South Tahoe Public Utility District

Annual Water Supply and Demand Assessment

Water Year 2022

6/24/2022

South Tahoe Public Utility District
Annual Water Supply and Demand Assessment
(WY 2022)

CERTIFICATION

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0 Executive Summary

The Annual Water Supply and Demand Assessment (AWSDA) provides data and projections for the current water year (WY 2022) and the subsequent water year (WY 2023) assuming drought.

The South Tahoe Public Utility District (District) is 100% reliant on groundwater sources pumping from the Tahoe Valley South Subbasin (TVS Subbasin). The TVS Subbasin is a designated medium-priority groundwater basin located at high elevation within the Lake Tahoe Hydrologic Basin. Groundwater is the primary source of drinking water for the communities overlying the TVS Subbasin. Surface water for recharge or in-lieu use is not presently used.

Water year type for the TVS Subbasin is based on total precipitation measured at SNOTEL 508. Water year type for WY 2022 is based on total precipitation measured at SNOTEL 508 through June 20, 2022 (29.3 inches). Water year type for WY 2023 is projected based on total precipitation measured at SNOTEL 508 during a preceding dry water year (WY 2001). Groundwater recharge for the TVS Subbasin is derived from the water budget calculated by the South Tahoe Groundwater Model (STGM) for the TVS Subbasin. Using the amount of precipitation recorded at SNOTEL 508 during WY 2013 (28.6 inches), the model-simulated groundwater recharge for WY 2022 is projected at 20,495 acre-feet (AF). Like WY 2022, WY 2013 was a normal water year following a below normal water year. Using the amount of precipitation recorded at SNOTEL 508 during WY 2001 (16.4 inches), the model-simulated groundwater recharge for WY 2023 is projected at 17,900 AF. WY 2023 is assumed to be a dry water year like WY 2001, which was a dry water year following a below normal water year.

The District is the primary user of groundwater with the TVS Subbasin. More than ninety percent (90%) of groundwater produced from the TVS Subbasin is from drinking water wells operated by the District, Tahoe Keys Water Company (TKWC), and Lukins Brothers Water Company (LBWC). Eighty percent (80% of this amount is from District wells. The remaining balance of groundwater production is pumped from private small water system and domestic wells. District pumpage projected for WY2022 (5,796 AF) uses the current monthly groundwater production from October 2021 through May 2022 plus the long-term (WY2005 - WY2021) monthly average groundwater production for June 2022 through September 2022 from District wells. Total pumpage for WY 2022 (6,955 AF) uses the sum of the WY 2022 District monthly groundwater production multiplied by 1.2 to account for pumpage from TKWC, LBWC and private wells. Total pumpage for WY 2023 uses groundwater production records from WY 2001 to assess groundwater supply during a following dry water year (Total = 9,500 AF; STPUD = 8,037 AF). Groundwater pumpage within the TVS Subbasin is significantly less than sustainable yield (13,200 AFY).

Available groundwater supply is calculated as the difference between the volume of groundwater in storage and the storage threshold (-55,687 AF) which is the minimum threshold for reductions of groundwater in storage for the TVS Subbasin. The available groundwater supply for the TVS Subbasin

through the end of WY 2021 is 41,082 AF and is projected at 40,627 AF for WY 2022 and at 35,368 AF for WY 2023.

Annual testing of District groundwater wells indicate that all wells are pumping at expected rates, except for the Paloma Well which has been removed from service for well repair and the Clement Well which is a treated water well off-line due to needed service to the Gardner Mountain Air Stripper. The District water system would likely experience water shortage conditions under the following scenarios:

- A water shortage in a neighboring water system(s) could result in an emergency condition requiring the District to provide emergency water through inter-tie(s) under a mutual aid agreement. Under below normal water year or dry water years, unexpected delivery of emergency water could possibly trigger 10%-20% water shortage for the District's system.

- An extended regional power outage (RPO) during a maximum demand in summertime would result in 40%-50% water shortage.

- A wildfire with extended RPO during a maximum demand in summertime would result in >50% water shortage.

There is no anticipated water supply deficient under current conditions, therefore no actions are triggered from the water supply and demand assessment for Water Year 2022. The District will adhere to Executive Order N-7-22 and any additional restrictions required by the State of California.

1 Introduction

The Annual Water Supply and Demand Assessment (AWSDA) provides data and projections for the current water year (WY 2022) and the subsequent water year (WY 2023) assuming drought. This assessment encompasses the period from October 1, 2021, through September 30, 2023.

The District has prepared the AWSDA in compliance with the annual reporting requirements of urban water suppliers to conduct an AWSDA pursuant to subdivision (a) of Section 10632 and, on or before July 1 of each year. A preliminary AWSDA was issued on May 24, 2022 in accordance with the 2022 Drought Emergency Executive Order N-7-22 requiring urban water suppliers to submit to the California Department of Water Resources (DWR) a preliminary AWSDA consistent with section 10632.1 of the Water Code no later than June 1, 2022, and submit a final AWSDA no later than the deadline set by section 10632.1 of the Water Code. This AWSDA is the first AWSDA prepared since adoption of the District's 2020 Urban Water Management Plan (2020 UWMP) in June 2021 (Kennedy-Jenks, 2021).

