Groundwater Report

2020 Annual

San Joaquin County

Flood Control and Water Conservation District

San Joaquin County
Flood Control and Water Conservation District

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Copies of the 2020 Annual Groundwater Report may be available upon request from:

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Acknowledgements

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This Groundwater Report is a product of the commitment that the San Joaquin County Flood Control and Water Conservation District together with many other interested agencies made to sustain and enhance the groundwater resources of the Eastern San Joaquin Basin. The District extends thanks to…

California Water Service

City of Lathrop

City of Lodi

City of Manteca

City of Stockton Municipal Utilities Department

East Bay Municipal Utility District

Morada Area Association Pacific Gas and Electric Company

San Joaquin County Department of Public Works

State of California, Department of Water Resources,

Central District Stockton East Water District

United States Bureau of Reclamation

United States Geological Survey

Most of all, we would like to thank all of the individual well owners, who give us access to their wells and in some cases some of their time.

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1 Introduction

Since the fall of 1971, the San Joaquin County Flood Control and Water Conservation District (District) has monitored groundwater levels and groundwater quality and has published the data in the Semi-annual Groundwater Report. This report utilizes data from federal, state and local government agencies as well as non-governmental sources.

Water level data is collected on a semi-annual basis, during the months of April and October, to observe groundwater levels before and after peak groundwater pumping conditions. Over 250 wells, most of which are measured by County staff, are included in the Monitoring Program. The exact number of wells varies from year to year, depending on circumstances such as destructions, new well construction, well accessibility, and well condition.

1.1 Purpose

The purpose of the annual Groundwater Reports is to provide information on groundwater conditions in San Joaquin County (County) and to publish the results of the groundwater monitoring program which consists of the following:

1. Measure groundwater levels on a County-wide basis.
2. Monitor groundwater quality along a North-South line from the north of the City of Stockton to the City of Lathrop.

In general, water quality data is more meaningful after peak production which usually occurs during the summer months. Therefore, groundwater quality data is only published for the fall months. The groundwater depth and elevation data are published for both the spring and fall.

Saline intrusion from the west is a continuing concern affecting the quality of groundwater in the County. Groundwater quality analysis is completed on an
annual basis, from approximately 12 municipal and domestic supply wells (exact number varies from year to year) located in proximity to the saline front.

1.2 Procedure

Water level measurements are performed using either a steel chain or sounder. Data is then immediately recorded in field books and then stored in a Microsoft Excel® spreadsheet for accessibility and reporting requirements.

Groundwater quality sampling is conducted on an annual basis during the month of October, along with the Fall measurements. Approximately 12 wells are sampled. The exact number of wells may vary depending on well access and other conditions. Replicate groundwater

samples (two) are analyzed for Chloride (Cl-) by Fruit Growers Laboratory, Inc., and analyzed for Electrical Conductivity (EC) using DiST 3 by Hanna Instruments. Total Dissolved Solids (TDS) are calculated using the formula: TDS = 0.64 X EC (umhos). Data is then stored in a database for accessibility and reporting requirements.

2 Rainfall Distribution

The groundwater basins in the County responds to changes in annual precipitation. There are four stations throughout the county which track rainfall throughout the year; however, rainfall records for one of these stations (Lodi Station) was not available. Figure 2-1 shows the location of the stations. The precipitation data from west to east, is presented in Figures 2-2 through 2-7. These graphs reflect areas located across the County and one area in Calaveras County. These stations have been collecting rainfall data since the 1950's.

A Water Year (WY) is the period between October 1st and ends on September 30th, the year in which the period ends denotes the water year, e.g. September 30th 2020, is the end of the 2020 Water Year. The WY type is based on million acre-feet (maf) of river water runoff observed during the WY period, these types are described as follows;

Wet Year	Equal to or greater than 3.8 maf
Above Normal	Greater than 3.1, and less than 3.8 maf
Below Normal	Greater than 2.5, and equal to or less than 3.1 maf
Dry	Greater than 2.1, and equal to or less than 2.5 maf
Critical	Equal to or less than 2.1 maf

The 2020 Water Year was classified as a Dry Year with 2.35 maf.

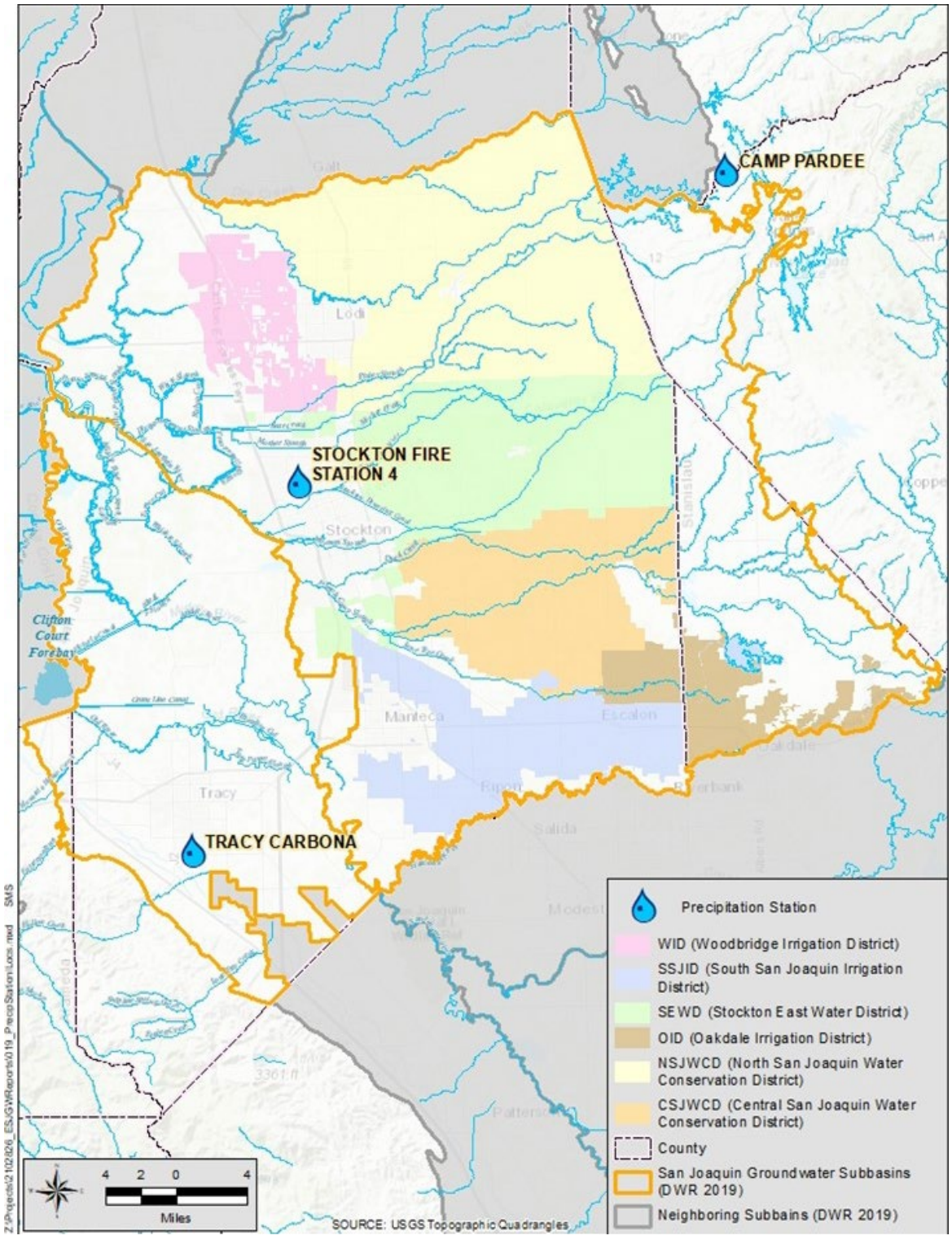


Figure 2-1 Precipitation Station Locations

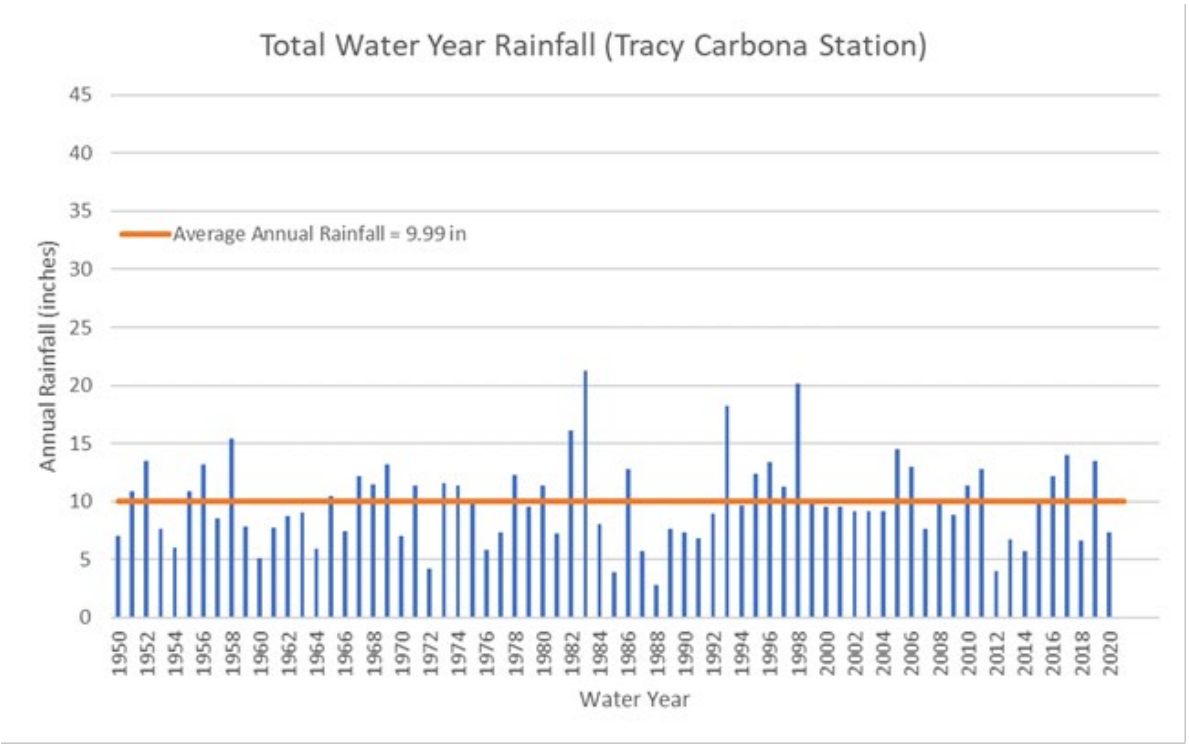


Figure 2-2 Total Annual Rainfall (Tracy Carbona Station)

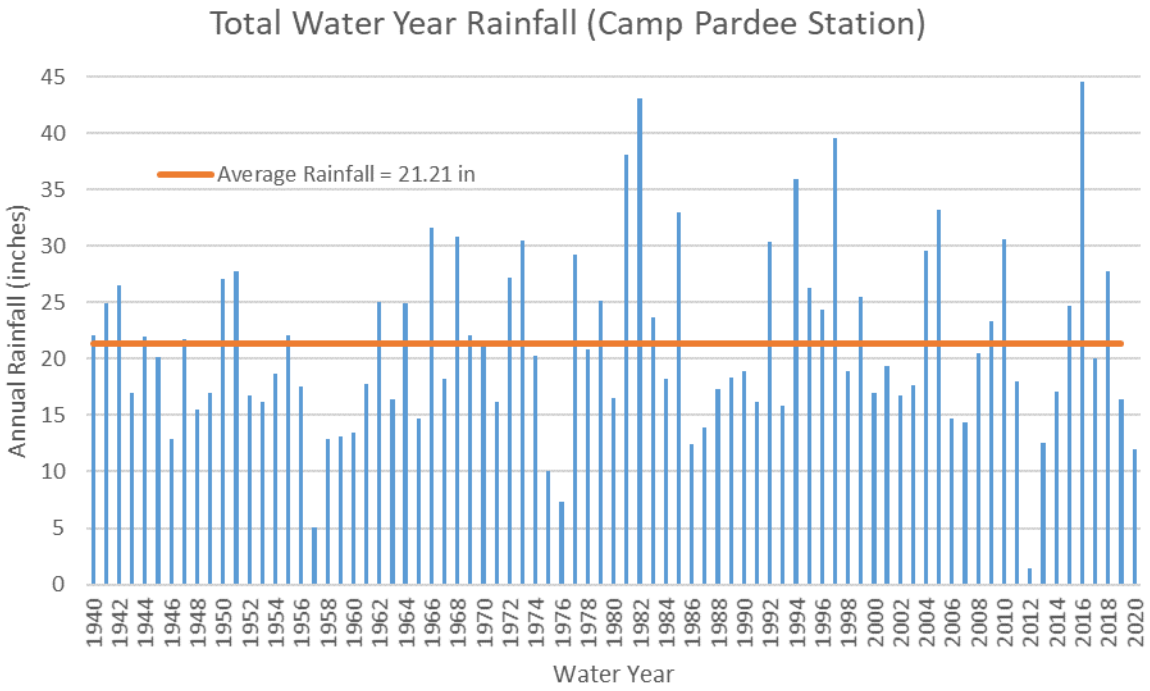


Figure 2-3 Total Annual Rainfall (Camp Pardee Station)

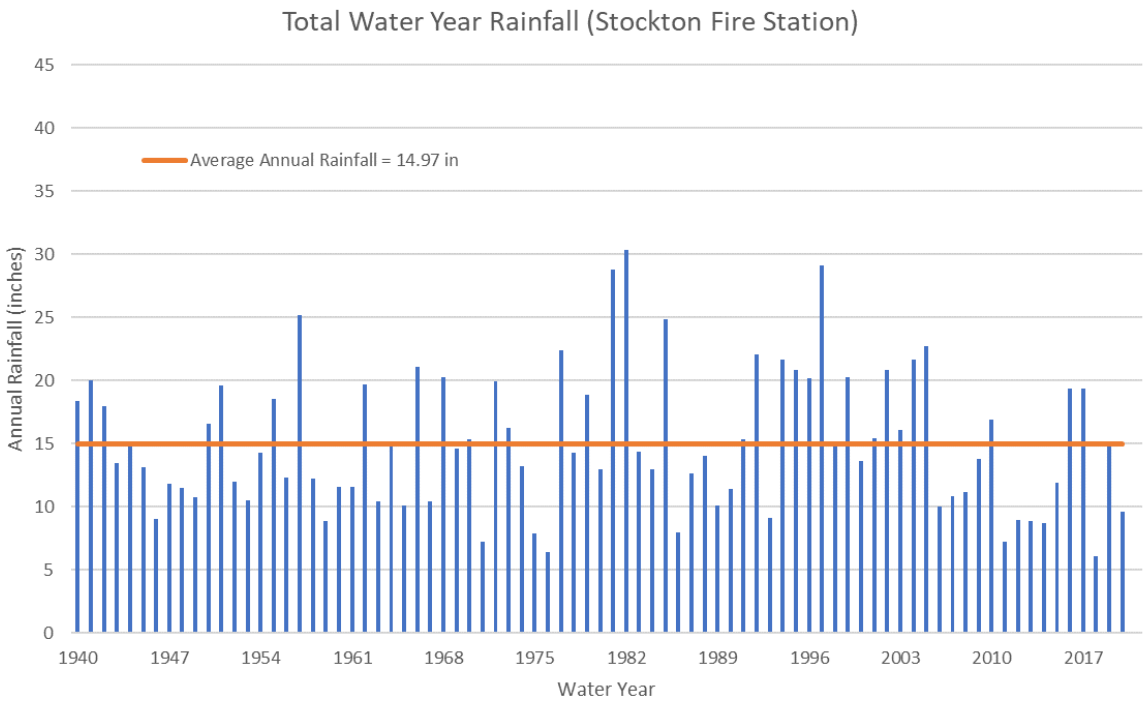


Figure 2-4 Total Annual Rainfall (Stockton Fire Station)

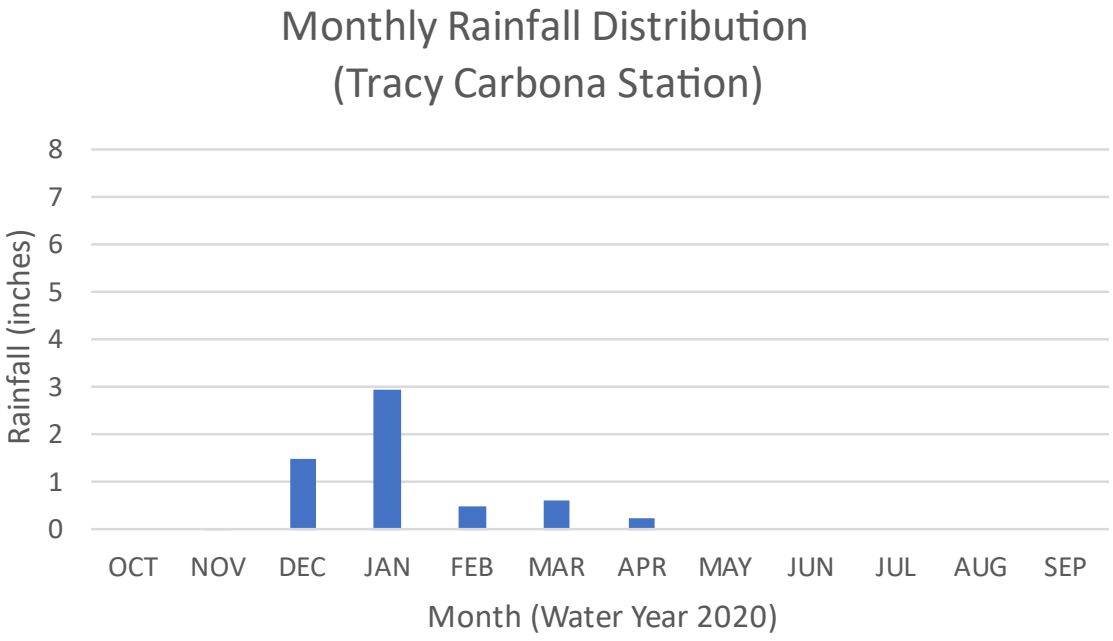


Figure 2-5 Monthly Rainfall Distribution (Tracy Carbona Station)

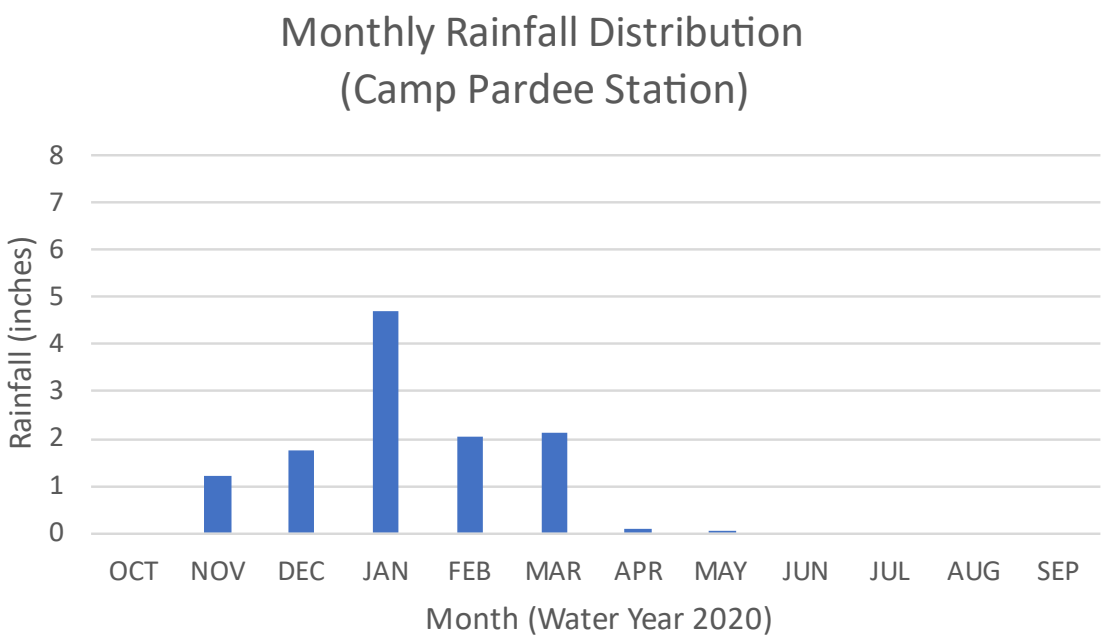


Figure 2-6 Monthly Rainfall Distribution (Camp Pardee Station)

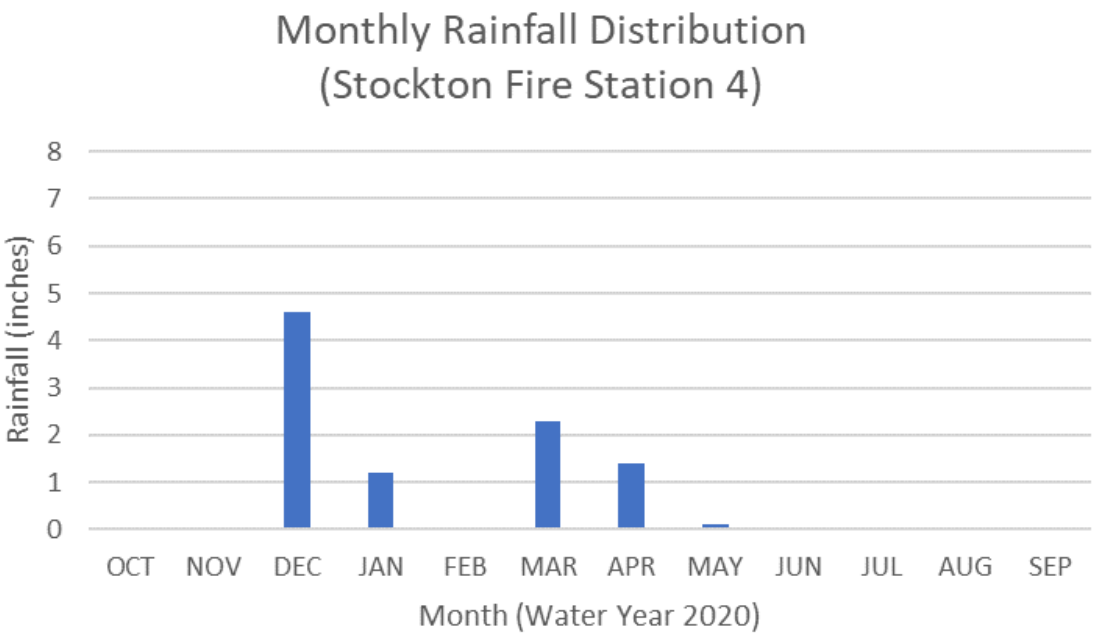


Figure 2-7 Monthly Rainfall Distribution (Stockton Fire Station)

3 Surface Water Levels and Storage

The groundwater levels in the County responds to not only changes in annual precipitation but also to the amount of surface water in storage and in the rivers. Typically, lower amounts of surface water in storage indicates higher amounts of groundwater pumping. Four river gaging stations were selected along the rivers and two reservoir stage stations. Figure 3-1 shows the location of these gages and Figures 3-2 through 3-6 provide the current and historic stages.

