RECLAMATION

Managing Water in the West

Environmental Assessment

5-Year Groundwater Acquisitions for South of Delta Central Valley Project Improvement Act Refuges

EA Number 15-30-MP

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Regional Office
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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.

1.0 Introduction

The Bureau of Reclamation (Reclamation) prepared this Environmental Assessment (EA) to evaluate and disclose any potential environmental impacts associated with its acquisition and/or exchange of groundwater to help meet the Incremental Level 4 (IL4) water supply needs of South of Delta (SOD) Central Valley Project Improvement Act (CVPIA) wetland habitat areas (aka "Refuges") located in California's San Joaquin Valley. These Refuges are identified on **Figure 1**. Reclamation's water acquisitions and exchanges for SOD Refuges are authorized under CVPIA, Sections 3406(d)(2) and 3406(b)(3).

This EA focuses on the potential impacts of acquiring up to 29,000 AF of IL4 groundwater for SOD Refuges annually for a period of 5 years. Such IL4 groundwater may be acquired from willing providers by either direct purchase or exchange.

1.1 Need for the Proposal

Reclamation is responsible for providing L2 and IL4 water to 19 designated federal, state, and privately owned/managed wetlands and wildlife areas in California's Central Valley, including the Grassland Resource Conservation District (GRCD). L2 water supplies are primarily provided from the CVP's annual surface water yield. Reclamation acquires IL4 water supplies through various means, including spot market purchases, exchanges, and groundwater development. IL4 supplies are not provided directly from the CVP's annual yield.

The need for the Proposed Action is to acquire (via direct purchase or exchange) IL4 groundwater supplies for SOD CVPIA Refuges through Reclamation's agreements with willing providers. The developed groundwater would augment IL4 annual water supplies available for allocation to SOD Refuges. SOD Refuges have a critical need for groundwater supplies to supplement limited surface water supplies (i.e., L2 water, for example) for developing and sustaining wetland habitats in support of resident and migratory birds, particularly during times of severe drought. Having sufficient wetland habitat for birds would help prevent overcrowding and reduce avian bird diseases.

Additionally, a portion of the groundwater developed and delivered to the SOD Refuges could be exchanged with SOD Refuge Level 2 (L2) water supplies to benefit CVP agricultural and municipal and industrial (M&I) water districts. SOD CVP water districts have experienced severe surface water shortages due to ongoing drought conditions as well as regulatory and environmental limitations placed on surface water exported from the Sacramento-San Joaquin River Delta. L2 exchanges would likely be with water districts and other interested parties located within or near the Grassland Ecological Area (GEA) and the City of Los Banos. Such L2 exchanges are typically characterized as "uneven" exchanges in that, for example, for every 2 acre feet of groundwater supplied to SOD Refuges, Reclamation would provide to a CVP water district 1 acre feet of SOD L2 water. These uneven L2 exchanges would yield additional IL4 water supplies to SOD Refuges for wetland habitat development and SOD Refuge L2 water to CVP water districts for crop irrigation or domestic purposes.

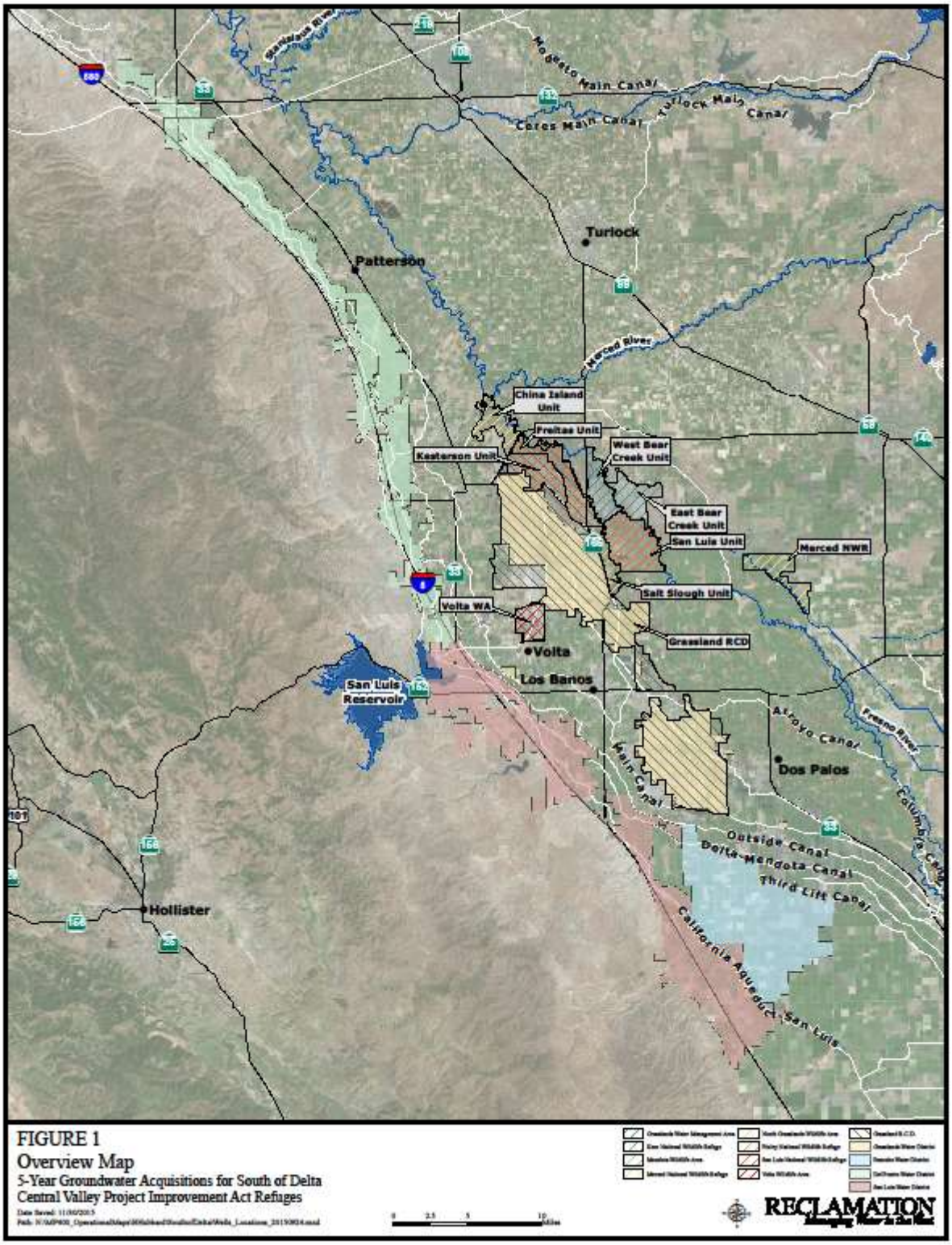


FIGURE 1
Overview Map
5-Year Groundwater Acquisitions for South of Delta
Central Valley Project Improvement Act Refuges

2.0 Proposed Action and Alternatives

2.1 No Action Alternative

The No Action Alternative would consist of Reclamation not entering into agreements with various parties for the acquisition of groundwater supplies and/or exchange of L2 water for groundwater supplies to help meet SOD Refuges' demand for IL4 water, as well as exchange L2 water for irrigation and domestic uses.

2.2 Proposed Action

Reclamation proposes to enter into agreements with various parties SOD to acquire IL4 water supplies from privately owned groundwater production wells within or near the GEA and the City of Los Banos (Proposed Action). The groundwater acquisitions are proposed as a 5-year action (March 2016 through February 2021). The Proposed Action will include monitoring well production, water quality, groundwater levels, and land subsidence. Monitoring would occur at each well location to confirm that groundwater quality is suitable for refuge use. Based on the data acquired, a determination could be made to modify or curtail the groundwater pumping operations at any time during the 5-year period to mitigate potential impacts.

The groundwater production wells would collectively produce up to 29,000 AF of groundwater of acceptable quality annually, which can be conveyed to and used within the SOD Refuges. Monitoring data would be used to ensure that the Proposed Action would not result in significant impacts to any resources identified in this EA, including water quality within the delivery canals and groundwater levels in the area of the Proposed Action. The Proposed Action would utilize existing facilities and would not involve any ground disturbance or construction.

The Proposed Action allows for the implementation of new water acquisition and exchange agreements between Reclamation and parties in the vicinity of the SOD Refuges. The Proposed Action will allow for an individual well to be included in a water acquisition agreement as well as an exchange agreement and for flexibility in adding and removing wells on an as-needed basis to achieve the Proposed Action's objectives, based on the economic considerations of each well owner, the performance of each well, available funding sources, and monitoring results. Groundwater acquisition may be directly funded by Reclamation when funding allows, or funded by other districts, as necessary, in exchange for a smaller volume of Refuge L2 surface water supplies.

IL4 water may also be acquired under this proposed action via an uneven exchange of Refuge L2 water. Such exchanges would likely be with local water districts and other interested parties. Such parties would provide groundwater to the refuges in exchange for a lesser amount of Refuge L2 water. The exchanged Refuge L2 water would likely be used for agricultural and M&I purposes, depending on who the exchange agreements are with and how they intend to put this water to beneficial use.

The general parameters of the Proposed Action are shown in **Table 1**:

Table 1 - Summary of Proposed Action Parameters

Purpose	Acquire IL4 water supplies needed by SOD Refuges as well as exchange Refuge L2 water for agricultural irrigation and municipal and industrial uses.
Volume of water	Up to 29,000 AF per water year
Proposed Action duration	5 years beginning in March 2016
Location of wells	All currently identified wells are in the vicinity of the GEA, and the City of Los Banos, and within the Delta-Mendota Subbasin of the San Joaquin Valley Groundwater Basin. The current known individual well location coordinates are identified in **Table 2** and locations are shown on **Figure 2**. The location of wells that would be added to the proposed action in future years will be identified and evaluated by Reclamation prior to inclusion in the Proposed Action.
Type of wells	Existing/already constructed.
Pump power source	Electricity for all existing wells, with the exception of Wells # 15 and #18 that are temporarily powered by diesel-driven engines.
Well production	See **Table 2** – Well Information.
Groundwater quality	See **Table 3** – Latest Wellhead Water Quality
Conveyance route(s)	See **Table 2** and **Figure 2** – Well Locations
Construction required	No construction is planned or required.
Monitoring	Groundwater volume, groundwater quality, surface water quality in conveyance systems, groundwater levels and land subsidence monitoring. See Water Quality Monitoring and Groundwater Level and Subsidence Monitoring Plans for details. (Appendix A and B).

Well Locations

The Proposed Action could pump groundwater from 23 or more groundwater wells. **Table 2** and **Figure 2** show wells currently or formerly used for Reclamation's groundwater acquisitions and/or exchanges for SOD Refuges. All of the wells would be within or in the vicinity of the GEA, and the City of Los Banos. All of the wells may not be utilized at any given time.

Table 2 - Well Information

New Well No.	Current Well Designation	Well Production			Discharge Location	GPS Coordinates
		CFS	AF Per Day	MaximumAF/Agreement #		
1	1	5.1	10.1	10,000/ #08-WC-20-3748	Santa Fe Canal	37°06’21.45"N 120°50’9.74W
2	2	1.1	2.2		Santa Fe Canal	37° 06’34.71"N 120°50’21.67"W
3	3	1.1	2.2		Santa Fe Canal	37° 06’51.37"N 120°50’38.43"W
4	5	4.0	7.9		Almond Drive/Habitat Direct	36°59’53.48"N 120°48’0.04"W
5	4	3.0	5.9		Almond Drive/Habitat Direct	37° 00’37.83"N 120°47’59.91"W
6	1	1.0	2.0	3,500/#14-WC-20-4640	Santa Fe Canal	37°06’14.74" N 120°50’01.76"W
7	2	1.0	2.0		Santa Fe Canal	37°06’12.47"N 120°50’00.03"W
8	4	4.5	8.9		Standard Ditch	37°07’35.69"N 120°49’24.53"W
9	7	4.0	7.9	*Wells J & K - Maximum AF is included in 10,000 AF total listed for Wells A-E.	Habitat Direct	37°15’13.34"N 120°56’24.56"W
10	6	2.6	5.1		San Luis Canal	37° 02’18.98"N 120°49’0.68"W
11	R10	8.2	16.3	4,000/ #14-WC-20-4655	San Luis Canal	37°02’06.28"N 120°48’29.93"W
12	R4	5.5	10.9		San Luis Canal	37°04’17.07"N 120°49’33.73"W
13	R3	5.1	10.1		San Luis Canal	37°05’07.36"N 120°50’26.67"W
14	R1	4.2	8.3		San Luis Canal	37°05"23.76"N 120°49’53.90"W
15	G-5(OR-5)*	4.5	8.9	10,000/#08-WC-20-3748 2,000/#14-WC-20-4636	Standard Ditch	37°07’50.02"N 120°49’52.96"W
16	G-4(8.04)*	3.4	6.7		Santa Fe Canal/Habitat Direct	37°07’25.83"N 120°51’11.98"W
17	G-3(8.03)	3.6	7.1	2,000/#14-WC-20-4636	Santa Fe Canal/Habitat Direct	37°08’36.61"N 120°52’20.30"W
18	OR-6	3.6	7.1		Santa Fe Canal	37°06’12.56"N 120°49’59.40"W

Table 2 (Cont.) – Well Information continued

Well	Current Well Designation	Well Production				Discharge Location	GPS Coordinates
		CFS	CFS	AF Per Day	Maximum AF/Agreement #		
19	N/A	Not Available	4.2*	8.3*	N/A	San Luis Canal	37°02’11.68"N 120°48’29.51"W
20	N/A	Not Available	4.2*	8.3*	N/A	San Luis Canal	37°02’18.94"N 120°48’32.36"W
21	N/A	Not Available	6.9*	13.7*	N/A	San Luis Canal	37°05’29.11"N 120°50’8.89"W
22	N/A	Not Available	6.5*	12.9*	N/A	San Luis Canal	37°05’35.86"N 120°50’23.17"W
23	N/A	Not Available	3.0	5.94	N/A	Santa Fe Canal	37°14’0.59"N 120°54’21.10"W

*Estimated

2.2.1 Monitoring

The Proposed Action’s monitoring would include metering of the flows received from each groundwater well. To minimize any potential for surface water quality degradation associated with the utilization of groundwater to supplement IL4 water supplies, water quality monitoring would consist of both surface and groundwater quality monitoring. Surface water quality monitoring would consist of both continuous and instantaneous sampling. Monitoring will include sampling from upstream locations to determine the base flow constituent concentrations, a downstream location, and at each wellhead. If water quality objectives* are exceeded at any time, corrective actions would be implemented within 24 hours, including modification of or ceasing well pumping operations until water quality objectives are again met.

