North American Groundwater Subbasin (NASb) Water Year (WY) 2022 Annual Report Update

Presentation to SGA Board Members

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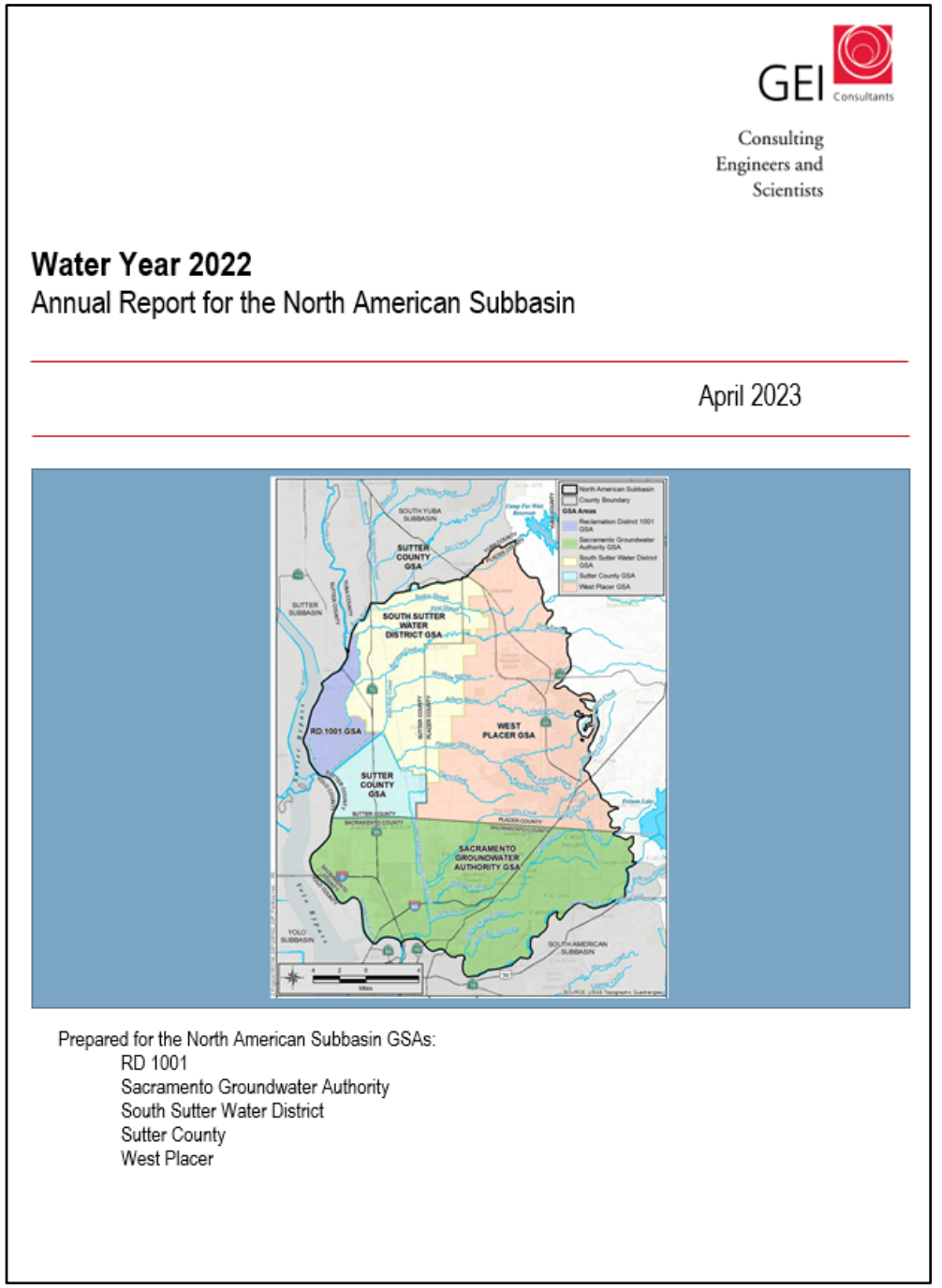
April 13, 2023

NORTH AMERICAN Subbasin

SGA

Annual Report

- Hydrologic Conditions
- Water Supply
- Groundwater Levels
- Change in Groundwater Storage
- GSP Implementation (e.g., Project and Management Actions/Supplemental Projects)
- Sustainability Indicators



GEI Consultants

Consulting Engineers and Scientists

Water Year 2022

Annual Report for the North American Subbasin

April 2023

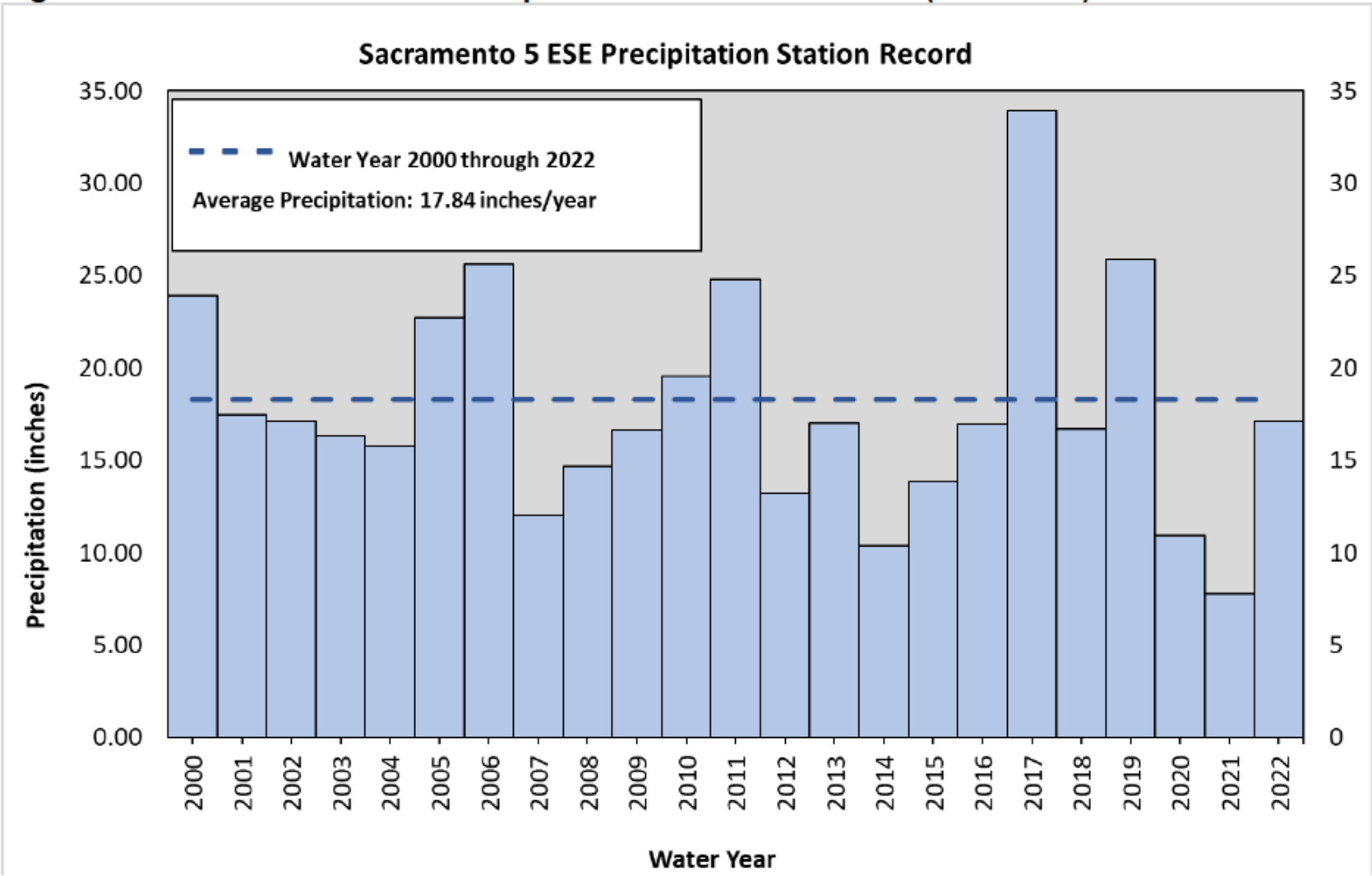
Prepared for the North American Subbasin GSAs:

RD 1001
Sacramento Groundwater Authority
South Sutter Water District
Sutter County
West Placer