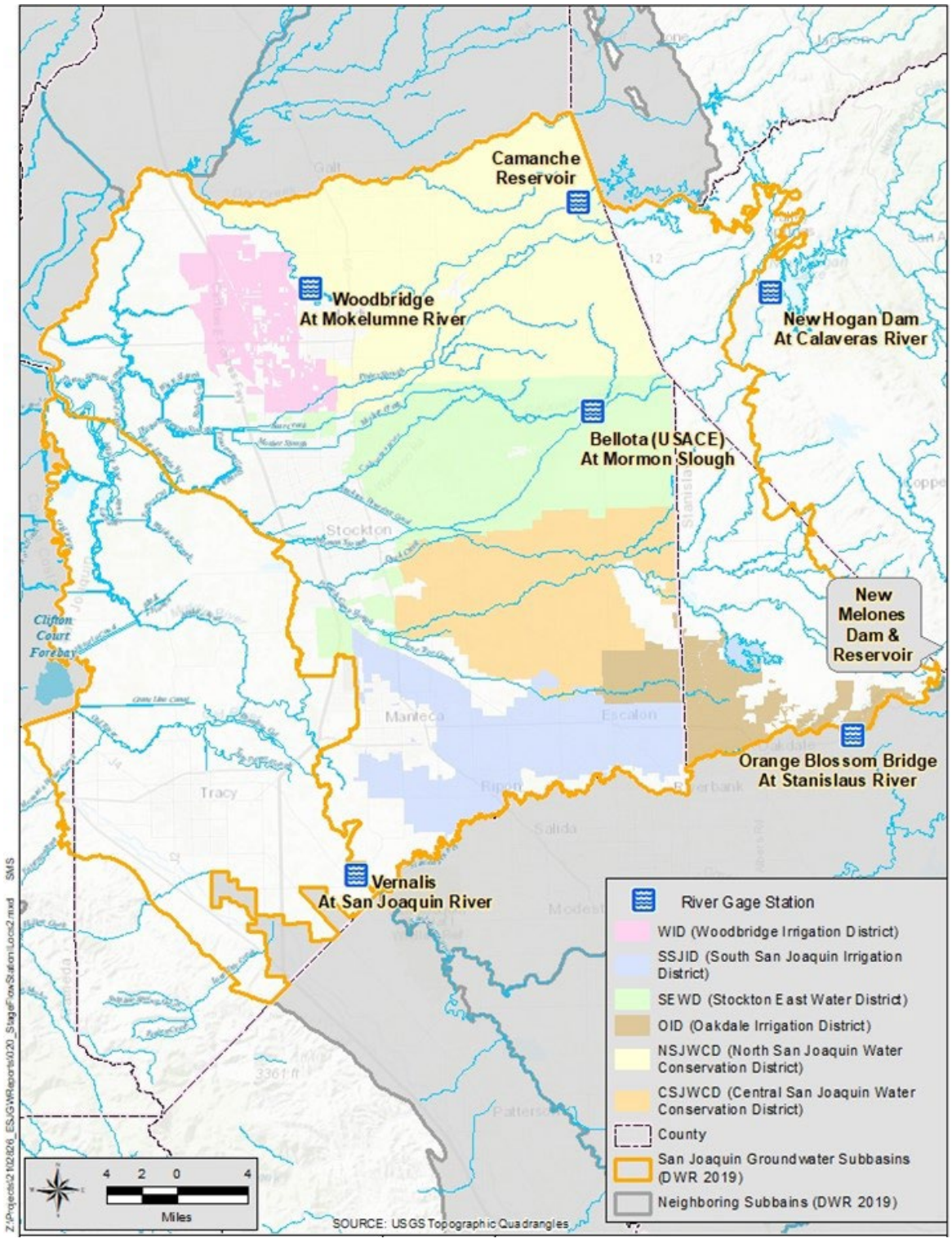


Figure 3-1 Surface Water Station Locations

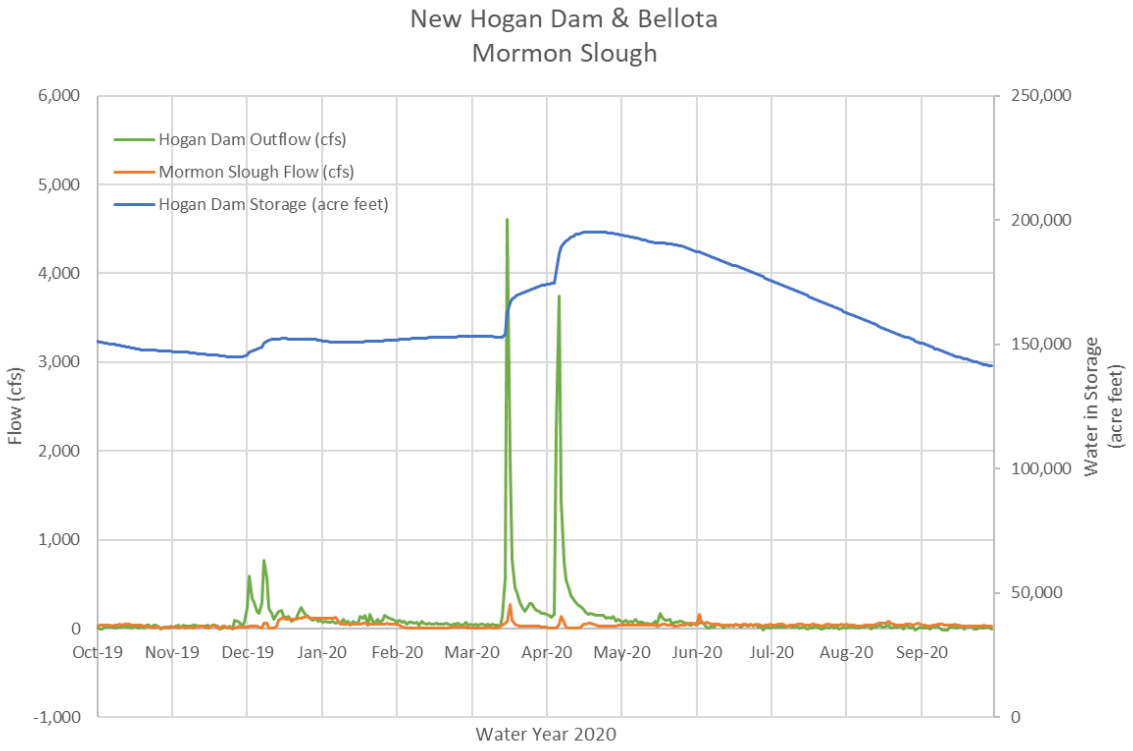


Figure 3-2 New Hogan Dam and Mormon Slough

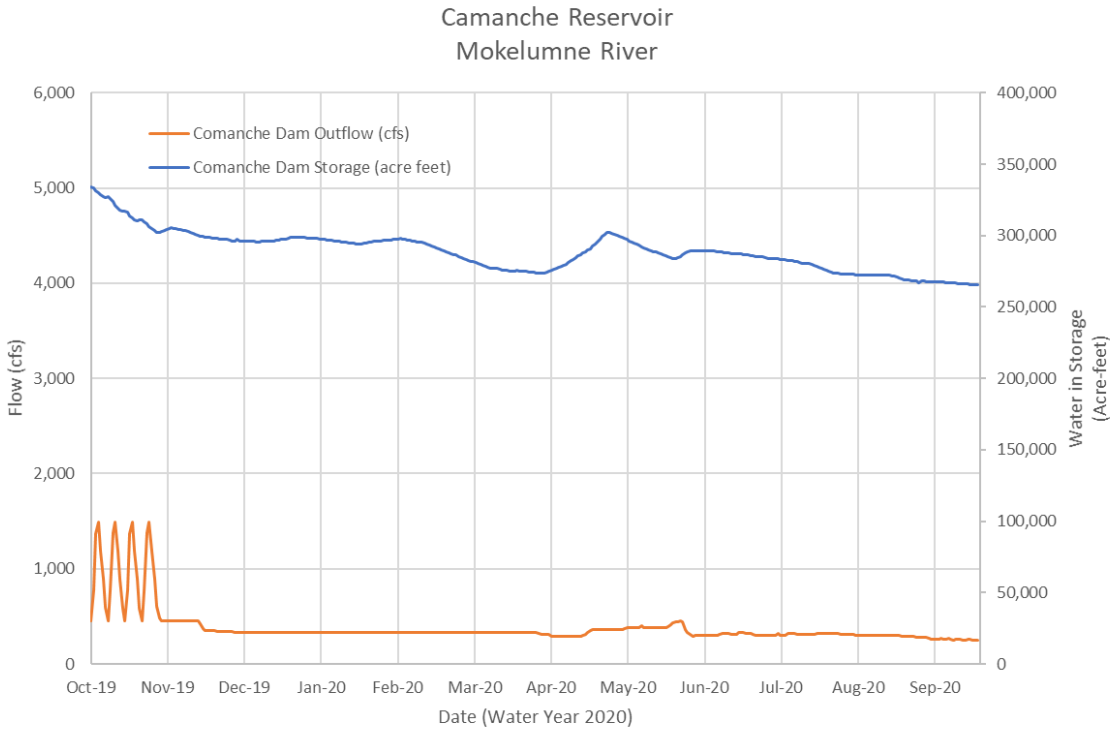


Figure 3-3 Camanche Dam

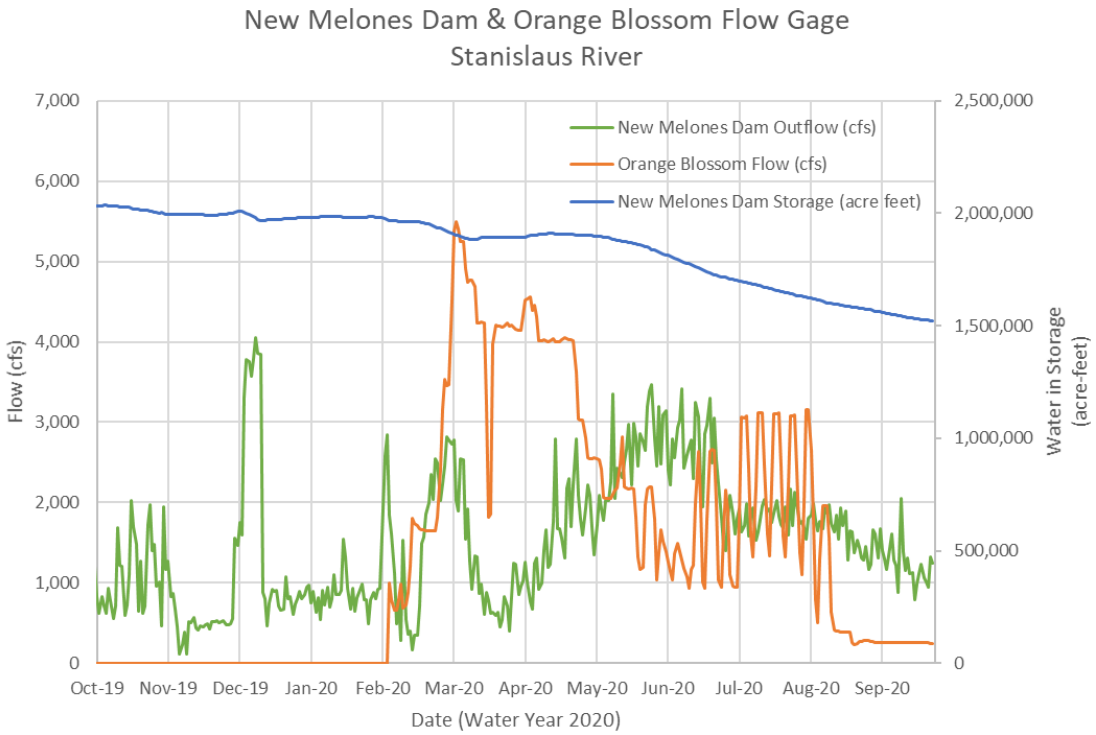


Figure 3-4 New Melones Dam & Orange Blossom Bridge

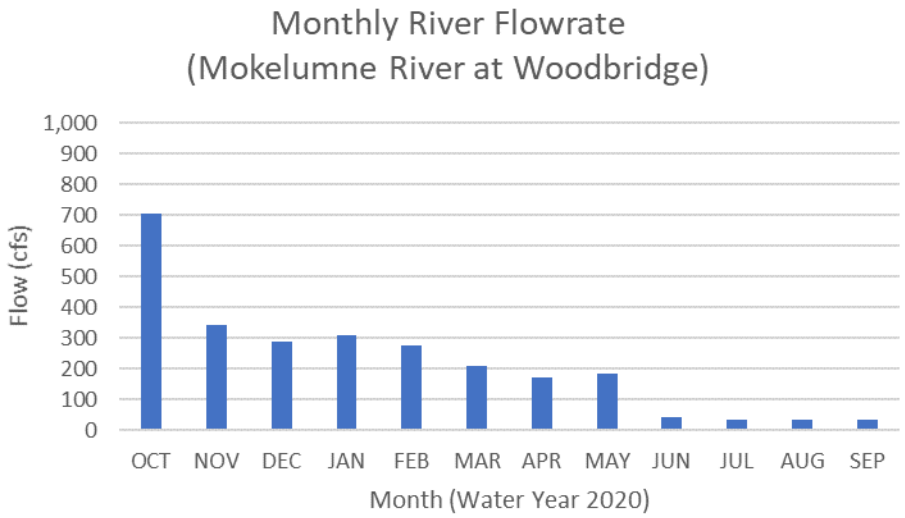


Figure 3-5 Mokelumne River Flow (Woodbridge Station) Monthly Average

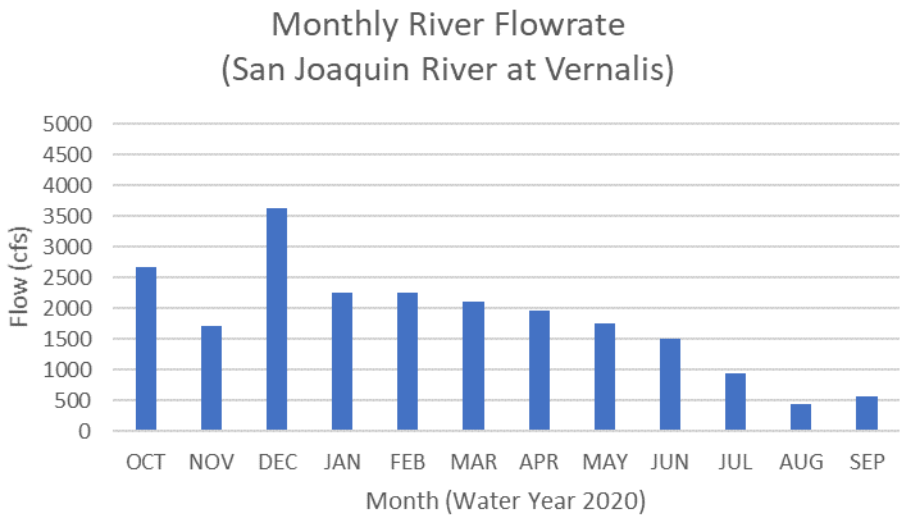


Figure 3-6 San Joaquin River Flow (Vernalis Station) Monthly Average

4 Groundwater Elevation Monitoring

Groundwater level data was provided by the County and supplemented with data available through the Department of Water Resources CASGEM program. Groundwater levels were gathered in the County for the Eastern San Joaquin County Subbasin and the Tracy Subbasin. Groundwater levels were also gathered from collected and presented for adjacent counties within the Eastern San Joaquin County Subbasin.

4.1 Groundwater Levels in San Joaquin County

Wells included in previous reports that had no available construction details, or discontinued measurements have been removed from Tables 4-1 to 4-9. Wells with comparable data are those wells with groundwater level measurements in both Spring and Fall 2019 and Spring and Fall 2020.

Measurements included in the tables are from two sources. County collected data is prioritized over CASGEM data. County data is highlighted in blue in the tables. If a well was not measured by as part of the county data it is reported as no measurement (NM). If CASGEM data was not available it is reported as "—". County data is prioritized for data collection consistency, CASGEM data is not and may not necessarily be collected in the same month as recorded by the County.

Due to the on-going COVID-19 pandemic; several monitoring wells were not able to be sampled in the spring of 2020, which affects the total amount of comparable wells for 2020.

The information gathered is summarized as follows:

Central San Joaquin Water Conservation District (CSJWCD) – Thirty-nine (39) wells were monitored, with fifteen (15) wells comparable for Spring, and nineteen (19) wells able to be compared for Fall of 2020 (Table 4-1). In the Spring, eight (8) wells show decreases in groundwater levels while six (6) wells show an increase. There was one (1) well with no change in groundwater elevations from Spring 2019 to Spring 2020. For Fall, eleven (11) wells showed a decrease in groundwater levels, while eight (8) wells declined, there were no wells with no change from Fall 2019 to Fall 2020.

North San Joaquin Water Conservation District (NSJWCD) – Thirty-three (33) wells were monitored, twenty-seven (27) wells were compared in NSJWCD for Spring and twenty-six (26) for Fall (Table 4-2). In the Spring, seventeen (17) wells decreased in groundwater levels and nine (9) wells increased. During the Fall; twenty-three (23) wells decreased, while only three (3) wells increased in groundwater level. There were no (0) wells that had no change in groundwater elevation for either season.

Oakdale Irrigation District (OID) – Out of the two (2) wells in OID, both were comparable wells for Fall groundwater levels, but neither (0) were comparable for Spring (Table 4-3). Both wells had decreased during the Fall comparison.

Stockton East Water District (SEWD) – Eighty-eight (88) wells were monitored, with sixty-two (62) wells comparable in Spring, and forty-five (45) wells could be compared in the Fall (Table 4-4). In the Spring, Thirty-nine (39) wells decreased in groundwater levels, while twenty-three (23) increased, no wells with no change. During the Fall, thirty-four (34) wells show decreases in groundwater levels, while ten (10) showed an increase. One (1) well had no change in groundwater elevation from Fall measurements.

South San Joaquin Irrigation District (SSJID) – Twenty-eight (28) wells were monitored, twenty-two (22) wells could be compared for Spring, while sixteen (16) Could be compared for Fall (Table 4-5). In Spring, eighteen (18) wells had decreased water levels, and four (4) had increased. During the Fall, fifteen (15) wells declined in groundwater elevation while none (0) increased. One (1) well had no change in groundwater elevation.

Southwest County Area in the Tracy Subbasin – Out of Twenty-eight (28) wells monitored, all twenty-eight (28) were comparable in the southwestern portion of the County (Table 4-6). Seven (7) wells declined in groundwater elevation. Nineteen (19) increased in groundwater elevation. Two (2) wells had no change in groundwater elevation.

Woodbridge Irrigation District (WID) – Nineteen (19) total wells were monitored, with eighteen (18) comparable during the Spring, and fifteen (15) comparable in the Fall (Table 4-7). During the Spring, twelve (12) wells had decreased in water level, while only six (6) had increased. All fifteen wells had decreased in water levels from the previous Fall season.

Calaveras County – Fourteen (14) wells were monitored, with seven (7) able to be compared in the Spring, and thirteen (13) comparable for the Fall (Table 4-8). In the Spring, all seven (7) wells showed decreases in groundwater levels. During the Fall, twelve (12) wells showed a decrease and one (1) well showed an increase. There were no wells (0) with no change in groundwater level.

Stanislaus County – Eight (8) wells were monitored, seven (7) wells could be compared in the Spring, while all eight (8) could be compared for the Fall (Table 4-9). In the Spring, six (6) wells showed a decrease in groundwater levels while the other one (1) increased. During the Fall, six (6) showed a decrease and two (2) wells showed an increase. No wells with no change.

4.2 Hydrographs

Hydrographs of select wells within the County are provided on Figures 4-1 through 4-27 to illustrate the changes in groundwater levels with time. Trend lines are plotted on each figure using data from 1980 to present (or shorter period if measurements are not available) to illustrate current groundwater levels, whether they are increasing or decreasing. Wells N and Q are provided but monitoring at these wells has been prevented due to access issues, but is attempting to be resolved

4.3 Groundwater Level Profiles

Groundwater level profiles were developed to illustrate the relationship of where groundwater levels were increasing or decreasing in relationship to Spring 1986, recent

historic high groundwater levels, and Fall 1992, historic low groundwater levels. Figure 4-28 shows the location of the profiles and Figures 4-29 through 4-31 provide the profiles.

4.4 Groundwater Level Changes

Changes in groundwater levels from Spring 2019 through Fall 2020 throughout the County are summarized on Figure 4-32. Figures 4-33 through 4-36 show depths to groundwater along surface elevation maps that were used to develop Figure 4-32.

The measurements included in all of the tables were from various sources. The County certified data reported measurements that were not able to be taken as NM or no measurement. When no data was available, CASGEM reported the measurement as "--" County measurements (highlighted in blue) were used with preference over the CASGEM measurements. Where County measurements were not available, CASGEM measurements were used for the Spring or Fall but may not necessarily be in the same month as recorded by the County.

Table 4-1 Comparison of CSJWCD Water Surface Elevations

State Well ID	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Change Fall (Feet)	Change Spring (Feet)
01N07E11L001	-66	--	-53.86	--	-12.14	--
01N07E14J002	-61.6	-81.41	--	--	--	--
01N07E14L001	NM	-43.31	-49.91	-42.41	--	-0.9
01N07E24R001	-58.5	--	--	--	--	--
01N07E26H003	-44	--	--	--	--	--
01N07E32A001	-18.89	-14.69	-16.89	-15.89	-2	1.2
01N08E02B001	--	-50.64	-57.14	-49.34	--	-1.3
01N08E11L001	-60	--	-78	--	18	--
01N08E13J001	NM	NM	-35.7	-48.7	--	--
01N08E16G001	-39	-40.45	--	-46.45	--	6
01N08E16H002	-57.6	-47.25	-65.25	-46.05	7.65	-1.2
01N08E18A002	NM	--	--	-61.5	--	--
01N08E27R002	NM	--	-48	--	--	--
01N08E29M002	NM	-35	NM	-43	--	8
01N08E35F001	-61.9	--	-55.9	--	-6	--
01N08E36F001	-38	--	-51	-30	13	--
01N09E13D001	1.8	--	--	--	--	--
01N09E15B002	NM	--	-24.5	--	--	--
01N09E17D001	-52.5	NM	NM	NM	--	--
01N09E17M001	-58.5	NM	-53.19	NM	-5.31	--
01N09E19C001	-64	-63	-60	-45	-4	-18
01N09E29R001	-40.5	-36.16	-36.16	NM	-4.34	--
01N09E30C005	-44.2	NM	-41.2	-27.2	-3	--
01S07E01J001	NM	-41.6	-37.6	-42.6	--	1
01S08E04R001	-40.3	NM	NM	-35	--	--
01S08E05A001	-42.4	-38.4	NM	NM	--	--
01S08E05R001	-54.8	-34.8	NM	-35.8	--	1
01S08E06D001	-39.1	NM	NM	NM	--	--
01S08E09Q001	-46.9	-34.9	-61.9	NM	15	--
01S08E11F001	-29.9	-18.9	-31.9	-39.9	2	21
01S08E14B001	-32.7	NM	-27.36	-22.36	-5.34	--
01S08E15A001	-30.57	-23.37	-29.47	-23.37	-1.1	0
01S08E23A001	NM	NM	14.5	NM	--	--
01S08E27A001	-8.85	-4.65	-7.05	-2.75	-1.8	-1.9
01S09E05H002	-20.1	-8.65	-32.65	-4.65	12.55	-4
01S09E07A001	-21.1	-16.3	-23.3	-12.3	2.2	-4
01S09E07N001	-16.3	NM	-28.3	-17.3	12	--
01S09E09R001	-8.7	NM	NM	NM	--	--
01S09E19Q002	1.3	-11	2	1	-0.7	-12

Number of Wells Spring 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
39	15	8	6	1	-18 to 21	-0.34

Number of Wells Fall 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
39	19	11	8	0	-12.14 to 12.55	1.93

Table 4-2 Comparison of NSJWCD Water Surface Elevations

State Well ID	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Change Fall (Feet)	Change Spring (Feet)
03N06E04C001	4.66	7.36	8.56	8.56	-3.9	-1.2
03N07E02G003	-37.14	-28.14	-35.74	-28.34	-1.4	0.2
03N07E03R001	NM	-26.3	-32.8	-25.3	--	-1
03N07E08E002	-28	-21	-25	-21.2	-3	0.2
03N07E09C001	-32.7	-23.7	-30.2	-23.5	-2.5	-0.2
03N07E15C004	-47	-36.8	-44	-36.3	-3	-0.5
03N07E17D004	-29.3	-23.4	-26.4	-23.8	-2.9	0.4
03N07E18D012	-29.8	-24	-26.5	-24.3	-3.3	0.3
03N07E19J004	NM	NM	-67	-62.5	--	--
03N07E23C002	-52	-43.33	-156.63	-43.43	104.63	0.1
03N08E07D002	-53.26	-47.06	-50.56	-43.26	-2.7	-3.8
03N08E22A001	-65.9	NM	-63.9	-56.5	-2	--
04N06E12C004	-36.4	-30	-36	-31.7	-0.4	1.7
04N06E12N002	-32.5	-21.32	-26.32	-21.62	-6.18	0.3
04N06E15B002	-12	-5.3	-12.2	-6.5	0.2	1.2
04N06E23K00	-11.5	-7.5	-6	2	-5.5	-9.5
04N06E24F001	-21.5	-14	-19	-16	-2.5	2
04N06E25R001	-5.3	-0.4	-2	0	-3.3	-0.4
04N06E27D002	3.2	8.2	8.2	12.2	-5	-4
04N07E12E001	-52.5	-46	NM	NM	--	--
04N07E17N001	-38.9	-27.8	-34.3	-27.9	-4.6	0.1
04N07E19K001	-27.6	-19.6	-24.6	-20.5	-3	0.9
04N07E20H003	-33.94	-25.74	-29.74	-24.44	-4.2	-1.3
04N07E21F001	-36.8	-27.6	-33.3	-27	-3.5	-0.6
04N07E27C002	-32.5	-31.5	-33.5	--	1	--
04N07E28J002	-28.7	-19.7	-24.4	-18.2	-4.3	-1.5
04N07E33H001	23.1	25	26	30.2	-2.9	-5.2
04N07E36L001	NM	-28	-28.75	-24.25	--	-3.75
04N08E14K001	-17.1	-12.8	-16.1	-11.7	-1	-1.1
04N08E17J001	-42.8	-36.4	NM	-34.9	--	-1.5
04N08E21M001	-47.1	-41	-42.1	-39.4	-5	-1.6
04N08E32N001	-49.1	-43.1	NM	-42.6	--	-0.5
05N07E34G001	NM	NM	-59.6	NM	--	--

Number of Wells Spring 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
33	28	17	9	0	-9.5 to 2	-1.08

Number of Wells Fall 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
33	26	23	3	0	-6.18 to 104.63	1.14

Table 4-3 Comparison of OID Water Levels

State Well ID	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Change Fall (feet)	Change Spring (feet)
01S09E21J002	21.8	NM	25.9	28.9	-4.1	--
01S09E24R001	49.9	52.1	51.5	NM	-1.6	--

Number of Wells Spring 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
2	0	0	0	0	--	--

Number of Wells Fall 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
2	2	2	0	0	-1.6 to -4.1	-2.85

Table 4-4 Comparison of SEWD Water Levels

State Well ID	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Change Fall (feet)	Change Spring (feet)
01N06E02C001	-34.83	-4.03	-6.13	-5.83	-28.7	1.8
01N06E04J003	NM	-8.43	-9.73	-8.23	--	-0.2
01N06E04J004	NM	-4.87	-5.77	-3.77	--	-1.1
01N06E04J005	NM	-1.61	-2.41	0.19	--	-1.8
01N06E05M004	-8.5	NM	NM	NM	--	--
01N06E36C003	NM	-10.4	-13	-9.8	--	-0.6
01N06E36C004	NM	-7.7	-9.7	-5.5	--	-2.2
01N06E36C005	NM	-6.2	3	-3.9	--	-2.3
01N07E01M002	-73	NM	NM	NM	--	--
01N07E02G001	-8.5	NM	NM	-47.5	--	--
01N07E03M001	NM	NM	-23	-8	--	--
01N07E04R001	-10.9	-9	-26	-12	15.1	3
01N07E09E004	-19	NM	-17	-18	-2	--
01N07E09H001	NM	NM	-27.5	NM	--	--
01N07E09Q003	-34.5	-64	-34	-28	-0.5	-36
01N07E10D001	-31	NM	NM	-27	--	--
01N07E20G001	-18	-16	-19	NM	1	--
01N09E05B001	--	--	--	--	--	--
01S06E01C002	-9	-2	-9	-1	0	-1
01S06E02G002	-10.27	-5.77	-6.77	-1.87	-3.5	-3.9
01S06E10G001	NM	-7.8	-11.8	-1.8	--	-6
01S07E06M002	-9	-7	-6	-1	-3	-6
01S07E08J002	NM	-3	-8	-4	--	1
02N05E01A002	NM	NM	-25.64	-24.34	--	--
02N05E01A003	NM	NM	-16.21	-14.31	--	--
02N05E01A004	NM	NM	-13.76	-11.76	--	--
02N05E01A005	NM	NM	-11.94	-10.14	--	--
02N05E01A006	NM	NM	-8.98	-7.98	--	--
02N06E01A001	-37.22	-32.22	-33.42	-32.12	-3.8	-0.1
02N06E08N001	NM	-23.18	-22.88	-20.98	--	-2.2
02N06E08N002	NM	-22.42	-21.32	-19.32	--	-3.1
02N06E08N003	NM	-19.61	-18.61	-16.41	--	-3.2
02N06E12H001	-43.09	-37.69	-35.89	-34.09	-7.2	-3.6
02N06E20E001	NM	-14.7	-15.2	-12.6	--	-2.1
02N06E24F001	NM	-41.5	-26.5	-21.5	--	-20
02N06E24J002	NM	-22.4	-20.6	-23.7	--	1.3
02N06E24J003	-25.87	-23.47	-19.87	-24.17	-6	0.7
02N07E03D001	-56.5	NM	-59.73	-48.73	3.23	--
02N07E08D001	NM	-58.2	-74.2	-63.2	--	5
02N07E08K003	-60.7	-47.7	-56.7	-50.4	-4	2.7
02N07E08R002	-58.24	-49.04	-52.44	-47.34	-5.8	-1.7
02N07E10F002	NM	NM	-63.2	-53.5	--	--
02N07E11F001	-86.5	-74.5	-78	-70	-8.5	-4.5
02N07E11R002	-83	-66	-69	-58	-14	-8
02N07E15C001	NM	--	--	-49.3	--	--
02N07E16F002	-61.04	-48.14	-54.29	-47.79	-6.75	-0.35
02N07E16L001	-76.3	-66.3	-71.3	-49.3	-5	-17
02N07E20N002	-39	-43	-40	-32	1	-11
02N07E21A002	-65.71	-53.11	-64.01	-55.31	-1.7	2.2
02N07E21K002	-56.7	-47.8	-56.2	-48.3	-0.5	0.5
02N07E21N001	-70	-63	-64	-49	-6	-14
02N07E23B001	-84	-79	-65	-62	-19	-17
02N07E24B001	NM	NM	NM	-58.1	--	--
02N07E24Q001	-72.7	-62.3	-72.6	-62.1	-0.1	-0.2
02N07E26N001	-63.2	NM	NM	NM	--	--
02N07E28K002	-61	-44	-60	-51	-1	7
02N07E28N004	-36	-49	-46	-48	10	-1
02N07E28P001	NM	-47	-54	-42	--	-5

