Long-term Warren Act Contract Between the United States of America and the City of Roseville

DRAFT

Environmental Assessment
Finding of No Significant Impact

Initial Study
Mitigated Negative Declaration

January 2006

Draft
Finding of No Significant Impact
for the
Long-term Warren Act Contract
Between the City of Roseville and the
United States of America

Lead Agency:
U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region
Sacramento, California

Local Agency:
City of Roseville
Community Development Department
Roseville, California

This Finding of No Significant Impact (FONSI) for the Long-term Warren Act Contract between the City of Roseville and the United States of America as been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, and the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508). The Mid-Pacific Regional Office of the U.S. Bureau of Reclamation (Reclamation) has determined that the Proposed Action will not significantly affect the quality of the environment; therefore, an Environmental Impact Statement (EIS) is not required.

1.0 BACKGROUND

The U.S. Bureau of Reclamation proposes to enter into a long-term (25-year) Warren Act Contract with the City of Roseville to facilitate delivery up to 30,000 acre-feet annually of Placer County Water Agency Middle Fork Project water through Folsom Reservoir and the federal facilities at Folsom Dam, to the City's Water Treatment Plant for ultimate use in the City's service area.

The action area includes the area in which the water would be delivered and ultimately used, including Folsom Reservoir, specifically the urban water supply intake located within Folsom Dam; the Folsom Pumping Plant and North Fork Pipeline; and the City of Roseville Water Treatment Plant, located on Barton Road in the community of Granite Bay, Placer County, CA. The action area also includes those waterbodies potentially affected by Reclamation's operation of CVP facilities and DWR's operation of the SWP

in response to water deliveries related to the proposed diversion. These latter areas include the CVP, namely the Sacramento River and its upstream reservoirs (i.e., Shasta and Trinity), and the lower American River including Folsom Reservoir, as well as Oroville Reservoir, the lower Feather River, and the Delta.

2.0 FINDINGS

An Environmental Assessment (EA), incorporated by reference, has been prepared to disclose potential environmental impacts pursuant to NEPA. The impact assessments conducted in the EA utilized hydrologic model output to evaluate the potential for implementation of the Proposed Action to result in effects to the following resource categories:

- Aesthetics
- Agricultural Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Hazardous Materials
- Water Supply and Hydrology
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Utilities/Service Systems
- Power Resources
- Water Quality

The following discussion identifies why any effects of the Proposed Action are not considered significant.

Aesthetics

- Visual resources and character of the water bodies and waterways within the project and regional study area would not be diminished by the Proposed Action, relative to the No Action Alternative.

Agricultural Resource

- Other than within the West Roseville Specific Area, there are no land areas designated for agricultural use. Potential impacts and associated mitigation measures regarding conversion of agricultural land were previously disclosed in the West Roseville Specific Plan EIR. As a result, the Proposed Action/Proposed Project or alternatives would not have any new or additional impact on agricultural lands within the City's service area.

Air Quality

- The Proposed Action will not change the City's attainment status for any of the criteria pollutants within the City (e.g., ozone and PM10).

Biological Resources

- Reclamation initiated and participated in informal consultation and technical assistance with the National Marine Fisheries Service (NMFS) on the effects of the Proposed Action on the federally listed winter-run Chinook salmon, spring-run Chinook salmon, Central Valley steelhead, as well as fall-run Chinook salmon

and green sturgeon, which were previously designated as candidate species. NMFS concurred with Reclamation that the Proposed Action, as defined for federal ESA consultation purposes would not adversely affect listed species, species proposed for listing, or candidate species within the local and regional study areas.

- Reclamation initiated and participated in informal consultation and technical assistance with the U.S. Fish and Wildlife Service (USFWS) on the effects of the Proposed Action on the federally listed delta smelt, as well as the previously listed Sacramento splittail. USFWS concurred with Reclamation that the Proposed Action, as defined for federal ESA consultation purposes would not adversely affect listed species or species proposed for listing in the local and regional study areas.
- Evaluation of the hydrologic, water temperature and salmon mortality modeling output under the Proposed Action, relative to the No Action Alternative, indicates that potential impacts to fisheries resources due to simulated changes in river flow, water temperature, reservoir water surface elevation, or storage in water bodies within the project and regional study area would be less than significant.
- Terrestrial resources (i.e., riparian corridor vegetation, its associated habitat value, including special-status species that rely upon the resource) along the waterways and water bodies within the project and regional study area would not be adversely affected by changes in river flows or reservoir water surface elevations under the Proposed Action, relative to the No Action Alternative.

Cultural Resources

- Cultural resources within the Proposed Action's Area of Potential Effect (APE) would not become more likely to be exposed along rivers or within reservoir drawdown areas of the project or regional study area due to the Proposed Action, relative to the No Action Alternative.
- The Proposed Action does not involve construction or earthwork activities that could lead to potential disturbance of buried cultural resources.
- Further, the City of Roseville will coordinate with the State of California's Historic Preservation Officer and the U.S. Advisory Council on Historic Preservation to ensure compliance with Section 106 of the National Historic Preservation Act.

Geology and Soils

- Potential impacts to geology and soils within the project study area as a result of the Proposed Action are considered less than significant.

Hazardous Materials

- The Proposed Action, as a water delivery effort, would not affect the hazardous material management efforts of the City and, therefore, would have no impact on hazardous materials within the City service area.

Water Supply and Hydrology

- There would be no water supply impacts to American River water rights holders, State Water Project customers, either Settlement or Exchange Contractors, or

Central Valley Project Water Service Contractors under the Proposed Action, relative to the No Action Alternative.

Land Use and Planning

- Variable-space storage operations at Folsom Reservoir and changes in river flows would not be inconsistent with any applicable land use plan. Therefore, there would be no operation-related impacts on land use.
- The Proposed Action would not directly contribute to substantial growth or growth-related impacts (i.e., population increases, substantial changes in land use development patterns, or other activities that could significantly affect the environment).

Mineral Resources

- Implementation of the Proposed Action would not affect the quantity, location, or revenue of sand and gravel extraction and, therefore, would have no impact on City service area mineral resources.

Noise

- The Proposed Action as a water delivery action, would not affect urban noise sources in the City's service area or efforts by the City to mitigate their effects.

Population and Housing

- Implementation of the Proposed Action would not affect state or county economic growth rates, interest rates, employment level, the national investment climate, the perception of Roseville as a community, or any other contributing factor that could influence population and housing changes within the City.

Public Services

- Implementation of the Proposed Action would not impact City service area land use or population and, therefore, would not impact City service area public services.

Recreation

- Recreation opportunities associated with water bodies within the project and regional study area would not be reduced by the Proposed Action, relative to the No Action Alternative.

Transportation and Traffic

- The Proposed Action, as a water delivery action, would not directly increase the travel demand on any existing roadways or create the need for new roadways. Accordingly, the Proposed Action would not affect transportation or traffic levels within the City's service area.

Utilities/Service Systems

- The Proposed Action, as a water delivery action intended to provide the City with the ability to fully exercise its purchased water rights entitlement, accommodates and is consistent with the Public Facilities Element of the City's General Plan.

Power Supply

- Evaluation of the hydrologic modeling output for the Proposed Action, relative to the No Action Alternative, indicates that impacts to hydropower generation would be reduced or there would be no impact (i.e., a net benefit).
- Further, the increase in energy requirement at Folsom Pumping plant is due entirely to the increased diversion for the City. In this case, the beneficiaries of the increased diversion (the City) would be the only party financially responsible for the increased energy requirement.

Water Quality

- The Proposed Action would not cause an exceedance of local, state, or federal water quality criteria or standards within local or regional study area water bodies.

3.0 CONCLUSION

Reclamation has fully evaluated the information and analysis contained in the EA for the execution of a Long-tern Warren Act contract as summarized above. On the basis of these considerations, Reclamation has determined that the EA adequately and accurately addresses the environmental issues and impacts of the Proposed Action and finds that the Proposed Action is not a major federal action that will significantly impact the quality of the human environment. Therefore, an EIS is not required and will not be prepared for this project, based on the fact that there will be no long-term adverse impacts on the natural environment resulting from the execution of a Long-term Warren Act Contract with the City of Roseville.

Comments or questions regarding this FONSI for the Long-term Warren Act Contract with the City of Roseville may be directed to:

Ms. Elizabeth Ayres
U.S. Bureau of Reclamation
Central California Area Office
7794 Folsom Dam Road
Folsom, CA 95630-1799

This **Finding of No Significant Impact** has been prepared and is submitted to document the environmental review and evaluation of the Proposed Action in compliance with the National Environmental Policy Act of 1969, as amended.

Recommended:

_____ _____
Northern California Area Office NEPA Coordinator Date

Approved:

_____ _____
Northern California Area Office Manager Date

FONSI No.

_____

NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION

DATE: **January 20, 2006**

TO: **Interested Parties**

FROM: **City of Roseville Community Development Department**

RE: **The proposed Long-Term Warren Act Contract between the City of Roseville and the U.S. Bureau of Reclamation**

Project Location and Description
The City of Roseville proposes to enter into a long-term (25-year) Warren Act Contract with the U.S. Bureau of Reclamation to facilitate delivery of up to 30,000 acre-feet annually of Placer County Water Agency's water rights water from Folsom Reservoir, through the federal facilities at Folsom Dam, to the City's Water Treatment Plant for ultimate use in the City service area.

The Proposed Action area includes the area in which the water would be delivered and ultimately used, including Folsom Reservoir, specifically the urban water supply intake located within Folsom Dam; the Folsom Pumping Plant and North Fork Pipeline; and the City of Roseville Water Treatment Plant, located on Barton Road in the community of Granite Bay, Placer County, CA. The action area also includes those water bodies potentially affected by Reclamation's operation of Central Valley Project (CVP) facilities and Department of Water Resources (DWR) operation of the SWP in response to water deliveries related to the proposed diversion. These latter areas include the CVP, namely the Sacramento River and its upstream reservoirs (i.e., Shasta and Trinity), and the lower American River including Folsom Reservoir, as well as Oroville Reservoir, the lower Feather River, and the Delta.

Document Review and Availability
The public comment period will extend from **January 27, 2006 through February 27, 2006.** The Initial Study and Mitigated Negative Declaration are available for public review at the following locations:

- The City of Roseville Permit Center and City Clerk's Office, located at 311 Vernon Street, Roseville, CA 95678 (8:00 A.M. to 5:00 P.M., Monday through Friday)
- The Roseville Main Library (255 Taylor Street) and the Maidu Branch Library (1530 Maidu Drive) during normal operating hours.

Contact
Questions regarding CEQA documentation may be directed to: Mark Morse, Environmental Coordinator, City of Roseville Community Development Department, 311 Vernon Street, Roseville, CA 95678 (916/774-5334).
Questions regarding NEPA documentation may be directed to Ms. Elizabeth Ayres, Bureau of Reclamation, Central California Area Office, 7794 Folsom Dam Road, Folsom, CA 95630-1799 (916/989-7192).

Written Comments
Written comments on the Draft Environmental Assessment/Initial Study (EA/IS) and the Draft Finding of No Significant Impact/Mitigated Negative Declaration (FONSI/MND) shall be directed to:

Ms. Elizabeth Ayres
Bureau of Reclamation
Central California Area Office
7794 Folsom Dam Road
Folsom, CA 95630-1799

MITIGATED NEGATIVE DECLARATION

PROJECT TITLE: Long-Term Warren Act Contract Between the City of Roseville and the United States of America

PROJECT LOCATION: Folsom Reservoir, specifically the urban water supply intake located within Folsom Dam; the Folsom Pumping Plant and North Fork Pipeline. The City of Roseville Water Treatment Plant, located on Barton Road in the community of Granite Bay, Placer County, CA. The CVP, including the Sacramento River and its upstream reservoirs (i.e., Shasta and Trinity), Folsom Reservoir, the lower American River, and the Delta. The SWP, including the Feather River and Oroville Reservoir.

DATE: January 20, 2006

PROJECT APPLICANT: City of Roseville Department of Environmental Utilities

LEAD AGENCY: City of Roseville Community Development Department

CONTACT PERSON: Derrick Whitehead (916/774-5770)

PROJECT DESCRIPTION: The U.S. Bureau of Reclamation proposes to enter into a long-term (25-year) Warren Act Contract with the City of Roseville to facilitate delivery of up to 30,000 acre-feet annually of Placer County Water Agency's water rights water from Folsom Reservoir, through the federal facilities at Folsom Dam, to the City's Water Treatment Plant for ultimate use in the City service area.

DECLARATION

The City of Roseville Environmental Coordinator has determined that the above project will have no significant effect on the environment and is therefore exempt form the requirement of an environmental impact report (EIR). The determination is based on the attached initial study and the following findings:

a) *The project will not degrade environmental quality, substantially reduce habitat, cause a wildlife population to drop below self-sustaining levels, reduce the number or restrict the range of special-status species, or eliminate important examples of California history or prehistory.*
b) *The project does not have the potential to achieve short-term, to the disadvantage of long-term, environmental goals.*
c) *The project will not have impacts that are individually limited, but cumulatively considerable.*
d) *The project will not have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly.*
e) *No substantial evidence exists that the project will have a negative or adverse effect on the environment.*
f) *The project incorporates all applicable mitigation measures identified in the attached initial study.*
g) *This mitigated negative declaration reflects the independent judgment of the lead agency.*

Written comments shall be submitted no later than 30 days from the posting date. City Council determination on this Mitigated Negative Declaration is final.

Submit comments to:
Ms. Elizabeth Ayres
U.S. Bureau of Reclamation
Central California Office
7794 Folsom Dam Road
Folsom, CA 95630-1799

Mark Morse, Environmental Coordinator

Posting Period: 1/27/06-2/27/06

Draft Environmental Assessment - Finding of No Significant Impact
Initial Study - Mitigated Negative Declaration
For a Long-term Warren Act Contract
Between the United States of America and the City of Roseville

Table of Contents

List of Tables

List of Figures

List of Appendices

Acronyms

AF	acre-feet
AFA	acre-feet annually
AFRP	Anadromous Fish Restoration Program
APE	Area of Potential Affect
AQAP	Air Quality Attainment Plan
ARB	Air Resources Board
ARBC	American River Basin Cumulative
BA	Biological Assessment
BMPs	Best Management Practices
CAR	Coordination Act Report
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CHP	California Highway Patrol
City	City of Roseville
CNDDB	California Natural Diversity Data Base
CO	carbon monoxide
COA	Coordinated Operations Agreement
CSUS	California State University, Sacramento
Cumulative Report	American River Basin Cumulative Study Impact Report
CVP	Central Valley Project
CVPIA	Central Valley Improvement Act
CVP-OCAP	CVP Operations Criteria and Plan
CWA	Clean Water Act
CWD	Carmichael Water District
D-1104	Decision 1104
Delta	Sacramento-San Joaquin River Delta
DMMs	Demand Management Measures
E/T	Efficacy and Timing Criterion
EA	Environmental Assessment
EC	Economic Criterion
EFH	essential fish habitat
EID	El Dorado Irrigation District
EIR	environmental impact report
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973, as amended
ESU	Evolutionarily Significant Unit
FHWA	Federal Highway Administration
FISH Plan	Initial Fisheries and In-stream Habitat Management and Restoration Plan
FMS	Flow Management Standard
FONSI	finding of no significant impact
FWCA	Fish and Wildlife Coordination Act
GWh	Gigawatthours

HCP	habitat conservation program
HME	Habitat Management Element
I-80	Interstate 80
IC	Institutional Criterion
IS	Initial Study
ITA	Indian Trust Assets
ITS	Incidental Take Statement
JPA	Joint Power Authority
MA	Monitoring Agreement
MAF	million acre-feet
MFP	Middle Fork Project
mgd	million gallons per day
MND	Mitigated Negative Declaration
MRF	Material Recovery Facility
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MW	Megawatts
NCPA	Northern California Power Agency
NCRSP	North Central Roseville Specific Plan
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMWC	Natomas Mutual Water Company
NO_x	oxides of nitrogen
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OC	Operational Criterion
OCAP	Operations Criteria and Plan
Parkway	American River Parkway
PCAPCD	Placer County Air Pollution Control District
PCSP	Pacific Coast Salmon Plan
PCWA	Placer County Water Agency
PG&E	Pacific Gas & Electric Company
PGWWTP	Pleasant Grove Wastewater Treatment Plant
PH	Public Health Criterion
RBDD	Red Bluff Diversion Dam
RC	Reliability Criterion
Reclamation	U.S. Bureau of Reclamation
RFD	Roseville Fire Department
RM	River Mile
ROG	reactive organic gases
RVDs	recreation visitor days
RWA	Regional Water Authority
RWQCB	Regional Water Quality Control Board
SACOG	Sacramento Area Council of Governments
SAQMA	Sacramento Air Quality Maintenance Area
SIP	State Implementation Plan
SLC	State Lands Commission

SMUD	Sacramento Municipal Utility District
SPMUD	South Placer Municipal Utility District
SPTCo	Southern Pacific Transportation Company
SRA	shaded riverine aquatic
SRA	State Recreation Area
SRWTP	Sacramento River Water Treatment Plant
SSWD	Sacramento Suburban Water District
SWP	State Water Project
SWRCB	State Water Resources Control Board
T/P	Technical and Physical Criterion
TAF	thousand acre-feet
TDS	total dissolved solids
TOC	total organic carbon
ULF	ultra low-flow
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
Western	Western Area Power Administration
WFA	Sacramento Area Water Forum Agreement
WRSL	Western Regional Sanitary Landfill
WTP	Water Treatment Plant

Chapter 1
Introduction

The U.S. Bureau of Reclamation (Reclamation) proposes to enter into a long-term (25-year) Warren Act contract with the City of Roseville (City). This contract is for the conveyance of up to 30,000 acre-feet annually (AFA) of Placer County Water Agency (PCWA) Middle Fork Project (MFP) water through Folsom Reservoir and the federal facilities at Folsom Dam to the City's Water Treatment Plant (WTP) for ultimate use in the City service area.

1.1. Project Purpose and Objectives

The purpose of executing a long-term Warren Act contract with the City is to allow for conveyance of up to 30,000 AFA of water rights water (purchased from PCWA) to the City's WTP for ultimate use in its retail service area. As such, this Environmental Assessment/Initial Study includes analysis of the secondary effects of growth facilitated by the delivery of water rights water within the City's water service area. The City's service area is within PCWA's authorized place of use and constitutes efficient in-basin utilization of PCWA's water rights water by the City. A new long-term Warren Act contract would provide the City with the operational flexibility to better meet its existing and future water demands through a combination of Central Valley Project (CVP) and non-CVP water supply deliveries. Under a new long-term Warren Act contract, the City would be able to exercise both its federal CVP contract water, as well as its purchased PCWA water rights water, under a wider range of water availability conditions. In water-short years for example, where deficiencies would be imposed upon the CVP supplies, the City would be able to rely on its PCWA water supply to meet its needs. This ability to access its water rights entitlement to meet water demands beyond their CVP water supply is critical to the City, as it continues to progress towards buildout and as water availability throughout the CVP becomes increasingly limited.

1.2. Purpose of this Environmental Assessment / Initial Study

The purpose of this document is threefold. First, it meets Reclamation's impact assessment obligations under the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq*.). NEPA requires full disclosure regarding potential federal actions, their alternatives, potential impacts, and possible mitigation for actions taken by federal agencies.

Second, it satisfies the City's environmental review obligations under the California Environmental Quality Act (CEQA) (Cal. Pub. Resources Code §21000 *et seq*.) and the California Endangered Species Act (CESA) (Cal. Fish and Game Code §2050 *et seq.*) as they act to enter into the proposed Warren Act contract with Reclamation. CEQA requires consultation with the California Department of Fish and Game (CDFG), as a trustee agency, for projects that might affect the habitat of a state threatened or endangered species. This joint document serves as the required CEQA document and includes information related to sensitive state species that are intended to support the appropriate consultations with CDFG.

CEQA mandates that projects which are consistent with the development density established by existing zoning, community plan, or general plan policies for which an environmental impact report (EIR) was certified shall not require additional environmental review, except as might be necessary to examine whether there are project-specific significant effects which are peculiar to the project or its site (CEQA Guidelines Section 15183). The proposed City of Roseville long-term Warren Act contract is designed to meet both the City's existing and future planned water needs within the context of an approved General Plan. Impacts on resources, activities, services, and the quality of life within the City's service area have already been addressed in the environmental review and approval processes associated with the General Plan and, moreover, have been evaluated in several individual specific plans. The previous environmental documents associated with these plans identified and addressed significant unavoidable effects associated with full buildout of the City. No new significant environmental effects peculiar to the proposed long-term Warren Act contract would occur within the City's service area that have not already been disclosed in previous environmental documents approved and certified by the City. Therefore, in accordance with CEQA Guidelines Section 15183, an EIR is not required to address potential impacts within the City's service area as a direct result of the proposed long-term Warren Act contract.

Third, it provides documentation for Reclamation's obligations and requirements under the federal Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. §§1531 *et seq*.) with respect to the action that Reclamation proposes to take (i.e., execution of a Warren Act contract and the delivery of water through the federal facilities at Folsom Dam and Reservoir pursuant thereto).

This joint document, therefore, will serve as the appropriate environmental review and approval document under both NEPA and CEQA. Under this joint document, an Environmental Assessment (EA) and finding of no significant impact (FONSI) are included in compliance with NEPA, and an Initial Study (IS) and Mitigated Negative Declaration (MND) are included in compliance with CEQA. Reclamation is the designated lead agency under NEPA and the City of Roseville is the designated lead agency under CEQA. Reclamation and the City will publish public notices, provide for public and agency review, and respond to substantive comments on this joint document, as required by NEPA and CEQA.

With respect to Reclamation's obligations under the federal ESA, this joint document also serves as the Biological Assessment (BA), which must be prepared by Reclamation pursuant to section 7(c) of the federal ESA (16 U.S.C. §1536(c)) and to 50 C.F.R. Part 402. The potential effects of Reclamation's Proposed Action on federally listed threatened and endangered species and on species proposed for federal listing must be evaluated within the context of the federal ESA. Reclamation and the City have been involved in coordination and informal consultations regarding the Proposed Action with both the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) since 2000. As a result of these efforts, NMFS has provided Reclamation with a Letter of Concurrence (dated December 13, 2002) that the Proposed Action is not likely to adversely affect Sacramento River winter-run Chinook

salmon, Central Valley spring-run salmon, or Central Valley steelhead, or designated critical habitat (see Appendix N). Additionally, NMFS indicated that the Proposed Action is not likely to adversely affect essential fish habitat (EFH) for Pacific salmon. (Please refer to Chapter 6, Endangered Species Act Compliance, for additional discussion regarding NMFS consultation history). As part of the administrative record, Reclamation will provide a copy of the public draft EA/IS and FONSI/MND to NMFS, which includes the BA.

Reclamation also will provide USFWS with a review copy of the public Draft EA/IS and FONSI/MND, which includes the BA. Similar to their involvement with NMFS, Reclamation and the City have coordinated with USFWS regarding ESA requirements and agreements for the Proposed Action. As a result of these efforts, USFWS has provided Reclamation with a Letter of Concurrence (dated January 19, 2006) that the included USFWS's determination that the Proposed Action is not likely to adversely affect the federally listed vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle or designated critical habitat (see Appendix N). (Please refer to Chapter 6, Endangered Species Act Compliance, for additional discussion regarding USFWS consultation history).

1.3. SCOPE OF THIS JOINT DOCUMENT AS A BIOLOGICAL ASSESSMENT

The BA analysis addresses whether the Proposed Action may affect any federally listed threatened or endangered species, candidate species, or any species proposed for listing under the ESA that is known or likely to occur within the action area. The action area includes all areas where direct or indirect effects of the Proposed Action may occur. Because the Proposed Action involves Reclamation's operation of CVP facilities for water supply, DWR's operation of the SWP in response to water deliveries related to the proposed diversion, and other environmental or regulatory obligations, the regional study area encompasses the reservoirs and water courses of the CVP and SWP, north of and including the Sacramento-San Joaquin River Delta (Delta), as well as all lands within the City's service area where the water may be distributed.

This BA addresses the following major issues for aquatic and terrestrial species within the action area:

- The presence of suitable habitat or potential suitable habitat for each proposed or listed species in the area affected by the Proposed Action (i.e., execution of a Warren Act contract);
- The established level of use or potential for use of the suitable habitat for each proposed or listed species in the area affected by the Proposed Action;
- The presence, and estimated magnitude, of potential disturbances to proposed or listed species or habitat as a result of the Proposed Action;
- The extent of direct habitat loss due to the Proposed Action;
- The overall level of direct and indirect effects of the Proposed Action on proposed and listed species; and
- The past measures implemented to mitigate for indirect effects on proposed and listed species and their habitat.

Reclamation, with cooperation from USFWS and NMFS, previously developed a strategy to address the cumulative effects of the multiple water diversion actions proposed for the American River Basin. These diversion actions include the water to be delivered to the City under its proposed Warren Act contract with Reclamation. A specific analysis prepared by Reclamation as contained in the American River Basin Cumulative Study Impact Report (Cumulative Report) (August 2002) is incorporated by reference as it represents the definitive (and most recent) evaluation of the potential future cumulative impacts to the American River Basin. The Cumulative Report is incorporated by reference in its entirety and made a part of this joint environmental document for the Proposed Action/Proposed Project. Accordingly, the hydrologic modeling relied upon for the cumulative analysis of the Proposed Action/Proposed Project is consistent with the Cumulative Report.

1.4. WARREN ACT CONTRACT

The Warren Act (43 U.S.C. §523) of 1911 authorized the Secretary of the Interior to enter into Warren Act contracts with water purveyors to carry non-Project water through federal facilities. Under section 305 of the States Emergency Drought Relief Act of 1991 (43 U.S.C. §2211 et seq.), "Excess Storage and Carrying Capacity," the Secretary is authorized to execute contracts with municipalities, public water districts and agencies, other federal agencies, state agencies, and private entities pursuant to the Warren Act. These contracts provide for the impounding, storage, and conveyance of non-Project water for domestic, municipal, fish and wildlife, industrial, and other beneficial uses using any CVP facilities identified in the law, including Folsom Dam and Reservoir.

In the past, PCWA has supplied the City with water in years with CVP shortages, or, more recently, when the City has projected using its full allocation of CVP water and needed additional water to meet its existing demands. In order to convey PCWA MFP water through the federal facilities at Folsom Dam, the City and Reclamation have entered into several one-year temporary "wheeling" contracts. The most recent of these one-year contracts expired on February 28, 2005. A one-year Warren Act contract was not requested for the March 2005 through February 2006 period due to above average precipitation during the spring of 2005. However, existing and future water demands within the City service area will continue to require the use of PCWA water supplies and the need to secure a long-term "wheeling" agreement from Reclamation.

As stated previously, the purpose of executing a long-term (25-year) Warren Act contract with the City is to allow for the conveyance of up to 30,000 AFA of water rights water (purchased from PCWA) to the City's WTP for ultimate use within its retail service area. With implementation of the full City WTP expansion and new raw water transmission line, the City will have the capacity to divert and ultimately treat up to 100 mgd. The City's WTP has a current treatment capacity of 60 mgd. The environmental review and compliance process for these projects is discussed under Section 1.5.2, City Water Facilities.

A draft Warren Act contract has been prepared by Reclamation and is included in Appendix M. This draft contract includes the following key provisions:

1. Term of the contract extends from contract execution through February 28, 2031.
2. Non-Project water available to the City is represented by the quantities set forth under an agreement between the City and PCWA (dated May 17, 1989, as amended), which includes a water supply of up to 30,000 AFA from PCWA's upstream Middle Fork Project (MFP) reservoirs.
3. Point-of-delivery of non-Project water to the City is the Hinkle "Y."
4. Responsibility for requiring PCWA to make releases from PCWA's upstream reservoirs during July, August, September, and October, as well as any other month where it is deemed by the State Water Resources Control Board (SWRCB) that PCWA has no right to divert the natural flow of the American River, rests with the City.
5. PCWA's releases should include an additional five percent to account for transportation losses.
6. Non-Project water introduced in Folsom Reservoir by the City and remaining there for 30 days or more shall be deemed unused water, available to the United States for Project purposes.
7. Responsibility for the supply and payment of all electrical power and associated transmission service charges to pump non-Project water through the federal facilities at Folsom Reservoir rests with the City.
8. Non-Project water conveyed to the City shall be measured and recorded with equipment furnished, installed, operated, and maintained by the City, and the accuracy of such equipment shall be subject to inspection by the United States.
9. Non-project water made available to the City shall be utilized in accordance with all applicable requirements of any Biological Opinion addressing the long-term renewal of the City's CVP water service contract.

1.5. CITY OF ROSEVILLE WATER SERVICE

In 1997, the City served 66,901 people through approximately 21,000 residential and 2,400 commercial water connections. The City's water needs have been steadily rising, with deliveries increasing from 14,242 acre-feet (AF) in 1990, to 25,644 AF in 2000 (City of Roseville 2002). In 2004 water demand within the City was 32,467 AF (City of Roseville 2005). Expected projections are estimated at approximately 58,900 AFA by buildout, including water supply demands for the Foothill Business Park area and the recently annexed West Roseville Specific Plan area (City of Roseville 1999, 2002, and 2004). **Table 1-1** presents the City's past and anticipated water needs through buildout in the year 2030.

Table 1-1. City of Roseville past and anticipated water usage through buildout.

	1995	2000	2005	2010	2015	2020	2025	2030	Buildout
Total (AFA)	18,839	25,644	39,900	46,145	51,300	52,900	53,859	54,426	58,890

Source: City of Roseville 1999, 2002, and 2004

1.5.1. Water Entitlements

The City's primary water supply source has historically been the CVP. In 1967, the City entered into a contract with Reclamation for a minimum annual quantity of 8,300 AFA and a maximum annual quantity of 40,000 AFA of CVP water to be diverted from Folsom Reservoir (Contract No. 14-06-200-3474A). CVP deliveries to the City commenced in 1971, when approximately 3,000 AF was scheduled for delivery. The CVP contract specified that the City was to receive 8,300 AFA for the years 1971 through 1975, however, the City's demands were insufficient to meet this minimum annual use requirement during this time period and, subsequently, the maximum quantity allowed under the contract was reduced to 32,000 AFA in 1976.

Prior to this time, PCWA secured water rights to appropriate American River water for consumptive uses pursuant to water right permits 13856 and 13858, as documented in SWRCB Decision 1104 (D-1104) dated October 10, 1962. PCWA, with the intent of putting surplus water rights water to beneficial use, sold 10,000 AFA of their water rights water to the City in 1991 and included an option for purchase of an additional 10,000 AFA. The City entered into another water agreement with PCWA in 1996 for the option to purchase the additional 10,000 AFA. The City entered into an agreement with San Juan Water District in 2001 for purchase of 800 AFA for use of a portion of their PCWA contract water supply during normal/wet years. In 2004 the City entered into a subsequent agreement with San Juan Water District for an additional 3,200 AFA, following annexation approval of the West Roseville Specific Plan area. With the CVP, PCWA, and SJWD water contracts, the City's current existing water entitlements total 66,000 AFA.

Although water contract entitlements total 66,000 AFA, the City has agreed under the Sacramento Area Water Forum Agreement (WFA)[1] to limit its surface water supplies from the American River to approximately 54,900 AFA at 2030. The WFA specifies maximum allowable surface water diversions based on unimpaired flows into Folsom Lake, with diversions by the City restricted in normal/wet and in dry years, with the objective of supporting environmental needs in the lower American River. The agreements between the City and San Juan Water District require that the water transfers discussed above comply with the District's commitments outlined in their Water Forum Purveyor Specific Agreement. As a result, the 4,000 AFA transferred from San Juan Water District to the City is only available during normal/wet years (City of Roseville 2004). Therefore, the maximum American River surface diversion by the City in normal/wet years is limited to 54,900 AFA, plus 4,000 AFA from San Juan Water District, for a total diversion from the American River of 58,900 AFA. This quantity is consistent with the City's current General Plan buildout demand estimate of 58,890 AFA, as noted in Table 1-1. In critically dry years, the maximum diversion from the

1 The Sacramento Area Water Forum is a diverse group of business and agricultural leaders, citizen groups, water managers, and local governments in Sacramento, Placer, and El Dorado counties. The Water Forum Agreement includes provisions for each of the participating agencies to achieve the plan's two co-equal objectives: (1) to provide a reliable and safe water supply for the region's economic health and planned development to 2030; and (2) to preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River. The elements of the Water Forum Agreement address key regional issues including surface water diversions, groundwater management, dry year water supplies, water conservation, and protection of lower American River resources.

American River is limited to 39,800 AFA. In below average to dry years, the City may divert an amount between 54,900 and 39,800 AFA from the American River.

The following section provides an overview of the City's water delivery facilities and includes a discussion of its current water demand reduction measures, and those additional measures anticipated under the Water Forum Agreement.

1.5.2. City Water Facilities

The City diverts its water supply from Folsom Reservoir, specifically at the urban water supply intake located within Folsom Dam. Water delivered through the urban water supply intake structure at the dam is conveyed to the Folsom Pumping Plant, where two pipelines deliver water both north and south of the American River. The North Fork Pipeline consists of an 84-inch pipeline that delivers water to the San Juan Water District and the City. The Natoma Pipeline delivers water south via the pipeline or Natomas Ditch to the City of Folsom, its customers (e.g. Aerojet), and Folsom State Prison.

The North Fork Pipeline, after leaving the Folsom Pumping Plant, splits at a junction point about 700 feet south of Hinkle Reservoir (referred to as the Hinkle "Y"), with both branches proceeding across the Placer County line (**Figure 1-1**). One branch of the "Y" delivers water to the Sydney N. Peterson WTP, owned and operated by the San Juan Water District. The other pipeline continues northwest approximately 9,000 feet to the City WTP.

The City WTP, located on Barton Road five and one-half miles southeast of Interstate 80 (I-80) in the community of Granite Bay, was built in 1971 with an original capacity of 12 million gallons per day (mgd). The City WTP Master Plan completed in March 1997 proposed several improvements to the WTP, which include a staged process to initially expand treatment capacity from 48 mgd to 60 mgd. With completion of improvements in 2002, the WTP currently has a treatment capacity of 60 mgd. Subsequent expansions would increase capacity to 100 mgd in order to meet the anticipated demand at General Plan buildout (2030).

The Draft EIR for the City of Roseville Water Treatment Plant Expansion Project and 60-Inch Raw Water Pipeline Project (SCH No.98012011) was completed and circulated for public review and comment in February and March 1999. The City certified the final EIR in July 1999. The City initiated construction activities for the first expansion phase in the fall of 1999 and completed construction in 2002. To address the installation of a 6 million gallon storage reservoir at the WTP, the City certified a supplement to the 1999 EIR in February 2003. Expansion to 100 mgd is expected to be competed in mid-2007 (Roseville 2005). The City is currently initiating a supplement to the 1999 EIR for expansion of the WTP capacity to 100 mgd.

This page left intentionally blank

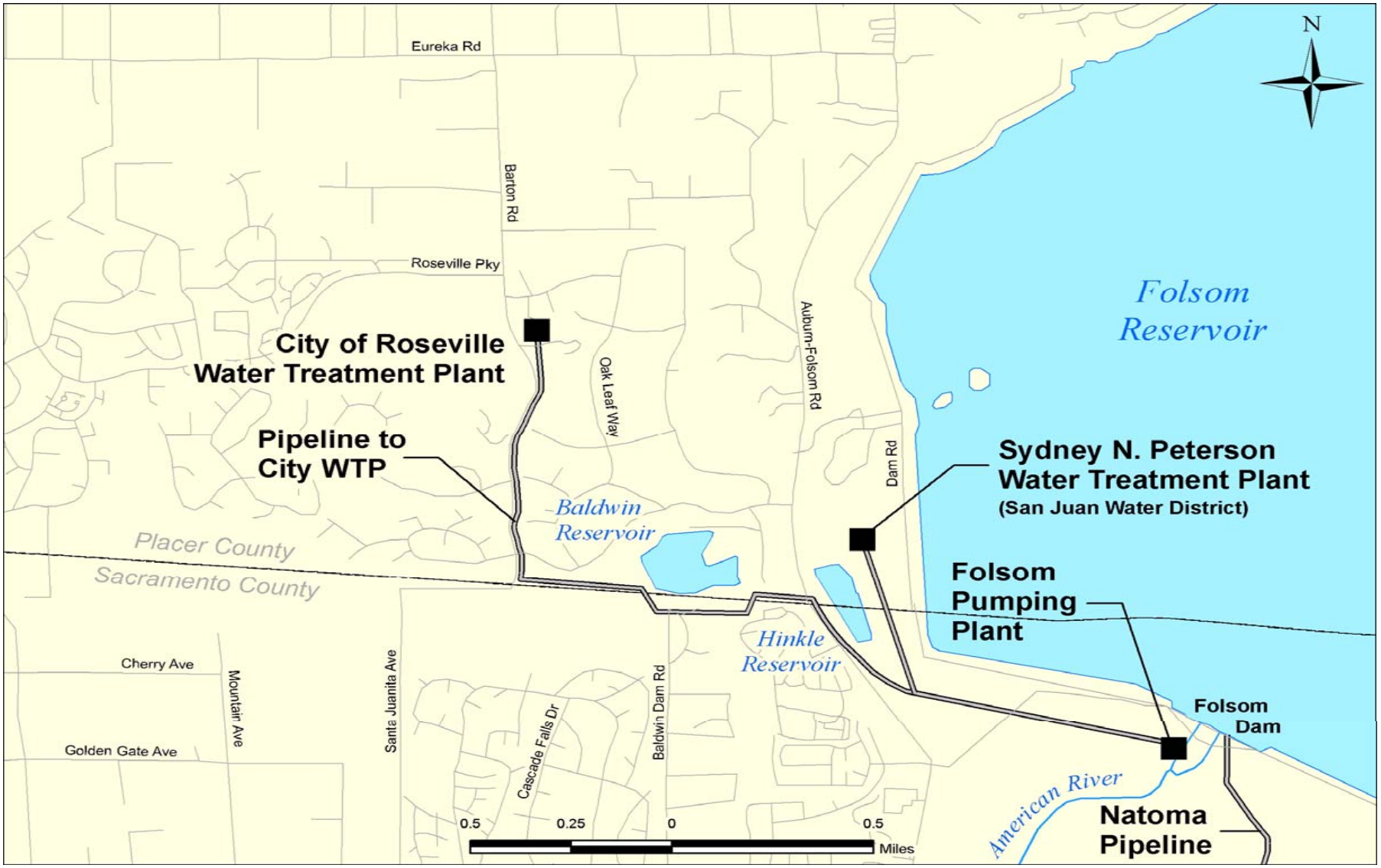

Figure 1-1. Conveyance facilities from Folsom Reservoir to City water treatment plant.

The City currently obtains its water through parallel raw water transmission lines from just downstream on the Hinkle "Y" to the City WTP. The paired 60-inch and 48-inch transmission mains result in the current peak delivery capacity to 97 mgd (150 cubic feet per second [cfs]) to the City WTP. Owing to the presence of federal easements along a small portion of the raw water transmission corridor, Reclamation prepared and issued a categorical exclusion under NEPA in the spring of 1999 for installation of the 60-inch line.

Two water pipelines, 66- and 42-inches in diameter, convey water from the WTP to the City's service area (City of Roseville 1993a). Once water reaches the City's service area, it enters a grid of water mains ranging in diameter from 4 to 54 inches for ultimate delivery to water users (City of Roseville 1993a).

1.5.2.1. Current Demand Reduction Measures

The Water and Energy Conservation Component of the City's General Plan encourages resource conservation and protection. Title 24 of the California Code of Regulations establishes water conservation standards for new development, including low-flow showerheads and low-flush toilets. In addition, all non-residential and multi-family landscaping must comply with Roseville Water Efficient Landscape Requirements. The City conserves its water use through the implementation of several specific water saving measures applied to both public and private sector users. These measures and the status of their implementation are presented in **Table 1-2**.

The City started its recycled water program in the winter of 1997-1998. Existing demand for recycled water use within the City limits is approximately 1,458 AFA, which equates to an average daily demand of 1.3 mgd (City of Roseville 2004). The total average annual supply of recycled water from the Dry Creek Wastewater Treatment Plant in 2002 was 10.1 mgd (11,313 AFA). The estimated recycled water supply from both the Dry Creek and Pleasant Grove Wastewater Treatment Plants is approximately 26.2 mgd (29,348 AFA) at General Plan buildout (City of Roseville 2004). The City also is currently investigating the potential feasibility of extending recycled water transmission lines to the proposed Placer Vineyards Specific Plan area in unincorporated Placer County, west of the City boundary (i.e., Fiddyment Road). The use of recycled water has been demonstrated to be an effective means for meeting the demand for new water caused by drought conditions and growth in California (Water Code Section 13555.2).

The City's water conservation plan was completed in January 1998. Since that time, the City has been coordinating with Reclamation on the details of certain specific components of its water conservation plan and has since made several modifications. A discussion specific to metering retrofit and conservation pricing is provided below.

Since January 1, 1992, all water services established within the City have been equipped with meters. However these meters went unread until implementation of the meter retrofit program began in 2001. The meter retrofit program addresses metering of all residential services in the City, as well as a transition of all residential accounts to an inclining block rate structure.

Table 1-2. City of Roseville's current and projected best management practices.

BMP	Description	Implementation	City Status
1. Water Audits and Incentive Programs. Interior and exterior water audits and incentive programs for single-family residential, multi-family residential, and governmental/ institutional customers.	This measure includes identifying the top 20 percent of water users in each sector, offering water auditing service, and providing incentives sufficient to achieve customer implementation (e.g., free showerheads, hose end sprinkler timers, adjustment to high water use bills if customers implement water conservation measures, etc.).	Underway	The City is currently in the initial stages of implementing this measure. The City has trained staff to conduct water audits and is performing them by a variety of means.
2. Plumbing, New and Retrofit A. Enforcement of water conserving plumbing fixture standards, including requirement for ultra low flush toilets in all new construction beginning January 1, 1992.	Under this measure major developers and plumbing supply outlets should be contacted to inform them of the requirement.	√	The City Building Department enforces this requirement in all new construction inspections.
B. Plumbing retrofit	This measure consists of delivering retrofit kits, including high quality low-flow showerheads, to pre-1992 single-family homes that do not have them and toilet displacement devices or other devices to reduce flush volume for each home that does not already have ultra low-flow (ULF) toilets. In addition, the measure should include offering to install the devices and following up with the retrofit at least three times.	Underway	The City has distributed some home water kits and plans to expand implementation. The City will continue to implement the program at a targeted rate of 10 percent of pre-1992 single-family homes each year.
3. Distribution System Water Audits, Leak Detection and Repair	Under this measure, a water audit of the water supplier's distribution system should be completed once every three years. In addition, customers should be advised whenever possible that leaks exist on the customer's side of the meter. Also, distribution system leak detection and repair should be performed whenever the audit reveals that it would be cost effective.	√	The City monitors and repairs leaks in City distribution systems. The City also has implemented a rehabilitation project for older system components.
4. Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	The City is subject to water conservation measures of the CVPIA, including water metering requirements.	Underway	The City has developed and is currently implementing a meter retrofit program to retrofit existing unmetered services and switch the current flat rate pricing to metered pricing.
5. Large Landscape Water Audits and Incentives	This measure includes identifying all irrigators of large (at least three acres) landscapes and contacting them to offer landscape audits. Cost-effective incentives sufficient to achieve customer implementation should also be offered and follow-up audits once every five years should be provided.	√	A certified irrigation auditor is on staff with the City. The City also promotes the use of reclaimed water as an incentive program.

Table 1-2. City of Roseville's current and projected best management practices.			
BMP	**Description**	**Implementation**	**City Status**
6. Landscape Water Conservation Requirements for New and Existing Commercial, Industrial, Institutional, Governmental, and Multi-Family Developments	This measure consists of enacting landscape water conservation ordinances, or if the supplier does not have the authority to enact ordinances, cooperating with cities, counties, and the "green industry" in the service area to develop and implement landscape water conservation ordinances.	√	The City adopted water efficient landscape requirements in 1993.
7. Public Information	Under this measure, programs promoting water conservation and conservation-related benefits should be implemented. These programs should include providing speakers to community groups and the media; using paid and public service advertising; using bill inserts; providing information on customers' bills showing use in gallons per day for the last billing period compared to the same period the year before; providing public information to promote other water conservation practices; and coordinating with other governmental agencies, industry groups, and public interest groups.	√	The City's public information program includes community speakers, paid and public service advertising, a City Web page, bill inserts and water use history information on customer bills. The City also participates in regional public information programs through the Regional Water Authority (RWA)
8. School Education	Under this measure, programs promoting water conservation and conservation-related benefits should be provided within the school districts in the water supplier's service area and should include educational materials and instructional assistance.	√	Speakers are provided on request as well as conservation related materials and facility tours. The City also participates in regional school education programs through the RWA
9. Commercial, Industrial and Institutional Water Conservation	This measure includes identifying and contacting the top 10 percent of the industrial and commercial customers and offering audits and incentives. In addition, follow-up audits should be provided at least once every five years if necessary.	Underway	The City is currently in the initial stages of implementing this measure. The City is developing an implementation schedule and training staff to conduct water audits.
10. New Commercial and Industrial Water Use Review	This measure consists of reviewing proposed water uses for new commercial and industrial water service and making recommendations for improved water use efficiency before completion of the building permit process.	√	Water usage and required conservation measures are reviewed during the project approval process.
11. Conservation Pricing	This measure consists of pricing and billing procedures that provide incentives for more efficient use and management of water. Such procedures include including block rate structures for metered accounts.	√	Implemented on metered accounts. The City adopted an inclining block rate structure.

Table 1-2. City of Roseville's current and projected best management practices.

BMP	Description	Implementation	City Status
12. Landscape Water Conservation for New and Existing Single Family Homes	This program includes providing guidelines, information and incentives for installation of more efficient landscapes and water saving practices, such as the use of low water using plants and distribution of landscape water conservation materials. This measure also calls for implementing landscape water conservation ordinances or, if the supplier does not have the authority to enact ordinances, cooperating with cities, counties, and the green industry in the service area to develop and implement landscape water conservation ordinances.	Under Consideration	No residential landscape conservation program currently exists. Single-family home landscape conservation is addressed mainly through public education and information. Audits and customer assistance will be provided.
13. Water Waste Prohibition	This practice consists of enacting and enforcing measures prohibiting gutter flooding, single pass cooling systems in new connections, non-recirculating systems in all new conveyor car wash and commercial laundry systems, and non-recycling decorative water fountains.	√	The City restricts water waste within the City's service area through the City Municipal Code.
14. Water Conservation Coordinator	This measure calls for the designation of a water conservation coordinator responsible for preparing the conservation plan, managing its implementation, and evaluating the results.	√	The City has designated a water conservation coordinator.
15. Financial Incentives	This measure includes offering financial incentives to facilitate implementation of conservation programs.	Under Consideration	The City is currently developing a program to meet the intent of this measure.
16. Ultra Low Flush Toilet Replacement	This measure consists of replacing existing toilets with ultra low-flow flush toilets, which use 1.6 gallons per flush or less.	√	The City offers rebates up to $75.00 per toilet replacement to the first 200 water customers who participate in this program on an annual basis.

√: Practice has been implemented.

Implementation of metered rates began immediately on all residential metered connections established after January 2002, with the remaining retrofitted homes transitioned in large blocks as retrofits are completed. During program development, it was requested that customers be provided use information for a period of one year before transitioning to a metered rate. This was incorporated into the plan, and the first block of homes to be transitioned began receiving comparative data in May 2003 with transition to metered rates occurring in May 2004. Other blocks of homes will have metered rates implemented after completion of meter installation and following one year of comparative bill information.

The City will continue to install and read meters on all new services, with billing on new homes on the tiered rate structure. The remaining homes in Roseville will be metered and transitioned to a metered rate through 2012, with an average installation rate of 1,400 meters per year (City of Roseville 2002).

1.5.3. Water Forum Purveyor-Specific Agreement Demand Reduction Measures

Through its commitment to implement the Water Conservation Element established by the Water Forum Agreement, the City has developed a water conservation program in conjunction with Reclamation and Water Forum Agreement participants that complies with requirements of the Central Valley Improvement Act (CVPIA) of 1992 and the Urban Water Management Planning Act. The Urban Water Management Planning Act calls for implementation of water Demand Management Measures (DMMs), including such measures as residential water audits, new plumbing fixtures and fixture retrofit, distribution system water audits, leak detection and repair, meter retrofit and conservation pricing, and conservation education and information programs.

The City's water conservation program includes 16 Best Management Practices (BMPs) that incorporate the DMMs required under the Urban Water Management Planning Act. The complete list of BMPs along with a description of each practice is presented in Table 1-2. The City has already implemented the majority of these BMPs and is currently evaluating implementation of the remaining BMP programs, either through its obligations under the water conservation provisions of the CVPIA or through its commitments to the Water Forum. The individual status of the City's efforts to implement each of the BMPs is presented in Table 1-2.

Chapter 2
Description of Proposed Action and Alternatives

2.1. PROPOSED ACTION / PROPOSED PROJECT

The Proposed Action/Proposed Project initiating preparation of this joint environmental document consists of Reclamation entering into a long-term (25-year) Warren Act contract with the City of Roseville to convey up to 30,000 AFA of non-Project water (i.e., water not part of the CVP) through the federal facilities at Folsom Dam (e.g., Folsom Pumping Plant). This long-term contract would permit City use of the CVP facilities to convey water from the PCWA MFP to the City's WTP for ultimate delivery to the City's service area. As such, this Environmental Assessment/Initial Study includes analysis of the secondary effects of growth facilitated by the delivery of water rights water within the City's water service area. For purposes of this joint environmental document, the Proposed Action under NEPA is synonymous with the Proposed Project under CEQA.

Diversion of the City's non-Project water supply as purchased PCWA water rights water would occur at the urban water supply intake at Folsom Dam. As described previously, water delivered through the urban water supply intake is conveyed to the Folsom Pumping Plant at the base of the dam. Of the two pipelines that convey water from the pumping plant to users both north and south of the American River, the 84-inch North Fork Pipeline delivers water to the City. The North Fork Pipeline, after leaving the Folsom Pumping Plant, splits at a junction point approximately 700 feet south of the San Juan Water District's Hinkle Reservoir know as the Hinkle "Y." Of the two branches that split from the Hinkle "Y," the western branch continues in a northwesterly direction for about 9,000 feet through a 48-inch pipeline to the City WTP. A second parallel 60-inch raw water transmission line from Reclamation facilities and the City's WTP was recently constructed. Combined, these raw water transmission lines are capable of conveying a peak flow of 97 mgd (150 cfs) for treatment at the City's WTP.

The Proposed Project/Proposed Action includes the City's participation in the Water Forum Agreement and financial contribution to the Lower American River Habitat Management Element (HME). The Lower American River HME was developed as part of the Water Forum Agreement to provide mitigation for both river habitat and recreation effects of Water Forum purveyor actions, including the City's long-term Warren Act contract. The lower American River HME includes detailed descriptions of all reasonable and feasible projects that could be implemented to avoid and/or offset potential impacts to lower American River fishery and riparian resources as a result of Water Forum actions, including the Proposed Action/Proposed Project.

As part of the lower American River HME, the Initial Fisheries and In-stream Habitat Management and Restoration Plan (FISH Plan) was developed in 2001, and serves as the aquatic Habitat Management Plan for the lower American River, as required by the Water Forum Agreement. The FISH Plan constitutes a single blueprint of management and restoration actions for enhancement of lower American River fisheries and in-stream habitat. Management and restoration actions presented in the FISH Plan for improvement of water temperature within the lower American River include developing

and implementing a basin-wide temperature modeling program; evaluating the effectiveness of coldwater pool management at Folsom Dam and Reservoir through a variety of methods; constructing and operating a temperature control device for El Dorado Irrigation District; accessing coldwater between the lower river outlet works and the penstocks to address the needs of priority lower American River fish species; and improving efficiency of water transport through Lake Natoma (e.g., modifying channel in Lake Natoma).

As part of its Purveyor Specific Agreement with the Water Forum, the City is committed to an annual payment of $3.00 per acre-foot of non-CVP water used above its 1995 baseline water demand to the Water Forum Habitat Management Element. The City's Purveyor Specific Agreement with the Water Forum also includes a requirement that Roseville enter into an agreement with PCWA for replacing up to 20,000 AF of water to the River from reoperation of PCWA's MFP reservoirs. This reoperation water is included as part of the Proposed Action/Proposed Project (see Appendix I, Modeling Technical Memorandum for detailed information).

2.2. PROJECT STUDY AREA

The project study area, hereafter referred to synonymously as the "action area," ostensibly includes portions of the CVP/SWP as well as the City's service area. In the regional context, the CVP and SWP include numerous rivers and reservoir facilities throughout the Central Valley of California, as shown in **Figure 2-1**. CVP facilities include Shasta and Trinity reservoirs, located in the Klamath mountains, as well as Folsom Reservoir, located on the eastern edge of the Sacramento Valley at the base of the Sierra Nevada foothills. As a result of the shared responsibility under the Coordinated Operations Agreement (COA) between the United States of America and the DWR to meet Delta water quality, water supply, and other environmental or regulatory requirements in the Delta, the regional study area also includes the SWP's Oroville Dam and Reservoir and the lower Feather River.

The City of Roseville is located in southwestern Placer County, approximately 16 miles northeast of downtown Sacramento, California and 5 miles west of Folsom Reservoir. The City's service area includes the incorporated City, which encompasses approximately 23,031 acres, which includes the recently annexed 3,162 acres within the West Roseville Specific Plan area. Two areas of the City are served by other water purveyors. These areas include: (1) the southeastern corner of the City (east of Sierra College Boulevard), which is served by the San Juan Water District; and (2) the area in the northeastern corner of the City which was annexed as part of the Stoneridge Specific Plan Project and is served by PCWA. Other than these two areas, the City's corporate boundary represents the City's service area (**Figure 2-2**). For additional information on the City's service area, please refer to Appendix L (Service Area Analysis and Water Allocation Issues).

Figure 2-1. CVP and SWP facilities.

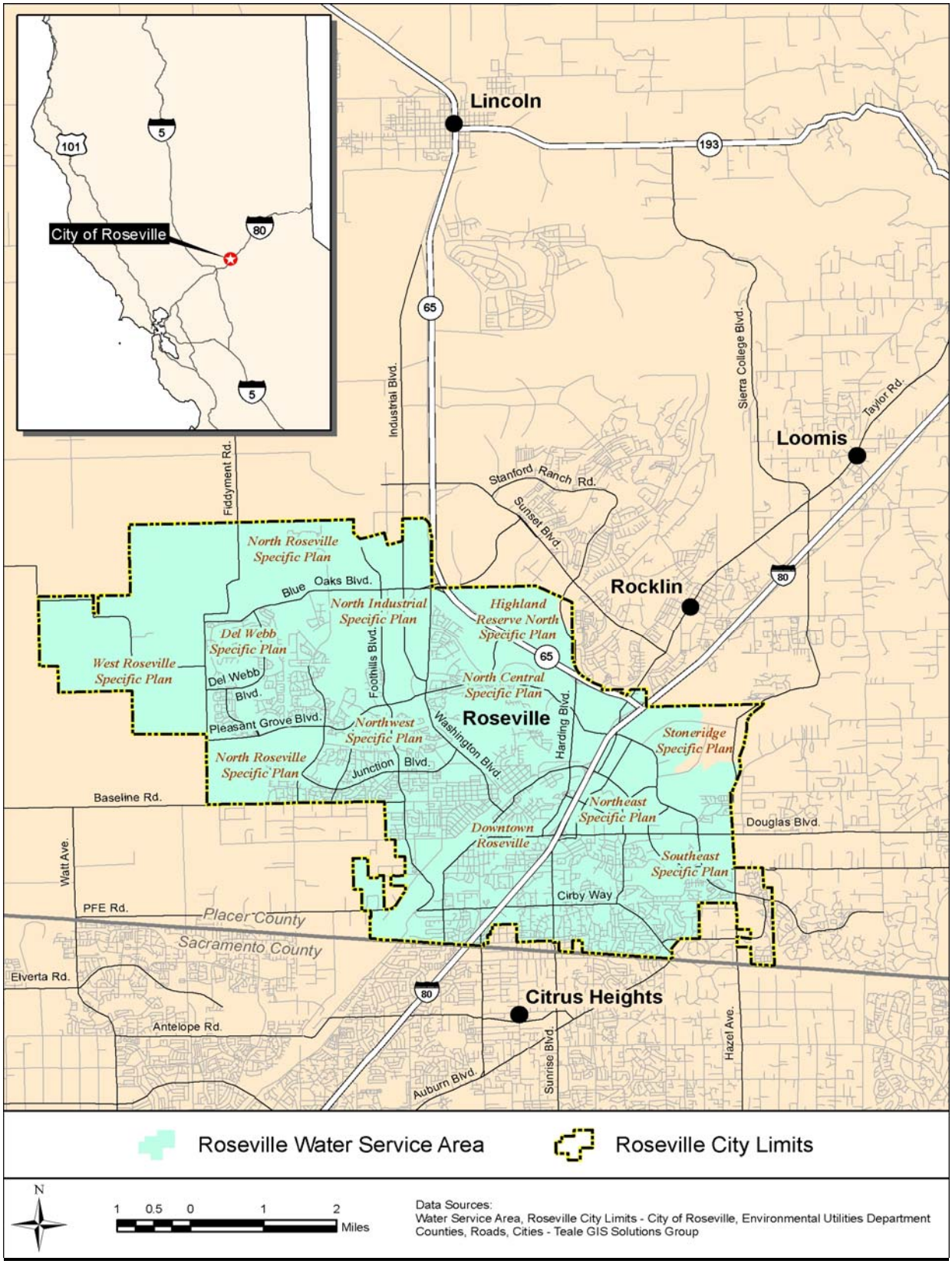

Figure 2-2. City of Roseville service area.

2.3. DEVELOPMENT OF PROJECT ALTERNATIVES

The environmental review process under NEPA requires that all reasonable alternatives to the Proposed Action/Proposed Project be examined. Alternatives initially developed during the environmental review process have been evaluated and screened so that only a reasonable range of alternatives are carried forward for detailed analysis in this joint environmental document. Those alternatives determined to be unreasonable are eliminated from further consideration. The following sections discuss the alternative development and screening process and identify those alternatives that would fulfill the purpose of and need for the Proposed Action that are selected for further consideration in this joint environmental document.

Consistent and standardized criteria for establishing the reasonableness or feasibility of certain alternatives are typically applied. Reasonable alternatives have been developed that are bound by the notion of desirability, emphasize common sense realities, provide a realistic range of choices designed to accomplish the objectives, consider actions outside of the federal agencies' capability or jurisdiction (if they too, are judged to be reasonable), be practical, technically and economically appropriate, be timely to implement, and include a No Action/No Project alternative.

The No Action/No Project alternative is defined generally as representing existing management and operational conditions that continue current activities without significant change. It also includes those actions in the future likely to proceed regardless of implementing the identified Proposed Action/Proposed Project. Under the NEPA context, the future No Action alternative is normally used as a basis for comparison of the impacts between alternatives. In the CEQA context, the No Project alternative may or may not be synonymous with the baseline, or current, condition.

2.3.1. Identification of Preliminary Alternatives

Potential alternatives to the Proposed Action/Proposed Project include an array of options representing both alternatives to the proposed Warren Act contract that could meet the objectives of the project, as well as alternative diversion locations from which the City could take delivery of its purchased PCWA water rights water.

At the outset of the environmental review process, various alternatives to the Proposed Action/Proposed Project were identified and preliminarily developed which would potentially satisfy the objectives of the project. These include the following:

- Alternative 1 – Purchase of a Surface Water Supply from the State Water Project
- Alternative 2 – Purchase of an Additional Surface Water Supply (Contract) from the Federal Central Valley Project
- Alternative 3 – Purchase of a Surface Water Supply from Other Agencies with Upstream Surface or Subsurface Storage
- Alternative 4 – Increased Surface Water Storage Upstream on the American River (e.g., Auburn Dam)

- Alternative 5 – Placer County Water Agency Water Supply Acquired Under Varying Points of Diversion
- Alternative 6 – Groundwater Supply
- Alternative 7 – Wastewater Reclamation
- Alternative 8 – Water Demand Reduction/Water Conservation

2.3.1.1. Alternative 1 - Purchase of a Surface Water Supply from the State Water Project

This alternative would involve the purchase of up to 30,000 AFA from the State Water Project (SWP).

2.3.1.2. Alternative 2 – Purchase of an Additional Surface Water Supply (Contract) from the Federal Central Valley Project

This alternative would involve the acquisition of a new federal CVP water services contract from Reclamation for an amount up to 30,000 AFA.

2.3.1.3. Alternative 3 – Purchase of a Surface Water Supply from Other Agencies with Upstream Surface or Subsurface Storage

This alternative would involve the City acquiring a surface water supply from a water agency or district(s) with upstream storage capability on the American River or other system. Such agencies could include Sacramento Municipal Utility District (SMUD) Nevada Irrigation District, El Dorado Irrigation District, Yuba County Water Agency, or Pacific Gas & Electric Company (PG&E). This alternative assumes the supplying agency or district has an existing, or would acquire, a separate long-term Warren Act contract, or that on-going conveyance of the purchased water would not be through any federal facilities and a Warren Act contract would not be required.

2.3.1.4. Alternative 4 – Increased Surface Water Storage Upstream on the American River (e.g., Auburn Dam)

Under this alternative, surface water storage from an upstream reservoir on the American River would be required.

2.3.1.5. Alternative 5 – Placer County Water Agency Water Supply Acquired Under Varying Points Of Diversion

This alternative assumes use of the purchased 30,000 AFA from PCWA by the City; however, the points of diversion at which the City would divert this water supply would vary. The potential alternative diversion points to Folsom Dam include the following:

Sub-Alternative 5a Future diversion and treatment facility on the Sacramento River, upstream of the American River confluence near Natomas;

Sub-Alternative 5b City of Sacramento's, Sacramento River Water Treatment Plant (SRWTP);

Sub-Alternative 5c City of Sacramento's E.A. Fairbairn Water Treatment Plant on the American River; and

Sub-Alternative 5d Water treatment facilities on the American River of Carmichael Water District (CWD) and/or Sacramento Suburban Water District (SSWD), or others.

Each of these alternative points of diversion would rely on water intake, treatment, and subsequent delivery facilities that are either existing, planned, or have been previously identified as potential projects. Since the points of diversion under this alternative do not involve Folsom Dam and Reservoir (and likely no federal facilities), the need to acquire a Warren Act contract would be eliminated.

2.3.1.6. Alternative 6 – Groundwater Supply

Under this alternative, the City would rely on local groundwater to meet its water demand needs above its CVP water service contract. Additional facilities including groundwater wells, wellhead treatment, pump stations, and conveyance pipelines would be required under this alternative. A significant groundwater supply would be needed (i.e., 26,900 AFA) on an annual basis to meet the long-term demands of the City.

2.3.1.7. Alternative 7 – Wastewater Reclamation

Under this alternative, the City would rely on reclaimed wastewater to meet its water demand requirements above its CVP water service contract. This alternative, however, involves the use of treated wastewater as a non-potable supply for municipal and industrial uses only. It would be limited to the use of highly treated wastewater for landscape irrigation, or as a possible supply for injection/percolation into the local groundwater aquifer. Some industrial users could also possibly benefit from this supply for certain process water needs. Similar to Alternative 6 - Groundwater Supply, a significant supply of reclaimed wastewater would be needed on an annual basis to meet the long-term demands of the City.

2.3.1.8. Alternative 8 – Water Demand Reduction/Water Conservation

Both short- and long-term water demand reduction management strategies could be applied to reduce the existing and future water demands in the City's service area. Demand management strategies that could be implemented or have been to some degree include contemporary water conservation measures consisting of water audits, residential meter retrofit programs, odd/even day landscape watering schedules, watering prohibitions, ultra low-flow toilets and shower fixtures, new home/business water metering, conservation education, etc. Other measures include domestic irrigation improvements, improvements to commercial water use efficiency, xeriscaping, and leak detection programs. It is generally accepted that some level of demand reduction is already being implemented through the City's service area and furthermore, that additional savings through water conservation will occur in the future.

2.3.2. Screening of Preliminary Alternatives

The following describes the results of the screening process where each preliminary alternative and sub-alternative was evaluated based on its ability to pass a set of screening criteria. The screening criteria included the following:

Technical and Physical Criterion (T/P)	An alternative must be technically and physically feasible.
Institutional Criterion (IC)	An alternative must not be conditioned upon speculative approvals, agreements, permits, or other discretionary actions.
Economic Criterion (EC)	An alternative should not incur costs that would result in undue hardships to the consumer or water purveyor implementing the project.
Reliability Criterion (RC)	An alternative should minimize the risk of disruptions to water supplies by maximizing technical reliability and be based upon a water source with the least risk of shortages.
Efficacy and Timing Criterion (E/T)	An alternative must be able to be implemented within a reasonable timeframe.
Public Health Criterion (PH)	An alternative must provide a water supply that meets or exceeds state and federal water quality standards associated with its intended use.
Operational Criterion (OC)	An alternative should endeavor to maximize a system's operational and implementation flexibility.
Environmental Criterion	An alternative should avoid or substantially lessen the proposed project's significant environmental impacts.

Table 2-1 summarizes the results of the screening analysis based on the application of the above screening criteria. It identifies which of the preliminary alternatives were carried forward for further analysis and which were rejected as infeasible. The summary table also provides a brief explanation of the determination concerning the inclusion or rejection of each preliminary alternative.

2.4. ALTERNATIVES SELECTED FOR DETAILED ANALYSIS

Based on the results of the screening evaluation as presented and summarized in **Table 2-1**, the following preliminary alternatives were deemed to have satisfied a significant number of the screening criteria so as to be considered feasible. These alternatives were carried forward for detailed analysis in this joint environmental document.

2.4.1. Downstream Diversion Alternative

Alternative 5 - Placer County Water Agency Water Supply Acquired Under Varying Points of Diversion; Sub-Alternative 5b - City of Sacramento's, SRWTP was selected for further detailed analysis in this joint environmental document. This alternative involves reliance on the City's purchased water rights water supply from PCWA (up to 30,000 AFA) and would require a long-term (25-year) Warren Act contract or "wheeling" agreement with Reclamation. It would, however, divert this water supply from the Sacramento River, downstream of its confluence with the American River at the City of Sacramento's SRWTP.

Table 2-1. Range of potential alternatives.

Alt	Description	Lesser Env. Impacts Relative to the Proposed Action (Env. Criteria)	Screening Criteria Not Met							Explanation of Determination	Carried Forward for Analysis in the EA/IS
			T/P	IC	EC	RC	E/T	PH	OC		
1	**Purchase of surface water from the SWP -** This alternative would involve the purchase of up to 30,000 AFA from the SWP.	No		✓		✓	✓			Acquiring a new surface water supply, if available, from the SWP would require entering into and executing a contract with the Department of Water Resources. It also would require an exchange agreement with Reclamation. While such a contract may not be too speculative to be considered unreasonable, the fact that the SWP cannot currently supply the contractual entitlements of its current contractors makes it doubtful that it would grant additional contracts. Additionally, the uncertain nature of the contract negotiation process could result in delays that would fail the Efficacy and Timing Criterion.	No
2	**Purchase of surface water from the federal CVP -** This alternative would involve the acquisition of a new federal CVP water contract with Reclamation for an amount up to 30,000 AFA.	No		✓		✓	✓			Acquiring a new federal CVP water service contract from Reclamation is too speculative at this time to be considered reasonable. Reclamation's increasing inability to fully supply its current contractors makes it unlikely that it would negotiate new water supply contracts at this time. In addition, the CVPIA prohibits new contracts or increased contract amounts within existing contracts. Similar to Alternative 1, the uncertain nature of the contract negotiation process could result in delays that would fail the Efficacy and Timing Criterion. In water short years, reliability of a Reclamation contract also would be compromised; thus failing the Reliability Criterion in relation to other more reliable supplies.	No
3	**Purchase of surface water from other agencies with upstream surface or subsurface storage –** The City would acquire a surface water supply from a water agency or agencies with upstream storage capability on the American River. Such agencies could include SMUD, Nevada Irrigation District, El Dorado Irrigation District, Yuba County Water Agency, or PG&E.	No		✓		✓	✓			Similar to Alternatives 1 and 2, acquiring a water supply from other agencies with upstream storage is possible, but too speculative at this time to be considered reasonable. The outcome of any such agreement and negotiation process remains uncertain. In addition, conveyance of non-Project water to the City from another agency with upstream storage on the American River also would likely require the use of the federal facilities at Folsom Dam and an approved Warren Act contract with Reclamation. The required environmental review, approval and agreement negotiation process also would likely compromise the Efficacy and Timing and Institutional Criteria.	No
4	**Increased surface water storage upstream on the American River (e.g., Auburn Dam) -** Under this alternative, surface water storage from a new or expanded upstream reservoir on the American River would be required.	Potentially		✓			✓			Reliance upon increased storage upstream on the American River, perhaps through utilization of an Auburn Dam facility, would require the approval and final construction of a new dam and reservoir facility. This action is too speculative to be considered reasonable at this time.	No

Criterion: T/P = Technical/Physical; IC = Institutional; EC = Economic; RC = Reliability; E/T = Efficacy and Timing; PH = Public Health; OC = Operational

Table 2-1. Range of potential alternatives.

Alt	Description	Lesser Env. Impacts Relative to the Proposed Action (Env. Criteria)	Screening Criteria Not Met							Explanation of Determination	Carried Forward for Analysis in the EA/IS
			T/P	IC	EC	RC	E/T	PH	OC		
5	**PCWA Water Supply Alternate Points of Diversion -** This alternative also involves the diversion of up to 30,000 AFA of PCWA water. Diversion, however, would occur at a point other than Folsom Dam and Reservoir. The potential sub-alternative diversion points are identified below.										
5a	**Future diversion from the Sacramento River near Natomas -** Under this alternative, the City would divert its PCWA supply from the Sacramento River near Natomas. This alternative would, however, involve an exchange between PCWA and the SWP and/or CVP so that releases from Oroville Reservoir and/or Shasta Reservoir could be made equivalent to PCWA's releases into Folsom Reservoir and Reclamation's subsequent release to the lower American River. New facilities including an intake structure, water treatment plant, and conveyance (raw/treated) would be required under this alternative.	Potentially					✓			Unlike the SRWTP or FWTP sub-alternatives (see 5b and 5c below), infrastructure components for diversion and treatment would need to be constructed at a new site on the Sacramento River near Natomas. Although the time necessary to complete such a project likely would result in its failing the Efficiency and Timing Criterion, this sub-alternative, in concept, has received considerable discussion among the Water Forum participants and is presently accepted as a viable alternative for several historic American River diversions. Despite the accepted nature of this sub-alternative through the Water Forum and the fact that this could have environmental benefits to Folsom Reservoir and the lower American River, relative to the Proposed Action, this sub-alternative is not significantly different than sub-alternative 5b (see below) where, diversions would occur at an already existing (and recently expanded) intake and treatment facility. To avoid redundancy from an environmental impacts evaluation perspective, it is not carried forward in the EA/IS.	No
5b	**City of Sacramento's SRWTP (Downstream Diversion Alternative) -** Under this sub-alternative, the City would divert from the Sacramento River and treat its water at the SRWTP. This alternative point of diversion would rely on water intake, treatment, and subsequent delivery facilities that are either existing or planned and may be available to supply water to the City. Because the points of diversion under this alternative do not include Folsom Dam (Proposed Action), it would need to rely on either existing, expanded, or new conveyance systems.	Potentially								Infrastructure components (i.e., intake structure and treatment facility) for the City to divert and treat a surface water supply from the Sacramento River are currently in place at the SRWTP. Available capacity at the SRWTP would need to be determined and an agreement entered into with the City of Sacramento for the City of Roseville to be provided appropriate capacity to receive and treat a PCWA water supply. New treated water conveyance, however, would be required to deliver the water to Roseville's service area. Given that much of the infrastructure necessary for the City to utilize a SRWTP alternative currently exists, the components of this sub-alternative passed the screening criteria. This alternative passed all of the screening criteria and would clearly have the potential to have lesser environmental impacts than the Proposed Action. Accordingly, it is carried forward in the EA/IS.	Yes

Table 2-1. Range of potential alternatives.

Alt	Description	Lesser Env. Impacts Relative to the Proposed Action (Env. Criteria)	Screening Criteria Not Met							Explanation of Determination	Carried Forward for Analysis in the EA/IS
			T/P	IC	EC	RC	E/T	PH	OC		
5	**PCWA Water Supply Alternate Points of Diversion - (continued)**										
5c	**City of Sacramento's FWTP -** Under this sub-alternative, the City would divert from the American River at the FWTP and treat its water at the same facility. This alternative point of diversion would rely on water intake, treatment, and subsequent delivery facilities that are either existing or planned and may be available to supply water to the City. Because the points of diversion under this alternative do not include Folsom Dam (Proposed Action), conveyance of treated water to the intended service areas would need to rely on either existing, expanded, or new conveyance systems.	Potentially		✓						At the FWTP, infrastructure components for diversion and water treatment are currently in place. As with the SRWTP Alternative 5b, available capacity at the FWTP would need to be determined and an agreement entered into with the City of Sacramento. New treated water conveyance would be required to deliver water from the FWTP to the City of Roseville. While this alternative also passed most of the screening criteria (Alternative 5b), the EA/IS already is carrying forward an alternative that addresses moving the City of Roseville point of diversion downstream of Folsom Reservoir and the lower American River. This alternative would not have any environmental benefits greater than Alternative 5b and, therefore, was not carried forward in the EA/IS.	No
5d	**Water treatment facilities on the American River - CWD and/or SSWD -** Under this alternative, the City would divert its PCWA water supply from the lower American River at the diversion facilities currently operated by CWD and/or SSWD. Treatment would presumably occur at the facilities owned by these entities. Additional conveyance facilities would likely be necessary to deliver treated water to the City's service area from these treatment facilities.	Potentially		✓		✓	✓			Diversion from the lower American River at a new and/or improved water diversion and treatment facility separate from the FWTP would require several considerations in order for the City to realize its project potential. Available capacity to meet the City's demands would be required in addition to a willingness on the part of the facility owners (i.e., CDW and/or SSWD) to sell capacity to the City. The new water treatment plant recently constructed by CWD, to take advantage of an improved Ranney collector and microtunnel system, is designed to 22 mgd. This capacity would likely meet the long-term needs of CWD, but is unlikely to provide the City of Roseville with its needed capacity. Moreover, the proposed water treatment facility at SSWD (i.e., Keller WTP) is more uncertain as to its likely implementation.	No

Table 2-1. Range of potential alternatives.

