Tule Lake Subbasin

Groundwater Sustainability Plan

Annual Report Water Years 2019 - 2021

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List of Acronyms and Abbreviations

AEM	Airborne Electromagnetic	MCL	Maximum Containment Level
BGS	Below Ground Surface	MT	Minimum Threshold
CASGEM	California Statewide Groundwater Elevation Monitoring	Reclamation	U.S. Bureau of Reclamation
DWR	California Department of Water Resources	SGMA	Sustainable Groundwater Management Act
FT	Feet	TDS	Total Dissolved Solids
GDE	Groundwater Dependent Ecosystems	TID	Tulelake Irrigation District
GSA	Groundwater Sustainability Agency	TSS	Technical Support Services
GSP or Plan	Groundwater Sustainability Plan	UKL	Upper Klamath Lake
IM	Interim Milestone	WY	Water Year

Executive Summary

Introduction

The Tule Lake Subbasin (Subbasin) Groundwater Sustainability Plan (GSP or Plan) was adopted on December 14, 2020, by the four Groundwater Sustainability Agencies (GSAs): the City of Tulelake GSA, Modoc County GSA, Siskiyou County GSA, and the Tulelake Irrigation District GSA. The GSAs were formed in accordance with the Sustainable Groundwater Management Act (SGMA) to prepare and implement the GSP for the Subbasin. The GSP was submitted to the California Department of Water Resources (DWR) on January 31, 2022, consistent with the January 31, 2022, deadline for submission of GSPs by medium priority basins.

SGMA Regulation § 356.2(c) requires GSAs to submit an Annual Report to DWR by April 1 of each year following the submission of the GSP, except for those years when 5-Year Plan updates are submitted. This Annual Report provides Subbasin information for water years (WY) 2019 through 2021. In some instances, the data used for this Annual Report was collected outside of the water year; however, it was used since it was the best and closest data available. This Annual Report was prepared and submitted to DWR under the guidance of the GSAs and Plan Manager, and is consistent with DWR's Annual Report Elements Guide.

The water year types[1] for each year addressed in this Annual Report were less dry (LD) in 2019, very dry (VD) in 2020, and VD in 2021. The drought conditions and lack of project supply has resulted in increased coordination between TID, the Klamath Water User's Association, other Klamath Project water districts, and Reclamation.

Basin Conditions

The drought conditions experienced in the Subbasin over the last three years have resulted in reduced surface water supply from the Klamath Project. The lack of surface water has impacted groundwater conditions.

Groundwater Levels and Storage

This Annual Report identifies the minimum threshold (MT), measurable objective (MO), interim milestone (IM), and most recent fall measurement for each representative groundwater monitoring well in the Tule Lake Subbasin. No MTs were exceeded during WY 2019 – WY 2021. However, due to the dry hydrologic conditions, groundwater levels within the Subbasin declined during WY 2021 as compared to WYs 2018 and 2019.

Change in groundwater storage was estimated using ArcGIS desktop software and Subbasin characteristics. Change in groundwater storage presented in this Annual Report are based on an evaluation of spring groundwater levels. It is estimated that groundwater storage in the Subbasin decreased by about 27,600 acre-feet when comparing spring 2020 to spring 2019.

[1] Water year types provide an indication of hydrology and are described in the technical memorandum provided in Appendix F of the Tulelake Subbasin GSP.

Water Quality

The GSAs established a minimum threshold of 900 milligrams per liter (mg/L) of Total Dissolved Solids and a minimum threshold of 9 mg/L of Nitrate at all representative monitoring sites for the water quality sustainability indicator within the Subbasin. The MTs were not exceeded during WY 2019 – WY 2021.

Water Use by Sector

SGMA Regulations require that the Annual Report include groundwater extraction, water supply, and total water use information for each water use sector. This Annual Report provides a summary of this information within the Subbasin during WY 2019 – WY 2021. The primary water use sectors in the Subbasin are urban and agriculture. The total annual water use within the subbasin was approximately 167,000 acre-feet (AF), 104,000 AF, and 68,000 AF, respectively. The difference in total water use each year is a result of decreased surface water supplies delivered from the Klamath Project to the Tulelake Irrigation District.

GSP Implementation Progress

The GSP identified that the Tule Lake Subbasin is currently being sustainably managed. Therefore, no projects or management actions are required to achieve sustainability; however, the Tule Lake Subbasin GSAs have identified projects and management actions that can improve their understanding of the groundwater Subbasin. Due to the standing of the Subbasin, the projects and management actions identified in the GSP are intended to help reduce or eliminate data gaps, and will be implemented based on the availability of resources and funding. Similarly, interim milestones are intended to be set to guide conditions during implementation of the GSP in order to define a pathway to reach sustainability within 20 years.

Implementation of Projects and Management Actions

Projects and management actions identified in the GSP include development of a well inventory, construction of dedicated groundwater monitoring wells, expansion of the water quality monitoring network to include additional wells, potential groundwater dependent ecosystems field investigations, groundwater recharge, domestic well assistance program, and an adaptive management strategy. This Annual Report provides a project and management action update summary.

1 Introduction

The Tule Lake Subbasin (Subbasin) Groundwater Sustainability Plan (GSP or Plan) was adopted on December 14, 2020, by the four Groundwater Sustainability Agencies (GSAs). The four GSAs are the City of Tulelake GSA, Modoc County GSA, Siskiyou County GSA, and the Tulelake Irrigation District GSA, which were formed in accordance with the Sustainable Groundwater Management Act (SGMA) to prepare and implement the GSP for the Subbasin. Collectively, these four GSAs will be referred to as "GSAs". The GSP was submitted to the California Department of Water Resources (DWR) on January 31, 2022, consistent with the January 31, 2022, deadline for submission of GSPs by medium priority basins. Figure 1-1 shows the location of the Tulelake Subbasin and the GSAs.

SGMA Regulation § 356.2(c) requires GSAs to submit an Annual Report to DWR by April 1 of each year following the submission of the GSP, except for those years when 5-Year Plan updates are submitted. The GSP included data and information describing conditions within the Subbasin through water year 2018. Therefore, this Annual Report provides Subbasin information for water years 2019 through 2021. The SGMA Regulation requires the Annual Report to cover groundwater elevations and change in groundwater storage, groundwater extractions, surface water supply, and a description of GSP implementation progress. In some instances, the data used for this Annual Report was collected outside of the water year; however, it was used since it was the best and closest data available. This Annual Report was prepared and submitted to DWR under the guidance of the GSAs and Plan Manager, and is consistent with DWR's Annual Report Elements Guide. A completed elements guide checklist is provided as Appendix A.

The water year types[2] for each year addressed in this Annual Report were less dry (LD) in 2019, very dry (VD) in 2020, and VD in 2021. As per the 2015 Klamath Project Operations Plan by the United States Bureau of Reclamation (Reclamation), the project water demand from Upper Klamath Lake (UKL) for a full supply is 390,000 acre-feet (AF) during the irrigation season. During the 2019, 2020, and 2021 irrigation seasons the Project Supply allocation (which is the surface water supply to irrigation districts), including the Tulelake Irrigation District (TID), for the Klamath Project was 322,000 AF, 140,000 AF, and 33,000 AF, respectively. Although there was a project supply identified in 2021, no Project water was delivered to TID. From 2011 through 2018 the Project Supply ranged from 239,000 AF to 390,000 AF, with an average of approximately 314,000 AF. The drought conditions and lack of project supply has resulted in increased coordination between TID, the Klamath Water User's Association, other Klamath Project water districts, and Reclamation.

[2] Water year types provide an indication of hydrology and are described in the technical memorandum provided in Appendix F of the Tulelake Subbasin GSP.

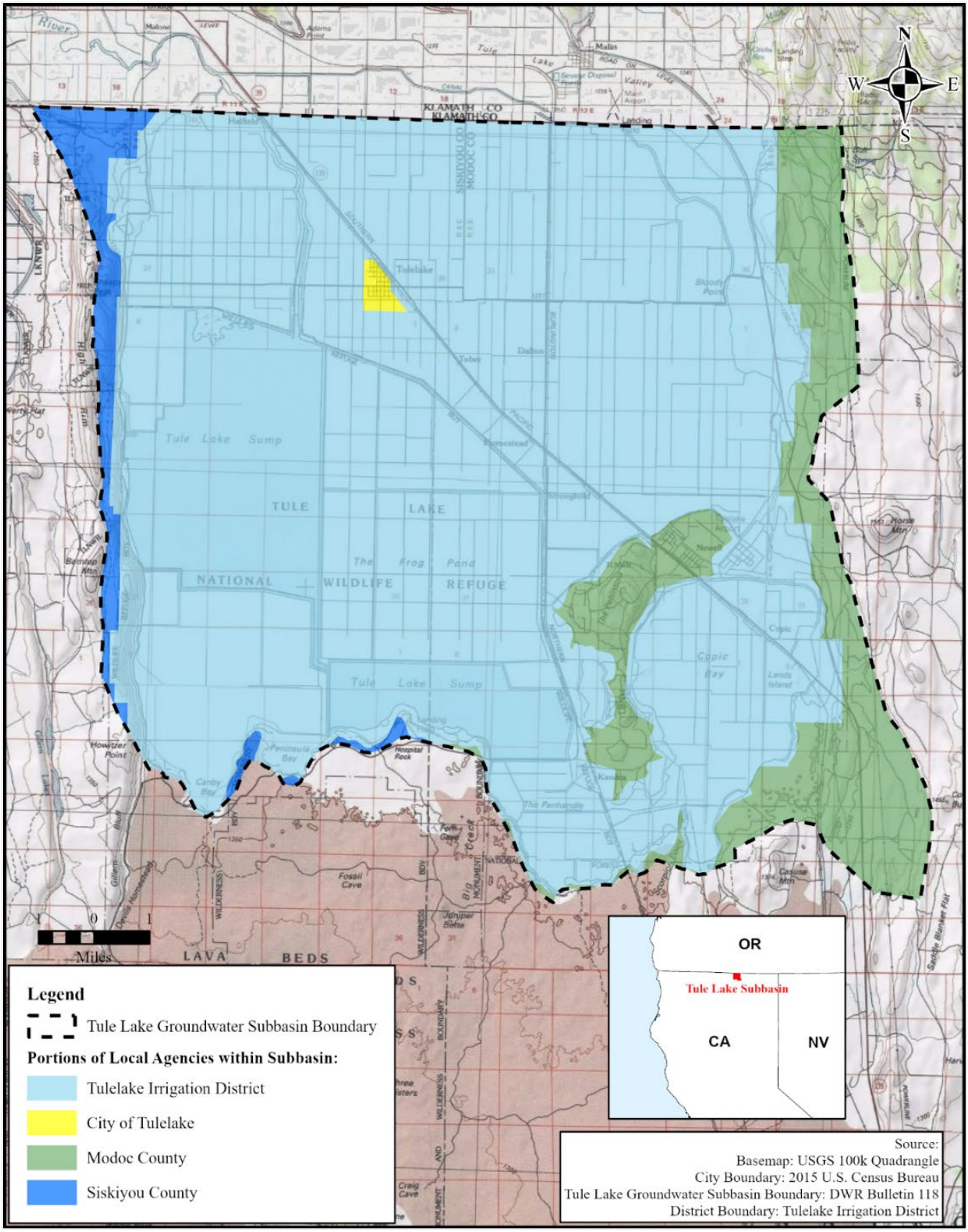


Figure 1-1. Location of the Groundwater Sustainability Agencies within the Tule Lake Subbasin

2 Basin Conditions

As described in the previous section, the drought conditions experienced in the Subbasin over the last three years have resulted in reduced surface water supply from the Klamath Project. The lack of surface water has impacted groundwater conditions, as described in this Annual Report.

Groundwater Conditions

Table 2-1 identifies the representative groundwater monitoring wells for the Tule Lake Subbasin. In addition, Table 2-1 identifies the minimum threshold (MT), measurable objective (MO), interim milestone (IM), and most recent fall measurement for each monitoring location. As identified in the GSP, the IMs are set at the same levels as the MOs.

Table 2-1. Summary of Sustainable Management Criteria and Most Recent Groundwater Level Measurement at Representative Monitoring Wells

State Well Number	Minimum Threshold (ft bgs)	Measurable Objective (ft bgs)	Current Measurement Date	Current Measurement (ft bgs)
48N05E35F001M	32	8	10/21/2021	11.30
48N04E22M001M	50	15	10/21/2021	17.50
48N04E31M001M	48	23	10/21/2021	22.40
48N04E19C001M	29	11	10/21/2021	14.00
47N05E04M001M	15	9	10/21/2021	12.80
47N05E01N001M	49	15	10/21/2021	18.20
46N05E21J001M	32	10	10/21/2021	9.00
46N05E01P001M	24	11	10/21/2021	9.80
41S12E19Q001W	50	6	10/21/2021	7.99
48N04E30F002M	80	38	10/8/2021	66.80
48N04E13K001M	212	42	10/8/2021	75.86
48N05E26D001M	304	48	10/8/2021	57.91
46N05E22D001M	99	40	10/8/2021	45.19
TL-T1 Q3B	35	27	10/8/2021	28.50
TL-T3 GP	16	12	10/8/2021	13.80
Note: ft bgs = feet below ground surface				

Figure 2-1 through Figure 2-8 identify the seasonal high (spring) and seasonal low (fall) groundwater elevations and contours within the Subbasin for 2018 through 2021. These figures illustrate the general location and volume of groundwater extractions. Groundwater level data were obtained from the GSAs

and the California Statewide Groundwater Elevation Monitoring (CASGEM) system. Reported groundwater levels were used to develop groundwater elevation contours. Contours were developed based on available surrounding data, which is very limited; therefore, the developed contours do not encompass the entire Subbasin. There is also limited monitoring in the middle of the Subbasin. The GSP identifies this as a data gap, and the GSAs have applied to DWR for Technical Support Services (TSS) in order to assist with installation of a new monitoring well.