State Well ID	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Change Fall (feet)	Change Spring (feet)
02N07E29B001	-41.2	-30.63	-41.43	-33.83	0.23	3.2
02N07E29M002	-30.2	-24.3	-27.4	-34.1	-2.8	9.8
02N07E30H001	-30.1	-23.7	-26.8	-25.9	-3.3	2.2
02N07E31M001	-10.8	-3.8	-2.8	--	-8	--
02N07E32J002	-19.3	-14.5	-18.6	-15.1	-0.7	0.6
02N07E32M002	-15.4	-9.76	-10.86	-3.16	-4.54	-6.6
02N07E32R001	NM	-12.6	NM	-6.6	--	-6
02N07E33L001	-22	-19	-26	-32	4	13
02N07E34R001	-37	-32	-65	-45	28	13
02N08E03G002	NM	-57.3	NM	-55.4	--	-1.9
02N08E04C001	-70.5	-53.5	-50.5	-52.5	-20	-1
02N08E05C001	-71.5	-77.5	-62.5	-53.5	-9	-24
02N08E08N001	NM	-46.5	-68.5	-58.5	--	12
02N08E09G002	40.8	50.6	49.4	40.8	-8.6	9.8
02N08E10H002	-66.9	-56.5	-64.1	-58.1	-2.8	1.6
02N08E14C001	-66	-57	-62	-48	-4	-9
02N08E16D001	NM	-47.1	-50.1	-72.1	--	25
02N08E18C001	NM	-71.7	-76.7	-74.7	--	3
02N08E20F001	-74.8	NM	NM	NM	--	--
02N08E24J001	NM	NM	NM	-36.1	--	--
02N08E28H002	-85.6	-62.6	NM	-40.6	--	-22
02N08E33E001	-87.6	-78.6	-81.6	-55.6	-6	-23
02N09E05N001	-35.19	-31.69	-32.99	NM	-2.2	--
02N09E09D001	NM	NM	-21.8	-2.8	--	--
02N09E28N001	NM	--	NM	-23.8	--	--
03N06E35P002	-24.84	-22.54	-22.14	-23.64	-2.7	1.1
03N07E35C002	--	-52.7	-60.7	-52.5	--	-0.2
03N07E35L001	-82	-84.5	-81.5	-71.5	-0.5	-13
03N07E36J001	-66.8	-56.3	-70.3	-67.3	3.5	11
03N09E25R001	80	--	84.6	82.8	-4.6	--
03N09E36G001	NM	NM	NM	NM	--	--

Number of Wells Spring 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
88	62	39	23	0	-36 to 25	-2.44

Number of Wells Fall 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
88	45	34	10	1	-28.7 to 10	-3.13

Table 4-5 Comparison of SSJID Water Levels

State Well ID	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Change Fall (feet)	Change Spring (feet)
01S07E14M001	-19.1	-9.1	--	42.4	--	-51.5
01S07E14P003	-15.8	--	--	43.7	--	--
01S07E15F002	-13.6	-6.6	-11.6	-11.6	-2	5
01S07E18L001	0.37	2.17	2.77	1.87	-2.4	0.3
01S07E21G001	4.35	4.95	6.65	6.15	-2.3	-1.2
01S07E25E001	-3	-1	NM	-5	--	4
01S07E26G001	-11	--	NM	NM	--	--
01S07E27K001	-4	1.6	1.6	3.7	-5.6	-2.1
01S07E30R001	4.56	11.46	9.16	11.66	-4.6	-0.2
01S07E36D001	6.45	5.95	8.25	8.55	-1.8	-2.6
01S08E19R001	NM	--	--	--	--	--
01S08E30C002	NM	-3	-7	-5	--	2
01S08E34Q001	--	--	--	--	--	--
01S08E35R002	--	--	--	18.77	--	--
01S09E29M002	20.5	--	--	--	--	--
01S09E33J002	41.52	43.32	42.72	44.32	-1.2	-1
01S09E33P001	36.21	40.01	37.91	42.31	-1.7	-2.3
02S07E07D002	7	6	NM	8	--	-2
02S07E11N002	22	--	26.35	27.35	-4.35	--
02S07E19H001	19	19	--	20	--	-1
02S08E04M001	NM	7.5	5.5	16.5	--	-9
02S08E06J001	11	14	13	15	-2	-1
02S08E07R001	NM	22	--	26	--	-4
02S08E08A001	15	21.36	17.36	23.36	-2.36	-2
02S08E08E001	15.2	18.2	17.2	20.2	-2	-2
02S08E09J001	29.06	29.76	29.06	30.46	0	-0.7
02S08E12D001	30.97	32.17	32.27	33.37	-1.3	-1.2
02S08E14E001	39.67	39.97	41.47	40.37	-1.8	-0.4
02S09E12R001	58.45	63.05	61.05	65.35	-2.6	-2.3

Number of Wells Spring 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
28	22	18	4	0	-51.5 to 5	-3.42

Number of Wells Fall 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
28	16	15	0	1	-5.6 to 0	-2.38

Table 4-6 Comparison of Southwest Area Water Levels

State Well ID	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Change Fall (feet)	Change Spring (feet)
01S05E31R002	NM	0.6	0.6	1.4	--	-0.8
02S04E15R001	51	53	53.41	53.41	-2.41	-0.41
02S05E08B001	NM	--	-1.9	-0.1	--	--
02S06E25J001	14.5	14.3	18.26	18.56	-3.76	-4.26
02S06E31N001	46.5	49.18	49.28	50.38	-2.78	-1.2
03S06E27N001	59.8	63.23	62.73	62.43	-2.93	0.8
03S07E06Q001	18.26	17.76	19.76	18.36	-1.5	-0.6
MW-1A	-18.57	--	-14.46	-7.53	-4.11	--
MW-1B	-26.23	--	-27.42	-13.96	1.19	--
MW-1C	-26.5	--	-25.94	-14.43	-0.56	--
MW-2A	-24.93	--	-20.39	-11.84	-4.54	--
MW-2B	-28.89	--	-24.59	-14.68	-4.3	--
MW-2C	-28.91	--	-24.7	-14.77	-4.21	--
MW-3A	-20.78	--	-17.18	-13.22	-3.6	--
MW-3B	-29.27	--	-23.98	-15.06	-5.29	--
MW-3C	-29.73	--	-24.42	-16.1	-5.31	--
MW-4A	-25.78	--	-21.01	-10	-4.77	--
MW-4B	-29.23	--	-25.35	-13.86	-3.88	--
MW-4C	-29.52	--	-25.37	-13.52	-4.15	--
MW-5A	-26.74	--	-21.75	-7.49	-4.99	--
MW-5B	-26.36	--	-23.21	-9.54	-3.15	--
MW-5C	-25.16	--	-21.77	-10.92	-3.39	--
MW-6A	-21.35	--	-17.85	-9.99	-3.5	--
MW-6B	-24.74	--	-24.43	-12.6	-0.31	--
MW-6C	-22.74	--	-21.59	-11.78	-1.15	--

Number of Wells Spring 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
25	6	5	1	0	-4.26 to 0.8	-1.08

Number of Wells Fall 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
25	23	22	1	0	-5.31 to 1.19	-3.19

Table 4-7 Comparison of WID Water Levels

State Well ID	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Change Fall (feet)	Change Spring (feet)
03N05E14C001	NM	-3.1	-3.23	-4.6	--	1.5
03N06E05N003	NM	-2.07	-3.07	-1.57	--	-0.5
03N06E07H003	-12	-7.6	-9.5	-8.3	-2.5	0.7
03N06E10D001	NM	NM	3.1	4.1	--	--
03N06E17A004	-19	-13.7	-16.7	-14	-2.3	0.3
03N06E18M003	-12.2	-8.4	-10.6	-8.6	-1.6	0.2
03N06E20D002	-16.5	-11.5	-13	-14.5	-3.5	3
03N06E32R001	-24	-23.5	-21	-18.5	-3	-5
04N05E10K001	-7.5	-3.14	-2.64	1	-4.86	-4.14
04N05E13H001	-5	2.88	2.88	6.5	-7.88	-3.62
04N05E13R004	NM	-0.3	-1.5	6.1	--	-6.4
04N05E14B002	-6.9	-1.9	-2.4	7.1	-4.5	-9
04N05E24J004	-1.6	4.8	5.8	8.4	-7.4	-3.6
04N05E36H003	-2.1	3.33	5.43	2.8	-7.53	0.53
04N06E17G004	-2	3.5	4	8.5	-6	-5
04N06E29N002	-3.3	0	2.4	3.1	-5.7	-3.1
04N06E30E001	1.7	4.7	5.7	10.2	-4	-5.5
04N06E34J002	22.1	22.6	25.4	26.9	-3.3	-4.3
05N05E28L003	-6.7	-3.1	-5.5	0.7	-1.2	-3.8

Number of Wells Spring 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
19	18	12	6	0	-9 to 3	-2.65

Number of Wells Fall 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
19	15	15	0	0	-7.88 to -1.2	-4.35

Table 4-8 Comparison of Calaveras County Water Levels

Local Well ID	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Change Fall (feet)	Change Spring (feet)
CCWD 001	99.5	91.5	86.84	--	12.66	--
CCWD 002	85.22	96	88.91	--	-3.69	--
CCWD 003	124.89	NM	131.91	130.74	-7.02	--
CCWD 004	95.72	95.88	96.7	98.3	-0.98	-2.42
CCWD 005	92.61	96.36	100.67	102.39	-8.06	-6.03
CCWD 006	103.98	105.61	105.09	106.35	-1.11	-0.74
CCWD 007	DRY	DRY	DRY	DRY	--	--
CCWD 008	72.35	73.46	75.86	NM	-3.51	--
CCWD 009	110.85	NM	111.97	111.29	-1.12	--
CCWD 010	87.56	47.4	94.18	97.83	-6.62	-50.43
CCWD 011	88.91	89.63	88.92	89.99	-0.01	-0.36
CCWD 012	147.41	149.93	149.6	154.81	-2.19	-4.88
CCWD 014	157.73	134.86	160.1	NM	-2.37	--
CCWD 015	147.4	151.27	151.27	152.47	-3.87	-1.2

Number of Wells Spring 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
14	7	7	0	0	-50.43 to -0.36	-9.44

Number of Wells Fall 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
14	13	12	1	0	-8.06 to 12.66	-2.15

Table 4-9 Comparison of Stanislaus Area Water Levels

State Well ID	Fall 2020	Spring 2020	Fall 2019	Spring 2019	Change Fall (feet)	Change Spring (feet)
01S10E04C001	64.34	68.22	54.32	--	10.02	--
01S10E21A001	87.315	90.065	90.815	91.485	-3.5	-1.42
01S10E26J001	81.94	84.89	83.98	87.66	-2.04	-2.77
01S10E27Q001	71.02	74.81	73.15	77	-2.13	-2.19
01S10E34R001	71.61	76.48	73.29	77.84	-1.68	-1.36
01S11E25N001	149.31	124.01	139.51	117.21	9.8	6.8
02S10E02P001	84.07	89.72	85.6	91.2	-1.53	-1.48
02S10E10M002	71.24	75.61	72.62	78.15	-1.38	-2.54

Number of Wells Spring 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
8	7	6	1	0	-2.77 to 6.8	-0.71

Number of Wells Fall 2020-2019					Change in Storage	
Total	Comparable	Decrease	Increase	No Change	Range	Average
8	8	6	2	0	-3.5 to 10.02	0.94

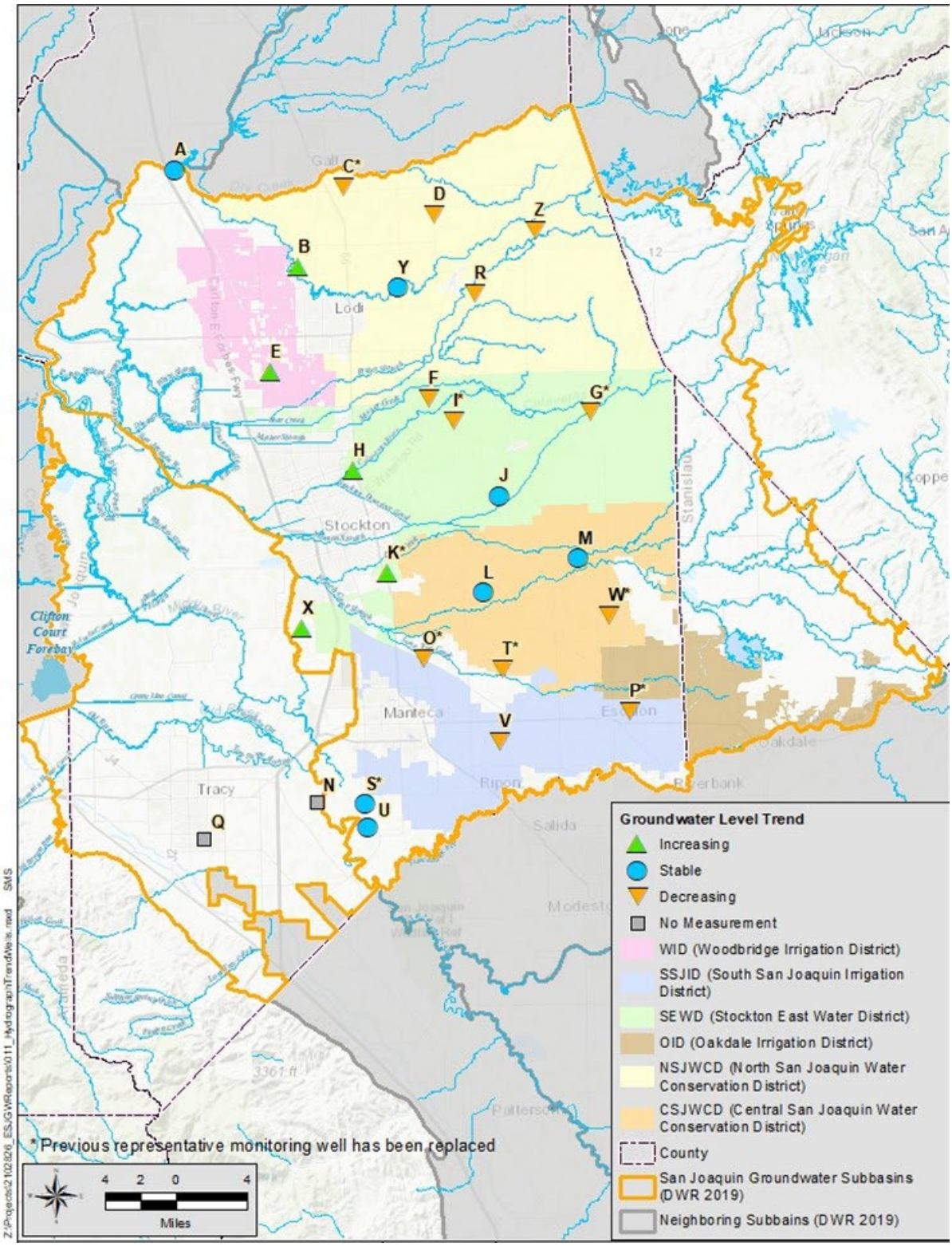


Figure 4-1 Hydrograph Well Locations

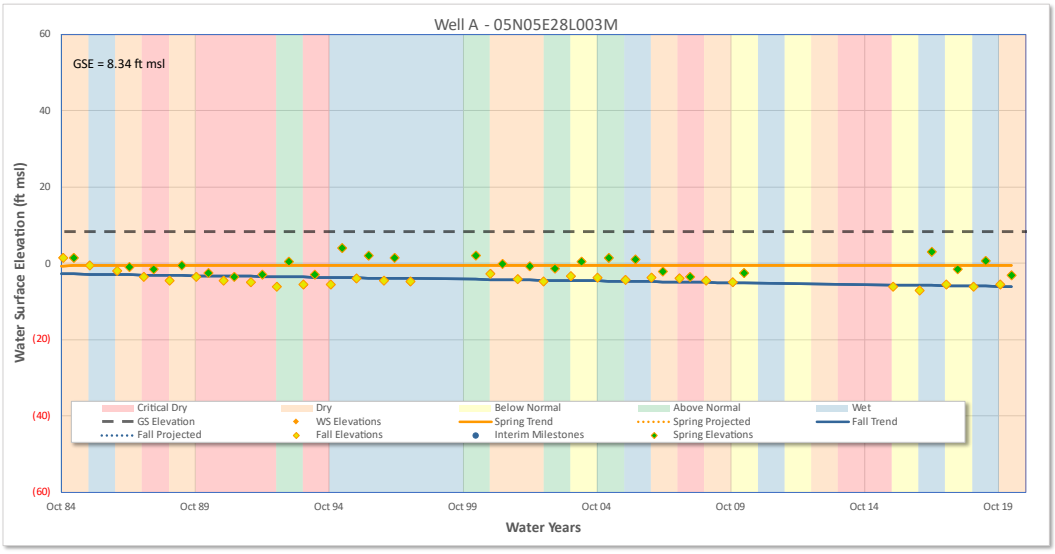


Figure 4-2 Fall Hydrograph Well A - East of Thornton Rd & South of Benson Ferry Rd.

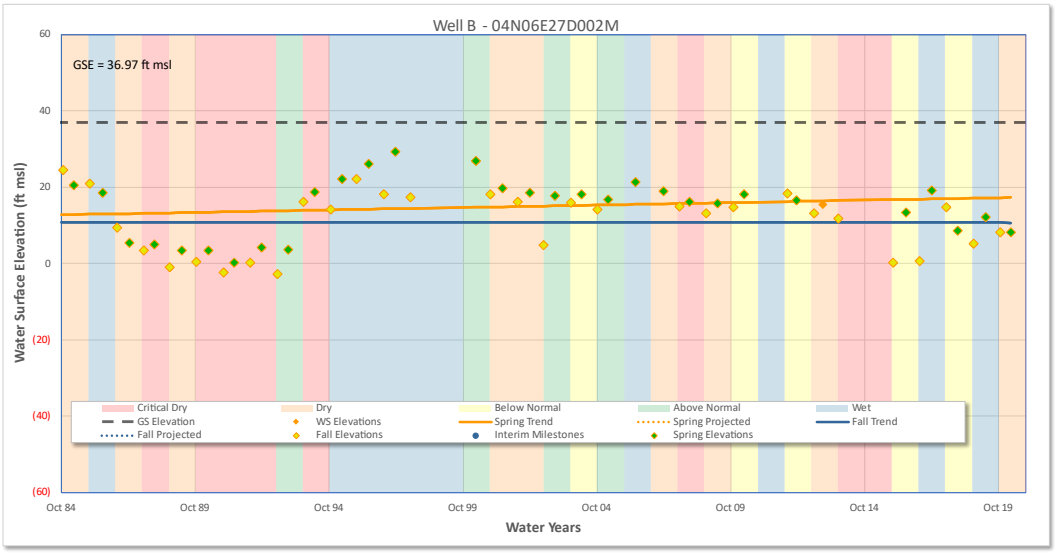


Figure 4-3 Fall Hydrograph Well B - East of Lower Sac Rd. & South of Acampo Rd.

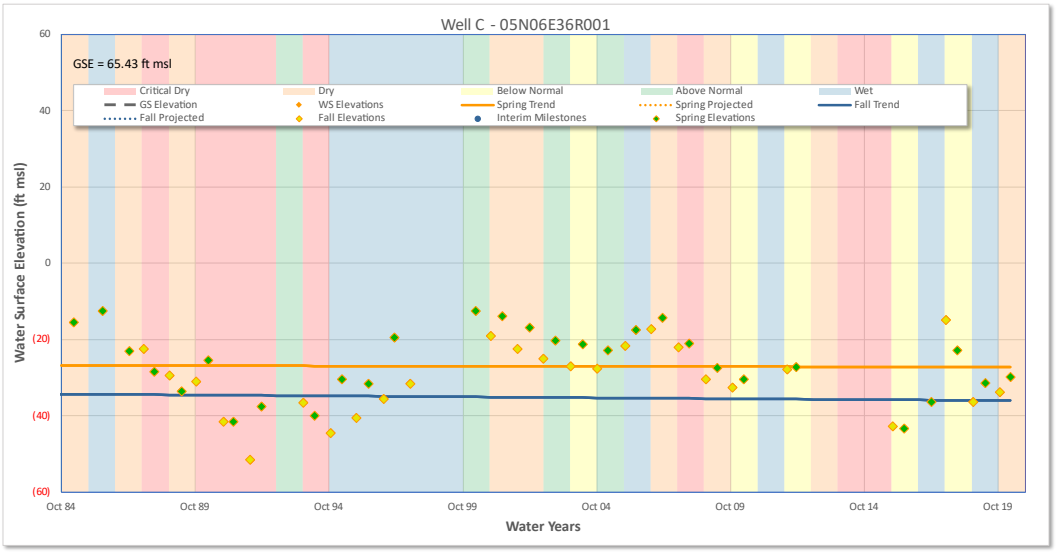


Figure 4-4 Fall Hydrograph Well C - North of Liberty Rd. & West of North Cherokee Ln.

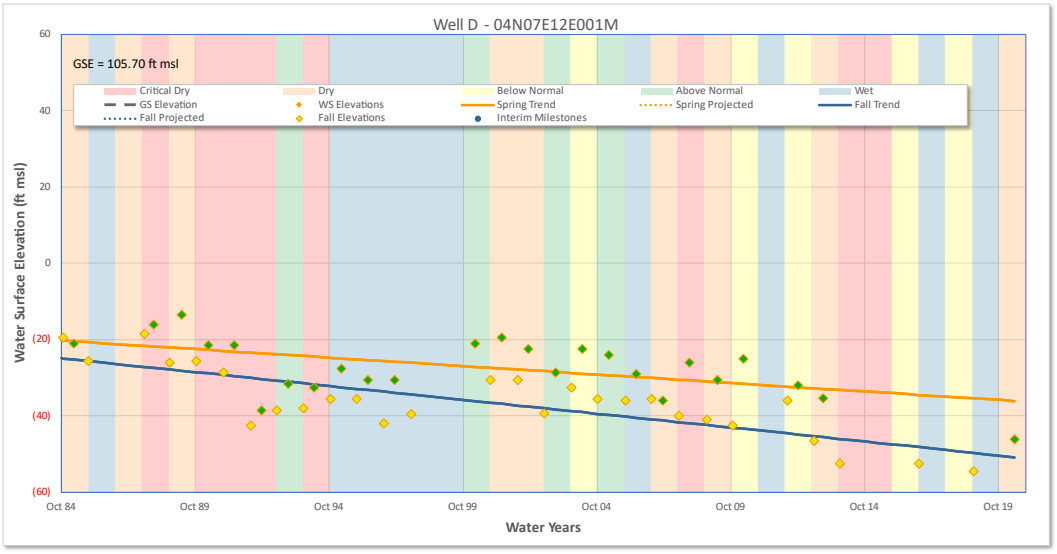


Figure 4-5 Fall Hydrograph Well D - West of Elliotto Rd. & North of Jahant Rd.

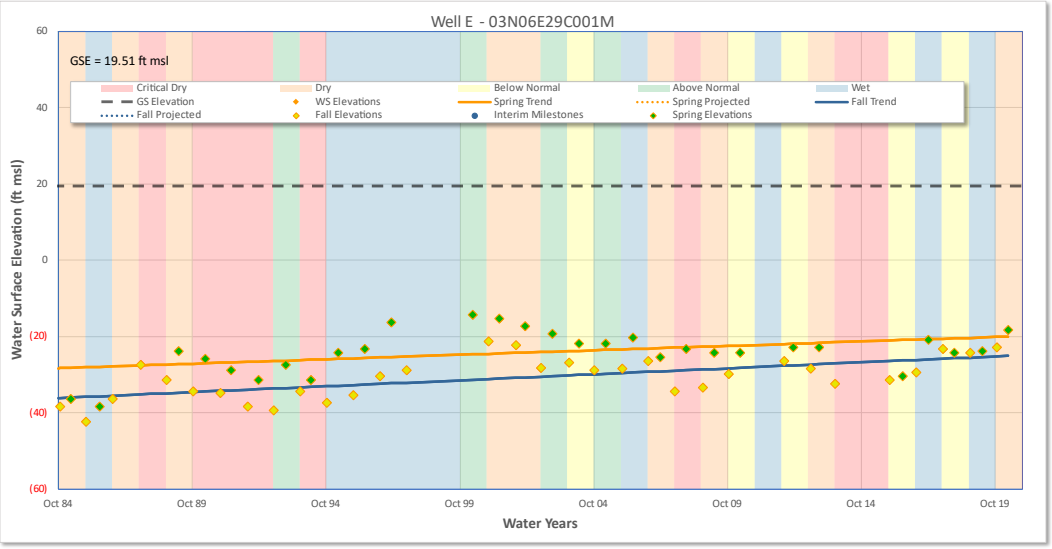


Figure 4-6 Fall Hydrograph Well E - East of Davis R. & South of Armstrong Rd.