The District is 100% reliant on groundwater to meet water demands. Groundwater production is currently provided by ten (10) active and three (3) stand-by wells which pump groundwater from the Tahoe Valley South Subbasin (TVS Subbasin). The District is the largest producer of groundwater within the TVS Subbasin and serves as the exclusive Groundwater Sustainability Agency (GSA), responsible to manage groundwater in a sustainable manner for all users and beneficial uses in accordance with the objectives of the Sustainable Groundwater Management Act (SGMA). Information on groundwater conditions and water demands presented in the AWSDA is consistent with information presented in the District's water year (WY) 2021 Annual Report (Bergsohn, 2022). Projections for groundwater conditions and water demands for the current WY 2022 and a subsequent dry water year (WY 2023) follow the Annual Assessment procedures described in Chapter 2 of the District's 2020 Water Shortage Contingency Plan, included as Appendix F of the 2020 UWMP.

1.1 TVS Subbasin

Drinking water is the primary use of groundwater within the TVS Subbasin. The TVS Subbasin is a designated medium-priority groundwater basin located at high elevation within the Lake Tahoe Hydrologic Basin (Figure 1-1).

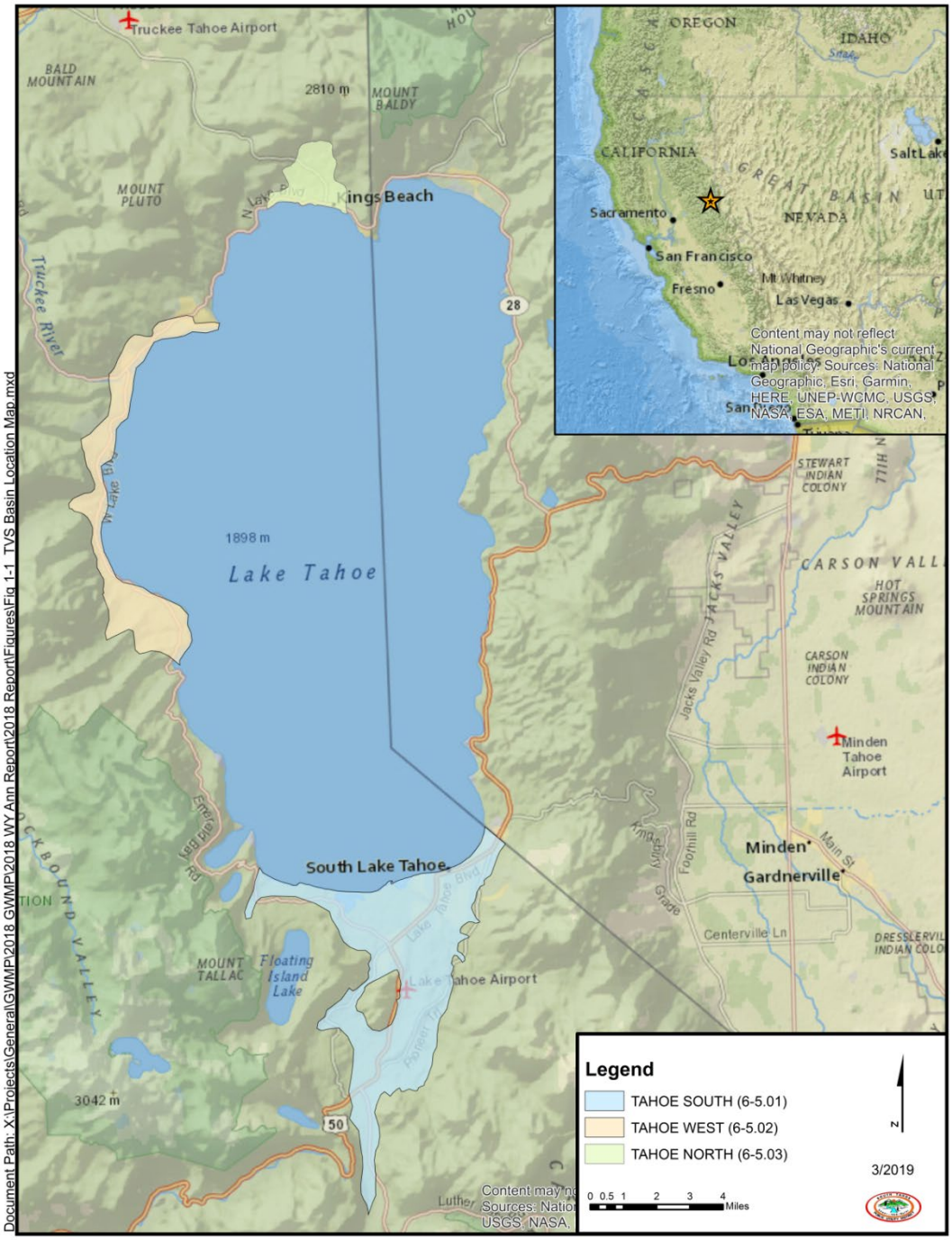


Figure 1-1. Lake Tahoe area regional map with Department of Water Resources (DWR) designated groundwater subbasins.

The TVS Subbasin has an area of approximately 23 square miles (14,814 acres) and is in El Dorado County, California (Figure 1-2). The TVS Subbasin is roughly triangular-shaped, bounded on the southwest by the Sierra Nevada Range, on the southeast by the Carson Range, and on the north by the southern shore of Lake Tahoe. The TVS Subbasin generally conforms to the valleys of the Upper Truckee River and Trout Creek. The TVS Subbasin does not share a boundary with any other DWR groundwater basin or sub-basin. The City of South Lake Tahoe (CSLT) overlies the northern portion of the TVS Subbasin. The southern boundary extends about 3 miles south of the unincorporated town of Meyers. The northeast boundary of the TVS Subbasin is defined by the California-Nevada state line.

