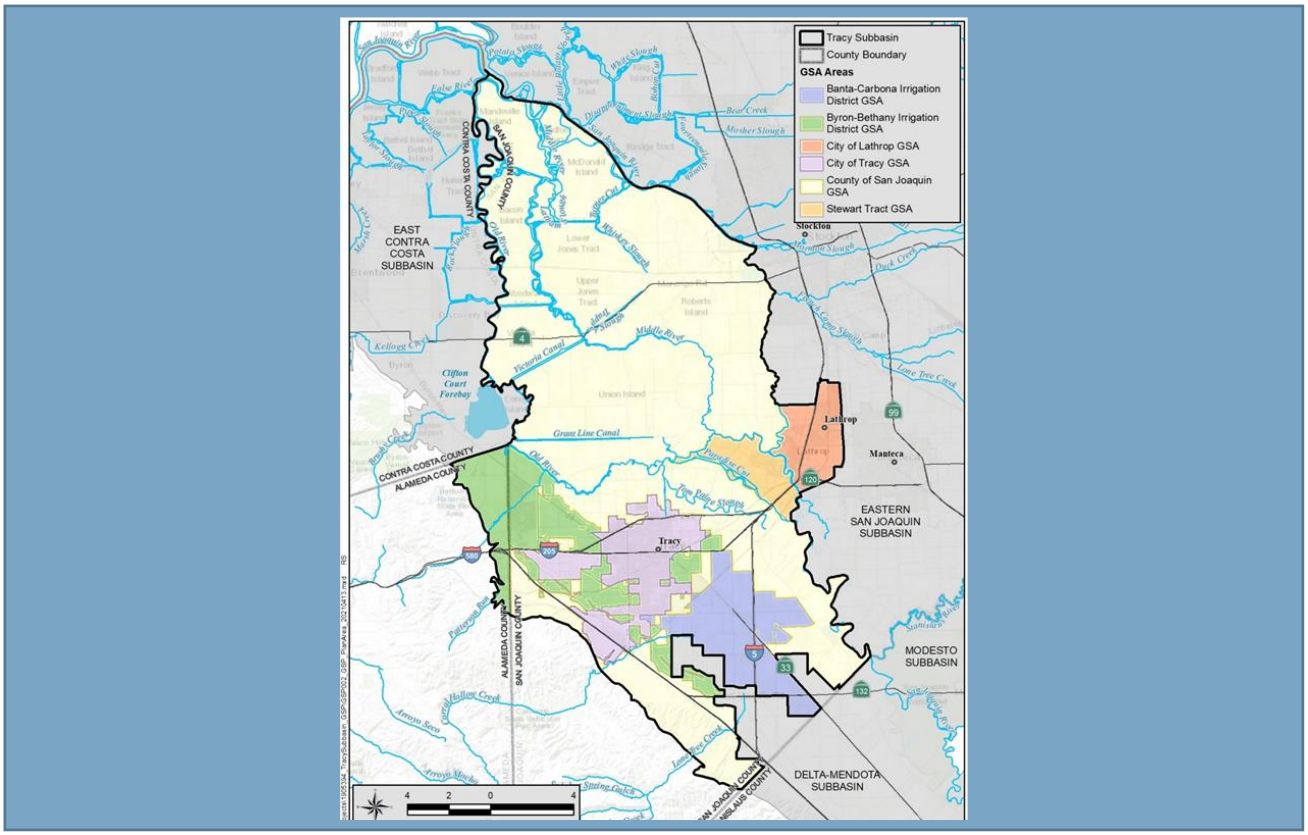
GEI Consultants

Consulting
Engineers and
Scientists

Water Year 2023

Annual Report for the Tracy Subbasin

March 2024



Prepared for the Tracy Subbasin GSAs:

- Byron-Bethany Irrigation District
- Banta-Carbona Irrigation District
- City of Lathrop
- City of Tracy
- San Joaquin County
- Stewart Tract

Water Year 2023

Annual Report for the Tracy Subbasin

Prepared for:

Tracy Subbasin GSAs

Prepared by:

GEI Consultants
11010 White Rock Road, Suite 200
Sacramento, CA 95670

March 2024

WATER YEAR 2023
ANNUAL REPORT FOR THE
GROUNDWATER SUSTAINABILITY PLAN FOR THE TRACY SUBBASIN

Certifications and Seals

This report and analysis were prepared by the following GEI Consultants Inc. professional geologists.

Pauline Espinoza Date: 3-19-2024

Pauline Espinoza
Staff Geologist
Geologist in Training
No. 1780

Richard W. Shatz Date: 3-19-2024

Richard W. Shatz
Principal Hydrogeologist
California Certified Hydrogeologist
C.H.G. No. 84

This page intentionally left blank.

Table of Contents

Figures

List of Tables

Appendices

Abbreviations and Acronyms

AF	acre-feet
AFY	acre-feet per year
amsl	above mean sea level
BBID	Byron-Bethany Irrigation District
BCID	Banta-Carbona Irrigation District
CVP	Central Valley Project
DWR	California State Department of Water Resources
GDE	Groundwater Dependent Ecosystem
GEI	GEI Consultants Inc.
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
InSAR	Interferometric Synthetic-Aperture Radar
msl	mean sea level
MTs	Minimum Thresholds
MOs	Measurable Objective
SJCEHD	San Joaquin County Environmental Health Department
SJRI	San Joaquin River Index
SGMA	Sustainable Groundwater Management Act
SSJID	South San Joaquin Irrigation District
SWP	State Water Project
Tsb	Tracy Subbasin
WY	Water Year

Executive Summary

This report summarizes Water Year (WY) 2023 (October 1, 2022 – September 30, 2023) conditions and groundwater management actions and projects in the Tracy Subbasin (Subbasin). The Tracy Subbasin Groundwater Sustainability Agencies (GSAs) submitted the adopted Groundwater Sustainability Plan (GSP) for review by the California Department of Water Resources (DWR) on January 27, 2022. DWR approved the GSP on January 18, 2024. This report represents the third required Annual Report under the Sustainable Groundwater Management Act (SGMA) of 2014.

The Subbasin encompasses an area of about 370 square miles in San Joaquin and Alameda counties. The Subbasin was divided into two management areas during preparation of the GSP, the Delta Management Area and the Non-Delta Management Area. The Delta Management Area consists of numerous islands within an area of about 190 square miles. Waterways surrounding each island provide a constant source of recharge to the groundwater system. The Delta Management Area is being managed by the Delta Protection Commission and therefore the GSP did not attempt to manage groundwater in this area. The Non-Delta Management Area is about 180 square miles and generally consists of the upland areas south of the delta and includes the cities of Lathrop, Tracy, and the community of Mountain House along with agricultural areas serviced by Byron-Bethany Irrigation District (BBID), Banta-Carbona Irrigation District (BCID), and Naglee Burk Irrigation District. Figure ES-1 shows the GSA areas. This report contains monitoring data and interpretations of only the Non-Delta Management Area, as shown on Figure ES-2.

Groundwater levels, groundwater extractions, surface water diversions, total water usage measurements, and change in groundwater storage estimates are presented in this report. The measurements and information presented demonstrate the groundwater in the Subbasin is sustainable, consistent with the GSP findings, and no undesirable results were present, even though one well exceeded its minimum threshold.

Water supplies to the Subbasin consisted of groundwater, surface water, and recycled water. The annual water use, quantified by acre-feet and estimates are shown in Table ES-1. Managed groundwater recharge was also evaluated as this replenishes pumped groundwater. The city of Tracy provided direct recharge to the aquifers with surface water through its aquifer storage and recovery Well #8. The city of Lathrop recharged recycled water into a percolation basin and within the Lathrop GSA area the Occidental Chemical Corporation is injecting treated groundwater into the Lower Aquifer. About 5,800 acre-feet (AF) of water was recharged in WY 2023. Groundwater recharge from applied surface water in BBID and BCID areas also likely provided groundwater recharge, but this could not be quantified. Precipitation also provided water in the Subbasin but also was not quantified.

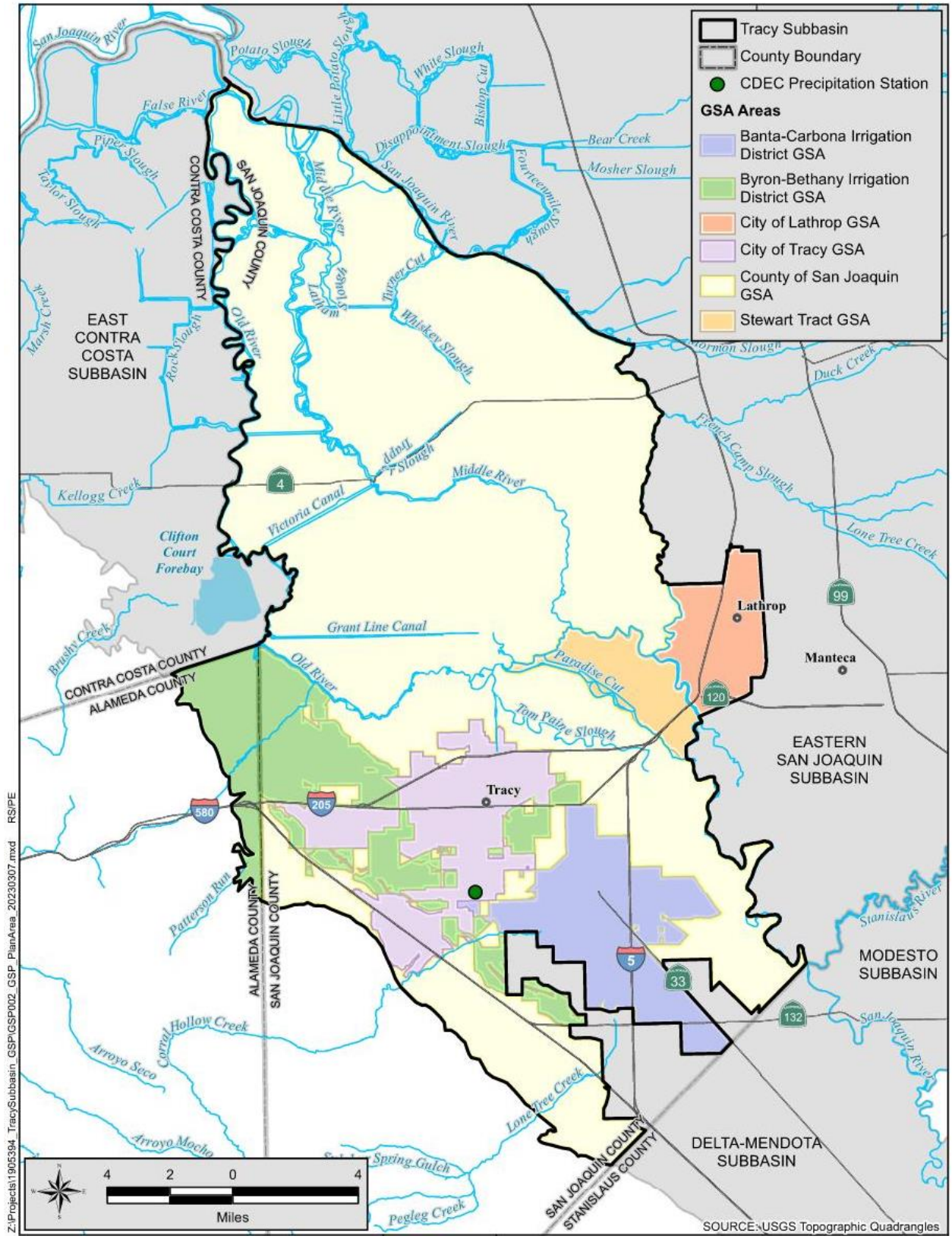


Figure ES-1-1. Tracy Subbasin

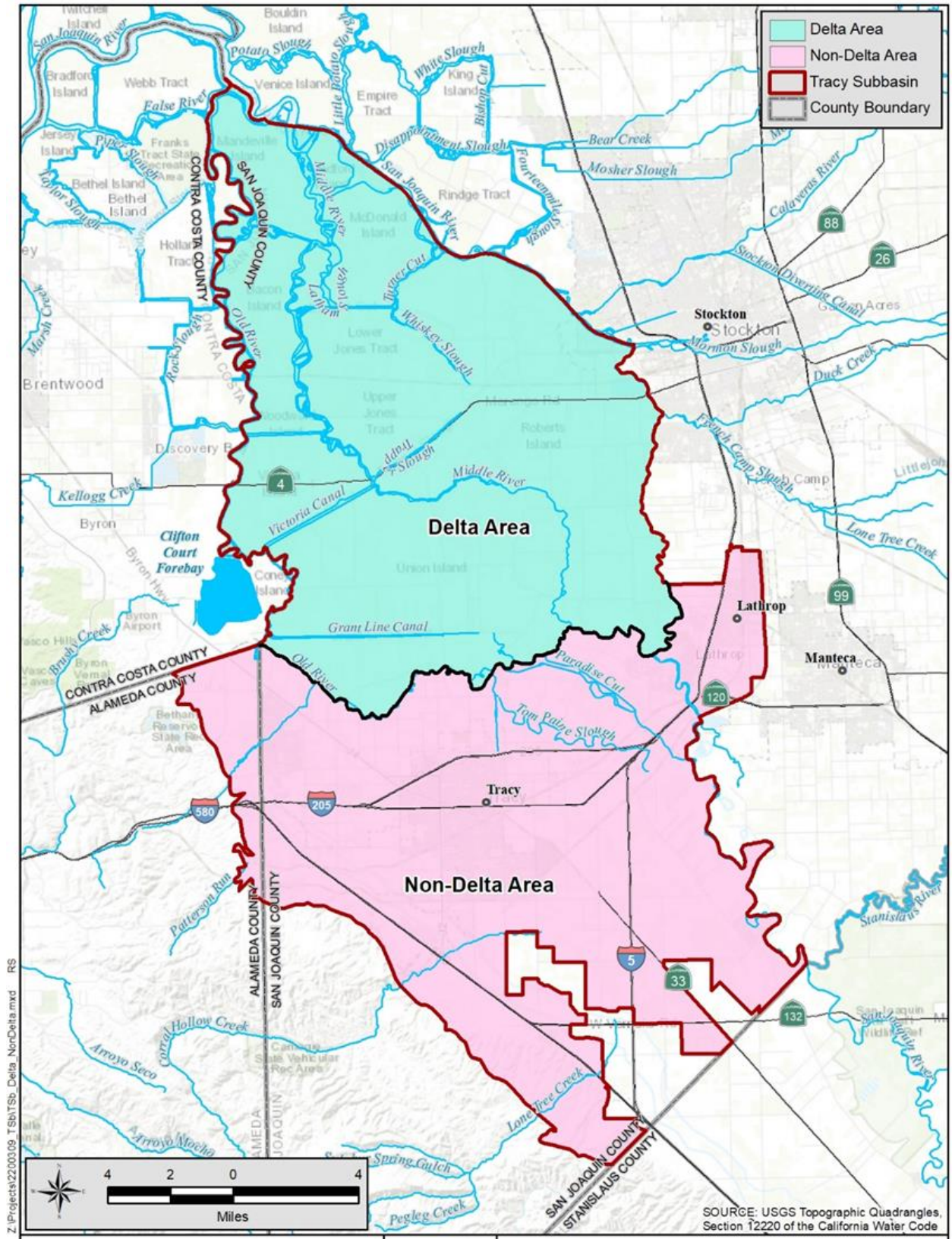


Figure ES-1-2. Tracy Subbasin Management Areas

Table ES-1. Tracy Subbasin Non-Delta Management Area Water Use

GSA Area	In Acre-Feet				
	Groundwater Pumping	Groundwater Recharge	Surface Water	Recycled Water	Total
BBID	0	---	24,200	---	24,200
BCID	0	(800)	30,900	---	31,700
City of Lathrop	3,700	(4,200)	5,200	500	13,600
City of Tracy	800	(800)	20,000	---	21,600
San Joaquin County	4,200	---	56,300	---	60,500
Stewart Tract	---	---	400	0	400
Total	*8,700*	*(5,800)*	*137,000*	*500*	152,000
Percent	*6%*	*---*	*94%*	*0.3%*	

Note: The total volumes of water extracted should only be considered accurate to the nearest 1,000 AF

The Subbasin has sufficient surface water rights and uses surface water as its predominant source of water supply. Groundwater is used to supplement these supplies. Treated wastewater is recycled, although there is currently minimal reuse, but it is expected to expand in the future.

The water supply to the Subbasin consisted of about 6 percent groundwater and 94 percent surface water. The accuracy of the total groundwater use in the Subbasin is about 23 percent metered and 77 percent is estimated. For surface water, about 83 percent is metered and 17 percent is estimated. Estimated groundwater pumping was derived by using satellite-based estimates of crop evapotranspiration minus surface water deliveries with the residual being groundwater pumping. The estimates were also adjusted based on local knowledge of irrigation practices relative to harvest times.

Groundwater conditions in the WY 2023 showed a rise in groundwater elevations across the Subbasin. In the Upper Aquifer groundwater levels rose Subbasin wide by about 5 feet. The Lower aquifer experienced a greater rise ranging from about 25 feet in the southeastern portion of the Subbasin to 0 feet at the eastern and western portions of the Subbasin, averaging about 12 feet across the Non-Delta Management Area. It is typical for positive and negative changes to occur in groundwater elevations from year to year in various parts of the Subbasin. Seasonal trends of higher spring groundwater elevations compared with fall levels are observed annually. One well in the Upper Aquifer and no wells in the Lower Aquifer had groundwater levels exceeded their minimum thresholds.

The change in storage in the Non-Delta Management Area of the Subbasin was estimated using the difference of groundwater contours from fall 2022 to fall 2023. In WY 2023, groundwater levels increased due to recharge from above normal precipitation (a wet year) and reduced groundwater pumping. The Subbasin gained about 23,500 AF in the Upper Aquifer and about 30,200 AF in the Lower Aquifer, for a total increase in storage of about 53,700 AF.

A review of other sustainability indicators including subsidence and degraded water quality found that all remained above their minimum thresholds. Surface water depletion sustainability indicator had one well out of 10 that exceeded a minimum threshold by 0.4 feet indicating a slight increase in surface water depletion.

The GSP identified several implementation activities consisting of one project, one management action and filling of data gaps. Portions of the project have already been implement reducing groundwater pumping by about 760 AF in WY 2023. A $10,000,000 grant has been obtained from DWR to fund design and construction of the remainder of the project and is expected to be completed ahead of schedule. Implementation of the management action is still in progress. Filling of data gaps has proceeded with assistance from DWR and local efforts.

Progress has been made toward achieving Subbasin's sustainability goals. Groundwater levels and water quality at most wells are currently above measurable objectives, to be obtained by 2042, but a few locations still need improvement as will be discussed in Section 3.

1. Introduction

1.1 Purpose

The Tracy Subbasin Groundwater Sustainability Agencies (GSAs) each adopted the Tracy Subbasin Groundwater Sustainability Plan (GSP). The GSP was submitted to California Department of Water Resources (DWR) for approval on January 27, 2022. DWR approved the GSP in WY 2024 on January 18, 2024 with seven conditional actions. DWR also released a guidance document for preparation of Annual Reports in October 2023 but did not prescribe specific methods GSAs must use. This report has been modified to incorporate portions of the suggested components compliant with SGMA, and still remain within the budget for report preparation. This report represents the third required Annual Report under the Sustainable Groundwater Management Act (SGMA) of 2014.

1.2 Tracy Subbasin

The Tracy Subbasin (Subbasin) is identified by DWR in Bulletin 118 as Subbasin No. 5-022.15 (DWR 2020). The Subbasin is part of the greater San Joaquin Valley region of California. **Figure 1-1** shows the location of the Subbasin and surrounding subbasins. The Subbasin encompasses an area of about 238,429 acres (about 370 square miles) in San Joaquin and Alameda counties, primarily between the eastern extent of the Coast Ranges on the south and the San Joaquin River on the north and east. The Subbasin is bounded on the southeast by the San Joaquin-Stanislaus counties border and the irregular northern boundary outline of the Del Puerto Water District (the Northern Delta-Mendota subbasin). The San Joaquin, Old, and Middle rivers are the principal rivers within or bordering the Subbasin. Within the Subbasin are the cities of Lathrop and Tracy. In 2018, DWR designated the Subbasin as a medium priority subbasin.

As described in the GSP, the Subbasin was subdivided into the Delta Management Area (managed by the Delta Protection Commission) and the Non-Delta Management Area as shown on **Figure 1-2**. The Delta Management Area consists of the Delta islands, which is a unique area in the state of California, where groundwater has to be drained or pumped away to maintain groundwater levels below ground surface. Most of the Delta island's ground surfaces are below sea level. The water is pumped back from the islands into the adjacent waterways. There is always a direct and constant connection between surface water and groundwater, requiring management of groundwater levels (dewatering) within the islands. There are hundreds of diversions that divert surface water from the adjacent waterways surrounding the islands for agricultural purposes. Because there have been no undesirable results for each of the sustainability indicators in the Delta Management Area and none are likely to occur in the future, groundwater monitoring is not necessary in this portion of the Subbasin for it to remain sustainable. As such, minimum thresholds and measurable objectives were not established for the Delta Management Area. The GSP identified the Non-Delta Management Area to be managed as the cities and agriculture in this area use some groundwater. This report documents the groundwater conditions and water supply for just the Non-Delta Management Area. .

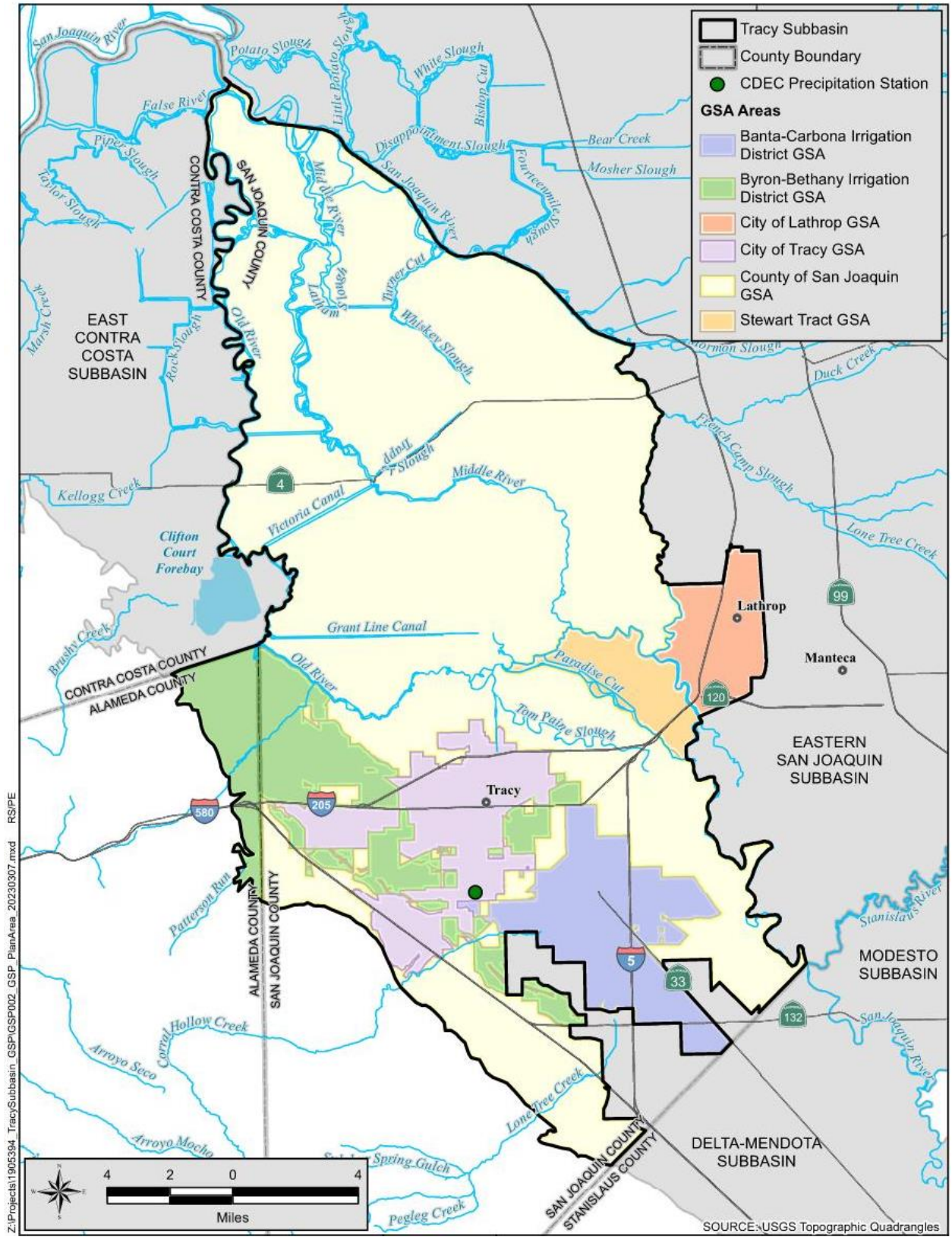


Figure 1-1. Tracy Subbasin

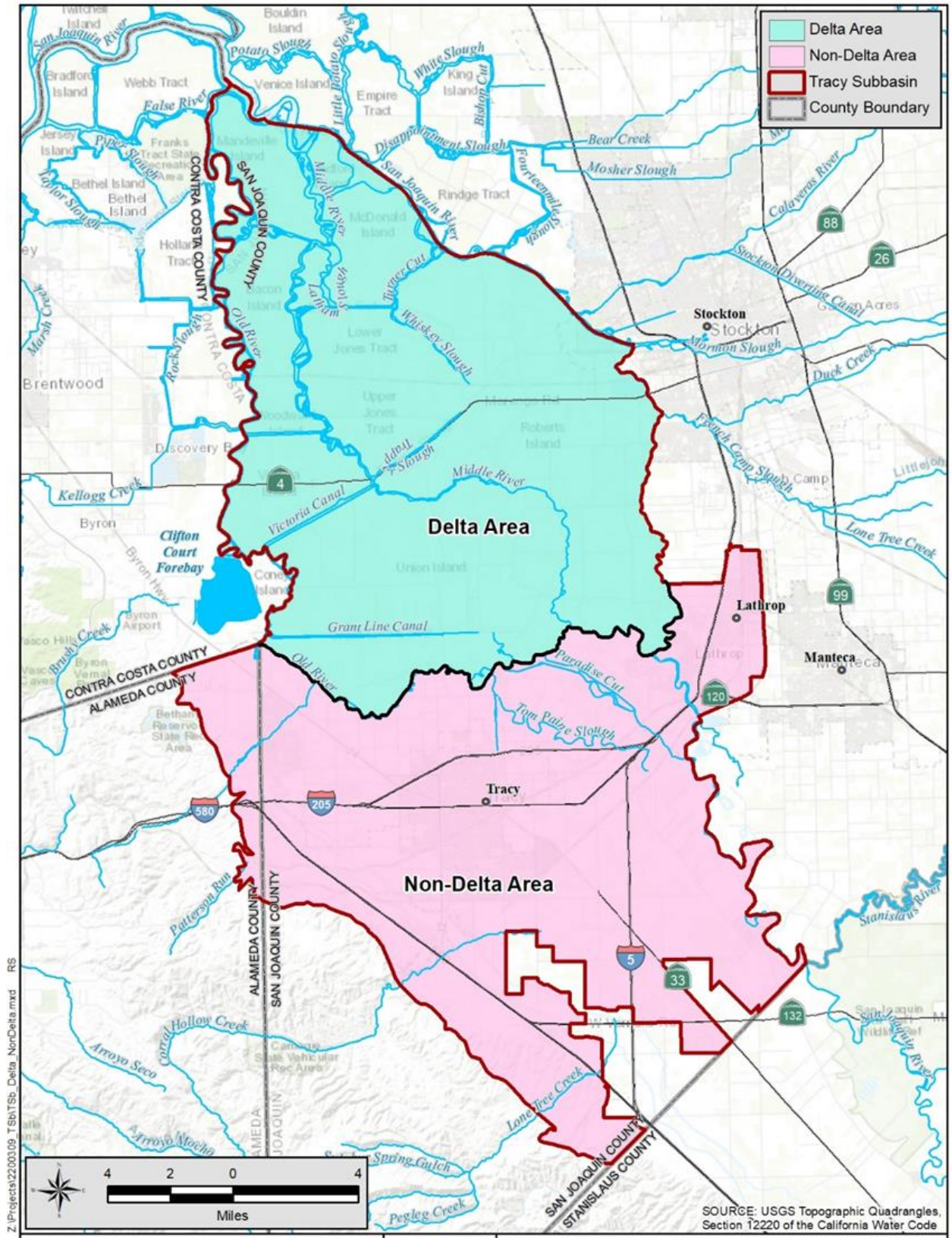


Figure 1-2. Tracy Subbasin Management Areas

1.3 Principal Aquifers

Water-bearing sand and gravel beds are generally grouped together into zones that are referred to as aquifers. The aquifers can be vertically separated by fine-grained zones that can impede the movement of groundwater between aquifers. The Subbasin has two principal aquifers; an Upper unconfined to semi-confined aquifer and a Lower confined aquifer that are separated by the Corcoran Clay.

Groundwater level extraction and managed recharge information in this report is provided by principal aquifer. However, some of the groundwater extraction data could not be sorted by principal aquifer because of having to estimate the groundwater pumping by agriculture using land use methods, well construction details were not available including filter pack surrounding the well, or where the well screen crossed the Corcoran Clay.

1.4 Tracy Subbasin GSAs

The Subbasin is managed by six GSAs which cover the entire Subbasin (**Figure 1-1**) and include:

- Byron-Bethany Irrigation District (BBID)
- Banta-Carbona Irrigation District (BCID)
- City of Lathrop
- City of Tracy
- San Joaquin County
- Stewart Tract

2. Data Analysis Summary

This section provides a brief description of the Subbasin setting and the groundwater management monitoring programs described in the GSP, as well as any notable events affecting monitoring activities or the quality of monitoring results for WY 2023. Much of the background information reported in this WY 2023 Annual Report was taken from the GSP prepared by GEI Consultants Inc (GEI 2022).

2.1 Hydrologic Conditions and Water Year Type

WY 2023 (October 1, 2022 – September 30, 2023) was an extreme year in terms of precipitation. WY 2023 was California's sixth wettest year based on statewide runoff on record (DWR 2023).

WY 2023 was the first wet year after three consecutive years of drought, with several major storms and precipitation lasting up to May. This surge in rainfall resulted in a statewide proclamation of water available for recharge by Governor Gavin Newsom (EO N-3-23).

The precipitation data from the Tracy Carbona Rainfall station (Index Number 04-899-05) is the Subbasin's longest and most continuous record of precipitation, from 1949 through present, and is located near the center of the Non-Delta Management Area as shown on **Figure ES-1**. The average annual precipitation was 9.89 inches, (NOAA); during WY 2023, precipitation was 15.12 inches. **Figure 2-1** shows the long-term average and the WY 2023 precipitation. Average to above average rain fell in 5 out of the 7 months with precipitation. **Figure 2-2** shows the monthly distribution of rain.