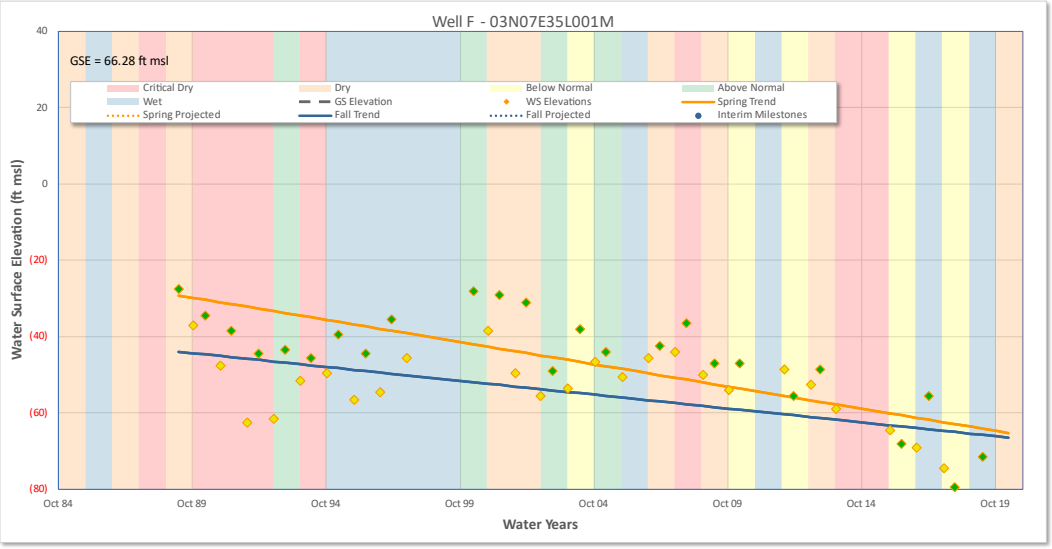


Figure 4-7 Fall Hydrograph Well F - West of Route 88 & North of Eight Mile Rd.

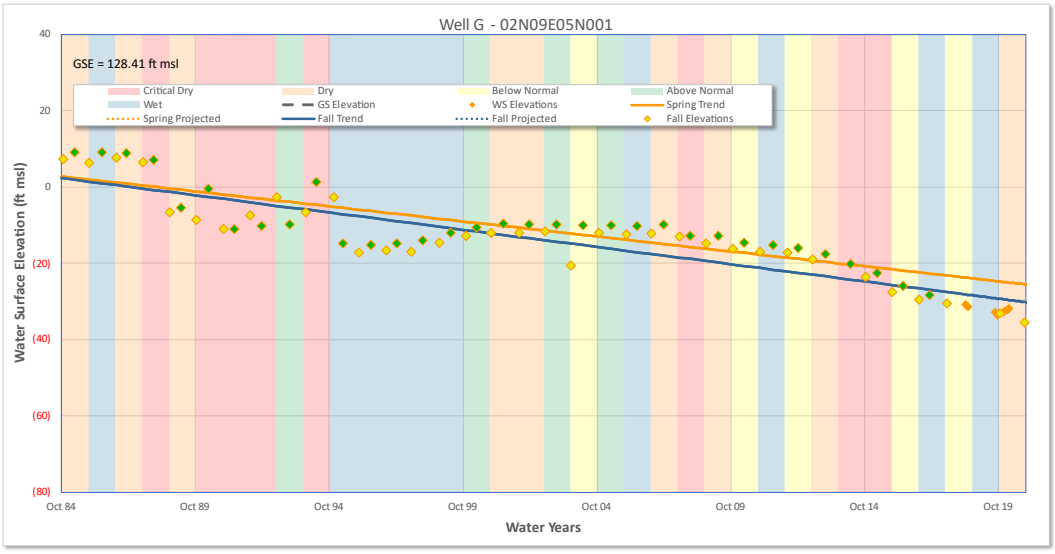


Figure 4-8 Fall Hydrograph Well G - West of Route 26 & South of Shelton Rd.

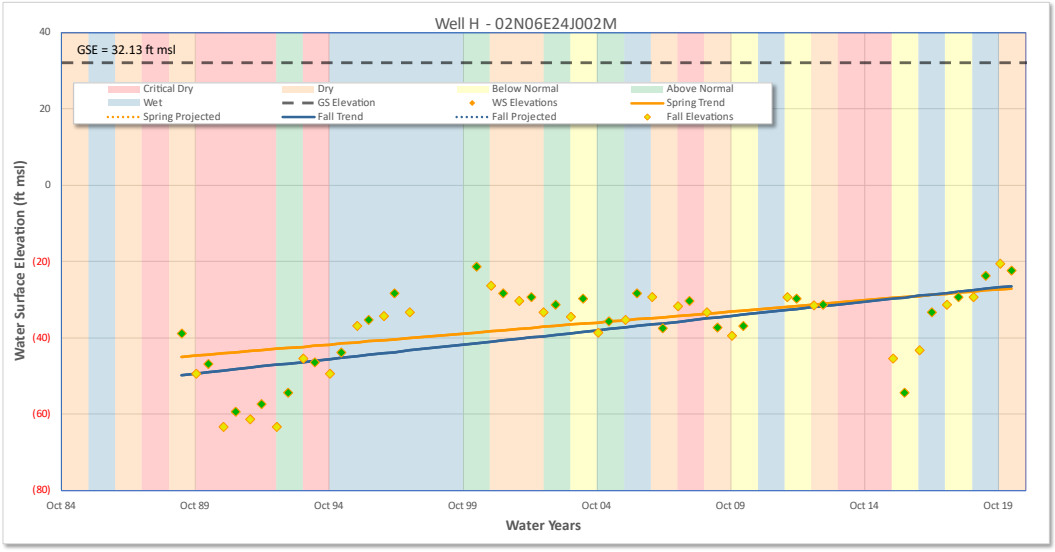


Figure 4-9 Fall Hydrograph Well H - East of Ijams Rd. & North of McAllen Rd.

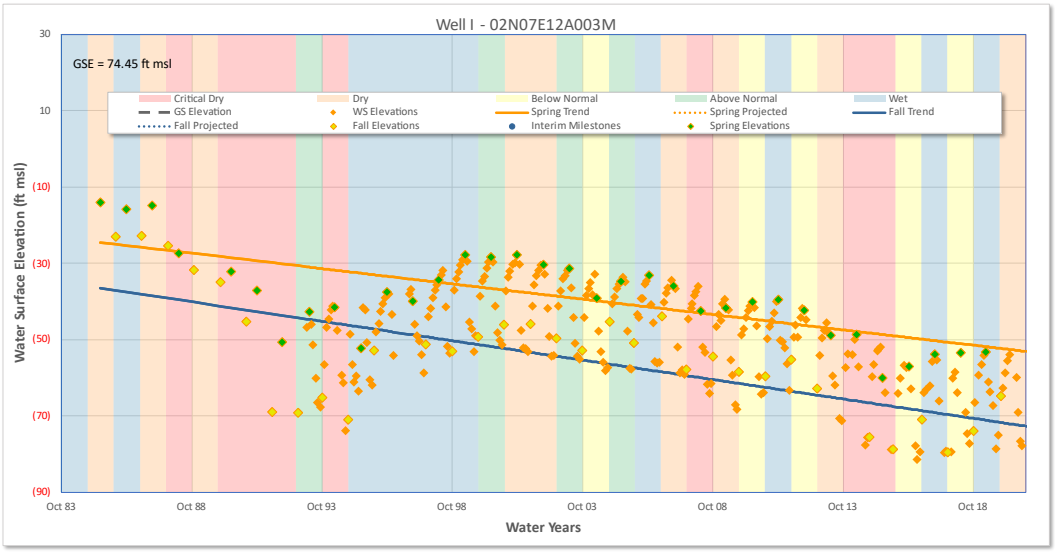


Figure 4-10 Fall Hydrograph Well I - West of Gogna Rd. & North of Route 26

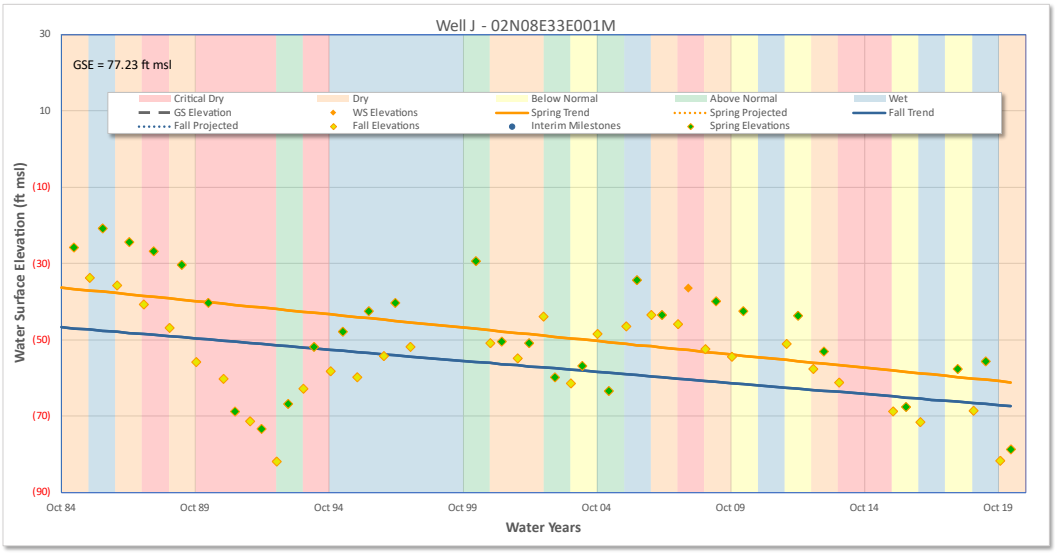


Figure 4-11 Fall Hydrograph Well J - East of Duncan Rd. & South of Milton Rd.

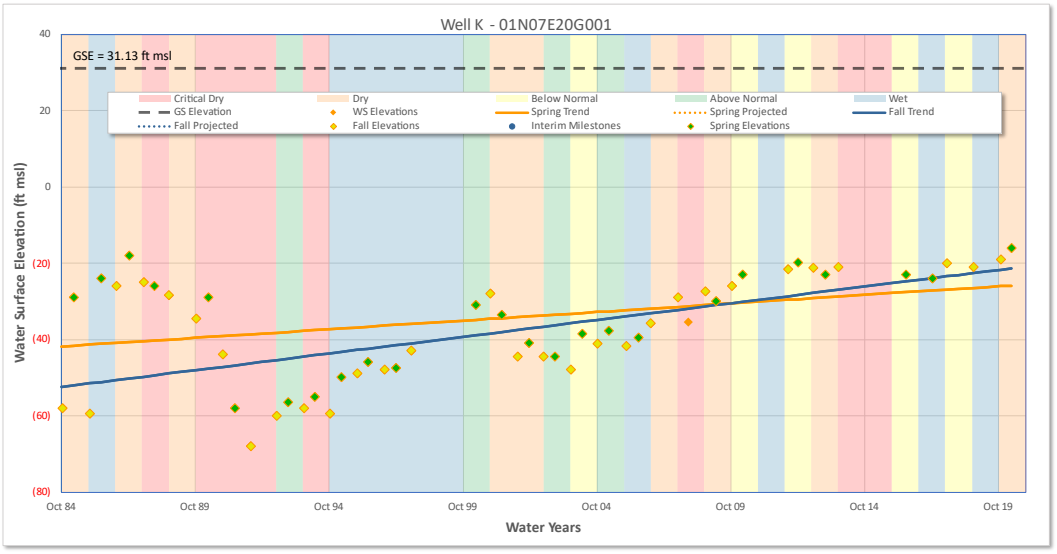


Figure 4-12 Fall Hydrograph Well K - East of Ash Rd. & North of Carpenter Rd.

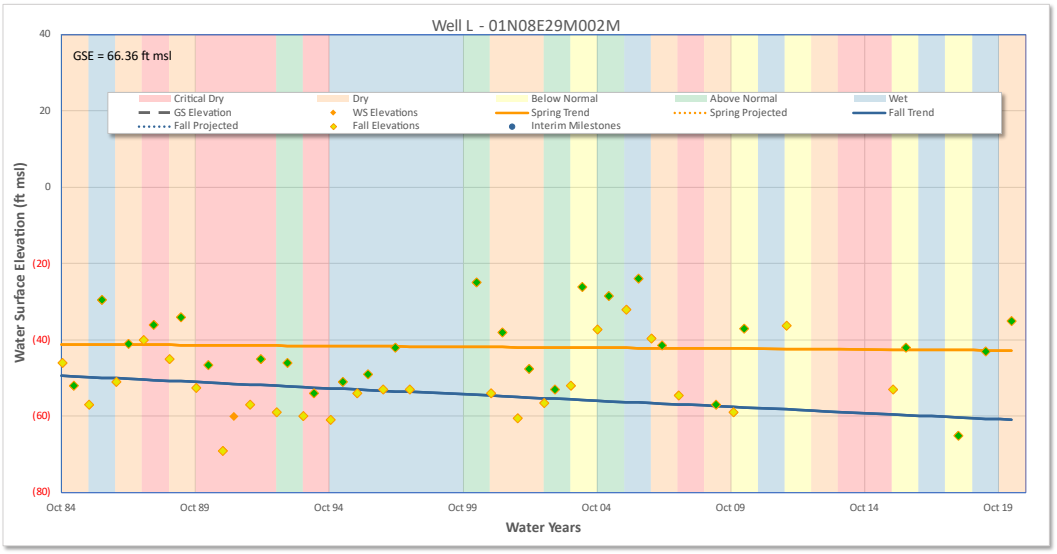


Figure 4-13 Fall Hydrograph Well L - West of Jack Tone Rd. & North of Mariposa Rd.

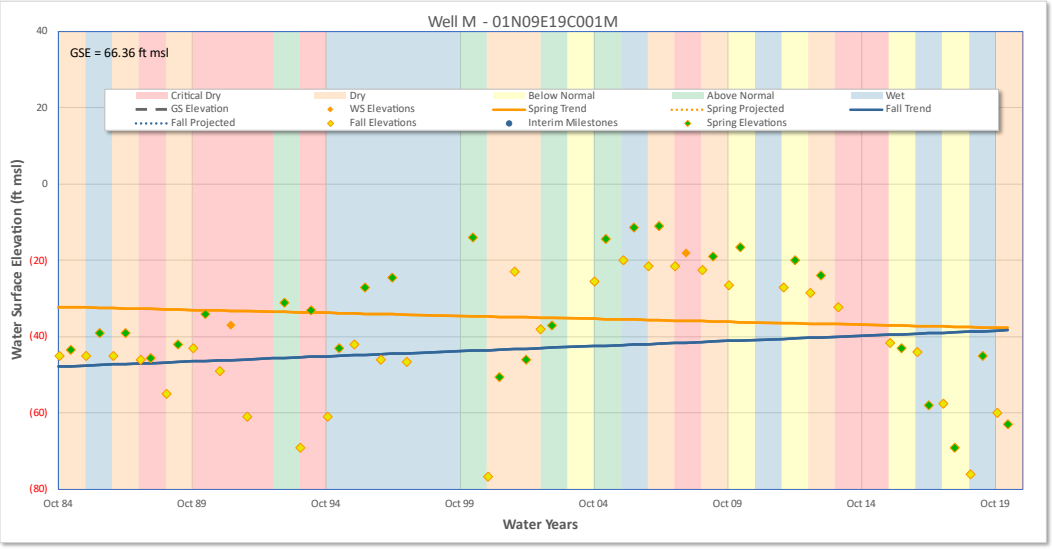


Figure 4-14 Fall Hydrograph Well M - West of Hewitt Rd. & South of Hwy. 4

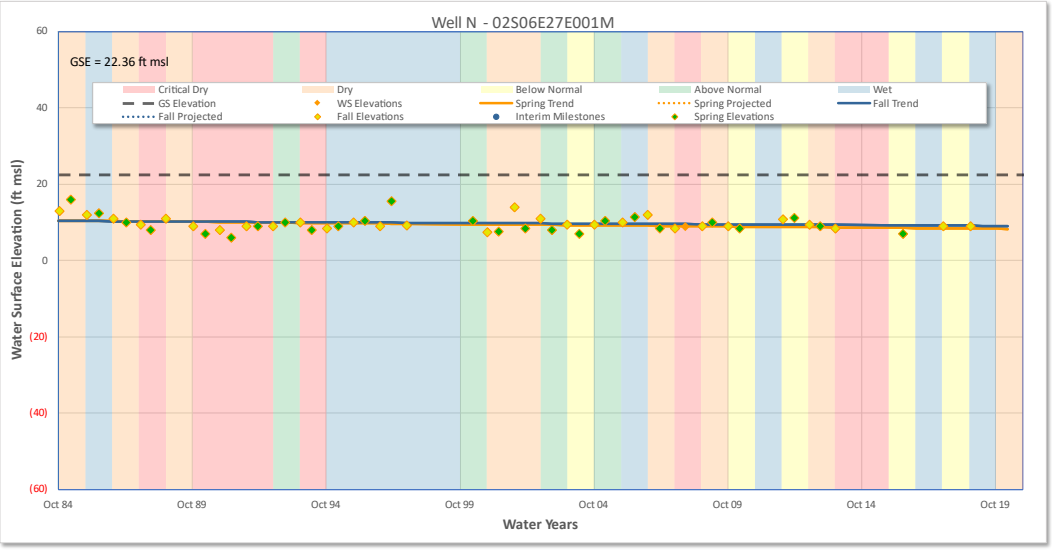


Figure 4-15 Fall Hydrograph Well N - West of Wright Rd. & North of Kasson Rd.

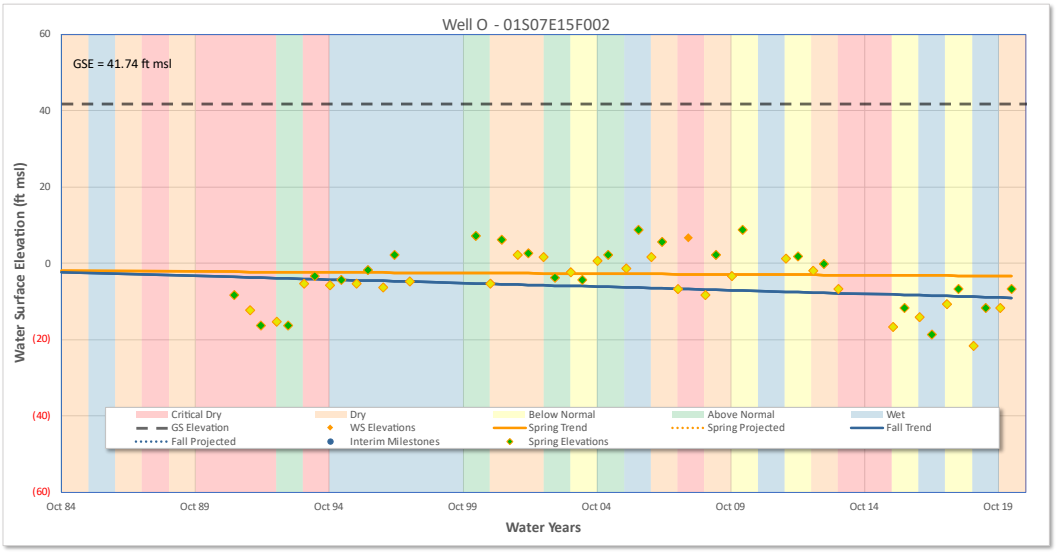


Figure 4-16 Fall Hydrograph Well O – West of Austin Rd. & North of French Camp Rd.

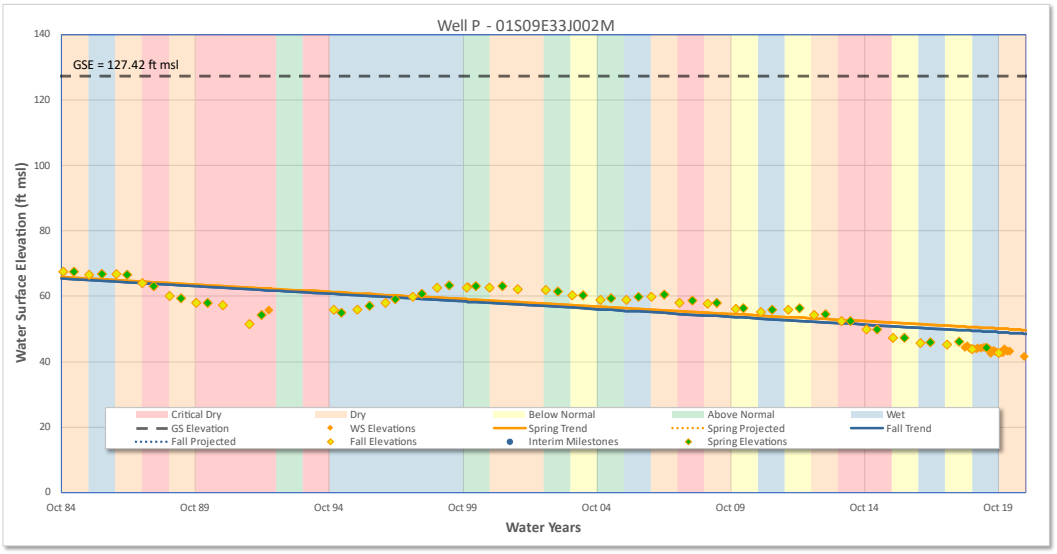


Figure 4-17 Fall Hydrograph Well P - West of Campbell Ave. & North of Hwy 120.

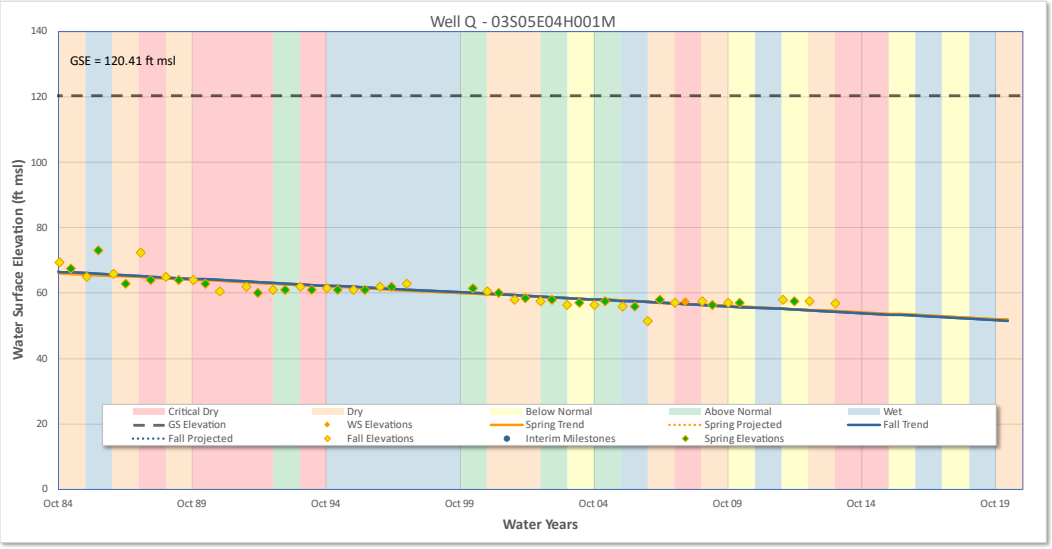


Figure 4-18 Fall Hydrograph Well Q - East of McArthur Rd. & North of Darlene Rd.

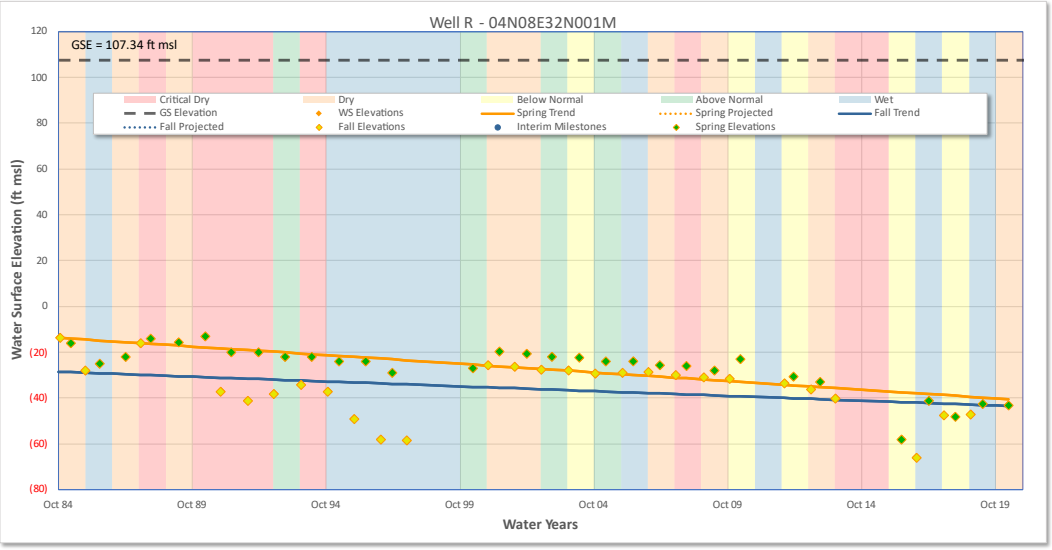


Figure 4-19 Fall Hydrograph Well R - West of Tully Rd. & North of Brandt Rd.

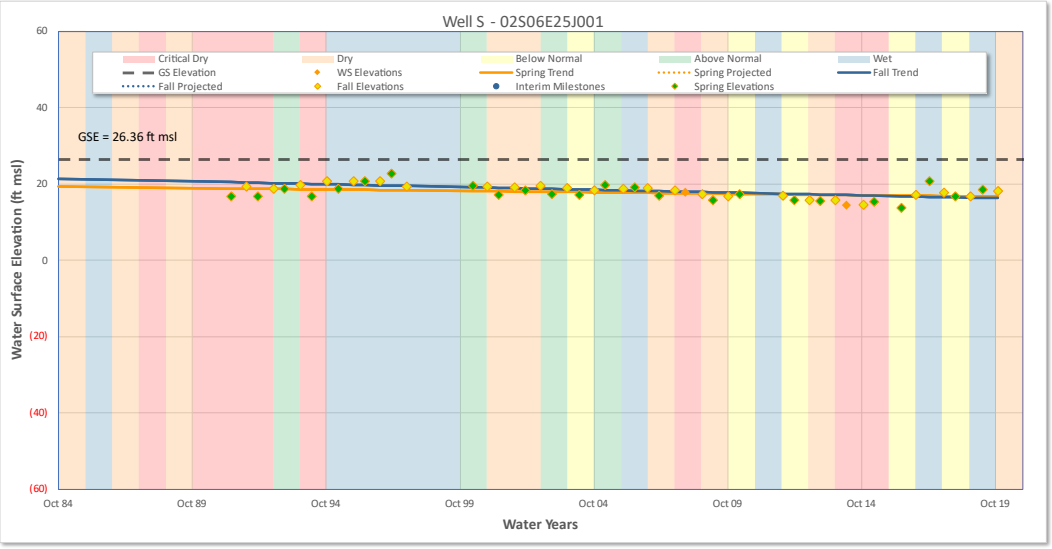


Figure 4-20 Fall Hydrograph Well S - East of Hays Rd. & North of Mullin Rd.

