



# EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

## Board of Directors Meeting

### AGENDA

Wednesday, March 25, 2020, 10:30 a.m. – 12:00 p.m.

**Teleconference Only**

**Call In Information Provided Below**

- I. Call to Order/Pledge of Allegiance & Safety Announcement/Roll Call
- II. **SCHEDULED ITEMS – *Presentation materials to be posted on ESJGroundwater.org and emailed prior to the meeting. Copies of presentation materials will be available at the meeting.***
  - A. **Discussion/Action Items:**
    1. Approval of Minutes of February 12, 2020 (See Attached)
    2. Accept the ESJ GSP Annual Report and Authorize Submittal to the California Department of Water Resources by April 1, 2020 per SGMA Requirements
    3. Status of the Proposition 68 Grant Preliminary Award
    4. DWR Update
- III. **Public Comment (non-agendized items)**
- IV. **Directors' Comments**
- V. **Future Agenda Items**
- VI. **Adjournment**

### NOTICE: Coronavirus COVID-19

See Attached Notice Regarding COVID 19, Closure of Board Chambers to the Public During the Eastern San Joaquin Groundwater Authority Board of Directors Meeting and Teleconference Information

### **Next Regular Meeting**

**June 10, 2020 at 10:30 a.m.**

San Joaquin County – Public Health Multi-Purpose Room  
1601 E. Hazelton Avenue, Stockton, California

### **Action may be taken on any item**

*Agendas and Minutes may also be found at <http://www.ESJGroundwater.org>*

*Note: If you need disability-related modification or accommodation in order to participate in this meeting, please contact San Joaquin County Public Works Water Resources Staff at (209) 468-3089 at least 48 hours prior to the start of the meeting.*

# EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY

## Board of Directors Meeting

### AGENDA

*(Continued)*

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#### **Important Notice Regarding COVID 19 and Closure of Board Chambers to the Public During Eastern San Joaquin Groundwater Authority Board of Directors Meetings**

On March 18, 2020, Governor Gavin Newsom issued Executive Order N-29-20 recognizing that COVID 19 continues to spread throughout our community resulting in serious and ongoing economic harm. Governor Newsom has therefore waived certain requirements of the Ralph M. Brown Act relating to public participation and attendance at public meetings.

Based on guidance from the California Department of Public Health and the California Governor's Officer, *effective immediately* and while social distancing measures are imposed, Board chambers will be closed to the public during the Eastern San Joaquin Groundwater Board of Directors Meetings.

In order to minimize the spread of the COVID 19 virus, the following options are available to members of the public to listen to these meetings and provide comments to the Board of Directors before and during the meeting:

1. You are strongly encouraged to listen to the Eastern San Joaquin Groundwater Authority Board of Directors meetings by attending the teleconference:

#### [Join Microsoft Teams Meeting](#)

[+1 415-915-2800](#) United States, San Francisco (Toll)

Conference ID: 209 678 040#

[Local numbers](#) | [Reset PIN](#) | [Learn more about Teams](#) | [Meeting options](#)

*Once connected, we request you kindly mute your phone.*

2. If you wish to make a comment on a specific agenda item, please submit your comment via email by 5:00 p.m. on the Tuesday prior to the meeting. Please submit your comment to the Clerk/Secretary of the Board at [kmsith@sjgov.org](mailto:kmsith@sjgov.org). Your comment will be shared with the Board members and placed into the record at the meeting. Every effort will be made to read comments received during the meeting into the record but some comments may not be read due to time limitations. Comments received after an agenda item will be made part of the record if received prior to the end of the meeting.

**EASTERN SAN JOAQUIN GROUNDWATER AUTHORITY**  
**Board Meeting Minutes**  
**February 12, 2020**

**I. Call to Order/Pledge of Allegiance & Safety Announcement/Roll Call**

The Eastern San Joaquin Groundwater Authority (GWA) Board meeting was convened when Matt Zidar provided the required safety information announcement. Chair Chuck Winn called the meeting to order at 10:04 a.m., on February 12, 2020, at the San Joaquin County Public Health Building, 1601 E. Hazelton Ave. Stockton, CA. The Pledge of Allegiance was completed.

In attendance were Chair Chuck Winn and Vice Chair Mel Panizza; Directors George Biagi, David Fletcher, Mike Henry, Tom Flinn; Alternate Directors Charlie Swimley, Walter Ward, Brandon Nakagawa; and Secretary Kris Balaji. Directors Dan Wright and Eric Thorburn were in attendance, and arrived after the meeting was called to order.

**II. SCHEDULED ITEMS**

**A. Discussion/Action Items:**

**1. Approval of Minutes of January 8, 2020**

**Motion:**

Vice Chair Mel Panizza moved, and Director Tom Flinn seconded, the approval of the January 8 minutes. The motion passed unanimously.

**2. Approval of Woodard & Curran Contract for annual Report and Technical Support (2/3 vote required)**

Mr. Matt Zidar (San Joaquin County) presented the proposed Woodard & Curran Agreement for Consultant Support, along with the Scope of Work and projected Timeline for Completion of Annual Reporting tasks. He explained that this was structured as a master services agreement that would allow issuance of task orders. The term and a not to exceed amount for the full contract was identified, and it was explained that subsequent task orders would be reviewed and approved by the Board.

The aggressive timeline for Annual Report completion and the need for the GSA's to ramp up the data submission for the report completion were discussed. Board Members expressed that there was a need to take the Annual Report to their respective Boards for approval prior to submittal to DWR. Chairman Winn expressed his concern with the amount of work to be done in a very short timeframe. This resulted in further discussion of when GSA Board approvals were needed and when the GWA could act as the JPA. Mr. Zidar agreed to try to provide resources and time, to support the GSA review of the Annual Report, but also noted that this was going to be the purpose of the proposed Ad Hoc Technical Advisory Committee.

Concern by Board Members was expressed in regards to the agreement amount and to the lack of contract review time for members who believe it is necessary to obtain approval from their Boards on the Agreement. Ms. Monica Streeter with Neumiller & Beardslee explained that safeguards were added to ensure the Board was comfortable with the agreement, noting that any items, task orders or amounts over the approved budget will be brought back before the Board for approval. Secretary Balaji further explained that the agreement is task-based and that task orders could only be issued with Board approval and under a Board approved budget. If funds were not budgeted, then task orders could not be approved. He also noted that the Board in January approved the cost allocations and the six-month budget to cover the annual

report and other GWA expenses for January through June. Alternate Director Charlie Swimley advised that he had no issue with the agreement and would recommend a motion to approve.

Public comment: Ms. Valerie Kincaid, Attorney for Oakdale Irrigation District and South San Joaquin Irrigation District, addressed the Board in regards to some concerns she has with the agreement. Ms. Kincaid stated the first issue was that every approval of additional task orders need to be presented to the Board members with time for them to take back to their individual agency boards for approval, before the Board approves. The second concern was that the Annual Report should not be approved until every GSA has seen the Annual Report document and has gotten their agency board approval. Ms. Kincaid stated that she understood this may be difficult to do, but it is a must and she would not recommend approving the agreement.

Ms. Monica Streeter clarified that the JPA is its own stand-alone agency and that the tasks listed were within an approved budget and any change orders or additional tasks would come back to the Board for approval. Additionally, Secretary Balaji described how the COG Board functions and how it does not need to take all decisions back to individual boards before approving or taking action, stating that it will be ineffective and costly to do business if representatives of the GSA that serve on the JPA have no authority and if all decisions need to be taken back to 16 boards for approval. Ms. Streeter explained that COG funding is different as this Board's funding sources are the GSA's, which is where the concern comes from.

The Board further discussed the need for some form of the agreement to be approved today, but further discussion was needed in regards to the contract capacity amount. Alternate Director Nakagawa suggested that an amendment to the motion needs to be made to only approve the amount needed to get through the April 1<sup>st</sup> tasks.

Additionally, the Board discussed the need for a later Board Meeting date for March to allow time for each GSA to review the completed Annual Report and get it approved by their individual boards before the GWA meeting to approve it.

Ms. Streeter advised the Board that she would recommend the motion made be modified to reflect an agreement dollar figure of \$382,000.00, which is the six-month budget amount, from January through June 2020. Ms. Streeter stated that the tasks and budget amounts have already been approved by the Board, but an approved contract with Woodard & Curran is needed in order for them to begin the work on the Annual Report. Alternate Director Swimley advised that he would modify his motion to approve agreement with dollar amount not to exceed \$382,000.00 defined in the approved budget.

The Board further discussed the dollar figure of the agreement and what would be an appropriate amount to approve today and discuss further tasks and dollar figure at a later date. Secretary Balaji addressed the Board's reluctance to approve the agreement, adoption of a six-month budget and tasks, questioning why there is issue with approving a task-based contract that is within and approved budget. Additional discussion was had on approving a contract to cover only Annual Report costs. Alternate Director Nakagawa suggested the agreement be kept at the \$162,000.00 figure, to cover the tasks already approved and modify the contract at a later date, as he is not comfortable with approving a higher amount without further discussion. This agenda item raised issues related to the decision making process, authority of GSA representatives, and the spirit and letter of the JPA and GWA bylaws.

Alternate Director Swimley made a second modification to his motion.



**Motion:**

Alternate Director Charlie Swimley moved, and Director David Fletcher seconded to approve the Woodard & Curran Contract for Annual Report and Technical Support and amend Section III of the Agreement to modify the contract not-to-exceed amount of \$162,000.00. The motion passed unanimously.

**3. Status of the Proposition 68 Grant Preliminary Award**

Mr. Matt Zidar provided details of the preliminary award for the Proposition 68 Grant money. Based on the Department of Water Resources (DWR) review of the GWA proposal, DWR recommended award of \$350K of the requested \$500K. Mr. Zidar will send a letter to DWR commenting on the basis for the DWR ratings, the funding cut and seek to restore full funding. He is also schedule to meet with DWR staff.

Public comment: Mr. Rodney Frizke on behalf of Sacramento County GSA addressed the Board in regards to their receipt of proposition 68 Grants funds to complete well drilling at Dry Creek and their desire to seek support in data sharing. Mr. Frizke encouraged working together on this project.

**4. Steering Committee Membership and Formation**

Mr. Matt Zidar described the proposed standing Board Steering Committee which would meet monthly to coordinate with Chairman Winn to develop GWA Board calendars and agendas, follow up on Board directed actions, support staff during implementation of the GSP, review and identify issues that should be brought to the full board for action along with a recommendation, prepare a draft budget, and clarify how the Board is to operate under the GWA JPA and Bylaws. The Steering Committee is subject to the Brown Act. A roster was presented and quorum requirements described. It was noted that Board Member participation could not exceed seven members or there would be a Board quorum and it would be considered a "special" Board Meeting and not a Steering Committee. The roster was revised accordingly. Concern was addressed in regards to the lack of City representation.

Public comment: Ms. Valerie Kincaid commented on the Steering Committee, stating that the Committee is needed to address issues in detail, coordinate the process, and support implementation of Board directed actions. Ms. Kincaid further stated that the Steering Committee needs to clarify the agency approval requirements and act as a Program Manager to support the Board.

Mr. Zidar also discussed the proposed Ad Hoc Technical Advisory Committee, which would be comprised of technical representatives of the GSA. For Ad Hoc committees, formation and membership can be by the Chair. The purpose of the proposed committee is to identify and address technical issues related to the model, monitoring network, data collection and management, DMS and other technical item referred by the Steering Committee or Board. The Ad Hoc Technical Advisory Committee would make recommendations to the Board and Steering Committee.

Chairman Winn advised that changes could be made to the functions as we go and as issues arise. Vice Chairman Panizza stated that there should be some form of written documentation on what the Steering and Ad Hoc Committees purpose and function would be. Chairman Winn assured the Board that all topics discussed within the Steering Committee would be brought before the Board.

Ms. Monica Streeter advised that formation of a standing Steering Committee and approval of the member composition would need a Board motion and approval. The current roster was reviewed and composition

discussed. Ms. Streeter advised that the member composition could be as is, as long as one member of SSJID did not have voting rights and they were counted as one agency representation. Alternate Director Brandon Nakagawa advised to keep Director Robert Holmes on the roster as their primary representative.

**Motion:**

Director Eric Thorburn moved, and Alternate Director Brandon Nakagawa seconded, to create the Steering Committee. The motion was approved unanimously.

**Motion:**

Director David Fletcher moved, and Director Tom Flinn seconded, to approve the identified composition of the committee with the seven members listed. The Board agreed to remove Alternate Director Brandon Nakagawa from the committee and approve the committee composition as amended. The motion was approved unanimously.

## **5. Ad-Hoc Technical Work Group Formation**

Mr. Matt Zidar presented additional details of the Ad-Hoc Technical Advisory Committee, providing information on the group's purpose and a tentative roster of committee members. Mr. Zidar requested additional volunteers to join the Technical Advisory Committee.

Public Comment: Mr. Dennis Mills with Eastside GSA addressed the Board, advising that he would like their agency to have a seat on the Ad Hoc Technical Advisory Committee.

## **6. Project Updates from GSA's**

Mr. Matt Zidar spoke about the information request to the GSA for GSP project to include any current information in the Annual Report, advising that this was an opportunity for the GSA's to provide project input and demonstrate that GSAs are moving the projects forward. Mr. Zidar recommended that project updates be a standing Board agenda item in the future.

## **7. Agendas and Meeting Schedule for Next Six Months**

Mr. Matt Zidar presented the proposed schedule for Board, Steering Committee and Technical Advisory Committee meetings, covering the next 6 months. Mr. Zidar advised there would be change to the March 11<sup>th</sup> Board meeting, moving it to March 25<sup>th</sup>, per previous meeting discussion, to allow for GSA review and approval of the Annual Report. Mr. Zidar advised he would identify the needed changes to the scheduling and make those adjustments.

Public Comment: Mr. Dennis Mills with Eastside GSA addressed the Board, advising that agency budgets are being made during April and May so budgetary numbers are needed now.

## **8. DWR Update**

Mr. Paul Wells with the Department of Water Resources (DWR) advised that the Public Comment period for the submitted GSP will be through April 15, 2020 and that DWR will have up to two years after the Public Comment Period ends to complete their review. Mr. Wells advised that there is a DWR Financial Assistance

Group that will be available to assist with grant funding questions. Mr. Wells agreed with the Technical Advisory Committee being a benefit to this Board.

**III. Other Information:**

- A. Training Opportunity**
- B. NGO Letter to DWR on DAC's and GSP's**
- C. Delta Conveyance Environmental Review Notice of Preparation Overview**

Items not discussed due to time limitations.

**IV. Public Comment:**

None.

**V. Directors' Comments:**

None.

**VI. Future Agenda Items:**

Future agenda items for March include review and approve Annual report, GSP project updates, data management system updates, and monitoring next steps.

**VII. Adjournment:**

The February 12 meeting was closed at 12:01.m. Vice Chair Mel Panizza moved, and Alternate Director Charlie Swimley seconded meeting adjournment. Chair Winn adjourned the meeting.

**Next Regular Meeting:** March 25, 2020 at 10:00 a.m.

**Location TBD**



**EASTERN SAN JOAQUIN  
GROUNDWATER AUTHORITY**

**Joint Exercise of Powers  
Special Board of Directors Meeting**

**MEMBER SIGN-IN SHEET**

Location: SJ COUNTY PUBLIC HEALTH MULTI-PURPOSE ROOM Date: 02/12/2020 Time: 10:00 AM

INITIAL	Member's Name	GSA	Phone	Email
	John Freeman	Cal Water Member	209-547-7900	<a href="mailto:jfreeman@calwater.com">jfreeman@calwater.com</a>
	Jeremiah Mecham	Cal Water Alternate		<a href="mailto:jmecham@calwater.com">jmecham@calwater.com</a>
	Steve Cavallini	Cal Water Alternate	209-464-8311	<a href="mailto:scavallini@calwater.com">scavallini@calwater.com</a>
GB	George Biagi, Jr.	Central Delta Water Agency Member	209-481-5201	<a href="mailto:gbiagi@deltabluegrass.com">gbiagi@deltabluegrass.com</a>
	Dante Nomellini	Central Delta Water Agency Alternate	209-465-5883	<a href="mailto:dnmpics@pachbell.net">dnmpics@pachbell.net</a>
	Grant Thompson	Central San Joaquin Water Conservation District Member	209-639-1580	<a href="mailto:gtom@velociter.net">gtom@velociter.net</a>
	Reid Roberts	Central San Joaquin Water Conservation District Alternate	209-941-8714	<a href="mailto:reidwroberts@gmail.com">reidwroberts@gmail.com</a>
	Alan Nakanishi	City of Lodi Member	209-333-6702	<a href="mailto:anakanishi@lodi.gov">anakanishi@lodi.gov</a>
	Charlie Swimley	City of Lodi Alternate	209-333-6706	<a href="mailto:cswimley@lodi.gov">cswimley@lodi.gov</a>
	David Breitenbucher	City of Manteca Member	209-456-8017	<a href="mailto:dbreitenbucher@ci.manteca.ca.us">dbreitenbucher@ci.manteca.ca.us</a>
<i>Present</i>		City of Manteca Alternate		
	Dan Wright	City of Stockton Member	209-937-5614	<a href="mailto:Dan.Wright@stocktonca.gov">Dan.Wright@stocktonca.gov</a>
	Paul Canepa	City of Stockton Alternate	209-603-7091	<a href="mailto:Paul.Canepa@stocktonca.gov">Paul.Canepa@stocktonca.gov</a>
	Mel Lytle	City of Stockton Alternate	209-	<a href="mailto:Mel.Lytle@stocktonca.gov">Mel.Lytle@stocktonca.gov</a>



INITIAL	Member's Name	GSA	Phone	Email
	Russ Thomas	Eastside San Joaquin GSA Member	209-480-8968	<a href="mailto:rthomascwd@hotmail.com">rthomascwd@hotmail.com</a>
WRW	Walter Ward	Eastside San Joaquin GSA Alternate	209-525-6710	<a href="mailto:ward@envres.org">ward@envres.org</a>
DFP	David Fletcher	Linden County Water District Member	209-887-3202	<a href="mailto:dqfpe@comcast.net">dqfpe@comcast.net</a>
	Paul Brennan	Linden County Water District Alternate	209-403-1537	<a href="mailto:ptbrennan@verizon.net">ptbrennan@verizon.net</a>
MHA	Mike Henry	Lockeford Community Services District Member	209-712-4014	<a href="mailto:midot@att.net">midot@att.net</a>
	Joseph Salzman	Lockeford Community Services District Alternate	209-727-5035	<a href="mailto:lcsd@softcom.net">lcsd@softcom.net</a>
ES	Eric Schmid	Lockeford Community Services District Alternate	209-727-5035	<a href="mailto:lcsd@softcom.net">lcsd@softcom.net</a>
TF	Tom Flinn	North San Joaquin Water Conservation District Member	209-663-8760	<a href="mailto:tomflinn2@me.com">tomflinn2@me.com</a>
	Joe Valente	North San Joaquin Water Conservation District Alternate	209-334-4786	<a href="mailto:jvalente@softcom.net">jvalente@softcom.net</a>
ES	Eric Thorburn, P.E.	Oakdale Irrigation District Member	209-840-5525	<a href="mailto:ethorburn@oakdaleirrigation.com">ethorburn@oakdaleirrigation.com</a>
		Oakdale Irrigation District Alternate		
CS	Chuck Winn	San Joaquin County Member	209-953-1160	<a href="mailto:cwinn@sigov.org">cwinn@sigov.org</a>
	Kathy Miller	San Joaquin County Alternate	209-953-1161	<a href="mailto:kmiller@sigov.org">kmiller@sigov.org</a>
	John Herrick, Esq.	South Delta Water Agency Member	209-224-5854	<a href="mailto:jherrlaw@aol.com">jherrlaw@aol.com</a>
	Jerry Robinson	South Delta Water Agency Alternate	209-471-4025	N/A
	Robert Holmes	South San Joaquin GSA Member	209-484-7678	<a href="mailto:rholmes@ssjid.com">rholmes@ssjid.com</a>
BN	Brandon Nakagawa	South San Joaquin GSA Alternate	209-249-4613	<a href="mailto:bnakagawa@ssjid.com">bnakagawa@ssjid.com</a>
MP	Melvin Panizza	Stockton East Water District Member	209-948-0333	<a href="mailto:melpanizza@aol.com">melpanizza@aol.com</a>
AW	Andrew Watkins	Stockton East Water District Alternate	209-484-8591	<a href="mailto:watkins.andrew@verizon.net">watkins.andrew@verizon.net</a>
	Anders Christensen	Woodbridge Irrigation District Member	209-625-8438	<a href="mailto:widirrigation@gmail.com">widirrigation@gmail.com</a>
		Woodbridge Irrigation District Alternate		

**Eastern San Joaquin Groundwater Authority Staff & Support**

INITIAL	Member's Name	Organization	Phone	Email
	Kris Balaji	San Joaquin County	468-3100	<a href="mailto:kbalani@sigov.org">kbalani@sigov.org</a>
	Fritz Buchman	San Joaquin County	468-3034	<a href="mailto:fbuchman@sigov.org">fbuchman@sigov.org</a>
	Matt Zidar	San Joaquin County	953-7460	<a href="mailto:mzidar@sigov.org">mzidar@sigov.org</a>
	Glenn Prasad	San Joaquin County	468-3089	<a href="mailto:gprasad@sigov.org">gprasad@sigov.org</a>
	Mike Callahan	San Joaquin County	468-9360	<a href="mailto:mcallahan@sigov.org">mcallahan@sigov.org</a>
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**EASTERN SAN JOAQUIN  
GROUNDWATER AUTHORITY**

3

**Joint Exercise of Powers  
Special Board of Directors Meeting**

**OTHER INTERESTED PARTIES - SIGN-IN SHEET**

Location: SJ COUNTY PUBLIC HEALTH MULTI-PURPOSE ROOM Date: 02/12/2020 Time: 10:00 AM

INITIAL	Member's Name	Organization	Phone	Email
	Rodney Frida	GEI consultants for Sacramento County GSA		casimiro@fridaregion.com
	Chelsea Spier	DWR		chelsea.spier@dwr.ca.gov
	Paul Walz	DWR		Paul.Walz@water.ca.gov
	Kirin Vitek	STC		kvitek@sjgov.org
	Scott MacKay	STC	209 938 7341	ellen@ejcw.org
	Ellen Bowen	ESTCM		delores.mitchell@stthomas.com
	Johnnie Mitchell	ESW		
	Dr. Dennis Mills	ERSTINE GSA		
	Jane Tucker	League of Women Voters		JaneTucker@mac.com
	Harvey Marks	SWC		
	Marcia Strachy	Newman Spaulding		
	Eric Resine	Kleinfelder	209 846 6736	
	Danny Trejo	City of Stockton		
	Emily Sheldon	OID	209 840 5509	





This is Rollcall for the

Eastern San Joaquin Groundwater Authority Board of Directors

Meeting

February 12, 2020

Agency Name	Director First	Director Last		Alternate First	Alternate Last	
Cal Water	John	Freeman		Steven Jeremiah	Cavallini Mecham	
Central Delta Water Agency	George	Biagi, Jr.		Dante	Nomellini	
Central San Joaquin Water Conservation District	Grant	Thompson		Reid	Roberts	
City of Lodi	Alan	Nakanishi		Charlie	Swimley	
City of Manteca	David	Breitenbucher				
City of Stockton	Dan	Wright <i>Late</i>		Mel Paul	Lytle Canepa	
Eastside San Joaquin GSA	Russ	Thomas		Walter	Ward	
Linden County Water District	David	Fletcher		Paul	Brennan	
Lockeford Community Services District	Mike	Henry		Joseph Eric	Salzman Schmid	
North San Joaquin Water Conservation District	Tom	Flinn		Joe	Valente	
Oakdale Irrigation District	Eric	Thorburn, P.E. <i>Late</i>				
South Delta Water Agency	John	Herrick, Esq.		Jerry	Robinson	
South San Joaquin Groundwater Sustainability Agency	Robert	Holmes		Brandon	Nakagawa	
Woodbridge Irrigation District	Andy	Christensen				
San Joaquin County Public Works Secretary (1)	Kris	Balaji				
Stockton East Water District Vice Chair (2)	Melvin	Panizza		Andrew	Watkins	
San Joaquin County Chairman (3)	Chuck	Winn		Kathy	Miller	

\*WE HAVE A QUORUM\*

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- Appendix B – Representative Monitoring Network Well Hydrographs
- Appendix C – Broad Monitoring Network Well Hydrographs

## List of Abbreviations and Acronyms

AC	Advisory Committee
AF	acre-feet
AFY	acre-feet per year
bgs	below ground surface
CASGEM	California Statewide Groundwater Elevation Monitoring
CCWD	Calaveras County Water District
CDWA	Central Delta Water Agency
CSJWCD	Central San Joaquin Water Conservation District
DMS	Data Management System
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utility District
EC	electrical conductivity
ESJ	Eastern San Joaquin
ESJGWA	Eastern San Joaquin Groundwater Authority
ESJWRM	Eastern San Joaquin Water Resources Model
GMP	Groundwater Management Plan
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
IDW	Inverse Distance Weighting
IWFM	Integrated Water Flow Model
LCSD	Lockeford Community Services District
LCWD	Linden County Water District
MAF	Million acre-feet
MAR	Managed Aquifer Recharge
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
msl	mean sea level
NAVD	North American Vertical Datum
NSJWCD	North San Joaquin Water Conservation District
OID	Oakdale Irrigation District
SDWA	South Delta Water Agency
SEWD	Stockton East Water District

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SGMA	Sustainable Groundwater Management Act
SMCL	Secondary Maximum Contaminant Level
SSJ GSA	South San Joaquin GSA
SSJID	South San Joaquin Irrigation District
TDS	total dissolved solids
WID	Woodbridge Irrigation District
WY	Water Year

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## EXECUTIVE SUMMARY

### INTRODUCTION

The Eastern San Joaquin Groundwater Subbasin (Eastern San Joaquin Subbasin, or Subbasin) has a long history of proactively and collaboratively managing water resources, with strong participation from local water management agencies, other local agencies, stakeholders, and state and federal agencies. Collaborative efforts that have guided sustainable groundwater resources management in the Eastern San Joaquin Subbasin include the *Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan* (GSP) (2019) and its forerunner, the *Eastern San Joaquin Groundwater Basin Groundwater Management Plan* (GMP) (2004).