Hydrologic Conditions

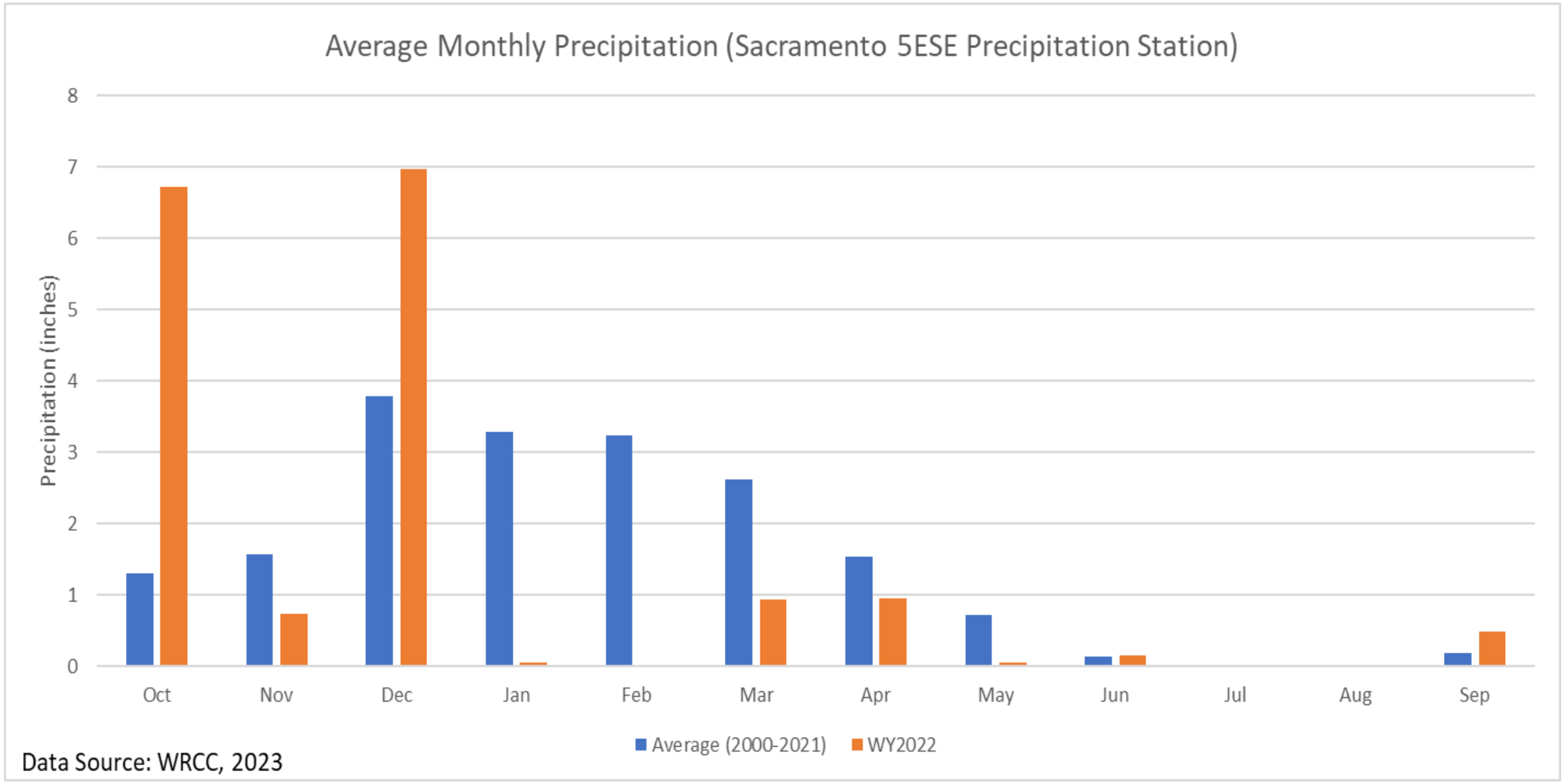
Water Year (WY) 2022 annual precipitation was 17.10 inches