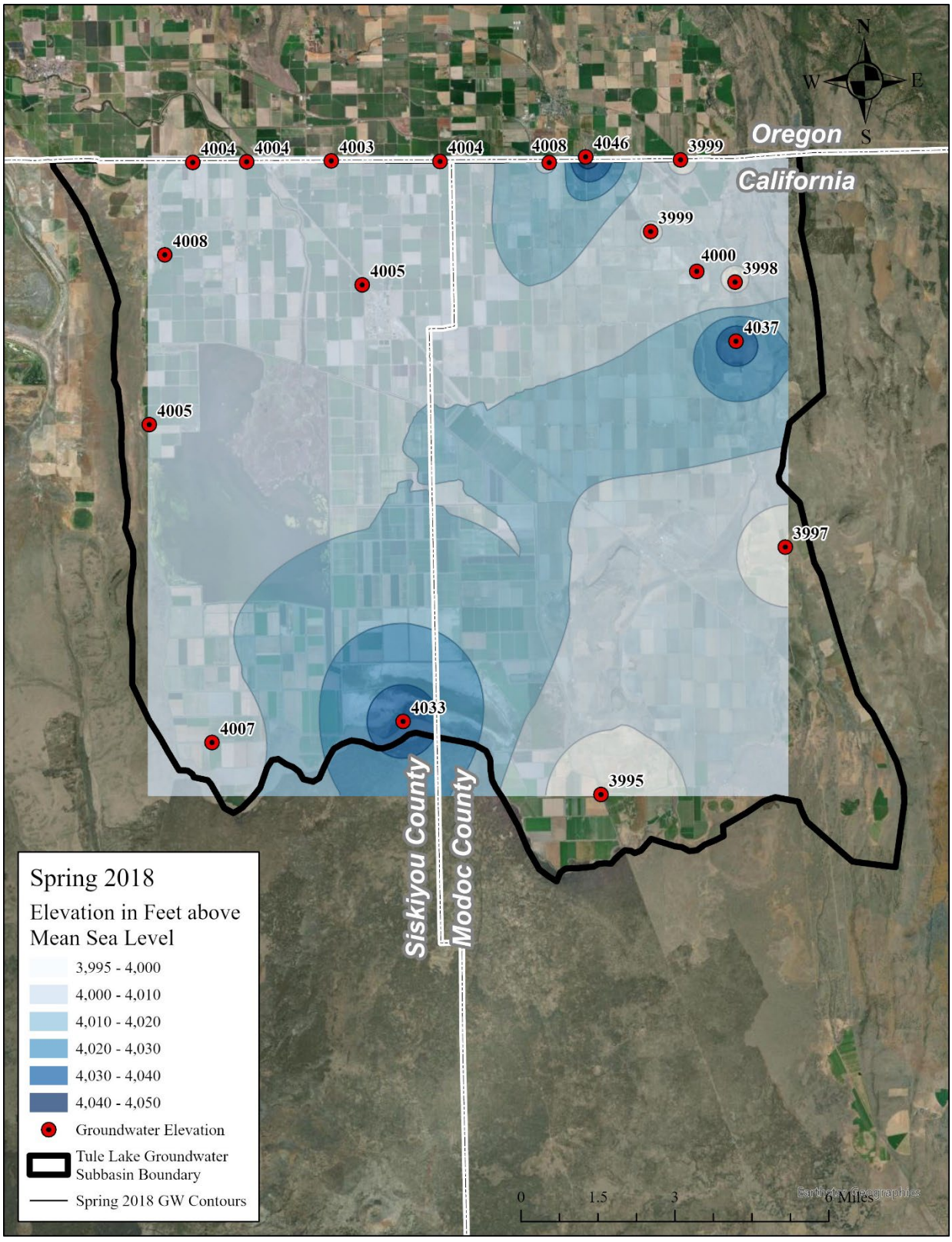


Figure 2-1. Spring 2018 Groundwater Surface Elevations

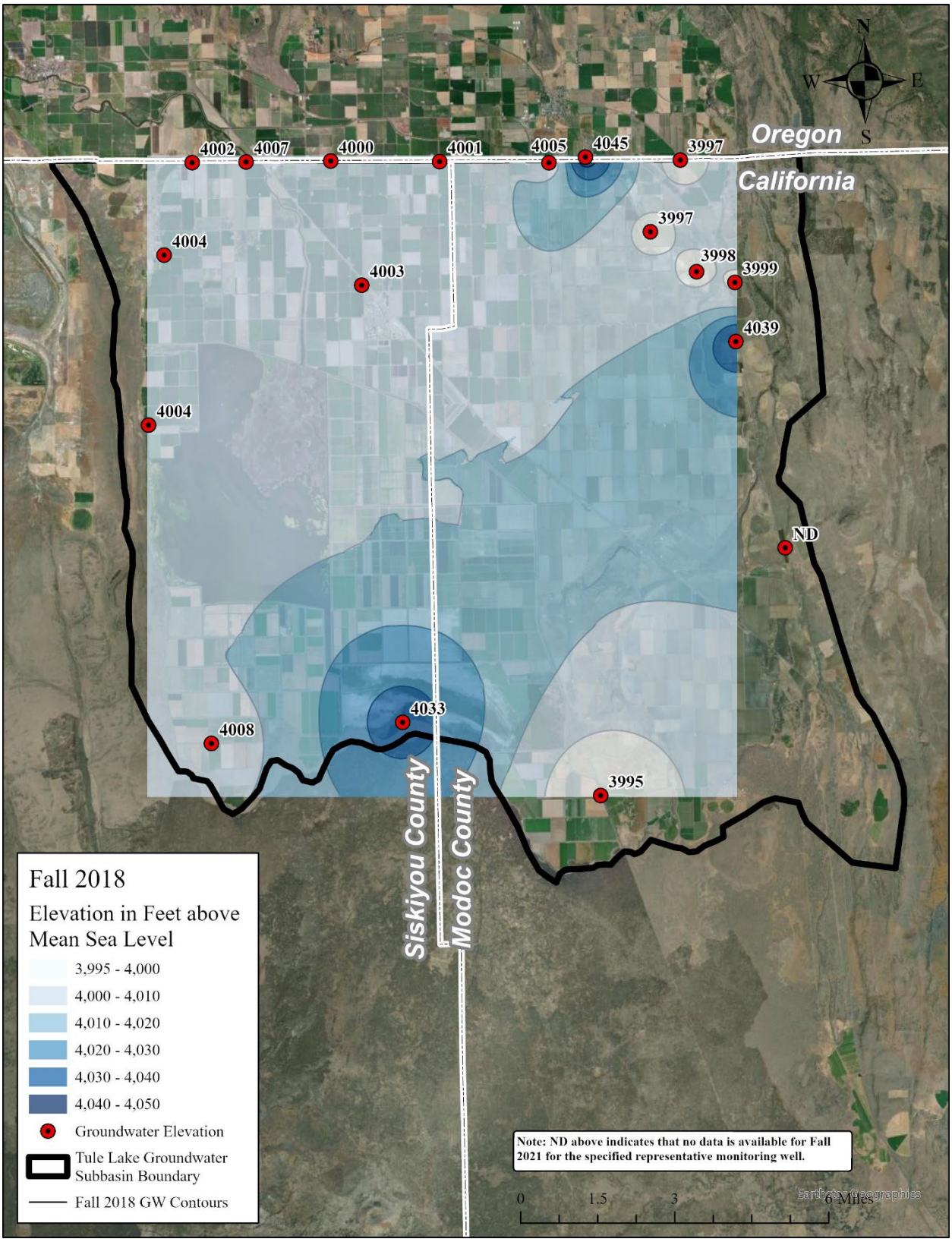


Figure 2-2. Fall 2018 Groundwater Surface Elevations

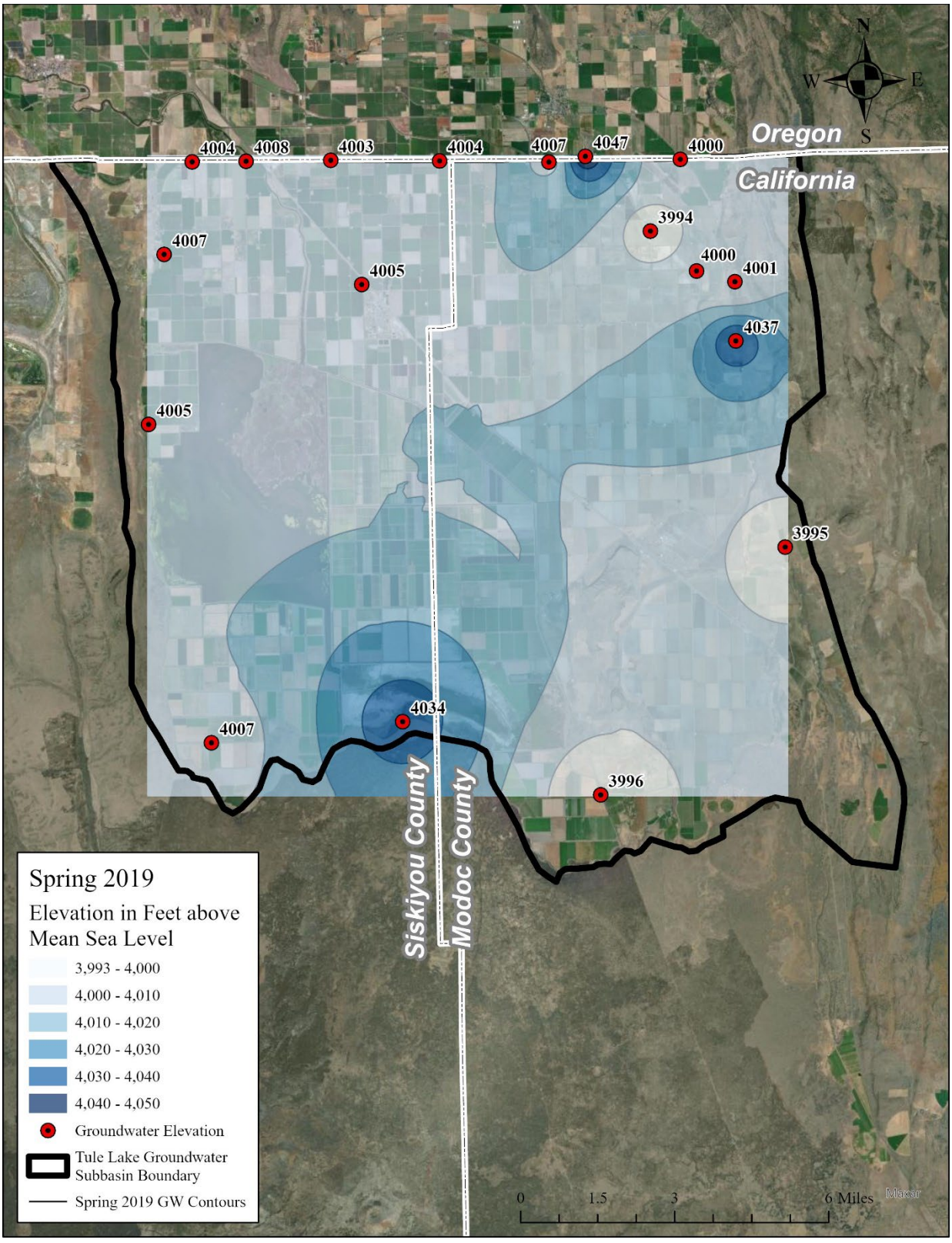


Figure 2-3. Spring 2019 Groundwater Surface Elevations

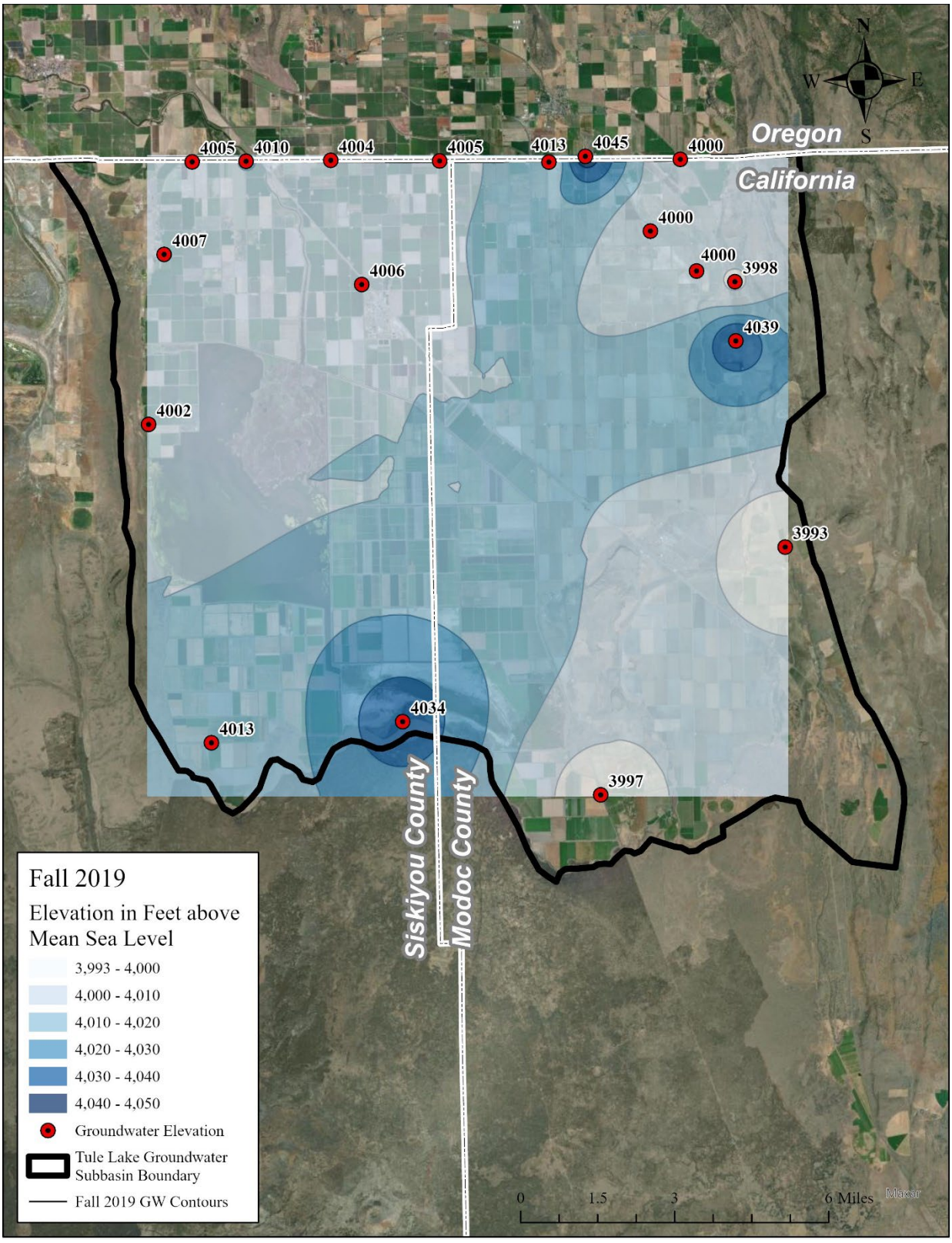


Figure 2-4. Fall 2019 Groundwater Surface Elevations

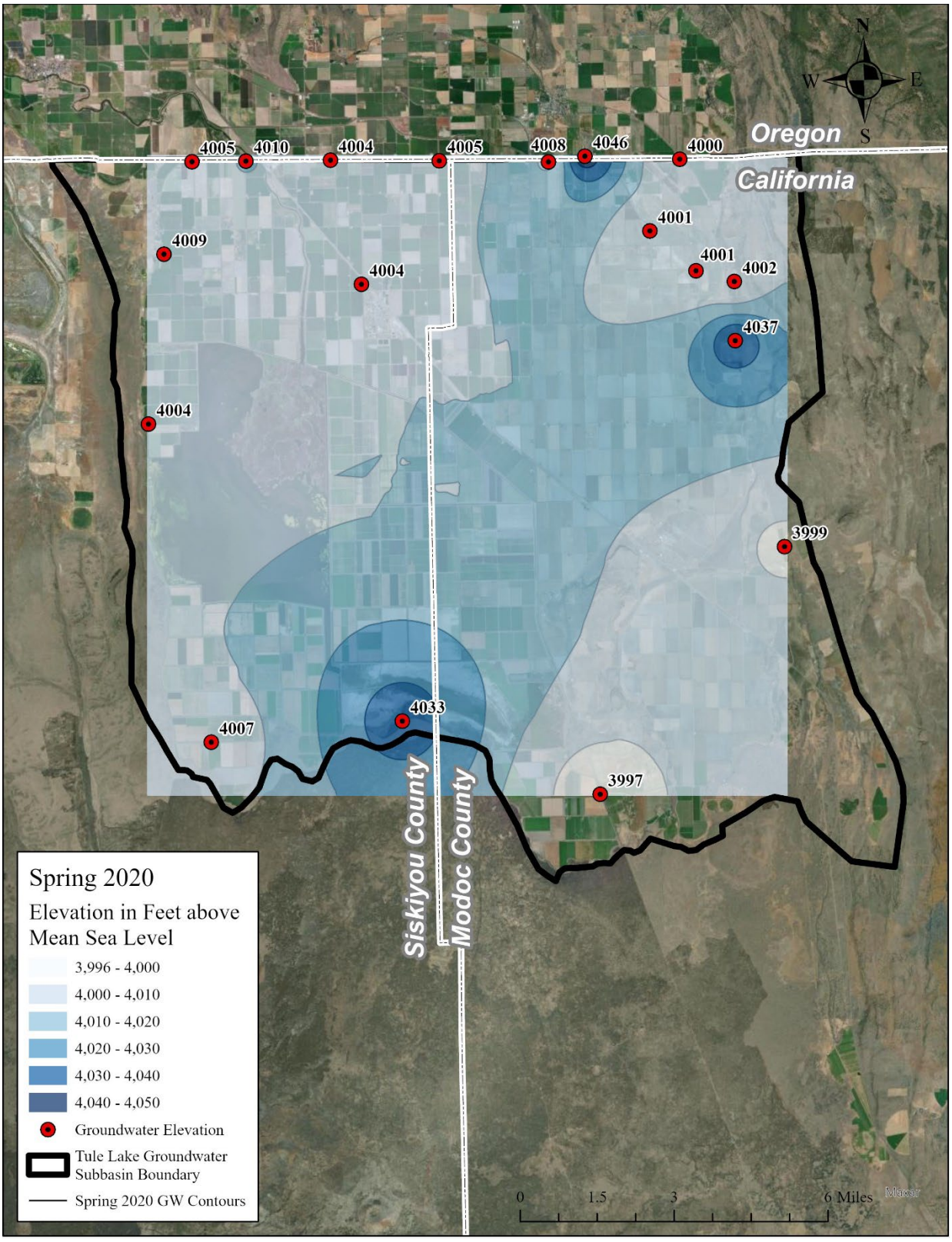


Figure 2-5. Spring 2020 Groundwater Surface Elevations

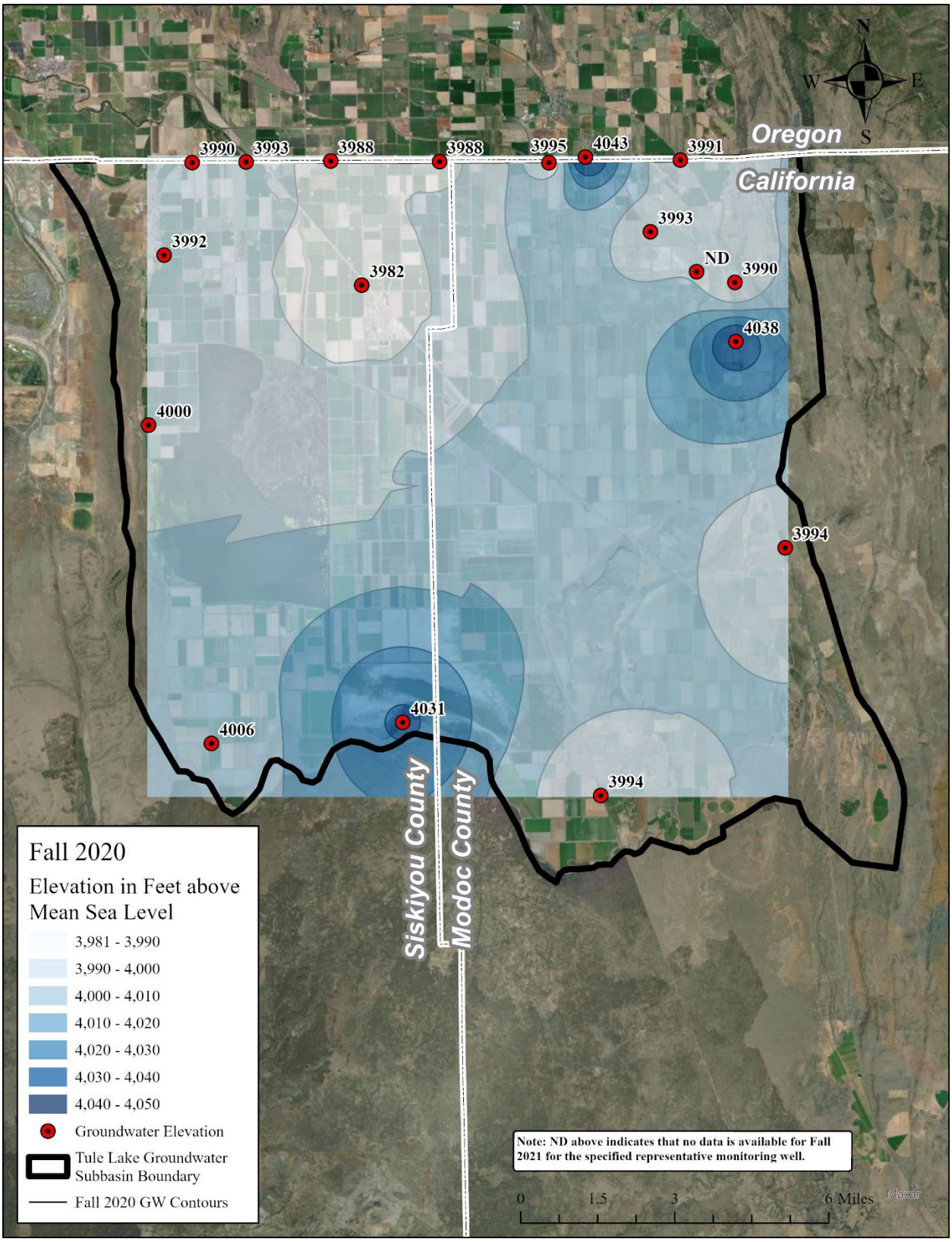


Figure 2-6. Fall 2020 Groundwater Surface Elevations

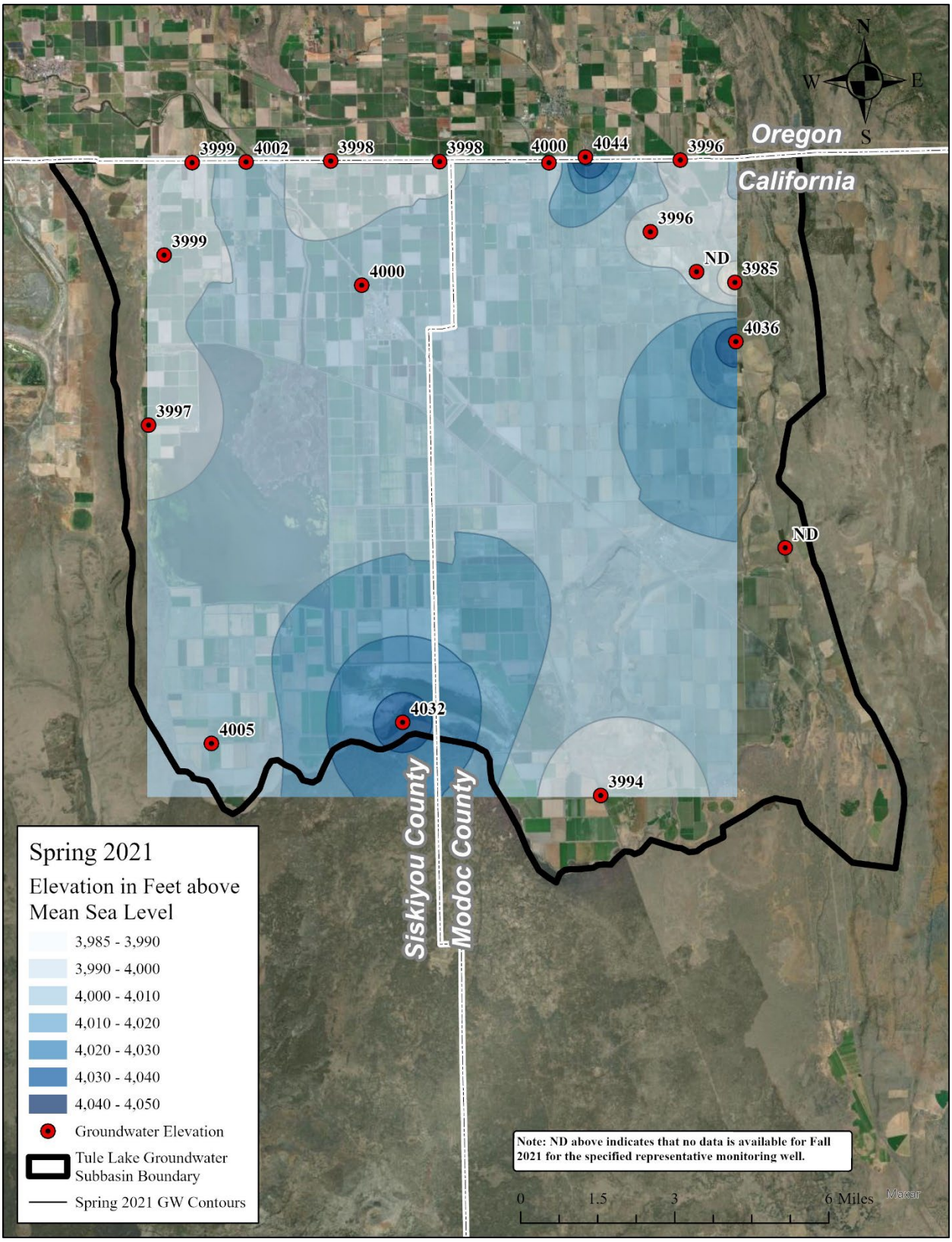


Figure 2-7. Spring 2021 Groundwater Surface Elevations

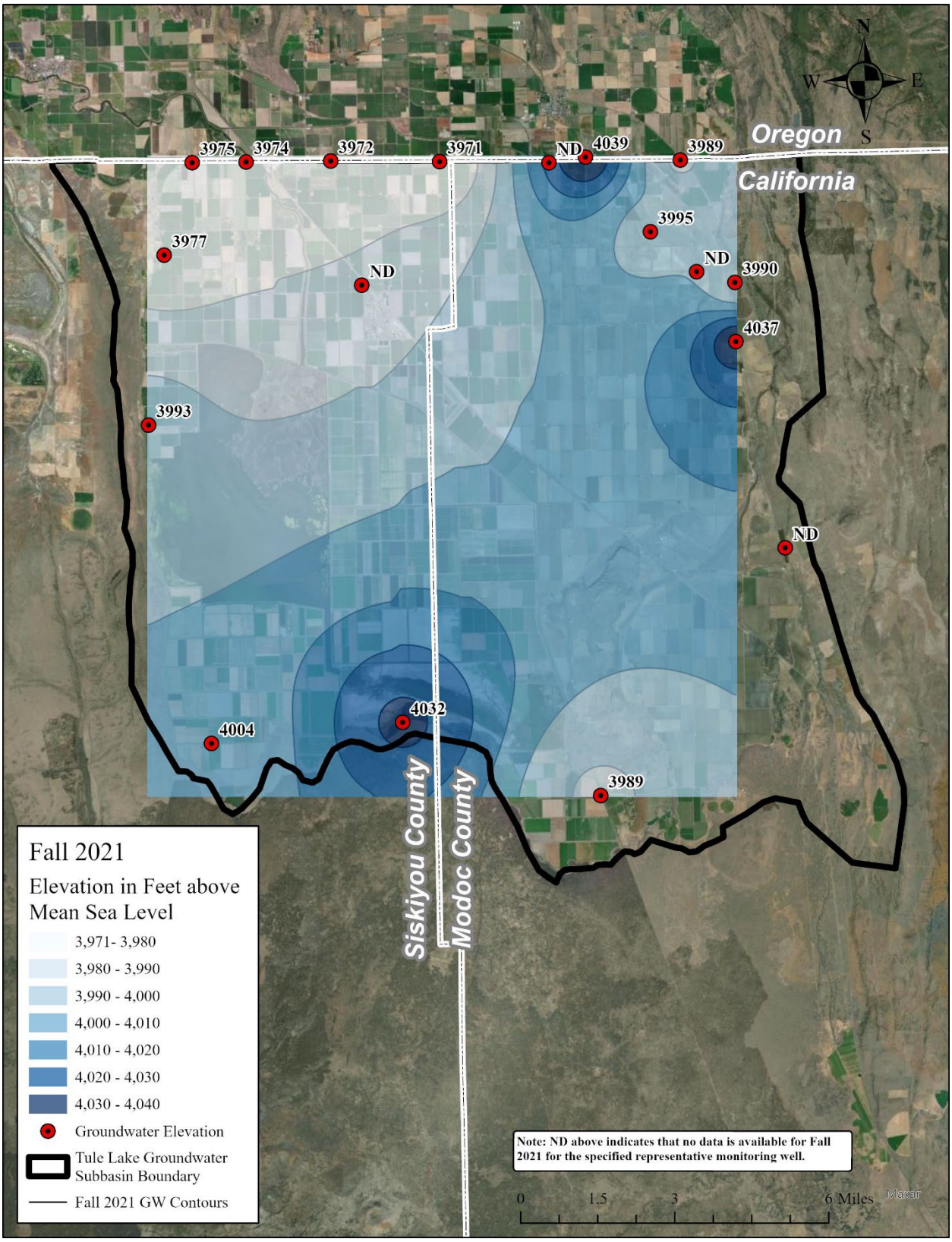


Figure 2-8. Fall 2021 Groundwater Surface Elevations

In addition to Table 2-1, and Figure 2-1 through Figure 2-8, hydrographs of groundwater elevations and water year types showing historical data through Fall 2021 are included in Appendix B of this Annual Report.

Water Quality

The GSAs established a minimum threshold of 900 milligrams per liter (mg/L) of Total Dissolved Solids and a minimum threshold of 9 mg/L of Nitrate at all representative monitoring sites for the water quality sustainability indicator within the Subbasin. Table 2-2 identifies the representative groundwater monitoring wells for water quality. In addition, Table 2-2 identifies the MT, MO, and most recent reported measurement for each monitoring location. Groundwater water quality data were obtained from the California Drinking Water Watch website. As identified in the GSP, the IMs are set at the same levels as the MOs.

Table 2-2. Water Quality Quantitative Sustainable Management Criteria

WQ Monitoring Well	Nitrate (mg/L)			Total Dissolved Solids (mg/L)		
	MO	MT	Measurement (Date)	MO	MT	Measurement (Date)
TULELAKE WELL 03	2	9	ND (4/1/2021)	205	900	210 (10/3/2018)
TULELAKE WELL 01	2	9	ND (12/17/2015)	190	900	190 (10/31/2018)
KBNWR WELL 01	2	9	ND (9/28/2021)	n/a	900	n/a
NEWELL WELL 01	2	9	ND (8/19/2020)	540	900	540 (12/19/2017)
NEWELL WELL 03	2	9	ND (8/19/2020)	610	900	610 (12/19/2017)

Notes:

1. There have been no measurements of TDS at KBNWR Well 01 since 2015.
2. ND identifies that the constituent was not detected in most recent measurement.

Change in Groundwater Storage

Change in groundwater storage was estimated using ArcGIS desktop software and Subbasin characteristics. Change in groundwater storage presented in this section is based on an evaluation of spring groundwater levels. The spring contour maps included in Figure 2-1, Figure 2-3, Figure 2-5, and Figure 2-7 were prepared based on groundwater elevation data collected in spring of each year and use Inverse Distance Weighting interpolation to generate a raster, which is further processed to develop contours at a 10 foot interval. Consecutive contour rasters (e.g., spring 2018 and spring 2019) were then compared to create changes in elevation maps, which are included in Appendix C. From these maps, the mean groundwater elevation change within the Subbasin was calculated. This was then multiplied by the total acreage of the Subbasin and an estimated specific yield of 0.05 for the Subbasin[3] to obtain an