The GSP was developed jointly with the Eastern San Joaquin Groundwater Authority (ESJGWA), which is a joint powers authority formed by the 16 groundwater sustainability agencies (GSAs) within the Eastern San Joaquin Subbasin. The ESJGWA includes the Central Delta Water Agency (CDWA), Central San Joaquin Water Conservation District (CSJWCD), City of Lodi, City of Manteca, City of Stockton, Eastside San Joaquin GSA (Eastside GSA) (composed of Calaveras County, Calaveras County Water District [CCWD], Stanislaus County, and Rock Creek Water District), Linden County Water District (LCWD), Lockeford Community Services District (LCSD), North San Joaquin Water Conservation District (NSJWCD), Oakdale Irrigation District (OID), San Joaquin County No. 1, San Joaquin County No. 2, South Delta Water Agency (SDWA), South San Joaquin GSA (composed of South San Joaquin Irrigation District [SSJID] including Woodward Reservoir, City of Ripon, and City of Escalon), Stockton East Water District (SEWD), and Woodbridge Irrigation District (WID). Collectively, these 16 GSAs will be referred to as “GSAs.”

Between November 2019 and January 2020, the GSAs individually adopted the GSP, which meets all relevant requirements contained within the Sustainable Groundwater Management Act (SGMA) of 2014 and the GSP Emergency Regulations. The GSP was developed in a stakeholder-driven environment with cooperation between the GSAs and their member agencies. A stakeholder engagement strategy was developed to enable the interests of beneficial users of groundwater in the Subbasin to be considered. The strategy incorporated monthly Groundwater Sustainability Workgroup meetings, monthly Advisory Committee meetings, monthly ESJGWA Board meetings, coordination with neighboring Subbasins, approximately quarterly informational open house events, outreach presentations to community groups, and information distribution to property owners and residents in the Subbasin. The GSP describes groundwater conditions in the Eastern San Joaquin Subbasin and sets up a system of management based on sustainable management criteria supported by monitoring networks, projects and management actions, adaptive management, and reporting.

This water year (WY) 2019 Annual Report for the Eastern San Joaquin Subbasin has been prepared in compliance with Article 7 *Annual Reports and Periodic Evaluations by the Agency*, § 356.2 *Annual Reports* of the GSP Emergency Regulations, as included in the California Code of Regulations. WY 2019 includes the period from October 2018 through September 2019.

### GROUNDWATER MANAGEMENT ACTIVITIES AND MILESTONES

As the first Annual Report, and as the Annual Report covers a water year prior to the adoption of the GSP, much of the information contained in this report relates to activities associated with GSP development.

While enactment of SGMA in 2015 prohibited the development or renewal of any GMPs within medium and high priority basins (such as the Eastern San Joaquin Subbasin), the GSAs continued to

implement the management activities identified in the 2004 GMP throughout the GSP development process. Such activities included continuing to work with DWR to improve sharing and exchange of data and development of the Eastern San Joaquin Water Resources Model (ESJWRM).

WY 2019 included substantial development of the GSP. This Annual Report uses the information contained within the GSP to evaluate continued sustainable conditions throughout the planning and implementation horizon.

The GSP sets sustainable management criteria for applicable sustainability indicators and identifies projects and management actions to aid in maintaining sustainable conditions throughout the Eastern San Joaquin Subbasin. During WY 2019, monitoring relative to all sustainability indicators indicated the Eastern San Joaquin Subbasin was continuing to operate under sustainable conditions relative to their respective sustainability indicators and established sustainable management criteria. As Projects are implemented, the ESJGWA will continue to assess conditions relative to established criteria and definitions of undesirable results.

## **GROUNDWATER MONITORING AND CONDITIONS ASSESSMENT**

### **Hydrologic Conditions**

Water year (WY) 2019 was a wetter year on average than WY 2018. During WY 2019, estimated precipitation in the Subbasin was 136% of long-term average and measured San Joaquin River flow was 144% of long-term averages.

### **Groundwater Levels**

Groundwater levels rose or remained stable through WY 2019 across all 20 of the wells in the representative monitoring network. All recent data shows typical patterns of annual highs in the Spring and lows in the late Summer or Fall that match the historical trends. No wells reported groundwater levels below the minimum thresholds establish in the GSP.

### **Groundwater Storage**

The change in groundwater storage sustainability indicator in the Eastern San Joaquin Subbasin uses the groundwater level sustainable management criteria as a proxy. Therefore, the minimum thresholds for groundwater levels are designed to be protective of significant and unreasonable impacts to changes in groundwater storage. For WY 2019, groundwater storage was estimated using the ESJWRM. Based on these estimates, from beginning to the end of WY 2019, the Eastern San Joaquin Subbasin saw an increase of storage of approximately 130,000 AF.

### **Groundwater Quality**

While representative network monitoring for the GSP had not yet begun in WY 2019, four out of ten of the representative monitoring wells did report measurements for total dissolved solids. All measurements reported did not surpass minimum thresholds for water quality set in the GSP.

### **Seawater Intrusion**

The Eastern San Joaquin Subbasin is not in a coastal area and seawater intrusion is not currently present. However, the GSP establishes monitoring protocols for the early detection of seawater intrusion, were it ever to occur, so that the ESJGWA can take action to address undesirable results. As GSP implementation did not occur in WY 2019, chloride monitoring has not yet started. Therefore, in



this annual report seawater intrusion conditions for WY 2019 were not evaluated. However, moving forward, chloride concentrations will be monitored according to the GSP.

### **Land Subsidence**

The land subsidence sustainability indicator in the Eastern San Joaquin Subbasin uses the groundwater level sustainable management criteria as a proxy. Therefore, the minimum thresholds for groundwater levels are designed to be protective of significant and unreasonable impacts to land subsidence. Land subsidence has not historically been an area of concern in the Subbasin, and there are no records of land subsidence caused by groundwater pumping in the Subbasin. Section 2.1.5 of the GSP details the extent of clay deposits in the Subbasin and Section 2.2.5 of the GSP includes a description of the minimal subsidence that has historically occurred in the Subbasin.

### **Groundwater-Surface Water Interaction**

The depletions of interconnected surface water sustainability indicator in the Eastern San Joaquin Subbasin uses the groundwater level sustainable management criteria as a proxy. Therefore, the minimum thresholds for groundwater levels are designed to be protective of significant and unreasonable impacts to depletions of interconnected surface waters.

### **Total Water Use**

The primary water use sectors in the Eastern San Joaquin Subbasin include urban and agriculture uses, with groundwater supplying the majority of the total water use. During WY 2019, groundwater use is estimated at 738,100 AF for the Eastern San Joaquin Subbasin. Surface water deliveries during WY 2019 is estimated at 516,300 AF. The majority of surface water is used between May and September. Total water use is the sum of the groundwater use and surface water use. Total water use during WY 2019 is estimated at 1,254,400 AF.

## **ANNUAL REPORT ELEMENTS**

The following table presents the sections and page numbers where requirements for Annual Report elements are included, subject to Article 7 § 356.2 of the GSP Regulation Sections in the California Code of Regulations.

<b>California Code of Regulations - GSP Regulations Sections</b>	<b>Annual Report Elements</b>	<b>Section(s) and page numbers(s) where requirements for Annual Report elements are included</b>
<b>Article 7</b>	<b>Annual Reports and Periodic Evaluations by Agency</b>	
<b>§ 356.2</b>	<b>Annual Reports</b>	
	Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:	
	(a) General information, including an executive summary and a location map depicting the basin	Executive Summary, Figure 1 (1-1)

<b>California Code of Regulations - GSP Regulation Sections</b>	<b>Annual Report Elements</b>	<b>Section(s) and page numbers(s) where requirements for Annual Report elements are included</b>
	covered by the report.	
	(b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:	--
	(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:	--

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	(A) Groundwater elevation at monitoring points our maps for each print cycle	Section 3.2 (3-15), Figure 2 (3-16), Figure 3 (3-17), Figure 4 (3-18)

<b>California Code of Regulations - GSP Regulation Sections</b>	<b>Annual Report Elements</b>	<b>Section(s) and page numbers(s) where requirements for Annual Report elements are included</b>
	aquifer, within the basin, illustrate that, at a minimum, these sections	

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	Highland Seasonal Groundwater	
	(B) Hydro	Section 3.2 (3-15), Figure 2 (3-16), Appendix B

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	g r a p h s o f g r o u n d w a t e r e l e v a t i o n s a n d w a t e r y e a r t y p e u s i n	

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	g h i s t o r i c a l d a t a t o t h e g r e a t e s t e x t e n t a v a i l a b l e ; i n c l u d i n g f r o	



California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included																								
	m J a n u a r y 1, 2 0 1 5, t o c u r r e n t r e p o r t i n g y e a r.																									
	(2) Groundwater extraction for the preceding water	<table border="1"> <tr> <td colspan="4" data-bbox="399 1572 1466 1646">Section 3.8.1 (3-23), Figure 8 (3-26), Table 4. Water Year 2019 Monthly Groundwater Pumping (in acre-feet)</td> </tr> <tr> <td colspan="2" data-bbox="399 1646 889 1696"><b>Agricultural</b></td> <td colspan="2" data-bbox="889 1646 1466 1696"><b>Urban and Industrial</b></td> </tr> <tr> <td data-bbox="399 1696 570 1747"><b>Reported Values</b></td> <td data-bbox="570 1696 889 1747"><b>Estimated Agricultural*</b></td> <td data-bbox="889 1696 1211 1747"><b>Agency Reported Values</b></td> <td data-bbox="1211 1696 1466 1747"><b>Private Domestic</b></td> </tr> <tr> <td data-bbox="399 1747 570 1797">0</td> <td data-bbox="570 1747 889 1797">93,300</td> <td data-bbox="889 1747 1211 1797">2,029</td> <td data-bbox="1211 1747 1466 1797">2,200</td> </tr> <tr> <td data-bbox="399 1797 570 1848">0</td> <td data-bbox="570 1797 889 1848">3,300</td> <td data-bbox="889 1797 1211 1848">1,249</td> <td data-bbox="1211 1797 1466 1848">1,700</td> </tr> <tr> <td data-bbox="399 1848 570 1896">0</td> <td data-bbox="570 1848 889 1896">2,600</td> <td data-bbox="889 1848 1211 1896">899</td> <td data-bbox="1211 1848 1466 1896">1,300</td> </tr> </table>	Section 3.8.1 (3-23), Figure 8 (3-26), Table 4. Water Year 2019 Monthly Groundwater Pumping (in acre-feet)				<b>Agricultural</b>		<b>Urban and Industrial</b>		<b>Reported Values</b>	<b>Estimated Agricultural*</b>	<b>Agency Reported Values</b>	<b>Private Domestic</b>	0	93,300	2,029	2,200	0	3,300	1,249	1,700	0	2,600	899	1,300
Section 3.8.1 (3-23), Figure 8 (3-26), Table 4. Water Year 2019 Monthly Groundwater Pumping (in acre-feet)																										
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<b>Reported Values</b>	<b>Estimated Agricultural*</b>	<b>Agency Reported Values</b>	<b>Private Domestic</b>																							
0	93,300	2,029	2,200																							
0	3,300	1,249	1,700																							
0	2,600	899	1,300																							

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included				
Jan-19	year.	0	1,600	952	1,300	
Feb-19	Data shall	0	22,800	1,623	1,200	
Mar-19	be collected	0	10,300	1,477	1,400	
Apr-19	using the	0	95,000	2,059	1,900	
May-19	best available	0	156,400	3,926	3,200	
Jun-19	measurement	0	111,900	4,270	3,600	
Jul-19	t	0	55,200	3,496	3,000	
<b>Total</b>		<b>0</b>	<b>681,400</b>	<b>29,547</b>	<b>27,200</b>	
<b>Measurement Accuracy</b>		<b>High</b>	<b>Medium</b>	<b>High</b>	<b>Medium</b>	
Additional groundwater pumping is estimated by the ESJWRM based on crop type, hydrologic data (precipitation and evapotranspiration), irrigation efficiency, and population information.						
	nted in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement	(3-28)				

<b>California Code of Regulations - GSP Regulation Sections</b>	<b>Annual Report Elements</b>	<b>Section(s) and page numbers(s) where requirements for Annual Report elements are included</b>
	(direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.	
	(3) Surface water supply used or available for use, for groundwater	Section 3.8.2 (3-25), Table 5 ( <b>Error! Bookmark not defined.</b> )

<b>California Code of Regulations - GSP Regulation Sections</b>	<b>Annual Report Elements</b>	<b>Section(s) and page numbers(s) where requirements for Annual Report elements are included</b>
	recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.	
	(4) Total water use shall be collected using the best available measurement	Section 3.8.3 (3-25), Table 6 ( <b>Error! Bookmark not defined.</b> )

<b>California Code of Regulations - GSP Regulation Sections</b>	<b>Annual Report Elements</b>	<b>Section(s) and page numbers(s) where requirements for Annual Report elements are included</b>
	t methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements.	

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.	
	(5) Change in groundwater	--

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	r in storage shall include the following:	
	(A) Change in groundwater at the instorage maps for	Section 3.3 (3-18), Figure 6 (3-20)

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	each principal aquifer in the basin.	
	(B) Appendix B	Section 3.3 (3-18), Figure 5 (3-19)Figure 5



California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	r y e a r t y p e, g r o u n d w a t e r u s e, t h e a n n u a l c h a n g e i n g r o u n d	

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	water r i n s t o r a g e, a n d t h e c u m u l a t i v e c h a n g e i n g r o u n d w a t e r	

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	in st o r a g e f o r t h e b a s i n b a s e d o n h i s t o r i c a l d a t a t o t h e g r e a t	

<b>California Code of Regulations - GSP Regulation Sections</b>	<b>Annual Report Elements</b>	<b>Section(s) and page numbers(s) where requirements for Annual Report elements are included</b>
	est x te n t a v ai la b le ; i n cl u d i n g fr o m J a n u a r y 1, 2 0 1 5, t o t h e c u	

California Code of Regulations - GSP Regulation Sections	Annual Report Elements	Section(s) and page numbers(s) where requirements for Annual Report elements are included
	<p>rr e n t r e p o r t i n g y e a r.</p>	
	<p>(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.</p>	<p>Section 2.3 (2-10), Appendix A</p>

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## 1. INTRODUCTION

The Eastern San Joaquin Groundwater Subbasin (Eastern San Joaquin Subbasin or Subbasin) (**Figure 1**) has been identified by the Department of Water Resources (DWR) as critically overdrafted. The Eastern San Joaquin Groundwater Sustainability Plan (Eastern San Joaquin GSP, GSP, or the Plan) has been developed to meet SGMA regulatory requirements by the January 31, 2020 deadline for critically-overdrafted basins while reflecting local needs and preserving local control over water resources. While the Eastern San Joaquin GSP offers a new and significant approach to groundwater resource protection, it was developed within an existing framework of comprehensive planning efforts. Throughout the Eastern San Joaquin Region, several separate yet related planning efforts have occurred previously or are concurrently proceeding, including integrated regional water management, urban water management, agricultural water management, watershed management, habitat conservation, and general planning and most closely, the *Eastern San Joaquin Groundwater Basin Groundwater Management Plan* (GMP) (2004). The Eastern San Joaquin GSP fits in with these prior planning efforts, building on existing local management and basin characterization.

The Eastern San Joaquin GSP provides a path to achieve and document sustainable groundwater management within 20 years following Plan adoption, promoting the long-term sustainability of locally-managed groundwater resources now and into the future.

The GSP was developed jointly the Eastern San Joaquin Groundwater Authority (ESJGWA), which is a joint powers authority formed by the 16 groundwater sustainability agencies (GSAs) within the Eastern San Joaquin Subbasin. Collectively, these 16 GSAs will be referred to as “GSAs”.

The ESJGWA includes the following GSAs:

- Central Delta Water Agency (CDWA)
- Central San Joaquin Water Conservation District (CSJWCD)
- City of Lodi
- City of Manteca
- City of Stockton
- Eastside San Joaquin GSA (Eastside GSA) (composed of Calaveras County, Calaveras County Water District [CCWD], Stanislaus County, and Rock Creek Water District)
- Linden County Water District (LCWD)
- Lockeford Community Services District (LCSD)
- North San Joaquin Water Conservation District (NSJWCD)
- Oakdale Irrigation District (OID)
- San Joaquin County No. 1
- San Joaquin County No. 2
- South Delta Water Agency (SDWA)

- South San Joaquin GSA (composed of South San Joaquin Irrigation District [SSJID] including Woodward Reservoir, City of Ripon, and City of Escalon)
- Stockton East Water District (SEWD)
- Woodbridge Irrigation District (WID)

During water year (WY) 2019 (October 1, 2018 through September 30, 2019), groundwater management within the Eastern San Joaquin Subbasin evolved through the development of the GSP, which was ultimately adopted by the GSAs between November 2019 and January 2020. The GSP was developed in a stakeholder-driven environment, including 69 open meetings and numerous other outreach activities. The result is a GSP that describes groundwater conditions in the Eastern San Joaquin Subbasin and sets up a system of management based on quantitative thresholds, termed sustainable management criteria, for six sustainability indicators: chronic lowering of groundwater levels, degraded water quality, seawater intrusion, land subsidence, change in groundwater storage, and depletions of interconnected surface water.

This Annual Report provides information on conditions in the Eastern San Joaquin Subbasin and progress towards implementing the GSP for WY 2019. The report has been prepared in accordance with *Article 7 Annual Reports and Periodic Evaluations by the Agency*, § 356.2 *Annual Reports* of the GSP Emergency Regulations as contained within the California Code of Regulations.



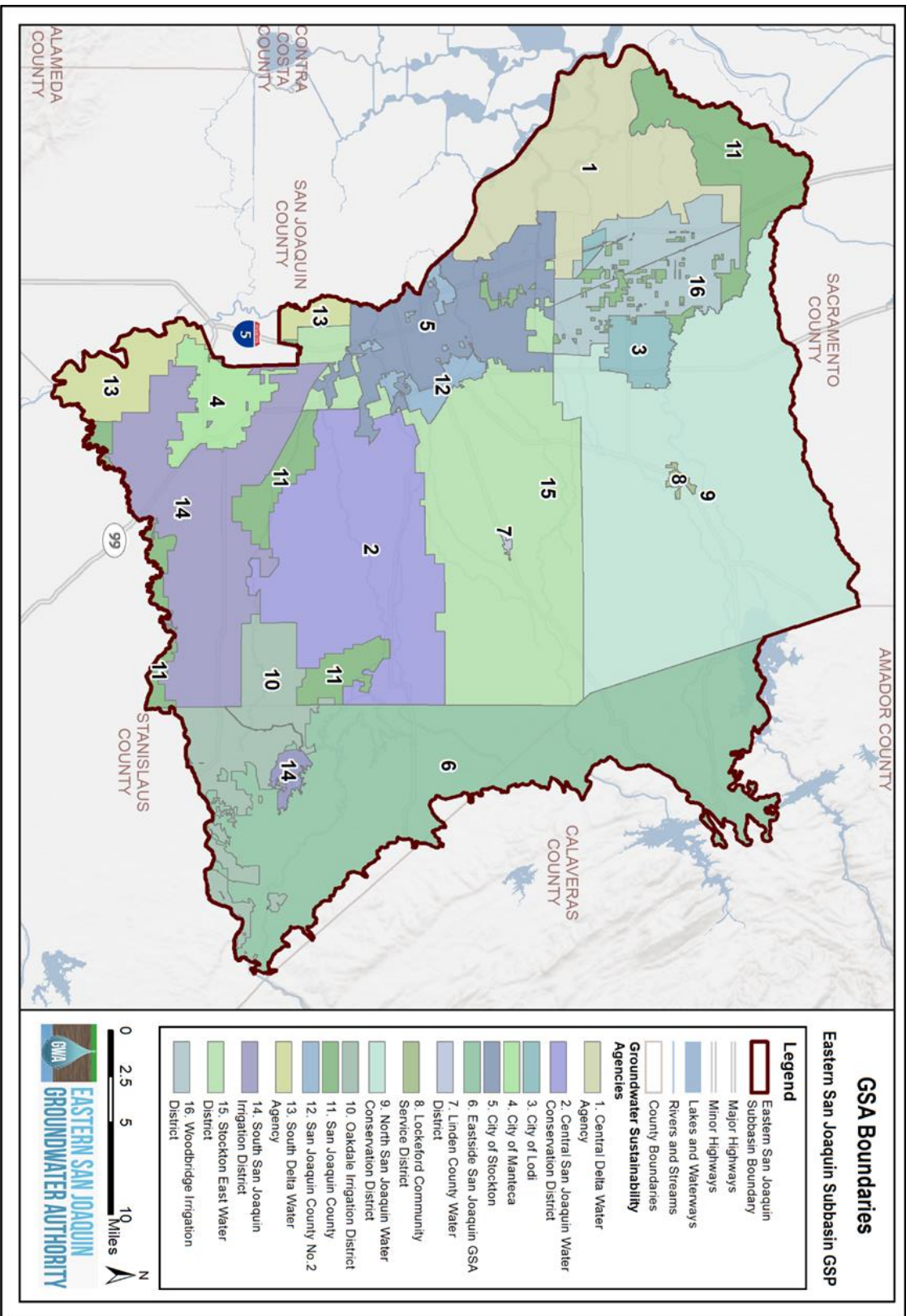


Figure 1. Eastern San Joaquin Groundwater Subbasin

## 2. GROUNDWATER MANAGEMENT ACTIVITIES AND MILESTONES

This section documents the initial activities and milestones from the passing of the Sustainable Groundwater Management Act (SGMA) throughout GSP development, summarizes the contents of the GSP for the Eastern San Joaquin Subbasins, and documents GSP implementation progress during WY 2019, noting that the GSP was not adopted until January 2020.

Implementation of the GSP is underway, which includes this Annual Report as well as monitoring and associated assessment of sustainable management criteria and identified projects, management actions, and adaptive management (as needed).

### 2.1 GROUNDWATER SUSTAINABILITY PLAN DEVELOPMENT

Preliminary development of the Eastern San Joaquin GSP began with formation of the member GSAs and agreement to form the ESJGWA for the purpose of GSP development and implementation. The ESJGWA Board of Directors (ESJGWA Board) developed an Advisory Committee (AC), which supports and provides recommendations to the ESJGWA Board for ongoing sustainable groundwater management and development of the Eastern San Joaquin GSP. The ESJGWA also developed a Groundwater Sustainability Workgroup (Workgroup) to promote stakeholder input and relied upon the Workgroup when developing the GSP. The Workgroup began with an application process to ensure a diverse cross section of populations were represented to serve on the Workgroup. Workgroup members participated and provided valuable input throughout the GSP development process.

On March 3, 2018, the GSAs filed a notice of intent to prepare a GSP with DWR. A public draft of the GSP was posted for public comment in July 2019, and a notice of intent to adopt a GSP was sent by the ESJGWA to all cities and counties in the Eastern San Joaquin Subbasin on August 16, 2019. The Final GSP, published November 5, 2019, was adopted by the individual GSAs between November 2019 and January 2020. On January 8, 2020, the ESJGWA Board passed a resolution agreeing to submit the Plan to DWR on behalf of the 16 GSAs.

### 2.2 GROUNDWATER SUSTAINABILITY PLAN CONTENTS SUMMARY

The GSP was prepared in compliance with all relevant elements of the SGMA Regulations and GSP Emergency Regulations, Article 5 *Plan Contents*. The subsections below summarize the contents of the GSP relevant to assessing changing conditions in the Eastern San Joaquin Subbasin for the purposes of evaluating GSP implementation progress in this Annual Report.

#### 2.2.1 Plan Area

The GSP's plan area encompasses the Eastern San Joaquin Subbasin (5-22.01), as defined by DWR's Final 2018 Basin Boundary Modifications (released February 11, 2019). The Eastern Subbasin is located at the north end of the larger San Joaquin Valley Groundwater Basin, to the west of the Sacramento-San Joaquin River Delta (Delta), and is generally bounded by the Sierra Nevada foothills to the east, the San Joaquin River to the west, Dry Creek to the north, and Stanislaus River to the south. The major river systems traversing the Subbasin include the Calaveras, Mokelumne, and Stanislaus rivers. Multiple smaller streams flow into the San Joaquin River.

The plan area covers areas of San Joaquin County east of the San Joaquin River, including the cities of Stockton, Lodi, Manteca, Escalon, and Ripon, and portions of Calaveras and Stanislaus County. The Subbasin is bordered by Sacramento, Amador, and Contra Costa counties. Land use patterns in the Eastern San Joaquin Subbasin are dominated by agricultural uses, including nut and fruit trees,

vineyards, row crops, grazing, and forage. Irrigated crop acreage in the Subbasin is 37% fruit and nut trees, 24% vineyards, and 11% alfalfa and irrigated pasture, according to 2015 CropScape data.

### **2.2.2 Hydrogeologic Conceptual Model**

One principal aquifer exists across the Eastern San Joaquin Subbasin that is composed of three water production zones. The zones are:

- Shallow Zone that consists of the alluvial sands and gravels of the Modesto, Riverbank, and Upper Turlock Lake Formations
- Intermediate Zone that consists of the Lower Turlock Lake and Laguna Formations
- Deep Zone that consists of the consolidated sands and gravels of the Mehrten Formation

The Stockton Fault is the largest fault in the Eastern San Joaquin Subbasin. It is a large reverse fault with displacements of up to 3,600 feet. The Vernalis Fault is a reverse fault with northwest-southeast trend that bounds the Tracy-Vernalis anticlinal trend that is mapped outside of the west boundary of the Eastern San Joaquin Subbasin. Additionally, the Stockton Arch is a broad transverse structure that underlies the southern half of the Eastern San Joaquin Subbasin. The base of fresh water (encountered saline) has been observed as shallow as 650 feet below ground surface (bgs) in the eastern part of the Subbasin to over 2,000 feet bgs in the northern part of the Subbasin.

### **2.2.3 Existing Groundwater Conditions**

Groundwater levels in some portions of the Subbasin have been declining for many years, while groundwater levels in other areas of the Subbasin have remained stable or increased in recent years. The change in groundwater levels varies across the Subbasin, with the greatest declines occurring in the central portion of the Subbasin. The western and southern portions of the Subbasin have experienced less change in groundwater levels, in part due to the minimal groundwater pumping in the Delta area to the west and the import of surface water for agricultural and urban uses.

In many areas of the Subbasin, groundwater levels reached their lowest in Fall 1992. In many cases, areas that experienced undesirable results in 1992 put mitigation measures in place, often deepening wells, meaning that 1992 groundwater levels would no longer trigger undesirable effects. Groundwater levels in some areas of the Subbasin have recovered since 1992; However, groundwater levels in other portions of the Subbasin further declined below 1992 levels.

