RECLAMATION

Managing Water in the West

Environmental Assessment

Amendatory Contract between the United States and Conaway Preservation Group, LLC and Sacramento River Settlement Contract between the United States and the Woodland-Davis Clean Water Agency

Bureau of Reclamation, Mid-Pacific Region

U.S. Department of the Interior
Bureau of Reclamation

July 2013

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Acronyms and Abbreviations

2007 DWWSP EIR	Davis Woodland Water Supply Project Environmental Impact Report
af	acre feet
BMO	Basin Management Objective
cfs	cubic feet per second
CPG	Conaway Preservation Group, LLC
CVP	Central Valley Project
CWA	Woodland Davis Clean Water Agency
DFW	California Department of Fish and Wildlife
DWWSP	Davis Woodland Water Supply Project
EA	Environmental Assessment
GPS	Global Positioning System
I-5	Interstate 5
I-80	Interstate 80
mg/L	milligrams per liter
msl	mean sea level
NCCP/HCP	Yolo County Natural Community Conservation Plan/Habitat Conservation Plan
NEPA	National Environmental Policy Act
NHP	Yolo Natural Heritage Program
NRDC/DOW	Natural Resources Defense Council/Defenders of Wildlife
RD	Reclamation District
Settlement Contract	Sacramento River Settlement Contract

SWRCB	State Water Resources Control Board
YCFCWCD	Yolo County Flood Control and Water Conservation District
µg/L	micrograms per liter

1 Introduction

This Environmental Assessment (EA) was prepared in accordance with the National Environmental Policy Act (NEPA) (42 USC 4321-4347), the Council of Environmental Quality's Regulations for implementing the procedural requirements of NEPA (40 CFR 1500-1508) and the Department of the Interior's NEPA regulations (43 CFR Part 46). This document provides an assessment of the potential impacts to the human environment from the execution of an amendatory Sacramento River Settlement Contract (Settlement Contract) between the United States and the Conaway Preservation Group, LLC (CPG), and the execution of a Settlement Contract between the United States and the Woodland-Davis Clean Water Agency (CWA). These contracts recognize the water rights changes approved by the State Water Resources Control Board (SWRCB) in 2012 authorizing the conveyance to CWA by CPG of CPG's interest in 10,000 acre feet (af) of Sacramento River water made available under CPG's state water rights licenses.

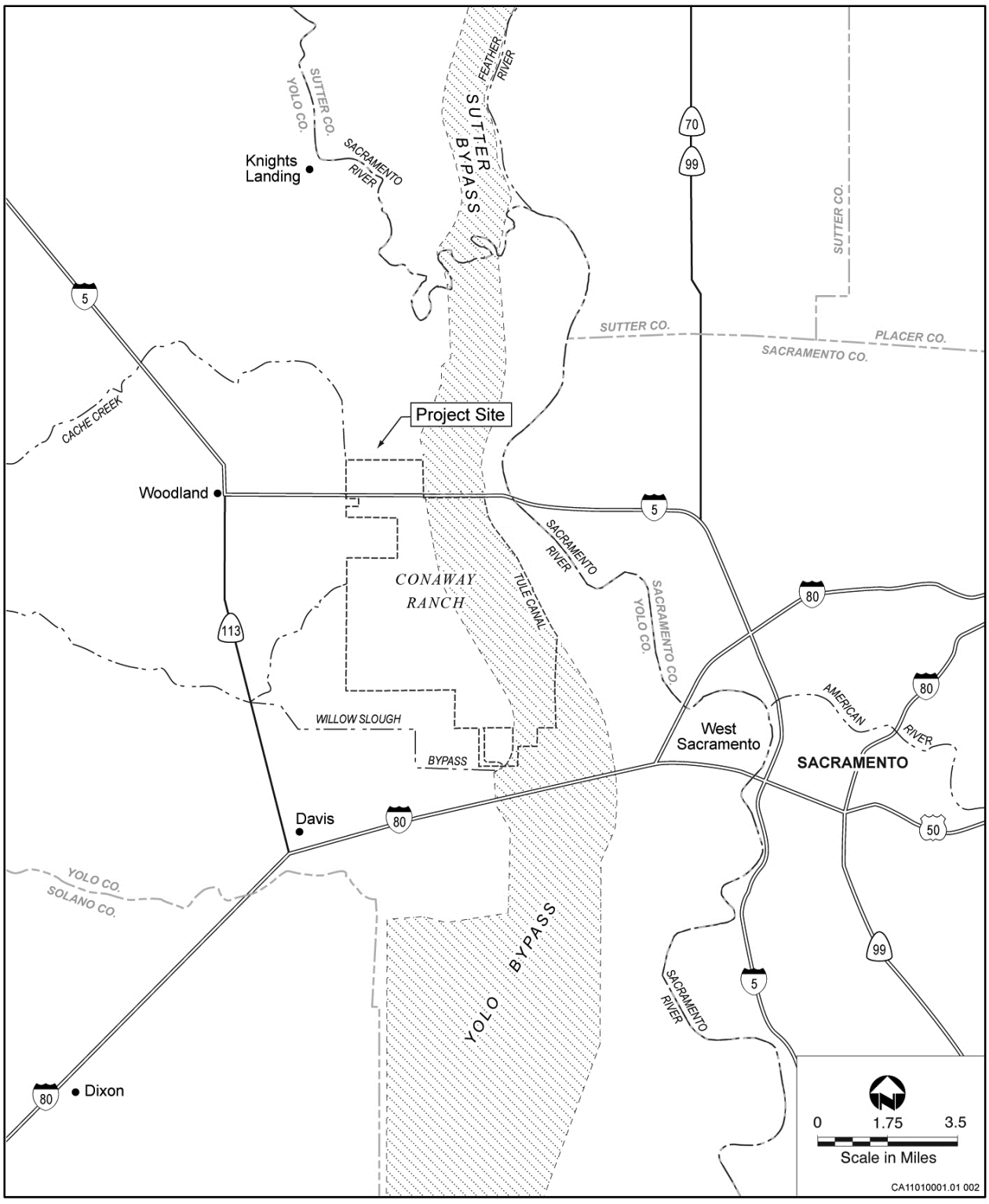
1.1 Background

1.1.1 Location

CPG owns 17,244 acres in eastern Yolo County known as Conaway Ranch (Exhibit 1-1). Surrounding landmarks and features include the Sacramento River to the east, City of Davis to the south and west, City of Woodland to the west, and Interstate 80 (I-80) to the south. Interstate 5 (I-5) bisects the northern portion of the ranch in an east-west direction. Conaway Ranch is located within Reclamation District (RD) 2035 and comprises the majority of land within the district. RD 2035 is responsible for providing levee maintenance, drainage, and irrigation services to properties within its service area and diverts water from the Sacramento River on behalf of CPG. RD 2035 also operates the diversion structure that supplies Sacramento River water to CPG and other properties in its service area.

1.1.2 Conaway Preservation Group, LLC Water Rights and Operations

CPG and its predecessors in interest have diverted water from the Sacramento River since at least 1919 for irrigation of Conaway Ranch. Primary crops irrigated on Conaway Ranch include rice, corn, tomatoes, wheat, and safflower. CPG holds appropriative water right licenses from the State of California (issued by the SWRCB and its predecessors) to divert water from the Sacramento River and Willow Slough and an appropriative water right permit to divert water from Cache Creek and the Yolo Bypass. Table 1-1 describes the maximum direct diversion rates and seasons allowed under the CPG's water right licenses and permit as they existed at the time CPG requested amendment of its Settlement Contract.



Source: Ascent 2011

Exhibit 1-1 **Project Vicinity**

Table 1-1 Water Right License/Permit for CPG

License/ Permit	Priority Date	Water Source	Maximum Direct Diversion Rate, cfs[a]	Authorized Season of Direct Diversion
License 904	March 1, 1919	Sacramento River	120	About April 1 – About September 30
License 905	December 26, 1919	Sacramento River	14.75	About April 1 – About September 30
License 5487[b]	September 8, 1947	Sacramento River	165.25	About April 1 – About October 31
License 6320	September 8, 1947	Willow Slough	9.4	About April 15 – About October 31
Permit 19372[c, d]	January 27, 1981	Cache Creek/ Yolo Bypass	100	April 15 – September 30

[a] cubic feet per second
[b] The total quantity of water diverted under Licenses 904, 905, and 5487 shall not exceed 232 cubic feet per second (cfs).
[c] The total quantity of water diverted under Licenses 904, 905, 5487, and 6320 and Permit 19372 shall not exceed 316 cfs.
[d] The maximum amount diverted under Permit 19372 shall not exceed 10,000 acre feet per year.

1.1.3 CPG Sacramento River Settlement Contract

On March 4, 2005, CPG renewed its Settlement Contract (Contract No. 14-06-200-7422A-R-1) with the United States. The Settlement Contract settled disputes between the United States and CPG as it pertained to the rights of each party to divert water from the regulated flow of the Sacramento River, provides for a supplemental supply in those months where the rights are deficient, and provides additional restrictions on diversion. The contract specifically identifies the volume of "Base Supply" and "Project Water" that can be diverted from the Sacramento River. The Base Supply is the quantity of surface water that may be diverted by CPG from the Sacramento River each month during the period April through October each year without payment to the United States. The quantity of Base Supply is based on CPG's underlying post-1914 appropriative water rights from the Sacramento River, confirmed by water right licenses 904, 905, and 5487.

Project Water is all water that may be diverted by CPG from the Sacramento River during the period of April through October in excess of the Base Supply as agreed to in the Settlement Contract. Table 1-2 presents the allowable diversion quantities of Base Supply and Project Water, as identified in Exhibit A of the Settlement Contract.

Table 1-2 Allowable Monthly Diversions, acre-feet (af)

Source	April	May	June	July	August	September	October	Annual Total
Base	6,890	13,970	14,690	**5,070**	**980**	**6,730**	1,860	50,190
Project	—	—	—	**304**	**288**	**80**	—	672
Total	*6,890*	*13,970*	*14,690*	***5,374***	***1,268***	***6,810***	*1,860*	*50,862*
					Total for Critical Months = 13,452			

Bold = Critical Months
Source: Reclamation 2005.

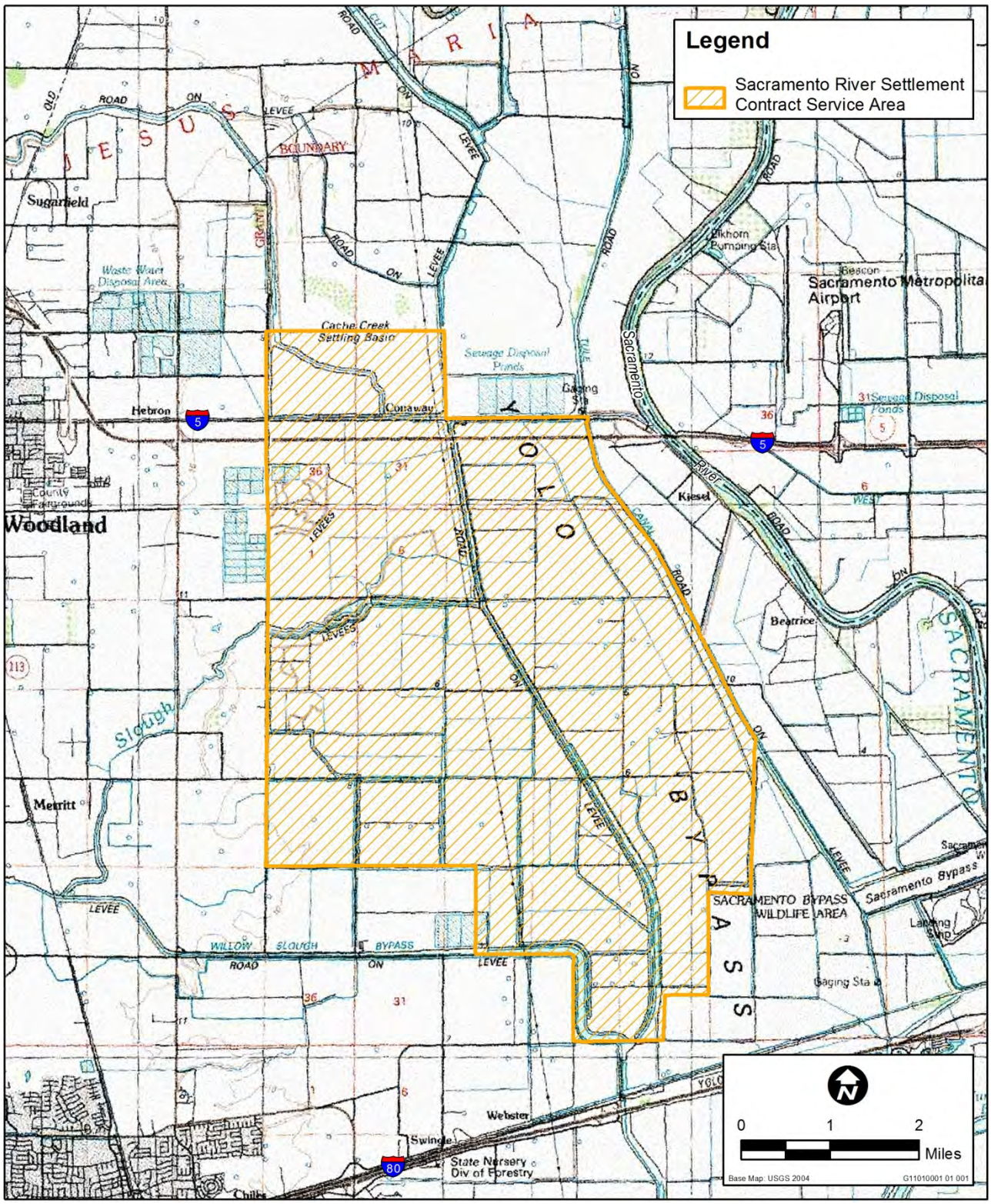
The Settlement Contract identifies certain constraints and diversion limitations. In a Critical Year, CPG's Base Supply and Project Water are subject to a 25 percent cutback. A Critical Year is a year in which 1) the forecasted full natural inflow to Shasta Lake for the current Water Year is equal to or less than 3.2 million af, or 2) the total accumulated actual deficiencies below 4 million af in the immediately prior Water Year or series of successive prior Water Years each of which had inflows of less than 4 million af, together with the forecasted deficiency for the current Water Year, exceed 800,000 af. Water can only be used for agricultural purposes within CPG's service area. Exhibit 1-2 presents CPG's service area as shown in Exhibit B of the Settlement Contract.