Alt	Description	Lesser Env. Impacts Relative to the Proposed Action (Env. Criteria)	Screening Criteria Not Met							Explanation of Determination	Carried Forward for Analysis in the EA/IS
			T/P	IC	EC	RC	E/T	PH	OC		
6	**Groundwater supply -** This alternative would involve the reliance of the City on a groundwater supply (up to 26,900 AFA) as replacement to its current 30,000 AFA surface water entitlement from PCWA. Under this alternative, new conveyance pipelines, and possibly wellhead treatment facilities, would have to be constructed to meet the City's demands.	No				✓	✓			New well fields would need to be developed in this area to support groundwater supplies at this level. From an institutional, technical, and operational perspective, this alternative does not appear constrained. Moreover, the ability to immediately provide a groundwater supply exists and, therefore, would not compromise the Efficacy and Timing Criterion. However, because the groundwater aquifer underlying much of northern Sacramento and southwestern Placer County has experienced significant declines over the years, in the long-term, it is uncertain whether sufficient groundwater supplies exist that could reliably accommodate Roseville's 30,000 AFA demand. The groundwater levels along the Placer/Sacramento county line west of the City continue to decline at a rate of about 1.5 feet per year. The declining groundwater basin in western Placer County has had substantial adverse economic impacts upon existing residents through the cost of lowering many individual wells, and upon agriculture by increasing the delivered cost of water to near the price tolerance level for the agricultural economy. The lower groundwater levels resulting from prolonged additional increased pumping from the underlying aquifer also leads water utilities to pass on to customers their increased costs of providing water. Additional pumping also can lead to degraded groundwater quality. Increased groundwater pumping also potentially could contribute to the adverse movement of groundwater contaminants. It is generally recognized through such efforts as the Water Forum Agreement and Sacramento Groundwater Authority that some curtailment of both current and future demands on this aquifer are required in order to avoid further depletion. This alternative would likely fail the Environmental Criteria. In addition, the costs associated with this alternative would be prohibitive considering that distribution and transmission systems have already been constructed to supply water from the WTP. An estimate of the costs associated with this alternative is as follows: • Assuming 26,900 AFA is required, well production of 48 million gpd would be required to meet demands on a maximum day; • Typical well production is 1,500 gpm, therefore requiring 22 additional wells; and • At a cost of $2 million per site for well siting and development, the resulting cost would be approximately $44 million. This cost estimate does not include the significant additional pumping and treatment costs for delivery of pumped well water, the stranded costs associated with the oversized transmission mains and pump stations, and the technical feasibility of identifying 22 appropriate well sites within the existing service area. Accordingly, this alternative was not carried forward for further study in the EA/IS.	

Table 2-1. Range of potential alternatives.

Alt	Description	Lesser Env. Impacts Relative to the Proposed Action (Env. Criteria)	Screening Criteria Not Met							Explanation of Determination	Carried Forward for Analysis in the EA/IS
			T/P	IC	EC	RC	E/T	PH	OC		
7	**Wastewater reclamation -** This alternative would involve the use of treated wastewater as a non-potable supply for municipal and industrial demands and potentially as a source of groundwater recharge. This alternative would be limited to the use of highly treated wastewater for landscape irrigation, or as a supply for injection/percolation and reuse for landscape irrigation and other beneficial uses gaining public acceptance in areas that experience periodic water shortages. However, the limited capability of this potential supply as a long-term reliable source is recognized.	Yes		✓	✓	✓	✓	✓		While acknowledging the City's expanded wastewater treatment plant, this alternative, by its very nature, would be unable to meet the required M&I water supply needs of the City, estimated at 30,000 AFA, if it's PCWA MFP entitlement was not exercised. Reclaimed water also is restricted in its use applications. Landscape irrigation and some commercial process users could benefit from an available reclaimed water supply, however, for the bulk of the City's anticipated potable M&I needs, this alternative would be unable to meet those demands. Accordingly, this alternative was not carried forward for detailed study in the EA/IS.	No
8	**Water demand reduction/conservation –** Short-term and long-term water demand management strategies could be applied to reduce both existing and future water demands in the intended service area of the City. Demand management strategies that could be implemented (or have been to some degree) include contemporary water conservation measures (e.g., water audits, residential retrofit programs, odd/even landscape water schedules, watering prohibitions, ultra low flow toilets, water metering, enforcement) and other measures including sprinkler uniformity, xeriscaping, leak detection programs, low flow fixtures. It is recognized that varying levels of demand reduction already are being implemented throughout the City's service area and likely will continue in the future.	Yes				✓				The extent to which this alternative would be able to offset the City's anticipated water needs into the future is contingent upon the intensity of conservation efforts imposed. It is doubtful, however, that even if all of the available conservation measures were implemented to the most rigorous level possible, enough water could be conserved to offset the City's identified need for 30,000 AFA. The City already is committed to the water conservation efforts included as part of the Water Forum Agreement. The Reliability Criterion, therefore, would be compromised with this alternative. This alternative was not carried forward for further evaluation in the EA/IS.	No

Primarily developed as a means of shifting the City's diversions from the American River (i.e., from Folsom Dam) downstream to the Sacramento River, this alternative has distinct environmental advantages. Aquatic biota and other water-related resources and activities in Folsom Reservoir and the lower American River would benefit from the City's shifting of its diversion downstream to the Sacramento River. No replacement obligation is included in this alternative (other than CVP allocation deficiencies) because there would be no water rights water diverted to Roseville from the American River at or above Folsom Dam. Also, the City would not be obligated to contribute additional funding to the lower American River HME as part of their Purveyor Specific Agreement with the Water Forum.

The City of Sacramento completed its project-level environmental review and approval for both a new enhanced water intake structure on the Sacramento River as well as expansion of treatment capacity at its SRWTP. Both projects are currently underway. The potential impacts associated with construction have been addressed in the environmental documentation and mitigation commitments made by the City of Sacramento.

To implement this alternative, an agreement between the City of Sacramento and City of Roseville would be necessary to determine capacity sharing and timing. Appropriate conveyance of treated water, however, likely would require additional pipeline construction and associated conveyance facilities (e.g., booster pump stations) in order to deliver this water supply to the City's service area.

Throughout the remainder of this joint environmental document, this alternative is referred to as the **Downstream Diversion Alternative**.

2.4.2. No Action / No Project Alternative

The No Action/No Project alternative, sometimes referred to as the no-change alternative, would remove Reclamation from participating in a long-term (25-year) Warren Act contract or "wheeling" agreement with the City. Although not identified as one of the preliminary alternatives, this alternative is mandated under NEPA as a necessary alternative for consideration and evaluation, where alternatives are applicable.

It is possible that without a Warren Act contract, the City and PCWA could still seek to divert, treat, and deliver the City's allotted MFP water supply through means other than reliance on any federal facilities (e.g., at Folsom Dam and Reservoir). Depending on what course of action the City would choose to pursue, in light of a decision not to pursue a long-term Warren Act contract with Reclamation, a federal nexus could still exist, requiring NEPA and ESA compliance. For example, if the City were to agree with PCWA to take delivery of its MFP water supply from the expanded pumping plant at Auburn on the North Fork of the American River, it is possible that the City would be required to facilitate NEPA compliance with Reclamation since diversions of its MFP water rights water from PCWA would cross Reclamation easements at the pumping plant.

Alternatively, it also is possible that, at least in the short-term, the City could continue pursuing temporary one-year Warren Act contracts to facilitate "wheeling" of its purchased PCWA MFP water supply. However, temporary Warren Act contracts would be necessary in each future year to accommodate existing and projected City water supply demands. Under the No Action/No Project Alternative, the City could utilize up to 4,000 AFA of purchased water from San Juan Water District during normal/wet years.

Chapter 3
Affected Environment

This chapter describes the environmental resources in the areas that may be affected by implementation of the Proposed Action/Proposed Project or alternatives. Because the Proposed Action/Proposed Project involves Reclamation's operation of CVP facilities for water supply and other environmental or regulatory obligations, the regional study area encompasses the reservoirs and water courses of the CVP, north of and including the Delta, as well as all lands within the City's service area where the water may be distributed. Additionally, CVP facility operational changes could potentially alter seasonal lower Feather River flow due to changes in releases from Oroville Reservoir to the lower Feather River to meet its share of Delta requirements under COA. The COA is an agreement between the SWP and CVP on how they will share the responsibility to meet operational requirements in the Delta. Since the COA takes local reservoir operations into account, any change in either project's operations may have an impact on the other. Therefore, this chapter describes the affected environment/environmental setting for all resources within the City service area and for those resources associated directly with water resources within the regional study area.

3.1. AESTHETICS

3.1.1. City Service Area

The City is in an area that can be characterized as a transitional zone between the flat, open terrain of the Central Valley and the Sierra Nevada foothills. The region is characterized by rolling topography with gentle slopes, creeks, and ravines. Regional identifying characteristics include open grassland, oak woodlands, riparian forests, scattered rural development, and corridors of commercial, industrial, and low to medium density residential uses. The natural landscape changes dramatically with the seasons. In the winter months, hillside grasses are lush and green. During the summer, the grasses dry creating brown hillsides (EIP 1999).

No prominent landscape features or areas of unique scenic quality have been identified in the regional vicinity of the City.

Through its development review process, the City has long promoted quality design principles that balance aesthetic and functional considerations, and attempt to integrate the natural and built environment (City of Roseville 1992).

The Community Design Component of the Roseville General Plan emphasizes development of a design framework that reflects the City's goal of high quality, community-wide design. To assist in achieving this goal, policies that address aesthetics and function, the integration of the built and the natural environments, art in public places, and community character have been developed. Application of these design principles helps to establish an aesthetically pleasing city and a distinct community identity (City of Roseville 1992).

3.1.2. Regulatory Setting

The visual character of development within the City is determined by the policies established by the City of Roseville General Plan and implemented through a design review process. These policies include the following:

Policy LG-1 *Through the design review process, the City shall apply design standards that promote the use of high quality building materials, architectural and site designs, landscaping, signage, and amenities.*

Policy LG-6 *Through the design review process, encourage site and building designs that are in scale and compatible with adjacent development, with respect to height, bulk, form, mass, and community character (*City of Roseville 1999*).*

3.2. AGRICULTURAL RESOURCES

3.2.1. City Service Area

The 2002 City of Roseville General Plan does not identify any lands designated for agriculture, or any agriculturally important soils, within the City service area. However, the recently annexed 3,162-acre West Roseville Specific Plan area is classified as Farmland of Local Importance by the California Department of Conservation. A 40.2-acre area north of Blue Oaks Blvd. encompassing a portion of the existing pistachio orchard is designated as Prime Farmland (City of Roseville 2004).

3.3. AIR QUALITY

3.3.1. City Service Area

Air quality in Roseville is poor primarily during the summer months. The pollutant of most concern is ground level ozone, caused by local and regional sources of air pollution, combined with warm air temperatures and topography, which tends to trap air pollution in the Sacramento Valley and the Sierra Nevada foothills.

The Placer County Air Pollution Control District (PCAPCD) regulates stationary sources (e.g. commercial and industrial), and the California Air Resources Board (ARB) regulates mobile sources of emissions (cars and trucks). Both agencies implement the requirements of the Federal Clean Air Act and California Clean Air Act.

3.3.1.1. California Clean Air Act Requirements

Under the California Clean Air Act, Placer County has been designated a “serious non-attainment” area for ozone and a "non-attainment" area for PM_{10} (particulate matter less than 10 microns in diameter). The PCAPCD is responsible for administration of state and federal air quality standards. In 1991, the PCAPCD adopted its first Air Quality Attainment Plan (AQAP). The AQAP is required by the California Clean Air Act, and is designed to bring Placer County into compliance with state ozone standards, which are generally more stringent than current federal ambient standards.

3.3.1.2. Federal Clean Air Act Requirements

Under the Federal Clean Air Act, Placer County is designated as a "severe non-attainment area" for ozone, and is an "attainment area" for the federal PM_{10} standards and other criteria pollutants. The City, along with the South Placer County area, is located in the Sacramento Air Quality Maintenance Area (SAQMA). The Sacramento Area Council of Governments (SACOG), in conjunction with SAQMA air quality management districts, and the California ARB, developed the SAQMA portion of the State Implementation Plan (SIP). The SIP is required to demonstrate compliance with the Federal Clean Air Act Amendments. The U.S. Environmental Protection Agency (EPA) approved the SIP in 1996, and the SAQMA has since been operating under the SIP control measures.

Table 3-1 summarizes Placer County and the Roseville area's state and federal attainment status with regard to the criteria pollutants. Roseville and the entire Placer County area are unclassified for carbon monoxide (CO) because monitoring is not conducted for CO in Placer County (City of Roseville 1999).

Table 3-1. Criteria pollutant attainment status for the City of Roseville.

Pollutant	Ambient Standards	
	California	**Federal**
Ozone	Serious Non-attainment	Severe Non-attainment
Carbon monoxide	Unclassified	Unclassified
Nitrogen dioxide	Attainment	Unclassified
Sulfur Dioxide	Attainment	Attainment
PM_{10}	Serious Non-attainment	Attainment

Note: Unclassified designations indicate that sufficient monitoring data are unavailable. Unclassified areas are generally treated as attainment areas.
Source: California ARB 1989

Given their status in relation to state and federal standards, PM_{10}, CO, and ozone are the primary focus of air quality efforts in the region.

A large percentage of Placer County emissions result from automobile use. Based on information generated by Placer County, the county's population and number of daily vehicle miles traveled are expected to increase by 82 percent overall between 1987 and 2010. It is projected that the percentage increment of pollutants resulting from automobile use will decrease over time, while the percentage attributable to other mobile and stationary sources will increase. This can particularly be attributed to improved automobile emission standards. Emission trends for reactive organic gases (ROG) and oxides of nitrogen (NO_x), the two primary contributors to high ozone concentrations and the formation of photochemical smog, are expected to drop slightly between 1987 and 1994 and then slowly increase through 2010 (City of Roseville 1999).

3.4. BIOLOGICAL RESOURCES

3.4.1. Fisheries

3.4.1.1. Regional Study Area

Several species within the regional study area are of primary management concern either as a result of their declining status or their importance to recreational and/or commercial fisheries. Winter-run Chinook salmon is listed as "endangered" and spring-run Chinook salmon is listed as "threatened" under both the federal and state ESA. Delta smelt is listed as a threatened species under both the federal and state ESA. Central Valley steelhead is listed as a "threatened" species and fall-run/late fall-run Chinook salmon[1] is a federal species of concern. On April 5, 2005, NMFS filed a proposed rule to list the southern population of North American green sturgeon as threatened under the ESA. Current recreationally and/or commercially important anadromous species include fall-run Chinook salmon, steelhead, striped bass, and American shad.

SHASTA RESERVOIR

Thermal stratification, which occurs in Lake Shasta annually between April and November, establishes a warm surface water layer, a middle water layer characterized by decreasing temperature with increasing depth, and a bottom, coldwater layer within the reservoir. Shasta Reservoir supports a "two-story" fishery during the stratified portion of the year, with coldwater fish species using the deeper, colder portion of the reservoir and warmwater fish species using the upper, warm-water layer. Fish inhabiting the reservoir include several species of trout, kokanee salmon, Sacramento sucker, Sacramento pikeminnow, largemouth and smallmouth bass, channel catfish, white catfish, threadfin shad, and common carp.

KESWICK RESERVOIR

Keswick Reservoir, the area between Shasta and Keswick dams, serves as a regulating afterbay for Shasta Reservoir and, due to scale, is not shown on Figure 2-1. It is characterized as a coldwater impoundment that supports a rainbow and brown trout sport fishery. Keswick Dam is a complete barrier to the upstream migration of anadromous fishes in the Sacramento River. Some of the migrating anadromous fish impeded by Keswick Dam are captured in a fish trap at the dam and are transported to the Coleman National Fish Hatchery located on Battle Creek (southeast of the town of Anderson).

[1] NMFS recognizes the late-fall-run Chinook salmon in the Central Valley fall-run ESU (Moyle 2002). On April 15, 2004, NMFS published a notice in the Federal Register acknowledging establishment of a species of concern list, addition of species to the species of concern list, description of factors for identifying species of concern, and revision of the candidate species list. In this notice, NMFS announced the Central Valley Fall-run and Late Fall-run Chinook Salmon ESU change in status from a candidate species to a species of concern. In 1999, the Central Valley ESU underwent a status review after NMFS received a petition for listing. Pursuant to that review, NMFS found that the species did not warrant listing as threatened or endangered under the ESA, but sufficient concerns remained to justify addition to the candidate species list. Therefore, according to NMFS April 15, 2004 interpretation of the ESA provisions, the Central Valley ESU now qualifies as a species of concern, rather than a candidate species (69 FR 19977).

No storage-, elevation-, or temperature-related impacts to the fishery resources of Keswick Reservoir are expected to occur because, as a regulating afterbay of Shasta Reservoir, its monthly storage and elevation would be affected little, if at all, by the Proposed Action/Proposed Project, alternatives, or the cumulative condition. Consequently, no quantitative assessment of potential storage-, elevation-, or temperature-related impacts to fishery resources within Keswick Reservoir is warranted.

UPPER SACRAMENTO RIVER

The upper Sacramento River is often defined as the portion of the river from Princeton (River Mile [RM] 163), which represents the downstream extent of salmonid spawning in the Sacramento River, to Keswick Dam (the upstream extent of anadromous fish migration and spawning).

The Sacramento River serves as an important migration corridor for anadromous fishes moving between the ocean and/or Delta and upper river/tributary spawning and rearing habitats. More than 30 species of fish are known to use the Sacramento River. Of these, a number of both native and introduced species are anadromous. Anadromous species include Chinook salmon, steelhead, green and white sturgeon, striped bass, and American shad. The upper Sacramento River is of primary importance to native anadromous species, and is currently used for spawning and early-lifestage rearing, to some degree, by all four runs of Chinook salmon (fall, late-fall, winter, and spring runs) and steelhead.

LOWER SACRAMENTO RIVER

The lower Sacramento River is generally defined as that portion of the river from Knights Landing, just above the confluence with the Feather River, to Freeport, just below the point where the Sacramento River enters the Delta. Aquatic habitat in the lower Sacramento River is characterized primarily by slow-water glides and pools, is depositional in nature, and has reduced water clarity and habitat diversity, relative to the upper portion of the river.

Many of the fish species using the upper Sacramento River also use the lower river to some degree, even if only as a migratory pathway to and from upstream spawning and rearing grounds. For example, Chinook salmon and steelhead primarily use the lower Sacramento River as an adult immigration route to upstream spawning habitats, and as a juvenile emigration route downstream to the Delta. The lower river also is used by other fish species (such as Sacramento splittail and striped bass) that make limited use of the upper river (upstream of RM 163). Overall, fish species composition in the lower portion of the Sacramento River is quite similar to that of the upper Sacramento River and includes resident and anadromous coldwater and warmwater species.

TRINITY RESERVOIR

Trinity Reservoir supports a “two-story” fishery, with coldwater fish using the lower, coldwater pool, and warmwater fish using the warmer, surface water layer. Fish inhabiting the reservoir include several species of trout, kokanee salmon, Sacramento sucker, pikeminnow, largemouth and smallmouth bass, channel catfish, white catfish, threadfin shad, and common carp.

OROVILLE RESERVOIR

Oroville Reservoir supports both coldwater and warmwater fisheries. The coldwater fishery is primarily comprised of Chinook salmon and brown trout, although rainbow trout and lake trout are periodically caught. The Oroville Reservoir warmwater fishery is a regionally important self-reproducing fishery, comprised of four species of black bass, two species of catfish, two species of sunfish, and two species of crappie. The black bass fishery is the most significant, both in terms of angler effort and economic impact on the area. Spotted bass are the most abundant bass species in Oroville Reservoir, with largemouth being next, followed by redeye and smallmouth bass. Bass fishing is highly rated, as attested by numerous bass tournaments. In addition to large and smallmouth bass, anglers fish for redeye and spotted bass, Chinook salmon, catfish, sturgeon, rainbow trout, and brown trout. Catfish are the next most popular warmwater fish at Lake Oroville, with both channel and white catfish present in the lake. White and black crappie are also found in Lake Oroville. Bluegill and green sunfish are the two primary sunfish species in Lake Oroville, though redear sunfish and warmouth are also present in very low numbers. Although common carp are considered by many to be a nuisance species, they are also abundant in Lake Oroville (DWR 2001). The primary forage fish in Lake Oroville are wakasagi and threadfin shad.

FEATHER RIVER

The lower Feather River from the Fish Barrier Dam to Honcut Creek supports a variety of anadromous and resident fish species. The most important fish species in terms of sport fishing is the fall-run Chinook salmon, although striped bass and American shad are also common targets for anglers. In addition to these sportfish, several other native and exotic fish species are found in the Feather River. The Feather River maintains spawning, rearing, and migration habitat for two special-status species: spring-run Chinook salmon and Central Valley steelhead. The Feather River also maintains populations of Sacramento splittail (DWR 2001). The occasional capture of larval green sturgeon in outmigrant traps suggests that green sturgeon spawn in the Feather River (Moyle 2002). However, NMFS (2002) reports that evidence of green sturgeon spawning in the Feather River is unsubstantiated.

FOLSOM RESERVOIR

Folsom Reservoir supports a “two-story” fishery during the stratified portion of the year (i.e., April through November), with warmwater species using the upper, warm-water layer and coldwater species using the deeper, colder portion of the reservoir. Black bass, sunfish, and catfish constitute the primary warmwater sport fisheries of Folsom Reservoir. The reservoir’s coldwater sport species include rainbow and brown trout, kokanee salmon, and Chinook salmon (stocked). The reservoir’s coldwater pool is important not only to the reservoir’s coldwater fish species, but also is important to lower American River steelhead and fall-run Chinook salmon. Seasonal releases from the reservoir’s coldwater pool provide thermal conditions in the lower American River that support annual in-river production of these salmonid species.

LAKE NATOMA

Lake Natoma supports many of the same fisheries found in Folsom Reservoir (rainbow trout, bass, sunfish, and catfish). Some recruitment of warmwater and coldwater fishes likely comes from Folsom Reservoir. In addition, CDFG stocks catchable-size rainbow trout into Lake Natoma annually.

Although supporting many of the same fish species found in Folsom Reservoir, Lake Natoma's limited primary and secondary production, colder epilimnotic water temperatures (relative to Folsom Reservoir), and daily elevation fluctuations are believed to reduce the size and annual production (USFWS 1991) of many of its fish populations, relative to Folsom Reservoir. Lake Natoma's characteristics, coupled with limited public access, result in its lower angler use compared to Folsom Reservoir.

LOWER AMERICAN RIVER

The lower American River (downstream of Nimbus Dam to the confluence of the Sacramento River) provides a diversity of aquatic habitats, including shallow, fast-water riffles, glides, runs, pools and off-channel backwater habitats. At least 43 species of fish have been reported to occur in the lower American River system, including numerous resident native and introduced species, as well as several anadromous species. Listed and candidate species under the federal ESA occurring in the lower American River include Central Valley steelhead and fall-run/late-fall-run Chinook salmon, respectively. Recreationally and/or commercially important anadromous species include fall-run Chinook salmon, steelhead, striped bass, and American shad. A variety of centrarchid species also are recreationally important.

SACRAMENTO-SAN JOAQUIN DELTA

The Delta and San Francisco Bay make up the largest estuary on the west coast. Its importance to fisheries is illustrated by the more than 120 fish species that rely on its unique habitat characteristics for one or more of their life stages. Fish species found in the Delta include anadromous species, as well as freshwater, brackish water, and saltwater species. Delta inflow and outflow are important for species residing primarily in the Delta (e.g., delta smelt and longfin smelt) as well as juveniles of anadromous species (e.g., Chinook salmon) that rear in the Delta prior to ocean entry. Seasonal Delta inflows affect several key ecological processes, including: (1) the migration and transport of various life stages of resident and anadromous fishes using the Delta; (2) salinity levels at various locations within the Delta as measured by the location of X2 (i.e., the position in kilometers eastward from the Golden Gate Bridge of the 2 parts per thousand [ppt] near-bottom isohaline); and (3) the Delta's primary (phytoplankton) and secondary (zooplankton) production.

3.4.1.2. City Service Area

AQUATIC HABITATS

Aquatic habitats within the City's service area are associated with streams such as Dry Creek, Pleasant Grove Creek, Kaseberg Creek, Antelope Creek, Linda Creek, Cirby Creek, Miner's Ravine, False Ravine, and Secret Ravine. These waterways support submergent vegetation within the channel and emergent vegetation along the stream

banks. Some streams, such as Dry Creek, Secret Ravine, Miner's Ravine, and Antelope Creek, have been known to support both Chinook salmon and steelhead fisheries. Potential Chinook salmon and steelhead habitat may also exist within Cirby and Linda creeks, although to a much lesser extent. Surveys conducted in the fall of 1998 and the spring of 1999 confirm the presence of Chinook salmon adults and juveniles in Linda Creek and Cirby Creek. Pleasant Grove and Kaseberg creeks are not known to contain anadromous fishes, but support mosquitofish, and potentially some warm water fish species (City of Roseville 2004). Several additional information sources were used to identify listed, proposed listed, candidate, and EFH managed fish species with the potential to occur within the City's service area, including USFWS species lists (see Section 6.4.1.2, Magnuson-Stevens Fishery Conservation and Management Act, for further information on EFH managed species). **Table 3-2** lists the federal and state listed, proposed listed, candidate, and EFH-managed fish species that potentially could occur within the City's service area portion of the action area.

Table 3-2. Federally and State listed, proposed listed, candidate, and EFH-managed fish species potentially occurring within the City's service area.

Species	Common Name	Status Federal[1]/State[2]
Acipenser medirostris	Green sturgeon	PT/CSC
Hypomesus transpacificus	Delta smelt	T/T
Oncorhynchus mykiss	Steelhead	T/--
Oncorhynchus tshawytscha	Fall-run/late fall-run Chinook salmon[3]	SC/CSC
Oncorhynchus tshawytscha	Winter-run Chinook salmon	E/E

1 Federal Status: E=Endangered; T=Threatened; PE=Proposed Endangered; PT=Proposed Threatened; SC=Species of Concern; C=Candidate; FPD/T = Federally proposed for De-listing as Threatened
2 State Status: E=Endangered; T=Threatened; CSC=Species of Special Concern
3 NMFS recognizes the late-fall-run Chinook salmon in the Central Valley fall-run ESU. On April 15, 2004, NMFS announced the Central Valley fall-run and late fall-run Chinook Salmon ESU change in status from a candidate species to a species of concern. Fall-run/late fall-run Chinook salmon is a federally managed fish species for EFH in accordance with the Magnuson-Stevens Fishery Conservation and Management Act.
Source: CDFG CNDDB and GAP Analysis; USFWS species lists.

Although green sturgeon and delta smelt have not been observed and are not likely to occur within the City's service area, they are included in Table 3-2 because they are included in the USFWS species lists as potentially occurring within the USGS quadrangles covering the City's service area.

3.4.2. Riparian Vegetation

3.4.2.1. Regional Study Area

RESERVOIRS

Reservoirs on the Sacramento, Trinity, Feather, and American rivers are surrounded by a rim of barren band (the drawdown zone) as a result of historic fluctuations in water elevations. The majority of this zone is devoid of vegetation and provides limited habitat value.

Arroyo willows (*Salix lasiolepis*) and narrow-leaved willows (*Salix exigua*) have established in some areas around the reservoir rim of Folsom Reservoir (USFWS

1991). The only contiguous riparian vegetation associated with Folsom Reservoir occurs along Sweetwater Creek at the southern end of the reservoir (USFWS 1991). Because the drawdown zone is virtually devoid of vegetation and the sparse willows that have established in some areas do not form a contiguous riparian community, the drawdown zone does not possess substantial habitat value.

SACRAMENTO RIVER

Much of the Sacramento River is confined by levees that reduce the natural diversity of riparian vegetation. Agricultural land (rice, dry grains, pastures, orchards, vineyards, and row and truck crops) is common along the lower reaches of the Sacramento River, but is less common in the upper portions. The bands of riparian vegetation that occur along the Sacramento River are similar to that found along the lower American River (see Lower American River below) but are somewhat narrower and not as botanically diverse. The riparian communities consist of Valley oak, cottonwood, wild grape, box elder (*Acer negundo*), elderberry (*Sambucus mexicanus*), and willow. Freshwater, emergent wetlands occur in the slow moving backwaters and are primarily dominated by tules (*Scirpus acutus* var. *occidentalis*), cattails, rushes, and sedges. Although riparian vegetation occurs along the Sacramento River, these areas are confined to narrow bands between the river and the riverside of the levee.

LOWER FEATHER RIVER

The lower Feather River is bordered by agriculture. The terrain is generally flat, with no discernible relief. Vegetation consists of grassland and croplands that contrast with riparian vegetation along the river. The river channel is wide and contains murky, slow-moving water. The banks of the Feather River from Oroville Dam to its confluence with the Sacramento River provide shaded riverine aquatic (SRA) habitat, which contains high-value feeding areas, burrowing substrates, and escape and reproductive cover for numerous regionally important fish and wildlife species.

LOWER AMERICAN RIVER

The lower American River provides a diverse assemblage of vegetation communities, including freshwater marsh and emergent wetland, riparian scrub, riparian forest, and in the upper, drier areas further away from the river, oak woodland and non-native grassland. The current distribution and structure of riparian communities along the river has been determined by human-induced changes such as gravel extraction, dam construction and operations, and levee construction and maintenance, as well as by both historic and on-going streamflow and sediment regimes and channel dynamics (Sands et al.; 1985; Watson 1985). As a result of these factors, several riparian vegetation zones exist along the banks of the lower American River.

SACRAMENTO-SAN JOAQUIN DELTA

Most of the vegetation in the Delta consists of irrigated agricultural fields and associated ruderal (disturbed), non-native vegetation fringes that border cultivated fields. Throughout much of the Delta, these areas border the levees of various sloughs, channels, and other waterways within the historic floodplain. Native habitats include remnant riparian vegetation that persists in some areas, with brackish and freshwater marshes also being present. Saline wetlands consist of pickleweed (*Salicornia*

virginica), cord grass (*Spartina* sp.), glasswort (*Salicornia* sp.), saltgrass (*Distichlis spicata*), sea lavender (*Limonium californicum*), arrow grass (*Triglochin* spp.), and shoregrass (*Monanthochloe littoralis*). These wetlands are very sensitive to fluctuations in water salinity, which are determined by water flows into the Delta.

3.4.2.2. City Service Area

RIPARIAN HABITATS

Section 3.4.1.2 discusses the aquatic habitats for the primary drainages occurring within the City's service area. Additional riparian habitats include seasonal wetlands (including vernal pools and swales), valley-foothill riparian, and riparian oak woodland.

Several information sources were used to identify listed, proposed listed, and candidate riparian species occurring or potentially occurring within the City's service area. **Table 3-3** presents the species with potential to occur within riparian habitats that were identified through these information sources, primarily supported by the California Natural Diversity Data Base (CNDDB) RAREFIND.

Table 3-3. Federally and State listed, proposed listed, and candidate riparian and terrestrial species potentially occurring within the City's service area.

Species	Common Name	Status Federal[1]/State [2]
Plants		
Gratiola heterosepala	Boggs Lake hedge-hyssop	--/E
Orcuttia tenuis	Slender Orcutt grass	T/E
Orcuttia viscida	Sacramento Orcutt grass	E/E
Invertebrates		
Branchinecta lynchi	Vernal pool fairy shrimp	T/--
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	T/--
Lepiduras packardi	Vernal pool tadpole shrimp	E/--
Amphibians		
Ambystoma californiense	California tiger salamander [3]	PT/CSC
Rana aurora draytonii	California red-legged frog	T/CSC
Reptiles		
Thamnophis gigas	Giant garter snake	T/T
Birds		
Aquila chrysaetos	Golden eagle	FP/CSC
Branta canadensis leucopareia	Aleutian Canada goose [4]	DM/--
Buteo Swainsoni	Swainson's hawk	SC/T
Empidonax traillii brewsteri	Little willow flycatcher	SC/E
Falco peregrinus anatum	American peregrine falcon [5]	DM/E
Haliaeetus leucocephalus	Bald eagle	FPD/T /E
Riparia riparia	Bank swallow	SC/T

1 Federal Status: E=Endangered; T=Threatened; PE=Proposed Endangered; PT=Proposed Threatened; SC=Species of Concern; C=Candidate; FPD/T = Federally proposed for De-listing as Threatened; DM=De-listed (monitored first 5 years)
2 State Status: E=Endangered; T=Threatened; CSC=Species of Special Concern; FP=Fully Protected against take pursuant to Fish and Game Code Section 3503.5.
3 California tiger salamander was designated as Proposed Threatened in Central CA on May 23, 2003.
4 Aleutian Canada goose was de-listed on March 20, 2001.
5 American peregrine falcon was de-listed in the entire range on August 25, 1999.
Source: CDFG CNDDB; USFWS species lists

3.5. CULTURAL RESOURCES

3.5.1. Regional Study Area

3.5.1.1. Shasta and Trinity Reservoirs

SHASTA RESERVOIR

Archaeological records indicate that Native Americans used the forests and waters in the Shasta area for at least 7,000 years prior to European occupation. The Pit River and Wintu Indians were the predominant groups inhabiting the area around Shasta and Keswick reservoirs. Numerous prehistoric sites are known within the drawdown zone of Shasta Reservoir. Small camps in particular are known to exist within this zone, and with fluctuating water levels and the lack of vegetation, they are periodically exposed to wave and wind action that deteriorates the sites. Looting of exposed sites also is a problem in this area.

In 1991, Reclamation consulted with the State Historic Preservation Officer regarding historical archaeological sites potentially affected by the Shasta Outflow Temperature Control Project (Reclamation 1991). It was determined that the dam itself, constructed in 1938, is eligible for inclusion in the National Register of Historic Places because of its historical and engineering significance.

TRINITY RESERVOIR

The Upper Trinity Wintu Indians inhabited the valley below Trinity Reservoir prior to the construction of Trinity Dam. Prehistoric evidence dates back 2,000 to 3,000 years, although the area was probably inhabited even before that time. Archaeological surveys during the 1950s documented very large village sites that are believed to have been inhabited year-round. These sites were destroyed when the valley was flooded after construction of the dam. As at Shasta Reservoir, many known prehistoric sites at Trinity Reservoir are subject to ongoing damage as a result of fluctuating water levels, which exposes them to wind and wave action, and as a result of looting.

Extensive gold mining and logging took place in the Trinity Reservoir area during the historic period. The valley inundated by the construction of Lewiston Dam contains several large homestead areas and two, or possibly three, historic communities.

3.5.1.2. Keswick Reservoir

No elevation-related impacts to cultural resources associated with Keswick Reservoir are expected to occur because, as a regulating afterbay of Shasta Reservoir, its monthly storage and elevation would be affected little, if at all, by the Proposed Action/Proposed Project, alternatives, or the cumulative condition. Consequently, no quantitative assessment of potential elevation-related impacts to cultural resources associated with Keswick Reservoir is warranted.

3.5.1.3. Upper and Lower Sacramento River

UPPER SACRAMENTO RIVER

The Sacramento River region is rich in historic and prehistoric resources. Considerable archaeological research has been conducted in the area, including early work that defined central California's prehistory. Of particular importance are the region's large, deep midden sites, which provide information on prehistoric culture extending over thousands of years. Historic archaeological sites and architectural resources are plentiful because this area was settled early in California's history. As in other parts of the Central Valley, resources related to agricultural development are prevalent.

LOWER SACRAMENTO RIVER AND DELTA

Many prehistoric and/or ethnographic sites were recorded along the banks of the lower Sacramento River in 1934 by R. F. Heizer, who described them as burial mounds which had been partially or completely leveled for agriculture or other development (Heizer 1934). Many of these were built on or adjacent to the natural levees, and over time have been severely affected by river erosion and levee construction (Bouey 1990). Excavations at a few of these mounds have shown them to contain human burials, grave offerings, and occupational debris, some of which are at least 2,000 years old (Milliken 1994; Olsen 1963). These sites, wherever they may survive, are extremely important. To date, the most complete field inventory of the lower Sacramento River has been done by Far Western (Bouey 1990), who surveyed and augured the toe of the levees between the Natomas Cross Canal and the town of Freeport.

One historic feature adjacent to the river, the Walnut Grove Branch Line Railroad, is considered significant and eligible for inclusion in the National Register (Maniery 1991). There is also the potential for other important historic resources along the river, where many landings, ferries, small settlements, and private homes/ranches are known to have been established between the 1850s and the 1930s (Bouey 1990). However, Bouey's survey did not detect the remains of any of these resources.

3.5.1.4. Oroville Reservoir and the Feather River

The archaeological record provides evidence of the earliest occupation in the region dating to at least several thousand years ago, with a few sites thought to represent initial settlement by Hokan language speakers. These people were seasonally mobile and relied on stone milling to process hard seeds, their food staple subsistence base. Subsequent archaeological periods are represented by more numerous sites that document the intrusion of Proto-Penutian speakers who displaced the Hokan's and developed a local cultural sequence that continued through to the ethnographic period of the Konkow (Olsen and Riddell 1963). All of the prehistoric archaeological periods are represented at Oroville Reservoir, including the ethnographic settlement pattern of the village community and the period of historic contact with Euro-American settlers (Kroeber 1925; Riddell 1978).

Prehistoric settlements were generally situated on the top of ridges, on canyon side mid-slope flats, and on the crest of knolls. Site types include lithic scatters, quarries and toolstone source locales, caves and rock shelters, seasonal camps, large village

settlements, and burial grounds. Associated elements include milling features, structural remains, and rock art. Konkow ethnographic and historic period sites and places are also known.

The Oroville Reservoir area also has a significant historic record. With the discovery of gold in 1849, thousands of gold seekers poured into the hills around Oroville. Many foothill mining towns were established that were short-lived and later deserted when the gold was depleted and the effort moved to river dredging at lower elevations. Remains of several of these towns were inundated by the reservoir. Once the Gold Rush was over, the lumber industry became dominant and was a major employer until recent years.

Another aspect of the history of the Feather River involved the search for a year-round trans-Sierra railroad route. Many attempts were made between the 1860-1880s, but they all failed because the Middle Fork Feather River was found impassable in the vicinity of Bald Rock Canyon. By the turn of the century, a successful route was finally found along the North Fork Feather River.

Limestone mining/processing was a relatively small industry compared to the gold mining operations; however, it was a significant component of the local economy around the turn of the century. Quicklime from the Lime Saddle kilns on the West Fork Feather River was used in the construction of the early buildings in Chico and other communities in the north Valley region. The original impetus for the local agricultural industries was to support the hordes of gold seekers who were working and settling in the area. Especially important were livestock grazing and tree crops such as olives, figs, and citrus.

Although mining, transportation, forestry, homesteading, agriculture, and associated water development are all represented archaeologically, they are not well documented and are significantly under-represented in the historic archaeological record. Evidence of these activities at Oroville Reservoir includes hydraulically mined landscapes and lime kilns, railroad grades and ferry landings, skid trails and loading ramps, wagon roads and gully dumps, leveled fields and fence lines, flumes, and diversion structures. Scant attention was paid to these historic period archaeological features and sites in the 1960s when the most extensive surveys were conducted.

A number of culturally important plant species occur within the Oroville Reservoir area. These species were used for a variety of purposes including food, shelter, clothing, tools, medicine, rituals, and ceremonies. Important food plants, which are common throughout the upper project area, include pines, oaks, buckeye, cattail, hazelnut, and berries. In addition, species used in basketry are common throughout the project area and include redbud, willow, and maidenhair fern.

3.5.1.5. Folsom Reservoir

A total of 157 archaeological sites have been recorded within or immediately adjacent to Folsom Reservoir. Of these 157 sites, 34 are historic, 110 are prehistoric, and 13 have both historic and prehistoric components. Prehistoric site types and features include midden deposits, possible burials, chipped stone scatters, ground stone, milling

stations, and artifact scatters. 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 (Corps 1992b).

In addition to the recorded archaeological sites, four isolated artifacts have been recorded within Folsom Reservoir, one known prehistoric archaeological site was inundated before it could be recorded, and numerous historic sites and features have not been recorded (Peak 1989).

Prior to construction of Folsom Dam in 1955, only one archaeological survey of the reservoir basin had been completed (Fenenga 1948). One prehistoric site, Eld-1, was documented within the planned reservoir pool. The results of this survey are a reflection more of the level of effort and methodology considered appropriate for that time period, than of the actual prehistoric and historic settlement patterns now known to have occurred in the region. Since that survey, there have been periodic investigations in the Folsom State Recreational Area, which have resulted in the generation of site records and survey reports describing nearly 170 archaeological sites. The level of detail and accuracy of these reports varies widely (Reclamation and SAFCA 1994a). The Folsom Powerhouse was listed as a National Historic Land Mark in 1973; however, no archaeological sites within Folsom Reservoir have been declared eligible, or listed in the Register (Reclamation and SAFCA 1994a).

Many studies have been carried out in and adjacent to the Folsom Reservoir basin (summarized in Scott 1995 and Waechter and Mikesell 1994). One hundred and twenty-three (123) prehistoric sites or components have been recorded, some with remnant patches of midden (Waechter and Mikesell 1994). Human burials are noted on a few of the early (1940s-50s) site records, but the present status of these burials is unknown. Forty-seven historic-period sites have been recorded at Folsom Reservoir, mostly related to mining, transportation, and settlement. Many of the recorded sites show signs of adverse effects from wave action, inundation, and/or recreation use at the reservoir (Waechter 1992, 1993; Waechter and Mikesell 1994).

3.5.1.6. Lake Natoma

Lake Natoma lies within the boundaries of the Folsom historic gold mining district. At least three known prehistoric sites have been inundated by Lake Natoma (Scott 1995).

3.5.1.7. Lower American River

Fifty-two archaeological sites have been recorded in the lower American River, defined as the area below Nimbus Dam to the confluence with the Sacramento River. Of these 52 sites, 7 are historic, 44 are prehistoric, and one has prehistoric and historic components. Seven of the prehistoric sites have been destroyed or severely damaged. 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 (Corps 1992b).

3.5.2. City Service Area

Prior to exploration by Spanish explorers and American trappers, the Roseville region was inhabited by the Valley Nisenan. Two large permanent Nisenan sites have been identified within the City. These sites are located within Maidu Regional Park. In addition, numerous smaller archaeological sites have been identified throughout Roseville. Many of the sites contain shallow midden deposits and bedrock mortar milling stations (City of Roseville 1992).

Traces of Roseville's ranching and mining past are still evident today. Holdings of the Spring Valley Ranch were enclosed by rock walls built by Chinese laborers. Several of these walls can still be found in the City. The Fiddyment Ranch Main Complex within the West Roseville Specific Plan area appears to meet several California and National Register criterion related to its architecture, archaeological potential, and the role the ranch played in the social and economic development of the Roseville community (City of Roseville 2004). In addition, numerous historic features, including ditches, pits, small mounds and low terraces exhibit evidence of historic mining operations along several of the City's creeks (City of Roseville 1992).

The Roseville Historical Society has prepared an inventory of significant historic sites. Two local sites, the Haman House and the Maidu Indian sites, are listed on the National Register of Historic Places (City of Roseville 1992).

3.6. GEOLOGY AND SOILS

3.6.1. City Service Area

3.6.1.1. Geology

The City of Roseville is located in the north-central part of the Great Valley Geomorphic Province. The Central Valley is composed of alluvial deposits from the adjoining Sierra Nevada to the east. The geology in the vicinity of the City consists of transitional formations between the alluvial deposits of the Central Valley and granite material characteristic of the Sierra Nevada. The Roseville area is principally underlain by relatively recent Plio-Pleistocene non-marine sedimentary deposits formed during the last 600,000 years (Cenozoic period). These sedimentary deposits include older Sacramento Valley alluvium (Laguna and Valley Springs formations). The Sacramento Valley alluvium typically consists of very firm layers of sand, silt, and gravel, which do not contain very weak or highly compressible soil layers (EIP 1999).

While numerous faults have been identified within 100 kilometers of the Sacramento area, there are no known active faults located within Placer County. Three inactive faults lie within the immediate Roseville vicinity: 1) the Volcano Hill Fault, extending northwesterly for approximately one mile starting just east of the City limits; 2) the Linda Creek Fault (the existence of which is disputed due to lack of recorded activity), extending along a portion of Linda Creek through Roseville and a portion of Sacramento County; and 3) an unnamed fault alignment, extending east to west between Folsom Reservoir and the City of Rocklin, portions of which are concealed, but possibly connected to the Bear Mountain Fault near Folsom Reservoir (City of Roseville 1992).

3.6.1.2. Soils

The Soil Survey of West Placer County groups soil types occurring in the City of Roseville region into the Arlington-Romona-Placentia soil association. These soils types occur on topography ranging from relatively flat, undulating, and rolling hill topography, characteristic of the topographic transition from the Great Valley Geomorphic Province to the foothills portion of the Sierra Nevada Geomorphic Province. Alluvial soils occur within the floodplains of drainages throughout the City's service area.

Within the City's service area, the primary soil mapping units consist of the Cometa-Fiddyment complex, Cometa-Ramona sandy loam, and Fiddyment-Kaseberg loam. These soil types are described below.

COMETA-FIDDYMENT COMPLEX

These undulating soils are on low terraces generally west of State Route 65 and south of Auburn Ravine. They occur at elevations of 75 to 200 feet. The unit is about 35 percent Cometa soil and 35 percent Fiddyment soil. The Cometa soil is on the younger land surfaces, and the Fiddyment on the older surfaces. The Cometa is a deep, well-drained claypan soil that formed in alluvium, mainly from granitic sources. The Fiddyment is a well-drained soil that is moderately deep over a hardpan. It formed in old valley fill siltstone (Rodgers 1973).

This soil supports little construction except for farmsteads. The major limitations to construction are the very slow permeability of the subsoil, the shrink-swell potential of the soil, and the limited ability of the soil to support a load (Rodgers 1973).

COMETA-RAMONA SANDY LOAM

These undulating soils are on low terraces in the Roseville area and west of Lincoln. They occur at elevations of 75 to 200 feet. The unit is about 50 percent Cometa soil and 30 percent Ramona soil. The Cometa soil is on short side slopes and bottoms, and the Ramona soil is on fingerlike ridges and younger land surfaces. The Cometa is a deep, well-drained claypan soil that formed in alluvium, mainly from granitic sources. The Ramona soil is very deep and well drained. It formed in alluvium from predominantly granitic sources. Natural vegetation is annual grasses, forbs, and scattered oak (Rodgers 1973).

The major limitations to urban use of the Cometa soil are the very slow permeability of the subsoil, the shrink-swell potential of the subsoil, and the limited ability of the soil to support a load. The major limitation to urban use of the Ramona soil is the moderately slow permeability of the subsoil (Rodgers 1973).

FIDDYMENT-KASEBERG LOAM

These undulating to gently rolling soils are on low siltstone terraces at elevations of 75 to 135 feet. The unit is about 50 percent Fiddyment soil and 30 percent Kaseberg soil. The Fiddyment soil is moderately deep over a hardpan, and the Kaseberg soil is shallow over a hardpan. The Fiddyment is a well-drained soil that is moderately deep

over a hardpan. It formed in old valley fill siltstone. The Kaseberg is a well-drained soil that is shallow over a hardpan. It formed in old valley fill siltstone (Rodgers 1973).

This unit supports little construction except for farmsteads. The major limitations to urban use of the Fiddyment soil are the very slow permeability of the subsoil, the moderate depth to the hardpan and siltstone, and the limited ability of the soil to support a load. The Kaseberg soil is limited by the shallowness over the hardpan and siltstone (Rodgers 1973).

3.7. HAZARDOUS MATERIALS

3.7.1. City Service Area

State and federal legislation, which address concerns regarding hazardous materials, provide much of the framework within which the City of Roseville manages hazardous materials. A variety of laws are now in effect which regulate hazardous materials cleanup, storage, testing procedures, and financial assistance for hazardous waste reduction.

3.7.1.1. Storage

There are several sites within the City that have been contaminated by underground storage tank (UST) leakage. As a result of these unauthorized releases, various on-site mitigation measures have been required to address the contaminated areas (City of Roseville 1992).

In order to avert spills or contamination, the Roseville Fire Department (RFD) regularly monitors hazardous material generators and storage facilities in the City for compliance with state regulations. The largest hazardous material generators/storage facilities in the Roseville area include NEC, Hewlett Packard, Southern Pacific Railroad, and H.B. Fuller Company (City of Roseville 1992).

3.7.1.2. Transportation

There are no designated routes for the transportation of hazardous materials within the City of Roseville. Most of these materials are transported by truck, and the City has designated truck routes that divert traffic away from residential areas. The California Highway Patrol (CHP) has created plans for the transportation of hazardous materials on state and federal highways, including 1-80 and State Highway 65. Allowable routes depend on the type of hazardous material being transported (City of Roseville 1992).

Hazardous materials also are transported on the Southern Pacific Railroad. As a major rail-switching yard, rail cars may remain on site for various lengths of time. The state requires that materials remaining on site for 30 days or more must comply with state regulations for the storage of hazardous materials. As a transportation company, Southern Pacific disputes its need to comply with these restrictions (City of Roseville 1992).

3.7.1.3. Cleanup

Within the City limits, the Southern Pacific Railroad Yard presents a challenge to the management of hazardous materials. Defective USTs, lead-contaminated grit waste, and groundwater contamination from diesel fuel are cleanup issues that have required assistance from outside the Southern Pacific Transportation Company. In recognition of significant contamination on the property, and in accordance with federal law, EPA proposed in October 1984 that the site be placed on the National Priorities List, more commonly known as the Superfund Site List. This list identifies, assesses and provides for cleanup of hazardous sites (City of Roseville 1992).

3.7.1.4. Emergency Response

Primary responsibility for handling emergency events involving hazardous materials within the City is assigned to the RFD. The RFD works in cooperation with the Placer County Hazardous Materials Response Team. To ensure proper handling of a hazardous materials release, RFD has developed a Hazardous Materials Emergency Response Plan (City of Roseville 1992).

3.8. WATER SUPPLY AND HYDROLOGY

3.8.1. Regional Study Area

The CVP is a multipurpose project operated by Reclamation that stores and transfers water from the Sacramento, San Joaquin, and Trinity River basins to the Sacramento and San Joaquin valleys. The CVP was authorized by Congress in 1937 to serve water supply, hydropower generation, flood control, navigation, fish and wildlife, recreation, and water quality control purposes.

The SWP supplies water to 30 agencies (contractors) in the San Francisco Bay area, the San Joaquin Valley, and southern California. The northernmost portion of the SWP consists of three small lakes on tributaries of the Feather River. The flows from the tributaries augment Feather River flows as the branches and forks of the Feather River converge at Oroville Reservoir, the principal reservoir of the SWP. From Oroville Reservoir, water flows through three hydroelectric power plants before continuing down the Feather and Sacramento rivers to the Delta.

3.8.1.1. Shasta Dam and Reservoir

Shasta Reservoir is the largest CVP reservoir, with a drainage area of 6,665 square miles. Shasta Dam (completed in 1945) serves to control floodwaters and store surplus water runoff for irrigation in the Sacramento and San Joaquin valleys. Additionally, the Dam is operated to provide maintenance of navigation flows, conservation of fish in the Delta from intrusion of saline ocean water, water for industrial use, and generation of hydroelectric electricity.

3.8.1.2. Keswick Dam and Reservoir

Keswick Dam (completed in 1950) is located on the Sacramento River, nine miles downstream from Shasta Dam and four miles northwest of the City of Redding.

Keswick Reservoir serves as an afterbay for releases from Shasta Dam and for discharges from the Spring Creek Powerplant.

3.8.1.3. Upper Sacramento River (to Knights Landing)

Flows in the upper Sacramento River are regulated by the CVP Shasta Dam and re-regulated approximately 15 miles downstream at Keswick Dam. As the Sacramento River nears Red Bluff, flows become more influenced by the inflow from major tributary streams, including Clear, Cow, Bear, Cottonwood, Battle, and Paynes creeks.

Following construction of Shasta Dam, average monthly flows during March and April were reduced and average flows during the summer irrigation months were increased. Since 1964, a portion of the flow from the Trinity River Basin has been exported to the Sacramento River Basin through CVP facilities. An average of 1,269,000 AF of water has been diverted from Whiskeytown Lake to Keswick Reservoir annually (1964 to 1992), which is approximately 17 percent of the flows in the Sacramento River measured at Keswick (CVPIA DEIS 1997).

Major water diversions on the Sacramento River include the Anderson-Cottonwood Irrigation District Diversion Dam, the Glen-Colusa Irrigation District Diversion Dam, and the Red Bluff Diversion Dam.

3.8.1.4. Lower Sacramento River (Knights Landing to Freeport)

The lower Sacramento River is identified as the reach that extends from Knights Landing to Freeport. The historical average annual flow on the Sacramento River at Freeport is approximately 16.7 million acre-feet (MAF), more than twice the average annual flow measured above the confluence of the Feather River over the same time period. This increase in flow in the lower Sacramento River is primarily due to the addition of Feather and American River flows.

The City of Sacramento operates the SRWTP, located just below the confluence of the American River and Sacramento River. The plant has the capability of treating 110 million gallons per day. The City of Sacramento has water rights totaling 81.8 thousand acre-feet (TAF) per year from the Sacramento River.

Natomas Mutual Water Company (NMWC) diverts water for irrigation from two pumping plants on the lower Sacramento River (i.e. Prichard Lake and Elkhorn pumping plants). The NMWC provides agricultural irrigation service to a 55,000-acre service area immediately east of the Sacramento River.

3.8.1.5. Trinity Dam and Reservoir

The CVP's Trinity River Division, completed in 1964, includes facilities to collect and regulate water in the Trinity River, as well as facilities to transfer portions of the collected water to the Sacramento River Basin. Specific facilities in the Trinity River Division include Trinity Dam and Power Plant, Trinity Reservoir, Lewiston Dam and Powerplant, Lewiston Reservoir, Clear Creek Tunnel, Whiskeytown Dam and Reservoir, Spring Creek Debris Dam and Reservoir, and the Cow Creek Unit.

Trinity Dam forms Trinity Reservoir, and has a storage capacity of 2,448,000 AF and a surface area of 16,400 acres at reservoir elevation 2,370 feet (top of active conservation level). Structures associated with the dam are the spillway, outlet works, auxiliary outlet works, and power plant. Trinity Dam regulates flows and stores surplus water for irrigation.

3.8.1.6. Oroville Dam and Reservoir

Oroville Dam is the tallest and one of the largest earthen dams in the United States. Most of the water stored behind Oroville Dam is for residential, M&I, and agricultural uses in the San Francisco Bay area, San Joaquin Valley, and southern California.

Oroville Reservoir is the largest reservoir within the SWP. The reservoir covers 15,858 acres and holds 3,537,577 AF. When at capacity, Oroville Reservoir inundates approximately 15,810 acres (DWR 1994). In addition to serving as a water storage facility, Oroville Reservoir provides flood control for downstream reaches. As the reservoir rises during heavy rains or spring snowmelt, water is released from the lake to prevent flooding downstream.

3.8.1.7. Feather River

The Feather River drains a large portion of the eastern side of the Sacramento Valley and is the largest tributary to the Sacramento River. The Feather River flows into the Sacramento River near Verona, with an average annual flow of 5,844,000 AF.

Three small lakes on Feather River tributaries in Plumas County, including Lake Davis, Frenchman Lake, and Antelope Lake comprise the northernmost SWP facilities.

The branches and forks of the Feather River flow into Oroville Reservoir, the SWP's principal reservoir with a capacity of 3.5 MAF. From Oroville Reservoir, water flows through three hydroelectric power plants, down the Feather River, the Sacramento River, and to the Delta. Oroville Dam is located at the confluence of the west branch and the north, middle, and south forks of the Feather River.

Flows in the lower reaches of the river are further controlled by releases from Thermalito Diversion Dam, which is located five miles downstream of Oroville Dam.

3.8.1.8. Folsom Dam and Reservoir

Folsom Reservoir is the principal reservoir on the American River, with a maximum storage capacity 977,000 AF. Major tributaries in the upper watershed of the American River include the north, middle, and south forks. Folsom Dam was originally authorized for construction by the Corps in 1944 as a 355,000 AF flood control unit. The Dam was reauthorized in 1949 as a 1,000,000 AF multi-purpose facility, with a surface area of 11,450 acres. Reclamation operates Folsom Dam and Reservoir for the purposes of flood control, meeting water contract obligations, providing adequate instream flows in the lower American River for recreation and fisheries resources, and as a means of meeting Delta water quality standards.

The region's municipal, agricultural, and industrial demands are met by water purveyors located in areas above, around, and below Folsom Reservoir. El Dorado Irrigation District, the City of Roseville, San Juan Water District, Sacramento Suburban Water District (formerly Northridge Water District), California State Prison, and the City of Folsom are the main purveyors that divert water from Folsom Reservoir.

3.8.1.9. Nimbus Dam and Lake Natoma

Lake Natoma, serves as the Folsom Dam afterbay. At its full capacity, the lake consists of approximately 500 surface-acres of water. The lake is controlled by Nimbus Dam, which along with Folsom Dam regulates water releases to the lower American River. Nimbus Dam was built in 1955 by the Corps and later transferred to Reclamation, as part of the CVP.

Lake Natoma has a maximum storage capacity of 8,760 AF. In addition to its role as a regulating facility for Folsom Dam releases, Nimbus Dam is the diversion location for the Folsom South Canal.

3.8.1.10. Lower American River

The lower American River consists of the 23-mile stretch of river from Folsom Dam to the confluence of the American and Sacramento rivers in the City of Sacramento. The average annual flow for the lower American River is 2,645,000 AF. The flow regime in the lower American River has been significantly altered since the completion of Folsom and Nimbus dams. Historically, the lower American River accounted for approximately 15 percent of Sacramento River flows.

Rapid flow fluctuations in the lower American River are primarily in response to either flood control operations at Folsom Dam or operational changes in releases to meet SWRCB water quality standards in the Delta. The close proximity of Folsom Dam and Reservoir to the Delta, and the relatively short period of time for the releases to reach the Delta, results in Folsom Reservoir commonly being relied upon to meet Delta standards in lieu of releases from more distant CVP reservoirs. In the past, rapid flow fluctuations were common, however, Reclamation, together with the Lower American River Operations Group, presently attempts to minimize these fluctuations in both magnitude and frequency.

3.8.1.11. Sacramento-San Joaquin Delta

The Sacramento-San Joaquin River Delta lies at the confluence of the Sacramento and San Joaquin rivers. The Delta boundary extends north along the Sacramento River to just south of the American River, south along the San Joaquin River to just north of the Stanislaus River, east to the City of Stockton, and west to Suisun Bay.

The Delta covers an area of 738,000 acres in parts of six counties (Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo). On average, precipitation contributes 990,000 AF to the Delta each year (DWR 1993).

Runoff from Central Valley streams accounts for approximately 95 percent of the inflows into the Delta. The Delta receives flows directly from the Sacramento, San Joaquin,

Mokelumne, Cosumnes, and Calaveras rivers. These rivers and their tributaries drain more than 40 percent of the state of California. Annual inflows to the Delta averaged 27.8 MAF during the period from 1980 to 1991.

Several CVP facilities in Reclamation's Delta Division transport water from the Delta. The Tracy Pumping Plant exports water from the Old River into the Delta Mendota Canal. The Delta Mendota Canal carries water from the Tracy Pumping Plant along the western side of the San Joaquin Valley for use for irrigation purposes in Reclamation's San Luis Unit; it terminates at the Mendota Pool. The Contra Costa Canal and Pumping Plant divert water at Rock Slough for use in eastern Contra Costa County. The Delta Cross Channel plays an integral part in the transport of inflows from northern streams, southerly across the Delta. The channel is a controlled diversion from the Sacramento River to Snodgrass Slough and the Mokelumne River system that allows more efficient transfer of releases of project water from Sacramento Valley facilities across the Delta to project pumps in the southern Delta.

The SWP also maintains facilities in the Delta that export and convey significant volumes of water: the Barker Slough Pumping Plant, located in the north Delta; H.O. Banks Pumping Plant, located in the south Delta; and the South Bay Aqueduct.

The Tracy, Banks, and Contra Costa pumping plants, the three main diversions from the Delta, divert approximately 2,530,000, 2,490,000, and 110,000 AFA, respectively (approximately 18 percent of the inflows to the Delta), based on an average from 1980 to 1991 (DWR 1993). The diversions by these facilities have increased over time. There also are numerous individual diversions from Delta channels for irrigation of Delta islands.

3.8.2. City Service Area

The City's surface water contract entitlements for diversions from the American River total 66,000 AFA. The City obtains a portion of its water from the CVP, of which Folsom Reservoir is a part. This is achieved through a contract with Reclamation that is renewed approximately every 25 years, with the cost per acre-foot being one of the principal topics of renegotiation. The current contract entitles the City to 32,000 AFA. (In 2004, the City utilized 32,467 AFA.) The City also has a water contract with PCWA that provides for an allocation of 10,000 AFA of water to the City for municipal and industrial purposes, with options for an additional 20,000 AFA supplied from the Middle Fork [American River] Project (MFP) (pers. comm. D. Whitehead, City of Roseville 2003).

The San Juan Water District has an existing contract entitlement with PCWA to obtain up to 25,000 AFA of water for use within Placer County and a long-term wheeling agreement with Reclamation for accessing the water through Folsom Lake. In addition to its CVP and PCWA contract water, the City has an 800 AFA contract with San Juan Water District for use of a portion of their PCWA contract supply water during normal/wet years (also provided from the MFP). With approval of the West Roseville Specific Plan annexation, the City acquired rights to an additional 3,200 AFA from the San Juan Water District (City of Roseville 2004).

The Roseville WTP is located on Barton Road, south of Douglas Boulevard and east of the City limits. Constructed in 1971, and designed to meet EPA standards for domestic drinking water, the WTP serves to treat water delivered from its source at Folsom Reservoir. The City WTP is currently undergoing a series of expansions, which will lead to an ultimate treatment capacity of 100 mgd. The City supplies its water resources to residents and businesses through the existing treatment delivery system. In addition, the City supplements its water system with recycled wastewater (City of Roseville 1992). Treated wastewater from the Dry Creek Wastewater Treatment Plant, located on Dry Creek near the Union Pacific Railroad Yard in Roseville, and the Pleasant Grove Wastewater Treatment Plant located on Philip Road just west of the Roseville's western city limit, produces recycled water for limited use for some landscape medians, parks, and golf courses within the City limits (City of Roseville 2004).

3.9. LAND USE AND PLANNING

3.9.1. City Service Area

The focus of the General Plan's land use policy is on the City's "planning area." Roseville's planning area includes approximately 36 square miles of incorporated lands as well as an additional 6,995 acres, which make up the City's sphere of influence (City of Roseville 1992 and City of Roseville 2004).

Within the City limits there are eleven subareas that have been planned for urban development. These include the Infill Area, the North Industrial Area, and the City's nine specific plan areas. Each area is briefly described below.

3.9.1.1. Infill Area

The Infill Area constitutes what historically has been the central core of Roseville, as well as the areas that were the focus of growth in the City until the early 1980's. With the exception of scattered parcels of limited acreage, the Infill Area is close to being fully developed. The land use in this area incorporates a mix of residential neighborhoods, commercial and industrial uses and amenities to serve the residents of the community. Totaling 7,491 gross acres, the Infill Area will accommodate approximately 42,313 residents and 24,482 jobs at full buildout (City of Roseville 1992).

3.9.1.2. North Industrial Area

The North Industrial Area, while not subject to a specific plan, is a recognized planning subarea of the City. The area consists of 2,443 gross acres west of Washington Boulevard and north of the Northwest Roseville Specific Plan Area. Devoted to industrial uses, the area is intended to provide a major employment/industrial center for the South Placer region. The North Industrial Area, while providing limited residential use (i.e., 895 single-family dwelling units), will accommodate approximately 31,346 jobs at buildout. At present, approximately half of the area remains undeveloped (City of Roseville 2004).

3.9.1.3. Southeast Roseville Specific Plan

The Southeast Roseville Specific Plan, originally adopted in February 1985 and expanded in April 1988, provides for the development of approximately 1,015 gross acres south of Douglas Boulevard in the southeast portion of the City. Land uses include a mix of single and multi-family residential, commercial and office uses with schools, parks and open space amenities. Mostly developed, the Plan area is anticipated to accommodate approximately 9,643 residents and provide 4,386 jobs at buildout (City of Roseville 1992).

3.9.1.4. Northeast Roseville Specific Plan

The Northeast Roseville Specific Plan was adopted in April 1987 and consists of 1,700 gross acres east of I-80 and north of Douglas Boulevard. The land use plan for this area consists largely of commercial and employment based uses focused towards the regional market, and the inclusion of 1,800 dwelling units. The Plan incorporates significant open space resources including Miner's and Secret ravines. Approximately 611 acres of the northernmost portion of the Plan area have been designated as urban reserve. Buildout population for the Northeast Plan area is projected at 4,770 residents with 18,587 jobs (City of Roseville 1992). Development within the Northeast Roseville Specific Plan area is mostly completed, except for the approved Stone Point Campus, which will include commercial, business, and professional land uses (City of Roseville 2004a).

3.9.1.5. North Central Roseville Specific Plan

The North Central Roseville Specific Plan area is generally situated between I-80 and Washington Boulevard, north of the Diamond Oaks Golf Course. The Plan, adopted in July 1990, is traversed by Highway 65 and incorporates 2,514 gross acres. The North Central Plan area provides a diverse mix of residential, commercial, office and light industrial uses. Included are regional commercial sites (i.e., the Galleria at Roseville mall) and significant wetland preservation/compensation areas. The Plan area is rapidly developing and is expected to accommodate approximately 11,551 residents and 15,633 jobs at buildout (City of Roseville 1992).

3.9.1.6. Highland Reserve North Specific Plan

The Highland Reserve North Specific Plan area consists of a 615-acre portion of the North Central Roseville Specific Plan (NCRSP) located north of Highway 65. As adopted in July 1990, the NCRSP designated the Highland Reserve North acreage "Urban Reserve," with future urbanization subject to amendment of the Specific Plan. The Highland Reserve North Specific Plan amends the NCRSP to extend the basic concepts of community form and design from the NCRSP area south of Highway 65 to the Urban Reserve area to the north. The Highland Reserve North Specific Plan Amendment includes a mix of residential neighborhoods, parks, open space, schools, churches, and high-intensity commercial and employment-related land uses. The Plan proposes 1,770 dwelling units to accommodate approximately 4,496 residents at buildout.

3.9.1.7. Northwest Roseville Specific Plan

The Northwest Roseville Specific Plan was adopted in May 1989 and includes 2,754 gross acres in the western portion of the City. Single and multi-family residences are the predominant land use in the area, with associated commercial, office and service uses. The Plan area incorporates a significant amount of parklands and open space, the City's Wood Creek Golf Club, and several school sites, including the Woodcreek Oaks High School. Currently nearly built out, the Plan is anticipated to include 8,898 dwelling units, accommodate approximately 23,678 residents, and provide 4,236 jobs at buildout (City of Roseville 1992 and 2004a).

3.9.1.8. North Roseville Specific Plan

The North Roseville Specific Plan is a three-phase plan that was originally adopted in August 1997 and amended in 1998, 1999, and 2000. The Plan area consists of approximately 1,552 gross acres in north and west Roseville and includes all properties not previously zoned for urban use or previously included in a specific plan. The Plan proposes a mix of residential neighborhoods, schools, parks, open space, commercial and office uses. The Plan includes a total of 5,381 dwelling units at full buildout in 2007, of which 3,872 units have been built (City of Roseville 2004a).

3.9.1.9. Stoneridge Specific Plan

The Stoneridge Specific Plan area consists of approximately 1,089 gross acres of undeveloped land located northeast of the center of the City of Roseville. The Plan area is bounded on the north by the City of Rocklin, on the west by I-80, Secret Ravine, and Roseville Parkway, on the south by Olympus Drive, and on the east by Sierra College Boulevard. The Plan incorporates a mix of residential neighborhoods, commercial and business-professional employment areas, parks, open space, and a variety of public and quasi-public land uses. The Plan proposes a total of 2,855 single-family and multi-family residential units (City of Roseville 2004a), and would accommodate approximately 7,320 new residents and 1,725 new jobs at buildout.

3.9.1.10. Del Webb Specific Plan

The Del Webb Specific Plan area encompasses approximately 1,200 gross acres located in the City of Roseville approximately 2.5 miles west of the Blue Oaks Boulevard interchange on Highway 65. The Plan is almost completely built out and consists of primarily single-family homes focused around recreational activities and a golf course. The Plan provides for 3,179 dwelling units and 27.3 acres of commercial property (City of Roseville 2004), along with recreation centers, parks, park preserves and public uses.

3.9.1.11. West Roseville Specific Plan

The West Roseville Specific Plan area consists of approximately 3,162 acres located approximately 8.5 miles west of I-80 and 6.5 miles west of the Blue Oaks Boulevard interchange on Highway 65. It is bounded Fiddyment Road to the east, Baseline Road to the south, and vacant pasture/dryland farmland to the north and west. The majority of the area is undeveloped and contains nonnative annual grasslands. The Plan incorporates a mix of high, medium, and low-density residential uses with a total of

8,430 dwelling units. The Plan also includes open space, parks, public/quasi-public, community commercial, business professional, and light and general industrial uses. The Plan is expected to accommodate 20,810 residents at buildout (City of Roseville 2004).

3.9.1.12. Sphere of Influence

Included within the City's primary planning area are approximately 6,995 acres of land within the City's sphere of influence (City of Roseville 1992 and City of Roseville 2004). The sphere of influence properties have been designated into five general areas, which are listed in **Table 3-4**.

Table 3-4. City of Roseville sphere of influence.

Subarea	Gross Acreage [1]
Roseville North (Athens)	3,770
Fiddyment Bend	45
Booth & PFE	308
Livoti Tract	132
Annabelle	375
West Roseville Specific Plan	2,365
Total Sphere of Influence	6,995

1 Gross acreages include road and highway rights-of-way, easements, etc.
Source: City of Roseville 1992 and City of Roseville 2004

The City's current sphere of influence exists outside of the City's water service area. Accordingly, it is irrelevant for the purposes of the specific evaluation presented in this document.

3.10. MINERAL RESOURCES

3.10.1. City Service Area

An extensive range of extractive mineral resources is found throughout Placer County, many of which have been mined since the Gold Rush era. Sand and gravel extraction is the most common and current mining activity in Placer County. These minerals also are identified for potential extraction within the City.

Five major and several smaller producers of sand and gravel are located throughout non-federal lands in Placer County. In addition to extraction processes, these operators also produce asphalt, Portland cement, and crushed quarry rock. One of the largest producers is concentrated near the Sunset Industrial area, adjacent to the City's service area (City of Roseville 1992).

Sand and gravel resources in Placer County are located along several streambed and adjacent floodplain deposits. Revenue generated by sand and gravel production in Placer County is estimated to be several times the value of all other minerals combined (Placer County Planning Department 1984). The high demand for aggregate is linked to construction activity. Over 90 percent of the state's production of sand is gravel used for construction and road building (Placer County 1994).

3.11. NOISE

3.11.1. City Service Area

The most significant noise sources throughout the Roseville area are the major highways and roadways, and the Southern Pacific Railroad operations.

Noise sources within the City can be characterized as "transportation related" and "fixed" (non-transportation related). Transportation related noise sources consist of roadway traffic noise and railroad noise. The fixed noise sources include, but are not limited to, industrial facility noise, operations associated with commercial land uses, racetrack operations, and special events such as softball and soccer games (City of Roseville 1992).

3.11.1.1. Community Noise

Noise sensitive land uses in the City of Roseville General Plan area were considered to include residential areas, schools, and hospitals (City of Roseville 1992).

In general, the most recently developed areas of the City, which contain noise sensitive uses, are relatively quiet. However, older residential areas located adjacent to I-80 and the railroad yards are exposed to noise levels that would be considered "normally unacceptable" (City of Roseville 1992).

3.11.1.2. Roadway Noise

The Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) was used to develop L_{dn} contours for all highways and major roadways in the City of Roseville General Plan Area. The traffic noise model identified I-80 and Highway 65 as the major roadway noise sources within the City. Noise levels adjacent to some major arterial roadway ware also found to exceed 60 Db L_{dn} (City of Roseville 1992).

3.11.1.3. Railroad Noise

Railroad activity within the City includes freight and Amtrak operations in the Southern Pacific Transportation Company (SPTCo) tracks, and activity within the SPTCo hump yard (City of Roseville 1992).

Noise levels associated with the hump yard include master and group retarder "squeal," recurring impulsive noises, and train pass-bys (City of Roseville 1992). Noise levels associated with railroad line operations are a result of warning horns, at-grade crossing bells, and locomotive engine and rail car noise (City of Roseville 1992). According to SPTCo, railroad operations within the Roseville area are not anticipated to change substantially in the future (City of Roseville 1992).

3.11.1.4. Fixed Noise Sources

There are numerous fixed noise sources dispersed throughout the City. Industrial processes are often recognized as primary fixed noise source. Commercial,

recreational and public service facility activities can also produce noise, which affects adjacent sensitive land uses (City of Roseville 1992).

3.12. POPULATION AND HOUSING

3.12.1. City Service Area

Population and employment growth are expected to rise dramatically in the South Placer area, particularly in the City of Roseville (**Table 3-5**). The encouragement of industrial expansion in the City's North Industrial Area, along with commercial/retail and office development in the specific plan areas, have and will continue to increase employment opportunities in Roseville. The magnitude of this growth will depend on variables including, but not limited to, state and county economic growth rates, interest rates, employment levels, the national investment climate, and the desirability of Roseville as a place to locate for prospective businesses and residents (City of Roseville 1992).

Table 3-5. Population, housing, and employment trends within the City of Roseville.

