Volume I: Draft
Environmental Impact Report/
Environmental Impact Statement

# East Bay Municipal Utility District Supplemental Water Supply Project

***Lead Agencies:***

EAST BAY
MUNICIPAL UTILITY DISTRICT

and

**U.S. Bureau of Reclamation**

***Environmental Consultant:***

Jones & Stokes Associates, Inc.
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DRAFT

Environmental Impact Report/Environmental Impact Statement

Supplemental Water Supply Project and Water Service Contract Amendment
between the U.S. Bureau of Reclamation
and the East Bay Municipal Utility District

The U.S. Department of Interior, Bureau of Reclamation (Reclamation) and the East Bay Municipal Utility District (EBMUD) have prepared this joint environmental impact report/environmental impact statement (EIR/EIS) on the proposed Supplemental Water Supply Project and possible water service contract amendment for water from the American River Division of the Central Valley Project (CVP). EBMUD is the state lead agency and Reclamation is the federal lead agency for this EIR/EIS, pursuant to the California Environmental Quality Act and the National Environmental Policy Act, respectively.

EBMUD currently holds a contract with Reclamation, signed in 1970, for delivery of up to 150,000 acre-feet per year from the existing Folsom South Canal. The existing contract specifies a delivery location at an existing turnout structure near Grant Line Road in Sacramento County. EBMUD's project objectives are to obtain a supplemental water supply to assist in meeting its drought needs, reducing customer deficiencies during extended droughts, and providing system reliability and to allow EBMUD to make use of its existing contract with Reclamation for delivery of water from the American River. Two primary alternatives are under consideration, and alternate project configurations of each of these primary alternatives also are being considered.

The first alternative is an EBMUD-only project that involves deliveries from the American River via the Folsom South Canal to a new pipeline connection between the Folsom South Canal in south Sacramento County and EBMUD's Mokelumne Aqueducts in San Joaquin County. Alternate project configurations under consideration involve pipeline connections from the turnout location described above, which would not require an amendment of the existing water service contract, and from the terminus of the Folsom South Canal, which would require an amendment of the water service contract.

The second alternative involves a joint project between EBMUD, the City of Sacramento, and the County of Sacramento. Under this project alternative, water for EBMUD and the county would be delivered to a new intake location on the American River near its confluence with the Sacramento River. Water for the City would be diverted under existing entitlements through an expansion of existing diversion and treatment facilities on the American and Sacramento rivers. A new pipeline would be constructed to convey the water to the City's E. A. Fairbairn Water Treatment Plant and to a point on the Folsom South Canal. Water for EBMUD would then be conveyed through the Folsom South Canal to its terminus, where a new pipeline would be constructed to convey the water to EBMUD's Mokelumne Aqueduct.

This EIR/EIS describes the environmental effects of taking delivery of water under EBMUD's contract from the Folsom South Canal and from the lower American River near its confluence with the Sacramento River. Emphasis is directed toward potential effects related to American River fisheries, endangered species, CVP water users, pipeline construction, and biological resources in the EBMUD service area. The EIR/EIS also fulfills the requirements of Executive Order 11988 (Floodplain Management), 11990 (Protection of Wetlands), and 12898 (Environmental Justice).

For further information on this EIR/EIS, contact Mr. Kurt Ladensack, Water Supply Improvements Division, EBMUD, P.O. Box 24055, Oakland, CA 94623, telephone (510) 287-1197, or Mr. Cecil Lesley, Contract Specialist, U.S. Bureau of Reclamation, Central California Area Office, 7794 Folsom Dam Road, Folsom, CA 95630, telephone (916) 989-7221.

Comments on the EIR/EIS must be provided by _____.

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# Summary



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# Summary

## BACKGROUND

The East Bay Municipal Utility District (EBMUD) holds a water service contract with the U.S. Bureau of Reclamation (Reclamation), which administers the Central Valley Project (CVP), for delivery of up to 150,000 acre-feet of American River water annually from the Folsom South Canal (FSC). EBMUD is proposing the Supplemental Water Supply Project to take delivery of its American River entitlement in order to decrease existing and future customer deficiencies during droughts and to enhance the reliability of the East Bay's water supply.

Currently, EBMUD obtains nearly all of its water from the Mokelumne River system. For a variety of reasons, additional demands are being placed on the Mokelumne River system, including increased demands for agricultural and urban use and for environmental resources. EBMUD has determined that the American River is the best quality supplemental source available. Connecting to it is also significantly less expensive and results in greater public health reliability than building new water treatment plants to treat lower quality water that might be obtained from other sources. EBMUD has been paying for water under the contract since shortly following the signing of the water service contract with Reclamation in 1970, although only small quantities of water have ever been delivered under the contract.

Since signing the contract, EBMUD has pursued obtaining supplemental water supplies from the American River. In 1972, the Environmental Defense Fund challenged EBMUD's contract with Reclamation in a lawsuit that was later joined by the County of Sacramento. The lawsuit alleged that delivery of the water from the FSC would be an "unreasonable" use of American River water. In June 1988, the California State Water Resources Control Board adopted findings that EBMUD's contract is a reasonable use of American River water (California State Water Resources Control Board 1988). On June 2, 1990, after a lengthy trial, Alameda County Superior Court Judge Richard Hodge affirmed those contractual rights, subject to a set of specific conditions known as the "Hodge Decision." In the 20 years between the initial signing of the American River contract with Reclamation and Judge Hodge's decision, the case went from superior court to the district court of appeal, twice to the California Supreme Court, once to the U.S. Supreme Court, and back to the superior court for a full trial.

Current negotiations including EBMUD and Sacramento-area interests could facilitate use of the American River by both regions. Public agencies from both areas are now involved in a cooperative effort, known as the Water Forum, designed to explore acceptable project alternatives that could bring additional high-quality water to the East Bay, Sacramento County, the City of Sacramento, and entities in Placer and El Dorado counties. The common goal is to provide a safe, reliable water supply for the entire region while preserving fishery, wildlife, recreational, and aesthetic values along the 23-mile stretch of the lower American River.

EBMUD is considering proceeding with an American River project under either of two alternatives. Its contractual delivery point from the FSC, which originates at Nimbus Dam (Lake Natoma), would provide higher quality water, but would be subject to court-ordered flows that would allow less water to be delivered to EBMUD in dry years. A joint Sacramento project proposal would guarantee water even in the driest years and still maintain high-quality water from an American River delivery point farther downstream. Because these alternatives would constitute a project that may result in significant environmental impacts as defined under the California Environmental Quality Act (CEQA), EBMUD must prepare an environmental impact report (EIR) to describe the project and its potential impacts on the



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environment. Because certain of the alternatives under consideration would require Reclamation to amend its water service contract with EBMUD, an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA) also must be prepared. This joint EIR/EIS for the Supplemental Water Supply Project has been prepared to satisfy the requirements of both acts.

## PROJECT OBJECTIVES

The objective of the project is to allow EBMUD to make use of its water service contract with Reclamation for delivery of American River water, consistent with the conditions set forth in the Hodge Decision, so as to achieve all of the following:

- maintain the high quality of EBMUD's raw and treated water supply;
- increase system reliability by providing an alternate source of supply to EBMUD's Mokelumne River supply in case of a catastrophic event or scheduled major maintenance at Pardee Dam or Reservoir;
- provide increased operational flexibility;
- reduce customer deficiencies;
- increase opportunities for protection and enhancement of Mokelumne River resources; and
- contribute to achieving EBMUD's planning objectives established as part of the Updated Water Supply Management Program.

**EBMUD Planning Objectives**

- Provide adequate capacity, flexibility, and reliability to respond to the problems and challenges of maintaining the EBMUD water supply.
- Minimize total direct costs to EBMUD customers.
- Maintain the high quality of the water supply. This includes taking steps to ensure that EBMUD's potable water will meet all existing and anticipated drinking water standards and that EBMUD's nonpotable water is of quality suitable to its use.
- Protect and improve the biological resources that could be affected by existing EBMUD facilities or by the Updated WSMP.
- Maintain outdoor recreation opportunities.
- Minimize risks to public health and safety.
- Minimize adverse sociocultural impacts.

Source: EDAW 1993.

## PURPOSE AND NEED

### Purpose

The purpose of the Supplemental Water Supply Project is to provide EBMUD with a supplemental water supply to reduce existing and future customer deficiencies to manageable levels during drought conditions, and to provide an alternative water supply in case of planned or unplanned outages at EBMUD's Mokelumne River diversion facilities, consistent with the project objectives described above.

### Need

EBMUD needs a supplemental water source because existing water supplies are insufficient to meet existing and future customer needs in droughts despite implementation of significant water conservation and water reclamation programs and an aggressive dry-year customer



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deficiency policy. Also, EBMUD needs an alternative water source to enable Pardee Dam and Reservoir to be taken off line for major maintenance and to provide an alternate water source in case of a catastrophic event.

## History

When the original EBMUD system was planned in the early 1920s, rights were acquired to 200 million gallons per day of water from the Mokelumne River. Pardee Dam was built to store that water during high river flows from spring snow runoff and rains. After World War II, the East Bay population grew rapidly, and EBMUD was granted another 125 million gallons per day of Mokelumne River water. By the early 1960s, EBMUD planners were predicting more shortages as growth continued in the East Bay.

Completion of Camanche Reservoir below Pardee Reservoir in 1964 provided some relief by giving EBMUD more ways to regulate Mokelumne River flows. Camanche's 417,000 acre-foot capacity is used to meet agriculture and fishery needs on the lower Mokelumne River, provide flood control, and allow EBMUD to hold a larger supply of high-quality water in Pardee Reservoir. Briones Reservoir north of Orinda, completed in 1964, provides another 60,000 acre-feet of backup water supplies in the East Bay.

Since then, no new water supply or storage has been added to the EBMUD system, and the population within EBMUD has grown by nearly 250,000 people. Despite successful water conservation and reclamation programs, EBMUD's Mokelumne River supply is no longer sufficient to provide reliable water supplies during a severe drought without resulting in substantial economic impacts on its customers. Because EBMUD has already undertaken extensive conservation measures, it is more difficult to achieve additional water savings during droughts.

At the same time, demands on the Mokelumne River have increased. In 1996, EBMUD, in consultation with state and federal resources agencies, agreed to increase releases from Camanche Reservoir to provide higher flows for fish in the lower Mokelumne River and to contribute 20% (up to 20,000 acre-feet) of any actual yield from new water projects to Mokelumne River fishery flows.

Most of EBMUD's increased water needs projected over the next 20 years are for increased flows for senior water rights holders and for resource protection in the Mokelumne River and the San Francisco Bay/Sacramento–San Joaquin River Delta. Needs of new residential, business, and industrial customers would be almost entirely offset in normal years by conservation and water reclamation projects.

Besides obtaining more water, EBMUD must maintain a high-quality water source to meet customer expectations and, like other agencies throughout the state and nation, must also meet increasingly stringent drinking water standards set by the U.S. Environmental Protection Agency and the California Department of Health Services. All agree that the highest quality water source provides the safest end product.

California drinking water quality laws and regulations set a tougher standard than federal law. The trend over the past decade has been for every utility to strive to serve the highest possible quality of water. Both the 1988 California State Water Resources Control Board decision and Judge Hodge's 1990 ruling cited drinking water quality as a priority. "This court is satisfied that the health risk concerns of EBMUD are well-founded," said Judge Hodge in his decision affirming EBMUD's right to use American River water.

Besides needing a supplemental water supply to reduce deficiencies during an extended drought, EBMUD also needs an alternative water supply in case of a catastrophic



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event or major maintenance at Pardee Reservoir. Currently, EBMUD is entirely dependent on the Mokelumne River system to meet almost all of its customer needs. As noted above, Pardee Dam was built in the 1920s and if it is damaged, such as in a natural disaster, or if major scheduled repair or maintenance is required, most of EBMUD's water supply could be temporarily interrupted. EBMUD would then be required to obtain its full needed supply from the terminal storage reservoirs within its service area. The amount of water available within these reservoirs is limited. Under current conditions, if the terminal reservoirs could not provide an adequate supply to meet customer demand until Pardee Reservoir and Dam and EBMUD's delivery facilities resumed operation, no other source of water would be available to EBMUD and its customers could experience severe shortages in supply. Use of terminal reservoir supplies could also substantially reduce how much storage is available for use during subsequent dry seasons. Provision of a supplemental water supply not dependent on operation of Pardee facilities would reduce this risk of diminished supplies during emergencies or other facility shutdowns.

## PUBLIC AND AGENCY INVOLVEMENT

EBMUD published a Notice of Preparation and Initial Study in January 1996 describing its initial Folsom South Canal Connection Project. Scoping meetings were held in February 1996 at several locations to solicit public and agency input and comment. A revised Notice of Preparation/Notice of Intent was published by EBMUD and Reclamation in April 1997. This revised notice described an additional alternative involving a joint project with Sacramento area water agencies that was not considered in the earlier notice. Scoping meetings were held in April and May 1997 to gather public input on both the earlier and the new proposal. Additionally, EBMUD conducted many individual and small group meetings with affected agencies and landowners to inform them of the progress of the project and obtain feedback. A summary of comments received during scoping meetings and copies of correspondence received are included in Appendix A to the EIR/EIS.

## APPROACH TO ALTERNATIVES DEVELOPMENT

CEQA and NEPA require that EIRs and EISs describe and evaluate reasonable alternatives to a proposed action, and both must describe a Alternative 1 that assumes that the proposed action and alternatives would not be implemented. To comply with these regulations, EBMUD has prepared an alternatives screening report (Appendix B) to evaluate a range of alternatives and to identify the most promising alternatives for detailed study.

## ALTERNATIVES CONSIDERED IN DETAIL IN THE EIR/EIS

EBMUD, Reclamation, the County of Sacramento, and the City of Sacramento have undertaken considerable work in formulating the alternatives evaluated in this EIR/EIS. Cost and engineering factors, water quality and reliability objectives, institutional considerations, and many environmental factors have had substantial influence in shaping the alternatives summarized below.

### Alternative 1: No Action

The discussion of Alternative 1 assesses future conditions within the CVP system and EBMUD service area as they are projected to be at buildout of the EBMUD ultimate service boundary (USB). Growth within the EBMUD service area would continue under this alternative, resulting in potential effects on biological resources and the human environment. Addressing this scenario allows a complete comparison of the impacts of an EBMUD project at the time EBMUD would be making use of its contractual water supply.



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## Alternative 2: Folsom South Canal Connection

Under Alternative 2, EBMUD would construct a new delivery facility connecting to the existing FSC to take delivery of its contractual supply through the canal. New pumping plants and a new pipeline would be constructed to connect the FSC to the existing Mokelumne Aqueducts. Water would be available to EBMUD only during those times when flows dictated in the Hodge Decision for the lower American River were being met. EBMUD would generally take delivery of American River water whenever it was available, consistent with the Hodge Decision, and whenever storage existed in EBMUD's existing system.

EBMUD has addressed four possible configurations of Alternative 2. These configurations are similar in concept and are differentiated by alternate pipeline alignments and pumping plant locations. Common facilities of all configurations include:

- a new pumping plant on the FSC to take delivery of American River water from the canal;
- a new 96-inch pipeline from the FSC to the Mokelumne Aqueducts;
- a new pumping plant at the Mokelumne Aqueducts to deliver the American River water into the aqueducts;
- a 3-million-gallon reservoir (tank) at the aqueduct pumping plant to provide operational flexibility; and
- improvements to EBMUD's in-line water treatment facilities.

Figure S-1 shows the alternate configurations under consideration.

## Alternative 3: Joint Water Supply

Alternative 3 is a mutually acceptable proposal developed by EBMUD, the City of Sacramento, and the County of Sacramento, in conjunction with the Sacramento-area Water Forum process. Some facilities are shared by these joint project participants. A new delivery facility would be constructed on the lower American River near its confluence with the Sacramento River and upstream of the Interstate 5 (I-5) bridge across the American River. A new pipeline would be constructed from this new delivery facility to a point near the City of Sacramento's E. A. Fairbairn Water Treatment Plant (WTP) and from that point to the FSC. Water for EBMUD would then be placed in the FSC and would be drawn from the FSC at its terminus into a new pipeline connection to the Mokelumne Aqueducts (Figure S-2). This connection would include features similar to those described above for Alternative 2. Water for the County would also be delivered at the new intake facility and pumped back to the Fairbairn WTP for treatment and distribution to the County's service area. Alternative 3 would also involve expansion of the existing delivery and treatment capacity at Fairbairn WTP by 100 million gallons per day and the Sacramento River WTP by 50 million gallons per day to provide increased capacity to the City to meet its future water supply needs.

Besides meeting EBMUD's project objectives, Alternative 3 would contribute to meeting the objectives of the City and County in providing a safe reliable water supply for the City and the County.

## PREFERRED ALTERNATIVE

No preferred alternative has been identified. The environmental review process will be helpful to EBMUD, the County, the City, and Reclamation in determining the tradeoffs between the alternatives and in identifying the preferred alternative.



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## ENVIRONMENTALLY SUPERIOR ALTERNATIVE

Neither action alternative is clearly environmentally superior. Because of the nature of the alternatives, there are substantial tradeoffs to be assessed; however, few significant unavoidable environmental impacts would result from implementation of either action alternative.

## SUMMARY OF ENVIRONMENTAL IMPACTS AND AVAILABLE MITIGATION MEASURES

Tables S-1, S-2, S-3, and S-4 summarize the environmental impacts of the Supplemental Water Supply Project alternatives. The tables are organized to present impacts by environmental topic area and to indicate the significance of each impact, available mitigation measures, and the significance of each impact if mitigation is implemented.

EBMUD and Reclamation have incorporated certain mitigation measures into the project description as environmental commitments. These commitments include preparation and implementation of the following:

- erosion and sediment control plan
- stormwater pollution prevention plan
- traffic control plan
- dust suppression plan
- fire control plan
- Phase I and Phase II hazardous materials studies
- hazardous materials management plan
- channel and levee restoration plan
- hydrologic simulation modeling and scour analysis
- agricultural land restoration
- spoils disposal plan
- environmental training
- access point/staging areas plan
- trench safety plan
- project planning, coordination, and communication plan

## AREAS OF CONTROVERSY

Primary areas of controversy include:

- potential effects of the alternatives on American River water temperatures and related effects on steelhead trout and chinook salmon;
- potential visual effects of a new intake structure in the lower American River under Alternative 3;
- disruption in urban areas during construction of the project, particularly under Alternative 3; and
- potential growth effects within EBMUD, County, and City service areas.



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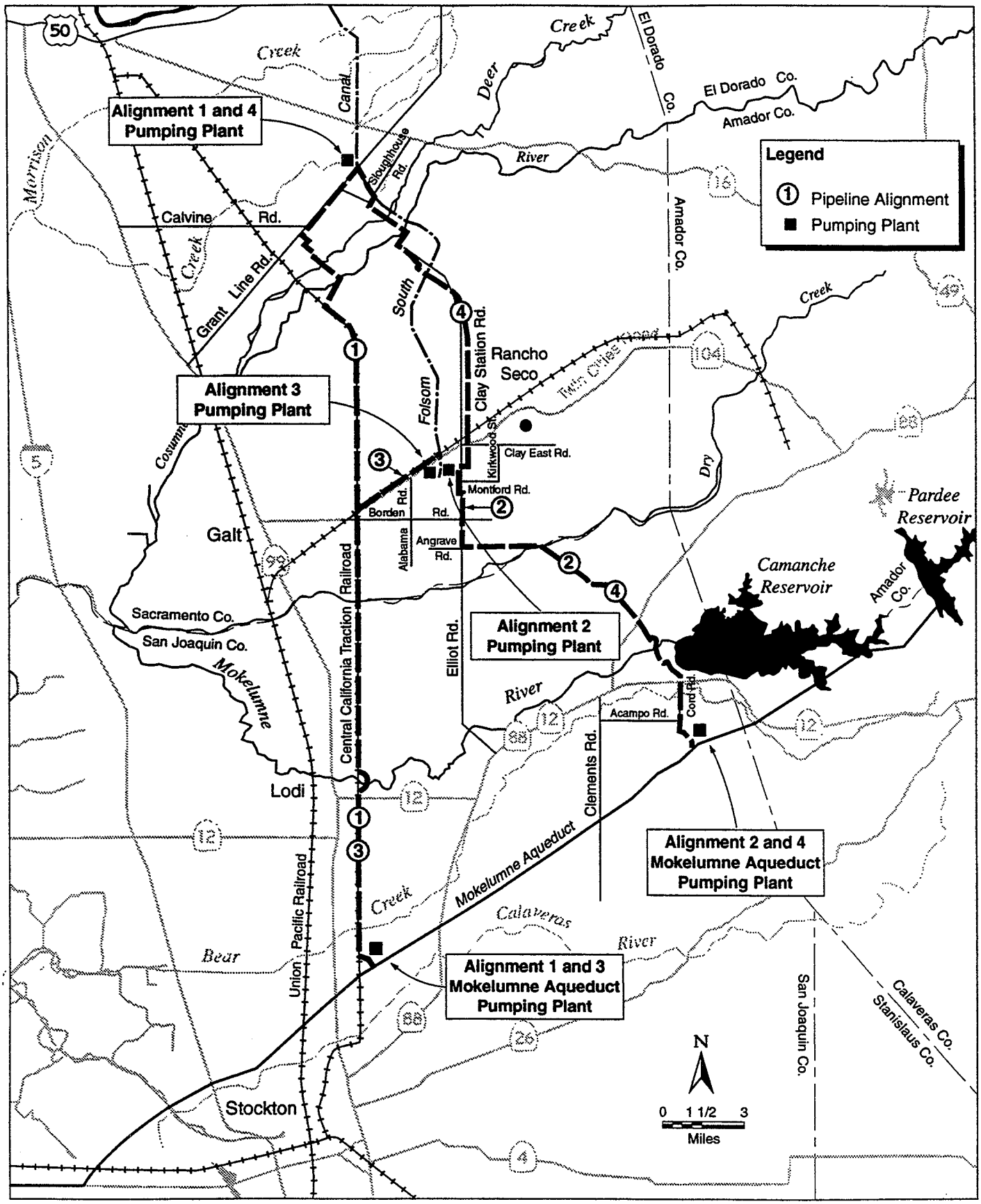


Jones & Stokes Associates, Inc.

**Figure S-1**
**Alternative 2: Folsom South Canal Connection**

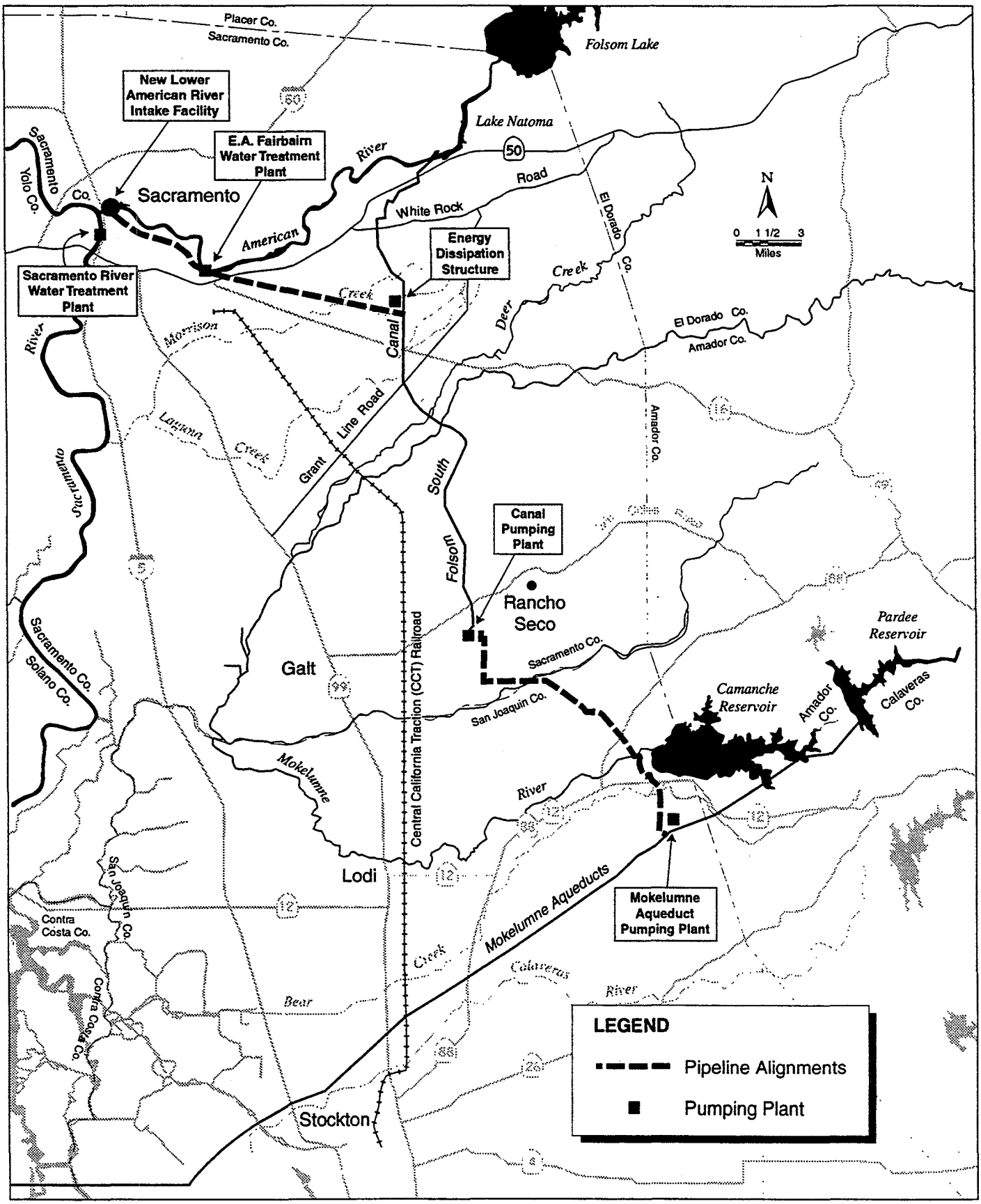


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**Figure S-2**
**Alternative 3: Joint Water Supply**

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Table S-1. Summary of Significant Impacts and Mitigation Measures for the Supplemental Water Supply Project

| Resource Topic/Impact | Applicable Alternative | Mitigation Measure | Level of Significance after Mitigation |
|---|---|---|---|
| **VEGETATION AND WETLAND RESOURCES** | | | |
| Temporary disturbance to or potential loss of sensitive vegetation and wetland resources near active construction areas | Alternative 2 | 7-1a: Confine construction activities and equipment to the designated construction work areas<br><br>7-1b: Avoid and protect sensitive vegetation and wetland resources near designated construction work areas<br><br>7-1c: Reestablish preconstruction site conditions to allow natural colonization of plant species and reseed, if necessary | LS |
| Degradation of oak woodlands and loss of individual locally protected trees | Alternative 2<br>Alignment 1: 1 ac<br>Alignment 2: 11 ac<br>Alignment 3: <1 ac<br>Alignment 4: 11 ac<br>Alternative 3: 11 ac | 7-2a: Identify and avoid oak woodlands and individual locally protected trees<br><br>7-2b: Obtain and comply with county tree removal permits and implement conditions of permits | LS |
| Loss of or disturbance to riparian woodland communities | Alternative 2<br>Alignment 1: 4 ac<br>Alignment 2: 1 ac<br>Alignment 3: <1 ac<br>Alignment 4: 5 ac<br>Alternative 3: 2 ac | 7-3a: Establish a protection buffer around woody riparian communities<br><br>7-3b: Compensate for unavoidable riparian woodland losses | LS |



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| Resource Topic/Impact | Applicable Alternative | Mitigation Measure | Level of Significance after Mitigation |
|---|---|---|---|
| Loss of or disturbance to jurisdictional waters of the United States, including wetlands | Alternative 2<br>Alignment 1: 17 ac<br>Alignment 2: <6 ac<br>Alignment 3: 11 ac<br>Alignment 4: 10 ac<br>Alternative 3: 12 ac | 7-4a: Avoid and minimize impacts on jurisdictional waters of the United States, including wetlands, by installing protective barriers and implementing best management practices<br><br>7-4b: Obtain and comply with state and federal wetland permits<br><br>7-4c: Compensate for unavoidable impacts on jurisdictional waters of the United States | LS |
| Loss of or disturbance to jurisdictional waters of the United States at the intake structure | Alternative 3 | Implement mitigation measures 7-4a and 7-5b | LS |
| Potential loss of special-status plant populations or habitat | Alternatives 2 and 3 | 7-5a: Conduct preconstruction surveys in areas not previously inventoried<br><br>7-5b: Avoid known special-status plant populations during project design<br><br>7-5c: Compensate for impacts on special-status plant populations | LS |
| **WILDLIFE** | | | |
| Loss of or disturbance to active raptor nests and tricolored blackbird nests | Alternatives 2 and 3 | 8-1: Conduct surveys for nesting raptors and tricolored blackbirds | LS |
| Disturbance to nesting Swainson's hawks | Alternatives 2 and 3 | 8-2: Consult with California Department of Fish and Game (DFG) and follow mitigation guidelines to avoid disturbance to nesting Swainson's hawks | LS |
| Loss of or disturbance to nesting western burrowing owls | Alternatives 2 and 3 | 8-3: Consult with DFG and follow DFG's burrowing owl mitigation guidelines | LS |



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| Resource Topic/Impact | Applicable Alternative | Mitigation Measure | Level of Significance after Mitigation |
|---|---|---|---|
| Loss of potential habitat for vernal pool fairy shrimp, vernal pool tadpole shrimp, and mid-valley fairy shrimp | Alternatives 2 and 3 | 8-4: Conduct surveys and and implement a mitigation plan for vernal pool fairy shrimp and vernal pool tadpole shrimp | LS |
| Loss of potential habitat for western spadefoot toad and California tiger salamander | Alternatives 2 and 3 | 8-5: Conduct preconstruction surveys and mitigate for the loss of western spadefoot toad or California tiger salamander habitat, if these species are present | LS |
| Potential mortality of or disturbance to the valley elderberry longhorn beetle during construction | Alternatives 2 and 3 | 8-6: Conduct preconstruction surveys for valley elderberry longhorn beetle and avoid or compensate for loss of habitat | LS |
| Potential loss of habitat for Sacramento anthicid beetle and Sacramento valley tiger beetle | Alternatives 2 and 3 | Implement mitigation measures 7-3a and 7-3b | LS |
| Loss of or temporary disturbance to Yuma myotis and northwestern pond turtle habitat | Alternatives 2 and 3 | Implement mitigation measures 7-3a and 7-3b | LS |
| **TRANSPORTATION AND CIRCULATION** | | | |
| Elimination of rail service | Alternative 2, Alignments 1 and 3 | No mitigation is available | S |
| **AIR QUALITY** | | | |
| Short-term increases in reactive organic gases (ROG), oxides of nitrogen ($NO_x$), and particulate matter (PM10) emissions during construction | Alternatives 2 and 3 | 13-1: Incorporate ROG and $NO_x$ emission-reducing measures into pipeline and pump station construction plans | LS |
| | | No mitigation is available for PM10 emissions in Sacramento County | S |
| **VISUAL RESOURCES** | | | |
| Changes in visual resources at the American River intake structure site | Alternative 3; Intake Alternatives 1, 2, and 3 | None available | S |



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| Resource Topic/Impact | Applicable Alternative | Mitigation Measure | Level of Significance after Mitigation |
|---|---|---|---|
| **CULTURAL RESOURCES** | | | |
| Disturbance to known cultural resources | Alternative 2<br>Alignment 1: 5 sites<br>Alignment 2: 6 sites<br>Alignment 3: 5 sites<br>Alignment 4: 7 sites<br>Alternative 3: 10 sites | 17-1: Prepare and implement a cultural resources significance evaluation, effects analysis, and mitigation plan for known cultural resources | LS |
| Disturbance of unidentified cultural resources | Alternatives 2 and 3 | 17-2: Prepare and implement a cultural resources inventory, significance evaluation, effects analysis, and mitigation plan for unidentified cultural resources<br><br>17-3: Prepare and implement a plan for the unanticipated discovery of cultural resources | LS |

S = significant.
LS = less than significant.



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Table S-2. Summary of Impacts Evaluated and Determined to Be Less Than Significant for the Supplemental Water Supply Project

| Resource Topic/Impact | Applicable Alternative | Mitigation Measure |
|---|---|---|
| **WATER QUALITY** | | |
| Discharge of pollutants in stormwater from construction of project facilities | Alternatives 2 and 3 | Not required |
| Discharge of sediment during construction of the lower American River intake structure | Alternative 3 | Not required |
| Increased frequency or duration of taste and odor events in EBMUD terminal reservoirs | Alternatives 2 and 3 | Not required |
| Impairment of Delta export water quality | Alternatives 2 and 3 | Not required |
| **FISHERIES** | | |
| Short-term loss of fish habitat near the lower American River intake structure | Alternative 3 | Not required |
| Loss of fish in the fish exclusion facility | Alternative 3 | Not required |
| Loss of warmwater fish habitat in Folsom Reservoir | Alternatives 2 and 3 | Not required |
| Loss of coldwater fish habitat at Folsom Reservoir | Alternatives 2 and 3 | Not required |
| Reduced fish habitat in the lower American River as a result of reduced flows | Alternative 2 | Not required |
| Reduction in suitable habitat as a result of increased water temperature in the lower American River | Alternatives 2 and 3 | Not required |
| Potential reduction in Delta habitat | Alternatives 2 and 3 | Not required |
| Potential reduction in fish habitat in Shasta and Trinity lakes | Alternatives 2 and 3 | Not required |
| Potential reduction in habitat in the upper and lower Sacramento River as a result of reduced flows | Alternatives 2 and 3 | Not required |
| Disturbance of habitat in the Cosumens River | Alternative 2 | Not required |
| Deliveries to meet EBMUD's planned outage needs | Alternatives 2 and 3 | Not required |
| **RECREATION** | | |
| Change in water-dependent and water-enhanced recreation opportunities at Folsom Reservoir | Alternatives 2 and 3 | Not required |
| Change in water-dependent recreation opportunities in the lower American River | Alternatives 2 and 3 | Not required |



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| Resource Topic/Impact | Applicable Alternative | Mitigation Measure |
|---|---|---|
| Change in recreation opportunities at Camanche and Pardee reservoirs | Alternatives 2 and 3 | Not required |
| Change in recreation opportunities on the lower Mokelumne River | Alternatives 2 and 3 | Not required |
| Change in water-dependent and water-enhanced recreation opportunities at Shasta Lake, Trinity Lake, and the Sacramento River | Alternatives 2 and 3 | Not required |
| Disruption of recreation opportunities on the lower American River associated with construction and operation of the Intake Alternatives 1 through 5 | Alternative 3 | Not required |
| **VEGETATION AND WETLAND RESOURCES** | | |
| Temporary disturbance to and permanent loss of developed areas, agricultural land, eucalyptus stands, artificially created roadside drainage ditches, and annual grassland habitat within the construction corridor | Alternatives 2 and 3 | Not required |
| Change in acreage or condition of willow scrub riparian; riparian woodland; or interior live oak woodland in and around Folsom, Camanche, and Pardee reservoirs and the lower American and Mokelumne rivers | Alternatives 2 and 3 | Not required |
| **WILDLIFE** | | |
| Loss of developed land, individual trees, and ornamental vegetation for wildlife habitat | Alternatives 2 and 3 | Not required |
| Temporary loss of Swainson's hawk foraging habitat | Alternatives 2 and 3 | Not required |
| Temporary loss of San Joaquin pocket mouse habitat | Alternatives 2 and 3 | Not required |
| **GEOLOGY, SOILS, SEISMICITY, AND GROUNDWATER** | | |
| Potential for increased flooding during and after construction | Alternatives 2 and 3 | Not required |
| Potential for localized accelerated erosion, siltation, and unstable soils during and after construction | Alternatives 2 and 3 | Not required |
| Potential for facility failure from seismic activity | Alternatives 2 and 3 | Not required |
| Potential for interference with groundwater recharge after construction | Alternative 2 | Not required |



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| Resource Topic/Impact | Applicable Alternative | Mitigation Measure |
|---|---|---|
| **LAND USE** | | |
| Residential and commercial land use conflicts | Alternatives 2 and 3 | Not required |
| Conversion of the CCT rail line to a water conveyance pipeline corridor | Alternative 2 | Not required |
| Potential conflicts with the KRC Aggregates gravel mining operation | Alternative 2 | Not required |
| Consistency with local plans and policies | Alternatives 2 and 3 | Not required |
| Conflicts with American River parkway use | Alternative 3 | Not required |
| Conflicts associated with expansions of service area WTPs | Alternative 3 | Not required |
| Conflicts associated with development of the Sacramento River WTP intake structure | Alternative 3 | Not required |
| Conflicts with proposed or planned projects in the City or County of Sacramento | Alternative 3 | Not required |
| Environmental justice effects | Alternative 3 | Not required |
| Conflict with Mather Airport operations | Alternative 3 | Not required |
| **AGRICULTURE** | | |
| Conversion and loss of prime farmland | Alternatives 2 and 3 | Not required |
| Loss of agricultural production | Alternatives 2 and 3 | Not required |
| Nonrenewal or termination of Williamson Act contracts | Alternatives 2 and 3 | Not required |
| **TRANSPORTATION AND CIRCULATION** | | |
| Alterations in circulation patterns and traffic delays | Alternatives 2 and 3 | Not required |
| Deterioration of roadway surfaces | Alternatives 2 and 3 | Not required |
| Increase in traffic | Alternatives 2 and 3 | Not required |
| Interference with emergency response routes | Alternatives 2 and 3 | Not required |
| Roadway safety hazards | Alternatives 2 and 3 | Not required |



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| Resource Topic/Impact | Applicable Alternative | Mitigation Measure |
|---|---|---|
| **NOISE** | | |
| Increase in noise levels from project operation | Alternative 2 | Not required |
| Short-term increase in noise levels from pipeline construction | Alternatives 2 amd 3 | Not required |
| Increased construction and operational noise at WTPs in EBMUD's service area | Alternatives 2 and 3 | Not required |
| Increase in noise levels from operation of the American River intake structure | Alternative 3 | Not required |
| Increase in noise levels from operation of Fairbairn and Sacramento River intake structures | Alternative 3 | Not required |
| Short-term increase in noise levels from intake construction | Alternative 3 | Not required |
| Minimal increase in noise levels from Fairbairn WTP pumping plant or Folsom Boulevard Bypass pumping plant operation | Alternative 3 | Not required |
| Short-term increase in noise levels from Fairbairn WTP construction | Alternative 3 | Not required |
| Increase in noise levels from operation of open energy dissipation structure at the FSC connection | Alternative 3 | Not required |
| Construction and operational noise from Alignment 2 | Alternative 3 | Not required |
| **PUBLIC HEALTH AND SAFETY** | | |
| Exposure of people to existing contamination | Alternatives 2 and 3 | Not required |
| Contamination of soil and water during construction | Alternatives 2 and 3 | Not required |
| Increased risk for fires during construction | Alternatives 2 and 3 | Not required |
| Potential for contamination at chemical conditions facilities | Alternative 3 | Not required |
| **VISUAL RESOURCES** | | |
| Changes in visual resources at FSC and Mokelumne Aqueduct pumping plants | Alternative 2 | Not required |
| Changes in pipeline corridor visual resources | Alternative 2 | Not required |
| Changes in views along transmission line alignments | Alternative 2 | Not required |
| Changes in visual resources from changes in American River flows | Alternatives 2 and 3 | Not required |



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| Resource Topic/Impact | Applicable Alternative | Mitigation Measure |
|---|---|---|
| Change in visual resources at WTPs in EBMUD's service area | Alternatives 2 and 3 | Not required |
| Change in visual resources at the sites of American River Intake Alternatives 4 and 5 | Alternative 3;<br>Intake Alternatives 4 and 5 | Not required |
| Changes in visual resources of the pipeline corridor and Fairbairn WTP | Alternative 3 | Not required |
| Effect on heritage trees along C Street | Alternative 3 | Not required |
| Change in views to the Fairbairn intake structure | Alternative 3 | Not required |
| Change in views to the Sacramento River WTP and intake structure | Alternative 3 | Not required |
| **CULTURAL RESOURCES** | | |
| Disturbance to cultural resources within Folsom Reservoir | Alternatives 2 and 3 | Not required |



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| Table S-3. Summary of Significant Cumulative Impacts and Mitigation Measures for the Supplemental Water Supply Project | | |
|---|---|---|
| Resource Topic/Impact | Applicable Cumulative Scenario | Mitigation Measure |
| **FISHERIES** | | |
| Reduction in coldwater reservoir fish habitat in Folsom Reservoir during April–October | Cumulative Scenarios 2 and 3 | Contribute to ongoing regional fishery management efforts by Reclamation, Sacramento-area Water Forum, SWRCB, and Sacramento County |
| Impacts on juvenile steelhead during emigration downstream of the Fairbairn WTP in the American River as a result of reduced flows | Cumulative Scenario 2 | Contribute to ongoing regional fishery management efforts by Reclamation, Sacramento-area Water Forum, SWRCB, and Sacramento County |
| Impacts on American shad spawning and migration in the American River as a result of reduced flows | Cumulative Scenarios 2 and 3 | Contribute to ongoing regional fishery management efforts by Reclamation, Sacramento-area Water Forum, SWRCB, and Sacramento County |
| Effects of increased temperatures on juvenile steelhead and chinook salmon in the American river as a result of reduced flows | Cumulative Scenarios 2 and 3 | Contribute to ongoing regional fishery management efforts by Reclamation, Sacramento-area Water Forum, SWRCB, and Sacramento County |
| Reduction in habitat for warmwater fish species in Trinity Lake | Cumulative Scenarios 2 and 3 | Contribute to ongoing regional fishery management efforts by Reclamation, Sacramento-area Water Forum, SWRCB, and Sacramento County |
| Reduction in habitat for coldwater fish species in Shasta and Trinity lakes during April–October | Cumulative Scenarios 2 and 3 | Contribute to ongoing regional fishery management efforts by Reclamation, Sacramento-area Water Forum, SWRCB, and Sacramento County |
| **RECREATION** | | |
| Change in water-dependent (i.e., boating and swimming) recreation opportunities in the lower American River | Cumulative Scenarios 2 and 3 | None available |
| Change in boating-related recreation opportunities at Trinity Lake | Cumulative Scenarios 2 and 3 | None available |



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| Resource Topic/Impact | Applicable Cumulative Scenario | Mitigation Measure |
|---|---|---|
| **VEGETATION, WETLANDS, AND WILDLIFE** | | |
| Effects of general growth and other local projects in combination with the Supplemental Water Supply Project on identified sensitive resources, including wetlands, riparian woodlands, and habitats for sensitive wildlife species | Cumulative Scenarios 2 and 3 | Implement all mitigation measures described in Chapter 7, "Vegetation and Wetland Resources," and Chapter 8, "Wildlife" |
| **AGRICULTURAL RESOURCES** | | |
| Effects of general growth and other local projects in combination with the Supplemental Water Supply Project on loss of prime agricultural lands | Cumulative Scenarios 2 and 3 | None available |
| **CULTURAL RESOURCES** | | |
| Potential effects of general growth and other local projects in combination with the Supplemental Water Supply Project on undiscovered cultural resources | Cumulative Scenarios 2 and 3 | Implement all mitigation measures described in Chapter 17, "Cultural Resources" |

Note: A description of reasonably foreseeable programmatic actions is included in Chapter 18, "Cumulative and Growth-Related Effects," as part of the qualitative cumulative impact analysis.



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| Table S-4. Summary of Cumulative Impacts Evaluated and Determined to be Less than Significant for the Supplemental Water Supply Project | | |
|---|---|---|
| Resource Topic/Impact | Applicable Cumulative Scenario | Mitigation Measure |
| **WATER QUALITY** | | |
| Impairment of Delta export water quality | Cumulative Scenarios 2 and 3 | Not required |
| **FISHERIES** | | |
| Impacts on warmwater reservoir fish habitat in Folsom Reservoir | Cumulative Scenarios 2 and 3 | Not required |
| Impacts on chinook salmon and steelhead upstream mitigation in the American River as a result of reduced flows | Cumulative Scenarios 2 and 3 | Not required |
| Impacts on chinook salmon during rearing and emigration in the American River as a result of reduced flows | Cumulative Scenario 2 | Not required |
| Reduction in habitat for warmwater fish species in Shasta Lake | Cumulative Scenarios 2 and 3 | Not required |
| **RECREATION** | | |
| Change in water-dependent and water-enhanced recreation opportunities at Folsom Reservoir | Cumulative Scenarios 2 and 3 | Not required |
| Change in boating-related recreation opportunities at Shasta Lake and the Sacramento River | Cumulative Scenarios 2 and 3 | Not required |
| **VEGETATION AND WETLAND RESOURCES** | | |
| Potential effects on riparian habitat as a result of flow changes in the lower American River | Cumulative Scenarios 2 and 3 | Not required |
| **VISUAL RESOURCES** | | |
| Potential effects on visual quality from changes in river flows in the lower American River | Cumulative Scenarios 2 and 3 | Not required |

Note: A description of reasonably foreseeable programmatic actions is included in Chapter 18, "Cumulative and Growth-Related Effects," as part of the qualitative cumulative impact analysis.



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Chapter 1

# Purpose of and Need for the Project

# Chapter 1. Purpose of and Need for the Supplemental Water Supply Project

## INTRODUCTION

The East Bay Municipal Utility District (EBMUD) obtains most of its water supply from Pardee Reservoir on the Mokelumne River, with the remainder collected from local runoff in its East Bay terminal reservoirs. The availability of this supply is limited by inflow into the reservoirs and by downstream flow obligations that require releases by EBMUD for flood control, fisheries, and other senior water rights holders. EBMUD's supply is most limited during dry periods, when runoff amounts are insufficient to meet user demand and the water supply must be drawn from reservoir storage. Projected increases in downstream flow obligations and increases in customer demand are anticipated to substantially burden EBMUD's ability to provide a reliable water supply to its customers in coming years, especially during droughts or temporary outages of Pardee Reservoir facilities.

In 1993, EBMUD adopted the Updated Water Supply Management Program (Updated WSMP), which assessed EBMUD's water supply needs and challenges through 2020 (EDAW 1993). The Updated WSMP is made up of five major components (see the discussion under "Updated Water Supply Management Program" below), including aggressive water conservation, reclamation, and reuse programs and a supplemental water supply project. Since adoption of the Updated WSMP and subsequent Action Plan (also discussed below), EBMUD has successfully implemented extensive water conservation, reclamation, and reuse measures throughout its service area. These programs are assisting EBMUD in meeting growing customer demands; however, significant deficiencies are anticipated to occur during droughts. With strict conservation measures already in place during normal seasons, EBMUD's options for reducing deficiencies during extended dry periods are limited.

This document is a joint environmental impact report/environmental impact statement (EIR/EIS) that addresses the potential environmental effects of the Supplemental Water Supply Project. The project alternatives under consideration would require adoption by EBMUD and approvals from numerous other state and local agencies. Because the Supplemental Water Supply Project is being proposed by EBMUD, EBMUD will serve as lead agency under the California Environmental Quality Act (CEQA). EBMUD has requested an amendment to its existing Water Service Contract 14-06-200-5183A with the U.S. Bureau of Reclamation (Reclamation) to accommodate operation of certain of the alternatives, although EBMUD is also considering alternatives that would not require such an amendment. Because amendment of the water service contract is a federal action, Reclamation is serving as lead agency under the National Environmental Policy Act (NEPA).

Two project alternatives are analyzed in this EIR/EIS at an equal level of detail and compared to a no-action alternative (Alternative 1). Alternative 2 is an EBMUD-only project that involves deliveries from the American River at the Folsom South Canal (FSC) and conveyance through the canal to a new pipeline connection between the FSC and EBMUD's Mokelumne Aqueducts. Alternative 3 involves a joint project between EBMUD, the City of Sacramento, and the County of Sacramento. Under this project alternative, EBMUD and the County would take delivery of water from the American River near its confluence with the Sacramento River. The City would take delivery of water through an expansion of its existing delivery and treatment facilities on both the American and Sacramento rivers.

This EIR/EIS has been prepared in compliance with the requirements of CEQA



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(Pub. Res. Code 21000 et seq.), the State CEQA Guidelines (14 CFR Section 15000 et seq.), NEPA, the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR Parts 1500-1508), and Reclamation's NEPA Handbook.

## PURPOSE

The purpose of the Supplemental Water Supply Project is to provide EBMUD with a supplemental water supply to reduce existing and future customer deficiencies to manageable levels during drought conditions, and to provide an alternative water supply in case of planned or unplanned outages at EBMUD's Mokelumne River diversion facilities, consistent with the project objectives described in Chapter 2, "Project Objectives and Alternatives under Consideration."

## NEED

EBMUD needs a supplemental water source because existing water supplies are insufficient to meet existing and future customer needs in droughts despite implementation of significant water conservation and water reclamation programs and an aggressive dry-year customer deficiency policy. Also, EBMUD needs an alternative water source to enable Pardee Dam and Reservoir to be taken off line for major maintenance and to provide an alternate water source in case of a catastrophic event.

## BACKGROUND

EBMUD is a multipurpose, regional agency that serves as water purveyor to an estimated 1.2 million municipal and industrial water users throughout portions of Contra Costa and Alameda counties in the East Bay region of the San Francisco Bay Area (Figure 1-1). During nondrought years, EBMUD supplies its customers with a total annual average of about 220 million gallons per day (MGD) of water. Approximately 95% of this supply is Mokelumne River water collected in Pardee Reservoir. The remaining estimated 5% of the supply is local runoff collected in terminal storage reservoirs owned and operated by EBMUD in the EBMUD service area. Both sources are described in the greater detail below.

The Updated WSMP EIR (EDAW 1993), the EBMUD Board of Directors CEQA Findings on the Updated WSMP (East Bay Municipal Utility District 1993a), and EBMUD's Urban Water Management Plan (East Bay Municipal Utility District 1996b) are hereby incorporated by reference and are available for inspection at EBMUD's headquarters in Oakland, California. Relevant aspects of each of these documents are described below and throughout this EIR/EIS.

### EBMUD's Mokelumne River Water Supply

EBMUD has water rights to divert a maximum of 325 MGD of water from the Mokelumne River for delivery to its service area. This water supply is impounded in Pardee Reservoir (197,950 acre-feet [AF]) from runoff collected from the Mokelumne River watershed, which encompasses 575 square miles of the western slope of the Sierra Nevada in Alpine, Amador, and Calaveras counties. From Pardee Reservoir, the water is diverted to the Mokelumne Aqueducts, which consist of three separate pipelines extending approximately 90 miles from Pardee Reservoir to the EBMUD service area (Figure 1-2). The system can operate under gravity flow at up to 200 MGD. Through operation of the Walnut Creek Pumping Plant, aqueduct capacity can be increased to 326 MGD.

EBMUD uses Camanche Reservoir (417,120 AF) downstream of Pardee Dam to impound Mokelumne River water and manage releases for regulation of downstream flows. EBMUD's ability to use its maximum Mokelumne River entitlement of 325 MGD is limited by river hydrology and a variety of downstream flow obligations, including releases



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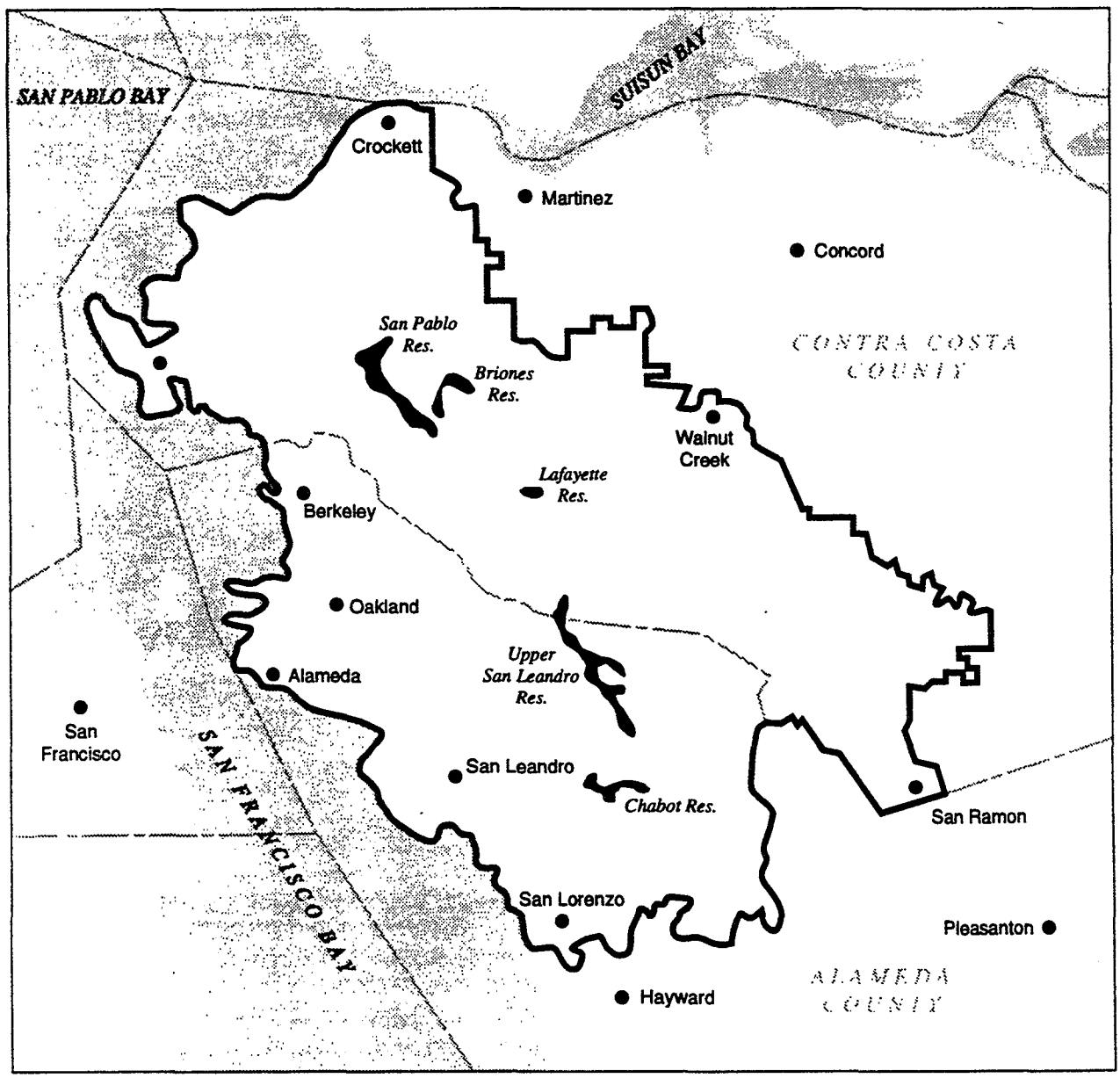


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0 5 10

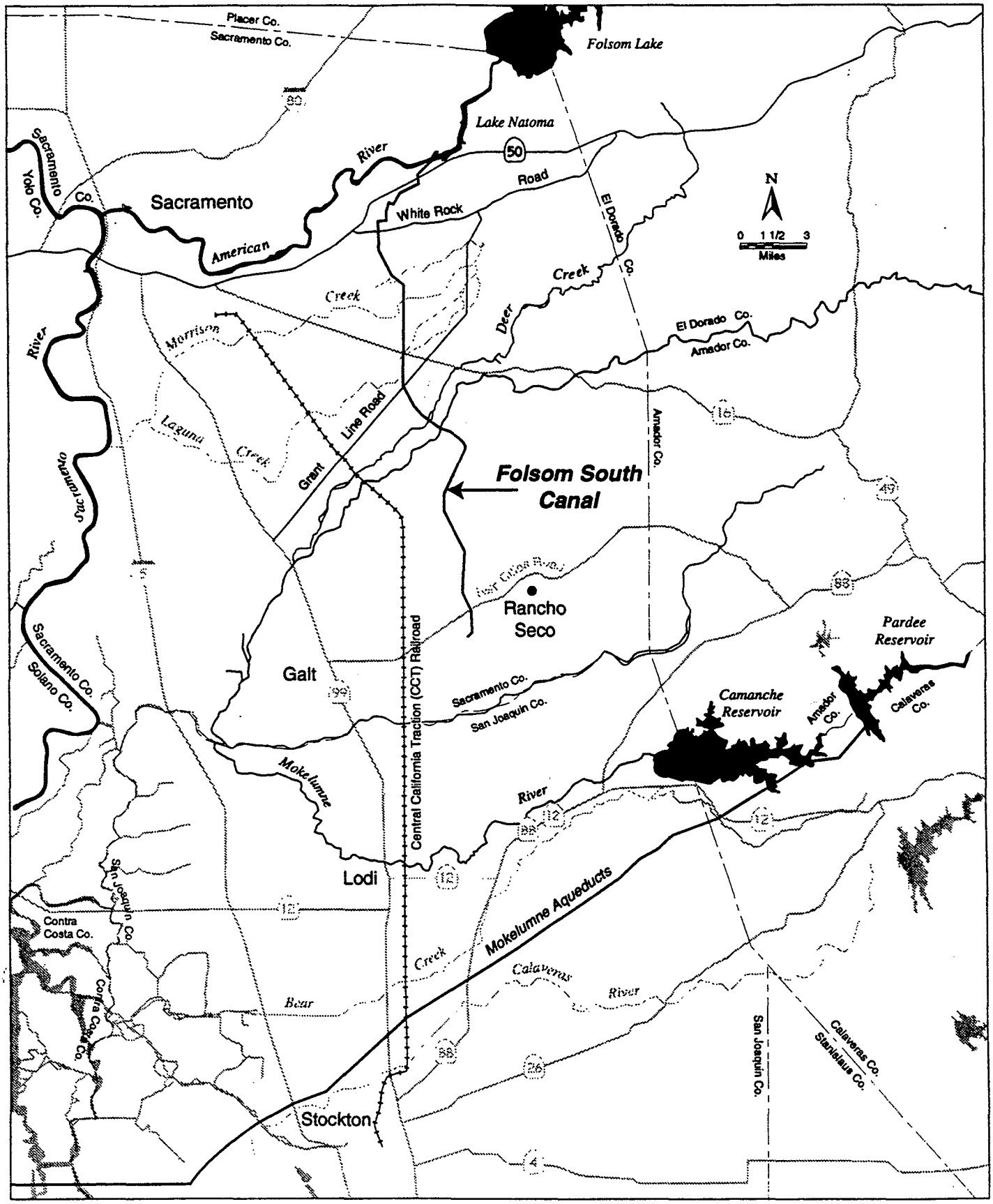
Scale in Miles

**Legend**

EBMUD Ultimate Water Service Area

Jones & Stokes Associates, Inc.

**Figure 1-1**
**EBMUD Service Area**




Jones & Stokes Associates, Inc.

**Figure 1-2**
**Location of the Folsom South Canal**

for flood control, fishery needs, and senior water rights holders. EBMUD's position in the hierarchy of Mokelumne River water users is determined by a variety of agreements between Mokelumne River rights holders, as well as by the appropriative permits and licences issued by the California State Water Resources Control Board (SWRCB).

## EBMUD Terminal Storage Reservoirs

As noted above, the Mokelumne Aqueducts deliver Mokelumne River water to Walnut Creek in EBMUD's service area. From Walnut Creek, the water is directed into three filter plants and/or to EBMUD's five terminal storage reservoirs (Figure 1-1). Capacities of the terminal reservoirs are provided in Table 1-1. Together, the terminal reservoirs have a usable capacity of approximately 138,000 AF.

Two of the terminal reservoirs, Upper San Leandro and San Pablo, convey water to three treatment plants that serve the northern and southern portions of the EBMUD distribution system west of the Oakland–Berkeley Hills. These two reservoirs and a third, Briones Reservoir, are used to store water before treatment and to reregulate the Mokelumne River supply to provide emergency supply and store local runoff. The remaining two reservoirs, Lafayette and Chabot, are not regularly used for water distribution but provide emergency standby supply and, along with San Pablo reservoir, are used extensively for recreation.

The intended functions of the terminal reservoirs are:

- Emergency Standby - A minimum of 120 days of supply at normal demand is maintained for use during supply disruptions or outages.
- Regulation - Mokelumne River water is stored in winter and spring, when Sierra runoff occurs and demand is low, for use during the high demand period in summer.
- Drought Reserve - Drought reserve is maintained for meeting supply shortages in dry periods such as occurred in 1928–1934, 1976–1977, and 1987–1992.
- Development of Local Yield - Storm runoff is collected and stored from the reservoir watersheds.
- Environmental Preservation and Recreation - The 26,000 acres of watershed land on which these reservoirs are located provide open space and water-related recreation. These lands and water constitute a valuable urban refuge permanently protected from development. These watershed lands and the adjacent regional parks include an 80-mile system of trails in the area east of the Oakland–Berkeley Hills.
- Flood Protection - During the wet season, a portion of the terminal storage is reserved for temporary storage of storm runoff. This storage reduces the risk of flooding downstream of the reservoirs.

EBMUD facilities also include the Bixler Emergency Pumping Plant (Bixler), located in Werner Dredger Cut, Mile 2.9 (Indian Slough), approximately 5 miles east of Brentwood. Completed in 1989, Bixler's permits limit operations to emergency purposes when EBMUD's normal water supply is disrupted or inadequate to meet customer needs. The capacity of Bixler is 90 cubic feet per second (cfs). On February 22, 1989, the Corps issued a permit to operate Bixler with an expiration date of December 31, 1989. Bixler was never operated, and the permit expired. Subsequently, permits were renewed twice with the last renewal expiring on December 31, 1993. Presently, Bixler does not have a permit to operate.



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Table 1-1. EBMUD Terminal Reservoir and Dam Characteristics

| | Water Source | Capacity in Thousand Acre-Feet | Overflow Elevation (feet) | Construction Date |
|---|---|---|---|---|
| Briones | Mokelumne Aqueducts<br>Bear Creek | 60.5 | 576.1 | 1964 |
| Chabot | Mokelumne Aqueducts<br>San Leandro Creek<br>Upper San Leandro Reservoir | 10.4 | 227.3 | 1875 |
| Lafayette | Mokelumne Aqueducts | 4.3 | 449.2 | 1929 |
| San Pablo | Mokelumne Aqueducts<br>San Pablo Creek<br>Bear Creek<br>Briones Reservoir | 38.6 | 313.7 | 1920<br>(Dam reinforced in 1979) |
| Upper San Leandro | Mokelumne Aqueducts<br>San Leandro Creek and tributaries | 41.5 | 460 | 1926<br>(New dam built immediately downstream in 1978) |
| Total existing capacity | | 155.3[a] | | |
| Total usable capacity | | 137.8 | | |

Notes: All dams are earthfill.

[a] 17,500 AF of the total capacity is unusable.

## Existing EBMUD–Reclamation Water Service Contract

In 1970, EBMUD entered into a water service contract with Reclamation to divert up to 150,000 AF of American River water annually from the FSC as a supplementary water supply. The FSC is a concrete-lined, open canal with a design capacity of 3,500 cfs of water. The canal originates on the American River at Nimbus Dam, which impounds Lake Natoma, and extends south approximately 26 miles, terminating west of the Rancho Seco nuclear power plant, which is south of Twin Cities Road (Figure 2-1). A turnout constructed near Grant Line Road, approximately 12 miles south of the Nimbus Diversion Works (Nimbus), represents the water delivery point identified in the EBMUD–Reclamation water service contract. Water is not currently being delivered under this contract.

Besides EBMUD, only the Sacramento Municipal Utility District (SMUD) and Arden Cordova Water Service hold long-term water service contracts with Reclamation for delivery through the FSC. SMUD holds a contract for up to 60,000 AF per year, and the Arden Cordova Water Service has a right for up to 10,000 AF per year. SMUD also has the right to an additional 15,000 AF per year from an assignment of water from the City of Sacramento. The City of Sacramento holds a water rights settlement contract with Reclamation, which guarantees American River water to meet the City's needs.

The County and Sacramento County Water Agency currently have no long-term surface water entitlements but are pursuing surface water entitlements through separate efforts, including a new water service contract with Reclamation under Public Law 101-514, an assignment of a portion of SMUD's existing



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Reclamation water service contract, water transfers, and a new water right from the SWRCB (Sacramento County Application to Appropriate Water by Permit submitted to SWRCB on April 14, 1995).

### The Hodge Decision

A lawsuit (*Environmental Defense Fund et al. v. East Bay Municipal Utility District*, Alameda County Case No. 425,955) filed in 1972 by the Environmental Defense Fund (EDF), and Save the American River Association and later joined into by Sacramento County, the California Department of Fish and Game (DFG), and the State Lands Commission as intervenors, sought to prevent EBMUD from taking delivery of American River water through the FSC as provided by the EBMUD–Reclamation contract. When the trial began in 1984, the court referred the case to the SWRCB. The plaintiffs argued that EBMUD's use of 150,000 AF annually would reduce downstream flows to the extent that lower American River instream public trust values would be jeopardized. Particular emphasis was placed on the need for maintenance of sufficient instream flows to protect the fishery resources of the lower American River, portions of which serve as spawning grounds for several species of anadromous fish, including chinook salmon, steelhead, and American shad. The importance of sufficient flows for recreational purposes was also considered.

On January 2, 1990, following 17 years of litigation, Alameda County Superior Court Judge Richard A. Hodge issued a decision, known as the Hodge Decision, which imposed a Physical Solution as a means of accommodating the diverse and conflicting interests that were addressed (Hodge Decision 1990). The ultimate objective was to provide for the fullest beneficial use of the water of the American River, and at the same time, to protect the sensitive public trust values of the lower American River (p. 108 in Hodge Decision 1990). Under the Hodge Decision, EBMUD may use its 1970 water service contract with Reclamation under the condition that it take delivery of American River water only when the river channel contains specific instream flow levels, which vary throughout the year. The required instream flow levels, determined by Judge Hodge to adequately protect resources on the lower American River, are:

- 2,000 cfs from October 15 through February;
- 3,000 cfs from March 1 through June; and
- 1,750 cfs from July 1 through October 14.

The Hodge Decision also encourages EBMUD to take delivery of as much of its allocated supply as possible when instream flows are least required for protection of environmental interests and public trust values. EBMUD must also limit use of its American River allocation to supplementing its municipal water supply in response to customer demand; the Hodge Decision does not currently allow EBMUD to sell any portion of its American River water supply delivered and conveyed through the FSC to a third party.

Extensive testimony on water quality, fisheries, and other American River issues was received during *EDF et al. v. EBMUD*. Case testimony used in evaluating the potential project alternatives is cited as appropriate in this document.

## UPDATED WATER SUPPLY MANAGEMENT PROGRAM

EBMUD's existing developed water supplies are insufficient to meet customer needs in droughts despite implementation of water conservation and reclamation programs. Even the 25% cutbacks in the 1987–1992 drought could not stretch water supplies to meet customer use. Without near-term additional water supplies, EBMUD customers will experience more frequent and severe water



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supply shortages. Rationing of up to 68% would be necessary in the future without additional water supplies, resulting in severe regional economic and quality-of-life impacts.

The combined storage capacity of Pardee and Camanche reservoirs is vital to EBMUD's ability to meet its downstream obligations for releases for fisheries and senior water rights and to ensure reliable service to its customers and sufficient flows for instream uses during dry years. In wet years, any portion of EBMUD's water supply that is not for current use within its service area or delivered to storage in Pardee or Camanche reservoirs is released downstream and is no longer available for EBMUD's use. During dry years, runoff amounts are not sufficient to meet user demands and the EBMUD supply must be drawn from reservoir supplies stored during previous years. During extended dry periods, such as the 1976–1977 and 1987–1992 droughts, storage has been insufficient to supply all consumptive needs of EBMUD customers without significant rationing and to meet EBMUD's downstream obligations. Projected increases in the demand for Mokelumne River water by other users and incremental growth in the EBMUD service area are anticipated to further decrease EBMUD's available water supply during droughts, thereby increasing the need for water rationing. Additionally, the intensive water conservation and reclamation measures currently in effect are reducing EBMUD's water supply needs during normal seasons, and options for further reducing this demand during droughts through additional measures are limited.

**Program Development and Implementation**

On October 26, 1993, the EBMUD Board of Directors adopted the Updated WSMP and associated EIR (EDAW 1992, 1993). The purpose of the Updated WSMP was to identify the actions and projects necessary to provide adequate protection and enhancement of the lower Mokelumne River fishery in balance with an adequate water supply for EBMUD customers through 2020. The following water supply problems and challenges were identified and addressed in the Updated WSMP:

- The number of EBMUD customers is projected to increase; therefore, EBMUD's demand for water is expected to increase unless some action is taken.
- The demand for Mokelumne River water by users other than EBMUD customers is projected to increase.
- EBMUD faces possible reduction in supply due to increased allocation of water to lower Mokelumne River resources, including fisheries.
- The number of salmon in the lower Mokelumne River has been reduced.
- EBMUD faces possible shortages of water during droughts.

In recognition of these concerns, the Updated WSMP established the following planning objectives:

- Provide adequate capacity, flexibility, and reliability to respond to the problems and challenges of maintaining the EBMUD water supply.
- Minimize total direct costs to EBMUD customers.
- Maintain the high quality of the water supply. This includes taking steps to ensure that EBMUD's potable water will meet all existing and anticipated drinking water standards and that EBMUD's nonpotable water is of quality suitable to its use.
- Protect and improve the biological resources that could be affected by existing EBMUD facilities or by the Updated WSMP.
- Maintain outdoor recreation opportunities.



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- Minimize risks to public health and safety.
- Minimize adverse sociocultural impacts.

The Updated WSMP included six alternative Composite Programs. The Composite Program adopted by the EBMUD Board of Directors consists of five major components to assist EBMUD in satisfying these objectives:

- a seismic strengthening program for the Mokelumne Aqueducts,
- an aggressive water conservation program,
- a wastewater reclamation and reuse program,
- a Lower Mokelumne River Management Plan (LMRMP), and
- a supplemental water supply project.

The aqueduct seismic strengthening, water conservation, water reclamation, and LMRMP components are currently in various stages of implementation as discussed in the following sections.

**Mokelumne Aqueduct Seismic Upgrade Program**

The Mokelumne Aqueduct Seismic Upgrade Program will retrofit one of EBMUD's three parallel pipelines that cross the Sacramento-San Joaquin Delta. In its 1993 Findings on the Updated WSMP (East Bay Municipal Utility District 1993a), the EBMUD Board of Directors determined that EBMUD's long-range water supply planning process shall address the need for increased security of the EBMUD's Mokelumne Aqueducts and directed that as a component of the Updated WSMP, staff should proceed with development of a specific project, including appropriate project-level environmental documentation for the Mokelumne Aqueduct Seismic Upgrade Program The project called for strengthening the elevated segments of Mokelumne Aqueduct No. 3 against a maximum credible earthquake where it crosses the Delta; securing the stretches of pipeline that pass under river channels within the Delta; and protecting the pipelines and foundations against flood damage caused by levee failures.

Preliminary design for the project was developed between 1994 and mid-1995. EBMUD began the environmental documentation and permitting for the projected in mid-1995. The EBMUD Board of Directors approved a project-specific mitigated negative declaration for the project in May 1996 (East Bay Municipal Utility District 1996a). Construction of the seismic upgrades will be completed between early 1998 and mid-1999.

**Demand Management - Conservation and Reclamation**

The Board of Directors determined to continue to promote conservation through implementation of Conservation Level II, described in Volume I, Chapter 7, pages 7-16 through 7-17 of the Updated WSMP EIR (EDAW 1993). In its 1993 Findings on the Updated WSMP (East Bay Municipal Utility District 1993a), the EBMUD Board of Directors directed staff to proceed with Conservation Level II with the objective of achieving a net reduction in potable water demand of 13 MGD by 2020, over and above water savings achieved from existing and previously adopted conservation programs. Such a reduction will decrease by 43% the 30-MGD increase in EBMUD demand projected between 1990 and 2020. The Board of Directors found that implementation of Conservation Level II would not have a significant adverse effect on the environment.

The Board of Directors also determined to promote the use of reclaimed water through Reclamation Alternative A1, as described in

Volume I, Chapter 7, pages 7-17 through 7-24 of the EIR. In its 1993 Findings on the Updated WSMP (East Bay Municipal Utility District 1993a), the EBMUD Board of Directors directed staff to proceed with implementation of Reclamation Alternative A1 with the objective of achieving a potable water demand reduction of 8 MGD by 2005 through the use of reclaimed water. This program was described in Volume I, Chapter 7, pages 7-17 through 7-24 of the EIR (East Bay Municipal Utility District 1993a). The Board of Directors found that, according to the information provided in the EIR, no significant environmental impacts would result from implementation of Reclamation Alternative A1 with the implementation of appropriate mitigation measures.

As part of the Updated WSMP, the EBMUD Board of Directors examined several alternative components for addressing demand management. Five levels of conservation were considered that ranged from an estimated savings of 7 MGD (Conservation Level I) to 40 MGD (Conservation Level V). All these potential program components were carried forward from the initial screening process and examined further. Two components (Level II and IV) were included in the six Composite Programs that were analyzed in detail as alternatives in the Updated WSMP EIR.

Additionally, 13 levels of water reclamation were considered in early project planning. Of these 13 potential programs, seven were held from further consideration during the Updated WSMP EIR process because they were determined to be infeasible or to result in significant environmental impacts. Six were carried forward and examined further, and three were included in the six "Composite Programs" that were analyzed in detail as alternatives in the Updated WSMP EIR.

One of the alternatives that was not selected for implementation was "Composite Program I," including "Conservation Level IV" and "Reclamation Alternatives A2 and A6," which placed total reliance on demand-side management measures for addressing projected water shortages through 2020 and therefore relied exclusively on aggressive conservation and reclamation. As described in volume I, Chapter 7, pages 7-10 through 7-24 of the Updated WSMP EIR (EDAW 1993), these measures would have included imposing deficiencies on customers of up to 35% during droughts, including up to 50% for residential customers, rather than the 25% limit that is EBMUD's policy. Composite Program I also would have required expansion of reclaimed water use to meet 25% of new institutional/ commercial/industrial demand and to offset the potable water demand of some existing commercial and industrial users. Additionally, 95% of new multi-family and 85% of new single-family residential development east of the Oakland/Berkeley Hills would have been required to be constructed with dual distribution systems for irrigation with nonpotable water

In its 1993 Findings on the Updated WSMP (East Bay Municipal Utility District 1993a), the EBMUD Board of Directors identified several disadvantages presented by Composite Program I, including the significant uncertainty of achieving program objectives and the potential for social and economic impacts. Estimates of water demand reductions projected to result from Composite Program I were based on data from existing programs, some of which were developed only recently and provided limited information with which to evaluate results. Neither the extent of customer participation nor the long-term acceptance of use reduction measures identified in Composite Program I has been tested. The estimates of customer participation and potential water savings from mandatory measures may have been higher than what could actually be achieved.

To obtain the high water use savings projected under Composite Program I, complex administrative and enforcement measures would have been needed to monitor and control water



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demand. Customers would have increased difficulty in meeting annual water use reduction goals during drought years (up to 50% for residential customers). These goals exceeded the level of water use reduction achieved during the 1976–1977 drought when widespread loss of landscaping and other lifestyle and economic impacts occurred. No other water districts were known to have implemented conservation programs on the scale that would have been required under Composite Program I.

The extensive construction required to implement the reclamation components would result in the most disruptive construction activity of the alternatives considered. The large reclaimed water distribution network also would have posed the potential for cross-connection of reclaimed water with the potable water supply.

Based on the information presented to it, the EBMUD Board of Directors determined that Composite Program I did not meet the Updated WSMP planning objectives as well as did some other project alternatives and withheld it from further consideration. Based on the effects of Composite Program I, uncertainty of results, and the Board Findings, additional conservation and reclamation are not considered as an alternative.

**Water Conservation.** EBMUD continues to actively participate in a statewide process of policy planning on conservation practices and has completed a water conservation master plan (East Bay Municipal Utility District 1994). A group of water agencies, public interest groups, and other interested parties proposed various water conservation measures as "Best Management Practices" (BMPs) to achieve timely, effective water conservation by urban users throughout California. A statewide Memorandum of Understanding (MOU) to implement the BMPs was signed by EBMUD in 1993 (East Bay Municipal Utility District 1993b).

The MOU prescribes an activity-based approach for water agencies to implement water conservation measures and a schedule for implementation. The 14 BMPs in the newly revised MOU address water audits, retrofit and incentive programs, metering requirements, leak detection, pricing, water waste prohibitions, and educational programs. Potential BMPs identified for future study include retrofit of car washes, replacement of existing home appliances, and graywater systems. EBMUD's participation in the MOU and implementation of cost-effective BMPs represent one element of EBMUD's commitment to efficient water use.

**Water Reclamation.** Since the mid-1960s, EBMUD has conducted water reclamation studies. At first, water reclamation was considered primarily for reducing wastewater discharges to San Francisco Bay. The more recent emphasis in water reclamation has expanded to reducing demand on drinking water supplies and increasing reliability of water supply during drought. EBMUD has completed a draft water reclamation master plan (East Bay Municipal Utility District 1991) and currently has nine water reclamation projects in place that are anticipated to result in savings of approximately 6 MGD by 2020. Additionally, EBMUD is preparing a Water Reclamation Implementation Plan (WRIP) that will be a comprehensive plan for implementing future water reclamation projects. Future water reclamation efforts are anticipated to reduce demands by an additional 8.3 MGD.

EBMUD has also adopted Policy 73 - Nonpotable Water (April 9, 1996), which requires that customers of EBMUD use nonpotable water for nondomestic purposes when it is of adequate quality and quantity, available at a reasonable cost, not detrimental to public health, and noninjurious to plant life, fish, and wildlife.

**Summary of EBMUD's Demand and Supply Projections.** Table 1-2 shows projected EBMUD customer demands through 2020 and



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adjusts these demands based on existing and future conservation and reclamation efforts. As noted in the table, although total demands for water would be expected to increase from 230 MGD in 1995 to 277 MGD in 2020, based on normalized 1990 conditions, EBMUD supply requirements are projected to increase from 222 MGD to 228 MGD during the same period because of the conservation and reclamation efforts undertaken by EBMUD.

**EBMUD Urban Water Management Plan.** In February 1996 EBMUD prepared and adopted an updated and revised Urban Water Management Plan (UWMP) as required by the state Urban Water Management Planning Act, which implements the state's policy to achieve conservation and efficient use or urban water supplies to protect both the people and water resources of the state. EBMUD adopted the first UWMP in 1985. The UWMP documents past water conservation and reclamation measures implemented by EBMUD, currently measures being implemented, and programs measures being investigated for potential future strategies. The conservation and reclamation measures identified in the Updated WSMP are included in the UWMP (East Bay Municipal Utility District 1996c), which is available for public review at EBMUD's headquarters in Oakland, California, for further information on EBMUD's demand management programs.

**Lower Mokelumne River Management Plan**

Lower Mokelumne River flows required for protection of fisheries are provided pursuant to the LMRMP, which was developed as part of the Updated WSMP to:

- document EBMUD's commitment to protecting public trust resources,
- contribute to developing EBMUD's definition of its need for water, and
- balance EBMUD's water supply needs with in-river needs.

The LMRMP also identified the following specific goals:

- maintain water supply reliability by minimizing unnecessary storage releases using intensive monitoring and real-time management;
- sustain and enhance fisheries benefits, especially salmon and steelhead trout, and other aquatic and riparian resources; and
- recognize and reduce uncertainty and develop new opportunities through a comprehensive and flexible monitoring and research program.

The LMRMP specifies flow regimes and reservoir and hatchery operations designed to benefit fishery resources. The LMRMP flow regime increases downstream flow releases for fisheries. However, at the time the Updated WSMP was adopted EBMUD and resource agencies, U.S. Fish and Wildlife Service (USFWS) and DFG, did not agree on the specific flows required for fishery resources.

The Updated WSMP defined EBMUD's "Need for Water" assuming implementation of the LMRMP. The Need for Water is the additional amount of water required during EBMUD's drought planning sequence to limit rationing to 25% of normal water demand levels at projected 2020 levels. Consistent with this definition, the Updated WSMP computed Need for Water as 130,000 AF over the 3-year drought period (EDAW 1992, 1993). However, subsequent factors have caused this estimate to increase since the adoption of the Updated WSMP.

The first factor is a result of a rerating of the storage capacity of Camanche and Pardee reservoirs, which occurred following a dry period during which EBMUD was able to better study actual capacity. The study resulted in a 23,000-AF decrease in the rated storage



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Table 1-2. Summary of EBMUD's Demand and Supply Projections (MGD)

| | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 |
|---|---|---|---|---|---|---|
| Customer demand (adjusted for accounts)[a] | 230 | 239 | 249 | 258 | 268 | 277 |
| Adjusted for conservation[b] | | | | | | |
| Natural replacement of ultra low flush toilets | -0.7 | -4 | -7.3 | -10.6 | -13.9 | -18.6 |
| EBMUD's existing and adopted conservation program | -1.4 | -4.6 | -7.7 | -10.9 | -14.1 | -16.1 |
| Adjusted for reclamation | | | | | | |
| EBMUD's existing and adopted reclamation program[c] | -5.9 | -5.9 | -5 | -5.9 | -5.9 | -5.9 |
| Potential water reclamation | | -4.3 | -8.3 | -8.3 | -8.3 | -8.3 |
| Oakland/Berkeley | | | -1.2 | -1.23 | -1.2 | -1.2 |
| San Leandro/Alameda-Phase III | | | -0.8 | -0.8 | -0.8 | -0.8 |
| Hercules/Franklin Canyon-Phase I | | -0.4 | -0.4 | -0.4 | -0.4 | |
| Hercules/Franklin Canyon-Phase I | | | -2 | -2 | -2 | -2 |
| San Ramon Valley | | -2.8 | -2.8 | -2.8 | -2.8 | -2.8 |
| Central Contra Costa | | -1.1 | -1.1 | -1.1 | -1.1 | -1.1 |
| Planning level of demand | 222 | 220 | 220 | 222 | 226 | 228 |
| Available supply (existing sources) | | | | | | |
| Normal year | >222 | >220 | >220 | >222 | >226 | >228 |
| Dry year (10% deficiency) | 200 | 198 | 198 | 200 | 203 | 205 |

Notes:

[a] Account growth from 330,000 in 1984 to 358,000 in 1995 (8%). Average of FY 1984, 1985, and 1986 = 214 MGD x 1.08 = 230 MGD, 2020 demand from WSMP projection.

[b] 2020 savings taken from June 1994 Water Conservation Master Plan (Exhibit 7-1). Linear savings assumed for a 26-year program.

[c] WSMP TA-D2, Attachment A, P.2 Exhibit 1, with Office of Reclamation updated numbers.

Source: East Bay Municipal Utility District 1996.

capacity of the Camanche Reservoir and a 12,000-AF decrease in Pardee Reservoir. Another factor increasing the Need for Water is the settlement of the ongoing Federal Energy Regulatory Commission (FERC) Proceeding. In 1991, FERC initiated a license modification proceeding to determine if modifications to EBMUD's project facilities or operations were appropriate to benefit fish and wildlife resources in the lower Mokelumne River. In 1993, FERC released a final environmental impact statement.

EBMUD, USFWS, and DFG have participated in settlement discussions in an effort to resolve issues in dispute in the license modification proceeding. These negotiations resulted in the parties' approval of "Principles of Agreement" in February 1996. In June 1997, the parties approved the Joint Settlement Agreement to resolve all issues in this proceeding and requested FERC to make its final determination in this matter. In addition to the effect of rerating both Pardee and Camanche reservoirs, implementation of the Joint

Settlement Agreement increases the Need for Water to approximately 185,000 AF.

Other potential instream flow requirements for the lower Mokelumne River have also been proposed. These include flow requirements that may be imposed as a result of the Bay-Delta Proceedings or implementation of the Central Valley Project Improvement Act. EBMUD has determined that the instream flow requirements accounted for in the Mokelumne River Joint Settlement Agreement provide reasonable increases in flow to fulfill EBMUD's obligations in these other proceedings.

**Supplemental Water Supply**

Identification and implementation of the Supplemental Water Supply Project has proven complex. In 1993, the preferred supplemental water supply project was a conjunctive-use project involving groundwater banking of Mokelumne River water in the eastern San Joaquin County groundwater basin; however, other options such as enlarging Pardee Reservoir, creating a new storage reservoir in the Sierra, and connecting to the American River were also considered (East Bay Municipal Utility District 1993a).

With the Mokelumne River conjunctive-use project, EBMUD would use excess Mokelumne River flows during wet years to recharge a portion of the San Joaquin County groundwater basin. EBMUD would then extract water from the basin during dry years when the availability of river flows would be limited and to meet water supply needs during a planned outage. A Pardee Reservoir enlargement project would involve increasing the storage capacity of Pardee Reservoir. Middle Bar Creek, upstream of Pardee Reservoir, was determined to be the preferred location for a potential new dam and storage reservoir in the Sierra. The conceptual Pardee Reservoir enlargement project, as considered in the Updated WSMP, and the location of a Middle Bar Creek reservoir are depicted in Figure 2-3. The added storage capacity provided by an enlarged Pardee Reservoir or new reservoir would provide EBMUD with additional flexibility in regulating reservoir storage for use during dry periods; however, because they would not provide a supply from a source independent of the Mokelumne River system, they would not create system redundancy or an alternative supply for use during a planned or unscheduled outage of Pardee Reservoir facilities.

Program-level environmental impact analysis performed for the Updated WSMP concluded that significant impacts related to loss of wetlands, effects on wildlife, and flooding of existing rapids on the Mokelumne River upstream of Pardee Reservoir could occur with the Pardee Reservoir enlargement project. Some of these potential effects could possibly be avoided by construction of a new dam downstream of the existing Pardee Dam. Studies of that option are only preliminary. The Pardee Reservoir enlargement project would also require many approvals and, if jurisdictionally feasible, could not be implemented by the goal implementation date of the beginning of 2001 for the currently proposed Supplemental Water Supply Project.

Extensive screening for a new reservoir was undertaken during preparation of the Updated WSMP. Forty-seven reservoir sites in 19 different geographical locations, including sites in Amador, Calaveras, Sacramento, Solano, San Joaquin, Alameda, and Contra Costa counties, were evaluated. Evaluation and disposition of the full range of additional water storage alternatives, which include increased capacity from 3,000 AF to 200,000 AF, was described in Volume I, Chapter 6, pages 6-5 through 6-9; Volume IV, Technical Appendix C, pages C-42 through C-53; and Volume V, Technical Appendix E1 of the EIR. Certain reservoir storage alternatives were excluded from further consideration because of geologic and hydrologic hazards and technical infeasibility, as described in Volume IV, Technical Appendix C, Exhibit 24 of the EIR. The Updated WSMP



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concluded that the Pardee Reservoir Enlargement Project would be the preferred surface storage alternative if additional Sierra storage was pursued.

The feasibility of Mokelumne River water conjunctive use is currently uncertain, based primarily on the unsuccessful efforts to negotiate a mutually acceptable agreement with San Joaquin County interests. Negotiations began in 1992 with seven San Joaquin County entities: the cities of Stockton and Lodi, the Woodbridge Irrigation District, the North San Joaquin Water Conservation District, Stockton East Water District, Central San Joaquin Water Conservation District, and the County of San Joaquin.

The obstacles to agreement center on the degree of responsibility that EBMUD would assume for the regulation of storage and reversing overdraft in the eastern San Joaquin groundwater basin. As articulated in the San Joaquin parties' 1996 "Principles for Further Negotiation," this responsibility is manifested as both a minimum acceptable groundwater elevation and an open-ended EBMUD financial liability for construction of additional facilities until the San Joaquin parties' groundwater elevation and saline mitigation goals are met. A minimum supply of 300,000 AF per year to the San Joaquin parties is specified, precluding a supply from the Mokelumne River alone. Because EBMUD would be a net groundwater recharger, and because anticipated EBMUD extractions would amount to less than 2% of Countywide groundwater pumping, EBMUD is concerned about accepting responsibility for actions that are largely beyond its control. Lack of progress during negotiations, combined with growing concerns over project timing, resulted in adoption of the updated WSMP Action Plan (described below), which calls for investigation into other water supply options.

EBMUD continues to explore opportunities for groundwater banking in San Joaquin County and is currently participating in a single-well groundwater injection pilot project with San Joaquin parties.

## Updated WSMP Action Plan

Based on the difficulties and changed conditions described above, the EBMUD Board of Directors directed staff to pursue other supplemental supply options. The resulting Updated WSMP Action Plan (East Bay Municipal Utility District 1995) focuses on multiple water supply options, including multiparty regional projects, and calls for the following four actions:

- Initiate preliminary design, prepare project-level environmental documentation, and initiate applicable permit processes and Reclamation contract modifications (as needed) for a pipeline connection between the FSC and the Mokelumne Aqueducts for delivering water to the customers of EBMUD as a standalone project not dependent on any additional water supply project components.

- Continue negotiations with San Joaquin County interests on a joint EBMUD–San Joaquin County conjunctive-use project to provide additional storage to meet EBMUD's need for additional water.

- Initiate discussions with Sacramento-area interests on a potential joint EBMUD–Sacramento-area conjunctive-use project to provide additional storage to meet EBMUD's need for additional water. This project would include negotiations with the Sacramento area Water Forum and San Joaquin County interests on a multiregional water solution.

- Initiate project-level studies for raising Pardee Dam to provide additional storage to meet EBMUD's need for additional water, while simultaneously evaluating creation of Middle Bar and Duck Creek reservoirs as possible alternatives to expanding Pardee



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Reservoir and make further recommendations as to the best reservoir option by December 1995. (In November 1995, enlargement of Pardee Reservoir was determined to be the best available option for increasing Mokelumne River storage capacity should additional Sierra storage be pursued.)

After further preliminary evaluation of the Pardee Reservoir Enlargement Project and continued unsuccessful efforts to implement a conjunctive use program, the Board of Directors decided to make use of its Reclamation water service contract as a supplemental water supply and released a Notice of Preparation of an EIR (EDAW 1996).

## CURRENT RELATED ACTIVITIES

There are numerous activities and studies that are currently ongoing or planned for the near future that are related to the EBMUD Supplemental Water Supply Project. Related studies and activities are summarized in Table 1-3 at the end of this chapter.

## STATEWIDE PROGRAMMATIC ACTIVITIES

### Relationship between Statewide Programs and the Supplemental Water Supply Project

#### CALFED Bay-Delta Program

The CALFED Bay-Delta program is the result of a collaboration of state and federal agencies and stakeholders from key interest sectors to address and resolve resource management issues in the San Francisco Bay-Sacramento/San Joaquin Delta (Bay-Delta). The mission of the CALFED Bay-Delta program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta. CALFED recognizes the interdependence and linkages of watersheds, streams, and rivers and the natural and biological resources dependent on the Bay-Delta.

In a NEPA and CEQA evaluation, CALFED will analyze the incremental impacts on the environment that result from its Bay-Delta program, in combination with reasonably foreseeable future actions. CALFED has included the Supplemental Water Supply Project in its cumulative impact analysis (CALFED 1996). CALFED will conduct a sensitivity analysis to assess the effects of EBMUD's American River contractual entitlement in combination with a CALFED program, but will not evaluate specific project-level impacts.

CALFED's programmatic environmental analysis will examine broad and general policy and program-level decisions. The CALFED programmatic EIS will not specify project locations, sizes, and components within the proposed programmatic alternatives. Essentially, CALFED will create a "general plan" concerning future approach and to "provide strategies and guidance for future project-level actions relative to implementation and phasing, mitigation, finance and assurances" (Gross pers. comm.). CALFED will not complete project-level environmental documentation for several years, well after EBMUD plans to have its American River supply in use.

CALFED's programmatic evaluation of key resource management issues for the Bay-Delta is similar to EBMUD's 1993 programmatic updated WSMP EIR/EIS that examined broad environmental issues and established an integrated resources management program for customer supply and quality needs, ecosystem management on the Mokelumne River, and a system integrity program for EBMUD's water distribution system (EDAW 1993).



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**Differences between CALFED Program and the Supplemental Water Supply Project**

Although CALFED's program is intended to include water supply and water reliability improvements, the Bay-Delta Advisory Council has agreed that "the goal of CALFED is to create a Bay-Delta solution, and not to resolve statewide water policy issues" (Snow pers. comm.). Thus, CALFED is focused on those water reliability problems directly attributable to improving conditions in the Bay-Delta Estuary and not on meeting the water supply needs of California.

CALFED has established a geographic scope for the "problem area" and the "solution area" to be considered in its Bay-Delta program. The problem scope confines resolution of problems to those within the legally defined Delta, Suisun Bay, and Suisun Marsh. CALFED has defined a broad solution scope because the Bay-Delta is part of a larger water and biological resource system. EBMUD's Supplemental Water Supply Project area is outside of CALFED's problem area, but is a small subset of the solution area. EBMUD believes that the Supplemental Water Supply Project and CALFED's ecosystem objectives with respect to meeting fishery resource protection needs on the Mokelumne and American rivers are mutually compatible.

EBMUD and many state and federal water project contractors are evaluating and implementing water supply augmentation projects in their respective regions to develop drought year net water supplies that meet near-term needs. Although CALFED has indicated an intent to evaluate these regional water supply projects in a programmatic impact analysis, these specific projects either are proceeding or will likely proceed ahead of the CALFED programmatic schedule. The project level EIR/EIS for these regional projects have focused on site-specific impacts and mitigation, and not the ecosystem or water supply objectives of the CALFED Bay-Delta program.

**Role of CVPIA and Relationship to the Supplemental Water Supply Project**

The Central Valley Project Improvement Act (CVPIA), enacted in 1992, mandates changes in management of the Central Valley Project (CVP), particularly for the protection, restoration, and enhancement of fish and wildlife. The federal CVP system is managed by Reclamation in California and consists of major facilities that affect Bay-Delta resources. The Department of the Interior is developing policies and programs to modify the operation, management, and physical facilities of the CVP and to renew existing CVP water service and repayment contracts to comply with the purposes and goals of the CVPIA and the revised purposes of the CVP. The flow and operational criteria developed through this project will be reflected in the CVPIA Programmatic EIS (draft document expected in late 1997).

Reclamation's management of CVP facilities and operations to meet CVPIA requirements has the potential to affect its ability to meet CVP contractual entitlements. The availability of water under EBMUD's American River contract will be affected by Reclamation's operation of CVP facilities to meet the requirements of the CVPIA.

## ORGANIZATION OF EIR/EIS

This EIR/EIS is organized in the following sections:

Chapter 1, "Need for the Supplemental Water Supply Project,"
Chapter 2, "Project Objectives and Alternatives under Consideration,"
Chapter 3, "Hydrology, Water Supply, and Power,"
Chapter 4, "Water Quality,"
Chapter 5, "Fisheries,"
Chapter 6, "Recreation,"
Chapter 7, "Vegetation and Wetland Resources,"



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Chapter 8, "Wildlife,"
Chapter 9, "Geology, Soils, Seismicity, and Groundwater,"
Chapter 10, "Land Use,"
Chapter 11, "Agricultural Resources,"
Chapter 12, "Transportation and Circulation,"
Chapter 13, "Air Quality,"
Chapter 14, "Noise,"
Chapter 15, "Public Health and Safety,"
Chapter 16, "Visual Resources,"
Chapter 17, "Cultural Resources,"
Chapter 18, "Cumulative and Growth-Related Effects,"
Chapter 19, "Impact Conclusions and Environmental Commitments,"
Chapter 20, "Consultation and Coordination,"
Chapter 21, "Citations," and
Chapter 22, "List of Preparers."

Table 1-3. Related Activities

| Project or Study | Lead Agency | Summary |
|---|---|---|
| American River Water Resources Investigations | Reclamation | This study identified the water-related needs for the American River watershed and alternative methods for meeting those needs. |
| Central Valley Project Improvement Act Programmatic EIS | Reclamation | The act mandates changes in management of the CVP, particularly for the protection, restoration, and enhancement of fish and wildlife. The programmatic EIS evaluates the impacts of implementing the act. |
| American-Sacramento Rivers Project | U.S. Army Corps of Engineers | This project studied alternatives to provide flood protection to the City of Sacramento and recommended system improvements. |
| CALFED Bay-Delta Program and Programmatic EIR/EIS | CALFED | Established in May 1995, this consortium of federal and state agencies is charged with the development of a long-term solution to Delta water concerns. The programmatic EIR/EIS will evaluate the impacts of the program alternatives. |
| Place of Use EIR for CVP Water Supplies | Reclamation and SWRCB | Environmental documentation for the SWRCB to evaluate the change in CVP service area boundaries to accommodate historical modifications in service areas of CVP contractors. |
| Trinity River Studies | U.S. Fish and Wildlife Service | Studies are being conducted to evaluate various flow and restoration alternatives for the mainstem of the Trinity River. |
| Sacramento-area Water Forum | Numerous participants | The Water Forum is developing an area-wide plan that will provide a reliable and environmentally sound water supply to meet the needs of the Sacramento area community. The two coequal objectives of the Water Forum are to provide a reliable and safe water supply for the region's economic health and planned development through 2030 and to preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River. |



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| Table 1-3. Related Activities | | |
|---|---|---|
| Project or Study | Lead Agency | Summary |
| Interim Reoperation of Folsom Reservoir | Reclamation/ Sacramento Area Flood Control Agency | This study examined potential alternatives for reducing flood risk in the Natomas area and the lower American River to a level below the 100-year risk criteria. It recommended that Reclamation operate Folsom Reservoir to allow flexible flood storage ranging from 400,000 AF to 670,000 AF. Reclamation began operating within this range in 1994 as an interim operating plan until a permanent flood protection plan is adopted. |
| Expansion of the City of Sacramento's American River Water Treatment Plant | City of Sacramento | The City has initiated the environmental review process for expanding its E. A. Fairbairn Water Treatment Plant on the American River. However, this expansion is also considered part of Alternative 3 for the EBMUD Supplemental Water Supply Project and is included as such in this EIR/EIS. |
| County of Sacramento/San Juan Water District/ Reclamation Water Service Contracts | County of Sacramento/ Reclamation | The County of Sacramento, San Juan Water District, and Reclamation have proposed to enter into a water service contract pursuant to Public Law 101-514. |
| El Dorado Irrigation District/Reclamation Water Service Contract | El Dorado Irrigation District/Reclamation | El Dorado Irrigation District and Reclamation have proposed to enter into a water service contract pursuant to Public Law 101-514. |
| Folsom Reservoir Reoperation | U.S. Army Corps of Engineers/ Sacramento Area Flood Control Agency | These agencies are currently considering reoperating Folsom Reservoir to provide additional flood control space on a permanent basis. |



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Chapter 2

# Project Objectives and Alternatives under Consideration

# Chapter 2. Project Objectives and Alternatives under Consideration

## PROJECT BACKGROUND

EBMUD is proposing the Supplemental Water Supply Project to provide a supplementary water supply for municipal and industrial water users within its service area.

The project involves constructing and operating a water conveyance system to deliver American River water to EBMUD's existing Mokelumne Aqueducts, which currently convey water from Pardee Reservoir on the Mokelumne River in the Sierra Nevada foothills to the EBMUD service area in Contra Costa and Alameda counties. Several alternative conveyance system alignments and delivery points are identified as possible options to provide an additional source of water to help EBMUD meet its current and projected customer demand. One project alternative involves the construction of joint facilities with the City of Sacramento and Sacramento County to meet multiple needs with a single project. The project conveyance facilities would be constructed in Sacramento and San Joaquin counties, and water treatment system improvements would be constructed in Sacramento and Contra Costa counties.

## PUBLIC INVOLVEMENT

Public involvement and incorporating public input are important parts of the project evaluation process. Feedback received by individuals and organization has been taken into careful consideration in the preparation of the draft EIR/EIS, as well as in the analyses conducted during preliminary engineering activities. A summary of comments received during scoping meetings, as well as copies of correspondence received, are included in Appendix A.

## PROJECT OBJECTIVES

The objective of the project is to allow EBMUD to make use of its water service contract with Reclamation for delivery of American River water, consistent with the conditions set forth in the Hodge Decision, so as to achieve all of the following:

- maintain the high quality of EBMUD's raw and treated water supply;
- increase system reliability by providing an alternate source of supply to EBMUD's Mokelumne River supply in case of a catastrophic event or scheduled major maintenance at Pardee Dam or Reservoir;
- provide increased operational flexibility;
- reduce customer deficiencies;
- increase opportunities for protection and enhancement of Mokelumne River resources; and
- contribute to achieving EBMUD's planning objectives established as part of the Updated WSMP (listed on the following page).

## SUMMARY OF THE ALTERNATIVES SCREENING PROCESS

Both CEQA and NEPA require that an EIR/EIS describe and evaluate reasonable alternatives to a proposed project or to the location of the project. One of the alternatives that must be considered is a no-action alternative. The State CEQA Guidelines state that the range of alternatives required to be evaluated in an EIR is governed by the "rule of reason"; the EIR needs to describe and evaluate only those alternatives necessary to permit a reasoned



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choice and to foster informed decision making and informed public participation (Section 15126[d][5]). Consideration of alternatives focuses on alternatives that can either eliminate significant adverse environmental impacts or reduce them to less-than-significant levels; alternatives considered in this context may include those that are more costly and those that do not fully attain the project objectives.

**EBMUD Planning Objectives**

- Provide adequate capacity, flexibility, and reliability to respond to the problems and challenges of maintaining the EBMUD water supply.
- Minimize total direct costs to EBMUD customers.
- Maintain the high quality of the water supply. This includes taking steps to ensure that EBMUD's potable water will meet all existing and anticipated drinking water standards and that EBMUD's nonpotable water is of quality suitable to its use.
- Protect and improve the biological resources that could be affected by existing EBMUD facilities or by the Updated WSMP.
- Maintain outdoor recreation opportunities.
- Minimize risks to public health and safety.
- Minimize adverse sociocultural impacts.

Source: EDAW 1993.

Similarly, the Council on Environmental Quality regulations for implementing NEPA (Section 1502.14) require all reasonable alternatives to be objectively evaluated in an EIS. Alternatives that cannot reasonably meet project objectives need be evaluated only to the extent necessary to allow a complete and objective evaluation and a fully informed decision by the lead agency. All alternatives recommended during the scoping process are addressed in this EIR/EIS.

EBMUD and Reclamation have considered numerous alternatives for the Supplemental Water Supply Project, beginning with the extensive alternatives evaluation performed for the Updated WSMP. After determining the need for the Supplemental Water Supply Project, EBMUD performed a subsequent alternatives evaluation in the Alternatives Screening Report for the Supplemental Water Supply Project (East Bay Municipal Utility District 1997c, Appendix B) to serve the following purposes:

- identify a set of reasonable alternatives to be included in this EIR/EIS and
- provide documentation of the process by which alternatives have undergone screening as part of the identification of practicable alternatives for the project.

A good faith effort was made to include in the screening process a full range of alternative projects capable of assisting EBMUD in meeting its needs. The alternatives were separated into two categories:

- EBMUD-only projects, which would be implemented by EBMUD individually without substantial coordination or special agreements (other than issuance of permits) with other agencies and
- joint projects, which would be implemented under direct coordination and agreement with other jurisdictions, with cost sharing likely.

The screening process involved evaluation of the ability of each alternative to meet the project objectives and other specific screening criteria useful in identifying the least environmentally damaging practicable alternative. (See "Alternatives Considered but Not Included in Detailed Analysis" below.) To be considered a feasible option for the proposed Supplemental Water Supply Project, the alternative needed to be reasonably capable of meeting the defined screening criteria. If an alternative could clearly be shown to be incapable of meeting one or more criteria, the alternative was eliminated from further consideration in this EIR/EIS. Those alternatives considered capable of achieving the project objectives are described below. Alternatives considered but eliminated



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because they were found to be impracticable for meeting the project objectives are discussed generally below under "Alternatives Considered but Not Included in Detailed Analysis."

## PROJECT ALTERNATIVES

The following three project alternatives are considered in this EIR/EIS:

- Alternative 1: No Action. This alternative assumes the proposed Supplemental Water Supply Project would not be implemented.
- Alternative 2: Folsom South Canal Connection. Under this alternative, EBMUD would independently pursue taking delivery of its contracted American River supply from the FSC.
- Alternative 3: Joint Water Supply. EBMUD, the City of Sacramento, and Sacramento County would construct joint facilities to take delivery of and use water supplies from the lower American River.

Each alternative is described in greater detail below.

### Ability of the Alternatives to Meet the Project Objectives

Both Alternative 2 and Alternative 3 would meet and be consistent with the project objectives described above. In addition to meeting the specific objectives of the EBMUD Supplemental Water Supply Project, Alternative 3 would also help EBMUD, the City of Sacramento, and the County of Sacramento achieve additional water supply and environmental protection goals, including:

- helping to meet future water demands of all parties, yet protecting the environment, including the lower American River;
- providing opportunities for EBMUD to make maximum use of its Reclamation water service contract;
- facilitating mutual support for American River resource protection;
- providing a point of delivery from the lower American River near its confluence for EBMUD and the County;
- offering opportunities to Sacramento parties for additional conveyance and treatment capacity as well as water supply; and
- allocating cost-sharing of the project.

### Summary of Environmental Commitments

As part of the project planning process, EBMUD has incorporated certain environmental commitments into the project for Alternatives 2 and 3. Because these commitments are part of the project, they have not been specifically described as mitigation measures in subsequent chapters. Environmental commitments for each resource area are discussed in the environmental consequences sections in subsequent chapters of this draft EIR/EIS and are listed below:

**Erosion and Sediment Control Plan**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will prepare and implement an erosion control and restoration plan to control short-term and long-term erosion and sedimentation effects and to restore soils and vegetation in areas affected by construction activities. The plan will include all requirements of the Sacramento County erosion control ordinance and will implement best management practices for erosion and sediment control as required (may be incorporated into the Storm Water Pollution Prevention Plan described below).



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**Storm Water Pollution Prevention Plan (SWPPP)**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will submit to the Regional Water Quality Control Board (RWQCB) a notice of intent to discharge stormwater before construction activities begin and will develop and implement a SWPPP as required by the conditions of a National Pollution Discharge Elimination System (NPDES) permit. EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will prepare an SWPPP that identifies BMPs for discharges and groundwater disposal from dewatering operations associated with trench construction, tunneling, and pipeline testing procedures. The SWPPP will identify how and where these discharges would be disposed of during construction. The SWPPP will include an erosion control and restoration plan, a water quality monitoring plan, a hazardous materials management plan, and postconstruction best management practices.

**Traffic Control Plan**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented), in coordination with affected jurisdictions, shall develop and implement a traffic control plan for construction activities to reduce construction-related effects on the roadway system and traffic and circulation patterns throughout the affected pipeline alignment area during the construction period. All construction activities will follow the standard construction specifications and procedures of these jurisdictions. The traffic control plan should include, but not limited to, the following actions:

- Coordinate with the affected jurisdictions on construction hours of operation and lane closures.
- Follow guidelines of the local jurisdiction for road closures caused by construction activities.
- Limit lane closures during peak commuting hours to the extent possible.
- Install traffic control devices as specified in the California Department of Transportation's Manual of Traffic Controls for Construction and Maintenance Works Zones.
- Provide notification of road closures in the immediate vicinity of the open trenches in the construction zone.
- Provide access to driveways and private roads outside the immediate construction zone.
- Provide alternate routes for bicyclists and pedestrians during sidewalk or bike lane closures.
- Consult with emergency service providers and develop an emergency access plan for emergency vehicles access in and adjacent to the construction zone.

**Dust Suppression Plan**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will develop and implement a dust suppression plan to reduce fugitive emissions during construction activities. This plan will be based on guidance from the Sacramento Metropolitan Air Quality Management District (SMAQMD) and other air pollution control agencies. The following practices will be implemented during pipeline construction activities to reduce PM10:

- Water all activity construction sites at least twice daily, more often if wind speeds exceed 15 miles per hour.
- Prohibit all grading activities during periods of high wind (i.e., winds greater than 30 miles per hour).
- Apply nontoxic chemical soil stabilizers to inactive construction areas.



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- Apply nontoxic binders to exposed areas after cut-and-fill operations and hydroseed area where appropriate.
- Where appropriate, plant vegetative groundcover in disturbed areas as soon as possible.
- Install wheel washers for all exiting trucks.
- Sweep streets if soil is carried onto adjacent public roads.

**Fire Control Plan**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will develop and implement a fire management plan in consultation with the appropriate city, county, and state fire suppression agencies to verify that the necessary fire prevention and response methods are included in the plan. The plan will include fire precaution, presuppression, and suppression measures consistent with the policies and standards in the affected jurisdictions.

**Phase I and Phase II Hazardous Materials Studies**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will complete Phase I hazardous materials studies for soil and groundwater contamination along the pipeline alignment before beginning construction. Additionally, the recommendations set forth in the Phase I hazardous materials site assessment will be implemented to the satisfaction of the appropriate local hazardous materials agencies before construction begins. If Phase I assessments indicate the potential for contamination within or adjacent to the pipeline alignment, Phase II studies will be completed before construction begins. Phase II studies shall include soil and groundwater sampling and analysis for anticipated contaminating substances. If soil or groundwater contaminated by potentially hazardous materials is exposed or encountered during construction, the affected local hazardous materials agencies will be notified. A work plan to characterize and possibly remove contaminants may be required by the affected local hazardous materials agencies.

**Hazardous Materials Management Plan**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will develop and implement a hazardous materials management plan before beginning construction. The plan will include appropriate practices to reduce the likelihood of spill of toxic chemicals and other hazardous materials during construction. A specific protocol for the proper handling and disposal of materials will be established before construction activities begin and will be enforced by EBMUD.

**Channel and Levee Restoration Plan**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented), in coordination with Reclamation, affected local jurisdictions, and the construction contractor, will develop and implement a channel and levee restoration plan to ensure levee flood protection and all water channels and levees affected by project construction activities are restored to preconstruction conditions. This plan will also include erosion protection methods that are consistent with the Erosion Control and Sedimentation Plan mentioned above.

**Hydrologic Simulation Modeling and Scour Analysis**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will complete an analysis to determine the potential for adverse effects related to scour of levees or the natural channel as a result of in-channel construction or placement of the intake structures. The analysis will identify measures for minimizing or avoiding adverse effects related to scour, erosion, and sedimentation.



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**Agricultural Land Restoration**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will prepare and implement an agricultural land restoration plan to ensure agricultural lands that have been disturbed during the construction of the pipeline are returned to preproject levels of production. These include agricultural lands crossed by the temporary 50-foot-wide pipeline construction corridor or used as construction staging areas. During construction, EBMUD will avoid using these lands as storage areas for pipeline trenching spoils. If these areas are used for storage of spoils, EBMUD will ensure that spoils are removed after pipeline construction is completed. If necessary, EBMUD will also ensure that lands are recontoured, topsoil is replaced, irrigation systems are reestablished, and fences are replaced.

**Spoils Disposal Plan**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented), in coordination with the construction contractor, will ensure that spoils materials from excavation activities during construction will be hauled to an appropriate offsite disposal location or used to cover the pipeline right-of-way, where feasible. The disturbed pipeline right-of-way will be reseeded with the appropriate seed mixture. Spoils materials will not be placed in sensitive habitat areas, such as wetlands, or in floodplains identified by the Federal Emergency Management Agency.

**Environmental Training**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will inform field management and construction personnel of the need to avoid and protect resources. Communication efforts will occur at preconstruction meetings so that construction personnel are aware of their responsibilities and the importance of compliance.

Construction personnel will be educated on the types of sensitive resources located in the project area and the measures required to avoid impacts on these resources. They will attend an environmental training program before ground-breaking activities associated with the proposed project are initiated. Materials covered in the training program will include environmental rules and regulations for the proposed project and requirements for limiting activities to the construction right-of-way and avoiding demarcated sensitive resources areas.

Training seminars will be held to educate construction supervisors and managers on:

- the need for resource avoidance and protection;
- construction drawing format and interpretation;
- staking methods to protect resources;
- the construction process;
- roles and responsibilities;
- project management structure and contacts;
- environmental commitments; and
- emergency procedures.

**Access Point/Staging Area Plan**

Staging areas for equipment storage and maintenance, construction materials, fuels, lubricants, solvents, and other possible contaminants will be established by EBMUD (in conjunction with the City and County if Alternative 3 is implemented) in coordination with the construction contractor. Practices and procedures for construction activities along existing city and county streets will be consistent with the policies of the affected local jurisdiction.

Staging areas will have a stabilized entrance and exit and will be located at least 100 feet



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from bodies of water. If such an area cannot be located, an alternative site (or sites) will be selected by EBMUD in coordination with the construction contractor. If an off-road site is chosen, the selected site will be surveyed by qualified biological and cultural resources personnel to verify that no sensitive resources are located on the site that would be disturbed by staging activities. If sensitive resources are found, an appropriate buffer zone would be staked and flagged to avoid impacts. If impacts on sensitive resources cannot be avoided, the site will not be used. No equipment refueling or fuel storage will take place within 100 feet of a body of water.

For areas where construction activities do not exist in the road right-of-way, the biological and cultural resources personnel will determine whether the selected staging area meets the criteria identified above and whether additional environmental clearance is required for the site. If sensitive resources are identified on the site that cannot be protected by environmental commitments described in the environmental document for similar resources, an alternate site will be selected.

**Trench Safety Plan**

EBMUD (in conjunction with the City and County if Alternative 3 is implemented) will ensure trench safety precautionary measures will be implemented during construction activities. These measures will be consistent with the city and county standard practices and requirements for roadway construction. These measures should include, but not be limited to, the following:

- Road closures shall be limited to the immediate vicinity of open trenches and the length of open trenches shall be kept as short as possible.
- No trenches shall be open overnight.
- All open trenches shall be closed within 24 hours.
- Any pit or hole required to be left open overnight shall be labeled and fenced according to the affected local jurisdiction or the U.S. Occupational Safety and Health Administration (OSHA).

**Project Planning, Coordination, and Communication Plan**

EBMUD and the appropriate City and County agencies will coordinate planning, engineering, and design phases of the project.

## *Alternative 1: No Action*

Under Alternative 1, EBMUD would not use American River supplemental water supplies and would continue to operate Pardee Reservoir and the Mokelumne Aqueducts under their current operational guidelines. In the future, the demand for Mokelumne River water by other users is expected to increase. Based on existing and projected demand in the EBMUD service area, EBMUD would continue to have water supply shortages now and in the future during drought periods, as identified in the Updated WSMP and in Chapter 1 of this EIR/EIS. Additionally, EBMUD would have no backup supply for use during scheduled or unplanned facility outages at Pardee Reservoir.

**EBMUD Service Area**

The EBMUD service area is located in the San Francisco Bay Area (Figure 1-1). EBMUD has limited its service area growth to its adopted ultimate service boundary (USB) and has also adopted additional policies that govern the provision of water service to new areas, including but not limited to Resolution 33038-97, "Consideration of EBMUD's Position on Water Service to the Tassajara Project," that excludes development outside the USB in the Tassajara Valley; Policy 1, "Annexations," which sets limitations on annexation of territory; and Policy 51, "Effects of Extension of Water Beyond the Ultimate Boundary," which provides that EBMUD will not extend water



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service to areas outside its boundaries if existing customers would be adversely affected. Each of these policies sets forth conditions that must be met prior to extension of water service into new areas or states EBMUD's policy on the extension of water service to specific areas. However, under state law, EBMUD is required to provide water service to all areas within its boundaries. The USB developed and adopted by EBMUD represents the area within which EBMUD anticipates that it can provide a safe reliable water supply with its existing Mokelumne River supply and supplemental water supply options being pursued by EBMUD.

EBMUD's demand and supply projections indicate that the planning level of normalized use in the USB would increase from 200 million gallons per day (MGD) to 228 MGD between 1993 and 2020, after accounting for the significant water conservation and reclamation programs described in Chapter 1. EBMUD's existing available water supply during normal years is 228 MGD and would adequately meet its USB demands in most years. However, during dry years, runoff amounts are insufficient to meet full, unconstrained demands and the EBMUD supply must be drawn, in part, from reservoir supplies stored during previous years. During extended dry periods, storage supplies may be insufficient to supply all consumptive needs of EBMUD customers without significant rationing. However, supplies are anticipated to be adequate to meet full buildout of the USB with implementation of water conservation and water reclamation programs and assuming up to 25% deficiencies in dry years, although at significant costs to ratepayers as described in the Updated WSMP EIR (EDAW 1993). Therefore, growth in the USB is projected to occur under Alternative 1, consistent with planning projections and land use decisions under the control of local jurisdictions. The effects of this growth are described in appropriate chapters throughout this EIR/EIS.

## *Alternative 2: Folsom South Canal Connection*

Alternative 2 involves the construction of a pipeline connection and water pumping plant facilities sized to deliver up to 350 cubic feet per second (cfs) of American River water to the EBMUD service area via the FSC and the Mokelumne Aqueducts. Raw water would be channeled into the FSC through the Reclamation-owned Nimbus Diversion Works at Lake Natoma and conveyed to either the existing EBMUD contract turnout near Grant Line Road in Sacramento County or a new turnout near the terminus of the FSC. From either point, water would be pumped from the canal through a pumping plant and routed into the buried FSC connection pipeline. The water would then be conveyed through the pipeline to a tank adjacent to the Mokelumne Aqueducts and then pumped into the aqueducts through a second pumping plant. The aqueducts would deliver the water to the EBMUD service area for treatment and distribution to customers. Existing treatment facilities in the EBMUD service area would be improved to accommodate the new supply.

EBMUD and Reclamation are evaluating four potential pipeline alignments under Alternative 2 (Figure 2-1). The general arrangement and design of the proposed facilities are essentially the same. These alignment configurations differ primarily in locations of pumping facilities along the FSC, location of conveyance pipelines, and surge protection requirements.

### General Description of Facilities

**Pipeline.** Under all four potential alignments, the FSC connection pipeline would be constructed of 96-inch-diameter pipe with 350-cfs capacity and would be buried beneath approximately 5 feet of cover material.

Alignment 1. Alignment 1 extends approximately 34 miles south from EBMUD's existing



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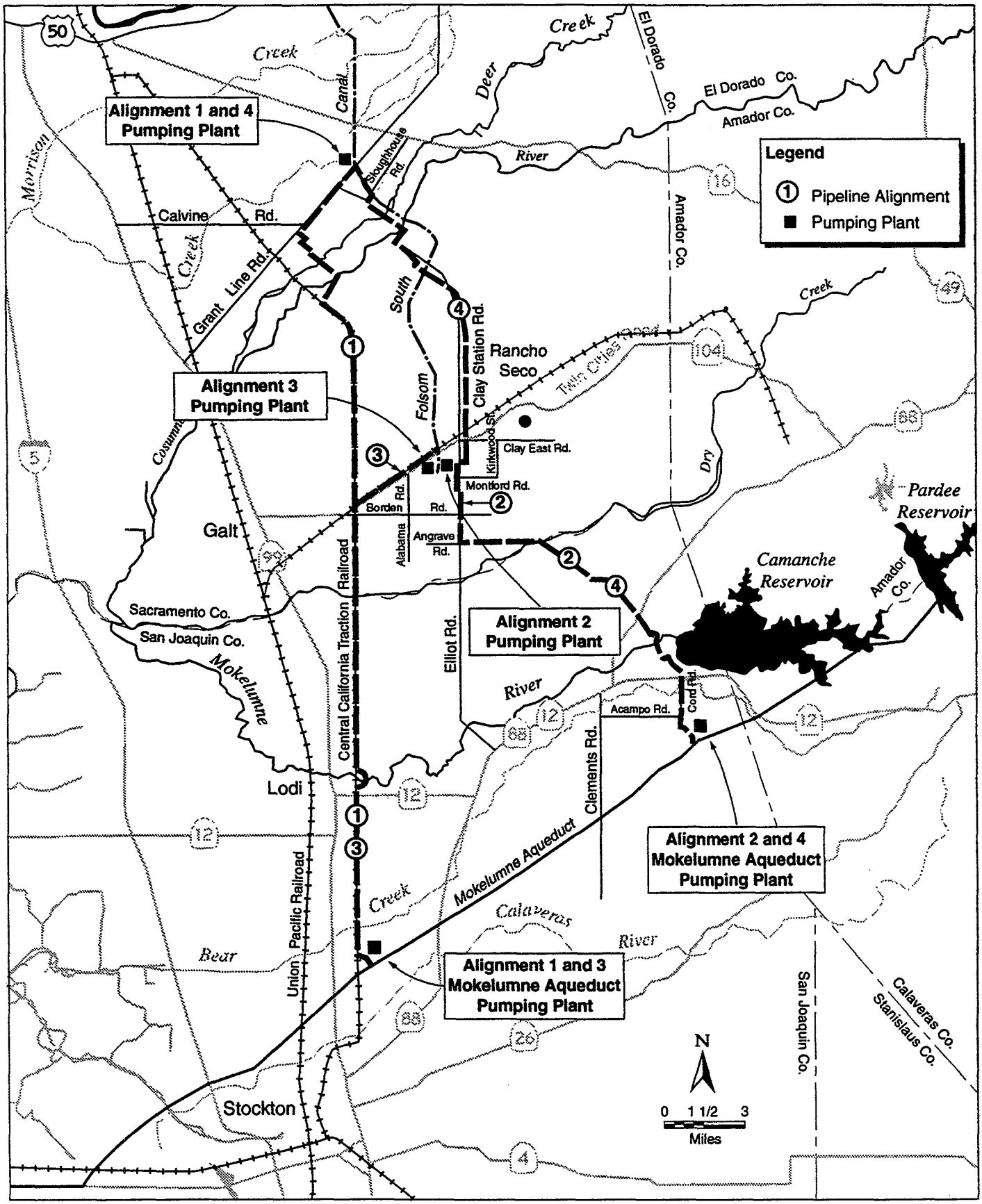


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**Figure 2-1**
**Alternative 2: Pipeline Alignments**

contract turnout on the FSC to the Mokelumne Aqueducts (Figure 2-1). The alignment begins at the turnout on the northwest side of Grant Line Road and generally follows the road for approximately 3 miles. The alignment then turns southeast, crossing Deer Creek and the Cosumnes River before turning southwest and intersecting with the Central California Traction (CCT) rail line. The alignment then follows the CCT rail line south, remaining within the right-of-way until it reaches the Mokelumne River. At this point, the alignment leaves the CCT right-of-way, turns east and then southeast, crosses the Mokelumne River, and heads west within private property until it reenters the CCT right-of-way. The alignment continues in the CCT right-of-way south until a point approximately 4,000 feet north of the CCT rail line intersection with the Mokelumne Aqueducts. At this point, the alignment turns east and then southeast to the aqueduct pumping plant site west of Hildreth Lane.

Alignment 2. Alignment 2 is approximately 16.9 miles long and extends from a new turnout near the southern end of the FSC to the aqueduct pumping plant site at the Mokelumne Aqueducts (Figure 2-1). From the new turnout and canal pumping plant, the alignment extends east to Clay Station Road then turns south, continuing along Clay Station Road to Angrave Road and east to Dry Creek. South of Dry Creek, the alignment continues southeast, generally adjacent to a Pacific Gas and Electric Company (PG&E) transmission line right-of-way, following the right-of-way to its intersection with Highway 88. The alignment continues southeast from Highway 88 to Buena Vista Road, paralleling the road, to EBMUD's property line. From Buena Vista Road, the alignment heads south, crossing the Mokelumne River, traversing EBMUD's Camanche Reservoir property to Highway 12, crossing Highway 12, and following the west side of Cord Road to Acampo Road. From Acampo Road, the alignment extends south 4,500 feet to the aqueduct pumping plant site.

Alignment 3. Alignment 3 is approximately 23 miles long, extending south from near the FSC terminus to the Mokelumne Aqueducts (Figure 2-1). From the FSC, the alignment heads southwest and follows the Union Pacific (formerly Southern Pacific) Railroad right-of-way adjacent to Twin Cities Road. The alignment connects with the CCT right-of-way and then continues south, following Alignment 1 described above.

Alignment 4. Alignment 4 is approximately 32 miles long. From EBMUD's existing contract turnout on the FSC, the alignment parallels the west side of the FSC immediately adjacent to the FSC right-of-way to Sloughhouse Road (Figure 2-1). The alignment then turns southwest and parallels Sloughhouse Road for approximately 2,000 feet to a 90-degree turn in Sloughhouse Road, where it heads southeast, crossing Deer Creek and the Cosumnes River. South of the Cosumnes River, the pipeline heads southeast, crossing the FSC at Clay Station Road. From this point, the pipeline parallels the west side of Clay Station Road, crossing Highway 104 and continuing south until it reaches the terminus of the FSC. From this point, the alignment follows Alignment 2 described above.

**Pumping Plants.** Each pipeline alignment would include a canal pumping plant to direct water from the FSC into the pipeline and an aqueduct pumping plant to deliver water from the end of the pipeline into the Mokelumne Aqueducts.

Canal Pumping Plant. A conceptual layout of canal pumping plant facilities and proposed locations is shown in Figures 2-2a, 2-2b, and 2-2c. For all four alignments, the canal pumping plant facility would consist of a steel-framed building with metal siding, a canal intake structure, pumps, a flow meter, site piping, surge-protection equipment, chlorine and lime storage and injection facilities, and an electrical substation designed to accommodate a pumping capacity of 350 cfs. Multiple pumps would be installed to allow for the pumping of a wide range of flows. Access to the canal pumping



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plant for Alignments 1 and 4 would be from Grant Line Road along an existing paved road on the FSC levee. Access to the canal pumping plant for Alignment 2 would be from Twin Cities Road along the east FSC maintenance road and/or from Clay Station Road along a new roadway east of the plant.

The specifications for the canal plant under each alignment are shown in Table 2-1. The canal pumping plant would require less horsepower for Alignments 1 and 4 than for Alignments 2 and 3.

Table 2-1. Canal Pumping Plant Specifications

| | Alignment | |
|---|---|---|
| | 1 and 3 | 2 and 4 |
| Number of pumps, including one standby | 6 | 6 |
| Pump capacity (cfs) | 350 | 350 |
| Operating horsepower | 4,500 | 16,000 |
| Approximate site dimensions (acres) | 2–3 | 3–4 |

The canal pumping plant would operate on electricity and would require a new 69-kilovolt (kV) transmission line extension from a nearby existing transmission line, a new substation transformer, and a new substation with 69-kV metering. These facilities would likely be owned and operated by the Sacramento Municipal Utility District (SMUD). For Alignments 1 and 4, the new 69-kV line would likely extend approximately 6,900 feet from an existing line near the intersection of Jackson Highway and Sunrise Boulevard. For Alignments 2 and 3, the new line would likely extend about 5,600 feet from an existing line on Highway 104 approximately 2.5 miles west of the town of Clay. For all alignments, the substation transformer and substation would be located on the pumping plant site.

Aqueduct Pumping Plant. A conceptual layout of aqueduct pumping plant facilities and proposed locations is provided in Figures 2-3a and 2-3b. The aqueduct pumping plant would be located at the end of the new pipeline where it connects with the Mokelumne Aqueducts. For all four alignments, the pumps would be housed in a steel-framed building with metal siding and the pumping plant site would include site piping, pipeline isolation valve, pumps, chlorine and lime storage and injection facilities, and a small maintenance workshop. Plant facilities also would include a 7-million-gallon concrete tank with a diameter of approximately 172 feet and a height of approximately 42 feet (55 feet if covered). The reservoir would be supported by a reinforced concrete slab placed on grade. The pumping plant would be capable of pumping up to 350 cfs of water from the tank into the Mokelumne Aqueducts.

The specifications for the aqueduct pumping plant for each alignment are shown in Table 2-2. Pump operating horsepower would be greater for Alignments 1 and 3 than for Alignments 2 and 4.

Each aqueduct pumping plant would operate on electricity and would require a new transmission line extension from an existing line, a new substation transformer, and a new electrical substation. These facilities would be constructed according to criteria established by the electrical utility provider. For Alignments 1 and 3, the new line would be extended approximately 25,000 feet from an existing 115-kV transmission line near Tully Road. The new 115-kV line would follow Eight Mile Road to the aqueduct pumping plant site. For Alignments 2 and 4, a new 230-kV transmission line would extend east approximately 750 feet from an existing 230-kV line west of the aqueduct pumping plant site. For all alignments, the substation transformer and substation would be located on the pumping plant site.