[3] (DWR, 2002). Tulelake Subbasin—Hydrogeologic Investigation. [Draft Report]. California Department of Water Resources. California. October 8, 2002.

estimated change in groundwater storage. Table 2-3 provides an annual summary of the estimated change in groundwater storage.

Table 2-3. Change in Groundwater Storage (TAF)

Water Year	Change in Groundwater Storage
2018-2019	(0.08)
2019-2020	5.45
2020-2021	(27.65)

Output from the model developed for the Tule Lake Subbasin GSP was used to estimate the historical change in groundwater storage for the Subbasin for 2000 through 2018. For the purposes of this Annual Report, the change in groundwater storage was estimated for 2019, 2020, and 2021 by comparing seasonal high groundwater contours, as provided in Figure 2-1, Figure 2-3, Figure 2-5, and Figure 2-7 of this Annual Report. Figure 2-10 shows the annual change in storage and cumulative change in storage along with an indication of the water year type. In addition, the annual estimated groundwater usage by users within the District service area (Irrigation & M&I Groundwater Pumping) and users outside of the District service area (Private Groundwater Pumping) is shown in Figure 2-9.

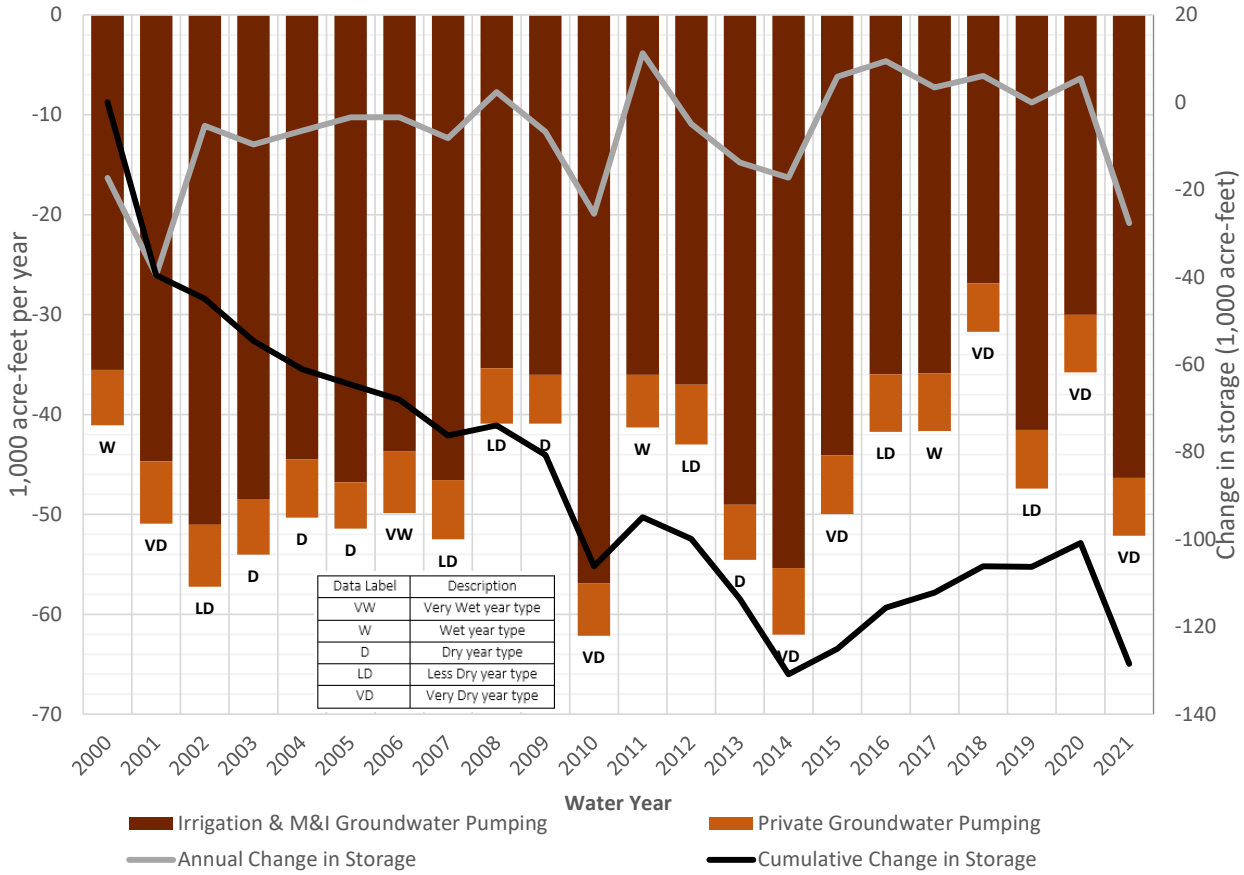


Figure 2-9. Estimated Groundwater Pumping and Change in Storage

Groundwater Extractions

SGMA Regulations require that the Annual Report include groundwater extraction information for each water use sector. Table 2-4 provides a summary of the groundwater extractions within the Subbasin during Water Years 2019 – 2021. The notes below Table 2-4 identify how the groundwater extractions were measured or estimated. In addition, Appendix D includes the templates provided by DWR for this information. Figure 2-1 through Figure 2-8 provide a general location of where the groundwater extractions occurred.

Table 2-4. Groundwater Extractions (TAF)

WY	Water Use Sector			
	Total	Urban[1]	Agricultural	
			District	Private[2]
2019	47.4	0.3	41.2[3]	5.9
2020	35.8	0.4	29.6[4]	5.8
2021	52.1	0.4	45.9[4]	5.8

[1] Values obtained from the City of Tulelake, which measures their extractions with magnetic flow meters.

[2] Values based on the calculated average annual extractions by private groundwater pumping, as calculated by the GSP Model for water years 2000 through 2018, during similar water year types. The estimated annual extractions for these years are show in Figure 2-9.

[3] Values based on the calculated average annual extractions within the District, as calculated by the GSP Model for water years 2000 through 2018, during similar water year types. The estimated annual extractions for these years are show in Figure 2-9.

[4] Values obtained from Tulelake Irrigation District, which measures their extractions with propeller flow meters.