	Population			Housing			Employment			Percent Change		
	1999	2025	Change	1999	2025	Change	1999	2025	Change	POP	HSG	EMP
Roseville	72,100	109,160	37,060	29,574	47,281	17,707	49,201	116,481	67,280	51.40	59.87	136.75
Placer County	218,034	415,335	197,301	88,774	175,039	86,265	99,731	227,510	127,779	90.49	97.17	128.12

Source: SACOG 2001

One of the major affordable housing challenges the City will face over the next twenty years is the issue of the mismatch between housing costs and income levels. Traditionally, housing costs throughout California have risen at a rate greater than household income (City of Roseville 1992).

The components of the Housing Element of the Roseville General Plan serve to reinforce the following overall principles:

- Roseville will work to accommodate the housing needs of its current and future residents by providing a range of purchase and rental units that are affordable to all income groups.
- The City will strive to guarantee housing affordability over time through the adoption of policies and implementation measures as detailed in this element.
- The City's policy to provide affordable housing for all income groups is a social objective and, as such, it is the responsibility of all segments of the Roseville community to actively work together to achieve the goal. The City of Roseville, its development community and business/manufacturing community should jointly work together to ensure the success of an affordable housing program (City of Roseville 1992).

3.13. PUBLIC SERVICES

3.13.1. City Service Area

The City of Roseville prides itself on being a full service city. As shown in **Table 3-6**, Roseville provides water, wastewater, solid waste, electric, and library services to its residents. School services are provided by the local school district (City of Roseville 1992).

Table 3-6. Providers of public services for the City of Roseville.

Cable Television	Comcast
Electricity	City of Roseville; Pacific Gas & Electric (limited)
Fire and Police Protection	City of Roseville
Flood Control and Drainage	City of Roseville
Hospital	City of Roseville
Library	City of Roseville
Natural Gas	Pacific Gas & Electric
Parks & Recreation	City of Roseville
Schools	Roseville Joint Union High, Eureka Union, Dry Creek Joint and Roseville City School Districts
Solid Waste	City of Roseville
Street Lighting and Maintenance	City of Roseville
Telephone	Roseville Telephone Company
Wastewater Treatment	City of Roseville
Water Service	City of Roseville San Juan Water District

Source: City of Roseville 1992

The City is targeting its service level and improvement standards over the next 15 to 20 years to accommodate the land use allocation identified in the Land Use Element of the General Plan (City of Roseville 1992).

Roseville originally adopted a Public Facilities Element in 1977, which was amended in 1988. It focused on the need to identify changes in infrastructure requirements as growth and development occurred. Having set a five-year course in most instances, the element recognized the need to regularly monitor and evaluate the City's service requirement capacity (City of Roseville 1992).

The rate of growth is a critical factor in ensuring that improvements are in place to service the planned development. For this reason, the Public Facilities Element must anticipate the City's response to development pressures, and the role that public services will play in facilitating such development. To this end, the City has chosen to establish a comprehensive reporting system, which can effectively monitor threshold standards for facility planning in accordance with defined service levels (City of Roseville 1992).

3.14. RECREATION

3.14.1. Regional Study Area

3.14.1.1. Shasta Reservoir

Shasta Reservoir and surrounding lands are managed by the U.S. Forest Service (USFS) and is a unit of the Whiskeytown-Shasta-Trinity National Recreation Area. The reservoir has 370 miles of shoreline. It has a highly developed system of recreation facilities including 4 picnic areas, 6 public boat ramps and 13 private marinas. Popular water-dependent recreation activities are power boating, houseboating, water-skiing, and fishing. Important water-enhanced activities include camping, hunting, and sightseeing. The reservoir has no designated swimming areas; however, individuals swim from boats or adjacent to campgrounds. There are 22 drive-to public campgrounds at the reservoir. Four other campgrounds are accessible only by boat. Recreation use in 1995 was an estimated 3.5 million recreation visitor days (RVDs), generating an estimated $38.0 million in recreation benefits (Trinity River Mainstem Fishery Restoration Final EIS/EIR 2000).

3.14.1.2. Keswick and Whiskeytown Reservoirs

Under current operating procedures, Keswick and Whiskeytown reservoirs serve as regulating reservoirs for Shasta Reservoir and Trinity/Lewiston Reservoir. This function enables releases from the larger upstream dams to fluctuate as needed for electrical power generation or other purposes while releases from the regulating dams on the downstream rivers can be made to change less abruptly. As a result, the water levels of Keswick and Whiskeytown reservoirs fluctuate regularly, but within a much smaller range of water surface elevations than Shasta and Trinity reservoirs. This creates relatively stable shoreline and launch-ramp conditions for swimming, fishing, and boating.

Under the Proposed Action/Proposed Project and alternatives, although it is assumed that dam release schedules would change, they would not alter the function of Keswick and Whiskeytown reservoirs as regulating reservoirs. As a result, even though water release patterns would be different from the existing condition, Shasta and Keswick dams as well as Trinity and Whiskeytown dams would still be operated in a coordinated way. Consequently, the historical range of water level fluctuations on Keswick and Whiskeytown reservoirs would be expected to continue into the future without substantial change. Therefore, recreation opportunities on these reservoirs would not change substantially and further evaluation is not warranted.

3.14.1.3. Upper Sacramento River (to Knights Landing)

On the upper Sacramento River, water-dependent activities (i.e., swimming, boating, and fishing) account for approximately 52 percent of the recreation uses (SCWA and Reclamation 1997). Fishing, rafting, canoeing, kayaking, swimming, and power boating are available along most of the upper Sacramento River. While fishing is a year-round activity, boating, rafting, and swimming use take place primarily in summer months when air temperatures are high.

From Colusa to Sacramento, public recreation areas include the Colusa-Sacramento River Recreation Area, Colusa Weir and Tisdale Weir access, River Bend Boating Facility, Knights Landing, Sacramento Bypass, and the Elkhorn Boating Facility.

3.14.1.4. Lower Sacramento River (Knights Landing to Freeport)

Recreational use of the lower Sacramento River is closely associated with recreational use of Delta waterways. This lower reach of the river, influenced by tidal action similar to the Delta, is a popular boating and fishing area, with numerous private marinas and public boat launching facilities along the river. Additional recreational areas along the river include Miller, Yolo County, and Garcia Bend parks. These parks provide picnic sites, playgrounds, and multi-use fields.

3.14.1.5. Trinity Reservoir

Trinity Reservoir and surrounding lands are managed by the USFS and is a unit within the Whiskeytown-Shasta-Trinity National Recreation Area. Trinity Reservoir, when full, has 145 miles of shoreline with a substantial number of coves and bays. The reservoir features 4 marinas, 10 boat launches, 20 campgrounds, and 2 swimming areas. Recreation opportunities in the vicinity of Trinity Reservoir include power boating, sailing, houseboating, swimming, water-skiing, camping, hunting, fishing, hiking, and sightseeing. Reservoir levels fluctuate seasonally, and have been as low as 220 feet below full (full is defined as the top of the Trinity Reservoir glory hole, or 2,370 msl). Operation of a number of recreation-related facilities is constrained by water levels. Recreation use of Trinity Reservoir was estimated at about 485,000 RVDs in 1995, generating about $5.3 million in recreation benefits (Trinity River Mainstem Fishery Restoration Final EIS/EIR 2000).

3.14.1.6. Oroville Reservoir

Oroville Reservoir was created in the 1960's when the Department of Water Resources began building the SWP. Boating, camping, sailing, fishing, picnicking, hiking, biking, horseback riding, fish hatchery tours, educational exhibits, and enjoyment of scenery and wildlife of the Sierra Nevada foothills are offered near Oroville Reservoir. Additionally, the reservoir features 2 full-service marinas, major boat launch ramps at Bidwell Canyon, the Dam Spillway, and Lime Saddle, several less-developed car-top boat launching areas, 84 boat-in campsites, and 10 floating campsites on the Oroville Reservoir Thermalito Afterbay. New extensions constructed in 2002 on the boat launch ramps at Bidwell Canyon, the Spillway, and Lime Saddle allow the ramps to remain open when lake elevations remain above 700 ft msl (Knox 2003). Many of the reservoir's recreational facilities within the Oroville Reservoir State Recreation Area are administered and operated by the California Department of Parks and Recreation.

3.14.1.7. Lower Feather River

In the Feather River, the section of river between the Fish Barrier Dam and Thermalito Afterbay is commonly referred to as the Low Flow Channel of the Feather River. This section of the Feather River is an important recreational resource for nearby residential areas. Access is available south of the City of Oroville, off of Highway 70. Based on CDFG regulations, the river is open for fishing north of the Table Mountain Bicycle

Bridge. In the spring and fall, salmon are known to congregate at the Thermalito Afterbay outlet. In recent years, the Feather River has hosted 40,000 Chinook salmon in the spring and fall. Several other types of fish also are sought by anglers in this section of the river. The Low Flow Channel section of the river also is used and enjoyed by swimmers, wildlife and birdwatchers, sightseers, hikers and bicyclists. The Brad P. Freeman Bicycle Trail runs beside this section of river from the Diversion Dam to Highway 162 where it heads west. Below the Thermalito Afterbay outlet, the river continues through the Oroville Wildlife Area where it gains water from the Afterbay outflow.

3.14.1.8. Folsom Reservoir

The California Department of Parks and Recreation manages the Folsom Reservoir State Recreation Area (SRA), which includes Folsom Reservoir and the surrounding facilities. Two to three million people visit the Folsom Reservoir SRA each year. The area's primary recreational uses are boating and fishing. In addition, the reservoir features approximately 75 miles of shoreline and 80 miles of trails, which provide opportunities for hiking, horseback riding, nature studies, camping and picnicking. The Folsom Reservoir SRA includes two campgrounds, the Beale's Point and Peninsula campgrounds, as well as two hike-in campsites. The area also provides biking opportunities through the Darrington Mountain Bike Trail, which extends 7.7 miles from the Salmon Falls Bridge on the south fork of the American River to the Peninsula Campground on Folsom Reservoir. The trail follows the Folsom Reservoir shoreline and traverses oak woodlands and several streams.

The predominant recreational activities at Folsom Reservoir are water-dependent uses, such as boating, water-skiing, personal watercraft use, swimming, and fishing. Five boat ramps are available at Folsom Reservoir. Reclamation attempts to maintain storage in Folsom Reservoir throughout the summer at sufficient levels to accommodate access to as many boat ramps and marine facilities as possible. The upper (easternmost) arms of the lake are designated as slow zones for quiet cruising, fishing, and nature appreciation. Folsom Reservoir also is an important source of scenic, natural, and cultural resources for water-enhanced recreational activities. Water-enhanced activities provided at the reservoir include camping, trail use, picnicking, and nature study.

The primary recreation season (April through September) coincides with the warmer spring and summer months when the daily high air temperatures average 90°F to 100°F. Approximately 75 percent of the annual visitation to the Folsom Reservoir SRA occurs during the spring and summer seasons. During these months, the reservoir experiences relatively high surface water temperature. Existing reservoir water has little movement and the newer (colder) water tends to sink to the bottom of the reservoir, resulting in noticeably warmer surface temperatures. Surface water temperatures during the peak visitation period (June through August) range from 68°F to 76°F.

3.14.1.9. Lake Natoma

Lake Natoma, as part of the Folsom Reservoir SRA, is managed by the California Department of Parks and Recreation as a less intensive recreation area, emphasizing

non-motorized water recreation. Primary water-related recreational uses include rowing, wind surfing, canoeing, small boat sailing, and fishing. Additional facilities include the Negro Bar campground, located on the north shore of Lake Natoma, and the Jedediah Smith Memorial Parkway Bicycle Trail, which extends the entire length of Lake Natoma and provides a recreational link to Folsom Reservoir.

Facilities at Lake Natoma include the California State University, Sacramento (CSUS) aquatic center, which provides instruction and equipment rentals for rowing, sailboarding, canoeing, and small-boat sailing. Other Lake Natoma facilities include several picnic areas and an 8-mile segment of the American River paved bicycle and pedestrian trail, which is contiguous with the Folsom Reservoir SRA. Bank fishing is common along the shoreline, and swimming and diving occur from the rock outcrops at the upper end of the lake. Summer water temperatures in Lake Natoma are generally much cooler than in Folsom Reservoir; therefore, Lake Natoma is less intensely used for swimming and wading.

3.14.1.10. Lower American River

Recreational opportunities along the lower American River are provided primarily through the American River Parkway (Parkway). The 5,000-acre Parkway consists of 14 interconnected parks and a continuous trail system. The 23-mile Parkway parallels the lower American River from Nimbus Dam to the river's confluence with the Sacramento River. Managed by the Sacramento County Parks and Recreation Department, the Parkway is recognized as one of the nation's premier urban parkways, providing outstanding recreational opportunities for Sacramento area residents.

The Jedediah Smith Memorial Bicycle Trail and a parallel equestrian trail extend approximately 32 miles along the length of the Parkway, from the confluence of the American and Sacramento rivers upstream to Folsom Dam. As illustrated in **Table 3-7**, trail use and sightseeing are the most popular activities within the Parkway, accounting for 21 percent and 15 percent of its total use, respectively (Corps 1991). The American River Parkway facilities include boat launches, picnic areas, archery greens, golf courses, and a nature study center. The Parkway contains no commercial recreation facilities, although raft rental outfitters are located nearby.

Table 3-7. Summary of American River parkway recreation activity.

Recreational Activity	Percentage of Total Use
Trail Use	21
Sightseeing/Photography	15
Rafting/Boating	12
Fishing	10
Swimming/Wading	10
Relaxing	7
Biking	6
Picnicking	5
Other (i.e., nature study, non-water dependent activities)	14

Source: Corps 1991

Rafting accounts for the largest in-stream recreational use of the lower American River. Fishing also is a popular river recreation activity. From spring though summer, ambient

air temperature and water flows are conducive to both of these activities. The boating and rafting season is generally between April and October. Fishing is permitted in the Parkway year-round except during fall and early winter, when portions of the river are closed to protect spawning fish. Swimming and wading are other popular water-dependent activities in the lower American River. In 1992, the lower American River experienced approximately 27,000 visitor days (Reclamation 1997).

3.14.1.11. Sacramento-San Joaquin Delta

The Delta is intensively used for recreational activities, including fishing, boating, and camping. Boating is the most popular activity in the Delta region, accounting for approximately 17 percent of the visitation, with other popular uses including fishing, relaxing, sightseeing, and camping. Peak use periods are summer weekends; however, recreation use occurs over extended summer periods for vacationing visitors and some boating and sport fishing are year-round activities (DWR and Reclamation 1996).

Boating and related facilities are located throughout the Delta and include launch ramps, marinas, boat rentals, swimming areas, camping sites, dining and lodging facilities, and marine supply stores. Most recreation facilities are privately owned and operated commercially. In 1991, the State Lands Commission (SLC) estimated that approximately 100 marinas provided 12,700 berths in the Delta (SLC 1991). Public recreation resources include fishing access sites, parks, camping sites, and boat launch ramps in 22 areas (DWR and Reclamation 1996).

Located near several metropolitan areas, the Delta supports about 12 million user days of recreation a year (DWR 1993). Parks along the mainstem of the Sacramento River and Delta sloughs provide access for water-oriented recreation as well as picnic sites and camping areas. Brannan Island State Park and Delta Meadows River Park are major water-oriented recreational areas. Use of these parks typically peaks in July.

3.14.2. City Service Area

The City Parks, Recreation and Libraries Department operates the City's park and recreation facilities. The Department is responsible for the development and maintenance of the City's various recreational facilities including parks, public golf courses, and open space areas. In addition, the Department manages a full range of recreation programs for the residents of the community.

The City has an adopted standard of 9 acres of parkland per 1,000 residents. In general, the newer specific plan areas of the City meet or exceed the park acreage requirement, while the older infill areas of the City are often below the standard (City of Roseville 1992).

3.15. TRANSPORTATION/TRAFFIC

3.15.1. City Service Area

The existing street network within the City is a product of both roadways that have provided access to the older portions of the City for decades, and roadways that were designed to serve the newer specific plan areas. In each of the City's nine existing

specific plans, arterial and collector roadway classifications have been defined. In the older portion of the City, some roadways function as arterial or collector roadways, but they have not previously been classified as such (City of Roseville 1992).

As noted in the City's nine specific plans, the primary function of arterial roadways is to move large volumes of traffic through the plan areas to other sections of the City and beyond. In the specific plan areas the right-of-way for arterials is 84 or 100 feet and generally incorporates four to six travel lanes, bike lanes, and a landscaped median. Outside the specific plan areas, some roadways function as arterials due to the current high traffic volumes and their key linkages between one section of the City and another. For these roadways, current right-of-way widths vary, but most contain more than two traffic lanes (City of Roseville 1992).

Collector streets generally link local residential streets and commercial and office parking areas to the arterials. In the specific plan areas, these streets are generally designed with a 54 or 60-foot right-of-way and contain two to four traffic lanes with bike lanes. Outside the specific plan areas, a number of roadways function as collectors due to moderate traffic volumes and their linkage to the arterial roadway system. Right-of-way widths vary, with most containing two traffic lanes (City of Roseville 1992).

Local streets provide direct access to abutting land and access to the collector street system. In the specific plan areas, the right-of-way for local streets is normally 54 feet, which provides for two traffic lanes and a narrow parking lane that doubles as a Class III bikeway on both sides. Actual pavement widths for local streets vary in both specific plan and infill areas (City of Roseville 1992).

Truck routes are another important component of the City's functional classification. Truck routes link with Sacramento County's designated truck routes on Roseville Road, Auburn Boulevard, Sunrise Boulevard, and Hazel Avenue. They also recognize some of the key routes for significant volumes of large trucks, including access to the Western Regional landfill site on Fiddyment Road (north of Baseline Road) and Athens Road (City of Roseville 1992).

As in most suburban areas travel within or through the Roseville vicinity is very dependent on the automobile. Until recently, this dependence was not viewed as a critical issue, however, traffic congestion in the Sacramento region is no longer confined to the central areas of downtown Sacramento. Many of Roseville's arterials, particularly Douglas Boulevard and Cirby Way, are currently experiencing regular peak hour congestion. Travel demand is expected to increase substantially as the City population increases by more than 40 percent over 1990 levels (City of Roseville 1992).

3.16. UTILITIES AND SERVICE SYSTEMS

3.16.1. City Service Area

The Public Facilities Element of the City of Roseville General Plan focuses on the following components:

- Electric and privately owned utilities
- Water system
- Wastewater system
- Solid waste, source reduction and recycling

3.16.1.1. Electric and Privately Owned Utilities

The City's electric system consists of transmission and generation facilities, subtransmission and substation facilities, and distribution facilities. The City operates its own electric utility. Telephone service is provided by Roseville Telephone; PG&E delivers natural gas and limited electric services to the City; and Comcast provides local cable television service. Roseville Telephone, PG&E, and Comcast are privately owned (City of Roseville 1992).

The City has a contract for 69 megawatts (MW) of electric capacity and associated energy from the Western Area Power Administration (Western). Additionally, Roseville is a participant in the electric generation and transmission facilities owned and/or operated by the Northern California Power Agency (NCPA) (City of Roseville 1992). The Roseville Electric Department was recently issued a license by the California Energy Commission and is currently constructing a City owned and operated approximately 160MW electric generating plant within the West Roseville Specific Plan area.

Substations and subtransmission facilities, which are owned and operated by the City, bring electricity to the distribution system. The electrical distribution system, consisting of distribution lines and connection services, also is managed by the City (City of Roseville 1992). For additional electrical supplies, the City, through NCPA, has negotiated contracts with the PG&E and other suppliers (City of Roseville 1992).

As of 1989, the City experienced a peak electrical demand of $\pm$130 MW. The forecast for peak electric demand between 1990 and 2010 is expected to increase to approximately 261 MW, assuming full population buildout and partial buildout of other General Plan uses. Although some shifting in the demand by different classes of customers is projected, residential uses will continue to compromise the largest single sector of peak electric demand (City of Roseville 1992).

3.16.1.2. Water System

The City supplies its water resources to residents and businesses through the existing treatment and delivery system. The water system network consists of water mains ranging in size from 4 to 66 inches in diameter. It is designed to deliver an adequate supply of water throughout the community at an acceptable pressure level for domestic and fire flow purposes (City of Roseville 1992).

The City of Roseville WTP is located on Barton Road, south of Douglas Boulevard and east of the City limits. Constructed in 1971, and designed to meet EPA standards for domestic drinking water, the WTP serves to treat water delivered from its source at Folsom Reservoir (City of Roseville 1992). The City WTP is currently undergoing a series of expansions, which will lead to an ultimate treatment capacity of 100 mgd,

which will be adequate to meet General Plan buildout demands of approximately 99.41 mgd (City of Roseville 2004).

In addition, the City supplements its water system with recycled wastewater (City of Roseville 1992). Treated wastewater from the Dry Creek Wastewater Treatment Plant, located on Dry Creek near the Union Pacific Railroad Yard in Roseville, produces recycled water for limited use for some landscape medians, parks, and golf courses within the City limits (City of Roseville 2004). Total average annual supply of recycled wastewater from the Dry Creek Wastewater Treatment Plant in 2030 is estimated at 14.3 mgd. In addition, the total average annual supply of wastewater from the Pleasant Grove Wastewater Treatment Plant in 2030 is estimated at 11.9 mgd, for a total recycled water supply of 26.2 mgd at General Plan buildout (City of Roseville 2004). Existing demand for recycled water within the City limits is estimated to be approximately 2.86 mgd (City of Roseville 2004).

3.16.1.3. Wastewater System

The collection of wastewater and its delivery to the treatment plant is accomplished by the City through a system of collector and trunk lines measuring up to 72 inches in diameter. The collection system is a gravity flow system, with wastewater flowing downhill to the wastewater treatment plant. Where gravity flow is not feasible due to the topography, sewer lift stations are used (City of Roseville 1992).

The City operates two wastewater treatment plants to provide wastewater treatment for the regional service area. The Dry Creek wastewater treatment plant is located on the western edge of the City on Booth Road. The new Pleasant Grove Wastewater Treatment Plant is located in the northwest portion of the City and began operation in the summer of 2004. These plants, owned and operated by the City, on behalf of the South Placer Wastewater Authority Joint Power Authority (JPA), serve not only the City, but also areas of Rocklin, Loomis, Granite Bay, and other areas within unincorporated Placer County, which are within the South Placer Municipal Utility District (SPMUD) (City of Roseville 1992).

3.16.1.4. Solid Waste, Source Reduction, and Recycling

The City, along with Placer County and several other cities within the county, has formed the Western Placer Waste Management Authority, which provides for solid waste management. The Western Regional Sanitary Landfill (WRSL) located at the southwest corner of Athens Road and Fiddyment Road serves the western portion of the county, including the City. The landfill is specified as a Class III non-hazardous site, and its operation is managed by a private firm under contract with the county. In January 2003, Placer County expanded the capacity of the WRSL to 25.7 million cubic yards. The landfill has a remaining capacity of 14,011,000 tons and is expected to reach capacity by 2052.

In addition to the WRSL, there are four inactive solid waste facilities in Roseville, not including individual recycling or salvage businesses. The four inactive sites include the Pacific Fruit Exchange Landfill, Old Roseville Landfill, Roseville Sanitary Landfill, and Finger's Landfill (City of Roseville 1992).

Collection of solid waste within the City is operated and managed by the City of Roseville's Environmental Utilities Department. The temporary collection and disposal of refuse, such as associated with construction and demolition activities, is normally handled by private firms (City of Roseville 1992).

In November 1995, the Material Recovery Facility (MRF) was opened at the WRSL. The MRF separates and recovers waste products for recycling, reuse, or conversion to energy sources.

3.17. POWER

Hydropower generation at CVP facilities is an important resource for contributing to the reliability of the electrical power system in California. Impacts to CVP hydropower operations can result from increased water diversions that result in both lower reservoir levels and less water flow through turbines. In addition to potential impacts to electric system reliability, loss of hydropower capacity and generation can also result in indirect environmental impacts by necessitating increased power generation using means that are less environmentally benign.

3.17.1. CVP Hydropower System

The CVP hydropower system consists of eight power plants and two pump-generating plants (**Table 3-8**). This system is fully integrated into the northern California power system and provides a significant portion of the hydropower available for use in northern and central California. The installed power capacity of the system is 2,071,350 kW. By comparison, the combined capacity of the 368 operational hydropower plants in California is 12,866,000 kW. PG&E is the area's major power supplier, with a generating capacity from all sources of over 20,000,000 kW. Once a strong influence on CVP operations, power operations are now secondary to other considerations. In part, this subordination is caused by the elevation of environmental needs to a higher standing, but changes in contractual relationships have also reduced the priority of power.

Power produced by the CVP hydropower system is used first for meeting Project water pumping loads (Project use power) at CVP pumping facilities (**Table 3-9**), then First Preference Customer needs. Western markets power that is surplus to First Preference Customer and Project use as "commercial power" under long-term, firm contracts to municipal and government entities (Preference Customers) at cost-based rates (based on generation, pumping, transmission, and distribution costs). In an average year, 4,600 gigawatthours (GWh) of energy and 1,700,000 kW of capacity are marketed to Preference Customers at rates that recover full cost of production and repayment obligations of project investment with interest. Energy surplus to CVP use and Preference Customer power needs is "banked" under CVP-PG&E Contract 2948A, to be repaid when needed by Western and its customers.

Contracts for the sale of Sierra Nevada Region power resources expired on December 31, 2004. Western has developed a marketing plan that defines the products to be

offered and the eligibility and allocation criteria that would lead to allocations of CVP electric power resources beyond the year 2004.

Table 3-8. Power resources of the Central Valley Project.

Unit	Max Generating Capacity (kW)	Net Generation 1999-2003 Annual Average (GWh)
Sacramento River Service Area		
Carr	154,000	457
Lewiston	350	3 (est)
Keswick	105,000	454
Shasta	629,000	2,005
Spring Creek	200,000	535
Trinity	140,000	506
Subtotal	1,228,350	4,007
American River Service Area		
Folsom	215,000	526
Nimbus	14,000	69
Subtotal	229,000	595
Delta Export and San Joaquin Valley		
O'Neill [1]	29,000	6
San Luis [1, 2]	202,000	125
New Melones	383,000	464
Subtotal	614,000	595
TOTAL	2,071,350	5,197

1 Pump-generating plant.
2 Jointly owned, pumping and generating facility, federal share only.
Source: Western 2003

Table 3-9. Major pumping plants of the Central Valley Project.

Unit	Capacity (cfs)	Average Annual Energy Use (kWh)
American River Service Area		
Folsom Pumping Plant	350	1,041,000
Delta Export and San Joaquin Valley		
Contra Costa Canal	410	18,908,000
Dos Amigos [1]	13,200	180,146,000 [2]
O'Neill	4,200	87,185,000
San Luis	11,000	306,225,000 [2]
Tracy	4,600	620,712,000

1 Joint state-federal facility
2 Federal energy use
Source: Reclamation 2001

3.17.1.1. Folsom Dam and Reservoir

The Folsom Power Plant has three generating units, with a total release capacity of 215,000kW (Reclamation 2001). By design, the facility is operated as a peaking facility. Peaking plants schedule the daily water release volume during the peak electrical demand hours to maximize generation at the time of greatest need. At other hours during the day, the plant my release little or no water, generating little or no power. The Folsom Power Plant generates an average annual 620,000 MWh.

To avoid fluctuations in flow in the lower American River, Nimbus Dam and Lake Natoma serve as a regulating facility. While the water surface elevation fluctuates, releases to the lower American River remain constant. The Nimbus Power Plant consists of two generating units with a release capacity of approximately 5,100 cfs (Reclamation 2001). Electric generation from this facility is continuous throughout the day.

Pumping energy requirements are affected by total reservoir storage, because less storage means that water must be lifted a greater height from the reservoir surface. Reductions in Folsom Reservoir surface water elevations caused by Reclamation's actions would increase energy requirements for pumping water at the Folsom Pumping Plant and the El Dorado Irrigation District (EID) pumping plant at Folsom Reservoir. These impacts, like those for hydropower, would not be expected to cause direct environmental effects, but would have economic consequences and may cause indirect effects requiring additional energy generation.

3.17.1.2. Oroville Reservoir

DWR stores winter and spring runoff in Lake Oroville for release to the Feather River as necessary for project purposes (i.e., water supply, power generation, flood protection, fish and wildlife enhancement, and recreation). These releases generate power at the Hyatt-Thermalito Power Plant Complex.

On a weekly basis, DWR schedules releases to accommodate water supply requirements, water quality and quantity requirements in the Delta, instream flow requirements in the Feather River, power requirements, and flood control. DWR updates this weekly plan as needed to respond to changing conditions.

DWR schedules hourly releases through the Edward Hyatt and Thermalito Pumping Generating plants to maximize the amount of energy produced when power values are highest. Because the downstream water supply is not dependent on hourly releases, and pumping of SWP water can occur at off-peak times; energy prices primarily dictate hourly operations for the power generation facilities.

Storage in Thermalito Forebay and Afterbay helps to maximize the value of project energy and maintain uniform flows in the Feather River downstream from the Oroville facilities. The Thermalito Afterbay also provides storage for pump-back operations, which are designed to maximize profit from the power generation facilities. DWR releases water from Lake Oroville when power prices are high, then pumps water not needed to meet downstream requirements back into Lake Oroville from Thermalito Forebay and Afterbay when power prices are low. Because DWR operates the power plants to maximize weekday generation when power prices are highest, storage is usually higher in the Afterbay at the end of each week than at the beginning. Downstream releases during the weekend, or pumpback to Lake Oroville (to prepare for the following week's operation), lowers the water in the Afterbay.

3.18. WATER QUALITY

3.18.1. Regional Study Area

3.18.1.1. Sacramento River

The Regional Water Quality Control Board (RWQCB) has defined the following existing and potential beneficial uses for the Sacramento River: municipal and domestic water supply; industrial service supply; irrigation and stock watering; power generation; contact recreation, non-contact recreation, and canoeing/rafting; warm and cold freshwater habitat; warm and cold freshwater migration and spawning habitat; wildlife habitat; and navigation (RWQCB 1994).

Sacramento River water quality monitoring studies indicate that the river's water is generally of high quality (Larry Walker Associates 1991; Larry Walker Associates and Brown and Caldwell 1995). Sacramento River water quality is primarily affected by land use practices within the watershed and associated urban runoff, storm water discharges, agricultural runoff, effluent discharge from wastewater treatment plants, and acid mine drainage. The lower Sacramento River receives urban runoff, either directly or indirectly (through tributary inflow), from the cities of Sacramento, Roseville, Folsom, and their surrounding communities. The Natomas East Main Drainage Canal discharges to the Sacramento River immediately upstream of the confluence with the American River. This canal transfers both agricultural discharges and urban runoff into the Sacramento River.

Despite the seasonal variability, a recent study found that water quality parameters in the vicinity of Freeport were almost always within water quality objectives specified in the former Inland Surface Waters Plan, except for some metals (SRCSD 1994). Concentrations of some trace elements (particularly copper and zinc) frequently approach limits established by regulatory agencies while other metals such as lead, cadmium, mercury, and silver may also approach these limits. Much of the trace element loading in the Sacramento River is from non-permitted sources. Acid mine drainage contributes cadmium, copper, and zinc, while agricultural return flows typically contribute chromium and nickel. A complete listing of applicable water quality objectives for the Sacramento River are provided in the WQCP (Basin Plan) for the Sacramento and San Joaquin River basins (RWQCB 1994).

3.18.1.2. Oroville Reservoir and the Feather River

Water quality in Lake Oroville is influenced by tributary streams, of which the Middle, North, and South forks of the Feather River contribute the bulk of the inflow to the reservoir. Flows in the Feather River are regulated by the SWP's Oroville Dam, which is operated to provide water for agricultural and urban water demands, flood control, hydropower, recreation, and management of Delta water quality. The quality of Feather River water between Oroville Dam and the confluence with the Sacramento River is generally acceptable for the identified beneficial uses except for periodic impairment related to excessive concentrations of mercury, various pesticides, and toxaphene that can impair aquatic habitat (SWRCB 1992).

3.18.1.3. Folsom Reservoir and Lake Natoma

Folsom Reservoir and Lake Natoma have numerous beneficial uses. The following existing and potential beneficial uses have been defined by the RWQCB for these water bodies (RWQCB 1994): municipal, domestic, and industrial water supply; irrigation; power; water contact and non-contact recreation; warm and cold freshwater habitat, warm freshwater spawning habitat; and wildlife habitat.

Water quality in Folsom Reservoir and Lake Natoma is generally acceptable for the beneficial uses currently defined for these water bodies. Water temperature, dissolved oxygen, conductivity, and toxic metals concentrations have been below recommended limits. However, taste and odor problems have occurred in municipal water supplies diverted from Folsom Reservoir in the past, which were attributed to blue-green algae blooms that occasionally occur in the reservoir as a result of elevated water temperatures, primarily during late summer.

3.18.1.4. Lower American River

Beneficial uses of the lower American River include all of those listed for Folsom Reservoir and Lake Natoma as well as recreational canoeing and rafting, warm and coldwater fish migration habitat, and coldwater spawning habitat (RWQCB 1994).

Historically, water quality parameters for the lower American River have typically been well within acceptable limits to achieve water quality objectives and beneficial uses identified for this water body (SWRCB 1992), and remain so today. Principal water quality parameters of concern for the river (e.g., pathogens, nutrients, total dissolved solids (TDS), total organic carbon (TOC), priority pollutants, and turbidity) are primarily affected by urban land use practices and associated runoff and stormwater discharges. The American River receives urban runoff from a number of unincorporated communities in the Sacramento metropolitan area and the City of Folsom at locations upstream of the E.A. Fairbairn WTP. The storm water discharges to the river temporarily elevate levels of turbidity and pathogens during and immediately after storm events. TOC and TDS levels in the lower American River are relatively low compared to the Sacramento River and Delta and thus are generally not of substantial concern. Metal concentrations in the river are typically within the range of drinking water standards (City of Sacramento 1993).

Taste and odor problems occur in water taken from the lower American River, primarily during late summer. The problems are attributable to increased concentrations of an actinomyces microorganism, which is associated with elevated summer temperatures. Control of taste and odor problems from these sources may require increased treatment of the raw water supply (Corps 1996).

Water released from Folsom Reservoir, through Lake Natoma, and into the lower American River affects numerous water quality parameters in the river. Operation of Folsom Dam and Reservoir also directly affects lower American River temperatures throughout much of the year. The effect of water temperatures in the lower American River on salmonid resources is discussed in Section 5.4, Biological Resources.

3.18.1.5. Sacramento-San Joaquin Delta

Beneficial uses of the Delta are the same as those of the Sacramento River, with the addition of industrial process supply and the exceptions of power generation, rafting, and cold freshwater spawning habitat. Applicable water quality objectives and standards for the Delta are provided in the WQCP (RWQCB 1994) and the WQCP for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (SWRCB 1995).

Water quality in the Delta is influenced by a combination of environmental and institutional variables, including upstream pollutant loading, water export and diversions within and upstream of the Delta, and agricultural activities in the Delta. Critical Delta water quality parameters, such as salinity and TDS, TOC, bromide, and pathogens, can show considerable geographic and seasonal variation. Salinity, TDS, TOC, and water temperature are strongly related to changes in Delta inflows (San Francisco Estuary Project 1992).

The tidal currents carry large volumes of seawater back and forth through the Delta with each tide cycle. The mixing zone of saltwater and freshwater can shift two to six miles depending on the tides, and may reach far into the Delta during periods of low inflow. Thus, the inflow of the tributaries into the Delta is essential in maintaining its water quality.

Metals, pesticides and petroleum hydrocarbons enter the Delta through several means, including agricultural runoff, municipal and industrial wastewater discharge, urban runoff, recreational uses, river inflow, and atmospheric deposition (San Francisco Estuary Project 1992). The concentrations of these pollutants in the Delta vary geographically and seasonally. The toxic effects of pollutants on aquatic life can vary with flow levels; however, water flowing into and through the Delta acts to dilute concentrations of toxicants.

3.18.2. City Service Area

For the most part, measurements of water quality within the Roseville area indicate no major sources of pollutants are present within watercourses that traverse the planning area (City of Roseville 1992). However, non-point sources of runoff from streets, driveways, parking lots, and landscaped areas typically contain oil and grease, petroleum, heavy metals, phosphates, nitrates, chlorides, sediment, and other compounds. These substances reach surface drainages through urban runoff.

The City has, and will continue to, comply with Environmental Protection Agency storm water management regulations as enforced by the SWRCB and the RWQCB. These regulations include requirements for National Pollution Discharge Elimination System (NPDES) permits. In accordance with NPDES Phase 2 requirements, the City recently adopted a Stormwater Management Program. The City promotes the use of cost-effective urban runoff controls, including Best Management Practices, to reduce pollutants from entering the waterways. These practices include the use of oil and sand separators, grassy swales, detention ponds, vegetative buffers, and other source control, housekeeping and treatment measures (City of Roseville 1992).

Chapter 4
Analytical Methodology

The analyses undertaken in this joint environmental document relied upon baseline information developed from several sources, including USFWS, CDFG, and various City environmental and planning documents. For the hydrological analyses, the Reclamation operations and planning model PROSIM 2000 was used to simulate system-wide CVP/SWP coordinated operations throughout the local and regional waterbodies for the Proposed Action/Proposed Project and alternatives. This section describes the framework used for the hydrologic analyses, impact assessment comparisons, and endangered species evaluation.

4.1. HYDROLOGIC ANALYSIS FRAMEWORK

4.1.1. PROSIM

The Reclamation planning and operations model PROSIM was used to generate the hydrologic output data necessary to assess hydrologic impacts associated with the Proposed Action/Proposed Project and alternatives. PROSIM is a linked mathematical model, which accounts for demands (e.g., diversions) and gains (e.g., pumping and accretions) within specific model segments, where each segment represents distinct river reaches of the CVP and SWP systems. The physical processes that occur from one segment of the model (referred to as a node) to another are captured within the accounting structure of the model. The most recent version of the Reclamation hydrologic model was used at the time the simulations were conducted, PROSIM 2000.

4.1.2. Period of Record

The period of record used in the hydrologic modeling analyses extended from 1922 though 1991 (70 years). The period of record used for the water temperature modeling analyses and the associated salmon mortality evaluations extended from 1922 through 1990 (69 years). These periods are considered to be representative of the natural variation in climate and hydrology experienced in the Central Valley during recent times, and include periods of extended drought, high precipitation and runoff, and variations in between.

4.1.3. Temporal Framework

The framework under which each of the hydrologic modeling simulations was conducted considered both existing and future conditions. The individual simulations were set at either one of these two timeframes. The existing (or current) condition represents current hydrologic conditions, water demands, and operating practices of the CVP and SWP. The future condition represents conditions assumed to be in place at some point in the future, in consideration of anticipated future hydrologic conditions, water demands, and assumed integrated operating practices of the CVP and SWP.

The hydrology used in the simulations was based on DWR Bulletin 160-98. For the existing condition, it assumed a 2000 hydrology developed from a linear interpolation of

land use between 1995 land use (DO6E) and 2020 land use. For the future condition, it assumed a 2020 hydrology consistent with 2020 level land use projections (CO9C).

4.1.4. Operational Studies

To capture the range of potential environmental impacts associated with the Proposed Action/Proposed Project and alternatives, five hydrologic simulations were developed. The modeling simulations conducted are identified and described below.

Based on agreements between the City and San Juan Water District, up to 4,000 AFA of San Juan Water District's PCWA contract water supply could be transferred to the City during normal/wet years. The City and San Juan Water District both divert water from the American River at the same location. The reassignment of a portion of San Juan Water District's water supply would occur subsequent to its diversion from the American River in accordance with an existing Warren Act contract between San Juan Water District and Reclamation.

Hydrologic modeling simulations are used to identify potential environmental impacts associated with changes in water diversions and not those associated with the transfer of water following diversion from the river. In addition, the purchase of up to a 4,000 AFA from San Juan Water District by the City would not change the amount of water the City or San Juan Water District would divert under any of the hydrologic simulations described below.

4.1.4.1. No Action/No Project Alternative

Under this simulation, no diversion of PCWA MFP water rights water for use by the City of Roseville was assumed, except as discussed above associated with purchase of 4,000 AFA from the San Juan Water District. This simulation is identical to the Existing Condition developed for the American River Basin Cumulative Impact Report under the direction of Reclamation. Under the No Action/No Project simulation, the City of Roseville would divert 26,633 AFA under its existing 32,000 AFA CVP M&I water service contract. No dry year reductions (as per the Water Forum Agreement) were imposed on the City's CVP water contract, nor was there any need for replacement water to be modeled since under this alternative, the City would not divert PCWA MFP water rights water off of the American River.

4.1.4.2. Proposed Action/Proposed Project

Under this simulation, a diversion of up to 30,000 AFA of PCWA MFP water rights water was simulated for the City of Roseville at Folsom Dam under 2000-level hydrology. Under the Water Forum Agreement, the maximum allowable surface water diversion for the City is 54,900 AFA. The PCWA MFP allotment to the City was used as necessary after primary reliance on the City's 32,000 AFA CVP contract. When the unimpaired inflow to Folsom Reservoir for the March through November (FUI_{M-N}) was projected to be less than 950,000 AF, the City would reduce its diversions as agreed to under the Water Forum Agreement (i.e., consistent with the City of Roseville's Purveyor Specific Agreement under the Water Forum). Total diversions would taper from 54,900 AFA at (FUI_{M-N}) of 950,000 AF to 39,800 AFA at (FUI_{M-N}) of 400,000 AF. In addition, water would be made available from the MFP to the American River at Folsom Reservoir as a

"replacement" for some of the diversions made when (FUI_{M-N}) was less than 950,000 AF. This replacement water would ramp up from zero when (FUI_{M-N}) equals 950,000 AF to 20,000 AF when (FUI_{M-N}) equals 400,000 AF or less.

4.1.4.3. Downstream Diversion Alternative

Under this simulation, a diversion of 30,000 AFA of PCWA MFP water rights water was simulated for the City of Roseville downstream of the mouth of the American River on the Sacramento River under 2000-level hydrology. No dry-year reduction in diversions or replacement obligation (as required under the Water Forum Agreement) was incorporated in this simulation (other than CVP allocation deficiencies) since there would be no diversion of PCWA MFP water rights water off of the American River, except as discussed above associated with purchase of 4,000 AFA from the San Juan Water District. Under this simulation, the City of Roseville would continue to divert up to 26,633 AFA at Folsom Dam under its existing 32,000 AFA CVP contract.

4.1.4.4. Future No Action/No Project

Under this simulation, no diversion of PCWA MFP water was simulated for the City of Roseville in the context of 2020 hydrology. No dry-year reduction in diversions or replacement obligation (as required under the Water Forum Agreement) was incorporated in this simulation (other than CVP allocation deficiencies) because there would be no diversion of PCWA MFP water rights water off of the American River by the City, except as discussed above associated with purchase of 4,000 AFA from the San Juan Water District. With this exception, this simulation is identical to the Future Cumulative Condition simulation developed by Surface Water Resources Inc. under the direction and approval of the Bureau of Reclamation for the American River Basin Cumulative Study. Under this simulation, the total Roseville demand is 32,000 AFA under its existing 32,000 AFA CVP contract.

4.1.4.5. Future Cumulative Condition

This simulation is identical to the future cumulative simulation conducted for the American River Basin Cumulative Impact Report under the direction of Reclamation. Similar to the Proposed Action/Proposed Project simulation, the maximum allowable surface water diversion for the City would be 54,900 AFA (consistent with the City of Roseville's Purveyor Specific Agreement under the Water Forum) and the 30,000 AFA of PCWA MFP water rights water would be used as necessary after primary reliance on the City's 32,000 AFA CVP contract.

When the unimpaired inflow to Folsom Reservoir for the March through November (FUI_{M-N}) was projected to be less than 950,000 AF, the City would reduce its diversions as agreed to under the Water Forum Agreement (i.e., consistent with the City of Roseville's Purveyor Specific Agreement under the Water Forum). Total diversions would taper from 54,900 AFA at (FUI_{M-N}) of 950,000 AF to 39,800 AFA at (FUI_{M-N}) of 400,000 AF. In addition, water would be made available from the MFP to the American River at Folsom Reservoir as a "replacement" for some of the diversions made when (FUI_{M-N}) was less than 950,000 AF. This replacement water would ramp up from zero when (FUI_{M-N}) equals 950,000 AF to 20,000 AF when (FUI_{M-N}) equals 400,000 AF or less.

4.2. IMPACT ASSESSMENT COMPARISONS

Specific assumptions used in the modeling related to hydrology, water supply demands, facilities/operations, CVP water allocation, and various regulatory standards are described in a modeling technical memorandum (see Appendix I, Modeling Technical Memorandum). Using the above simulations, the following comparisons between simulations were conducted to provide the analytical framework with which to determine potential impacts under the Proposed Action/Proposed Project, Downstream Diversion Alternative, No Action/No Project Alternative, Future No Action/No Project Alternative, and Future Cumulative Condition:

1. Proposed Action/Proposed Project versus No Action/No Project Alternative
2. Downstream Diversion Alternative versus No Action/No Project Alternative
3. Future Cumulative Condition versus No Action/No Project Alternative
4. Future Cumulative Condition versus Future No Action/No Project Alternative

Hydrologic modeling output (as generated data templates and graphics) is provided in technical appendices to this joint document. References to the technical appendices are as follows:

Appendix A	Proposed Action/Proposed Project	Modeling Template Output
Appendix B	Proposed Action/Proposed Project	Modeling Output Data
Appendix C	Downstream Diversion	Modeling Template Output
Appendix D	Downstream Diversion	Modeling Output Data
Appendix E	Future Cumulative	Modeling Template Data
Appendix F	Future Cumulative	Modeling Output Data
Appendix G	Future No Action/No Project	Modeling Template Output
Appendix H	Future No Action/No Project	Modeling Output Data
Appendix I	Modeling Technical Memorandum	

The modeling template output provides the results of the individual simulations. The modeling output data includes summary tables and graphical representations of the data used in comparisons between alternative conditions or scenarios. Both types of output are used and referenced within the individual water-related resource sections of Chapter 5, Environmental Consequences and within Section 7.1, Cumulative Impacts.

4.3. ENDANGERED SPECIES

A species list provided by USFWS was reviewed to initially identify listed, proposed listed, and candidate species having the potential to be affected by the Proposed Action/Proposed Project (letter dated December 11, 1996 and subsequently updated in a letter dated August 13, 1998). Species lists were updated again via the USFWS Quad Species List website on April 28, 2004 (USFWS 2004). A record search of the CNDDB RAREFIND was conducted for the Roseville, Folsom, Rocklin, and Citrus Heights quadrangles to identify listed, proposed listed, and candidate species occurrences within the City's service area portion of the action area. The CNDDB record search was updated via the CDFG CNDDB Quad Viewer website on April 24, 2004 (CDFG 2004). In addition to these information sources, City planning documents, including the 2004 West Roseville Specific Plan Final EIR, were reviewed to determine

if any additional species occurrences were identified during project field surveys. The information obtained from USFWS, CDFG, and the City were used to identify listed, proposed listed, and candidate species that could be affected by the Proposed Action/Proposed Project, either directly, indirectly, or cumulatively (including interdependent and interrelated actions).

Potential effects on listed, proposed listed, and candidate species identified as occurring or potentially occurring within the action area were analyzed. Effects within the City's service area portion of the action area were analyzed through examining the effects of development on species and habitat in undeveloped areas facilitated through water deliveries to those areas. Effects within the CVP/SWP portion of the action area (i.e., the regional study area) were evaluated within the context of reviewing and interpreting PROSIM generated hydrologic modeling output to those potentially affected waterbodies and the species that use them. The analytical framework for the evaluation of effects within the City's service area portion of the action area is discussed below.

4.3.1. City Development Analysis Framework

Effects upon species within the City's service area were determined through evaluation of the City's plan for development of its remaining undeveloped, but entitled land, similar to the approach used in Reclamation documents such as the Biological Assessment prepared for the CVP Water Supply Contracts Under P.L. 101-514 (Section 206) (Reclamation, SCWA, SJWD, and Folsom 1997).

In the City, the majority of undeveloped land (i.e., land that does not support existing infrastructure, or has been altered from its previous state, regardless of land use entitlement or development agreement) is contained in the West Roseville, Stoneridge, Highland Reserve North, North Roseville Phase I, II and III specific plans and the Foothill Business Park areas.

Development of these areas is governed by the City of Roseville General Plan, area specific plans, and the City's project planning and review process. Land development projects must complete the planning and review process during which time any potential environmental impacts are identified and mitigated, development agreements executed, and land entitlements granted. Required state and federal permits also are obtained as part of this process, which includes Clean Water Act Section 404 permits (all specific plan areas listed above have received their Section 404 permits). The City also uses this planning and review process to evaluate the adequacy of its existing services to meet the needs of anticipated additional City residents. Also during this process, the City works to integrate future development into existing urban infrastructure and to regulate the timing and location of future projects.

The City's biological resources are found within three types of areas within the City: (1) designated open space containing preservation and mitigation lands not anticipated to be changed from its current land use; (2) entitled but undeveloped lands contained within the developing Highland Reserve North, Stoneridge, and North Roseville specific plan areas; and (3) urban reserve areas. At this time, no urban reserve areas remain within the City. Since activities planned and approved for these areas could affect biological resources, including sensitive species, the action area was limited to these

portions of the City. Specific plans and environmental impact reports associated with each of these areas were reviewed to identify past and projected future habitat and species losses and any mitigative or restorative actions undertaken or committed to by the City. Impact determinations were based upon this review and are discussed in Chapter 5, Environmental Consequences.

Chapter 5
Environmental Consequences

This chapter identifies and discusses potential impacts on environmental resources that may occur with implementation of the Proposed Action/Proposed Project and alternatives. For all resource impact evaluations within the City's service area, there would be no difference between the Proposed Action/Proposed Project and Downstream Diversion Alternative. Both the Proposed Action/Proposed Project and Downstream Diversion Alternative represent variations in the point of diversion of the City's PCWA MFP water rights entitlement. The Proposed Action/Proposed Project assumes a Folsom Dam diversion, while the Downstream Diversion Alternative considers a diversion from the Sacramento River near the mouth of the American River. Regardless of where the City diverts its PCWA MFP water rights entitlement, there would be no difference in the potential magnitude or frequency of indirect impacts to any resource within the City's service area. Potential indirect impacts within the City's service area would not be influenced by the source of the water supply.

For the No Action/No Project Alternative, it is assumed that the City would pursue an alternative means of acquiring its PCWA MFP water rights entitlement, separate from a Warren Act contract. However, regardless of how the City chooses to pursue long-term acquisition of its PCWA MFP water supply, resource impacts within the City's service area would not differ. For this reason, impact discussions for resources within the City's service area are treated singly and without differentiation between the Proposed Action/Proposed Project and any of the alternatives.

From a hydrologic modeling perspective, the No Action/No Project Alternative assumes no execution of a Warren Act contract. Without a Warren Act contract, the City would not divert the PCWA MFP water supply through the federal facilities at Folsom Dam. Under such a situation, the No Action/No Project Alternative would have the same hydrologic conditions as the existing or baseline condition.

It is possible, however, that without a Warren Act contract the City would pursue some alternate means of acquiring the PCWA water rights supply, in addition to purchasing a portion of San Juan Water District's PCWA contract water. The Downstream Diversion Alternative provides this alternate means. In keeping with the guidance provided in both CEQA and NEPA regarding the selection of alternative(s) that possess the ability to provide environmental benefit (relative to the Proposed Action/Proposed Project), this alternative meets CEQA/NEPA regulatory requirements. Moreover, it also addresses the possibility of an alternate No Action/No Project scenario from that described above.

While the No Action/No Project scenario on the part of the City is speculative, the modeling framework developed and applied in this environmental document addresses both possibilities. Accordingly, within the context of the environmental impacts analysis presented here, and as incorporated in the PROSIM modeling, it is assumed that the No Action/No Project Alternative, from an in-river hydrological perspective, would be identical to the existing condition (i.e., no diversion of PCWA MFP water by the City).

Finally, given the multiple-purposes of this joint environmental document, impact analyses and their concomitant discussions focus on listed, proposed listed, and candidate species, where appropriate, as identified under the federal ESA in deference of the intent to have this document also serve as a BA under section 7(c) of the ESA (16 U.S.C. §1536(c)).

This joint environmental document recognizes that insofar as potential impacts to resources within the City of Roseville's service area are concerned, the Proposed Action/Proposed Project will result in no independently related effects to resources within the City's service area. The Proposed Action/Proposed Project, as defined, within the quantities of water intended for federal "wheeling," is designed to meet both the City's existing and future planned water needs within the context of an approved General Plan. The Proposed Action/Proposed Project, therefore, is intended to fulfill the City's growth and infill projections as projected in its General Plan. The Proposed Action/Proposed Project does not require construction activities, nor would it directly result in construction activities or land conversions. Indirectly, the City's service area would undergo continual changes to its various resources and services as it maintains its current growth trends. This joint environmental document does not intend to re-evaluate long-term impacts associated with planned growth within the City's service area, as was assessed in the City General Plan EIR and associated specific plan EIRs. However, it does summarize results of citywide endangered species habitat mapping conducted by the City in association with USFWS. This work was performed consistent with the City/USFWS MOU developed to address secondary effects of the Pleasant Grove Wastewater Treatment Plant project. As discussed in Appendix L (Service Area Analysis and Water Allocations Issues), because the City wastewater and water service areas are substantially the same, the resulting mapping and analyses are directly applicable to the analyses required for this Warren Act contract. In addition, this joint environmental document summarizes the analysis of potential impacts and associated mitigation measures related to listed, proposed, and candidate species from the 2004 West Roseville Specific Plan Final EIR.

Without the water supply facilitated through this Warren Act contract, the City would be unable to meet its existing water demands in most years, nor would it be able to achieve its projected and approved General Plan growth. Impacts to resources, activities, services, and the quality of life within the City's service area have already been addressed in the environmental review and approval processes associated with the General Plan and, moreover, have been evaluated in several individual specific plans. Therefore, no impacts to any of the resources within the City's service area would be a direct result of the Proposed Action/Proposed Project. The Proposed Action/Proposed Project will *accommodate* the City's already planned and approved growth.

5.1. AESTHETICS

5.1.1. City Service Area Impacts

As indicated above, the Proposed Action/Proposed Project will not affect aesthetic resources within the City's service area beyond that disclosed in previous environmental

documents (i.e., general plan and specific plan EIRs). The balanced aesthetic and functional characteristics of the City's design, within the context of its natural and urban environment, will remain unaffected by the implementation of the Proposed Action/Proposed Project. Urban development will continue consistent with applicable design guidelines, which will ensure that any potential impacts are mitigated to less than significant levels.

5.1.2. Mitigation Measures

As no impacts to the aesthetic quality or features within the City's service area are anticipated to occur as a result of the Proposed Action/Proposed or alternatives, no mitigation measures are necessary or recommended.

5.2. AGRICULTURAL RESOURCES

5.2.1. City Service Area Impacts

As stated in Section 3.2, Agricultural Resources, other than within the West Roseville Specific Area, there are no land areas designated for agricultural use. The West Roseville Specific Plan area was classified as Farmland of Local Importance based on its previous Placer County zoning classification, with a total of 40.2 acres of land classified as Prime Farmland. However, zoning within the West Roseville Specific Plan area was redesignated with annexation approval. In addition, approximately 22.4 acres of Prime Farmland will be developed with residential uses and a community garden, leaving the remaining 16.8 acres in undeveloped open space. Potential impacts and associated mitigation measures regarding conversion of agricultural land were previously disclosed in the West Roseville Specific Plan EIR. As a result, the Proposed Action/Proposed Project or alternatives would not have any new or additional impact on agricultural lands within the City's service area.

5.2.2. Mitigation Measures

No new impacts on agricultural resources with implementation of the Proposed Action/Proposed Project are identified within the City, therefore no mitigation measures pertaining to agricultural resources are necessary or recommended.

5.3. AIR QUALITY

5.3.1. City Service Area Impacts

The City of Roseville, as with many Central Valley urban centers, experiences elevated levels of several criteria pollutants (e.g., ozone and PM_{10}). Currently, under existing conditions, the City is a serious and severe non-attainment area for ozone under both state and federal standards, respectively, and is a non-attainment area for PM_{10} under state standards. The Proposed Action/Proposed Project, as defined, will not change the City's attainment status for any of these criteria pollutants. Consequently, the Proposed Action/Proposed Project's air quality impacts are considered less than significant.

5.3.2. Mitigation Measures

As no impacts to the air quality within the City's service area would be anticipated to occur as a result of the Proposed Action/Proposed Project or alternatives, no mitigation measures are necessary or recommended.

5.4. BIOLOGICAL RESOURCES

5.4.1. City Service Area Impacts

Of the listed, proposed listed, and candidate species under the federal ESA having the potential to occur within the City's service area, delta smelt, green sturgeon, California red-legged frog, giant garter snake, California tiger salamander, Aleutian Canada goose, little willow flycatcher, and bank swallow do not occur within the City's service area and, therefore, are not discussed in this analysis. In addition, the American peregrine falcon, golden eagle, and bald eagle, while having the potential to pass over the City's service area, are rarely seen, if ever, in the vicinity of the City's portion of the action area. Due to the rarity of their presence and the lack of suitable habitat for these species, effects on the American peregrine falcon, golden eagle, and bald eagle are not anticipated to occur and are, therefore, not discussed further in this analysis.

5.4.1.1. City of Roseville/U.S. Fish and Wildlife Service Memorandum of Understanding

On August 18, 2000, the City of Roseville and USFWS entered into a MOU intended to implement a number of commitments and attain various objectives consistent with the USFWS Biological Opinion and associated Incidental Take Statement (ITS) regarding construction of the Pleasant Grove Wastewater Treatment Plant (PGWWTP), which at the time was located just outside the western boundary of the City.

On May 25, 1999, USFWS issued a Biological Opinion under a formal consultation for the PGWWTP on the federally listed endangered vernal pool fairy shrimp and the threatened vernal pool tadpole shrimp. The ITS authorized incidental take of these species associated with both the direct and indirect effects of the PGWWTP construction. The City of Roseville, as a participant in the project (to construct the PGWWTP) committed at the time, to develop and implement an interim conservation strategy and a long-term habitat conservation program (HCP), or equivalent, to address PGWWTP service area impacts.

The planning area for the interim conservation strategy and the HCP encompassed that portion of the PGWWTP service area within the corporate boundaries of the City. As the City continues to expand, it is recognized in the MOU that lands annexed through agreement with Placer County also would be included in the planning area. Therefore, the City has essentially committed to developing an interim conservation strategy and HCP or equivalent for its entire wastewater service area, which is generally the same as and in some locations larger than the City's water service area. Consequently, as discussed in Appendix L (Service Area Analysis and Water Allocation Issues), the work performed to address service area endangered species issues under the PGWWTP City/USFWS MOU also is applicable to the City's water service area as defined under the Proposed Action/Proposed Project.

Much of the intent of the MOU is to foster an understanding of the need to cooperatively plan for the development of an interim conservation strategy. The key tenets that make up the framework of the intended conservation strategy include:

1. Future development in areas adjacent to vernal pool preserves shall take measures to protect and, where practicable, improve the integrity of the preserve. Such measures may include providing adequate buffers, enlarging the preserve area when resources are contiguous, providing protection to the preserve through the maintenance of watershed integrity or topographical isolation, or providing connectivity between fragmented preserves.

2. Development projects going forward prior to establishment of the HCP or its equivalent shall not preclude options for establishing a viable long-term preserve system. Special attention should be given to areas of high conservation value. Some of these areas, however, may be developed in the context of the HCP or its equivalent if warranted by the overall preserve design and management strategy developed through the HCP or its equivalent. This approach will allow the City and USFWS to develop an acceptable conservation strategy without any single project foreclosing critical conservation opportunities.

3. As provided in the ITS attached to the PGWWTP Biological Opinion, the City agrees to preserve all vernal pools located in preserves established by prior agreement between the City and USFWS, or the City and third parties, and to establish and implement individual operations and maintenance plans for the management of the preserves. The City further agrees to require that all projects subject to its approval, including infrastructure, avoid, to the maximum extent practicable, direct and indirect effects to the preserves unless the parties agree otherwise.

By agreeing to participate in the MOU, the City committed to initiating a comprehensive and integrated planning process designed to develop both an interim and long-term habitat conservation strategy that will provide the basis upon which future development projects can protect threatened, endangered, and other listed species within the City's service area. This process is designed to address the indirect effects of the PGWWTP on federally listed species within the City's service area. It includes, at the outset, a process whereby new or updated information can be collated and shared with USFWS. This includes:

- Identification of future planned development and infrastructure activities within the City that will be serviced by Phase I of the PGWWTP;
- Identification and mapping of existing, including City permitted vernal pool resources within the service area; and,
- Development of a framework under which take resulting from projects proposed prior to issuance of ITPs or their equivalent by USFWS may be authorized in a streamlined and efficient manner consistent with the goals and objectives of the conservation strategy and with federal law, including ESA and NEPA.

Other components of the MOU include: the commitment by both the City and USFWS to ongoing discussions regarding future projects within the City as the draft interim conservation strategy framework is being developed; development of operations and maintenance plans for certain vernal pool preserves; and the initiation of discussions between the City, USFWS, and other jurisdictions served by the PGWWTP to ascertain opportunities for joint collaboration in the development of an acceptable interim conservation strategy and HCP, or its equivalent.

To date, the City has completed several deliverables as part of its commitments to USFWS under this MOU. The deliverables include the following (as referenced by the appropriate MOU Section):

30-DAY DELIVERABLES

MOU Section 7.3a.

- Final City of Roseville 2010 Land Use Diagram (General Plan Map)
- Final Location of City of Roseville Capital Improvement Projects With Potential to Impact Vernal Pools (Map and Table)

MOU Section 7.3b.

- Final Permitted Vernal Pools Map, City of Roseville
- Final Completed Federal 404 Permits and Section 7 Consultation (Map Overlay)

SEPTEMBER 2000 DELIVERABLES

The City also has completed several milestones as part of its obligations to meet the September 2000 Deliverables schedule identified in the original MOU. Although the MOU was not executed until August 2000, several requested milestones were identified as September 2000 deliverables. Progress, nevertheless, was made by the City on several deliverables, as follows:

MOU Section 7.3c.

- Establishment of species and habitat conservation goals and objectives

MOU Section 7.3d.

- Development of interim strategy framework

The City of Roseville has submitted its draft Interim Strategy Goals and Objectives to USFWS for review. With the agreement between the City and USFWS not to pursue a habitat conservation plan for the remaining undeveloped lands within the City, the scope of this document has been reduced. Two strategies are presented; one for the goals and objectives within the existing City limits, and one for potential annexation projects in areas currently outside the City limits. Within the existing City limits, the proposed permitting strategy recommends maintenance of the status quo. For potential annexation projects, the strategy sets up a process for early HCP-type consultations and the establishment of preservation goals and objectives. This early consultation process was followed for the West Roseville Specific Plan project. The City currently is working to revise the interim strategy consistent with direction provided by USFWS (see related correspondence in Appendix J).

MOU Section 7.3e.

- Development of Operations and Maintenance Plans (O&M) for existing preserves and any established by the draft Interim Conservation Strategy

The City submitted to USFWS on October 26, 2000, the Highland Reserve South Open Space Preserve Operations and Management Plan. Other O&M plans under development for preserves identified in the MOU are modeled after this plan. All plans include monitoring and reporting requirements as well as perpetual funding mechanisms.

MOU Section 7.3f.

- Initiate PGWWTP Member Agency Participation Discussions

An informational discussion of the PGWWTP MOU conservation measures was presented at the June 11, 2001 South Placer Wastewater Authority JPA meeting. The JPA Board includes representatives from all jurisdictions served by the PGWWTP.

It is the intent of the City that the fundamental particulars and good faith efforts exercised to date by the City in implementing the obligations under this MOU, continue to serve as the foundation for all service area-related issues with USFWS. The City, through their May 10, 2001 conveyance letter to USFWS, reported on the MOU deliverables that either had been, or were in the process of being furnished to USFWS. On June 28, 2001, USFWS acknowledged receipt of the deliverables, provided input on various components of the draft interim strategy and sample operations and maintenance plan, and identified points of agreement (with the City's prepared deliverables). On December 5, 2001, the City clarified its understanding of USFWS comments on the deliverables, transmitted the data files for all MOU associated vernal pool mapping efforts, and identified the prospects for integrating O&M across preserves under different scenarios. See also Section 5.4.1.3, Terrestrial/Riparian Resources regarding vernal pool habitat within the City service area.

As identified in the Analytical Methodology (Chapter 4), the potential effects upon species within the City's service area were determined through an evaluation of the City's plan for development of its remaining undeveloped, but entitled land. In the City, it is generally acknowledged that the majority of undeveloped land (i.e., lands that do not currently support infrastructure, or have been altered from a natural state, regardless of land use entitlement or development agreement) is contained in the West Roseville, Stoneridge, Highland Reserve North, and North Roseville Phase I, II and III specific plan areas, and the Foothill Business Park area. Accordingly, the focus of the evaluations centered on these areas, although the entire City service area was considered.

5.4.1.2. Fisheries

As a preface to the discussion on fisheries resources within the City's service area, it should be noted that the City and NMFS have engaged in dialogue regarding the development of a programmatic review and evaluation of these resources within the City's service area. This dialogue is memorialized in a Monitoring Agreement (MA)

between the City and NMFS dated July 23, 2003. The MA identifies City monitoring tasks that are currently being undertaken to evaluate the effects of urbanization on fisheries habitat. It also outlines thresholds for adaptive management as well as appropriate adaptive management response. The MA also outlines a programmatic approach to consultation that includes a City commitment to engage in watershed planning efforts, including implementation of the City of Roseville Creek and Riparian Management and Restoration Plan. Implementation of this plan, which was prepared in consultation with NMFS, will provide additional management oversight and long-term direction in the protection of anadromous species within the City service area.

WINTER-RUN CHINOOK SALMON

Adverse changes to riparian and instream habitat suitable for spawning and rearing could adversely affect this species in Dry and Antelope creeks, and Secret and Miners ravines, where winter-run Chinook salmon have been known to occur. Such adverse alterations in riparian habitat, if significant, also may affect other streams, while not known to currently support this species, could support expansion of this species' range in the future. In addition, degraded water quality in City streams and creeks resulting from point and non-point source urban/storm water runoff also could be detrimental to winter-run Chinook salmon in either Dry or Antelope creeks or other local streams.

As an indirect effect, winter-run Chinook salmon could be affected by riparian habitat loss as well as by increased urban/storm water runoff. **Table 5-1** summarizes the riparian habitat loss for the Stoneridge, North Roseville, and Highland Reserve North specific plan areas.

Table 5-1. Riparian habitat loss in the Stoneridge, North Roseville, and Highland Reserve North specific plan areas.

Specific Plan Area	Type	Existing Habitat (acres)	Affected Habitat (acres)	Remaining Habitat (acres)
Stoneridge	Valley Oak Riparian	33.0	4.0	29.0
	Interior Live Oak Riparian	68.0	10.0	58.0
North Roseville Phases 1,2, & 3	Riparian Woodland	82	9.2	72.8
Highland Reserve North	--	0	0	0
Total		**183.0**	**23.2**	**159.8**

The West Roseville Specific Plan area does not support a coldwater stream conducive to adult spawning and juvenile rearing use by winter-run Chinook salmon. Most of the 80 acres of existing riparian habitat within the West Roseville Specific Plan area occurs along Pleasant Grove Creek, Kaseberg Creek, and some of their unnamed tributaries, and will be preserved as part of the designation of approximately 685 acres of on-site preservation and open space land. Effects to riparian vegetation would result from creek crossings for roadways and recreational trails. Streamside alterations would occur in compliance with CDFG, Corps, USFWS, and City requirements. The potential loss of riparian habitat with development of the West Roseville Specific area was considered significant, however, implementation of previously identified mitigation

measures including buffer zones and implementation of riparian habitat protection policies will reduce the severity of this impact to a less-than-significant level (City of Roseville 2004).

A total of 13 percent (or 23.2 acres out of 189 acres) of riparian habitat would be lost due to development in the Stoneridge and North Roseville specific plan areas (City of Roseville 1997a; 1997d). Development within the Stoneridge Specific Plan area includes designation of 233 acres of open space, encompassing Secret, Miner's, and False ravines, for the preservation of streamside habitats. These streamside habitats have been disturbed by previously permitted road crossings, the Miner's Ravine sewer line, and the Miner's Ravine bike trail. However, disturbance of streamside habitat resulting from roadway, utility line, and trail crossings was subject to requirements of CDFG (through a Streambed Alteration Agreement), Corps, and USFWS (through federal ESA requirements).

In addition, any trees removed would have to be replaced in compliance with the City's Tree Preservation Ordinance. Even with the preservation of a majority of the streamside environment and compliance with CDFG, Corps, USFWS, and City requirements, the Stoneridge Specific Plan EIR considered this loss of riparian habitat a potentially significant impact (City of Roseville 1997d). The Stoneridge Specific Plan EIR avoided riparian habitat by designating these areas as Open Space and ensuring compliance with the City's Tree Preservation Ordinance; however, under the EIR the impact is considered significant and unavoidable. For the Foothill Business Park area, the 19 acres of designated Open Space along Pleasant Grove Creek and its adjacent floodplain will ensure no adverse effects to the existing riparian corridor.

The North Roseville Specific Plan would not affect anadromous species per se due to the characterization of Pleasant Grove Creek as a warmwater creek. Moreover, the loss of riparian habitat in the North Roseville Specific Plan area has been minimized by designating Open Space along a majority of the area along Pleasant Grove Creek and the south branch of Pleasant Grove Creek, as well as its major tributaries. This would include the proposed North Roseville Phase III Specific Plan area as well. Effects to riparian vegetation would result from creek crossings for roadways and recreational trails. As with the West Roseville and Stoneridge specific plans, streamside alterations would occur in compliance with CDFG, Corps, USFWS, and City requirements. The North Roseville Specific Plan EIR considers the four acres of riparian habitat loss to be less-than-significant, and requires mitigation measures for the loss of habitat by avoiding habitat where possible and requiring compliance with the City's Tree Preservation Ordinance (City of Roseville 1997a).

The Highland Reserve North Specific Plan area does not support mature riparian habitat, therefore, development is not likely to adversely affect such habitat in that area (City of Roseville 1996b). Moreover, similar to the North Roseville Specific Plan area, it does not support a coldwater stream conducive to adult spawning and juvenile rearing use by winter-run Chinook salmon.

Future planned development of the City's undeveloped areas could increase erosion, sedimentation, and urban run-off in local streams. However, the City requires

developers to prepare and implement erosion and urban runoff control measures and to follow existing Best Management Practices to control stream water quality (City of Roseville 1997a; 1997b; 1996b). The City, in addition to having erosion and urban runoff control policies, also advocates the retention of riparian buffer areas. These areas usually are retained through designation of stream floodways as Open Space and permanent dedication to the City. As part of the City's compliance with NPDES Phase 2 requirements, construction site storm water controls/BMPs were also recently updated and construction inspection enforcement efforts have also been improved.

Winter-run Chinook salmon could potentially be affected by riparian habitat loss and decreased water quality, which typically accompany development activities. However, the small loss of riparian habitat and retention of riparian buffer areas, along with the implementation of erosion, sedimentation, and urban runoff control measures, would effectively reduce the significance of these potential impacts. Additionally, in most of the City's service area, coldwater streams and associated habitat are not present other than those noted in the above discussions. Furthermore, as noted previously, the City was recently awarded a $228,470 CALFED grant, and on June 1, 2005, the City Council is scheduled to approve the City's Creek and Riparian Management and Restoration Plan. Plan development and implementation will enhance and expand creek and riparian functions and values consistent with provisions of the draft City/NMFS MA. Therefore, future planned and approved development within the West Roseville, Stoneridge, North Roseville, and Highland Reserve North specific plan areas, and Foothills Business Park area would not be likely to adversely affect winter-run Chinook salmon. In addition, future planned and approved development would not be likely to adversely affect any anticipated expansion of the winter-run Chinook salmon range due to protective urban runoff control measures that would be implemented along sensitive channel embankments.

FALL-RUN/LATE FALL-RUN CHINOOK SALMON

Fall-run/late fall-run Chinook salmon potentially could be affected by riparian habitat loss and decreased water quality, which typically accompany development activities. Changes to riparian and instream habitat suitable for spawning and rearing could adversely affect this species in either Dry Creek or Antelope Creek, where this species has been known to occur. Some spawning and rearing also have been observed in Cirby and Linda creeks. Alterations in riparian habitat also may affect other streams, while not known to currently support this species, could support expansion of this species' range in the future such as Cirby and Linda creeks. In addition, degraded water quality in City streams and creeks resulting from point and non-point source urban/storm water runoff also could be detrimental to fall-run/late fall-run Chinook salmon in either Dry or Antelope creeks or other local streams.

The potential indirect effects related to the implementation of the Proposed Action/Proposed Project are the same as those described for winter-run Chinook salmon (refer to the above discussion).

Overall, the loss of a small amount of riparian habitat and retention of riparian buffer areas, along with the implementation of erosion, sedimentation, and urban runoff control measures, would effectively reduce the significance of these potential impacts. In most

of the City's service area, coldwater streams and associated habitat are not present other than those noted in the above discussions. Therefore, future planned and approved development within the West Roseville, Stoneridge, North Roseville, and Highland Reserve North specific plan areas, and Foothills Business Park area is not likely to adversely affect fall-run/late fall-run Chinook salmon. Moreover, future planned and approved development is not likely to adversely affect any anticipated expansion of the fall-run/late fall-run Chinook salmon range due to protective urban runoff control measures that would be implemented along sensitive channel embankments.

STEELHEAD

Steelhead potentially could be affected by riparian habitat loss and decreased water quality, which typically accompany development activities. Alterations in riparian and instream habitat used for spawning and rearing could adversely affect this species. In addition, degraded water quality in City streams and creeks resulting from urban runoff also could be detrimental to steelhead.

The potential indirect effects related to the implementation of the Proposed Action/Proposed Project are the same as those described for Chinook salmon (refer to the above discussion).

