RECLAMATION

Managing Water in the West

Environmental Assessment

Refuge Level 2 Water Exchange with San Luis Water District

U.S. Department of the Interior
Bureau of Reclamation
Mid Pacific Region
Sacramento, CA

October 2015

Mission Statements

The mission of the Department of the Interior is to protect and manage the Nation's natural resources and cultural heritage; provide scientific and other information about those resources; and honor its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated 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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List of Acronyms and Abbreviations

AF	Acre-feet
B	Boron
CFR	Code of Federal Regulations
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
Delta	Sacramento-San Joaquin Delta
District	San Luis Water District
EA	Environmental Assessment
EBCU	East Bear Creek Unit of the San Luis National Wildlife Refuge
FONSI	Finding of No Significant Impact
IL4	Incremental Level 4 refuge water supply
ITA	Indian Trust Assets
L2	Level 2 refuge water supply
L4	Level 4 refuge water supply
mg/L	Milligrams per liter
NEPA	National Environmental Policy Act
NWR	National Wildlife Refuge
Reclamation	Bureau of Reclamation
Report	Reclamation's *Report on Refuge Water Supply Investigations* (1989)
Se	Selenium
Secretary	Secretary of the U.S. Department of Interior
SHPO	State Historic Preservation Officer
SOD	South of Delta
TDS	Total Dissolved Solids
ug/L	Micrograms per liter
USFWS	U.S. Fish and Wildlife Service

1 Introduction

This Environmental Assessment (EA) has been prepared by the Bureau of Reclamation (Reclamation) to evaluate and disclose any potential environmental impacts associated with Reclamation's exchange of up to 6,048 acre-feet (AF) of groundwater for up to 3,024 AF of Level 2 (L2) water with the San Luis Water District (District). This water exchange is authorized under the Central Valley Project Improvement Act (CVPIA), specifically Sections 3406(d)(2) and 3406(b)(3).

A *Report on Refuge Water Supply Investigations* (Report) describes water needs and delivery requirements for 19 CVPIA designated National Wildlife Refuges (NWR), State Wildlife Management Areas, and the Grassland Resource Conservation District, collectively referred to as "Refuges" (Reclamation 1989). In this Report, the Refuges' average annual historical water supplies were termed Level 2 (L2), and the water supplies needed for optimum habitat management were termed Level 4 (L4). CVPIA (Section 3406[d][1]) requires the Secretary of the Interior (Secretary) to deliver full L2 water to the Refuges in California's Central Valley. Furthermore, CVPIA (Section 3406[d][2]) directs the Secretary to provide supplemental water supplies to meet the Refuges' full L4 demands through the acquisition of water from willing providers. Such supplemental water is commonly referred to as "Incremental Level 4" (IL4). Additionally, CVPIA (Section 3406[d][1]) directs the Secretary to endeavor diversifying the Refuges' water supply sources.

This EA focuses on the potential impacts of exchanging up to 6,048 AF of groundwater developed by the District (in cooperation with Modesto Properties) and delivered to the East Bear Creek Unit of the San Luis National Wildlife Refuge (EBCU) for up to 3,024 AF of L2 water made available to the District and up to 3,024 AF delivered to South of Delta (SOD) Refuges. The L2 water allocated for EBCU stored in San Luis Reservoir will be exchanged and up to 3,024 AF of this water will be provided to the District and up to 3,024 AF will be made available to SOD Refuges. The entire amount of pumped groundwater originates from and is delivered within the Merced Groundwater Subbasin. The exchange would provide a portion of the EBCU's L2 need and provide approximately 3,024 AF of IL4 water for other San Joaquin Valley Refuges. This proposed exchange (Proposed Action) would occur between October 2015 and May 31, 2016. The EBCU is located in the San Joaquin Valley, south of Bear Creek and east of the San Joaquin River, as shown in Figure 1.