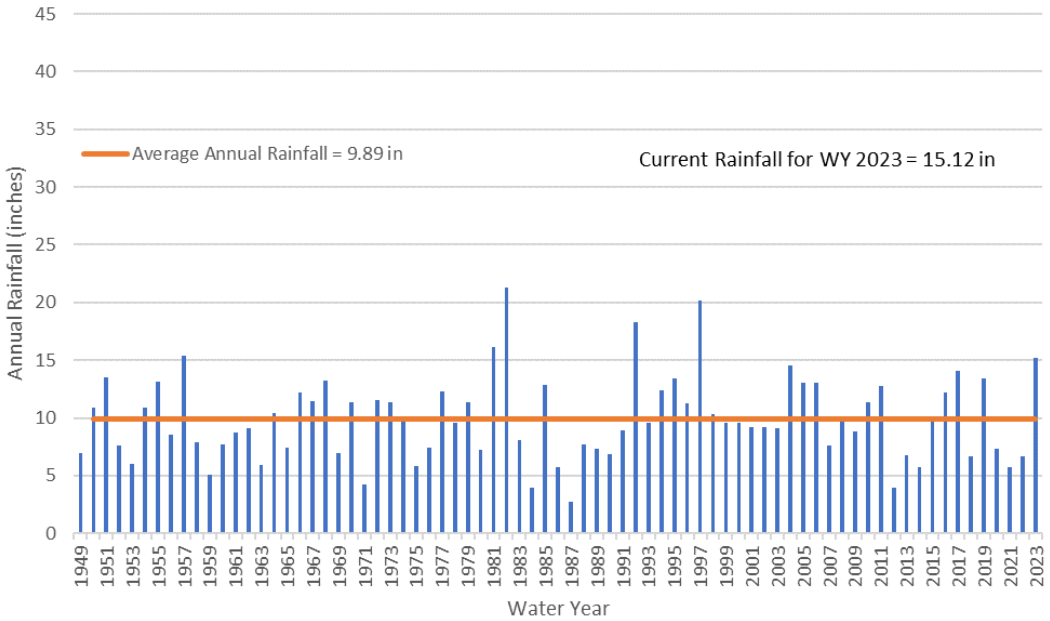


Figure 2-1. Tracy Carbona Station Annual Precipitation Record

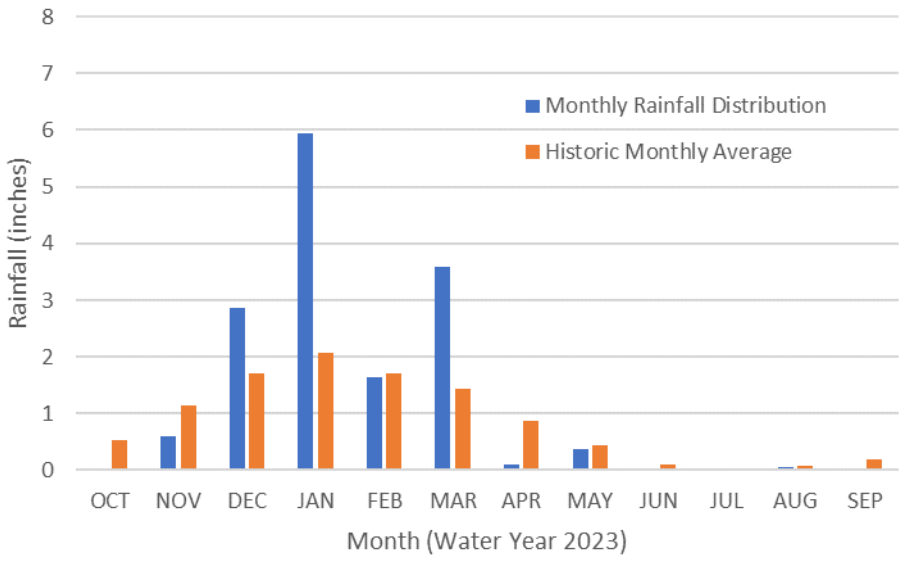


Figure 2-2. Tracy Carbona Station Monthly Precipitation Record

The San Joaquin River (SJR) Index is calculated by DWR on a water year basis. WY 2023 was preliminarily classified as a wet year by DWR. DWR has not yet released a final classification.

2.2 Groundwater Elevations

This section provides groundwater level monitoring results displayed as hydrographs and groundwater contours. All of the data are presented as groundwater elevations. The groundwater levels were obtained by various entities including: DWR, city of Tracy, San Joaquin County and from various agencies with groundwater monitoring programs overseen by the Regional Water Quality Control Board. Groundwater levels for WY 2023 were uploaded to the Sustainable Groundwater Management Act (SGMA) Portal[1] and are contained in the Subbasin data management system.

The Subbasin has two principal aquifers; an Upper unconfined to semi-confined aquifer and a Lower confined aquifer that are separated by the Corcoran Clay. Groundwater level information in this report is provided by principal aquifer.

Positive and negative changes in groundwater elevations from year to year are observed in various parts of the Subbasin and have been observed historically. Seasonal trends of slightly higher spring groundwater elevations compared with fall levels are typically observed.

Appendix A contains the location of the monitoring networks by principal aquifer and hydrographs downloaded from DWR's SGMA Data viewer for representative monitoring wells with established minimum thresholds, showing ground water levels through the end of WY 2023. Groundwater levels generally showed an increase across the subbasin. Access continued to be a challenge at Well N and no fall measurements were made in WY 2023. Groundwater level measurements at wells 02S03E01D001M and 01S04E31P005M monitoring duties have not yet

[1] https://sgma.water.ca.gov/portal/

been transferred to BBID. Well ORL-1W is still in the process of being transferred to BBID by DWR but until the transaction is completed groundwater levels cannot be measured at this well.

2.3 Groundwater Contours

Spring (seasonal high) and fall (seasonal low) water-level elevation contours were prepared by GEI for each of the principal aquifers for WY 2023 to illustrate groundwater conditions in the Subbasin. The seasonal low groundwater contours were developed using October 2023 groundwater level measurements, even though they are outside of the defined water year but represent groundwater conditions based on pumping during WY 2023. Groundwater elevation measurements to develop the contours WY 2023 for each principal aquifer were obtained from SGMA data viewer.

Groundwater level data from 23 wells within the Subbasin were used to create the Upper Aquifer groundwater elevation contour maps with another 10 wells from surrounding subbasins. Groundwater level data from 18 wells within the Subbasin were used to create the Lower Aquifer groundwater elevation contour maps with another 7 wells from surrounding subbasins.

2.3.1 Upper Aquifer Groundwater Contours

Groundwater contours for the Upper Aquifer in the Non-Delta Management Area for spring and fall WY 2023 show very little difference as shown on **Figures 2-3 and 2-4**. The groundwater is at a higher elevation, about 260 feet above mean sea level (amsl) near the foothills and lower elevations (about 0-10 feet amsl) near the rivers, suggesting the groundwater in the Upper Aquifer is discharging into the rivers and waterways. Groundwater levels remained at about the same elevation between spring and fall. Recharge to Upper Aquifer appears to be near Corral Hollow Creek, as a groundwater mound is present. Near the city of Lathrop, the groundwater contours are higher near the San Joaquin River and are lower to the east, into the Eastern San Joaquin Subbasin, suggesting groundwater is being recharged by the river in this area.

2.3.2 Lower Aquifer Groundwater Elevation Contours

Groundwater contours were developed for the Lower Aquifer for spring and fall 2023 as shown on **Figures 2-5 and 2-6**. Overall, groundwater conditions in the Subbasin in the spring were higher than in the fall, a typical seasonal trend for the Subbasin.

Groundwater flow direction is generally to the northwest over most of the Subbasin during the spring. Groundwater contours appear to show recharge reaching the aquifer around Corral Hollow Creek. In the fall, a pumping depression was present near the center of the Subbasin, likely due to the city of Tracy having five municipal supply wells in this area and agricultural. This pumping depression has been present since at least 2007 (GEI 2007). The regional groundwater flow direction is from the southeast to the northwest, but due to the pumping depression radial flow into the depression is from the east, west and north. Groundwater elevations are higher near the city of Lathrop and decrease to the east.

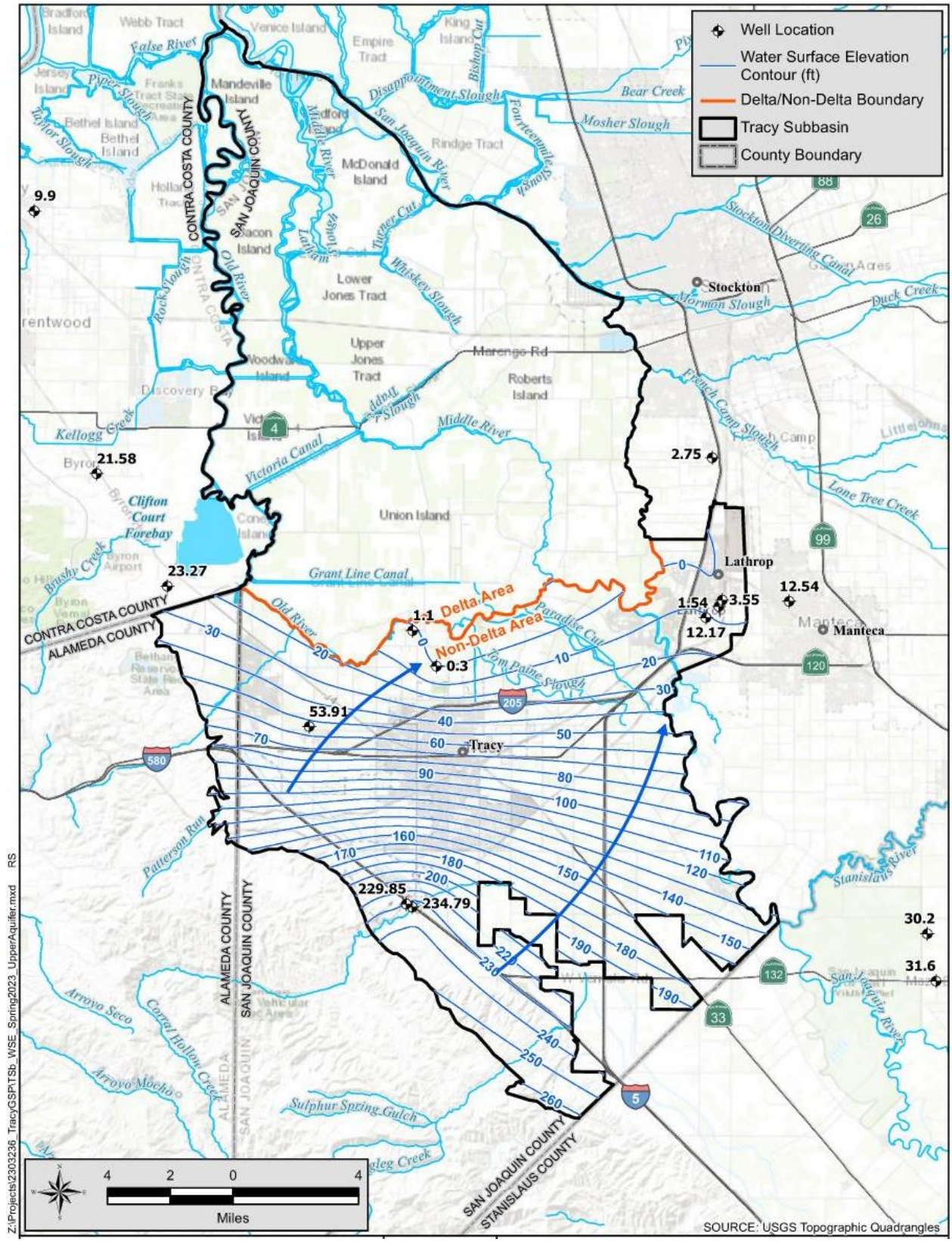


Figure 2-3. Upper Aquifer Spring 2023

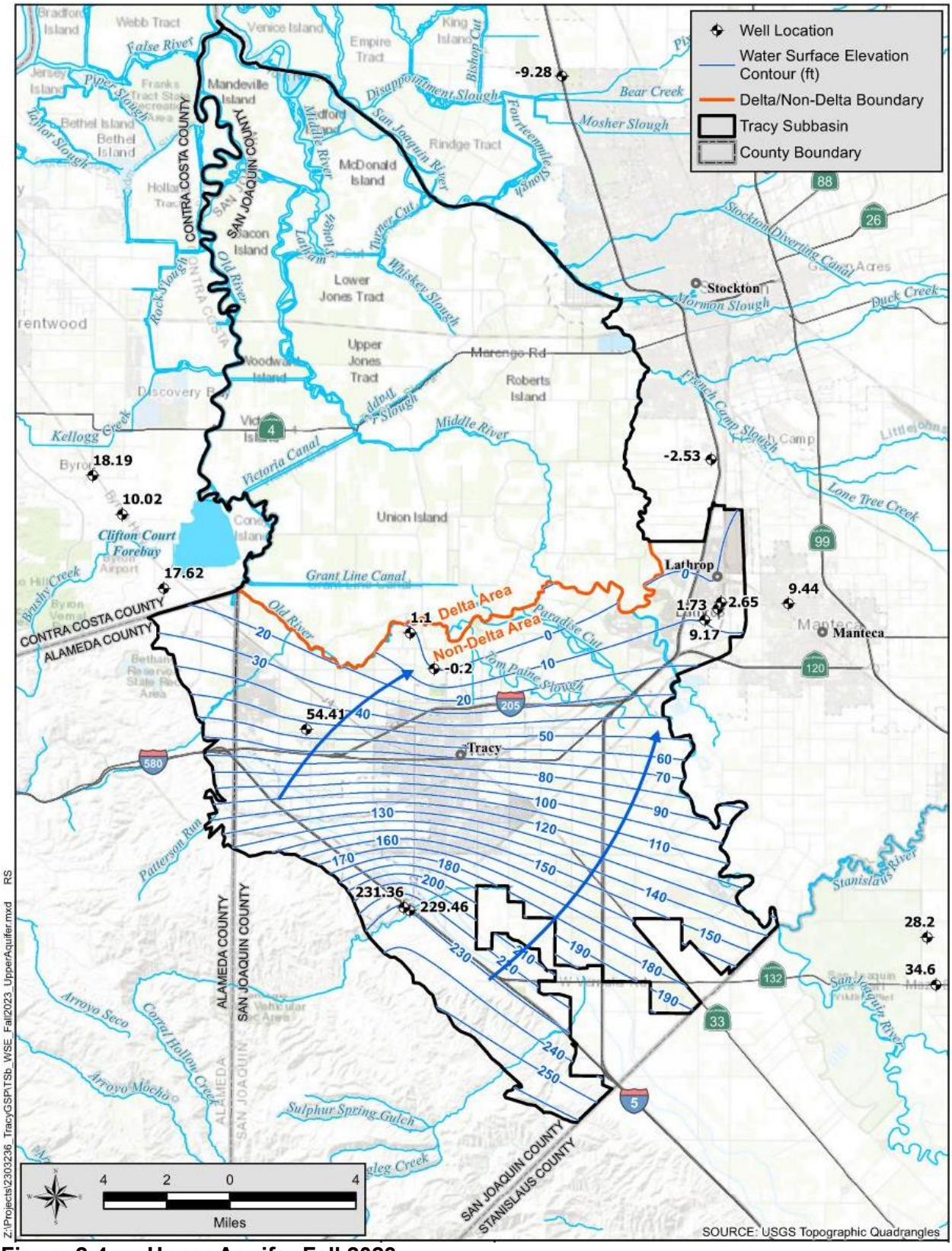


Figure 2-4. Upper Aquifer Fall 2023

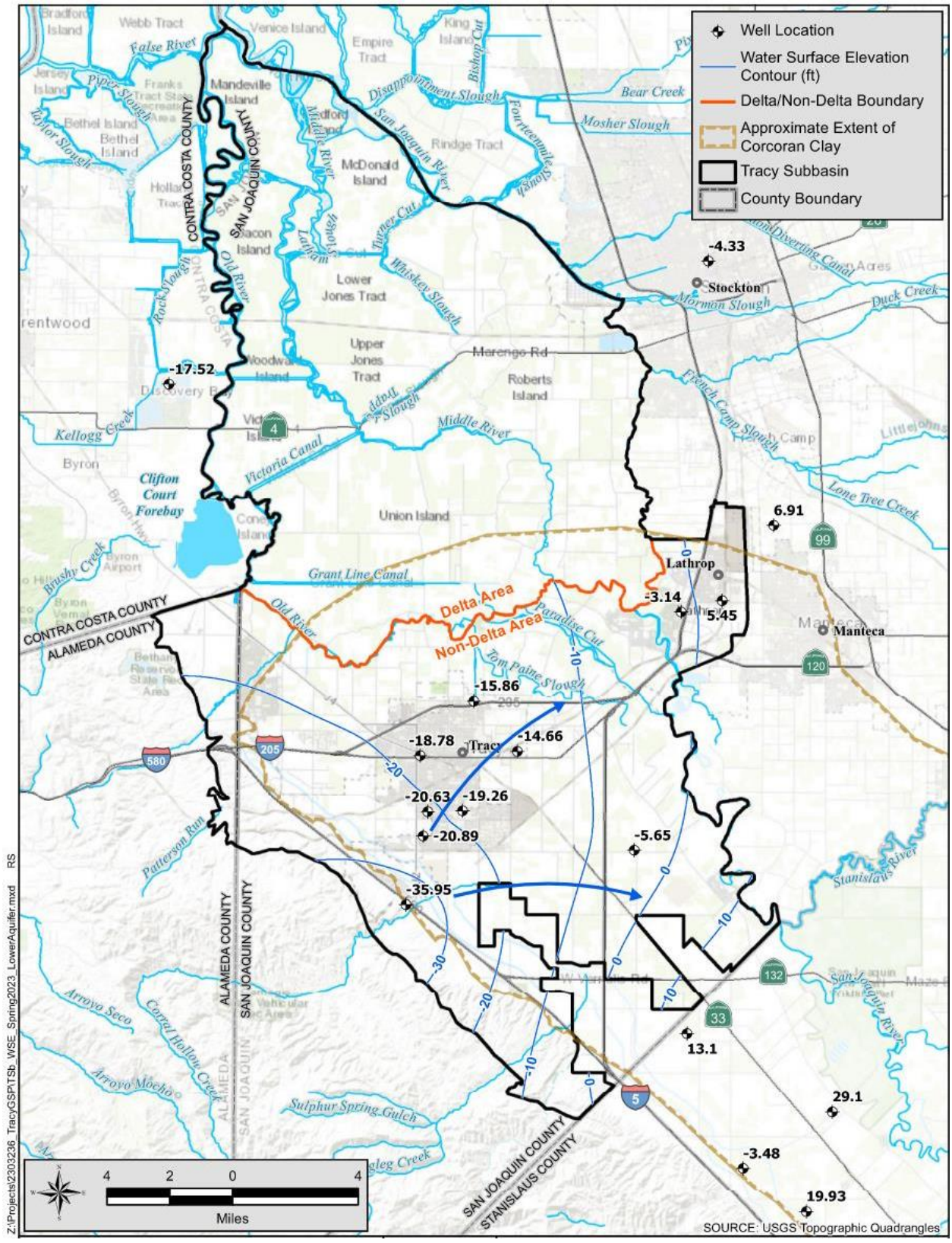


Figure 2-5. Lower Aquifer Spring 2023

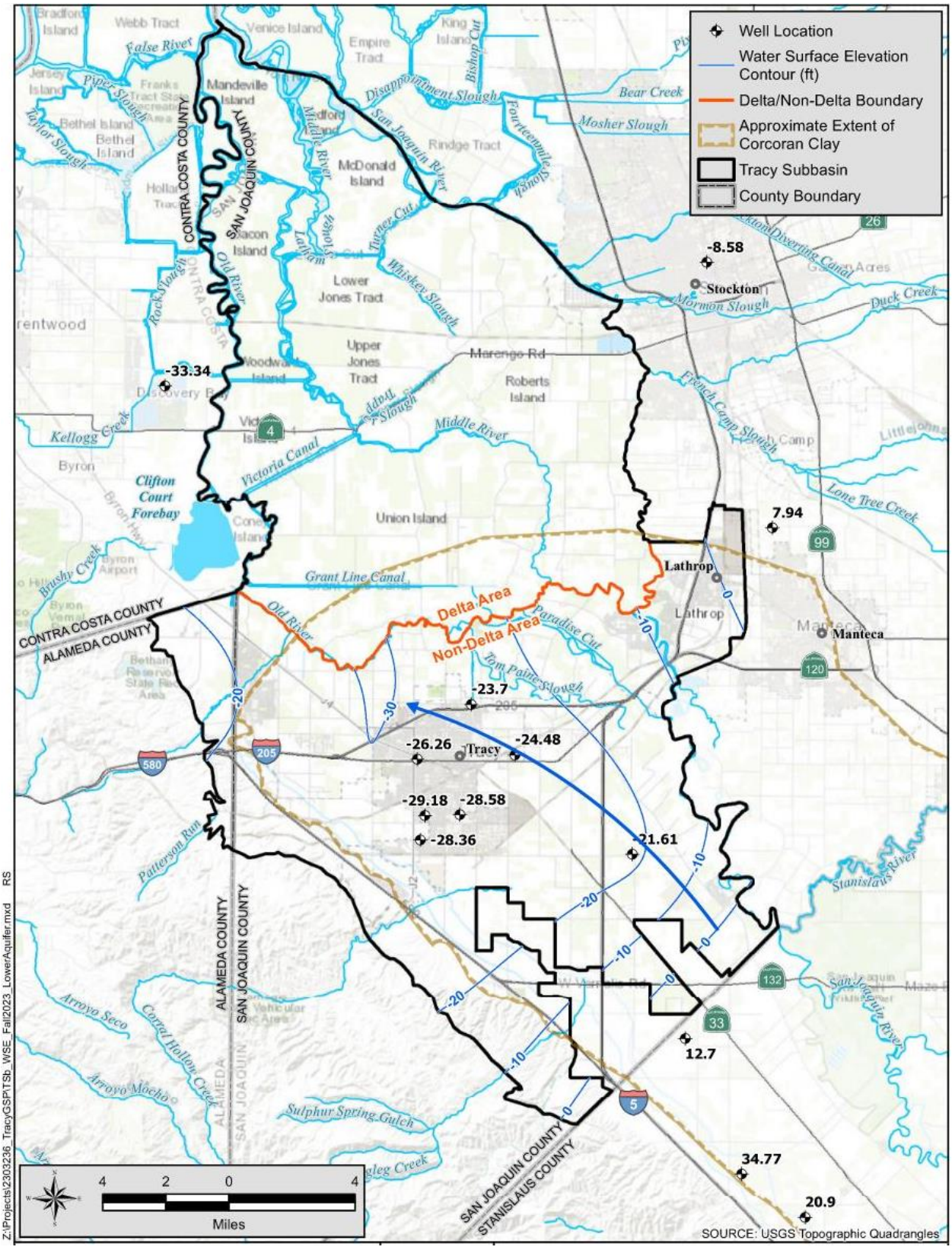


Figure 2-6. Lower Aquifer Fall 2023

2.4 Groundwater Extractions

This section presents the metered and estimated groundwater extractions from the Subbasin for WY 2023. The types of groundwater extraction by water use sector including agricultural, urban (municipal and small public water systems), industrial, managed wetlands and native vegetation. All groundwater extractions are provided in acre-feet (AF).

Metered groundwater extractions account for about 3,500 AF and have an accuracy of about 95 percent. Estimated groundwater extractions account for about 5,100 AF of pumping in the Subbasin. The estimated extractions have and accuracy of 70 percent, an improvement from previous years due to obtaining additional surface water diversions records and a reduction of estimated riparian diversions as detailed in **Appendix C**.

Groundwater extractions from the Subbasin are metered in urban areas by community water agencies and at a few agricultural wells. **Appendix B** contains the detailed water accounting provided by each GSA and for metered groundwater extractions.

Groundwater extractions were estimated for urban and agricultural uses. Estimates for small community water systems (about 1,300 AF) were estimated based on average water uses for categories of small systems times the population served or by annual water deliveries averaged over a 12-month period and then converted to water year accounting months. Groundwater extractions for most agricultural well owners are not metered and had to be estimated. Direct evapotranspiration was estimated by using field boundaries for the area (obtained from the 2022 provisional LandIQ crop data available from DWR), OpenET (satellite data), and the ee-METRIC approach to estimate crop evapotranspiration. **Appendix C** provides a summary of the approach used to estimate groundwater extractions for agricultural areas. In general, to estimate the groundwater pumping in agricultural areas, water supplies (precipitation, metered groundwater pumping, meter surface water diversions) were subtracted from the total crop evapotranspiration with the residual being estimated groundwater pumping for agriculture.

Groundwater extractions for domestic well owners were not included in the estimated groundwater pumping as these are de-minimus users, typically using less than 2 AF of water per year.

The groundwater extraction volumes for WY 2023 by principal aquifer and previous water years for each water sector are provided in **Table 2-1.** In WY2021 and WY2022 the groundwater extractions were not summarized by aquifer. All values in this table (8,700 AF) have been rounded and therefore do not match exactly (8,636 AF) to those detailed account values contained in **Appendix B**. For the WY 2023, total groundwater pumping (metered and estimated) was about 8,700 AF, about one-third of the groundwater extraction in previous water years, the difference being drought years versus a wet year. Agricultural pumping was the largest component of total groundwater pumping and accounts for about 40 percent of total pumping during WY 2023. Urban (community and small community water districts) account for about 30 percent of the groundwater use. Industrial pumping account for 7 percent of groundwater use. Groundwater pumping for remedial activities was 20 percent of the total.

In comparison to the sustainable yield for both aquifers, groundwater extractions were under the sustainable yield by about 53,000 AF, indicating groundwater storage should have increased this water year, along with recharge from precipitation.

Figure 2-7 illustrates the general location and volume of extractions, from **Table 2-1**, in each GSA to correlate the pumping presented with the locations shown within the Subbasin. The precise locations of the urban groundwater extractions are known but the estimated groundwater extractions by agriculture are not known; therefore, only the total amounts within each GSA are shown. Also, the aquifers that the wells extract water from is unknown are not fully known.

Table 2-1. Total Groundwater Extraction by Water Use Sector and Aquifer

Upper Aquifer (Metered and Estimated)			
Groundwater Extraction Sector	WY2021 (AF)	WY2022 (AF)	WY2023 (AF)
Agricultural	---	---	0
Urban	---	---	900
Industrial	---	---	600
Managed Wetlands	---	---	0
Native Vegetation	---	---	0
Other - Remediation	---	1,040	2,000
Managed Recharge	---	---	4,400
Total Extractions	---	---	**3,500**
Total = Extractions - Managed Recharge	---	---	**-900**
Sustainable Yield	---	---	**---**

Lower Aquifer (Metered and Estimated)			
Groundwater Extraction Sector	WY2021 (AF)	WY2022 (AF)	WY2023 (AF)
Agricultural	---	---	0
Urban	6,800	3,819	1,300
Industrial	---	---	0
Managed Wetlands	---	---	0
Native Vegetation	---	---	0
Other - Remediation	---	---	0
Managed Recharge	---	250	1,400
Total Extractions	---	---	**1,300**
Total = Extractions - Managed Recharge	---	---	**-100**
Sustainable Yield	---	---	

Both Aquifers or Unknown Aquifer (Metered and Estimated)			
Groundwater Extraction Sector	WY2021 (AF)	WY2022 (AF)	WY2023 (AF)
Agricultural (See Appendix C)	22,000	21,700	3,500
Urban	0	0	300
Industrial	1,000	500	100
Managed Wetlands	0	0	0
Native Vegetation	0	0	0
Other - Remediation	1,000	0	0
Managed Recharge	600	0	0
Total Extractions	**24,000**	**22,200**	**3,900**
Total = Extractions - Managed Recharge	**23,400**	**22,200**	**3,900**

Total Extraction - All Aquifers (Metered and Estimated)			
Groundwater Extraction Sector	WY2021 (AF)	WY2022 (AF)	WY2023 (AF)
Agricultural	22,000	21,700	3,500
Urban	6,800	3,800	2,500
Industrial	1,000	500	700
Managed Wetlands	0	0	0
Native Vegetation	0	0	0
Other - Remediation	1,000	1,000	2,000
Managed Recharge	600	1,500	5,800
Subtotal Extractions	**30,800**	**27,000**	**8,700**
Total = Extractions - Recharge	**30,200**	**25,500**	**2,900**
Sustainable Yield (Upper + Lower Aquifers)	**62,100**	**62,100**	**62,100**

Notes: The total volumes of water extracted (metered and estimated) should only be considered accurate to the nearest 1,000 AF
WY 2021 and 2022 values from Part A DWR Submittal
Sustainable Yield from GSP Section 6.7, Not subdivided by aquifer

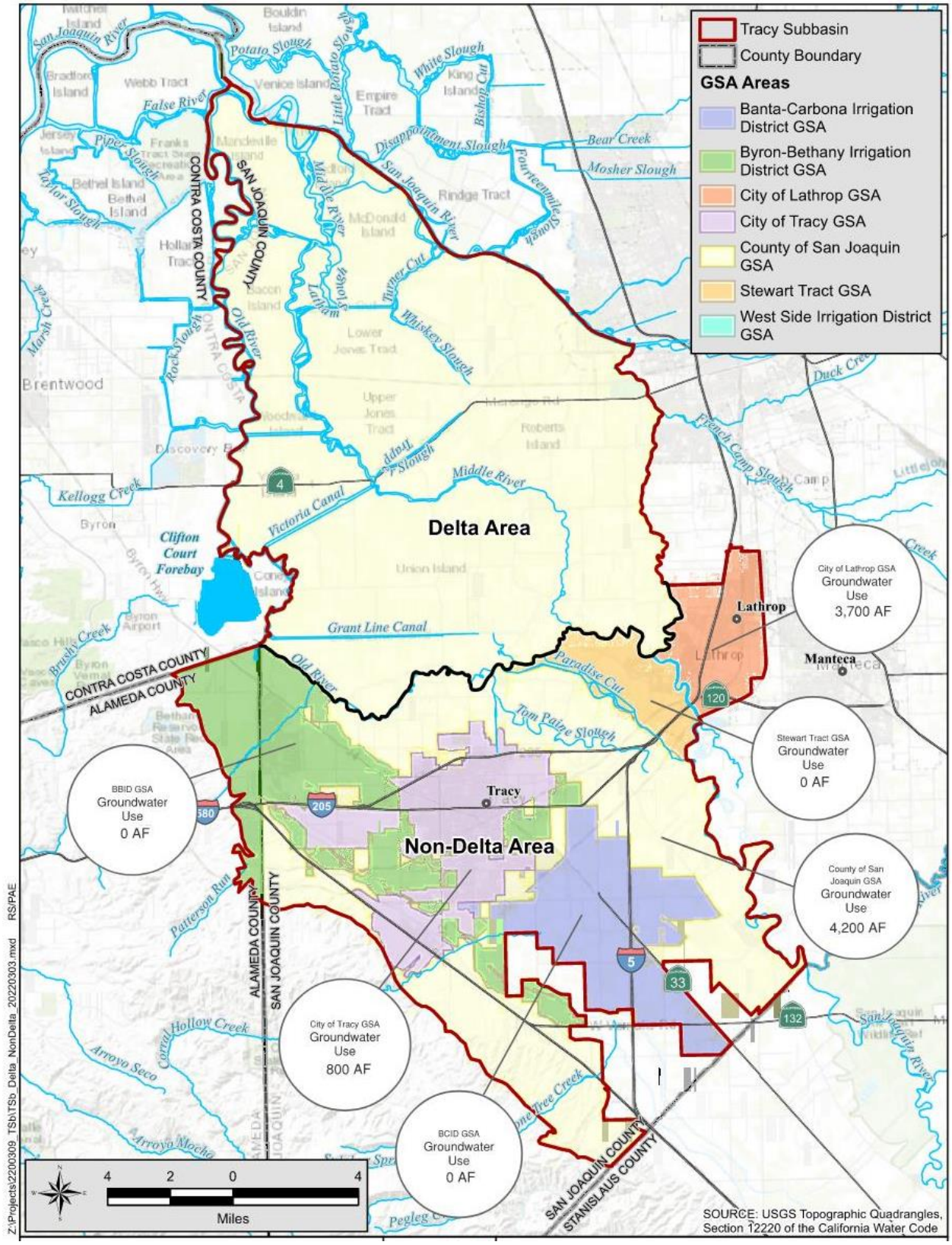


Figure 2-7. Location and Volume of Groundwater Extractions

2.5 Surface Water Supply

The Non-Delta Management Area relies on three surface water source types: imported supplies (South San Joaquin Irrigation District [SSJID]), Central Valley Project (CVP) supplies, and local supplies (from the San Joaquin and Old River). A small amount of water (about 600 AF) is being used from the State Water Project (SWP) under a water exchange with CVP water rights. Brief descriptions of each of the sources of supply and water use sectors are provided below. Surface water use by sector is summarized in **Table 2-2** and surface water use by source is summarized in **Table 2-3**, along with data from previous water years.

The accuracy of the metered water is 95 percent while the accuracy of the estimated water supplies is lower since the surface water diversion from WY2017 were used, as surface water diversions for WY2023 because 2017 was another wet year but is still estimated to be about 70%. Diversion record from SWRCB were downloaded from SWRCB in January 2024, prior to the new date for electronic submittals by February 1,2024. **Appendix B** contains the detailed water accounting provided for each GSA and for both metered and estimated surface water use.