Figure 2-1. Sacramento 5 ESE Precipitation Station Water Year (2000-2022) Record



Source: WRCC, 2023

Average Monthly Precipitation

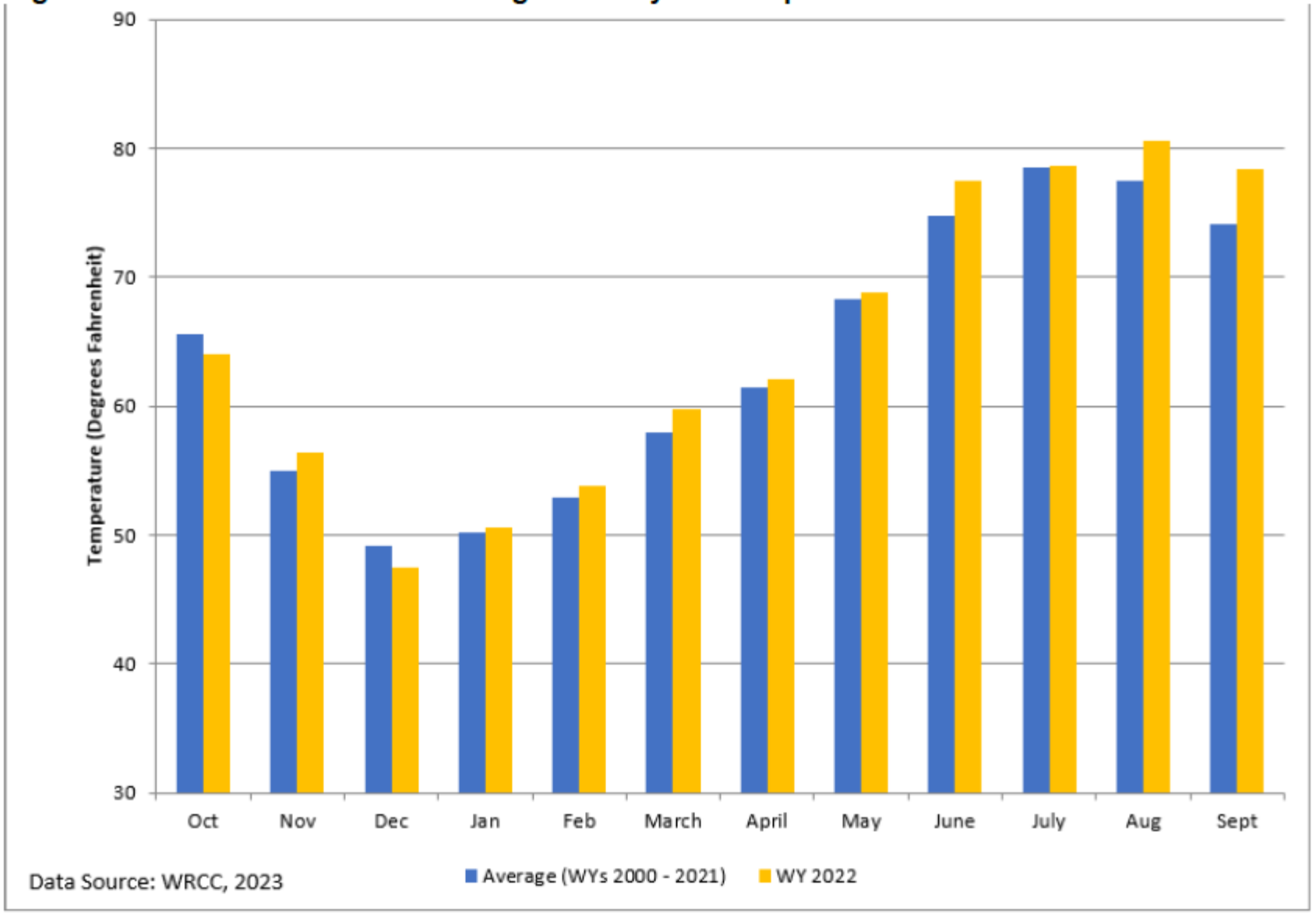


Data Source: WRCC, 2023

Temperature

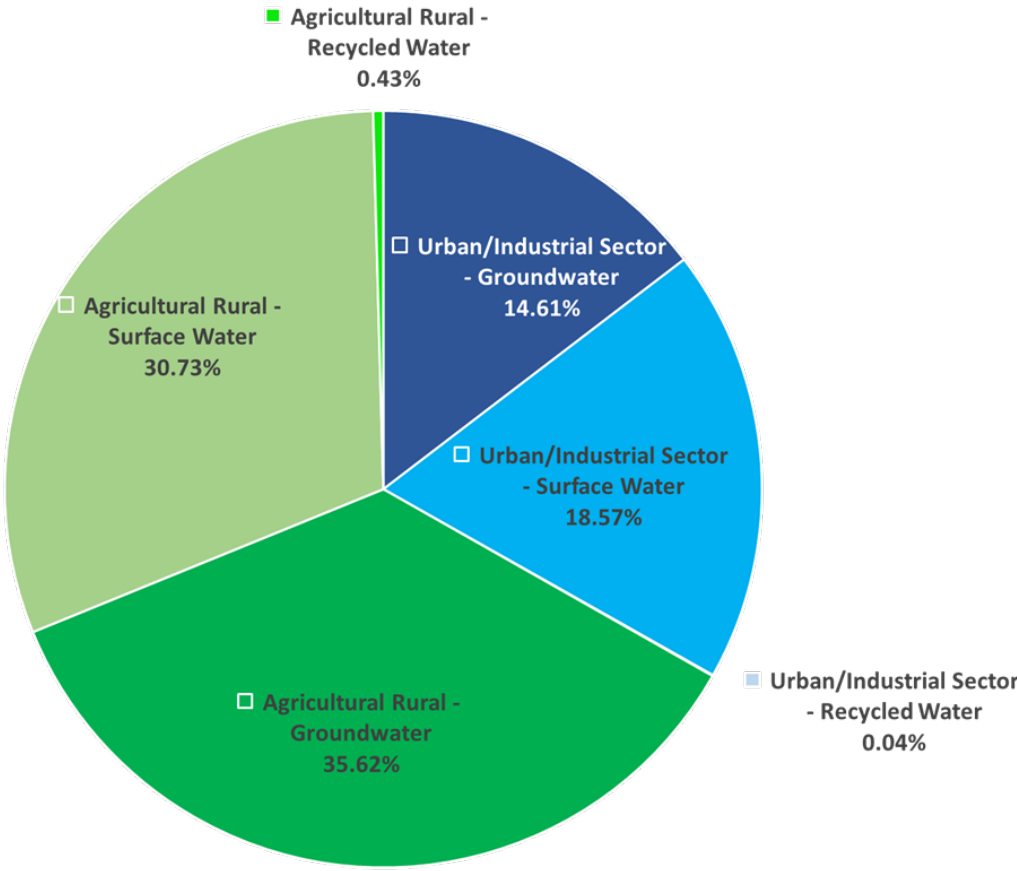
The average annual air temperature at the Sacramento 5 ESE station in WY 2022 was approximately 0.05 degrees Fahrenheit (°F) warmer than the 2000 through 2021 average (63.83 compared to 63.88 °F, respectively)

Figure 2-3. Sacramento 5 ESE Average Monthly Air Temperature



WY 2022 Water Use by Source

Month	Groundwater (AF)	Surface Water (AF)	Remediation (AF)	Recycled Water (AF)	Total (AF)
Oct-21	14,800	12,200	600	225	27,830
Nov-21	22,100	10,400	600	12	33,110
Dec-21	10,100	6,800	700	13	17,610
Jan-22	6,500	5,900	600	13	13,010
Feb-22	9,700	6,400	600	15	16,710
Mar-22	11,000	7,900	600	169	19,670
Apr-22	20,200	17,200	600	119	38,120
May-22	49,900	51,000	600	421	101,920
Jun-22	46,500	45,800	600	543	93,450
Jul-22	43,100	53,400	600	497	97,600
Aug-22	40,400	48,900	600	398	90,300
Sep-22	18,600	21,600	600	304	41,100
Total WY 2022	**292,900**	**287,500**	**7,300**	**2,730**	**590,430**



WY 2022 Total Use by Water Sector

Table 3-2. Water Year 2022 Total Water Use by Water Sector

	Urban/Industrial Sector				Agricultural/Rural Sector			
Month	Groundwater (AF)	Surface Water (AF)	Recycled Water (AF)	Total (AF)	Groundwater (AF)	Surface Water (AF)	Recycled Water (AF)	Total (AF)
Oct-2021	6,200	8,700	10	14,910	8,600	3,500	220	12,310
Nov-2021	5,900	5,100	10	11,010	16,200	5,300	0	21,500
Dec-2021	4,600	5,300	10	9,910	5,500	1,500	0	7,000
Jan-2022	3,900	5,900	10	9,810	2,600	0	0	2,600
Feb-2022	4,400	6,100	10	10,510	5,300	300	0	5,600
Mar-2022	5,300	7,900	10	13,210	5,700	0	160	5,860
Apr-2022	5,400	8,100	10	13,510	14,800	9,100	110	24,010
May-2022	7,700	10,900	20	18,620	42,200	40,100	400	82,700
Jun-2022	8,500	12,900	30	21,430	38,000	32,900	520	71,420
Jul-2022	10,700	13,100	40	23,840	32,400	40,300	460	73,160
Aug-2022	12,000	13,200	30	25,230	28,400	35,700	370	64,470
Sep-2022	10,600	11,100	20	21,720	8,000	10,500	280	18,780
Total WY 2022	**85,200**	**108,300**	**210**	**193,710**	**207,700**	**179,200**	**2,520**	**389,420**
Method	Metered	Metered	Metered		~10% Metered ~90% Estimated	~80% Metered or Gaged ~20% Estimated	Metered	
Accuracy	90%	95%	95%		80%	85%	95%	