To minimize any potential for impacts on groundwater levels associated with the Proposed Action, pre-production groundwater levels would be measured prior to pumping operations using an electronic water level sensor. Well drawdown would be monitored during pumping operations, and groundwater recovery would be measured annually during years when pumping occurs. All results will be provided to Reclamation with the monthly water quality data.

To minimize the Proposed Action’s potential impacts on land subsidence associated with cumulative groundwater pumping in the Delta-Mendota Subbasin, all parties will collaborate with and participate in the San Luis and Delta-Mendota Water Authority’s and Central California Irrigation District’s established land subsidence monitoring programs. More detailed monitoring information is located in the Groundwater Level and Subsidence Monitoring Plan (Appendix B).

* For the wells that would pump directly into habitat, wellhead water quality objectives need to be met during the period when the groundwater is discharged directly to habitat. Monitoring information would collected to show that these wells would not contribute to surface water quality standards exceedances.

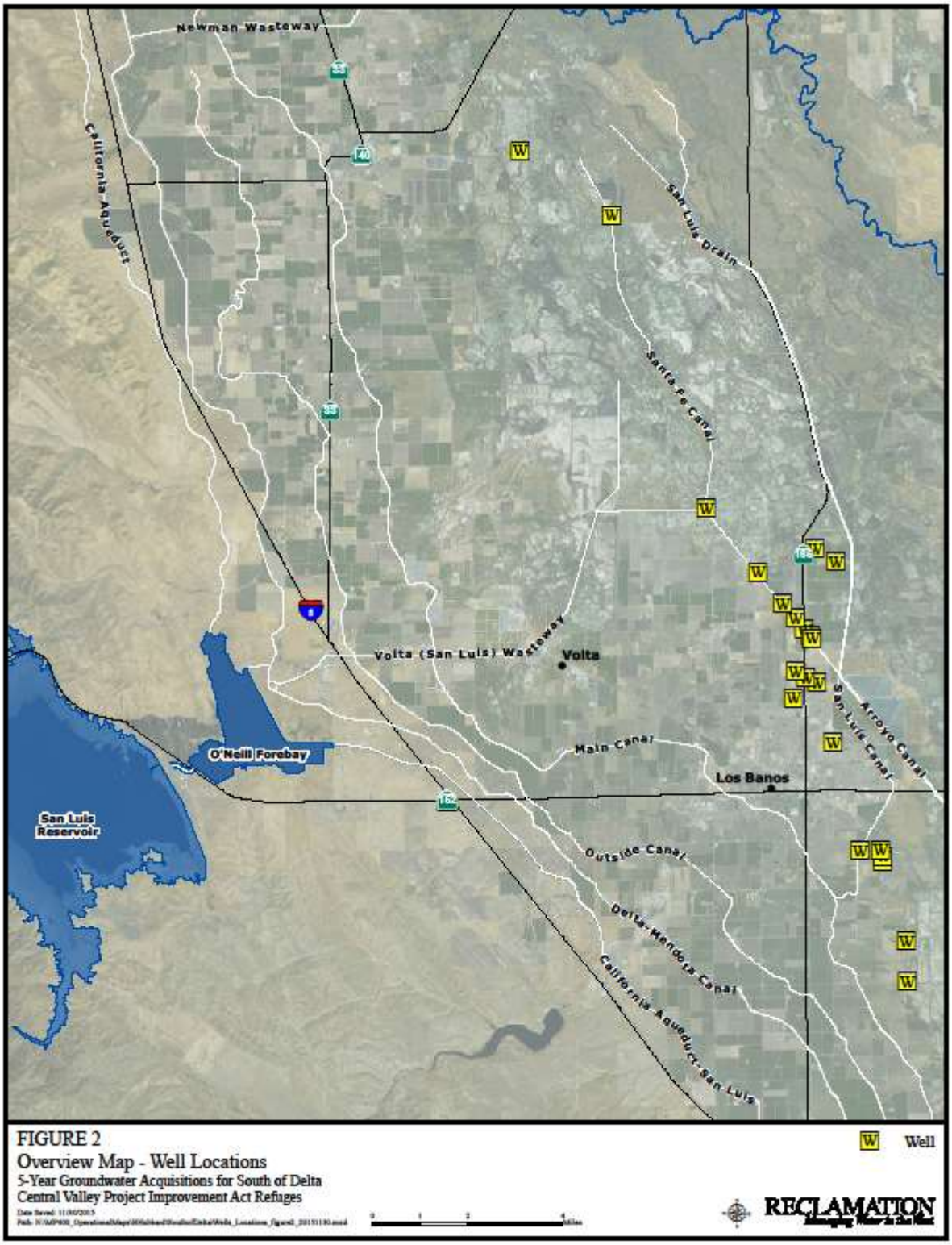


FIGURE 2
Overview Map - Well Locations
5-Year Groundwater Acquisitions for South of Delta
Central Valley Project Improvement Act Refuges

3.0 Affected Environment and Environmental Consequences

This section discusses the affected environment and environmental consequences of the Proposed Action and the No Action Alternative, in addition to environmental trends and conditions that currently exist.

The overall study area includes specific analysis for each resource that may be directly or indirectly affected by groundwater pumping and the use of groundwater for habitat management purposes within or near the GEA and the City of Los Banos. The overall study area also includes San Luis Water District (SLWD), Panoche Water District (PWD) and Del Puerto Water District (DPWD). These three districts are expected to be part of the Proposed Action as signatories to exchange agreements. SLWD, PWD and DPWD are located on the west side of San Joaquin, Stanislaus, Merced and Fresno counties and the GRCD and GEA are located in Merced County (**Figure 1**). The counties are bounded by the Sierra Nevada Mountains to the east and the Pacific coastal range to the west. The Refuges that can receive water from the Proposed Action are also locate in this general vicinity and are also shown on **Figure 1**. The study area region is characterized by flat valley lowland wetlands and agricultural lands, with a climate that is cool and moist in the winter and hot and dry in the summer.

The 58,000 acre GRCD is located in western Merced County, several miles away from the City of Los Banos (**Figure 1**). The GRCD has primarily been managed as a seasonally flooded wetland to provide for the habitat needs of migratory waterfowl and associated species. The GRCD provides habitat for a variety of bird species, including ducks, geese, shorebirds, coots, and wading birds. Black-necked stilts, sandpipers, dunlins, and dowitchers are the dominant shorebird species.

3.1 Resources Not Analyzed in Detail

Department of the Interior Regulations, Executive Orders, and Reclamation guidelines require a discussion of the following items when preparing environmental documentation:

3.1.1 Indian Trust Assets (ITAs)

ITAs are legal interests in assets that are held in trust by the United States for federally recognized Indian tribes or individuals. The Proposed Action does not have the potential to affect ITA (see Appendix C).

3.1.2 Indian Sacred Sites

Sacred sites are defined in Executive Order 13007 (May 24, 1996) as "any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as

sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site." The Proposed Action is not on federal lands, and will not affect or prohibit access to and ceremonial use of Indian sacred sites.

3.1.3 Cultural Resources

Reclamation has determined that the proposed action is the type of undertaking that does not have the potential to cause effects on historic properties, should such properties be present, pursuant to 36 CFR § 800.3(a)(1). As such, Reclamation has no further obligations under 54 U.S.C. § 306108, commonly known as Section 106 of the National Historic Preservation Act (NHPA).

3.1.4 Environmental Justice

Executive Order 12898 requires each Federal agency to identify and address disproportionately high and adverse human health or environmental effects, including social and economic effects of its program, policies, and activities on minority populations and low-income populations. No significant changes in refuge management or in agricultural communities or practices would result from the Proposed Action, other than potential acquisition of groundwater or exchange water. These changes are not likely to have effects to any individuals or populations within the action area. Accordingly, the Proposed Action would not have disproportionately negative impacts on low-income or minority populations within the study area.

3.2 Surface Water Resources

3.2.1 Affected Environment

GRCD and Wetland Habitats

CVPIA L2 and IL4 water is provided by Reclamation Contract 01-WC-20-1756 signed January 19, 2001, to provide firm water supplies to refuge lands south of the Delta. The total amount of CVPIA L4 water allocated to GWD for delivery to the GRCD is 180,000 acre-feet per year (125,000 AF L2, and 55,000 AF IL4). CVP water is delivered to the GRCD and other SOD refuges from water pumped from the Delta by the Tracy Pumping Plant and conveyed via the Delta Mendota Canal (DMC) to the Mendota Pool in the San Joaquin River. A series of canals and ditches convey CVP water through the GRCD.

GWD also delivers IL4 water supplies to the GRCD from a variety of sources. Historically, Reclamation has made annual purchases of up to 49,000 AF of IL4 water from the San Joaquin River Exchange Contractors (SJREC). Reclamation also acquires up to 25,000 AF of groundwater from wells that are within or in close proximity to the GRCD as part of the Volta Project (5,500 AF) and 2015 GWD Projects (19,500 AF). Historically, the IL4 water is pooled among SOD refuges, with GWD receiving approximately 67% of the total.

The Proposed Action includes the potential of exchanging Refuge L2 Water with agricultural and/or municipal and industrial water users. The Refuge L2 Water exchanged would be

required to be beneficially used within the CVP Place of Use service area and would be required to result in a net increase of water supply for the refuges.

Agricultural Areas
In the early 1950's, the DMC was constructed by Reclamation. During and after construction of the DMC, major development of farmland occurred on the western side of the San Joaquin Valley and led to the formation of SLWD, PWD, DPWD and other water districts in the area.

SLWD has a long-term water service contract with Reclamation that provides for both agricultural and M&I service from either the DMC or the San Luis Canal (SLC). SLWD's current contract quantity is 125,080 acre-feet. This contract does not identify specific quantities of agricultural versus M&I water nor does it identify specific quantities to be delivered from the DMC versus the SLC. This supply equates to a maximum supply of 2.1 acre-feet per acre to those parcels within SLWD eligible to receive an allocation. SLWD does not have a contract for SWP water nor does it have any other source of local surface supply. (SLWD 2013)

PWD has a contract with Reclamation to supply 94,000 acre-feet of agricultural water(PWD 2014, page 1). PWD's delivery system was configured such that no operational spills left the PWD boundaries. Operational spills from one lateral were picked up into an adjacent lateral, where they were delivered to the farm turnouts. As more drip irrigation systems have been installed, water demand variability has increased on some of the districts laterals. This has resulted in some flooding in certain areas. To minimize the occurrence of flooding, some spill water is currently discharge into the drainage system. (PWD 2014, page 3)

DPWD has a contract with Reclamation to supply 140,210 acre-feet of agricultural water(DPWD 2011, page 3-4). DPWD serves approximately 45,229 irrigable acres with agricultural water supplies. No urban population is served by DPWD. All water deliveries are made "canalside" from the DMC through turnouts installed and owned by Reclamation, licensed for DPWD use, and operated and maintained by the San Luis Delta-Mendota Water Authority. The few natural resources within DPWD boundaries include ephemeral streams that flow primarily through open natural channels into neighboring water districts before entering the San Joaquin River.

3.2.2 Environmental Consequences

No Action
Under the No Action Alternative, Reclamation would not fund the acquisition of groundwater or exchange L2 water for groundwater delivered to the refuges from groundwater wells in the vicinity of the GRCD. Groundwater would not be delivered to GRCD to help meet IL4 refuge water needs. The total available water supply for the GRCD refuge would remain far short of L4 water needs. Westside agricultural and M&I water users would not receive Refuge L2 surface water supplies through exchange.