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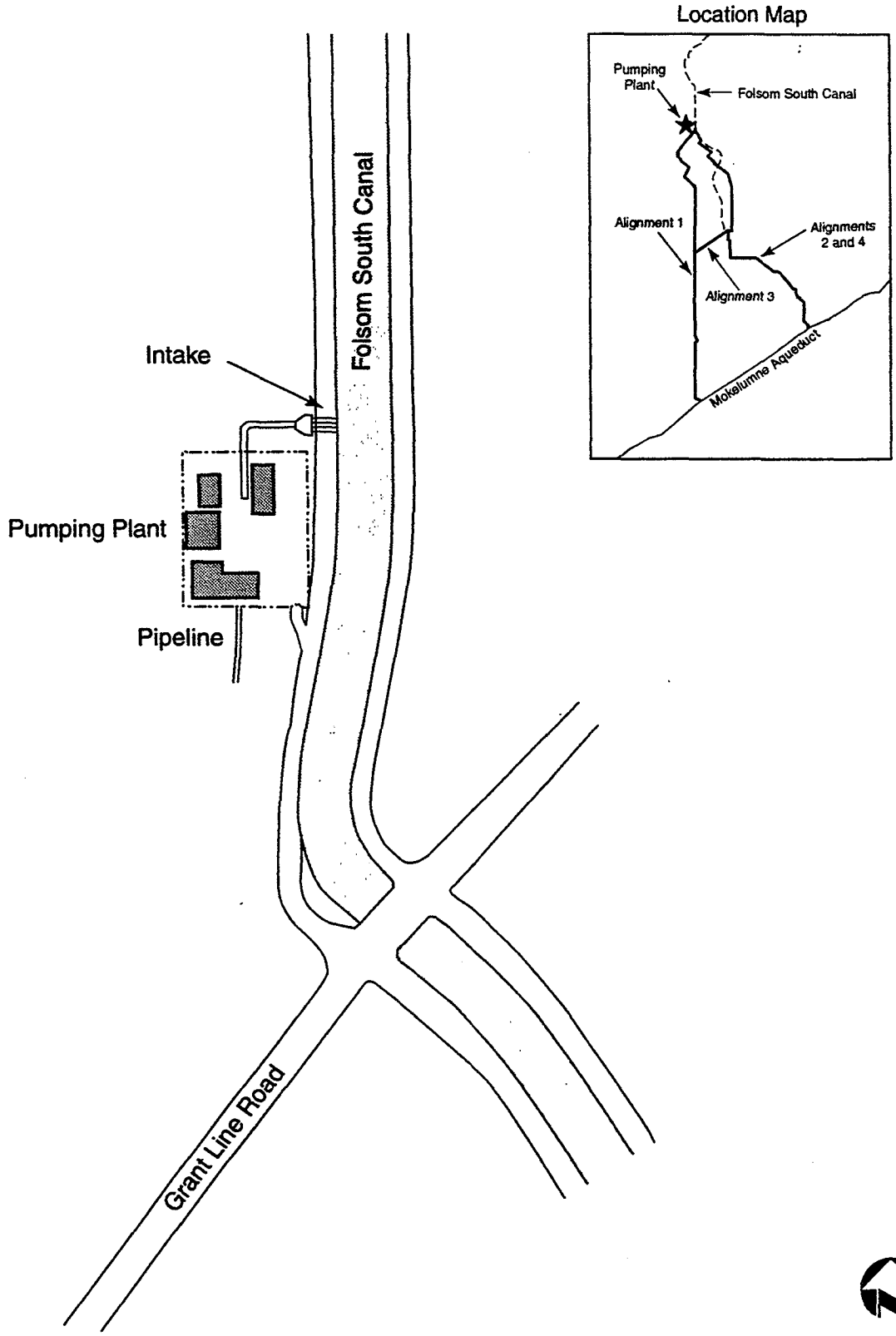


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**Figure 2-2a**
**Conceptual Canal Pumping Plant Layout and Location for Alignments 1 and 4**

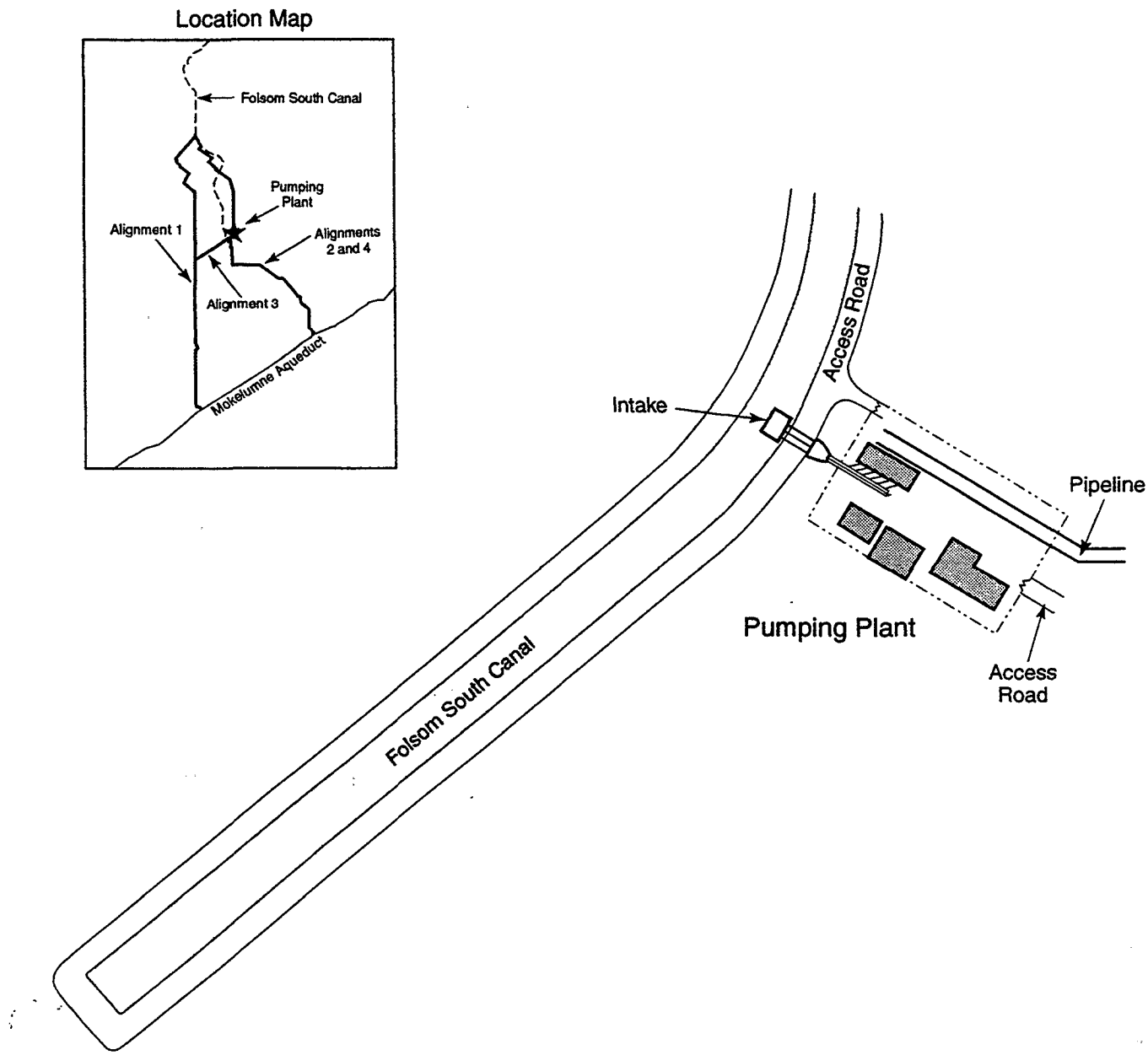


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**Figure 2-2b**
**Conceptual Canal Pumping Plant Layout and Location for Alignment 2**

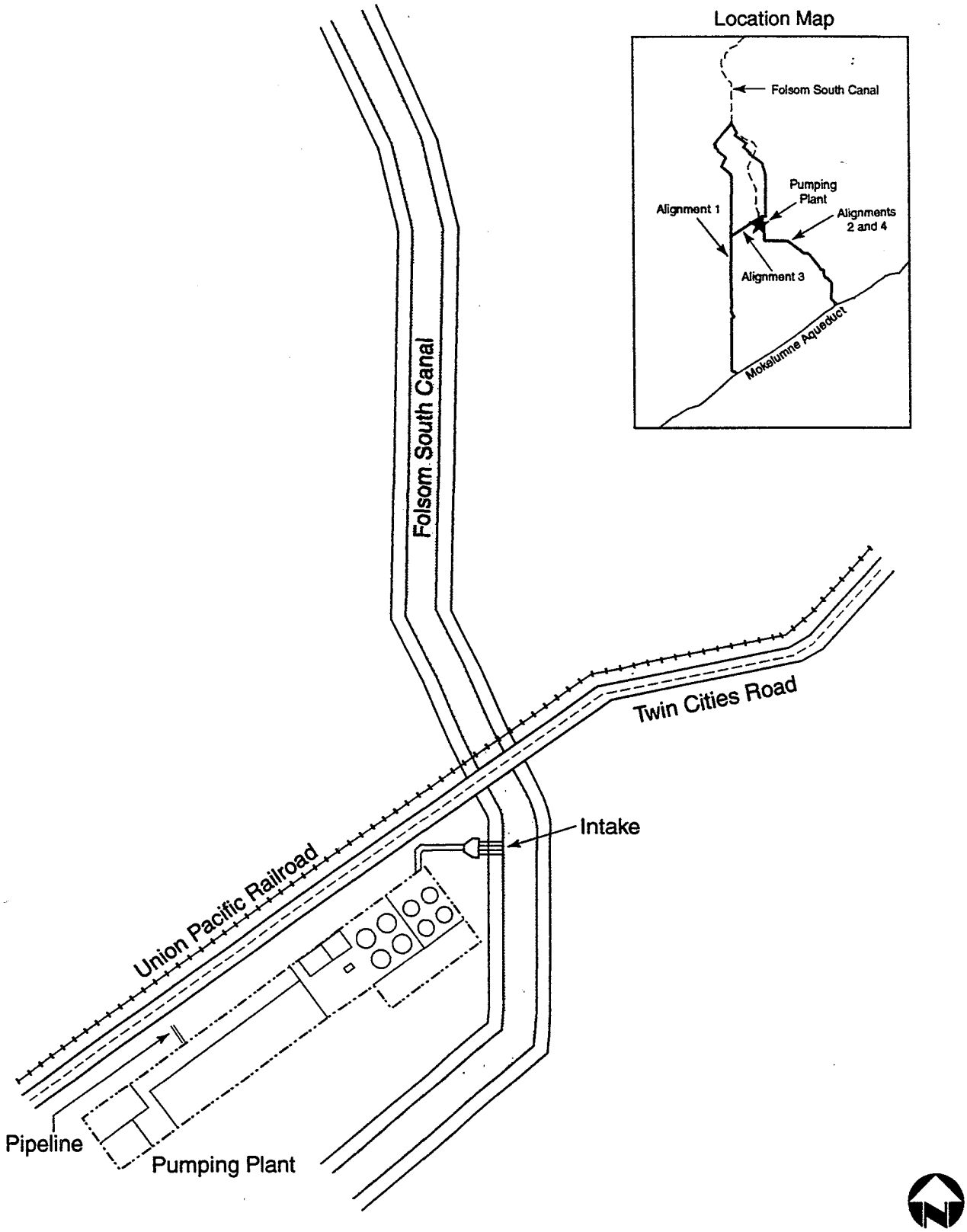


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**Figure 2-2c**
**Conceptual Canal Pumping Plant Layout and Location for Alignment 3**

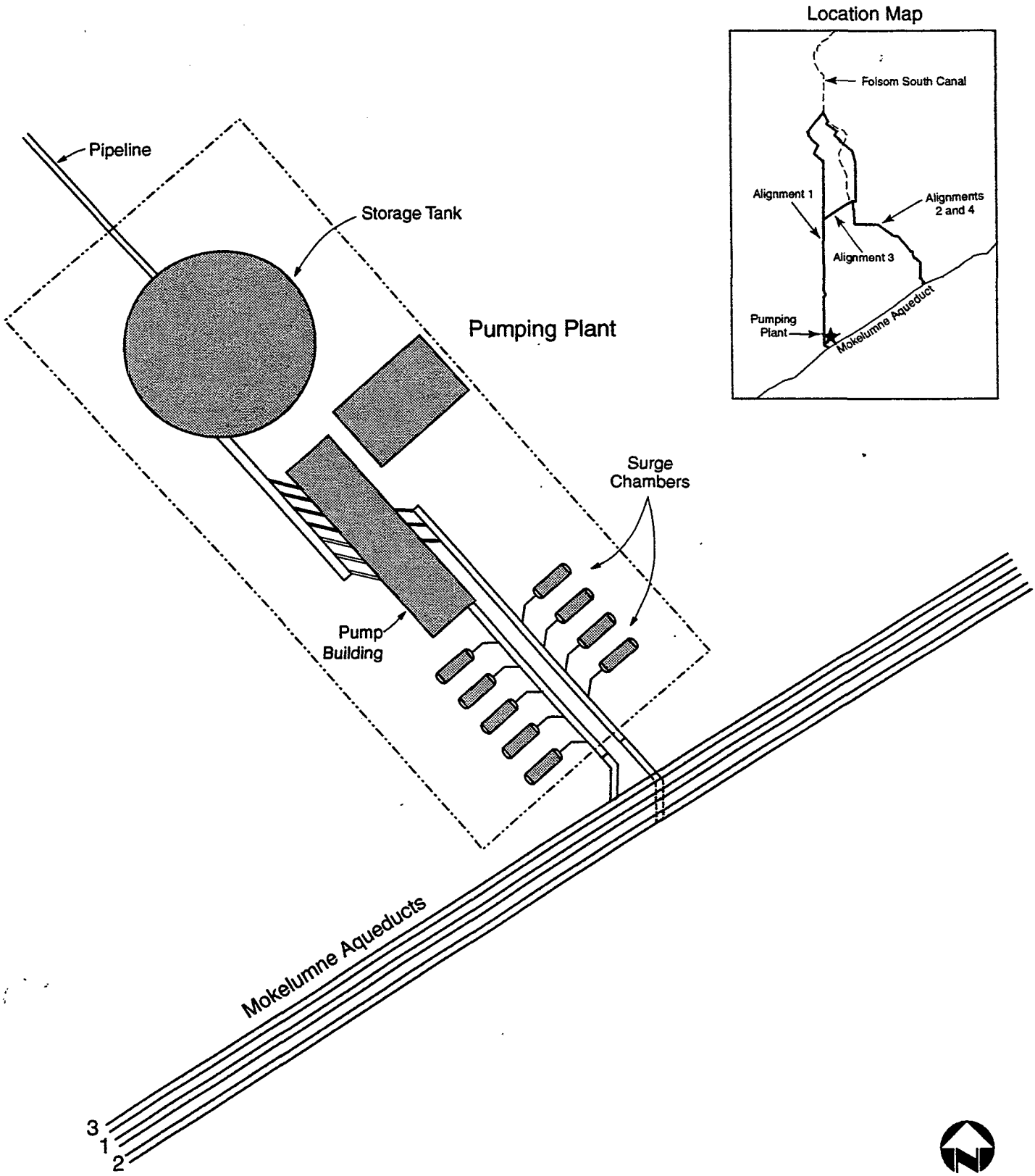


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**Figure 2-3a**
**Aqueduct Pumping Plant Location for Alignments 1 and 3**

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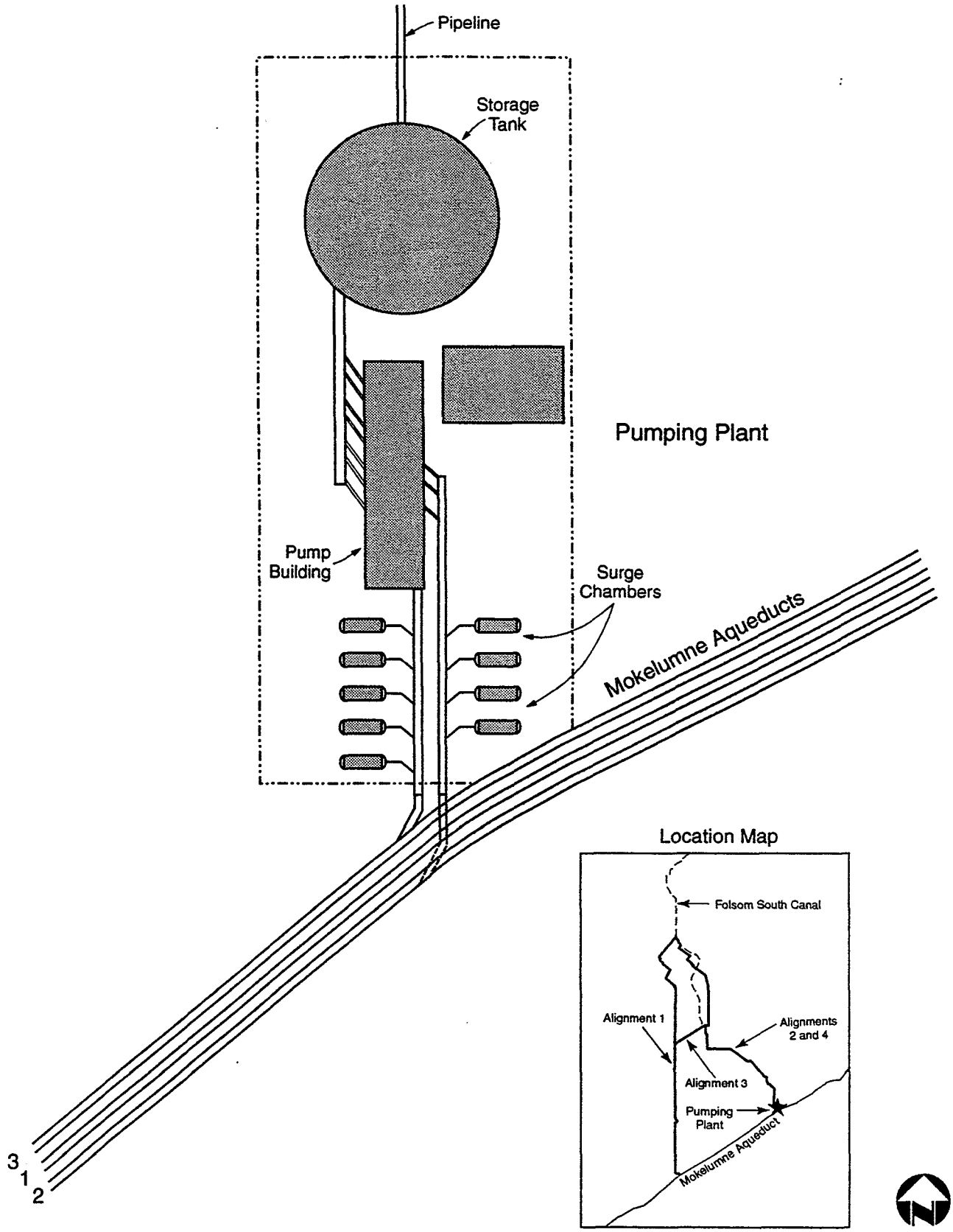


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**Figure 2-3b**
**Aqueduct Pumping Plant Location for Alignments 2 and 4**

Table 2-2. Aqueduct Pumping Plant Specifications

| | Alignment | |
|---|---|---|
| | 1 and 3 | 2 and 4 |
| Number of pumps, including one standby | | |
| Aqueduct No. 2 | 4 | 4 |
| Aqueduct No. 3 | 4 | 4 |
| Pump capacity (cfs) | | |
| Aqueduct No. 2 | 135 | 135 |
| Aqueduct No. 3 | 266 | 266 |
| Operating horsepower | | |
| Aqueduct No. 2 | 8,000 | 5,000 |
| Aqueduct No. 3 | 15,000 | 9,000 |
| Approximate site dimensions (acres) | 5–6 | 4–5 |

**Improvements to EBMUD's Service Area Water Treatment System.** Alternative 2 would also include improvements to EBMUD's existing Walnut Creek, Lafayette, and Orinda water treatment plants (WTPs) to provide appropriate levels of treatment for American River water supplies. These improvements include new flocculation facilities at each location. The flocculation facilities and solids management and ancillary equipment would include basins approximately 15 feet deep and would cover an area of approximately 0.5 acre at each plant. New chemical feed facilities for the flocculation facilities would also be constructed. Improvements would also be made to the onsite solids handling facilities. The facilities would be designed following applicable water quality standards and agency recommendations and would be constructed entirely within existing EBMUD property.

At the Walnut Creek WTP, the new facilities would generally be located on the north and east portions of the existing site. The Lafayette WTP facilities would be similar and would be located in the south portion of the existing site. The Orinda WTP facilities would be located at the north end of the existing site. EBMUD is currently evaluating improvements to the Walnut Creek WTP as part of the San Ramon Valley Master Plan process.

**Required Right-of-Way.** The permanent right-of-way for pipeline operation and maintenance under Alternative 2 would be 80 feet wide, and an additional 50 feet of temporary right-of-way would required for construction. The combined area of the permanent and temporary easements would accommodate the top width of the pipeline trench and stockpiled materials and provide maneuvering room for construction equipment. A cross-section of a typical pipeline construction area is depicted in Figure 2-4. Where feasible, the pipeline alignments have been routed to avoid structures, sensitive environmental resources, and other land use and environmental resource conflicts. Along those sections of the pipeline not visible for inspection from existing roads, a gravel road may be placed within the pipeline right-of-way.

### Operations

EBMUD operates its current Mokelumne River system to provide adequate water supplies to its customers and minimize deficiencies. Water supply forecasts are used in the preparation of operation projections. The operations projection is updated throughout February, March, and April as more reliable information becomes available. The main parameters considered in the operation projection are the water supply forecast of projected runoff, water demand of other users on the river, water demand of EBMUD customers, and flood control requirements.

Under Alternative 2, EBMUD would take delivery of American River water whenever it is available and can be used either to supplement its water supplies or to store in its reservoirs. Under these conditions, which occur on average for at least one month in four out of every five years (see Appendix C), EBMUD would take



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delivery of up to 350 cfs of water from the FSC. These deliveries would be limited to those periods when flows in the American River are at or above flows required by the Hodge Decision (1990). The yearly frequency of deliveries from the American River is high because the Hodge Decision restricts American River water availability for some of the dry years when the water is needed to reduce deficiencies. Water from the American River is thus required prior to any time period that could be subject to dry conditions. However, the deliveries would take place sporadically throughout many of the years when water is delivered. On a monthly basis, the frequency of diversions would be approximately 1 out of every 5 months. For the purposes of this EIR/EIS, water was considered to be available for delivery to EBMUD whenever flows were above those required by the Hodge Decision (1990). It was not assumed that water would be released specifically to meet EBMUD needs. Figure 2-5 shows average annual project deliveries. Chapter 3 and Appendix C provide additional details on project operations.

During a planned outage of Pardee Dam or Reservoir, such as for major maintenance or seismic improvements, EBMUD would take delivery of up to 350 cfs of American River water from the FSC during periods when the flows required by the Hodge Decision are satisfied for direct use by its customers, instead of using Mokelumne River water. Planned outages would occur infrequently and total no more than 12 months in a 20-year period, with no single event extending beyond 6 months.

At times when EBMUD is not using the full capacity available from this alternative, some capacity may potentially be available to others; however, implementation of the project is not dependent on use of this potentially available capacity by others. Such use by others will be subject to separate/supplemental project-level environmental compliance. Supplemental information is included at the ends of Chapters 2, 3, 4, 5, 6, 7, and 16 in this EIR/EIS to describe the potential effects of use of this capacity.

**Construction Considerations**

**Pipelines.** Construction of the Alternative 2 pipeline alignments would require three to four construction crews operating concurrently over an anticipated 24-month construction period. General construction, operation, and maintenance access to the project area would be via major highways in the area and various lesser roads that parallel and traverse the alignment. The rate of pipeline installation is expected to range from 100 to 300 feet per day per crew. Select river and roadway crossings would be constructed by tunneling. Pipeline construction would involve several steps, including pipe fabrication and transport to the job site, clearing of the right-of-way, and trench excavation followed by onsite stockpiling and hauling of excavated materials offsite (described below), placement of bedding material, pipe laying, and installation of backfill material, including surface restoration. Pipe and valves would be fabricated offsite and transported to the construction site by truck and possibly by train.

To install the pipe, a bottom trench width providing approximately 24 inches of clear working space on both sides of the pipe would be excavated. The pipe would generally be installed 5 to 6 feet below finished grade, with greater depths possible at roadway, railroad, stream and river, and utility crossings. Equipment used to construct the pipeline would include scrapers, bulldozers, excavators, loaders, cranes, and compactors, and smaller equipment such as water and maintenance trucks.

**River and Stream Crossings.** As shown in Figure 2-1, the Alternative 2 pipeline alignments would cross several streams and rivers in Sacramento and San Joaquin counties. Rivers and major streams crossed by Alignments 1 and 4 include (from north to south) Deer Creek, Cosumnes River, Dry Creek, Mokelumne River, and Bear Creek. Rivers and major streams crossed by Alignments 2 and 3 include Dry Creek and Mokelumne River.



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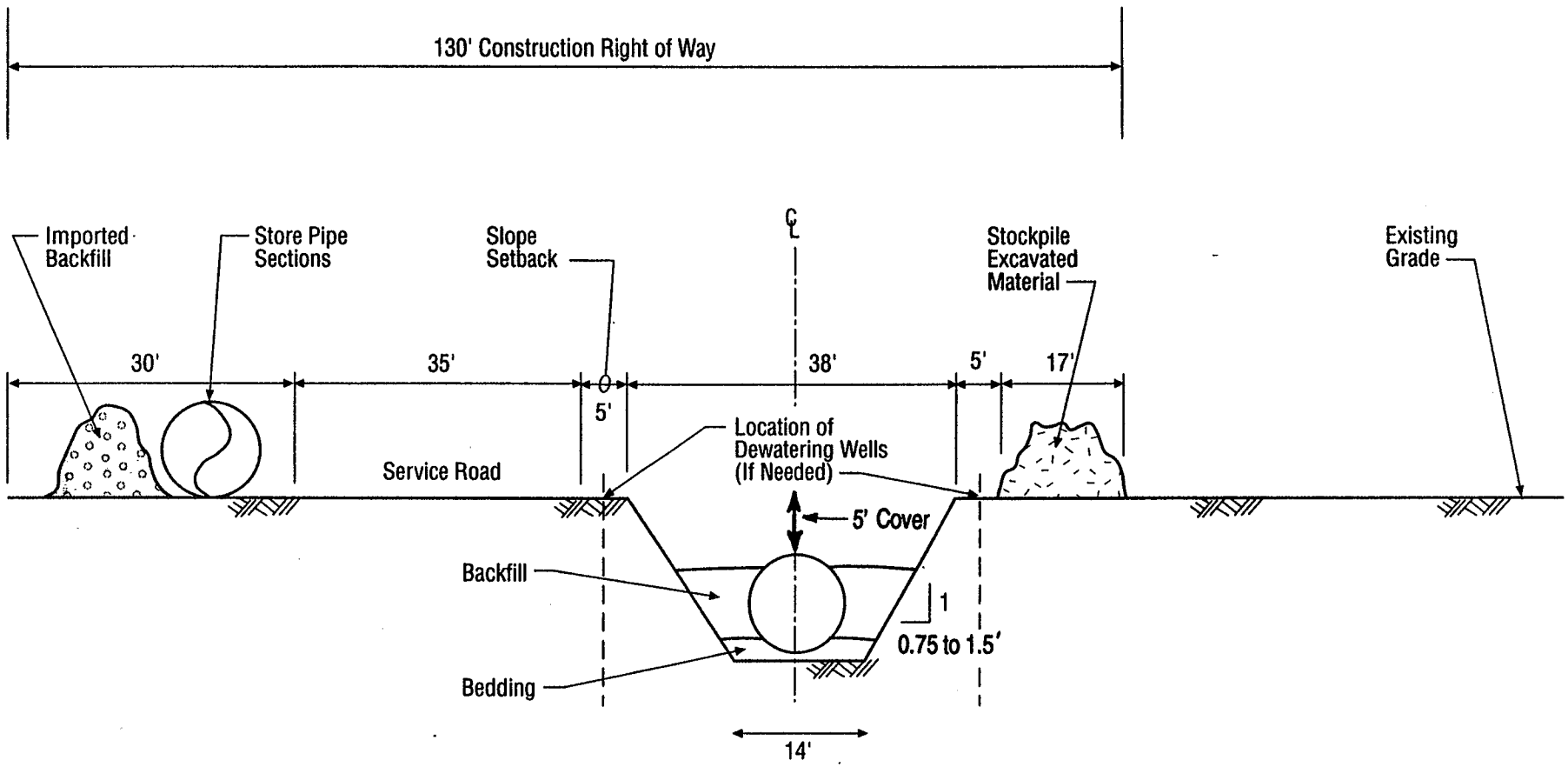


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**Figure 2-4**
**Typical Pipeline Construction Area Cross Section**

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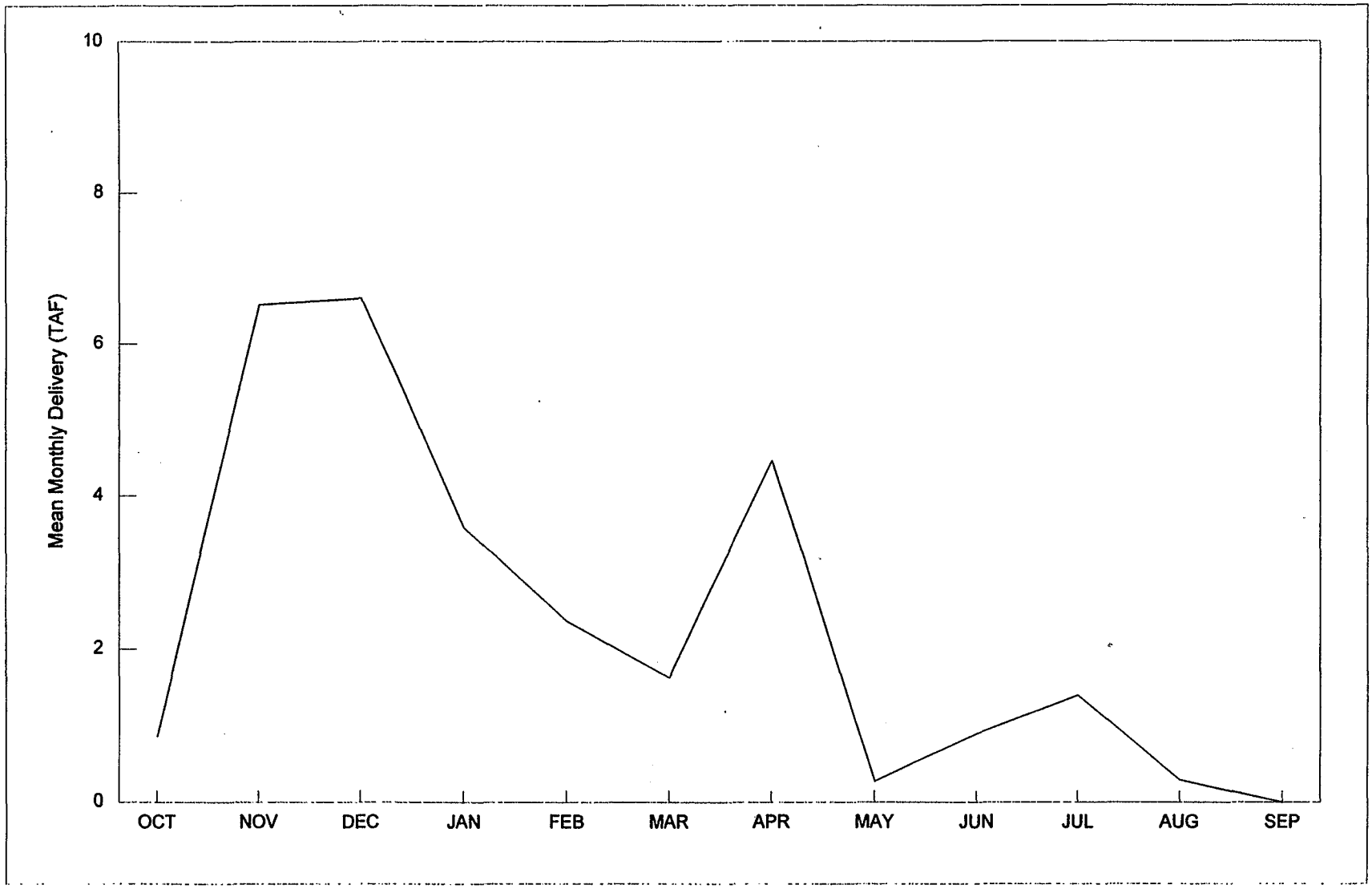


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**Figure 2-5**
**Average Annual Project Deliveries under Alternative 2**

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Construction at stream and minor river crossings would use open cut methods during the dry season when many minor streams and tributaries are dry or have low flows. If necessary, a temporary delivery channel would be constructed to redirect flows around the open cut area during construction. Open trench work would be contained within the 130-foot construction easement, except for construction of a sedimentation basin, which would likely be about 1,000 square feet in area and built next to a creek bank just downstream of a stream crossing. Stream hydrology would be restored to its original condition immediately following construction.

Where necessary, major rivers would be crossed by tunneling the pipeline beneath the water channel to avoid disruption of flows. Tunneling is currently planned for the Mokelumne River, which is crossed by all alignments. This construction method involves establishing an accessible, cleared area, approximately 0.5 to 1 acre in size at the driving side of the tunnel, for lay down and storage of pit construction and tunnel liner materials, mobilization of the tunnel machinery and construction equipment, and temporary stockpiling of excavated tunnel material. Tunnel construction would entail creating driving and receiving pits, building an approximately 2,000-square-foot sedimentation basin, excavating the tunnel and installing a liner, and cleaning up and restoring the site after construction. These temporary activities would require additional easements.

**Roadway Crossings.** Roadways crossed by the Alternative 2 pipeline are listed in Table 12-1, in Chapter 12, "Transportation and Circulation." Many minor roadways and several major highways in rural Sacramento and San Joaquin counties would be crossed by all four alignments. Minor roadways would generally be crossed by open cut methods, and the roadway surface would be repaired immediately following construction. The pipeline may be tunneled under major highways to avoid disrupting traffic (see Table 12-6, in Chapter 12 for a list of roads to be tunneled).

**Pumping Plants.** Most pumping plant facilities for Alternative 2 would be constructed aboveground. Portions of the pump building to be located underground would be constructed by standard, open cut construction methods. General construction, operation, and maintenance access to the project area would be via major highways in the area and various lesser roads that parallel and traverse the alignment. No existing facilities or structures would be removed during construction. Construction activities would include clearing and excavation, use of concrete forms, and backfilling. The 7-million-gallon tank for the aqueduct pumping plant would be constructed of concrete.

For construction of Alignments 2 and 3, a temporary cofferdam would be installed in the south end of the FSC to allow a new turnout structure to be built near the canal pumping plant. Because the existing EBMUD turnout structure would be used for Alignments 1 and 4, a cofferdam in the FSC would not be necessary.

**Access Roads and Staging Areas.** Access roads and staging areas would be required to provide access to construction sites and to provide areas for material and equipment storage. The location of these facilities cannot be determined at this time. EBMUD would require that construction contractors identify such sites early in the construction planning process and would review the proposed locations to ensure that sensitive resources are not disturbed or affected. Contractors would be required to contain all activities within the approved sites.

**Excavated Material.** Excavation of native materials for pipeline trenches, pumping plants, and staging areas would produce excess material for disposal. Where feasible, displaced materials would be hauled to an appropriate off-site disposal location or spread across the right-of-way. Topsoil removed from the area to be excavated would be stockpiled and used to cover the pipeline right-of-way where feasible. The disturbed right-of-way would be reseeded with an appropriate seed mixture. To avoid



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altering local hydrologic conditions or floodflows, spoil materials would not be placed in sensitive habitat areas such as wetlands or in floodplains identified by the Federal Emergency Management Agency.

**Construction Schedule.** Construction of Alternative 2, including the pipeline and both pumping plants, would begin in early 1999 and continue for approximately 24 months. The pipeline would generally be constructed at a rate of between 100 and 300 feet per day per construction crew, with road and stream crossings constructed at a slower rate. The filtration plant expansions in the EBMUD service area would likely take one to two full construction seasons. Required truck trips during construction are described in Chapter 12.

**Capital Cost.** Estimated capital costs of all four alignments and the treatment facility improvements are shown in Table 2-3.

Table 2-3. Alternative 2 Costs

| Alignment | Estimated Capital Cost[a] ($ million) |
|---|---|
| 1 | 312 |
| 2 | 169 |
| 3 | 238 |
| 4 | 267 |
| Service area filtration plant expansion[b] | 14.5 |

[a] Includes administrative and engineering costs (March 25, 1997 cost-share agreement).

[b] Applies to all potential alignments.

**Ratepayer Costs.** This discussion presents an evaluation of the costs to construct and operate Alternative 2. This evaluation is presented for comparison purposes and may change based on the final costs to construct and operate the alternative.

The ratepayer cost assessment was based on the following assumptions:

- estimated cost of Alternative 2 would range from $326.5 million to $183.5 million (Alignment 1: $326.5 million, Alignment 2: $183.5 million, Alignment 3: $252.5 million, and Alignment 4: $281.5 million),
- System Capacity Charges would fund 70% of the cost of each alternative for EBMUD,
- total annual deliveries would total 29,000 AF,
- annual costs per acre-foot are based on a 75-year project life and are reported in 1997 dollars.

A large share of the cost of the Supplemental Water Supply Project will be paid through system capacity charges, which are fees charged to applicants for new water service and used to pay for capital programs necessary to provide new water supply, treatment, and distribution system capacity to serve those customers. The proportion of costs for Alternative 2 covered by system capacity charges is shown in Table 2-4.

Total costs under Alternative 2 would range from a high of $326.5 million under Alignment 1 to a low of $183.5 million under Alignment 2.

Estimated EBMUD ratepayer costs under Alternative 2 would range from a high of $98 million for Alignment 1 to a low of $55 million under Alignment 2.

Total estimated annual EBMUD ratepayer costs per acre-foot under Alternative 2 would range from a high of $45 under Alignment 1 to a low of $25 under Alignment 2.



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Table 2-4. Estimated Costs of Alternative 2 and Associated System Capacity Charges and Ratepayer Costs

| | Preliminary Construction[a] ($ million) | Costs ($ million) | | Annual Ratepayer Costs per AF ($)[c] |
|---|---|---|---|---|
| | | System Capacity Charge[b] | Ratepayer | |
| Alignment 1 | 326.5 | 228.5 | 98 | 45 |
| Alignment 2 | 183.5 | 128.5 | 55 | 25 |
| Alignment 3 | 252.5 | 176.8 | 75.7 | 35 |
| Alignment 4 | 281.5 | 197.1 | 84.4 | 39 |

Notes:

[a] Construction costs are preliminary and may change based on final engineering estimates.

[b] System capacity charges would account for 70% of construction and operation costs.

[c] Average annual deliveries to EBMUD total 29,000 AF under Alternative 2 and 35,000 AF under Alternative 3. Costs per AF are based on a 75-year life span for the project and are not adjusted.

## Alternative 3: Joint Water Supply

Alternative 3 is the mutually acceptable proposal developed by EBMUD, the City, and the County. Some facilities are shared by these joint project participants. A new intake facility with a capacity of 217 cfs (140 MGD) would be constructed on the lower American River upstream of the Interstate 5 (I-5) American River Bridge. A new pipeline with a capacity of 217 cfs would be constructed from this new delivery point to the City of Sacramento's E. A. Fairbairn WTP. Water for Sacramento County would be delivered at the new facility upstream of I-5 and would be pumped back to the Fairbairn WTP for treatment and ultimate distribution to the County's water service area. A second pipeline with a capacity of 350 cfs would be constructed from this point to the FSC for EBMUD. From the FSC terminus, a new 350-cfs pipeline connection to the Mokelumne Aqueducts, represented by Alignment 2 described above for Alternative 2, would be constructed. Alignment 2 represents the facilities included in the mutually acceptable alternative agreed to by EBMUD, the City, and the County.

Alternative 3 would also involve expansion of the existing diversion and treatment capacity at Fairbairn WTP by 100 MGD and the Sacramento River WTP by 50 MGD to provide increased capacity for the City to meet its future water supply needs.

Besides meeting EBMUD's project objectives described above, Alternative 3 would contribute to meeting the objectives of the City and the County to provide a safe reliable water supply to 2030 and preserve the values of the lower American River. This alternative is described in detail below.

### Facilities

**New Delivery Facility.** Under Alternative 3, the joint project partners would construct a new delivery facility on the lower American River with an intake structure located in the lower American River. Five potential intake locations are being considered (Figure 2-6a). The facility would be located in the portion of the river where the channel is deeper. Figure 2-7 shows the conceptual design of this facility. The new intake facility would



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allow the delivery of up to 217 cfs (140 MGD) from the American River. Up to 155 cfs of this capacity would be available to EBMUD, and the remaining 62 cfs capacity would be used by the County. The facility would be similar in general design to the existing City intake facility at Fairbairn WTP. The pumping equipment would be contained within the intake structure. The intake facility would be approximately 100–25 feet long, 30–40 feet wide, and about 70 feet high. Six individual pumps would be located inside the facility, each capable of pumping up to 28 MGD. The foundation would be pile-supported with pile lengths of 60 feet or more. An upper level pump and motor deck would be constructed above the 100-year flood elevation. The pumps would discharge to a common manifold and a discharge line(s) that would be carried to the south bank of the river via an access bridge. The access bridge would likely be pier- and pile-supported and run from the levee to the intake structure.

Chemical conditioning may be required at the intake location. The chemical feed facility would include small pumps and four 6,000- to 7,000-gallon tanks most likely constructed on the landward side of the levee near the intake location. Chemical conditioning will likely include chlorination using sodium hypochlorite to control biological growth. Because American River water is also slightly corrosive, lime slurry will likely be used to control pH. The chemical conditioning facilities will be enclosed within a building and will be designed to prevent contamination in the unlikely event of a chemical spill. Access to these facilities will be from existing streets and will be infrequent.

The facility would include a fish exclusionary system and will be designed to meet California Department of Fish and Game (DFG), National Marine Fisheries Service (NMFS), and U.S. Fish and Wildlife Service (USFWS) criteria.

A source of electrical power would be required to operate the new intake facility. Because of the industrial nature of the surrounding land uses, many options for power supply are available. The new pumping plant and expanded treatment facilities at Fairbairn WTP or the alternate pumping plant location on Ramona Avenue would create a need for additional power supply; because substantial amounts of electrical power is already used at Fairbairn WTP, only minor modifications would be required.

**Lower American River Intake**

Intake Alternatives 1 through 5 would be located upstream of the I-5 American River Bridge and would include the intake features previously described (Figure 2-6a). Intake Alternative 1 would be located approximately 600 feet upstream of the I-5 American River Bridge and would extend into the river in an alignment from Bercut Drive. Intake Alternative 2 would be constructed approximately 2,000 feet upstream of the I-5 bridge crossing and would extend into the river in an alignment north of a railroad spur east of North 3rd Street. Intake Alternative 2 would be located in an area of the river generally known as the Truxel Avenue corridor and could tie visually into a potential future Sacramento Regional Transit District crossing of the American River and Parkway between Truxel Avenue and Richards Boulevard. However, physically combining these structures is infeasible because construction of the light-rail bridge has not been approved and larger structural elements would be required, the potential light-rail facility is only in the preliminary planning phase, and a decision on the final alignment and project implementation would not be expected for several years.

Intake Alternative 3 would be located approximately 3,700 feet upstream of the I-5 bridge crossing near north 5th Street. Intake Alternative 3 could provide water quality benefits because the intake structure would be upstream of a stormwater discharge outfall at approximately north 5th Street. Intake Alternative 4 would be located approximately 6,000 feet upstream of the I-5 bridge crossing,



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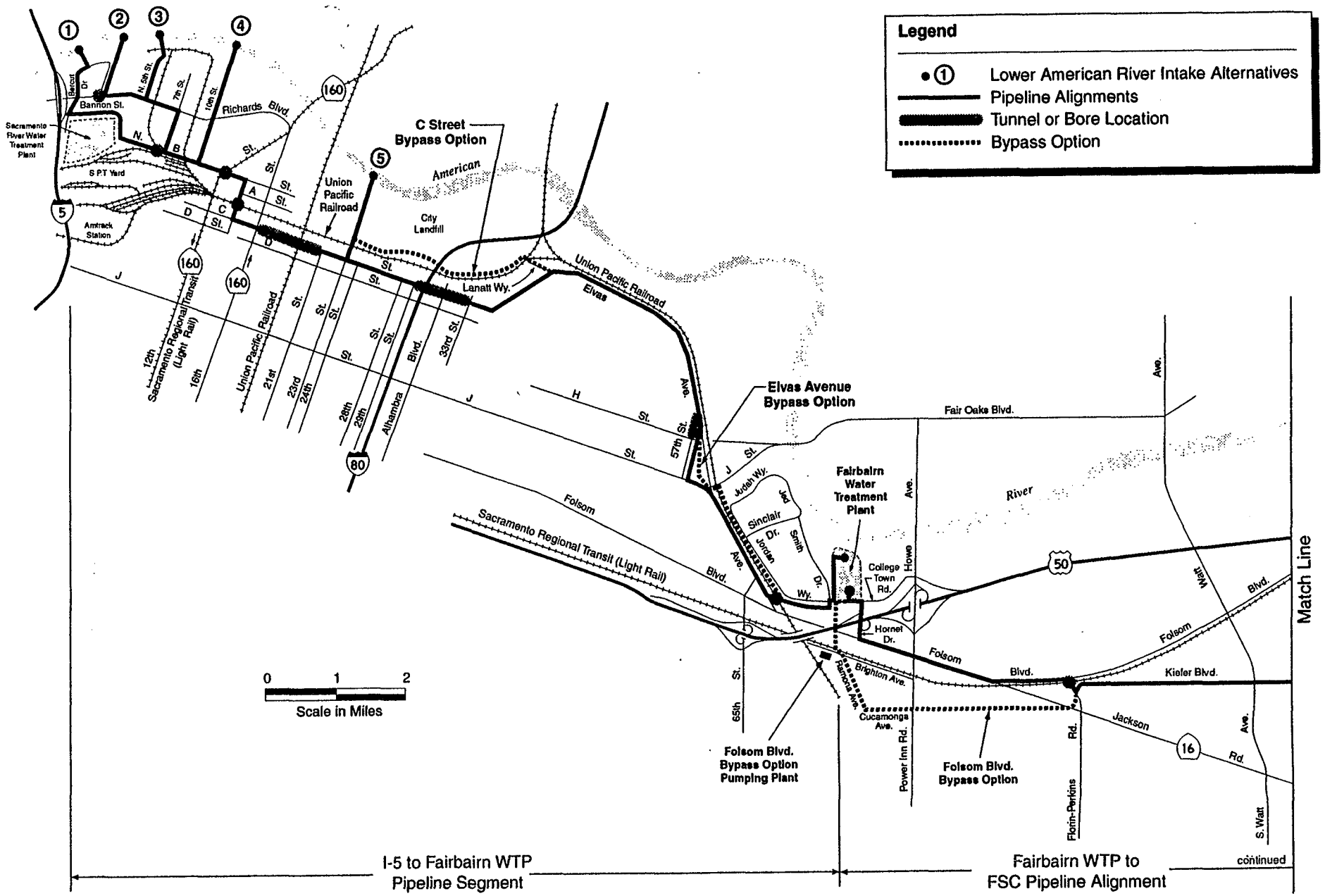


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**Figure 2-6a**

**Alternative 3: Intake, Pipeline, and Treatment Plant Expansion Locations**

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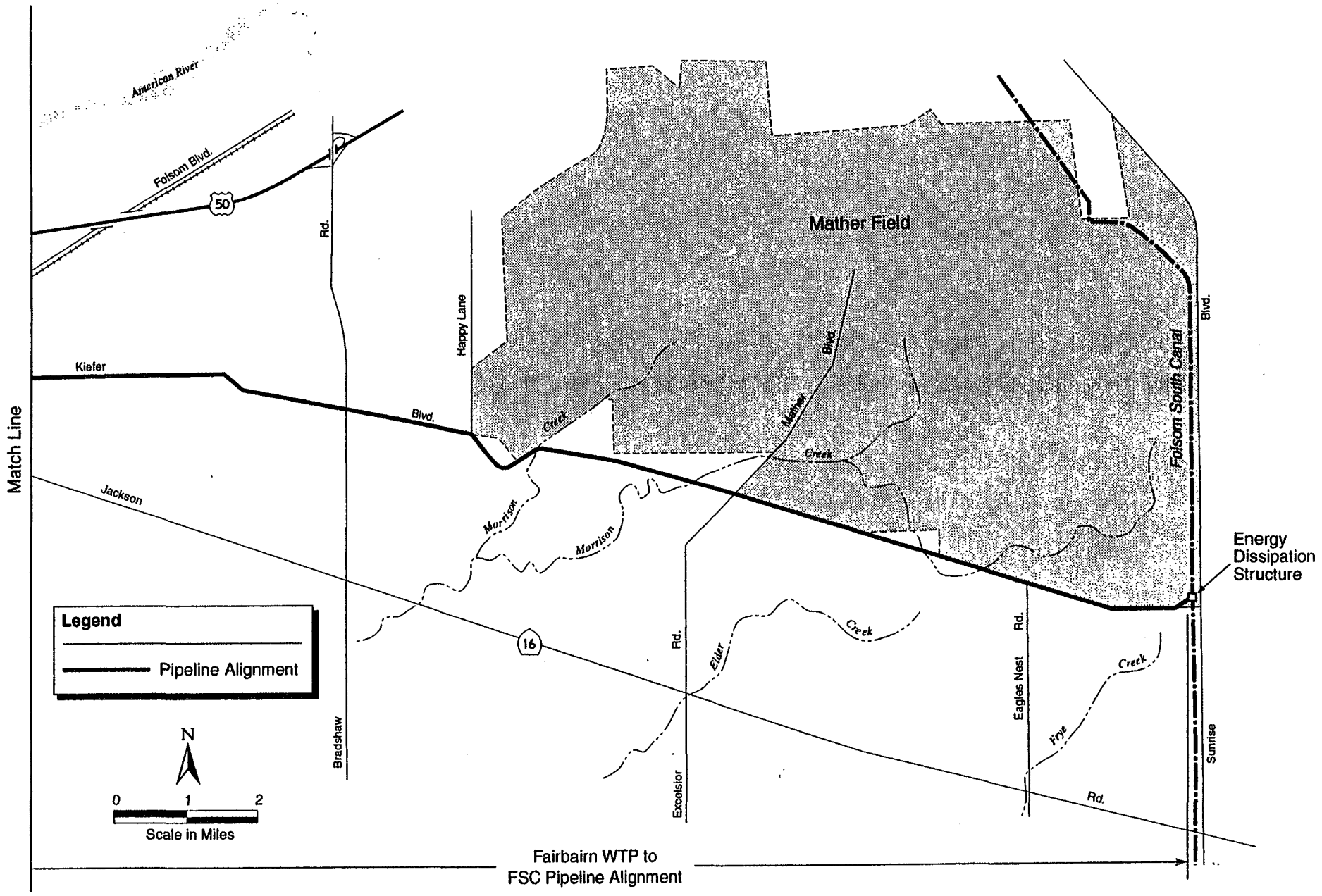


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**Figure 2-6b**
**Alternative 3: Intake, Pipeline, and Treatment Plant Expansion Locations (Continued)**

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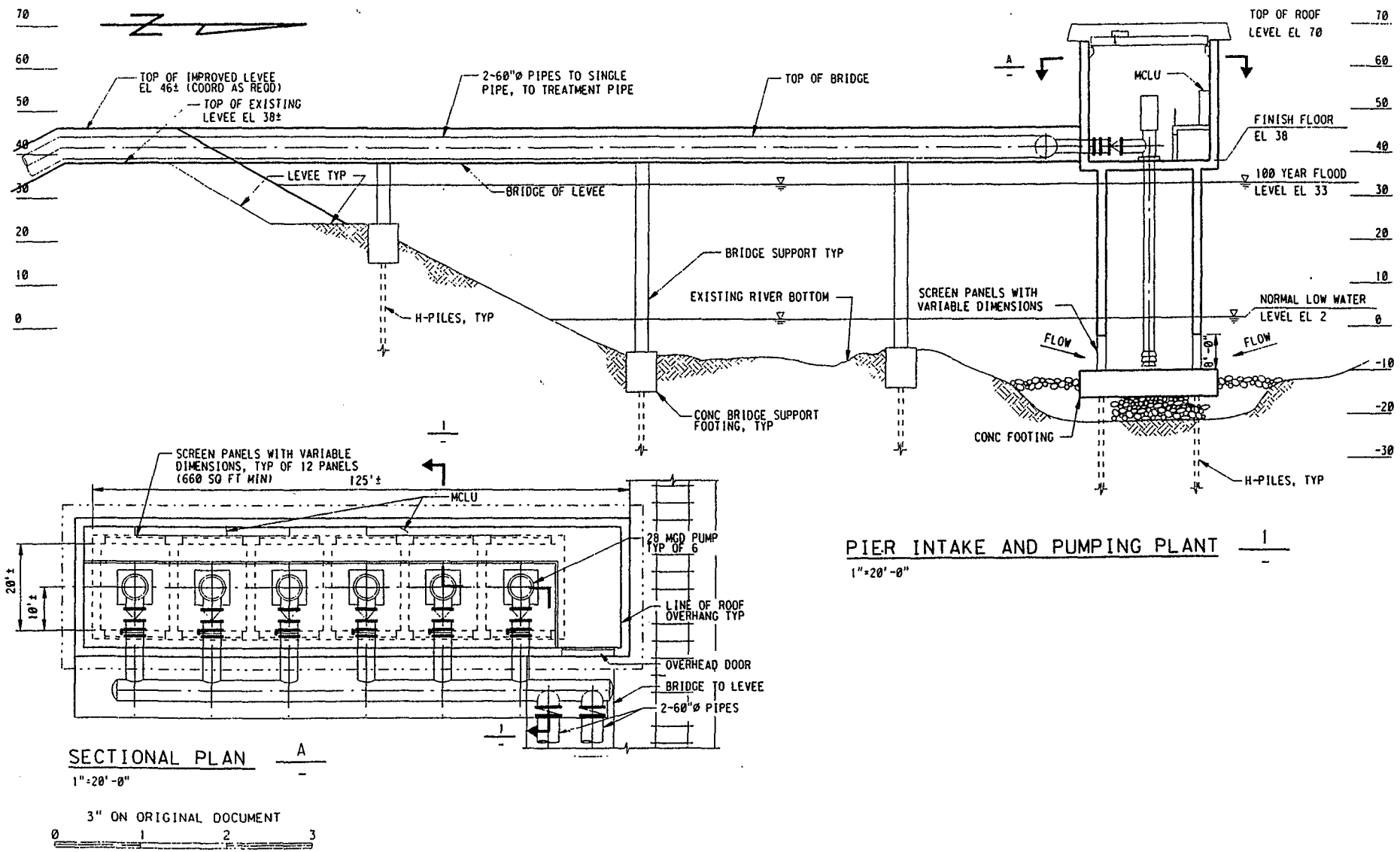


Graphic source: Montgomery Watson.

**Figure 2-7**
**Conceptual Design of New American River Intake Pumping Plant**

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extending from 10th Street, and Intake Alternative 5 is approximately 12,000 feet upstream of the I-5 bridge. Intake Alternatives 1 through 4 would be situated in the northern portion of the river because the channel is deeper at these locations. Intake Alternative 5 would be situated near the southern bank of the river, allowing construction of a shorter access bridge to the intake structure.

Intake Alternatives 2 through 5 would shorten the amount of pipeline that would need to be constructed in city streets, compared to Intake Alternative 1, thereby reducing disruption and costs.

**New Delivery Facility to Fairbairn WTP Pipeline Alignments.** From the intake facility, a pipeline approximately 78 inches in diameter (217-cfs capacity) would be constructed to the Fairbairn WTP (Figure 2-6a). The pipeline would be constructed mostly under existing streets.

**Alignment 1.** From the location of Intake Alternative 1, Alignment 1, the pipeline heads south on Bercut Road to the intersection of Richards Boulevard. From this point, Alignment 1 would continue south for approximately 500 feet and then would turn east on Bannon Street. The alignment follows Bannon Street for approximately 2,400 feet and then turns south where it merges with North B Street. The pipeline follows North B Street for approximately 4,500 feet and then turns south on 14th Street. The pipeline then crosses under the existing railroad embankment and continues one block to C Street. From this point, the pipeline follows C Street for 11,500 feet, crossing under the Capital City Freeway (formerly Business 80) and continuing along C Street until it turns into Elvas Avenue. The pipeline follows Elvas Avenue east and south approximately 8,000 feet to the intersection with H Street. The pipeline then would follow 57th Street south to the intersection with J Street. The pipeline would then turn east on J Street for 700 feet and then return to Elvas Avenue heading south to the intersection of Elvas Avenue and Folsom Boulevard. Just north of this intersection, the pipeline would turn east, crossing under the existing railroad embankment. The pipeline would then pass through the California State University, Sacramento, campus to College Town Drive and then continue east to Fairbairn WTP. Portions of the pipeline would be constructed using trenchless and/or tunneling technology to minimize disruption to surrounding land uses and transportation and circulation. Figure 2-6a shows the locations of planned trenchless construction.

**Alignments 2–5.** Pipeline alignments for Intake Alternatives 2 through 5 would be constructed south of the American River and would connect to the Alignment 1 pipeline at various locations (Figure 2-6a). The Alignment 2 pipeline would be sited along a railroad spur east of 3rd Street to Richards Boulevard. At Richards Boulevard the alignment would head east to 7th Street where it would parallel 7th Street south to North B Street. The pipeline alignment east of North B Street is the same as described for Alignment 1.

Alignment 3 would extend south in 5th Street to Richards Boulevard. The pipeline would extend east in Richards Boulevard to 7th Street and then south to North B Street and a connection with Alignment 1.

The Alignment 4 pipeline would extend south down 10th Street to connect with the Alignment 1 pipeline at North B Street.

The Alignment 5 pipeline would begin at the 23rd Street extension and parallel the western property line of an old landfill site south to the Southern Pacific Rail Road (SPRR), cross under the railroad right-of-way, and parallel 23rd Street south to C Street and Alignment 1.

**C Street Bypass Option.** Alignments 1–5 could include a C Street bypass option beginning at the intersection of 23rd and C streets and extending north 600 feet under the SPRR crossing (Figure 2-6a). The bypass



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would extend 6,300 feet along the northern edge of the railroad right-of-way and pass under the Capital City Freeway to near Lanatt Way. The pipeline bypass would then cross south under the railroad tracks 1,100 feet to the Elvas Avenue intersection where the pipeline would connect to Alignment 1. The C Street bypass option would cross or be sited immediately adjacent to an old landfill, the city landfill, and an undeveloped parcel bounded by the Union Pacific Railroad tracks and the Capital City Freeway and would avoid approximately 7,300 feet of construction within C Street east of 24th Street.

**Elvas Avenue Bypass Option.** Alignments 1–5 could also include an Elvas Avenue bypass option (Figure 2-6a) beginning at the intersection of Elvas Avenue and 57th Street and extending south-southeast on the eastern side of 57th Street to a point just south of J Street. The alignment would then extend east under the Southern Pacific Railroad right-of-way and then southeast between the railroad tracks and Jordan Way to a connection with Alignment 1.

**Fairbairn WTP Expansion.** The City is currently analyzing components of a City water expansion project that will involve expanding the Fairbairn WTP diversion and treatment capacity. Expansion of the Fairbairn WTP is included as part of Alternative 3 because Fairbairn WTP diversion capacity could be used in combination with the new intake facility previously described to supply water to EBMUD during a planned outage of EBMUD's Mokelumne River supply system. As part of Alternative 3, the City would expand its intake capacity at Fairbairn WTP from 100 MGD (155 cfs) to 200 MGD (310 cfs). This expansion would occur at the existing delivery site and would involve constructing a new "arm" on the existing intake facility and installing additional pumping capacity. The new intake would include state-of-the-art fish exclusionary facilities designed to meet DFG, NMFS, and USFWS criteria. The facilities for the existing intake will be upgraded prior to operation of the new intake as part of a separate and ongoing effort.

The City would also expand treatment capacity at Fairbairn WTP from 100 MGD to 200 MGD. This expansion would be entirely contained within the existing Fairbairn WTP site and would be used to serve existing and projected municipal and industrial customers within the City's service area. A bypass pipeline would be provided to allow delivery from the river into the new pumping plant and into the Fairbairn to FSC pipeline during a planned outage. A conceptual layout for these facilities is shown in Figure 2-8.

Besides the Fairbairn WTP expansion, the City also plans to expand its existing Sacramento River WTP delivery and treatment capacity by 50 MGD (77 cfs). The projected date of this expansion is uncertain and depends on many factors, particularly growth rates and patterns within the City's service area. If EBMUD is undergoing a planned outage and using Fairbairn WTP intake capacity, the City may have to use an alternate source, such as the Sacramento River WTP. A conceptual layout for these facilities is shown in Figure 2-9. As with the Fairbairn WTP expansion, expanded treatment facilities would be entirely contained within the existing facility site. A new intake structure would also be constructed similar in general design to the new intake structure at the I-5 location described above and include a fish screen designed to meet DFG, NMFS, and USFWS criteria.

The County would fund and use up to 40 MGD (62 cfs) of the capacity in the new intake facility and the I-5 to Fairbairn pipeline described above. The County would also use 40 MGD of added Fairbairn WTP treatment capacity to treat water before distribution. From Fairbairn WTP, the County would use interconnections to convey water delivered from the lower American River to various areas in the County. If additional distribution facilities need to be constructed for distribution of the County's water supplies, separate subsequent



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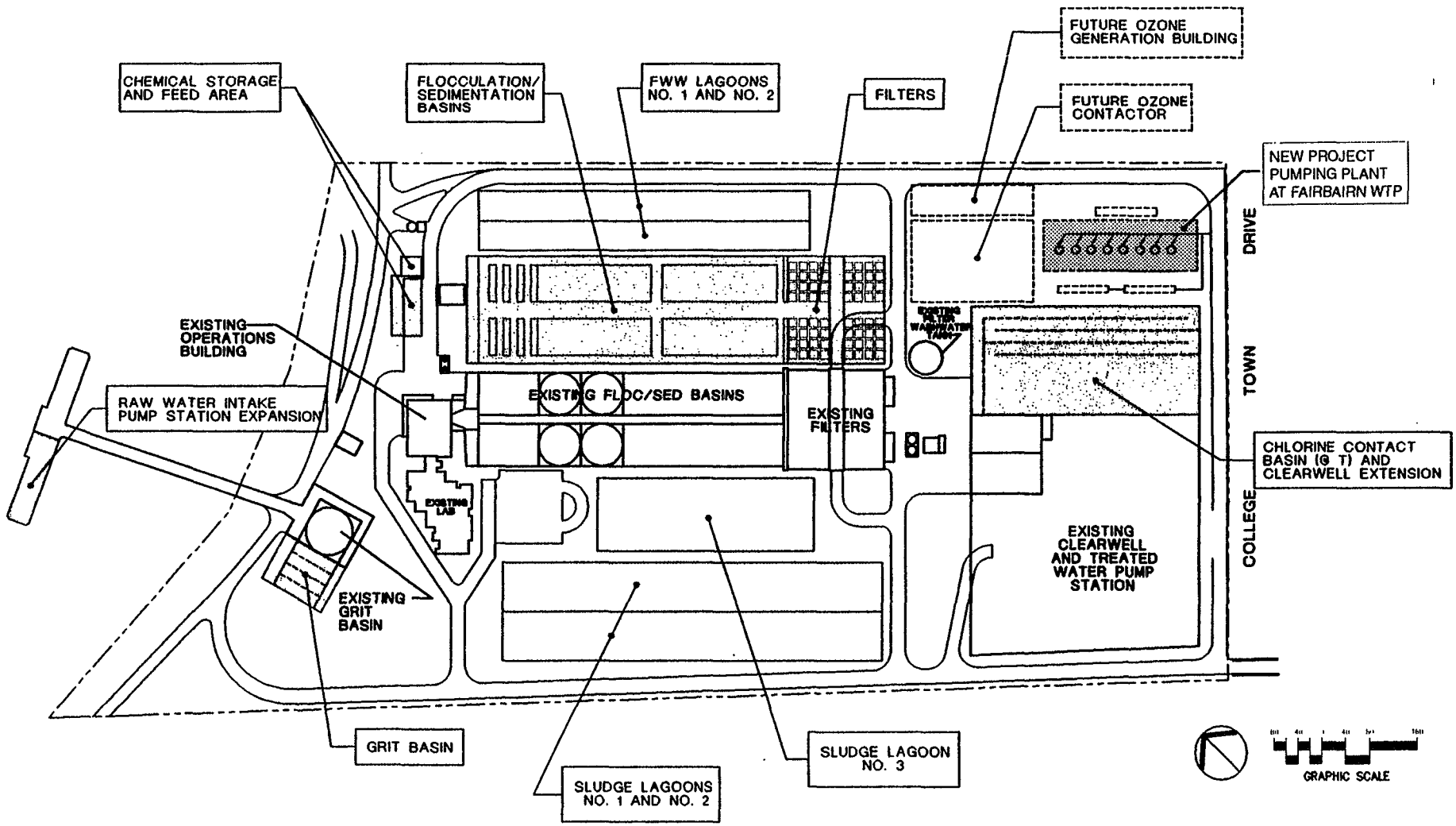


Graphic source: Montgomery Watson.

**Figure 2-8**
**Conceptual Layout of E. A. Fairbairn WTP Facilities Expansion**

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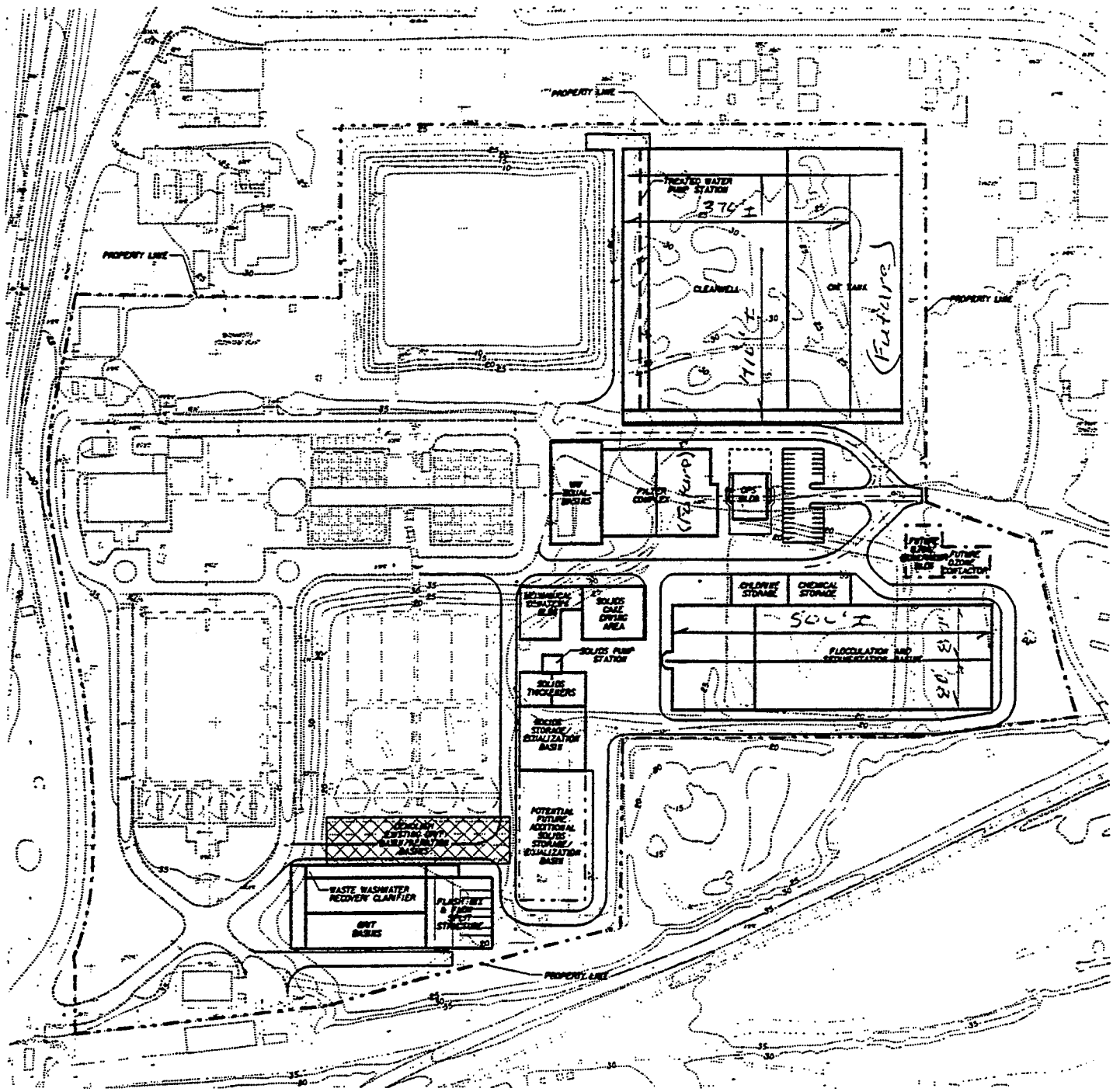


Graphic source: Montgomery Watson.

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**Figure 2-9**
**Conceptual Layout of SRWTP Facilities Expansion**

environmental documentation will address such facilities.

**Fairbairn WTP Pumping Plant.** A new pumping plant would be constructed at or near the Fairbairn WTP site to allow water for EBMUD to be pumped by this pumping plant to the FSC through a pipeline described below. The pumping plant would be capable of pumping up to 350 cfs to provide for a planned outage of EBMUD's Mokelumne River facilities (see below). A 3-million-gallon storage reservoir or wet well would be constructed on the pumping plant site.

**Fairbairn WTP to FSC Pipeline.** This pipeline would be approximately 96 inches in diameter to accommodate up to 350 cfs needed to meet planned outage needs for EBMUD. The pipeline could be sized smaller only if the planned outage needs (1 in 20 year event, as described earlier) were met from a combination of the new lower American River intake facility and the FSC instead of from a combination of the new intake facility and the Fairbairn WTP. As shown in Figure 2-6a, from Fairbairn WTP, the pipeline would head east along College Town Road to Hornet Drive, then south along the east side of Hornet Drive to Folsom Boulevard. From this point, the pipeline would head east along Folsom Boulevard to just east of the intersection with Florin Perkins Road. The pipeline then would turn south and cross the Southern Pacific and Sacramento Regional Transit light rail tracks and intersect Kiefer Boulevard. The pipeline would then head east along Kiefer Boulevard to the FSC. Near the former Mather Air Force Base, the County owns a right-of-way for an extension of Kiefer Boulevard, but no road has yet been constructed between Happy Lane and Eagles Nest Road. The portion of the pipeline would be constructed on the north side of the existing right-of-way. A new energy dissipation structure at the FSC would allow water to flow into the FSC. The anticipated design of the energy dissipation structure is an impact-type stilling basin with most features located below the ground surface. The basin would discharge flow directly into the FSC at reduced velocities.

**Folsom Boulevard Bypass Option.** One option to the Fairbairn to FSC pipeline that could be implemented to avoid congested traffic conditions on Folsom Boulevard is available. This option could also be used to accommodate a pumping plant at the intersection of Ramona and Brighton Avenues, should this pumping plant location be preferred to the Fairbairn WTP site (Figure 2-6b). This option would involve routing the pipeline west of the Fairbairn WTP along College Town Road approximately 500 feet and then extending the pipeline south approximately 3,500 feet under I-50, Folsom Boulevard, and the Sacramento Regional Transit Light Rail right-of-way to the intersection of Brighton and Ramona avenues, which would be the location of the pumping plant under this option. The pipeline would then extend southeast in Ramona Avenue to the intersection with Cucamonga Avenue. The pipeline option would extend about 6,500 feet to the end of Cucamonga Avenue extending across an abandoned Granite Construction aggregate mine area that is a planned development and park site also known as Granite Park. Approximately 200 feet west of the intersection of State Route 16 and Florin-Perkins Road the alignment would turn northeast, cross State Route 16 and connect to Florin-Perkins Road north of the intersection. The pipeline option would then extend be placed within Florin-Perkins Road to the intersection with Kiefer Boulevard where it would connect with the proposed Fairbairn to FSC pipeline alignment.

**FSC to Mokelumne Aqueducts Pipeline.** Water would be conveyed through the FSC from the delivery point to the terminus of the FSC. A new pipeline would convey the water from the FSC to the Mokelumne Aqueducts. The pipeline, pumping, and power supply facilities would be identical to the Alignment 2 pipeline, as described for Alternative 2.

**Improvements to EBMUD's Service Area Water Treatment System.** Alternative 3

would also include improvements to EBMUD's existing Walnut Creek, Lafayette, and Orinda WTPs to provide additional treatment for American River water supplies. Although overall water quality is lower at the joint project intake location than at Nimbus, these improvements would be generally the same as those described above for Alternative 2 to meet applicable regulatory requirements.

**Operations**

**East Bay Municipal Utility District.** Water supply forecasts are used in the preparation of operation projections. The operations projection is updated throughout February, March, and April as more reliable information becomes available. The main parameters considered in the operation projection are the water supply forecast of projected runoff, water demand of other users on the river, water demand of EBMUD customers, and flood control requirements. Under these conditions, EBMUD would take delivery of 155 cfs from the American River through the new intake facility to supplement its water supplies and retain storage in its Mokelumne River and terminal reservoir systems. Diversions would cease when EBMUD end-of-March projections indicate that total system storage is expected to remain above 500,000 at the end of September.

Figure 2-10 shows the average annual deliveries under this alternative. This alternative assumes that the delivery limitations mandated in the Hodge Decision would not apply to this delivery location because of its proximity to the confluence of the American and Sacramento rivers, and because this area is downstream of most of the critical fisheries habitat and flow-based recreation areas.

During a planned outage of EBMUD's Mokelumne River facilities, such as for major maintenance or seismic improvements, EBMUD would also use part of the intake capacity at Fairbairn WTP, in addition to the new lower American River intake facility, to meet its full customer needs and deliver 350 cfs. Planned outages would occur infrequently and total no more than 12 months in a 20-year period, with no single event extending beyond 6 months.

**City of Sacramento.** The City of Sacramento holds a permanent water rights settlement contract with Reclamation that guarantees its American River supply. The City currently has a physical intake capacity of 155 cfs (100 MGD or 112,000 AF) from the American River. As part of the Sacramento-area Water Forum process, the City is considering limiting its American River diversions. Following is a summary of the City's Water Forum purveyor specific agreement (Water Forum 1997):

a. In extremely dry years (i.e., years in which the projected unimpaired flow into Folsom Reservoir would be 550,000 AF annually or less), the City would limit its diversions of City Water at the Fairbairn WTP to not greater than 155 cubic feet per second (cfs) and not greater than 50,000 AF annually. Any additional water needs would be met by diversions at other locations and/or other sources.

b. City water diverted at the Fairbairn WTP in extremely dry years in accordance with the foregoing limitations could be used anywhere within the City's authorized Place of Use (POU) as it exists now and in the future.

   In all other years, the City may divert City Water at the Fairbairn WTP in accordance with the following criteria.

   (1) Diversion up to 310 cfs (200 MGD) so long as the flow bypassing the diversion at the Fairbairn WTP is greater than the Hodge flow criteria.

   (2) Whenever flow bypassing the diversion at the Fairbairn WTP is less than the Hodge flow criteria, diversions no greater than:

| | |
|---|---|
| January through May | 120 cfs |
| June through August | 155 cfs |
| September | 120 cfs |
| October through December | 100 cfs |



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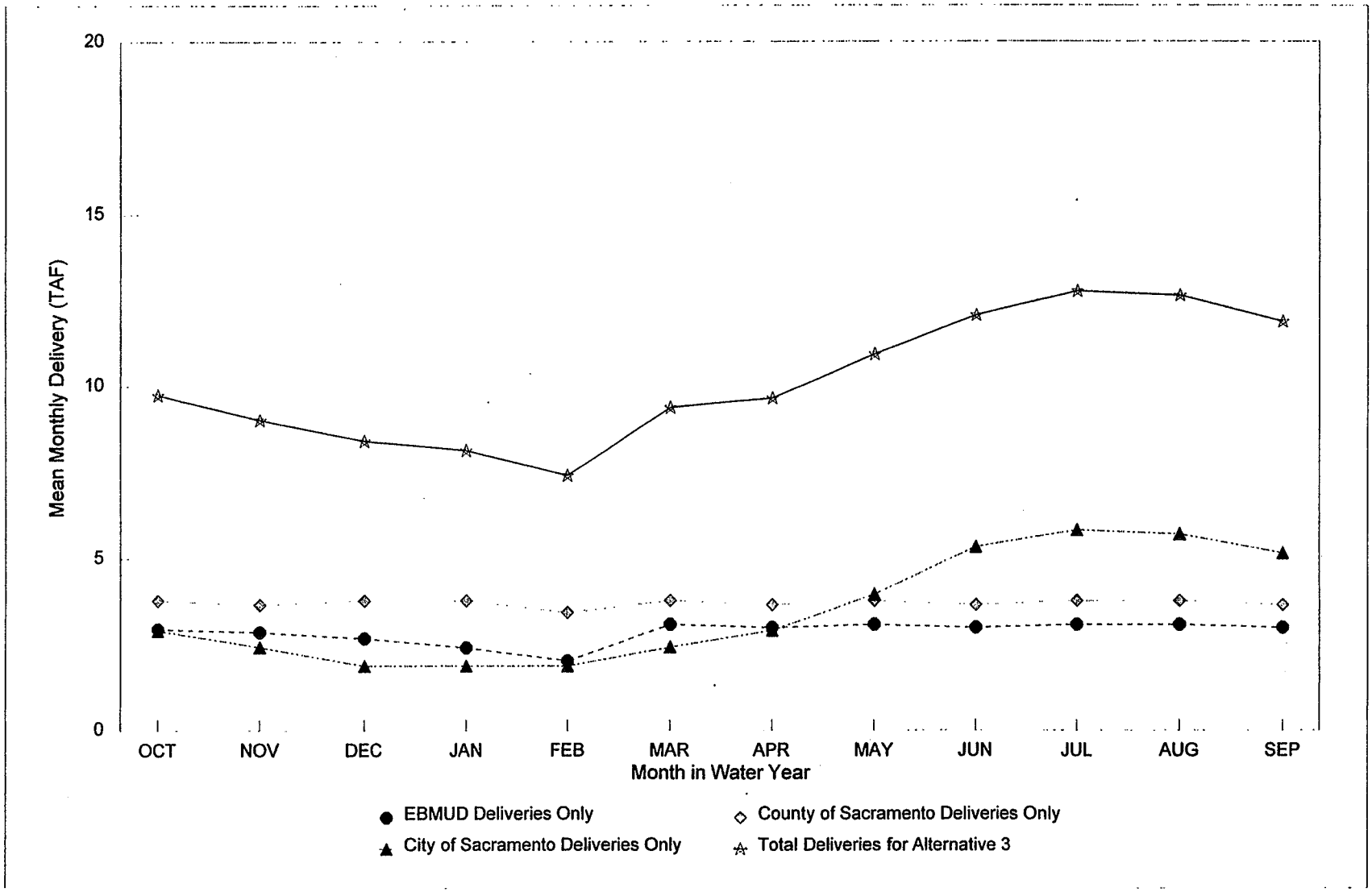


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**Figure 2-10**
**Typical Pattern and Frequency of Deliveries for Alternative 3**

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The anticipated pattern of deliveries to the City under Alternative 3 is shown in Figure 2-10.

**County of Sacramento.** The County and Sacramento County Water Agency currently have no long-term surface water supply entitlements but are pursuing surface water entitlements through several related efforts. These efforts include a new water service contract with Reclamation under Public Law 101-514, assignments of portions of Sacramento Municipal Utility District's (SMUD's) existing Reclamation water service contract, water transfers, and a new water right from the State Water Resources Control Board (SWRCB) (Sacramento County Application to Appropriate Water by Permit submitted to SWRCB on April 14, 1995).

The County Water Agency and Reclamation have released a draft EIS/EIR for the Public Law 101-514 water service contracts. The contract would make available to the County Water Agency 22,000 AF of surface water from the American River. Of the 22,000 AF, 7,000 AF is proposed to be subcontracted to the City of Folsom and delivered at Folsom Dam.

The County Water Agency has also entered into a three-party "Agreement-in-Principle" with SMUD and the City of Sacramento for the assignment to the County Water Agency of 15,000 AF annually of SMUD's existing contract with Reclamation. Negotiations between the County Water Agency, SMUD, and City of Sacramento have begun for a second similar three-party arrangement for the assignment to the County Water Agency of an additional 15,000 AF annually of surface water from SMUD.

The Public Law 101-514 water service contract and SMUD water assignments would ultimately make 45,000 AF available to the County Water Agency annually. To meet the water needs of planned growth consistent with the Water Forum, additional annual water supplies up to 78,000 AF are needed. To meet these long-term needs, the County Water Agency has applied to the SWRCB for excess flows on the American and Sacramento rivers and could pursue future water transfers.

Under Alternative 3, up to 62 cfs of surface water could be diverted from the County-funded portion of the new intake and pumpback facility. The County, County Water Agency, or other agencies may rely on the analysis in this EIR/EIS of impacts of Alternative 3 for their approvals of the project and related actions. They may also rely on EIRs or other analyses prepared or to be prepared for other actions, as appropriate to ensure compliance with CEQA related to construction of the joint project and the diversion of water through joint project facilities. Under maximum use of the 62-cfs capacity, 45,000 AF of surface water could be delivered annually to the County. Use of this capacity during winter could require the use of groundwater injection facilities because the capacity for delivering surface water for in-lieu groundwater recharge is limited in these months by lack of water demands.

**Full-Use Scenario.** At times when EBMUD is not utilizing the full capacity available from this alternative, some capacity may potentially be available to others; however, implementation of the project is not dependent on use of this potentially available capacity by others, including the joint project partners. Such use will be subject to additional environmental documentation and compliance. This EIR/EIS includes supplemental information on the potential effects of full use of the project facilities at the ends of Chapters 2, 3, 4, 5, 6, 7, and 16.

The draft water service contract amendment provides for transfers of EBMUD's water entitlement subject to review and approval of Reclamation. Environmental compliance would be required for any such transfers.



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**Construction Considerations**

**New Lower American River and Sacramento River Intake Facilities and Expansion of Fairbairn WTP Intake Facilities.** Construction of these facilities would require installation of sheet pilings and dewatering of the construction location. Construction materials may be brought to the site by water or from the bank of the rivers. Some dredging of the sites may also be required.

**I-5 to Fairbairn and Fairbairn to FSC Pipeline.** Construction methods for this pipeline would generally be similar to those described for the Alternative 2 pipelines. However, portions of the pipeline within streets and roads would generally be constructed within a narrower shored trench. Besides general construction guidelines and practices, the City and County maintain specific guidelines for construction activities within their jurisdictions (City of Sacramento Department of Public Works 1989, City of Sacramento 1990, Sacramento County Department of Public Works 1992), particularly within streets and roadways. Construction of the project would comply with these guidelines. As described above, portions of this pipeline would be constructed using trenchless technology to minimize disruption to surrounding land uses and circulation patterns. These tentative locations are shown in Figure 2-6a. In other areas within streets and roadways, the pipeline would be placed within a shored trench to minimize the width of construction area required. Construction would require up to 35 feet of vertical clearance for operation of trenching equipment. Where the pipeline would be constructed within city streets, the pipe is assumed to be installed in approximately the center of the roadway.

**Fairbairn and Sacramento River WTP Expansions.** Expansion of these facilities would occur within the footprint of existing facilities. Some additional truck trips would be required to bring materials and equipment to the sites. Access to the sites would be by existing major roadways, and no new access road would be needed.

**Required Right-of-Way**

Where possible, the permanent pipeline right-of-way would be 80 feet wide, with an additional 50 feet of temporary right-of-way required for construction. Where construction would be located within city streets and roads and space is more limited, construction would be restricted to the existing street or road right-of-way. A cross-section of a typical pipeline construction area within streets and roadways is shown in Figure 2-11.

**River and Stream Crossings**

River and stream crossings for Alternative 3 (Figures 2-6a and 2-6b) and for the FSC to Mokelumne Aqueducts connection (Figure 2-1) would be constructed as described above for Alignment 2 under Alternative 2. As with Alternative 2, the Mokelumne River would be crossed through tunneling. Other water courses would be crossed with open-cut methods.

**Railroad and Roadway Crossings**

The I-5 to FSC pipeline alignment for Alternative 3 would cross and be constructed within many roadways within the City and County (refer to Tables 12-1, 12-3, and 12-4 in Chapter 12). Roadway crossings would be constructed as described above for Alternative 2, with tunneling performed at busy intersections and major highways. All crossed rail lines would also be tunneled.

**Canal and Aqueduct Pumping Plants**

Alternative 3 includes Alignment 2 as described for Alternative 2. Construction considerations for the canal pumping plant and aqueduct pumping plant for this alignment are discussed above for Alternative 2.



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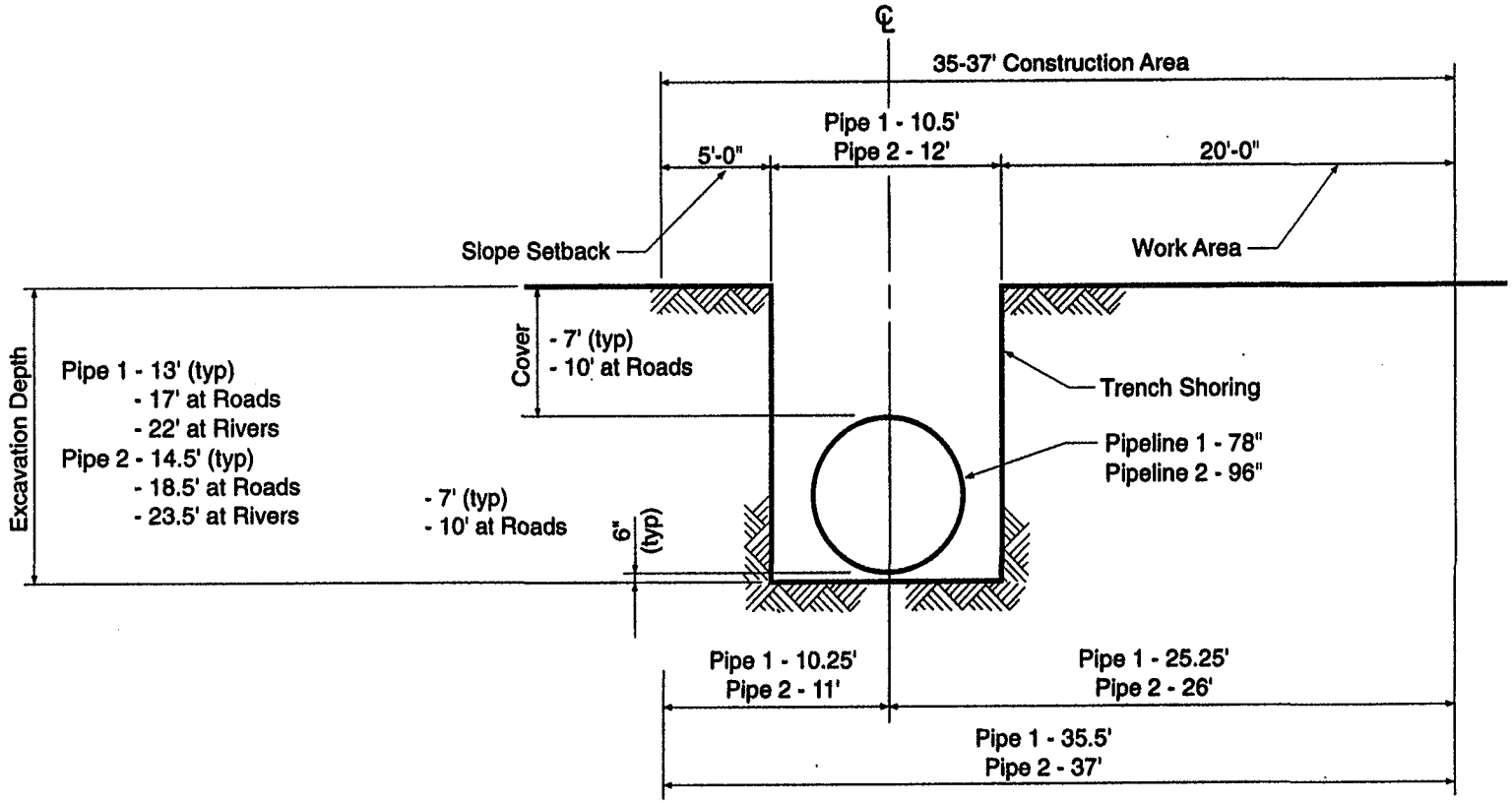


Note:

For poor soils, excavation below the pipe will be 3 feet or to firm material.

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**Figure 2-11**
**Typical Shored Trench Pipeline Construction Cross Section**

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**Access Roads and Staging Areas**

The location of access roads and staging areas would be controlled as previously described for Alternative 2.

**Excavated Material**

Excavated material would be used and disposed of as previously described for Alternative 2.

**Construction Schedule**

Construction of all components of Alternative 3 would require approximately 24 months if the following project components are constructed concurrently:

- the construction period for the new American River intake structure would be between 12 and 18 months, depending on river flow and weather conditions;
- the I-5 to Fairbairn pipeline would generally be constructed at an average rate of 150 feet per day and require between 55 and 60 weeks to complete over a span of 16 months;
- the Fairbairn WTP expansion would likely require two full construction seasons for completion;
- the Fairbairn to FSC pipeline would be constructed at an average rate of 100 feet per day along Folsom Boulevard, 150 feet per day within other city and county streets, and up to 400 feet per day in construction areas outside roadways and require approximately 52 weeks over 15-month span to complete; and
- the filtration plant expansions in the EBMUD service area and the Sacramento WTP expansion and new intake structure would each likely require two full construction seasons to complete.

**Capital Cost.** The estimated total capital cost of Alternative 3 is provided in Table 2-5.

**Ratepayer Costs.** This discussion presents an evaluation of the costs to construct and operate Alternative 3. This evaluation is presented for comparison purposes and may change based on the final costs to construct and operate the alternative.

Table 2-5. Alternative 3 Cost Distribution

| Responsible Joint Project Participant | Estimated Total Cost ($ million)[a] |
|---|---|
| EBMUD | 311 |
| City of Sacramento | 127 |
| Sacramento County | 25 |
| Total | 463 |

[a] March 25, 1997 cost-share agreement.

The ratepayer cost assessment was based on the following assumptions:

- estimated cost of Alternative 3 is $463 million (with County of Sacramento and City of Sacramento cost sharing of approximately $127 million and $25 million, respectively),
- System Capacity Charges would fund 70% of the cost of each alternative for EBMUD,
- total annual deliveries would total 35,000 AF under Alternative 3, and
- annual costs per acre-foot are based on a 75-year project life and are reported in 1997 dollars.

A large share of the cost of the Supplemental Water Supply Project will be paid through system capacity charges, which are fees charged to applicants for new water service and used to pay for capital programs necessary to provide new water supply, treatment, and distribution system capacity to serve those

customers. The proportion of costs for Alternative 3 covered by system capacity charges is shown in Table 2-6.

Total costs to EBMUD under Alternative 3 are estimated to total $311 million. Costs to ratepayers under Alternative 3 are estimated to total $93.3 million. Total estimated annual EBMUD ratepayer costs per acre-foot under under Alternative 3 would total $36.

Table 2-6. Estimated Costs of Alternative 3 and Associated System Capacity Charges and Ratepayer Costs

| | Preliminary Construction[a] ($ million) | Costs ($ million) | | Annual Ratepayer Costs per AF ($)[c] |
|---|---|---|---|---|
| | | System Capacity Charge[b] | Ratepayer | |
| Alternative 3 [d] | 311 | 217.7 | 93.3 | 36 |

Notes:

[a] Construction costs are preliminary and may change based on final engineering estimates.

[b] System capacity charges would account for 70% of construction and operation costs.

[c] Average annual deliveries to EBMUD total 29,000 AF under Alternative 2 and 35,000 AF under Alternative 3. Costs per AF are based on a 75-year life span for the project and are not adjusted.

[d] Total cost of Alternative 3 is $463 million. Cost sharing by the City of Sacramento and the County of Sacramento is estimated at $127 million and $25 million, respectively.

## REQUIRED PERMITS, APPROVALS, AND REVIEWS

Several regulatory permits and approvals have been identified as potentially applicable to implementation of the project alternatives (Table 2-7).

## ALTERNATIVES CONSIDERED BUT NOT INCLUDED IN DETAILED ANALYSIS

As described in greater detail in the Alternatives Screening Report for the Supplemental Water Supply Project (East Bay Municipal Utility District 1997c) (Appendix B), EBMUD undertook an extensive process to screen alternatives potentially capable of meeting the project objectives described earlier in this chapter. An extensive range of potential alternatives was examined during this process.

In conducting this screening process, EBMUD developed specific criteria against which potential alternatives were evaluated. Failure of a potential alternative to substantially achieve one or more of the specific criteria resulted in elimination of the alternative from detailed consideration in this EIR/EIS. The specific criteria used in the screening evaluation were to:

- allow EBMUD to take delivery of its contracted maximum 150,000 AF per year



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of American River water consistent with the Hodge Decision;

- allow EBMUD to maintain the high quality of both its raw and treated water supply while minimizing health risks and health risk uncertainties for EBMUD customers consistent with state and federal law and EBMUD's Policy 81 (East Bay Municipal Utility District 1997b);
- increase system reliability by providing a reliable alternate water supply to EBMUD's Mokelumne River supply in the case of a catastrophic event or scheduled major maintenance at Pardee Reservoir;
- provide increased operational flexibility and reduce customer deficiencies;
- increase opportunities for protection and enhancement of Mokelumne River resources;
- not result in unacceptable environmental impacts;
- contribute to achieving EBMUD's planning objectives established as part of the Updated WSMP;
- not have any significant geotechnical or engineering problems, questionable or untested technology, or unreliability of site or resources;
- not require any permits that cannot be reasonably obtained given consideration of cost, logistics, or existing technology;
- not require infeasible approvals, agreements, or coordination between EBMUD and other agencies or jurisdictions;
- be capable of being feasibly implemented by 2001;
- be of reasonable cost while meeting most of the project objectives; and
- minimize costs to rate payers.

A summary of the results of the alternatives screening process is provided in Table 2-8. As shown, of all alternatives considered, an EBMUD-only project with delivery of American River water from Nimbus Dam, an EBMUD-only alternative with a lower American River delivery point, and a joint project with the City and County of Sacramento with a lower American River delivery point were found to potentially meet all of the screening criteria. All other alternatives fail to meet at least one of the criteria and therefore are not evaluated in this EIR/EIS. As described in Chapter 5 of the Alternatives Screening Report (Appendix B), an EBMUD-only alternative involving essentially identical new facilities but with no participation by the County or the City also substantially met the alternatives screening criteria. For purposes of this EIR/EIS, the more inclusive joint water supply alternative will be analyzed in detail. EBMUD and Reclamation believe that the environmental analysis of the joint project alternative sufficiently addresses the potential environmental effects of a similar downsized EBMUD-only alternative.

A full description of each alternative considered for screening, supporting information for each criterion, and details of the alternatives evaluation process are provided in Appendix B.



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Table 2-7. Summary of Anticipated Regulations, Regulatory Agencies, and Approvals for EBMUD and City and County of Sacramento Water Supply Project

| Regulation | Regulatory Agency | Required Permits/Agreements/Authorizations |
|---|---|---|
| **FEDERAL REGULATIONS** | | |
| Clean Water Act Section 404 (33 USC 1344) | U.S. Army Corps of Engineers | Section 404 permit for discharges of dredged or fill material into waters of the United States, including wetlands |
| Clean Water Act Section 402 (33 USC 1311,1342) | Central Valley Regional Water Quality Control Board | National Pollutant Discharge Elimination System permit (General Construction Activity Storm Water permit) |
| Clean Water Act Section 401 | State Water Resources Control Board, Central Valley Regional Water Quality Control Board | Water Quality Certification or Waiver for work in wetlands or streams |
| Rivers and Harbors Act, Section 10 (33 CFR 329.4) | U.S. Army Corps of Engineers | Section 10 permit for construction of structures in, over, or under; excavation of material from; or deposition of material into navigable waters of the United States |
| Fish and Wildlife Coordination Act (16 USC 661 et seq.) | U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Fish and Game | Consultation or Fish and Wildlife Coordination Act report |
| Federal Executive Order 11990: Protection of Wetlands | U.S. Army Corps of Engineers, U.S. Bureau of Reclamation | Requires federal agencies to follow avoidance/ mitigation/preservation procedures before proposing new construction in wetlands |
| Endangered Species Act (16 USC 1531 et seq.) | U.S. Bureau of Reclamation in consultation with U.S. Fish and Wildlife Service, National Marine Fisheries Service | Biological Assessment and Biological Opinion |
| National Historic Preservation Act Section 106 (16 USC 470 et seq.) | State Historic Preservation Officer, Native American Heritage Commission | Consultation (required for Clean Water Act Section 404 permit and Bureau's contract amendment) |
| Clean Air Act - Authority to Construct and Permit to Operate | Sacramento Metropolitan Air Quality Management District, San Joaquin Valley Unified Air Pollution Control District | Authority to Construct permit to construct or modify a facility that may emit air pollutants from a stationary source into the atmosphere. Permit to Operate to operate said facility. |



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| Regulation | Regulatory Agency | Required Permits/Agreements/Authorizations |
|---|---|---|
| U.S. Council on Environmental Quality Memoranda on Farmland Preservation and Farmland Protection Act (7 USC 4201, 7 CFR 658) | U.S. Bureau of Reclamation | Requires federal agencies to identify adverse effects of programs on preservation of farmland; consider alternative actions to lessen effects; and ensure compatibility with state, local, and private farmland protection programs |
| National Wild and Scenic Rivers Act (16 USC 1271-1287) | National Park Service | Requires that proposed actions on designated Wild and Scenic Rivers be in conformity with management guidelines for protection of resource |
| Reclamation Water Service Contract Amendment | U.S. Bureau of Reclamation | Amendment to original water service contract required if water delivery point (or turnout point) is changed |
| Federal Executive Order 11988: Floodplain Management (42 FR 26951) | U.S. Bureau of Reclamation | Requires federal agencies to take action to reduce the risk of flood loss and restore and preserve the values of floodplains |
| Executive Order 11990: Protection of Wetlands (42 FR 26961) | U.S. Bureau of Reclamation | Requires federal agencies to follow avoidance, mitigation, and preservation procedures with public input, before proposing new construction in wetlands. |
| Federal Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629) | U.S. Bureau of Reclamation | Requires federal agencies to address disproportionately high and adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations. |
| **STATE REGULATIONS** | | |
| California Fish and Game Code Section 1601 | California Department of Fish and Game | Streambed alteration agreement |
| California Code of Regulations, Title 2, Division 3, Section 1900 et seq. and Public Resources Code Section 6000 et seq. | California State Lands Commission | Land use lease and dredging permit |
| California Water Code Section 8590 et seq. | The Reclamation Board | Encroachment permit |



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| Regulation | Regulatory Agency | Required Permits/Agreements/Authorizations |
|---|---|---|
| California Endangered Species Act (California Fish and Game Code Sec. 2081 et seq.) | California Department of Fish and Game | Biological Opinion/No Jeopardy Opinion/ consultation with U.S. Fish and Wildlife Service |
| California Water Code Sections 1700-1746 | State Water Resources Control Board - Division of Water Rights | Water Rights Amendment or Change Petition (to originally permitted appropriative right) |
| California Wild and Scenic Rivers Act (Pub. Res. Code Sec. 5093.50 et seq.) | Secretary of the Resources Agency - State of California | Requires that proposed actions on designated Wild and Scenic Rivers be in conformity with management guidelines for protection of resources |
| California Streets and Highways Code Sections 660-734 | California Department of Transportation | Encroachment permit |
| California Health and Safety Code Sections 116275-116750 | California Department of Health Services | Public Water System permit |
| **KEY REGIONAL AND LOCAL AGENCY REGULATIONS** | | |
| California Land Conservation Act (Williamson Act) (California Government Code 51200-51295) | California Department of Conservation | Acquisition of contracted land by purchasing or by eminent domain |
| Government Code Section 66410 et seq.; County Ordinances; City Ordinances | Sacramento County Departments of Planning and Public Works, San Joaquin County Departments of Planning and Public Works, City of Sacramento Departments of Planning and Public Works | Conditional or special use permits, grading permits (including erosion and sediment control plans), building permits, encroachment permits, natural resources permits (tree removal and protection) |
| American River Parkway Plan | Sacramento County Departments of Parks, Recreation and Open Space | Area plan amendment |
| Utility Line Coordination | California Public Utilities Commission (CPUC) | Compliance with CPUC General Orders that guide utilities in development, construction, maintenance, and operation of utility facilities |
| Railroad and Light Rail Crossing Coordination | Union Pacific/Southern Pacific, Central California Traction, Sacramento Regional Transit | Encroachment permit |



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Table 2-8. Summary of Results of Alternatives Screening Process

| Alternative | Fails to Substantially Meet Screening Criteria | Substantially Meets Screening Criteria |
|---|---|---|
| **EBMUD-Only Project Alternatives** | | |
| American River Delivery through the Folsom South Canal | | |
| Pipeline Alignments 1-4 | | √ |
| Open Canal | √ | |
| American River Delivery - Intake Upstream of I-5 Bridge | | √ |
| Sacramento River Water Treatment Plant Delivery | √ | |
| Sacramento River at Freeport Delivery | √ | |
| Delta Delivery | √ | |
| **Joint Project Alternatives** | | |
| Joint Project with the City of Sacramento and the County of Sacramento - Intake Upstream of I-5 Bridge | | √ |
| Joint Project with the City of Sacramento and the County of Sacramento - Fairbairn WTP Intake Only | √ | |
| Joint Project with the City of Sacramento and the County of Sacramento - Sacramento River Water Treatment Plant Delivery | √ | |
| EBMUD/CALFED Combined Facility | √ | |
| Conjunctive Use with American River Water | √ | |

Source: East Bay Municipal Utility District 1997c.

## ANALYSIS OF FULL-USE SCENARIO

Both Alternative 2 and Alternative 3, as described in the preceding discussions, could meet the needs of EBMUD. Alternative 3 also meets a portion of the needs of the County and the City. Under both alternatives, however, additional capacity in the facilities would exist during certain years and that capacity, under certain circumstances, could potentially be available to take delivery of water not included as part of the project description or to "wheel" water to other entities using separate entitlements.

Although there is no proposal for such use, some very limited discussions on the potential use of additional Alternative 3 capacity have taken place. EBMUD and Reclamation consider it appropriate to incorporate additional analyses into this EIR/EIS to provide information on the full potential range of Alternative 3 project operations involving full use of the project facilities. Use of this capacity may require subsequent or supplemental environmental documentation.



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Any such future use of the project facilities would require project-specific environmental documentation under CEQA and/or NEPA to address at least the purpose and place of use of any additional water deliveries.

Information on the environmental effects of these full-use scenarios is included at the end of Chapters 3, 4, 5, 6, 7 and 16. Additional information on hydrologic modeling output is also included in Appendix C.

For this additional analysis, it was assumed that the facilities would be operated at 217 cfs (140 MGD) at all times (Figure 2-12).

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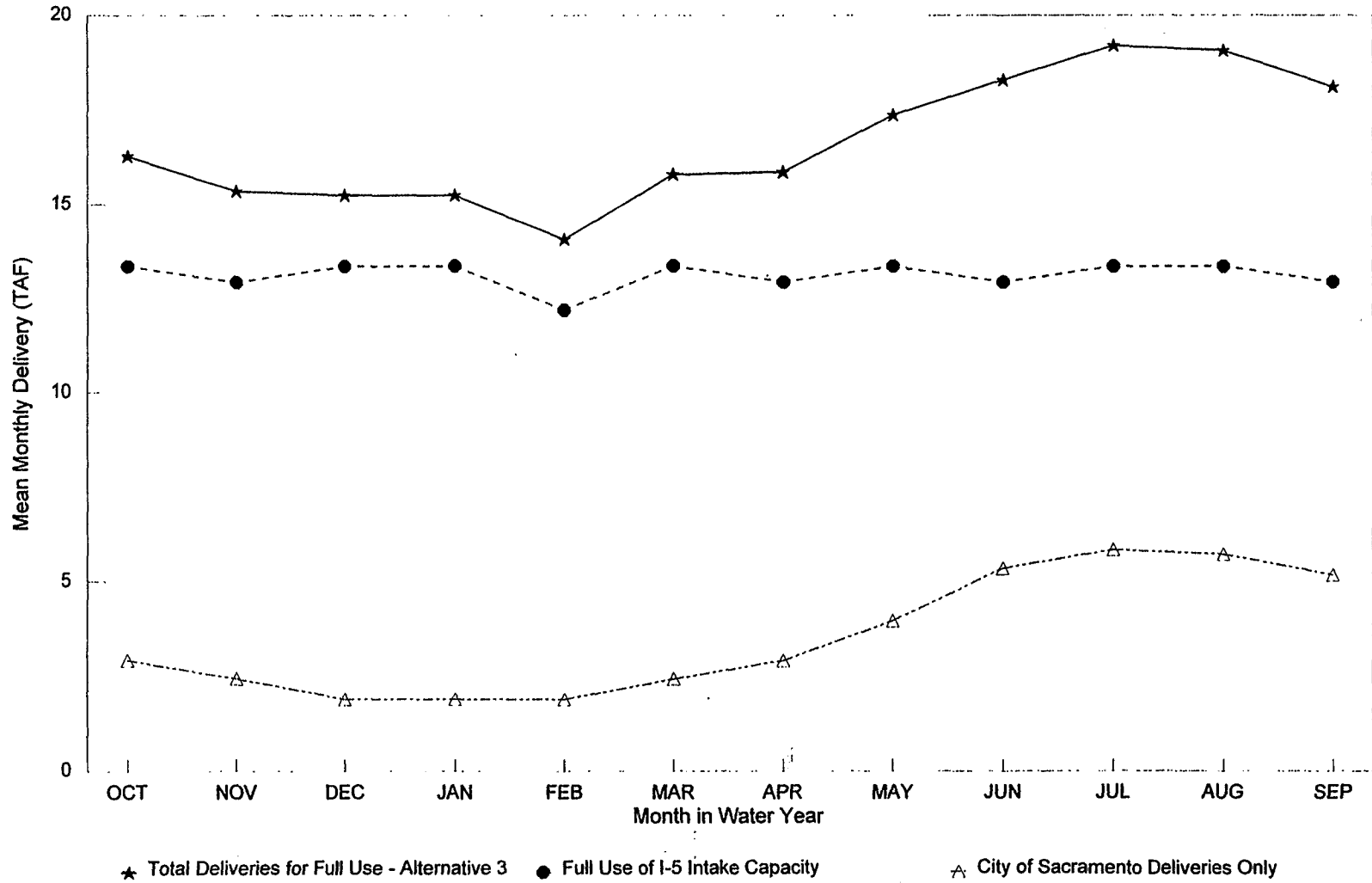


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**Figure 2-12**
**Typical Pattern and Frequency of Deliveries for Full-Use Scenario - Alternative 3**

Chapter 3

# Hydrology, Water Supply, and Power

# Chapter 3. Hydrology, Water Supply, and Power

## INTRODUCTION

Each of the project alternatives (i.e., Alternatives 2 and 3) under consideration has the potential to change the timing, location, and volume of water diverted from the Central Valley Project (CVP) system. To determine the probable magnitude and effect of these changes and to evaluate the ability of the alternatives to meet EBMUD's project objectives, EBMUD has used available technology to extensively model hydrologic and water quality conditions.

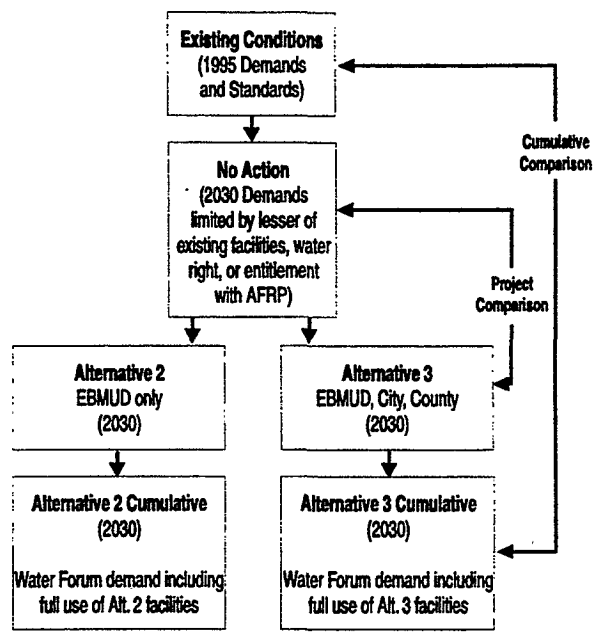
This chapter provides information on the evaluation of river and reservoir hydrology conducted for this EIR/EIS. It includes a summary of existing hydrologic conditions and changes in these conditions that are expected to occur under Alternative 1 (no action), Alternatives 2 and 3, and cumulative conditions.

This chapter also includes a discussion of the changes to water supply and power production that would occur under each of the conditions discussed above.

## USE OF HYDROLOGIC DATA IN THE ENVIRONMENTAL IMPACT ASSESSMENT

Hydrologic data served as the primary assessment tool for the evaluation of effects on water supply, power production, water quality, fisheries, and recreation. Hydrologic data were also used as part of the evaluation of effects on vegetation and visual resources in the lower American River that could result from changes in river flows. A detailed discussion of how the hydrologic data were used to support the evaluations is included in the "methods and assumptions" section of Chapter 4, "Water Quality," Chapter 5, "Fisheries," and Chapter 6, Recreation." The evaluation of changes to water supply and power production is presented later in this chapter.

The evaluation for each resource topic includes a description of existing conditions, conditions under Alternative 1, conditions under Alternative 2 and 3 operations, and conditions under the cumulative scenarios of the alternative project facilities. To provide a full range of comparisons, two baseline conditions were used in the evaluations. Alternative 1 was used as the baseline for assessing effects of the project alternatives and existing conditions was used as the baseline for assessing cumulative effects. The following flow chart shows these comparisons and the different hydrologic scenarios examined.




Hydrologic changes will not result in significant environmental impacts unless one or more of the environmental resources evaluated in subsequent chapters are substantially affected. The hydrologic changes reported here are not evaluated for significance.



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## MODELING ASSUMPTIONS

Hydrologic modeling of existing conditions, no action, and the project alternatives was based on the demand assumptions described below. The period of record for the hydrologic analysis is 1922–1991. River and reservoir hydrology for each condition was estimated for the entire 70-year period. Table 3-1 indicates the flow requirements or standards (e.g., Modified D-1400, AFRP, Bay/Delta Accord, which are described later in this chapter) that were applied to the hydrologic modeling for existing conditions and Alternative 1. The requirements applied to Alternative 1 were also used in the evaluation of Alternatives 2 and 3 and cumulative scenarios.

### Existing Conditions

Existing conditions represent hydrologic conditions that would be expected without implementation of the project alternatives, future increases in demands by other entities, or changes in flow standards. The hydrologic evaluation of existing conditions is based on the present level of water demands and existing CVP operations (Table 3-1). This level of development is representative of the existing demand for water from the American River and assumes that only currently existing facilities are in place.

### Alternative 1: No Action

Under this alternative, hydrologic conditions are representative of a future level of water development (2030) without deliveries being made to EBMUD from the lower American River. This level of development is representative of increased diversions that may occur in the future without the construction and operation of new diversion facilities by any entity. Therefore, although the demands used in this analysis are 2030 water demands, actual deliveries simulated in the hydrologic modeling are limited because no new facilities were assumed. Table 3-1 provides information on the overall demands for water used in the hydrologic modeling for Alternative 1. The table also provides a comparison between existing demands and future demands. 2030 demand for water from the American River by individual water purveyors is shown in Table 3-2.

### Alternatives 2 and 3 Evaluation

Under Alternative 2, additional demands were included in the hydrologic modeling to provide for simulation of EBMUD's receiving delivery of water under its water service contract through the FSC up to the maximum intake capacity of the pipeline (350 cfs). These demands were added to the hydrologic simulation of Alternative 1 and represent the only change in the modeling for Alternative 1. The assumed operations of this alternative are described in Chapter 2, "Project Objectives and Alternatives under Consideration."

Under Alternative 3, additional demands were included in the hydrologic modeling to provide for simulation of EBMUD and the County's receiving delivery of water at a new intake structure (maximum intake 217 cfs [140 MGD]) in the lower American River near its confluence with the Sacramento River. Additional demands were also included for the City's expansion and use of the Fairbairn WTP as described in Chapter 2. As under Alternative 2, these demands were added to the hydrologic simulation of Alternative 1. The assumed operations of this alternative are described in Chapter 2.

### Cumulative Evaluation

Under cumulative conditions, hydrologic conditions are representative of a future level of demand. Future demands by other water purveyors on the American River are simulated using demand patterns similar to those developed by the Sacramento-area Water Forum, a consortium of local water purveyors designed to develop and plan for reliable water



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Table 3-1. Primary Assumptions Used in the EBMUD PROSIM Modeling[a]

| | Water Demand (acre-feet) | |
|---|---|---|
| | Existing Conditions (1995) | Alternative 1: No Action (2030) |
| CVP agricultural demands[b] | | |
| North of the Delta[f] | 2,547,000 | 2,546,000 |
| South of the Delta | 2,980,000 | 2,983,000 |
| CVP municipal and industrial demands | | |
| North of the Delta | 441,000 | 551,000 |
| South of the Delta | 145,000 | 145,000 |
| American River demands[c, f] | 285,000 | 368,000 |
| Wildlife refuge demands (Level II) | | |
| North of the Delta | 92,000 | 190,000 |
| South of the Delta | 157,000 | 292,000 |
| Nonproject demands | 3,119,000 | 3,315,000 |
| State Water Project demands | 3,998,000 | 4,222,000 |
| Folsom Reservoir operation | 400,000–670,000 flood rule curve | 400,000–670,000 flood rule curve |
| American River instream flows | modified D-1400 | AFRP flows[e] |
| Dedicated water | not applicable | upstream |
| Trinity River flows | 340,000 | 390,000–750,000 |
| Delta standards | Bay/Delta Accord | Bay/Delta Accord |
| Tuolumne River | FERC criteria | FERC 1996 relicense[g] |
| Stanislaus River | drought management principles[d] | D-1422, D95-06 |
| Mokelumne River | LMRMP | Settlement Agreement |

[a] Demands were estimated by summing the demand time series for the model input. "North of the Delta" includes PROSIM Nodes 1-29 and 50. "South of the Delta" includes Nodes 30-55, excluding 50.

[b] Demands exclude Feather River service area demands at PROSIM Node 11.

[c] Also included in the CVP North-of-the-Delta demands. Developed by averaging the times series input for PROSIM Nodes 14-17.

[d] Drought management principles are Reclamation actions to preserve storage for low-flow conditions.

[e] Estimates of AFRP objections as developed in the CVPIA Programmatic EIS based on target flows identified by the U.S. Fish and Wildlife Service in October 1996.

[f] An additional 36,000 AF is assumed to be diverted by Placer County Water Agency upstream of Folsom Reservoir.

[g] Based on FERC license number 2299.



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Table 3-2. Comparison of American River Demands (acre-feet)

| Agency | No Action (Alternative 1) | Folsom South Canal Connection (Alternative 2) | Joint Water Supply (Alternative 3) |
|---|---|---|---|
| **PROSIM Node 14** [b] | | | |
| Placer County Water Agency Water Rights | 25,000 | 25,000 | 25,000 |
| Placer County Water Agency | 0 | 0 | 0 |
| Roseville | 0 | 0 | 0 |
| Granite Bay | 25,000 | 25,000 | 25,000 |
| Northridge | 0 | 0 | 0 |
| North Area Water Rights | 60,000 | 60,000 | 60,000 |
| Fair Oaks | 15,000 | 15,000 | 15,000 |
| Citrus Heights | 18,000 | 18,000 | 18,000 |
| City of Folsom | 20,000 | 20,000 | 20,000 |
| Folsom Prison | 2,000 | 2,000 | 2,000 |
| Folsom Transfer | 5,000 | 5,000 | 5,000 |
| San Juan Suburban | 11,200 | 11,200 | 11,200 |
| Orangevale | 6,500 | 6,500 | 6,500 |
| City of Folsom | 700 | 700 | 700 |
| San Juan (County) | 4,000 | 4,000 | 4,000 |
| El Dorado Irrigation District | 7,550 | 7,550 | 7,550 |
| El Dorado Hills | 7,500 | 7,500 | 7,500 |
| El Dorado Irrigation District | 50 | 50 | 50 |
| Georgetown | 0 | 0 | 0 |
| Roseville | 26,000 | 26,000 | 26,000 |
| Roseville (CVP) | 26,000 | 26,000 | 26,000 |
| Placer County Water Agency (CVP) | 0 | 0 | 0 |
| **Total** | **129,800** | **129,800** | **129,800** |
| **PROSIM Node 15** | | | |
| Southern California Water Company | 5,000 | 5,000 | 5,000 |
| Sacramento Municipal Utilities District | 15,000 | 15,000 | 15,000 |
| EBMUD | 0 | 28,900 [a] | 0 |
| Losses | 5,000 | 5,000 | 5,000 |
| California Parks and Recreation | 5,000 | 5,000 | 5,000 |
| Sacramento County | 15,000 | 15,000 | 15,000 |
| **Total** | **45,000** | **73,900** | **45,000** |



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| Agency | No Action (Alternative 1) | Folsom South Canal Connection (Alternative 2) | Joint Water Supply (Alternative 3) |
|---|---|---|---|
| **PROSIM Node 16** | | | |
| City of Sacramento | 100,000 | 100,000 | 141,900[c] |
| EBMUD | 0 | 0 | 35,000[d] |
| Sacramento County | 0 | 0 | 44,800 |
| Carmichael | 12,000 | 12,000 | 12,000 |
| **Total** | **112,000** | **112,000** | **338,000** |
| **PROSIM Node 17** | | | |
| City of Sacramento | 81,200 | 81,200 | 108,500 |
| Sacramento County Agriculture | 0 | 0 | 0 |
| Placer County Water Agency | 0 | 0 | 0 |
| **Total** | **81,200** | **81,200** | **81,200** |

[a] Average annual delivery through the FSC based on 350-cfs EBMUD capacity, deliveries subject to Hodge Decision criteria, and EBMUD operations.

[b] An additional 36,000 AF is assumed to be diverted by Placer County Water Agency upstream of Folsom Reservoir.

[c] The City of Sacramento's joint project water supply is assumed to shift from Node 16 to Node 17 in dry years.

[d] Average annual delivery through the intake facility based on 155 cfs EBMUD capacity and EBMUD operations.

supplies in the Sacramento region and to protect the fishery, recreation, and aesthetic resources of the lower American River (described later in this chapter) (Table 3-3). Under the Alternative 2 cumulative scenario, the pipeline is operated at full capacity (350 cfs), constrained by the flows required by the Hodge Decision (1990). No proposals for the use of water from the additional delivery capacity above EBMUD's contract amount has been identified. Under the Alternative 3 cumulative scenario, the intake structure would be operated continuously at its maximum intake capacity of 217 cfs. These operations are assumed to simulate the maximum potential contribution of the project alternatives to possible cumulative effects and represent a worst-case scenario.

## AFFECTED ENVIRONMENT

The "Affected Environment" section describes the hydrology and water supply conditions in the American and Mokelumne river basins, Sacramento and Feather rivers, and Sacramento-San Joaquin Delta. Hydropower, a vital component of the operations of Central Valley reservoirs, is also described. This section also includes a description of the hydrologic modeling and assumptions used in the analysis.



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Table 3-3. Cumulative Impact Analysis Assumed Demands (in AF)

| Agency | Average Year[a] | Dry Year[a] | Average Yield[b] |
|---|---|---|---|
| **Upstream of PROSIM Node 14** | | | |
| Placer County Water Agency | 35,500 | 35,500 | 35,500 |
| Georgetown | 18,700 | 12,500 | 17,700 |
| El Dorado County Water Agency | 40,800 | 21,200 | 37,600 |
| Subtotal | 95,000 | 69,200 | 90,800 |
| **PROSIM Node 13** | | | |
| Placer County Water Agency | 35,000 | 35,000 | 35,000 |
| Subtotal | 35,000 | 35,000 | 35,000 |
| **PROSIM Node 14** | | | |
| Northridge | 29,000 | 0 | 13,600 |
| City of Folsom | 34,000 | 20,000 | 31,700 |
| Folsom Prison | 2,000 | 2,000 | 2,000 |
| San Juan (Placer County) | 25,000 | 8,000 | 22,200 |
| San Juan (Sacramento County) | 57,200 | 44,200 | 55,100 |
| City of Roseville | 54,900 | 39,800 | 52,400 |
| Subtotal | 202,100 | 114,000 | 177,000 |
| **PROSIM Node 15[d]** | | | |
| Southern California Water Company | 5,000 | 0 | 4,200 |
| California Department of Parks | 5,000 | 5,000 | 5,000 |
| Sacramento Municipal Utilities District | 30,000 | 15,000 | 27,500 |
| South Sacramento County Agriculture | 35,000 | 0 | 16,400 |
| Losses | 5,000 | 5,000 | 5,000 |
| Subtotal | 80,000 | 25,000 | 58,100 |
| **PROSIM Node 16** | | | |
| City of Sacramento | 128,000 | 67,000 | 117,900 |
| Arcade | 11,200 | 3,500 | 9,900 |
| Carmichael | 12,000 | 12,000 | 12,000 |
| Sacramento County | 78,000 | 0 | 65,100/12,900[c] |
| EBMUD (Alternative 3 cumulative scenario only) | 112,000 | 112,000 | 112,000 |
| Subtotal | 341,200 | 194,500 | 329,800 |
| **PROSIM Node 17** | | | |
| City of Sacramento | 120,000 | 120,000 | 120,000 |
| Subtotal | 120,000 | 120,000 | 120,000 |
| Total for PROSIM Nodes 13-17 | 778,300 | 488,500 | 719,900 |

| Agency | Average Year[a] | Dry Year[a] | Average Yield[b] |
|---|---|---|---|
| Total including upstream demands | 873,300 | 557,700 | 810,700 |

[a] Average and dry year determined from the unimpaired inflow to Folsom Reservoir.

[b] Potential yield for the 70-year simulation considering all year types.

[c] Sacramento County diversion is split: 65,100 AF from the American River and 12,900 from the Sacramento River.

[d] Alternative 2 cumulative demands during dry years total 79,500 AF and average yield totals 100,200 AF.

## Hydrology, Water Supply, and Demands

### American River Basin

The American River drainage basin encompasses approximately 1,900 square miles; the headwater areas in the Sierra Nevada rise to more than 10,000 feet elevation. Average annual precipitation ranges from approximately 15 inches in the valley to 70 inches in the mountains, falling mostly as snow above the 6,000-foot elevation. Major tributaries in the upper watershed include the North, Middle, and South forks of the American River. Unimpaired runoff is estimated from historical hydrologic records and represents the basin drainage that would occur in the absence of any diversions or storage in reservoirs. Annual average unimpaired runoff at the U.S. Geological Survey's Fair Oaks gage is approximately 2,645,000 acre-feet (AF)[1] but varies from less than 900,000 AF (lowest 10% of years) to more than 5,000,000 AF (wettest 10% of years). Streamflow varies throughout the year, with snowmelt generally peaking in April and May; high runoff from large rainfall storms can occur from November through April. Flow in the lower American River below Nimbus Dam is controlled by reservoir releases. Flood control storage operations in November through April generally pass the runoff into the lower American River (with daily flood control operations reducing the peak flows). Releases for downstream deliveries and for Delta operations are generally highest in May through September. Mean annual flow in the lower American River is 3,300 cfs; the design capacity of the channel for floodflows is 115,000 cfs.

Folsom Reservoir is the principal reservoir in the basin with a capacity of 975,000 AF; several smaller reservoirs upstream contribute another 820,000 AF of storage capacity. Flood control operations require that 400,000 to 670,000 AF of Folsom Reservoir storage capacity remain empty from December through March. Nimbus Dam impounds Lake Natoma, which holds 9,000 AF, and regulates releases from Folsom Reservoir to the lower American River. FSC deliveries are made near Nimbus Dam, and the Nimbus Hatchery water supply comes from Nimbus Dam. Below Nimbus Dam, Dry Creek and Arcade Creek runoff enters the lower American River via the Natomas East Main Drainage Canal. Flows in the lower American River contribute an average of approximately 15% of the flow in the Sacramento River.

Minimum instream flow requirements for the lower American River, which were originally established under the California State Water Resources Control Board's (SWRCB's) Water Rights Decision 893 (D-893) (in 1957 for Folsom Reservoir water rights), are 500 cfs

[1] Relation of AF to cfs: approximately 60,000 AF is provided by a continuous flow of 1,000 cfs for 1 month.



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from September 15 to January 1 and 250 cfs for the rest of the year. D-1400 established (in 1972) lower American River minimum flow requirements, contingent on construction of the Auburn Dam, as 1,250 cfs from July 15 to October 14 and 800 cfs for the rest of the year. Reclamation has operated Folsom Dam in the past according to the "Modified D-1400" objective, which was a commitment to meet D-1400 criteria at H Street when conditions were determined by Reclamation to be favorable and D-893 when conditions were less than favorable.

Recently, Reclamation has operated Folsom Dam to attempt to meet flows that the U.S. Fish and Wildlife Service's (USFWS's) Anadromous Fish Restoration Program (AFRP) has recommended as part of the Central Valley Project Improvement Act (CVPIA). Currently, these flows are specified annually by USFWS. The Water Forum has suggested modified AFRP storage-flow criteria that emphasize summer flows for temperature protection of steelhead.

AFRP and Water Forum instream flow criteria were developed to provide flow patterns based on storage flow relationships. These relationships are reflective of variable hydrologic conditions and the habitat requirements for anadromous fish species. Both sets of criteria reflect a shift from historical operations of Folsom Dam, resulting in a greater proportion of the annual flow being released in fall, winter, and spring. The shift is most noticeable in years with dry conditions. In general, AFRP criteria require larger instream flows than the Water Forum pattern. Data on storage flow relationships for AFRP and Water Forum instream flows are included in Appendix C, Tables C-1 and C-2.

Water deliveries to EBMUD through the FSC are restricted by the Hodge Decision (1990). The Hodge Decision allows EBMUD to take delivery of water from the FSC only when flows exceed 1,750 cfs from July 1 to October 14, 2,000 cfs from October 15 through February, and 3,000 cfs from March 1 through June 30.

**American River Demands**

Of the approximately 2,645,000 AF of annual runoff in the American River basin, existing water supply demands are approximately 137,000 AF from Folsom Reservoir (or upstream), 19,500 AF from Nimbus (at the FSC), and about 105,000 AF from the lower American River (U.S. Bureau of Reclamation and Sacramento County Water Agency 1997). Several deliveries take place upstream (Placer County Water Agency) or from Folsom Reservoir (San Juan Suburban, City of Roseville, Folsom Prison, and El Dorado Irrigation District). The largest deliveries of water downstream of Folsom Dam occur at the FSC intake and Fairbairn WTP (City of Sacramento). Several smaller deliveries occur along the lower American River between Nimbus Dam and the confluence with the Sacramento River.

An additional 80,000 AF is delivered to the City of Sacramento just downstream of the mouth of the American River on the Sacramento River (considered an American River water right).

**American River Water Rights**

There are over 1,000 water rights on the American River. The volume of all water rights and entitlements from the American River exceeds 900,000 AF. In some years, the unimpaired flow of the American River has been less than the volume of these water rights and entitlements. The California State Water Resources Control Board granted permits to Reclamation in 1949 to store water at Folsom Reservoir for municipal, industrial, domestic, and recreation purposes. However, there are over 40 water rights on the American River that were granted prior to Reclamation's permits (Bourez 1995). The priority of these other rights may result in Reclamation not being able to meet the demand of all of its American River



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contracts when the unimpaired flow of the American River is less than the volume of all water rights and entitlements.

**Mokelumne River Basin**

The Mokelumne River basin has a watershed area of about 660 square miles (at the Woodbridge stream gage) on the western slope of the Sierra Nevada in Alpine, Amador, and Calaveras counties. The Cosumnes River basin lies between the American and Mokelumne River basins. The Mokelumne River basin upstream of Pardee Reservoir (watershed area of 570 square miles) is the principal water supply for EBMUD's service area. Rainfall averages 15 inches in the valley and 60 inches at the higher elevations. The average annual unimpaired flow at Pardee is about 700,000 AF, with a range from less than 250,000 AF (driest 10% of the years) to about 1,200,000 AF (wettest 10% of the years).

The unimpaired flows indicate an average inflow to Pardee Reservoir of about 965 cfs. Snowmelt dominates the seasonal runoff pattern, with the highest flows in April–June of wet years. Unimpaired flows are typically very low (less than 100 cfs) in July through November. However, the Pacific Gas and Electric Company's (PG&E's) operation of Salt Spring Reservoir (and several other smaller upstream reservoirs) provides higher inflows to Pardee Reservoir during these months in most years.

Pardee and Camanche reservoirs were built and are operated by EBMUD. Pardee Reservoir was completed in 1929 with a capacity of about 198,000 AF. Camanche Reservoir was completed in 1962 with a capacity of 417,000 AF. The Mokelumne Aqueducts originate at Pardee Reservoir and convey water to EBMUD's service area and terminal storage reservoirs, with a maximum gravity flow of about 310 cfs (200 MGD). Pumping at the Walnut Creek Pumping Plant can increase the capacity to about 500 cfs (325 MGD). Mean annual flow in the lower Mokelumne River since Camanche Reservoir was completed is about 500 cfs. Salt Springs Reservoir, which was constructed by PG&E and has a capacity of 142,000 AF, is located upstream of Pardee Reservoir and provides flood control and hydropower benefits.

Flood control operations for Pardee, Camanche, and Salt Springs are regulated by the U.S. Army Corps of Engineers. Flood control storage space can be coordinated between the three major reservoirs on the Mokelumne River. A maximum of 200,000 AF of flood storage space is required from the end of October until the end of March. The flood storage space from April through June depends on snowpack estimates, and the reservoirs can be completely filled at the end of May in dry years and the end of July in wet years.

The Cosumnes River joins the Mokelumne River near Thornton. The Mokelumne River splits into the North and South Fork channels downstream of Thornton. The Delta Cross Channel (DCC) delivers water from the Sacramento River into the North Fork channel. The Mokelumne River channels enter the San Joaquin River in the Delta.

**Mokelumne River Demands**

About 15,000 AF are delivered upstream from Pardee Reservoir. The EBMUD demand (from Pardee) is about 250,000 AF (220 MGD) under existing conditions (1995 demand) and is assumed to be about 275,000 AF (250 MGD) under Alternative 1 (2020 demand before conservation and reclamation). The Woodbridge Irrigation District demands are between 39,000 AF in dry years and 60,000 AF in normal and wet years. The maximum summer deliveries are approximately 350 cfs. Additional downstream deliveries are about 20,000 AF and total channel losses account for approximately 70,000 AF annually.

Instream flow requirements for the lower Mokelumne River (below Camanche Dam) are maintained by EBMUD's operations of Pardee



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and Camanche reservoirs. EBMUD, DFG, and USFWS recently approved the Mokelumne Settlement Agreement (Partnership Agreement) for management of the lower Mokelumne River in connection with settlement of a Federal Energy Regulatory Commission (FERC) license proceeding. The agreement requires releases from Camanche Reservoir that depend on fish life-stage protection throughout the year and the water year type. The agreement also includes a provision to provide up to 20,000 AF for in-river use during a dry period. Releases range from 100 to 325 cfs during normal and above-normal runoff water year types, 100 to 250 cfs in below-normal years, 100 to 220 cfs in dry years, and 100 to 130 cfs in critically dry years. The agreement provides for annual total releases of 22,500 AF in critically dry years, 67,400 AF in dry years, 89,000 AF in below-normal years, and 129,000 AF in wet years. The required flows for wet and below-normal years must be met at least 65% of the time.

**Other Rivers and Reservoirs**

The Sacramento River drainage basin upstream of the City of Sacramento encompasses approximately 23,500 square miles and produces an average annual runoff of about 17,000,000 AF at the Freeport gaging station (below the confluence with the American River). Principal reservoirs controlling flows in the lower Sacramento River include Lake Shasta (4,550,000 AF) on the Sacramento River upstream of Redding and Trinity Lake (2,480,000 AF), which regulates deliveries made to the Sacramento River from the Trinity River basin. Diversions from the Trinity River basin averaged 1,030,000 AF annually from 1967 to 1991; current instream flows for the Trinity River are 340,000 AF. The Feather River is a major tributary to the Sacramento River; Lake Oroville, a component of the State Water Project (SWP), provides 3,540,000 AF of storage of water from the Feather River. Average runoff from the Feather River basin (including the Yuba River) is approximately 5,850,000 AF at the Nicholas gaging station (downstream of the confluence with the Yuba River).

The San Joaquin River basin encompasses approximately 13,500 square miles (at the Vernalis gage) and is controlled by several reservoirs on the Stanislaus, Tuolumne, Merced, and upper San Joaquin rivers. The upper San Joaquin River is controlled by the Friant Dam (Millerton Reservoir) with most water diverted to the Kern and Madera canals. The average annual unimpaired flow at Vernalis is about 6,200,000 AF for 1972–1992. Average annual historic runoff for 1972–1992 at Vernalis is 3,200,000 AF, but runoff varies from 700,000 AF (lowest 10% of years) to over 6,000,000 AF (wettest 10% of years). Because San Joaquin River tributary reservoir projects and water deliveries are operated independently of the Sacramento River basin projects, there is no substantial connection between EBMUD American River deliveries and San Joaquin River flows.

**Sacramento-San Joaquin River Delta**

The Delta is a 1,150-square-mile region southwest of the City of Sacramento and northwest of the City of Tracy and extends west to where the San Joaquin and Sacramento rivers join. The area was historically a vast coastal brackish marsh until the late 1870s when reclamation of the Delta for agriculture began in earnest. Today, the Delta is a complex hydrologic system with levee-controlled channels; flow control structures; and deliveries for agricultural, municipal, and industrial uses. Much of the land surface on Delta islands, the areas of land surrounded by levees, lies below sea level. The range of daily tidal variation in the Delta is approximately 5 feet at the western edge near Pittsburg, with the changes in flow direction moving large quantities of salt water back and forth in the western portion of the Delta. Total annual inflow to the Delta averages approximately 23,000,000 AF, with the Sacramento River (including the American River flow) contributing 62%, the San Joaquin River contributing 15%, the Yolo Bypass



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(deliveries from the Sacramento River) contributing 14%, eastside streams (including the Mokelumne River flow) contributing 5%, and precipitation runoff (and drainage) contributing 4%. Inflows have ranged from as little as 9,000,000 AF to as high as 72,000,000 AF annually.

Total inflow to the Delta is critical for maintaining water quality for numerous agricultural deliveries throughout the Delta and for major water supply deliveries in the southern Delta at the SWP's Banks Pumping Plant, CVP's Tracy Pumping Plant, and Contra Costa Water District's intakes at Rock Slough and Old River. Inflow is also critical to fisheries habitat, and operations of the SWP and CVP are coordinated to meet Delta outflow and other Delta water quality requirements and to maintain adequate protection for the Delta smelt and winter-run chinook salmon (i.e., criteria in applicable biological opinions).

Water demands for deliveries and instream flows are changing as growth occurs and regulatory conditions are modified through endangered species protective measures and implementation of other laws, such as the CVPIA. Nevertheless, for purposes of this project evaluation, the water supply demands, instream flow requirements, and applicable Delta water quality objectives are assumed to remain unchanged.

## Hydropower Resources and Energy Production

Folsom Dam is a component of CVP's hydropower system in northern California that consists of 11 facilities with a combined total power generating capacity of 2,045 megawatts (MW). Most of this capacity is derived from the Trinity, Carr, Spring Creek, Shasta, Keswick, Folsom, and Nimbus powerplants that are identified as the CVP North facilities. Two facilities, New Melones and San Luis, are located south of the Delta. The generating capacity at Folsom Dam is 215 MW, and the capacity at Nimbus Dam is 17 MW. CVP powerplants are located downstream from the storage reservoirs and operate in conjunction with releases of stored water that are made to meet demands. The major power supplier in the region is PG&E with a capacity of 20,000 MW.

CVP power generation capacity is a function of reservoir elevation and the rate at which water is passed through the turbines. The pattern of generation is directly related to reservoir releases made for irrigation, municipal and industrial uses, instream flow requirements, and other CVP water demands. Maximum releases generally occur in the summer irrigation season, which often corresponds to the peak power load period within the CVP service area. Recent water quality requirements in the rivers and Delta have increased the need for water releases in spring and winter, reducing the amount of water available for release during peak power loads.

In northern California, the CVP generates power in coordination with PG&E operations. The Western Area Power Administration (Western), operates, maintains, and upgrades the transmission grid for the western United States. Power generated at CVP facilities is dedicated first to meeting CVP power requirements ("Project Use Load"), primarily for pumping facilities. CVP generating capacity is generally not sufficient to meet peak project-use demand; therefore, CVP coordinates power production with PG&E under a contract that expires in 2004 to ensure that peak power loads are satisfied. Western is responsible for ensuring that CVP Project Use Loads are met at all times. In addition, Western markets surplus power that is generated by CVP, with preference given to "Preference Power Customers," which include irrigation districts, cooperatives, public utility districts, municipalities, California educational and penal institutions, federal defense agencies, and other institutions.

## Hydrologic Modeling and Assumptions

The potential effects of the alternatives on the hydrologic characteristics of Folsom Reservoir, the lower American River, the Delta, and other rivers and reservoirs in northern California were primarily evaluated with Reclamation's hydrologic simulation model PROSIM (PROject SIMulation). PROSIM is a planning model designed to simulate the operations of the CVP and SWP reservoir and water delivery system for current and future facilities, flood control operating criteria, water delivery policies, instream flow and Delta outflow requirements, and hydroelectric power generation operations. A comprehensive evaluation of Sacramento River basin reservoirs and rivers is necessary because operations of the American River may influence Delta conditions and Delta operations, as well as upstream SWP and CVP reservoirs.

Effects of the project alternatives on the Mokelumne River system were evaluated with results from EBMUD's hydrologic simulation model EBMUDSIM, which simulates river hydrology, reservoir operations, demands on the Mokelumne River and within the EBMUD service area, Mokelumne River instream flow requirements, and the water delivery system constraints. Deficiencies in the simulated EBMUDSIM deliveries were translated into demands from the American River in the PROSIM model. Deliveries from the American River were then input to a second EBMUDSIM simulation to determine the effects on the Mokelumne River reservoirs, downstream Mokelumne River flows, and EBMUD deliveries.

The PROSIM and EBMUDSIM models each rely on a variety of user-defined inputs and modeling assumptions. Appendix C contains a summary of the principal assumptions used to simulate the Supplemental Water Supply Project. The two models simulate the EBMUD and Sacramento River basin water supply systems at a monthly time step over a 70-year period of the historic hydrologic record (1922–1991). The PROSIM model uses a fixed monthly time series for estimating San Joaquin River flows at Vernalis.

PROSIM simulations for this project were performed with model assumptions similar to those used for Reclamation's Central Valley Project Improvement Act (CVPIA) Programmatic EIR/EIS. CVPIA (Public Law 102-575, Title 34) mandated changes to the management of the CVP system for the protection, restoration, and enhancement of wildlife. The principal difference between model inputs for CVPIA and the Supplemental Water Supply Project is the assumed water demands for American River water. The CVPIA used a total demand of 280,000 AF upstream of Nimbus and 230,000 AF from the lower American River. Alternative 1 assumed a total of 175,000 AF above Nimbus and 112,000 AF from the lower American River. This difference is attributable to the assumption in CVPIA that deliveries were not limited to existing facilities capacities. Adjustments to PROSIM inputs from the CVPIA were used to incorporate Folsom Reservoir flood-control storage space using a variable 400,000–670,000 AF criterion (depending on upstream reservoir storage space), as directed by Congress in 1996.

Reclamation and USFWS recently discovered an inconsistency in the PROSIM input hydrology that may cause the model to overestimate the potential flexibility of CVP operations. As a result, the PROSIM simulations presented in this analysis may underestimate the use of CVP storage and overestimate water deliveries in some critical dry years. This inconsistency affects all the PROSIM simulations reported in this draft EIR/EIS and probably does not significantly change the relative differences between the simulations for each alternative. Because of the parallel effect on the simulations and the use of a comparative analysis, there is no expected effect on the impact conclusions presented in the EIR/EIS. Reclamation is in the process of

making coding changes to PROSIM. When those coding changes are calibrated and available for use, PROSIM simulations will be updated if necessary.

The monthly planning models, although useful for comparative assessment of likely changes with these project alternatives, should not be used to forecast actual operations of EBMUD, CVP, or SWP facilities. The actual day-to-day operations of these water management facilities are more complex than can be simulated with monthly models. The monthly model results are considered sufficiently accurate and appropriate for impact assessment purposes.

**PROSIM Simulated Alternative 1 American River Deliveries**

Under Alternative 1 simulation, EBMUD would not take delivery of water from the American River. The primary difference between simulations for Alternative 1 and the existing conditions scenario involves changes in American River demands and instream flow requirements. Under existing conditions, annual American River demands were assumed to average 285,000 AF and instream flow requirements were based on modified D-1400 standards. Under Alternative 1, annual American River demands were assumed to average 368,000 AF and instream flow requirements were based on AFRP targets. Other Sacramento River basin demands under Alternative 1 were based on a 2030 level of development. Changes in the simulated hydrologic conditions on the American River, Delta, and other tributary streams and upstream reservoirs are shown in Appendix C.

**PROSIM Simulated Alternative 2 American River Deliveries**

EBMUD operates its current Mokelumne River system to provide adequate water supplies to its customers and minimize deficiencies. Water supply forecasts are used in the preparation of operation projections. The operations projection is updated throughout February, March, and April as more reliable information becomes available. The main parameters considered in the operation projection are the water supply forecast of projected runoff, water demand of other users on the river, water demand of EBMUD customers, and flood control requirements. Demands for American River water are estimated in EBMUDSIM whenever there is available total system storage.

Deliveries from the American River for Alternative 2 were simulated from the PROSIM Model Node 15 at Nimbus (FSC) (Figure 3-1). PROSIM simulates deliveries made from Nimbus in months in which an EBMUD project demand occurs and Hodge Decision flows are exceeded at Nimbus, with a maximum delivery rate of 350 cfs. Figure 3-2 shows the pattern of PROSIM simulated annual deliveries for Alternative 2 and indicates that some deliveries from Nimbus were simulated by PROSIM in a majority of the 70 years evaluated. The monthly frequency of deliveries from the American River is high because the Hodge Decision generally restricts American River water availability for some of the dry years when the water is needed to reduce deficiencies. Water from the American River is thus required prior to any time period that could be subject to dry conditions. However, the deliveries would take place sporadically throughout many of the years when water is delivered.

The simulated deliveries occur primarily in November through April of years with simulated EBMUD storage below flood control maximum and available American River flows greater than Hodge Decision flows. The mean annual simulated delivery was 29,000 AF, with a maximum take of 105,000 AF projected in one of the 70 years (1963). During the 1928–1934 period, considered the representative period for dry conditions, annual average delivery would be 31,000 AF.

The cumulative condition scenario introduces additional American River demands

by EBMUD and by existing American River water users and other CVP contractors. EBMUD demands are increased under the assumption that deliveries from the American River are not constrained by available EBMUD storage. For Alternative 2 cumulative conditions, it was assumed that water would be delivered to EBMUD whenever water was available under the Hodge Decision criteria and would be limited only by available capacity in the FSCC pipeline (up to 350 cfs). The annual average EBMUD deliveries under this scenario are about 100,000 AF. No specific plans for use of this water have been developed; therefore, only a limited analysis of the potential effects of this water use in terms of cumulative impacts has been completed for water-based resources. As mentioned above, the cumulative condition scenario also includes increased water use by other American River water users. For purposes of this analysis, future American River water use by other entities was estimated at 435,000 AF for the average water year using assumptions developed by the Water Forum. These water use estimates represent the best available information regarding future water use in the American River basin.

**PROSIM Simulated Alternative 3 American River Deliveries**

Water supply forecasts are used in the preparation of operation projections. The operations projection is updated throughout February, March, and April as more reliable information becomes available. The main parameters considered in the operation projection are the water supply forecast of projected runoff, water demand of other users on the river, water demand of EBMUD customers, and flood control requirements. Under these conditions, EBMUD would take delivery of 155 cfs from the American River through the new intake facility to supplement its water supplies and retain storage in its Mokelumne River and terminal reservoir systems. Diversions would cease when EBMUD end-of-March projections indicate that total system storage is expected to remain above 500,000 at the end of September.

Alternative 3 includes new deliveries made to EBMUD and the County upstream of the I-5 bridge. These deliveries made near the mouth of the American River are assumed not to be constrained by the Hodge Decision flow criteria and so are simulated whenever there is an EBMUD monthly demand. Under Alternative 3, the City of Sacramento would take delivery of additional water primarily at Fairbairn WTP during most years. During dry years, the City would take delivery of the additional water from the Sacramento River immediately downstream from the confluence with the American River (Node 17). Because PROSIM does not include a model node for the mouth of the American River, deliveries made to EBMUD and the County under Alternative 3 were simulated at the Fairbairn WTP (Node 16). For the analyses of project effects on the river reach between Fairbairn WTP and the Sacramento River, EBMUD and County deliveries were added into the PROSIM calculated flow at Fairbairn WTP.

Figure 3-3 shows the annual simulated additional American River deliveries for Alternative 3.

Deliveries are simulated at a monthly rate of about 155 cfs from March through the next February (unless flood control storage is exceeded). Compared to Alternative 2, the Alternative 3 deliveries are simulated in response to EBMUD's system demands, resulting in a pattern of regular monthly deliveries only in years when combined storage projections are less than 500,000 AF. EBMUDSIM simulation results indicate that storage projections will be less than 500,000 AF in 23 years (i.e., March projections). Because the deliveries to EBMUD continue until the following February, deliveries to EBMUD are simulated by PROSIM in 33 of the 70 water years. EBMUD's water year average deliveries would be about 35,000 AF, with a maximum of 112,000 AF taken in 12 of the 70 water years (i.e., 2 years in sequence requiring deliveries).