Notes: AF = acre feet; WY = Water Year
Source: Woodard & Curran, 2023

WY 2022

Groundwater Contour Maps

Figure 4-1. Spring 2022 Groundwater Elevation Contour Map

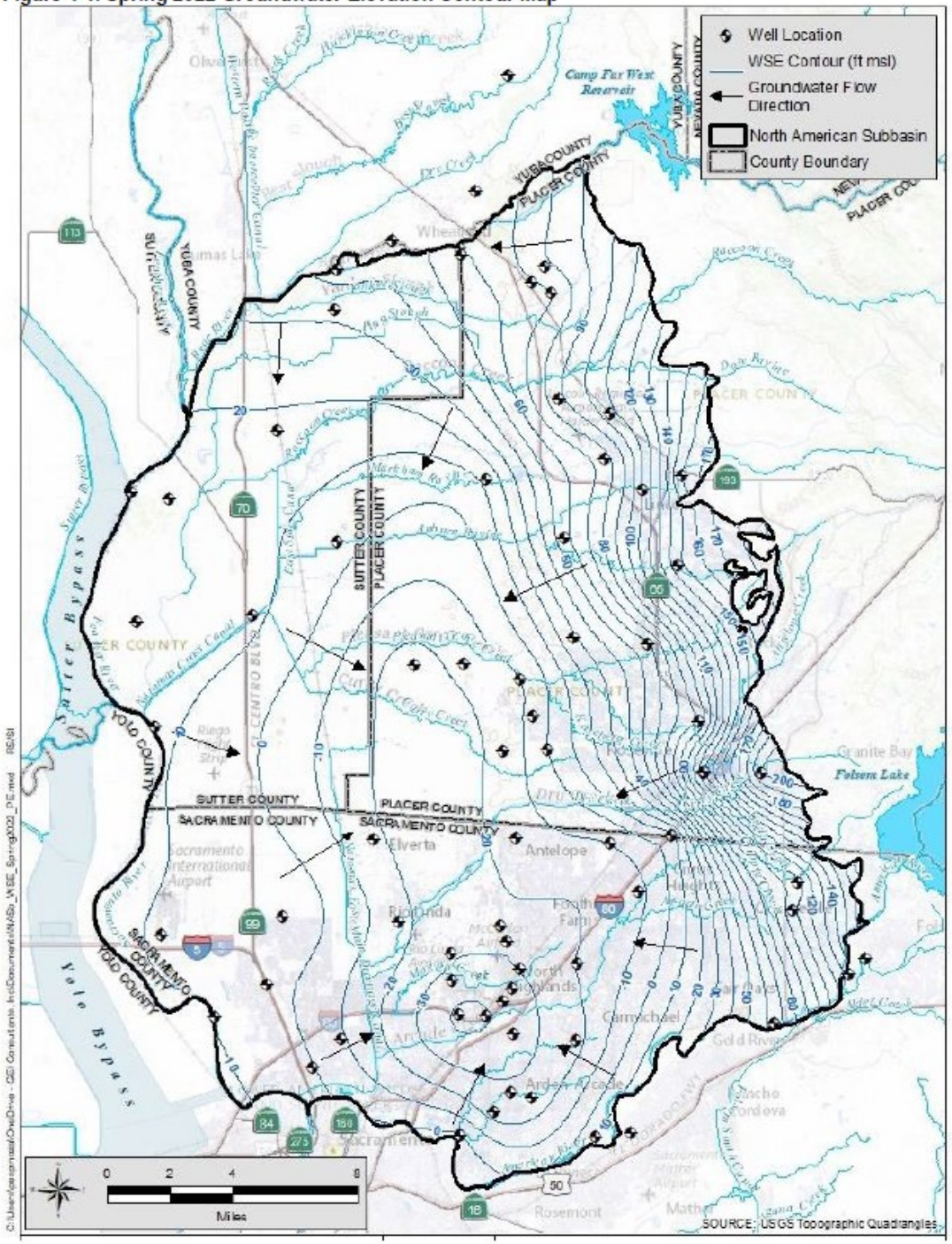
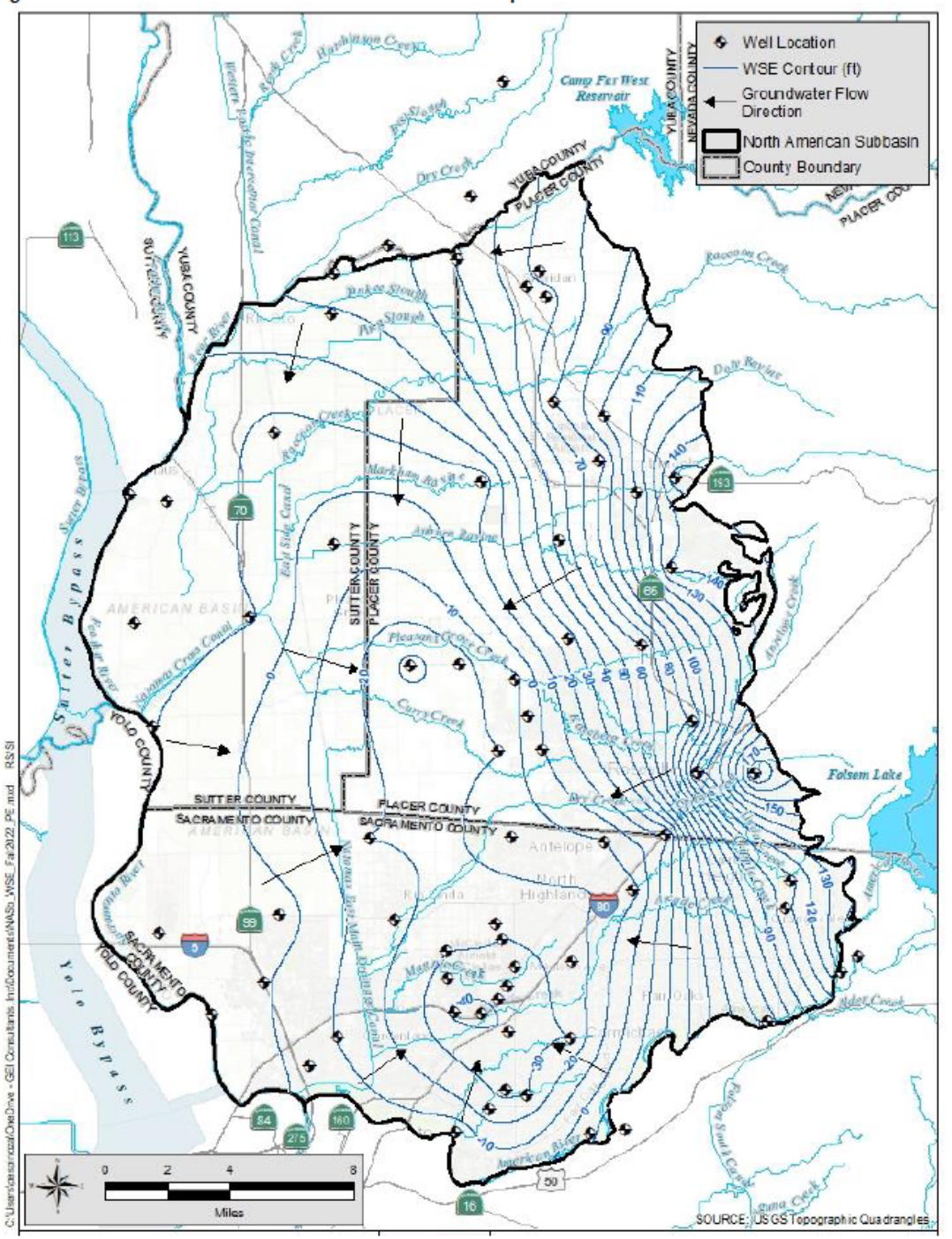
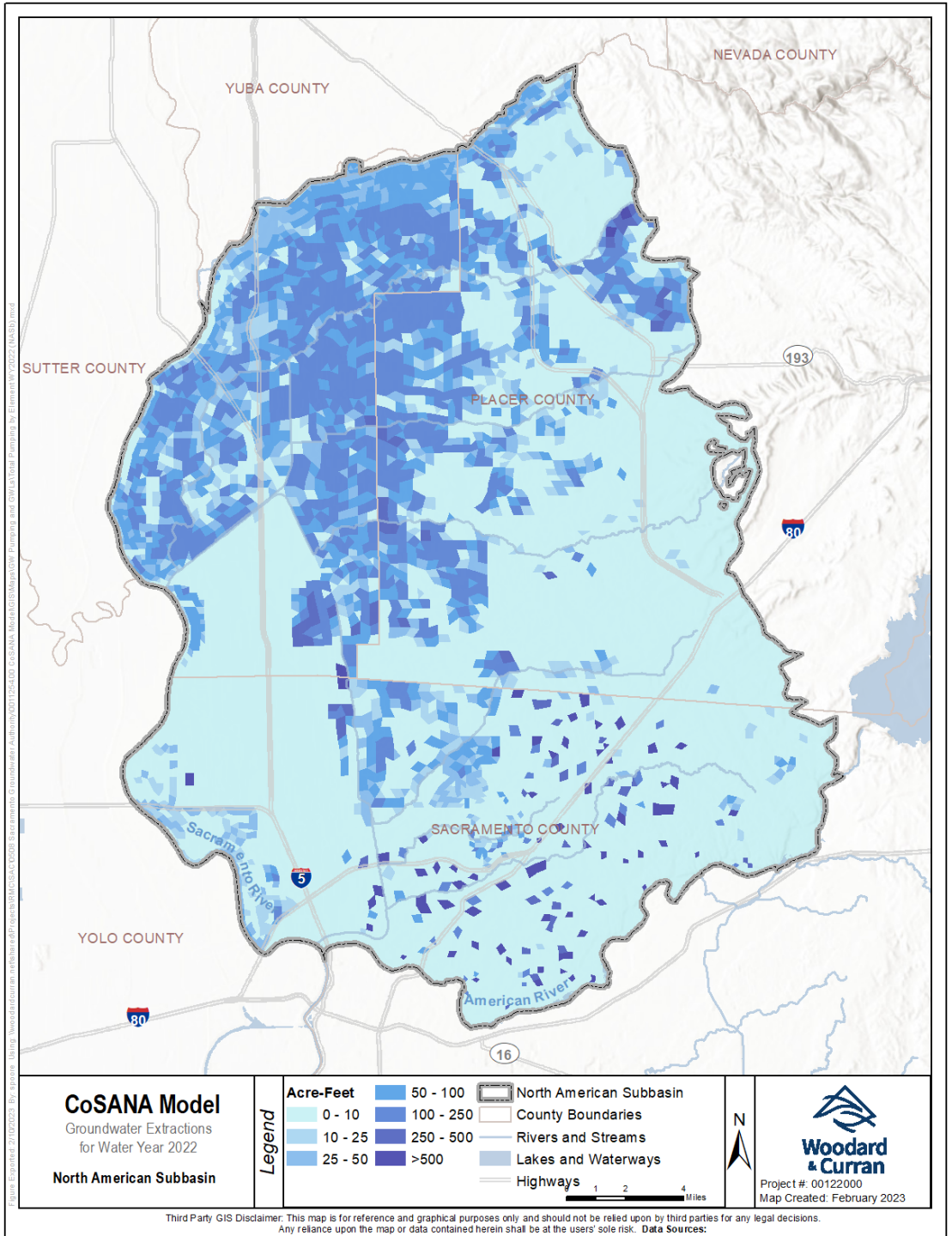