Proposed Action
The Proposed Action would not impact surface water supplies because a net increase or

decrease in CVP surface water supplies being delivered south of the Delta would not occur. The total amount of CVP surface water delivered south of the Delta would remain the same. Surface water and pumped groundwater would be comingled for reasonable and beneficial use within the GRCD, to meet habitat needs for wildlife. Westside agricultural and M&I water users would receive L2 refuge surface water supplies through exchange.

Cumulative Impacts
No adverse impacts to surface water resources would result from implementation of the Proposed Action, therefore, the Proposed Action would not contribute to cumulative impacts to the resource.

3.3 Groundwater and Geologic Resources

3.3.1 Affected Environment

Geographically the GRCD is located in Merced County within the Delta-Mendota Subbasin of the San Joaquin Valley Groundwater Basin. Groundwater supplies are present in unconsolidated deposits extending to 800 feet or more below grade. An upper, semi-confined aquifer extends from approximately 50 to 450 feet below grade (DWR 2003). The Corcoran Clay aquitard provides a confining layer that is thick enough to separate the upper semi-confined aquifer from deeper alluvial deposits, which form the lower aquifer (DWR 2006). Wells screened above the Corcoran Clay may be in hydraulic communication with overlying surface water features, such as refuge wetlands, whereas wells screened in the lower aquifer are not likely to affect surface waters. Due to the potential for mixing waters between the two aquifer units, the Merced County Environmental Health Department prohibits the construction of wells that are open to both aquifers within the same casing (Merced County Ordinance 9.28.060). Two of the twenty three wells (wells # 15 and #22) listed in **Table 2** produce water from the lower aquifer below the Corcoran Clay. All of the other wells in **Table 2** produce water from shallower depths above the Corcoran Clay.

Little groundwater is used in the GRCD. The only well infrastructure currently used for refuge purposes includes groundwater wells listed in Table 2, which under current agreements can provide up to 19,500 AF annually. Historically, water pumped from these wells is divided among SOD refuges through the IL4 pool. In addition, 50% of the groundwater pumped from several of the wells listed in Table 2 is used to exchange with SOD L2 refuge water supply, by freeing up a portion of L2 refuge supplies for use by agricultural contractors. The refuges receive the other 50% of the water pumped for IL4 supplies.

The region is heavily groundwater reliant. Within the region, groundwater accounts for about 30 percent of the annual supply used for agricultural and urban purposes. Groundwater use in the region accounts for about 18 percent of statewide groundwater use for agricultural and urban needs. Groundwater use in the region accounts for 5 percent of the State's overall supply from all sources for agricultural and urban uses (DWR 2003). The City of Los Banos' projected volume of groundwater to be pumped during the Proposed Action is anticipated to increase from approximately 9,189 AFY to over 11,201 AFY. (City of Los Banos 2010, Table 19, page 16).

Groundwater wells commonly extend to depths of up to 800 feet. Aquifers include unconsolidated alluvium and consolidated rocks with unconfined and confined groundwater conditions. Typical well yields in the San Joaquin Valley range from 300 to 2,000 gallons per minute with yields of 5,000 gallons per minute possible. The region's only significant basin located outside the San Joaquin Valley is Yosemite Valley. The Yosemite Valley Basin supplies water to Yosemite National Park and groundwater wells in the basin have substantial well yields (DWR 2003).

Groundwater supplies in the region are declining due to a long-term overdraft condition caused by over-pumping. However, due to reliable surface water deliveries to the refuges in the area and the neighboring SJREC, the groundwater level in the vicinity of the proposed wells remains stable and the pumping of the wells for refuge water purposes is not expected to impact local groundwater resources (GWD 2011).

Based on well completion reports received by the California Department of Water Resources (DWR) in 2014 (through September 2014), more than 350 new water supply wells are reported in Fresno and Tulare counties, and more than 200 water supply wells are reported in Merced County. (DWR 2014 pages vii, 5 and 9). The Delta-Mendota subasin is listed by DWR as a High Priority Unmonitored Basin as of October 7, 2014. (DWR 2014, Table 1 page 25)

Land subsidence due to groundwater withdrawal is triggered by decreases in pore pressure in a confined aquifer system containing clay layers (typically montmorillonite or kaolinite clay). The decrease in pore pressure increases the effective stress on the aquifer skeleton. If this effective stress exceeds the maximum stress to which the aquifer skeleton has been subjected in the past, the clay layers can undergo permanent compaction (USGS 2009).

Elastic subsidence occurs in response to seasonal changes in pore pressure within the aquifer system. Elastic subsidence is a characteristic of any confined aquifer system and does not result in permanent compaction (USGS 2009).

SLWD does not own any groundwater wells and has no other long-term contracts for surface or groundwater supplies. Approximately 6,000 acres within SLWD overlie usable groundwater supplies. The quality of the groundwater is poor, averaging in excess of 1,000 parts per million of total dissolved solids. Some of this acreage is served exclusively by wells, while in other cases the wells are used to supplement water supplies. All wells in this area are privately owned and operated. SLWD does not have specific pumping information regarding these wells, but it is estimated that approximately 10,000 acre feet of groundwater are pumped annually (SLWD 2013).

In 2012 within PWD, groundwater deliveries were 2,073 acre feet. Groundwater quality within PWD is poor and it is not a preferred water source. Groundwater is used only when surface supplies are insufficient. PWD owns and operates one well. No recharge areas exist in PWD. Panoche Water District is an agency in the Southern Delta-Mendota Canal service area. San Luis Delta-Mendota Water Authority adopted an AB 3030 Groundwater Management Plan on November 1994 and the District is a participating agency with that plan. (PWD 2014, page 9).

California DWR Bulletin 118 has identified that the DPWD is in two sub-basins of the San Joaquin Valley Groundwater Basin. These are the Tracy Subbasin and the Delta-Mendota Subbasin. The Tracy Subbasin has a surface area of 1,170 sq. mi. with no published groundwater values. In DPWD, groundwater is used when and where surface water is unable to meet demands (as available). Nonproject water from private wells is introduced into the DMC under the auspices of the District's Warren Act Contract and redelivered to lands commonly held by the individuals that pump the supply. However, groundwater is spotty in many areas of the DPWD and/or lacks the quality requirements for cropping.

3.3.2 Environmental Consequences

No Action
The No Action Alternative would consist of Reclamation not entering into agreements with water sellers for the acquisition of groundwater supplies or exchange of L2 water for groundwater supplies to help meet the demand for IL4 water in the GRCD, and the pumping of private wells for purposes defined in this EA would not occur. GWD would not deliver groundwater developed under the Proposed Action to GRCD lands to help meet IL4 refuge water needs. The volume of groundwater pumping within the GRCD would likely decrease. The volume groundwater pumping by westside agricultural and M&I water users would likely increase.

Proposed Action
Groundwater would be produced from privately owned wells for use within GRCD. Groundwater would be pumped in an amount up to 29,000 AF annually during the highest demand periods for refuge water supplies, which would ensure that blending with surface water would be maximized. The actual amount of groundwater produced in a given water year would be dependent on the productivity of the wells and other factors, such as water quality and the availability of surface water. Groundwater produced by the production wells would be discharged into the GWD conveyance system and mixed with surface water for dilution (if necessary). All groundwater produced during the Proposed Action would be used for refuge management purposes in the GRCD. Pumping would only occur if monitoring data indicates water quality is suitable for refuge use and groundwater levels are projected to be sustainable during the life of the Proposed Action.

GWD's current groundwater acquisition agreements allow for the development of up to 19,500 AF of groundwater annually from 18 groundwater wells to serve the northern and southern divisions of the GRCD. In addition, up to 5,500 AF of groundwater is developed from the two Volta Wildlife Area wells that also serves the northern division of the GRCD, for a total of up to 25,000 AF per year of groundwater being delivered by existing GWD and Reclamation groundwater projects. The Proposed Action could cause a slight increase in groundwater use in the area, up to a total of 29,000 AF per year for a five-year period.

Increased use of groundwater in Merced County could potentially affect groundwater levels, surface water groundwater interactions, and rates of inelastic land subsidence. These types of potential impacts would not occur beyond the GRCD and its immediate vicinity as a result of the Proposed Action. Although an increase in groundwater extraction would occur, the amount is minimal when compared to total groundwater use in the San Joaquin Valley

hydrological region. Average groundwater usage in the region accounts for about 30 percent of the annual supply used for agricultural and urban purposes. DWR estimates that total groundwater pumping from the Delta-Mendota Subbasin is 500,000 AF per year (DWR 2003). Average pumping in the general area of GRCD, however, is minimal due to relatively stable surface water supplies. In addition, there are very few domestic residences located within the GRCD, and the majority of GRCD land is not used for irrigated agriculture. GWD estimates that annual groundwater recharge from its water conveyance system is approximately 29,000 AF per year, which provides an equivalent amount of groundwater recharge to offset the amount of proposed refuge groundwater pumping (GWD 2011). Total groundwater recharge for all of GWD's wetland habitat management activities is much higher.

Any exchanged Refuge L2 Water would be delivered within the CVP Place of Use service area and would be used beneficially to meet unmet demand due to the ongoing shortage of surface water in the study area. The Proposed Action would potentially benefit groundwater resources within the boundaries of SLWD, PWD and DPWD.

Groundwater Levels

There are a handful of local landowner wells in the vicinity of GRCD, in addition to the IL4 Pilot Project production wells and the Volta wells. GWD maintains a groundwater monitoring program that includes pre- and post-season water level measurements. Monitoring data indicates that groundwater levels in the vicinity of the Proposed Action are relatively stable. Groundwater levels fluctuate somewhat throughout the year, and recharge of the subbasin generally occurs from October through February (GWD 2011). Under the Proposed Action, 29,000 AF per year would be a minimal increase to the average regional groundwater use and is only 4,000 AF per year greater than currently provided for in existing agreements (including the Volta wells) under which no significant impacts to groundwater levels have been identified. If monitoring indicates a significant sustained decline in groundwater levels in the relevant vicinity of the proposed wells, and that any such decline is not directly attributable to a cause other than the Proposed Action, then pumping would be modified or terminated as necessary to avoid any significant adverse impacts.

Each groundwater well under the Proposed Action will be equipped with a meter that can measure the instantaneous flow rate and volume of groundwater pumped, in cubic-feet per second and total AF, respectively. GWD also uses an electronic water level sensor to measure depth to groundwater in each well before pumping operations begin (pre-production or ambient), then again during the middle of the pumping period (drawdown or pumping water level), and approximately 24 hours after pump shutoff (post-production or recovery).

Historical trend analyses show the GWD groundwater program has not had a negative impact on groundwater levels in the vicinity of the wells or in the groundwater subbasin. **Figure 3** summarizes the results of the groundwater monitoring for the wells included in the four groundwater acquisition/exchange agreements that are currently being implemented by GWD and the Volta wells, with the exception of Well 13 that has not been operated under any formal agreement purposes to date. The wells that are included in the Pilot Project (Wells 1-5, 9 and 10) have three years of data with the exception of Well 10 that was not operated in 2014. The wells included in the 2015 GWD Projects (Wells 6-8 and 11-18) have complete data for one operating

year (2014). As shown in **Figure 3**, the difference in the depth to groundwater level after pumping ceases (post pumping) as compared to the pre-pumping depth to groundwater level for all wells during the three-year period has been insignificant. Analysis of the data shows that the depth to groundwater has varied only a couple of feet between pre-pumping depths to post pumping depths. Many of the post pumping depth to groundwater levels were less than the pre-pumping groundwater levels, which indicates that the groundwater recovery rate of the well exceeded the rate of extraction during the operating period. The fact that post-pumping depth to groundwater level data is collected only 24 hours after the well is shut off indicates that soils in the area have very high transmissivity rates, and the rapid recovery of groundwater levels in the vicinity of the wells after well shut off indicates the ability of the aquifer to recovery very quickly from pumping operations. This rapid recovery of groundwater levels is also an indication of the stability of groundwater levels due to the tremendous groundwater recharge associated with the large volume of imported surface water in the region as previously discussed.

The two wells included in the Volta Project (Note: the Volta Project is separate from the Proposed Action and is considered in the cumulative impacts for this EA) are each equipped with a pressure transducer (sensor) that measures the water pressure above the sensor in the well casing that is reported as the depth of water, in feet, above the sensor. **Figure 4** presents representative pre-pumping and post-pumping values collected by the sensor for the recorded period of operation. Comparison of the "depth of water above the sensor" data for Water Years 2011 – 2014 shows that groundwater levels at the two wells have remained remarkably constant, with the difference in pre-pumping and post-pumping "depth of water above sensor" values varying less than a few feet over the four year period. Again, this indicates the very high transmissivity of the soils in the vicinity of the wells and the rapid response of the aquifer and recovery of groundwater levels in the vicinity of the wells after well shut off. This rapid recovery of groundwater levels in the Volta Wells is also an indication of the stability of groundwater levels due to the tremendous groundwater recharge associated with the large volume of imported surface water in the region.