Groundwater is the primary source of drinking water for the communities overlying the TVS Subbasin. Surface water for recharge or in-lieu use is not presently used.

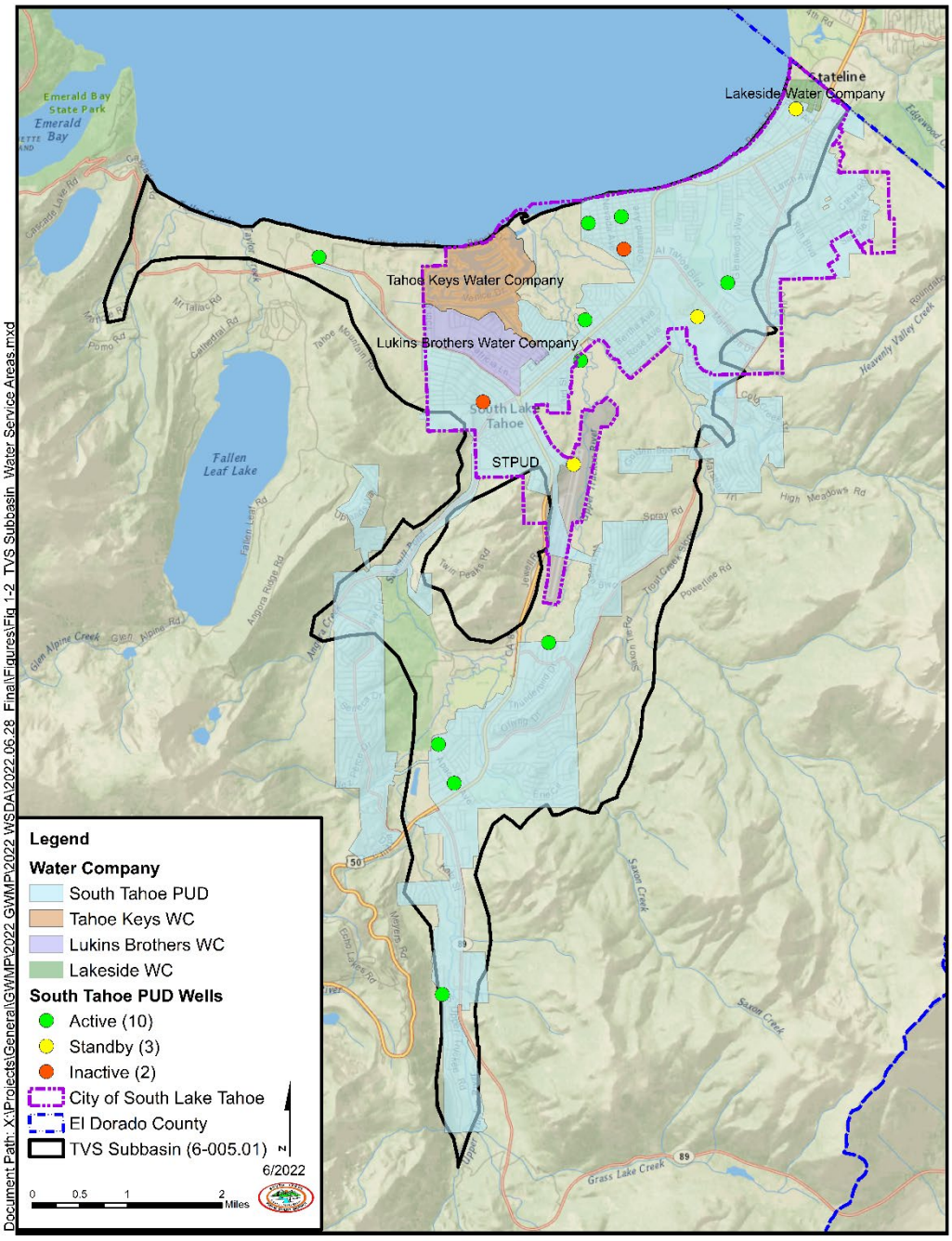


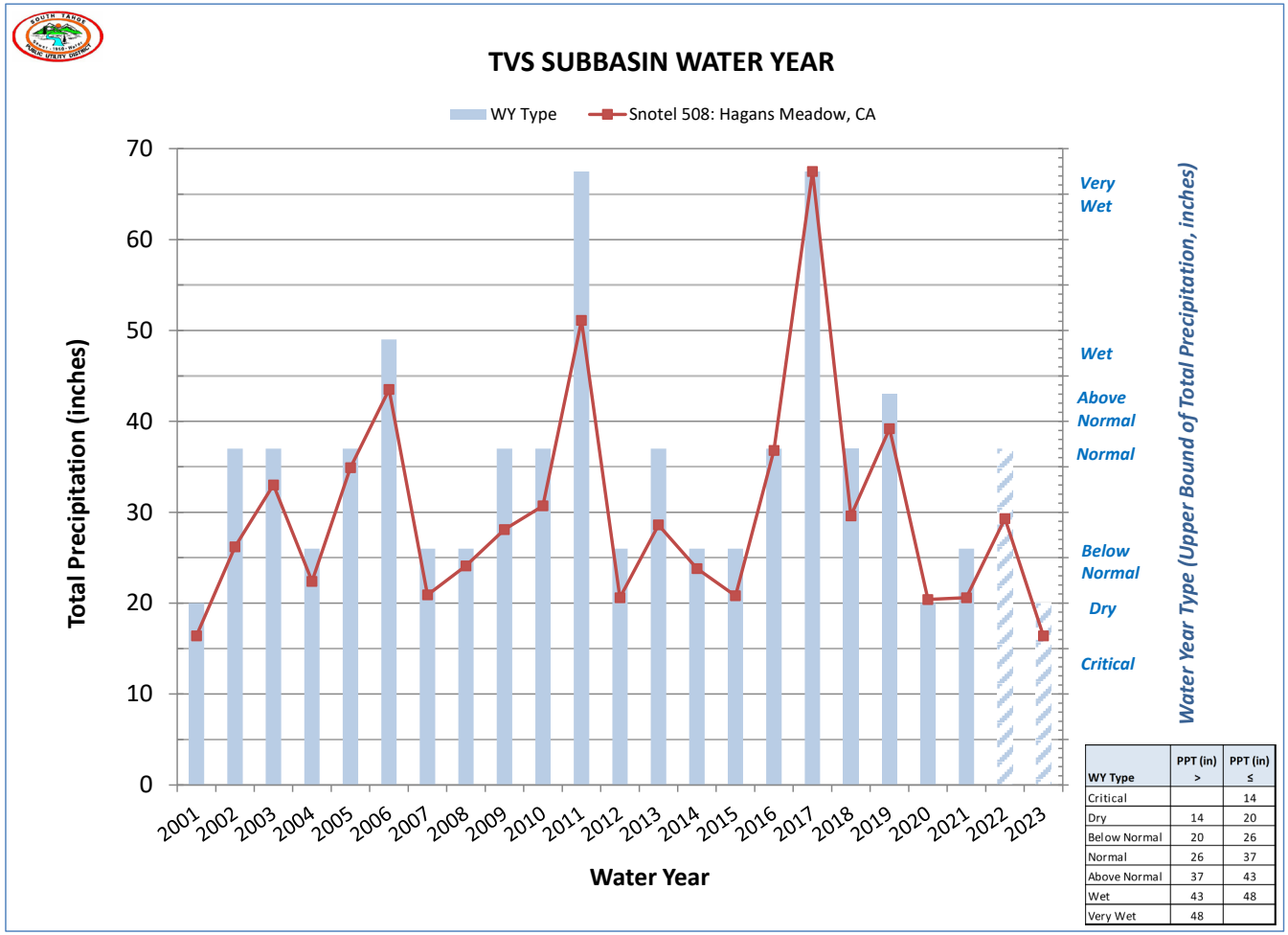
Figure 1-2. Water service areas overlying the Tahoe Valley South Subbasin (6-005.01).

2 Water Supply Assessment

The following section presents data collected by the District and derived from numeric groundwater models to show the current state of the TVS Subbasin in terms of precipitation and groundwater recharge.

2.1 Precipitation

Water year classification refers to the categories used to assess the amount of annual precipitation in a basin. The water year classification system for the TVS Subbasin was created in collaboration with development of the South Tahoe Groundwater Model (STGM) to help describe hydrologic conditions as either Critical, Dry, Below Normal, Normal, Above Normal, Wet or Very Wet, based on total accumulated precipitation recorded at SNOTEL 508: Hagan's Meadow, CA. Precipitation measured at this station has the best correlation of any weather station within the South Lake Tahoe area to model-simulated groundwater recharge. Figure 2-1 is a graph of annual precipitation measured at SNOTEL 508 and accompanying water year type since WY 2001. Water year type for WY 2022 is based on the total precipitation recorded at SNOTEL 508 through June 20, 2022 (29.3 inches) typed as a normal water year. Water year type for WY 2023 is assumed to be a dry year with total precipitation same as WY 2021 (16.4 inches).



