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Annual Report for the Martis Valley Groundwater Basin

Water Years 2020 and 2021

June 2, 2022

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Prepared for:

Truckee Donner Public Utility District

On behalf of Truckee Donner Public Utility District, Northstar Community Service District, and Placer County Water Agency collectively referred to as the MVGB Agencies.

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June 2, 2022

TRUCKEE DONNER PUBLIC UTILITY DISTRICT
MARTIS VALLEY GROUNDWATER BASIN ANNUAL REPORT

WATER YEARS 2020 AND 2021

Certifications and Seals

This report and analysis was prepared by the following GEI Consultants Inc. professional geologists. Report sections contained herein based on available data and were prepared by:

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Executive Summary

This report provides annual monitoring data and an assessment of groundwater conditions in the Martis Valley Groundwater Basin (MVGB or Basin) for water years 2020 and 2021. A water year (WY) is defined as October through September of any year.

The MVGB does not have to comply with the Sustainable Groundwater Management Act, as the Basin was re-classified in 2018 as a very low priority basin. However, the MVGB Agencies recognize the importance of groundwater management and are continuing to implement their 2013 Groundwater Management Plan.

Groundwater levels, groundwater extractions, surface water conditions, groundwater recharge from locally derived and imported wastewater, measured and estimated total water use and groundwater storage change estimates were compiled and analyzed. Climatic conditions were also evaluated as to their effects on groundwater levels.

Both WYs 2020 and 2021 have been classified as dry years based on precipitation with WY 2021 being the driest on record. In WY 2021, rainfall was less than 50 percent of normal rainfall. Groundwater levels throughout the Basin decreased due primarily to the lack of precipitation recharging the aquifers and increases in groundwater pumping in response the extremely dry conditions. Most wells remained above their lowest measured groundwater levels in WY 2020 and 2021, except for three wells during the dry summer months of each water year. The historical record for these wells is limited and in recent years the participating agencies have substantially increased the number of reporting wells and intervals of measurement The detection of the groundwater levels exceeding the lowest levels previously recorded would not have been detected without the Agencies increasing groundwater level monitoring frequency to a monthly basis.

Groundwater pumping in the Basin increased by about 10 percent, about 800 acre-feet (average), during these water years in comparison to previous years (average from 2016 through 2019). Change in groundwater storage values reflected the extremely dry conditions and moderate increase in pumping, and overall groundwater in storage decreased by about 17,000 acre-feet (AF) over the last two WYs. Most groundwater basins in northern California experienced decreases in storage during these two WYs. The average annual groundwater pumping over this two-year period was approximately 7,400 AF, much less than the sustainable yield of 22,000 AF per year, which suggests that the long-term groundwater levels and storage will recover after above normal and wet precipitation year(s). The Basin storage has been conservatively estimated to be about 484,000 AF so the overall change over the last two years is relatively small (about 3.5%) in comparison to the total water stored in the Basin.

1. Introduction

The Martis Valley Groundwater Basin (MVGB or Basin) groundwater resources have been evaluated for many years starting in the 1990s. In 2013, a Groundwater Management Plan (GMP) was developed for the Basin (Brown and Caldwell, 2013). In 2014, the Sustainable Groundwater Management Act (SGMA) classified the MVGB as medium priority basin, which required compliance with the SGMA regulations. In December 2016, an Alternative Submittal to a Groundwater Sustainability Plan was submitted to the California Department of Water Resources (DWR) by the Truckee Donner Public Utility District (TDPUD) on behalf its MVGB SGMA Local Agencies (MVGB Agencies), which include TDPUD, Northstar Community Services District (NCSD), Placer County Water Agency (PCWA), the Town of Truckee, Nevada County, and Placer County. As referenced in the MVGB Alternative Submittal, scientific analyses determined the Basin has at least a 25-year history of sustainable groundwater operations and conditions, despite several periods of drought. In compliance with SGMA requirements an Annual Report for water years (WYs) 2016 and 2017 were developed and submitted to DWR.

Prior to DWR completing its review of the Alternative Submittal and Annual Reports, DWR was required to review basin prioritizations as part of implementation of SGMA. The MVGB Agencies reviewed DWR's initial prioritization of the Basin and worked extensively with DWR staff to ensure accurate information was being used. In 2018, DWR re-evaluated the Basin and changed its priority to Very Low Priority, thus the Basin was no longer required to comply with SGMA. The MVGB Agencies recognize the importance of groundwater management and have subsequently reconvened to implement the 2013 GMP. As part of this plan, Best Management Objective #1 is to compile an annual report to summarize groundwater conditions and to share the information with interested stakeholders. Since WY 2018, the MVGB Agencies have prepared annual reports and have shared them with stakeholders. This document provides a summary and interpretation of groundwater conditions for WY's 2020 and 2021, instead of just one WY, due to COVID restrictions. The report provides historical data for reference along with a more detailed assessment of the conditions since implementation of the GMP.

1.1 Martis Valley Groundwater Basin

The MVGB, Basin No. 6-67, as defined by DWR in Bulletin 118 Interim Update (2016), is a 35,600-acre (57-square-mile) intermontane, fault-bounded basin east of the Sierra Nevada crest. Figure 1 shows the location of the MVGB and pertinent geographic features.

The MVGB uses groundwater almost exclusively for water demands, although several major surface water bodies are present within the Basin. The Truckee River traverses the Basin from the southwest to the northeast in a shallow, incised channel. Principal tributaries to the Truckee River within the MVGB are Donner Creek, Martis Creek, and Prosser Creek; as well as discharge from Boca Reservoir slightly before the Truckee River leaves the Basin. Surface water storage reservoirs inside MVGB include Martis Lake and Prosser Reservoir. Donner Lake and Boca Reservoir lie just outside the MVGB boundaries, but release surface water into the MVGB. Although surface water released from reservoirs is not used to satisfy local demands, it is a major, and highly regulated, component of the Basin's hydrologic system. Surface water

within the MVGB is under the purview of the Truckee River Operating Agreement (TROA), a Bi-State, multi-party Federal Agreement enacted by the US Congress which sets limits on the consumptive use of both groundwater and surface water in the Basin.

Wastewater is generated within the MVGB, within the Truckee River watershed, and outside the watershed (Lake Tahoe area) and sent to a treatment facility operated by the Tahoe-Truckee Sanitation Agency (T-TSA). The treated water is recharged into the groundwater system via two leach fields (Figure 1), increasing the groundwater contribution to downstream Truckee River flows.

1.2 Climatic Conditions

Water year types were developed for the MVGB using local precipitation data from Truckee Ranger Station No. 049043. Its location is shown on Figure 1. WY 2020 was California's fifth driest year and WY 2021 is the second driest on record (DWR 2021). The average precipitation at the Truckee Ranger Station (1988–2019) was 29 inches while WY 2020 received only 18 inches and in WY 2021 only 14 inches, less than half of normal and the driest on record. The deviation of annual WY precipitation from the mean is shown on Figure 2. Wet conditions were set at more than one standard deviation above the mean annual WY precipitation total. Above normal conditions were defined as annual precipitation between the mean value and one standard deviation above it. Likewise, below normal conditions were defined as an annual precipitation between the mean value and one standard deviation below it. Dry conditions were defined as an annual precipitation total more than one standard deviation below the mean. WYs 2020 and 2021 are both classified as dry water years and have been the only back-to-back dry years reported during the period of record at the Truckee Ranger Station. Since precipitation is the major source of recharge in the Basin, groundwater levels responded by decreasing during the last two years.

1.3 Surface Water Conditions

The Truckee River is the dominant hydrologic feature in the MVGB. It conveys hundreds of thousands of acre-feet (AF) of surface water through the Basin and flows along the lowest portions of the Basin. The measured outflow of the Truckee River at the edge of the Basin was about 385,000 AF in WY 2020, and only 290,000 AF in WY 2021.

Figure 1. Martis Valley Groundwater Basin Location

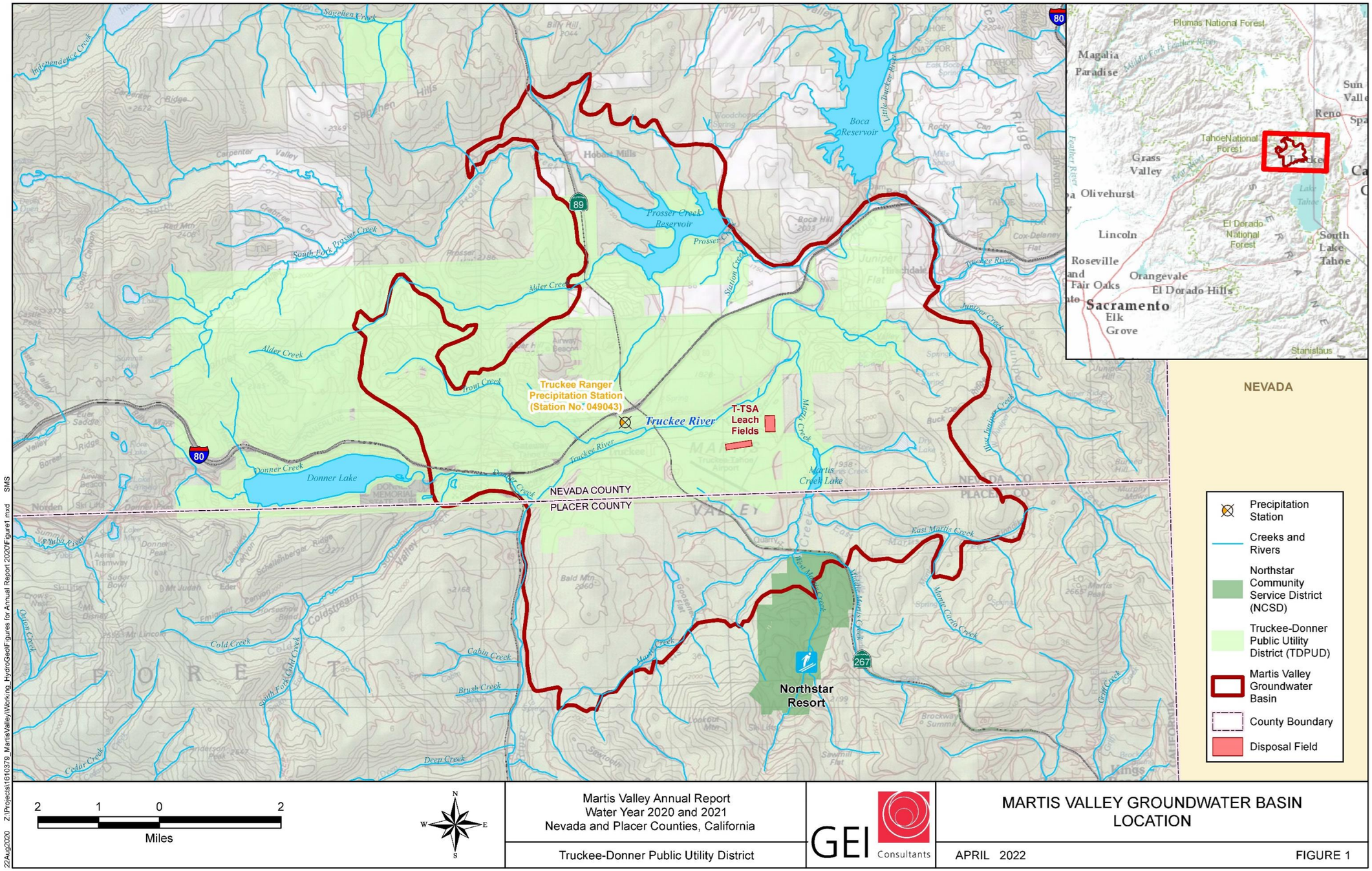

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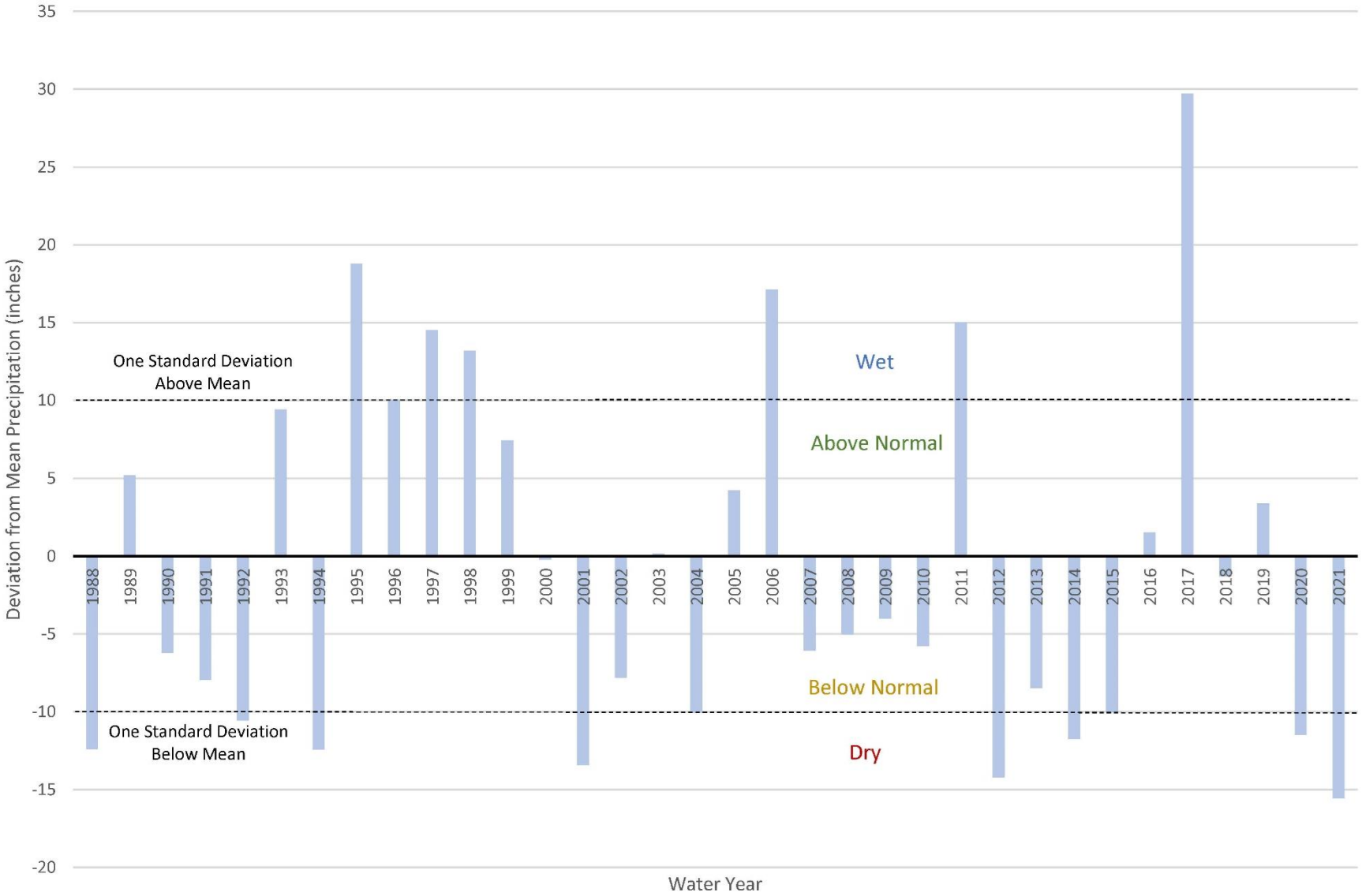
Figure 2. Annual Precipitation Deviation from Mean: Truckee Ranger Station No. 049343



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2. Groundwater Conditions

Wells used for groundwater level monitoring (labeled as CASGEM wells or piezometers) in the MVGB are shown on Figure 3. Groundwater levels at these wells are monitored by the MVGB Agencies and DWR and are reported to the California Statewide Groundwater Elevation Monitoring (CASGEM) program. These wells are used to help assess the sustainability of the MVGB. Data from the wells were used to generate hydrographs to show groundwater level elevation trends over time at each monitoring location. Groundwater levels in the Basin range from within a few feet of ground surface to as much as 100 feet below ground surface and have consistently remained within this range.

Historically, groundwater level measurements were taken in the spring and fall. In 2017, the MVGB Agencies voluntarily implemented monthly monitoring of groundwater levels for all wells in the CASGEM program. This proactive move to monthly monitoring was, in part, to investigate and address uncertainties in seasonal variations. This evaluation continues to utilize spring and fall measurements to assess the health of the Basin, to show whether the basin has refilled in the spring, and the effects of pumping in the fall. Monthly groundwater measurements are illustrating that peak summer-time groundwater pumping temporarily lowers groundwater levels below the previous fall measurements, as would be expected, but are not depleting reserves. Because of climatic conditions groundwater levels may vary from year to year but should fully recover during above-normal to wet precipitation years.

Three of the CASGEM monitoring wells (TH-Fibreboard, TH-Prosser Village, and TH-Martis Valley) are located near municipal supply wells that at times affect their measurements. Historically, it was not documented whether the nearby municipal wells were pumping or recently shut off when the measurements were taken. This has been corrected in recent years by shutting off the pumping wells for at least one-hour prior to taking a groundwater level measurement. In addition to the CASGEM wells, six temporary piezometers were constructed near Martis Creek for a restoration project and provided some additional information about the groundwater conditions in the Basin. In WY 2019, groundwater level measurements were discontinued at these piezometers.

The MVGB Agencies' monitoring network has good regional distribution (covering over 70 percent of the Basin) and is monitoring groundwater levels near areas of pumping, inflow, and outflow. The network has 30 years of data that can be used to assess changes in the Basin and monitor aquifers that are being used for municipal and industrial purposes.

2.1 Groundwater Levels

Long-term hydrographs, from 1989 through 2021 for all of the 14 monitoring wells, are presented on Figure 4 along with the water year types. Figure 5 provides a shorter time period than Figure 4 to further assess these seasonal variations in groundwater levels. Hydrographs for each individual monitoring well are presented in Attachment A.

Based on spring to spring and fall to fall measurements, groundwater elevations, depending on the location in the Basin, are generally stable remaining within their historic ranges but some levels have decreased by

more than 10 feet over the last two years. This is expected due to both WYs being classified as dry with reduced recharge potential caused by less than 50 percent of normal precipitation and about 10 percent increase in pumping in response to the drought conditions. Local lowering of groundwater levels by this amount is not of concern as there is still over 800 feet of saturated sediments and the aquifers will likely recover after the next above normal to wet precipitation years. Seasonal fluctuations due to climate and pumping patterns are apparent. In general, spring groundwater levels decreased overall from 2019 to 2020 and fluctuated both directions from 2020 to 2021, primarily in response to decreased recharge due to the drought conditions. WYs 2020 and 2021 groundwater levels are all within their historical ranges except for two wells (Fibreboard TH and 18N17E33L001) that fell below their historical fall lows in 2020 and 2021, by 18 and 0.6 feet, respectively. The larger drawdown at the Fibreboard TH is likely due to influence from the nearby municipal well. As shown by groundwater level measurements from the Fibreboard TH, obtained during 2020, groundwater levels recovered by more than 40 feet within two months of after pumping was stopped in the nearby municipal well, indicating this was not a permanent depletion of groundwater but a temporary and local effect of pumping.