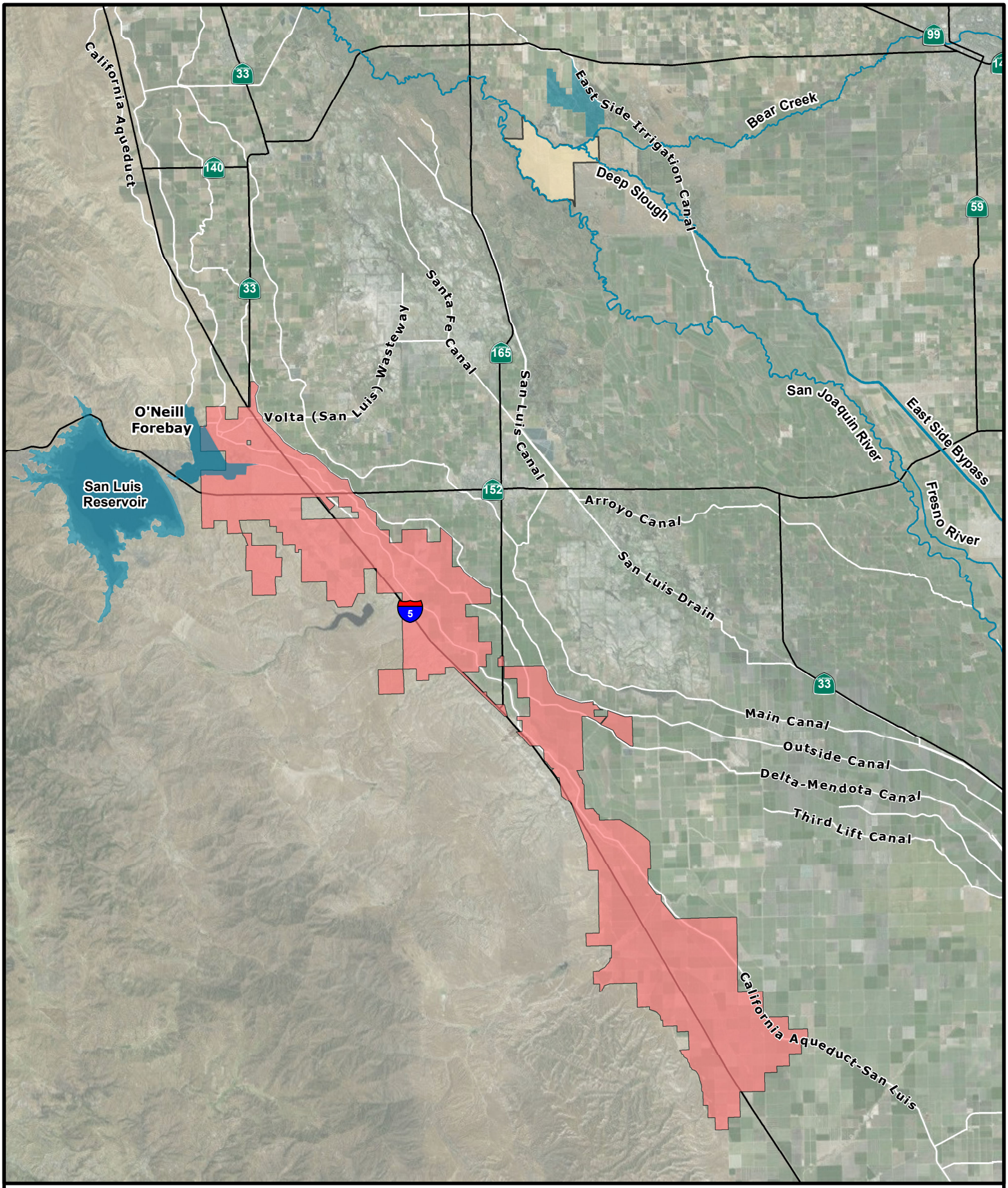

FIGURE 1
Overview Map
Refuge Level 2 Exchange with San Luis Water District

San Luis Water District
Modesto Properties
East Bear Creek Unit

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0 1.25 2.5 5 Miles

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1.1 Need for the Proposal

The Secretary, through Reclamation, is responsible for providing full L2 and IL4 water to the Refuges, including the EBCU. L2 water supplies are primarily provided from CVP supplies while IL4 supplies are acquired from willing providers. The Proposed Action is needed to provide L2 water supplies to EBCU wetlands in support of migratory waterfowl habitat during this period of extreme water shortage SOD, which may otherwise remain dry for a second year. The Proposed Action is the most efficient way to get water to the EBCU due to potential water losses via other methods of delivery.

1.2 Resources Analyzed in Detail

This EA analyzes the affected environment of the Proposed Action and No Action Alternative in order to determine the potential impacts and cumulative effects to the following environmental resources:

- Surface Water Resources
- Groundwater Resources
- Biological Resources

Impacts to the following resources were considered and found to be minor or absent. Brief explanations for their elimination from further considerations are provided below:

- Indian Sacred Sites: The Proposed Action will neither affect nor prohibit access to and ceremonial use of Indian sacred sites.

- Indian Trust Assets: There are no Indian reservations, Rancherias, or allotments in the Project area. The Proposed Action does not have the potential to affect Indian Trust Assets.

- Environmental Justice: The Proposed Action would not have disproportionately negative impacts on low-income or minority individuals or populations.

- Cultural Resources: The Proposed Action involves the acquisition of water from existing facilities with no ground disturbance, modifications to facilities, or other potential impacts to cultural resources. Pursuant to the regulations at 36 CFR Part 800.3(a)(1), the Proposed Action has no potential to cause effects on historic properties and will result in no impacts to cultural resources. As such, Reclamation has no further obligations under Section 106 of the National Historic Preservation Act.

2 Proposed Action & Alternatives

2.1 No Action Alternative

The No Action Alternative would consist of Reclamation not approving the exchange of L2 water supplies with the District. The proposed 6,048 AF of groundwater to be pumped as part of the Proposed Action would not be delivered to the EBCU this year, likely leaving the refuge dry for a second year. No Action would exacerbate the already significantly reduced habitat for waterfowl SOD. The District would not receive L2 water supplies (equivalent to 50% of the up to 6,048 AF delivered to the EBCU) delivered by Reclamation to help meet the District's water needs. The No Action alternative would reduce the overall refuge supplies (L2 and IL4) by up to 9,072 AF.

2.2 Proposed Action

The District proposes to fund the costs associated with pumping groundwater supplies from existing private wells located within the Modesto Properties (up to 6,048 AF) in exchange for Refuge L2 water supply (up to 3,024 AF). The pumped groundwater would be discharged directly into Bear Creek and delivered to the EBCU to meet a component of its L2 water demand. The District in cooperation with Modesto Properties will oversee and coordinate the delivery of groundwater supplies to the EBCU. Operationally, once the Modesto Properties wetlands are at capacity, the groundwater wells would continue delivering water into Bear Creek via two existing structures, as shown on Figure 2. The water would then travel down Bear Creek less than one mile to the EBCU's pump station, prior to the confluence of the San Joaquin River where it would be lifted onto the EBCU. The rate of discharge to Bear Creek would be controlled at the two existing discharge structures that have historically been used to draw down the Modesto Properties wetlands and to allow flood waters to pass through the property.

Once the EBCU schedules delivery of its L2 water supply in the fall of 2015, it is proposed that the District fund the cost to develop and deliver up to 6,048 AF of groundwater in exchange for up to 3,024 AF of L2 water during the EBCU L2 delivery period in water years 2015/16. For every 2 AF of groundwater made available to the EBCU, the District will receive 1 AF of L2 water. The L2 exchange water will be made available to the District each month following the delivery of groundwater to the EBCU. This 2:1 exchange will provide water for EBCU and result in a refuge water supply benefit of up to 6,048 AF of L2 water at no cost to Reclamation and up to 3,024 AF of new water supply for the District. The remaining 50% not delivered to the District would be made available to other SOD Refuges. The EBCU will pump 5% less than provided by the District to account for conveyance losses.