As indicated in Table 1-2 and described in more detail below, CPG may divert up to 50,862 af during the period April through October under the Settlement Contract. A limitation of the Settlement Contract is that the monthly quantities of water available to CPG during the "critical months," the period from July through September, cannot be supplemented by shifting other quantities from months outside this period. Water can be shifted from month-to-month within this period, so long as it does not exceed the total allowable diversions of 13,452 af for the critical months. The monthly maximum diversion quantities for the months of April through June and October can be supplemented through the shifting of water within those months. For example, while the month of April has an allowable diversion of 6,890 af, CPG could increase the amount diverted in April to 8,890 af provided that the scheduled quantities between the months May through October are reduced by 2,000 af. Thus, diversions from the Sacramento River can be shifted among months up to the maximum of 50,862 af during the period April through October, provided that the maximum allowable diversion quantity for July through September, 13,452 af, is not exceeded during that period.

1.1.4 Agreement between CPG and Woodland-Davis CWA

The CWA is converting its water supply from groundwater to surface water through implementation of the Davis Woodland Water Supply Project (DWWSP). The DWWSP is intended to address issues associated with providing water for municipal and industrial (M&I) needs, including aging water systems, more stringent water quality standards and regulations, and increasing water demands within these jurisdictions. In March 2011, as a component to implement the DWWSP, the SWRCB approved a surface water right for the CWA for diversions of up to 45,000 af from the Sacramento River during January through December (Decision 1650, approving Permit 20281)[1]. The CWA permit

[1] An existing diversion structure on the Sacramento River has been used since 1919, and continues to be used, to divert water to Conaway Ranch. As a separate habitat enhancement project and to convey the full permitted right of 45,000 af approved for the CWA, RD 2035 is proposing a new diversion and intake structure on the Sacramento River, with a fish screen; this project is undergoing separate environmental review (CEQA/NEPA compliance) by RD 2035. Reclamation is only proposing to provide funding for the fish screen, and the U.S. Army Corps of Engineers is the lead agency for NEPA. The diversion/intake structure would be located just south of RD 2035's existing diversion structure near River Mile (RM) 11.9R and the existing diversion structure would be demolished. The intake project would move forward with or without the proposed contract actions (which address a fraction of the water required by the CWA) and is, therefore, not considered in this EA.



Source: Ascent 2011

Exhibit 1-2 **Project Location**

contains standard permit Term 91, which prevents the CWA from diverting water under its permit during certain conditions when notified by the SWRCB. As a result of the Term 91 limitation, the CWA permit contains a condition providing that no water may be diverted under the permit until the CWA obtains a long-term water supply covering the Term 91 period when water is not available for diversion under the permit. (Condition 25 to Permit 20281.)

To fulfill this condition, CPG and the CWA entered into an agreement for the permanent assignment to the CWA of 10,000 af of CPG's water diverted under CPG's state water rights Licenses 904 and 5487, which is a portion of CPG's Base Supply under its Settlement Contract. The agreement assigns CPG's right to divert up to 10,000 af during the months of June, July, August and September, which are the periods in which Term 91 restrictions would normally limit the CWA's ability to divert under its own surface water permit. The agreement provides that CPG will make up for the assigned water by substituting up to 10,000 af of groundwater. When Term 91 conditions are not present, the CWA would divert under its Sacramento River water right; and pursuant to the agreement between the CWA and CPG, through the year 2039, CPG may divert any of the 10,000 af of surface water not used by the CWA.

To implement the agreement, by letter dated January 19, 2011, CPG requested that the Bureau of Reclamation (Reclamation), acting on behalf of the United States, amend CPG's existing Settlement Contract to, among other things, assign 10,000 af of Base Supply to the CWA. Also, on March 17, 2011, CPG filed Petitions for Change with the SWRCB. In the petitions, CPG asked to split its water rights License 904 into 904A and 904B and License 5487 into 5487A and 5487B and assign Licenses 904A and 5487A to the CWA. The petitions identified that the total quantity of water assigned to Licenses 904A and 5487A shall not exceed 10,000 af per year (afy) from a point of diversion located a few hundred feet downstream of CPG's currently authorized point of diversion. The place of use for Licenses 904A and 5487A would be expanded to include the CWA's service area, currently 23,950 acres, in addition to CPG's authorized places of use. The petitions also proposed that the purpose of use for Licenses 904A and 5487A would include (in addition to irrigation), municipal, industrial, fish and wildlife enhancement, and fisheries and aquaculture research. The changes would authorize diversions from the Sacramento River under Licenses 904A and 5487A for use within the CWA and CPG, in accordance with the agreement.

Protests to CPG's petitions for change were filed by Reclamation, DWR, the California Department of Fish and Wildlife (DFW), the Natural Resources Defense Council/Defenders of Wildlife (NRDC/DOW) and one individual. The SWRCB dismissed the protest filed by the one individual. Negotiations among CPG, the agencies and other non-governmental organizations resulted in an agreement by Reclamation, DWR, DFW, and NRDC/DOW to dismiss their protests in exchange for certain conditions to the water rights licenses.

By letter of November 21, 2012, as modified by letter of December 21, 2012, the SWRCB approved CPG's petitions for change, and Amended Licenses 904A and 5487A were issued to the CWA and Amended Licenses 904B and 5487B were issued to CPG, each subject to specific terms and conditions, including the agreed-upon conditions to the protest dismissals (applicable dismissal terms are included in the environmental commitments to the proposed project).

Table 1-3 describes the state water rights issued for the CWA and CPG. The conditions to the protest dismissals constituting environmental commitments of the Proposed Action are set forth in Section 2.3.

Table 1-3 Summary of Changes to State Water Right Licenses

Former License	New Licenses	Approved Changes
904	904A and 904B	**904A** CWA License 80 cfs[a] 100 cfs (max)[b] April 1 – Sept 30 changed the place of use to include the CWA service area changed purpose of use to add M&I, Fish and Wildlife Enhancement, and Fishery & Aquaculture Research uses **904B** CPG License all water rights not assigned to the CWA (904A) changed purpose to add Incidental Fish & Wildlife Enhancement uses
5487	5487A and 5487B	**5487A** CWA License 80 cfs[a] 100 cfs (max)[b] Oct 1 – Oct 31 changed the place of use to include the CWA service area changed purpose of use to add M&I, Fish and Wildlife Enhancement, and Fishery & Aquaculture Research uses **5487B** CPG License all water rights not assigned to the CWA (5487A) changed purpose to add Incidental Fish & Wildlife Enhancement uses
Water Right Licenses 904A and 5487A: CWA licenses have priority over CPG's licenses (904B and 5487B) as long as water is used for M&I uses within the CWA. Total maximum annual authorized diversions will not exceed 10,000 af.		

[a] maximum 30-day average direct diversion rate
[b] maximum instantaneous direct diversion rate

1.2 Need for the Proposed Action

The underlying need for the Proposed Action is for the CWA to be able to exercise its water right under Permit 20281, which provides for a reliable source of high-quality surface water for the CWA. The CWA is converting its water supply from groundwater to surface water through implementation of the DWWSP. The CWA has obtained Permit 20281 issued by the SWRCB for diversions from the Sacramento River. Pursuant to the SWRCB's Decision 1650, diversions under the CWA's permit are prohibited until the CWA obtains a supplemental supply during Term 91 curtailment periods (Condition 25, Permit 20281). To fulfill this condition, CPG and the CWA entered into an agreement for the permanent assignment to the CWA of 10,000 af of CPG's water diverted under CPG's state water rights Licenses 904 and 5487, which is a portion of CPG's Base Supply under its Settlement Contract. The agreement provides that CPG will make up for the assigned water by substituting up to 10,000 af of groundwater. To recognize and account for this assignment, Reclamation will need to execute an amendatory Settlement Contract between the United States and CPG and execute a Settlement Contract between the United States and the CWA.

2 Alternatives

2.1 No Action Alternative

Under the No Action Alternative, Reclamation would not amend CPG's Settlement Contract and would not execute a Settlement Contract with the CWA. As a result, in order to exercise its right to divert surface water under Permit 20281, the CWA would have to secure an alternate source of long-term water supply covering those periods when water is not available for diversion under the permit, such as another water right assignment or transfer (Condition 25, Permit 20281). Demands within the CWA would continue to be met primarily by groundwater pumping within the CWA. Reclamation would continue to implement the existing Settlement Contract with CPG consistent with its existing provisions, and CPG would have no need to increase groundwater pumping to replace the permanently assigned surface water.

2.2 Proposed Action – Amend CPG, LLC's Sacramento River Settlement Contract No. 14-06-200-7422A-R-1, and Execute a Sacramento River Settlement Contract with Woodland-Davis CWA

The Proposed Action is the execution of an amendatory Settlement Contract between the United States and CPG and the execution of a Settlement Contract between the United States and the CWA that recognize the water rights changes approved by the State Water Resources Control Board in 2012 authorizing the conveyance to CWA by CPG of CPG's interest in 10,000 af of Sacramento River water made available under CPG's state water rights licenses. CPG would not reduce its demand for water, and would pump 10,000 af of groundwater to replace the surface water during Term 91conditions on the Sacramento River.

Table 2-1 identifies the maximum monthly quantities of Base Supply available for diversion by the CWA pursuant to the proposed Settlement Contract with the CWA. The Settlement Contract with the CWA would contain similar terms and conditions as CPG's existing Settlement Contract with a termination date of March 31, 2045. The "service area" for CWA's Settlement Contract includes the cities of Davis and Woodland, and UC Davis, in addition to CPG, and the "purpose of use" would include M&I uses in addition to agricultural uses. CPG's amendatory Contract would retain the quantities and conditions listed in its existing Settlement Contract, less the quantities assigned to the CWA, and would add M&I uses for the purpose of fish and wildlife enhancement. Further, no crop idling or land fallowing would occur at Conaway Ranch.

Table 2-1 Proposed Maximum Quantities of Base Supply Available for Diversion by the CWA (af)				
Diverter	June	July	August	September
Proposed CWA Settlement Contract	2,500	**3,500**	**500**	**3,500**
Remaining Available for CPG Amendatory Settlement Contract	12,190	**1,570**	**480**	**3,230**
Total		***5,070***	***980***	***6,730***
		Total for Critical Months = 12,780		

2.3 Previous Environmental Documents

The DWWSP Environmental Impact Report was certified by the City of Davis in 2007 (2007 DWWSP EIR) (City of Davis 2007). Since certification of the EIR, the Cities of Woodland and Davis have formed the CWA, a joint powers authority, to implement the DWWSP. The CWA has proceeded with implementation of the DWWSP, including additional project planning in support of the engineering design and project construction phases, financial planning, property acquisition, and acquisition of project permits and approvals. The 2007 DWWSP EIR evaluated the following environmental issues: surface and groundwater resources, hydrology and water quality, land use and agriculture, geology, soils, and seismicity, air quality, noise, hazards and hazardous materials, public health, transportation, public services and utilities, cultural resources, recreation, aesthetics, growth inducing effects, and cumulative effects. The 2007 DWWSP EIR (Section 3.0, Environmental Analysis) describes the criteria that were used to determine the significance of environmental impacts. All mitigation measures identified in the 2007 DWWSP EIR were subsequently adopted by the DWWSP Partners as conditions of project approval.

On April 21, 2011, the CWA, acting as CEQA lead agency, approved an addendum (addendum #1) to the EIR for the DWWSP that the City of Davis (then acting as CEQA lead agency) certified on October 16, 2007. Addendum #1 provided an assessment of changes to Delta water and aquatic resources since the 2007 DWWSP EIR as well as changes to the number of wells used by CPG to pump an additional 10,000 af of groundwater to the DWWSP. This addendum also looked at the construction impacts from constructing new wells. On June 21, 2012, CWA approved Addendum #2 to the EIR, which provided an assessment of changes to the location of the proposed RWTF. On October 18, 2012, CWA approved Addendum #3 with Resolution No. 2012-03, related to revisions to the project raw water and Woodland finished water pipeline alignments, which concluded that no subsequent EIR or further CEQA review was required.

Reclamation reviewed the 2007 DWWSP EIR, and addenda, and incorporates that document by reference to the extent practicable. This EA will provide additional analysis of the surface water, groundwater, land subsidence, and potential water quality impacts that might result from the Proposed Action of entering into an amendatory and new settlement contract with CPG and CWA, respectively. There

is also a discussion of resources that were not analyzed pursuant to CEQA that are required by CEQ and DOI regulations for implementing NEPA.