2.5.1 Imported Supplies

The cities of Tracy and Lathrop import treated surface water from the SSJID. During WY 2023, the cities imported and used 14,800 AF, similar to previous water years.

2.5.2 Central Valley Project Supplies

The city of Tracy and BBID use water supplied from the Delta-Mendota Canal which is part of the CVP. The water is collected from the Old River into the Clifton Forebay, located just west of the Subbasin (*refer to* **Figure 2-7**). The amount of imported water used during WY 2023 from the CVP was about 15,000 AF, within the range of diversions from previous water years.

2.5.3 Local Supplies

Local surface water supplies include surface water from the San Joaquin River, Old River and other adjacent waterways. BBID and BCID divert water from the rivers. Riparian landowners also diverted water from the waterways. During WY 2023, the total local supply was 106,500 AF. The diversions were at a historic high compared to previous water years.

2.5.4 Total Surface Water Supplies

Local surface water supplies include surface water flows that entered the Subbasin from San Joaquin, Old River, and other adjacent waterways. Although, water was supplied from the CVP aqueduct (Delta-Mendota Canal) the water was diverted from the Old River through the Clifton forebay, so this water could be considered to be from a local source. Water was also imported into the Subbasin from SSJID. **Table 2-2** provides a summary of the total surface water use.

Table 2-2. Surface Water Use by Sector

Total Surface Water Source (Metered and Estimated)				
Surface Water Supply Sectors	WY2021 (AF)	WY2022 (AF)	WY2023 (AF)	Method Used to Determine
Central Valley Project	16,800	9,700	15,000	Metered
State Water Project	0	0	600	Metered
Colorado River Project	0	0	0	
Managed Local Supplies	91,100	103,400	106,500	Metered, Estimated (Land Use, WY2017 metered values)
Local Imported Supplies	14,800	14,600	14,800	Metered
Recycled Water	400	500	500	Metered
Reused Water	---	---	---	
Desalination	0	0	0	
Other	0	0	0	
Total	**123,100**	**128,200**	**137,400**	

Note: --- = information not available
The total volumes of water should only be considered accurate to the nearest 100 AF
791 AF of Tracy urban water from SSJID used for recharge

Table 2-3. Surface Water Use by Source (Acre-Feet)

Total Surface Water Sector (Metered and Estimated)				
Surface Water Supply Sectors	WY2021 (AF)	WY2022 (AF)	WY2023 (AF)	Method Used to Determine
Agricultural	97,900	101,800	109,300	Metered and Estimated
Urban	24,800	25,900	27,000	Metered
Industrial	0	0	600	Metered
Managed Wetlands	0	0	0	
Native Vegetation	0	0	0	
Other - Recycled	400	500	500	
Total	**123,100**	**128,200**	**137,400**	

Notes: --- = information not available
The total volumes of water extracted should only be considered accurate to the nearest 1,000 AF
791 AF of Tracy urban surface water from SSJID used for Groundwater Recharge

2.6 Managed Recharge

Managed recharge is being performed by multiple entities and at various locations around the Subbasin. All of the managed recharge is metered and has an accuracy of 95 percent.

Managed groundwater recharge (about 790 AF) through the city of Tracy's aquifer storage and recovery well is injected into the Lower Aquifer and is included in **Table 2-4**, per DWRs guidance document, as the recharge could reduce the total groundwater extracted. However, about two-thirds of the water in WY 2023 remains in storage for the City's use in the future.

As part of BCID's conjunctive use program (about 760 AF) of surface water was used instead of groundwater pumping.

Groundwater was also recharged through various percolation ponds by city of Lathrop, Sharpe and Tracy Army Defense Distribution Deports into the Upper aquifer. Treated remedial water from Occidental Chemical Corporation was injected into both the Upper and Lower Aquifers.

Combined the total managed recharge in WY 2023 was about 5,800 AF. Additional managed recharge is occurring in small community water systems where wastewater is placed into individual septic systems. This recharge is not included in the managed recharge.

2.7 Recycled Water Supplies

Treated wastewater was used by the city of Lathrop for irrigation of some lands/agricultural fields within the Lathrop GSA area and in the Stewart Tract GSA area. California Natural Products, located within the city of Lathrop, treats their own wastewater. The treated wastewater is a combination from both groundwater and surface water. The total recycled water was about 500 AF, similar to previous years.

2.8 Change in Groundwater Storage

Groundwater change in storage were estimated from the California Central Valley Groundwater-Surface Water Simulation Model (C2VSim-FG_v1.0) groundwater flow model for the period of WY 1974 through WY 2015. Changes in storage for WY 2016 through WY 2023 were estimated using fall groundwater contours to coincide with previous water year estimates made using the groundwater model. However, fall measurements are often affected by late season pumping and are not as consistent as spring measurements, made typically before pumping starts. For consistency purposes, the same wells, to the extent possible, each year were used for contouring and to estimate the change in groundwater elevations. As previously discussed in **Section 2-2**, some wells had missing measurements during WY 2023, so a similar set of wells used for WY 2016 through WY 2022 could not be used to calculate change in storage in WY 2023.

Raster files of the change in groundwater elevation maps were then used to calculate an average change in groundwater levels in each principal aquifer. The average change in groundwater levels were then multiplied by the average specific yield or storage coefficient for each aquifer. The volume change depicted represents a total volume, including the volume displaced by the aquifer material and the volume of groundwater stored within the void space of the aquifer. The portion of void space in the aquifer that can be utilized for groundwater storage is represented by the aquifer storage coefficient (S), a unitless factor, which is multiplied by the total volume change to derive the change in groundwater in storage. The average storativity, or specific yield, is about 0.05 for the Upper Aquifer and was used to estimate the change in storage for the Upper Aquifer (Hotchkiss and Balding 1971). The storage coefficient, obtained through aquifer testing at a Well #8 and nearby observation wells in the city of Tracy, was estimated as 0.0001 (Padre and Associates 2004). The specific storage (storativity times the average aquifer thickness of 200 feet) or 0.02 was used to estimate the change in storage for the Lower Aquifer (Fetter 1988).

The total change in storage in the for WY 2023 was about 53,700 AF. The groundwater elevation change maps for fall 2023, **Figures 2-8 and 2-9**, corresponds to the areas where changes in storage occurred. Groundwater levels/elevations increased for the first time in three water years (Subbasin wide average 4.02 feet) in the Upper Aquifer and resulted in an increase of about 23,500 AF. The change in groundwater elevations in the Lower Aquifer was the greatest in the southeastern portion of the Non-Delta Management Area where the levels rose by about 20 feet but was less than 5 feet along the western and eastern sides of the Subbasin. A small area of decline occurred near Lathrop, but is due to increased pumping for groundwater remediation. The average change in groundwater elevation was (12.89 feet) resulting in a change in storage of about 30,200 AF in the Lower Aquifer.

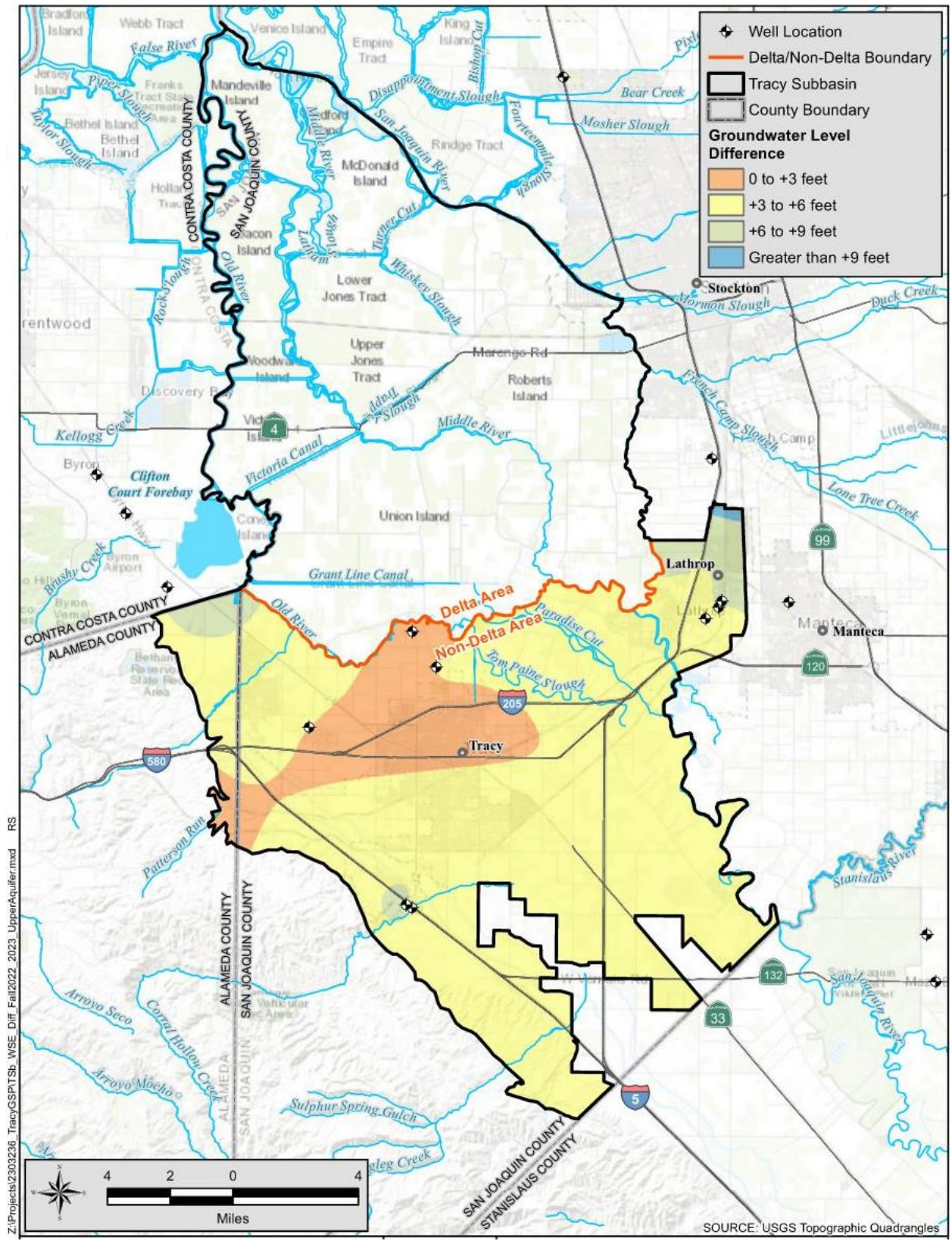


Figure 2-8. Upper Aquifer Change in Groundwater Levels for WY 2023

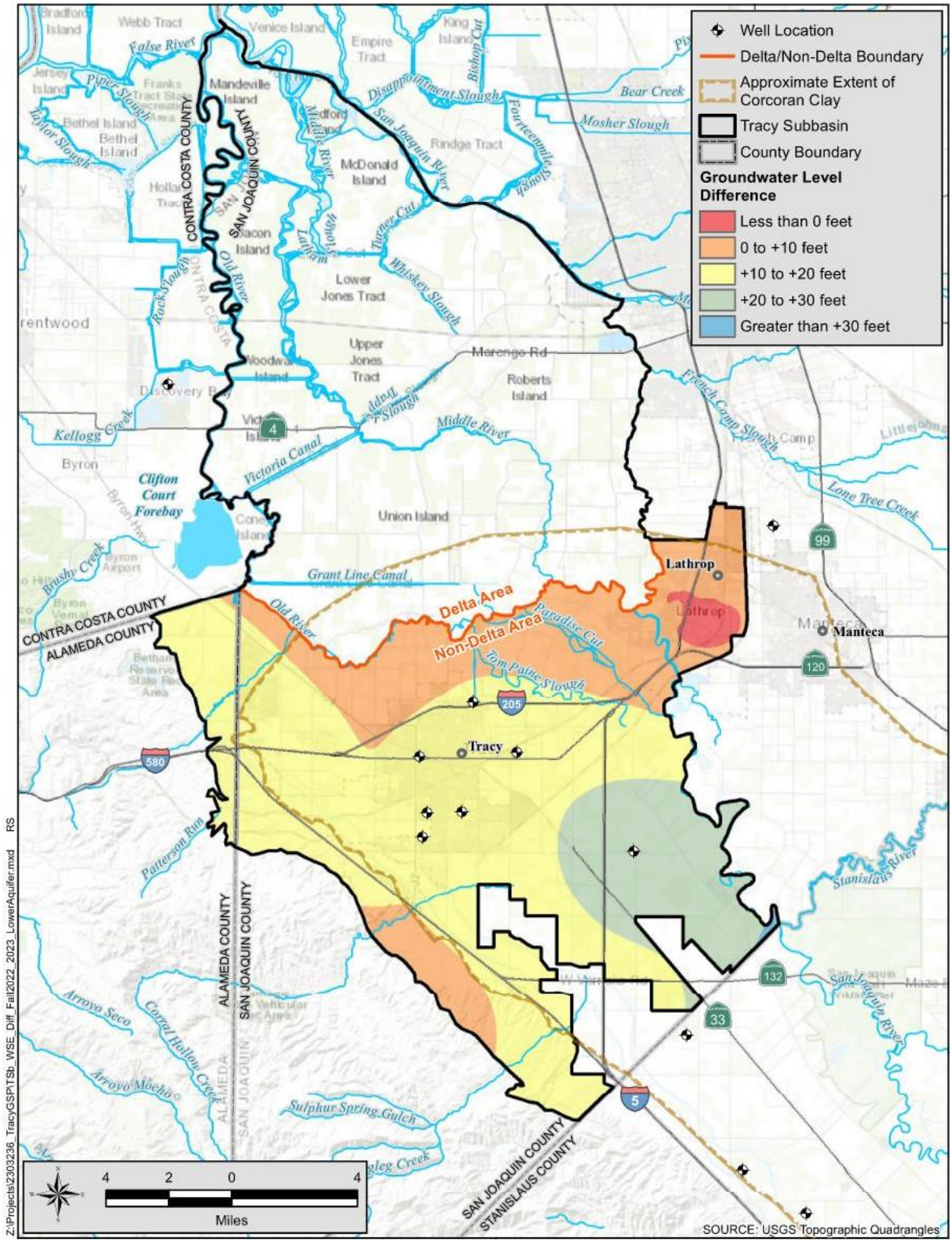


Figure 2-9. Lower Aquifer Change in Groundwater Levels for WY 2023

Table 2-4 provides fall change in storage (fall–fall) measurements for comparison along with the water year classification. Groundwater elevations and change in storage in the Upper Aquifer have remained similar with the slight differences due to the water year type (amount of recharge). As shown the fall change in storage correlate well with the water year classifications and that aquifers generally refill to the seasonal high during wet years, indicating the Subbasin is within its sustainable yield.

Overall, the Upper and Lower Aquifers from 2016, the end of the last drought refilled during the 2017 through 2019 wetter years and but declined through WY 2020 through WY 2022 drought years. In WY 2023, groundwater increased.

Table 2-4. Annual Change in Groundwater in Storage

Water Year	SJR Water Year Classification	Upper Aquifer Annual Fall Change (AF)	Lower Aquifer Annual Fall Change (AF)	Combined Net Change (AF)
2016	dry	-2,200	-7,800	-10,000
2017	wet	600	23,800	24,400
2018	below normal	-2,300	5,400	3,100
2019	wet	3,000	0	3,000
2020	dry	-6,100	-3,000	-9,100
2021	critical	-2,500	-23,500	-26,000
2022	critical	-8,800	-6,500	-15,300
2023	wet	23,500	30,200	53,700

There was a total increase of 53,700 AF (combined fall total of Upper and Lower aquifers) in groundwater in storage in WY 2023. **Table 2-4** shows that over the last eight water years the Subbasin has gained about 23,800 AF of storage.

Figure 2-10 is a graph demonstrating the cumulative change in storage for the Upper Aquifer from both the C2VSim groundwater model and the calculated change in storage using the groundwater contour differences. **Figure 2-11** is a graph demonstrating the cumulative change in storage for the Lower Aquifer. The change in storage for the Upper Aquifer has a much smaller magnitude of change in storage using the calculated change in storage from groundwater contours in comparison to the groundwater model predications. This is possibly related to the groundwater model having an average pumping of 250,000 AF per year (AFY) rather than the groundwater pumping of about 27,000 AF. The Lower Aquifer has about the same magnitude of change in storage between CV2Sim and those made using groundwater contours.

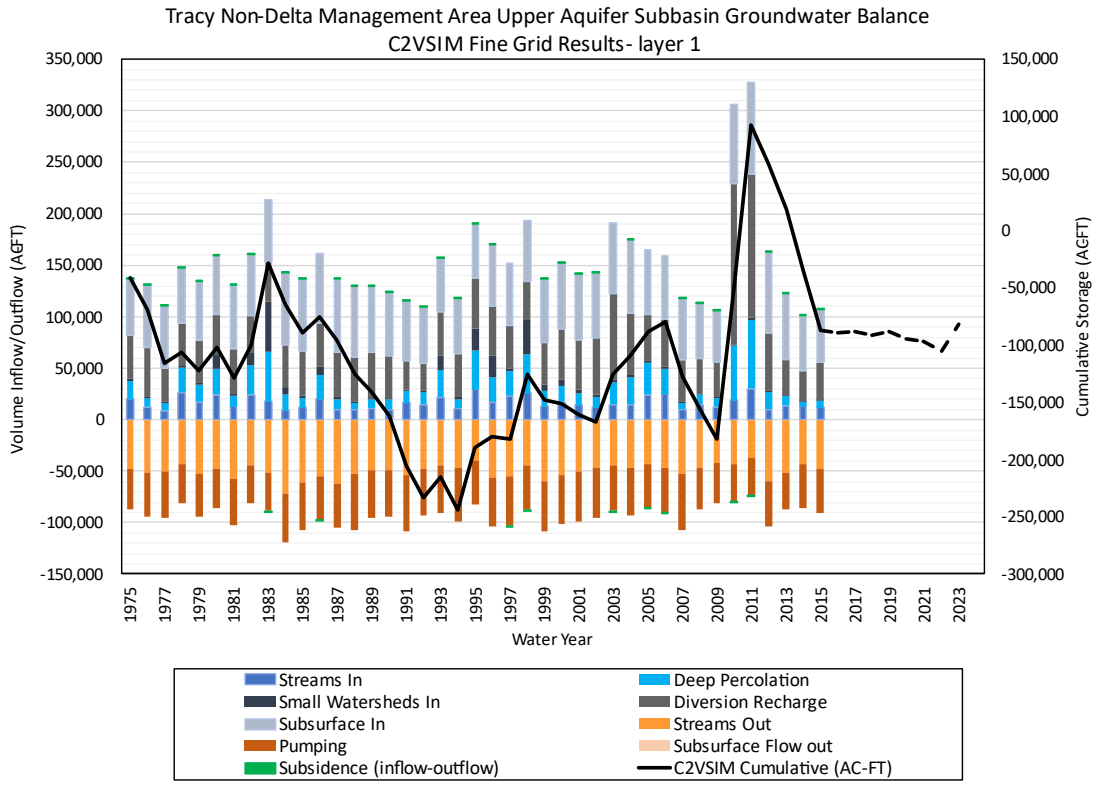


Figure 2-10. Upper Aquifer - Cumulative Change in Storage

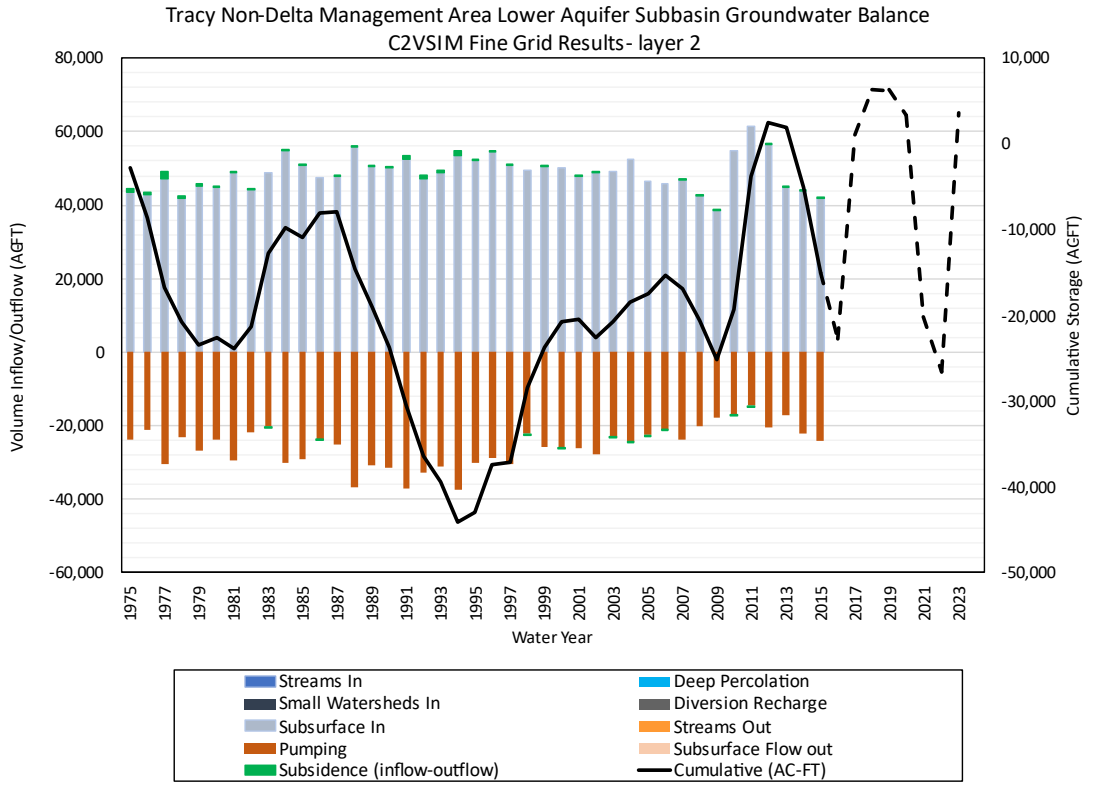


Figure 2-11. Lower Aquifer - Cumulative Change in Storage

2.9 Total Water Use

This section summarizes the total annual groundwater and surface water used to meet agricultural, urban and rural, industrial demands and remedial cleanup activities in the Non-Delta Management Area. **Tables 2-5 and 2-6** provides a summary, along with the method, of these water sources and water sectors for WY 2023.

For WY 2023, the quantification of total water use was completed from reported metered municipal water production and metered surface water delivery, and from models used to estimate agricultural and rural water demand.

Table 2-5. Total Water Use by Sector

Water Use Sector	WY2021 (AF)	WY2022 (AF)	WY2023 (AF)	Method Used to Determine
Urban	39,669	29,708	29,600	Metered and Population Estimated
Industrial	1,115	519	1,200	Metered
Agricultural	119,686	123,981	113,400	Metered and Land Use Estimated
Managed Wetlands	0	0	0	
Managed Recharge	0	1,519	5,800	Metered
Native Vegetation	0	0	0	
Other - Remediation	1,490	1,038	2,000	Metered
Total	**161,960**	**156,765**	**140,400**	

Notes: The total volumes of water extracted should only be considered accurate to the nearest 1,000 AF
Metered estimated accuracy is about 95%
Estimated urban and agricultural is about 70%

Table 2-6. Total Water Use by Source

Water Use Source	WY2021 (AF)	WY2022 (AF)	WY2023 (AF)	Method Used to Determine
Groundwater	29,470	27,548	2,900	Metered and Land Use Estimated
Surface Water	130,770	127,652	137,000	Metered and Estimated
Recycled Water	230	527	500	Metered
Reused Water	0	0	0	
Other - Remediation	1,490	1,038	2,000	Metered
Total	**161,960**	**156,765**	**140,400**	

Notes: The total volumes of water rounded to nearest 1,000 AF where combination of metered and estimated, or just estimated
The total volumes of water rounded to nearest 100 AF where only metered
The total volumes of water extracted should only be considered accurate to the nearest 1,000 AF
Metered estimated accuracy is about 95%
Estimated urban and agricultural is about 70%

[Page Left Intentionally Blank]

3. Progress Toward GSP Implementation

The previous sections of this report provided information to evaluate the sustainability of the Subbasin. This section evaluates sustainable management criteria including chronic lowering of groundwater levels, reduction of groundwater storage, subsidence, groundwater quality, and surface water depletion. The GSAs furthered the assessment by evaluation of subsidence, groundwater quality and surface water depletion.

3.1 Chronic Lowering of Groundwater Levels

In general, the groundwater elevations observed in the Subbasin during WY 2023 show an increase across most portions of the Subbasin; due to this WY 2023 being classified as a wet year after WY 2021 and WY 2022 were classified as critically dry years.

Significant and undesirable results for chronic lowering of groundwater levels is defined in the GSP as:

> When 25 percent or more of the representative monitoring wells (5 out of 21 wells) record groundwater levels that exceed the minimum thresholds for more than 2 consecutive years that are categorized as non-dry years (below-normal, above-normal, or wet), according to the San Joaquin Valley Water Year Hydrologic Classification. The lowering of groundwater levels during consecutive dry or critically-dry years is not considered to be unreasonable, and would therefore not be considered an undesirable result, unless the levels do not rebound to above the thresholds following those consecutive non-dry years.

In WY 2023, 14 wells were monitored in the fall in both the Upper and Lower aquifers. Fall measurements are used for comparison to MTs. All representative monitoring wells were above their minimum thresholds (MTs) except one well in the Upper Aquifer as shown in **Table 3-1**. With only one well exceeding the MT no undesirable results occurred.

Of the 20 wells with spring measurements, averages were developed to provide a general sense as to whether the Subbasin groundwater levels would conservatively be above their minimum objectives in 2042. Spring measurements are used for comparison to MOs. The average is including two drought years and this one wet year. Ten wells are still below the MOs, all within 6 feet, except 1 which was 10 feet of reaching the MOs.

No domestic wells were reported to be dry in the Subbasin in WY 2023, providing additional confirmation that undesirable results are not occurring.

Table 3-1. Groundwater Elevations at Representative Monitoring Wells

Representative Wells				Groundwater Elevations (ft msl)						Average Spring (ft msl)	Above/Below MO (ft)
CASGEM ID	Local Name	Selected MTs (ft msl)	Selected MOs (ft msl)	Spring WY2021	Fall WY2021	Spring WY2022	Fall WY2022	Spring WY2023	Fall WY2023		
Upper Aquifer Wells											
377341N1213039W001	Well N	**5**	**7**	NM	NM	8.86	NM	15.86	NM	12.36	5.36
377061N1214199W001	Well Q	**55**	**57**	NM	NM	50.91	47.11	51.31	51.41	51.11	-5.89
377951N1216011W001	02S03E01D001M	**73**	**80**	78	77.1	77.77	NM	NM	NM	77.9	-2.12
377813N1214420W001	02S05E08B001M	**-7**	**0**	-0.7	-1.2	NM	-3.2	0.3	-0.2	-0.2	-0.20
377976N1214560W001	01S05E31R002M	**-1**	**0**	0.2	0.6	NM	-1.4	1.1	1.1	0.65	0.65
376388N1213233W001	03S06E28N001M	**58**	**64**	62.54	61.44	60.14	NM	NM	NM	61.34	-2.66
377528N1215156W001	02S04E15R001M	**43**	**48**	55.41	NM	59.41	51.41	53.91	54.41	56.24	8.24
377979N1215800W001	01S04E31P005M	**41**	**45**	40.99	41.54	41.06	NM	NM	NM	41.03	-3.97
378103N1215449W001	ORL-1W	**-3**	**-1**	NM	NM	NM	NM	NM	NM	--	--
378165N1213145W001	MWM-24	**-1**	**3**	3.86	2.91	3.15	3.89	6.78	3.38	4.60	1.60
377823N1213330W001	MWR-25	**3**	**4**	4.37	4.99	4.46	5.02	13.45	7.75	7.43	3.43
378287N1212673W001	SAD MW-402D	**-2**	**3**	3.79	0.3	3.24	1.67	5.16	1.67	12.19	9.19
378116N1212841W001	PW11-031	**0**	**4**	3.59	1.69	2.28	1.5	3.14	5.33	9.01	5.01
378130N1212758W001	PW16-216	**-19**	**0**	-5.43	0.79	-3.83	-3.34	3.55	2.65	-5.71	-5.71
Lower Aquifer Wells											
376713N1214581W001	Corral MW-6	**-60**	**-38**	-24.76	-28.08	-32.63	-36.56	-35.95	--	-31.11	7
377402N1214508W002	MW-1B	**-69**	**-20**	-23.72	-39.81	-31.20	-40.41	-18.78	-26.99	-24.57	-4.57
377031N1214485W002	MW-3B	**-40**	**-22**	-21.84	-47	-30.83	-43.34	-20.89	-28.36	-24.52	-3
377427N1213943W002	MW-5B	**-60**	**-17**	-17.34	-37.61	-25.84	-39.53	-14.66	-26.46	-19.28	-2.28
377656N1214199W002	MW-6B	**-67**	**-20**	-24.4	-34.85	-29.87	-35.4	-15.86	-24.24	-23.38	-3.38
376974N1213258W001	03S06E05R001M	**-33**	**-7**	-23.81	-43	-20.81	-47.11	-5.65	-21.61	-16.76	-10
378076N1212997W001	PW20-500	**-10**	**0**	0.31	-4	-2.33	-6.18	-3.14	--	-1.72	-2

Notes: Yellow highlight indicates Minimum Treshold exceeded

msl = mean sea level

3.2 Depletion of Storage

In general, the groundwater elevations observed in the Subbasin during WY 2023 rose across the Subbasin; due to WY 2023 being classified as a wet year, this increased groundwater storage basin wide.

Significant and undesirable result for the reduction of groundwater storage in the Tracy Subbasin is experienced if groundwater storage volumes are insufficient to satisfy beneficial uses within the Subbasin over the planning and implementation horizon of this GSP. Chronic lowering of groundwater levels is used as a proxy for this sustainable condition.

As discussed in Section 2.2 and shown on Figures in Section 2.8, groundwater in storage increased in WY 2023 after three years of drought, returning to pre-drought levels of storage.

3.3 Subsidence

Land subsidence is the lowering of the land surface. As described in the GSP, several human-induced and natural causes of subsidence exist, but the only process applicable to the SGMA are those due to lowered ground surface elevations caused by groundwater pumping. As described in Section 2.4 groundwater extractions were 60 percent lower in WY 2023 compared to previous water years.

Subsidence would be considered significant and undesirable, as defined in the GSP, as:

An increase from historic rates of subsidence in the Non-Delta Management Area caused by lowering of groundwater levels that impact infrastructure. The minimum threshold for land subsidence in the Subbasin is set at no more than 0.03 feet in any single year (October 1 – October

1 to match the water year) and a cumulative -0.13 feet in any 5-year period. The cumulative amount would exceed the estimation error in the InSAR data of 0.1 foot and would therefore be valid.

Land subsidence in the Subbasin is monitored using interferometric synthetic-aperture radar (InSAR) data collected *via* microwave satellite imagery provided by DWR. Historical subsidence was estimated using InSAR data provided by DWR. InSAR measures ground elevation using microwave satellite imagery data.

The GSP documents minor subsidence in the Subbasin using data provided by DWR depicting the difference in InSAR measured ground surface elevations between October 1, 2022 through October 1, 2023 as processed by DWR.[2] These data show that subsidence of -0.1 to +0.1 feet occurred in the Subbasin shown in **Figure 3-1**. The estimation error of the InSAR data is 0.1 foot. Therefore, undesirable results have not occurred during WY 2023 or in the previous two water years as they had similar rates of +0.1 to -0.1 feet/year.