A central pumping depression exists east of the City of Stockton. Groundwater generally flows from the outer edges of the Subbasin towards the depression in the middle of the Subbasin. Along the eastern side of the Subbasin, the lateral gradient of groundwater levels ranges from approximately 21 ft/mi during the seasonal high to 16 ft/mi during the seasonal low. Along the western side of the Subbasin, the lateral gradient ranges from approximately 7 ft/mi during the seasonal high to 6 ft/mi during the seasonal low. The steeper gradients on the east side of the Subbasin compared to the west side is primarily due to the steeper topography in that area.

Groundwater quality in the Subbasin varies by location. Areas along the western margin have historically had higher levels of salinity. Salinity may be naturally occurring or the result of human activity. Sources of salinity in the Subbasin include Delta sediments, deep saline groundwater, and irrigation return water. Elevated concentrations of other constituents, such as nitrate, arsenic, and point-source contaminants, are generally localized and not widespread and are generally related to natural sources or land use activities.

While the total volume of groundwater in storage in the Subbasin has declined over time, groundwater storage reduction has not historically been an area of concern in the Subbasin, as there are large volumes of fresh water stored in the aquifer. The total fresh groundwater in storage was estimated at over 50 million-acre-feet (MAF) in 2015. The amount of groundwater in storage has decreased by approximately 0.01 percent, or over 5,000 AF, per year between 1995 and 2015. As such, it is highly unlikely the Subbasin will experience conditions under which the volume of stored groundwater poses a concern, although the depth to access that groundwater does pose a concern.

Land subsidence has not historically been an area of concern in the Subbasin, and there are no records of land subsidence caused by groundwater pumping in the Subbasin.

Seawater intrusion is not present in the Subbasin. While the Delta ecosystem evolved with a natural salinity cycle that brought brackish tidal water in from the San Francisco Bay, current management practices endeavor to maintain freshwater flows through a combination of hydraulic and physical barriers and alterations to existing channels.

Major river systems in the Subbasin are highly managed to meet instream flow requirements for fisheries, water quality standards, and water rights of users downstream. Many smaller streams run through the Subbasin that provide contributions to both groundwater, riparian habitat, and the major river systems. The interconnection between reaches of these streams and the groundwater system will be better understood through monitoring as the GSP is implemented.

#### **2.2.4 Water Budgets**

Water budgets provide a quantitative accounting of surface water and groundwater entering and leaving the Eastern San Joaquin Subbasin under historical, current, projected, and projected with climate change conditions. The budgets were estimated using the ESJWRM. The primary components of the groundwater budget are:

- Inflows:
  - Deep percolation from precipitation, applied water (surface water and groundwater) for agricultural lands, and applied water (surface water and groundwater) for outdoor use in the urban areas or industrial purposes
  - Stream seepage (i.e., losses to the groundwater system)
  - Other recharge (including unlined canals/reservoir seepage, local tributaries seepage, and Managed Aquifer Recharge [MAR] projects)
  - Subsurface inflow
- Outflows:
  - Groundwater outflow to streams (i.e., stream gain from the groundwater system)
  - Groundwater pumping
  - Subsurface outflow
- Change in Groundwater Storage (Inflows Minus Outflows)

The average annual groundwater storage is shown as decreasing under historical, current, projected, and projected with climate change conditions, suggesting conditions of overdraft.

The sustainable conditions scenario results in groundwater outflows almost equal to groundwater inflows, bringing the long-term (50-year) average change in groundwater storage to close to zero. Based on this analysis, the sustainable yield of the Subbasin is 715,000 AF/year  $\pm$  10 percent. Groundwater pumping and sustainable yield is discussed further in Section 3.8.1.

## 2.2.5 Sustainable Management Criteria

SGMA allows several pathways to meet the distinct local needs of each groundwater basin, including development of sustainable management criteria, usage of other sustainability indicators as a proxy, and identification of indicators as not being applicable to the basin. Sustainable management criteria were developed based on information about the Subbasin in the hydrogeologic conceptual model, the descriptions of current and historical groundwater conditions, the water budget, and input from stakeholders during the GSP development process.

The sustainability goal for the Eastern San Joaquin Subbasins is:

*to maintain an economically viable groundwater resource for the beneficial use of the people of the Eastern San Joaquin Subbasin by operating the Subbasin within its sustainable yield or by modification of existing management to address future conditions. This goal will be achieved through the implementation of a mix of supply and demand type projects consistent with the GSP implementation plan.*

The method prescribed by SGMA to measure undesirable results and achieve the sustainability goal involves setting minimum thresholds and measurable objectives for a series of representative monitoring sites. These representative sites are all or a subset of the monitoring network developed as part of the GSP. The sustainable management criteria are summarized in **Table 1**.

Of the six sustainability indicators addressed in the Eastern San Joaquin Subbasin, chronic lowering of groundwater levels is the driver for sustainable groundwater management, as several other indicators are all correlated with groundwater levels. Measurable objectives, minimum thresholds, and interim milestones were developed for each of the identified representative wells.

Minimum thresholds for groundwater levels were developed with reference to historical drought low conditions and domestic well depths. Specifically, minimum thresholds were established based on the deeper of the historical drought low plus a buffer of the historical fluctuation or the 10th percentile domestic well depth, whichever is shallower – establishing levels that are protective of 90 percent of domestic wells. In municipalities with ordinances requiring the use of municipal water (water provided by a city's municipal wells) for domestic users, the 10th percentile municipal well depth is used in place of the 10th percentile domestic well depth criteria. Measurable objectives were established based on the historical drought low and provide a buffer above the minimum threshold. A table summarizing minimum thresholds and measurable objectives is included in the GSP. Graphs showing the minimum threshold and measurable objective for each of the representative wells are contained in an appendix to the GSP.

Minimum thresholds for water quality were defined by considering two primary beneficial uses at risk of undesirable results related to salinity: drinking water and agriculture uses. Minimum thresholds are 1,000 mg/L for each representative monitoring well, consistent with the upper limit SMCL for TDS. Crop tolerances in the Subbasin range by crop type from 900 mg/L TDS for almonds up to 4,000 mg/L TDS for wheat, assuming a 90 percent yield.

The Eastern San Joaquin Subbasin is not in a coastal area and seawater intrusion is not currently present. Undesirable results related to seawater intrusion are not currently occurring and are not reasonably expected to occur. However, this GSP establishes monitoring protocols for the early detection of seawater intrusion, were it ever to occur, so that the ESJGWA can take action to address undesirable results. There is the possibility of future seawater intrusion due to potential future changes in the Delta that could be caused by sea level rise. This GSP develops minimum thresholds and measurable objectives that include monitoring for chloride and an analysis of isotopic ratios to identify

the source of high salinity. The minimum threshold for seawater intrusion is a 2,000 mg/L chloride isocontour line established near the western edge of the Subbasin, between sentinel monitoring locations. 2,000 mg/L chloride is approximately 10 percent of seawater chloride concentrations (19,500 mg/L).

For depletions of interconnected surface water, the minimum thresholds and measurable objectives for groundwater levels are used. There is significant correlation between groundwater levels and depletions, and the groundwater levels minimum thresholds are found to be protective of depletions. Similarly, the minimum thresholds and measurable objectives for groundwater levels are used for the land subsidence and groundwater storage sustainability indicators, as both are strongly linked to groundwater levels. The groundwater levels minimum thresholds are found to be protective of land subsidence and groundwater storage.

### 2.2.6 Monitoring Networks

Monitoring networks are developed for the sustainability indicators that apply to the Eastern San Joaquin Subbasin, leveraging existing monitoring that has been developed locally and in cooperation with DWR. The objective of these monitoring networks is to monitor conditions across the Subbasin so that the GSAs can continue to manage groundwater sustainably. Specifically, the monitoring network was developed to do the following:

- Monitor impacts to the beneficial uses or users of groundwater
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds
- Demonstrate progress toward achieving measurable objectives described in the GSP
- Support estimation of annual changes in water budget components

To achieve these objectives, the monitoring networks incorporate sites and frequencies that can detect seasonal and long-term trends in each applicable sustainability indicator. This includes selection of an appropriate temporal frequency and spatial density to evaluate groundwater conditions related to the effectiveness of the GSP.

There are four monitoring networks in the Eastern San Joaquin Subbasin GSP: a representative network for water levels, a broad network for water levels, a representative network for water quality, and a broad network for water quality. Representative networks are used to determine compliance with the minimum thresholds, while the broad networks collect data for informational purposes to identify trends and fill data gaps. The two monitoring networks for water quality will additionally be used to develop a chloride isocontour to evaluate potential for seawater intrusion, and water levels data will inform depletions of interconnected surface water.

Wells in the monitoring networks will be measured on a semi-annual schedule for both groundwater levels and water quality. Historical measurements have been entered into the Subbasin Data Management System (DMS), and future data will also be stored in the DMS.

A summary of the wells in the monitoring networks is shown in the table below.

Summary of Monitoring Network Wells	
Representative Networks	Well Count
Groundwater Level	20
Groundwater Quality	10
Broad Networks	
CASGEM (Groundwater Levels)	76
Nested or Clustered Wells (Groundwater Levels & Quality)	16
Agency Wells (Groundwater Levels & Quality)	5

**2.2.7 Projects and Management Actions**

Achieving sustainability in the Subbasin requires implementation of projects and management actions (Table 1). The Subbasin will achieve sustainability by implementing water supply projects that either replace groundwater use or supplement groundwater supplies to attain the current estimated pumping offset and/or recharge targets identified in the GSP. In addition, three projects have been identified that support demand conservation activities, including water use efficiency upgrades. Currently, no pumping restrictions have been proposed for the Subbasin; however, GSAs maintain the flexibility to implement such demand-side management actions in the future if need is determined. Additional management activities are:

- Monitoring and recording of groundwater levels and groundwater quality data
- Maintaining and updating the Subbasin Data Management System (DMS) with newly collected data
- Annual monitoring of progress toward sustainability
- Annual reporting of Subbasin conditions to DWR as required by SGMA

**2.2.8 Implementation**

Implementation of the GSP includes monitoring of conditions, comparing against sustainable management criteria, reporting of those conditions, evaluating the GSP, implementing adaptive management strategies, implementing projects and management actions, and funding of these activities.

Data are collected through monitoring on a prescribed schedule for each monitoring network. The data collected will be used to improve the understanding of the Subbasin as well as for comparison with the sustainable management criteria. The representative monitoring sites included in each monitoring network have defined sustainable management criteria that allow for comparison with monitored data to track progress towards maintaining desired conditions and avoiding undesirable results.

Comparisons between monitored data at representative sites and the sustainable management criteria allow for assessment of whether desired conditions are being maintained, through comparison with the measurable objectives. The comparisons also allow for assessment of whether conditions are approaching minimum thresholds. While conditions considered to be undesirable results are not anticipated, should sites begin to approach minimum thresholds, the ESJGWA will convene a working group to evaluate adaptive management strategies. Further, if sites exceed the minimum threshold, the

total percentage of representative sites exceed minimum thresholds will be calculated and compared against the percentage which has been identified as reflective of undesirable results.

Implementation activities will be reported in annual reports produced by April 1 of each year, reporting on conditions and activities from the previous water year. This is the first such annual report has been developed. Every five years, evaluation reports will be developed to document progress in implementation and to reconsider elements of the GSP.

Implementation of the GSP is estimated to cost between \$600,000 and \$1 million per year, with additional costs beyond for projects and management actions based on decisions made by each GSA. Some of these costs are already being incurred through existing groundwater management. Additional one-time costs, such as model refinement, are estimated to be on the order of \$315,000. GSAs will individually fund implementation of projects in their respective areas. Options for GSA funding include fees based on groundwater pumping, acreage, or combinations of these, and pursuit of available grant funds. The GSAs will evaluate options for securing the needed funding on an individual basis. The estimated initial costs of projects range from on the order of \$50,000 to \$328 million, depending on the project. Annual project costs range from \$3,000 to \$9 million per year to provide funds for operations and maintenance.

The Eastern San Joaquin Subbasin applied for funding under the Proposition 68 Sustainable Groundwater Management Grant Program, Round 3. The ESJGWA was awarded \$350,000 on January 24, 2020. These grant funds will be used to in part to design a Rate Study to develop a cost allocation framework that will help the Subbasin identify how costs for implementation activities will be distributed between GSAs. Such implementation activities include monitoring and reporting, model verification efforts, and public engagement and outreach. Projects will be implemented at the GSA level.



**Table 1. Summary of Sustainable Management Criteria**

<b>Sustainability Indicator</b>	<b>Undesirable Results</b>	<b>Identification of Undesirable Results</b>	<b>Measurable Objective</b>	<b>Minimum Threshold</b>
<b>Chronic lowering of groundwater levels</b>	An undesirable result is experienced if sustained groundwater levels are too low to satisfy beneficial uses within the Subbasin over the planning and implementation horizon of the GSP.	Undesirable results occur when more than 25% of representative monitoring wells (5 of 20 wells in the Subbasin) fall below their minimum elevation thresholds for two 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.	At each of 20 representative wells, the measurable objective was defined based on the deeper of 1992 or 2015-2016 groundwater level values.	The deeper of 1992 and 2015-2016 groundwater levels with a buffer of 100 percent of historical range applied, or the 10th percentile domestic well depth with-in a 3-mile radius of the monitoring well, <sup>1</sup> whichever is shallower. In municipalities with ordinances requiring the use of municipal water, the 10th percentile municipal well depth is used in place of the 10th percentile domestic well depth criteria.
<b>Reduction in groundwater storage</b>	An undesirable result is experienced if sustained groundwater storage volumes are insufficient to satisfy beneficial uses within the Subbasin over the planning and implementation horizon of the GSP. Undesirable results related to groundwater storage are not present and are not likely to occur in the Subbasin.	Undesirable results would occur if groundwater storage levels were depleted by 23 MAF, to 30 MAF.	Management of reduction in groundwater storage is performed using groundwater levels as a proxy.	Management of reduction in groundwater storage is performed using groundwater levels as a proxy.
<b>Degraded water quality</b>	An undesirable result is experienced if SGMA-related groundwater management activities cause significant and unreasonable impacts to the long-term viability of domestic, agricultural, municipal, environmental, or other beneficial uses over the planning and implementation horizon of the GSP.	Undesirable results occur when more than 25% of representative monitoring wells (3 of 10 wells in the Subbasin) exceed the minimum thresholds for water quality for two consecutive years and where these concentrations are the result of groundwater management activities.	At each of 10 representative wells, 600 milligrams per liter (mg/L) total dissolved solids (TDS). The measurable objective is close to the recommended Secondary Maximum Contaminant Level (SMCL) of 500 mg/L and significantly below the upper limit SMCL of 1,000 mg/L.	At each of 10 representative wells, 1,000 mg/L TDS, consistent with the upper SMCL and developed based on the crop tolerances for fruit and nut trees and vineyards.

<b>Sustainability Indicator</b>	<b>Undesirable Results</b>	<b>Identification of Undesirable Results</b>	<b>Measurable Objective</b>	<b>Minimum Threshold</b>
<b>Seawater intrusion</b>	An undesirable result is experienced if sustained groundwater salinity levels caused by seawater intrusion and due to groundwater management practices are too high to satisfy beneficial uses within the basin over the planning and implementation horizon of the GSP. Seawater intrusion is not present and is not likely to occur in the Eastern San Joaquin Subbasin.	Undesirable results are considered to occur during GSP implementation when 2,000 mg/L chloride reaches an established isocontour line and where these concentrations are caused by intrusion of a seawater source as a result of groundwater management activity.	500 mg/L chloride concentrations at an established isocontour line along the western portion of the Subbasin.	2,000 mg/L chloride concentrations at the established isocontour line along the western portion of the Subbasin. An action plan is in place to trigger additional monitoring and analysis at detections of 1,000 mg/L chloride in the monitoring network to confirm seawater source.
<b>Land subsidence</b>	An undesirable result is experienced if the occurrence of land subsidence substantially interferes with beneficial uses of groundwater and infrastructure within the Subbasin over the planning and implementation horizon of the GSP. There are no historical records of significant and unreasonable impacts from subsidence in the Subbasin.	An undesirable result occurs when subsidence substantially interferes with beneficial uses of groundwater and surface land uses. Undesirable results would occur when substantial interference with land use occurs, including significant damage to canals, pipes, or other water conveyance facilities.	Management of land subsidence is performed using groundwater levels as a proxy.	Management of land subsidence is performed using groundwater levels as a proxy.
<b>Depletions of interconnected surface water</b>	An undesirable result is experienced if the depletions of interconnected surface water causes significant and unreasonable adverse effects on beneficial uses of surface water within the Subbasin over the planning and implementation horizon of the GSP.	An undesirable results occurs when depletions result in reductions in flow or levels of major rivers and streams that are hydrologically connected to the basin such that the reduced surface water flow or levels have a significant and unreasonable adverse impact on beneficial uses and users of the surface water.	Management of depletions of interconnected surface water is performed using groundwater levels as a proxy.	Management of depletions of interconnected surface water is performed using groundwater levels as a proxy.

Notes:

1. A radius of 2 miles was used for well 03N07E21L003 to reflect domestic well depths in close proximity to the Mokelumne River.

## **2.3 GSP IMPLEMENTATION PROGRESS**

Since the Eastern San Joaquin GSP was not adopted by the GSAs until January 2020, implementation of the GSP was not occurring during WY 2019. While future annual reports will document progress toward implementing the GSP, this annual report will document conditions and activities during GSP development as they relate to GSP implementation.

Throughout the GSP development process, measurable objectives, interim milestones, and minimum thresholds for applicable sustainability indicators as well as projects and management actions were identified to aid in maintaining sustainable conditions throughout the Subbasin. Implementation progress of projects, management actions, and adaptive management activities are detailed in **Appendix A**.

The following sections describe progress made in achieving the interim milestones identified in the GSP for groundwater levels and groundwater quality. Groundwater levels are used as a proxy for reduction in groundwater storage, land subsidence, and depletions of interconnected surface water. Monitoring for seawater intrusion is done in conjunction with measuring chloride concentrations through the groundwater quality representative monitoring network wells. The ESJWRM was used to quantify recent changes in groundwater storage to reflect WY 2016 to 2019 for this annual report, described in Section 3.4. During WY 2019, conditions relative to all thresholds for all applicable sustainability indicators were considered sustainable.

### **2.3.1 Groundwater Levels**

An analysis was performed to determine conditions relative to established thresholds (including interim milestones for 2025, measurable objectives, and minimum thresholds) during WY 2019 for the chronic lowering of groundwater levels sustainability indicator (Table 2).

As defined in the GSP, interim milestones are established as the current condition for the first 10 years and then follow a linear trend between the current condition and the measurable objective.

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**Table 2. Chronic Lowering of Groundwater Levels Threshold Analysis**

Well ID	CASGEM ID	Interim Milestone (2025)	Measurable Objective	Minimum Threshold	Spring 2019 (Seasonal High)	Difference between Spring 2019 (ft msl)		
		(ft msl)	(ft msl)	(ft msl)	(ft msl)	Interim Milestone (2025)	Measurable Objective	Minimum Threshold
01S09E05H002	378824N1210000W001	-8.7	-19.6	-49.8	-4.6	4.1	15	45.2
01N07E14J002	379316N1211665W001	-49.9	-70.4	-114.4	*	*	*	*
Lodi City Well #2	Not Part of CASGEM Program	0.6	-3.5	-38.5	5.2	4.6	8.7	43.7
Manteca 18	Not Part of CASGEM Program	9.1	5.8	-16.0	8.8	-0.3	3	24.8
Svenson-3	380067N1213458W003	-19.3	-19.3	-26.6	*	*	*	*
01S10E26J001M	378163N1208321W001	81.7	81.7	43.7	87.7	6	6	44
02N08E15M002	380206N1210943W001	-63.2	-69.7	-124.1	*	*	*	*
#3 Bear Creek	Not Part of CASGEM Program	-49.3	-50.3	-72.3	-54.3	-5	-4	18
04N07E20H003M	381843N1212261W001	-35.5	-36.7	-81.7	-24.1	11.4	12.6	57.6
03N07E21L003	380909N1212153W001	-51.5	-57.5	-100.0	*	*	*	*
Hirschfeld (OID-8)	Not Part of CASGEM Program	31.5	31.5	8.0	32.0	0.5	0.5	24
Burnett (OID-4)	377909N1208675W001	79.7	79.7	60.7	82.9	3.2	3.2	22.2
02S07E31N001	377136N1212508W001	13.8	13.0	1.5	16.3**	2.5	3.3	14.8
02S08E08A001	377810N1211142W001	22.2	24.0	0.6	23.4	1.2	-0.6	22.8
02N07E03D001	380578N1212017W001	-61.7	-79.7	-122.8	-48.7	13	31	74.1
01N09E05I001	379661N1210011W001	-20.2	-51.1	-86.8	*	*	*	*
02N07E29B001	379976N1212308W001	-49.8	-80.4	-130.1	-43.5***	6.3	36.9	86.6
04N05E36H003	381559N1213727W001	-5.1	-5.1	-31.1	5.2	10.3	10.3	36.3
03N06E05N003	381317N1213524W001	-14.1	-14.1	-35.1	-1.6	12.5	12.5	33.5
04N05E24J004	381816N1213723W001	-6.2	-6.2	-31.2	10.8	17	17	42

\*Groundwater level data for WY 2019 unavailable.

\*\*Data source for WY 2019 inconsistent with the GSP. Groundwater level data for WY 1991-2018 was provided by South Delta Water Agency, as reported in the GSP. Groundwater level data for WY 2019 was provided by San Joaquin County.

\*\*\*Data source for WY 2019 inconsistent with the GSP. Groundwater level data for WY 1991-2018 was provided by Stockton East Water District, as reported in the GSP. Groundwater level data for WY 2019 was provided by San Joaquin County.

### **2.3.2 Groundwater Quality**

An analysis was performed to determine conditions relative to established sustainable management criteria (including interim milestones for 2025, measurable objectives, and minimum thresholds) during WY 2019 for the degraded water quality sustainability indicator **Table 3**.

As defined in the GSP, interim milestones are established following a linear trend between the current condition and measurable objective. As shown, in many cases, the most recent available data are what was presented in the GSP. Additional groundwater quality data will be collected and reported moving forward as part of GSP implementation.

**Table 3. Degraded Water Quality Threshold Analysis**

Well ID	Interim Milestone (2025)	Measurable Objective	Minimum Threshold	Current Conditions from GSP	WY 2019, if available ***	
	(Total Dissolved Solids, mg/L)	(Total Dissolved Solids, mg/L)	(Total Dissolved Solids, mg/L)	(Total Dissolved Solids, mg/L)	Date of Measurement	(Total Dissolved Solids, mg/L)
Well 1	525	600	1,000	500	1/2/19	460
Well 2	532.5	600	1,000	510	NA	NA
Well 3	532.5	600	1,000	510	NA	NA
Stockton 10R	391.5	600	1,000	322	2/12/2019	390
Stockton 26	412.5	600	1,000	350	NA	NA
Stockton SSS8	427.5	600	1,000	370	NA	NA
Well 15	375	600	1,000	300	NA	NA
Well 16	360	600	1,000	280**	11/13/2018	250
Well 17	375	600	1,000	300**	NA	NA
119-075-01	375	600	1,000	300	11/12/19*	380

\*Measurement was taken in WY 2020.

\*\*Calculated by averaging 2012-2018 data due to limitations on data availability.

\*\*\*For wells where Water Year 2019 is unavailable, the current conditions presented in the GSP represent the most recent available information.

### 3. GROUNDWATER MONITORING AND CONDITIONS ASSESSMENT

This section discusses hydrologic conditions, groundwater elevation trends, groundwater quality, and groundwater-surface water interaction in the Eastern San Joaquin Subbasin.

#### 3.1 HYDROLOGIC CONDITIONS

Rainfall data derived from the PRISM (Precipitation-Elevation Regressions on Independent Slopes Model) dataset of the DWR's California Simulation of Evapotranspiration of Applied Water (CALSIMETAW) model indicate a Subbasin average of 21 inches of rainfall during WY 2019. This represents approximately 136% of the long-term (WY 1969-2018) Subbasin average precipitation of 15.4 inches. San Joaquin River flow at Vernalis for the same period had an average monthly discharge of approximately 380 thousand acre-feet, representing about 144% of the long-term (WY 1930-2016) average flow at that location (USGS, 2020).

#### 3.2 GROUNDWATER LEVELS

**Figure 2** shows the location of the representative wells identified in the GSP monitoring network for the chronic lowering of groundwater levels. Individual hydrographs<sup>1</sup>, charts of groundwater levels over time, for these wells are included in **Appendix B**. The hydrographs display historical trends of groundwater levels in the Subbasin through WY 2019, contingent upon data availability. All available data are shown (DWR, 2020). Hydrographs for representative monitoring wells also display the minimum threshold and measurable objective that were developed in Chapter 3 (Sustainable Management Criteria) of the GSP.