2.4 Environmental Commitments

Reclamation protested CPG's petition to assign 10,000 af of its right to divert water from the Sacramento River during the Term 91 period because of the possible impacts to the Sacramento River from additional groundwater pumping. This protest was settled by adding the following conditions to CPG's amended licenses. These license conditions were developed to eliminate any impact on Sacramento River streamflow during the Term 91 period. Applicable conditions are as follows:

In the event Licensee chooses to use groundwater as a substitute for the 10,000 acre-feet of surface water assigned to Licenses 904A and 5487A, the quantity of groundwater pumped as a result of substitution for the diversions made under Licenses 904A and 5487A shall be in accordance with the following conditions. These conditions are considered to be a functional equivalent to Mitigation Measure 3.3-3 at page ES-12 in the "Davis-Woodland Water Supply Project Final Environmental Impact Report", dated October 1, 2007.

a. *Licensee shall, on an annual basis, identify the wells that it will use for the purpose of substituting all or a portion of the 10,000 acre-feet of surface water assigned to Licenses 904A and 5487A. The wells shall be separately metered and the meters maintained in good working condition at all times. Any well may only be used to provide substitute water at times that its well meter is working properly. Use of the wells is subject to conditions (b) through (e) below. In no case shall Licensee use the so-called "O'Connor" wells located North of Interstate 5 and between the Sacramento River and Tule Canal, as identified on the map attached as Exhibit A to the December 20, 2011 U.S. Bureau of Reclamation letter to the Division of Water Rights, for the purpose of substituting all or a portion of the 10,000 acre-feet of surface water assigned to Licenses 904A and 5487A.*

b. *The quantity of groundwater pumped to replace the 10,000 acre-feet of surface water assigned to Licenses 904A and 5487A shall, if necessary, be adjusted by a streamflow depletion factor to be based on the results of the analysis provided for in condition (c) below to account for any additional streamflow depletion due to the additional groundwater pumping. The quantity of substitute groundwater pumped monthly by Licensee shall be reported to the State Water Board annually in the Report of Licensee, shall be separately accounted for under Licenses 904B and 5487B (no aggregate quantities shall be reported) , and shall not be claimed as groundwater substitution credits under Water Code section 1011 et seq. The quantity of substitute groundwater pumped monthly by Licensee shall be reported to the U.S. Bureau of Reclamation (Reclamation) and Department of Water Resources (DWR) by the 30th day of the month following the month in which this groundwater is pumped.*

c. *Within one year of issuance of this amended license, and prior to pumping any groundwater to replace the 10,000 acre-feet of water assigned to Licenses 904A and 5487A, Licensee shall provide Reclamation and DWR an analysis of the change in streamflow depletion that will result from the proposed additional*

groundwater pumping associated with the replacement of the 10,000 acre-feet of surface water assigned to Licenses 904A and 5487A. This analysis shall be undertaken with an integrated groundwater/surface water model that can estimate the impacts of groundwater pumping on streamflow. The model shall be agreed upon by Licensee, Reclamation and DWR prior to undertaking the analysis. Licensee will make all information from its past, current, and future well construction and geologic exploration activities available to Reclamation, DWR and the State Water Board to assist in the evaluation of the model's suitability for this analysis.

d. *Licensee shall, within one year of issuance of this amended license, and prior to pumping any groundwater to replace the 10,000 acre-feet of water assigned to Licenses 904A and 5487A, (1) develop a monitoring program to observe, document, and report the effects on Reclamation and DWR, if any, of Licensee's proposed in lieu groundwater pumping; and (2) develop a mitigation plan that describes Licensee's approach to address potential adverse impacts to Reclamation and DWR, if any, resulting from additional groundwater pumping undertaken by Licensee to replace water as a result of the subject assignment of Licenses 904A and 5487A. This monitoring program and mitigation plan shall be agreed upon by Licensee, Reclamation and DWR and approved by the Deputy Director for Water Rights. The plan shall, at a minimum, document compliance with the diversion limits of Licenses 904B and 5487B by documenting the quantities of diversion that Licensee will forego under each separate license to offset the adverse effect, if any, resulting from in lieu groundwater diversions. The plan shall also establish a reporting requirement for all diversions, including groundwater and surface water diversions. Licensee shall continue to monitor and collect data from the groundwater substitution wells in all years, irrespective of whether groundwater substitution is occurring. In the event the results of the modeling provided for in condition (c) above, or the ongoing monitoring provided for in this condition (d), results in a determination that the in lieu groundwater pumping has a depletion factor equal to or greater than the value previously determined by Reclamation and DWR in consultation with Licensee, then Licensee shall mitigate for those impacts as provided for in the plan required by this condition (d).*

e. *In the event of a dispute among Licensee, Reclamation and DWR over the results of the modeling effort, the monitoring program, the mitigation plan, or the calculated depletion factor, they shall jointly agree upon and retain a neutral third party expert in groundwater/surface water modeling. In the event that Licensee, Reclamation and DWR are unable to resolve the dispute with the assistance of the neutral third party, any of the parties may refer the matter to the State Water Board for resolution. All disputes must be resolved within one year of issuance of this amended license, or the dispute shall be referred to the Deputy Director for Water Rights for a determination.*

Licensee shall only use groundwater pumped in accordance with the terms and conditions of this License, or surface water transferred to Licensee pursuant to a separate Order of the State Water Board or obtained otherwise from others in a manner consistent with the requirements of state law, to replace the water diverted under Licenses 904A and 5487A or to offset the adverse effect, if any, resulting from in lieu groundwater pumping. Licensee shall not divert surface water under any other existing right, whether riparian, appropriative, or other, to substitute for reductions in diversions under Licenses 904B and 5487B or to offset any adverse effect, if any from in lieu groundwater pumping.

3 Affected Environment and Environmental Consequences

This section discusses the affected environment and environmental consequences of the Proposed Action and No Action Alternative. This section also presents minimization measures, when necessary, to reduce potential adverse effects to environmental resources. The study area includes specific areas of analysis for each resource that may be directly or indirectly affected by the Proposed Action. In general, the study area includes (1) lands, canals, and drainages of Conaway Ranch and adjacent properties, (2) the Sacramento River, (3) groundwater basins that may be affected by groundwater substitution; and (4) the Sacramento Valley Air Basin boundaries.

3.1 Surface and Groundwater

3.1.1 Surface Water Resources

Affected Environment

Regional Surface Water Features

Sacramento River

The Sacramento River is located approximately 0.6 mile east of the eastern boundary of Conaway Ranch (See Exhibit 2-3). The Sacramento River is approximately 400 miles long and generally flows in a north to south direction through the northern Central Valley of California, between the Pacific Coast Ranges and the Sierra Nevada. The chief tributaries to the Sacramento River are the Pit, Feather, McCloud and American rivers. The Sacramento River Basin produces about two-thirds of the surface water supply of the Central Valley. Average annual runoff is approximately 22.4 million af (USGS 2009, p. 3). The most intensive runoff originates in the upper watershed of the Sacramento River upstream of Lake Shasta (approximately 145 miles north of Conaway Ranch) and on the waterways originating on the west slope of the Sierra Nevada and Cascade Mountains. Average daily discharge (between 1949 and 2009) of the Sacramento River is 23,490 cubic feet per second (cfs) (USGS 2009, p. 3). The American River joins the Sacramento River approximately 3 miles downstream of Conaway Ranch, immediately north of the City of Sacramento. The Sacramento River continues south to the Sacramento-San Joaquin River Delta, where it commingles with flows from other eastside waterways, flows from the San Joaquin River basin, and tidal water from the San Francisco Bay. Currently, Conaway Ranch receives surface water from the Sacramento River via a surface water pumping station located just north of the I-5 river crossing. Diversions from the Sacramento River by CPG during 2009 totaled 46,634 af. During the critical months (July through September) of 2009, which was a Term 91 period, CPG fully exercised its maximum allowable quantity by diverting 13,452 af (its

maximum Sacramento River water right) and purchasing an additional 874 af from another Central Valley Project (CVP) contractor.

Sacramento-San Joaquin Delta

The Delta receives runoff from a watershed that includes more than 40 percent of the State's land area. The Sacramento and San Joaquin Rivers unite at the western end of the Delta near Suisun Bay. The three major sources of freshwater flowing into the Delta are the Sacramento River, the San Joaquin River, and Eastside streams (Mokelumne, Cosumnes, and Calaveras Rivers). The Sacramento River (including the Yolo Bypass) contributes from 77 to 85 percent of the freshwater inflows to the Delta, while the San Joaquin River contributes about l0 to 15 percent (City of Davis 2007, p. 3.2-10).

Onsite Surface Water Features

The primary surface water features on Conaway Ranch include the Yolo Bypass, Cache Creek, Willow Slough, and the Willow Slough Bypass. These are described in detail below. Other onsite surface water channels include the Cross Canal, Conaway Canal, and Tule Canal.

Yolo Bypass

The Yolo Bypass is a major component of the region's flood damage reduction system. The Yolo Bypass is a 59,000-acre floodplain located on the west side of the lower Sacramento River in Yolo and Solano counties and transects the center of Conaway Ranch from north to south. The Yolo Bypass carries floodwaters from the Sacramento River, Feather River, and other tributaries to the Delta. The Yolo Bypass capacity is approximately 500,000 cfs, which is approximately 4.5 times greater than the capacity of the lower Sacramento River. Consequently, the Yolo Bypass is the principal means of draining the Sacramento Valley during major flood events. During non-flood conditions, the Yolo Bypass is used for agricultural and wildlife purposes (City of Davis 2007, p. 3.2-7).

Cache Creek

Cache Creek is a large stream that traverses Lake, Colusa, and Yolo counties. Cache Creek is a tributary of the Yolo Bypass; however, flow in the creek now only reaches the bypass during extremely wet years due to damming and diversion of the stream's water (Yolo County 2009, p. 641). Cache Creek crosses the northern portion of Conaway Ranch. Surface water from Cache Creek enters the Conaway Ranch site through an existing diversion where Cache Creek enters the Cross Canal.

Willow Slough

Willow Slough is a minor watercourse that drains much of the area between Cache and Putah Creeks (Putah Creek is located south of the City of Davis, approximately 5 miles southwest of Conaway Ranch) (County of Yolo 2009, p. 642). A level control lake, referred to as "the Lake," is located adjacent to Willow Slough on the Conaway Ranch site.

Willow Slough Bypass

The Willow Slough Bypass was constructed to divert up to 6,000 cfs of floodwaters from Willow Slough through a shorter path to the Yolo Bypass (Yolo County 2009, p. 642). The Willow Slough Bypass is located at the southern boundary of the Conaway Ranch site; surface water from Willow Slough Bypass is not diverted to Conaway Ranch.

Environmental Consequences

No Action Alternative

With the No Action Alternative, the amendatory contract would not be executed and no change to the existing use of surface and groundwater at Conaway Ranch or the CWA would occur. The Cities of Davis and Woodland, and UC Davis would continue to meet their service area demands by pumping groundwater.

Proposed Action

The Proposed Action would not result in any change in the amount or timing of diversion from the Sacramento River during Term 91 periods. The point of diversion would move from its current location to the CWA point of diversion approximately ¼ mile downstream. This change in the point of diversion is to accommodate construction of a fish screen, and not to increase the total diversion capacity for the CWA or CPG.

Because the execution of this contract would allow the CWA to exercise its rights pursuant to Permit 20281, the CWA would divert up to an additional 45,000 af from the Sacramento River at times outside the Term 91 period. The DWWSP EIR evaluated the impacts of this diversion, and concluded the long-term average annual pumping at the CVP Jones Pumping Plant would be reduced by about 1,000 afy, which is less than 0.1 percent of average annual CVP diversions. Similar percent reductions would be observed at other downstream pumping plants (City od Davis 2007, p. 3.2-47).

3.1.2 Groundwater Resources

Affected Environment

Regional Hydrogeology

The Conaway Ranch is part of the Sacramento Valley Groundwater Basin, which is the major groundwater basin in the Sacramento River Hydrologic Region and is considered a single aquifer system (City of Davis 2007, p. 3.3-1). The storage capacity of the Sacramento Valley Groundwater Basin is about 114 million af beginning at depths of 20 to 60 feet below the land surface. Groundwater provides about 31 percent of the water supply during normal periods for urban and agricultural uses in the region. During dry periods, groundwater usage typically increases. Groundwater quality of the overall basin is generally excellent (City of Davis 2007, p. 3.3-1). This groundwater basin is composed of 18 groundwater subbasins, including the Yolo, Solano, Colusa, and North American Subbasins. Conaway Ranch is within the Yolo Subbasin, which encompasses approximately

400 square miles in the southern portion of the Sacramento Valley Groundwater Basin, primarily in Yolo County. The subbasin is bounded on the east by the Sacramento River, on the west by the Coast Ranges, on the north by Cache Creek, and on the south by Putah Creek (DWR 2004a).

Local Hydrogeology

In addition to the shallow unconfined aquifer (depths of 10 to 25 feet), two main aquifers are present within the Yolo Subbasin, an intermediate unconfined aquifer at depths of approximately 200 to 700 feet, and a deep confined aquifer at depths of approximately 700 to 2,700 feet.

Groundwater, which has historically been pumped mostly from the intermediate aquifer, supplies a large portion of the water demand in Yolo County. Groundwater in Yolo County is recharged by the Sacramento River, tributaries, agricultural return flows, local precipitation, and contributions from adjacent basins. The total groundwater storage capacity for the Yolo Subbasin is approximately 6.5 MAF (DWR 2004a).

Groundwater levels within portions of the Yolo Subbasin have shown substantial declines during droughts because of increased groundwater pumping and less surface water recharge (e.g., in the late 1970s and early 1990s). In most areas, groundwater levels have recovered quickly in subsequent, wetter years. Groundwater levels also fluctuate on an annual basis, decreasing during summer and autumn periods when recharge is minimal and pumping rates are high, and recharging during the wet season (DWR 2004a).