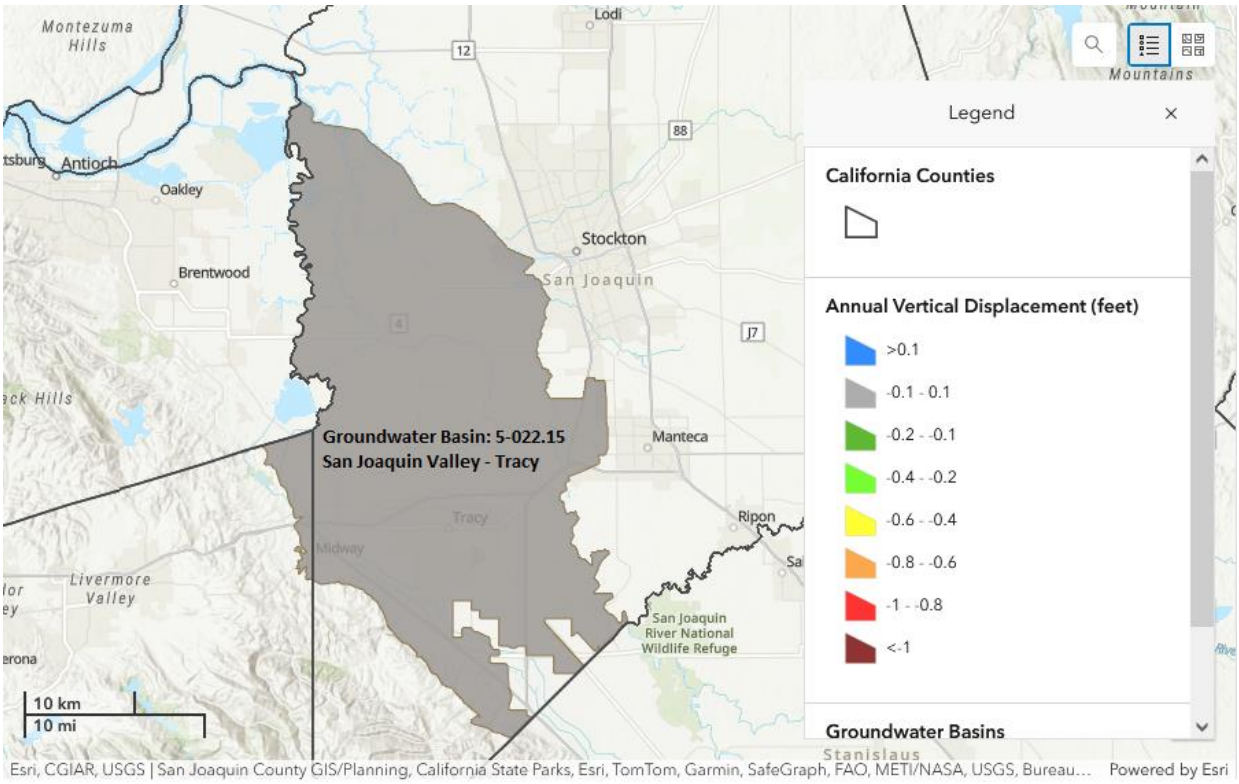


Figure 3-1. Lower Aquifer – InSAR Subsidence

2 https://storymaps.arcgis.com/stories/41574a6d980b4e5d8d4ed7b90f9698d2?utm_medium=email&utm_source=govdelivery

3.4 Interconnected Surface Water

Surface water depletion was based on exceedances of groundwater level minimum thresholds established at representative wells.

Significant and undesirable results would be if groundwater levels in 25 percent of the representative monitoring wells in normal years, excluding drought years, would decline below the minimum thresholds for 2 consecutive years.

Minimum thresholds were established at 10 representative monitoring wells in both the Upper and Lower Aquifers for surface water depletion. Fall measurements are used for comparison to MTs. Representative monitoring wells were established in the Lower Aquifer due to the unknown extent of the Corcoran Clay beneath the Delta Management Area. Three wells were not monitored in 2023, wells ORL-1W, Well N (fall 2023), and 01S04E31P005M. **Table 3-2** shows a comparison of MTs and fall 2022 groundwater elevations. No wells exceeded the MTs in WY 2023.

Spring measurements are used for comparison to MOs. Of the 8 wells with spring measurements, spring averages were developed to obtain a general sense as to whether the Subbasin groundwater levels would conservatively be above their MOs in 2042. The average is including two drought years and this one wet year. One well in the Upper aquifer and three in the Lower aquifer are below their MOs but by less than 5 feet, as shown in **Table 3-2**.

Table 3-2. Summary of Surface Water Depletion

Representative Wells for Surface Water Depletion											
CASGEM ID	Local Name	Minimum Thresholds (ft amsl)	Selected MOs (ft msl)	Spring WY2021	Fall WY2021	Spring WY2022	Fall WY2022	Spring WY2023	Fall WY2023	Average Spring (ft msl)	Above/Below MO (ft)
Upper Aquifer Wells											
377341N1213039W001	Well N	5	7	NM	NM	8.86	NM	15.86	NM	12.36	5.36
377813N1214420W001	02S05E08B001	-7	0	-0.7	-1.2	NM	-3.2	30	-0.2	14.65	14.65
377976N1214560W001	01S05E31R002	-1	0	0.2	0.6	NM	-1.4	1.1	1.1	0.65	0.65
378165N1213145W001	MWM-24	-1	3	3.86	2.91	3.15	3.89	6.78	3.38	4.60	1.60
377823N1213330W001	MWR-25	3	4	4.37	4.99	4.46	5.02	13.45	7.75	7.43	3.43
378103N1215449W001	ORL-1W	-3	-1	NM	NM	NM	NM	NM	NM	---	---
377979N1215800W001	01S04E31P005M	41	45	40.99	41.54	41.06	NM	NM	NM	41.03	-3.97
Lower Aquifer Wells											
377402N1214508W002	MW-1B	-69	-20	-23.72	-39.81	-31.2	-40.41	-18.78	-26.99	-24.57	-4.57
377427N1213943W002	MW-5B	-60	-17	-17.34	-37.61	-25.84	-39.53	-14.66	-26.46	-19.28	-2.28
377656N1214199W002	MW-6B	-67	-20	-24.4	-34.85	-29.87	-35.4	-15.86	-24.24	-23.38	-3.38

Notes: Cells highlighted in yellow are those that exceed the MT
ORL-1W not measured in WY 2022 by DWR or GSAs due to transfer of well

3.5 Groundwater Quality

Evaluation of the water quality sustainability indicator is achieved through monitoring of an existing network of supply wells in the Subbasin. Constituents of concern identified in the GSP that have the potential to impact suitability of water for public supply or agricultural use include salinity (as indicated by total dissolved solids), nitrate, and boron. Eight representative wells with construction details were selected to monitor water quality and have minimum thresholds established. Six of the wells are public water supply wells and two wells were selected from the Irrigated Regulatory Lands Program water quality monitoring network.

Undesirable results, that were determined to be significant and unreasonable for degraded water quality are:

- The average TDS concentration in representative monitoring wells increases and exceed the secondary upper drinking water MCL of 1,000 mg/L unless the concentration is already above the MCL

- The average nitrate concentration in representative monitoring wells to exceed the primary MCL of 10 mg/L

- The average boron concentrations to exceed the Long-Term Health Advisory level of 2.0 mg/L, in representative monitoring wells unless concentrations already are above this level

- When concentrations of TDS and nitrate in more than 25% of the representative monitoring wells increase above the MCL, agricultural water objective or Health Advisory level, unless the concentration already have been exceeded

Although groundwater quality is not a primary focus of SGMA, actions or projects undertaken by GSAs to achieve sustainability cannot degrade water quality to the extent that they would cause undesirable results. As stated in the GSP, groundwater quality in the Subbasin is generally poor, with few areas of good water quality. Total dissolved solids, nitrate, and boron were identified as constituents of concern and MTs were established. Eight wells were identified as representative monitoring wells with 6 of the wells being municipal water supply wells which may only sample for some constituents once every three years. **Table 3-3** provides a list of the wells and any water quality data that was available during WY 2023. None of the water quality constituents exceeded the MTs in WY 2023.

An average concentration for three years was developed to compare to MOs. **Table 3-3** provides a comparison of the average water quality to MOs. Two to three wells for each constituent are above their MOs. Groundwater management activities, implementing projects, are in the initial stages, so exceeding the MOs and MTs are not related to these activities.

Table 3-3. Summary of Groundwater Quality

TDS

PWS Code	Local Name	MT (mg/L)	MO (mg/L)	WY2021 (mg/L)	WY 2022 (mg/L)	WY2023 (mg/L)	Average (mg/L)	Above/Below MO (mg/L)
Upper Aquifer								
	SJCDW00032	1,210	1100	--	1300	--	1300	200
	SJCDW00034	1,320	1200	--	1430	--	1430	230
3910015-005	WELL 06	500	470	--	--	500	500	30
Lower Aquifer								
3910702-006	WSW009	1,000	733	521	535	494	517	216
3910011-003	PRODUCTION WELL 01	1,000	910	870	--	--	870	40
3910011-018	WELL 04R -NEW LINCOLN	1,000	850	750	--	--	750	100
3910011-032	PRODUCTION WELL 06	1,000	760	690	--	--	690	70
3910011-034	PRODUCTION WELL 07	1,000	830	760	--	--	760	70

Nitrate

PWS Code	Local Name	MT (mg/L)	MO (mg/L)	WY2021 (mg/L)	WY 2022 (mg/L)	WY2023 (mg/L)	Average (mg/L)	Above/Below MO (mg/L)
Upper Aquifer								
	SJCDW00032	10	7.8	11.0	11.0	--	11.0	3.2
	SJCDW00034	14	13.0	15.0	15.0	--	15.0	2.0
3910015-005	WELL 06	10	6.3	5.4	4.6	4.97	5.0	1.3
Lower Aquifer								
3910702-006	WSW009	10	2.0	1.3	0.81	0.73	0.9	1.1
3910011-003	PRODUCTION WELL 01	10	4.6	2.2	2.2	3	2.5	2.1
3910011-018	WELL 04R -NEW LINCOLN	10	3.0	2.1	1.3	--	1.7	1.3
3910011-032	PRODUCTION WELL 06	10	1.3	1.0	0.78	0.84	0.9	0.4
3910011-034	PRODUCTION WELL 07	10	1.9	1.6	1.5	1.3	1.5	0.4

Boron

PWS Code	Local Name	MT (mg/L)	MO (mg/L)	WY2021 (mg/L)	WY 2022 (mg/L)	WY2023 (mg/L)	Average (mg/L)	Above/Below MO (mg/L)
Upper Aquifer								
	SJCDW00032	4.2	3.8	--	4.7	--	4.7	0.9
	SJCDW00034	1.0	0.9	--	1.6	--	1.6	0.7
3910015-005	WELL 06	0.7	0.2	--	--	<0.1	0.1	0.1
Lower Aquifer								
3910702-006	WSW009	1.7	1.5	0.89	0.88	0.70	0.8	0.7
3910011-003	PRODUCTION WELL 01	2.9	2.6	2.4	--	--	2.4	0.2
3910011-018	WELL 04R -NEW LINCOLN	1.4	1.3	1.2	--	--	1.2	0.1
3910011-032	PRODUCTION WELL 06	1.5	1.4	1.2	--	--	1.2	0.2
3910011-034	PRODUCTION WELL 07	2.0	1.8	1.4	--	--	1.4	0.4

Note: NA = Not analyzed, no sample taken; TDS = total dissolved solids.
Cells highlighted in yellow are those that exceed the MT

3.6 Projects and Management Actions

The hydrologic conditions and hydrogeologic setting of the Subbasin and ongoing proactive water management have demonstrated the resilient nature of the Subbasin and avoidance of groundwater overdraft conditions. As a result, the DWR has designated the Subbasin as medium priority. The groundwater modeling with climate change and projections over the next 50 years showed that the Upper Aquifer has a deficit of 800 AFY, while the Lower Aquifer has a surplus of about 1,000 AFY (GEI 2021).

One project was identified to expand BCID service area to maintain sustainability of the Upper Aquifer. One management action was included in the GSP to evaluate and consider revising the San Joaquin County well ordinance to provide more protection for domestic wells, GDEs and surface water.

The status of each project and management action is described below.

3.6.1 Project #1: Reduction of Groundwater Pumping

This conjunctive use project consists of expansion of the BCID distribution facilities to provide surface water to up to 2,000 acres of agricultural land that is currently solely reliant on groundwater. The project requires construction of new lateral pipelines, establishment of new turnouts to deliver water to the agricultural properties, and enlargement of a pump station tied to an existing main lift canal. The expansion of the distribution facilities project is currently under review by BCID Board of Directors. Construction was expected to begin in 2023 and be completed by 2030.

In WY 2022, BCID sought to improve groundwater levels by construction of Phase 1 of the project, which included about 6,800 linear feet of 36-inch diameter pipeline to serve 340 acres of farmland with surface water and began providing surface water in July 2022. This portion of the project was projected to reduce pumping by an average of 600 AFY. In the last two years the project has reduced groundwater pumping by 530 AF in WY 2022 (only a partial year) and by 760 AF in WY 2023, meeting a portion of the forecasted future overdraft deficit.

BCID in WY 2023 submitted and was awarded $10 million dollars through a Proposition 1, Round 2, DWR sponsored grant program to help to fund the remaining project buildout. This funding will provide about 17,000 linear feet of additional pipeline to expand the conjunctive use program. The project is to be completed by April 2026, 4 years earlier than the projected completion date in the GSP.

BCID has informed the public about the project and funding award at their monthly Board meeting and also during the public workshop to present the WY 2022 Annual report. Additional outreach is planned in WY2023 along with release of draft CEQA documents to continue outreach and engagement of the public.

3.6.2 Management Action #1: Modify Well Ordinance

This management action may consist of revising San Joaquin County Well Ordinance to create surface water protection zones near rivers, canals, and sloughs in the Non-Delta Management Area. Minimum sanitary seal and screen depth requirements could be developed to limit wells from using shallow aquifers directly connected to surface water. The management action will require development of technical information to support the development of protection zones and modification of the Well Ordinance. Exemptions may be allowed for replacement of existing wells. The well ordinance may also be modified to include special study requirements for high-capacity wells to assess their potential effects on nearby domestic wells.

San Joaquin County Environmental Health Department (SJCEHD) well permitting agency developed an approach to the Governor's Executive, Action 9.a and 9.b, which required implementation of temporary requirements for approval of well permits. To address Action 9.b requirements, SJCEHD developed a simple distance-drawdown curve with various pumping rates to assess whether nearby wells could be affected by pumping of a new well. Additional meetings with SJCEHD are planned for WY 2024 to continue to explore long-term potential improvements, potentially keeping the develop approach after the EO is rescinded and using it for new wells near

surface water. On February 13, 2023, Governor Newsom signed Executive Order N-3-23 (the "Order"), which aims to enhance water supply resilience in the state and modified slightly Order N-7-22.

New California Well Standards were expected to be originally released in Spring 2023 with the final in Fall 2023 which will require adoption of local well ordinances to meet the minimum standards. The revised schedule is for release of a public draft in Fall 2024. SJCEHD could potentially include a permanent version of Action 9.b along with proposed surface water protection zones and special studies into their well ordinance at that time. The GSAs do not have authority to permit wells or adopt ordinances pertaining to them.

3.7 Other Information on Implementing Progress

The GSA agencies in the Subbasin have agreed to work together to protect the groundwater resources of the Subbasin to meet the current and future beneficial uses in the Subbasin by developing a GSP during WY 2022 that conforms with the requirements of SGMA.

This section describes the project and management actions from the GSP that are in progress, recently implemented, or anticipated in the Subbasin to maintain sustainability. It also includes public outreach activities.

3.8 Public Involvement

The Tracy Subbasin GSAs held seven regular Coordination Committee meetings during WY 2023. The Coordination Committee meetings are open to the public and held monthly over Zoom from January through June, and quarterly in October and December. Meetings are publicly noticed in compliance with Brown Act requirements.

The agendas for these meetings primarily focus on:

- Approval of the minutes from the previous meetings;
- Round robin updates from each GSA representative on the status of GSP implementation, including updates on projects and management actions, efforts to pursue funding and resources to support sustainable groundwater management activities, updates on local groundwater conditions, and other coordination needs;
- Presentations from the technical consultant staff on progress towards GSP implementation; and
- Inter-basin coordination updates from neighboring subbasins on GSP implementation activities.

The WY 2022 Draft Annual Report was presented and discussed with the GSAs during the January 19, February 16, and March 23, 2023 Coordination Committee Meetings. The document was approved by the Subbasin GSAs in March under the condition that comments and edits discussed during the meeting or received via email from the GSA representatives would be incorporated

prior to finalization and submittal to DWR by April 1. The final Annual Report was presented to the GSAs during the April 20, 2023 Coordination Committee meeting.

As mentioned in the WY 2022 Annual Report, in accordance with the GSP, an update to the Subbasin's Communication and Engagement Plan was initiated. That document was finalized and approved by the GSAs during the December 15, 2022 Coordination Committee meeting.

The Public Outreach and Engagement Table included within **Appendix D** summarizes all outreach and engagement activities that occurred in the Tracy Subbasin during WY 2023.

3.9 Progress Toward Corrective Actions

No progress toward corrective actions was made as DWR had not approved of the GSP in WY 2023.

3.10 Progress Toward Filling Data Gaps

The GSAs identified in the GSP data gaps in their monitoring network, hydrogeologic conceptual model, and uncertainties in the groundwater model.

3.10.1 Expanded Groundwater Monitoring Network

Five new monitoring well locations have been selected and applications were submitted to DWR's Technical Support Services in September 2022. In WY 2023, further progress was made with the landowners entering into agreements to allow DWR to construct the wells. Land for a sixth well may be acquired as part of Project #1 described above and is being explored to potentially include in the monitoring network.

DWR constructed one monitoring well (MW-203) near the end of WY 2023. DWR plans to return and construct MW-201 and MW-204 in early 2024, WY2024.

3.10.2 Purchase and Install Transducers

Purchase of transducers for three wells to improve the correlation of groundwater to surface water. The transducers have not been purchased or installed.

3.10.3 Groundwater Dependent Ecosystems

The Natural Communities Commonly Associated with Groundwater (commonly known as NCCAG) identified potential Groundwater Dependent Ecosystems (GDEs). The potential GDE areas have not been validated. Evaluation of potential GDEs with the depth to groundwater are scheduled to begin in WY 2024.

3.10.4 Improve Groundwater Quality Monitoring Network

The GSP, identified 125 community and small community water supply wells in the Subbasin with water quality data but only 50 of the wells had well construction details to identify which aquifer they extract water from. The GSP indicated that within the next 5 years, construction details will be located so that water quality results can be sorted by principal aquifers to improve the distribution of representative monitoring wells for water quality and trend assessment in the

Subbasin. Well construction details are being obtained from the Division of Drinking Water and San Joaquin County to perform this evaluation. The evaluation will be completed in WY2024.

3.10.5 C2VSim Improvements

The GSAs, in their GSP, identified multiple items that could potentially improve C2VSim-FG_v1.0 and make the model more useful for the Subbasin. In January 2023, the GSAs met with DWR to discuss the updates to the C2VSim-FG_v1.0. The revised copy is expected to be released in Spring 2024 and provided them with water supply information to use in the model update.

4. Summary of Progress toward Meeting Subbasin Sustainability

The GSAs have begun to resolve data gaps by submitting five applications for groundwater level monitoring wells to Technical Support Services. One nested set of monitoring wells were constructed in the Subbasin in early WY 2024. No other progress towards filling other gaps were made in WY 2023. The GSAs are adjusting their monitoring of groundwater levels to improve upon the regularity to obtain groundwater level measurements.

Groundwater levels rose across most of the Subbasin. Groundwater MTs for chronic lowering of groundwater levels were exceeded at one well in the Non-Delta Management Area in fall 2023, but this did not produce undesirable results as defined in the GSP. There was an associated increase in groundwater in storage. The evaluation of other sustainability indicators did not result in any exceedances of MTs.

Progress has been made toward implementing Project #1: Reduction of Groundwater Pumping (*refer to* **Section 3.6.1**). Partial implementation to provide surface water to areas that were solely reliant on groundwater was completed in WY 2022. This has reduced groundwater pumping is the Upper Aquifer by about 600 AFY, almost fully resolving the projected deficit of over 700 AF in WY 2023.

Actions are underway to collect data, improve the monitoring and data collection networks, and coordinate coordination with adjacent GSAs.

[Page Left Intentionally Blank]

5. References

Hotchkiss, W. R., and G.O. Balding. 1971. Geology, hydrology, and water quality of the Tracy-Dos Palos area, San Joaquin Valley, California. U.S. Geological Survey. Open-File Report. Hotchkiss and Balding. 1971. https://pubs.er.usgs.gov/publication/ofr72169. Accessed. March 8, 2023.

California Department of Water Resources (DWR). Reprinted 1995. Sacramento Delta San Joaquin Atlas. https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/exhibit3/rdeir_sdeis_comments/RECIRC_2646_ATT%203.pdf. Accessed. March 8, 2023.

_____. California Cooperative Snow Surveys, WATER SUPPLY INDEX (WSI) FORECASTS, 2022 Water Year Hydrologic Classification Indices http://cdec.water.ca.gov/reportapp/javareports?name=WSI. Accessed. March 8, 2023.

California Department of Water Resources (DWR) SGMA Data Viewer. https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions

EO N-3-23. Executive Department State of California. Executive Order N-3-23. https://www.gov.ca.gov/wp-content/uploads/2023/02/Feb-13-2023-Executive-Order.pdf?emrc=b12708

GEI Consultants, Inc. (GEI). 2007. Tracy Subbasin Groundwater Management Plan.

_____. 2021. Tracy Subbasin Groundwater Sustainability Plan.

_____. 2022. Tracy Subbasin WY 2021 Annual Report.

_____. 2023. Tracy Subbasin WY 2022 Annual Report.

Fetter, 1988. Applied Hydrogeology, Second Edition.

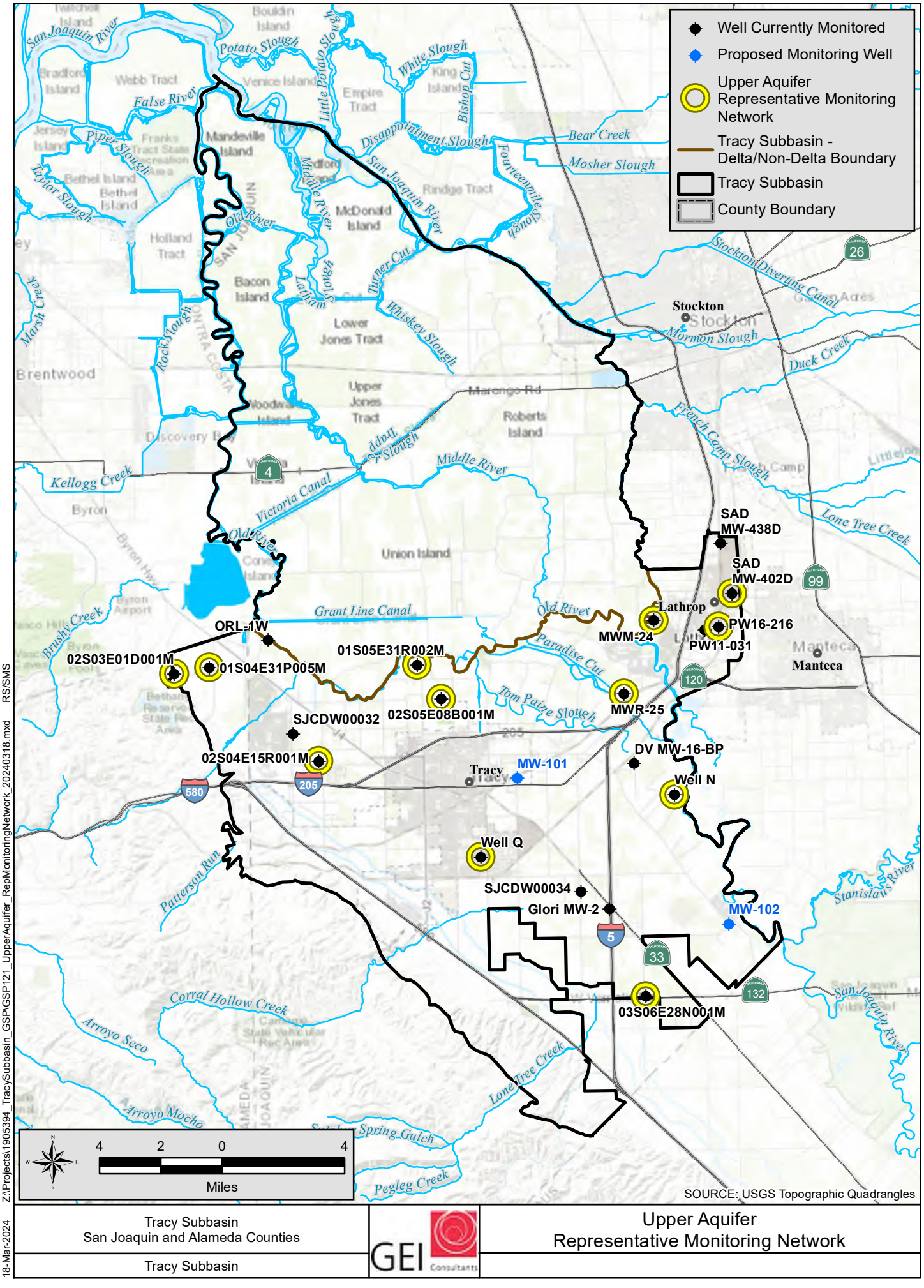
National Oceanic and Atmospheric Administration (NOAA). 2022.

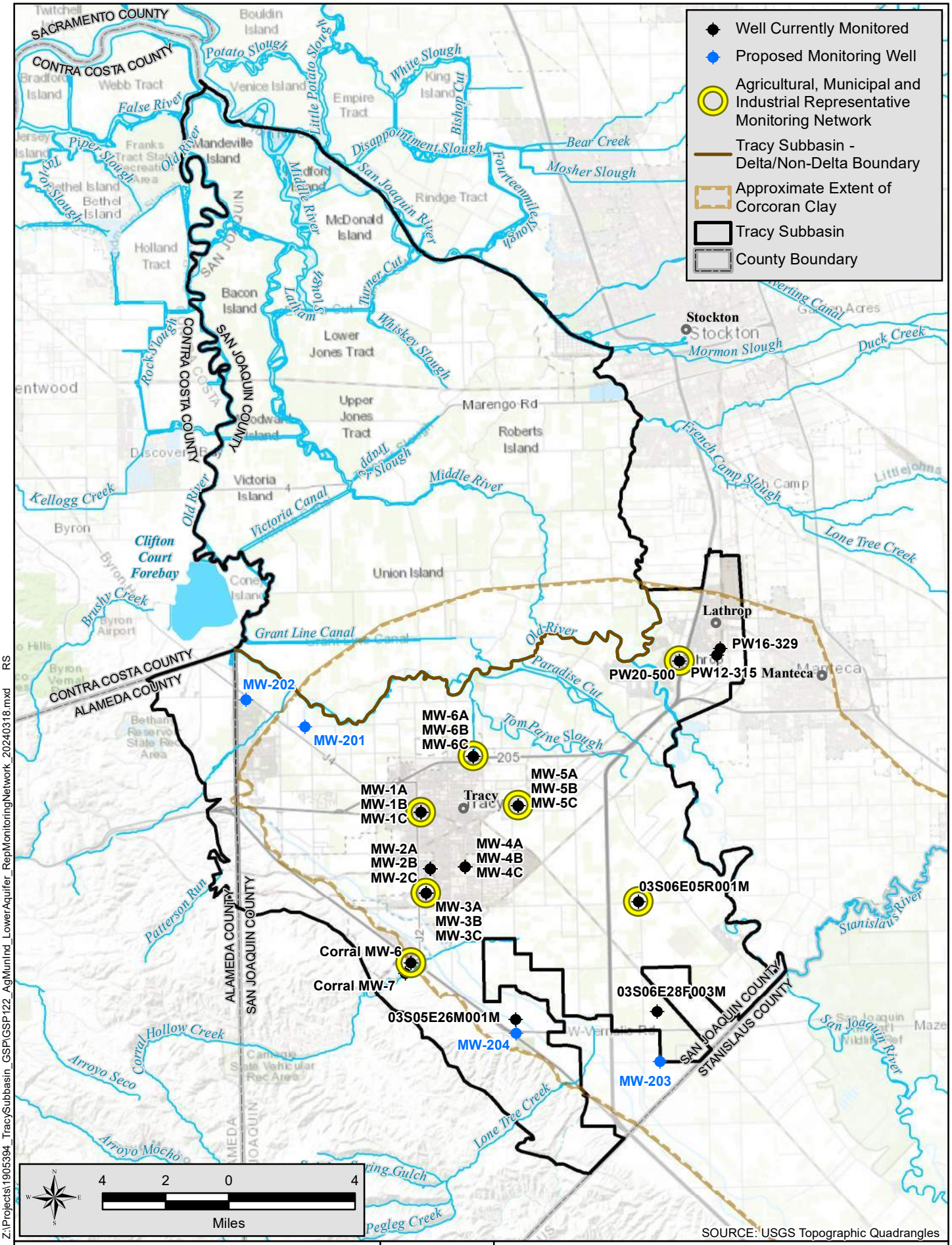
Padre and Associates, Inc. 2004. personnel communication with Mike Burke regarding aquifer testing at City of Tracy Well 8.