Surface Water Supply

SGMA Regulations require that the Annual Report include surface water supply information for each water use sector. Table 2-5 provides a summary of the surface water supply within the Subbasin during Water Years 2019 – 2021. As identified in the GSP, the surface water supplier for the Subbasin is the Reclamation, which is the entity that operates the Klamath Project. The point of diversion for the Tulelake Irrigation District is Station 48, which is located in Oregon. For the purposes of this Annual Report, measured deliveries from the Klamath Project at the J Canal Headworks were used, as that is the location where the supply enters the Subbasin. As identified in the GSP, return flow from agricultural irrigations upstream of TID may also contribute to the surface water supply in any given year. Therefore, the quantities in Table 2-5 represent the volume of Project water and return flow that was available at the J Canal Headworks. In addition, Appendix E includes the templates provided by DWR for this information.

Table 2-5. Surface Water Supply (TAF)

WY	Water Use Sector			
	Total	Urban	Agricultural	
			District	Private
2019	119.7	0.0	119.7	0.0
2020	68.4	0.0	68.4	0.0
2021	16.2	0.0	16.2	0.0

Total Water Use

SGMA Regulations require that the Annual Report include the total water use for each water use sector. Table 2-6 provides a summary of the total water use, which is the combined groundwater use (Table 2-4) and surface water use (Table 2-5) for Water Years 2019-2021 by water use sector. See Table 2-4 and Table 2-5 for additional information on groundwater and surface water use. In addition, Appendix F includes the templates provided by DWR for this information.

Table 2-6. Total Water Use (TAF)

WY	Water Use Sector			
	Total	Urban	Agricultural	
			District	Private
2019	167.1	0.3	160.9	5.9
2020	104.2	0.4	98.0	5.8
2021	68.3	0.4	62.1	5.8

3 GSP Implementation Progress

As identified in the GSP, the Tule Lake Subbasin is currently being sustainably managed. Therefore, no projects or management actions are required to achieve sustainability; however, the Tule Lake Subbasin GSAs have identified projects and management actions that can improve their understanding of the groundwater Subbasin. Due to the standing of the Subbasin, the projects and management actions identified in the GSP are intended to help reduce or eliminate data gaps, and will be implemented based on the availability of resources and funding. Similarly, interim milestones are intended to be set to guide conditions during implementation of the GSP in order to define a pathway to reach sustainability within 20 years. In the Tule Lake Subbasin, the interim milestones were not assumed to be needed, as implementation activities are not required to achieve the measurable objectives. However, for the purpose of the GSP, the interim milestones were set at the same levels as the measurable objectives. See Table 2-1 for an overview of the most recent groundwater level measurements and the associated interim milestones at the representative groundwater monitoring wells. Similarly, see Table 2-2 for a similar summary of the representative water quality monitoring locations.

Implementation of Projects and Management Actions

The purpose of this section of the Annual Report is to provide an update on GSP implementation progress of projects and management actions. Projects and management actions identified in the GSP include development of a well inventory, construction of dedicated groundwater monitoring wells, expansion of the water quality monitoring network to include additional wells, potential groundwater dependent ecosystems field investigations, groundwater recharge, domestic well assistance program, and an adaptive management strategy. Table 3-1 provides a project and management action update summary.

Table 3-1. Summary of Projects and Management Actions

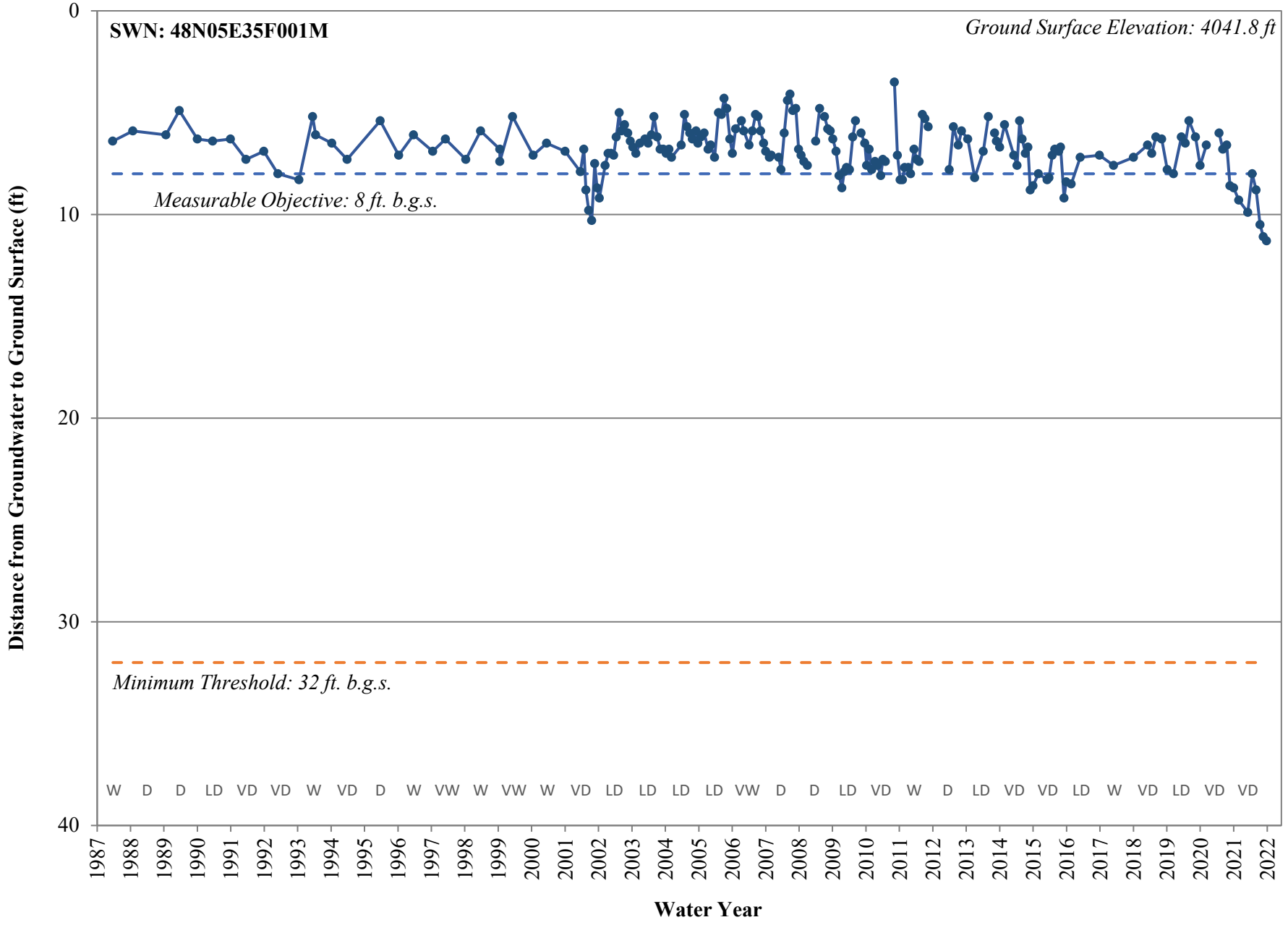
Project or Management Action	Update
Perform Well Inventory	Progress made includes a download of all currently available well completion reports from DWR's Well Completion Report database, and an initial review of this information to identify duplicative records, and destroyed and abandoned wells.
File for well installation application with TSS	Technical Support Services General Application filed on March 8, 2022. Upon approval the GSAs will work with DWR to prepare and file the Service Request Application.
Add 2 wells to WQ Monitoring Network	No update to provide at this time. This effort is ongoing.
Complete field inspections of GDEs	No update to provide at this time. This effort is ongoing.
Review AEM survey data	No update at this time. The GSAs are awaiting the release of the AEM survey data.
Recharge via Operation of Station 48	No update at this time. Discussions of Klamath Project 2022 operations are ongoing.
Provide Domestic Well Assistance	During 2021, TID coordinated with and assisted local agencies to address domestic well issues.
Adaptive Management Strategy	TID assisted with the Drought Response Agency programs in 2020 and 2021, which are implemented to address supply shortages from the Klamath Project.

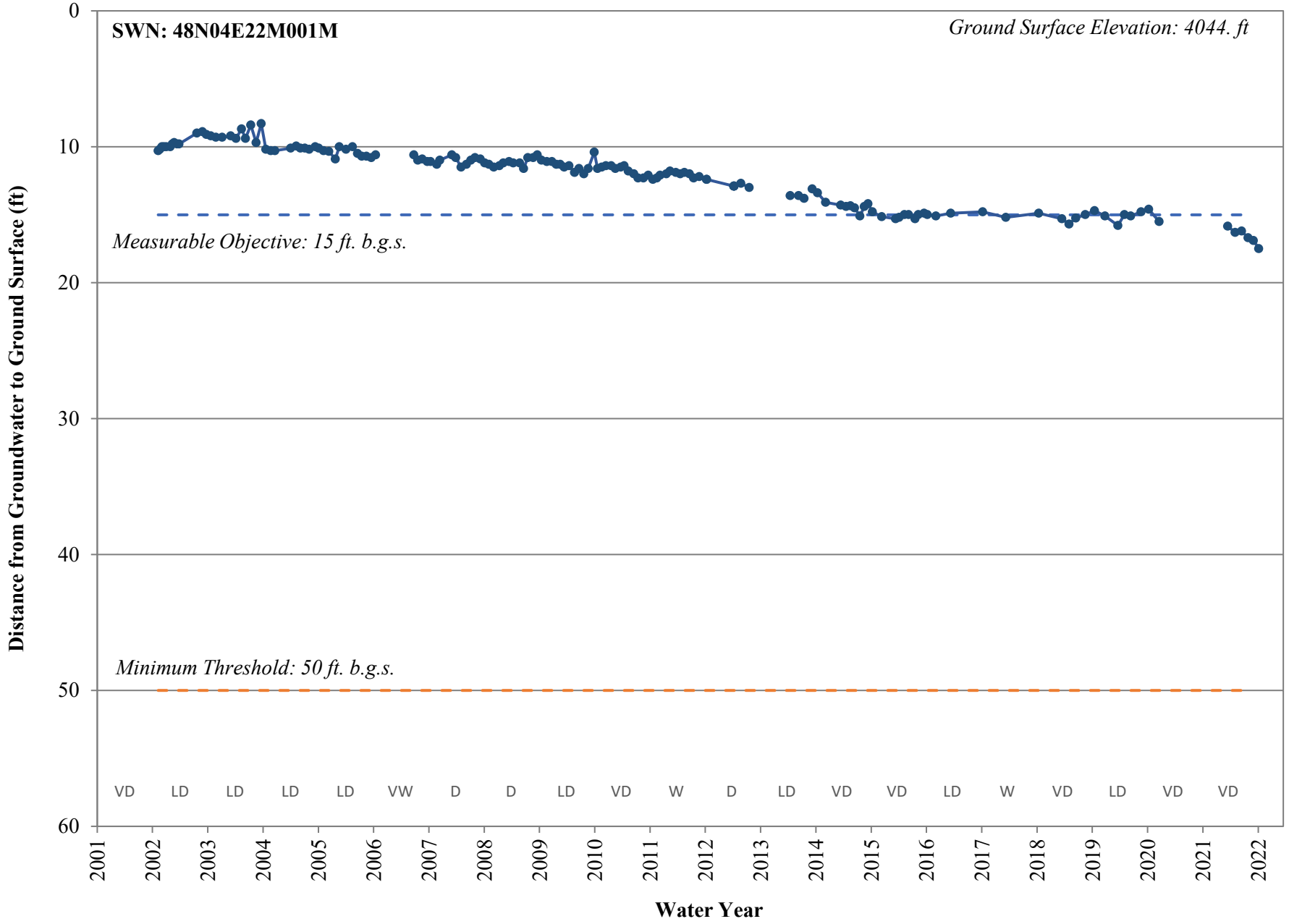
Appendix A.
Elements Guide Checklist

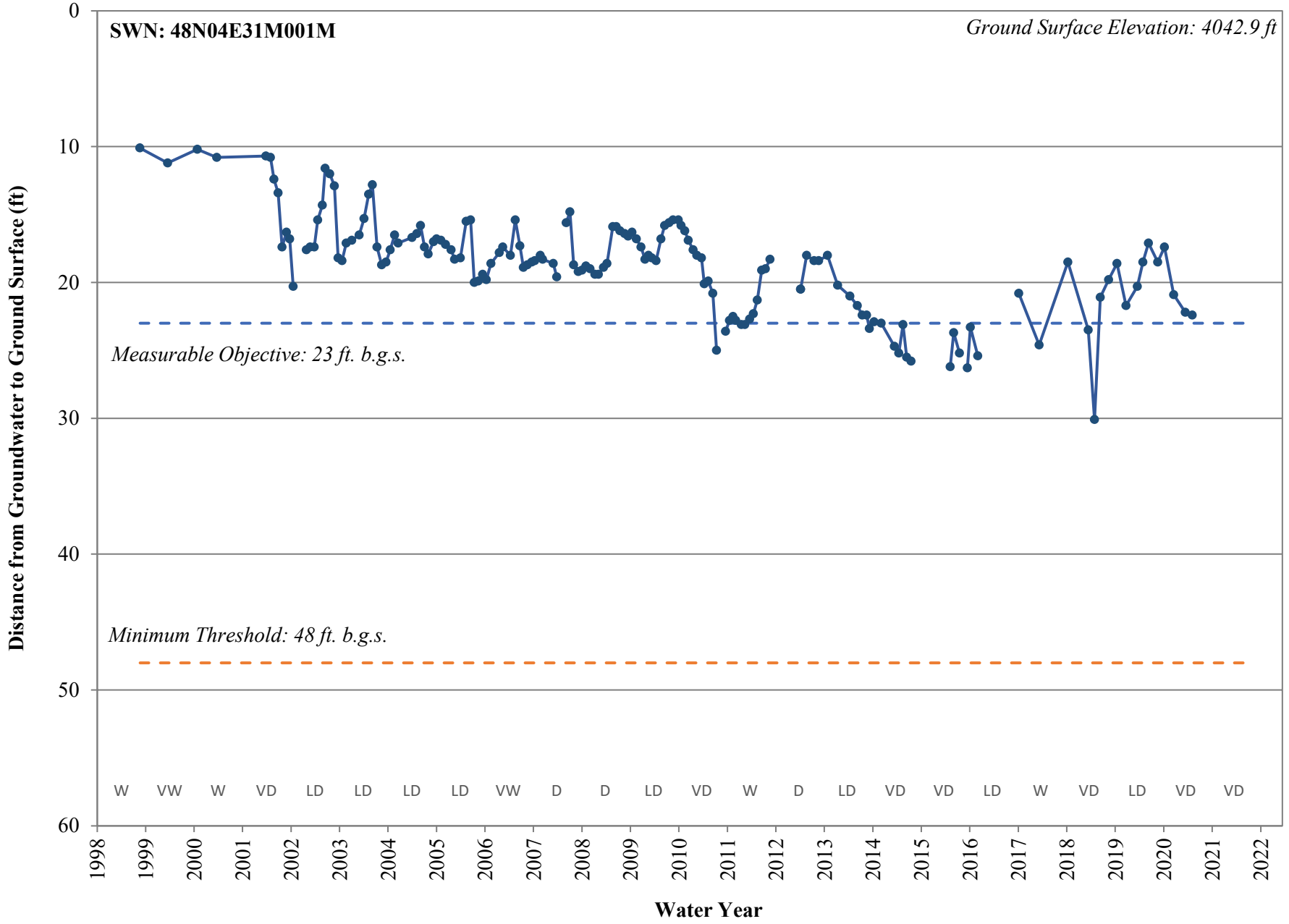
Groundwater Sustainability Plan Annual Report Elements Guide		
Basin Name	Tule Lake Subbasin	
GSP Local ID		
California Code of Regulations - GSP Regulation Sections	***Groundwater Sustainability Plan Elements***	**Document *page number(s) that address the applicable GSP element.***
Article 5	**Plan Contents**	
Subarticle 4	***Monitoring Networks***	
§ 354.40	**Reporting Monitoring Data to the Department**	
	Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.	
	Note: Authority cited: Section 10733.2, Water Code. Reference: Sections 10728, 10728.2, 10733.2 and 10733.8, Water Code.	
Article 7	**Annual Reports and Periodic Evaluations by the Agency**	
§ 356.2	**Annual Reports**	
	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 covered by the report.	Executive Summary (page ES-1, pp5:6); Figure 1-1 (page 1-2, pp. 8)
	(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:	
	(A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.	Section 2, Figure 2-1 through 2-8 (pages 2-3 through 2-10, pp.11:18)
	(B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.	Appendix B, pp. 28:43