Overall, the small loss of riparian habitat and retention of riparian buffer areas, along with the implementation of erosion, sedimentation, and urban runoff control measures, would effectively reduce the significance of these potential impacts. Additionally, in most of the City's service area, coldwater streams and associated habitat are not present other than those noted in the above discussions. Therefore, future planned and approved development within the West Roseville, Stoneridge, North Roseville, and Highland Reserve North specific plan areas, and Foothills Business Park area is not likely to adversely affect steelhead. In addition, future planned and approved development is not likely to adversely affect any anticipated expansion of the steelhead range due to protective urban runoff control measures that would be implemented along sensitive channel embankments.

5.4.1.3. Terrestrial/Riparian Resources

BOGGS LAKE HEDGE-HYSSOP

Development-related impacts associated with the disruption and/or loss of vernal pool habitat could potentially affect the Boggs Lake hedge-hyssop. Land conversion of vernal pools and other wetland habitat to urban uses in the West Roseville and Stoneridge Specific Plan areas is anticipated to affect the present occurrences and existing habitat of the species. The proposed North Roseville Phase III Specific Plan area does not support extensive wetlands or vernal pools which could support this species. A total of 1.38 acres of wetland is proposed to be filled in Phase III, and compensation wetlands will be created in an off-site preserve. The Foothills Business Park area contains approximately 19 acres of riverine/wetland habitat (associated with Pleasant Grove Creek and its adjacent floodplain). This entire riverine area is proposed for designation as Open Space. In the remaining areas of the Foothill Business Park, wetlands have been filled under a Section 404 permit, with compensatory wetlands

created within the area designated for Open Space. In the southeastern portion of the Foothill Business Park, a 0.8-acre seasonal swale was identified during a wetland delineation performed by PG&E. The swale collects sufficient quantities of water to meet wetland criteria and has the potential to support populations of Boggs Lake hedge-hyssop. Land conversion in the North Roseville and Highland Reserve North Specific Plan areas also could affect future range expansion of Boggs Lake hedge-hyssop.

A population of Boggs Lake hedge-hyssop was identified within the Olympus Pointe portion of the Stoneridge Specific Plan area in 1987 (City of Roseville 1997d). The species was not identified during surveys of the Stoneridge area in 1993 (Whitney 1999). However, development in the area would affect existing, potential habitat. The Olympus Oaks and Elliot Homes projects would fill 85 percent (3.79 out of 4.47 acres) of the existing vernal pool habitat. Preserved on-site vernal pools would total 0.68 acres.

While no populations of Boggs Lake hedge-hyssop have been observed within the West Roseville, North Roseville and Highland Reserve North Specific Plan areas, habitat may exist which could support future expansion of the species. In addition, suitable habitat for Boggs Lake hedge-hyssop exists within the West Roseville Specific Plan area, although this species was not identified during field reviews (City of Roseville 2004). However, dense growth of common species and the characteristic shallow depths of basin wetlands limits the habitat for these species (City of Roseville, 1996b). Within the North Roseville Phase I Specific Plan area, 3.81 acres of vernal pools exist of which 94 percent (or 3.59 acres) would be lost during development activities (City of Roseville 1997a). Of the 1.92 acres of vernal pool habitat in Phase II of the North Roseville area, all acres would be lost (100 percent). In the Highland Reserve North Specific Plan area, 4.02 acres of vernal pools currently exist and future development in the area would result in a loss of 91 percent (or 3.67 acres) of this habitat (City of Roseville 1996b; USFWS, 1997a). Within the West Roseville Specific Plan area, there are 41.47 acres of vernal pool and vernal swale habitat, of which 16.63 acres (40 percent) would be lost and 9.57 acres would be indirectly impacted by development activities (City of Roseville 2004).

Biological opinions addressing the West Roseville Specific Plan area, Olympus Oaks, Highland Reserve North, Diamond Creek/Eskaton, Mourier 140, Woodcreek North, and Woodcreek West projects have been issued in support of Section 404 permits obtained for project activities. While the Elliot Homes Project (Stoneridge Specific Plan Area) has received a conditional permit (conditional on the recording of any deed restrictions), the Mourier 160 Project (North Roseville Phase II Specific Plan Area), has secured its permits.

A summary of anticipated potential vernal pool habitat loss in the West Roseville, Stoneridge, North Roseville (Phase I, II and III), and Highland Reserve North specific plan areas is presented in **Table 5-2**. The table also contains vernal pool mitigation acreages, both preserved and created and/or restored, required by their Section 404 permits. Mitigation is not included for the Elliot Homes and Mourier 160 projects. However, Elliot Homes has committed to preserving approximately 0.3 acres of vernal pool habitat in the Stoneridge Specific Plan area as part of an 8.7-acre preserve.

Table 5-2. Anticipated vernal pool habitat loss in the West Roseville, Stoneridge, North Roseville, and Highland Reserve North specific plan areas.

Specific Plan Area	Existing Habitat (acres)	Affected Habitat (acres/ percent)	Remaining Habitat (acres)	Mitigation Required Per Section 404 Permit (acres)	
				Preservation	Creation/ Restoration
West Roseville[1]	41.47	16.63 (40%)	24.84	26.68[2]	43.00[3]
Stoneridge	6.29	5.33 (85%)	0.96	5.30	2.04
North Roseville Phase I	3.81	3.59 (94%)	0.22	7.18	3.59
North Roseville Phase II	1.92	1.92 (100%)	0	3.84[1]	1.92[4]
North Roseville Phase III	1.38	1.38 (100%)	0	0	1.38
Highland Reserve North	4.02	3.67 (91%)	0.35	2.04	7.94
Total	**58.89**	**32.52 (55%)**	**26.37**	**45.04**	**59.87**

1 Includes habitat areas for both vernal pools (33.42 acres) and vernal swales (8.05 acres)
2 Off-site preservation at Yankee Slough Preserve (1.2 acres) and East Sheridan Vernal Pool Mitigation Area (25.48 acres)
3 At Yankee Slough Preserve
4 The Mourier 160 portion of the North Roseville Phase II Specific Plan area has received its Section 404 permit.

As shown in Table 5-2, future planned development within the un-urbanized portions of the City would affect 55 percent (or 32.52 acres of 58.89 acres) of existing vernal pools. The loss of vernal pool habitat has been addressed and mitigated through the Section 7 ESA process during acquisition of Clean Water Act Section 404 permits. Through the issuance of biological opinions, mitigation acreages have been required for project impacts to vernal pools. A total of 45.04 acres of vernal pool habitat will be preserved and 59.87 acres of vernal pools will be created off-site.

In the West Roseville Specific Plan area, mitigation for the direct loss of 16.63 acres of vernal pool and vernal swale habitat, as well as indirect impacts on vernal pool and vernal swale habitat, includes a combination of on-site avoidance and preservation, off-site acquisition and preservation of existing vernal pool complexes, and off-site restoration of degraded vernal pool habitat. Mitigation may also include participation in a mitigation credit program at an agency-approved wetlands mitigation bank. Harvested inoculum (i.e., the top few inches of soil containing the seed bank and vernal pool crustacean cysts) from existing vernal pools will be used in the creation of off-site vernal pools (City of Roseville 2004). The Section 404 permit was signed on October 27, 2004 and the vernal pools within the West Roseville Specific Plan area have been filled in accordance with the permit.

In the Stoneridge Specific Plan area, mitigation includes preservation of 0.96 acres of vernal pools on-site, 5.3 acres of vernal pool habitat preserved off-site at an approved mitigation bank, and 2.04 acres of vernal pools created off-site using inoculum excavated from natural vernal pools within the Stoneridge Specific Plan area. The inoculum is to contain soils from the vernal pools, which contained Boggs Lake hedge-hyssop in the past (Whitney 1999).

For the North Roseville Phase I Specific Plan area, mitigation for vernal pool habitat losses include preservation of 0.22 acres of habitat on-site, preservation of 7.18 acres of habitat off-site, and creation of 3.59 acres of habitat off-site (USFWS 1997b; USFWS 1998).

For the North Roseville Phase II Specific Plan area, no on-site preservation will occur, however, 3.84 and 1.92 acres will be preserved and created off-site, respectively. Similarly, for the proposed North Roseville Phase III Specific Plan area, no on-site preservation will occur, however, 1.38 acres will be created off-site.

Mitigation activities for loss of vernal pool habitat in the Highland Reserve North Specific Plan area includes on-site preservation of 0.35 acres of vernal pool habitat, 3.0 acres of wetlands, establishment of two on-site preserves totaling 50 acres, preservation of 2.04 acres of vernal pool habitat on-site or at an off-site mitigation bank, and creation of 11.24 acres of wetlands at a mitigation bank of which 7.94 acres is to be vernal pool habitat (USFWS 1997a).

While development of the West Roseville, Stoneridge, Highland Reserve North, and North Roseville specific plan areas would disrupt vernal pool fairy shrimp populations in their respective areas and 32.52 acres of existing vernal pool habitat would be lost (City of Roseville 1997a; 1997b; 1996b, 2004), biological opinions have been issued for a majority of the development projects occurring within these areas. The biological opinions have identified conservation measures and required mitigation for vernal pool habitat loss, as discussed above.

No populations of Boggs Lake hedge-hyssop are known to exist within the City's service area. As the City's proposed and approved specific plan areas become fully developed, there would be a loss of potential vernal pool habitat for this species. This would occur in the West Roseville, Stoneridge, North Roseville, and Highland Reserve North specific plan areas and, in the Foothill Business Park area. However, in light of the mitigation required for each development project, future planned development activities facilitated by the Proposed Action/Proposed Project would not likely adversely affect the Boggs Lake hedge-hyssop. For areas having yet to complete their Section 404 permit and federal ESA Section 7 processes, pending mitigation requirements are likely to offset any adverse effects resulting from the loss of potential habitat for this species.

SLENDER ORCUTT GRASS

Similar to Boggs Lake hedge-hyssop, slender orcutt grass is affected by development-related impacts associated with disruption and/or loss of vernal pool habitat. The potential indirect effects associated with the conversion of vernal pools due to planned and approved urban growth or other causes may affect the slender orcutt grass (CDFG 1996). While no known populations of this species exist within the 58.89 acres of vernal pool habitat within the un-urbanized portion of the City's service area, habitat suitable to expand the current range of this species could be affected by future planned City development (see Table 5-2). Suitable habitat for slender orcutt grass exists within the West Roseville Specific Plan area, although this species was not identified during field reviews (City of Roseville 2004).

Existing populations of slender orcutt grass would not be indirectly affected by City land actions, as no known populations of this species exist within the City's service area. Considering the absence of this species within the City's service area, loss of potential suitable habitat is not likely to adversely affect this species.

SACRAMENTO ORCUTT GRASS

Urbanization and the associated loss of suitable habitat could affect this species (Skinner and Pavlik 1994), although no known populations of this species exist in the un-urbanized portions of the City's service area. Suitable habitat for Sacramento orcutt grass exists within the West Roseville Specific Plan area, although this species was not identified during field reviews (City of Roseville 2004). As shown in Table 5-2, 55 percent (or 32.52 acres of 58.89 acres) of vernal pool habitat would be lost during the full development within the West Roseville, Stoneridge, North Roseville (Phases I, II, and III), and Highland Reserve North specific plan areas. This does not include potentially affected acreage within a portion (that owned by PG&E) of the Foothill Business Park area, which has also completed its Section 404 permit and federal ESA processes.

While populations of the Sacramento orcutt grass likely would not be indirectly affected by the City's future planned and approved land use actions, potential habitat that could serve to expand the known range of this species could be affected. Because this species has not been known to occupy vernal pools in the City's service area, the Proposed Action/Proposed Project is not likely to adversely affect current Sacramento orcutt grass populations. While the potential loss of suitable habitat could adversely affect the ability of this species to expand its present range, and therefore adversely affect potential future recovery opportunities, the fact that there are no known occurrences of this species within the City's service area reduces the likelihood of any natural expansion of their range.

VERNAL POOL FAIRY SHRIMP

Disruption of vernal pool habitat, including changes in hydrologic patterns, could adversely affect this species. Conversion of vernal pool habitat to other land uses also could affect this species (USFWS 1994b). Conversion of vernal pools to urban uses may affect the species' present habitat as well as the future range expansion of this species. The availability of water to sites where this species presently exists changes in surface water hydrology, or alteration of critical soil strata resulting from development activities may, in the future, lead to the degradation of vernal pool habitat.

Although specific surveys for vernal pool fairy shrimp were not conducted within the West Roseville Specific Plan area, they occur commonly in vernal pools in the Roseville area and have been found in both natural and constructed vernal pools within the area and surrounding vicinity. Vernal pool fairy shrimp are assumed to be present throughout the vernal pools within the West Roseville Specific Plan area. Direct and indirect impacts to the habitat for this species occurring from development of the West Roseville Specific Plan area were considered to be significant, however the proposed vernal pool mitigation discussed above would reduce potential impacts to a less-than-significant level (City of Roseville 2004).

While the Stoneridge Specific Plan area has not been completely surveyed for vernal pool fairy shrimp, the species was assumed to be present in a portion of the specific plan area's vernal pools. The Elliot Homes portion of the Stoneridge Specific Plan area conducted protocol-level determinant surveys and no fairy shrimp have been found.

Due to the loss of 5.33 acres of vernal pool habitat, which were assumed to contain vernal pool fairy shrimp (Table 5-2), development activities within the area were considered potentially significant and unavoidable to the vernal pool fairy shrimp (City of Roseville 1997d). Mitigation activities for this habitat loss are described under the Boggs Lake hedge-hyssop discussion and include on- and off-site preservation and off-site creation. For the Stoneridge Specific Plan area (including the Foothill Business Park area), approximately 5.3 acres are proposed for preservation and 2.04 acres proposed for creation.

A vernal pool fairy shrimp survey conducted in the North Roseville Phase I and II specific plan areas identified the species occurring in both natural and constructed vernal pools (City of Roseville 1997a). The loss of 5.51 acres of vernal pool habitat would be a potentially significant impact, as determined by the EIR prepared for the project (City of Roseville 1997a). Mitigation for adverse effects to this species are similar to those described for Boggs Lake hedge-hyssop and include on-site vernal pool preservation and off-site preservation and creation at approved wetland mitigation banks. For the proposed North Roseville Phase III Specific Plan area, 1.38 acres are proposed for off-site creation.

The Highland Reserve North Specific Plan area was not surveyed for this species, however, it was assumed to be present for the purposes of the analysis conducted in the specific plan EIR (City of Roseville 1996b). The loss of 3.67 acres of vernal pool habitat was determined to represent a potentially significant impact. Mitigation activities for this loss of vernal pool habitat are discussed under the Boggs Lake hedge-hyssop section of this chapter and include both on-site and off-site preservation and habitat creation.

While development of the West Roseville, Stoneridge, Highland Reserve North, and North Roseville specific plan areas would disrupt vernal pool fairy shrimp populations in their respective areas including 55 percent (or 32.52 out of 58.89 acres) of existing vernal pool habitat (City of Roseville 1997a; 1997b; 1996b; 2004), biological opinions have been issued for a majority of the development projects occurring within these areas. The biological opinions have identified required mitigation for vernal pool habitat loss, as discussed above.

Loss of 55 percent (or 32.52 acres) of existing vernal pool habitat due to future planned and approved land conversions will affect existing populations of vernal pool fairy shrimp as well as their habitat. However, this loss is offset by the 45.04 acres of preserved acreage required as mitigation under the Section 404 permits and an additional 59.87 acres of required off-site vernal pool habitat creation and/or restoration. Biological opinions have been issued for a majority of the development projects occurring within the West Roseville, Stoneridge, Highland Reserve North, and North Roseville specific plan areas and, as discussed above, have required vernal pool habitat preservation and creation to mitigate for vernal pool habitat loss. Potential buildout impacts will be addressed consistent with the City/USFWS MOU, which requires several commitments to be implemented by the City, including the development of an interim conservation strategy and habitat conservation program. With the existing levels of committed mitigation and the primary planning tenets of the

City's interim conservation strategy and habitat conservation program in place, future planned and approved development within the City's service area is not likely to adversely affect this species.

VERNAL POOL TADPOLE SHRIMP

Disruption of vernal pool habitat, including changes in hydrologic patterns, could adversely affect this species. Conversion of vernal pool habitat to other land uses also could affect this species (USFWS 1994b). Similar to the vernal pool fairy shrimp, conversion of vernal pools to urban uses may affect the species' present habitat as well as the future range expansion of this species. While surveys of the undeveloped areas of the City have not identified any populations of this species, the West Roseville and Stoneridge Specific Plan EIRs assumed that this species was present within the plan areas. The Highland Reserve North and North Roseville specific plans, however, did not determine the presence of this species. Direct and indirect impacts to the habitat for this species occurring from development of the West Roseville Specific Plan area were considered to be significant, however the proposed vernal pool mitigation discussed above would reduce potential impacts to a less-than-significant level. Potential impacts to the habitat for this species occurring from development of the Stoneridge Specific Plan area were considered to be potentially significant and unavoidable. Mitigation has been developed to reduce the significance of this adverse effect (refer to the discussion under vernal pool fairy shrimp for further information).

As shown in Table 5-2, 55 percent (or 32.52 acres) of existing vernal pool habitat would be lost due to planned and approved development within the City's service area. As discussed previously for vernal pool fairy shrimp, mitigation for vernal pool habitat loss has been addressed in several biological opinions issued for a majority of the West Roseville, Stoneridge (including the Foothill Business Park area), Highland Reserve North, and North Roseville specific plan areas. The mitigation requires establishment of on-site preserves, preservation of off-site vernal pool fairy shrimp critical habitat, and creation and/or restoration of vernal pool habitat.

Loss of 55 percent (or 32.52 acres) of existing vernal pool habitat due to future planned and approved land conversions likely will affect existing populations of vernal pool tadpole shrimp as well as their habitat. As previously discussed, biological opinions have been issued for a majority of the development projects occurring within the West Roseville, Stoneridge, Highland Reserve North, and North Roseville specific plan areas and the Foothills Business Park area. These biological opinions require vernal pool habitat preservation and creation/restoration to mitigate for vernal pool habitat loss. Potential buildout impacts will be addressed consistent with the City/USFWS MOU, which requires several commitments to be implemented by the City, including the development of an interim conservation strategy and habitat conservation program. With the existing levels of committed mitigation and the primary planning tenets of the City's interim conservation strategy and habitat conservation program in place, future planned and approved development within the City's service area is not likely to adversely affect this species.

VALLEY ELDERBERRY LONGHORN BEETLE

Disruption or loss of elderberry shrubs, the sole habitat of the VELB, would adversely affect this species. Development within the Stoneridge, North Roseville, and Highland Reserve North specific plan areas could disrupt elderberry shrubs, thereby adversely affecting VELB. No elderberry shrubs were observed during biological surveys conducted within the West Roseville Specific Plan area, and no potential impacts on VELB were identified within this area (City of Roseville 2004).

Within the Stoneridge Specific Plan area, surveys conducted of area elderberry shrubs did not exhibit any evidence of past or present use by VELB. Of the 48 shrubs identified in the Stoneridge Specific Plan area, 46 are located in area ravines (i.e., Miner's, Secret, and False ravines), which would remain unaffected by virtue of the protection offered by the City's Open Space designation. The two remaining shrubs would be affected by future planned development activities and are anticipated for re-location (City of Roseville 1997d; USFWS 1996).

Within the North Roseville Specific Plan area, an elderberry shrub was identified during surveys on the Diamond Creek portion of the area, however, no evidence of VELB presence was found (City of Roseville 1997a). This one shrub will be preserved within designated Open Space within the North Roseville Specific Plan area.

No VELB or elderberry shrubs were identified in the Highland Reserve North Specific Plan area (City of Roseville 1996b).

Although the elderberry shrub on which VELB is dependent occurs along ravines in the Stoneridge Specific Plan area and one shrub exists in the North Roseville Specific Plan area, viable VELB populations were not found associated with those shrubs. Considering that these shrubs will be avoided to the extent possible and mitigation will ensure no net loss of elderberry shrubs, land conversions within the City's developing areas is not likely to adversely affect VELB. Any impacts to VELB that could occur within the City's sphere-of-influence would be subject to City or Placer County goals, policies, and planning processes, along with the requirements of the ESA at the time of plan approval and prior to implementation.

5.4.1.4. Bird Species

SWAINSON'S HAWK

Large riparian trees in the City's service area could be affected by removal or alteration of local stream hydrology. Impacts to riparian trees that provide nesting habitat for Swainson's hawk could adversely affect the species. Grasslands provide important foraging habitat for Swainson's hawk and CDFG considers the loss of foraging habitat within 10 miles of an active next to be detrimental to the breeding success of this species (City of Roseville 2004).

Agricultural conversion or urbanization of grasslands used by this species could disrupt foraging patterns. Indirect impacts associated with loss of Swainson's hawk hunting or nesting habitat due to conversion of agricultural land and urban growth may be

considered significant. Three historic records of Swainson's hawk have been identified within the City's service area, and observations in the project vicinity are not uncommon. A pair of Swainson's hawks were observed nesting in a tree adjacent to the West Roseville Specific Plan area between April and June of 2000 (City of Roseville 2004) and potential nesting and foraging habitat exists within the City's service area. Implementation of the West Roseville Specific Plan would result in the loss of approximately 1558.75 acres of Swainson's hawk foraging habitat to development activities (City of Roseville 2004). The potential negative effects that this loss of foraging habitat could have on nesting Swainson's hawks is considered significant. However, providing protection for a quantity of similar habitat in southwestern Placer County, in perpetuity, in accordance with a CDFG-established mitigation formula will reduce the severity of this impact to a less than significant level. Mitigation for the project also requires pre-construction raptor nest surveys during the nesting season in areas slated for tree removal, grading or other excavation, and development of appropriate protocols in consultation with CDFG to prevent disturbance that could cause nest abandonment and subsequent loss of young (City of Roseville 2004).

The Stoneridge Specific Plan area together with the Foothill Business Park area of the North Industrial Area contains 802 grassland acres, 768 acres of which would be converted to urban uses during development of the area. In addition, 14 riparian woodland acres, out of 120 total riparian woodland acres, would be developed (City of Roseville 1997d). While potential habitat for the Swainson's hawk would be lost, this habitat is considered marginal at best. To mitigate for this habitat loss, the project included measures to avoid Swainson's hawk and raptor nesting sites and minimize disturbance to nesting activities (City of Roseville 1997d).

Development activities in the North Roseville Specific Plan area would convert 90 percent (or 1,275 acres out of 1,419 acres) of grassland to urban uses. In addition, 15 percent (or 15 acres out of 98 acres) of riparian and oak woodlands would be affected (City of Roseville 1997a). The North Roseville Specific Plan EIR considered this loss of habitat significant, as it would reduce foraging habitat for this species in an area where Swainson's hawks were observed, at least until 1995. Similar to the mitigation measures identified in the Stoneridge Specific Plan, pre-construction surveys would be conducted and avoidance measures implemented to reduce the effects to Swainson's hawk nests (City of Roseville 1997c).

Development of the Highland Reserve North Specific Plan area would convert 63 percent (or 387 acres out of a total of 613 acres) of grassland to urban uses (City of Roseville 1996b). The lack of riparian woodlands in the area does not provide adjoining nesting and foraging habitat, although Swainson's hawks have been known to travel over 10 miles to forage. However, no hawks have been observed in the area and no potential foraging habitat was identified during analyses conducted for Highland Reserve North Specific Plan. The specific plan EIR did include mitigation for temporary disturbance to wildlife habitat during construction and the biological opinion issued for the project requires establishment of two preserves totaling 50 acres (City of Roseville 1996b; USFWS 1997a).

Development of the West Roseville, Stoneridge, North Roseville, and Highland Reserve North specific plan areas as well as the North Industrial Area could affect the Swainson's hawk through reduction in potential foraging and nesting habitat. Future approved land conversion in the West Roseville, Stoneridge, Highland Reserve North, and North Roseville specific plan areas and the Foothill Business Park area would result in a loss of 79 percent (or 3,989 out of 5,038 acres) of grassland habitat and 10 percent[2] (or 29 acres out of 298 acres) of riparian woodland habitat. Although a substantial amount of grassland and, to a lesser extent, riparian habitat would be lost due to planned and approved development within the currently undeveloped portions of the City, this species is infrequently observed within the City and only one nesting site has been found adjacent to the West Roseville Specific Plan area. With implementation of the previously identified mitigation measures discussed above, the loss of potential habitat due to future approved land conversions within the City Service area are not likely to adversely affect Swainson's hawks.

5.4.1.5. City Service Area Mitigation Measures

For the above noted biological resources (i.e., listed and proposed listed species) within the City's service area, none of the species have the potential to be adversely affected, either directly or indirectly by the Proposed Action/Proposed Project. Vernal pool invertebrate species (i.e., vernal pool fairy shrimp and vernal pool tadpole shrimp) do, however, show the potential to have their potential habitats reduced, as approved development within the City continues.

The MOU between the City and USFWS outlines the specific processes intended to provide the long-term protection necessary for vernal pool species. Specifically, the MOU identified, at the time of its signing, the commitment of the City to address the needs of vernal pool species occupying vernal pool habitats within the plan area within the context of an HCP or equivalent (see Section 8.3 of the MOU). Since the MOU was signed, the City and USFWS have agreed not to pursue a City-wide HCP but, rather, address species protections on a project-by-project basis. Additionally, as part of the guidance for the City's interim conservation strategy, the MOU also identified several milestones with which it committed the City to pursue regarding the management of its vernal pools. The MOU requested the City to identify and map all existing, including City permitted, vernal pool resources within the plan area (see Section 7.3b. of the MOU). The City also was requested to develop individual operations and maintenance plans for each vernal pool preserve established through the interim conservation strategy and for certain existing vernal pool preserves established by prior agreement between the City and USFWS. Previous discussions of the City's commitments in meeting the requirements set out by the MOU have been provided in Section 5.4.1.1 (see also Appendix J, City of Roseville/USFWS MOU and related correspondence).

It is the position of the City and USFWS that through satisfactory completion and implementation of the various commitments and requirements associated with the MOU, that indirect effects to listed and proposed species within the City's service area have otherwise been evaluated, minimized, and mitigated, in accordance with the

[2] Riparian impacts within the West Roseville Specific Plan area are mostly limited to road crossings and are not included in this calculation regarding total acres and percent loss of riparian woodland habitat.

provisions of the federal ESA. Both the City and USFWS have agreed through the MOU that USFWS will provide regulatory assurances consistent with its statutory authorities upon issuance of an ITP.

Similarly, with the City's commitment to engage with NMFS in the development of an MA that would address and otherwise protect federally listed anadromous fish species potentially occurring in the City's service area, a comparable level of assurance can be assumed. As noted previously, the MA is supplemented or supported by additional protective assurances, including the development and preparation of a Creek and Riparian Management and Restoration Plan in consultation with NMFS as provided in the grant funding awarded the City through CALFED.

5.4.2. Diversion Related Impacts

Diversion-related impacts associated with the Proposed Action/Proposed Project and Downstream Diversion Alternative have the potential to result from Reclamation's operation of its CVP facilities, as well as DWR's operation of the SWP as a result of the their shared responsibility under the COA to meet operational requirements in the Delta. Because operation of Folsom Dam and Reservoir is coordinated with operations of Shasta Dam and Reservoir, and Oroville Dam and Reservoir, for the purposes of meeting Delta water quality, water supply, and other environmental or regulatory requirements, the evaluation of these impacts include Shasta and Trinity reservoirs, the Sacramento River, Oroville Reservoir, the Feather River, Folsom Reservoir, the lower American River, and the Delta region.

5.4.2.1. Fisheries

Several species within the regional study area are of primary management concern either as a result of their declining status or their importance to recreational and/or commercial fisheries. The species selected for species-specific assessments include those sensitive to changes in both river flows and water temperature throughout the year, as well as habitat conditions within the Delta. Therefore, an evaluation of effects on winter-run, spring-run, and fall-run/late fall-run Chinook salmon, steelhead, delta smelt, American shad, and striped bass is believed to reasonably encompass the range of potential effects that could occur on other fish resources, including green sturgeon. Given the similarities between riverine conditions suitable for adult green sturgeon migration and spawning and juvenile green sturgeon rearing and those of Chinook salmon, and a general lack of definitive information on green sturgeon life history requirements in Central Valley rivers, assessing impacts on Chinook salmon are anticipated to provide a reasonable estimate of potential impacts on green sturgeon.

PROPOSED ACTION/PROPOSED PROJECT

Shasta Reservoir

Coldwater Fisheries

Long-term average end-of-month storage would not be substantially reduced under the Proposed Action/Proposed Project, relative to the existing condition, during any month of the April through November period, the period when the reservoir is stratified. Reductions in long-term average end-of-month storage under the Proposed

Action/Proposed Project would be less than 0.2 percent during all months of the April through November period, relative to the existing condition, during the 70-year period of record included in the analysis (Appendix A, Fish Reservoirs, Shasta Storage). The anticipated reductions in reservoir storage would not be expected to adversely effect the reservoir's coldwater fisheries because: 1) coldwater habitat would remain available in the reservoir during all months of all years; 2) physical habitat is not believed to be among the primary factors limiting coldwater fish populations; and 3) anticipated seasonal changes in storage would not be expected to adversely affect the primary prey species utilized by coldwater fish. Therefore, minor seasonal reductions in end-of-month storage expected to occur under the Proposed Action/Proposed Project would have less-than-significant impacts to Shasta Reservoir's coldwater fisheries, relative to the existing condition.

Warmwater Fisheries

The Proposed Action/Proposed Project would not result in substantial changes relative to the existing condition in the long-term average end-of-month water surface elevation in Shasta Reservoir during the March through September period, when warmwater fish spawning and rearing occurs. Reductions in average end-of-month water surface elevation of one foot or more would not occur during any year of the March through September period, during the 70-year period of record included in the analysis (Appendix A, Fish Reservoirs, Shasta Elevation).

Changes in water surface elevation in Shasta Reservoir during the March through September period could result in corresponding changes in the availability of reservoir littoral habitat containing inundated terrestrial vegetation (willows and button brush). Such shallow, nearshore waters containing physical structure are believed to be important to producing and maintaining strong year-classes of warmwater fishes. However, reductions in the 70-year average amount of littoral habitat potentially available to warmwater fishes for spawning and/or rearing in Shasta Reservoir under the Proposed Action/Proposed Project generally would be negligible, with reductions in 70-year average amount of littoral habitat of less than 0.5 percent for all months of the March through September period (Appendix A, Fish Reservoirs, Shasta Littoral Habitat). Reductions in littoral habitat availability of 10 percent or more (a value used for illustrative purposes only) would occur in five of the 490 months (approximately one percent) analyzed during March through September over the 70-year period of record (Appendix B, Shasta Reservoir Littoral Habitat). The infrequent reductions in the availability of littoral habitat, under the Proposed Action/Proposed Project, would not be of sufficient magnitude to substantially reduce long-term average initial year-class strength of warmwater fish populations.

In addition, the Proposed Action/Proposed Project could alter the rates by which water surface elevations in Shasta Reservoir change during each month of the primary warmwater fish-spawning period of the year (March through July). Review of the available literature suggests that on average self-sustaining black bass populations in North America experience a nest success (i.e., the nest produces swim-up fry) rate of 60 percent (Latta 1956; Kramer and Smith 1962; Turner and MacCrimmon 1970; Hurley 1975; Neves 1975; Goff 1986; Raffetto et al. 1990; Ridway and Shuter 1994; Lukas and

Orth 1995; Philipp et al. 1997; Friesen 1998; Knotek and Orth 1998; Hunt and Annett 2002; Steinhart 2004). A study by CDFG, which examined the relationship between reservoir water surface elevation fluctuation rates and nesting success for black bass, suggests that a reduction rate of approximately six feet per month or greater would result in 60 percent nest success for largemouth bass and smallmouth bass (Lee et al. 1999).

Therefore, a decrease in reservoir water surface elevation of six feet or more per month was selected as the threshold beyond which spawning success of nest-building, warmwater fish could potentially result in long-term population declines. To evaluate effects on largemouth bass, smallmouth bass, and ultimately warmwater fish in general, the number of times that reservoir reductions of six feet or more per month could occur under the Proposed Action/Proposed Project was compared to the number of occurrences that were modeled under the existing condition. Modeling results indicate that the Proposed Action/Proposed Project would result in one fewer potential nest dewatering event than the existing condition, during any month of the March through July spawning period (Appendix A, Fish Reservoirs, Shasta).

In summary, the Proposed Action/Proposed Project would not result in substantial changes in the availability of littoral habitat in Shasta Reservoir, relative to the existing condition, and thus, would not adversely affect warmwater fish rearing. Implementation of the Proposed Action/Proposed Project would reduce the frequency of potential nest dewatering events in Shasta reservoir, relative to the existing condition, and thus, would not adversely affect long-term warmwater fish nesting success. Therefore, under the Proposed Action/Proposed Project, potential impacts on the Shasta Reservoir warmwater fisheries would be less than significant, relative to the existing condition.

Trinity Reservoir

Coldwater Fisheries

Under the Proposed Action/Proposed Project, reductions in the 70-year average end-of-month storage in Trinity Reservoir would be less than 0.5 percent during all months of the April through November period (the period when the reservoir is stratified), relative to the existing condition (Appendix A, Fish Reservoirs, Trinity Storage). Reductions in Trinity Reservoir end-of-month storage, relative to the existing condition, would be less than two percent in all individual years during all months of the April through November period, over the 70-year period of record included in the analysis (Appendix B, Trinity Reservoir Storage). The anticipated reductions in reservoir storage would not be expected to adversely effect the reservoir's coldwater fisheries because: 1) coldwater habitat would remain available in the reservoir during all months of all years; 2) physical habitat is not believed to be among the primary factors limiting coldwater fish populations; and 3) anticipated seasonal changes in storage would not be expected to adversely affect the primary prey species utilized by coldwater fish. Therefore, seasonal reductions in end-of-month storage expected to occur under the Proposed Action/Proposed Project would have less-than-significant impacts to Trinity Reservoir's coldwater fisheries, relative to the existing condition.

Warmwater Fisheries

The Proposed Action/Proposed Project would not result in changes relative to the existing condition in the 70-year average end-of-month water surface elevation in Trinity Reservoir during the March through September period, when warmwater fish spawning and rearing occurs (Appendix A, Fish Reservoirs, Trinity Elevation).

Reductions in the 70-year average amount of littoral habitat potentially available to warmwater fishes for spawning and/or rearing in Trinity Reservoir under the Proposed Action/Proposed Project, relative to the existing condition, generally would be negligible. Reductions in the long-term monthly average amount of littoral habitat would be less than 0.2 percent for all months of the March through September period included in the analysis under the Proposed Action/Proposed Project, relative to the existing condition (Appendix A, Fish Reservoirs, Trinity Littoral Habitat). Reductions in littoral habitat availability of 10 percent or more (a value used for illustrative purposes only) would occur in five of the 490 months (approximately one percent) analyzed during March through September over the 70-year period of record (Appendix B, Trinity Reservoir Littoral Habitat). The infrequent reductions in the availability of littoral habitat, under the Proposed Action/Proposed Project, would not be of sufficient magnitude to substantially reduce long-term average initial year-class strength of warmwater fish populations.

In addition, the Proposed Action/Proposed Project could alter the rates by which water surface elevations in Trinity Reservoir change during each month of the primary warmwater fish-spawning period of the year (March through July). Adverse impacts to spawning from nest dewatering are assumed to have the potential to occur when reservoir elevation decreases by more than six feet within a given month. However, modeling results indicate that the frequency with which potential nest dewatering events could occur in Trinity Reservoir would not change under the Proposed Action/Proposed Project, relative to that under the existing condition, during any month of the March through July spawning period (Appendix A, Fish Reservoirs, Trinity).

In summary, the Proposed Action/Proposed Project would not result in substantial changes in the availability of littoral habitat in Trinity Reservoir, relative to the existing condition, and thus, would not adversely affect warmwater fish rearing. Implementation of the Proposed Action/Proposed Project would not alter the frequency of potential nest dewatering events in Trinity Reservoir, relative to the existing condition, and thus, would not adversely affect long-term warmwater fish nesting success. Therefore, under the Proposed Action/Proposed Project, impacts on the Trinity Reservoir warmwater fisheries would be less than significant, relative to the existing condition.

Upper Sacramento River

Flow-related Impacts in the Upper Sacramento River

A decrease in flow of 10 percent or greater has been previously identified (e.g., USFWS Trinity River Mainstem Fishery Restoration Draft EIS/EIR (1999)) as that which could be sufficient to reduce habitat quantity and/or quality to an extent that would significantly affect fish. The Trinity EIS/EIR further states, *"…[t]his assumption [is] very conservative…[i]t is likely that reductions in streamflows much greater than 10 percent*

would be necessary to significantly (and quantifiably) reduce habitat quality and quantity to an extent detrimental to fishery resources." Conversely, the Trinity EIS/EIR considers increases in streamflow of 10 percent or greater, relative to the basis of comparison, to be "beneficial" to fish species.

Because the USFWS defines a 10 percent change in streamflow as a change that could potentially affect fish resources, this fisheries impact analysis considers changes in streamflow from the existing condition in individual months over the 70-year period of 10 percent or greater, in addition to considering the long-term average flows under the Proposed Action/Proposed Project and existing condition.

The 70-year average flow released from Keswick Dam under the Proposed Action/Proposed Project would be essentially equivalent to that under the existing condition during all months of the year. Moreover, reductions of more than 0.3 percent in long-term monthly average flow releases from Keswick Dam would not occur in any month of the period of record (Appendix A, Fish Flows, Keswick). Additionally, there would be no increases or decreases of flow under the Proposed Action/Proposed Project greater than 10 percent in any individual month over the 70-year period of record, relative to the existing condition.

The minimum flow objective for Keswick Dam releases stipulated in the NMFS Biological Opinion (1993) for the protection of winter-run Chinook salmon rearing and downstream passage is 3,250 cfs between October 1 and March 31. Modeling output shows that mean monthly flows below Keswick Dam would not be below 3,250 cfs in any month of the October through March period in any of the 70 years modeled under the Proposed Action/Proposed Project or the existing condition (Appendix A, Fish Flows, Keswick).

Therefore, minor flow changes below Keswick Dam that would occur under the Proposed Action/Proposed Project, relative to the existing condition, would result in less-than-significant impacts to upper Sacramento River fisheries resources.

Water Temperature-related Impacts in the Upper Sacramento River

The Proposed Action/Proposed Project would not result in changes to the 69-year average water temperatures at Keswick Dam or Bend Bridge for any month of the year. Relative to the existing condition, there would be one less year in the number of years exceeding 56ºF, and there would be no change in the number of years exceeding 60°F, or 65°F at Keswick Dam under the Proposed Action/Proposed Project. At Bend Bridge, there would be one additional year exceeding 56ºF, no change in the number of years exceeding 60ºF, and one less year exceeding 65ºF under the Proposed Action/Proposed Project, relative to the existing condition (Appendix A, Fish Temps, Keswick Dam and Bend Bridge). Thus, the Proposed Action/Proposed Project would not result in a net number of additional exceedances of the water temperature criteria identified in the NMFS Biological Opinion for winter-run Chinook salmon. The long-term average early life stage survival of fall-run/late fall-run, winter-run, or spring-run Chinook salmon under the Proposed Action/Proposed Project would be essentially equivalent to that under the existing condition. In addition, there would be no substantial decreases

in annual early life stage survival of fall-run/late fall-run, winter-run, or spring-run Chinook salmon in any individual year under the Proposed Action/Proposed Project, relative to that under the existing condition. Based on these findings, any water temperature-related impacts to upper Sacramento River fisheries under the Proposed Action/Proposed Project would be considered less than significant.

Lower Sacramento River

Flow-related Impacts in the Lower Sacramento River

The 70-year average flow at Freeport under the Proposed Action/Proposed Project would generally be equivalent to flows under the existing condition during all months of the year (Appendix A, Fish Flows, Freeport). Flow reductions of one to eight percent would occur in a few individual years during most months; however, flow reductions of more than 10 percent would not occur during any month of any individual year (Appendix B, Freeport Flows). Therefore, neither physical habitat availability for fishes residing in the lower Sacramento River, nor adult immigration or juvenile emigration would be substantially affected under the Proposed Action/Proposed Project, relative to the existing condition. Consequently, any flow-related impacts to lower Sacramento River fisheries, including those to migrating anadromous fishes that could occur under the Proposed Action/Proposed Project, would be considered less than significant.

Water Temperature-Related Impacts in the Lower Sacramento River

The 69-year average water temperature at Freeport on the lower Sacramento River would not change under the Proposed Action/Proposed Project during any month of the yearly period, relative to the existing condition. The number of years that mean monthly water temperatures at this location would exceed 56°F and 60°F would be similar under the Proposed Action/Proposed Project and existing condition during the March through November period. There would be one additional year in which mean monthly water temperature under the Proposed Action/Proposed Project would exceed 70°F, relative to the existing condition (Appendix A, Fish Temps, Freeport). Overall, potential water temperature-related impacts to fish species within the lower Sacramento River would be considered less than significant.

Oroville Reservoir

Coldwater Fisheries

Under the Proposed Action/Proposed Project, reductions in the 70-year average monthly end-of-month storage in Oroville Reservoir would be equivalent to the existing condition during all months of the April through November period (the period when the reservoir is stratified) (Appendix A, SWP, Oroville Reservoir Storage). Reductions under the Proposed Action/Proposed Project in Oroville Reservoir end-of-month storage, relative to the existing condition, would be less than 0.5 percent in all individual years during all months of the April through November period, over the 70-year period of record included in the analysis (Appendix B, Oroville Reservoir Storage). The anticipated reductions in reservoir storage would not be expected to adversely effect the reservoir's coldwater fisheries because: 1) coldwater habitat would remain available in

the reservoir during all months of all years; 2) physical habitat is not believed to be among the primary factors limiting coldwater fish populations; and 3) anticipated seasonal changes in storage would not be expected to adversely affect the primary prey species utilized by coldwater fish. Therefore, seasonal reductions in end-of-month storage expected to occur under the Proposed Action/Proposed Project would have less-than-significant impacts to Oroville Reservoir's coldwater fisheries.

Warmwater Fisheries

The Proposed Action/Proposed Project would not result in changes, relative to the existing condition, in the 70-year average end-of-month water surface elevation in Oroville Reservoir during the March through September period, when warmwater fish spawning and rearing occurs (Appendix A, Fish Reservoirs, Oroville Elevation).

Changes in water surface elevation in Oroville Reservoir during the March though September period could result in corresponding changes in the availability of reservoir littoral habitat containing submerged vegetation (willows and button brush). Such shallow, nearshore waters containing physical structure are believed to be important to producing and maintaining strong year-classes of warmwater fish annually. The small and infrequent changes in individual month water surface elevation during March through November that would occur under the Proposed Project/Proposed Action, relative to the existing condition, over the 70-year period of record would not be of sufficient magnitude to substantially reduce the amount of available littoral habitat and thus, long-term average initial year-class strength of warmwater fish populations.

In addition, the Proposed Action/Proposed Project could alter the rates by which water surface elevations in Oroville Reservoir change during each month of the primary warmwater fish-spawning period (March through July). Adverse impacts to spawning from nest dewatering are assumed to have the potential to occur when reservoir elevation decreases by more than six feet within a given month. Modeling results indicate that the frequency with which potential nest dewatering events could occur in Oroville Reservoir would increase by one additional event under the Proposed Action/Proposed Project, relative to that under the existing condition, during any month of the March through July spawning period (Appendix A, SWP, Oroville Reservoir).

In summary, the Proposed Action/Proposed Project would not result in substantial changes in the availability of littoral habitat at Oroville Reservoir, relative to the existing condition, and thus, would not adversely affect warmwater fish rearing. Implementation of the Proposed Action/Proposed Project would not substantially alter the frequency of potential nest dewatering events in Oroville Reservoir, relative to the existing condition, and thus, would not adversely affect long-term warmwater fish nesting success. Therefore, under the Proposed Action/Proposed Project, impacts on the Oroville Reservoir warmwater fisheries would be less than significant, relative to the existing condition.

Lower Feather River

Flow-related Impacts in the Lower Feather River

The 70-year average monthly flow released from Thermalito Afterbay Outlet under the Proposed Action/Proposed Project would be essentially equivalent to that under the existing condition during all months of the year (Appendix A, SWP, Thermalito Flows). Moreover, reductions of greater than one percent under the Proposed Action/Proposed Project relative to the existing condition in monthly flow releases from Thermalito Afterbay Outlet would occur in 36 of the 840 months (approximately four percent of all months) included in the analysis. Reductions of greater than 10 percent under the Proposed Action/Proposed Project relative to the existing condition in monthly flow releases from Thermalito Afterbay Outlet would occur in one of the 840 months (less than one percent of all months) included in the analysis (Appendix B, Thermalito Flows).

Therefore, flow changes in the lower Feather River downstream of the Thermalito Afterbay Outlet that could occur under the Proposed Action/Proposed Project would result in less-than-significant impacts to lower Feather River fisheries resources.

Water Temperature-related Impacts in the Lower Feather River

The 69-year average monthly water temperature below Thermalito Afterbay Outlet under the Proposed Action/Proposed Project would be essentially equivalent to that under the existing condition during all months of the year (Appendix A, SWP, Thermalito Temperature). Moreover, there would be no additional occurrences under the Proposed Action/Proposed Project, relative to the existing condition, of water temperatures exceeding 56°F, 60°F or 70°F in any individual months in the 828 months included in the analysis (Appendix B, Thermalito Temperatures). Therefore, potential water temperature-related impacts to fish species within the lower Feather River would be considered less than significant.

Folsom Reservoir

Coldwater Fisheries

Under the Proposed Action/Proposed Project, reductions in the 70-year average end-of-month storage would be less than 6,000 AF, relative to mean monthly storage levels under the existing condition, during all months of the April through November period, when the reservoir is stratified. The Proposed Action/Proposed Project would not reduce long-term monthly average end-of-month reservoir storage by more than two percent, relative to the existing condition (Appendix A, Fish Reservoirs, Folsom Storage). The single greatest reduction in storage in any month of the April through November period under the Proposed Action/Proposed Project, relative to the existing condition, would be approximately six percent (Appendix B, Folsom Reservoir Storage). The anticipated reductions in reservoir storage would not be expected to adversely effect the reservoir's coldwater fisheries because: 1) coldwater habitat would remain available in the reservoir during all months of all years; 2) physical habitat is not believed to be among the primary factors limiting coldwater fish populations; and 3) anticipated seasonal changes in storage would not be expected to adversely affect the

primary prey species utilized by coldwater fish. Therefore, seasonal reductions in end-of-month storage that could occur under the Proposed Action/Proposed Project would result in a less-than-significant impact to Folsom Reservoir's coldwater fisheries.

Warmwater Fisheries

The Proposed Action/Proposed Project would not result in substantial changes in the 70-year average end-of-month water surface elevation, relative to the existing condition, in Folsom Reservoir during the March through September period, when warmwater fish spawning and rearing occurs. Reductions in average end-of-month water surface elevation of one foot or more would occur infrequently during the March through September period (Appendix A, Fish Reservoirs, Folsom Elevation).

Changes in water surface elevation in Folsom Reservoir during the March through September period could result in corresponding changes in the availability of reservoir littoral habitat containing inundated terrestrial vegetation (willows and button brush). Such shallow, near shore waters containing physical structure are believed to be important to producing and maintaining strong year-classes of warmwater fishes annually. However, the 70-year average amount of littoral habitat potentially available to warmwater fishes for spawning and/or rearing in Folsom Reservoir under the Proposed Action/Proposed Project would not decrease by more than about 2.4 percent, during all months of the March through September period, relative to the existing condition (Appendix A, Fish Reservoirs, Folsom Littoral Habitat). Reductions in littoral habitat availability of 10 percent or more (a value used for illustrative purposes only) would occur in 41 of the 490 individual months (approximately eight percent) analyzed during March through September over the 70-year period of record (Appendix B, Folsom Reservoir Elevation). The reductions in the availability of littoral habitat would not be of sufficient frequency and magnitude to substantially reduce long-term average initial year-class strength of the warmwater fish populations of management concern.

In addition, the Proposed Action/Proposed Project could alter the rates by which water surface elevations in Folsom Reservoir change during each month of the primary warmwater fish-spawning period of the year (March through July). Adverse impacts to spawning from nest dewatering are assumed to have the potential to occur when reservoir elevation decreases by more than six feet within a given month. Modeling results indicate that the Proposed Action/Proposed Project would result in one fewer potential nest dewatering events than the existing condition, during any month of the March through July spawning period (Appendix A, Fish Reservoirs, Folsom).

In summary, the Proposed Action/Proposed Project would not result in substantial changes in the availability of littoral habitat at Folsom Reservoir of sufficiently frequency and magnitude, relative to the existing condition to adversely affect warmwater fish rearing. Additionally, implementation of the Proposed Action/Proposed Project would reduce the frequency of potential nest dewatering events in Folsom Reservoir, relative to the existing condition, and thus, would not adversely affect long-term warmwater fish nesting success. Therefore, under the Proposed Action/Proposed Project, potential impacts on the Folsom Reservoir warmwater fisheries would be less than significant, relative to the existing condition.

Nimbus Fish Hatchery

Operations of Folsom Dam and Reservoir under the Proposed Action/Proposed Project would generally have little effect on water temperatures below Nimbus Dam during the May through September period, relative to the existing condition. Under the Proposed Action/Proposed Project, the 69-year average temperature of water released from Nimbus Dam would be similar (i.e., no increase greater than 0.1°F), relative to that under the existing condition, during any month of the year (Appendix A, Fish Temps, Nimbus Dam).

The frequency with which Nimbus Dam release water temperatures that would exceed 65°F and 70°F under the Proposed Action/Proposed Project, relative to the existing condition, would not increase during any month of the yearly period. Under the Proposed Action/Proposed Project there would be four fewer years with water temperatures exceeding 65ºF, relative to the existing condition. Additionally, relative to the existing condition, there would be one additional and two fewer occurrences of water temperatures exceeding 68ºF, under the Proposed Action/Proposed Project during the 69-year period of record (Appendix A, Fish Temps, Nimbus Dam). The mean water temperature for the years exceeding these index values also would not change measurably during the yearly period.

Finally, exceedance curves showing the cumulative probability with which water temperatures under the Proposed Action/Proposed Project and the existing condition exceed specified levels below Nimbus Dam, during the July through September period, based on the 69-year period of record included in the analysis, further illustrate that the long-term average water temperature cumulative probability distribution would change little, if at all, under the Proposed Action/Proposed Project (Appendix A, Fish Temps Exceedance, Nimbus Dam). On a long-term basis, the minor and infrequent changes in water temperature that could occur during the May through September period (when hatchery water temperatures reach seasonal highs annually) would have little, if any, effect on hatchery operations and resultant fish production in most years.

Therefore, the minor and infrequent increases in water temperature at Nimbus Hatchery that could occur under the Proposed Action/Proposed Project would result in less-than-significant impacts, relative to the existing condition.

Lower American River

Flow- and water temperature-related impacts on the lower American River are discussed separately below by species and life stage. Organizationally, flow- and water temperature-related impacts to fall-run Chinook salmon and steelhead are discussed concurrently, followed by impact discussions for American shad and striped bass.

Fall-run Chinook Salmon and Steelhead

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

Even at current minimum flow requirements (250 cfs under SWRCB Water Rights Decision No. 893), flow-related physical impediments to adult salmonid passage are not known to occur in the lower American River. Reduced flows at the mouth are of concern primarily because reduced flow could result in insufficient olfactory cues for immigrating adult salmonids, thereby making it more difficult for them to "home" to the lower American River. Large reductions in flow could result in higher rates of straying to other Central Valley rivers. Therefore, flow-related impacts on adult Chinook salmon immigration primarily would be determined by flows at the mouth of the American River during the September through December period, when lower American River adult Chinook salmon immigrate through the Sacramento River and Delta in search of their natal stream to spawn. The same would be true for steelhead during the December through March period of the year.

Under the Proposed Action/Proposed Project, the 70-year average flow at the mouth of the lower American River would be similar to the existing condition during all months of the September through March period. Reductions in 70-year average flow would range from approximately 12 cfs (0.6 percent) in October to about 49 cfs (2.2 percent) in September, relative to the existing condition (Appendix A, Fish Flows, Lower American River Mouth). Moreover, although the simulated 70-year average flow at the mouth during September would be reduced by approximately 49 cfs, the simulated 70-year average Sacramento River flow at Freeport would be reduced by approximately eight cfs during this month (Appendix A, Fish Flows, Freeport). Sacramento River flow reductions at Freeport would be similar to those at the mouth of the lower American River during all other months of the adult fall-run Chinook salmon and steelhead immigration period (October through March).

Individual monthly flows over the period of record under the Proposed Action/Proposed Project would decrease by 10 percent or more, relative to the existing condition, in 18 of the 490 months (3.6 percent) included in the analysis for the September through March period. However, individual monthly flows over the period of record under the Proposed Action/Proposed Project would increase by 10 percent or more, relative to the existing condition, in seven of the 490 individual months (1.4 percent) included in the analysis for the September through March period. Therefore, the net number of individual months in which the flows under the Proposed Action/Proposed Alternative would be decreased by 10 percent or more, relative to the existing condition, would be 11 out of the 490 individual months (2.2 percent) included in the analysis (Appendix B, Flows Lower American River Mouth).

Water Temperature-related Impacts to Adult Fall-run Chinook Salmon and Steelhead Immigration (September through March)

Reclamation's Lower American River Temperature Model does not account for the influence of Sacramento River water intrusion on water temperatures at the mouth of the American River. Therefore, the water temperature assessments for adult fall-run

Chinook salmon and steelhead immigration are based on water temperatures modeled at the mouth of the American River and at Freeport in the Sacramento River. The 69-year average water temperatures modeled for the Proposed Action/Proposed Project would be similar to those under the existing condition at both the mouth of the lower American River and at Freeport in the Sacramento River during all months of the September through March adult fall-run Chinook salmon and steelhead immigration period (Appendix A, Fish Temps, Lower American River Mouth and Freeport).

Measurable increases in water temperature (i.e., increases of 0.3°F or more) would occur in six of the 483 months (1.2 percent) included in the analysis during the September through March period under the Proposed Action/Proposed Project, relative to the existing condition. However, water temperatures would not increase by more than 0.5°F under the Proposed Action/Proposed Project, relative to the existing condition, in any of those six months (Appendix B, Flow Lower American River Mouth). Water temperature exceedance curves further illustrate that water temperature under the Proposed Action/Proposed Project would have a similar cumulative probability distribution to the existing condition during the September through March adult fall-run Chinook salmon and steelhead immigration period (Appendix A, Fish Temps Exceedance, Lower American River Mouth).

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

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

The 70-year average flows below Nimbus Dam under the Proposed Action/Proposed Project would generally be similar to those under the existing condition during all months of the October through February period. Differences in simulated 70-year average Nimbus Dam flows between the Proposed Action/Proposed Project and the existing condition during the October through February period would range from a decrease of 12 cfs (0.6 percent) in October to a decrease of 45 cfs (0.9 percent) in February (Appendix A, Fish Flows, Nimbus Dam).

Individual monthly flows over the period of record under the Proposed Action/Proposed Project at Nimbus would decrease by 10 percent or more, relative to the existing condition, in 12 of the 350 individual months (3.4 percent) included in the analysis for the October through February period. However, individual monthly flows over the period of record under the Proposed Action/Proposed Project would increase by 10 percent or more, relative to the existing condition, in six of the 350 individual months (1.7 percent) included in the analysis for the October through February period. Therefore, the net number of individual months in which the flows under the Proposed Action/Proposed Alternative would be decreased by 10 percent or more, relative to the

existing condition, would be six out of the 350 individual months (1.7 percent) included in the analysis (Appendix B, Nimbus Dam Flows).

Additionally, changes in long-term monthly average and individual monthly flow releases under the Proposed Action/Proposed Project, relative to the existing condition, for each month of the October through February period, are the same at Watt Avenue as those reported above for Nimbus Dam (Appendix A, Fish Flows, Watt Avenue and Appendix B, Watt Avenue Flows).

Analytical interpretation of probability of occurrence data (i.e., exceedance) inherently incorporates elements of risk assessment, including the probability of an event occurring, and the magnitude of the effect if that event were to occur. For example, a flow reduction of 500 cfs when flows were 2,500 cfs may have a similar probability of occurrence as a 500 cfs reduction when flows under the existing condition were 1,000 cfs; however, the magnitude of effect of the latter situation would be more severe, particularly when considering that the existing condition flows could already be limiting habitat availability.

Flow exceedance curves for the October through February period illustrate that the cumulative probability distribution of flows under the Proposed Action/Proposed Project would be equivalent to that under the existing condition during most years (Appendix A, Fish Flows Exceedance, Nimbus Dam). Reductions in flows below 2,000 cfs could reduce the amount of available Chinook salmon spawning habitat, which could result in increased redd superimposition during years when adult returns are high enough for spawning habitat to be limiting. Flow reductions anticipated to occur would not reduce the probability that mean monthly flows below Nimbus Dam during the October through February period would be 2,000 cfs or higher. However, flow reductions of 10 to 20 percent could occur at Nimbus Dam during a few individual months under CVP operations associated with implementation of the Proposed Action/Proposed Project when flows under the existing condition would be below 2,000 cfs. Based on flow exceedance curves for the October through January period, these simulated flow reductions could occur at Nimbus Dam approximately four to seven percent of the time (out of the 70-year period of record) (Appendix A, Fish Flows Exceedance, Nimbus Dam).

These findings indicate that, during the October through January period (when the majority of fall-run Chinook salmon spawning occurs annually), the Proposed Action/Proposed Project could slightly reduce flows at Nimbus Dam and Watt Avenue in a few years when flows under the existing condition would already be below 2,000 cfs. Flow reductions below 2,000 cfs could reduce the amount of available Chinook salmon spawning habitat, which could result in increased redd superimposition during years when adult returns are high enough for spawning habitat to be limiting.

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

Under the Proposed Action/Proposed Project, the 69-year average water temperatures would be essentially equivalent to those under the existing condition, during the October

through February period at Watt Avenue and Nimbus Dam (Appendix A, Fish Temps, Watt Avenue and Nimbus Dam).

Water temperatures at Watt Avenue would increase measurably (i.e., 0.3°F or more) during two individual months out of the 345months (less than one percent) included in the analysis (Appendix B, Watt Avenue Temperatures). Water temperatures at Nimbus Dam would increase measurably (i.e., 0.3°F or more) in four individual months of the 345 months (1.2 percent) included in this analysis (Appendix B, Nimbus Dam Temperatures). Mean monthly river water temperatures at Nimbus Dam would be less than 56°F during each month of the December through February period (Appendix A, Fish Temps, Nimbus Dam).

Water temperature exceedance curves further illustrate that water temperature cumulative probability distribution under the Proposed Action/Proposed Project would be essentially equivalent to that under the existing condition during the October through February period at both Nimbus Dam and Watt Avenue (Appendix A, Fish Temps Exceedance, Nimbus Dam and Watt Avenue).

Finally, the 69-year average annual early life stage survival (percent survival of emergent fry from egg potential) for fall-run Chinook salmon would be 85.1 percent under the Proposed Action/Proposed Project and 84.9 percent under the existing condition. Substantial increases or decreases in survival would not occur in any individual year of the 69-year period of record (Appendix A, Fish Survival, Chinook Salmon).

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

The 70-year average flows below Nimbus Dam under the Proposed Action/Proposed Project would be reduced by less than one percent relative to the existing condition during the December through March period. Reductions in the 70-year average flow would range from 30 cfs (0.8 percent) to 45 cfs (0.9 percent), relative to the existing condition. In addition, changes in 70-year average flows under the Proposed Action/Proposed Project, for each month of the December through March period, are generally equivalent at Watt Avenue as those reported above for Nimbus Dam (Appendix A, Fish Flows, Nimbus Dam and Watt Avenue).

Long-term average water temperature under the Proposed Action/Proposed Project would be essentially equivalent (i.e., within 0.1°F) to that under the existing condition over the 69-year period of record during December through March. Under the Proposed Action/Proposed Project, the number of years that mean monthly water temperatures below Nimbus Dam and at Watt Avenue exceed 56°F would be the same as the existing condition during the December through March period (Appendix A, Fish Temps, Nimbus Dam and Watt Avenue).

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

The majority of juvenile salmonid rearing is believed to occur upstream of Watt Avenue, and depletions (primarily diversions) generally exceed tributary accretions to the river throughout the March through June period (generally resulting in lower flows at Watt Avenue than at Nimbus Dam). Therefore, all flow-related impact assessments for juvenile fall-run Chinook salmon and steelhead rearing are based on flows at Watt Avenue.

Under the Proposed Action/Proposed Project, the 70-year average flow at Watt Avenue would be essentially equivalent to that under the existing condition in all months of the March through June period. The 70-year average flow at Watt Avenue would be within two percent of the flow under the existing condition for any given month during the March through June period (Appendix A, Fish Flows, Watt Avenue).

Individual monthly flows over the period of record under the Proposed Action/Proposed Project would decrease by 10 percent or more, relative to the existing condition, in nine of the 280 individual months (3.2 percent) included in the analysis for the March through June period. However, individual monthly flows over the period of record under the Proposed Action/Proposed Project would increase by 10 percent or more, relative to the existing condition, in three of the 280 individual months (1.1 percent) included in the analysis for the March through June period. Therefore, the net number of individual months in which the flows under the Proposed Action/Proposed Alternative would be decreased by 10 percent or more, relative to the existing condition, would be six out of the 280 individual months (2.1 percent) included in the analysis (Appendix B, Watt Avenue Flows).

The probability of mean monthly flows exceeding the different flow objectives included in the Anadromous Fish Restoration Program (AFRP) for this period would not change substantially, if at all, during the March through June period (Appendix A, Fish Flows, Watt Avenue). Flow cumulative probability distribution curves further illustrate that flow exceedances at Watt Avenue under the Proposed Action/Proposed Project would be essentially equivalent to those under the existing condition during all months of the March through June period (Appendix A, Fish Flows Exceedance, Watt Avenue).

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

Modeling for the Proposed Action/Proposed Project indicates that the 69-year average water temperature at Watt Avenue during any month of the March through June period is essentially equivalent to the existing condition. Measurable water temperature increases (0.3°F or more) would occur in two years of the 69-year period of record for the month of March, one year for the month of April, one year for the month of May, and three years for the month of June. Of these years with water temperature increases, measurable increases in water temperature (0.3°F or more) would occur in one individual year in May and four years in June, with the increases occurring when water temperatures under the existing condition were above 60°F, an indicator value used to assess water temperature-related impacts (Appendix B, Watt Avenue Temperature).

Water temperature cumulative probability distribution curves further illustrate that resulting Watt Avenue water temperature exceedance under the Proposed Action/Proposed Project would be essentially equivalent to that under the existing condition during the March through June period (Appendix A, Fish Temps Exceedance, Watt Avenue).

The minor water temperature changes discussed above for the March through June period also would not affect juvenile emigration upstream of Watt Avenue. Water temperature-related impacts to fish emigrating through the lower river (downstream of Watt Avenue), discussed below, are assessed based on water temperatures at the mouth.

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

The primary period of juvenile fall-run Chinook salmon emigration occurs from February into June, with the majority of juvenile steelhead emigration occurring during this same period. Generally little, if any, emigration occurs during July and August. Flow-related impacts to salmonid immigration (discussed above) addressed flow changes in February and March.

Adequate flows for emigration from the portion of the river above Watt Avenue would be met by flows that were previously discussed (see discussions regarding juvenile rearing). Flows at the lower American River mouth are used to assess potential flow-related impacts to salmonid emigration through the lower river (below Watt Avenue).

Under the Proposed Action/Proposed Project, the simulated 70-year average flow at the mouth would decrease slightly during all months of the February through June period, relative to the existing condition. However, the magnitude of decrease in the simulated 70-year average flows would range from approximately 0.6 percent (21 cfs) to about 1.8 percent (70 cfs), relative to the existing condition (Appendix A, Fish Flows, Lower American River Mouth). Individual monthly flows over the period of record under the Proposed Action/Proposed Project would decrease by 10 percent or more, relative to the existing condition, in 12 of the 350 individual months (3.4 percent) included in the analysis for the February through June period. However, individual monthly flows over the period of record under the Proposed Action/Proposed Project would increase by 10 percent or more, relative to the existing condition, in five of the 350 individual months (1.1 percent) included in the analysis for the February through June period. Therefore, the net number of individual months in which the flows under the Proposed Action/Proposed Alternative would be decreased by 10 percent or more, relative to the existing condition, would be six out of the 280 individual months (2.1 percent) included in the analysis (Appendix B, Lower American River Mouth Flows).

High flows and increased turbidity have been reported to be associated with higher rates of downstream juvenile emigration. However, much of this information comes from findings associated with large pulse flows following significant precipitation events, not relatively small changes in flow on the order of 10 to 20 percent. High flow and

turbidity levels, although believed to potentially trigger emigration events, are not necessary for successful emigration of a salmonid year-class from the river. In fact, emigration surveys conducted by CDFG have shown no direct relationship between peak emigration of juvenile Chinook salmon and peak spring flows (Snider et al., 1997). Moreover, emigrating fish are more likely to be adversely affected by events when flows are high and then ramp down quickly (resulting in isolation and stranding).

Water Temperature-related Impacts to Juvenile Fall-run Chinook Salmon and Steelhead Emigration (February through June)

With the possible exception of a small percentage of fish that may rear near the mouth of the lower American River, water temperature impacts at the mouth to fall-run Chinook salmon and steelhead would be limited to the time that it takes emigrants to pass through the lower portion of the river and into the Sacramento River en route to the Delta (up to several days). Water temperatures near the mouth during the primary emigration period (February into June) are often largely affected by intrusion of Sacramento River water, which is not accounted for by Reclamation's Lower American River Water Temperature Model. Consequently, actual water temperatures near the mouth likely would be somewhere between water temperatures modeled for the mouth, and water temperatures modeled for the Sacramento River at Freeport (RM 46), located 14 miles downstream of the lower American River's confluence. For this reason, the 69-year average water temperatures for each month are discussed for both of these locations.

The 69-year average water temperatures expected to occur under the Proposed Action/Proposed Project at the mouth during February and March would be similar to water temperatures under existing conditions, as discussed previously under impacts to adult salmonid immigration. The 69-year average April, May, and June water temperatures at the mouth and at Freeport under the Proposed Action/Proposed Project are essentially equivalent to the existing condition (Appendix A, Fish Temps, Lower American River Mouth and Freeport). Measurable increases in water temperatures (0.3°F or more) at the mouth over the 69-year period of record would occur in two years during the month of March (2.9 percent of the years included in the analysis period), two years during the month of April (2.9 percent of the years included in the analysis period), one year during the month of May (1.4 percent of the years included in the analysis period), and three years during the month of June (4.3 percent of the years included in the analysis period). Of these years with water temperature increases, measurable increases in water temperature (0.3°F or more) would occur in one individual year in April, two years in May, and four years in June, when water temperatures under the existing condition were above 60°F (Appendix B, Lower American River Mouth Temperature). At Freeport, measurable water temperature increases would not occur in any individual year of the February through May period (Appendix B, Freeport Temperature).

Flow-related Impacts to Juvenile Steelhead Rearing (July through February)

Juvenile steelhead are believed to rear in the lower American River year-round. The majority of juvenile salmonid rearing is believed to occur upstream of Watt Avenue;

therefore, all flow-related impact assessments for juvenile steelhead rearing are based on flows at Nimbus Dam and Watt Avenue.

Under the Proposed Action/Proposed Project, the 70-year average flow at Nimbus Dam would remain essentially equivalent to that under the existing condition for the July through February period. Reductions in the 70-year average flow under the Proposed Action/Proposed Project would range from 12 cfs (0.6 percent reduction) to 72 cfs (2.1 percent reduction), relative to the existing condition, during the July through February period. These results are essentially the same at Watt Avenue (Appendix A, Fish Flows, Nimbus Dam and Watt Avenue).

Individual monthly flows over the period of record under the Proposed Action/Proposed Project would decrease by 10 percent or more, relative to the existing condition, in 21 of the 560 individual months (3.8 percent) included in the analysis for the July through February period. However, individual monthly flows over the period of record under the Proposed Action/Proposed Project would increase by 10 percent or more, relative to the existing condition, in seven of the 560 individual months (1.3 percent) included in the analysis for the July through February period. Therefore, the net number of individual months in which the flows under the Proposed Action/Proposed Alternative would be decreased by 10 percent or more, relative to the existing condition, would be 14 out of the 560 individual months (2.5 percent) included in the analysis (Appendix B, Nimbus Dam and Watt Avenue Flows).

Flow cumulative probability distribution curves illustrate that the probability of flows at Nimbus Dam and Watt Avenue during the month of August would be essentially equivalent to that under the existing condition (Appendix A, Fish Flows Exceedance, Nimbus Dam and Watt Avenue). During the months of July through February, flow cumulative probability distribution curves suggest that flows would be reduced in a few years (approximately four percent of the time out of the 70-year period of record) when flows under the existing condition are at or below 1,500 cfs (Appendix A, Fish Flows Exceedance, Nimbus Dam and Watt Avenue).

Based on these findings, flow reductions under the Proposed Action/Proposed Project could reduce the quality and/or quantity of juvenile steelhead rearing habitat in a few years during the July through February period, relative to that which would occur under the existing condition. However, juvenile steelhead rearing in the lower American River is believed to be more limited by instream water temperature conditions rather than flow.

Water Temperature-related Impacts to Juvenile Steelhead Rearing (July through February)

Juvenile steelhead are believed to rear in the lower American River year-round. However, water temperature is not believed to be a limiting factor during the November through February period, when water temperatures are generally cool under both the Proposed Action/Proposed Project and the existing condition. Therefore, water temperature-related impact assessment for juvenile steelhead rearing will focus on the July through September period. Furthermore, the majority of juvenile salmonid rearing is believed to occur upstream of Watt Avenue; therefore, all water temperature-related

impact assessments for juvenile steelhead rearing are based on water temperatures at Nimbus Dam and Watt Avenue.

Water temperature-related impacts to juvenile steelhead rearing have been performed for the July through September period. Water temperature modeling indicates that the 69-year average water temperatures under the Proposed Action/Proposed Project at Nimbus Dam and Watt Avenue would be essentially equivalent (i.e., no change greater than 0.1°F) during all months of the July through September period, relative to those under the existing condition (Appendix A, Fish Temps, Nimbus Dam and Watt Avenue).

Measurable water temperature increases (0.3°F or more) would occur at Nimbus Dam under the Proposed Action/Proposed Project during seven, six, two, and six months of the 69 years modeled for July, August, September and October, respectively, relative to the existing condition. Measurable water temperature decreases (0.3°F or more) would occur at Nimbus Dam under the Proposed Action/Proposed Project during nine, five, three, and 13 months of the 69 years modeled in July, August, September and October, respectively, relative to the existing condition. Therefore, over the July through October period under the Proposed Action/Proposed Project, relative to the existing condition, there would be a net total of nine additional months out of the 276 months included in the analysis (3.3 percent) in which the water temperature would be decreased a measurable amount at Nimbus Dam (Appendix B, Nimbus Dam Temperature).

Measurable water temperature increases (0.3°F or more) would occur at Watt Avenue under the Proposed Action/Proposed Project during eight, five, one, and five months of the 69 years modeled for July, August, September and October, respectively, relative to the existing condition. Measurable water temperature decreases (0.3°F or more) would occur at Watt Ave under the Proposed Action/Proposed Project during five, one, one, and eight months of the 69 years modeled in July, August, September and October, respectively, relative to the existing condition. Therefore, over the July through October period under the Proposed Action/Proposed Project, relative to the existing condition, there would be a net total of four additional months out of the 276 months included in the analysis (1.4 percent) in which the water temperature would be increased a measurable amount at Watt Avenue (Appendix B, Watt Avenue Temperature).

Water temperature cumulative probability distribution curves further illustrate that water temperature exceedance under the Proposed Action/Proposed Project would generally be equivalent to that under the existing condition during the July through September period (Appendix A, Fish Temps Exceedance, Nimbus Dam and Watt Avenue) at Nimbus Dam and Watt Avenue.

Summary of Potential Impacts on Fall-run Chinook Salmon and Steelhead in the Lower American River Under the Proposed Action/Proposed Project

In summary, potential changes in flow in the lower American River under the Proposed Action/Proposed Project during September through March would not be of sufficient frequency and magnitude to adversely affect adult fall-run Chinook salmon and steelhead homing or immigration. Similarly, fluctuations in flows under the Proposed Action/Proposed Project during October through February would not be of sufficient

frequency and magnitude to adversely affect fall-run Chinook salmon or steelhead spawning and egg incubation. Changes in flow that would occur under the Proposed Action/Proposed Project during the March through June period would not be of sufficient frequency and magnitude to adversely affect juvenile fall-run Chinook salmon or steelhead rearing. Similarly, changes in flow that would occur under the Proposed Action/Proposed Project during the February through June period would not be of sufficient frequency and magnitude to adversely affect juvenile fall-run Chinook salmon or steelhead emigration. Lastly, potential changes in flow in the lower American River under the Proposed Action/Proposed Project during July through February would not be of sufficient frequency and magnitude to adversely affect steelhead rearing.

Changes in water temperature in the lower American River under Proposed Action/Proposed Project during September through March would not be of sufficient frequency and magnitude to adversely affect adult fall-run Chinook salmon and steelhead homing or immigration. Similarly, changes in water temperature under the Proposed Action/Proposed Project during October through February would not be of sufficient frequency and magnitude to adversely affect fall-run Chinook salmon or steelhead spawning and egg incubation. Changes in water temperature that would occur under the Proposed Action/Proposed Project during the March through June period would not be of sufficient frequency and magnitude to adversely affect juvenile fall-run Chinook salmon or steelhead rearing. Similarly, potential changes in water temperature that would occur under the Proposed Action/Proposed Project during the February through June period would not be of sufficient frequency and magnitude to adversely affect juvenile fall-run Chinook salmon or steelhead emigration. Lastly, potential changes in water temperature in the lower American River under the Proposed Action/Proposed Project during July through February would not be of sufficient frequency and magnitude to adversely affect steelhead rearing.

Overall, the potential changes in flow and water temperature in the lower American River under the Proposed Action/Proposed Project, relative to the existing condition, would not be of sufficient frequency and magnitude to adversely affect fall-run Chinook salmon or steelhead. Therefore, impacts on fall-run Chinook salmon and steelhead in the lower American River with implementation of the Proposed Action/Proposed Project, relative to the existing condition would be less than significant.