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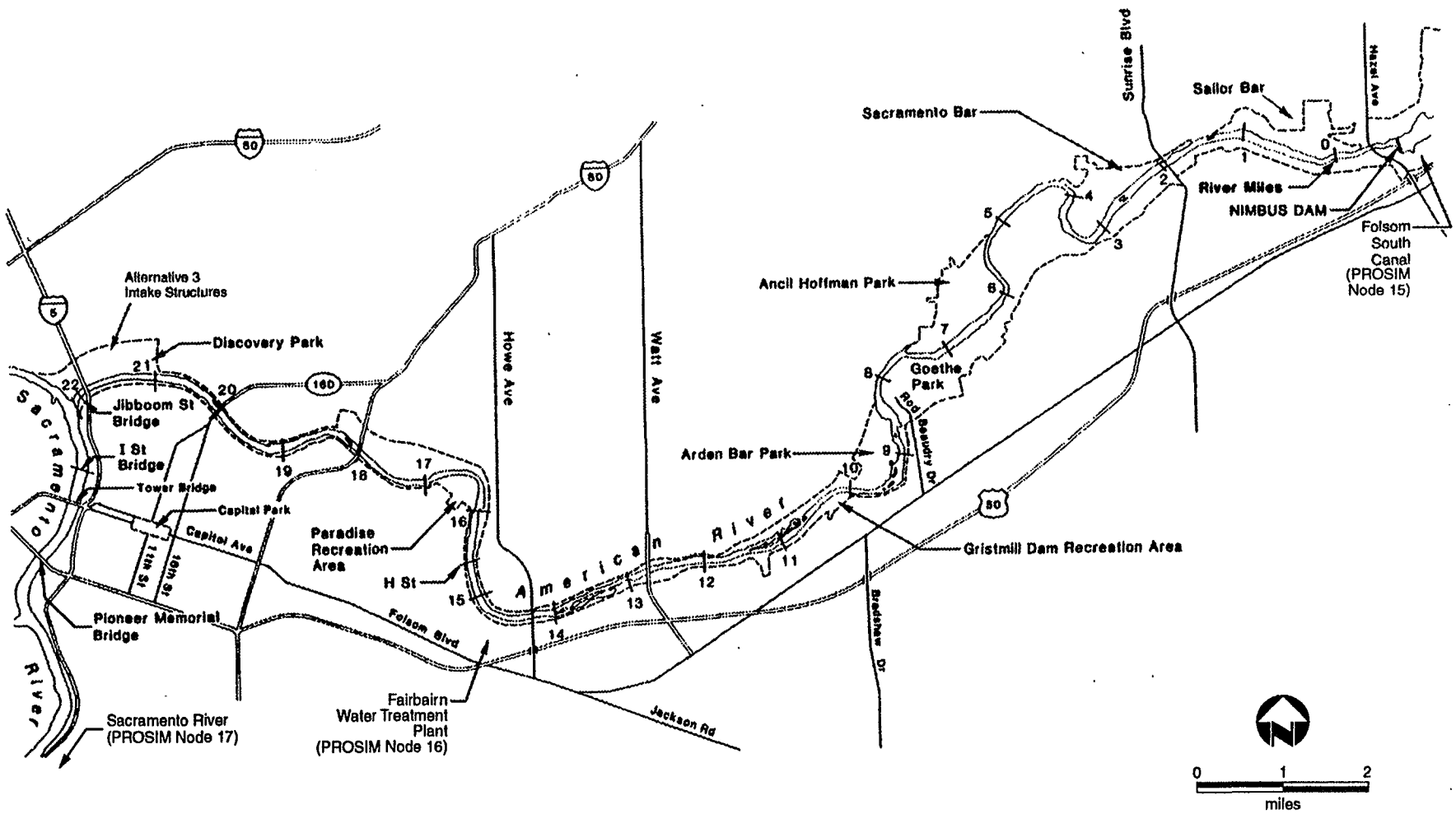


Source: Modified from Watson, D. 1985 Stream Flow and Recreation on the Lower American River. Prepared for East Bay Municipal Utility District.

Jones & Stokes Associates, Inc.

**Figure 3-1**
**Map of the Lower American River**

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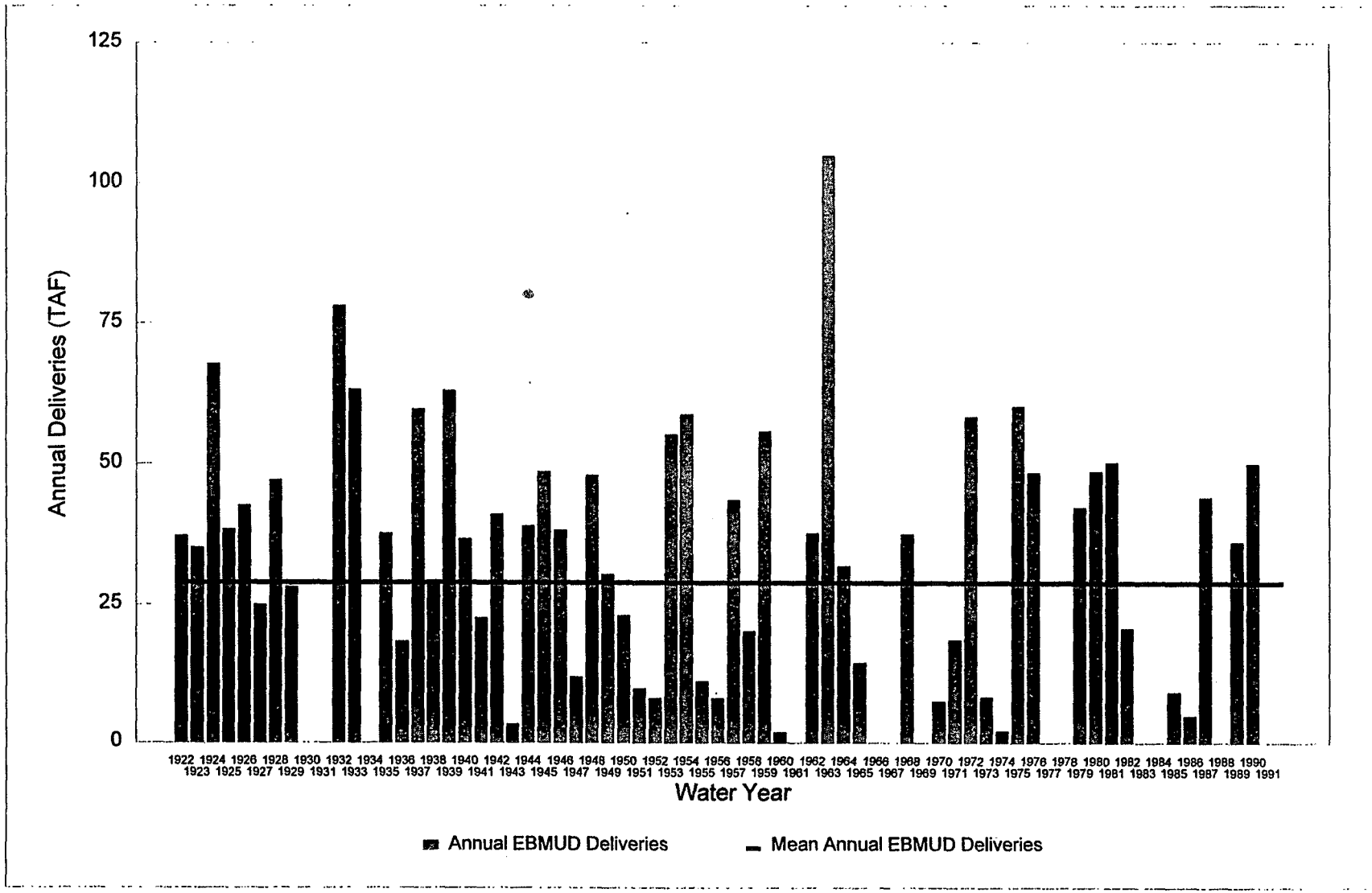


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Figure 3-2.
Annual Deliveries from the American River for Alternative 2

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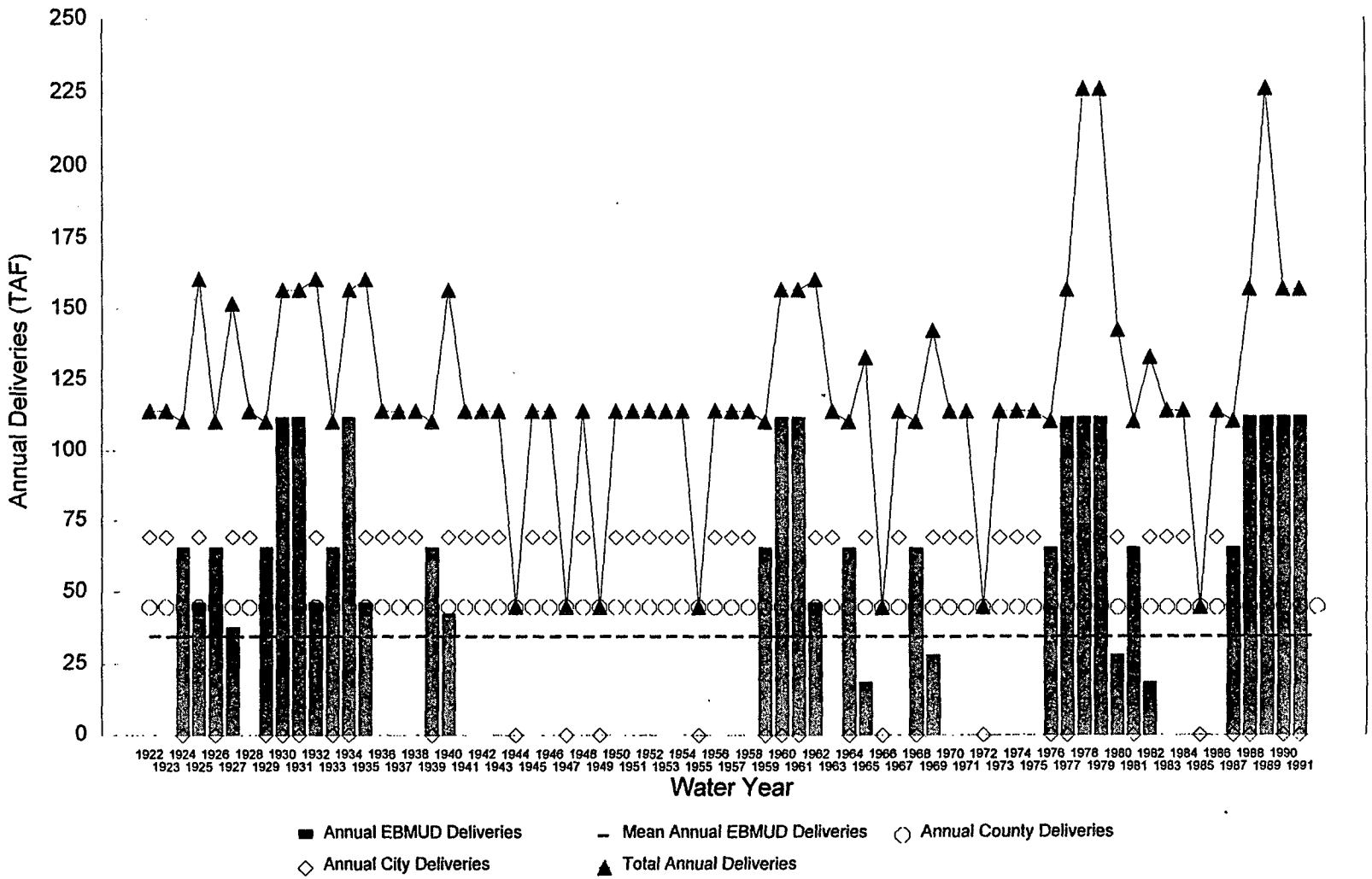


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**Figure 3-3.**
**Annual Deliveries from the American River for Alternative 3**

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Additional City and County deliveries were simulated at a constant annual rate of approximately 69,000 AF and 45,000 AF, respectively. In dry years, however, the City's new deliveries would come from the Sacramento River. Therefore, total annual new American River deliveries for Alternative 3 were simulated to equal from 45,000 AF (County only) to 226,000 AF with an annual average of 122,000 AF for the 70-year period. During the 1928–1934 dry period, new American River deliveries would average 138,000 AF.

Modeling assumptions used for the cumulative Alternative 3 conditions also include additional American River demands by EBMUD and other American River water users as described for Alternative 2 cumulative conditions. EBMUD demands are increased under the assumption that deliveries from the American River are not constrained by the operational criteria described in Chapter 2. Instead, EBMUD would take delivery of 112,000 AF annually, simulated at a continual delivery rate of 155 cfs within the total 217 cfs capacity of the intake facility. As with the cumulative Alternative 2 scenario, no specific plans for use of this water have been developed; therefore, only a limited analysis of the potential effects of this water use in terms of cumulative impacts has been completed for water-based resources. Other American River basin demands are identical to those described for the cumulative Alternative 2 scenario.

**Modeling for Hydropower Resources and Energy Production**

Power generation at CVP facilities was calculated with the power module in the PROSIM hydrologic model for the 1922 through 1990 calendar years. Model results for average monthly power generated at Folsom Dam and the combined CVP North (i.e., north of the Delta) facilities were compared to Alternative 1 (i.e., no action) for Alternatives 2 and 3 and to existing conditions for the cumulative conditions under Alternatives 2 and 3.

Several methods can be used to evaluate effects of the project on power resources, including generating capacity (i.e., total instantaneous power output from the facility) and energy production. As indicated below, project effects on generating capacity were not evaluated. Losses of capacity are difficult to recover because capacity is dictated by hydrologic inputs to the reservoir. Monthly and annual average energy production provides an evaluation of the project's effects on average fluctuations in operations of the dam. Losses in energy production are more easily recovered than capacity because lost energy production may be gained at other times in the year.

Previous studies that evaluated Folsom reoperation scenarios (Sacramento Area Flood Control Agency 1994) indicated that decreases in capacity are associated primarily with high winter flows. Additionally, according to the hydrologic analysis of PROSIM modeling results, the project alternatives would negligibly affect Folsom Reservoir elevations throughout the year. Therefore, it is assumed that generating capacity would be affected negligibly because project deliveries would not result in substantial lake elevation fluctuations compared to existing conditions, would be a small fraction of inflows to Folsom Reservoir, and would be derived from preexisting river flows.

The project alternatives could affect power resources primarily through a reduction in energy production as a result of underutilized capacity. Energy production could be reduced by changing the quantity or timing of stored water that is available to be passed through CVP turbines. The operations and energy use by pumping operations from Folsom Reservoir by the El Dorado Irrigation District and the City of Folsom depend on the lake elevation, which is governed by storage and releases. The project alternatives are assumed to have a small effect on the existing pumping operations from the



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lake because of the small change in reservoir elevations throughout the year.

Economic effects could result from reductions in surplus CVP power available for sale or from an increased need to purchase additional power to support peak load demands of preference customers. If net CVP capacity is affected by the project, Western's commitment to provide energy for project use peak loads and preference customers under power sale contracts could require supplemental purchases from another generator and result in a cost impact on Western's customers including CVP preference customers. It is possible that reductions in the available CVP energy could be replaced with energy from other power sources such as fossil fuel plants that have greater environmental effects than hydropower (e.g., air pollutants). However, it is impossible to predict where the replacement energy would originate because Western markets power from a large network of facilities across the western United States that have a combined generating capacity of approximately 156,000 MW.

## RESULTS

### Hydrologic Conditions

The modeling results from PROSIM and EBMUDSIM were evaluated to identify the magnitude and pattern of changes in hydrologic characteristics of the various rivers and reservoirs that might be affected by project deliveries from the American River. The changes that were evaluated include Folsom Reservoir storage and elevation; flows in the lower American River below Nimbus Dam and Fairbairn WTP; water surface elevation in the lower American River at Sailor Bar and Sacramento Bar; storage in Camanche and Pardee reservoirs; flows in the lower Mokelumne River; Shasta Lake, Trinity Lake, and Lake Oroville storage; Sacramento River flows at Keswick and Freeport; total Delta inflow and outflow; and total from the Delta pumping plants.

Changes in hydrologic characteristics resulting from increased deliveries made from the American River do not necessarily constitute an environmental impact. However, changes in hydrologic regimes can affect other resources such as fisheries, water quality, vegetation, recreation, and visual characteristics of rivers and reservoirs. A hydrologic impact would occur if some defined regulatory threshold such as an instream flow standard were violated or if the probability of flooding were increased. This analysis assumes that instream flow standards will be met and that the small quantities delivered under the alternatives would have a negligible effect on flood control facilities or operations. Therefore, this section focuses on describing the hydrologic changes that may occur under each alternative. Appendix C contains a description of the criteria used for the PROSIM and EBMUDSIM modeling and a comprehensive set of tabular presentations of the modeling output for existing conditions and each alternative.

Because PROSIM simulates monthly operations for the entire Sacramento River basin, a change in American River flow will sometimes cause Delta flows to change, which may then change the reservoir releases from Folsom or other upstream reservoirs. The PROSIM results indicate that sometimes the EBMUD deliveries accumulate and then a threshold effect is triggered in the model. For example, changes in Folsom Reservoir storage may cause a different instream flow requirement that will cause a greater change in Folsom Reservoir storage than the original difference. Generally, agency personnel operating the water supply and delivery control systems have more flexibility in controlling these interactions between the criteria than the monthly model results would suggest. In general, operators of the major storage, delivery, and conveyance facilities would not be affected by the relatively small maximum daily delivery rates of 350 cfs for Alternative 2 or 381 cfs (in July) for Alternative 3.

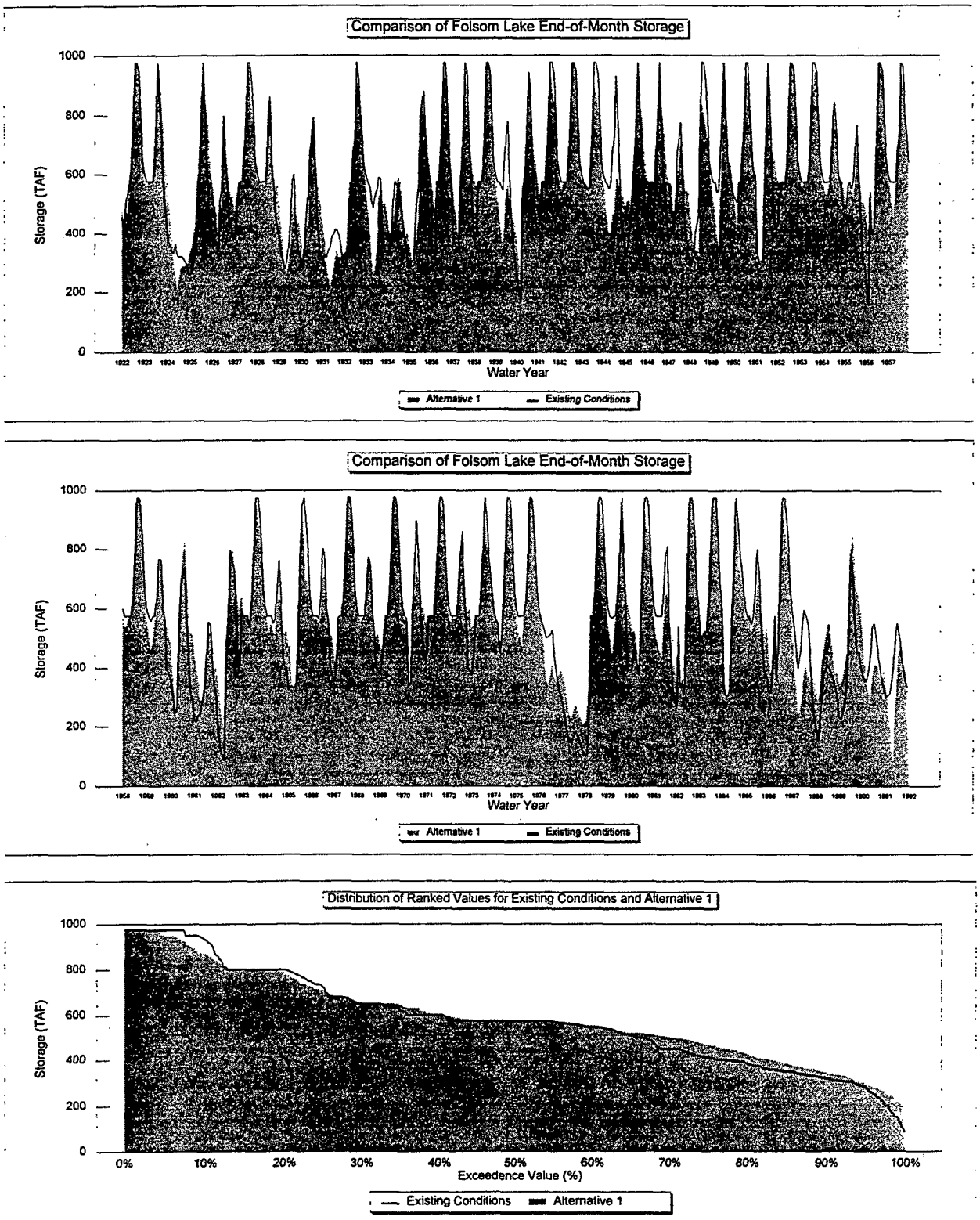


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**Figure 3-4.**
**Folsom Lake Storage:**
**Existing Conditions and Alternative 1**

**Folsom Reservoir**

Figure 3-4 shows the 70-year pattern of end-of-month storage for the existing conditions scenario and Alternative 1 and the distribution of the ranked storage values that indicate the percentage of months with storage of a particular value. Alternative 1 end-of-month storage values are somewhat higher in July through December and lower in January through June, compared to the existing conditions scenario. The pattern occurs primarily as a result of reserving storage for higher release flows for fish in late fall and winter (November–March). End-of-September storage is termed "carryover" storage and is important for protecting against unanticipated drought conditions that may occur during the following year. Carryover storage is about 90,000 AF higher under Alternative 1 as a result of the increased fall storage compared to existing conditions.

Figure 3-5 shows that the effect of project deliveries on Folsom Reservoir storage under Alternatives 2 and 3 are small compared to Alternative 1. Compared to Alternative 1, carryover storage is 2,000 AF lower under Alternative 2 and 3,000 AF lower under Alternative 3. There are no substantial differences between alternatives in the 1928–1934 dry period, and both the range of monthly values and the mean annual storage are similar for both alternatives.

Figure 3-6 shows the results for cumulative conditions under Alternatives 2 and 3. Under cumulative conditions, additional American River demands and regulatory constraints result in slightly greater and more uniform reductions in Folsom Reservoir storage when compared to existing conditions. Average carryover storage values are 61,000 AF higher for Alternative 2 and 70,000 AF higher for Alternative 3.

Mean monthly reservoir surface elevations are directly related to end-of-month storage levels. Mean monthly reservoir surface elevation would be reduced by less than one foot under Alternative 2 and less than 3 feet under Alternative 3, compared to Alternative 1. Mean monthly changes are slightly greater under cumulative conditions.

**Lower American River**

Effects of the project alternatives were evaluated for flows in the lower American River below Nimbus Dam, and changes in river stage at Sailor Bar and Sacramento Bar. Figure 3-7 shows the 70-year flow record and distribution of ranked data for flows below Nimbus Dam under the existing conditions scenario and Alternative 1. The difference in Folsom Reservoir operations discussed above is reflected in changes from existing conditions to Alternative 1; mean monthly flows are decreased in late summer to reserve storage for fall releases. Mean monthly flows for April through September are decreased, and monthly flows for October through March are increased. Mean annual flow at Nimbus is reduced by 64,000 AF under Alternative 1 compared with existing conditions. The lower average flows reflect deliveries made to meet the greater demand within the basin in 2030.

Figure 3-8 shows that the differences in Nimbus flow with project deliveries for Alternatives 2 and 3 are negligible. Deliveries made under Alternative 2 are expected to result in minor flow effects below Nimbus Dam because deliveries generally occur only during winter when flows greatly exceed minimum flow requirements. Under Alternative 3, deliveries have only indirect effects (i.e., simulated changes in Folsom releases to satisfy Delta outflow and export demands) on flows below Nimbus Dam because American River water is not delivered until it reaches the lower American River intake structure. Correspondingly, the mean annual flow at Nimbus Dam under Alternative 1 is reduced by 27,000 AF under Alternative 2 and by 2,000 AF under Alternative 3. Results do not change appreciably under the 1928–1934 dry period with a reduction in mean annual flow of 31,000

AF under Alternative 2 and 2,000 AF under Alternative 3.

Figure 3-9 shows that the pattern of changes from existing conditions for cumulative conditions under Alternatives 2 and 3 are similar to the change under Alternative 1. Flows are reduced in summer and increase in winter. Mean annual flow at Nimbus is reduced by 291,000 AF and 191,000 AF, respectively, under Alternative 2 and Alternative 3 cumulative conditions, compared to existing conditions.

Figures 3-10 to 3-12 show the 70-year flow record and distribution of ranked data for flows below Fairbairn WTP. The plots are similar to those showing flows below Nimbus (Figures 3-7 to 3-9). Mean annual flow under Alternative 1 is 75,000 AF less than under existing conditions. Mean annual flow is reduced by 27,000 AF under Alternative 2 and 85,000 AF under Alternative 3 compared to Alternative 1. Flow reductions evident under Alternative 2 cumulative conditions reflect deliveries of water from the FSC.

Figures 3-13 and 3-14 show only the 70-year series of flows less than 2,000 cfs that would occur downstream of the intake structure for Alternative 3. For these relatively low-flow conditions, flow reductions from the Alternative 1 values are infrequent and reflect the PROSIM modeling constraints for instream flow requirements. When they occur, the reductions average about 170 cfs under Alternative 3 and 300 cfs under Alternative 3 cumulative conditions.

The analysis of potential changes in river stage (i.e., elevation) that is important for evaluating effects on vegetation inhabiting the riparian zone is shown in Figure 3-15. River stage is directly related to the amount of flow in the channel and depends on the shape and width of the cross section where the measurements are taken. The relationships were developed with mathematical relationships to simulate the discharge data collected by DFG as part of lower American River instream flow studies. Results indicate that the maximum change in river elevation is reduced by less than 0.6 foot (in August) at Sailor Bar and Sacramento Bar under Alternatives 2 or 3. Alternative 2 and 3 cumulative changes are identical and result in the largest changes in river elevations that reflect reduced flows in the summer and slightly increased winter flows.

Data for flows below Nimbus Dam were evaluated for their conformance with Hodge Decision and AFRP instream flow criteria. In general, river flows for the project alternatives would be similar to Hodge Decision and AFRP flows. The greatest change occurs for Alternative 2 compared to Alternative 1: 5 additional months fall below AFRP flows with an average flow reduction of 804 cfs below the criteria. As noted above, future reservoir operations result in reduced river flows in summer compared to existing conditions. Consequently, the project alternatives under cumulative conditions generally result in more reductions in flow below Hodge Decision and AFRP criteria in May–September; the number of months with violations of the flow criteria are reduced in October–January. Under Alternative 2 cumulative conditions, 3 additional months exhibit flow reductions below AFRP criteria compared to existing conditions. All other cumulative condition scenarios (e.g., Alternative 2 Hodge Decision flows, Alternative 3 AFRP flows and Hodge Decision flows) exhibit net reductions in the number of months with violations of the flow criteria.

**Pardee and Camanche Reservoirs**

Figure 3-16 shows the distribution of combined Pardee and Camanche reservoir end-of-month storage data based on EBMUDSIM model results. Under Alternative 1, carryover storage would be 38,000 AF lower than under existing conditions because of implementation of the settlement agreement and additional demands at the 2020 level of development by EBMUD and others. Deliveries from the American River under Alternatives 2 and 3,



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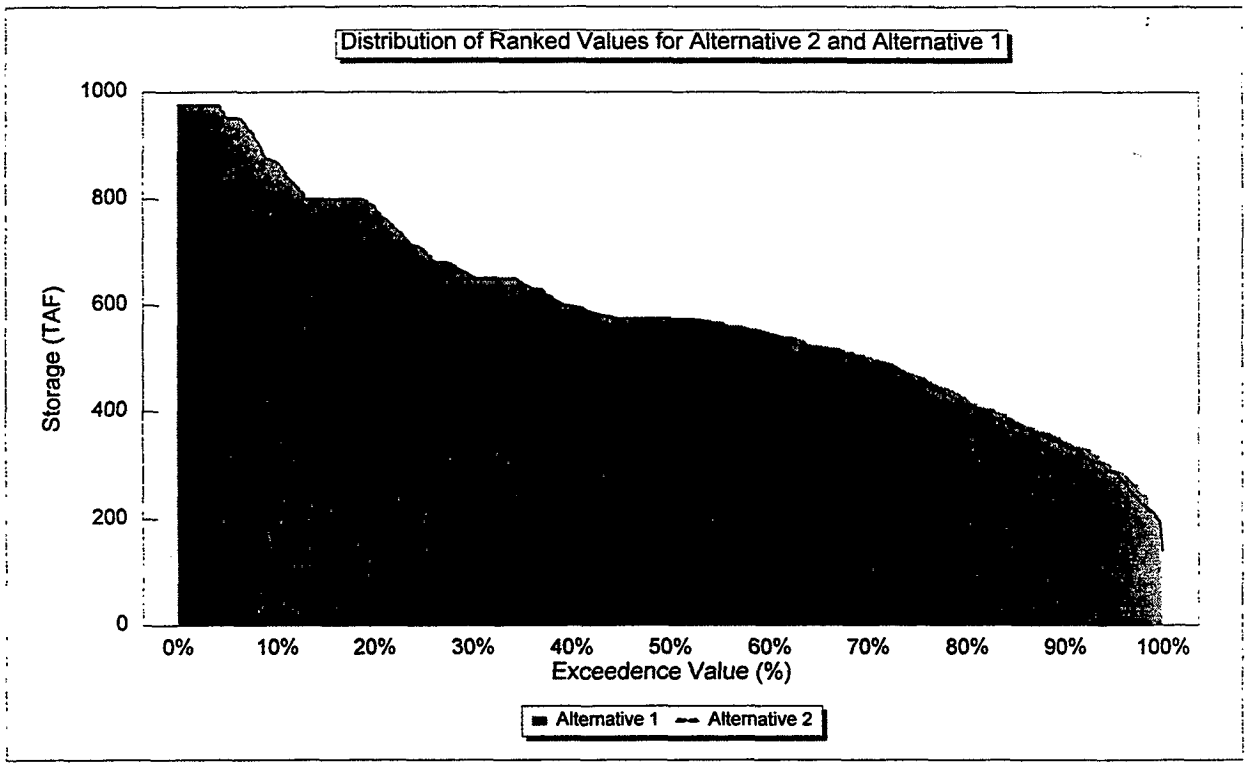


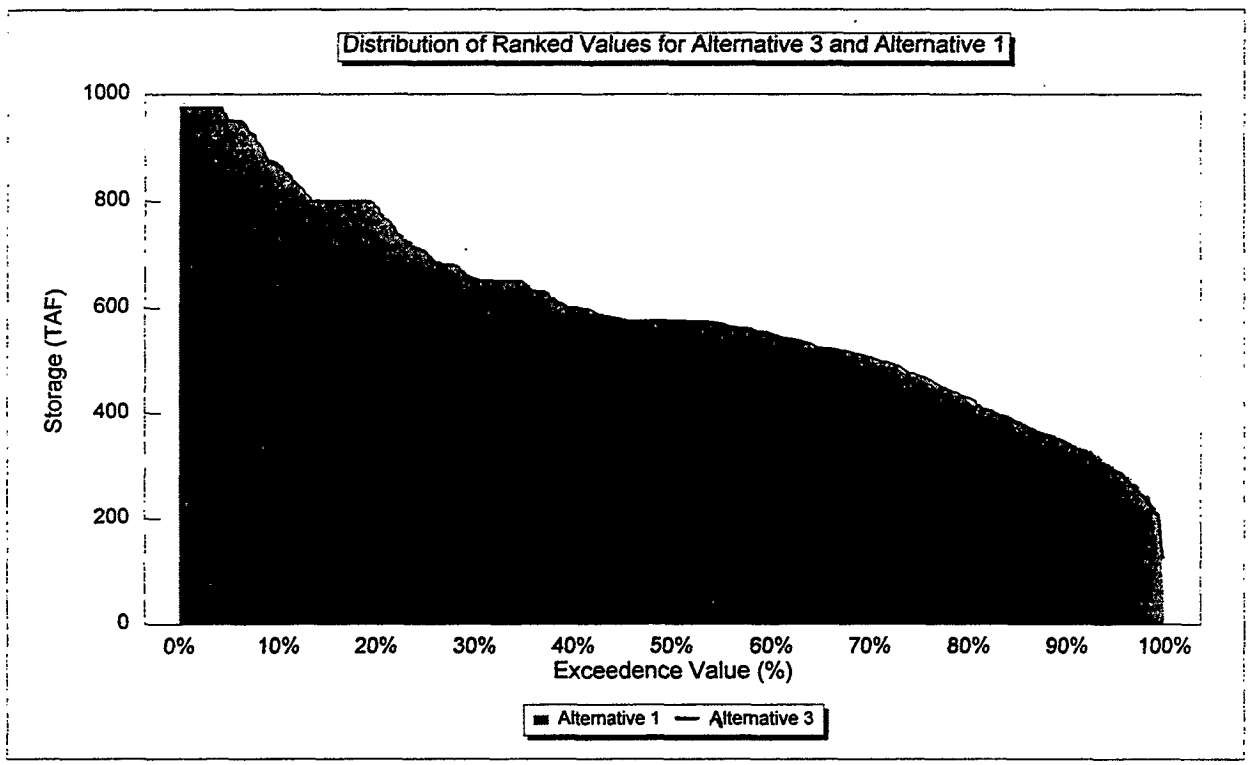


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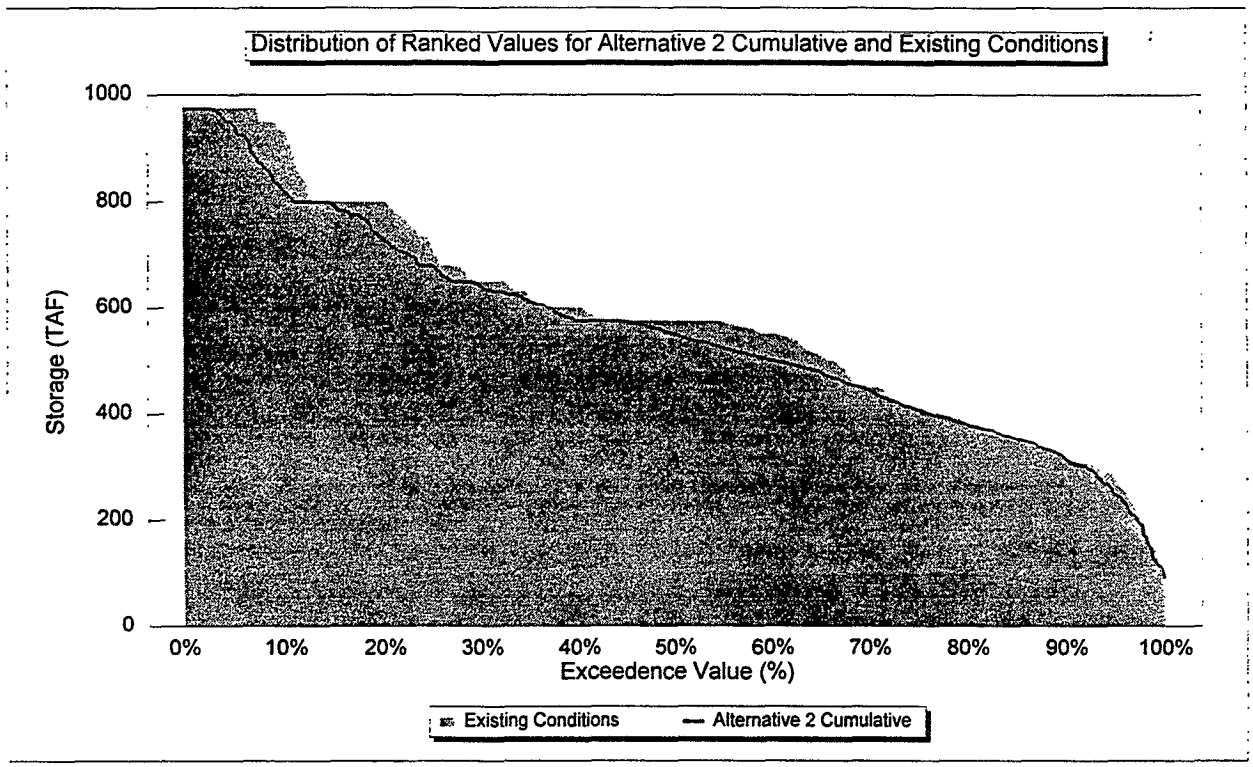
**Figure 3-5.**
**Folsom Lake Storage:**
**Alternative 2 and Alternative 3**



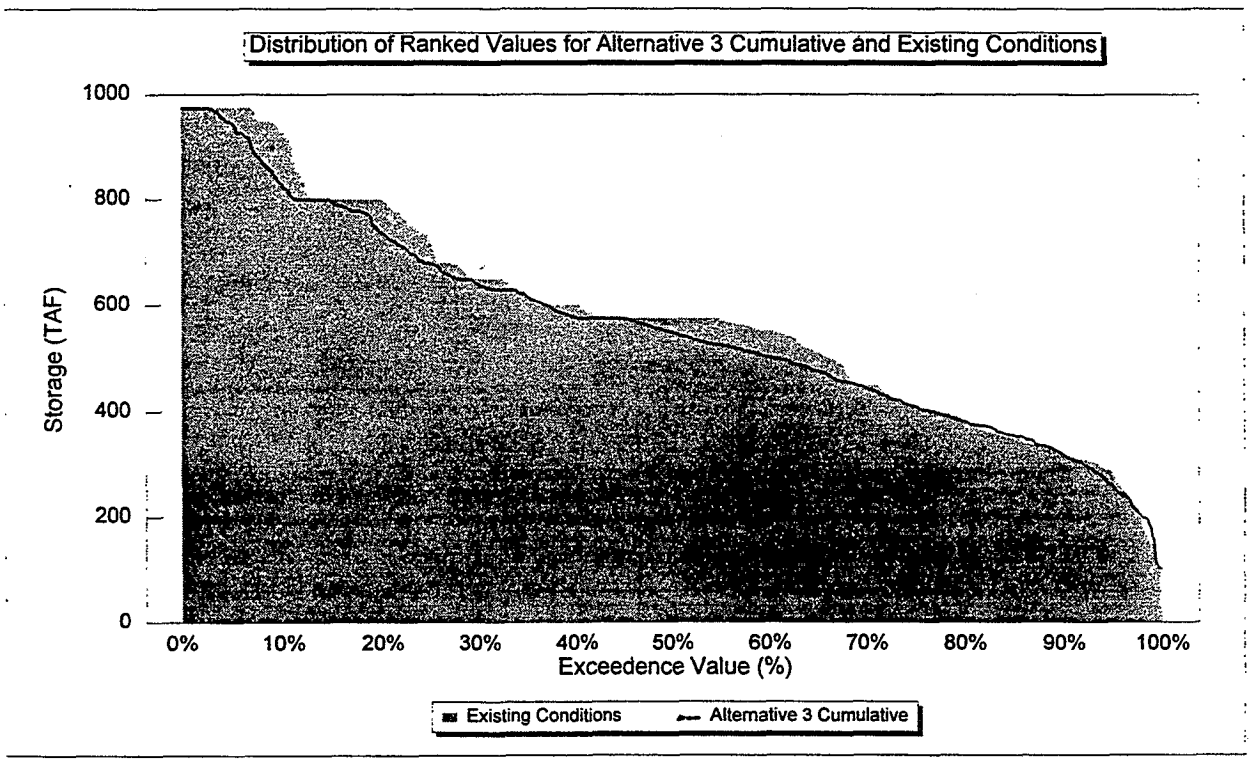




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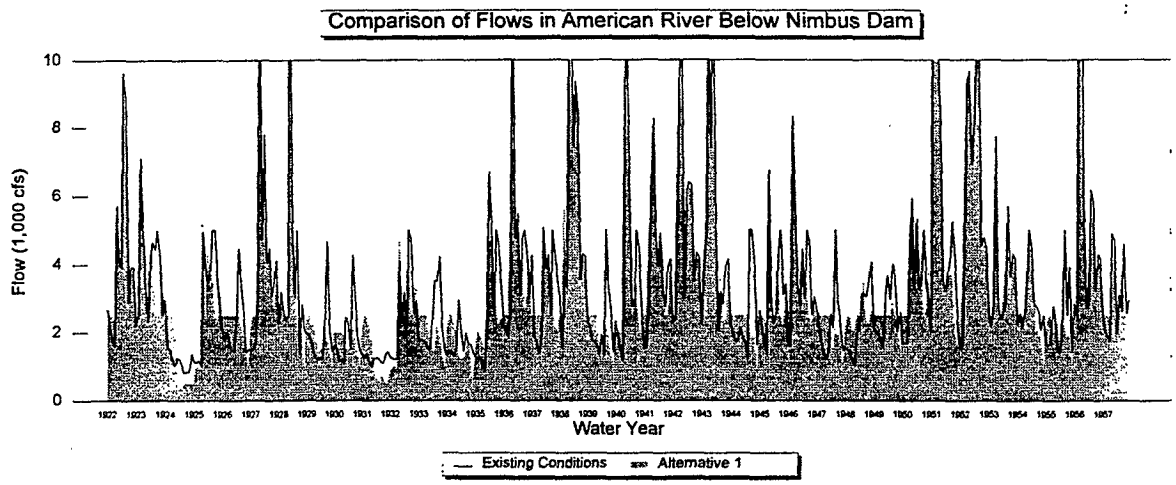
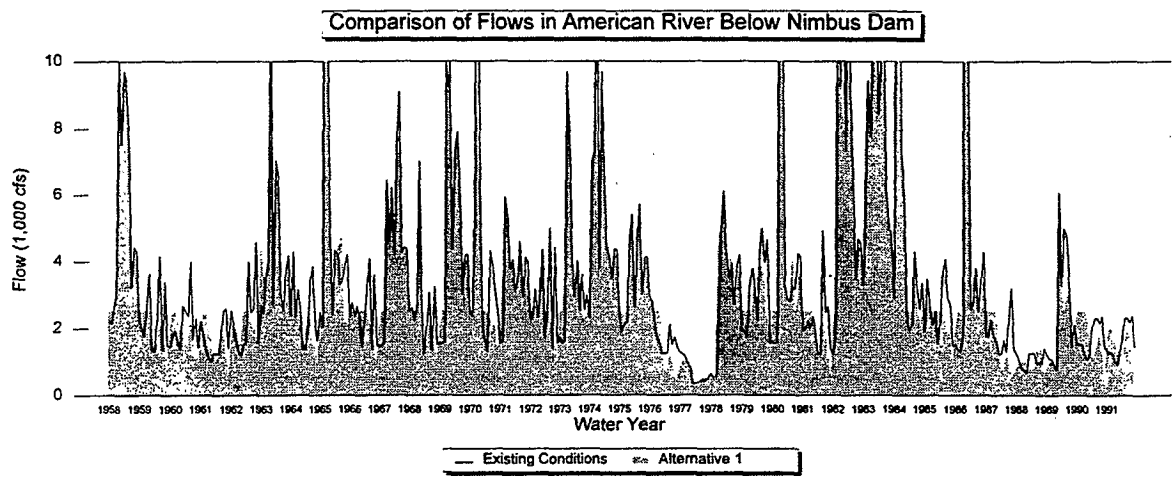
**Figure 3-6.**
**Folsom Lake Storage:**
**Alternative 2 and Alternative 3 Cumulative Conditions**



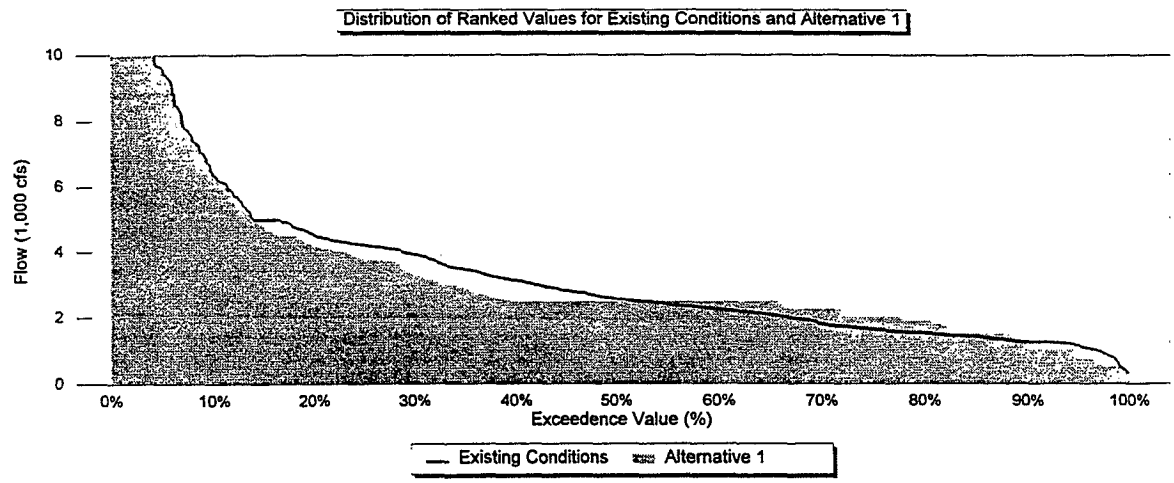




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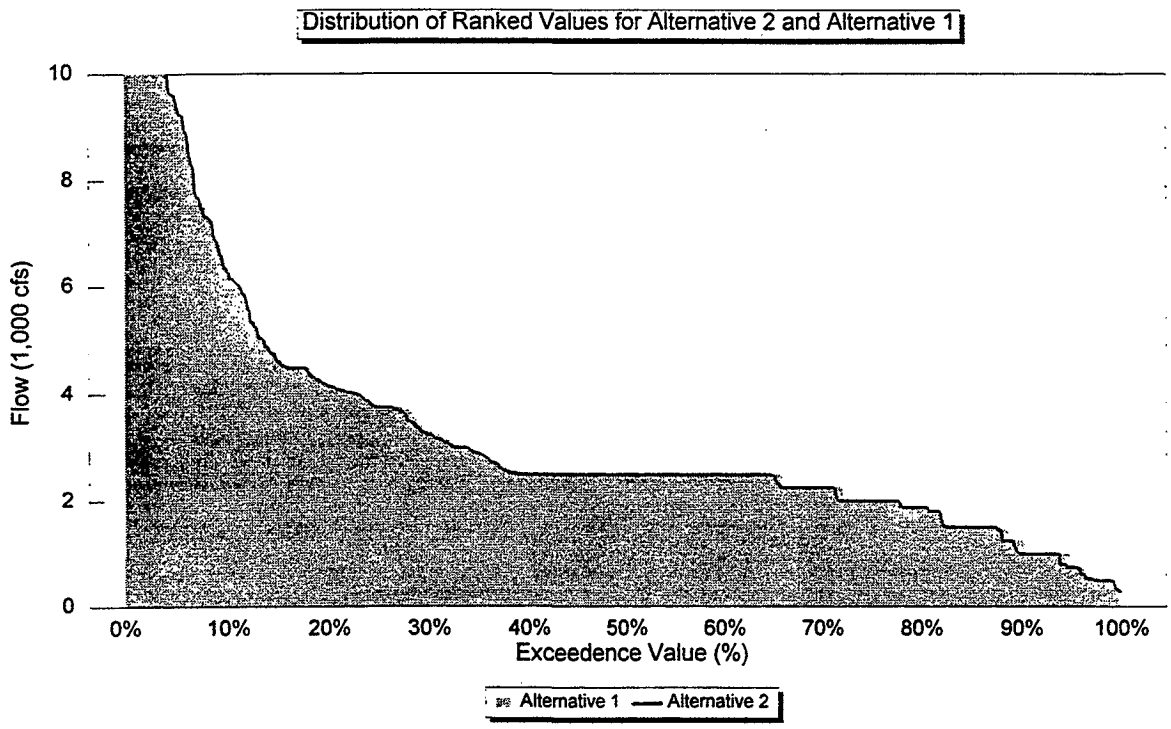
**Figure 3-7.**
**American River Flows Below Nimbus Dam: Existing Conditions and Alternative 1**



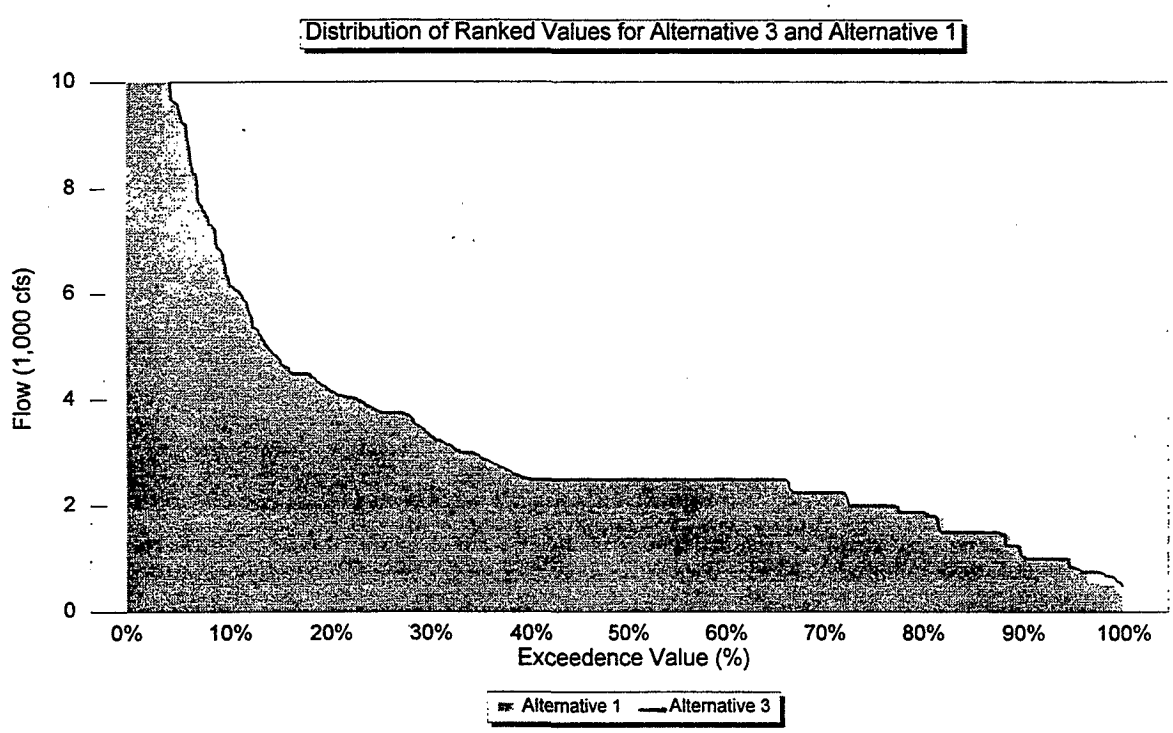




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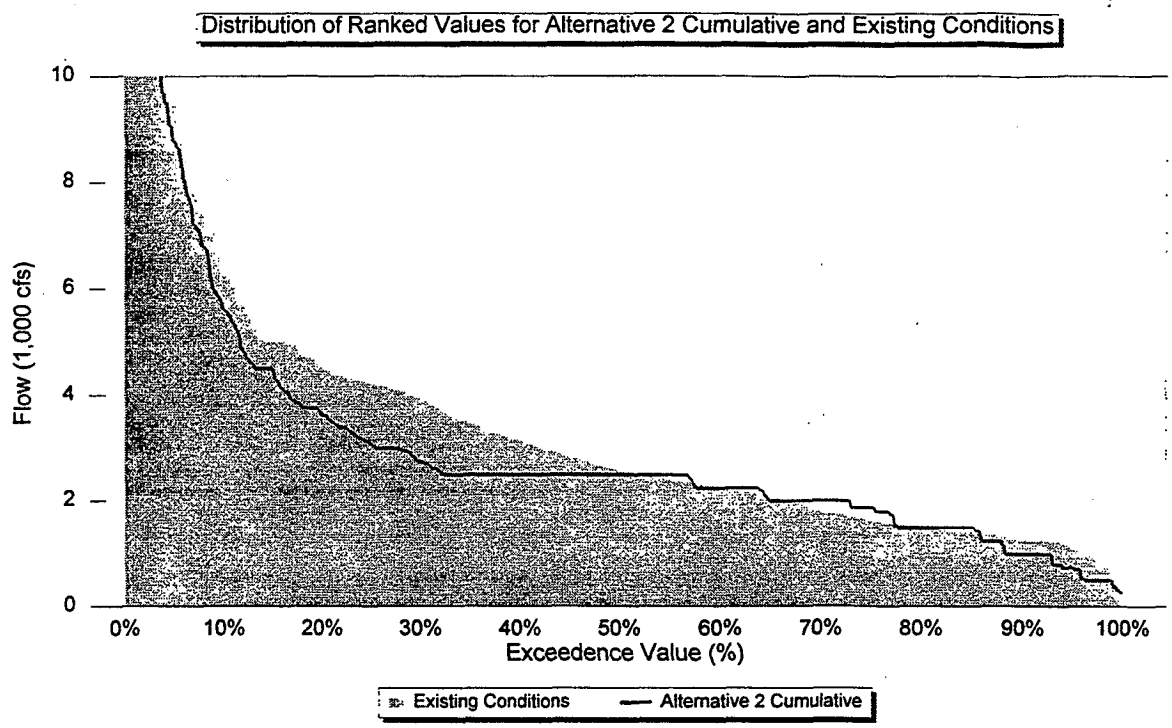
**Figure 3-8.**
**American River Flows Below Nimbus Dam: Alternative 2 and Alternative 3**



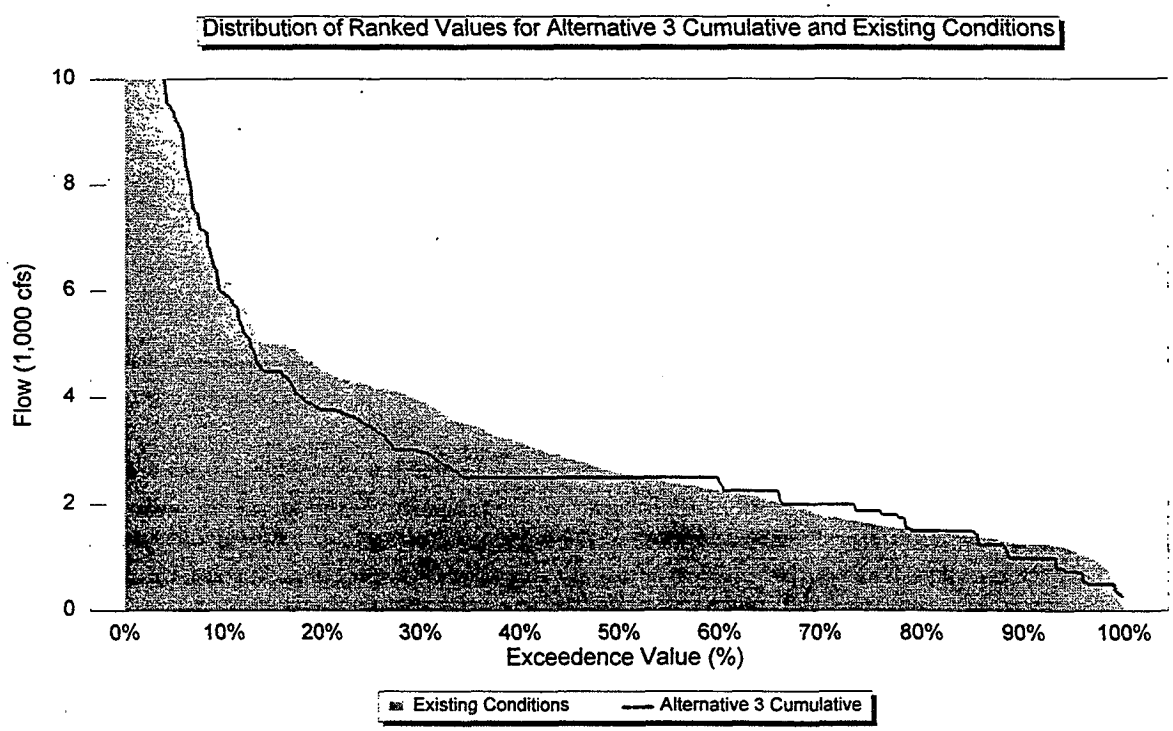




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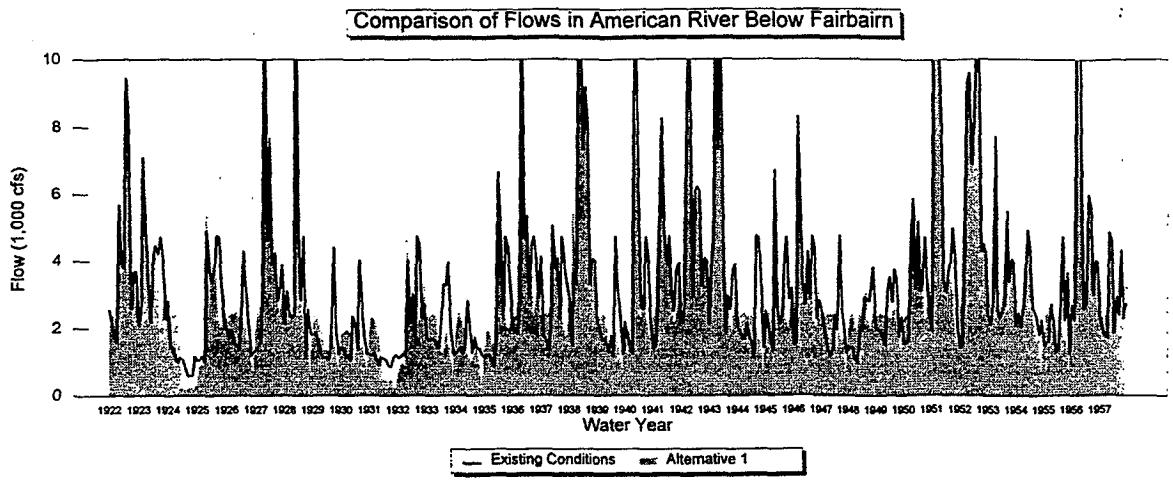
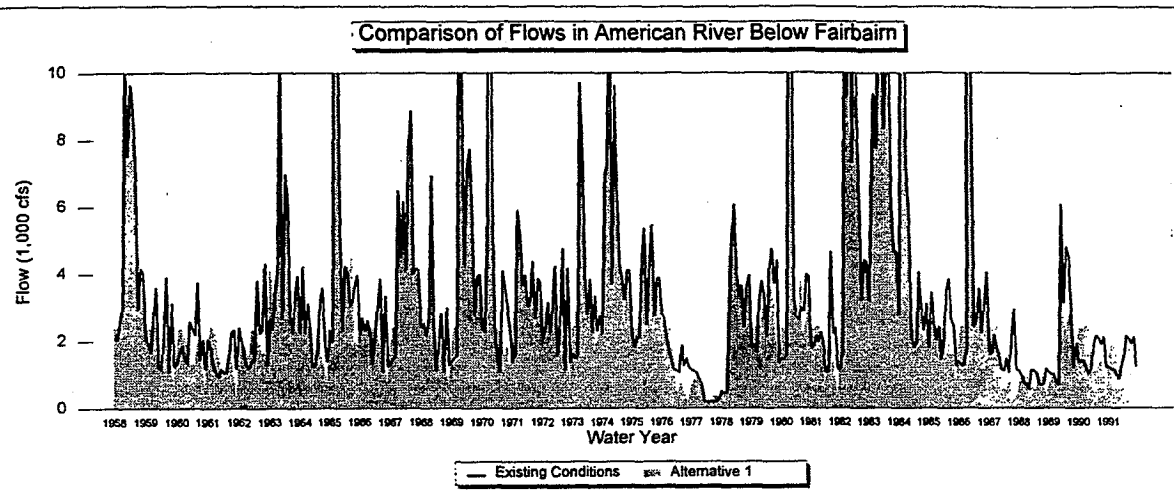
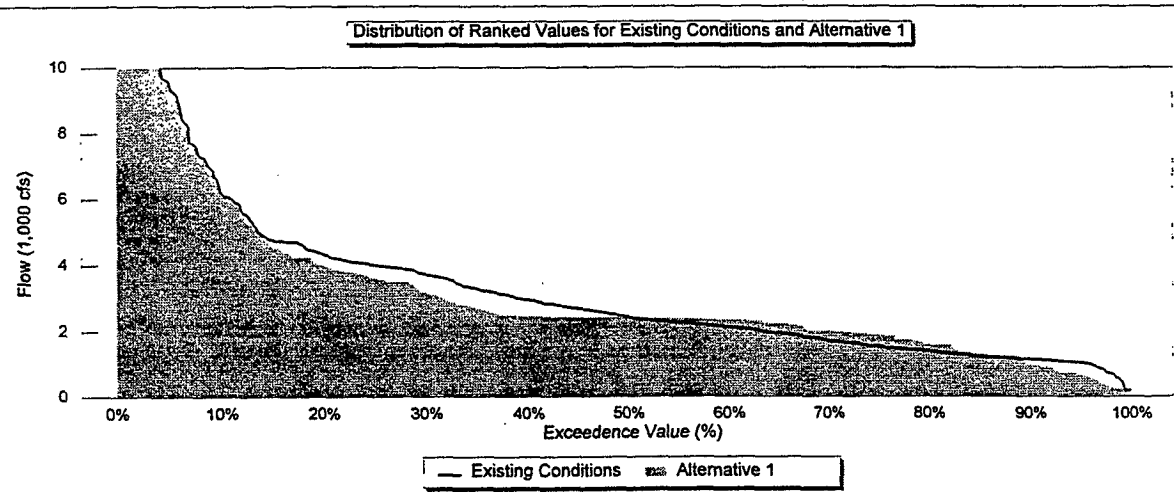
**Figure 3-9.**
**American River Flows Below Nimbus Dam: Alternative 2 and Alternative 3 Cumulative Conditions**




* Note: Deliveries to EBMUD and County added to PROSIM results to account for simulated diversion at Fairbairn WTP

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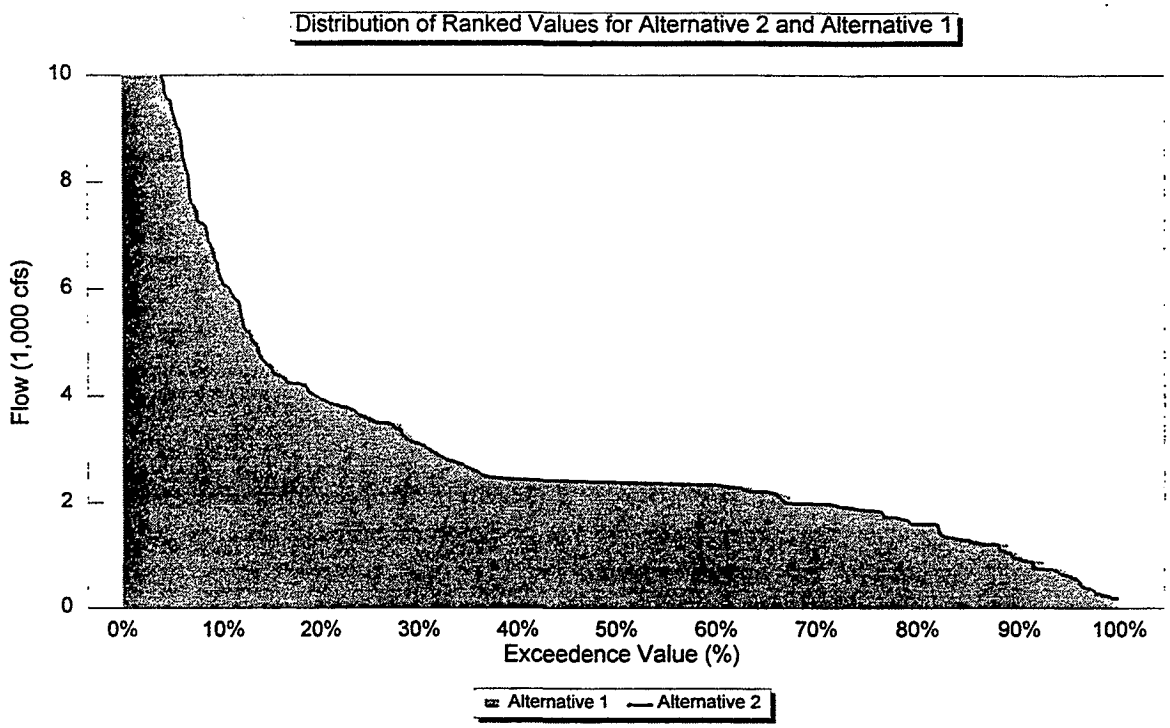
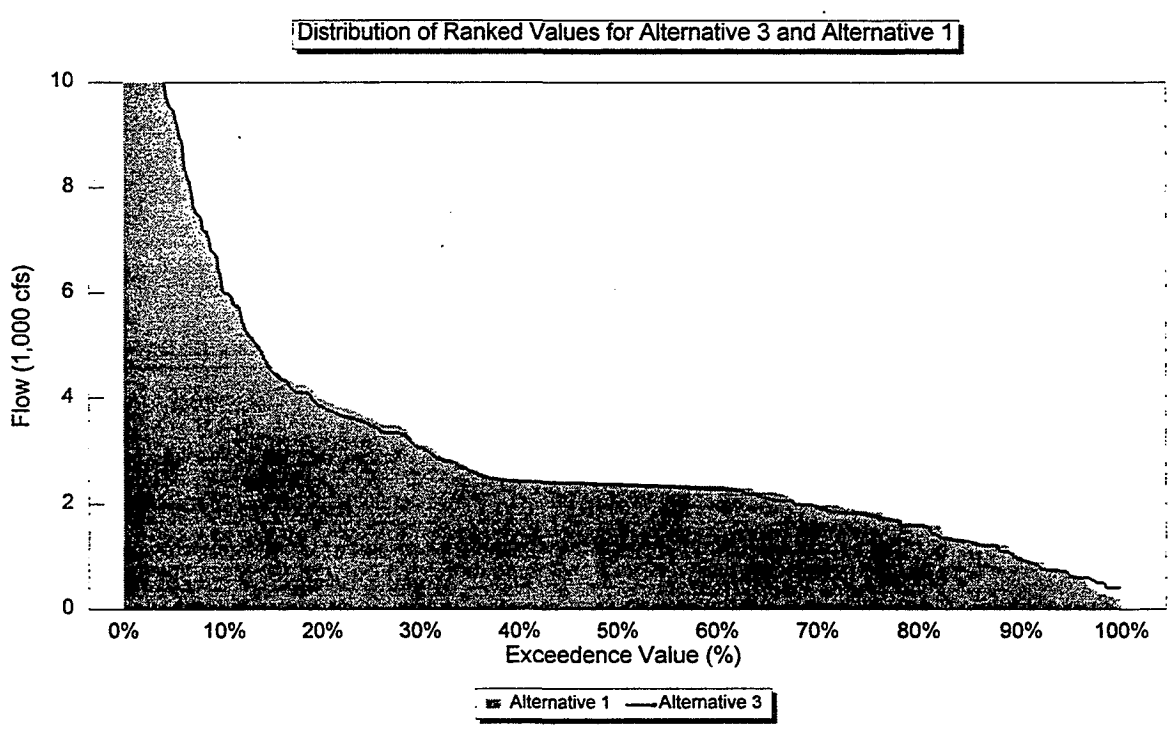
**Figure 3-10.**
**American River Flows Below Fairbairn: Existing Conditions and Alternative 1**




* Note: Deliveries for Alternative 3 to EBMUD and County added to PROSIM results to account for intake modeled at Fairbairn WTP

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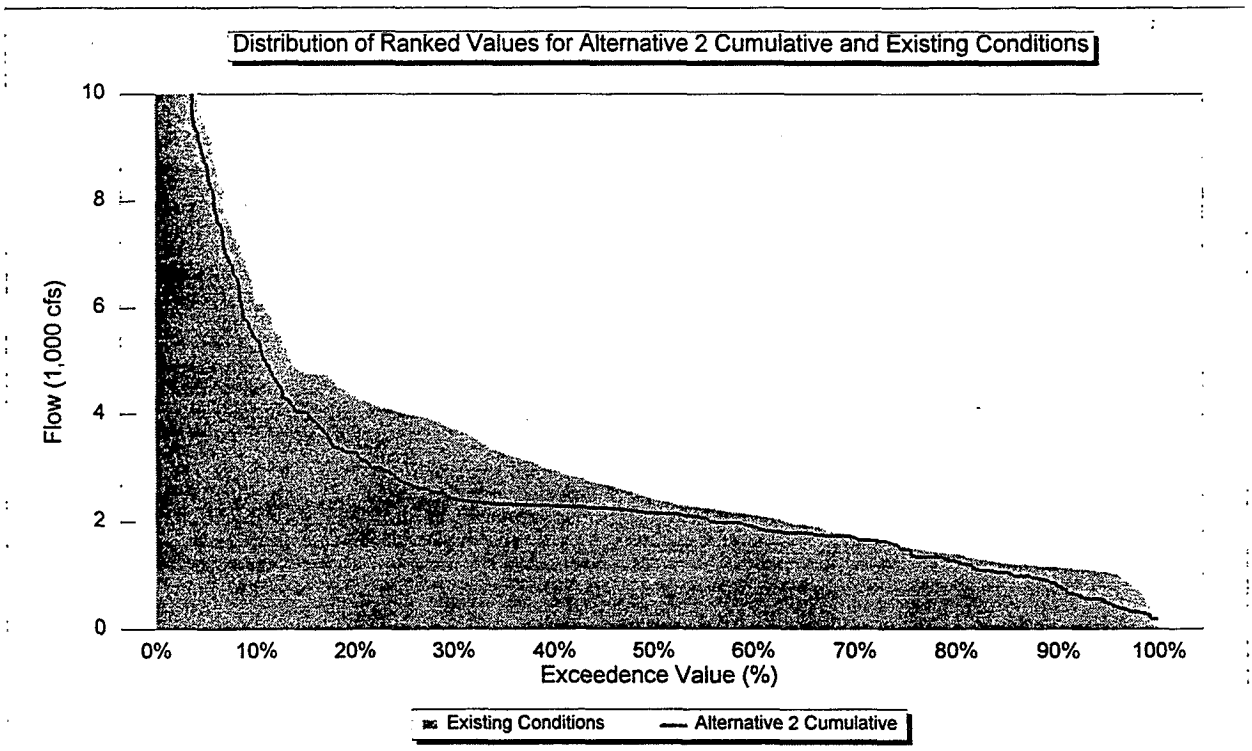
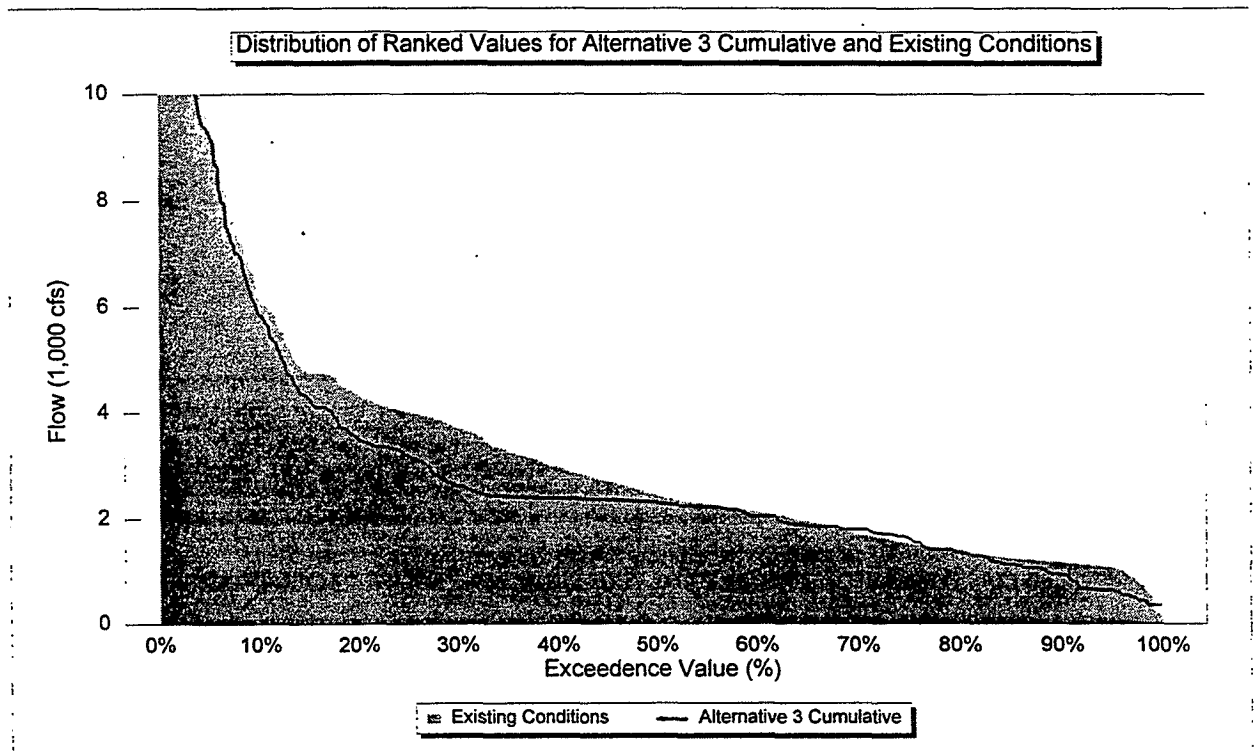
**Figure 3-11.**
**American River Flows Below Fairbairn: Alternative 2 and Alternative 3**




* Note: Deliveries for Alternative 3 Cumulative to EBMUD and County added to PROSIM results to account for intake modeled at Fairbairn WTP

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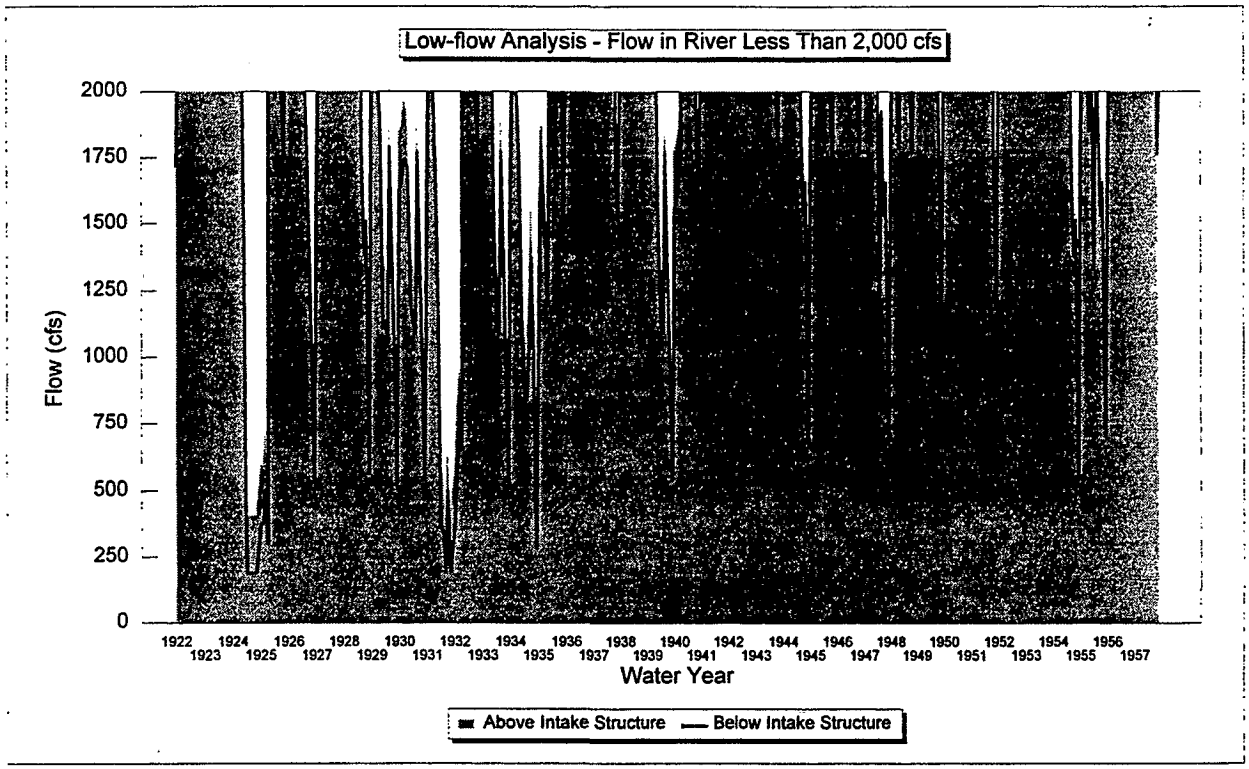
**Figure 3-12.**
**American River Flows Below Fairbairn: Alternative 2 and Alternative 3 Cumulative Conditions**



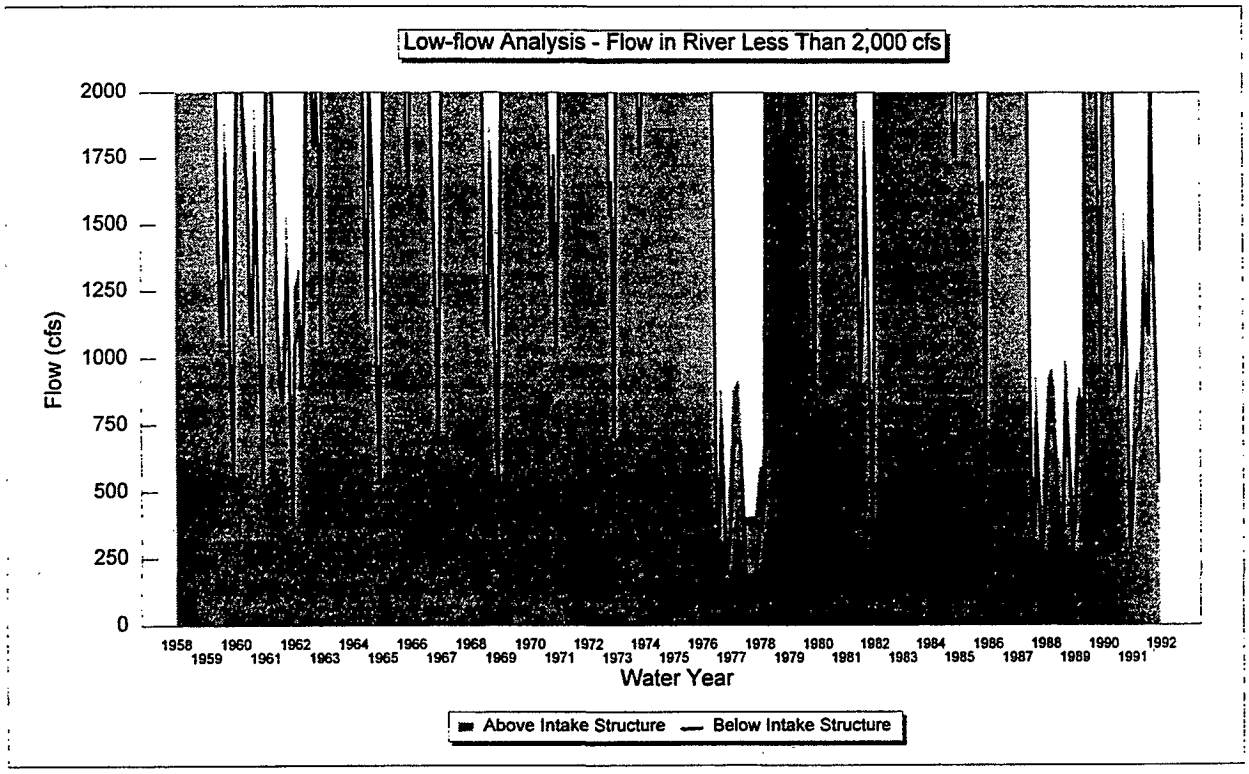




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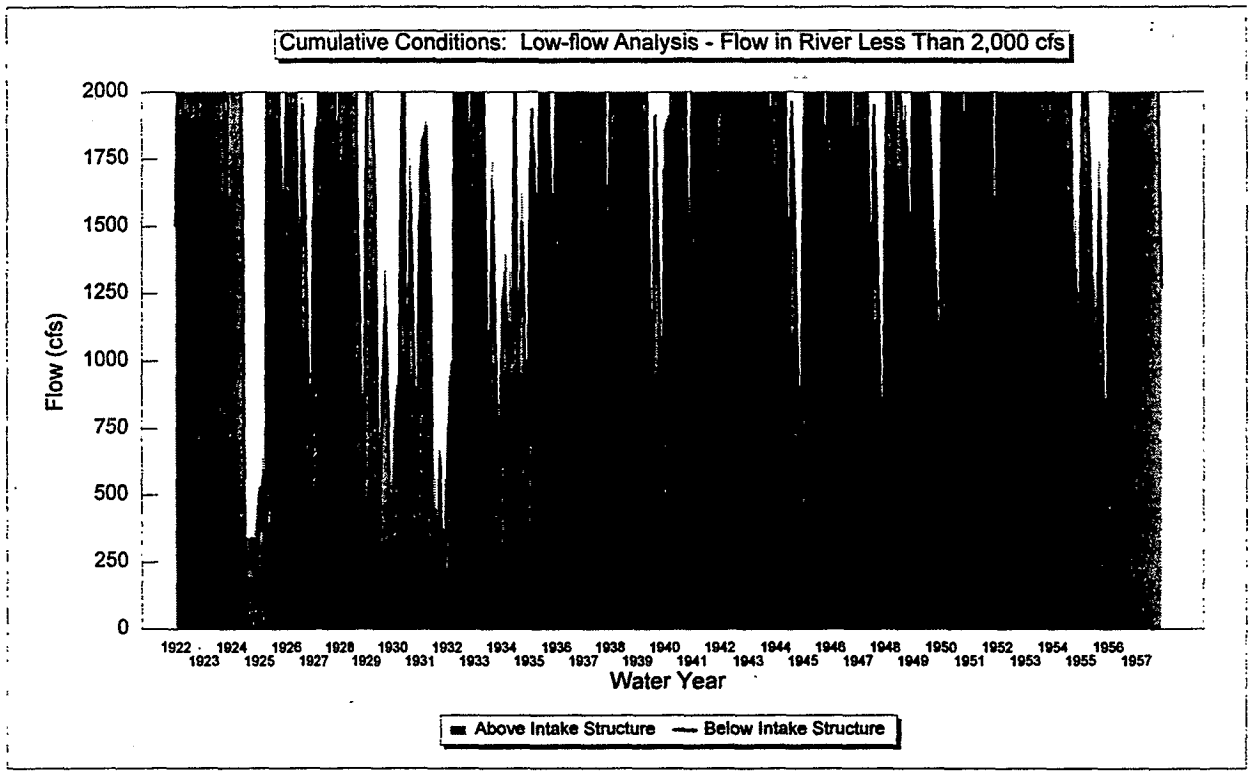
**Figure 3-13.**
**American River Flows Below Alternative 3 Intake Structure**



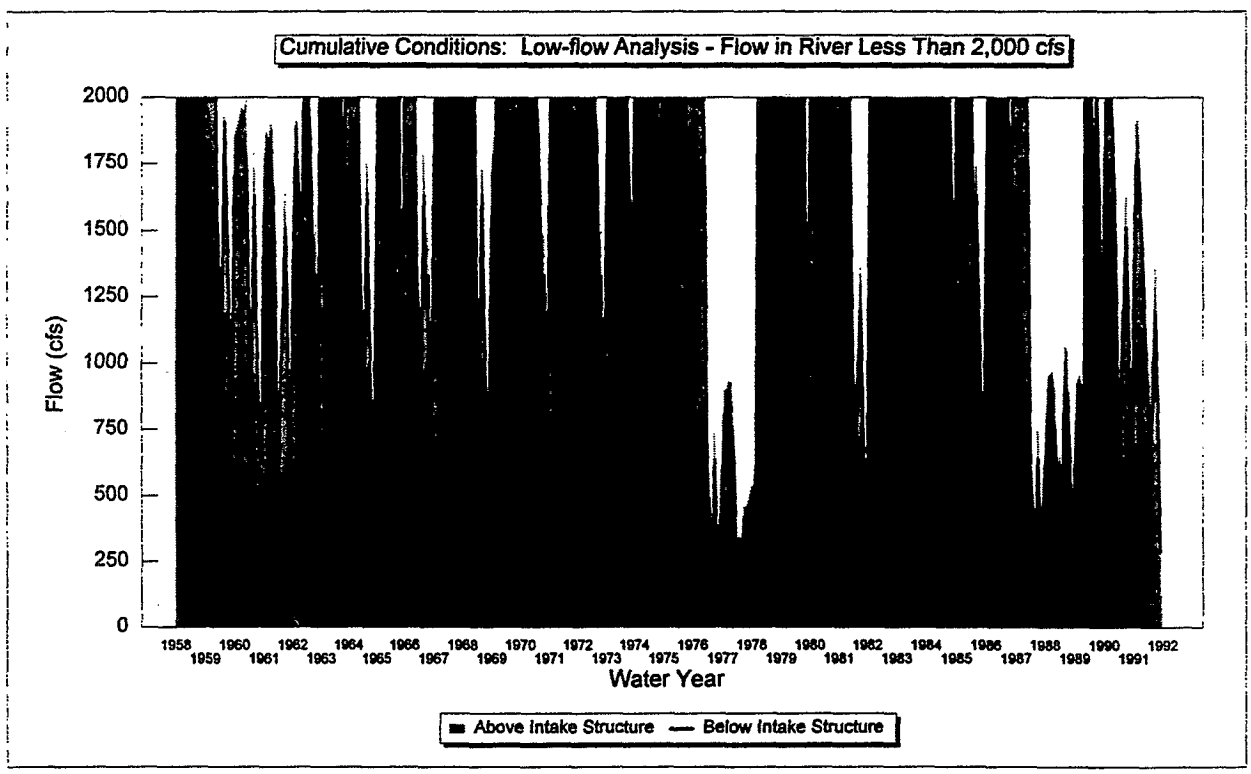




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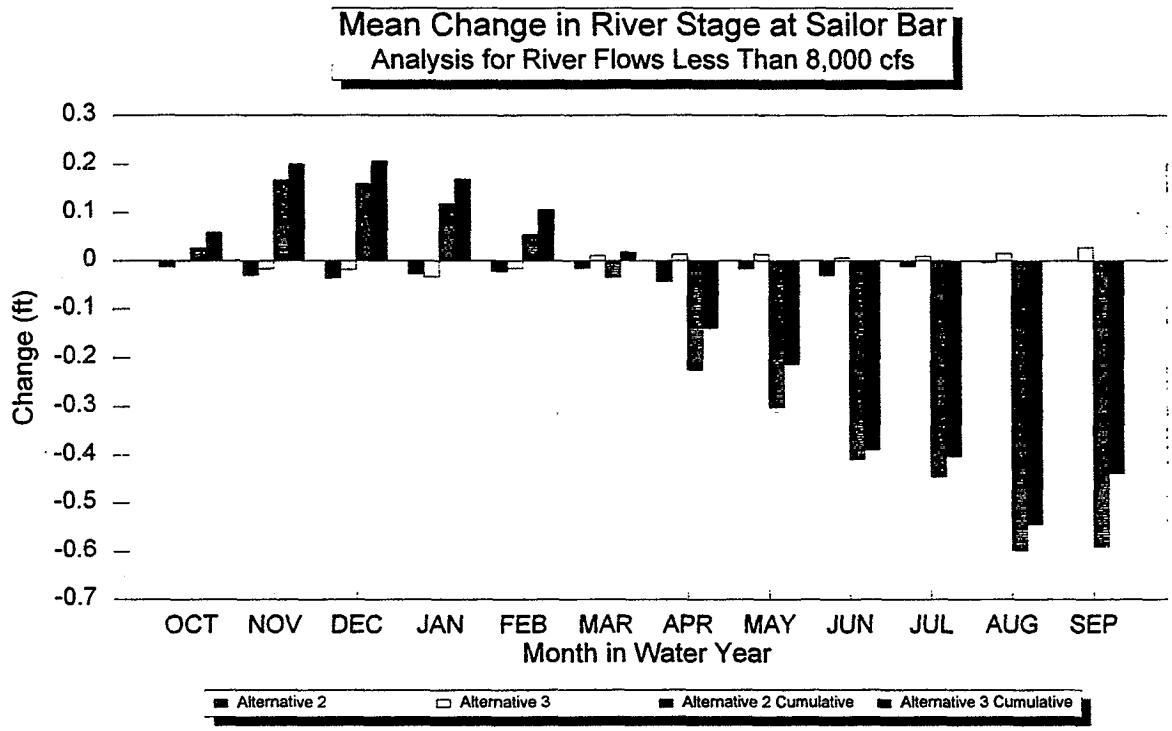
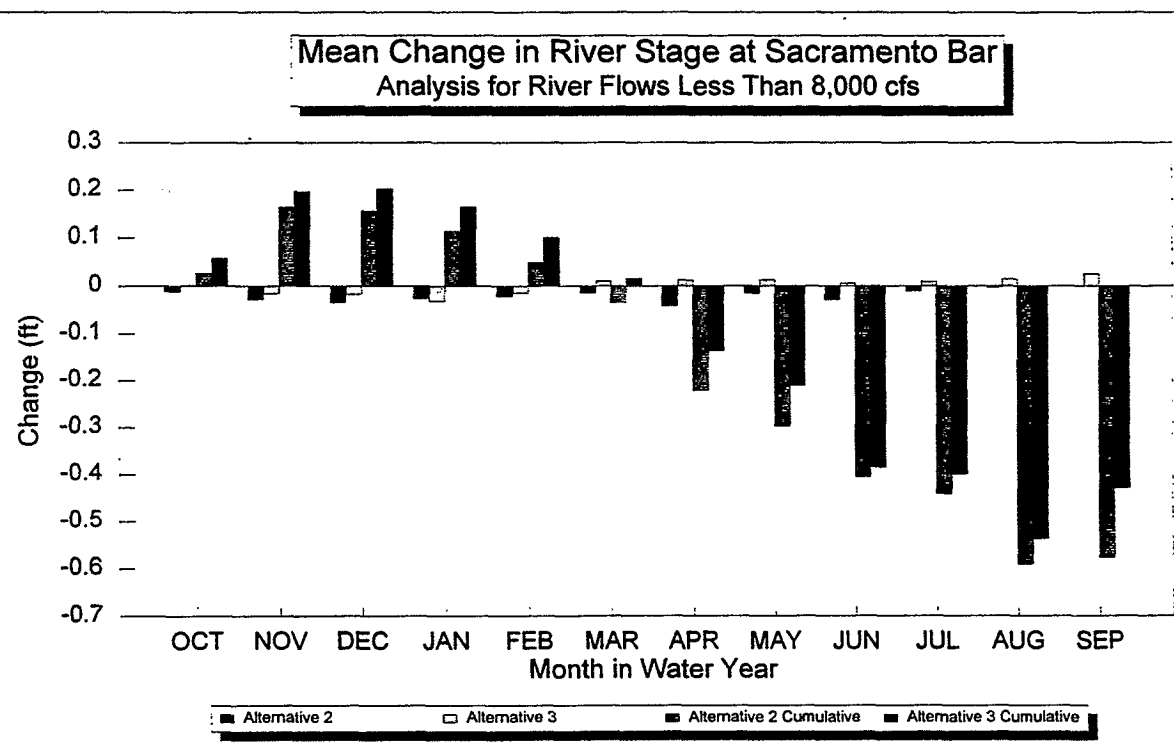
**Figure 3-14.**
**American River Flows Below Alternative 3 Intake Structure: Cumulative Conditions**




* Note: Alternatives 2 and 3 compared to Alternative 1; Cumulative conditions compared to Existing Conditions

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**Figure 3-15.**
**Changes in Monthly River Stage in the American River at Sailor Bar and Sacramento Bar**

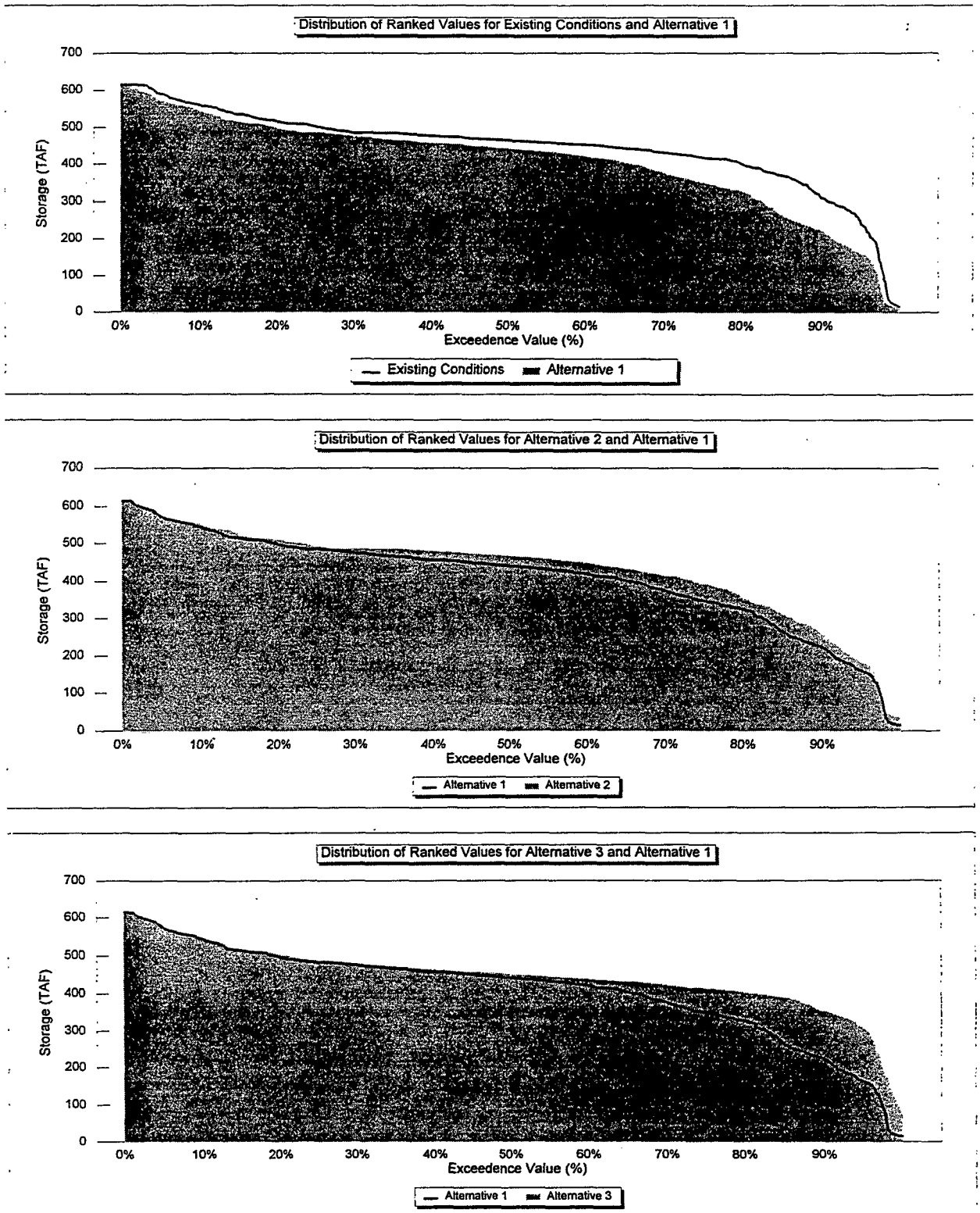


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**Figure 3-16.**
**Combined Monthly Storage for Camanche and Pardee Reservoirs: Alternative 1, Alternative 2, and Alternative 3**

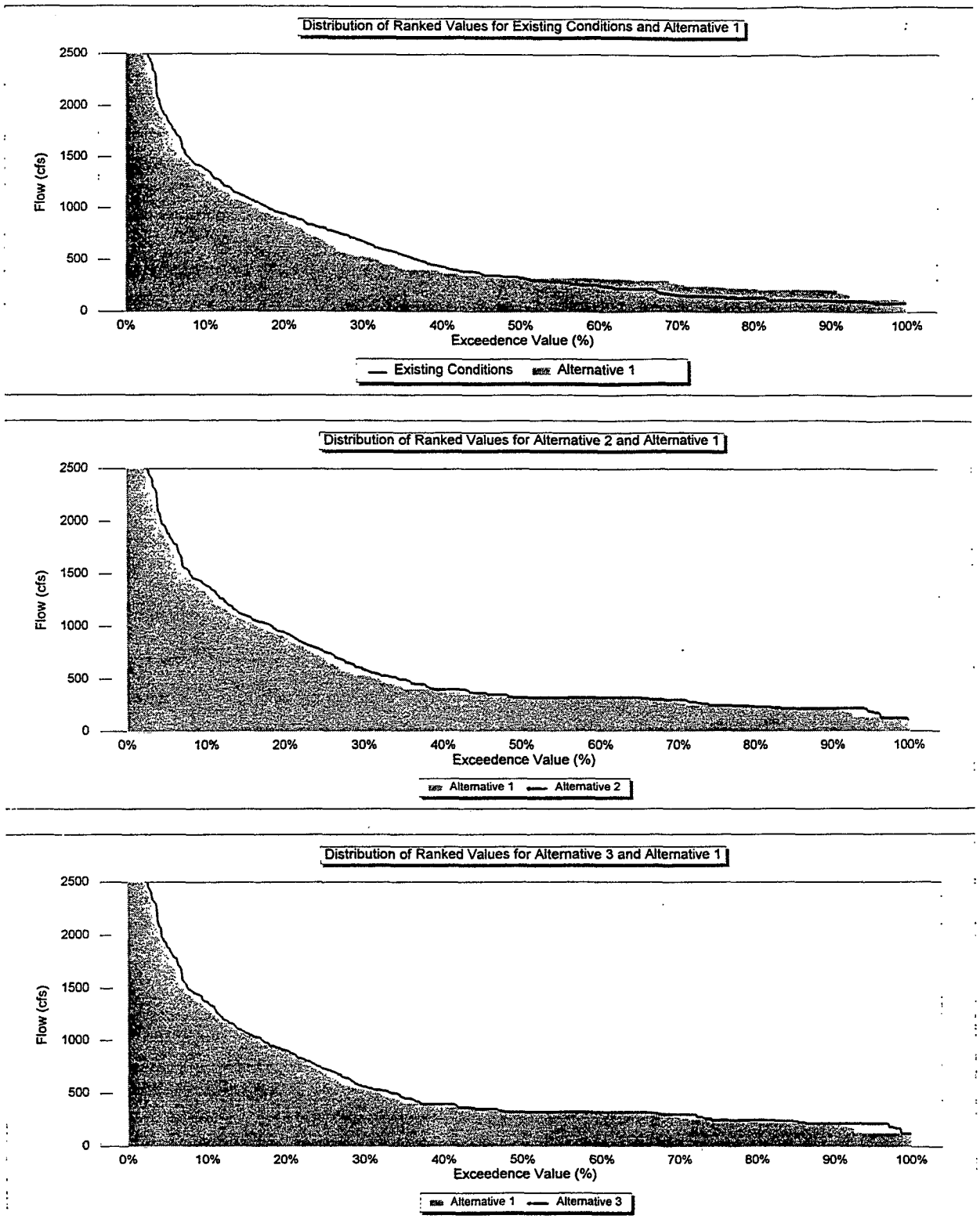


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**Figure 3-17.**
**Camanche Release Flows:**
**Alternative 1, Alternative 2, and Alternative 3**

when deliveries occur, would help conserve storage at Pardee and Camanche reservoirs, resulting in average carryover storage increases of 18,000 AF and 39,000 AF, respectively. Based on the Settlement Agreement, 20,000 AF of gain-share water for instream purposes is provided one time during dry periods.

**Mokelumne River**

Figure 3-17 shows the distribution of Mokelumne River flows released from Camanche Reservoir. Under Alternative 1, changes in flows would occur in some years but the overall changes would be negligible compared to existing conditions. Under Alternatives 2 and 3, the flows increase slightly in the winter flood control season because of releases to maintain flood control space. There are no simulated changes in Mokelumne River flows under cumulative Alternative 2 and 3 conditions.

**Other Reservoirs and Rivers**

Components of the CVP water supply system that could be affected by project deliveries include the Trinity River basin and Shasta Reservoir operations and associated flows in the Sacramento River. Table 3-4 summarizes descriptive statistics for PROSIM simulated changes to several variables.

**Sacramento River Basin**

Average end-of-month storage at Shasta Lake under Alternative 1 is lower than under existing conditions. Generally, PROSIM results indicate that mean storage levels are not affected by project deliveries. However, several large storage increases and reductions occur in the modeling results. As previously noted, real time management of the reservoirs would be unlikely to cause such large changes.

Average Alternative 1 flows in the Sacramento River below Keswick Dam decrease from flows under existing conditions. Under Alternatives 2 and 3, annual flows increase by 4,000 AF and 6,000 AF compared to Alternative 1, respectively.

Average Alternative 1 winter flows in the Sacramento River at Freeport increase and summer flows decrease from existing conditions. Project deliveries from the American River under Alternative 3 are reflected in summer flows at Freeport that generally decrease from Alternative 1. Annual flows at Freeport under Alternatives 2 and 3 are reduced by 24,000 AF and 133,000 AF, respectively.

**Trinity River System**

CVP operations of Trinity River do not change appreciably under Alternative 1. Under Alternatives 2 and 3, reductions in mean storage and carryover storage are small. Carryover storage for Alternatives 2 and 3 are 1,000 AF less than Alternative 1 (Table 3-4).

**Sacramento-San Joaquin River Delta**

Water supply deliveries made from the Delta by the CVP and SWP operations were evaluated to identify project effects on Central Valley water supplies. Figure 3-18 shows the distribution of data for total Delta outflow. Delta outflow would be similar under the existing conditions scenario and Alternative 1. As expected, because of the magnitude of potential project delivery rates accounting for a fraction of total Delta inflow, there is no detectable change in the pattern or magnitude of Delta outflow under Alternative 2 or 3.

## *Water Supply*

**Delta Export Deliveries**

Water supply deliveries made from the Delta by the CVP and SWP operations were evaluated to identify project effects on Central Valley water supplies. Figure 3-19 shows the distribution of data for annual SWP deliveries. Deliveries under Alternative 1 compared to existing conditions increase because of higher



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Table 3-4. Summary of Mean Changes in Hydrologic Characteristics for Selected Central Valley Locations

| Alternative Scenarios | Month of Water Year | | | | | | | | | | | | Annual Mean Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | |
| **Trinity Storage (TAF[a])** | | | | | | | | | | | | | |
| Alternative 1 minus existing conditions[b] | -190 | -182 | -177 | -177 | -176 | -176 | -181 | -247 | -290 | -266 | -236 | -208 | -209 |
| Alternative 2 minus no action | -1 | -1 | -1 | -1 | -1 | -1 | -2 | -1 | -1 | -1 | -1 | -1 | -1 |
| Alternative 3 minus no action | -4 | -4 | -4 | -3 | -3 | -3 | -2 | -2 | -2 | -2 | -2 | -1 | -3 |
| Alternative 2 cumulative minus existing conditions | -191 | -184 | -179 | -178 | -178 | -177 | -183 | -249 | -292 | -267 | -238 | -209 | -210 |
| Alternative 3 cumulative minus existing conditions | -189 | -182 | -177 | -177 | -177 | -176 | -181 | -247 | -290 | -265 | -236 | -207 | -209 |
| **Lake Shasta Storage (TAF)** | | | | | | | | | | | | | |
| Alternative 1 minus no action | -108 | -107 | -86 | -111 | -125 | -159 | -151 | -127 | -128 | -73 | -88 | -94 | -113 |
| Alternative 2 minus no action | -2 | -3 | -4 | -5 | -5 | -5 | -6 | -7 | -8 | -7 | -5 | -5 | -5 |
| Alternative 3 minus no action | -8 | -8 | -7 | -7 | -8 | -8 | -9 | -10 | -11 | -14 | -16 | -16 | -10 |
| Alternative 2 cumulative minus existing conditions | -104 | -103 | -82 | -109 | -124 | -158 | -151 | -126 | -127 | -72 | -84 | -90 | -110 |
| Alternative 3 cumulative minus existing conditions | -104 | -103 | -81 | -108 | -124 | -158 | -150 | -126 | -128 | -71 | -84 | -91 | -111 |
| **Sacramento River at Keswick (cfs)** | | | | | | | | | | | | | |
| Alternative 1 minus existing conditions | -70 | -333 | -665 | 89 | -61 | 249 | -576 | -722 | -419 | -1402 | -122 | -211 | -258 |
| Alternative 2 minus no action | 24 | 17 | 19 | 24 | -5 | 5 | 23 | -1 | 9 | -8 | -37 | -3 | 4 |
| Alternative 3 minus no action | 2 | -9 | -18 | 1 | 12 | -6 | 2 | 2 | 33 | 49 | 24 | -1 | 6 |
| Alternative 2 cumulative minus existing conditions | -43 | -337 | -655 | 108 | -40 | 257 | -568 | -726 | -419 | -1421 | -162 | -213 | -256 |
| Alternative 3 cumulative minus existing conditions | -51 | -328 | -667 | 111 | -28 | 253 | -582 | -734 | -407 | -1433 | -155 | -199 | -256 |
| **Sacramento River at Freeport (cfs)** | | | | | | | | | | | | | |
| Alternative 1 minus existing conditions | 21 | 274 | 382 | 342 | 542 | 838 | -220 | -904 | -1105 | -2150 | -950 | -910 | -235 |
| Alternative 2 minus no action | 1 | -29 | -42 | -36 | -67 | -40 | -50 | -37 | -33 | -13 | -52 | 4 | -24 |
| Alternative 3 minus no action | -176 | -249 | -175 | -222 | -245 | -176 | -172 | -193 | -178 | -131 | -159 | -137 | -133 |
| Alternative 2 cumulative minus existing conditions | -285 | -223 | -19 | -173 | -39 | 336 | -560 | -1196 | -1290 | -2170 | -1152 | -1238 | -485 |
| Alternative 3 cumulative minus existing conditions | -380 | -256 | -30 | -148 | 9 | 349 | -542 | -1166 | -1334 | -2266 | -1200 | -1187 | -495 |



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| Alternative Scenarios | Month of Water Year | | | | | | | | | | | | Annual Mean Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | |
| **Lake Oroville Storage (TAF)** | | | | | | | | | | | | | |
| Alternative 1 minus existing conditions | -20 | -6 | 0 | 19 | 23 | 30 | 42 | 42 | 36 | 12 | -17 | -25 | 11 |
| Alternative 2 minus no action | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 |
| Alternative 3 minus no action | -40 | -38 | -39 | -36 | -26 | -24 | -25 | -25 | -28 | -32 | -36 | -41 | -32 |
| Alternative 2 cumulative minus existing conditions | -83 | -62 | -57 | -30 | -10 | 3 | 15 | 14 | 7 | -22 | -59 | -88 | -29 |
| Alternative 3 cumulative minus existing conditions | -76 | -58 | -54 | -28 | -7 | 5 | 17 | 15 | 8 | -20 | -57 | -81 | -28 |
| **Feather River at Nicholas (cfs)** | | | | | | | | | | | | | |
| Alternative 1 minus existing conditions | 4 | -229 | -89 | -360 | -94 | -5 | 13 | 158 | 230 | 461 | 514 | 187 | 49 |
| Alternative 2 minus no action | -4 | 1 | -6 | 6 | -7 | -1 | 6 | -5 | 2 | 15 | -9 | 8 | 0 |
| Alternative 3 minus no action | 12 | -41 | 16 | -51 | -177 | -20 | 4 | 9 | 46 | 71 | 61 | 97 | 2 |
| Alternative 2 cumulative minus existing conditions | 5 | -339 | -75 | -491 | -385 | -100 | 11 | 187 | 237 | 553 | 633 | 546 | 49 |
| Alternative 3 cumulative minus existing conditions | 22 | -306 | -55 | -470 | -391 | -87 | 10 | 189 | 249 | 545 | 625 | 461 | 50 |
| **Total Delta Inflow (cfs)** | | | | | | | | | | | | | |
| Alternative 1 minus existing conditions | -19 | 154 | 257 | 293 | -163 | 1038 | 142 | -588 | -876 | -2061 | -685 | -758 | -197 |
| Alternative 2 minus no action | 12 | -19 | 9 | 26 | 47 | -1 | -29 | 20 | -9 | -4 | -44 | 12 | 1 |
| Alternative 3 minus no action | -32 | -96 | 3 | -54 | -129 | -21 | -45 | -57 | -36 | 1 | -27 | -5 | -30 |
| Alternative 2 cumulative minus existing conditions | -194 | -250 | -58 | -134 | -728 | 594 | -127 | -746 | -961 | -1981 | -789 | -1014 | -384 |
| Alternative 3 cumulative minus existing conditions | -202 | -195 | 13 | 20 | -650 | 683 | -50 | -683 | -959 | -2013 | -772 | -899 | -346 |



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south-of-Delta municipal and industrial demands. Deliveries are the same under Alternatives 2 and 3 because increased demands south of the Delta are assumed to be the same. The distributions for Alternatives 2 and 3 indicate that the small quantity of project deliveries should not appreciably affect the timing or quantity of water available to meet SWP demands. SWP deliveries do not change under Alternative 2 and reduced by 5,000 AF under Alternative 3.

Figure 3-20 shows data for CVP deliveries south of the Delta. Under Alternative 1, CVP deliveries would be reduced from levels under existing conditions because of greater apportionment of Delta flow requirements to CVP supplies compared to SWP supplies. Compared to Alternative 1, CVP deliveries south of the Delta are reduced by 3,000 AF under Alternative 2 and do not change under Alternative 3. For cumulative compared to existing conditions, CVP deliveries are reduced by 11,000 AF and 6,000 AF under Alternative 2 and 3 respectively. The observed deficiencies occur primarily during the months of April through August.

**Hydropower and Energy Production**

A summary of the annual energy generated at Folsom Dam and CVP North facilities under Alternative 1 and existing conditions and changes induced under each alternative is shown in Table 3-5. (Appendix C includes monthly summaries of power generation at Folsom Dam and CVP North facilities.) Overall, energy production at Folsom would be reduced a small amount under future Alternative 1 conditions (18 GWh) as compared to existing conditions. Power generation corresponds to revised release patterns that provide for smaller releases in spring and summer, and greater fish and instream flow releases in fall and winter. Compared to Alternative 1, energy production under Alternative 2 and 3 would be reduced by 2 GWh and 1 GWh, respectively. These small changes would occur because project deliveries would generally be derived from a portion of the existing instream flow pattern.

Table 3-5. Comparison of Annual Power Generation for Each Alternative

| Alternative 1 and Changes in Alternatives from Alternative 1 | Annual Power Generated (GW-hr[a]) | |
|---|---|---|
| | Folsom Dam | CVP North Facilities |
| Existing conditions | 656 | 4,738 |
| Alternative 1 (no action) | 638 | 4,433 |
| Alternative 1 minus existing conditions | -18 | -305 |
| Alternative 2 minus Alternative 1 | -2 | -1 |
| Alternative 3 minus Alternative 1 | -1 | -0 |
| Alternative 2 cumulative minus existing conditions | -55 | -347 |
| Alternative 3 cumulative minus existing conditions | -54 | -345 |

[a] 1 GW-hr is equivalent to 1,000 MW hours.

Under cumulative conditions, average annual power generation reductions (approximately 37 gigawatt hours [GW-hr]) would be similar for both Alternative 2 and Alternative 3 water intake locations. Reductions would occur from cumulative demands for Folsom Reservoir water. Slight additional reductions in power generation that are not reflected in the results for Folsom Dam would result from Alternative 2 and associated cumulative conditions because of deliveries from the FSC that would not pass through the Nimbus Dam power plant.

Annual power generation at CVP North facilities are substantially reduced (305 GW-hr) under future Alternative 1 conditions, with curtailed generation primarily occurring during winter and spring. Project deliveries would not appreciably affect power generation at CVP North facilities. Under cumulative conditions,

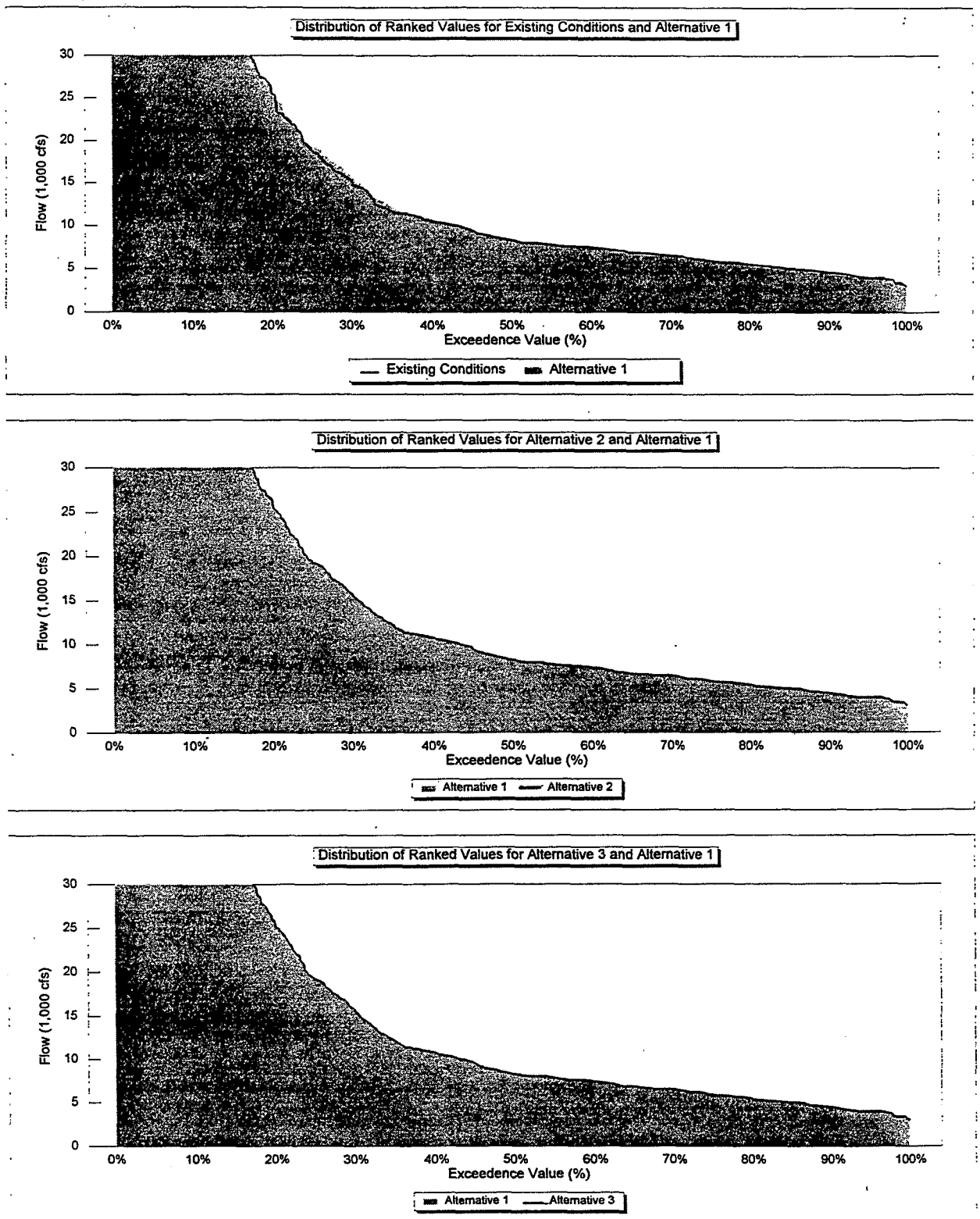


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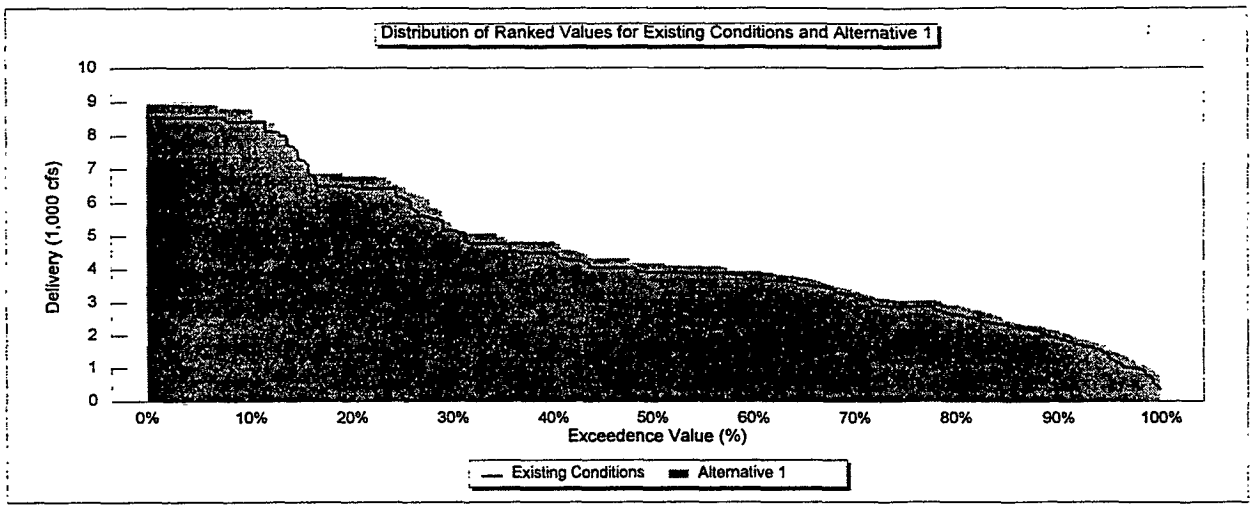
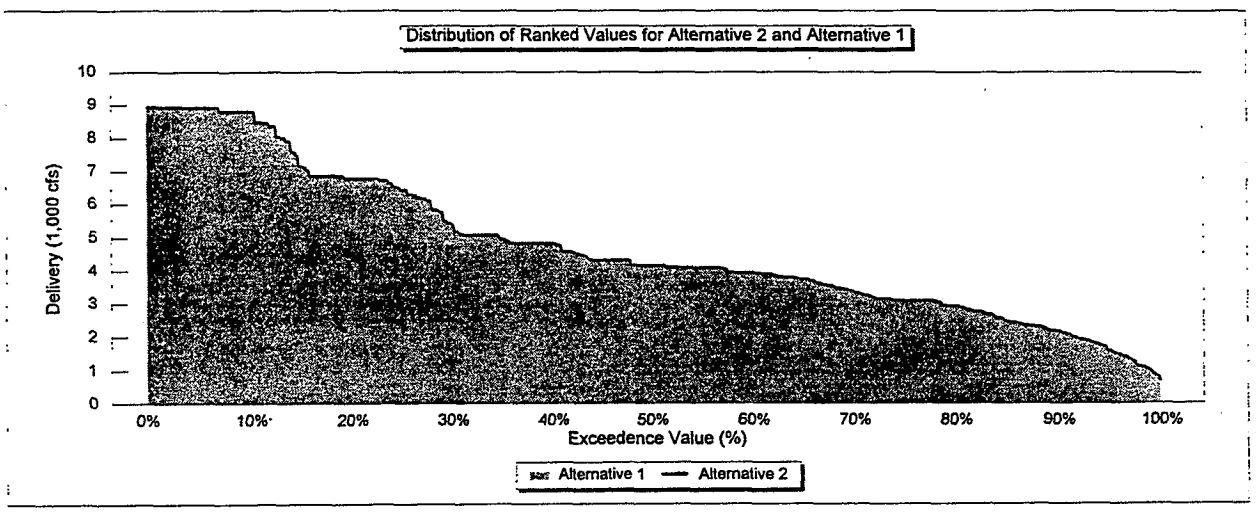
**Figure 3-18.**
**Mean Monthly Delta Outflow:**
**Alternative 1, Alternative 2, and Alternative 3**



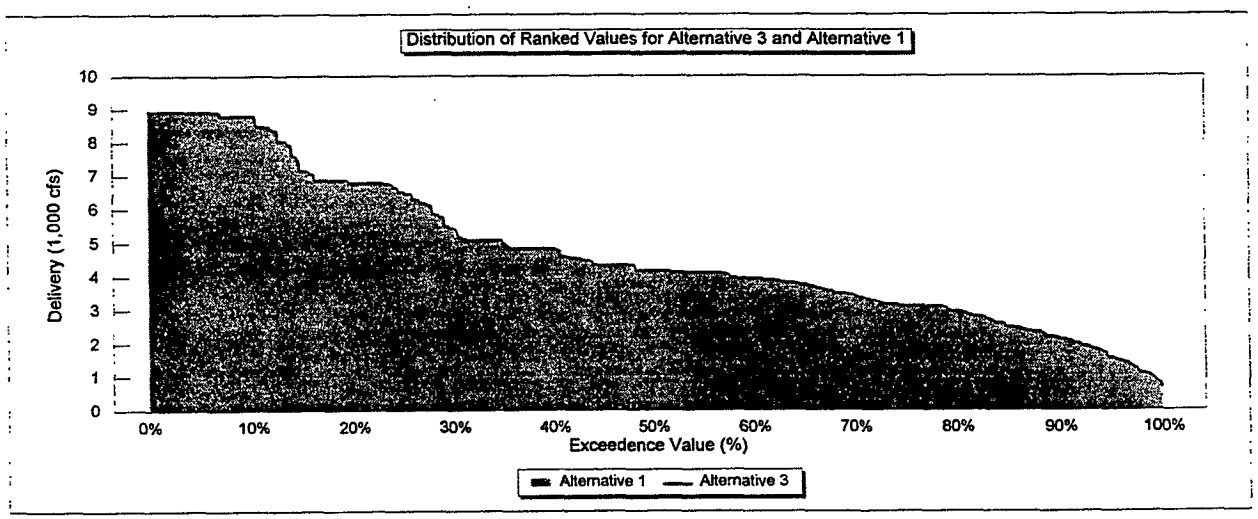




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**Figure 3-19.**
**Monthly SWP Deliveries from the Delta: Alternative 1, Alternative 2, and Alternative 3**

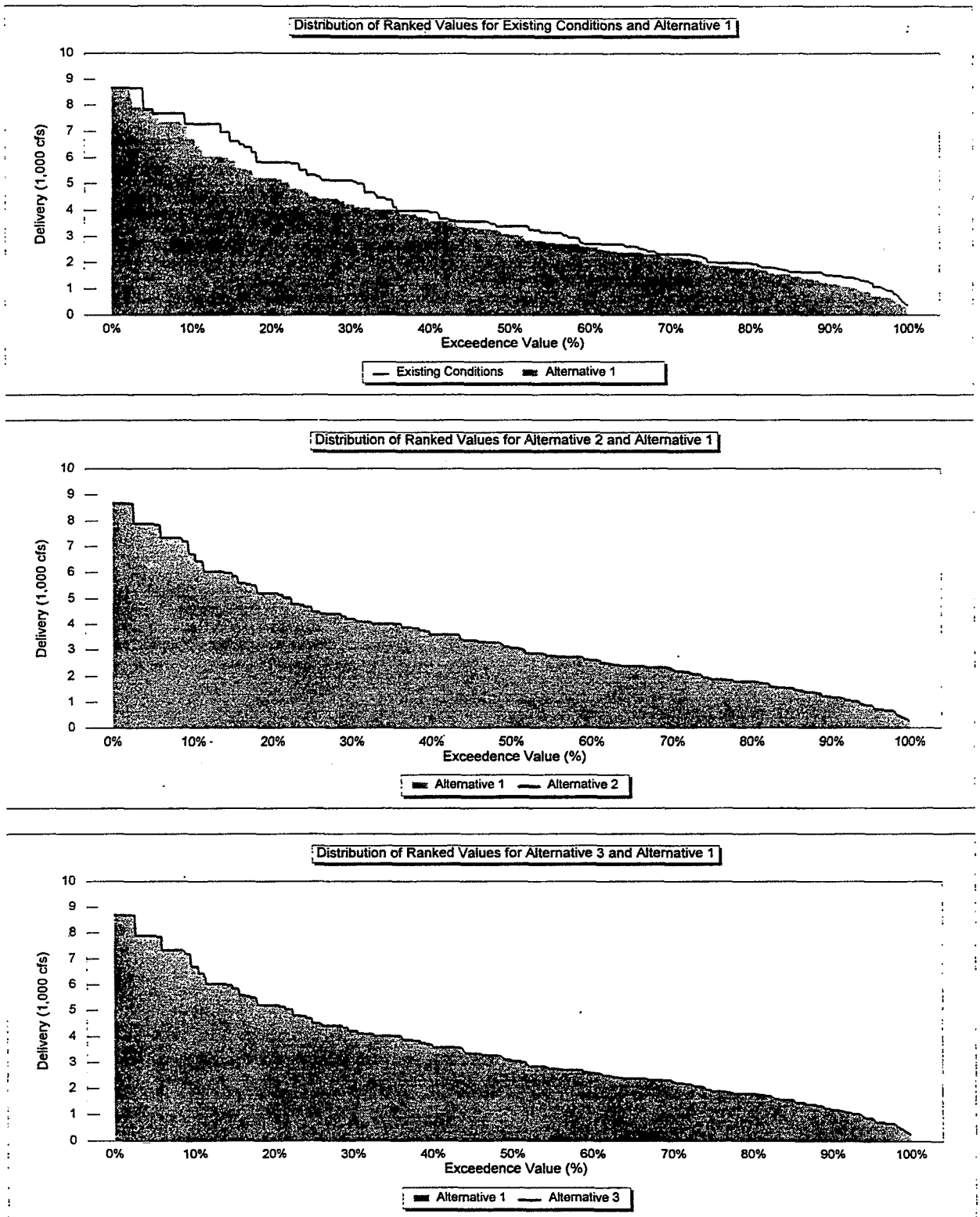


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**Figure 3-20.**
**Monthly CVP Deliveries South of the Delta: Alternative 1, Alternative 2, and Alternative 3**

reductions in CVP North energy production would be slightly larger than reductions at Folsom Reservoir (approximately 55 GW-hr). The reductions would occur primarily as a result of reduced reservoir releases in winter in order to reserve storage for releases made in late summer and fall.

## ANALYSIS OF FULL-USE SCENARIO

To provide a full range of analysis, the full use of the intake facility capacity upstream of I-5 included in Alternative 3 was also analyzed at the 2030 (No Action) level of development. This analysis utilized the full intake capacity of 217 cfs on a continuous basis without regard to EBMUD and County demands. EBMUD is assumed to take full delivery of its CVP contract amount (112,000 AF). The full-use scenario did not include increased deliveries to other water purveyors beyond those described for Alternative 1. No proposals for the use of the additional water provided under this scenario have been identified, but, as described above, the analysis has been included to provide a full range of analysis. The results of this additional analysis were compared to Alternative 1 for purposes of evaluation. These results are shown in Appendix C, Table C-27.

The full-use scenario represents an additional annual delivery of approximately 40,000 AF compared to Alternative 3. Consequently, Folsom Reservoir carryover storage is nearly the same as Alternative 3, a reduction of 5,000 AF compared to Alternative 1.

Under the full-use scenario, the Nimbus Dam and Fairbairn WTP seasonal flow pattern is identical to the pattern under Alternative 3. Flows downstream of the intake structure would be reduced by an additional 76,000 AF compared to Alternative 3. Reductions in flow would be greatest in winter.

Storage at Shasta and Trinity lakes would be slightly reduced under the full-use scenario. These reductions would be nearly the same as indicated under Alternative 3. Flows in the Sacramento River under the full-use scenario would be nearly the same as under Alternative 3 and would not appreciably change from conditions under Alternative 1. CVP south-of-Delta deliveries and SWP deliveries would be similar to deliveries under Alternative 3 and not substantially different than under Alternative 1.

Power generation at Folsom Dam and at CVP North facilities would be nearly the same as under Alternative 1.

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Chapter 4

# Water Quality

# Chapter 4. Water Quality

## AFFECTED ENVIRONMENT

Water quality conditions in the American River basin depend on the timing and quantities of watershed runoff, regulation of reservoir releases, discharges of municipal and industrial stormwater from the urbanized area of the City and County of Sacramento, and reduction in flows as a result of water deliveries for municipal uses. This section describes the current knowledge of factors influencing river water quality conditions and the conditions that could be affected by the project alternatives.

### Regulatory Framework

The beneficial uses and water quality objectives for waters within the American River and Mokelumne River basins are established by the Central Valley Regional Water Quality Control Board (CVRWQCB) and undergo regular review by state and federal agencies. Water quality objectives are designed to protect beneficial uses such as agricultural, municipal, and industrial supply; fish and wildlife; recreation; navigation; and power generation. The CVRWQCB sets numerical and narrative water quality objectives for several physical and chemical parameters.

Beneficial uses are protected primarily through programs for municipal and industrial wastewater and stormwater discharges associated with the CVRWQCB and the National Pollutant Discharge Elimination System (NPDES) permitting process pursuant to the federal Clean Water Act. General NPDES stormwater permits are also required for certain industrial activities, construction activities, and dewatering activities from trenching and dewatering, pump testing, and coffer dam construction. NPDES permits require preparation of a Storm Water Pollution Prevention Plan (SWPPP) that identifies Best Management Practices (BMPs) to be employed to prevent discharges of pollutants such as eroded soil, petroleum-based fuels and oils, and other hazardous materials that could contaminate nearby water resources and exceed the established water quality objectives. Activities that are performed under the U.S. Army Corps of Engineers jurisdiction for Section 404 of the Clean Water Act require Section 401 Water Quality Certification from the CVRWQCB, and stream crossings are permitted by California Department of Fish and Game (DFG) Streambed Alteration Agreements. Local grading and erosion control ordinances may also apply for components of the project that involve substantial soil disturbance.

### American River Basin

Water in the American River is considered good for all beneficial uses. Upper watershed source waters generally have excellent mineral and nutrient quality, with low total dissolved solids content. The South Fork of the American River has elevated levels of hardness with moderately low dissolved solids content (Sacramento Metropolitan Water Authority and U.S. Bureau of Reclamation 1996). Water quality in the lower American River is primarily controlled by the seasonal release pattern for Folsom Dam. The lower American River has a greater potential for receiving discharges of urban source pollutants such as stormwater discharges, spills of hazardous materials, and temperature increases during low-flow periods. Temperature is a concern in the lower American River during low-flow periods and is addressed in detail in Chapter 5, "Fisheries." The American River and Sacramento River have been monitored since 1992 on a routine basis for heavy metals and conventional parameters as part of the Sacramento Coordinated Monitoring Program (CMP) (Sacramento County Water Agency 1995). Results indicate that water quality would generally meet U.S. Environmental Protection Agency (EPA) ambient water quality criteria for aquatic life protection at all of the monitored sites. CMP



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data for 1992–1995 monitoring indicate mean total suspended solids of <1 milligram per liter (mg/L), mean electrical conductivity (EC) of 52 microsiemens per centimeter ($\mu$S/cm), and 25 mg/L hardness as calcium carbonate.

### Mokelumne River Basin and Terminal Storage Reservoirs

Source waters of the upper Mokelumne River basin have excellent water quality for all beneficial uses. Factors influencing water quality in the lower Mokelumne River historically included acid mine drainage and water temperature increases during low flows. Terminal storage reservoirs in the EBMUD service area generally have good water quality for beneficial uses. EBMUD has been evaluating recent increases in taste and odor events in its terminal reservoirs that are caused by specific types of algae and potentially from fungus-like organisms. It is difficult to predict and treat taste and odor problems, which can be related to physical and chemical (e.g., nutrient) cycles in the reservoirs, inflow water quality, and weather patterns.

### Sacramento River Basin

The upper regions of the Sacramento River basin and Lake Shasta have excellent water quality for all beneficial uses with low mineral and nutrient content, although acid mine drainage is a continuing concern above Redding. Water quality is generally good for beneficial uses from Red Bluff to the Delta, although periodic reductions occur in the late summer from agricultural return flows that contribute the majority of suspended sediment and discharges of treated wastewater. Historic contributions of pesticides from rice field drainage have largely been controlled through programs to modify timing of applications and return flow discharge (California State Water Resources Control Board 1995). At Freeport, downstream of the confluence with the American River, 1992–1995 monitoring for the CMP found mean levels of total suspended solids of 26 mg/L, mean EC of 142 $\mu$S/cm, and mean hardness of 56 mg/L as calcium carbonate.

### Sacramento-San Joaquin River Delta

Maintaining beneficial uses of Delta waters depends on complex circulation patterns that are affected by channel geometry, flow volumes, pumping for Delta agricultural operations and exports, and tidal cycles that affect the distribution of inflowing dissolved and suspended materials. Under average hydrological conditions, approximately 30% of Delta inflows is used for Central Valley Project (CVP) and State Water Project (SWP) exports, 10% is used locally, 20% is required for salinity control, and the remaining 40% is Delta outflow that results exclusively from winter precipitation and runoff (California State Water Resources Control Board 1995). The SWP and CVP export pumping plants exert a considerable influence on water circulation in the Delta by creating a net flow of water from northern regions of the Delta southward through Old River and Middle River.

Constituents of concern in the Delta include potentially harmful disinfection byproducts (DBPs) that can be formed during certain disinfection treatment processes used for drinking water. Trihalomethane (THM) compounds and their precursors (dissolved organic carbon, chloride, and bromide) are of the greatest concern for DBP formation. High-salinity water from Suisun Bay intrudes into the Delta during periods of low Delta outflow and can adversely affect agricultural and municipal uses. Salinity standards at the Contra Costa Canal intake (municipal objective) and at Jersey Point (agricultural objective) on the San Joaquin River are often controlling variables that determine required releases by upstream SWP and CVP reservoirs to maintain adequate Delta outflow. Agricultural drainage in the Delta contains high levels of nutrients, suspended solids, minerals (salinity), and trace chemicals such as the



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organophosphate, carbamate, and organochlorine pesticides. Synthetic organic chemicals, particularly the chlorinated pesticides, and heavy metals (e.g., mercury) accumulate in Delta fish in quantities that occasionally exceed acceptable standards for human consumption (San Francisco Bay-Delta Aquatic Habitat Institute 1991).

## ENVIRONMENTAL CONSEQUENCES

### Methods and Assumptions

Impacts from construction activities and discharge of American River water in terminal storage reservoirs were based on the location, duration, and intensity of project activities.

Impacts of Delta salinity on water supplies were calculated with monthly average Delta outflow for a simulated 1922–1991 period of record from PROSIM modeling completed for the hydrology analysis. (A detailed discussion of hydrologic modeling for this project is provided in Chapter 3, "Hydrology, Water Supply, and Power.") In response to comments received during public scoping, the methodology follows the suggestion of the Contra Costa Water District (CCWD) to calculate the effective outflow (i.e., equivalent steady-state outflow) that is controlling salinity intrusion. An effective outflow was calculated to estimate EC and chloride concentrations at Rock Slough, which is the location of the Contra Costa Canal intake structure. Estimated Rock Slough chloride levels are assumed to be representative of chloride in Old River, which conveys most of the water exported from the Banks and Tracy pumping plants. Historical Rock Slough chloride values are a constant fraction (i.e., 0.11) of the Jersey Point EC value, and Jersey Point EC is a function of effective outflow.

Figure 4-1 shows the monthly average Alternative 1 Delta outflows calculated by PROSIM and the effective average monthly outflows calculated with the method recommended by CCWD. The effective outflow depends on the previous month's outflow. The difference between the PROSIM outflow and the effective outflow is greatest when there is a large change in outflow. The change in effective outflow will lag behind the change in PROSIM outflow. This lag is greatest for smaller outflows. Figure 4-2 shows the historical monthly average Jersey Point EC and Rock Slough chloride, along with the estimates using CCWD's G-Model methodology. Although there are other sources of variation in these salinity measurements, the changes caused by the effective Delta outflow are reasonably approximated with these equations. Whenever the effective outflow increases, salinity is expected to be reduced; whenever the effective outflow is reduced, salinity is expected to increase. Because of its location closer to Suisun Bay than the other major exporters, Rock Slough was assumed to represent worst-case conditions for the purposes of impact analysis.

### Significance Criteria

The primary water quality issues of the proposed project include surface soil and instream disturbances from construction of intake structures, pumping plants, and pipelines; changes to the water quality in terminal reservoirs that may receive water from the American River; and changes in ambient water quality variables in the Delta as a result of reduced Delta inflow. The project will result in a significant impact if:

- construction activities would substantially degrade water quality or violate CVRWQCB water quality objectives for turbidity;
- discharge of transported American River water would substantially increase the frequency or duration of nuisance taste and odor in EBMUD terminal reservoirs; or
- reductions in Delta outflow would result in an increase in average annual chloride

levels at delivery points within the Delta by more than 3 mg/L or an increase of more than 30 mg/L in 10% of the months that were evaluated. These criteria are based on the most restrictive municipal water quality objective for monthly average chloride at the Contra Costa Canal of 150 mg/L.

## Impacts Found to Be Less than Significant

Changes to conditions under Alternative 1 were compared to existing conditions; changes under Alternatives 2 and 3 were compared to no action.

**Alternative 1: No Action**

Reduction of annual flows in the lower American River as a result of deliveries from the basin under 2030 conditions could reduce Delta outflow compared to existing conditions. Figure 4-3 shows chloride concentrations under Alternative 1 and changes that would occur compared to existing conditions. Both sets of data are plotted against the corresponding existing condition value to show how values are distributed.