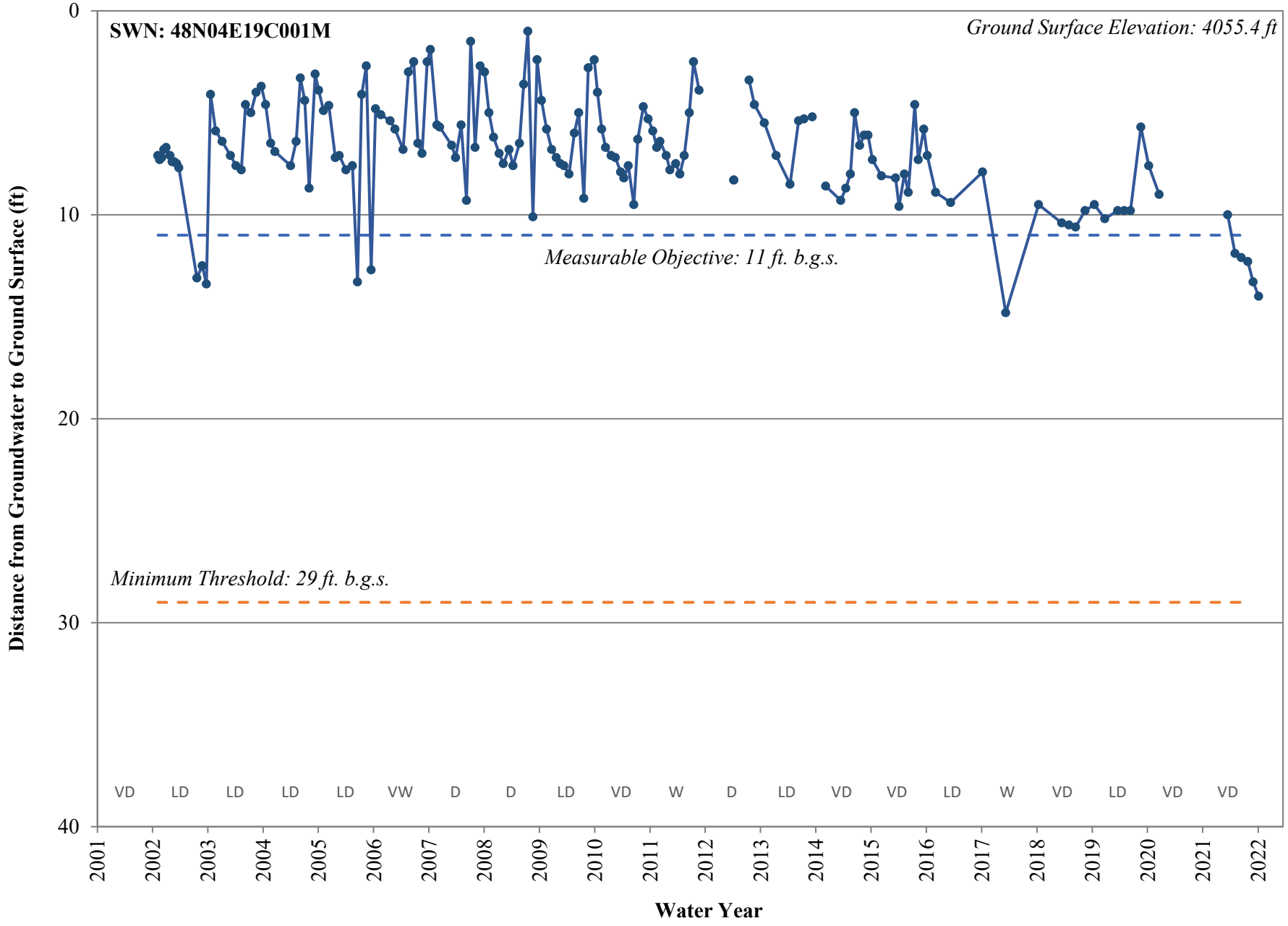
California Code of Regulations - GSP Regulation Sections	*Groundwater Sustainability Plan Elements*	Document *page number(s) that address the applicable GSP element.*
	(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector, and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.	Table 2-3, pp. 20; Appendix D, pp. 48:52
	(3) Surface water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.	Table 2-4, pp.21 ; Appendix E, pp. 53:54
	(4) Total water use shall be collected using the best available measurement 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. 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.	Table 2-5, pp. 22; Appendix F, pp. 55:56
	(5) Change in groundwater in storage shall include the following:	
	(A) Change in groundwater in storage maps for each principal aquifer in the basin.	Section 2, Figure 2-1 through 2-8 (pages 2-3 through 2-10, pp.11:18)
	(B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.	Figure 2-9, pp. 18
	(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.	Table 2-1 (pp. 9), Table 2-2 (pp. 19), and Section 3 (pp. 23:24)

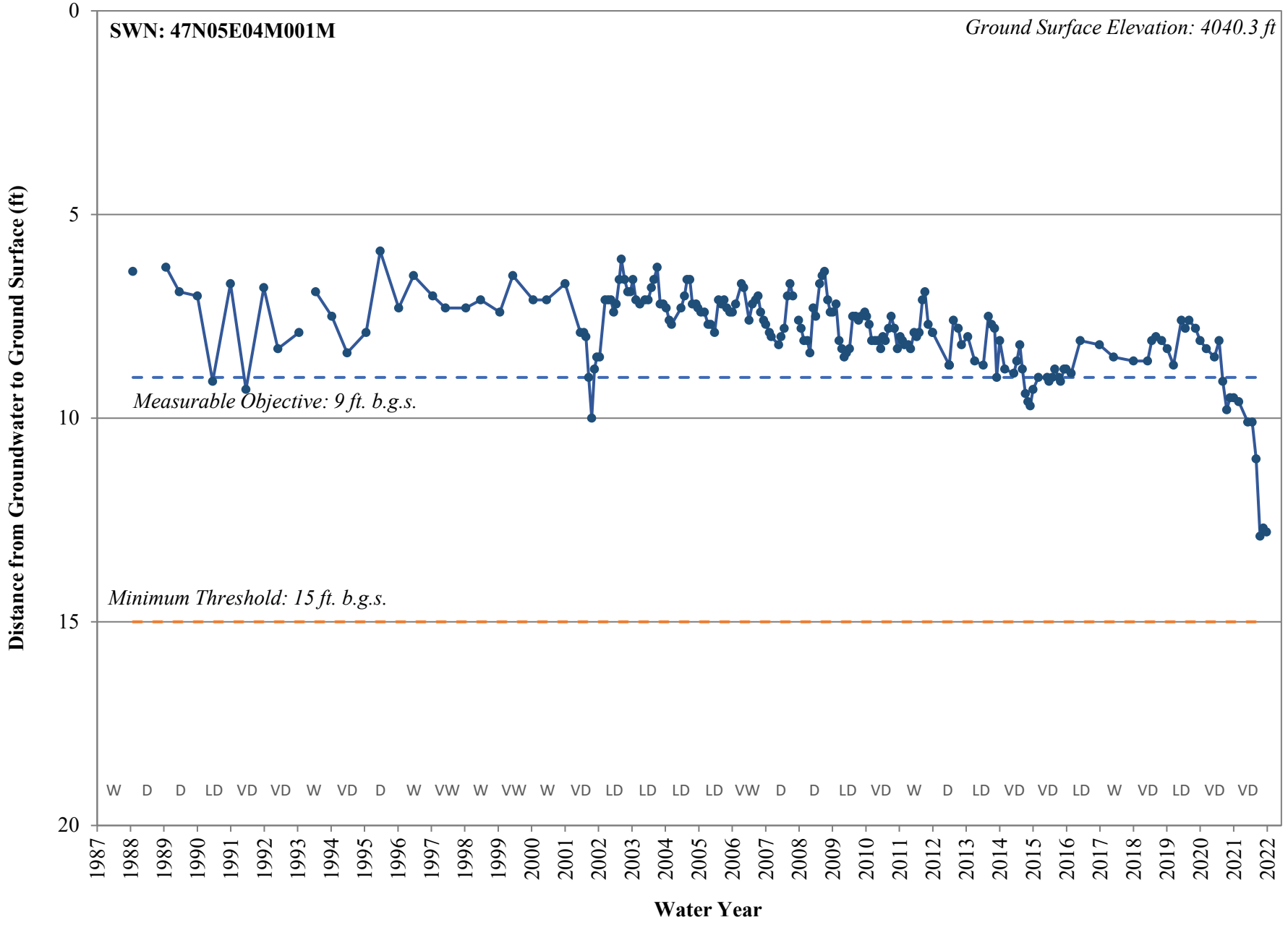
Appendix B.
Groundwater Monitoring Well Hydrographs

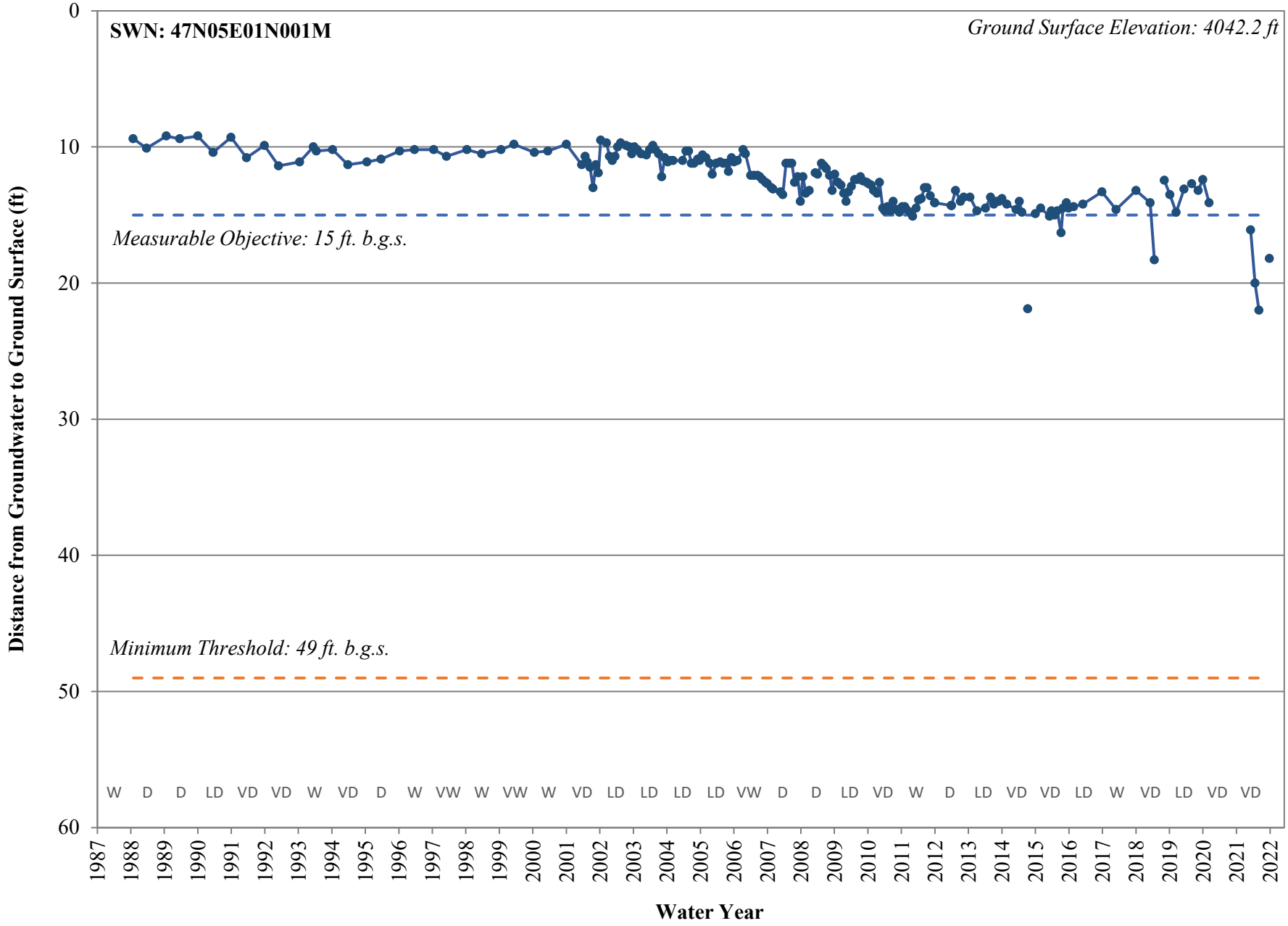

SWN: 48N05E35F001M
Ground Surface Elevation: 4041.8 ft
Measurable Objective: 8 ft. b.g.s.
Minimum Threshold: 32 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
10
20
30
40
W D D LD VD VD W VD D W VW W VW W VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Water Year

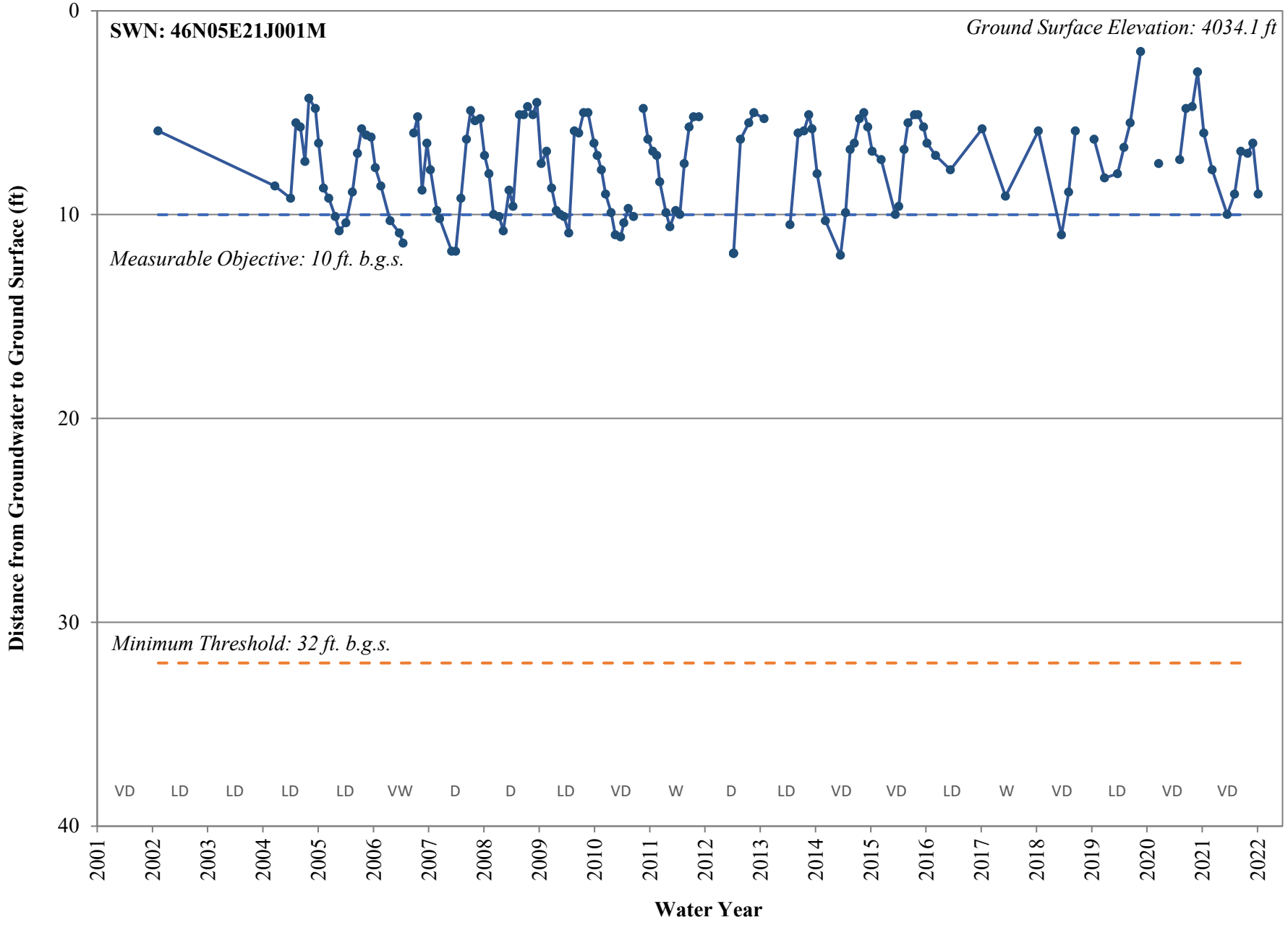

SWN: 48N04E22M001M
Ground Surface Elevation: 4044. ft
Measurable Objective: 15 ft. b.g.s.
Minimum Threshold: 50 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
10
20
30
40
50
60
VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Water Year

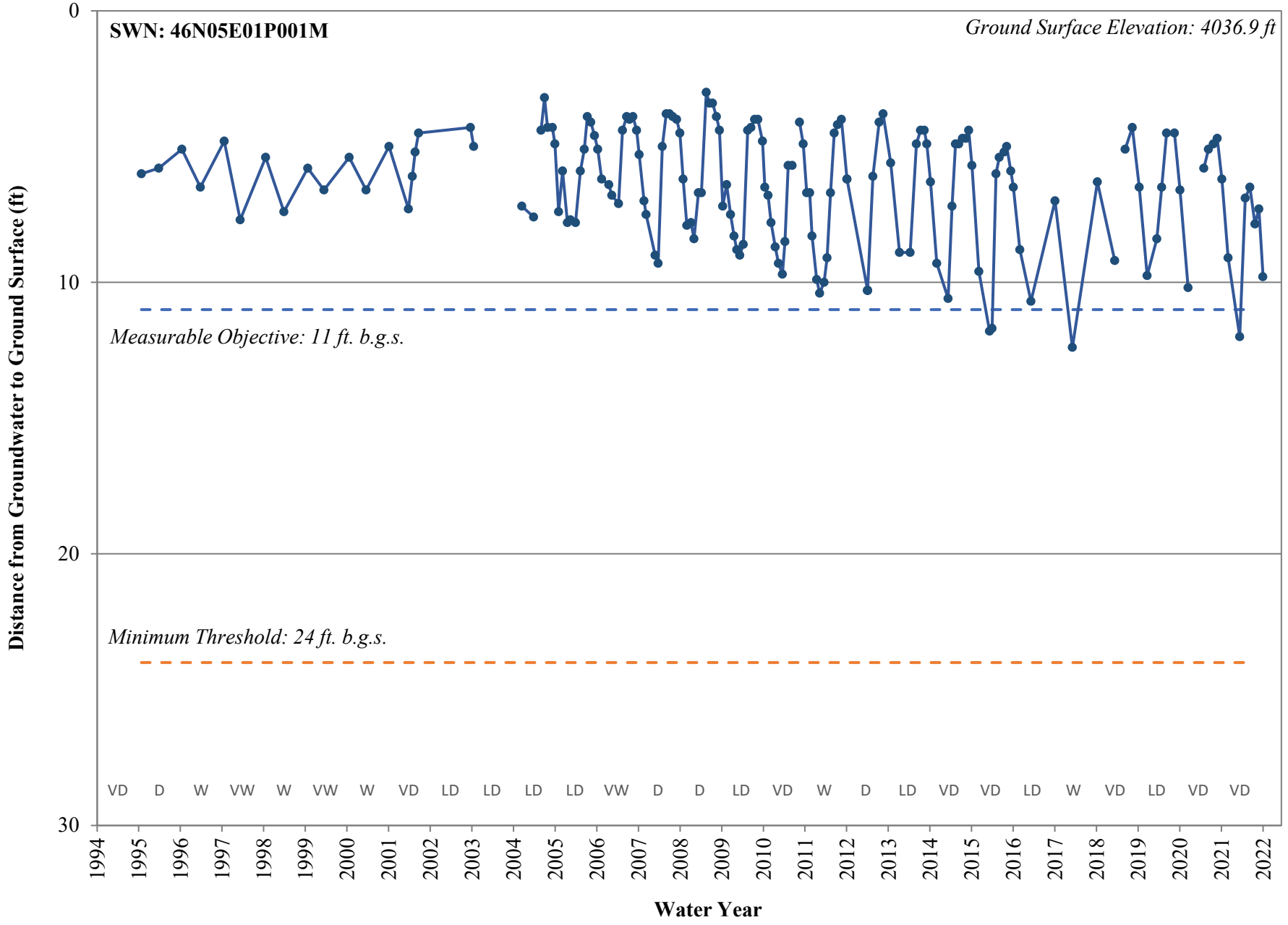

SWN: 48N04E31M001M
Ground Surface Elevation: 4042.9 ft
Measurable Objective: 23 ft. b.g.s.
Minimum Threshold: 48 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
10
20
30
40
50
60
W VW W VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Water Year