The District will enter into an agreement with Reclamation for the exchange of water. The District, in cooperation with Modesto Properties, will be responsible for all water quality monitoring associated with the development of these groundwater supplies and insure that all water quality monitoring criteria and standards identified in the Monitoring and Mitigation Plan (Appendix A) are met. The EBCU will provide monthly volumetric totals to the District and Reclamation.

The EBCU is planning to start taking delivery of its L2 water in the fall of 2015 and plans to receive water deliveries through May 31, 2016. When the exchange agreement with Reclamation is executed and the EBCU starts taking delivery of the groundwater, the exchange can be initiated. It is anticipated the wells will be operated for exchange purposes through the end of May 2016.

The District would be responsible for well operations and maintenance and for coordinating the delivery of groundwater into Bear Creek at times when the EBCU requests such water. Reclamation and the EBCU would have access to the wells in order to independently test water quality and monitor flow. If water quality monitoring results do not meet the criteria set forth in the Monitoring and Mitigation Plan, the District would notify Reclamation and the exchange would cease until water quality criteria can be met.

Well Locations

The location of the Modesto Properties wells and the upstream and downstream monitoring locations are shown below in Table 1 and in Figure 2.

Table 1 Well and Monitoring Locations

Well No.	GPS Coordinates
5P	37°16’54.17”N 120°46’43.53”W
18	37°17’42.90”N 120°46’33.83”W
20	37°16’05.69”N 120°45’37.76”W
21	37°15’59.68”N 120°45’21.59”W
24	37°16’57.24”N 120°46’36.36”W
Conveyance Monitoring Locations	
Upstream Monitoring	37°15’45.81”N 120°45’39.25”W
Discharge No. 1	37°15’46.51”N 120°45’41.70”W
Discharge No. 2	37°15’33.00”N 120°45’52.96”W
Downstream Monitoring	37°15’32.16”N 120°45’50.72”W

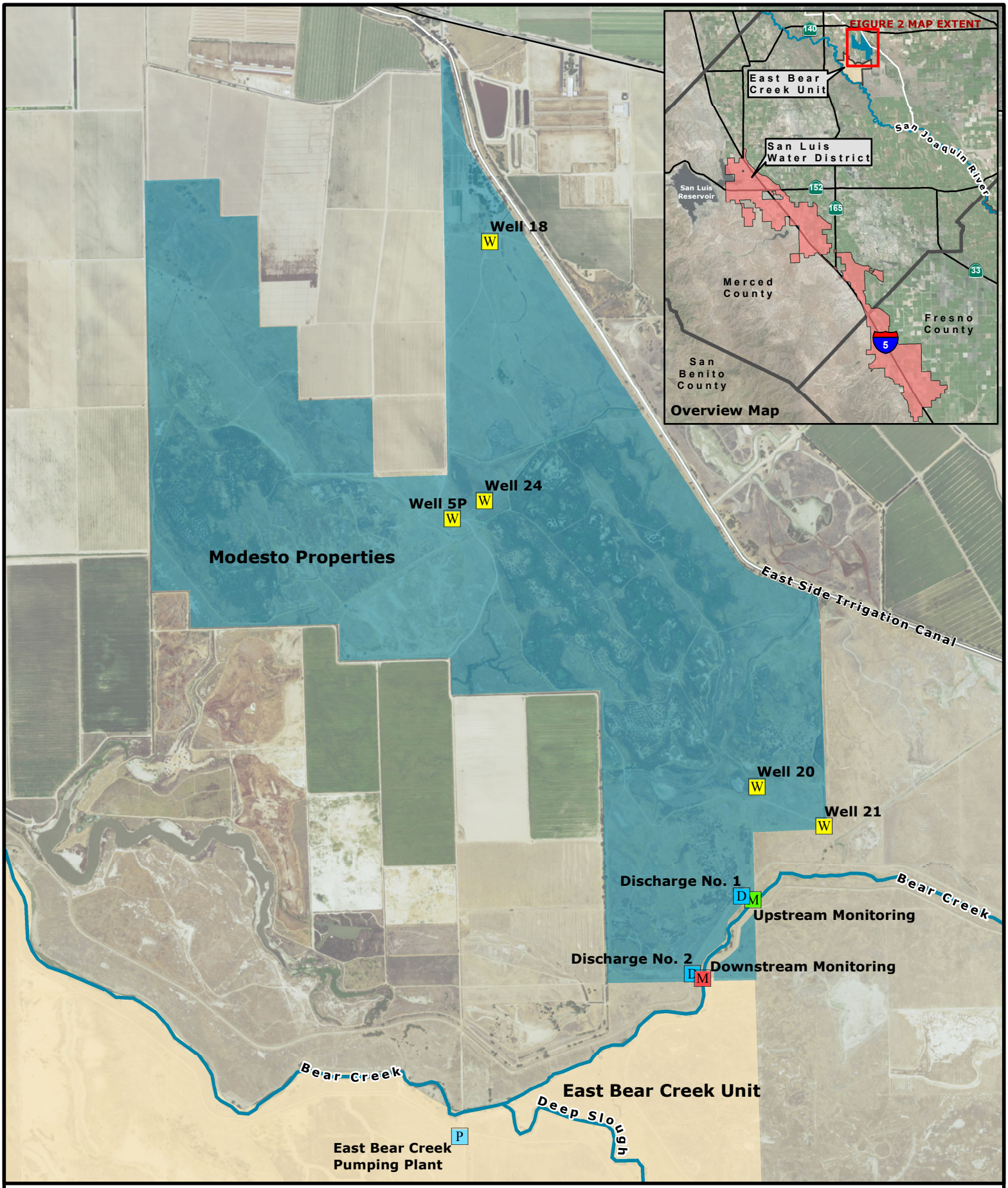

FIGURE 2
Well, Monitoring and Discharge Location Map
Refuge Level 2 Exchange with San Luis Water District

P Pumping Plant
M Downstream Monitoring
W Well
M Upstream Monitoring
D Discharge

0 0.25 0.5 1 Miles

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2.4 Monitoring

Project monitoring would include metering of the flows received from each of the wells. Flows would be metered at each wellhead and at the discharge points into Bear Creek.