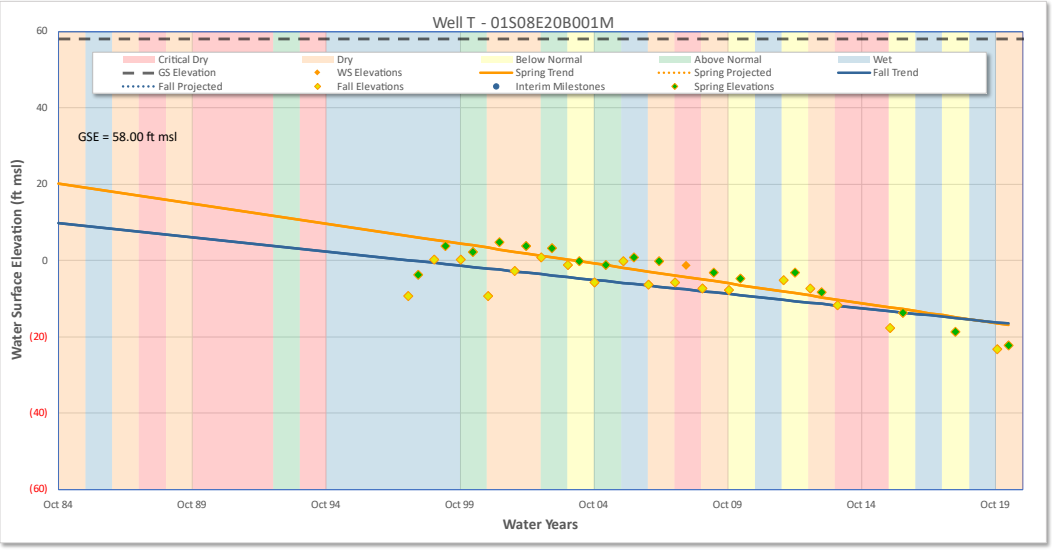


Figure 4-21 Fall Hydrograph Well T - West of Murphy Rd. & South of Avena Rd.

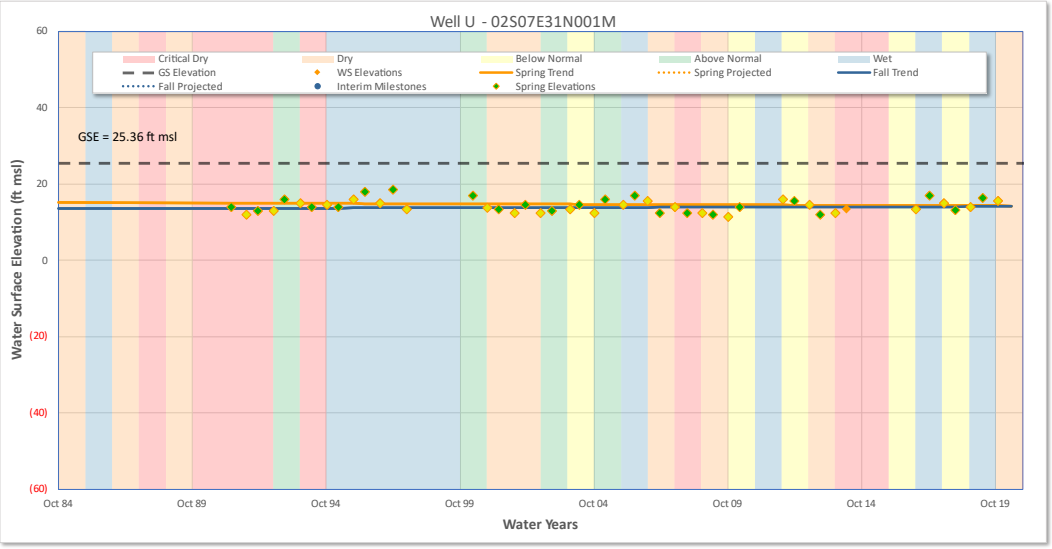


Figure 4-22 Fall Hydrograph Well U - East of Airport Rd. & South of Perrin Rd.

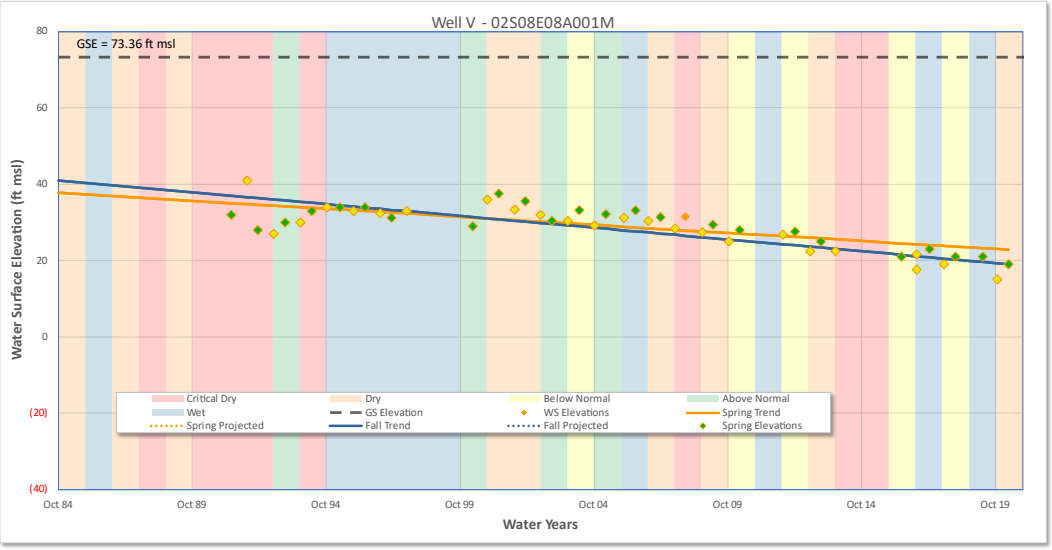


Figure 4-23 Fall Hydrograph Well V - East of Murphy Rd. & South of Cedar Ln.

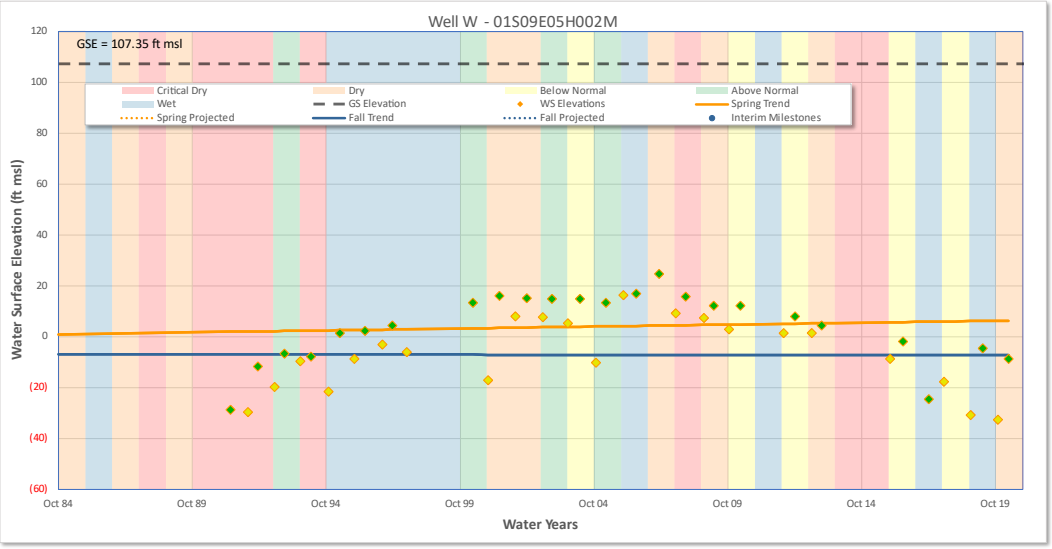


Figure 4-24 Fall Hydrograph Well W - West of Henry Rd. & South of Sonora Rd.

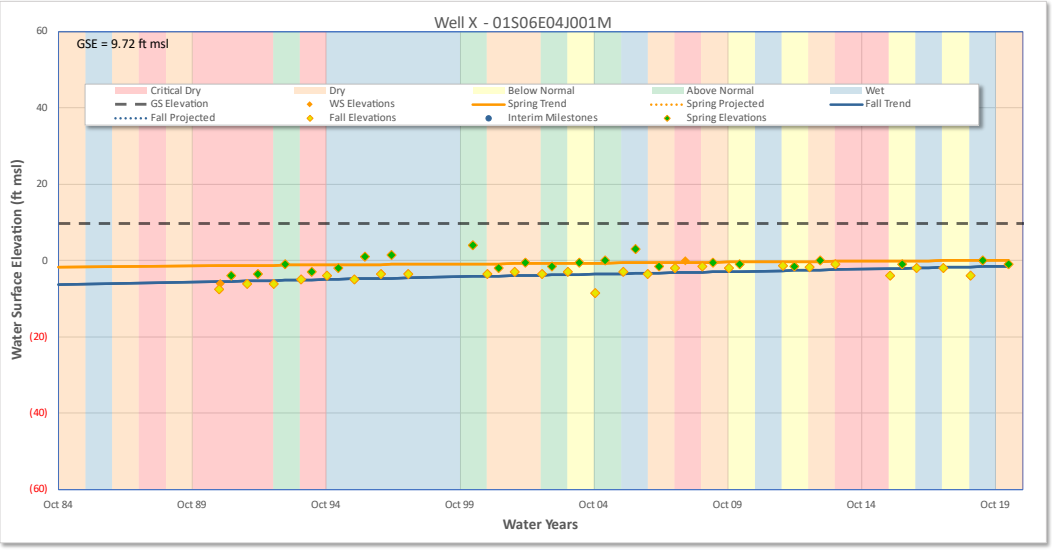


Figure 4-25 Fall Hydrograph Well X - East of Wolfe Rd. & South of Howard Rd.

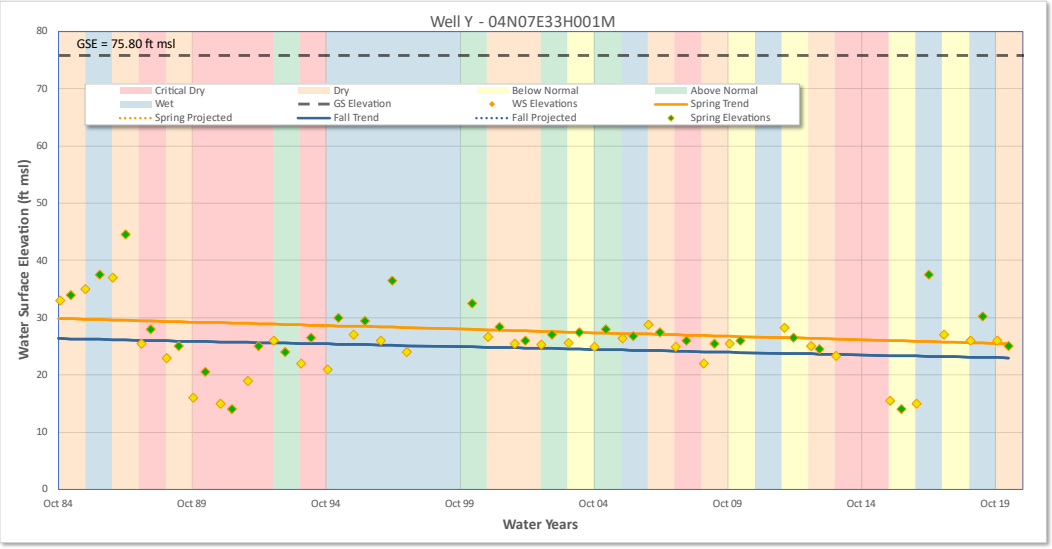


Figure 4-26 Fall Hydrograph Well Y - East of Bruella Rd. & North of Schmiedt Rd.

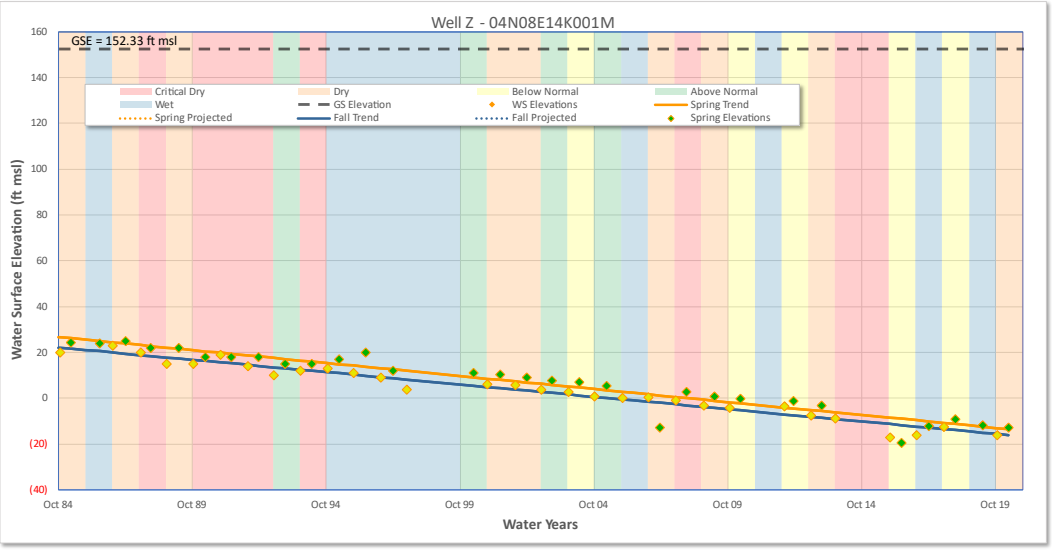


Figure 4-27 Fall Hydrograph Well Z - East of Johnson Rd. & South of Route 12

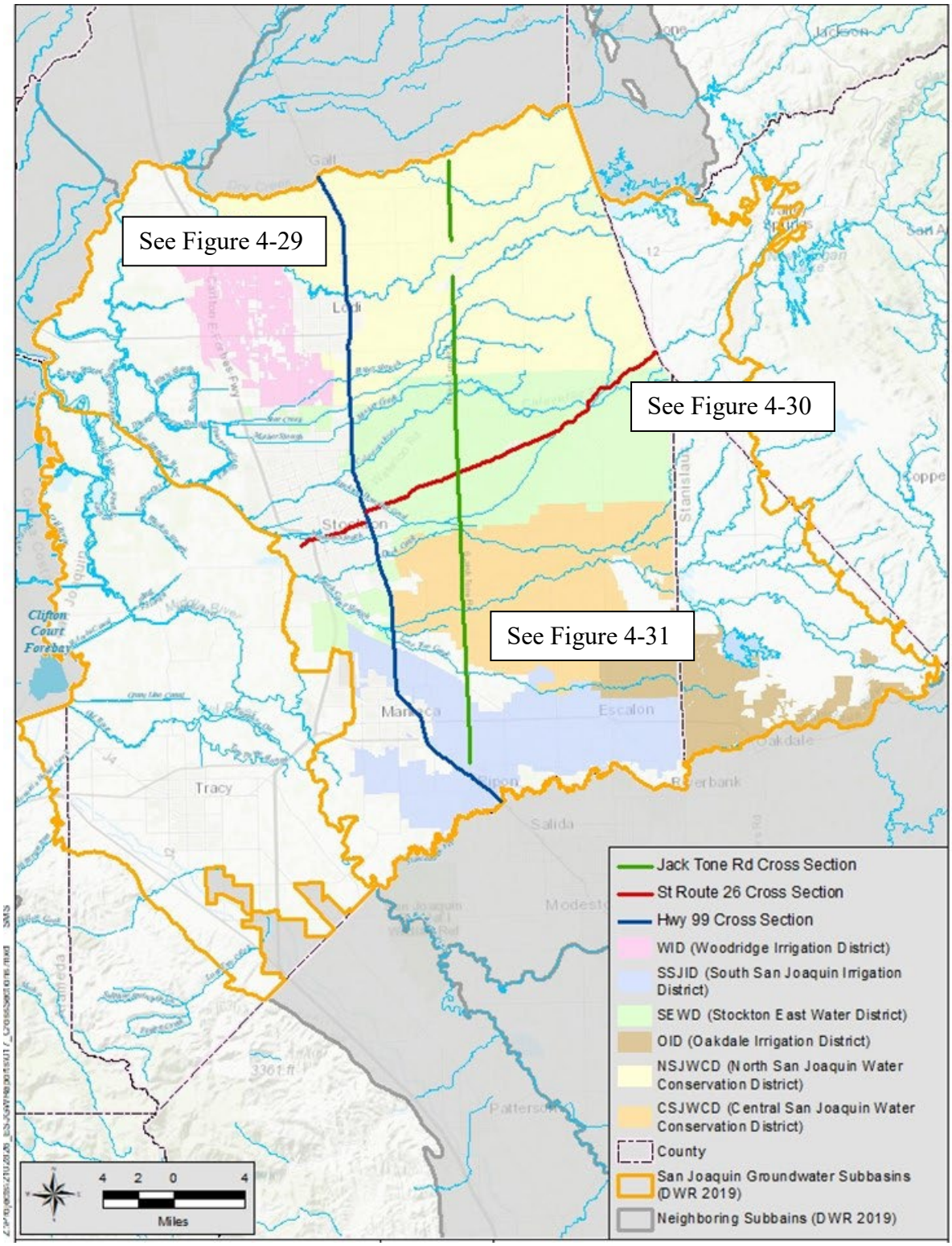
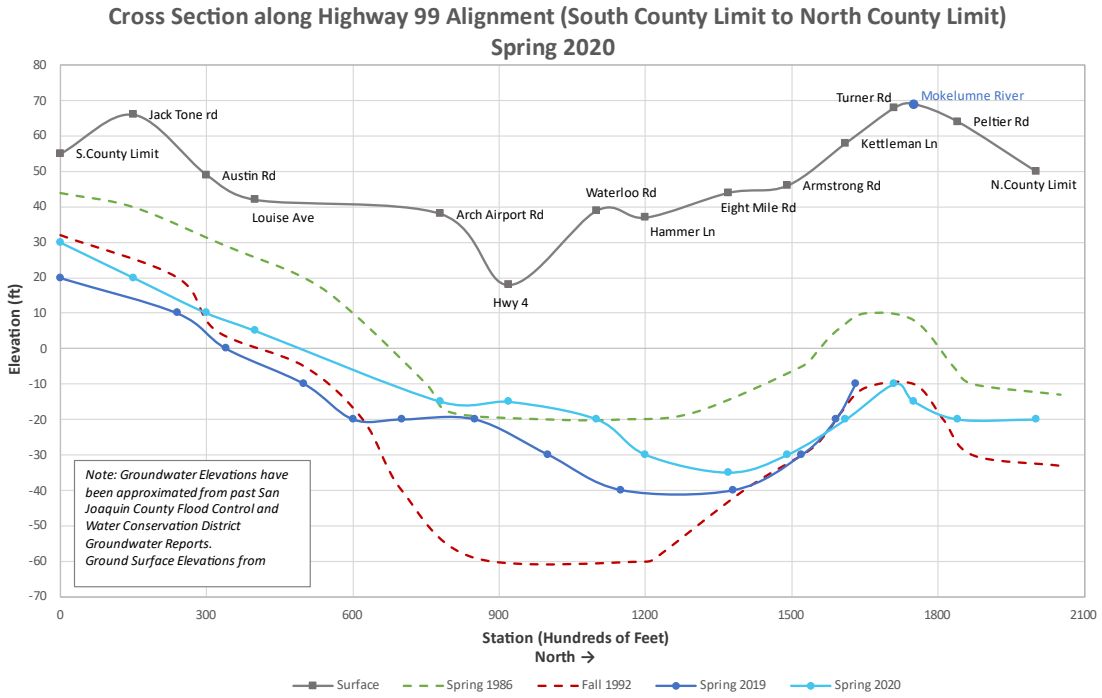


Figure 4-28 Water Surface Cross Sections



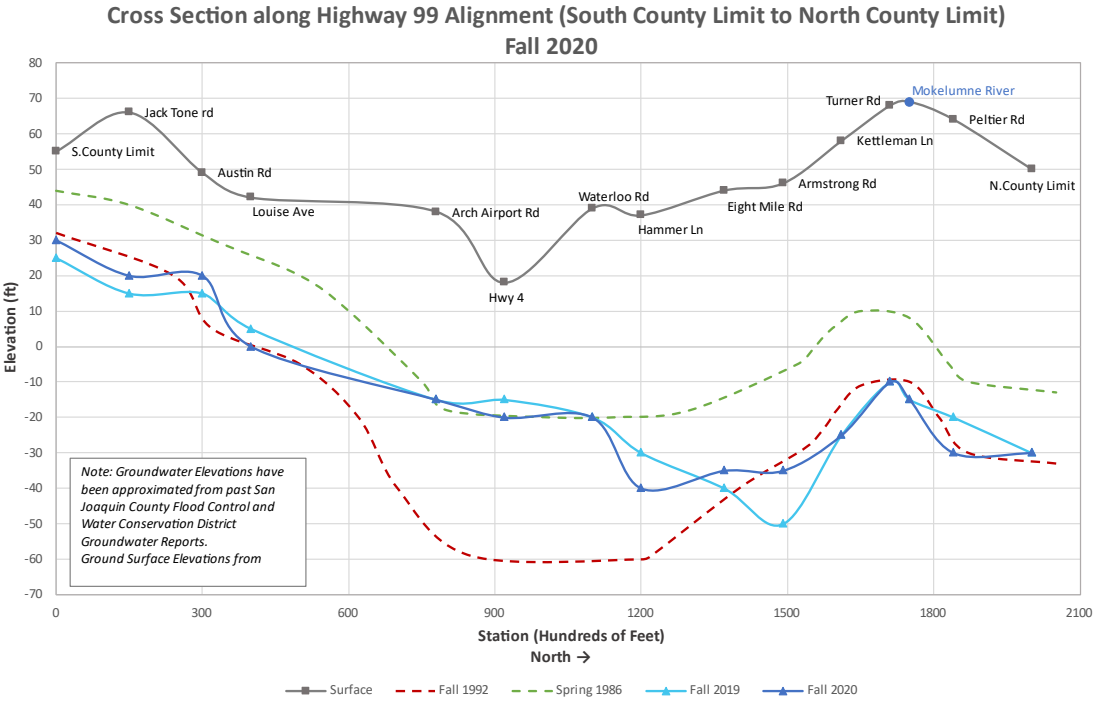
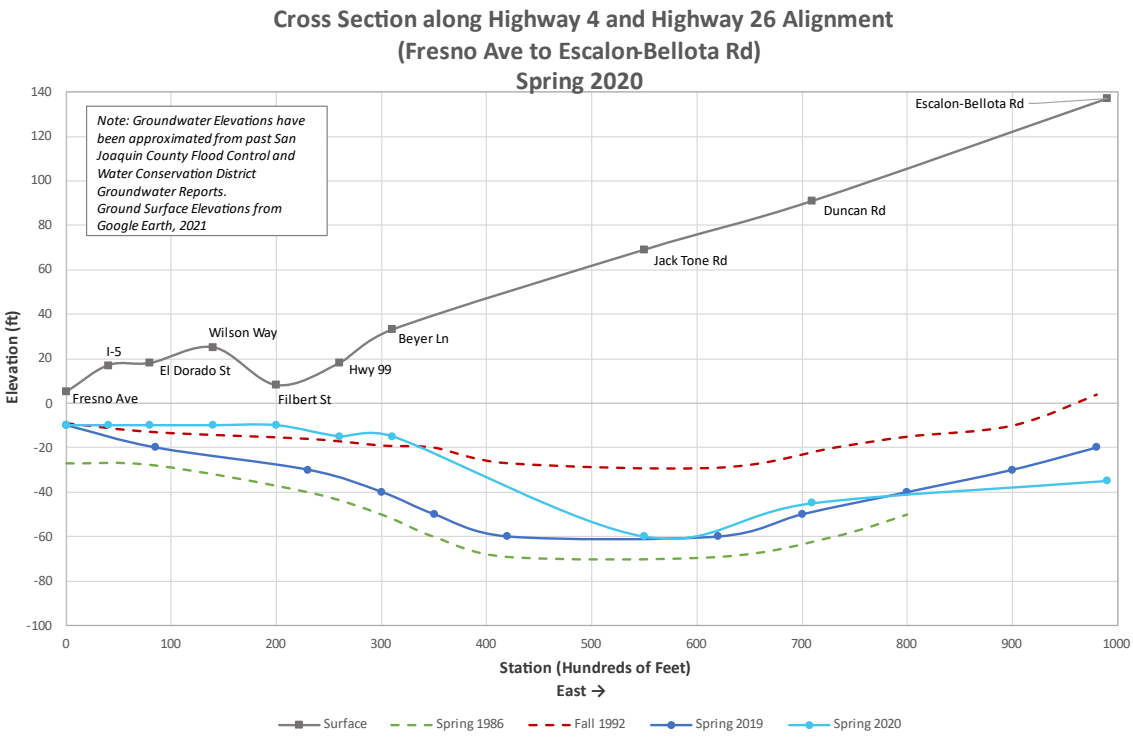