The CWA currently operates a total of 46 wells with a combined pumping capacity of 95,400 af per year (City of Davis 2007, p. 2-3). CPG's 33 wells have a cumulative estimated pumping capacity of 14,500 af per month, but they are used during a limited time of year, typically from July through September. Groundwater supplements surface water during this period, when the combination of higher irrigation demands and restrictions on monthly surface water diversions (maximum of 13,452 af can be diverted from the Sacramento River during July through September) results in the need for groundwater. The CPG wells discharge into the onsite water conveyance system at various locations including the Lake, the Cross Canal, the Conaway Main Canal, and the secondary irrigation supply canals. The locations of these wells are shown on Exhibit 2-3. Groundwater pumping at Conaway Ranch over the last three decades (1981-2010) has averaged 10,790 afy, with a minimum of 2,350 afy and a maximum of 17,400 afy (Cordova, pers. comm., 2011a). The average quantity of surface water diverted from the Sacramento River during this period was approximately 29,000 afy. The average percentage of groundwater pumped by CPG has generally been 27 percent of the total water used per year at Conaway Ranch. During the months it is used, however, groundwater use can equal or exceed surface water use (City of Davis 2010, p. 1-16). The highest monthly maximum groundwater pumping volume during a Term 91 period was 5,875 AF in July 2009 (Cordova pers. comm. 2011b).

Interaction between Groundwater and Surface Water
Most groundwater originates as surface water at some point. Water typically enters the ground via recharge from the ground surface (e.g., as precipitation, snow melt) or from leakage through streambeds. The length of time required for water to reach the groundwater system varies based on the local hydrogeologic conditions (USBR 2010a, p. 3-24).

Increases in groundwater pumping can lower the groundwater table and may change the relative difference between the groundwater and surface water levels. Generally, the water pumped from a groundwater well may reduce the amount of surface water compared to pre-pumping conditions via two mechanisms:

Induced leakage - Groundwater pumping can lower the water table below the surface water level causing leakage from the stream.

Interception of groundwater - Groundwater pumping can intercept groundwater that may normally have discharged to the surface water.

Environmental Consequences

No Action Alternative
The No Action Alternative would result in no change to existing use of surface and groundwater by CPG. The CWA member agencies would continue to meet demand using groundwater, which may result in the decline of groundwater elevations in their service areas.

Proposed Action
The 2007 DWWSP EIR evaluated the impacts of increased groundwater pumping (including increased pumping by CPG) on streamflow depletion in the Sacramento River (through hydrologic connectivity to the river) (City of Davis, 2007, p. 3.3-33). In order to avoid impacts to the Sacramento River, the DWWSP EIR included mitigation that would require the siting of wells used for replacement groundwater pumping to meet the siting criteria established by DWR (see Mitigation Measure 3.3-3, p. 3.3-33). According to the EIR, wells that met the siting criteria would avoid groundwater/surface water interactions and, therefore, would avoid streamflow depletion impacts to the Sacramento River. Whether this would be the case for a permanent change in surface water diversions and substitute groundwater pumping is not clear. However, CPG has chosen not to implement this mitigation measure, and instead agreed to quantify streamflow depletion through a modeling effort described in its amended water rights license (described in Environmental Commitments).

CPG has an existing network of groundwater wells plus two new wells that would be installed as part of its planned operation that could be used to pump replacement groundwater. Five wells closer to the Sacramento River, known as the O'Connor wells, have been specifically excluded (see Exhibit 3-1) from use for the replacement groundwater pumping under the Proposed Action (see license conditions in Environmental Commitments). As described in Environmental

Commitments, CPG must implement specific conditions to mitigate impacts to Sacramento River streamflow caused by pumping replacement groundwater, as described in its amended water right licenses. Implementation of these conditions would be equivalent to mitigation measure 3.3-3, and were designed to effectively eliminate any negative impacts to Sacramento River streamflow from replacement pumping. As required in the license conditions, Reclamation and DWR will need to agree to the exact amount of streamflow depletion that will be required to mitigate any impacts that may occur as a result of additional groundwater pumping.

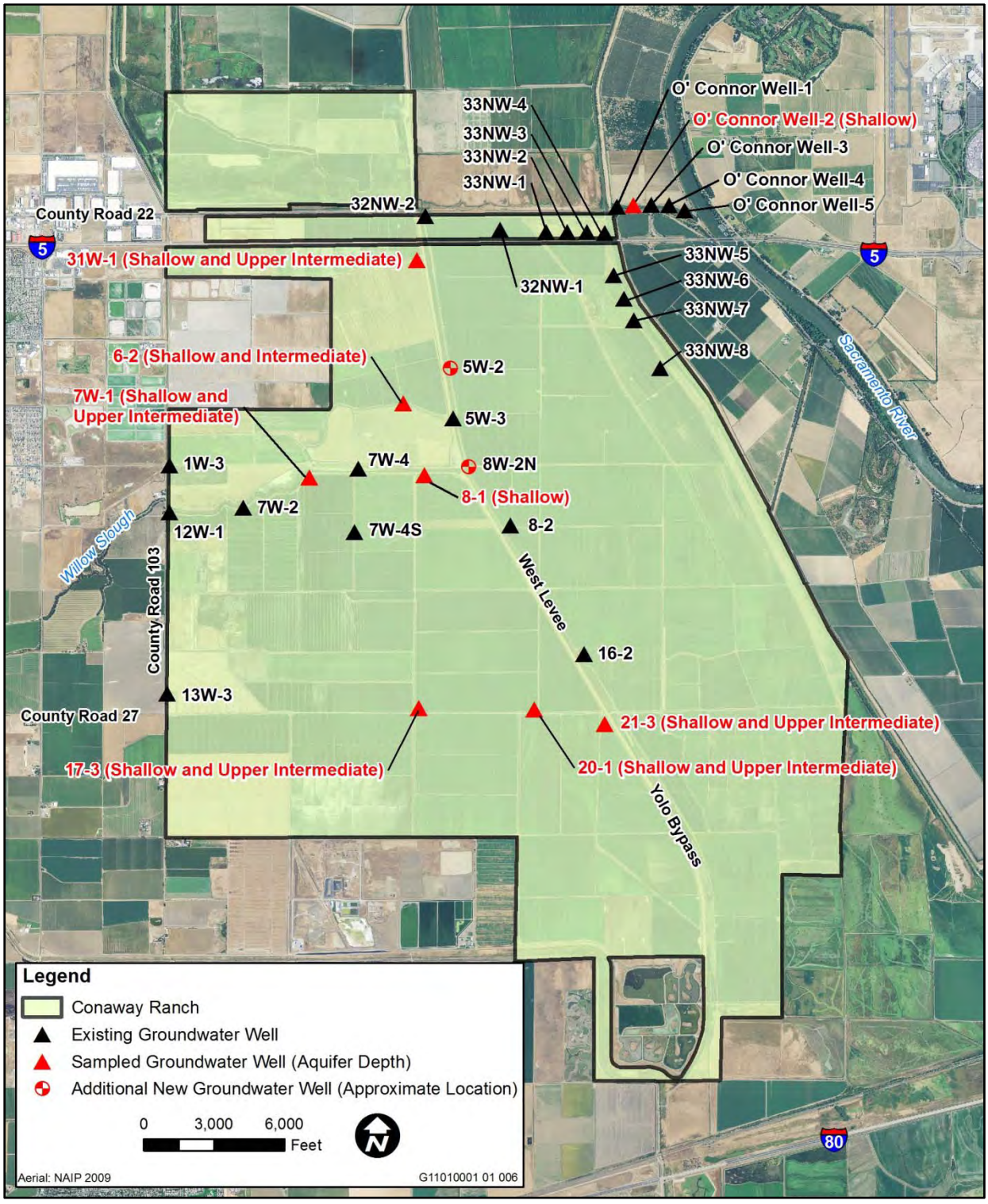
The following example illustrates how the streamflow depletion factor would be applied. (Note: because the exact streamflow depletion factor will be determined through collaboration between CPG, DWR, and Reclamation [as described in the dismissal terms] the exact percentage has not yet been determined). If the assumed depletion factor is 10%, and CPG pumps 10,000 af of groundwater to replace the portion provided to CWA, the calculated surface water depletion would be 1,000 af (10,000 x 0.10 = 1,000) during Term 91. Under this scenario, CPG would need to reduce diversions from the Sacramento River during the Term 91 period by 1,000 af to mitigate streamflow depletion. This could be accomplished in several ways, including reducing its own diversions from the remaining right, or by entering into an agreement with a third party to provide the additional streamflow. Implementing the dismissal terms in this manner would eliminate any potential impact to streamflow.

3.2 Subsidence

3.2.1 Affected Environment

Topography

Conaway Ranch is located within Yolo County. Land surface elevations within the County range from approximately sea level along the southeastern edge to approximately 630 feet above mean sea level (msl) along the western edge. In the proximity of the Conaway Ranch site, the USGS National Elevation Database Digital Elevation Model shows elevations ranging from approximately 40 feet above msl at the western boundary of the Conaway Ranch to approximately 16 feet above msl at the southeastern end of the reuse area, near the Davis Wetlands (City of Davis 2010, p. 1-4). The Conaway Ranch site and surrounding area has a relatively flat topography.



Source: Data received from MBK in 2012; adapted by Ascent Environmental in 2012

Exhibit 3-1 **Sampled Groundwater Wells**

Geology and Soils

Yolo County lies within the Great Valley and Coast Ranges geomorphic provinces. The geologic materials within the region were formed from erosion of mountain ranges to the east and geologic uplift along the western shore of the North American continent. The Great Valley geomorphic province began forming as deposition of sediment-laden runoff approximately 245 million years ago. Over time, these sediments accumulated to a depth of six miles. The Coast Ranges continued to be uplifted until approximately 1.6 million years ago. Cache and Putah Creeks began to deposit fresh sediment on top of existing sediments as a broad and complex alluvial fan. These modern sediments are generally less than 150-feet thick.

The Conaway Ranch site is located in the natural Yolo Floodbasin, on the eastern edge of the Yolo Subbasin. This area developed geomorphically as a natural flood basin for the Sacramento River. Historically, during years receiving higher levels of precipitation, the natural levees containing the Sacramento River would overtop and flow into this flood basin, depositing silts and clays, along with other stream channel deposits. This flood basin would drain slowly over time through the soils, developing the soils that exist on the ranch into their present state (City of Davis 2010).

Within the Yolo Bypass, the prominent soils include the Clear Lake Series and the Sacramento Series, which are considered slow draining, having a relatively low hydraulic conductivity. Outside the bypass, the dominant onsite soils types include the Clear Lake Series and the Capay Series. These series are also considered poorly drained soils with low saturated hydraulic conductivities. Soil pH for these series is slightly alkaline to neutral, ranging from 6.6 to 8.4. These soils are described as prismatic, dark brown or gray clay, with coarse prismatic structures (City of Davis 2010).

Subsidence

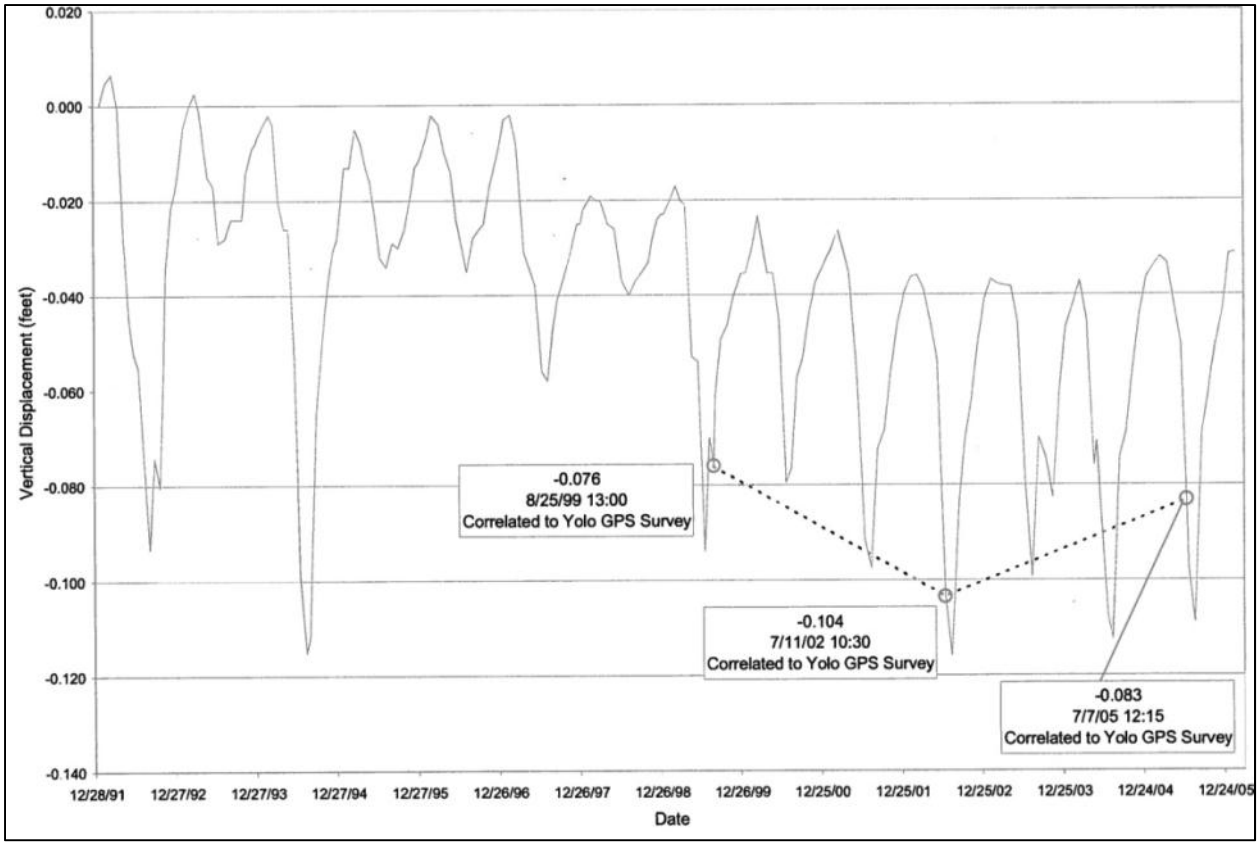
Land subsidence due to groundwater withdrawal is triggered by decreases in pore pressure in a confined aquifer system containing compressible clay layers. If this effective stress exceeds the maximum stress to which the aquifer skeleton has been subjected in the past, the clay layers will undergo permanent compaction. The risk of significant impacts from differential land subsidence depends on a complex array of variables including: the degree of new groundwater development, land use, the mineral composition of the clays, and consolidation history of the aquifer skeleton.