The groundwater level monitoring data indicates that the refuge groundwater pumping activities have not had a significant effect on groundwater levels in the vicinity of the wells or on nearby wells, and that the Proposed Action does not create the potential for a significant effect on the groundwater resources in the area. GWD's established policy, should it ever be necessary, is to respond promptly to any complaints, and take all measures available to avoid any third party well impacts. The same groundwater level monitoring, analysis and policy will continue as part of the Proposed Action.

Figure 3- Groundwater Level Monitoring

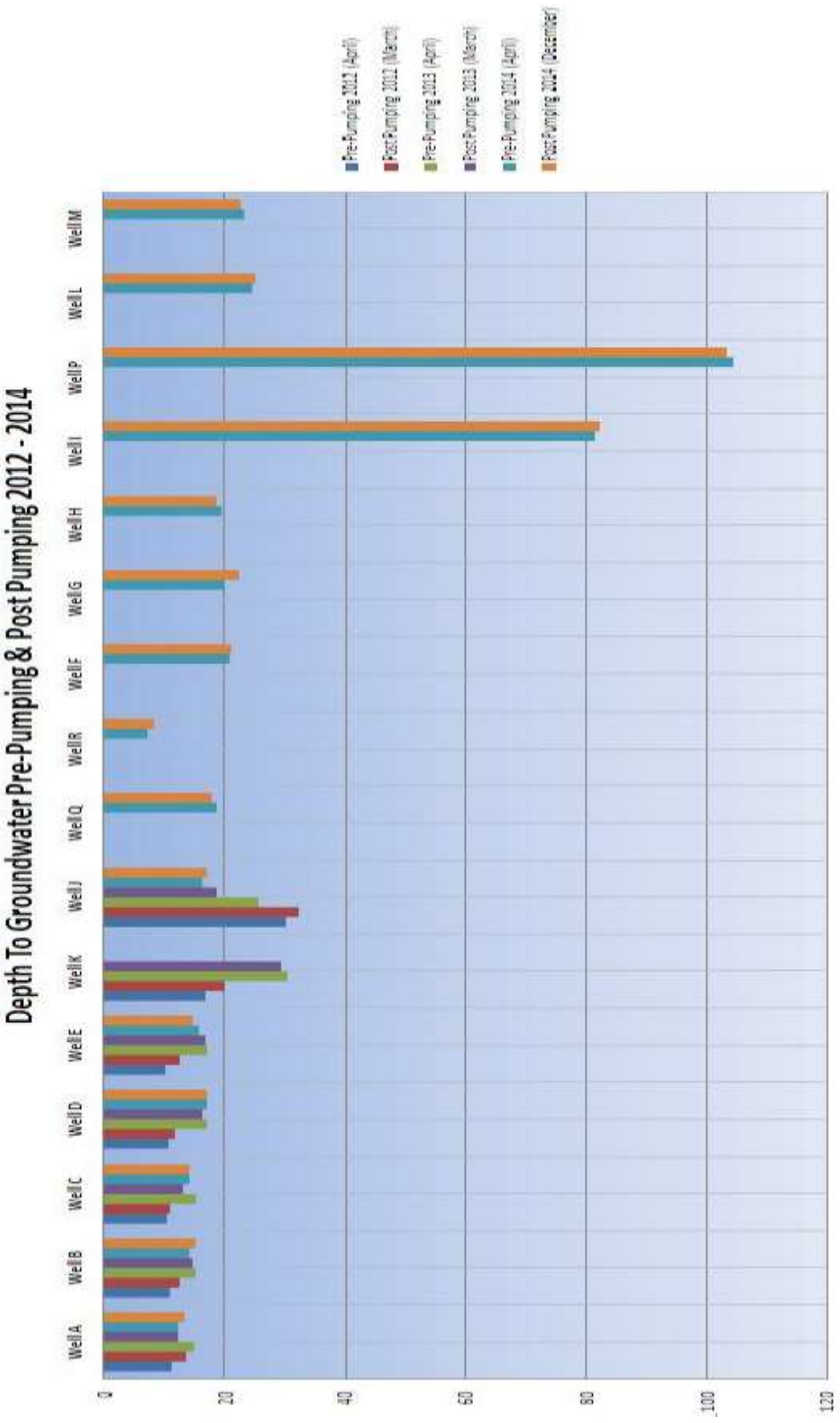
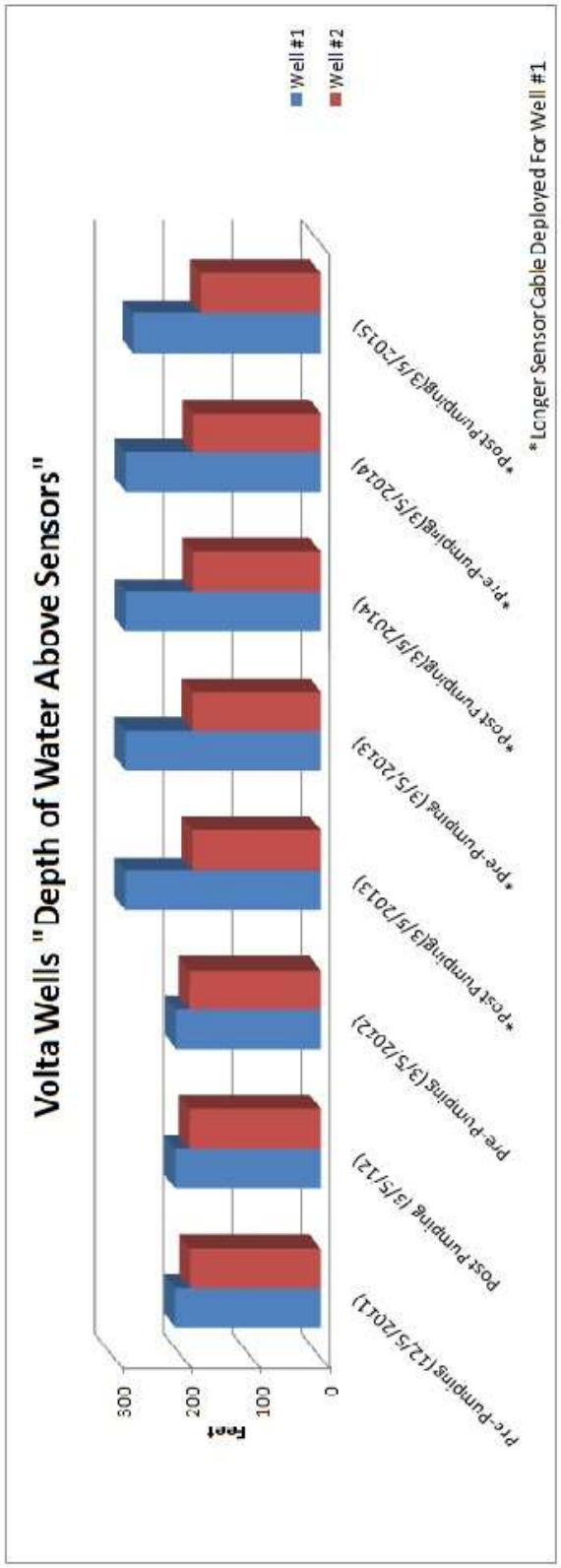


Figure 4 – Volta Wells Groundwater Level Monitoring



Land Subsidence

One of the generally unrecognized limitations in groundwater availability is subsidence from groundwater withdrawal. If pumpage demands are large enough and certain geologic formations are present, subsidence can occur. In the San Joaquin Valley, land subsidence has resulted in damage to buildings, aqueducts, well casings, bridges, and highways and has caused flooding. These damages have cost millions of dollars (USGS 2009). Subsidence is unlikely to occur as a result of the Proposed Action. Pumping would occur primarily from above the Corcoran Clay, and the total volume of groundwater produced would be minimal when compared to regional groundwater pumping in the western San Joaquin Valley. Subsidence in the western San Joaquin Valley is typically associated with pumping from beneath the Corcoran Clay. The United States Geological Survey (USGS) recently completed a thorough subsidence study that documented land subsidence to the south of the GRCD, but not within GRCD (USGS 2013). Subsidence has been minimal or nonexistent within GRCD. Continued deliveries of L2 and IL4 surface water for wetland habitat management, in combination with precipitation from winter storms, would allow for sufficient recharge to offset any minor decreases in pore pressure caused by the Proposed Action.

Land subsidence is caused by subsurface movement of earth materials. Principal causes of subsidence within the San Joaquin Valley include: aquifer compaction due to groundwater pumping, hydrocompaction caused by application of water to dry soils, and oil mining. Large withdrawals of groundwater within the San Joaquin Valley between the 1920s and 1960s for agricultural irrigation caused significant overdraft within the central west side of the valley and most of the southern valley causing substantial land subsidence within those areas. Importation of surface water from the CVP and State Water Project (SWP) starting in the 1970s decreased the rate of groundwater withdrawal allowing aquifer levels to recover subsequently reducing subsidence rates. Recently, groundwater pumping rates have increased throughout the San Joaquin Valley due to regulatory and drought-related curtailments placed on water deliveries from the CVP and SWP, resulting in groundwater level declines and renewed compaction.

In 2013, the USGS, in cooperation with Reclamation and the San Luis & Delta-Mendota Water Authority, published a Scientific Investigations Report which assessed land subsidence and water levels in the vicinity of the Delta-Mendota Canal (DMC) from 2003-2010 (USGS 2013). Analysis of land surface deformation determined that the northern portion of the DMC was relatively stable between 2003-2010 but that the area around Checks 15-21 (below O'Neill Forebay to the Mendota Pool) was part of a large area of subsidence located south of the town of El Nido, indicating a shift northeast of the area of maximum subsidence previously recorded for the 1926-1970 period. The area affected by 0.07 feet or more of subsidence extended about 50 miles west-east, from Check 17 of the DMC to the town of Madera, and 25 miles north-south, from near Merced to near Mendota. Maximum subsidence was at least 1.8 feet during 2008–2010. However, based on stable water levels in shallow wells within this area, it was determined that subsidence was not caused by groundwater-level-induced stresses in the shallow or intermediate zones (unconfined zones) but likely originated below the Corcoran Clay (confined zone).

Various entities, including Reclamation, USGS, DWR, San Luis & Delta-Mendota Water Authority, and the SJREC have been monitoring subsidence trends within the Central Valley. In 2011, Reclamation established the San Joaquin River Restoration Program (SJRRP) Geodetic

Control Network to begin monitoring subsidence with the SJRRP Restoration Area. Subsidence in the SJRRP Restoration Area has been conducted biannually since 2011. In addition, due to significant subsidence rates along the flood control bypasses that parallel the San Joaquin River (some localized areas showing rates of more than 1 foot per year), DWR has collected levee survey data to help further refine the estimated annual rates along the levees of the flood bypasses.

To provide a general estimate of the potential subsidence rates and trends within the Restoration Area and surrounding areas, Reclamation developed an exhibit map (**Figure 5**) that combined data from various sources prior to the 2011 data collection effort. **Figure 5** shows annual subsidence rates ranging from less than 0.02 feet to more than 0.5 feet per year. However, Reclamation and DWR surveys from 2011 to 2013 indicate that the rates have either stayed the same or have more than doubled in some areas (see **Figure 6**). As shown in **Figure 7**, subsidence rates between December 2012 and December 2013 for the area in the vicinity of the Proposed Action ranged between 0 and 0.3 feet. (**Figures 5 -7** are from the Final Environmental Assessment for the "Warren Act Contract for Conveyance and Storage of Groundwater from 4-S Ranch and SHS Ranch to Del Puerto Water District", EA-14-020). **Figures 8 and 9** are recent subsidence rate figures from Reclamation. Figures 8 indicates that subsidence rates in the study area declined (improved) in the July 2013 to July 2014 period with rates ranging from +0.15 to -0.15 feet per year, or essentially neutral. **Figure 9** shows the overall subsidence rates in the study area for the period of December 2011 to July 2014 were again in the +0.15 to -0.15 feet per year, or essentially neutral. These measured subsidence rates and the associated analysis indicates that land subsidence in and around the study area are not being impacted by groundwater pumping.

Although land subsidence has been measured within the Delta-Mendota Subbasin, most of it has occurred south and east of the GRCD and has been associated with pumping from the lower confined zone, beneath the Corcoran Clay. The area in the vicinity of the Proposed Action wells has not been identified as a critical land subsidence area. In addition, the proposed wells pump from the unconfined zone above the Corcoran Clay and therefore should not contribute to any land subsidence associated with pumping from the confined zone below the Corcoran Clay.

As part of the Groundwater Level and Subsidence Monitoring Plan and as part of GWD's ongoing Groundwater Management Plan, GWD and other water districts included in the Proposed Action would collaborate with the San Luis & Delta-Mendota Water Authority and the Central California Irrigation District, which maintain local land subsidence monitoring programs. Reclamation will review the results of those monitoring programs and work with the monitoring agencies to the extent practical to address any regional problems associated with land subsidence.