Values for Alternative 1 increase in a linear relationship to existing conditions. The plot of the differences shows that at either high or low chloride levels in Rock Slough, future conditions (i.e., Alternative 1) do not appreciably change in concentration from existing conditions. Chloride levels increase in late fall and winter and decrease slightly in January through May as a result of changes to reservoir operations and associated changes to Delta outflow (Chapter 3). The variability in Delta outflow results in considerable scatter in the data, which can be estimated statistically by the standard deviation. The standard deviation represents the range of values in which approximately 70% of the monthly values would fall. The mean annual difference and associated standard deviation between existing conditions and Alternative 1 values is 1.7 ± 8.3 mg/L $Cl^-$, and less than 2% of the monthly differences exceed 30 mg/L $Cl^-$.

**Alternative 2: Folsom South Canal Connection**

***Impact: Discharge of Pollutants in Stormwater from Construction of Project Facilities.*** Construction activity along all of the proposed pipeline alignments extending from the FSC pumping plant to the Mokelumne Aqueducts would require vegetation removal, grading, trench excavation, stream and river crossings, minor cut and fills, stockpiling of spoils, and general soil disturbance that could accelerate natural rates of soil erosion. Construction sites would contain substances such as fuels, concrete, and other materials potentially harmful to streams and wetlands if released to the environment, and pipeline construction in some areas would require the disposal of wastewater from trench dewatering operations. Construction would last for approximately 2 years, and disturbed construction areas would be exposed to storms that could transport materials. EBMUD and its contractors would obtain all required local permits, clearances, and NPDES permits from the CVRWQCB and implement appropriate BMPs to protect water resources from contamination. This impact is less than significant. No mitigation is required.

***Impact: Increased Frequency or Duration of Taste and Odor Events in EBMUD Terminal Reservoirs.*** Transport of American River water that may have a higher content of biostimulatory nutrients may increase the frequency or duration of taste and odor events in EBMUD terminal reservoirs. Although it can generally be assumed that nutrient content in American River water is higher than in the headwater areas of the Mokelumne River, it is difficult to predict what the numerical effect of a new water source would be on existing algae populations in the terminal reservoirs (California Department of Water Resources 1994, East Bay Municipal Utility District 1997a). Methods are available for the control of



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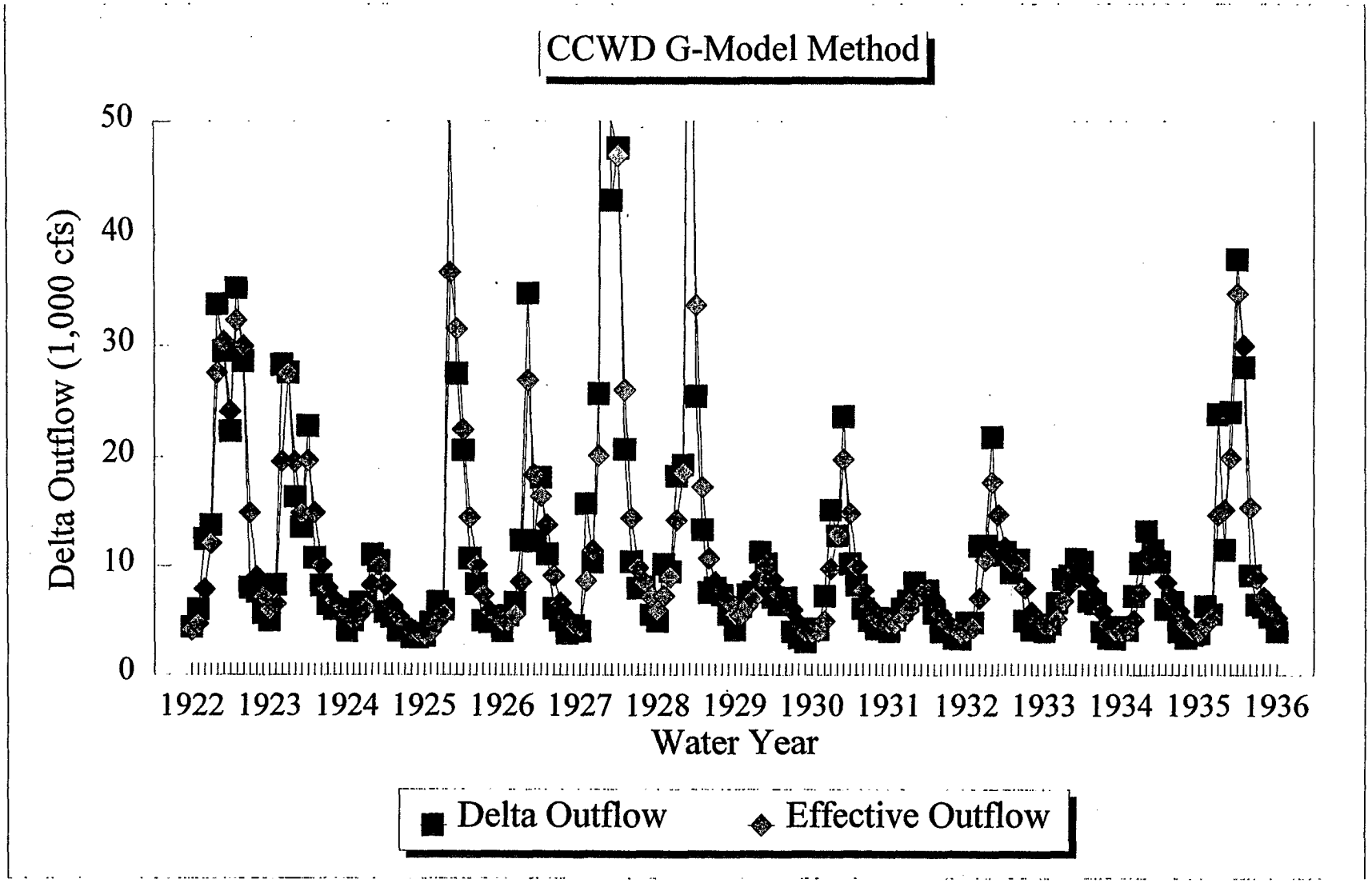


Figure 4-1.
**Relationship of Delta Outflow to Effective Outflow**

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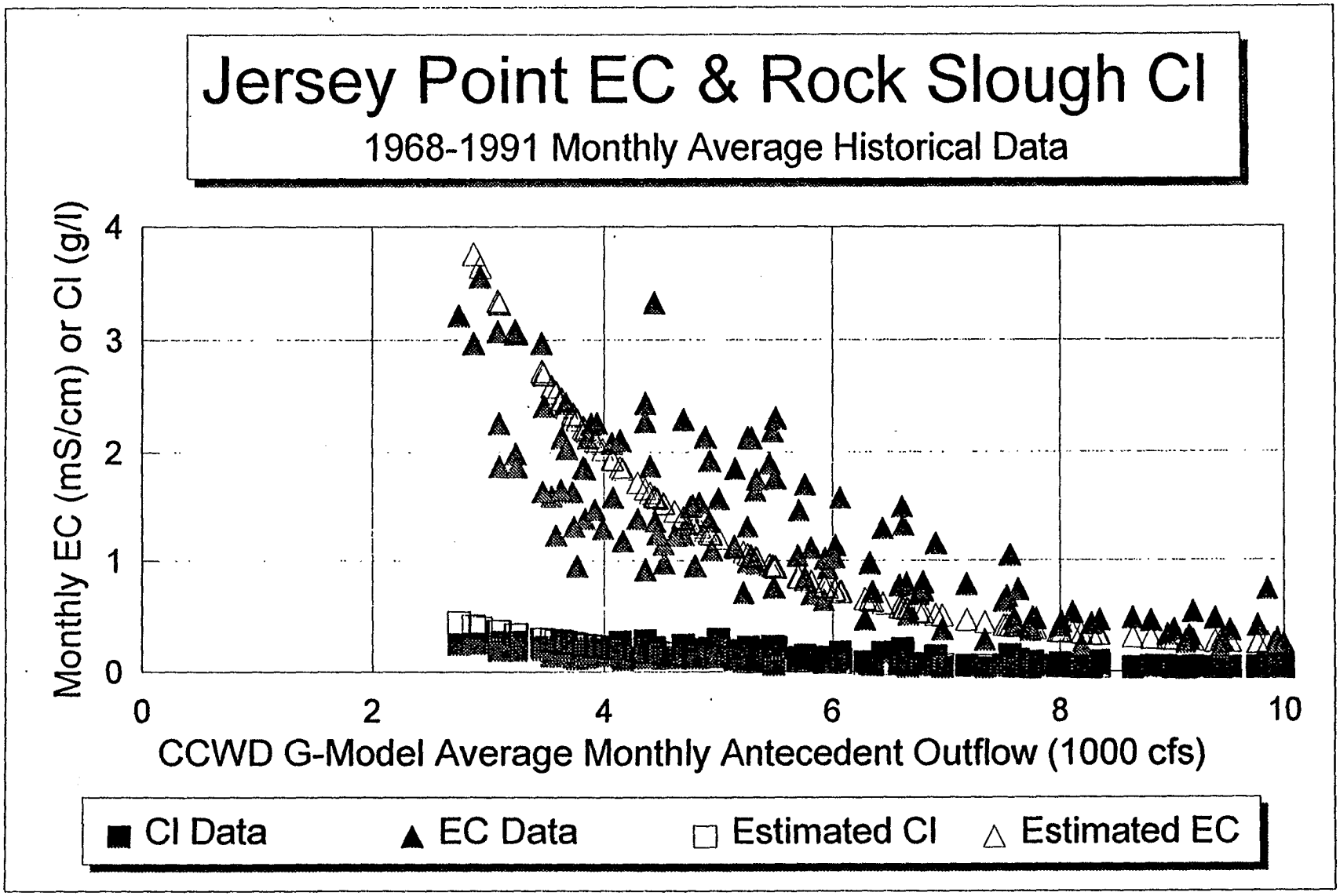


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**Figure 4-2.**
**Relationship of Jersey Point Electrical Conductivity to Rock Slough Chloride**

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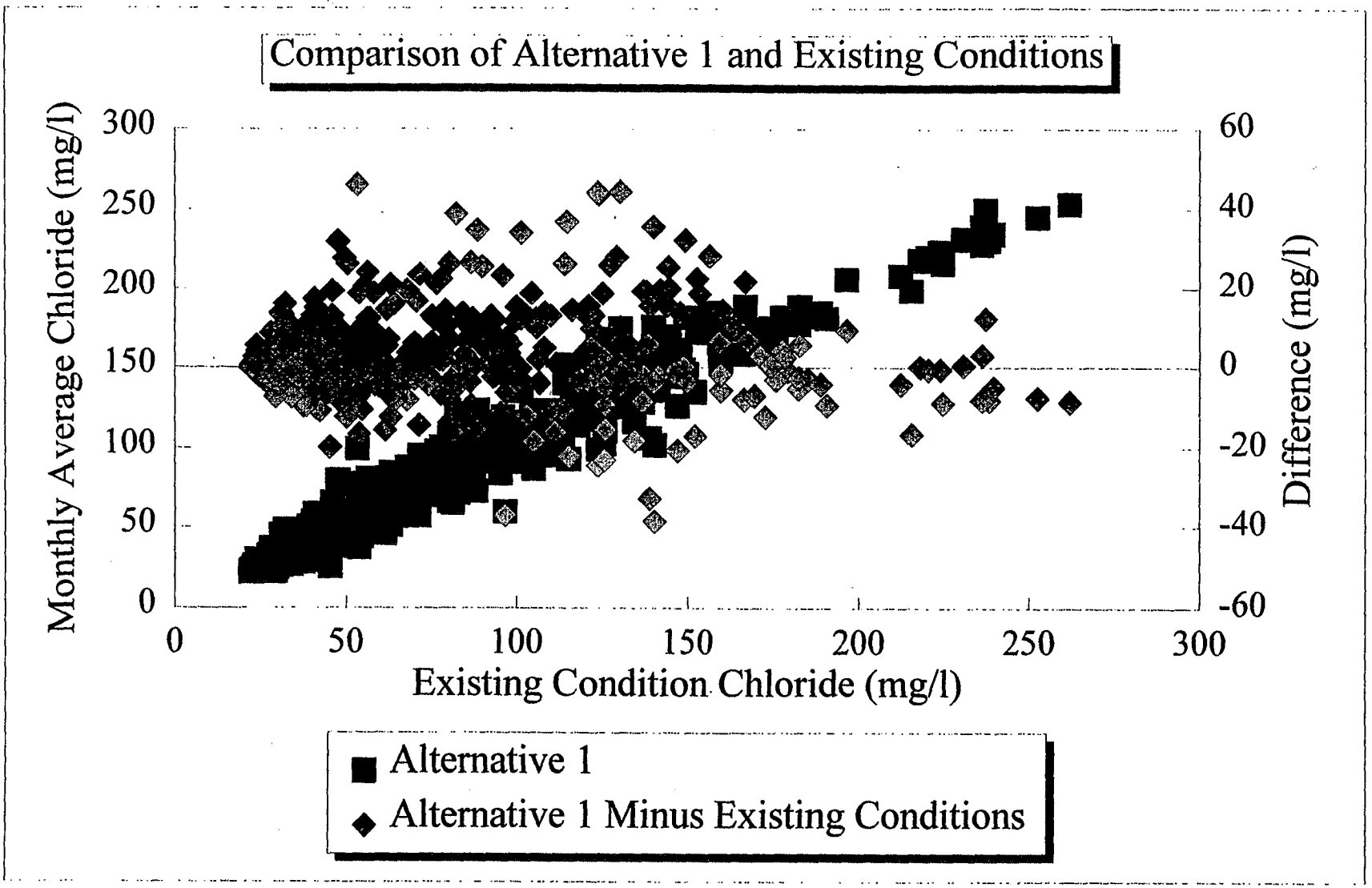


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Figure 4-3.
**Rock Slough Chloride: Alternative 1 and Existing Conditions**

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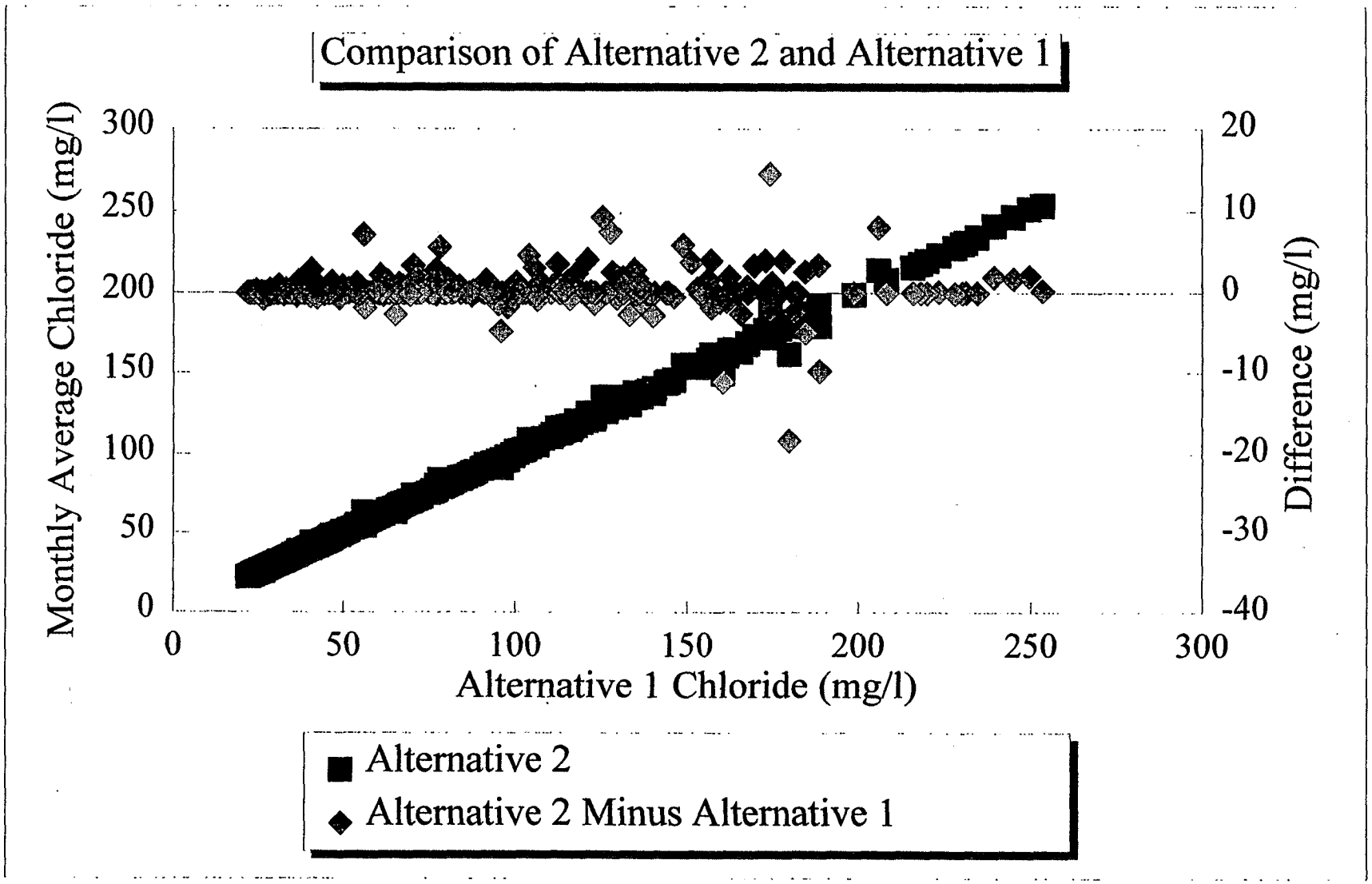


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Figure 4-4.
**Rock Slough Chloride: Alternative 2 and Alternative 1**

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algae and other organisms that produce the compounds that cause taste and odor problems in drinking water supplies. Some control of algae problems can be exerted through physical and management approaches, including selective watershed land use management techniques; control of nutrient-laden runoff within the reservoir's watershed; and physical manipulation of the reservoir through blending of different waters, artificial circulation, or aeration. Because effective and environmentally safe methods of control are available for algae and taste and odor control, this impact is less than significant. No mitigation is required.

***Impact: Impairment of Delta Export Water Quality.*** Reduction of annual flows in the lower American River as a result of project deliveries from the basin would reduce Delta outflow. Delta outflow provides a repelling force to tidal encroachment of saltwater and dilution of harmful chemicals of concern such as salts in agricultural return flows that are controlling variables for Delta water quality. Figure 4-4 shows Rock Slough chloride concentrations under Alternative 1 and estimated changes that would occur under Alternative 2. The results indicate very little difference in chloride levels as a result of the project deliveries. The mean annual difference and associated standard deviation between Alternative 1 and 2 values is $0.1 \pm 1.3$ mg/L $Cl^-$. The small average difference seen in the modeled data is considered reasonable because the delivery quantity is a small fraction of average Delta outflow conditions. Because the predicted mean annual change is small compared to the significance criteria and the monthly differences never exceed 30 mg/L $Cl^-$, this impact is less than significant. No mitigation is required.

**Alternative 3: Joint Water Supply**

***Impact: Discharge of Pollutants in Stormwater from Construction of Project Facilities.*** Construction activity along the proposed pipeline alignment extending from the intake structure to the FSC and continuing to the Mokelumne Aqueducts would disturb the surrounding soil and vegetation extensively. Construction would last for approximately 2 years and disturbed construction areas would be exposed to storms that could transport soil and construction materials to streams or wetlands. Because EBMUD and its contractors would obtain all required permits and implement appropriate BMPs for water pollution control, this impact is less than significant. No mitigation is required.

***Impact: Discharge of Sediment during Construction of Lower American River Intake Structure.*** As part of construction of the lower American River intake structure, a series of sheet piles would be installed in the American River to allow dewatering of the construction area. The construction activities could increase turbidity in the river for several days during the initial phases of the operation. Turbidity would increase on a daily intermittent and temporary basis. The turbidity generated in the river would affect a relatively small area.

State water quality objectives indicate that turbidity should not exceed 20% of background levels. Given the high quality of American River flows, the allowable increase would probably be on the order of 1 to 6 NTUs (nephelometric turbidity units). The CVRWQCB would likely require water quality monitoring during construction as part of the Section 401 permitting process to maintain acceptable turbidity levels. The impact on water quality is less than significant because sheet pile driving and dewatering would be of limited duration and increases in turbidity would be temporary and probably below the CVRWQCB thresholds. No mitigation is required.

***Impact: Increased Frequency or Duration of Taste and Odor Events in EBMUD Terminal Reservoirs.*** Transport of American River water that may have a higher content of biostimulatory nutrients may increase the frequency or duration of taste and odor events in



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EBMUD terminal reservoirs. The adverse effects of Alternative 3 may be greater than under Alternative 2 because delivery of water from the American River would be taken further downstream and would have the potential to accumulate more nutrients from runoff within the urbanized area of the City of Sacramento. It is difficult to predict the effect of the imported water on taste and odor. Methods are available for the control of algae and other organisms that produce compounds that cause taste and odor problems in drinking water supplies. Some control of algae problems can be exerted through physical and management approaches. This impact is less than significant. No mitigation is required.

***Impact: Impairment of Delta Export Water Quality.*** Reduction of annual flows in the lower American River as a result of project deliveries from the basin could reduce Delta outflow. Figure 4-5 shows chloride concentrations and changes that would occur under Alternative 3 compared to Alternative 1. The results indicate very little difference in chloride levels as a result of the project deliveries. The mean annual difference and associated standard deviation between Alternative 1 and 3 values is $0.2 \pm 1.9$ mg/L $Cl^-$. Although the timing and quantity of delivery would differ between Alternatives 2 and 3, the potential reduction in chloride would be comparable. Because of the small predicted change, this impact is less than significant. No mitigation is required.

## Significant Impacts and Mitigation

Implementation of the project alternatives would have no significant impacts on water quality.

## Cumulative Impacts

Conditions under the Alternative 2 and 3 cumulative scenarios were compared to existing conditions.

***Impact: Impairment of Delta Export Water Quality.*** Reduction of annual flows in the lower American River as a result of cumulative conditions would reduce Delta outflow to a greater degree than under Alternatives 2 or 3 alone. Figures 4-6 and 4-7 show the chloride concentrations under existing conditions and changes that would occur under Alternatives 2 and 3 cumulative conditions, respectively. The mean annual difference and standard deviation between the Alternative 2 cumulative and existing conditions values is $2.2 \pm 8.6$ mg/L $Cl^-$. The mean annual difference and standard deviation between Alternative 3 cumulative and existing condition values is $2.1 \pm 8.3$ mg/L $Cl^-$, which is comparable to changes estimated for Alternative 2 cumulative conditions. The data have a substantial amount of scatter; most differences that exceed 30 mg/L $Cl^-$ occur in September through December when Delta outflow is reduced. Although the scatter is substantial, less than 2% of the monthly differences exceed 30 mg/L $Cl^-$, and the mean annual difference is less than the criteria; therefore, this impact is less than significant. No mitigation is required.

## ANALYSIS OF FULL-USE SCENARIO

The reduction of annual flows in the lower American River as a result of the full-use scenario for Alternative 3 would be slightly greater than conditions under Alternative 3. This reduction in flows would result in a slight increase in chloride concentration under the full-use scenario, compared to Alternative 3. Under the full-use scenario, the mean annual difference and standard deviation is 0.6 +- 1.7 mg/l CL (Figure 4-8). The chloride concentrations for the full-use scenario would not be above the significance criteria established for the evaluation of Alternatives 2 and 3.



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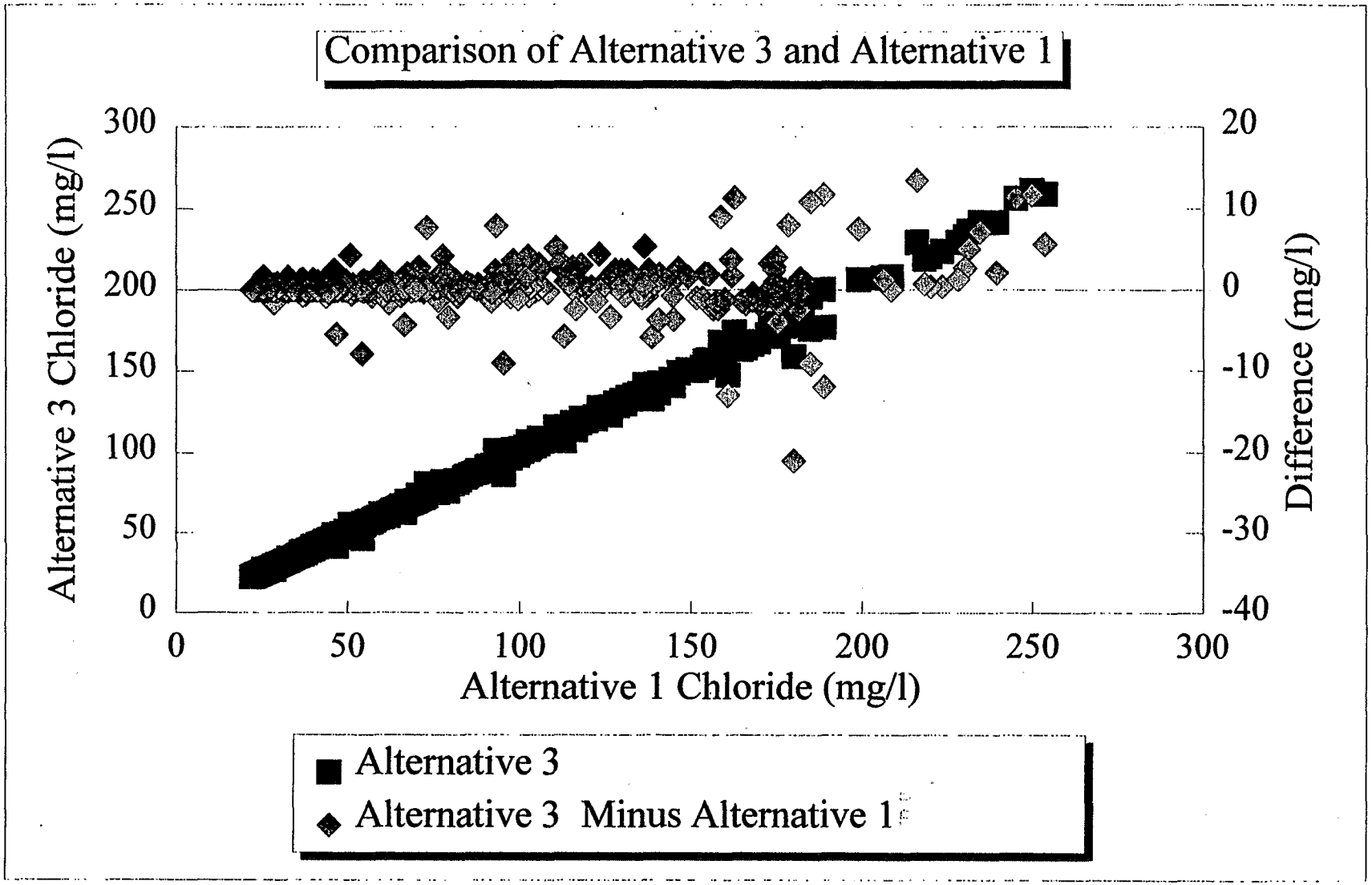


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Figure 4-5.
**Rock Slough Chloride: Alternative 3 and Alternative 1**

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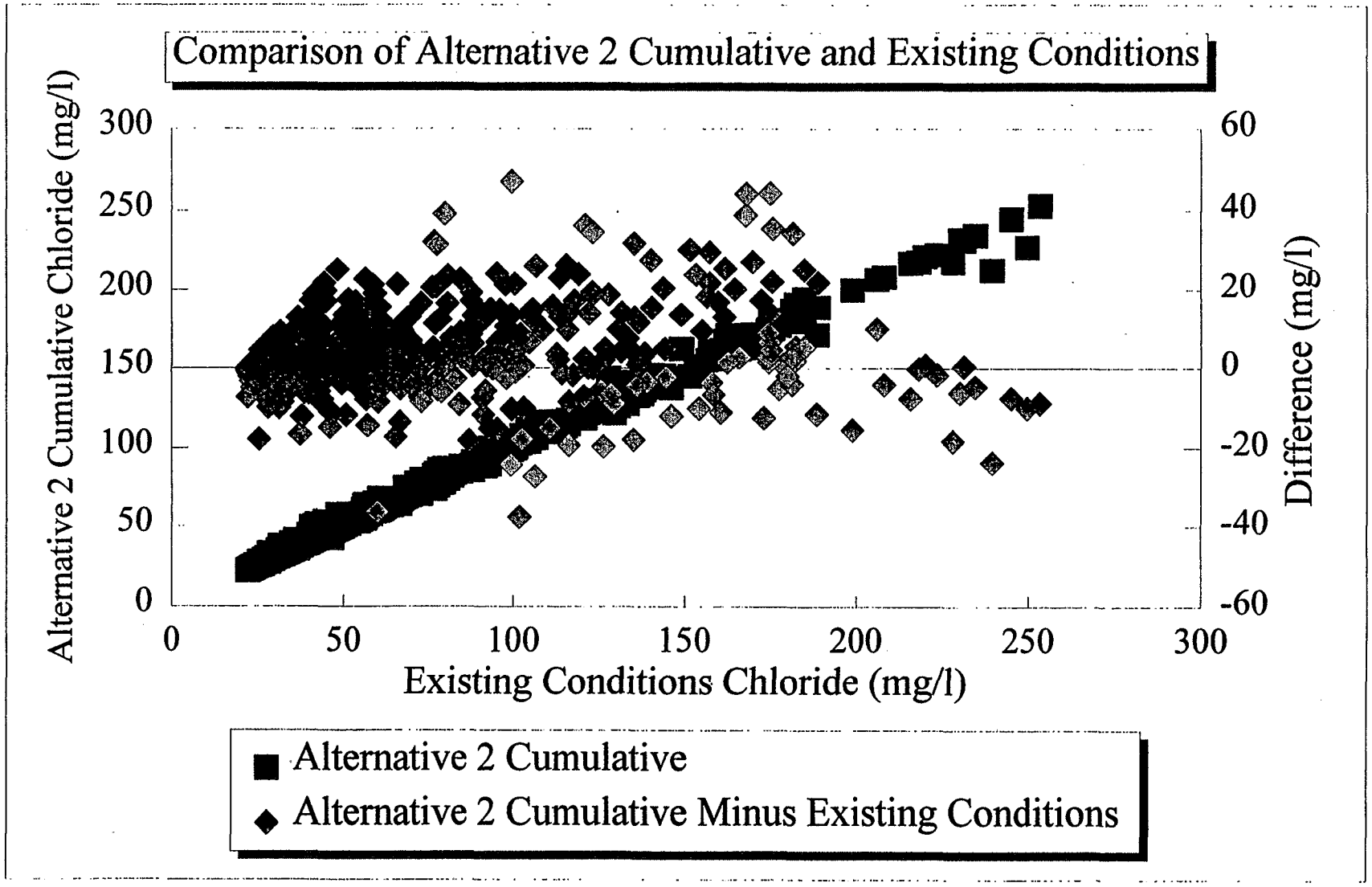


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Figure 4-6.
**Rock Slough Chloride: Alternative 2 Cumulative and Existing Conditions**

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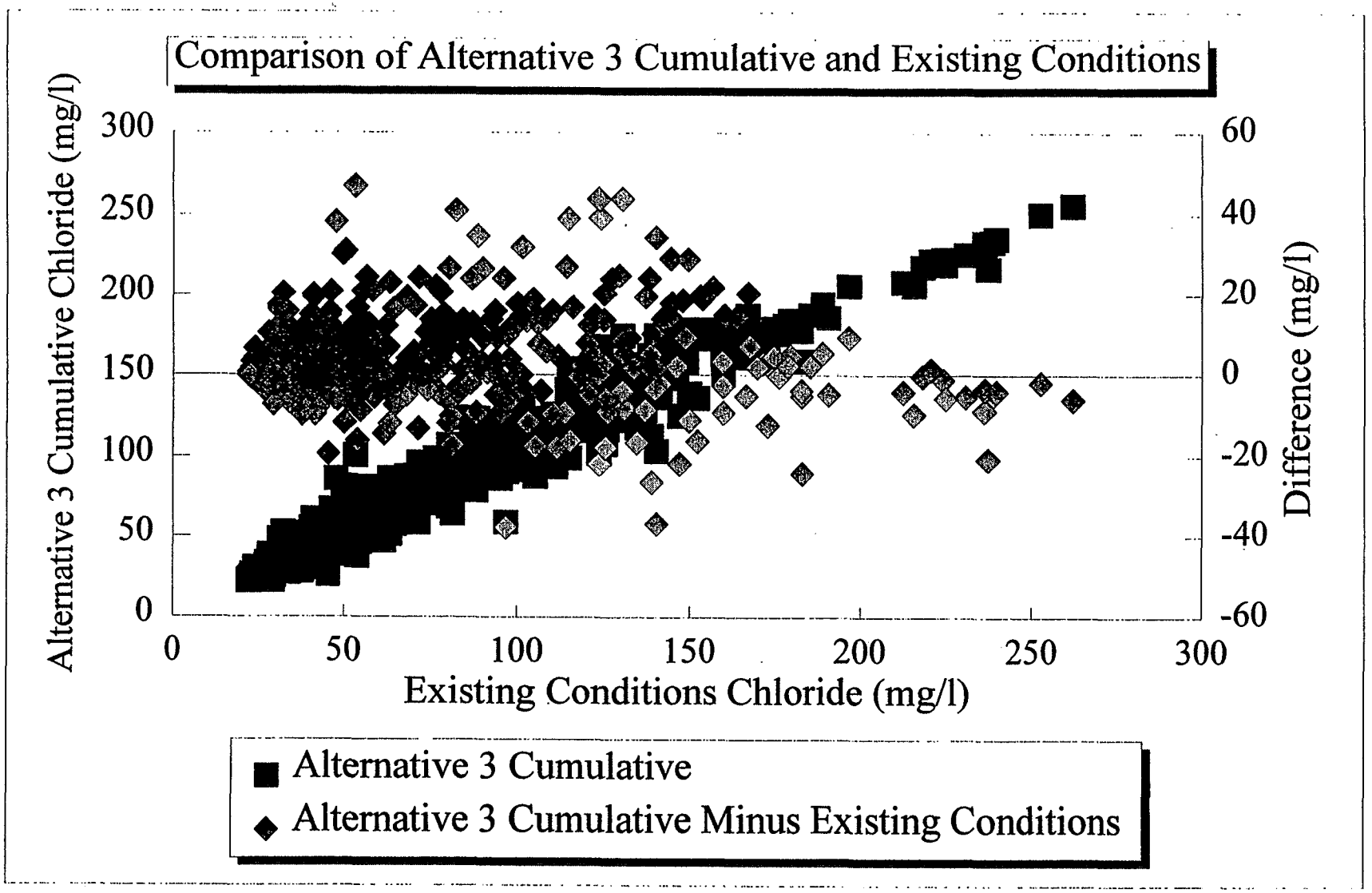


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Figure 4-7.
**Rock Slough Chloride: Alternative 3 Cumulative and Existing Conditions**

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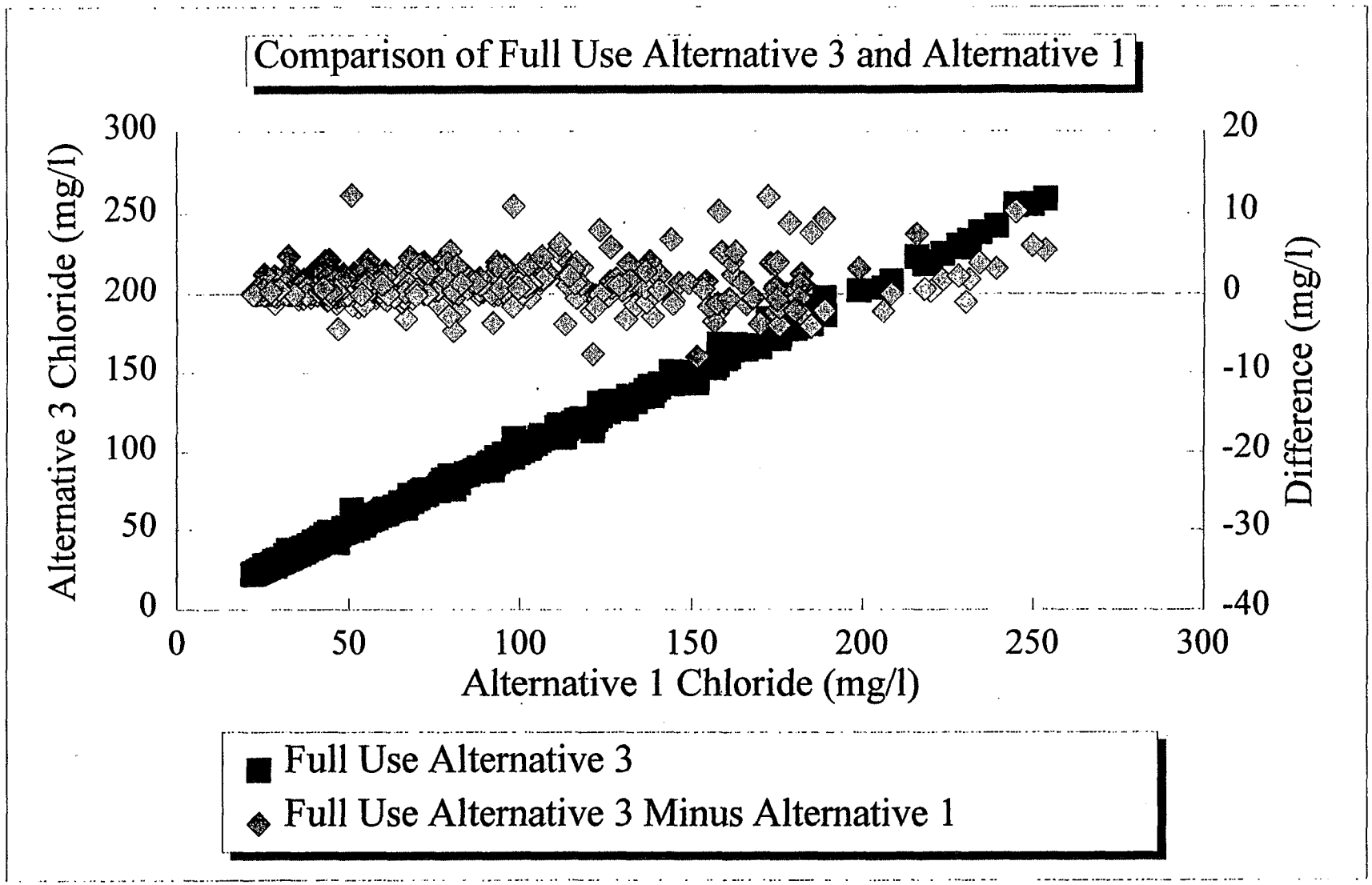


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**Figure 4-8.**
**Rock Slough Chloride:**
**Full-Use Scenario-Alternative 3**

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Chapter 5

# Fisheries

# Chapter 5. Fisheries

## AFFECTED ENVIRONMENT

This section describes fisheries in Folsom Reservoir, the lower American River, Sacramento River, Shasta and Trinity lakes, and Sacramento-San Joaquin Delta (Delta). Information on water temperatures in the lower American River, an important assessment variable for fisheries, is also provided. Supporting tables and figures are provided at the end of this chapter.

### Folsom Reservoir

Folsom Reservoir's fishery includes both warmwater and coldwater species. Important warmwater game species include black bass (largemouth and smallmouth bass), sunfish, and catfish (Table 5-1). Coldwater species include rainbow trout and landlocked sockeye salmon (kokanee). Annual hatchery plants of subcatchable- and catchable-size rainbow trout sustain a seasonal (primarily winter and spring) trout fishery.

Apart from the low productivity of human-made reservoirs overall, water level fluctuations generally are considered the most significant environmental factor influencing reservoir fish productivity. Folsom Reservoir typically fluctuates more than 60 feet annually, resulting in direct and indirect effects on reservoir fish populations. Reservoir drawdowns during late spring and summer can adversely affect the reproductive success of littoral (nearshore) spawners (e.g., bass, sunfish) by disrupting spawning activity, dewatering nests, or exposing nests to wave action. Reproductive success may also be adversely affected by coldwater intrusion resulting from rising reservoir levels during spring.

Declining water levels also may reduce the extent of suitable littoral habitat available for spawning and rearing. Generally, fish production increases with greater reservoir surface area and water level stability during sensitive spawning and early rearing periods.

Thermal stratification of Folsom Reservoir during summer and fall provides important coldwater habitat for salmonids. Little or no successful salmonid spawning is believed to occur in Folsom Reservoir.

### Lower American River

**Background**

Many species of game and nongame fish are found in the lower American River (Table 5-1). Anadromous species include chinook salmon, steelhead, striped bass, American shad, and Pacific lamprey. Resident game fish include rainbow trout, largemouth bass, smallmouth bass, sunfish, and catfish. Common nongame species include Sacramento sucker, Sacramento squawfish, tule perch, and riffle sculpin. Special-status species that may occur in the lower American River, as well as the Sacramento River, are the delta smelt, Sacramento splittail, winter-run chinook salmon, and steelhead (Table 5-2). Information on chinook salmon, steelhead, striped bass, American shad, Sacramento splittail, and Delta smelt is provided below.

The aquatic environment and fish fauna of the lower American River have been altered substantially from prehistoric conditions by several factors, including construction of early dams at various points along the river, construction of Folsom and Nimbus dams in the 1950s, regulation of river flows, and introduction of nonnative species. The construction of Folsom and Nimbus dams, and earlier dams, blocked access and inundated much of the historical salmon and steelhead spawning and rearing habitat above the dam sites. Anadromous species are now limited to the lower 23 miles of the American River from Nimbus Dam to the confluence with the



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Sacramento River. Upstream reservoir operations modified the seasonal flow extremes of the lower American River before Folsom and Nimbus dam construction, resulting in higher discharges during summer and fall and lower discharges during winter and spring. Water temperature regimes have also been altered by the operation of Folsom and Nimbus dams. The effects of these changes are discussed later.

Fishery resources of the lower American River also are subjected to relatively rapid flow fluctuations, resulting from the operation of Folsom Reservoir to meet Delta water quality standards and Central Valley Project (CVP) water contract obligations. Flow fluctuations can cause adverse effects during the chinook salmon and steelhead incubation and juvenile rearing periods. Lowering river levels can cause mortality of eggs and larvae by exposing redds (nests), reducing flow rates through the redds, or increasing water temperatures. Rapid flow fluctuations during the early rearing period can trap juveniles in isolated pools and backwaters, where they are subjected to elevated water temperatures, low dissolved oxygen levels, and high predation rates. The most critical stranding problems in the lower American River occur when flows are reduced below 1,500 cubic feet per second (cfs) following a rapid flow increase (McEwan 1991). Other potential adverse effects of flow fluctuations on fish populations include reduced production of aquatic food organisms, rapid changes in physical habitat conditions, and loss of temperature stratification in pools.

Nimbus Salmon and Steelhead Hatchery, which is operated by the California Department of Fish and Game (DFG), was completed in 1955 to compensate for salmon and steelhead losses caused by construction of Folsom and Nimbus dams. The hatchery produces smolt-size fall-run chinook salmon and yearling steelhead, which are transported and released directly into the Sacramento-San Joaquin River estuary. Waters released from Nimbus Dam that exceed 56°F have historically caused mortality to chinook salmon eggs taken at the hatchery. Exposure of chinook incubated eggs and juveniles to temperature stress at the hatchery has been reduced in part by delaying the take of eggs and releasing juveniles directly into the Delta (Sacramento Area Flood Control Agency et al. 1994). Reared steelhead and chinook salmon eggs also have been transported to hatcheries on the Feather and Mokelumne rivers to avoid mortality during summer and fall because conditions on these rivers are generally more favorable.

**Flow Requirements**

**Hodge Decision Flows.** As discussed in Chapter 1, in *Environmental Defense Fund et al. v. East Bay Municipal Utility District*, Alameda County Case No. 425,955, the court conditioned EBMUD's right to take delivery of its contract entitlement to periods when certain instream flow requirements, aimed at protecting public trust values in the lower American River, were met. The Hodge Decision (1990) requires that flows of 2,000 cfs from October 15 through February, 3,000 cfs from March through June, and 1,750 cfs from July through October 14 be met before EBMUD can take delivery of water from the FSC (Table 5-3). These flows were based on input from DFG, U.S. Fish and Wildlife Service (USFWS), EBMUD, and the County of Sacramento and fall within the ranges recommended by these agencies. The court decision reserved jurisdiction if new evidence supports adjustments of the recommendations. EBMUD has been contributing to the Hodge Decision studies of fisheries by collecting data at six to eight locations along the lower American River. These data have been used to calibrate the temperature record used for the impact assessment (Appendix D).

**Anadromous Fish Restoration Program Flows.** Under the Central Valley Project Improvement Act (CVPIA), flows were developed through the Anadromous Fish Restoration Program (AFRP) to maximize anadromous fish survival, with the goal of

doubling the natural production of anadromous fish. Target enhancement flows based on water year type are shown in Table 5-3. Based on the criteria established in the 1997 draft AFRP, the end of September storage in Folsom Reservoir will be used to determine the water year type. The flows in the lower American River from October 1 to December 31 will be based on Folsom storage at the end of September. Flows between January 1 and September 30 will be based on the previous months' storage and projected inflow.

Recent instream flow investigations of the lower American River conducted for the AFRP focused on identifying instream flow requirements for chinook salmon and steelhead spawning. USFWS used the Physical Habitat Simulation component of the Instream Flow Incremental Methodology to predict physical habitat availability over a range of flows (U.S. Fish and Wildlife Service 1997a). Relationships between spawning habitat and flow were developed for selected areas that received extensive use by spawning fall-run chinook salmon. These studies conclude that the flows required by the Hodge Decision are generally consistent with the flows associated with maximum physical habitat availability for chinook salmon during the species' October–December spawning.

Table 5-3 identifies Hodge Decision and AFRP flows, as well as flows identified by agencies for the maintenance and/or enhancement of chinook salmon that were used by Judge Hodge to make his final decision.

**Fisheries Resources**

The primary management species and most economically important fish species in the lower American River are fall-run chinook salmon, steelhead, American shad, and striped bass. The Sacramento splittail, currently proposed for listing under the federal Endangered Species Act, is also known to occur in the lower American River. Species life history, habitat requirements, and distribution are described below. The potential occurrence of other special-status species in the lower American River is also described.

The water temperature requirements for fall-run chinook salmon and steelhead are discussed in Appendix D.

**Chinook Salmon.** Chinook salmon produced in the American River substantially contribute to the sport and commercial salmon fisheries of California. Commercial catches of American River-produced chinook salmon averaged about 120,000 fish annually in 1967–1981 (U.S. Fish and Wildlife Service 1985). On average, ocean and river sport anglers land another 60,000 fish (Mills and Fisher 1993). Although the 1967–1991 annual spawning escapement of American River-produced chinook salmon (i.e., adults not captured by commercial and sport fisheries that return to the lower American River to spawn) averaged 41,000 fish.

Chinook salmon are anadromous, migrating to sea as juveniles and returning to fresh water to spawn as adults. The lower American River is known to support fall-run chinook salmon only. Adult chinook salmon enter the American River in September and October and may continue to arrive through January. Spawning usually extends from October to January, with peak spawning in November. Nearly all chinook salmon in the lower American River spawn in the upper 7 miles of the river (Vyverberg et al. 1996). Chinook salmon production in the lower American River is supplemented by hatchery-reared fish originating from the Nimbus Salmon and Steelhead Hatchery. Estimates of the hatchery contribution to annual adult returns range from 33% to 80% (Dettman and Kelley 1987, Cramer et al. 1990).

Chinook salmon females deposit their eggs in redds, which they excavate in the gravel bottom. The eggs are fertilized by one or more



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males. Chinook salmon eggs generally hatch in 6–9 weeks, and yolk-sac larvae remain in the gravel several more weeks. The time of fry emergence generally extends from mid-December through mid-April. A large percentage of young chinook salmon less than 50 millimeters long (fry) migrate out of the lower American River immediately or soon after emergence in late winter and early spring (Snider and Titus 1995). The remaining fry continue to rear and emigrate as juveniles in April, May, and June. Fish that remain in the river are believed to have higher survival rates than early migrating fry because of their larger size during emigration (Rich and Leidy 1985). However, fish that emigrate as fry may also provide an important contribution to the gene pool in years when the Delta provides better conditions than the lower American River.

Winter-run chinook salmon, designated an endangered species under the federal and state Endangered Species Acts, may occur in the lower American River. The USFWS has raised concern regarding the potential occurrence of winter-run chinook salmon in the lower American River, citing evidence that juvenile chinook salmon in the winter-run size range (greater than 80 millimeters [mm] fork length) were caught by DFG in 1992 in the American River above the backwater influence of the Sacramento River (McInnis pers. comm.). Although these fish were in the predicted size range for winter-run chinook salmon, overlap in the sizes of different chinook salmon races makes accurate identification difficult (U.S. Fish and Wildlife Service 1997b). Therefore, the potential exists for winter-run juveniles to temporarily enter the lower American River for additional rearing before continuing their seaward migration. Based on the general timing of rearing and downstream migration in the lower Sacramento River, winter-run chinook salmon may occur in the lower American River from October through May, with the greatest potential from December through April. The designated critical habitat of winter-run chinook salmon does not include the American River.

**Steelhead.** Steelhead are an important component of the sport fishery of the lower American River. Although current estimates of the annual steelhead run size are unavailable, run sizes in 1971–1972 and 1973–1974 were estimated at 19,583 and 1,274, respectively (McEwan 1991). The National Marine Fisheries Service (NMFS) has identified the Central Valley stock of steelhead (which includes the lower American River) as an evolutionarily significant unit and has proposed it for federal listing as endangered (61 FR 41541, August 9, 1996).

Adult steelhead that are 2–4 years old return from the ocean and enter the lower American River from October through May, with peak numbers in January and February. Limited feeding occurs while adults are migrating upstream to spawn. Spawning occurs between December and April. A small fraction of the adults survives spawning and returns to the ocean between April and June.

Like chinook salmon, female adult steelhead deposit their eggs in excavated redds. Egg incubation generally extends from December through May. Fry emergence usually occurs in April and May but can extend into June. After emergence, juveniles spend 1 to 2 years in the river before migrating to the ocean. Emigration typically occurs in March.

Because of low natural production, most adult steelhead returning to the lower American River are of hatchery origin (Snider and Gerstung 1986). Poor steelhead production is exacerbated by several factors in the lower American River. Nearly all the historical spawning and rearing habitat for steelhead in the American River was blocked by Nimbus Dam. High water temperature in summer and fall also is a major limiting factor for natural steelhead production. Water temperatures frequently exceed optimal levels for rearing at Nimbus Salmon and Steelhead Hatchery during July through October. Habitat conditions for juvenile steelhead are more degraded



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downstream of the hatchery where water temperatures are even higher due to atmospheric warming (McEwan 1991).

**Striped Bass.** Striped bass are anadromous and are an important component of the lower American River sport fishery. Although little or no spawning occurs in the lower American River, adult and juvenile striped bass are abundant in the river during summer. Juvenile and sub-adult fish have also been reported to be abundant during fall (DeHaven 1977).

**American Shad.** A popular sport fishery for American shad exists each year in the Sacramento, American, Feather, and Yuba rivers (Painter et al. 1980). American shad are anadromous and return from the ocean to spawn in April–July (Snider and Gerstung 1986). Spawning migration peaks in mid-May and early June.

Run sizes of shad depend partially on flow conditions in the major rivers; DFG has identified flows of 3,000–4,000 cfs in the American River during the spawning season as sufficient attraction flows to maintain the present shad fishery (California Department of Fish and Game 1986).

Most American shad are 3 to 5 years old when they first spawn, and some can survive to spawn more than once. Temperature may be the most important factor in triggering the timing of the spawning run; however, optimal temperatures are not well defined and vary among the larger river systems (Sacramento Area Flood Control Agency et al. 1994). DFG found migrating shad in the western Delta at temperatures between 57°F and 66°F (Painter et al. 1980). Based on available data (Moyle 1976, Stier and Crance 1985), the upper optimal temperature for shad spawning in the lower American River is approximately 68°F. American shad generally do not feed while migrating upstream to spawn.

American shad are pelagic broadcast spawners, and most eggs spawned in the lower American River probably do not hatch until they have drifted downriver and entered the Sacramento River (California Department of Fish and Game 1986). Few juvenile American shad have been collected in the lower American River (Painter et al. 1980).

**Sacramento Splittail.** Sacramento splittail are currently proposed for federal listing as threatened and are identified as a state species of special concern. Reduced Delta outflow, water diversions, entrainment in diversions, dams, introduced aquatic species, loss of wetlands and shallow water habitats, and drought conditions appear to have contributed to the decline in splittail distribution and abundance (U.S. Fish and Wildlife Service 1993).

Splittail are freshwater fish but are capable of withstanding moderate levels of salinity. Adult splittail move into upstream freshwater areas to spawn primarily during February through April. Migration patterns are not defined clearly, but spawning may be associated with rising temperatures and long periods of daylight in spring (Daniels and Moyle 1983). Splittail prefer to spawn over flooded streambanks and aquatic vegetation. Juveniles rear in quiescent areas, moving to open water as summer progresses (Wang 1986). A temperature of 68°F is considered optimal for spawning and early rearing.

Adult splittail have been captured in the lower American River, but no information is available on splittail use of the river for spawning and rearing. During larval splittail surveys in April 1995, DFG caught larval splittail in the Yolo and Sutter bypasses and in the lower Sacramento River, but none were caught in the American and Feather rivers or in the Sacramento River above the Sutter Bypass (Baxter pers. comm.).



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**Delta Smelt.** Delta smelt are found primarily in the Sacramento-San Joaquin River Estuary, although they may move as far upstream as the American River confluence during their spawning migration. The potential exists for delta smelt to occur in the lowermost reaches of the American River; however, field surveys indicate that their occurrence is rare. Declines in delta smelt abundance led to listing the species as threatened in 1993 under the federal Endangered Species Act (58 FR 12854, March 5, 1993).

Delta smelt are euryhaline (i.e., adapted to a wide salinity range) and inhabit a narrow range of salinities, rarely occurring in water with more than 14 parts per thousand (ppt) salinity (Moyle et al. 1992). Except for spawning adults and recently hatched larvae and juveniles, delta smelt primarily inhabit the region of the estuary with salinities between 0.45 and 4.4 ppt (California Department of Water Resources and U.S. Bureau of Reclamation 1993). The location of this region varies from year to year depending on the volume of freshwater outflows, but it is generally in the western Delta and Suisun Bay. Delta smelt have been collected in the Sacramento River as far upstream as Verona, near the mouth of the Feather River, and in the San Joaquin River as far upstream as Mossdale (Wang 1991). Their normal downstream limit appears to be the western Suisun Bay, but they are sometimes washed into San Pablo Bay during high outflows. The entire Sacramento-San Joaquin Delta and Suisun Bay has been identified as critical habitat for delta smelt (59 FR 852, January 6, 1994). The critical habitat does not extend into the American River above the confluence with the Sacramento River.

Because delta smelt may move as far upstream as the American River confluence during their spawning migration, the potential exists for delta smelt to occur in the lowermost reaches of the American River.

**Lower American River Water Temperature**

Seasonal water temperatures in the lower American River have been altered substantially by Folsom and Nimbus reservoir operations. Water temperatures often exceed optimal levels for chinook salmon spawning in fall and for juvenile salmon and steelhead during spring and summer, especially in dry and critically dry water years. High summer water temperatures in the lower American River severely limit natural production of steelhead, which reside in fresh water for a full year or more before migrating to sea. Significant reductions in Folsom Reservoir storage in dry and critically dry water years can cause water temperatures to exceed suitable levels for chinook salmon egg survival in October and November under current conditions, adversely affecting both natural and hatchery production.

The temperature of water released from Folsom Reservoir into the lower American River is influenced by storage volume in Folsom Reservoir and by the elevation at which water is drawn into the power plant. The intake elevation to the power plant is controlled by panels on the trashrack. Operation of the panels and associated effects on release temperatures are described in Appendix D. Approximately 3 miles below Folsom Dam, the river enters Lake Natoma. Lake Natoma is relatively small (8,000-AF capacity) but is large enough to allow water temperatures to stratify in spring and summer. Water is released from the bottom of Lake Natoma, but some of the release water is pulled from the upper elevations of the lake so that release temperatures may be slightly warmer than bottom temperatures.

Generally, Folsom Reservoir release temperatures are cool, and water temperature tends to increase as the water flows down the lower American River. Folsom Reservoir release temperatures in fall and early winter, however, may be warmer relative to ambient air temperatures and water temperatures may



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slightly decrease at lower flows as water flows down the river.

Before 1990, water temperature data were collected from three locations in the lower American River: Nimbus Salmon and Steelhead Hatchery (water is drawn from the middle elevations of Lake Natoma), the U.S. Geological Survey (USGS) Fair Oaks gage (1962 to 1978), and Fairbairn WTP (1984 to 1997). Since 1990, however, additional data have been collected by DFG, Beak Consultants, and EBMUD at several additional locations along the river.

Recent temperature measurements from Hazel Avenue indicate that the hatchery temperatures are a good approximation of Lake Natoma release temperatures. For any particular month, the historical hatchery temperatures show a range of 8–13°F (Figure 5-1), with the coolest temperatures representing conditions that might be expected when Folsom Reservoir storage and flow through Lake Natoma are high.

During spring and summer, downstream water temperatures are higher than those near Nimbus Dam and may be more likely to be detrimental to some fish life stages. The longest record of temperatures measured downstream of the Hazel Avenue Bridge has been at Fairbairn WTP (1984–1997). Recent temperature measurements in the river at Fairbairn WTP (by Beak Consultants in 1990–1991) and at H Street (by EBMUD in 1991–1994) indicate that treatment plant temperatures are generally similar to river temperatures, although the plant temperatures are occasionally higher. Figure 5-2 shows the daily average temperatures recorded at the Fairbairn WTP in 1984–1997. The range of monthly temperature variations is approximately 10°F. Peak temperatures, historically reached in August, range from approximately 67°F to 77°F.

Recent downstream temperature measurements made in 1992 and 1993 show that water temperatures may continue to increase from H Street to the mouth of the river at the I-5 bridge (Figures 5-3 and 5-4). Measured temperatures during April 1992 show that downstream warming can increase when flows are low (750 cfs in this case). Temperatures measured on July 8, 1992, when the Folsom power plant intake panels were lifted show a large, brief decrease.

**Nimbus Salmon and Steelhead Hatchery**

Nimbus Salmon and Steelhead Hatchery was completed in 1955 to compensate for salmon and steelhead trout losses caused by construction of Folsom and Nimbus dams. The hatchery produces smolt-size fall-run chinook salmon and yearling steelhead, which are transported and released directly into the Sacramento-San Joaquin River Estuary. Waters released from Nimbus Dam that exceed 56° F have historically caused mortality to chinook salmon eggs taken at the hatchery. Exposure of chinook salmon eggs and salmon and steelhead juveniles to unsuitable temperatures at the hatchery has been reduced in part by delaying the take of eggs and releasing juveniles directly into the Delta (Sacramento Area Flood Control Agency et al. 1994). Reared steelhead also have been transported to hatcheries on the Feather and Mokelumne rivers to avoid mortality during summer and fall.

## *Sacramento-San Joaquin Delta*

The Delta provides important migration, spawning, and nursery habitats for numerous anadromous and resident fish species. Anadromous species use or depend on the Delta for some portion of their life cycle. The Estuary is the primary habitat for several euryhaline species, including the delta smelt. Special-status species that occur in the Delta include winter- and spring-run chinook salmon, steelhead, delta smelt, green sturgeon, and Sacramento splittail.



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Delta environmental conditions depend primarily on the physical structure of Delta channels, volume of freshwater inflow, Delta Cross Channel operations, within Delta diversions (including Delta export pumping, small agricultural diversions, and others), and tidal fluctuations. These conditions determine Delta flow patterns, total Delta outflow to San Francisco Bay, and the location of the entrapment zone, which in turn influence fish distribution and survival through a variety of mechanisms related to water temperature, predation, food production and availability, physical habitat conditions, entrainment in Delta exports and diversions, competition with introduced fish and invertebrates, and pollutant levels.

## Sacramento River

The Sacramento River between Keswick Dam and the Delta supports a diverse assemblage of anadromous and resident fish. Anadromous species include four runs of chinook salmon (fall-, late-fall-, winter-, and spring-run), steelhead, striped bass, American shad, white and green sturgeon, and Pacific lamprey. Chinook salmon and steelhead runs in the upper Sacramento River have declined substantially during the last 30 years. The winter-run chinook salmon, which has had record low run sizes in recent years, is designated an endangered species under the federal and state Endangered Species Acts. Special-status fish species in the Sacramento River are listed in Table 5-2. Resident game and nongame species in the Sacramento River include most of the species common to the lower American River.

Factors affecting fish populations in the Sacramento River include fish passage problems at Red Bluff Diversion Dam; unfavorable water temperatures during incubation, rearing, and emigration phases; altered river hydrology; entrainment losses at water diversions; habitat loss associated with levee and bank stabilization projects; predation; toxic discharges; harvest; and reduced supply of salmon spawning gravel.

## Shasta and Trinity Lakes

Like Folsom Reservoir, both Shasta and Trinity lakes contain both warmwater and coldwater fish species. Important warmwater game species include black bass, sunfish, and catfish. Coldwater species include rainbow trout and kokanee. Annual hatchery plants of subcatchable- and catchable-size rainbow trout sustain a seasonal (primarily winter and spring) trout fishery similar to Folsom Reservoir. Like Folsom Reservoir, water level fluctuations in these reservoirs generally are considered the most significant environmental factor influencing reservoir fish productivity.

Releases from various CVP reservoirs are conducted to maintain Delta flow conditions established for the protection of Delta water quality and estuarine species. If storage at Folsom Reservoir is maintained to enhance habitat conditions in the lower American River, releases from other CVP reservoirs, including Shasta and Trinity lakes, would increase.

## Cosumnes River

The Cosumnes River, a tributary to the Mokelumne River, contains more than 20 fish species, including steelhead and splittail (Michney 1973, San Joaquin Valley Drainage Program 1990). The extent to which splittail use the Cosumnes River is unknown; however, splittail are not likely to move upstream much past the segment of river that is tidally influenced, downstream of the pipeline crossing. Spawning habitat for chinook salmon exists within the 15-mile stretch between Sloughhouse and Latrobe (Westgate 1958), 5 to 10 miles upstream of the pipeline crossing of the Cosumnes River.



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## ENVIRONMENTAL CONSEQUENCES

Potential impacts of the alternatives on fisheries resources in Folsom Reservoir, the lower American River, the Sacramento River, Shasta and Trinity lakes, and the Delta were evaluated. For the lower American River, evaluations focused on fall-run chinook salmon, steelhead, striped bass, American shad, and Sacramento splittail. Delta evaluations were based on the changes in Delta outflow and exports and in the location of X2 (the zone of freshwater and saltwater interface in the estuary where the bottom salinities are 2 ppt) that would potentially affect Delta fish species, including winter-run chinook salmon, spring-run chinook salmon, and delta smelt.

Chinook salmon and steelhead spawn primarily in the upper reaches of the lower American River between Goethe Park and Nimbus Dam. Below Fairbairn WTP, spring and summer water temperatures are less favorable for salmonid rearing than they are upstream. Consequently, most rearing of juvenile salmon and steelhead occurs above Fairbairn WTP.

The lower American River was evaluated in three reaches for the flow analysis (Nimbus Dam to Fairbairn WTP, Fairbairn WTP to the intake alternative, and the intake alternative to the mouth of the American River) and in three reaches for the temperature analysis (Nimbus Dam to Goethe Park, between Goethe Park and Fairbairn WTP, and below Fairbairn WTP to the mouth).

American shad spawn mostly between Fairbairn WTP and Nimbus Dam. Sacramento splittail are assumed to spawn mostly between Arden Bar Park and the mouth of the American River because of the presence of extensive backwater habitat.

To provide a full range of comparisons, two baseline conditions were used in the evaluations. Alternative 1 was used as the baseline for assessing effects of the project alternatives (Alternatives 2 and 3). Cumulative effects were compared to existing conditions.

### Methods and Assumptions

This section describes the methods and assumptions used in the fisheries impact assessment. The methodology discussion includes information on how changes in flows and water temperatures in the lower American River, storage in Folsom Reservoir and other CVP reservoirs, flows in the Sacramento River, and Delta outflow were used to evaluate fisheries impacts.

#### Methods

**Hydrologic Modeling.** PROSIM output was used to assess changes in lower American and Sacramento river flows, storage in Folsom and other CVP reservoirs (Shasta and Trinity lakes), and Delta outflows. For the American River, changes in simulated flows were evaluated for the three reaches of the river mentioned previously. Flows simulated at Keswick Dam were used to evaluate conditions for fish in the Sacramento River. Changes in storage in Folsom Reservoir and Shasta and Trinity lakes were evaluated to determine the effects on coldwater reservoir fish species. Changes in reservoir surface elevation were evaluated to determine effects on warmwater reservoir fish species. Changes in Delta outflow and exports were evaluated to determine effects on Delta fisheries. A detailed discussion of the PROSIM hydrologic modeling output is provided in Chapter 3, "Hydrology, Water Supply, and Power."

**Exceedance Frequency Analysis.** The analysis of impacts on physical habitat associated with the project alternatives was based primarily on an assessment of the frequency with which flow conditions needed to maintain fishery resources were met. A frequency exceedance analysis was performed



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in which fishery impact thresholds (river flow during critical months) were evaluated for each alternative. Differences in the exceedance frequencies between Alternative 1 and Alternatives 2 and 3 and between existing conditions and Alternative 2 and 3 cumulative scenarios are presented in terms of number and percentage of months that a given fishery impact threshold would be exceeded over the 70-year hydrologic simulation period. Hydrologic data used to evaluate impacts on fishery resources included predicted monthly reservoir surface elevations and storage, river flows, and Delta outflows and exports.

**Flow Impacts on Fish Habitat.** Impacts of changes in flow on physical habitat for fisheries resources were assessed for the lower American River, Sacramento River, and the Delta.

Flow-related impact thresholds for physical habitat in the lower American River were the minimum flows stipulated in the Hodge Decision and minimum flows established by the AFRP during below-normal and above-normal water year types (Table 5-3). The AFRP minimum flow objectives for above- and below-normal water-year types were used as a threshold for evaluating flow impacts on anadromous fish in the lower American River because these flows are believed to provide appropriate spawning conditions for fall-run chinook salmon, appropriate juvenile rearing habitat and outmigration flows, temperature control during May and June, and some thermal protection for juvenile steelhead during summer (U.S. Fish and Wildlife Service 1995). Higher minimum flows are recommended for wet water-year types but such water-year types occur relatively infrequently and would not be expected to have substantial additional benefits above those recommended for above- and below-normal water-year types. The lower minimum flows recommended for dry and critically dry years result in reductions in the level of protection offered by above-and below-normal flows and therefore were not considered suitable thresholds for assessing flow-related impacts on fisheries resources.

Hodge Decision flows and AFRP flows for the lower American River were based primarily on the habitat needs of chinook salmon and steelhead. Because PROSIM calculates simulated monthly averages, the flows for October for the impact assessment were set at the more conservative flow of 1,750 cfs.

Little or no information is available to address the flow needs of other species. For splittail, the frequency of flooding of riparian vegetation in the lower American River has been used to evaluate changes in the amount of flooded vegetation potentially available for splittail spawning (U.S. Bureau of Reclamation and Sacramento County Water Agency 1997). This evaluation was based on a positive relationship between Nimbus Dam flow releases above 3,500 cfs and total acres of flooded riparian vegetation between river miles 8 and 9. Therefore, impacts on potential splittail spawning habitat were evaluated in the present analysis based on the frequency that Nimbus Dam flows would be above the 3,500-cfs threshold during the splittail spawning period.

For the Sacramento River, thresholds used were required flows established by the NMFS in its biological opinion for the winter-run chinook salmon (National Marine Fisheries Service 1993). Delta thresholds were based on Delta outflow and export standards established in the SWRCB's Bay-Delta Water Quality Control Plan for anadromous and estuarine fish species (California State Water Resources Control Board 1995). Changes in the location of X2 were used to evaluate potential changes in estuarine habitat (see "Delta Fisheries").

Daily and weekly flow fluctuations can adversely affect fisheries resources in the lower American River. PROSIM is limited to providing monthly flows based on monthly operating criteria and release schedules. Therefore, an assessment of impacts related to



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daily and weekly flow fluctuations (e.g., stranding of chinook salmon and steelhead redds and juveniles) could not be made. The probability of stranding is assumed to be the same for the project alternatives (i.e., daily and weekly ramping rates and flow fluctuations would not differ substantially). Under this assumption, the daily operations of project alternatives would not be expected to have significant impacts on lower American River fisheries resources, compared to baseline conditions.

**Water Temperature Impacts on Fisheries Resources in the Lower American River.** The temperature assessment methodology estimates the monthly risk of temperature increases (i.e., warming risk assessment) in the lower American River of greater than 1°F caused by simulated hydrology changes (Folsom storage and American River flows) for each project alternative.

Temperature changes in the lower American River are assumed to result from changes in release temperatures (caused by changes in Folsom Reservoir storage and associated warming in Lake Natoma) and release flows from Nimbus Dam. The effect of storage on release temperatures from Nimbus Dam was estimated based on regressions developed from historical storage and temperature data. Temperature changes resulting from flow changes in the lower American River were estimated by use of a daily river temperature model.

The storage regressions and the daily temperature model were used to generate monthly warming coefficients resulting from Folsom Reservoir storage changes (Table 5-4) and American River flow changes (Table 5-5). The PROSIM hydrologic simulations of end-of-month Folsom Reservoir storage and average monthly American River flows were then evaluated using these monthly warming coefficients to determine the risk of warming (i.e., temperature change of greater than 1°F) for each project alternative. (Figure 5-5.)

The possible effects of the modified temperature control panels and the proposed temperature control device for the Folsom Dam raw water outlet are not specifically included in the EBMUD temperature assessment because the seasonal operation procedures for these outlets have not yet been established. A more complete description of the likely future temperature control operations for Folsom Reservoir is included in Appendix D.

Changes to Folsom Reservoir release elevations may allow increased flexibility in the timing of coldwater releases. However, changes in release temperatures resulting from such modifications will probably be less than 5°F for any particular month and, because there is a limited supply of cold water, seasonal temperature patterns in the future are expected to be similar to historical patterns. Consequently, temperature increases resulting from storage and flow reductions are likely to remain a concern for particular life stages of fish during some months, even if operations are altered.

**Storage Effects.** Regression equations for the water temperature at Nimbus Dam as a function of Folsom Reservoir storage were developed for each month to evaluate the effect of changes in storage on Nimbus Dam release temperatures (Table 5-4). The regression equations were developed from 37 years of data for end-of-month Folsom Reservoir storage and inflow temperatures at the Nimbus Salmon and Steelhead Hatchery. The relationships were quite strong ($R^2$>0.5) for July–October with about a 1°F increase correlated to a 100,000-AF reduction in storage. Because flow through Lake Natoma is correlated with storage, Lake Natoma flow effects are indirectly included in the regressions. Appendix D describes these monthly correlations between Folsom Reservoir storage and Nimbus Dam temperature in greater detail. Folsom Reservoir storage has



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historically been associated with reduced flows and higher Nimbus Dam temperatures, although future operation of the reservoir to meet flow and temperature objectives may change this historical correlation. Future Folsom Reservoir operations may allow the monthly reservoir release temperatures to be less dependent on storage than the historical Nimbus Dam temperatures. However, the correlation between Folsom Reservoir storage and Nimbus Dam temperature is considered adequate for impact assessment purposes.

The regression equations were used to estimate the changes in temperature that would result from the changes in storage simulated by PROSIM. For example, for July 1979, PROSIM predicts a 17,000-AF storage reduction under Alternative 2, compared to Alternative 1. For July, the regression slope is -0.01087°F per thousand acre-feet (Table 5-4). Consequently, temperature increase of 0.18°F would be expected at Nimbus Dam in July.

**Flow Effects.** A daily water temperature model of the lower American River (from Nimbus Dam to the confluence with the Sacramento River) was used to evaluate maximum potential impacts of water temperature based on expected flow changes. A detailed discussion of the temperature model is provided in Appendix D. The model was used to simulate a 10-year period of water temperatures (1986–1995) under Hodge Decision flows and Hodge Decision flows plus 500 cfs (Table 5-5) using data on historical daily Nimbus Dam release temperatures and meteorology. Use of this data allows the fluctuations associated with Nimbus Dam release temperatures and meteorology to be incorporated in the warming risk assessment.

The temperature model results were used to estimate the maximum daily change in temperature caused by the simulated 500-cfs flow change at Goethe Park, Fairbairn WTP, and the river mouth (Table 5-5). These maximum daily temperature changes for each month were used as interpolation coefficients to estimate the change in temperature resulting from the monthly flow changes simulated by PROSIM. Generally, the maximum daily change in temperature occurs on many days each month. The maximum daily change is often 50% greater than the average temperature change for each month.

Hodge Decision flows were chosen as the lower flow level for the simulations because EBMUD is not permitted to take delivery of water at the FSC when diversions would reduce Nimbus Dam releases to below Hodge Decision flows. Therefore, temperatures under Hodge Decision flows represent the highest temperatures that would occur when EBMUD is taking delivery of water under Alternative 2.

Hodge Decision flows are not applicable for diversions downstream of the FSC and do not control EBMUD deliveries at the mouth of the American River under Alternative 3.

PROSIM results may indicate changes in American River flows under Alternatives 2 and 3. The monthly change in temperature associated with these simulated changes in river flow are calculated for each alternative using the monthly maximum temperature change coefficients estimated from the 10-year daily river temperature model results (Table 5-5).

July 1979 can be used as an example of how the daily temperature model results were used to estimate the potential warming in the lower American River. PROSIM predicts that the July 1979 flow would be 3,400 cfs under Alternative 1 and 3,088 cfs under Alternative 2, a reduction of 312 cfs. Interpolation of results from the daily temperature model indicates that the 312-cfs flow reduction would produce temperature increases of 0.44°F at Goethe Park, 0.81°F at Fairbairn WTP, and 1.12°F at the mouth of the American River in July 1979. When the 0.18°F warming at Nimbus Dam attributable to storage changes at Folsom Reservoir is included, the potential warming

increases to 0.62°F at Goethe Park, 0.99°F at Fairbairn WTP, and 1.30°F at the mouth. PROSIM results predict that the July 1979 flow under Alternative 3 would increase by 132 cfs to 3,532 cfs. Use of the simulated maximum daily temperature difference coefficients indicates estimated temperature reductions of 0.18°F, 0.34°F, and 0.47°F, respectively, for the three river locations.

**Effect of Temperature Changes on Fisheries.** The fish species included in this evaluation were fall-run chinook salmon, steelhead, American shad, and splittail. Temperature criteria for these fish are presented in Table 5-6, and the basis for selecting these criteria is discussed in Appendix E. Because the potential occurrence of winter-run chinook juveniles in the lower American River (December–April) overlaps with the principal rearing and emigration periods for fall-run chinook salmon in the lower American River (January–June), the results of the water temperature assessment for fall-run chinook salmon rearing and emigration life stages can be used to evaluate potential impacts on winter-run chinook salmon.

The first step in evaluating potential temperature impacts on fish is to determine if temperatures are likely to exceed the temperature criteria defined for each evaluation species and life stage within the primary reaches and months in which those species and life stages occur. Table 5-6 compares the temperature threshold for each fish life stage to the simulated temperatures expected under Hodge Decision flows (i.e., the highest temperatures permitted when EBMUD is making water deliveries through the FSC). Those reaches and months in which the highest monthly average temperature exceeded the temperature criteria for one or more of the evaluation species and life stages were identified as having the potential for temperature impacts.

For each reach and month in which the potential for temperature impacts existed, an incremental warming of 1°F was used to evaluate temperature impacts because a change of less than this magnitude cannot be differentiated from other sources of natural variability. When an increase of 1°F or greater was estimated to occur 10% or more of the time at one of the three reaches (Goethe Park, Fairbairn WTP, or the mouth of the American River), an alternative was considered to have significant impacts on the species and life stage of concern. Because temperature increases are larger farther downstream, the farthest downstream location for each life stage was used for the impact evaluation.

**Reservoir Fisheries.** Impacts were evaluated for warmwater and coldwater fisheries at Folsom Reservoir and Shasta and Trinity lakes. The spawning process for warmwater reservoir fish species (nest building to swim-up of larvae) lasts for approximately 2 weeks, primarily between April and July, for black bass and other warmwater reservoir species. Reservoir drawdowns of 2 feet or more per month generally have been correlated with a 50% reduction in spawning success of black bass in California reservoirs (Lee pers. comm.). Largemouth and smallmouth bass have been reported to spawn at depths ranging from 1 to 9 feet (Lee pers. comm.), and other warmwater game species such as catfish and sunfish are also shallow water spawners. Thus, a 2-foot or greater decrease in reservoir surface elevation during the spawning period could result in significant impacts on spawning success of these species.

Because largemouth and smallmouth bass spawn at depths ranging from 1 to 9 feet, deeper water will result in coldwater intrusion to the nest (nest flooding), thus decreasing hatching success. The spawning period for warmwater reservoir fish species lasts approximately 2 weeks, during which nests could be exposed to cold water with increases in depth over 10 feet. Therefore, to assess the impacts of nest flooding



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on a monthly basis, an increase of 20 feet (10 feet per 2-week period) was used, with the assumption that the elevation increases steadily throughout the month (Sacramento Area Flood Control Agency et al. 1994).

Reduced reservoir levels resulting from drawdown and associated depletion of cold water in the reservoirs could reduce the available habitat for stocked rainbow trout and kokanee salmon in Folsom Reservoir, as well as the coldwater species in Shasta and Trinity lakes. When reservoir storage is high, minor reductions in storage levels will not significantly affect fish habitat. However, if storage is substantially reduced, or if beginning storage is low and is then reduced, coldwater fish habitat could be significantly reduced. Potential impacts on coldwater fisheries were evaluated by determining the frequency of modeled reductions when reservoir storage is greater than half the maximum monthly storage over the 70-year period and is reduced by at least 10%, compared to Alternative 1, or when reservoir storage is less than half the maximum monthly storage capacity and is reduced by at least 5%, compared to Alternative 1.

**Delta Fisheries.** Reduction of freshwater flow in the American River could potentially lead to either further releases from storage reservoirs or direct reductions in Delta outflow or Delta exports. Reductions in exports and storage could lead to indirect reductions in Delta outflow. Delta outflow can affect anadromous fish species as well as estuarine-dependent species; however, the limits set for Delta exports were established primarily to protect winter-run chinook salmon. Delta exports are determined based on the amount of Delta inflow. Impacts on Delta fisheries resources were evaluated by assessing the overall reduction in monthly Delta outflow, compared to Alternative 1, and the increase in the number of months not meeting the required export limits, compared to Alternative 1.

Reductions in Delta outflow would affect the location of X2, the salt front or upstream extent of the freshwater–saltwater interface in the Estuary. The X2 location is the commonly used criterion for position of the salt front. X2 is measured or predicted as the distance (in kilometers from the Golden Gate Bridge) of the 2 ppt near-bottom isohaline (isohaline is a line connecting all points of equal salinity). Changes in outflow to the estuary will be reflected in shifts either upstream or downstream in the location of X2. The location of X2 is important because it represents the entrapment zone where food and nutrients are concentrated. The Estuary is believed to be more productive when X2 is within Suisun Bay and less productive when X2 shifts upstream into the Delta.

Various models are available to predict the position of X2 as a function of outflow. Such models are generally crude, predicting only average monthly location per average monthly outflow. Other models can more precisely predict daily or hourly location of X2 given outflow history, tidal conditions, wind, and other factors. Location of X2 at Chipps Island in Suisun Bay on average takes approximately 12,000 cfs of outflow. Location of X2 at Collinsville at the upstream end of Suisun Bay takes approximately 8,000 cfs of flow. In this area of the Estuary, a change in flow of 1,000 cfs is generally considered to result in a shift in the location of X2 of approximately 1 kilometer (0.7 mile).

**Assumptions**

The fisheries impact evaluation was based on the following assumptions:

- PROSIM reasonably simulates river and Delta flows and reservoir storage effects under existing conditions and alternatives;
- the daily water temperature model developed for this EIR/EIS accurately



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simulates water temperatures as a function of flow and meteorological conditions;

- incremental temperature changes in the lower American River associated with each alternative will not change under future changes in the operations of other facilities (e.g., Folsom Reservoir temperature control device);
- the maximum amount of shallow water habitat occurs at a surface elevation of 410 feet in Folsom Reservoir, 1,017 feet in Lake Shasta, and 2,295 feet in Trinity Lake;
- the general criteria for evaluating fisheries impacts on warmwater species (i.e., a 2-foot per month decrease or a 20-foot per month increase in reservoir elevation) are applicable to Folsom Reservoir and Shasta and Trinity lakes;
- the carryover storage criterion of 1.9 million AF for water temperature control in the upper Sacramento River will always be met (specified by NMFS in its 1993 biological opinion for winter-run chinook salmon); and
- no change would occur in the frequency that flows would meet the October–March minimum release criterion of 3,250 cfs at Keswick Dam (specified by NMFS in its 1993 biological opinion for winter-run chinook salmon).

## Significance Criteria

For fisheries resources, a 10% or greater change in the frequency of a particular impact relative to baseline conditions was used to identify a potentially significant impact. Any changes less than 10% were not considered further and were assumed to have no effect or a less-than-significant effect. This 10% change was used as a threshold criterion for impact significance because:

- the natural variation in hydrologic conditions is substantially larger than hydrologic changes associated with the alternatives;
- a 10% change was considered a reasonable threshold for identifying the potential for population-level effects (e.g., changes in numbers of fish);
- an environmental change that occurs 10% of the time or more was considered large enough to substantiate a conclusion that an adverse or beneficial effect is significant, given the quantity and quality of available fisheries data and the precision and accuracy of available impact assessment tools; and
- environmental impact assessments typically establish quantitative "significance" thresholds in the 10% range.

Additionally, the hydrologic analysis indicated that there are several instances when environmental conditions associated with reservoir storage and river flows would improve under the alternatives, compared to baseline conditions. The application of the 10% significance criterion provides a balanced evaluation of the environmental effects by taking into consideration the frequency of both adverse and beneficial changes.

The evaluation of significance for potential impacts was based on professional judgment and on all available information for the species under consideration. Changes in the magnitude of the predicted changes were also considered in the evaluation.

In general, impacts on anadromous fish in the lower American River were considered significant if:

- the frequency of simulated mean monthly flows equal to or greater than Hodge

Decision or AFRP flows was reduced by 10% or more;

- a temperature increase of at least 1°F would occur at least 10% of the time in months when baseline temperatures are likely to exceed acceptable levels for the evaluation species and life stages;
- flow reductions would result in substantial reductions in populations of sport, commercial, and special-status fish species due to entrainment, handling, or predation losses at the intake facility (Alternative 3); and
- construction activities would result in substantial delays in migration, avoidance by fish of important habitat, or direct or indirect mortality caused by toxic spills or prolonged increases in turbidity and sedimentation.

Impacts on fisheries resources in other geographic areas were considered significant if the following would be likely to occur:

- a substantial decrease in the frequency of flooding of vegetated habitat during the spawning and rearing periods of warmwater reservoir species;
- a substantial increase in the number of months that nest flooding or dewatering thresholds would be exceeded during the primary spawning period of warmwater reservoir species;
- a substantial reduction in the availability and amount of coldwater habitat available to coldwater reservoir species (impacts were considered significant if simulated monthly reservoir elevations decreased by at least 5% or 10% [depending on baseline storage] at least 10% of the time relative to baseline conditions);
- substantial reductions in the frequency of Delta outflows and exports that meet or exceed Delta outflow and export standards (California State Resources Control Board 1995) and/or substantial changes in the location of X2;
- substantial reductions in habitat in the upper Sacramento River as a result of reductions in the frequency of flows that meet or exceed minimum flow requirements established for winter-run chinook salmon; and
- substantial reductions in habitat in the lower Sacramento River as a result of reductions in the frequency and magnitude of flows.

## Impacts Found to Be Less Than Significant

Changes to conditions under Alternative 1 were compared to existing conditions; changes under Alternatives 2 and 3 were compared to no action.

**Alternative 1: No Action**

In the reach between Nimbus Dam and the Fairbairn WTP, flows in the lower American River that meet Hodge Decision flows would increase in frequency by 38% from November to February and decrease in frequency by 1–4% from March to October compared to existing conditions. Compared to AFRP flows, the frequency of flows would increase by 37% from October to February and decrease by 4–17% from March to September. In the reach between the Fairbairn WTP and the mouth, flows that meet Hodge Decision flows would increase in frequency by 34% from November to February and decrease by 5–9% from March to October. Compared to AFRP flow s, the frequency of flows would increase by 37% from October to February; decrease by 4% from March to June, 37% in July, and 44% in August; and increase by 20% in September.

Folsom Reservoir storage under Alternative 1 tends to be lower than storage under existing conditions in January–May and higher in July–November. Consequently, Folsom Reservoir release temperatures under Alternative 1 will tend to be warmer than release temperatures under existing conditions in winter and spring and cooler in summer and fall. Storage differences are of most interest during summer and early fall when they have the greatest impact on water temperatures. The largest difference occurs in September when average storage under Alternative 1 is 89,000 AF greater than storage under existing conditions. (This storage difference corresponds to a potential 1°F decrease at Nimbus Dam during September under Alternative 1.)

Reduced storage under Alternative 1 during winter and spring corresponds to an increase in flow at Nimbus in October–March. The increase in summer and fall storage under Alternative 1 would occur because release flows are greatly reduced in April–September. Flow differences are of most interest during summer when the differences have the greatest impact on water temperatures. The largest flow difference occurs in August when average flows under Alternative 1 at Nimbus Dam are 866 cfs less than flows under existing conditions. (This flow difference corresponds to a potential 2°F increase at Fairbairn WTP during August under Alternative 1.)

**Alternative 2: Folsom South Canal Connection**

***Impact: Impacts on Warmwater Fish Habitat in Folsom Reservoir.*** Under Alternative 2, the availability of vegetated rearing habitat during the spawning and rearing periods of warmwater game fish, defined by the number of months the reservoir surface elevation is above 410 feet, would decrease by as much as 2%, compared to Alternative 1. The frequency that reservoir drawdowns greater than 2 feet per month (≥2-foot reductions could result in nest dewatering) would occur during the primary spawning months for warmwater game fish (April–July) would be increased by 10 months (<2%) during the 70-year simulation period, compared to Alternative 1. The frequency that reservoir surface elevation increases of greater than 20 feet (≥20-foot increases could result in nest flooding) per month would occur during the primary spawning month for warmwater game fish (April–July) would increase by 1 month (less than 1%) during the 70-year simulation period (Table 5-7). The impact on warmwater fish spawning and rearing habitat is less than significant because of the small changes in the frequency of occurrence that reservoir surface elevations would be above or below thresholds. No mitigation is required.

***Impact: Loss of Coldwater Reservoir Fish Habitat in Folsom Reservoir.*** The effects of Alternative 2 on coldwater fish habitat during the period of reservoir stratification would be minimal; a 5–10% reduction in storage would occur 4% of the time (Table 5-8). The impact on coldwater fish habitat is less than significant. No mitigation is required.

***Impact: Reduced Fish Habitat in the Lower American River as a Result of Reduced Flows.*** Under Alternative 2, the frequency that flows in the lower American River between Nimbus Dam and Fairbairn WTP would meet or exceed Hodge Decision flows would remain the same from November to February, would decrease by 1% from March to June, and would decrease by 6% from July to October. The frequency that lower American River flows would meet or exceed AFRP flows would increase by 1% from October to February, decrease by 1% from March to June, and remain the same as under Alternative 1 for the remaining months. (Table 5-9.)

The frequency that lower American River flows between Fairbairn WTP and the lower American River intake structure would meet or exceed Hodge Decision flows would decrease



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by 1% from November to June and increase by 1% from July to October. The frequency that lower American River flows would meet or exceed AFRP flows would decrease by 1% from October to June and by 2% in August and would remain the same as under Alternative 1 in July and September (Table 5-10.)

The frequency that lower American River flows between the lower American River intake structure and the mouth of the river would meet or exceed Hodge Decision flows would decrease by 1% from November to June and increase by 1% from July to October. The frequency that lower American River flows would meet or exceed AFRP flows between the I-5 structure and the mouth would decrease by 1% from October to June and by 2% in August and would remain the same as under Alternative 1 in July and September (Table 5-11).

The frequency that flows under Alternative 2 would meet Hodge Decision flows and AFRP target recommendation flows during the critical months for all life stages of chinook salmon (Tables 5-12 to 5-14), winter-run chinook salmon (Tables 5-15 to 5-17), steelhead (Tables 5-18 to 5-20), striped bass (Tables 5-21 to 5-23), American shad (Table 5-24 to 5-26), and Sacramento splittail (Tables 5-27 and 5-29) in the lower American River would not change substantially compared to Alternative 1. No substantial change would occur in the availability of potential spawning habitat for splittail in February–April. As described in Chapter 3, the frequency and magnitude of flows in the lower American River would not be substantially different for Alternatives 1 and 2. The impact on fisheries in the lower American River is less than significant because the frequency that Hodge Decision flows and AFRP flows would be met during the prescribed months and the frequency that these flows would be met during critical life stages for the species evaluated would not change substantially from conditions under Alternative 1. This impact is less than significant. No mitigation is required.

***Impact: Reduction in Suitable Habitat as a Result of Increased Water Temperature in the Lower American River.*** Storage and flow reductions under this alternative are relatively small. As a result, no temperature increases of 1°F or more are expected at either Nimbus Dam or Goethe Park. The largest temperature increases are expected to occur at the mouth of the river in June. Even during June, the warming is relatively small; only 7% of the months during the years of analysis have potential temperature increases of 1°F or more (Table 5-30). The impact on suitable habitat for fish in the lower American River as a result of changes in water temperatures is less than significant. No mitigation is required.

***Impact: Potential Changes in Delta Habitat.*** Minimal to no changes in Delta outflow, exports, or location of X2 under Alternative 2 would occur (Tables 5-31 and 5-32). For a detailed discussion of Delta hydrology and the changes as a result of the project, refer to Chapter 3. The impact on anadromous fish (e.g., winter-run chinook salmon) or on estuarine-dependent species, including delta smelt, is less than significant. No mitigation is required.

***Impact: Potential Reduction in Reservoir Habitat in Shasta and Trinity Lakes.*** Under Alternative 2, reservoir storage would be similar to storage under Alternative 1 and warmwater and coldwater fish habitat in Shasta and Trinity lakes is not expected to be affected (Tables 5-8, 5-33, 5-34). This impact is less than significant. No mitigation is required.

***Impact: Potential Reduction in Habitat in the Upper Sacramento River as a Result of Reduced Flows.*** Flows in the upper Sacramento River would be similar to conditions under Alternative 1. This impact is less than significant. No mitigation is required.

***Impact: Potential Reduction in Habitat in the Lower Sacramento River.*** Changes in lower Sacramento River flows under



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Alternative 2 could potentially affect fish that use the portion of the Sacramento River below the mouth of the American River during some portion of their life cycle. Diversions up to 350 cfs from the American River would reduce flows at Freeport up to 350 cfs under a worst-case scenario. In some cases, some or all of the diverted water would be made up by additional releases from Lake Shasta, Lake Oroville, or Folsom Reservoir, while in other cases, the total effect would occur below the mouth of the American River. In drier years flows at Freeport fall to 6,000–10,000 cfs over much of the year, and reductions of 350 cfs from additional American River diversions would represent a reduction of flow of about 3% to 5%.

Such reductions in flow are small in terms of net outflow and even smaller in terms of tidal flows in the lower Sacramento River. Fish species that depend on river flow for habitat or transport in this reach include all races of Sacramento River salmon and steelhead, striped bass, delta smelt, splittail, American shad, white and green sturgeon, and some resident fish species. Effects of small changes in outflow in this reach are difficult to estimate, but are likely manifested in very small changes in juvenile survival during migration downstream to the Estuary. The frequency of such an occurrence would be low given that Alternative 2 rarely diverts water in dry years because of limitations of the Hodge Decision flows in the American River. More commonly the diversion would be 0.5% to 2%. This impact is less than significant. No mitigation is required.

***Impact: Disturbance of Habitat in the Cosumnes River.*** Minimal impacts on fisheries resources are expected as a result of trenching across the Cosumnes River. Construction will occur during summer when flows are low and salmon and splittail are not in the Cosumnes River. Any steelhead rearing in the Cosumnes River would be expected to be well upstream of the proposed construction site. Construction is anticipated to last a short time, thus minimizing impacts on fisheries resources. Minimal vegetation removal and appropriate sediment control measures are incorporated into the project construction plans. This impact is less than significant. No mitigation is required.

***Impact: Deliveries to Meet EBMUD's Planned Outage Needs.*** Under this alternative, EBMUD would meet its planned outage needs by taking delivery of up to 350 cfs of water from the FSC. This planned outage would be scheduled to occur in a wet year when flows in the lower American River exceed Hodge Decision flows. EBMUD needs under the planned outage scenario would require the ability to take delivery of up to 350 cfs of water for a 6-month period during a wet year. Deliveries under the planned outage scenario are similar in magnitude to the deliveries modeled in several years under Alternative 2. Because it is not possible to determine when such a planned outage might occur, detailed modeling and analysis is not practical. However, this operation would be similar in scope and magnitude to operations included in the detailed impact analysis, and this operation would occur only during a wet year and over a 6-month period. Based on the finding that no significant impacts would result from typical project operations, any impacts resulting from planned outage operations are also less than significant. No mitigation is required.

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**Alternative 3: Joint Water Supply**

***Impact: Short-Term Loss of Fish Habitat near the Lower American River Intake Structure.*** Construction of the lower American River intake structure could result in increased turbidity, generation of noise, and potential discharge of hazardous materials into the lower American River. Increased turbidity and noise could occur as a result of installation and removal of sheet piles and other construction activities. The potential for discharge of hazardous materials would exist during the entire construction period.



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Monitoring will be performed to ensure that turbidity levels stay within Central Valley Regional Water Quality Control Board (CVRWQCB) water quality objectives. Implementation of Best Management Practices pursuant to NPDES permit restrictions described in Chapter 4, "Water Quality," will minimize the potential for discharges of hazardous materials during construction. Noise impacts would be short term and would occur primarily as a result of installation and removal of sheet piles. This impact is less than significant because turbidity is expected to remain within the CVRWQCB objectives, best management practices will be implemented, and generation of noise would occur over a short period. No mitigation is required.

***Impact: Loss of Fish in the Fish Exclusion Facility.*** The intake structure would be located in the lower portion of the lower American River upstream of the confluence with the Sacramento River. As described in Chapter 2, the intake system would conform to DFG and NMFS requirements.

Regardless of specific construction design, fish could be entrained at the structure because of the proposed rates of water intake. Possible flow reductions associated with Alternative 3 (including both the expansion of the Fairbairn WTP intake and the new I-5 intake) in fall would range from 7% to 11% in drier years and from 1% to 7% in wetter years. Winter flow reductions could range from 4% to 15% in drier years and from near 0% to 3% in wetter years. Spring and summer reductions would be similar and could range from 8% to 30% in drier years and from 1% to 6% in wetter years.

The proposed screen design would provide protection to all life stages but eggs and larval fish. Juvenile fish of all species at risk, including salmon and steelhead, should be protected from entrainment by the small-size mesh size and low approach velocity at the fish exclusion facility.

Eggs and larvae of splittail, American shad, and possibly delta smelt may be present at the intakes and could be entrained. Only eggs and larvae of American shad could be present and entrained in large numbers. Because the lower American River is not a primary spawning area for splittail and delta smelt, the loss of eggs and larvae would be low compared to the overall population abundance of these species. The loss of American shad eggs and larvae could be relatively high in proportion to the river's population in late spring and early summer if the proportion of flow reduction is relatively high, as could occur in drier years.

Although a relatively high number of American shad eggs and larvae could be entrained, American shad are exposed to many similar and much larger intake structures throughout the Sacramento River system; populations of American shad have remained stable over years and have shown increases (Interagency Ecological Program for the Sacramento-San Joaquin Estuary 10(2):42). This impact is less than significant. No mitigation is required.

***Impact: Loss of Warmwater Reservoir Fish Habitat in Folsom Reservoir.*** The effects of Alternative 3 on warmwater reservoir fish species would be essentially the same as described for Alternative 2 (Table 5-7). Changes in the frequency that reservoir surface elevations would be above or below thresholds would be very small. This impact is less than significant. No mitigation is required.

***Impact: Loss of Coldwater Reservoir Fish Habitat in Folsom Reservoir.*** The effects of Alternative 3 on coldwater reservoir fish during reservoir stratification is minimal. A 5% to 10% reduction in storage would occur 3% of the time (Table 5-8). This impact is less than significant. No mitigation is required.

***Impact: Reduced Habitat in the Lower American River as a Result of Reduced Flows.*** The effects of flows on fish habitat under



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Alternative 3 are similar to effects under Alternative 2 (Tables 5-9 through 5-11). Minor changes in the frequency of Hodge Decision and AFRP flows from Nimbus Dam to the mouth of the river would occur under Alternative 3.

The frequency that flows under Alternative 3 would meet Hodge Decision flows and AFRP target recommendation flows during the critical months for all life stages of chinook salmon, steelhead, striped bass and American shad in the lower American River would not change substantially compared to Alternative 1 (Tables 5-12 through 5-26). Flow requirements of 3,500 cfs from February to April for splittail are generally met (Tables 5-27 to 5-29).

Reductions in flow below the intake alternatives are not expected to substantially affect fisheries resources in the segment of river between the intake alternatives and the mouth of the American River because this section of the river is largely controlled by Sacramento River water surface elevations and tides. Additionally, the flow changes would not impair passage of upstream migrating fish to spawning areas or the attraction of adult fish into the lower American River to spawning areas, and habitat for resident fish would not be substantially altered. This impact is less than significant. No mitigation is required.

***Impact: Reduction in Suitable Habitat as a Result of Increased Water Temperature in the Lower American River.*** Changes in water temperatures under Alternative 3 are less than under Alternative 2. Temperature increases of 1°F or more would occur no more than 3% of each month (Table 5-30). This impact is less than significant. No mitigation is required.

***Impact: Potential Reduction in Delta Habitat.*** Changes in Delta outflows, exports, and location of X2 under Alternative 3 would be similar to changes under Alternative 2 (Tables 5-31 and 5-32). Impacts on anadromous fish (e.g., winter-run chinook salmon) or estuarine species, including delta smelt, under Alternative 3 would be less than significant. No mitigation is required.

***Impact: Potential Reduction in Reservoir Habitat in Shasta and Trinity Lakes.*** Under Alternative 3, reservoir storage would be similar to storage under Alternative 1 (Tables 5-33 and 5-34). This impact is less than significant. No mitigation is required.

***Impact: Potential Reduction in Habitat in the Upper Sacramento River as a Result of Reduced Flows.*** Under Alternative 3, flows in the upper Sacramento River would be similar to flows under Alternative 1 (Table 5-8). This impact is less than significant. No mitigation is required.

***Potential Reduction in Habitat in the Lower Sacramento River as a Result of Reduced Flows.*** Changes in Sacramento River flows under Alternative 3 could potentially affect fish species that use the affected portion of the Sacramento River during some part of their life cycle. Year-round reductions of 200 cfs at the mouth of the American River would have varying degrees of effect on lower Sacramento River flow, ranging from a high of a 5% in driest years to less than 1% in wetter years. A reduction of 200-cfs under the lowest river flows (about 4,000 cfs) could slightly reduce survival of adult and juvenile anadromous fish passing through the reach or resident fish living in the reach. This impact is less than significant. No mitigation is required.

***Impact: Deliveries to Meet EBMUD's Planned Outage Needs.*** Similar to Alternative 2, EBMUD would meet its planned outage needs by taking delivery of up to 350 cfs of water from the lower American River. Planned outage needs would be met by taking delivery of 155 cfs of water from the new intake location near I-5, as well as making use of the expanded capacity at Fairbairn WTP to provide water to EBMUD. During the time that EBMUD was using Fairbairn WTP intake capacity, the City would shift to taking



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deliveries from the Sacramento River WTP and other sources of water. As with Alternative 2, the planned outage would be scheduled to occur in a wet year when flows in the lower American River exceed the flows dictated by the Hodge Decision. EBMUD needs under the planned outage scenario would require the ability to take delivery of up to 350 cfs of water for a 6-month period during a wet year. Deliveries under the planned outage scenario are similar in magnitude to deliveries modeled in several years under Alternative 3. Because it is not possible to determine a planned outage might occur, detailed modeling and analysis are not practical. However, this operation would be similar in scope and magnitude to operations addressed in the detailed impact analysis, and this operation would occur only during a wet year and over a 6-month period. Based on the finding that no significant impacts would result from typical project operations, any impacts resulting from planned outage operations are also less than significant. No mitigation is required.

## Cumulative Impacts

Conditions under the Alternative 2 and 3 cumulative scenarios were compared to existing conditions.

***Impact: Impacts on Warmwater Reservoir Fish Habitat in Folsom Reservoir.*** Reservoir surface elevations under the Alternative 2 and 3 cumulative scenarios during the spawning and incubation period would be higher compared to existing conditions. Surface elevations during the juvenile/adult rearing period would be slightly lower under the Alternative 2 cumulative scenario and slightly higher under the Alternative 3 cumulative scenario. The frequency that the reservoir elevation would decrease by less than 2 feet per month would decrease slightly under both cumulative scenarios. The frequency that the reservoir elevation would increase 20 feet per month would increase under the Alternative 2 cumulative scenario and would not change under the Alternative 3 cumulative scenario. (Table 5-7.) The change would be expected to improve habitat conditions for warmwater game species by increasing the availability of shallow water habitat during the spawning and incubation periods. Juvenile and adult rearing habitat would be similar to existing conditions. The impact is less than significant. No mitigation is required.

***Impact: Reduction in Coldwater Reservoir Fish Habitat in Folsom Reservoir.*** Average monthly storage under the cumulative scenarios would decrease by 15–19% from April to October in years when storage would already be low (Table 5-8). Therefore, significant and unavoidable cumulative impacts on coldwater reservoir species would occur during these months. No mitigation is available.

***Impact: Reduced Fish Habitat in the American River as a Result of Reduced Flows.*** Under the Alternative 2 and 3 cumulative scenarios, the frequency that lower American River flows between Nimbus Dam and the Fairbairn WTP would meet or exceed Hodge Decision flows would decrease by 3–7% from March to October and increase substantially by 36% from November to February. The frequency that lower American River flows would meet or exceed AFRP flows would decrease by 7–23% from March to September and increase up to 35% from October to February (Table 5-9).

Under the Alternative 2 cumulative scenario, the frequency that lower American River flows between Fairbairn WTP and I-5 would meet or exceed Hodge Decision flows would increase by 25% from November to February and decrease by 12% from March to June and 23% from July to October. Under the Alternative 3 cumulative scenario, this frequency would increase by 28% from November to February and decrease by 10% from March to June and 15% from July to October (Table 5-10).



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Under the Alternative 2 cumulative scenario, the frequency that flows in the lower American River between Fairbairn WTP and I-5 would meet or exceed AFRP flows would increase by 20% from October to February; decrease by 12% from March to June, 55% in July, and 64% in August; and increase by 6% in September. Under Alternative 3, this frequency would increase by 12–24% from September to February and decrease 10% from March to June, 47% in July, and 51% in August. (Table 5-11.)

Under the Alternative 2 cumulative scenario, the frequency that lower American River flows between the lower American River intake structure and the mouth of the American River would meet or exceed Hodge Decision flows would increase by 25% from November to February and decrease by 12% from March to June and 23% from July to October. Under the Alternative 3 cumulative scenario, this frequency would increase by 26% from November to February and decrease by 12% from March to June and 29% from July to October. (Table 5-11.)

Under the Alternative 2 cumulative scenario, the frequency that flows in the lower American River between the lower American River intake structure and the mouth of the river would meet or exceed AFRP flows would increase 6–20% from September to February and decrease 12% from March to June, 55% in July, and 64% in August. Under the Alternative 3 cumulative scenario, this frequency would increase 8–20% from September to February and decrease 12% from March to June, 56% in July, and 60% in August. (Table 5-11.) These reductions represent significant cumulative impacts on lower American River fisheries resources.

Under both cumulative scenarios, the percentage of time that Hodge Decision flows and AFRP flows were met between Nimbus Dam and the Fairbairn WTP would improve substantially during the critical months for all life stages of chinook salmon and for all life stages except emigration for steelhead in the lower American River, compared to existing conditions (Tables 5-12, 5-15, and 5-18).

Under the Alternative 2 cumulative scenario, the frequency that flows in reaches from the Fairbairn WTP to I-5 and I-5 to the mouth of the American River would meet or exceed Hodge Decision and AFRP flows would increase by 2% and 14%, respectively, during the chinook salmon upstream migration period (Tables 5-13 and 5-14). Under the Alternative 3 cumulative scenario, these frequencies would increase by 15% and 2% from the Fairbairn WTP to I-5 and 6% and 15% from I-5 to the mouth of the American River (Tables 5-13 and 5-14).

Under the Alternative 2 cumulative scenario, the frequency that flows would meet or exceed Hodge Decision flows during steelhead adult migration would decrease by 6% between the Fairbairn WTP and the mouth of the American River. Under the Alternative 3 cumulative scenario, this frequency would increase by 8%, compared to existing conditions (Tables 5-19 and 5-20). Effects on flow under the cumulative scenarios would be be less than significant for chinook salmon and steelhead upstream migration.

The frequency that the flows meet or exceed Hodge Decision or AFRP flows during rearing and emigration for chinook salmon under the cumulative scenarios would decrease by 1–4% between the Fairbairn WTP and the mouth of the American River (Tables 5-13 and 5-14). During the juvenile steelhead emigration period, the frequency of Hodge Decision and AFRP flows would decrease 10–12% from Fairbairn to I-5 and I-5 to the mouth of the American River. Under the Alternative 2 cumulative scenario, effects of flows on juvenile steelhead during emigration downstream of the Fairbairn WTP would be significant and the effects on chinook salmon emigration would be less than significant.

Under both cumulative scenarios, the frequency of months that striped bass could be affected by reduced flows throughout the lower American River would increase during the April–October rearing period, compared to existing conditions (Tables 5-21 to 5-23). The average reduction in flow would exceed 10% (-14% to -23%) during months in which striped bass are present below Fairbairn WTP, but the significance of this change cannot be determined because of the lack of information on the flow requirements of juvenile striped bass.

Under both cumulative scenarios, the frequency of months that American shad could be affected by reduced flows in the lower American River would increase from April to July, compared to existing conditions. Reductions in the frequency of Hodge Decision flows would be 5%–7% in the upper reach (above Nimbus Dam) and 16–18% below Fairbairn WTP. The reductions in the frequency of AFRP flows under both scenarios, compared to existing conditions, range from 12% to 25%, and would result in significant impacts on American shad spawning and migration. (Tables 5-24 to 5-26.) Mitigation to address these impacts is described below.

***Impact: Reduction in Suitable Habitat as a Result of Increased Water Temperature in the Lower American River.*** Significant temperature impacts on juvenile steelhead and chinook salmon in the American River are expected under both cumulative scenarios. All life stages that are subjected to temperatures of concern from March to September (Table 5-6) are expected to be significantly affected by temperature increases (Table 5-30). These life stages include steelhead spawning and incubation, steelhead rearing, steelhead smolting and emigration, and chinook rearing and emigration. From July to October, a significant number of months are expected to produce a cooling of 1°F or more of the water released from Nimbus Dam, although during July, the benefits of this cooling are canceled by the number of months with expected warming at Nimbus Dam. This cooling could provide significant benefits to the fish using the area just below Nimbus Dam during August and September (for rearing steelhead) and for fish throughout the river during October (during steelhead rearing and chinook spawning and incubation). However, because of the greater percentages of temperature increases compared to temperature decreases (temperature increases are expected more of the time and at more locations than temperature decreases), net impacts under both cumulative scenarios are significant. Mitigation to address these impacts is described below.

***Impact: Reduction in Reservoir Fish Habitat in Shasta and Trinity Lakes.*** Effects under both cumulative scenarios would result in minimal changes in reservoir surface elevation in Lake Shasta, compared to existing conditions (Table 5-33). No significant cumulative impacts on warmwater fish species in Lake Shasta would occur, and no mitigation is required. However, at Trinity Lake, a significant reduction (21%–24%) in the availability of shallow water habitat and a significant increase in the frequency of reservoir drawdown of at least 2 feet in a 1-month period (14%) would occur under both cumulative scenarios (Table 5-34). Therefore, significant cumulative impacts on warmwater fish habitat in Trinity Lake would occur. No mitigation is available.

Under the cumulative scenarios, average monthly storage would be reduced by 5–10% from April to October with a frequency of 19–20% in both Shasta and Trinity lakes (Table 5-8). Therefore, significant and unavoidable cumulative impacts on coldwater reservoir species would occur during these months. No mitigation is available.

***Mitigation: Contribute to Regional Fishery Management Efforts.*** No project-level mitigation is available to reduce EBMUD's contribution to the significant cumulative

impacts described above or to reduce the cumulative impacts to less-than-significant levels. There are several ongoing efforts within the American River basin that could mitigate the cumulative impacts described above. For example, Reclamation and the County have proposed in the EIR/EIS for the Public Law 101-514 water service contracts to install a temperature control device on the Folsom Dam raw water inlet to various northern Sacramento County water users and to implement a coldwater management approach that attempts to most efficiently use the available cold water for fishery purposes.

Another ongoing regional effort is the Sacramento-area Water Forum. As described previously, the Water Forum is a collaborative effort by a diverse group of stakeholders who have been working to find solutions to the area's water needs while preserving the fishery, wildlife, recreational, and aesthetic values of the lower American River. Another aspect of the Water Forum's efforts is to establish a habitat mitigation element composed of several initiatives to enhance fish habitat in the lower American River. These efforts are the appropriate venues for addressing overall impacts on the lower American River fishery that would result from implementation of the Water Forum's draft recommendations.

As one approach to mitigation for cumulative impacts, EBMUD could contribute an appropriate share to these overall mitigation efforts in the form of money or in-kind services. The proportional share should be determined based on the amount of contribution to the overall cumulative impact.

Additionally, the SWRCB could adopt minimum instream flow requirements that would be protective of the public trust resources of the lower American River. The SWRCB is the appropriate agency to adopt, and has the regulatory authority to implement, such standards.

## ANALYSIS OF FULL-USE SCENARIO

### Folsom Reservoir

The analysis of hydrology for Folsom Reservoir indicates that surface elevations under the full-use scenario for Alternative 3 would change slightly (less than 5%) compared to Alternative 1. The availability of shallow water habitat for spawning and rearing and the frequency of surface elevation decreases of greater than 2 feet and surface elevation increases of greater than 20 feet during the spawning period for warmwater fish would be similar to conditions under Alternative 3 (Table 5-35). Changes in coldwater fish habitat would be the same as described for Alternative 3 (Table 5-36). These changes would not exceed the significance criteria identified earlier in this chapter.

### Lower American River

**Flows**

Under the full-use scenario, minimal changes in the flows between Nimbus and the I-5 intake structure occur under both Hodge Decision and AFRP flow standards during most months (Tables 5-37 to 5-39). During July through October, flows between the intake structure and the mouth of the American River would meet the Hodge Decision flow criteria much less frequently than under Alternative 1 (Table 5-39).

Fall-run chinook salmon would be slightly affected under the full-use scenario, except for adult migration below the I-5 intake structure, according to Hodge Decision flow criteria. The number of months that meet or exceed Hodge Decision flow requirements would decrease by 12%, compared to Alternative 1 (Tables 5-40 to 5-42). Under the full-use scenario, the frequency that flows are below the fall-run chinook salmon adult migration threshold would



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exceed the significance criteria identified earlier in this chapter.

The number of months flows meet or exceed the established criteria for steelhead, striped bass, American shad, and splittail are typically similar to those of Alternative 1. The lower stretch of the river between the I-5 intake and the mouth of the river shows the greatest number of months that do not meet the criteria; however, the change would not exceed the significance criteria identified earlier in this chapter. (Tables 5-43 to 5-53).

**Temperature**

Under the full-use scenario, increased water temperatures near the mouth of the American River are expected to be minimal. Temperature increases of more than 1°F would occur in less than 3% of the months (Table 5-30). The change in water temperature would not exceed the significance criteria identified earlier in this chapter.

## Delta Habitat

The analysis of 70-year hydrology indicates that monthly Delta outflow, exports, and X2 under the full-use scenario would be essentially the same as under Alternative 3 (Tables 5-54 and 5-55). The change would not exceed the significance criteria identified earlier in this chapter.

## Shasta and Trinity Lakes

The analysis of hydrology for Shasta and Trinity lakes indicates that surface elevations under the full-use scenario would change slightly (less than 1%) compared to Alternative 1. The availability of shallow water habitat for spawning and rearing and the frequency of surface elevation decreases of greater than 2 feet and increases of greater than 20 feet during the spawning period for warmwater fish would be similar to conditions under Alternative 3 (Tables 5-56 and 5-57). Minimal changes in coldwater fish habitat would occur compared to Alternative 1 (Table 5-36). These changes would not exceed the significance criteria identified earlier in this chapter.

## Sacramento River

Under the full-use scenario, minimal to no changes to the upper Sacramento River flow would occur compared to Alternative 1.



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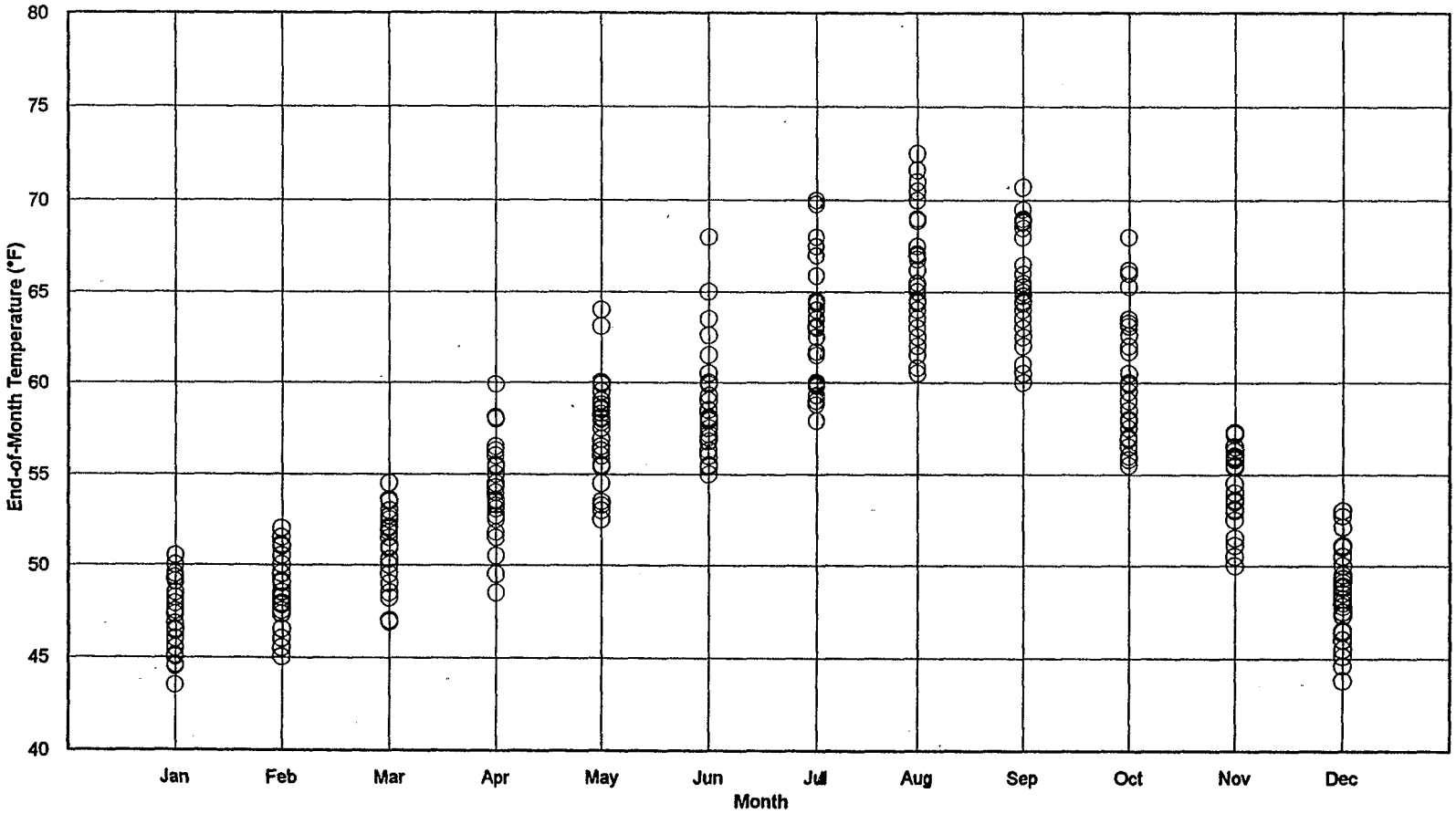


Figure 5-1
End-of-Month Hatchery Temperatures (1959-1995)
in the Lower American River

Jones & Stokes Associates, Inc.

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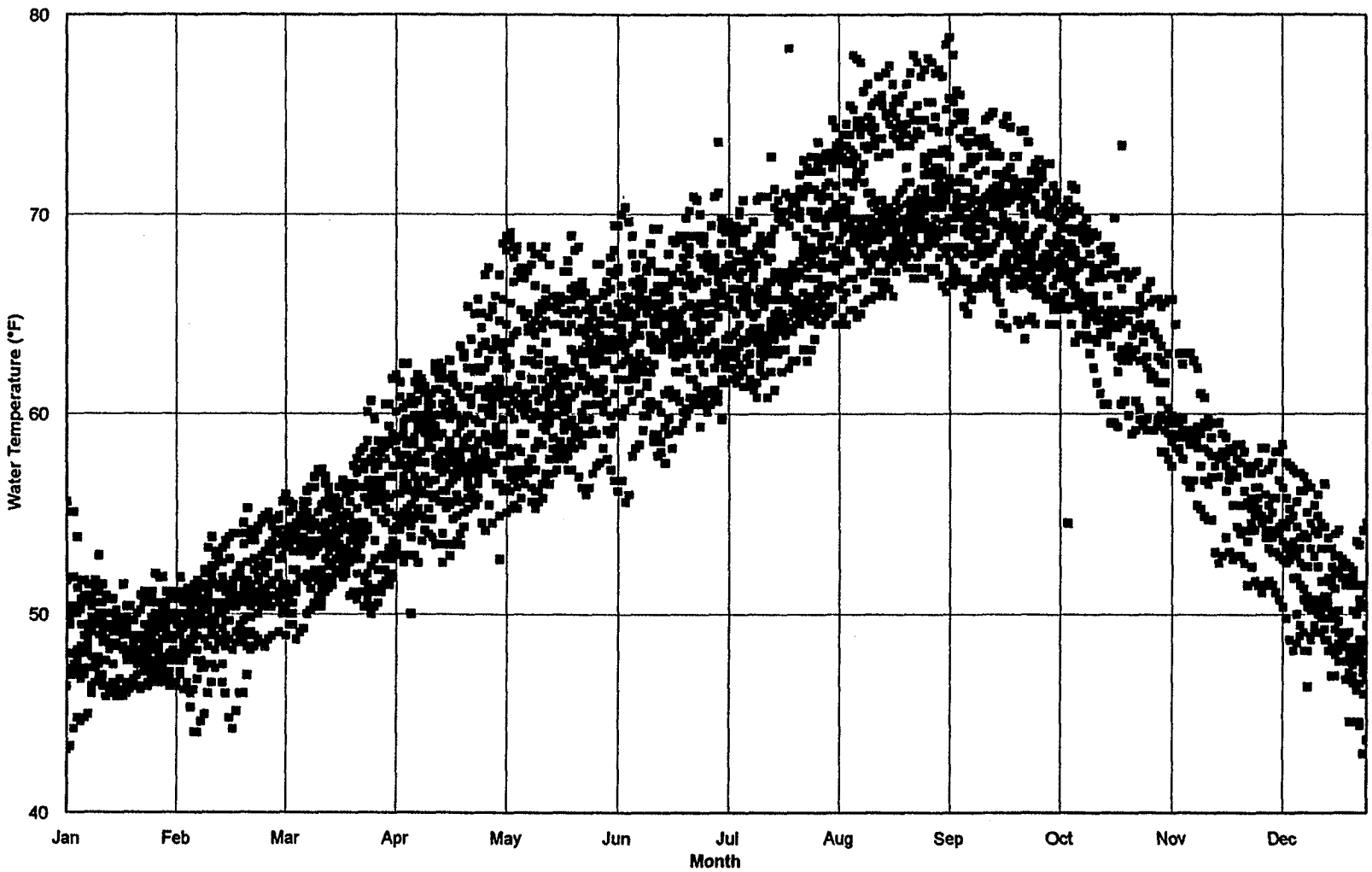


Jones & Stokes Associates, Inc.

Figure 5-2
Average Daily Temperatures at the Fairbairn
Water Treatment Plant Measured During 1984-1997

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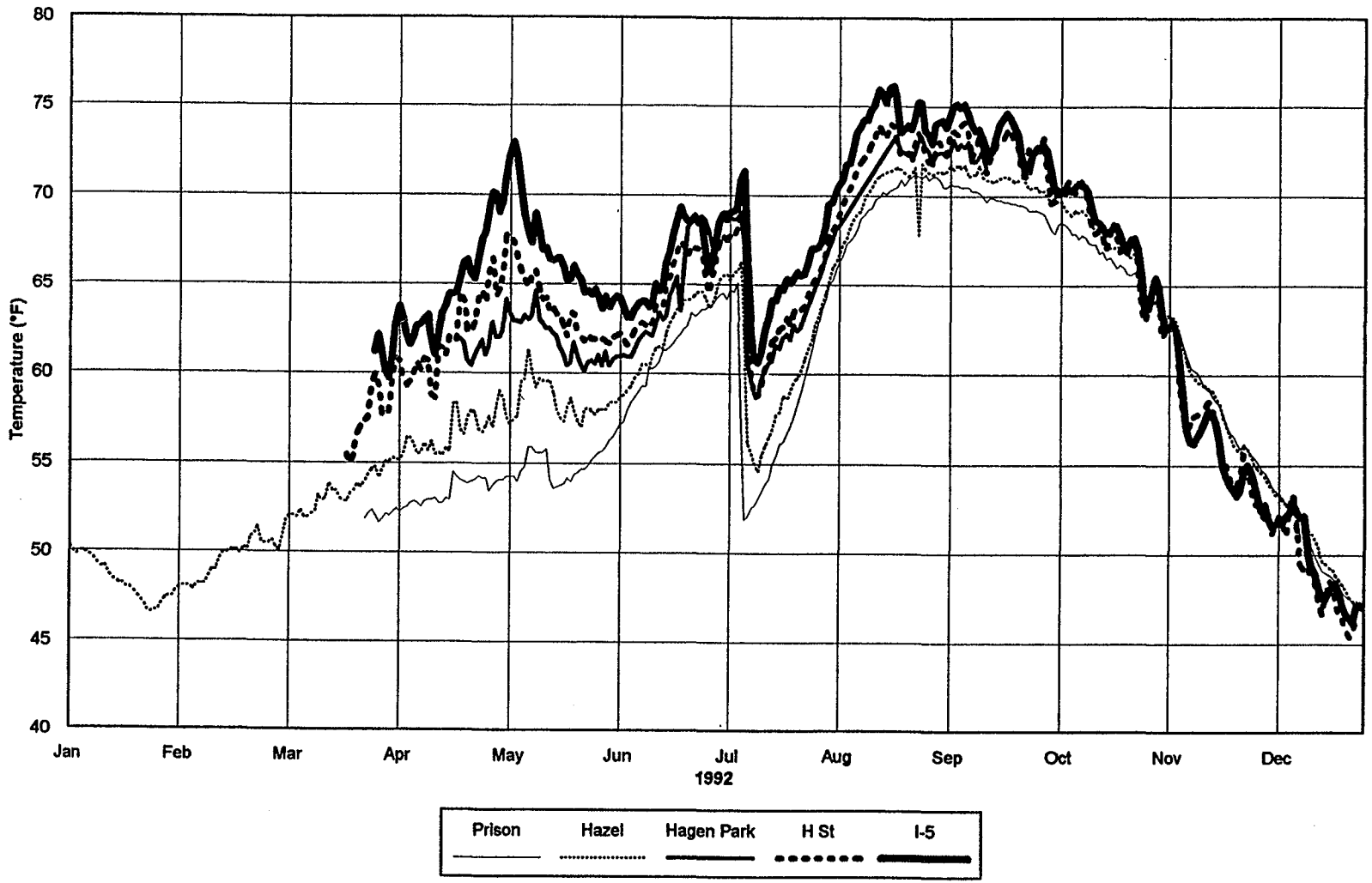


Jones & Stokes Associates, Inc.

Figure 5-3
Temperatures Measured in the Lower American River During 1992

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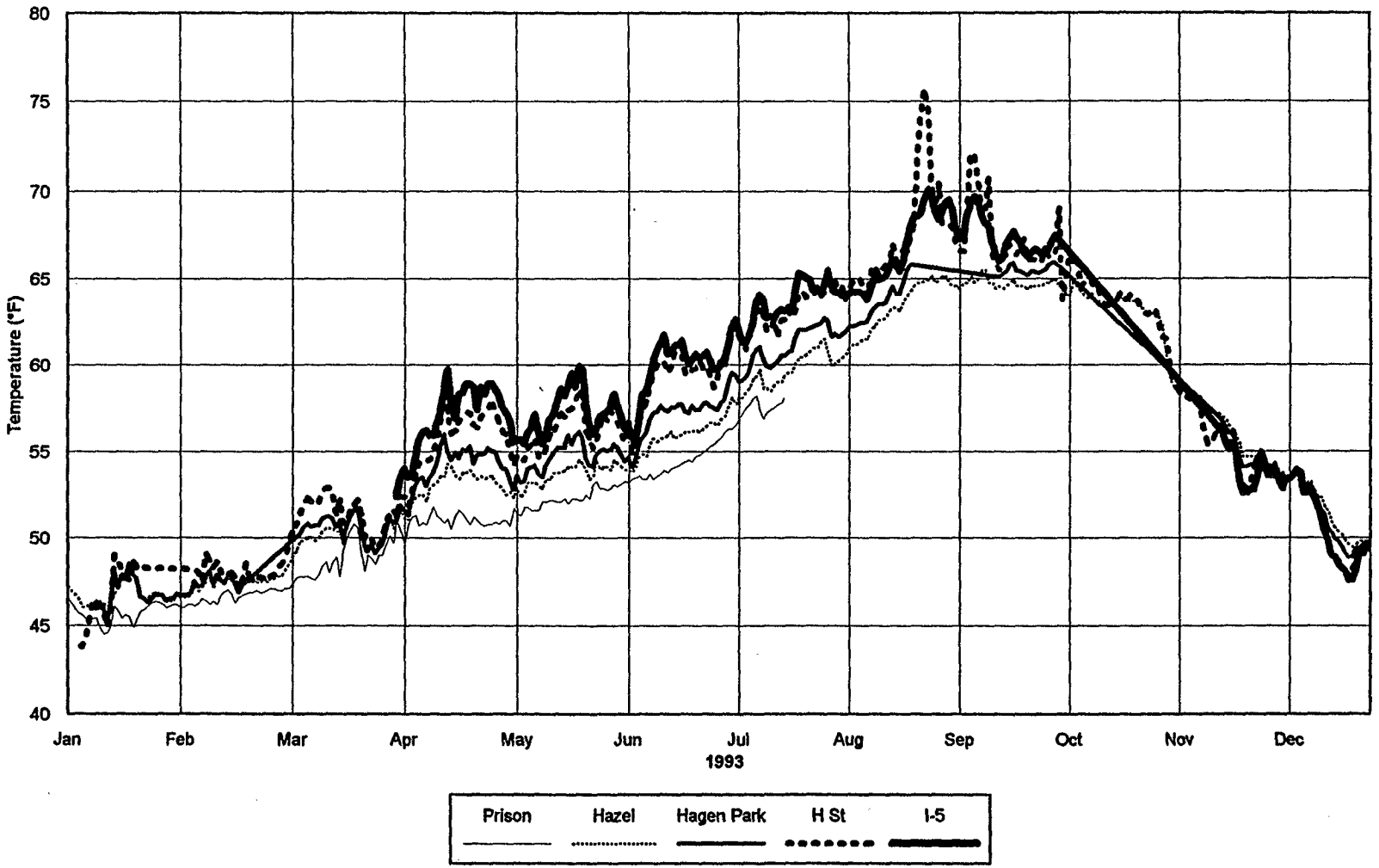


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Figure 5-4
Temperatures Measured in the Lower American River During 1993

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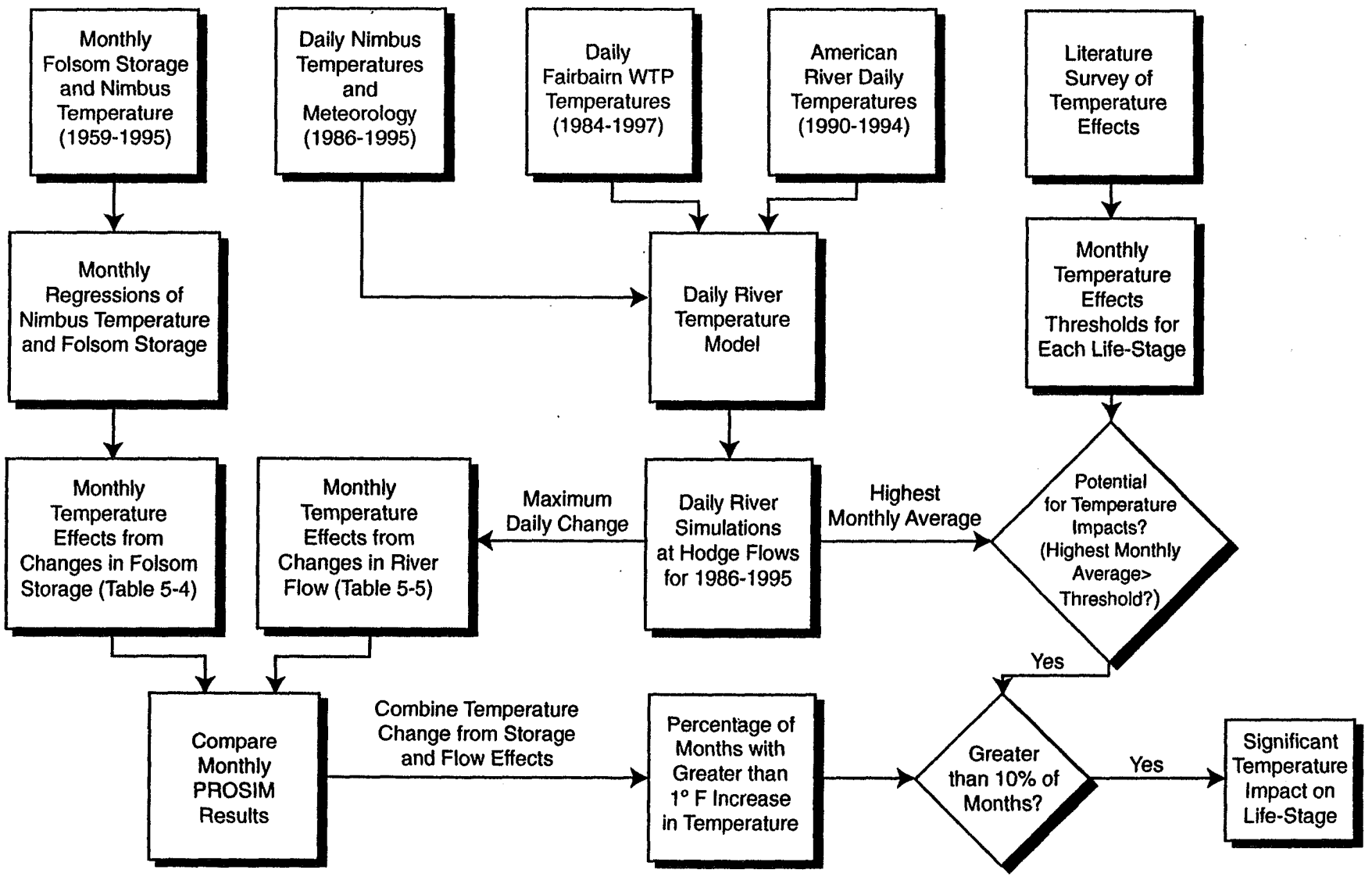


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**Figure 5-5**
**American River Water Temperature Impact Assessment Methodology**

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Table 5-1. Fish Species of Folsom Reservoir and the Lower American River

| Common Name | Scientific Name | Folsom Reservoir | Lower American River |
|---|---|---|---|
| Steelhead/rainbow trout | *Oncorhynchus mykiss* | √ | √ |
| Kokanee (sockeye salmon) | *Oncorhynchus nerka* | √ | |
| Chinook salmon | *Oncorhynchus tshawytscha* | | √ |
| Brown trout | *Salmo trutta* | √ | √ |
| American shad | *Alosa sapidissima* | | √ |
| Threadfin shad | *Dorosoma petenense* | √ | √ |
| White sturgeon | *Acipenser transmontanus* | | √ |
| Pacific lamprey | *Lampetra tridentata* | | √ |
| River lamprey | *Lampetra ayresi* | | √ |
| Goldfish | *Carassius auratus* | √ | √ |
| Common carp | *Cyprinus carpio* | √ | √ |
| California roach | *Hesperoleucus symmetricus* | | √ |
| Hitch | *Lavinia exilicauda* | | √ |
| Hardhead | *Mylopharodon conocephalus* | | √ |
| Golden shiner | *Notemigonus crysaleucas* | √ | |
| Sacramento blackfish | *Orthodon microlepidotus* | | √ |
| Fathead minnow | *Pimephales promelas* | | √ |
| Tui chub | *Gila bicolor* | | |
| Sacramento splittail | *Pogonichthys macrolepidotus* | | √ |
| Sacramento squawfish | *Ptychocheilus grandis* | | √ |
| Speckled dace | *Rhinichthys osculus* | | √ |
| Sacramento sucker | *Catostomus occidentalis* | √ | √ |
| White catfish | *Ictalurus catus* | √ | √ |
| Black bullhead | *Ictalurus melas* | √ | √ |
| Brown bullhead | *Ictalurus nebulosus* | √ | √ |
| Channel catfish | *Ictalurus punctatus* | √ | √ |
| Largemouth bass | *Micropterus salmoides* | √ | √ |
| Smallmouth bass | *Micropterus dolomieui* | √ | √ |
| Warmouth | *Lepomis gulosus* | √ | √ |
| Bluegill | *Lepomis macrochirus* | √ | √ |
| Redear sunfish | *Lepomis microlophus* | √ | √ |
| Green sunfish | *Lepomis cyanellus* | √ | √ |
| White crappie | *Pomoxis annularis* | √ | √ |
| Tule perch | *Hysterocarpus traski* ssp. | | √ |
| Mosquitofish | *Gambusia affinis* | | |
| Inland silverside | *Menidia beryllina* | | √ |
| Threespine stickleback | *Gasterosteus aculeatus* | | √ |
| Bigscale logperch | *Percina macrolepida* | | |
| Wakasagi | *Hypomesus nipponensis* | √ | |
| Riffle sculpin | *Cottus gulosus* | | √ |
| Prickly sculpin | *Cottus asper* | | √ |



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Table 5-2. Legal Status, Habitat Requirements, and Geographic Distribution of Special-Status Aquatic Species

| Species | Status Federal/State | Habitat Requirements | Geographic Distribution |
|---|---|---|---|
| River lamprey *Lampetra ayresi* | --/SSC | Anadromous species spending much of its adult life in estuaries; spawns in small, clean tributary streams, and rears in silty backwaters of such streams | Widely distributed in northern California coastal areas south to San Francisco and probably most abundant in Sacramento-San Joaquin River system |
| Steelhead *Oncorhynchus mykiss gairdneri* | P/SSC | Anadromous species favoring large cold-water tributaries with deep pools for over summering habitat | Distributed throughout coastal and central California |
| Chinook salmon (spring run) *Oncorhynchus tshawytscha* | --/SSC | Anadromous species favoring large, cold-water tributaries with deep pools for over summering habitat | Major isolated tributaries to the Trinity, Klamath, and Upper Sacramento rivers, including Mill, Deer, and Butte creeks and the Feather River |
| Chinook salmon (winter run) *Oncorhynchus tshawytscha* | E/E | Anadromous species favoring clean, coldwater over gravel beds during summer months and appropriate habitats for rearing and smolt emigration through the Delta | Sacramento River, with successful spawning limited to the reach immediately downstream of Keswick Reservoir |
| Delta smelt *Hypomesus transpacificus* | T/T | Euryhaline habitats with salinities no more than 10-12 ppt in both main Delta channels and open waters | Delta, Suisun Bay, Suisun Marsh, and lower Sacramento River |
| Sacramento splittail *Pogonichthys macrolepidotus* | P/SSC | Primarily freshwater but tolerant of salinities of 10-12 ppt in slow-moving sections of rivers and sloughs with flooded vegetation for spawning | Delta; Suisun Bay; and Suisun Marsh, Napa Marsh, and other parts of the estuary |
| Hardhead *Mylopharadon conocephalus* | --/SSC | Undisturbed streams with clear, deep pools with sand-gravel-boulder substrates and slow-water velocities and mid-elevation reservoirs | Widely distributed in low- to mid-elevation streams in Sacramento-San Joaquin drainage and Russian River drainage and mid-elevation reservoirs |

Notes:

Federal
- E = listed as endangered under the federal Endangered Species Act.
- T = listed as threatened under the federal Endangered Species Act.
- P = proposed for listing as either a threatened or an endangered species.
- -- = no listing.