There were three wells that fell below their historical lows but these were during the summer months of both WYs when there was no historic monthly data to compare them to, including the previous drought years of 2012 to 2016 which likely would have recorded lower monthly groundwater levels. Groundwater levels in the Fibreboard TH monitoring well fell below fall historical lows by about 16 feet for 4 months in the summer of WY 2020, and 25 feet below the historical low in the summer of WY 2021 for 5 months. The Prosser Village TH monitoring well fell just below historical low in WY 2020 for 1 month and fell 9 feet below historical lows for 2 summer months in WY 2021. Well 18N17E33L001M fell less than 1 foot below historic fall low for 3 months in WY 2021. These wells may be influenced by pumping at nearby municipal wells.

Figure 3. Martis Valley Groundwater Basin Monitoring Well Locations

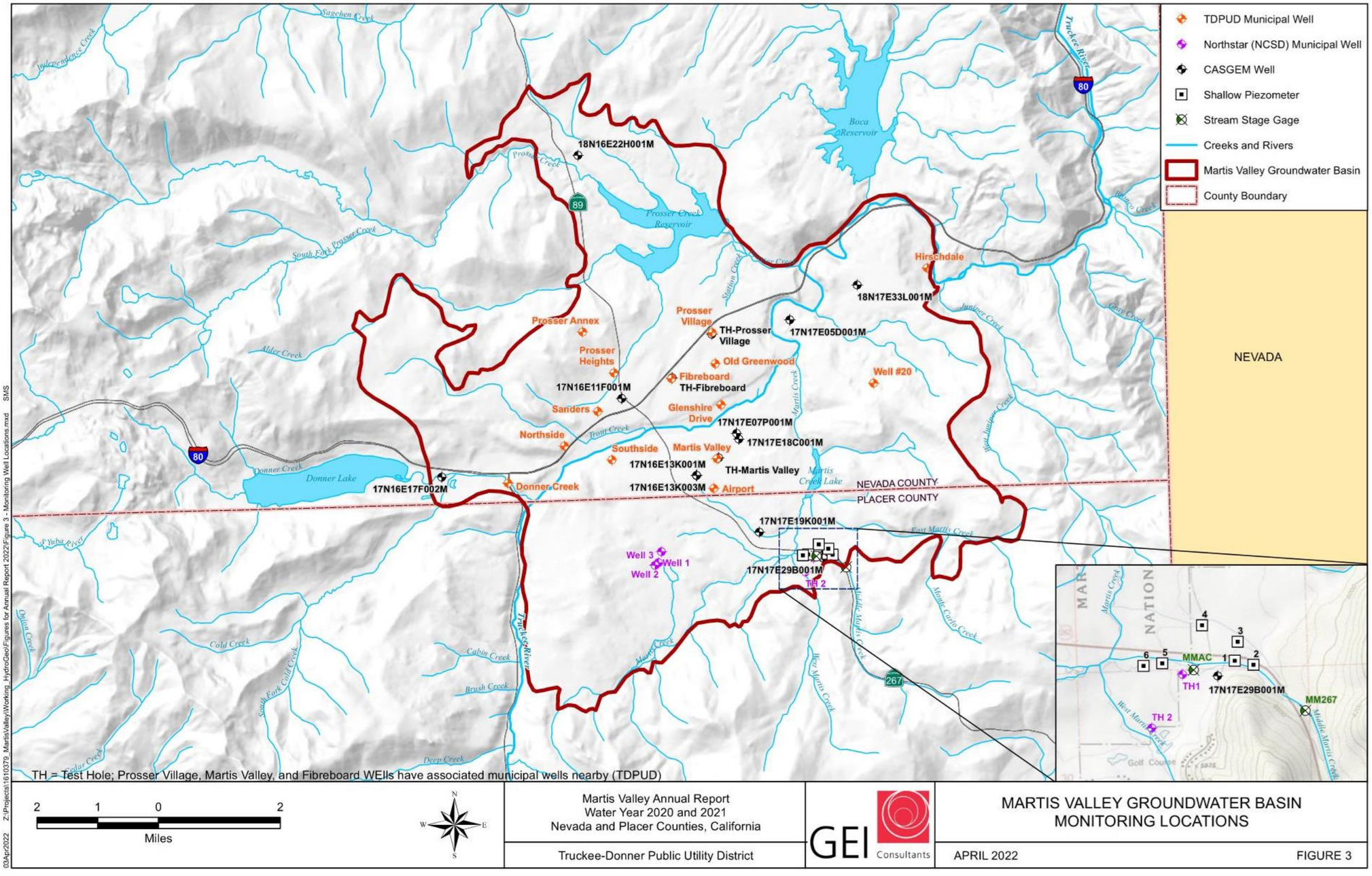

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Figure 4. Martis Valley Groundwater Basin Historic Groundwater Level Elevations, Water Years 1989-2021

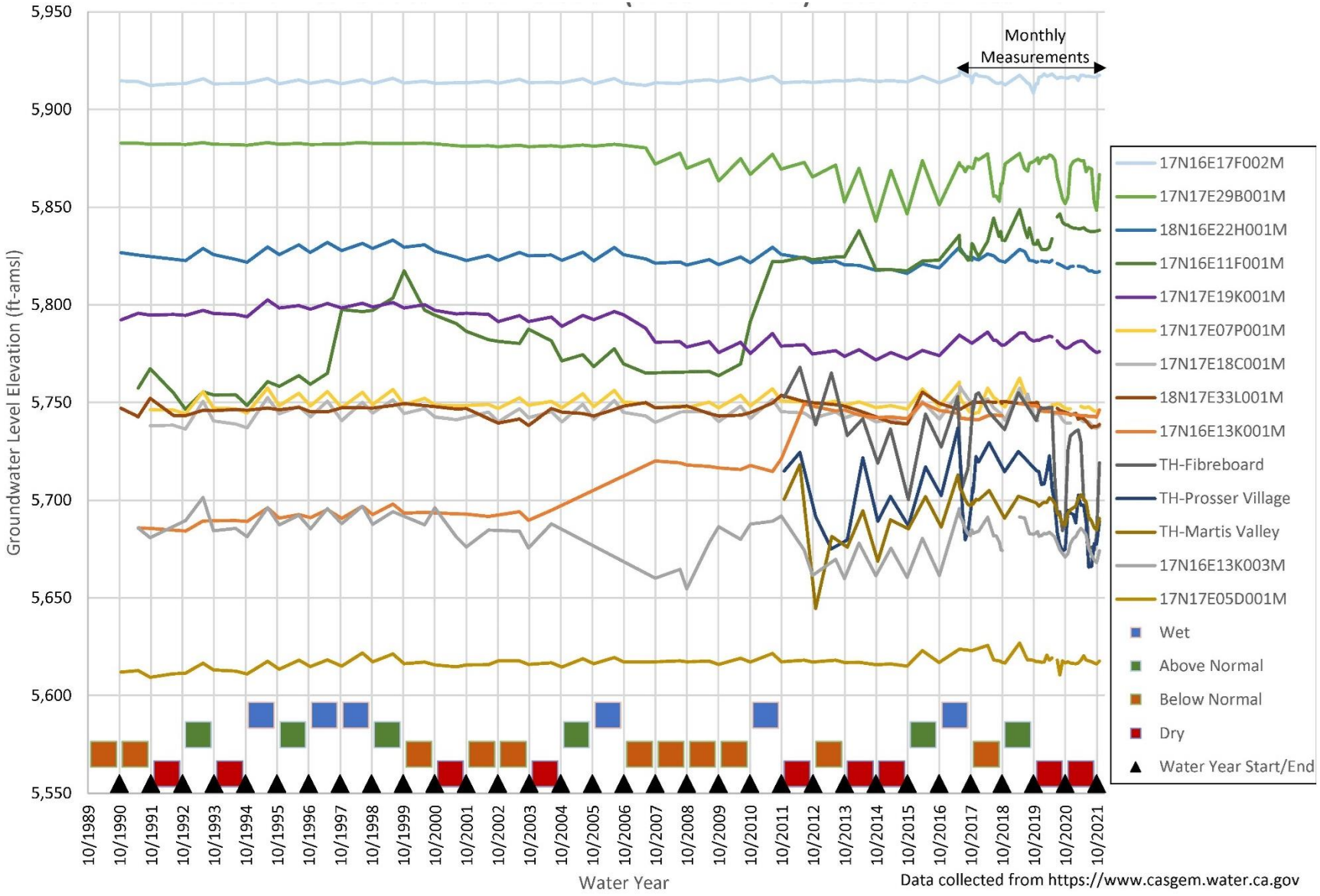
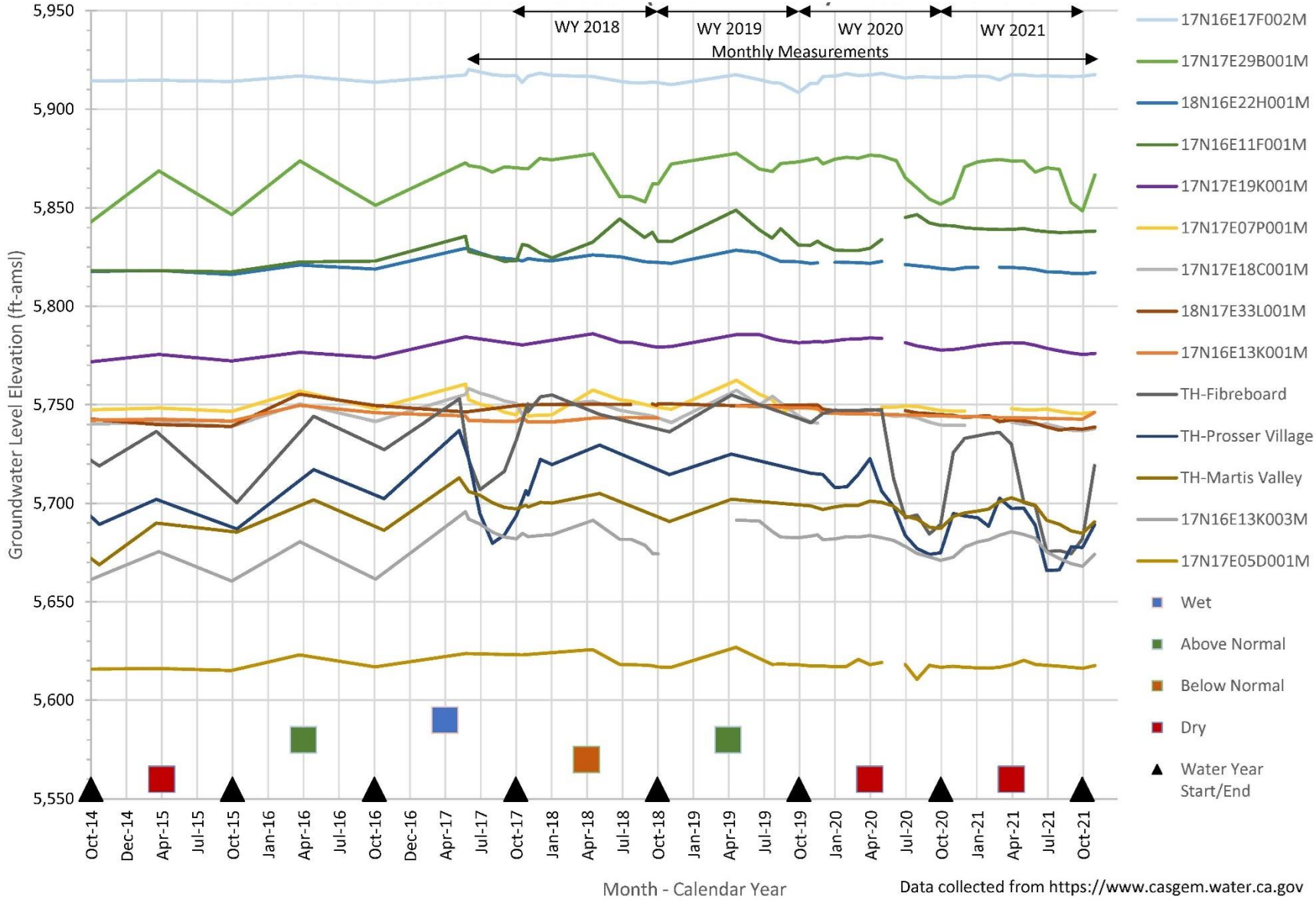


Figure 5. Martis Valley Groundwater Basin Historic Groundwater Level Elevations, Water Years 2015-2021



2.2 Groundwater Flow

Seasonal groundwater level elevation contours for Spring and Fall 2020 through 2021 are shown on **Figures 6 through 9**. These contours reflect pumping, recharge, geologic conditions, and discharges to surface water. Monitoring well groundwater levels and bed elevations of gaining surface water reaches were used to develop the groundwater elevation contour maps. Groundwater levels at 17N16E13K003M were used for contouring as 17N16E13K001M appears to reflect groundwater levels in a shallower portion of the aquifer.

As expected, Fall season contours exhibit lower groundwater level elevations in the central portions of the Basin, relative to Spring conditions, due to increased pumping and less natural recharge. Spring contours for both years are similar, although at slightly different elevations, indicating recharge is reaching and refilling the aquifers despite the dry conditions during the summer months.

The groundwater flow patterns remained generally the same during both water years, with flow from the perimeter of the MVGB towards the Truckee River, consistent with previous years. The groundwater contours show pumping has changed this regional pattern near the airport, but this is not a new development as the historical contours have also reflected this pumping depression. The pumping depression appears to be caused by the Martis Valley municipal well. The extent and depth of the depression has increased slightly because of the dry conditions of both WYs 2020 and 2021.

Beginning in Fall 2020 a new pumping depression formed east of the town of Truckee and north of the Truckee River and remained through Spring and Fall 2021. Historically the contours showed discharges to the river, but with the lower groundwater levels due to drought conditions and the creation of a pumping depression, surface water may be discharging to groundwater in this area while the depression is present. The pumping depression appears to be the result of increased pumping from the Fibreboard, Prosser, and Old Greenwood wells.

Figure 6. Martis Valley Groundwater Basin Spring 2020 Groundwater Elevation Contours

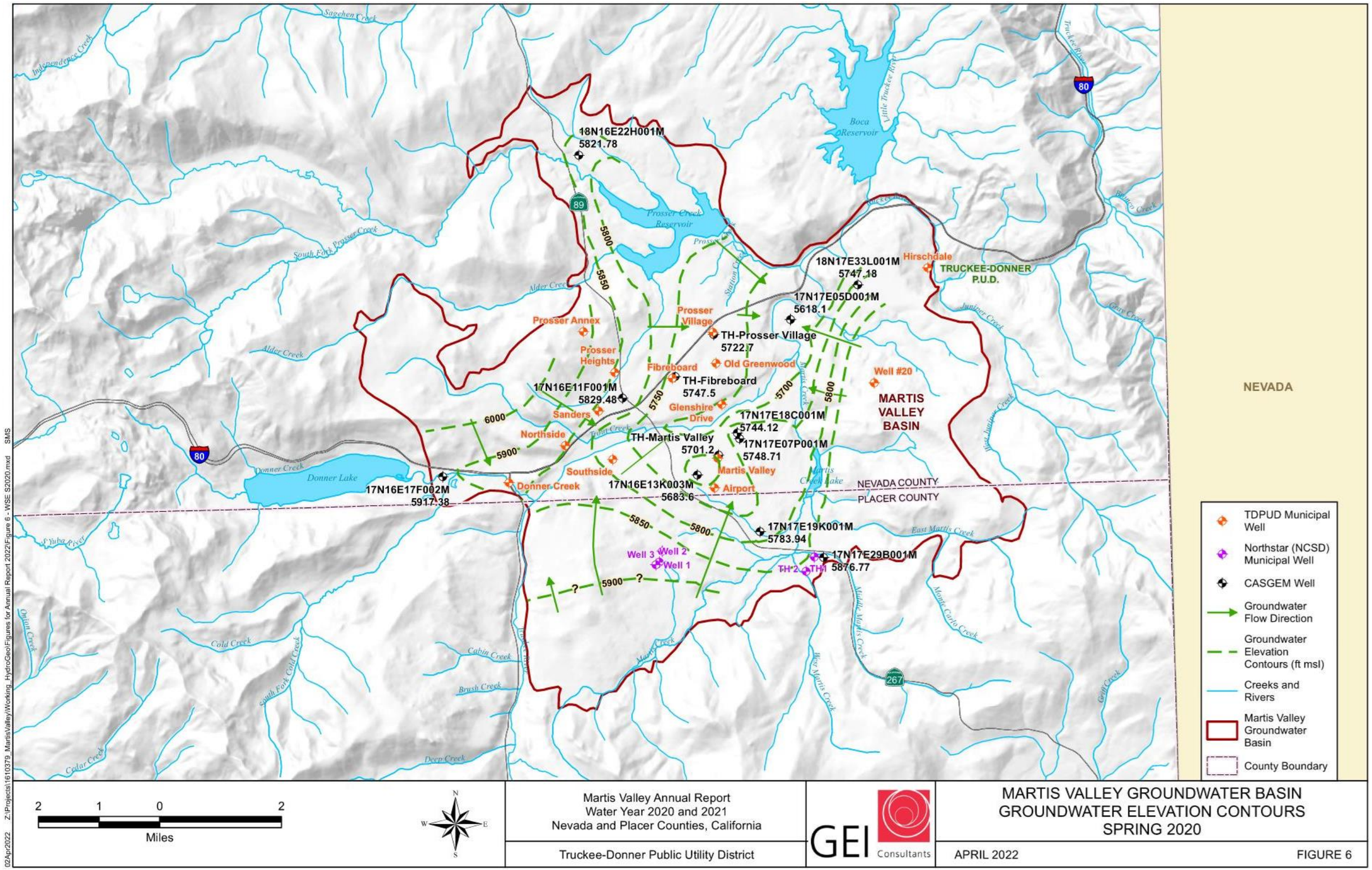


Figure 7. Martis Valley Groundwater Basin Fall 2020 Groundwater Elevation Contours