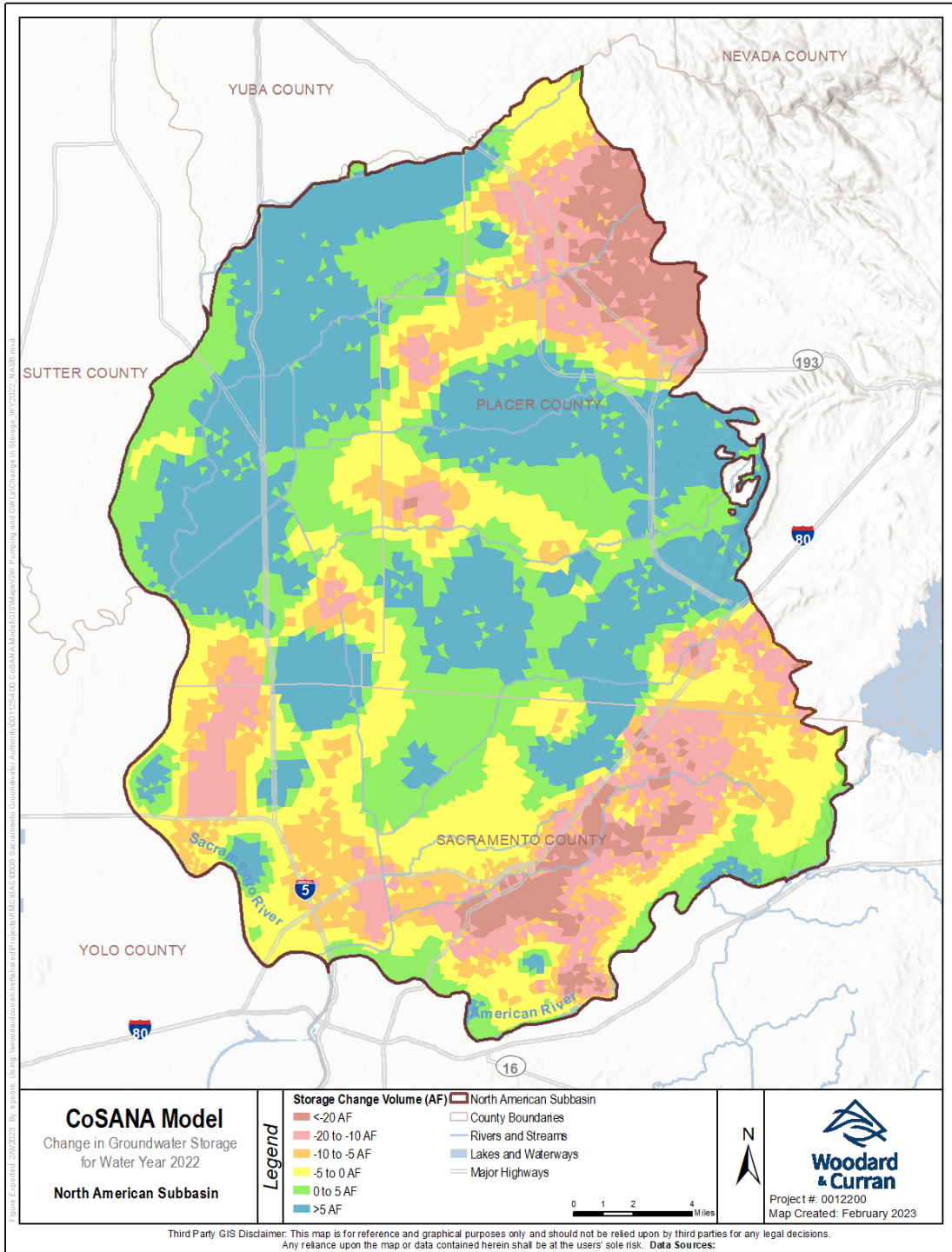
Figure 4-2. Fall 2022 Groundwater Elevation Contour Map