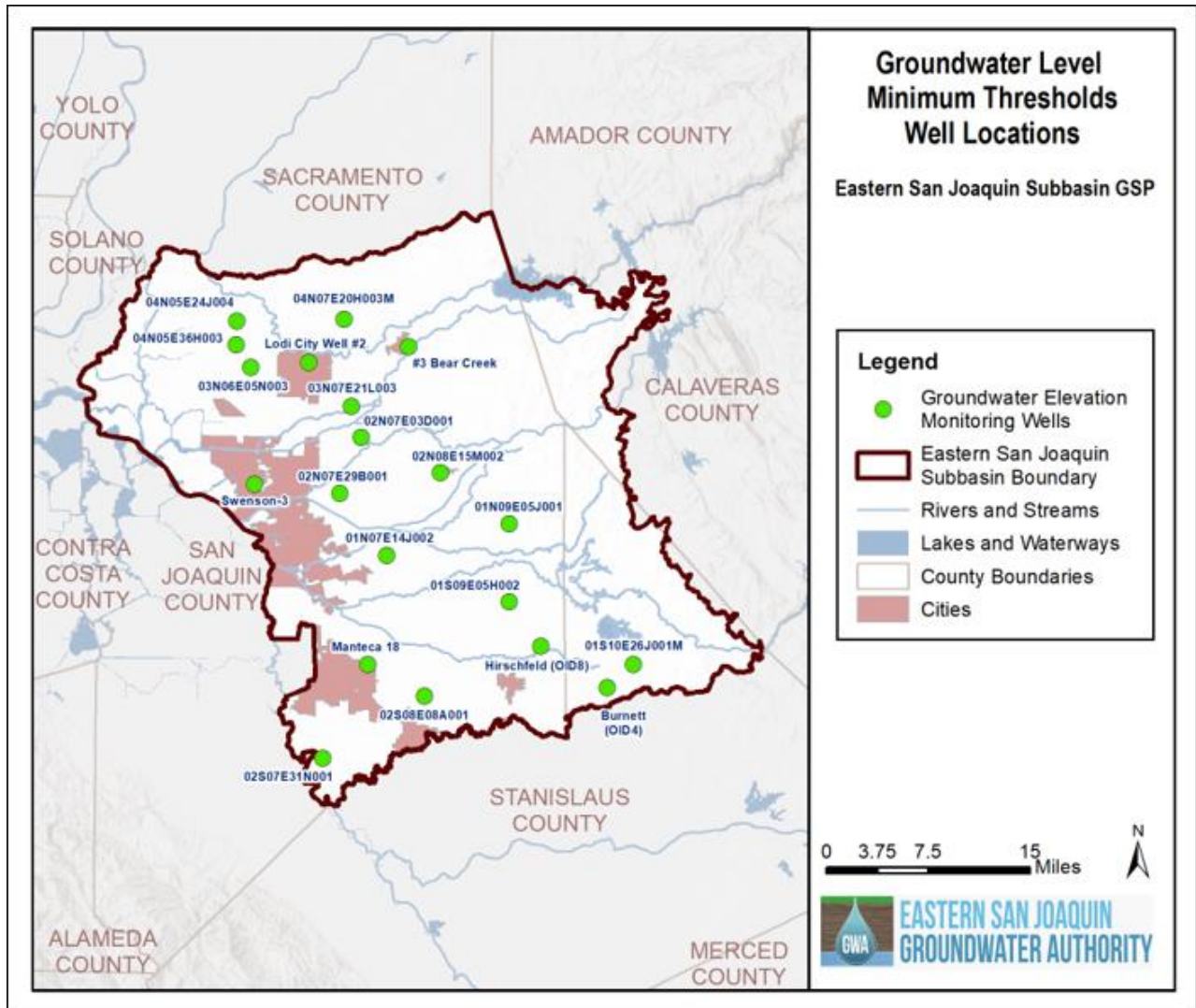
All hydrographs show yearly cycles of groundwater level declines in summer due to typical patterns in groundwater pumping and recharge, followed by winter recovery. Of the twenty representative wells, fifteen wells reported groundwater levels for Fall 2018 and Spring 2019 as shown in **Table 2**. Generally, groundwater levels rose or remained stable over WY 2019. Though water levels fluctuated around the measurable objective for multiple representative wells, water levels remained an average of 10.3 feet above the measurable objectives defined in the GSP. Only one representative well in the southern portion of the Subbasin (02S08E08A001) reported Spring 2019 levels slightly below the measurable objective. Water levels remained an average of 39.3 feet above the minimum threshold for all representative wells with reported data. No wells reported groundwater levels below the minimum threshold, and as a result, no undesirable results were triggered as specified by the sustainable management criteria set in the GSP.

Hydrographs showing WY 2019 for wells in the broad monitoring network are included in **Appendix C**.

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<sup>1</sup> Except where noted, groundwater levels in hydrographs were converted to the North American Vertical Datum of 1988 (NAVD88), consistent with CASGEM groundwater data reporting.





**Figure 2. Groundwater Level Representative Monitoring Well Locations**

**3.2.1 Comparison of Current and Historical Spring Groundwater Levels**

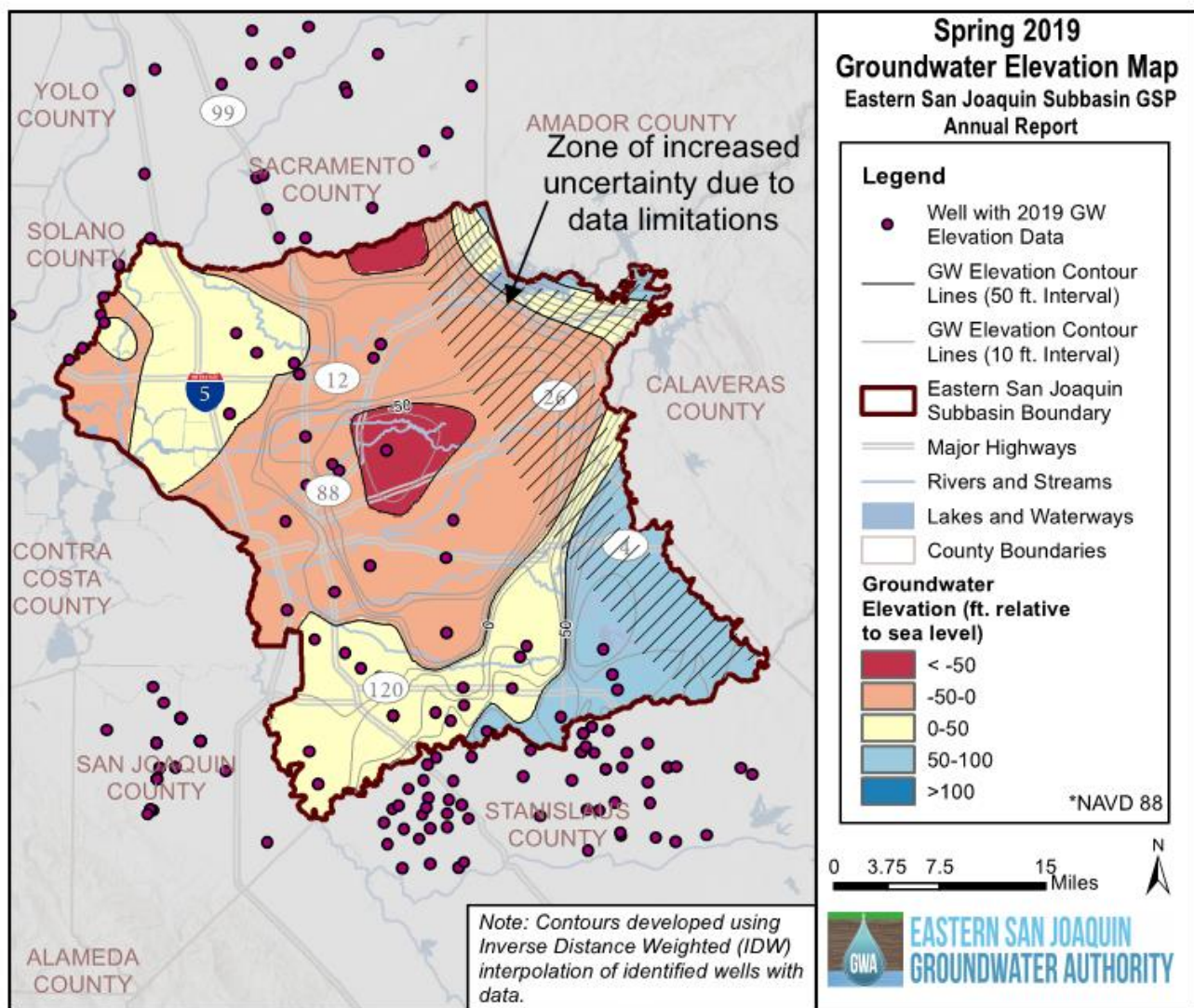
A comparison of Spring 2019 groundwater levels with the range of historical spring levels for representative wells in the Subbasin shows a general trend of decreasing groundwater levels. Groundwater levels increased an average of 0.5 feet between Spring 2018 and Spring 2019 for representative wells with WY 2018 and WY 2019 data.

**3.2.2 Groundwater Level Contour Maps**

Figure 3 and Figure 4 present contour maps of groundwater levels for seasonal high conditions (March/April) and seasonal low conditions (September) during WY 2019. Generally, groundwater flows from the Sierra Nevada foothills west toward the pumping depression in the center of the Subbasin. During WY 2019 seasonal high conditions (Spring 2019), measured groundwater levels ranged from about -61 to 371 feet relative to mean sea level (presented relative to the NAVD88 vertical datum). Seasonal high conditions had an average groundwater level of approximately 28 ft. mean sea level. A contour map showing Spring 2019 conditions is shown in **Figure 3**. Similar spatial patterns of groundwater levels are observed during WY 2019 seasonal low conditions (Fall 2019),

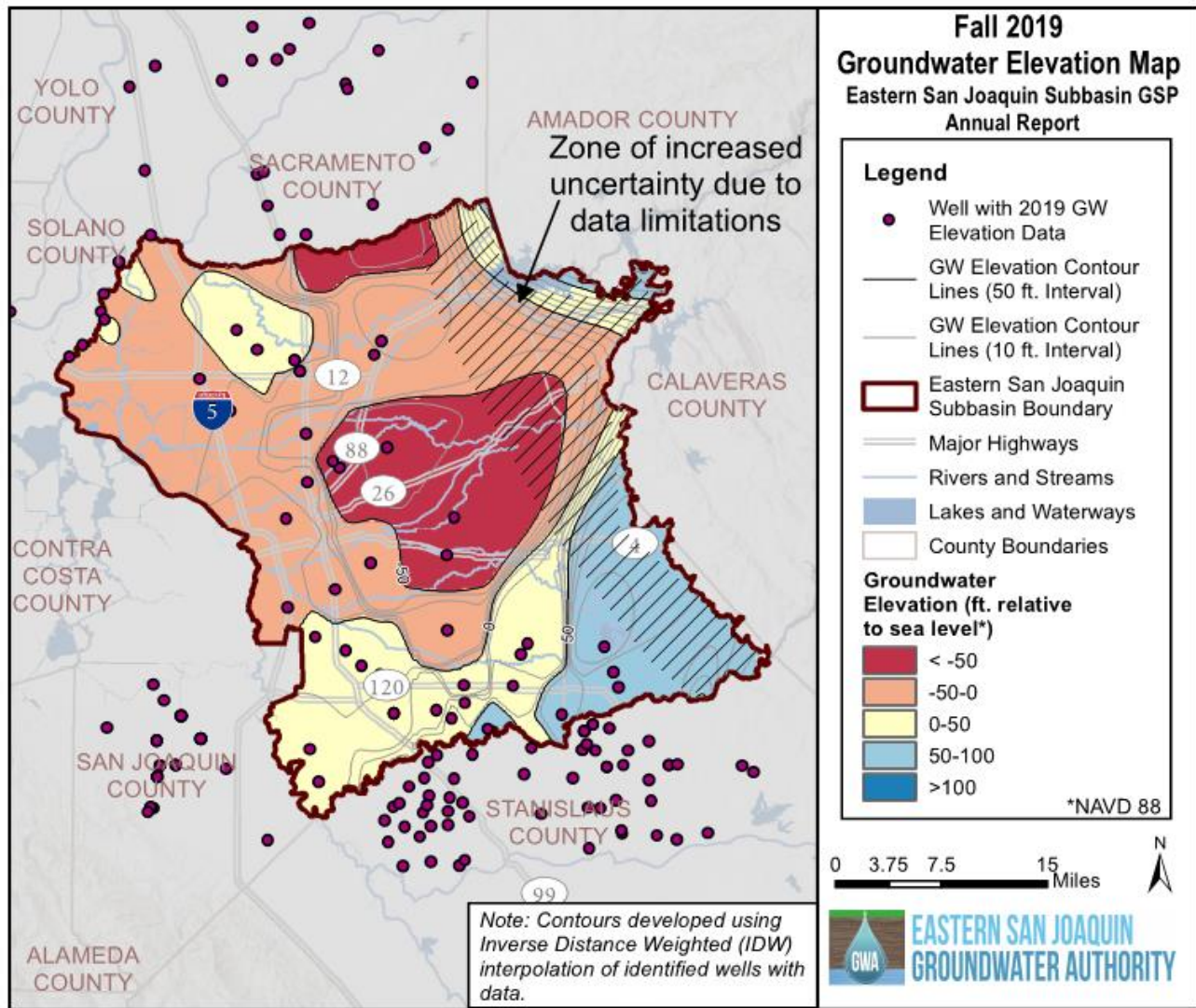
where measured groundwater levels ranged from about -64 to 363 feet relative to mean sea level. Seasonal low conditions in WY 2019 had an average groundwater level of approximately 24 ft. mean sea level. A contour map showing Fall 2019 conditions is shown in **Figure 4**.

Included in the GSP was a similar analysis for seasonal high and seasonal low 2017. The interpolation method used in the GSP was spline interpolation in ESRI’s ArcGIS Toolbox. However, for WY 2019, Inverse Distance Weighting (IDW) interpolation was used to better represent the updated data. Data gaps in 2019, however, have contributed to larger areas of uncertainty than in the 2017 analysis. Areas where there was limited 2019 data available are indicated with hash marking in both **Figure 3** and **Figure 4**. There is a notable data gap on the eastern side of the Subbasin. Installation of new monitoring wells in these regions and the corresponding groundwater level monitoring that will be done as the GSP is implemented will be an important step in filling these data gaps.



**Figure 3. Seasonal High Groundwater Levels in the Eastern San Joaquin Subbasin, Spring 2019**





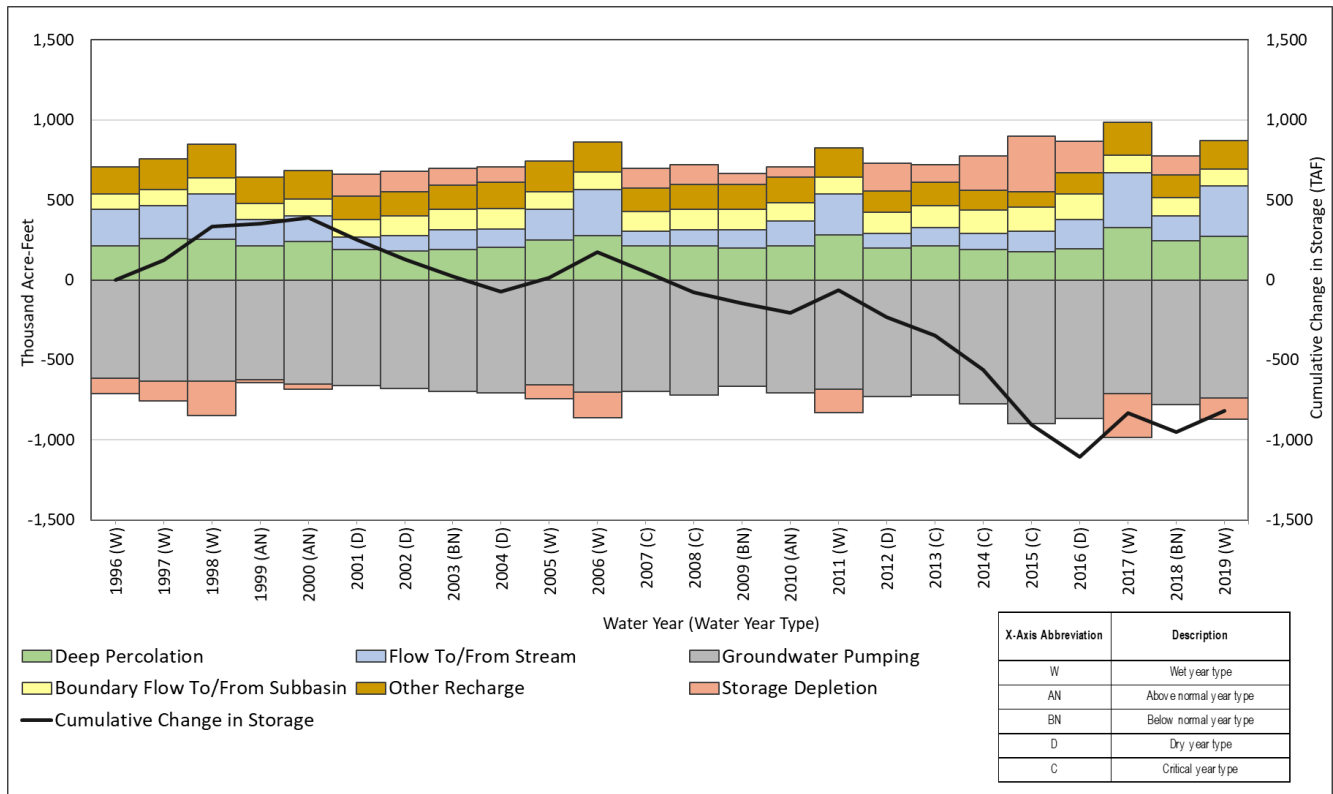
**Figure 4. Seasonal Low Groundwater Levels in the Eastern San Joaquin Subbasin, Fall 2019**

**3.3 GROUNDWATER STORAGE**

Change in groundwater storage is estimated using the ESJWRM. **Figure 5** shows the annual and cumulative change in storage from WY 1996 to 2019 for the Eastern San Joaquin Subbasin. In WY 2019 (October 2018 to September 2019), the Eastern San Joaquin Subbasin saw an increase of groundwater in storage of approximately 132,000 AF, reflecting the wetter conditions of the year. **Figure 5** indicates negative “Storage Depletion,” meaning that inflows were greater than outflows in WY 2019.

**Figure 6** shows the change in groundwater storage for the Eastern San Joaquin Subbasin by ESJWRM element between October 1, 2018 and September 30, 2019. On an ESJWRM element basis, groundwater storage was estimated to increase or decrease by 0.25 feet over much of the Subbasin, with an area of decrease of up to 2 feet in the center of the Subbasin. Though change in storage varied on an ESJWRM element basis, there was an overall net increase in groundwater storage in the Eastern

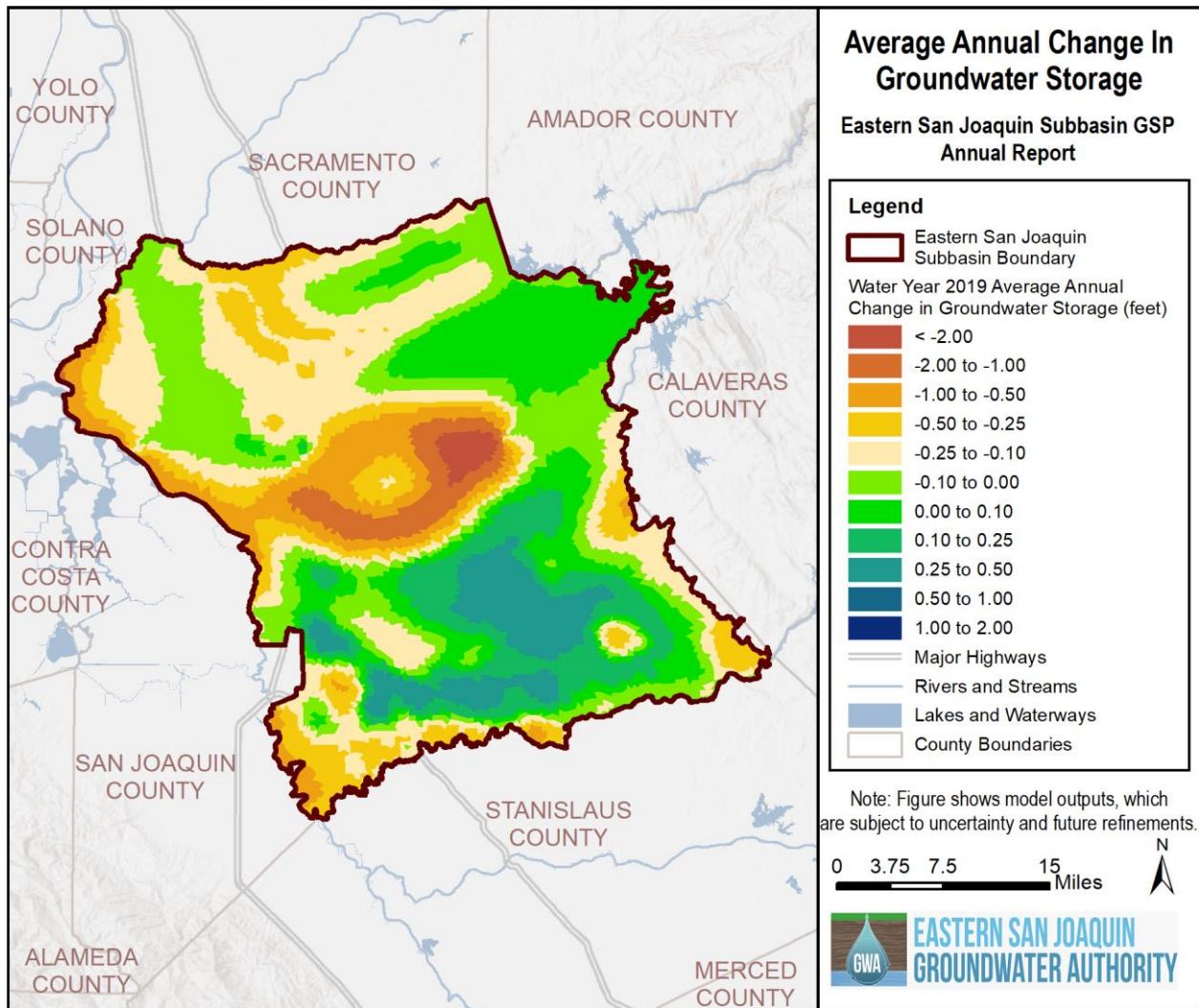
San Joaquin Subbasin during WY 2019, as previously stated and reflected in **Figure 5** and mapped in **Figure 6**.



**Figure 5. Historical Modeled Change in Annual Storage with Water Use and Year Type**

**Notes:**

1. Water Year Types based on San Joaquin Valley Water Year Index (CA DWR, 2018), Water Year 2019 classification is Wet (W).
2. “Other Recharge” includes managed aquifer recharge, recharge from unlined canals and/or reservoirs, and recharge from ungauged watersheds.
3. “Storage Depletion” balances the water budget. For instance, if annual outflows (-) are greater than inflows (+), there is a decrease in storage, but this would be shown on as storage depletion on the positive side of the bar chart to balance out the increased outflows on the negative side of the bar chart.



**Figure 6. Eastern San Joaquin Subbasin WY 2019 Change in Storage**

### 3.4 GROUNDWATER QUALITY

While groundwater quality in the Eastern San Joaquin Subbasin is generally sufficient to meet beneficial uses and is on track to surpass measurable objectives, there are a few constituents of concern that are either currently impacting groundwater use or could impact groundwater in the future. Each water quality parameter may be naturally occurring or anthropogenic in source as well as localized or widespread. The primary naturally occurring water quality constituents of concern in the Eastern San Joaquin Subbasin are salinity and arsenic. The primary water quality constituents related to human activity include nitrates, salinity, and various point-source contaminants such as petroleum hydrocarbons, solvents, and emerging contaminants. Historical groundwater quality conditions for these constituents are described in Section 2.2.4 in the GSP.

A primary maximum contaminant level (MCL) or SMCL is defined for a variety of parameters. For the purposes of this GSP, comparing parameter concentrations to their MCL or SMCL is used as the basis for describing groundwater quality concerns in the Eastern San Joaquin Subbasin. Water quality is generally not known to have significantly adversely affected beneficial uses of groundwater in the Eastern San Joaquin Subbasin.

Through GSP implementation, monitoring networks monitoring for water quality will test for total dissolved solids (TDS), cations and anions (including chloride and nitrate), arsenic, and field parameters including pH, electrical conductivity (EC), and temperature. Arsenic will be monitored for informational purposes and to track trends in arsenic concentrations. The GSP does not include sustainability goals, measurable objectives, or minimum thresholds for arsenic.

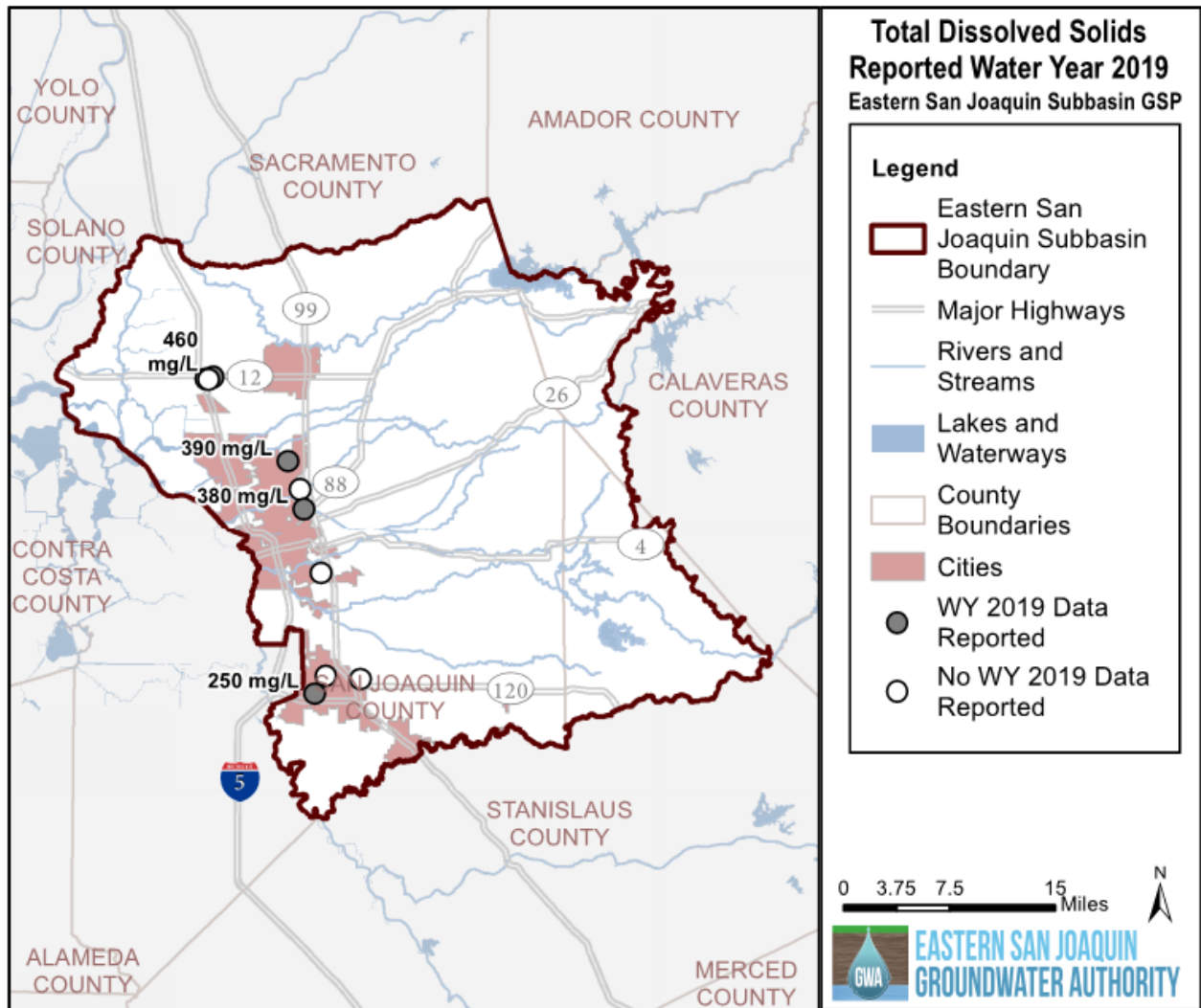
Ten representative monitoring wells were selected to be monitored for water quality. These wells are currently monitored and managed by City of Manteca, Cal Water, City of Stockton, and San Joaquin County. While the GSP was published shortly before this annual report was prepared, there are only a few recent measurements that have been recorded since. These measurements are logged in **Table 3** in Section 2.5, GSP Implementation Progress.