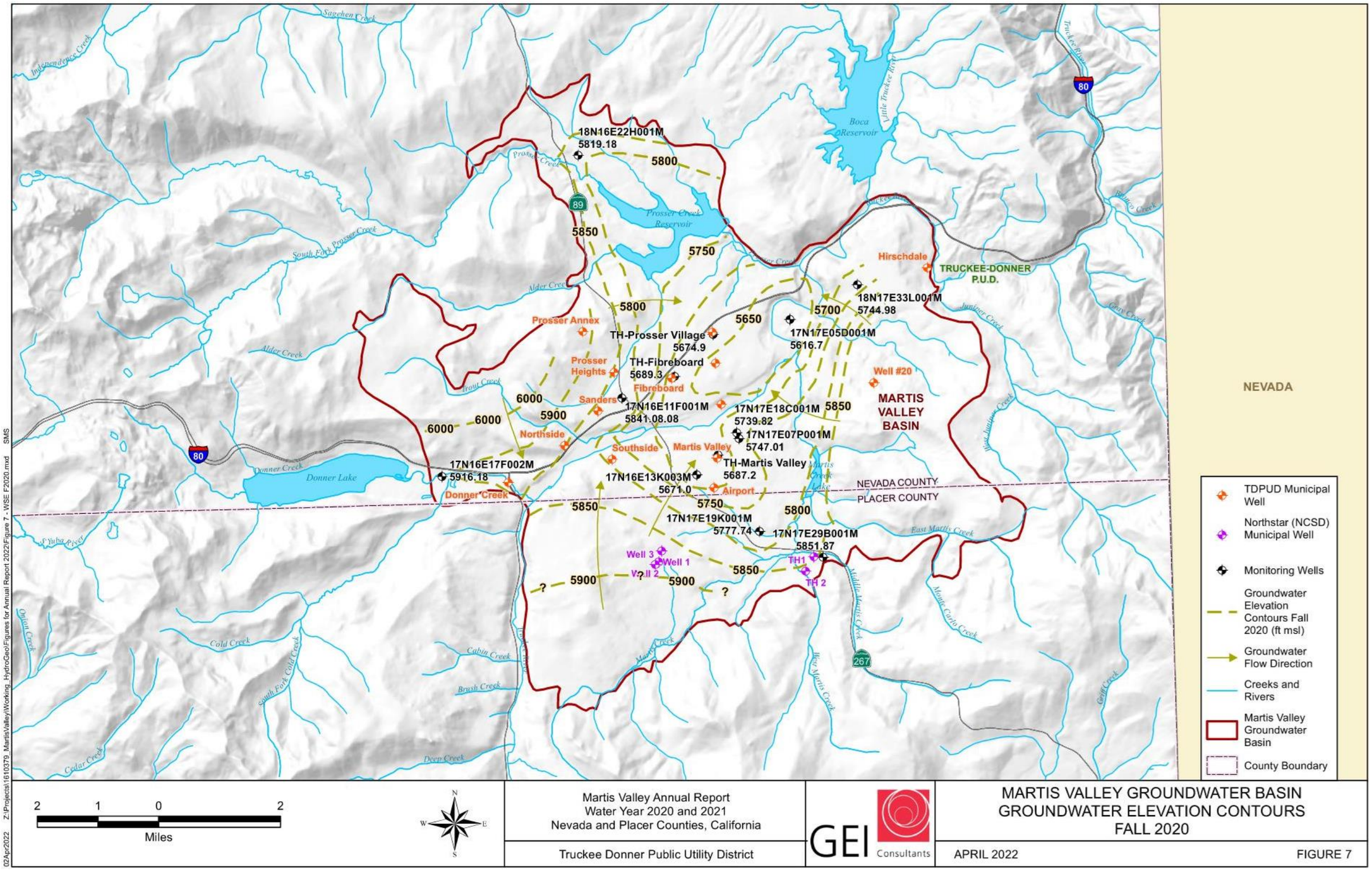


Figure 8. Martis Valley Groundwater Basin Spring 2021 Groundwater Elevation Contours

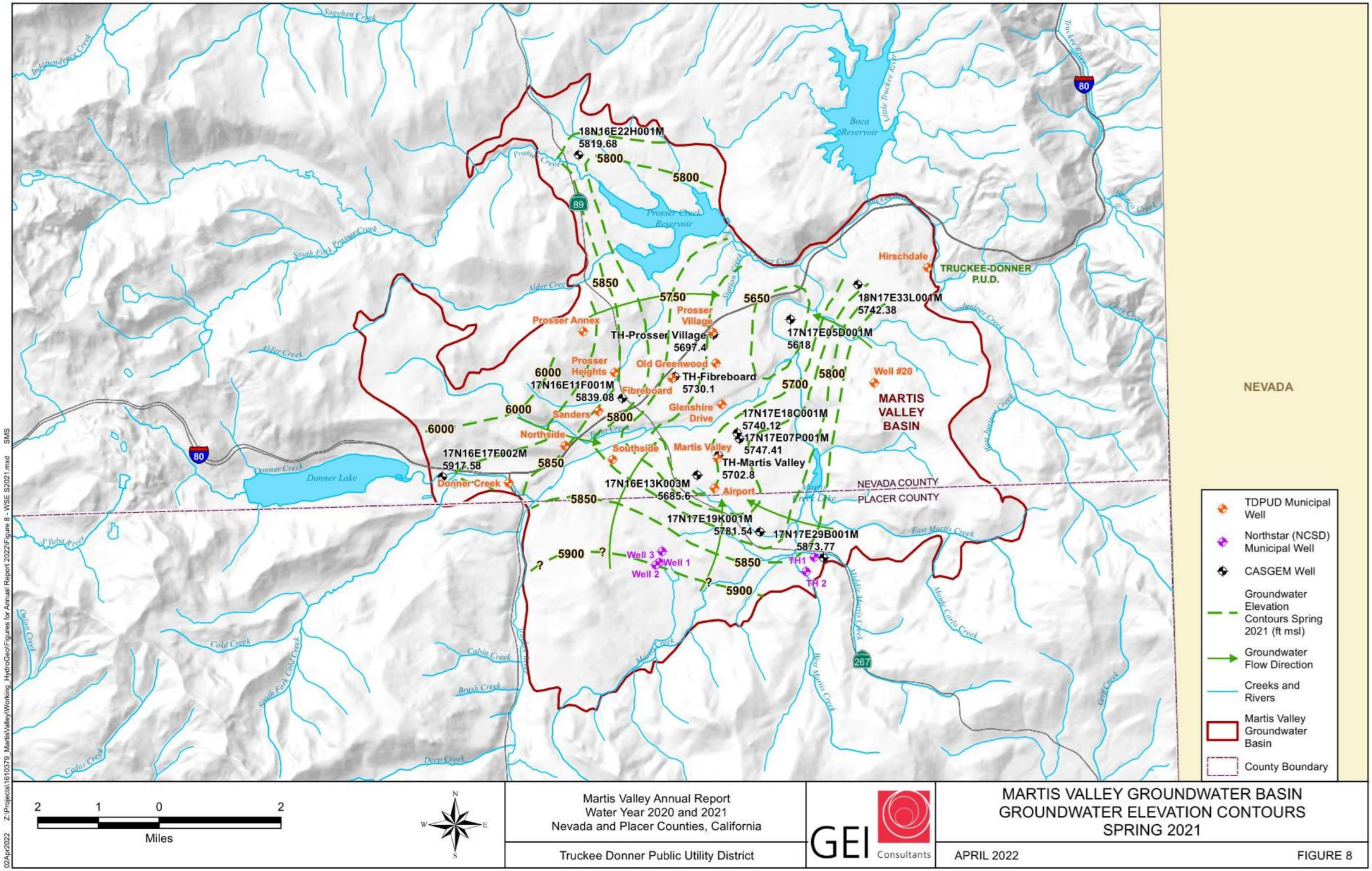
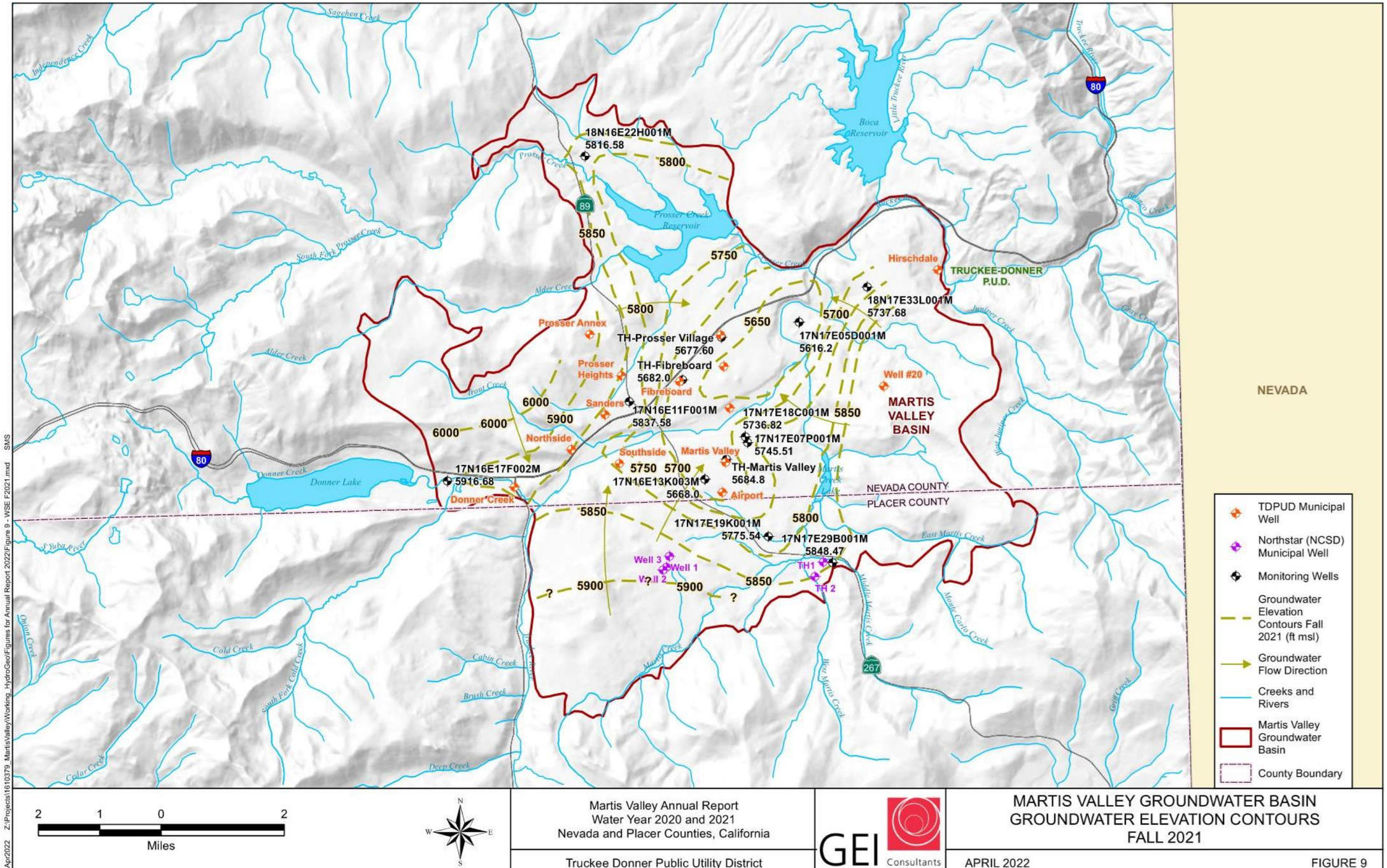


Figure 9. Martis Valley Groundwater Basin Fall 2021 Groundwater Elevation Contours



3. Groundwater Extraction

Groundwater extractions for various water use sectors are presented in Tables 1 and 2 for WYs 2020 and 2021, respectively. The methods used to measure extraction data are noted along with water use sector totals. The total water use is based on metered and estimated pumping. The general locations of the community water service areas and non-community water purveyors, along with the location of golf courses, are shown on Figure 10. Total groundwater extraction in the MVGB was about 7,160 and 7,670 AF for WYs 2020 and 2021, respectively, well below the sustainable yield estimate of 22,000 AF.

Municipal groundwater extractions by TDPUD and NCSD, which are metered, account for about 80 percent of the total extractions; therefore, total groundwater extraction is well quantified. Groundwater extraction estimates for non-community uses and golf course irrigation were developed by others and are reported annually to the DWR, State Board, and TROA program. These estimates are developed on a calendar-year basis, not by WYs. The calendar-year extraction data is approximately equal to WY estimates due to the annual cycle of climatic conditions, including freezing temperatures and significant amounts of snow and other precipitation, which typically limits the need to pump groundwater in the spring and summer months of each WY. These estimated values are provided in Tables 1 and 2. A full reporting of annual 2021 estimates will be available later in 2022, in the TROA annual report.

The locations of wells for the public and community water systems, and general locations of golf courses and non-community entities that also use groundwater in the MVGB, are shown on Figure 10. The distribution of groundwater extractions for the wells are illustrated by the size of the symbol (magnitude) and color (pumping entity). The largest volume of water extracted at any location in the MVGB is from the Martis Valley well, located near the airport, and has altered the regional groundwater flow direction. Three other wells north of the Truckee River and east of the town of Truckee are the next largest producers in the valley and changed the overall regional groundwater flow direction in both WYs. Groundwater pumping increased on average by about 800 AF during WY 2020 and 2021 contributing to the pumping depression. The depth of the pumping depression may also be greater due to drought conditions and lower overall regional groundwater levels. Figure 10 is also useful for comparison with the groundwater contours (presented in Section 2) and corresponds with the pumping data.

Graphical representations of monthly and annual pumping for TDPUD and NCSD wells are presented on Figure 11. Seasonally, groundwater demand peaks in the summer and declines to approximately one-third to one-quarter of that amount during the winter and spring. This distribution suggests that calendar (for non-community users and golf course irrigation) and water year pumping estimates are typically similar in magnitude for this Basin, hence the tabulated totals in Tables 1 and 2 with calendar year pumping estimates are defensible surrogates to approximate water year pumping estimates. Figure 11 also shows that the overall pumping volume fluctuates from year to year but overall remains consistent unless dry conditions persist, varying by about 1,000 AF over the last 4 years. Groundwater use was higher in WY 2021 than in 2020, consistent with the second year of below-normal precipitation.

Table 1 Groundwater Pumping for Water Year 2019 - 2020 (values in acre-feet)

Agency	Metered/ Estimated	2019 Oct	Nov	Dec	2020 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual Total	Percent
Public Utility Water Purveyors [1]															
Truckee-Donner PUD															
Potable														**Water Year**	
1. Airport Well	Metered	9	10	11	14	12	13	12	20	10	21	20	7	159	
2. Martis Valley Well	Metered	156	161	169	158	158	165	168	182	208	219	220	212	2,175	
3. South Side Well	Metered	0	0	0	0	0	0	0	0	0	0	0	0	0	
4. Glenshire Dr Well	Metered	9	0	0	0	0	0	0	8	43	77	69	51	257	
5. Hirschdale Well	Metered	1	1	1	1	1	1	1	1	1	1	1	1	9	
6. Prosser Annex Well	Metered	16	0	0	0	0	0	0	17	23	26	26	24	132	
7. Prosser Heights Well	Metered	7	0	0	0	0	0	0	9	14	16	16	15	78	
8. Sanders Well	Metered	0	0	0	0	0	0	0	31	39	39	38	36	183	
9. Prosser Village Well	Metered	50	40	43	45	33	27	32	82	97	104	103	92	747	
10. Northside Well	Metered	0	0	0	0	0	0	0	0	14	18	20	16	68	
11. Old Greenwood Well	Metered	23	12	24	24	20	26	30	48	65	91	83	66	512	
12. Well 20	Metered	5	0	0	0	0	0	0	8	15	19	18	16	81	
13. "A" Well	Metered	0	0	0	0	0	0	0	0	0	0	0	0	0	
Non Potable															
14. Fibreboard Well	Metered	30	3	0	0	0	0	15	68	85	102	98	74	474	
15. Donner Creek Well	Metered	0	0	0	0	0	0	5	22	40	50	53	34	203	
16. Southside Well #1	Metered	1	1	0	0	0	0	0	0	2	0	1	1	5	
Subtotal		**308**	**228**	**247**	**242**	**224**	**232**	**261**	**493**	**655**	**782**	**767**	**645**	**5,083**	**71%**
Community Water Purveyors [2]															
Northstar C.S.D.														**Water Year**	
TH-1	Metered	2	1	3	0	0	1	0	0	16	28	19	18	89	
TH-2	Metered	2	0	1	3	1	0	0	6	12	25	31	22	104	
Well 1	Metered	13	0	0	0	0	0	0	13	41	38	39	33	178	
Well 2	Metered	18	8	11	9	8	7	9	32	23	38	42	40	244	
Well 3	Metered	3	1	1	1	1	1	1	3	4	3	0	1	22	
Subtotal		**38**	**11**	**16**	**13**	**10**	**10**	**11**	**53**	**95**	**133**	**133**	**115**	**638**	**9%**
Non-Community Water Purveyors [3,2]	*(Estimated using 2020 calendar year values.)*														
														Calendar Year	
Hobart Work Center [5]	Estimated													0	
Aggregates Martis Valley [5]	Estimated													120	
Subtotal														**120**	**2%**
Golf Courses [3,2]	*(Estimated using 2020 calendar year values.)*														
														Calendar Year	
Gray's Crossing [4]	Estimated	(Served by TDPUD and included in their reported pumping)												179	
Old Greenwood [4]	Estimated	(Served by TDPUD and included in their reported pumping)												295	
Ponderosa (9-hole Course)	Estimated	(Private wells not operated by TDPUD, monthly pumping not available)												4	
Coyote Moon [4]	Estimated	(Served by TDPUD and included in their reported pumping)												295	
Schaffer's Mill [5]	Estimated													232	
Lahontan [5]	Estimated													311	
Northstar [5]	Estimated													195	
Martis Camp [5]	Estimated													330	
Tahoe Donner	Estimated	(component of demand provided by TDPUD from wells in basin)												242	
Subtotal														**1,314**	**18%**
													Total	**7,155**	

[1] Values reported in gallons and converted to acre-feet

[2] Values reported in million gallons and converted to acre-feet

[3] Estimated and obtained from Annual Inventory of Water Use Lake Tahoe & Truckee River Basins Calendar Year 2020

[4] Groundwater use already accounted for in TDPUD reported pumping and not included in golf course demand subtotal

[5] Groundwater use not currently available, used 2020 values as surrogate.