Figure 5 – Subsidence Rates Prior to 2011

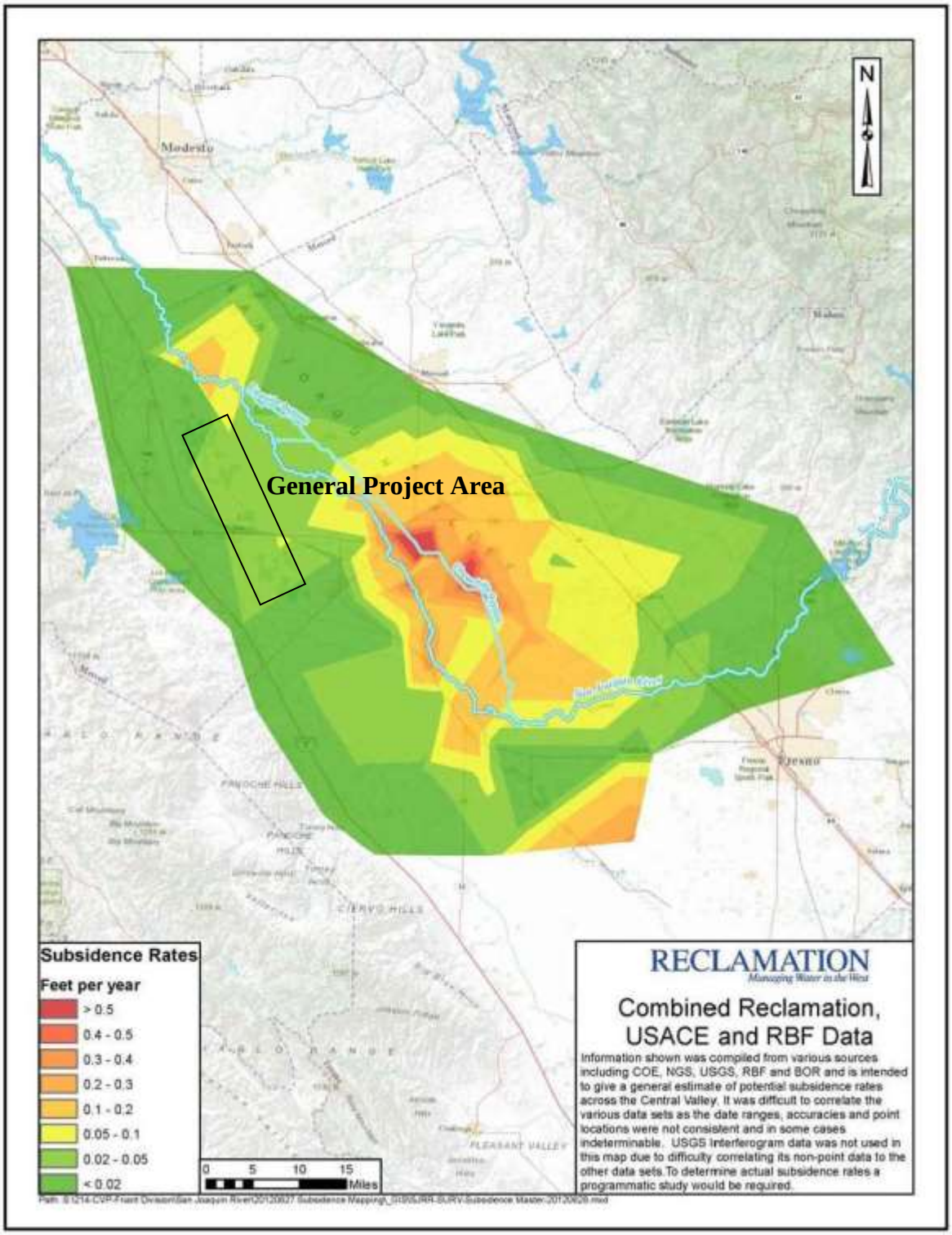


Figure 6 – Annual Subsidence Rates from December 2011 to December 2013

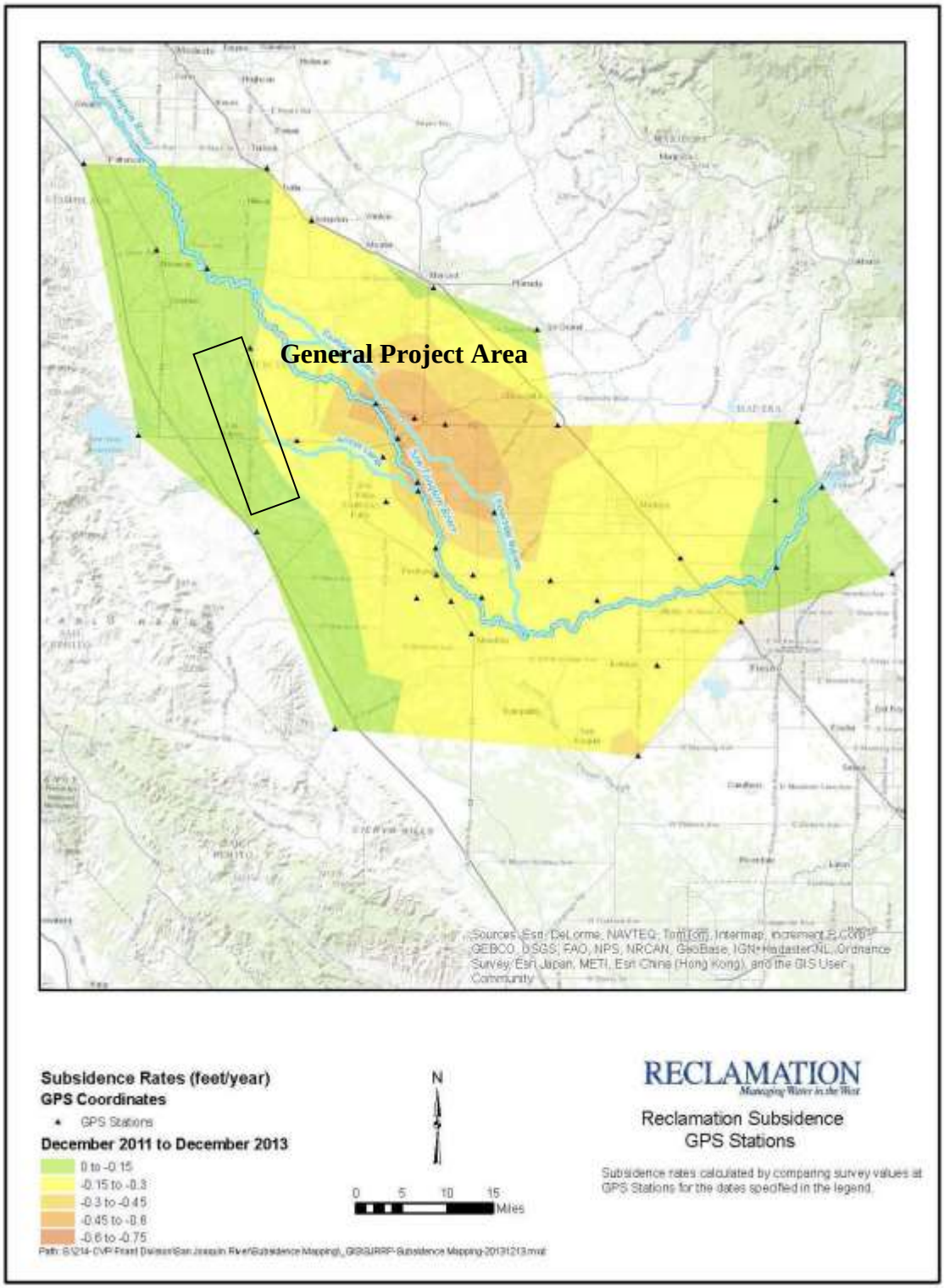


Figure 7 - Annual Subsidence Rates from December 2012 to December 2013

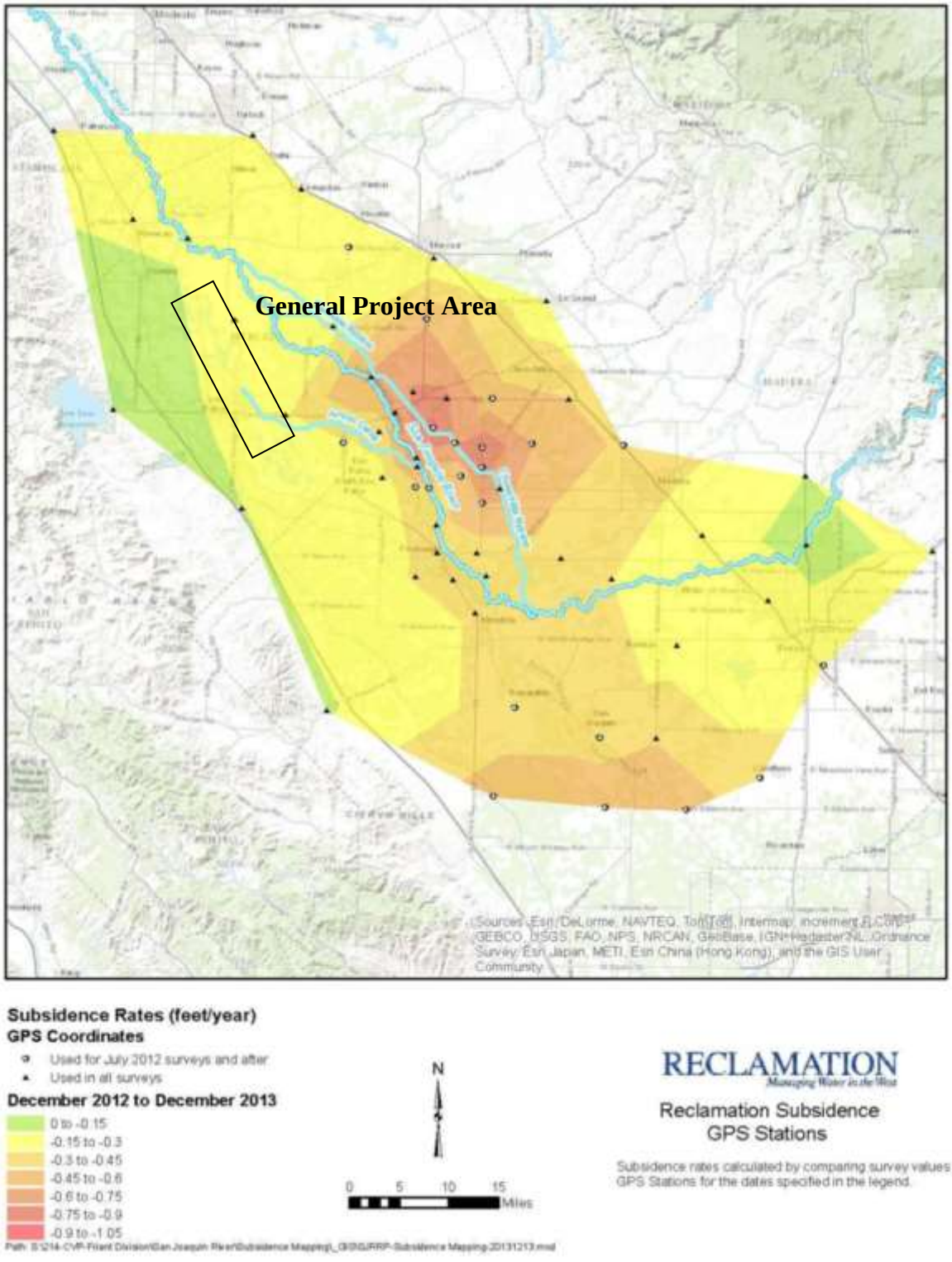


Figure 8 - Annual Subsidence Rates from July 2013 to July 2014

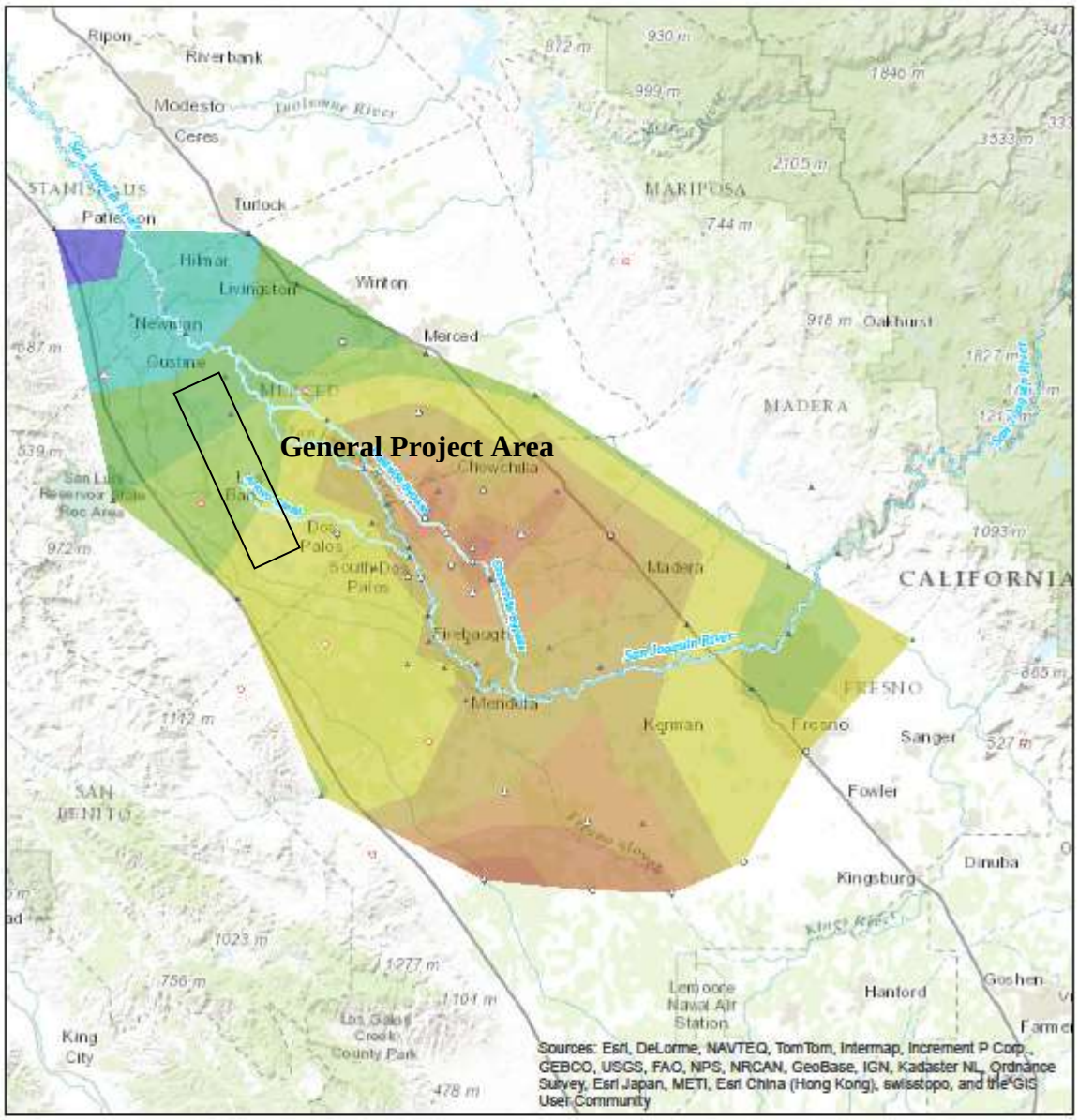
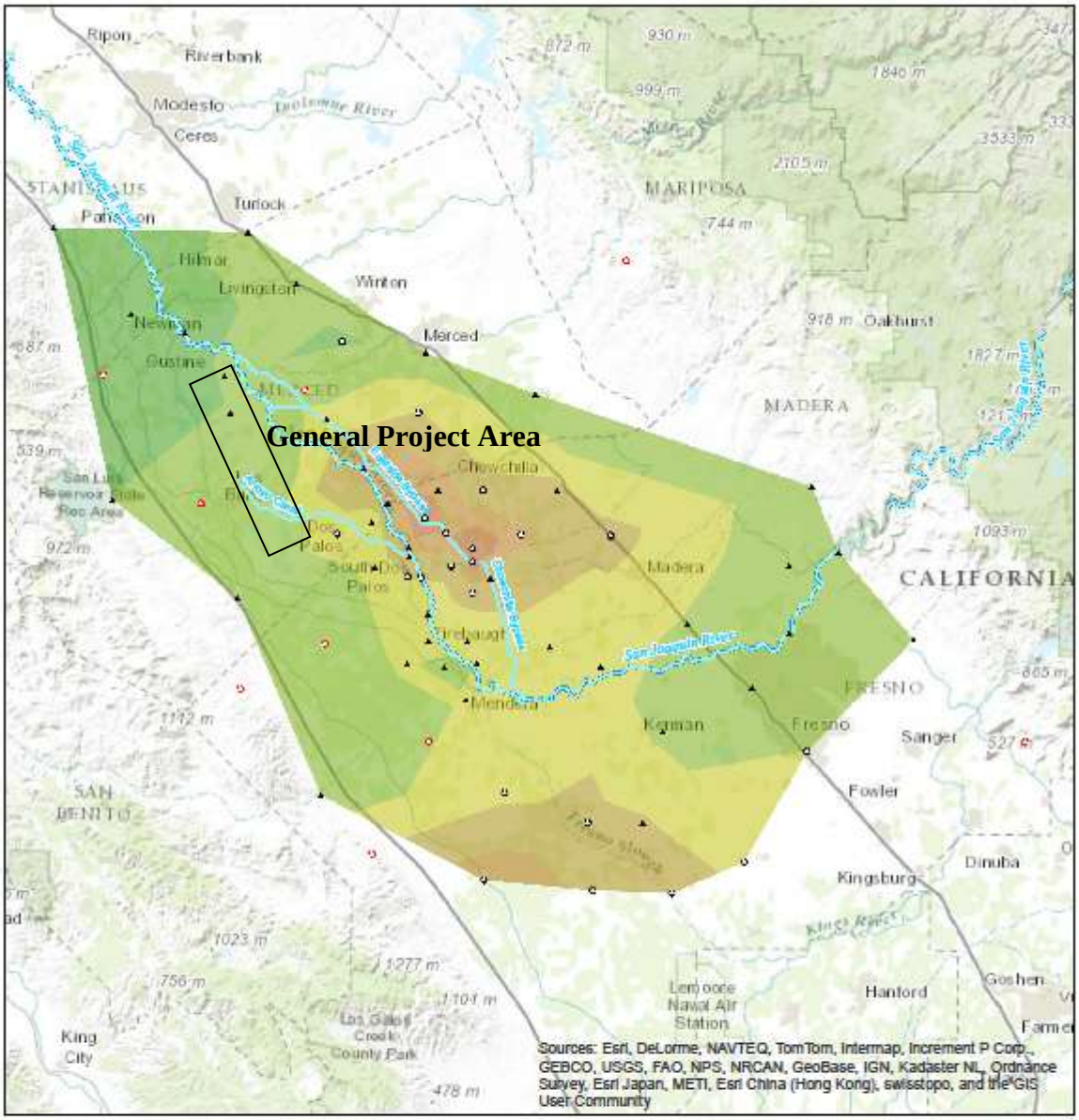


Figure 9 - Annual Subsidence Rates from December 2011 to July 2014



Subsidence Rates (feet/year)
December 2011 to July 2014

- 0.3 to 0.45
- 0.15 to 0.3
- 0 to 0.15
- -0.15 to 0
- -0.3 to -0.15
- -0.45 to -0.3
- -0.6 to -0.45
- -0.75 to -0.6
- -0.9 to -0.75

GPS Coordinates

- GPS Point-December 2011
- GPS Point-added July 2012
- GPS Point-added December 2013

0 7 14 21 Miles

N

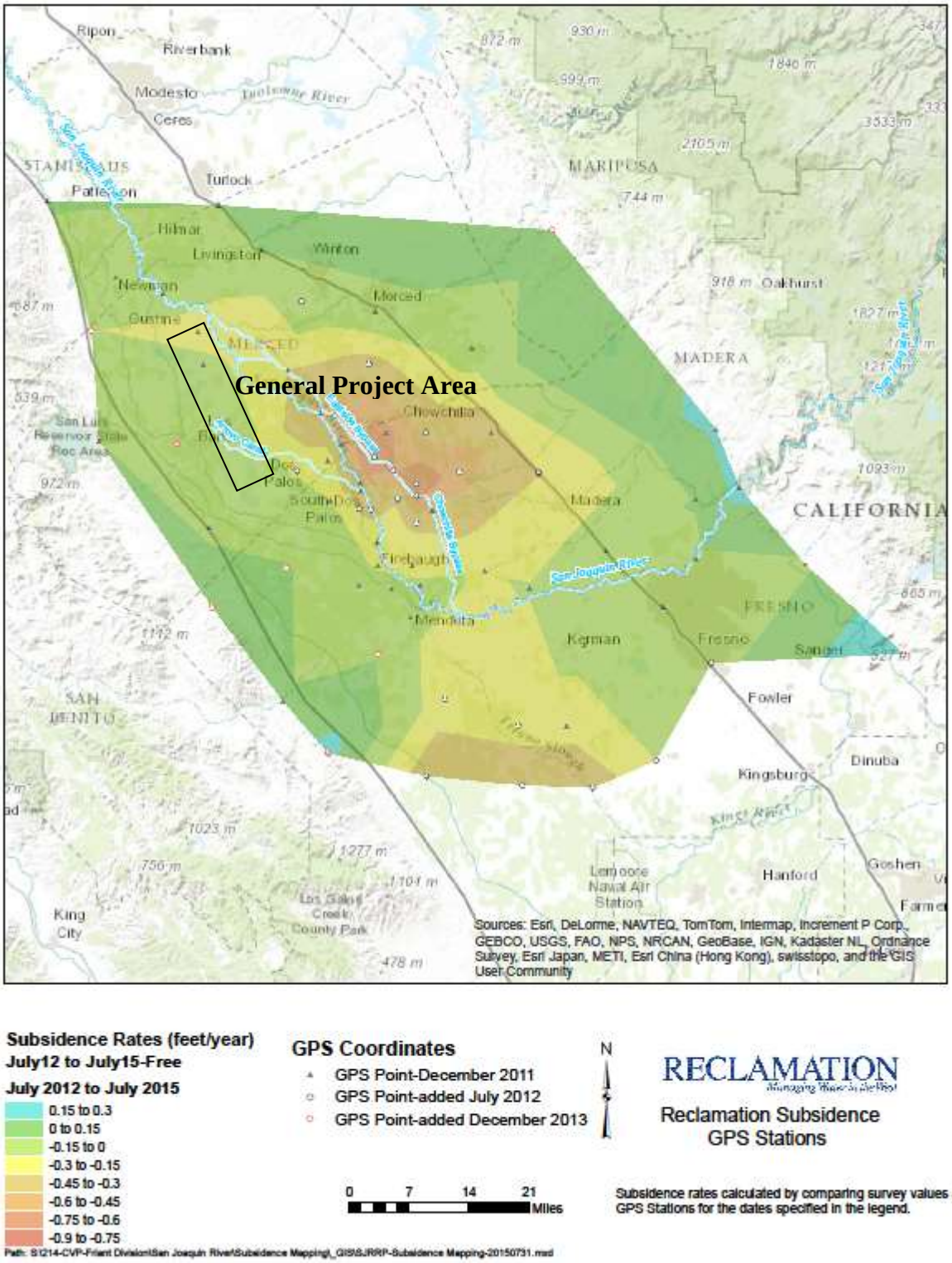
RECLAMATION
Managing Water in the West

Reclamation Subsidence GPS Stations

Subsidence rates calculated by comparing survey values at GPS Stations for the dates specified in the legend. GPS points that have not been monitored for over one year were not included in the Subsidence Rates surface.

Path: S:\214-CVP-Friant Division\San Joaquin River\Subsidence Mapping_GIS\SJRRP-Subsidence Mapping-20140717.mxd

Figure 10 - Annual Subsidence Rates from July 2012 to July 2015



Cumulative Effects
When added to past, present, and future foreseeable action, the Proposed Action would contribute a minor increase in groundwater production in the general vicinity. Private and publically owned wells in and near the study area would continue to be utilized for groundwater development during the Proposed Action. Pumping would not affect the lower aquifer system below the Corcoran Clay, and it is not anticipated that pumping during the Proposed Action would substantially impact the upper aquifer system.