WY Type	PPT (in) >	PPT (in) ≤
Critical		14
Dry	14	20
Below Normal	20	26
Normal	26	37
Above Normal	37	43
Wet	43	48
Very Wet	48	

Figure 2-1. Water year type for the TVS Subbasin based on total precipitation measured at SNOTEL 508 (WY 2001 through WY 2021). Water year type for WY 2022 is based on total precipitation measured at SNOTEL 508 through June 20, 2022. Water year type for WY 2023 is projected using total precipitation measured at SNOTEL 508 during WY 2001.

2.2 Groundwater Recharge

Groundwater recharge for the TVS Subbasin is derived from the water budget calculated by the South Tahoe Groundwater Model (STGM) for the TVS Subbasin and is calculated as the sum of areal recharge over the TVS Subbasin (Zone 10) and the subsurface inflow of groundwater from the adjoining mountains (Zone 1) referred to as Mountain Block Recharge (MBR). MBR is calculated in the water budget as the difference between the areal recharge within Zone 1 and the sum of the baseflow to streams plus discharge to Lake Tahoe within Zone 1 (Rybarski et al, 2022). Figure 2-2 is a graph of model-simulated groundwater recharge for the TVS Subbasin since WY 2001. The amount of precipitation recorded at SNOTEL 508 through May 16, 2022, is 29.3 inches. Using the amount of precipitation recorded at SNOTEL 508 for WY 2013 (28.6 inches), the model-simulated total recharge to the TVS Subbasin for WY 2022 is projected at 20,495 AF. Using the amount of precipitation recorded at SNOTEL 508 for WY 2001 (16.4 inches), the model-simulated total recharge to the TVS Subbasin for WY 2023 is estimated at 17,900 AF.