Table 2 Groundwater Pumping for Water Year 2020 - 2021 (values in acre-feet)

Agency	Metered/ Estimated	2020 Oct	Nov	Dec	2021 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual Total	Percent
Public Utility Water Purveyors [1]															
Truckee-Donner PUD															
Potable														**Water Year**	
1. Airport Well	Metered	0	0	0	0	0	7	38	46	47	52	67	49	306	
2. Martis Valley Well	Metered	199	120	123	135	98	92	110	132	197	157	139	132	1,635	
3. South Side Well	Metered	0	0	0	0	0	0	0	0	0	0	0	0	0	
4. Glenshire Dr Well	Metered	24	18	32	25	53	44	78	134	99	106	33	0	647	
5. Hirschdale Well	Metered	1	1	1	1	1	1	1	1	1	1	1	1	10	
6. Prosser Annex Well	Metered	18	0	0	0	0	0	17	27	29	27	23	12	153	
7. Prosser Heights Well	Metered	13	0	0	0	0	7	17	16	17	16	17	9	111	
8. Sanders Well	Metered	32	0	0	0	0	11	34	33	34	30	26	0	200	
9. Prosser Village Well	Metered	68	64	40	54	44	39	50	80	102	67	76	41	728	
10. Northside Well	Metered	0	0	0	0	0	0	0	14	20	20	13	0	68	
11. Old Greenwood Well	Metered	42	42	53	34	59	54	66	86	99	99	85	37	756	
12. Well 20	Metered	11	0	0	0	0	3	13	18	20	19	14	6	104	
13. "A" Well	Metered	0	0	0	0	0	0	0	0	0	0	0	0	0	
Non Potable															
14. Fibreboard Well	Metered	33	0	0	0	0	45	78	106	117	89	78	23	568	
15. Donner Creek Well	Metered	16	0	0	0	0	6	39	49	55	44	30	10	248	
16. Southside Well #1	Metered	1	1	0	0	0	0	0	1	1	1	0	0	5	
Subtotal		**458**	**246**	**249**	**249**	**255**	**309**	**542**	**742**	**839**	**726**	**604**	**320**	**5,539**	**72%**
Community Water Purveyors [2]															
Northstar C.S.D.														**Water Year**	
TH-1	Metered	8	0	0	0	0	2	1	15	5	2	20	17	72	
TH-2	Metered	22	5	1	7	0	0	0	9	41	51	25	20	180	
Well 1	Metered	13	0	0	0	0	0	0	13	41	38	39	33	178	
Well 2	Metered	18	8	11	9	8	7	9	32	23	38	42	40	244	
Well 3	Metered	3	1	1	1	1	1	1	3	4	3	0	1	22	
Subtotal		**64**	**15**	**13**	**17**	**9**	**10**	**12**	**72**	**114**	**133**	**127**	**112**	**696**	**9%**
Non-Community Water Purveyors [3,2]	*(Estimated using 2021 calendar year values.)*														
														Calendar Year	
Hobart Work Center [5]	Estimated													0	
Aggregates Martis Valley [5]	Estimated													120	
Subtotal														**120**	**2%**
Golf Courses [3,2]	*(Estimated using 2021 calendar year values.)*														
														Calendar Year	
Gray's Crossing [4]	Estimated	(Served by TDPUD and included in their reported pumping)												179	
Old Greenwood [4]	Estimated	(Served by TDPUD and included in their reported pumping)												295	
Ponderosa (9-hole Course)	Estimated	(Private wells not operated by TDPUD, monthly pumping not available)												4	
Coyote Moon [4]	Estimated	(Served by TDPUD and included in their reported pumping)												295	
Schaffer's Mill [5]	Estimated													232	
Lahontan [5]	Estimated													311	
Northstar [5]	Estimated													195	
Martis Camp [5]	Estimated													330	
Tahoe Donner	Estimated	(component of demand provided by TDPUD from wells in basin)												242	
Subtotal														**1,314**	**17%**
													Total	**7,669**	

[1] Values reported in gallons and converted to acre-feet

[2] Values reported in million gallons and converted to acre-feet

[3] Estimated and obtained from Annual Inventory of Water Use Lake Tahoe & Truckee River Basins Calendar Year 2020

[4] Groundwater use already accounted for in TDPUD reported pumping and not included in golf course demand subtotal

[5] Groundwater use not currently available, used 2020 values as surrogate.

Figure 10. Martis Valley Groundwater Basin Locations of Groundwater Extractions

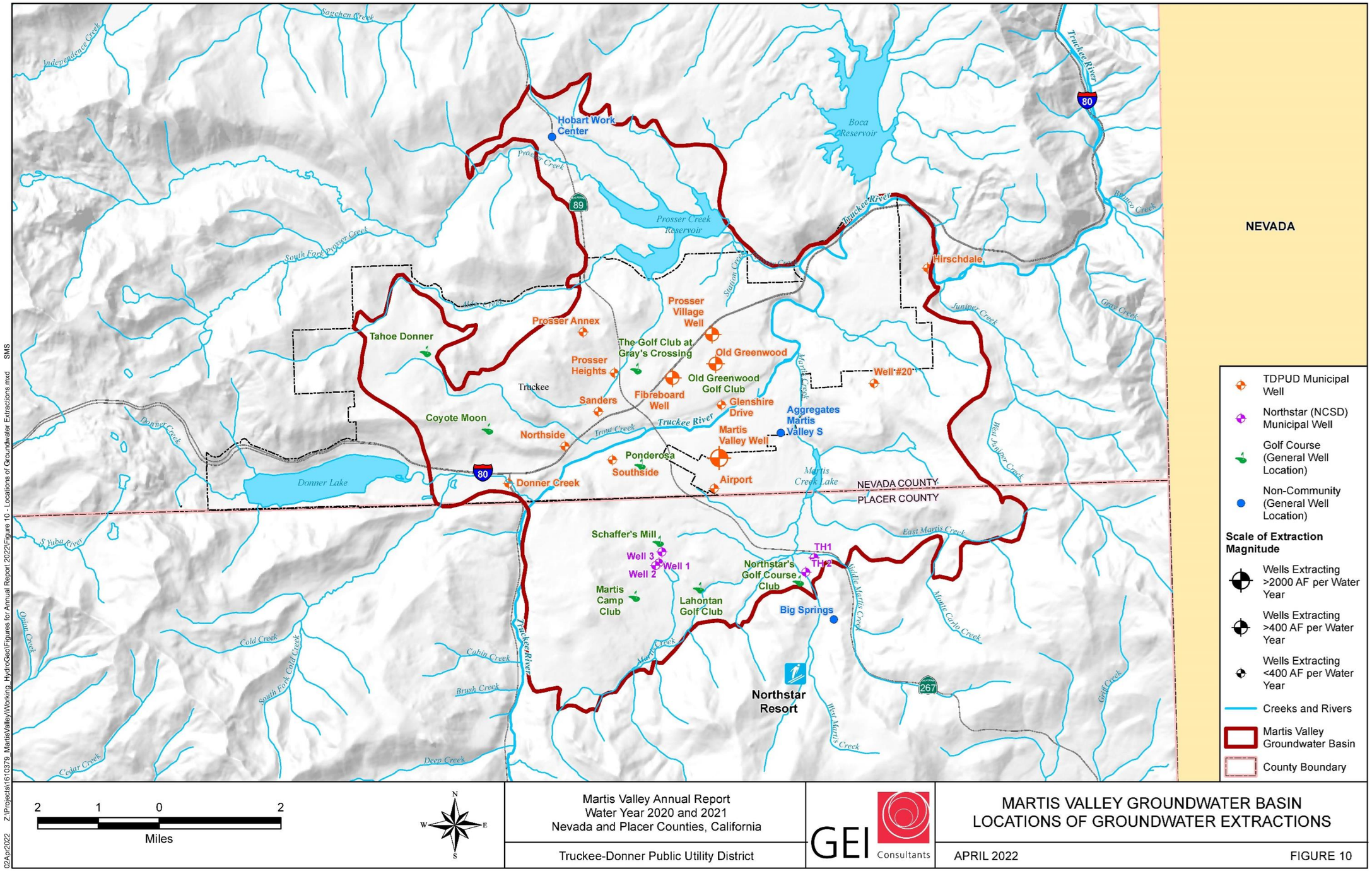


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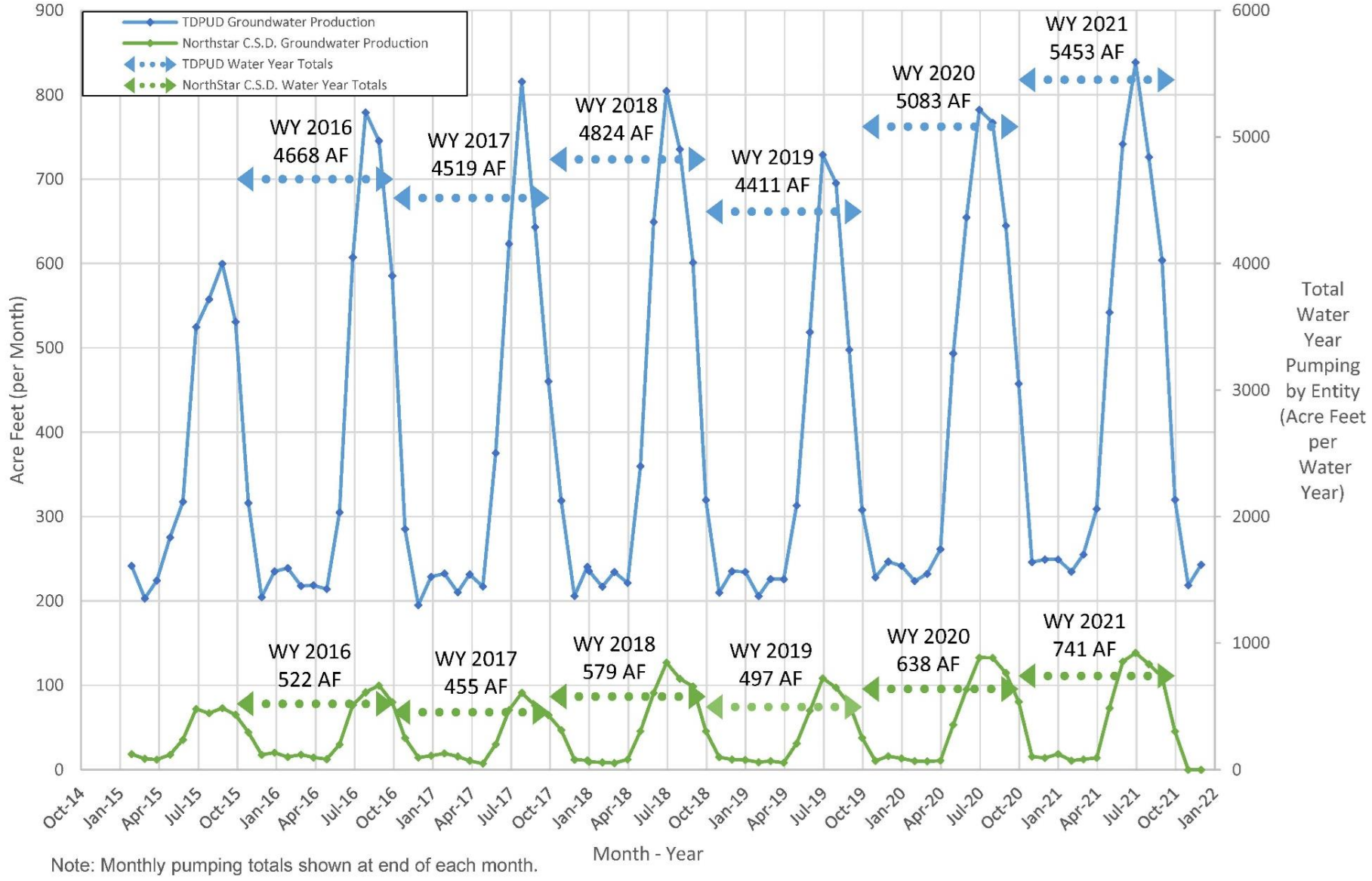
Figure 11. Martis Valley Groundwater Basin Community Water System Monthly Pumping Totals



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4. Surface Water Diversions

Although the Truckee River and multiple tributaries course throughout the MVGB, surface water constitutes less than one percent of Basin water supply. The total surface water diverted for use is about 450 AF in 2020 and 2021, but not all was diverted within the MVGB. Estimated surface water diversions are listed in Tables 3 and 4 for WYs 2020 and 2021, respectively. Water diversions for 2021 will be updated when the 2021 TROA annual report is released in 2022.

NCSD has water rights to use water from Big Springs, which is located outside the Basin but within the watershed as shown on Figure 11. Northstar Resort uses water from the spring, primarily for snowmaking. A portion of this water supplies recharge to the Basin aquifer by storing water as snow, which later melts, becomes runoff, and infiltrates into the Basin. Water from the spring is also used in the Basin, at the Northstar golf course, along with other commercial and domestic uses. The amount of groundwater recharge attributable to surface water from Big Springs cannot be quantified at this time.

A second surface water source, from within the MVGB, is used for irrigation at the Ponderosa Golf Course, but its diversion point is unidentified. Some deep percolation from turf irrigation also provides groundwater recharge within the MVGB.

Table 3 Surface Water Usage Reported for Water Year 2019-2020 (values in acre-feet)

		2019			2020									Annual
Agency	Metered/ Estimated	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Public Utility Water Purveyors														
Truckee-Donner PUD [1]	Metered	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal														**0**
Community Water Purveyors	*(2020 calendar year values)*													
Northstar C.S.D. [2]	Metered	*11*	0	24	13	0	0	0	0	0	0	0	1	50
Non-PUD Community Purveyors	Estimated													283
Subtotal														**333**
Non-Community Water Purveyors	*(2020 calendar year values)*													
Hobart Work Center	Estimated													0
Aggregates Martis Valley	Estimated													53
Subtotal														**53**
Golf Courses	*(2020 calendar year values from Annual Water Use report 2020)*													
Ponderosa Golf Course	Metered													73
Northstar Golf Course (from Big Springs) [2]	Estimated													0
Subtotal														**73**
													Total	**459**

n/a = Not Applicable

[1] TDPUD has an allocation of Truckee River flows but does not use it, has no infrastructure to access it, and has no plans to use it.

[2] NCSD holds ripariain water rights for use of Big Springs, which is outside of the MVGB. A portion of this water is used for limited municipal use within the MVGB and Northstar Golf Course.

Table 4 Surface Water Usage Reported for Water Year 2020-2021 (values in acre-feet)

Agency	Metered/ Estimated	2020 Oct	2020 Nov	2020 Dec	2021 Jan	2021 Feb	2021 Mar	2021 Apr	2021 May	2021 Jun	2021 Jul	2021 Aug	2021 Sep	Annual Total
Public Utility Water Purveyors														
Truckee-Donner PUD [1]	Metered	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal														**0**
Community Water Purveyors	*(2021 calendar year values)*													
Northstar C.S.D. [2,3] (M&I)	Metered	*4*	14	9	9	0	0	0	0	0	0	0	0	36
Non-PUD Community Purveyors	Estimated	*(From Non-PUD Community Purveyors)*												283
Subtotal														**319**
Non-Community Water Purveyors	*(2021 calendar year values)*													
Hobart Work Center	Estimated													0
Aggregates Martis Valley[3]	Estimated													53
Subtotal														**53**
Golf Courses	*(2021 calendar year values Estimated from Annual Water Use report 2020)*													
Ponderosa Golf Course[3]	Estimated													73
Northstar Golf Course (from Big Springs) [2,3]	Estimated													0
Subtotal														**73**
													Total	**445**

n/a = Not Applicable

[1] TDPUD has an allocation of Truckee River flows but does not use it, has no infrastructure to access it, and has no plans to use it.

[2] NCSD holds ripariain water rights for use of Big Springs, which is outside of the MVGB. A portion of this water is used for limited municipal use within the MVGB and Northstar Golf Course.

[3] 2021 values not reported at this time.

5. Groundwater Recharge

Wastewater is exported from the North Lake Tahoe area and is sent to the T-TSA water treatment plant, located in the MVGB. Total estimated monthly wastewater imports to the MVGB from areas outside the Basin for the past 2 water years, as well as metered wastewater (weir) derived from within the MVGB, from the Truckee Sanitary District (TSD), were provided by T-TSA and are listed in Tables 5 and 6 for WYs 2020 and 2021, respectively. About 1,800 AF and 1,700 AF of wastewater was imported into the MVGB in WYs 2020 and 2021, respectively.

The treated water from the T-TSA is recharged into the MVGB groundwater system through subsurface leach fields (pipes with holes surrounded by gravel) under permit with the Lahontan Regional Water Quality Control Board. The locations of the leach fields are shown on Figure 1. About 3,750 AF of treated water was recharged into the MVGB in both WYs 2020 and 2021. Wastewater from TSD is partially derived from groundwater pumping within the MVGB and partially offset impacts of local pumping near the Truckee River.

Table 5 Estimated Groundwater Recharge from T-TSA for Water Year 2019 - 2020 (acre-feet)

		2019			2020									Annual
Tahoe-Truckee Sanitary Agency (T-TSA) Sources of Inflows [1]	Metered/ Estimated	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY Total
Lake Tahoe Area (Imported water)	Estimated	86	80	162	156	148	145	155	148	159	200	182	152	**1,773**
Truckee Sanitary District (TSD)	Metered	193	179	208	176	142	113	136	153	170	198	161	142	**1,970**
													Total	**3,743**

[1] Deliveries to treatment facility from outside the MVGB provided by T-TSA and are converted from million gallons to acre-feet
[2] Metered readings from Granite Flats used to calculate imported wastewater from Lake Tahoe area

Table 6 Estimated Groundwater Recharge from T-TSA for Water Year 2020 - 2021 (acre-feet)

		2020			2021									Annual
Tahoe-Truckee Sanitary Agency (T-TSA) Sources of Inflows [1]	Actual/ Estimated	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	WY Total
Lake Tahoe Area (Imported water)	Estimated	143	137	138	140	149	159	144	129	146	178	126	88	**1,677**
Truckee Sanitary District (TSD)	Metered	125	123	159	200	181	197	186	178	198	232	172	143	**2,093**
													Total	**3,770**

[1] Deliveries to treatment facility from outside the MVGB provided by T-TSA and are converted from million gallons to acre-feet
[2] Metered readings from Granite Flats used to calculate imported wastewater from Lake Tahoe area

6. Total Water Use

The total estimated groundwater and surface water use in the MVGB by sector is summarized in Table 7. Over 90 percent of the water use was provided from groundwater, with a total water use of 7,155 AF and 7,669 AF in 2020 and 2021, respectively. About one-half of the groundwater pumped was returned to the Basin after being treated by T-TSA.

Table 7 Total Water Use for Water Years 2020 & 2021 (acre-feet)

Water Use Sector	2020	2021
Municipal and Industrial (M&I)	**6,227**	**6,727**
Groundwater Metered	5,721	6,235
Groundwater Estimated	120	120
Surface Water Metered	50	36
Surface Water Estimated	336	336
Golf Courses	**1,387**	**1,387**
Groundwater Estimated	1,314	1,314
Surface Water Estimated	73	73
Subtotal Groundwater	7,155	7,669
Subtotal Surface Water	459	445
Total Water Use	**7,614**	**8,114**
T-TSA Groundwater Recharge	**3,743**	**3,770**
Total	**3,871**	**4,344**

Note: Only includes water sources in MVGB, see Tables 3 and 4 and does not include evapotranspiration from native vegetation.