WY 2022

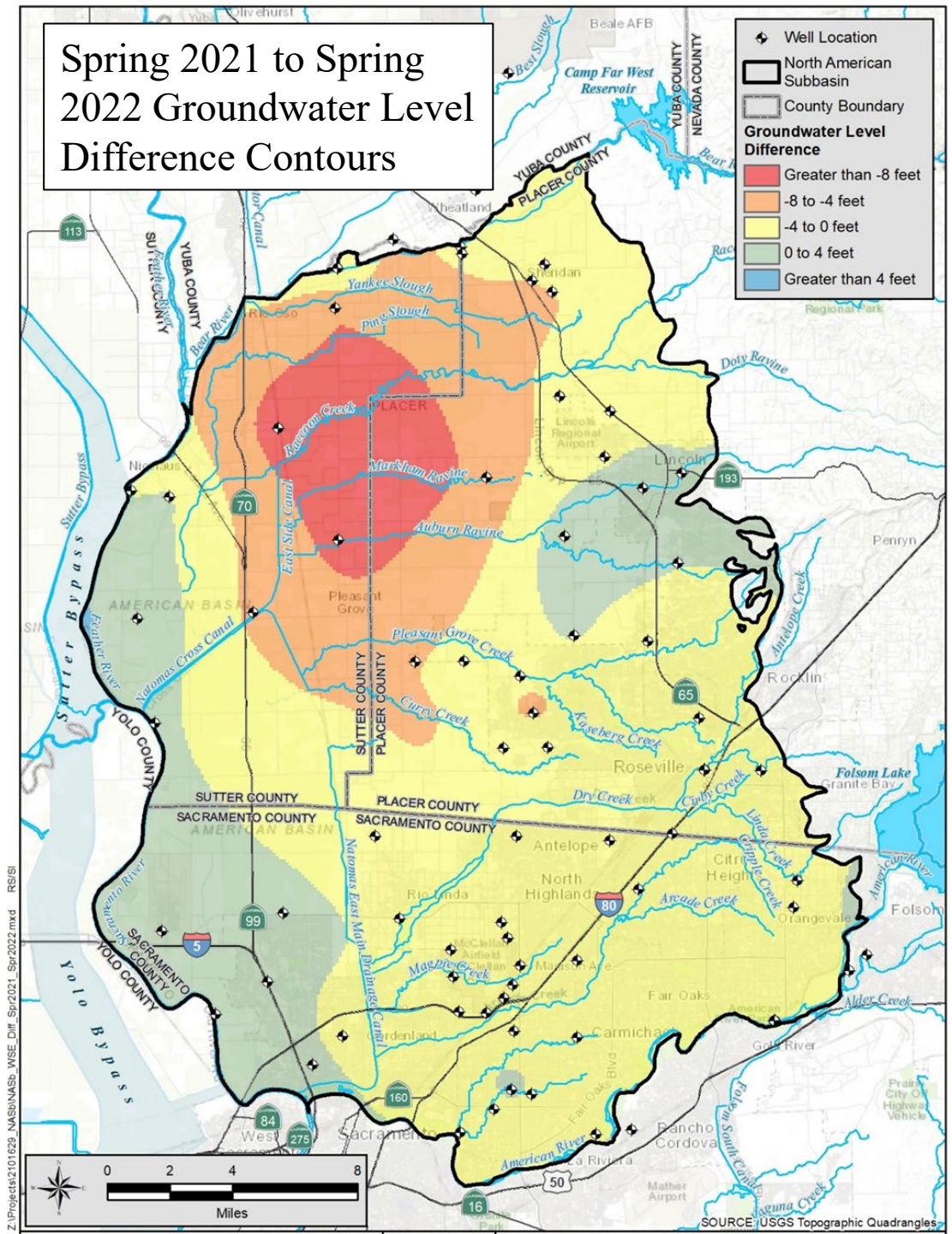
Groundwater Conditions

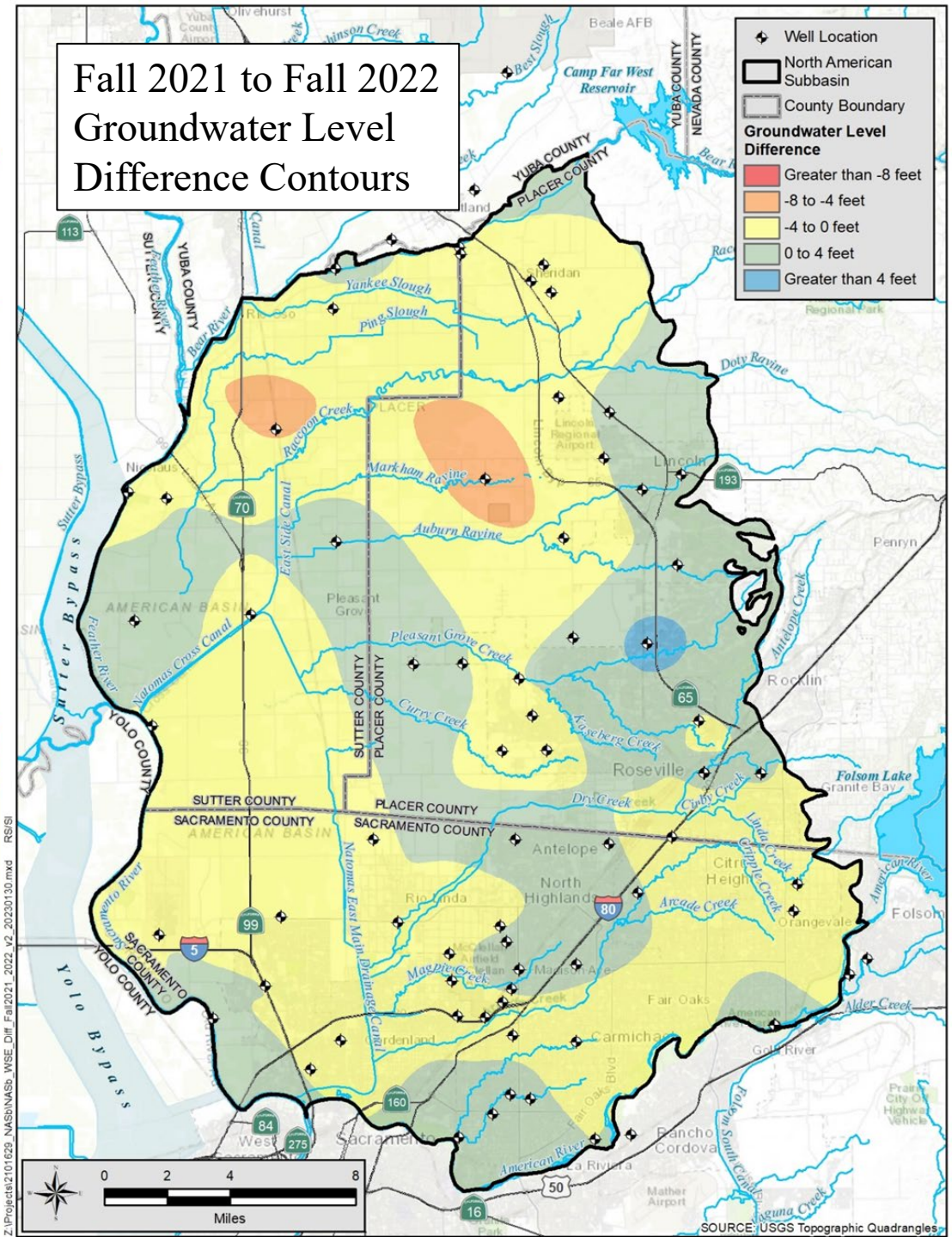




WY 2022

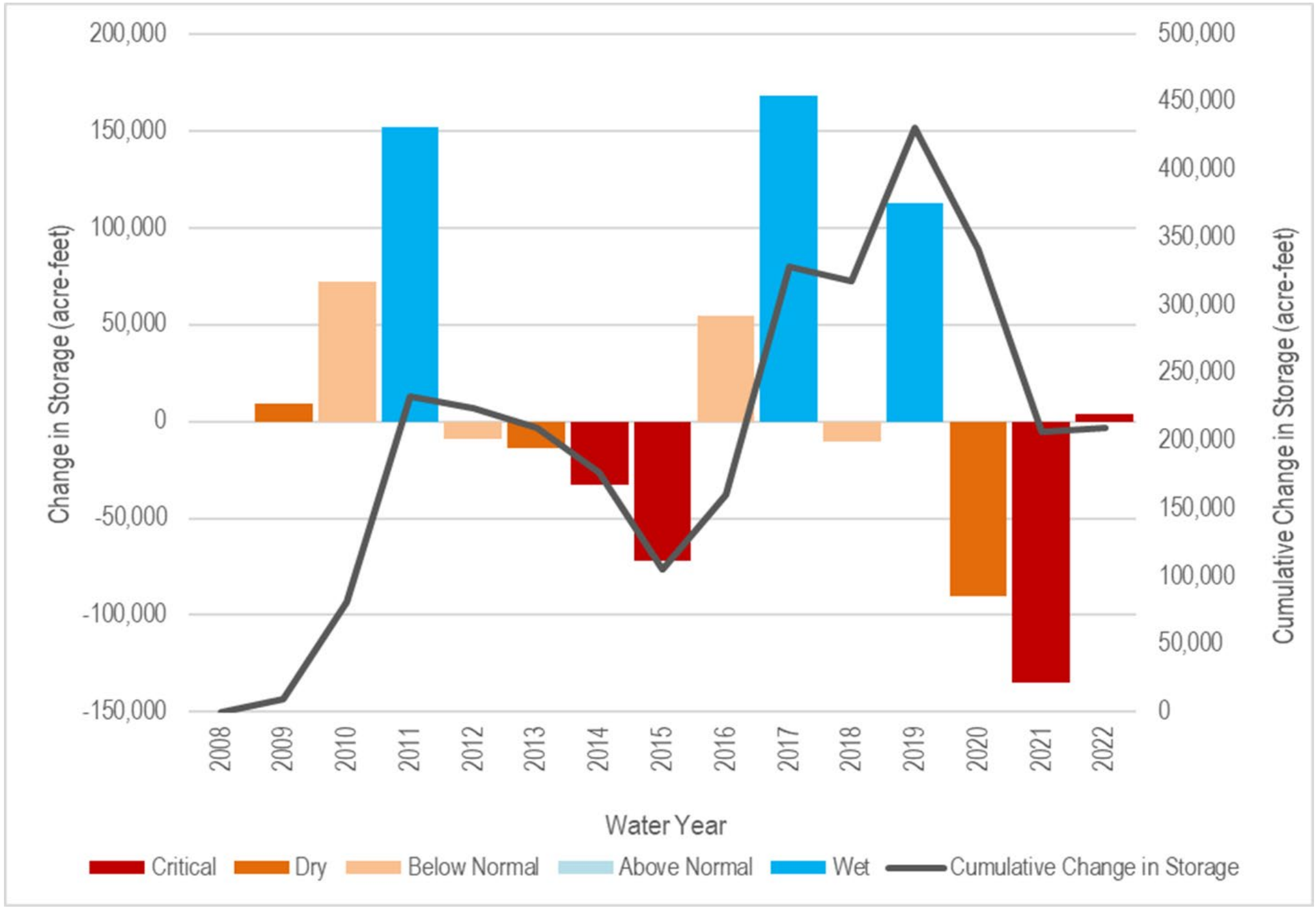
Groundwater Level Differences





WY 2022

Annual and Cumulative Changing in Groundwater Storage



Projects and Management Actions and Supplemental Projects

Projects

#1: Regional Conjunctive Use Expansion - Phase 1

#2: Natomas Cross Canal Stability Berm and Channel Habitat Enhancement Project

Management Actions

#1: Complete Planning for Sacramento Regional water Bank

#2: Explore Improvements with NASb Well Permitting Programs

#3: Proactive Coordination with Land Use Agencies

#4: Domestic/Shallow Well - Data Collection and Communication Program

#5: GDE Assessment Program

Supplemental Projects

- Regional Water Authority - Expansion of the Sacramento Regional Water Bank (Phase 2)
- Placer County Water Agency - RiverArc
- South Sutter Water District - Water System Conveyance System Improvements
- Natomas Mutual Water Company - Service Area Expansion
- Expansion City of Lincoln – Recycled Water Conjunctive Use
- Placer County - Sustainable Agricultural Groundwater Recharge Program

Sustainability Indicators

Table 7-1. Sustainability Indicators and Undesirable Results

Sustainability Indicator	Undesirable Result Definition
Chronic lowering of groundwater levels	*20% or more of all NASb RMS have MT exceedances for 2 consecutive Fall measurements (8 out of 41 wells)*
Reduction of storage	*20% or more of all NASb RMS have MT exceedances for 2 consecutive Fall measurements (8 out of 41 wells)*
Depletion of surface water	*20% or more of the NASb interconnected surface water RMSs have MT exceedances for 2 consecutive Fall measurements (5 out of 21 wells)*
Land Subsidence	*The rate of inelastic subsidence exceeds 0.5 feet over a 5-year period over an area covering approximately 5 or more square miles*
Degraded groundwater quality	For public water system wells • *The basin-wide average TDS concentrations of all public water system wells exceeds 400 mg/L* *OR* • *The basin wide average nitrate (as N) concentration of all public water system wells exceeds 8 mg/L* For the shallow aquifer (i.e., domestic and self-supplied) wells *25% of the RMSs, TDS and nitrate (as N) concentrations exceed state maximum contaminant levels*

Notes: mg/L= milligrams per liter; MT = minimum threshold; NASb = North American Subbasin; RMS = representative monitoring site;
TDS = total dissolved solids