[Page Left Intentionally Blank]

Appendix A RMS Well Hydrographs

[Page Left Intentionally Blank]


Well Currently Monitored
Proposed Monitoring Well
Upper Aquifer Representative Monitoring Network
Tracy Subbasin - Delta/Non-Delta Boundary
Tracy Subbasin
County Boundary
ORL-1W
02S03E01D001M
01S04E31P005M
01S05E31R002M
02S05E08B001M
SJCDW00032
02S04E15R001M
MWM-24
MWR-25
SAD MW-438D
SAD MW-402D
PW16-216
PW11-031
DV MW-16-BP
Well N
Well Q
MW-101
MW-102
SJCDW00034
Glori MW-2
03S06E28N001M
Lathrop
Manteca
Tracy
Stockton
Union Island
Roberts Island
Lower Jones Tract
Upper Jones Tract
McDonald Island
Bacon Island
Mandeville Island
Bethel Island
Holland Tract
Webb Tract
Empire Tract
Rindge Tract
Brentwood
Byron
Discovery Bay
Old River
Middle River
Victoria Canal
Grant Line Canal
Paradise Cut
Tom Paine Slough
Turner Cut
Whiskey Slough
Mormon Slough
Stockton Diverting Canal
French Camp Slough
Lone Tree Creek
Duck Creek
Mosher Slough
Bear Creek
Disappointment Slough
Fourteenmile Slough
Bishop Cut
White Slough
Potato Slough
Little Potato Slough
San Joaquin River
False River
Piper Slough
Taylor Slough
Middle River
Latham Slough
Rock Slough
Marsh Creek
Kellogg Creek
Brushy Creek
Byron Hwy
Byron Airport
Patterson Pass
Corral Hollow Creek
Arroyo Seco
Arroyo Mocho
Spring Gulch
Pegleg Creek
Stanislaus River
4
2
0
4
Miles
SOURCE: USGS Topographic Quadrangles
Z:\Projects\1905394_TracySubbasin_GSP\GSP121_UpperAquifer_RepMonitoringNetwork_20240318.mxd
RS/SMS
18-Mar-2024
Tracy Subbasin
San Joaquin and Alameda Counties
Tracy Subbasin
GEI Consultants
Upper Aquifer
Representative Monitoring Network



Z:\Projects\1905394_TracySubbasin_GSP\GSP122_AgMunInd_LowerAquifer_RepMonitoringNetwork_20240318.mxd RS

18-Mar-2024

Tracy Subbasin
San Joaquin and Alameda Counties

Tracy Subbasin

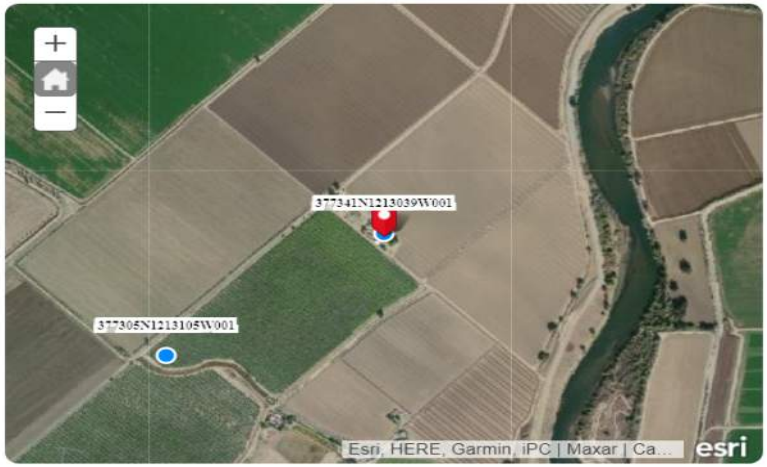
GEI Consultants

Representative Monitoring Wells for Lower Aquifer Agricultural, Municipal and Industrial Wells

Figure A-1. Well N

Site Code: 377341N1213039W001 **State Well Number:** 02S06E27E001M **Local Well Name:** Well N

Site Code: 377341N1213039W001
Local Well Name: Well N
State Well Number: 02S06E27E001M
Station ID: 6755
WCR Number:
Latitude: 37.73410
Longitude: -121.30390
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Residential
Well Completion Type: Single Well
Well Depth (feet bgs): 40
Top Perforation (feet bgs):
Bottom Perforation (feet bgs):
Ground Surface Elevation: 22.36
Reference Point Elevation: 23.36
Reference Point Description: None Provided
Station Comments: WELL CONSTRUCTION INFORMATION CONFIRMED AS OF: 2/1/2011



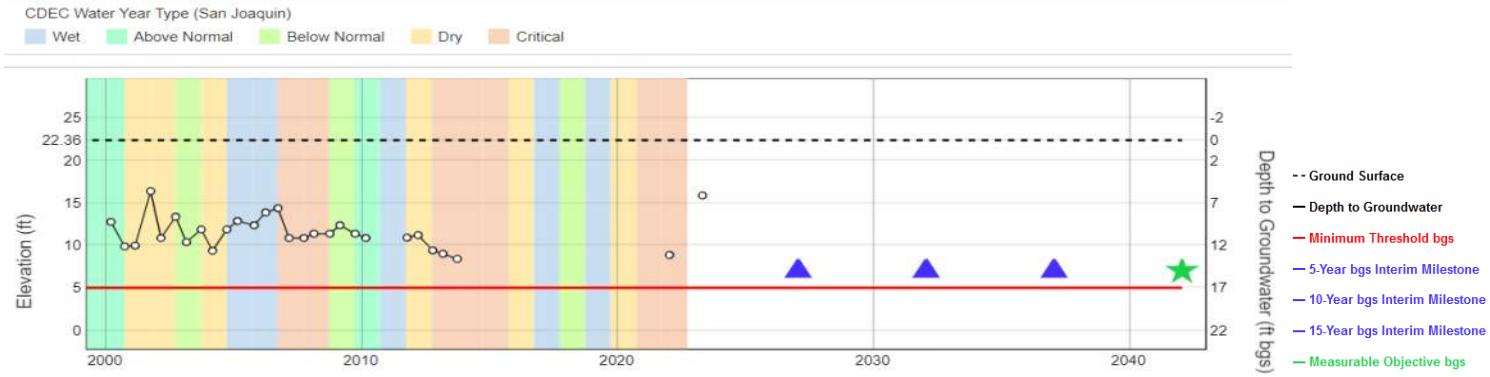
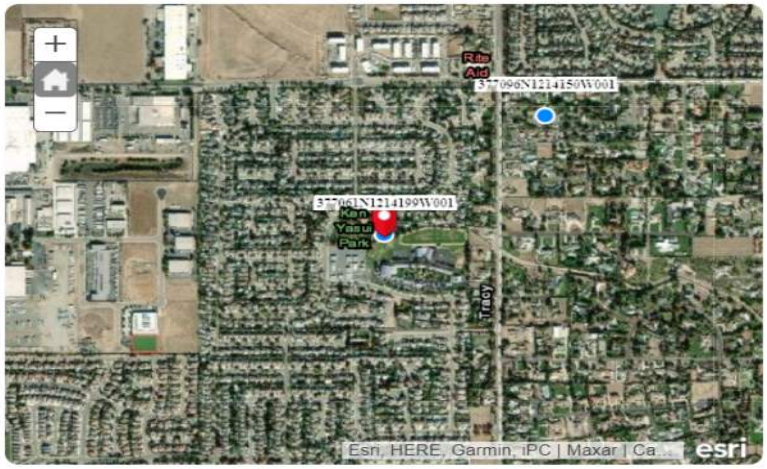


Figure A-2. Well Q

Site Code: 377061N1214199W001 **State Well Number:** 03S05E04H001M **Local Well Name:** Well Q

Site Code: 377061N1214199W001
Local Well Name: Well Q
State Well Number: 03S05E04H001M
Station ID: 2411
WCR Number:
Latitude: 37.70610
Longitude: -121.41990
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Residential
Well Completion Type: Single Well
Well Depth (feet bgs): 140
Top Perforation (feet bgs): 120
Bottom Perforation (feet bgs): 140
Ground Surface Elevation: 120.41
Reference Point Elevation: 121.41
Reference Point Description: None Provided
Station Comments: WELL CONSTRUCTION INFORMATION CONFIRMED AS OF: 4/23/2014 by TRB



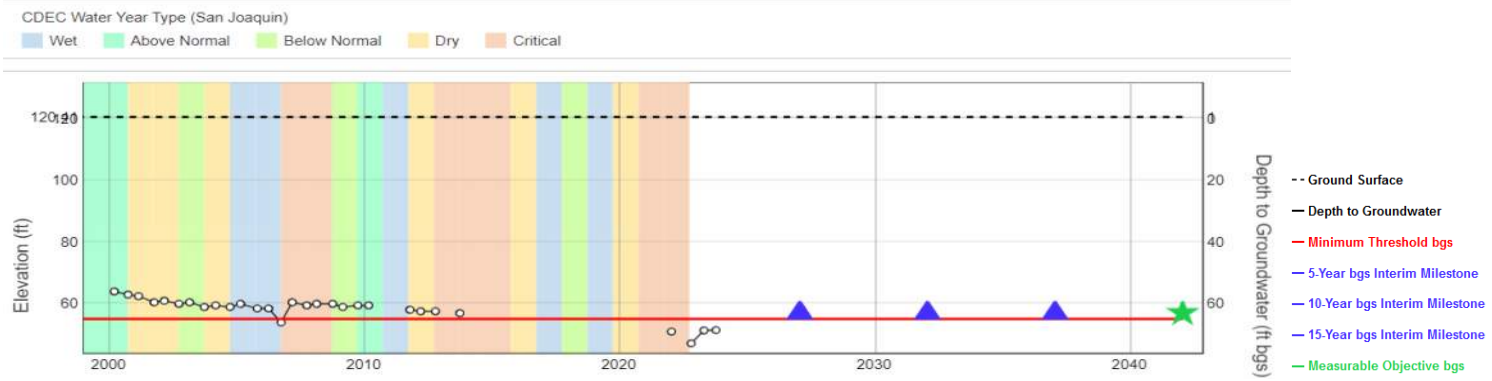
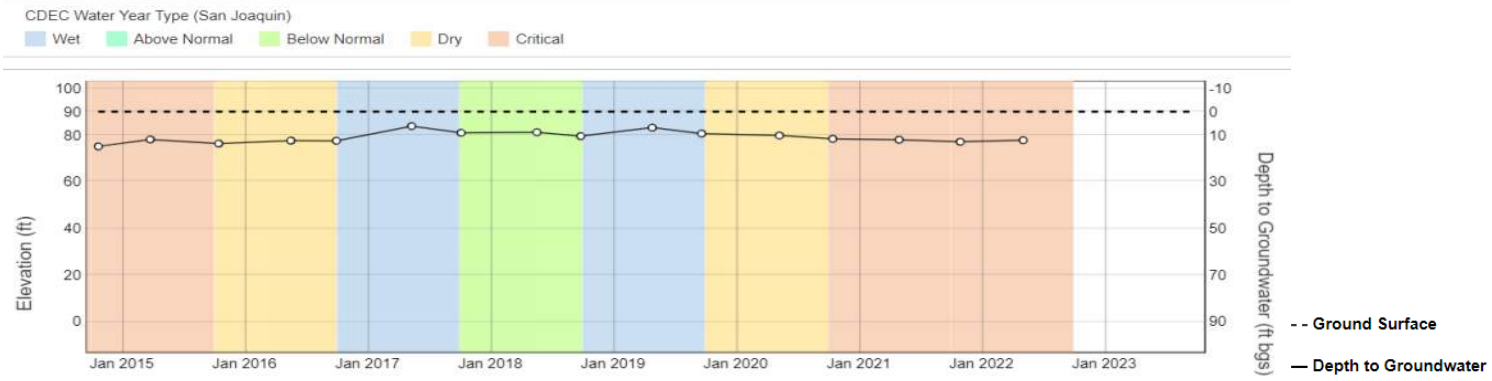


Figure A-3. 02S03E01D001

Site Code: 377951N1216011W001 **State Well Number:** 02S03E01D001M **Local Well Name:** 2S3E01D001

Site Code: 377951N1216011W001
Local Well Name: 2S3E01D001
State Well Number: 02S03E01D001M
Station ID: 50456
WCR Number:
Latitude: 37.79512
Longitude: -121.60111
Station Organization ID:
Station Organization Name:
Well Location Description: KELSO RD & BRUNS RD
Well Use Type: Irrigation
Well Completion Type: Single Well
Well Depth (feet bgs): 80
Top Perforation (feet bgs): 40
Bottom Perforation (feet bgs): 80
Ground Surface Elevation: 90
Reference Point Elevation: 90
Reference Point Description: Top of casing
Station Comments: IRRIGATION



Commented [FS1]: MO/MT not displaying on website

Commented [EP2]: No data uploaded for 2023.

Figure A-4. 02S05E08B001

Site Code: 377813N1214420W001 **State Well Number:** 02S05E08B001M **Local Well Name:** 02S05E08B001

Site Code: 377813N1214420W001
Local Well Name: 02S05E08B001
State Well Number: 02S05E08B001M
Station ID: 3016
WCR Number:
Latitude: 37.78130
Longitude: -121.44200
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Residential
Well Completion Type: Single Well
Well Depth (feet bgs): 80
Top Perforation (feet bgs): 50
Bottom Perforation (feet bgs): 80
Ground Surface Elevation: 4
Reference Point Elevation: 4.3
Reference Point Description: None Provided
Station Comments: WELL CONSTRUCTION INFORMATION CONFIRMED AS OF: 2/1/2011

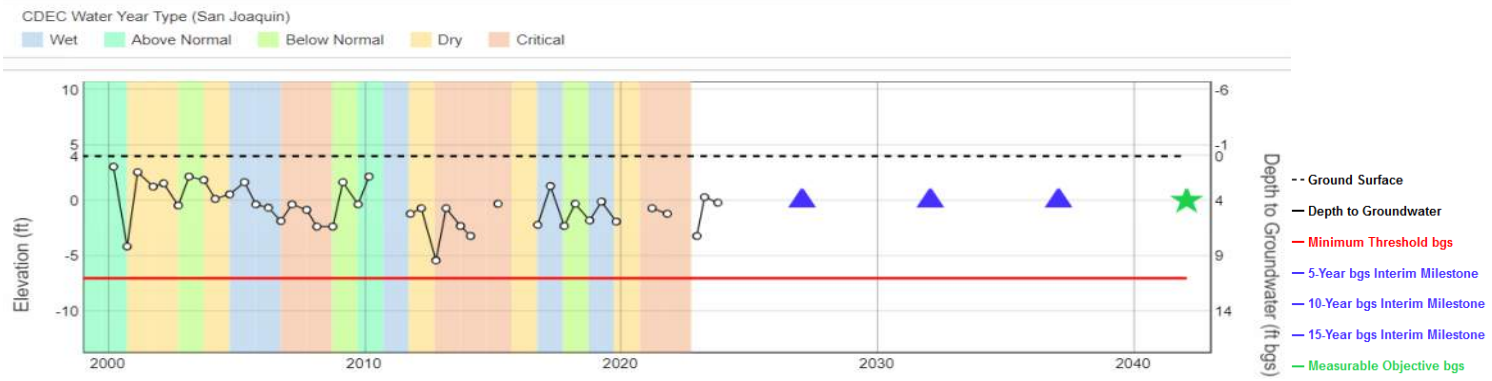
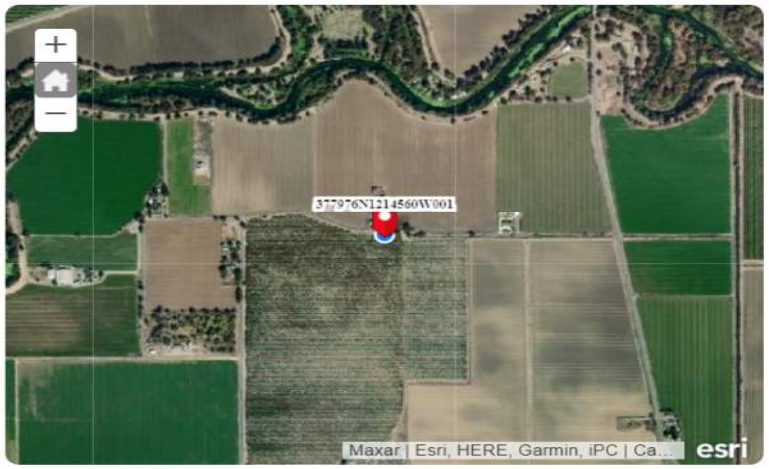


Figure A-5. 01S05E31R002

Site Code: 377976N1214560W001 **State Well Number:** 01S05E31R002M **Local Well Name:** 01S05E31R002

Site Code: 377976N1214560W001
Local Well Name: 01S05E31R002
State Well Number: 01S05E31R002M
Station ID: 26597
WCR Number:
Latitude: 37.79760
Longitude: -121.45600
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Residential
Well Completion Type: Single Well
Well Depth (feet bgs): 92
Top Perforation (feet bgs):
Bottom Perforation (feet bgs):
Ground Surface Elevation: 4
Reference Point Elevation: 4.6
Reference Point Description: None Provided
Station Comments: WELL CONSTRUCTION INFORMATION CONFIRMED AS OF: 2/1/2011



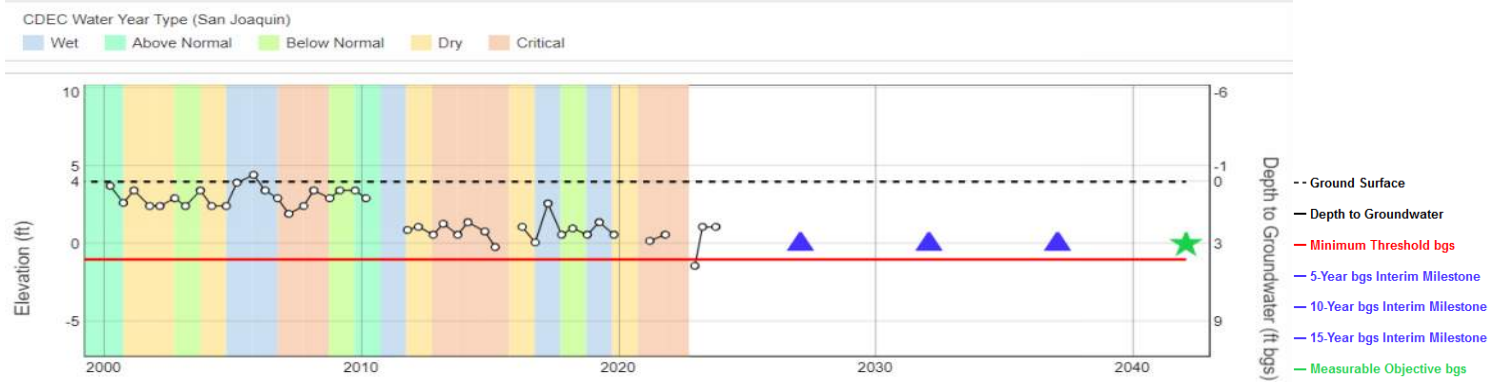
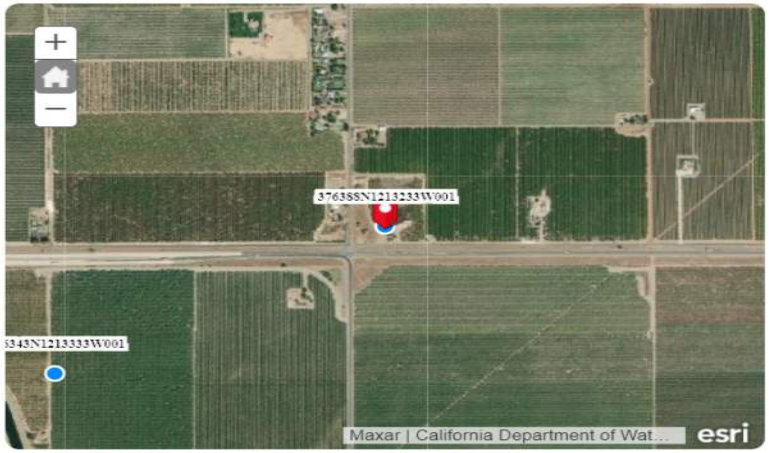
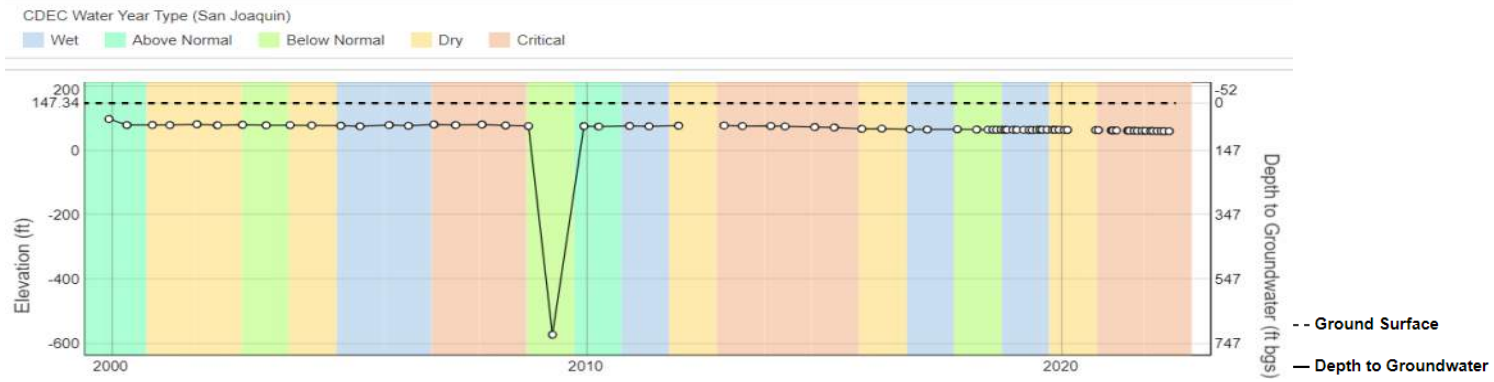


Figure A-6. 03S06E28N001M

Site Code: 376388N1213233W001 **State Well Number:** 03S06E28N001M **Local Well Name:** 03S06E28N001M

Site Code: 376388N1213233W001
Local Well Name: 03S06E28N001M
State Well Number: 03S06E28N001M
Station ID: 3132
WCR Number:
Latitude: 37.63880
Longitude: -121.32330
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Unknown
Well Completion Type: Single Well
Well Depth (feet bgs): 128
Top Perforation (feet bgs):
Bottom Perforation (feet bgs):
Ground Surface Elevation: 147.34
Reference Point Elevation: 148.24
Reference Point Description: None Provided
Station Comments: WELL CONSTR. INFO CONFIRM AS OF: 2/1/2011 Well was removed in Nov 2020 from DWR network due to lack of well constr details.





Commented [FS3]: MO/MT not displaying on website

Commented [EP4]: Not sure why.

Figure A-7. 02S04E15R001

Site Code: 377528N1215156W001 **State Well Number:** 02S04E15R001M **Local Well Name:** 02S04E15R001

Site Code: 377528N1215156W001
Local Well Name: 02S04E15R001
State Well Number: 02S04E15R001M
Station ID: 2999
WCR Number:
Latitude: 37.75280
Longitude: -121.51560
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Other
Well Completion Type: Single Well
Well Depth (feet bgs): 45
Top Perforation (feet bgs):
Bottom Perforation (feet bgs): 45
Ground Surface Elevation: 62.41
Reference Point Elevation: 63.41
Reference Point Description: None Provided
Station Comments: WELL CONSTRUCTION INFORMATION CONFIRMED AS OF: 2/1/2011

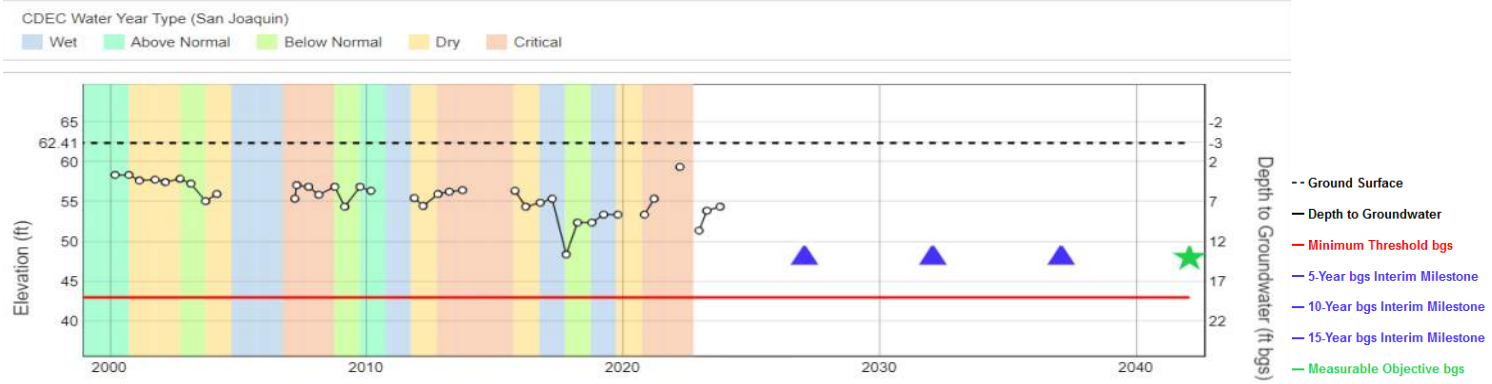
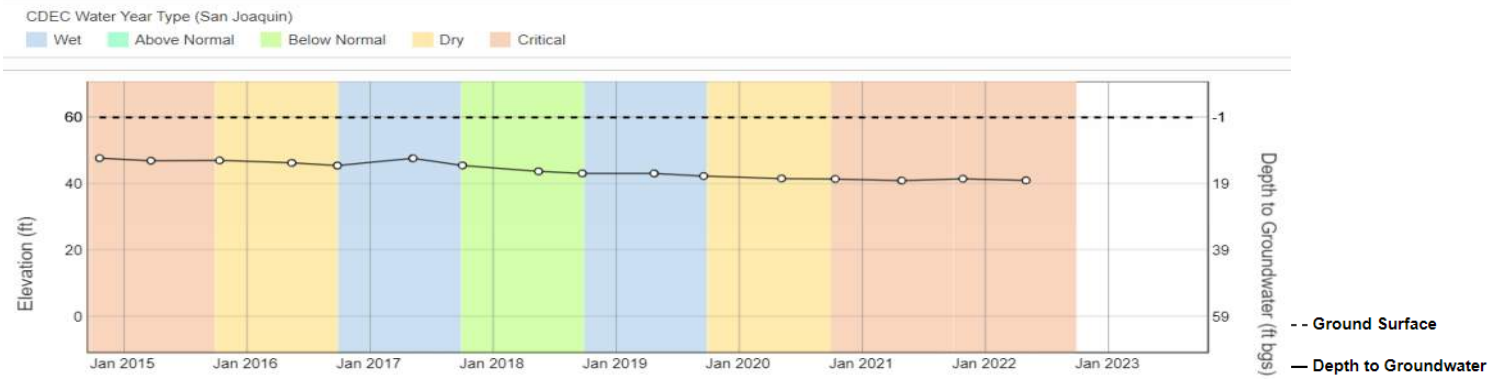


Figure A-8. 01S04E31P005

Site Code: 377979N1215800W001 **State Well Number:** 01S04E31P005M **Local Well Name:** 1S4E31P005

Site Code: 377979N1215800W001
Local Well Name: 1S4E31P005
State Well Number: 01S04E31P005M
Station ID: 50455
WCR Number:
Latitude: 37.79713
Longitude: -121.57940
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Single Well
Well Depth (feet bgs): 24
Top Perforation (feet bgs): 8
Bottom Perforation (feet bgs): 23
Ground Surface Elevation: 60
Reference Point Elevation: 60
Reference Point Description: Top of casing
Station Comments:



Commented [FS5]: MO/MT not displaying on website

Commented [EP6]: Not sure why….

Figure A-9. ORL-1W

Site Code: 378103N1215449W001 **State Well Number:** 01S04E28P002M **Local Well Name:** ORL-1W

Site Code: 378103N1215449W001
Local Well Name: ORL-1W
State Well Number: 01S04E28P002M
Station ID: 49536
WCR Number:
Latitude: 37.81031
Longitude: -121.54489
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Single Well
Well Depth (feet bgs): 106
Top Perforation (feet bgs): 86
Bottom Perforation (feet bgs): 106
Ground Surface Elevation: 13.7
Reference Point Elevation: 16.6
Reference Point Description: Top of Casing
Station Comments:

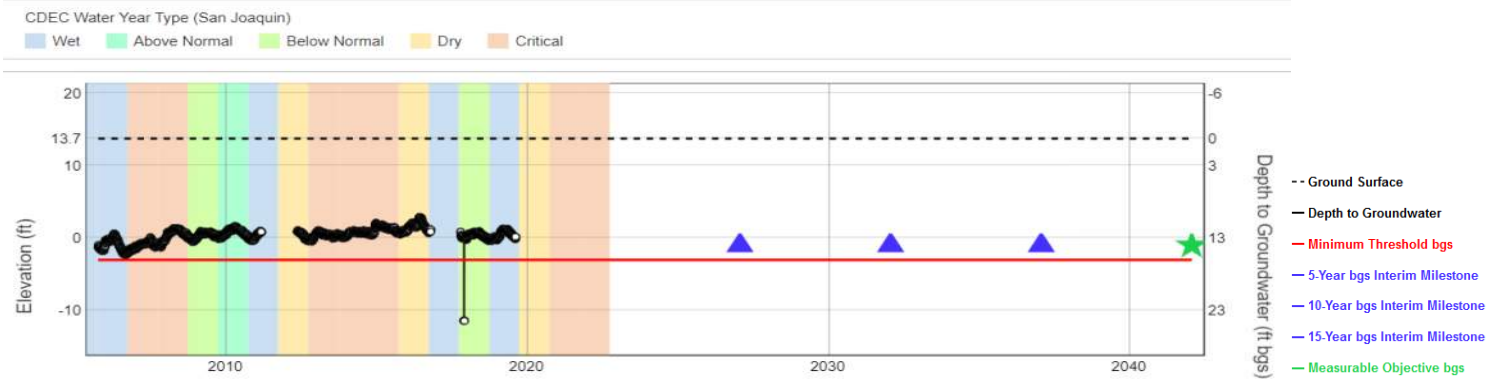


Figure A-10. MWM-24

Site Code: 378165N1213145W001 **State Well Number:** **Local Well Name:** MWM-24

Site Code: 378165N1213145W001
Local Well Name: MWM-24
State Well Number:
Station ID: 57576
WCR Number:
Latitude: 37.81657
Longitude: -121.31459
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Single Well
Well Depth (feet bgs): 21
Top Perforation (feet bgs): 10
Bottom Perforation (feet bgs): 20
Ground Surface Elevation: 16.75
Reference Point Elevation: 16.88
Reference Point Description: Top of Casing
Station Comments: GSE obtained through Google Earth on 1/20/2022

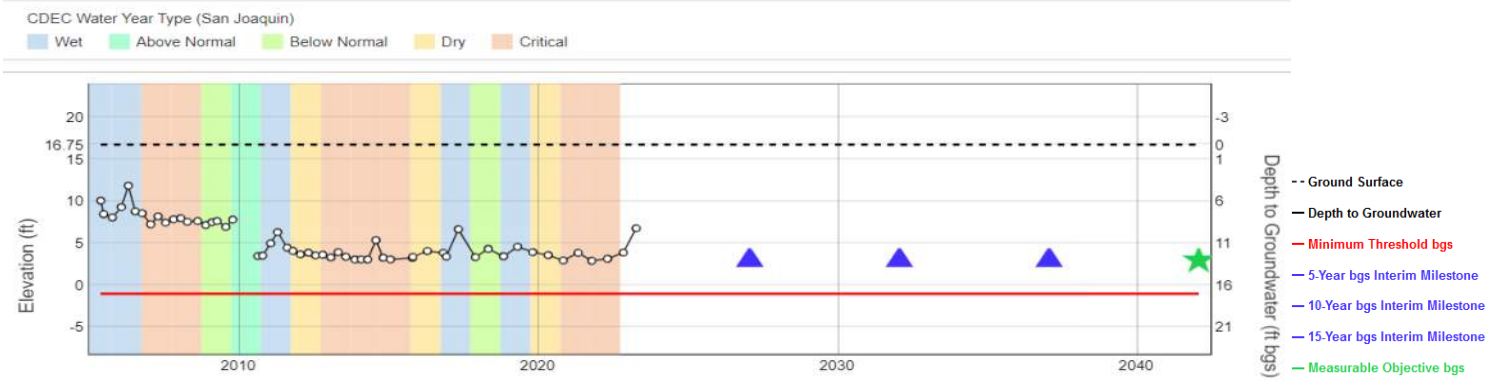


Figure A-11. MWR-25

Site Code: 377823N1213330W001 **State Well Number:** **Local Well Name:** MWR-25

Site Code: 377823N1213330W001
Local Well Name: MWR-25
State Well Number:
Station ID: 57577
WCR Number:
Latitude: 37.78232
Longitude: -121.33303
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Single Well
Well Depth (feet bgs): 22
Top Perforation (feet bgs): 11
Bottom Perforation (feet bgs): 21
Ground Surface Elevation: 16.15
Reference Point Elevation: 16.25
Reference Point Description: Top of Casing
Station Comments: GSE obtained through Google Earth on 1/20/2022

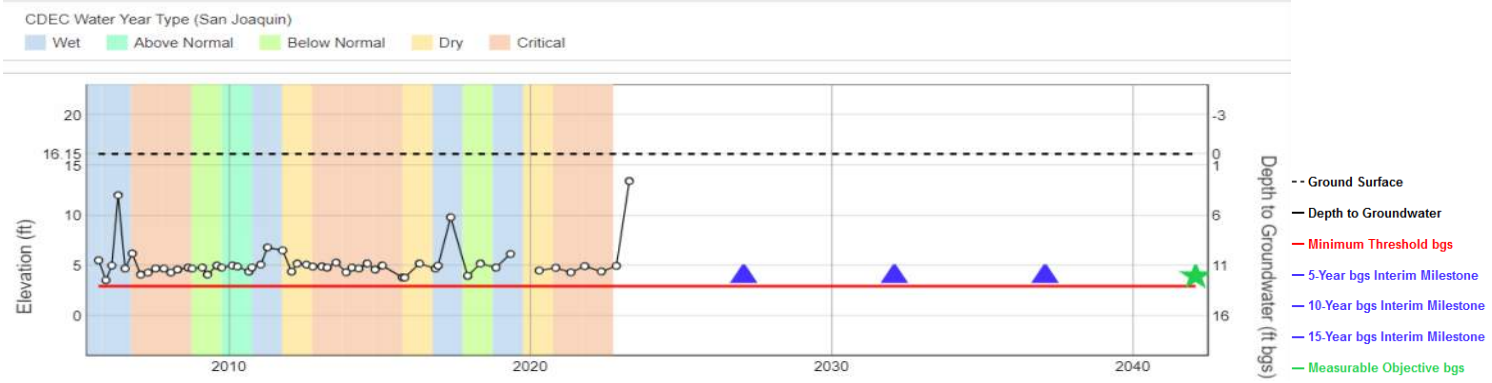


Figure A-12. SAD MW-402D

Site Code: 378287N1212673W001 **State Well Number:** **Local Well Name:** SAD MW-402D