7. Change in Groundwater Storage

An empirical approach was used to calculate change in storage using spring groundwater elevation contours for 2016 through 2021. The spring contour surfaces were then subtracted to produce water level change distributions for the last two WYs. The use of spring-to-spring water level differences was deemed to be the most appropriate when assessing ambient groundwater conditions, because it has less influence of temporal, localized changes due to pumping adjacent to monitoring wells.

Figures 12 and 13 spatially show the estimated groundwater elevation changes (current year elevations subtracted from previous year elevations). Portions of the Basin (northwest, southwest, and southeast corners) with no groundwater level monitoring wells were not contoured. According to DWR files (DWR, 2022) there are no irrigation, municipal or domestic wells in the northwest and southwest corners of the Basin. In the southwest corner there are four domestic wells but their logs show that they encountered lava flows and ash layers, and no sediments so it is unknown whether these wells would provide representative groundwater levels with the rest of the Basin.

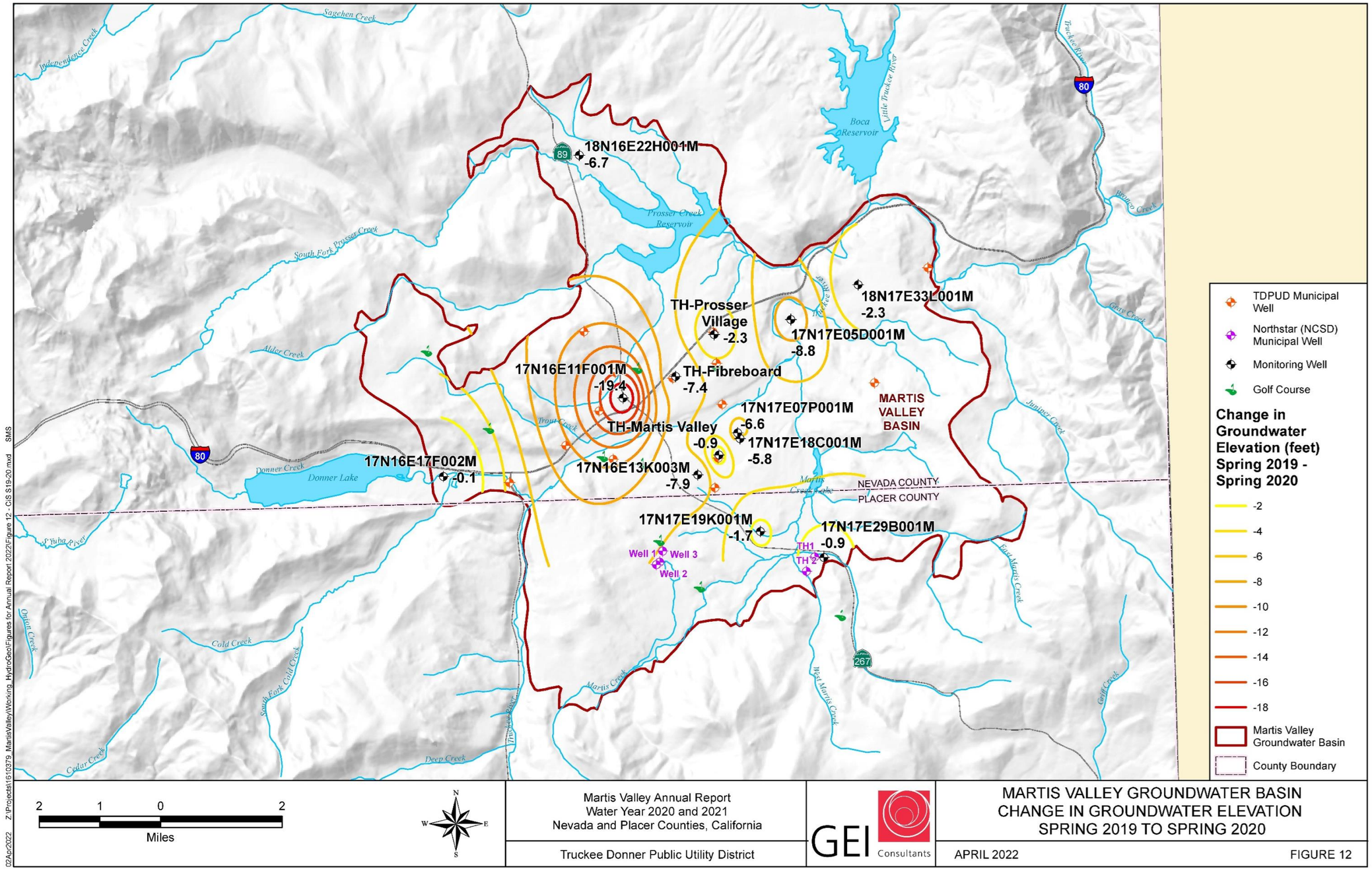
Change in storage estimates are dependent upon the assumed specific yield (the percent of sediments with pore space that contains water that can be drained by gravity) or storage coefficient (similar to specific yield but used when aquifers are more confined as is typical with depth) of the aquifer formation. Given the complex and often interbedded nature of the MVGB aquifer system, an average of depth storage coefficients (ranging from 0.1 – 0.05) were used for the analysis. The results and input values are presented in Table 8. Groundwater in storage in the MVGB decreased in both WY 2020 and 2021. Most of the change in storage is likely due to the reduced groundwater recharge due to the drought conditions with the greatest differences being located near the highest density of pumping. The lack of recharge is evidenced by the groundwater extractions being within 2,000 AF of the change in storage estimates.

Table 8 Estimated Change in Storage

Time Periods for Groundwater Level Elevation Comparisons	Basin Area Used in Analysis [1] (acres)	Average Groundwater Level Change (feet)	Average Storage Coefficients	Estimated Change in Storage (AF)
Spring 2019 - Spring 2020	24,500	-5.45	0.075	-10,007
Spring 2020 - Spring 2021	24,500	-3.72	0.075	-6,841
		Total Change 2020 and 2021 WYs		-16,848

[1] Basin Area limited to extent of MVGB with groundwater elevation data to limit interpolation error

Figure 12. Martis Valley Groundwater Basin Change in Groundwater Elevation, Spring 2019-Spring 2020



Z:\Projects\1610379_MartisValley\Working_HydroGeo\Figures for Annual Report 2022\Figure 12 - CiS S19-20.mxd SMS 02/Apr/2022

Martis Valley Annual Report
Water Year 2020 and 2021
Nevada and Placer Counties, California

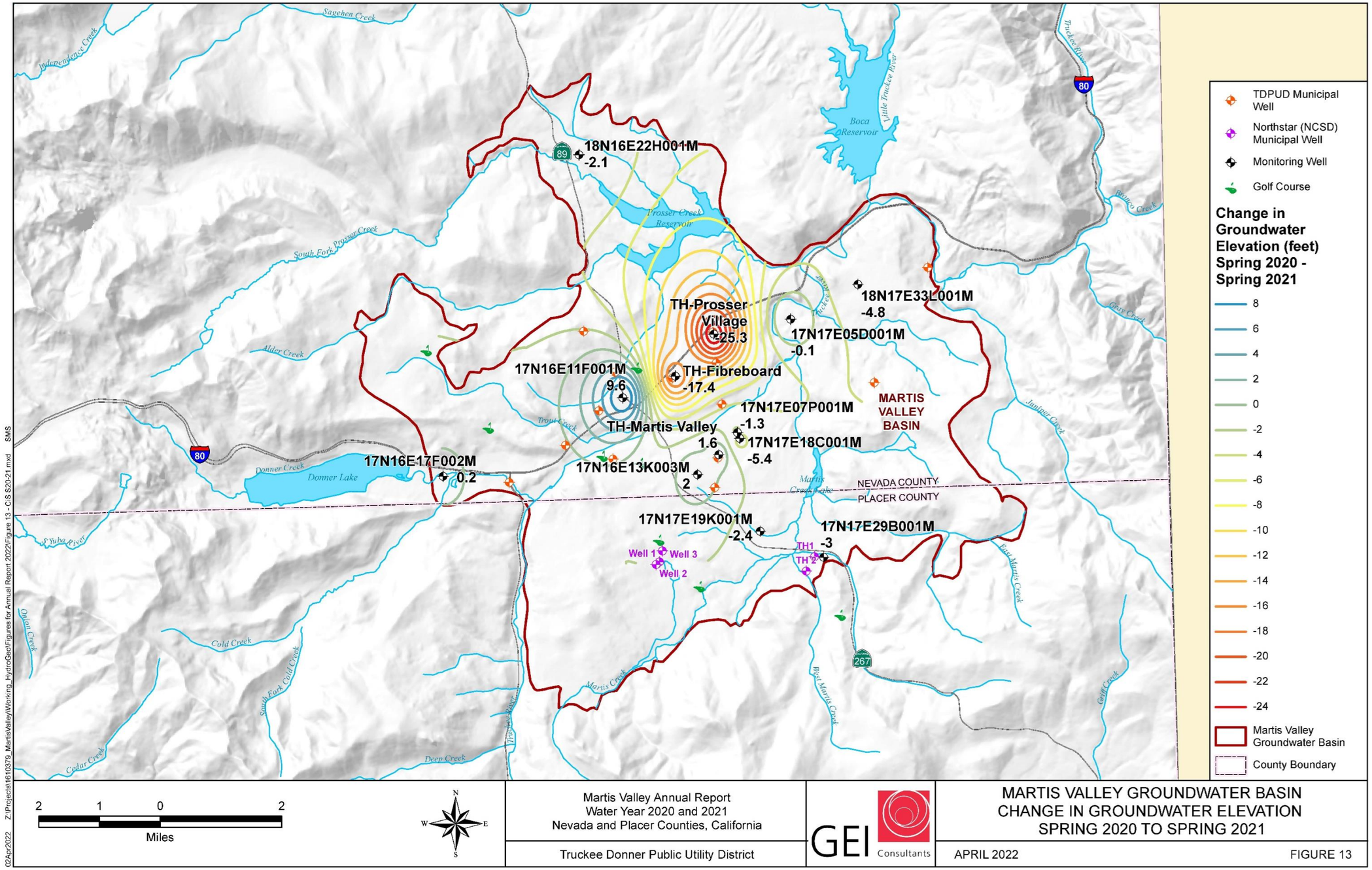
Truckee Donner Public Utility District

GEI Consultants

MARTIS VALLEY GROUNDWATER BASIN
CHANGE IN GROUNDWATER ELEVATION
SPRING 2019 TO SPRING 2020

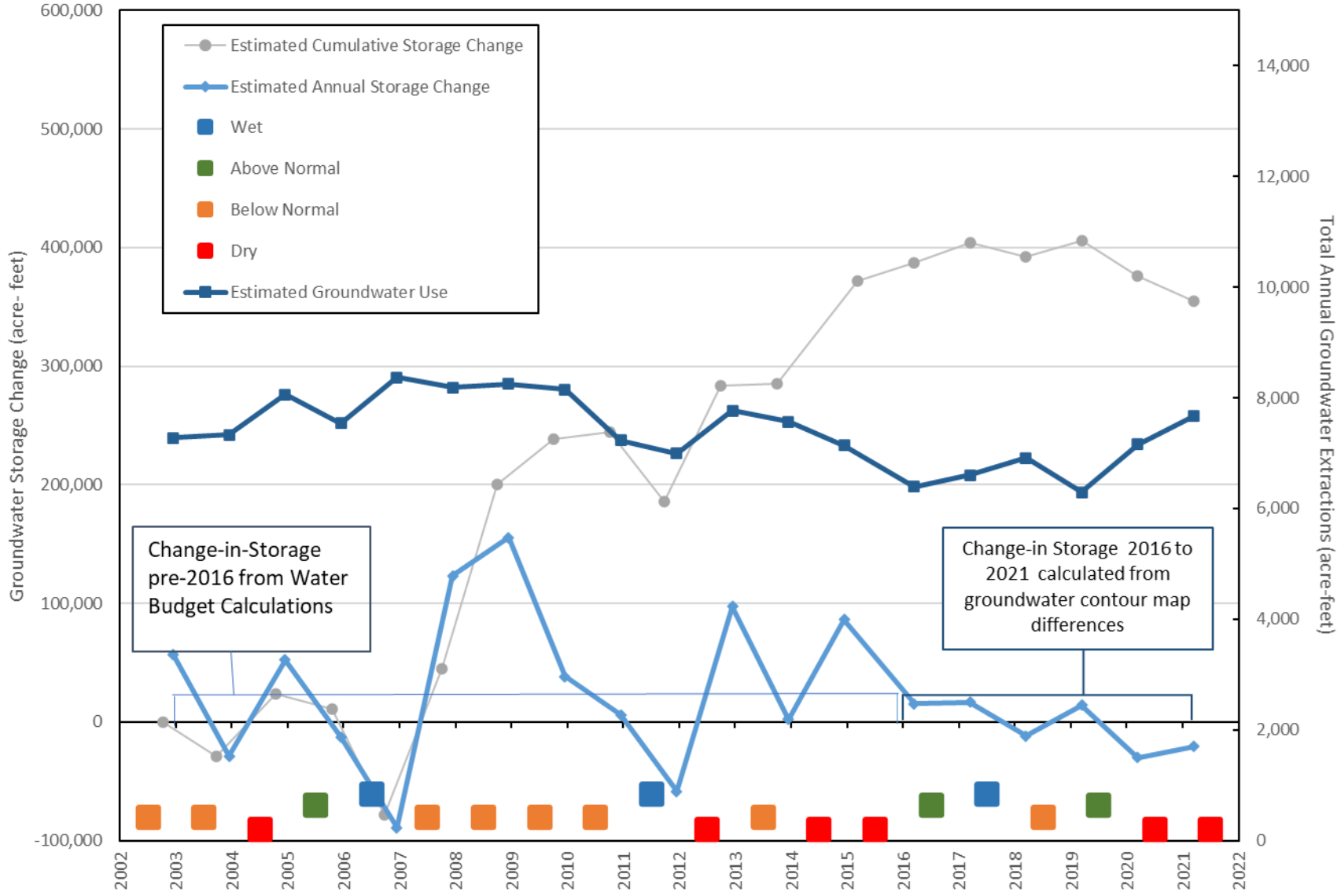
APRIL 2022 FIGURE 12

Figure 13. Martis Valley Groundwater Basin Change in Groundwater Elevation, Spring 2020-Spring 2021



Historic trends in the estimated annual and cumulative change of groundwater in storage, along with water year type and annual groundwater use, are shown on Figure 14. Storage change and groundwater use estimates prior to WY 2017 were derived from previous analyses. Over the last 2 WYs, groundwater in storage decreased by about 17,000 AF as a result of 2 years of dry conditions resulting in less recharge and with increased pumping. For perspective, the Basin has approximately 484,000 AF in storage, so the overall change is relatively small (about 3.5% over the 2-year period) in comparison to the total water stored in the Basin.

Figure 14. Change in Storage and Groundwater Use



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8. Groundwater Management Activities

The MVGB Agencies continue to invest in the stewardship of the Basin and practicing of adaptive management to proactively ensure that the Basin operates within its sustainable yield. This includes frequent monitoring of key data points and interactions with local stakeholders' meetings.

The most significant management action has been the voluntary implementation of monthly monitoring of groundwater levels for all wells in the CASGEM program. This proactive move to monthly monitoring over 5 years ago and well before the mandate was, in part, to investigate and address uncertainties in seasonal variations. Without this proactive change the lower groundwater levels during the summer months noted in WY 2020 and 2021 would not have been detected. The results and trends from this improved monitoring program are presented in this report, and both TDPUD and NCSD, who are responsible for the monitoring, intend to continue this monthly monitoring going forward as an MVGB adaptive management strategy.

The MVGB Agencies continue to interact with local environmental interests and MVGB stakeholders to provide information and hear concerns. Primarily, this has been done by the participation in the Truckee River Basin Working Group (TRBWG). The TRBWG was formed with the passage of the TROA 20 years ago and has been strengthened with the support of the newly formed DWR-TROA division. The TRBWG is comprised of the California stakeholders in the river watershed including water purveyors, local governments, environmental interests, recreational interests, DWR, California Department of Fish and Wildlife, United States Forest Service, and others.

The MVGB Agencies shared the findings from the 2018 and 2019 Annual Report with stakeholders and are planning to share this report and discuss the findings in the near future.

9. Conclusions

Groundwater levels decreased in the MVGB through WYs 2020 and 2021 in response to drought conditions and increased pumping. Groundwater levels in most monitoring wells have remained above their respective historic low levels when compared to historic spring and fall levels. Because of more frequent monthly monitoring, three wells reported groundwater levels that were lower than previously measured levels. The monthly monitoring also showed groundwater levels quickly recovered, indicating the lower groundwater levels were a localized effect due to pumping.

Groundwater pumping increased by about 10 percent, averaging about 800 AF, during these two water years. Most of the increase was north of the Truckee River. In response to the increased groundwater use in this area a pumping depression formed that extended beneath the river. Because of the drought conditions the pumping depression did not refill during the winter months. The pumping depression may have increased surface water depletion from the Truckee River but any depletion was offset by recharge from the T-TSA facility, which contributed to approximately 50 percent of all of the groundwater pumped in the Basin.

Historic low precipitation and higher groundwater use in WY 2020 and 2021 resulted in an overall decrease in groundwater storage, similar to other northern California groundwater basins. During the 2-year period, groundwater in storage decreased by about 17,000 AF, or about 3.5 percent of the total storage in the Basin. Although the Basin had a decrease in groundwater storage this is considered to be part of a natural cycle, and as long as groundwater levels recover in future years, the Basin would still be considered sustainable.

10. References

Brown and Caldwell, 2013. Martis Valley Groundwater Management Plan (GMP).

California Department of Water Resources (DWR), 2016. California's Groundwater. Bulletin 118-Interim Update 2016.

California Department of Water Resources (DWR), 2021. Annual Inventory of Water Use, Lake Tahoe and Truckee River Basins, Calendar Year 2020.

California Department of Water Resources (DWR), September 2021. Water Year 2021: An Extreme Year.