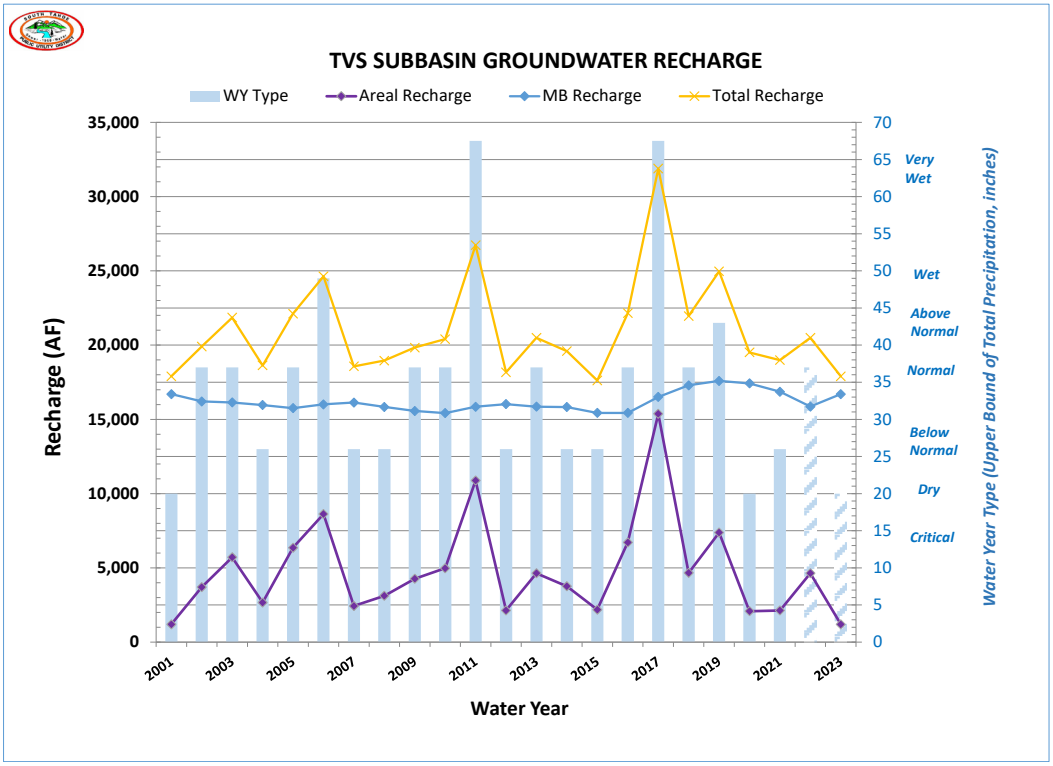


Figure 2-2. Annual groundwater recharge derived from the water budget calculated by the South Tahoe Groundwater Model (STGM) for the TVS Subbasin (WY 2001 through WY 2021). Groundwater recharge for WY 2022 is projected based on the total precipitation recorded at SNOTEL 508 during WY 2013. Groundwater recharge for WY 2023 is projected based on the total precipitation recorded at SNOTEL 508 during WY 2001.

3 Water Demand Assessment

This section presents the current unconstrained water demand using the groundwater pumpage data and planned water demand for WY 2022 and a subsequent dry year (WY 2023)

3.1 Groundwater Production

Groundwater is the primary source of drinking water within the TVS Subbasin. More than ninety percent (90%) of groundwater produced from the TVS Subbasin is from drinking water wells operated by the District, Tahoe Keys Water Company (TKWC), and Lukins Brothers Water Company (LBWC). Eighty percent (80%) of this amount is from District wells. The remaining balance of groundwater production is pumped from private small water system and domestic wells. Pumpage from the District, TKWC and LBWC are metered using propeller or turbine type flowmeters with a register for total flow and a flow rate indicator. Totalizer readings are recorded daily by the District and monthly by TKWC, and LBWC. These records are compiled annually following the end of the water year for annual update of the STGM. Accuracy of measurement for these flow meters is typically on the order of +/- 2%. Pumpage from private small water system and domestic wells are typically not metered.

Annual District and total groundwater production from metered wells since WY 2001 is shown below in Figure 3-8. Pumpage projected for WY 2022 uses the current monthly groundwater production from October 2021 through May 2022 plus the long-term average (WY2005 - WY2021) monthly groundwater production for June 2022 through September 2022. Total pumpage for WY 2022 uses the sum of the WY 2022 District monthly groundwater production multiplied by 1.2 to account for pumpage from TKWC, LBWC and private wells. By this method the total pumpage for WY 2022 is projected at 6,955 AF, of which 5,796 AF is extracted by District wells. Total pumpage for WY 2023 uses groundwater production records from WY 2001 to assess groundwater supply for a following dry water year (Total = 9,500 AF; STPUD = 8,037 AF).