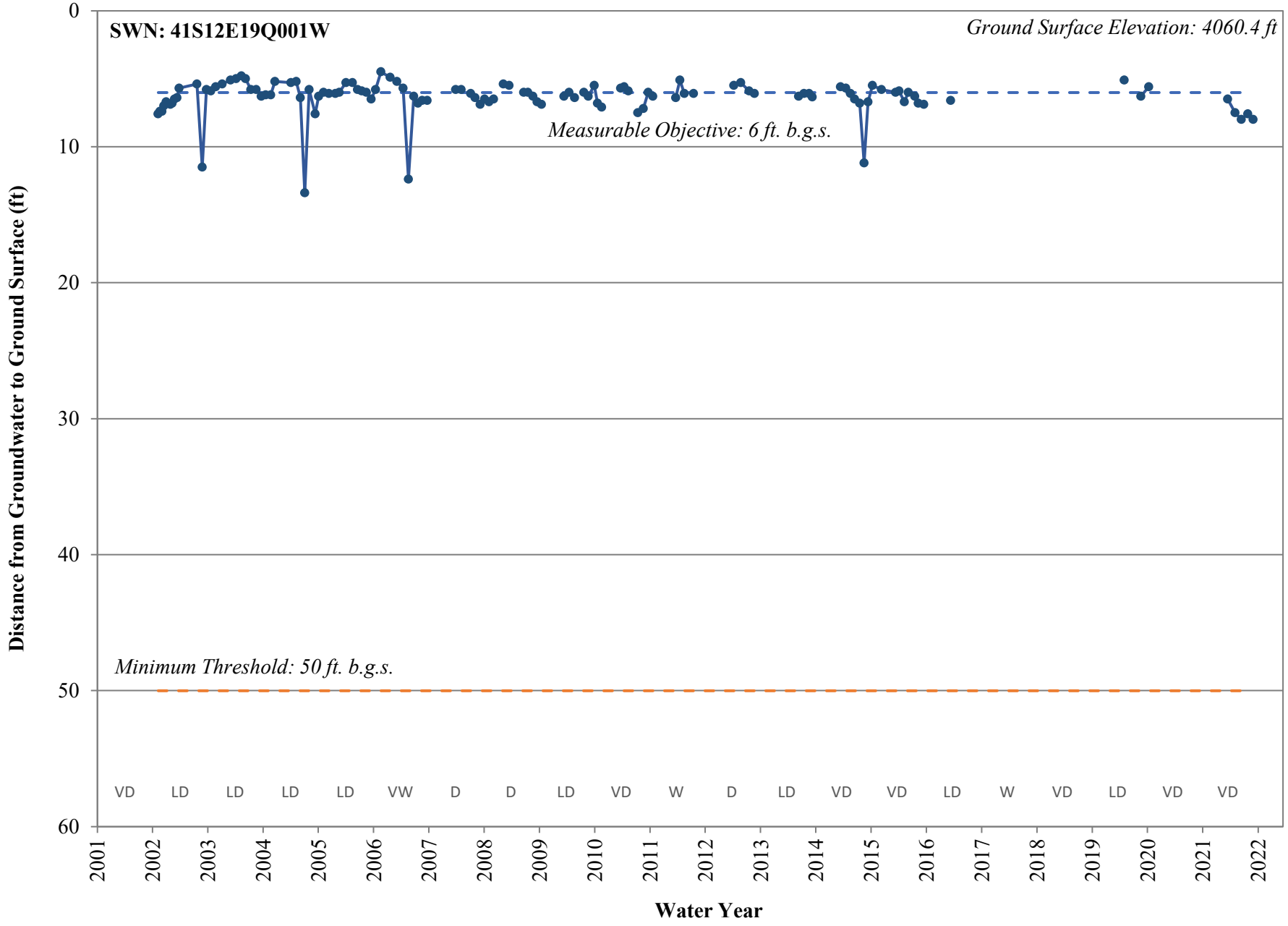

SWN: 48N04E19C001M
Ground Surface Elevation: 4055.4 ft
Measurable Objective: 11 ft. b.g.s.
Minimum Threshold: 29 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
10
20
30
40
VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Water Year

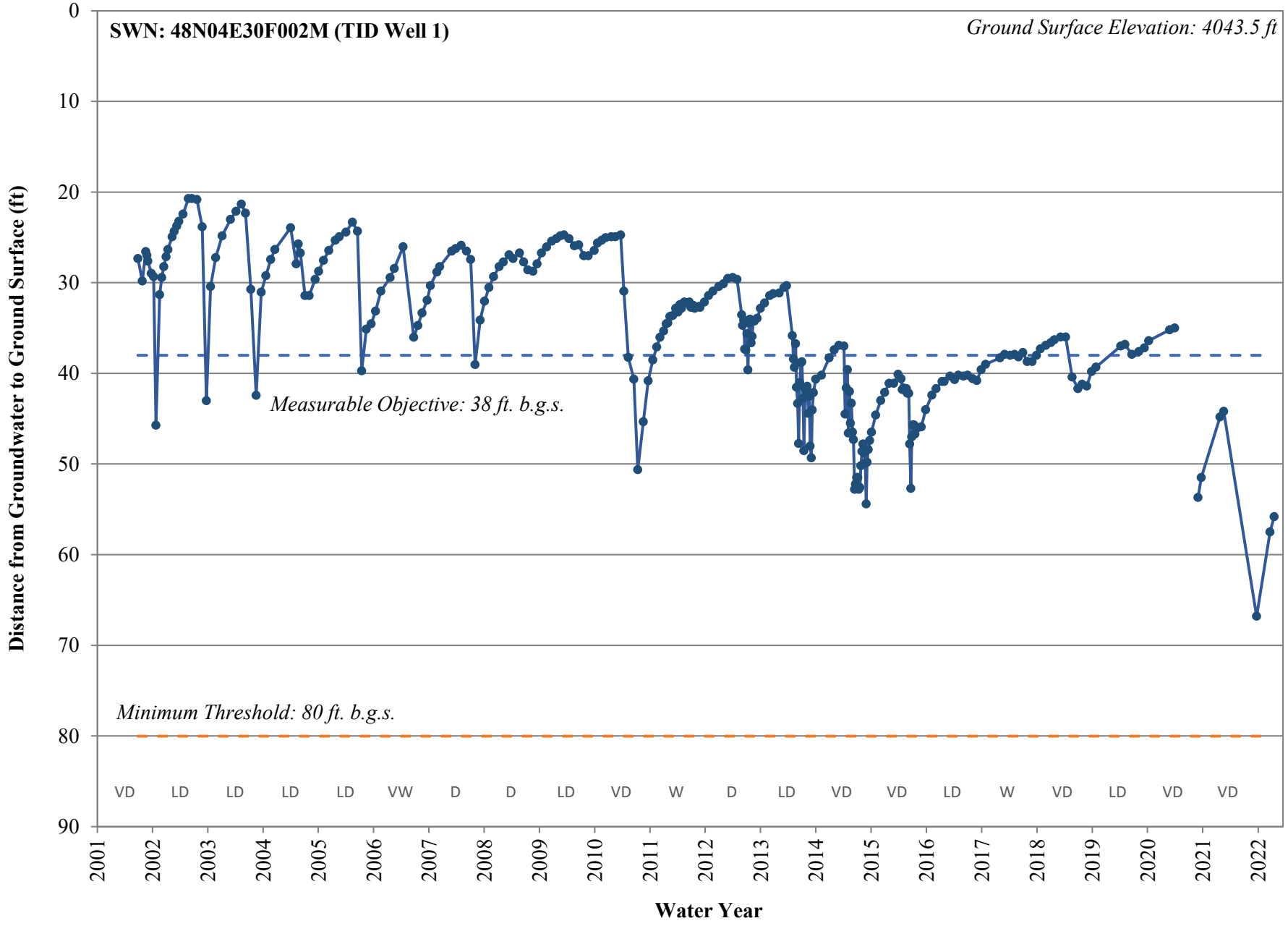

SWN: 47N05E04M001M
Ground Surface Elevation: 4040.3 ft
Measurable Objective: 9 ft. b.g.s.
Minimum Threshold: 15 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
5
10
15
20
W D D LD VD VD W VD D W VW W VW W VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Water Year

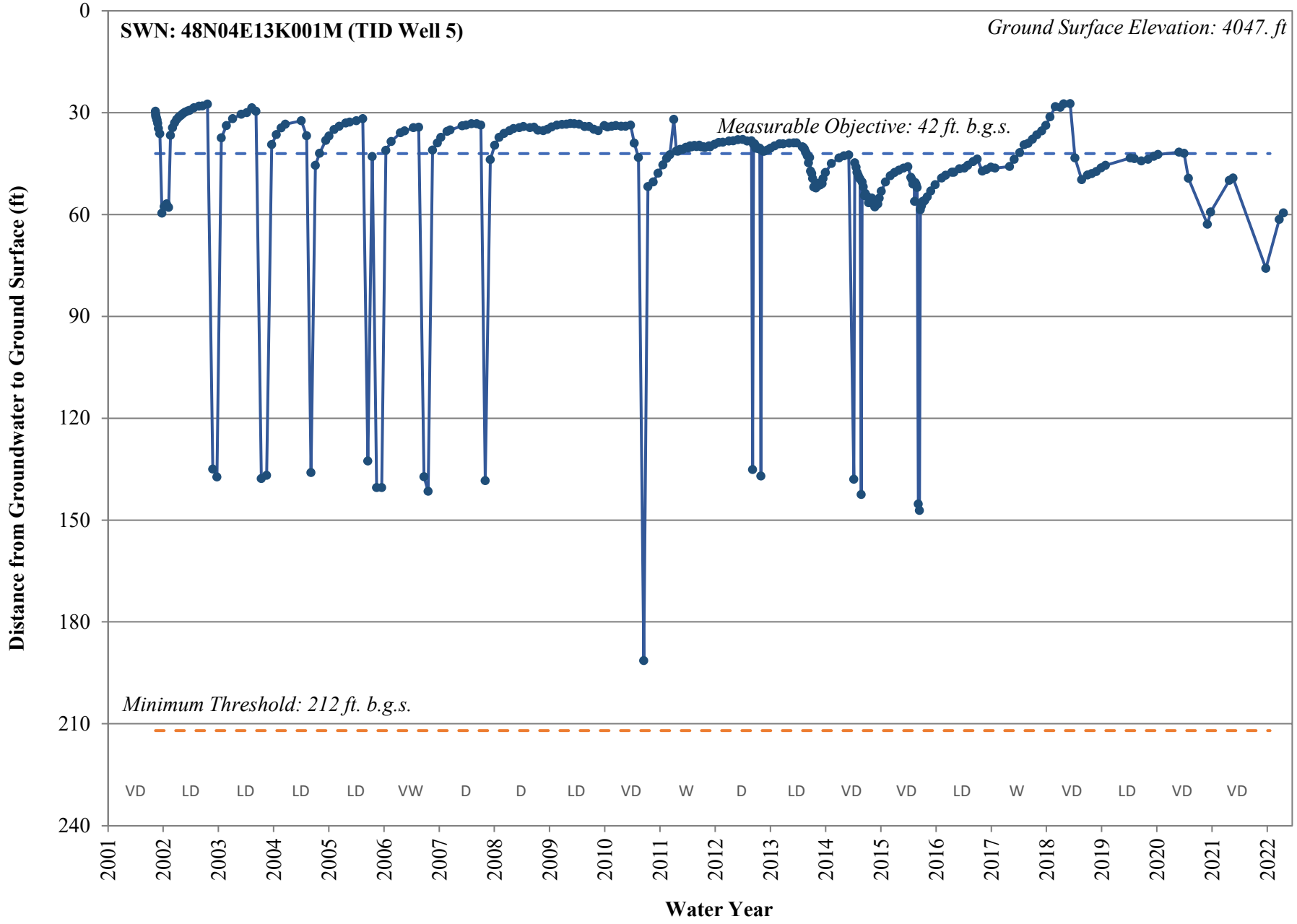

SWN: 47N05E01N001M
Ground Surface Elevation: 4042.2 ft
Measurable Objective: 15 ft. b.g.s.
Minimum Threshold: 49 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
10
20
30
40
50
60
W D D LD VD VD W VD D W VW W VW W VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Water Year

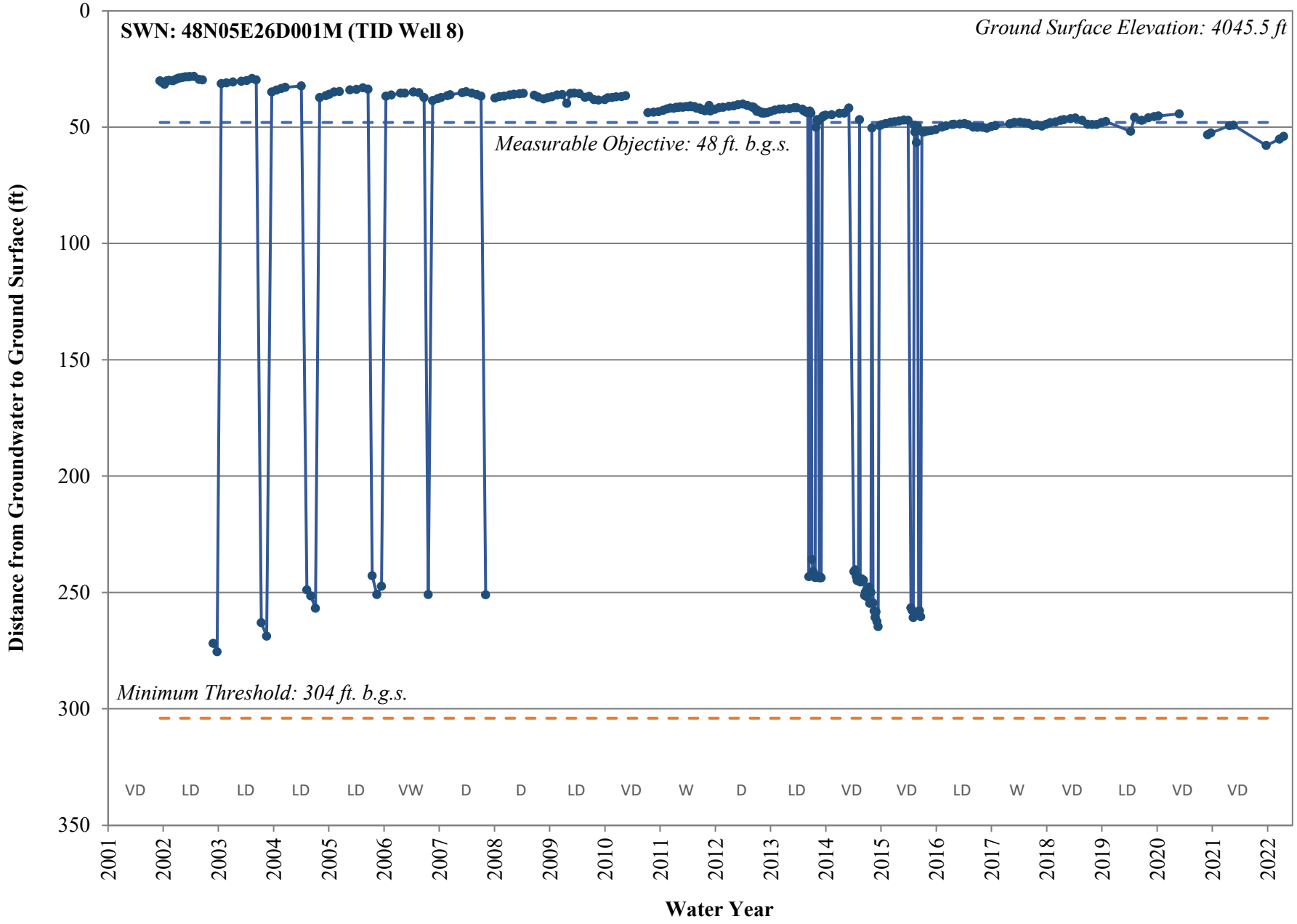

SWN: 46N05E21J001M
Ground Surface Elevation: 4034.1 ft
Measurable Objective: 10 ft. b.g.s.
Minimum Threshold: 32 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
10
20
30
40
VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Water Year