The broad monitoring network for water quality includes five identified local water quality wells and 16 nested and/or clustered well sites that are also monitored for groundwater levels in the broad monitoring network for groundwater levels.

#### 3.4.1 Total Dissolved Solids Measurements in Representative Monitoring Network Wells

While GSP implementation had not begun in WY 2019, four total dissolved solids measurements were reported from the ten representative monitoring wells for water quality. These figures are included in **Table 3** and are shown visually in **Figure 7**.





**Figure 7. Water Year 2019 Total Dissolved Solids Measurements at Representative Monitoring Well Sites**

### 3.4.2 Contaminated Sites

Please refer to the GSP (published in November 2019) for the most recent information regarding contaminated sites within the Eastern San Joaquin Subbasins. As the GSP was completed shortly before development of this annual report, limited additional data are available on contaminated sites. Updates regarding contaminated sites within the Eastern San Joaquin Subbasins will be provided in subsequent Annual Reports.

### 3.4.3 Regional Groundwater Quality

Please refer to the GSP (published in November 2019) for the most recent information regarding regional water quality within the Eastern San Joaquin Subbasin. As the GSP was completed shortly before development of this annual report, limited additional data are available on regional groundwater quality. Updates regarding regional water quality within the Eastern San Joaquin Subbasin will be provided in subsequent Annual Reports.

### 3.5 SEAWATER INTRUSION

As described in the GSP, the ESJGWA will monitor chloride concentrations moving forward to support information collection and early detection of seawater intrusion and will report chloride isocontours to DWR in each annual report going forward. While seawater intrusion is not expected to occur, the GSP established monitoring protocols for the early detection of seawater intrusion, were it ever to occur. The GSP was not adopted until January 2020, and GSP implementation did not occur during WY 2019. As such, seawater intrusion conditions for WY 2019 were not evaluated.

### 3.6 LAND SUBSIDENCE

SGMA considers the impact of groundwater management actions on land subsidence through the land subsidence sustainability indicator. In the Eastern San Joaquin Subbasin, the land subsidence sustainability indicator uses the groundwater level sustainability indicator as a proxy. Minimum thresholds for groundwater levels are protective of significant and unreasonable impacts to land subsidence, as described in the GSP.

### 3.7 GROUNDWATER-SURFACE WATER INTERACTION

SGMA considers the impact of groundwater management actions on groundwater-surface water interactions through the depletions of interconnected surface water sustainability indicator. In the Eastern San Joaquin Subbasin, the depletions of interconnected surface water sustainability indicator use the groundwater level sustainability indicator as a proxy. Minimum thresholds for groundwater levels are protective of significant and unreasonable impacts to depletions of interconnected surface waters, as described in the GSP.

### 3.8 TOTAL WATER USE

#### 3.8.1 Groundwater Use

Groundwater pumping data are available only from a limited number of metered wells within the Eastern San Joaquin Subbasin, with the remainder of extraction information estimated using ESJWRM. Metered data are available from municipal water purveyors (Cal Water, City of Escalon, City of Lodi, City of Manteca, City of Ripon, City of Stockton, LCWD, LCSD, and SEWD). Agricultural, private domestic, and other groundwater production in the Subbasin is largely unmetered and were estimated using the ESJWRM, which bases water use on crop type, hydrologic data (precipitation and evapotranspiration), irrigation efficiency, and population information.

**Figure 8** shows the general location and volume of groundwater pumping within the Subbasin by ESJWRM element for WY 2019. Large portions of the Subbasin experience very low pumping between 0.0 to 0.5 feet, while areas with agriculture or municipal pumping wells have pumping ranging from 0.5 to up to about 10 feet.

In WY 2019, total groundwater use in the Eastern San Joaquin Subbasin was estimated at 738,147 AF across water use sectors, as shown in **Table 4**. Water Year 2019 Monthly Groundwater Pumping (in acre-feet)

	Agricultural		Urban and Industrial		Total
	Agency Reported Values	Estimated Agricultural*	Agency Reported Values	Private Domestic*	



18	0	93,300	2,029	2,200	97,520
18	0	3,300	1,249	1,700	6,249
18	0	2,600	899	1,300	4,799
19	0	1,600	952	1,300	3,852
19	0	22,800	1,623	1,200	25,623
19	0	10,300	1,477	1,400	13,177
19	0	95,000	2,059	1,900	98,959
19	0	57,100	3,016	2,700	62,816
19	0	156,400	3,926	3,200	163,526
19	0	71,900	4,552	3,700	80,152
19	0	111,900	4,270	3,600	119,770
19	0	55,200	3,496	3,000	61,696
<b>Total</b>	<b>0</b>	<b>681,400</b>	<b>29,547</b>	<b>27,200</b>	<b>738,147</b>
<b>Management Strategy</b>	<b>High</b>	<b>Medium</b>	<b>High</b>	<b>Medium</b>	<b>n/a</b>

Groundwater pumping is estimated by the ESJWRM based on crop type, hydrologic data (precipitation and evapotranspiration), irrigation efficiency, and population information.

. As the estimated sustainable yield of 715,000 AF/year  $\pm$  10 percent in the Eastern San Joaquin Subbasin is a long-term value, pumping may exceed the sustainable yield during certain years, balanced by other years with reduced pumping so that the long-term average remains at or below the sustainable yield. The groundwater use simulated in ESJWRM over the last 10 years (WY 2010-2019) ranged from a low of 682,000 AF in WY 2011 (wet year) to a high of 897,000 AF in WY 2015 (critical year), with 8 of the 10 years staying within the range of the sustainable yield.

### 3.8.2 Surface Water Use

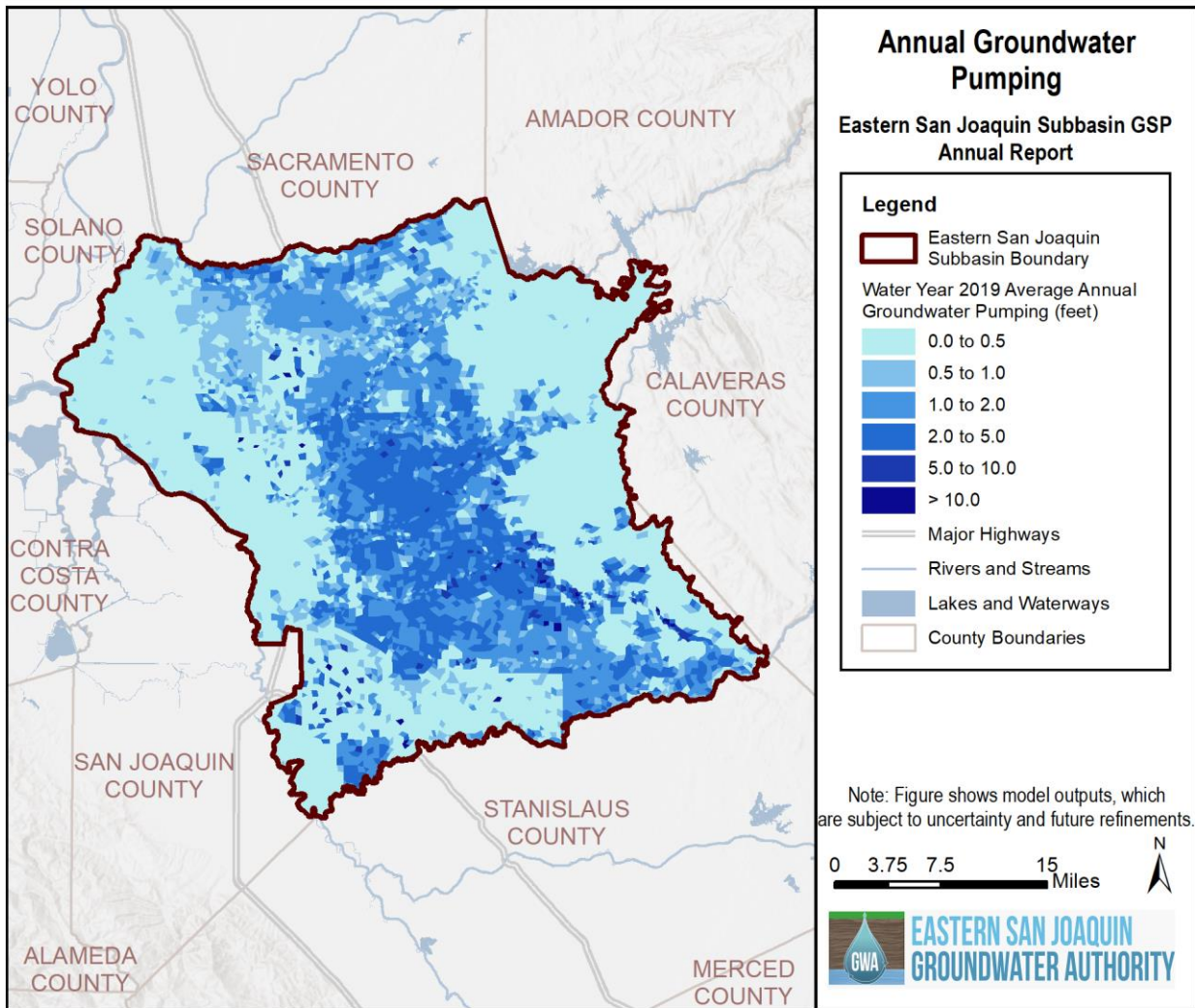
Surface water delivery data are available from purveyors in the Subbasin and include deliveries for urban and industrial use (City of Lodi; City of Manteca; and City of Stockton, including Cal Water and unincorporated portions of San Joaquin County) and deliveries for agricultural use (CCWD, CSJWCD, NSJWCD, OID, SSSJID, SEWD, and WID). The remaining surface water use is estimated in the ESJWRM and covers riparian diversions occurring in the CDWA, SDWA, and along major Subbasin rivers. Sources of surface water in the Subbasin include Calaveras River, Mokelumne River, San Joaquin River, and Stanislaus River. Surface water deliveries during WY 2019 are estimated as 516,444 AF for the Eastern San Joaquin Subbasin (**Table 5**). The majority of surface water is used between May and September.

Conjunctive use is the use of surface water to allow the Subbasin to recharge and store additional water supply, either through in-lieu use or direct recharge. In-lieu recharge occurs for both agricultural and municipal purveyors wherever surface water is being delivered to offset the use of groundwater. Agencies conducting in-lieu recharge include Cal Water, CCWD, City of Escalon, City of Lodi, City of Manteca, City of Ripon, City of Stockton, CSJWCD, LCWD, LCSJ, NSJWCD, OID, SSSJID, SEWD, and WID. Riparian users of surface water are also benefitting from in-lieu recharge. While in-lieu recharge was not quantified in this report, estimates may be made in future annual reports.

Direct recharge projects exist in NSJWCD and SEWD and recharged over 5,500 AF in WY 2019. These projects use water from the Calaveras River, Mokelumne River, and Stanislaus River and include NSJWCD's Tracy Lake Groundwater Recharge Project, NSJWCD's Cal-Fed/Costa Recharge project, and SEWD's Farmington Groundwater Recharge Program.

### 3.8.3 Total Water Use

Total water use is the sum of the groundwater use and surface water use. Total water use during WY 2019 is estimated as 1,254,591 AF for the Eastern San Joaquin Subbasin (**Table 6**). Groundwater pumping accounts for almost 60% of total water use in the Subbasin, while surface water deliveries are a little more than 40%.



**Figure 8. Eastern San Joaquin Subbasin WY 2019 Groundwater Pumping**

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**Table 4. Water Year 2019 Monthly Groundwater Pumping (in acre-feet)**

Month	Agricultural		Urban and Industrial		Total
	Agency Reported Values	Estimated Agricultural*	Agency Reported Values	Private Domestic*	
Oct-18	0	93,300	2,029	2,200	97,529
Nov-18	0	3,300	1,249	1,700	6,249
Dec-18	0	2,600	899	1,300	4,799
Jan-19	0	1,600	952	1,300	3,852
Feb-19	0	22,800	1,623	1,200	25,623
Mar-19	0	10,300	1,477	1,400	13,177
Apr-19	0	95,000	2,059	1,900	98,959
May-19	0	57,100	3,016	2,700	62,816
Jun-19	0	156,400	3,926	3,200	163,526
Jul-19	0	71,900	4,552	3,700	80,152
Aug-19	0	111,900	4,270	3,600	119,770
Sep-19	0	55,200	3,496	3,000	61,696
<b>Total</b>	<b>0</b>	<b>681,400</b>	<b>29,547</b>	<b>27,200</b>	<b>738,147</b>
<b>Measurement Accuracy</b>	<b>High</b>	<b>Medium</b>	<b>High</b>	<b>Medium</b>	<b>n/a</b>

\* Additional groundwater pumping is estimated by the ESJWRM based on crop type, hydrologic data (precipitation and evapotranspiration), irrigation efficiency, and population information.

**Table 5. Water Year 2019 Monthly Surface Water Deliveries (in acre-feet)**

Month	Agricultural		Urban and Industrial		Total
	Agency Reported Values	Estimated Riparian*	Agency Reported Values	Estimated in ESJWRM*	
Oct-18	16,964	8,100	6,063	0	31,127
Nov-18	2,354	700	5,301	0	8,355
Dec-18	604	300	3,768	0	4,672
Jan-19	651	300	3,532	0	4,482
Feb-19	1,494	1,800	2,423	0	5,717
Mar-19	6,873	3,200	3,220	0	13,292
Apr-19	21,761	10,400	4,734	0	36,895
May-19	32,413	41,400	5,818	0	79,631
Jun-19	42,912	30,800	6,858	0	80,570
Jul-19	48,207	47,700	7,560	0	103,467
Aug-19	46,400	29,000	7,713	0	83,114
Sep-19	28,647	30,100	6,374	0	65,121
<b>Total</b>	<b>249,279</b>	<b>203,800</b>	<b>63,364</b>	<b>0</b>	<b>516,444</b>
<b>Measurement Accuracy</b>	<b>High</b>	<b>Medium</b>	<b>High</b>	<b>Medium</b>	<b>n/a</b>

\* Estimated agricultural surface water deliveries include deliveries to Central Delta Water Authority, South Delta Water Authority, and riparian users along major streams.

**Table 6. Water Year 2019 Monthly Total Water Use (in acre-feet)**

Month	Agricultural		Urban and Industrial		Total
	Direct Measurement	Estimated in ESJWRM*	Direct Measurement	Estimated in ESJWRM*	
Oct-18	16,964	101,400	8,092	2,200	128,656
Nov-18	2,354	4,000	6,551	1,700	14,605
Dec-18	604	2,900	4,667	1,300	9,471
Jan-19	651	1,900	4,483	1,300	8,334
Feb-19	1,494	24,600	4,046	1,200	31,340
Mar-19	6,873	13,500	4,697	1,400	26,469
Apr-19	21,761	105,400	6,793	1,900	135,854
May-19	32,413	98,500	8,834	2,700	142,447
Jun-19	42,912	187,200	10,784	3,200	244,096
Jul-19	48,207	119,600	12,112	3,700	183,619
Aug-19	46,400	140,900	11,983	3,600	202,883
Sep-19	28,647	85,300	9,870	3,000	126,817
<b>Total</b>	<b>249,279</b>	<b>885,200</b>	<b>92,911</b>	<b>27,200</b>	<b>1,254,591</b>
<b>Measurement Accuracy</b>	<b>High</b>	<b>Medium</b>	<b>High</b>	<b>Medium</b>	<b>n/a</b>

\* Includes estimated groundwater pumping or surface water deliveries. See previous tables for further details.

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### 3.8.4 Eastern San Joaquin Water Resources Model Update

The ESJWRM was originally developed and calibrated to model historical groundwater storage from water years 1996-2015. The model was updated for this annual report to reflect more recent data. Data for water years 2016-2019 were collected from the same public and private sources that had provided the historical data through 2015 used in the GSP. As a result of the model update, a new historical water budget was generated including updated estimates of change in groundwater storage.

The 2016-2019 continuation of the historical water budget is intended to verify and further evaluate the aquifer system under a variety of hydrological and anthropogenic conditions. This update is particularly critical to the management of the aquifer system as it reflects the post 2013-2015 drought conditions and operations of the Subbasin. The full annual groundwater budget for water years 1996-2019 is shown earlier in **Figure 5**.

#### Data Sources

Data were requested and received from the following entities in the Subbasin to complete the ESJWRM update:

##### Agricultural Water Purveyors

- Calaveras County Water District
- Central San Joaquin Water Conservation District
- North San Joaquin Water Conservation District
- Oakdale Irrigation District
- South San Joaquin Irrigation District
- Stockton East Water District
- Woodbridge Irrigation District

##### Municipal Water Purveyors

- California Water Service Company Stockton District
- City of Escalon
- City of Lodi
- City of Manteca
- City of Ripon
- City of Stockton
- Linden County Water District
- Lockeford Community Services District
- Stockton East Water District

Additional publicly-available data were downloaded to complete the EJSWRM update:

##### State

- California Department of Finance population estimates
- DWR 2016 Statewide Crop Mapping

##### Federal

- United States Geological Survey (USGS) stream flows
- United States Army Corps of Engineers reservoir releases

##### Other

- Precipitation-Elevation Regressions on Independent Slopes Model (PRISM) Climate Group, Oregon State University

### **Updated Components**

The above data sources provided the necessary data to allow the historical model to reflect recent conditions. The following components of the model were updated.

**Surface Water Diversions and Deliveries:** Monthly surface water diversions and deliveries were provided for October 2015 through September 2019 for urban and industrial use and agricultural use as described in Section 3.8.2. Remaining riparian diversion occurring in CDWA, SDWA, and along major rivers were estimated based off agricultural demands estimated in ESJWRM.

**Groundwater Pumping:** Groundwater extractions from October 2015 to September 2019 were provided by municipal water purveyors as described in Section 3.8.1. Pumping estimates were made in ESJWRM for private agriculture and domestic wells based on land use type and population.

**Population:** Department of Finance estimates (E-4 Population Estimates for Cities, Counties, and the State, 2011-2019, with 2010 Census Benchmark) were downloaded to update annual population from 2016 to 2019. Rural populations were estimated from Department of Finance county totals and spatially assigned throughout the model by urban acreage.

**Land Use:** Each element within the ESJWRM is comprised of some fraction of 27 land uses, including 23 agricultural crop categories, native vegetation, water surface, riparian vegetation, and urban landscape. For the 2016-2019 update, the model utilizes data from DWR's 2016 Statewide Crop Mapping which provides data on urban and irrigated land throughout the model domain on a parcel scale (DWR, 2016).

**Precipitation:** Rainfall data for the model area is derived from the PRISM (Precipitation-Elevation Regressions on Independent Slopes Model) database used in the DWR's CALSIMETAW (California Simulation of Evapotranspiration of Applied Water) model. The database contains daily precipitation data from October 1, 1921 on a 4-kilometer grid throughout the model area. ESJWRM has monthly rainfall data defined for every model element in order to preserve the spatial distribution of the monthly rainfall. Each of the model elements was mapped to the nearest of 364 available PRISM reference nodes, uniformly distributed across the model domain. The PRISM dataset is available online from Oregon State University through a partnership the NRCS National Water and Climate Center.

**Streamflow:** Monthly inflow to the Eastern San Joaquin Subbasin were updated for Dry Creek, Mokelumne River, Calaveras River, Stanislaus River, and San Joaquin River. Sources of data included USGS and United States Army Corps of Engineers. Non-gauged tributaries into the Subbasin were estimated internally by the model using the Integrated Water Flow Model (IWFM) small-watershed package.

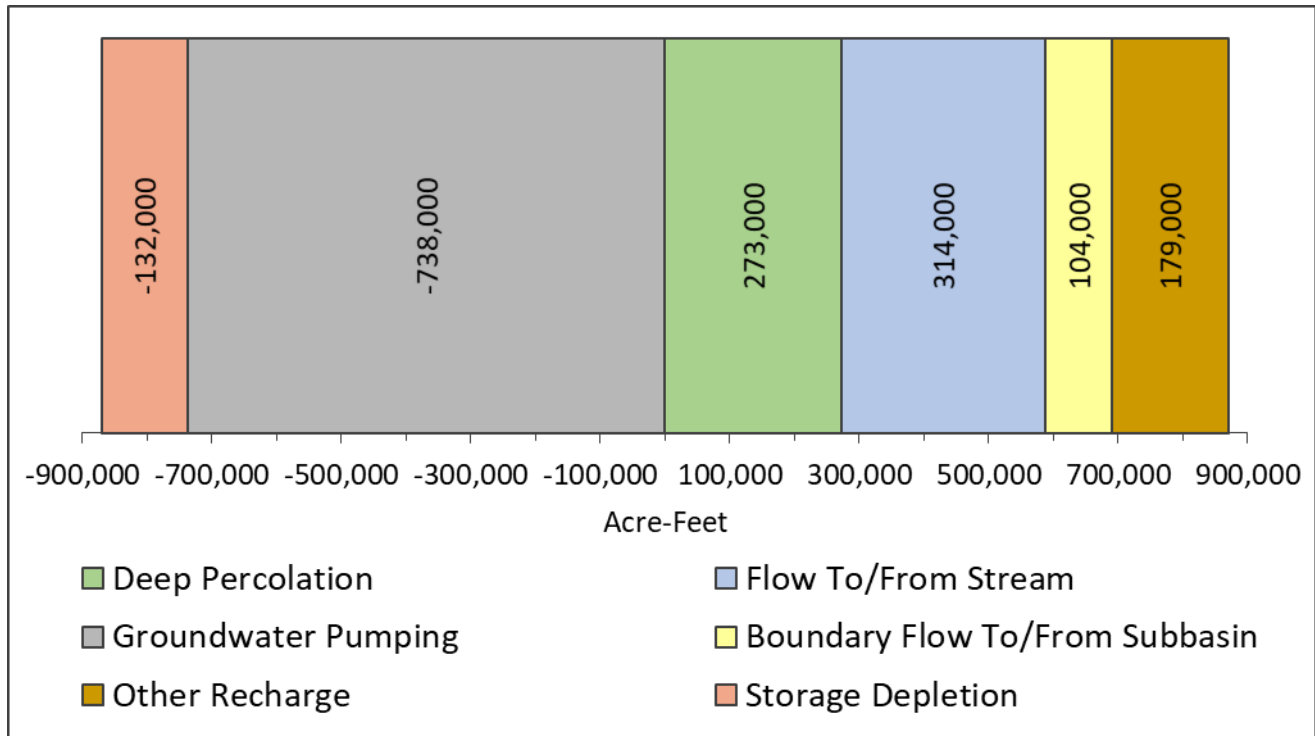
**Boundary Conditions:** Averages of historical model data by water year type were used to update the assumed groundwater elevation boundary conditions in the model.

### **Results**

Evaluation of Water Year 2019 (**Figure 9**) shows that the Eastern San Joaquin Subbasin experienced, on average and a net basis, 870,000 AF of inflows and 738,000 AF of outflow each year, leading to an annual increase in groundwater in storage of almost 132,000 AF. Recharge from streams is the largest contributor of groundwater inflow (314,000 AFY), followed by deep percolation from the root zone (273,000 AFY); recharge from managed aquifer projects, unlined canals or reservoirs, and ungauged watersheds (179,000 AFY); and boundary flows from surrounding groundwater subbasins (104,000

AFY). Groundwater production (738,000 AFY) accounts for the greatest outflow from the Eastern San Joaquin Subbasin.

**Figure 9. WY 2019 Average Annual Estimated Groundwater Budget, Eastern San Joaquin Subbasin**



**Notes:**

1. “Other Recharge” includes managed aquifer recharge, recharge from unlined canals and/or reservoirs, and recharge from ungauged watersheds.
2. “Change in Storage” is placed to balance the water budget. For instance, if annual outflows (-) are greater than inflows (+), there is a decrease in storage, but this would be shown on the positive side of the bar chart to balance out the increased outflows on the negative side of the bar chart.