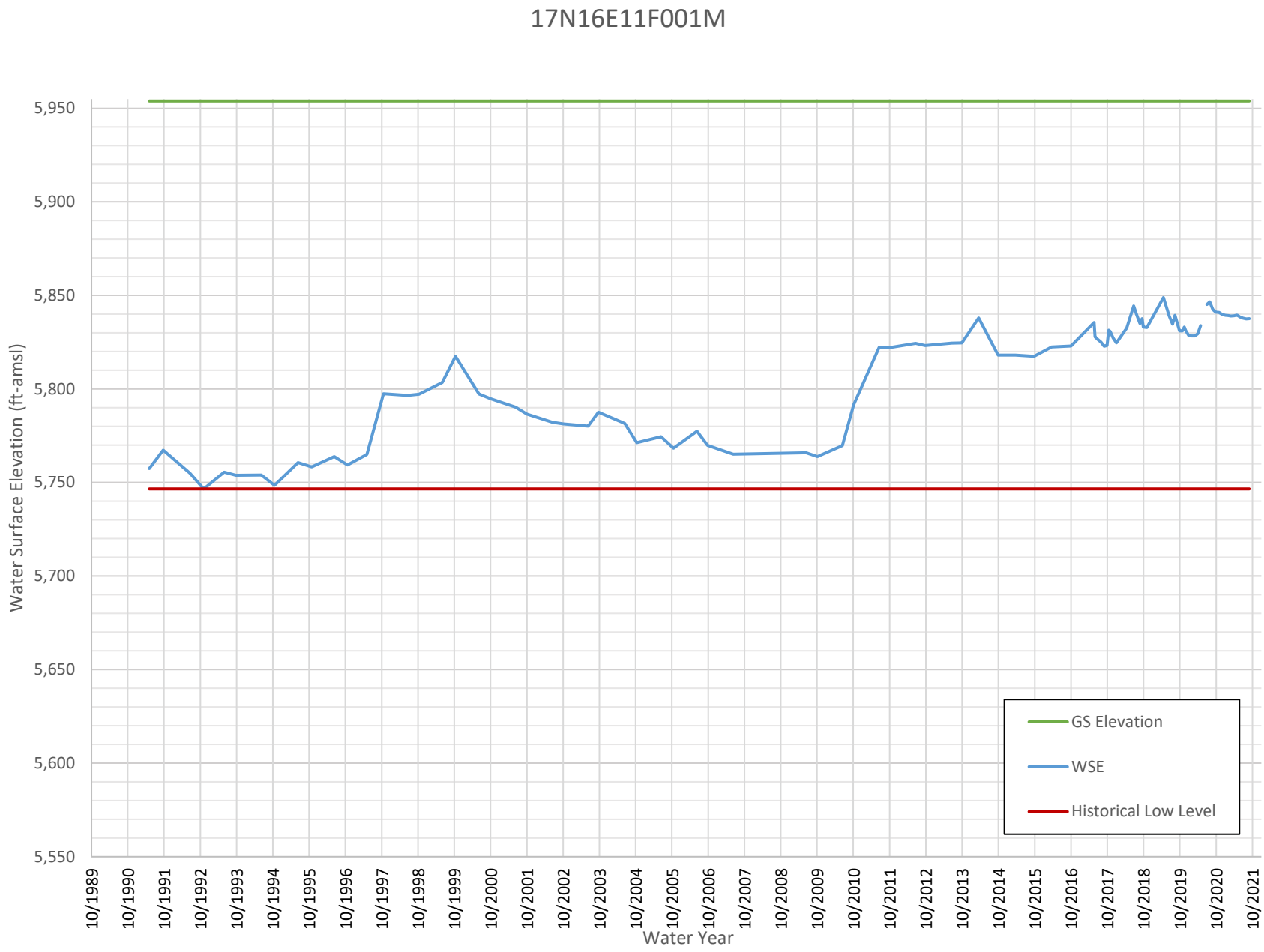
California Department of Water Resources (DWR), accessed May 2022. California Groundwater Live. https://sgma.water.ca.gov/CalGWLive/#wells

GEI, March 2018. Annual Report for the Martis Valley Groundwater Basin, Sustainable Groundwater Management Act Alternative Submittal, Water Years 2016 and 2017.

GEI, January 2021. Annual Report for the Martis Valley Groundwater Basin, Water Years 2018 and 2019.

Truckee Donner Public Utility District (TDPUD), December 2016. Martis Valley Groundwater Basin Sustainable Groundwater Management Act Alternative Submittal.

Attachment A. Monitoring Well Hydrographs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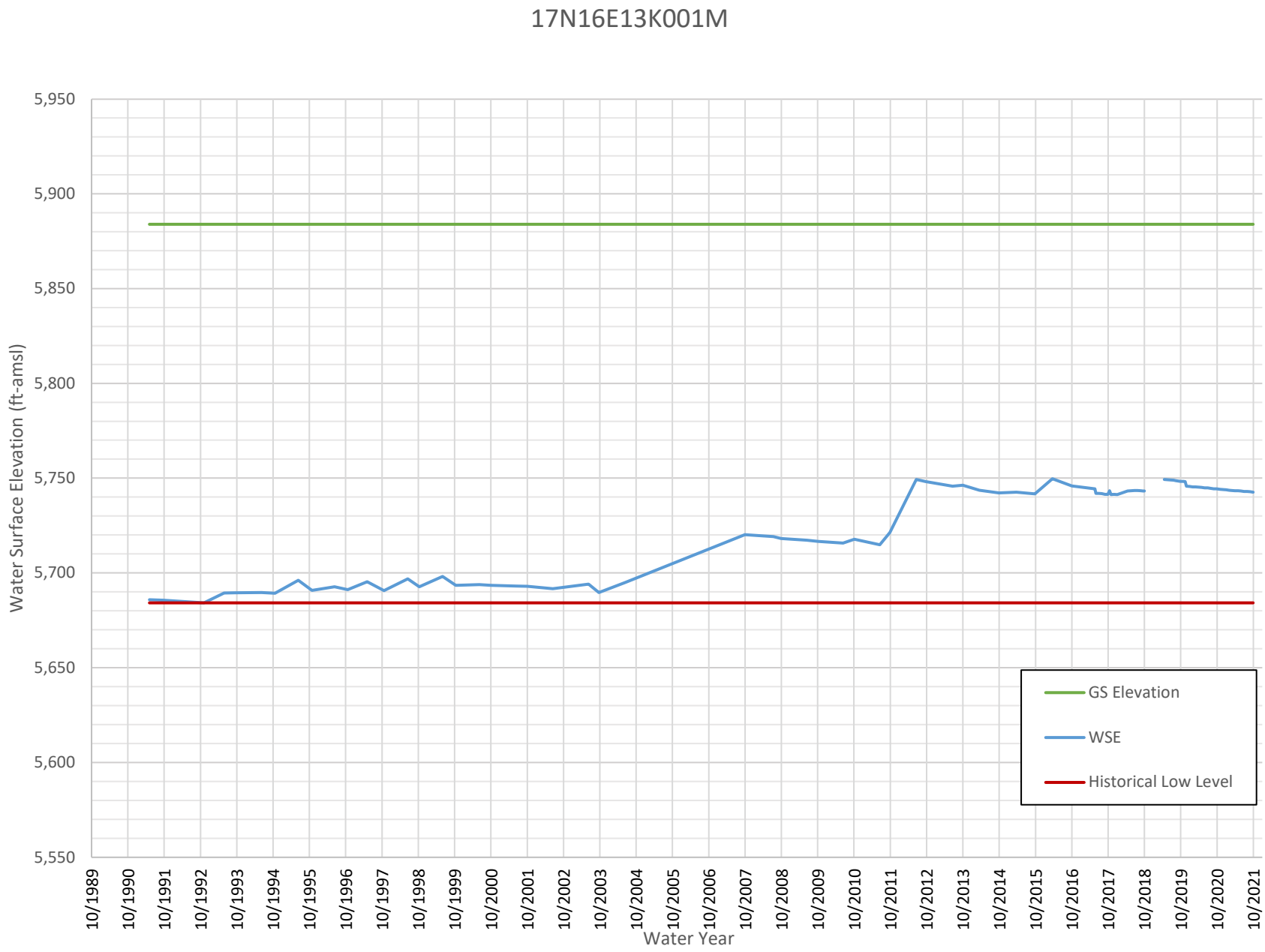
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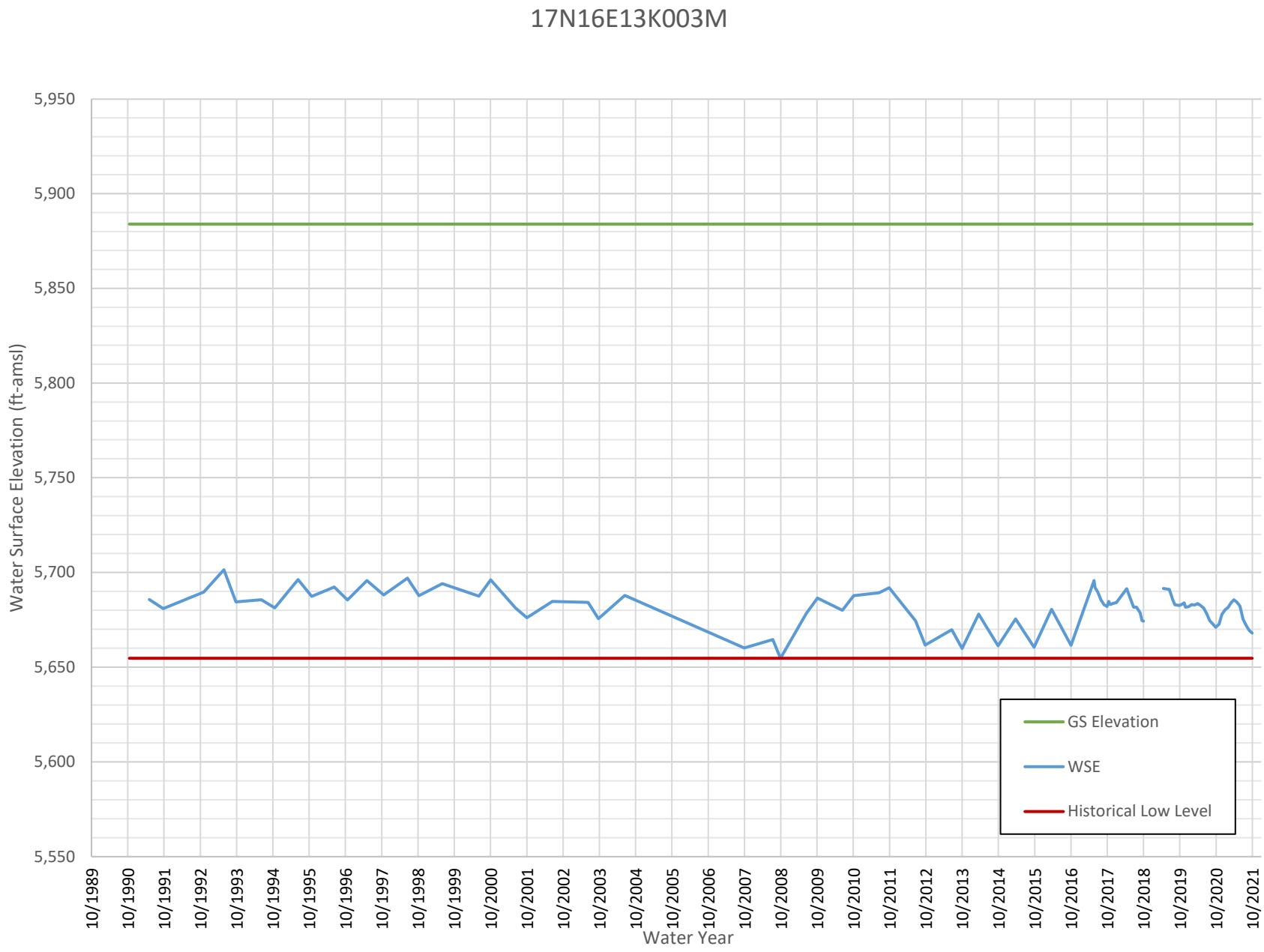
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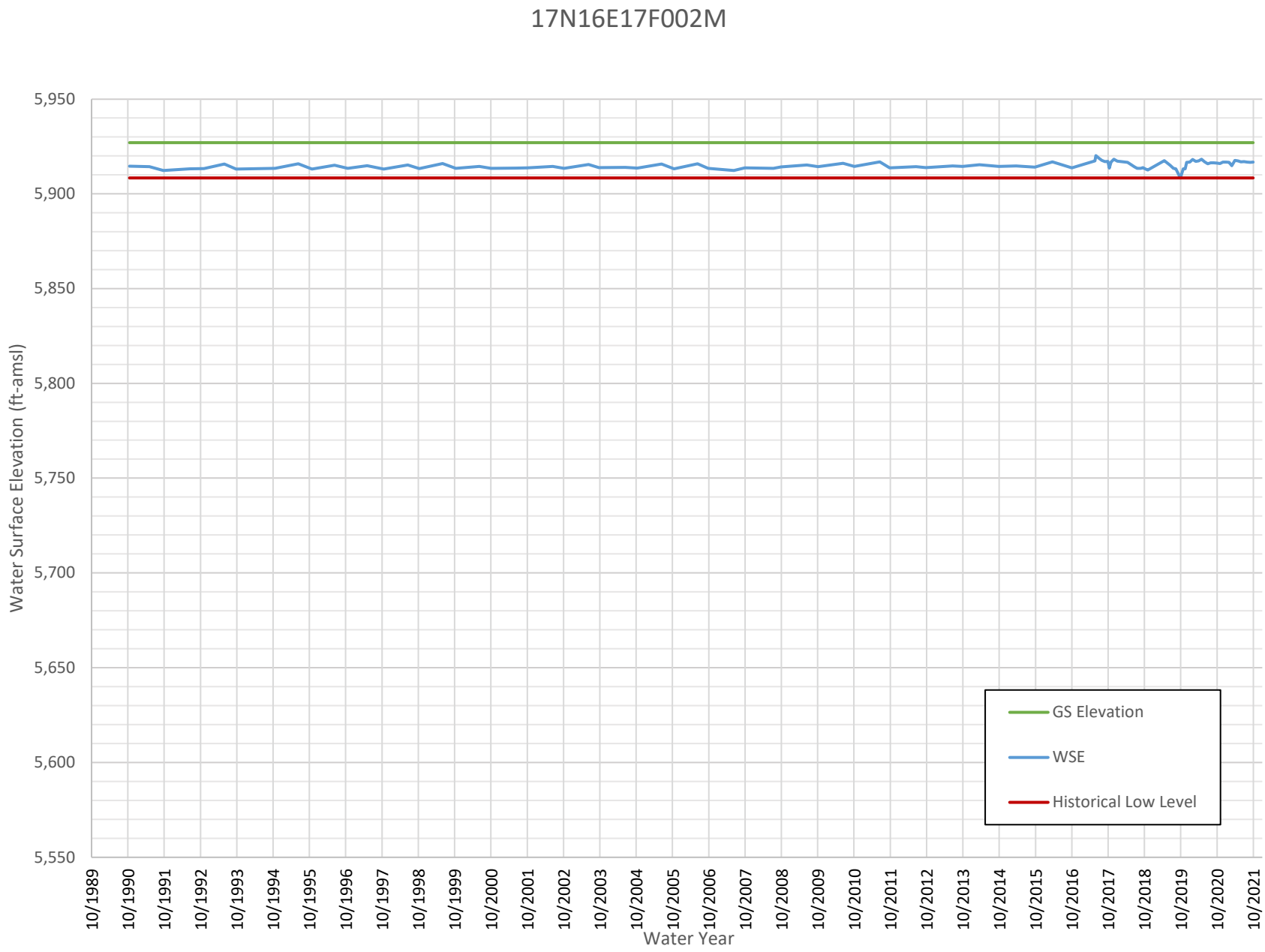
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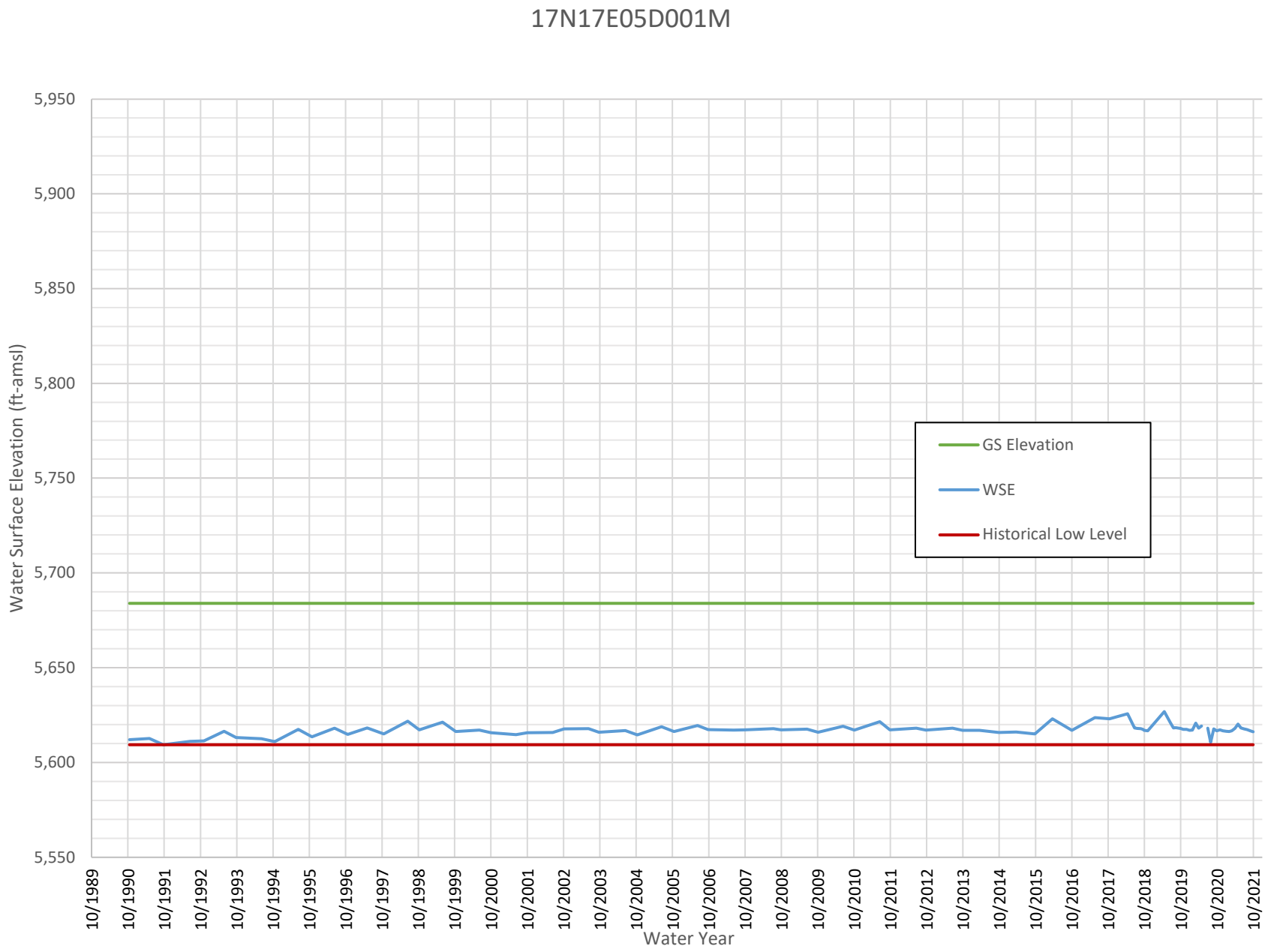
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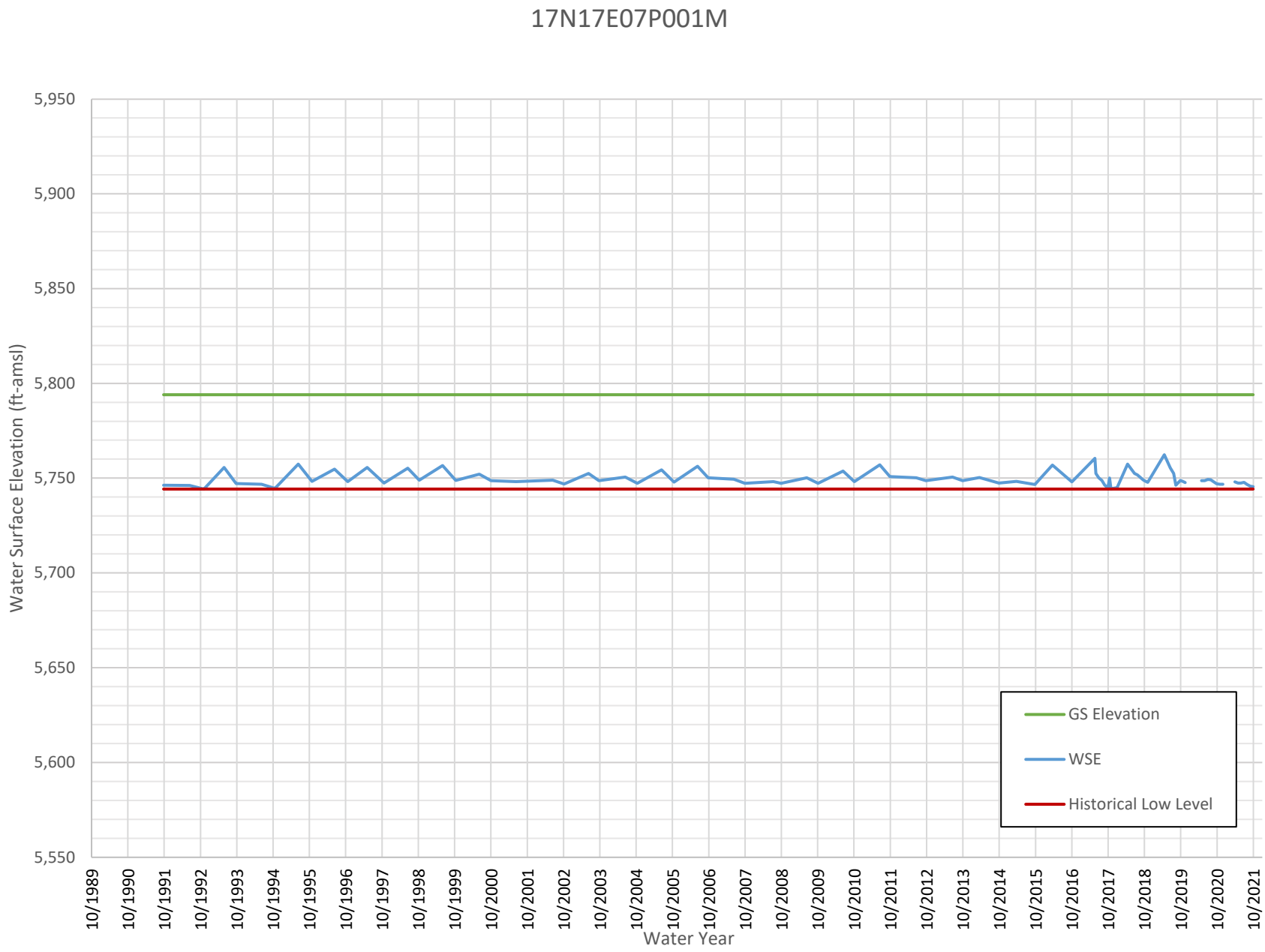
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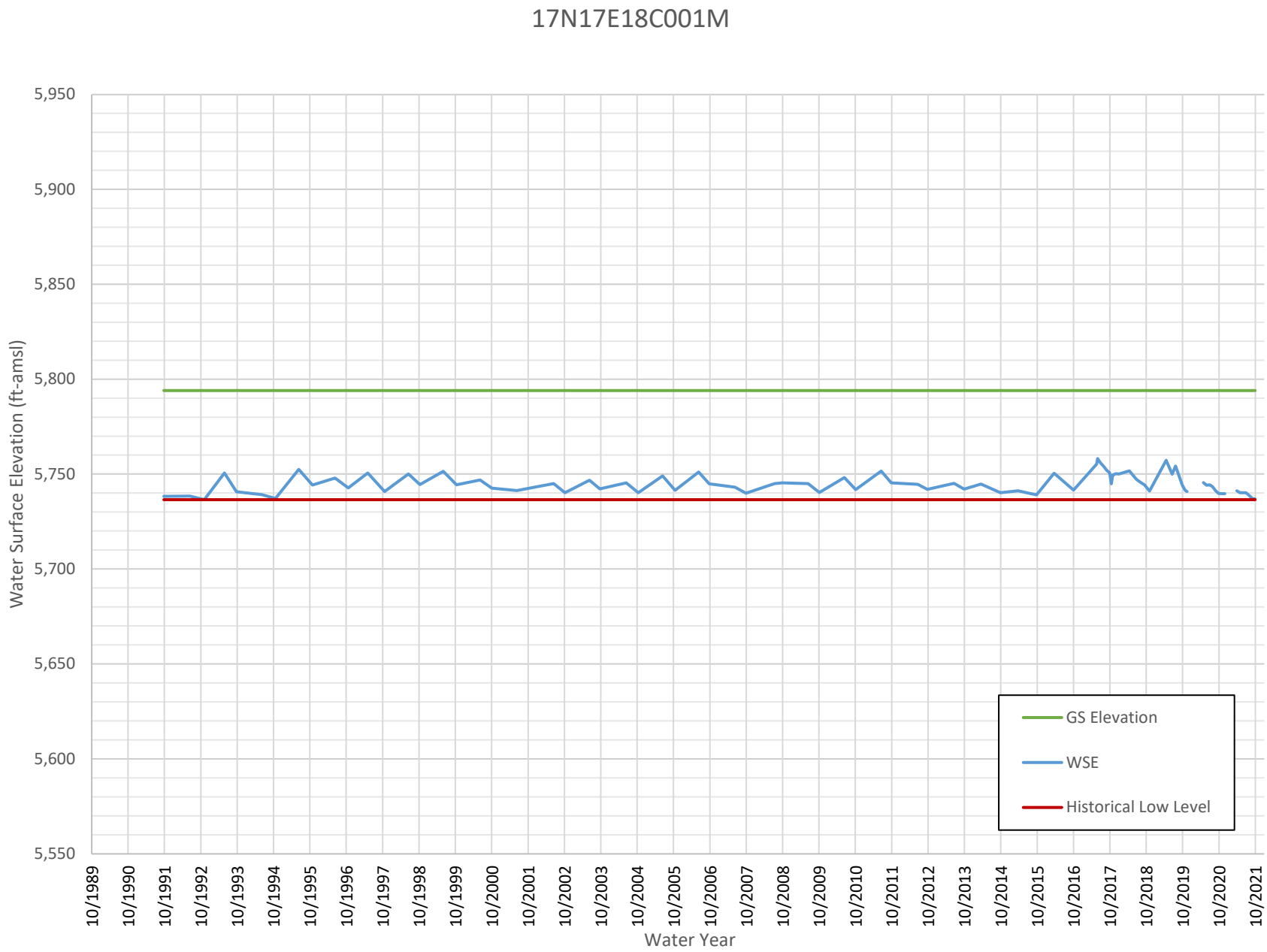
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Water Year
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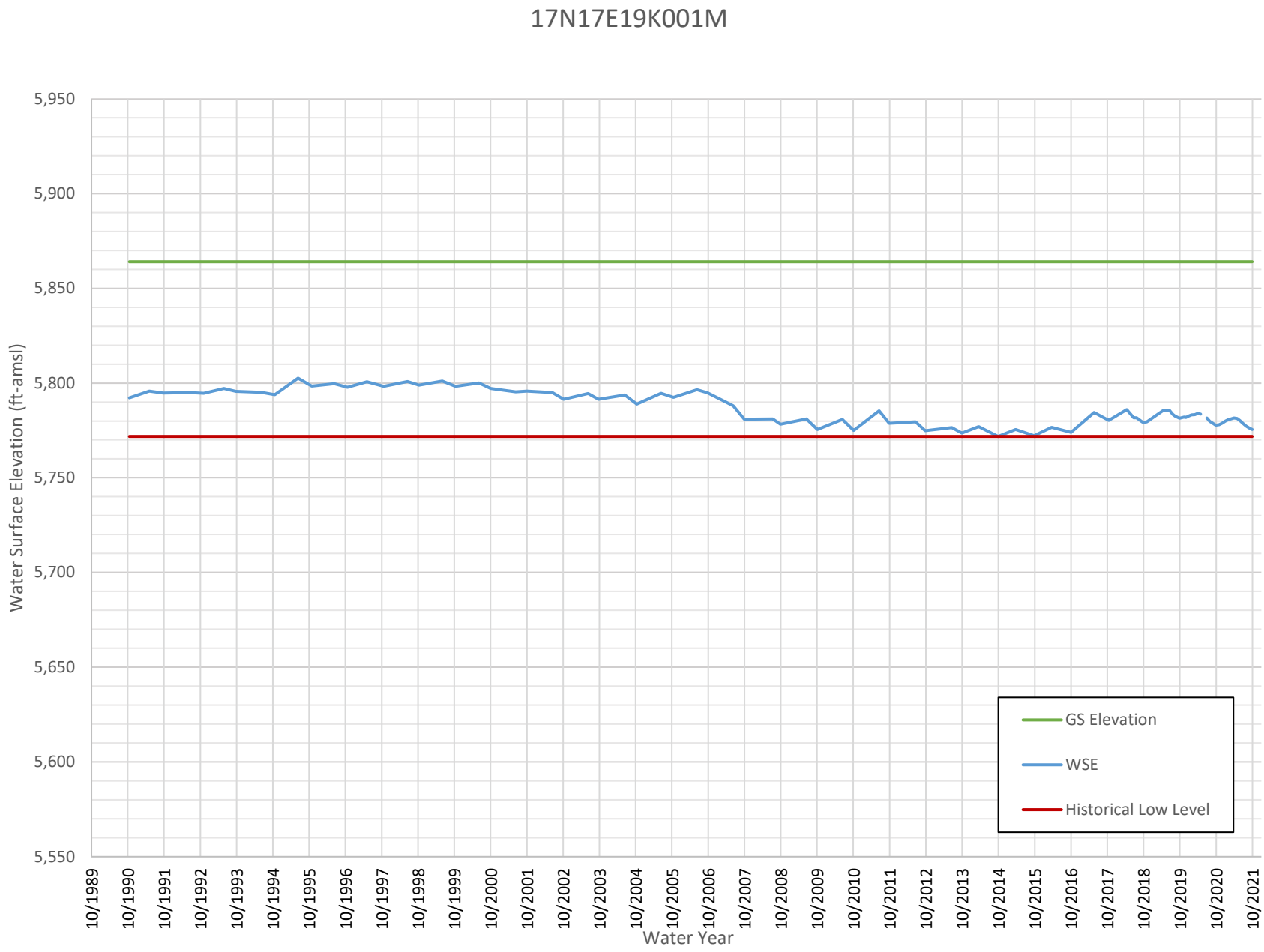
WSE
Historical Low Level