To minimize any potential for surface water quality degradation associated with the utilization of groundwater in Bear Creek to supplement L2 water supply, water quality monitoring would consist of both surface and groundwater quality monitoring. Surface water quality monitoring would consist of instantaneous sampling. Monitoring will include sampling from upstream locations to determine the base flow constituent concentrations, a downstream location, and at each wellhead. If threshold surface water quality objectives are exceeded at any time, corrective actions would be implemented within 24 hours, reducing or ceasing well pumping operations until water quality objectives can be met.

In an effort to minimize any potential significant impact on groundwater aquifers associated with the development of groundwater as part of this Proposed Action, groundwater levels will be measured prior to beginning pumping operations for the Proposed Action using an electronic water level meter referenced to a GPS coordinate and elevation at each wellhead. Subsequently, well drawdown related to the operation of each well will be measured in the middle of the proposed pumping period, and at the end of the pumping period prior to well shutdown. Groundwater recovery will be measured approximately 24 hours after pump shutoff. Groundwater level data will be recorded and provided to Reclamation for review. If the mid-pumping period groundwater level data indicates a significant decline in groundwater levels in the vicinity of the proposed wells, and if any such decline is not directly attributable to a cause other than the operation of the proposed wells during the Proposed Action pumping period, the District will modify or terminate pumping for project purposes to avoid any significant adverse groundwater impacts. The District will take all measures necessary to avoid third party well impacts.

The Proposed Action wells are 180 to 440 feet deep and pump groundwater predominately from above the Corcoran Clay, which has not been associated with land subsidence. Significant land subsidence has not been documented within the Modesto Properties area.

More detailed monitoring information is located in the Project Monitoring and Mitigation Plan (Appendix A).

3 Affected Environment & Environmental Consequences

The District is located on the west side of San Joaquin, Merced and Fresno counties and the EBCU is located in western Merced County (Figure 1). The wells are all located in Merced County, within the boundaries of Modesto Properties. The counties are bounded by the Sierra Nevada Mountains to the east and the Pacific coastal range to the west. The project 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 EBCU includes a section of Bear Creek and contains natural grasslands, vernal pools, riparian floodplain habitat, irrigated pasture and small-grain production lands. The EBCU is managed primarily for migratory waterfowl, shorebirds, marsh and water birds and their associated habitat types, as well as for listed species.

Modesto Properties consists of about 1,860 acres that are primarily managed seasonal wetlands. A portion of the southern property line of Modesto Properties is contiguous to the EBCU with the majority of the property lying on the north side of Bear Creek. Modesto Properties utilizes groundwater to manage their seasonal wetlands and the owners have indicated that the well field that serves their property has the capacity to provide water to the EBCU in addition to meeting the seasonal needs of their property.

3.1 Surface Water Resources

3.1.1 Affected Environment

The EBCU is located east of the San Joaquin River, in Merced County. It includes a section of Bear Creek and contains native uplands, seasonal wetlands, vernal pools, and riparian floodplain habitat. It provides critically important habitat for both resident species and the migratory waterfowl that utilize the Pacific Flyway, and requires substantial water supplies.

Historically, the water supplies delivered to the EBCU have been obtained by diverting water from Bear Creek via its riparian water rights or water annually acquired by Reclamation's Refuge Water Supply Program from willing sellers. The average annual supply purchased for the Refuge has been approximately 4,017 AF, substantially less than the optimal amount. As a result, the EBCU remains underdeveloped for optimum wetland management in support of migratory birds.

The 4-S/SHS Ranches and Del Puerto Water District Water Supply Project (4-S Project) is in the second year of a two-year pilot project that is discharging groundwater into Bear Creek for delivery to Del Puerto Water District. The water from the 4-S Project is discharged into Bear Creek upstream of the two Modesto Properties Bear Creek discharge locations and also into the Eastside Bypass channel that converges with Bear Creek downstream of the Modesto Properties discharge locations. The EBCU pump station is located on Bear Creek approximately 0.2 miles downstream of the confluence of the Eastside Bypass with Bear Creek. The 4-S Project is scheduled to operate during the same time period that the Proposed Action proposes to operate. Therefore, during the Proposed Action, the water in Bear Creek at the EBCU pump station will be a blend of the waters from the two projects, as well as other sources of water that may be present in Bear Creek. There are also other sources of water of varying volumes and quality that enter Bear Creek that cannot be accounted for.

3.1.2 Environmental Consequences

No Action
Under the No Action Alternative, Reclamation would not approve the exchange of L2 surface water for groundwater. Groundwater would not be delivered via Bear Creek to the ECBU to help meet 2015-2016 refuge water needs. The EBCU would not receive any water remaining dry unless storm events provide access to riparian water, and the risk of avian disease outbreaks would remain extremely high. Also, the District would not receive up to 3,024 AF of water for agricultural use, which is needed to help offset the District's zero allocation of CVP water.

Proposed Action
The Proposed Action would result in no substantial change or impact to CVP operations, or to Delta pumping by the CVP. The acquired water would be delivered to the EBCU via Bear Creek. Implementation of the Monitoring and Mitigation Plan (Appendix A) would ensure that conveyance of water under this Proposed Action would not adversely impact existing water supplies or water quality. The Proposed Action would not adversely impact water conveyance facilities or activities within the EBCU. Instead, the additional deliveries through the Proposed Action would have the beneficial effect of helping to meet L2 refuge needs during a period when there are severe physical constraints on providing the L2 supplies, as well as to provide a supplemental supply for agricultural use in the District during a year of zero CVP water allocation.

Cumulative Impacts
No significant 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.