**4. REFERENCES**

DWR. (2016). *Statewide Crop Mapping 2016*. Retrieved from <https://gis.water.ca.gov/app/CADWRLandUseViewer/>

DWR. (2020). *CASGEM Online System*. Retrieved from [https://www.casgem.water.ca.gov/OSS/\(S\(ezkaom5a1ihttdi0zvoxrke\)\)/Default.aspx?ReturnUrl=%2fOSS%2f](https://www.casgem.water.ca.gov/OSS/(S(ezkaom5a1ihttdi0zvoxrke))/Default.aspx?ReturnUrl=%2fOSS%2f)

USGS. (2020). *National Water Information System*. Retrieved from [https://waterdata.usgs.gov/nwis/inventory?agency\\_code=USGS&site\\_no=11303500](https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=11303500)

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## **APPENDIX A – GSP IMPLEMENTATION PROGRESS**

**Table A. Summary of Implementation Progress of GSP Projects and Management Actions**

Activity	Project Type	Project Proponent	Current Status	Time-table (initiation and completion)	Status
Project 1: Lake Grupe In-lieu Recharge	In-lieu Recharge	SEWD	Can be implemented immediately	2020-2022	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Project 2: SEWD Surface Water Implementation Expansion	In-lieu Recharge	SEWD	Design phase	2019-2020	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Project 3: City of Manteca Advanced Metering Infrastructure	Conservation	City of Manteca	Currently underway	2019-2021	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Project 4: City of Lodi Surface Water Facility Expansion & Delivery Pipeline	In-lieu Recharge	City of Lodi	Planning phase	2030-2033	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Project 5: White Slough Water Pollution Control Facility Expansion	Recycling/ In-lieu Recharge	City of Lodi	Construction complete	2019-2020	The Project status information presented in the GSP is up to date. As the GSP was adopted in

						January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Project 6: CSJWCD Capital Improvement Program	In-lieu Recharge	CSJWCD	Can be implemented immediately	2020-2027, ongoing with 7-year completion cycles	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.	
Project 7: NSJWCD South System Modernization	In-lieu Recharge	NSJWCD	Environmental review is complete, funding has been sought and a landowner improvement district formed	2018-2023	The Project status information presented in the GSP is up to date. This project is progressing. The new pump station was completed in Fall 2019. Variable frequency drive (VFD) and automation equipment were added in February through March 2020. There are plans to operate in irrigation season 2020 if water is available. The next phase of the project is improvements to the pipeline and assisting landowners with connections.	
Project 8: Long-term Water Transfer to SEWD and CSJWCD	Transfers/ In-lieu Recharge	SSJ GSA	Infrastructure is in place. Environmental Review may need to be implemented	2019-2021	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.	
Project 9: BNSF Railway Company Intermodal Facility Recharge Pond	Direct Recharge	CSJWCD	Planning phase	2020-2023	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur	

						during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Project 10: City of Stockton Advanced Metering Infrastructure	Conservation	City of Stockton	Initial study completed in 2011	2020/25-2025/28	The Project status information presented in the GSP is up to date. Project was included in City of Stockton Municipal Utilities Department's (MUD's) Capital Improvement Program (CIP) 2025 schedule.	
Project 11: South System Groundwater Banking with East Bay Municipal Utilities District (EBMUD)	In-lieu Recharge	NSJWCD	Agreement is in place; parties need to finalize design. Environmental review and permitting needed	2020-2025	The Project status information presented in the GSP is up to date. NSJWCD and EBMUD are working to complete the pilot Dream Project so that they can dedicate resources to this larger banking project.	
Project 12: NSJWCD North System Modernization/ Lakso Recharge	In-lieu Recharge/ Direct Recharge	NSJWCD	Planning phase	2021-2026	The Project status information presented in the GSP is up to date. NSJWCD is working on strategic plan and funding options for this and other projects in 2020. A landowner workshop was held in December 2019, and newsletters were sent out. There will be regular monthly work on the strategic plan effort in 2020.	
Project 13: Manasero Recharge Project	Direct Recharge	NSJWCD	Planning phase	2019-2022	The Project status information presented in the GSP is up to date. NSJWCD is working on strategic plan and funding options for this and other projects in 2020. A landowner workshop was held in December 2019, and newsletters were sent out. There will be regular monthly	



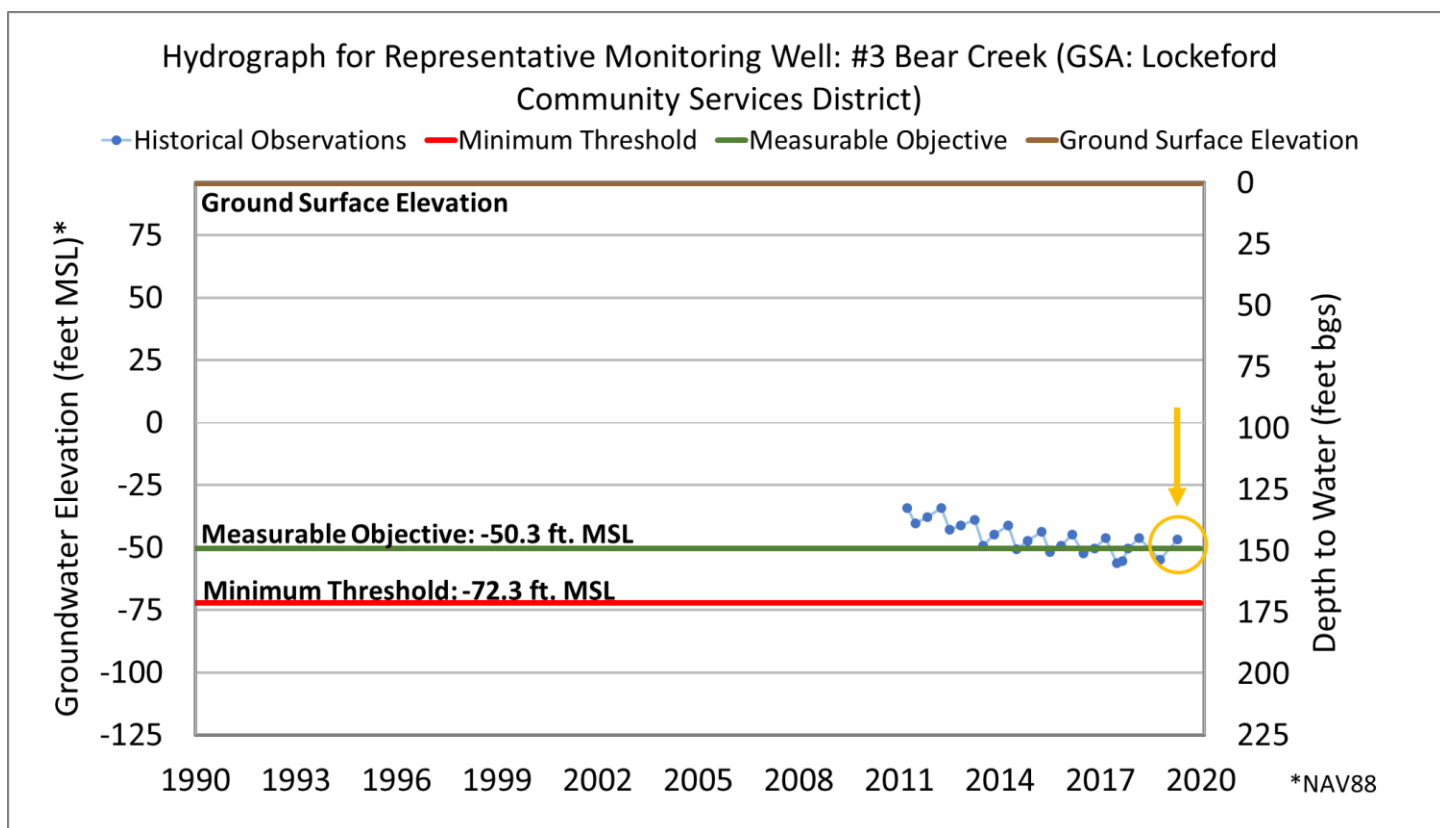
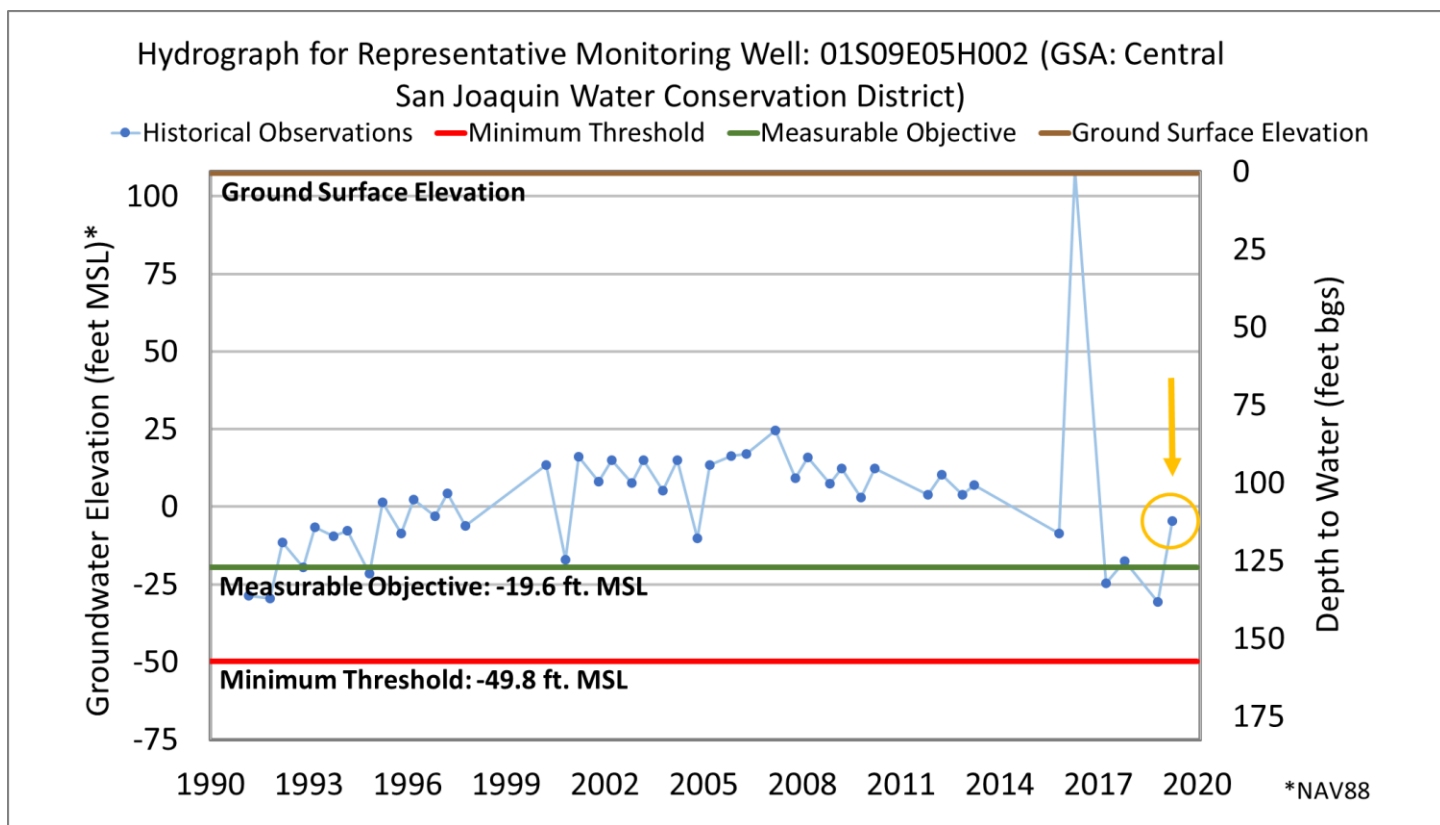
						work on the strategic plan effort in 2020.
Project 14: Tecklenburg Recharge Project	Direct Recharge	NSJWCD	Planning phase	2020-2023	The Project status information presented in the GSP is up to date. NSJWCD is working on strategic plan and funding options for this and other projects in 2020. A landowner workshop was held in December 2019, and newsletters were sent out. There will be regular monthly work on the strategic plan effort in 2020.	
Project 15: City of Escalon Wastewater Reuse	Recycling/ In-lieu Recharge/ Transfers	SSJ GSA	Planning phase	2020-2028	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.	
Project 16: City of Ripon Surface Water Supply	In-lieu Recharge	SSJ GSA	Design complete; environmental permitting underway	2020-2024	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.	
Project 17: City of Escalon Connection to Nick DeGroot Water Treatment Plant	In-lieu Recharge	SSJ GSA	Conceptual design phase; environmental review complete	2020-2023	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.	

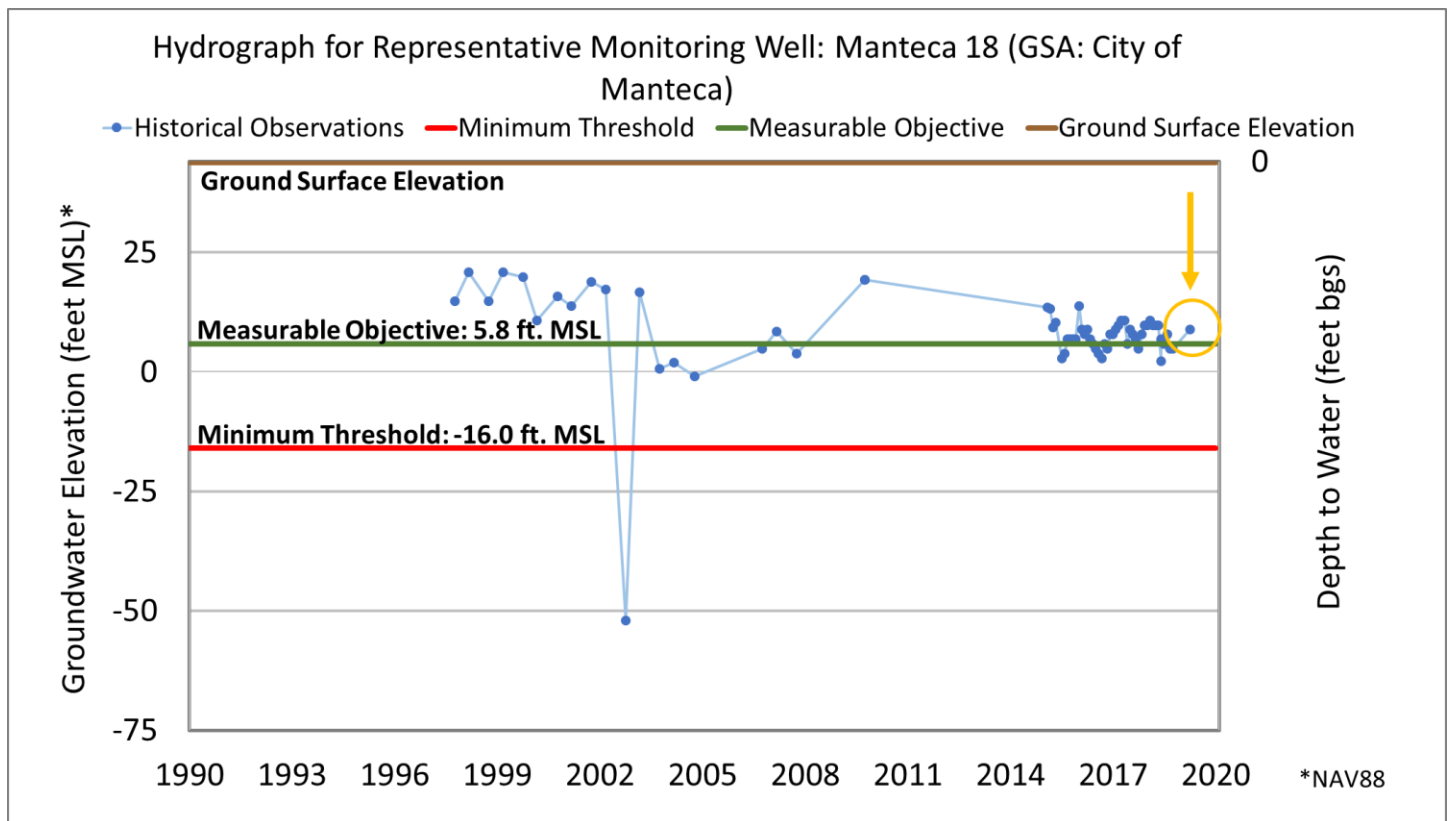
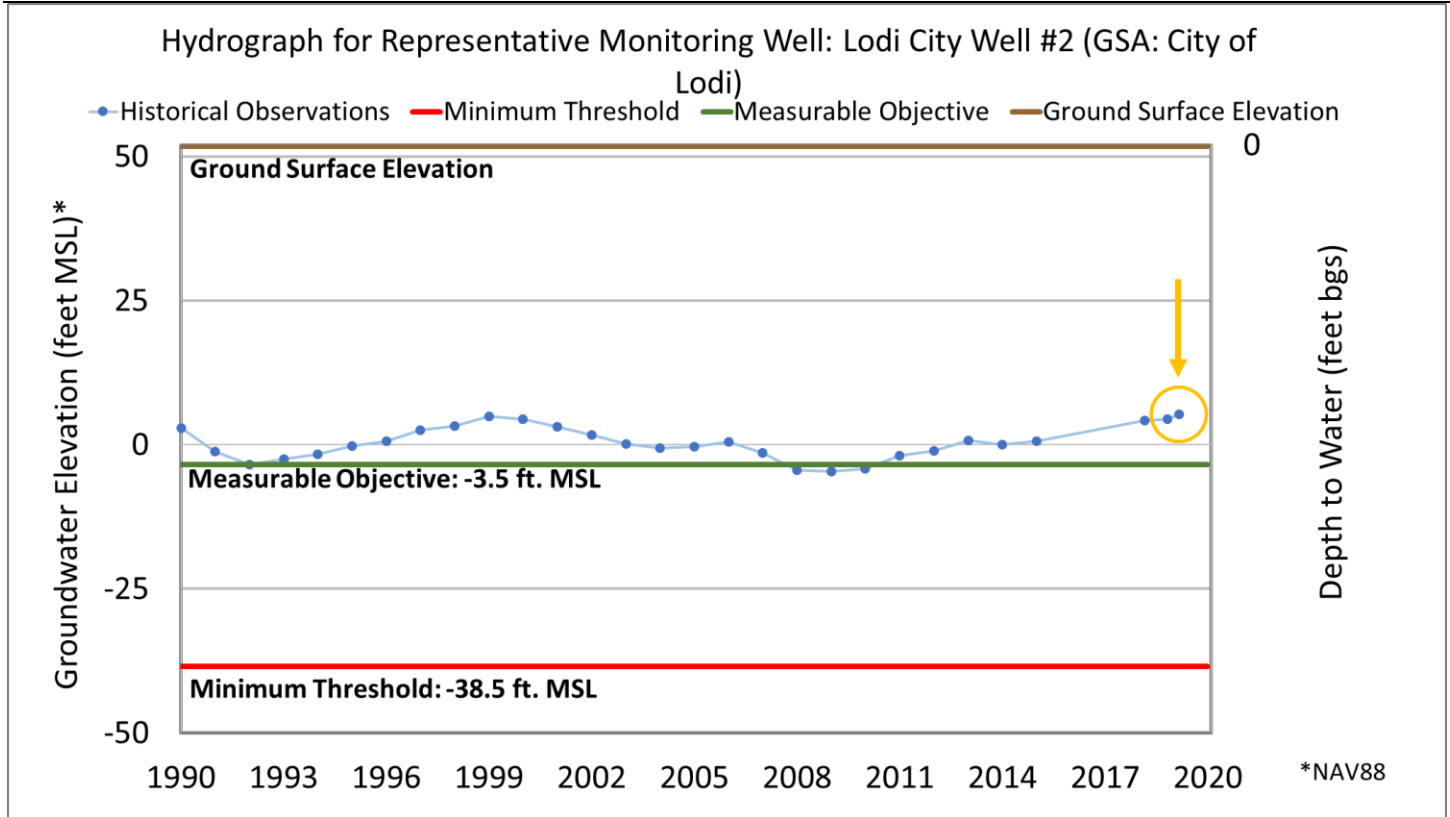
Project 18: Farmington Dam Repurpose Project	Direct Recharge	SEWD	Preplanning phase with reconnaissance study complete	2030-2050	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Project 19: Recycled Water Transfer to Agriculture	Recycling/Transfers/ In-lieu Recharge	City of Manteca	Planning phase with evaluation completed in Draft Reclaimed Water Facilities Master Plan	Not determined	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Project 20: Mobilizing Recharge Opportunities	Direct Recharge	San Joaquin County	Early conceptual planning phase	Not determined	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Project 21: NSJWCD Winery Recycled Water	Recycling/ In-Lieu Recharge/ Direct Recharge	NSJWCD	Conceptual planning and discussion	2025-2027	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Project 22: Pressurization of SSJID Facilities	Conservation	SSJ GSA	Feasibility study complete	2019-2030	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates

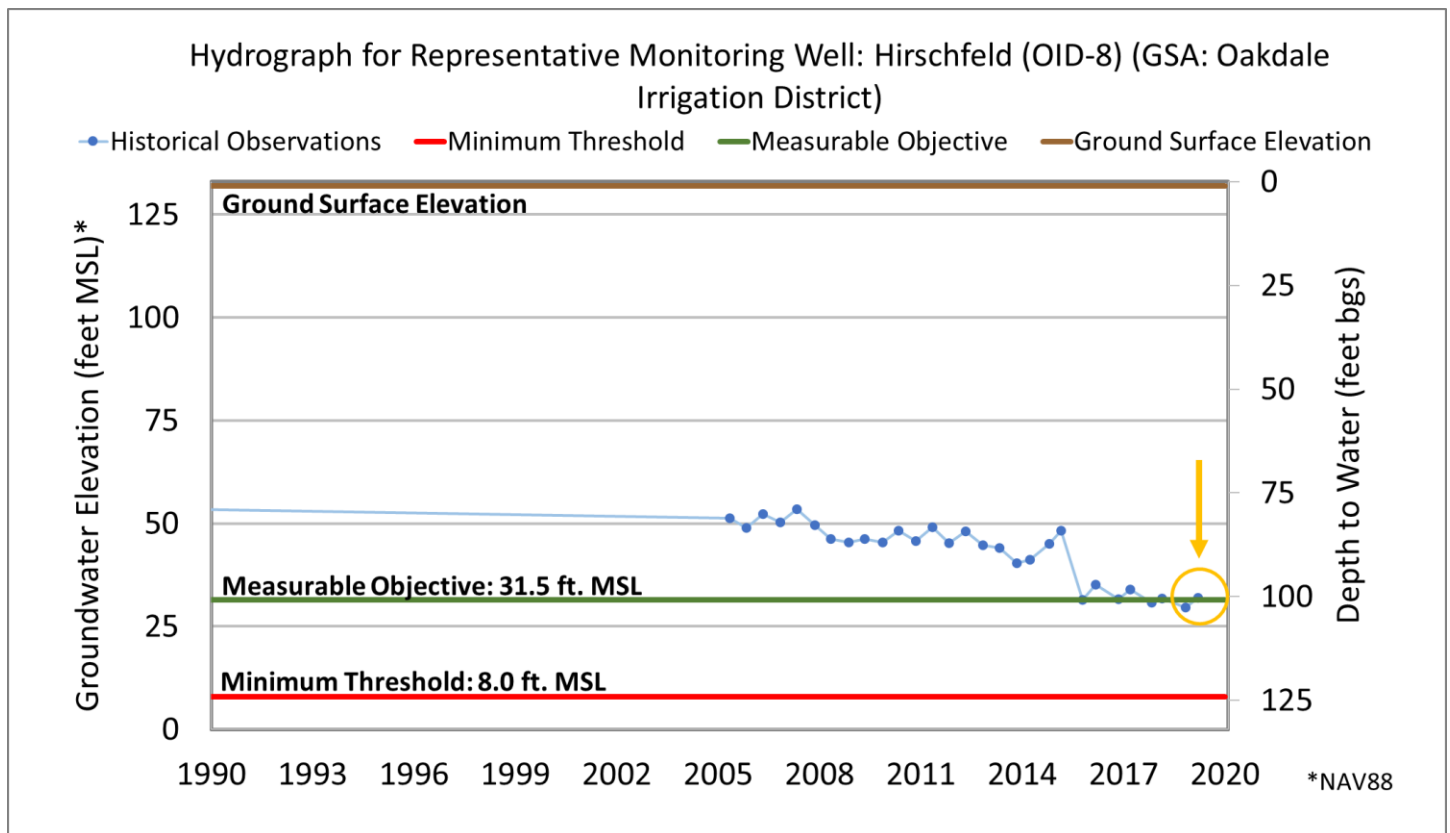
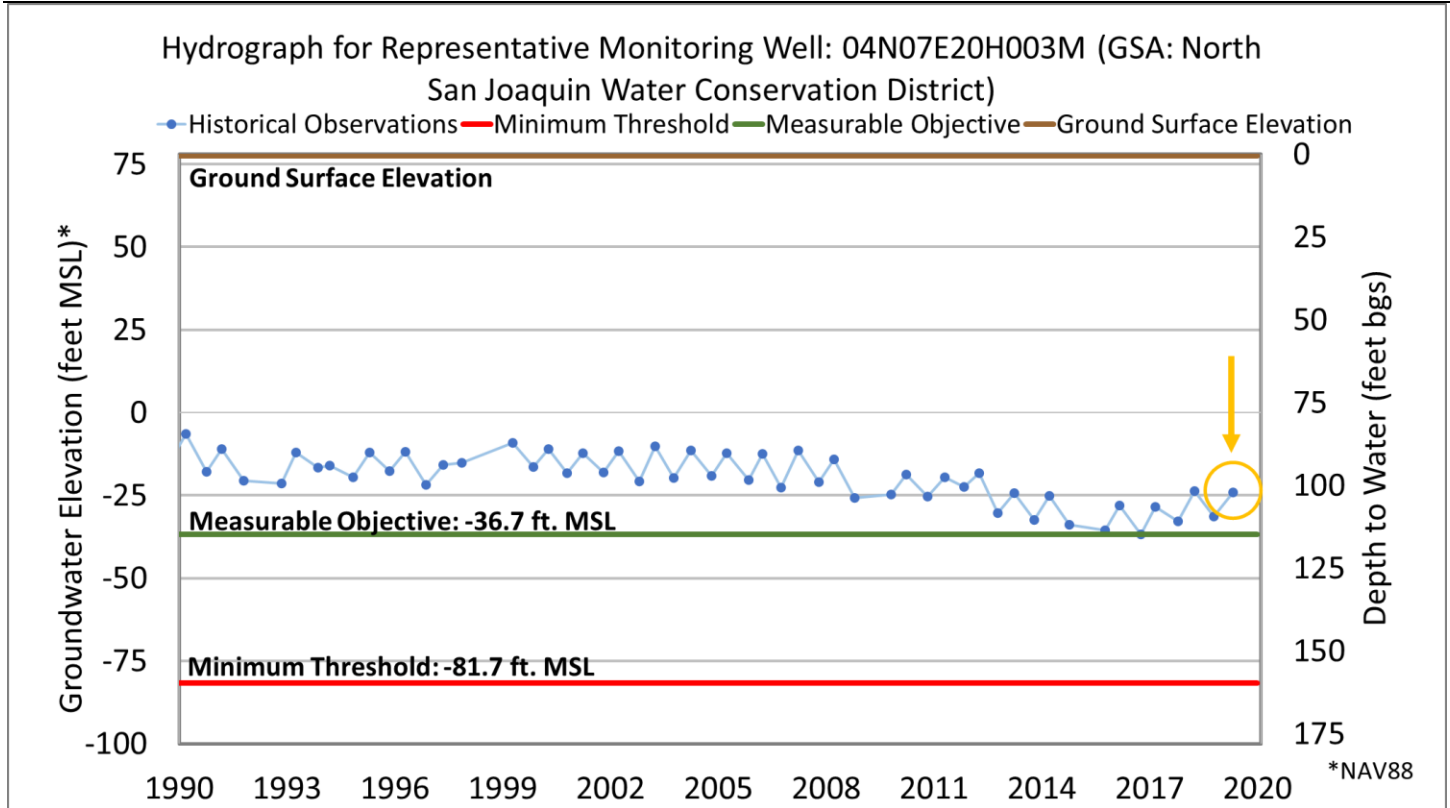
						regarding activity progress will be included in future Annual Reports.
Project 23: SSIID Storm Water Reuse	Storm Water/ In-lieu Recharge/ Direct Recharge	SSI GSA	Planning phase	2027-2030		The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Mokelumne River Loss Study	Model Refinement and Validation	NSJWCD	Conceptual planning and discussion	2020-2025		The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Monitoring and recording of groundwater levels and groundwater quality data	Monitoring and Reporting	Implemented at Subbasin scale	Ongoing	2020-2040		The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Maintaining and updating the Subbasin Data Management System (DMS) with newly collected data	Monitoring and Reporting	Implemented at Subbasin scale	Ongoing	2020-2040		The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Annual monitoring of progress toward sustainability	Monitoring and Reporting	Implemented at Subbasin scale	Ongoing	2020-2040		The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur

				2020-2040	during WY 2019. Updates regarding activity progress will be included in future Annual Reports.
Annual reporting of Subbasin conditions to DWR as required by SGMA	Monitoring and Reporting	Implemented at Subbasin scale	Ongoing	2020-2040	The Project status information presented in the GSP is up to date. As the GSP was adopted in January 2020, GSP implementation did not occur during WY 2019. Updates regarding activity progress will be included in future Annual Reports.