Source: SGA, 2021

Chronic Lowering of Groundwater Levels

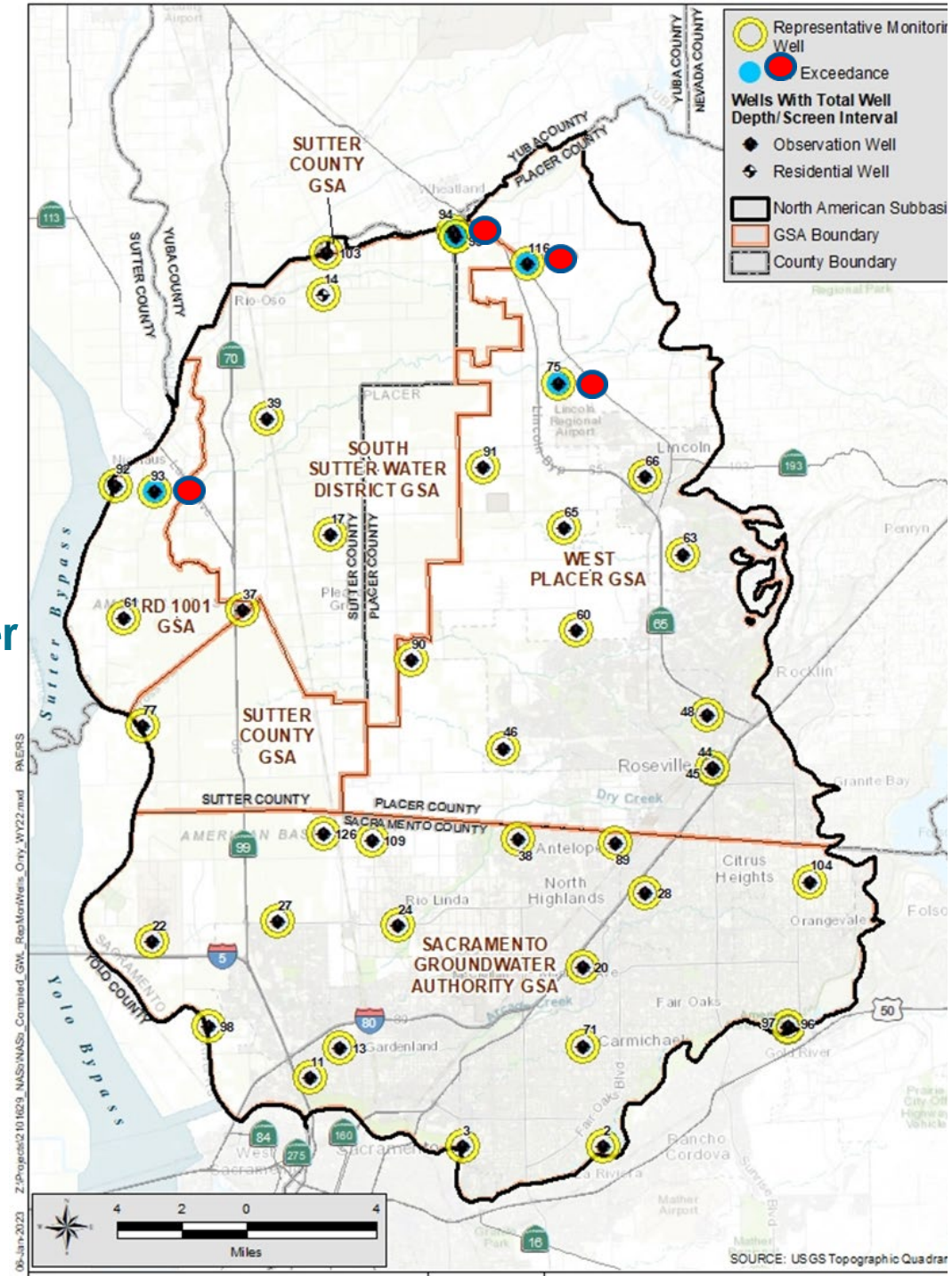


Table 7-2. Chronic Lowering of Groundwater Levels and Minimum Thresholds

Representative Monitoring Sites (i.e. Wells)			WY 2022		2021 Fall Exceeded	2022 Fall Exceeded	Fall 2022 - MT = Difference (ft)
Map No.	Local Name	MT (ft msl)	Spring (ft msl)	Fall (ft msl)			
2	SGA_MW06	1	9.44	7.78	No	No	6.8
3	SGA_MW04	-5	0.34	-0.42	No	No	4.6
11	Bannon Creek Park	-5	0.26	-1.74	No	No	3.3
13	Chuckwagon Park	-15	-9.39	-11.34	No	No	3.7
14	13N04E23A002M	26	32.18	27.88	No	No	1.9
17	AB-2 shallow	-17	3.07	-7.69	No	No	9.3
20	SGA_MW05	-37	-19.63	-27.43	No	No	9.6
22	AB-4 shallow	-1	9.03	3.46	No	No	4.5
24	SGA_MW02	-27	-15.46	-16.91	No	No	10.1
27	AB-3 shallow	-4	8.75	5.70	No	No	9.7
28	Twin Creeks Park	-28	-12.30	-16.00	No	No	12.0
37	SUT-P1	10	16.51	12.21	No	No	2.2
38	Lone Oak Park	-27	-15.23	-16.91	No	No	10.1
39	AB-1 shallow	3	17.66	5.39	No	No	2.4
44	WPMW-10A	133	135.51	134.37	No	No	1.4
45	WPMW-9A	135	138.53	137.46	No	No	2.5
46	SVMW West - 1A	-32	-16.55	-21.25	No	No	10.8
48	WPMW-4A	75	79.19	79.07	No	No	4.1
60	WPMW-2A	22	26.10	24.70	No	No	2.7
61	Sutter County MW-5A	10	17.46	14.40	No	No	4.4
63	WPMW-3A	145	147.51	146.90	No	No	1.9
65	MW 1-3	49	57.03	54.74	No	No	5.7
66	MW 5-2	108	110.96	108.93	No	No	0.9
71	WCMS5	-40	-22.41	-29.39	No	No	10.6
75	MW 2-3	89	88.58	83.04	Yes	Yes	-6.0
77	SREL-1-27-F1	9	11.84	10.38	No	No	1.4
89	Roseview Park - 315	-22	-9.46	-11.76	No	No	10.2
90	WPMW-12A	-45	-23.08	-35.53	No	No	9.5
91	WPMW-11A	3	12.58	0.52	No	Yes	-2.5
92	RDMW-101	15	19.49	16.46	No	No	1.5
93	RDMW-102	12	15.33	11.03	Yes	Yes	-1.0
94	RDMW-103	58	60.44	50.68	Yes	Yes	-7.3
95	RDMW-104	57	58.52	51.08	Yes	Yes	-5.9
96	1516	67	69.76	69.72	No	No	2.7
97	1518	57	60.42	60.48	No	No	3.5
98	URS71000-700+00C	7	10.38	8.00	Yes	No	1.0
103	BR-1B	36	40.99	36.97	No	No	1.0
104	SGA_MW08	97	106.21	105.76	No	No	8.8
109	SGA_MW01	-33	-18.26	-20.61	No	No	12.4
116	Old Well #2	68	69.10	65.30	Yes	Yes	-2.7
126	DeWit	-25	5.30	-3.80	No	No	21.2

Note: ft msl = feet above or below mean sea level; MT = minimum threshold
Yellow highlight indicates MT exceedance.

Depletion of Surface Water

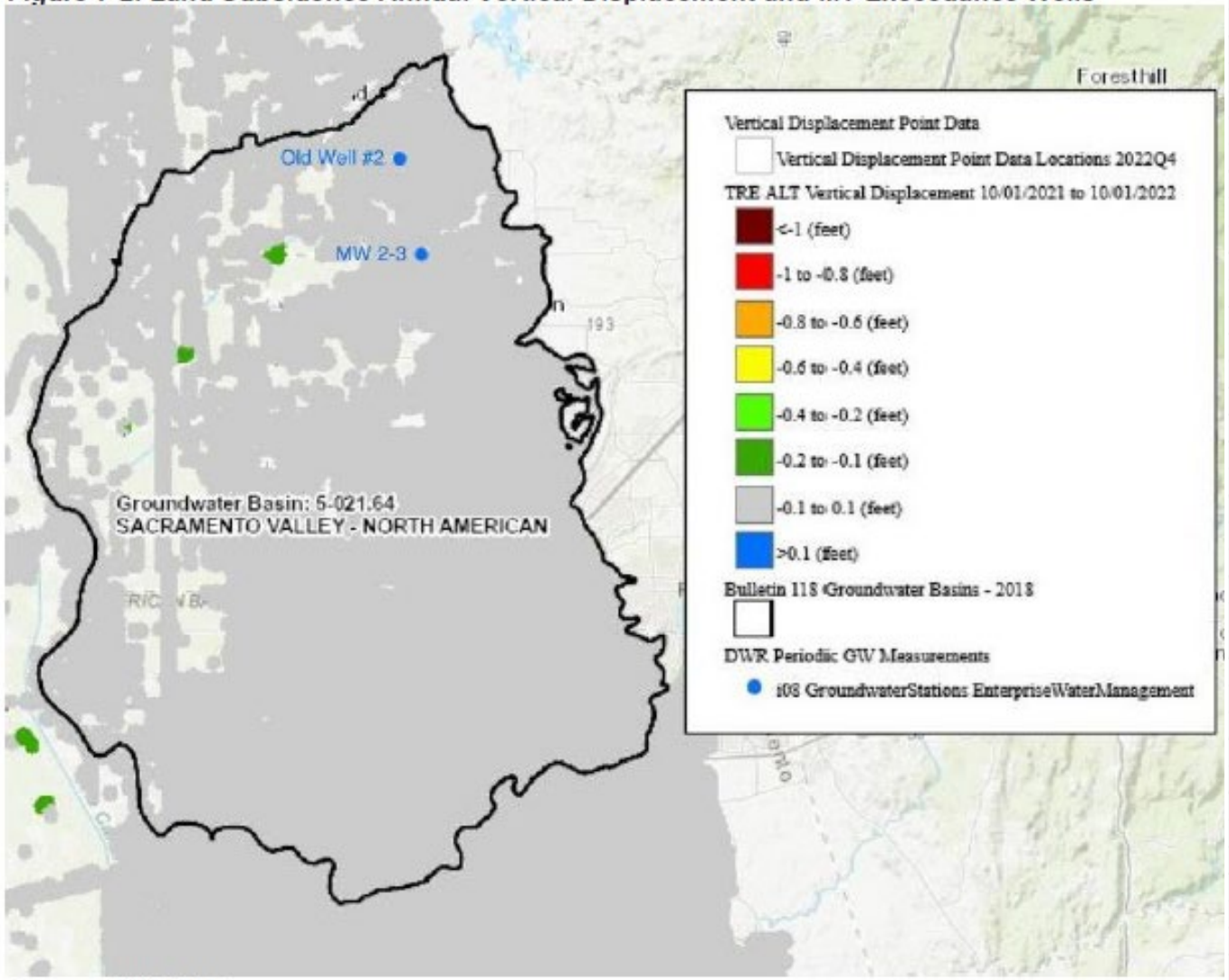
Table 7-3. Depletion of Surface Water and Minimum Thresholds