State
- E = listed as endangered under the California Endangered Species Act.
- T = listed as threatened under the California Endangered Species Act.
- SSC = species of special concern.



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Table 5-3. Suggested Flow Requirements by Agency for the Maintenance and/or Enhancement of Chinook Salmon

| Agency | Time Period | Flow Requirement |
|---|---|---|
| California Department of Fish and Game (IFIM data interpretation)[a, b] | October 15–February | 1,750–4,000 |
| | March–June | 3,000–6,000 |
| | July–October 15 | 1,500 |
| U.S. Fish and Wildlife Service (IFIM study)[a, c] | October 15–December | 1,750–2,000 |
| | January–March | 1,250 |
| | April–June | 1,750–2,000 |
| EBMUD[d] | October 15–December | 1,500–2,000 |
| | January–March 15 | 1,250–30,000 |
| | March 16–May 15 | 750–1,250 |
| | May 16–June | 2,000 |
| County of Sacramento | | |
| Necessary flows (flows necessary for the protection of instream and public trust values)[a] | October | 2,500 |
| | November | 3,000 |
| | December | 3,500 |
| | January–March | 4,000 |
| | April–May | 4,500 |
| | June | 4,000 |
| Hodge Decision flows[e] | October 15–February | 2,000 |
| | March–June | 3,000 |
| | July–October 14 | 1,750 |
| AFRP[f] | October–February | 2,000 |
| | March–June | 3,000 |
| | July | 2,500 |
| | August | 2,000 |
| | September | 1,500 |

[a] California State Water Resources Control Board 1988b.
[b] California Department of Fish and Game 1986.
[c] U.S. Fish and Wildlife Service 1985.
[d] Kelley et al. 1995.
[e] Hodge Decision 1990.
[f] U.S. Fish and Wildlife Service 1997.

Table 5-4. Linear Regression Equations for Temperatures at Nimbus Dam as a Function of Folsom Storage

| Month | Constant (°F) | Slope | Reduction in Storage Correlated with a 1°F Increase at Nimbus Dam (TAF) | Estimated Nimbus Temperature at a Folsom Storage of 200 TAF (°F) | Estimated Nimbus Temperature When Folsom Reservoir is Full (°F) | Temperature Increase Correlated with a 100 TAF Decrease in Storage (°F) | N | $R^2$ | Significance Level (P Value) |
|---|---|---|---|---|---|---|---|---|---|
| October | 66.61 | -0.01321 | 76 | 64.0 | 53.4 | 1.32 | 37 | 0.485 | <0.001 |
| November | 55.97 | -0.00428 | 234 | 55.1 | 51.7 | 0.43 | 37 | 0.151 | 0.009 |
| December | 49.17 | -0.00186 | 539 | 48.8 | 47.3 | 0.19 | 37 | 0.020 | 0.205 |
| January | 48.22 | -0.00231 | 433 | 47.8 | 45.9 | 0.23 | 37 | 0.034 | 0.138 |
| February | 50.21 | -0.00344 | 291 | 49.5 | 46.8 | 0.34 | 37 | 0.057 | 0.078 |
| March | 54.64 | -0.00576 | 174 | 53.5 | 48.9 | 0.58 | 37 | 0.148 | 0.009 |
| April | 59.45 | -0.00716 | 140 | 58.0 | 52.3 | 0.72 | 37 | 0.157 | 0.008 |
| May | 63.88 | -0.00831 | 120 | 62.2 | 55.6 | 0.83 | 37 | 0.260 | 0.001 |
| June | 65.97 | -0.00839 | 119 | 64.3 | 57.6 | 0.84 | 36 | 0.319 | <0.001 |
| July | 70.8 | -0.01087 | 92 | 68.6 | 59.9 | 1.09 | 37 | 0.523 | <0.001 |
| August | 73.15 | -0.01262 | 79 | 70.6 | 60.5 | 1.26 | 37 | 0.739 | <0.001 |
| September | 70.57 | -0.01052 | 95 | 68.5 | 60.1 | 1.05 | 37 | 0.553 | <0.001 |



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Table 5-5. Simulated Temperatures under Hodge Flows and under Hodge Flows + 500 cfs for 1986–1995 Natoma Release Temperatures and Meteorological Conditions (°F)

| | Nimbus Dam (mile 23) | | Upstream End of Goethe Park (mile 15) | | | | Fairbairn WTP (mile 7) | | | | Mouth of the American River (mile 0) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | Average Temperature | Hodge Flows (cfs) | Hodge Flows | Hodge Flows + 500 cfs | Difference | Largest Maximum Daily Difference | Hodge Flows | Hodge Flows + 500 cfs | Difference | Largest Maximum Daily Difference | Hodge Flows | Hodge Flows + 500 cfs | Difference | Largest Maximum Daily Difference |
| January | 47.8 | 2,000 | 47.6 | 47.6 | 0.0 | 0.1 | 47.4 | 47.5 | -0.1 | 0.2 | 47.3 | 47.4 | -0.1 | 0.3 |
| February | 48.2 | 2,000 | 48.6 | 48.5 | 0.1 | 0.2 | 48.9 | 48.8 | 0.1 | 0.5 | 49.2 | 49.1 | 0.2 | 0.6 |
| March | 50.5 | 3,000 | 51.1 | 51.0 | 0.1 | 0.2 | 51.7 | 51.6 | 0.1 | 0.4 | 52.2 | 52.0 | 0.2 | 0.5 |
| April | 53.8 | 3,000 | 54.7 | 54.6 | 0.1 | 0.2 | 55.7 | 55.5 | 0.2 | 0.4 | 56.5 | 56.1 | 0.3 | 0.6 |
| May | 55.0 | 3,000 | 57.3 | 57.1 | 0.2 | 0.3 | 58.6 | 58.3 | 0.3 | 0.5 | 59.7 | 59.2 | 0.5 | 0.7 |
| June | 57.9 | 3,000 | 59.7 | 59.5 | 0.2 | 0.3 | 61.4 | 61.0 | 0.4 | 0.7 | 62.7 | 62.2 | 0.6 | 0.9 |
| July | 61.5 | 1,750 | 64.3 | 63.8 | 0.5 | 0.7 | 66.8 | 65.8 | 1.0 | 1.3 | 68.7 | 67.5 | 1.2 | 1.8 |
| August | 66.6 | 1,750 | 68.5 | 68.1 | 0.4 | 0.6 | 70.2 | 69.5 | 0.6 | 1.1 | 71.5 | 70.6 | 0.8 | 1.6 |
| September | 67.0 | 1,750 | 68.0 | 67.8 | 0.2 | 0.4 | 69.0 | 68.6 | 0.4 | 0.8 | 69.7 | 69.2 | 0.5 | 1.1 |
| October | 65.4 | 2,000 | 65.6 | 65.6 | 0.0 | 0.3 | 65.8 | 65.7 | 0.1 | 0.5 | 66.0 | 65.9 | 0.1 | 0.6 |
| November | 58.4 | 2,000 | 58.0 | 58.1 | -0.1 | 0.1 | 57.7 | 57.8 | -0.1 | 0.2 | 57.4 | 57.6 | -0.2 | 0.2 |
| December | 51.9 | 2,000 | 51.3 | 51.4 | -0.1 | 0.0 | 50.7 | 50.9 | -0.2 | 0.0 | 50.2 | 50.5 | -0.3 | -0.1 |



C-084577

Table 5-6. Temperature Thresholds for Life Stages of Chinook Salmon, Steelhead, American Shad, and Splittail in Relation to the Maximum Simulated Temperatures (at Hodge Decision Flows) for 1986–1995

| Month | Temperature Sensitive Life Stages Present | Location for Evaluation | Temperature Threshold[a] (°F) | Highest Monthly Average Temperature at Evaluation Location[b] (°F) |
|---|---|---|---|---|
| February | Chinook spawning and incubation | Goethe | 56 | 50.7 |
| | Steelhead spawning and incubation | Goethe | 52 | 50.7 |
| | Steelhead rearing | Fairbairn | 65 | 51.1 |
| | Chinook rearing and emigration | Mouth | 61 | 51.4 |
| | Splittail spawning | Mouth | 68 | 51.4 |
| March | Chinook spawning and incubation | Goethe | 56 | 53.3 |
| | Steelhead spawning and incubation | Goethe | 52 | 53.3 |
| | Steelhead rearing | Fairbairn | 65 | 53.9 |
| | Chinook rearing and emigration | Mouth | [illegible] | 54.4 |
| | Splittail spawning | Mouth | 68 | 54.4 |
| | Steelhead smolting and emigration | Mouth | 57 | 54.4 |
| April | Steelhead spawning and incubation | Goethe | 52 | 57.3 |
| | Steelhead rearing | Fairbairn | 65 | 58.2 |
| | Chinook rearing and emigration | Mouth | 61 | 58.9 |
| | Splittail spawning | Mouth | 68 | 58.9 |
| | Steelhead smolting and emigration | Mouth | 57 | 58.9 |
| May | Steelhead spawning and incubation | Goethe | 52 | 60.3 |
| | Steelhead rearing | Fairbairn | 65 | 61.8 |
| | Chinook rearing and emigration | Mouth | 61 | 63.0 |
| | Shad spawning | Mouth | 68 | 63.0 |
| | Steelhead smolting and emigration | Mouth | 57 | 63.0 |
| June | Steelhead rearing | Fairbairn | 65 | 64.1 |
| | Chinook rearing and emigration | Mouth | 61 | 65.4 |
| | Shad spawning | Mouth | 68 | 65.4 |
| July | Steelhead rearing | Fairbairn | 65 | 69.1 |
| August | Steelhead rearing | Fairbairn | 65 | 74.0 |
| September | Steelhead rearing | Fairbairn | 65 | 72.4 |
| October | Chinook spawning and incubation | Goethe | 56 | 69.1 |
| | Steelhead rearing | Fairbairn | 65 | 69.3 |

Notes:

Water temperatures in November, December, and January did not increase in response to a decrease in flow.
[a] Shaded values indicate when the temperature threshold is exceeded by the highest monthly average.
[b] Simulated under Hodge Decision flows.



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C-084578

Table 5-7. Effects of Changes in Reservoir Elevation on Warmwater Fish Habitat in Folsom Reservoir

| Life Stage | Number of Months (Relevant Period) | Alternative 1 Months/ Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/ Percent[b] | Alternative 2 Cumulative Change (Months/Percent)[b] | Alternative 3 Cumulative Change (Months/Percent)[b] |
|---|---|---|---|---|---|---|---|
| **410-Foot Surface Elevation** | | | | | | | |
| Spawning/incubation | 280 | 249 | -1 | -5 | 196 | 44 | 50 |
| | (Apr-Jul) | 89% | 0% | -2% | 70% | 16% | 18% |
| Juvenile/adult rearing | 840 | 649 | -12 | -8 | 599 | -20 | 21 |
| | (Oct-Sep) | 77% | -1% | -1% | 71% | -2% | 3% |
| **<2-Foot Surface Elevation Decrease** | | | | | | | |
| Spawning/incubation | 280 | 162 | 10 | 3 | 160 | 5 | 10 |
| | (Apr-Jul) | 58% | 2% | 1% | 57% | 2% | 4% |
| **<20-Foot Surface Elevation Increase** | | | | | | | |
| Spawning/incubation | 280 | 254 | 7 | 11 | 266 | -9 | 0 |
| | (Apr-Jul) | 91% | 2% | 4% | 95% | -3% | 0% |

[a] Number and percentage of months during the relevant period when the reservoir elevation is at least 410 feet, reservoir surface elevation decreases by less than 2 feet per month, or the reservoir surface elevation increases by less than 20 feet per month.

[b] Difference in the number and percentage of months during the relevant period between Alternative 1 and Alternatives 2 and 3 when the reservoir elevation is above or below thresholds.



C-084579
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Table 5-8. Effects of Changes in Reservoir Storage on Coldwater Reservoir Fish Habitat

| Life Stage | Number of Months (Relevant Period) | Alternative 2 Project Change (Months/Percent)[a] | Alternatave 3 Project Change (Months/Percent)[a] | Alternative 2 Cumulative Change (Months/Percent)[b] | Alternative 3 Cumulative Change (Months/Percent)[b] |
|---|---|---|---|---|---|
| **Folsom Reservoir** | | | | | |
| Juvenile/adult rearing | 490 | -21 | -15 | -91 | -75 |
| | (April-October) | -4% | -3% | -19% | -15% |
| **Shasta Lake** | | | | | |
| Juvenile/adult rearing | 490 | -6 | -11 | -98 | -95 |
| | (April-October) | -1% | -2% | -20% | -19% |
| **Trinity Lake** | | | | | |
| Juvenile/adult rearing | 490 | 0 | -17 | -91 | -93 |
| | (April-October) | 0% | -3% | -19% | -19% |

[a] Difference in the number and percentage of months during the relevant period between Alternative 1 and Alternatives 2 and 3 when reservoir storage is less than 5 or 10% of reservoir storage under Alternative 1.

[b] Difference in the number and percentage of months during the relevant period between Existing Conditions and the cumulative conditions under Alternatives 2 and 3 when reservoir storage is less than 5 or 10% of reservoir storage under Existing Conditions.



C-084580

C—084580

Table 5-9. Hodge Decision and AFRP Flows (Nimbus Dam to Fairbairn WTP)

| Flows | Number of Months (Relevant Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Condition | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/Percent[a] | Project Change (Months/Percent)[b] | Project Change (Months/Percent)[b] | Months/Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **Hodge Decision Flows** | | | | | | | |
| 2,000 cfs | 280 | 254 | 0 | -4 | 148 | 101 | 99 |
| | (Nov-Feb) | 91% | 0% | -1% | 53% | 36% | 36% |
| 3,000 cfs | 280 | 139 | -1 | 2 | 152 | -21 | -21 |
| | (Mar-Jun) | 50% | -1% | 1% | 54% | -7% | -7% |
| 1,750 cfs | 280 | 209 | -17 | 0 | 206 | -16 | -8 |
| | (Jul-Oct) | 75% | -6% | 0% | 74% | -6% | -3% |
| **AFRP Flows** | | | | | | | |
| 2,000 cfs | 350 | 314 | 1 | -4 | 185 | 122 | 120 |
| | (Oct-Feb) | 90% | 0% | -1% | 53% | 35% | 34% |
| 3,000 cfs | 280 | 139 | -1 | 2 | 152 | -21 | -21 |
| | (Mar-Jun) | 50% | -1% | 1% | 54% | -7% | -7% |
| 2,500 cfs | 70 | 40 | 0 | 1 | 53 | -14 | -14 |
| | (Jul) | 57% | 0% | 1% | 76% | -20% | -20% |
| 2,000 cfs | 70 | 49 | 0 | 0 | 61 | -16 | -16 |
| | (Aug) | 70% | 0% | 0% | 87% | -23% | -23% |
| 1,500 cfs | 70 | 42 | 0 | 0 | 49 | -11 | -10 |
| | (Sep) | 60% | 0% | 0% | 70% | -16% | -14% |

[a] Number and percentage of months during the relevant period when the flows meet or exceed the indicated minimum flows.

[b] The difference in the number and percentage of months during the relevant period between Alternative 1 and Alternatives 2 and 3 when flows meet or exceed the minimum flows.

[c] The difference in the number and percentage of months during the relevant period between existing conditions and cumulative conditions under Alternatives 2 and 3 when flows meet or exceed the minimum flows.



C-084581

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Table 5-10. Hodge Decision and AFRP Flows (Fairbairn WTP to I-5)

| Flows | Number of Months (Relevant Period) | Alternative 1 Months/Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/Percent[a] | Alternative 2 Cumulative Change (Months/Percent)[c] | Alternative 3 Cumulative Change (Months/Percent)[c] |
|---|---|---|---|---|---|---|---|
| **Hodge Decision Flows** | | | | | | | |
| 2,000 cfs | 280 | 238 | -2 | -1 | 140 | 70 | 80 |
| | (Nov-Feb) | 84% | -1% | 0% | 50% | 25% | 29% |
| 3,000 cfs | 280 | 125 | -2 | -1 | 141 | -35 | -30 |
| | (Mar-Jun) | 45% | -1% | 0% | 50% | -12% | -10% |
| 1,750 cfs | 280 | 176 | 4 | 0 | 202 | -64 | -52 |
| | (Jul-Oct) | 63% | 1% | 0% | 72% | 23% | -28% |
| **AFRP Flows** | | | | | | | |
| 2,000 cfs | 350 | 278 | -6 | -1 | 174 | 71 | 84 |
| | (Oct-Feb) | 79% | -1% | 0% | 50% | 20% | 24% |
| 3,000 cfs | 280 | 125 | -2 | 1 | 141 | -35 | -30 |
| | (Mar-Jun) | 45% | -1% | 0% | 50% | -12% | -10% |
| 2,500 cfs | 70 | 20 | 0 | -3 | 46 | -38 | -34 |
| | (Jul) | 29% | 0% | -4% | 66% | -55% | -49% |
| 2,000 cfs | 70 | 25 | -1 | -1 | 56 | -45 | -41 |
| | (Aug) | 36% | -2% | -1% | 80% | -64% | -59% |
| 1,500 cfs | 70 | 36 | 0 | 0 | 22 | 4 | 6 |
| | (Sep) | 51% | 0% | 0% | 31% | 6% | 9% |

[a] Number and percentage of months during the relevant period when the flows meet or exceed the indicated minimum flows.

[b] The difference in the number and percentage of months during the relevant period between Alternative 1 and Alternatives 2 and 3 when flows meet or exceed the minimum flows.

[c] The difference in the number and percentage of months during the relevant period between existing conditions and cumulative conditions under Alternatives 2 and 3 when flows meet or exceed the minimum flows.



C-084582

C-084582

Table 5-11. Hodge and AFRP Flows (I-5 to the Mouth of the American River)

| Flows | Number of Months (Relevant Period) | Alternative 1 Months/Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/Percent[a] | Alternative 2 Cumulative Change (Months/Percent)[c] | Alternative 3 Cumulative Change (Months/Percent)[c] |
|---|---|---|---|---|---|---|---|
| **Hodge Decision Flows** | | | | | | | |
| 2,000 cfs | 280 | 238 | -2 | -5 | 140 | 70 | 73 |
| | (Nov-Feb) | 84% | -1% | -2% | 50% | 25% | 26% |
| 3,000 cfs | 280 | 125 | -2 | -2 | 141 | -35 | -36 |
| | (Mar-Jun) | 45% | -1% | -1% | 50% | -12% | -12% |
| 1,750 cfs | 280 | 176 | 4 | -19 | 202 | -64 | -82 |
| | (Jul-Oct) | 63% | 1% | -7% | 72% | 23% | -29% |
| **AFRP Flows** | | | | | | | |
| 2,000 cfs | 350 | 278 | -6 | -5 | 174 | 71 | 70 |
| | (Oct-Feb) | 79% | -1% | -1% | 50% | 20% | 20% |
| 3,000 cfs | 280 | 125 | -2 | -2 | 141 | -35 | -36 |
| | (Mar-Jun) | 45% | -1% | -1% | 50% | -12% | -12% |
| 2,500 cfs | 70 | 20 | 0 | -5 | 46 | -38 | -39 |
| | (Jul) | 29% | 0% | -7% | 66% | -55% | -56% |
| 2,000 cfs | 70 | 25 | -1 | -1 | 56 | -45 | -42 |
| | (Aug) | 36% | -2% | -1% | 80% | -64% | -60% |
| 1,500 cfs | 70 | 36 | 0 | 0 | 22 | 4 | 3 |
| | (Sep) | 51% | 0% | 0% | 31% | 6% | 8% |

[a] Number and percentage of months during the relevant period when the flows meet or exceed the indicated minimum flows.

[b] The difference in the number and percentage of months during the relevant period between Alternative 1 and Alternatives 2 and 3 when flows meet or exceed the minimum flows.

[c] The difference in the number and percentage of months during the relevant period between existing conditions and cumulative conditions under Alternatives 2 and 3 when flows meet or exceed the minimum flows.



C-084583

C—084583

Table 5-12. Effects of Lower American River Flows on Fall-Run Chinook Salmon (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 Months/ Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/ Percent[a] | Alternative 2 Cumulative Change (Months/Percent)[c] | Alternative 3 Cumulative Change (Months/Percent)[c] |
|---|---|---|---|---|---|---|---|
| **Hodge Decision Flows** | | | | | | | |
| Adult migration | 210 (Sep–Nov) | 160 76% | 6 3% | -2 -1% | 117 56% | 29 14% | 34 16% |
| Spawning | 210 (Oct–Dec) | 188 90% | -1 -1% | -4 -2% | 106 50% | 76 37% | 76 37% |
| Incubation | 420 (Oct–Mar) | 347 83% | 1 0% | -3 -1% | 224 53% | 111 27% | 112 27% |
| Rearing/emigration | 420 (Jan–Jun) | 265 63% | 4 1% | 2 0% | 238 57% | 14 3% | 16 3% |
| **AFRP Flows** | | | | | | | |
| Adult migration | 210 (Sep–Nov) | 166 79% | 0 0% | -2 -1% | 117 56% | 41 19% | 42 20% |
| Spawning | 210 (Oct–Dec) | 188 90% | -1 -1% | -4 -1% | 99 47% | 83 40% | 83 40% |
| Incubation | 420 (Oct–Mar) | 347 83% | 1 0% | -3 -4% | 217 52% | 118 28% | 119 28% |
| Rearing/emigration | 420 (Jan–Jun) | 265 63% | -1 0% | 2 3% | 238 57% | 14 3% | 16 3% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084584

C—084584

Table 5-13. Effects of Lower American River Flows on Fall-Run Chinook Salmon (Fairbairn to I-5)

| Life Stage | Number of Months (Critical Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/ Percent[a] | Project Change (Months/ Percent)[b] | Project Change (Months/ Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **Hodge Decision Flows** | | | | | | | |
| Adult migration | 210 | 154 | 2 | -2 | 107 | 5 | 18 |
| | (Sep-Nov) | 73% | 1% | -1% | 51% | 2% | 9% |
| Rearing/emigration | 420 | 242 | 2 | 0 | 227 | -12 | -2 |
| | (Jan-Jun) | 58% | 0% | 0% | 54% | -3% | 0% |
| **AFRP Flows** | | | | | | | |
| Adult migration | 210 | 138 | -2 | 0 | 81 | 30 | 40 |
| | (Sep-Nov) | 66% | -1% | 0% | 39% | 14% | 19% |
| Rearing/emigration | 420 | 242 | -4 | 0 | 226 | -11 | -3 |
| | (Jan-Jun) | 58% | -1% | 0% | 54% | -3% | -1% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084585

C-084585

Table 5-14. Effects of Lower American River Flows on Fall-Run Chinook Salmon (I-5 to the Mouth of the American River)

| Life Stage | Number of Months (Critical Period) | Alternative 1 Months/ Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/ Percent[a] | Alternative 2 Cumulative Change (Months/Percent)[c] | Alternative 3 Cumulative Change (Months/Percent)[c] |
|---|---|---|---|---|---|---|---|
| **Hodge Decision Flows** | | | | | | | |
| Adult migration | 210 | 154 | 2 | -19 | 107 | 5 | 12 |
| | (Sep-Nov) | 73% | 1% | -9% | 51% | 2% | 6% |
| Rearing/emigration | 420 | 242 | 2 | -7 | 227 | -12 | -18 |
| | (Jan-Jun) | 58% | 0% | -2% | 54% | -3% | -4% |
| **AFRP Flows** | | | | | | | |
| Adult migration | 210 | 138 | -2 | 0 | 81 | 30 | 33 |
| | (Sep-Nov) | 66% | -1% | 0% | 39% | 14% | 15% |
| Rearing/emigration | 420 | 242 | -4 | -7 | 226 | -11 | -17 |
| | (Jan-Jun) | 58% | -1% | -2% | 54% | -3% | -4% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084586

C-084586

Table 5-15. Effects of Lower American River Flows on Winter-Run Chinook Salmon (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/ Percent[a] | Project Change (Months/Percent)[b] | Project Change (Months/Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **Hodge Decision Flows** | | | | | | | |
| Rearing/emigration | 350 (December–April) | 255<br>73% | 1<br>0% | 3<br>0% | 180<br>51% | 68<br>20% | 66<br>19% |
| **AFRP Flows** | | | | | | | |
| Rearing/emigration | 350 (December–April) | 255<br>73% | 1<br>0% | 2<br>0% | 180<br>51% | 68<br>20% | 66<br>19% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



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Table 5-16. Effects of Lower American River Flows on Winter-Run Chinook Salmon (Fairbairn to I-5)

| Life Stage | Number of Months (Critical Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/ Percent[a] | Project Change (Months/ Percent)[b] | Project Change (Months/ Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **Hodge Decision Flows** | | | | | | | |
| Rearing/emigration | 350 (December–April) | 235<br>67% | 1<br>0% | -2<br>0% | 178<br>51% | 25<br>7% | 42<br>12% |
| **AFRP Flows** | | | | | | | |
| Rearing/emigration | 350 (December–April) | 235<br>67% | -4<br>-1% | -4<br>-1% | 177<br>51% | 27<br>7% | 33<br>9% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084588

C-084588

Table 5-17. Effects of Lower American River Flows on Winter-Run Chinook Salmon (I-5 to the Mouth of the American River)

| Life Stage | Number of Months (Critical Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Condition | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/ Percent[a] | Project Change (Months/Percent)[b] | Project Change (Months/Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **Hodge Decision Flows** | | | | | | | |
| Rearing/emigration | 350 (December–April) | 235<br>67% | 1<br>0% | -4<br>-1% | 178<br>51% | 25<br>7% | 32<br>9% |
| **AFRP Flows** | | | | | | | |
| Rearing/emigration | 350 (December–April) | 235<br>67% | -4<br>-1% | -4<br>-1% | 177<br>51% | 27<br>7% | 33<br>9% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between Existing Conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084589

C-084589

Table 5-18. Effects of Lower American River Flows on Steelhead (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 Months/Percent[a] | Alternative 2 Project Change (Months Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/ Percent[a] | Alternative 2 Cumulative Change (Months/Percent)[c] | Alternative 3 Cumulative Change (Months/Percent)[c] |
|---|---|---|---|---|---|---|---|
| **Hodge Decision Flows** | | | | | | | |
| Adult migration | 630 (Aug–Apr) | 464 74% | 7 1% | -2 0% | 359 57% | 76 12% | 83 13% |
| Spawning | 350 (Dec–Apr) | 255 73% | 1 0% | 0 0% | 180 51% | 64 19% | 66 19% |
| Incubation | 420 (Dec–May) | 289 69% | 1 0% | 0 0% | 217 52% | 59 14% | 62 14% |
| Rearing | 840 (Oct–Sep) | 602 72% | -18 -2% | -2 0% | 506 60% | 59 7% | 70 9% |
| Emigration | 280 (Mar–Jun) | 139 50% | -1 -1% | 2 1% | 152 54% | -23 -8% | -21 -7% |
| **AFRP Flows** | | | | | | | |
| Adult migration | 630 (Aug–Apr) | 470 75% | 1 0% | -2 0% | 358 57% | 90 14% | 92 14% |
| Spawning | 350 (Dec–Apr) | 255 73% | 1 0% | 0 0% | 180 51% | 60 19% | 66 19% |
| Incubation | 420 (Dec–May) | 289 69% | 1 0% | 0 0% | 217 52% | 59 14% | 62 14% |
| Rearing | 840 (Oct–Sep) | 584 70% | 0 0% | -1 0% | 500 60% | 57 6% | 59 7% |
| Emigration | 280 (Mar–Jun) | 139 50% | -1 -1% | 2 1% | 152 54% | -23 -8% | -21 -7% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084590

C-084590

Table 5-19. Effects of Lower American River Flows on Steelhead (Fairbairn WTP to I-5)

| Life Stage | Number of Months (Critical Period) | Alternative 1 Months/Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Condition Months/Percent[a] | Alternative 2 Cumulative Change (Months/Percent)[c] | Alternative 3 Cumulative Change (Months/Percent)[c] |
|---|---|---|---|---|---|---|---|
| **Hodge Decision Flows** | | | | | | | |
| Adult migration | 630 (August–April) | 430<br>68% | 3<br>1% | -1<br>0% | 346<br>55% | -39<br>-6% | 39<br>6% |
| Emigration | 280 (March–June) | 125<br>45% | 2<br>0% | 1<br>0% | 141<br>50% | -35<br>-12% | -30<br>-10% |
| **AFRP Flows** | | | | | | | |
| Adult migration | 630 (August–April) | 398<br>63% | -8<br>-1% | 31<br>5% | 314<br>50% | -34<br>-6% | 41<br>6% |
| Emigration | 280 (March–June) | 125<br>45% | -2<br>-1% | 1<br>0% | 141<br>50% | -35<br>-12% | -30<br>-10% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084591

C-084591

Table 5-20. Effects of Lower American River Flows on Steelhead (I-5 to the Mouth of the American River)

| Life Stage | Number of Months (Critical Period) | Alternative 1 Months/ Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/ Percent[a] | Alternative 2 Cumulative Change (Months/Percent)[b] | Alternative 3 Cumulative Change (Months/Percent)[b] |
|---|---|---|---|---|---|---|---|
| **Hodge Decision Flows** | | | | | | | |
| Adult migration | 630 (August–April) | 430<br>68% | 3<br>1% | -26<br>-4% | 346<br>55% | -39<br>-6% | -2<br>0% |
| Emigration | 280 (March–June) | 125<br>45% | 2<br>0% | -2<br>-1% | 141<br>50% | -35<br>-12% | -36<br>-12% |
| **AFRP Flows** | | | | | | | |
| Adult migration | 630 (August–April) | 398<br>63% | -8<br>-1% | -7<br>-1% | 314<br>50% | -34<br>-6% | 24<br>4% |
| Emigration | 280 (March–June) | 125<br>45% | -2<br>-1% | -2<br>-1% | 141<br>50% | -35<br>-12% | -36<br>-12% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084592

C-084592

Table 5-21. Effects of Lower American River Flow on Striped Bass (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 Months/ Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/ Percent[a] | Alternative 2 Cumulative Change (Months/Percent)[c] | Alternative 3 Cumulative Change (Months/Percent)[c] |
|---|---|---|---|---|---|---|---|
| **Hodge Decision Flows** | | | | | | | |
| Rearing | 490 | 315 | -18 | 1 | 326 | -38 | -28 |
| | (April–October) | 64% | -3% | 0% | 67% | -8% | -6% |
| **AFRP Flows** | | | | | | | |
| Rearing | 490 | 297 | 0 | 2 | 320 | -40 | -39 |
| | (April–October) | 61% | 0% | 0% | 65% | -8% | -8% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084593

C-084593

Table 5-22. Effects of Lower American River Flow on Striped Bass ( Fairbairn WTP to I-5)

| Life Stage | Number of Months (Critical Period) | Alternative 1 Months/ Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/ Percent[a] | Alternative 2 Cumulative Change (Months/Percent)[c] | Alternative 3 Cumulative Change (Months/Percent)[c] |
|---|---|---|---|---|---|---|---|
| **Hodge Decision Flows** | | | | | | | |
| Rearing | 490 | 270 | 5 | 0 | 312 | -94 | -65 |
| | (Apr-Oct) | 55% | 1% | 0% | 64% | -20% | -14% |
| **AFRP Flows** | | | | | | | |
| Rearing | 490 | 218 | 3 | -4 | 269 | -109 | -85 |
| | (Apr-Oct) | 44% | 0% | -1% | 55% | -22% | -17% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084594

C-084594

Table 5-23. Effects of Lower American River Flow on Striped Bass (I-5 to Mouth of the American River)

| Life Stage | Number of Months (Critical Period) | Alternative 1 Months/ Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Condition Months/ Percent[a] | Alternative 2 Cumulative Change (Months/Percent)[c] | Alternative 3 Cumulative Change (Months/Percent)[c] |
|---|---|---|---|---|---|---|---|
| **Hodge Decision Flows** | | | | | | | |
| Rearing | 490 | 270 | 5 | -20 | 312 | -94 | -113 |
| | (April–October) | 55% | 1% | -4% | 64% | -20% | -23% |
| **AFRP Flows** | | | | | | | |
| Rearing | 490 | 218 | -3 | -7 | 269 | -109 | -108 |
| | (April–October) | 44% | 0% | -1% | 55% | -22% | -22% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084595

C-084595

Table 5-24. Effects of Lower American River Flow on American Shad (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/ Percent[a] | Project Change (Months/Percent)[b] | Project Change (Months/Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **Hodge Decision Flows** | | | | | | | |
| Adult migration/ spawning/incubation | 280 (April–July) | 170<br>61% | -25<br>-9% | 1<br>0% | 178<br>64% | -19<br>-7% | -14<br>-5% |
| **AFRP Flows** | | | | | | | |
| Adult migration/ spawning/incubation | 280 (April–July) | 146<br>52% | -1<br>0% | 2<br>1% | 173<br>62% | -35<br>-13% | -34<br>-12% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084596

C-084596

Table 5-25. Effects of Lower American River Flow on American Shad (Fairbairn WTP to I-5)

| Life Stage | Number of Months (Critical Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/ Percent[a] | Project Change (Months/Percent)[b] | Project Change (Months/Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **Hodge Decision Flows** | | | | | | | |
| Adult migration/ spawning/incubation | 280 (April–July) | 134<br>48% | 2<br>1% | 1<br>0% | 168<br>60% | -49<br>-17% | -45<br>-16% |
| **AFRP Flows** | | | | | | | |
| Adult migration/ spawning/incubation | 280 (April–July) | 114<br>41% | -2<br>-1% | -3<br>-1% | 156<br>56% | -68<br>-25% | -59<br>-21%0 |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084597

C-084597

Table 5-26. Effects of Lower American River Flow on American Shad (I-5 to the Mouth of the American River)

| Life Stage | Number of Months (Critical Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/ Percent[a] | Project Change (Months/Percent)[b] | Project Change (Months/Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **Hodge Decision Flows** | | | | | | | |
| Adult migration/ spawning/incubation | 280 (Apr-Jul) | 134<br>48% | 2<br>1% | 0<br>0% | 168<br>60% | -49<br>-17% | -50<br>-18% |
| **AFRP Flows** | | | | | | | |
| Adult migration/ spawning/incubation | 280 (Apr-Jul) | 114<br>41% | -2<br>-1% | -6<br>-2% | 156<br>56% | -68<br>-25% | -70<br>-25% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge Decision or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when Hodge Decision or AFRP flows are met or exceeded.



C-084598

C-084598

Table 5-27. Effects of Lower American River Flow on Sacramento Splittail (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/ Percent[a] | Project Change (Months/Percent)[b] | Project Change (Months/Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **3,500-cfs Flows** | | | | | | | |
| Spawning/incubation/ rearing | 210 (February–April) | 84<br>40% | -2<br>-1% | 1<br>0% | 90<br>43% | -18<br>-9% | -7<br>-3% |

[a] Number and percentage of months during the critical life stage period when 3,500-cfs flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when 3,500-cfs flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when 3,500-cfs flows are met or exceeded.



C-084599

C—084599

Table 5-28. Effects of Lower American River Flow on Sacramento Splittail (Fairbairn WTP to I-5)

| Life Stage | Number of Months (Critical Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/ Percent[a] | Project Change (Months/Percent)[b] | Project Change (Months/Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **3,500-cfs Flows** | | | | | | | |
| Spawning/incubation/ rearing | 210 (February–April) | 84<br>40% | -3<br>-1% | 0<br>0% | 89<br>42% | -21<br>-10% | -12<br>-5% |

[a] Number and percentage of months during the critical life stage period when 3,500-cfs flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when 3,500-cfs flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when 3,500-cfs flows are met or exceeded.



C-084600

C-084600

Table 5-29. Effects of Lower American River Flow on Sacramento Splittail (I-5 to the Mouth of the American River)

| Life Stage | Number of Months (Critical Period) | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|---|
| | | Months/ Percent[a] | Project Change (Months/Percent)[b] | Project Change (Months/Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[c] | Cumulative Change (Months/Percent)[c] |
| **3,500-cfs Flows** | | | | | | | |
| Spawning/incubation/ rearing | 210 (February–April) | 84<br>40% | -3<br>-1% | 0<br>0% | 89<br>42% | -21<br>-10% | -17<br>-8% |

[a] Number and percentage of months during the critical life stage period when 3,500 cfs flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Alternatives 2 and 3 when 3,500-cfs flows are met or exceeded.

[c] The difference in the number and percentage of months during the critical life stage periods between existing conditions and cumulative conditions under Alternatives 2 and 3 when 3,500-cfs flows are met or exceeded.



C-084601

C-084601

Table 5-30. Percent of Months with Potential to Have at Least a 1°F Increase or Decrease at Four Locations along the American River under Alternatives 2 and 3

| | Increase | | | | Decrease | | | |
|---|---|---|---|---|---|---|---|---|
| | Alternative 2 | Alternative 3 | Alternative 2 Cumulative | Alternative 3 Cumulative | Alternative 2 | Alternative 3 | Alternative 2 Cumulative | Alternative 3 Cumulative |
| **Nimbus Dam** | | | | | | | | |
| October | 0 | 3 | 10 | 1 | 0 | 0 | 41 | 41 |
| November | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| December | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| January | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| February | 0 | 0 | 6 | 1 | 0 | 0 | 0 | 0 |
| March | 0 | 0 | 20 | 14 | 1 | 1 | 0 | 0 |
| April | 0 | 0 | 21 | 16 | 1 | 1 | 0 | 0 |
| May | 0 | 0 | 19 | 16 | 1 | 1 | 1 | 1 |
| June | 0 | 0 | 17 | 9 | 1 | 1 | 3 | 3 |
| July | 0 | 0 | 19 | 14 | 1 | 1 | 10 | 16 |
| August | 0 | 0 | 13 | 6 | 1 | 1 | 31 | 31 |
| Sepember | 0 | 0 | 0 | 0 | 1 | 1 | 36 | 39 |
| **Goethe Park** | | | | | | | | |
| October | 0 | 1 | 1 | 0 | 0 | 0 | 39 | 41 |
| November | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| December | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| January | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| February | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| March | 0 | 0 | 14 | 11 | 1 | 1 | 0 | 0 |
| April | 0 | 0 | 23 | 19 | 1 | 1 | 0 | 0 |
| May | 0 | 0 | 24 | 20 | 1 | 1 | 0 | 0 |
| June | 0 | 0 | 24 | 20 | 1 | 1 | 0 | 0 |
| July | 0 | 0 | 60 | 47 | 1 | 1 | 6 | 7 |
| August | 0 | 0 | 54 | 33 | 1 | 1 | 9 | 10 |
| Sepember | 0 | 0 | 21 | 10 | 1 | 1 | 17 | 23 |
| **Fairbairn WTP** | | | | | | | | |
| October | 0 | 0 | 3 | 0 | 0 | 0 | 39 | 40 |
| November | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| December | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| January | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| February | 0 | 0 | 9 | 7 | 0 | 0 | 4 | 6 |
| March | 0 | 0 | 16 | 10 | 1 | 1 | 0 | 0 |
| April | 1 | 0 | 26 | 23 | 1 | 1 | 0 | 0 |
| May | 0 | 0 | 33 | 30 | 1 | 1 | 0 | 0 |
| June | 4 | 1 | 47 | 46 | 1 | 1 | 0 | 1 |
| July | 1 | 0 | 77 | 73 | 1 | 3 | 13 | 14 |
| August | 3 | 0 | 77 | 74 | 3 | 1 | 6 | 7 |
| Sepember | 1 | 0 | 47 | 26 | 1 | 1 | 6 | 13 |
| **Mouth** | | | | | | | | |
| October | 0 | 0 | 4 | 0 | 0 | 0 | 37 | 39 |
| November | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| December | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| January | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| February | 0 | 0 | 9 | 7 | 0 | 0 | 9 | 10 |
| March | 0 | 0 | 16 | 13 | 1 | 1 | 1 | 0 |
| April | 1 | 0 | 29 | 23 | 1 | 3 | 0 | 1 |
| May | 1 | 0 | 36 | 33 | 1 | 1 | 0 | 0 |
| June | 7 | 1 | 51 | 51 | 3 | 1 | 4 | 9 |
| July | 3 | 0 | 79 | 76 | 1 | 3 | 11 | 19 |
| August | 4 | 1 | 83 | 79 | 3 | 3 | 4 | 6 |
| Sepember | 3 | 0 | 61 | 50 | 3 | 1 | 3 | 9 |



C-084602

C-084602

Table 5-31. Comparison of Delta Outflow Required

| Month | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|
| | Months/ Percent[a] | Project Change (Months/ Percent)[b] | Project Change (Months/ Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[b] | Cumulative Change (Months/Percent)[b] |
| October | 68 | -1 | 0 | 69 | 1 | 1 |
| | 99% | -2% | 0% | 99% | 1% | 1% |
| November | 69 | 1 | 0 | 68 | 1 | 2 |
| | 100% | 1% | 0% | 97% | 1% | 3% |
| December | 70 | 0 | 0 | 70 | 0 | 0 |
| | 100% | 0% | 0% | 100% | 0% | 0% |
| January | 70 | 0 | 0 | 70 | 0 | 0 |
| | 100% | 0% | 0% | 100% | 0% | 0% |
| February | 70 | 0 | 0 | 70 | 0 | 0 |
| | 100% | 0% | 0% | 100% | 0% | 0% |
| March | 70 | 0 | 0 | 70 | 0 | 0 |
| | 100% | 0% | 0% | 100% | 0% | 0% |
| April | 68 | 0 | 0 | 68 | 0 | 2 |
| | 99% | 0% | 0% | 99% | 0% | 3% |
| May | 70 | 0 | 0 | 70 | 0 | 0 |
| | 100% | 0% | 0% | 100% | 0% | 0% |
| June | 70 | 0 | 0 | 70 | 0 | 0 |
| | 100% | 0% | 0% | 100% | 0% | 0% |
| July | 70 | 0 | 0 | 70 | 0 | 0 |
| | 100% | 0% | 0% | 100% | 0% | 0% |
| August | 70 | 0 | 0 | 70 | 0 | 0 |
| | 100% | 0% | 0% | 100% | 0% | 0% |
| September | 70 | 0 | 0 | 70 | 0 | 0 |
| | 100% | 0% | 0% | 100% | 0% | 0% |

[a] Number and percentage of months during the simulated 70-year period when the minimum Delta outflow requirements are met.

[b] The difference in the number and percentage of months between Alternative 1 and Alternatives 2 and 3, or between existing conditions and the cumultative conditions under Alternatives 2 and 3 when the minimum Delta outflow requirements are met.



C-084603

C-084603

Table 5-32. Comparison of Delta Exports

| Month | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 2 | Alternative 3 |
|---|---|---|---|---|---|---|
| | Months/ Percent[a] | Project Change (Months/ Percent)[b] | Project Change (Months/ Percent)[b] | Months/ Percent[a] | Cumulative Change (Months/Percent)[b] | Cumulative Change (Months/Percent)[b] |
| October | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| November | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| December | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| January | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| February | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| March | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| April | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| May | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| June | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| July | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| August | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |
| September | 70<br>100% | 0<br>0% | 0<br>0% | 70<br>100% | 0<br>0% | 0<br>0% |

[a] Number and percentage of months during the simulated 70-year period when the minimum Delta export requirements are met.

[b] The difference in the number and percentage of months between Alternative 1 and Alternatives 2 and 3 when the Delta export requirements are met.



C-084604

C-084604

Table 5-33. Effects of Changes in Reservoir Elevation on Warmwater Fish Habitat in Shasta Lake

| Life Stage | Number of Months (Relevant Period) | Alternative 1 Months/ Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/ Percent[b] | Alternative 2 Cumulative Change (Months/Percent)[b] | Alternative 3 Cumulative Change (Months/Percent)[b] |
|---|---|---|---|---|---|---|---|
| **1,017-Foot Surface Elevation** | | | | | | | |
| Spawning/incubation | 280 | 220 | 0 | 0 | 235 | -16 | -15 |
| | (April–July) | 79% | 0% | 0% | 84% | -5% | 5% |
| Juvenile/adult rearing | 840 | 482 | -2 | -1 | 531 | -45 | -47 |
| | (October–September) | 57% | 0% | 0% | 63% | -5% | -5% |
| **<2-Foot Surface Elevation Decrease** | | | | | | | |
| Spawning/incubation | 280 | 117 | -2 | -1 | 113 | 3 | 3 |
| | (April–July) | 42% | -1% | -1% | 40% | 1% | 1% |
| **<20-Foot Surface Elevation Increase** | | | | | | | |
| Spawning/incubation | 280 | 267 | 0 | 0 | 265 | 2 | 2 |
| | (April–July) | 95% | 0% | 0% | 95% | 0 % | 0% |

[a] Number and percentage of months during the relevant period when the reservoir elevation is at least 1,017 feet, reservoir surface elevation decreases by less than 2 feet per month, or the reservoir surface elevation increases by less than 20 feet per month.

[b] Difference in the number and percentage of months during the relevant period between Alternative 1 and Alternatives 2 and 3 when the reservoir elevation is above or below thresholds.



C-084605

Table 5-34. Effects of Changes in Reservoir Elevation on Warmwater Fish Habitat in Trinity Lake

| Life Stage | Number of Months (Relevant Period) | Alternative 1 Months/ Percent[a] | Alternative 2 Project Change (Months/Percent)[b] | Alternative 3 Project Change (Months/Percent)[b] | Existing Conditions Months/ Percent[b] | Alternative 2 Cumulative Change (Months/Percent)[b] | Alternative 3 Cumulative Change (Months/Percent)[b] |
|---|---|---|---|---|---|---|---|
| **2,295-Foot Surface Elevation** | | | | | | | |
| Spawning/incubation | 280 | 122 | -3 | 10 | 179 | -59 | -60 |
| | (April–July) | 44% | -1% | 3% | 64% | -21% | -21% |
| Juvenile/adult rearing | 840 | 244 | -2 | 3 | 447 | -204 | -204 |
| | (October–September) | 29% | 0% | 0% | 53% | -24% | -24% |
| **<2-Foot Surface Elevation Decrease** | | | | | | | |
| Spawning/incubation | 280 | 96 | 2 | 3 | 137 | -40 | -40 |
| | (April–July) | 34% | 1% | 1% | 49% | -14% | -14% |
| **<20-Foot Surface Elevation Increase** | | | | | | | |
| Spawning/incubation | 280 | 276 | 0 | 0 | 278 | -2 | -2 |
| | (April–July) | 99% | 0% | 0% | 99% | 0 % | 0% |

[a] Number and percentage of months during the relevant period when the reservoir elevation is at least 2,295 feet, reservoir surface elevation decreases by less than 2 feet per month, or the reservoir surface elevation increases by less than 20 feet per month.

[b] Difference in the number and percentage of months during the relevant period between Alternative 1 and Alternatives 2 and 3 when the reservoir elevation is above or below thresholds.



C-084606

C-084606

Table 5-35. Effects of Changes in Reservoir Elevation on Warmwater Fish Habitat in Folsom Reservoir under the Full-Use Scenario-Alternative 3

| Life Stage | Number of Months (Relevant Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario (Months/Percent)[b] |
|---|---|---|---|
| **410-Foot Surface Elevation** | | | |
| Spawning/incubation | 280 | 249 | 2 |
| | (April–July) | 89% | 1% |
| Juvenile/adult rearing | 840 | 649 | 3 |
| | (October–September) | 77% | 1% |
| **<2-Foot Surface Elevation Decrease** | | | |
| Spawning/incubation | 280 | 162 | 5 |
| | (April–July) | 58% | 2% |
| **<20-Foot Surface Elevation Increase** | | | |
| Spawning/incubation | 280 | 254 | 11 |
| | (April–July) | 91% | 4% |

[a] Number and percentage of months during the relevant period when the reservoir elevation is at least 410 feet, reservoir surface elevation decreases by less than 2 feet per month, or the reservoir surface elevation increases by less than 20 feet per month.



C-084607

C-084607

Table 5-36. Effects of Changes in Reservoir Storage on Coldwater Reservoir Fish Habitat under the Full-Use Scenario Alternative 3

| Life Stage | Number of Months (Relevant Period) | Full-Use Scenario (Months/Percent)[a] |
|---|---|---|
| **Folsom Reservoir** | | |
| Juvenile/adult rearing | 490 | -17 |
| | (April-October) | -3% |
| **Shasta Lake** | | |
| Juvenile/adult rearing | 490 | -9 |
| | (April-October) | -2% |
| **Trinity Lake** | | |
| Juvenile/adult rearing | 490 | -15 |
| | (April-October) | -3% |

[a] Difference in the number and percentage of months during the relevant period in the full-use scenario-Alternatives 3 when reservoir storage is less than 5% or 10% of reservoir storage under Alternative 1.



C-084608

C-084608

Table 5-37. Hodge Decision and AFRP Flows
Full-Use Scenario-Alternative 3 (Nimbus Dam to Fairbairn WTP)

| Flows | Number of Months (Relevant Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| 2,000 cfs | 280 (November–February) | 254 91% | -1 <0% |
| 3,000 cfs | 280 (March–June) | 139 50% | 1 <1% |
| 1,750 cfs | 280 (July–October) | 209 75% | 0 0% |
| **AFRP Flows** | | | |
| 2,000 cfs | 350 (October–February) | 314 90% | -1 <1% |
| 3,000 cfs | 280 (March–June) | 139 50% | 1 <1% |
| 2,500 cfs | 70 (Jul) | 40 57% | 1 <1% |
| 2,000 cfs | 70 (August) | 49 70% | 0 <1% |
| 1,500 cfs | 70 (September) | 42 60% | 0 0% |

[a] Number and percentage of months during the relevant period when the flows meet or exceed the indicated minimum flows.

[b] The difference in the number and percentage of months during the relevant period between Alternative 1 and Full-Use Scenario-Alternative 3 when flows meet or exceed the minimum flows.



C—084609

C-084609

Table 5-38. Hodge and AFRP Flows
Full-Use Scenario-Alternative 3 (Fairbairn WTP to I-5)

| Flows | Number of Months (Relevant Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| 2,000 cfs | 280 (Nov-Feb) | 235 84% | -1 <0% |
| 3,000 cfs | 280 (Mar-Jun) | 123 44% | 0 <1% |
| 1,750 cfs | 280 (Jul-Oct) | 176 63% | -2 -1% |
| **AFRP Flows** | | | |
| 2,000 cfs | 350 (Oct-Feb) | 278 79% | -4 -1% |
| 3,000 cfs | 280 (Mar-Jun) | 123 44% | 0 <1% |
| 2,500 cfs | 70 (Jul) | 20 29% | -3 -4% |
| 2,000 cfs | 70 (Aug) | 25 36% | 0 0% |
| 1,500 cfs | 70 (Sep) | 36 51% | -1 -1% |

[a] Number and percentage of months during the relevant period when the flows meet or exceed the indicated minimum flows.

[b] The difference in the number and percentage of months during the relevant period between Alternative 1 and Full Use Scenario - Alternative 3 when flows meet or exceed the minimum flows.



C-084610

C-084610

**Table 5-39. Hodge and AFRP Flows**
**Full-Use Scenario-Alternative 3 (I-5 to the Mouth)**

| Flows | Number of Months (Relevant Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| 2,000 cfs | 280 (Nov-Feb) | 235 84% | -11 -4% |
| 3,000 cfs | 280 (Mar-Jun) | 123 44% | -5 -2% |
| 1,750 cfs | 280 (Jul-Oct) | 176 63% | -38 -14% |
| **AFRP Flows** | | | |
| 2,000 cfs | 350 (Oct-Feb) | 278 79% | -15 -4% |
| 3,000 cfs | 280 (Mar-Jun) | 123 44% | -5 -2% |
| 2,500 cfs | 70 (Jul) | 20 29% | -6 -9% |
| 2,000 cfs | 70 (Aug) | 25 36% | -4 -6% |
| 1,500 cfs | 70 (Sep) | 36 51% | -3 -4% |

[a] Number and percentage of months during the relevant period when the flows meet or exceed the indicated minimum flows.

[b] The difference in the number and percentage of months during the relevant period between Alternative 1 and Full Use Scenario - Alternative 3 when flows meet or exceed the minimum flows.



C-084611

C-084611

Table 5-40. Effects of Lower American River Flows on Chinook Salmon Full-Use Scenario-Alternative 3 (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Adult migration | 210 (Sep-Nov) | 160 76% | -1 0% |
| Spawning | 210 (Oct-Dec) | 188 90% | -2 -1% |
| Incubation | 420 (Oct-Mar) | 347 83% | -1 0% |
| Rearing/emigration | 420 (Jan-Jun) | 265 63% | 2 <1% |
| **AFRP Flows** | | | |
| Adult migration | 350 (Sep-Nov) | 163 47% | -4 -1% |
| Spawning | 280 (Oct-Dec) | 185 66% | -5 -2% |
| Incubation | 420 (Oct-Mar) | 341 81% | -7 1% |
| Rearing/emigration | 420 (Jan-Jun) | 259 62% | -4 1% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario - Alternative 3 when Hodge or AFRP flows are met or exceeded.



C-084612

C-084612

Table 5-41. Effects of Lower American River Flows on Chinook Salmon Full-Use Scenario-Alternative 3 (Fairbairn WTP to I-5)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Adult migration | 210 (Sep-Nov) | 154 73% | -4 -2% |
| Rearing/emigration | 420 (Jan-Jun) | 240 57% | -1 0% |
| **AFRP Flows** | | | |
| Adult migration | 210 (Sep-Nov) | 138 66% | -4 -2% |
| Rearing/emigration | 420 (Jan-Jun) | 240 57% | -1 0% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario - Alternative 3 when Hodge or AFRP flows are met or exceeded.



C-084613

C-084613

Table 5-42. Effects of Lower American River Flows on Chinook Salmon Full-Use Scenario-Alternative 3 (I-5 to the Mouth)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Adult migration | 210 (Sep-Nov) | 154 73% | -25 -12% |
| Rearing/emigration | 420 (Jan-Jun) | 240 57% | -16 -4% |
| **AFRP Flows** | | | |
| Adult migration | 210 (Sep-Nov) | 138 66% | -7 -3% |
| Rearing/emigration | 420 (Jan-Jun) | 240 57% | -16 -4% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario - Alternative 3 when Hodge or AFRP flows are met or exceeded.

Table 5-43. Effects of Lower American River Flows on Steelhead
Full-Use Scenario-Alternative 3 (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Adult migration | 630 (Aug - Apr) | 464 74% | 0 0% |
| Spawning | 350 (Dec-Apr) | 255 73% | 1 <1% |
| Incubation | 420 (Dec-May) | 289 69% | 1 <1% |
| Rearing | 840 (Oct-Sep) | 602 72% | 0 0% |
| Emigration | 280 (Mar-Jun) | 139 50% | 1 <1% |
| **AFRP Flows** | | | |
| Adult migration | 630 (Aug - Apr) | 461 73% | -9 -1% |
| Spawning | 350 (Dec-Apr) | 250 71% | -4 -1% |
| Incubation | 420 (Dec-May) | 283 67% | -5 -1% |
| Rearing | 840 (Oct-Sep) | 572 68% | -11 -1% |
| Emigration | 280 (Mar-Jun) | 135 48% | -3 -1% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario - Alternative 3 Hodge or AFRP flows are met or exceeded.



C-084615

C-084615

**Table 5-44. Effects of Lower American River Flows on Steelhead Full-Use Scenario-Alternative 3 (Fairbairn WTP to I-5)**

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Emigration | 280 (Mar-Jun) | 123 44% | 0 0% |
| Adult migration | 630 (Aug-Apr) | 428 68% | -4 -1% |
| **AFRP Flows** | | | |
| Emigration | 280 (Mar-Jun) | 123 44% | 0 0% |
| Adult migration | 630 (Aug-Apr) | 396 63% | 28 4% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario - Alternative 3 when Hodge or AFRP flows are met or exceeded.

**Table 5-45. Effects of Lower American River Flows on Steelhead Full-Use Scenario-Alternative 3 (I-5 to Mouth)**

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Emigration | 280 (Mar-Jun) | 123 44% | -5 -2% |
| Adult migration | 630 (Aug-Apr) | 428 68% | -53 -8% |
| **AFRP Flows** | | | |
| Emigration | 280 (Mar-Jun) | 123 44% | -5 -2% |
| Adult migration | 630 (Aug-Apr) | 396 63% | -25 -4% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario - Alternative 3 when Hodge or AFRP flows are met or exceeded.



C—084616

C-084616

Table 5-46. Effects of Lower American River Flow on Striped Bass
Full-Use Scenario-Alternative 3 (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Rearing | 490 (Apr-Oct) | 315 64% | 1 <1% |
| **AFRP Flows** | | | |
| Rearing | 490 (Apr-Oct) | 290 59% | -5 -1% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario - Alternative 3 when Hodge or AFRP flows are met or exceeded.

Table 5-47. Effects of Lower American River Flow on Striped Bass
Full-Use Scenario-Alternative 3 ( Fairbairn WTP to I-5)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Rearing | 490 (Apr-Oct) | 269 55% | -2 <1% |
| **AFRP Flows** | | | |
| Rearing | 490 (Apr-Oct) | 217 44% | -7 -1% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario-Alternative 3 when Hodge or AFRP flows are met or exceeded.



C-084617

C-084617

Table 5-48. Effects of Lower American River Flow on Striped Bass Full-Use Scenario-Alternative 3 (I-5 to Mouth)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Rearing | 490 (Apr-Oct) | 269 55% | -40 -8% |
| **AFRP Flows** | | | |
| Rearing | 490 (Apr-Oct) | 217 44% | -19 -4% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and the Full Use Scenario-Alternative 3 when Hodge or AFRP flows are met or exceeded.

Table 5-49. Effects of Lower American River Flow on American Shad, Full-Use Scenario-Alternative 3 (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Adult migration/ spawning/incubation | 280 (Apr-Jul) | 170 61% | -1 <1% |
| **AFRP Flows** | | | |
| Adult migration/ spawning/incubation | 280 (Apr-Jul) | 142 51% | -2 -1% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario-Alternative 3 when Hodge or AFRP flows are met or exceeded.



C-084618

C-084618

Table 5-50. Effects of Lower American River Flow on American Shad Full-Use Scenario-Alternative 3 (Fairbairn WTP to I-5)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Adult migration/ spawning/incubation | 280 (Apr-Jul) | 133 48% | 1 <1% |
| **AFRP Flows** | | | |
| Adult migration/ spawning/incubation | 280 (Apr-Jul) | 113 40% | -3 -1% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario-Alternative 3 when Hodge or AFRP flows are met or exceeded.

Table 5-51. Effects of Lower American River Flow on American Shad Full-Use Scenario-Alternative 3 (I-5 to Mouth)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **Hodge Decision Flows** | | | |
| Adult migration/ spawning/incubation | 280 (Apr-Jul) | 133 48% | -1 <1% |
| **AFRP Flows** | | | |
| Adult migration/ spawning/incubation | 280 (Apr-Jul) | 113 40% | -8 -3% |

[a] Number and percentage of months during the critical life stage period when minimum Hodge or AFRP flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario-Alternative 3 when Hodge or AFRP flows are met or exceeded.



C-084619

C-084619

Table 5-52. Effects of Lower American River Flow on Sacramento Splittail (Nimbus Dam to Fairbairn WTP)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **3,500 cfs Flows** | | | |
| Spawning/incubation/ rearing | 210 (Feb-Apr) | 84 40% | 0 0% |

[a] Number and percentage of months during the critical life stage period when 3,500 cfs flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario-Alternative 3 when 3,500 cfs flows are met or exceeded.

Table 5-53. Effects of Lower American River Flow on Sacramento Splittail Full-Use Scenario-Alternative 3 (Fairbairn WTP to I-5)

| Life Stage | Number of Months (Critical Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **3,500 cfs Flows** | | | |
| Spawning/incubation/ rearing | 210 (Feb-Apr) | 84 40% | 0 0% |

[a] Number and percentage of months during the critical life stage period when 3,500 cfs flows are met or exceeded.

[b] The difference in the number and percentage of months during the critical life stage periods between Alternative 1 and Full Use Scenario-Alternative 3 when 3,500 cfs flows are met or exceeded.



C-084620

C-084620

Table 5-54. Percent of Months with Potential to Have at Least a 1°F Temperature Increase or Decrease at Four Locations along the American River under the Full-Use Scenario-Alternative 3

| | Increase | Decrease |
|---|---|---|
| **Nimbus Dam** | | |
| October | 3 | 0 |
| November | 0 | 0 |
| December | 0 | 0 |
| January | 0 | 0 |
| February | 0 | 0 |
| March | 0 | 0 |
| April | 0 | 0 |
| May | 0 | 0 |
| June | 0 | 0 |
| July | 0 | 0 |
| August | 0 | 0 |
| September | 0 | 0 |
| **Goethe Park** | | |
| October | 1 | 0 |
| November | 0 | 0 |
| December | 0 | 0 |
| January | 0 | 0 |
| February | 0 | 0 |
| March | 0 | 0 |
| April | 0 | 0 |
| May | 0 | 0 |
| June | 0 | 0 |
| July | 0 | 0 |
| August | 0 | 0 |
| September | 0 | 0 |
| **Fairbairn WTP** | | |
| October | 0 | 0 |
| November | 0 | 0 |
| December | 0 | 0 |
| January | 0 | 0 |
| February | 0 | 1 |
| March | 0 | 0 |
| April | 0 | 0 |
| May | 0 | 0 |
| June | 0 | 1 |
| July | 0 | 3 |
| August | 0 | 0 |
| September | 0 | 0 |
| **Mouth** | | |
| October | 0 | 0 |
| November | 0 | 0 |
| December | 0 | 0 |
| January | 1 | 0 |
| February | 0 | 1 |
| March | 0 | 0 |
| April | 0 | 1 |
| May | 0 | 0 |
| June | 0 | 1 |
| July | 0 | 4 |
| August | 1 | 3 |
| September | 3 | 0 |



C-084621

C-084621

Table 5-55. Comparison of Delta Outflow Required under the Full-Use Scenario-Alternative 3

| Month | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|
| October | 68<br>99% | 0<br>0% |
| November | 69<br>100% | -1<br>-1% |
| December | 70<br>100% | 0<br>0% |
| January | 70<br>100% | 0<br>0% |
| February | 70<br>100% | 0<br>0% |
| March | 70<br>100% | 0<br>0% |
| April | 68<br>99% | 0<br>0% |
| May | 70<br>100% | 0<br>0% |
| June | 70<br>100% | 0<br>0% |
| July | 70<br>100% | 0<br>0% |
| August | 70<br>100% | 0<br>0% |
| September | 70<br>100% | 0<br>0% |

[a] Number and percentage of months during the simulated 70-year period when the minimum Delta outflow requirements are met.

[b] The difference in the number and percentage of months between Alternative 1 and full-use scenarios for Alternative 3 when the minimum Delta outflow requirements are met.



C-084622

C-084622

Table 5-56. Comparison of Delta Exports under the Full-Use Scenario-Alternative 3

| Month | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|
| October | 70<br>100% | 0<br>0% |
| November | 70<br>100% | 0<br>0% |
| December | 70<br>100% | 0<br>0% |
| January | 70<br>100% | 0<br>0% |
| February | 70<br>100% | 0<br>0% |
| March | 70<br>100% | 0<br>0% |
| April | 70<br>100% | 0<br>0% |
| May | 70<br>100% | 0<br>0% |
| June | 70<br>100% | 0<br>0% |
| July | 70<br>100% | 0<br>0% |
| August | 70<br>100% | 0<br>0% |
| September | 70<br>100% | 0<br>0% |

[a] Number and percentage of months during the simulated 70-year period when the minimum Delta export requirements are met.

[b] The difference in the number and percentage of months between Alternative 1 and the full-use scenario for Alternative 3 when the Delta export requirements are met.

Table 5-57. Effects of Changes in Reservoir Elevation on Warmwater Fish Habitat in Shasta Lake under the Full-Use Scenario-Alternative 3

| Life Stage | Number of Months (Relevant Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **1017-Foot Surface Elevation** | | | |
| Spawning/incubation | 280 (Apr-Jul) | 220 79% | 1 0% |
| Juvenile/adult rearing | 840 (Oct-Sep) | 482 57% | -1 0% |
| **<2-Foot Surface Elevation Decrease** | | | |
| Spawning/incubation | 280 (Apr-Jul) | 117 42% | -1 -1% |
| **<20-Foot Surface Elevation Increase** | | | |
| Spawning/incubation | 280 (Apr-Jul) | 267 95% | 0 0% |

[a] Number and percentage of months during the relevant period when the reservoir elevation is at least 1017 feet, reservoir surface elevation decreases by less than 2 feet per month, or the reservoir surface elevation increases by less than 20 feet per month.



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Table 5-58. Effects of Changes in Reservoir Elevation on Warmwater Fish Habitat in Trinity Lake under the Full-Use Scenario-Alternative 3

| Life Stage | Number of Months (Relevant Period) | Alternative 1 (Months/Percent)[a] | Full-Use Scenario Change (Months/Percent)[b] |
|---|---|---|---|
| **2,295-Foot Surface Elevation** | | | |
| Spawning/incubation | 280 (Apr-Jul) | 122 44% | -2 -1% |
| Juvenile/adult rearing | 840 (Oct-Sep) | 244 29% | 1 0% |
| **<2-Foot Surface Elevation Decrease** | | | |
| Spawning/incubation | 280 (Apr-Jul) | 96 34% | 1 1% |
| **<20-Foot Surface Elevation Increase** | | | |
| Spawning/incubation | 280 (Apr-Jul) | 276 99% | 0 0% |

[a] Number and percentage of months during the relevant period when the reservoir elevation is at least 2,295 feet, reservoir surface elevation decreases by less than 2 feet per month, or the reservoir surface elevation increases by less than 20 feet per month.



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Chapter 6

# Recreation

# Chapter 6. Recreation

## AFFECTED ENVIRONMENT

Implementation of the project alternatives could affect recreational opportunities primarily at Folsom Reservoir, the lower American River, Pardee Reservoir, Camanche Reservoir, and the Mokelumne River below Camanche Reservoir.

### Folsom Reservoir

**Facilities and Activities**

Folsom Reservoir is part of the Folsom Lake State Recreation Area (SRA), which is managed by the California Department of Parks and Recreation (DPR). The SRA encompasses both Folsom Reservoir and Lake Natoma. When full, Folsom Reservoir has a surface area of 11,450 acres, 75 miles of shoreline, and a surface elevation of 466 feet above mean sea level (msl).

Folsom Reservoir accommodates a variety of water-dependent recreational activities, including boating, fishing, swimming, jet skiing, windsurfing, and sailing. Water-enhanced activities include camping, picnicking, and hiking. The reservoir has eight boat ramps at five different use areas around the lake. Major shoreline use areas are Beals Point, Granite Bay, and Rattlesnake Bar on the western shoreline; Dike 8, Mormon Island, and Brown's Ravine Marina on the southern and eastern shorelines; and the Peninsula Campground between the north and south forks of the American River. Brown's Ravine Marina has 670 berthing slips for year-round mooring and a watercraft rental business.

Boating, sailing, and waterskiing take place throughout the main reservoir area. Anglers fish from boats throughout the lake and especially in the upper arms that are designated slow-boating zones. Fishing is mainly for rainbow trout and warmwater species. Swimming and sunbathing take place at the designated beaches at Beals Point and Granite Bay and at many nondesignated areas along the reservoir shoreline.

**Use**

In 1996, visitation to the entire Folsom Lake SRA was estimated at 912,600 visits (Woods pers. comm.). The SRA is one of the most visited units in the California state park system, primarily because of its proximity to the Sacramento metropolitan area, the arid summer climate, and high regional interest in recreation (U.S. Army Corps of Engineers 1991).

Water-dependent activities dominate Folsom Reservoir recreation, accounting for more than 80% of annual use. Boating is the most popular activity at the reservoir, followed by swimming and fishing (California Department of Parks and Recreation 1989).

Approximately 85% of Folsom Reservoir's annual recreation visits are between April and September; most visits, 17%, are in July. Annual visitation is approximately 15% in October through March and reaches its lowest level, 1%, in December. (California Department of Parks and Recreation 1989.)

Approximately 95% of day-use recreationists and 33% of overnight recreationists originate from the Sacramento Valley. The remaining overnight users originate from the San Francisco Bay area and elsewhere. (California Department of Parks and Recreation 1989.)

### Lake Natoma

Lake Natoma covers an estimated 500 acres and is just downstream of Folsom Reservoir. The lake has approximately 10 miles of shoreline with a typical daily drawdown of approximately 3–4 feet (California Department of Parks and Recreation 1989). Water-



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dependent activities include fishing, nonmotorized boating, and windsurfing. Lake Natoma is not as popular for swimming and wading as Folsom Reservoir because of its cooler water temperature (U.S. Army Corps of Engineers 1991). Lake facilities include the California State University, Sacramento, aquatic center; several picnic areas; and an 8-mile-long segment of the Jedediah Smith National Recreation Trail.

## Lower American River

### Facilities and Activities

The lower American River extends for 23 miles between Folsom Reservoir and the confluence with the Sacramento River. The river passes through the American River Parkway, a 6,000-acre open space corridor extending between Nimbus Dam and the river's confluence with the Sacramento River (U.S. Army Corps of Engineers 1991).

The parkway has 14 county parks that provide user access. The Jedediah Smith National Recreation Trail provides bicycling, hiking, and horseback riding opportunities from Discovery Park to the Folsom Lake SRA (U.S. Army Corps of Engineers 1991).

The lower American River is a major site for recreational boating (rafting, kayaking, and canoeing), fishing, swimming, and wading. The most popular reach for rafting is from Sunrise Avenue to Watt Avenue; however, when ambient temperatures are cold, rafting declines, even during the peak recreation season (May–September). Both shoreline and boat fishing take place throughout the river. Fishing is mainly for salmon, steelhead, and shad. Swimming and wading are popular at Paradise Beach and Tiscornia Park. (California State Water Resources Control Board 1988b.)

### Use

Total annual use of the parkway in 1996 was estimated at 5.5 million visitors. Water-dependent activities accounted for an estimated 32% of total annual use. Boating, particularly rafting, is the most popular water-dependent activity at the river, followed by fishing and swimming. (U.S. Army Corps of Engineers 1991.)

Although overall recreational use of the American River Parkway is relatively uniform throughout the year, boating and swimming occur more frequently in summer. Approximately 90% of the annual rentals of commercial rafts occurs between Memorial Day and Labor Day (U.S. Army Corps of Engineers 1991).

## Pardee Reservoir

### Facilities and Activities

Pardee Reservoir is owned and operated by EBMUD. Water-contact recreation is not allowed on the reservoir. When full, Pardee Reservoir has a surface area of 2,200 acres, 43 miles of shoreline, and a surface elevation of 568 feet above msl.

Recreation facilities at the reservoir include a main recreation area with tent and recreational vehicle camp sites, a marina, and one boat ramp. The marina rents boats and has a bait and tackle shop. (EDAW 1992.)

Water-dependent activities include boating and fishing. Shoreline access for anglers is provided at Boathouse Cove, Marina Cove, Woodpile Gulch, and Stoney Creek Landing. Float tubes are allowed only in designated areas of the reservoir (EDAW 1992). Anglers fish for coldwater species such as rainbow trout and kokanee salmon and warmwater species such as bass and catfish (Pierner pers. comm.).



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**Use**

An estimated 103,000 visits were recorded at Pardee Reservoir in 1996. Day-use activities account for 71% of annual visitation. The most popular day uses are water-dependent activities such as fishing and boating. (Pierner pers. comm.)

Most recreational use at Pardee Reservoir takes place during spring and early summer (March–June); however, when ambient temperatures are cold, activities such as fishing decline. Although Pardee Reservoir is not as popular as Camanche Reservoir during summer because of restrictions on water-contact activities, the three summer holiday weekends (Memorial Day, July 4th, and Labor Day) attract full-capacity crowds. Public access to the reservoir is not allowed from mid-November to mid-February to coincide with the migratory waterfowl season. (Pierner pers. comm.)

## Camanche Reservoir

**Facilities and Activities**

Camanche Reservoir is owned and operated by EBMUD. When full, Camanche Reservoir has a surface area of 7,700 acres, 53 miles of shoreline, and a surface elevation of 236 feet above msl.

Recreation facilities include 15,000 acres of recreation lands, two main recreation areas with tent and recreational vehicle camp sites, two marinas, and three paved boat ramps. The north and south shore marinas are full-service facilities featuring boat slips, boat rentals, and bait and tackle (EDAW 1992).

Water-dependent recreation activities include swimming, waterskiing, jet skiing, windsurfing, and fishing. Waterskiing is restricted in the upper reservoir arms. Anglers fish for coldwater species such as rainbow and brown trout and warmwater species such as channel and white catfish; sunfish; crappie; largemouth, smallmouth, and spotted bass; and white sturgeon (BioSystems Analysis 1992).

**Use**

In 1996, visits to Camanche Reservoir were an estimated 380,000. Use at Camanche Reservoir is equally divided between day and overnight use. Boating is the most popular activity at the reservoir, followed by fishing and camping. (Pierner pers. comm.)

Camanche Reservoir is open throughout the year. Most recreationists participate in water-dependent activities during the peak summer recreation season, and most visits take place in July.

## Mokelumne River

**Facilities and Activities**

The lower Mokelumne River extends for approximately 40 miles between Camanche Reservoir and the Sacramento–San Joaquin Delta. Most of the lower Mokelumne River traverses private rural lands. Major public recreation facilities on the river are EBMUD's Mokelumne River Day Use Area on McIntire Road near Camanche Reservoir, San Joaquin County's Stillman McGee County Park on Mackville Road near the town of Clements, and the City of Lodi's Lake Lodi Park near the community of Woodbridge.

Facilities at the Mokelumne River Day Use Area consist of parking, picnic areas, portable toilets, and river access. Popular water-dependent activities include fishing, wading, swimming, canoeing, kayaking, and tubing (Moranton pers. comm.). Important game fish are American shad, chinook salmon, and steelhead.



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**Use**

No comprehensive estimates of the number of recreation-related visits to the lower Mokelumne River are available because recreation activities are generally dispersed along the length of the river and no single recreation entity administers all the recreation and access facilities. Day use at the Mokelumne River Day Use Area at the fish hatchery totaled approximately 108,000 visits in 1996, mostly between May and September (Pierner pers. comm.). Although attendance figures for Stillman McGee County Park (approximately 4 miles downstream at Mackville Road) are not compiled annually, the most current figures indicate approximately 1,200 visitors annually in 1989 and 1990 (EDAW 1992).

## Other Reservoirs and Rivers

Recreational opportunities at Shasta Lake, Trinity Lake, and the Sacramento River could also be affected by the project alternatives. Similar to Folsom Reservoir and the lower American River, each of these reservoirs and the Sacramento River provide various water-dependent and water-enhanced recreation opportunities.

**Shasta Lake**

Shasta Lake is a unit of the Whiskeytown-Shasta-Trinity NRA. Recreation facilities and activities are administered by the U.S. Forest Service (USFS). At full pool, the lake has a surface area of approximately 30,000 acres, 370 miles of shoreline, and a surface elevation of 1,067 feet above msl. The lake has four main arms: Sacramento River, McCloud, Pit River, and Squaw Creek.

Water-dependent activities include power boating, house boating, waterskiing, and fishing. Water-enhanced activities include camping and sightseeing. Recreational use at Shasta Lake averages about 2.4 million visitor days per year, with an estimated 75% of the recreational use between May and September. Facilities include six public boat ramps, 13 private marinas, and 22 public campgrounds. (U.S. Bureau of Reclamation 1997).

**Trinity Lake**

Trinity Lake is a unit of the Whiskeytown-Shasta-Trinity NRA, with recreation facilities and activities administered by the USFS. Water-dependent activities include power boating, house boating, waterskiing, and fishing. Water-enhanced activities include camping and sightseeing.

Recreational use at Trinity Lake averages about 260,000 visitor days per year, with an estimated 85% of the total recreational use at Trinity Lake between May and September. Facilities at Trinity Lake include four marinas, 10 boat ramps, and 20 campgrounds (Jones & Stokes Associates 1996).

**Sacramento River**

The Sacramento River extends for 300 miles between Keswick Reservoir and the Delta. Public access points are administered by various city and county entities along with the State of California and the U.S. Bureau of Land Management. Popular water-dependent activities include boating and fishing. Water-enhanced activities include camping, hiking, and sightseeing. In 1980, during the last recreation-user survey completed for the entire river, total annual recreational use was estimated to total approximately 2 million 6-hour visitor days (Jones & Stokes Associates 1996).

## ENVIRONMENTAL CONSEQUENCES

This assessment describes the impacts on recreation as a result of changes in reservoir storage, river flows, and disruption of activities associated with facility construction. The assessment focuses on evaluating impacts on:



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- water-dependent (e.g., boating and swimming) recreation opportunities at Folsom Reservoir, the lower American River, Lake Camanche, Pardee Reservoir, the lower Mokelumne River, and other major reservoirs and rivers (i.e., Trinity Lake, Shasta Reservoir, and the Sacramento River) and
- recreation activities on the lower American River near the intake alternatives.

Project level impacts were evaluated by comparing Alternatives 2 and 3 with Alternative 1 (no action). Cumulative impacts were evaluated by comparing Alternatives 2 and 3 cumulative scenarios with existing conditions. The analysis also includes a discussion of the expected changes in recreation opportunities under Alternative 1, compared to existing conditions.

Table 6-1. Recreation Opportunity Thresholds for Important Recreation Sites

| Recreation Site | Recreation Opportunity Thresholds[a] |
|---|---|
| Folsom Reservoir | 360 msl - last boat ramp out of operation<br>400 msl - limited surface area (boating constrained)<br>405 msl - marina closes<br>430 msl - decline in shoreline activities |
| Lower American River | |
| SWRCB thresholds | 1,500–2,000 cfs - boating minimum range<br>3,000–6,000 cfs - boating optimal range<br>1,250–5,000 cfs - swimming |
| CVPIA thresholds | 1,750–3,000 cfs - boating optimal range<br>1,750 cfs - minimum boating flows<br>1,500 cfs - optimal swimming flows |
| Hodge Decision | 1,750 cfs - minimum summer recreation flows |
| Trinity Lake[b] | 2,250 msl - last boat ramp out of operation<br>2,320 msl - limited surface area (boating constrained) |
| Shasta Lake[c] | 950 msl - last boat ramp out of operation<br>1,017 msl - limited surface area (boating constrained) |
| Sacramento River | 2,500–12,000 cfs - boating optimal range |

Notes:

[a] Thresholds are measured in feet above mean sea level (msl) for reservoirs and in cubic feet per second (cfs) for rivers.
[b] Recreation opportunity thresholds at Trinity Lake are for the northern portion of the lake.
[c] Recreation opportunity thresholds at Shasta Lake are for the Sacramento River arm.

Sources: California State Water Resources Control Board 1988b (SWRCB opportunity thresholds for the lower American River). Hodge Decision 1990 and U.S. Bureau of Reclamation 1997 (all other opportunity thresholds).



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## Methods and Assumptions

The analysis of water-dependent and water-enhanced recreation was based on PROSIM and EBMUDSIM hydrological modeling to estimate how changes in hydrological conditions at reservoirs and rivers could affect recreation opportunities. PROSIM was used to evaluate changes at Folsom Reservoir, the lower American River, the Sacramento River, and other CVP reservoirs (Shasta, Whiskeytown, and Trinity). EBMUDSIM was used to evaluate changes at Pardee and Camanche reservoirs and the lower Mokelumne River. A detailed discussion of PROSIM and EBMUDSIM is included in Chapter 3, "Hydrology, Water Supply, and Power."

Changes in both reservoir hydrology and river flows could result in impacts on recreation by changing the frequency at which reservoir levels or river flows are within acceptable ranges or above minimum flows necessary to conduct recreation activities. Key opportunity thresholds used in this analysis are shown in Table 6-1.

The recreation opportunity thresholds used in the impact assessment for the lower American River are based on information compiled by the California State Water Resources Control Board (SWRCB) (1988b), in accordance with the Alameda Superior Court's Order for Reference and developed for the Central Valley Project Improvement Act (CVPIA) Programmatic EIS (U.S. Bureau of Reclamation 1997). Additionally, minimum summer flows stipulated in the Hodge Decision were also evaluated. Information on flows compiled by the SWRCB and developed for the CVPIA Programmatic EIS are specific to the two primary water-dependent activities occurring on the lower American River, swimming and boating. The Hodge Decision stipulated that flows of 1,750 cfs during summer (July through October 15) be met before EBMUD could begin taking deliveries from the lower American River. The Hodge Decision indicated that these flows were the minimum required for meeting the needs of a broad range of recreation activities on the lower American River. The impact analysis incorporates the flows compiled by the SWRCB and developed for the CVPIA Programmatic EIS to assess impacts on specific recreation opportunities and applies the July through October 15 flows stipulated in the Hodge Decision to assess impacts on a broad range of activities.

The recreation opportunity thresholds used in the impact assessment for the Sacramento River, Shasta Lake, and Trinity Lake were based on information developed for the CVPIA Programmatic EIS. The thresholds for the Sacramento River are for boating, the most popular water-dependent activity on the river. For both Shasta and Trinity lakes, opportunity thresholds for areas with the greatest sensitivity to reservoir water levels were used to evaluate impacts on recreation.

The evaluation of recreation opportunities focused on late spring and summer, which typically constitute the busiest recreation season. Peak-use seasons are April–September for reservoirs and May–September for rivers. An off-season analysis was conducted for boating on reservoirs because boating is the most popular activity in fall, winter, and spring. An off-season analysis was not conducted for rivers because water-dependent activities occur infrequently during this period.

The length of time that lake levels or river flow thresholds are exceeded also provides an indication of the impacts on recreation opportunities at reservoirs and rivers. The duration (number of consecutive months) that reservoir levels or river flows would remain below a specific threshold also was evaluated for each alternative.

Impacts on recreation were not assessed at certain CVP/State Water Project (SWP) reservoirs, the Sacramento-San Joaquin River



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Delta, or EBMUD terminal reservoirs for the following reasons:

- Hydrological conditions at other CVP/SWP reservoirs (e.g., Whiskeytown, Oroville, San Luis, New Melones reservoirs) would be very similar under all alternatives.
- Changes in Delta flows would be very similar under all alternatives.
- Operation of EBMUD terminal reservoirs would be similar under all alternatives.

## Significance Criteria

Impacts on both water-dependent and water-enhanced recreation opportunities were considered significant if:

- changes in river flows or reservoir surface elevations would result in substantial changes in recreation opportunities when compared to Alternative 1 or
- operational or construction activities related to the placement of project facilities would cause a substantial long-term disruption of any institutionally recognized recreational activities.

## Impacts Found to Be Less Than Significant

Changes to conditions under Alternative 1 were compared to existing conditions; changes under Alternatives 2 and 3 were compared to no action.

**Alternative 1: No Action**

Alternative 1 would have no project-related impacts on recreation opportunities because hydrologic conditions at reservoirs and rivers would not change.

Under Alternative 1, changes in hydrologic conditions at Folsom Reservoir, the lower American River, and other major reservoirs would result in changes in recreation opportunities at these sites. At Folsom Reservoir, the surface elevation of the reservoir during the peak and off seasons would be above important recreation opportunity thresholds more frequently under Alternative 1 than under existing conditions (Table 6-2). On the lower American River, flows would be within the minimum ranges for boating more frequently under Alternative 1 than under existing conditions and within the optimal flow range for boating and swimming less frequently under Alternative 1 than under existing conditions (Table 6-3). At Shasta and Trinity lakes, the surface elevation of both reservoirs would be below important recreation opportunity thresholds more frequently under Alternative 1 than under existing conditions (Table 6-4).



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**Table 6-2. Comparison of Lake Level Exceedance Frequencies for Recreation Opportunities Occurring at Folsom Reservoir[a]**

| | Project Change | | | | Cumulative Change | |
|---|---|---|---|---|---|---|
| | Alternative 1 | Alternative 2 | Alternative 3 | Existing Conditions | Alternative 3 | Alternative 3 |
| Recreation Threshold | Months[b]/ Percent[c] | Months[d]/ Percent[c] | Months[d]/ Percent[c] | Months[b]/ Percent | Months[d]/ Percent[c] | Months[d]/ Percent[c] |
| Peak-Season[e] | | | | | | |
| 360 msl - last boat ramp out of operation | 420/100% | No change | -2/100% | 416/99% | 3/100% | 4/100% |
| 400 msl - limited surface area | 388/92% | -4/91% | No change | 372/89% | 9/91% | 11/91% |
| 405 msl - marina closes | 372/81% | No change | +2/89% | 342/81% | 23/87% | 26/88% |
| 430 msl - decline in shoreline activities | 287/68% | -1/68% | -1/68% | 254/60% | 12/63% | 2/65% |
| Off-Season[f] | | | | | | |
| 360 msl - last boat ramp out of operation | 418/100% | +1/100% | No change | 410/98% | 2/98% | 6/99% |
| 400 msl - limited lake surface area | 330/79% | -9/76% | No change | 304/72% | -10/70% | 8/74% |

Notes:

[a] Exceedance frequencies are for the peak recreation season, which extends from May to September and totals 350 months.
[b] Number of months lake level is above indicated threshold.
[c] Percent of time lake level is above indicated threshold.
[d] Change in number of months below or above threshold compared to Alternative 1 or existing conditions: + additional months above threshold, - additional months below threshold.
[e] The peak season extends from April to September (420 months over the 70-year hydrologic period).
[f] The off season extends from October to March (420 months over the 70-year hydrologic period).



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**Table 6-3. Comparison of River Flow Exceedance Frequencies for Recreation Opportunities on the Lower American River[a]**

| Recreation Threshold[b] | Project Change: Alternative 1 Months[c]/Percent[d] | Project Change: Alternative 2 Months[d]/Percent[e] | Project Change: Alternative 3 Months[d]/Percent[e] | Existing Conditions Months[c]/Percent[d] | Cumulative Change: Alternative 2 Months[d]/Percent[e] | Cumulative Change: Alternative 3 Months[d]/Percent[e] |
|---|---|---|---|---|---|---|
| Nimbus to Fairbairn WTP | | | | | | |
| SWRCB thresholds | | | | | | |
| 1,500–2,000 cfs - boating minimum range | 68/19% | No change | -3/19% | 19/5% | +56/21% | +58/22% |
| 3,000–6,000 cfs - boating optimal range | 113/32% | -2/32% | -1/32% | 178/51% | -92/25% | -84/27% |
| 1,250–5,000 cfs - swimming | 281/80% | -3/79% | -1/80% | 311/89% | -39/78% | -36/79% |
| CVPIA thresholds | | | | | | |
| 1,750–3,000 cfs - boating optimal range | 136/39% | +2/39% | +16/43% | 85/24% | +64/43% | +64/43% |
| 1,750 cfs - minimum boating flows | 261/75% | -1/74% | +1/75% | 283/81% | -48/67% | -36/71% |
| Hodge Decision | | | | | | |
| 1,750 cfs - summer recreation flows | 209/75% | No change | No change | 206/74% | -17/68% | -8/71% |
| Fairbairn WTP to I-5 | | | | | | |
| SWRCB thresholds | | | | | | |
| 1,500–2,000 cfs - boating minimum range | 71/20% | +1/21% | -3/19% | 19/5% | +58/22% | +59/22% |
| 3,000–6,000 cfs - boating optimal range | 103/29% | -4/28% | -5/28% | 156/45% | -106/14% | -77/23% |
| 1,250–5,000 cfs - swimming | 250/71% | No change | No change | 277/79% | -49/65% | -41/67% |
| CVPIA thresholds | | | | | | |
| 1,750–3,000 cfs - boating optimal range | 109/31% | +3/32% | +6/33% | 106/30% | +12/34% | +12/34% |
| 1,750 cfs - minimum boating flows | 228/65% | -1/65% | No change | 280/80% | -99/52% | -69/60% |
| Hodge Decision | | | | | | |
| 1,750 cfs - summer recreation flows | 176/63% | No change | No change | 202/72% | -87/41% | -39/58% |

Notes:

[a] Project changes under Alternatives 2 and 3 are based on a comparison with Alternative 1. Cumulative changes under Alternatives 2 and 3 are based on a comparison with existing conditions.
[b] Exceedance frequencies are for the peak recreation season, which extends from May to September and totals 350 months, except for Hodge Decision summer recreation flows, which extend from July through October and total 280 months.
[c] Number of months river flows are above indicated threshold or inside of indicated range.
[d] Percent of time river flows are above threshold or inside of indicated range.
[e] Change in number of months river flows are above threshold or inside indicated range: + additional months above threshold or inside of indicated range - fewer months above threshold or inside indicated range.



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**Table 6-4. Comparison of Lake Level and River Flow Exceedance Frequencies for Recreation Opportunities at Other Important Recreation Sites[a]**

| Recreation Threshold | Alternative 1 | Project Change: Alternative 2 | Project Change: Alternative 3 | Existing Conditions | Cumulative Change: Alternative 2 | Cumulative Change: Alternative 3 |
|---|---|---|---|---|---|---|
| | Months[b]/ Percent[c] | Months[d]/ Percent[c] | Months[d]/ Percent[c] | Months[b]/ Percent[c] | Months[d]/ Percent[c] | Months[d]/ Percent[c] |
| Shasta Lake | | | | | | |
| Peak season[d] | | | | | | |
| 950 msl - last boat ramp out of operation | 327/93% | -3/93% | -2/93% | 332/95% | -7/93% | -6/93% |
| 1,017 msl - limited lake surface area | 224/64% | No change | -1/64% | 236/67% | -9/65% | -11/64% |
| Off season[e] | | | | | | |
| 950 msl - last boat ramp out of operation | 460/94% | -6/93% | -5/93% | 462/94% | -3/94% | -2/94% |
| 1,017 msl - limited lake surface area | 258/53% | No change | No change | 293/60% | -34/53% | -34/53% |
| Trinity Lake | | | | | | |
| Peak season[d] | | | | | | |
| 2,250 msl - last boat ramp out of operation | 273/78% | No change | -1/78% | 312/89% | -40/78% | -40/78% |
| 2,320 msl - limited lake surface area | 39/11% | No change | No change | 114/33% | -75/11% | -75/11% |
| Off season[e] | | | | | | |
| 2,250 msl - last boat ramp out of operation | 381/78% | -1/78% | -1/78% | 428/87% | -46/78% | -46/78% |
| 2,320 msl - limited lake surface area | 52/11% | -1/10% | -1/10% | 104/21% | -54/10% | -54/10% |
| Sacramento River[d] | | | | | | |
| 2,500–12,000 cfs - boating optimal range | 263/75% | No change | -2/75% | 231/66% | +33/75% | +33/75% |

Notes:

[a] Project changes under Alternatives 2 and 3 are based on a comparison with Alternative 1. Cumulative changes under Alternatives 2 and 3 are based on a comparison with existing conditions.
[b] Number of months lake level is above indicated threshold or river flows are between optimal range.
[c] Percent of time lake level is above indicated threshold or river flows are between optimal range.
[d] Change in number of months above or below threshold or within optimal range: + additional months above threshold - additional months below threshold.
[e] The peak season extends from May to September (350 months over the 70-year hydrologic period).



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**Alternative 2: Folsom South Canal Connection**

***Impact: Change in Water-Dependent and Water-Enhanced Recreation Opportunities at Folsom Reservoir.*** Under Alternative 2, changes in reservoir levels would result in small incremental changes in peak-season water-dependent and water-enhanced recreational opportunities (Table 6-2). Off-season boating opportunities would be nearly the same as under Alternative 1. The duration over which lake levels would be below recreation thresholds would be the same as under Alternative 1. The small changes in lake levels would have little effect on water-dependent and water-enhanced recreation at Folsom Reservoir. This impact is less than significant. No mitigation is required.

***Impact: Change in Water-Dependent Recreation Opportunities in the Lower American River.*** Changes in river flows under Alternative 2 would result in relatively small incremental changes in peak-season recreational opportunities compared to Alternative 1 (Table 6-3). Analysis of both SWRCB and CVPIA recreation opportunity thresholds and Hodge flows indicate no substantial change to boating or swimming opportunities from the Nimbus Dam to Fairbairn WTP or the Fairbairn WTP to I-5 reaches of the lower American River. The duration over which river flows would fall below or be outside recreation thresholds in both reaches would be the same as under Alternative 1. The impact of small changes in flows on water-dependent recreation opportunities in both reaches of the lower American River would be less than significant. No mitigation is required.

***Impact: Change in Recreation Opportunities at Camanche and Pardee reservoirs.*** As described in Chapter 3, storage at Camanche and Pardee reservoirs would increase compared to Alternative 1. This increase could benefit recreation at the reservoir. No mitigation is required.

***Impact: Change in Recreation Opportunities on the Lower Mokelumne River.*** As described in Chapter 3, flows in the lower Mokelumne River could increase under Alternative 2. This increase in flows could benefit recreation on the lower Mokelumne River. No mitigation is required.

***Impact: Change in Water-Dependent and Water-Enhanced Recreation Opportunities at Shasta Lake, Trinity Lake, and the Sacramento River.*** Under Alternative 2, changes in reservoir levels and river flows would result in small incremental changes in peak-season recreational opportunities or would remain unchanged when compared to Alternative 1 (Table 6-4). Off-season boating opportunities at Trinity and Shasta lakes would also be nearly the same as under Alternative 1. The duration over which lake levels would be below recreation opportunity thresholds would be the same as under Alternative 1. The small changes in lake levels and river flows would have little effect on recreation opportunities at Shasta Lake, Trinity Lake, and the Sacramento River. This impact is less than significant. No mitigation is required.

**Alternative 3: Joint Water Supply**

***Impact: Change in Water-Dependent and Water-Enhanced Recreation Opportunities at Folsom Reservoir.*** Reservoir level exceedance frequencies for recreation opportunities under Alternative 3 are shown above in Table 6-2. Under this alternative, the impact is similar to that described for Alternative 2 and is considered less than significant. No mitigation is required.

***Impact: Change in Water-Dependent Recreation Opportunities in the Lower American River between Nimbus Dam and Fairbairn WTP.*** As shown above in Table 6-3, analysis of both SWRCB and CVPIA recreation thresholds and Hodge Decision flows indicated few overall changes to boating or swimming opportunities in the reaches of the lower



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American River between Nimbus Dam and the Fairbairn WTP and between Fairbairn WTP and the lower American River intake structure. This impact is similar to that described for Alternative 2 and is less than significant. No mitigation is required.

***Impact: Disruption of Recreation Opportunities on the Lower American River Associated with Construction and Operation of the Intake Alternatives 1, 2, 3, 4, and 5.*** Construction and operation of Intake Alternatives 1, 2, 3, 4, and 5 could result in disruption to recreation activities on the south levee (walking, running, and biking) and in the lower American River near the location of the alternative intake sites (power boating).

Public use of the portion of the levee near intake alternatives would not be allowed during construction. However, the portion of the levee upstream and downstream of each alternative would remain accessible during construction. Public use of the portion of the levee crossed by the access bridge to the intake alternatives would be reestablished on completion of construction.

Power boating is the primary recreation activity in the American River between the confluence with the Sacramento River and the location of Intake Alternative 5. Boating in this reach of the river is limited to 5 miles per hour. Access to the American River upstream of the construction site for each alternative would be maintained during construction because boats would be allowed to pass to the north of the construction sites. On completion of construction, boats would be allowed to pass under the access bridges to the alternative intake structures.

The impact on recreation near the intake structures is less than significant because access to the south levee and boating on the lower American River would be maintained during and after construction. No mitigation is required.

***Impact: Change in Recreation Opportunities at Camanche and Pardee Reservoirs.*** As described in Chapter 3, storage at Camanche and Pardee reservoirs would increase compared to Alternative 1. This impact is similar to that described for Alternative 2 and is less than significant. No mitigation is required.

***Impact: Change in Water-Dependent Recreation Opportunities on the Lower Mokelumne River.*** As described in Chapter 3, flows in the lower Mokelumne River could increase under Alternative 3. This increase in flows could benefit recreation on the river. No mitigation is required.

***Impact: Change in Water-Dependent and Water-Enhanced Recreation Opportunities at Other Reservoirs and Rivers.*** Reservoir level and river flow exceedance frequencies for important recreation opportunities at Trinity Lake, Shasta Lake, and the Sacramento River are shown in Table 6-4. The change in lake levels and river flows would be similar to that described for Alternative 2. This impact is less than significant. No mitigation is required.

## Significant Impacts and Mitigation

Implementation of Alternatives 2 and 3 is not expected to result in significant impacts on recreational opportunities.

## Cumulative Impacts

Conditions under the Alternative 2 and 3 cumulative scenarios were compared to existing conditions.

***Impact: Change in Water-Dependent and Water-Enhanced Recreation Opportunities at Folsom Reservoir.*** Changes in the frequency that reservoir levels would fall below important recreation opportunity thresholds at Folsom Reservoir under Alternatives 2 and 3 cumulative



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scenarios are shown in Table 6-2. Changes in reservoir levels under Alternatives 2 and 3 would result in small changes in peak-season and off-season recreation opportunities compared to existing conditions. Although these changes are not considered substantial, the frequency that reservoir levels are above thresholds would occur slightly more often under Alternative 3 than under Alternative 2. The cumulative impact on recreation opportunities at Folsom Reservoir under Alternatives 2 and 3 is less than significant. No mitigation is required.

***Impact: Change in Water-Dependent Recreation Opportunities in the Lower American River.*** Changes in the frequency that river flows would fall below or outside of important recreation opportunity thresholds on the lower American River under Alternatives 2 and 3 cumulative scenarios are shown in Table 6-3. Under Alternatives 2 and 3, river flows in the reach from Nimbus Dam to Fairbairn WTP would be above the minimum necessary for boating more frequently than under existing conditions. River flows would be inside the optimum ranges for boating and swimming and above the minimum flow for boating much less frequently under Alternatives 2 and 3 than under existing conditions. River flows would be below Hodge Decision summer recreation flows more frequently under Alternatives 2 and 3 than under existing conditions. River flows would be within the minimum range for boating more frequently under Alternatives 2 and 3 than under existing conditions. The change in the frequency flows is outside the optimum range for both boating and swimming and below the minimum flow for boating. The impact on boating and swimming is therefore significant.

Under Alternatives 2 and 3, changes in river flows in the reach from the Fairbairn WTP to I-5 would be similar to the changes in the reach from Nimbus to Fairbairn WTP. Flows would be within the minimum range more frequently under Alternatives 2 and 3 than under existing conditions, but above the minimum flow for boating and within the optimum ranges for boating and swimming less frequently. River flows would be below Hodge Decision summer recreation flows much more frequently under Alternatives 2 and 3 than under existing conditions.

The cumulative impact on recreation opportunities under Alternatives 2 and 3 is significant. No mitigation is available to reduce this impact to a less-than-significant level.

***Impact: Change in Water-Dependent and Water-Enhanced Recreation Opportunities at Shasta Lake, Trinity Lake, and the Sacramento River.*** Changes in reservoir levels and rivers flows under Alternatives 2 and 3, when compared to existing conditions, would result in relatively small incremental changes to recreation opportunities at Shasta Lake and the Sacramento River (Table 6-4). Peak- and off-season recreation opportunities at Shasta Lake would be slightly reduced under Alternatives 2 and 3. River flows in the Sacramento River would be within the optimal range for boating more frequently under Alternatives 2 and 3 than under existing conditions. Under Alternatives 2 and 3, changes in the surface elevation of Trinity Lake would result in a substantial change in recreation opportunities by increasing the frequency that the lake would be below the elevation that boating activities become constrained and below the elevation that the last boat ramp in the northern portion of the lake ceases operation.

The cumulative impact of small changes in the surface elevation of Shasta Lake and the flows in the Sacramento River is considered less than significant. The substantial change in surface elevation of Trinity Lake under both Alternatives 2 and 3 would result in a significant cumulative impact on peak-season and off-season boating activities. No mitigation is available to reduce this impact to a less than significant level.



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## ANALYSIS OF FULL-USE SCENARIO

Changes in recreation opportunities at Folsom Lake, the lower American River and other important recreation sites (Shasta Lake, Trinity Lake, and the upper Sacramento River) under the full use scenario for Alternative 3 are shown in Tables 6-5, 6-6, and 6-7, respectively. As shown in Table 6-5, the frequency the level of Folsom Reservoir would be below important recreation opportunity thresholds during both the peak and off seasons would not change substantially from conditions under Alternative 1. For the lower American River, the frequency river flows would be above minimum flows or within optimum ranges would not change substantially compared to conditions under Alternative 1 (Table 6-6). Peak-season and off-season lake levels at Shasta and Trinity Lakes would be nearly the same as under Alternative 1 (Table 6-7). Flows in the upper Sacramento River would be nearly the same as under Alternative 1.

Table 6-5. Comparison of Lake Level Exceedance Frequencies for Recreation Opportunities Occurring at Folsom Reservoir Full-Use Scenario - Alternative 3

| Recreation Threshold | Alternative 1 Months[a]/Percent[b] | Full-Use Scenario Change Months[c]/Percent[b] |
|---|---|---|
| Peak-Season[d] | | |
| 360 msl - last boat ramp out of operation | 420/100% | -2/100% |
| 400 msl - limited surface area | 388/92% | -1/92% |
| 405 msl - marina closes | 372/89% | No change |
| 430 msl - decline in shoreline activities | 287/68% | -7/67% |
| Off-Season[e] | | |
| 360 msl - last boat ramp out of operation | 418/100% | -2/99% |
| 400 msl - limited lake surface area | 330/79% | -4/78% |

Notes:

[a] Number of months lake level is above indicated threshold.

[b] Percent of time lake level is above indicated threshold.

[c] Change in number of months below or above threshold compared to Alternative 1 or existing conditions: + additional months above threshold, - additional months below threshold.

[d] The peak season extends from April to September (420 months over the 70-year hydrologic period).

[e] The off season extends from October to March (420 months over the 70-year hydrologic period).



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Table 6-6. Comparison of River Flow Exceedance Frequencies for Recreation Opportunities on the Lower American River Full-Use Scenario - Alternative 3

| Recreation Threshold[a] | Alternative 1 Months[b]/Percent[c] | Full-Use Scenario Change Months[b]/ Percent[d] |
|---|---|---|
| Nimbus to Fairbairn WTP | | |
| SWRCB thresholds | | |
| 1,500–2,000 cfs - boating minimum range | 68/19% | -10/17% |
| 3,000–6,000 cfs - boating optimal range | 113/32% | -1/32% |
| 1,250–5,000 cfs - swimming | 281/80% | -1/80% |
| CVPIA thresholds | | |
| 1,750–3,000 cfs - boating optimal range | 136/39% | -5/37% |
| 1,750 cfs - minimum boating flows | 261/75% | +1/75% |
| Hodge Decision | | |
| 1,750 cfs - summer recreation flows | 209/75% | No change |
| Fairbairn WTP to I-5 | | |
| SWRCB thresholds | | |
| 1,500–2,000 cfs - boating minimum range | 71/20% | -10/17% |
| 3,000–6,000 cfs - boating optimal range | 103/29% | No change |
| 1,250–5,000 cfs - swimming | 250/71% | +4/73% |
| CVPIA thresholds | | |
| 1,750–3,000 cfs - boating optimal range | 109/31% | +8/33% |
| 1,750 cfs - minimum boating flows[e] | 228/65% | +8/67% |
| Hodge Decision | | |
| 1,750 cfs - summer recreation flows | 176/63% | +8/66% |

Notes:

[a] Exceedance frequencies are for the peak recreation season, which extends from May to September and totals 350 months, except for Hodge Decision summer recreation flows which extends from July through October and totals 280 months.

[b] Number of months river flows are above indicated threshold or inside of indicated range.

[c] Percent of time river flows are above threshold or inside of indicated range.

[d] Change in number of months river flows are above threshold or inside indicated range: + additional months above threshold or inside of indicated range - fewer months above threshold or inside indicated range .



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Table 6-7. Comparison of Lake Level and River Flow Exceedance Frequencies for Recreation Opportunities at Other Important Recreation Sites Full-Use Scenario - Alternative 3

| Recreation Threshold | Alternative 1 Months[a]/Percent[b] | Full-Use Scenario Change Months[c]/Percent[b] |
|---|---|---|
| Shasta Lake | | |
| Peak season[d] | | |
| 950 msl - last boat ramp out of operation | 327/95% | -5/92% |
| 1,017 msl - limited lake surface area | 224/64% | -10/61% |
| Off season | | |
| 950 msl - last boat ramp out of operation | 460/94% | -6/93% |
| 1,017 msl - limited lake surface area | 258/34% | -7/51% |
| Trinity Lake | | |
| Peak season[d] | | |
| 2,250 msl - last boat ramp out of operation | 278/78% | -2/77% |
| 2,320 msl - limited lake surface area | 39/11% | -1/11% |
| Off season | | |
| 2,250 msl - last boat ramp out of operation | 381/78% | -2/77% |
| 2.320 msl - limited lake surface area | 52/11% | -2/10% |
| Sacramento River[d] | | |
| 2,500–12,000 cfs - boating optimal range | 263/75% | -4/74% |

Notes:

[a] Number of months lake level is above indicated threshold or river flows are between optimal range.

[b] Percent of time lake level is above indicated threshold or river flows are between optimal range.

[c] Change in number of months above or below threshold or within optimal range: + additional months above threshold - additional months below threshold.

[d] The peak season extends from May to September (350 months over the 70-year hydrologic period).

[e] The off season extends from October to April (490 months over the 70-year hydrologic period).



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Chapter 7

# Vegetation and Wetland Resources

# Chapter 7. Vegetation and Wetland Resources

## SUMMARY

Potential effects of the project alternatives on vegetation and wetland resources are summarized in Table 7-1. To address the various alternative intake locations and bypass options described for Alternative 3: Joint Water Supply, Table 7-1 includes a summary acreage affected by Intake Alternatives 1 through 5. As incorporated into the analysis, each of these bypass options begins at the designated alternative intake site and makes use of all of the bypass options for comparative purposes. Because most of the bypass options would result in moving the pipeline from city streets to currently undeveloped areas, effects on vegetation and wetland resources are generally greater than with the original proposed pipeline alignment. The quality of many of these habitats is relatively low, however, and most of the areas potentially affected are within areas already proposed for development.

## AFFECTED ENVIRONMENT

The study area for this chapter includes potential locations of pipelines and project facilities in Sacramento County and northern San Joaquin County within developed urban, agricultural, and undeveloped rural lands. The study area is within the Sacramento Valley subdivision of the California floristic province (Hickman 1993), an area known for its plant community diversity. Key natural physical attributes in the study area include:

- several major waterways and associated active floodplains, riparian woodlands, and wetlands;
- alluvial terraces and associated grasslands, tributary waterways, oak communities, and wetlands;
- low valley foothill areas with extensive grasslands and infrequent, scattered blue oaks; and
- large water storage reservoirs on rivers along the eastern edge of the valley.

### Survey Methods

The study area was defined based on preliminary engineering design drawings and a description of project facility footprints and permanent right-of-way corridors and a description of pipeline construction methods for waterways such as rivers and creeks (CH2M Hill and Montgomery Watson 1997). The study area for the lower American River and Folsom Reservoir was determined based on previous studies that evaluated the hydrological impacts on vegetation at these sites. These studies include the SAFCA/Bureau of Reclamation Interim Operations EIR/EIS (Sacramento Area Flood Control Agency et al. 1990) and the American River Watershed Project (U.S. Army Corps of Engineers 1995).

For project facilities such as the canal and aqueduct pumping plants and the lower American River intake structure, the footprint of the facility and a 50-foot-wide buffer were evaluated for the presence of sensitive vegetation and wetland resources. For the pipeline alignments, a 200-foot-wide corridor along the route of each alignment was evaluated.

A presurvey investigation, including review of literature and a records search of the California Department of Fish and Game (DFG's) Natural Diversity Database (1996), was conducted to identify vegetation resources that could be affected by the project alternatives. Field surveys were conducted during the appropriate periods in 1996 and 1997 to determine the presence of special-status plants .



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Table 7-1 Acres of Plant Communities and Habitats in the Study Area Adversely Affected by Alternatives 2 and 3

| | Alternative 2 (Acres per Alignment) | | | | Alternative 3 (includes Alignment 2) (Acres per Intake Pipeline) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Intake and Bypass Options | | | | |
| Plant Community Type | 1 | 2 | 3 | 4 | Proposed Alignment | 1 | 2 | 3 | 4 | 5 |
| **Artificial Habitats and Common Plant Communities** | | | | | | | | | | |
| Developed area[b] | 18 | -- | 16 | -- | 205 | 186 | 177 | 172 | 164 | 136 |
| Agricultural land | 118 | 24 | 124 | 94 | 24 | 24 | 24 | 24 | 24 | 24 |
| Annual grassland[c] | 356 | 227 | 171 | 414 | 284 | 297 | 2997 | 299 | 297 | 303 |
| Eucalyptus stand | 1 | 7 | 1 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| **Sensitive Upland Communities** | | | | | | | | | | |
| Blue oak/live oak woodland | -- | 11 | -- | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| Valley oak woodland | 1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Blackberry/rose riparian scrub | 1 | -- | 1 | -- | -- | -- | -- | -- | -- | -- |
| Willow riparian scrub | 2 | <0.5 | <0.5 | <0.5 | 1 | 6 | 6 | 6 | 6 | 6 |
| Riparian woodland | 4 | 1 | <0.5 | 5 | 1 | 6 | 6 | 6 | 6 | 6 |
| **Wetland Plant Communities** | | | | | | | | | | |
| Freshwater marsh | 3 | <0.5 | 1 | <0.5 | 3 | 3 | 3 | 3 | 3 | 3 |
| Vernal pool | 2 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| Vernal swale | <0.5 | 3 | <0.5 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| Seasonal wetland | 7 | <0.5 | 4 | 4 | <0.5 | 9 | 9 | 9 | 9 | 9 |
| Open water (creeks, rivers, and ponds) | 5 | 1 | 5 | 1 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |

Notes:

[a] Acreage calculations are estimates based on preliminary alignment designs and photo interpretation of aerial photograph signatures.
[b] Includes housing developments, roadways, industrial complexes, parks and schools, and other unvegetated or landscaped areas.
[c] Includes roads, the railroad, minor other development, and scattered trees.

and jurisdictional wetlands in the study area to the extent property access was available

## Plant Communities and Habitat Types in the Study Area

From field surveys and existing information, 15 types of plant communities and associated habitat types were identified in the study area. Table 7-2 summarizes key characteristics and distribution of each of these major plant communities.

### Common Plant Communities

Common plant communities are found in developed areas, such as housing developments; roadways, railroad tracks, industrial complexes, parks, schools and similar facilities; and other unvegetated or landscaped areas. These communities also include agricultural lands that have been repeatedly plowed, planted, seeded, and harvested and therefore no longer support native or naturalized vegetation. Because they are subject to active ground-disturbing practices, these communities do not provide high-quality habitat for native plant species.



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Table 7-2. Summary of Plant Communities and Other Habitats in the Study Area

| Plant Community/ Habitat Type | Characteristic Plant Species | | | Folsom Reservoir | American River | Mokelumne River | FSC Pipeline Alignments | | | | I-5 to FSC Pipeline Alignment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Tree | Shrub/Vine | Herb | | | | Alignment 1 | Alignment 2 | Alignment 3 | Alignment 4 | |
| ARTIFICIAL HABITATS AND COMMON PLANT COMMUNITIES | | | | | | | | | | | |
| Developed areas | Landscaped cultivars | Landscaped cultivars | Landscaped cultivars | √ | √ | -- | √ | √ | √ | -- | √ |
| Agricultural land | Absent or agricultural cultivars (walnuts) | Absent or agricultural cultivars (grapes) | Absent or agricultural crops (row crops, grains, hay) | -- | -- | -- | √ | √ | √ | √ | -- |
| Annual grassland | Absent or infrequent individual blue oak, valley oak | Absent | Soft chess, ripgut grass, annual fescue, wild oat, Italian ryegrass, filaree, smooth cat's ear, tomcat clover, dwarf sac clover, spring vetch, virgate tarweed, common spikeweed, shining peppergrass | √ | √ | -- | √ | √ | √ | √ | √ |
| Eucalyptus stand | Eucalyptus globulosus | Absent or sparse cultivars | Soft chess, ripgut brome, annual fescue, wild oats, Italian wildrye, burr clover, spring vetch, filaree, virgate tarweed, wild lettuce, prickly oxtongue | -- | -- | -- | √ | √ | √ | √ | -- |
| SENSITIVE UPLAND PLANT COMMUNITIES | | | | | | | | | | | |
| Blue oak woodland | Blue oak, occasional valley oak, interior live oak | Absent | Annual grassland species | √ | √ | √ | -- | √ | -- | √ | -- |
| Valley oak woodland | Valley oak, occasional blue oak, interior live oak | Absent | Annual grassland species | √ | √ | √ | √ | √ | √ | √ | -- |
| Live oak woodland | Interior live oak, occasional foothill pine, buckeye | Absent | Annual grassland species | √ | √ | √ | -- | -- | -- | -- | -- |
| Blackberry/rose riparian scrub | Absent | Himalaya berry, California wild rose | Absent or sparse annual grassland species | √ | √ | √ | √ | -- | √ | -- | -- |
| Willow riparian scrub | Absent | Narrow-leaved willow, Goodding's black willow | Absent or sparse annual grassland species | √ | √ | √ | √ | √ | √ | √ | √ |



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Table 7-2. Summary of Plant Communities and Other Habitats in the Study Area

| Plant Community/ Habitat Type | Characteristic Plant Species | | | Folsom Reservoir | American River | Mokelumne River | FSC Pipeline Alignments | | | | I-5 to FSC Pipeline Alignment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Tree | Shrub/Vine | Herb | | | | Alignment 1 | Alignment 2 | Alignment 3 | Alignment 4 | |
| Riparian woodland | Fremont's cottonwood, valley oak, California black walnut, box elder, Oregon ash, Goodding's willow, Arroyo willow | Himalaya blackberry, California wild rose, blue elderberry, sandbar willow, California wild grape, poison oak | Mugwort, dallis grass, horsetails, sedge, curly dock, Baltic rush | √ | √ | √ | √ | √ | √ | √ | √ |
| SENSITIVE WETLAND PLANT COMMUNITIES | | | | | | | | | | | |
| Freshwater marsh | Absent | Absent | Cattail, tule, Baltic rush, Pacific rush, iris-leaved juncus, dallis grass, umbrella sedge, nut sedge, spikerush, willow-herb | √ | √ | √ | √ | √ | √ | √ | √ |
| Vernal pool | Absent | Absent | Carter's buttercup, stipitate popcornflower, downingia, white-head navarretia, Fremont's goldfields, coyote thistle, spikerush, toad rush, isoetes, pillwort, manna grass | -- | -- | -- | √ | √ | √ | √ | √ |
| Vernal swale | Absent | Absent | Douglas's meadowfoam, California goldfields, blennosperma, Italian ryegrass, Carter's buttercup, stipitate popcornflower, coyote thistle, tomcat clover, toad rush | -- | -- | -- | √ | √ | √ | √ | √ |
| Seasonal wetland | Absent | Absent | Annual bluegrass, Bermuda grass, nut sedge, umbrella sedge, curley dock, stipitate popcornflower, coyote thistle, spike rush, toad rush, isoetes, manna grass | -- | -- | -- | √ | √ | √ | √ | √ |
| Open water (unvegetated) | Absent | Absent | Absent | √ | √ | √ | √ | √ | √ | √ | √ |



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Table 7-1 indicates the presence of these communities within the study area.

**Sensitive Upland Plant Communities**

Sensitive plant communities include habitats that are locally or regionally scarce; are vulnerable to elimination; support unique or biologically important plant or wildlife species; are considered special habitat types by DFG; or are regulated by local, state, or federal agencies. Most of these communities are given special consideration because they perform important ecological functions such as maintaining water quality or providing essential habitat for dependent wildlife or plant species. Sensitive upland plant communities in the study area include several types of riparian and oak woodland communities that are of particular concern to regulatory agencies. Table 7-1 indicates the presence of these communities within the study area.

**Sensitive Wetland Plant Communities**

Wetlands are considered a sensitive plant community and are one type of "waters of the United States," which are areas that are subject to regulation under Section 404 of the Clean Water Act. As defined by federal regulations, waters of the United States typically include inter- and intra-state waterways, lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, and natural ponds. Wetlands are subject to regulation by the U.S. Army Corps of Engineers (Corps) and U.S. Environmental Protection Agency (EPA), pursuant to Section 404 of the Clean Water Act. Wetlands are defined for regulatory purposes as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated conditions" (33 CFR 328.3, 40 CFR 230.3). Table 7-1 indicates the presence of these communities within the study area.

**Special-Status Plant Species in the Study Area**

Special-status plant species are species legally protected under state and federal Endangered Species Acts and other regulations or species considered sufficiently rare by the scientific community to qualify for such listing (e.g., California Native Plant Society [CNPS] list 1B species). Nineteen special-status plant species were identified as having the potential to occur in the study area (Table 7-2).

Legenere was the only special-status plant found during surveys. Legenere is a CNPS list 1B species and a federal species of concern (a former candidate for federal listing). This species is associated with deep vernal pools that remain inundated or saturated late into the blooming season in areas dominated by spikerush, rayless lasthenia, and downingia. Two populations were found in the survey area, one population along the I-5 to FSC pipeline alignment (approximately 1 mile west of the intersection of Eagles Nest Road and Kiefer Boulevard) and one population in the southern half of the Alignment 2 pipeline corridor. Suitable habitat for several other special-status plant species identified in Table 7-3 exists in unsurveyed areas along the project alignments.

## ENVIRONMENTAL CONSEQUENCES

### Significance Criteria

According to Appendix G of the State CEQA Guidelines, impacts on vegetation and wetland resources are considered significant if a proposed project would:

- conflict with the adopted environmental plans and goals of the community where the project is located;



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Table 7-3 Special-Status Plant Species Known or with Potential to Occur in the Study Area

| Species | Legal Status* Federal/State/CNPS | Distribution | Habitat Associations | Identification Period | Potential Occurrence in the Study Area |
|---|---|---|---|---|---|
| Heartscale *Atriplex cordulata* | SC/--/1B | Western Central Valley and valleys of adjacent foothills | Alkali grassland, alkali meadow, alkali scrub | April–October | Low |
| Brittlescale *Atriplex depressa* | SC/--/1B | Western Central Valley and valleys of adjacent foothills | Alkali grassland, alkali meadow, alkali scrub | May–October | Low |
| San Joaquin spearscale *Atriplex joaquiniana* | SC/--/1B | Western Central Valley and valleys of adjacent foothills | Alkali grassland, alkali meadow | April–September | Low |
| Succulent owl's-clover *Castilleja campestris* ssp. *succulenta* | T/E/1B | Fresno, Madera, Merced, Mariposa, Stanislaus counties | Vernal pools and vernal swales | April–May | High |
| Hoover's spurge *Chamaesyce hooveri* | T/--/1B | Butte, Glenn, Stanislaus, Tehama, Tulare counties | Vernal pools | July–August | Low |
| Dwarf downingia *Downingia pusilla* | --/--/2 | Southern Sacramento Valley northern San Joaquin Valley and southern North Coast Ranges | Vernal pools in valley and foothill grasslands, below 1,500 feet | March–May | High |
| Four-angled spikerush *Eleocharis quadrangulata* | --/--/2 | Butte, Merced, Shasta, and Tehama counties; widespread outside California | Marshes and swamps (freshwater) | May–September | High |
| Boggs Lake hedge-hyssop *Gratiola heterosepala* | SC/E/1B | Central Valley and other scattered locations in northern California | Vernal pools and margins of seasonally receding ponds and lakes | April–August | High |
| California hibiscus *Hibiscus lasiocarpus* | --/--/2 | Scattered small locations in central California from Butte County to San Joaquin Valley | Freshwater marsh | June–September | High |
| Ahart's dwarf rush *Juncus leiospermus* var. *ahartii* | SC/--/1B | Butte, Calaveras, Placer, and Sacramento counties | Vernal pools | March–May | Moderate |
| Red Bluff dwarf rush *Juncus leiospermus* var. *leiospermus* | --/--/1B | Northern Sacramento Valley | Vernal pools and swales in annual grassland | March–May | Moderate |
| Legenere *Legenere limosa* | SC/--/1B | Southern Sacramento Valley, south North Coast Ranges | Deep, seasonally wet habitats such as vernal pools, ditches, marsh edges, and river banks | April–June | High |
| Pincushion navarretia *Navarretia myersii* | --/--/1B | Amador, Lake, Merced, and Sacramento counties | Vernal pools | May | High |



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Table 7-3. Special-Status Plant Species Known or with Potential to Occur in the Study Area

| Species | Legal Status* Federal/State/CNPS | Distribution | Habitat Associations | Identification Period | Potential Occurrence in the Study Area |
|---|---|---|---|---|---|
| Slender Orcutt grass *Orcuttia tenuis* | T/E/1B | Northern Sacramento Valley, Pit River Valley, isolated populations in Lake and Sacramento counties | Vernal pools | May–July | Moderate |
| Sacramento Orcutt grass *Orcuttia viscida* | E/E/1B | Sacramento county | Vernal pools | May–June | Moderate |
| Ahart's paronychia *Paronychia ahartii* | SC/--/1B | Northern Central Valley | Vernal swales and margins of vernal pools, in clay soils | March–June | Low |
| Hartweg's golden sunburst *Pseudobahia bahiifolia* | E/E/1B | Fresno, Madera, Stanislaus, Sutter [extirpated], and Yuba [extirpated] counties | Cismontane woodland, valley and foothill grassland/ clay | March–April | Low |
| Sanford's arrowhead *Sagittaria sanfordii* | SC/--/1B | Widespread but infrequent throughout northern and central California; Orange and Ventura counties (believed extinct) | Sloughs and sluggish streams with silty or muddy substrate, associated with emergent aquatic marsh vegetation | May–October | High |
| Greene's tuctoria *Tuctoria greenei* | E/R/1B | Scattered distribution along east edge of the Central Valley from Tehama to Merced County; Fresno, Madera, San Joaquin, Stanislaus, and Tulare counties (believed extinct) | Bottoms of large vernal pools | May–July | High |

* Status explanations:

**Federal**

-- = no listing.
E = listed as endangered under the federal Endangered Species Act.
T = listed as threatened under the federal Endangered Species Act.
SC = species of concern; species for which existing information indicates it may warrant listing but for which substantial biological information to support a proposed rule is lacking (formerly C2 species).

**State**

-- = no listing.
E = listed as endangered under the California Endangered Species Act.
R = listed as rare under the California Native Plant Protection Act. This category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.

**California Native Plant Society**

1B = List 1B species: rare, threatened, or endangered in California and elsewhere.
2 = List 2 species: rare, threatened, or endangered in California but more common elsewhere.



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- substantially affect a rare or endangered species of plant or animal or the habitat upon which the species is dependent;
- interfere substantially with the movement of any resident or migratory fish or wildlife species; or
- substantially diminish habitat quantity or quality for dependent wildlife, plant, or fish species.

The following general criteria were also considered in this document to determine whether an impact on vegetation and wetland resources would be significant:

- federal or state legal protection of the resource or species;
- conflict with federal, state, and local agency regulations and policies (described below);
- documented resource scarcity and sensitivity, both locally and regionally,
- substantial reduction or elimination of species diversity or abundance;
- long-term degradation of a vegetation type because of substantial alteration of land form or site conditions (e.g., alteration of wetland hydrology);
- substantial disturbance of sensitive plant communities (e.g., riparian vegetation, wetlands, oak woodlands); and
- substantial decrease in flows below the 3,000-cfs threshold during March through June established in the Hodge Decision (1990) to protect riparian habitat in the lower American River;
- loss of or substantial disturbance to a special-status plant population.

Besides the State CEQA Guidelines, selected federal, state, and local laws, regulations, and policies pertaining to vegetation and wetland resources apply to impacts on waters of the United States, including wetlands; riparian communities; oak communities; and individual heritage or protected trees. These regulations and policies include the following:

- Section 404 of the Clean Water Act;
- California Fish and Game Code Sections 1601;
- Federal Executive Order 11990 and DFG's no-net-loss policy on wetlands;
- Section V of the Conservation Element of the County of Sacramento General Plan;
- Conservation and Open Space Element of the City of Sacramento General Plan;
- San Joaquin County General Plan 2010 and Habitat Conservation and Open Space Plan;
- Senate Concurrent Resolution 17 regarding protection of oak woodlands;
- City of Sacramento Heritage Tree Ordinance (Title 45: Trees);
- County of Sacramento Tree Preservation Ordinance of the Sacramento County Code, Chapter 19.12; and
- Title 9 of the San Joaquin Development Title Code on protection of heritage oak, native oak, and historical trees.

## Survey Methods and Assumptions

Vegetation and wetland resources could be directly and indirectly affected by the proposed project. Direct project effects include permanent loss of vegetation and wetlands resulting from construction of project facilities and



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establishment and use of equipment staging areas and access roads. Indirect project impacts on vegetation and wetland resources could result from the following types of activities:

- soil compaction, erosion, dust, and surface water runoff from construction sites;
- side casting or disposal of excess soil, cement, gravel, equipment wash water or other excess construction waste materials; and
- temporary parking of vehicles or storage of construction materials outside designated construction areas.

Because the exact location and extent of disturbances related to equipment and material staging areas and haul routes cannot be precisely determined at this time, impacts are described qualitatively. The following assumptions were made regarding construction-related impacts on vegetation and wetland resources:

- All vegetation and wetland resources within the 130-foot-wide construction corridor could be adversely affected during construction. The pipeline footprint was assumed to be 130 feet wide and to include the pipeline trench, stockpile area, and construction access.
- Vegetation and wetland resources within the footprint of permanent facilities were considered to be permanently removed by project construction.
- In flat terrain, vegetation and wetland resources next to construction areas could be temporarily disturbed or stressed by heavy equipment, inadvertent side casting of trench materials, or changes in drainage and soil compaction.

The analysis of effects on vegetation resources at Folsom, Camanche, and Pardee reservoirs and along the lower American and Mokelumne rivers were based on a comparison of hydrologic conditions under each alternative, with the following assumptions:

- vegetation types and amounts in areas within the reservoirs and river floodplains are continually influenced by seasonal conditions (floods, droughts) and flow management (draw downs for flood control, operations and maintenance, and water deliveries);
- willow scrub riparian vegetation can survive partial inundation for up to 2 months during the growing season; and
- upland vegetation surrounding the reservoirs (e.g., interior live oak woodland) is not sustained nor affected by water levels in the reservoirs.

## Impacts Found to Be Less than Significant

**Alternative 1: No Action**

As described in Chapter 10, "Land Use," potential areas of growth within the ultimate service boundary (USB) were defined for the purpose of estimating impacts related to the Supplemental Water Supply Project. The USB includes existing and potential future residential, commercial, industrial, agricultural, and recreation/open space lands. EBMUD's Updated WSMP EIR (EDAW 1993), the Alameda County General Plan (Alameda County Planning Commission 1981), the Contra Costa County General Plan (Contra Costa County Community Development Department 1991), and other pertinent planning documents for both counties, were used to determine expected growth patterns and development trends.

According to aerial photography interpretation, limited field surveys, and an analysis of current land use, the potential growth area within the USB supports approximately 53,200



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acres of developed and undeveloped lands, including 33,100 acres of developed lands and 20,100 acres of undeveloped, common and sensitive plant communities. The estimated acreages of plant communities within the potential growth area are:

- 3,330 acres of oak woodland,
- 14, 960 acres of grassland (potentially including isolated seasonal wetlands that were not discernable on the aerial photographs),
- 960 acres of chaparral, and
- 850 acres of riparian and associated aquatic habitats (creeks, ponds, and other water bodies that typically support riparian habitats).

These plant communities also support occupied or suitable habitat for several special-status plant species (see Table F-1 in Appendix F). Most of the special-status plants that have the potential to occur in the service area are associated with annual grasslands and seasonal wetland plant communities.

Sensitive botanical resources could be directly affected by land development activities and indirectly affected through hydrological alterations of surrounding areas, increased recreation activities in areas not previously accessible to the general public, pollution from urban and agricultural runoff, establishment of noxious weeds, habitat fragmentation, and changes in land management. Some of these effects (e.g., land management) may benefit botanical resources within the service area.

Growth within the USB's potential growth areas would result in incremental direct and indirect effects on vegetation and wetland resources in the region. These effects can be mitigated through measures imposed by the City and County planning agencies that have jurisdiction to regulate new development.

EBMUD actively supports land use measures to protect biological resources. The EBMUD Board of Directors has determined in its findings on the Updated WSMP EIR (EDAW 1993) that EBMUD will continue to work with other jurisdictions to assist in mitigating the impacts of growth by:

- participating in efforts to improve regional planning in the Bay Area;
- encouraging local land use planning agencies to coordinate land use planning functions and the provision of utility services; and
- encouraging cities and counties to adopt general plans and zoning ordinances that favor high-density development and urban in-filling (which tends to minimize per-capita water use and minimize the costs and environmental impacts of water delivery systems), provide incentives for more housing near public transit, and adopt ordinances which conserve open space, protect wildlife habitat, and conserve energy and water resources.

EBMUD also determined that it will support county general plan policies and other measures pertaining to protection and management of biological resources in Alameda and Contra Costa counties (described below).

**Alameda County.** Alameda County implements the following major measures to protect biological resources within the county (Buckley pers. comm.):

- environmental resources policies contained within Alameda County's General Plan for the Central Metropolitan, Eden, and Washington Planning Units (Alameda County Planning Commission 1981);
- the County's Watercourse Ordinance (December 1984), and

- CEQA.

Alameda County's general plan for the Central Metropolitan, Eden, and Washington planning units contains a compilation of Alameda County's comprehensive, long-term policies for development and conservation for the western portion of Alameda County. This plan contains environmental resources policies for the entire planning area, as well as water and biotic resources policies that apply only to the unincorporated portions of the planning area. The environmental resource policies (1.1.1 through 1.1.3 and 1.2.1 through 1.2.3) call for directing development away from significant resources and adequately managing resource areas to provide for maximum short- and long-term benefits. Specifically, policy 1.2.1 provides for the acquisition of significant environmental resource areas for public management, including wildlife habitat areas, watershed and groundwater basins, and areas providing outdoor recreation needs. Policy 1.2.2 calls for the provision of appropriate regulation and assistance to private uses that are determined to be compatible with the protection of resource values.

Alameda County's water resources policies (3.3.1, 3.4.1, 3.4.2, and 3.5.1) strive to protect the quality of creeks, streams, lakes, reservoirs, the San Francisco Bay, and the groundwater supply through evaluation and use of alternative methods to control urban runoff. The biotic resources policies (3.10.1 through 3.10.3, 3.11.1 through 3.11.3, 3.12.1, 3.13.1 through 3.13.2, 3.14.1 through 3.14.2, and 3.15.1 through 3.15.3) recognize the importance of sensitive natural communities in the county (including native woodland communities, natural riparian areas, special-status fish and wildlife habitat, habitat for seasonal waterfowl, San Francisco Bay and shoreline areas, and streams) and requires environmental review of projects containing sensitive areas, utilization of site review and planned development review procedures, and development and implementation of policies and development guidelines for protection of sensitive areas.

Alameda County's Watercourse Ordinance (Title 7, Article 1, Section 7-200.0 et. seq.) is aimed at safeguarding and preserving watercourses, protecting lives and property, preventing damage from flooding, controlling erosion and sedimentation, restricting the discharge of polluted materials into watercourses, and enhancing the recreational and beneficial uses of watercourses. The ordinance requires that a permit be obtained from Alameda County's Director of Public Works to discharge into or connect any channel to a watercourse; modify the natural flow of water in watercourse; deposit in, plant in, or remove any material from a watercourse and its banks; construct in a watercourse; place any unconsolidated material along side or within a watercourse; or carry out development within a setback. The ordinance requires that setbacks be established adjacent to open channel watercourses in areas proposed for development in order to prevent activities that would destroy riparian areas or inhibit their restoration; contribute significantly to flooding, erosion, or sedimentation; or inhibit access for watercourse maintenance.

All development within Alameda County is reviewed by the Alameda County Community Development Agency consistent with CEQA. For those projects that could have a significant effect on the environment, impacts and mitigation measures are addressed in project EIRs. The types of biological resources mitigation measures that Alameda County has required include creation of buffers, development and implementation of habitat enhancement plans, creation of in kind habitat as a replacement for lost habitat, tree replacement, creation of educational booklets for homeowners that discuss habitat protection measures, implementation of measures to minimize harm to habitat during construction, conducting special-status species surveys, and compliance with regulatory requirements related



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to endangered species and habitat protection (Buckley pers. comm. and Alameda County Planning Department 1994).

**Contra Costa County.** The Contra Costa County General Plan (Contra Costa County Community Development Department 1991) represents Contra Costa County land use policy and is intended to guide decision-making on future growth, development, and the conservation of resources in Contra Costa County through 2005. The vegetation and wildlife and water resources goals, policies, and implementation measures contained in the Conservation Element of the general plan are aimed at protecting natural resources.

Contra Costa County's vegetation and wildlife goals (8-D through 8-F) recognize the value of protecting ecologically significant lands, wetlands, and plant and wildlife habitats; special-status fish, wildlife, and plant species; and the San Francisco Bay/Delta estuary and adjacent lands. The associated policies (8-6 through 8-28) call for retention of wildlife migration corridors, protection of significant ecological resource areas, restrictions on hillside development, preservation and reestablishment of native and sport fisheries, restrictions on the filling and dredging of water bodies and wetlands, management of marshes for wildlife management, planting of native trees and shrubs, use of biological and nontoxic controls of pests and weeds over toxic pesticides and herbicides, and protection of wetlands from urban runoff and industrial spills. The implementation measures (8-a through 8-v) that support these policies generally require that an inventory of significant ecological resource areas be updated and maintained; appropriate biological resource surveys be conducted as part of the development review process; feasible mitigation measures to protect resources be evaluated and implemented; setbacks be required for development adjacent to wetlands; and impacts on wetlands be avoided, minimized, or compensated.

The Conservation Element's water resources goals, policies, and implementation measures strive to protect riparian corridors and wildlife and vegetation resources along creeks and streams. The goals (8T through 8-X) recognize the value of maintaining water resources in their natural state. The policies (8-74 through 8-94) address the need to protect, maintain, and restore riparian zones and set policy for new development along natural watercourses. The new development policies require that native riparian habitat be preserved and enhanced unless removal is required for public safety purposes, that an equivalent amount of riparian habitat be restored when habitat must be destroyed, that setbacks with deeded development rights be required along natural waterways in areas planned for development, and that revegetation of watercourses employ native vegetation. The Conservation Element also contains several water resources implementation measures (8-cp through 8-dj), including requirements to develop guidelines for creek maintenance practices that ensure native vegetation is not unnecessarily removed; to establish setbacks along natural creeks and streams; and to implement measures, as part of the development review process that will mitigate construction impacts on natural watercourses.

**Alternative 2: Folsom South Canal Connection and Alternative 3: Joint Water Supply**

***Impact: Temporary Disturbance to and Permanent Loss of Developed Areas, Agricultural Land, Eucalyptus Stands, Artificially Created Roadside Drainage Ditches, and Annual Grassland Habitat within the Construction Corridor.*** These areas support limited values to dependent species and are locally and regionally common. Temporary disturbance to or permanent loss of these plant communities would not substantially diminish habitat for dependent plant species. (Refer to Chapter 8, "Wildlife," for information on loss of wildlife habitat values associated with these



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plant communities.) This impact is less than significant. No mitigation is required.

***Impact: Change in Acreage or Condition of Willow Oak Riparian Scrub, Riparian Woodland, or Interior Live Oak Woodland in and around Folsom, Camanche, and Pardee Reservoirs and the Lower American and Mokelumne Rivers.*** No substantial change in the acreage or condition of willow scrub riparian, riparian woodland, or interior live oak woodland in and around the reservoirs or rivers is expected to result from implementation of any of the alternatives. As indicated in Chapter 3, "Hydrology, Water Supply, and Power" changes in surface elevations at Folsom, Camanche, and Pardee reservoirs between Alternative 1 (no action) and Alternatives 2 and 3 would be very small. Reservoir levels are affected by longer term hydrologic events and can vary substantially over years. During extended dry periods, lake levels remain lower on average, allowing willow scrub riparian vegetation to become established along former stream courses. During extended wet periods, reservoir levels are typically higher, often resulting in elimination of this vegetation type. The minor annual changes in reservoir elevations resulting from the alternatives would not be substantial and would be obscured by these longer term events.

Changes in river flows would be minor and would remain well within the typical seasonal and annual variations of these locations. The alternatives would not alter flood flow regimes in the rivers, which have been identified as the most critical factors in riparian vegetation productivity. Additionally, under Alternative 2, EBMUD would not take delivery of water from the American River system unless the flows mandated in the Hodge Decision were being met. These flows (3,000 cfs) were established, in part, to protect riparian vegetation during the most critical period of March–June (Hodge Decision 1990).

Under Alternative 2, flows would drop below 3,000 cfs during March–June only one additional month, compared to Alternative 1 (no action). Under Alternative 3, the frequency that flows would equal or exceed 3,000 cfs during the March–June period would increase by two months (Table 5-9). Therefore, the impacts of Alternative 2 are considered less than significant, while the effects of Alternative 3 are slightly beneficial.

In the SWRCB proceedings in *Environmental Defense Fund v. East Bay Municipal Utility District* (Alameda County Case No. 425,955), it was concluded that because of the extensive previous changes to the habitat and flow regime of the lower American River since the construction and operation of Folsom Dam, the impact of EBMUD diversions on riparian plant communities and emergent wetlands and ponds along the river corridor would be negligible (Testimony of Dr. Dean Taylor and Mitchell Swanson, SWRCB Hearings, Volume 9, pp. 62 and 74; Testimony of Dr. Holland, SWRCB Hearings, Volume 8, p. 220; Hodge Decision 1990). These conclusions are supported by the information presented above and in Chapter 3.