## **APPENDIX B – REPRESENTATIVE MONITORING NETWORK WELL HYDROGRAPHS**

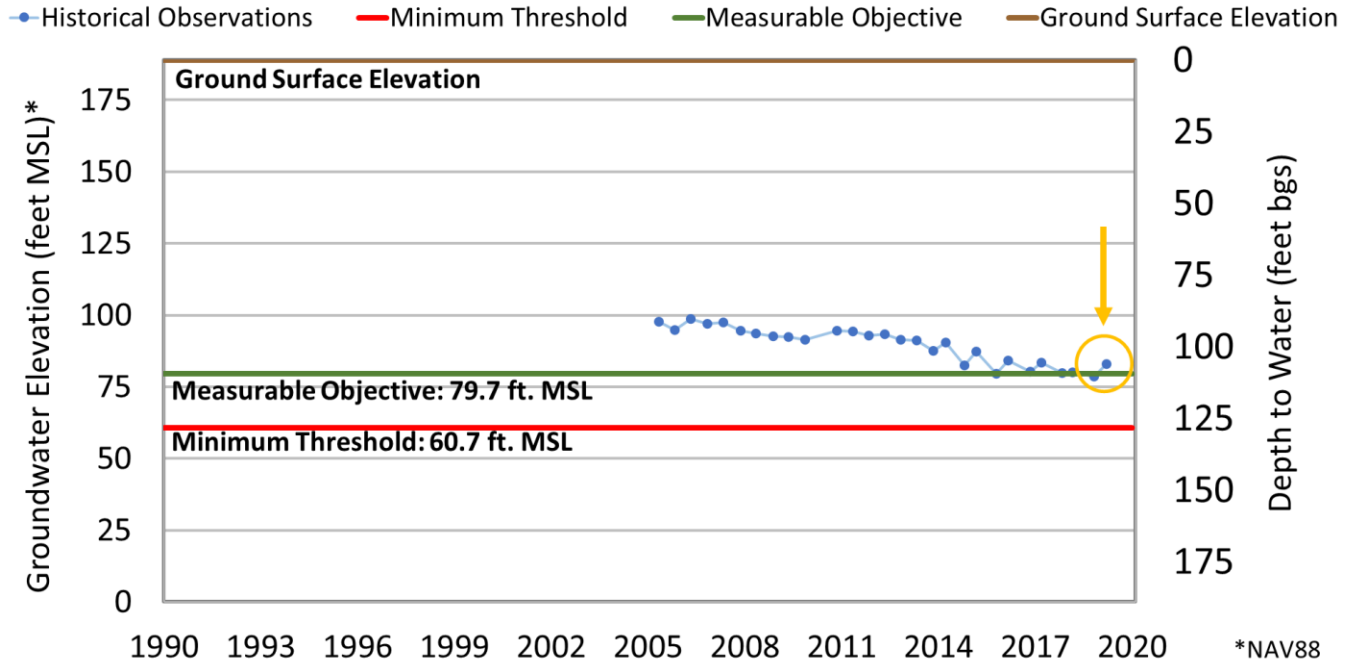




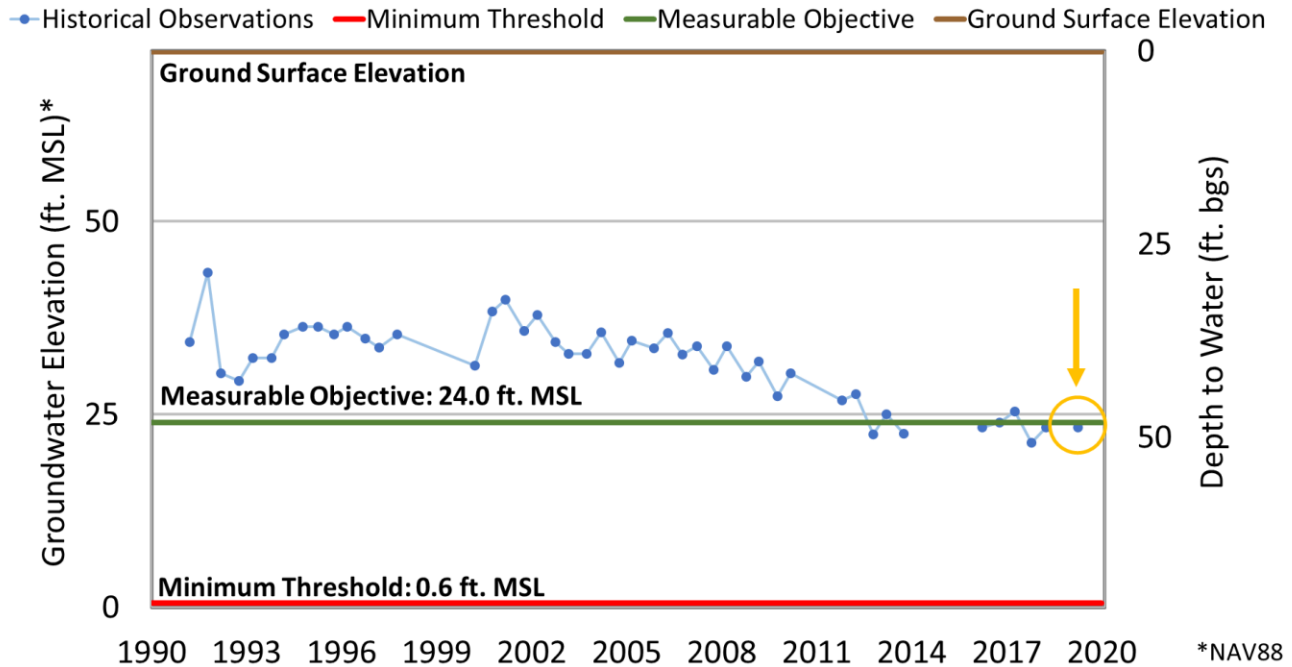


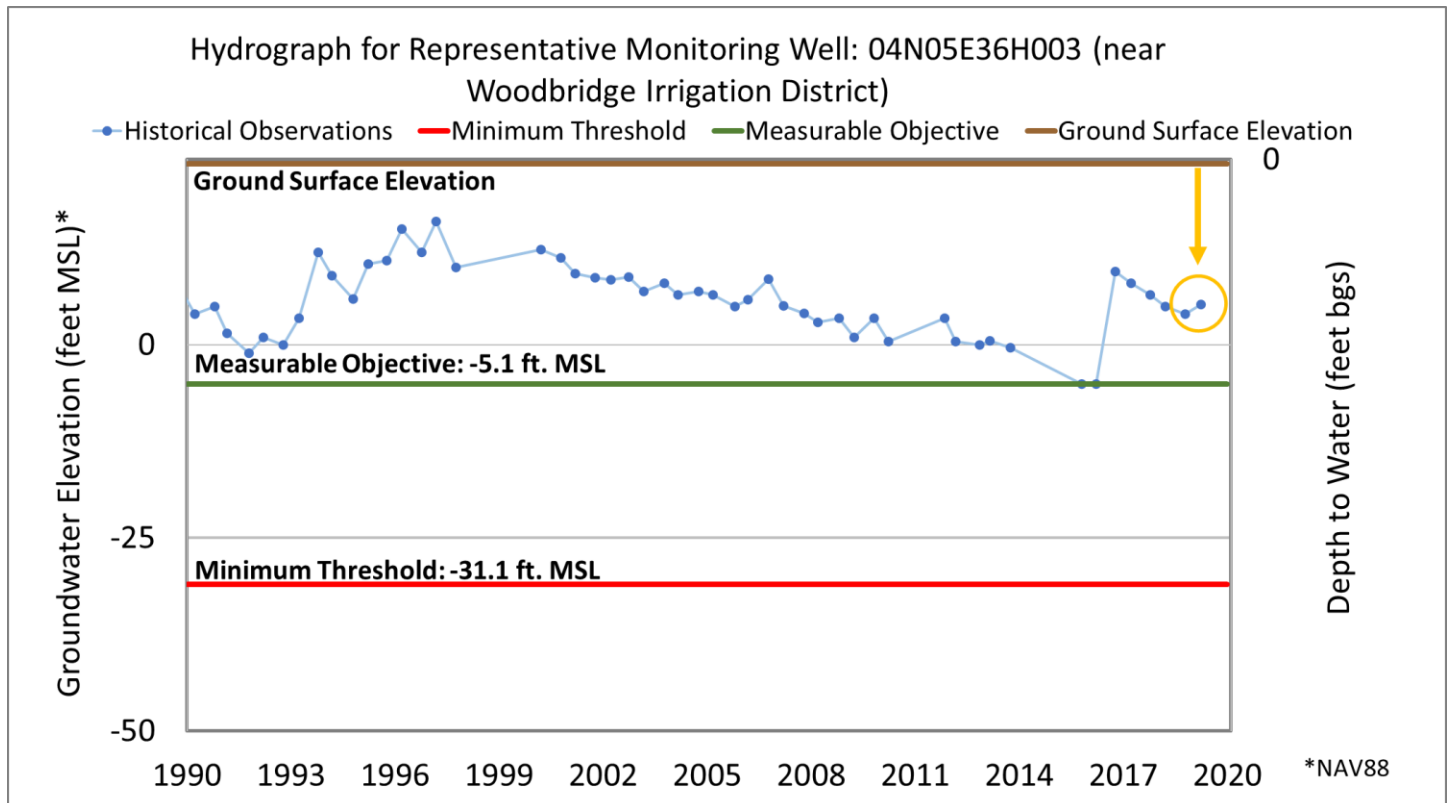
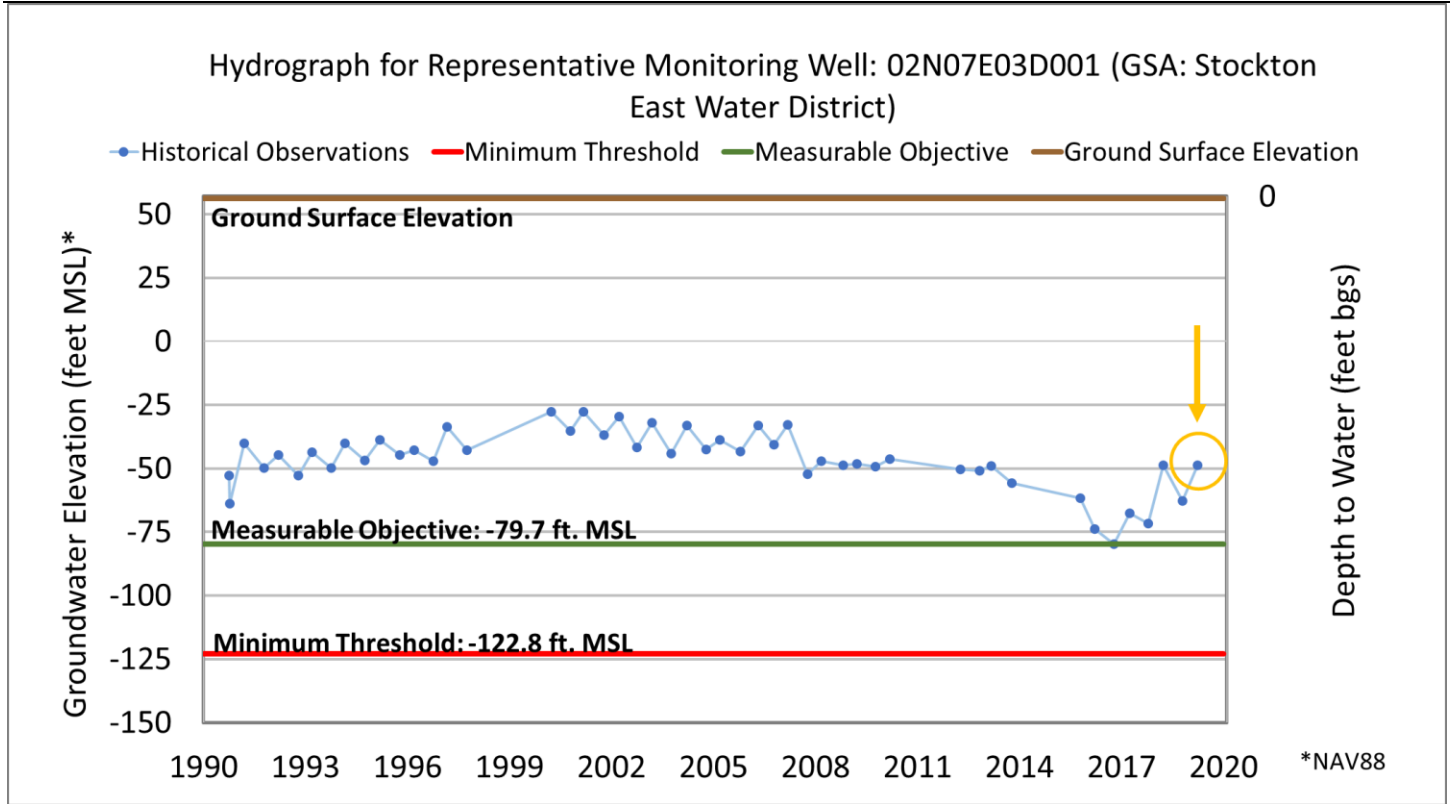


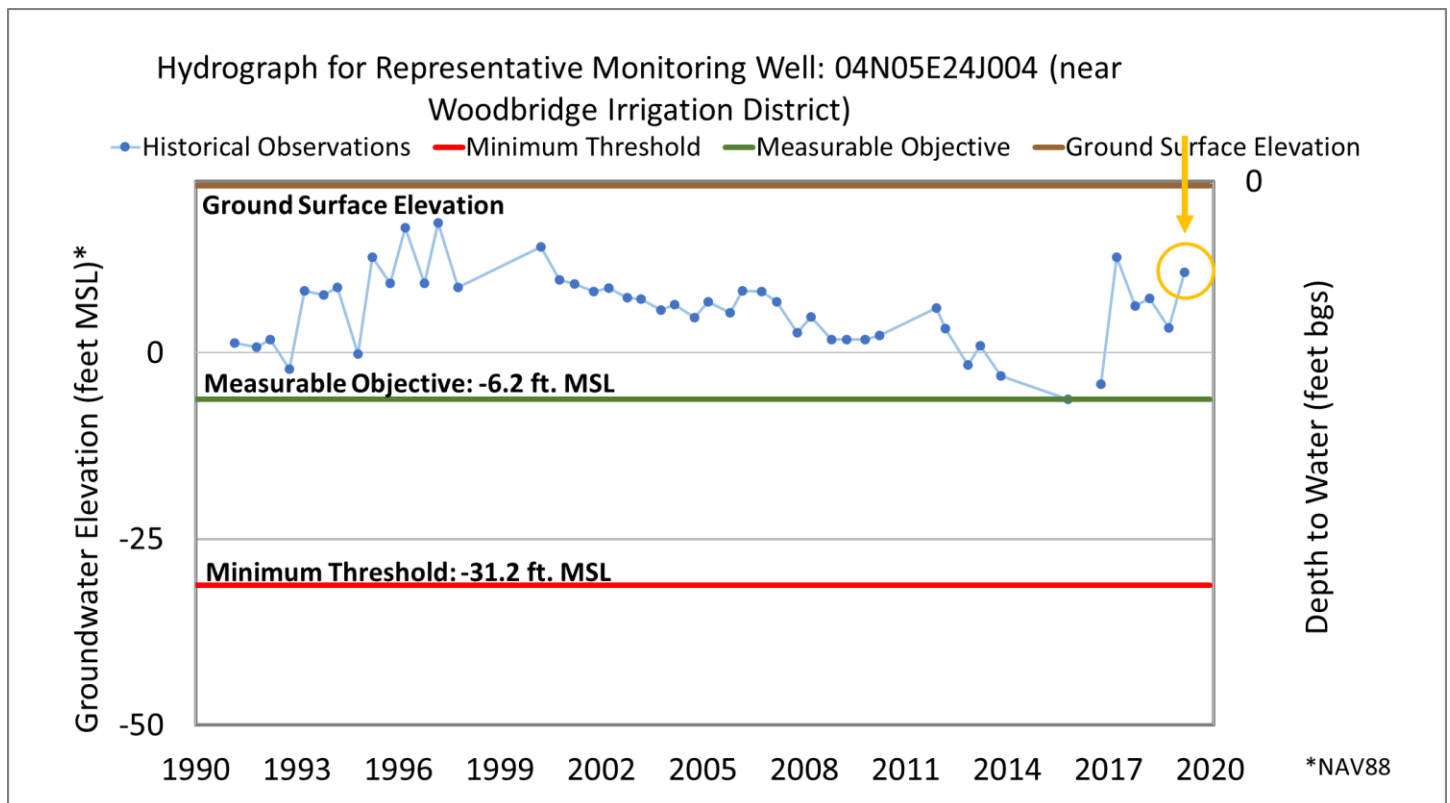
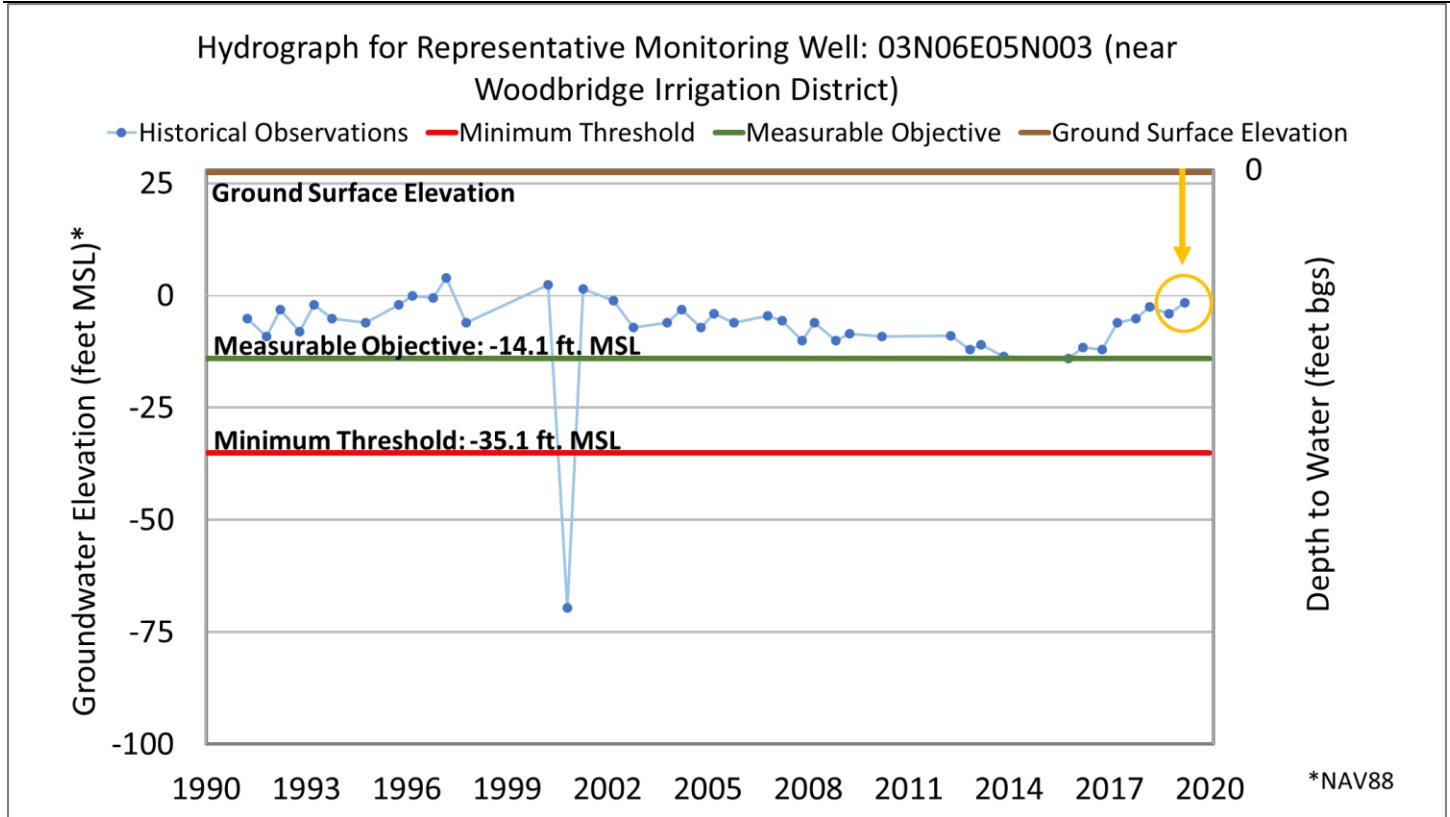
### Hydrograph for Representative Monitoring Well: Burnett (OID-4) (GSA: Oakdale Irrigation District)

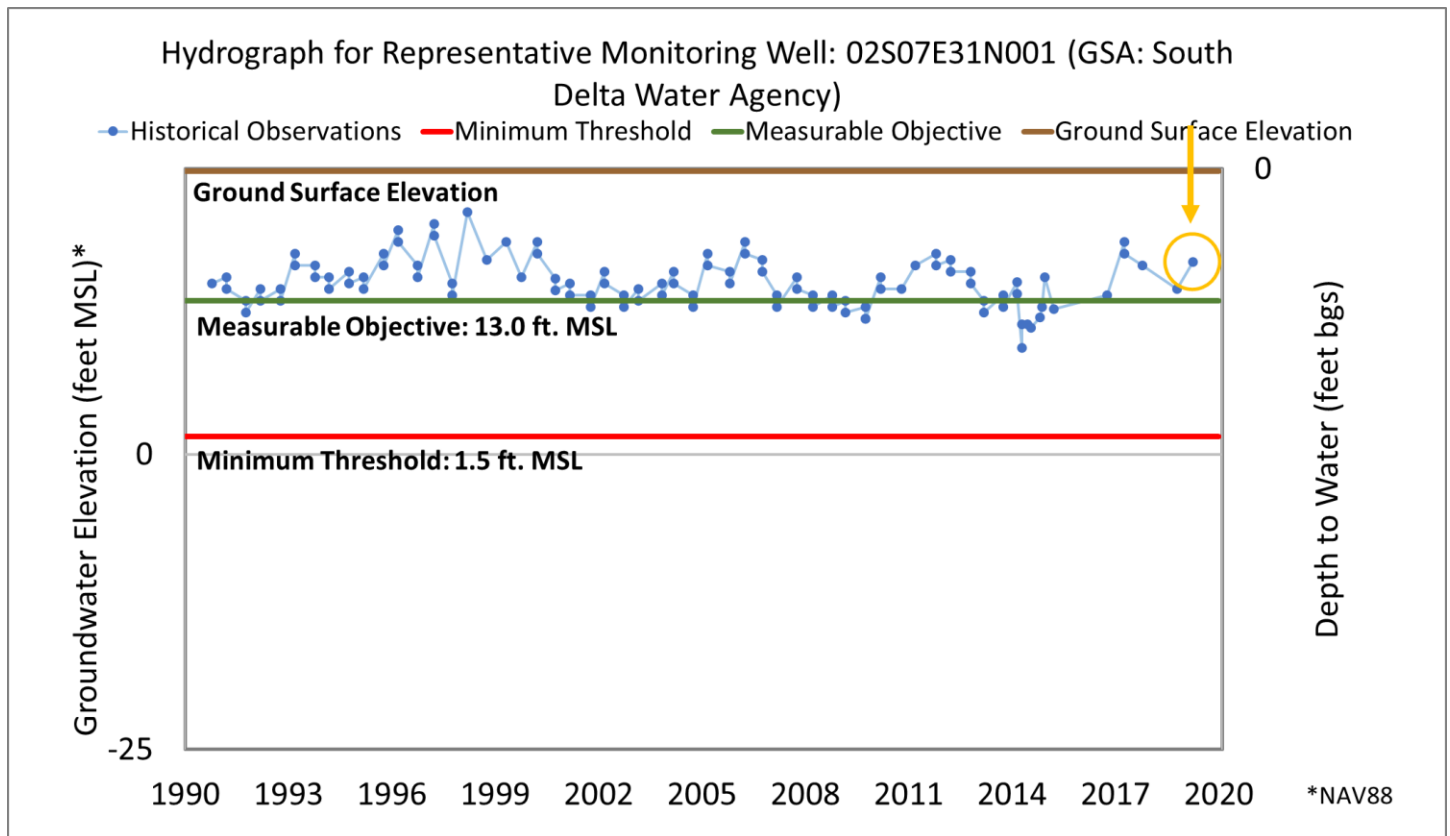
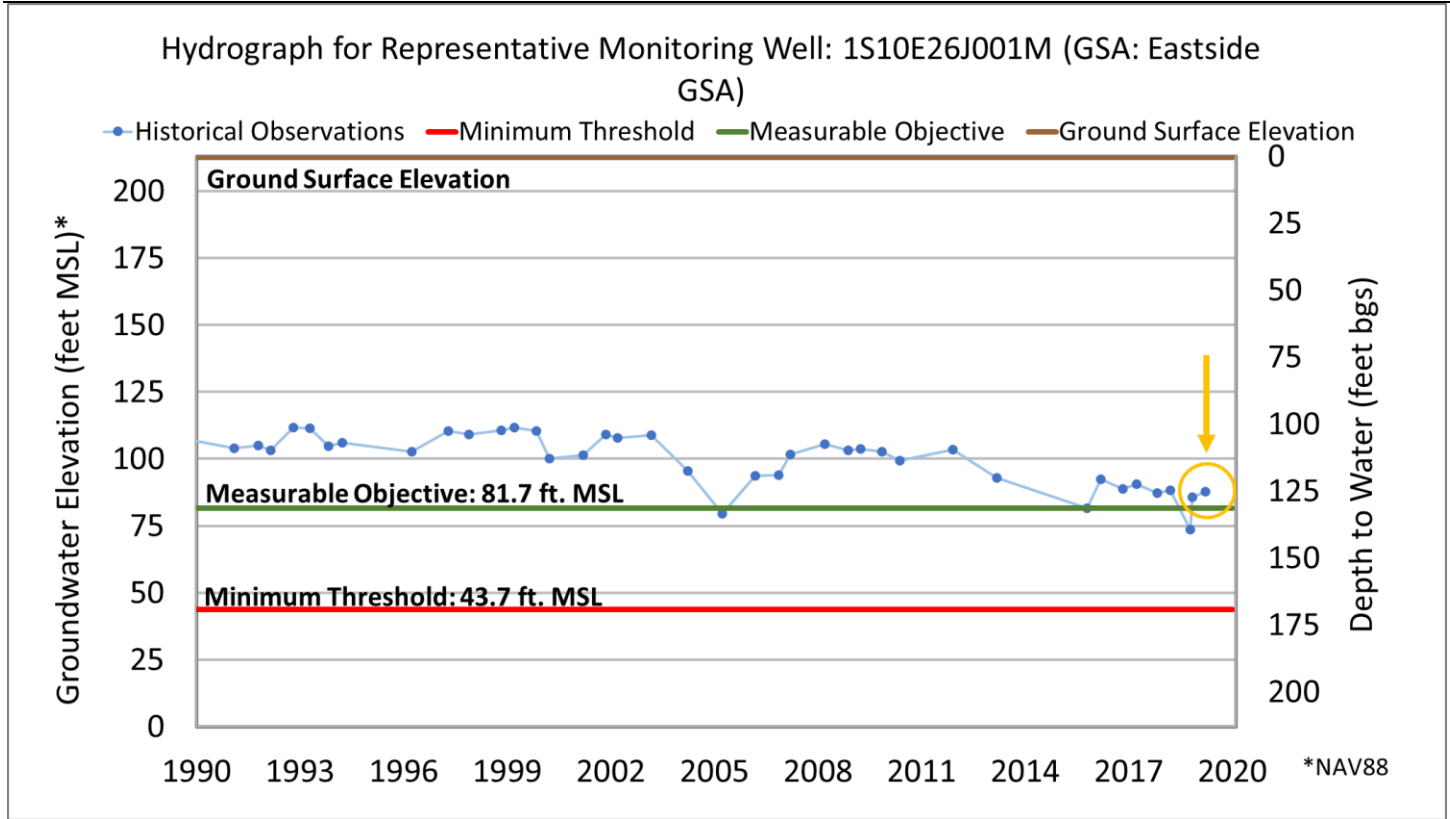