The sustainable yield for the TVS Subbasin is 13,200 AFY which is the maximum quantity of water calculated over a base period that is representative of long-term conditions in the basin and including any temporary surplus, that can be drawn annually from a groundwater supply without causing an undesirable result (Rybarski, et al, 2022). Figure 3-1 shows that groundwater pumpage within the TVS Subbasin is significantly less than sustainable yield.

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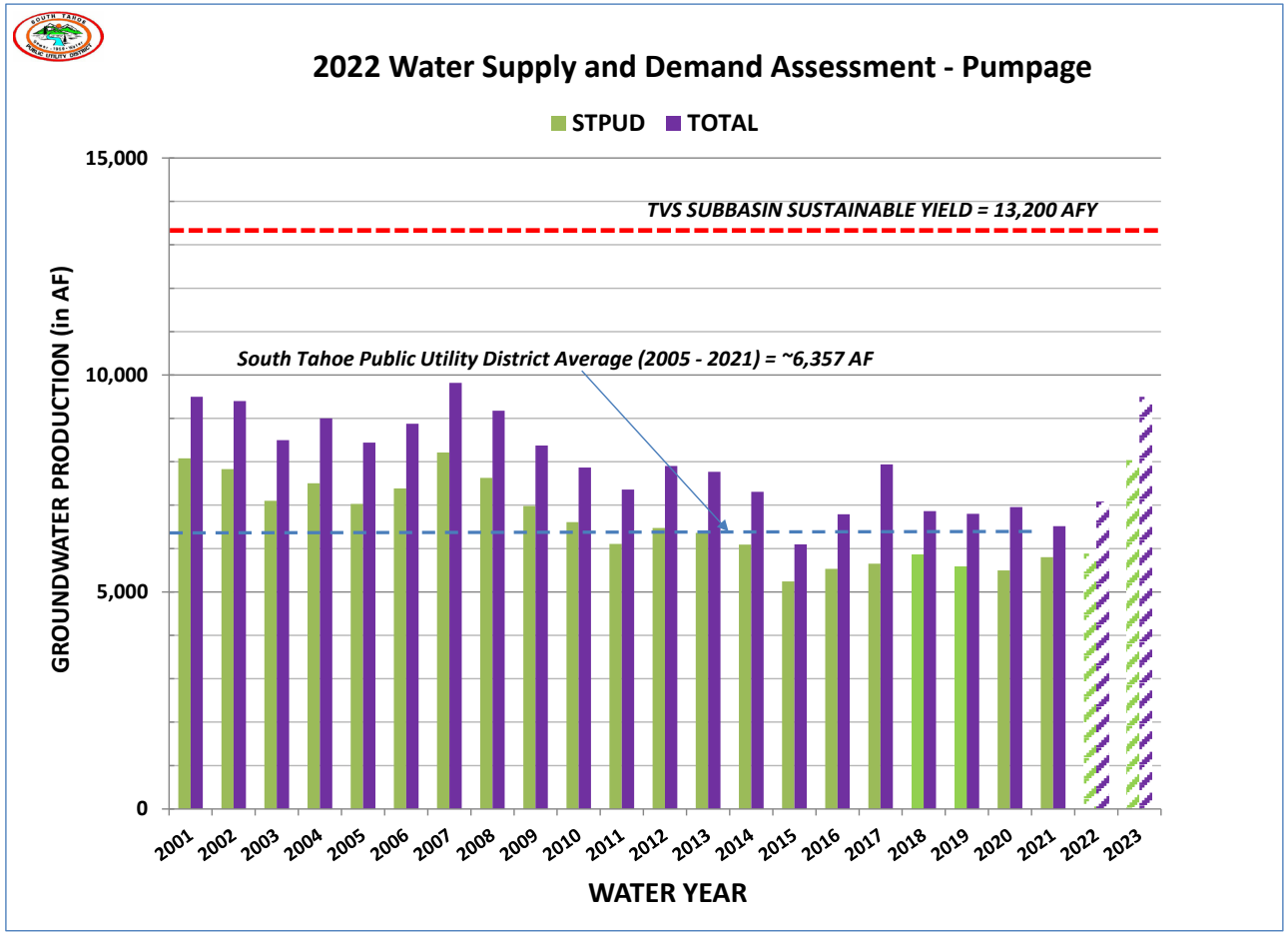

Figure 3-1. Annual groundwater production for South Tahoe Public Utility District (District) wells and total groundwater production including District, Tahoe Keys Water Company, and Lukins Brothers Water Company wells (WY 2001 through WY 2021). District pumpage for May 2022 through September 2022 is projected using average monthly water production (WY 2005 through WY 2021). WY 2022 total pumpage is estimated as the sum of District monthly water production values times 1.2 to account for pumpage from other metered wells. Groundwater production for WY 2023 uses the same water production values as WY 2001.

4 Water Supply Reliability Assessment

This section uses the water budget calculated by the STGM to assess the available groundwater supply within the TVS Subbasin considering projected changes in precipitation, groundwater recharge, groundwater pumping and changes in groundwater storage.

4.1 Groundwater Supply

During WY 2021, the District reconciled different water demand projections between the first five-year update of the Alternative Plan (Rybarski et al., 2022) and the 2020 UWMP (Kennedy-Jenks, 2021). As part of this process, the District updated water budgets derived from the STGM and used the updated water budget to assess current year available groundwater supply.