Figure 4-29 Highway 99 Cross Section Spring & Fall 2020



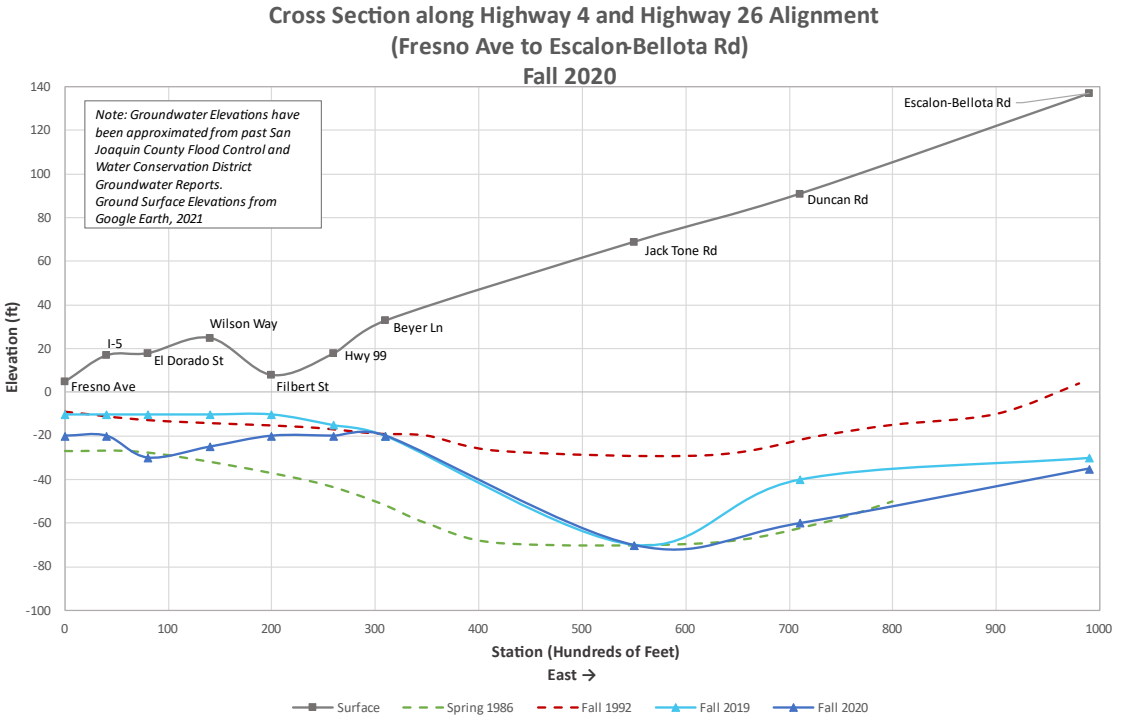
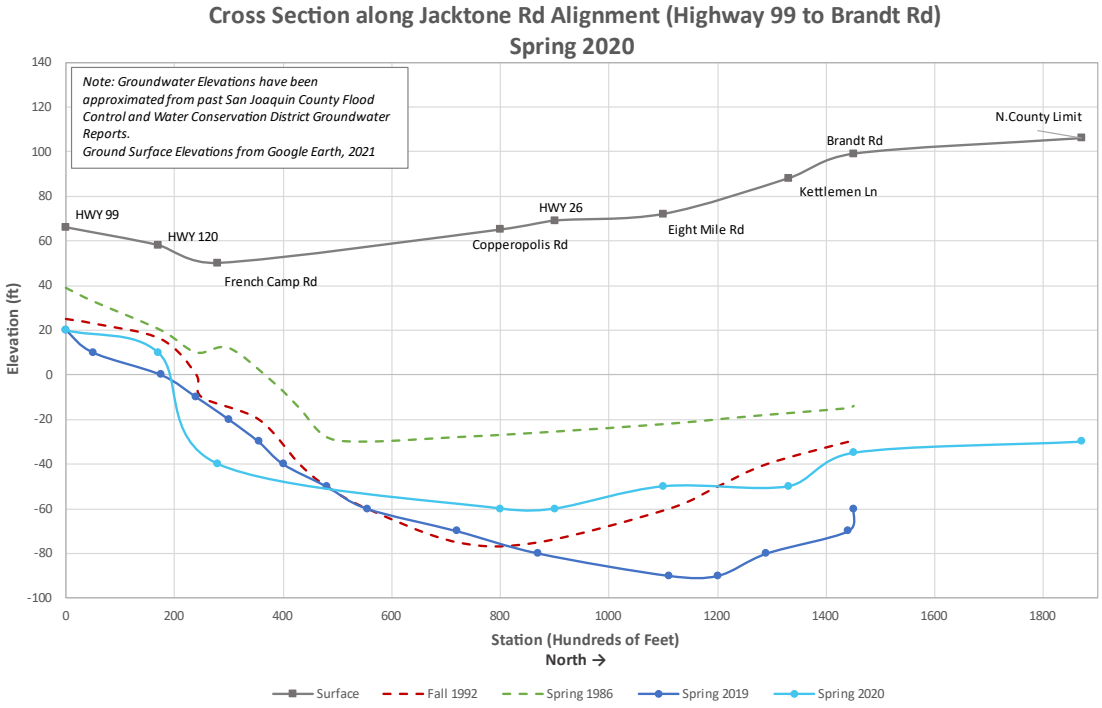