Site Code: 378287N1212673W001
Local Well Name: SAD MW-402D
State Well Number:
Station ID: 57580
WCR Number:
Latitude: 37.82872
Longitude: -121.26737
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Single Well
Well Depth (feet bgs): 271
Top Perforation (feet bgs): 260
Bottom Perforation (feet bgs): 270
Ground Surface Elevation: 24.52
Reference Point Elevation: 24.52
Reference Point Description: Top of Casing
Station Comments: GSE obtained through Google Earth on 1/20/2022

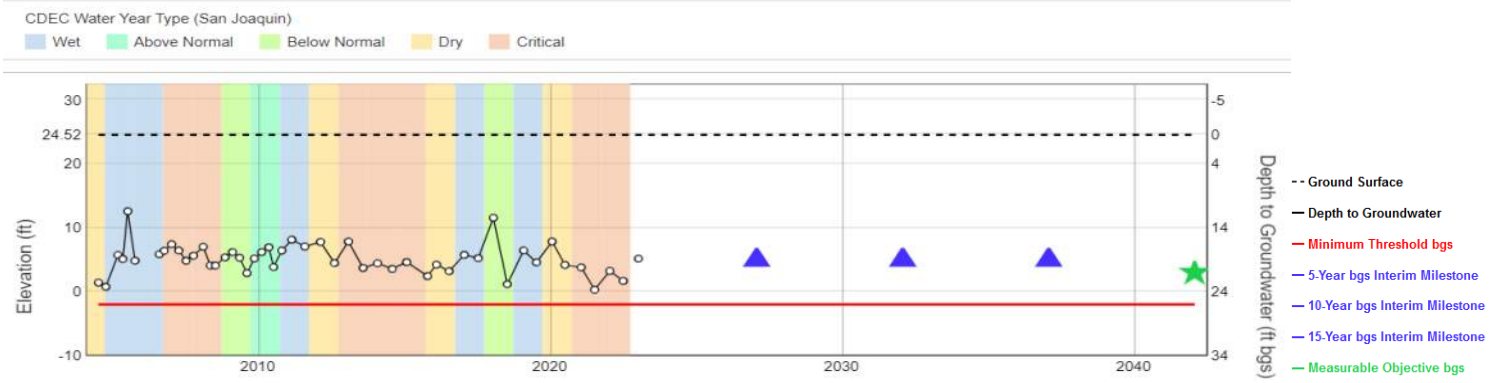


Figure A-13. PW11-031

Site Code: 378116N1212841W001 **State Well Number:** **Local Well Name:** PW11-031

Site Code: 378116N1212841W001
Local Well Name: PW11-031
State Well Number:
Station ID: 57578
WCR Number:
Latitude: 37.81163
Longitude: -121.28417
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Single Well
Well Depth (feet bgs): 31
Top Perforation (feet bgs): 23
Bottom Perforation (feet bgs): 28
Ground Surface Elevation: 20
Reference Point Elevation: 18.5
Reference Point Description: Top of Casing
Station Comments: GSE obtained through Google Earth on 1/20/2022

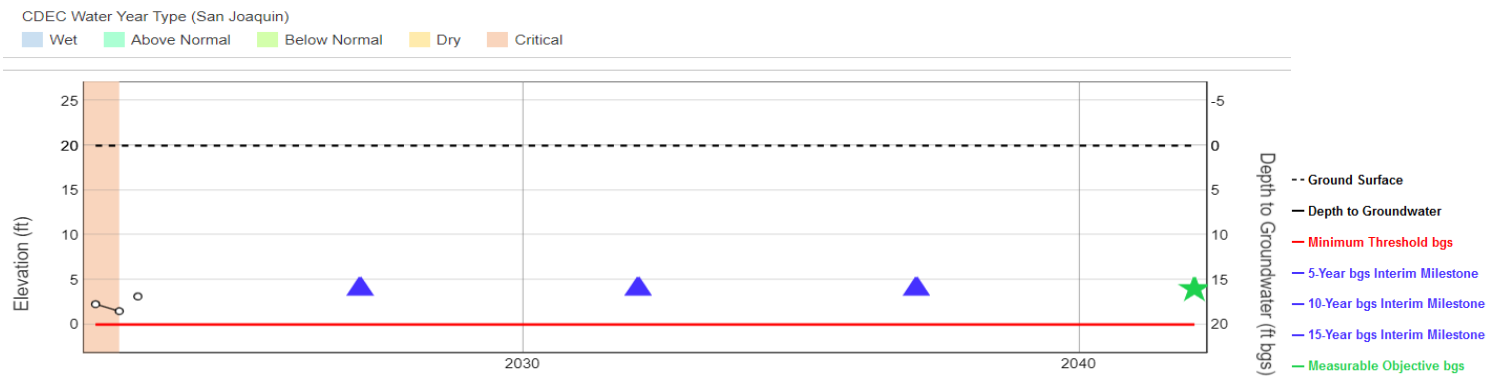


Figure A-14. PW16-216

Site Code: 378130N1212758W001 **State Well Number:** **Local Well Name:** PW16-216

Site Code: 378130N1212758W001
Local Well Name: PW16-216
State Well Number:
Station ID: 57579
WCR Number:
Latitude: 37.81305
Longitude: -121.27582
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Industrial
Well Completion Type: Part of a nested/multi-completion well
Well Depth (feet bgs): 216
Top Perforation (feet bgs): 208
Bottom Perforation (feet bgs): 213
Ground Surface Elevation: 23
Reference Point Elevation: 23.26
Reference Point Description: Top of Casing
Station Comments: GSE obtained through Google Earth on 1/20/2022

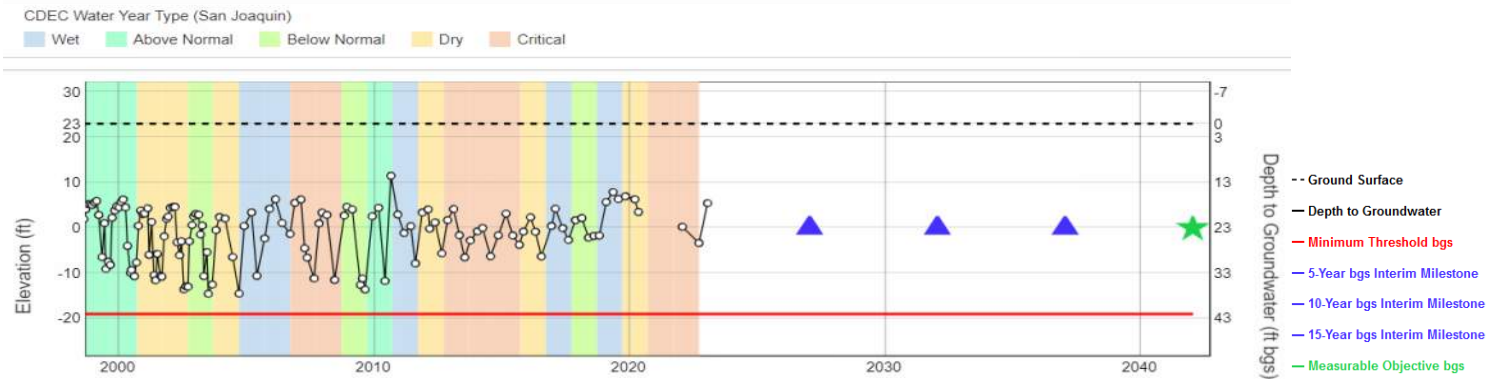


Figure A-15. Corral MW-6

Site Code: 376713N1214581W001 **State Well Number:** **Local Well Name:** Corral MW-6

Site Code: 376713N1214581W001
Local Well Name: Corral MW-6
State Well Number:
Station ID: 50727
WCR Number:
Latitude: 37.67127
Longitude: -121.45809
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Single Well
Well Depth (feet bgs): 477
Top Perforation (feet bgs): 455
Bottom Perforation (feet bgs): 475
Ground Surface Elevation: 300.33
Reference Point Elevation: 303.33
Reference Point Description: Top of casing
Station Comments:

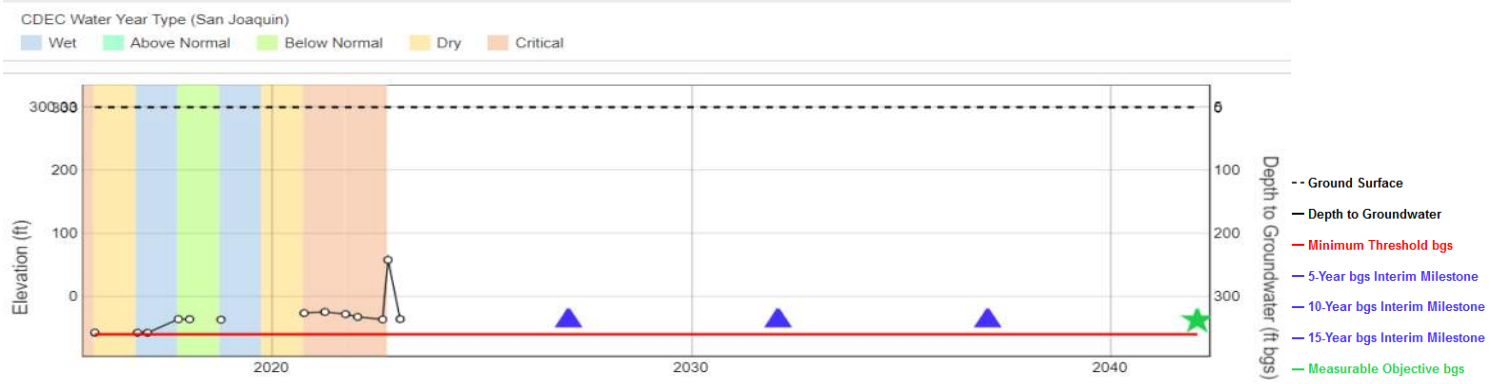
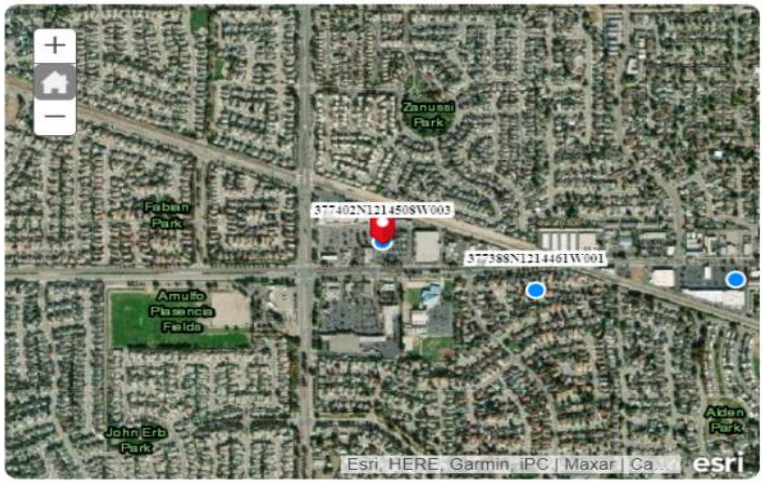


Figure A-16. MW-1B

Site Code: 377402N1214508W002 **State Well Number:** **Local Well Name:** MW-1B

Site Code: 377402N1214508W002
Local Well Name: MW-1B
State Well Number:
Station ID: 49252
WCR Number:
Latitude: 37.74019
Longitude: -121.45076
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Part of a nested/multi-completion well
Well Depth (feet bgs): 670
Top Perforation (feet bgs): 618
Bottom Perforation (feet bgs): 658
Ground Surface Elevation: 48.86
Reference Point Elevation: 50.09
Reference Point Description: Top of pipe
Station Comments:



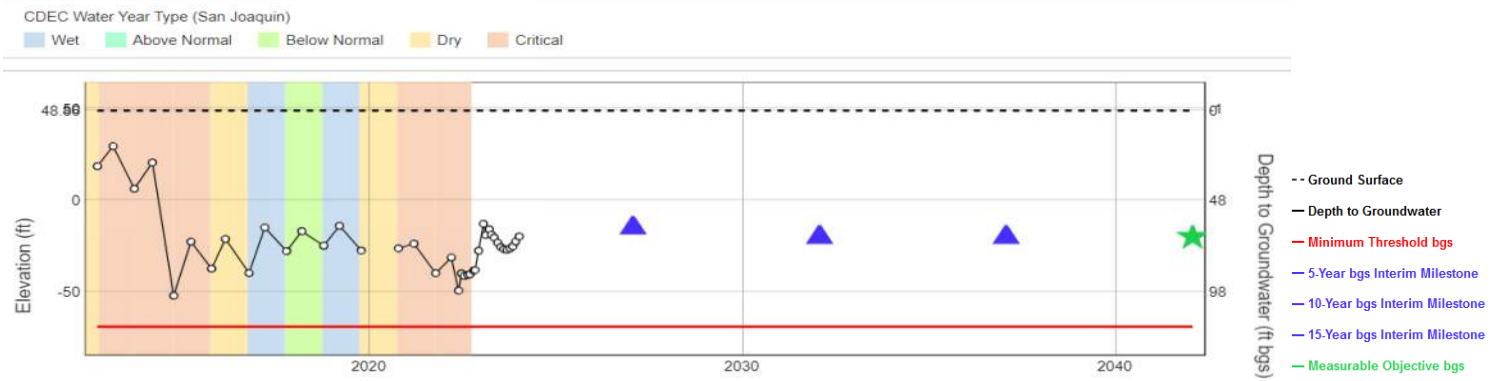


Figure A-17. MW-3B

Site Code: 377031N1214485W002 **State Well Number:** **Local Well Name:** MW-3B

Site Code: 377031N1214485W002
Local Well Name: MW-3B
State Well Number:
Station ID: 49258
WCR Number:
Latitude: 37.70306
Longitude: -121.44854
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Part of a nested/multi-completion well
Well Depth (feet bgs): 595
Top Perforation (feet bgs): 540
Bottom Perforation (feet bgs): 580
Ground Surface Elevation: 136.37
Reference Point Elevation: 138.08
Reference Point Description: Top of pipe
Station Comments:

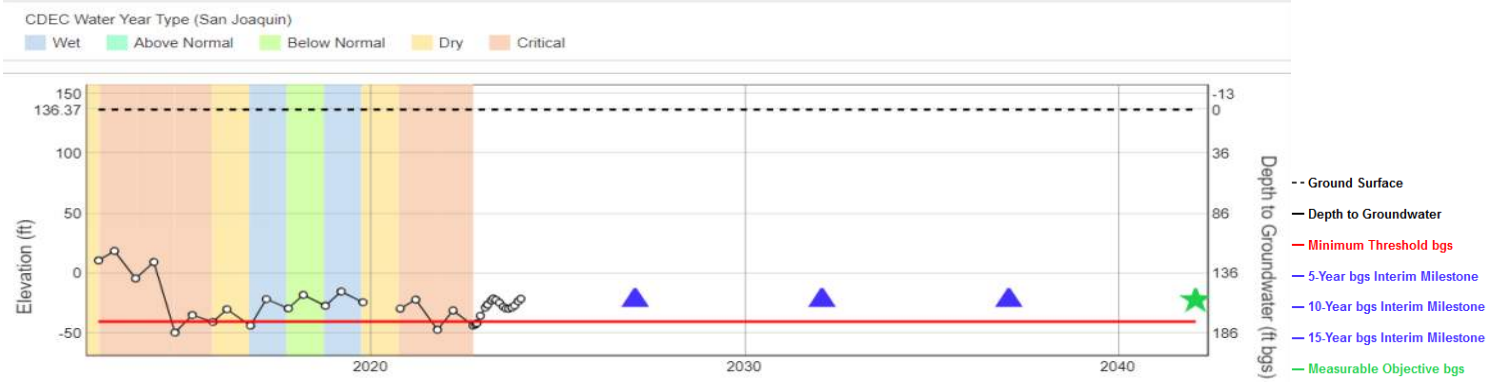


Figure A-18. MW-5B

Site Code: 377427N1213943W002 **State Well Number:** **Local Well Name:** MW-5B

Site Code: 377427N1213943W002
Local Well Name: MW-5B
State Well Number:
Station ID: 49264
WCR Number:
Latitude: 37.74266
Longitude: -121.39432
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Part of a nested/multi-completion well
Well Depth (feet bgs): 640
Top Perforation (feet bgs): 576
Bottom Perforation (feet bgs): 616
Ground Surface Elevation: 45.94
Reference Point Elevation: 47.82
Reference Point Description: Top of pipe
Station Comments:

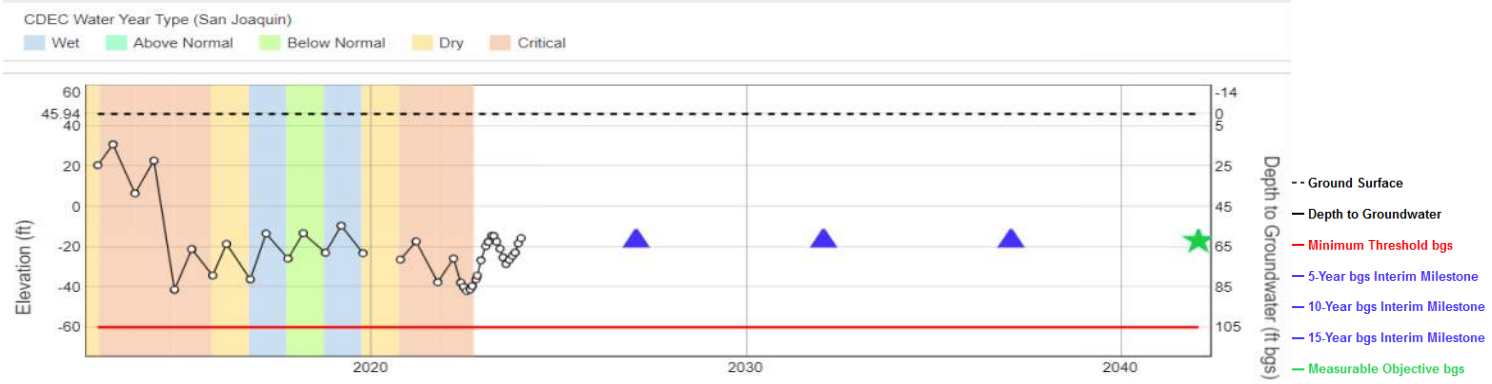


Figure A-19. MW-6B

Site Code: 377656N1214199W002 **State Well Number:** **Local Well Name:** MW-6B

Site Code: 377656N1214199W002
Local Well Name: MW-6B
State Well Number:
Station ID: 49267
WCR Number:
Latitude: 37.76563
Longitude: -121.41992
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Part of a nested/multi-completion well
Well Depth (feet bgs): 645
Top Perforation (feet bgs): 590
Bottom Perforation (feet bgs): 630
Ground Surface Elevation: 24.15
Reference Point Elevation: 26.65
Reference Point Description: Top of pipe
Station Comments:

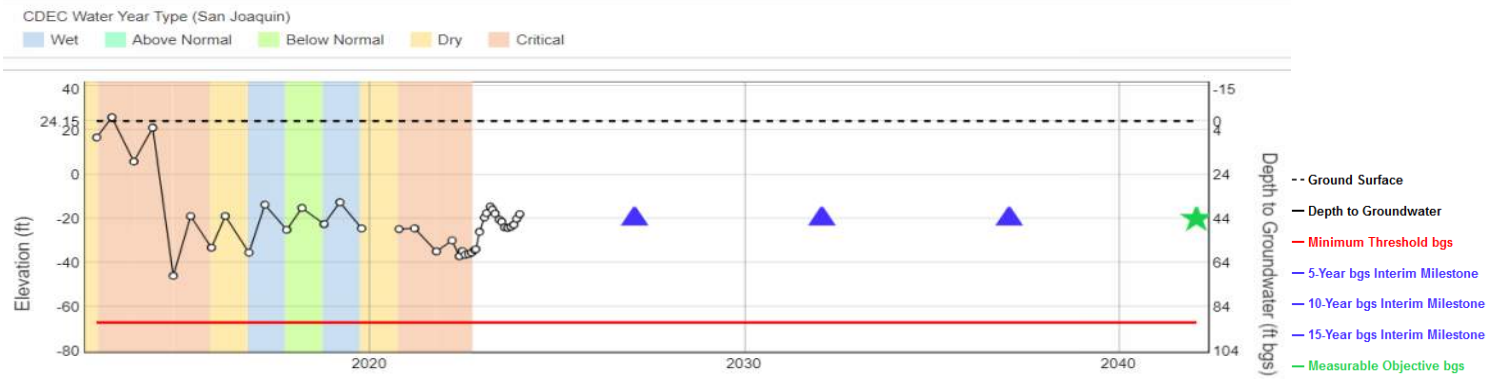


Figure A-20. 03S06E05R001M

Site Code: 376974N1213258W001 **State Well Number:** 03S06E05R001M **Local Well Name:** 03S06E05R001M

Site Code: 376974N1213258W001
Local Well Name: 03S06E05R001M
State Well Number: 03S06E05R001M
Station ID: 2441
WCR Number: WCR0089819
Latitude: 37.69725
Longitude: -121.32598
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Unknown
Well Completion Type: Single Well
Well Depth (feet bgs): 775
Top Perforation (feet bgs): 252
Bottom Perforation (feet bgs): 749
Ground Surface Elevation: 59.09
Reference Point Elevation: 59.69
Reference Point Description: None Provided
Station Comments: WELL CONSTRUCTION INFORMATION CONFIRMED AS OF: 5/22/2014 by TRB. DWR Surveyed well in 2022.

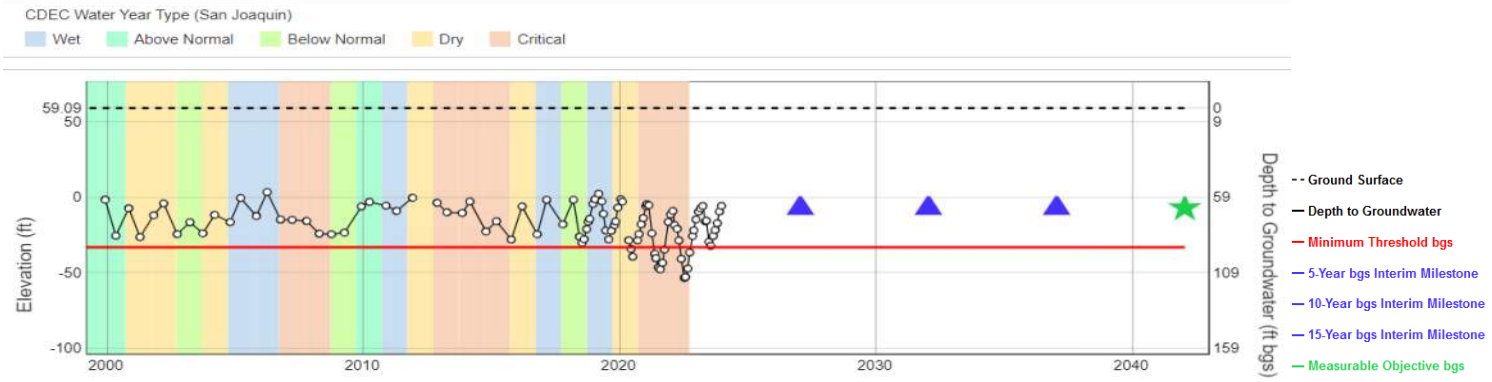
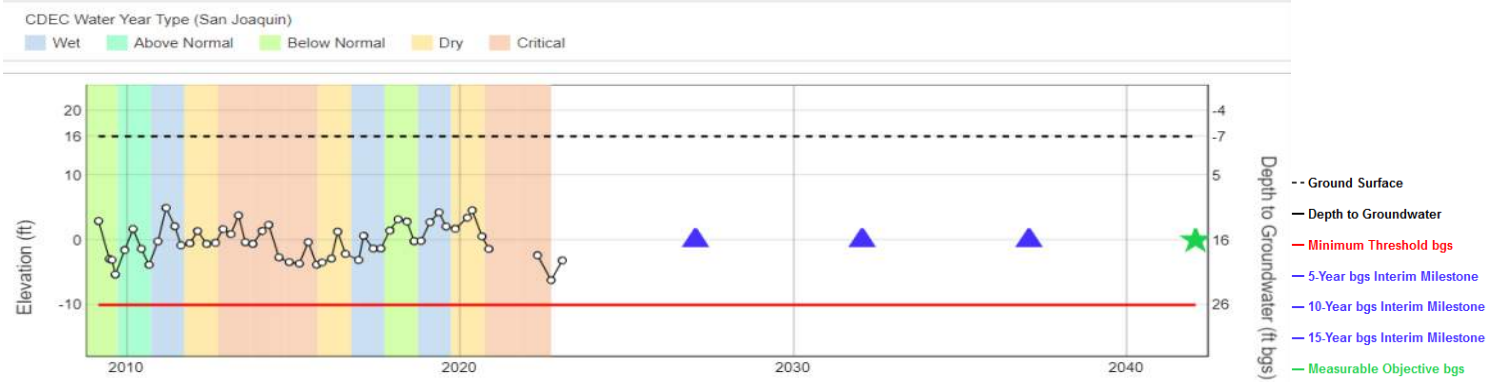


Figure A-21. PW20-500

Site Code: 378076N1212997W001 **State Well Number:** **Local Well Name:** PW20-500

Site Code: 378076N1212997W001
Local Well Name: PW20-500
State Well Number:
Station ID: 57581
WCR Number:
Latitude: 37.80760
Longitude: -121.29972
Station Organization ID:
Station Organization Name:
Well Location Description:
Well Use Type: Observation
Well Completion Type: Single Well
Well Depth (feet bgs): 498
Top Perforation (feet bgs): 321
Bottom Perforation (feet bgs): 326
Ground Surface Elevation: 16
Reference Point Elevation: 15.82
Reference Point Description: Top of Casing
Station Comments: GSE obtained through Google Earth on 1/20/2022



[Page Left Intentionally Blank]

Appendix B Detailed Water Supply Accounting

[Page Left Intentionally Blank]

APPENDIX C
ESTIMATING AGRICULTURAL GROUNDWATER PUMPING

Groundwater is used for agricultural purposes, in some areas as their sole source of supply and in others to augment surface water supplies. Most agricultural wells are not metered so alternative methods were employed to estimate groundwater pumping in agricultural areas. The water use by agriculture was estimated for the Non-Delta Management Area portion of the Tracy Subbasin (Subbasin) (*see* **Figure C-1, Non-Delta Management Area)**. **Figure C-2, Irrigated Agricultural Fields,** shows the agricultural fields in the Non-Delta Management Area by Groundwater Sustainability Agency (GSA) area.

Evapotranspiration

This year a different method of estimating actual crop evaporation was used. Actual crop evapotranspiration (ETc) in the Non-Delta of the Subbasin was obtained from OpenET as calculated by eeMETRIC for Water Year (WY) 2023 between October 1, 2022 through September 30, 2023. The eeMETRIC process was used which depends upon both accurate and frequent LandSAT satellite thermal images. Evapotranspiration was estimated using LandSAT 8 and LandSAT 9 satellites, available from the United States Geological Survey on 16-day-intervals, and ground-based weather data available from various sources.

A critical benefit of using eeMETRIC process to determine actual evapotranspiration (ETc) is that land use/crop type information is not needed. Therefore, inaccuracies of determining land use are not part of the uncertainty in ETc output.

The eeMETRIC process calculated ETc for each GSA area in the Non-Delta Management Area portions of the Subbasin. **Table C-1** provides these estimates.

The total ETc for irrigated fields was calculated using the ETc raster data and the most recent available field boundaries for the area (obtained from the 2022 provisional LandIQ crop data available from DWR). This ETc volume for irrigated fields was subtracted from the volume for the entire area within the boundaries to estimate ETc from non-irrigated areas, provided in **Table C-2**. The total ETc was processed to remove urban areas where water is supplied by municipal entities and is metered. Because of rapid development and changing land use conditions, GEI closely assessed the city of Tracy and Stewart Tract areas in coordination with the GSAs, resulting in further reductions to the total agricultural irrigated acreage. The volume of all agricultural fields ETc by GSA are provided in **Table C-3**.

The Non-Delta Management Area portion of the Subbasin is bounded by the San Joaquin River, Middle River, Old River, Tom Paine Slough, and various other canals and water ways. About 70 diversions have been documented as shown on **Figure C-4** (DWR 1995). In previous Annual Reports, to attempt to quantify these surface water supplies a search of riparian diversion reports was performed through the State Water Resources Control Board Water (Water Board), however, only three filings were present, and one reported no

diversions. Irrigation diversions may be reported under other diversion types (appropriative or statement of diversions) but due to the limited time and funding an alternative approach was used. Parcels immediately adjacent to the rivers and waterways were identified as potential users of surface water and the ETc estimates for these parcels were assumed to be met by surface water. The estimated ETc volume from these parcels was not included in the ETc volume supplied with groundwater. **Figure C-3** shows the parcels assumed to have riparian water rights. This year 17 diversion fillings were located for Naglee Burke Irrigation District (NBID) and Pescadero Reclamation District No 2058 (RD 2058), which overlie about 50 percent of previous assigned riparian parcels; therefore, there is a possibility that some overcounting of the riparian diversion may be occurring but will have to be resolved in subsequent years. **Table C-4** provides a summary of the ETc for the riparian areas/fields and assumed water diversions. **Table C-5** provides an estimate of ETc volume for irrigated agricultural lands without riparian water supplies.

Water Supplies

Water supplies to the Non-Delta Management Area consists of surface water deliveries by Byron-Bethany Irrigation District and Banta-Carbona Irrigation District for metered diversions in WY 2023. This water year, 22 diversion fillings were found on SWRCB's website for: NBID, Paradise Mutual Water Company, RD 2058, Costa Campbell, and Patteson but they did not report divisions for WY 2023. All diversions are metered. Filings are not required to be reported for WY 2023 until April 1, 2024, after this Annual Report is due. Therefore, to estimate the diversions for WY 2023 the diversions from WY 2017 (a similar wet year to WY 2023) were used. Water supplies also include metered agricultural wells and precipitation.

Table C-6 contains the metered and estimated surface water diversions to non-riparian fields (Naglee Burk Irrigation District and Pescadero Reclamation District 2058 supplies listed under the San Joaquin County GSA area).

Byron-Bethany Irrigation District and Banta-Carbona Irrigation District both have a few wells that are used to supplement water supplies. These wells are metered. In WY 2023 no metered wells were used. **Table C-7** contains the metered groundwater pumping to non-riparian agricultural fields. No other Reported Riparian Diversions were found this year as indicated in Table C-8.

Total precipitation was measured at the Tracy Carbona precipitation station and reported as inches and converted to feet. The total Non-Riparian Field ETc acres were then multiplied to obtain an estimate of the volume of precipitation that helped to meet ETc estimates. An effective precipitation of 80 percent was assumed to more accurately estimate the water supplied by precipitation. **Table C-9** contains the estimated contribution of precipitation to all Non-Riparian fields.

Estimated Groundwater Pumping

The Non-Riparian Field ETc monthly data was then processed by subtracting water supplies (metered surface water, metered groundwater pumping diversions, reported riparian diversions and precipitation) with the residual being estimated groundwater pumping for agriculture. **Table C-10** provides the estimated groundwater pumping, with negative values indicating the lack of adequate water to meet ETc demands and therefore groundwater may have been used make up the residual. The estimated groundwater pumping is about 17,000 acre-feet (AF) in WY 2023.