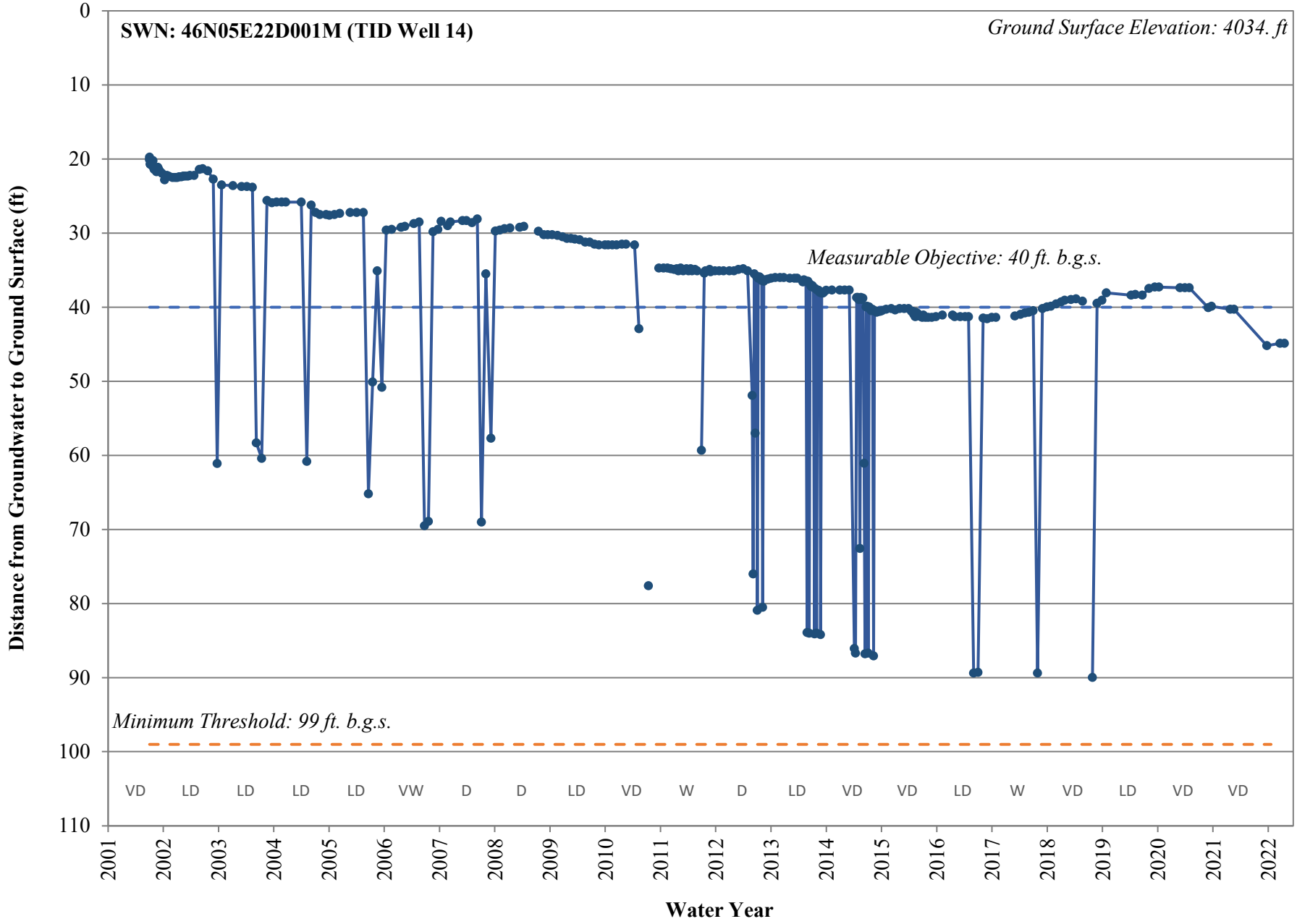

SWN: 46N05E01P001M
Ground Surface Elevation: 4036.9 ft
Measurable Objective: 11 ft. b.g.s.
Minimum Threshold: 24 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
10
20
30
VD D W VW W VW W VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Water Year

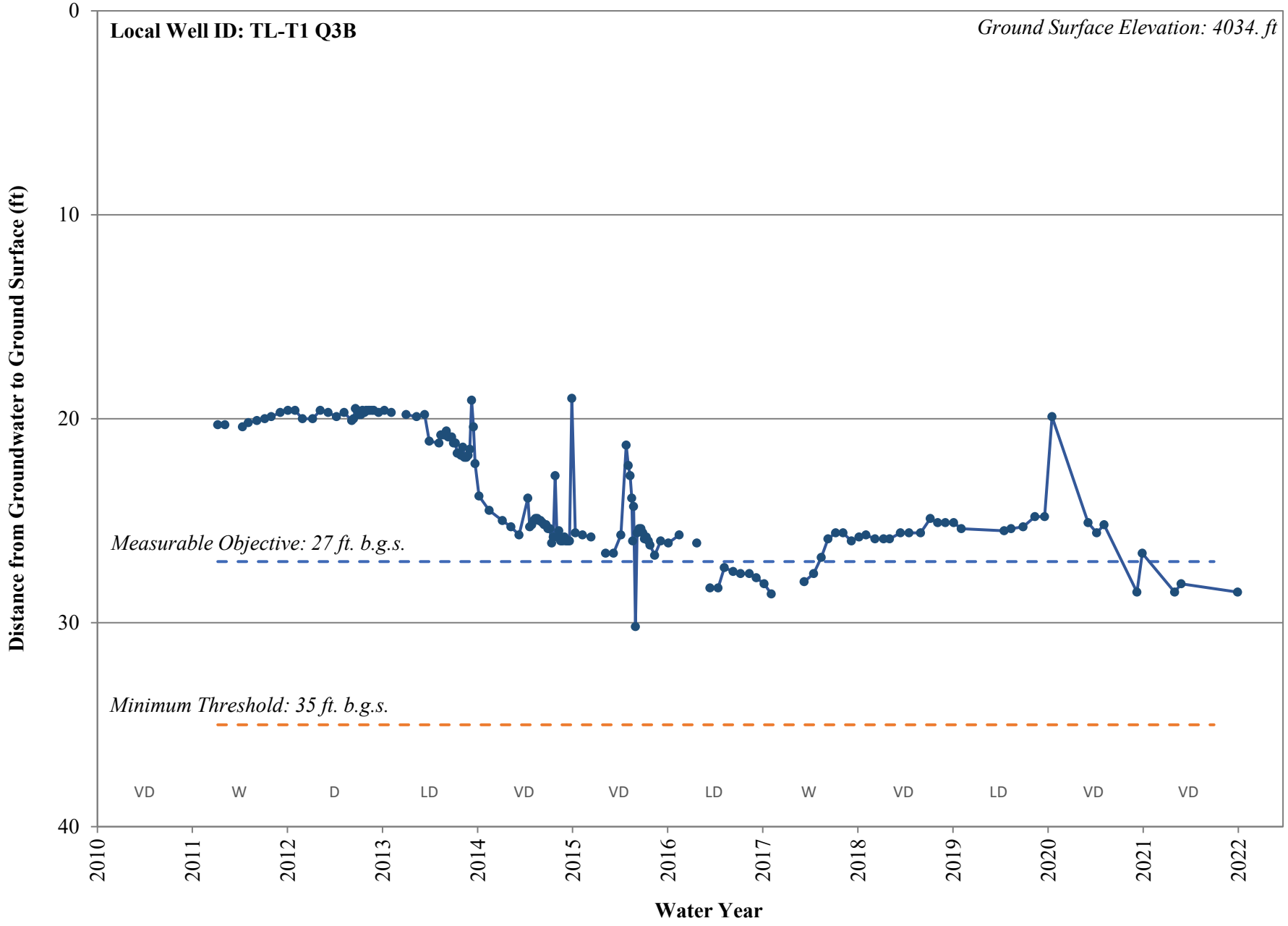

SWN: 41S12E19Q001W
Ground Surface Elevation: 4060.4 ft
Measurable Objective: 6 ft. b.g.s.
Minimum Threshold: 50 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
10
20
30
40
50
60
VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Water Year

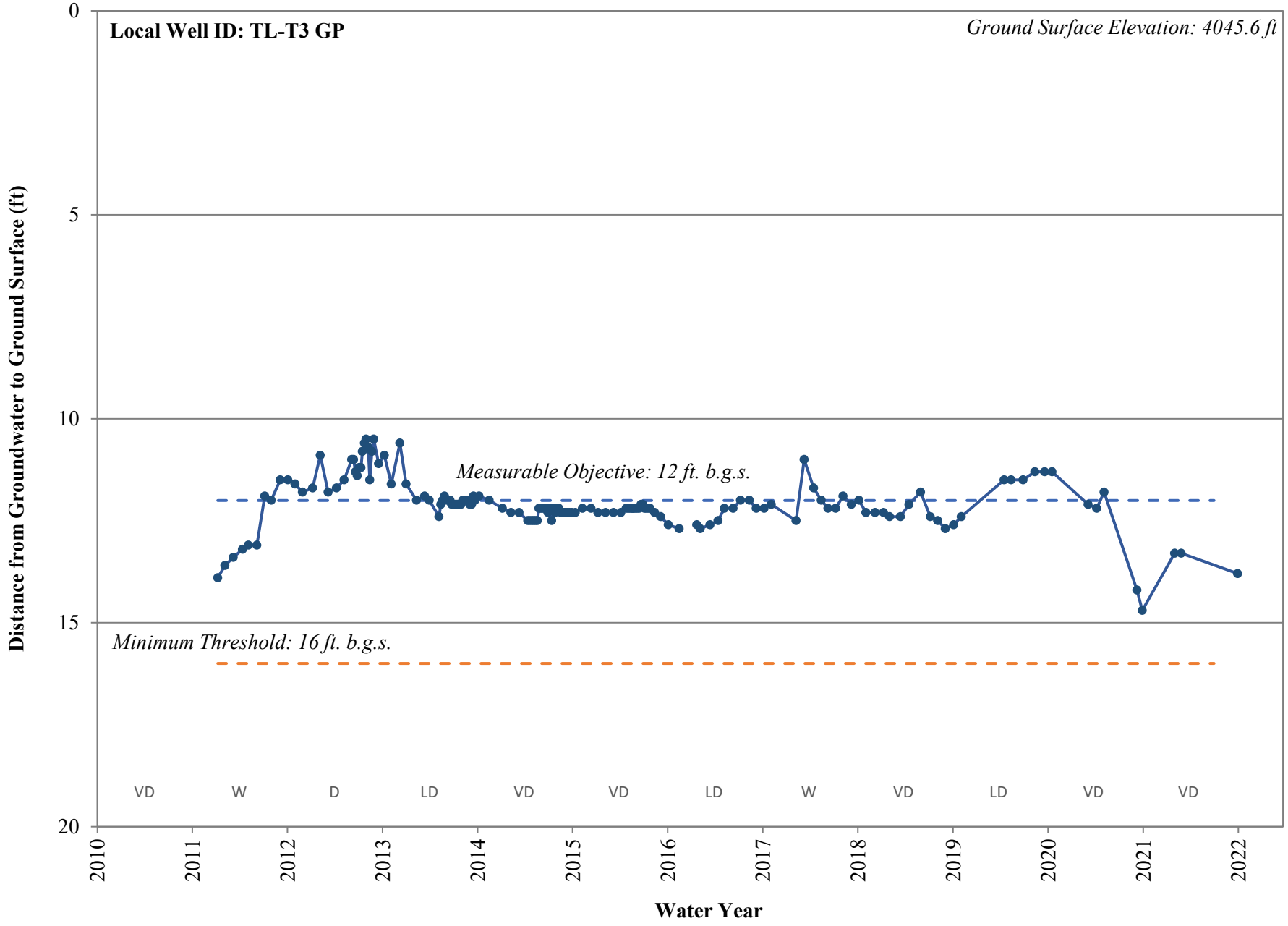

SWN: 48N04E30F002M (TID Well 1)
Ground Surface Elevation: 4043.5 ft
Measurable Objective: 38 ft. b.g.s.
Minimum Threshold: 80 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
Water Year
0
10
20
30
40
50
60
70
80
90
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD


SWN: 48N04E13K001M (TID Well 5)
Ground Surface Elevation: 4047. ft
Measurable Objective: 42 ft. b.g.s.
Minimum Threshold: 212 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
30
60
90
120
150
180
210
240
VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Water Year

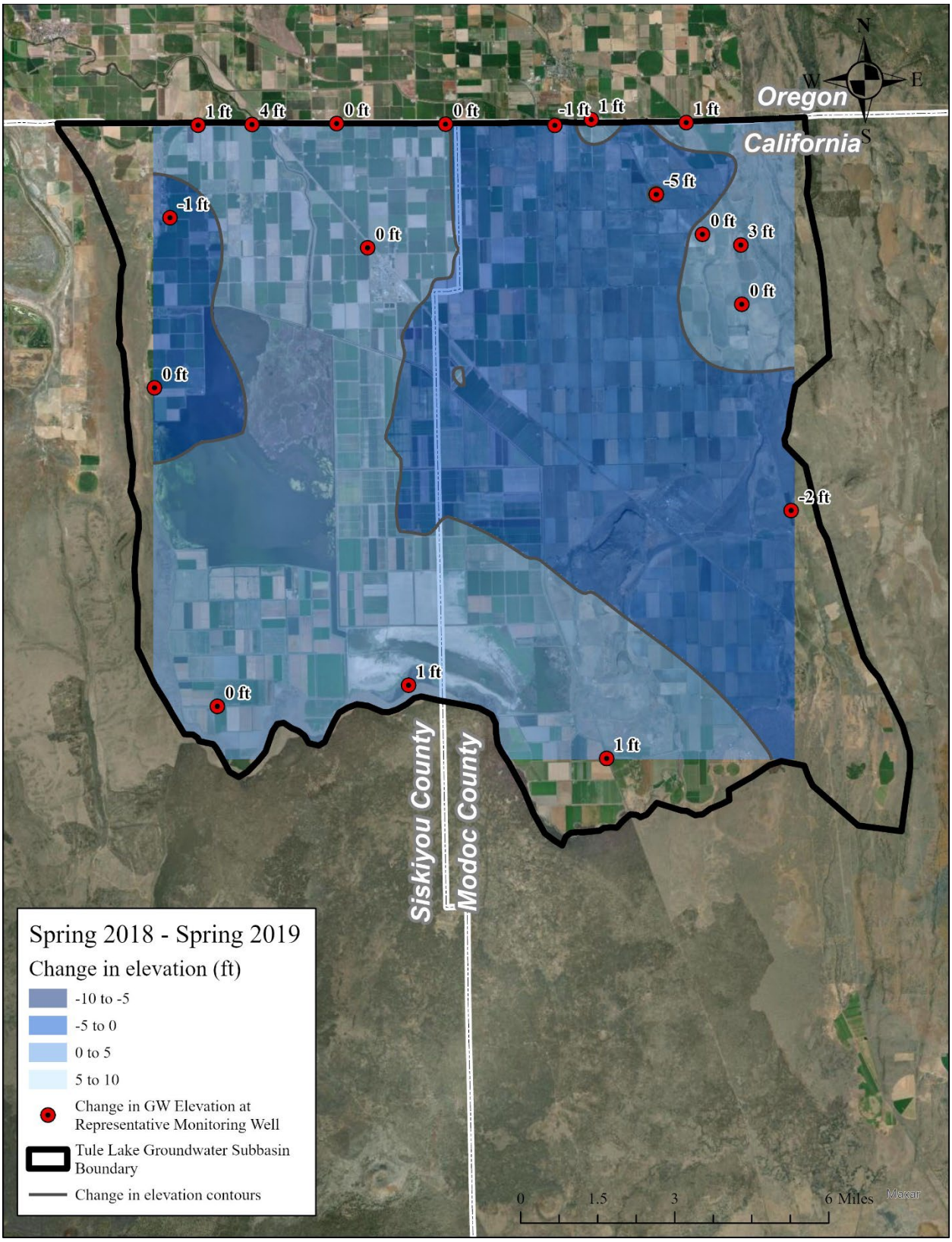

SWN: 48N05E26D001M (TID Well 8)
Ground Surface Elevation: 4045.5 ft
Measurable Objective: 48 ft. b.g.s.
Minimum Threshold: 304 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
50
100
150
200
250
300
350
VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Water Year