The impact of pumping up to 29,000 AF per year under the Proposed Action when compared to the pumping that occurs under the Volta Wells Project, and 2015 GWD Projects (up to 25,000 AF per year total) would contribute to a minimal increase to groundwater pumping in the vicinity of the wells during the 5-year Proposed Action. This cumulative impact would not be substantial because groundwater levels would be monitored and if required actions would be taken to avoid adverse impacts. Monitoring has indicated pumping from existing wells over the course of many years has not had a negative impact on groundwater elevations (GWD 2011; GWD 2012).

The groundwater production period would occur primarily during the refuge water supply season (September through February), and substantial refuge pumping will not occur simultaneous with substantial pumping of local agricultural wells. The additional amount of pumping proposed as part of the Proposed Action would not substantially impact groundwater resources.

3.4 Water Quality

3.4.1 Affected Environment

The groundwater quality within the Delta-Mendota Subbasin varies with location and depth both within the upper aquifer above the Corcoran Clay and in the lower aquifer beneath the Corcoran Clay. Groundwater quality in the GRCD is typically characterized by total dissolved solids (TDS), selenium (Se), and boron. Based on several years of water quality data collected under the existing IL4 Pilot Project and other groundwater acquisition and L2 exchange agreements, the primary constituents of concern for refuge water supplies are TDS and selenium.