Significant land subsidence has been documented in Solano and Yolo counties over the years, especially in areas that rely solely on groundwater supplies. Land subsidence of up to 5.4 feet is documented over the past few decades in a north-south trending zone that extends from Zamora to Dixon. Down-well television surveys have been used to document well casings damaged by land subsidence over this same zone. A comparison of damaged and undamaged wells in the main area of subsidence showed similar amounts of compressible sediments and that

the damaged wells were those in which the greatest declines in head had occurred after well installation (City of Davis 2007, p. 2-24). The land subsidence has damaged or reduced the integrity of highways, levees, irrigation canals, and wells. The primary hazards associated with subsidence are increased pressure on levees, increases in relative flood water depths and area, and damage to underground utilities. Other effects of subsidence include changes in the gradients of stormwater and sanitary sewer drainage systems, particularly a concern when the flow is gravity-driven (Yolo County 2009, p. 638).

Yolo County Subsidence Monitoring Network (headed by the Water Resources Agency of Yolo County) conducted subsidence surveys in 1999, 2002, and 2005. The 2005 survey results, when compared with the 1999 and 2002 surveys, provided definite proof of subsidence and a picture of the amount and distribution of subsidence in the region. The central corridor of the region is undergoing the greatest subsidence. The corridor runs north from Davis, through Woodland, north to Zamora and through the northeast corner of the county and includes the Conaway Ranch site. The corridor is generally characterized as having little or no surface water availability and substantial groundwater pumping. The subsidence does not appear to be strictly uniform—a common characteristic of the phenomenon—but rather the result of several factors (D'Onofrio and Frame 2006, p. 11).

Subsidence monitoring has been conducted at the Conaway Ranch site. The subsidence rates at Conaway Ranch are lower than those measured in the surrounding areas. For example, based on these preliminary results using Global Positioning System (GPS) repeat elevation surveys, 3.1 inches (0.26 feet) of subsidence have occurred at the UC Davis Continuously Operating Reference Station, which is located over five miles from Conaway Ranch, and 0.8 inches (0.07 feet) of subsidence have occurred at Conaway Ranch. Exhibit 3-2 below shows the monitoring data for historic subsidence at the Conaway Ranch extensometer (a high accuracy mechanical device that measures subsidence down to its completion depth at about 600 feet).



Source: D'Onofrio and Frame 2006

Exhibit 3-2 Historic Subsidence at Conaway Ranch Extensometer (1991 to 2005)

3.2.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, there would be no additional pumping of groundwater at Conaway Ranch. However, it should be noted that the ongoing increases in land subsidence would likely continue in the region due to the onsite and regional groundwater pumping that would continue, including the increased groundwater pumping by CWA member agencies that could occur if it were not able to secure alternative transfers/assignments in absence of the Proposed Action.

Proposed Action

The Proposed Action could potentially result in localized decreased groundwater levels (increasing area drawdown rates) as a result of increased groundwater pumping (up to 10,000 af) over a relatively short period (i.e., primarily June through September). Basin-wide groundwater levels are anticipated to remain mostly unaffected by the Proposed Action because the CWA member agencies would eliminate a commensurate amount of groundwater pumping from the same groundwater basin. As mentioned above, the Conaway Ranch site is near an area

that is experiencing relatively high levels of subsidence. However, onsite extensometer data reveal that subsidence at Conaway Ranch is much lower than the surrounding areas (i.e., UC Davis, Woodland, and Zamora).

During June through September, substantially greater groundwater pumping is occurring within the project area and within the overall groundwater basin because it is the prime growing season for crops. Total historical groundwater pumping by CPG during this time period averages approximately 10,000 afy. Therefore, the amount of groundwater pumping by CPG could double. As was concluded in the 2007 DWWSP EIR (City of Davis 2007, p. 3.3-30), additional groundwater pumping by CPG would result in the short-term drawdown of groundwater levels by 16 to 26 feet, but groundwater levels would return to pre-pumping conditions following one or more normal to above normal precipitation cycles. Further, these drawdown levels are within the historical range of groundwater level fluctuations. However, potential short-term groundwater drawdown rates during multiple dry years would increase groundwater drawdown level by 31 to 50 feet and could result in increased subsidence in the immediate vicinity of Conaway Ranch (City of Davis 2007, p. 3.3-30).

Because the primary factor contributing to the subsidence issue is groundwater extraction, an increase in local groundwater pumping could increase subsidence rates in the immediate vicinity of Conaway Ranch, which could increase potential for damage to various infrastructure including local flood control facilities, especially levees surrounding onsite canals.

Geology and Soils Minimization Measures

GEO-1

CPG shall prepare a groundwater monitoring plan that includes the following components:

Groundwater Pumping Measurements

All wells pumping groundwater to replace surface water assigned to the CWA shall be configured with a permanent instantaneous and totalizing flow meter (capable of measuring well discharge rates and volumes). Flow meter readings shall be recorded just prior to initiation of pumping and at designated times, but no less than monthly and as close as practical to the last day of the month, June through October. CPG will report the readings and calculate and report the quantity of water pumped between successive readings for assigned water. In addition, CPG shall record electric meter readings and report them to the DWR and Reclamation as requested.

Groundwater Levels

CPG shall collect groundwater level measurements in both production and monitoring wells. Groundwater level monitoring shall include measurements prior to the CWA diversions beginning to establish background trends. CPG shall

measure groundwater levels no less than monthly, during and after the assignment months until groundwater levels recover to pre- assignment levels or groundwater levels recover to seasonal highs in the spring of the year following the assignment months. CPG shall submit a proposed monitoring schedule to DWR and Reclamation.

Coordination with Other Monitoring Efforts

The monitoring program shall include a plan to coordinate the collection and organization of monitoring data, and communication with other nearby well operators. The monitoring plan shall identify a contact person responsible for the monitoring and assembly of data. This contact person should be available to meet with DWR and Reclamation before the start of pumping. Together, these parties may visit the production and monitoring wells at least one month prior to the start of pumping to measure pre-pumping groundwater levels, inspect flow meter installations, and record pre-assignment meter readings. Monitoring results shall be shared with other local water resource agencies, including the Water Resources Agency of Yolo County, RD 2035, Yolo County Flood Control and Water Conservation District (YCFCWCD), and the cities of Davis and Woodland.

Response Strategy and Conservation Measures

The monitoring program shall include a response strategy, consistent with the YCFCWCD Basin Management Objective (BMO) for Groundwater Quantity (YCFCWCD 2006, p. 12) because this strategy provides regionally consistent trigger points and response actions for groundwater impacts and increases coordination between regional stakeholders. Further, the YCFCWCD's BMO is also generally consistent with City of Davis and UC Davis Groundwater Management Plan BMO (City of Davis 2006, p. 3-10). The response strategy shall be triggered when ¾ of CPG's monitoring wells reach within 25 percent of the lowest water level recorded for those wells. (If the well is new, or data is otherwise limited, groundwater levels at similar wells during the multiple drought years 1976-1977 will be used; if such data is not available, data shall be collected during multiple drought years in the future to establish a benchmark. Until that time, data shall be inferred from the 1976-1977 drought years). The response strategy shall indicate that when the trigger point is reached, a letter shall be immediately sent to DWR and Reclamation, as well as local water providers and agencies, including RD 2035, YCFCWCD, Yolo County, and the cities of Davis and Woodland. The letter shall indicate that groundwater levels are approaching historically low levels at Conaway Ranch. The letter shall request that stakeholders immediately implement adopted conservation measures from applicable groundwater management plans, if such strategies have not already commenced.

The response strategy shall include a suite of conservation measures which shall be implemented by CPG during critical months if and when the trigger point is reached. As part of the preparation of the response strategy, CPG shall coordinate with DWR, Reclamation, and other local water resource agencies regarding additional feasible conservation strategies that could potentially be incorporated. Implementation of these conservation measures shall either result in stabilization of

groundwater levels, or shall result in modified groundwater pumping. These conservation measures may include (but are not limited to):

Increased Monitoring Frequency: Frequency of groundwater level monitoring shall increase to once per week after commencement of replacement pumping.

Coordinated Well Pumping: A qualified hydrogeologist shall analyze the most current groundwater level monitoring data and work with CPG to identify a strategic well operating schedule, which shall include reduced operating time of wells in areas experiencing the highest levels of groundwater decline, especially for such wells within 0.25-mile of an operational offsite production well, and increase operating time of wells in areas experiencing less decline. The well operating schedule shall also be based on well depth and will allocate pump operation time according to depths that result in the lowest rate of groundwater drawdown. The well operating schedule shall be updated weekly (if necessary) based on the weekly monitoring data.

3.3 Vegetation and Wildlife

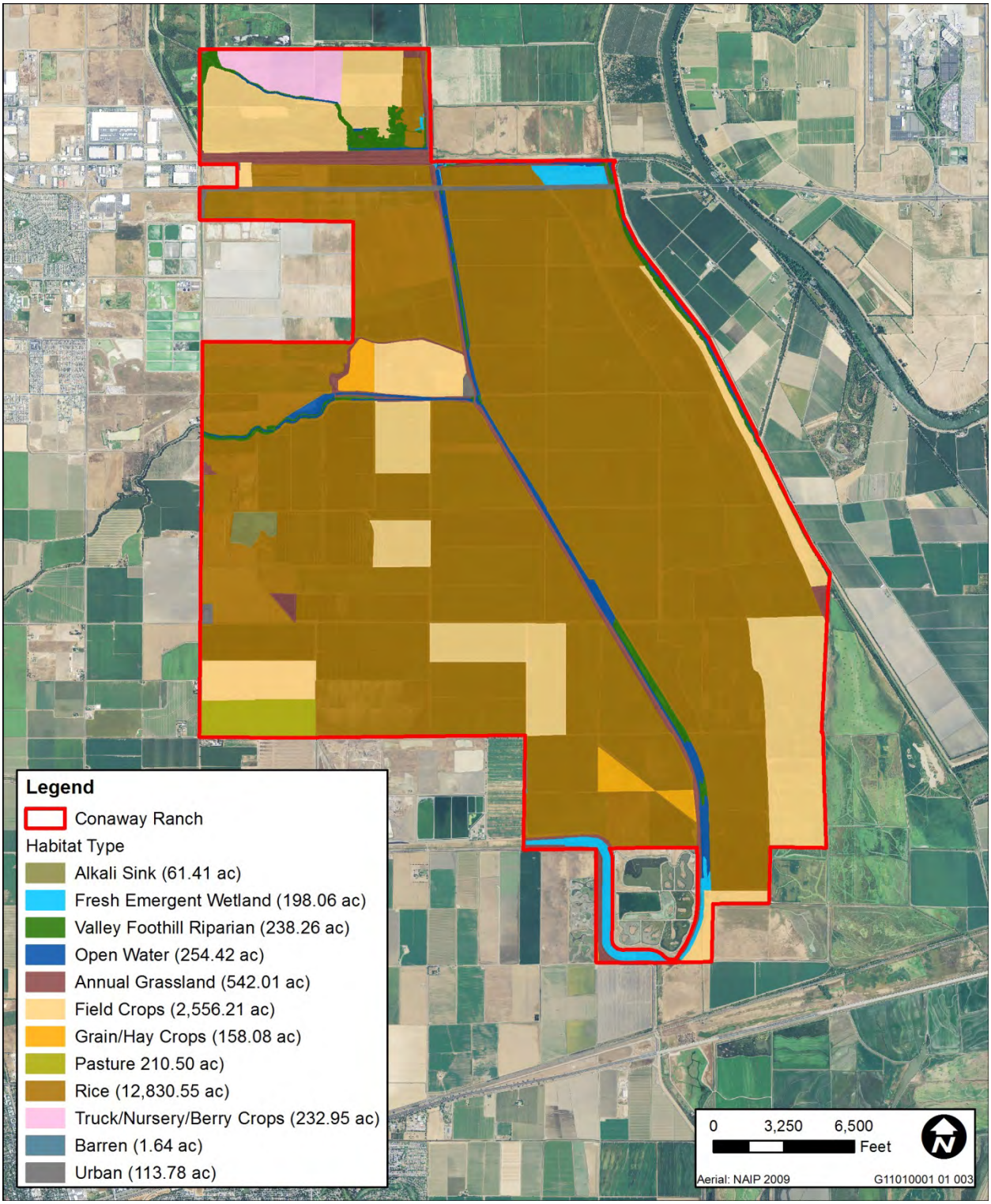
Vegetation and wildlife information presented in this section was obtained from a review of the 2007 DWWSP EIR (City of Davis 2007), the Bureau of Reclamation 2010-2011 Water Transfer Program Final EA (2010), and the Yolo County Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) Administrative Working Draft Ecological Baseline Report (H.T. Harvey & Associates 2005).

Affected Environment

Vegetation information for the proposed alternative was obtained from the Yolo Natural Heritage Program (NHP) (2008). The Yolo NHP classification system uses a three-level hierarchy that established natural communities, habitat associations, and floristic-based vegetation types, based on the Manual of California Vegetation classification system. Conaway Ranch contains 12 habitat associations (Exhibit 3-3), and agricultural habitats compose approximately 90 percent of Conaway Ranch. Table 3-1 contains the hierarchical classifications of the habitats found within Conaway Ranch.

Habitats and Associated Plant and Wildlife Species

The habitats at Conaway Ranch and associated plant and wildlife species are described below. The identified habitats and vegetation types follow the framework of the Yolo County NCCP/HCP Administrative Working Draft Ecological Baseline Report (H.T. Harvey & Associates 2005).