Figure 4-30 Highway 4 & Highway 26 Cross Section Spring & Fall 2020



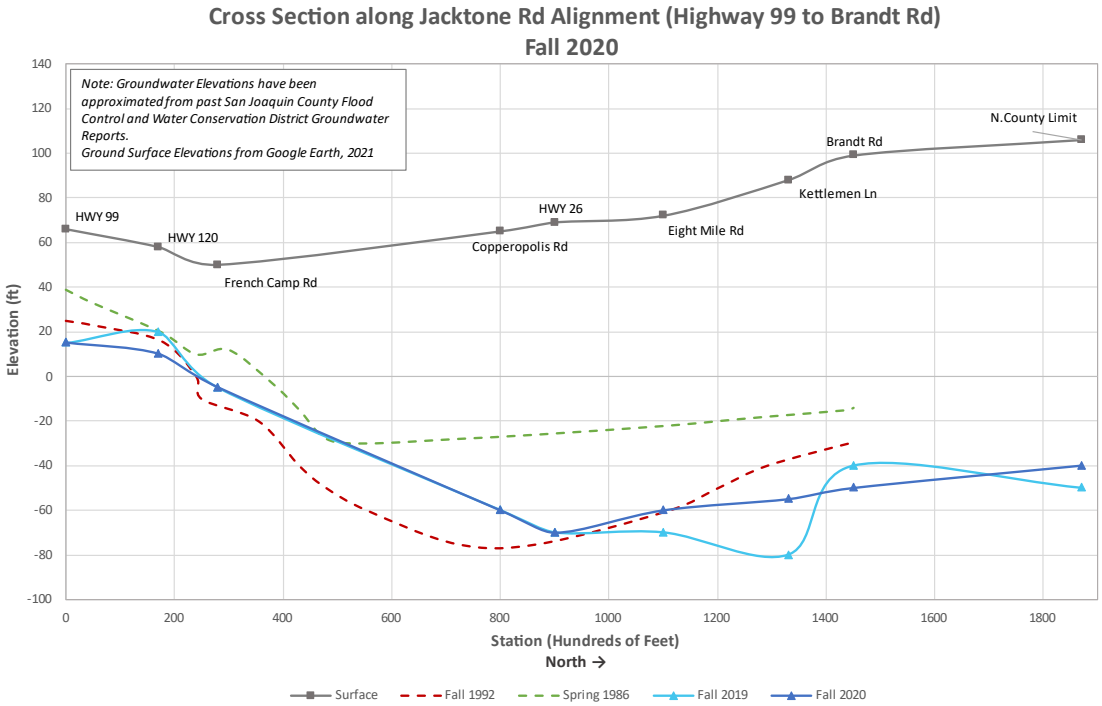


Figure 4-31 Jack Tone Rd Cross Section Spring & Fall 2020

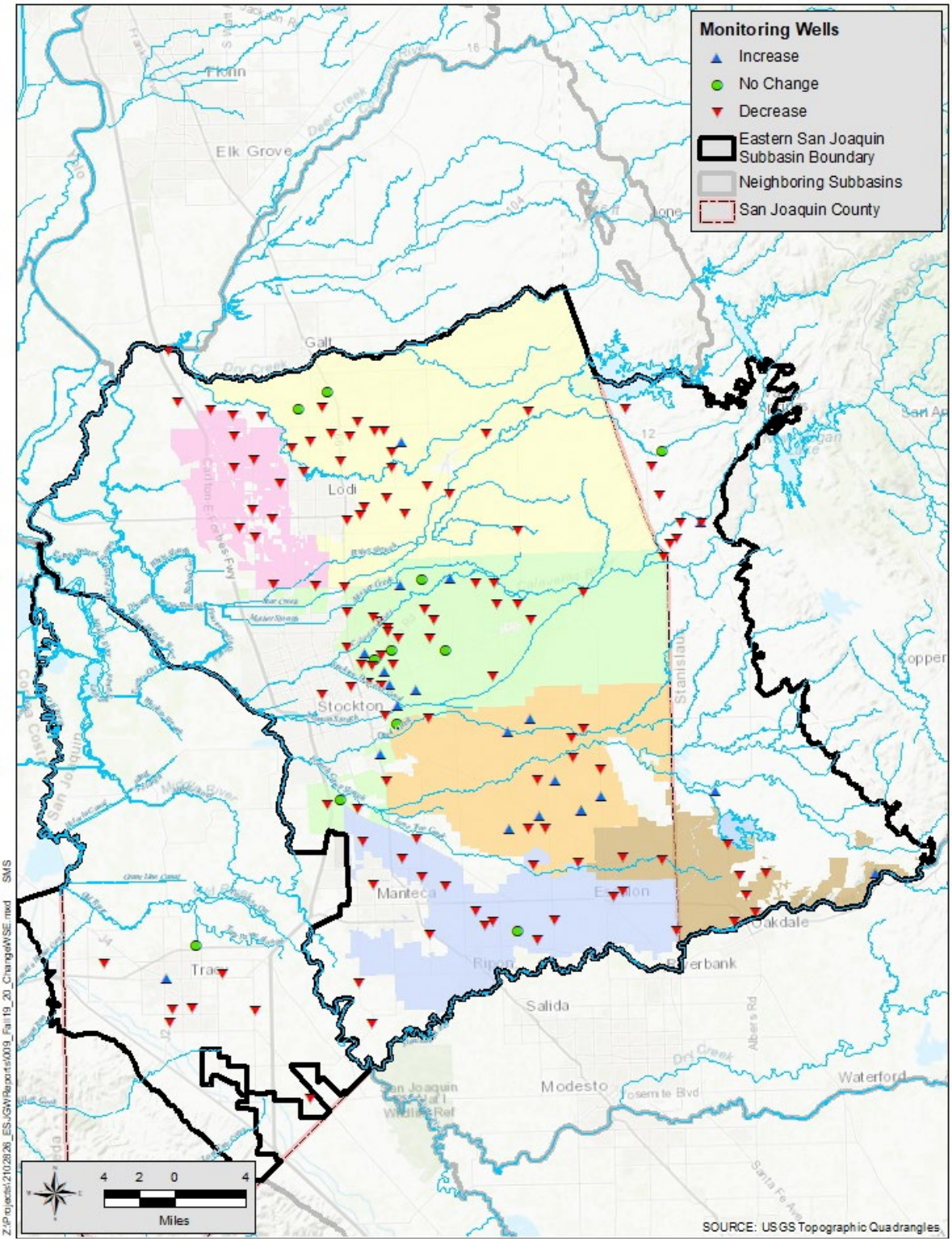


Figure 4-32 Change in Groundwater Elevation – Fall 2019 to Fall 2020

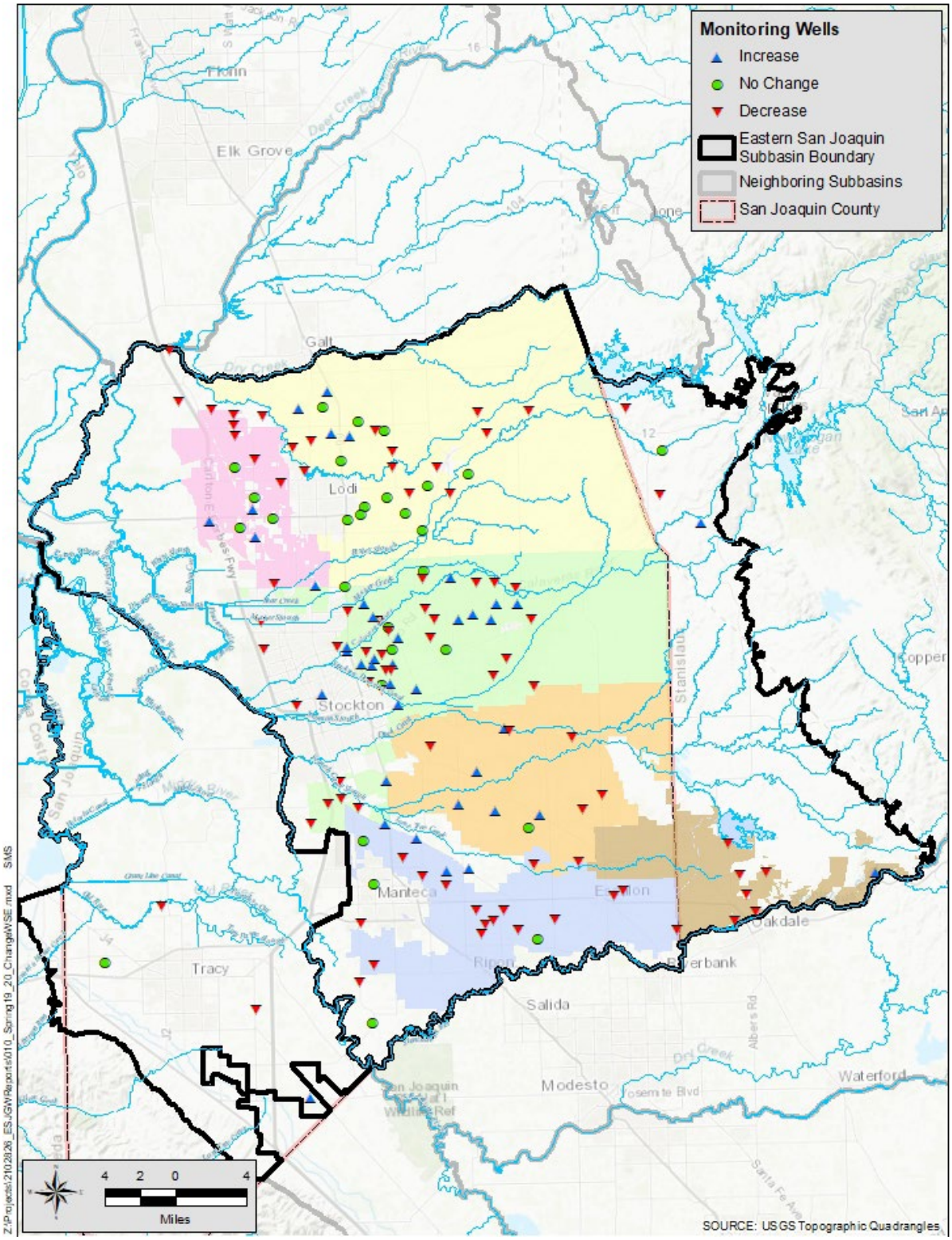


Figure 4-33 Change in Groundwater Elevation – Spring 2019 to Spring 2020

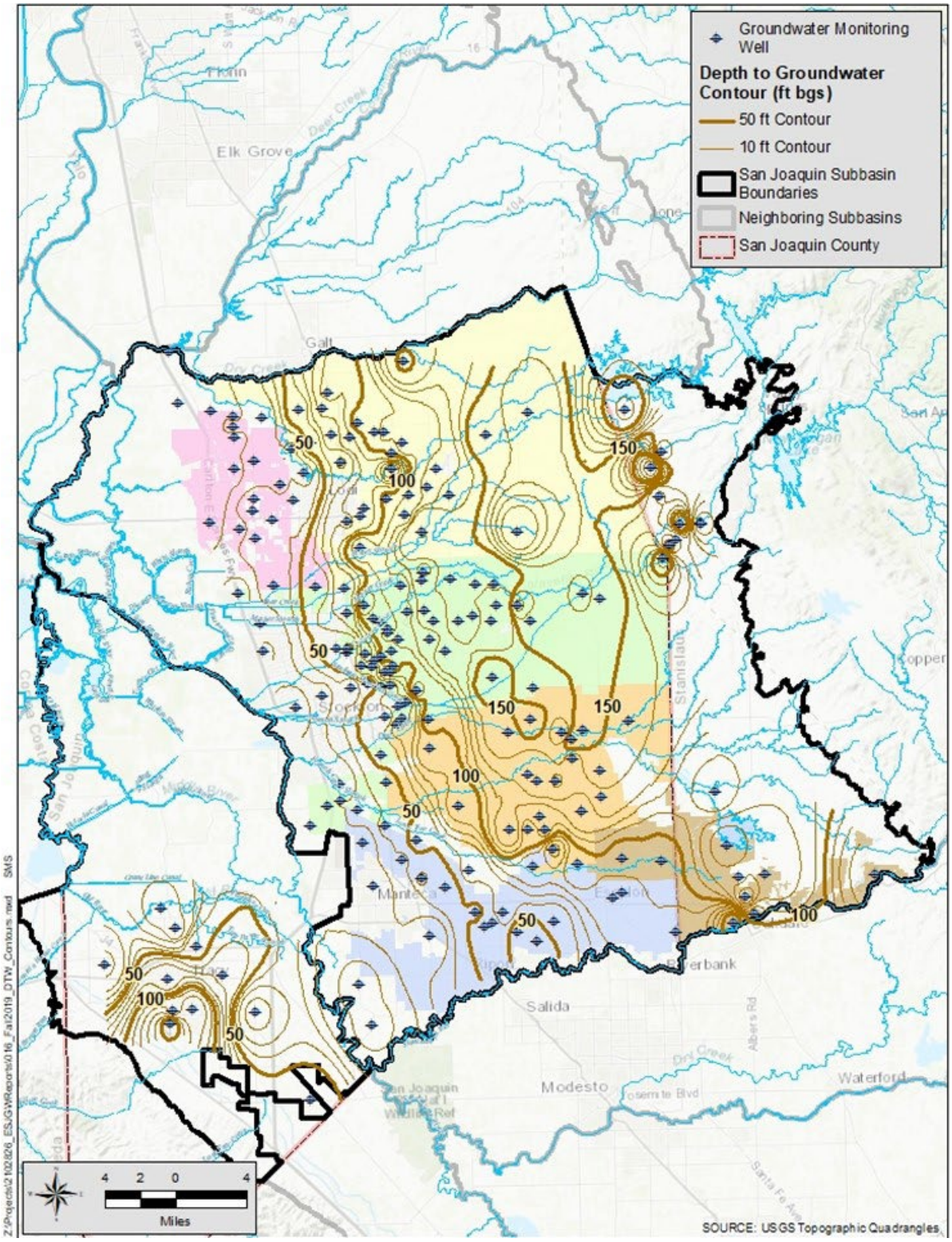


Figure 4-34 Depth to Groundwater – Fall 2019

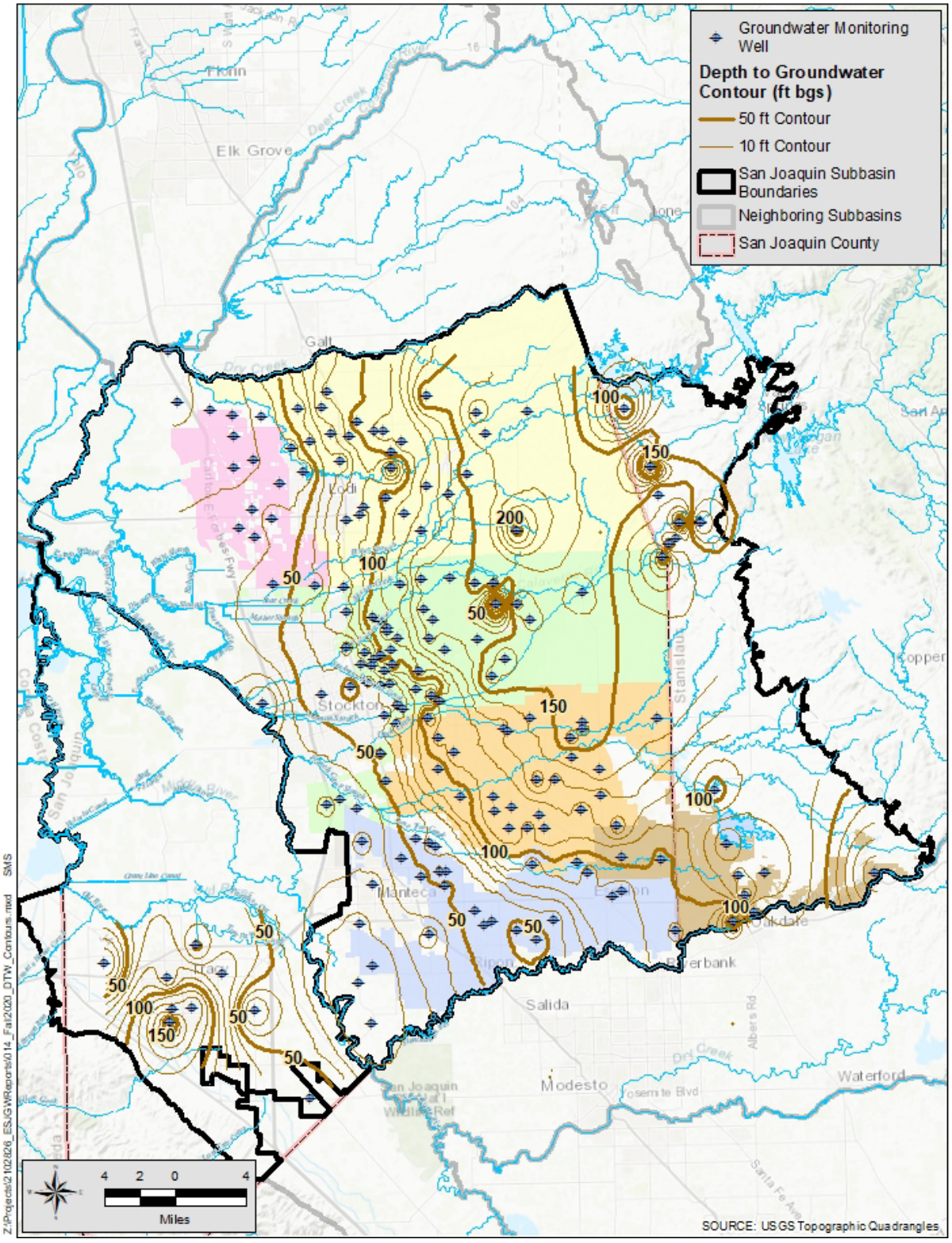


Figure 4-35 Depth to Groundwater – Fall 2020

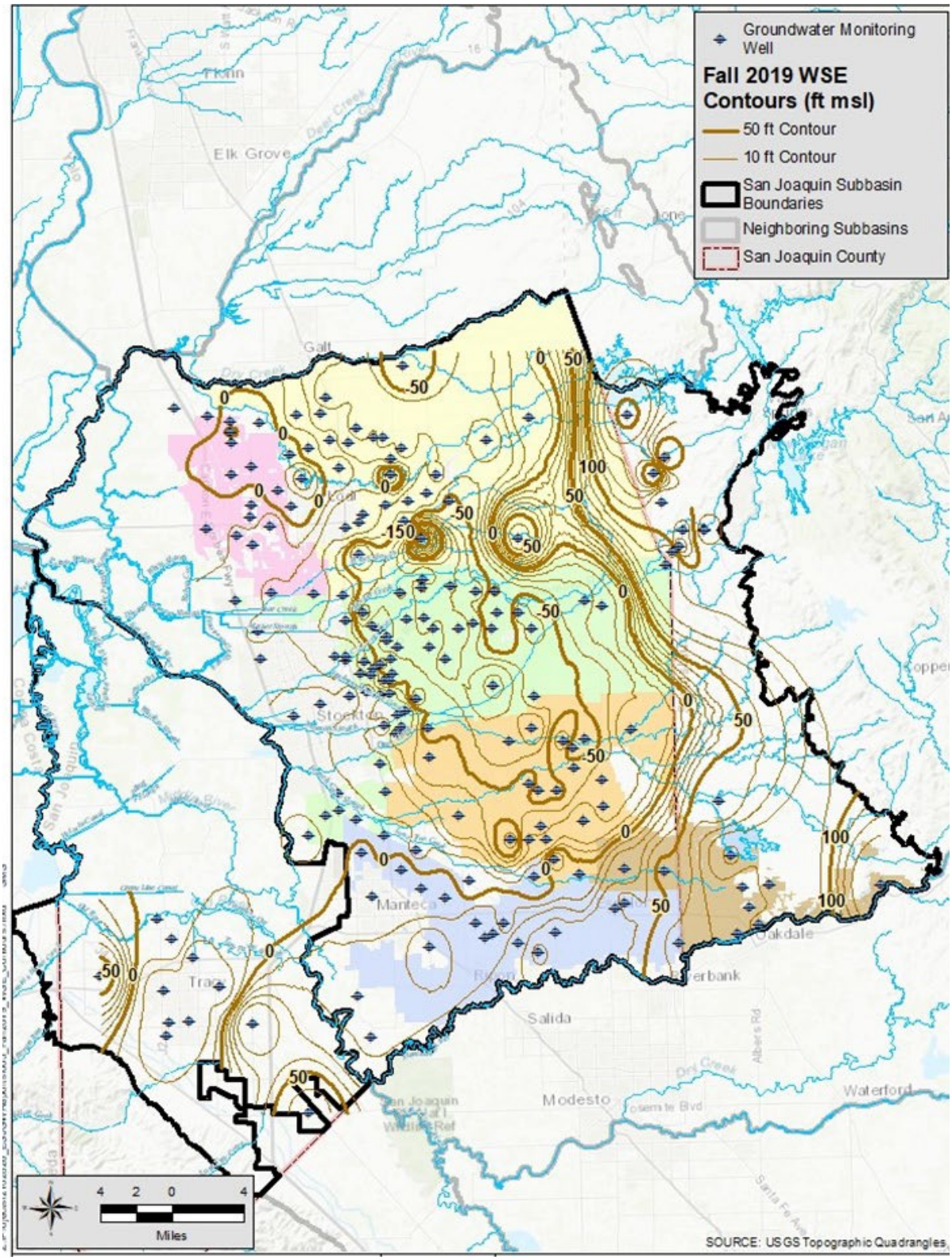


Figure 4-36 Groundwater Surface Elevation – Fall 2019

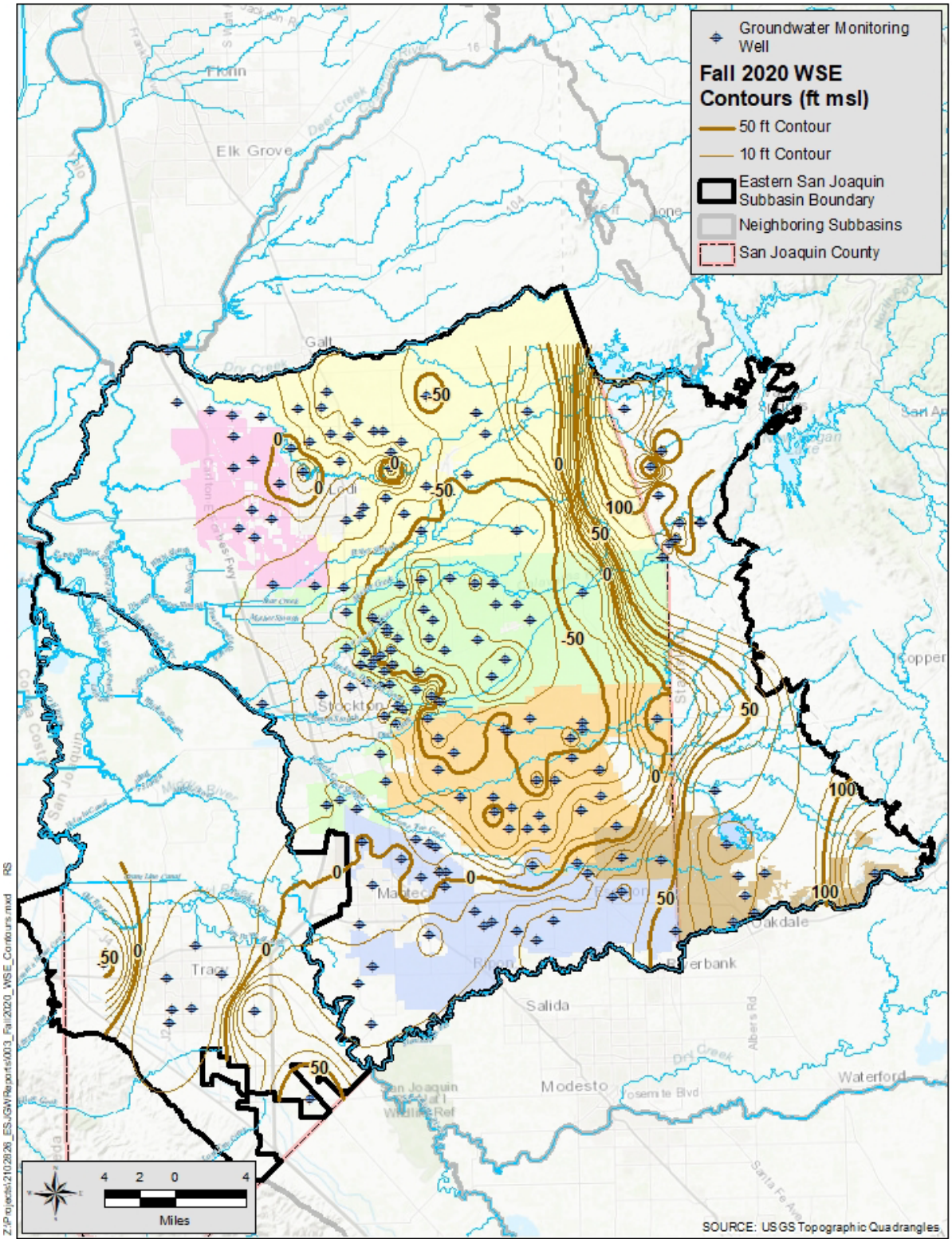


Figure 4-347 Groundwater Surface Elevation – Fall 2020

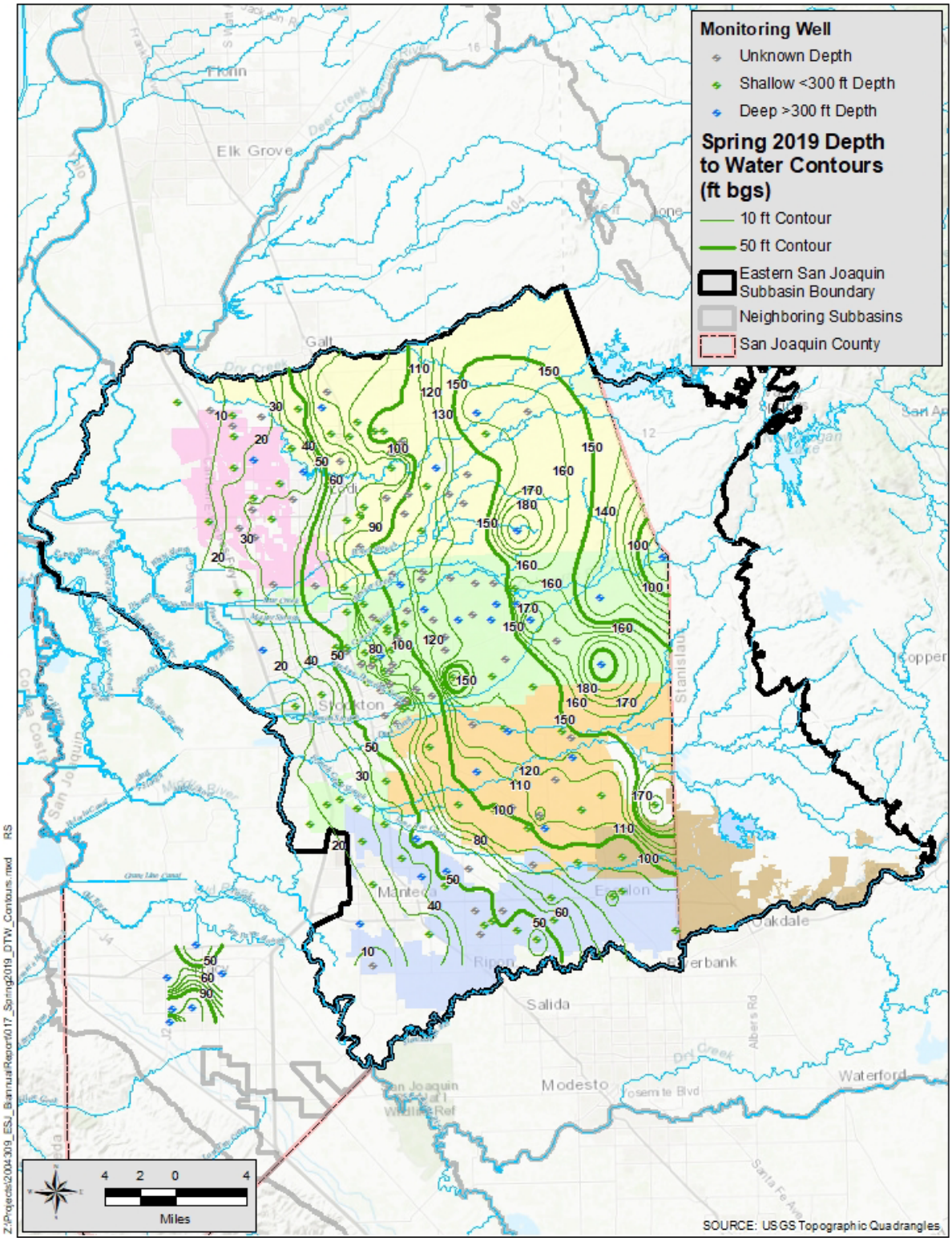


Figure 4-38 Depth to Groundwater – Spring 2019

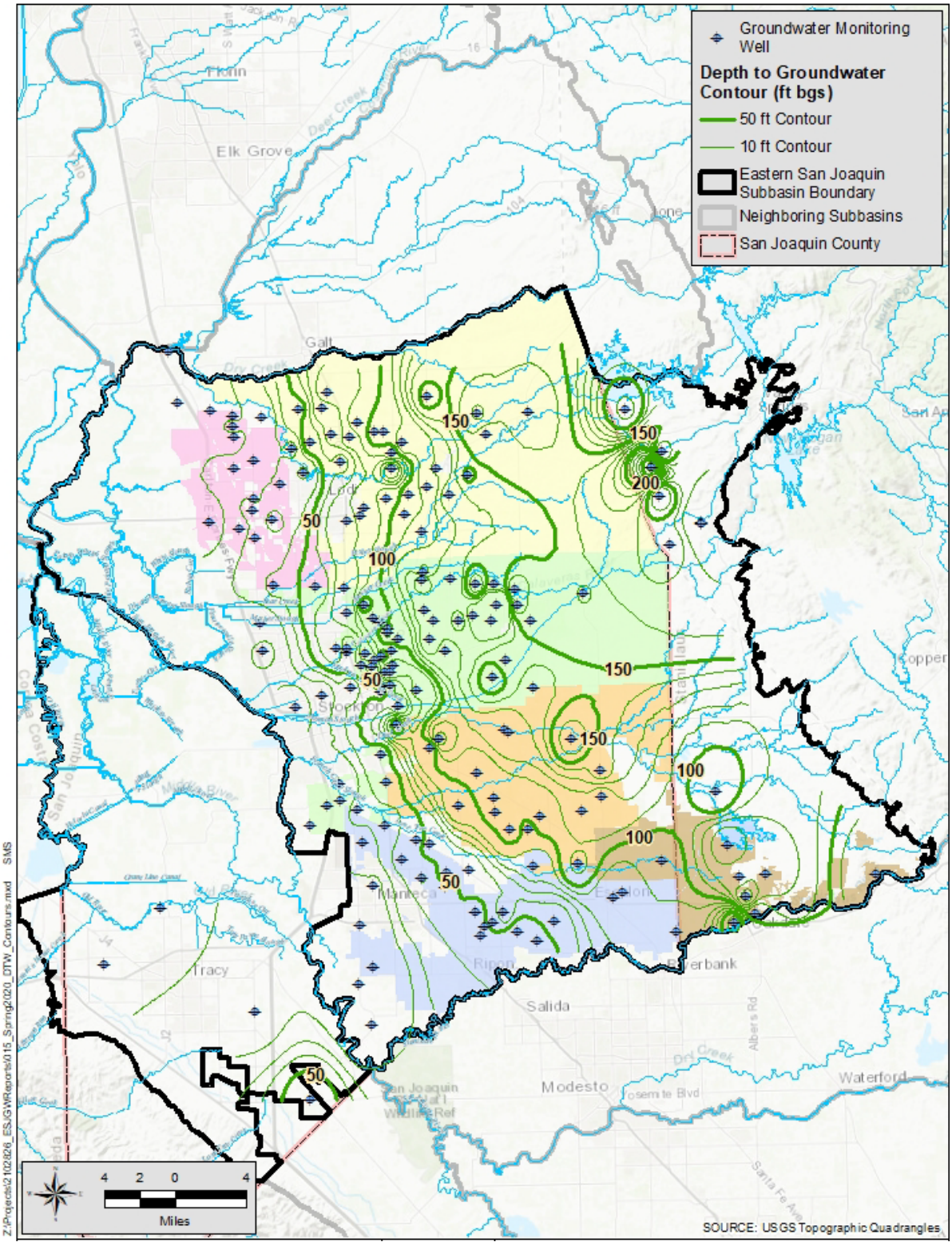


Figure 4-39 Depth to Groundwater – Spring 2020

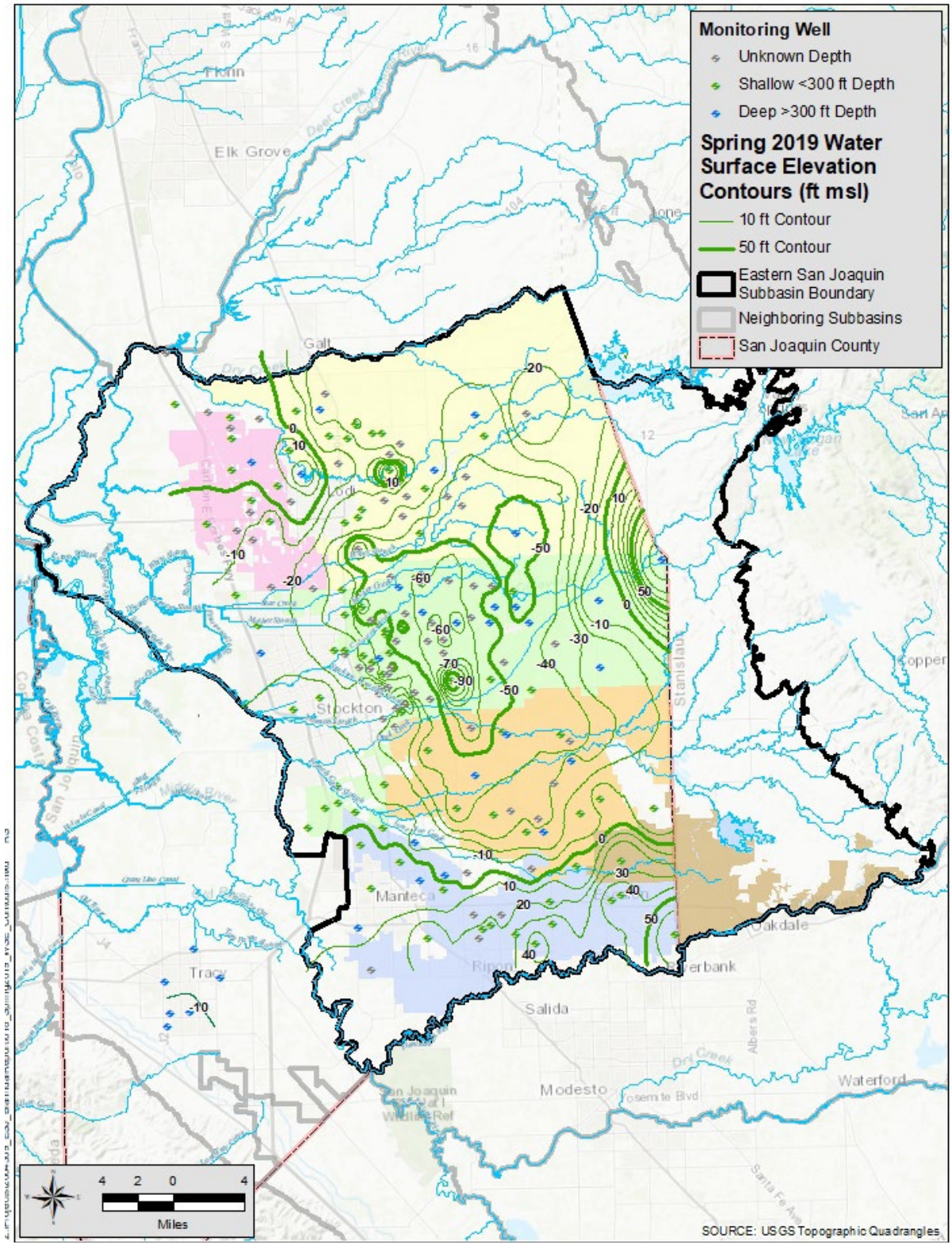


Figure 4-40 Groundwater Surface Elevation – Spring 2019

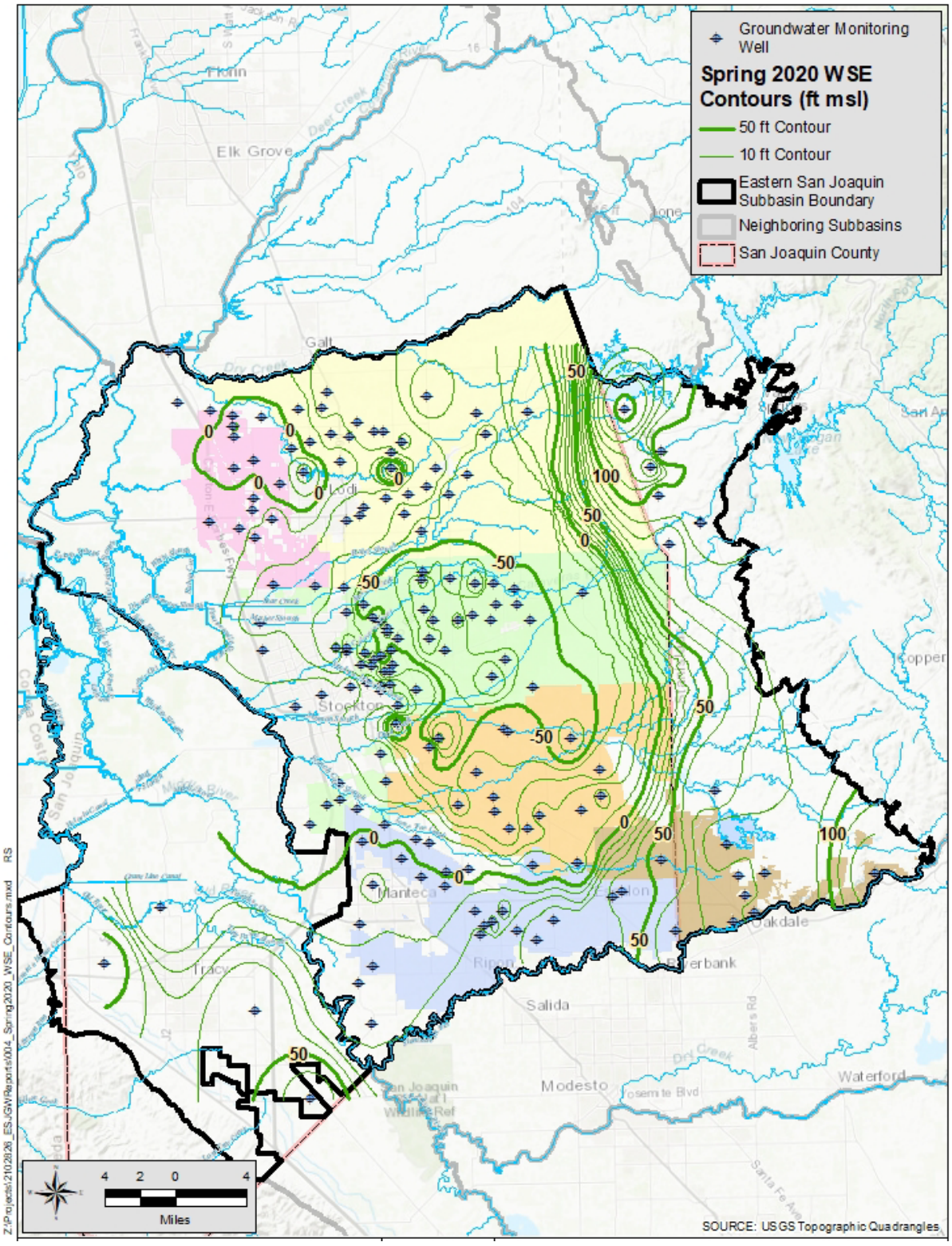


Figure 4-41 Groundwater Surface Elevation – Spring 2020

5 Groundwater Quality Monitoring

San Joauqin County personnel did not collect water quality samples in Fall of 2019 or 2020. Samples were collected by the water agencies for Title 22 drinking water compliance between February and July 2020. The information for water quality in the Fall 2020 in comparison to 2019 concentrations are summarized as follows:

North Stockton – Two wells (4E1 and 8C1) were sampled in North Stockton this year.

County Hospital Area – Due to access constraints no wells were tested in this area this year.

Lathrop – Two wells (25M3 and 25M4) were sampled in Lathrop.

Table 5-1 Comparison of Water Quality Results

Well	Fall 2019			Fall 2020		
	Chloride (ppm)	EC (umhos/cm)	TDS (ppm)	Chloride (ppm)	EC (umhos/cm)	TDS (ppm)
North Stockton						
4E1	--	--	--	47	832	540
8C1	--	--	--	46	931	740
8Q2	--	--	--	--	--	--
29M1	--	--	--	--	--	--
7D2	--	--	--	--	--	--
County Hospital Area						
35G2	--	--	--	--	--	--
35N1	--	--	--	--	--	--
Lathrop Area						
25M3	--	--	--	59	732	470
25M4	--	--	--	33	607	380
New Wells						
1	--	--	--	4	184	130
2	--	--	--	--	--	--
3	--	--	--	--	--	--