17N17E19K001M
Water Surface Elevation (ft-amsl)
5,950
5,900
5,850
5,800
5,750
5,700
5,650
5,600
5,550
10/1989
10/1990
10/1991
10/1992
10/1993
10/1994
10/1995
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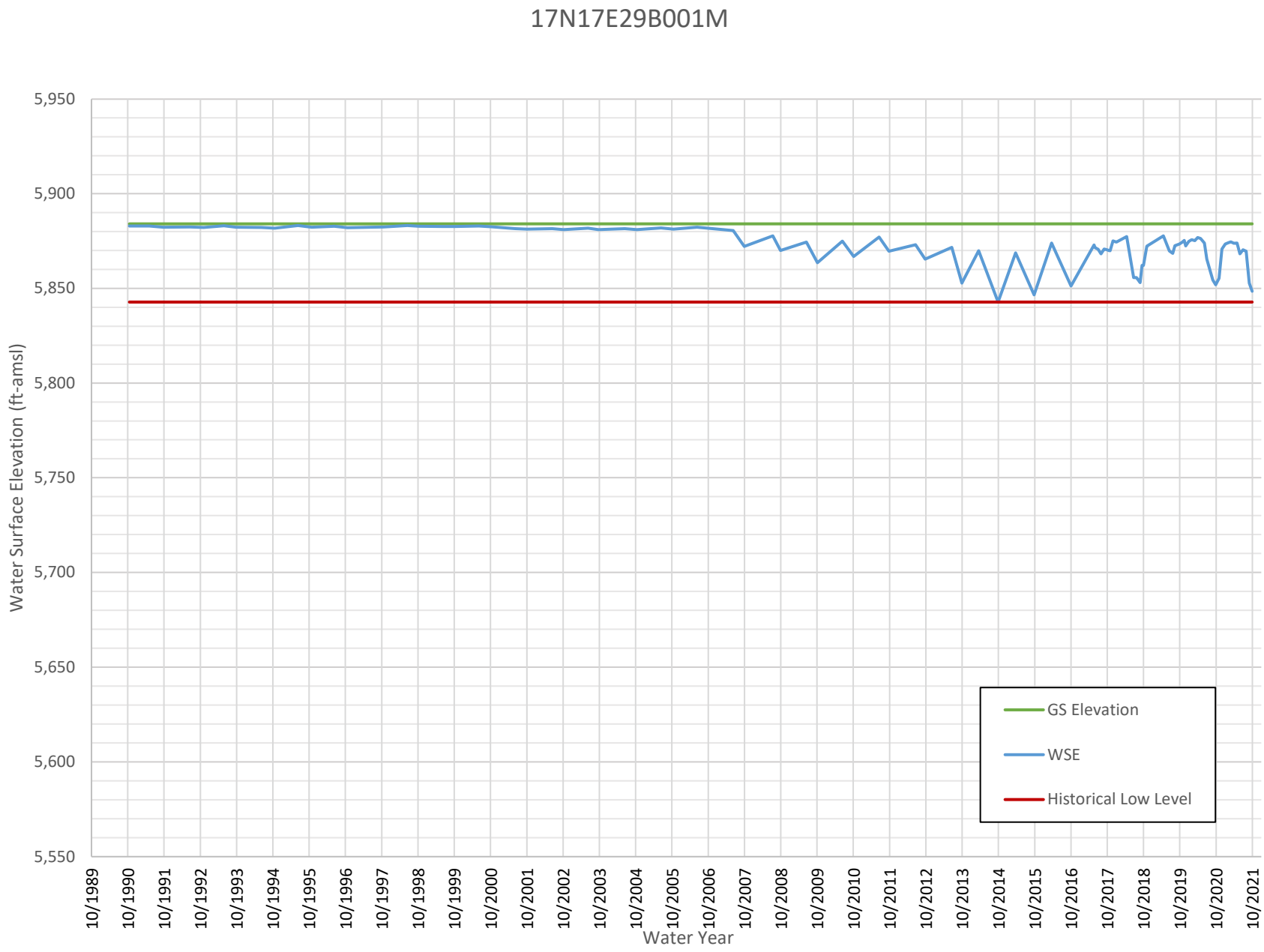
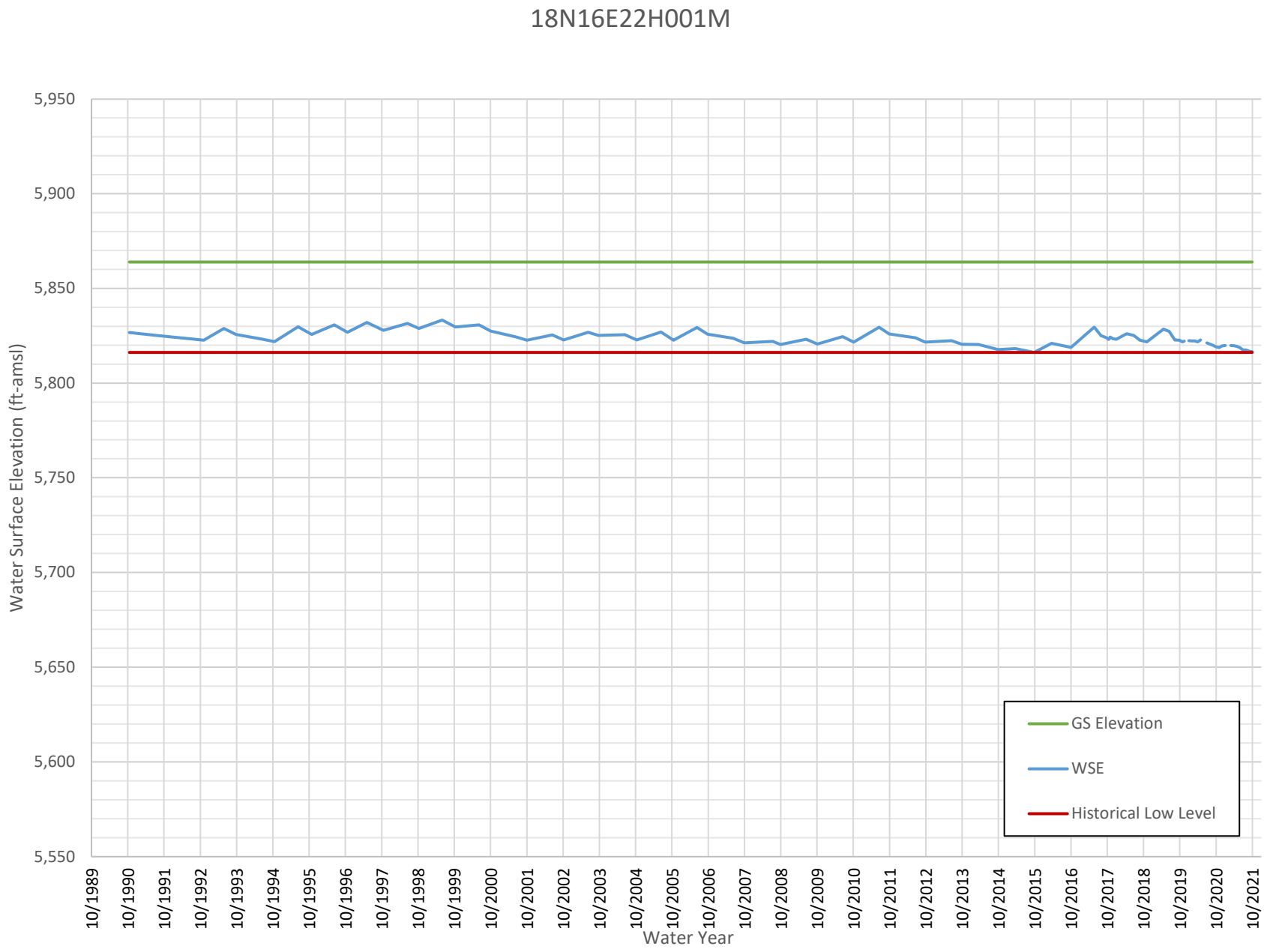
10/2004
10/2005
10/2006
10/2007
10/2008
10/2009
10/2010
10/2011
10/2012
10/2013
10/2014
10/2015
10/2016
10/2017
10/2018
10/2019
10/2020
10/2021
Water Year
GS Elevation
WSE
Historical Low Level