Representative Monitoring Sites (i.e. Wells)			WY 2022		2021 Fall Exceeded	2022 Fall Exceeded	Fall 2022 - MT = Difference (ft)
Map No.	Local Name	MT (ft msl)	Spring (ft msl)	Fall (ft msl)			
2	SGA_MW06	1	9.44	7.78	No	No	6.8
3	SGA_MW04	-5	0.34	-0.42	No	No	4.6
11	Bannon Creek Park	-5	0.26	-1.74	No	No	3.3
13	Chuckwagon Park	-15	-9.39	-11.34	No	No	3.7
14	13N04E23A002M	26	32.18	27.88	No	No	1.9
22	AB-4 shallow	-1	9.03	3.46	No	No	4.5
27	AB-3 shallow	-4	8.75	5.70	No	No	9.7
28	Twin Creeks Park	-28	-12.30	-16.00	No	No	12.0
37	SUT-P1	10	16.51	12.21	No	No	2.2
44	WPMW-10A	133	135.51	134.37	No	No	1.4
45	WPMW-9A	135	138.53	137.46	No	No	2.5
61	Sutter County MW-5A	10	17.46	14.40	No	No	4.4
63	WPMW-3A	145	147.51	146.90	No	No	1.9
66	MW 5-2	108	110.96	108.93	No	No	0.9
75	MW 2-3	89	88.58	83.04	Yes	Yes	-6.0
77	SREL-1-27-F1	9	11.84	10.38	No	No	1.4
92	RDMW-101	15	19.49	16.46	No	No	1.5
93	RDMW-102	12	15.33	11.03	Yes	Yes	-1.0
94	RDMW-103	58	60.44	50.68	Yes	Yes	-7.3
95	RDMW-104	57	58.52	51.08	Yes	Yes	-5.9
96	1516	67	69.76	69.72	No	No	2.7
97	1518	57	60.42	60.48	No	No	3.5
98	UR571000-700+00C	7	10.38	8.00	Yes	No	1.0
103	BR-1B	36	40.99	36.97	No	No	1.0

Note: ft msl = feet above or below mean sea level; MT = minimum threshold

Land Subsidence

Figure 7-2. Land Subsidence Annual Vertical Displacement and MT Exceedance Wells



Source: DWR, 2023

Table 7-4. Land Subsidence Groundwater Levels and Minimum Thresholds

Representative Monitoring Sites (i.e. Wells)			WY 2022		2021 Fall Exceeded	2022 Fall Exceeded	Fall 2022 - MT = Difference (ft)
Map No.	Local Name	MT (ft msl)	Spring (ft msl)	Fall (ft msl)			
2	SGA_MW06	1	9.44	7.78	No	No	6.8
3	SGA_MW04	-5	0.34	-0.42	No	No	4.6
11	Bannon Creek Park	-5	0.26	-1.74	No	No	3.3
13	Chuckwagon Park	-15	-9.39	-11.34	No	No	3.7
14	13N04E23A002M	15	32.18	27.88	No	No	12.9
17	AB-2 shallow	-21	3.07	-7.69	No	No	13.3
20	SGA_MW05	-37	-19.63	-27.43	No	No	9.6
22	AB-4 shallow	-1	9.03	3.46	No	No	4.5
24	SGA_MW02	-27	-15.46	-16.91	No	No	10.1
27	AB-3 shallow	-4	8.75	5.70	No	No	9.7
28	Twin Creeks Park	-28	-12.30	-16.00	No	No	12.0
37	SUT-P1	8	16.51	12.21	No	No	4.2
38	Lone Oak Park	-27	-15.23	-16.91	No	No	10.1
39	AB-1 shallow	-5	17.66	5.39	No	No	10.4
44	WPMW-10A	133	135.51	134.37	No	No	1.4
45	WPMW-9A	131	138.53	137.46	No	No	6.5
46	SVMW West - 1A	-32	-16.55	-21.25	No	No	10.8
48	WPMW-4A	72	79.19	79.07	No	No	7.1
60	WPMW-2A	21	26.10	24.70	No	No	3.7
61	Sutter County MW-5A	-1	17.46	14.40	No	No	15.4
63	WPMW-3A	145	147.51	146.90	No	No	1.9
65	MW 1-3	38	57.03	54.74	No	No	16.7
66	MW 5-2	104	110.96	108.93	No	No	4.9
71	WCMSS	-40	-22.41	-29.39	No	No	10.6
75	MW 2-3	86	88.58	83.04	Yes	Yes	-3.0
77	SREL-1-27-F1	9	11.84	10.38	No	No	1.4
89	Roseview Park - 315	-22	-9.46	-11.76	No	No	10.2
90	WPMW-12A	-65	-23.08	-35.53	No	No	29.5
91	WPMW-11A	-18	12.58	0.52	No	No	18.5
92	RDMW-101	14	19.49	16.46	No	No	2.5
93	RDMW-102	8	15.33	11.03	No	No	3.0
94	RDMW-103	36	60.44	50.68	No	No	14.7
95	RDMW-104	36	58.52	51.08	No	No	15.1
96	1516	67	69.76	69.72	No	No	2.7
97	1518	57	60.42	60.48	No	No	3.5
98	URS71000-700+00C	6	10.38	8.00	No	No	2.0
103	BR-1B	36	40.99	36.97	No	No	1.0
104	SGA_MW08	97	106.21	105.76	No	No	8.8
109	SGA_MW01	-33	-18.26	-20.61	No	No	12.4
116	Old Well #2	68	69.10	65.30	Yes	Yes	-2.7
126	DeWit	-25	5.30	-3.80	No	No	21.2

Note: ft msl = feet above mean sea level; MT = minimum threshold

Degraded Water Quality

Table 7-5. Public Supply Wells Water Quality Summary

	TDS	Nitrate (as Nitrogen)
Number of Wells Sampled	224	267
Date Range of Samples	02/20/2013-10/06/2022	08/21/2014-11/02/2022
Units	mg/L	mg/L
Minimum Concentration	5	<0.05
Maximum Concentration	650	9.10
Average Concentration (1)	256.47	1.71
Minimum Threshold (average of all wells)	400	8

Notes: mg/L= milligrams per liter; TDS = total dissolved solids
(1) For average Nitrate concentrations, values below laboratory detection levels were calculated as one-half the reporting limit.
Source: SWRCB, 2023

Table 7-6. Shallow Aquifer Water Quality Summary

Map No.	Local Name	WY 2022 TDS Reported Concentration (mg/L)	WY 2022 Nitrate as N Reported Concentration (mg/L)	TDS (Secondary MCL = 500 mg/L)	Nitrate (Primary MCL = 10 mg/L)
				Selected MTs (mg/L)	Selected MTs (mg/L)
17	AB-2 shallow	--	--	500	10
20	SGA_MW05	--	--	500	10
24	SGA_MW02	--	--	500	10
27	AB-3 shallow	--	--	500	10
37	SUT-P1	--	--	500	10
39	AB-1 shallow	--	--	500	10
46	SVMWWest1A	--	--	500	10
80	Cemetery (IRLP)	240	1.5	500	10
89	Roseview Park - 315	--	--	500	10
90	WPMW-12A	210	0.73	500	10
91	WPMW-11A	210	3.6	500	10
99	Main Well	--	--	500	10
109	SGA_MW01	--	--	500	10
133	LW-1	--	--	500	10
177	Well 22 - Northrop	--	--	500	10
298	Tinker Road Well	--	--	500	10

Note: --- = sample not acquired; mg/L = milligrams per liter

SGA – Timeline of Activities

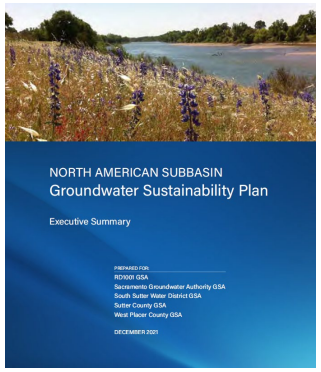
SGA - SGMA

SGA – Non SGMA

GSP development and adoption

GSP Implementation Begins and continues…

5-year updates (2026, 2031, 2036, 2041)



2016 to 2021

2022

2023

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Dec

Annual Reporting

Projects and Management Actions

Groundwater Sustainability Agency (GSA) Coordination

Outreach and Engagement

Monitoring and Data Management

Budgeting and Funding

Prior Groundwater Management Plan Development and Implementation

SGM Department of Water Resources (DWR) Grant

Analysis of Pumping Targets to Optimize Conjunctive Use

Regional Contamination Issues Committee (RCIC)

Monitoring and Data Management

Other: Well Permitting, General Plan Evaluation, Future Grants, etc