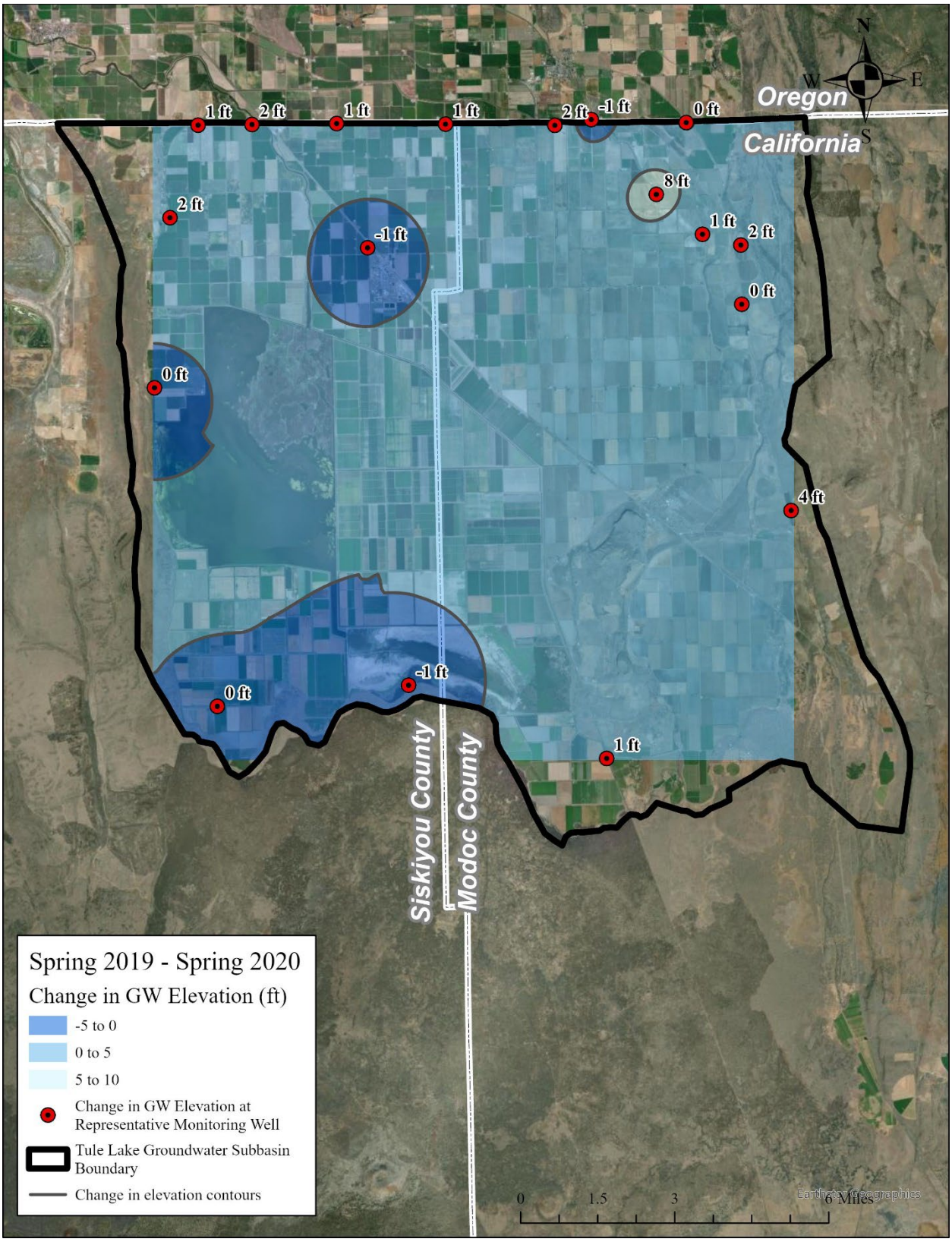

SWN: 46N05E22D001M (TID Well 14)
Ground Surface Elevation: 4034. ft
Measurable Objective: 40 ft. b.g.s.
Minimum Threshold: 99 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
10
20
30
40
50
60
70
80
90
100
110
VD LD LD LD LD VW D D LD VD W D LD VD VD LD W VD LD VD VD
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Water Year

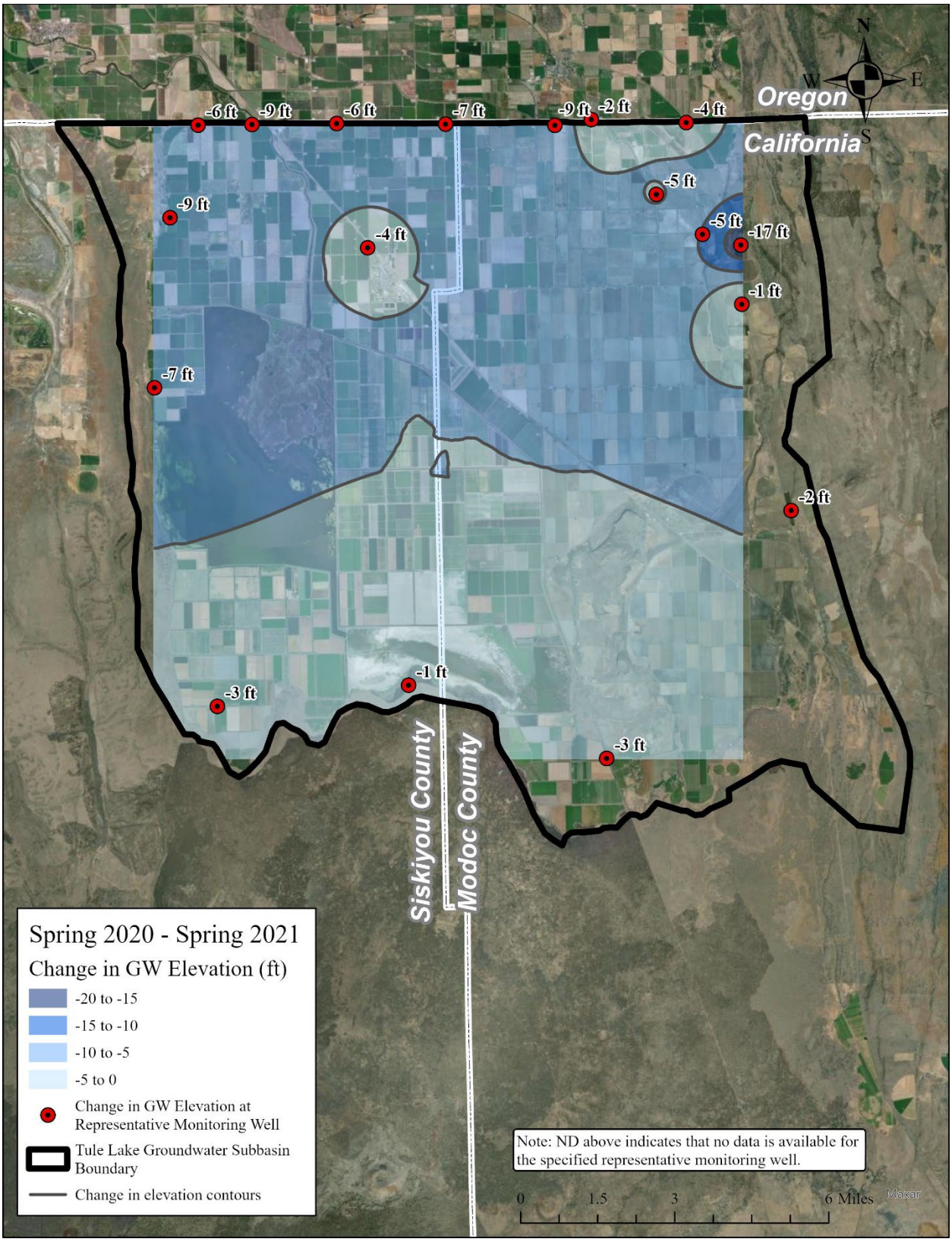

Local Well ID: TL-T1 Q3B
Ground Surface Elevation: 4034. ft
Distance from Groundwater to Ground Surface (ft)
0
10
20
30
40
Measurable Objective: 27 ft. b.g.s.
Minimum Threshold: 35 ft. b.g.s.
VD
W
D
LD
VD
VD
LD
W
VD
LD
VD
VD
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Water Year


Local Well ID: TL-T3 GP
Ground Surface Elevation: 4045.6 ft
Measurable Objective: 12 ft. b.g.s.
Minimum Threshold: 16 ft. b.g.s.
Distance from Groundwater to Ground Surface (ft)
0
5
10
15
20
VD
W
D
LD
VD
VD
LD
W
VD
LD
VD
VD
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Water Year

Appendix C.
Change in Groundwater Elevation Figures


N
W
E
S
Oregon
California
1 ft
4 ft
0 ft
0 ft
-1 ft
1 ft
1 ft
-5 ft
-1 ft
0 ft
0 ft
3 ft
0 ft
0 ft
-2 ft
1 ft
0 ft
1 ft
Siskiyou County
Modoc County
Spring 2018 - Spring 2019
Change in elevation (ft)
-10 to -5
-5 to 0
0 to 5
5 to 10
Change in GW Elevation at Representative Monitoring Well
Tule Lake Groundwater Subbasin Boundary
Change in elevation contours
0
1.5
3
6 Miles
Maxar


N
W
E
S
Oregon
California
1 ft
2 ft
1 ft
1 ft
2 ft
-1 ft
0 ft
2 ft
-1 ft
8 ft
1 ft
2 ft
0 ft
0 ft
4 ft
-1 ft
0 ft
1 ft
Siskiyou County
Modoc County
Spring 2019 - Spring 2020
Change in GW Elevation (ft)
-5 to 0
0 to 5
5 to 10
Change in GW Elevation at Representative Monitoring Well
Tule Lake Groundwater Subbasin Boundary
Change in elevation contours
0
1.5
3
6 Miles
Earthstar Geographics


N
W
E
S
Oregon
California
-6 ft
-9 ft
-6 ft
-7 ft
-9 ft
-2 ft
-4 ft
-5 ft
-9 ft
-4 ft
-5 ft
-17 ft
-1 ft
-7 ft
-2 ft
-1 ft
-3 ft
-3 ft
Siskiyou County
Modoc County
Spring 2020 - Spring 2021
Change in GW Elevation (ft)
-20 to -15
-15 to -10
-10 to -5
-5 to 0
Change in GW Elevation at Representative Monitoring Well
Tule Lake Groundwater Subbasin Boundary
Change in elevation contours
Note: ND above indicates that no data is available for the specified representative monitoring well.
0
1.5
3
6 Miles
Maxar

Appendix D.

Groundwater Extractions and Methods

Groundwater Extractions

Basin Number	Water Year	Total Groundwater Extractions (AF)	Water Use Sector Urban (AF)	Water Use Sector Industrial (AF)	Water Use Sector Agricultural (AF)
1-002.01	2019 (Oct. 2018 - Sept. 2019)	47400	300	0	47100
1-002.01	2020 (Oct. 2019 - Sept. 2020)	35800	400	0	35400
1-002.01	2021 (Oct. 2020 - Sept. 2021)	52100	400	0	51700

Basin Number	Water Year	Water Use Sector Managed Wetlands (AF)	Water Use Sector Managed Recharge (AF)	Water Use Sector Native Vegetation (AF)	Water Use Sector Other (AF)
1-002.01	2019 (Oct. 2018 - Sept. 2019)	0	0	0	0
1-002.01	2020 (Oct. 2019 - Sept. 2020)	0	0	0	0
1-002.01	2021 (Oct. 2020 - Sept. 2021)	0	0	0	0

Basin Number	Water Year	Water Use Sector Other Description
1-002.01	2019 (Oct. 2018 - Sept. 2019)	n/a
1-002.01	2020 (Oct. 2019 - Sept. 2020)	n/a
1-002.01	2021 (Oct. 2020 - Sept. 2021)	n/a

Groundwater Extraction Methods

Basin Number	Water Year	Meters Volume (AF)	Meters Description	Meters Type	Meters Accuracy (%)	Meters Accuracy Description
1-002.01	2019 (Oct. 2018 - Sept. 2019)	300	Magnetic Flowmeters	Direct	0-5 %	Manufacturer's Documentation
1-002.01	2020 (Oct. 2019 - Sept. 2020)	30000	Magnetic Flowmeters & Propeller Meters	Direct	0-5 %	Manufacturer's Documentation
1-002.01	2021 (Oct. 2020 - Sept. 2021)	46300	Magnetic Flowmeters & Propeller Meters	Direct	0-5 %	Manufacturer's Documentation

Basin Number	Water Year	Electrical Records Volume (AF)	Electrical Records Description	Electrical Records Type	Electrical Records Accuracy (%)	Electrical Records Accuracy Description
1-002.01	2019 (Oct. 2018 - Sept. 2019)	0	-	-	-	-
1-002.01	2020 (Oct. 2019 - Sept. 2020)	0	-	-	-	-
1-002.01	2021 (Oct. 2020 - Sept. 2021)	0	-	-	-	-

Basin Number	Water Year	Land Use Volume (AF)	Land Use Description	Land Use Type	Land Use Accuracy (%)	Land Use Accuracy Description
1-002.01	2019 (Oct. 2018 - Sept. 2019)	0	-	-	-	-
1-002.01	2020 (Oct. 2019 - Sept. 2020)	0	-	-	-	-
1-002.01	2021 (Oct. 2020 - Sept. 2021)	0	-	-	-	-

Groundwater Extraction Methods

Basin Number	Water Year	Groundwater Model Volume (AF)	Groundwater Model Description	Groundwater Model Type	Groundwater Model Accuracy (%)	Groundwater Model Accuracy Description
1-002.01	2019 (Oct. 2018 - Sept. 2019)	0	-	-	-	-
1-002.01	2020 (Oct. 2019 - Sept. 2020)	0	-	-	-	-
1-002.01	2021 (Oct. 2020 - Sept. 2021)	0	-	-	-	-

Basin Number	Water Year	Other Method(s) Volume (AF)	Other Method(s) Description	Other Method(s) Type	Other Method(s) Accuracy (%)	Other Method(s) Accuracy Description
1-002.01	2019 (Oct. 2018 - Sept. 2019)	47100	District groundwater extraction values based on the calculated average annual extractions within the District, as calculated by the GSP Model for water years 2000 through 2018, during similar water year types. Private groundwater extraction values based on the calculated average annual extractions by private groundwater pumping, as calculated by the GSP Model for water years 2000 through 2018, during similar water year types. The estimated annual extractions for these years are show in Figure 2-9 of the Annual Report.	Estimate	Other	Accuracy of the model is unknown.

Groundwater Extraction Methods

Basin Number	Water Year	Other Method(s) Volume (AF)	Other Method(s) Description	Other Method(s) Type	Other Method(s) Accuracy (%)	Other Method(s) Accuracy Description
1-002.01	2020 (Oct. 2019 - Sept. 2020)	5800	Private groundwater extraction values based on the calculated average annual extractions by private groundwater pumping, as calculated by the GSP Model for water years 2000 through 2018, during similar water year types. The estimated annual extractions for these years are show in Figure 2 9 of the Annual Report.	Estimate	Other	Accuracy of the model is unknown.
1-002.01	2021 (Oct. 2020 - Sept. 2021)	5800	Private groundwater extraction values based on the calculated average annual extractions by private groundwater pumping, as calculated by the GSP Model for water years 2000 through 2018, during similar water year types. The estimated annual extractions for these years are show in Figure 2 9 of the Annual Report.	Estimate	Other	Accuracy of the model is unknown.

Appendix E.
Surface Water Supply

Surface Water Supply

Basin Number	Water Year	Methods Used To Determine	Water Source Type Central Valley Project (AF)	Water Source Type State Water Project (AF)	Water Source Type Colorado River Project (AF)
1-002.01	2019 (Oct. 2018 - Sept. 2019)	Combination of gate rating and spillway rating at the J Canal Headworks.	0	0	0
1-002.01	2020 (Oct. 2019 - Sept. 2020)	Combination of gate rating and spillway rating at the J Canal Headworks.	0	0	0
1-002.01	2021 (Oct. 2020 - Sept. 2021)	Combination of gate rating and spillway rating at the J Canal Headworks.	0	0	0

Basin Number	Water Year	Water Source Type Local Supplies (AF)	Water Source Type Local Imported Supplies (AF)	Water Source Type Recycled Water (AF)	Water Source Type Desalination (AF)
1-002.01	2019 (Oct. 2018 - Sept. 2019)	0	0	0	0
1-002.01	2020 (Oct. 2019 - Sept. 2020)	0	0	0	0
1-002.01	2021 (Oct. 2020 - Sept. 2021)	0	0	0	0

Basin Number	Water Year	Water Source Type Other (AF)	Water Source Type Other Description
1-002.01	2019 (Oct. 2018 - Sept. 2019)	119667	USBR's Klamath Project
1-002.01	2020 (Oct. 2019 - Sept. 2020)	68445	USBR's Klamath Project
1-002.01	2021 (Oct. 2020 - Sept. 2021)	16205	USBR's Klamath Project

Appendix F.
Total Water Use

Total Water Use

Basin Number	Water Year	Total Water Use (AF)	Methods Used To Determine	Water Source Type Groundwater (AF)	Water Source Type Surface Water (AF)	Water Source Type Recycled Water (AF)
1-002.01	2019 (Oct. 2018 - Sept. 2019)	167100	Combination of direct measurement and estimates.	47400	119700	0
1-002.01	2020 (Oct. 2019 - Sept. 2020)	104200	Combination of direct measurement and estimates.	35800	68400	0
1-002.01	2021 (Oct. 2020 - Sept. 2021)	68300	Combination of direct measurement and estimates.	52100	16200	0

Basin Number	Water Year	Water Source Type Reused Water (AF)	Water Source Type Other (AF)	Water Source Type Other Description	Water Use Sector Urban (AF)	Water Use Sector Industrial (AF)
1-002.01	2019 (Oct. 2018 - Sept. 2019)	0	0		300	0
1-002.01	2020 (Oct. 2019 - Sept. 2020)	0	0		400	0
1-002.01	2021 (Oct. 2020 - Sept. 2021)	0	0		400	0

Basin Number	Water Year	Water Use Sector Agricultural (AF)	Water Use Sector Managed Wetlands (AF)	Water Use Sector Managed Recharge (AF)	Water Use Sector Native Vegetation (AF)	Water Use Sector Other (AF)
1-002.01	2019 (Oct. 2018 - Sept. 2019)	166800	0	0	0	0
1-002.01	2020 (Oct. 2019 - Sept. 2020)	103800	0	0	0	0
1-002.01	2021 (Oct. 2020 - Sept. 2021)	67900	0	0	0	0