Flows in the lower Mokelumne River likely would increase slightly under both Alternatives 2 and 3. Various resource agencies have been seeking to increase flows in the lower Mokelumne River for habitat enhancement purposes. The slight increase in lower Mokelumne River flows is considered less than significant for downstream riparian vegetation.

## Significant Impacts and Mitigation

### Alternative 2: Folsom South Canal Connection

***Impact: Temporary Disturbance to or Potential Loss of Sensitive Vegetation and Wetland Resources near Active Construction Areas.*** Sensitive plant communities protected by local, state, and federal policies and laws and



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located outside identified construction areas could be disturbed during construction of any of the alternatives. These communities include valley and blue oak woodland, several types of riparian communities, and several types of wetland communities. This impact is significant. Implementation of the following mitigation measures can reduce this impact to a less-than-significant level.

***Mitigation Measure 7-1a: Confine Construction Activities and Equipment to the Designated Construction Work Area.*** To minimize potential impacts on sensitive vegetation and wetland resources, the contractor can be required to designate work areas outside the currently identified construction zone. These designated work areas can include staging areas, equipment and vehicle parking areas, and pipeline trench and construction access corridors. Before construction, additional work areas can be surveyed by a qualified botanist, relocated as necessary to avoid impacts on sensitive resources, approved by EBMUD, and demarcated before construction with lath and flagging, temporary orange construction fencing, or chain-link fencing. Construction contractors can require construction equipment and personnel to stay within these designated work areas.

***Mitigation Measure 7-1b: Avoid and Protect Sensitive Vegetation and Wetland Resources near Designated Construction Work Area.*** To minimize impacts on sensitive vegetation and wetland resources immediately next to designated construction areas, EBMUD can post areas containing sensitive vegetation and wetland resources as "Restricted Areas" and protect these areas with temporary barriers. The construction contractor can be required to keep construction equipment and personnel out of designated restricted areas.

***Mitigation Measure 7-1c: Reestablish Preconstruction Site Conditions to Allow Natural Colonization of Plant Species and Reseed, If Necessary.*** EBMUD can require the construction contractor to restore the construction zone to preconstruction site conditions. To ensure that impacts on native plant species and other natural communities are not long term, native topsoil can be immediately replaced and the natural site topography reestablished. Preconstruction conditions can be reestablished to allow natural colonization of plant species.

Site restoration can focus on reestablishing preconstruction conditions to allow natural reestablishment of local plant species. In areas that require immediate stabilization, nonvegetative techniques that allow natives to reestablish can be used, including use of weed- and disease-free mulch, erosion blankets, or rolled organic fiber material.

Erosion control seed mixes may be necessary on selected small sites. If sites need to be stabilized through seeding, the seed mix can include native or sterile seed varieties that are appropriate for stabilizing local site conditions. Special attention can be given to erosion control near wetland areas such as vernal pools.

Site-specific erosion control measures (nonvegetative or mechanical techniques) can be determined on a site-specific basis by a vegetation specialist and project engineer familiar with erosion control measures.

***Impact: Degradation of Oak Woodlands and Loss of Individual Locally Protected Trees.*** Construction of Alignments 2 and 4 could fragment blue oak and valley oak woodland habitats, remove individual trees, and degrade overall woodland habitat quality. Construction of Alignments 1 and 3 could affect individual and small stands of trees (Table 7-1). Individual trees are protected under local policies and the oak woodlands provide important travel corridors for wildlife species. This impact is significant. Implementation of the following mitigation measures would reduce this impact to a less-than-significant level.



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***Mitigation Measure 7-2a: Identify and Avoid Oak Woodland and Individual Locally Protected Trees.*** To the extent possible, fragmentation of oak woodlands and loss of individual native trees can be minimized as part of determining the final alignment of the selected pipeline alignment. Before ground-disturbing construction activities, EBMUD can identify protected trees outside designated construction areas with flagging or temporary construction fencing and post the protected area with restricted area signs. Fencing can encompass the tree dripline and a buffer to be determined in consultation with the local planning departments. Construction specifications can require construction equipment and personnel to stay out of designated restricted areas. Construction activities that could affect tree health, such as trenching and placement of fill, can be prohibited within posted restricted areas.

***Mitigation Measure 7-2b: Obtain and Comply with County Tree Removal Permits and Implement Conditions of Permits.*** In areas where locally protected trees cannot be avoided during final project design, county tree removal permits can be obtained by EBMUD. The permit terms and conditions can be included in the construction specifications. Local ordinances require successful replacement of lost trees as a condition of tree removal permits. EBMUD can either require the construction contractor to implement tree replacement as a condition of the construction contract or retain a qualified consultant to implement tree replacement requirements and conduct appropriate monitoring to verify that the permit conditions have been implemented.

***Impact: Loss of or Disturbance to Riparian Communities.*** The pipeline alignments cross several waterways that support woody riparian communities, including the Cosumnes River. These communities provide important functions and values, are regulated by state and federal agencies, and are of concern to local planning departments. Construction of the pipeline alignments could affect riparian communities (Table 7-1). This impact is significant. Implementation of the following mitigation measures would reduce this impact to a less-than-significant level.

***Mitigation Measure 7-3a: Establish a Protection Buffer around Woody Riparian Communities.*** As part of the project design, EBMUD has attempted to avoid woody riparian community corridors by siting facilities in areas that minimize impacts and by minimizing the width of construction work areas near riparian communities. To the extent feasible, a buffer can be established for each drainage in the project area that supports woody riparian vegetation and that could be affected by construction activities. This buffer can be established in the field and can generally extend from the outer edge of the riparian vegetation. The width of the buffer can be identified before initiation of construction activities and can be based on site-specific conditions, seasonal restrictions for wildlife, local planning department specifications, and resource agency requirements (e.g., USFWS and DFG). The outer edge of the designated riparian protection buffer can be demarcated using flagging or temporary orange mesh construction fencing.

***Mitigation Measure 7-3b: Compensate for Unavoidable Riparian Woodland Losses.*** A combination of restoration and enhancement of degraded riparian sites can be used to compensate for the relatively minor losses of this community that would result from any of the alternatives. Restoration can occur as close as possible to the areas affected, preferably along the same drainage that would sustain impacts.

Compensation for riparian community losses can encompass the goal of no net loss of riparian habitat acreage or values. Impacts on riparian communities would be compensated for at a minimum 2:1 ratio (2 acres treated for every 1 acre affected). The ratio of trees and shrubs



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planted for each tree or shrub eliminated would be determined on a site-by-site basis to ensure long-term replacement of habitat functions and values. A revegetation plan can be prepared by a qualified restoration ecologist and reviewed by the appropriate agencies. The revegetation plan can specify the planting stock appropriate for the region and each site and employ the most successful techniques available at the time of planting. Success criteria can be established as part of the plan. Plantings can be monitored for 5 years to ensure they have established successfully. The riparian community mitigation would be considered successful when sapling trees are established, no longer require active management, and are arranged in groups that, when mature, can replicate the area, natural structure, and species composition of similar riparian habitats in the region.

***Impact: Loss of or Disturbance to Jurisdictional Waters of the United States, Including Wetlands.*** Construction of the pipeline alignments would result in the loss or temporary disturbance of waters of the United States (including sensitive wetland plant communities and unvegetated open water habitat) (Table 7-1). These plant communities, including wetlands, perform important natural functions; provide important habitat to dependent plant and wildlife species; are regionally and locally uncommon; and are regulated by local, state, and federal laws and policies. This impact is significant. Implementation of the following mitigation measures would reduce this impact to a less-than-significant level.

***Mitigation Measure 7-4a: Avoid and Minimize Impacts on Jurisdictional Waters of the United States, Including Wetlands, by Installing Protective Barriers and Implementing Best Management Practices.*** EBMUD has already undertaken substantial avoidance measures to minimize impacts on these resources. During final project design, EBMUD can attempt to further avoid wetland plant communities to the extent feasible. Where avoidance is infeasible, EBMUD can minimize the size of construction work areas in and around wetland plant communities and ensure that construction is contained within designated work areas as described under Mitigation Measure 7-1b. Remaining impacts on wetlands can be mitigated as described below under Mitigation Measure 7-4c.

Impacts on waterways from open cut trenching can be minimized with best management practices. EBMUD can ensure that construction in waterways is expedited to the extent possible. EBMUD can monitor contractor's dewatering activities and comply with the Central Valley Regional Water Quality Control Board requirements pursuant to Sections 401 and 402 of the Clean Water Act, including preparing and implementing a stormwater pollution prevention plan, maintaining water quality, and controlling turbidity and sedimentation. EBMUD can also ensure that natural flows are maintained in downstream waterways.

To expedite site restoration after construction, EBMUD can require construction contractors to separate and stockpile native topsoil and plant materials at waterway crossings, then immediately replace soil and plant materials after construction is complete and restore trenched areas to original site contours.

***Mitigation Measure 7-4b: Obtain and Comply with State and Federal Wetland Permits.*** EBMUD can obtain and comply with state and federal permit requirements pertaining to impacts on waters of the United States. EBMUD can coordinate with the Corps to obtain a permit under Section 404 of the Clean Water Act, and if necessary, a Section 10 permit(s) pursuant to the Rivers and Harbors Act. EBMUD can also coordinate with DFG to obtain a 1601 streambed alteration agreement. Permit conditions can be included in the construction specifications, where applicable.



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***Mitigation Measure 7-4c: Compensate for Unavoidable Impacts on Jurisdictional Waters of the United States.*** EBMUD may be required by the Corps to implement a wetland mitigation and monitoring plan as a condition of permit issuance. A restoration specialist can be retained to prepare and implement a wetland mitigation and monitoring plan to compensate for unavoidable impacts on waters of the United States. The wetland mitigation plan can specify the form and size of mitigation sites appropriate for the region and each site and employ the most successful techniques available at the time of planting. Success criteria can be established as part of the plan. Created wetlands can be monitored for 5 years to ensure that plants have established successfully. The wetland mitigation and monitoring plan can be reviewed and approved by regulatory agencies (e.g., EPA, USFWS, and DFG). Once approved, the plan can be implemented by EBMUD or its representatives before or concurrent with activities having impacts on waters of the United States. Annual monitoring reports can be prepared and submitted to the appropriate resource agencies.

Compensation for wetland losses can encompass the goal of no net loss of wetland acreage or values. Final compensation ratios can be determined in consultation with the Corps and other consulting resource agencies (e.g., USFWS) during permitting. The compensation would consist of protection, enhancement, and creation of wetland habitat. A combination of protection of existing high-quality sites, restoration and enhancement of degraded wetlands, and creation of new wetland areas can be used to compensate for the losses of these communities that would result from any of the alternatives. Protection, restoration, and creation can occur as close as possible to the areas affected, preferably within the same watershed.

***Impact: Potential Loss of Special-Status Plant Populations.*** One population of legenere, a CNPS List 1B species, was found in one vernal pool along a common portion of Alignments 2 and 4. Construction of the pipeline alignments has the potential to eliminate this population. Although no other special-status plant populations were identified within surveyed areas, additional populations or suitable habitats may occur within unsurveyed portions of the pipeline alignments. Construction could therefore result in the loss of suitable and occupied habitat for other special-status plants that may be found within areas not previously surveyed because of lack of property access. These impacts would be considered significant. Implementation of the mitigation measures listed below would eliminate or reduce impacts on special-status plant populations known or with the potential to occur along the alignments to less-than-significant levels.

***Mitigation Measure 7-5a: Conduct Preconstruction Surveys in Areas Not Previously Inventoried.*** Before initiating construction for the selected alignment, EBMUD can retain a qualified botanist to conduct floristic surveys within areas not previously inventoried. Any newly identified special-status plant populations can be mitigated by implementing Mitigation Measures 7-5b and 7-5c, described below.

***Mitigation Measure 7-5b: Avoid Known Special-Status Plant Populations during Project Design.*** To the extent possible, EBMUD can design the project to avoid special-status plant populations. Where avoidance is infeasible, EBMUD can focus on minimizing the width of construction work areas in and around special-status plant populations. Before construction, special-status plant populations can be demarcated with temporary orange construction fencing and posted as a restricted area. Depending on the proximity of the populations to the construction work area, populations may be monitored to ensure inadvertent impacts on special-status plant populations are avoided. If impacts on special-status plant populations are unavoidable,



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EBMUD can implement Mitigation Measure 7-5c described below.

***Mitigation Measure 7-5c: Compensate for Impacts on Special-Status Plant Populations.*** If impacts on a special-status plant population are unavoidable, EBMUD or its consultant can coordinate with appropriate resource agencies (USFWS, DFG) to determine appropriate mitigation. EBMUD can then retain a specialist to prepare and implement a transplantation or species preservation plan. As with most plants endemic to vernal pools, legenere and other species may have specific habitat requirements that preclude habitat creation as a viable mitigation option. Therefore, preservation of a nearby high-quality site, transplantation of the affected damaged population, or enhancement of a nearby degraded population may be required by the resource agencies as compensatory mitigation.

The restoration site can be monitored for a specified time until the special-status plant population has successfully reestablished and has been approved by the resource agencies.

**Alternative 3: Joint Water Supply**

***Impact: Loss of or Disturbance to Riparian Woodland Communities.*** Construction of the American River intake structure may result in the loss of a small area of riparian vegetation along the American River, which is part of an important travel corridor for migratory and resident wildlife species. Riparian communities are regulated by state and federal agencies and are of concern to the City of Sacramento. This impact is significant. Implementation of Mitigation Measures 7-3a and 7-3b would reduce this impact to a less-than-significant level.

***Impact: Loss of or Disturbance to Jurisdictional Waters of the United States at the Intake Structure.*** Construction of the American River intake structure and construction of the I-5 to FSC pipeline alignment would result in the discharge of fill material into jurisdictional waters of the United States. Waters of the United States and associated plant communities perform important natural functions, provide important habitat to dependent plant and wildlife species, are regionally and locally uncommon, and are regulated by state and federal laws and policies. This impact is significant. Implementation of Mitigation Measures 7-4a and 7-4b would reduce this impact to a less-than-significant level.

***Impact: Potential Loss of Special-Status Plant Habitat.*** The American River intake structure, depending on its final location, may affect suitable habitat for Sanford's sagittaria, a species that could occur near the proposed intake structure. This impact is significant. Implementation of Mitigation Measures 7-5a, 7-5b, and 7-5c would reduce this impact to a less-than-significant level.

***Impact: Loss of or Disturbance to Individual Locally Protected Trees within the City and County of Sacramento.*** The pipeline corridor from I-5 to the FSC would include urbanized areas and approximately 544 locally protected trees. Street trees and native trees are regulated by the City of Sacramento and are of concern to the public. Poulson Arborist, Inc., has concluded that approximately 257 locally protected trees may incur minor root damage within the portion of the alignment between Fairbairn and the FSC that is largely within the county's jurisdiction. An additional 36 trees may incur significant root damage during construction between Fairbairn and the FSC. Although the arborist report concluded that 251 trees would not be affected, this impact is significant. Implementation of Mitigation Measure 7-6 would reduce this impact to a less-than-significant level.

***Mitigation Measure 7-6: Obtain and Comply with City and County Tree Removal Permits and Implement Conditions of Permits.*** In areas where locally protected trees cannot be



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avoided during final project design, appropriate tree removal permits must be obtained and complied with. The permit terms and conditions can be included in the construction specifications. Local ordinances may require successful replacement of lost trees as a condition of tree removal permits. EBMUD can either require the construction contractor to implement tree replacement as a condition of the construction contract or retain a qualified consultant to implement tree replacement requirements and conduct appropriate monitoring to verify that the permit conditions have been implemented.

***Impact: Loss of or Disturbance to Jurisdictional Waters of the United States (Including Vernal Pools, Seasonal Swales, and Ephemeral Drainages), Oak Woodland Communities, Riparian Communities, One Special-Status Plant Population of Legenere, and Individual Locally Protected Native and Heritage Trees during Construction of the Fairbairn to FSC Pipeline.*** Table 7-1 describes the effects of Alternative 3 on these resources. For purposes of this analysis, Alternative 3 includes the effects of Alignment 2 described under Alternative 2. Overall, effects of Alternative 3 are similar to Alternative 2 as to the type and magnitude of impacts. These sensitive vegetation and wetland resources are regulated by local, state, and federal regulations and policies. These impacts are significant. Implementation of Mitigation Measures 7-1a, 7-1b, 7-1c, 7-2a, 7-2b, 7-3a, 7-3b, 7-4a, 7-4b, 7-4c, 7-5a, 7-5b, and 7-5c, would reduce these impacts to a less-than-significant level.

## CUMULATIVE IMPACTS

This analysis focuses on flow changes in the lower American River and potential effects on riparian habitat. Under the cumulative impact scenarios for Alternatives 2 and 3, compared to existing conditions, flows in the lower American River between Nimbus Dam and the Fairbairn WTP would fall below 3,000 cfs during March through June an additional 7–8% of the time (Table 5-18). Downstream of Fairbairn WTP and the lower American River intake facility, flows would fall below 3,000 during March through June an additional 10–12% of the time (Tables 5-19 and 5-20). An examination of flow conditions during this period, however, indicates that average flows would remain very close to the 3,000-cfs threshold during March through June (Tables C-11 and C-12 in Appendix C). For example, under both cumulative scenarios, average flows between Nimbus Dam and the Fairbairn WTP average greater than 3,000 cfs. Between Fairbairn WTP and the mouth of the American River, average flows under both cumulative scenarios are greater than 2,700 cfs in all months during this period. In addition, this approximately 300-cfs reduction in average flows occurs only during May. In all other months during March through June, average flows are 2,850 cfs or greater. Based on this analysis, cumulative impacts are less than significant.

## ANALYSIS OF FULL-USE SCENARIO

This analysis focuses on flow changes in the lower American River and potential effects on riparian habitat under the full-use scenario for Alternative 3, the frequency that flows would equal or exceed 3,000 cfs during the March–June period would increase by one month, compared to Alternative 1.



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# Chapter 8
# Wildlife

# Chapter 8. Wildlife

## AFFECTED ENVIRONMENT

California's Central Valley supports a diversity of wildlife habitats, including riparian woodland, freshwater marsh, oak woodland, annual grassland, and agricultural land. The region provides important wildlife habitat values. The valley's vernal pools are one of the most diverse ecosystems in California, and wetlands in the region provide breeding habitat for many wildlife species and wintering habitat for millions of migratory waterfowl and shorebirds using the Pacific Flyway.

The American, Cosumnes, and Mokelumne rivers and their tributaries support the riverine ecosystems found in the project area. Riverine ecosystems that once dominated the Central Valley landscape have historically been altered by flood control and agricultural and urban land conversion. The remnant riparian habitat supports high value wildlife habitat because of the presence of perennial water and relatively undisturbed corridors of native plant cover.

The project area supports many important wildlife habitats, including streams, riparian habitats, vernal pools, seasonal wetlands, and marshes, and potential habitat for special-status wildlife species, including vernal pool fairy shrimp, mid-valley fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle (elderberry shrubs), California tiger salamander, western spadefoot toad, northwestern pond turtle (streams and stock ponds), white-tailed kite, Swainson's hawk (nest sites and foraging habitat), prairie falcon (foraging habitat), northern harrier, western burrowing owl (nest sites), and tricolored blackbird (nesting and foraging habitat).

### Survey Methods

Information on biological resources is based on field surveys, previous studies conducted along the project alignment (Jones & Stokes Associates 1994), a review of the California Department of Fish and Game's (DFG's) Natural Diversity Data Base (NDDB) (1996), pertinent literature, and contacts with knowledgeable individuals.

Surveys for special-status wildlife species were conducted on February 17 and 21; March 4 and 5; and April 1, 3, and 4, 1997. Aerial photographs were examined before the field visit to aid in determining areas of potential habitat for special-status species in the study area. Surveys were conducted on portions of the pipeline alignments that supported suitable habitat and where access was available. Survey methods included an assessment of habitat suitability for special-status wildlife species, visual surveys for target species, and surveys for raptor nests in the trees along the pipeline alignment corridors.

Reconnaissance invertebrate surveys were conducted to determine the potential for special-status invertebrates to occur within the pipeline alignments. Where access was available, parcels were surveyed for potential habitat, and all potential habitat was examined for special-status invertebrate populations. Invertebrate surveys deviated from the sampling protocol for fairy shrimp recommended by the U.S. Fish and Wildlife Service (USFWS) (1996) in that each accessible pool was sampled only once. Wet season sampling occurred from February 3 to 14, 1997. Where property access was not available, areas that could potentially support special-status invertebrate habitat or populations were mapped based on aerial photograph interpretation of suitable habitat.

### Wildlife Habitats and Resources of the Study Area

During field surveys, 14 types of wildlife habitats were identified in the project area. These habitat types correspond to the plant communities identified in Chapter 7,



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"Vegetation and Wetland Resources," and their potential to support wildlife species is discussed below. Table 7-2 indicates locations within the study area where the various habitats exist.

**Artificial Habitats and Common Plant Communities**

**Developed Areas.** Developed areas are considered low-quality wildlife habitats because of human activity, noise, and lack of vegetation resulting from past and ongoing disturbances. However, the developed areas in the study area provide some value to wildlife species that are tolerant of human disturbance. Birds and mammals that may occupy developed areas include northern mockingbirds, scrub jays, house finches, raccoons, opossums, and striped skunks.

There are relatively few developed areas within Alignments 2, 3, and 4. Many parcels near Alignment 1 are developed, and a substantial portion of the I-5 to FSC pipeline alignment is developed or disturbed from previous human activity.

**Agricultural Land.** Agricultural wildlife habitats include active cropland, vineyards, and orchards. The cover of the croplands changes throughout the year as crops are disked, planted, irrigated, and harvested. Generally, agricultural habitats have low wildlife value, especially vineyards and orchards, because of annual harvesting of crops and disking of the soil. Agricultural crops provide foraging habitat for rodents such as California voles, Botta's pocket gophers, and California ground squirrels and raptors such as red-tailed hawks, American kestrels, barn owls, and great horned owls. Songbirds, European starlings, and woodpeckers forage for fruits and nuts in the vineyards and orchards.

**Annual Grassland.** Grasslands have high value for some wildlife species, including raptors such as red-tailed hawks, American kestrels, and rough-legged hawks.

Compared with other natural habitats in the study area, wildlife species abundance and diversity are relatively low in grassland habitats along the pipeline alignments. However, the proximity of grassland habitat to oak woodland and oak savanna habitat along Alignments 2 and 4 increases this habitat's value to wildlife. Wildlife species observed in annual grassland during the field visit included white-crowned sparrows, American goldfinches, mourning doves, Brewer's blackbirds, and yellow-billed magpies.

**Eucalyptus Stands.** Eucalyptus stands that have been planted in large groves in the study area generally support fewer wildlife species than the natural wildlife communities surrounding them. No permanent or winter resident wildlife species forage in eucalyptus trees, except birds such as hummingbirds and yellow-rumped warblers that feed on nectar or insects associated with winter-blooming flowers. Raptors such as red-tailed hawks, red-shouldered hawks, Swainson's hawks, and great horned owls often place their nests in eucalyptus trees, but none were observed in the study area during field surveys.

**Sensitive Upland Plant Communities**

**Blue Oak Woodland.** Oak woodland and savanna habitat provide high-quality nesting and foraging areas for a variety of bird species and mammals. Blue oaks provide important nesting sites for cavity-nesting birds and small mammals. Acorns are important food during fall and winter for mule deer, western gray squirrels, acorn woodpeckers, northern flickers, and scrub jays. Other mammals that commonly occupy this habitat are California ground squirrels, Botta's pocket gophers, striped skunks, and gray foxes.

Wildlife species observed during the field survey in blue oak woodland were bushtits, ruby-crowned kinglets, scrub jays, dark-eyed juncos, white-breasted nuthatches, acorn woodpeckers, and northern flickers.



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**Valley Oak Woodland**. Valley oak woodland has similar high wildlife value to blue oak woodlands. Valley oak woodlands in the study area are fragmented or degraded from their historical extent by human activities.

**Live Oak Woodland**. Live oak woodland is often associated with blue oak woodlands and has similar high wildlife values in the study area.

**Blackberry and Rose Riparian Scrub**. Blackberry and rose riparian scrub provides high-quality breeding and foraging habitat and cover for many wildlife species. The dense foliage created by blackberries and roses (along with the needles and thorns) provides excellent cover and protection for many shrub-dependent or other cover-dependent wildlife species, including California quails, common yellowthroats, rufous-sided towhees, white-crowned sparrows, golden-crowned sparrows, song sparrows, and desert cottontails. The berries also provide food for many birds and mammals, including California quails, scrub jays, rufous-sided towhees, gray foxes, coyotes, and striped skunks.

**Willow Riparian Scrub**. Willow riparian scrub provides high-quality breeding and foraging habitat and cover for many wildlife species. The dense foliage created by the willows provides excellent cover for many shrub-dependent or other cover-dependent wildlife species, including California quails, bushtits, rufous-sided towhees, Wilson's warblers, Nashville warblers, song sparrows, and gray foxes. The insects on willow foliage also provide food for many birds, including flycatchers, vireos, and warblers.

**Riparian Woodland**. Riparian woodland provides high-quality foraging habitat, nesting sites, and cover for wildlife. Riparian woodlands along the Mokelumne River, Cosumnes River, Deer Creek, and Dry Creek have high biological productivity and species diversity because of their multilayered vegetation and the presence of surface water. Wildlife species observed in these riparian woodlands were red-shouldered hawks, red-tailed hawks, rufous-sided towhees, California towhees, northern orioles, black-headed grosbeaks, Nuttall's and downy woodpeckers, western fence lizards, terrestrial garter snakes, raccoons, striped skunks, and western gray squirrels.

**Sensitive Wetland Plant Communities**

**Freshwater Marsh**. Freshwater marshes provide nesting or foraging habitat for a variety of wildlife species, including pied-billed grebes, mallards, American coots, soras, song sparrows, marsh wrens, river otters, muskrats, and beavers. Many reptiles, such as common and terrestrial garter snakes and racers, and amphibians, such as Pacific chorus frogs and bullfrogs, also breed and forage in freshwater marshes. Although the freshwater marshes in the study area are generally narrow, they have substantial habitat value for wildlife.

**Vernal Pool and Vernal Swale**. Vernal pools and swales in the study area provide suitable breeding habitat for amphibians, including western toads, western spadefoot toads, and Pacific chorus frogs. Invertebrate species such as crawling water beetles, copepods, and insect larvae serve as food for developing amphibian larvae and for the many birds that overwinter or migrate through the Central Valley. In winter and spring, birds such as killdeers, snowy egrets, and greater yellowlegs may use vernal pools for foraging areas.

**Seasonal Wetland**. Wildlife species that use seasonal wetlands are similar to those that inhabit vernal pools and vernal swales. Seasonal wetlands are prevalent throughout the study area.

**Open Water**. Open water provides foraging and loafing areas for waterfowl and breeding habitat for amphibians. Species



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associated with these habitats include pied-billed grebes, Canada geese, mallards, buffleheads, ruddy ducks, common goldeneyes, American coots, and greater yellowlegs. Other wildlife species that may occur in this habitat include Pacific treefrogs, belted kingfishers, tree swallows, and great egrets.

### Special-Status Wildlife Species

Before conducting field surveys, a prefield investigation was undertaken to identify the potential for special-status species to occur in the study area. During field surveys, potential habitat was identified in the study area for 25 special-status wildlife species. A detailed discussion of each of the 25 special-status wildlife species and their potential to occur in the study area is provided in Table 8-1.

## ENVIRONMENTAL CONSEQUENCES

### Significance Criteria

Appendix G of the State CEQA Guidelines provides guidance for determining impact significance for biological resources. A project is normally considered to have a significant effect on wildlife resources if it:

- conflicts with the adopted environmental plans and goals of the community where the projects are located;
- substantially affects rare, endangered, or unique species of plants or animals or the habitats on which the species depend;
- interferes substantially with the movement of any resident or migratory fish or wildlife species; and
- substantially diminishes habitat quantity or quality for dependent wildlife, plant, or fish species.

In addition to guidelines stated above, impacts on special-status wildlife and their associated habitats were also considered significant in the impacts resulted in:

- loss of or disturbance to a unique, rare, or threatened plant community or wildlife habitat;
- loss of an entire special-status wildlife population or a restriction in the range of any unique, rare, or special-status wildlife species; and
- substantial disturbance to special-status species or their habitats during construction or operation of the project.

In addition to the State CEQA Guidelines, the following federal, state, and local laws, regulations, and policies pertain to protection of wildlife resources.

- The federal Endangered Species Act prohibits the "taking" of any plant or wildlife species listed as threatened or endangered, including the destruction of habitat that prevents species recovery. Taking is "harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting or attempting to engage in any such conduct."
- The U.S. Department of the Interior governs the protection of migratory birds pursuant to the Migratory Bird Treaty Act. The act states that without a permit issued by the U.S. Department of the Interior, pursuing, hunting, taking, capturing, or killing any migratory bird is unlawful.
- The California Endangered Species Act prohibits the take of state-listed endangered and threatened plants or wildlife, but habitat destruction is not included in the state's definition of a take.



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**Table 8-1. Special-Status Wildlife Species with Potential to Occur in the Project Area**

| Species | Status[a] Federal/State | California Distribution | Habitat | Reason for Decline or Concern | Occurrence in Study Area |
|---|---|---|---|---|---|
| **INVERTEBRATES** | | | | | |
| Vernal pool fairy shrimp *Branchinecta lynchi* | T/-- | Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County; isolated populations also in Riverside County | Common in vernal pools; also found in sandstone rock outcrop pools | Habitat loss to agricultural and urban development | Extensive suitable habitat was found in the affected areas; suitable habitat was found along Alignment 1 and vernal pool fairy shrimp were found from Live Oak Road to the Mokelumne River; vernal pool fairy shrimp were also found between Centrailia and Walmort, Sacramento County; potential habitat was found on various properties along Alignments 2 and 4 |
| Mid-valley fairy shrimp (No scientific name designated) | --/-- | San Joaquin County | Vernal pools and other seasonal wetlands | Unknown | Occurs along Alignments 1 and 3 in Black Lands and along Kennifick Road between Youngstown and Jahant Road, San Joaquin County |
| Vernal pool tadpole shrimp *Lepidurus packardi* | E/-- | Shasta County south to Merced County | Vernal pools and ephemeral stock ponds | Habitat loss to agricultural and urban development | Found along Alignment 4 at the south side of Grant Line Road and near Clay Station Road |
| Valley elderberry longhorn beetle *Desmocerus californicus dimorphus* | T/-- | Streamside habitats below 3,000 feet through the Central Valley of California | Riparian and oak savanna habitats with elderberry shrubs; elderberries are host plant | Loss and fragmentation of riparian habitats | No elderberry shrubs were found along the I-5 to FSC pipeline alignment, but they were found at several locations along Alignments 1, 2, and 4, including Deer Creek, Cosumnes River, Dry Creek, Mokelumne River, south of the Mokelumne River, and the Camanche Reservoir spillway |
| Sacramento anthicid beetle *Cicindela hirticollis abrupta* | SC/-- | First described at Grand Island, Sacramento County; and has been reported along the Sacramento River from its mouth to Butte County and along Putah Creek, Yolo County | Sandy habitats in riparian areas or similar habitats; occurs along sandy shores on slip faces among willows and giant reed | Alteration of stream courses and changes in hydrology | No intensive surveys were conducted, but potential habitat exists at all stream crossings at Alignments 1, 2, and 4 |
| Sacramento Valley tiger beetle *Cicindela hirticollis abrupta* | SC/-- | Lower Sacramento Valley (i.e., Sacramento River, lower American River, and Cache Creek) | Found in sandy areas among willows in riverine and riparian habitats | Alteration of valley steams | No intensive surveys were conducted, but potential habitat exists along stream crossings at Alignments 1, 2, and 4 |



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| Species | Status[a] Federal/State | California Distribution | Habitat | Reason for Decline or Concern | Occurrence in Study Area |
|---|---|---|---|---|---|
| **AMPHIBIANS** | | | | | |
| California tiger salamander *Ambystoma californiense (=A. tigrinum c.)* | C/SSC | Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Butte County south to Santa Barbara County | Small ponds, lakes, or vernal pools in grasslands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy | Loss of grasslands, vernal pools, and other wetlands to agricultural development and urbanization | Overall, the potential for occurrence is low in the affected areas because habitat quality is considered marginal; no salamanders were seen during field surveys |
| Western spadefoot *Scaphiopus hammondii* | SC/SSC | Sierra Nevada foothills, Central Valley, Coast Ranges, coastal counties in southern California | Shallow streams with riffles and seasonal wetlands, such as vernal pools in annual grasslands and oak woodlands | Alteration of stream habitats by urbanization and hydroelectric projects, loss of seasonal wetlands and vernal pools | Known to occur at Mather Field; no spadefoot toads were seen during field surveys, but potential habitat exists along Kiefer Road, about 0.25 mile west of Eagle Nest Road; the potential for occurrence is moderate along the I-5 to FSC pipeline alignment and low along the other pipeline alignments |
| **Reptiles** | | | | | |
| Northwestern pond turtle *Clemmys marmorata marmorata* | SC/SSC | In California, range extends from Oregon border of Del Norte and Siskiyou counties south along coast to San Francisco Bay, inland through Sacramento Valley, and on the western slope of Sierra Nevada; range overlaps with that of southwestern pond turtle through the Delta and Central Valley to Tulare County | Woodlands, grasslands, and open forests; occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation | Loss and alteration of aquatic and wetland habitats, habitat fragmentation | No pond turtles were seen during field surveys, but suitable habitat exists along the Cosumnes River, Deer Creek, Mokelumne River, Dry Creek, Jahant Slough, and Bear Creek; they also could occur at stock ponds and perennial ditches on Alignments 1, 2, 3, and 4; no suitable habitat was observed along the I-5 to FSC pipeline alignment |
| Giant garter snake *Thamnophis gigas* | T/T | Central Valley from Fresno north to the Gridley/Sutter Buttes area; has been extirpated from areas south of Fresno | Sloughs, canals, and other small waterways where there is a prey base of small fish and amphibians; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter | Loss of habitat from agriculture and urban development, habitat fragmentation | No records in the affected areas; probably outside the species range; not expected to occur in the affected areas |



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| Species | Status* Federal/State | California Distribution | Habitat | Reason for Decline or Concern | Occurrence in Study Area |
|---|---|---|---|---|---|
| California red-legged frog *Rana aurora draytoni* | T/SSC | Found along the coast and coastal mountain ranges of California from Humboldt County to San Diego County; Sierra Nevada (midelevations [above 1,000 feet] from Butte County to Fresno County) | Permanent and semipermanent aquatic habitats, such as creeks and coldwater ponds, with emergent and submergent vegetation and riparian species along the edges; may estivate in rodent burrows or cracks during dry periods | Alteration of stream and wetland habitats, overharvesting (historically), habitat destruction, competition and predation by fish and bullfrogs | Not known to occur in the Sacramento or San Joaquin valleys below 1,000 feet |
| **Birds** | | | | | |
| White-tailed kite *Elanus leucurus* | --/FP | Lowland areas west of Sierra Nevada from head of Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border | Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging | Loss of grassland and wetland habitats to agriculture and urban development | No kites were observed during the field surveys; potential nesting habitat exists along Alignment 1, especially at stream crossings with riparian habitat (i.e., Cosumnes or Mokelumne rivers) and Alignment 4; no potential nesting habitat exists along the I-5 to FSC pipeline alignment |
| Northern harrier *Circus cyaneus* | --/SSC | Throughout lowland California; has been recorded in fall at high elevations | Grasslands, meadows, marshes, and seasonal and agricultural wetlands providing tall cover | Loss of habitat to agricultural and urban development | No harriers were observed during the field surveys; potential nesting habitat exists along Alignments 1, 2, and 4; no potential nesting habitat exists along the I-5 to FSC pipeline alignment |
| Swainson's hawk *Buteo swainsoni* | --/T | Lower Sacramento and San Joaquin valleys, the Klamath Basin, and Butte Valley; the state's highest nesting densities occur near Davis and Woodland, Yolo County | Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grain fields | Loss of riparian, agriculture, and grassland habitats; vulnerable to human disturbance at nest sites | No suitable nesting habitat was found along the I-5 to FSC pipeline alignment, but Alignments 1, 2, and 4 pass through many potential nesting areas, especially near the Cosumnes River, Deer Creek, Mokelumne River, Dry Creek, Jahant Slough, and Bear Creek; one active nest was found at the Drey Creek crossing |
| Western burrowing owl *Athene cunicularia hypugea* | SC/SSC | Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast | Rodent burrows in sparse grassland, desert, and agricultural habitats | Loss of habitat, human disturbance at nesting burrows | Burrowing owls were observed at two locations along Alignment 1 (north of Centrailia and south of Centrailia) and at two locations along Alignments 2 and 4 (about 6 miles from Camanche Reservoir), but none were seen along the I-5 to FSC pipeline alignment; they could be found along portions of the alignments that were not surveyed or they could move into new areas |



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| Species | Status [a] Federal/State | California Distribution | Habitat | Reason for Decline or Concern | Occurrence in Study Area |
|---|---|---|---|---|---|
| Tricolored blackbird *Agelaius tricolor* | SC/SSC | Largely endemic to California; permanent residents in the Central Valley from Butte County to Kern County; at scattered coastal locations from Marin County south to San Diego County; breeds at scattered locations in Lake, Sonoma, and Solano counties; rare nester in Siskiyou, Modoc, and Lassen counties | Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grainfields; nesting habitat must be large enough to support 50 pairs; probably requires water at or near the nesting colony; requires large foraging areas, including marshes, pastures, agricultural wetlands, dairies, and feedlots, where insect prey is abundant | Loss of wetland and upland breeding habitats from conversion to agriculture and urban development and to water development projects, pesticides contamination, human disturbance of nesting colonies | Potential nesting and foraging habitat exists along Alignments 1, 2, and 4; no tricolored blackbirds were seen during field surveys; the potential for nesting along these alignments is moderate to high |
| Mammals | | | | | |
| Spotted bat *Euderma maculatum* | SC/SSC | Occurs throughout eastern and southern California, the central Sierra Nevada, and the Sierra Nevada foothills bordering the San Joaquin Valley; probably occurs in other portions of the state where habitat is suitable | Roosts primarily in rock crevices; uses arid deserts and open pine forests set in rocky terrain; females may favor ponderosa pine forests during reproduction | Loss and fragmentation of pine forests; human disturbance at roosting and breeding sites | Not within the species' known range |
| Greater western mastiff-bat *Eumops perotis californicus* | SC/SSC | Occurs along the eastern San Joaquin Valley from El Dorado County through Kern County; also found along the south Coast, Peninsular, and Transverse Ranges from San Francisco to the Mexico border | Roosts and breeds in deep, narrow rock crevices; may also use crevices in trees, buildings, and tunnels; forages in a variety of semiarid to arid habitats | Unclear; possibly insecticide contamination and loss of foraging habitat, possibly disturbance to roosting sites | Probably not within the species' known range |
| Small-footed myotis *Myotis ciliolabrum* | SC/-- | Sierra Nevada; south Coast, Transverse, and Peninsular Ranges; and the Great Basin | Open stands in forests and woodlands, as well as shrublands; uses caves, crevices, and abandoned buildings | Unclear; possibly loss and fragmentation of habitat | Probably not within the species' known range |
| Fringed myotis *Myotis thysanodes* | SC/-- | Sierra Nevada, Klamath Mountains, Coast Ranges, and Transverse and Peninsular Ranges | Open woodlands; coastal and montane forests | Possibly loss and fragmentation of habitat | Probably not within the species' known range |



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| Species | Status * Federal/State | California Distribution | Habitat | Reason for Decline or Concern | Occurrence in Study Area |
|---|---|---|---|---|---|
| Long-eared myotis *Myotis evotis* | SC/-- | Sierra Nevada, Klamath Mountains, Coast Ranges, and Transverse and Peninsular Ranges | Woodlands | Possibly loss and fragmentation of habitat | Probably does not occur in the study area; no records |
| Long-legged myotis *Myotis volans* | SC/-- | Mountains throughout California | Most common in woodlands and forests above 4,000 feet, but occurs from sea level to 11,000 feet | Possibly loss and fragmentation of habitat | Probably does not occur in the study area; no records |
| Yuma myotis *Myotis yumanensis* | SC/-- | Considered common and widespread in northern California; colonies known from Marin and San Francisco counties and San Joaquin Valley | Roosts colonially in a variety of natural and human-made sites, including caves, mines, buildings, bridges, and trees; in northern California, maternity colonies are usually in fire-scarred redwoods, pines, or oaks; forages for insects over water bodies | Possibly loss and fragmentation of habitat | Could occur in the riparian forests in the study area; no records |
| Pacific Townsend's (=western) big-eared bat *Plecotus townsendii townsendii* | SC/SSC | Coastal regions from Del Norte County south to Santa Barbara County | Roosts in caves, tunnels, mines, and dark attics of abandoned buildings; very sensitive to disturbances and may abandon a roost after onsite visit | Unclear; possibly human disturbance to roost sites | Probably not in the species' range; no records |
| San Joaquin pocket mouse *Perognathus inornatus* | SC/-- | Occurs along the eastern side of the San Joaquin Valley | Favors grasslands and oak savannas with friable soils | Probably loss of habitat | Could occur in undisturbed grasslands; no records |



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| Species | Status * Federal/State | California Distribution | Habitat | Reason for Decline or Concern | Occurrence in Study Area |
|---|---|---|---|---|---|

* Status explanations:

**Federal**

E = listed as endangered under the federal Endangered Species Act.
T = listed as threatened under the federal Endangered Species Act.
C = species for which USFWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list, but issuance of the proposed rule is precluded.
SC = species of concern; species for which existing information indicates it may warrant listing but for which substantial biological information to support a proposed rule is lacking.
-- = no listing.

**State**

T = listed as threatened under the California Endangered Species Act.
FP = fully protected under the California Fish and Game Code.
SSC = species of special concern in California.
-- = no listing.



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- The California Department of Fish and Game regulates activities that would interfere with the natural flow of, or substantially alter the channel, bed, or bank of a lake, river or stream under California Fish and Game Code Sections 1600–1607, which require issuance of a streambed alteration agreement for regulated activities. Protection of biological resources is often one condition of streambed alteration agreements.

- Removal of raptor nests is prohibited by the California Fish and Game Code 3503.5.

## Survey Methods

Survey methods for this analysis were similar to those described in Chapter 7, "Vegetation and Wetland Resources."

## Impacts Found to Be Less than Significant

**Alternative 1: No Action**

As described in Chapter 7, "Vegetation and Wetland Resources," approximately 20,052 acres of undeveloped habitat exist within the service area. Most of this habitat is located within a large contiguous area west of the Highway 680 corridor and is surrounded by developed lands. This large habitat corridor provides important local habitat for resident and migratory wildlife because it is continuous and unfragmented, is of large size, and encompasses a diversity of habitats. The diversity of oak woodland, chaparral, grassland, and riparian communities within the service area provides suitable habitat for a variety of special-status wildlife species (See Table F-2 in Appendix F).

Impacts on wildlife resources in the service area would be similar to the impacts described for vegetation and wetland resources in Chapter 7. EBMUD is committed to working with local jurisdictions to ensure that county general plan policies are implemented and to assist in mitigating the impacts of growth on biological resources.

**Alternative 2: Folsom South Canal Connection**

***Impact: Loss of Developed Land, Individual Trees, and Ornamental Vegetation for Wildlife Habitat.*** Developed land, individual trees, and ornamental vegetation are common throughout the region, provide habitat for common wildlife species, and do not represent significant habitat for sensitive wildlife species. This impact is less than significant. No mitigation is required.

***Impact: Temporary Loss of Swainson's Hawk Foraging Habitat.*** Impacts on annual grassland and agricultural land and permanent conversion of agricultural land to annual grassland along the pipeline corridor and at the pump station could result in temporary loss of Swainson's hawk foraging habitat. The temporary loss of annual grassland and agricultural land during construction and the permanent conversion of agricultural land to grassland will not significantly affect foraging habitat for Swainson's hawk. Because the pipeline corridor impacts are linear, and the size of the pump station is small, the affected area is small compared with the overall foraging area available for a pair of hawks. This impact is less than significant. No mitigation is required.

***Impact: Temporary Loss of San Joaquin Pocket Mouse Habitat.*** Impacts on annual grassland along the pipeline corridor and at the pump station could result in temporary loss of San Joaquin pocket mouse habitat. The temporary loss of annual grassland during construction will not significantly affect habitat for the San Joaquin pocket mouse. Because the pipeline corridor impacts are linear and the size of the pump station is small, the affected area is small compared with the overall habitat available for pocket mice. This impact is less than significant. No mitigation is required.



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**Alternative 3: Joint Water Supply**

Less-than-significant impacts under Alternative 3 would be the same as described for Alternative 2.

## Significant Impacts and Mitigation

**Alternative 2: Folsom South Canal Connection**

***Impact: Loss of or Disturbance to Active Raptor Nests and Tricolored Blackbird Nests.*** Construction could result in the loss of or disturbance to raptor (e.g., white-tailed kite, northern harrier, and red-shouldered hawk) or tricolored blackbird nests. Because disturbance of an active raptor nest would violate Sections 3503 and 3503.5 of the California Fish and Game Code and because the tricolored blackbird is a state species of special concern and a federal species of concern, this impact is significant. Implementation of Mitigation Measure 8-1 would reduce this impact to a less-than-significant level.

***Mitigation Measure 8-1: Conduct Surveys for Nesting Raptors and Tricolored Blackbirds.*** Monthly surveys can be conducted by a qualified biologist during spring and early summer (April–July) along the entire pipeline corridor before the start of each phase of construction activities near any suitable nest tree or emergent marsh area. If an active raptor nest or tricolored blackbird nesting colony is located within 500 feet of a construction area, construction within 500 feet of the nest tree or nesting colony can be minimized during the nesting season (March–June 15) until the young have fledged. If an active nest tree or colony cannot be avoided, the removal or disturbance of the marsh can occur outside the breeding season.

***Impact: Disturbance of Nesting Swainson's Hawks.*** Disturbance of nesting Swainson's hawks during construction could result in nest abandonment or force nestlings to fledge early, which could potentially cause their death. This impact would be considered significant because the Swainson's hawk is a state-listed threatened species. Implementation of Mitigation Measure 8-2 would reduce this impact to a less-than-significant level.

***Mitigation Measure 8-2: Consult with DFG and Follow Mitigation Guidelines to Avoid Disturbance of Nesting Swainson's Hawk.*** If an active Swainson's hawk nest is found or reported to exist within 0.5 mile of the pipeline construction corridor, DFG can be consulted if construction is scheduled during the nesting season (March–June 15). Draft mitigation guidelines for Swainson's hawks in the Central Valley (California Department of Fish and Game 1994) recommend a 0.5-mile radius of no disturbance around active nests between March 1 and generally August 15 (California Department of Fish and Game 1994). If the nest tree must be removed, it can be done outside of the nesting season.

***Impact: Loss of or Disturbance to Nesting Western Burrowing Owls.*** Disturbance of nesting western burrowing owls during construction could cause nest abandonment or force nestlings to fledge early, which could result in mortality. Because the burrowing owl is a state species of special concern and a federal species of concern, this impact is significant. Implementation of Mitigation Measures 8-1 and 8-3 would reduce this impact to a less-than-significant level.

***Mitigation Measure 8-3: Consult with DFG and Follow DFG's Burrowing Owl Mitigation Guidelines.*** If an active burrowing owl burrow (nesting or winter roosting) is found or reported to exist within 500 feet of the pipeline construction corridor during the raptor surveys (see Mitigation Measure 8-1), DFG can be consulted. The 1995 DFG burrowing owl mitigation guidelines recommend a no disturbance area (buffer area) within 160 feet of occupied burrows during the nonbreeding season (September 1–January 31) and 250 feet



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during the breeding season (February 1–August 31).

If an active burrowing owl burrow cannot be avoided during construction, EBMUD can consult with DFG regarding the appropriate mitigation measures. DFG's guidelines recommend providing artificial burrows (boxes) at a 2:1 ratio (i.e., two boxes constructed and placed near the existing burrows for each burrow destroyed). The owls can be moved away from the affected area approximately 2 weeks before construction to the artificial burrows by passive relocation, as described in the mitigation guidelines.

***Impact: Loss of Potential Habitat for Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp, and Mid-Valley Fairy Shrimp.*** Excavation during construction could remove vernal pools that are occupied habitat for the federally listed vernal pool fairy shrimp and vernal pool tadpole shrimp and for the mid-valley shrimp, a rare species. This impact is considered significant because it could cause direct mortality of these species. Implementation of Mitigation Measure 8-4 would reduce this impact to a less-than-significant level.

***Mitigation Measure 8-4: Conduct Surveys and Prepare a Mitigation Plan for Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp.*** Protocol-level invertebrate surveys can be conducted by a qualified biologist to determine whether vernal pool tadpole shrimp and vernal pool fairy shrimp exist in the pipeline construction corridor. If either species is found, compliance with the federal Endangered Species Act would be required if habitat cannot be avoided and would be adversely affected. If the mid-valley fairy shrimp is found, impacts on occupied habitat can be avoided.

Compliance with the federal Endangered Species Act will likely require development of a compensation plan that mitigates impacts through preservation of existing habitat and creation of compensatory habitat.

If vernal pool fairy shrimp and vernal pool tadpole shrimp are not found on the project site in protocol-level surveys, no further mitigation measures for these species would be required. However, mitigation would be required to compensate for the loss of wetland habitats (refer to mitigation measures described in Chapter 7, "Vegetation and Wetland Resources").

Alternatively, EBMUD can assume all potential habitat is occupied and develop mitigation plans based on that assumption. No protocol-level surveys would be required.

***Impact: Loss of Potential Habitat for Western Spadefoot Toad and California Tiger Salamander.*** Excavation during construction could remove vernal pools that are occupied habitat for the western spadefoot toad or California tiger salamander. The potential is low for these species to exist along any of the pipeline alignments, but they have been recorded in the region. If these species are present along the pipeline alignments, construction would cause their direct mortality. This potential impact is significant. Implementation of Mitigation Measure 8-5 would reduce this impact to a less-than-significant level.

***Mitigation Measure 8-5: Conduct Preconstruction Surveys and Mitigate for the Loss of Western Spadefoot Toad or California Tiger Salamander Habitat, If These Species Are Present.*** Preconstruction surveys can be conducted by a qualified biologist to determine whether western spadefoot toads or California tiger salamanders exist in the affected areas. Three surveys during late March through early May can be conducted for tadpoles and larvae for these species. Alternatively, EBMUD can assume these species are present in the affected areas and not perform the surveys. If one or more of these species is present or assumed to



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be present and cannot be avoided during construction, EBMUD can mitigate for the loss of habitat by implementing Mitigation Measures 7-4a, 7-4b, or 7-4c.

***Impact: Potential Mortality of or Disturbance to the Valley Elderberry Longhorn Beetle during Construction.*** Construction could result in mortality of or disturbance to the beetle or its habitat. Because the beetle is a federally listed species, this impact is significant. Implementation of Mitigation Measure 8-6 would reduce this impact to a less-than-significant level.

***Mitigation Measure 8-6: Conduct Preconstruction Valley Elderberry Longhorn Beetle Surveys and Avoid or Compensate for Loss of Habitat.*** Before initiating construction, EBMUD can ensure that a qualified biologist surveys the alignment corridor and documents the extent of habitat for the valley elderberry longhorn beetle. The information gathered can include the number of emergence holes and stems greater than 1 inch in diameter for each elderberry shrub encountered.

EBMUD can implement USFWS's mitigation guidelines for the beetle by avoiding construction activities within 20 feet of any elderberry shrub. Where avoidance is not feasible, a compensation plan can be prepared and implemented to compensate for the loss of habitat. Permits can be obtained as required from USFWS and DFG before construction commences.

As required by the federal Endangered Species Act, USFWS requires preparation of a compensation and monitoring plan that reduces potential impacts and describes measures to ensure that continued existence of the valley elderberry longhorn beetle is not jeopardized. EBMUD can prepare the compensation plan consistent with USFWS mitigation guidelines (U.S. Fish and Wildlife Service 1996).

USFWS guidelines call for avoidance of habitat wherever possible. When avoidance is not possible, the guidelines direct that all elderberry plants in an affected area be transplanted, when feasible, and that all stems 1 inch or greater in diameter be replaced. The replacement ratio depends on the percentage of elderberry shrubs in the affected area that have beetle emergence holes. The guidelines require the project proponent to monitor the transplanted shrubs and replacement plants for 10 years from the date of transplanting to monitor the success of mitigation efforts.

***Impact: Potential Loss of Habitat for Sacramento Anthicid Beetle and Sacramento Valley Tiger Beetle.*** Construction at stream crossing could result in the loss of habitat for the Sacramento anthicid beetle and Sacramento Valley tiger beetle. Because these beetles are rare, loss of potential habitat is a significant impact. Implementation of Mitigation Measures 7-3a and 7-3b would reduce this impact to a less-than-significant level.

***Impact: Loss of or Temporary Disturbance to Yuma Myotis and Northwestern Pond Turtle Habitat.*** Construction at stream crossings could result in the loss of or temporary disturbance to riparian and stream habitats for the Yuma myotis and northwestern pond turtle. Because these species are state and federal species of concern and riparian and stream habitats are considered sensitive wildlife habitats, loss of or disturbance to potential myotis and pond turtle habitat is a significant impact. Implementation of Mitigation Measures 7-3a and 7-3b would reduce this impact to a less-than-significant level.

**Alternative 3: Joint Water Supply**

***Impact: Loss of or Disturbance to Active Raptor Nests in the Riparian Woodland Communities.*** Construction of the American River intake structure and I-5 to FSC pipeline alignment may result in the loss of or disturbance to raptor nests (e.g., white-tailed



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kites, red-shouldered hawks, red-tailed hawks). Because disturbance of an active raptor nest would violate Sections 3503 and 3503.5 of the California Fish and Game Code, this impact is significant. Implementation of Mitigation Measure 8-1 would reduce this impact to a less-than-significant level.

***Impact: Loss of Potential Habitat for Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp, and Mid-Valley Fairy Shrimp.*** Excavation during construction could remove vernal pools that are occupied habitat for the vernal pool fairy shrimp, vernal pool tadpole shrimp, and mid-valley fairy shrimp. This impact is significant because it could cause direct mortality of these species. Implementation of Mitigation Measure 8-4 would reduce this impact to a less-than-significant level.

***Impact: Potential Mortality of or Disturbance to the Valley Elderberry Longhorn Beetle.*** Construction of the American River intake structure may result in the loss of or disturbance to VELB or its habitat (elderberry shrubs). This impact is significant because it could cause direct mortality of these species. Implementation of Mitigation Measure 8-6 would reduce this impact to a less-than-significant level.

***Impact: Potential Loss of Habitat for Sacramento Anthicid Beetle, Sacramento Valley Tiger Beetle, Yuma Myotis, and Northwestern Pond Turtle.*** Construction of the American River intake structure may result in the loss of or disturbance to habitat for the Sacramento anthicid beetle, Sacramento valley tiger beetle, Yuma myotis, and northwestern pond turtle. Because these beetles are rare, loss of potential habitat is significant. Implementation of Mitigation Measures 7-3a and 7-3b would reduce this impact to a less-than-significant level.

***Impact: Loss of or Disturbance to Tricolored Blackbird Nests; Disturbance of Nesting Swainson's Hawks; Loss of or Disturbance to Nesting Western Burrowing Owls; Loss of Potential Habitat for Western Spadefoot Toad and California Tiger Salamander.*** For the purposes of this analysis, Alternative 3 includes the effects of Alignment 2 described for Alternative 2. Overall, effects of Alternative 3 are similar to those of Alternative 2 in terms of the type and magnitude of impacts on wildlife resources. These sensitive wildlife resources are regulated by local, state, and federal regulations and policies. These impacts are significant. Implementation of Mitigation Measures 7-3a, 7-3b, 7-4a, 7-4b, 8-1, 8-2, 8-3 and 8-5 would reduce these impacts to less-than-significant levels.



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Chapter 9

# Geology, Soils, Seismicity, and Groundwater

# Chapter 9. Geology, Soils, Seismicity, and Groundwater

## AFFECTED ENVIRONMENT

### Regional Geology

Sacramento and San Joaquin counties are in the eastern Central Valley in terrain consisting mainly of low alluvial plains and fans and dissected uplands, with local crossings of river floodplains and channels. This region is characterized by very gently west-sloping terrain of generally low relief except where it is incised by channels of large streams and the American, Sacramento, Cosumnes, and Mokelumne rivers.

The region lies approximately along the axis of rotation between the west-tilting uplift of the Sierra Nevada and the subsiding down warp of the Central Valley (Unruh 1991). The region has been tectonically stable throughout the Cenozoic. Erosion and sedimentation are the primary geologic processes in the area (Slemmons 1966). Subsidence may occur in parts of the region where substantial groundwater extraction has lowered the water table extensively (Poland and Evenson 1966, Poland et al. 1975). Resources in the project area include local accumulations of sand and gravel suitable for use as aggregate (Hart 1966), some remaining placer gold in alluvium derived from gold-bearing source rocks in the foothills to the east, and natural gas (e.g., the Lodi gas field).

The EBMUD filtration plants that would be expanded as part of the project are located in Contra Costa County, which is predominantly within the Coast Ranges geologic province. Recent surface deposits in this province have originated from alluvial fans, streams, and landslides. The eastern part of the county is in the Great Valley portion of the Sierran Block province, which consists of deep alluvial materials underlain by basement rock. (Contra Costa Water District and U.S. Bureau of Reclamation 1992.)

### Regional Soils

Soils in Sacramento and San Joaquin counties are defined by a succession of underlying Tertiary and Quaternary formations and by the residual and transported soils that mantle the ground surface throughout the region. The Tertiary formations range from the Eocene (40 million years ago) for the Ione Formation, the oldest basal unit, to the Pliocene (2 million years ago) for the youngest, the Laguna Formation. The complete Tertiary succession consists of the Ione, Valley Springs, Mehrten, and Laguna formations. This Tertiary sequence is overlain by Quaternary Riverbank and Modesto formations and by younger alluvial accumulations of varying age (Wagner et al. 1981).

Most of the facilities for Alternative 2, including most of the new pipeline and both pumping plants, would be constructed on ground underlain by dense but uncemented deposits of the Riverbank and Modesto formations. Parts of the southeast end of Alignment 2 would cross ground underlain by the older Mehrten and Valley Springs formations. Alternative 3 pipeline facilities would be constructed on deposits ranging from the active channel alluvium of the American River to dense sand and gravel of the Laguna Formation.

Review of available data, including the Natural Resources Conservation Service (NRCS) soil survey maps, indicates that soils of this region are not subject to structural loss of strength (e.g., collapse or quick failure) or excessive shrinking and swelling and are generally not corrosive. Most areas where project construction would occur, including the City of Sacramento and affected portions of Sacramento and San Joaquin counties, have relatively flat topography and therefore rela-



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tively low erosion potential. Erosion potential is highest in and near streams and rivers, including the Sacramento and American river channels where the new intake structures and Fairbairn WTP expansion would be constructed. Water-saturated alluvium along the American River and in some smaller drainage courses may be subject to liquefaction if exposed to seismic ground shaking.

The Coast Ranges within Contra Costa County consist of complexly folded and faulted Tertiary marine and nonmarine formations and Cretaceous marine formations (AGS 1989). The remainder of the county is underlain by deep alluvial materials (Contra Costa Water District and U.S. Bureau of Reclamation 1992). Construction of the filtration plant expansions would occur generally on level valley fill soils. Erosion potential is anticipated to be relatively low, although these soils may be prone to liquefaction during seismic ground shaking.

## Regional Seismicity

Historically, little seismic activity has occurred in Sacramento and San Joaquin counties, and no earthquakes exceeding magnitude 3.0 on the Richter scale have been recorded within an approximate 20-mile radius of this portion of the project area (CH2M Hill and Montgomery Watson 1996). The region is underlain by crystalline basement rock and overlying Cenozoic-age strata that have shown no evidence of local faulting for more than 40 million years.

The epicenters of most recorded earthquakes stronger than magnitude 3.0 in Sacramento and San Joaquin counties are coincident with the major faults in the San Francisco Bay Area. Major seismic sources that could potentially create moderate to strong ground shaking in the area, their corresponding maximum credible earthquake and approximate distance and direction from the project area for Alternatives 2 and 3 are shown in Table 9-1. The maximum credible earthquake (defined as the largest earthquake that a fault segment is considered capable of generating) with the potential to have the greatest effect on the area would be a magnitude 6.5 event in the Foothill fault system, which is a segment of the Bear Valley fault zone located about 12–30 miles from the Alternatives 2 and 3 project area.

The potential for severe seismic ground shaking is higher in Contra Costa County, which is known to have active faults and is closer to the Bay Area faults identified in Table 9-1. Several seismic events of Richter magnitudes less than 6 have occurred in the county along faults considered active. Active local faults include the Greenville fault, which was the source of the 1980 Livermore earthquakes (Richter magnitudes 5 to 6), the Antioch fault, and buried faults in the Coast Ranges–Sierran Block boundary zone. (Contra Costa Water District and U.S. Bureau of Reclamation 1992.)

## Regional Groundwater

The project area overlies parts of the Sacramento County and eastern San Joaquin County groundwater basins (Page 1986). These basins consist of an upper unconfined water table within the unconsolidated Quaternary deposits and a series of deeper confined or semi-confined aquifers in the Laguna and Mehrten formations. The upper unconfined aquifer ranges in thickness from 200 feet to more than 1,000 feet and averages about 800 feet. It is recharged partly by direct infiltration of precipitation and agricultural irrigation and partly by underflow from the channels of the larger drainages, especially the Cosumnes River, Dry Creek, and the Mokelumne River (Piper et al. 1939).

Review of available data indicates that groundwater levels were typically 50 to 100 feet below the land surface in 1990 throughout the project area in Sacramento and San Joaquin counties, except in local perched groundwater zones and in the zones of channel underflow (EDAW 1993).



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Table 9-1. Major Seismic Sources with Potential to Affect Sacramento and San Joaquin Counties and the San Francisco Bay Area

| Seismic Source | Maximum Credible Earthquake (Richter magnitude) | Approximate Distance from Alternatives 2 and 3 Project Area (miles) | General Direction from Project Area |
|---|---|---|---|
| San Andreas fault | 8.3 | 71–83 | west |
| Hayward fault | 7.25 | 53–65 | southwest |
| Calaveras fault | 7.25 | 44–54 | southwest |
| Marsh Creek-Greenville faults | 6.5 | 37–45 | southwest |
| Coast Ranges-Sierran block boundary zone | 7.0 | 24–30 | southwest |
| Bear Mountain and Melones fault zones of the Foothill fault system | 6.5 | 12–30 | northeast |

Source: CH2M Hill and Montgomery Watson 1996.

Groundwater conditions are expected to vary along the pipeline routes; groundwater levels near rivers and streams would be consistent with in-channel flow levels and would fluctuate seasonally. The water table would likely be deeper in areas distant from surface channels or water bodies; however, local perched groundwater may be present in some areas along the pipeline alignments. (CH2M Hill and Montgomery Watson 1996).

Groundwater supplies are low in Contra Costa County, and groundwater flows tend to be intermittent and at lower depths than would typically be encountered during the procedures necessary for construction of the proposed filtration plant expansions.

### Project Area Flood Control

The pipeline alignments for Alternatives 2 and 3 cross the floodplains of natural streams and rivers in Sacramento and San Joaquin counties (see Chapter 2, "Project Objectives and Alternatives under Consideration," for streams and rivers crossed by each alignment). These streams and rivers help provide flood protection during seasonal storms by collecting and directing runoff downstream.

The proposed sites for the American River intake structure and the Fairbairn WTP intake expansion under Alternative 3 are within the river channel next to a levee that is part of the American River Flood Control Project. The Sacramento River is also leveed at the Sacramento River WTP. The levees are operated and maintained by the State Reclamation Board.

## ENVIRONMENTAL CONSEQUENCES

### Methods and Assumptions

The evaluation of impacts related to geology, soils, seismicity, and groundwater was based on consideration of construction procedures and project design provided by the project engineers and review of available data and information, including publications of the U.S. Geological Survey (USGS), NRCS, California Department of Water Resources (DWR), and other relevant sources.



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## Significance Criteria

According to the State CEQA Guidelines, a significant impact would normally result if the project would:

- cause substantial flooding, erosion, or release of soils into surface waters (siltation);
- expose people or structures to major geologic hazards;
- substantially degrade or deplete groundwater resources; or
- interfere substantially with groundwater recharge.

For purposes of this analysis, a significant impact could also result if the project would:

- remove any unique geologic or physical feature or
- involve changes in topography that would result in unstable soil conditions.

## Impacts Found to Be Less than Significant

**Alternative 1: No Action**

Alternative 1 would have no impacts related to geology, soils, and seismicity. Groundwater levels and quality under future no-action conditions could be expected to decline if the current rate of groundwater pumping continues in Sacramento County.

Growth in EBMUD's service area under this alternative could require that increased groundwater pumping occur during drought years to help meet projected water demands.

**Alternative 2: Folsom South Canal Connection**

***Impact: Potential for Increased Flooding during Pipeline Construction.*** The nature and design of pipeline construction through stream and river floodplains would ensure that the potential for increased flooding during construction is avoided or minimized. Construction procedures would call for tunneling the pipeline beneath the largest river, the Mokelumne, and open trench construction within the floodplains of other streams and rivers would be short term and occur during the dry season when risk of major flooding would be minimal. Stream and river beds would be restored to their original dimensions immediately following pipeline installation. The pumping plants would not be constructed within floodplains. This impact is less than significant. No mitigation is required.

***Impact: Potential for Localized Accelerated Erosion, Siltation, and Unstable Soils during and after Construction.*** Construction of the pipeline and pumping plants, including the new transmission line extension, would require removal of vegetation, cut-and-fill operations, grading for site preparation and access, and trenching. Most of the areas proposed for construction are currently in agricultural use and have relatively flat, even topography with minimum potential for substantial slope failure during construction. No unique geologic features that could be removed by project construction are known to exist along the alignment routes. However, depending on the specific geologic conditions in the areas proposed for construction, construction activities could result in localized accelerated erosion, siltation, or unstable soils. Trench dewatering, which would be required in areas where the soil is saturated with surface water or shallow groundwater, could temporarily interrupt natural hydrology or induce local soil subsidence; however, these effects would be avoided or

minimized through standard engineering procedures to be determined after the project geotechnical investigations have been completed.

Construction of the filtration plant expansions in the EBMUD service area would be performed on level ground within the boundaries of the existing facilities, and the potential for increased erosion or other substantial effects on soils would be minimal.

As noted in Chapter 2, the project will comply with the regional water quality control board's (RWQCB's) requirements for discharges from general construction activity and dewatering in accordance with the National Pollutant Discharge Elimination System (NPDES). These requirements call for implementation of a Storm Water Pollution Prevention Plan (SWPPP) identifying the best management practices (BMPs) to be employed during and following construction to prevent soil erosion and control possible waste discharges into waterways. BMPs may include but will not be limited to construction of berms and runoff diversion ditches, hydroseeding, use of silt fences where needed, and similar measures. The project will also include implementation of an erosion control plan that complies with all applicable city and county regulatory requirements for construction. Given the duration of construction and the area covered by the project, the RWQCB may require specific pollution control measures through the issuance of waste discharge requirements pursuant to the state Porter-Cologne Water Quality Control Act. Long-term BMPs, such as revegetation of exposed soil, would also be implemented to minimize erosion after construction. Because of these elements incorporated in the project design, this impact is less than significant. No mitigation is required.

***Impact: Potential for Facility Failure from Seismic Activity.*** As described above under "Affected Environment," no known faults exist in the Sacramento and San Joaquin county project vicinity. Active faults are known to exist in and near the EBMUD service area. Potential local ground shaking from a seismic event could affect project facilities; however, this potential hazard would not necessarily result from implementation of the project. Current seismic safety measures will be implemented as part of the project, including using appropriate construction materials and designing pipelines to be flexible at connections to structures or transitions between soil types. In any areas determined to have a potential for liquefaction, lateral spreading, or slope failure during an earthquake, ground improvements, construction of pier or pile supports, or other special design considerations will be implemented. These standard measures will eliminate or greatly reduce the potential for pipeline, pumping plant, or treatment facility failure related to seismic ground shaking. The project would also be consistent with standards of seismic safety identified under the Uniform Building Code and related zoning or other requirements issued by local jurisdictions. This impact is less than significant. No mitigation is required.

***Impact: Potential for Interference with Groundwater Recharge after Construction.*** According to preliminary engineering evaluations, groundwater likely would be encountered during construction at various locations along all pipeline alignments, especially near stream and river crossings and other surface water bodies. Trench dewatering at these locations would be a temporary construction procedure and would not remove enough groundwater to substantially deplete the local groundwater supply or result in regional ground subsidence. Similarly, location of a pipeline in an area with shallow groundwater, such as beneath a stream channel, would not substantially change groundwater flow and overall hydrology because the area affected by these crossings would be small. (Impacts related to groundwater contamination with hazardous substances are addressed in Chapter 15, "Public Health and Safety.")



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Substantial interference with groundwater recharge typically may occur with large-scale developments that cover large areas of the natural ground surface with impermeable material such as asphalt, preventing surface water runoff from infiltrating the soil. The pipeline alignments would not be covered with impermeable material and would not restrict infiltration of runoff or groundwater recharge. Groundwater recharge would not be substantially limited at the sites of the two pumping plants; the area of land covered would be small and stormwater would be released to infiltrate the large areas of uncovered soil surrounding the plant sites. The expanded treatment facilities would be relatively small in scale and constructed within existing developed facilities and therefore would not contribute substantially to reduced infiltration rates. This impact is less than significant. No mitigation is required.

**Alternative 3: Joint Water Supply**

***Impact: Potential for Increased Flooding from Siting of an Intake Structure.*** Construction of an American River intake structure would include installation of an access bridge and pipeline over the top of the American River Flood Control Project levee at that location. The Fairbairn WTP intake structure expansion and new Sacramento River WTP intake structure would be constructed near existing levees. Construction crews and equipment would require access to and over the levees into the river channels. Construction of facilities in the river channels would be limited to periods of dry weather and restricted by established maximum river flows and would not cause increased flooding or decrease the effectiveness of existing flood control operations. An intake structure located in the river channel would not substantially affect channel flood capacity because the intake structure displacement would be minor compared to the overall floodway capacity.

As noted in Chapter 2, the project will require issuance of levee encroachment permits from the State Reclamation Board for construction activities on the levees. To comply with State Reclamation Board requirements, project construction and operation will be planned to ensure that the integrity and safety of the levees are not compromised and that access to the levees for maintenance or repair is not restricted. Under Alternative 3, the impact on flood protection at the American River Flood Control Project and Sacramento River levees would be less than significant. The impact of pipeline construction within stream and river floodplains is similar to that under Alternative 2 and is less than significant. No mitigation is required.

***Impact: Potential for Localized Erosion, Siltation, and Unstable Soils from Construction.*** The impact would be similar to the impact under Alternative 2, although the potential for erosion, siltation, and unstable soil conditions could be higher at the site of an American River intake structure and the Fairbairn WTP expansion, where soils within the river channel would be disturbed. Because construction practices would be conducted in accordance with the project SWPPP and erosion control plan and all applicable NPDES and City of Sacramento requirements, this impact is less than significant. No mitigation is required.

Construction of new structures within the American and Sacramento river channels could also result in increased scour and potential bank erosion from increased water velocities. Before construction within the river channels commences, hydrologic simulation modeling will be conducted to determine the localized hydrologic effects (e.g., potential for scour and downstream erosion) of the new and expanded intake structures. The project will be designed to include any actions required and agreed on by the project participants to minimize or avoid these effects and will likely include continued monitoring of channel conditions. Any impacts are less than significant. No mitigation is required.

***Impact: Potential for Facility Failure from Seismic Activity.*** As with Alternative 2, for all



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project components, including an American River intake structure, seismic safety measures would be incorporated into construction procedures and applicable Uniform Building Code requirements would be met. This impact is less than significant. No mitigation is required.

***Impact: Potential for Increased Flooding during Pipeline Construction.*** This impact is similar to that under Alternative 2 and is less than significant. No mitigation is required.

## Significant Impacts and Mitigation

None of the project alternatives would result in significant impacts related to geology, soils, seismicity, and groundwater, and no mitigation measures are necessary.



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Chapter 10

# Land Use

# Chapter 10. Land Use

## AFFECTED ENVIRONMENT

The regional land use context for the project alternatives encompasses rural, agricultural areas in Sacramento and San Joaquin counties under Alternative 2 and urban and suburban areas in the City and County of Sacramento under Alternative 3.

### Alternative 2: Folsom South Canal Connection

**Existing Land Uses**

Existing land uses near the FSC pipeline alignments are mainly agriculture and open space with rural and suburban residential areas scattered infrequently along the potential alignments. Agricultural uses are mainly livestock grazing, irrigated crop production, and orchard and vineyard operations. Developed uses are generally limited to small to moderately sized rural residential areas, transportation corridors, and aggregate mining areas.

Land uses near the canal pumping plants at the FSC for Alignments 1 and 4 include grazing and agricultural areas and a small residential area along the south side of Grant Line Road near its intersection with Sunrise Boulevard; approximately five houses in the development are located along Grant Line Road within 1,200 feet of the proposed plant site. Land uses near the Alignment 1 corridor include private agricultural and grazing operations with appurtenant facilities and the Central California Traction (CCT) railroad. Alignment 1 briefly enters the City of Lodi within the CCT alignment in an industrial use area. A spur from the CCT railroad at Lodi Junction (Lodi Avenue) provides rail service to industrial businesses in the City of Lodi. (Bartlam and Forkas pers. comms.) Additional information on use of the CCT is provided in Chapter 12, "Transportation and Circulation." The southern portion of Alignment 1 crosses agricultural fields and skirts the northeast side of a suburban residential area before it connects with the proposed aqueduct pumping plant near the Mokelumne Aqueducts west of Hildreth Lane. Approximately 10 rural residences are located within several hundred feet of the proposed aqueduct pumping plant, and a suburban housing development, including the community of Morada, is located approximately 0.25 to 0.5 mile to the west. Residences also exist 800 feet south of the plant site along Hildreth Lane. Agricultural and rural residential land uses are located along Eight Mile Road and Jackson Road in areas proposed for 115-kilovolt (kV) and 69-kV electric transmission lines.

Land uses near the Alignment 2 pumping plants and pipeline corridor are agricultural and grazing land, aggregate mining, and rural residential. Approximately 10–15 residences are located on a private road west of Clay Station Road outside of the community of Herald. These rural homes are within 1,300 feet to 1,500 feet of the pumping plant near the south end of the FSC. The pipeline alignment from the pumping plant follows the private road where these homes are located. Much of the pipeline alignment follows county or private roads and the right-of-way for a Pacific Gas and Electric Company transmission line. The southern end of the alignment at the proposed Mokelumne Aqueducts pumping plant is near KRC Aggregate's mining operations. Land uses near the existing 230-kV electric transmission line structures west of the aqueduct pumping plant site include rural and agricultural uses.

The northern portion of Alignment 3 crosses an unincorporated area of Sacramento County along the SR 104 corridor before aligning with the CCT railroad. Land uses along the rest of this alignment south to its connection with the Mokelumne Aqueducts are the same as described for Alignment 1. The 69-kV electric transmission line would extend from State



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Route 104 across agricultural fields to the proposed FSC pump station.

Land uses next to Alignment 4 are the same as described for Alignment 1 near the FSC Grant Line Road pumping plant and the same as described for Alignment 2 south of the FSC and at the Mokelumne Aqueducts pumping plant site. Land uses near the northern portion of the pipeline alignment near Clay Station Road are rural residential, agricultural, and grazing. South of Twin Cities Road, the pipeline alignment would be located in a rural area near several residences.

**Planned Land Uses**

No developments in Sacramento or San Joaquin county are planned near any of the FSC pipeline alignments or facilities (Jimenez and DeLaTorre pers. comms.).

**Relevant Plans and Policies**

**Sacramento County**. The proposed canal pumping plants and pipelines for Alignments 1–4 are in county areas designated as General Agriculture (20 acres) on the Sacramento County General Plan Land Use Diagram. According to the Sacramento County General Plan, the General Agriculture (20 acres) designation is applied to

> land that is generally suitable for agricultural production with the specific intent to provide an opportunity for starter farms or large hobby farms. Much of the land in this category is classified as "statewide in significance". . . . Approximately 30% of the land in this category is primarily suitable for grazing.

The general plan also indicates that uses other than agricultural production are not allowed within areas designated as General Agriculture. (Sacramento County Planning and Community Development Department 1993). The county approval process allows for a conditional-use permit for projects involving utility corridors and related facilities.

**City of Lodi.** A portion of Alignments 1 and 3 within the CCT railroad right-of-way generally follows the east side of the City of Lodi general plan area in an area designated mainly for industrial land uses (City of Lodi Community Development Department 1991). Lodi's future growth plans include development up to the west side of the CCT tracks, generally between the Mokelumne River to the north and Kettleman Lane to the south. Lodi also anticipates annexing some parcels next to the railroad that are or will be developed for industrial uses (Bartlam and Forkas pers. comms.). Because Alignments 1 and 3 would be generally within the CCT right-of-way, no Lodi general plan policies or land uses plans would be applicable to the project.

**San Joaquin County**. The proposed aqueduct pumping plant at the south end of Alignments 1 and 3 would be within the northeast corner of the City of Stockton general plan area, but outside the city limits. The proposed pumping plant would be in an area designated as General Agriculture on the San Joaquin County General Plan 2010 map and is close to the east side of an area designated as residential (San Joaquin County Community Development Department 1992). The county's land use designations in this area overlap with and are similar to those of the City of Stockton and would require a Finding of Conformity from the city before project approval (Niblock pers. comm.).

Section IV of the San Joaquin County General Plan identifies policies on utility corridors, including electrical transmission and major water lines. County objectives to protect the public from hazards related to utility corridors, protect the scenic value of landscapes in the county, and protect land uses from poorly sited utilities are identified in Policies 1–6 of Section IV of the plan.

Section VI of the San Joaquin County General Plan addresses protection of open space and natural resources, including agricultural lands. Development in areas designated as



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General Agriculture is restricted to agricultural and related uses; other uses of these areas, such as for utility corridors, would require a conditional-use permit (San Joaquin County Community Development Department 1992). San Joaquin County has two agricultural compatibility policies: Policy 9 ensures that agricultural uses are protected from nuisance complaints and Policy 10 requires that buffers separate nonagriculture and agriculture areas.

The proposed aqueduct pumping plant at the south end of Alignments 2 and 4 is within or near an area designated as Resource Conservation on the San Joaquin County General Plan 2010 map (San Joaquin County Community Development Department 1992). Areas designated for resource conservation are generally restricted to uses that will not limit extraction activities or that would require a conditional-use permit to protect the resources. The extractive resources section in Section VI of the general plan addresses management of resources, including aggregate resources. Policy 1 states that:

> [m]ineral deposits of significant quantity, value, or quality, as identified by the State Division of Mines and Geology reports as MRZ - 2 Mineral Resource Zones . . . shall remain in open space uses until extraction of resources, unless the immediate area has been committed to other uses.

## *Alternative 3: Joint Water Supply*

### Existing Land Uses

Existing land uses along the Alternative 3 alignment consist generally of residential, commercial, and industrial uses in the City of Sacramento; recreation and open space uses in the American River Parkway; and grazing and mining uses in Sacramento County.

**Intake Alternatives.** Land uses near Intake Alternatives 1 through 5 consist of low-intensity recreation associated with the American River Parkway. (Refer to Chapter 6, "Recreation," for a description of recreational uses in this area.) Discovery Park and the Jedediah Smith National Recreation Trail are on the north side of the American River. No formal parkway facilities exist south of the American River at these locations, although the levee is used informally by pedestrians and joggers.

**Intake Pipeline 1.** The Rusty Duck restaurant is located south of the American River levee and immediately west of the proposed pipeline extension (Intake Pipeline 1) from the Intake Alternative 1 structure. Other commercial establishments, including hotels, restaurants, and small businesses, are located nearby. Intake Pipeline 1 would cross the parking lot of the restaurant to Bercut Drive. Land uses along Bannon and North B streets are mostly light industrial with some residential uses; the pipeline follows the north and east boundaries of the Sacramento WTP and the north side of the Southern Pacific Railroad (SPRR) yards. Land uses near the Sacramento River WTP consist of highway commercial to the north and the I-5 corridor to the west. The area between the plant and the existing intake structure on the Sacramento River is vacant industrial land except for the old Pacific Gas and Electric Company building.

The alignment turns south at 14th Street where it crosses under the SPRR through an abandoned walkway tunnel and then turns east to follow C Street for approximately 26 blocks. Land uses along C Street are predominately single-family residential with limited commercial and office developments and several small areas of open space. A church is located at 28th and C streets. Neighborhoods along C Street include Mansion Flats between 12th and 16th streets, New Era Park from 16th to 29th streets, and McKinley-Elvas eastward of 29th Street. C Street is narrow and bordered by mature shade trees along most of its length. The alignment would pass the Blue Diamond Growers plant located on C Street between 16th and 19th streets before crossing under the Capital City Freeway. An office and warehouse



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complex known as Cannery Business Park is located at 33rd and C streets.

From the east end of C Street, the pipeline follows Elvas Avenue, which is bordered on the north by a row of tall trees and the SPRR and on the south by the McKinley-Elvas neighborhood. The pipeline alignment then follows 57th Street and crosses J Street before realigning with Elvas Avenue. The residential area along Elvas Avenue and 57th Street is combined with commercial uses, particularly along 57th Street where several small restaurants and antique stores are located. The alignment would pass by a National Guard facility and St. Francis High School along Elvas Avenue south of J Street before it crosses under the SPRR near Folsom Boulevard and 66th Street.

East of the SPRR, the pipeline alignment would cross near a student parking lot and new baseball field on the California State University, Sacramento (CSUS), campus to Jordan Way and Fairbairn WTP. Land uses surrounding Fairbairn WTP include the CSUS campus, an apartment complex, and office and commercial areas on College Town Drive. The north side of Fairbairn WTP is next to the American River Parkway. Alumni Grove, a barbecue and turf area, is immediately west of Fairbairn WTP on the south side of the river. The alignment would turn south to follow Hornet Road under U.S. Highway 50 to Folsom Boulevard.

Land uses along Folsom Boulevard are predominately commercial, light industrial, and small offices. Commercial development includes gas stations, restaurants, markets, and specialty stores. A small trailer park and some residences also exist along this portion of the alignment. Land uses along Kiefer Boulevard include small commercial shopping malls, residential developments, and small apartment complexes. Between Watt Avenue and Bradshaw Road, Kiefer Boulevard is a four-lane road that passes through the Rosemont residential area. A post office and the Juvenile Court Schools are near Bradshaw Road. Land uses along Kiefer Boulevard east of Bradshaw Road are primarily rural. Gravel mining operations exist along the south side of the road between Florin-Perkins Road and South Watt Avenue and the Mather Airport flight line is immediately north of the proposed alignment. Land uses east of Mather Airport are generally livestock grazing and planned aggregate mining areas.

Kiefer Boulevard dips to the south near the south end of the Mather Airport runways. The proposed pipeline would be aligned along "the dip" in Kiefer Boulevard south of the airport runways and within the approach-departure and overflight safety zones established by the Airport Land Use Commission (ALUC) in the Mather Airport Comprehensive Land Use Plan (CLUP) (Airport Land Use Commission 1997). A draft version of the CLUP was adopted by the ALUC in May 1997 and has been submitted to the County of Sacramento for a minimum 180-day review period leading to adoption by the county. (Hill pers. comm.) Adoption of the CLUP by the County could occur in November 1997 (Pryor pers. comm.).

The ALUC would not consider a buried pipeline for conveyance of water to be in conflict with the intended uses and purposes of the applicable airport safety zones, provided no aboveground valves or other structures were constructed as part of the pipeline (Hill pers. comm.). However, concerns have been raised about potential conflicts between the proposed pipeline and operations of navigational and weather-sensing equipment and other issues related to airport security. Also, known hazardous contamination sites related to air base operations occur near the proposed pipeline alignment. (Kozub pers. comm.)

**Intake Pipelines 2, 3, 4, or 5.** Intake Pipelines 2 through 5 would avoid the commercial areas along Bercut Drive and Bannon Street and some of the residential areas located along the west end of North B Street. Intake Pipeline 5 would avoid all of the area near Richards Boulevard and the C Street neighborhoods corridor between 14th and 24th



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streets; other land uses east of 24th Street are the same as described for Intake Pipeline 1.

Intake Pipeline 2 would be aligned in a narrow area between warehouses and parking areas along a railroad spur. The intake pipeline would turn east to follow Richards Boulevard and south along North 7th Street where several large industrial and warehousing and distribution businesses are located. The 52-acre Sierra Quality Canners and Sierra Cold Storage Facilities are located at North 7th Street and Richards Boulevard. The alignment would continue east at North B Street along the north side of the SPRR yards.

Intake Pipeline 3 would be aligned along North 5th Street; adjacent land uses include light industrial and warehousing and distribution businesses, vacant land, and parking areas. As described for Intake Pipeline 2, the pipeline would follow a section of Richards Boulevard before turning south on North 7th Street.

Intake Pipeline 4 would align with North 10th Street and continue southward to North B Street. Land uses along North 10th Street include service commercial, business parks, light industrial and warehousing businesses, parking areas, and vacant land.

Intake Pipeline 5 crosses an abandoned landfill, dump sites, and vacant land before aligning with the SPRR and 24th Street near C Street. This alignment is generally along the western side of the City's former landfill.

**Bypass Options.** The C Street Bypass Option would turn north at 24th Street to cross under the SPRR and east to follow the north side of the railroad. The area north of the railroad and the C Street Bypass Option is the site of the City's former landfill. This bypass alignment would cross under the Capital City Freeway near the A Street crossing before realigning with the railroad in an area that is in open space and agricultural uses. The bypass alignment would turn southeast to cross back under the railroad at Lanatt Street to Elvas Avenue. The C Street Bypass Option would avoid the C Street neighborhoods east of 24th Street. This bypass also would avoid the church at 28th and C streets and most of the Cannery Business Park area.

The Elvas Avenue Bypass Option would cross under the SPRR just south of J Street and would parallel the railroad and Jordan Way corridor along the CSUS campus. This bypass option would continue east along Jordan Way to the Fairbairn WTP. The Elvas Avenue Bypass Option would avoid St. Francis High School and the commercial and residential areas along Elvas Avenue between J Street and Folsom Boulevard.

The Folsom Boulevard Bypass Option would turn south along a short section of Jed Smith Drive at the south end of the CSUS campus before crossing under U.S. Highway 50, Folsom Boulevard, and multiple rail lines to Ramona Avenue. This bypass option would follow Ramona and Cucamonga avenues in an area with multiple land uses before crossing a former sand and gravel mining site known as Granite Park. The alignment would turn north to cross under Highway 16 near Florin-Perkins Road to align with Kiefer Boulevard. Most of the existing land uses near this bypass option are generally related to industrial and aggregate mining operations.

**Planned Land Uses**

Several development projects are planned to occur near pipeline alignments. Table 10-1 provides details on nearby development projects. Most of the projects listed occur within the City of Sacramento. Figure 10-1 depicts locations of the projects listed in Table 10-1.

**Relevant Plans and Policies**

Intake Alternatives 1 through 5 are within the American River Parkway. The American River Parkway Plan is an element of the Sacramento County General Plan that provides

Table 10-1. Development Projects Proposed within the City and County of Sacramento That Are near Alternative 3 Project Facilities

| Proposed/ Approved Project[a] | Project Description/Status | Location Relative to EBMUD Project Facilities |
|---|---|---|
| **City of Sacramento** | | |
| * 300 Richards Boulevard | This project includes offices, 224 hotel rooms, and a parking structure to be constructed in four phases totaling 990,000 square feet. The owners have requested a special permit to allow construction of the first phase, a 150,000-square-foot building at the west end of the site. Construction could begin in 1998. Future development phases of this planned unit development (PUD) will depend on market conditions in the area. Construction of 5th Street (described below) could occur as the 300 Richards Boulevard project proceeds. (Corcoran pers. comm.) | Intake Pipeline 1 would border the south side of the 300 Richards Boulevard project along Bannon Street. Intake Pipeline 2 would border part of the north side of the development project along Richards Boulevard. |
| Construction of 5th Street | This project involves construction of a "new" 5th Street that will connect the Richards Boulevard area to existing 5th Street at I Street. Construction of the roadway will depend on future development in the Richards Boulevard area. (Childers pers. comm.) | 5th Street would cross Intake Pipeline 1 along Bannon/North B Street. The new roadway also would cross Intake Pipeline 2 along Richards Boulevard. |
| Extension of North 7th Street | The project to extend and connect North 7th Street between D Street and Richards Boulevard is included in the Northeast Area Transportation Study. The new section of the street is planned as a two-way four-lane arterial. North of Richards Boulevard, North 7th Street would be improved as a collector street. The project schedule is unknown. (Childers pers. comm.) | Intake Pipeline 1 along North B Street would cross the north end of the roadway extension. |
| * Continental Plaza | This is an approved project for an 810,000 square foot office building at North 7th Street and Richards Boulevard. The project is part of a PUD, which includes two existing office buildings (Phases I and II) and construction of two new office buildings (Phases III and IV). This project will require improvements at the intersections of Richards Boulevard with North 5th and North 7th streets. The schedule of future development phases will depend on market conditions in the area. (Corcoran pers. comm.) | The project site is near Intake Pipeline 3. Proposed intersection improvements on Richards Boulevard are along the pipeline alignment. |



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Table 10-1. Development Projects Proposed within the City and County of Sacramento That Are near Alternative 3 Project Facilities

| Proposed/ Approved Project[a] | Project Description/Status | Location Relative to EBMUD Project Facilities |
|---|---|---|
| Intermodal Terminal | The City plans to build an intermodal terminal at 7th and North B streets that will serve as a transfer station to provide intercity and commuter rail services, local and intercity bus services, and local and regional shuttle services ( Roma Design Group 1997a). Project implementation may proceed in about 10 years (Saunders pers. comm.). | The intermodal terminal would be constructed on the south side of North B Street at 7th Street. Intake Pipelines 1, 2, and 3 align with North B Street, north of the intermodal terminal. |
| * Extension of Metro Light Rail Transit | This project would ultimately connect Metro Light Rail between downtown and the Sacramento International Airport. The City anticipates implementation of a phased project. The first phase would involve extension of light rail from downtown north along 7th and North 7th streets (see above description of the project to extend North 7th Street) to the planned intermodal terminal. Future phases would involve extensions north into the Richards Boulevard area and across the lower American River to South Natomas, North Natomas, and the airport. (Roma Design Group 1997a.) The first phase of this project may proceed in about 5 years (Saunders pers. comm.). | Intake Pipelines 2 and 3 parallel the planned Metro Light Rail extension along North 7th Street and Richards Boulevard. Intake Pipeline 2 also would parallel the planned rail line along an existing railroad spur north of Richards Boulevard. Intake Alternative 2 would be constructed where the light-rail extension would cross over the lower American River. |
| Bannon Street Realignment/ Extension | This project would realign and extend Bannon Street east to connect with 16th Street near North C Street. This project is included in the City's Capital Improvement Plan; the project schedule is unknown. (Childers pers. comm.) | The Bannon Street extension would cross Intake Pipeline 2 along North 7th Street. The extended roadway also would cross Intake Pipeline 3 along North 10th Street. |
| Richards Boulevard Connector | The project to extend and connect Richards Boulevard to the Capitol City Freeway is included in the Northeast Area Transportation Study, which should be completed in 1998. Ground-breaking for the project could occur by 2008. Construction of a related interchange at the Capitol City Freeway could occur before the extension of Richards Boulevard. (Mar pers. comm.) | The Richards Boulevard extension would cross Intake Pipeline 4 along North 10th Street. The C Street Bypass Option generally parallels a section of the proposed roadway extension. |



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Table 10-1. Development Projects Proposed within the City and County of Sacramento That Are near Alternative 3 Project Facilities

| Proposed/ Approved Project[a] | Project Description/Status | Location Relative to EBMUD Project Facilities |
|---|---|---|
| * Sutter's Landing Park | This project involves establishing a 173-acre park on the former City landfill immediately west of the Capitol City Freeway along the American River. The first phase on park construction could occur in about 5 years (2002). Approximately 130 acres of the site will remain undeveloped for at least 30 years. The Richards Boulevard connector is proposed for siting along the southern park boundary. (Rudek pers. comm.) | The C Street Bypass Option may be within or adjacent to the southern edge of the proposed park. |
| * C Street Closure at Blue Diamond Growers | Blue Diamond Growers has submitted an application to the City requesting closure of C Street between 17th and 19th streets. The City would retain rights to the utility corridor along the alignment. The project applicant is not proposing to establish permanent structures within the existing utility corridor as part of the street closure. Project implementation could occur in 1998. (Childers pers. comm.) | The pipeline associated with Intake Pipelines 1, 2, 3, and 4 is within the C Street corridor, including the section proposed for closure. |
| * C Street Reconstruction | This project involves resurfacing/reconstructing C Street between 12th and 21st streets. The improvements are scheduled to occur in 1998 (Bates pers. comm.). | Intake Pipelines 1, 2, 3, and 4 are within the C Street corridor, including most of the length that is planned for resurfacing. |
| * Midtown Traffic Calming | This project involves installing a variety of traffic control devices to regulate and calm traffic in the midtown area. Project implementation will be completed by the end of 1997. (Grehm pers. comm.) | Intake Pipelines 1, 2, 3, and 4 are within the C Street corridor. A few traffic control devices have been or will be installed on C Street between 16th Street and Alhambra Boulevard. |
| * Cannery Business Park | This project involves demolishing a 110,000-square-foot warehouse and constructing two new office buildings at Cannery Business Park at 3301 C Street. The project application is incomplete. Project implementation will require a general plan amendment and rezone from light industrial to office building. (Corcoran pers. comm.) | Intake Pipelines 1, 2, 3, and 4 are within the C Street corridor and adjacent to the Cannery Business Park project. The C Street Bypass Option skirts the eastern edge of Cannery Business Park along Lanatt Street. |



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Table 10-1. Development Projects Proposed within the City and County of Sacramento That Are near Alternative 3 Project Facilities

| Proposed/ Approved Project[a] | Project Description/Status | Location Relative to EBMUD Project Facilities |
|---|---|---|
| * Combined Sewer System Improvement Program | This is a 40-year phased program to upgrade and rehabilitate the sewer and stormwater system throughout downtown Sacramento. The program will continue through about 2027. (Batha pers. comm.) | Throughout city |
| Improvements at the Intersection of Folsom Boulevard and Power Inn Road | The City's Northeast Area Transportation Study will include an analysis of alternatives to improve the intersection of Folsom Boulevard with Power Inn Road. The most complex alternative involves construction of an urban interchange. The project schedule and the recommended alternative(s) are unknown. (Grehm pers. comm.) | All intake pipelines extend along Folsom Boulevard to cross the intersection with Power Inn Road. |
| * Power Inn Road and Metro Light Rail Transit Grade Separation | The City is proceeding with a project to construct a grade separation to allow Power Inn Road to pass under the Metro Light Rail Transit tracks. The City released the draft EIR on the project in September 1997. Construction will begin in early 1998. (Grehm pers. comm.) | The grade separation project is located about 700 feet south of where the pipeline alignment will cross Power Inn Road along Folsom Boulevard. |
| * Granite Regional Park Planned Unit Development | This project is located generally south of Folsom Boulevard between Power Inn and Florin-Perkins roads. The draft EIR on the project could be circulated for public review on December 23, 1997. The City Council could approve the project and all necessary entitlements in May 1998. The drainage basin plan for the site is being revised. Current site plans include approximately 126 acres for parks, recreation, and open space uses. Most of the remaining acreage will be reserved for regional and local commercial uses and office development. A small amount of industrial and warehousing uses will be allowed. Cucamonga Avenue will be extended through the site to Florin-Perkins Road. (Melko pers. comm.) | The Folsom Boulevard Bypass Option crosses the project site from west to east. |
| **County of Sacramento** | | |
| Extension of and Improvements to Kiefer Boulevard | The main project involves improving and extending Kiefer Boulevard between Happy Lane and Eagles Nest Road to a four-lane arterial with an 84-foot-wide right-of-way. Sacramento County is pursuing plans to acquire the right-of-way | All intake pipelines parallel Kiefer Boulevard, including the sections proposed for extension, realignment, |



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Table 10-1. Development Projects Proposed within the City and County of Sacramento That Are near Alternative 3 Project Facilities

| Proposed/ Approved Project[a] | Project Description/Status | Location Relative to EBMUD Project Facilities |
|---|---|---|
| * Sunrise Douglas Community Plan and Specific Plan | The community and specific plans are part of a master planned community that lies generally east of Sunrise Boulevard, south of Douglas Road in Sacramento County, north of Highway 16, and west of Grant Line Road. Within the specific plan area, 483 acres are designated as wetland preserve at the northeast corner of Kiefer Boulevard and Sunrise Boulevard. The revised Notice of Preparation on the project was released on July 31, 1997. The County could approve the specific plan during summer 1998. Construction will not proceed before summer 1999. (Baker pers. comm.) | The intersection of Kiefer and Sunrise boulevards marks the southeast corner of the specific plan area. All intake pipelines terminate where Kiefer Boulevard meets the FSC, approximately 400 feet west of Sunrise Boulevard. Areas reserved for housing within the specific plan area are approximately .25 miles east of where the pipelines intersect with the FSC. |

[a] Projects are generally listed as they occur along the project alignment from west to east. Figure 10-1 depicts locations of the projects. The symbol "*" indicates projects that are currently under construction, approved, or likely to proceed within the next 5 years. The symbol is not used for projects that are being considered among several alternatives, or that are otherwise in the early planning stages and are somewhat conceptual, or if the implementation schedule is unknown or is far in the future.



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**Figure 10-1a**
**Development Projects Proposed within the City and County That Are near Alternative 3 Project Facilities**

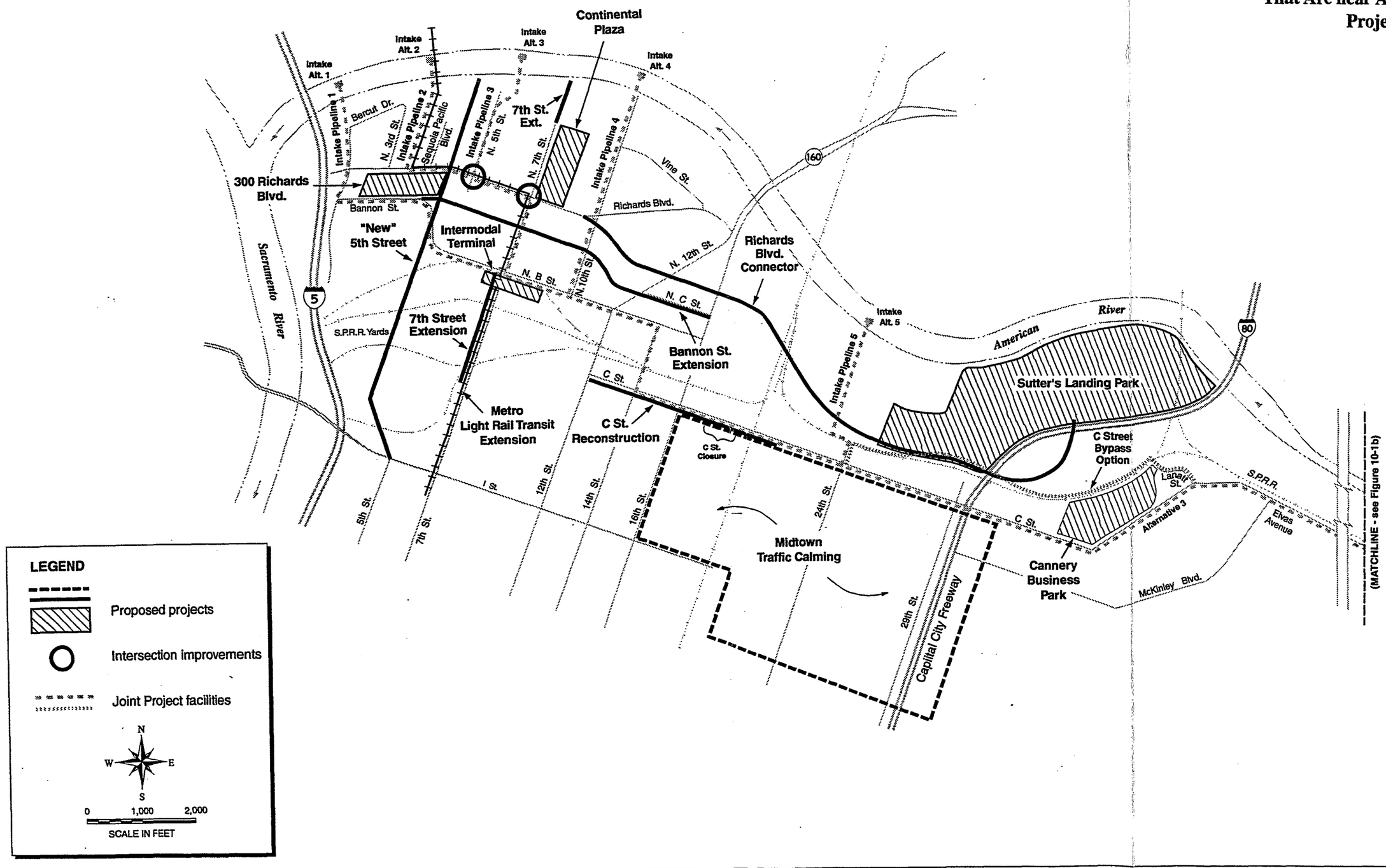


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**Figure 10-1b**
**Development Projects Proposed within the City and County That Are near Alternative 3 Project Facilities**

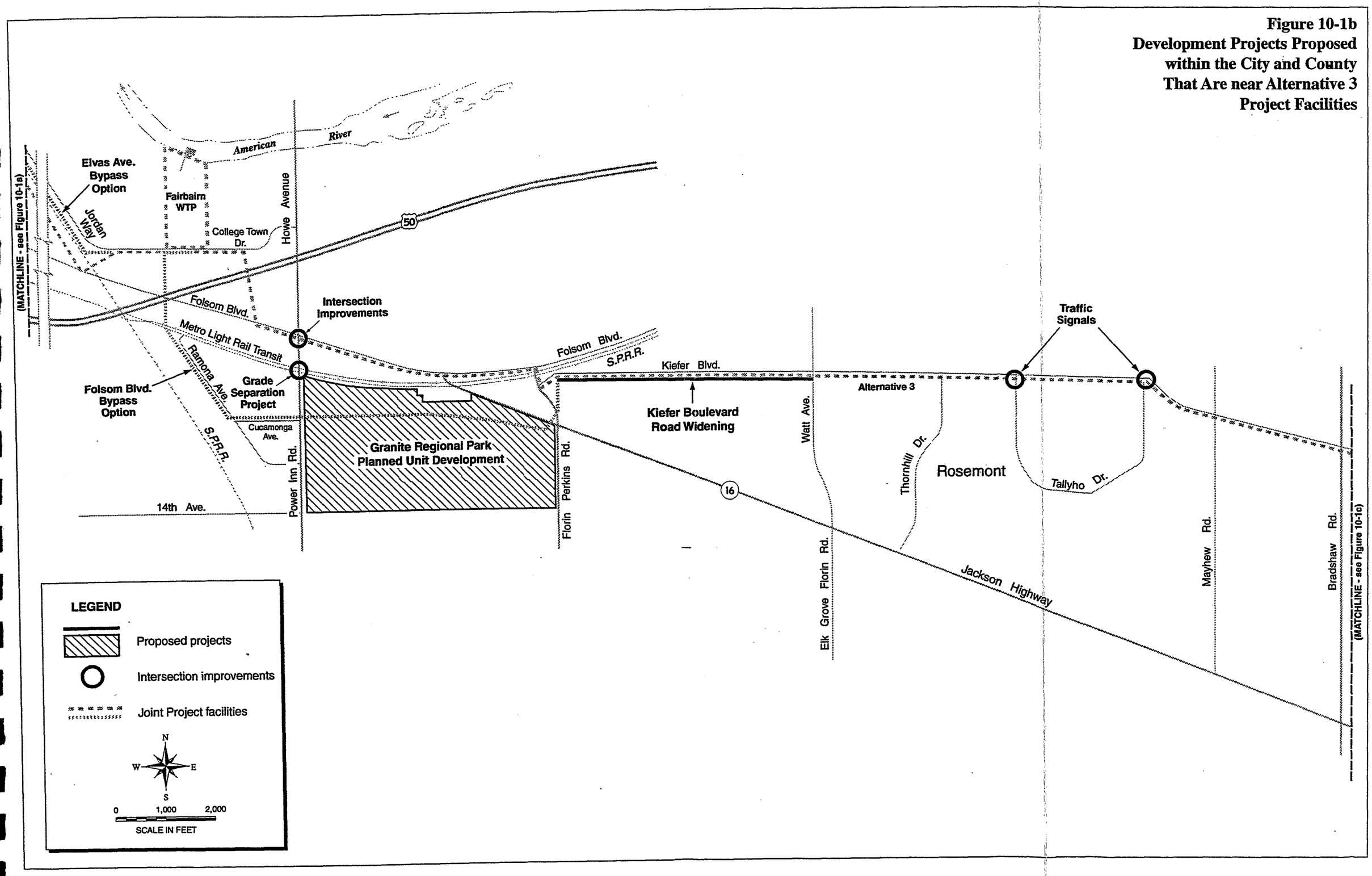


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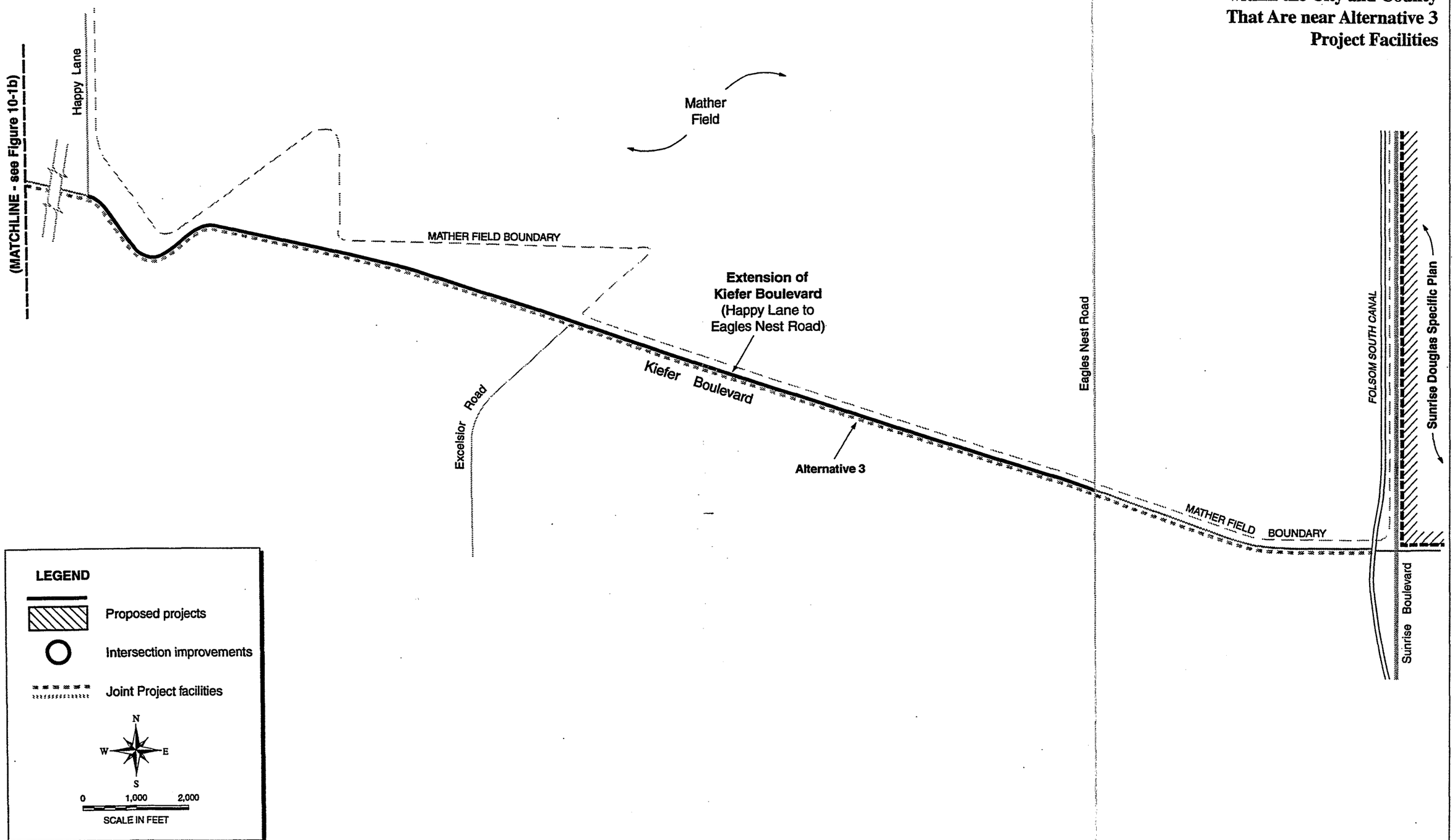
**Figure 10-1c**
**Development Projects Proposed within the City and County That Are near Alternative 3 Project Facilities**

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policy guidance for 29 miles of open space parkway along the American River from Folsom Dam to the confluence with the Sacramento River. The parkway plan recognizes certain nonrecreational uses of the parkway and acknowledges that public facilities, such as water lines and pumping stations, already exist along the river. The plan states that the "establishment of these facilities in the Parkway should be consistent with the goals and policies of this Plan." Regarding non-recreational use of the parkway, Policy 5.4 states that:

> the impact of any new public utility or similar public service facilities on the Parkway shall be minimized by clustering the facilities with existing facilities and Parkway crossings, revegetating areas where utilities have been placed underground, and soundproofing pump stations.

The plan also calls for preserving the crown of the levee system along the river for recreational purposes and authorized vehicle access. (Sacramento County Planning and Community Development Department 1985.)

The American River Parkway Plan divides the parkway into planning areas. The Campus Commons area encompasses Fairbairn WTP, which is included on the area plan map. For siting of facilities, the parkway plan states that "[u]nless facilities or improvements are specifically designated on the area plan map, they may not be constructed or installed." The county began developing conceptual plans for the parkway in the early 1960s; Fairbairn WTP was constructed in 1964, before adoption of the 1976 American River Parkway Plan. (Sacramento County Planning and Community Development Department 1985.)

Intake Alternatives 1–5 and their associated five intake pipelines along the western half of the proposed pipeline alignment are within the City of Sacramento planning area. The Conservation and Open Space Element of the city's general plan specifies in Policy 1 with regard to outdoor recreation that the city shall implement the goals and policies of the American River Parkway Plan. The Public Facilities and Services Element specifies in Goal E that the city "should continue to support and encourage the construction of utility lines underground and provide safe, attractive infrastructure." (City of Sacramento Department of Planning and Development 1988.)

The Richards Boulevard Area Plan also guides development in the area south of the American River; Policy 8.1 in the land use section requires configuration of new development and land uses to enhance public access and recreational use of the American River Parkway (Roma Design Group 1994). A facility element was prepared and adopted as part of the Richards Boulevard Area Plan and the Railyards Specific Plan, the planning area that lies immediately south of the Richards Boulevard area.. The facility element describes the program for provision of transportation facilities and infrastructure in support of the two planning areas. The facility element includes a policy that addresses siting of water supply facilities in the planning areas. Policy 3.3 requires placement of all public water mains within rights-of-way dedicated for public streets unless use of easements is specifically approved by the Department of Utilities. Regarding excavation for placement of underground facilities, Policy 3.4 requires that:

> excavation associated with all facilities avoids areas suspected of having soil or groundwater contamination in excess of levels protective of construction worker health and safety unless suitable mitigation measures, in accordance with all applicable laws, regulations, the Railyards Specific Plan and other City planning documents, are implemented. (Roma Design Group 1997a).

Lead contamination is suspected in soils along the south side of North B Street as a result of operations at the SPRR yards. Also, the groundwater in this area is suspected to be contaminated by various metals and volatile organic compounds. (Roma Design Group

1997b.) (Refer to Chapter 15, "Public Health and Safety," for further details on suspected and known contamination areas near the SPRR yard.)

The eastern half of the proposed pipeline alignment is within the County of Sacramento. Relevant general plan issues are discussed under "FSC Pipeline Alignments."

**Environmental Justice**

On February 11, 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations." This Executive Order requires each federal agency to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities (U.S. Deaprtment of the Interior 1995). Reclamation policy requires that NEPA documents include a determination of whether a project will have any adverse impacts on minority or low-income populations.

In compliance with Reclamation direction for the environmental justice assessment, U.S. Census demographic data were analyzed at a geographic scale commensurate with the potential impact area. Because it passes through an area that includes portions of the City of Sacramento, the alignment corridor for Alternative 3 traverses a variety of land uses (i.e., residential, commercial, and industrial) and is therefore the focus of this assessment.

Census data also were examined for areas crossed by the Alternative 2 pipeline alignments. It was determined that these alignments would have no impacts on minority or low-income populations because they pass through limited amounts of land designated for residential purposes.

The assessment for Alternative 3 involved an examination of 11 census tracts in both the City and County of Sacramento that encompass the alignment corridor for Alternative 3. Income and ethnicity variables for each census tract were compared to the income and ethnicity composition of the City and County to determine whether they had a relatively high low-income or minority composition.

City-level information on population ethnicity was derived from the 1990 census. For 1990, the City of Sacramento's total population was approximately 370,000. As shown in Table 10-2, the City's ethnic composition ranges from 53% white to 1% American Indian. The City is considered ethnically diverse, with minority populations accounting for an estimated 46% of the 1990 population. Census information for Sacramento County indicates a similar, but slightly less diverse, ethnic composition.

Income characteristics for the City of Sacramento during the 1990 census indicate a median household income of $28,000 (Table 10-2) and a median family income of $33,000. Persons in poverty for the 1990 census year were estimated at 62,200 or 17% of the City of Sacramento's total population. Information from the 1990 census indicates a median household income of $32,300 (Table 10-2) and a median family income of $37,800 in Sacramento County. Persons in poverty for the 1990 census year were estimated at 127,100 or 12% of the County's total population. (U.S. Bureau of the Census 1990.)

According to the 1990 census data, the ethnic composition of the census tracts affected by the alignment corridor for Alternative 3 is diverse, and there is little difference in the ethnic composition compared to surrounding census tracts. Minority populations range from 64% to 11% of the total population for each census tract. Median household income for people residing within the census tracts affected by the alignment corridor for Alternative 3 range from $10,000 to $42,000 (Table 10-2).

Table 10-2. Income and Ethnicity Data for Sacramento County, the City of Sacramento, and Census Tracts that Contain the Alignment Corridor for Alternative 3

| Area | Median Household Income ($) | % White | % African American | % American Indian | % Asian/Pacific Islander | % Other | % Hispanic |
|---|---|---|---|---|---|---|---|
| **County** | 32,300 | 69 | 9 | 1 | 9 | <1 | 12 |
| **City** | 28,000 | 53 | 15 | 1 | 14 | <1 | 16 |
| **Census Tracts** | | | | | | | |
| Tract 2 | 36,000 | 88 | 1 | <1 | 3 | 0 | 7 |
| Tract 3 | 36,000 | 86 | 1 | 1 | 3 | 0 | 9 |
| Tract 4 | 21,000 | 69 | 7 | 1 | 3 | 0 | 20 |
| Tract 5 | 15,000 | 42 | 12 | 3 | 6 | <1 | 37 |
| Tract 16 | 36,000 | 90 | 1 | <1 | 3 | <1 | 6 |
| Tract 52.01 | 12,000 | 36 | 20 | 7 | 13 | <1 | 24 |
| Tract 52.03 | 31,000 | 66 | 10 | 1 | 16 | 1 | 6 |
| Tract 53 | 10,000 | 78 | 7 | 1 | 5 | 0 | 9 |
| Tract 90.01 | 37,000 | 66 | 13 | 2 | 12 | <1 | 7 |
| Tract 91.04 | 36,000 | 69 | 8 | 1 | 12 | <1 | 10 |
| Tract 91.08 | 42,000 | 70 | 6 | 3 | 14 | <1 | 7 |

Note: "Other" refers to a residual category used by the U.S. Census to place individuals who fail to respond to the ethnicity questions.

Source: U.S. Bureau of the Census 1990.

## ENVIRONMENTAL CONSEQUENCES

### Methods and Assumptions

Sections 53091 and 53096 of the California Government Code exempt public water supply facilities from regulation under local zoning ordinances; therefore, review of local zoning designations and evaluation of inconsistencies with zoning have not been included in this impact assessment.

### Significance Criteria

The criteria used for determining the significance of an impact on existing or planned land uses are based on the State CEQA Guidelines and professional standards and practices. Impacts on land use are considered significant if implementation of an alternative would:

- require removal or relocation of structures or facilities used for residential, commercial, or industrial purposes;
- result in permanent incompatibilities with existing or proposed land uses;
- result in substantial construction nuisances or conflicts in residential, commercial, or gravel mining areas;
- result in unavoidable conflicts with planned developments; or
- result in substantial inconsistencies with adopted plans and policies.



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## Impacts Found to Be Less than Significant

**Alternative 1: No Action**

Under Alternative 1, no new intake facilities, pumping plants, or water conveyance pipelines would be constructed and land use impacts would be avoided.

Service area land use impacts from future urbanization within EBMUD's ultimate service area boundary (USB) would be similar to that described in the Updated WSMP EIR (EDAW 1993). Land use conversion effects from growth in the USB would generally be concentrated in the eastern portion of the USB because of the relatively undeveloped nature of this area. Evaluation of major growth areas in the Updated WSMP EIR and aerial photography interpretation of currently undeveloped areas that exhibit the potential for urban growth indicates that approximately 21,400 acres of open space and agricultural land could be converted to urban and suburban uses by buildout of EBMUD's USB.

Growth in the central and western portions of the USB are not expected to result in substantial effects from land use conversion because most of the central USB consists of EBMUD watershed property, regional parks, agricultural preserves, and property with low potential for development. Western portions of the USB consist of densely populated urban areas; growth in these areas is expected to consist mainly of infill projects that would further increase land use densities. (Refer to Chapter [illegible], "Vegetation and Wetland Resources," for additional discussion of potential service area habitat changes under this alternative.)

**Alternative 2: Folsom South Canal Connection**

***Impact: Residential and Commercial Land Use Conflicts.*** Construction of the FSC pipelines could result in temporary conflicts and construction-related nuisances at several locations along Alignments 1–4. Alignment 3 along the SR 104 right-of-way could result in conflicts with the adjacent SPT railroad alignment. (Refer to Chapter 12 for details on potential conflicts with the SPT.) Construction of the buried pipeline would proceed at an average rate of approximately 150 feet per day, and localized construction nuisances, such as noise, dust, and construction equipment traffic, could temporarily inconvenience residents and business operations near alignment corridors. (Refer to Chapter 12, Chapter 13, "Air Quality," and Chapter 14, "Noise," for detailed discussions of these impacts.)

The proposed canal pumping plant under Alignments 1 and 4 would be constructed within approximately 1,200 feet of five residences on the south side of Grant Line Road. The proposed aqueduct pumping plant for Alignments 1 and 3 would be constructed within several hundred feet of approximately 10 rural residences and within 0.25 to 0.5 mile of suburban residential areas west and south of the proposed plant. The proposed canal pumping plant for Alignment 2 would be constructed within 1,300 feet to 1,500 feet of 10 to 15 rural residences west of Clay Station Road. Construction of any of the proposed plants would occur over 18 to 24 months.

Construction of the 115-kV electric transmission lines for the Alignment 1 and 3 aqueduct pumping plant along major roadways near the Mokelumne Aqueducts pumping plants could also result in temporary construction nuisances for residents living along Eight Mile Road. Construction of this transmission line could also required acquisition of a new utility easement along the roadway. The 230-kV electric transmission line that would extend 750 linear feet to the Alignment 2 and 4 aqueduct pumping plant would not create construction or operation nuisances because sensitive land uses do not exist in the area.



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The impact of construction-related land use conflicts associated with the FSC pipeline alignments, pumping plants, and electric transmission lines would be minor because the study area consists primarily of agricultural and grazing land with scattered rural residences and businesses that would be affected only temporarily during construction activities. Because proposed pipeline alignments and transmission lines generally follow existing roadway/utility corridors, potential direct conflicts with existing residential uses are expected to be minimal. For areas where pipeline alignments or transmission lines cross properties and are outside of roadway/utility corridors, EBMUD will be required to offer appropriate compensation for land held in private ownership as part of acquisition of utility easements. EBMUD also will be required to compensate for removal of any structures as a result of construction of project facilities. Therefore, this impact is less than significant. No mitigation is required. (Refer to the environmental commitments section in Chapter 2, "Project Objectives and Alternatives under Consideration," for additional information concerning acquisition of lands and compensation for affected property. Refer to Chapter 16, "Visual Resources," for a discussion of the effects of electric transmission line towers on local views. Refer to Chapter 14 for a discussion of the effects of operations of pumping plants in residential areas.)

***Impact: Conversion of the CCT Rail Line to a Water Conveyance Pipeline Corridor.*** Under Alignments 1 and 3, the CCT rail line would be converted to an underground water conveyance pipeline corridor and the railroad tracks removed. This direct land use conversion would occur generally within the existing railroad right-of-way. No adverse land use changes would occur next to the new pipeline corridor, and the alignment would remain a linear corridor that would be privately owned and operated. Therefore, this impact is less than significant. No mitigation is required. (Refer to Chapter 12 for a discussion of the consistency of this alignment with transportation facility plans and policies.)

***Impact: Potential Conflicts with the KRC Aggregates Gravel Mining Operation.*** Construction of the Mokelumne Aqueduct pumping plant under Alignments 2 and 4 would involve siting the pumping plant near an existing aggregate mining facility owned and operated by KRC Aggregates. Adverse land use impacts could result if important aggregate resources were irretrievably committed to other uses. Development on KRC Aggregates property, which is designated as Resource Conservation in the San Joaquin County General Plan, would be restricted to uses that do not limit extraction activities. Policy 1 addressing management of aggregate resources also states that significant aggregate mining areas will remain in open space use until resources have been extracted (San Joaquin County Community Development Department 1992). The potential impact of land use conflicts is less than significant because most of the pumping plant would be sited next to mining operations, only 4–5 acres of KRC Aggregates property would be converted, and construction of the pumping plant on a portion of the KRC Aggregates property could be allowed with compensation for lost mining potential and site approval by San Joaquin County (DeLaTorre pers. comm.). No mitigation is required.

***Impact: Consistency with Local Plans and Policies.*** Construction and operation of the FSC pipeline alignments would be consistent with general plan policies of Sacramento and San Joaquin counties. Underground water supply pipelines are generally consistent with agricultural general plan land use designations in the study area (DeLaTorre and Winter pers. comms.), and conditional-use permits could allow pumping plants, electric transmission lines, and other appurtenant structures in areas of Sacramento and San Joaquin counties designated as agricultural. Compliance with all relevant agricultural policies, including San Joaquin County general plan policies for siting utility corridors (Section IV, Policies 1, 3, 4, 5,

6, 9, and 10), would be required. This impact is less than significant. No mitigation is required.

**Alternative 3: Joint Water Supply**

***Impact: Conflicts with American River Parkway Use.*** Construction and operation of Intake Alternatives 1–5 near the west end of the pipeline alignment under Alternative 3 could result in impacts associated with recreational use of the parkway and river and could result in visual resource impacts. (Refer to Chapters 6 and 16 for discussions of these impacts.) No other land use conflicts would result from construction and operation of the intake structure. This impact is less than significant. No mitigation is required.

***Impact: Residential and Commercial Land Use Conflicts.*** Land use conflicts from intake pipelines would consist mainly of combined nuisance effects on local residents and business operations from construction-related traffic, increased noise, and dust from trenching and ground disturbances. Concerns about safety issues and congestion at major intersections could also result from implementation of the project. Construction of Intake Pipeline 1 would result in temporary land use conflicts in service commercial, light industrial and residential areas near Richards Boulevard, Bercut Drive, and Bannon and North B streets. Localized construction-related nuisances could temporarily inconvenience business operations in the area. Construction of Intake Pipelines 2, 3, or 4 would result in conflicts similar to those associated with Intake Pipeline 1 because of the similarity of land uses within the Richards Boulevard Area and would generally require less temporary disturbance than Intake Pipeline 1. (Refer to Chapters 12, 13, 14 for detailed discussions of traffic, air quality, and noise impacts.)

Temporary land use conflicts associated with Intake Pipelines 1, 2, 3, and 4 during construction would be particularly noticeable in residential neighborhoods along the C Street corridor and the west end of Elvas Avenue because of the proximity of homes to the construction area. Construction of the pipelines also could temporarily affect access to the Blue Diamond Growers Plant, Cannery Business Park, and other businesses along this corridor. Temporary conflicts with commercial and residential uses along 57th Street and the east end of Elvas Avenue also would occur. Construction activities could be disruptive to activities at St. Francis High School. Businesses, residences and other facilities are generally closely spaced and close to the pipeline alignment along the 57th Street and Elvas Avenue corridor.

Construction of Intake Pipeline 5 would avoid temporary land use conflicts with light industrial, service commercial, and warehousing and distribution businesses throughout the Richards Boulevard area; implementation of this alternative also would avoid disruptions to a portion of the Mansion Flats neighborhood and all of the New Era Park neighborhood along the C Street residential corridor.

East of Fairbairn WTP, Folsom Boulevard is a busy thoroughfare bordered by a variety of commercial and light industrial businesses and offices. Temporary land use conflicts during construction phases would occur along Folsom Boulevard, particularly if access to businesses were affected. Affects would be similar along Kiefer Boulevard west of Bradshaw Road. Temporary conflicts and construction-related nuisances also would occur along Kiefer Boulevard within the Rosemont community; several small streets intersect with Kiefer Boulevard in this residential area.

East of Bradshaw Road to the FSC, land use conflicts during construction phases would be minimal due to the open, rural character of the area and the absence of intense urban uses.

Implementation of any combination of the three bypass options would lessen the severity of temporary land use conflicts in construction areas where intense residential and/or commercial uses occur along constricted



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corridors. Implementation of the C Street Bypass Option would avoid impacts along parts of the the New Era Park and McKinley-Elvas neighborhoods. Implementation of the Elvas Avenue Bypass Option would avoid impacts on commercial and residential areas along Elvas Avenue south of J Street. Implementation of the Folsom Boulevard Bypass Option would avoid impacts on commercial and industrial businesses along a busy section of Folsom Boulevard. However, this bypass option could result in removal of a building near the southeast corner of the intersection of Kiefer Boulevard with Florin Perkins Road and would involve construction of a pumping plant near the intersection of Brighton and Ramona Avenues.

The impact of construction-related land use conflicts associated with all of the intake pipelines is considered relatively minor because the combined nuisance effects would be temporary, only very minor permanent land use conversions would be required, and utility line and street improvement projects in the City area common. Furthermore, all of the pipelines would be buried and would be bored and jacked (as described in Chapter 2) in sensitive areas and at major street intersections to avoid conflicts. (Refer to the environmental commitments section in Chapter 2 for additional information on the traffic control plan that will be required as a condition of project approval.) Because the proposed intake pipelines would generally follow existing roadway corridors, potential direct conflicts with existing residential, commercial, and industrial uses are expected to be minimal. For areas where pipeline alignments cross property outside of roadway/utility corridors, EBMUD will be required to offer appropriate compensation for land held in private ownership as part of acquisition of utility easements. Therefore, this impact is less than significant. No mitigation is required. (Refer to the environmental commitments section in Chapter 2 for additional information concerning acquisition of lands and compensation for affected property.)

***Impact: Conflicts with Proposed or Planned Projects in the City or County of Sacramento.*** Several projects are proposed or planned by local jurisdictions to occur near proposed intake pipelines. Redevelopment plans by the City for the Richards Boulevard area include improving the roadway system to connect the area with downtown Sacramento, north Sacramento, and the Capital City Freeway. Some of the planned roadway construction projects would cross or parallel sections of proposed Intake Pipelines 1 through 5. The schedules for these roadway projects are generally unknown, and conflicts that could occur if pipeline construction schedules overlapped with those of the City's development projects are difficult to predict.

The proposed C Street closure between 17th and 19th Streets and the C Street reconstruction project would occur along the EBMUD pipeline alignment for Intake Pipelines 1 through 4; the City will delay this project if necessary to allow for completion of EBMUD project facilities first (Bates pers. comm.). By the end of 1997, a few traffic control devices will have been installed along C Street between 16th Street and Alhambra Boulevard as part of the City's midtown traffic "calming" project. Removal and subsequent replacement of these devices by EBMUD following construction of a pipeline along C Street would not be difficult or expensive (Grehm pers. comm.). Potential isolated conflicts between intake pipelines and projects associated with the City's combined sewer system improvement program can be addressed on a case-by-case basis (i.e., coordination among project engineers to ensure a 1- to 2-foot separation between buried facilities for the two projects) (Batha pers. comm.). Planned improvements to Kiefer Boulevard include widening the roadway between Florin-Perkins Road and South Watt Avenue and extending and improving the roadway east of Happy Lane; the schedules for these projects also are unknown.

Because the proposed pipeline alignments and related alternatives generally follow

existing roadway/utility corridors, potential direct conflicts with proposed service commercial and office development projects are expected to be minimal. The intermodal terminal planned for the rail yards south of the Richards Boulevard area would be located south of Intake Pipelines 1 through 4 where they align with North B Street. The C Street Bypass Option would generally follow the south side boundary of the proposed Sutter's Landing Park and would be planned to avoid direct conflicts with developed areas within the park. The Folsom Boulevard Bypass Option would cross the planned Granite Regional Park Public Utility District; this bypass option will include plans to site the pipeline to follow easements along roadways, fire lanes, or parking areas and to avoid conflicts with buildings or other structures. Because coordination with City and County staff will be an integral component of implementation of Alternative 3, the impacts associated with all the intake pipelines and bypass options are less than significant. No mitigation is required. (Refer to the environmental commitments section in Chapter 2 for additional information concerning coordination with the County of Sacramento Planning and Community Development Department, the City of Sacramento Department of Planning and Development, and the City and County Public Works Departments during project planning phases.)

***Impact: Conflicts Associated with Expansions of Service Area Water Treatment Plants.*** Expansion of the Walnut Creek, Orinda, and Lafayette WTPs would not substantially conflict with adjacent land uses because facility improvements would be relatively small scale and would occur within the existing treatment plant site boundaries. This impact is less than significant. No mitigation is required.

***Impact: Conflicts Associated with Development of the Sacramento River WTP Intake Structure.*** No land use conflicts associated with construction or operation of a new Sacramento River WTP intake structure would occur under Alternative 3 because no sensitive land uses would be adversely affected by the structure. (Refer to Chapters 6 and 16 for discussions of these impacts.) This impact is less than significant. No mitigation is required.

***Impact: Conflict with Mather Airport Operations.*** Construction and maintenance of the pipeline along the future extension of Kiefer Boulevard east of Happy Lane in Sacramento County would occur outside of Mather Airport property and within the roadway right-of-way. Access to Mather Airport property during construction phase and for maintenance purposes will not be required. A section of Kiefer Boulevard south of the airport runways is within the approach-departure zone and the less restrictive overflight safety zone as described in the CLUP (Airport Land Use Commission 1997). Preliminary evaluation of the Kiefer Boulevard corridor south of the airport runway indicates that construction and operation of a pipeline in this location would not result in conflicts with airport operations or with the intended uses and purposes of the applicable airport safety zones (Hill pers. comm.). This impact is less than significant. No mitigation is required. (Refer to the environmental commitments section in Chapter 2 for additional information on compliance with Mather Airport management guidelines concerning airbase operations and related safety issues.)

***Impact: Consistency with Local Plans and Policies.*** Construction of the Alternative 3 pipelines and appurtenant facilities is consistent with City of Sacramento plans and policies because the project design has incorporated all the city's requirements for construction in the American River Parkway and city streets. Construction of the Alternative 3 will also be consistent with the Facility Element of the Railyards Specific Plan and the Richards Boulevard Area Plan for projects involving excavation in areas suspected of having soil or groundwater contamination. (See Chapter 15 for details on site remediation and suspected hazardous contamination sites.) Construction and maintenance of the pipeline is also considered consistent with future plans to



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extend Kiefer Boulevard between Happy Lane and Eagles Nest Road because the pipeline alignment would be constructed adjacent to or in the road alignment, depending on results of negotiations with Sacramento County. Construction within or adjacent to the future Kiefer Boulevard alignment is also considered consistent with plans for aggregate mining south of Mather Airport in the Morrison Creek Mining Reach because the pipeline would be constructed within or immediately adjacent to an established, planned transportation corridor. This impact is less than significant. No mitigation is required.

*Impact: Environmental Justice Effects.* The median household income and ethnic diversity of each census tract through which the intake pipelines would pass is shown in Table 10-2. The pipeline alignment would pass through census tracts that exhibit median household incomes both above and below the median household income reported for the entire city and county. This includes six census tracts with median household incomes that are greater than both the city and county averages and four census tracts that exhibit median household incomes below the city and county averages.

The pipeline alignment would pass through census tracts that exhibit levels of ethnic diversity that are both similar and less diverse than the demographic character of the city and county. In four census tracts, the proportion of whites is substantially greater than the city or county averages. In two census tracts, the proportion of minorities is substantially greater than city of county averages.

The environmental impacts identified for the project alternatives would not result in a disproportionate impact on minority or low-income populations. As described above, the pipeline alignments would pass through census tracts that exhibit demographic characteristics that are both similar and dissimilar to that of the city and county. The intake pipelines under Alternative 3 would not pass only through areas of predominantly low-income or minority populations.

In addition, efforts to minimize social effects were considered as part of the selection of intake pipelines for this project. Efforts included an extensive screening analysis that evaluated various alignments against several criteria, including environmental and technical factors. Alignments were modified to minimize project impacts, including pipeline construction within city streets, use of trenchless construction methods, and routing through rural areas. Most of the project effects related to construction of the intake pipelines, including relocating housing and businesses, disrupting surrounding land uses, and disrupting transportation facilities and circulation have been avoided. This impact is less than significant. No mitigation is required.

## Significant Impacts and Mitigation Measures

None of the project alternatives would result in significant land use impacts and no mitigation measures are necessary.



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Chapter 11

# Agricultural Resources

# Chapter 11. Agricultural Resources

## AFFECTED ENVIRONMENT

### Local Agricultural Environment

The study area for the following discussion includes Sacramento and San Joaquin counties.

**Prime Farmland**

The study area contains an estimated 557,530 acres of prime farmland, making up 46% of its total agricultural land acreage and 36% of its total land base (California Department of Conservation 1997). Most of the prime farmland within the study area is in northwestern and southwestern Sacramento County and northwestern San Joaquin County.

**Agricultural Production**

Approximately 979,000 acres of land were in agricultural production within the study area in 1995 (Table 11-1). Of seven primary agricultural crops grown within the study area, vineyards ranked first in estimated production value in 1995 at $3,560 per acre (Table 11-1). Orchards and truck crops ranked second and third at $2,970 and $2,750 per acre, respectively.

**Williamson Act Lands**

The California Land Conservation Act (Williamson Act) enables counties and cities to designate agricultural preserves (Williamson Act lands) and offer preferential taxation to agricultural landowners based on the income-producing value of their property in agricultural use, rather than on its assessed market value. In return for the preferential tax rate, the landowner is required to sign a contract with the county or city agreeing not to develop the land for a minimum 10-year period. Contracts are automatically renewed annually for 10 years unless a party to the contract files for nonrenewal or petitions for cancellation. In 1994, lands under Williamson Act contract accounted for approximately 50% (776,860 acres) of the total land base of the study area (Gatz pers. comm.).

Table 11-1. Estimates of Harvested Acreage and Value of Agricultural Production in the Study Area for 1995

| Crop Type[a] | Harvested Acreage | Value per Acre ($) | Gross Value ($) |
|---|---|---|---|
| Truck crops[b] | 88,000 | 2,750 | 242,000,000 |
| Field crops[c] | 234,000 | 500 | 116,000,000 |
| Orchards | 107,000 | 2,970 | 318,000,000 |
| Vineyards | 73,000 | 3,560 | 260,000,000 |
| Pastures | 294,000 | 30 | 10,000,000 |
| Grains and hay crops | 169,000 | 600 | 101,000,000 |
| Rice | 14,000 | 790 | 11,000,000 |
| Total | 979,000 | | 1,058,000,000 |

Notes:
[a] Crop type categories are based on DWR's evaporation and water use survey for statewide agricultural production.
[b] Truck crops include all vegetable crops and strawberries.
[c] Field crops include nongrain crops (e.g., beans, sugar beets).

Source: Sacramento County Department of Agriculture 1996, San Joaquin County Agricultural Commissioner's Office 1996.

### Service Area

The study area for the following discussion includes Alameda and Contra Costa counties.

**Prime Farmland**

The study area contains an estimated 48,624 acres of prime farmland, making up 9% of its total agricultural land acreage and 5% of its total land base (California Department of Conservation 1997). Most of the prime farmland within the study area is in central and northeastern Alameda County and eastern Contra Costa County.



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**Agricultural Production**

Approximately 543,000 acres of land were in agricultural production within the study area in 1996; approximately 420,000 acres of this land were used for grazing (California Department of Conservation 1997). Nursery crops ranked first in estimated total production value in 1996 at $51,430,000. Vegetable and seed crops and fruit and nut crops ranked second and third at $20,482,000 and $20,232,000, respectively. (Alameda County 1996b, Contra Costa County 1996.)