Source: Yolo NHP 2008

Exhibit 3-3 **Conaway Ranch Habitat Types**

Table 3-1 Habitat Classifications for Conaway Ranch

Natural Communities	Habitat	Vegetation Type
Riparian and Wetlands (752.15 acres)	Alkali Sink (61.41 acres)	Alkali Sink (61.41 acres)
	Fresh Emergent Wetland (198.06 acres)	Bulrush – Cattail Fresh Water Marsh NFD[1] Super Alliance (24.59 acres)
		Carex spp. – Juncus spp. – Wet Meadow Grasses NFD Super Alliance (107.90 acres)
		Crypsis spp. – Wetland Grasses – Wetland Forbs NFD Super Alliance (65.56 acres)
	Valley Foothill Riparian (238.26 acres)	Blackberry NFD Super Alliance (0.68 acres)
		Fremont Cottonwood – Valley Oak – Willow (Ash – Sycamore) Riparian Forest NFD Association (101.90 acres)
		Intermittently Flooded to Saturated Deciduous Shrubland (58.84 acres)
		Mixed Fremont Cottonwood – Willow spp. NFD Alliance (3.23 acres)
		Mixed Willow Super Alliance (73.61 acres)
	Open Water (254.42 acres)	Water (254.42 acres)
Grasslands (542.01 acres)	Annual Grassland (542.01 acres)	Upland Annual Grasslands Forbs Formation (542.01 acres)
Agriculture (15,988.29 acres)	Field Crops (2,556.21 acres)	Undifferentiated Field Crops (2,556.21 acres)
	Grain/Hay Crops (158.08 acres)	Grain and Hay Crops (158.08 acres)
	Pasture (210.50 acres)	Pasture (210.50 acres)
	Rice (12,830.55 acres)	Rice (12,830.55 acres)
	Truck/Nursery/Berry Crops (232.95 acres)	Undifferentiated Truck and Berry Crops (232.95 acres)
Unvegetated, Vacant, Urban (115.42 acres)	Barren (1.64 acres)	Barren – Anthropogenic (1.24 acres)
		Barren – Gravel and Sand Bars (0.40 acres)
	Urban (113.78 acres)	Urban or Built-up (113.78 acres)

[1] NFD: Not Formally Defined

Source: Adapted from Yolo NHP 2008

Environmental Consequences

No Action Alternative

Under the No Action Alternative, surface water flows and groundwater pumping on Conaway Ranch would be similar to existing conditions; therefore, existing wildlife habitat provided by agriculture and available riparian habitat on Conaway Ranch would not substantially change from its current condition. The CWA member agencies would also continue to meet demands through groundwater pumping until an alternate source could be found.

Proposed Action

Under the Proposed Action, CPG would not reduce its demand for water; and would increase its pumping of groundwater to replace the surface water during the Term 91 period.

Land Use Changes

There would be no direct physical land use changes and no removal of vegetation associated with the Proposed Action. The vegetation types present on Conaway Ranch are expected to stay the same. Under the Proposed Action there would be no direct habitat conversion and no barriers to wildlife movement would be created; therefore, the Proposed Action would not remove important wildlife habitats.

Groundwater/Wetlands Interaction

As part of the Proposed Action, CPG would increase groundwater pumping and decrease the use of surface water June through September. This could result in potential groundwater drawdowns during drier water years and multiple-year drought conditions. Lowering of the groundwater table may change the relative difference between the volume of groundwater and surface water within the Conaway Ranch drainage system. Seasonal wetlands, marsh, and riparian habitats often depend on surface/groundwater interactions for their water supply. Increased pumping could potentially result in changes to surface water hydrology within federally protected wetlands. However, Conaway Ranch is largely underlain by a clay layer that separates the actively used groundwater table from surface water. The Yolo Sub-basin consists primarily of silts and clays (up to 150 feet), which are considered to have low permeability (DWR 2004a, p. 1). Under these conditions water is generally supplied via irrigation practices and it is unlikely for wetlands to depend on surface/groundwater interactions for their water supply on Conaway Ranch. Implementation of the Proposed Action would not change the quantity of irrigation water used.

Groundwater/Vegetation Interaction

Vegetation associated with streams, creeks, and floodplains (e.g., riparian vegetation) depend on a high groundwater table for their water supply. The groundwater table at Conaway Ranch is generally less than 20 feet below the land surface and that condition would not be changed by the proposed action (Durbin 2013, pg. 2).

The groundwater pumping associated with the Proposed Action would cause changes in seasonal and year-to-year fluctuations in groundwater levels within deeper parts of the groundwater system, but it would not cause changes in the higher groundwater table that is accessible to plant roots. The production zone within the groundwater system is separated from the groundwater table by a sequence of fine-grained materials that are as much as several hundred feet in thickness (Durbin 2013, pg. 2). The fine-grained materials tend to damp the upward migration of groundwater-level fluctuations within the deeper zones of the groundwater system to the groundwater table. The fine-grained materials

buffer the groundwater table from pumping effects. In addition, the shallow groundwater system is connected hydraulically to the channels, canals, and rice fields on Conaway Ranch and the surface-water contained within such features is generally the same from year to year. Therefore the groundwater table is expected to be correspondingly the same under the Proposed Action and would continue to support the growth of riparian vegetation.

Groundwater/Biota Toxicity

An increase in reliance on groundwater could have an adverse effect on wildlife or vegetation if it substantially increased contamination of water bodies or introduced chemical constituents above certain threshold levels. A number of water quality constituents, if found in high enough concentrations, have the potential to adversely affect vegetation and wildlife. In agricultural settings, concentrations of selenium, boron, arsenic, and other constituents can increase as a result of irrigation practices (e.g., through agricultural drain water leaching constituents in soil or evaporative concentration). Of these constituents, selenium in agricultural drainwater has been associated the most with adverse biological effects. In May and June 2011, Luhdorff & Scalmanini Consulting Engineers performed water quality testing of eight agricultural wells on Conaway Ranch and from Conaway Ranch's Sacramento River Intake. The sample collection reflects a snapshot look at groundwater quality in the shallow and intermediate aquifer zones. Table 3-2 summarizes the concentrations of selenium, boron, and arsenic in onsite wells. The water sample from the Conaway Ranch's Sacramento River Intake had non-detectable levels of selenium, boron, and arsenic. Mercury was not detected in any wells or in the sample from the Sacramento River intake (Luhdorff & Scalmanini 2011, Table 1).

Table 3-2 Conaway Ranch Groundwater: Selenium, Boron, and Arsenic Concentrations

Constituent, Units	Detection Limit	Minimum	Maximum	Average
Selenium, µg/L	1.1	< 1.1[a]	2.0	1.2
Boron, mg/L	<.1	1.3	3.0	1.84
Arsenic, µg/L	0.27	2.2	8.0	4.4

Notes: µg/L = micrograms per liter, mg/L = milligrams per liter

[a] Below detection levels.

Source: Data Compiled by Ascent in 2011

Although the selenium, boron, and arsenic levels in the well water samples are generally low, the irrigation water at CPG is a blend of surface water, pumped groundwater, and recirculated water (i.e., agricultural drainwater), the proportions of which change throughout the year.

CPG recirculates water to minimize offsite drainage and the resulting recirculated agricultural drainwater may contain higher concentrations of salts and other contaminants. Some water is lost through evapotranspiration, which also may result in salts and other contaminants concentrating in the recirculated water.

Evapotranspiration is the sum of direct evaporation of water from land surface and plant transpiration through leaves. During July through September, when evapotranspiration rates are highest due to high ambient temperature, constituent levels may increase due to evaporative concentration. However, the constituent concentration also depends on the reduction-oxidation potential of the element, pH of the water, and other water and soil chemistry factors, not just evaportranspiration and leaching.

A Salt Balance Mixing Model was developed by Luhdorff & Scalmanini to evaluate the progression of monthly irrigation water quality from April through October (the irrigation season for rice) for 2010 and for projected irrigation conditions in the future when groundwater is the primary supply during critical months. The model is subdivided into monthly periods in which irrigation derived from surface water and/or groundwater is input along with the water quality of those water sources. The model input begins with the month of April. Losses from evapotranspiration and evaporation reduce the volume of water and increase the concentrations of salts in the residual water (re-circulated water). The model then incorporates the volume and water quality of the re-circulated water in the following month (May) and mixes the re-circulated water with additional volumes of surface and/or groundwater. The model is based on several assumptions including that water quality data collected in 2010 is representative of the baseline irrigation practices at Conaway Ranch and that constituent concentrations in the soil do not influence irrigation water quality. The model did not consider other factors such as pH of the water, reactive potential of the constituent, uptake by various plant species, or other chemical process. Because the level of arsenic in the groundwater was substantially lower than the threshold of concern for aquatic life and is not considered to be a constituent of concern at Conaway Ranch, it was not included in the model.

Total water use (i.e., surface water, groundwater, and recirculated water) on Conaway Ranch has ranged from about 40,000 to 81,000 acre-feet annually. Surface water is diverted from the Sacramento River for use on Conaway Ranch up to the amounts permitted by the Settlement Contract as needed to meet agricultural demands from the late spring through fall (April-October). Water is also diverted from Willow Slough, Cache Creek, and the Yolo Bypass, primarily during the spring months. In addition, water supplies collected from the irrigation drainage system are re-circulated with Conaway Ranch's conveyance system. Sacramento River water has a very low selenium level (reported as 0.4 µg/L[micrograms per liter]) (DWR 2004b, p. 2). Boron and arsenic were not detected at the Sacramento River intake in samples for the Salt Balance model. Water from the existing groundwater wells has been used primarily during the period from July through September (critical months) when surface water supplies are relatively limited. Even so, some blending occurs; under current conditions, up to 13,452 af of surface water is diverted by Conaway Ranch during the critical months, as allowed by contract. As described in Section 2, historical data shows that groundwater pumping ranges from 2,350 afy to 17,400 afy during these same months, an average of 10,790 afy (Cordova, pers. comm., 2011a).

Under current conditions, the average ratio of groundwater-to-surface water during the critical months is 0.8 (i.e., 0.8 af of groundwater is applied per 1.0 af of surface water). (Note: the contract provides for a certain water use per month; however, these amounts can be shifted to different months, so long as the total amount allotted during the critical months is not exceeded during the critical month period. Because of this flexibility, the analysis evaluates use across all critical months, rather than on a month-to-month basis.) The Proposed Action would result in increased groundwater pumping by CPG from June through September by a total of 10,000 af and would reduce surface water diversion by the same amount. On average, 20,760 af of groundwater and 3,452 af of surface water would be applied within Conaway Ranch over the critical months, a ratio of 6:1. In any given year, before ground water pumping commences (typically July through September), the existing irrigation water consists of surface water and recirculated irrigation water. The existing surface water presumably would have very low selenium, boron, and arsenic levels because the source of water at this time of year would be runoff from winter rains or diversion from the Sacramento River. Gradually, groundwater pumped and applied during the critical months would make up a higher ratio of water circulating and recirculating on Conaway Ranch.

Selenium

Selenium is a naturally occurring element that is nutritionally essential, but it can be toxic to aquatic life if concentrations are excessive. Risks stem from aquatic life eating food that is contaminated with selenium rather than from direct exposure to selenium in the water. Although selenium bioaccumulates, that is, accumulates in tissues of aquatic organisms, it is not significantly biomagnified, meaning it does not increase significantly in animals at each level of the food chain going from prey to predator.

As shown in Table 3-3, ecological risks to some species can occur in concentrations as low as 2 micrograms per liter (µg/L) in water, and toxicity can begin above 5µg/L in water. The toxic effects of excessive selenium include developmental abnormalities and reproductive impairment of fish and birds.

Table 3-3 Recommended Ecological Risk Guidelines for Selenium Concentrations

Medium	Effects on	Units	No Effect	Concern	Toxicity
Water (total recoverable selenium)	fish and bird reproduction	µg/L	< 2	2 - 5	> 5
Invertebrates (as diet)	bird reproduction	µg/g (dry weight)	< 3	3 - 7	> 7
Warmwater Fish (whole body)	fish growth/ condition/ survival	µg/g (dry weight)	< 4	4 - 9	> 9
Avian egg	egg hatchability	µg/g (dry weight)	< 6	6 - 10	> 10
Vegetation (as diet)	(via foodchain) bird reproduction	µg/g (dry weight)	< 3	3 -7	> 7

Source: Beckon et al. 2007

Eight of CPG's existing wells were tested to determine the quality of groundwater produced; results of this testing show that selenium levels range from < 1.1 μg/L to 2.0 μg/L (Table 3-2). Ecological research has shown that selenium levels in water of 2.0 μg/L or higher could be of concern (Table 3-3).

Although selenium is a concern in aquatic systems because it is readily taken up by species, and concentrations sometimes reach levels higher than those measured in the water column, the blending of groundwater and surface water, along with mixing in the irrigation canals, would result in selenium levels below the 2 μg/L threshold of concern, where risks to species are not likely.

Boron

In general, plants are far more sensitive than animals to boron toxicity. A certain amount of boron is essential for the growth of higher plants; however, too high a concentration can adversely affect plant growth. For instance, rice (the predominant crop on Conaway) can be adversely affected by water with boron concentrations as low as 2.5-5 milligrams per liter (mg/L) (reported in Eisler 1990). Animals are generally far more tolerant to boron exposure, but the point at which boron concentrations can affect animals is species-specific and far ranging. Data are limited. However, based on the data that is available, the most sensitive species, rainbow trout embryo/larvae, can be adversely affected in boron concentrations as low as 1.02 mg/L. The next most sensitive species, the water flea (*Daphnia manga*), is affected at boron concentrations of 13 mg/L. The boron exposure concentration at which adverse effects may occur increases to over 20 mg/L for most species studied to such levels as 22 mg/L for channel catfish, 47 mg/L for leopard frog, 113 mg/L for yearling Coho salmon, and higher for other species (Davis 2000).