3.2 Groundwater Resources, Geologic Resources, & Water Quality

3.2.1 Affected Environment

The wells are located in the Merced Subbasin of the San Joaquin Valley Groundwater Basin. There are three ground water bodies in the area: an unconfined water body, a confined water body, and the water body in consolidated rocks. The unconfined water body occurs in the unconsolidated deposits above and east of the Corcoran Clay, which underlies the western half of the subbasin at depths ranging between about 50 and 200 feet (DWR 1981), except in the western and southern parts of the area where clay lenses occur and semi-confined conditions exist. The confined water body occurs in the unconsolidated deposits below the Corcoran Clay and extends downward to the base of fresh water. The water body in consolidated rocks occurs under both unconfined and confined conditions. The estimated average specific yield of this subbasin is 9.0 percent (based on DWR, San Joaquin District internal data and that of Davis 1959).

Groundwater flow is primarily to the southwest, following the regional dip of basement rock and sedimentary units. DWR (2000) data show two groundwater depressions south and southeast of the city of Merced during 1999. (DWR Bulletin 118)

Changes in groundwater levels are based on annual water level measurements by DWR and cooperators. Water level changes were evaluated by quarter township and computed through a custom DWR computer program using geostatistics (kriging). On average, the subbasin water level has declined nearly 30 feet from 1970 through 2000. The period from 1970 through 1978 showed steep declines totaling about 15 feet. The ten-year period from 1978 to 1988 saw stabilization and a rebound of about 10 feet. 1988 through 1995 again showed steep declines, bottoming out in 1996 with water levels rising from 1996 to 2000. Water level declines have been more severe in the eastern portion of the subbasin. (DWR Bulletin 118)

The groundwater in this subbasin is characterized by calcium-magnesium bicarbonate at the basin interior, sodium bicarbonate to the west, and calcium-sodium bicarbonate to the south. Small areas of sodium chloride and calcium-sodium chloride waters exist at the southwest corner of the basin (Page 1973). TDS values range from 100 to 3,600 mg/L, with a typical range of 200 to 400 mg/L. The Department of Health Services, which monitors Title 22 water quality standards, reports TDS values in 46 wells ranging from 150 to 424 mg/L, with an average value of 231 mg/L. For 10 wells, EC values range from 260 to 410 μmhos/cm, with an average value of 291 μmhos/cm. (DWR Bulletin 118)

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).

Groundwater quality in the project area is typically characterized by TDS, selenium (Se), and boron. The water quality of the receiving waterway is also a relevant factor. Under the Proposed Action's Monitoring and Mitigation Plan (Appendix A), groundwater entering Bear Creek shall not increase TDS by more than 200 milligrams per Liter (mg/L) upstream to downstream of the groundwater discharge points in Bear Creek, Se concentrations shall not exceed 2 ug/L downstream of the discharge points in Bear Creek and Boron shall not exceed 4.0 mg/L downstream of the discharge points in Bear Creek.

3.2.2 Environmental Consequences

No Action
Under the No Action Alternative, Reclamation would not approve the exchange of L2 surface water to the ECBU for groundwater. Groundwater would not be delivered via Bear Creek to the ECBU to help meet 2015-2016 refuge water needs. EBCU would not likely receive any water remaining dry unless storm events provide access to riparian water, and the risk of avian disease outbreaks would remain extremely high. Also, the District would not receive up to 3,024 AF of water for agricultural use, which is needed to help offset the District's zero allocation of CVP water and SOD Refuges would not receive up to 3,024 AF of IL4 water.

Proposed Action
Groundwater would be produced from existing electrically powered wells. Groundwater would be pumped in an amount up to 6,048 AF beginning in fall 2015 through the end of May 2016. When compared to Modesto Properties' 2014 groundwater pumping, and taking into consideration the approximately 632 AF of water conserved from proposed wetland idling, Modesto Properties would pump an additional amount of approximately 3,000 AF. The actual amount of groundwater pumped would be dependent on the productivity of the wells and other factors, such as water quality and groundwater drawdown. All groundwater produced by the production wells would be discharged into Bear Creek and mixed with other waters in the creek. All groundwater produced during the project would be used for refuge management purposes within the EBCU. Pumping would only occur if monitoring data indicates that water quality are suitable for refuge use and water quality standards provided in the Monitoring and Mitigation Plan are being met.

The District, in cooperation with Modesto Properties, will monitor groundwater depths at the wells. They will measure groundwater depths 24 hours prior to pumping, and then measure again at approximately the midpoint of the pumping period and at the end of the pumping period. They will then take another measure of groundwater depth approximately 24 hours after the pumping period ends to evaluate the recovery time of the groundwater.
The District and Modesto Properties will closely monitor water quality at the wells

during the Proposed Action. The three major water quality constituents of concern are salinity (measured in TDS), boron, and selenium. If the water quality data indicates that the use of a well(s) may adversely impact water quality, the mitigation measures described below (and incorporated into the Proposed Action, as well as the Monitoring and Mitigation Plan) will be implemented. If groundwater is found to contain constituent concentrations above the Central Valley Regional Water Quality Control Board's (CVRWQCB) surface water thresholds, the well production rate will be reduced or curtailed for purposes of the Proposed Action until flow conditions improve and water quality objectives can be achieved. The mitigation measures below will ensure that the groundwater supply developed during this Proposed Action will not significantly adversely impact surface water quality. If the monitoring indicates that threshold values are exceeded, mitigation measures will be implemented within 24 hours of identifying an exceedance.

Two of the five wells pump from the aquifer above and below the Corcoran Clay (Wells 5 and 21), however, these two wells will be used mainly as secondary supply to maintain 10 cfs during flood up of the Modesto Properties wetlands and to get water to the EBCU's pumping plant for purposes of the Proposed Action. If the other three wells (Wells 18, 20 and 24) are able to achieve 10 cfs, then Wells 5 and 21 would not be utilized. Pumping groundwater from below the Corcoran Clay will only be temporary and may not occur at all. In addition, the Proposed Action is only occurring for approximately 8 months and for a total of up to 6,048 AF.