17N17E29B001M
Water Surface Elevation (ft-amsl)
5,950
5,900
5,850
5,800
5,750
5,700
5,650
5,600
5,550
10/1989
10/1990
10/1991
10/1992
10/1993
10/1994
10/1995
10/1996
10/1997
10/1998
10/1999
10/2000
10/2001
10/2002
10/2003
10/2004
10/2005
10/2006
10/2007
10/2008
10/2009
10/2010
10/2011
10/2012
10/2013
10/2014
10/2015
10/2016
10/2017
10/2018
10/2019
10/2020
10/2021
Water Year
GS Elevation
WSE
Historical Low Level


18N16E22H001M
Water Surface Elevation (ft-amsl)
5,950
5,900
5,850
5,800
5,750
5,700
5,650
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5,550
10/1989
10/1990
10/1991
10/1992
10/1993
10/1994
10/1995
10/1996
10/1997
10/1998
10/1999
10/2000
10/2001
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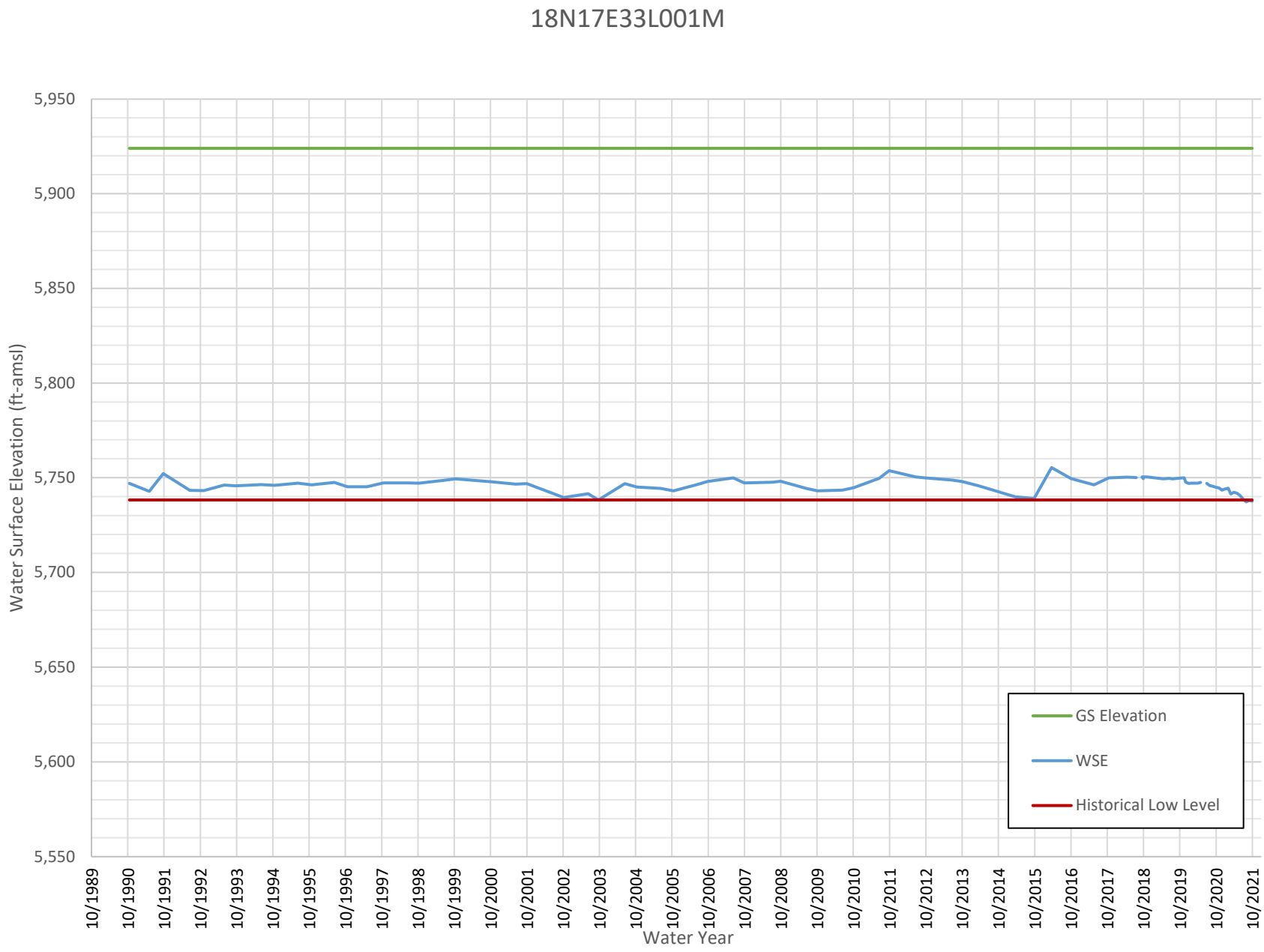
10/2005
10/2006
10/2007
10/2008
10/2009
10/2010
10/2011
10/2012
10/2013
10/2014
10/2015
10/2016
10/2017
10/2018
10/2019
10/2020
10/2021
Water Year
GS Elevation
WSE
Historical Low Level


18N17E33L001M
Water Surface Elevation (ft-amsl)
5,950
5,900
5,850
5,800
5,750
5,700
5,650
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5,550
10/1989
10/1990
10/1991
10/1992
10/1993
10/1994
10/1995
10/1996
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10/2007
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10/2010
10/2011
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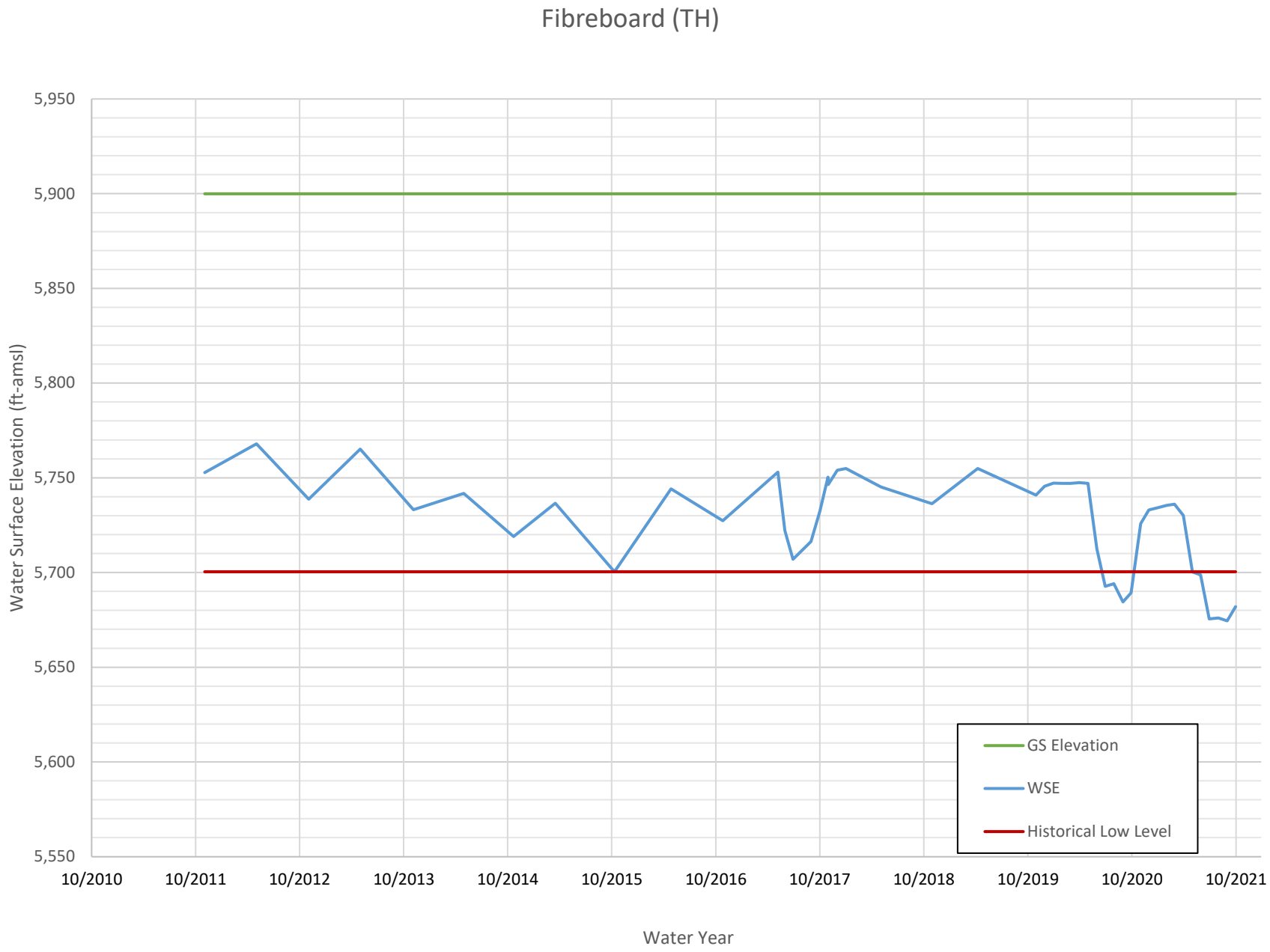
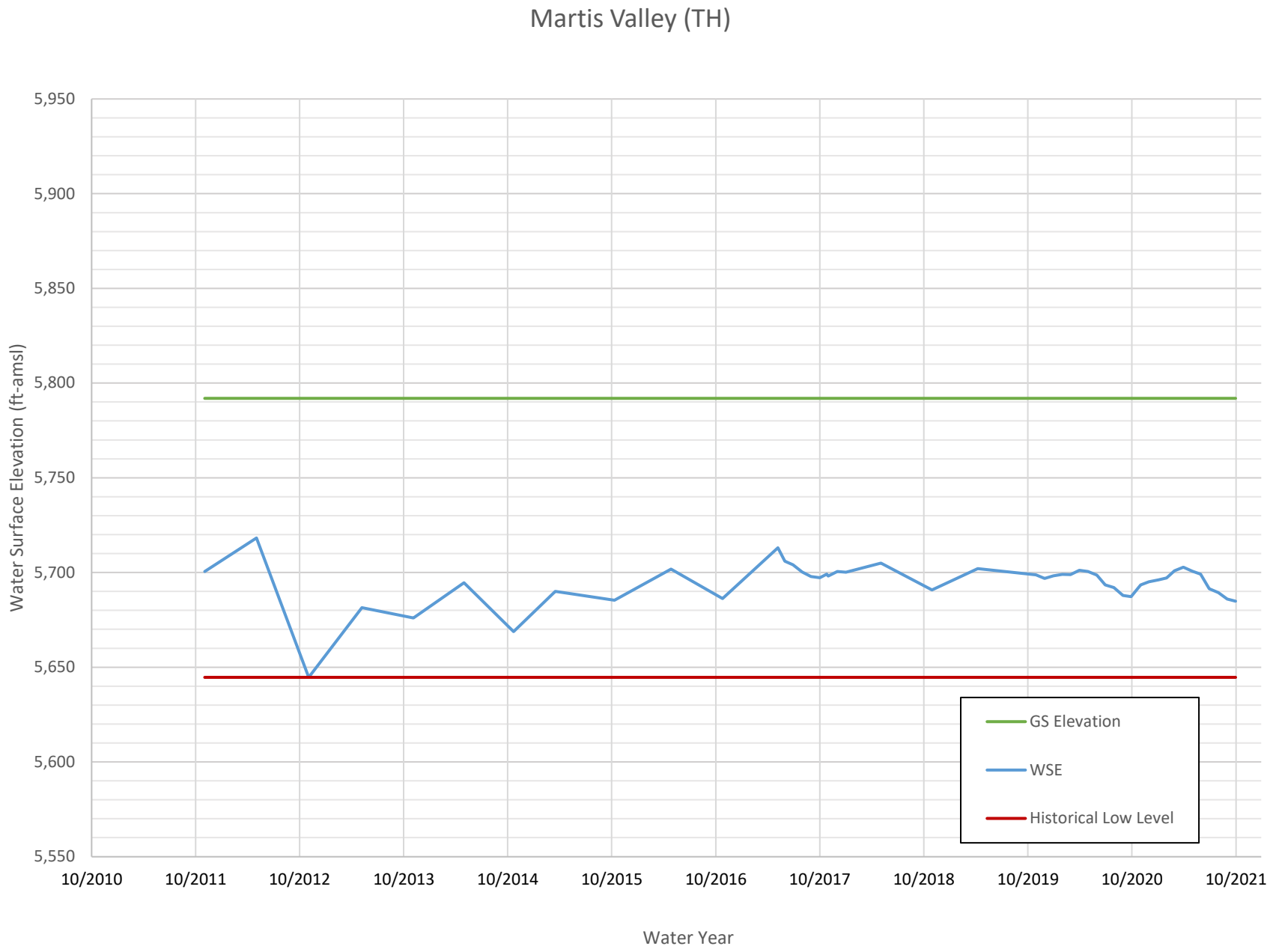
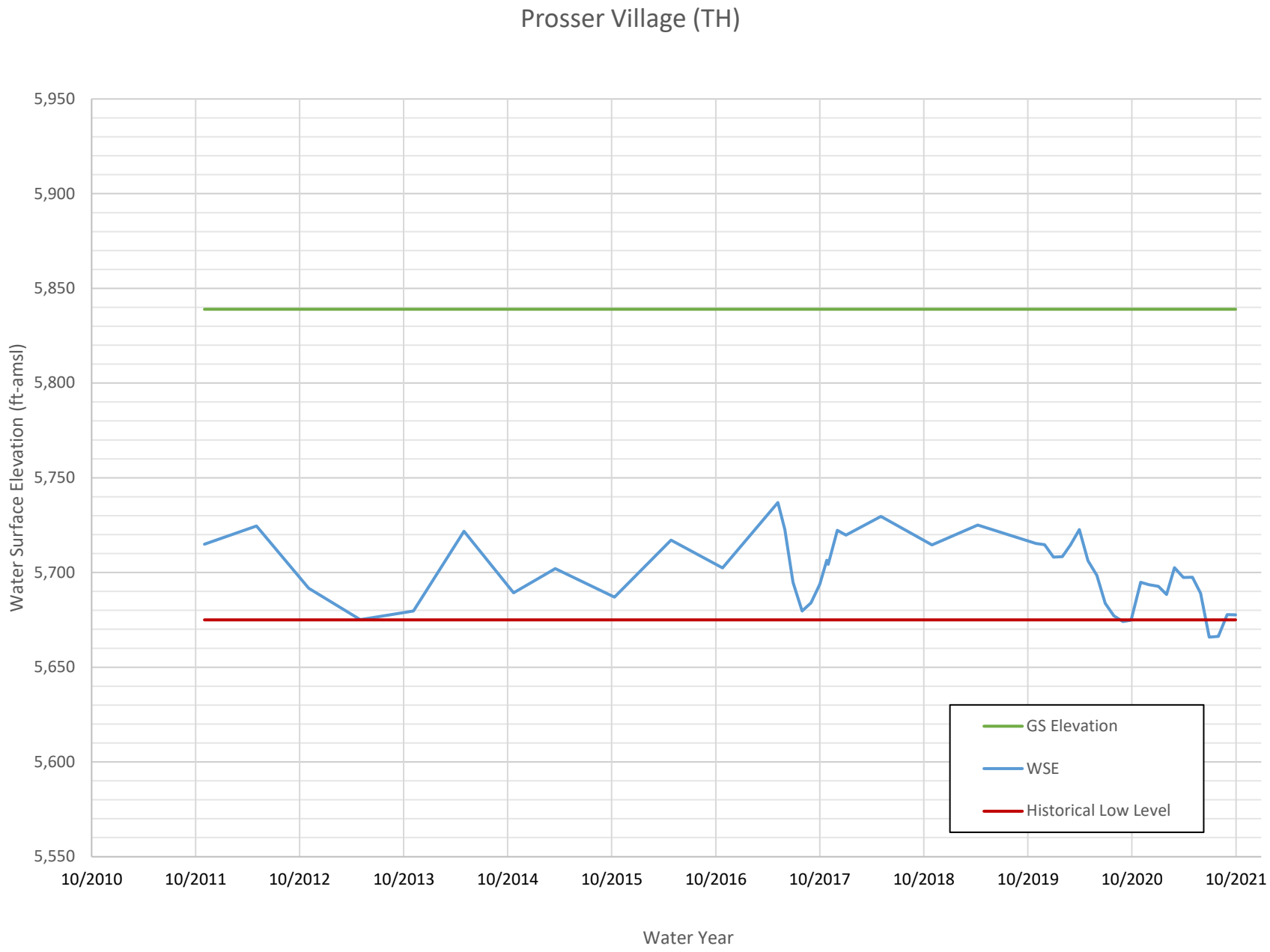
10/2013
10/2014
10/2015
10/2016
10/2017
10/2018
10/2019
10/2020
10/2021
Water Year
GS Elevation
WSE
Historical Low Level


Fibreboard (TH)
Water Surface Elevation (ft-amsl)
5,950
5,900
5,850
5,800
5,750
5,700
5,650
5,600
5,550
10/2010
10/2011
10/2012
10/2013
10/2014
10/2015
10/2016
10/2017
10/2018
10/2019
10/2020
10/2021
Water Year
GS Elevation
WSE
Historical Low Level


Martis Valley (TH)
Water Surface Elevation (ft-amsl)
5,950
5,900
5,850
5,800
5,750
5,700
5,650
5,600
5,550
10/2010
10/2011
10/2012
10/2013
10/2014
10/2015
10/2016
10/2017
10/2018
10/2019
10/2020
10/2021
Water Year
GS Elevation
WSE
Historical Low Level


Prosser Village (TH)
Water Surface Elevation (ft-amsl)
5,950
5,900
5,850
5,800
5,750
5,700
5,650
5,600
5,550
10/2010
10/2011
10/2012
10/2013
10/2014
10/2015
10/2016
10/2017
10/2018
10/2019
10/2020
10/2021
Water Year
GS Elevation
WSE
Historical Low Level