Plants in general are far more sensitive than animals to boron toxicity. The mechanism of boron toxicity in animals is not fully understood and it is not known whether boric acid, the borate ion, or some other boron complex is the toxic boron compound. Boric acid and the borate ion are stable in aquatic ecosystems and any boron that is not taken up by plants and/or animals will tend to accumulate and remain bioavailable over extended periods of time (USDOI 1998, p. 26). The USDOI prepared guidelines based on the most sensitive life stages of some animals to consider for boron exposure (listed in Table 3-4), but acknowledged that there is a paucity of data on this subject, and that the guidelines provided only tentative predictions of when adverse effects may occur (USDOI 1998, p. 26). No other species-specific guidelines have been established.

Table 3-4 Recommended Ecological Risk Guidelines for Boron Concentrations

Medium	Effects on	Units	No Effect	Concern	Toxicity
Water	fish (catfish and trout embryos)	mg/L	< 5	5-25	> 25
Water[1]	invertebrates (*Daphnia magna*)	mg/L	< 6	6-13	> 13
Water	vegetation (crops and aquatic plants)	mg/L	< .05	0.5-10	> 10
Waterfowl diet[2]	duckling growth	mg/kg (dry weight)	--	> 30	--
Waterfowl diet	embryo growth	mg/kg (dry weight)	< 1	> 10	> 30

[1] Water guidelines for invertebrates are based on the "no observed adverse effects level" and "lowest observed adverse effects level" for *Daphnia magna*.

[2] Lowest-observed-adverse-effect level (LOAEL), the lowest dose in an experiment which produced an observable adverse effect, for mallards. Impaired growth of ducklings.

Notes: EPA suggested that the no adverse response level for drinking water is 600 μg/L.

Sources: Beckon et al. 2007; USDOI 1998; Eisler 1990

The well water quality data indicate that boron levels on Conaway Ranch range from 1.3 to 3.0 mg/L (Table 3-2). These levels are within the 'No Effect' range of boron concentrations for fish embryos, invertebrates, and aquatic vegetation (Table 3-4).

However, the Salt Balance Mixing Model calculates that boron concentrations in October could be up to 13.0 mg/L under the Proposed Action, which is an increase of up to 10 mg/L compared to existing conditions. During July through September, boron concentrations could range from 5.3 to 10.0 mg/L, which would be approximately 4 to 7 mg/L higher than existing conditions. These concentrations are within the range of concern for invertebrates (6-13 mg/L) and fish embryos (5-25 mg/L) provided by Table 3-4. However, this exposure would only be for a limited period of time, during late summer, and the concentrations would rapidly fall when use of Sacramento River water is the dominant irrigation source. Modeled concentrations do not provide for attenuation of total boron concentrations by plant uptake and soil sorption during this period.

Although the future water quality model output shows a potential increase in boron concentration, the potential effect on wildlife is uncertain. More importantly, effects are expected to be minimal for three reasons:

1. Conaway Ranch produces rice as its primary crop and boron levels higher than 2.5 – 5 mg/L would adversely affect rice productivity. It is therefore expected that the ranch operator would manage water flow, blending, and circulation to reduce boron levels to below 5 mg/L to maintain the economic viability of the ranch;

2. Concentrations approaching 13 mg/L, if they were to occur, would be short-lived and after the breeding season, when sensitivity to higher boron

concentrations would be expected to be highest (e.g., such as during embryo development); and

3. The vast majority of species studied would not be adversely affected at boron concentrations of 13 mg/L; no data on species sensitivity has been developed for sensitive species expected to be exposed to irrigation water on the site, such as the giant garter snake, but nearly all species studied are tolerant to boron concentrations below 20 mg/L and no evidence is available to suggest the giant garter snake would be an exception. One study on leopard frog indicated concentrations of 200 to 300 mg/L were required to cause 100 percent mortality and teratogenesis. This study also concluded that boron was more toxic to embryos than adults, and that amphibians were more tolerant of boron than fish (USDOI 1998, p. 30). Data for boron toxicity to reptiles was not available.

Arsenic

Arsenic exists in four oxidation states as inorganic or organic forms. In general, inorganic arsenic compounds are more toxic than organic compounds, and trivalent species are more toxic than pentavalent species. Arsenic may be absorbed by ingestion, inhalation, or through permeation of skin or mucous membranes; cells take up arsenic through an active transport system normally used in phosphate transport (Eisler 1988, p. 2).

Plants absorb arsenic fairly easily, so animals with a plant-based diet may be exposed to high concentrations. Accumulation of arsenic in the bodies of plant-eating freshwater organisms increases chances of alteration of genetic material or acute toxicity. For examples, birds that eat fish, which already contain high amounts of arsenic, will die as a result of arsenic poisoning as the fish is decomposed in their bodies. Arsenic is a teratogen and carcinogen that can traverse placental barriers and produce fetal death and malformations in many species of mammals (Eisler 1988, p. 2).

The chronic criteria for arsenic depend on the oxidation state. Most of the arsenic in oxygenated surface waters would be in the less toxic oxidation state, As(V) (Table 3-5) (Seiler et al. 2003, p. 22).

Table 3-5 Recommended Ecological Risk Guidelines for Arsenic Concentrations[1]

Medium	Units	No Effect	Concern	Toxicity Threshold
Water[1]	µg/L	48	48-190	190
Sediment	mg/kg (dry weight)	8.2	8.2-70	70
Plants	mg/kg (dry weight)	1-1.7	2-5	5
Invertebrates	mg/kg (dry weight)	30	30-50	50
Fish	mg/kg (dry weight)	1.0	1-12	12
Bird eggs	mg/kg (dry weight)	1.3	1.3-2.8	< 2.8

[1] 48 µg/L is the lowest chronic value for arsenic (V) in aquatic plants; 190 µg/L is the National Ambient Water Quality (NAWQ) chronic criterion for arsenic (III)

Arsenic concentrations in the well water ranged from 2.2 µg/L to 8.0 µg/L (Table 3-2) and are well below the threshold of concern for adverse effects to biota (Table 3-5). Recirculating irrigation water and subsequent evapotranspiration and evaporation are not expected to result in arsenic concentrations that pose an ecological risk because the existing well water and surface water are substantially below the level of concern.

3.3.1 Federally Listed Species

A list of federally endangered and threatened species that may occur in the study area was generated from the USFWS, Sacramento Fish and Wildlife Office database. The potential for these species to occur in the study area is evaluated in Table 3-6, based on known occurrence data and habitat suitability. Five listed species have potential to occur in the study area: valley elderberry longhorn beetle, giant garter snake, western snowy plover, least Bell's vireo, and palmate-bracted bird's beak (USFWS 2011).

Table 3-6 Federally Listed Species with Potential to Occur Within the Study Area

Species	Status	Habitat	Potential for Occurrence
INVERTEBRATES			
Branchinecta conservation conservancy fairy shrimp	E	Vernal pools and other seasonal wetlands in valley and foothill grasslands. Typically found in large, turbid pools.	Unlikely to occur. Vernal pools are not expected to occur on Conaway Ranch.
Branchinecta lynchi vernal pool fairy shrimp	T	Vernal pools and other seasonal wetlands in valley and foothill grasslands.	Unlikely to occur. Vernal pools are not expected to occur on Conaway Ranch.
Desmocerus californicus dimorphus valley elderberry longhorn beetle	T	Elderberry shrubs below 3,000 feet in elevation, typically in riparian habitats.	Could occur. Potential habitat present within the project site.
Lepidurus packardi vernal pool tadpole shrimp	T	Vernal pools and other seasonal wetlands in valley and foothill grasslands.	Unlikely to occur. Vernal pools are not expected to occur on Conaway Ranch.
FISH			
Acipenser medirostris Green sturgeon	T	Spawn in late spring and early summer in upper Sacramento River. Juveniles widespread in Sacramento-San Joaquin Delta until entering marine habitats at maturity.	Unlikely to occur on Conaway Ranch, Proposed Action would not result in physical changes to Sacramento River habitat.

Table 3-6 Federally Listed Species with Potential to Occur Within the Study Area

Species	Status	Habitat	Potential for Occurrence
Hyomesus transpacificus Delta smelt	T	Sacramento-San Joaquin Delta	Unlikely to occur on Conaway Ranch. Proposed Action would not result in physical changes to Sacramento River habitat.
Oncorhynchus mykiss Central valley steelhead	T	Sacramento River system	Unlikely to occur on Conaway Ranch. Proposed Action would not result in physical changes to Sacramento River habitat.
Oncorhynchus tshawytscha Chinook salmon-Central valley spring-run and winter-run	T/E	Sacramento River system	Unlikely to occur on Conaway Ranch. Proposed Action would not result in physical changes to Sacramento River habitat.
AMPHIBIANS			
Ambystoma californiense California tiger salamander	T	Fishless, seasonal and semi-permanent ponds, vernal pools, and seasonal wetlands and surrounding uplands, primarily grasslands, with active ground squirrel or gopher burrows.	Unlikely to occur. There is no suitable breeding or upland habitat in the study area.
Rana aurora draytonii California red-legged frog	T	Ponds with dense shrubby or emergent riparian vegetation and upland refugia for aestivation.	Unlikely to occur. Considered extirpated from the valley floor.
REPTILES			
Thamnophis gigas giant garter snake	T	Marshes, sloughs, ponds, slow-moving streams, ditches, and rice fields that have water from early spring until mid-fall. Emergent vegetation (cattails and bulrushes) and open areas for sunning and high ground for hibernation and cover.	Known to occur on the project site within Willow Slough, irrigation ditches and canals, and rice fields.

Table 3-6 Federally Listed Species with Potential to Occur Within the Study Area

Species	Status	Habitat	Potential for Occurrence
BIRDS			
Charadrius alexandrines nivosus western snowy plover	T	Flat sandy beaches, salt flats, and sandy areas with minimal vegetation. Nests in sandy depressions. Has been known to nest near sewage ponds.	Could occur. Suitable foraging habitat within the project site. Recent nesting attempts in the Yolo Bypass Wildlife Area.
Coccyzus americanus occidentalis Western yellow-billed cuckoo	C	Nests in riparian forests, along the broad flood plains of Sacramento River and other large river systems	Unlikely to occur on Conaway Ranch. Riparian forest in study area lacks cover density typically required by this species.
Vireo bellii pusillus Least Bell's vireo	E	Nests placed along margins of bushes or on twigs projecting into pathways. Usually nests in willow, bccharis, or mesquite shrubs in low riparian habitat near water or in dry river bottoms.	Could occur. Although extremely rare in the Sacramento area, Bell's vireos have been detected during the breeding season in the Putah Creeks Sinks portion of the Yolo Bypass Wildlife Area.
PLANTS			
Cordylanthus palmatus palmate-bracted bird's-beak	E	Prefers marshes and swamps, lake margins, vernal pools and wet places. Blooms May-October.	Could occur. Potential habitat present within the project site.
Neostaphfia colusana Colusa grass	T	Vernal pools. Blooms May-August.	Unlikely to occur. Vernal pools are not expected to occur at Conaway Ranch.
Tuctoria mucronata Solano grass	E	Vernal pools and wet grasslands. Blooms April-August.	Unlikely to occur. Vernal pools are not expected to occur at Conaway Ranch.

Status:
E: Endangered; T: Threatened; C: Candidate for listing as threatened or endangered
Source: USFWS 2011

Valley elderberry longhorn beetle lives exclusively on its host plant, the blue elderberry shrub, for all stages of its life cycle. USFWS considers all elderberry shrubs within the historic range of valley elderberry longhorn beetle (the Central Valley and foothills up to 3,000 feet) as potential habitat for this species. Elderberry shrubs occur mostly along riparian habitats, elderberry savannas, along irrigation and drainage ditches. Suitable habitat (i.e., elderberry shrubs) may be present on Conaway Ranch.

Giant garter snake habitat includes marshes, sloughs, ponds, small lakes, flooded rice fields, drainage canals, and wetlands. During their active season,

giant garter snakes are usually found within a few feet of water, often between the water level and the top of adjacent banks. Open areas and grassy banks are needed for basking. Giant garter snakes are active from the time they emerge to the end of October with surface activity concentrated from April to July. Giant garter snakes give birth to live young from late July through early September. Young immediately scatter into dense cover and absorb their yolk sacs, after which they begin feeding on their own. Giant garter snake begin to move out of aquatic habitats in October and inhabit small mammal burrows and other soil crevices above prevailing flood elevations throughout its winter dormancy period (i.e., November to mid-March).A concentration of giant garter snakes has been documented in the east central portion of Yolo County, with records in the Yolo Bypass east of Conaway Ranch near the Tule Canal, the Willow Slough/Willow Slough Bypass from Conaway Ranch south to the Yolo Basin Wildlife Area, and the Davis Wetlands complex south of Conaway Ranch between the Willow Slough Bypass and the Yolo Bypass. Surveys conducted in 2005, 2006, and 2007 resulted in captures of 34, 9, and 1 unique individual(s), respectively, in the Yolo Basin Wildlife Area; 8, 18, and 8 unique individuals, respectively, in the adjacent ricelands; and 36 unique individuals (2007 only) in the Davis Wetlands complex (Yolo NHP 2009a, p. 5). CNDDB reports ten occurrences on Conaway Ranch for 2009-2010 (CNDDB 2011). This species may occur in the vicinity of the flooded rice fields, irrigation ditches, wetlands, and streams on Conaway Ranch.

Western snowy plover forages in flat open areas having little vegetation, including sandy beaches and salt flats. Western snowy plovers nest in small depressions on the ground. They have nested twice at the Yolo Bypass Wildlife Area in 1998, and at the Old Davis Sewage Ponds in 1963; they have also been detected during migration at that location as well as the Davis Wetlands and the Woodland Wastewater Treatment Plant (Yolo NHP 2009b, p. 3). This species has been observed exhibiting breeding behavior in spring 2011 in the Yolo Bypass area. Open unvegetated seasonal ponds and wetlands within Conaway Ranch provide suitable foraging habitat.