Water Quality Mitigation Measures
The District, in cooperation with Modesto Properties, will modify or cease operations under this Proposed Action until flow conditions improve if any of the following downstream water quality thresholds are exceeded:

- Maximum of 2.0 µg/L for selenium downstream of discharge points in Bear Creek
- Maximum increase of 200 mg/L TDS upstream to downstream of discharge points in Bear Creek
- Maximum of 4.0 mg/L for boron downstream of discharge points in Bear Creek

In the event that the water from any of the wells increase TDS levels in Bear Creek downstream from the discharge points by more than 200 mg/L, the well(s) production rate will be reduced or operation curtailed for Proposed Action purposes until flow conditions improve and downstream water quality objectives can be achieved.

Monitoring of downstream locations will determine the combined flow and chemistry of the blended water. The sites shall be adequate distance from the well discharges to assure proper blending for grab sample collection. All water quality data will be kept at the District's office. As soon as practical (generally within 7 days of the District's receipt of information from the water quality testing laboratory), the District will ensure that Reclamation receives electronic copies of the complete data reports submitted by the laboratory. The District in cooperation with Modesto Properties will also provide a monthly water quality summary report, including volumetric data on wellhead production, within 60 days of sample collection.

Although the Modesto Properties has reported there is no known subsidence on or under Modesto Properties, the project location is within an area that has shown increased rates of subsidence in recent years. As such, Reclamation will be monitoring locations close to this project's location as part of a biannual subsidence monitoring program. Monitoring over the period of the Proposed Action would assess whether any subsidence that may occur on or in the areas surrounding the Modesto Properties can be attributed to the Proposed Action or outside influences.

Due to the short duration of the Proposed Action and the limited amount of proposed groundwater pumping, the Proposed Action is not expected to have adverse impacts to groundwater resources or subsidence trends.

Cumulative Effects

When added to past, present, and future foreseeable action, the Proposed Action could contribute to a minor increase in groundwater production (approximately 3,000 AF) in the general vicinity during the project pumping period. A total of approximately 9,000 AF of groundwater pumping would occur at the Modesto Properties' wells during the Proposed Action period. Private wells in and near the project area would continue to utilize groundwater during the proposed action, however, local groundwater use would be low since the period of the Proposed Action is during the non-irrigation season. Pumping is not expected to significantly 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.

Water quality analyses were conducted on samples taken from the project wells. A summary of the analysis reports is shown in Table 2. Under the Proposed Action, impacts to water quality would be insignificant and scheduled monitoring would occur along with any follow-on actions under the Project Monitoring and Mitigation Plan. Therefore, the Proposed Action would not significantly contribute to cumulative impacts to water quality.

Table 2 Modesto Properties Well Production and Water Quality[1]

	Well Production								
Well No	**gpm**	**cfs**	**AF/ 30 days**	**Se (µg/L)**	**B (mg/L)**	**EC (µmhos/ cm)**	**Estimated Blended EC[2] (µmhos/ cm)**	**TDS (mg/ L)**	**Estimated Blended TDS[2] (mg/L)**
5P	900	2.01	119	ND	0.11	1,090		736	
18	2,300	5.12	305	<0.4	0.12	1,090		875	
20	1,788[1]	3.98	237	<0.4	0.094	775		616	
21	1,700	3.79	225	ND	0.098	684		487	
24	750	1.67	99	<0.4	0.076	765		576	
Total	7,438	16.57	986				889		677

[1] Sample Date: 8/20/2015
[2] Flow-weighted average

Although the Modesto Properties has reported there is no known subsidence on or under Modesto Properties, the Modesto Properties are within an area that has shown increased rates of subsidence in recent years. In addition, environmental commitments, including a monitoring plan for groundwater levels, water quality, and subsidence have been incorporated into the Proposed Action to minimize potential impacts. As such, the Proposed Action would not contribute cumulatively to adverse impacts to groundwater levels or subsidence trends.

3.3 Biological Resources

3.3.1 Affected Environment

The exchange for groundwater supplies under the Proposed Action would result in the EBCU temporarily receiving more water than the average supply utilized from intermittent Bear Creek flows that would likely occur under the No Action Alternative, thus providing benefits to the EBCU and the species that rely on it, particularly in dry years. The Proposed Action would not involve the conversion of any agricultural land. There would be no change in land use patterns of cultivated or fallowed fields that do have some value to listed species or to birds protected by the Migratory Bird Treaty Act (MBTA). Groundwater that would be moved into the Bear Creek would use existing facilities and would be limited by its quality. Maintaining high water quality as a condition of the project assures there would be no direct or indirect impacts to listed species or their critical habitat.

The EBCU, as part of the San Luis NWR, is a major wintering ground and migratory stopover point for large concentrations of waterfowl, shorebirds and other water birds. Large flocks of northern shoveler, mallard, gadwall, wigeon, green-winged teal, cinnamon teal, northern pintail, ring-billed duck, canvasback, ruddy duck, and snow, Ross' and white-fronted geese utilize seasonal and permanent wetlands in the San Luis NWR, including the EBCU. Waterfowl generally remain until mid-April before beginning their journey north to breeding areas. Some mallard, gadwall, and cinnamon teal stay through the spring and summer and breed on the refuge. (USFWS website 2010)

Shorebirds, including sandpipers and plovers, can be found in the tens of thousands from autumn through spring. Large flocks of dunlin, long-billed dowitchers, least sandpipers and western sandpipers can be found feeding in shallow seasonal wetlands, whereas flocks of long-billed curlews are found using both wetlands and grasslands. Over 25 species of shorebirds have been documented at the San Luis NWR. (USFWS website 2010)

The EBCU supports a rich botanical community of native bunchgrasses, native and exotic annual grasses, forbs, and native shrubs. Trees, such as valley oak, cottonwood, and willow are found along riparian corridors. Coyotes, desert cottontail rabbits, ground squirrels, western meadowlarks, yellow-billed magpies, loggerhead shrikes, northern harriers, and white-tailed kites are found within these areas. (USFWS website 2010)

The following list of federally listed, proposed and candidate species potentially occurring in the EBCU area was obtained on June 9, 2015 by accessing the USFWS Database. The list also includes State listed, proposed and candidate species potentially occurring in the area obtained by accessing the California Department of Fish and Game California Natural Diversity Database/Rarefind (CNDDB/Rarefind) on June 9, 2015.