The estimated groundwater pumping was reviewed by the GSAs and with local knowledge of agricultural practices modified the estimated groundwater pumping estimates. **Table C-11**, provides these modified estimates of groundwater pumping based on the following considerations:

- Although ETc occurs during August, September, and October irrigation stops during this timeframe as this is harvest time for trees, almonds and walnuts, and many other crops as well. So even though plants continue to transpire it doesn't mean the plant needs water as it dries down for harvest in those months, essentially obtaining/depleting water in the soil pores. Also, the tree roots may extend down to the groundwater surface and use groundwater during this period. Lima beans are grown in the area. Irrigation stops in mid-August and the plants rely on water in the soil to finish the development of the seed and then in September spend most of the month drying down (to the wilting point) to be ready for cutting them off at the ground. All of this time they are transpiring and are intentionally in water deficit to prep for harvest. Alfalfa is a crop that doesn't normally get irrigated in October but is continually transpiring all of October. Therefore, even though there was estimated groundwater pumping during these 3 months, no groundwater pumping likely occurred during these months.
- The estimated groundwater pumping between November and January were also removed as crops are dormant, not grown or irrigated during these months.
- The Stewart Tract GSA area is surrounded entirely by surface water, (*see* **Figure C-4**) and has numerous diversions points suggesting any ETc would be met with surface water. Therefore, groundwater pumping in this area was removed.
- In April 2023, all GSAs were reported as having groundwater pumping. It possible that rain from March (6.33 inches) may have sustained soil moisture and carried over into April delaying the diversion of surface water and creating this apparent short fall in April. Therefore, April pumping was also removed from the estimates.

As a result of these modifications, the estimated groundwater pumping in the Non-Delta Management Area of the Subbasin was about 3,500 AF during WY 2023.

Conclusions and Recommendations

This is the first year of estimating groundwater pumping using OpenET source data and the eeMETRIC method to quantify demand and quantifying the amount of water supplies. Agricultural field designations were also updated using 2022 Land IQ data. Some assumptions were made that could affect the results and may be improved upon in future reports. For purposes of estimating the groundwater pumping, the modified estimate of groundwater pumping (is about 3,500 AF) should be used for reporting estimated groundwater pumping for agriculture, because it considers local agricultural practice knowledge.

The information contained in this report can be used to reduce uncertainties in the C2VSim groundwater model used to develop the water budgets for the Groundwater Sustainability Plan. Water supply information used in this report and historic information were provided to DWR's C2VSim modeling group in January 2023, but this done prior to identifing an additional 19 surface water diversions.

In future water years, the following improvements may help to better quantify the estimated groundwater pumping:

- Attempt to refine the assigned riparian areas by obtaining appropriative and statements of diversions reporting's to locate these fields.
- Perform an irrigation well canvas in the Byron-Bethany Irrigation District and Banta-Carbona Irrigation District areas to document location of wells. An inventory of wells using DWR's well logs database was insufficient to locate wells in these areas requiring field well canvases.

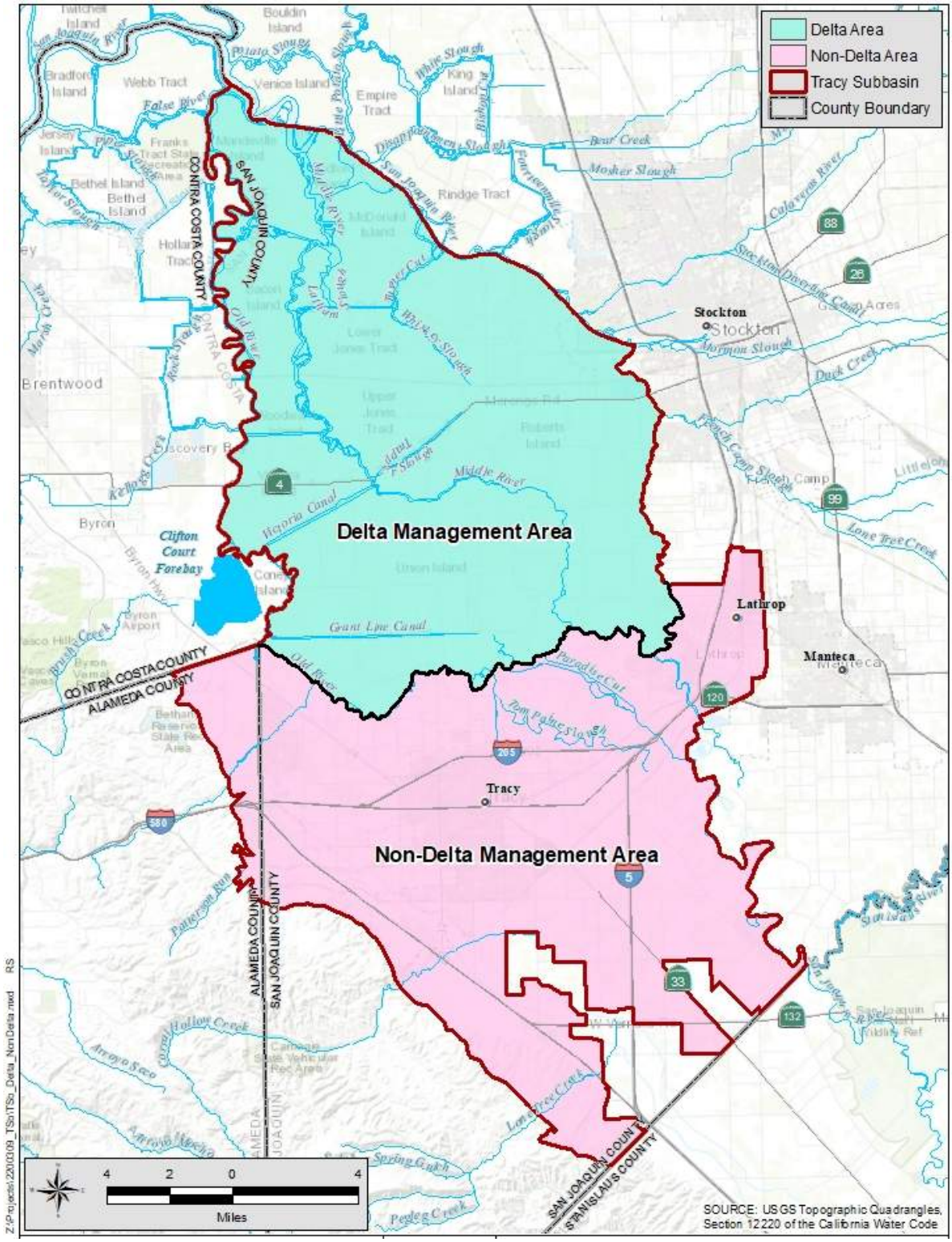


Figure C-1 Non-Delta Management Area

[Page Intentionally Left Blank]

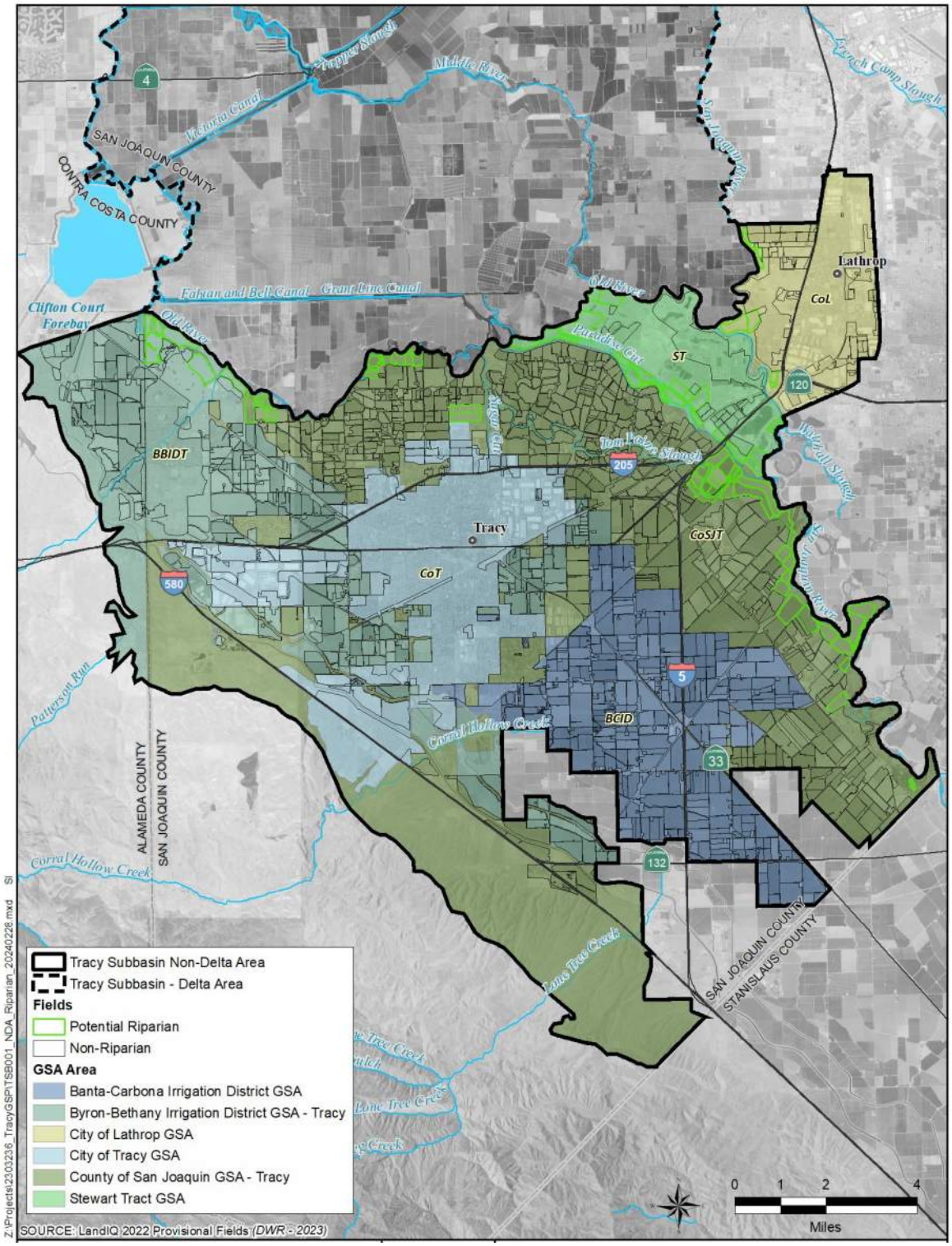


Figure C-2 Identified Agricultural Fields

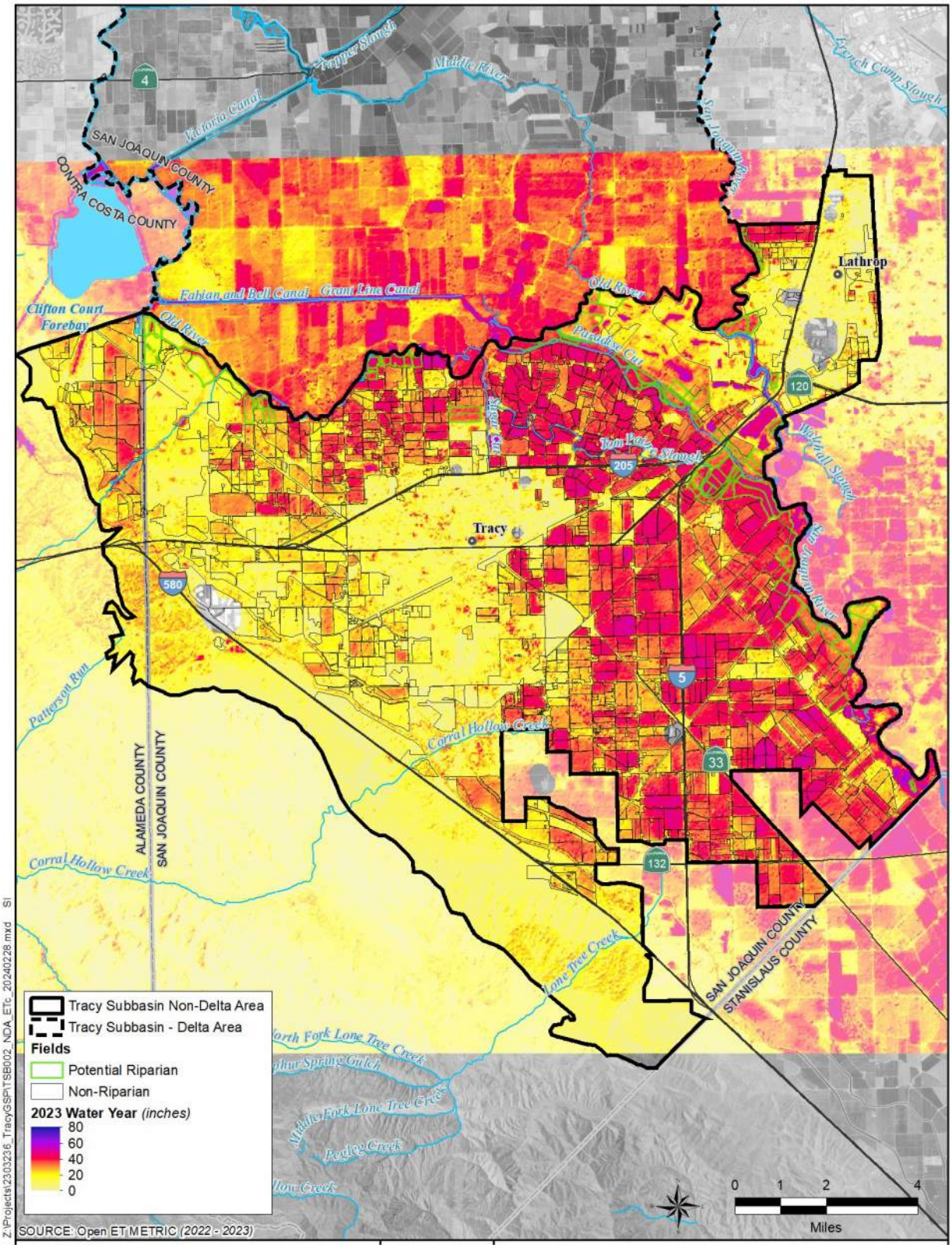


Figure C-3 ETc by Field and Estimated Riparian Parcels

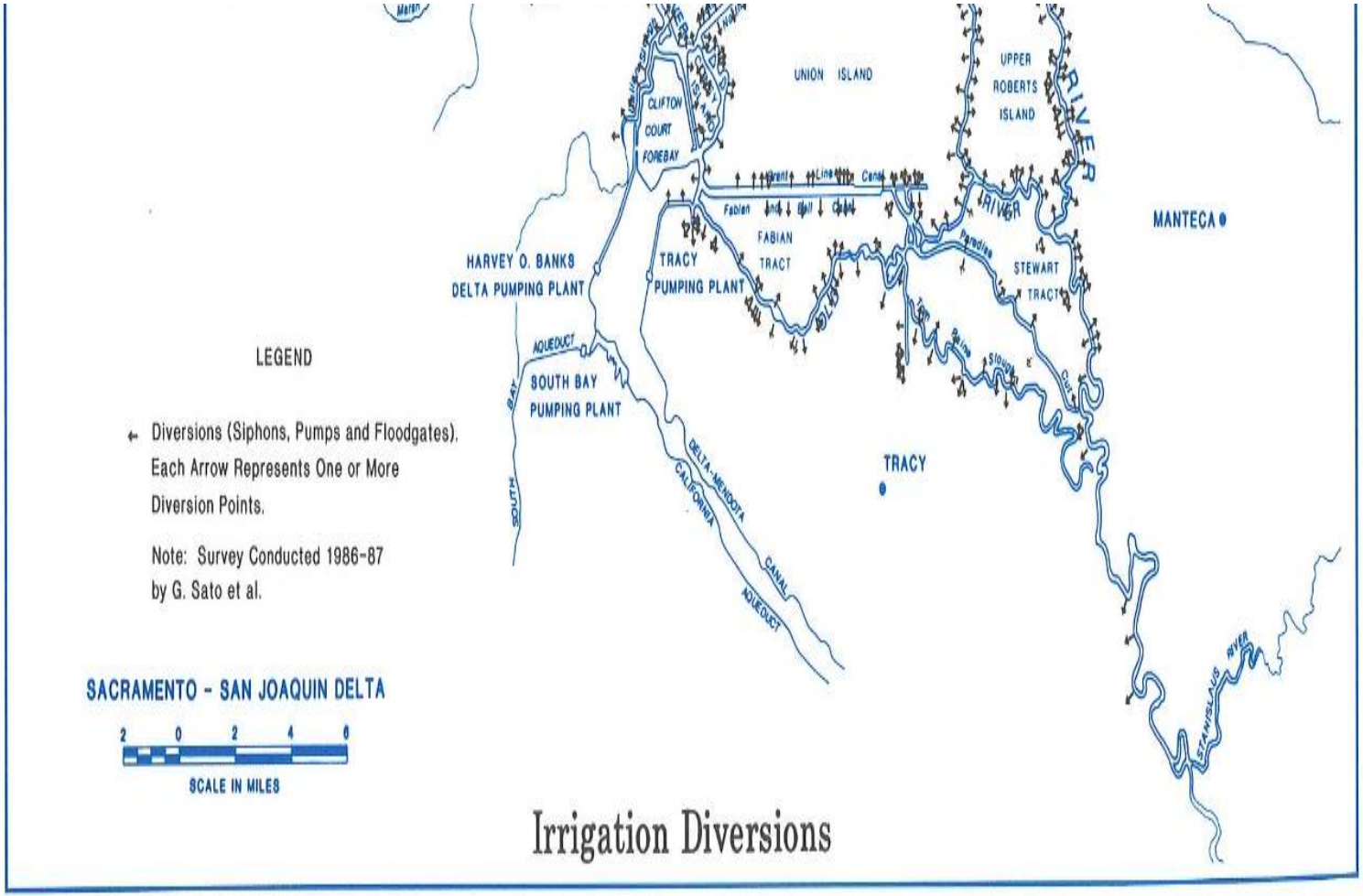


Figure C-4 Surface Water Diversion

[Page Intentionally Left Blank]

Table C-1. Overall Boundary ETc

OVERALL BOUNDARY ETc (INCHES)													
GSA	ACRES	2021-2022											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Banta-Carbona ID GSA	16,629	2.68	0.94	0.34	0.92	1.12	1.35	2.83	3.76	4.35	5.46	4.99	3.37
Byron-Bethany ID GSA - TSb	22,179	1.34	0.50	0.22	0.78	1.07	1.88	3.00	2.55	2.62	2.94	2.64	1.87
City of Lathrop GSA	7,637	1.52	0.61	0.33	0.56	0.77	1.05	1.69	1.76	1.84	2.42	2.21	1.64
City of Tracy GSA	16,538	1.24	0.45	0.17	0.41	0.59	0.96	1.78	1.58	1.53	1.76	1.78	1.34
County of San Joaquin GSA - TSb	49,445	1.75	0.68	0.31	0.92	1.20	1.91	3.58	3.13	3.00	3.49	3.39	2.42
Stewart Tract GSA	6,068	1.98	0.91	0.46	1.07	1.38	2.04	3.45	3.71	3.51	4.16	3.74	2.71

OVERALL BOUNDARY ETc (AF)														
GSA	ACRES	2021-2022												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Banta-Carbona ID GSA	16,629	3,707	1,298	473	1,274	1,544	1,873	3,922	5,203	6,026	7,570	6,919	4,674	**44,485**
Byron-Bethany ID GSA - TSb	22,179	2,471	919	397	1,426	1,961	3,461	5,547	4,705	4,844	5,432	4,875	3,451	**39,490**
City of Lathrop GSA	7,637	969	374	198	333	454	655	1,064	1,118	1,174	1,542	1,407	1,045	**10,334**
City of Tracy GSA	16,538	1,704	614	227	561	809	1,323	2,450	2,182	2,109	2,422	2,448	1,840	**18,689**
County of San Joaquin GSA - TSb	49,445	7,217	2,818	1,287	3,771	4,946	7,883	14,752	12,885	12,347	14,364	13,960	9,976	**106,206**
Stewart Tract GSA	6,068	1,002	462	233	542	699	1,032	1,745	1,875	1,776	2,102	1,891	1,372	**14,732**
Total	**118,496**	**17,071**	**6,485**	**2,816**	**7,908**	**10,413**	**16,227**	**29,481**	**27,969**	**28,276**	**33,432**	**31,501**	**22,357**	**233,937**

Notes: The tables above include ETc within the urban areas including cities of Lathrop, Tracy and Mountain House

Table C-2. Non-Irrigated Areas ETc

Non-Irrigated Areas ETc (AF)														
GSA	ACRES	2022-2023												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Banta-Carbona ID GSA	2,629	376	135	52	141	168	217	461	549	572	715	666	465	4,516
Byron-Bethany ID GSA - TSb	12,235	957	343	145	625	943	1,785	2,840	2,211	2,155	2,276	2,026	1,356	17,661
City of Lathrop GSA	6,610	766	283	155	242	327	442	733	854	908	1,199	1,045	776	7,731
City of Tracy GSA	15,165	1,556	539	191	468	681	1,077	2,047	1,875	1,829	2,103	2,138	1,613	16,117
County of San Joaquin GSA - TSb	27,919	2,209	897	459	1,570	2,205	3,817	7,752	5,581	4,748	4,892	4,649	3,313	42,092
Stewart Tract GSA	5,395	910	412	207	473	605	891	1,500	1,664	1,588	1,878	1,652	1,188	12,969
Total	**69,953**	**6,773**	**2,610**	**1,209**	**3,518**	**4,929**	**8,229**	**15,333**	**12,734**	**11,800**	**13,063**	**12,176**	**8,712**	**101,086**

Table C-3. All Agricultural Field ETc

ALL AGRICULTURAL FIELD ETc (INCHES)													
GSA	ACRES	2022-2023											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Banta-Carbona ID GSA	13,999	2.86	1.00	0.36	0.97	1.18	1.42	2.97	3.99	4.68	5.88	5.36	3.61
Byron-Bethany ID GSA - TSb	9,944	1.83	0.69	0.30	0.97	1.23	2.02	3.27	3.01	3.24	3.81	3.44	2.53
City of Lathrop GSA	1,026	2.37	1.07	0.51	1.06	1.49	2.49	3.87	3.09	3.11	4.02	4.24	3.14
City of Tracy GSA	1,374	1.30	0.65	0.32	0.81	1.11	2.15	3.53	2.69	2.44	2.79	2.70	1.98
County of San Joaquin GSA - TSb	21,526	2.79	1.07	0.46	1.23	1.53	2.27	3.90	4.07	4.24	5.28	5.19	3.71
Stewart Tract GSA	673	1.64	0.90	0.46	1.22	1.67	2.51	4.38	3.77	3.36	3.98	4.27	3.28

ALL AGRICULTURAL FIELD ETc (AF)														
GSA	ACRES	2022-2023												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Banta-Carbona ID GSA	13,999	3,332	1,163	421	1,134	1,376	1,656	3,461	4,654	5,454	6,855	6,253	4,209	**39,969**
Byron-Bethany ID GSA - TSb	9,944	1,514	576	252	802	1,018	1,676	2,707	2,494	2,689	3,156	2,850	2,095	**21,829**
City of Lathrop GSA	1,026	203	91	43	91	127	213	331	265	266	344	362	268	**2,604**
City of Tracy GSA	1,374	149	74	36	93	128	247	404	307	280	319	309	226	**2,572**
County of San Joaquin GSA - TSb	21,526	5,009	1,921	828	2,202	2,741	4,066	7,000	7,304	7,599	9,472	9,310	6,663	**64,115**
Stewart Tract GSA	673	92	50	26	68	94	141	245	211	188	223	240	184	**1,763**
Total	**48,543**	**10,298**	**3,875**	**1,607**	**4,390**	**5,484**	**7,998**	**14,148**	**15,235**	**16,476**	**20,369**	**19,325**	**13,646**	**132,852**

Notes: The tables have the monthly ETc for fields summarized for each GSA - ETc for areas classified as Urban have been removed as these are supplies are metered.

Table C-4. Riparian Areas ETc

GSA	ACRES	2022-2023												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Banta-Carbona ID GSA	0	-	-	-	-	-	-	-	-	-	-	-	-	**0**
Byron-Bethany ID GSA - TSb	62	2	0	0	8	10	16	24	9	10	13	8	3	**104**
City of Lathrop GSA	230	64	20	11	22	31	49	75	52	63	80	103	82	**653**
City of Tracy GSA	0	-	-	-	-	-	-	-	-	-	-	-	-	**0**
County of San Joaquin GSA - TSb	1,754	397	142	66	185	236	343	648	694	684	767	763	549	**5,472**
Stewart Tract GSA	163	17	12	6	18	25	39	65	49	38	58	61	45	**432**
Total	**2,208**	**479**	**175**	**83**	**233**	**302**	**447**	**812**	**804**	**795**	**918**	**935**	**679**	**6,661**

Table C-5. Non- Riparian Field ETc

NON-RIPARIAN FIELD ETc (INCHES)													
GSA	ACRES	2022-2023											
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Banta-Carbona ID GSA	13,999	2.86	1.00	0.36	0.97	1.18	1.42	2.97	3.99	4.67	5.87	5.36	3.61
Byron-Bethany ID GSA - TSb	9,883	1.84	0.70	0.31	0.96	1.22	2.02	3.26	3.02	3.25	3.82	3.45	2.54
City of Lathrop GSA	796	2.11	1.07	0.49	1.03	1.45	2.47	3.86	3.20	3.06	3.96	3.91	2.81
City of Tracy GSA	1,374	1.30	0.65	0.32	0.81	1.11	2.15	3.52	2.69	2.44	2.79	2.70	1.98
County of San Joaquin GSA - TSb	19,772	2.80	1.08	0.46	1.22	1.52	2.26	3.85	3.99	4.18	5.28	5.19	3.70
Stewart Tract GSA	510	1.78	0.85	0.42	1.08	1.43	2.20	3.97	2.96	2.83	3.50	4.17	3.22

NON-RIPARIAN FIELD ETc (AF)														
GSA	ACRES	2022-2023												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Banta-Carbona ID GSA	13,999	3,331	1,163	421	1,134	1,376	1,656	3,461	4,654	5,454	6,854	6,252	4,209	**39,964**
Byron-Bethany ID GSA - TSb	9,883	1,512	575	252	794	1,008	1,660	2,682	2,484	2,678	3,142	2,841	2,092	**21,720**
City of Lathrop GSA	796	140	71	33	69	96	164	256	212	203	263	259	187	**1,952**
City of Tracy GSA	1,374	149	74	36	93	128	247	403	307	280	319	309	226	**2,571**
County of San Joaquin GSA - TSb	19,772	4,607	1,774	759	2,008	2,498	3,720	6,339	6,571	6,895	8,702	8,550	6,103	**58,525**
Stewart Tract GSA	510	76	36	18	46	61	94	169	126	120	149	177	137	**1,209**
Total	**46,335**	**9,815**	**3,693**	**1,518**	**4,143**	**5,167**	**7,540**	**13,310**	**14,354**	**15,630**	**19,429**	**18,390**	**12,954**	**125,940**

Table C-6. Surface Water Supplies to Fields (AF)

Surface Water Supplies to Agricultural Fields (AF)														
GSA		2022-2023												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Banta-Carbona ID GSA		2,406	651	5	0	0	0	1,581	4,788	5,929	6,798	5,708	2,922	30,788
Byron-Bethany ID GSA - TSb		1989	198	19	19	29	36	1828	3190	3558	3983	2796	1744	19,389
City of Lathrop GSA		46	25	0	0	0	0	11	26	36	39	33	11	228
City of Tracy GSA		0	0	0	0	0	0	162	137	408	338	419	195	1,659
County of San Joaquin GSA - (BCID+NBID)		1963	929	1016	883	956	2191	2276	5569	7287	8544	7722	5458	44,796
Stewart Tract GSA (recycled)		30	48	95	61	0	69	0	0	0	0	0	0	303
Total		**6,435**	**1,851**	**1,135**	**963**	**985**	**2,296**	**5,858**	**13,710**	**17,218**	**19,702**	**16,678**	**10,331**	**97,162**

Note: City of Lathrop surface water deliveries are from treated wastewater.

Table C-7. Metered Groundwater Pumping to Fields (AF)

GSA		2022-2023												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Byron-Bethany ID GSA - TSb		0	0	0	0	0	0	0	0	0	0	0	0	0
City of Lathrop GSA		0	0	0	0	0	0	0	0	0	0	0	0	0
City of Tracy GSA		0	0	0	0	0	0	0	0	0	0	0	0	0
County of San Joaquin - TSb		0	0	0	0	0	0	0	0	0	0	0	0	0
Stewart Tract GSA (recycled)		0	0	0	0	0	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	0	0	0	0	0	0	0	0
Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table C-8. Other Reported Diversions (AF)

GSA		2022-2023												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Banta-Carbona ID GSA														
Byron-Bethany ID GSA - TSb														
City of Lathrop GSA														
City of Tracy GSA														
County of San Joaquin GSA - TSb														
Stewart Tract GSA														
Total		0	0	0	0	0	0	0	0	0	0	0	0	0

Table C-9. Total Precipitation

GSA		2022-2023												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Total (inches)		0	0.59	2.86	5.94	1.65	3.58	0.11	0.38	0.01	0	0.05	0	15.17
Total (feet)		0.00	0.05	0.24	0.50	0.14	0.30	0.01	0.03	0.00	0.00	0.00	0.00	1.26

Table D-10. Estimated Groundwater Pumping (AF)

Estimated Agricultural Groundwater Pumping (AF)														
GSA	Acres	2022-2023												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Banta-Carbona ID GSA	13,999	(925)	39	2,253	4,410	164	1,685	(1,777)	489	485	(56)	(498)	(1,287)	(4,542)
Byron-Bethany ID GSA - TSb	9,944	477	14	1,664	3,163	115	750	(781)	958	887	841	(12)	(348)	(1,141)
City of Lathrop GSA	1,026	(93)	(5)	164	338	17	81	(238)	(161)	(166)	(224)	(223)	(175)	(1,286)
City of Tracy GSA	1,374	(149)	(20)	226	451	24	81	(231)	(136)	129	19	114	(31)	(567)
County of San Joaquin GSA - TSb	21,526	(2,644)	2	4,361	7,400	826	3,609	(3,904)	(456)	406	(158)	(756)	(645)	(8,564)
Stewart Tract GSA	673	(46)	38	205	282	13	136	(164)	(109)	(120)	(149)	(175)	(137)	(899)
Total	48,543													**(17,000)**

Notes:

Negative values indicate groundwater pumping because deficient surface water suplies.

Estimated Groundwater Pumping (AF) = diversions + precip + surface water supply + metered groundwater pumping - Non-Riparian Fields ETc

Table C-11. Modified Estimated Groundwater Pumping (AF)

Modified Estimated Agricultural Groundwater Pumping (AF)														
GSA	Acres	2022-2023												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Water Year Total
Banta-Carbona ID GSA	13,999	-	-	-	-	164	1,685	(1,777)	489	485	(56)	-	-	-
Byron-Bethany ID GSA - TSb	9,944	-	-	-	-	115	750	(781)	958	887	841	-	-	-
City of Lathrop GSA	1,026	-	-	-	-	205	81	(238)	(161)	(166)	(224)	-	-	(749)
City of Tracy GSA	1,374	-	-	-	-	24	81	(231)	(136)	129	19	-	-	-
County of San Joaquin GSA - TSb	21,526	-	-	-	-	826	3,609	(3,904)	(456)	406	(158)	-	-	(2,714)
Stewart Tract GSA	673	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	48,543	-	-	-	-	1,333	6,206	(6,932)	695	1,741	422	-	-	**(3,463)**

Negative values indicate groundwater pumping because deficient of surface water suplies. Water year total only summing negative values, no carry over from previous

Notes and Assumptions:

In Modified Estimate ETc for August, September and October are not valid as this is harvest time for trees, Almonds and Walnuts, and many other crops as well. So even though plants have evaportranspiration it doesn't mean the plant needs water as it dries down for harvest in those months. The tree roots may extend down to the groundwater surface and use groundwater during this period. Another example, are lima beans, grown in the area. Irrigation stops in mid August and the plants rely on water in the soil to finish the development of the seed and then in September spend most of the month drying down to be ready for cutting them off at the ground. All of this time they are transpiring and are intentionally in water deficit to prep for harvest. Alfalfa is a crop that doesn't normally get irrigated in October but is continually transpiring all of October. Therefore, although groundwater pumping was calculated for these months, no groundwater pumping occurred during these months.

In Modified Estimate: The April calculations include half of the March precipitation and irrigation carry over for the City of Lathrop and County of San Joaquin, all other months do not include carry over from the previous month irrigation.

In Modified Estimate: November, December and January = Etc removed as crops have been harvested and irrigation shut off for the season.