Notes: Water quality from Drinking Water Watch

Well 4E1 sample collected 2/20/20

Well 8C1 sample collected 2/12/20

Wells 25M3 and 25M4 samples collected 4/6/20

Well 1 sample collected 7/15/20

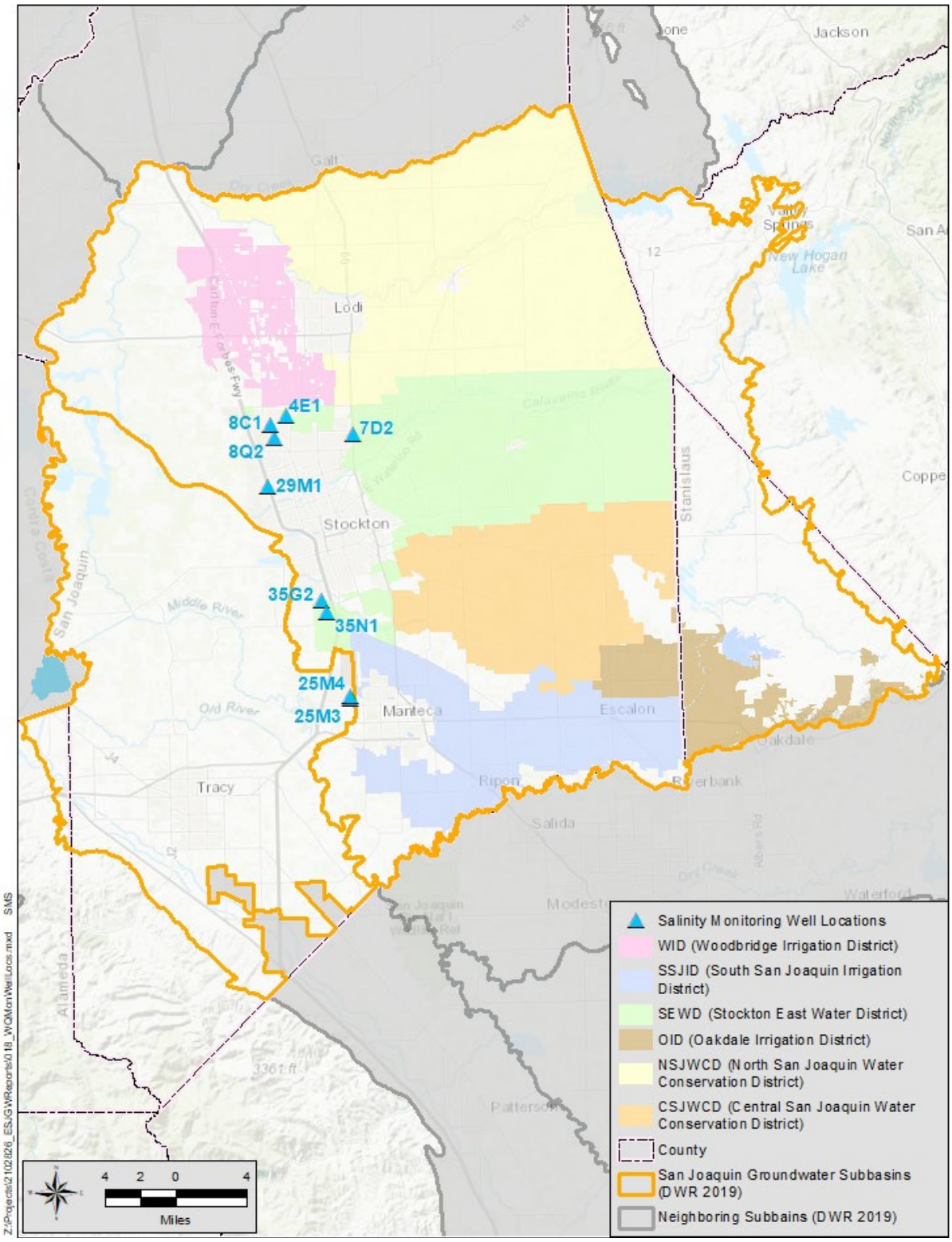


Figure 5-1 Salinity Monitoring Well Locations

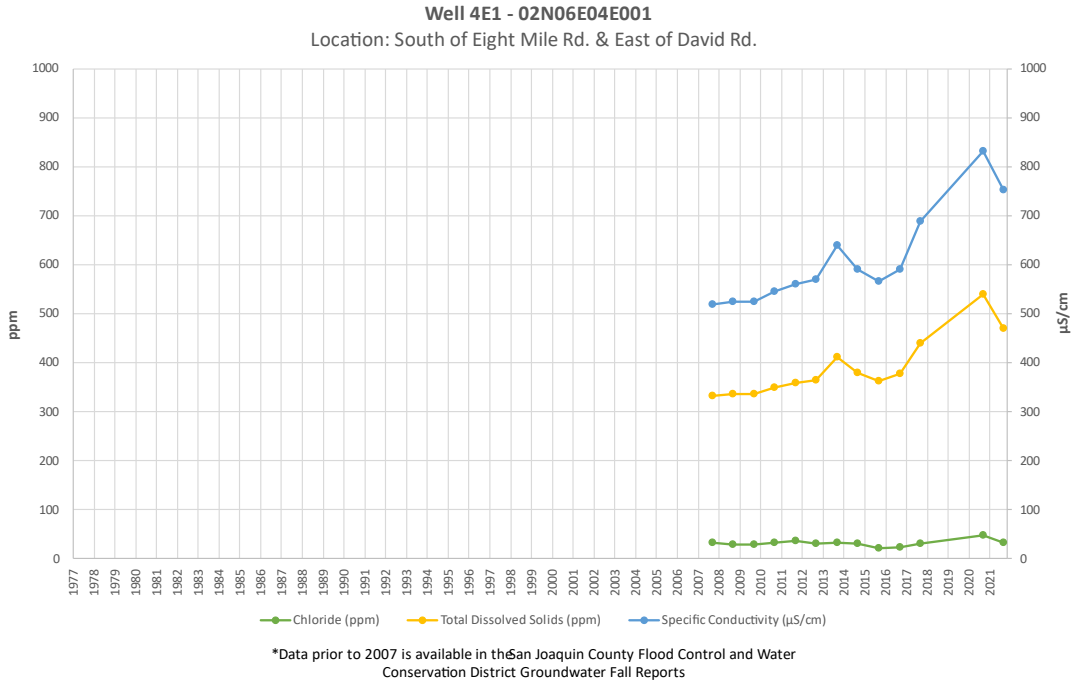


Figure 5-2 Water Quality Comparison Graph Well 4E1

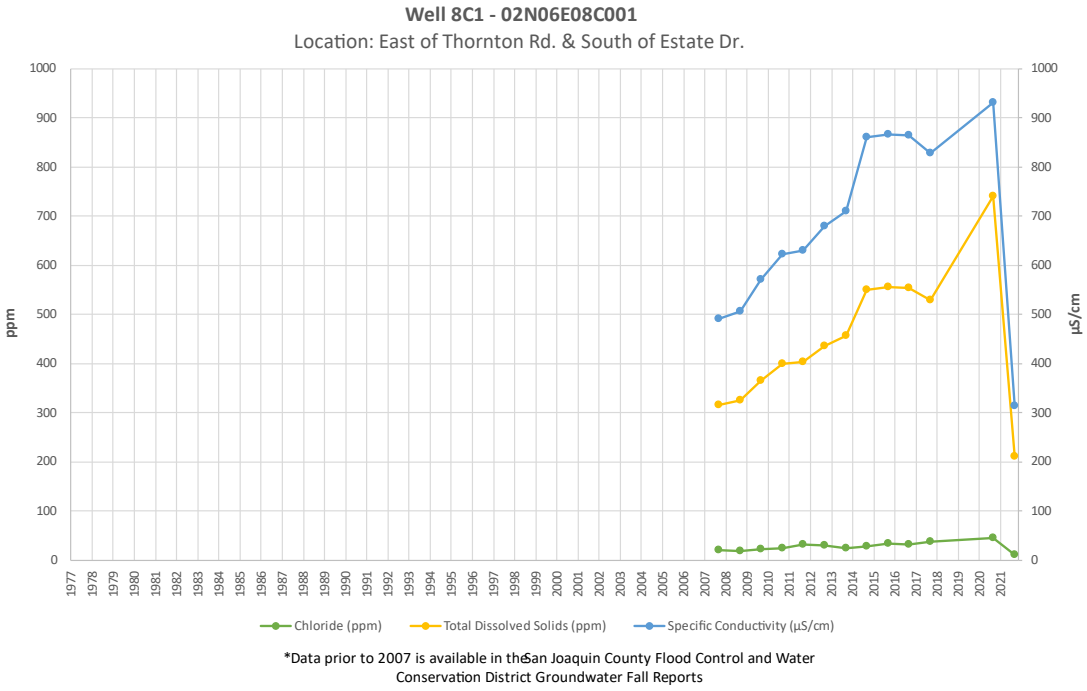


Figure 5-3 Water Quality Comparison Graph Well 8C1

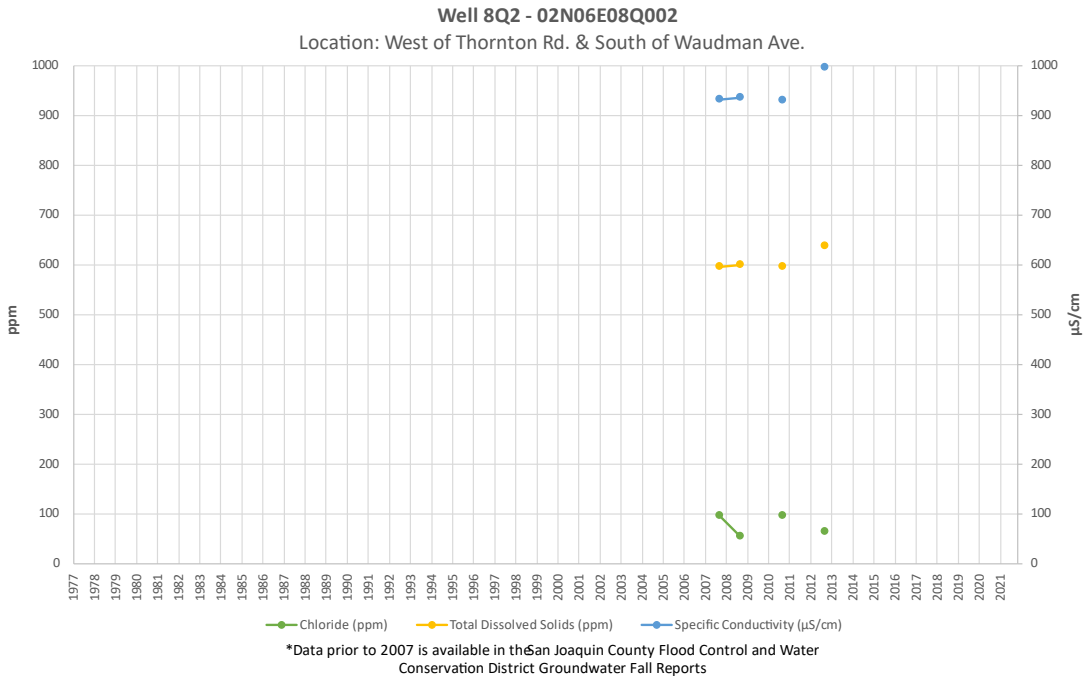


Figure 5-4 Water Quality Comparison Graph Well 8Q2

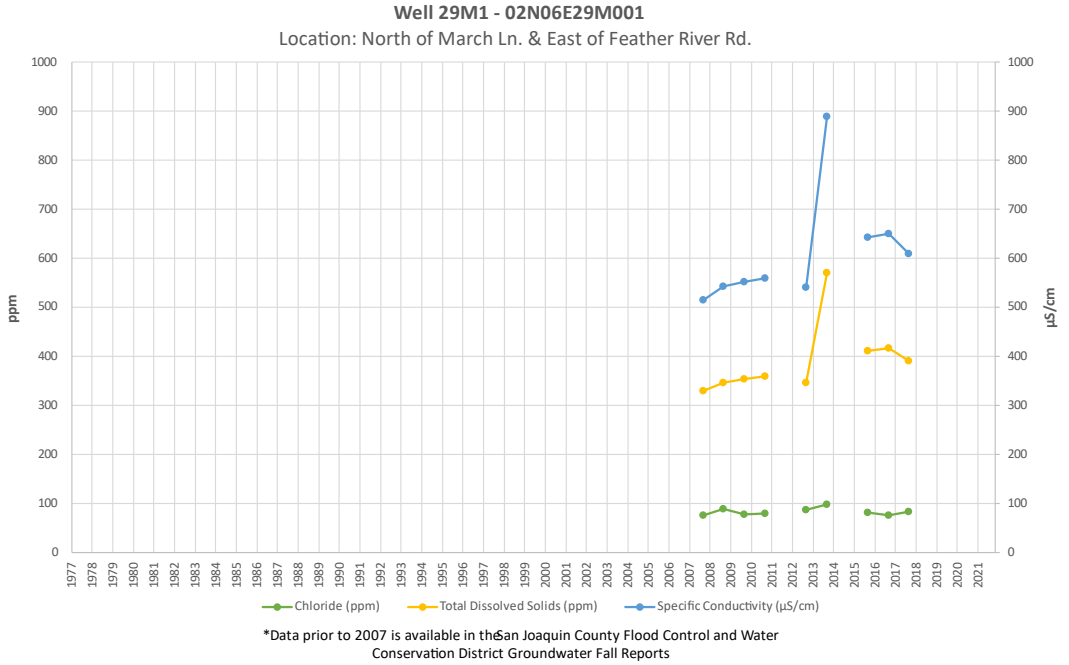


Figure 5-5 Water Quality Comparison Graph Well 29M1

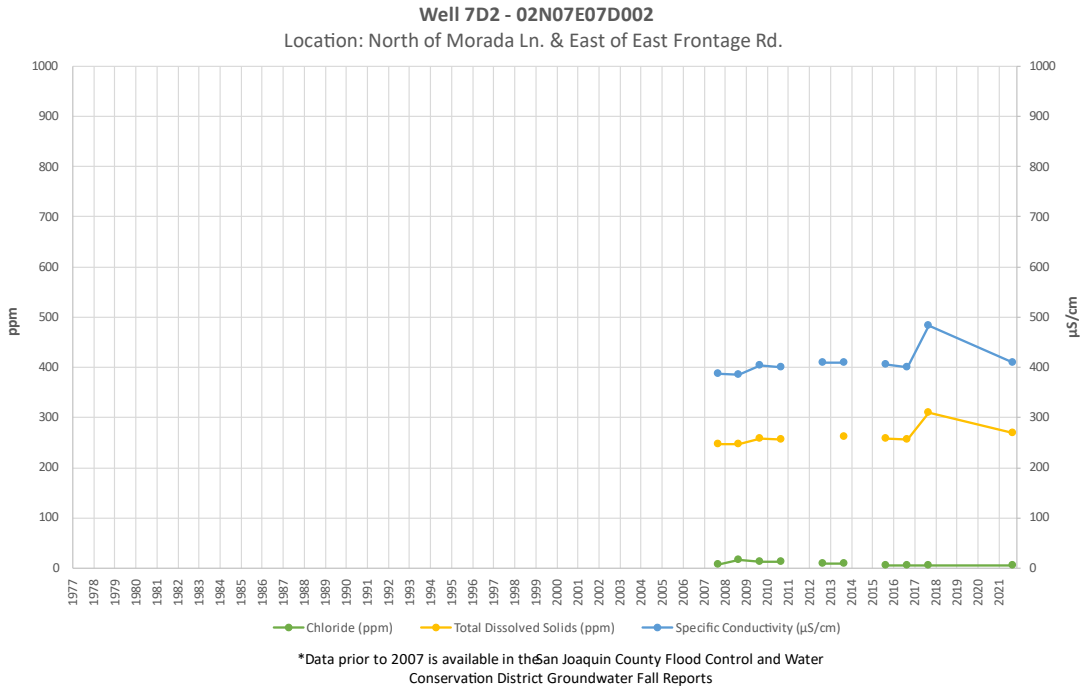


Figure 5-6 Water Quality Comparison Graph Well 7D2

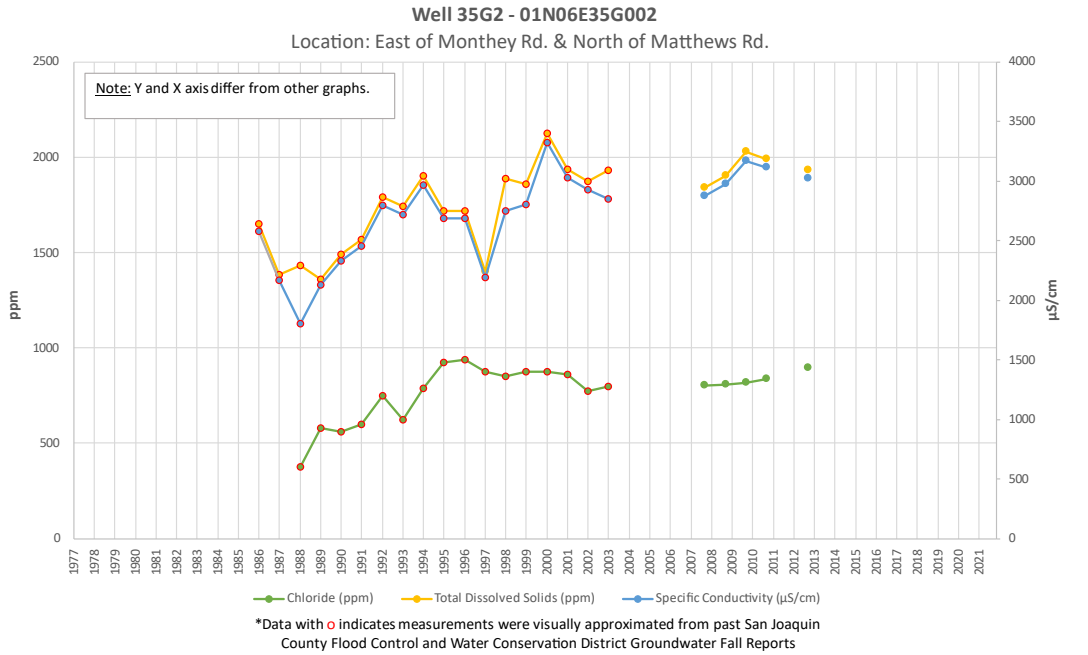


Figure 5-7 Water Quality Comparison Graph Well 35G2

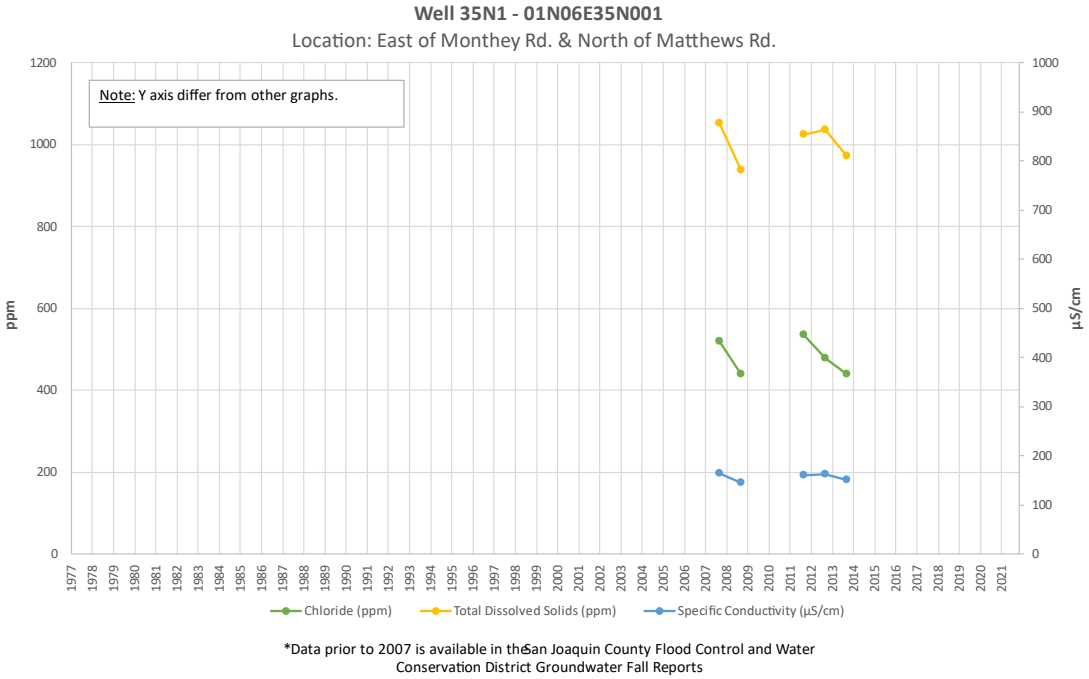


Figure 5-8 Water Quality Comparison Graph Well 35N1

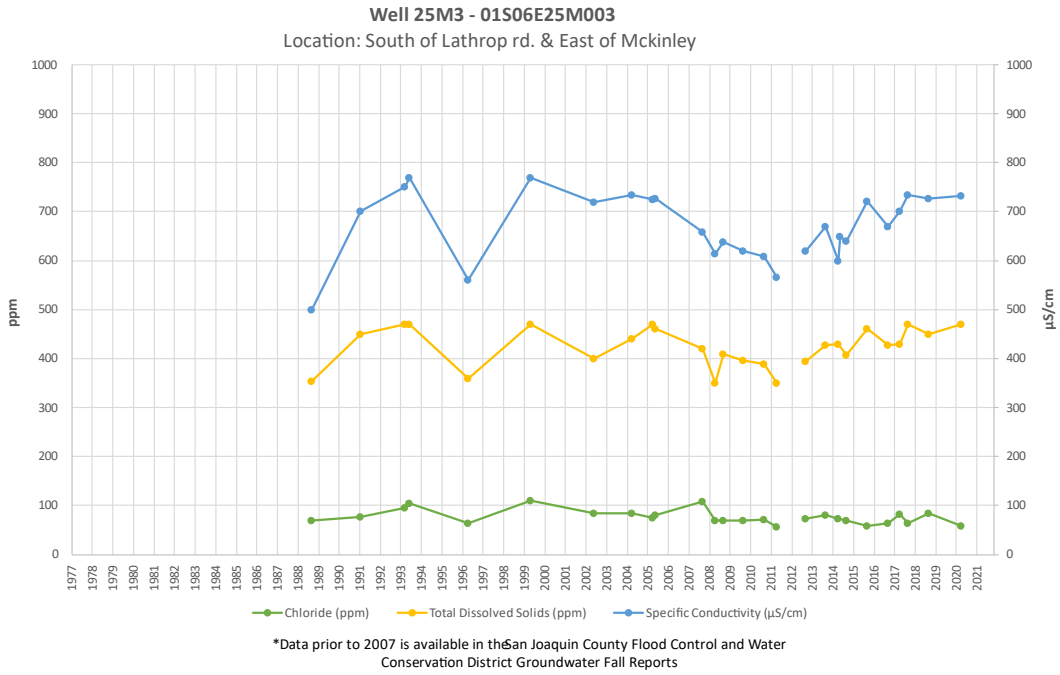


Figure 5-9 Water Quality Comparison Graph Well 25M3

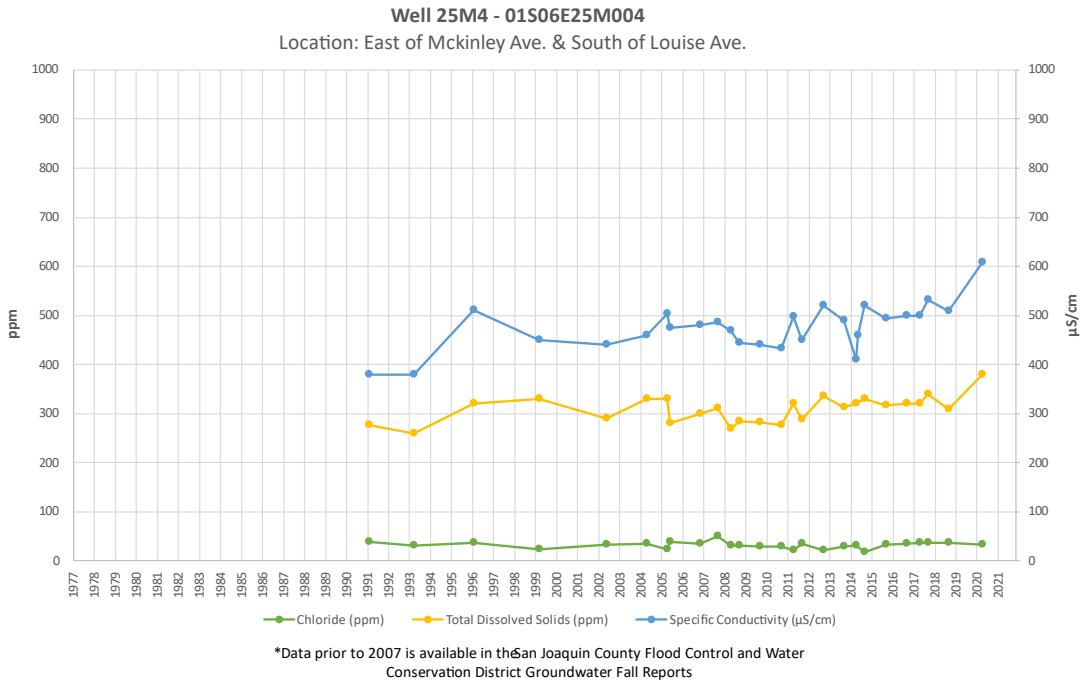


Figure 5-10 Water Quality Comparison Graph Well 25M4

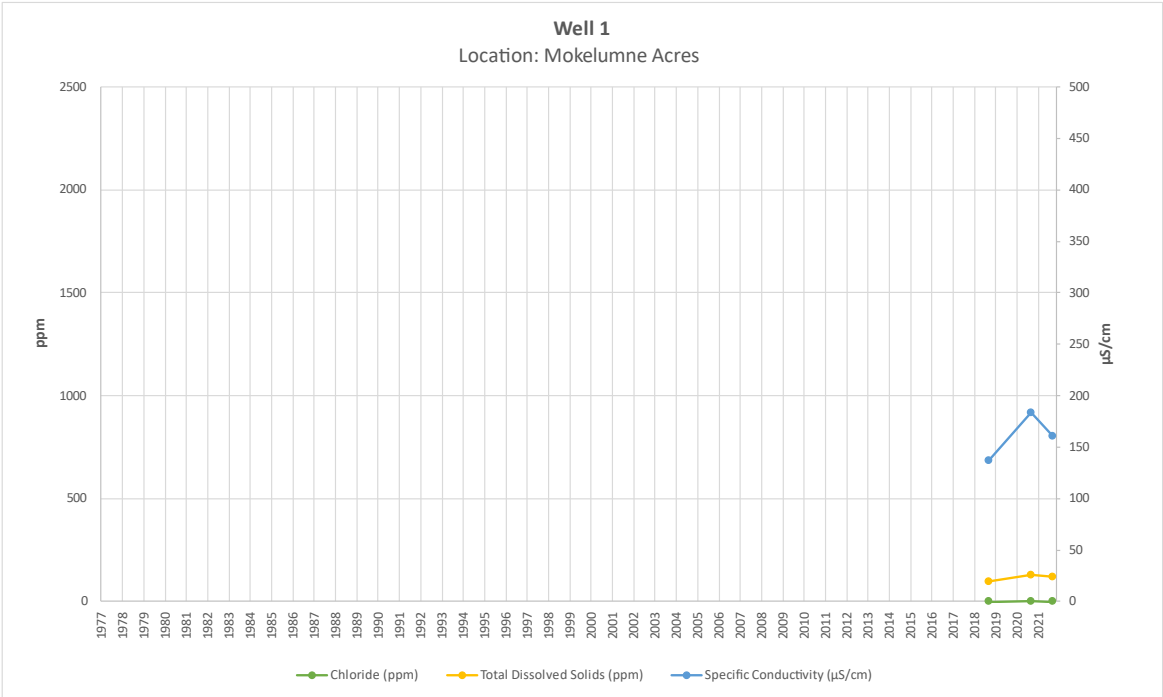


Figure 5-11 Water Quality Comparison Graph Well 1

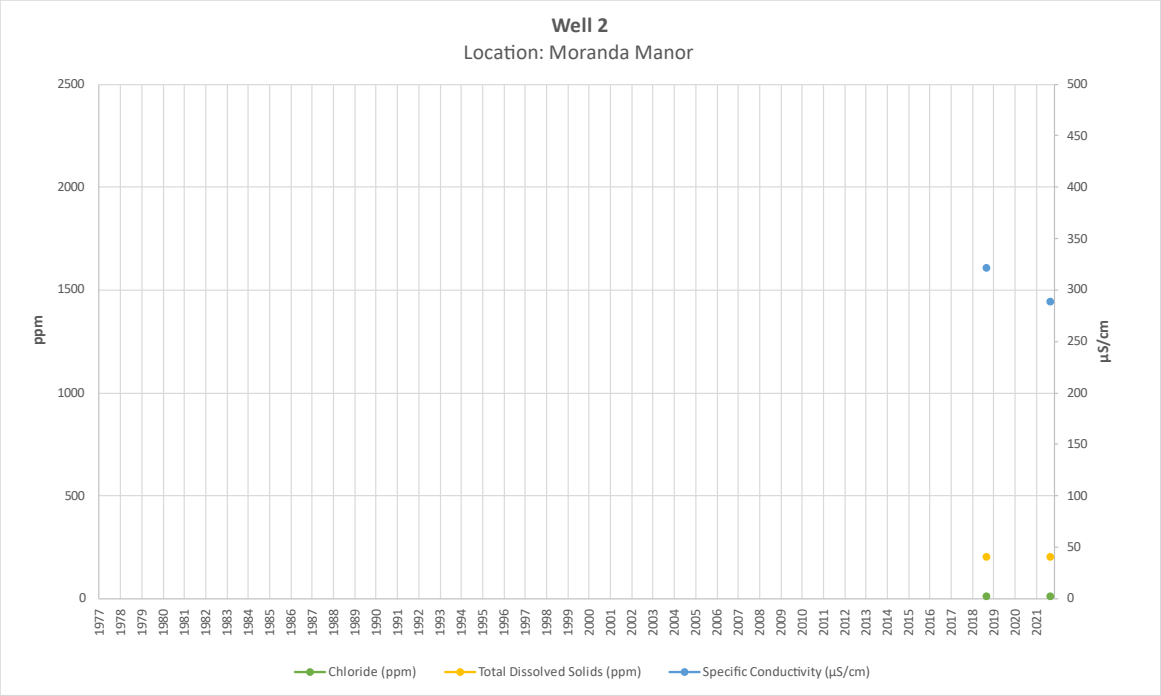


Figure 5-12 Water Quality Comparison Graph Well 2

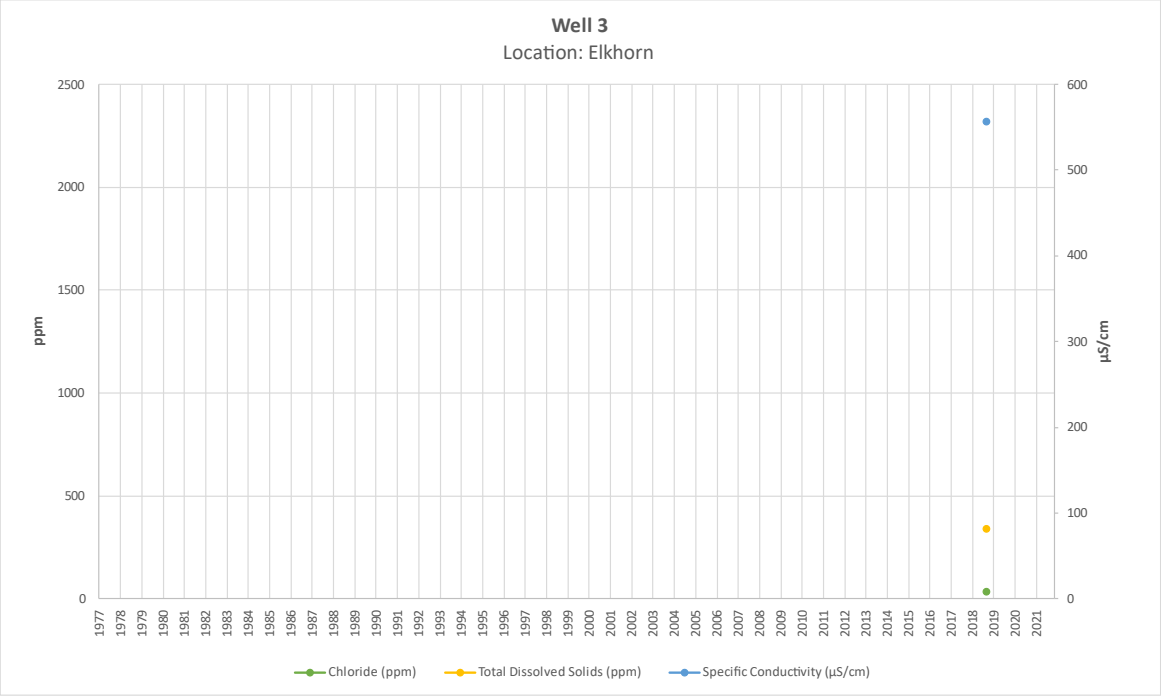


Figure 5-13 Water Quality Comparison Graph Well 3