The water quality of the receiving waterway is also a relevant factor. GWD's primary source of surface water is from the Delta, which is conveyed via the DMC to the conveyance canals serving GWD. GWD occasionally receives a blend of San Joaquin River water (that typically has lower salinity concentration than DMC water) and DMC water via the Mendota Pool. The TDS in the DMC during the last five years, as measured at Check 21 near the Mendota Pool, has ranged from approximately 121 mg/L to 735 mg/L. During the primary period of surface water deliveries in GWD (September – January) the TDS in the DMC during the last five years has ranged from approximately 171 mg/L to 600 mg/L. The large volume of surface water being delivered via the GWD conveyance channels and canals (over 200,000 AF per year) provides the ability to maintain acceptable selenium and salinity concentrations in the District's conveyance system. Concentrations of all constituents will be monitored at each wellhead. Under the Water Quality Monitoring Plan (Appendix A), groundwater entering GWD's conveyance system may require dilution or mixing with surface water to ensure that concentrations of selenium do not exceed 0.0020 mg/L in GWD's conveyance facilities.

Groundwater that exceeds 0.0050 mg/L of selenium at the wellhead will not be utilized, regardless of the resulting blended concentration in GWD's conveyance system.

PWD, which is a part of Panache Drainage District (PDD), requires that all tailwater be retained on farm and be managed by each water user. Discharge of tailwater into PDD system is prohibited. See Appendix A, Resolution No. 499-98. PWD manages drainage so that its drainage reduction goal is attained. The drainage water is recycled into the delivery system to achieve blended water quality of an average of no more than 700 mg/I Total Dissolved Solids (TDS) and 0.7 mg/I Boron. Subsurface drain water is captured, stored, recirculated and used within the District, or discharged into the PDD system. Ultimately, PDD discharges drainage water into the San Luis Drain under a Waste Discharge Permit for the Grassland Bypass Project issued to the SLDMWA and Reclamation. The current permit expires on 12/31/19 (PWD 2014, page 6).

DPWD has neither subsurface drainage nor operational spills. DPWD does have the ability to discharge outflows into the numerous creeks listed in the natural resource section, as well as to downslope water districts and county storm drains, all of which eventually drain into the San Joaquin River. Due to the installation of high efficiency irrigation systems throughout the DPWD, however, there is little or no outflow from a majority of DPWD lands. DPWD participates in the Westside San Joaquin River Watershed Coalition (Coalition), which was formed under the umbrella of the San Joaquin Valley Drainage Authority (SJVDA) to participate as a coalition group in the Regional Boards' Irrigated Lands Waiver Program. The Coalition provides data collection, report preparation and communication with the Regional Board. Decision-making, such as setting of budgets and policy direction, is accomplished through regular public meetings of an appointed SJVDA Steering Committee (DPWD 2011, pages 3-20 and 3-21).

3.4.2 Environmental Consequences

No Action

The No Action Alternative would consist of Reclamation not entering into agreements with water sellers for the acquisition of groundwater supplies or exchange of L2 water for groundwater supplies to help meet the demand for IL4 water in the GRCD, and the pumping of wells for IL4 acquisition purposes would not occur. Reclamation would not fund the proposed water acquisitions, and production wells would not be operated for refuge water supply purposes. Groundwater pumping would likely decline within the GRCD.

Proposed Action

Groundwater Quality

Collection and analysis of groundwater quality data is necessary for the protection of groundwater resources because deterioration of groundwater quality may be irreversible and treatment of contaminated groundwater can be expensive. Water quality impacts that could occur to surface water by pumping groundwater of poor quality and discharging it into the GWD conveyance system are minimal. This type of impact is unlikely to occur since the volume of surface water moving through GWD's conveyance system would be much greater than the volume of groundwater that would be pumped into the conveyance system during the primary pumping season (fall and winter). If necessary, during spring and summer operations, surface water in the GWD conveyance system would be used to dilute the groundwater to acceptable

quality suitable for delivery to GRCD habitat. Dilution of groundwater with surface water is a common practice.

Various water-management actions potentially have groundwater quality effects. Therefore, water quality needs to be considered in conjunction with information about changes in water levels and water in storage in evaluating the availability and sustainability of groundwater. The Proposed Action would implement a water quality monitoring plan to ensure that water quality standards for TDS and selenium are not exceeded. If water quality monitoring indicates unsuitable water quality, pumping operations would be modified or curtailed as necessary to stay in compliance with established thresholds. Further detail is provided in the Water Quality Monitoring Plan included in Appendix A.

The potential for poor-quality water to be extracted under the Proposed Action exists, however, the Water Quality Monitoring Plan would avoid or mitigate for unsuitable water quality to ensure that no adverse impacts occur to surface water supplies during the Proposed Action.

GWD regularly monitors for three water quality constituents: total dissolved solids (TDS), selenium (Se), and boron (B). GWD uses instantaneous monitoring techniques through a grab sample analysis, and all grab samples are promptly and independently analyzed by a federally approved laboratory. GWD also regularly monitors water temperature and pH.

GWD's Board of Directors adopted a water quality objective of 2,500 parts per million (or mg/L) or less TDS for all waters introduced into GWD's conveyance system. For selenium, GWD and Reclamation have agreed on a water quality objective of 5 parts per billion (or μg/L) at each wellhead. For boron, GWD and Reclamation have agreed on a water quality objective of 4 parts per million (or mg/L) in the receiving conveyance channel downstream of the well discharge. Under the Proposed Action, GWD will continue to monitor for TDS, boron and selenium at all wells at the beginning of the initial well pumping period and then monthly for 6 months and then quarterly thereafter. Wells producing water containing selenium concentrations above 2 μg/L will be monitored monthly during well operations. GWD will not accept water from a groundwater well if it exceeds the wellhead water quality objective of 2,500 mg/L for TDS or 5 μg/L for selenium. Table 4 summarizes the latest available water quality monitoring results at the wellheads for the wells currently being operated under GWD's groundwater acquisition and L2 exchange agreements.

Table 4 – Latest Wellhead Water Quality

Well	Analysis Date	TDS (mg/L)	Se (µg/L)	B (mg/L)
1	9/18/2014	1,860	<0.40	1.9
2	9/17/2014	1,910	<0.40	1.6
3	11/12/2014	1,160	<0.40	1.0
4	9/23/2015	1,420	4.30	0.90
5	9/23/2015	1,240	3.44	0.82
6	9/23/2015	2,390	<0.40	1.5
7	9/23/2015	2,300	<0.40	1.9
8	11/12/2014	1,330	<0.40	2.7
9	9/23/2015	1,220	<0.40	1.4
10	3/13/2014	634	<0.40	2.0
11	9/23/2015	456	2.40	0.72
12	8/27/2015	1150	2.14	0.98
13	9/16/2015	1,730	3.57	2.2
14	9/23/2015	1,760	3.25	1.60
15	9/23/2015	1,550	<0.40	2.0
16	9/23/2015	500	<0.40	.66
17	9/23/2015	1,230	<0.40	1.2
18	9/23/2015	1,370	<0.40	2.2
19	3/24/2015	504	3.00	0.85
20*				
21	3/31/2015	1450	3.36	1.8
22	8/31/2015	1960	1.66	3.5
23	5/16/2013	2320	<0.40	3.1

*Sample was collected, waiting on analysis.

Surface Water Quality

Current groundwater monitoring plans require GWD to monitor for TDS, selenium, and boron in GWD's surface water channels. For selenium, the Regional Water Quality Control Board (RWQCB) has established a maximum surface water concentration of 2 µg/L. There is no adopted surface water quality objective for boron within the GRCD, because boron is primarily an agricultural constituent of concern, but the RWQCB has established a maximum objective of 5.8 mg/l in the lower San Joaquin River. However, GWD and Reclamation have agreed to establish an objective of 4 mg/L for boron in the receiving channel downstream of the well discharge. If any water quality objectives are exceeded, GWD would modify groundwater pumping operations or curtail groundwater pumping until water quality objectives are again met.

Historical trends analyses show that the groundwater wells within the GRCD and on nearby lands produce water of sufficient quality for wetland habitat. The GWD's water quality monitoring policies and practices are very effective at detecting any such exceedances promptly, and managing groundwater supplies accordingly. On a limited number of occasions, GWD has not utilized wells because the groundwater quality does not meet the wellhead objectives. Overall, GWD's groundwater management activities have prevented the degradation of water quality within the GRCD.

Under the Proposed Action, surface water quality sampling and analysis for selenium will be conducted monthly downstream of well discharges containing selenium concentrations greater than 2 μg/L to ensure compliance with surface water quality objectives set by the RWQCB. If a surface water quality objective is exceeded groundwater pumping will be modified or curtailed or additional surface water will be routed into the receiving conveyance channel until surface water quality objectives are met. Weekly monitoring of the EC, pH and temperature upstream and downstream of each well discharge will continue. The water quality monitoring and reporting for the Proposed Action is described in the Water Quality Monitoring Plan included as Appendix A.

Cumulative Impacts
The latest water quality analyses conducted on samples taken from the Proposed Action wells are summarized in Table 4. Selenium was not measurable in 13 of the 22 wells for which analyses are available, and in the other nine wells selenium concentrations were well below the Water Quality Monitoring Plan's threshold. TDS levels in all wells were below the Water Quality Monitoring Plan's threshold for TDS, ranging from 456 to 2,390 mg/L, which is of very good quality for wetland habitat use. Boron concentrations were also below the RWQCB's objective for the lower San Joaquin River.

Under the Proposed Action, impacts to water quality would not be significant and continual monitoring would occur along with any follow-on actions required under the Water Quality Monitoring Plan. Therefore, the Proposed Action would not contribute to cumulative impacts to water quality.

3.5 Biological Resources

3.5.1 Affected Environment

Wetlands
The wetlands of GRCD are maintained primarily by surface water, and water conveyance infrastructure is in place to service each of the numerous ponds or cells. In GRCD, wetland habitats consist of seasonally flooded marshes, including moist soil impoundments, and permanent ponds and summer water. Vernal pools or seasonal wetlands occur within the GRCD.

Seasonally flooded marsh is by far the most numerous and diverse of the wetland habitat types on the state and federal refuges and private wetland areas of the San Joaquin Valley

River Basin. Seasonal wetlands are inundated fields or ponds that are managed primarily to grow seed and to produce invertebrates for migratory waterfowl, shorebirds and other wetland-dependent wildlife. These wetlands are usually flooded from October through March, and are dry for the rest of the year except for summer irrigation.

The diversity of seasonal wetlands is the product of a variety of water depths that result in an array of vegetative species that, in combination, provide habitat for the greatest number of wildlife species throughout the course of a year. Through the fall and winter, seasonally flooded marshes are used by large concentrations of waterfowl and smaller numbers of egrets, herons, ibis, and grebes, to name a few. In addition, a full complement of raptors takes advantage of the water bird prey base. Water is removed in the spring, so large concentrations of shorebirds use the shallow depth and exposed mudflats on their northern migration. Seed-producing plants germinate and grow to maturity on the moist pond bottoms during the springs and early summer. Wetland flooding in the fall makes this food available to early migrant waterfowl and other waterfowl.

Moist soil impoundments are similar to seasonally flooded marshes, except that they are irrigated in the summer to improve production of water grass, sprangletop, and swamp timothy, the primary food species for waterfowl. Moist soil impoundments are typically irrigated during the summer to bolster plant growth and to enhance seed production. During irrigation periods, these units are often used by locally nesting colonial water birds (egrets, herons). Once flooded, these units provide an abundant food source for waterfowl. In addition, a number of wading bird species frequent them throughout the year.

Semi-permanent and permanent wetlands provide wetland habitat for year-round and summer resident species. Semi-permanent wetlands are flooded for 8 or months of the year, while permanent wetlands remain flooded throughout the year. Characterized by both emergent and submergent aquatic plants, semi-permanent and permanent wetlands provide brood and molting areas for waterfowl, secure roosting and nesting sites for wading birds and other over-water nesters, and provide feeding areas for species like cormorants and pelicans.

Riparian

There are no riparian habitats that occur in the Proposed Action area or near the water delivery areas.

Agricultural Lands

Agricultural lands within and adjacent to the study area include flood irrigated pastures, orchards, and row crops. Pastures are typically cultivated in alfalfa (*Medicago sativa*), rescue grass (*Bromus catharticus*), Johnson's grass (*Sorghum halepense*), tall fescue (*Festuca arundinaceae*), and Italian ryegrass (*Festuca perennis*). Some of the key orchard crops in the vicinity of the Proposed Action are apricot (*Prunus armeniaca*), English walnut *(Juglans regia*), and almond (*Prunus dulcis*) cultivars. Row crops include broccoli (*Brassica oleracea*), corn (*Zea mays*), and tomatoes (*Solanum lycopersicum*), among others. Flood irrigated pastures provide food, cover, and nesting grounds for wildlife species; the value of the habitat varies with crop

type and agricultural practices. Bird diversity can be high in irrigated pastures. Species commonly utilizing pasture lands include red-winged blackbird (*Agelaius phoeniceus*), Brewer's blackbird (*Euphagus cyanocephalus*), western meadowlarks (*Sturnella neglecta*), European startling (*Sturnus vulgaris*), house finch (*Carpodacus mexicanus*), killdeer (*Charadrius vociferous*), American crow (*Corvus brachyrhynchos*), and American kestrel (*Falco sparverius*). Some pasture lands and crop fields provide suitable breeding habitat for northern harrier (*Circus cyaneus*). Small mammals in flood irrigated pasture and row crops provide important prey resources for raptors such as red-tailed hawk (*Buteo jamaicensis*) and Swainson's hawk (*Buteo swainsoni*).