Impacts on American Shad

Potential changes in lower American River flows that could be expected to occur during May and June under the Proposed Action/Proposed Project have been discussed previously under impact discussions for fall-run Chinook salmon and steelhead. In addition to that evaluation, further analysis was performed to determine the probability that lower American River flows at the mouth would be less than 3,000 cfs, a flow level identified by CDFG as that which would be sufficient to maintain the American shad sport fishery. Under the Proposed Action/Proposed Project, monthly flows would be less than the 3,000 cfs attraction flow at the mouth in one additional year (one percent of the time) during June and no additional years during May relative to the existing condition (Appendix B, Lower American River Mouth Flows).

Because American shad spawn opportunistically where suitable conditions are found, potentially attracting fewer adult spawners into the lower American River in a few years would not be expected to adversely impact annual American shad production within the Sacramento River system. Flow reductions under the Proposed Action/Proposed Project in May and June could potentially reduce the number of adult shad attracted into the river during a few years. Because annual production of American shad within the Sacramento River system would not be affected, and because direct impacts to the lower American River sport fishery would be less than substantial in most years, any flow-related impacts to American shad would be less than significant.

Long-term monthly average water temperatures at Nimbus Dam and at the American River mouth under the Proposed Action/Proposed Project would be within the reported preferred range for American shad spawning (60°F to 70°F), with no measurable change during May and June, relative to the existing condition (Appendix A, Fish Temps, Nimbus Dam and Lower American River Mouth). Because the frequency with which suitable water temperatures for American shad spawning would not differ substantially between the Proposed Action/Proposed Project and existing condition, and because water temperatures would nearly always remain suitable for American shad rearing, water temperature-related impacts to American shad also are considered to be less than significant. Overall, potential impacts to American shad associated with implementation of the Proposed Action/Proposed Project would be less than significant.

Impacts on Striped Bass

Changes in lower American River flows that could be expected to occur during May and June under the Proposed Action/Proposed Project have been discussed previously under analyses for fall-run Chinook salmon and steelhead. In addition to that evaluation, further analysis was performed to determine the probability that lower American River flows at the mouth would be less than 1,500 cfs, a flow level identified by CDFG as that which would be sufficient to maintain the sport fishery. Under the Proposed Action/Proposed Project, monthly flows in the lower American River would be below 1,500 cfs at the mouth during no additional years in May, and one additional year in June, relative to the existing condition (Appendix B, Lower American River Mouth Flows). Because flows at the mouth that are believed to be sufficient to maintain the striped bass fishery would be met or exceeded in most years during May and June, and because substantial changes in the strength of the striped bass fishery would not be expected to occur in all years when mean May and/or June flows fall below 1,500 cfs, flow-related impacts to the striped bass fishery that could potentially occur under the Proposed Action/Proposed Project would be less than significant.

Monthly water temperatures at Nimbus Dam would be within the reported preferred range for juvenile striped bass rearing of 61°F to 73°F in one additional year in May and two additional years in June under the Proposed Action/Proposed Alternative, relative to the existing condition. The number of years that mean monthly water temperatures would be within this range at the lower American River mouth decrease by two years in May by one year in June (Appendix B, Nimbus Dam and Watt Avenue Temperatures). Because the frequency with which suitable water temperatures for juvenile striped bass rearing in the lower American River would differ little between the Proposed

Action/Proposed Project and the existing condition during May and June, water temperature-related impacts to juvenile striped bass rearing also are considered to be less than significant. Overall, potential impacts to striped bass with implementation of the Proposed Action/Proposed Project would be less than significant, relative to the existing condition.

Sacramento-San Joaquin Delta

Delta outflow is considered to have a substantial effect on a number of fish species relying on Delta habitats for one or more of their life stages. Reductions in the 70-year average Delta outflow of up to approximately 0.3 percent could occur under the Proposed Action/Proposed Project, relative to the existing condition. However, with regard to Delta outflow, the period of February through June is believed to be of greatest concern for potential effects to spawning and rearing habitat and downstream transport flows for delta smelt, longfin smelt, striped bass, salmonids, and other aquatic species in the Delta. Changes in 70-year average Delta outflow under the Proposed Action/Proposed Project would not exceed 0.1 percent during the February through June period, relative to the existing condition. Reductions in Delta outflow of more than two percent under the Proposed Action/Proposed Project, relative to the existing condition, would not occur in any individual year during the February through June period (Appendix B, Delta Outflow,).

Under the Proposed Action/Proposed Project, there would not be an upstream shift in the 70-year average monthly position of X2, relative to the existing condition (Appendix A, Fish Delta, X2). Furthermore, during the February through June period, considered an important period for spawning and rearing, and downstream transport flows for various fish species, upstream shifts in the position of X2 of more than one km would not occur in any individual year. In fact, maximum upstream shifts in the position of X2 for any individual year would be well below one km during all months of the February through June period (Appendix B, Delta X2).

In addition, it should be noted that the model simulations conducted for the Proposed Action/Proposed Project included conformance with the export requirements set forth in SWRCB Water Rights Decision No. 1641, as well as Interior's Final Administrative Proposal for the Management of 3406(b)(2) Water. Modeling output also showed that the Delta export-to-inflow ratios under the Proposed Action/Proposed Project would not exceed the maximum export limits for either the February through June (35 percent of Delta inflow) or the July through January period (65 percent of Delta inflow), as set by SWRCB Water Rights Decision No. 1641 (Appendix A, Fish Delta, E/I Ratio).

Overall, the minimal changes in Delta conditions under the Proposed Action/Proposed Project, relative to the existing condition, would result in less-than-significant impacts to Delta fish populations.

Shasta Reservoir

Coldwater Fisheries

Hydrologic conditions under CVP operations associated with implementation of the Downstream Diversion Alternative would not result in substantial reductions (i.e., greater than 0.1 percent) in 70-year average Shasta Reservoir storage, relative to the existing condition, during any month of the April through November period, when the reservoir is stratified (Appendix C, Fish Reservoirs, Shasta Storage). Reductions in Shasta Reservoir storage would be less than 1.5 percent in all individual years during all months of the April through November period (Appendix D, Shasta Reservoir Storage). The anticipated reductions in reservoir storage would not be expected to adversely effect the reservoir's coldwater fisheries because: 1) coldwater habitat would remain available in the reservoir during all months of all years; 2) physical habitat is not believed to be among the primary factors limiting coldwater fish populations; and 3) anticipated seasonal changes in storage would not be expected to adversely affect the primary prey species utilized by coldwater fish. Therefore, minor seasonal reductions in end-of-month storage expected to occur under the Downstream Diversion Alternative would have less-than-significant impacts to Shasta Reservoir's coldwater fisheries.

Warmwater Fisheries

Hydrologic conditions under CVP operations associated with implementation of the Downstream Diversion Alternative would not result in substantial changes in the 70-year average end-of-month water surface elevation relative to the existing condition in Shasta Reservoir during the March through September period, when warmwater fish spawning and rearing occurs (Appendix C, Fish Reservoirs, Shasta Elevation). Reductions under the Downstream Diversion Alternative, relative to the existing condition, in end-of-month elevation of one foot or more would not occur during any year of the March through September period (Appendix D, Shasta Reservoir Elevation).

Reductions in the 70-year average amount of littoral habitat potentially available to warmwater fishes for spawning and/or rearing in Shasta Reservoir under the Downstream Diversion Alternative would be 0.3 percent or less for all months of the March through September period, relative to the existing condition (Appendix C, Fish Reservoirs, Shasta Littoral Habitat). Reductions in littoral habitat availability of 10 percent or more (a value used for illustrative purposes only) would occur in four of the 490 months (less than one percent) analyzed during March through September over the 70-year period of record (Appendix D, Shasta Reservoir Littoral Habitat). These minor and infrequent reductions in the availability of littoral habitat, under the Downstream Diversion Alternative relative to the existing condition, would not be of sufficient magnitude to substantially reduce long-term average initial year-class strength of warmwater fish populations.

In addition, the Downstream Diversion Alternative could alter the rates by which water surface elevations in Shasta Reservoir change during each month of the primary warmwater fish-spawning period of the year (March through July). Adverse impacts to

spawning from nest dewatering are assumed to have the potential to occur when reservoir elevation decreases by more than six feet within a given month. Modeling results indicate that the Downstream Diversion Alternative would result in one fewer potential nest dewatering event than the existing condition, during any month of the March through July spawning period (Appendix C, Fish Reservoirs, Shasta).

In summary, the Downstream Diversion Alternative would not result in substantial changes in the availability of littoral habitat in Shasta Reservoir, relative to the existing condition, and thus, would not adversely affect warmwater fish rearing. Implementation of the Downstream Diversion Alternative would reduce the frequency of potential nest dewatering events in Shasta Reservoir, relative to the existing condition, and thus, would not adversely affect long-term warmwater fish nesting success. Therefore, under the Downstream Diversion Alternative, impacts on the Shasta Reservoir warmwater fisheries would be less than significant, relative to the existing condition.

Trinity Reservoir

Coldwater Fisheries

Under the Downstream Diversion Alternative, reductions in the 70-year average monthly storage in Trinity Reservoir would be less than 0.2 percent, relative to the existing condition, during all months of the April through November period, when the reservoir is stratified (Appendix C, Fish Reservoirs, Trinity Storage). Reductions in Trinity Reservoir storage would be less than 1.3 percent in all individual years during all months of this period (Appendix D, Trinity Reservoir Storage). The anticipated reductions in reservoir storage would not be expected to adversely effect the reservoir's coldwater fisheries because: 1) coldwater habitat would remain available in the reservoir during all months of all years; 2) physical habitat is not believed to be among the primary factors limiting coldwater fish populations; and 3) anticipated seasonal changes in storage would not be expected to adversely affect the primary prey species utilized by coldwater fish. Therefore, seasonal reductions in storage expected to occur under the Downstream Diversion Alternative would have less-than-significant impacts to Trinity Reservoir's coldwater fisheries.

Warmwater Fisheries

The Downstream Diversion Alternative would result in changes in the 70-year average end-of-month water surface elevation in Trinity Reservoir, relative to the existing condition, of no greater than one foot during the March through September period, when warmwater fish spawning and rearing occurs (Appendix C, Fish Reservoirs, Trinity Elevation). Reductions in end-of-month water surface elevations of one foot or more would occur infrequently, if at all, during any individual year of the March through September period (Appendix D, Trinity Reservoir Elevation).

Reductions in the 70-year average amount of littoral habitat potentially available to warmwater fishes for spawning and/or rearing in Trinity Reservoir under the Downstream Diversion Alternative generally would be less than 0.3 percent, relative to the existing condition (Appendix C, Fish Reservoirs, Trinity Littoral Habitat). Substantial reductions in littoral habitat availability would occur infrequently, if at all, during

individual years of the March through September period. Reductions in littoral habitat availability of 10 percent or more (a value used for illustrative purposes only) would occur in three of the 490 months (less than one percent) analyzed during March through September over the 70-year period of record (Appendix D, Shasta Reservoir Littoral Habitat). These minor and infrequent reductions in the availability of littoral habitat, under the Downstream Diversion Alternative relative to the existing condition, would not be of sufficient magnitude to substantially reduce long-term average initial year-class strength of warmwater fish populations.

In addition, the Downstream Diversion Alternative could alter the rates by which water surface elevations in Trinity Reservoir change during each month of the primary warmwater fish-spawning period of the year (March through July). Adverse impacts to spawning from nest dewatering are assumed to have the potential to occur when reservoir elevation decreases by more than six feet within a given month. Modeling results indicate that the frequency of potential nest dewatering events is equal between the Downstream Diversion Alternative and the existing condition, during any month of the March through July spawning period (Appendix A, Fish Reservoirs, Trinity).

In summary, the Downstream Diversion Alternative would not result in substantial changes in the availability of littoral habitat in Trinity Reservoir, relative to the existing condition, and thus, would not adversely affect warmwater fish rearing. Implementation of the Downstream Diversion Alternative would not alter the frequency of potential nest dewatering events in Trinity Reservoir, relative to the existing condition, and thus, would not adversely affect long-term warmwater fish nesting success. Therefore, under the Downstream Diversion Alternative, impacts on the Trinity Reservoir warmwater fisheries would be less than significant, relative to the existing condition.

Upper Sacramento River

Flow-related Impacts in the Upper Sacramento River

A decrease in flow of 10 percent or greater has been previously identified (e.g., USFWS Trinity River Mainstem Fishery Restoration Draft EIS/EIR (1999)) as that which could be sufficient to reduce habitat quantity and/or quality to an extent that would significantly affect fish. The Trinity EIS/EIR further states, *"…[t]his assumption [is] very conservative…[i]t is likely that reductions in streamflows much greater than 10 percent would be necessary to significantly (and quantifiably) reduce habitat quality and quantity to an extent detrimental to fishery resources.*" Conversely, the Trinity EIS/EIR considers increases in streamflow of 10 percent or greater, relative to the basis of comparison, to be "beneficial" to fish species.

Because the USFWS defines a 10 percent change in streamflow as a change that could potentially affect fish resources, this fisheries impact analysis considers changes in streamflow from the existing condition in individual months over the 70-year period of 10 percent or greater, in addition to considering the long-term average flows under the Proposed Action/Proposed Project and existing condition.

The 70-year average flow released from Keswick Dam under CVP the Downstream Diversion Alternative would be essentially equivalent to that under the existing condition during all months of the year. Moreover, reductions of more than 0.2 percent in long-term monthly average flow releases from Keswick Dam would not occur in any month of the period of record (Appendix C, Fish Flows, Keswick). Additionally, there would be no increases or decreases of flow under the Downstream Diversion Alternative greater than 10 percent in any individual month over the 70-year period of record, relative to the existing condition.

The minimum flow objective for Keswick Dam releases stipulated in the NMFS Biological Opinion (1993) for the protection of winter-run Chinook salmon rearing and downstream passage is 3,250 cfs between October 1 and March 31. Modeling output shows that mean monthly flows below Keswick Dam would not be below 3,250 cfs in any additional months of the October through March period in any of the 70 years modeled under the Downstream Diversion Alternative, relative to the existing condition (Appendix D, Keswick Dam Flows).

These findings indicate that flow changes below Keswick Dam that would occur under the Downstream Diversion Alternative, would result in less-than-significant impacts to upper Sacramento River fisheries resources.

Water Temperature-related Impacts in the Upper Sacramento River

The Downstream Diversion Alternative would result in essentially equivalent water temperatures at Keswick Dam and Bend Bridge relative to the existing condition, for any month of the year over the 69-period of record. Relative to the existing condition, there also would be no change in the number of years exceeding 56°F, 60°F, or 65°F at Keswick Dam or Bend Bridge under this alternative (Appendix C, Fish Temps, Keswick Dam and Bend Bridge). Thus, the downstream diversion alternative would not result in any additional exceedances of the water temperature criteria identified in the NMFS Biological Opinion for winter-run Chinook salmon. The long-term average early life stage survival of fall-run/late fall-run, winter-run, or spring-run Chinook salmon under the Downstream Diversion Alternative would be essentially equivalent to that under the existing condition. In addition, there would be no substantial decreases (i.e., decreases greater than 0.1 percent) in annual early life stage survival of fall-run, late fall-run, winter-run, or spring-run Chinook salmon in any individual year under this alternative (Appendix C, Fish Survival, Sacramento River). Based on these findings, water temperature-related impacts to upper Sacramento River fisheries under the Downstream Diversion Alternative would be less than significant.

Lower Sacramento River

Flow-related Impacts in the Lower Sacramento River

The 70-year average flow at Freeport under the Downstream Diversion Alternative would generally be equivalent (i.e., within one percent) to flows under the existing condition during all months of the year. Flow reductions of one to four percent would occur in a few individual years during most months; however, flow reductions of more than 10 percent would not occur during any month of any individual year (Appendix D,

Freeport Flows). Therefore, neither physical habitat availability for fishes residing in the lower Sacramento River nor would anadromous fish adult immigration or juvenile emigration be substantially affected under this alternative, relative to the existing condition. Consequently, flow-related impacts to lower Sacramento River fisheries or migrating anadromous fishes that could occur under the Downstream Diversion Alternative are considered to be less than significant.

Water Temperature-related Impacts in the Lower Sacramento River

The 69-year average water temperature at Freeport in the lower Sacramento River would be essentially equivalent (i.e., within 0.3°F) between the Downstream Diversion Alternative and the existing condition, during any month of the year. The number of years that mean monthly water temperatures at this location would exceed 56°F, 60°F, and 70°F would be the same under the Downstream Diversion Alternative and the existing condition during the March through November period (Appendix C, Fish Temps, Freeport). Measurable water temperature increases (i.e., 0.3ºF or more) would not occur in any individual year of the October through September period (Appendix D, Freeport Temperatures). Overall, potential impacts to fish species within the lower Sacramento River associated with implementation of the Downstream Diversion Alternative would be considered less than significant.

Oroville Reservoir

Coldwater Fisheries

Under the Downstream Diversion Alternative, reductions in the 70-year average monthly end-of-month storage in Oroville Reservoir would be within 0.2 percent of the existing condition during all months of the April through November period (the period when the reservoir is stratified) (Appendix C, SWP, Oroville Reservoir Storage). Reductions in Oroville Reservoir end-of-month storage relative to the existing condition would be less than 1.7 percent in all individual years during all months of the April through November period, over the 70-year period of record included in the analysis (Appendix D, Oroville Reservoir Storage). The anticipated reductions in reservoir storage would not be expected to adversely effect the reservoir's coldwater fisheries because: 1) coldwater habitat would remain available in the reservoir during all months of all years; 2) physical habitat is not believed to be among the primary factors limiting coldwater fish populations; and 3) anticipated seasonal changes in storage would not be expected to adversely affect the primary prey species utilized by coldwater fish. Therefore, seasonal reductions in end-of-month storage expected to occur under the Downstream Diversion Alternative would result in less-than-significant impacts to Oroville Reservoir's coldwater fisheries.

Warmwater Fisheries

The Downstream Diversion Alternative would not result in changes relative to the existing condition in the 70-year average end-of-month water surface elevation of greater than one foot in Oroville Reservoir during the March through September period, when warmwater fish spawning and rearing occurs (Appendix C, SWP, Oroville Reservoir Elevation).

Changes in water surface elevation in Oroville Reservoir during the March though September period could result in corresponding changes in the availability of reservoir littoral habitat containing submerged vegetation (willows and button brush). Such shallow, nearshore waters containing physical structure are believed to be important to producing and maintaining strong year-classes of warmwater fish annually. The small and infrequent changes in individual month water surface elevation during March through November that would occur under the Proposed Project/Proposed Action, relative to the existing condition, over the 70-year period of record would not be of sufficient magnitude to substantially reduce the amount of available littoral habitat and thus, long-term average initial year-class strength of warmwater fish populations (Appendix D, Oroville Reservoir Elevation).

In addition, the Downstream Diversion Alternative could alter the rates by which water surface elevations in Oroville Reservoir change during each month of the primary warmwater fish-spawning period of the year (March through July). Adverse impacts to spawning from nest dewatering are assumed to have the potential to occur when reservoir elevation decreases by more than six feet within a given month. Modeling results indicate that the Downstream Diversion Alternative would result in one additional occurrence of a six-foot or greater drop in water surface elevation within one month, relative to the existing condition, during any month of the March through July spawning period (Appendix C, SWP, Oroville Reservoir).

In summary, the Downstream Diversion Alternative would not result in substantial changes in the availability of littoral habitat in Oroville Reservoir, relative to the existing condition, and thus, would not adversely affect warmwater fish rearing. Implementation of the Downstream Diversion Alternative would minimally alter the frequency of potential nest dewatering events in Oroville Reservoir (i.e., one additional occurrence), relative to the existing condition, and thus, would not adversely affect long-term warmwater fish nesting success. Therefore, under the Downstream Diversion Alternative, impacts on the Oroville Reservoir warmwater fisheries would be less than significant, relative to the existing condition.

Lower Feather River

Flow-related Impacts in the Lower Feather River

The 70-year average monthly flow released from Thermalito Afterbay Outlet under the Downstream Diversion Alternative would be essentially equivalent (i.e., within one percent) to that under the existing condition during all months of the year (Appendix C, SWP, Thermalito Flows). Moreover, reductions of greater than one percent under the Downstream Diversion Alternative relative to the existing condition in individual month flow releases from Thermalito Afterbay Outlet would occur in 20 of the 840 months (2.4 percent of all months) included in the analysis. Reductions of greater than 10 percent under the Downstream Diversion Alternative relative to the existing condition in individual month flow releases from Thermalito Afterbay Outlet would not occur (Appendix D, Thermalito Flows).

Therefore, potential flow changes downstream of the Thermalito Afterbay Outlet that could occur under the Downstream Diversion Alternative would be considered a less-than-significant impact to lower Feather River fisheries resources.

Water Temperature-related Impacts in the Lower Feather River

The 69-year average monthly water temperature below Thermalito Afterbay Outlet under the Downstream Diversion Alternative would be equivalent to that under the existing condition during all months of the year. Moreover, there would be no additional occurrences under the Downstream Diversion Alternative, relative to the existing condition, of water temperatures exceeding 56°F, 60°F or 70°F in any individual months of the 828 months included in the analysis (Appendix D, Thermalito Temperatures). Therefore, potential water temperature-related impacts to fish species within the lower Feather River associated with implementation of the Downstream Diversion Alternative would be considered less than significant, relative to the existing condition.

Folsom Reservoir

Coldwater Fisheries

Additional diversions from the lower American River under the Downstream Diversion Alternative would require Folsom Reservoir operations that would result in minor seasonal changes in end-of-month storage during most years. However, under the Downstream Diversion Alternative, reductions in the 70-year average end-of-month storage would be less than two TAF, relative to mean monthly storage levels under the existing condition, during all months of the April through November period of the year. Additionally, under the Downstream Diversion Alternative, long-term monthly average reservoir storage would not be reduced by more than 0.3 percent, relative to the existing condition, during any month of the April through November period (Appendix C, Fish Reservoirs, Folsom Storage). The anticipated reductions in reservoir storage would not be expected to adversely effect the reservoir's coldwater fisheries because: 1) coldwater habitat would remain available in the reservoir during all months of all years; 2) physical habitat is not believed to be among the primary factors limiting coldwater fish populations; and 3) anticipated seasonal changes in storage would not be expected to adversely affect the primary prey species utilized by coldwater fish. Therefore, seasonal reductions in end-of-month storage expected to occur under the Downstream Diversion Alternative would result in less-than-significant impacts to Folsom Reservoir's coldwater fisheries.

Warmwater Fisheries

The Downstream Diversion Alternative would not result in substantial changes in the 70-year average end-of-month water surface elevation in Folsom Reservoir during the March through September period, relative to the existing condition. Reductions in average end-of-month elevation of more than one foot would occur infrequently during the March through September period (when warmwater fish spawning and initial rearing occurs) (Appendix C, Fish Reservoirs, Folsom Elevation).

Changes in water surface elevation in Folsom Reservoir during the March through September period could result in corresponding changes in the availability of reservoir littoral habitat containing inundated terrestrial vegetation (willows and button brush). Such shallow, near shore waters containing physical structure are believed to be important to producing and maintaining strong year-classes of warmwater fishes annually. However, the 70-year average amount of littoral habitat potentially available to warmwater fishes for spawning and/or rearing in Folsom Reservoir under the Downstream Diversion Alternative would not decrease by more than 0.3 percent for all months of the March through September period (Appendix C, Fish Reservoirs, Folsom Littoral Habitat). Substantial reductions in littoral habitat availability would occur infrequently, if at all, during individual years of the March through September period. There would be five months out of the 490 months (approximately one percent) included in the modeling for this period where reductions in littoral habitat under the Downstream Diversion Alternative would be greater than 10 percent (a value used for illustrative purposes), relative to the existing condition (Appendix D, Folsom Reservoir Littoral Habitat). The minor and infrequent reductions in the availability of littoral habitat would not be of sufficient magnitude to substantially reduce long-term, average initial year-class strength of the warmwater fish populations of management concern.

In addition, the Downstream Diversion Alternative could alter the rates by which water surface elevations in Folsom Reservoir change during each month of the primary warmwater fish-spawning period of the year (March through July). Adverse impacts to spawning from nest dewatering are assumed to have the potential to occur when reservoir elevation decreases by more than six feet within a given month. Modeling results indicate that the frequency of occurrence of potential nest dewatering events under the Downstream Diversion Alternative would be equivalent to the existing condition during any month of the March through July spawning period (Appendix C, Fish Reservoirs, Folsom).

In summary, the Downstream Diversion Alternative would not result in substantial changes in the availability of littoral habitat in Folsom Reservoir, relative to the existing condition, and thus, would not adversely affect warmwater fish rearing. Implementation of the Downstream Diversion Alternative would not alter the frequency of potential nest dewatering events in Folsom Reservoir, relative to the existing condition, and thus, would not adversely affect long-term warmwater fish nesting success. Therefore, under the Downstream Diversion Alternative, potential impacts on the Folsom Reservoir warmwater fisheries would be less than significant, relative to the existing condition.

Nimbus Fish Hatchery

Operations of Folsom Dam and Reservoir under the Downstream Diversion Alternative would generally have little effect on water temperatures below Nimbus Dam during the May through September period when water temperature at the hatchery would be of particular concern, relative to the existing condition. For example, under the Downstream Diversion Alternative, the 69-year average temperature of water released from Nimbus Dam would not change, relative to that under the existing condition, during any month of the year. The frequency with which Nimbus release water temperatures under the Downstream Diversion Alternative would exceed 65°F, 68°F, and 70°F would

increase by one additional year exceeding 65°F and 68°F during any month of the annual period, relative to the existing condition (Appendix C, Fish Temps, Nimbus Dam). The mean water temperature for the years exceeding these index values also would not change measurably during the yearly period. Finally, exceedance curves showing the probability with which water temperatures under the Downstream Diversion Alternative and the existing condition exceed specified levels below Nimbus Dam, during the critical July through September period, based on the 69-year period of record modeled, further illustrate that the cumulative probability distribution of water temperatures would change little, if at all, under the Downstream Diversion Alternative (Appendix C, Fish Temps, Nimbus Dam). On a long-term basis, any minor and infrequent changes in water temperature that could occur during the May through September period (when hatchery water temperatures reach seasonal highs annually) would have little, if any, effect on hatchery operations and resultant fish production in most years. Overall, potential changes in water temperature under the Downstream Diversion Alternative at Nimbus Fish Hatchery would be a less-than-significant impact.

Lower American River

Fall-run Chinook Salmon and Steelhead

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

Even at current minimum flow requirements (250 cfs under SWRCB Water Rights Decision No. 893), flow-related physical impediments to adult salmonid passage are not known to occur in the lower American River. Reduced flows at the mouth are of concern primarily because reduced flow could result in insufficient olfactory cues for immigrating adult salmonids, thereby making it more difficult for them to "home" to the lower American River. Large reductions in flow could result in higher rates of straying to other Central Valley rivers. Therefore, flow-related impacts on adult Chinook salmon immigration primarily would be determined by flows at the mouth of the American River during the September through December period, when lower American River adult Chinook salmon immigrate through the Sacramento River and Delta in search of their natal stream to spawn. The same would be true for steelhead during the December through March period of the year.

Under the Downstream Diversion Alternative, the 70-year average flow at the mouth of the lower American River would be reduced little, if at all, during all months of the September through March period. Reductions in 70-year average flow under the Downstream Diversion Alternative would only occur in September, January and February (a long-term monthly average flow reduction of up to 0.5 percent), relative to the existing condition. Sacramento River flow reductions at Freeport would be similar to those at the mouth of the lower American River during all other months of the adult fall-run Chinook salmon and steelhead immigration period of September through March (i.e., reductions of up to 0.3 percent) (Appendix C, Fish Flows, Lower American River Mouth and Freeport).

Individual monthly flows over the period of record under the Downstream Diversion Alternative would decrease by 10 percent or more, relative to the existing condition, in 4

of the 490 individual months (less than one percent) included in the analysis for the September through March period. However, individual monthly flows over the period of record under the Downstream Diversion Alternative would increase by 10 percent or more, relative to the existing condition, in four of the 490 individual months (less than one percent) included in the analysis for the September through March period. Therefore, there would be no change in the net number of individual months in which the flows under the Downstream Diversion Alternative would decrease by 10 percent or more, relative to the existing condition, in the 490 individual months included in the analysis (Appendix D, Lower American River Mouth Flows).

Water Temperature-related Impacts to Adult Fall-run Chinook Salmon and Steelhead Immigration (September through March)

Reclamation's Lower American River Temperature Model does not account for the influence of Sacramento River water intrusion on water temperatures at the mouth of the American River. Therefore, the water temperature assessments for adult fall-run Chinook salmon and steelhead immigration are based on water temperatures modeled at the mouth of the American River and at Freeport in the Sacramento River. The 69-year average water temperatures modeled for the Downstream Diversion Alternative would be equivalent to those under the existing condition at both the mouth and at Freeport during all months of the September through March adult immigration period (Appendix C. Fish Temps, Lower American River Mouth and Freeport).

Monthly modeling data indicates that measurable water temperature increases (0.3°F or more) under the Downstream Diversion Alternative would occur at the mouth in three of the 69 months (4.3 percent) modeled for October, and none for the other months of the adult immigration period (Appendix D, Lower American River Mouth Temperatures). Water temperature cumulative probability distribution curves further illustrate that the water temperature probability distribution at the mouth associated with implementation of the Downstream Diversion Alternative would be essentially equivalent to that under the existing condition throughout the September through March adult fall-run Chinook salmon and steelhead immigration period (Appendix C, Fish Temps Exceedance, Lower American River Mouth).

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

All flow-related impact assessments regarding fall-run Chinook salmon spawning and incubation were based on flows at Nimbus Dam and Watt Avenue, with a greater emphasis placed on flows at Nimbus Dam. Aerial redd surveys conducted by CDFG in recent years have shown that 98 percent of all fall-run Chinook salmon spawning occurs upstream of Watt Avenue, with 88 percent of spawning occurring upstream of RM 17 (located just upstream of Ancil Hoffman Park). Hence, the majority of spawning occurs in the approximate 6 miles below Nimbus Dam.

The 70-year average flows below Nimbus Dam under the Downstream Diversion Alternative would generally be equivalent to those under the existing condition during all months of the October through February period. Differences in simulated 70-year average Nimbus Dam flows during the October through February period would range

from an increase of two cfs (<0.1 percent) in October to a decrease of 21 cfs (0.5 percent) in January. In addition, changes in 70-year average flows under the Downstream Diversion Alternative, for each month of the October through February period, are generally equivalent at Watt Avenue as those reported above for Nimbus Dam (Appendix C, Fish Flows, Nimbus Dam and Watt Avenue).

Analytical interpretation of probability of occurrence data (i.e., exceedance) inherently incorporates elements of risk assessment, including the probability of an event occurring, and the magnitude of the effect if that event were to occur. For example, a flow reduction of 500 cfs when flows were 2,500 cfs may have a similar probability of occurrence as a 500 cfs reduction when flows under the existing condition were 1,000 cfs; however, the magnitude of effect of the latter situation would be more severe, particularly when considering that the existing condition flows could already be limiting habitat availability.

Flow exceedance curves for the October through February period illustrate that the cumulative probability distribution of flows under the Downstream Diversion Alternative would be equivalent to that under the existing condition during most years (Appendix C, Fish Flows Exceedance, Nimbus Dam). Reductions in flows below 2,000 cfs could reduce the amount of available Chinook salmon spawning habitat, which could result in increased redd superimposition during years when adult returns are high enough for spawning habitat to be limiting. Flow reductions anticipated to occur would not reduce the probability that mean monthly flows below Nimbus Dam during the October through February period would be 2,000 cfs or higher. However, flow reductions of one to seven percent could occur at Nimbus Dam during a few years under the Downstream Diversion Alternative when flows under the existing condition would be below 2,000 cfs. During the month of January, this could occur during one individual year with flow reductions greater than seven percent. Flow reductions at Watt Avenue under the Downstream Diversion Alternative would be similar to those reported for Nimbus Dam, when flows under the existing condition are already below 2,000 cfs (Appendix D, Nimbus Dam and Watt Avenue Flows).

These findings indicate that, during the October through February period (when the majority of fall-run Chinook salmon spawning occurs annually), the Downstream Diversion Alternative could slightly reduce flows at Nimbus Dam and Watt Avenue in a few years when flows under the existing condition would already be below 2,000 cfs. Flow reductions below 2,000 cfs could reduce the amount of available Chinook salmon spawning habitat, which could result in increased redd superimposition during years when adult returns are high enough for spawning habitat to be limiting.

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

Under the Downstream Diversion Alternative, the 69-year average water temperatures would be the same as those under the existing condition during the October through February period at Nimbus Dam and at Watt Avenue (Appendix C, Fish Temps, Nimbus Dam and Watt Avenue).

Monthly water temperatures at Watt Avenue would increase measurably (0.3°F or more) during four years in October. Monthly water temperatures at Nimbus Dam would increase measurably (0.3°F or more) in four years during October and one year during November of the 69 years modeled for each month, relative to the existing condition (Appendix D, Nimbus Dam and Watt Avenue Flows). Mean monthly river temperatures at Nimbus Dam would be less than 56°F in all 69 years modeled, during each month of the November through February period.

Water temperature exceedance curves further illustrate that the water temperature cumulative probability distribution under the Downstream Diversion Alternative would be essentially equivalent to that under the existing condition during the October through February period at both Nimbus Dam and Watt Avenue (Appendix C, Fish Temps Exceedance, Nimbus Dam and Watt Avenue).

Finally, the 69-year average annual early life stage survival (percent survival of emergent fry from egg potential) for fall-run Chinook salmon would be 84.9 percent under both the existing condition and the Downstream Diversion Alternative. Substantial increases or decreases in survival would not occur in any individual year of the 69-year period of record (Appendix D, Lower American River Salmon Survival).

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

The 70-year average flows below Nimbus Dam under the Downstream Diversion Alternative would be reduced by less than 0.5 percent relative to the existing condition during the December through March period. Differences in simulated 70-year average Nimbus Dam flows during the December through March period would range from an increase of three cfs (0.1 percent) to a decrease of 21 cfs (0.5 percent). In addition, changes in 70-year average flows under the Downstream Diversion Alternative, for each month of the December through March period, are generally equivalent at Watt Avenue as those reported above for Nimbus Dam (Appendix C, Fish Flows, Nimbus Dam and Watt Avenue).

Long-term average water temperature under the Downstream Diversion Alternative would be essentially equivalent (i.e., within 0.1°F) to that under the existing condition over the 69-year period of record during December through March. Under the Downstream Diversion Alternative, the number of years that mean monthly water temperatures below Nimbus Dam and at Watt Avenue exceed 56°F would be the same as the existing condition during the December through March period (Appendix C, Fish Temps, Nimbus Dam and Watt Avenue).

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

The majority of juvenile salmonid rearing is believed to occur upstream of Watt Avenue, and depletions (primarily diversions) generally exceed tributary accretions to the river throughout the March through June period (generally resulting in lower flows at Watt Avenue than at Nimbus Dam). Therefore, all flow-related impact assessments for

juvenile fall-run Chinook salmon and steelhead rearing are based on flows at Watt Avenue.

Under the Downstream Diversion Alternative, the 70-year average flow at Watt Avenue would be essentially equivalent (within 0.2 percent) to that under the existing condition in all months of the March through June period (Appendix C, Fish Flows, Watt Avenue).

Individual monthly flows over the period of record under the Downstream Diversion Alternative would decrease by 10 percent or more, relative to the existing condition, in one of the 280 individual months (less than one percent) included in the analysis for the March through June period. However, individual monthly flows over the period of record under the Downstream Diversion Alternative would increase by 10 percent or more, relative to the existing condition, in one of the 280 individual months (less than one percent) included in the analysis for the March through June period. Therefore, there would be no change in the net number of individual months in which the flows under the Downstream Diversion Alternative would be decreased by 10 percent or more, relative to the existing condition in the 280 individual months included in the analysis (Appendix D, Watt Avenue Flows).

The probability of mean monthly flows exceeding the different flow objectives included in the AFRP for this period would not change substantially, if at all, during the March through June period (Appendix C, Fish Flows, Watt Avenue). Flow cumulative probability distribution curves further illustrate that flow exceedance at Watt Avenue under the Downstream Diversion Alternative would be essentially equivalent to that under the existing condition during all months of the March through June period (Appendix C, Fish Flows Exceedance, Watt Avenue).

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

Modeling for the Downstream Diversion Alternative indicates that the 69-year average water temperature at Watt Avenue would not change during any month of the March through June period, compared to the existing condition (Appendix C, Fish Temps, Watt Avenue). Measurable water temperature increases (0.3°F or more) would occur in one year of the 69-year period of record for the month of March, and two years in June. No measurable increases would occur in any individual year of the 69-year period of record during the months of April and May (Appendix D, Watt Avenue Temperature). Water temperature cumulative probability distribution curves further illustrate that resulting Watt Avenue cumulative distribution of water temperatures under the Downstream Diversion Alternative would be essentially equivalent to that under the existing condition during the March through June period (Appendix C, Fish Temps Exceedance, Watt Avenue).

The minor water temperature changes discussed above for the March through June period also would not affect juvenile fall-run Chinook salmon and steelhead emigration upstream of Watt Avenue. Water temperature-related impacts to fish emigrating through the lower river (downstream of Watt Avenue) are assessed below, based on water temperatures at the mouth.

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

The primary period of juvenile fall-run Chinook salmon emigration occurs from February into June, with the majority of juvenile steelhead emigration occurring during this same period. Generally little, if any, emigration occurs during July and August. Flow-related impacts to salmonid immigration (discussed above) addressed flow changes in February and March. Any changes in flows under the Downstream Diversion Alternative during February and March would not adversely affect juvenile fall-run Chinook salmon or steelhead emigration. Hence, this discussion focuses primarily on the April through June period of the year.

Adequate flows for emigration from the portion of the lower American River above Watt Avenue would be met by flows that were previously discussed (see discussions regarding juvenile rearing). Flows at the lower American River mouth are used to assess potential flow-related impacts to salmonid emigration through the lower river (below Watt Avenue).

Under the Downstream Diversion Alternative, the simulated 70-year average flow at the mouth would increase slightly (i.e., up to 0.2 percent) during the months of March, April and June, and remain the same for May, relative to the existing condition (Appendix C, Fish Flows, Lower American River Mouth). Individual monthly flows over the period of record under the Downstream Diversion Alternative would decrease by 10 percent or more, relative to the existing condition, in one of the 350 individual months (less than one percent) included in the analysis for the February through June period. However, individual monthly flows over the period of record under the Downstream Diversion Alternative would increase by 10 percent or more, relative to the existing condition, in two of the 350 individual months (less than one percent) included in the analysis for the February through June period. Therefore, the net number of individual months in which the flows under the Downstream Diversion Alternative would be increased by 10 percent or more, relative to the existing condition, would be one out of the 280 individual months (less than one percent) included in the analysis (Appendix D, Lower American River Mouth Flows). High flows and increased turbidity have been reported to be associated with higher rates of downstream juvenile emigration. However, much of this information comes from findings associated with large pulse flows following significant precipitation events, not relatively small changes in flow on the order of 10 to 20 percent. High flow and turbidity levels, although believed to potentially trigger emigration events, are not necessary for successful emigration of a salmonid year-class from the river. In fact, emigration surveys conducted by CDFG have shown no direct relationship between peak emigration of juvenile Chinook salmon and peak spring flows (Snider et al., 1997). Moreover, emigrating fish are more likely to be adversely affected by events when flows are high and then ramp down quickly (resulting in isolation and stranding).

Water Temperature-related Impacts to Juvenile Fall-run Chinook Salmon and Steelhead Emigration (February through June)

With the possible exception of a small percentage of fish that may rear near the mouth of the lower American River, impacts of water temperatures at the mouth to fall-run Chinook salmon and steelhead would be limited to the time that it takes emigrants to pass through the lower portion of the river and into the Sacramento River en route to the Delta (up to several days). Water temperatures near the mouth during the primary emigration period (February into June) are often largely affected by intrusion of Sacramento River water, which is not accounted for by Reclamation's lower American River Water temperature Model. Consequently, actual water temperatures near the mouth would be likely somewhere between water temperatures modeled for the mouth, and water temperatures modeled for the Sacramento River at Freeport (RM 46), located 14 miles downstream of the lower American River confluence. For this reason, the 69-year average water temperatures for each month are discussed for both of these locations.

The 69-year average water temperatures expected to occur at the mouth under the Downstream Diversion Alternative during the February through June period would be the same as water temperatures under existing conditions (Appendix C, Fish Temps, Lower American River Mouth and Freeport). Measurable increases in water temperature (0.3°F or more) at the mouth would occur in two years during June under the Downstream Diversion Alternative, relative to the existing condition. Measurable water temperature increases would not occur in any individual year at the mouth during February through May. Likewise, measurable water temperature increases would not occur in any individual year of the February through June period at Freeport (Appendix D, Lower American River Mouth and Freeport Temperatures).

Flow-related Impacts to Juvenile Steelhead Rearing (July through February)

Juvenile steelhead are believed to rear in the lower American River year-round. The majority of juvenile salmonid rearing is believed to occur upstream of Watt Avenue; therefore, all flow-related impact assessments for juvenile steelhead rearing are based on flows at Nimbus Dam and Watt Avenue.

Under the Downstream Diversion Alternative, the 70-year average flow at Nimbus Dam would remain essentially equivalent to that under the existing condition for the July through February period. Differences in simulated 70-year average Nimbus Dam flows during the July through February period would range from an increase of six cfs (0.2 percent) to a decrease of 21 cfs (0.5 percent). These results are essentially the same at Watt Avenue (Appendix C, Fish Flows, Nimbus Dam and Watt Avenue).

Flow cumulative probability distribution curves further illustrate that flows exceedances at Nimbus Dam and Watt Avenue during the months of July through February under the Downstream Diversion Alternative would be essentially equivalent to those under the existing condition (Appendix C, Fish Flows Exceedance, Nimbus Dam and Watt Avenue).

Based on these findings, flow reductions under the Downstream Diversion Alternative would not be expected to reduce the quality and/or quantity of juvenile steelhead rearing habitat during July through February, relative to that which would occur under the existing condition. However, steelhead populations in the lower American River are believed to be limited by instream water temperature conditions during the July through February period, not flows.

Water Temperature-related Impacts to Juvenile Steelhead Rearing (July through February)

Juvenile steelhead are believed to rear in the lower American River year-round. However, water temperature is not believed to be a limiting factor during the November through February period, when water temperatures are generally cool under both the Proposed Action/Proposed Project and the existing condition. Therefore, the water temperature-related impact assessment for juvenile steelhead rearing focuses on the July through September period. Furthermore, the majority of juvenile salmonid rearing is believed to occur upstream of Watt Avenue; therefore, all water temperature-related impact assessments for juvenile steelhead rearing are based on water temperatures at Nimbus Dam and Watt Avenue.

Water temperature-related impacts to juvenile steelhead rearing have been performed for the July through September period. Water temperature modeling indicates that the 69-year average water temperatures under the Downstream Diversion Alternative at Nimbus Dam and Watt Avenue would be essentially equivalent during all months of the July through September period, relative to those under the existing condition (Appendix C, Fish Temps, Nimbus Dam and Watt Avenue).

Measurable water temperature increases (0.3°F or more) would occur at Nimbus Dam under the Downstream Diversion Alternative during two years in July, one year in August, one year in September, four years in October and one year in November over the 69-year period of record modeled for each month. Measurable water temperature increases would occur at Watt Avenue during one year in August, one year in September, and four years in October over the 69-year period of record modeled for each month (Appendix D, Nimbus Dam and Watt Avenue Temperatures).

Water temperature cumulative probability distribution curves further illustrate that the exceedances of water temperatures under the Downstream Diversion Alternative would generally be equivalent to those under the existing condition during the July through September period (Appendix C, Fish Temps Exceedance, Nimbus Dam and Watt Avenue) at Nimbus Dam and Watt Avenue.

Summary of Potential Impacts on Fall-run Chinook Salmon and Steelhead in the Lower American River Under the Downstream Diversion Alternative

In summary, potential changes in flow in the lower American River under the Downstream Diversion Alternative during September through March would not be of sufficient frequency and magnitude to adversely affect adult fall-run Chinook salmon and steelhead homing or immigration. Similarly, fluctuations in flows under the Downstream Diversion Alternative during October through February would not be of sufficient frequency and magnitude to adversely affect fall-run Chinook salmon or

steelhead spawning and egg incubation. Changes in flow that would occur under the Downstream Diversion Alternative during the March through June period would not be of sufficient frequency and magnitude to adversely affect juvenile fall-run Chinook salmon or steelhead rearing. Similarly, changes in flow that would occur under the Downstream Diversion Alternative during the February through June period would not be of sufficient frequency and magnitude to adversely affect juvenile fall-run Chinook salmon or steelhead emigration. Lastly, potential changes in flow in the lower American River under the Downstream Diversion Alternative during July through February would not be of sufficient frequency and magnitude to adversely affect steelhead rearing.

Changes in water temperature in the lower American River under Downstream Diversion Alternative during September through March would not be of sufficient frequency and magnitude to adversely affect adult fall-run Chinook salmon and steelhead homing or immigration. Similarly, changes in water temperature under the Downstream Diversion Alternative during October through February would not be of sufficient frequency and magnitude to adversely affect fall-run Chinook salmon or steelhead spawning and egg incubation. Changes in water temperature that would occur under the Downstream Diversion Alternative during the March through June period would not be of sufficient frequency and magnitude to adversely affect juvenile fall-run Chinook salmon or steelhead rearing. Similarly, potential changes in water temperature that would occur under the Downstream Diversion Alternative during the February through June period would not be of sufficient frequency and magnitude to adversely affect juvenile fall-run Chinook salmon or steelhead emigration. Lastly, potential changes in water temperature in the lower American River under the Downstream Diversion Alternative during July through February would not be of sufficient frequency and magnitude to adversely affect steelhead rearing.

Overall, the potential changes in flow and water temperature in the lower American River under the Downstream Diversion Alternative, relative to the existing condition, would not be of sufficient frequency and magnitude to adversely affect fall-run Chinook salmon or steelhead. Therefore, impacts on fall-run Chinook salmon and steelhead in the lower American River with implementation of the Downstream Diversion Alternative, relative to the existing condition would be less than significant.

Impacts on American Shad

Potential changes in lower American River flows that could be expected to occur during May and June under the Downstream Diversion Alternative have been discussed previously under impact discussions for fall-run Chinook salmon and steelhead. In addition to that evaluation, further analysis was performed to determine the probability that lower American River flows at the mouth would be less than 3,000 cfs, a flow level identified by CDFG as that which would be sufficient to maintain the sport fishery. Under the Downstream Diversion Alternative, there are no additional occurrences in which monthly flows would be below the 3,000 cfs attraction flow at the mouth, relative to the existing condition (Appendix D, Lower American River Mouth Flows). Because American shad spawn opportunistically where suitable conditions are found, potentially attracting fewer adult spawners into the lower American River in a few years would not be expected to adversely impact annual American shad production within the

Sacramento River system. Flow reductions under the Downstream Diversion Alternative in May and June could potentially reduce the number of adult shad attracted into the river during a few years. Because annual production of American shad within the Sacramento River system would not be affected, and because direct impacts to the lower American River sport fishery would be less than substantial in most years, any flow-related impacts to American shad would be less than significant.

The number of years that individual month water temperatures at Nimbus Dam would be within the reported preferred range for American shad spawning of 60°F to 70°F, would decrease by one year (one percent less often) in May and would increase by one year under the Downstream Diversion Alternative in June, relative to the existing condition (Appendix D, Nimbus Dam Temperature). Additionally, at the mouth, the number of years that individual month water temperatures would be within the reported preferred range for American shad spawning would remain unchanged in May, and would decrease by one year (one percent less often) in June, relative to the existing condition (Appendix D, Lower American River Mouth Temperatures). Because the frequency with which suitable water temperatures for American shad spawning would not differ substantially between the Downstream Diversion Alternative and the existing condition, and because river water temperatures would nearly always remain suitable for American shad rearing, water temperature-related impacts to American shad also are considered to be less than significant. Overall, potential impacts to American shad associated with implementation of the Downstream Diversion Alternative would be less than significant, relative to the existing condition.

Impacts on Striped Bass

Changes in lower American River flows that could be expected to occur during May and June under the Downstream Diversion Alternative have been discussed previously under impact discussions for fall-run Chinook salmon and steelhead. In addition to that analysis, further analysis was performed to determine the probability that lower American River flows at the mouth would be less than 1,500 cfs, a flow level identified by CDFG as that which would be sufficient to maintain the sport fishery. Under the Downstream Diversion Alternative, monthly flows in the lower American River would not be less than 1,500 cfs at the mouth during any individual years for the months of May and June, relative to the existing condition (Appendix D, Lower American River Mouth Flows). Because flows at the mouth that are believed to be sufficient to maintain the striped bass fishery would be met or exceeded in most years during both May and June, and because substantial changes in the strength of the striped bass fishery would not be expected to occur in all years when mean May and/or June flows fall below 1,500 cfs, flow-related impacts to the striped bass fishery that could potentially occur under the Downstream Diversion Alternative would be less than significant.

The number of years that individual month water temperatures at Nimbus Dam would be within the reported preferred range for juvenile striped bass rearing of 61°F to 73°F under the Downstream Diversion Alternative, relative to the existing condition, would increase by one year (one percent more often) in May, and remain unchanged in June. The number of years that individual month water temperatures would be within this range at the mouth would decrease by two years in May, and one year in June, relative

to the existing condition (Appendix D, Nimbus Dam and Lower American River Mouth Temperatures). Because the frequency with which suitable water temperatures for juvenile striped bass rearing in the lower American River would differ little between the Downstream Diversion Alternative and the existing condition during May and June, water temperature-related impacts to juvenile striped bass rearing also are considered to be less than significant. Overall, potential impacts associated with implementation of the Downstream Diversion Alternative to striped bass would be less than significant, relative to the existing condition.

Sacramento-San Joaquin Delta

Delta outflow is considered to have a substantial effect on a number of fish species relying on Delta habitats for one or more of their life stages. Reductions in the 70-year average Delta outflow of up to approximately 0.3 percent could occur under the Downstream Diversion Alternative, relative to the existing condition. However, with regard to Delta outflow, the period of February through June is believed to be of greatest concern for potential effects to spawning and rearing habitat, and downstream transport flows for delta smelt, longfin smelt, striped bass, salmonids, and other aquatic species in the Delta. Changes in 70-year average Delta outflow under the Downstream Diversion Alternative would not exceed 0.1 percent during the February through June period. Reductions in Delta outflow of more than 1.1 percent under the Downstream Diversion Alternative, relative to the existing condition, would never occur in any individual year during the February through June period (Appendix D, Delta Outflow).

Under the Downstream Diversion Alternative, there would not be an upstream shift in the 70-year average position of X2, relative to the 70-year average monthly position under the existing condition. Furthermore, during the February through June period, considered an important period for spawning, rearing, and emigration for various fish species, upstream shifts in the position of X2 of more than 0.1 km would not occur in any individual year. In fact, maximum upstream shifts in the position of X2 for any individual year would be well below 1 km during all months of the February through June period (Appendix D, Delta X2).

In addition, it should be noted that the model simulations conducted for the Downstream Diversion Alternative included conformance with the export requirements set forth in SWRCB Water Rights Decision No. 1641, as well as Interior's Final Administrative Proposal for the Management of 3406(b)(2) Water. Modeling output also showed that the Delta export-to-inflow ratios under the Downstream Diversion Alternative would not exceed the maximum export limits for either the February through June (35 percent of Delta inflow) or the July through January period (65 percent of Delta inflow) as set by SWRCB Water Rights Decision No. 1641 (Appendix C, Fish Delta, E/I Ratio). Overall, impacts to Delta fish populations associated with implementation of the Downstream Diversion Alternative would be less than significant, relative to the existing condition.

NO ACTION/NO PROJECT ALTERNATIVE

Given that any actions associated with the No Action/No Project Alternative are essentially synonymous with existing conditions, and the hydrology of the CVP/SWP would be the same under both conditions, there are no anticipated adverse fisheries

impacts associated with the No Action/No Project Alternative, relative to the existing condition.

5.4.2.2. Riparian Resources

CITY SERVICE AREA IMPACTS

Previous discussions regarding the City/USFWS MOU have described the manner with which riparian resources would be accommodated through collaborative planning. Similar long-term benefit also would accrue from the pending City/NMFS MA, including the City's commitment to prepare a Creek and Riparian Management and Restoration Plan (scheduled for City Council approval on June 1, 2005) through its CALFED grant. With no anticipated direct changes to land use designations, land use, or proposed facility or construction projects, no new impacts to riparian resources are expected beyond those previously disclosed in individual specific plan EIRs as a result of the Proposed Action/Proposed Project.

DIVERSION RELATED IMPACTS

Proposed Action/Proposed Project

Reservoirs

Relative to the existing condition, the Proposed Action/Proposed Project would result in minor and insignificant changes in reservoir storage. Similarly, changes in reservoir water surface elevation vary little, if at all, between the Proposed Action/Proposed Project and existing condition. It is unlikely, therefore, that shoreline vegetation or vegetation near the water surface would be affected by the Proposed Action/Proposed Project.

Sacramento River

A decrease in mean monthly flows during the spring and summer months (i.e., growing season for riparian vegetation) could potentially affect riparian habitat types. Based on modeling output, mean monthly flows in the Sacramento River would not be reduced by a significant magnitude (i.e., up to 0.2 percent) or in substantial frequency under the Proposed Action/Proposed Project during the critical growth and establishment period of March through June, or during the remainder of the growing season from July to October, relative to the existing condition (Appendix B, Keswick Release and Freeport Flow). Less-than-significant impacts to riparian vegetation as a result of the Proposed Action/Proposed Project are anticipated.

Lower Feather River

The critical growing season for riparian vegetation within this region occurs during the months of March though October. Under the Proposed Action/Proposed Project, Feather River mean monthly flows were similar for each month of the critical growing season, relative to the existing condition, over the 70-year period of record. The differences in mean monthly flows ranged from a decrease of two cfs (0.1 percent) to an increase of eight cfs (0.3 percent) (Appendix A, SWP, Feather River Flow). These

differences in flow would not be of enough magnitude to significantly effect riparian vegetation, therefore, potential impacts to lower Feather River riparian vegetation would be less than significant.

Lower American River

Hydrologic modeling results for mean monthly flows in the American River at H Street were used to evaluate the potential impacts of the Proposed Action/Proposed Project. During the months of March through June, existing condition flows drop below the 3,000 cfs threshold in 45 percent of the time (or 126 months) of the 70-year period of record. Under the Proposed Action/Proposed Project, flows would be expected to drop below this threshold in one additional month (Appendix B, H Street Flow). This less than 0.4 percent change, relative to the existing condition, represents a less than significant impact to the optimal conditions of riparian vegetation in the lower American River.

During the July through October period, when the lower American River flow threshold for riparian vegetation is 1,765 cfs, existing condition flows below H Street would be below the threshold 33 percent of the time (or 92 months) of the 70-year period of record. Under the Proposed Action/Proposed Project, flows would be expected to drop below this threshold in three additional months (Appendix B, H Street Flow). This less than one percent change, relative to the existing condition, similarly represents a less than significant impact to riparian vegetation during this period.

For backwater pond recharge, existing condition flows during the March through June period below H Street are below the 2,700 cfs ARWRI Fish and Wildlife Coordination Act minimum recharge threshold in 112 months (or 40 percent of the time) over the 70-year period of record. Under the Proposed Action/Proposed Project, flows would be below this threshold in four additional months, relative to the existing condition (Appendix B, H Street Flow). This less than two percent increase in the number of months that flows at H Street would be below this threshold represents a less than significant impact to backwater pond recharge potential.

For backwater ponds farthest from the river, existing condition mean monthly flows below 4,000 cfs (the threshold for recharge of distant backwater ponds) occur in 186 months (or 66 percent of the time). Under the Proposed Action/Proposed Project, mean monthly flows would be below this threshold in one additional month (Appendix B, H Street Flow). This change (between the Proposed Action/Proposed Project and existing condition) indicates that the Proposed Action/Proposed Project would have no impact on the recharge of those backwater ponds farthest from the lower American River.

Sacramento-San Joaquin Delta

Under the Proposed Action/Proposed Project, Sacramento River mean monthly flows at Freeport were similar for each month of the critical growing season (i.e., March through June), relative to the existing condition, over the 70-year period of record. For the March through June period, the maximum difference in 70-year mean monthly flows was 28 cfs. For the remainder of the growing season spanning from July through October, the maximum difference in 70-year mean monthly flows was 19 cfs. These

flow differences, relative to the existing condition, represented changes in flow of less than 0.2 percent (Appendix B, Freeport Flow). These differences in flow would not be of enough magnitude to significantly effect riparian vegetation and, therefore, potential impacts to Delta riparian vegetation would be less than significant.

Downstream Diversion Alternative

Reservoirs

Relative to the existing condition, the Downstream Diversion Alternative would result in minor and insignificant changes in reservoir storage. Similarly, changes in reservoir water surface elevation vary little, if at all, between this alternative and existing condition. It is unlikely, therefore, that shoreline vegetation or vegetation near the water surface would be affected by the Downstream Diversion Alternative.

Sacramento River

A decrease in mean monthly flows during the spring and summer months (i.e., growing season for riparian vegetation) could potentially affect riparian habitat types. Based on modeling output, mean monthly flows in the Sacramento River would not be reduced by a significant magnitude (i.e., up to 0.4 percent) or at a substantial frequency under the Downstream Diversion Alternative during the critical growth and establishment period of March through June, or during the remainder of the growing season from July to October, relative to the existing condition (Appendix D, Keswick Release and Freeport Flow). Less-than-significant impacts to riparian vegetation as a result of the Downstream Diversion Alternative are expected.

Lower Feather River

The critical growing season for riparian vegetation within this region occurs during the months of March though October. Under the Downstream Diversion Alternative, Feather River mean monthly flows were similar for each month of the critical growing season, relative to the existing condition, over the 70-year period of record. The differences in mean monthly flows ranged from a decrease of five cfs (0.1 percent) to an increase of 18 cfs (0.6 percent) (Appendix C, SWP, Feather River Flow). These differences in flow would not be of enough magnitude to significantly effect the riparian vegetation and, therefore, potential impacts to lower Feather River riparian vegetation would be less than significant.

Lower American River

Hydrologic modeling results for monthly flows in the American River at H Street were used to evaluate the potential impacts of the Downstream Diversion Alternative. During the months of March through June, existing condition flows drop below the 3,000 cfs threshold in 45 percent of the time (or 126 months) of the 70-year period of record. Under the Downstream Diversion Alternative, flows would be expected to drop below this threshold in exactly the same number of months, relative to the existing condition (Appendix D, H Street Flow). Accordingly, no impacts to the optimal conditions of

riparian vegetation in the lower American River would occur under the Downstream Diversion Alternative during this time period.

During the July through October period, when the lower American River flow threshold for riparian vegetation is 1,765 cfs, existing condition flows below H Street would be below the threshold 33 percent of the time (or 92 months) of the 70-year period of record. Under the Downstream Diversion Alternative flows would be expected to drop below this threshold in one additional month, representing a less than one percent change, relative to the existing condition (Appendix D, H Street Flow). Accordingly, this change would result in a less than significant impact on the optimal conditions of riparian vegetation in the lower American River.

For backwater pond recharge, existing condition flows during the March through June period below H Street are below the 2,700 cfs ARWRI Fish and Wildlife Coordination Act minimum recharge threshold in 112 months (or 40 percent of the time) over the 70-year period of record. Under the Downstream Diversion Alternative, flows would be identical to the existing condition (Appendix D, H Street Flow). Accordingly, no impacts to backwater pond recharge potential would occur under this alternative.

For backwater ponds farthest from the river, existing condition mean monthly flows below 4,000 cfs (the threshold for recharge of distant backwater ponds) occur in 186 months (or 66 percent of the time). Under the Downstream Diversion Alternative, mean monthly flows would be below this threshold in an identical number of months (Appendix D, H Street Flow). Accordingly, this alternative would have no impact on the recharge of those backwater ponds farthest from the lower American River.

Sacramento-San Joaquin Delta

Under the Downstream Diversion Alternative, Sacramento River mean monthly flows at Freeport were similar for each month of the critical growing season (i.e., March through June), relative to the existing condition, over the 70-year period of record. For the March through June period, the maximum difference in 70-year mean monthly flows was 38 cfs. For the remainder of the growing season spanning from July through October, the maximum difference in 70-year mean monthly flows was 57 cfs. These flow differences, relative to the existing condition, represent changes in flow of less than 0.4 percent (Appendix D, Freeport Flow). These differences in flow would not be of enough magnitude to significantly effect riparian vegetation and, therefore, potential impacts to Delta riparian vegetation would be less than significant.

NO ACTION/NO PROJECT ALTERNATIVE

The hydrology assumed under the existing condition is identical to that assumed under the No Action/No Project Alternative. From the perspective of system-wide modeling evaluation, there would be no impacts under the No Action/No Project Alternative, relative to the existing condition.

5.4.3. Mitigation Measures

Because all potential impacts on fish resources associated with both the Proposed Action/Proposed Project and Downstream Diversion Alternative are considered less than significant, no diversion related mitigation measures are recommended or necessary.

Because there are no significant impacts identified for riparian vegetation under the Proposed Action/Proposed Project, Downstream Diversion Alternative, or No Action/No Project Alternative, no diversion related mitigation measures are necessary or recommended. For the City service area, as discussed previously, the existing mitigation requirements contained in individual specific plan EIRs, the City/USFWS MOU, the City/NMFS MA, and final adoption of the City's Creek and Riparian Management and Restoration Plan would collectively avoid, or otherwise provide the mechanism for which mitigation measures, as necessary, would be implemented in the future.

5.5. Cultural Resources

Criteria for defining significant cultural resources are stipulated in the National Historic Preservation Act (NHPA) and CEQA. The NHPA defines a significant cultural property as one, which is eligible for listing on the National Register of Historic Places (NRHP). Eligible properties are those which "(a)…are associated with events that have made a significant contribution to the broad patterns of our history; or (b) that are associated with the lives of persons significant in our past; or (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (d) that have yielded, or may be likely to yield, information important in prehistory or history" (36 CFR 60.4).

It is usually necessary to identify, based on previous scientific studies, research issues which are important to an understanding of the regional history or prehistory, and to determine whether a particular cultural resource contains information which may help to address these issues; a resource which does contain such information is considered significant and, therefore, eligible for NHRP. In practice, and under regulation, unevaluated resources are treated as potentially significant.

CEQA requires that *important* cultural resources be protected. The CEQA Guidelines define an important resource as one listed on, or eligible for listing on, the California Register of Historical Resources (PRC Section 5024). Resources that are found to be eligible for the Register "are to be protected from substantial adverse change." Such change is defined in Section 5020.1 as demolition, destruction, relocation, or alteration activities that would impair historical significance; one example would be "remodeling a historic structure in such a way that its distinctive nature is altered" (OPR, 1994).

Adverse effects can occur when prehistoric or historical archaeological sites, structures, or objects listed on, or eligible for listing on the NHRP are subject to any one of the following effects:

- physical destruction of all or part of the property;
- isolation of the property from the property's setting or alteration of the property's setting when that character contributes to the property's qualification for the NHRP;
- introduction of visual, audible, or atmospheric elements that are out of character with the property or 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)

From an aquatic resources perspective, many of the recorded cultural resources within the action area have been historically inundated by earlier projects. A large number of these sites lie submerged beneath the surface of Folsom Reservoir. Studies of reservoir impacts to cultural sites have shown that the most significant impacts result from wave action, which erode the deposit and move artifacts. Equally damaging is the potential for damage associated with cycles of inundation and drawdown, which also cause erosion and movement, in addition to repeated wetting and drying of the deposit (Foster, et al., 1977; Foster and Bingham, 1978; Henn and Sundahl, 1986; Lenihan, et al., 1981; Stoddard and Fredrickson, 1978; Ware, 1989).

These same studies suggest that sites that lie permanently submerged, for example, within the deep pool of a reservoir, suffer much less damage than those within the drawdown zone. For sites that already are submerged, continued submergence does not constitute an adverse effect. However, inundation to sites that lie above the present waterline (and that have not been subject to inundation before) potentially would represent an adverse effect.

5.5.1. City Service Area Impacts

With no anticipated direct changes to land use designations, land use, or proposed facility or construction projects, no new impacts to cultural resources resulting from implementation of the Proposed Action/Proposed Project or alternatives are expected beyond those previously disclosed in individual specific plan EIRs.

5.5.2. Diversion Related Impacts

This section presents an analysis of the potential impacts to cultural resources for the Proposed Action/Proposed Project and alternatives as a result of changes in the hydrological regime of the rivers and reservoirs within the action area. As discussed above, potential impacts to cultural resources within or adjacent to waterbodies and resulting from changing hydrologic regimes may include: (1) physical destruction by waves; (2) bank slumping caused by the formation of a new shoreline; and (3) development of a new zone of wetting-and-drying cycles (enhancing deterioration of some materials supporting cultural resources).

To evaluate potential impacts to cultural resources in and around reservoirs, PROSIM modeling was performed to determine the maximum increase and decrease in mean monthly water surface elevations for the existing condition and under CVP operations associated with implementation of the Proposed Action/Proposed Project. If the reservoir's water surface elevations rise above the current high water line, previously

exposed cultural resources near the shoreline could be inundated. Conversely, lower water surface elevations in the reservoir could expose cultural resources that were previously submerged. Additionally, and perhaps more significantly, if CVP/SWP operations associated with implementation of the Proposed Action/Proposed Project would result in a shift in the zone of fluctuation, cultural resources located within the zone also could be potentially affected through increased exposure to erosion, hydrologic sorting caused by wave action, and breakdown of organic matter through repeated wetting and drying.

5.5.2.1. Proposed Action/Proposed Project

SHASTA RESERVOIR, TRINITY RESERVOIR, AND THE UPPER SACRAMENTO RIVER

PROSIM modeling data indicate that for Shasta and Trinity reservoirs, maximum and minimum mean monthly water surface elevations would not significantly differ (i.e., increases in minimum water surface elevation of up to four feet) between the Proposed Action/Proposed Project and existing condition. Similarly, the frequency of inundation and drawdown events would be virtually identical (i.e., difference up to 0.2 percent) between the Proposed Action/Proposed Project and existing condition (Appendix A, Cultural, Shasta and Trinity Reservoir). Therefore, the Proposed Action/Proposed Project would have no significant effect on the cultural resources of these upstream reservoirs.

For the upper Sacramento River, as measured by flow releases at Keswick Dam, the largest mean monthly change in minimum flow between the Proposed Action/Proposed Project and existing condition would occur in September. Mean monthly flows would be less by 19 cfs (0.4 percent), relative to the existing condition (Appendix A, Cultural, Keswick). This magnitude of flow change is considered to represent imperceptible changes in the hydrology of the upper Sacramento River. Therefore, impacts to cultural resources along this stretch of the Sacramento River are expected to be less than significant.

LOWER SACRAMENTO RIVER

For the lower Sacramento River, the 70-year maximum and minimum mean monthly flows at Freeport were assessed by comparing the existing condition with CVP operations associated with implementation of the Proposed Action/Proposed Project. The lower Sacramento River is influenced in large part by tides; the relationship between river stage and discharge is affected by the diurnal influence of these tides.

Under the Proposed Action/Proposed Project, Sacramento River flows at Freeport differed slightly, if at all, from those under the existing condition. Maximum mean monthly flows decreased by 301 cfs (0.8 percent) for October. For the other 11 months, mean monthly flows were virtually identical (i.e., greatest change of 0.1 percent) with those under the existing condition. Minimum mean monthly flows showed more variability between the Proposed Action/Proposed Project and existing condition. The largest change was observed for the month of June where, the minimum mean monthly flow decreased 262 cfs (or 3.8 percent), relative to the existing condition (Appendix A, Cultural, Freeport). As discussed previously, however, it is likely that no significant sites

have survived within the riverbed itself. Lower flows, therefore, would not likely expose previously submerged (and intact) cultural resources.

These increments of change and the infrequency of their occurrence (i.e., limited only to one month) are unlikely to result in a noticeable and prolonged change in river stage. Therefore, they are unlikely to affect cultural resources. Moreover, the lower Sacramento River is bordered by levees that act to stabilize the riverbank during both low and high flows; this means that changes in river flows of the magnitude expected would not affect the adjacent riverbanks, where additional cultural sites might occur. Impacts to cultural resources along this stretch of the Sacramento River are expected to be less than significant.

OROVILLE RESERVOIR

Under the Proposed Action/Proposed Project, Oroville Reservoir mean end-of-month water surface elevations, based on average elevation, did not fluctuate by more than one foot for any month over the entire 70-year period of record, relative to the existing condition. The maximum mean monthly water surface elevations for the Proposed Action/Proposed Project and existing condition are identical. The minimum mean monthly water surface elevations decreased by up to one foot and increased by up to two feet under the Proposed Action/Proposed Project, relative to the existing condition (Appendix A, SWP, Oroville Reservoir). These differences, however, are considered less than significant.

LOWER FEATHER RIVER

Under the Proposed Action/Proposed Project, Feather River flows differed slightly, if at all, from those under the existing condition. Mean monthly flows increased by up to eight cfs (0.3 percent) in September. For the other 11 months of the year, mean monthly flows were virtually identical (i.e., greatest change of 0.1 percent) with those under the existing condition (Appendix A, SWP, Feather River Flow). These increments of change and the infrequency of their occurrence (i.e., limited only to one month) are unlikely to result in a noticeable and prolonged change in river stage, and are therefore unlikely to affect cultural resources. Impacts to cultural resources along the Feather River are expected to be less than significant.

FOLSOM RESERVOIR

Under the Proposed Action/Proposed Project, Folsom Reservoir mean end-of-month water surface elevations, based on average elevation, did not fluctuate by more than one foot for any month over the entire 70-year period of record, relative to the existing condition. The maximum mean monthly water surface elevations between the Proposed Action/Proposed Project and existing condition are virtually identical, with the only decrease occurring in the month of September (one foot). The minimum mean monthly water surface elevations also are virtually the same, except for the months of January and February, which showed mean minimum monthly elevation decreases of five and six feet, respectively, relative to the existing condition (Appendix A, Cultural, Folsom Reservoir).

The number of inundation and drawdown events (based on end-of-month water surface elevations) also varied insignificantly (i.e., changes up to 0.5 percent) under the Proposed Action/Proposed Project between the key elevations of water surface fluctuation (i.e., between 465-375 feet msl), relative to the existing condition (Appendix A, Cultural, Folsom Reservoir).

The modeling results indicate that CVP operations associated with implementation of the Proposed Action/Proposed Project would not result in inundation of previously exposed areas during any month of the 70-year period of record, compared to the existing condition (Appendix B, Folsom Reservoir Elevation). Changes in the hydrologic regime of Folsom Reservoir caused by the Proposed Action/Proposed Project, therefore, would not result in significant impacts to cultural resources.

LOWER AMERICAN RIVER

For the lower American River, the maximum and minimum mean monthly flows, as well as the relative change in average mean monthly flows over the 70-year hydrologic period of record, were compared between the existing condition and CVP operations associated with implementation of the Proposed Action/Proposed Project. In order to estimate the magnitude and frequency of bank exposure and bank inundation along the lower American River, two locations were assessed: Nimbus Dam and the river mouth (confluence with the Sacramento River).

A definitive stage/discharge relationship has never been developed for the entire range of flows occurring in the lower American River, though limited information does exist for very high (flood) flows. For this reason, it is difficult to quantify precisely the potential for exposure or inundation of cultural resources along the banks of the lower American River. Generally, however, it is accepted that higher water surface elevations occur under higher flows and lower water elevations occur under lower flows. A comparison of flows under the existing condition and under CVP operations associated with implementation of the Proposed Action/Proposed Project provides an estimate of the relative changes in river stage that could result.

Cultural Resources Along the Lower American River Bank Near Nimbus Dam

It is accepted that no significant sites have survived within the riverbed itself. Lower flows, therefore, would not expose previously submerged (and intact) significant cultural resources.

CVP operations associated with implementation of the Proposed Action/Proposed Project would result in maximum mean monthly river flows downstream of Nimbus Dam that are virtually identical to those under the existing condition (Appendix A, Cultural, Nimbus Dam). For the higher flow months (i.e., November through June), the maximum mean monthly releases at Nimbus Dam did not differ under the Proposed Action/Proposed Project, relative to the existing condition, by more than 173 cfs (0.9 percent). These flows indicate that no new areas of the riverbank would be inundated under the Proposed Action/Proposed Project. Therefore, the impacts to cultural resources along the river near Nimbus Dam from changes in river flows would be less than significant.

Cultural Resources Along the Lower American River Near the Mouth

CVP operations associated with implementation of the Proposed Action/Proposed Project would result in maximum and minimum mean monthly river flows at the mouth that differ only slightly from those under the existing condition (Appendix A, Cultural, Nimbus Dam). Maximum mean monthly river flows under CVP operations associated with implementation of the Proposed Action/Proposed Project would be slightly less than under the existing condition for each month of the higher flow months (November through June), indicating that no new areas of the riverbank would be inundated.

It is possible that historic-era (post-1869) shipwrecks lie beneath the silty river bottom near the confluence, and that very low river flows could expose these resources. However, the magnitude of the changes predicted under CVP operations associated with implementation of the Proposed Action/Proposed Project is so minor (i.e., 10 cfs) that this is highly unlikely (Appendix A, Cultural, Nimbus Dam). Known resources along the riverbank (two historic levees, a portion of the Natomas East Main Drainage Canal [CA-SAC-463H], and prehistoric mound CA-SAC-26) lie outside the present river channel, and decreases in river flows should have no effect on these resources.

Overall, effects to cultural resources along the lower American River from changes in river flows associated with implementation of the Proposed Action/Proposed Project would be less than significant**.**

5.5.2.2. Downstream Diversion Alternative

SHASTA RESERVOIR, TRINITY RESERVOIR, AND THE UPPER SACRAMENTO RIVER

Similar with the Proposed Action/Proposed Project, PROSIM modeling data indicate that for Shasta and Trinity reservoirs, maximum and minimum mean monthly water surface elevations would not differ significantly (i.e., changes of up to one foot) between the Downstream Diversion Alternative and existing condition. Similarly, the frequency of inundation and drawdown events would be virtually identical between this alternative and existing condition (Appendix C, Cultural, Shasta and Trinity Reservoir). This alternative would have no significant effect on the cultural resources in these upstream reservoirs.