### Hydrograph for Representative Monitoring Well: 02S08E08A001 (GSA: South San Joaquin GSA)

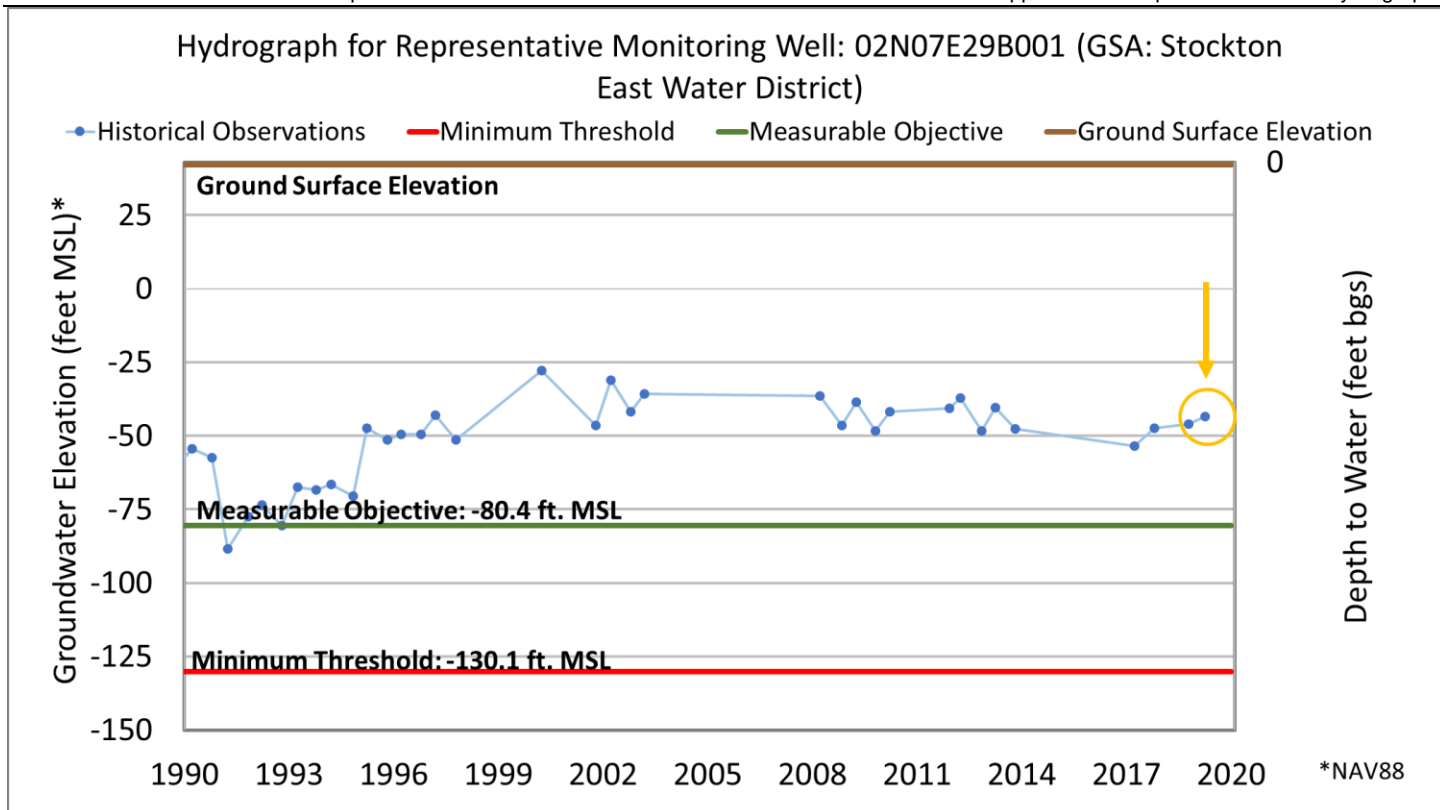




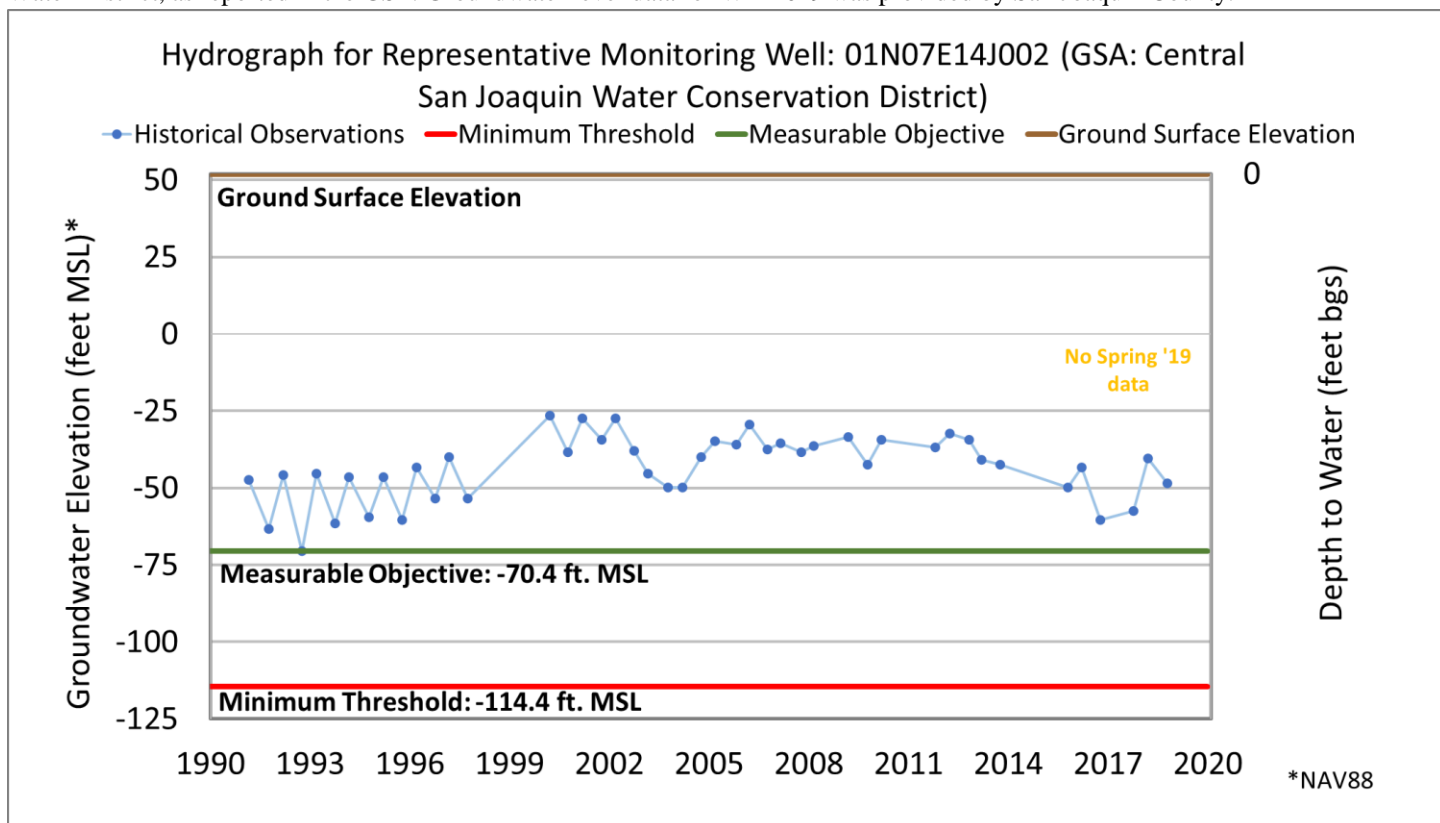




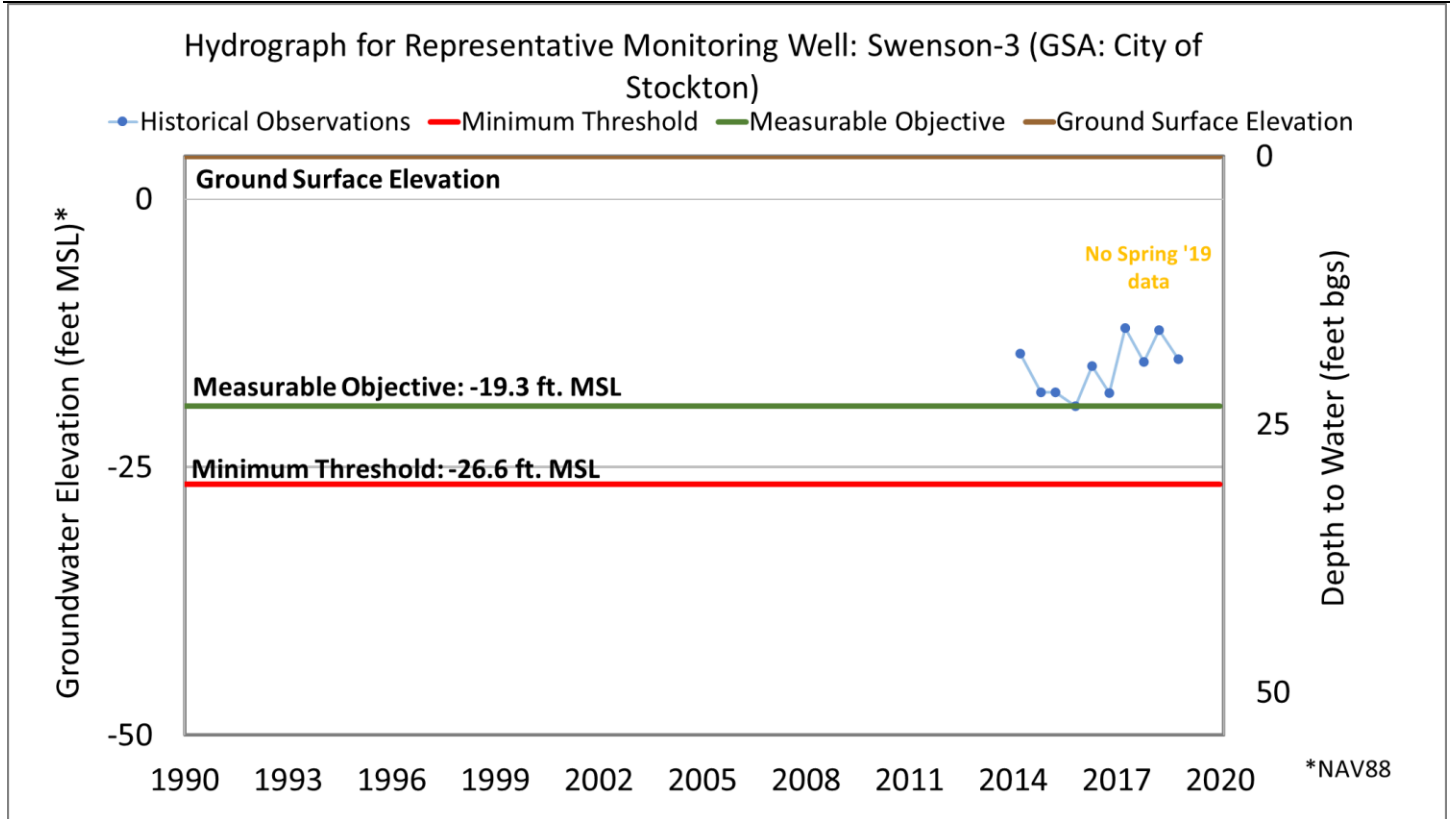
Data source for WY 2019 inconsistent with the GSP. Groundwater level data for WY 1991-2018 was provided by South Delta Water Agency, as reported in the GSP. Groundwater level data for WY 2019 was provided by San Joaquin County.



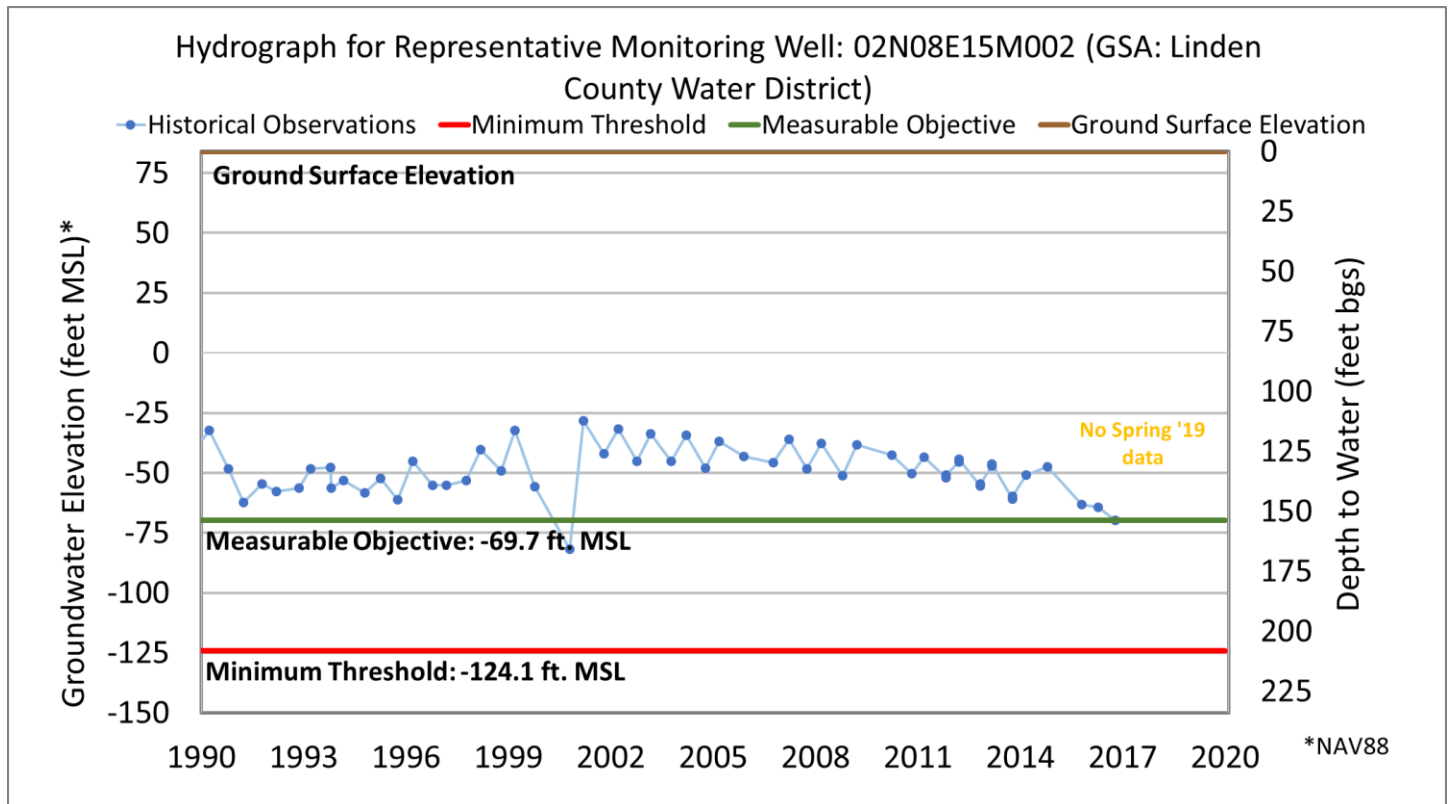
Data source for WY 2019 inconsistent with the GSP. Groundwater level data for WY 1991-2018 was provided by Stockton East Water District, as reported in the GSP. Groundwater level data for WY 2019 was provided by San Joaquin County.



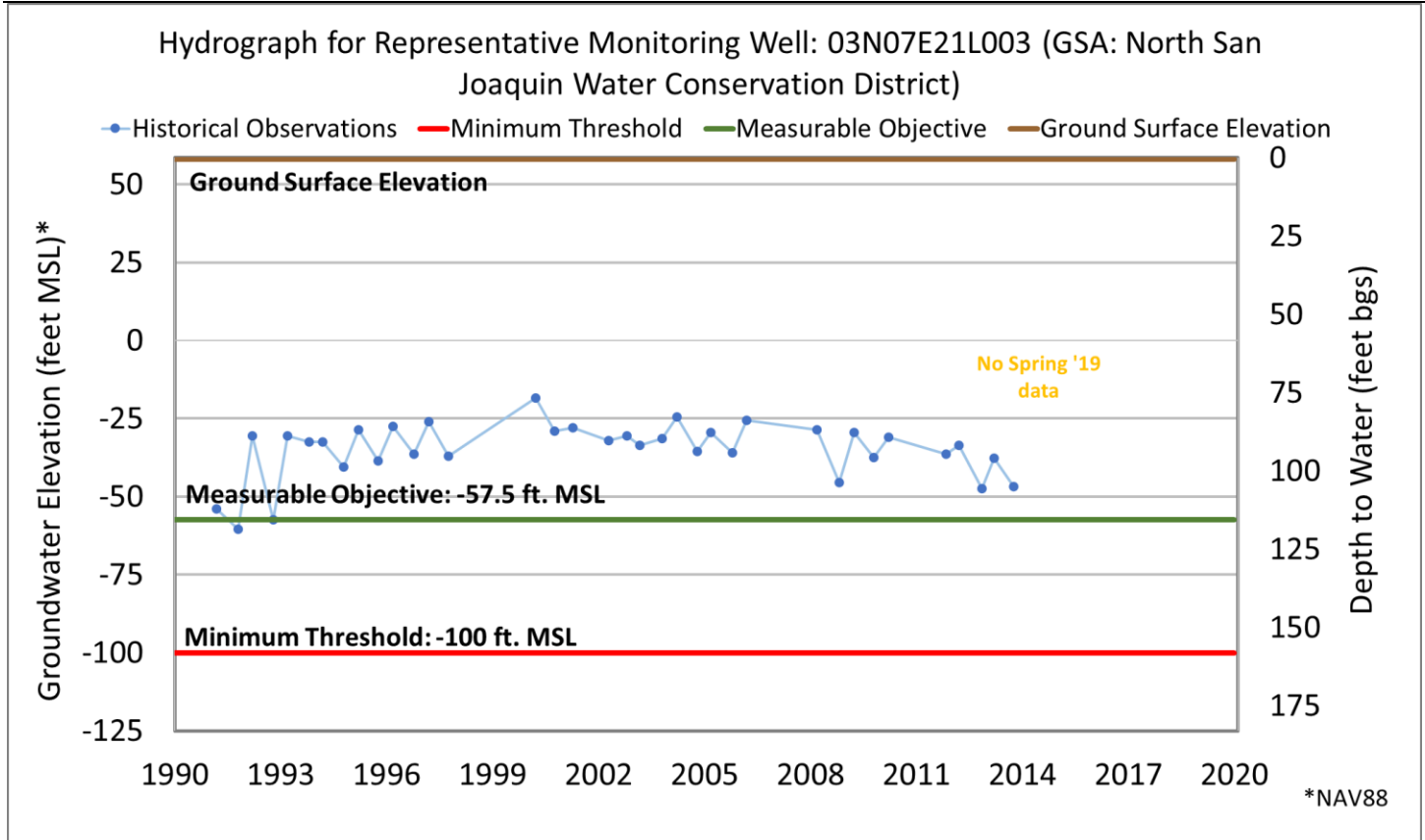
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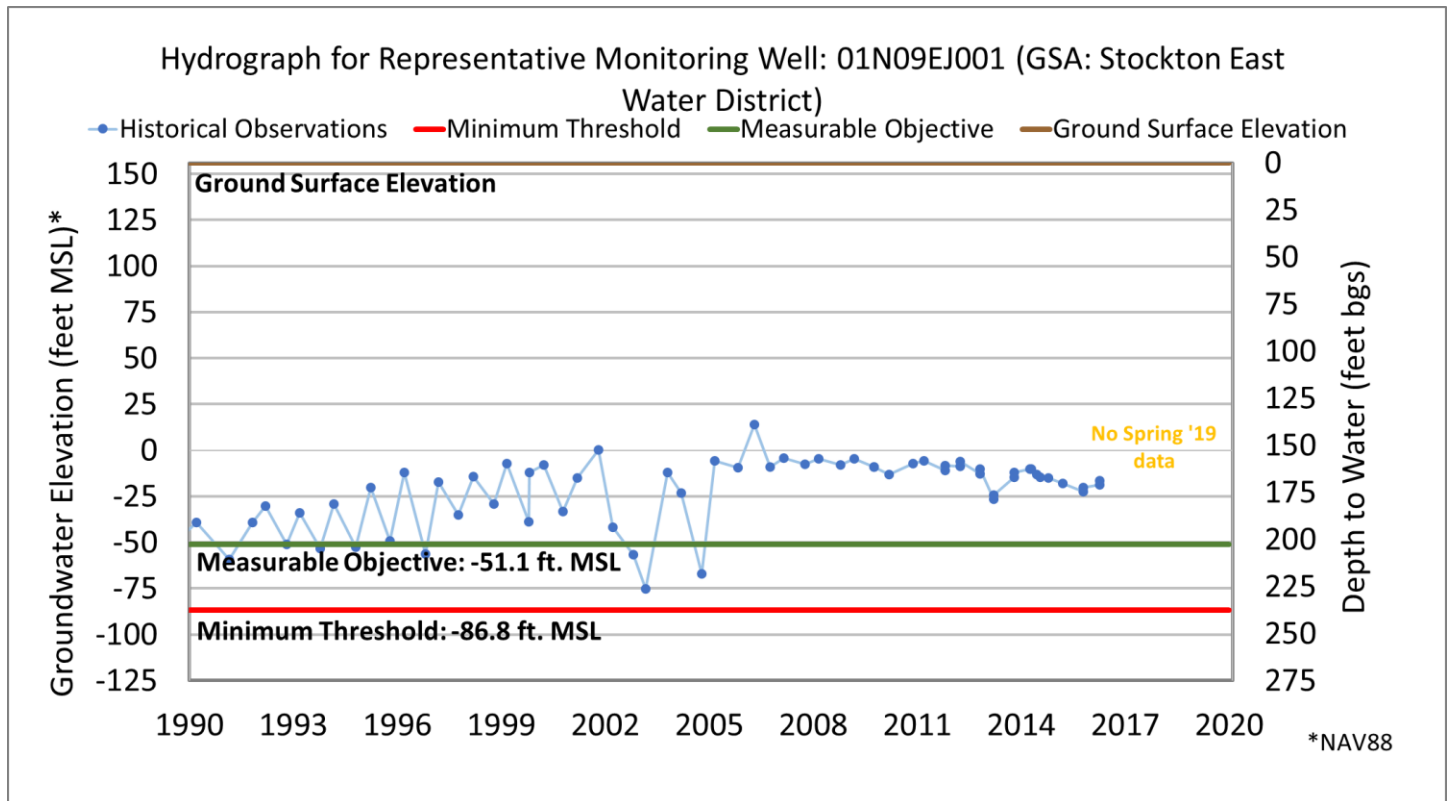
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Groundwater level data for WY 2019 unavailable.



Groundwater level data for WY 2019 unavailable.



Groundwater level data for WY 2019 unavailable.