The species list below is for the area near the project wells in the vicinity of Los Banos. This area is included in the San Luis Ranch and Los Banos 7 ½ minute U.S. Geological Survey quadrangles. Not all of the species listed below are within the project area, but were included on the list provided by USFWS for the area.

Invertebrates

Branchinecta conservatio
Conservancy fairy shrimp (FE)
Critical habitat, Conservancy fairy shrimp (X)

Branchinecta longiantenna
Critical habitat, longhorn fairy shrimp (X)
Longhorn fairy shrimp (FE)

Branchinecta lynchi
Critical habitat, vernal pool fairy shrimp (X)
Vernal pool fairy shrimp (FT)

Desmocerus californicus dimorphus
Valley elderberry longhorn beetle (FT)
Lepidurus packardi
Critical Habitat, vernal pool tadpole shrimp (X)
Vernal pool tadpole shrimp (FE)

Fish

Hypomesus transpacificus
Delta smelt (FT) (ST)

Oncorhynchus mykiss
Central Valley steelhead (FT) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (FT)

Rana aurora draytonii
California red-legged frog (FT)

Reptiles

Gambelia (=Crotaphytus) *sila*
Blunt-nosed leopard lizard (FE) (SE)

Thamnophis gigas
Giant garter snake (FT) (ST)

Mammals
Dipodomys nitratoides exillis
Fresno kangaroo rat (FE)

Vulpes macrotis mutica
San Joaquin kit fox (FE) (ST)

Plants
Chamaesyce hooveri
Critical habitat, Hoover's spurge (X)
Hoover's spurge (FT)

FE: Listed as Endangered under the ESA.
FT: Listed as Threatened under the ESA.
X: Critical Habitat designated for this species
SE: Listed as Endangered under the CESA
ST: Listed as Threatened under the CESA

Of all the wildlife and all the listed species identified in the area, due to proximity to the well pumping and the nature of the proposed action, only a few species were identified to be assessed further in this EA. Affected environment information is provided below for these few species.

Aleutian Canada Goose, Bald Eagle, and Peregrine Falcon
The Aleutian Canada goose, Bald Eagle, Peregrine Falcon, and Yellow-Billed Cuckoo are occasional visitors to the EBCU. The Proposed Action would provide additional loafing, foraging, and roosting sites within the EBCU for Aleutian Canada Geese, Bald Eagles, and Peregrine Falcons.

Swainson's Hawk
Swainson's hawk 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. 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. Nest sites do occur along the San Joaquin River, which is not located in the Proposed Action area. 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 project area.

3.3.2 Environmental Consequences

No Action
Conditions would remain the same as existing conditions if no action were taken. There would be no new impacts to wildlife, including threatened and endangered species, their critical habitat, or general habitat types.

Proposed Action
The acquisition of water supplies under the Proposed Action would result in the EBCU temporarily receiving more water than they would have received under the No Action Alternative. The additional water supplies would be delivered late 2015 and early 2016. The water would allow for improved management of the wetland habitat areas to benefit migratory and breeding waterfowl and other water birds within the EBCU. The water would be used for:

- fall flooding of seasonal marshes to allow for increased wildlife use;
- maintenance of additional acreage of late summer water and maintenance of permanent ponds for breeding wildlife;
- an increase in the amount and quality of watergrass, an important waterfowl food item;
- an increase in the “flow through” of water levels to decrease the potential for disease outbreaks;

- maintenance of water depths to provide optimal foraging conditions for water birds; and

- control of undesirable vegetation.

These management changes would improve water quality and habitat value for migrating water birds, which could also improve diversity. Until long-term water supplies become available and are acquired by Reclamation, this water is considered temporary and the benefits short-term. Therefore, the Proposed Action would result in beneficial impacts on vegetation and wildlife resources.

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

4 Consultation and Coordination

Reclamation intends to sign a Finding of No Significant Impact for this Project, and will make the EA available for seven days beginning October 15, 2015. Any comments received 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

Monitoring and Mitigation Plan For San Luis Water District's Exchange of Groundwater from Modesto Properties for Refuge Level 2 Water

WATER QUALITY MONITORING

In an effort to minimize ambient surface water quality degradation associated with the San Luis Water District (District) exchange of groundwater for refuge water supplies, water quality monitoring will consist of both surface and groundwater quality monitoring. Additionally, this groundwater exchange will provide refuge Incremental Level 4 water supplies to South of Delta Refuges. The District, in collaboration with Modesto Properties, will be responsible for implementing this Monitoring and Mitigation Plan (Plan).

Surface water quality monitoring will consist of instantaneous sampling (grab samples). Monitoring will include sampling from upstream locations to determine the background constituent concentrations, a downstream location, and at each wellhead. Additionally flow meters at each of the outlets will characterize amount of water being released in cubic-feet per second and total flow in acre-feet. Data will be recorded and included in the District's monthly reports to the Bureau of Reclamation (Reclamation) in conjunction with monthly well head meter readings. Instantaneous water quality monitoring will be accomplished through grab sample analysis of the ambient surface water quality upstream and downstream of the discharge points as well as the groundwater quality at the wellhead. The upstream, downstream and wellhead water will be sampled and analyzed (EC, pH, and temperature) by Modesto Properties or their contractor on a weekly basis during the well operational period and recorded in a weekly log.