Developed/Disturbed

Developed and disturbed areas include major roads, highways, and buildings and structures within more urban areas, but also facilities and access roads which are located throughout the GRCD and near each well location.

Wildlife

The following list (Table 5) was obtained by accessing the U.S. Fish and Wildlife database at http://www.fws.gov/sacramento/es_species/Lists/es_species_lists-overview.htm (USFWS 2015). Accessed on October 26, 2015: Consultation Code: 08ESMF00-2016-SLI-0138, Event Code: 08ESMF00-2016-E-00271.

Table 5. Federally Listed, Proposed & Candidate Species and Migratory Birds Potentially Occurring In Proposed Action Area

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS
INVERTEBRATES		
Branchinecta longiantenna	Longhorn fairy shrimp	Endangered
Lepidurus packardi	Vernal pool tadpole shrimp	Endangered
Branchinecta lynchi	Vernal pool fairy shrimp	Threatened
Branchinecta conservation	Conservancy fairy shrimp	Endangered
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	Threatened
FISH		
Hypomesus transpacificus	Delta smelt	Threatened
Oncorhynchus mykiss	Central Valley Steelhead	Threatened (NMFS)
AMPHIBIANS		
Ambystoma californiense	California tiger salamander, central population	Threatened
Rana aurora draytonii	California red-legged frog	Threatened
REPTILES		
Gambelia (=Crotaphytus) sila	Blunt-nosed leopard lizard	Endangered
Thamnophis gigas	Giant garter snake	Threatened
MAMMALS		
Dipodomys nitratoides exilis	Fresno kangaroo rat	Endangered
Vulpes macrotis mutica	San Joaquin kit fox	Endangered
BIRDS		
Charadrius alexandrinus nivosus	Western snowy plover	Threatened (Kern County)
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	Candidate (Kern County) (critical habitat)

Empidonax traillii extimus	Southwestern willow flycatcher	Endangered (Kern County) (critical habitat)
Gymnogyps californianus	California condor	Endangered (Kern & Tulare counties) (critical habitat)
Vireo bellii pusillus	Least Bell's vireo	Endangered (Kern County)
PLANTS		
Monolopia congdonii (=Lembertia congdonii)	San Joaquin woolly-threads	Endangered

Although there are several species identified in the list, only those species that could potentially occur in the action area are analyzed in detail.

Sensitive Plants

Major representative plant communities and habitat types present include seasonally flooded freshwater emergent wetland and alkali sink scrub. The California Natural Diversity Database records and Services species list for Merced County indicate the following rare, threatened, or endangered plant species have been sighted on or near the area in recent times:

Hispids' bird's-beak (State- and Federally-listed endangered)	*Cordylanthus mollis hispids*
Owl's clover (Endangered)	*Calstilleja campestris ssp. Succlenta*
Hoover's spurge (Threatened)	*Chamaesyce hooveri*
Colusa grass (Threatened)	*Neostapfia coulusana*
San Joaquin Valley Orcutt grass (Threatened)	*Orcuttia inaequalis*
Hairy Orcutt grass (Endangered)	*Orcuttia pilosa*
Greene's tuctoria grass) (Endangered)	*Greene's tuctoria* (=Orcutt

As groundwater will be used to continue wetland management practices in the Proposed Action area, impacts to sensitive plant species are not expected.

Giant Garter Snake
The giant garter snake (GGS) inhabits wetland habitats and vegetated permanent water channels in scattered subpopulations in the Central Valley from Butte County in the north to Fresno County in the south. It is believed extirpated from the vicinity of Buena Vista and Tulare Lakes south of Fresno County. Giant garter snakes are present within the GRCD, primarily within the Volta Wildlife Area.

Giant garter snakes are always found in close proximity to permanent or semi-permanent water with vegetated perimeters. The GGS is an aquatic feeder specializing in capturing small fish and frogs in or under water. The giant garter snake spends the winter in upland retreats above the high water level. As discussed further below, the Proposed Action is not expected to impact this species and its habitat.

Aleutian Canada Goose, Bald Eagle, Peregrine Falcon, and Yellow-Billed Cuckoo
The Aleutian Canada goose, Bald Eagle, Peregrine Falcon, and Yellow-Billed Cuckoo are occasional visitors to the study area. The Proposed Action would provide additional loafing, foraging, and roosting sites within the GRCD for Aleutian Canada Geese, Bald Eagles, and Peregrine Falcons. There is no suitable riparian habitat within GRCD for the Yellow-billed Cuckoo.

Swainson's Hawk
This species is the most migratory of all North American buteos. It breeds and summers in the arid and semiarid regions of western North America and winters on the pampas of Argentina. The breeding population in California has declined by an estimated 90 percent. In 1979, the breeding population in California was estimated at 375 pairs. This species arrives in the vicinity of the North Grasslands Wildlife Area and Los Banos Wildlife Area in late February to early March each year, and nests within an intermix of trees. Trees commonly used for nesting in this area are cottonwoods, willows, and valley oaks. The principal foods in the Central Valley are meadow mice and small birds. Use of the area by Swainson's hawk coincides with the time of year when most of the seasonal wetlands have been allowed to dry for their annual growing season. Likewise, this species migrates south prior to the seasonal wetlands being flooded for wintering wildlife populations arriving in the fall.

Based upon The California Natural Diversity Database records and observations by CDFG staff, no known Swainson's hawk nest sites occur within the GRCD Comprehensive Management Plan project area. Nest sites do occur along the San Joaquin River, which is not located in the Proposed Action area. Swainson's hawks are featured species in the GRCD management plan and would benefit from the Proposed Action. Grassland foraging areas and potential nest trees would not be disturbed.

San Joaquin Kit Fox
The San Joaquin kit fox, a State-listed threatened and Federally-listed endangered species, is a small nocturnal canid which now occurs in scattered populations from Contra Costa County south to Kern County. Historically, this species occupied extensive areas of semiarid lands in the San Joaquin Valley. Flat topography in valley bottoms with valley sink scrub, valley saltbush scrub, interior coast range saltbush scrub, nonnative grassland and alkali playa plain

communities (described in Holland, 1986) are the typical habitat, but substantial populations have always inhabited the surrounding low foothills where slopes do not exceed 40 degrees (O'farrell 1983). Agricultural, industrial, and urban developments have caused rapidly increasing rates of habitat loss.

The San Joaquin kit fox is an obligate year-round burrow dweller which feeds largely upon lagamorphs and kangaroo rats (but would utilize whatever prey is locally abundant). Numerous dens are excavated and inhabited in the course of a year and individuals may cover great distances while foraging and/or dispersing.

The San Joaquin kit fox is considered here because of the potential foraging habitat (irrigated pasture and seasonally flooded grassland and alkali sink scrub). No known active or potential kit fox dens have been observed within the study area.

3.5.2 Environmental Consequences

No Action

Conditions would remain the same as existing conditions if no action were taken, except that the quantity of water available for use within the GRCD and local agricultural districts would potentially be reduced. There would be no new impacts to wildlife, including threatened and endangered species, their critical habitat, or general habitat types.

Proposed Action

The pumping and conveyance of groundwater within GRCD would not affect aquatic species or their habitat. Habitat for Delta smelt, Chinook salmon (spring and winter run), central valley steelhead, or green sturgeon would not be affected because no construction or flow modifications are proposed on natural waterways. There would be no effect to federally listed fish species mentioned above and there would be no modification of critical habitat for the species as a result of the Proposed Action.

Indirect impacts are not expected to occur from water quality affecting the prey base of the GGS. Groundwater from existing production wells would be pumped into the GWD conveyance system and delivered downstream throughout the GRCD, similar to all GWD refuge water supplies. Refuge water deliveries primarily occur in the fall, winter, and spring, during a period when the GGS is not active, and no effects to GGS are anticipated.

Water is expected to be of suitable quality for other aquatic species that use wetland areas within the GRCD. Water quality would be continually tested during the Proposed Action at the outflow of the production wells and immediately upstream and downstream. If groundwater quality is determined to be of unsuitable quality, pumping into the GWD conveyance system would modified or curtailed.

Overall, the Proposed Action would provide a benefit to waterfowl, shorebirds, and raptors, as the water would be used for refuge management to sustain wetland habitats. The Proposed Action may benefit GGS in that it would provide additional habitat.

Cumulative Impacts

Implementation of the Proposed Action would not result in effects to biological resources, and therefore could not contribute to cumulative impacts.

3.6 Air Quality

Section 176 (C) of the Clean Air Act [CAA] (42 U.S.C. 7506 (C)) requires any entity of the federal government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate that the action conforms to the applicable State Implementation Plan (SIP) required under Section 110 (a) of the Federal CAA (42 U.S.C. 7401 (a)) before the action is otherwise approved. In this context, conformity means that such federal actions must be consistent with SIP's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of those standards. Each federal agency must determine that any action that is proposed by the agency and that is subject to the regulations implementing the conformity requirements would, in fact conform to the applicable SIP before the action is taken.

On November 30, 1993, the Environmental Protection Agency (EPA) promulgated final general conformity regulations at 40 CFR 93 Subpart B for all federal activities except those covered under transportation conformity. The general conformity regulations apply to a proposed federal action in a non-attainment or maintenance area if the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutant caused by the Proposed Action equal or exceed certain *de minimis* amounts thus requiring the federal agency to make a determination of general conformity.

3.6.1 Affected Environment

The Proposed Action lies within the San Joaquin Valley Air Basin (SJVAB) under the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). Air basins share a common "air shed," the boundaries of which are defined by surrounding topography. Although mixing between adjacent air basins inevitably occurs, air quality conditions are relatively uniform within a given air basin. The San Joaquin Valley experiences episodes of poor atmospheric mixing caused by inversion layers formed when temperature increases with elevation above ground, or when a mass of warm, dry air settles over a mass of cooler air near the ground. NAAQS and California Ambient Air Quality Standards (CAAQS) have been established for the following criteria pollutants: carbon monoxide (CO), ozone (O3), sulfur dioxide (SO2), nitrogen dioxide (NO2), inhalable particulate matter between 2.5 and 10 microns in diameter (PM10), particulate matter less than 2.5 microns in diameter (PM2.5), and lead. The CAAQS also set standards for sulfates, hydrogen sulfide, and visibility.

The pollutants of greatest concern in the San Joaquin Valley are CO, O3, O3 precursors such as volatile organic compounds (VOC), reactive organic gases (ROG) and nitrogen oxides (NOx), as well as PM10, and PM2.5. The SJVAB has reached Federal and State attainment status for CO, NO2, and SO2. Federal attainment status has been reached for PM10 but is in non-attainment for O3 and PM2.5. State attainment status has also been reached for lead but is in non-attainment for both PM10, and PM2.5 (SJVAPCD 2010).

3.6.2 Environmental Consequences

No Action

There would be no impact to air quality as conditions would remain the same as existing conditions.

Proposed Action

Operation of Wells 15 and 18 would be temporarily operated by diesel engines. It is anticipated that these two well motors will be converted to electric power prior to the start of the 2017 water year. Operation of the diesel engines would contribute to the criteria pollutant emissions in the study area. Since these wells would only be operated on a short-term basis and would only operate in accordance with the permits acquired by the private landowner air pollutant emissions are estimated to be well below the established SJVAPCD's *de minimis* thresholds; therefore, the Proposed Action would not result in an adverse impact upon air quality.

Cumulative Impacts

Operation of Wells 15 and 18 may cumulatively impact air quality if they were to operate continuously during 5-year duration of the Proposed action; however, it is unlikely that this would occur as the wells should be converted to electric. In addition, each well would be required to meet State and local air quality emission standards.

Well operation and maintenance emissions for the Proposed Action are well below the *de minimis* thresholds established by the SJVAPCD and are expected to be temporary in duration. As a result, the Proposed Action is not expected to contribute to cumulative adverse impacts to air quality.

Consultation and Coordination

4.1 Public Review Period

Reclamation intends to sign a Finding of No Significant Impact for this Proposed Action, and will make the EA available for a three week period beginning in December, 2015. All comments will be addressed in the FONSI. Additional analysis will be prepared if substantive comments identify impacts that were not previously analyzed or considered.

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Appendix A

Water Quality Monitoring Plan

Appendix B
Groundwater Level and Subsidence Monitoring Plan

Appendix C
Indian Trust Assets Determination