Figure 4-1 shows the available groundwater supply for the TVS Subbasin through the end of WY 2021 (41,082 AF) and projected groundwater supply for WY 2022 (40,627 AF) and WY 2023 (35,368 AF). The annual change of groundwater in storage is the difference in the volume of water in an aquifer from one year to the next. Figure 4-1 shows the annual trends of total groundwater production from the TVS Subbasin and the changes of groundwater in storage, as derived from the annual water budget calculated by the STGM (WY 2001 through WY 2021). The main components of the water budget include groundwater recharge; groundwater discharge to streams (baseflow); groundwater flux to Lake Tahoe; and groundwater pumping. Changes of groundwater in storage for the TVS Subbasin (Zone 10) are calculated from the differences in total inflow (MBR, areal recharge, inflow from Lake Tahoe, Storage) and total outflows (pumping, baseflow to streams, outflow to Lake Tahoe and Storage) (Rybarski, et al., 2022).

Available groundwater supply is calculated as the difference between the volume of groundwater in storage and the storage threshold (-55,687 AF) which is the minimum threshold for reductions of groundwater in storage for the TVS Subbasin. This reduction of groundwater in storage corresponds to a seven (7) foot basin-wide-decline in groundwater levels compared to WY 2005. The undesirable result from a basin-wide reduction of groundwater level elevations of this magnitude would cause the District to reduce well pumping rates to prevent pumping water levels to decline below top of screen intervals thereby inhibiting the District's ability to ensure a sustainable groundwater supply. Basin-wide groundwater level declines of this magnitude are not expected during interannual climate variations but may be expected during an extended long-term drought (Rybarski et al., 2022) This is a conservative estimate as the change of groundwater in storage accounts for groundwater production from confirmed active public and private water wells operating within the TVS Subbasin. Under the reporting requirements for the AWSDA, only groundwater production from water wells serving the District's water system need to be accounted.

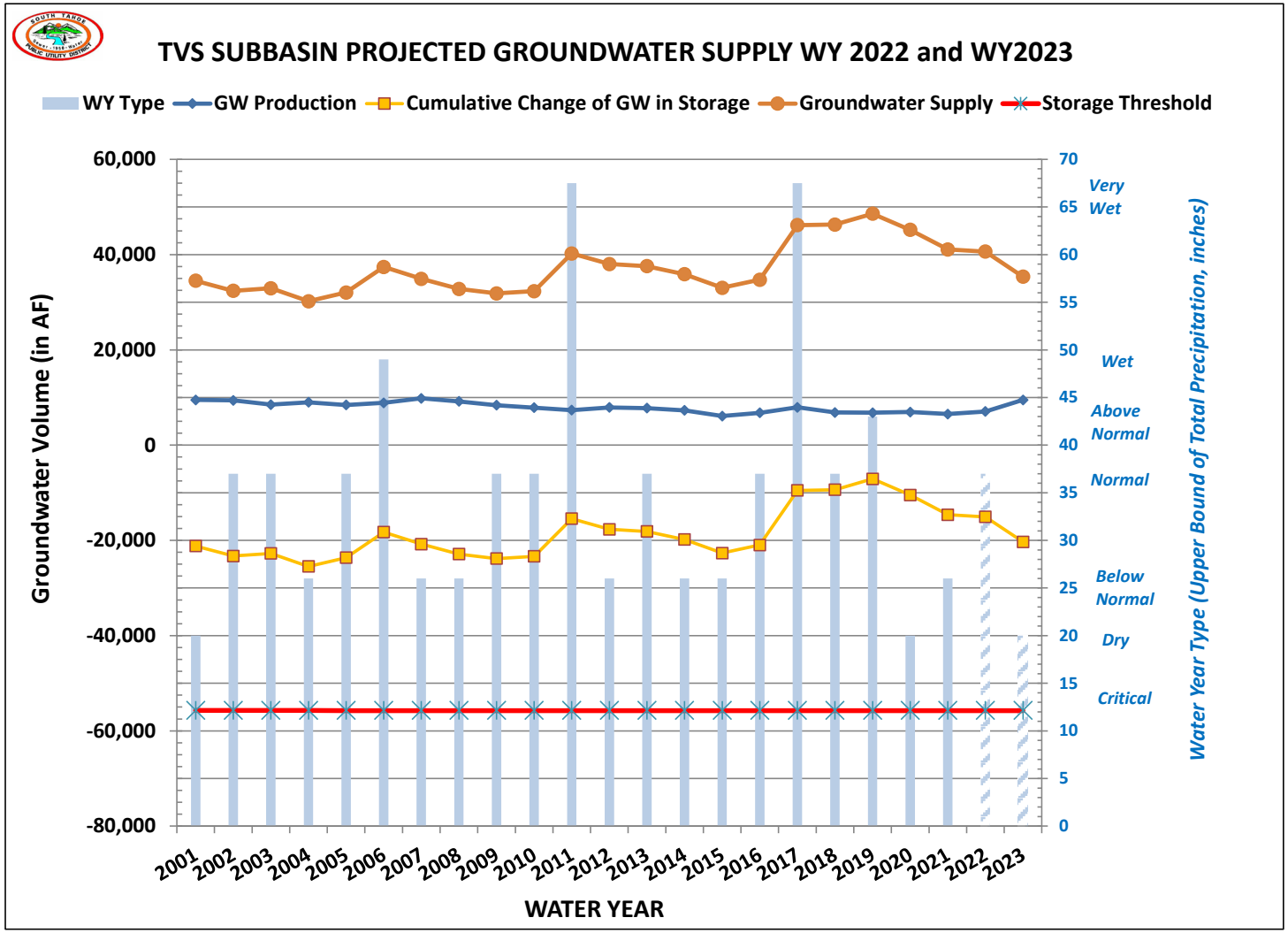

Figure 4-1. Available groundwater supply derived from the water budget calculated by the STGM for the TVS Subbasin through WY 2021 and projected for the current WY 2022 and a subsequent dry water year (WY 2023).