## ENVIRONMENTAL CONSEQUENCES

### Methods and Assumptions

The estimates of acreage of prime farmland within the alignment corridors were based on California Department of Conservation (CDC) important farmland maps for Sacramento and San Joaquin counties. The location and extent of crop types were based on California Department of Water Resources (DWR) land use maps. Crop yields and values were based on Sacramento and San Joaquin county annual crop reports. The analysis of farmland conversion impacts was performed by calculating farmland acreage within each alignment corridor, calculating corresponding crop yields and values that would be lost because of pipeline construction, and comparing the results with study area totals.

The number of properties currently under Williamson Act contracts was estimated by review of available maps and data provided by Sacramento and San Joaquin counties.

The impact evaluation assumed a 130-foot-wide right-of-way for all pipeline alignments. The 130-foot-wide right-of-way consists of an 80-foot-wide permanent operation corridor and a 50-foot-wide temporary construction corridor. The analysis also assumed that all agricultural land within the permanent operation corridors would not return to agricultural production and that agricultural land uses would be reestablished in the temporary construction corridors. No agricultural production was assumed to occur within the portion of Alignment 1 that follows the Central California Traction (CCT) rail line right-of-way. Certain agricultural uses, including nonirrigated crops and pasture, likely would be allowed to resume within pipeline rights-of-way following construction; the evaluation method used in this analysis provides a worst-case estimate of the amount of agricultural land permanently converted.

The analysis also included an evaluation of impacts on agricultural lands associated with the FSC and Mokelumne Aqueduct pumping plants, power transmission facilities and pipeline construction staging areas. Conversion of agricultural land as a result of construction of the FSC and Mokelumne Aqueduct pumping plants and power transmission facilities was considered permanent. The pipeline construction staging areas would be small and would be restored to their original use following construction and thus would not contribute to any long-term impacts on agricultural production or loss of prime farmland. Although the exact number and locations of construction staging areas have not yet been determined, these areas were accounted for in this conservative analysis.

### Significance Criteria

Appendix G of the State CEQA Guidelines states that "a project will normally have a significant effect on the environment if it will convert prime agricultural land to nonagricultural use or impair the agricultural productivity of prime agricultural land." No guidance is provided concerning how much land must be converted before the impact is considered significant; however, the guidelines indicate that the physical qualities of the agricultural land, the extent of the conversion,



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the productivity of the land, and the relative effects of conversions on the local area should all be considered when determining the significance of farmland conversion impacts.

For purposes of analysis, impacts on agricultural resources were considered significant if a substantial portion of farmland in the local region (defined as the study area) would be converted or its productivity reduced because of construction and operation of the project. The determination of what degree of conversion constitutes a "substantial portion" of farmland was based on two factors:

- the amount of prime farmland converted by the project relative to the amount in the study area and
- the loss of production value of specific crops relative to the total production value in the study area.

## Impacts Found to Be Less than Significant

**Alternative 1: No-Action**

Alternative 1 would have no impacts on prime farmland or crop production within Sacramento and San Joaquin counties because no construction activities associated with the project would occur.

Under Alternative 1, expected development within the EBMUD service area would result in the conversion of agricultural land within Alameda and Contra Costa counties. Based on growth patterns and development trends indicated in EBMUD's Water Supply Management Plan (EDAW 1993), the Alameda County General Plan (Alameda County Planning Commission 1981), the Contra Costa County General Plan (1991), and the Castro Valley Canyonlands Issue Paper (Alameda County 1996a), development within the EBMUD service area would result in the conversion of approximately 10,600 acres of grazing land and approximately 1,300 acres of farmland of local importance.

The total acreage of farmland of local importance and grazing land affected by expected development within the service area would represent less than 3% of farmland of local importance and less than 3% of grazing land in Alameda and Contra Costa counties.

**Alternative 2: Folsom South Canal Connection**

***Impact: Conversion and Loss of Prime Farmland.*** The total acreage of prime farmland affected by construction of the FSC pipeline alignments would represent less than 0.01% of the total acreage of prime farmland in Sacramento and San Joaquin counties (Table 11-2). The permanent conversion of prime farmland would range from 21 acres under Alignment 4 to 12 acres under Alignment 2. The temporary loss of prime farmland from construction activities within the 50-foot-wide construction corridor would range from 42 acres under Alignment 1 to 7 acres under Alignment 2.

Table 11-2. Estimated Acreage of Prime Farmland within each Alignment Corridor under Alternative 2

| | Estimated Acreage of Prime Farmland | | |
|---|---|---|---|
| | 80-Foot-Wide Operation Corridor | 50-Foot-Wide Construction Corridor | Total Acres |
| Alignment 1 | 9 | 42 | 51 |
| Alignment 2 | 12 | 7 | 19 |
| Alignment 3 | 5 | 35 | 40 |
| Alignment 4 | 21 | 13 | 34 |

Note: Acreage of prime farmland in the study area totaled 557,530 acres in 1995.

The impact of permanent conversion of prime farmland is less than significant because the amount of prime farmland converted would be small in relation to the total amount of prime farmland in the local region. The impact of tem-



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Table 11-3. Estimated Harvest Acreage and Production Values within the Alignment Corridors under Alternative 2

| Crop Type | Alignment 1 | | | Alignment 2 | | | Alignment 3 | | | Alignment 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Operation Corridor | Construction Corridor | Total | Operation Corridor | Construction Corridor | Total | Operation Corridor | Construction Corridor | Total | Operation Corridor | Construction Corridor | Total |
| Truck crops | | | | | | | | | | | | |
| Acres | 1 | 2 | 3 | 7 | 5 | 12 | -- | 1 | 1 | 7 | 5 | 12 |
| Value ($) | 2,750 | 5,500 | 8,250 | 19,250 | 13,750 | 33,000 | -- | 2,750 | 2,750 | 19,250 | 13,750 | 33,000 |
| Field crops | | | | | | | | | | | | |
| Acres | 11 | 6 | 17 | 6 | 4 | 10 | 18 | 10 | 28 | 16 | 10 | 26 |
| Value ($) | 5,500 | 3,000 | 8,500 | 3,000 | 2,000 | 5,000 | 9,000 | 5,000 | 14,000 | 8,000 | 5,000 | 13,000 |
| Orchards | | | | | | | | | | | | |
| Acres | 5 | 9 | 14 | -- | -- | -- | 4 | 8 | 12 | 1 | 1 | 2 |
| Value ($) | 14,750 | 26,550 | 41,300 | -- | -- | -- | 11,800 | 23,600 | 35,400 | 2,950 | 2,950 | 5,900 |
| Vineyards | | | | | | | | | | | | |
| Acres | 18 | 29 | 47 | -- | -- | -- | -- | 18 | 18 | -- | -- | |
| Value ($) | 64,080 | 103,240 | 167,320 | -- | -- | -- | -- | 64,080 | 64,080 | -- | -- | |
| Pastures | | | | | | | | | | | | |
| Acres | 15 | 19 | 34 | -- | -- | -- | 6 | 13 | 19 | 51 | 18 | 65 |
| Value ($) | 450 | 560 | 1,010 | -- | -- | -- | 180 | 380 | 560 | 1,530 | 410 | 1,940 |
| Range | | | | | | | | | | | | |
| Acres | -- | -- | -- | 8 | -- | 8 | 3 | -- | 3 | 4 | -- | 4 |
| Value ($) | -- | -- | -- | 70 | -- | 70 | 130 | -- | 30 | 40 | -- | 40 |
| Grain and hay crops | | | | | | | | | | | | |
| Acres | 3 | 3 | 6 | -- | -- | -- | 1 | 1 | 2 | 3 | 1 | 4 |
| Value ($) | 1,800 | 1,800 | 3,600 | -- | -- | -- | 600 | 600 | 1,200 | 1,800 | 600 | 2,400 |
| Rice | | | | | | | | | | | | |
| Acres | -- | -- | -- | 1 | 0 | 1 | -- | -- | -- | 1 | -- | 1 |
| Value ($) | -- | -- | -- | 800 | -- | 800 | -- | -- | -- | 800 | -- | 800 |
| Total Acres | 53 | 68 | 121 | 22 | 9 | 24 | 32 | 51 | 83 | 83 | 31 | 114 |
| Total Value ($) | 89,330 | 140,650 | 229,980 | 23,120 | 15,750 | 38,870 | 21,610 | 96,410 | 118,020 | 34,370 | 22,710 | 57,080 |

Note: The permanent operation corridor is assumed to be 80 feet wide, and the temporary construction corridor is assumed to be 50 feet wide. Operation corridor totals include land converted as a result of construction of pumping plants.



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temporary loss of prime farmland is less than significant because of the small amount of prime farmland affected and because of the environmental commitments for agricultural land restoration described in Chapter 2, "Project Objectives and Alternatives under Consideration," that will ensure that the production capability of agricultural lands disturbed in the temporary construction corridor will be returned to preproject levels. No mitigation is required.

***Impact: Loss of Agricultural Production.*** The estimated total acreage of agricultural land removed from production within each alignment corridor represents less than 0.01% of the total agricultural land under production in the study area (Table 11-3). The loss of production from these lands would represent less than 0.01% of the total value of agricultural production in the study area. The permanent conversion of agricultural land would range from 83 acres under Alignment 4 to 22 acres under Alignment 2. Associated losses in annual production value would range from approximately $89,330 under Alignment 1 to $21,610 under Alignment 3. The temporary loss of production because of construction activities occurring within the 50-foot-wide construction corridor would range from 68 acres under Alignment 1 to 9 acres under Alignment 2. Associated temporary losses in annual production value would range from $140,650 under Alignment 1 to $15,750 under Alignment 2.

The impact of permanent loss of agricultural production is less than significant because the total acreage of farmland removed from production and associated loss of production value would be small compared with the total farmland under production and associated production value in the study area. The impact of temporary loss of production is less than significant because of the small amount of acreage affected and because of measures outlined in the project description that will ensure that the production capability of agricultural lands disturbed in the temporary construction corridor will be returned to preproject levels. No mitigation is required.

***Impact: Nonrenewal or Termination of Williamson Act Contracts.*** Lands currently under Williamson Act contracts exist within the construction corridors of Alignments 1–4 (Table 11-4). As described in Chapter 2, EBMUD will comply with state and local notification requirements for construction of public facilities across lands under Williamson Act contract. Construction and operation of the pipeline are not expected to foster development within the study area and would not accelerate nonrenewal or termination of existing Williamson Act contracts. This impact is less than significant. No mitigation is required.

Table 11-4. Estimated Number of Parcels Currently under Williamson Act Contracts along Alignments 1-4

| | Estimated Number of Contracts |
|---|---|
| Alignment 1 | 34 |
| Alignment 2 | 11 |
| Alignment 3 | 21 |
| Alignment 4 | 15 |

Source: California Department of Conservation 1997a, 1997b.

**Alternative 3: Joint Water Supply**

The agriculture analysis for Alternative 3 focuses on the pipeline segment between Fairbairn WTP and the FSC and Alignment 2. The portion of the Alternative 3 pipeline extending from the I-5 delivery point to Fairbairn WTP does not cross agricultural land.

***Impact: Loss or Conversion of Prime Farmland.*** The total acreage of prime farmland affected under Alternative 3 would represent less than 0.01% of the total acreage of prime farmland in Sacramento and San Joaquin



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less than 0.01% of the total acreage of prime farmland in Sacramento and San Joaquin counties (Table 11-5). Impacts would include the permanent loss of approximately 13 acres in the 80-foot-wide operations corridor and the temporary loss of 7 acres in the 50-foot-wide construction corridor.

Table 11-5. Estimated Acreage of Prime Farmland within each Alignment Corridor under Alternative 3

| | Estimated Acreage of Prime Farmland | | |
|---|---|---|---|
| | 80-Foot-Wide Operation Corridor | 50-Foot-Wide Construction Corridor | Total Acres |
| Fairbairn WTP to FSC | .60 | .40 | 1 |
| Alignment 2 | 12 | 7 | 19 |
| Total | 12.6 | 7.4 | 20 |

Note: Acreage of prime farmland in the study area totaled 557,530 acres in 1995.

The impact of permanent loss of prime farmland is less than significant because the amount of prime farmland converted would be small in relation to the total amount of prime farmland in the local region. The impact of temporary loss of prime farmland is less than significant because of the small amount of prime farmland affected and because of measures described in the project description that will ensure that the production capability of agricultural lands disturbed in the temporary construction corridor will be returned to preproject levels. No mitigation is required.

***Impact: Loss of Agricultural Production.*** The estimated acreage of agricultural land removed from production within each alignment corridor represents less than 0.01% of the total agricultural land under production in the study area (Table 11-6). The construction of Alternative 3 would permanently convert an estimated 24 acres of farmland and temporarily affect production on 11 acres of farmland.

The impact of permanent loss of agricultural production is less than significant because the total acreage of farmland removed from production and associated loss of production value would be small compared with the total farmland under production and associated production value in the study area. The impact of temporary loss of production from farmland in the 50-foot-wide construction corridor is less than significant because of the small amount of land affected and because of measures described in the project description that will ensure that the production capability of agricultural lands disturbed in the temporary construction corridor will be returned to preproject levels.

***Impact: Nonrenewal or Termination of Williamson Act Contracts.*** An estimated 13 parcels currently under Williamson Act contracts exist within the pipeline alignment construction corridor under Alternative 3. As described in Chapter 2, EBMUD will comply with all state and local requirements for construction of water supply facilities across lands under Williamson Act contract. Construction and operation of the project are not expected to foster development within the study area and would not accelerate nonrenewal or termination of existing Williamson Act contracts. This impact is less than significant. No mitigation is required.

## Significant Impacts and Mitigation

None of the project alternatives would result in significant impacts on agriculture, and no mitigation measures are necessary.



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Table 11-6. Estimated Harvested Acreage and Production Values within Alignment Corridors under Alternative 3

| | Acres | | | Estimated Annual Value ($) | | |
|---|---|---|---|---|---|---|
| Crop Type | Operation Corridor | Construction Corridor | Total | Operation Corridor | Construction Corridor | Total |
| Truck crops | 7 | 5 | 12 | 19,250 | 13,750 | 33,000 |
| Field crops | 6 | 4 | 10 | 3,000 | 2,000 | 5,000 |
| Pasture | 2 | 2 | 4 | 60 | 60 | 120 |
| Range | 8 | -- | 8 | 70 | -- | 70 |
| Rice | 1 | 0 | 1 | 800 | -- | 800 |
| Total | 24 | 11 | 35 | 23,180 | 15,810 | 38,990 |



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Chapter 12

# Transportation and Circulation

# Chapter 12. Transportation and Circulation

## AFFECTED ENVIRONMENT

### Alternative 2: Folsom South Canal Connection

**Affected Roadways**

All FSC pipeline alignments would cross public roadways in Sacramento and San Joaquin counties (Table 12-1). These roads include highways, such as State Routes 12, 88, and 104, and smaller county roadways. Selected roadways crossed or paralleled by the FSC pipeline alignments are shown in Figures 2-7a and 2-7b.

Construction of the filtration plant expansions in the EBMUD service area would occur within the compounds of the existing treatment facilities, and no construction would occur across or within public roadways.

**Rail Lines**

Alignments 1 and 3 would be constructed within part of the existing Central California Traction (CCT) railroad right-of-way (ROW) south of the City of Sacramento and north of the City of Lodi. The CCT railroad extends from Sacramento to the City of Stockton and is used primarily to transport freight between Sacramento and Lodi. Table 12-2 provides a list of CCT users and indicates the number of railroad car moves handled by each from January through April 1997. Approximately 54% of the rail car moves made during that time were by these primary users; the remaining 46% used portions of the CCT as bridge connections between two other rail lines.

Alignment 3 would be constructed within the existing Union Pacific (formerly Southern Pacific) railroad ROW which parallels the north side of Twin Cities Road between the FSC and the CCT railroad. With Alignments 1 and 4, the Union Pacific rail line would be crossed. The line is used primarily to transport freight.

Table 12-1. Public Roadway Crossings under Alternative 2

| Roadway | Alignment |
|---|---|
| **State Highways** | |
| Twin Cities Road (State Route 104) | 1, 3 |
| State Route 88 | 2, 4 |
| State Route 12 | 1, 2, 3, 4 |
| **Sacramento County Roads** | |
| Grant Line Road | 1, 4 |
| Sloughhouse Road | 1, 4 |
| Green Road | 1 |
| Dillard Road | 1, 4 |
| Walmort Road | 1 |
| Arno Road | 1 |
| Valinsin Road | 1 |
| Conley Road | 1 |
| Borden Road | 1, 2, 3, 4 |
| Quiggle Road | 1, 3 |
| Simmerhorn Road | 1, 3 |
| Boessow Road | 1, 3 |
| Clay Station Road | 2, 4 |
| **San Joaquin County Roads** | |
| Liberty Road | 1, 3 |
| Collier Road | 1, 3 |
| Jahant Road | 1, 3 |
| Peltier Road | 1, 3 |
| Acampo Road | 1, 2, 3, 4 |
| Dougherty Road | 1, 3 |
| Woodbridge Road | 1, 3 |
| Kennison Lane | 1, 3 |
| Pine Street | 1, 3 |
| Sargent Road | 1, 3 |
| Realty Road | 1, 3 |
| Kettleman Lane | 1, 3 |
| Harney Lane | 1, 3 |
| Hogan Lane | 1, 3 |
| Armstrong Lane | 1, 3 |
| Bear Creek Road | 1, 3 |
| Live Oak Road | 1, 3 |
| Eight Mile Road | 1, 3 |
| Quashnick Road | 1, 3 |
| Liberty Road | 2, 4 |
| Buena Vista Road | 2, 4 |



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Table 12-2. Railroad Cars Handled by CCT Railroad Main Line Carriers, January–April 1997

| Commercial/Industrial Users | Number of Railroad Car Moves on CCT Rail Line per User |
|---|---|
| Hunt Wesson Foods | 89 |
| D A Lube | 3 |
| Airco | 3 |
| Liqui Box | 26 |
| Continental Hardwood | 8 |
| Pacific Adhesives | 6 |
| Floor Service Supply | 4 |
| Eastside Wine | 2 |
| Pacific Coast Producers | 178 |
| California Bulk/West Lake PVC | 150 |
| Huntsman Chemical | 38 |
| Hatlack Trucking | 5 |
| A&K Railroad Materials | 48 |
| Total rail car moves by primary users | 560 |
| Total rail car moves across bridge connections* | 474 |
| Total rail car moves for rail line | 1,034 |

* Indicates portions of the CCT rail line used as connections between two other lines. There are six separate bridge connections along the rail line.

Source: Central California Traction Company 1997.

## Alternative 3: Joint Water Supply

### Affected Roadways

Construction along much of the I-5 to FSC pipeline alignments would be within existing streets in the City of Sacramento. The affected roadways and approximate length of construction along each are presented in Table 12-3. All these roadways are under City of Sacramento jurisdiction, except for Kiefer Boulevard, a portion of which is under County of Sacramento jurisdiction.

Table 12-3. Street Segments Affected by Construction of the I-5 to FSC Pipeline Alignment under Alternative 3*

| Alignment Segment/Roadway | Approximate Length of Construction (ft) |
|---|---|
| **I-5 to Fairbairn** | |
| Bercut Road | 500 |
| Bannon Street | 2,400 |
| North 5th Street | 2,100 |
| 10th Street | 3,600 |
| Richards Boulevard | 2,300 |
| 24th Street | 580 |
| Lanatt Way | 920 |
| 57th Street | 1,200 |
| North B Street | 4,500 |
| 14th Avenue | 1,280 |
| C Street | 11,500 |
| Elvas Avenue | 12,300 |
| 56th Avenue | 1,000 |
| J Street | 700 |
| College Town Drive | 1,700 |
| **Fairbairn to FSC** | |
| College Town Drive | 1,500 |
| Hornet Drive | 1,500 |
| Folsom Boulevard | 3,750 |
| Brighton Avenue | 2,650 |
| Ramona Avenue | 4,050 |
| Cucamonga Avenue | 1,400 |
| Florin-Perkins Road | 750 |
| Kiefer Boulevard | 16,750 |

* Does not include roadways crossed by the pipeline (see Table 11-4).



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The Alternative 3 pipeline alignment would also cross roadways in the City and County of Sacramento and San Joaquin County. These roadways include city streets, highways, and smaller local roads. Crossed roadways are identified in Table 12-4.

Table 12-4. Roadways Crossed by Pipeline Alignments under Alternative 3

| Roadway | Alignment/Alignment Segment[a] |
|---|---|
| **State Highways** | |
| State Route 160 | I-5 to Fairbairn |
| Capitol City Freeway (formerly Business 80)[b] | I-5 to Fairbairn |
| State Route 88 | Alignment 2 |
| State Route 12 | Alignment 2 |
| **City of Sacramento Roadways** | |
| Richards Boulevard | I-5 to Fairbairn |
| 15th through 33rd Streets | I-5 to Fairbairn |
| H Street | I-5 to Fairbairn |
| Power Inn Road | Fairbairn to FSC |
| Florin-Perkins Road | Fairbairn to FSC |
| Jackson Highway/State Route 16 | Fairbairn to FSC |
| Folsom Boulevard | Fairbairn to FSC |
| Watt Avenue | Fairbairn to FSC |
| South Port Drive | Fairbairn to FSC |
| Tallyho Drive | Fairbairn to FSC |
| Mayhew Road | Fairbairn to FSC |
| Bradshaw Road | Fairbairn to FSC |
| Excelsior Road | Fairbairn to FSC |
| Eagles Nest Road | Fairbairn to FSC |
| **Sacramento County Roads** | |
| Borden Road | Alignment 2 |
| Clay Station Road | Alignment 2 |
| **San Joaquin County Roads** | |
| Liberty Road | Alignment 2 |
| Buena Vista Road | Alignment 2 |
| Acampo Road | Alignment 2 |

[a] I-5 to Fairbairn is the pipeline segment from the lower American River intake structure to Fairbairn WTP. Fairbairn to FSC is the pipeline segment from Fairbairn to the Folsom South Canal. Alignment 2 is the pipeline segment from the terminus of FSC to the Mokelumne Aqueducts.

[b] Because the pipeline would cross under an elevated portion of this highway, open trench construction would not disrupt traffic.

Selected roadways along or crossed by the Alternative 3 pipeline alignment are shown in Figures 2-7a and 2-7b in Chapter 2, "Project Objectives and Alternatives under Consideration."

As with Alternative 2, construction of the filtration plant expansions in the EBMUD service area would occur within the compounds of the existing treatment facilities, and no construction would occur across or within public roadways.

### Rail Lines

Depending on the alignment chosen, the I-5 to FSC pipeline alignment would cross the Union Pacific Railroad tracks in several locations, including North B Street, Richards Boulevard, 24th Street, Lanatt Way (south of I-80), 14th Street, C Street at 20th Street, Elvas Avenue (south of the California State University, Sacramento (CSUS) campus and north of Folsom Boulevard), and Florin-Perkins Road (south of Folsom Boulevard and north of Jackson Highway/State Route 16). These railroad tracks are used primarily to transport freight.

The I-5 to FSC pipeline alignment also parallels the Union Pacific Railroad along the Elvas Avenue and C Street bypass options. These options are described in more detail in Chapter 2.

### Public Transit

Regional Transit operates light-rail cars and public buses on portions of the I-5 to FSC pipeline alignment. Light-rail tracks that would be crossed by the alignment are located on 12th Street and south of Folsom Boulevard, between Power Inn Road and Florin-Perkins Road. The Folsom Boulevard Bypass Option would also cross the light-rail tracks south of Folsom Boulevard near Brighton Avenue. Bus Routes 34, 81, and 84 operate on a portion of Elvas Avenue between J Street and 66th Street.



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Bus Route 8 operates on the portion of Folsom Boulevard between Power Inn Road and Florin-Perkins Road (Regional Transit 1996).

**Bikeways**

The I-5 to FSC pipeline alignment is located on portions of planned and existing bikeways identified in the 2010 Sacramento City/County Bikeway Master Plan. Portions of 14th Street, Elvas Avenue, Folsom Boulevard, and Kiefer Boulevard are identified as existing bikeways. Portions of North B Street and Kiefer Boulevard are proposed bikeways. (City of Sacramento and Sacramento County 1993.)

## ENVIRONMENTAL CONSEQUENCES

### Methods and Assumptions

The transportation and circulation evaluation was based on project siting and design information and preliminary traffic estimates provided by the project engineers.

### Significance Criteria

According to Appendix G of the State CEQA Guidelines, a significant impact on transportation and circulation would normally result if the project would:

- cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system or
- interfere with emergency response plans or emergency evacuation plans.

For purposes of this analysis, a significant impact could also result if the project would:

- substantially alter the present patterns of circulation or movement,
- substantially increase the traffic delay experienced by drivers,
- result in substantial deterioration of the roadway surface following completion of construction activities, or
- expose people to roadway safety hazards.

For the initial screening of impacts of increased traffic, the Institute of Transportation Engineers (ITE) (1989) recommends that an impact be examined more closely if it involves an increase of 50 or more trucks, 100 passenger vehicles, or an equivalent combination of vehicles per hour in the peak direction during the peak hour at any roadway intersection. For purposes of analysis, impacts of increased traffic may be considered substantial if the number of project-generated vehicle trips would exceed any of these thresholds. Because more than one project segment would be constructed at a given time, trucks would typically gain access to construction sites by different sets of roadways and intersections.

Assumptions for estimated number of truck trips under Alternative 2 are 22 working days per month for 24 months, a 10-hour work day, and four crews per day at separate construction sites along the alignment. For Alternative 3, assumptions are a 10-hour work day and a construction period of 52 to 60 weeks for the intake structure and the I-5 to FSC pipeline and four separate crews working 22 days per month for 24 months for Alignment 2. Construction requirements will be similar to those for the new American River intake structure and Fairbairn WTP expansion.

### Impacts Found to Be Less than Significant

**Alternative 1: No Project**

Under Alternative 1, the present patterns of circulation and movement would continue along roadways described under Alternatives 2 and 3.



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Traffic congestion and roadway surface deterioration could increase in future years as growth occurs in the Sacramento-San Joaquin Valley. Growth in EBMUD's service area is projected to increase traffic impacts significantly along the Interstate 80 and 680 corridors with or without Alternatives 2 or 3.

Pipeline construction-related impacts on traffic and circulation patterns and roadways would not occur because a pipeline would not be constructed.

**Alternative 2: Folsom South Canal Connection**

***Impact: Alterations in Circulation Patterns and Traffic Delays.*** Construction of the pipeline at roadway crossings could result in temporary, short-term lane or road closures and detours. Most of the roadways crossed by the Alternative 2 alignments are smaller roads located in rural areas. As noted in Chapter 2, the project has been designed to minimize adverse effects on traffic circulation by incorporating a traffic control plan consistent with all applicable jurisdiction requirements, which would include various measures for effectively managing traffic during construction. Additionally, pipelines at rail line crossings would be tunneled to avoid interruptions in rail traffic or would occur under close coordination with rail line operators. Some construction of new transmission line extensions to the pumping plant sites would occur near roadways, but the lines would be constructed outside the roadway and no substantial effects on traffic are anticipated. This impact is less than significant. No mitigation is required.

***Impact: Deterioration of Roadway Surfaces.*** Construction of project facilities could result in damage to the roadway surface from trench excavation at roadway crossings and truck traffic. As discussed in Chapter 2, deterioration of local truck routes is typically monitored and repaired regularly by local jurisdictions. Damage to the surface of roadways not maintained under such a program will be repaired by EBMUD following completion of construction activities as part of the project roadway surface repair plan (also described in Chapter 2). Additionally, all open trenching of the roadway surface would be repaired as part of standard construction procedures. This impact is less than significant. No mitigation is required.

***Impact: Increase in Traffic.*** The largest proportion of truck trips under Alternative 2 would occur with construction of the pipeline. Pipeline construction would likely be performed by several crews operating at different locations along the pipeline alignment. Table 12-5 provides an estimate of the average number of truck trips per day for each crew and construction location.

Table 12-5. Estimated Number of Truck Trips during Pipeline Construction under Alternative 2

| Alignment | Trips per Crew per Hour* |
|---|---|
| 1 | 9 |
| 2 | 5 |
| 3 | 6 |
| 4 | 9 |

* Assumes 22 working days per month for 24 months, a 10-hour work day, and four crews per day at separate construction sites along the alignment.

As shown, the average number of truck trips per hour for pipeline construction is not expected to exceed 9. Construction of the canal pumping plant and aqueduct pumping plant would result in an average of one additional truck trip per day per pumping plant. Daily employee trips by construction workers traveling to and from the sites are not anticipated to exceed 20 per day per crew for pipeline construction and 30–92 per day for pumping plant construction at each site.



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According to these estimates, pipeline construction under Alternative 2 would not exceed ITE thresholds. Additionally, the number of vehicle trips associated with pipeline and pumping plant operation and maintenance would be minimal and would not represent substantial increases in traffic volumes on local roadways.

Construction of the filtration plant expansions in the EBMUD service area is anticipated to require a total of approximately the same number of truck trips as would construction of the Fairbairn WTP expansion (see discussion below under "Alternative 3: Joint Water Supply"). Based on this assumption, and with the trips divided evenly among the three infiltration plant sites, an estimated maximum three truck trips per hour would occur per site, which is well below the ITE thresholds. Operation of the newly expanded filtration plants would also likely generate a small long-term increase in traffic for operation of the new facilities including a small increase in truck trips to haul sludge from the new solids handling facilities to an offsite location; however, this increase would be minor and also would not produce enough new trips to exceed the ITE thresholds. These impacts are less than significant. No mitigation is required.

***Impact: Interference with Emergency Response Routes.*** Open-cut construction at roadway crossings and increased truck traffic along haul routes could temporarily increase response times for emergency services such as fire protection, police, and ambulance along affected roadways. However, implementation of the project traffic control plan, which would require limits on the number and extent of road closures, effective traffic direction, and coordination with emergency service providers before construction, would substantially reduce the potential for such disruptions to response routes. This impact is less than significant. No mitigation is required.

***Impact: Roadway Safety Hazards.*** Open trenches could create safety hazards at open-cut roadway crossings. Implementation of project construction safety and security measures under the Traffic Control Plan, an environmental commitment described in Chapter 2, would substantially reduce this risk. This impact is less than significant. No mitigation is required.

**Alternative 3: Joint Water Supply**

***Impact: Alterations in Circulation Patterns and Traffic Delays.*** This impact is similar to that described for Alternative 2; however, because the I-5 to FSC pipeline would be constructed primarily in existing city streets, potential traffic delays related to construction would be of longer duration than delays for the roadway crossings required for Alternative 2. All the intake pipelines would be constructed in urban areas and along higher volume roadways, compared to Alternative 2. Intake Pipeline 1 would be the longest and have the most effect on city streets. Generally, upstream intakes would create less need for pipeline construction in roadways and would have fewer effects on traffic. Because portions of Intake Pipeline 2 would be constructed primarily along a railroad spur east of 3rd Street and portions of Intake Pipeline 5 would be constructed along the property line of an old landfill site, there would be less need for construction in roadways at these locations. Potential traffic delays would be similar to those described above.

Portions of Intake Pipelines 2 and 3 would be constructed in Richards Boulevard, and Intake Pipelines 1 and 4 would cross intersections at Richards Boulevard. Potential disruption in traffic patterns during construction activities would occur at these locations and could result in traffic delays. Construction of all the intake pipelines would affect residential portions of C Street and Elvas Avenue, although Intake Pipeline 5 would affect substantially fewer linear feet in C Street. The I-5 to FSC alignments would also all result in temporary alteration of circulation patterns and traffic



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patterns from trenching in Keifer Boulevard near the Rosemont community.

To minimize effects on circulation patterns and traffic delays, some street segments are planned for tunnel construction along the I-5 to FSC pipeline (Table 12-6). As described in Chapter 2, a Traffic Control Plan has been incorporated into the project to minimize adverse effects on traffic. This impact is less than significant. No mitigation is required.

***Impact: Deterioration of Roadway Surfaces.*** This impact is similar to that described for Alternative 2 for all pipeline alignments and bypass options chosen. Implementation of a roadway surface repair plan as described in Chapter 2 would be particularly important along arterials such as Richards Boulevard, J Street, Folsom Boulevard, and Kiefer Boulevard. A Roadway Surface Repair Plan would also be implemented in areas of high traffic volumes such as C Street, Elvas Avenue, and portions of Kiefer Boulevard to minimize access effects on local residences and businesses. This impact is less than significant. No mitigation is required.

***Impact: Increase in Traffic.*** Estimates of numbers of truck trips required for construction of project facilities under Alternative 3 (the new American River intake structure), the I-5 to FSC pipeline alignments, Alignment 2, and the Sacramento River WTP expansion and intake) are provided in Table 12-7.

As shown, the average number of truck trips per hour for construction of these Alternative 3 facilities is not expected to exceed 10. As discussed for Alternative 2, construction of the pumping plants along Alignment 2 would result in an average of one additional truck trip per day per pumping plant. Employee trips are not anticipated to exceed 30 per day per crew for alternative intake structures and the I-5 to FSC

Table 12-6. Street Segments Planned for Tunnel (Trenchless) Construction for the I-5 to FSC Pipeline Alignment

| Alignment Segment/ Tunneling Location | Approximate Length of Tunneling (feet) |
|---|---|
| **I-5 to Fairbairn** | |
| Bercut Road and Richards Boulevard intersection | 200 |
| Railroad at North B Street | 100 |
| North B Street and 12th Street intersection | 200 |
| Railroad at 14th Street | 300 |
| C Street between 16th Avenue and 20th Avenue (Blue Diamond Almond Factory and railroad spur) | 3,200 |
| Railroad at 24th Street | 150 |
| I-80 at railroad | 200 |
| Railroad at Lanatt Way | 200 |
| C Street between 29th Avenue and 33rd Avenue | 2,000 |
| 56th Avenue between H Street and Elvas Avenue | 3,200 |
| J Street at Elvas Avenue | 150 |
| Elvas Avenue and railroad to CSUS | 450 |
| Union Pacific Railroad tracks at CSUS campus | 200 |
| **Fairbairn to FSC** | |
| Hornet Drive and Folsom Boulevard intersection | (width of intersection) |
| Highway 50, railroad, and light rail | 900 |
| Folsom Boulevard and Howe Avenue/Power Inn Road intersection* | (width of intersection) |
| Folsom Boulevard at Jackson Highway | 140 |
| Kiefer Road and South Watt Avenue intersection | (width of intersection) |
| Kiefer Road and Bradshaw Road intersection | (width of intersection) |

* This intersection is being studied for possible improvements by the City of Sacramento; EBMUD will coordinate with the city to determine whether special pipeline depth requirements will be necessary.



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Table 12-7. Estimated Number of Truck Trips during Facility Construction under Alternative 3

| Facility/Alignment Segment | Estimated Number Truck Trips per Crew per Hour[a] |
|---|---|
| **American River intake structure** | 8 |
| **I-5 to Fairbairn alignments** | 4 |
| **Fairbairn WTP expansion** | 8 |
| **Fairbairn to FSC** | |
| Folsom Boulevard | 6 |
| Other City of Sacramento streets | 9 |
| Kiefer Boulevard | 10 |
| Sacramento River WTP expansion and intake[b] | 8 |
| **FSC Alignment 2** | 5 |

[a] Assumes a 10-hour work day and a construction period of 52 to 60 weeks for the intake structure and the I-5 to FSC pipeline alignment and four separate crews working 22 days per month for 24 months for Alignment 2.

[b] Assumes construction requirements will be similar to those for the new American River intake structure and Fairbairn WTP expansion.

pipeline, 50 per day for the Fairbairn WTP and Sacramento River WTP expansions, 20 per day per crew for Alignment 2, and 92 per day for each pumping plant. Based on these estimates, construction of Alternative 3 would not exceed ITE thresholds. As noted above, construction of the filtration plant expansions in the EBMUD service area is anticipated to require a total of approximately the same number of truck trips as would construction of the Fairbairn WTP expansion, well below the ITE thresholds in those areas. Additionally, the number of vehicle trips related to intake structure, pipeline, pumping plant, and filtration facility operations and maintenance would be minimal and would not exceed the ITE thresholds. This impact is less than significant. No mitigation is required.

***Impact: Interference with Emergency Response Routes.*** Construction within city streets, open cut roadway crossings, and increased truck traffic along haul routes could create temporary disruptions in emergency response routes, potentially resulting in a slight decrease in emergency response times for emergency services such as fire protection, police, and ambulance along affected roadways. As described in the discussion of environmental commitments in Chapter 2, implementation of the Traffic Control Plan, which would include limiting the number and extent of road closures, effective traffic direction, and coordination with emergency service providers before construction, would substantially reduce the potential for such disruptions in response routes. This impact is less than significant. No mitigation is required.

***Impact: Roadway Safety Hazards.*** This impact under all pipeline alignments and bypass options is the same as discussed for Alternative 2 and is less than significant. No mitigation is required.

## Significant Impacts and Mitigation

***Impact: Elimination of Rail Service.*** Construction and operation of the Alignment 1 and 3 pipelines under Alternative 2 would result in elimination of approximately 20 miles of the existing CCT rail line south of the City of Sacramento and north of the City of Stockton and approximately 3 miles of the Union Pacific rail line along Twin Cites Road. Rail service currently used by businesses along the railroad route to transport freight would be eliminated. Although alternative freight transportation is likely available, this impact is significant. No mitigation is available to reduce this impact to a less-than-significant level.

No other significant impacts would occur under any other pipeline alignment or project alternative.



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Chapter 13

# Air Quality

# Chapter 13. Air Quality

## AFFECTED ENVIRONMENT

### Regional Climate and Atmospheric Conditions

The project area in Sacramento and San Joaquin counties is in the south end of the Sacramento Valley and the north end of the San Joaquin Valley. This area is about 50 miles east-northeast of the Carquinez Strait, a sea-level gap between the Coast Ranges and the Diablo Range. The prevailing winds are from the south and west, primarily because of marine breezes through the Carquinez Strait, although during winter the sea breezes diminish and winds from the north occur more frequently. This portion of the project area has episodes of poor atmospheric mixing caused by inversion layers. Inversion layers form when temperature increases with elevation aboveground or when a mass of warm, dry air settles over a mass of cooler air near the ground. Surface inversions (0–500 feet) are most frequent in winter, and subsidence inversions (1,000–2,000 feet) are most frequent in summer. Inversion layers limit vertical mixing in the atmosphere, trapping pollutants near the surface.

The climate in the East Bay is generally cooler than in the Sacramento and San Joaquin valleys. Wind directions are predominantly from the northwest. The proximity to the Pacific Ocean and the influence of marine air moderates the region's temperature and precipitation.

### Air Pollutants and Ambient Air Quality Standards

Both the State of California and the federal government have established ambient air quality standards for several different pollutants. For some pollutants, separate standards have been set for different periods. Most standards have been set to protect public health. For some pollutants, standards have been based on other values (such as protection of crops, protection of materials, or avoidance of nuisance conditions). The pollutants of greatest concern in the project area are carbon monoxide (CO), ozone, and inhalable particulate matter less than 10 microns in diameter (PM10). A summary of state and federal ambient air quality standards is shown in Table 13-1.

State and federal CO standards have been set for both 1-hour and 8-hour averaging times. The state 1-hour standard is 20 parts per million (ppm) by volume, and the federal 1-hour standard is 35 ppm. Both state and federal standards are 9 ppm for the 8-hour averaging period. CO is a public health concern because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream.

Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter when periods of light winds combine with the formation of ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

Ozone is not emitted directly into the air, but is formed by a photochemical reaction in the atmosphere. Ozone precursors, which include reactive organic gases (ROG) and oxides of nitrogen ($NO_x$), react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem. Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and can cause substantial damage to vegetation and other materials. State and federal standards for ozone have been set



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Table 13-1. Ambient Air Quality Standards Application in California

| Pollutant | Symbol | Average Time | Standard, as parts per million | | Standard, as micrograms per cubic meter | | Violation Criteria | |
|---|---|---|---|---|---|---|---|---|
| | | | California | National | California | National | California | National |
| Ozone | $O_3$ | 1 hour | 0.09 | 0.12 | 180 | 235 | If exceeded | If exceeded on more than 3 days in 3 years |
| Carbon monoxide | CO | 8 hours | 9.0 | 9 | 10,000 | 10,000 | If exceeded | If exceeded on more than 1 day per year |
| | | 1 hour | 20 | 35 | 23,000 | 40,000 | If exceeded | If exceeded on more than 1 day per year |
| (Lake Tahoe only) | | 8 hours | 6 | N/A | 7,000 | N/A | If exceeded | N/A |
| Nitrogen dioxide | $NO_2$ | Annual average 1 hour | N/A | 0.053 | N/A | 100 | N/A | If exceeded |
| | | | 0.25 | N/A | 470 | N/A | If exceeded | N/A |
| Sulfur dioxide | $SO_2$ | Annual average | N/A | 0.03 | N/A | 80 | N/A | If exceeded |
| | | 24 hours | 0.04 | 0.14 | 105 | 365 | If exceeded | If exceeded on more than 1 day per year |
| | | 1 hour | 0.25 | N/A | 655 | N/A | N/A | N/A |
| Hydrogen sulfide | $H_2S$ | 1 hour | 0.03 | N/A | 42 | N/A | If equaled or exceeded | N/A |
| Vinyl chloride | $C_2H_3Cl$ | 24 hours | 0.010 | N/A | 26 | N/A | If equaled or exceeded | N/A |
| Inhalable particulate matter | PM10 | Annual geometric mean | N/A | N/A | 30 | N/A | If exceeded | N/A |
| | | Annual arithmetic mean | N/A | N/A | N/A | 50 | N/A | If exceeded |
| | | 24 hours | N/A | N/A | 50 | 150 | N/A | If exceeded on more than 1 day per year |
| Sulfate particles | $SO_4$ | 24 hours | N/A | N/A | 25 | N/A | If equaled or exceeded | N/A |
| Lead particles | Pb | Calendar quarter | N/A | N/A | N/A | 1.5 | N/A | If exceeded no more than 1 day per year |
| | | 30 days | N/A | N/A | 1.5 | N/A | If equaled or exceeded | N/A |

Notes: All standards are based on measurements at 25°C and 1 atmosphere pressure.
National standards shown are the primary (health effects) standards.
N/A = not applicable.



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for a 1-hour averaging time. The state 1-hour ozone standard is 0.09 ppm, not to be exceeded. The federal 1-hour ozone standard is 0.12 ppm, not to be exceeded more than three times in any 3-year period.

Health concerns associated with suspended particulate matter focus on those particles small enough to reach the lungs when inhaled. Few particles larger than 10 microns in diameter reach the lungs. Consequently, both the federal and state air quality standards for particulate matter apply only to particulate matter 10 microns or less in diameter (generally designated as PM10). The state PM10 standards are 50 micrograms per cubic meter as a 24-hour average and 30 micrograms per cubic meter as an annual geometric mean. The federal PM10 standards are 150 micrograms per cubic meter as a 24-hour average and 50 micrograms per cubic meter as an annual arithmetic mean.

## Existing Air Quality Conditions

Air quality data for 1991–1995 from monitoring stations in Sacramento and San Joaquin counties are summarized in Tables 13-2 and 13-3. Data from 1995 are the most recent available. Because some monitoring stations do not monitor all pollutants, a distinct set of monitoring stations was chosen for each pollutant that would best represent conditions in the project area or, for ozone, in the region. The data show that monitored CO levels have been trending down over the period shown. This downtrend is primarily a result of the use of oxygenated gasoline in winter. The state ozone standard has been exceeded between 2 and 52 times each year. Ozone monitoring data do not show an upward or downward trend. However, in 1996 the California Air Resources Board (CARB) introduced a reformulated automobile gasoline expected to reduce ozone levels through lower emissions of ozone precursors from automobile and light truck exhaust. The state 24-hour PM10 standard has been exceeded between 3% and 52% of the time. The state annual PM10 standard has been exceeded 1 year at Sacramento County monitoring stations during the period shown and 4 years at the San Joaquin County station. The federal annual PM10 standard has been exceeded in only 1 year at the San Joaquin County station.

The closest monitoring station to the Walnut Creek, Orinda, and Lafayette WTPs in Concord indicates that between 1992 and 1995 the state ozone standard was exceeded 3–8 times per year, the state hourly and daily CO standard was not exceeded, and the state PM10 standard was exceeded at least 1 day per year.

### FSC Pipeline Alignments

Alignments 1, 2, 3, and 4 are all in southeastern Sacramento County and northeastern San Joaquin County. These alignments are not near any congested roadways or intersections or other sources of localized air pollutants. The general area is subject to high levels of regional pollutants, including ozone and PM10. The dominant land uses are agricultural. Rural residences are scattered throughout the area, with several next to the alignment.

### I-5 to FSC Pipeline Alignment

This alignment is within the City of Sacramento and passes near parks, industrial and residential areas, and agricultural and open space land. The I-5 to FSC pipeline would be constructed largely within the rights-of-way of city and county roadways and across highly congested intersections. The alignment corridor is subject to high levels of regional pollutants such as ozone and PM10, as well as high levels of localized pollutants such as CO near congested intersections; heavily traveled roadways; and large, heavily used parking lots.

## Regulatory Environment

Air quality management responsibilities exist at local, state, and federal levels of government. Air quality management planning



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Table 13-2. Summary of Carbon Monoxide, Ozone, and PM10 Monitoring Data for Sacramento County

| Station Location | Yearly Monitoring Data | | | | |
|---|---|---|---|---|---|
| | 1991 | 1992 | 1993 | 1994 | 1995 |
| **Carbon Monoxide** | | | | | |
| Sacramento - 13th Street and T Street | | | | | |
| Highest 1-hour concentration (ppm) | 12 | 12 | 12 | 11 | 10 |
| Highest 8-hour concentration (ppm) | 9.6 | 6.5 | 9.4 | 6.4 | 6.5 |
| Hours above standard[a] | 0 | 0 | 0 | 0 | 0 |
| Days above standard[b] | 2 | 0 | 1 | 0 | 0 |
| Sacramento - El Camino Avenue and Watt Avenue | | | | | |
| Highest 1-hour concentration (ppm) | 15 | 11 | 12 | 10 | 8 |
| Highest 8-hour concentration (ppm) | 12.3 | 8.6 | 9.4 | 8.6 | 7.4 |
| Hours above standard[a] | 0 | 0 | 0 | 0 | 0 |
| Days above standard[b] | 6 | 0 | 1 | 0 | 0 |
| **Ozone** | | | | | |
| Sacramento - 13th Street and T Street | | | | | |
| 1st High (ppm) | 0.14 | 0.12 | 0.13 | 0.11 | 0.13 |
| 2nd High (ppm) | 0.12 | 0.11 | 0.11 | 0.10 | 0.11 |
| Days above standard[c] | 8 | 11 | 4 | 3 | 7 |
| Elk Grove - Bruceville Road | | | | | |
| 1st High (ppm) | | | 0.10 | 0.11 | 0.12 |
| 2nd High (ppm) | | | 0.10 | 0.11 | 0.11 |
| Days above standard[c] | | | 3 | 8 | 15 |
| Folsom | | | | | |
| 1st High (ppm) | 0.19 | 0.15 | 0.15 | 0.14 | 0.16 |
| 2nd High (ppm) | 0.16 | 0.15 | 0.14 | 0.14 | 0.15 |
| Days above standard[c] | 52 | 42 | 24 | 31 | 33 |
| **PM10** | | | | | |
| Sacramento - 13th Street and T Street | | | | | |
| Highest 24-hour concentration ($\mu$g/m3) | 134 | 72 | 77 | 99 | 85 |
| Geometric mean ($\mu$g/m3) | 37.7 | 29.1 | 25.3 | 26.1 | 26.3 |
| Arithmetic mean ($\mu$g/m3) | 46.3 | 32.2 | 28.9 | 30.1 | 31.6 |
| Percentage of days above standard[d] | 36% | 11% | 11% | 8% | 27% |
| Sacramento - Branch Center Road | | | | | |
| Highest 24-hour concentration ($\mu$g/m3) | 95 | 71 | 70 | 83 | 81 |
| Geometric mean ($\mu$g/m3) | 29.2 | 27.0 | 20.8 | 22.2 | 19.6 |
| Arithmetic mean ($\mu$g/m3) | 34.3 | 30.4 | 25.0 | 26.4 | 26.2 |
| Percentage of days above standard[d] | 15% | 11% | 7% | 5% | 7% |
| Sacramento - Stockton Boulevard | | | | | |
| Highest 24-hour concentration ($\mu$g/m3) | 98 | 85 | 75 | 94 | 74 |
| Geometric mean ($\mu$g/m3) | 29.1 | 26.9 | 24.2 | 22.4 | 22.9 |
| Arithmetic mean ($\mu$g/m3) | 35.3 | 29.8 | 29.0 | 25.3 | 27.0 |
| Percentage of days above standard[d] | 24% | 8% | 15% | 3% | 7% |



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Table 13-3. Summary of Carbon Monoxide, Ozone, and PM10 Monitoring Data for San Joaquin County

| Station Location | Yearly Monitoring Data | | | | |
|---|---|---|---|---|---|
| | 1991 | 1992 | 1993 | 1994 | 1995 |
| **Carbon Monoxide** | | | | | |
| Stockton - Hazelton Street | | | | | |
| Highest 1-hour concentration (ppm) | 14 | 11 | 10 | 10 | 10 |
| Highest 8-hour concentration (ppm) | 11.4 | 7.4 | 6.3 | 7.1 | 4.5 |
| Hours above standard[a] | 0 | 0 | 0 | 0 | 0 |
| Days above standard[b] | 1 | 0 | 0 | 0 | 0 |
| Stockton - Claremont Avenue | | | | | |
| Highest 1-hour concentration (ppm) | 15 | 11 | 10 | 11 | 9 |
| Highest 8-hour concentration (ppm) | 11.0 | 8.3 | 6.9 | 7.9 | 6.4 |
| Hours above standard[a] | 0 | 0 | 0 | 0 | 0 |
| Days above standard[b] | 2 | 0 | 0 | 0 | 0 |
| **Ozone** | | | | | |
| Stockton - Hazelton Street | | | | | |
| 1st High (ppm) | 0.11 | 0.11 | 0.11 | 0.13 | 0.13 |
| 2nd High (ppm) | 0.11 | 0.11 | 0.10 | 0.12 | 0.12 |
| Days above standard[c] | 10 | 7 | 7 | 8 | 8 |
| Stockton - East Mariposa Street | | | | | |
| 1st High (ppm) | 0.12 | 0.11 | 0.13 | 0.12 | 0.13 |
| 2nd High (ppm) | 0.11 | 0.11 | 0.12 | 0.12 | 0.13 |
| Days above standard[c] | 22 | 18 | 11 | 15 | 13 |
| Tracy - Patterson Pass Road | | | | | |
| 1st High (ppm) | | | | 0.11 | 0.12 |
| 2nd High (ppm) | | | | 0.10 | 0.12 |
| Days above standard[c] | | | | 2 | 9 |
| **PM10** | | | | | |
| Stockton - Hazelton Street | | | | | |
| Highest 24-hour concentration ($\mu$g/m3) | 140 | 145 | 104 | 109 | 109 |
| Geometric mean ($\mu$g/m3) | 43.0 | 39.9 | 32.0 | 32.6 | 23.8 |
| Arithmetic mean ($\mu$g/m3) | 52.5 | 44.8 | 38.5 | 36.8 | 28.6 |
| Percentage of days above standard[d] | 40% | 34% | 22% | 17% | 6% |

[a] Hours above standard = hours above state 1-hour standard of 20 ppm.
[b] Days above standard = days above state 8-hour standard of 9 ppm.
[c] Days above standard = days above state 8-hour standard of 0.09 ppm.
[d] Percentage of days above standard = days above state 24-hour standard of 50 ug/m3 divided by number of days sampled.

Source: California Air Resources Board 1997.



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programs were developed during the past decade generally in response to requirements established by the federal Clean Air Act. The enactment of the California Clean Air Act of 1988 (CCAA) produced additional changes in the structure and administration of air quality management programs in California.

**Air Quality Management at the State Level**

The CCAA substantially added to the authority and responsibilities of the state's air pollution control districts. The CCAA established an air quality management process that generally parallels the federal process. The CCAA process, however, focuses on attainment of the state ambient air quality standards that, for certain pollutants and averaging periods, are more stringent than the comparable federal standards.

The CCAA requires that an air district prepare an air quality attainment plan if the district violates state air quality standards for CO, sulfur dioxide ($SO_2$), $NO_x$, or ozone. No locally prepared attainment plans are required for areas that violate the state PM10 standards. The CCAA requires that the state air quality standards be met as expeditiously as practicable, but it does not set precise attainment deadlines. Instead, the act established increasingly stringent requirements for areas that will require more time to achieve the standards. The least stringent requirements are set for areas expected to achieve air quality standards by the end of 1994. The most stringent requirements are set for areas that cannot achieve the standards until after 1997.

The air quality attainment plan requirements established by the CCAA are based on the severity of air pollution problems caused by locally generated emissions. Upwind air pollution control districts are required to establish and implement emission control programs commensurate with the extent of pollutant transport to downwind districts.

**Air Quality Management in Sacramento County**

The Sacramento Metropolitan Air Quality Management District (SMAQMD) developed the 1991 Air Quality Attainment Plan for Sacramento County (Sacramento Metropolitan Air Quality Management District 1991), which addresses attainment of California air quality standards for ozone and CO. The plan listed Sacramento as a severe nonattainment area for ozone (compliance to be achieved after 1997) and a moderate nonattainment area for CO (compliance to be achieved by 1994). Great emphasis was placed on both transportation control measures and indirect source control measures. The attainment plan must be updated every 3 years.

The SMAQMD has also published the Sacramento Area Regional Ozone Attainment Plan to address attainment of the federal ozone standard. The plan, which has been incorporated in California's State Implementation Plan (SIP), demonstrates that existing and proposed control measures will achieve a 39% reduction in ROG emissions and a 40% reduction in $NO_x$ emissions by 1999 (Sacramento Metropolitan Air Quality Management District 1994b). California's SIP was recently approved by the U.S. Environmental Protection Agency (EPA). To avoid duplication, CARB has proposed that SMAQMD also use this plan to meet state requirements. Consequently, this plan satisfies the requirement for an updated air quality attainment plan.

**Air Quality Management in San Joaquin County**

The San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) is responsible for air quality within the eight counties making up the San Joaquin Valley Air Basin (SJVAB). The SJVUAPCD's 1991 Air Quality Attainment Plan addresses CO and ozone problems in the SJVAB (San Joaquin



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Valley Unified Air Pollution Control District 1991).

The strategy outlined in the plan includes all feasible control measures to reduce emissions of CO and ozone precursors. Because the SJVUAPCD cannot predict attainment and maintenance of the state ozone or CO standards until after December 31, 1997, the pollution problem in the SJVAB is classified as severe. As a severe nonattainment area, the SJVAB is subject to the most stringent requirements in the CCAA and must apply all feasible measures to reduce emissions.

The SJVUAPCD released its 1994 Serious Area PM10 Plan for the SJVAB, as required by the federal Clean Air Act Amendments. The plan addresses PM10 problems in the SJVAB. The strategy outlined in the plan includes implementation of Best Available Control Measures (BACM) as defined by EPA to achieve federal PM10 standards by 2001 (San Joaquin Valley Unified Air Pollution Control District 1994a).

The SJVUAPCD has also released its Ozone Attainment Demonstration Plan, Proposed Revised 1993 Rate of Progress Plan, and Proposed Post 1996 Rate of Progress Plan, each of which address various aspects of attaining the federal ozone standard. The 1993 plan, which will be incorporated into California's SIP, demonstrates that existing and proposed control measures will achieve a 15% reduction in volatile organic compound (VOC) emissions between 1990 and 1996. The post 1996 plan demonstrates that existing and proposed control measures will achieve an additional 9% reduction of VOC emissions between 1996 and 1999 (San Joaquin Valley Unified Air Pollution Control District 1994b, San Joaquin Valley Unified Air Pollution Control District 1994c, San Joaquin Valley Unified Air Pollution Control District 1994d).

The SJVUAPCD has also prepared Regulation VIII - Fugitive PM10 Prohibitions (San Joaquin Valley Air Pollution Control District 1995). Within Regulation VIII are several rules intended to control PM10 emissions. Rules 8010, 8020, 8030, 8060, and 8070 related to fugitive dust requirements from various sources are applicable to the proposed project.

**Bay Area Air Quality Management District**

The Bay Area Air Quality Management District (BAAQMD) is responsible for air quality management throughout the San Francisco Bay Area Air Basin (SFBAAB). In 1991, BAAQMD prepared a Clean Air Plan to fulfill requirements of the CCAA. The Clean Air Plan is a planning document designed to show the steps that BAAQMD will take to bring the SFBAAB into compliance with standards for ozone and CO. Although SFBAAB has demonstrated attainment of the national 1-hour ozone standard of 0.12 ppm, the region is unable to project attainment of the state 1-hour ozone standard of 0.09 ppm by 1997. Consequently, SFBAAB is classified as a severe nonattainment area for ozone. In December 1994, SFBAAB was reclassified as an attainment area for CO.

The 1994 Clean Air Plan was released in October 1994. Because SFBAAB has been redesignated as a state CO attainment area, the 1994 plan focuses on attaining the ozone standard and includes proposed rules and regulations to be adopted during the next 3 years that will limit ozone precursor emissions from both stationary and mobile sources.

## ENVIRONMENTAL CONSEQUENCES

### Methods and Assumptions

Construction of the project would result in the temporary generation of emissions of ROG, $NO_x$, and PM10. Construction-related emissions would result from construction equipment exhaust and fugitive dust from land



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clearing, earthmoving, and wind erosion of exposed soil. Emissions would also result from trucks used to haul equipment and materials to and from the work sites.

Construction-related emissions were calculated using emission rates from EPA and the Midwest Research Institute (MRI) (U.S. Environmental Protection Agency 1985, Midwest Research Institute 1995). Construction-related emissions are based on expected construction equipment that would be used. The analysis also included the land area that would be excavated and graded for each activity. The assumptions and calculations used to estimate the construction emissions that would be created by the FSC pipeline alignments and pump stations and Alternative 3 facility construction are shown in Appendix G of this EIR/EIS. Because the amount of emissions released within each county cannot be determined at this stage, total project emissions were assumed for each county as a worst-case analysis.

No operation-related pollutant emissions are assumed because the pump stations and intake structure would be electric powered.

## Significance Criteria

According to Appendix G of the State CEQA Guidelines, a project will normally have a significant effect on the environment if it will:

- violate any ambient air quality standard,
- contribute substantially to an existing or projected air quality violation, or
- expose sensitive receptors to substantial pollutant concentrations.

In addition to the criteria detailed above, the SMAQMD's Air Quality Thresholds of Significance (Sacramento Metropolitan Air Quality Management District 1994a) were used in determining project-related air quality impacts in Sacramento County. The thresholds are defined by SMAQMD as more than 85 parts per day (ppd) for ROG or $NO_x$, or 275 ppd for PM10.

For the portion of the project within San Joaquin County, SJVUAPCD guidelines were used. The SJVUAPCD considers construction-related emissions of ROG or $NO_x$ exceeding 10 tons per year (tpy) to be a significant impact. Construction-related emissions of PM10 are considered to be less than significant as long as the applicable dust suppression measures contained in Regulation VIII, as described in Chapter 2, "Project Objectives and Alternatives under Consideration," are implemented.

Expansion of treatment plants in the BAAQMD would create no long-term operational emissions, and PM10 emissions are considered less than significant with implementation of recommended BAAQMD control measures for construction emissions.

## Impacts Found to Be Less than Significant

The air quality impacts associated with expansion of the Walnut Creek, Orinda, and Lafayette WTPs under Alternatives 2 and 3 in the SFBAAB would be less than significant. No long-term operational emissions would result from these improvements. Short-term construction-related emissions would be temporary and would be minimized by implementation of BAAQMD's control measures for construction emissions of PM10. Short-term ROG and $NO_x$ emissions from construction equipment would be minimal because of the small scale of the improvements.

**Alternative 1: No Action**

Alternative 1 would not result in air quality impacts associated with construction of proposed water delivery facilities. Future growth and traffic volumes that would inevitably occur in the region and service areas



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would continue to contribute to regional air quality conditions in Sacramento and San Joaquin counties and the Bay Area.

## Significant Impacts and Mitigation

**Alternative 2: Folsom South Canal Connection**

***Impact: Short-Term Increase in ROG, $NO_x$, and PM10 Emissions from Pipeline Construction.*** Construction of the FSC pipeline alignments, canal pumping plants, and electric transmission lines would result in construction-related emissions ranging from 851 to 1,724 ppd of ROG, 2,864 to 5,575 ppd of $NO_x$, and 396 to 567 ppd of PM10 in Sacramento and San Joaquin counties (Table 13-4). Construction of Alignments 1 and 4 would create the greatest emissions of the alternatives evaluated, and all the emissions levels for portions of alternative alignments in Sacramento and San Joaquin counties would exceed the SMAQMD and SJVUAPCD thresholds for ROG and $NO_x$ and the SMAQMD threshold for PM10. Therefore, construction-related air quality impacts for Alignments 1–4 are considered significant and unavoidable. To partially reduce the impacts associated with PM10, although not to a less-than-significant level, the dust suppression measures required by SJVAPCD will be implemented during construction in both counties. Standard dust suppression measures typically reduce fugitive dust emissions by 20–25%. To partially reduce the impacts from ROG and $NO_x$ emissions, EBMUD should implement Mitigation Measure 13-1.

***Mitigation Measure 13-1: Incorporate ROG and $NO_x$ Emission-Reducing Measures into Pipeline and Pump Station Construction Plans.*** The construction plans for the pipeline and pumping plant will include as many of the following mitigation measures as are applicable to the project:

- require ignition timing retard of 2 degrees on diesel vehicles,
- install high-pressure injectors on diesel vehicles,
- encourage the use of reformulated diesel fuel,
- use diesel engines that meet the most recent emission standards,
- use electric equipment,
- maintain equipment in tune with manufacturer's specifications,
- install catalytic convertors on gasoline-powered equipment, and
- use natural gas- or propane-powered equipment.

Implementation of Mitigation Measure 13-1 would partially reduce the impact of increases in ROG and $NO_x$ emissions during construction but not to a less-than-significant level. The impact of short-term increases in ROG, $NO_x$, and PM10 is significant and unavoidable.

**Alternative 3: Joint Water Supply**

***Impact: Short-Term Increase in ROG, $NO_x$, and PM10 Emissions from Construction of Joint Project Facilities.*** Construction of an intake structure, pipeline, pump station facilities, and electric transmission lines under Alternative 3 could result in considerable short-term emission levels for all the project components combined, assuming construction of all the project elements occurs during the same period. If construction activities for all facility components under Intake Pipeline 1 were to occur on the same day, the project would result in the short-term emissions of 6,509 ppd of ROG, 21,195 ppd of $NO_x$, and 1,987 ppd of PM10 in an area encompassing the entire pipeline corridor. Table 13-4 summarizes the project components and construction-related emissions that would result from each.



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Intake Pipelines 2, 3, 4, and 5 would create progressively fewer emissions than Intake Pipeline 1 because of their shorter overall length. The three bypass options were not quantitatively analyzed, but the C Street Bypass Option is only 295 feet longer than Intake Pipeline 1, so the emissions generated by this option over the entire alignment would be very similar to those created under Intake Pipeline 1. The Elvas Avenue Bypass Option is only 650 feet shorter than Intake Pipeline 1 and would also generate a roughly equivalent amount of emissions. The Folsom Boulevard Bypass Option is 4,060 feet longer than Intake Pipeline 1 and would be expected to generate a somewhat higher level of emissions. Because combined ROG, $NO_x$, and PM10 emissions for the project under any combination of intake alternatives or pipeline alignments options would exceed the SMAQMD threshold, this impact is considered significant and unavoidable. To partially reduce the impacts associated with PM10, although not to a less-than-significant level, the dust suppression plan described in Chapter 2 will be implemented. Implementation of Mitigation Measure 13-1 would partially reduce the impact of ROG and $NO_x$ emissions but not to a less-than-significant level. This impact is significant and unavoidable.

Table 13-4. Summary of Emissions from Project Alternatives

| | ROG | | $NO_x$ | | PM10* | |
|---|---|---|---|---|---|---|
| | ppd | tpy | ppd | tpy | ppd | tpy |
| Alternative 2 | | | | | | |
| Alignment 1 | 1,724 | 216 | 5,575 | 697 | 567 | 71 |
| Alignment 2 | 851 | 106 | 2,864 | 358 | 396 | 50 |
| Alignment 3 | 851 | 106 | 2,864 | 358 | 396 | 50 |
| Alignment 4 | 1,724 | 216 | 5,575 | 697 | 567 | 71 |
| Alternative 3 | | | | | | |
| Lower American River intake structure | 68 | 9 | 315 | 39 | 118 | 15 |
| I-5 to Fairbairn pipeline | 2,725 | 341 | 8,684 | 1,086 | 649 | 81 |
| Fairbairn WTP expansion | 72 | 9 | 369 | 46 | 57 | 7 |
| Sacramento River intake structure | 68 | 9 | 315 | 39 | 118 | 15 |
| Pipeline from Fairbairn to FSC | 2,725 | 341 | 8,648 | 1,086 | 649 | 81 |
| Alignment 2 | 851 | 106 | 2,864 | 358 | 396 | 50 |
| Total for Alternative 3 | 6,509 | 815 | 21,195 | 2,654 | 1,987 | 249 |

* Implementation of dust suppression measures would reduce fugitive dust emissions by 20–25%.



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Chapter 14

# Noise

# Chapter 14. Noise

## AFFECTED ENVIRONMENT

Background information on environmental acoustics and state and federal noise regulations is provided in Appendix H.

### Noise Regulations

The City of Sacramento and Sacramento and San Joaquin counties have adopted noise ordinances, which serve as enforcement mechanisms for controlling noise, and general plan noise elements, which are used as planning guidelines to ensure that long-term noise generated by a source is compatible with adjacent land uses.

The Sacramento County noise ordinance sets exterior noise standards and special requirements for construction noise. Noise limits are calculated as a 24-hour average of sound measurements in dBA that adds greater weight to nighttime (e.g., 10 p.m. to 7 a.m.) sounds. A dBA is a measurement of sound that approximates the way the human ear responds to sound levels. Figure H-1 of Appendix H illustrates the dBA scale in terms of the sound level from common noises. The exterior noise standards for episodes of noise lasting 30 minutes or more are 55 dBA from 7:00 a.m. to 10:00 p.m. and 50 dBA from 10:00 p.m. to 7:00 a.m. Shorter duration noise episodes have higher maximum acceptable noise levels. Construction noise is specifically exempted from the exterior noise standards, provided that construction activities do not take place between 8:00 p.m. and 6:00 a.m. on weekdays and 8:00 p.m. and 7:00 a.m. on weekends.

The Sacramento County noise element provides compatibility guidelines that compare various land uses with a range of noise levels to determine what are "acceptable," "conditionally acceptable," and "unacceptable" levels (Figure 14-1). According to the guidelines, the maximum conditionally acceptable noise level for noise-sensitive land uses such as residences is 75 dBA day-night average sound level (Ldn), and the maximum acceptable noise level is 60 dBA Ldn.

The City of Sacramento's noise ordinance is the same as the county's noise ordinance and is enforced by Sacramento County. The city's noise element provides compatibility guidelines that are the same as the county's guidelines.

San Joaquin County's noise ordinance states that no sound level shall exceed 65 dBA Ldn at the property line. The noise ordinance also specifically exempts temporary construction noise as long as construction does not occur between 7:00 p.m. and 7:00 a.m. The San Joaquin County noise element states that exterior noise levels of 65 dBA Ldn or less for residential development and 60 dBA Ldn or less for schools, group care facilities, and hospitals are acceptable.

### Existing Noise Conditions and Noise-Sensitive Land Uses

**Alternative 2: Folsom South Canal Connection**

No substantial noise sources exist along Alignments 1, 2, 3, or 4. Minor noise sources for all the alignments include vehicle traffic, trains, and natural sources such as birds and wind. Noise sources along the Alignment 1 corridor include Grant Line Road, State Routes 104 and 12, and numerous collector roads and streets. The route also parallels the Central California Traction (CCT) rail line, which is lightly used. Noise levels during infrequent train operation could be from 55 to 65 dBA Ldn. In most locations along Alignment 1, current noise levels are likely to range from 45 to 55 dBA Ldn. Lands near Alignment 1 are rural agricultural areas with scattered residential development. Alignment 1 passes near an industrial area in the City of Lodi. Near the



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City of Stockton, Alignment 1 would be constructed close to residential development in the Morada community.

Minor noise sources near Alignment 2 include State Routes 88 and 12 and several collector roads and streets. In most locations along Alignment 2, current noise levels are also likely to range from 45 to 55 dBA Ldn. Alignment 2 would traverse primarily agricultural areas with scattered rural residences.

Noise sources and levels near Alignment 3 are similar to those described for Alignment 1. Land uses in the southern portion of Alignment 3 are the same as described for Alignment 1.

Noise sources along Alignment 4 would include traffic noise from Grant Line, Slough House, Dillard, and Clay Station roads in its northern reaches and the same noise sources as described for Alignment 2 in its southern reaches. Alignment 4 would pass through agricultural and grazing land with scattered rural residential areas near major roadways.

**Alternative 3: Joint Water Supply**

Several noise sources exist near the I-5 to FSC pipeline corridor, including automobile traffic, aircraft, trains, and industrial facilities. Most of the pipeline corridor would be constructed in a highly urbanized area of the City of Sacramento with typical urban noise sources such as major highways and arterials. Most of the pipeline corridor would be sited in existing roadways. The corridor also crosses or parallels the Southern Pacific Railroad and the Union Pacific Railroad at several locations. Noise levels along the alignment are likely to range from 50 to 60 dBA Ldn in most locations. Noise levels would be higher in the more urbanized areas and lower in rural areas along Kiefer Boulevard.

A variety of land uses are directly adjacent to the five intake pipelines. Nonsensitive land uses include industrial, commercial, office, and undeveloped land. A variety of sensitive land uses exist next to some segments of the intake pipelines, as well. Multifamily residential uses exist along Bercut Drive, and lands along Bannon Street and North B Street also are in residential use. A neighborhood park is located between 15th and 16th streets along C Street. C Street between 20th Street and 35th Street is principally residential. Small parks are located between 21st and 22nd streets and between 27th and 28th streets. Residential uses abut C Street and Elvas Avenue between 35th and 40th streets. Between 40th Street and D Street, uses include residential and medical offices. A residential healthcare facility is located at 52nd Street. Residential uses also exist on Elvas Avenue between D Street and H Street. College Town Drive is principally residential. Between South Watt Avenue and Bradshaw Road, Kiefer Road is bordered by a mixture of uses, including residential uses and a church and preschool.

Residential uses abut Intake Pipeline 5 along 24th Street between the Union Pacific Railroad tracks and C Street.

The C Street Bypass Option traverses the north side of the Union Pacific Railroad tracks from 24th Street to Lannat Way and along Lannat Way to connect to Intake Pipeline 1 on Elvas Avenue. This segment borders the old city dump, and no sensitive land uses exist in the vicinity. Land uses next to Lannat Way are commercial.

The Elvas Avenue Bypass Option traverses the east side of the Union Pacific Railroad tracks between J Street and College Town Drive and near classroom buildings along the north portion of the CSUS campus.

Residential land uses exist near the intersection of Ramona Avenue and Brighton Avenue along the Folsom Boulevard Bypass Option. No sensitive noise receptors are located near the Folsom Boulevard Bypass pumping plant.



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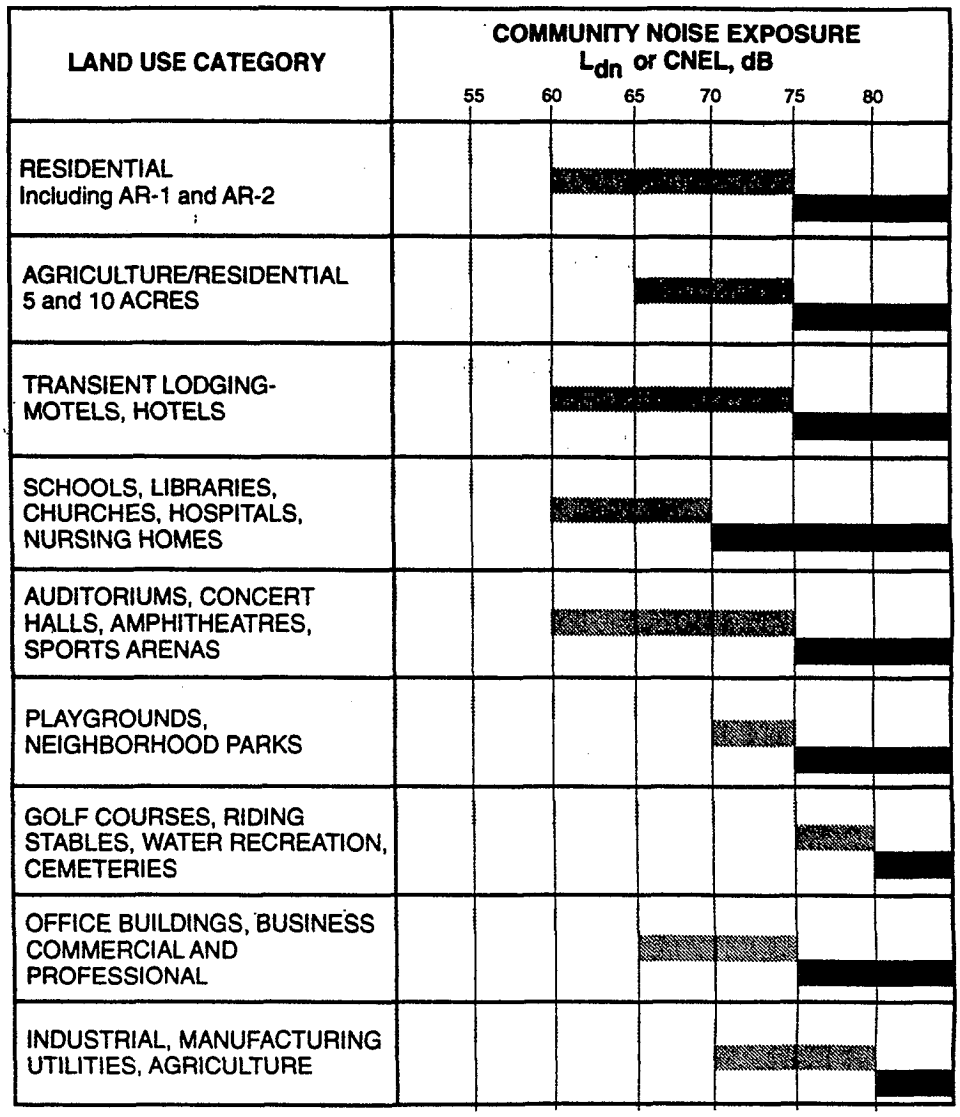


**Legend**

ACCEPTABLE

Specified land use is satisfactory. No noise mitigation measures are required.

CONDITIONALLY ACCEPTABLE

Use should be permitted only after careful study and inclusion of protective measures as needed for intended use and to satisfy policies of the Noise Element.

UNACCEPTABLE

Development is not feasible in accordance with the Noise Element. Use is prohibited.

This figure is to be used to determine the necessity for an acoustical study based on the exterior, pre-mitigation noise exposure level. Any mitigation must achieve noise levels that are in compliance with the policies of the Noise Element.

Source: County of Sacramento 1993.

Jones & Stokes Associates, Inc.

**Figure 14-1**
**Sacramento County Land Use Compatibility for Community Noise Environments**

Alternative 3 also uses Alignment 2, described above under "Alternative 2: Folsom South Canal Connection."

## ENVIRONMENTAL CONSEQUENCES

### Methods and Assumptions

Construction noise would consist of noise from construction equipment, pipeline, pump station, and intake structure construction activities, and modifications to Fairbairn WTP, Sacramento River WTP, and other water treatment plants in EBMUD's service area. Pipeline construction activities would temporarily increase noise levels along the project alignment and could temporarily affect noise-sensitive land uses, such as residences, schools, hospitals, places of worship, and recreation areas, near the construction area. The effect of increased noise levels during construction or operation would be diminished because most construction activity would occur during daytime hours when noise levels are generally the highest and people's tolerance is the highest. Construction crews likely would complete between 100 and 150 feet of pipeline each day and, in most areas along the alignment, construction noise probably would be audible only for several days in possible sensitive areas. Construction of intake structures and possible facilities at the Fairbairn WTP and at other water treatment plants in EBMUD's service area could result in increased noise levels for several months. Noise conditions and land uses within the compounds of the Walnut Creek, Orinda, and Lafayette WTPs are assumed to be compatible with planned facility expansions because the facilities would be constructed entirely within the boundaries of the existing WTPs and noise from new facilities would be consistent with current noise sources and levels at these sites. Typical noise levels for a variety of construction equipment are shown in Figure 14-2. Most equipment produces noise levels near the middle of the indicated range.

Operation-related noise effects would result from long-term operation of the pump stations. A noise level study of the project indicated that nonenclosed pumps would generate noise levels from 107 dBA to 112 dBA at close range, up to 65 dBA at a distance of 210 feet, and up to 45 dBA at a distance of 2,100 feet (Crowe pers. comm.). The study also indicated that the use of appropriate enclosures would reduce offsite pump station noise levels to below 45 dBA.

### Significance Criteria

The following significance criteria are used to determine the level of significance of noise impacts and are based on guidance in Appendix G of the State CEQA Guidelines and Council on Environmental Quality NEPA regulations. A project would result in a significant impact if it would:

- substantially increase noise levels for an extended period near noise-sensitive land uses or
- expose people to severe noise levels.

Construction-related noise impacts are evaluated against the noise ordinance guidelines of Sacramento and San Joaquin counties and the City of Sacramento. These noise ordinances specifically exempt construction-related noise.

Operation-related noise impacts are also evaluated against the noise element guidelines of Sacramento and San Joaquin counties and the City of Sacramento for each respective portion of the project. Each noise element specifies a maximum acceptable exterior noise level of 60 dBA Ldn for noise-sensitive land uses.



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## Impacts Found to Be Less than Significant

### Alternative 1: No Action

Alternative 1 would not result in construction or operation noise impacts associated with future construction of water delivery facilities. Noise levels along transportation corridors would be expected to increase as growth occurs in the region and service areas.

### Alternative 2: Folsom South Canal Connection

***Impact: Increase in Noise Levels from Project Operation.*** Project operation of facilities required for Alignments 1–4 would result in increased noise levels from new pump stations. The pump stations would be capable of generating substantial noise levels that could exceed the acceptable standards of Sacramento and San Joaquin counties. Because pump station noise would be reduced by enclosing pump stations within acoustically efficient enclosures, as described in Chapter 2, "Project Objectives and Alternatives under Consideration," this impact is less than significant. No mitigation is required.

***Impact: Short-Term Increase in Construction Noise Levels.*** Project construction would result in a short-term increase in noise levels along all the alignments. Pipeline construction would proceed at the rate of approximately 150 feet per day, and noise impacts would persist for no more than several days to a few weeks at most individual locations. Because construction of the pipeline, pump stations, electric transmission lines, and appurtenant facilities would meet all applicable noise ordinances, as described in Chapter 2, that restrict construction activities to daytime hours, this impact is less than significant. No mitigation is required.

***Impact: Increased Construction and Operational Noise at Water Treatment Plants in EBMUD's Service Area.*** Construction and operation of the expanded Walnut Creek, Orinda, and Lafayette water treatment plants would result in short-term construction noise and long-term operational noise. Construction noise would be temporary and would occur within the existing plant boundaries; operational noise would be required to comply with local noise requirements. This impact is less than significant. No mitigation is required.

### Alternative 3: Joint Water Supply

***Impact: Increase in Noise Levels from Operation of an American River Intake Structure.*** Operation of an American River intake structure at one of the five proposed sites could result in a substantial increase in noise levels within the American River Parkway if the pumping facilities were not adequately enclosed. Because the intake structure pumps would be enclosed in an acoustically efficient enclosure (refer to Chapter 2), noise would be within an acceptable level (45 dBA or less) at the structure. This impact is less than significant. No mitigation is required.

***Impact: Increase in Noise Levels from Operation of Fairbairn and Sacramento River Intake Structures.*** Operation of the expanded Fairbairn intake and new Sacramento River intake would result in an increase in operational noise. This impact is less than significant for the same reasons described for the new American River intake structure. No mitigation is required.

***Impact: Short-Term Increase in Noise Levels from Pipeline Construction.*** Pipeline construction under this alternative would result in a short-term increase in noise levels near noise-sensitive land uses in developed areas of the City and County of Sacramento. Under Pipeline Intake 1, temporary noise effects would affect the American River Parkway and residences and businesses along the alignment.



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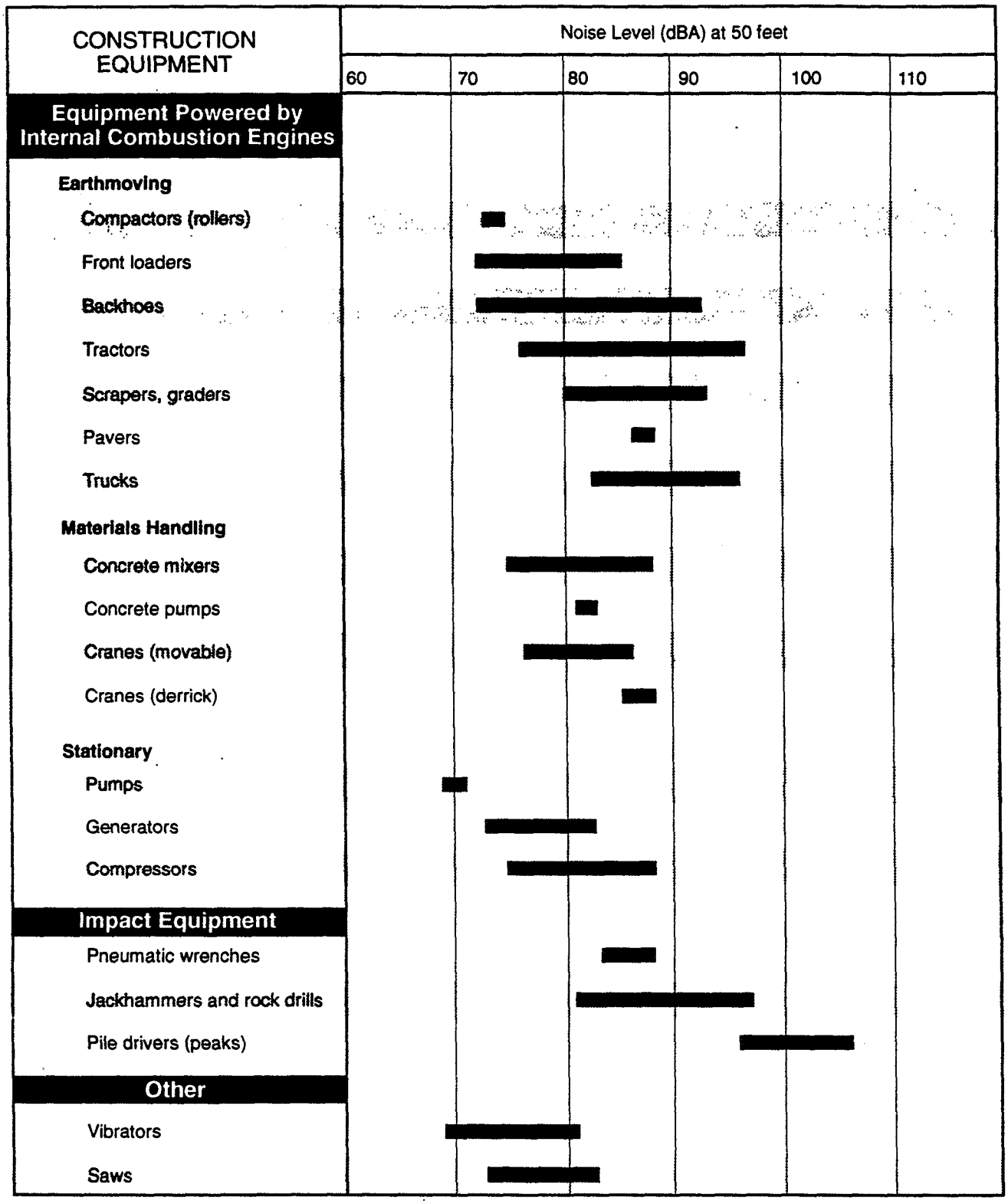


Note: Based on limited available data samples.

Source: U.S. Environmental Protection Agency 1971.

Jones & Stokes Associates, Inc.

**Figure 14-2**
**Construction Equipment Noise Ranges**

Sensitive land uses along this alignment include residences, a residential medical facility, and a preschool. Temporary noise effects would be most noticeable in residential areas along North B Street, C Street, Elvas Avenue, and Kiefer Boulevard. The Blue Diamond Almond facility and other businesses near the alignment could be subjected to nuisance noise from pipeline construction in roadways. Because pipeline construction would proceed at the rate of 100 to 150 feet per day, noise impacts would persist for no more than several days to a few weeks at individual locations. Impacts could persist for up to 2–4 weeks in areas where the pipeline construction would require boring and jacking.

The impacts under Intake Pipelines 2, 3, and 4 would be the same as those for Intake Pipeline 1, except that temporary noise effects on residences along North B Street would be avoided. The impacts under Intake Pipeline 5 would be the same as those under Intake Pipeline 1 except temporary noise effects on residences along North B Street and along C Street between 20th and 23rd streets would be avoided.

The impacts under the C Street Bypass Option would be the same as those under Intake Pipeline 1, except that temporary noise effects on residences along C Street between 24th Street and Elvas Avenue would be avoided. The impacts under the Elvas Avenue Bypass Option would be the same as those under Pipeline Alignment 1, except that temporary noise effects on businesses and residences along Elvas Avenue would be avoided and temporary noise effects on the CSUS campus near the pipeline would occur.

The impacts under the Folsom Boulevard Bypass Option would be the same as those under Intake Pipeline 1, except that temporary noise effects on businesses along Hornet Drive and Folsom Boulevard would be avoided and temporary noise effects of pipeline and pump station construction would affect residences near Ramona Avenue.

Despite the potential for noise nuisances in sensitive areas, this impact is less than significant because noise from pipeline construction would be temporary and construction crews would be required to comply with applicable noise ordinances. No mitigation is required.

***Impact: Short-Term Increase in Noise Levels from Intake Construction.*** Construction of an American River intake structure, expansion of the Fairbairn intake, and construction of the Sacramento River intake under this alternative would result in short-term increases in construction noise at these sites on the American and Sacramento rivers. Combined construction noise levels could be in the 80–90 dBA range at the construction site. Construction would be temporary and crews would abide by applicable noise ordinance requirements. This impact is less than significant. No mitigation is required.

***Impact: Increase in Noise Levels from Fairbairn WTP Pumping Plant or Folsom Boulevard Bypass Pumping Plant Operation.*** Possible siting of a pump station at Fairbairn WTP or near Ramona Avenue, or increasing treatment capacity at Fairbairn WTP would result in a minimal increase in noise levels. Because expansion or construction of new facilities at Fairbairn WTP would increase noise levels only minimally and because any new facilities would be surrounded by an acoustically efficient enclosure, this impact is less than significant. No mitigation is required.

***Impact: Short-Term Increase in Noise Levels from Fairbairn WTP Construction.*** Project construction at Fairbairn WTP would result in a short-term increase in noise levels. Because construction noise would be temporary and construction crews would abide by applicable noise ordinances, this impact is less than significant. No mitigation is required.



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***Impact: Increase in Noise Levels from Operation of Open Energy Dissipation Structure at the FSC Connection.*** Operation of the energy dissipation structure at the FSC would result in a very minor localized increase in noise levels from water discharges that would be above the ambient noise levels in the area. This impact is less than significant because the energy dissipation structure would be underground. No sensitive receptors exist near the proposed structure, and houses built as part of planned future developments would be located more than 0.25 mile away. Any noise produced by the energy dissipation device would be broad band, or "white noise," which is less intrusive than narrow band noise.

***Impact: Construction and Operational Noise from Alignment 2.*** Noise impacts associated with the Alignment 2 pipeline, pumping plants, and electric transmission lines under this alternative would be the same as discussed above for Alternative 2. Operation and construction impacts are less than significant. No mitigation is required.

***Impact: Increased Construction and Operational Noise at Water Treatment Plants in EBMUD's Service Area.*** Impacts of service area WTPs under Alternative 3 would be the same as described for Alternative 2. No mitigation is required.

## Significant Impacts and Mitigation Measures

None of the project alternatives would result in significant impacts related to noise, and no mitigation measures are necessary.



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Chapter 15

# Public Health and Safety

# Chapter 15. Public Health and Safety

## AFFECTED ENVIRONMENT

### Alternative 2: Folsom South Canal Connection

The FSC pipeline alignments traverse primarily agricultural land with scattered residences, small businesses (such as gas stations and stores), and industries (such as wineries, packing companies, and dairy operations) in Sacramento and San Joaquin counties. Portions of Alignments 1 and 3 are within the CCT rail line right-of-way, and Alignments 1, 3, and 4 would cross the Union Pacific Railroad tracks at Twin Cities Road. Unknown soil contamination may exist at or near commercial and industrial sites, along railroad tracks where pesticides or other chemicals may have been used or released, and potentially in cultivated areas where agricultural chemicals are used.

Historical gold and copper mining along the upper Cosumnes and Mokelumne river drainages may have resulted in mercury contamination of alluvial sediment as far downstream as Alignment 1. Acid mine drainage, spilled concentrator reagents, and some detrital heavy metal sulfide minerals were released into the Mokelumne River from Penn Mine and carried downstream before construction of Camanche Reservoir (Leland Gardner and Associates 1996). Some remnants of solid components of those releases could still be present in the downstream river alluvium, although it is unlikely that more than trace amounts remain. Remnants of fuel, lubricants, hydraulic fluid, and similar substances, possibly spilled during construction of Camanche Dam and the Mokelumne River fish hatchery, could also be present, especially near the Alignment 2 Mokelumne River crossing. An existing power house with a substation at the dam could be a source of past soil contamination near Alignment 2.

A search of federal and state databases for recorded hazardous materials and hazardous waste sites along Alignments 1 and 2 revealed the presence of several sites of potential contamination, including several accidental spills and leaking underground storage tanks (VISTA Environmental Information 1996a, 1996b). A database search has not yet been performed for the upper portions of Alignment 3 (north of its connection with Alignment 1) or Alignment 4 (north of its connection with Alignment 2), but similar conditions are expected to exist along these segments.

Following the database search, a preliminary hazardous materials assessment was performed for Alignment 2. The assessment included a soil characterization study involving soil sampling at various locations along the alignment. Analysis of the soil samples obtained did not reveal the presence of any soil constituents at hazardous or potentially hazardous levels at the sites sampled. (CH2M Hill and Montgomery Watson 1997).

Construction in the extensive annual grasslands along some portions of the alignments, particularly Alignments 2 and 3, could create a potential fire hazard.

Construction of the filtration plant expansions in EBMUD's service area would occur within the boundaries of existing treatment facilities. Land uses surrounding the filtration plants include various developed urban uses.

### Alternative 3: Joint Water Supply

The I-5 to Fairbairn pipeline segment is within developed urban areas in the City of Sacramento.

The Fairbairn to FSC pipeline segment traverses some long-established commercial uses and parallels the southern corner of the former Mather Air Force Base runway, which is now under the jurisdiction of Sacramento County. The airport is the site of extensive



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groundwater contamination, largely from past releases of solvents and potentially jet fuel. However, groundwater levels are well below the anticipated 10- to 15-foot trench depth for pipeline construction, and no near-surface soil contamination is known to be present at the site.

The remainder of the Fairbairn to FSC pipeline segment crosses grazing land and land previously mined for aggregate, and the potential for existing soil contamination is relatively low. Construction in the annual grasslands along this alignment segment could increase the potential for fire.

A Phase I environmental site assessment was performed by Kennedy/Jenks Consultants for the I-5 to FSC alignment in June 1997 (East Bay Municipal Utility District 1997a). The assessment included an extensive search of federal, state, and local databases; evaluation of historical records; and a site reconnaissance survey. A total of 44 sites within .5 mile of the alignment were identified as warranting further investigation during a planned Phase II hazardous materials assessment. As described in the site assessment, sites of potential concern for contamination include Union Pacific Railroad lines, Ralph & Farber's, City of Sacramento landfills, Suburban Roofing Company, the former Metropolitan Ambulance Facility, Home Depot/Walsh Construction, Mather Field, and numerous commercial businesses. As recommended in the Phase I assessment, the planned Phase II assessment should include soil and groundwater sampling to confirm the presence or absence of contamination at the identified sites.

Some of the areas of concern identified in the site assessment are classified as medium to high priority and are recommended for further investigation. These sites are presented in Table 15-1. Low-priority hazardous sites identified in the project area and recommended for further investigation are also discussed in detail in the report.

Table 15-1 Hazardous Material and Hazardous Waste Locations along the Alignments

| Alignment | Affected Matrix | Type of Business | Location |
|---|---|---|---|
| 1 | Unknown | Southern Pacific Railways | Between 501 and 603 North B Street |
| 4 | Potential for soil contamination | Ralph's & Farber's | 1005 B Street |
| 1 | Unknown | Southern Pacific Railways | End of 14th Street |
| 1 | Potential for air, soil, and groundwater contamination | City of Sacramento Landfills | North, East, and West of 28th and A streets |
| 1 | Potential soil and groundwater contamination | Suburban Roofing Company and Former Lobo Oil | 5613 Elvas Avenue |
| 1 | Unknown | Former Metropolitan Ambulance Facility | 6329 Elvas Street |
| 1 | Potential for soil and groundwater | Home Depot/ Walsh Construction | 8000 Folsom Boulevard./ 7820 Folsom Boulevard |

Source: East Bay Municipal Utility District 1997a.

As noted above for Alternative 2, construction of the filtration plant expansions in EBMUD's service area would occur within the boundaries of existing treatment facilities. Land uses surrounding the filtration plants include various developed urban uses.

## ENVIRONMENTAL CONSEQUENCES

### Methods and Assumptions

The evaluation of impacts on public health and safety was focused on the potential for



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health and safety hazards during project construction. Health and safety issues following construction, such as general facility safety and public access to facilities, would be minimized or avoided through implementation of permanent security and design features described in Chapter 2, "Project Objectives and Alternatives under Consideration."

## Significance Criteria

According to the State CEQA Guidelines, a significant impact would normally result if the project would:

- create a potential public health hazard or involve the use, production, or disposal of materials that pose a hazard to people or animal or plant populations in the affected area.

For purposes of this analysis, the project was considered to create a potential public health hazard if it would:

- expose people to existing soil or water contamination,
- result in new contamination of soil or water, or
- substantially increase the risk of fire in area with flammable vegetation.

## Impacts Found to Be Less Than Significant

**Alternative 1: No Action**

Under the No-Action Alternative, hazardous materials and contaminated groundwater would continue to exist at recorded locations identified by federal and state databases and new sites may be identified. Public health and safety impacts would not occur as a result of construction because the project would not be constructed.

**Alternative 2: Folsom South Canal Connection**

***Impact: Exposure of People to Existing Contamination.*** As noted previously, soil contamination may exist along the pipeline alignments or at the pumping plant and transmission line extension locations. Areas with the highest potential for contamination are Union Pacific railroad corridors, major roadway crossings, and areas currently or previously supporting commercial or industrial uses. Construction workers and members of the public could be exposed to existing soil contamination during ground-disturbing activities, such as excavation and grading. Because groundwater may also be contaminated in these areas, people could also be exposed to contaminated groundwater during trench and tunnel dewatering. Workers could also potentially be exposed to existing contamination within the boundaries of the existing treatment facility compounds during expansion of the service area filtration plants.

As noted in Chapter 2, Phase I hazardous materials studies will be conducted before the beginning of construction to identify the potential for soil and groundwater contamination in construction areas. Areas where contamination is suspected or confirmed will be examined in Phase II studies. As part of Phase II studies, appropriate state and local agencies will be notified and all applicable requirements implemented to minimize or avoid health risks. Additionally, construction workers will be required to comply with all worker safety requirements, including those set forth by the California Occupational Safety and Health Administration (CAL/OSHA).

As noted above, a database search and preliminary hazardous materials assessment have been performed for Alignment 2. Although the assessment revealed no hazardous or potentially hazardous soil contamination along the alignment, it is possible that previously undiscovered contamination could be encoun-



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tered during construction. In that case, construction procedures would be temporarily stopped at the site of concern until Phase II studies have been completed.

Groundwater levels are typically well below the anticipated depth of excavation throughout the project area and therefore the potential for human exposure to contaminated groundwater would be extremely low in most areas. However, in areas where the pipeline alignments cross streams and rivers or are close to surface water bodies, groundwater may be encountered during construction. If the soil is contaminated, the groundwater also may be contaminated and construction workers and members of the public could be exposed to the contaminated groundwater during trench and tunnel dewatering procedures. To reduce this risk, Phase I and, if necessary, Phase II hazardous materials studies will be conducted in areas where groundwater is encountered. The potential for groundwater contamination will be identified during Phase I. If groundwater contamination is suspected or confirmed, Phase II studies will require installation of monitoring wells (unless existing wells can be used) and groundwater sampling and analysis for anticipated contaminants. If groundwater contaminated by potentially hazardous materials is expected to be extracted during dewatering, appropriate local agencies and the Central Valley Regional Water Quality Control Board will be notified. A contingency plan to dispose of contaminated groundwater will also be developed before construction activities begin. Additionally, the project will comply with all local requirements for dewatering, including those for issuance of a dewatering permit.

Because the project will be designed to include implementation of the measures described above, this impact is less than significant. No mitigation is required.

***Impact: Contamination of Soil and Water during Construction.*** Potentially toxic substances, such as fuels, oils, and lubricants, would be used during project construction. Accidental releases of these substances could contaminate soils and degrade the quality of surface water and groundwater, resulting in a public safety hazard. The potential for water quality degradation would be of highest concern where the pipeline alignments cross streams and rivers and wherever dewatering procedures would be implemented. This effect would be minimized through implementation of the project hazardous materials management plan as described in Chapter 2. Because construction of the filtration plant expansions in EBMUD's service area would be performed within the boundaries of the existing facility compounds, the risk of public exposure to any encountered contamination would be extremely low. Implementation of EBMUD's standard environmental assessment procedures for this type of construction project, and compliance with worker safety requirements, would minimize risks of potential exposure of construction workers.

Because the project will be designed to include implementation of the measures described above, this impact is less than significant. No mitigation is required.

***Impact: Increased Risk for Fires during Construction.*** Large segments of the pipeline alignments would be constructed within or near annual grasslands with high potential for fire during dry seasons. Operation of equipment used to construct pipelines, such as bulldozers, tractors, transportation vehicles, welders, and grinders, may increase the potential for fire along the alignment routes. This hazard will be minimized or avoided through implementation of the project fire control plan described in Chapter 2. This plan will require coordination with the appropriate agencies responsible for fire protection on lands crossed by the proposed pipeline alignments and compliance with all applicable local, state, and federal fire regulations and will be approved by all affected fire agencies before construction in areas with high fire hazards.



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Because the project will be designed to include implementation of the measures described above, this impact is less than significant. No mitigation is required.

**Alternative 3: Joint Water Supply**

***Impact: Exposure of People to Existing Contamination.*** This impact will be the same as described for Alternative 2; however, the potential for encountering existing contamination during construction may be higher within the City of Sacramento (i.e., for the I-5 to Fairbairn alignment segment) than in the more rural areas in southern Sacramento and San Joaquin counties.

According to the Kennedy/Jenks report, many potential and known hazardous sites exist along Intake Pipeline 1 and are concentrated in the industrial area on North B Street. Because the Intake Pipelines 2 through 5 alignments are similar to Intake Pipeline 1, most of the hazardous sites identified for Intake Pipeline 1 would be the same for other alignments. The areas of concern with medium to high priority exist throughout the project area and recommended for further investigation.

The City of Sacramento Landfills near Alignment 5 and the C-Street bypass option are identified as hazardous sites and are considered a medium priority for the recommended Phase II assessment. The former Metropolitan Ambulance Facility, located near the Elvas Street bypass option, is also considered a high priority hazardous site.

Other sites identified in the Kennedy/Jenks report recommended for further investigation, including those along the Folsom Boulevard bypass option, are considered low priority.

Because much construction would occur within densely populated areas, the potential for public exposure to contamination is increased.

Because EBMUD will implement the Phase I and II studies and hazardous materials plan as described in Chapter 2, this impact is less than significant. No mitigation is required.

***Impact: Contamination of Soil and Water during Construction.*** This impact is the same as described for Alternative 2; however, the potential for surface water quality degradation may be higher with construction of the lower American River intake structure and the Fairbairn WTP expansion because construction would be performed directly within the river channel for extended periods. Because much of the construction would occur within densely populated areas (particularly the I-5 to Fairbairn alignment segment and west portion of the Fairbairn to FSC alignment segment), there may also be a greater potential for public exposure to any contamination encountered.

Because EBMUD will implement the Phase I and Phase II studies and the hazardous materials plan as described in Chapter 2, this impact is less than significant. No mitigation is required.

***Impact: Increased Risk for Fires during Construction.*** This impact is similar to that described for Alternative 2. Because the project will include implementation of a fire control plan as described in Chapter 2, this impact is less than significant. No mitigation is required.

***Impact: Potential for Contamination at Chemical Conditioning Facilities.*** As described in Chapter 2, chemical conditioning facilities would be located near the proposed new intake structure. The chemicals used would consist of lime and sodium hypochlorite. Neither of these substances is highly toxic and the chemical conditioning facilities would be enclosed in a building and equipped with modern containment measures. This impact is less than significant. No mitigation is required.



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## Significant Impacts and Mitigation

None of the project alternatives would result in significant impacts on public health and safety, and no mitigation measures are required.



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Chapter 16

# Visual Resources

# Chapter 16. Visual Resources

## TERMINOLOGY AND METHODS

The method used for this visual assessment was adapted from guidelines prepared by the Federal Highway Administration (FHWA) (1983) for visual impact assessments on highway projects in combination with other established federal visual assessment systems; these guidelines are easily transferred to other types of projects that could alter existing landscapes. The process to describe and evaluate visual resources near the project alignments involves the following steps:

- Identify the visual features or resources that make up and define the *visual character* of the landscapes.
- Assess the *quality* of the identified visual resources relative to overall regional visual character.
- Identify major viewer groups and describe *viewer exposure*.
- Identify the importance to people, or the *viewer sensitivity*, of views in the landscape.

These steps, which are described in detail below, establish the existing or baseline conditions of visual resources within the area. This information is used to identify areas of high, moderate, and low visual quality and viewer sensitivity near project alignments and facilities.

Visual importance of landscape elements is described with respect to each element's position relative to the viewer. Foreground elements are those features nearest to the viewer, and background elements are features at a great distance from the viewer. The middle ground of a view is intermediate between the foreground and background. Generally, the closer a resource is to the viewer, the more dominant it is and the greater is its importance to the viewer.

### Visual Character

Distinct landscape components combine to create the existing visual character of an area or view. Landscape components include topography, vegetation, surface water, and the built environment.

### Visual Quality

Visual quality of landscapes is determined using criteria established by the FHWA (1983). These criteria are intactness, vividness, and unity. These terms are defined as follows:

- *Intactness* is the visual integrity of the natural and constructed landscape and its freedom from encroaching elements. This factor can be present in well-kept urban and rural landscapes and in natural settings.
- *Vividness* is the visual power or memorability of landscape components that combine in striking or distinctive visual patterns.
- *Unity* is the visual coherence, composition, and harmony of the landscape considered as a whole. It frequently attests to the careful design of individual components in the landscape.

### Viewer Exposure and Sensitivity

Viewer exposure refers to the location of viewer groups, the number of viewers, and the frequency and duration of views. (This analysis will include general descriptions of viewer groups; specific numbers of viewers will not be established.) Viewer sensitivity will vary depending on the characteristics and preferences of the viewer group. Viewer sensitivity is generally higher for views seen by people who



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are driving for pleasure or relaxing in scenic surroundings. Also, homeowners are expected to be highly sensitive to views from their homes.

## AFFECTED ENVIRONMENT

Descriptions of existing visual resources focus on areas where implementation of a project alternative would require construction of permanent aboveground facilities. Because the canal pumping plant for Alignment 3 and the aqueduct pumping plant for Alignments 2 and 4 are generally not accessible to the general public via roadways or other access routes, viewer exposure and sensitivity in these areas is low and these locations are not discussed further.

### Existing Visual Resource Conditions

**Alternative 2: Folsom South Canal Connection**

The visual character of the landscape near the canal pumping plant site for Alignments 1 and 4 is generally rural with flat, open pasture-land and occasional eucalyptus trees (Figure 16-1). Foreground views near the site are dominated by the heavily traveled intersection of Grant Line Road and Sunrise Boulevard, the concrete-lined FSC and bordering chain-link fence, and the overhead utility lines paralleling both roadways and bisecting the rural landscape. The tallest element in the landscape near the pumping plant site is a transmission tower on the east side of the FSC and across from the proposed site for the canal pumping plant. A few rural residences are located along the south side of Grant Line Road at its intersection with Sunrise Boulevard.

Overall views near the canal pumping plant site for Alignments 1 and 4 have a low level of intactness because urban elements have encroached into the rural landscape setting. Although background views of the surrounding countryside are moderately intact, the views are not particularly vivid and are common to the region. The visual quality of views near the project site is generally low. Viewer exposure is high because of the high volume of commute traffic on Grant Line Road and Sunrise Boulevard, but viewer sensitivity is low because the site does not possess unique visual qualities that would attract concerned viewer groups.

The canal pumping plant for Alignment 2 would be constructed near the south end of the FSC. Between 10 and 15 rural residences are located within 1,400 to 1,500 feet of the Alignment 2 plant near a private road west of Clay Station Road. Access to the site is limited to nearby residents, and viewer exposure is low. However, because homes are located near the site, viewer sensitivity could be high.

The aqueduct pumping plant for Alignments 1 and 3 would be constructed in a field next to the Mokelumne Aqueducts approximately 0.25 mile west of Hildreth Lane. The visual character of the surrounding landscape is rural. Agricultural fields are visible in all directions. The area is bisected by the Mokelumne Aqueducts (as a buried pipeline under a dirt road). Electric transmission lines on wooden poles parallel the aqueduct and Hildreth Lane. Trees are visible in the middle ground and background. Urban encroachment is minimal compared with the area near the canal pumping plant. Suburban housing developments, including the community of Morada, are located within 0.25 to 0.5 mile west of the site. Residences also are located along Hildreth Lane, beginning approximately 800 feet south of the pumping plant site, and approximately 10 rural residences are located near the periphery of the field where the pumping plant would be built. The traffic along Hildreth Lane and other minor roadways bordering this field is mostly related to nearby residential areas.

Overall views near the aqueduct pumping plant are moderately intact because of minimal



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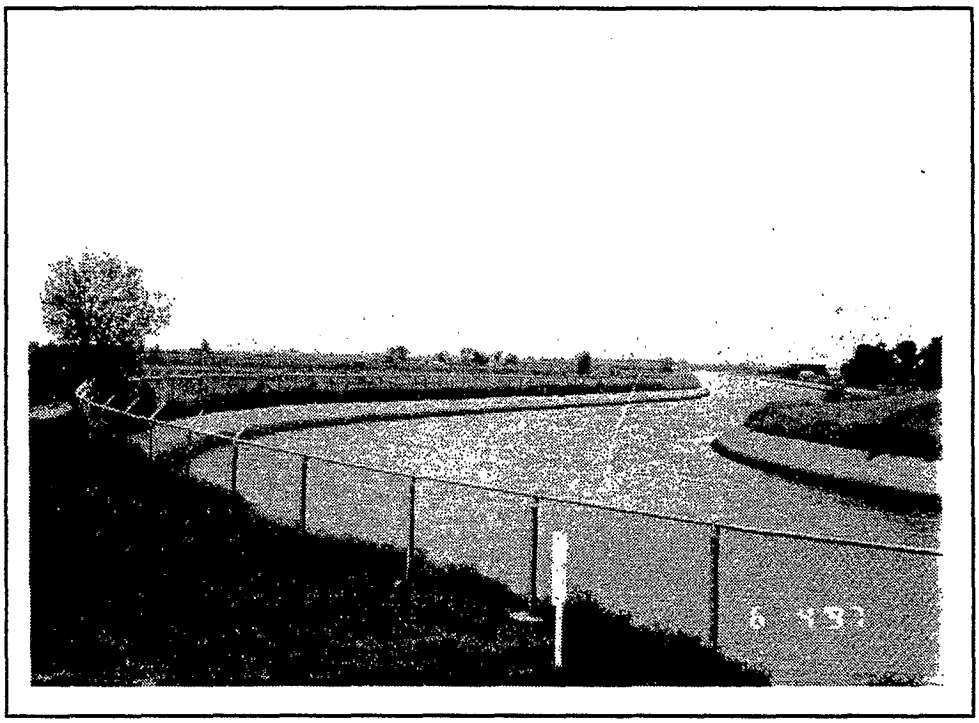
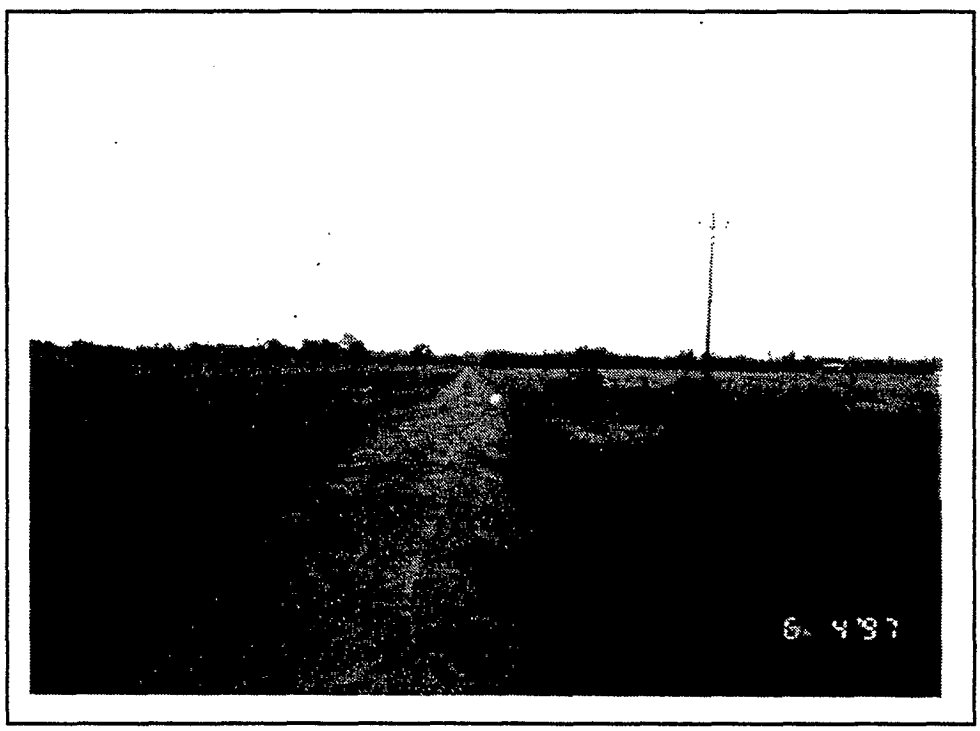


View north along the west side of the Folsom South Canal from Grant Line Road toward the Folsom South Canal pumping plant site for Alignments 1 and 4



View southeast along the Mokelumne Aqueduct from Hildreth Lane toward the pumping plant site for Alignments 1 and 3

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**Figure 16-1**
**Views of Alternative 2 Pumping Plant Locations**

urban encroachment or other incongruous elements in the rural landscape. The quality of views near the project site is generally moderate. Viewer exposure is mostly limited to local residents traveling to and from semi-rural subdivisions south and west of the site. Because homes are located near the pumping plant, viewer sensitivity could be moderate to high.

Proposed 115-kV electric transmission lines for the Alignments 1 and 3 aqueduct pumping plant would extend from an existing north–south transmission line east along Eight Mile Road before aligning with the Mokelumne Aqueducts. Typical views along Eight Mile Road are of agricultural fields and orchards interspersed with rural residences. The landscape is unified and generally free of encroaching elements, and views along the roadway are moderately to highly intact. Overall vividness and visual quality along Eight Mile Road is moderate. Because of the few residents in this rural area, viewer exposure is low to moderate. Several local residents, however, could be sensitive to changes in views along Eight Mile Road.

The 230-kV electric transmission lines that would be extended to the Alignments 2 and 4 aqueduct pumping plant are generally inaccessible and would be located adjacent to the Mokelumne Aqueducts right-of-way for approximately 750 linear feet. No sensitive views or viewer groups are located in this area.

An interconnecting group of roadways in northeastern San Joaquin County is designated scenic in the county general plan (Figure 16-2). The transmission line route for Alignments 1 and 3 include a section of Eight Mile Road between State Route 88 and Jack Tone Road that is designated scenic. The open space element of the general plan states that "development proposals along scenic routes shall not distract from the visual and recreational experience." (San Joaquin County Community Development Department 1992.)

**Alternative 3: Joint Water Supply**

The visual character of the landscape surrounding the I-5 to FSC pipeline alignment within the City of Sacramento is urban, except for the American River Parkway, and rural near the FSC. Land uses along the pipeline alignment include the American River Parkway; restaurants and hotels; industrial and manufacturing areas; residential areas; commercial, office, and warehousing uses; schools; churches, gravel operations, undeveloped open fields, freeways, railroads, and the FSC.

The American River Parkway is a continuous open space greenbelt extending nearly 30 miles from Folsom Dam to the American River confluence with the Sacramento River. The river corridor is bordered by levees and abundant riparian vegetation.

The lower American River can be divided into three visual units:

- Nimbus Dam to the Gristmill Dam Recreation Area, approximately 2 miles upstream of the Watt Avenue bridge;
- the Gristmill Dam Recreation Area to just below the Howe Avenue bridge; and
- the California State University, Sacramento (CSUS), campus to the confluence with the Sacramento River (Litton 1985 and Sacramento Area Flood Control Agency 1994).

Nimbus Dam to the Gristmill Dam Recreation Area is the most visually interesting and varied unit (Sacramento Area Flood Control Agency 1994). Most water-oriented recreation takes place within this unit, and it is viewed most by recreationists and passing motorists at the Hazel Avenue and Sunrise Boulevard bridge crossings. This unit is the most visually sensitive. The unit from Gristmill Dam



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Recreation Area to below the Howe Avenue Bridge has less visual variety than the upper section of the river. This unit is most commonly viewed by motorists on the Howe and Watt Avenue bridges and is a well-known viewing area for local travelers. From the CSUS campus to the confluence, the river is slower flowing and more channelized. Artificial bank protection has degraded the visual attractiveness of this unit. The visual corridor along the river is still complex, providing a variety of views from the river and along the riverbank.

The visual character of the parkway corridor near the confluence and at upstream intake locations consists generally of natural riverine elements, including the river surface, gravel banks, and sandy shorelines, and dense riparian forest to the north with a relatively narrow strip of riparian vegetation and a levee to the south. The river is slow flowing and channelized in these areas, and flow levels vary throughout the year. The parkway character near the confluence also has substantial built elements, including the visually dominant I-5 bridge structure that separates the site of Intake Alternative 1 from high use areas of the Discovery Park recreation area. The bridge spans the river approximately 32 feet above the average surface water elevation. Other built elements are the Jibboom Street Bridge, American River levee, and a restaurant (Rusty Duck) that overlooks the river east of the I-5 bridge.

Views of the site of Intake Alternative 1 are mainly from boats at the water surface; interspersed areas of Discovery Park on the northern bank; the southern parkway levee, which is used informally for walking and jogging; a local restaurant; and 600 feet downstream of the site at the I-5 bridge crossing. The equestrian and bicycle trails (including the Jedediah Smith National Recreation Trail) are located in the American River Parkway north of the river. Views of the river from the trails along the lower section of the river are mostly blocked by dense riparian vegetation. It is possible to view the intake structure site only by leaving the bicycle trail and walking through dense vegetation to the levee edge. Views of the intake structure site from Discovery Park and the Jibboom Street Bridge west of the I-5 overcrossing are dominated by the I-5 structure in the middle ground (Figure 16-3).

Visual resources of the site of Intake Alternative 1 range from moderate to high intactness and vividness, depending on the direction of the view. Views from the site to upstream portions of the parkway are generally higher quality than downstream views. Viewer exposure and sensitivity at the intake structure site are relatively high because of the high annual recreational use of the river and parkway and the proximity of the site to the I-5 corridor. Views of the upstream river and parkway by northbound motorists traveling on I-5 are of a high-quality riverine and riparian vista that contrasts with the surrounding urban environment. Because of the high speed of traffic on I-5, the duration of views by motorists is short.

Views of the sites of Intake Alternatives 2 through 5 are mainly from the water surface and bank, with no views to limited views from Discovery Park of intake locations further upstream and limited or no views from the Jedediah Smith National Recreation Trail because of intervening riparian vegetation and a berm along the trail. Generally, views from boats to the intake sites would be more frequent at intake sites near the confluence because boating activity is generally greater near the confluence than at upstream sites. Intake Alternatives 2 through 5 could also be viewed from the southern levee similar to that discussed for Intake Alternative 1. Intake Alternatives 2 and 3 could also be viewed in the background from the I-5 bridge crossing. Intake Alternatives 4 and 5 would exhibit the least public visibility because of the upstream location, lack of public access near the sites, and private landownership along these segments of



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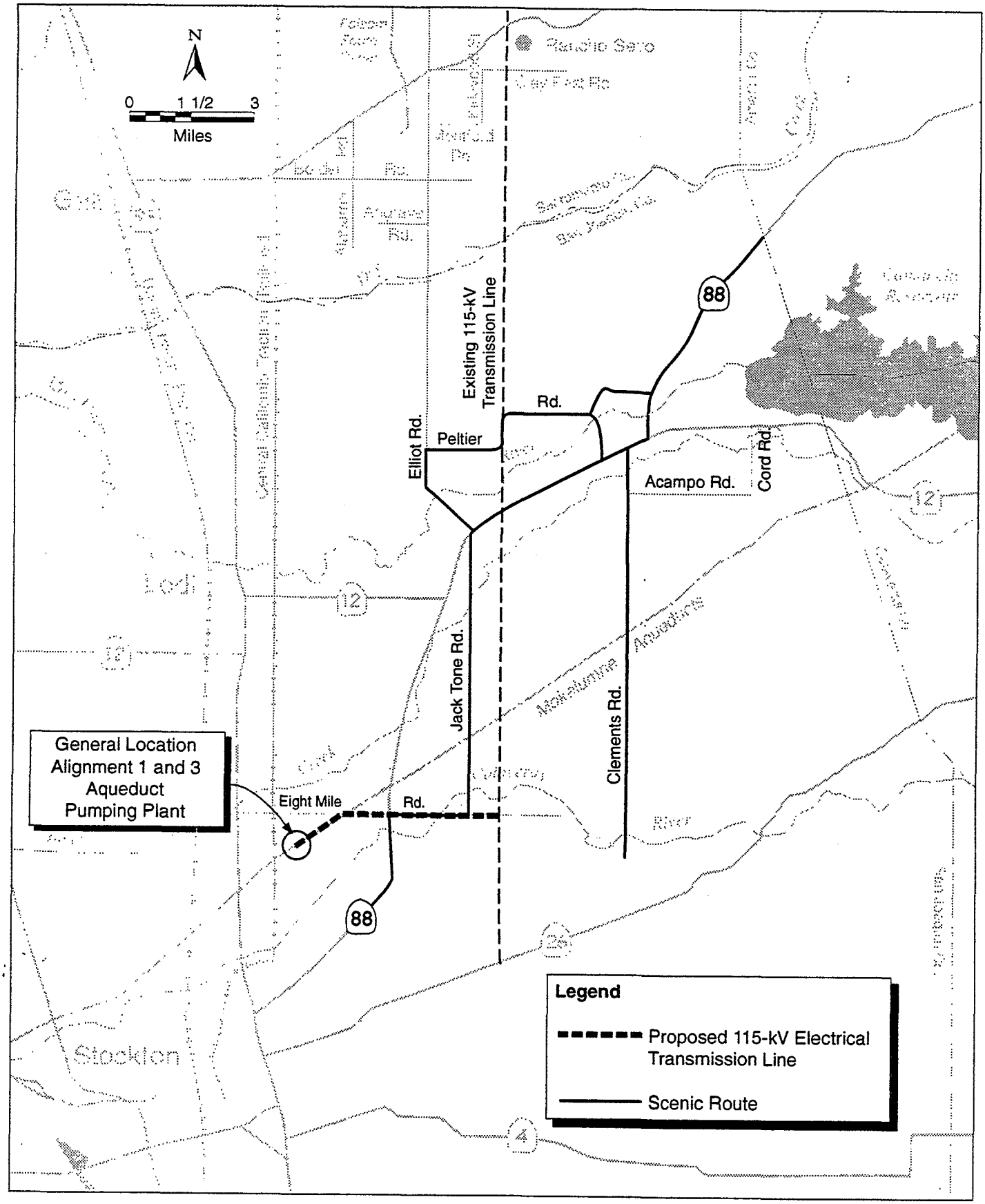


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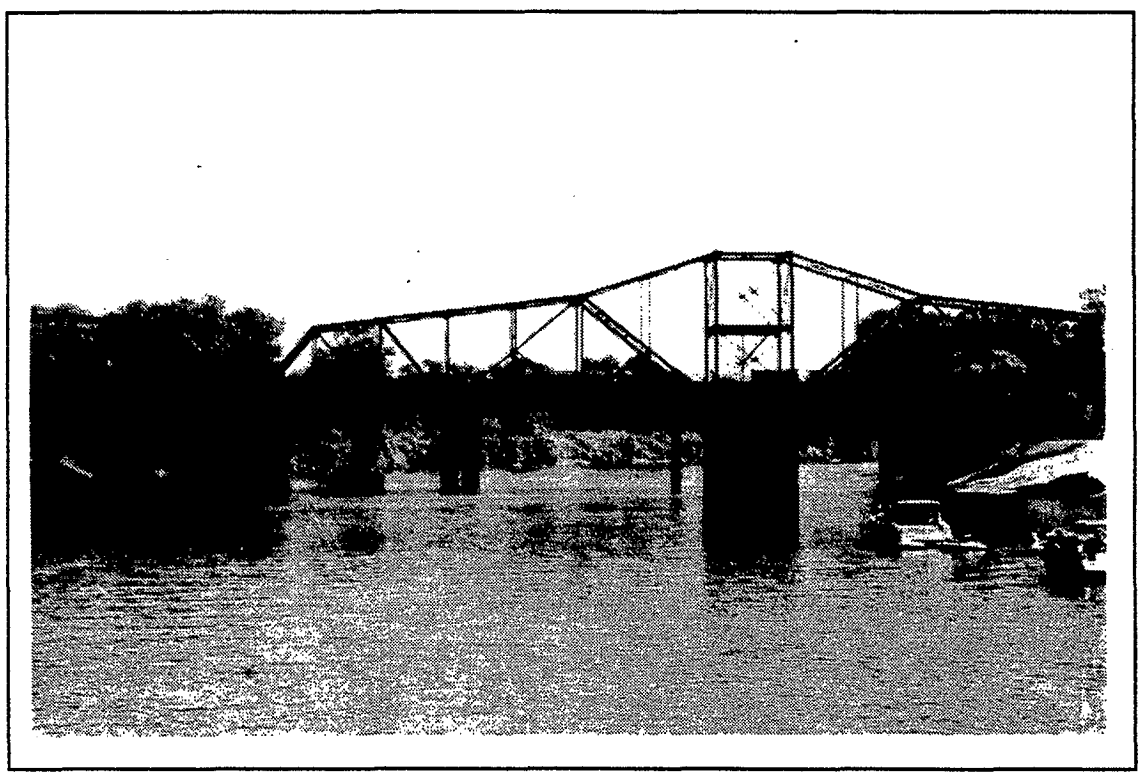
**Figure 16-2**
**Location of a Proposed Electrical Transmission Line and Roads Designated as Scenic in the San Joaquin County General Plan**

View southeast from Discovery Park turf area at a location between the I-5 and Jibboom Street bridges



View east upstream from the western boundary of Discovery Park at the northern American River bank showing the Jibboom Street bridge and I-5 structure in the middle ground

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**Figure 16-3**
**Views toward Intake Alternative 1 Site from High-Use Areas in Discovery Park**

the river. Obscured background views of Intake Alternative 5 would be possible from approximately 840 feet downstream at the pedestrian bridge crossing. Views would be partially blocked by a railroad bridge.

Visual resources of Intake Alternatives 2 through 5 range from moderate to high intactness and vividness, depending on the condition and use of adjacent banks and riparian areas in the area. Intake Alternatives 2 and 3 generally possess similar visual quality as described for Intake Alternative 1, although viewer exposure and sensitivity are less than Intake Alternative 1 because of the distance from Discovery Park and the I-5 crossing. Intake Alternative 4 visual quality is moderate along the northern bank because of past mining activity and minimal riparian areas, and high along the southern bank because of denser riparian area. Viewer exposure and sensitivity at Intake Alternative 4 is low to moderate because views of the site would be limited to infrequent boaters and informal use of the southern levee. Intake Alternative 5 visual quality is similar to that of Intake Alternative 4 and viewer exposure and sensitivity would be low because no formal public access is provided to the site and boating is infrequent in this area.

Visual resources near the I-5 to FSC pipeline alignment (intake pipelines) are mainly associated with urban development in the City and County of Sacramento. Historic buildings, established industrial areas, and tree-lined residential streets are visible in the western reaches of the alignment. Views along portions of city and county streets are typical of urban and suburban settings and generally have low to moderate intactness, low vividness, high viewer exposure, and low to moderate viewer sensitivity. Views along portions of C Street are dominated by mature trees and early 1900-era residences that characterize midtown neighborhoods. Similarly, views along Elvas Avenue are of residences on the south side of the street and a row of mature trees along the north side of the street that screen views of the Southern Pacific railroad. Viewer sensitivity along portions of residential streets could be high.

Views of the C Street Bypass Option site would be limited because of the location of this alignment north of the Union Pacific Railroad. Visual quality would generally be low to moderate with the exception of portions of the undeveloped property that exhibit natural vegetation features. Viewer exposure and sensitivity along this alignment would be low. Views and visual quality of the Elvas Avenue Bypass Option and the Folsom Boulevard Bypass Option sites would be similar to those described for the intake pipelines. The Folsom Boulevard Bypass would also cross natural and low-lying areas of the Granite Park site and the pump station associated with this option would be located in a commercial/industrial area near Brighton and Ramona avenues.

Views near Fairbairn WTP are of open parking lots, turf areas, and a softball diamond construction site in the south part of the CSUS campus. Fairbairn WTP is buffered by tall, mature hedges that screen the view of most of the processing equipment and structures from outside the property.

Visual resources at the existing Fairbairn WTP intake structure site on the American River west of the Howe Avenue bridge are typical of the resources found in the upper reach of the visual unit from the CSUS campus to the confluence, as generally described by Litton (1985). The site has low visual intactness and unity because of the presence of the structure and evidence of past disturbance. The site is bordered to the east by a dense riparian area at the river's edge and by disturbed, less dense, vegetated areas at the pipeline bridge site and west of the intake structure. Views of the intake structure are mainly from the Howe Avenue crossing to the east, the Alumni Grove at CSUS, and the Jedediah Smith National Recreation Trail along the northern levee. Overall, the site is highly visible from boats on the water surface



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at Alumni Grove and Guy West Bridge, moderately to highly visible from Howe Avenue and the northern bank, and low to moderately visible from the south and west. Viewer sensitivity near the Fairbairn WTP is considered moderate to high because of the presence of recreationists in the American River Parkway. However, the existing intake structure is the most prominent built element in views near the site. Overall visual quality is considered low because of the encroachment of the structure and other urban elements in this seminatural landscape setting.

The existing Sacramento River WTP is located in an urban setting with highway commercial uses to the north, the Southern Pacific rail yards to the south, mixed residential and industrial uses along North B Street to the east, and Interstate 5 to the west. The plant structure is locally important because of its contribution to the city's public works history and visually sensitive because of its unique design. Views of the plant are primarily from the west. Visual resources at the existing intake structure include the river surface and mature riparian vegetation. The site's visual intactness and unity is similar to that described for the Fairbairn WTP intake structure. The site is visible mainly from the water surface and by recreationists on the riverbanks, including the bikeway connecting Old Sacramento with Tiscornia Park. Viewer quality in the area is generally low for the same reasons described above for the Fairbairn WTP intake structure.

Views along Kiefer Boulevard in Sacramento County are of typical suburban development in the Rosemont area transitioning to a more open, rural setting from Happy Lane to the FSC. Visual resources generally have low to moderate intactness and vividness, moderate viewer exposure, and low viewer sensitivity.

Visual resources at water treatment plants in EBMUD's service area are typical of those found in an urban and suburban setting. The facility grounds are enclosed and views of treatment facilities are limited.

## Relevant Policies and Ordinances

The American River Parkway Plan was developed to protect and manage the parkway (Sacramento County Planning and Community Development Department 1985). The plan addresses the entire parkway regardless of jurisdiction and provides basic policy guidance for its future. The new intake structure site would be located in a portion of the parkway designated "Recreation" within both the state and federal Wild and Scenic River Systems.

The plan recognizes that establishing utility corridors and other facilities in the parkway could have a visual and physical effect on the parkway and that these facilities are necessary to promote the overall health, safety and welfare of the community. The following plan policies are applicable to the assessment of visual resource impacts on the American River in the city:

- Policy 2.1: Any development within the Parkway, including buildings, roads, parking lots and turfed areas, shall be designed and located such that any impact upon native vegetation is minimized, and appropriate mitigation measures are incorporated into the project.
- Policy 5.4: The impact of any new public utility or similar public service facilities on the Parkway shall be minimized by clustering the facilities with existing facilities and parkway crossings, revegetating areas where utilities have been placed underground, and soundproofing pump stations.
- Policy 5.7: Structures that are in the Parkway or visible from the Parkway shall be of a design, color, texture and scale that minimizes adverse visual intrusion into the Parkway.



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## ENVIRONMENTAL CONSEQUENCES

### Significance Criteria

The criteria used for determining significance of an impact on visual resources are based on the State CEQA Guidelines and professional standards and practices. Impacts on visual resources are considered significant if implementation of an alternative would:

- have a substantial, demonstrable, negative aesthetic effect;
- result in permanent and substantial reductions in the visual quality of highly sensitive views; or
- conflict with adopted visual resource policies.

The visual resource impact methodology for Intake Alternatives 1 through 5 is based on a relative scale assessment of the visibility of intake sites from major viewing areas. The impact assessment methodology assumes that the visual resource impact significance associated with siting intake structures is largely dependent on how visible the structure would be from major viewing locations within the American River Parkway. The viewing locations that are most important in assessing relative visibility include boating views on the lower American River, the Jedediah Smith National Recreation Trail, the I-5 crossing, and the southern American River levee.

Numeric rankings (shown in Table 16-1) are based on knowledge of the sites and the possibility for intakes to be viewed from viewing locations. As used in this analysis, "visibility" includes both the ability to see the intake structure from various locations, as well as the intensity of use from each of those potential viewing locations. For example, all of the potential intake structure sites would be highly visible from the water surface. However, the intensity of such uses (primarily power boating) generally diminishes at upstream locations. Therefore, although Intake Alternative 5, for example, would be as visible from the water surface as other intake alternatives, it would be viewed much less frequently by far fewer users than intake alternative sites downstream. Thus it receives a "low visibility" ranking. Significance of impacts are based on the subjective judgment that visibility scores over 10 would represent a significant unavoidable impact and scores under 10 less-than-significant impacts.

### Impacts Found to Be Less than Significant

**Alternative 1: No-Action**

Under Alternative 1, no new intake facilities, pumping plants, or water conveyance pipelines would be constructed and all impacts on visual resources associated with the project alternatives would be avoided.

Visual resource effects under future no-action conditions could occur as urban and suburban growth in the region and service areas results in visual quality changes associated with open space and agricultural land conversion.

**Alternative 2: Folsom South Canal Connection**

***Impact: Changes in Visual Resources at FSC and Mokelumne Aqueduct Pumping Plants.*** Construction of the FSC and the Mokelumne Aqueduct pumping plants would change the visual character of these sites from an agricultural and rural residential setting to a built area consisting generally of a fenced compound approximately 250 feet by 400 feet surrounding a 35- to 45-foot-high structure. Visual quality at the pumping plant sites is low to moderate. Viewer sensitivity is low at the FSC pumping plant sites for Alignments 1and 4.



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The Alignment 2 FSC plant would be located in the general vicinity of several rural residences

Table 16-1. Relative Visibility of Intake Alternatives from Major View Locations

| Intake Alternative | American River Bikeway | I-5 Freeway | Southern Levee | Boaters | Overall Impact |
|---|---|---|---|---|---|
| 1 | 1 | 4 | 4 | 4 | 13 |
| 2 | 1 | 3 | 4 | 4 | 12 |
| 3 | 2 | 1 | 4 | 4 | 11 |
| 4 | 0 | 1 | 4 | 2 | 7 |
| 5 | 0 | 1 | 1 | 1 | 3 |

0–1 = low visibility.
2–3 = medium visibility.
4 = high visibility.

and viewer sensitivity could be high. The Mokelumne Aqueduct pumping plant would be located within several hundred feet of suburban housing developments, and viewer sensitivity could be high. However, viewer exposure could be low to moderate depending on the location of viewers. Furthermore, the design of all pumping plants will be subject to review and approval by Sacramento and San Joaquin counties. This impact is less than significant. No mitigation is required.

***Impact: Changes in Pipeline Corridor Visual Resources.*** Temporary changes in visual resources would result from construction of the pipeline alignments under Alternative 2 in mainly rural, open space and agricultural areas of Sacramento and San Joaquin counties. Because these sites are largely inaccessible and construction would be temporary, visual resource effects would not be substantial. This impact is less than significant. No mitigation is required.

***Impact: Changes in Views along Transmission Line Alignments.*** Construction and operation of 115-kV electric transmission line towers (75-100 feet tall) along a limited portion of Eight Mile Road in San Joaquin County could result in some change to moderate-quality visual resources along this rural road. This change could affect views from rural residences and from the roadway. The transmission lines for Alignments 1 and 3 parallel a portion of Eight Mile Road that is designated scenic in the San Joaquin County general plan. Viewer exposure in this area would be relatively low, only a small number of rural residents would be affected, and the transmission lines would avoid most of the roads designated as scenic as depicted in Figure 16-2. This impact is less than significant. No mitigation is required.

***Impact: Changes in Visual Resources from Changes in American River Flows.*** Changes in lower American River flows under Alternative 2 could reduce the amount of water surface in the three visual units of the lower American River. According to Litton (1985), at flows between 4,000 and 1,750 cfs stream characteristics in the units generally reveal only subtle differences in visual quality. Below 1,500 cfs, visual quality begins to deteriorate, and visual deterioration is conspicuous at flows between 800 and 250 cfs. Delivery of water



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would be taken at Nimbus under Alternative 2 only when river flows met the minimum flows required by the Hodge Decision; the minimum allowable flow level in the lower American River would be 1,750 cfs. At this flow level, visual resource effects from changes in surface water elevation would not be substantial and would probably not be noticeable because flows in the American River fluctuate seasonally. An analysis of 70-year monthly river flow levels at Nimbus and the Fairbairn WTP indicates that under Alternative 2 conditions flows could be expected to drop below 1,500 two to three more months, depending on the location, than under Alternative 1. This monthly flow change between Alternative 1 and Alternative 2 is less than 1%. (Refer also to Chapter 7, "Vegetation and Wetland Resources," for a discussion of surface water flow effects on riparian vegetation.) This impact is less than significant. No mitigation is required.

***Impact: Change in Visual Resources at Water Treatment Plants in EBMUD's Service Area.*** Changes in views of the Walnut Creek, Orinda, and Lafayette water treatment plants associated with expanded treatment requirements under Alternative 2 are expected to be minor because the expansions would occur within the existing facility area of all the plants and expansions would be consistent with the existing visual resources. This impact is less than significant. No mitigation is required.

**Alternative 3: Joint Water Supply**

***Impact: Change in Visual Resources at the Sites of American River Intake Alternatives 4 and 5.*** Construction and operation of Intake Alternatives 4 and 5 would add a new built element to the American River Parkway upstream of the I-5 bridge crossing. The intake structure for each alternative site would be 100–125 feet long, 30–40 feet wide, and approximately 70 feet tall. Intake Alternative 4 would be constructed in the northern half of the river channel and Intake Alternative 5 would be constructed in the southern half of the river channel. Both would have an elevated discharge line supported by an access bridge extending from the south bank. Intake Alternative 5 would require a substantially shorter access bridge than Intake Alternative 4. Additionally, the intake facility would be designed to comply with Policy 5.7 of the American River Parkway Plan and to minimize visual obtrusiveness (e.g., by using colors and architectural materials compatible with the surrounding riverine environment).

Table 16-1 provides a comparison of the relative visibility of each of the intake alternatives from boating views on the lower American River, the Jedediah Smith National Recreation Trail, the I-5 crossing, and the southern American River levee. The impact methodology assumes that the visual resource impact significance associated with siting intake structures is largely dependent on how visible the structure would be from major viewing locations within the American River Parkway.

Intake Alternatives 4 and 5 are not visible from most locations along the Jedediah Smith National Recreation Trail (bicycle trail) or from I-5 (Figures 16-4 and 16-5). Both structures would be visible from the pedestrian trail along the southern levee, which is used informally by a few recreationists. However, viewer exposure along the southern parkway levee is generally low due to the limited recreational use. Also, no established entrances provide access to the southern parkway levee. The area immediately south of the levee near Intake Alternative 4 is privately owned and is in light industrial and warehousing uses associated with the Richards Boulevard area. The area south of the levee near Intake Alternative 5 is undeveloped private property. Both intake structures would be visible from boats on the lower American River; however, viewer exposure from the river would be low to moderate because of the general decrease in the numbers of boaters upstream of the Sacramento River confluence (Figures 16-6 and 16-7.)