For the upper Sacramento River, as measured by flow releases at Keswick Dam, the largest mean monthly change in flow between the Downstream Diversion Alternative and existing condition would occur in June and July. Mean monthly flows would be greater by 19 cfs (0.1 percent) and 22 cfs (0.1 percent) respectively, under the Downstream Diversion Alternative, relative to the existing condition (Appendix C, Cultural, Keswick). These magnitudes of flow changes are considered to represent imperceptible changes in the hydrology of the upper Sacramento River. Impacts to cultural resources along this stretch of the Sacramento River are expected to be less than significant.

LOWER SACRAMENTO RIVER

Under the Downstream Diversion Alternative, Sacramento River flows at Freeport differed slightly, from those under the existing condition. Maximum mean monthly flows decreased by 192 cfs (0.5 percent) for October. For the other 11 months, mean monthly flow changes were insignificant, when compared to those under the existing condition (Appendix C, Cultural, Freeport). Minimum mean monthly flows showed more variability between the Downstream Diversion Alternative and existing condition. The largest change was observed for the month of August where, the minimum mean monthly flow increased 229 cfs (3.1 percent), relative to the existing condition (Appendix C, Cultural, Freeport). As explained previously, the lower Sacramento River is bordered by levees that act to stabilize the riverbank during both low and high flows; this means that changes in river flows of the magnitude expected would not affect the adjacent riverbanks, where additional cultural sites might occur.

These increments of change and the infrequency of their occurrence are unlikely to result in a noticeable and prolonged change in river stage and are unlikely to affect cultural resources. Impacts to cultural resources along this stretch of the Sacramento River are expected to be less than significant.

OROVILLE RESERVOIR

Under the Downstream Diversion Alternative, Oroville Reservoir mean end-of-month water surface elevations, based on average elevation, did not fluctuate by more than one foot for any month over the entire 70-year period of record, relative to the existing condition. The maximum mean monthly water surface elevations for the Proposed Action/Proposed Project and existing condition are identical. The minimum mean monthly water surface elevations decreased by up to one foot under the Downstream Diversion Alternative, relative to the existing condition (Appendix C, SWP, Oroville Reservoir). These differences, however, are considered less than significant.

LOWER FEATHER RIVER

Under the Downstream Diversion Alternative, Feather River flows differed slightly from those under the existing condition. Mean monthly flows decreased by up to 15 cfs (0.5 percent) in November and increased by up to 18 cfs (0.6 percent) in September. For the other 10 months, mean monthly flows were virtually identical (i.e., greatest change of 0.3 percent) with those under the existing condition (Appendix C, SWP, Feather River Flow). These increments of change and the infrequency of their occurrence (i.e., limited only to one month) are unlikely to result in a noticeable and prolonged change in river stage and are, therefore, unlikely to affect cultural resources. Impacts to cultural resources along the Feather River are expected to be less than significant.

FOLSOM RESERVOIR

Under the Downstream Diversion Alternative, Folsom Reservoir mean end-of-month water surface elevations, based on average elevation, did not fluctuate by more than one foot for any month over the entire 70-year period of record, relative to the existing condition. The maximum mean monthly water surface elevations for the Downstream Diversion Alternative and existing condition are identical. The minimum mean monthly water surface elevations also are virtually the same except for the month of October,

which showed an increases in mean minimum monthly elevation of four feet, relative to the existing condition (Appendix C, Cultural, Folsom Reservoir). This difference, however, is considered a less than significant effect to cultural resources within the reservoir.

The number of inundation and drawdown events (based on end-of-month water surface elevations) also varied insignificantly between the key elevations of water surface fluctuation (i.e., between 465-375 feet msl), relative to the existing condition. The number of inundation and drawdown cycles increased by four months at the 375 feet msl elevation (where the inundation and drawdown threshold was crossed), relative to the existing condition (Appendix C, Cultural, Folsom Reservoir).

The modeling results indicate that CVP operations associated with implementation of the Downstream Diversion Alternative would not result in significantly increased inundation of previously exposed areas during any month of the 70-year period of record, compared to the existing condition. Changes in the hydrologic regime of Folsom Reservoir with implementation of the Downstream Diversion Alternative, therefore, would not result in significant impacts to cultural resources.

LOWER AMERICAN RIVER

Cultural Resources Along the Lower American River Bank Near Nimbus Dam

It is accepted that no significant sites have survived within the riverbed itself. Lower flows, therefore, would not expose previously submerged (and intact) significant cultural resources.

CVP operations associated with implementation of the Downstream Diversion Alternative would result in maximum mean monthly river flows downstream of Nimbus Dam that are virtually identical to those under the existing condition. For the higher flow months (i.e., November through June), the maximum mean monthly releases at Nimbus Dam did not differ under the Downstream Diversion Alternative, relative to the existing condition, by more than 45 cfs (0.2 percent) (Appendix C, Cultural, Nimbus Dam). No new areas of the riverbank would be inundated at these flows under the Downstream Diversion Alternative. Therefore, the impacts to cultural resources along the river near Nimbus Dam from changes in river flows would be less than significant.

Cultural Resources Along the Lower American River Near the Mouth

CVP operations associated with implementation of the Downstream Diversion Alternative would result in maximum mean monthly river flows at the mouth that differ only slightly from those under the existing condition. Minimum mean monthly flows would be identical. Maximum mean monthly river flows under the Downstream Diversion Alternative would be slightly more than those under the existing condition for December of the higher flow months (November through June). Maximum mean monthly flows in December would be 45 cfs higher (0.2 percent), relative to the existing condition (Appendix C, Cultural, Mouth). Such flow magnitudes and frequencies indicate that no significant new areas of the riverbank would be inundated under the Downstream Diversion Alternative.

Similar with the Proposed Action/Proposed Project, it is possible that historic-era (post-1869) shipwrecks lie beneath the silty river bottom near the confluence, and that very low river flows could expose these resources. However, since the magnitude of the changes predicted under CVP operations associated with the implementation of the Downstream Diversion Alternative are immeasurable, relative to the existing condition, this alternative would not result in any additional risk of exposure (Appendix C, Cultural, Mouth). Known resources along the riverbank (two historic levees, a portion of the Natomas East Main Drainage Canal [CA-SAC-463H], and prehistoric mound CA-SAC-26) lie outside the present river channel, and decreases in river flows will have no effect on these resources.

Overall, effects to cultural resources along the lower American River from changes in river flows associated with implementation of the Downstream Diversion Alternative would be less than significant.

5.5.2.3. No Action/No Project Alternative

There would be no change in CVP operations or the resulting hydrological regime of the CVP/SWP under the No Action/No Project Alternative, relative to the existing condition. Identical hydrology and operations between this alternative and existing condition would result in no change or effect on cultural resources.

5.5.3. Mitigation Measures

With no anticipated impacts to cultural resources as a result of the Proposed Action/Proposed Project or alternatives, no mitigation measures are recommended. Programmatic mitigation measures contained in Specific Plan EIRs which address potential impacts to unknown subsurface cultural resources are implemented at the project-level, when and where individual projects are proposed and undergo their separate environmental reviews. In addition, mitigation measures developed for specific cultural or historic resources located within the City's service area, as contained in individual specific plan EIRs, would be implemented to ensure impacts to known resources are minimized to the greatest extent feasible.

5.6. GEOLOGY AND SOILS

5.6.1. City Service Area Impacts

The existing transitional formations and sedimentary depositional overburden that characterize the City's structural and surficial geologic environment would not be affected by implementation of the Proposed Action/Proposed Project. Similarly, the make-up, extent, and structural characteristics of soils within the City's service area, including designation of its current three soil mapping units, would likewise not be affected by implementation of the Proposed Action/Proposed Project.

5.6.2. Mitigation Measures

Because no impacts to the geology and soils within the City's service are anticipated to occur from implementation of the Proposed Action/Proposed Project or alternatives

beyond those previously disclosed in individual specific plan EIRs, no mitigation measures are necessary or recommended.

5.7. HAZARDOUS MATERIALS

5.7.1. City Service Area Impacts

A variety of state and federal laws currently exist that guide the City's hazardous material management framework including regulations for hazardous material cleanup, storage, testing procedures, and quantity reduction. The Proposed Action/Proposed Project, as a water delivery effort, would not affect the hazardous material management efforts of the City and, therefore, would have no impact on hazardous materials within the City service area.

5.7.2. Mitigation Measures

Because no new impacts to hazardous material management efforts or hazardous materials within the City service area are anticipated to occur from implementation of the Proposed Action/Proposed Project or alternatives beyond those previously disclosed in individual specific plan EIRs, no mitigation measures are necessary or recommended.

5.8. HYDROLOGY AND WATER SUPPLY

5.8.1. City Service Area Impacts

From a water supply perspective, the Proposed Action/Proposed Project, in and of itself, is intended to facilitate the acquisition of a long-term sustainable supply to meet the City's current and future anticipated approved growth. The Proposed Action/Proposed Project, as an in-City water supply action, cannot have impacts to itself.

5.8.2. Diversion Related Impacts

Potential impacts to water supply deliveries across the SWP and CVP resulting from the implementation of the Proposed Action/Proposed Project were identified and evaluated relative to the existing condition (current levels of demand). Impacts focused on changes to annual water deliveries to contractors within the CVP and SWP, and non-CVP American River water users.

5.8.2.1. Non-CVP American River Deliveries

Non-CVP American River water users would receive the same deliveries in all years under the existing condition and the Proposed Action/Proposed Project and alternative hydrology simulations (Appendix A, Water Supply). Therefore, no impact to non-CVP American River water users would result from the implementation of the Proposed Action/Proposed Project or alternative.

5.8.2.2. Proposed Action/Proposed Project

DELIVERIES TO SWP CUSTOMERS

SWP customers receive deliveries from the Feather River and the Delta. Although deliveries to SWP customers would be less than 100 percent of demand in some years, both the Feather River and the Delta service area customers would receive identical deliveries under both the existing condition and Proposed Action/Proposed Project (Appendix A, Water Supply, SWP Contractors). Therefore, there would be no water supply delivery impacts to SWP customers from the implementation of the Proposed Action/Proposed Project.

DELIVERIES TO CVP CUSTOMERS

CVP customers, under different contract types, receive deliveries from north and south of the Delta and under different contract types. CVP customers north of the Delta can be placed in four categories based on contract type: water settlement, refuge, M&I, and agricultural. CVP customers south of the Delta also can be placed in four categories based on contract type: exchange, refuge, M&I, and agricultural. M&I and agricultural contractors north and south of the Delta would experience a five percent reduction in deliveries under the Proposed Action/Proposed Project, relative to the existing condition, in one year of the 70 years of record (Appendix B, CVP Contractors). This single year delivery reduction would result in a maximum five percent decrease in the long-term average deliveries for M&I and agricultural contractors north and south of the Delta under the Proposed Action/Proposed Project, relative to the condition (Appendix A, Water Supply, CVP Contractors). The model evaluates the current amount of CVP storage available to maintain minimum delivery allocations for customers. If the model demonstrates that after deliveries are made, there will not be enough CVP storage remaining in the system to meet minimum storage requirements, then it reduces the percentage of CVP deliveries. The minimum reduction step within the model is five percent. Under real-time operations, this reduction may not be experienced at all, or experienced to a lesser degree. Although deliveries to water settlement, exchange, and refuge CVP contractors would be less than 100 percent of demand in some years, these contractors would receive identical deliveries under the existing condition and the Proposed Action/Proposed Project hydrology simulations for all years (Appendix A, Water Supply, CVP Contractors). Therefore, there would be no water supply delivery impacts to CVP customers from the implementation of the Proposed Action/Proposed Project.

5.8.2.3. Downstream Diversion Alternative

DELIVERIES TO SWP CUSTOMERS

Although deliveries to SWP customers would be less than 100 percent of demand in some years, both the Feather River and the Delta service area customers would receive identical deliveries under the existing condition and the Downstream Diversion Alternative (Appendix C, Water Supply, SWP Contractors). Therefore, there would be no water supply delivery impacts to SWP customers resulting from the implementation of the Downstream Diversion Alternative.

DELIVERIES TO CVP CUSTOMERS

Although deliveries to CVP customers would be less than 100 percent of demand in some years, contractors north and south of the Delta would receive identical deliveries under the existing condition and the Downstream Diversion Alternative (Appendix C, Water Supply, CVP Contractors). Therefore, there would be no water supply delivery impacts to CVP customers as a result of the Downstream Diversion Alternative.

5.8.2.4. No Action/No Project Alternative

There would be no change in water diversions under the No Action/No Project Alternative relative to the existing condition. Identical hydrology and operations between this alternative and existing condition would result in no change in SWP and CVP water deliveries north and south of the Delta. Therefore, implementation of the No Action/No Project Alternative would result in no water delivery impacts to SWP and CVP contractors.

5.8.3. Mitigation Measures

With no anticipated water supply impacts to either SWP or CVP contractors as a result of the Proposed Action/Proposed Project or alternatives, no mitigation measures are necessary or recommended.

5.9. LAND USE AND PLANNING

5.9.1. City Service Area Impacts

The various policies governing land use and land use planning within the City's service area is outlined in the City's General Plan and in individual specific plans. The City's "planning area," as outlined in the General Plan (and with subsequent annexations), consists of eleven subareas (including nine specific plans) planned for urban development. Implementation of the Proposed Action/Proposed Project would provide the City with the means to fully exercise its water entitlements. It would not affect the City's General Plan or planning area and, therefore, would have no impact on City service area land use and planning.

The project would not involve changes in land use, construction of housing or commercial buildings, or the employment of large number of workers necessary to induce substantial growth or concentrate population. However, implementation of the Proposed Action/Proposed Project would increase both the reliability of water deliveries and the amount of PCWA MFP water that would be conveyed to the City's service area. By supplying this water, the Proposed Action/Proposed Project would help meet water supply demands for projected growth in the service area and could support future development.

The Proposed Action/Proposed Project, as defined, within the quantities of water intended for federal "wheeling," is designed to meet both the City's existing and future planned water needs within the context of an approved General Plan. The Proposed Action/Proposed Project is intended to fulfill the City's growth and infill projections as projected in its General Plan. Implementation of the Proposed Action/Proposed Project

would provide the City with the means to fully exercise its water entitlements. Without the water supply facilitated through the long-term Warren Act contract, the City would be unable to meet its existing water demands (in water-short years), nor would it be able to achieve its projected and approved General Plan growth. Impacts on resources, activities, services, and the quality of life within the City's service area have already been addressed in the environmental review and approval processes associated with the General Plan and, moreover, have been evaluated in several individual specific plans. Therefore, beyond those previously disclosed in individual specific plan EIRs, no impacts to land use within the City's service area would result from implementation of the Proposed Action/Proposed Project.

Due to projected land use development and related population growth in the future, further development of the City's public services is expected. Projected growth of the necessary City services is acknowledged as the City continues toward buildout. Population and employment growth are expected to continue within the City of Roseville. Implementation of the Proposed Action/Proposed Project would not impact City service area land use or population and, therefore, would not impact City service area public services. The various policies governing land use and land use planning within the City's service area are outlined in the City's General Plan and in individual specific plans. The City follows the Public Facilities Element of its General Plan in planning and guiding the development of its public services. In addition, the City follows the Housing Element of its General Plan in its planning for population and housing. For these reasons, the Proposed Action/Proposed Project would not have any significant growth inducing impacts, and would merely accommodate the City's already planned and approved growth.

5.9.2. Mitigation Measures

Because no impacts to the City service area land use and planning are anticipated to occur from implementation of the Proposed Action/Proposed Project or alternatives beyond those previously disclosed in individual specific plan EIRs, no mitigation measures are necessary or recommended. Future planning efforts/annexation projects would conform with the City/USFWS MOU and resulting interim strategy to ensure protections to listed species consistent with the ESA.

5.10. MINERAL RESOURCES

5.10.1. City Service Area Impacts

The City's most common and current extractive mineral resources are sand and gravel. Facilities that extract and process sand and rock materials also produce related products including asphalt, cement, and crushed quarry rocks. Implementation of the Proposed Action/Proposed Project would not affect the quantity, location, or revenue of sand and gravel extraction beyond that previously disclosed in individual specific plan EIRs and, therefore, would have no impact on City service area mineral resources.

5.10.2. Mitigation Measures

Because no new impacts to City service area mineral resources are anticipated as a result of implementation of the Proposed Action/Proposed Project or alternatives

beyond those previously disclosed in individual specific plan EIRs, no mitigation measures are necessary or recommended.

5.11. NOISE

5.11.1. City Service Area Impacts

The most significant noise sources in the City's service area are transportation related as well as some fixed noise sources. The City's General Plan identifies and addresses potential problems associated with these common urban noise sources. The Proposed Action/Proposed Project, as a water delivery action, would not affect these noise sources in the City's service area or efforts by the City to mitigate their effects.

5.11.2. Mitigation Measures

Because no new impacts to noise in the City's service area are anticipated due to the implementation of the Proposed Action/Proposed Project or alternatives beyond those previously disclosed in individual specific plan EIRs, no mitigation measures are necessary or recommended.

5.12. POPULATION AND HOUSING

5.12.1. City Service Area Impacts

Population and employment growth are expected to continue within the City of Roseville. The City follows the Housing Element of its General Plan in its planning for population and housing. Implementation of the Proposed Action/Proposed Project would not affect state or county economic growth rates, interest rates, employment level, the national investment climate, the perception of Roseville as a community, or any other contributing factor that could influence population and housing changes within the City beyond those previously disclosed in individual specific plan EIRs.

5.12.2. Mitigation Measures

Because no impacts to City service area population and housing are anticipated to occur due to the implementation of the Proposed Action/Proposed Project or alternatives beyond those previously disclosed in individual specific plan EIRs, no mitigation measures are necessary or recommended.

5.13. PUBLIC SERVICES

5.13.1. City Service Area Impacts

Due to projected land use development and related population growth in the future, further development of the City's public services is expected. The City follows the Public Facilities Element of its General Plan in planning and guiding the development of its public services. Projected growth of the necessary City services is acknowledged as the City continues toward buildout. Implementation of the Proposed Action/Proposed Project would not impact City service area land use or population beyond that

previously disclosed in individual specific plan EIRs and, therefore, would not impact City service area public services.

5.13.2. Mitigation Measures

Because no new impacts to City service area public services are anticipated to occur due to implementation of the Proposed Action/Proposed Project or alternatives beyond those previously disclosed in individual specific plan EIRs, no mitigation measures are necessary or recommended.

5.14. RECREATION

5.14.1. City Service Area Impacts

The City of Roseville Parks and Recreation Department is responsible for the development and maintenance of the City's various recreational facilities and administering the associated levels of recreational activities. The Proposed Action/Proposed Project, as a water delivery action, would not affect the department's ability to develop or maintain existing recreational facilities within the City's service area or the City's standard for recreational land intensity. Therefore, the Proposed Action/Proposed Project would not affect recreational facilities or the levels of recreational activity in the City's service area beyond that previously disclosed in individual specific plan EIRs.

5.14.2. City Service Area Mitigation Measures

Because no new impacts to the City's recreational facilities or level of recreational activity are anticipated to occur due to implementation of the Proposed Action/Proposed Project or alternatives beyond those previously disclosed in individual specific plan EIRs, no mitigation measures are necessary or recommended.

5.14.3. Diversion Related Impacts

Impacts to CVP operations and the associated changes in system hydrology as a result of the Proposed Action/Proposed Project and alternatives are described below for the Sacramento River reservoirs, upper and lower Sacramento River, Folsom Reservoir, Lake Natoma, the lower American River, and the Delta.

5.14.3.1. Proposed Action/Proposed Project

SHASTA RESERVOIR

The primary recreation use season for water-dependent and water-enhanced recreation activities at Shasta Reservoir is May through September. Therefore, the potential to affect reservoir levels during these months of the year was assessed to evaluate the potential impacts to boating-related activities, shoreline recreation, and boat-in camping. Since boating opportunity is heavily influenced by the access to launching ramps, the relationship between reservoir levels and the operability of ramps was evaluated. Additionally, the drawdown distance between the water surface and the vegetated shoreline is considered an important factor in sustaining shoreline recreation use and boat-in camping.

The most important threshold for boating is elevation 941 feet msl, above which at least one public launching ramp is available on each of the three major arms of the reservoir. Above elevation 1,017 feet msl, all public ramps are operable. For boat-in camping and shoreline use, the key threshold is elevation 967 feet msl, below which substantial decreases in use typically occur, because of the influence of the distance between the water and the vegetated shoreline.

The Proposed Action/Proposed Project would not result in a decrease in the total number of years when all boat ramps are usable (elevation 1,017 feet msl) during any month of the season, relative to the existing condition. The number of years when at least one public ramp is maintained on each of the reservoir arms (elevation 941 feet msl) would actually increase by one year in July, relative to the existing condition (Appendix A, Recreation, Shasta Reservoir).

With regard to Shasta Reservoir shoreline and camping facilities, repeat visitors have come to expect the reservoir level to decline as the summer progresses; therefore, they appear to exhibit some tolerance of low-water conditions. Using the 60 feet drawdown criterion where boat-in camping and shoreline use begin to decline (1,007 feet msl), the analysis indicates that the Proposed Action/Proposed Project would not result in reduced reservoir levels during the months of May through September, relative to the existing condition (Appendix A, Recreation, Shasta Reservoir).

TRINITY RESERVOIR

Similar to Shasta Reservoir, the primary recreation use season for water-dependent and water-enhanced recreation activities at Trinity Reservoir is from May through September. Therefore, the potential to affect reservoir levels during these months of the year was assessed for boating-related activities and shoreline recreation. Since boating opportunity is heavily influenced by access to launching ramps, the relationship of reservoir levels to the operability of ramps was evaluated. Additionally, the drawdown distance between the water surface and the vegetated shoreline is an important factor in sustaining shoreline recreation use and also was evaluated.

There would be no difference between the existing condition and the Proposed Action/Proposed Project in the number of years when reservoir elevations would be high enough to operate two of the three major public launching ramps (Fairview and Stuart Fork) during May through September. There would be one fewer year in August of the 70-year period (less than 0.2 percent of the entire 70-year recreational period) when reservoir elevations would be high enough to operate the Main Arm boat ramp under the Proposed Action/Proposed Project, relative to the existing condition (Appendix A, Recreation, Trinity Reservoir). Because these reductions in elevation would not occur with enough frequency to constitute a significant effect to boating opportunities, the overall effect of the Proposed Action/Proposed Project on Trinity Reservoir boating would be less than significant.

UPPER SACRAMENTO RIVER

Water-dependent recreational use activities on the upper Sacramento River, between Keswick Dam and the confluence of the American River, is higher during the May through September period than during other periods of the year. Consequently, the potential effects of the Proposed Action/Proposed Project on Sacramento River flows during this period would be the most important for determining the effects on recreational opportunities.

A minimum recreation flow of 5,000 cfs is identified for the Sacramento River in the California Water Plan Update (DWR, 1994). This is an overall standard that is not related to specific reaches of the upper Sacramento River, so it provides only general guidance in assessing recreation impacts. Definitive optimum and maximum/minimum river flows for recreation uses are not available for the upper Sacramento River, so the relative change in river flows are compared between the Proposed Action/Proposed Project and the existing condition to assess potential recreation impacts. If relative flows were not substantially less for the Proposed Action/Proposed Project compared to the existing condition, boat ramps and access points along the river between Keswick Dam and Colusa would not be adversely affected.

During the months of highest recreation use (May through September), the Proposed Action/Proposed Project would result in equivalent or higher flows in a majority of years over the 70-year period of record. During these months, flows downstream of Keswick Reservoir would not decrease by more than one percent, relative to the existing condition in 68 years for May, 70 years for June, 69 years for July, 69 years in August, and 70 years for September. In most years, therefore, flow conditions resulting from the operation of the system in response to the additional Proposed Action/Proposed Project diversions would not affect recreation opportunities in the upper Sacramento River. When reductions in flow would occur, the magnitude would not be sufficient to cause substantial adverse effects to recreation opportunities. For example, the most frequent reductions in flow would occur in May, when flows would decrease by no more than 1 percent, relative to the existing condition. This would occur in two of the 70 years. Flows are sufficiently high in May (ranging from 4,900 to 15,900 cfs range), so that substantial adverse effects to recreation opportunities would not occur (Appendix B, Keswick Release). Therefore, the potential to affect recreational opportunities on the upper Sacramento River resulting from the Proposed Action/Proposed Project would be less than significant.

LOWER SACRAMENTO RIVER

Similar to other water recreation areas of northern California, the highest recreational use period for the lower Sacramento River (between the American River confluence and the Delta), is from May to September. Under the existing condition, mean monthly flow in the Sacramento River at Freeport averages between 13,300 and 19,200 cfs during this period. No definitive thresholds for optimal or minimum/maximum recreation flows are available for the lower Sacramento River; therefore, the relative difference between the existing condition and the Proposed Action/Proposed Project was evaluated and considered in light of tidal influences, which could affect recreation opportunity.

The Proposed Action/Proposed Project would result in reductions in mean monthly flows in the lower Sacramento River during the high recreation use months (May through September) in most years, relative to the existing condition. However, the average magnitude of the reduction would be relatively minor. Flows at Freeport would be decreased by no more than one percent in four years for June, one year in July, four years in August, and four years in September over the 70-year period of record (Appendix B, Freeport Flow). The minor reductions in flow resulting from the Proposed Action/Proposed Project, relative to the existing condition, would not have a substantial effect on recreation opportunities, considering the other hydrologic factors that have a more important influence, such as tidal action.

OROVILLE RESERVOIR

Similar to Shasta and Trinity reservoirs, the primary recreation use season for water-dependent and water-enhanced recreation activities at Oroville Reservoir is from May through September. The mean monthly water surface elevations between the Proposed Action/Proposed Project and existing condition are identical for all months of the recreation use season, relative to the existing condition (Appendix A, SWP, Oroville Reservoir). Therefore, impacts to recreation opportunities within Oroville Reservoir are expected to be less than significant.

LOWER FEATHER RIVER

Under the Proposed Action/Proposed Project there would be an increase in Feather River flow of up to eight cfs (0.3 percent) during the month of September, relative to the existing condition. For the other four months of the recreation use season, mean monthly flows were virtually identical (i.e., greatest change of 0.1 percent) with those under the existing condition (Appendix A, SWP, Feather River Flow). These increments of change and the infrequency of their occurrence (i.e., limited only to one month) are unlikely to result in a noticeable and prolonged change in river stage. Therefore, impacts to the recreation resources at the Feather River under the Proposed Action/Proposed Project would be less than significant.

FOLSOM RESERVOIR – BOATING

The primary boating season on Folsom Reservoir is generally between March and September, with peak use occurring during the summer months (i.e., May, June, July, and August). The focus of this evaluation centered on the primary boating season. Because boating opportunity is heavily influenced by boaters' access to the lake ramps and marina, the relationship of expected reservoir levels to the usability of these facilities is an important consideration in any impact evaluation.

A water surface elevation of 420 feet msl is necessary in Folsom Reservoir to keep all boat ramps operable. For the months of March through September over the 70-year period of record (490 months), reservoir levels under the Proposed Action/Proposed Project would decline below the 420 feet msl elevation in 9 additional months (less than two percent), relative to the existing condition (Appendix A, Recreation, Folsom Reservoir). However, the Proposed Action/Proposed Project would not result in unusable boat ramps during July and August. The potential impact on the availability of

low-water boat ramps on each side of the reservoir would be less-than-significant as a result of the Proposed Action/Proposed Project.

The Proposed Action/Proposed Project would not affect the usability of the Folsom Reservoir Marina wet slips (which require a minimum 412 feet msl elevation) in the primary boating season when compared to the existing condition (Appendix A, Recreation, Folsom Reservoir).

Overall, boating opportunities under the Proposed Action/Proposed Project would not be diminished when compared to the existing condition. Consequently, the overall effect on Folsom Reservoir boating opportunities as a result of the Proposed Action/Proposed Project would be less than significant**.**

FOLSOM RESERVOIR – SWIMMING

The most popular swimming months of the year at Folsom Reservoir are May through September when the summer weather is typically sunny and hot. Designated swimming beaches at Beal's Point and Granite Bay are generally usable between the elevations of 420 and 455 feet msl. Below 420 feet msl, the water declines below sandy areas and/or is too distant from parking and concessions; visitation decreases substantially when low-water conditions occur. Even with reservoir levels approximating 430 feet msl, the shoreline is relatively far from parking and concessions and some special low-water facilities are necessary to adequately accommodate swimmers. Above 455 feet msl, the high water limits the width of the available beach area, reducing the capacity of the beaches. As a result, to evaluate the effects of swimming opportunities as a result of the Proposed Action/Proposed Project, an examination of the number of months when water levels were in the usable range during the peak swimming period, relative to the existing condition, was completed.

The Proposed Action/Proposed Project would not substantially reduce the availability of swimming beaches during the months of May through September. In June and September, the number of years where the water levels within the usable beach range would not be within the optimal range would be four and two years, respectively (Appendix A, Recreation, Folsom Reservoir). Therefore, over the recreation season, the Proposed Action/Proposed Project would reduce swimming opportunities in only six months (1.7 percent) over the 70-year May through September period, relative to the existing condition (Appendix A, Recreation, Folsom Reservoir). The availability of swimming opportunities during July, August and September would not be affected. Therefore, the overall impact on Folsom Reservoir swimming opportunities would be less than significant.

LAKE NATOMA

Under current operating procedures, Lake Natoma serves as a regulating reservoir for Folsom Dam. This function enables releases from Folsom Dam to fluctuate as needed for electrical power or other purposes, while releases from Nimbus Dam to the lower American River can be made to change less abruptly. As a result, the water level of Lake Natoma fluctuates regularly, but within a much smaller range of water surface levels than Folsom Reservoir. Typically, lake levels change only within a range of 4 to 7

feet, creating a relatively stable shoreline and launching ramp conditions for swimming, fishing, and boating.

Under the Proposed Action/Proposed Project, Folsom Dam releases would not alter the function of Lake Natoma as a regulating reservoir. As a result, even though water release patterns from Nimbus Dam to the lower American River would be different than the existing condition, Nimbus Dam and Folsom Dam operations would still be coordinated. Consequently, the historical range of water level fluctuations on Lake Natoma would be expected to continue into the future without substantial change. Therefore, recreation opportunities on Lake Natoma would not be affected, resulting in a less-than-significant impact.

LOWER AMERICAN RIVER

Water-dependent and water-enhanced recreational activities on the lower American River are concentrated during the May through September period, relative to other time of the year. The focus of this evaluation, therefore, is restricted to this period of high intensity recreational use the river.

The optimal mean monthly flow range for river recreation below Nimbus Dam is 3,000 to 6,000 cfs. The minimum/maximum range for adequate river recreation flow is 1,750 to 6,000 cfs. Over the course of the May through September period of the 70-year record (350 months), implementation of the Proposed Action/Proposed Project would result in mean monthly flows within the optimal range, a total of eight months less often than under the existing condition. However, implementation of the Proposed Action/Proposed Project would result in flows within the minimum/maximum recreation flow range only one month less often than under existing condition (Appendix A, Recreation, Lower American River).

The analysis also considered whether there would be years when flows under the existing condition would be above the minimum threshold of 1,750 cfs, relative to the Proposed Action/Proposed Project. Over the course of the May through September period, there would be only one month in which this situation would occur (Appendix B, Nimbus Dam Release).

Based on the above assessment, the Proposed Action/Proposed Project would have a less-than-significant impact on water-dependent and water-enhanced recreational activities and use of the lower American River, as a result of changing hydrological conditions.

SACRAMENTO-SAN JOAQUIN DELTA

Like other water resources of northern California, the most intense period of recreational use in the Delta occurs between May and September. The Proposed Action/Proposed Project would result in reduced Delta Inflow, relative to the existing condition, during the high recreation use period in several years over the 70-year period of record (Appendix B, Delta Inflow, Sacramento River).

The Delta's hydrology is complex and influenced by other water sources, specifically tidal action, San Joaquin River inflows, and east-side tributary inflows. Consequently, differences in flows from the Sacramento River would not translate directly into Delta water recreation effects. For instance, incoming tidal action in the summer contributes approximately 70,000 cfs in the Sacramento River near Rio Vista and 58,000 cfs in the central Delta reach of the San Joaquin River (DWR, 1994).

These tidally influenced flows are substantially more than the 13,300 cfs to 19,200 cfs range of mean monthly flows from the lower Sacramento River at Freeport from May to September. As a result, any effect the lower Sacramento River flows could have on water-dependent and water-enhanced recreation would be at least moderated and, potentially, overshadowed completely, depending on the location in the Delta. Consequently, the differences in summertime inflow to the Delta resulting from the Proposed Action/Proposed Project (as summarized in the lower Sacramento River impact discussion) would be a less-than-significant impact on Delta recreation opportunities.

5.14.3.2. Downstream Diversion Alternative

SHASTA RESERVOIR

Implementation of the Downstream Diversion Alternative would result in no change to the total number of years when all boat ramps are usable (elevation 1,017 feet msl) during any month of the season, relative to the existing condition. Additionally, the number of years when at least one public ramp would be maintained on each of the reservoir arms (elevation 941 feet msl) would not change, relative to the existing condition (Appendix C, Recreation, Shasta Reservoir).

Using the 60 feet drawdown criterion where boat-in camping and shoreline use begin to decline (1,007 feet msl), the Downstream Diversion Alternative would not result in reduced reservoir levels during the months of May through September, relative to the existing condition. Also, there would be no change under the Downstream Diversion Alternative in the number of years in which reservoir levels would be at or above the 100 feet drawdown (967 feet msl) during the May through September period, relative to the existing condition (Appendix C, Recreation, Shasta Reservoir). Therefore, the overall impact on Shasta Reservoir recreation opportunities would be less than significant.

TRINITY RESERVOIR

There would be no difference between the existing condition and the Downstream Diversion Alternative regarding the number of years when reservoir elevations would be high enough to operate two of the three major public launching ramps (Fairview and Stuart Fork) during the May through September period. However, there would be one fewer year in September when reservoir elevations would be high enough to operate the Main Arm boat ramp, relative to the existing condition (Appendix C, Recreation, Trinity Reservoir). Therefore, the overall effect of the Downstream Diversion Alternative on Trinity Reservoir recreational opportunities would be less than significant.

UPPER SACRAMENTO RIVER

During the months of highest recreation use (May through September), the Downstream Diversion Alternative would result in equivalent or higher flows in a majority of years of the 70-year record, relative to the existing condition. In most years, therefore, flow conditions resulting from the Downstream Diversion Alternative diversions would not affect recreation opportunities in the upper Sacramento River. When reductions in flow relative to the existing condition would occur, the magnitude would not be sufficient to cause substantial adverse effects to recreation opportunities. For example, the most frequent reductions in flow would occur in July, when flows would decrease no more than 1.5 percent of the existing condition. This occurrence, however, would occur in one of the 70 years. Flows in the upper Sacramento River are sufficiently high in July (8,500 cfs to 15,900 cfs, with 64 years having flows above 10,000 cfs) such that substantial adverse effects to recreation opportunities would not occur (Appendix D, Keswick Release). Therefore, the impact of flow differences on recreation opportunities on the upper Sacramento River resulting from operation of the system in response to the Downstream Diversion Alternative would be less than significant.

LOWER SACRAMENTO RIVER

The Downstream Diversion Alternative would result in reductions in mean monthly flows along the lower Sacramento River during the high recreation use months (May through September) in most years, relative to the existing condition. However, the average magnitude of the reduction would be relatively minor. Flows at Freeport would be decreased by no more than four percent in one year in June, three years in August, one year in September, and no years in May and July over the 70-year period of record (Appendix D, Freeport Flow). The minor reductions in flow resulting from the Downstream Diversion Alternative would not have a substantial effect on recreation opportunities, considering the other hydrologic factors that have a more important influence, such as tidal action.

OROVILLE RESERVOIR

Similar to Shasta and Trinity reservoirs, the primary recreation use season for water-dependent and water-enhanced recreation activities at Oroville Reservoir is from May through September. The mean monthly water surface elevations between the Downstream Diversion Alternative and existing condition are identical for all months of the recreation use season, except for September. During the month of September, there was a decrease of one foot in the mean monthly elevation, relative to the existing condition (Appendix C, SWP, Oroville Reservoir). These increments of change and the infrequency of their occurrence (i.e., limited only to one month) are unlikely to result in a noticeable and prolonged change in reservoir elevation. Therefore, impacts to recreation opportunities within Oroville Reservoir are expected to be less than significant.

LOWER FEATHER RIVER

Under the Downstream Diversion Alternative there would be increases in Feather River flow (i.e., up to 18 cfs [0.6 percent]) during all months of the May through September recreation use season (Appendix C, SWP, Feather River Flow). These increases in flow may provide a beneficial effect to the recreation opportunities in and around the

Feather River. Impacts to the recreation resources at the Feather River under the Proposed Action/Proposed Project would, therefore, be less than significant.

FOLSOM RESERVOIR – BOATING

A water surface elevation of 420 feet msl is necessary in Folsom Reservoir to keep all boat ramps operable. For the period March through September of the 70-year period of record (490 months), reservoir levels would decline below the 420 feet msl elevation in two additional months under the Downstream Diversion Alternative, relative to the existing condition (Appendix C, Recreation, Folsom Reservoir). The potential impact on the availability of low-water boat ramps on each side of the reservoir would be less-than-significant as a result of the Downstream Diversion Alternative.

The Downstream Diversion Alternative also would increase the usability of the Folsom Reservoir Marina wet slips (which require a minimum 412 feet msl elevation) in the primary boating season by a total of two months, relative to the existing condition (Appendix C, Recreation, Folsom Reservoir).

Overall, boating opportunities under the Downstream Diversion Alternative would not be diminished, relative to the existing condition. Consequently, the overall effect on Folsom Reservoir boating opportunities resulting from the Downstream Diversion Alternative would be less than significant**.**

FOLSOM RESERVOIR – SWIMMING

Under the Downstream Diversion Alternative, the availability of swimming beaches during the period of May through September, relative to the existing condition, would not be reduced substantially. During June and September, the number of years that the reservoir water levels would be within the usable beach range would decrease by one year, relative to the existing condition. The availability of swimming opportunities during July, August and September would not be affected under the Downstream Diversion Alternative (Appendix C, Recreation, Folsom Reservoir).

Over the recreation season, the Downstream Diversion Alternative would reduce swimming opportunities by two months (of the total 350 months of the 70-year May through September season), relative to the existing condition (Appendix C, Recreation, Folsom Reservoir). Because these reductions in reservoir elevation do not occur with enough frequency to constitute a significant effect to swimming opportunities, the overall impact on Folsom Reservoir swimming opportunities resulting from the Downstream Diversion Alternative would be less than significant.

LAKE NATOMA

Under the Downstream Diversion Alternative, Folsom Dam releases would not alter the function of Lake Natoma as a regulating reservoir. As a result, even though water release patterns from Nimbus Dam to the lower American River would be different than that under the existing condition, Nimbus Dam and Folsom Dam operations would still be coordinated. Consequently, the historical range of water level fluctuations on Lake Natoma would be expected to continue into the future without substantial change. Therefore, recreation opportunities on Lake Natoma, as a result of the Downstream

Diversion Alternative would not be affected substantially, resulting in a less-than-significant impact.

LOWER AMERICAN RIVER

Over the course of the May through September period of the 70-year record (350 months), the Downstream Diversion Alternative would result in no change in the number of months that mean monthly flows would fall within the optimal range (3,000 to 6,000 cfs) and the minimum/maximum recreation flow range (1,750 to 6,000 cfs), relative to the existing condition (Appendix C, Recreation, Lower American River). Additionally, there would be no months where the Downstream Diversion Alternative would result in flows below the minimum threshold of 1,750 cfs (Appendix D, Nimbus Dam Release).

Based on the above assessment, the Downstream Diversion Alternative would have a less-than-significant impact on water-dependent and water-enhanced recreational use activities on the lower American River.

SACRAMENTO-SAN JOAQUIN DELTA

Differences in Delta inflow between the Downstream Diversion Alternative and the existing condition in the high recreation use period would occur in several years over the 70-year period of record (Appendix D, Delta Inflow, Sacramento River). The Delta's hydrology, however, is complex and influenced by other water sources, specifically tidal action, San Joaquin River inflows, and east-side tributary inflows. Consequently, differences in flows from the Sacramento River would not translate directly into Delta water recreation effects. For instance, incoming tidal action in the summer contributes approximately 70,000 cfs in the Sacramento River near Rio Vista and 58,000 cfs in the central Delta reach of the San Joaquin River (DWR, 1994).

These tidally influenced flows are substantially more than the 13,300 cfs to 19,200 cfs range of mean monthly flows from the lower Sacramento River at Freeport from May to September. As a result, any effect the lower Sacramento River flows could have on water-dependent and water-enhanced recreation would be at least moderated and, potentially, overshadowed completely, depending on the particular location in the Delta. Consequently, the differences in summertime inflow to the Delta resulting from the Downstream Diversion Alternative (as summarized in the lower Sacramento River impact discussion) would be a less-than-significant impact on Delta recreation opportunities.

5.14.3.3. No Action/No Project Alternative

Identical hydrology and operations between the No Action/No Project Alternative and the existing condition is assumed. Accordingly, no change in lower American River flows, Lake Natoma elevations, Folsom Reservoir water surface elevations, upper and lower Sacramento River flows, upper Sacramento River reservoir water surface elevations, or Delta inflows would result, relative to the existing condition. Therefore, implementation of the No Action/No Project Alternative would result in no impact to recreational opportunities.

5.14.4. Diversion Related Mitigation Measures

With no anticipated recreational impacts on the lower American River, Lake Natoma, Folsom Reservoir, upper and lower Sacramento River, Sacramento River reservoirs, or the Delta as a result of the Proposed Action/Proposed Project or alternatives, no mitigation measures are necessary or recommended.

5.15. TRANSPORTATION / TRAFFIC

5.15.1. City Service Area Impacts

The automobile is currently the predominant form of transportation within the City's service area. Travel demand, traffic, and vehicular congestion are projected to increase as the City population increases and buildout is approached. The City's nine specific plans define and plan for arterial roadways, collector streets, and local streets within the City's service area. The Proposed Action/Proposed Project, as a water delivery action, would not directly increase the travel demand on any existing roadways or create the need for new roadways beyond that previously disclosed in individual specific plan EIRs. Accordingly, the Proposed Action/Proposed Project would not affect transportation or traffic levels within the City's service area.

5.15.2. Mitigation Measures

Because no new impacts to City service area transportation or traffic levels are anticipated to occur with implementation of the Proposed Action/Proposed Project or alternatives beyond those previously disclosed in individual specific plan EIRs, no mitigation measures are necessary or recommended.

5.16. UTILITIES AND SERVICE SYSTEMS

5.16.1. City Service Area Impacts

The Public Facilities Element of the City's General Plan recognizes and provides for the accommodation of expected growth of the City's electric and privately owned utilities, water system, wastewater system, solid waste source reduction, and recycling. The City has proactively planned for the necessary expansion of these utility services and their associated facilities. From a water supply perspective, the City has proceeded with projects to increase capacity in its raw water line from Folsom Dam and the federal pumping plant, as well as expanded the capacity of their water treatment plant. Likewise, the City recently added wastewater treatment capacity via construction of the new PGWWTP. As the City continues to grow, the City's water supply and wastewater treatment needs, the former recognized through the City's purveyor-specific agreement with the Sacramento Area Water Forum, have been acknowledged. The Proposed Action/Proposed Project, as a water delivery action intended to provide the City with the ability to fully exercise its purchased water rights entitlement, accommodates and is consistent with the City's Public Facilities Element.

5.16.2. Mitigation Measures

Because no new adverse effects to the City's utilities and service systems are anticipated to occur with implementation of the Proposed Action/Proposed Project or alternatives beyond those previously disclosed in individual specific plan EIRs, no mitigation measures are necessary or recommended.

5.17. POWER SUPPLY

5.17.1. Diversion Related Impacts

Potential power supply impacts include changes in CVP hydroelectric power generation and capacity as well as potential water supply pumping electrical requirements for diverters at Folsom Reservoir. No other potential effects on power generation or demand are anticipated from CVP operations associated with implementation of the Proposed Action/Proposed Project or any outlined alternative, with the exception of potential increases in the use of energy resources for conveyance and treatment of the new water supply.

Hydropower impacts may result from a reduction in hydropower generation or dependable capacity. Reduction in CVP generation would be a cost impact either because Western would be precluded from selling excess energy or would be required to purchase additional energy for its customers. Similarly, if dependable capacity were reduced as a result of the Proposed Action/Proposed Project, then a cost impact would be incurred. This analysis assumed that impacts would be significant if hydropower generation or dependable capacity were substantially reduced by the implementation of the Proposed Action/Proposed Project.

5.17.1.1. Proposed Action/Proposed Project

HYDROPOWER GENERATION

Hydropower generation, the amount before project use, is evaluated and presented in this document. Generation from New Melones Dam is included and the values generated are reduced for transmission loss to represent the energy generation available at the load center near Tracy.

The median year indicates the year for which 50 percent of the time impacts would be smaller or there would be no impact (a net benefit). Likewise, the 90 percent exceedance year indicates the year for which 90 percent of the time impacts would be smaller or there would be no impact (a net benefit). Annual generation would be reduced 22 GWh (0.4 percent) in a median year and reduced by 11 GWh (0.3 percent) in a 90 percent exceedance year under the Proposed Action/Proposed Project, relative to the existing condition. The greatest decrease in average hydropower generation over the 70-years under the Proposed Action/Proposed Project would be one GWH, relative to the existing condition (Appendix A, Power, Tracy Generation). This is considered to represent a less-than-significant impact.

GROSS HYDROPOWER CAPACITY

In response to Western concerns about the availability of electrical power in California, this document evaluates the amount of hydropower capacity available over a specified, extended period of time. This capacity is defined as the monthly generation divided by the hours specified in Table 1 of Contract 2948A between the CVP and PG&E (but not more than the instantaneous capacity). The capacity presented is gross (before action use), includes capacity at New Melones and is adjusted for transmission to reflect capacity at the load center near Tracy.

The negative differences in the amount of capacity generated by CVP facilities under the Proposed Action/Proposed Project and existing conditions indicate that, in those years, there would be less capacity under the Proposed Action/Proposed Project than under the existing condition (Appendix A, Power, Tracy Capacity). However, much of the negative difference values, or impacts, are counterbalanced by positive values, or benefits. Meanwhile, the magnitude of the negative difference values is small.

The median of the differences between the Proposed Action/Proposed Project and existing condition is zero in most months and one MW in the remaining months. The maximum monthly 90 percent exceedance value for the difference in capacity is in February, at 22 MW (Appendix A, Power, Tracy Capacity). This represents one percent of the dependable capacity of 1,598 MW in February under the Proposed Action/Proposed Project condition. This is considered to represent a less-than-significant impact.

PUMPING ENERGY REQUIREMENTS

The Folsom Pumping Plant and the EID Pumping Plant lift water from Folsom Reservoir up to treatment plants for treatment and distribution. The Proposed Action/Proposed Project condition results in lower water elevations in Folsom Reservoir, which creates a need for greater amounts of energy to provide the required pumping. The increased energy requirement under the Proposed Action/Proposed Project, relative to the existing condition is 35 percent greater at the Folsom Pumping Plant while there is no change at the EID Pumping Plant (Appendix A, Power, Folsom and EID). The increased energy requirement at Folsom Pumping Plant is expected because, under the Proposed Action/Proposed Project, the City would be using these facilities to pump the increased diversion of 30 TAF. Because Folsom Reservoir elevations do not change significantly under the Proposed Action/Proposed Project, relative to the existing condition, the increase in energy requirement at Folsom Pumping plant is due entirely to the increased diversion for the City. In this case, the beneficiaries of the increased diversion (the City) would be the only party financially responsible for the increased energy requirement. This results in a less-than-significant impact on pumping energy requirements for any third party.

5.17.1.2. Downstream Diversion Alternative

HYDROPOWER GENERATION

Annual generation would not be reduced in a median year, but would be reduced by four GWh in a 90 percent exceedance year under the Downstream Diversion Alternative

relative to the existing condition. There would be no decrease in the average 70-year hydropower generation under the Downstream Diversion Alternative, relative to the existing condition (Appendix C, Power, Tracy Generation). Therefore, there would be a less than significant impact on hydropower generation under the Downstream Diversion Alternative.

GROSS HYDROPOWER DEPENDABLE CAPACITY

The negative differences in the amount of capacity generated by CVP facilities under the Downstream Diversion Alternative and existing conditions indicate that, in those years, there would be less dependable capacity under the Downstream Diversion Alternative than under the existing condition (Appendix C, Power, Tracy Capacity). However, much of the negative difference values, or impacts, are counterbalanced by positive values, or benefits. Meanwhile, the magnitude of the negative difference values is small.

The median of the differences in dependable capacity between the Downstream Diversion Alternative and the existing condition is zero in all months. The maximum monthly 90 percent exceedance value for the difference in dependable capacity is in August, at 3 MW (Appendix C, Power, Tracy Capacity). This represents less than one percent of the dependable capacity of 1,557 MW in August under the Downstream Diversion Alternative. This is considered to represent a less-than-significant impact.

PUMPING ENERGY REQUIREMENTS

The Downstream Diversion Alternative condition results in lower water elevations in Folsom Reservoir, which creates a need for greater amounts of energy to provide the required pumping. The increased energy requirement under the Downstream Diversion Alternative, relative to the existing condition is only 0.3 percent greater at the Folsom Pumping Plant while there is no change at the EID Pumping Plant (Appendix C, Power, Folsom and EID). This is considered to represent a less-than-significant impact.

5.17.1.3. No Action/No Project Alternative

Identical hydrology and operations between the No Action/No Project and the existing condition would result in no change in either hydropower or pumping energy requirements. Therefore, implementation of the No Action/No Project Alternative would result in no power supply impacts to CVP hydropower generation and capacity or pumping energy requirements, relative to the existing condition.

5.17.2. Mitigation Measures

With no anticipated power supply impacts to either CVP hydropower or pumping energy requirements as a result of the Proposed Action/Proposed Project or alternatives, no mitigation measures are necessary or recommended.

5.18. WATER QUALITY

5.18.1. City Service Area Impacts

The Proposed Action/Proposed Project would, as an indirect result of the beneficial use of the City's water supply, result in additional discharge of treated wastewater into Pleasant Grove and Dry creeks both downstream and within the City. Additionally, the Proposed Action/Proposed Project also would indirectly result in an increase in storm water runoff into the City's creeks and streams due to an increase in irrigation runoff (e.g., lawns, car washing, etc.). For the City's wastewater treatment plants, detailed permits and/or other authorizations strictly control the manner with which treated effluent discharges are allowed into adjacent watercourses. Storm water runoff, as an indirect result of the Proposed Action/Proposed Project would, for the most part, provide a beneficial addition to the flow regimes of the City's creeks and streams during periods of lowered natural flow (i.e., summer).

5.18.2. City Service Area Mitigation Measures

Because no adverse effects to the City's waterways water quality are anticipated to occur with implementation of the Proposed Action/Proposed Project or alternatives, no mitigation measures are necessary or recommended.

5.18.3. Diversion Related Impacts

Potential impacts to water quality within the CVP and SWP system water bodies resulting form implementation of the Proposed Action/Proposed Project were identified and evaluated relative to the existing condition. Impacts focused on the changes in reservoir storage and river flows. Substantial decreases in either of those types of water bodies could decrease the dilution potential for the identified contaminants in these water bodies.

5.18.3.1. Proposed Action/Proposed Project

QUALITY OF DRINKING WATER AVAILABLE DOWNSTREAM AND AT OTHER LOCATIONS IN THE CVP AND SWP STUDY AREA

Changes in operation of the CVP and SWP systems associated with the Proposed Action/Proposed Project could reduce storage levels in Folsom, Shasta, Trinity, and Oroville reservoirs and reduce flows in the lower American, Sacramento, and Feather rivers compared to existing conditions. The mean monthly storage levels under the Proposed Action/Proposed Project would be reduced by up to five TAF (1.2 percent) in Folsom Reservoir and up to one TAF (0.1 percent) in Trinity Reservoir, relative to the existing condition. Under the Proposed Action/Proposed Project the mean monthly storage levels would increase by two TAF (0.1 percent) in Shasta Reservoir and up to one TAF in Oroville Reservoir, relative to the existing condition (Appendix A, Water Quality). The decreases in reservoir storage do not occur with enough magnitude to significantly affect the storage levels in these reservoirs. In addition, the increases in storage that would occur in these reservoirs could provide a beneficial impact on the water quality condition of these reservoirs.

Under the Proposed Action/Proposed Project mean monthly flows would be reduced by up to 49 cfs (two percent) in the lower American River, up to eight cfs (0.1 percent) in the upper Sacramento River, up to 28 cfs (0.2 percent) in the lower Sacramento River, and up to four cfs (0.1 percent) in the Feather River, relative to the existing condition (Appendix A, Water Quality). There would also be increases in the mean monthly flows under the Proposed Action/Proposed Project, relative to the existing condition. The mean monthly flow would increase by up to 21 cfs (0.2 percent) in the upper Sacramento River, up to nine cfs (0.1 percent) in the lower Sacramento River, and up to eight cfs (0.3 percent) in the Feather River (Appendix A, Water Quality). The decreases in river flows do not occur with enough magnitude to significantly affect the flows levels in these rivers. In addition, the increases in flows that would occur in these rivers could provide a beneficial impact on the water quality condition of these rivers.

The Proposed Action/Proposed Project would not contribute significantly in either magnitude or frequency to the reductions in reservoir storage or river flows, and therefore would not result in a decrease in the dilution capability of the reservoirs and rivers. Therefore, impacts on water quality associated with the quality of drinking water available downstream and at other locations in the CVP and SWP study area would be considered less than significant.

DELTA WATER QUALITY

Under the Proposed Action/Proposed Project the 70-year average Delta outflow would decrease by up to 25 cfs (0.1 percent), relative to the existing condition (Appendix B, Delta Outflow). The decreases in Delta outflow under the Proposed Action/Proposed Project would not be of sufficient magnitude to constitute a significant effect on Delta outflow. In addition, the 70-year average position of X2 would remain the same under the Proposed Action/Proposed Project and the existing condition (Appendix B, Delta X2). Therefore, impacts on Delta water quality under the Proposed Action/Proposed Project would be considered less than significant.

5.18.3.2. Downstream Diversion Alternative

QUALITY OF DRINKING WATER AVAILABLE DOWNSTREAM AND AT OTHER LOCATIONS IN THE CVP AND SWP STUDY AREA

Changes in operation of the CVP and SWP systems associated with the Downstream Diversion Alternative could reduce storage levels in Folsom, Shasta, Trinity, and Oroville reservoirs and reduce flows in the lower American, Sacramento, and Feather rivers compared to existing conditions. The mean monthly storage levels under the Downstream Diversion Alternative would be reduced by up to one TAF (0.2 percent) in Folsom Reservoir, up to three TAF (0.1 percent) in Shasta Reservoir, up to two TAF (0.1 percent) in Trinity Reservoir, and up to four TAF (0.2 percent) in Oroville Reservoir, relative to the existing condition (Appendix C, Water Quality). The decreases in reservoir storage do not occur with enough magnitude to significantly affect the storage levels in these reservoirs.

Under the Downstream Diversion Alternative mean monthly flows would be reduced by up to 21 cfs (0.5 percent) in the lower American River, up to 13 cfs (0.2 percent) in the

upper Sacramento River, up to 57 cfs (0.4 percent) in the lower Sacramento River, and up to 15 cfs (0.5 percent) in the Feather River, relative to the existing condition (Appendix C, Water Quality). There would also be increases in the mean monthly flows under the Downstream Diversion Alternative, relative to the existing condition. The mean monthly flow would increase by up to seven cfs (0.2 percent) in the lower American River and up to 14 cfs (0.1 percent) in the upper Sacramento River (Appendix C, Water Quality). The decreases in river flows do not occur with enough magnitude to significantly affect the flows levels in these rivers. In addition, the increases in flows that would occur in these rivers could provide a beneficial impact on the water quality condition of these rivers.

The Downstream Diversion Alternative would not contribute significantly in either magnitude or frequency to the reductions in reservoir storage or river flows, and therefore would not result in a decrease in the dilution capability of the reservoirs and rivers. Therefore, impacts on water quality associated with the quality of drinking water available downstream and at other locations in the CVP and SWP study area would be considered less than significant.

DELTA WATER QUALITY

Under the Downstream Diversion Alternative the 70-year average Delta outflow would decrease by up to 28 cfs (0.1 percent), relative to the existing condition (Appendix D, Delta Outflow). The decreases in Delta outflow under the Downstream Diversion Alternative would not be of sufficient magnitude to constitute a significant effect on Delta outflow. In addition, the 70-year average position of X2 would remain the same under the Downstream Diversion Alternative and the existing condition (Appendix D, Delta X2). Therefore, impacts on Delta water quality under the Downstream Diversion Alternative would be considered less than significant.

5.18.3.3. No Action/No Project Alternative

Identical hydrology and operations between the No Action/No Project Alternative and the existing condition is assumed. Accordingly, no change in lower American River flows, Folsom Reservoir water surface elevations, upper and lower Sacramento River flows, upper Sacramento River reservoir water surface elevations, Feather River flows, or Delta inflows would result, relative to the existing condition. Therefore, implementation of the No Action/No Project Alternative would result in no impacts to water quality.

5.18.4. Diversion Related Mitigation Measures

With no anticipated water quality impacts to either the project reservoirs or rivers as a result of the Proposed Action/Proposed Project or alternatives, no mitigation measures are necessary or recommended.

5.19. CEQA ENVIRONMENTAL CHECKLIST

Consistent with the CEQA Guidelines (Section 15063 (d)(3)), an Environmental Checklist (Appendix G of the CEQA Guidelines) is provided as part of this Initial Study. As required under CEQA, a brief explanation of each resource impact describing the determination of potential effects is included in this joint environmental review

document. The individual resources described in this chapter are sequentially arranged in the same order as those typically found in an Environmental Checklist. Refer to the previous discussions of each resource category for supporting text of the identified impacts in the following Environmental Checklist. Refer to Chapter 7 for the supporting cumulative analysis.

Impact	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS - Would the project:				
a) Have a substantial adverse effect on a scenic vista?	θ	θ	θ	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	θ	θ	θ	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	θ	θ	θ	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	θ	θ	θ	☒
II. AGRICULTURE RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	θ	θ	θ	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	θ	θ	θ	☒
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	θ	θ	θ	☒
III. AIR QUALITY – Where available, the significance criteria established by the applicable air quality management or air pollution control the District may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	θ	θ	θ	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	θ	θ	☒	θ
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	θ	θ	☒	θ
d) Expose sensitive receptors to substantial pollutant concentrations?	θ	θ	θ	☒
e) Create objectionable odors affecting a substantial number of people?	θ	θ	θ	☒

Impact	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES – Would the project:				
a) Have a substantial adverse effect, either directly, or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulators, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	θ	θ	☒	θ
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	θ	θ	☒	θ
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	θ	θ	☒	θ
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	θ	θ	☒	θ
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	θ	θ	θ	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	θ	θ	θ	☒
V. CULTURAL RESOURCES – Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	θ	θ	θ	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	θ	θ	θ	☒
c) Directly or indirectly destroy a unique paleontological resource of site or unique geological feature?	θ	θ	θ	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	θ	θ	θ	☒
VI. GEOLOGY AND SOILS – Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	θ	θ	θ	☒
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	θ	θ	θ	☒
ii) Strong seismic ground shaking?	θ	θ	θ	☒

Impact	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
Iii) Seismic-related ground failure,, including liquefaction?	θ	θ	θ	☒
iv) Landslides?	θ	θ	θ	☒
b) Result in substantial soil erosion or the loss of topsoil?	θ	θ	θ	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	θ	θ	θ	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform building Code (1994), creating substantial risks to life or property?	θ	θ	θ	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	θ	θ	θ	☒
VII. HAZARDS AND HAZARDOUS MATERIALS – Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	θ	θ	θ	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	θ	θ	θ	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	θ	θ	θ	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	θ	θ	θ	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	θ	θ	θ	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	θ	θ	θ	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	θ	θ	θ	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	θ	θ	θ	☒
VIII. HYDROLOGY AND WATER QUALITY – Would the project:				
a) Violate any water quality standards or waste	θ	θ	θ	☒

Impact	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
discharge requirements?				
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	θ	θ	θ	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	θ	θ	θ	☒
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which results in flooding on- or off-site?	θ	θ	☒	θ
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	θ	θ	☒	θ
f) Otherwise substantially degrade water quality?	θ	θ	☒	θ
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	θ	θ	θ	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	θ	θ	θ	☒
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	θ	θ	θ	☒
j) Inundation by seiche, tsunami, or mudflow?	θ	θ	θ	☒
IX. LAND USE AND PLANNING – Would the project:				
a) Physically divide an established community?	θ	θ	θ	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	θ	θ	θ	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	θ	θ	θ	☒
X. MINERAL RESOURCES – Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	θ	θ	θ	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land	θ	θ	θ	☒

Impact	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
use plan?				
XI. NOISE – Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	θ	θ	θ	☒
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	θ	θ	θ	☒
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	θ	θ	☒	θ
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	θ	θ	θ	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	θ	θ	θ	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	θ	θ	θ	☒
XII. POPULATION AND HOUSING – Would the project?				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	θ	θ	θ	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	θ	θ	θ	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	θ	θ	θ	☒
XIII. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	θ	θ	θ	☒
Police protection?	θ	θ	θ	☒
Schools?	θ	θ	θ	☒
Parks?	θ	θ	θ	☒
Other public facilities?	θ	θ	θ	☒

Impact	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. RECREATION				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	θ	θ	θ	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	θ	θ	θ	☒
XV. TRANSPORTATION/TRAFFIC – Would the project:				
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio to roads, or congestion at intersections)?	θ	θ	θ	☒
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion/management agency for designated roads or highways?	θ	θ	θ	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	θ	θ	θ	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	θ	θ	θ	☒
e) Result in inadequate emergency access?	θ	θ	θ	☒
f) Result in inadequate parking capacity?	θ	θ	θ	☒
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	θ	θ	θ	☒
XVI. UTILITIES AND SERVICE SYSTEMS – Would the project?				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	θ	θ	☒	θ
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	θ	θ	☒	θ
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	θ	θ	θ	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	θ	θ	θ	☒
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the	θ	θ	θ	☒

Impact	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
provider's existing commitments?				
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	θ	θ	θ	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	θ	θ	θ	☒
XVII. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number of restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	θ	θ	☒	θ
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probably future projects)?	θ	θ	☒	θ
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	θ	θ	☒	θ

Chapter 6
Endangered Species Act Compliance

6.1. INTRODUCTION

As discussed in Chapter 1, Introduction, this joint document has multiple purposes. Within the context of complying with the federal ESA, the Proposed Action (i.e., execution of a Warren Act contract and delivery of water pursuant thereto) has the potential to affect Reclamation's obligations under the federal Endangered Species Act of 1973, as amended (16 U.S.C. §§1531 *et seq*.). Additionally, the analysis of the Proposed Action described herein serves to address EFH considerations for species protected by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). A detailed description of the Proposed Action under consideration is provided in Section 2.1, Proposed Action/Proposed Project.

6.1.1. Regulatory Context

With respect to Reclamation's obligations under the federal ESA, this document is intended to serve as the BA pursuant to section 7(c) of the federal ESA (16 U.S.C. §1536(c)) and to 50 C.F.R. Part 402 concerning the potential effects of Reclamation's action on federally listed threatened and endangered species and on species proposed for listing.

The applicable federal regulations state that the purpose of a biological assessment is to:

> (a) …evaluate the potential effects of the action on listed and proposed listed species and designated and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action (50 C.F.R. §402.12, 1995).

In turn, 50 C.F.R. § 402.02 (1995) defines "effect of the action" as follows:

> *Effect of the action* refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action that will be added to the environmental baseline… Indirect effects are those that are caused by the proposed action and are later in time, but still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger actions for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

Based on the above definitions of indirect, interrelated, and interdependent effects, the area of effect for the Proposed Action includes the area in which the water would be delivered and ultimately used and would also include those waterbodies potentially affected by the proposed diversion. These latter areas include the CVP, namely the

Sacramento River and its upstream reservoirs (i.e., Shasta and Trinity), the lower American River including Folsom Reservoir, and the Delta. DWR's operation of the SWP in response to water deliveries related to the proposed diversion are also included, which includes Oroville Reservoir and the lower Feather River. The area of effect also includes the City service area.

Federally listed, proposed, and candidate species with the potential to occur within the action area for the Proposed Action include green sturgeon (*Acipenser medirostris),* Delta smelt *(Hypomesus transpacificus),* steelhead, (*Oncorhynchus mykiss),* spring-run Chinook salmon (*Oncorhynchus tshawytscha*), winter-run Chinook salmon (*Oncorhynchus tshawytscha*), slender orcutt grass (*Orcuttia tenuis*), Sacramento orcutt grass (*Orcuttia viscida*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepiduras packardi*), and the valley elderberry longhorn beetle (VELB or beetle) (*Desmocerus californicus dimorphus).* Fall-run/late fall-run Chinook salmon (*Oncorhynchus tshawytscha*) is also included to satisfy the analytical requirements for EFH for federally managed fish species in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (see Section 6.4.1.2 for further discussion).

This BA considers the following major issues for aquatic and terrestrial species within the action area:

- The presence of suitable habitat or potentially suitable habitat for each listed, proposed listed, candidate, or EFH-managed fish species in the area affected by the Proposed Action (i.e., execution of a Warren Act contract);
- The established level of use or potential for use of the suitable habitat for each species in the area affected by the Proposed Action;
- The presence, and estimated magnitude, of potential disturbances to species or habitat due to the Proposed Action;
- The extent of direct habitat loss due to the Proposed Action;
- The overall level of direct and indirect effects of the Proposed Action on sensitive species; and
- The past measures implemented to mitigate for indirect effects to sensitive species and their habitat.

6.2. CONSULTATION HISTORY

Incompliance with the federal ESA, Reclamation and the City have been involved in coordination and informal consultation activities with both USFWS and NMFS since 2000. Key meetings, deliverables, decisions and other activities related to the evaluation of Proposed Action effects upon federal special-status species within the action area are described below. Contact information for the Proposed Action is as follows:

Project Applicant:	U.S. Bureau of Reclamation Central California Area Office
Address:	7794 Folsom Dam Road, Folsom California 95630-1799
Contact:	Rob Schroeder (916) 989-7280

6.2.1. U.S. Fish and Wildlife Service

May 10, 2001 – City provides status report to USFWS regarding MOU deliverables that either had been, or were in the process of being furnished to USFWS.

June 28, 2001 – USFWS acknowledged receipt of MOU deliverables, provided input on various components of the draft interim strategy and sample operations and maintenance plan, and identified points of agreement (with the City's prepared deliverables).

December 5, 2001 – City transmitted the data files for all MOU associated vernal pool mapping efforts, and identified the prospects for integrating operations and maintenance planning across vernal pools preserves under different scenarios.

October, 2002 – Reclamation submits internal/administrative draft EA/IS and BA to USFWS for their review and consideration of potential effects to threatened and endangered species within the action area for the Proposed Action

April 14, 2004 – Reclamation and the City met with USFWS representatives to discuss revisions to the hydrologic modeling methodology completed as a result of changes in CEQA requirements regarding cumulative analyses, as well as a comparative assessment of PROSIM and CALSIMII modeling simulations.

September 29, 2005 - Reclamation sends letter to USFWS requesting concurrence that the Proposed Action is not likely to adversely affect threatened and endangered species within the action area for the City of Roseville Warren Act Contract with Reclamation.

January 19, 2006 – USFWS letter to Reclamation – indicating concurrence with Reclamation's findings that the Proposed Action is not likely to adversely affect the federally listed vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, or designated critical habitat.

Reclamation will submit the Draft EA/IS and BA report to USFWS to include as part of the administrative record documenting the analysis and evaluation of federal species under consideration in this consultation. Reclamation also will provide USFWS with copies of the Final EA/IS including the FONSI/MND following circulation of the draft report and preparation of any responses to public or agency comments.

6.2.2. National Marine Fisheries Service

October, 2002 – Reclamation submits internal/administrative draft EA/IS and BA to NMFS for their review and consideration of potential effects to threatened and endangered species within the action area for the Proposed Action.

November 6, 2002 – Reclamation sends letter to NMFS requesting concurrence that the Proposed Action is not likely to adversely affect threatened and endangered species within the action area for the City of Roseville Warren Act Contract with Reclamation.

December 13, 2002 – NMFS letter to Reclamation – indicating concurrence with Reclamation's findings that the Proposed Action is not likely to adversely affect Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, or Central Valley steelhead, or designated critical habitat. In addition, NMFS determined that the ESA consultation serves as the EFH consultation for the Proposed Action. NMFS believes that the Proposed Action is not likely to adversely affect EFH for Pacific salmon. The ESA and EFH determinations are contingent on Reclamation and the City implementing all measures intended to avoid and minimize impacts to fish and fish habitat identified in the concurrence letter and all other supporting documents. Should additional information reveal that the Proposed Action may affect federally listed endangered or threatened species, their critical habitat, or EFH for Pacific salmon in a way not previously considered or should the Proposed Action be modified in such a way that may cause additional affects to listed species, critical habitat, or EFH, consultation for the Proposed Action may be reinitiated and the concurrence determination reconsidered.

Reclamation will submit the Draft EA/IS and BA report to NMFS to include as part of the administrative record documenting the analysis and evaluation of federal species under consideration in this consultation. Reclamation also will provide NMFS with copies of the Final EA/IS including the FONSI/MND following circulation of the draft report and preparation of any responses to public or agency comments.

May 5, 2004 – Meeting between City of Roseville and NMFS to discuss progress on the City's Creek and Riparian Management and Restoration Plan and related permitting for plan implementation. John Baker of NMFS expressed support for the plan and the proposed approach to consolidated permitting.

6.3. ACTION AREA

The action area is defined in 50 CFR 402.14(g)(3) as the immediate area involved in the action and the entire area where effects to listed species extend as a direct and indirect effect of the action. The action area for the Proposed Action includes the area in which the water would be delivered and ultimately used (the City's service area) and also includes those waterbodies potentially affected by Reclamation's operation of CVP facilities and DWR's operation of the SWP in response to water deliveries related to the proposed diversion. These latter areas include the CVP, namely the Sacramento River and its upstream reservoirs (i.e., Shasta and Trinity), and the lower American River including Folsom Reservoir, as well as Oroville Reservoir, the lower Feather River, and the Delta. These areas are shown in **Figures 2-1** and **2-2** (see Chapter 2, Description of Proposed Action/Proposed Project and Alternatives).

6.4. SUMMARY OF LEGAL AND STATUTORY AUTHORITIES, WATER RIGHTS, AND CONTRACTUAL OBLIGATIONS RELEVANT TO THE PROPOSED ACTION

Legal and statutory authorities and obligations, water rights, and contractual obligations influence how the Proposed Action, and Reclamation's actions in general, operate within the action area. This section of the BA elaborates on those authorities, responsibilities, policies, and obligations.

6.4.1. Legal and Statutory Authorities

6.4.1.1. Endangered Species Act

The ESA establishes a federal program to conserve, protect and restore threatened and endangered plants and animals, and their habitats. The ESA specifically charges federal agencies with the responsibility of using their authority to conserve threatened and endangered species. All federal agencies must ensure any action they authorize, fund or carry out is not likely to jeopardize the continued existence of an endangered or threatened species, or result in the destruction of critical habitat for these species, unless the agency has been granted an exemption (USFWS and NMFS 1998). Consultation with USFWS and NMFS under the ESA has taken place over the course of the environmental process for the Proposed Action. USFWS and NMFS representatives assisted in defining the scope of analysis for this BA and the EA, and will participate in their review.

6.4.1.2. Magnuson-Stevens Fishery Conservation and Management Act

The 1996 amendments to the MSFCMA (16 USC 1801 *et seq*.) require the identification of EFH for federally managed fishery species and the implementation of measures to conserve and enhance this habitat. EFH includes specifically identified waters and substrate necessary for fish spawning, breeding, feeding, or growth to maturity and covers a species' full life cycle (16 USC 1802(10)). Federal action agencies are required to consult with NMFS on any action authorized, funded, or undertaken that may adversely impact EFH. This consultation process is usually integrated into existing environmental review procedures in accordance with the NEPA or ESA to provide the greatest level of efficiency. Therefore, information regarding potential implementation of the Proposed Action that is contained in the EA, and supplemented by information in this BA, satisfies the analytical requirements for EFH (NMFS 1999) (see Section 6.5.2, Essential Fish Habitat Managed Species, for additional information).

6.4.1.3. Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) ensures that fish and wildlife receive equal consideration during planning and construction of federal water projects (16 USC Sec. 661). The FWCA requires that the USFWS's views be considered when evaluating impacts and determining mitigation needs. Consultation with USFWS under the FWCA has taken place over the course of the environmental review process for the Proposed Action. USFWS representatives assisted in defining the scope of analysis for this BA and the EA, and will participate in their review.

6.4.2. Reclamation's Ongoing Conservation Initiatives

Reclamation has numerous programs and policies in place designed to assure that throughout the CVP, listed species and designated critical habitat are protected and, where possible, enhanced. Implementation of these on-going and future programs serves to avoid adverse effects potentially associated with Reclamation's operation of the CVP and DWR's operation of the SWP, including operations associated with or related to the Proposed Action, upon species protected under the federal ESA. The various programs and policies are described below.

6.4.2.1. Central Valley Project Conservation Program

Reclamation and USFWS are implementing the Central Valley Project Conservation Program (or Conservation Program), a long-term, adaptive management-based program designed to address the needs, including habitat needs, of special-status species potentially affected by the operations of the CVP. Reclamation and USFWS expect the long-term implementation of the Conservation Program to be accomplished through partnerships with various other programs that have the potential to contribute to and share the goals of the Conservation Program, and with substantive public involvement in defining, refining, and implementing this program.