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4.2 Water System Supplies

The District regularly conducts well and pump performance efficiency tests on its active groundwater sources. Information gathered from this testing program is used to schedule appropriate maintenance to recover lost well and pump efficiency. The Well Efficiency Test consists of a two-hour (120-minute) constant rate pumping test. During the test, measurements are made of pre-pumping (i.e., static water level) groundwater water conditions and, during well operation, of pumping water levels, flow rate, discharge line pressure, sand content and field water quality parameters. The averaged flow rate and drawdown at 120 minutes is used to monitor potential changes in the wells' specific capacity and can also be used as check against the long-term specific capacity for each source. Overall, the District's groundwater wells are pumping at expected rates, except for the Paloma Well which was removed from service for well repair (October 2020) and the Clement Well which is a treated water well off-line due to needed service to the Gardner Mountain Air Stripper. Table 4-1 lists the well capacities for the District's groundwater sources under normal conditions and those wells with stand-by generators that can operate under a regional power outage (RPO).

Using monthly water production data, the 10-year water system maximum day demand (WY 2011 – WY-2020) for the District's water system is calculated at 9.86 million gallons per day (MGD), equivalent to 6,849 gallons per minute (GPM) or 11,047 acre-feet per year (AFY) (Rybarski et al, 2022). During development of the 2020 WSCP percent shortages up to 50% of the total source capacity for the water system was calculated and compared to the District's monthly water production over the past 30 years (Kennedy-Jenks, 2021). Comparison of these values indicates that the District would likely experience water shortage conditions under the following scenarios:

- A water shortage in a neighboring water system(s) could result in an emergency condition requiring the District to provide emergency water through inter-tie(s) under a mutual aid agreement. Under below normal water year or dry water years, unexpected delivery of emergency water could possibly trigger 10%-20% water shortage for the District's system.

- An extended RPO during a maximum demand in summertime would result in 40%-50% water shortage.

- A wildfire with extended RPO during a maximum demand in summertime would result in >50% water shortage.

Source	Status	Source Capacity (GPM/MGD/AFY)	Stand-By Generator (Y/N)	Regional Power Outage (GPM/MGD/AFY)	NOTES
Al Tahoe Well #2	Active	2500/3.6/4,000	Y	2500/3.6/4,000	
Arrowhead Well #3	Active	775/1.12/1,250	N		
Bakersfield Well	Active	1450/2.09/2,339	Y	1450/2.09/2,339	
Bayview Well	Active	3600/5.18/5,807	N		
Clement Well	Inactive	0/0/0	N	0/0/0	Treatment system out of service
Elks Club Well #2	Active	500/0.72/807	Y	500/0.72/807	
Glenwood Well #5	Active	1,000/1.44/1,613	Y	1,000/1.44/1,613	
Helen Well #2	Active	240: 0.35/387	N		
Paloma Well	Inactive	0/0/0	N		Temporarily out of service for well repair
Sunset Well	Active	650/0.94/1,048	N		
South Upper Truckee Well #3	Active	850 /1.22/1,371	Y	850 /1.22/1,371	
Valhalla Well	Active	600/0.86/968	Y	600/0.86/968	
Active Well Totals		12,165/17.52/19,622		6,903/9.94/11,134	
Airport Well	Stand-By	500/0.72/807	N		Restricted to emergency use
Blackrock Well	Stand-By	90/0.13/145	N		Restricted to emergency use
College Well	Stand-By	1100/1.58/1,774	Y	1100/1.58/1,774	Restricted to emergency use
Stand-By Well Totals		1,690/2.43/2,726		1100/1.58/1,774	
Active + Stand-By Well Totals		13,855/19.95/22,348		8,003/11.52/12,908	

Table 4-1. District water system well source capacities for active and stand-by wells under normal and emergency regional power outage conditions.

5 Triggered Actions

There is no anticipated water supply deficient under current conditions, therefore no actions are triggered from the water supply and demand assessment for WY 2022. The District will adhere to Executive Order N-7-22 and any additional restrictions required by the State of California.

6 Communication Actions

No actions are triggered since there is no anticipated water supply deficit. The District will adhere to Executive Order N-7-22 and promote water conservation in our service area. The District continues to promote water conservation rebates for turf replacement, water efficient clothes washers, and water efficient toilets; water wise landscape consultations and water wise house calls; designated watering days; and water loss restrictions.

7 References

Bergsohn I., 2022. South Tahoe Public Utility District Tahoe Valley South Subbasin (6-005.01), Annual Report, Water Year 2021, March 29, 2022.

Kennedy-Jenks, 2021. 2020 Urban Water Management Plan for South Tahoe Public Utility District Final, June 30, 2021.

Rybarski, S., Hausner, M. and Bergsohn, I., 2022. Alternative Plan for Tahoe Valley South Subbasin (6-005.01) first five-year update, April 22, 2022.