Grab samples will also be collected at the discharge point, upstream of the discharge, downstream of the discharge (where the input of the delivered well water is mixed with the receiving water), and at each wellhead on a monthly basis and analyzed for selenium, boron, and Total Dissolved Solids (TDS) concentrations by a Reclamation approved laboratory. The Reclamation-approved lab used to analyze selenium will provide a maximum reporting limit (RL) of 0.4 micrograms per liter (µg/L). Boron analysis requires a maximum RL of 0.01 mg/L and TDS a maximum RL of 10 milligrams per liter (mg/L). Physical measurements of EC, temperature and pH will be completed in the field using calibrated field instruments.

If the water quality data indicates that the use of a well(s) may adversely impact water quality, the mitigation measures described later in this Plan (and incorporated into the Proposed Action) will be implemented. If groundwater is found to contain constituent concentrations above the Central Valley Regional Water Quality Control Board's (CVRWQCB) surface water thresholds, the well production rate will be reduced and/or discharge rate onto Bear Creek curtailed for purposes of the Proposed Action until flow conditions improve and water quality objectives can be achieved. The mitigation measures below will ensure that the groundwater supply developed during this Proposed Action will not significantly adversely impact surface water quality. If the monitoring indicates that threshold values are exceeded, mitigation measures will be implemented within 24 hours of identifying an exceedance.

Water Quality Threshold and Reporting Limits – Laboratory Analysis

Analyte	**Water Quality Goal (Threshold Value)**	**Maximum RL**
Boron (mg/L)	Not to exceed 4 mg/L in conveyance	.01 mg/L
TDS (mg/L)	<200 mg/L increase over background	10 mg/L
Selenium (µg/L)	Not to exceed 2 µg/L in conveyance/not to exceed 5µg/L at the wellhead	0.4 µg/L

Water Quality Monitoring and Sampling Schedule

Location	Sample Frequency				
	EC, Temp, pH	FLOW	SELENIUM	BORON	TDS
Upstream	Weekly		Monthly	Monthly	Monthly
Wellhead	Weekly	Continuous	Monthly	Monthly	Monthly
Downstream	Weekly		Monthly	Monthly	Monthly
Discharge Point	Weekly	Continuous	Monthly	Monthly	Monthly

Water Quality Mitigation Measures

For the EBCU to accept water from any of the project wells triggering the exchange of water the following water quality characteristics must not be exceeded

- Maximum of 5.0 µg/L for selenium at each wellhead

The District, in cooperation with Modesto Properties, will modify or cease operations under this Proposed Action until flow conditions improve if any of the following downstream water quality thresholds are exceeded:

- Maximum increase of 200 mg/L TDS upstream to downstream of discharge points in Bear Creek

- Maximum of 2.0 µg/L for selenium downstream of discharge points in Bear Creek

- Maximum of 4.0 mg/L for boron downstream of discharge points in Bear Creek

In the event that the water from any of the discharge points from Modesto Properties increase TDS levels in Bear Creek downstream by more than 200 mg/L, the discharge rate will be reduced or operation curtailed for Proposed Action purposes until flow conditions improve and downstream water quality objectives can be achieved.

Modesto Properties has quantified flow conditions required to meet downstream water quality objectives for each of the wells based on individual wellhead water quality sampling data.

Each well and discharge point into Bear Creek, as it is operated for Proposed Action purposes, will be monitored for selenium, boron, TDS, EC and flow. Flow will be measured by a flow meter capable of recording instantaneous flow in cubic-feet per second and total flow in acre-feet.

The groundwater delivered to Bear Creek will be a blend of groundwater produced by all Project wells. This groundwater will blend with existing surface water flowing in Bear Creek. Monitoring of downstream locations will determine the combined flow and chemistry of the blended water. The sites shall be adequate distance from the well discharges to assure proper blending for grab sample collection. All water quality data will be kept at the District's Office. As soon as practical (generally within 7 days of the District's receipt of information from the water quality testing laboratory), the District will ensure that Reclamation receives electronic copies of the complete data reports submitted by the laboratory. The District, in cooperation with Modesto Properties, will also provide a monthly water quality summary report, including volumetric data on wellhead production, within 60 days of sample collection.

GROUNDWATER LEVEL MONITORING

In an effort to minimize any potential significant impact on groundwater aquifers associated with the development of groundwater as part of this Proposed Action, groundwater levels will be measured prior to pump operation for the Proposed Action using an electronic water level meter referenced to a GPS coordinate and elevation at each wellhead. Subsequently, well drawdown related to the operation of each well will be measured in the middle of the proposed pumping period, and at the end of the pumping period prior to well shutdown. Groundwater recovery will be measured approximately 24 hours after pump shutoff. Groundwater level data will be recorded and provided to Reclamation with 30 days of completion of Proposed Action. If the mid-pumping period groundwater level data indicates a significant decline in groundwater levels in the vicinity of the proposed wells, different from the levels of decline typically seen during operation of Modesto Properties' wells, and if any such decline is not directly attributable to a cause other than the operation of the proposed wells during the Proposed Action pumping period, the District, in cooperation with Modesto Properties, will modify or terminate pumping associated with this Proposed Action to avoid any significant adverse groundwater impacts. The District, in cooperation with Modesto Properties, will take all measures necessary to avoid third party well impacts.

LAND SUBSIDENCE MONITORING

Reclamation's San Joaquin River Restoration Program monitors land subsidence in the Merced subbasin. Three of the five groundwater wells utilized for the Proposed Action pump from the intermediate zone, above the Corcoran Clay. Two of the wells pump groundwater from both above and below the Corcoran Clay, thus the groundwater within these wells is a blend of the two sources. These two wells, however, will only be used as secondary supply to maintain a discharge rate of 10 cfs into Bear Creek in order to maintain water deliveries to the EBCU's pumping plant. Although land subsidence has been measured within the Merced subbasin, most of it has occurred south of Modesto Properties and has been associated with pumping from the lower zone, beneath the Corcoran Clay. Reclamation and the District will review results of land subsidence monitoring programs in the area and collaborate to the extent practical to mitigate problems associated with land subsidence attributable to the Proposed Action.