6.4.2.2. Central Valley Project Improvement Act (CVPIA)

Reclamation and USFWS are implementing the provisions of the CVPIA, which, in part, provides for the protection and enhancement of anadromous fish species, waterfowl, and other species not specifically identified in the CVPIA. Actions are underway to benefit winter-run Chinook salmon and steelhead (species which could be adversely affected by the Proposed Action) as well as initiatives to conserve other species. These species include the giant garter snake, vernal pool species, and other riparian species.

6.4.2.3. Central Valley Project Wetlands Program

Reclamation is implementing a program to protect and enhance wetlands throughout the area administered by its Mid-Pacific Region. Those projects, which provide benefits to threatened, endangered, and proposed threatened and endangered species, receive priority protection. The various projects underway benefit vernal pool species and riparian species, which could be adversely affected by the Proposed Action.

6.4.2.4. Central Valley Operations Under Existing Biological Opinions and Agreements

Reclamation is presently operating the CVP and DWR is presently operating the SWP in accordance with several biological opinions and agreements, which collectively serve to protect threatened and the endangered species that may be adversely affected by the Proposed Action. These include:

- 1983 agreement between DWR and DFG "Concerning the Operation of the Oroville Division of the SWP for Management of Fish and Wildlife;"
- Biological opinion on the Friant Water Contract Renewals (October 15, 1991);
- Biological opinion for the Operation of the Federal CVP and the California SWP (February 12, 1993);
- Winter-run Chinook salmon biological opinion (February 23, 1993 and May 1995 amendment as per the Bay-Delta Accord);
- Delta smelt biological opinion for the Operations Criteria and Plan (OCAP) (May 26, 1993);
- Delta smelt biological opinion for Los Vaqueros (September 9, 1993);
- Sacramento splittail conference opinion for the OCAP (March 1996);
- Giant garter snake biological opinion for the Interim CVP Water Contracts (December 27, 1994);
- Giant garter snake biological opinion for the Re-initiation of Interim CVP Water Contracts (February 23, 1995);

- Biological opinion on Implementation of the CVPIA and Continued Operation of the CVP (October 2000);
- Biological opinion on Interim Operations of the CVP and SWP on Central Valley Spring-run Chinook Salmon and Central Valley Steelhead (September 2002);
- NMFS supplemental BO to the 2002 BO on the Interim Operations of the CVP and SWP on Central Valley Spring-run Chinook Salmon and Central Valley Steelhead (February 2004);
- USFWS delta smelt biological opinion on the long-term Operations, Criteria, and Plan (OCAP) for the CVP and SWP (July 2004);
- NMFS biological opinion on the long-term OCAP for the CVP and SWP (October 2004).

Many of the CVP operations and maintenance actions have been the subject of previous consultations initiated by Reclamation. The results of these consultations have been biological opinions that stand on their own merits, that establish thresholds to ensure both survival and recovery of listed species, and that establish a baseline for the effects considered by the opinions.

6.4.2.5. Water Forum Process and Development of the Flow Management Standard

The City of Roseville is an active participant of the Water Forum process. The Water Forum is a diverse group of water agencies, business groups, agricultural interests, environmentalists, citizen groups, and local governments (stakeholders) that have been working since the fall of 1993 to evaluate future water needs and supplies in the Sacramento area. The Water Forum stakeholders formulated a Water Forum Proposal for the effective long-term management of the region's water resources. The Water Forum Proposal was formulated based on the two coequal objectives of the Water Forum: (1) provide a reliable and safe water supply for the region's economic health and planned development through the year 2030; and (2) preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River. The Water Forum Proposal was refined into a Water Forum Agreement (in the form of a Memorandum of Understanding among stakeholder agencies). The Water Forum Agreement contains a purveyor-specific agreement that includes provisions for diversions in drier and driest years. The Water Forum Proposal has seven linked elements, including "*support for an improved pattern of fishery flow releases from Folsom Reservoir*" and "*Lower American River Habitat Management Element.*"

The Proposed Action includes the City's participation in the Water Forum Agreement and financial contribution to the Lower American River HME. The Lower American River HME was developed as part of the Water Forum Agreement to provide mitigation for both river habitat and recreation effects of Water Forum purveyor actions, including the City's long-term Warren Act contract. The lower American River HME includes detailed descriptions of all reasonable and feasible projects that could be implemented to avoid and/or offset potential impacts to lower American River fishery and riparian resources as a result of Water Forum actions, including the Proposed Action.

As part of its Purveyor Specific Agreement with the Water Forum, the City is committed to an annual payment of $3.00 per acre-foot of non-CVP water used above its 1995

baseline water demand to the Water Forum Habitat Management Element. The City's Purveyor Specific Agreement with the Water Forum also includes a requirement that Roseville enter into an agreement with PCWA for replacing up to 20,000 AF of water to the River from reoperation for the PCWA's MFP reservoirs. This reoperation water is included as part of the Proposed Action (see Appendix I, Modeling Technical Memorandum for detailed information). Further discussion regarding the City's obligations under the Water Forum Agreement is provided in Section 2.1, Proposed Action/Proposed Project.

Development of the proposed Water Forum Flow Management Standard (FMS) is a critical component in achieving the Water Forum objectives, as well as implementing the FISH Plan, which constitutes the aquatic habitat management plan for the lower American River. The primary purpose of the proposed FMS is to maximize the annual production and survival of anadromous salmonids, particularly fall-run Chinook salmon and steelhead, in the lower American River, within water availability constraints. With improved habitat conditions for salmonids, the proposed FMS also will benefit other fish species within the lower American River. Development of an improved flow standard will increase the minimum release requirement for the lower American River and establish water temperature standards, in conjunction with establishing a river management process, including a monitoring program, for Folsom Reservoir and lower American River operations. The proposed FMS consists of three separate elements: (1) required flows and water temperatures; (2) river management; and (3) monitoring and evaluation. The Lower American River Flow Management Standard Report is currently being prepared and will include the detailed analyses and associated discussion required to fully support the three elements contained within the proposed FMS. It is anticipated that the Lower American River Flow Management Standard Report will be submitted to the SWRCB in 2005.

6.4.2.6. Warren Act Contracts

The Warren Act of 1911, as supplemented by the Drought Relief Act of 1991 and section 3408(c) of the CVPIA, authorizes Reclamation to negotiate and execute contracts to use excess capacity in CVP reservoirs for non-project water for domestic, municipal, industrial, fish and wildlife, irrigation, and any other beneficial uses, provided such use does not frustrate project purposes or applicable federal requirements. Such activities are generally covered by "Warren Act contracts" which are intended to formalize the terms and conditions, particularly the priority, of the non-federal party's right (in this case, the City of Roseville) to access CVP facilities for the purposes of impounding, storing or conveying the non-federal party's water rights, and to secure appropriate payment to the United States for the use of such facilities. The water to be stored or conveyed is held by the contractor, pursuant to the contractor's or a third party's water right. The execution of such contracts is preceded by the adequate completion of all appropriate environmental documentation and Section 7 consultation, consistent with NEPA and the federal ESA, respectively. Reclamation will continue to assure that no Warren Act type services will be provided if these services would have a significant adverse impact on the ability of Reclamation or USFWS to meet fish and wildlife obligations as specified under the CVPIA (USFWS 2000).

Warren Act contracts are negotiated at the sole discretion of Reclamation when capacity is available at federal facilities. The exact amount of non-Project water to be conveyed through Warren Act contracts varies from year to year and cannot be predicted in advance. The use of federal facilities is usually the most efficient means to deliver the contractor's water supply and frequently, as is the case with the City of Roseville, supplements a federal water supply (i.e., CVP water service contract).

6.5. SPECIES LISTING AND POTENTIAL PRESENCE

Listed, proposed listed, candidate, and EFH-managed fish species within the regional study area portion of the action area are identified in Table 6-1. These species potentially would be affected by changes in reservoir or riverine hydrology due to implementation of the Proposed Action.

Although initially included in the environmental evaluation under ESA, Sacramento splittail is no longer considered a listed species and is not included as part of ESA compliance for the Proposed Action. USFWS removed Sacramento splittail from the list of threatened species on September 22, 2003, and did not identify it as a candidate for listing under FESA. Sacramento splittail is identified as a California species of special concern and, informally, as a federal species of concern.

As discussed in Chapter 4, Analytical Methodology, several information sources were used to identify listed, proposed listed, candidate, and EFH-managed fish species occurring or potentially occurring within the City's service area. **Table 6-1** presents the species that were identified through these information sources, primarily supported by the CNDDB RAREFIND. The occurrences of these species within the City's service area are discussed in Chapter 3, Affected Environment. While **Table 6-2** identifies a wide range of potential species present within the City's service area (as established by the CNDDB RAREFIND), detailed review of City planning documents and relevant environmental reports provide further confirmation with which to refine the likelihood of species occurrences.

Table 6-1. Federally and State listed, proposed listed, candidate, and EFH-managed fish species potentially occurring within the regional study area.

Species	Common Name	Status Federal [1]/State [2]
Acipenser medirostris	Green sturgeon	PT/CSC
Hypomesus transpacificus	Delta smelt	T/T
Oncorhynchus mykiss	Steelhead	T/--
Oncorhynchus tshawytscha	Spring-run Chinook salmon	T/T
Oncorhynchus tshawytscha	Fall-run/late fall-run Chinook salmon[3]	SC/CSC
Oncorhynchus tshawytscha	Winter-run Chinook salmon	E/E

1 Federal Status: E=Endangered; T=Threatened; PE=Proposed Endangered; PT=Proposed Threatened; SC=Species of Concern; C=Candidate; FPD/T = Federally proposed for De-listing as Threatened

2 State Status: E=Endangered; T=Threatened; CSC=Species of Concern

3 NMFS recognizes the late-fall-run Chinook salmon in the Central Valley fall-run ESU. On April 15, 2004, NMFS announced the Central Valley fall-run and late fall-run Chinook Salmon ESU change in status from a candidate species to a species of concern. Fall-run/late fall-run Chinook salmon is included herein to satisfy the analytical requirements for EFH for federally managed fish species in accordance with the Magnuson-Stevens Fishery Conservation and Management Act.

Source: CDFG CNDDB and GAP Analysis; USFWS species lists.

Table 6-2. Federally and State listed, proposed listed, candidate, and EFH-managed species potentially occurring within the City service area.

Species	Common Name	Status Federal [1]/State [2]
Plants		
Gratiola heterosepala	Boggs Lake hedge-hyssop	--/E
Orcuttia tenuis	Slender Orcutt grass	T/E
Orcuttia viscida	Sacramento Orcutt grass	E/E
Invertebrates		
Branchinecta lynchi	Vernal pool fairy shrimp	T/--
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	T/--
Lepiduras packardi	Vernal pool tadpole shrimp	E/--
Fish		
Acipenser medirostris	Green sturgeon	PT/CSC
Hypomesus transpacificus	Delta smelt	T/T
Oncorhynchus mykiss	Steelhead	T/--
Oncorhynchus tshawytscha	Fall-run/late fall-run Chinook salmon [3]	SC/CSC
Oncorhynchus tshawytscha	Winter-run Chinook salmon	E/E
Amphibians		
Ambystoma californiense	California tiger salamander [4]	PT/CSC
Rana aurora draytonii	California red-legged frog	T/CSC
Reptiles		
Thamnophis gigas	Giant garter snake	T/T
Birds		
Aquila chrysaetos	Golden eagle	FP/CSC
Branta canadensis leucopareia	Aleutian Canada goose [5]	DM/--
Buteo Swainsoni	Swainson's hawk	SC/T
Empidonax traillii brewsteri	Little willow flycatcher	SC/E
Falco peregrinus anatum	American peregrine falcon [6]	DM/E
Haliaeetus leucocephalus	Bald eagle	FPD/T /E
Riparia riparia	Bank swallow	SC/T

1 Federal Status: E=Endangered; T=Threatened; PE=Proposed Endangered; PT=Proposed Threatened; SC=Species of Concern; C=Candidate FPD/T = Federally proposed for De-listing as Threatened; DM=De-listed (monitored first 5 years)

2 State Status: E=Endangered; T=Threatened; CSC=Species of Concern; FP=Fully Protected against take pursuant to Fish and Game Code Section 3503.5.

3 NMFS recognizes the late-fall-run Chinook salmon in the Central Valley fall-run ESU. On April 15, 2004, NMFS announced the Central Valley fall-run and late fall-run Chinook Salmon ESU change in status from a candidate species to a species of concern. Fall-run/late fall-run Chinook salmon is included herein to satisfy the analytical requirements for EFH for federally managed fish species in accordance with the Magnuson-Stevens Fishery Conservation and Management Act.

4 California tiger salamander was designated as Proposed Threatened in Central CA on May 23, 2003.

5 Aleutian Canada goose was de-listed on March 20, 2001.

6 American peregrine falcon was de-listed in the entire range on August 25, 1999.

Source: CDFG CNDDB; USFWS species lists.

As discussed previously (see Section 5.4, Biological Resources), Delta smelt, green sturgeon, California red-legged frog, giant garter snake, California tiger salamander, Aleutian Canada goose, little willow flycatcher, and bank swallow do not occur within the City's service area and, therefore, were not considered in the environmental evaluation. Additionally, the American peregrine falcon, golden eagle, and bald eagle, while having the potential to pass over the City's service area, are rarely seen, if ever, in the vicinity of the City's service area. Due to the rarity of their presence and the lack of suitable

habitat for these birds, effects to the American peregrine falcon, golden eagle, and bald eagle are not anticipated to occur and are, therefore, not discussed further.

Critical habitat for a threatened or endangered species is defined in Section 3(5)(A) of the ESA as the specific areas occupied by the species, at the time it is listed, on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection. Further, specific areas outside the geographical area occupied by the species also may be designated as critical habitat, upon a determination that such areas are essential for the conservation of the species. Critical habitat is discussed below for each species included in the BA.

The following sections describe the biological characteristics that are relevant to the assessment of project impacts for each species included in this BA. Descriptions include life stage periodicity, current range, habitat requirements, and summary of species occurrence in the potentially affected region. Detailed information for each listed species also has been incorporated by reference from previous NMFS and USFWS BOs. In addition, the following sections summarize information about species-specific recovery plans, where available, that have been implemented to assist in the recovery of the special-status species described below.

6.5.1. Endangered, Threatened, Proposed Endangered, or Proposed Threatened Species

The species identified for evaluation in this BA include Delta smelt, steelhead, spring-run Chinook salmon, fall-run/late fall-run Chinook salmon, winter-run Chinook salmon, green sturgeon, slender orcutt grass, Sacramento orcutt grass, vernal pool fairy shrimp, vernal pool tadpole shrimp, and the VELB.

6.5.1.1. Delta Smelt

LISTING STATUS

USFWS listed delta smelt as "threatened" on March 5, 1993 (58 FR 12863). Under the ESA, a "threatened species" is "…*any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range*" (15 USC 1532(20). On August 1, 2003 the USFWS announced that it would conduct a status review of the delta smelt (68 FR 45270; August 1, 2003), to be completed by March 1, 2004 (USFWS 2003b). USFWS has agreed to initiate the five-year review for the delta smelt at this time as a result of settlement negotiations on two recent lawsuits (USFWS 2003b).

CRITICAL HABITAT DESIGNATION

USFWS designated critical habitat for delta smelt on December 19, 1994 (59 FR 65256). Critical habitat for delta smelt is contained within Contra Costa, Sacramento, San Joaquin, Solano, and Yolo counties. It is designated in areas of all water and all submerged lands below the ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker bays);

and Montezuma Slough; and the existing contiguous waters contained within the Delta, as defined in Section 12220 of the California Water Code.

The critical habitat designation for delta smelt provides additional protection under Section 7 of the ESA with regard to activities that require federal agency action (59 FR 65256: December 19, 1994). In designating critical habitat, the USFWS identified the following primary constituent elements essential to the conservation of the delta smelt: (1) physical habitat; (2) water; (3) river flow; and (4) salinity concentrations required to maintain delta smelt habitat for spawning, larval and juvenile transport, rearing, and adult migration.

BACKGROUND/LIFE HISTORY

Delta smelt is endemic to Suisun Bay upstream of San Francisco Bay through the Delta in Contra Costa, Sacramento, San Joaquin, and Solano counties, California. Delta smelt is a euryhaline species (tolerant of a wide salinity range), which has a lifespan of approximately one year. The species spawns in freshwater and has been collected from estuarine waters up to 14 parts ppt salinity (Moyle et al. 1992). For a large part of its annual life span, this species is associated with the freshwater edge of the mixing zone (saltwater-freshwater interface), where the salinity is approximately 2 ppt (Ganssle 1966, Moyle et al. 1992, Sweetnam and Stevens 1993). Shortly before spawning, adult delta smelt migrate upstream from the brackish-water habitat associated with the mixing zone to disperse widely into river channels and tidally-influenced backwater sloughs (Radtke 1966; Moyle 1976; Wang 1991). The delta smelt spawning season varies from year to year and may occur from late winter to early summer (i.e., December through July). Moyle (1976) collected gravid adults from December to April, although ripe delta smelt were most common in February and March. In 1989 and 1990, Wang (1991) estimated that spawning had taken place from mid-February to late June or early July, with peak spawning occurring in late April and early May. A study of delta smelt eggs and larvae confirmed that spawning may occur from February through June, with a peak in April and May (Wang and Brown 1994 *in* DWR and Reclamation 1994).

After hatching, delta smelt larvae and juveniles move downstream toward the mixing zone where they are retained by the vertical circulation of fresh and salt waters (Stevens et al. 1990). When X2 is contained within Suisun Bay and when adequate transport and behavioral flows from both the Sacramento and San Joaquin rivers have allowed downstream movement, young delta smelt are dispersed more widely throughout a large expanse of shallow-water and marsh habitat than when X2 is upstream in the deeper Delta channels.

RECOVERY PLAN IMPLEMENTATION

USFWS completed a proposed recovery plan for the federally threatened delta smelt in August 1996. The objective of the recovery plan is *"...to remove delta smelt from the Federal list of threatened species through restoration of its abundance and distribution."* (USFWS 1996a). According to USFWS, the basic strategy to recover delta smelt is *"to manage the estuary in such a way that is better habitat for native fish in general and the delta smelt in particular."* (USFWS 1996a). For further description and additional detail of the recovery plan for delta smelt, please refer to *USFWS Recovery Plan for the Sacramento/San Joaquin Delta Native Fishes* (USFWS 1996a).

6.5.1.2. Central Valley Steelhead

LISTING STATUS

The Central Valley Steelhead Evolutionarily Significant Unit (ESU) is listed as "threatened" under the federal ESA, and has no listing status under the California ESA. Naturally spawning populations are known to occur in the lower American River, but are believed to have substantial hatchery influence and their ancestry is not clearly known (Busby et al. 1996). Additionally, steelhead runs in the lower American River are sustained largely by Nimbus Hatchery (McEwan and Jackson 1996).

CRITICAL HABITAT DESIGNATION

On February 16, 2000, NMFS designated critical habitat for the Central Valley ESU of steelhead (65 FR 7779). NMFS designated that critical habitat to include: 1) all river reaches accessible to listed steelhead in the Sacramento River and its tributaries in California; 2) all river reaches and estuarine areas of the Delta; 3) all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; 4) all waters of San Pablo Bay westward of the Carquinez Bridge; and 5) all waters of San Francisco Bay (north of the San Francisco-Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (65 FR 7779).

On April 30, 2002, under a Consent Decree, the United States District Court for the District of Columbia vacated NMFS' designation of critical habitat for the Central Valley ESU of steelhead (Consent Decree, *Nat'l Assn. Of Home Builders et al. v. Evans*, (D.D.C. Case No. 1:00-CV-02799 (CKK), dated April 30, 2002). On November 30, 2004, NMFS filed proposed rules with the Federal Register to designate critical habitat areas in Washington, Oregon, Idaho, and California for 20 species of salmon and steelhead listed as threatened and endangered under the ESA, including the Central Valley ESU of steelhead. The proposed rules include analyses of the economic and other impacts of such designations, and a range of areas that are being considered for exclusion in the final rules. Public hearings were held in January 2005 to receive comments and feedback on the proposal. Following the public comment period and hearings, the final rules are scheduled to be completed by NMFS by June 2005 (NMFS 2004b).

BACKGROUND/LIFE HISTORY

Adult steelhead immigration into Central Valley streams typically begins in December and continues into March. Steelhead immigration generally peaks during January and February (Moyle 2002). Optimal immigration water temperatures have been reported to range from 46°F to 52°F (CDFG 1991). Spawning usually begins during late-December and may extend through March, but also can range from November through April (CDFG 1986). Optimal water temperatures for steelhead spawning activities have been reported to range from 39°F to 52°F (CDFG 1991). Unlike Chinook salmon, many steelhead do not die after spawning. Those that survive return to the ocean, and may spawn again in future years.

Optimal water temperatures for egg and fry incubation have been reported to range from 48°F to 52°F, while optimal water temperatures for fry and juvenile rearing is

reported to range from 45°F to 60°F (CDFG 1991). Similar to Chinook salmon, it is believed that water temperatures up to 65°F are suitable for steelhead rearing. Each degree increase between 65°F and the upper lethal limit of 75°F becomes increasingly less suitable and thermally more stressful for the fish (Bovee 1978). The primary period of steelhead emigration occurs from March through June (Castleberry et al. 1991).

RECOVERY PLAN IMPLEMENTATION

In the Federal Register dated March 19, 1998, NMFS announced that it would issue protective regulations for the Central Valley steelhead under Section 4(d) of the ESA. NMFS has not yet published a proposed recovery plan for Central Valley steelhead.

6.5.1.3. Winter-run Chinook Salmon

LISTING STATUS

NMFS listed winter-run Chinook salmon as "threatened" under emergency provisions of the ESA in August 1989 (54 FR 10260), and formally listed the species as "threatened" in November 1990 (55FR 46515). The state of California listed winter-run Chinook salmon as "endangered" in 1989 under the California ESA. In June 1992, NMFS proposed that the winter-run Chinook salmon be reclassified as an "endangered" species (57 FR 27416). NMFS finalized its proposed rule and re-classified the winter-run Chinook salmon as an endangered species on January 4, 1994 (59 FR 440).

CRITICAL HABITAT DESIGNATION

On August 14, 1992, NMFS published a proposed critical habitat designation for the Sacramento River winter-run Chinook salmon (57 FR 35526). The habitat proposed for designation included: 1) the Sacramento River from Keswick Dam, Shasta County (RM 302) to Chipps Island (RM 0) at the westward margin of the Delta; 2) all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; 3) all waters of San Pablo Bay westward of the Carquinez Bridge; and 4) all waters of San Francisco Bay to the Golden Gate Bridge (NMFS 1997a).

On June 16, 1993, the final rule designating critical habitat was published (58 FR 33212). The habitat for designation was identical to that in the proposed ruling except that critical habitat in San Francisco Bay was limited to those waters north of the San Francisco-Oakland Bay Bridge.

BACKGROUND/LIFE HISTORY

Prior to construction of Shasta and Keswick dams in 1945 and 1950, respectively, winter-run Chinook salmon were reported to spawn in the upper reaches of the Little Sacramento, McCloud, and lower Pit rivers (Moyle et al. 1989). Completion of the Red Bluff Diversion Dam (RBDD) in 1966 enabled accurate estimates of all salmon runs to the upper Sacramento River based on fish counts at the fish ladders.

The first winter-run Chinook salmon upstream migrants appear in the Delta during the early winter months (Skinner 1972). On the upper Sacramento River, the first upstream migrants appear during December (Vogel and Marine 1991). Since the construction of

Shasta and Keswick dams, winter-run Chinook salmon spawning has primarily occurred between RBDD and Keswick Dam. The spawning period of winter-run Chinook salmon generally extends from mid-April to mid-August with peak activity occurring in June (Vogel and Marine 1991).

Winter-run Chinook salmon eggs hatch after an incubation period of about 40 to 60 days depending on ambient water temperatures. Emergence of the fry from the gravel begins during late June and continues through September. The emigration of juvenile winter-run Chinook salmon from the upper Sacramento River is highly dependent on streamflow conditions and water year type. Thus, emigration past Red Bluff may begin as early as July, generally peaks in September, and can continue until mid-March in drier years (Vogel and Marine 1991).

In the Delta, juvenile winter-run Chinook salmon generally occur from December through April as evidenced from trawling, seining, and CVP/SWP fish salvage data (CDFG 1993). High river flows in the winter and early spring reportedly assist juvenile fish migrating downstream to the estuary, while positive outflow from the Delta improves juvenile survival and migration to the ocean.

RECOVERY PLAN IMPLEMENTATION

In August 1997, NMFS published a proposed recovery plan for the Sacramento River winter-run Chinook salmon. The goal of this recovery plan was to identify and set priorities for actions necessary to ultimately restore the Sacramento River winter-run Chinook salmon as a naturally sustaining population throughout its present range. The recovery plan also identified actions to prevent any further erosion of the population's viability and it's genetic integrity.

6.5.1.4. Spring-run Chinook Salmon

LISTING STATUS

On September 16, 1999, NMFS listed the Central Valley ESU of spring-run Chinook salmon as a "threatened species" (64 FR 50393). On March 11, 2002, pursuant to a January 9, 2002 rule issued by NMFS under Section 4(d) of the ESA (15 USC 1533(d)), the take restrictions that apply statutorily to endangered species began to apply to the Central Valley ESU of spring-run Chinook salmon (67 FR 1116, 1129).

CRITICAL HABITAT DESIGNATION

On February 16, 2000, NMFS designated critical habitat for the Central Valley ESU of spring-run Chinook salmon (65 FR 7778). NMFS designated critical habitat to include: 1) all river reaches accessible to listed Chinook salmon in the Sacramento River and its tributaries; 2) all river reaches and estuarine areas of the Delta; 3) all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; 4) all waters of San Pablo Bay westward of the Carquinez Bridge; and 5) all waters of San Francisco Bay (north of the San Francisco-Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge (65 FR 7778). On April 30, 2002, under a consent decree, the United States District Court for the District of Columbia vacated NMFS' designation of critical habitat for the Central Valley ESU of

spring-run Chinook salmon (Consent Decree, *Nat'l Assn. Of Home Builders et al. v. Evans*, (D.D.C. Case No. 1:00-CV-02799 (CKK), dated April 30, 2002).

On November 30, 2004, NMFS proposed new critical habitat designations for seven ESUs of Pacific salmon and steelhead in California, including the California Central Valley steelhead ESU. Within the action area, proposed critical habitat for Central Valley steelhead includes the lower American River and Dry Creek, extending from the headwaters to the confluence with the Sacramento River via the Natomas East Main Drainage Canal. Unlike the February 2000 designations that included "all accessible river reaches within the current range of the listed species," the November 2004 proposal identifies stream reaches where listed salmon and steelhead have actually been observed or where biologists with local area expertise presume them to occur. Therefore, certain areas previously identified in 2000 are being considered for exclusion in the final rules. Following an extension of the public comment period on the proposed critical habitat designations, the public comment period closed in March 2005. NMFS is expected to issue final critical habitat designations for Central Valley steelhead in September 2005.

BACKGROUND/LIFE HISTORY

Historically, spring-run Chinook salmon were predominate throughout the Central Valley, occupying the upper and middle reaches of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud, and Pit rivers, with smaller populations in most other tributaries with sufficient habitat for over-summering adults (Stone 1874; Rutter 1904; Clark 1929). Spring-run Chinook salmon no longer exist in the American River due to the existence and operation of Folsom Dam (NMFS 2000).

Central Valley spring-run Chinook salmon adults are estimated to leave the ocean and enter the Sacramento River from March to July (Myers et al. 1998). Spring-run Chinook salmon spawning typically occurs between late-August and early October with a peak in September. Most "yearling" spring-run Chinook salmon move downstream in the first high flows of the winter from November through January (USFWS 1995; CDFG 1998). In the Sacramento River and other tributaries, juveniles may begin migrating downstream almost immediately following emergence from the gravel with emigration occurring from December through March (Moyle et al. 1989; Vogel and Marine 1991).

Natural spawning populations of Central Valley spring-run Chinook salmon are currently restricted to accessible reaches in the upper Sacramento River, Antelope Creek, Battle Creek, Beegum Creek, Big Chico Creek, Butte Creek, Clear Creek, Deer Creek, Feather River, Mill Creek, and Yuba River (CDFG 1998; USFWS unpublished data). With the exception of Butte Creek and the Feather River, these populations are believed to be relatively small, ranging from a few fish to several hundred fish.

RECOVERY PLAN IMPLEMENTATION

NMFS has not yet published a proposed recovery plan for the Central Valley spring-run Chinook salmon.

6.5.1.5. ***Green Sturgeon***

LISTING STATUS

On April 5, 2005, NMFS filed a proposed rule to list the southern population of North American green sturgeon as threatened under the ESA. This species has no listing status under the California ESA. Because there is limited reported information about green sturgeon available, particularly with respect to species utilization of the lower American River, a broader scope of information is presented below.

CRITICAL HABITAT DESIGNATION

Critical habitat has not been designated for green sturgeon.

BACKGROUND/LIFE HISTORY

Green sturgeon is an anadromous species, migrating from the ocean to freshwater to spawn. San Francisco Bay and its associated river systems contain the southern-most spawning population of green sturgeon, and spawning populations have been identified in the Sacramento River (Beak Consultants 1993). Adults begin their inland migration in late-February (Moyle et al. 1995), and enter the Sacramento River between February and late-July (CDFG 2001). The green sturgeon spawning period generally extends from March through July, with peak spawning occurring from mid-April through mid-June (Moyle et al. 1992 *in* NMFS 2003). Spawning is believed to be triggered by seasonal floods and corresponding changes in water temperature, flow velocity, and turbidity (Kohlhorst et al. 1991; CDFG 1992). In the Sacramento River, green sturgeon presumably spawn at temperatures ranging from 46°F to 57°F (Beak Consultants 1993) and water temperatures above 20°C (68°F) are lethal to green sturgeon embryos (Cech et al. 2000 *in* NMFS 2003). Green sturgeon larvae first feed at about 10 days post-hatch, and metamorphosis to the juvenile lifestage is generally complete at 45 days. Juveniles appear to spend one to three years in fresh water before they enter the ocean (Nakamoto et al. 1995 *in* NMFS 2003). Small numbers of juvenile green sturgeon have been captured and identified each year from 1993 through 1996 in the Sacramento River at the Hamilton City Pumping Plant (RM 206) (Brown 1996). Lower American River fish surveys conducted by the CDFG have not collected green sturgeon (Snider 1997).

RECOVERY PLAN IMPLEMENTATION

The green sturgeon is not currently included in the NMFS' list of federally threatened species with a final recovery plan.

6.5.1.6. Slender Orcutt Grass

LISTING STATUS

On April 25, 1997, the USFWS listed the slender orcutt grass as a threatened species (62 FR 14338). This species was listed as endangered by the California Department of Fish and Game in September 1979. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

CRITICAL HABITAT DESIGNATION

On September 5, 2003, the USFWS designated critical habitat for the slender orcutt grass (68 FR 46742). USFWS designated critical habitat to include: 1) 16 units in California (i.e., Modoc Plateau, Stillwater Plains, Inskip Hill, Vina Plains, and Bogg's Lake) (68 FR 46742 to 42743).

BACKGROUND/LIFE HISTORY

Slender Orcutt grass occurs in valley grassland and blue oak woodland. It grows in vernal pools on remnant alluvial fans and high stream terraces and recent basalt flows. The species is restricted to northern California. Scattered, disjunct populations occur in the Sacramento Valley from Siskiyou County to Sacramento County. Most of the 59 native extant populations are in Shasta County and Tehama County. The species is also found in Lake, Lassen, Plumas, Sacramento and Siskiyou counties. The native perennials common spikerush (*Eleocharis macrostachya*) and button-celery (*Eryngium* spp). appear to limit distribution and abundance of three populations of slender Orcutt grass in Shasta County and ten populations in Tehama County.

Several historically known populations have been eliminated by agricultural conversion, airport construction, and wetland draining for mosquito abatement. Many undocumented populations were probably lost during the intensive agricultural development that eliminated many vernal pools in the Central Valley. Twenty-three populations are variously threatened by urbanization, altered hydrology, off-highway vehicles, and competition from nonnative weeds.

Livestock grazing and associated trampling may or may not adversely affect vernal pool plants depending on, among other things, the kind of livestock, stocking level, season of use and grazing duration. However, as long as the land remains in dry pasture, moderate grazing regimes appear to have little impact on Orcutt grasses. Human activities that alter the hydrology of vernal pools, including changes in the amount of water or the length of inundation, may directly and indirectly affect vernal pool plants.

Populations are protected at The Nature Conservancy's Boggs Lake (Lake County) and Vina Plains (Tehama County) Preserves. The U.S. Forest Service and U.S. Bureau of Land Management manage and protect 12 populations on federal lands. Most of the populations on non-Federal lands are not protected.

RECOVERY PLAN IMPLEMENTATION

USFWS has a recovery plan for the Vernal Pools of Northern California under development.

6.5.1.7. Sacramento Orcutt Grass

LISTING STATUS

On April 25, 1997, the USFWS gave its final rule on the listing of the Sacramento orcutt grass as endangered (62 FR 14338). This species was listed as endangered by the California Department of Fish and Game in July 1979. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

CRITICAL HABITAT DESIGNATION

On September 5, 2003, the USFWS designated critical habitat for the Sacramento orcutt grass (68 FR 46740). USFWS designated critical habitat to include the Rancho Seco Unit in Sacramento and Amador Counties (68 FR 46740).

BACKGROUND/LIFE HISTORY

Sacramento Orcutt grass (*Orcuttia viscida*) is a small, densely tufted annual member of the grass family (Poaceae). Although Sacramento Orcutt grass is geographically isolated from all other members of the genus, it most closely resembles the threatened San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*). Sacramento Orcutt grass grows in relatively large, deep vernal pools. It is restricted to a region of approximately 135 square miles in eastern Sacramento County, with no historic locations are known outside this area. The distance between the northernmost and southernmost population is only 18 miles. The modern range of the species is somewhat smaller than the known historical range because two known populations have been extirpated. The distribution and abundance of Sacramento Orcutt grass at six of the seven extant sites is significantly restricted by common spikerush (*Eleocharis macrostachya*), which appears to threaten one population through competitive exclusion.

The species has declined mainly due to severe habitat loss caused by agricultural and urban development. Because the human population of the Central Valley is growing rapidly, numerous populations of Orcutt grasses, including Sacramento Orcutt grass, have been extirpated and continue to be threatened by urban development projects.

Three of the seven remaining known populations of Sacramento Orcutt grass occur on private lands and four populations occur on non-federal public lands. One of these sites is owned by a public municipality, one by the County of Sacramento, one by the City of Fair Oaks and another one by California Department of Fish and Game in a small, urban preserve. Five of the seven remaining populations are threatened by one or more of the following: a proposed landfill project, urban development, and competition from nonnative weeds.

RECOVERY PLAN IMPLEMENTATION

USFWS has a recovery plan for the Vernal Pools of Northern California under development.

6.5.1.8. Vernal Pool Fairy Shrimp

LISTING STATUS

On September 19, 1994, the USFWS gave its final rule on the vernal pool fairy shrimp to list the species as threatened (59 FR 48136).

CRITICAL HABITAT DESIGNATION

On September 5, 2003, the USFWS designated critical habitat for the vernal pool fairy shrimp (68 FR 46723). USFWS designated critical habitat to include: 1) four units in Oregon (i.e., the North Agate Desert, the White City East, the White City West, and the

Table Rocks in Jackson County); and 2) 29 units in California (i.e., Redding, Red Bluff, Vina Plains, Orland, Beale, Western Placer County, Napa River, San Joaquin, Altamont Hills, Stanislaus, Merced, Cross Creek, Madera, Pixley, San Benito County, Central Coastal Ranges, Carrizo Plain, Lake Cachuma, and Ventura County) (68 FR 46724 to 42729).

BACKGROUND/LIFE HISTORY

Vernal pool fairy shrimp were first described by Eng et al. in 1990 from a type specimen that was collected in 1982 at Souza Ranch, Contra Costa County, California. The species occurs in disjunct fragmented habitats distributed across the Central Valley of California from Shasta County to Tulare County and the central and southern coast ranges from northern Solano County to Ventura County, California. Additional disjunct occurrences have been identified in southern California and in Oregon. In Oregon, the species' distribution is limited to the vicinity of an approximately 32 square mile (mi^2), 82.9 square kilometer (km^2) area known as the Agate Desert in Jackson County, north of Medford. In southern California, the distribution is equally limited, with populations occurring in three areas in Riverside County. Vernal pool fairy shrimp are characterized by the presence and size of several bulges on the male's antenna, and by the female's short, pyriform or pear shaped brood pouch. Vernal pool fairy shrimp vary in size, ranging from 0.4 to 1.0 in (11 to 25 mm) in length (Eng et al. 1990). Vernal pool fairy shrimp are currently found in 27 counties across the Central Valley and coast ranges of California, inland valleys of southern California, and southern Oregon. Although vernal pool fairy shrimp are distributed more widely than most other fairy shrimp species, they are generally uncommon throughout their range and rarely abundant where they do occur (Eng et al. 1990; Eriksen and Belk 1999).

RECOVERY PLAN IMPLEMENTATION

USFWS has a recovery plan for the Vernal Pools of Northern California under development.

6.5.1.9. Vernal Pool Tadpole Shrimp

LISTING STATUS

On September 19, 1994, the USFWS gave its final rule on the vernal pool tadpole shrimp to list the species as endangered (59 FR 48136).

CRITICAL HABITAT DESIGNATION

On September 5, 2003, the USFWS designated critical habitat for the vernal pool tadpole shrimp (68 FR 46729). USFWS designated critical habitat to include 13 units in California (i.e., Stillwater Plains, Dales, Vina Plains, Dolan, Beale, Cosumnes, Davis Communications Annex, Stanislaus, San Francisco Bay, Merced, and Tulare) (68 FR 46729 to 42731).

BACKGROUND/LIFE HISTORY

Vernal pool tadpole shrimp were initially described by Simon in 1886 and named *Lepidurus packardi.* After subsequent reclassification by Longhurst (1955), the species was given a subspecies status based primarily on the lack of apparent geographic

boundaries between *L. apus* and *L. packardi* populations. Lynch (1972) resurrected *L. packardi* to full species status based on further examination of specimens, and this is the currently accepted taxonomic status of vernal pool tadpole shrimp. Vernal pool tadpole shrimp inhabit sites in California's Central Valley and San Francisco Bay area. The geographic range of this species includes disjunct occurrences found in the Central Valley from Shasta County to northern Tulare County, and in the central coast range from Solano County to Alameda County. Vernal pool tadpole shrimp are known from 160 occurrences (CNDDB 2001). Vernal pool tadpole shrimp are distinguished by a large, shieldlike carapace, or shell, that covers the anterior half of their body. Vernal pool tadpole shrimp have 30 to 35 pairs of phyllopods, a segmented abdomen, paired cercopods or tail-like appendages, and fused eyes. Vernal pool tadpole shrimp will continue to grow as long as their vernal pool habitats remain inundated, in some cases for six months or longer. They periodically shed their shells, which can often be found along the edges of vernal pools where vernal pool tadpole shrimp occur. Mature vernal pool tadpole shrimp range in size from 0.6 to 3.4 in (15 to 86 mm) in length. Vernal pool tadpole shrimp have relatively high reproductive rates. Ahl (1991) found that fecundity increases with body size. A large female greater than 0.8 in (20 mm) in carapace length could deposit as many as 6 clutches, averaging 32 to 61 eggs per clutch, in a single wet season.

RECOVERY PLAN IMPLEMENTATION

USFWS has a recovery plan for the Vernal Pools of Northern California under development.

6.5.1.10. Valley Elderberry Longhorn Beetle

LISTING STATUS

USFWS listed VELB as "threatened" on August 8, 1980 (45 FR 52803). Several factors contributed to the USFWS decision to list VELB as a threatened species under the federal ESA, including: 1) degradation of undisturbed patches of riparian habitat; 2) extensive clearance of riparian forest for fuel, building material and agricultural, as well as urban and suburban development; 3) extensive use of pesticides; and 4) overgrazing.

CRITICAL HABITAT DESIGNATION

The USFWS has designated the American River Parkway as critical habitat for VELB (USFWS 1996b). This decision was based on recorded findings that the species has a strong presence in elderberry shrubs near backwater ponds along the lower American River. VELB critical habitat is designated within a portion of the City of Sacramento that encompasses an area enclosed on the north by the Route 160 freeway, on the west and southwest by the Western Pacific railroad tracks, and on the east by Commerce Circle and extends southward to the railroad tracks (45 FR 52803, August 8, 1980). In addition, the *Recovery Plan for the Valley Elderberry Longhorn Beetle* (USFWS 1984) also considers an area along Putah Creek in Solano County and the area west of Nimbus Dam along the American River Parkway in Sacramento County, to be essential VELB habitat because these areas support large numbers of mature elderberry shrubs which show extensive evidence of use by the beetle (USFWS 1996b).

BACKGROUND/LIFE HISTORY

The VELB's range in California consists of patchy distribution from as high as 3,000 feet from Redding south to Bakersfield, and the western Sierra Nevada foothills to eastern Coast Range foothills (USFS 2000). The VELB is dependent on its host plant, elderberry (*Sambucus spp*.), which is a common component of the remaining riparian forests of the Central Valley (USFWS 1996b). The VELB do not travel well so if a tree is isolated from other strands of elderberry that are hosting VELB, it is unlikely that the VELB will move to other trees, especially if their distance is greater than one mile (HCP Stakeholders 2003). Use of the plants by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larva just prior to the pupal stage (USFWS 2003a). Field work along the Cosumnes River and in the Folsom Reservoir area indicates that larval galleries can be found in elderberry stems with no evidence of exit holes; the larvae either succumb prior to constructing an exit hole or are not far enough along in developmental process to construct an exit hole (USFWS 2003a). Larvae appear to be distributed in stems which are one inch or greater in diameter at ground level (USFWS 1996b).

The life cycle takes one or two years to complete with most of that time spent as larvae living within the stems of the plant. Adults generally emerge from late March through June, and adults are short lived. In March to early June, adults feed in the riparian areas in which they breed on the foliage and possibly the flowers of elderberry trees or shrubs of *Sambucus mexicana* and *S. racemosa* (USFS 1993). The adults eat the elderberry foliage until mating begins.

Eggs are laid in May on elderberry stems greater than one inch in diameter, as measured at the base, on healthy and unstressed plants. VELB larvae excavate passages into the elderberry shrub, where they may remain in larval form for as long as two years before they emerge as adults. Upon hatching the larvae then begin to tunnel into the tree where they will spend 1 to 2 years eating the interior wood, which is their sole food source.

RECOVERY PLAN IMPLEMENTATION

USFWS completed a recovery plan for the federally threatened VELB in 1984. The goals of the recovery plan for VELB are …" *to protect the three known localities, survey riparian vegetation along certain Central Valley rivers for remaining VELB colonies and habitats, provide protection to remaining VELB within its suspected historic ranges, and determine the number of sites and populations.*" On July 9, 1999, the USFWS issued revised conservation guidelines for VELB. This most recently issued version of the guidelines should be used in developing all actions and habitat restoration plans. The survey and monitoring procedures described in these guidelines are designed to avoid any adverse effects to the VELB, and obviates the need of a permit to survey for VELB or its habitat, or to monitor conservation areas (USFWS 1984). For further description and additional detail of the recovery plan and the new conservation guidelines for VELB in the Action Area, please refer to *Recovery Plan for the Valley Elderberry Longhorn Beetle* (USFWS 1984) and to the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999), respectively.

6.5.2. Essential Fish Habitat Managed Species

The 1996 reauthorization of the MSFCMA added a provision for federal agencies to consult with NMFS on impacts to EFH (see Section 6.4.1, Legal and Statutory Authorities). Because EFH only applies to commercial fisheries, Chinook salmon (i.e., winter-run, spring-run, fall-run, and late fall-run) is the only listed species within the action area for which EFH must be considered. Steelhead and green sturgeon habitat is removed from consideration because there are no commercial fisheries for these species.

EFH is defined in the MSFCMA, and NMFS has provided further clarification of the definition of EFH in the document titled *Essential Fish Habitat Consultation Guidance* (NMFS 1999), which identifies EFH as follows: …EFH is defined in the MSFCMA as "…those waters and substrate necessary to fish for spawning, breeding, feeding or growth and maturity…" NMFS regulations further define "waters" to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" to include sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" to mean habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" to cover a species' full life cycle.

EFH includes all anadromous streams (including some intermittent streams) up to impassable barriers. In the American River Basin, EFH includes the lower American River up to Nimbus Dam. In the Central Valley, EFH also includes accessible waters of the Delta, Sacramento River, and tributaries up to impassable barriers. Within the action area, Keswick Dam represents the first impassible barrier on the Sacramento River.

Federal agencies must consult with NMFS on all actions that may adversely affect EFH (Section 305 (b)(2) of the MSFCMA). The EFH consultation regulations state that existing procedures should be used to the greatest extent possible (50 CFR 600.920(e)). Therefore, the ESA consultation process and the NEPA process are two coordination procedures that may be used to satisfy EFH consultation requirements (NMFS 1999). For the purposes of this ESA consultation, all potential impacts associated with the Proposed Action are included in the habitat evaluations which address potential effects to the federally listed as threatened spring-run Chinook salmon ESU, the federally listed as endangered winter-run Chinook salmon ESU, and the Central Valley fall-run Chinook salmon ESU (see Section 6.5.2.1, Fall-run/Late Fall-run Chinook Salmon, below). Thus, a separate EFH document is not required for the Proposed Action. Information regarding the potential effects of the Proposed Action that is contained within this BA, and in the EA for this Proposed Action/Proposed Project, satisfy the analytical requirements of EFH for Chinook salmon within the action area.

6.5.2.1. Fall-run/Late Fall-run Chinook Salmon

LISTING STATUS

Fall-run Chinook salmon is a species of recreational/commercial importance as well as a species of concern under the federal ESA. Fall-run Chinook salmon has recently been removed from the federal list of candidate species but which remains a federal species of concern[3]. Fall-run Chinook salmon has been the dominant run of Chinook salmon in the lower American River since the 1940's (SWRI 2001). Because NMFS also recognizes late fall-run Chinook salmon in the Central Valley fall/late fall-run ESU (NMFS 2004), both runs will be addressed simultaneously in this evaluation. This species has no listing status under the California ESA.

IDENTIFICATION OF ESSENTIAL FISH HABITAT

The Pacific Coast Salmon Plan has designated EFH for the Pacific Coast salmon fishery, which includes those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem. In estuaries and marine areas, salmon EFH extends from the shoreline to the 200-mile boundary of the Exclusive Economic Zone (EZZ) offshore of Washington, Oregon, and California north of Point Conception. In fresh water, salmon EFH includes all the streams, lakes, ponds, rivers, wetlands or other bodies of water that have been historically accessible to salmon. Salmon EFH also includes those areas above all artificial barriers, except for certain dams that fish cannot pass. However, activities that occur above impassable dams that are likely to adversely affect Chinook salmon EFH below the dams would be subject to consultation under the MSFCMA. Portions of the action area for the Proposed Action are identified as EFH for fall-run Chinook salmon.

BACKGROUND/LIFE HISTORY

Adult fall-run Chinook salmon begin migrating upstream annually in August and September, with immigration continuing through December in most years and January in some years. Adult immigration activities generally peak in November, and typically, greater than 90 percent of the run has entered the lower American River by the end of November (CDFG 1992, 1995). The immigration timing of fall-run Chinook salmon tends to be temporally similar year-to-year because it is largely dictated by cues (photoperiod, maturation, and other season environmental cues) that exhibit little year-to-year variation.

The timing of adult Chinook salmon spawning activity is strongly influenced by water temperature. When daily average water temperatures decrease to approximately 60°F,

3 On April 15, 2004, NMFS published a notice in the Federal Register acknowledging establishment of a species of concern list, addition of species to the species of concern list, description of factors for identifying species of concern, and revision of the candidate species list. In this notice, NMFS announced the Central Valley Fall and Late Fall-run Chinook Salmon ESU change in status from a candidate species to a species of concern. In 1999, the Central Valley ESU underwent a status review after NMFS received a petition for listing. Pursuant to that review, NMFS found that the species did not warrant listing as threatened or endangered under the ESA, but sufficient concerns remained to justify addition to the candidate species list. Therefore, according to the NMFS April 15, 2004 interpretation of the ESA provisions, the Central Valley ESU now qualifies as a species of concern, rather than a candidate species (69 FR 19977).

female fall-run Chinook salmon begin to construct nests (redds) into which their eggs are deposited and simultaneously fertilized by the male. Fertilized eggs are subsequently buried with streambed gravel. Due to the timing of adult arrivals and occurrence of appropriate spawning temperatures, spawning activity in recent years in the lower American River, for example, has peaked during mid- to late-November (CDFG 1992, 1995).

The intragravel residence period of incubating eggs and alevins (yolk-sac fry) is highly dependent upon water temperature and generally extends from about mid-October through March. Within the lower American River, fall-run Chinook salmon fry emergence generally occurs from late-December through mid-May.

In the Sacramento River Basin, fall-run Chinook salmon juvenile emigration occurs from January through July (Vogel and Marine 1991; Yoshiyama et al. 1998). Emigration surveys conducted by CDFG have shown no evidence that peak emigration of fall-run Chinook salmon is related to the onset of peak spring flows in the lower American River (Snider et al. 1997). Temperatures required during emigration are believed to be about the same as those required for successful rearing.

MANAGEMENT PLANS

Chinook salmon are managed under the Pacific Coast Salmon Plan (PCSP). Additionally, measures for recovery of late fall-run Chinook salmon populations are presented in the AFRP, and the *Recovery Plan for Sacramento-San Joaquin Delta Native Fishes*. CALFED and CDFG are working together to identify restoration goals following the viable salmonid populations framework, which aims to ensure the long-term viability of Sacramento-San Joaquin fall-run and Sacramento late fall-run Chinook salmon.

6.5.3. Environmental Baseline

The regulations governing ESA consultations define “environmental baseline” as follows (50 CFR 402.02):

> *The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have already undergone formal or early Section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.*

A part of the evaluation for the Proposed Action utilized hydrologic modeling output to assist in the determination of potential effects to listed, proposed, and candidate species. According to the definition provided above, the hydrologic modeling simulations of all past and present actions included implementation of the CVPIA and the interim operations of the CVP and SWP, which have all completed Section 7 consultation. In addition, the hydrologic modeling simulations included the operation parameters contained in those biological opinions listed in Section 6.4.2.4, which have

completed Section 7 consultation as well. Therefore, the environmental baseline for the Proposed Action is consistent with the existing condition, as defined in Appendix I.

6.6. EFFECT DETERMINATIONS AND CONCLUSIONS

This joint environmental document, as discussed, has been prepared to meet the requirements of CEQA, NEPA, and the federal ESA, as well as EFH-managed fish species. Impact determinations and supportive discussions provided previously in Chapter 5, Environmental Consequences, as they pertain to listed, proposed listed, candidate, and EFH-managed species are not reiterated here. For all aquatic listed, proposed listed, candidate, and EFH-managed fish species within the regional study area portion of the action area potentially affected by the Proposed Action, impact determinations are provided in Section 5.4 (Biological Resources). For all listed, proposed listed, candidate, and EFH-managed fish species within the City's service area, impact determinations are similarly provided in Section 5.4 (Biological Resources).

A summary of the impact conclusions for each federally listed, proposed listed, candidate, and EFH-managed fish species is provided below.

6.6.1. Direct and Indirect Effects

Direct effects to a listed species or its habitat are caused by the direct or immediate effects of the Proposed Action and occur at the time of the action. Indirect effects are those that are caused by or result from the Proposed Action, are later in time, and are reasonably certain to occur (USFWS, NMFS and AFS 2001).

<u>Fish Species within the Regional Study Area Portion of the Action Area:</u>

- Green sturgeon (*Acipenser medirostris*)
- Delta smelt (*Hypomesus transpacificus*)
- Steelhead (*Oncorhynchus mykiss*)
- Winter-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Fall-run/late fall-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Spring-run Chinook salmon (*Oncorhynchus tshawytscha)*

All federally listed, proposed listed, candidate, and EFH-managed fish species known to occur within the regional study area portion of the action area are not likely to be adversely affected by the Proposed Action.

<u>All Species within the City Service Area Portion of the Action Area:</u>

- Slender Orcutt grass (*Orcuttia tenuis*)
- Sacramento Orcutt grass (*Orcuttia viscida*)
- Vernal pool fairy shrimp (*Branchinecta lynchi*)
- Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
- Vernal pool tadpole shrimp (*Lepiduras packardi*)
- Steelhead (*Oncorhynchus mykiss*)
- Winter-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Fall-run/late fall-run Chinook salmon (*Oncorhynchus tshawytscha*)

All federally listed, proposed listed, candidate, and EFH-managed species known to occur within the City service area portion of the action area are not likely to be adversely affected by the Proposed Action.

6.6.2. Interrelated Effects

Interrelated actions are those that are part of a larger action and depend on the larger action for their justification (i.e., this action would not occur "but for" a larger action) (USFWS, NMFS and AFS 2001). The execution of a Warren Act contract and delivery of water pursuant thereto is not reliant upon a larger action for its implementation. Therefore, implementation of the Proposed Action would not result in interrelated effects according to the definition provided above. However, the Proposed Action and related components are consistent with the Water Forum Agreement, described above, and its coequal objectives of: 1) providing a reliable and safe water supply for the region's economic health and planned development through the year 2030; and 2) preserving the fishery, wildlife, recreational, and aesthetic values of the lower American River. For further description and detail regarding the Water Forum, please refer to the Water Forum Action Plan (Water Forum 2000).

6.6.3. Interdependent Effects

Interdependent actions are those that have no significant utility apart from the action that is under consideration (i.e., other actions would not occur "but for" this action) (USFWS, NMFS and AFS 2001). The exact amount of non-project water to be conveyed through the City of Roseville Warren Act contracts varies from year to year and cannot be predicted in advance. The use of federal facilities is usually the most efficient means to deliver the contractor's water supply and frequently, as is the case with the City of Roseville, supplements a federal water supply (i.e., CVP water service contract). Therefore, there would be no interdependent effects of the Proposed Action on the physical environment as a result of execution of the Warren Act contract and delivery of water pursuant thereto.

6.6.4. Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area. Future federal actions that are unrelated to the Proposed Action are not considered in this section because they will be subject to separate consultation pursuant to Section 7 of the ESA (USFWS, NMFS and AFS 2001).

This joint environmental document, as discussed above, has been prepared to meet the requirements of CEQA, NEPA, and the federal ESA. Cumulative impact determinations and supportive discussions are provided in Chapter 7, Other Impact Considerations, as they pertain to listed, proposed listed, candidate, and EFH managed fish species are not reiterated here. For all aquatic listed, proposed listed, candidate, and EFH managed fish species within the regional study area portion of the action area potentially affected by the Proposed Action, impact determinations are provided in Section 7.1.2.1 (Biological Resources).

6.7. CONSERVATION MEASURES AND COMMITMENTS

6.7.1. CVP/SWP System-Wide

As noted previously, Reclamation is presently operating the CVP and DWR is presently operating the SWP in accordance with several biological opinions and agreements, which collectively serve to protect threatened and the endangered species, including those species that may be affected by the Proposed Action. Reclamation is committed to operate the CVP consistent with all current operations criteria and applicable biological opinions, especially those addressing the CVP Operations Criteria and Plan (CVP-OCAP), Los Vaqueros, and the Record of Decision for the CALFED Bay-Delta Program. As a result of a number of factors, including new information, CALFED actions, and newly listed species, Reclamation committed to reinitiate consultation on the CVP-OCAP so that CVP operations could be re-evaluated in the context of current conditions.

The USFWS Biological Opinion on Implementation of the CVPIA and Continued Operation of the CVP (October 2000) identified several ongoing commitments that Reclamation and USFWS would implement that generally include:

Commitments Associated with Implementation of the CVPIA

- Anadromous Fisheries Restoration Activities (§ 3406(b)(1))
- Habitat Restoration Program (§ 3406(b)(1) other)
- Management of Dedicated Yield (§ 3406(b)(2))
- Supplemental Water Acquisition Program (§ 3406(b)(3))

Commitments Associated with Long-term Renewal of CVP Water Service Contracts
Commitments for Activities Associated with CVP Water and/or Facilities
Commitments Associated with CVP Conveyance and Storage
Commitments Associated with Operations and Maintenance Planning
Commitments Associated with Conservation Programs

Under the USFWS Biological Opinion on Implementation of the CVPIA and Continued Operation of the CVP (October 2000), specific commitments by Reclamation and USFWS have been made to ensure that all aspects of the CVP and CVPIA, for which either agency has discretionary authority, will be in compliance with the ESA. These are specifically set out at pages 2-72 through 2-74 of the October 2000 UFSWS Biological Opinion.

A biological assessment for the CVP and SWP Operations Criteria and Plan (OCAP) was issued by Reclamation on March 22, 2004. On June 30, 2004, Reclamation issued a revised OCAP and associated biological assessment. In October 2004, NMFS issued a Biological Opinion on the effects of the long-term CVP and SWP OCAP on federally-listed endangered Sacramento River winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, threatened Central Valley steelhead, threatened southern Oregon/ northern California coast coho salmon, and threatened central California coast steelhead and their habitat (NMFS 2004a). The October 2004 BO superceded all previous Biological Opinions regarding the CVP and SWP OCAP. In addition, in July 2004, USFWS issued a Biological Opinion for the coordinated

operations of the CVP and SWP and the OCAP on the federally threatened delta smelt (Reclamation 2004a). These OCAP BOs address required commitments under the ESA for continued operation of the CVP and SWP. Reclamation is committed to continue operating the CVP in conformance with existing or new biological opinions addressing listed species.

6.7.2. City Service Area

None of the listed, proposed listed, candidate, or EFH-managed species within the City service area have the potential to be adversely affected, either directly or indirectly, by the Proposed Action. Vernal pool invertebrate species (i.e., vernal pool fairy shrimp and vernal pool tadpole shrimp) do, however, show the potential to have their potential habitats reduced, as approved development within the City continues.

The MOU between the City and USFWS outlines the specific processes intended to provide the long-term protection necessary for vernal pool species. Specifically, the MOU identified, at the time of its signing, the commitment of the City to address the needs of vernal pool species occupying vernal pool habitats within the plan area within the context of an HCP or equivalent (see Section 8.3 of the MOU). Since the MOU was signed, the City and USFWS have agreed not to pursue an HCP for remaining developing properties within the City but, rather, address species protections for remaining buildout on a project-by-project basis. Additionally, as part of the guidance for the City's interim conservation strategy, the MOU also identified several milestones with which it committed the City to pursue regarding the management of its vernal pool preserves. The MOU requested the City to identify and map all existing, including City permitted, vernal pool resources within the plan area (see Section 7.3b. of the MOU). See Appendix K for the 30-day deliverables (four maps) agreed to by the City under the MOU. The City also was requested to develop individual operations and maintenance plans for each vernal pool preserve established through the interim conservation strategy and for certain existing vernal pool preserves established by prior agreement between the City and USFWS. Using this approach, existing and future vernal pool preserves would be managed consistent with the larger sub-regional City of Roseville HCP or equivalent and regional county-wide HCP/NCCP being pursued by Placer County. Previous discussions of the City's commitments in meeting the requirements set out by the MOU have been provided in Section 5.4.1.1 (see also Appendix J, City of Roseville/USFWS MOU and related correspondence).

The City, through their May 10, 2001 conveyance letter to USFWS, reported on the MOU deliverables that either had been, or were in the process of being furnished to USFWS. On June 28, 2001, USFWS acknowledged receipt of deliverables, provided input on various components of the draft interim strategy and sample operations and maintenance plan, and identified points of agreement (with the City's prepared deliverables). On December 5, 2001, the City clarified its understanding of Service comment on deliverables, transmitted the data files for all MOU associated vernal pool mapping efforts, and identified the prospects for integrating O&M across preserves under different scenarios. The City and USFWS will continue to refine and finalize the long-term vernal pool conservation plan and interim planning strategy, and also continue to work with each other to implement all of the remaining measures outlined in the MOU.

It is the position of the City and USFWS that through satisfactory completion and implementation of the various commitments and requirements associated with the MOU, that indirect effects to listed, proposed listed, and candidate species within the City plan area (service area) have otherwise been evaluated, minimized, and mitigated, in accordance with the provisions of the federal ESA. Both the City and USFWS have agreed through the MOU that USFWS will provide regulatory assurances consistent with its statutory authorities upon issuance of an ITP.

Chapter 7
Other Impact Considerations

Both NEPA and CEQA require specific analysis of cumulative impacts. Reclamation NEPA policies further require that, along with environmental review and assessment activities, consideration be given to short-term uses of the environment versus long-term productivity, irreversible and irretrievable commitment of resources, Indian Trust Assets (ITA), and Environmental Justice. Chapter 5 (Environmental Consequences) describes the affected environment and potential environmental consequences of the Proposed Action/Proposed Project and the Downstream Diversion Alternative for specific resource categories and impact issues. This chapter addresses broader, indirect, and more qualitative impact issues associated with the above NEPA and CEQA requirements. The purpose of this chapter is to describe and evaluate:

- Potential cumulative impacts of the Proposed Action/Proposed Project when added to other past, present, and reasonably foreseeable future projects;
- The relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity;
- Irreversible and irretrievable commitments of resources associated with the project; and
- Consistency of the project with Reclamation ITA (Department of Interior Secretarial Order 3175) and Environmental Justice (Executive Order 12898) policies.

7.1. CUMULATIVE IMPACTS

Cumulative impacts are defined in CEQA Regulations (40 CFR 1508.7 and 1508.25) as follows:

> "*Cumulative impact* is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The State CEQA Guidelines (Section 15130(b)) describe the scope of the cumulative impacts analysis as follows:

> "The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided of the effects attributable to the project alone. The discussion should be guided by the standards of practicality and reasonableness. The following elements are necessary to an adequate discussion of cumulative impacts:
> (1) Either:

(A) A list of past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the agency, or

(B) A summary of projections contained in an adopted general plan of related planning document, which is designed to evaluate regional or area wide conditions. Any such planning document shall be referenced and made available to the public at a location specified by the Lead Agency;

(2) A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available; and

(3) A reasonable analysis of the cumulative impacts of the relevant projects. An EIR shall examine reasonable options for mitigation or avoiding any significant cumulative effects of a proposed project."

Within the context of this joint environmental document, cumulative impacts are identified and discussed. NEPA and the federal ESA both require an analysis of cumulative impacts. Cumulative impacts also are addressed within the context of question XVII (b) of the Environmental Checklist completed to satisfy the CEQA requirements for an Initial Study (see Section 5.19, CEQA Environmental Checklist).

Comprehensive listings of past, present, and reasonably foreseeable future actions have been prepared and identified in numerous recent joint NEPA/CEQA documents. Of particular note, the Reclamation/Sacramento County Water Agency EIS/EIR for New CVP Water Service Contract under Public Law 101-514 (Section 206) provides a listing of these actions. A more recent discussion also is provided in Reclamation's Programmatic EIS (PEIS) for the CVPIA. For a comprehensive discussion of Reclamation and USFWS' anticipated actions as part of its commitment to fully implement the CVPIA, the *Biological Opinion on Implementation of the CVPIA and Continued Operation of the CVP* (October 12, 2000) provides a detailed description of each of these actions.

For CVP/SWP system-wide hydrological effects, Reclamation, USFWS, and other relevant public trust resource agencies have ratified the hydrological modeling framework with which to simulate the system-wide potential impacts under a future cumulative condition. Future demand assumptions, along with anticipated CVP/SWP operations and the projected regulatory controls have been agreed to and incorporated into the modeling construct of PROSIM 2000.

Over two dozen actions potentially affecting the American River under the jurisdiction and authority of the American River Division were evaluated by Reclamation. These federal actions are collectively referred to as the American River Basin Cumulative (ARBC) actions (see **Table 7-1**). For the American River alone, these assumed future Reclamation actions are incorporated into the modeling simulations.

Table 7-1. American River basin - cumulative actions.	
	Reclamation Action
PCWA	CVP contract amendment
PCWA Pump Station	Facility construction
MFP Replacement	Warren Act contract
City of Roseville	CVP contract renewal
City of Roseville	Warren Act contract
EDCWA/ EID	101-514 CVP contract and renewal
EDCWA/ GDPUD	101-514 CVP contract and renewal
EID Sly Park	CVP contract renewal
EID Camp Creek	Warren Act contract
EID Lake Hills	CVP contract renewal
EID El Dorado Hills	CVP contract renewal
EID Silver Fork	Warren Act contract
Northridge WD	Warren Act contract
SCWA	101-514 CVP contract renewal
SCWA/ City of Folsom	101-514 CVP contract renewal
SJWD	101-514 CVP contract renewal
SJWD	CVP contract renewal
SMUD	CVP contract renewal
S. Sac Co. ag	CVP contract reassignment from SMUD
SCWA	CVP contract reassignment from SMUD
EBMUD	CVP contract amendment
EID TCD	Facility construction
Folsom flood control re-operation	Operations
Folsom minimum release	Operations
Water Forum Dry-year actions	Upstream diversion agreements

The hydrological cumulative analysis (i.e., the evaluation of potential system-wide CVP/SWP effects to water-related resources) involves modeling the future cumulative condition and comparing it to some baseline condition. Variations exist in the manner with which the baseline (or existing) condition is selected, depending on regulatory mandate.

Reclamation has completed several environmental documents that definitively illustrate, through PROSIM modeling, the anticipated future cumulative impacts to the integrated CVP/SWP. These documents include the Reclamation/PCWA American River Pump Station Project EIS/EIR, as well as the associated American River Basin Cumulative Impact Report (Cumulative Report). All water-related resources were evaluated in these documents. This current joint environmental document uses and relies upon the identical hydrologic modeling output for the future cumulative impacts analysis as contained in these documents. Both of these documents were released for public review early in the summer of 2001. The final EIS/EIR, including the Cumulative Report, were completed in September 2002. The cumulative analyses included in the American River Pump Station Project Final EIS/EIR, as well as the associated Cumulative Report, are herein incorporated by reference into this joint environmental document.

This joint environmental document provides a summary of the central conclusions of the future cumulative analysis that is consistent with the Reclamation/PCWA American

River Pump Station Project EIS/EIR and the Cumulative Report. Detailed discussions of the modeling results for each of the potentially affected water-related resources are provided in these prior documents and are not reiterated in this current joint document.

7.1.1. City Service Area Cumulative Impacts

Future cumulative impacts to various resources, activities, services, and the quality of life within the City service area have been addressed in a variety of previous City planning and environmental documents. The City of Roseville General Plan, numerous specific plans, and various facility project EIRs have all addressed the potential future cumulative impacts to resources within the City.

The level of development assumed for an assessment of the future cumulative impacts is defined generally as 2010 of the City of Roseville General Plan, plus buildout of the adopted specific plan areas, the Hewlett Packard Campus Plant Master Plan, the NEC Semiconductor Manufacturing Expansion Project, and full buildout of the Highland Reserve North Specific Plan, the North Roseville Specific Plan, the West Roseville Specific Plan, and the Stoneridge Specific Plan. Collectively, buildout of the various specific plans and General Plan would result in extensive urban and residential development. Much of the development associated with these plans has already occurred.

The City has addressed potential project-specific and cumulative service area impacts upon environmental resources through the adoption and implementation of mitigation measures to minimize or avoid significant effects. In instances where feasible mitigation was not identified, the City prepared and adopted relevant statements of overriding considerations, pursuant to CEQA. The Proposed Action/Proposed Project, through delivery of a reliable water supply within the City's service area, is considered a growth-accommodating action that supports approved projects but does not directly cause the impacts identified in these earlier analyses. The overall contribution of the Proposed Action/Proposed Project to previously identified cumulative impacts is considered less than significant because no new impacts would occur with implementation of the Proposed Action/Proposed Project beyond those previously disclosed in prior CEQA documents.

As discussed in Chapter 6, Endangered Species Act Compliance, the City is working closely with Reclamation and USFWS to address the cumulative loss of vernal pool and riparian habitat and species within its service area.

7.1.2. Diversion Related Cumulative Impacts

The Cumulative Report evaluated the potential for future impacts on resources associated with the lower American River, Sacramento River, Feather River, Sacramento-San Joaquin Delta, and Folsom, Shasta, Trinity, and Oroville reservoirs. The potentially significant cumulative impacts identified in the Cumulative Report for biological, cultural, water supply, recreation, power, and water quality resources are listed below. For additional descriptions of these potentially significant cumulative impacts, please refer to the Reclamation/PCWA American River Pump Station Project

Final EIS/EIR and the American River Basin Cumulative Impact Report (PCWA and Reclamation 2002).

The Cumulative Report identified potentially significant cumulative impacts related to the following resource areas:

Biological Resources

- Folsom Reservoir Warmwater Fisheries
- Lower American River Fall-run Chinook Salmon and Steelhead
- Lower American River Splittail (Flow-related)
- Shasta Reservoir Warmwater Fisheries
- Upper Sacramento River Fisheries (Temperature-related)
- Lower Sacramento River Fisheries (Temperature-related)
- Delta Fish Populations
- Oroville Reservoir Warmwater Fisheries
- Feather River Fisheries (Flow-related)
- Vegetation and Special-Status Species Associated with Oroville Reservoir

Cultural Resources

- Changes in Water Surface Elevation at Shasta Reservoir
- Changes in Water Surface Elevation at Oroville Reservoir
- Changes in Flow on the Feather River

Water Supply

- Delivery Allocations to SWP Customers
- Delivery Allocations to CVP Water Service Contractors

Recreation

- Lower American River Recreation
- Folsom Reservoir Boating
- Folsom Reservoir Swimming
- Shasta Reservoir Recreation
- Oroville Reservoir Recreation
- Feather River Recreation

Power Supply

- CVP Hydropower Generation
- Folsom and EID Pumping Energy Requirements
- Oroville Reservoir Pumping Energy Requirements

Water Quality

- Quality of Drinking Water Available Downstream and at Other Locations in the CVP and SWP Study Area
- Delta Water Quality

The following sections evaluate the potential for the Proposed Action/Proposed Project to result in a considerable contribution to the potentially significant cumulative impacts identified in the Cumulative Report.

7.1.2.1. Biological Resources

EFFECTS ON FOLSOM RESERVOIR WARMWATER FISHERIES

Under the cumulative condition, long-term average end-of-month water surface elevations would be reduced in Folsom Reservoir by up to 8 feet during the March through September period, relative to the existing condition. Under the cumulative condition, changes in elevation of Folsom Reservoir would translate into reductions in littoral habitat of 5 to 30 percent. The Proposed Action/Proposed Project would not substantially contribute to reductions in reservoir end of month elevation and acres of littoral habitat under the cumulative condition. Reductions in long-term average monthly water surface elevation in Folsom Reservoir during March through September, attributable to the Proposed Action/Proposed Project, would not be greater than 1-foot msl (Appendix G, Fish Reservoirs, Folsom). Escape cover for young-of-the year warmwater fish may be most important during the spring months and relatively less important as the season progresses from spring through fall for two primary reasons: (1) behavioral sequence of habitat utilization, including general pelagic life stages after nest dispersal; and (2) increased size and swimming capability with increased age. During March through September, reductions in the monthly long-term average amount of available littoral habitat would range from 0.1 percent to 4.0 percent of the total cumulative reductions (Appendix G, Fish Reservoirs, Folsom Littoral Habitat).

The cumulative condition would result in 86 potential nest-dewatering events (out of 70 years), relative to 72 potential events under the existing condition. The Proposed Action/Proposed Project would not contribute to increases in the frequency of potential nest-dewatering events in any month during April through July (Appendix G, Fish Reservoirs, Folsom Elevation). During March, there would be one less occurrence under the Proposed Action/Proposed Project in which monthly surface water elevations would decrease more than six feet. This decrease in the number of nest dewatering events could be considered a beneficial effect to Folsom Reservoir warmwater fish species.

Reductions in reservoir water surface elevation attributable to the Proposed Action/Proposed Project would not occur with sufficient frequency or magnitude to contribute to the potentially significant reductions in littoral habitat availability that could occur under the cumulative condition. Therefore, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant effects on warmwater fish nests that could occur under the cumulative condition. Cumulative incremental impacts on Folsom Reservoir warmwater fisheries would be considered ***less than significant***.

EFFECTS ON LOWER AMERICAN RIVER FALL-RUN CHINOOK SALMON AND STEELHEAD

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

During the October through February fall-run Chinook salmon spawning and incubation period, the long-term average monthly flow below Nimbus Dam and at Watt Avenue

under the cumulative condition would be up to 14.3 percent less (October) than the flow under the existing condition. The Proposed Action/Proposed Project would have no cumulatively considerable contribution to future lower American River flow reductions at either Nimbus Dam or Watt Avenue during October through February. Long-term average monthly flow reductions below Nimbus Dam and at Watt Avenue, attributable to the Proposed Action/Proposed Project, would range from 18 cfs to 45 cfs, or 0.4 percent to 2.4 percent of the total cumulative reduction in flows (Appendix G, Fish Flows, Nimbus and Watt).

The cumulative condition would result in flow reductions below Nimbus Dam and at Watt Avenue of up to 750 cfs nearly 50 percent of the time during October, November, and December, when the existing condition flow would be 2,500 cfs or less. The Proposed Action/Proposed Project could result in differences in flow of up to 250 cfs, approximately 13 percent of the time during the months of October, November, and December, whereas flow reductions in January and February would be minor (Appendix G, Fish Flows Exceedance, Nimbus). Even with the flow reductions that could occur as a result of the Proposed Action/Proposed Project, the long-term average monthly flows would remain above 2,300 cfs in November through February and above 1,800 cfs in October; which are within an adequate range to provide spawning habitat. In addition, flow differences of up to 250 cfs occur as a step function in the model as a result of small changes in Folsom Reservoir storage (i.e., decreases in storage ranging from 22 to 34 TAF). These changes occur as a result of a modeling trigger (which releases water from Folsom Reservoir during dry year conditions, as defined in the model framework), and would not occur in the 250 cfs increment under real-time operations. Small changes in storage, such as a 34 TAF decrease, would result in small changes in flows (although less than 250 cfs). Long-term average monthly flow levels under the Proposed Action/Proposed Project would remain within the range of flows that provide spawning habitat, and the few flow reductions that would occur when flows are already at levels of concern would be much smaller than reflected in the model under real-time operations.