Least Bell's vireo nests in willow and other scrubby riparian vegetation. Once thought extirpated from most of its historic range, populations were confined to eight counties south of Santa Barbara at the time the species was listed in 1986. In recent years, the species has been expanding into its former historic range (Kus 2002). Bell's vireos have been detected during the breeding season in the Putah Creeks Sinks portion of the Yolo Bypass Wildlife Area (Whisler 2010).**Palmate-bracted bird's beak** is a 4- to 12-inch tall herbaceous annual in the broom-rape family that blooms from May through October. This species is found in sink scrub vegetation in valley bottoms and playas that are seasonally flooded and underlain by alkaline soils. Within Yolo County, there are two known extant occurrences: one at the City of Woodland Preserve and another on private parcels north of County Road 25 (City of Davis 2007, p. 3.6-8).

Environmental Consequences

No Action Alternative
Under the No Action Alternative, the CWA may take alternative water supply actions in response to potential shortages, including continued groundwater pumping, or other water assignments and transfers. Surface water diversions on Conaway Ranch would be similar to existing conditions.

Proposed Action
The Proposed Action would not affect riparian habitat, elderberry shrubs, or other terrestrial habitat for wildlife. There would be no effect to Valley elderberry longhorn beetle, western snowy plover, least Bell's vireo, or palmate bird's beak.

The rice fields and associated irrigation ditches, wetlands, and streams on Conaway Ranch may provide habitat for giant garter snake. As part of the agreement between CPG and CWA, CPG would not fallow any croplands as a result of the water assignment. The acreage of land currently farmed as rice by CPG would continue to be farmed as rice with implementation of the Proposed Action. As part of normal CPG operations there may be localized spatial shifting of rice fields, but no net loss of total rice field acreage. Giant garter snake may be susceptible to changes to water quality because they are dependent on aquatic habitats during their active season; however, no specific water quality thresholds have been developed for giant garter snake. The selenium level in the aquatic habitat at Conaway as a result of the use of additional ground water is expected to be <1.0 μg/L, which is within the "No Effect" range of ecological risk. Similarly, the levels of arsenic and mercury in the irrigation wells were below the level of detection and are not expected to result in any toxicological effects on giant garter snake.

Based on the Salt Balance Mixing Model results (only considering water/salt balance and not soil, pH, or other chemical processes), with the use of groundwater instead of surface water, boron concentrations could range from 5.3 to 10.0 mg/L in the summer months, which is an increase of up to 4 mg/L from existing levels. In September and October, boron concentrations could increase by about 6-10 mg/L for a total concentration of 13.0 mg/L in October. However, because rice is sensitive to boron concentrations above 2.5 to 5 mg/L (see discussion of boron above), Conaway Ranch management activities, including irrigation water blending, would be expected to reduce boron concentrations to well below 13 mg/L, even for short periods.

No data is available pertaining to giant garter snake boron exposure toxicity, but as described previously, the vast majority of species studies show no adverse effects in exposure to concentrations below 20 mg/L. Boron toxicity in amphibians, for example has been correlated to concentrations between 47 and 145 mg/L (Davis 2000), and greater than 200 mg/L (USDOI 1998, p. 30). The potential increase in boron would occur later in the year after giant garter snake have given birth, and with the highest modeled levels of boron in the irrigation

water when giant garter snake are leaving aquatic habitat for upland hibernation sites. Because the concentration of boron would not be expected to reach levels toxic to giant garter snakes and the snakes would have limited exposure to aquatic habitats with slightly higher boron concentrations than under existing conditions, no effects are expected to giant garter snake.

3.4 Cultural Resources/Indian Trust Assets

3.4.1 Cultural Resources Affected Environment

Cultural resources include archaeological, paleontological and historic resources, including cemeteries and burials outside of cemeteries. Yolo County has examples of all of these resources, including prehistoric Native American sites, and historical man-made artifacts, sites, and landmarks (Yolo County 2009, p. CO-49). Background information on cultural resource issues for the project area was obtained from review of the Yolo County 2030 General Plan, the 2007 DWWSP EIR, and the Bureau of Reclamation 2010-2011 Water Transfer Program Final EA. Background research conducted for the Yolo County 2030 General Plan included a detailed literature review of reports that focused on all lands within the county and the identification of any State or National recognized Historic resources in Yolo County.

The National Historic Preservation Act (NHPA) of 1966 is the primary Federal legislation that outlines the Federal Government's responsibility to cultural resources. Section 106 of the NHPA requires the Federal Government to take into consideration the effects of an undertaking on cultural resources listed on or eligible for inclusion in the National Register of Historic Places (National Register). Those resources that are on or eligible for inclusion in the National Register are referred to as historic properties. The Section 106 process is outlined in the Federal regulations at 36 Code of Federal Regulations (CFR) Part 800. These regulations describe the process that the Federal agency (Reclamation) takes to identify cultural resources and the level of effect that the proposed undertaking will have on historic properties. In summary, Reclamation must first determine if the action is the type of action that has the potential to affect historic properties.

No soil disturbance, demolition, construction, or other earthmoving activities would occur as a result of implementation of the Proposed Action. Further, there are no structures that would be affected by the Proposed Action. Finally, the Proposed Action would not alter the flows or water levels of the Sacramento River or upstream storage reservoirs such that cultural resources may be exposed or otherwise altered. Reclamation concludes that this action does not have the potential to cause effects to historic properties, assuming such historic properties were present, pursuant to the regulations that implement the NHPA at 36 CFR Part 800.3(a)(1).

3.4.2 Indian Trust Assets Affected Environment

Indian Trust Assets (ITAs) are legal interests in property held in trust by the U.S. for Federally-recognized Indian tribes or individual Indians. An Indian trust has three components: (1) the trustee, (2) the beneficiary, and (3) the trust asset. ITAs can include land, minerals, Federally-reserved hunting and fishing rights, Federally-reserved water rights, and instream flows associated with trust land. Beneficiaries of the Indian trust relationship are Federally-recognized Indian tribes with trust resources; the U.S. is the trustee.

The nearest ITA to Conaway Ranch is the Rumsey Rancheria, and Conaway Ranch is located greater than 30 miles from these ITA. Therefore, there would be no impact to ITA as a result of the Proposed Action.

3.5 Environmental Justice

3.5.1 Affected Environment

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires Federal agencies to identify and address "disproportionately high and adverse human health or environmental effects" of programs on minority and low-income populations

Normal agricultural practices and employment would continue on Conaway Ranch, and implementation of the project would not result in economic and quality of life effects on any individual or groups of people. Therefore, minority and low-income people would not be disproportionately affected.

3.6 Cumulative Effects

This section describes cumulative effects of the Proposed Action for each resource area evaluated in this EA. The CEQ NEPA regulations require an analysis of direct and indirect effects and define "effects" as "… ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative" (40 CFR [Code of Federal Regulations] 1508.8). NEPA defines a cumulative effect as " the impact of 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 actions (40 CFR 1508.7).

3.6.1 Projects in the Cumulative Analysis

This cumulative analysis considers other potential water transfers/assignments that could occur as described below.

Davis-Woodland Water Supply Project

On April 14, 2011 the SWRCB's Division of Water Rights issued water-right Permit 20281 to the CWA. This permit authorizes the CWA to divert up to 45,000 acre-feet of surface water per year from the Sacramento River for the Davis-Woodland Water Supply Project (DWWSP). The DWWSP is a project approved by the cities of Woodland and Davis and University of California Davis (now collectively referred to as the CWA) to address issues associated with aging water systems, more stringent water quality standards and regulations, and increasing water demands within these jurisdictions. The CWA would construct and operate a new water diversion facility on the Sacramento River that would convey untreated surface water from the river to a new water treatment plant. From the water treatment plant, the water would be distributed to the CWA customers.

Long-Term 'North-to-South' Water Transfers

Reclamation and the San Luis & Delta- Mendota Water Authority propose to prepare a joint EIS/EIR to analyze the effects of water transfers from water agencies in northern California to water agencies south of the Sacramento-San Joaquin Delta and in the San Francisco Bay Area. The EIS/EIR will address transfers of CVP and non-CVP water supplies that require use of CVP or SWP facilities to convey the transferred water. Water transfers would occur through various methods, including, but not limited to, groundwater substitution and cropland idling, and would include individual and multiyear transfers during a future 10-year period (USBR 2010).

3.6.2 Hydrology

Surface Water Resources

The Proposed Action would not result in any direct changes to surface water flows and no changes in diversions along the Sacramento River. (See below for discussion of streamflow depletion resulting from groundwater pumping.) Further, the project would not result in any changes to the timing or quantity of water released from upstream water storage reservoirs. The Proposed Action would result in the same volume of water diverted from the Sacramento River during periods when Term 91 curtails diversions under the CWA's Permit 20281, and variations would be similar to normal monthly and yearly historical variations. While other cumulative water transfer programs could create changes in the timing and quantity of water released from upstream reservoirs, altering river flows, the Proposed Action would not contribute to this cumulative impact.

Groundwater Resources

Groundwater Drawdown

Multi-year groundwater pumping increases under cumulative programs operating in similar areas of the Sacramento Valley could reduce groundwater levels. Groundwater levels may not fully recover following a transfer and may experience a substantial net decline in groundwater levels over several years.

Under the Proposed Action, CPG would increase its pumping of groundwater to replace water assigned to the CWA and meet its agricultural irrigation demands; however, this increased groundwater pumping is less than the volume of reduced groundwater pumping within the same overall groundwater basin (i.e., Sacramento Valley Groundwater Basin, Yolo County Groundwater Subbasin) by the CWA. During periods when Term 91 is in effect, the CWA would divert water that is provided by CPG and other transferring senior water right holders. Some of these holders would also implement a groundwater substitution program by pumping groundwater in lieu of using their surface water supplies during certain months, thereby freeing up surface water for transfer to the CWA during these months. At this time, it is estimated that the CWA may acquire a potential average annual quantity of approximately 15 TAF/yr from senior water rights holders that would implement a groundwater substitution program, about 40% of which would be supplied through the Proposed Action on an average annual basis.

Implementation of the Proposed Action would result in fluctuations of groundwater levels consistent with historical subbasin-wide groundwater fluctuations, even during multiple dry years. Because mitigation would be implemented to ensure that short-term drawdown would not occur during multiple dry years as a result of increased groundwater pumping, the Proposed Action would not contribute to long-term, basin-wide drawdown of groundwater levels.

Streamflow Depletion

As discussed above, CPG's reliance on increased groundwater pumping includes the commitment that there will be no net change to streamflow in the Sacramento River. Therefore, the Proposed Action would not result in or contribute cumulatively to streamflow depletion during the Term 91 period.

3.6.3 Subsidence

Conaway Ranch is in the middle of an area that is experiencing relatively high levels of subsidence. Because the primary factor contributing to the subsidence issue is groundwater extraction, the proposed increase in local groundwater pumping by CPG could increase subsidence rates within the area, which could increase potential for damage to various infrastructure, including well casings, and could even potentially compromise the integrity of local flood control facilities. Rates of subsidence in this area of Yolo County are being closely monitored by the Yolo County Subsidence Monitoring Network. With implementation of Mitigation Measure Geo-1, which provides for subsidence monitoring and, if needed, groundwater pumping limitations the Proposed Action would not have an adverse impact related to subsidence. While other potential cumulative projects could result in increased groundwater pumping that could result in adverse subsidence impacts, the Proposed Action, with implementation of minimization measures identified in this EA, would not result in a substantial cumulative contribution to subsidence in the area.

3.6.4 Biological Resources

Vegetation and Wildlife

Under the Proposed Action, the only potential environmental effect relates to increases in selenium and boron during the critical months (July through September) when the project site is more reliant on groundwater than under current operating conditions. However, levels of selenium in the groundwater and in the overall mix of irrigation water that would be used at the site will be below the EPA threshold under which adverse effects to biota would occur. Similarly for boron, there are no adverse effects expected from boron concentrations reaching 13 mg/L during the fall months, and the project is not anticipated to contribute to any cumulative impacts to vegetation and wildlife.

Special-Status Species

As described under Vegetation and Wildlife above, no effects to vegetation and wildlife are expected under the Proposed Action. Therefore, the project would not contribute to any cumulative impacts on special-status species in the region.

4 Consultation and Coordination

4.1 Public Review

The EA and Finding of No Significant Impact (FONSI) are being released for a 30-day public review period beginning July 26. Reclamation will consider all comments received on the EA and FONSI prior to approval of the Proposed Action.

4.2 Persons or Agencies Consulted During Preparation of the EA.

Reclamation filed a protest against Conaway's proposed assignment of 10,000 acre-feet of its water rights to the CWA. The protest was based on potential injury to the water rights held by Reclamation caused by this assignment. Reclamation resolved this protest in consultation with DWR, Conaway (MBK Engineer's Darren Cordova), and the State Board.

Reclamation discussed potential surface and groundwater impacts with DWR.

Reclamation discussed potential impacts to listed species with the USFWS.

4.3 Endangered Species Act Section 7 Consultation

Reclamation has determined that the Proposed Action would not affect listed fish species beyond the effects already considered in the Biological Opinion for the Long-term Operation of the SWP/ CVP and, therefore, no additional consultation with the National Marine Fisheries Service or the USFWS is necessary. Reclamation has evaluated the effects of the Proposed Action on listed terrestrial species and critical habitats in the project area and has determined that the Proposed Action will have no effect to these species.

4.4 California Environmental Quality Act

The CWA completed CEQA environmental review requirements for the proposed conveyance to the CWA by CPG of CPG's interest in 10,000 af of Sacramento River water made available under CPG's state water rights licenses. The DWWSP EIR was certified on October 16, 2007 and three CEQA addenda to the EIR were prepared in between May 2011 and December 2012.

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