Estimated agricultural pumping was zeroed as the Stewater Tract GSA is an island with surface water intrusions providing all supply needed.

Appendix C Estimated Groundwater Pumping

[Page Left Intentionally Blank]

Metered Groundwater Extraction Reported for Water Year 2023 (acre-feet)

	2022			2023									
Water Use Sector/Agency	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY Total
Agricultural													
BBID (Lower Aquifer)	0	0	0	0	0	0	0	0	0	0	0	0	0
BCID [1] (Lower Aquifer)	0	0	0	0	0	0	0	0	0	0	0	0	0
BCID	0	0	0	0	0	0	0	0	0	0	0	0	
BCID	0	0	0	0	0	0	0	0	0	0	0	0	
Delivered to farmlands outside BCID, within TSb	0	0	0	0	0	0	0	0	0	0	0	0	
Delivered to NDMCSb	0	0	0	0	0	0	0	0	0	0	0	0	
BCID - Yamasaki Property (Unknown Aquifer)	0	0	0	0	0	0	0	0	0	0	0	0	0
SJ County (Unknown Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	---
Stewart Tract (Unknown Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	---
												Subtotal Agricultural Extractions	**0**
Urban/Small Community/Rural													
City of Lathrop (Upper Aquifer)	81	81	20	9	15	31	55	108	109	140	128	76	852
City of Tracy (Lower Aquifer)	56	40	3	0	0	0	27	1	77	20	17	45	287
San Joaquin County - Small Community Water Systems:													
ARP Minimart Corp WS (Unknown Aquifer)													
Banta Inn Water System (Upper Aquifer)													
Bradshaw Cristian School (Unknown Aquifer)													
Carbona Food & Liquor (Lower Aquifer)													
Carmelo Industrial Park (Lower Aquifer)													
Corral Hollow PWS (Lower Aquifer)	10	6	3	---	---	---	---	---	---	---	---	---	19
Corral Hollow PWS (Upper Aquifer)	0	0	0	---	---	---	---	---	---	---	---	---	0
Country Mart Diesel & Gas (Lower Aquifer)													
Currier Estates Water Corp (Lower Aquifer)													
Darrigos Water System (Lower Aquifer)													
Defense Distrib. Depot - Tracy Site (Unknown Aquifer)													
Defense Distrib. Depot - Tracy Site (Unknown Aquifer)													
Defense Distrib. Depot - Tracy Site (Unknown Aquifer)													
Deuel Vocational Inst. - Well 03 (Unknown Aquifer)													
Deuel Vocational Inst. - Well 03 (Unknown Aquifer)													
Deuel Vocational Inst. - Well 04 (Lower Aquifer)													
Deuel Vocational Inst. - Well 05 (Both Aquifers)													
Deuel Vocational Inst. - Well 06 (Lower Aquifer)													
Deuel Vocational Inst. - Well 09 (Unknown Aquifer)													
PWS #44 Fairoaks - Well 1 (Lower Aquifer)	0	0	0	---	---	---	---	---	---	---	---	---	0
PWS #44 Fairoaks - Well 3 (Lower Aquifer)	56	36	19	---	---	---	---	---	---	---	---	---	110
PWS #44 Fairoaks - Well 4 (Lower Aquifer)	0	0	0	---	---	---	---	---	---	---	---	---	0
French Camp (Lower Aquifer)													
La Torres Park (Upper Aquifer)													
Morehead Park - Well 2 (Upper Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	0
Morehead Park - Well 3 (Lower Aquifer)													
Navarra Water System (Lower Aquifer)													
New Jerusalem School (Upper Aquifer)													
New Jerusalem School (Unknown Aquifer)													
Northwest Pipe Co. (Upper Aquifer)													
Old River Golf Course (Unknown Aquifer)													
Pallet King (Lower Aquifer)													
Par Country Estates (Lower Aquifer)	10	3	1	---	---	---	---	---	---	---	---	---	13
CSA #16 Par County Estates (Both Aquifers)	0	5	3										8
San I PAK (Upper Aquifer)													
San Joaquin River Club (Both Aquifers)	---	---	---	---	---	---	---	---	---	---	---	---	0
San Joaquin River Club (Both Aquifers)													
CSA#35 Santos Ranch - Well #2 Standby) PWS#5 -(Lower Aquifer)	15	8	4	---	---	---	---	---	---	---	---	---	27
CSA#35 Santos Ranch Well 1 WS#5 (Lower Aquifer)	0	0	0										0
Southwinds Church of Tracy (Lower Aquifer)													
Star Motel (Unknown Aquifer)													
Tracy Islamic Center (Unknown Aquifer)													
W. 11th St Chevron (Lower Aquifer)													
Domestic Well Owners	---	---	---	---	---	---	---	---	---	---	---	---	0
												Subtotal Urban Extractions	**1,317**
Industrial													
Deuel Vocational Institution (Unknown Aquifers)	---	---	---	---	---	---	---	---	---	---	---	---	0
JR Simplot (Upper Aquifer)	6	29	27	16	18	32	31	24	24	25	25	5	264
Tracy Army Defense Distribution Depots (Unknown Aquifer)	5	3	4	3	3	3	5	6	6	9	8	6	62
												Subtotal Industrial Extractions	**326**
Managed Wetlands													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Wetlands Extractions	**0**
Native Vegetation													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Native Vegetation Extractions	**0**

Metered Groundwater Extraction Reported for Water Year 2023 (acre-feet)

	2022			2023									
Water Use Sector/Agency	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY Total
Other Water Use Sector - Groundwater Remediation													
Occidental (Upper Aquifer)	91	113	122	115	99	97	62	79	74	72	74	68	1,066
Sharpe Army Defense Distribution Depot (Upper Aquifer)	48	40	49	65	69	81	60	79	80	71	77	80	800
Tracy Army Defense Distribution Depots (Upper Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	0
Deuel Vocational Institution (Upper Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	0
												Subtotal Remediation Extractions	**1,866**
Managed Recharge [2]													
Tracy (Lower Aquifer - Well 8)	0	82	187	172	156	183	11	0	0	0	0	0	791
BCID - Yamasaki Property - (Upper Aquifer - Conjunctive Use)	0	0	0	0	0	0	0	162	177	220	157	43	759
Sharpe Army Defense Distribution Depot (Upper Aquifer - S. Perc Pond)	18	8		51	42	41	20	18	8	594	586	21	1,408
Sharpe Army Defense Distribution Depot (Upper Aquifer - N. Perc Pond)	0	1		0	0	13	18	18	36	586	223	808	1,703
Sharpe Army Defense Distribution Depot WWTF (Upper Aquifer)				4	3	7	7	6	6	6	6	6	51
City of Lathrop CTF (Upper Aquifer - percolation ponds)													0
Occidental (Upper Aquifer injected treated remediation)	27	52	54	52	39	42	20	30	32	32	33	20	432
Occidental (Lower Aquifer injected treated remediation)	64	61	69	63	60	55	42	49	42	41	41	48	634
												Subtotal Recharge Extractions	**5,778**
												Total Metered Groundwater Extractions [2]	**3,509**

Notes:

--- Information not available

[1] Groundwater pumping exported to the North and Central Delta-Mendota subbasin

[2] Managed Recharge not included in Total Metered Groundwater Extractions

Small Community Water System Well Construction Details and Assignments to Aquifers, see GEI Water Quality Report, 2024

Estimated Groundwater Extractions for Water Year 2023 (acre-feet)

	2022			2023									
Water Use Sector/Agency	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY Total
Agricultural [1]													
BBID Area (Unknown Aquifer)	0	0	0	0	0	0	0	0	0	0	0	0	0
BCID Area (Unknown Aquifer)	0	0	0	0	0	0	0	0	0	0	0	0	0
BCID (Yamasaki Property)	0	0	0	0	0	0	0	0	0	0	0	0	0
City of Lathrop Area (Unkown Aquifer)	0	0	0	0	0	0	198	161	166	224	0	0	749
City of Tracy Area (Unknown Aquifer)	0	0	0	0	0	0	0	0	0	0	0	0	0
SJ County Area (Unknown Aquifer)	0	0	0	0	0	0	2,100	456	0	158	0	0	2,714
Stewart Track (Unknown Aquifer)	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Agricultural Extractions	**3,462**
Urban/Municipal/Rural													
Lathrop (Upper Aquifer)	0	0	0	0	0	0	0	0	0	0	0	0	0
Tracy (Upper Aquifer)	0	0	0	0	0	0	0	0	0	0	0	0	0
San Joaquin County - Small Community Water Systems:													
ARP Minimart Corp WS (Unknown Aquifer)													
Banta Inn Water System (Upper Aquifer)													3.80
Bradshaw Cristian School (Unknown Aquifer)													44.81
Carbona Food & Liquor (Lower Aquifer)													56.85
Carmelo Industrial Park (Lower Aquifer)													1.34
Corral Hollow PWS (Lower Aquifer)	0	0	0	7	7	7	7	7	7	7	7	7	36
Corral Hollow PWS (Upper Aquifer)	0	0	0										0
Country Mart Diesel & Gas (Lower Aquifer)													1.96
Currier Estates Water Corp (Lower Aquifer)													37.00
Darrigos Water System (Lower Aquifer)													5.60
Defense Distrib. Depot - Tracy Site (Unknown Aquifer)													53.77
Defense Distrib. Depot - Tracy Site (Unknown Aquifer)													0.00
Defense Distrib. Depot - Tracy Site (Unknown Aquifer)													0.00
Deuel Vocationial Inst. - Well 03 (Unknown Aquifer)													0.00
Deuel Vocationial Inst. - Well 04 (Lower Aquifer)													0.00
Deuel Vocationial Inst. - Well 03 (Unknown Aquifer)													0.00
Deuel Vocationial Inst. - Well 04 (Lower Aquifer)													0.00
Deuel Vocationial Inst. - Well 05 (Both Aquifers)													0.00
Deuel Vocationial Inst. - Well 06 (Lower Aquifer)													0.00
Deuel Vocationial Inst. - Well 09 (Unknown Aquifer)													0.00
PWS #44 Fairoaks - Well 1 (Lower Aquifer)	0	0	0	58	58	58	58	58	58	58	58	58	519
PWS #44 Fairoaks - Well 3 (Lower Aquifer)	0	0	0										0
PWS #44 Fairoaks - Well 4 (Lower Aquifer)	0	0	0										0
French Camp (Lower Aquifer)													1.53
La Torres Park (Upper Aquifer)													10.00
Morehead Park - Well 2 (Upper Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	75.00
Morehead Park - Well 3 (Lower Aquifer)													0.00
Navarra Water System (Lower Aquifer)													40.83
New Jerusalem School (Upper Aquifer)													9.41
New Jerusalem School (Unknown Aquifer)													0.00
Northwest Pipe Co. (Upper Aquifer)													3.67
Old River Golf Course (Unknown Aquifer)													1.40
Pallet King (Lower Aquifer)													2.69
Par Country Estates (Lower Aquifer)	0	0	0										0
CSA #16 Par County Estates (Both Aquifers)	0	0	0	8	8	8	8	8	8	8	8	8	73
San I PAK (Upper Aquifer)													1.40
San Joaquin River Club (Both Aquifers)	---	---	---	---	---	---	---	---	---	---	---	---	150.00
San Joaquin River Club (Both Aquifers)	---	---	---	---	---	---	---	---	---	---	---	---	0.00
CSA#35 Santos Ranch - Well #2 Standby) PWS#5 -(Lower Aquifer)	0	0	0	13	13	13	13	13	13	13	13	13	115
CSA#35 Santos Ranch Well 1 WS#5 (Lower Aquifer)	0	0	0										0
Southwinds Church of Tracy (Lower Aquifer)													1.40
Star Motel (Unknown Aquifer)													1.90
Tracy Islamic Center (Unknown Aquifer)													1.40
W. 11th St Chevron (Lower Aquifer)													1.40
CSA 50 Patterson Irrigation Park	---	---	---	---	---	---	---	---	---	---	---	---	
Domestic Well Owners	---	---	---	---	---	---	---	---	---	---	---	---	---
												Subtotal Urban Extractions	**1,250**
Industrial													
Deuel Vocational Institution	---	---	---	---	---	---	---	---	---	---	---	---	0
JR Simplot (Upper Aquifer)													
Tracy Army Defense Distribution Depots (Unknown Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	325
												Subtotal Industrial Extractions	**325**
Managed Wetlands													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Wetlands Extractions	**0**

Estimated Groundwater Extractions for Water Year 2023 (acre-feet)

	2022			2023									
Water Use Sector/Agency	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY Total
Native Vegetation													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Native Vegetation Extractions	**0**
Other Water Use Sector - Groundwater Remediation													
Occidental (Upper Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	0
Sharpe Army Defense Distribution Depot (Upper Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	0
Tracy Army Defense Distribution Depot (Upper Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	90
Deuel Vocational Institution (Upper Aquifer)	---	---	---	---	---	---	---	---	---	---	---	---	---
												Subtotal Remediation Extractions	**90**
Managed Recharge													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Recharge Extractions	**0**
												Total Estimated Groundwater Extractions	**5,127**

Notes:

[1] Estimated Groundwater Pumping for Agriculture (see Appendix C)

--- Information not available

Urban/Municipal/Rural estimates develop by using = number of people served *0.25 acre-feet per person

Industrial water use is only based on public water system number of people served and may not include industrial uses.

Other water use estiamtes are from average annual pumping as documented in the GSP

Metered Surface Water Diversions Reported for Water Year 2023 (acre-feet)

	2022			2023									
Water Use Sector/Agency	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY Total
Agricultural Use - CVP													
BBID Area	88	0	0	0	0	4	217	282	580	680	447	401	2,699
BCID Area (inside District)	--	--	--	--	--	--	--	--	--	--	--	--	0
												Subtotal Agricultural Diversions Reported	**2,699**
Agricultural Use - Local - San Joaquin River/Old River													
BBID Area	1,901	198	19	19	29	32	1,611	2,908	2,978	3,303	2,349	1,343	16,690
Intake Channel	1,136	120	19	19	29	32	1,069	2,078	2,978	3,303	2,349	1,343	
Intake Channel (Raw Water to Tracy)							542	830					
Intake Channel (former Westside ID)	765	78	0	---	---	---	---	---	---	---	---	---	
Diverion (Patteson, POD_ID 53924)	---	---	---	---	---	---	---	---	---	---	---	---	---
BCID Area (inside District)	2406	651	5	0	0	0	1581	4626	5752	6578	5551	2879	30,029
BCID (Yamasaki Property)	0	0	0	0	0	0	0	162	177	220	157	43	759
City of Tracy (Sugar Cut)	0	0	0	0	0	0	162	137	408	338	419	195	1,659
SJ County Area (BCID Kasson area)	392	7	0	0	0	0	279	694	1,305	1,287	1,211	825	6,000
SJ County Area (Naglee-Burke, POD_ID 52194)	---	---	---	---	---	---	---	---	---	---	---	---	---
SJ County Area (Costa-Campbell, POD_ID 55018)	---	---	---	---	---	---	---	---	---	---	---	---	---
SJ County Area (RD 2058 Pescador)	---	---	---	---	---	---	---	---	---	---	---	---	---
												Subtotal Local Agricultural Diversions Reported	**55,137**
Urban/Municipal - CVP													
Mountain House	406	244	205	192	190	197	279	406	453	536	587	532	4,227
Tracy (CVP)	500	0	0	0	0	0	672	1,252	1,429	1,336	1,567	1,274	8,030
												Subtotal Urban CVP Diversions Reported	**12,257**
Urban/Municipal - Imported													
Lathrop (SSJID)	417	262	271	276	268	260	318	405	495	531	525	484	4,512
Tracy (SSJID) [1]	1157	1289	1209	1151	864	1157	583	362	476	792	598	638	10,277
												Subtotal Urban Imported Reported	**14,789**
Industrial - SWP													
BBID Area (Musco Olive)	62	48	43	44	52	15	47	61	53	54	46	43	568
												Subtotal Industrial Extractions	**568**
Managed Wetlands													
	---	---	---	---	---	---	---	---	---	---	---	---	0
												Subtotal Industrial Extractions	**0**
Native Vegetation													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Native Vegetation	**0**
Other													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Other	**0**
Managed Recharge (imported SSJID surface water)[1]													
Tracy (Well 8 injected SSJID imported water)	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Recharge Extractions	**0**
												Total Diversions Reported [2]	**85,450**

Notes:

--- Information not available

[1] = 791 AF of SSJID used by Tracy for recharge

[2] Managed Recharge not included in Total Diversion

Estimated Surface Water Diversions for Water Year 2023 (acre-feet)

	2022			2023									
Water Use Sector/Agency	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY Total
Agricultural Use - Local - San Joaquin River/Old River													
BBID Area	0	0	0	0	0	0	0	0	0	0	0	0	0
Diversion (Patteson, POD_ID 53924)	---	---	---	---	---	---	---	---	---	---	---	---	---
POD_ID 539245214 (SWRCB) - BBID GSA	0	0	0	0	0	0	0	0	0	0	0	0	0
BCID Area	0	0	0	0	0	0	0	0	0	0	0	0	0
City of Lathrop Area	0	0	0	0	0	0	0	0	0	0	0	0	0
City of Tracy Area	0	0	0	0	0	0	0	0	0	0	0	0	0
SJ County Area (Total SWRCB Reported Diversions)	1,963	929	1,016	883	956	2,191	2,276	5,569	7,287	8,544	7,722	5,458	44,796
POD_ID 52190 (NBID)	21	0	123	0	0	0	0	245	526	490	608	463	
POD_ID 52191 (NBID)	---	---	---	---	---	---	---	---	---	---	---	---	
POD_ID 52192 (NBID)	105	0	0	0	0	0	0	237	201	425	465	242	
POD_ID 52194 (NBID)	279	43	0	0	0	0	13	267	701	1031	944	680	
POD_ID 52195 (NBID)	58	0	0	0	0	0	0	220	400	549	510	261	
POD_ID 52271 (NBID)	494	19	15	15	18	16	22	1176	1496	1929	2170	1627	
POD_ID 005116 (Paradise MWC)	0	1	0	0	0	0	0	0	0	0	0	0	
POD_ID 001156 (RD2058)	974	0	0	0	0	0	0	3392	3125	3125	2949	2125	
POD_ID 002704 (RD2058)	0	860	871	860	926	2161	2217	0	0	0	0	0	
POD_ID 54937 (RD2058)	0	0	0	0	0	0	0	0	28	34	0	0	
POD_ID 54952 (RD2058)	0	0	0	0	0	0	0	0	131	159	0	0	
POD_ID 54565 (RD2058)	0	0	0	0	0	0	0	0	101	123	0	0	
POD_ID 54596 (RD2058)	0	0	0	0	0	0	0	0	165	201	0	0	
POD_ID 55135 (RD2058)	0	0	0	0	0	0	0	0	22	27	0	0	
POD_ID 54919 (RD2058)	0	0	0	0	0	0	0	0	45	55	0	0	
POD_ID 54930 (RD2058)	0	0	0	0	0	0	0	0	137	167	0	0	
POD_ID 54951 (RD2058)	0	0	0	0	0	0	0	0	37	45	0	0	
POD_ID 54904 (RD2058)	0	0	0	0	0	0	0	0	82	99	0	0	
POD_ID 55018 (SWRCB)- SJCo GSA	15	0	0	0	0	0	0	0	48	48	42	29	
SJ County Area (Costa-Campbell, POD_ID 55018)	17	8	6	8	12	14	24	34	41	35	34	31	
Stewart Tract Area	---	---	---	---	---	---	---	---	---	---	---	---	0
												Subtotal Agricultural Diversions	**44,796**
Agricultural Use Riparian [1] - Local (from Appendix C)													
BBID Area	0	0	0	0	0	0	0	0	0	0	0	0	0
BCID Area	2	0	0	8	10	16	24	9	10	13	8	3	104
City of Lathrop Area	64	21	11	23	32	51	77	54	65	83	105	83	669
City of Tracy Area	0	0	0	0	0	0	0	0	0	0	0	0	0
SJ County Area	397	142	66	185	236	343	648	694	684	767	763	549	5,472
Stewart Tract Area	17	12	6	18	25	39	65	49	38	58	61	45	432
												Subtotal Riparian Agricultural Diversions	**6,678**
Urban/Municipal/Rural													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Urban Diversions	**0**
Industrial													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Industrial Diversions	**0**
Managed Wetlands													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Wetlands	**0**
Native Vegetation													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Native Vegetation	**0**
Other													
	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Other	**0**
Managed Recharge													
Tracy (Well 8 injected SSJID imported water)	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Fallowed Land	**0**
												Total Estimated Diversions	**51,473**

Notes:

[1] Estimated based on land parcels immediately adjacent to rivers or waterways

--- Information not available

From SWRCB Diversion filling WY2017, diverison data for WY2023 not avaiable at the time of preparation of this report.

Estimated accuracy to be plus or minus 50%

Metered Recycled Water to Agriculture for Water Year 2023 (acre-feet)

	2022			2023									
Water Use Sector/Agency	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY Total
Agricultural Use - Recycled													
City of Lathrop Area (Total)	76	73	95	61	0	69	11	26	36	39	33	11	530
CA Natural Products	34	25	0	0	0	0	0	0	0	0	0	0	
CTF - Agricultural Irrigation	30	48	95	61	0	69	0	0	0	0	0	0	
CTF - Landscape Irrigation	12	0	0	0	0	0	11	26	36	39	33	11	
City of Tracy Area	0	0	0	0	0	0	0	0	0	0	0	0	0
SJ County Area	0	0	0	0	0	0	0	0	0	0	0	0	0
Tracy Army Defense Distribution Depot Wastewater (Shallow Aquifer)													
Stewart Tract (CTF)	0	0	0	0	0	0	0	0	0	0	0	0	0
												Subtotal Recycled Agriculture	**530**
												Total Recycled	**530**

Notes:

--- Information not available

[Page Left Intentionally Blank]

Appendix D Public Outreach

[Page Left Intentionally Blank]

Table D-1. Tracy Subbasin Outreach and Engagement Activities in WY2023

Activity Date and Time	Outreach or Engagement Type	Agenda Item(s) Relevant to the Status of GSP Implementation	Additional Information and/or Available Public Comments
September - December 2022	Communication & Engagement Plan: Stakeholder Interviews	N/A	Stakeholders from various beneficial uses and user groups were interviewed to support development of an update to the Tracy Subbasin's Communication and Engagement Plan. Interviews were intended to assess the effectiveness of existing engagement strategies; identify opportunities to coordinate outreach with local organizations; understand priority topics during GSP implementation; identify stakeholders that may not have been engaged in the GSP development process; and understand barriers to engagement. Feedback shared during interviews was synthesized into the final Communications and Engagement Plan Update approved by the Subbasin GSAs in January 2023 and is available on the Tracy Subbasin website.
January 11, 2023	Banta-Carbona Irrigation District (BCID) Board of Directors Meeting	Item 11 - Update on the GSP for the Tracy Subbasin.	During the BCID Board meeting, an update was provided on a project to extend the 3 East Pipeline to Durham Ferry Rd and help to reduce BCID's reliance on groundwater. During the meeting, it was shared that a funding application was submitted for $14 million to Round 2 of the California Department of Water Resources Sustainable Groundwater Management Grant Program for the project. It was noted that there were only 15 applications submitted for the SGM Program and $200 million in available grant funds so the District was likely to receive some funds. No SGMA/GSP related comments received from the public this meeting.
January 19, 2023	Subbasin Technical Committee Meeting	All Agenda Items	This meeting focused on items related to GSP implementation and included updates related to GSP implementation activities occurring in neighboring subbasins. For the months of January, February, and March, the main topic of discussion was development of the Annual Report. Additional details can be found in the meeting minutes located on the Tracy Subbasin Website. No SGMA/GSP related comments received from the public this meeting.

Activity Date and Time	Outreach or Engagement Type	Agenda Item(s) Relevant to the Status of GSP Implementation	Additional Information and/or Available Public Comments
February 15, 2023	BCID Board of Directors Meeting	Item 10 - Update On The GSP For The Tracy Subbasin. Action As Necessary	During the BCID Board meeting, an update was provided about the DWR grant application for the project to extend 3 East Pipeline to Durham Ferry Rd. It was noted that DWR funding announcements were not expected before May 2023. No SGMA/GSP related comments received from the public this meeting.
February 16, 2023	Subbasin Technical Committee Meeting	All Agenda Items	This meeting focused on items related to GSP implementation and included updates related to GSP implementation activities occurring in neighboring subbasins. For the months of January, February, and March, the main topic of discussion was development of the Annual Report. Additional details can be found in the meeting minutes located on the Tracy Subbasin Website.
March 15, 2023	BCID Board of Directors Meeting	Item 12 - Update On The GSP For The Tracy Subbasin. Action As Necessary	During the BCID Board meeting, it was noted that BCID filed an application for $14 million grant funds to extend the 3 East Pipeline to Durham Ferry Rd. There were only a total of 15 applications filed and grant funds available of $200 million so the District is likely to get some funds. No SGMA/GSP related comments received from the public this meeting.
March 23, 2023	Subbasin Technical Committee Meeting	All Agenda Items	This meeting focused on items related to GSP implementation and included updates related to implementation activities occurring in neighboring subbasins. For the months of January, February, and March, the main topic of discussion was development of the Annual Report. Additional details can be found in the meeting minutes located on the Tracy Subbasin Website.
April 12, 2023	BCID Board of Directors Meeting	Item 15 - Update On The GSP For The Tracy Subbasin.	During the BCID Board meeting, General Manager Weisenberger asked Richard Shatz of GEI to prepare a proposal for investigating potential areas for surface water recharge to the underground aquifers of the Tracy Subbasin. There was a tremendous amount of local creek flow into the Tracy Subbasin this past winter.

Activity Date and Time	Outreach or Engagement Type	Agenda Item(s) Relevant to the Status of GSP Implementation	Additional Information and/or Available Public Comments
		Action As Necessary	The intent is to research the best places to use that local creek water for groundwater recharge in the Subbasin. In addition, BCID may want to store water through surface water recharge to the basin and is interested in the best land areas to do that type of recharge.
April 20, 2023	Subbasin Technical Committee Meeting	All Agenda Items	This meeting focused on items related to GSP implementation and included updates related to implementation activities occurring in neighboring subbasins. For the months of April and May the main topic of discussion was the development of the annual budget for the following fiscal year. Additional details can be found in the meeting minutes located on the Tracy Subbasin Website.
May 17, 2023	BCID Board of Directors Meeting	Item 14b - Update On The GSP For The Tracy Subbasin. Action As Necessary	During the BCID Board meeting, it was noted that Mr. Shatz is preparing a proposal for the BCID Board to consider. The proposal will focus on investigating potential areas for surface water recharge to the underground aquifers of the Tracy Subbasin.
May 18, 2023	Subbasin Technical Committee Meeting	All Agenda Items	This meeting focused on items related to GSP implementation and included updates related to implementation activities occurring in neighboring subbasins. For the months of April and May the main topic of discussion was the development of the annual budget for the following fiscal year. Additional details can be found in the meeting minutes located on the Tracy Subbasin Website.
June 14, 2023	BCID Board of Directors Meeting	Item 12b - Update On The GSP For The Tracy Subbasin. Action As Necessary	During the BCID Board meeting, Mr. Shatz presented the proposal for the recharge investigation work. The proposal is also being reviewed by staff. An announcement was also made about the upcoming June 29 Tracy Subbasin public workshop which provides an update on the status of groundwater management activities in the Tracy Subbasin. The workshop will be held at the City of Tracy City Hall at 6 pm.

Activity Date and Time	Outreach or Engagement Type	Agenda Item(s) Relevant to the Status of GSP Implementation	Additional Information and/or Available Public Comments
June 15, 2023	Subbasin Technical Committee Meeting	All Agenda Items	This meeting focused on items related to GSP implementation and included updates related to implementation activities occurring in neighboring subbasins. For the month of June, the main topics of discussion were the development of the annual budget for the following fiscal year and the public workshop slated to occur later that month. Additional details can be found in the meeting minutes located on the Tracy Subbasin Website.
June 29, 2023	Public Workshop	All Agenda Items	The Tracy Subbasin GSAs held an in-person public workshop from 6:00 p.m. to 7:30 p.m. on Thursday, June 29, 2023. This was the third SGMA-focused public workshop in the Subbasin. It aimed to educate interested parties and solicit input on key topics related to GSP implementation in the region. The topics included an overview of SGMA and how it is being implemented in the Tracy Subbasin; current groundwater conditions for the region; updates on the status of ongoing projects and management actions; and how interested parties could stay involved and informed of the GSAs' groundwater management activities. Comments received from the public are noted in the Workshop Summary found on the Tracy Subbasin website.
July 12, 2023	BCID Board of Directors Meeting	Item 10c - Update On The GSP For The Tracy Subbasin. Action As Necessary	During the BCID Board meeting, a summary of the June 29 Tracy Subbasin public meeting was provided. It was noted that during and after the presentations there were opportunities for participants to ask questions and provide comments. Staff from the GSAs were available to answer questions and provide clarifications. It was noted that there appeared to a few members of the public present and several agency participants, including representatives from Sierra Club, Mountain House, City of Tracy, BBID, BCID, City of Lathrop, City of Tracy, a developer consultant, and the GSP technical and facilitation teams.

Activity Date and Time	Outreach or Engagement Type	Agenda Item(s) Relevant to the Status of GSP Implementation	Additional Information and/or Available Public Comments
			BCID had not heard an update from DWR about the $14 million grant funding for the pipeline expansion project.
August 16, 2023	BCID Board of Directors Meeting	Item 11c - Update On The GSP For The Tracy Subbasin. Action As Necessary	During the BCID Board meeting, it was noted that BCID has not heard from DWR about the recommended grant funding for $10 million dollars for the pipeline expansion project. The Tracy Subbasin has been granted groundwater well drilling services for four monitoring wells by DWR through the Technical Support Services (TSS) program. Two wells MW-203 and MW-204 will be located in the BCID GSA territory. The BCID will need to execute a license agreement with the State of California for the placement of the wells and for access to the wells. In addition, an agreement for TSS will need to be entered into that obligates the BCID GSA for operating and maintaining the monitoring wells and sharing the data gathered with the State. The BCID Board authorized BCID staff and officials to execute the License Agreements, TSS agreements, obtain the well drilling permits and complete any other actions required to facilitate the drilling of the two wells
August – September 2023	Inter-basin Coordination Meetings	N/A	The GSA Plan Manager, facilitation team, and technical consultants from the Tracy and Eastern San Joaquin Subbasins met on multiple occasions to initiate efforts regarding inter-basin coordination between the two groundwater basins. These meetings focused on planning and coordination in preparation for one large group meeting between the Tracy Subbasin GSAs and Eastern San Joaquin Groundwater Authority. The GSA representatives identified several priority topics for inter-basin coordination meetings, including subbasin boundary flows, a shared data management system, and subbasin responses to well mitigation programs and the County well ordinance. The large group meeting was postponed due to changes in staffing at San Joaquin County and is anticipated to be revisited in 2024.

Activity Date and Time	Outreach or Engagement Type	Agenda Item(s) Relevant to the Status of GSP Implementation	Additional Information and/or Available Public Comments
September 20, 2023	BCID Board of Directors Meeting	Item 10c - Update On The GSP For The Tracy Subbasin. Action As Necessary	During the BCID Board meeting, it was noted that BCID has not heard from DWR about the recommended grant funding for $10 million dollars for the pipeline expansion project. DWR is ready to commence drilling the TSS wells. MW-203 is currently being drilled along the BCID Lift Canal just south of 5 Sump. The BCID did execute a license agreement with the State of California for the placement of well MW203. In addition, an agreement for TSS was entered into that obligates the BCID GSA for operating and maintaining the MW-203 monitoring well and sharing the data gathered with the State.
December 13, 2023	Subbasin Technical Committee Meeting	All Agenda Items	This meeting focused on items related to GSP implementation and included updates related to implementation activities occurring in neighboring subbasins. For the month of December, the main topics of discussion were current groundwater conditions and getting the interim GSA Plan Manager at San Joaquin County up to speed on GSP implementation at the GSA level. BCID mentioned having been awarded $10 million dollars out of the $14 million dollars requested through Round 2 of DWR's SGM Program. Additional details can be found in the meeting minutes located on the Tracy Subbasin Website. No SGMA/GSP related comments received from the public this meeting.