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

Under the cumulative condition, the largest reduction in the long-term average monthly flow at Watt Avenue would occur during May (i.e., 247 cfs or 6.3 percent) for any given month of the March through June period, relative to the existing condition. Under the cumulative condition, flow reductions occurring during the month of May occurred when flows under the existing condition were already less than 2,000 cfs. The Proposed Action/Proposed Project would contribute 0.3 to 1.1 percent of the reductions in long-term average monthly flows that occur during the March through June period under the cumulative condition (Appendix G, Fish Flows, Watt Ave.). The Proposed Action/Proposed Project would result in only minor flow reductions during the months of March, April, and May, while in June, the proposed project would result in flow reductions (i.e., up to 372 cfs) approximately 7 percent of the time (Appendix H, Flows, Watt Ave). Few, relatively minor, flow reductions, attributable to the Proposed Action/Proposed Project, would occur at levels above 2,000 cfs, resulting in flow levels

within the range of flows adequate to provide rearing habitat. During the month of June, flow reductions would occur when flow levels are above 1,700 cfs, which would not result in an observable physical habitat change. During this same month there also would be slight increases in flow, which could provide a potential benefit to rearing habitat availability (Appendix H, Flows, Watt Ave.). Thus, flow reductions attributable to the Proposed Action/Proposed Project would not occur with sufficient frequency to result in significant impacts under the cumulative condition. Flows would remain at levels adequate to provide rearing habitat and flow reductions would be minor.

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

Under the cumulative condition, there would be 2 more occurrences during the month of May of water temperatures above 65°F at Watt Avenue during the March through June fall-run Chinook salmon and steelhead juvenile rearing period. In addition, under the cumulative condition, water temperature increases of greater than 0.3°F would occur in 50 out of 276 months modeled, relative to the existing condition. The Proposed Action/Proposed Project would not contribute to additional occurrences of water temperatures exceeding 65°F at Watt Avenue during the months of March through June (Appendix G, Fish Temps, Watt Ave). In addition, under the Proposed Action/Proposed Project, the long-term average monthly water temperatures at Watt Avenue would not change by more than 0.3°F (Appendix G, Fish Temps, Watt Ave.). Because the long-term average water temperature would not change by more than 0.3°F, and there would be no additional occurrences of water temperatures exceeding 65°F in May, the increases in water temperature at Watt Avenue attributable to the Proposed Action/Proposed Project would not occur with enough frequency to result in significant impacts under the cumulative condition.

Flow-related Impacts to Steelhead Rearing (July through February)

Under the cumulative condition, the long-term average flow below Nimbus Dam and at Watt Avenue would decrease by approximately 2 to 16 percent during the July through February period, relative to the existing condition. The Proposed Action/Proposed Project would result in a 0.3 to 2.4 percent contribution to the reduction in long-term average flows that could occur under the cumulative condition (Appendix G, Fish Flows, Nimbus and Watt Ave.). Even with the flow reductions that could occur as a result of the Proposed Action/Proposed Project, long-term average monthly flows remain above 1,800 cfs below Nimbus Dam and above 1,700 cfs at Watt Ave during the July through February period.

Water Temperature-related Impacts to Steelhead Rearing (July through February)

Temperature modeling indicates that the long-term average water temperature at Watt Avenue would increase slightly (i.e., 0.2ºF in July and October and 0.1ºF in August) during the July through February period under the cumulative condition, relative to the existing condition. The Proposed Action/Proposed Project would have no cumulatively

considerable contribution to substantial water temperature increases that could occur under the cumulative condition. During August, September, and December, there would a decrease in long-term average water temperatures of 0.1°F at Nimbus Dam, attributable to the Proposed Action/Proposed Project, and no change during the remaining months of the July through February period. In addition, the Proposed Action/Proposed Project would have no contribution to the increase of long-term average water temperatures during July through September that occur under the cumulative condition at Watt Avenue (Appendix G, Fish Temperatures, Nimbus Dam and Watt Ave.).

Temperature modeling indicates that there would be two additional occurrences of water temperatures exceeding 65°F at Watt Avenue under the cumulative condition during the July though February period. The Proposed Action/Proposed Project would not result in any increase in the frequency in which water temperatures at Watt Avenue would be above 65°F in any month of the July through February period. During September there would be one less occurrence of water temperatures exceeding 65°F attributable to the Proposed Action/Proposed Project (Appendix G, Fish Temperatures, Watt Ave.). The decreases in water temperature attributable to Proposed Action/Proposed Project would have a beneficial impact to steelhead rearing. In addition, the fewer occurrences of temperatures exceeding 65°F would also provide a beneficial impact on steelhead rearing.

SUMMARY OF THE PROPOSED ACTION/PROPOSED PROJECT'S INCREMENTAL CONTRIBUTION TO EFFECTS ON LOWER AMERICAN RIVER FALL-RUN CHINOOK SALMON AND STEELHEAD

The long-term average monthly flow levels under the Proposed Action/Proposed Project would remain within the range of flows that provide spawning habitat, and the few flow reductions that do occur when flows are already at levels of concern would be much smaller than reflected in the model under real-time operations. Therefore, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant impacts on fall-run Chinook salmon spawning and incubation. Consequently, the Proposed Action/Proposed Project would not contribute to potentially significant impacts on the long-term initial year-class strength of lower American River fall-run Chinook salmon that could occur under the cumulative condition.

Flows would remain at levels adequate to provide rearing habitat and flow reductions that occur at Watt Avenue would be minor. Therefore, the Proposed Action/Proposed Project would not have a cumulatively considerable contribution to potentially significant flow reductions and, accordingly, would not contribute to potentially significant flow-related impacts on fall-run Chinook salmon and steelhead juvenile rearing that could occur under the cumulative condition. The increases in water temperature at Watt Avenue attributable to the Proposed Action/Proposed Project would not occur with enough frequency to result in significant impacts. Therefore, the Proposed Action/Proposed Project would not contribute to potentially significant water temperature-related impacts on fall-run Chinook salmon and steelhead juvenile rearing that could occur under the cumulative condition. Flow levels below Nimbus Dam and at Watt Avenue would remain within an adequate range to provide spawning habitat. Consequently, the Proposed Action/Proposed Project would not have a cumulatively

considerable contribution to potentially significant flow-related impacts on steelhead rearing that could occur under the cumulative condition. The decreases in water temperature and the fewer occurrences of temperatures exceeding 65°F at Watt Avenue attributable to Proposed Action/Proposed Project would have a beneficial impact to steelhead rearing. Consequently, the Proposed Action/Proposed Project would not have a cumulatively considerable contribution to potentially significant water temperature-related impacts on steelhead rearing that could occur under the cumulative condition.

Therefore, cumulative incremental impacts on lower American River fall-run Chinook salmon and steelhead would be ***less than significant***.

EFFECTS ON LOWER AMERICAN RIVER SPLITTAIL

Although included in the Cumulative Report, an evaluation of the Proposed Action/Proposed Project's contribution to the potentially significant cumulative flow-related impacts on Sacramento splittail within the lower American River is not required because Sacramento splittail is no longer considered a species of primary management concern. USFWS removed Sacramento splittail from the list of threatened species on September 22, 2003, and did not identify it as a candidate for listing under FESA. Sacramento splittail is identified as a California species of special concern and, informally, as a federal species of concern.

EFFECTS ON SHASTA RESERVOIR WARMWATER FISHERIES

Under the cumulative condition, long-term average end-of-month water surface elevation in Shasta Reservoir would decrease by up to 11 ft msl during the March through September period, relative to the existing condition. Under the cumulative condition, there would be 12 additional occurrences of potential nest dewatering events at Shasta Reservoir. The Proposed Action/Proposed Project would contribute one-foot msl to the long-term average end-of-month reductions in surface water elevation that could occur under the cumulative condition during the months of August, September, and March. During the months of April through July, there would be no reduction in the long-term average end-of-month surface water elevation at Shasta Reservoir attributable to the Proposed Action/Proposed Project (Appendix G, Fish Reservoirs, Shasta Elevation). None of the nest-dewatering events that occur under the cumulative condition would be attributable to the Proposed Action/Proposed Project. There would be two less nest-dewatering events at Shasta Reservoir during the March through September period, attributable to the Proposed Action/Proposed Project (Appendix G, Fish Reservoirs, Shasta Elevation).

Under the cumulative condition there would be a reduction in littoral habitat availability at Shasta Reservoir of up to 23 percent, relative to the existing condition. The Proposed Action/Proposed Project would contribute up to 9 acres or 0.6 percent (i.e., in July) to the reductions in the long-term average amount of littoral habitat that could occur under the cumulative condition. The Proposed Action/Proposed Project also would result in minor increases (i.e., up to 1 acre) in the long-term average amount of littoral habitat available under the cumulative condition. Escape cover for young-of-the year warmwater fish may be most important during the spring months and relatively less important as the season progresses from spring through fall for two primary reasons:

(1) behavioral sequence of habitat utilization, including general pelagic life stages after nest dispersal; and (2) increased size and swimming capability with increased age.

The reductions in reservoir elevation attributable to the Proposed Action/Proposed Project do not occur with enough frequency or magnitude to constitute a cumulatively considerable contribution to the potentially significant impacts on warmwater fish spawning and initial rearing that could occur under the cumulative condition. Therefore, cumulative incremental impacts on Shasta Reservoir warmwater fisheries would be considered ***less than significant***.

EFFECTS ON UPPER SACRAMENTO RIVER FISHERIES (TEMPERATURE-RELATED)

The cumulative condition would result in changes in the long-term average water temperature (both increases and decreases) at Keswick Dam and Bend Bridge, relative to the existing condition. The Proposed Action/Proposed Project would have no cumulatively considerable contribution to significant upper Sacramento River water temperature-related fisheries impacts that could occur under the cumulative condition. For water temperatures below Keswick Dam, the Proposed Action/Proposed Project would contribute to a decrease in long-term average water temperatures of 0.1°F in July and would not contribute to increases in the long-term average water temperatures that could occur under the cumulative condition during the remaining months. In addition, the Proposed Action/Proposed Project would not contribute to any water temperature increases that could occur at Bend Bridge under the cumulative condition (Appendix G, Fish Temps, Bend Bridge). The resultant long-term average monthly water temperatures would remain within a range suitable for providing adequate habitat conditions for fisheries resources in the upper Sacramento River.

Under the cumulative condition, there would be several additional months in which temperatures would exceed 56°F or 60°F at either Keswick Dam or Bend Bridge. Under the Proposed Action/Proposed Project, there would be one less occurrence where the 56°F index would be exceeded at Keswick Dam in November and March. The Proposed Action/Proposed Project would not contribute to the occurrence of temperatures exceeding the 60°F index at Keswick Dam. The Proposed Action/Proposed Project would contribute one additional occurrence in October and July where the 56°F index would be exceeded at Bend Bridge, and two less occurrences in July. There would be one less occurrence in October attributable to the Proposed Action/Proposed Project where water temperatures would exceed the 60°F index at Bend Bridge (Appendix G, Fish Temps, Keswick Dam and Bend Bridge). These contributions would not occur with enough frequency to constitute a significant effect on the fisheries resources in the upper Sacramento River.

Winter-run Chinook salmon long-term average early-life stage survival would be 93.4 percent under the cumulative condition, compared to 96 percent under the existing condition. For fall-run Chinook salmon, long-term average early life stage survival would be 86.2 percent under the cumulative condition, compared to 89.6 percent under the existing condition. Spring-run Chinook salmon long-term average early-life stage survival would be 81.7 percent under the cumulative condition, compared to 87.5 percent under the existing condition. For winter-run Chinook salmon, the Proposed Action/Proposed Project would not contribute to the decrease in long-term average

early-life stage survival that could occur under the cumulative condition. The Proposed Action/Proposed Project would contribute 0.1 percent to the decrease in the long-term average early-life stage survival for fall-run Chinook salmon (i.e., 86.2 percent for the cumulative condition and 86.3 percent without implementation of the Proposed Action/Proposed Project). The Proposed Action/Proposed Project would contribute 0.1 percent to the decrease in long-term average early-life stage survival for spring-run Chinook salmon (i.e., 81.7 percent under the cumulative condition and 81.8 percent without implementation of the Proposed Action/Proposed Project).

The long-term average early life-stage survival of winter-run, spring-run, and fall-run Chinook salmon would experience only slight decreases as a result of the Proposed Action/Proposed Project, and would not occur with enough magnitude to be considered significant. Because long-term average water temperatures would remain at levels adequate to provide suitable habitat, there would be only minor contributions to the temperature exceedances, and only slight decreases in the long-term average early life-stage survival, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant impacts on upper Sacramento River fishery resources that could occur under the cumulative condition. Therefore, cumulative incremental impacts on upper Sacramento River fisheries would be considered ***less than significant***.

EFFECTS ON LOWER SACRAMENTO RIVER FISHERIES (TEMPERATURE-RELATED)

Under the cumulative condition, exceedance of the 56°F and 65°F temperature criteria would increase significantly, relative to the existing condition (i.e., 2 more occurrences for the 56°F index and 5 more occurrences for the 65°F index). The water temperature at Freeport would increase by more than 0.3°F under the cumulative condition, relative to the existing condition, in 111 months out of the 621 months included in the March through November period. The Proposed Action/Proposed Project would contribute one occurrence to the increases in the frequency of temperature exceeding 65°F (during May) and no occurrences to water temperatures exceeding the 56°F index at Freeport that could occur under the cumulative condition (Appendix G, Fish Temps, Freeport). The Proposed Action/Proposed Project would not contribute to the water temperature increases at Freeport during the March through November period that could occur under the cumulative condition (Appendix H, Temperature, Freeport).

Because the long-term average monthly water temperatures would not change by more than 0.3°F, the monthly temperatures would remain at equivalent levels, and the only minor contributions to the temperature exceedances, the Proposed Action/Proposed Project would not have a cumulatively considerable contribution to potentially significant impacts on lower Sacramento River fishery resources that could occur under the cumulative condition. Therefore, cumulative incremental impacts on lower Sacramento River fisheries would be considered ***less than significant***.

EFFECTS ON DELTA FISH POPULATIONS

Under the cumulative condition, Delta outflow decreases of 10 percent or more would occur in 38 months out of the 350 months included in the February through June period of analysis. The long-term average position of X2 would move upstream by less than 1

km for any given month under the cumulative condition, relative to the existing condition, with monthly mean changes in position of more than 1 km occurring 10 percent of the time. The Proposed Action/Proposed Project would not result in flow reductions of 10 percent or more in any of the 350 months included in the analysis (Appendix H, Delta Outflow). There would be no substantial decreases (i.e., up to 0.04 percent or 19 cfs) in long-term average Delta outflow, attributable to the Proposed Action/Proposed Project. In fact there would be increases in long-term average Delta outflow (i.e., up to 0.1 percent or 16 cfs) during the February through June period (Appendix G, Fish Delta, Outflow). Even with the outflow reductions attributable to the Proposed Action/Proposed Project, the long-term average flow at the Delta would remain above 11,700 cfs, which would provide adequate flows for Delta fishery habitat. Thus, the Proposed Action/Proposed Project would not have a cumulatively considerable contribution to the potentially significant reductions in Delta outflow that could occur under the cumulative condition. In addition, the Proposed Action/Proposed Project would not contribute to shifts in the long-term average position of X2 during the February through June period that could occur under the cumulative condition (Appendix G, Fish Delta, X2). Because long-term average flows would remain at levels to provide adequate habitat and the position of X2 would remain within the range necessary to avoid adverse effects on delta fisheries, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant impacts on Delta fishery resources that could occur under the cumulative condition. Therefore, cumulative incremental impacts on Delta fish populations would be considered ***less than significant***.

EFFECTS ON OROVILLE RESERVOIR WARMWATER FISHERIES

Under the cumulative condition, the long-term average end-of-month water surface elevation at Oroville Reservoir would be reduced during the months of March through September (i.e., up to 18 ft msl), compared to the existing condition. The largest increase in frequency with which potential nest-dewatering events could occur under the cumulative condition is in July, from 57 out of 70 years under the existing condition to 63 out of 70 years under the cumulative condition. There would be no decreases in long-term average end-of-month water surface elevation, attributable to the Proposed Action/Proposed Project, during the March through September period. The Proposed Action/Proposed Project would not contribute to the frequency in nest dewatering event that could occur under the cumulative condition. Escape cover for young-of-the year warmwater fish may be most important during the spring months and relatively less important as the season progresses from spring through fall for two primary reasons: (1) behavioral sequence of habitat utilization, including general pelagic life stages after nest dispersal; and (2) increased size and swimming capability with increased age.

Because there would be no decrease in the long-term average end-of-month water surface elevation attributable to the Proposed Action/Proposed Project and the Proposed Action/Proposed Project would not contribute to the frequency of potential nest-dewatering events, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant effects on warmwater fisheries that could occur under the cumulative condition. Therefore, cumulative incremental impacts on Oroville Reservoir warmwater fisheries would be considered ***less than significant***.

EFFECTS ON FEATHER RIVER FISHERIES (FLOW-RELATED)

Under the cumulative condition, relative to the existing condition, the long-term average Feather River flows released from Oroville Reservoir range from decreases of 14.1 percent during the month of November to increases of 36.4 percent during the month of August. The long-term average Feather River flow changes attributable to the Proposed Action/Proposed Project would range from decreases of up to 0.2 percent to increases of up to 0.5 percent. The few, relatively minor, flow reductions, attributable to the Proposed Action/Proposed Project, would occur at levels above 1,900 cfs, resulting in flow levels within the range of flows adequate to provide rearing habitat. Consequently, the Proposed Action/Proposed Project would not have a cumulatively considerable contribution to potentially significant flow-related impacts on Feather River fisheries that could occur under the cumulative condition. Therefore, cumulative incremental impacts on Feather River fisheries would be considered ***less than significant***.

EFFECTS ON VEGETATION AND SPECIAL-STATUS SPECIES ASSOCIATED WITH OROVILLE RESERVOIR

Under the cumulative condition long-term end of month water surface elevation reductions for Oroville Reservoir would range from six to 18 feet, compared to the existing condition, during the March through September vegetation growing period. There are no decreases in long-term average end-of-month elevation attributable to the Proposed Action/Proposed Project. The Proposed Action/Proposed Project would not contribute to the decreases in Oroville Reservoir water surface elevation that could occur under the cumulative condition and, therefore, would not contribute to the degradation of continuous strands of native vegetation of relatively high to moderate wildlife value during the March through September time period. Therefore, the Proposed Action/Proposed Project would not have a cumulatively considerable contribution to the potentially significant impacts on vegetation and special-status species associated with Oroville Reservoir that could occur under the cumulative condition. Therefore, cumulative incremental impacts on vegetation and special-status species associated with Oroville Reservoir would be considered ***less than significant***.

7.1.2.2. Cultural Resources

EFFECTS OF CHANGES IN WATER SURFACE ELEVATION AT SHASTA RESERVOIR

Under the cumulative condition, the minimum water surface elevation at Shasta Reservoir would be from 8 to 45 feet msl lower throughout each month of the year, relative to the existing condition. The Proposed Action/Proposed Project would contribute up to 5 ft msl to the decreases in the minimum long-term average end-of-month elevation at Shasta Reservoir that could occur under the cumulative condition. With implementation of the Proposed Action/Proposed Project, there also would be increases of up to 1 ft msl in the minimum long-term average end-of-month elevation at Shasta Reservoir (Appendix G, Cultural Reservoirs, Shasta). To reduce the potential for significant adverse effects on cultural resources at Shasta Reservoir due to the increased potential for the reservoir elevation to fall below normal minimal end-of-month elevations due to Reclamation's actions on the American River, including the Roseville Warren Act Contract, Reclamation has entered into a Programmatic Agreement with SHPO, developed in compliance with Section 106 of the NHPA. This agreement

requires Reclamation to take mitigative actions to protect cultural resources in the event that Shasta Reservoir levels fall below the existing condition minimum elevations posing a potential threat to cultural resources within the reservoir. Implementation of resource protection measures would be performed in coordination with SHPO. Therefore, the Proposed Action/Proposed Project would not contribute significantly to increases in the exposure of cultural resources at Shasta Reservoir, and hence, would have no cumulatively considerable contribution to potentially significant impacts on Shasta Reservoir cultural resources that could occur under the cumulative condition. Therefore, cumulative incremental impacts on cultural resources associated with changes in water surface elevations at Shasta Reservoir would be considered ***less than significant***.

EFFECTS OF CHANGES IN WATER SURFACE ELEVATION AT OROVILLE RESERVOIR

Long-term average end-of-month water surface elevation reductions under the cumulative condition would range from 6 feet to 18 feet, relative to the existing condition. The Proposed Action/Proposed Project would not contribute to the reductions in end-of-month water surface elevation that could occur under the cumulative condition in any month of the year. Therefore, the Proposed Action/Proposed Project would not contribute significantly to increases in the exposure of cultural resources at Oroville Reservoir, and hence, would have no cumulatively considerable contribution to potentially significant impacts on Oroville Reservoir cultural resources that could occur under the cumulative condition. Therefore, cumulative incremental impacts on cultural resources associated with changes in water surface elevations at Oroville Reservoir would be considered ***less than significant***.

EFFECTS OF CHANGES IN FLOW ON THE FEATHER RIVER

Long-term average monthly flow reductions in the Feather River under the cumulative condition would be up to 5.7 percent and increases would be up to 36.4 percent, relative to the existing condition. The largest reduction in long-term average monthly flow on the Feather River attributable to the Proposed Action/Proposed Project would be 8 cfs or 0.1 percent. Long-term average flow increases would be up to 14 cfs or 0.5 percent (Appendix G, SWP Flows, Oroville). Flow fluctuations attributable to the Proposed Action/Proposed Project would not occur with enough frequency to constitute a significant effect on cultural resources. Therefore, the Proposed Action/Proposed Project would not contribute significantly to increases in the exposure of cultural resources along the Feather River, and hence, would have no cumulatively considerable contribution to potentially significant impacts on Feather River cultural resources that could occur under the cumulative condition. Therefore, cumulative incremental impacts on cultural resources associated with changes in Feather River flows would be considered ***less than significant***.

7.1.2.3. Water Supply and Hydrology

EFFECTS ON DELIVERY ALLOCATIONS TO SWP CUSTOMERS

Under the cumulative condition, delivery reductions to SWP customers would range from 5 percent to 45 percent, relative to the existing condition. The Proposed Action/Proposed Project would not contribute, in either frequency or magnitude, to any

anticipated long-term SWP customer delivery reduction that could occur under the cumulative condition. Therefore, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant impacts on deliveries to SWP customers that could occur under the cumulative condition. Therefore, cumulative incremental impacts on water supply and hydrology associated with delivery allocations to SWP customers would be considered ***less than significant***.

EFFECTS ON DELIVERY ALLOCATIONS TO CVP WATER SERVICE CONTRACTORS

Under the cumulative condition, CVP water service contractors would experience reductions in allocation ranging from 5 percent to 25 percent, relative to the existing condition. The Proposed Action/Proposed Project would not contribute, in either frequency or magnitude, to any reduction in delivery to CVP agricultural or M&I contractors, either north or south of the Delta, that could occur under the cumulative condition (Appendix G, Water Supply, CVP Contractors). Therefore, the Proposed Action/Proposed Project would not have a cumulatively considerable contribution to potentially significant impacts on CVP deliveries that could occur under the cumulative condition. Therefore, cumulative incremental impacts on water supply and hydrology associated with delivery allocations to CVP customers would be considered ***less than significant***.

7.1.2.4. Recreational Resources

EFFECTS ON LOWER AMERICAN RIVER RECREATION

Under the cumulative condition, the long-term average monthly flow during the May through September period would be approximately 15 percent lower than lower American River flows under the existing condition. The Proposed Action/Proposed Project would not contribute to flow reductions with sufficient frequency to constitute a significant impact on lower American River recreation opportunities. The Proposed Action/Proposed Project would result in four fewer months in which lower American River long-term average monthly flows would be in the minimum to maximum flow range (1,750 to 6,000 cfs) required for recreation, and three fewer months within the optimum flow range (3,000 to 6,000 cfs) required for recreation during the May through September period. In addition, the Proposed Action/Proposed Project would contribute one more month when the long-term average monthly flows would be within the minimum to maximum and optimal flow ranges for recreation (Appendix G, Recreation, Lower American River). Because the reductions in usable months for recreation activities on the lower American attributable to the Proposed Action/Proposed Project do not occur with enough frequency to constitute a significant impact on recreation and the contribution of one additional month within the optimal and minimum to maximum flow ranges for recreation, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to the potentially significant recreational impacts on the lower American River that could occur under the cumulative condition. Therefore, cumulative incremental impacts on recreational resources on the lower American River would be considered ***less than significant***.

EFFECTS ON FOLSOM RESERVOIR BOATING

Under the cumulative condition, Folsom Reservoir levels would fall below the elevations required for use of all boat ramps and marina wet slips more frequently than under the existing condition (i.e., below 420 ft in 197 months under the cumulative condition, compared to 160 months under the existing condition and below the 412 ft in 159 months under the cumulative condition, compared to 122 months under the existing condition). The Proposed Action/Proposed Project, would result in one month in which Folsom Reservoir elevation would be below the elevation required for use of all boat ramps (420 feet msl), but would also contribute one additional month to the usability of all boat ramps during the March through September recreation season. Folsom Reservoir elevations would fall below 412 feet msl required for the usability of marina wet slips in one additional month during the 490 months of the March through September period. However, the Proposed Action/Proposed Project would result in two months in which reservoir elevations would be below 412 feet msl and one additional month in which reservoir elevations would be above 412 feet msl (Appendix G, Recreation, Folsom Reservoir). The reductions in the usability of boat ramps, attributable to the Proposed Action/Proposed Project do not occur with enough frequency to constitute a significant impact on recreation use at Folsom Reservoir. Moreover, the additional months provided would result in a beneficial impact on Folsom Reservoir boating. Consequently, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to the potentially significant Folsom Reservoir boating impacts that could occur under the cumulative condition. Therefore, cumulative incremental impacts on recreational resources associated with Folsom Reservoir boating would be considered ***less than significant***.

EFFECTS ON FOLSOM RESERVOIR SWIMMING

Under the cumulative condition, the frequency in which Folsom Reservoir water levels would be within the usable (i.e., 420 to 455 feet) and optimum (i.e., 435 to 455 feet) ranges during the peak May through September swimming season would be substantially reduced, relative to the existing condition (i.e., within the usable beach range in 123 months, relative to 149 months under the existing condition and within the optimum range in 58 months, relative to 73 months under the existing condition). The Proposed Action/Proposed Project would result in six additional months with usable surface elevation ranges required for swimming activities at Folsom Reservoir during the May through September period. These additional months would result in a beneficial impact on Folsom Reservoir swimming opportunities. There would be one less month in which Folsom Reservoir elevations would be within the optimum elevation ranges (Appendix G, Recreation, Folsom Reservoir). However, this decrease does not occur with enough frequency to constitute a significant impact on Folsom Reservoir swimming. Therefore, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant Folsom Reservoir swimming impacts that could occur under the future cumulative condition. Therefore, cumulative incremental impacts on recreational resources associated with Folsom Reservoir swimming would be considered ***less than significant***.

EFFECTS ON SHASTA RESERVOIR RECREATION

Under the cumulative condition, there would be 25 fewer months in which all boat ramps are usable, and 12 fewer months in which one boat ramp is usable at Shasta Reservoir. The Proposed Action/Proposed Project would result in one additional month above the elevation required for use of all boat ramps (1,017 feet msl), but would result in five months in which the elevations would be below the usability for all boat ramps during the 350 months included in the May through September analysis period. The Proposed Action/Proposed Project would not contribute to reductions in the usability of at least one boat ramp (941 feet msl). However, the Proposed Action/Proposed Project would result in one additional month in which water surface elevations would be below the level suitable for shoreline uses (1,007 feet msl), and three months in which boat-in camping would be sustained (967 feet msl) during the May through September period (Appendix G, Recreation, Shasta Reservoir). The reductions that occur under the Proposed Action/Proposed Project do not occur with enough frequency to constitute a significant impact on Shasta Reservoir recreation. Therefore, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant impacts on recreation at Shasta Reservoir that could occur under the cumulative condition. Therefore, cumulative incremental impacts on recreational resources associated with Shasta Reservoir would be considered ***less than significant***.

EFFECTS ON OROVILLE RESERVOIR RECREATION

Long-term average Oroville Reservoir end-of-month elevation under the cumulative condition would be reduced by up to 18 feet, relative to the existing condition. There would be no change in the long-term average end-of-month elevation during the May through September period attributable to the Proposed Action/Proposed Project. In addition, the reservoir elevation would remain above 700 ft msl during this period, allowing for the usability of all boat ramps (Appendix G, SWP, Oroville Reservoir Elevation). Therefore, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant impacts on recreation at Oroville Reservoir that could occur under the cumulative condition. Therefore, cumulative incremental impacts on recreational resources associated with Oroville Reservoir would be considered ***less than significant***.

EFFECTS ON FEATHER RIVER RECREATION

The long-term average monthly flow in the Feather River would be reduced by up to 14.1 percent under the cumulative condition, relative the existing condition. The change in long-term average monthly flows in the Feather River, attributable to the Proposed Action/Proposed Project, would be less than 1 percent in all months (Appendix G, SWP, Feather River Flow). The flow changes that do occur are not of sufficient magnitude to constitute a significant impact on recreation in the Feather River. Therefore, the Proposed Action/Proposed Project would have no cumulatively considerable contribution to potentially significant impacts on recreation in the Feather River that could occur under the cumulative condition. Therefore, cumulative incremental impacts on recreational resources associated with the Feather River would be considered ***less than significant***.

7.1.2.5. Power Supply

EFFECTS ON CVP HYDROPOWER GENERATION

Changes in the future operations of CVP facilities under the cumulative condition would result in an estimated annual reduction in annual CVP hydropower generation of 357GWh, or 7 percent, relative to the existing condition. The Proposed Action/Proposed Project would not contribute substantially to either monthly or annual reductions in CVP hydropower generation; the greatest reduction in long-term average monthly generation would be 2 GWh or 0.8 percent (Appendix G, Power, Tracy Generation). Any decrease in generation that may occur in individual months would result in increased costs that would be passed on to CVP customers. Thus, while the Proposed Action/Proposed Project would not result in significant reductions in long-term average CVP hydropower generation, increases in individual months could result in substantial cost impacts to CVP customers. Therefore, the potential environmental impact is considered ***less than significant*** and the Proposed Action/Proposed Project would have no cumulatively considerable contribution to the reductions in CVP hydropower generation that could occur under the cumulative condition.

EFFECTS ON CVP GROSS HYDROPOWER CAPACITY

There would be similar future reductions in gross CVP capacity under the cumulative condition, relative to the existing condition, with 90% exceedance values of up to 371 MW. The greatest reduction in monthly gross CVP capacity under the cumulative condition would be 94 MW, relative to the existing condition. The Proposed Action/Proposed Project would result in a contribution of 1 MW to the reduction in monthly gross CVP capacity under the cumulative condition (Appendix G, Power, Tracy Capacity). While such reductions would contribute to significant economic impacts in individual years, they would not result in direct environmental impacts. Such cost impacts would be passed directly to CVP customers. Therefore, the potential environmental impact is considered ***less than significant***, and the Proposed Action/Proposed Project would have no cumulatively considerable contribution to the reductions in CVP hydropower capacity that could occur under the cumulative condition.

EFFECTS ON FOLSOM AND EID PUMPING ENERGY REQUIREMENTS

The energy requirement under the cumulative condition would be more than doubled at the Folsom Pumping Plant and 6 times greater at the EID Pumping Plant, relative to the existing condition. The Proposed Action/Proposed Project, would contribute to increases to the future average energy requirement, by up to 498 MWh or 28 percent at the Folsom Pumping Plant and 6 MWh or 0.2 percent at the EID Pumping Plant (Appendix G, Power, Folsom and EID Pumping Plant). The increased energy requirement that would occur at Folsom Pumping Plant is expected to occur since the City would be using these facilities to pump Warren Act Contract water. The increase in energy requirement at Folsom Pumping Plant is, therefore, due entirely to the increased diversion for the City. The City would be the only party financially responsible for the energy requirement increase. Therefore, there would be no increase in energy requirements experienced by other water purveyors at Folsom Pumping Plant. Such infrequent increases at both pumping plants could result in a slight contribution to cost impacts under the cumulative condition, though any effects would not be of sufficient

frequency or magnitude to result in a significant impact on Folsom and EID pumping energy requirements. Therefore, the Proposed Action/Proposed Project would not have a cumulatively considerable contribution to potentially significant impacts on Folsom and EID pumping energy requirements that could occur under the cumulative condition. Therefore, cumulative incremental impacts on power supplies associated with Folsom and EID pumping energy requirements would be considered ***less than significant***.

EFFECTS ON OROVILLE RESERVOIR PUMPING ENERGY REQUIREMENTS

The cumulative condition would result in a reduction in the long-term average water surface elevation at Oroville Reservoir of up to 18 feet and a long-term average reduction in storage of up to 8.5 percent. The Proposed Action/Proposed Project would not contribute to the reductions in long-term average water surface elevation at Oroville Reservoir that could occur under the cumulative condition (Appendix G, SWP, Oroville Reservoir Elevation). The greatest decrease in long-term average storage at Oroville Reservoir attributable to the Proposed Action/Proposed Project would be 0.1 percent. Such infrequent decreases in reservoir storage that occur under the Proposed Action/Proposed Project could result in a slight contribution to pumping cost impacts under the cumulative condition, though any effects would not be of sufficient frequency or magnitude to create a significant impact on Oroville Reservoir pumping energy requirements. Therefore, the Proposed Action/Proposed Project would not have a cumulatively considerable contribution to potentially significant impacts on Oroville Reservoir pumping energy requirements that could occur under the cumulative condition. Therefore, cumulative incremental impacts on power supplies associated with Oroville Reservoir pumping energy requirements would be considered ***less than significant***.

7.1.2.6. Water Quality

EFFECTS ON THE QUALITY OF DRINKING WATER AVAILABLE DOWNSTREAM AND AT OTHER LOCATIONS IN THE CVP AND SWP STUDY AREA

Under the cumulative condition, long-term average monthly storage levels would be reduced from 0.3 percent to 11.3 percent in Folsom, Shasta, Trinity, and Oroville reservoirs. The Proposed Action/Proposed Project would contribute to decreases in the long-term average monthly storage levels in Folsom, Shasta, and Oroville reservoirs, however, these decreases would not be greater than 1.3 percent. The greatest decrease in long-term average monthly storage at Folsom Reservoir would be 1.3 percent (5 TAF), 0.1 percent (3 TAF) at Shasta Reservoir, and 0.1 percent (1 TAF) at Oroville Reservoir. The Proposed Action/Proposed Project would not contribute to decreases in the long-term average storage at Trinity Reservoir that could occur under the cumulative condition. In addition, the Proposed Action/Proposed Project would contribute to increases in the long-term average storage at Trinity and Oroville reservoirs (i.e., up to 0.1 percent or 1 TAF) (Appendix G, Water Quality, Folsom, Shasta, and Trinity Reservoir and Appendix H, Oroville Reservoir Storage). The decreases in reservoir storage do not occur with enough magnitude to significantly affect the storage levels in these reservoirs. In addition, the increases in storage that would occur in these reservoirs would provide a beneficial impact on the water quality condition of these reservoirs.

Long-term average monthly flows under the cumulative condition would be reduced by approximately 15 percent in the lower American River, 10 percent in the upper Sacramento River, five percent in the lower Sacramento River, and 14 percent in the Feather River, relative to the existing condition. Long-term average monthly flow reductions attributable to the Proposed Action/Proposed Project in the lower American River would be up to 2.4 percent (56 cfs) below Nimbus Dam and up to 2.6 percent (55 cfs) at Watt Ave (Appendix G, Water Quality, Nimbus Dam and Watt Ave.). The Proposed Action/Proposed Project would contribute to long-term average monthly flow reductions in the upper Sacramento River of up to 0.5 percent (32 cfs) (Appendix G, Water Quality, Keswick Dam). In the lower Sacramento River, the Proposed Action/Proposed Project would contribute to long-term average monthly flow reductions of up to 0.2 percent (39 cfs) (Appendix G, Water Quality, Freeport). Within the Feather River, the greatest reduction in long-term average monthly flow, attributable to the Proposed Action/Proposed Project, would be 0.2 percent (7 cfs) (Appendix H, Feather River Flows). These decreases in flows do not occur with enough magnitude to significantly affect river flows.

Because the Proposed Action/Proposed Project would not contribute significantly in either magnitude or frequency to the reductions in reservoir storage or river flows, and therefore would not result in a decrease in the dilution capability of the reservoirs and rivers. The Proposed Action/Proposed Project would not have a cumulatively considerable contribution to potentially significant impacts on the quality of available downstream drinking water that could occur under the cumulative condition. Therefore, cumulative incremental impacts on water quality associated with the quality of drinking water available downstream and at other locations in the CVP and SWP study area would be considered ***less than significant***.

EFFECTS ON DELTA WATER QUALITY

The greatest reduction in long-term average monthly Delta outflow under the cumulative condition would be approximately 8.3 percent (October), relative to the existing condition. Under the cumulative condition, the long-term average position of X2 would move upstream less than 1 kilometer, relative to the existing condition. The Proposed Action/Proposed Project would contribute to decreases in long-term average Delta outflow that could occur under the cumulative condition of up to 17 cfs in February, and would result in increases in long-term average Delta outflow of up to 20 cfs (Appendix G, Outflow, Delta). The decreases in Delta outflow attributable to the Proposed Action/Proposed Project would not be of sufficient magnitude to constitute a significant effect on Delta outflow. In addition, the Proposed Action/Proposed Project would not contribute to the shift in the long-term average position of X2 that could occur under the cumulative condition throughout the majority of the year; in May however, the Proposed Action/Proposed Project would result in an additional upstream shift of 0.1 km. (Appendix G, X2 Position, Delta). This shift in X2 is not of sufficient magnitude or frequency to have a significant effect on Delta water quality. Based on these findings, the Proposed Action/Proposed Project would not have a cumulatively considerable contribution to the potentially significant impacts on water quality associated with changes in long-term average Delta outflow or the position of X2 that could occur under

the cumulative condition. Therefore, cumulative incremental impacts on Delta water quality would be considered ***less than significant***.

7.2. Relationship Between Short-term Uses and Long-term Productivity

Reclamation's NEPA policies require that during preparation of an EA, both short- and long-term impacts should be addressed (Section 102(2)(c)(iv) and 40 CFR 1502.16). Short-term refers to the time period that includes the immediate implementation of the project and long-term refers to the time period that includes the operation life of the project facilities and beyond. This discussion addresses how the implementation of the Proposed Action/Proposed Project would affect the long-term productivity of the natural and human environment.

Implementation of the Proposed Action/Proposed Project would increase the reliability and availability of water supplies for the City of Roseville. This increase in reliability and productivity would help the City meet current and projected demands, thus supporting the economic viability of the project service area. In addition, implementation of the long-term Warren Act contract would fulfill the City's growth and infill projections as projected in its General Plan. No short-term impacts would occur due to implementation of the Proposed Action/Proposed Project.

7.3. Irreversible and Irretrievable Commitments of Resources

As stated in Reclamation's NEPA Handbook:

> "Irreversible commitments are decisions affecting renewable resources such as soils, wetlands, and waterfowl habitat. Such decisions are considered irreversible because their implementation could affect a resource that has deteriorated to the point that renewal can occur only over a long period of time or at great expense or because they would cause the resource to be destroyed or removed."

No irreversible commitments of resources associated with implementation of the Proposed Action/Proposed Project and Downstream Diversion Alternative have been identified.

The handbook states further:

> "Irretrievable commitment of natural resources means loss of production or use of resources as a result of a decision. It represents opportunities foregone for the period of time that a resource cannot be used."

Irretrievable commitments of resources that would result from implementation of the Proposed Action/Proposed Project and alternatives include:

- Energy needed for operation and maintenance of facilities.

7.4. CONFLICTS WITH U.S. BUREAU OF RECLAMATION POLICIES

In addition to NEPA compliance, Reclamation must comply with Department of Interior directives such as protection of ITAs and Executive Orders, such as Environmental Justice. Compliance with these directives is discussed below.

7.4.1. Indian Trust Assets

ITAs are legal interests in property held in trust for Indian tribes or individuals by the United States. It is Reclamation's policy to protect ITAs from adverse impacts resulting from its programs and activities. There have been no ITAs identified within the project study area and Reclamation has confirmed that no adverse impacts would occur to ITAs as a result of this project (Welch 1998). For a more detailed discussion of ITAs, refer to Section 8.1.5, Indian Trust Assets Policy.

7.4.2. Environmental Justice

Executive Order 12898, Environmental Justice, requires that review of proposed federal actions analyze any disproportionately high and adverse environmental or human health effects on minority and low-income communities. No disproportionately high or adverse environmental or human health impacts on minority or low-income communities have been identified for this Proposed Action/Proposed Project. For a more detailed discussion of Executive Order 12898, refer to Section 8.1.8, Other Federal Statutes and Regulations of Relevance.

Chapter 8
Statutes and Regulations

8.1. FEDERAL STATUTES AND REGULATIONS

8.1.1. National Environmental Policy Act

NEPA requires federal agencies to examine the impact of any major federal actions affecting the environment (42 U.S.C. § 102). Federal actions include projects undertaken or funded by the agencies as well as proposals over which the agency has approval powers. Reclamation is the lead federal agency under NEPA for this project. Additional agencies that could use this document to satisfy NEPA requirements include the U.S. Army Corps of Engineers (Corps), USFWS, and other agencies. This EA/IS has been prepared in compliance with NEPA.

8.1.2. Federal Endangered Species Act of 1973, as Amended

As part of this project, Reclamation requested and received from USFWS a list of federally designated endangered, threatened, and proposed listed species. The list was initially received in December 1996 and was updated in August 1998. Species lists were updated again via the USFWS Quad Species List website on April 28, 2004 (USFWS 2004). Endangered, threatened, proposed listed, and candidate species located within the project vicinity and potential impacts to those species are discussed in Section 5.4, Biological Resources. This document also serves as the BA, which must be prepared by Reclamation pursuant to section 7(c) of the federal ESA (16 U.S.C. §1536(c)) and to 50 C.F.R. Part 402. Reclamation and the City have been involved in coordination and informal consultations regarding the Proposed Action/Proposed Project with both USFWS and NMFS since 2000. As a result of these efforts, NMFS has provided Reclamation with a Letter of Concurrence (dated December 13, 2002) that the Proposed Action is not likely to adversely affect Sacramento River winter-run Chinook salmon, Central Valley spring-run salmon, or Central Valley steelhead, or designated critical habitat (see Appendix N). Additionally, NMFS indicated that the Proposed Action is not likely to adversely affect EFH for Pacific salmon.

As a result of the coordination and informal consultations, USFWS has provided Reclamation with a Letter of Concurrence (dated January 19, 2006) that the included USFWS's determination that the that the Proposed Action is not likely to adversely affect the federally listed vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle or designated critical habitat (see Appendix N).

8.1.3. Fish and Wildlife Coordination Act

The FWCA gives the U.S. Secretary of Interior the authority to provide assistance to federal, state, public, or private agencies in developing, protecting, rearing, or stocking all wildlife, wildlife resources and their habitats (16 U.S.C. § 661). Under the FWCA, whenever waters of any stream or other water body are proposed to be impounded, diverted, or otherwise modified by any public or private agency under federal permit, that agency must consult with the USFWS and, in California, the CDFG. The Proposed

Action/Proposed Project would temporarily modify storage in Folsom Reservoir, and therefore, must comply with the FWCA. Consultations are being held among Reclamation, USFWS, and CDFG. The findings of the USFWS and CDFG regarding impacts to listed species and species not listed under the ESA will be summarized by USFWS in a Fish and Wildlife Coordination Act Report (CAR). The CAR will be included in the Final EA/IS.

8.1.4. National Historic Preservation Act

The National Historic Preservation Act requires the federal government to list significant historic resources in the National Register of Historic Places. Federal agencies must consult the National Register when planning to undertake or grant approval for a project. Prior to issuing any license or implementing a project, the federal agency shall consider the effects of the project or license on any historical buildings, sites, structures, or objects that are included in, or eligible for inclusion in, the National Register (16 U.S.C. § 470, f). The evaluations of cultural resources as part of this EA/IS document comply with the National Historic Preservation Act as it applies to the Proposed Action/Proposed Project and alternatives. Relevant and available documentation for the Area of Potential Affect (APE) are summarized in Section 3.5, Cultural Resources. Reclamation has coordinated with SHPO staff to discuss the scope of the project APE, the impact determinations made, and the level of mitigation appropriate for recommendation. Communications with Reclamation indicate that no archaeological sites within Folsom Reservoir have been declared eligible, or listed in the Register (Reclamation and SAFCA 1994a).

8.1.5. Indian Trust Assets Policy

ITAs are legal interest in property held in trust for Indian tribes or individuals by the United States. Trust Assets can be lands, minerals, hunting and fishing rights, and water rights. Reclamation's ITA policy and NEPA implementing procedures provide for the protection of ITAs from adverse impacts resulting from federal programs and activities. Potential impacts on ITAs resulting from the Proposed Action/Proposed Project have been reviewed. Reclamation has confirmed that no adverse affects would occur to ITAs as a result of this project (Welch 1998).

8.1.6. National Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act of 1968 (P.L.-542, 16 U.S.C. 1271-1287) establishes the policy that certain rivers and their immediate environments which possess outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values will be preserved and protected. In January 1981, the Department of the Interior designated the lower American River from Nimbus Dam to its confluence with the Sacramento River as wild and scenic for both fishery and recreation values.

Section 10 of this act requires that each component of the Wild and Scenic river system be administered in such a manner as to protect and enhance the values for which the river was designated. Under this act, federal agencies that have discretionary decision-making authority (i.e., permitting authority) must review the proposed project in relation to Section 7 and Section 10 of the act to determine if the proposed project would affect the values of the Wild and Scenic river. If approved, Reclamation would ensure that the

proposed project would not adversely affect the fisheries and recreation values of the lower American River.

8.1.7. Farmland Protection Policy Act, P.L. 97-98

The Farmland Protection Policy Act is administered by the Natural Resources Conservation Service (NRCS). This act requires a federal agency to consider the effects of its actions and programs on the Nation's farmlands. The Proposed Action/Proposed Project would not result in any loss of farmland, as discussed in Section 5.2, Agricultural Resources.

8.1.8. Other Federal Statutes And Regulations of Relevance

Presented below is a preliminary review of federal permits and requirements that may be associated with the implementation of the proposed long-term Warren Act Contract.

8.1.8.1. Section 10 of the Rivers and Harbors Act

Under Section 10 of the Rivers and Harbors Act, the Corps regulates the construction of structures or activities that could interfere with navigation. A permit is needed to construct or modify structures such as water intake systems in navigable waters as well as to perform activities such as dredging, stream channelization, excavation, and filling (33 USC § 403).

8.1.8.2. Section 401 of the Clean Water Act

Section 401 of the Clean Water Act (CWA) (33 USC § 1311) prohibits the discharge of any pollutants into navigable waters, except as allowed by permit issued under sections 402 and 404 of the CWA (33 USC § 1342 and 1344). If new structures (e.g., treatment plants) are proposed, that would discharge effluent into navigable waters, relevant permits under the CWA would be required for the project applicant(s). Section 401 requires any applicant for an individual Corps dredge and fill discharge permit to first obtain certification from the state that the activity associated with dredging or filling will comply with applicable state effluent and water quality standards. This certification must be approved or waived prior to the issuance of a permit for dredging and filling.

8.1.8.3. Section 404 of the Clean Water Act

Section 404 of the CWA authorizes the Corps to issue permits to regulate the discharge of "dredged or fill materials into waters of the United States" (33 USC § 1344). Should activities such as dredging or filling of wetlands or surface waters be required for project implementation, then permits obtained in compliance with CWA section 404 would be required for the project applicant(s).

8.1.8.4. Executive Order 11990 (Protection of Wetlands)

Executive Order 11990 on Protection of Wetlands calls for each federal agency, in carrying out its ordinary responsibilities, to take actions to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. Reclamation will not be undertaking or assisting in any new construction in wetlands.

8.1.8.5. Executive Order 12898 (Environmental Justice)

Executive Order 12898 on Environmental Justice requires that environmental analyses of proposed federal actions address any disproportionately high and adverse human health or environmental effects on minority and low–income communities. Reclamation's responsibility under this order applies equally to Native American programs. In addition, each federal agency must ensure that public documents, notices, and hearings are readily accessible to the public. No disproportionately high or adverse human health or environmental effects on minority and low-income communities have been identified. Mailing notices and distribution of other project information includes property owners and potentially affected persons and institutions without any distinction based on minority or income status.

8.1.8.6. Executive Order 11988 (Floodplain Management)

Executive Order 11988 on Floodplain Management requires the Corps to provide leadership and take action to: 1) avoid development in the base (100-year) floodplain; 2) reduce the hazards and risks associated with floods; 3) minimize the impact of floods on human safety, health, and welfare; and 4) restore and preserve the natural and beneficial values of the base flood plain. The Proposed Action/Proposed Project is in compliance with this executive order.

8.2. STATE STATUTES AND REGULATIONS

8.2.1. California Environmental Quality Act

The City of Roseville is the CEQA lead agency for the proposed project because the long-term Warren Act contract is specific to the City's water supply needs. This joint EA/IS was prepared to fulfill the City's obligation under CEQA and in accordance with the California Environmental Quality Act of 1970, as amended (Public Resources Code, Section 21000, et seq.) and the State Guidelines for Implementation of CEQA, as amended (California Code of Regulations, Section 15000, et seq.). This document complies with the rules, regulations, and procedures for implementation of CEQA adopted by the City of Roseville.

8.2.2. California Endangered Species Act

CDFG is responsible for implementing the CESA (Fish and Game Code Chapter 1.5; §§2050-2068). Upon review of the Proposed Action/Proposed Project and associated mitigation measures (where applicable), CDFG will issue a written Finding based upon its determination of whether the Proposed Action/Proposed Project would jeopardize the continued existence of any endangered species or result in the destruction or adverse modification of habitat essential to the continued existence of the species. The written finding will also include CDFG's determination of whether the Proposed Action/Proposed Project(s) would result in any taking of an endangered or threatened species incidental to the Proposed Action(s) (Fish and Game Code § 2090[b]).

8.2.3. California Wild and Scenic Rivers Act (PRC § 5093.56)

The State of California holds that certain rivers which possess extraordinary scenic, recreational, fishery, or wildlife values shall be preserved in their free-flowing state,

together with their immediate environments, for the benefit and enjoyment of the people of the state (PRC § 5093.50). Rivers are considered eligible for Wild and Scenic status if they are free flowing and possess one or more of the following outstandingly remarkable values: fish, wildlife, ecological, geological, scenic, recreation, historic/cultural, hydrologic, or other values. Under the California Wild and Scenic Rivers Act, no department or agency of the state shall assist or cooperate, whether by loan, grant, license, or otherwise, with any department or agency of the federal, state, or local government, in the planning or construction of any dam, reservoir, diversion, or other water impoundment facility that could have an adverse effect on the free-flowing condition and natural character of the river and segments thereof designated as Wild and Scenic.

Under the California Wild and Scenic River Act, the State of California designated a portion of the lower American River as a component of the California Wild and Scenic River System (PRC § 5093.54 [e]). The lower American River, from Nimbus Dam to its confluence with the Sacramento River, was classified as "recreational" (PRC § 5093.545 [h]). Recreational rivers are those rivers or segments of rivers that are accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past. The City is responsible for ensuring that the Proposed Action/Proposed Project is in compliance with the state Wild and Scenic Rivers Act.

8.2.4. Other State Statutes and Regulations of Relevance

Other state statutes and regulations, which potentially may become relevant include:

- Stream Alteration Agreement (Fish and Game Code Sections 1601);
- Domestic Water Supply Permit;
- State Archeological and Historic Survey Review;
- Encroachment permit on Delta Levees;
- Encroachment permit affecting rights-of-way of state highways;
- Authority to construct or permit to operate large nitrogen oxide producers (related to backup generators at pumping plants); and
- Water Discharge Requirements – National Pollution Discharge Elimination System Permit – General Construction Activity Storm Water Permit.

Compliance with the above state statutes and regulations is normally required for project-specific actions. These regulatory approvals are typically necessary when the project-site specific engineering and design features have been established for any new facilities because the activities subject to these requirements include physical alterations due to construction or operation. In addition to these permits and activities, numerous county, municipal, and utility district permits and requirements may be required. These include county and municipal planning and zoning permits; utility and special district encroachment permits; consents from railroad, pipeline, and transmission line owners or operators; and local drainage permits.

Chapter 9
List of Preparers

Table 9-1 identifies a list of preparers for this joint environmental document.

Table 9-1. List of preparers.

Name	Qualifications	Expertise	Years of Experience	Participation
Surface Water Resources, Inc.				
George "Buzz" Link	B.S. 1975 Civil Engineering	Hydrologic Modeling and CVP Power	24	PROSIM hydrologic simulations; hydropower; water supply and hydrology; Reclamation operations and modeling liaison
Paul Bratovich	M.S. 1985 Fisheries Resources B.S. 1977 Fisheries	Fisheries Biology; Endangered Species; Flow-Habitat Relationships	20	Fisheries and aquatic resources
Patti Idlof	B.S. 1982 Natural Resource Management	CEQA/NEPA Compliance; Environmental Impacts Analysis	18	Project management, ESA facilitations; project coordination; and EA/IS document management
Robert Leaf	M.S. 1994Civil Engineering, B.S. 1992 Civil Engineering B.S. 1987 Forestry	Hydrologic Modeling; PROSIM	9	PROSIM hydrologic simulations; hydrology; Reclamation operations and modeling liaison
Ines Ferreira	M.S. 1993 Civil & Environmental Engineering M.S. 1992 Applied Mathematics GCE Mathematics Education, 1986 B.S. 1985 Mathematics	Hydrologic Modeling; PROSIM	10	PROSIM hydrologic simulations
John Faux	M.S. 1996 Agricultural and Resource Economics M.S. 1983 Civil Engineering: Water Resources Planning and Management B.S. 1979 Watershed Science	Hydrologic Modeling; PROSIM	15	PROSIM hydrologic simulations; hydropower; Reclamation operations and modeling liaison
Jason Lemieux	M.S. 2000 Agricultural & Resource Economics B.S. 1996 Food and	Hydrologic Modeling; PROSIM; CVP hydropower	2	PROSIM hydrologic simulations; hydropower

Table 9-1. List of preparers.

Name	Qualifications	Expertise	Years of Experience	Participation
	Resource Economics			
Allison Dvorak	M.S. 2000 Hydrologic Sciences B.S. 1998 Earth and Atmospheric Sciences	Hydrologic Modeling; Environmental Impacts Analysis	2	PROSIM hydrologic simulations; water supply; hydropower; cultural resources; recreation; service area related effects; cumulative analysis
Robert Shibatani	M.S. 1988 Hydrology B.S. 1984 Earth Sciences	Hydrology and Regulatory Compliance	13	Alternatives identification, screening, and development; hydrologic analytical framework and methodology; project overview; cumulative impacts; ESA facilitations; and EA/IS document management
Jason Ramos	B.S. 2000 Natural Resources Planning and Interpretation	Environmental Impacts Analysis	1	Fisheries and aquatic resources; riparian vegetation
Julie Hall	B.S. 1997 Environmental Biology and Management	Environmental Impacts Analysis	1	Geology and soils; recreation/aesthetics; compliance; and cultural resources
Jeff Strawn	B.S. 1989 Business Administration	Graphic Design	8	EA/IS graphics
Linda Standlee		Administrative Support; Document Management	13	Document editing and formatting
Tami Mihm	B.S. 1988 Environmental Policy Analysis and Planning	CEQA/NEPA Compliance; Environmental Impacts Analysis	12	ESA facilitations; project coordination; and EA/IS document management
Carol Lazzarotto	M.S. 1984 Public Policy B.A. 1981 Political Science	CEQA/NEPA Compliance; Environmental Impacts Analysis	13	Environmental analysis; project coordination
Meryka Atherstone	B.S. 2001 Earth Systems Science and Policy	Environmental Impacts Analysis; Environmental Planning	4	Cumulative and environmental analysis
Karen Riggs	B.A. 2001 Environmental Studies	Environmental Impacts Analysis	2	Environmental analysis
U.S. Bureau of Reclamation				
John Robles	B.A. 1992 Conservation Biology B.S. 1986 Resource and Environmental Geography	Natural Resources Specialist	10	Environmental Assessment review and oversight

Table 9-1. List of preparers.				
Name	**Qualifications**	**Expertise**	**Years of Experience**	**Participation**
Rob Schroeder	B.S. Environmental Resources	Resource Manager	30	Environmental Assessment review and oversight
Jim West	B.A. 1967 Anthropology M.A. 1972 Anthropology PhD 1978 Anthropology	Regional Archeologist	34	Cultural resources analysis review

Chapter 10
Literature Cited

Bouey, P.D. 1990. Intensive Cultural Resources Survey and National Register Evaluation: Sacramento Urban Area Flood Control Project. Far Western Anthropological Research Group, Inc. Davis. Prepared for United States Army Corps of Engineers, Sacramento, Contract #DACWO589P3759.

California Air Resources Board. 1989. Criteria Pollutant Attainment Status for the City of Roseville.

California Department of Fish and Game (CDFG). 1992. Chinook Salmon and Steelhead Trout Redd Survey Lower American River, 1991- 1992, Final Report.

CDFG. 1993. Factors Controlling the Abundance of Aquatic Resources in the Sacramento-San Joaquin Estuary.

CDFG. 1995. Chinook Salmon Redd Survey: Lower American River, Fall 1993.

CDFG. 1998. A Report to the Fish and Game Commission: A Status Review of the Spring-run Chinook (*Oncorhynchus tshawytscha*) in the Sacramento River Drainage. Candidate Species Status Report 98-01. June 1998.

CDFG. 2004. California Natural Diversity Database (CNDDB) Quad Viewer. Accessed April 28, 2004. Available from http://maps.dfg.ca.gov/CNDDB_Quads/

CH2M HILL and Surface Water Resources, Inc (SWRI). 2000. City of Sacramento Water Facilities Expansion Project. Administrative Draft Environmental Impact Report.

City of Roseville General Plan. 1992. City of Roseville Planning Department.

City of Roseville. 1999. Draft EIR for the Water Treatment Plant Expansion Project and 60-Inch Paw Water Pipeline Project. February 1999.

City of Roseville. 2002. Urban Water Management Plan. City of Roseville Environmental Utilities Division. July 2002.

City of Roseville. 2003. West Roseville Specific Plan and Sphere of Influence Amendment Area Draft Environmental Impact Report. September 15, 2003.

City of Roseville. 2004. West Roseville Specific Plan and Sphere of Influence Amendment Area Final Environmental Impact Report. January 9, 2004.

City of Roseville. 2004a. Quarterly Development Activity Report, Third Quarter of 2004. City of Roseville Planning Department. November 2004.

City of Sacramento. 1993. Notice of Preparation for Central Valley Project Water Supply Contracts.

Clark, G.H. 1929. Historical and Statistical Review of the Sacramento-San Joaquin Salmon Fishery (Part I). Survey of salmon spawning grounds on Sacramento and San Joaquin river systems (Part II). Calif. Div. Fish and Game, Fish Bulletin No. 17. pp. 1-47.

Corps. 1992a. Draft Environmental Impact Statement for Folsom Dam and Reservoir Re-operation Study, California.

Corps. 1992b. Draft Environmental Impact Statement for Folsom Dam and Reservoir Re-operation study, California. South Pacific Division, Sacramento District.

Corps. 1996. Final American and Sacramento Rivers Project, Task 4: Folsom Dam and Reservoir Permanent Reoperation. Administrative Draft Report. Sacramento, California. 1996.

Department of Water Resources (DWR) and U. S. Bureau of Reclamation (Reclamation). 1996. Interim South Delta Program - Draft Environmental Impact Environmental Impact Statement. July 1996.

DWR. 1993. Sacramento Delta San Joaquin Atlas. State of California Department of Water Resources, Sacramento, California.

DWR. 1994. Effects of the Central Valley Project and State Water Project on Delta Smelt and Sacramento Splittail. Prepared for the U.S. Fish and Wildlife Service by the California Department of Water Resources and the U.S. Bureau of Reclamation. August 1994.

DWR. 2001. Initial Information Package. Relicensing of the Oroville Facilities. Federal Energy Regulatory Commission License Project. No. 2100. January 2001.

EDAW, Inc. and SWRI. 1999. Water Forum Proposal. Draft Environmental Impact Report for the Water Forum Proposal.

EIP Associates. 1999. Draft Environmental Impact Report for the City of Roseville Water Treatment Plant Expansion Project and 60-Inch Raw Water Pipeline Project. City of Roseville.

Fenenga, F. 1948. Appraisal of the archeological resources of Folsom Reservoir, California, manuscript on file, California Department of Parks and Recreation, Sacramento.

Friesen, T. G. 1998. Effects of food abundance and temperature on growth, survival, development and abundance of larval and juvenile smallmouth bass. Ph. D. Dissertation. University of Guelph, Guelph, Ontario.

Goff, G. P. 1986. Reproductive success of male smallmouth bass in Long Point Bay, Lake Erie. Transactions of the American Fisheries Society 115: 415-423.

HCP Stakeholders. 2003. September 27 Meeting Notes. Available on the Internet at: scwa2.com/agendas/stakeholders%20group%209-27.01%20mtg%20notes.doc. (last accessed on April 21, 2003).

Heizer, R.F. 1934. Archaeological Site Survey Records for CA-SAC-26, 28, 29, 30, 41, 42, 43, 44, 46. On file at North Central Information Center, California State University Sacramento, Department of Anthropology.

Hunt, J. and C.A. Annett. 2002. Effects of habitat manipulation on reproductive success of individual largemouth bass in an Ozark Reservoir. North American Journal of Fisheries Management 22:1201-1208.

Hurley, G. V. 1975. The reproductive success and early growth of smallmouth bass, *Micropterus dolomieu Lacepede*, at Baie du Dore, Lake Huron, Ontario. M. S. Thesis. University of Toronto, Toronto.

Knotek, W. L., and D. J. Orth. 1998. Survival for specific life intervals of smallmouth bass, *Micropterus dolomieu*, during parental care. Environmental Biology of Fishes 51: 285-296.

Kramer, R. H., and J. L. Smith. 1962. Formation of year classes in largemouth bass. Transactions o the American Fisheries Society 91:29-41.

Kroeber, A.L. 1925. Handbook of the Indians of California. Bureau of American Ethnology Bulletin 78. Smithsonian Institute, Washington,

Larry Walker Associates and Brown and Caldwell. 1995. Sacramento Coordinated Water Quality Monitoring Program 1994 Annual Report. March 1995.

Larry Walker Associates. 1991. Sacramento Regional Wastewater Treatment Plant Master Plan Report. Task 400 Technical Memorandum No. 3: Background Water Quality. August 1992.

Latta, W. C. 1956. The life history of the smallmouth bass, *Micropterus d. dolomieui*, at Waugoshance Point, Lake Michigan. Institute for Fisheries Research (Michigan Department of Conservation) and The University of Michigan, No. 5, Ann Arbor, Michigan.

Lee, D.P. 1999. Water Level Fluctuation Criteria for Black Bass in California Reservoirs. Fisheries Programs Branch, CDFG, Sacramento, CA. July 1999

Lukas, J. A., and D. J. Orth. 1995. Factors affecting nesting success of smallmouth bass in a regulated Virginia stream. Transactions of the American Fisheries Society 124: 726-735.

Milliken, R.T. 1994. Report on the 1994 Archaeological Excavation on the Skirt of the Souza Mound, Sac-42, Sacramento County, California. Prepared by Far Western Anthropological Research Group, Inc. Davis, CA, for the City of Sacramento.

Moyle, P.B. 2002. Inland Fishes of California; revised and expanded. University of California Press. Berkeley, CA. 2002.

Moyle, P.B., J.E. Williams, and E.D. Wikramanayake. 1989. Fish Species of Special Concern in California. Final report to CDFG, Rancho Cordova, Ca. October 1989. 222 pp.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of Chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Of Commerce, NMFS Tech Memo. NMFS-NWFSC-35, 443 p.

Neves, R. J. 1975. Factors affecting fry production of smallmouth bass (*Micropterus dolomieui*) in South Branch Lake, Maine. Transactions of the American Fisheries Society 103: 83-87.

National Marine Fisheries Service (NMFS). 1999. Endangered and Threatened Species: Threatened Status for Two Chinook Salmon Evolutionarily Significant Units (ESUs) in California; Final Rule. Federal Register 64 (179).

NMFS. 1999. Essential Fish Habitat Consultation Guidance. November 1999.

NMFS. 2000. NMFS' Final Biological Opinion for the Proposed Operation of the Central Valley Project (CVP) and the State Water Project (SWP) During the Period Between December 1999, and March 2000, and its Effects on Federally Threatened Central Valley Steelhead and Threatened Central Valley Spring-run Chinook Salmon Pursuant to Section 7 of the ESA. Memorandum, March 27, 2000.

NMFS. 2002. A status review for North American green sturgeon *(Acipenser medirostris).* National Marine Fisheries Service, Southwest Fisheries Science Center, Northwest Fisheries Science Center.

NMFS. 2003. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List North American Green Sturgeon as a Threatened or Endangered Species. Federal Register 68(19):4433.

NMFS. 2004. Species of Concern and Candidate Species. Available on the internet at: http://www.nmfs.noaa.gov/pr/species/concern/.

NMFS. 2004a. Biological Opinion on the Long-Term CVP and SWP Operations Criteria and Plan. National Marine Fisheries Service, Southwest Region, October 2004.

NMFS. 2004b. Proposed Critical Habitat Designations in Washington, Oregon, Idaho and California for Endangered and Threatened Pacific Salmon & Steelhead. Available on the internet at: http://www.nwr.noaa.gov/1salmon/salmesa/crithab/CHfactsheet.pdf

Olsen, W.H. 1963. CA-BUT-212 Archeological Site Survey Record on file at the Northeast Information Center, Department of Anthropology, California State University, Chico.

Olsen, W.H., and F.A. Riddel. 1963. The Archeology of the Western Pacific Railroad Relocation, Oroville Project, Butte County, California. Department of Parks and Recreation Archeological Report No. 7.

Peak and Associates. 1989. Folsom Lake Reoperation: Historical resources overview. Prepared for U.S. Army Corps of Engineers. Sacramento, CA.

Philipp, D. P., C. A. Toline, M. F. Kubacki, and D. B. F. Philipp. 1997. The impact of catch-and-release angling on the reproductive success of smallmouth bass and largemouth bass. North American Journal of Fisheries Management 17: 557-567.

Placer County. 1994. Placer County General Plan Update. Placer County Planning Department.

Placer County Water Agency (PCWA) and Reclamation. 2002. American River Pumps Station Project Final EIS/EIR.

Raffetto, N., S., J. R. Baylis, and S. L. Serns. 1990. Complete estimates of reproductive success in a closed population of smallmouth bass (*Micropterus dolomieui*). Ecology 71: 1523-1535.

Reclamation. 1991. Planning Report/Final Environmental Statement. Shasta Outflow Temperature Control.

Reclamation. 1997. Central Valley Project Improvement Act. Draft Programmatic Environmental Impact Statement.

Reclamation. 2001. American River Basin Cumulative Impact Draft Report. U.S. Bureau of Reclamation.

Reclamation. 2002. American River Basin Cumulative Impact Report. U.S. Bureau of Reclamation.

Regional Water Quality Control Board (RWQCB), Central Valley Region. 1994 Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board, Central Valley Region (5).

Riddell, F.A. 1978. Maidu and Knokow. In California, edited by R.F. Heizer, pp. 370-386. Handbook of North American Indians, vol. 8, W.C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Ridgway, M. S., and B. J. Shuter. 1994. The effects of supplemental food on reproduction in parental male smallmouth bass. Environmental Biology of Fishes 39: 201-207.

Rodgers, H. John. 1980. Soil Survey of Placer County, California: Western Part. United State Department of Agriculture, Soil Conservation Service.

Rutter, C. 1904. Natural History of the Quinnat Salmon. Investigation on Sacramento River, 1896-1901. Bull. U.S. Fish Comm. 22:65-141.

Sacramento Area Council of Governments. 2001. Website. Population, housing, and employment trends of the City of Roseville.

Sacramento Regional County Sanitation District. 1994. Sacramento Regional Wastewater Treatment Plant Solids Disposal Facilities: 1993 Annual Monitoring Report. February 1994.

Sands, A., S.D. Sanders, E.C. Beedy, R.F. Holland, and V. Dains. 1985. Vegetation and wildlife resources along the lower American River and their relationships to instream flows. Report prepared for: McDonough, Holland, and Allen, Sacramento.

Scott, B. 1995. Cultural resources portion of Administrative Draft Report, American & Sacramento Rivers Project Task 4: Folsom Dam and Reservoir Permanent Reoperation. Jones & Stokes Associates, Inc., Sacramento. Prepared for the U.S. Army Corps of Engineers, Sacramento District.

Skinner, J.E. 1972. Ecological Studies of the Sacramento-San Joaquin Estuary. CDFG, Delta Fish and Wildlife Protection Study, Report No. 8. June 1972. 94 pp.

Snider, B., R.G. Titus, and B.A. Payne. 1997. Lower American River Emigration Survey: November 1994-September 1995. Final report. CDFG, Environmental Sciences Division, Stream Evaluation Program. September, 1997.

State Water Resources Control Board (SWRCB). 1992. State Water Resources Control Board Water Rights Hearing on the Lower Yuba River, Yuba County Water Agency *v*. State Water Resources Control Board. 1992.

Steinhart, G. B. 2004. Exploring factors affecting smallmouth bass nest success and reproductive behavior. Ph. D. Dissertation. Department of Evolution, Ecology, and Organismal Biology. The Ohio State University.

Stone, L. 1874. Report of Operations During 1872 at the U.S. Salmon Hatching Establishment on the McCloud River, and on the California Salmonidae Generally; with a List of Specimens Collected. Report of U.S. Commissioner of Fisheries for 1872-1873, 2: 168-215.

Turner, G. E., and H. R. MacCrimmon. 1970. Reproduction and growth of smallmouth bass, *Micropterus dolomieui*, in a Precambrian lake. Journal of the Fisheries Research Board of Canada 27: 395-400.

U.S. Army Corps of Engineers (Corps). 1991. Draft Feasibility Report. American River Watershed Investigation, California. Appendix H. Recreation Resources Appendix.

U.S. Bureau of Reclamation (Reclamation) and Sacramento Area Flood Control Agency (SAFCA). 1994. Interim Reoperation of Folsom Dam and Reservoir Final Environmental Assessment/Environmental Impact Report.

U.S. Fish and Wildlife Services (USFS). 1993. Pacific Southwest Region Threatened, Endangered, Sensitive, and Riparian-associated Species: Habitat Requirements Summary and Habitat Objectives. Unpublished document, July 30, 1993, San Francisco, CA.

USFS. 2000. Sierra Nevada Forest Plan Amendment EIS. Available at: http://www.fs.fed.us/r5/snfpa/library/archives/bio-assess/effects/species/bald-eagle.html (last accessed on April 15, 2003).

USFWS and NMFS. 1998. Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act. March 1998. Pp 3-10 to 3-11, 4-22 to 4-23.

USFWS, NMFS, and California-Nevada Chapter of the American Fisheries Society (AFS). 2001. Biological Assessment Workshop with Tools for Expediting Section 7 Consultations. Santa Rosa, California. March 28, 2001.

USFWS, Reclamation, and Hoopa Valley Tribe. 2000. Trinity River Mainstem Fishery Restoration Final Environmental Impact Statement/Report.

USFWS. 1991. American River Watershed Investigation, detailed report on fish and wildlife resources. Fish and Wildlife Coordination Act Report. Ecological Services, Sacramento Field Office.

USFWS. 1995. Formal Consultation and Conference (Biological Opinion) on Effects of Long-term Operation of the Central Valley Project and State Water Project on the Threatened Delta Smelt, Delta Smelt Critical Habitat, and Proposed Threatened Sacramento Splittail.

USFWS. 1996. Programmatic Formal Consultation Permitting Projects and Relatively Small Effects on the Valley Elderberry Longhorn Beetle within the Jurisdiction of the Sacramento Field Office, California. (Corps File #199600065).

USFWS. 2003. Species Account for the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*). Available on the Internet at: http://sacramento.fws.gov/es/animal_spp_acct/valley_elderberry_longhorn_beetl.htm (last accessed on September 23, 2003).

USFWS. 2004. Quad Species Lists. Accessed April 28, 2004. Available from http://sacramento.fws.gov/es/spp_list.htm.

USFWS. 2004a. Biological Opinion on the Long-Term CVP and SWP Operations Criteria and Plan. US Fish and Wildlife Service, Sacramento Fish and Wildlife Office, July 2004.

Vogel, D.A., and K.R. Marine. 1991. Guide to Upper Sacramento River Chinook Salmon Life History. Prepared for the U.S. Bureau of Reclamation, Central Valley Project. 55 pp. With references.

Waechter, S.A. 1992. Folsom Reservoir Reoperation Study, El Dorado, Placer, and Sacramento Counties, California: Cultural Resources Survey. Submitted to U.S. Army, Corp of Engineers, Sacramento. Far Western Anthropological Research Group, Inc.

Waechter, S.A. 1993. Final Report on a cultural resources inventory of a portion of the Folsom Reservoir study area. Submitted to the U.S. Department of the Interior, Bureau of Reclamation, Sacramento. Far Western Anthropological Research Group, Inc.

Waechter, S.A., and S.D. Mikesell. 1994. Research Design for Prehistoric, ethnographic, and historic cultural resources at Folsom Reservoir, California. Prepared for the USDI Bureau of Reclamation, Sacramento. Far Western Anthropological Research Group, Inc., and JRP Historical Consulting Services, Davis.

Water Forum. 2000. Water Forum Agreement. Developed by Stakeholder Representatives for Adoption by Their Governing Boards. January 2000.

Welch, P. 1998. U.S. Bureau of Reclamation Environmental Affairs Division. Telephone conversation with Julie Hall. June 30, 1998.

Western. 2003. Statistical Appendix to the Annual Report 2003. Western Area Power Administration. Available at http://www.wapa.gov.