Using this visibility impact methodology (described previously under "Significance



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Criteria") and an assessment of viewer exposure, Intake Alternatives 4 and 5 would result in less-than-significant visual resource impacts because the overall visibility rating for these structures is lower than 10.

***Impact: Changes in Visual Resources of the Pipeline Corridor and Fairbairn WTP.*** The effects of construction and operation of the pipeline on visual resources would be temporary and would affect primarily city and county roads. Only minor appurtenant pipeline facilities would be visible along the alignment from roadways. Visual resources in the enclosed Fairbairn WTP site would be modified by addition of pumping plant facilities. Effects on existing visual resources of the area or views of the plant would be minor because the site is enclosed and pumping plant facilities would be consistent with the existing facilities. This impact is less than significant. No mitigation is required.

***Impact: Changes in Visual Resources from Changes in American River Flows.*** Changes in lower American River flows under Alternative 3 would involve only a small portion of the visual unit from the CSUS campus to the confluence with the Sacramento River and would not be substantial or noticeable. An analysis of 70-year monthly river flow levels at Nimbus and the Fairbairn WTP indicates that under Alternative 2 conditions flows could be expected to drop below 1,500 cfs two to three more months, depending on the location, than under Alternative 1. This monthly flow change between Alternative 1 and Alternative 3 is less than 1%. This impact is less than significant. No mitigation is required.

***Impact: Change in Visual Resources at Wastewater Treatment Plants in EBMUD's Service Area.*** The same visual resource impacts as described under Alternative 2 would apply to the Alternative 3 service area wastewater treatment plants. This impact is less than significant. No mitigation is required.

***Impact: Effect on Heritage Trees along C Street.*** Construction activities along the pipeline alignment on C Street between 20th and 29th streets would require trimming of as many as 123 street trees on the north and south side of C Street. Many trees in this area could qualify as heritage trees. Trenching activities could require a vertical clearance of up to 35 feet. Because the pipeline would be constructed in the middle of C Street, tree trimming would likely be required only on a relatively small number of the total number of trees in this area, no trees would need to be removed, and visual resource effects would be relatively minor. This impact is less than significant. No mitigation is required.

***Impact: Change in Views of the Fairbairn Intake Structure.*** Under Alternative 3, the expanded Fairbairn WTP intake structure on the American River would be visible from the water surface, several areas along the parkway, and several locations at the CSUS campus. The top of the structure may also be visible from residences north and east of the site (Beak in prep.). Visual quality at the existing site is low to moderate and the addition of new intake capacity at the existing structure would not substantially change the visual character of the area. Because the expansion is occurring at the existing intake structure, the visual resources in other nearby locations of the parkway also would be unaffected. To comply with Policy 5.7 of the American River Parkway Plan, the intake expansion facility will be designed to minimize visual obtrusiveness (e.g., by using colors and architectural materials compatible with the surrounding riverine environment) and the size of the pump enclosure to reduce the structure's visibility from surrounding areas. This impact is less than significant. No mitigation is required.

***Impact: Change in Views of the Sacramento River WTP and Intake Structure.*** Expansion of the Sacramento River WTP facilities could result in a visual change in the character of the historic plant structures or the visual setting of the existing plant, depending on



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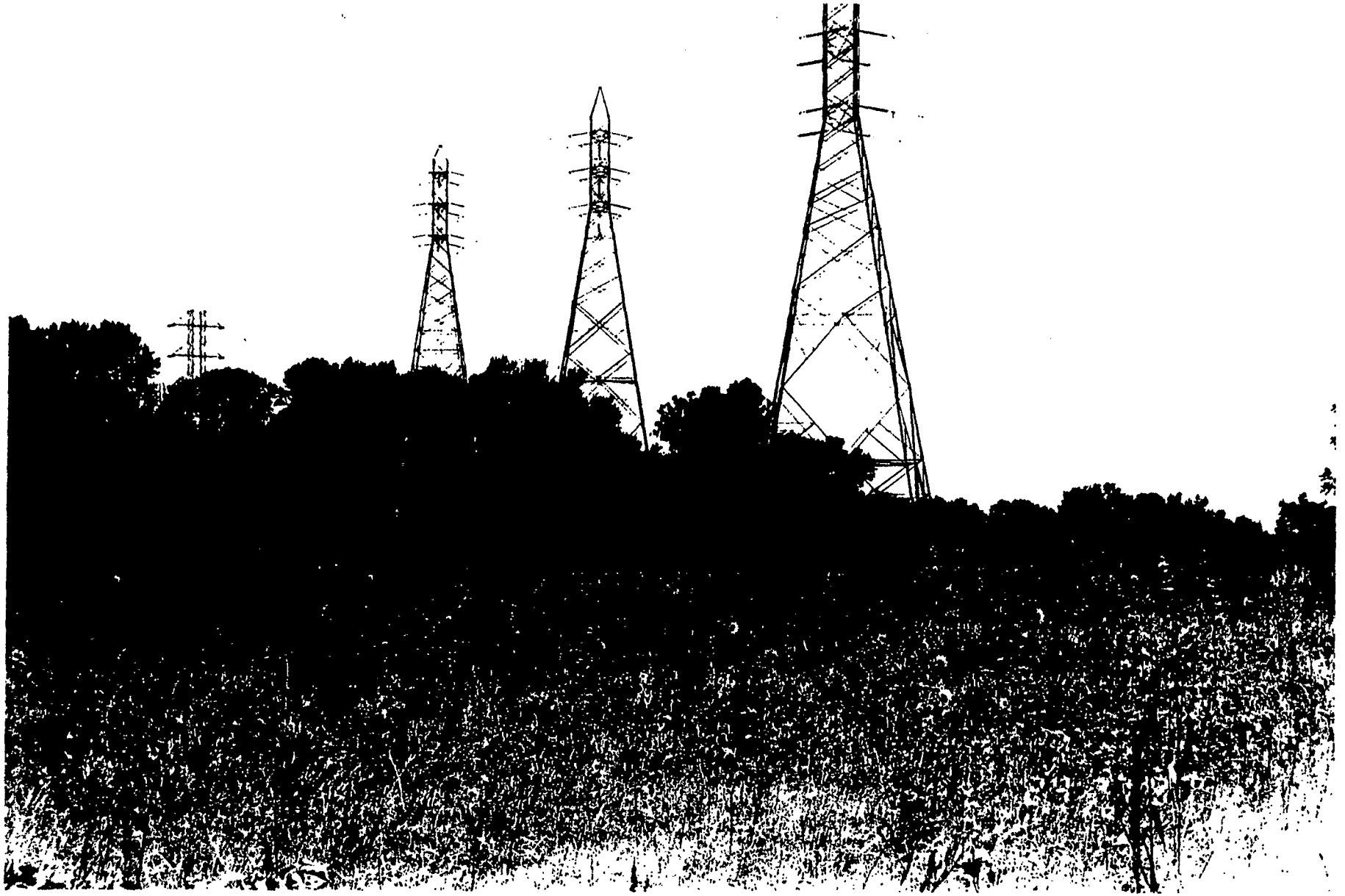

Note: The intake structure would be behind the trees in the background and would not be visible from the trail.

**Figure 16-4**
**View toward Intake Alternative 4 Site from the Bicycle Trail**

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Note: The intake structure could be slightly visible in the distance.

**Figure 16-5**
**View toward Intake Alternative 5 Site from the Bicycle Trail**

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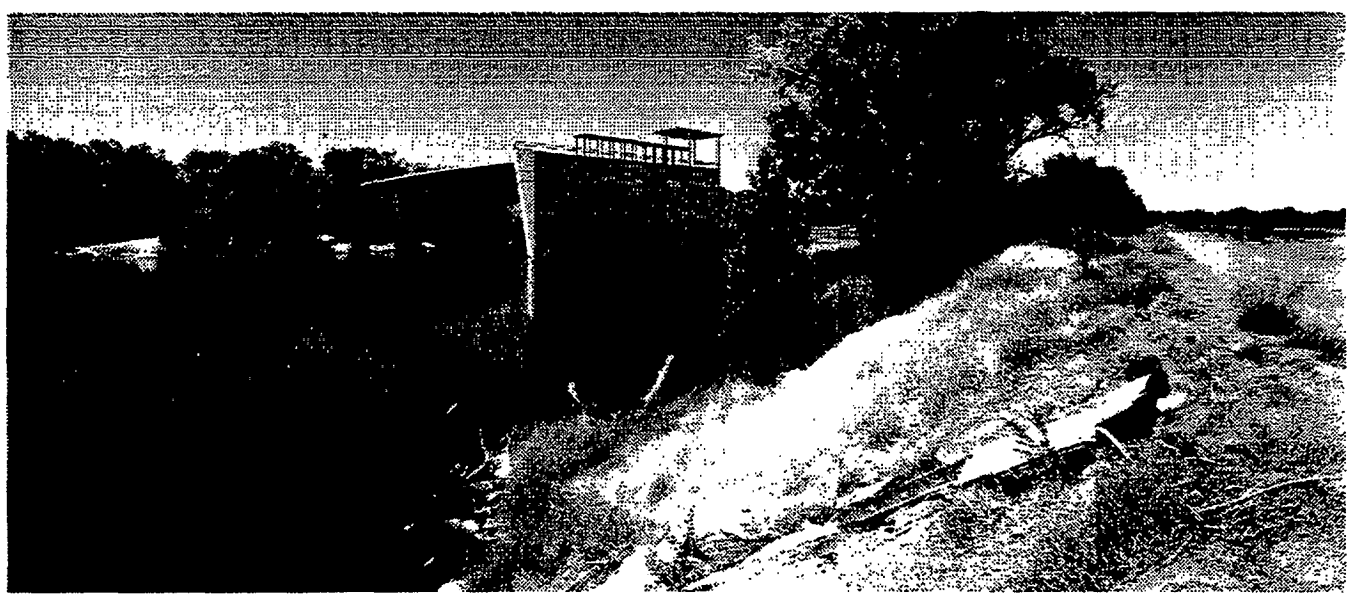
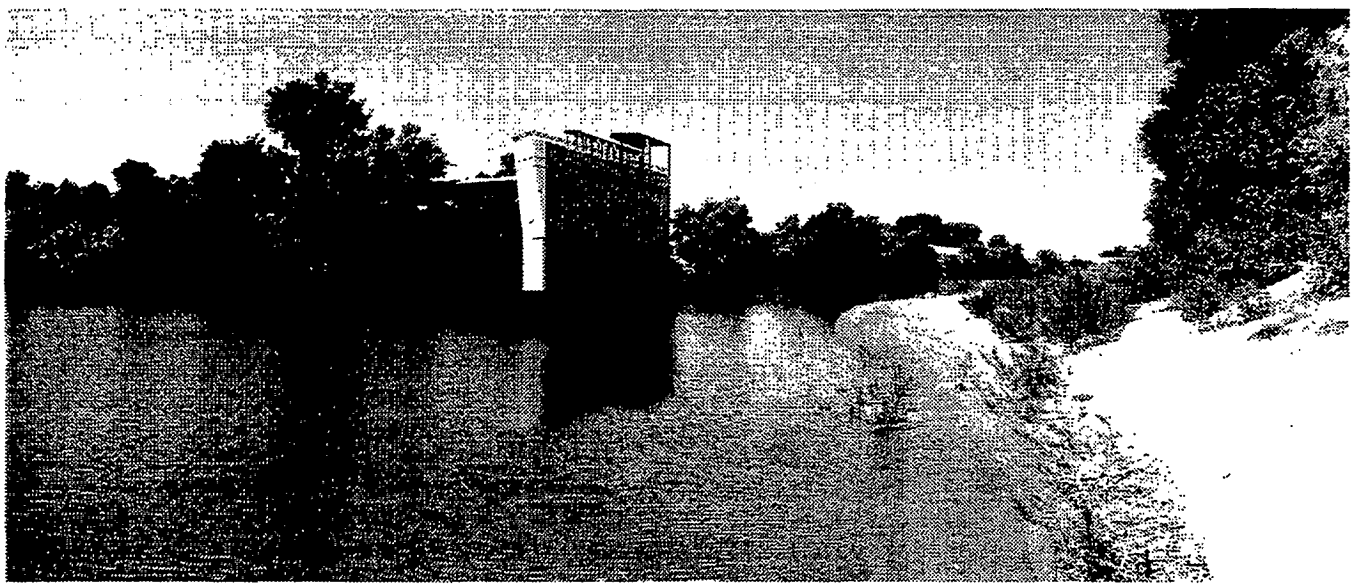


Jones & Stokes Associates, Inc.

**Figure 16-6**
**Photosimulation of Intake Alternative 4 from an Upstream Location before and after Project Implementation**



Jones & Stokes Associates, Inc.

**Figure 16-7**
**Photosimulation of Intake Alternative 5 from an Upstream Location before and after Project Implementation**

the design of new facilities. Views of the facility are limited and design of new facilities could easily be made visually compatible with existing historic structures. The new Sacramento River WTP intake structure would be located near the existing intake structure and would be visible from the water surface and surrounding banks. The structure would visually affect only a relatively small portion of the expansive Sacramento River surface water and riparian area. This impact is less than significant. No mitigation is required.

## Significant Impacts and Mitigation

***Impact: Change in Visual Resources at the American River Intake Alternatives 1, 2, and 3 Sites.*** Intake Alternative 1 would be visible to varying degrees from several limited locations. Most notable are foreground views from the water surface and intermittent views from the southern levee and the Rusty Duck restaurant. The structure could partially block views from these areas to more natural portions of the parkway. The structure would also be partially visible from several locations in the western portion of Discovery Park on the northern river bank and from the Jibboom Street bridge and the northbound lanes of the I-5 bridge crossing (Figures 16-3 and 16-8). Intake Alternative 1 would be highly visible to boaters on the lower American River near the Sacramento River confluence (Figure 16-9 [1]). The structure would not be visible from the bicycle trail and other high-use areas in Discovery Park east of I-5 (Figure 16-10).

Intake Alternatives 2 and 3 could be visible from a few places along the bicycle trail; however, most views along the trail near these alternatives are obscured by dense vegetation (Figures 16-11 and 16-12). These alternatives would be highly visible to boaters on the lower American River; however, boating use generally decreases upstream of the Sacramento River confluence and viewer exposure from boats would be moderate because recreational public access in the vicinity of these intakes is limited (Figures 16-13 and 16-14).

According to the visibility impact comparison in Table 16-1, Intake Alternatives 1, 2, and 3 would result in significant visual resource impacts because of the proximity of these structures to the I-5 crossing, informal use areas along the southern levee, and high boating use areas. Although the intake structure would be designed to minimize visual obtrusiveness (e.g., by using colors and architectural materials compatible with the surrounding riverine environment), no mitigation is available to reduce this impact to a less-than-significant level.

Construction of an intake structure near the I-5 crossing is partially consistent with Policies 2.1 and 5.4 of the American River Parkway Plan, which call for minimizing effects on native vegetation and clustering new facilities with existing facilities or crossings. The design and architectural treatment of the intake structure shall be subject to review and approval by the City and County of Sacramento.

## CUMULATIVE IMPACTS

This analysis focuses on changes in river flows and resulting potential effects on visual quality. Under the cumulative impact scenarios for Alternatives 2 and 3, compared to existing conditions, flows in the lower American River between Nimbus and the Fairbairn WTP and between the Fairbairn WTP and the mouth of the lower American River would exceed the 1,500-cfs threshold discussed earlier in this chapter from 0.1% more frequently to 3.3% less frequently, depending on location and cumulative scenario. These impacts are less than significant.

[1] Because of limited access to the river channel, the photosimulation for Intake Alternative 1 was taken from a greater distance than were the other photosimulations.



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## ANALYSIS OF FULL-USE SCENARIO

The analysis of 70-year monthly river flow levels at Nimbus and the Fairbairn WTP indicates that under the full-use scenario for Alternative 3 conditions (full 217 cfs capacity) flows could be expected to drop below 1,500 cfs between two and 39 more months than under Alternative 1, depending on the location. This monthly flow change between Alternative 1 and the full-use Alternative 3 scenario is up to 5% and would not exceed the significance criteria identified earlier in this chapter.



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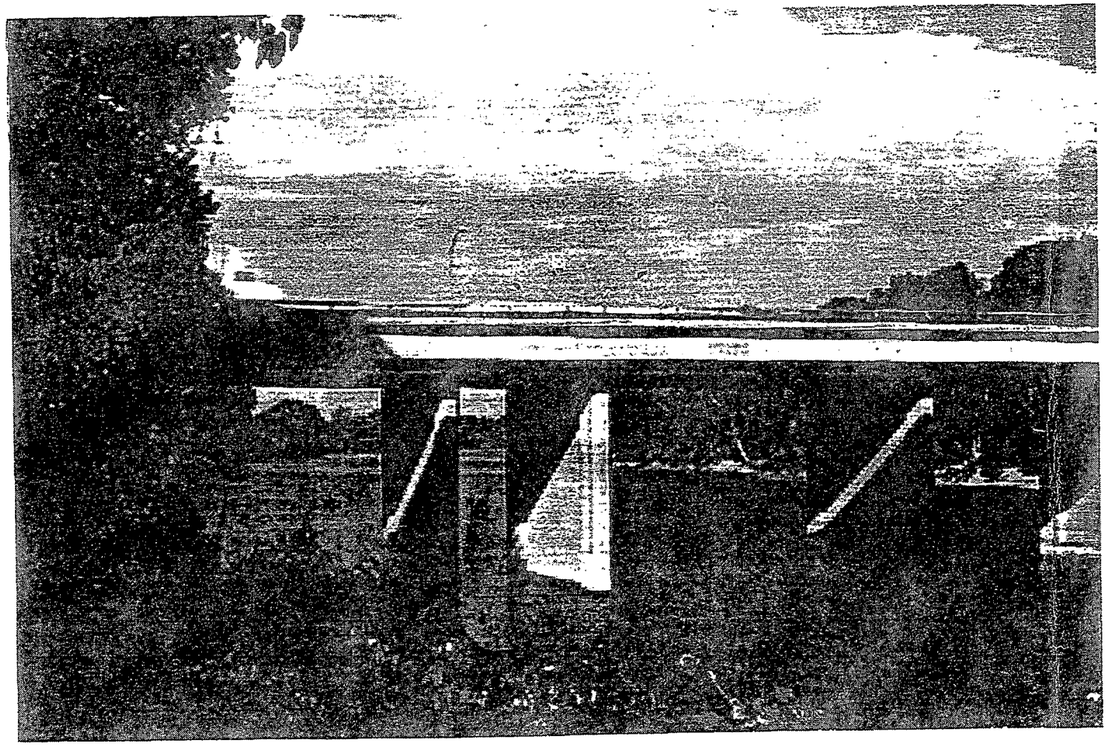

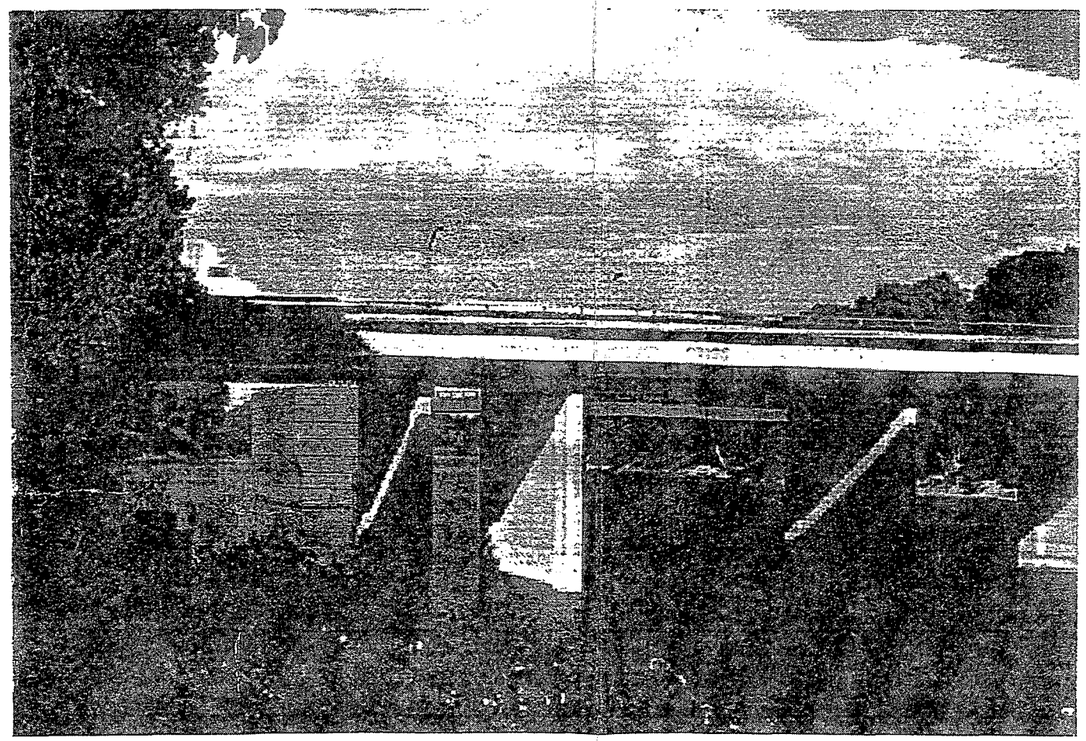

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**Figure 16-8**
**Photosimulation of the Proposed American River Intake Alternative 1 Site from Discovery Park before and after Project Implementation**

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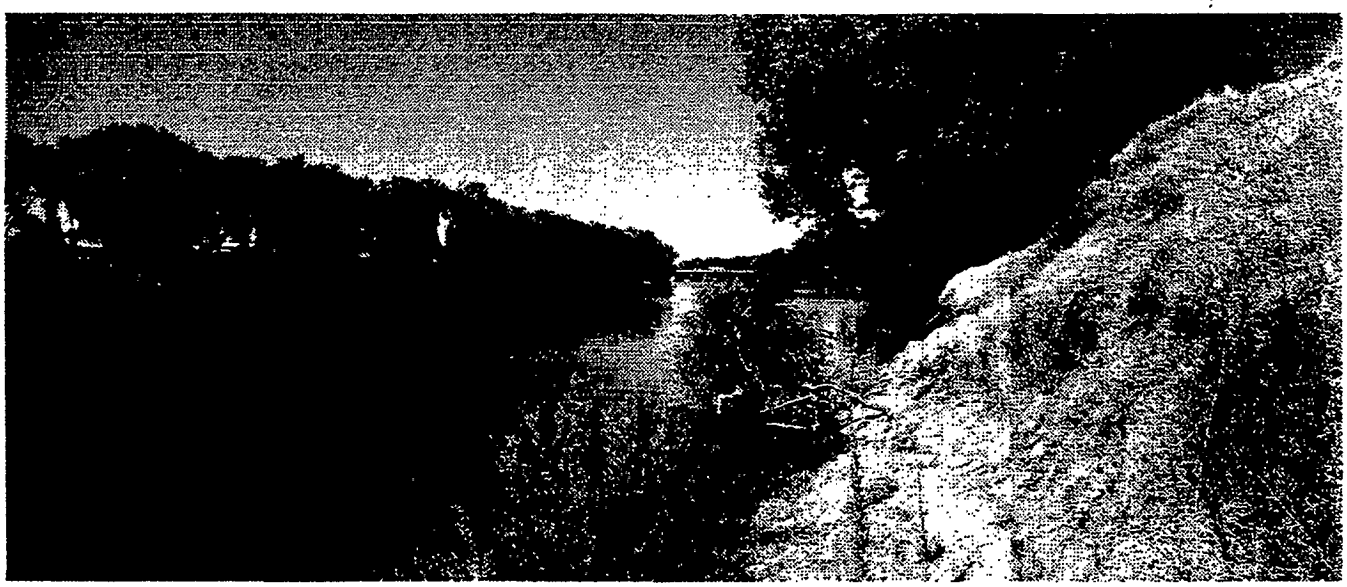

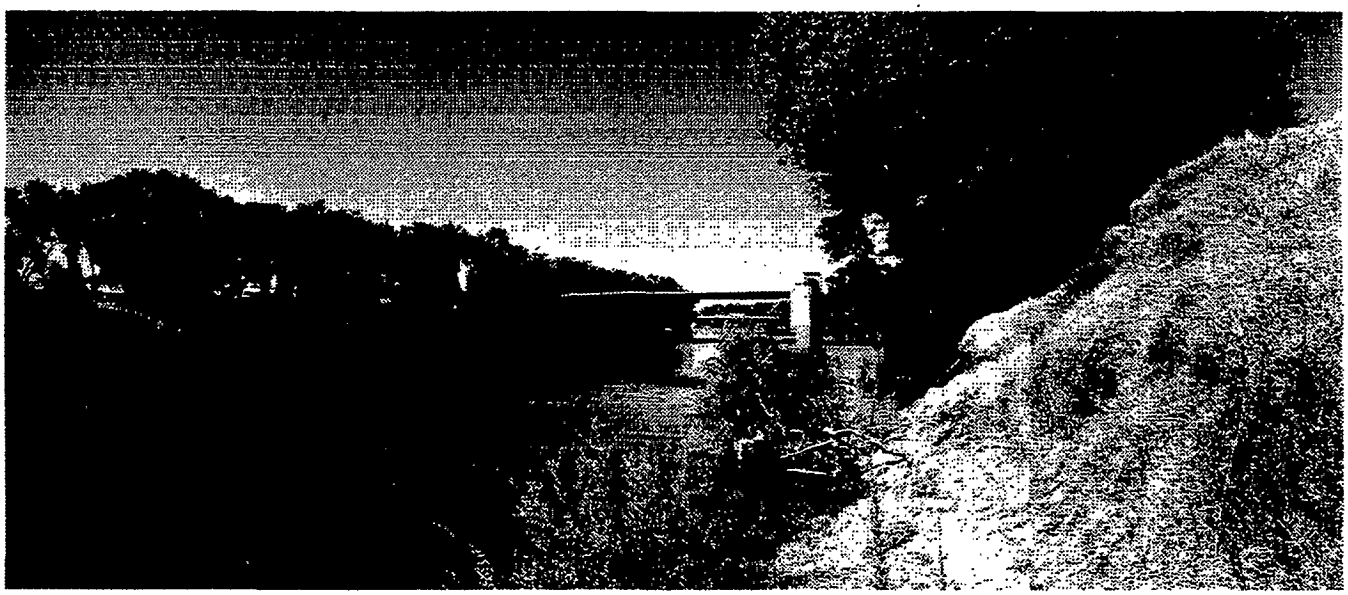

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**Figure 16-9**
**Photosimulation of Intake Alternative 1 from an Upstream Location before and after Project Implementation**

Note: The intake structure would be behind the trees and shrubs in the middle ground and would not be visible from the trail.

**Figure 16-10**
**View toward Intake Alternative 1 Site from the Bicycle Trail**

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Note: The intake structure would be behind the dense vegetation in the foreground and middle ground and would not be visible from the trail.

**Figure 16-11**
**View toward Intake Alternative 2 Site from the Bicycle Trail**

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Note: The intake structure could be somewhat visible in the middle ground in front of the vegetation in the background.

**Figure 16-12**
**View toward Intake Alternative 3 Site from the Bicycle Trail**

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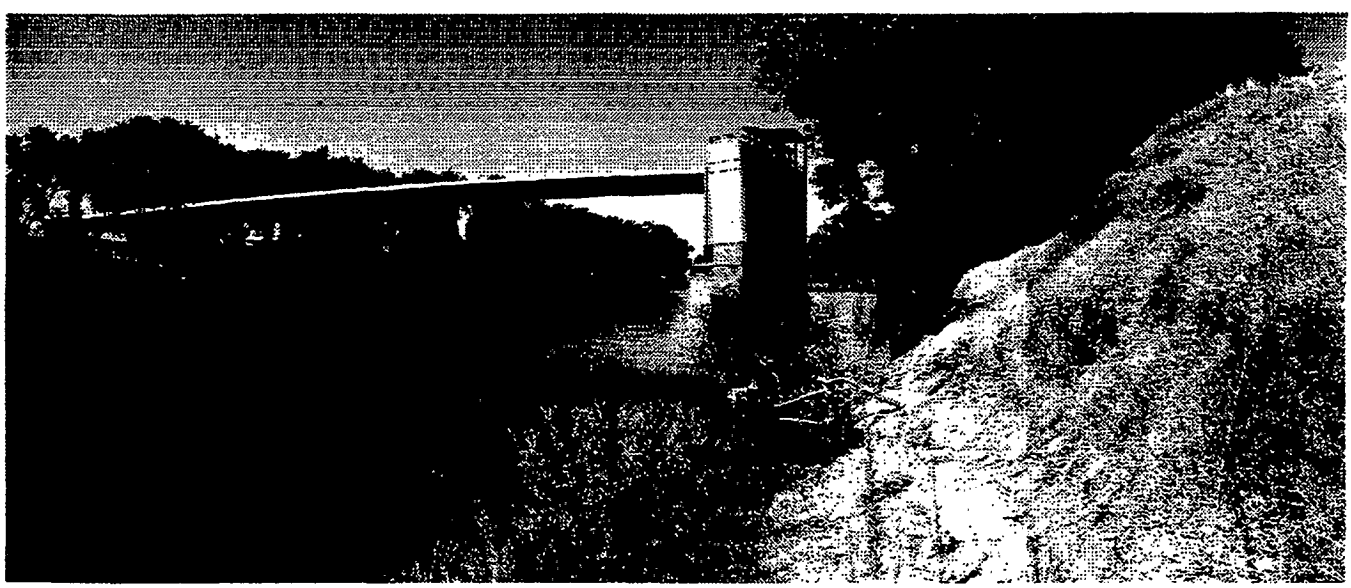
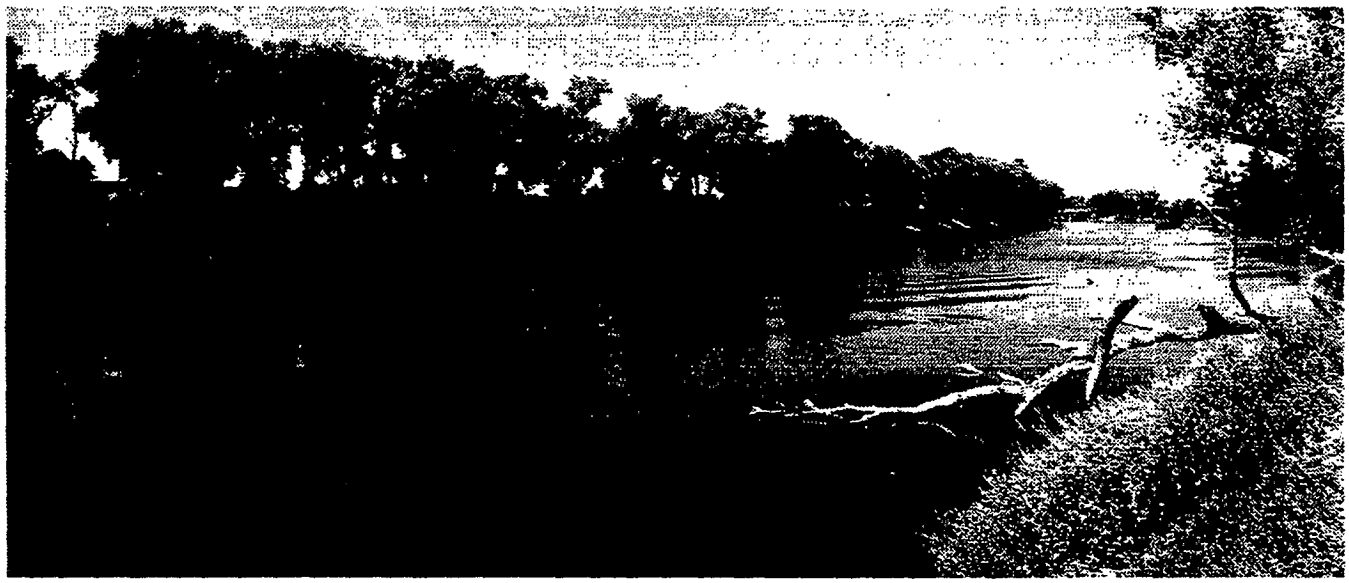
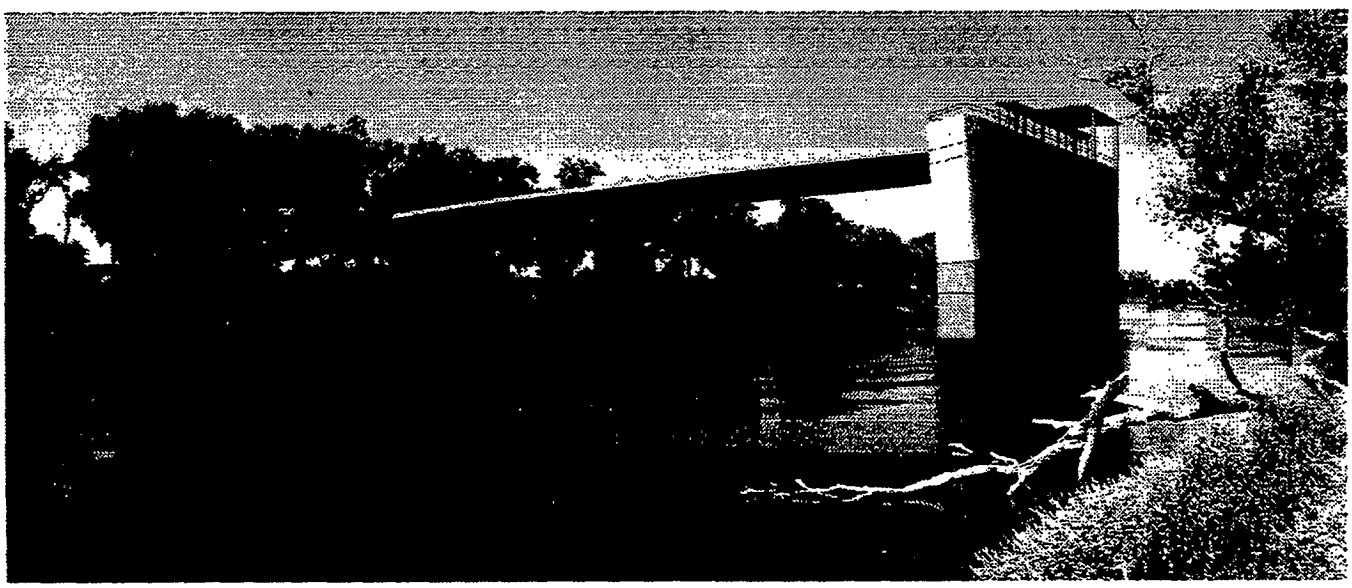


Jones & Stokes Associates, Inc.

**Figure 16-13**
**Views toward Intake Alternative 2 from an Upstream Location before and after Project Implementation**





Jones & Stokes Associates, Inc.

**Figure 16-14**
**Views toward Intake Alternative 3 from an Upstream Location before and after Project Implementation**

Chapter 17

# Cultural Resources

# Chapter 17. Cultural Resources

## AFFECTED ENVIRONMENT

### History of the Region

The project region is within California's Central Valley. The general historical context of the project region is described below, followed by discussions of cultural resources in specific locales in the project region.

The first use of California's Central Valley by humans occurred more than 12,000 years ago at the end of the Pleistocene. The Central Valley during the Pleistocene is thought to have been colder and wetter than today. Parts of the valley, particularly the riparian zones along the rivers, were vegetated with alder, pine, and fir (West 1997). In parts of the San Joaquin Valley, piñon pine was present (West et al. 1991). The valley was not as arid as it is today, and lakes, some quite large, were present. The economy of these first people is thought to have been based on hunting the large animals that roamed the region. Because parts of the Sierra Nevada were covered with large glaciers, the Central Valley was a major movement corridor for animals and people. People used valley locations to hunt and camp and for other daily activities.

Artifacts of these activities probably exist throughout the Central Valley, but they are rarely found. A few archaeological sites in the project region are thought to date to the Ice Age (Johnson 1967, Peak 1981, Treganza and Heizer 1953). However, most are deeply buried in the gravels and silts that have accumulated in the Sacramento Valley from erosion and river flooding over the last 5,000 years.

Other valley sites from this period, such as those around Tulare Lake in the San Joaquin Valley, are closer to the surface and are much better known (Wallace and Riddell 1991).

Approximately 12,000 years ago, many large animals that were the major food source of the first Californians became extinct because of warming temperatures, rising sea levels, and changing precipitation patterns at the end of the Ice Age. The Central Valley gradually became both warmer and drier. Pine and riparian forests were slowly replaced with vegetation similar to the grasslands and oak forest found in the valley today. To survive, valley inhabitants evolved food procurement strategies to make use of a more diverse range of smaller plants and animals.

Using a wider range of smaller resources meant that people had to have access to larger areas of land to hunt and collect food and other resources they needed. Small groups of people probably moved throughout the valley, the foothills, and the Sierra Nevada to take advantage of seasonally available resources and resources limited to particular ecozones. The ability to move from resource to resource was key to survival.

Over time, the population of the valley and foothills increased. As the population increased, it gradually became more and more difficult for people to move from one place to another to take advantage of the localized resources and they were forced to find ways to increase the amount of food that could be obtained from increasingly smaller portions of land.

The Central Valley inhabitants met these pressures by specializing in two ways. Some specialized in using the marshlands of what is today the Delta, and others specialized in using the oak acorn. During this period of specialization, which began about 5,000 years ago, the Delta was much more expansive than it is today and provided a concentrated number of plants and animals that could be used as a stable food source sufficient to support many people. Those who did not live near the Delta increased their use of the oak acorn as a food source,



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eventually focusing their entire economic system on the acorn and developing specialized technologies to procure and process this resource.

People in this period were more sedentary than they had been in the past, living in villages found throughout the valley along rivers and other permanent water sources. Because of their restricted range and specialized resource base, the valley inhabitants had to develop economic relationships with other groups living in other areas. Although resources and commodities had previously been moving throughout the region, it is in this period that extensive and frequently used economic networks developed.

The population continued to increase up to the historical period (beginning approximately 500 years ago), and group territories continued to become smaller and more defined. The population density of the Delta reached levels higher than most other areas of North America (Chartkoff and Chartkoff 1984). Patterns in the activities, social relationships, belief systems, and material culture continued to develop during this period, taking forms similar to those described by the first Europeans entering the area. Today, the groups that developed are called the Valley Nisenan, Plains Miwok, and Northern Valley Yokut.

The Central Valley was visited by Spanish explorers in the 1700s searching for sites suitable for inland missions. In 1772, Pedro Fages passed through San Francisco Bay and the Delta and reached the San Joaquin and Sacramento rivers. In 1793, Francisco Eliza sailed into the as-yet unexplored Sacramento River. Between 1806 and 1817, several other mission site reconnaissance expeditions were conducted. Gabriel Moraga entered the area several times between 1805 and 1817, during which time he is believed to have reached the American, Mokelumne, and Cosumnes rivers. Other notable explorations were carried out by Jose Antonio Sanchez in 1811 and Father Narciso Duran in 1817 who were looking for stolen cattle and horses and for mission runaways. The first European American to travel through the area was Jedidiah Strong Smith in the late 1820s, who reported to the Hudson's Bay Company on the quantity and quality of furs in California and established the Sacramento Trail. Joseph Walker and Ewing Young, during separate excursions, followed his general path in the 1830s. (Gudde 1969, Kyle 1990.)

The establishment of Franciscan missions along the California coast did not affect the Nisenan living in the project region to the extent that other indigenous groups were affected. American and Hudson's Bay Company trappers who entered the area in the late 1820s also had a minimal effect on the indigenous population. However, an epidemic believed to be malaria swept through the Sacramento Valley in 1833. This epidemic wiped out entire villages and prompted survivors to evacuate their homes and move into the hills for protection from the disease. Only 25% to 50% of the population survived the epidemic. (Cook 1955.)

Domestic sheep and cattle were introduced to central California after the secularization of the missions in the 1830s. By the 1860s, areas that were not under cultivation were occupied by grazing cattle and sheep. At that time, the cattle population had reached 1 million in California, 40% of which was in the Sacramento and San Joaquin valleys. During summer, cattle herds generally were moved to the cooler, more water-abundant high elevations of the Sierra Nevada (Burchum 1981).

After the transcontinental railroad was completed in 1869, many people were enticed by the railroad companies to California by cheap fares and the promise of rich agricultural land. Agricultural ventures that provided staples for nearby communities began to expand to supply the eastern United States.



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## Relevant Sites

### Alternative 2: Folsom South Canal Connection

#### Alignment 1

Local History. The California Central Traction (CCT) railroad was chartered in 1905 in Stockton as an urban electric rail line. Within 5 years the line had expanded to Sacramento as an intercity electric railway. At the same time (to satisfy franchise requirements), CCT also began an urban line between 8th and J and 31st and X streets in Sacramento. The rail distance from Stockton to Sacramento was 56 miles. The CCT railroad was sold to Southern Pacific Company, Santa Fe Railway Company, and Western Pacific Railroad Company in 1928. Electrification ceased in December 1946. The railroad currently operates as a short-line freight rail primarily serving the agricultural market between Stockton and Sacramento.

Because Alignment 1 parallels major roads and railroads, it passes through areas of the earliest and most intense development in southern Sacramento and northern San Joaquin counties. Alignment 1 passes through the Rancheria de los Omochumnes land grant at the north, the Rancho Cosumnes land grant, and the eastern border of the Rancho Sanjon de los Moquelumnes land grant. In 1841, Jared Sheldon and William Daylor, who had been working for John Sutter, applied for a grant from the Mexican government for lands bordering the Cosumnes River. The town of Sheldon was named for Jared Sheldon, the original grantee of the Rancheria de los Omochumnes. In 1869, railroad lines extended south from Sacramento to Stockton and beyond to southern California (Kyle 1990). Alignment 1 uses the route of the CCT railroad and crosses two Southern Pacific Railroad branches: Galt to Ione and Lodi to Kentucky House. Many ranches and small towns, such as Lodi, Galt, and Stockton, sprang up or expanded near the railroad tracks and sidings. The town of Wilton was a stop on the CCT and was named after a local landowner who had lived and raised dairy and poultry in the area since 1887.

Known Cultural Resources. A record search was conducted for cultural resources near Alignment 1 at the California Historic Resources Inventory System (CHRIS). Except for a few cultural resources surveys across the alignment (Ritter 1971; Peak 1980, 1992; Peak & Associates 1982; Soule 1978; Gerry pers. comm.; Napton 1989), most of Alignment 1 had not been surveyed for cultural resources. None of these prior surveys found resources within the alignment.

Several cultural resources, however, are known to exist near Alignment 1. Archaeological sites CA-Sac-118 and CA-Sac-119 are somewhere near the right-of-way around the Cosumnes River crossing, although the exact location of these sites is unknown. The CHRIS identifies four locations for site CA-Sac-118 and two locations for CA-Sac-119. Other sites are known to exist around Cosumnes and Deer creek (Peak 1973) and, as with other areas with permanent sources of water, have high potential for human habitation and use.

Alignment 1 traverses portions of several Mexican land grants. Rancheria de los Omochumnes, at the north end of Alignment 1, was first granted in 1841 (Gudde 1969). South of the Rancheria de los Omochumnes, the alignment enters the Rancho Cosumnes grant and then continues south through the Sanjon de los Moquelumnes grant. Although these grants are historical resources in their own right, no known structures, objects, or features along Alignment 1 are associated with them.

To further identify cultural resources along Alignment 1, letters were sent to individuals who had been identified as potential sources of information by the California Native American Heritage Commission and by other methods (Jones & Stokes Associates 1987). Individuals were asked to provide information on cultural



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resources, particularly resources considered traditional cultural properties (National Park Service 1994). The two communities thought to have the greatest potential for having traditional cultural properties in the project region were the Native American community and the Mexican American community. Alignment 1 passes by Wilton Rancheria, a Native American rancheria. Wilton Rancheria was removed from federal trust status under Public Law 85-671 and 88-419 on September 22, 1964 (California Department of Housing and Community Development 1996). Although some individuals responded to this information request, no new cultural resources along Alignment 1 were identified through this process.

A pedestrian surface survey for cultural resources was undertaken along portions of Alignment 1. Attempts to survey a 200-foot-wide corridor following the route of the proposed alignment were not always successful because of lack of property access. Approximately 84% of the linear distance of Alignment 1 was surveyed; however, portions of this linear distance could not be surveyed to the full 200-foot width. Several cultural resources, primarily railroads, were identified. Table 17-1 lists the various resources identified through pedestrian surveys along Alignment 1. The two previously known archaeological sites identified through the CHRIS record search, CA-Sac-118 and CA-Sac-119, were not found during the pedestrian surveys.

**Alignment 2**

Local History. Alignment 2 passes through areas that historically emphasized agriculture, mining, and water projects. Toward the foothills and along the upper Mokelumne River the concentration of gold mining claims and settlements increases. For example, Dogtown, on the Mokelumne River west of Alignment 2, was given its colorful name in recognition of the original character of the mining camp (Gudde 1969). A mining district known as Camanche-Lancha Plana followed the Mokelumne River from Amador County west to Clements in San Joaquin County. From 1904 to 1923, the district was mined by single prospectors, hydraulic mining operations, and Chinese miners who reworked the tailings, and large-scale dredging was conducted by American Dredging Company. Most of the district was inundated by the Camanche Reservoir. The primary agricultural products in this area were grapes, peaches, hay, barley, walnuts, beef, and sheep.

Known Cultural Resources. A record search was conducted for cultural resources near Alignment 2 at the CHRIS. Except for a few linear cultural resource surveys crossing the alignment (Derr 1981, Napton 1993, Page 1992) and a block of land surveyed at the alignment's south end (Jones & Stokes Associates 1995), most of the alignment had not been surveyed for cultural resources. None of these prior surveys found resources within the 200-foot-wide alignment right-of-way.

As with Alignment 1, letters were sent to individuals identified as potential sources of information by the California Native American Heritage Commission and by other methods (Jones & Stokes Associates 1997). Although some individuals responded to the information request, no new cultural resources along Alignment 2 were identified through this process.

A pedestrian surface survey for cultural resources was undertaken along portions of Alignment 2. An attempt was made to survey a 200-foot-wide corridor following the route of the proposed alignment. Because of restrictions to property access, approximately 70% of Alignment 2 was surveyed. Several cultural resources are known to exist in the 200-foot-wide alignment right-of-way. These resources are listed in Table 17-1.



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Table 17-1. Inventory of Known Cultural Resources along the Pipeline Alignments

| Alignment 1 (based on 84% field survey) | Alignment 2 (based on 70% field survey) | Alignment 3 (based on 75% field survey) | Alignment 4 (based on 37% field survey) | I-5 to Folsom South Canal* (based on record review and 3 miles of field survey) |
|---|---|---|---|---|
| JSA-EBMUD-01: CCT railroad (1905) | JSA-EBMUD-20: SPPR Galt to Ione Branch (1876) | JSA-EBMUD-01: CCT railroad (1905) | JSA-EBMUD-10: SPPR Kentucky House Branch (1882) | First transcontinental railroad (1863) |
| JSA-EBMUD-10: SPPR Kentucky House Branch (1882) | JSA-EBMUD-26: Former ranch (1870s) | JSA-EBMUD-10: SPPR Kentucky House Branch (1882) | JSA-EBMUD-26: Former ranch (1870s) | Sacramento Valley Railroad (1856) |
| JSA-EBMUD-20: SPPR Galt to Ione Branch (1876) | JSA-EBMUD-27: Mining disturbance (date unknown), debris scatter (ca. 1930), and concrete tank (20th Century). | JSA-EBMUD-20: SPPR Galt to Ione Branch (1876) | JSA-EBMUD-27: Mining disturbance (date unknown), debris scatter (ca. 1930), and concrete tank (20th century). | Sacramento Northern Railroad (early 20th century) |
| | JSA-EBMUD-28: Ranch complex (early 20th century) | | JSA-EBMUD-28: Ranch complex (early 20th century) | Western Pacific Railroad (1862) |
| | JSA-EBMUD-ISO-1: Pile of basalt field stone | | JSA-EBMUD-ISO-1: Pile of basalt field stone | |
| | JSA-EBMUD-ISO-2: Pile of basalt field stone | | JSA-EBMUD-ISO-2: Pile of basalt field stone | |

* This list of resources includes only those within the street area (generally about 60 feet). An additional 21 cultural resources are known to exist within the 200-foot-wide corridor.

**Alignment 3**

Local History. Alignment 3 shares the same historical context as Alignment 1, except that it does not cross Mexican land grants and generally covers less territory. Resources associated with the history of this area are also similar to those of Alignment 1.

Known Cultural Resources. A record search was conducted for cultural resources near Alignment 3 at the CHRIS. Except for a few cultural resource surveys crossing the alignment (Derr pers. comm., Peak 1992, Peak & Associates 1982, Soule 1978, Gerry pers. comm., Napton 1989), most of the alignment had not been surveyed for cultural resources.

None of these prior surveys found resources within the 200-foot-wide alignment right-of-way.

Letters were sent to individuals who had been identified as potential sources of information by the California Native American Heritage Commission and by other methods (Jones & Stokes Associates 1997). Although some individuals responded to this information



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request, no new cultural resources along Alignment 3 were identified through this process.

A pedestrian surface survey for cultural resources was undertaken along portions of Alignment 3. Attempts to survey a 200-foot-wide corridor following the route of the proposed alignment were not always successful because of a lack of property access. Approximately 75% of the linear distance of Alignment 3 was surveyed for cultural resources. These resources are listed in Table 17-1.

**Alignment 4**

Local History. The history of the southern portion of this route is the same as for Alignment 2, but the history of the northern section of Alignment 4 is distinctive. The section between the FSC turnout and the point where the alignment would cross the FSC at Clay Station Road passes through the historic Omochumnes and Cosumnes land grants. Prehistoric settlements and historical ranching and agricultural establishments were typical of the area where the alignment crosses Deer Creek and the Cosumnes River. The route along Clay Station Road south of Laguna Creek was not a part of an original Mexican land grant, but fell between the Cosumnes and the Rancho Arroyo Seco grants. There were very few roads through the southeastern portion of the county. In the 1860s, one stagecoach line followed Laguna Creek to Stockton Road (Marvin and Fryman 1994).

In the early 1870s, the Central Pacific Rail Road (CPRR) began acquiring land for the construction of a line connecting Galt with Ione in the Gold Country. Between the purchase of the Arroyo Seco land grant and the federal land subsidies awarded to railroad development, the CPRR became the owners of most of the Alabama township (Marvin and Fryman 1994). The CPRR used the vast area for cattle grazing, and, by the end of the century, there were fewer developments and a smaller population in this area than earlier in the century. Clay Station was established along the CPRR in 1878 on the ranch of Thomas Steele. By the 1890s, the railroad had been transferred to the Southern Pacific Railroad (SPRR), which subdivided and sold approximately 75% of the original railroad land holdings in the area.

Known Cultural Resources. Alignment 4 includes all known and potential cultural resources identified above for Alignment 2 (Table 17-1). Approximately 35% of Alignment 4 has been surveyed, including portions surveyed as a part of this project and a portion surveyed by Ritter (1971).

**Alternative 3: Joint Water Supply**

**Local History**. The western point of the route begins in the City of Sacramento, which was an early transportation center for the gold mines of the Sierra Nevada. As a result, many historic developments important to the history of the state and country occurred in and near Sacramento. The following discussion provides the general context of this area.

In 1839, John A. Sutter received a grant of eleven leagues from the Mexican government on which he established a frontier outpost, naming it New Helvetia. Sutter's outpost became a trading post, military fort, and frontier oasis. As the only settled area in this part of California, New Helvetia became the area's social, economic, and political nucleus and the forerunner to the City of Sacramento. (Gudde 1969, Kyle 1990.)

In 1844, the Mexican government granted a 35,000-acre parcel east of New Helvetia to William Leidesdorff, vice-consul of the United States (Kyle 1990, Thompson and West 1880). This land grant, called the Rio de los Americanos, extended from the eastern border of New Helvetia along the south bank of the American River to just east of the town of Folsom. After Leidesdorff's death in 1848, the



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land was acquired by Captain Joseph L. Folsom, whose activities focused near the east side of the land grant at the town of Folsom, which he subsequently founded. When Captain Folsom died in the 1860s, his land was divided and sold (Thompson and West 1880).

Before the word of gold discovery reached the outside world, John Sutter had turned his property over to his son, John Jr. By December 1848, the younger Sutter had laid out the grid pattern for the town of Sacramento. After the discovery of gold in the Sierra Nevada, freight and people arriving at the Port of San Francisco traveled through Sacramento on the way to the goldfields of the Sierra Nevada foothills. When it was incorporated in 1850, the city had a permanent population of 15,000 (Sacramento Bee 1894). In 1854, the State Capitol was established in Sacramento, which aided in the city's economic growth (Gudde 1969, Kyle 1990).

Although the City of Sacramento was growing as a residential and business center, the area east of 31st Street developed differently. Characterized by larger parcels than the city lots, the area included orchards, vegetable gardens, and flower gardens and parks. These gardens and parks had groomed walkways, gazebos, zoos, and other diversions that provided weekend respites for Sacramento residents.

Several major transportation routes were located in the project vicinity. Major historical routes include the following:

- The Sacramento Valley Railroad from Sacramento to Folsom, the first railroad in California, was completed in 1856, providing more expedient and economic transport of goods and people. A station along the Sacramento Valley Railroad at Brighton still stands today. Theodore Judah, the founder of the Sacramento Valley Railroad, also charted the railroad route through the Sierra Nevada that would become the western portion of the first transcontinental railroad, meeting the eastern portion in 1869 at Promontory, Utah. Equipment for the transcontinental railroad was built in the Central Pacific Railroad yard shops in what is now downtown Sacramento (Gudde 1969, Kyle 1990).

- The Road to Jackson, an early wagon route, was established in 1849 and was heavily traveled by miners throughout the 1850s (Gudde 1969, Kyle 1990). Way stations were built at intervals along this wagon route. Perkins Station, which was a Sacramento Valley Railroad Station and a wagon route stop, still stands along Kiefer Road. Kiefer Road generally follows the alignment of the "Old Road to Jackson," as it is labeled on General Land Office maps dating from 1855 through 1871 (Bureau of Land Management 1855, 1856a, 1856b, 1865, 1866, 1871).

- The Central Overland Pony Express was established in 1860 to deliver mail between the east and west by riders on horseback. A parcel leaving St. Joseph, Missouri, could reach Sacramento in 10 days via this route. Before this, mail between the east and west took at least 24 days to reach its intended recipient. Relay stations were established along the route approximately every 25 miles, where riders and horses would stop and pass their *mochila* (a mail bag adapted for horse travel) to a new rider and horse to carry it further along the route. The Pony Express continued its service until October 1861, when the completion of the overland telegraph made the express route obsolete. One remount station was at the Five Mile House, on the east side of the American River near the California State University, Sacramento, campus. (Gudde 1969, Kyle 1990).

The land between the City of Sacramento and Folsom became a major agricultural area beginning in the 1880s, primarily producing



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fruits. Orchards of peaches, pears, prunes, walnuts, and almonds; large vineyards; and hop fields dotted the area. By 1894, 75% of all deciduous fruits grown in California were being grown within a 50-mile radius of Sacramento (Sacramento Bee 1894).

The Natoma Water Company, which was organized in 1852 to provide water for mining near the Folsom area, adapted its canals for agricultural irrigation in the area after the mining industry declined. During the 1860s, the Natoma Water and Mining Company expanded its interests into construction, quarrying, hydroelectric power generation, agriculture, and viticulture. During the 1880s, vineyards held by the Natoma Vineyard Company covered approximately 2,000 acres and were the largest in the world. By 1914, the company had acquired more than 12,500 acres along the river and bordering the Rio de Los Americanos land grant, with parcels extending south of the river as far as 3 miles (Winston and Janin 1910, Weber and Company 1914).

In 1918, the Natomas Company conveyed a large parcel of its land deemed "undredgeable" to the U.S. Army for the establishment of an aviation field. During the 1930s and 1940s, additional parcels were conveyed to the military for expansion of what had become Mather Field (Hagwood 1976).

Known Cultural Resources. A records search of the CHRIS was conducted for the I-5 to FSC pipeline alignment. Approximately 30% of the alignment had been surveyed in many different cultural resources investigations (Peak 1974; Johnson 1974; Johnson 1975; Brienes, West & Schulz 1981; Historic Environmental Consultants 1981; O'Connor and Wiant 1982; Decater 1983; McIvers 1985; Theodoratus 1987; PAR 1987; Praetzellis and Praetzellis 1990; Lindstrom 1990, 1991; BioSystems 1991; Derr 1995; Warner 1995). In addition to a review of previous surveys, 3 miles of the alignment were targeted for new surveys. These areas were previously unsurveyed areas that were not covered with pavement and were located predominantly along Kiefer Boulevard.

Within the full 200-foot-wide alignment corridor, a total of 25 cultural resources were identified during previous surveys. These sites include historical artifact scatters, structural remains, architectural resources, districts, roads and bridges, and railroad routes and physical remains. At least five of these historical resources have either been listed or determined eligible for listing on the National Register of Historic Places (NRHP), and several more have been designated as a California Historic Landmark or are listed on the California Inventory of Historic Resources, California Register of Historic Resources, or Sacramento Official Register. Ninety percent of these identified historical cultural resources are concentrated in the urban portion of the alignment. (Historic Environmental Consultants 1981; Derr 1995; Lindstrom 1990, 1991; Seidel 1989; JRP Historic Consultants 1993.)

A study by Beak Consultants (1997) has identified the Sacramento River Water Treatment Plant as a historical resource:

> At the time of its construction in 1921, the plant was considered the most modern of its kind in the United States. It was dedicated by Mrs. Calvin Coolidge, First Lady, who threw the switch that started the pumps. The Classical Revival structures still stand at 101 Bercut Drive, and are in the process of being evaluated for the City of Sacramento Register.

Construction of the alignment in urban areas will be confined to the boundaries of existing roads (i.e., road rights-of-way) in an approximately 60-foot-wide corridor. Within the road right-of-way for this alignment, four cultural resources have been identified. These resources are listed in Table 17-1.

**Folsom Reservoir and the American River**

**Local History.** The American River Valley was used by people in both prehistoric and



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historic times. The valley was likely used during all periods of prehistory although, like other areas of the Central Valley, the early evidence of human activities is deeply buried and is infrequently found. More commonly found are sites from later periods, including large village settlements.

As discussed earlier, the Folsom area was part of the large Rancho Rio de los Americanos grant awarded to William A. Leidesdorff in 1844. The Folsom gold mining district was established during the 1850s, consisting mainly of a dredging field that extended from the town of Folsom along the south side of the American River to Fair Oaks, south through the town of Natoma to Nimbus and then west to the east border of what is now Mather Air Force Base. Much of this district is now flooded and regulated by Folsom Reservoir.

The American River near Folsom has long been used as a source of generating power for the Sacramento area. In the 1850s, Horatio Gates Livermore pioneered the development of ditches and dams on the American River for industry and agriculture (Office of Historic Preservation 1996). By 1895, Livermore's system had grown to include the Folsom Powerhouse, which delivered 11,000 volts of power to Sacramento. Energy production at Livermore's Natoma Water and Mining Company was a new achievement in long-distance high-voltage transmission. The original generating plant remained in continuous operation until 1952. The plant remains in its original location and is a registered California and National Historic Landmark. The dam and associated ditch system was revamped in 1912 to support the reorganized and renamed Natoma Company's dredging operations (Waechter and Mikesell 1994). These lands and features were sold to the United States government in 1953 as part of the Folsom Reservoir project. The reservoir was completed by the U.S. Corps of Engineers in 1956 as part of the Central Valley Project.

**Known Cultural Resources.** A total of 157 archaeological sites have been recorded within or immediately adjacent to Folsom Reservoir (Montgomery Watson Americas and Jones & Stokes Associates 1997). Of these 157 sites, 34 are historic, 110 are prehistoric, and 13 have both historic and prehistoric components. Prehistoric site types and features include debris scatters and dumps, potential cemeteries and individual burials, chipped stone artifacts, ground stone tools, and milling stations. Historic site types and features include towns, foundations and structures, debris scatters and dumps, mining tunnels, rock walls, bridges, ditches, flumes and water pipes, and cemeteries and individual burials.

Fifty-two archaeological sites have been recorded along the American River below Folsom Reservoir (Montgomery Watson Americas and Jones & Stokes Associates 1997). Of these 52 sites, seven are historic, 44 are prehistoric, and one has prehistoric and historic components. Seven of the prehistoric sites have been destroyed or virtually destroyed, and at least three sites are inundated by Lake Natoma. Prehistoric site types and features include village mounds and midden deposits, burials, artifact scatters, milling stations, and chipped and ground stone scatters. Historic site types and features include a cemetery, bridge abutments, a hydroelectric power system, mining tailings, and water pipes.

No new cultural resource surveys or record searches have been done for Folsom Reservoir or the American River for the preparation of this document. However, several cultural resource investigations of these locations are known to have been completed. In addition to the study by Montgomery Watson Americas and Jones & Stokes Associates (1997), these include Sacramento Metropolitan Water Authority and U.S. Department of the Interior Bureau of Reclamation (1996); Waechter, Mikesell, et al., (1994); U.S. Army Corps of Engineers (1991); U.S. Army Corps of Engineers, California Reclamation Board, and Sacramento Area Flood



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Control Agency (1995); Sacramento Area Flood Control Agency and U.S. Department of the Interior Bureau of Reclamation (n.d.); and Ann S. Peak & Associates (1978a, 1978b).

**Potential Cultural Resources.** In the recent study of Folsom Reservoir by Montgomery Watson Americas and Jones & Stokes Associates (1997), the authors report that only 10–15% of the reservoir drawdown zone is believed to have been intensively surveyed for cultural resources. Based on the known number of resources and the amount of land surveyed for cultural resources, an estimate of the total number of cultural resources in the reservoir area would be between 1,460 and 1,570. It is also likely that undiscovered cultural resources exist along the American River.

## ENVIRONMENTAL CONSEQUENCES

### Significance Criteria

#### Major Federal Requirements

**National Historic Preservation Act.** According to Section 106 of the National Historic Preservation Act (NHPA):

> the head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking. (16 USC 470f)

The Advisory Council on Historic Preservation (ACHP) issued regulations under its rulemaking authority (which was established by Section 211 of NHPA) on how to comply with Section 106 of the NHPA. These regulations are entitled Protection of Historic Properties (36 CFR Part 800). Although the tasks necessary for compliance with Section 106 may be delegated to others, Reclamation has the ultimate responsibility for ensuring that Section 106 of the NHPA is completed according to the statute. Five basic steps must be completed to comply with Section 106 of the NHPA.

- Step 1. Identify Historic Properties. Historic properties within the project area, also called the area of potential effects (APE), must be identified. Identification can include record checks, archival research, field surveys, and public surveys.

- Step 2. Evaluation of Historic Properties. Historic properties that exist in the APE are evaluated for their eligibility for inclusion on the NRHP. The evaluation criteria are listed below. For archaeological sites it is usually necessary to conduct library and archival research, field excavations, and laboratory analyses to make an evaluation. Evaluation of an extant historic property usually involves library and archival research and field recording. Evaluation of a traditional cultural property usually involves library and archival research, ethnological field studies, and interviews.

- Step 3. Assess Effects. Historic properties that are eligible for inclusion in the NRHP are studied to determine the effects the proposed project will have on the property. One of three determinations will be made for each property: the project will have no effect on the property, the project will have an effect on a property but the effect will not be adverse, or the project will have an adverse effect on a property. These determinations will be made in consultation with the SHPO.



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- Step 4. Identify Mitigation Measures. If a historic property will be adversely affected by a project, a variety of interested parties may be consulted, including the SHPO and the public, to identify measures that can be taken to mitigate the effects of the project on the property. A memorandum of agreement (MOA) outlining the mitigation measures to be taken is drafted and signed by the interested parties.

- Step 5. ACHP Comment. The ACHP is provided the opportunity to comment on and accept the MOA. If the MOA is accepted by the ACHP, the project may proceed. If the ACHP does not accept the MOA, it provides written comments to the head of the federal agency, in this case Reclamation, who must then decide how to proceed.

Federal guidelines define a significant historical resource as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places" (36 CFR 800.2). A historical resource may be eligible for inclusion in the NRHP if it:

- is associated with events that have made a significant contribution to the broad patterns of our history;

- is associated with the lives of persons important in our past;

- embodies the distinctive characteristics of a type, period, region, or method of construction; represents the work of a master; possesses high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction; or

- has yielded, or may be likely to yield, information important in prehistory or history (36 CFR Part 60).

Federal regulations define an undertaking as affecting a historical property when the undertaking could alter the characteristics of the property that may qualify the property for inclusion in the NRHP, including alteration of its location, setting, or use. An undertaking may be considered to adversely affect a historical property when the effect may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historical properties include, but are not limited to:

- physical destruction or alteration of all or part of the property;

- isolation of the property from or alteration of the property's setting when that character contributes to the property's qualification for the NRHP;

- introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting;

- neglect of a property resulting in its deterioration or destruction; and

- transfer, lease, or sale of the property (36 CFR 800.9).

**Native American Graves Protection and Repatriation Act of 1990.** If project activities are conducted on federal land and those activities result in the discovery of Native American burials and associated or unassociated funerary objects, compliance with the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 would be required. NAGPRA and its accompanying regulations (43 CFR 10) establish procedures to determine the ownership and disposition of Native American and Hawaiian human remains, funerary objects, sacred objects, or objects of cultural patrimony discovered on federal lands. The law establishes penalties for persons convicted of illegal trafficking of Native American human

remains and cultural items, requires federal agencies to inventory their collections of human remains and associated or unassociated funerary objects, determine ownership, and repatriate cultural items in accordance with the provisions of the law.

**Archeological Resources Protection Act of 1979.** If project activities are conducted on federal land, the Archeological Resources Protection Act (ARPA) and its regulations (43 CFR 7, 36 CFR 296, 18 CFR 1312, 32 CFR 229) require the acquisition of permits if archaeological excavation is to take place or if archaeological materials are to be removed from federal lands. ARPA also requires that appropriate Native American tribes be notified if the archaeological activities have the potential to cause harm to or destruction of sites having religious or cultural importance (16 USC 470 cc.).

**Archeological and Historic Preservation Act of 1974.** For any federal project causing alteration of the terrain, or projects requiring federal licence, compliance with the Archeological and Historic Preservation Act (AHPA) is required. AHPA allows the secretary of the interior to initiate the archaeological survey, recovery, protection, and preservation of data if deemed significant (16 USC 469). This process is initiated by written notification to the secretary by a federal agency or appropriate historical or archaeological authority that scientific data may be lost or destroyed. In practical application, compliance with Section 106 of the NHPA and NAGPRA ensures that the activities specified in the AHPA are undertaken.

**Other Federal Laws.** Many other federal laws and presidential executive orders relate to cultural resources. These laws, however, play relatively minor roles. Some of these include the National Environmental Policy Act of 1969, American Indian Religious Freedom Act, Housing and Community Development Act, and the Department of Transportation Act of 1966.

**State Regulations**

CEQA requires that before approving most discretionary projects the lead agency must identify and examine the significant adverse environmental effects that may result from the project, including effects on historical resources. In addition, CEQA specifies the procedure to be followed in case of the unexpected discovery of human remains on nonfederal land (Pub. Res. Code Sec. 5097).

CEQA guidelines define a significant historical resource as "a resource listed or eligible for listing in the California Register of Historical Resources" (Pub. Res. Code Sec. 5024.1). The eligibility criteria are essentially identical to those for the NRHP.

Under CEQA, an impact is considered significant if a project would have an effect that may change the significance of the resource (Pub. Res. Code Sec. 5020.1). Demolition, replacement, substantial alteration, and relocation of historic properties are actions that will change the significance of a historical resource.

## Impacts Found to Be Less than Significant

***Impact: Disturbance to Cultural Resources within Folsom Reservoir.*** As discussed in "Affected Environment" above, cultural resources are known to exist within the pool area of Folsom Reservoir. These resources are repeatedly inundated and flooded during the course of a normal year. The project alternatives are not expected to result in any substantial changes in Folsom Reservoir levels (Appendix C), nor would they substantially alter the frequency of inundation or exposure of sites within the reservoir. Additionally, Reclamation has previously committed to preparing and implementing a study plan for cultural resources within the reservoir to mitigate for effects of the interim reoperation of Folsom Reservoir (Sacramento Area Flood Control Agency et. al.



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1994). This impact is less than significant under both project alternatives. No mitigation is required.

## Significant Impacts and Mitigation

**Alternative 2: Folsom South Canal Connection**

The types of significant impacts on cultural resources and mitigation measures recommended to reduce impacts to less-than-significant levels are similar for all FSC pipeline alignments (Alignments 1–4).

***Impact: Disturbance to Known Cultural Resources.*** Construction of the pipeline alignments and related facilities could affect the known cultural resources described above under "Affected Environment" and listed in Table 17-1. As indicated in Table 17-1, Alignment 1 would affect five known cultural resources, Alignment 2 would affect seven known cultural resources, Alignment 3 would affect five known cultural resources, and Alignment 4 would affect seven known cultural resources. Generally, the impacts of all FSC pipeline alignments would be similar. An impact on known cultural resources is significant for all FSC pipeline alignments. To reduce this impact to a less-than-significant level, implement Mitigation Measure 17-1.

***Mitigation Measure 17-1: Prepare and Implement a Cultural Resources Significance Evaluation, Effects Analysis, and Mitigation Plan for Known Cultural Resources.*** As required by Section 106 of the NHPA, ACHP Regulation 36 CFR Part 800: Protection of Historic Properties, and CEQA, the significance of known cultural resources should be evaluated according to federal and state criteria. The impacts of the project alternatives on these resources should then be determined. The following steps should be taken to fulfill these requirements:

- Known cultural resources should be avoided if doing so is feasible.
- If avoidance is not feasible, then the significance of these resources should be assessed using federal and state criteria. If the resources are determined to be significant, impacts on the resources should be subject to mitigation in consultation with the SHPO and the ACHP. For archaeological sites, mitigation usually consists of data recovery excavations to retrieve the data that would be lost through disturbance. For existing cultural features, mitigation usually consists of photographic, graphical, and text documentation to record the data that would be lost through disturbance.

***Impact: Disturbance of Unidentified Cultural Resources.*** Buried or previously unidentified cultural resources are likely to be discovered along all the FSC pipeline alignments. The alignments pass through areas considered sensitive for undiscovered cultural resources. Additionally, some portions of the alignments have not been surveyed for resources. An impact on buried or unidentified cultural resources is significant. To reduce this impact to a less-than-significant level, implement Mitigation Measures 17-2 and 17-3.

***Mitigation Measure 17-2. Prepare and Implement a Cultural Resources Inventory, Significance Evaluation, Effects Analysis, and Mitigation Plan for Unidentified Cultural Resources.*** As required by procedures outlined in Section 106 of the NHPA, ACHP Regulation 36 CFR Part 800: Protection of Historic Properties, and CEQA, cultural resources must be located and evaluated and the impacts of the project on these resources must be determined. The following steps can be taken to fulfill these requirements:

- Consult with Native Americans as identified by the California Native American Heritage Commission to identify cultural resources



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of importance to the Native American community. Consult with representatives of other cultural groups, as identified by the CHRIS and State Historic Preservation Officer, to identify cultural resources of importance to these groups.

- Conduct a records search at the CHRIS to identify known cultural properties within the project region (records searches have been completed).
- Conduct a cultural resources survey in unsurveyed areas as identified and recommended by the CHRIS.
- Consult with the SHPO and ACHP.
- Avoid newly identified cultural resources if it is feasible to do so.
- If avoidance is not feasible, assess the significance of these resources using federal and state criteria. If the resources are determined to be significant, they should be subject to mitigation in consultation with the SHPO. Mitigation at archaeological sites usually consists of data recovery excavations to retrieve data that would be lost through disturbance. Mitigation for extant cultural features usually consists of photographic, graphical, and text documentation to record the data that would be lost through disturbance.

***Mitigation Measure 17-3. Prepare and Implement a Plan for the Unanticipated Discovery of Cultural Resources.*** Because of changes to the landscape of the project region during prehistoric and historical periods, the limitations of surface survey techniques, and obstructions to the visibility of the ground surface, previously unknown cultural resources likely will be discovered during pipeline construction. A plan to manage these resources should be developed and at minimum should include the following components:

- If cultural resources, such as chipped or ground stone, historic debris, building foundations, or human bone, are inadvertently discovered during construction activities, the construction contractor should:
  - stop work in that area within 100 feet of the find;
  - notify EBMUD and Reclamation; and
  - retain a qualified archaeologist to assess the significance of the find, and, if necessary, to develop appropriate treatment measures in consultation with the State Historic Preservation Officer.
- If human bone is found as a result of any construction activities, the construction contractor will stop work and notify the Sacramento or San Joaquin county coroner in compliance with the California Public Resources Code Section 5097. On federal land, the federal land manager will be notified.

**Alternative 3: Joint Water Supply**

**Intake Structure**

***Impact: Potential Disturbance to Unidentified Cultural Resources.*** Although no cultural resources are known from the proposed locations of the lower American River, Fairbairn WTP, or Sacramento River WTP intake structures, currently unknown cultural resources could be discovered during construction. An impact on buried or unidentified cultural resources is significant. To reduce this impact to a less-than-significant level, implement Mitigation Measures 17-2 and 17-3 discussed above.

**I-5 to FSC Pipeline Alignment**

***Impact: Potential Disturbance to Known Cultural Resources.*** Construction of the I-5 to

FSC pipeline would generally be within existing street and road rights-of-way, except at the east end of the alignment near Mather Park (formerly Mather Air Force Base). As shown in Table 17-1, this pipeline alignment would affect four known cultural resources. Alternative 3 would also use Alignment 2 and thus could affect the seven cultural resource sites along that alignment, as described above. An impact on known cultural resources is significant. To reduce this impact to a less-than-significant level, implement Mitigation Measure 17-1 discussed above.

***Impact: Potential Disturbance to Unidentified Cultural Resources.*** Much of the I-5 to FSC pipeline alignment is within existing streets and roads and surveys were not possible. A substantial portion of this pipeline alignment would pass through older portions of the City of Sacramento and there is a high probability of finding cultural resources. Additionally, unidentified resources may also be present along Alignment 2, as described above. An impact on buried or unidentified cultural resources is significant. To reduce this impact to a less-than-significant level, implement Mitigation Measures 17-2 and 17-3 discussed above.





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Chapter 18

# Cumulative and Growth-Related Effects

# Chapter 18. Cumulative and Growth-Related Effects

## CUMULATIVE EFFECTS

### Approach to Cumulative Impact Analysis

**Legal Requirements**

State CEQA Guidelines and NEPA regulations require that the cumulative impacts of a proposed project be addressed in an EIR/EIS when the cumulative impacts are expected to be significant (14 CCR 1530[a], 40 CFR 1508.25[a][2]). Cumulative impacts are impacts on the environment that result from the incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions (14 CCR 15355[b], 40 CFR 1508.7). Such impacts can result from individually minor but collectively significant actions taking place over time.

Section 15130 of the State CEQA Guidelines states that the discussion of cumulative impacts need not provide as much detail as the discussion of effects attributable to the project alone. The level of detail should be guided by what is practical and reasonable.

**Methodology**

According to the State CEQA Guidelines (Section 15130), an adequate discussion of cumulative impacts should contain the following elements:

- an analysis of related future projects or planned development that would affect resources in the project area similar to those affected by the proposed project,
- a summary of the expected environmental effects to be produced by those projects with specific reference to additional information and the sources of the information, and
- a reasonable analysis of the cumulative impacts of the relevant projects and an examination of reasonable options for mitigating or avoiding the significant cumulative effects of a proposed project.

To identify the related projects, the State CEQA Guidelines (14 CCR 15130[b]) recommend either:

- the list approach, which entails listing past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the agency, or
- the projection approach, which uses a summary of projections contained in an adopted general plan or related planning document designed to evaluate regional or areawide conditions.

For the Supplemental Water Supply Project, cumulative impacts are analyzed both quantitatively and qualitatively. The following sections describe each approach.

### Quantitative Cumulative Impact Analysis

Cumulative impacts of both action alternatives considered in this EIR/EIS on the American River system and on the Central Valley Project (CVP), including impacts on hydrology and water supply, water quality, fisheries, recreation, riparian vegetation, and visual quality, are discussed quantitatively in Chapters 3, 4, 5, 6, 7, and 16, respectively. This quantitative analysis takes into account reasonably foreseeable future increased water use within the American River basin based on work conducted as part of the Sacramento area Water Forum (Water Forum 1997). In addition, an effort was made to use, to the extent practicable, modeling assumptions consistent with other ongoing regional efforts, particularly



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the Central Valley Project Improvement Act (CVPIA). A detailed description of PROSIM modeling assumptions for the cumulative impact analysis is contained in Appendix C. Based on the PROSIM modeling conducted for the project as discussed in the subject chapters, the project alternatives have little potential to add to impacts that could occur outside the American River basin.

Quantitative assessment of cumulative impacts includes, through use of Water Forum assumptions, the likely projected water use within the American River basin by agencies holding entitlements for water in the basin. Use of these assumptions defines the extent to which cumulative impacts of the Supplemental Water Supply Project can reasonably be analyzed quantitatively. Cumulative impacts of these actions with other reasonably foreseeable future actions that cannot be defined quantitatively at this time are discussed below.

## *Qualitative Cumulative Impact Analysis*

Besides the actions included in the quantitative cumulative impact analysis, other programmatic actions can be considered reasonably foreseeable, but have not advanced in the planning process to the point where a quantitative analysis is warranted. These additional projects include implementation of the CVPIA and the CALFED Bay-Delta Program, and water service contracts under Public Law 101-514. Each of these projects is briefly described below.

### Other Projects

**Central Valley Project Improvement Act.** The CVPIA (Public Law 102-575, Title XXXIV, 1992) reauthorizes the CVP for a wider range of beneficial uses and interests than originally mandated. The CVPIA establishes that fish and wildlife are recognized as project purposes equal to irrigation, power generation, and municipal and industrial use and reallocates significant quantities of CVP yield (800,000 AF) to meet the new purposes. The CVPIA is intended to address CVP impacts on fish, wildlife, and associated habitats and protect, restore, and enhance these resources in the Central Valley and Trinity River basins. The CVPIA is also intended to increase the water-related benefits provided by the CVP by expanding use of voluntary water transfers and increased water conservation practices. All these initiatives have the purpose of shifting the balance among the competing demands for CVP water.

**CALFED Bay-Delta Program.** The CALFED Bay-Delta Program is a collaboration between state and federal agencies and stakeholders from key interest sectors created to address and resolve resource management issues in the Bay-Delta system. The mission of the CALFED Bay-Delta Program is to develop a comprehensive plan that addresses resource problems in the Bay-Delta estuary related to fish and wildlife, water supply reliability, natural disasters, and water quality. CALFED recognizes the interdependence and linkages of watersheds, streams, and rivers to the natural and biological resources dependent on the Bay-Delta system. In its NEPA/CEQA evaluation, CALFED will analyze the incremental impacts on the environment that result from its Bay-Delta program in combination with reasonably foreseeable future actions.

**Folsom Dam Temperature Control Device and Cold Water Management.** In the EIS/EIR for the water service contracts authorized under Public Law 101-514, Reclamation and the County of Sacramento have proposed installation of a temperature control device on the water supply intake at Folsom Dam and integration of target release temperature objectives with real-time operations model development for Folsom Dam shutters. These measures are intended to improve temperature conditions in the lower American River for steelhead and chinook salmon spawning in the river. Implementation of the Supplemental Water Supply Project in

combination with these measures would not be expected to adversely affect resource conditions in the river or contribute to negative cumulative impacts.

**Aquatic Resources**

As indicated above and detailed in the respective resource chapters, the Supplemental Water Supply Project alternatives have little potential to contribute to any significant cumulative impacts outside the American River basin. To the extent that such impacts could result, the CVPIA and CALFED programs are intended to rectify past and present impacts associated with water deliveries in the Central Valley. Overall, contract water withdrawals have the potential to cumulatively affect water availability for consumptive uses or instream beneficial uses throughout the Central Valley river system. The potential cumulative effects within the regional area could include the following:

- changes in Delta outflow,
- changes in reservoir levels and carryover storage,
- changes in water quality,
- impacts on sensitive species, and
- changes in water supply.

Reclamation, along with the State of California, is obligated to meet specific Delta outflow requirements. Implementation of the CVPIA and CALFED Bay-Delta Program is likely to increase Delta outflows. Implementation of the Supplemental Water Supply Project is not expected to have a substantial effect on Delta outflows.

The cumulative effects of the Supplemental Water Supply Project in combination with implementation of the CVPIA and the CALFED Bay-Delta Program could conceivably reduce the amount of water stored behind Folsom Dam. Other reservoirs may also be drawn down to meet water quality and quantity requirements for winter-run chinook salmon and delta smelt, as well as certain other CVPIA obligations for fish and wildlife. These demands for water may result in some reservoirs being drawn down to levels that could adversely affect summer recreation use. The degree of additional effect, beyond that attributed to implementation of the Anadromous Fish Restoration Program (AFRP) and projected future American River basin water use, as described in Chapters 3 through 6, is unknown at this time.

Implementing the Supplemental Water Supply Project in combination with CVPIA and the CALFED Bay-Delta Program may also reduce the amount of water available from the American River during some months. Reduction in flows from the American River could slightly decrease the ambient water quality of the lower American River and the Sacramento River with respect to some parameters. The degree of additional effect beyond that attributed to implementation of the AFRP and projected future American River basin water use, as described in Chapters 3 through 6, is unknown at this time.

The CVPIA and the CALFED Bay-Delta Program have specific objectives to restore and protect sensitive species such as winter-run chinook salmon and delta smelt. The programs include monitoring and enforcement actions that increase the potential for restoring these species to acceptable population levels. Implementation of the Supplemental Water Supply Project would not affect state or federal commitments to such restoration programs.

The current use of CVP water supplies is about 6.1 million AF per year. The CVP's maximum contractual obligation to deliver water is about 6.6 million AF per year. Therefore, the annual demand for CVP water under existing contracts could increase over time by more than 500,000 AF. About 50% of this potential increase in contractual water deliveries by the CVP would be from the



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American River watershed. This increase in deliveries could decrease the reliability of CVP deliveries to the existing water users and reduce the water available to meet instream flow and temperature requirements in the lower American River.

Both the CVPIA and the CALFED Bay-Delta Program emphasize restoration of natural resources. The impacts of both programs on natural resources are generally assumed to be positive. Therefore, the Supplemental Water Supply Project is not expected to contribute to any cumulative impacts of these programs. As a CVP contractor, EBMUD may sustain increased shortages under its contract as a result of these programs, depending on their final implementation.

**Terrestrial Resources**

Impacts related to construction and operation of water conveyance pipelines associated with the project alternatives would generally result in minor and temporary impacts. Because of the minor and temporary nature of most impacts, they are not considered additive to other ongoing regional impacts. Discussed below are those resource areas to which the Supplemental Water Supply Project could contribute to ongoing regional impacts.

**Vegetation, Wetlands, and Wildlife.** Implementation of the Supplemental Water Supply Project in combination with other local projects and general growth in the region surrounding the pipeline alignments would contribute to the cumulative loss of identified sensitive resources, including wetlands, riparian woodlands, and habitats for sensitive wildlife species. Implementation of the mitigation measures recommended in Chapters 7 and 8 would reduce EBMUD's contributions to these cumulative impacts to a less-than-significant level.

**Agriculture.** Implementation of the Supplemental Water Supply Project in combination with other local projects and general growth in the region surrounding the pipeline alignments would contribute to the cumulative loss of prime agricultural lands. As noted in Chapter 11, the alternatives would result in an extremely small amount of impacts on prime farmland as a result of conversion when taken in the context of the amount of such farmland in the region. However, the loss of prime farmland is an issue of statewide concern. Therefore, the project alternatives would contribute a minor amount of loss to greater ongoing regional losses. The conversion of prime farmland is considered a significant cumulative impact that cannot be reduced to a less-than-significant level.

**Cultural Resources.** Several relatively minor cultural resources have been identified within the areas potentially affected by the project alternatives. Additionally, other as-yet unknown resources may be discovered during project construction. Implementation of the Supplemental Water Supply Project would contribute to the cumulative loss of cultural (archeological and historic) resources in the region resulting from other projects and general growth within the region. Implementation of the mitigation measures described in Chapter 17 would reduce EBMUD's contribution to these cumulative impacts to a less-than-significant level.

## GROWTH-RELATED EFFECTS

### Approach to Growth-Related Effects Analysis

**Legal Requirements**

Section 15126(g) of the State CEQA Guidelines and Reclamation's NEPA handbook require that indirect and growth-inducing effects of a proposed action be addressed in an EIR/EIS. The State CEQA Guidelines state the following:

> Discuss ways in which the proposed project could foster economic or population growth, or



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> the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a wastewater treatment plant might, for example, allow for more construction in service areas.) Increases in the population may further tax existing community service facilities so consideration must be given to this impact. Also discuss the characteristics of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

A project EIR need not evaluate general growth within a community if that growth is not caused, in part, by the project being evaluated.

Section 1508.8(b) of the Council on Environmental Quality NEPA Regulations states that the definition of "effects" includes:

> Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

**Methodology and Assumptions**

Evaluation of growth-inducing effects of the Supplemental Water Supply Project is based on a qualitative analysis of the indirect effects that could result from use of the water supply within the EBMUD ultimate service boundary (USB) and the City and County of Sacramento service areas. Indirect growth effects in the EBMUD USB are based on the analysis in the Updated WSMP EIR (EDAW 1993, Chapter 13, pp. 13-1 through 13-13 and Exhibits 13-1 and 13-2) because the WSMP fully described anticipated growth within the USB. The evaluation of growth effects assumes that the project would improve EBMUD's drought water supply and the water system reliability as presented in Chapter 1. Estimates of growth within the USB are based on the WSMP projections and ongoing service area water demand projections developed by EBMUD.

Water supply growth effects from information provided by the City (Franck pers. comm.) and the County are summarized from the Central Valley Project Water Supply Contracts draft EIS/EIR (U.S. Bureau of Reclamation and Sacramento County Water Agency 1997).

This evaluation of potential growth-inducing impacts addresses whether the project would directly or indirectly:

- foster economic, population, or housing growth,
- remove obstacles to growth,
- tax community service facilities, or
- encourage or facilitate other activities that cause significant environmental effects.

The analysis evaluates the potential for growth-inducing effects to result from construction of water system facilities and from use of water supplies made available under the Supplemental Water Supply Project.

## Service Area Growth

**EBMUD Service Area**

The existing EBMUD service area is located in the San Francisco Bay Area (Figure 1-1). The District Board of Directors has adopted a formal policy to oppose annexation to the EBMUD service area of properties located outside EBMUD's USB, including the developments collectively identified as Tassajara Project and Dougherty Valley. In the case of the Tassajara Project, the EBMUD Board adopted Resolution 33038-97, which

stated EBMUD's opposition to serving a large residential subdivision outside the USB. Regarding Dougherty Valley, EBMUD entered into a settlement agreement with several parties in which another agency is named as the preferred water service provider to the project. In the Updated WSMP EIR (Chapter 13), EBMUD estimates that the number of housing units in its USB by 2020 will grow by approximately 79,000 units, accommodating a projected population increase of approximately 137,000. EBMUD also projects that it will serve more than 5,600 new commercial, institutional, industrial, and irrigation accounts by 2020. Most of the population growth (59%) would occur as urban infill in the urbanized western regions of the USB. Household growth in the less urbanized eastern regions of EBMUD's service area is expected to occur mostly on currently undeveloped land.

A description of the methodology used in the analysis is included in Chapter 10. Effects on biological resources are included in Chapters 7 and 8.

**City of Sacramento**

The City of Sacramento's service area, for the purpose of this analysis, includes the entire city limits, other water purveyor service areas within the city's place of use, and potential water purveyor service areas outside the place of use that could receive city water through wheeling contracts.

Except for a period in the 1960s, the City has sustained relatively uninterrupted growth since the postwar era. Historically, development patterns and rates of growth in Sacramento have not been either driven or restrained by water supply projects or lack thereof. Situated by two rivers, secured with community water rights that exceed growth demands, and with a relatively high water table, Sacramento has generally grown without water supply issues becoming a central factor to land use patterns and rates of growth. Instead, public projects such as the construction of the interstate freeway system and trends such as the expansion of the employment base and the attraction of affordable housing have been the factors more closely related to periods of growth and the resulting land use patterns.

**County of Sacramento**

Sacramento County has become one of the fastest growing areas in the state. Recent growth is generally attributable to comparative locational and economic advantages, such as good highway access, competitively priced land and housing, an expanding and diversifying economy, labor availability, and proximity to recreational and other cultural amenities. By 2010, the County's population is projected to be more than 1.35 million, with more than half the increase projected for the unincorporated area of the County (Sacramento County 1992).

Urban communities will accommodate most of the new development in the unincorporated areas of Sacramento County. Near-term urban development will be accommodated through the buildout of planned communities because it is in these areas that urban infrastructure and public services already exist (Sacramento County 1992). The infill development, however, cannot accommodate all the development projected during the planning period, and the Sacramento County General Plan also identifies and designates new urban growth areas. These urban growth areas are primarily located in the area between the American and Cosumnes Rivers within the Sacramento County Water Agency's Expanded Zone 40 area.

Under Alternative 3, facilities would be used to supply surface water for the Expanded Zone 40 area, as defined in the Central Valley Project Water Supply Contracts EIS/EIR (U.S. Bureau of Reclamation and Sacramento County Water Agency 1997). The Expanded Zone 40 area encompasses 83,000 acres of land within the County General Plan designated Urban Services Boundary. Approximately 34,000 acres are designated for urban growth or projected infill in the County General Plan.



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Surface water supplied under the Supplemental Water Supply Project would be used to serve a portion of this growth and to replace or supplement existing groundwater supplies that currently serve approximately 12,000 acres of developed land in the Expanded Zone 40 service area.

Urban growth is conditioned on the planning and growth policies of the Sacramento County General Plan. Growth projections in turn establish the amount of water needed to accommodate the projected growth. Additional water supplies are needed to support projected growth. To meet the water needs of planned growth within the Expanded Zone 40 area, consistent with the Water Forum, annual surface water supplies of up to 78,000 AF of surface water are needed in addition to further reliance on the groundwater aquifer.

Current annual groundwater production within Expanded Zone 40 is approximately 22,000 AF. There is, however, an immediate annual water supply need of an estimated 45,000 AF. This difference between the near-term demand estimate and the current production results from the over 7,300 acres of development already approved by Sacramento County that is projected to be constructed in the near future. Without additional water supplies, provided that current groundwater production remains constant and aquifer supplies uncompromised, future growth would be curtailed in Expanded Zone 40.

## Evaluation of Growth-Inducing Effects

Evaluation of growth-inducing effects under Alternative 3 assumes a new intake facility would be constructed on the American River and a 78-inch diameter pipeline would deliver up to 140 MGD of surface water supply for use by EBMUD (100 MGD) and in the Sacramento County service area (40 MGD), as described in Chapter 2. The Supplemental Water Supply Project would also involve expanding the Fairbairn WTP intake and treatment capacity by 100 MGD and the Sacramento River WTP intake and treatment capacity by 50 MGD to meet the City's future water supply needs. Alternative 2 would result in similar growth-related issues for EBMUD; however, under this alternative, the City and County would not receive additional water supplies.

**EBMUD Ultimate Service Boundary**

The Final EIR and Findings for the EBMUD Updated WSMP indicate that the Updated WSMP "would have growth inducing impacts in that the District's ability to serve new customers through 2020 would permit cities and counties within the District's service area to accommodate growth that has been projected and planned for within their respective jurisdictions" (EDAW 1993). EBMUD's demand and supply projections indicate that the planning level of demand in the USB from 1995 to 2020 would increase from 200 MGD to 228 MGD, adjusted to reflect implementation of aggressive conservation and reclamation programs.

EBMUD's existing available water supply during normal years is 228 MGD, which would adequately meet its USB demand during most years. However, during dry years, runoff amounts are insufficient to meet full, unconstrained user demands and the EBMUD supply must be drawn from reservoir supplies stored during previous years. During extended dry periods, storage supplies may be insufficient to supply all consumptive needs of EBMUD customers without significant rationing. Therefore, the EBMUD portion of the Supplemental Water Supply Project water supply would be used primarily to ensure that sufficient water supply is provided to reduce customer deficiencies during extended droughts and to ensure system reliability in case of damage to EBMUD's existing water supply and distribution system. Because the Supplemental Water Supply Project is intended to provide a supplemental water supply during drought years and to improve system redundancy and



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reliability, it would not contribute to new growth-inducing effects that have not already been evaluated for the overall Updated WSMP.

**Updated WSMP Growth Effects.** The overall environmental consequences of this projected growth as presented in the Updated WSMP EIR (Chapter 13) and within discussions of Alternative 1 in this EIR/EIS are expected to include land use, traffic, biological, socioeconomic, and other impacts. Growth-related land use effects are expected to include urban infill and higher densities or mixed uses in the western portion of the service area with new development projects and growth areas occurring mainly in the eastern undeveloped areas (including a small amount of land used for agriculture) of the USB.

Traffic impacts in the USB along the Interstate 80 and Interstate 680 corridors are expected to increase significantly with and without new projected growth. Planned regional traffic improvements, including the State Route 24/Interstate 680 junction freeway improvements, are expected to maintain current traffic congestion levels only into the foreseeable future, assuming current growth rates. Significant increases in traffic will likely occur in the East Bay even if no new growth occurs in the USB because of projected increases in commuter traffic throughout the East Bay from rapidly growing bedroom communities in Solano, San Joaquin, and Stanislaus counties.

Air quality conditions in the USB are expected to continue to decline as a result of growth, although air quality conditions in the San Francisco Bay Area Air Basin (SFBAAB) are generally superior to other air basins in the state. Currently the SFBAAB is designated as an attainment area for carbon monoxide and a severe nonattainment area for ozone. The Bay Area Air Quality Management District (BAAQMD) is implementing a Clean Air Plan to attain the ozone standard.

Biological resource effects in the USB associated with loss of native vegetation and wildlife habitat will occur as a result of urban and suburban development. Habitat losses are expected to be greatest in the eastern portion of the USB, where new development would occur in undeveloped open space and agricultural areas. The Updated WSMP EIR indicates that up to 13 special-status species occur in the USB that could be adversely affected by urban and suburban growth.

Socioeconomic effects of growth in the USB could include positive economic growth resulting in new employment and business opportunities and less desirable financial effects of needed investments in infrastructure improvement projects such as roads, water distribution and wastewater treatment facilities, and educational and recreation facilities.

Other growth-related impacts in the USB include possible urban runoff effects of new development from increased impermeable surfaces, increased noise levels along major transportation corridors, visual resource effects from conversion of open space and agricultural areas to urban development, and possible effects on known or unknown archaeological or historical resources.

**Supplemental Water Supply Project Growth Effects in the EBMUD USB.** Use of water under the Supplemental Water Supply Project would likely have no additional growth-inducing effects in the USB because it would not foster additional economic, population, or housing growth beyond what has already been projected for the Updated WSMP and considered in the Updated WSMP EIR.

Use of the water supply under the Supplemental Water Supply Project would not directly or indirectly tax community service facilities because growth within the USB has been planned for in city and county general plans, new development projects would not be served by the Supplemental Water Supply Project. As mentioned above, EBMUD's policy

is to oppose annexation of and service to developments outside of its USB, and EBMUD is not the preferred water service provider to the project.

The Supplemental Water Supply Project could be considered to indirectly facilitate growth decisions by service area cities and counties by reducing the amount of uncertainty that exists related to system reliability and the availability of water supply during severe drought conditions. However, this indirect effect would not create additional growth-inducing effects beyond what has already been considered for the Updated WSMP and EIR.

**EBMUD Growth Policies.** The Updated WSMP EIR findings indicate that potential growth-inducing impacts could be mitigated through measures imposed by the planning agencies of city and county jurisdictions. The EBMUD Board of Directors has determined that it will continue to work with other jurisdictions to assist in mitigating the impacts of growth by:

- participating in efforts to improve regional planning in the Bay Area;
- encouraging local land use planning agencies to coordinate land use planning functions and the provision of utility services; and
- encouraging cities and counties to adopt general plans and zoning ordinances that favor high-density development and urban infill (which tends to minimize per-capita water use and environmental impacts of water delivery systems); provide incentives for more housing near public transit; and adopt ordinances that conserve open space, protect wildlife habitat, and conserve energy and water resources (EDAW 1993).

**City of Sacramento Service Area**

The potential for the City's water supply expansion projects to have growth-inducing impacts is related to the objectives of the project and to the geographic area in which the water will be used. Potential growth-inducing impacts resulting from expansion of the City's water supply system are closely related to the general plans of the City and surrounding municipalities. This relationship is based on the purpose of these planning documents, which includes providing a pattern for the location and timing of new growth.

The City's existing demands can be met with a water supply production system that can produce a maximum daily output of 166 MGD. The City's current maximum daily sustainable capacity is estimated to be about 200 MGD, including from groundwater pumping. Because of the City's ability to provide additional water in excess of current demands, water is not considered to be a current barrier to new growth in the City. However, at some point in the future, the City's current system would not be able to supply all of the City's water needs. The City's expected maximum-day demands would be 287 MGD in 2030, assuming a conservation rate of 8%. The expansion of the City's water supply production system by 150 MGD would increase the maximum capacity of the system to approximately 350 MGD. In this manner, the City's water supply expansion project would remove a future barrier to new growth in the City of Sacramento and therefore may have growth-inducing impacts related to this future increment of growth.

The City of Sacramento General Plan (City of Sacramento 1988) provides a context for assessing the impacts of new growth, including impacts that may be attributable to the proposed project. New growth in the City of Sacramento generally conforms to the general plan, both in terms of land use and policy consistency. The general plan was adopted in January 1988 and is intended to direct growth and development within the City for the period from 1986–2006. The plan recognizes the ability of the City to accommodate an additional 87,500 dwelling units and is "strongly oriented toward physical development of land uses, a circulation network, and supporting facilities and services." Based on a review of general plan policies, the



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orientation of the general plan with regard to growth and infrastructure issues is characterized as:

- coordinating the development of new growth areas (e.g., North Natomas, North Sacramento, Meadowview/South Sacramento) with the provision of adequate public services;
- developing financing plans for providing public services to new growth areas; and
- continuing to provide and maintain adequate public services in existing developed areas.

The general plan states that "the City has the rights to enough quality water to supply all planned growth within the city limits until build out," and does not indicate that providing an adequate water supply is a limiting factor in the growth of the City.

At a broad level, the general plan contains policies for the preservation of environmental quality in the City of Sacramento. Specific goals and policies are contained in the Conservation and Open Space Element of the general plan. These policies provide a regulatory standard for mitigating significant regional environmental effects associated with urban growth pursuant to the general plan and, indirectly, to the expansion of the City's water supply system. Accordingly, adherence to the general plan, especially to the goals and policies contained in the Conservation and Open Space Element, effectively mitigates any growth-inducing effects attributable to the City's water supply expansion project.

Wholesale contracts may also be executed between the City and other water purveyors located within the City's place of use. The amount and geographic extent of these potential wholesale contracts are unknown at this time. Water purveyors within the place of use are for the most part located in urbanized areas (e.g., Arden, Rosemont, Foothill Farms) that do not represent significant County growth areas. Because these areas are heavily dependent on groundwater, it is likely that wholesale contracts between the City and these water purveyors would be used to facilitate conjunctive-use programs to help reduce dependence on groundwater. Supplying the water needs of new growth may be a minor objective of these water purveyors. Growth-inducing impacts are not expected to result from contracts within the place of use because these contracts are not expected to be closely linked to new development.

Wheeling contracts may be executed between the City and water purveyors outside of the place of use; however, the amount and geographic extent of potential wheeling contracts are unknown. Although it is generally assumed that such contracts would not provide water to areas outside of Sacramento County, there are no limitations to that effect. In general, wheeling water to areas where development is currently limited by lack of available water supply may have growth-inducing impacts. For areas outside of the place of use, the potential environmental impacts of growth attributable to wheeling contracts are speculative because specific recipients of City-wheeled water are not currently identified. In general, the extent of any growth-inducing impacts would likely be mitigated by the policies contained in the general plan of the receiving jurisdiction (e.g., Sacramento County General Plan), as long as development allowed by the wheeled water is consistent with that general plan. Growth-inducing impacts associated with wheeling contracts would also be evaluated as part of project-level environmental review. As part of this review, limitations on growth in the receiving jurisdiction should be analyzed and applicable general plan policies should be reviewed.

**County of Sacramento Service Area**

The Sacramento County General Plan update has previously assessed the growth-related effects that could result from development of 34,000 acres of land approved





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in the general plan for future growth. The general plan EIR indicates that growth in the county's service area could result in effects on terrestrial habitats and wetlands, wildlife and cultural resources, agricultural land, recreation resources, water quality, air quality, noise, and visual resources. Small amounts of most habitat types occur in currently zoned and proposed growth areas.

A recent biological assessment prepared for County service areas (U.S. Bureau of Reclamation and Sacramento County Water Agency 1997) indicates that three special-status plant species and 16 animal and fish species could potentially be affected by growth in the service area and only small amounts of riparian, vernal pool, and woodland habitats that support wildlife species would be affected. The County is participating in the South County Habitat Conservation Plan that would coordinate expected development with the protection of terrestrial vegetation and wildlife resources (U.S. Bureau of Reclamation and Sacramento County Water Agency 1997).

Existing unknown cultural resources could be affected in the County service areas as development proceeds. Future construction-related activities associated with new intake structures, raw and treated water conveyance corridors, and new or modified water treatment plants may also combine with other existing construction projects to potentially affect existing cultural resources, especially along riparian corridors. Along water courses, levee improvements by the Sacramento Area Flood Control Agency could also increase the potential for impacts on certain sites along the lower American River.

The continued productivity of existing agricultural and prime farmlands would likely be affected by future developments throughout the County. No prime or unique farmlands lie within any of the service areas; however, approximately 4,000 acres of farmland of statewide significance exist within Expanded Zone 40. Slightly more than half of this farmland would remain in agricultural production, and nearly 2,000 acres would be lost to future development.

No loss in public recreation uses, including community and County parks or activity areas along the American River Parkway, is expected from growth in the County service area. Future increases in use of existing recreational resources may result in a gradual decline in the quality of the recreational experiences.

Growth in the service area could result in greater risk of contamination in the underlying groundwater aquifer. Recent TCE and perchlorate detections in wells in the Sunrise Industrial Service Area, on Mather Field, and in the Arden-Cordova Water Service Area are examples of this increasing risk. Ongoing efforts such as Aerojet's long-term clean up of the American River Study Area will continue and could be supplemented with additional efforts in the future.

Although efforts are currently underway across the County to stabilize the regional groundwater aquifer, it is reasonable to assume that groundwater supplies, to some extent, will be continually relied on to meet water needs in Sacramento County. Increased urbanization would also result in a greater risk of surface water quality degradation from more non-point-source pollutant runoff from urban areas.

Increased air quality and regional noise effects are also expected from growth in the County service areas. The Sacramento region has recently been designated an attainment area for carbon monoxide. Continued compliance with the standard will be maintained under a maintenance plan administered by the Sacramento Metropolitan Air Quality Management District (SMAQMD), which considers growth projected in the County service areas. Sacramento has not exceeded the federal PM10 standard for several years and is seeking redesignation to an attainment status. Regional air quality exceeds the standards for ozone. SMAQMD is seeking to attain

compliance with ozone emission standards by 2005 under a federally approved implementation plan that takes into consideration growth projected in the County.

The Sacramento County General Plan Noise Element and County Noise Ordinance standards provide a means to ensure that projects will not significantly affect ambient noise levels. Compliance with these standards and guidelines is expected to provide an acceptable noise environment for residential and other noise-sensitive land uses, although it is anticipated that, with future growth, construction-related noise impacts and increased traffic noise would result.

The visual landscape in the County will change with the growth expected in the County service area. These expected changes are considered significant visual resource impacts that would be minimized to the extent practicable through implementation of County general plan policies and mitigation measures for development projects. (U.S. Bureau of Reclamation and Sacramento County Water Agency 1997).





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Chapter 19

# Impact Conclusions and Environmental Commitments

# Chapter 19. Impact Conclusions and Environmental Commitments

## SIGNIFICANT AND UNAVOIDABLE IMPACTS

Significant and unavoidable impacts associated with the project alternatives are listed below. Unavoidable impacts are those impacts that would result even when the mitigation measures incorporated into the project description and the mitigation measures described in each resource chapter of thies EIR/EIS are implemented.

### Alternative 2: Folsom South Canal Connection

Significant and unavoidable impacts under this alternative are:

- elimination of rail service along portions of two existing and operating rail lines and
- increased PM10 emissions during construction in Sacramento County.

### Alternative 3: Joint Water Supply

Significant and unavoidable impacts under this alternative are:

- increased PM10 emissions during construction in Sacramento County.

## EFFECTS FOUND NOT TO BE SIGNIFICANT

Each resource chapter throughout this EIR/EIS identifies impacts found to be less than significant.

## IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources would result from implementing any of the project alternatives. These resources include:

- construction materials;
- labor;
- energy needed for construction, operation, and maintenance; and
- minor land conversion of agricultural, open space, and natural environments.

Land uses that would be irreversibly committed include prime agricultural lands that are used to grow row crops, vineyards, and orchards; annual grasslands used for grazing; oak woodlands; riparian habitats; and wetland areas. The loss of wetland, riparian, and oak woodland resources could be mitigated by creating new habitats as part of the project. The conversion of agricultural lands to nonagricultural uses is considered an irreversible and irretrievable commitment of resources.

## RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The short-term benefits of implementing any of the project alternatives include:

- reduced deficiencies to EBMUD customers and



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- improved system reliability for EBMUD customers.

Alternative 3: Joint Water Supply will also result in benefits to the County and the City by increasing the reliability and availability of their municipal water supplies. The additional delivery capacity provided under this alternative would help meet their current and projected demands, and regional urban and agricultural economies would also benefit from less groundwater overdraft and reduced risk of contaminant migration.

Long-term productivity refers to the values of the existing environment. The values of the existing environment affected by the project alternatives would be relatively minor, as described throughout this EIR/EIS.

## ENVIRONMENTAL COMMITMENTS

Each topical chapter of the EIR/EIS contains a description of mitigation measures that could be implemented to reduce identified impacts to less-than-significant levels. Because no preferred alternative has been identified at this stage, a list of mitigation measures proposed for implementation by EBMUD and Reclamation will be included in the final EIR/EIS once a preferred alternative has been identified.

## MITIGATION MONITORING AND REPORTING PLAN

Public Resources Code Section 21081.6 requires that a reporting and monitoring program be adopted to ensure compliance with project mitigation measures identified in an EIR or other conditions requiring monitoring. According to that section, "the reporting or monitoring program shall be designed to ensure compliance during project implementation." The Mitigation Monitoring and Reporting will identify the impacts and present the mitigation measures contained in the final EIR/EIS.



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Chapter 20

# Consultation and Coordination

# Chapter 20. Consultation and Coordination

## PUBLIC AND AGENCY INVOLVEMENT

Public involvement in the Supplemental Water Supply Project has been significant since EBMUD's initial commitment to the project in 1995. EBMUD, the County of Sacramento, the City of Sacramento, and Reclamation have made substantial efforts to solicit public input to the project through public hearings, public workshops, small group meetings, and scoping meetings. Since initiation of the project, EBMUD has continually updated the public on the progress of the project by conducting small group meetings and publishing fact sheets.

### Notice of Preparation/ Notice of Intent

On January 25, 1996, EBMUD issued a Notice of Preparation (NOP) of an EIR for the FSCC project informing agencies and the general public that an EIR was being prepared and inviting specific comments on the scope and content of the document. The NOP also requested participation at public scoping meetings. The NOP included an initial study outlining what were considered the key issues related to the project and discussed the potential environmental impacts of the project.

Subsequently, ongoing discussions between EBMUD, the County, and the City led to formulation of a joint project concept that offered a different alternative for achieving the project objectives. Therefore, EBMUD and Reclamation prepared a revised NOP/Notice of Intent (NOI) in April 1997 describing the revised project objectives and alternatives. The NOP/NOI briefly described the joint project concept, invited public comment on the scope and content of this EIR/EIS, and announced an additional set of scoping meetings.

### Scoping Meetings

Section 15083 of the State CEQA Guidelines authorizes and encourages an early consultation or scoping process to help identify the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in an EIR and to help resolve concerns of affected agencies and individuals. In addition, the U.S. Council on Environmental Quality EIS regulations (40 CFR Section 1501.7) require "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action."

EBMUD held three initial scoping meetings in February 1996 to solicit public comments in determining the scope of the FSCC EIR. Scoping meetings were held in Oakland, Sacramento, and Lodi. Before the meetings, notices were published in local newspapers announcing the time, date, location, and purpose of the meetings. Copies of the NOP and initial study were also mailed to an extensive list of recipients. Each scoping meeting included an overview of the meeting's purpose, the proposed project and alternatives, and potentially significant environmental issues. Attendees were given the opportunity to provide both written and oral comments.

The revised NOP/NOI was mailed to an extensive list of recipients. In addition to the revised NOP/NOI and publication of notices in local newspapers, approximately 28,000 notices of public scoping meetings were sent to residents in the greater Sacramento area. Five additional scoping meetings were held in late April and early May in Sacramento, Oakland, Lodi, and Galt. The format for these meetings was similar to the initial meetings and the meetings were sponsored jointly by EBMUD, the County, the City, and Reclamation. A scoping report has been prepared summarizing the input received at the 1996 and 1997 socping



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meetings and written comments in response to the NOP/NOI. The scoping report is included as Appendix A to this EIR/EIS. All comments received during the scoping process have been considered during preparation of this EIR/EIS.

## CONSULTATION REQUIREMENTS

### Federal Endangered Species Act

Reclamation has been informally consulting with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) regarding the project. Reclamation initiated informal consultation by requesting a list of threatened, endangered, and candidate species in the project areas from USFWS and NMFS by letter dated May 14, 1997. Both agencies responded with a list of such species. Chapter 5, "Fisheries," Chapter 7, "Vegetation and Wetland Resources," and Chapter 8, "Wildlife," describe the potential for listed, proposed, and other sensitive species to occur in areas affected by the alternatives. Meetings are being conducted with USFWS and NMFS to determine the scope, identify species of concern, and develop an appropriate approach to addressing listed and proposed species as part of the Section 7 consultations required by the federal Endangered Species Act. Reclamation is in the process of preparing a biological assessment and will submit that report to USFWS and NMFS.

### Fish and Wildlife Coordination Act

This act requires federal agencies to provide equal consideration of fish and wildlife resources in the planning and proposals for water resource development projects.

EBMUD and Reclamation have coordinated with USFWS and the California Department of Fish and Game. This EIR/EIS is intended to serve as the vehicle for compliance with the Fish and Wildlife Coordination Act.

### National Historic Preservation Act

A memorandum of agreement (MOA) outlining the mitigation measures to be implemented will be prepared once a preferred alternative is selected, surveys have been completed, and effects have been assessed. Chapter 17, "Cultural Resources," describes the potential effects of project alternatives on cultural resources and identifies measures that may be necessary to avoid or reduce impacts on cultural resources. The Section 106 process is proceeding concurrently with the draft EIR/EIS and will continue through preparation of the final EIR/EIS.

### Farmlands Protection Policy

Memoranda from the U.S. Council on Environmental Quality to heads of agencies dated August 30, 1976, and August 11, 1980, and the Farmlands Protection Policy Act of 1981 require federal agencies in their EISs to include farmlands assessments designed to minimize adverse impacts on prime and unique farmlands.

The U.S. Natural Resources Conservation Service (NRCS) has been requested to consult on the effects of the project. The results of this consultation will be included in the final EIR/EIS.

As described in Chapter 11, "Agricultural Resources," the project alternatives would cause only minor permanent losses of farmland acreage in the project area. The environmental analysis of the project alternatives includes a thorough discussion of impacts on prime and unique farmlands. The analysis includes an evaluation of farmlands using California Department of Conservation (CDC) classifications and an evaluation of the project's effects on prime and unique farmlands as determined by CDC's Farmland Mapping and Monitoring Program.

## Executive Order 11988 (Floodplain Management)

Executive Order 11988 requires federal agencies to prepare floodplain assessments for proposals located in or affecting floodplains. An agency proposing to conduct an action within a floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. If the only practicable alternative involves siting in a floodplain, the agency must minimize potential harm to or development within the floodplain and explain why the action is proposed within the floodplain.

Although project features are located in floodplains, they are designed to avoid effects on flooding. Construction of pipelines within the floodplain of various creeks, streams, and rivers would be temporary and the stream channels would be restored to their original condition immediately following construction. No effects from these facilities are anticipated. The only feature with the potential to affect flooding is the intake facility associated with Alternative 3. This facility must be located within the floodplain and will be designed to have no measurable effect on floodflows or capacity of the current floodplain area.

## Executive Order 11990 (Protection of Wetlands)

Executive Order 11990 requires federal agencies to prepare wetlands assessments for proposals located in or affecting wetlands. Agencies must avoid undertaking new construction in wetlands unless no practicable alternative is available and the proposed action includes all practicable measures to minimize harm to wetlands.

The project alternatives would result in direct impacts on wetlands. All project alternatives were evaluated for their impact on wetlands and other resources. The mitigation measures specified for the project alternatives require avoidance, replacement, and enhancement measures that would replace all wetland acreage and habitat values. For a detailed discussion of the project alternatives' impacts on wetlands, see Chapter 7, "Vegetation and Wetland Resources."

## Executive Order 12898 (Environmental Justice)

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations," requires each federal agency to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities (U.S. Department of the Interior 1995). Reclamation policy requires that NEPA documents include a determination of whether a project will have any adverse impacts on minority or low-income populations.

To comply with Reclamation direction for the environmental justice assessment, U.S. Census demographic data were analyzed at a geographic scale commensurate with the potential impact area. The results of this analysis are included in Chapter 10, "Land Use."

## Clean Water Act

The federal Clean Water Act requires a permit to be obtained from the U.S. Army Corps of Engineers (Corps) for the discharge of dredged or fill materials to waters of the United States, including adjacent wetlands. The Corps reviews applications for Section 404 permits in accordance with guidelines for Section 404 of the Clean Water Act. The Corps must also determine that the project is not contrary to the public interest (33 CFR 323.6). The project alternatives likely are consistent with nationwide permits adopted by the Corps,

particularly Nationwide Permit 12 - Utility Crossings.

### Indian Trust Assets and Native American Consultation

The U.S. Department of the Interior is responsible for ensuring that its actions do not negatively affect assets held in trust by the United States for Native Americans. Reclamation's Indian Trust Asset Coordinator has confirmed that no Indian Trust Assets are located within the project study area or would be affected by the project alternatives under consideration. Chapter 17, "Cultural Resources," describes consultation to date with the Native American community.

## NOTIFICATION AND CONSULTATION LIST

During preparation of the EIR/EIS, resource agencies and interest groups were notified of the proposed project. As indicated above, EBMUD and Reclamation have provided materials to an extensive list of interested agencies and individuals. The following entities will receive a copy of the draft EIR/EIS or notice that it is available. EBMUD will also mail notices to an existing 3,300-person mailing list, informing these parties where the document is available locally for their review and where they may request an individual copy. The current mailing list includes property owners, interested parties, and USBR-CVP interested parties.

### Sacramento County

Agricultural Council
Board of Supervisors
County of Sacramento Water Quality Division
County of Sacramento Water Resources
Department of Environmental Management
Department of Environmental Review and Assessment
Department of Planning and Community Development
Department of Regional Parks, Recreation and Open Space
Public Works Agency
Sacramento County Flood Control Agency

### Cities/Counties and Other Agencies

Alameda County Water District
Amador County Conservation District
Amador County Water Agency
American River Flood Control District
American River Parkway Advisory Committee
Arcade Water District
Arden-Cordova Water Service
Berkeley Chamber of Commerce
Calaveras County Chamber of Commerce
Calaveras County Public Works
Calaveras Public Utility District
Carmichael Water District
Central Delta Water Agency
Central San Joaquin Water Conservation District
Central Valley Project Water Users Association
Citizens Utilities Company of California
Citrus Heights Water District
City of Alameda
City of Albany
City of Berkeley
City of El Cerrito
City of Emeryville
City of Escalon
City of Folsom
City of Galt
City of Hayward
City of Hercules
City of Ione
City of Isleton
City of Jackson
City of Lafayette
City of Lathrop
City of Lodi
City of Manteca
City of Oakland
City of Orinda
City of Piedmont
City of Pinole
City of Pleasant Hill



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City of Richmond
City of Ripon
City of Sacramento
City of San Ramon
City of Stockton
City of Tracy
City of Walnut Creek
Clay Water District
Clay Irrigation District
Clements-Lockeford Chamber of Commerce
Contra Costa County Board of Supervisors
Contra Costa Water District
County of Alameda
County of Amador
County of Calaveras
County of Contra Costa
County of El Dorado
County of Placer
County of San Joaquin
Del Paso Manor Water District
East Bay Municipal Utility District
East San Joaquin Parties Water Authority
El Dorado County Water Agency
El Dorado Irrigation District
Elk Grove Water Works
Fair Oaks Water District
Florin County Water District
Fruitridge Vista Water Company
Galt Chamber
Galt Irrigation District
Georgetown Divide Public Utilities District
Jackson Valley Irrigation District
Kern County Water Agency
Lockeford Community Services District
Metropolitan Water District of Southern California
Modesto-Turlock Irrigation District
Natomas Community Planning Advisory Council
Natomas Mutual Water Company
Neighborhood Association Alliance Group
North Delta Water Agency
North San Joaquin Water Conservation District
Northridge Water District
Oakdale Irrigation District
Oakland Chamber of Commerce
Omochumne-Hartnell Water District
Orange Vale Water Company
Pacific Gas and Electric - Department of Transmissions and Distribution
Placer County Water Agency
Rancho Cordova Community Planning Advisory Council
Rancho Murieta Community Services District
Rancho Murieta Water District
Reclaimation District 1000
Rio Linda Water District
Sacramento Air Resources Board
Sacramento County Alliance of Neighbors
Sacramento Metropolitan Water Authority
Sacramento Metropolitan Chamber of Commerce
Sacramento Municipal Utilities District
Sacramento Old City Association
San Juan Water District
San Leandro Chamber of Commerce
San Luis Delta Mendota Water Authority
San Ramon Chamber of Commerce
Santa Clara Valley Water District
South Delta Water Agency
South San Joaquin Irrigation District
Southeast Area Community Planning Advisory Council
Southern California Water Company
Stockton East Water District
Sutter County Board of Supervisors
Tokay Park Water Company
Town of Danville
Walnut Creek-City Council
West Sacramento Chamber of Commerce
Westlands Water District
Woodbridge Irrigation District

## State of California

Air Resources Board
Environmental Protection Agency - External Affairs
Public Utilities Commission
Central Valley Regional Water Quality Control Board
Department of Conservation
Department of Environmental Toxicology
Department of Fish and Game
Department of Health Services
Department of Parks and Recreation



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Department of Toxic Substances Control
Department of Transportation
Department of Water Resources
Office of Drinking Water
Office of Planning & Research
Resources Agency
State Lands Commission
State Office of Historical Preservation
State Reclamation Board
State Water Resources Control Board
Waste Management Board

## Federal Agencies

Army Corps of Engineers - District Engineer
Army Corps of Engineers - Regulatory Branch
Bureau of Land Management
Bureau of Reclamation - Mid-Pacific Region
Bureau of Reclamation - North Central California Area
Bureau of Reclamation - Regional Director
Department of Agriculture Soil Conservation Services
Department of Interior - Office of Water & Science
Environmental Protection Agency - Oceans & Estuaries
Environmental Protection Agency - Office of Water
Environmental Protection Agency - Region IX
Environmental Protection Agency - San Francisco Estuary Project
Federal Energy Regulatory Commission
Fish and Wildlife Service - District 1
Fish and Wildlife Service - Sacramento
Forest Service
Forest Service, Stanislaus National Forest
Forest Service, El Dorado National Forest
National Marine Fisheries Service

## Representatives

California State Assembly - Barbara Alby
California State Assembly - Dion Aroner
California State Assembly - Larry Bowler
California State Assembly - Lynne Leach
California State Assembly - Michael Machado
California State Assembly - Thomas Rico Oller
California State Assembly - Deborah Ortiz
California State Assembly - Don Perata
California State Assembly - Mike Sweeney
California State Assembly - Helen Thomson
California State Assembly - Tom Torlakson
California State Senate - Leroy Greene
California State Senate - Maurice Johannessen
California State Senate - Patrick Johnston
California State Senate - Barbara Lee
California State Senate - Tim Leslie
California State Senate - Bill Lockyer
California State Senate - Richard Rainey
State Agriculture and Water Resources Committee - Jim Costa
U.S. House of Representatives - Ron Dellums
U.S. House of Representatives - John Doolittle
U.S. House of Representatives - Vic Fazio
U.S. House of Representatives - Robert Matsui
U.S. House of Representatives - George Miller
U.S. House of Representatives - Richard Pombo
U.S. House of Representatives - Ellen Tauscher
U.S. Senate - Barbara Boxer
U.S. Senate - Dianne Feinstein

## Other Interested Groups

AFBCA/DB Mather
Alameda County Economic Development, Alliance for Business
Alameda Taxpayers Association
American Land Conservancy
American River Coalition
American River Recreation
American River Utilization Program
Associations of California Water Agencies
Audubon Society - Golden Gate Chapter
Audubon Society - Mt. Diablo Chapter
Audubon Society - Ohlone Chapter
Audubon Society - Sacramento Chapter
Buckhorn Canyon Legal Defense Fund
Cal Trout
CALFED Bay - Delta Program
California Alliance for Jobs
California Environmental Trust
California Farm Water Coalition
California Fly Fishers Unlimited
California Groundwater Association
California League of Conservation Voters



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California Marine Mammal Center
California Marine Parks and Harbors
California Native Plant Society
California Outdoors
California Sport Fishing Protection Alliance
California Trout Incorporated
California Urban Water Agencies
California Waterfowl Association
California Water Resources Association
California Wilderness Coalition
Center for Natural Lands Management
Central Valley Water Project Association
Citizens for Alameda's Last Marshland
Citizens for Albany Shoreline
Citizens for a Better Environment
Clean Water Action
Coalition for American River Water Resources
Coast-to-Crest Trail
Common Cause
Consumnes Community Planning Advisory Council
Delta Fly Fisherman
Ducks Unlimited, Inc.
Environmental Council of Sacramento
Environmental Defense Fund
Friends of the River
Greenbelt Alliance
Greenpeace
League Conservation Voters
League of Women Voters California
Lockeford Ranches, Inc.
Lower American River Task Force
Mokelumne River Association
Native American Heritage Commission
Natural Heritage Institute
Natural Resources Defense Council
Natomas Community Association
Office of City Attorney, San Francisco
Pacific Advocates
Pacific Coast Federation of Fisherman's Association
Planning and Conservation League
Point Reyes Bird Observatory
Protect American River Canyons
Public Officials for Water and Environmental Reform
Romberg Tiburon Center
Rosemont Community Association
Sacramento Area Water Works Association
Sacramento County Farm Bureau
Sacramento River Preservation Trust
Sacramento Valley Open Space Conservancy
Sacramento Water Intelligently Managed
San Francisco Bay Bird Observatory
San Francisco Public Utilities Commission
San Joaquin County Farm Bureau
Save Mount Diablo
Save San Francisco Bay Association
Save the American River Association
Share the Water
Sierra Club - Mount Diablo
Sierra Club - North Alameda Co.
Sierra Club - Northern California
Sierra Club - Sacramento Valley Group
Sierra Club - San Francisco Bay Chapter
Sierra Club - West County
Sierra Club Water Committee
Terwillinger Nature Education Center
The Bay Institute of San Francisco
The Ecology Center
The Gem & Mineral Society
The Nature Conservancy
The Pacific Institute
The Resources Agency
Trust for Public Land
United Anglers of California
University of California Energy & Resources
Urban Creeks Council
Urban Habitat-Earth Island Inst.
W.A.T.E.R.
Waltner & Gorman
Water Advisory Commission
Water Education Foundation
WateReuse Association

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Chapter 21

# Citations

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## PERSONAL COMMUNICATIONS

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Mar, Tim. Funding and priority specialist. City of Sacramento Public Works Department, Sacramento, CA. August 25, 1997 - telephone conversation; August 26, 1997 - maps depicting Richards Boulevard Area Plan, Facility Element Roadways Alignments.

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Chapter 22

# List of Preparers

# Chapter 22. List of Preparers

Following is a list of persons who contributed to preparation of this EIR/EIS. This list is consistent with the requirements set forth in NEPA and CEQA (40 CFS 1502.17 and Section 15129 of the State CEQA Guidelines).

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| Andy Enos | B.S., 1984, Civil Engineering | Water and wastewater operations and applied process engineering | 13 | Review of water quality information |
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| Roderick Hall | M.S., 1970, Mechanical Engineering<br>B.S., 1965, Mechanical Engineering | NEPA compliance | 30 | Federal project management; NEPA process and compliance; EIS/EIR review |
| Cecil Lesley | B.A., 1978, Social Sciences | Water service contract development and administration | 17 | EIS/EIR review |
| **Jones & Stokes Associates** | | | | |
| Albert Herson | J.D., 1984<br>M.A., 1976, Urban Planning<br>B.A., 1972, Psychology | Program management for major EISs and EIRs; environmental regulatory compliance | 22 | Principal-in-charge |
| Harlan Glines | B.A., 1985, Environmental Studies | Water resource planning and impact analysis, socioeconomic studies, land use planning and impact analysis, planning policy consistency assessment, environmental documentation, and project management | 14 | Project manager |

| Name | Qualifications | Expertise | Years of Professional Experience | Participation |
|---|---|---|---|---|
| Gregg Roy | B.S., 1982, Political Economy of Natural Resources | Socioeconomic and economic analysis, natural resources studies, agricultural land studies, and recreation impact analysis | 13 | Assistant project manager |
| John Anderson | B.A., Social Science | Desktop publishing | 3 | Desktop publisher |
| Victoria Axiaq | B.A., 1975, English<br>M.A., 1992, English | Technical and scientific editing, publications management | 15 | Lead technical editor |
| Debbie Bloom | | Graphic design | 5 | Graphic artist |
| Ken Bogdan | J.D., 1989<br>B.S., Environmental Management | Legal and regulatory compliance, environmental impact studies | 9 | ESA compliance |
| Russ Brown | Ph.D., Civil Engineering (water resources)<br>M.S., Ocean Engineering<br>B.S., Civil and Environmental Engineering | Hydrologic and water quality modeling to support fisheries and other water resource investigations | 20 | Hydrologist and water quality specialist |
| Susan Bushnell | B.S., 1990, Conservation and Resource Studies | Natural resource management, rare plant studies, floristic inventories, vegetation mapping, mitigation and monitoring studies, wetland delineation, CEQA and NEPA compliance, agency coordination | 8 | Botanist |
| Steve Centerwall | B.S., 1986, Environmental Policy Analysis and Planning | General plan and specific plan EIR management and analyses; land use and environmental planning; physical and policy impact assessments; CEQA compliance and expert review; water, wastewater, and public services impact assessments; and visual resource analysis | 11 | EIR/EIS task leader |
| Ellyn Davis | M.E.M., 1986, Resource Ecology<br>B.S., 1984, Botany | Habitat mitigation plan development, restoration planning, wetland delineation and permitting assistance, botanical inventory and assessment, and sensitive species surveys | 11 | 404 permit compliance/ biological resources task leader |



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| Name | Qualifications | Expertise | Years of Professional Experience | Participation |
|---|---|---|---|---|
| Christopher Dore | Ph.D., 1996, Anthropology M.A., 1986, Anthropology B.A., 1982, Anthropology | Cultural and behavioral factors in archeological design, community and regional planning, quantitative analysis, GIS, remote sensing, photogrammetry and computer cartography | 16 | Section 106 compliance/cultural resources task leader |
| Aimee Dour-Smith | B.S., 1992, Environmental Policy Analysis and Planning | Coordination of large-scale state and federal environmental assessments, environmental permit requirements for transportation projects, and endangered species habitat conservation planning | 5 | Environmental planner |
| Trish Fernandez | B.A., 1995, Anthropology | Archeological excavations and surveys in California; site recordings, evaluation and development of mitigation measures | 2 | Cultural resources specialist |
| Christina Franchetti | B.S., 1994, Natural Resource Planning and Interpretation | Environmental planning for multi-disciplinary environmental analyses and water resource, development, and other plan projects | 4 | Task leader |
| Jeanine Hinde | B.A., 1982, Geography | Environmental planning and impact assessments, policy analyses, visual and land use studies | 8 | Project analyst |
| Anne Huber | M.S., Ecology B.S., Biology | Development and interpretation of water temperature models and water operations models | 5 | Water quality specialist |
| Chris Keithley | M.S., 1991, Geography B.A., 1988, Geography | Project management and analyses using GIS, ARC/INFO, ArcView, and ERDAS Imagine remote sensing applications | 8 | GIS specialist |
| Jeff Lafer | M.S., 1992, Environmental Science B.S., Environmental Science | Water quality monitoring and data analysis, impact assessment, and watershed analysis of pollution sources, control, and management | 6 | Water quality specialist |
| Kathryn McDonald | B.A., English | Technical and scientific editing | 20 | Technical editor |



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| Name | Qualifications | Expertise | Years of Professional Experience | Participation |
|---|---|---|---|---|
| Bill Mitchell | M.S., 1988, Fisheries Biology B.S., 1980, Biology | Fish population dynamics and modeling, aquatic ecology, sampling design and statistical analyses, impact assessments, direct and microhabitat observations and analyses | 11 | Fisheries biologist |
| Rebecca Rozumowicz | B.S., 1994, Soil and Water Science | Wetland delineation and mitigation planning; soil morphology, genesis, and classification; soil, plant, and water relationships | 4 | Wetlands specialist |
| Tony Rypich | A.A., Drafting and Architectural Technology | Graphic design | 15 | Graphic artist |
| Randy Stegen | B.S., 1988, Physical Science | Air quality and noise modeling and impact analyses | 9 | Air quality and noise analyst |
| Stephanie Theis | M.S., 1996, Applied Ecology and Conservation Biology (Fisheries) B.S., 1990, Fisheries Biology (marine option) | Fish population and habitat sampling, quantitative fisheries impact assessment, and computer applications for fisheries | 6 | Fisheries biologist |
| Ray Weiss | B.A., 1994, Economics | Recreation demand evaluation; demographic and financial analysis; and socioeconomic impact assessment | 3 | Economist |
| Ed Whisler | B.S., 1982, Biological Science | Wildlife habitat evaluation and restoration; special-status species surveys; biological resource impact analysis; mitigation planning | 14 | Wildlife biologist |
| **Subconsultants** | | | | |
| Black and Veatch - Steve Foellmi | B.S., 1972, Civil Engineering M.S., 1981, Civil Engineering | Water supply treatment, transmission, and distribution | | Engineering consultant - facilities |
| CH2M Hill - Mike Price | B.S., 1975, Civil Engineering M.S., 1976, Environmental Engineering | Water supply treatment and distributio of potable water | 21 | Engineering consultant - water quality |



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| Name | Qualifications | Expertise | Years of Professional Experience | Participation |
|---|---|---|---|---|
| Gary Nuss | M.S., 1981, Agricultural Engineering | Planning and design of water resource facilities | 17 | Engineering consultant - facilities |
| Entrix/Trihey & Associates - Jean Baldridge | B.A., 1974, Biology M.S., 1988, Fisheries | Aquatic ecology with emphasis in fisheries and assessment of aquatic habitat | 20 | Review of fishery impact assessment |
| Garcia and Associates - John Garcia | M.S., 1974, Forest Resources B.S., 1973, Ecology/Inter-disciplinary Studies | Natural and cultural resources, specializing in archaeology, aquatic, and terrestrial ecology, and natural resources policy and planning applications | 26 | Field studies |
| Hanson Environmental - Charles Hanson | Ph.D., 1980, Ecology and Fisheries Biology M.S., 1973, Fisheries Biology B.S., 1972, Fisheries Biology | Aquatic and wildlife biology and quantitative science | 20 | Review of fisheries impact assessment |
| Larry Dale Associates - Larry Dale | Ph.D., 1990, Agricultural Economics M.S., 1971, Economics | Economics | 19 | Water resource economist |
| Leland R. Gardner & Associates - Douglas Hamilton | Ph.D., 1984, Geology M.S., 1962, Geology B.S., 1956, Geology | Engineering, seismic, groundwater, and mineral resource geology | 38 | Geology and soils |
| May Consulting Services - Loran May | B.S., 1985, Biology | Botanical assessments, wetland delineation, environmental permitting assistance, resource planning, and construction mitigation and monitoring services | 19 | Botanist |
| Montgomery Watson - Paul Wisheropp | B.S., 1979, Environmental Engineering M.S., 1982, Civil Engineering | Water resources engineering | 17 | Engineering consultant - PROSIM modeling |



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| Name | Qualifications | Expertise | Years of Professional Experience | Participation |
|---|---|---|---|---|
| Sandoval Word Processing - Esther Sandoval | A.A., 1975, General Education (Foreign Languages) | Word processing, desktop publishing, and administrative services | 16 | Desktop publisher |
| Uribe & Associates - Tom Meichtry | M.S., 1980, Engineering<br>M.B.A., 1971<br>B.S., 1967, Engineering<br>P.E. (Registered in CA) | Master planning and design engineering | 30 | Visual and land use components |
| Muriel Waller | | | | Visual and land use components |

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# Key Terms

| | |
|---|---|
| ACHP | Advisory Council on Historic Preservation |
| AF | acre-feet |
| ALUC | Airport Land Use Commission |
| APE | area of potential effects |
| BAAQMD | Bay Area Air Quality Management District |
| BACM | Best Available Control Measures |
| BMPs | best management practices |
| CAL/OSHA | California Occupational Safety and Health Administration |
| CARB | California Air Resources Board |
| CCAA | California Clean Air Act of 1988 |
| CCT | Central California Traction |
| CCWD | Contra Costa Water District |
| CEQ | Council on Environmental Quality |
| CEQA | California Environmental Quality Act |
| cfs | cubic foot per second |
| CHRIS | California Historic Resources Inventory System |
| CMP | Coordinated Monitoring Program |
| CNPS | California Native Plant Society |
| CO | carbon monoxide |
| Corps | U.S. Army Corps of Engineers |
| CPRR | Central Pacific Rail Road |
| CSUS | California State University, Sacramento |
| CVP | Central Valley Project |
| CVPIA | Central Valley Project Improvement Act |
| DBPs | disinfection byproducts |
| Delta | Sacramento-San Joaquin River Delta |
| DFG | California Department of Fish and Game |
| DWR | California Department of Water Resources |
| EBMUD | East Bay Municipal Utility District |
| EC | electrical conductivity |
| EDF | Environmental Defense Fund |
| EIR/EIS | environmental impact report/environmental impact statement |
| EPA | U.S. Environmental Protection Agency |
| FERC | Federal Energy Regulatory Commission |
| FSC | Folsom South Canal |
| gpm | gallons per minute |
| I-5 | Interstate 5 |
| ITE | Institute of Transportation Engineers |
| kV | kilovolt |
| Ldn | day-night average sound level |
| LMRMP | lower Mokelumne River Management Plan |
| Mather Airport CLUP | Mather Airport Comprehensive Land Use Plan |
| mg/L | milligrams per liter |
| MGD | million gallons per day |
| MOA | memorandum of agreement |
| MOU | Memorandum of Understanding |
| MRI | Midwest Research Institute |
| NDDB | Natural Diversity Data Base |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| Nimbus | Nimbus Diversion Works |
| NMFS | National Marine Fisheries Service |
| $NO_x$ | oxides of nitrogen |
| NPDES | National Pollutant Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| PG&E | Pacific Gas and Electric Company |
| PM10 | inhalable particulate matter less than 10 microns in diameter |
| ppd | parts per day |
| ppm | parts per million |
| PROSIM | **PRO**jects **SIM**ulation |
| Reclamation | U.S. Bureau of Reclamation |
| ROG | reactive organic gases |
| ROW | right-of-way |
| RWQCB | regional water quality control board |
| SAFCA | Sacramento Area Flood Control Agency |
| SFBAAB | San Francisco Bay Area Air Basin |
| SIP | State Implementation Plan |
| SJVAB | San Joaquin Valley Air Basin |
| SJVUAPCD | San Joaquin Valley Unified Air Pollution Control District |
| SMAQMD | Sacramento Metropolitan Air Quality Management District |
| SMUD | Sacramento Municipal Utility District |
| $SO_2$ | sulfur dioxide |
| SCC | System Capacity Charges |
| SWP | State Water Project |
| SWPPP | Storm Water Pollution Prevention Plan |
| SWRCB | California State Water Resources Control Board |
| TAF | thousand acre-feet |
| THMs | trihalomethane |
| tpy | tons per year |
| Updated WSMP | Updated Water Supply Management Program |
| USB | ultimate service boundary |
| USFWS | U.S. Fish and Wildlife Service |
| UWMP | Urban Water Management Plan |
| VOC | volatile organic compound |
| WRIP | Water Reclamation Implementation Plan |
| WTPs | water treatment plants |
| $\mu$S/cm | microsiemens per centimeter |

*CONVERSION FACTORS*

**1 MGD = 1.547229 cfs**

**1 cfs = 0.6463169 MGD**

**1 cfs = 1.98 acre-ft/day**

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