Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

June 2023

Prepared for

Fox Canyon Groundwater Management Agency and
Arroyo Santa Rosa Basin Groundwater Sustainability Agency

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Executive Summary [§354.4(a)]

§354.4 General Information. *Each Plan shall include the following general information:*
(a) *An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.*

Introduction

This Groundwater Sustainability Plan (GSP) was prepared jointly by the Arroyo Santa Rosa Basin Groundwater Sustainability Agency (ASRGSA) and the Fox Canyon Groundwater Management Agency (FCGMA) (the GSAs) to sustainably manage the Arroyo Santa Rosa Valley Groundwater Basin (Department of Water Resources [DWR] Basin No. 4-007; ASRVGB or Basin) in accordance with the Sustainable Groundwater Management Act (SGMA).

The State of California enacted SGMA, effective January 1, 2015, to provide a statewide framework for groundwater management by locally formed Groundwater Sustainability Agencies (GSAs). Groundwater basins deemed to have medium or high priority by the DWR are required to comply with SGMA. The ASRVGB priority assigned by DWR was reduced from medium to very low in 2019, making SGMA compliance optional. The GSAs are developing this GSP voluntarily under SGMA to be good stewards of the Basin groundwater resources, ensure reliability of local water supplies, and create additional opportunities to enhance groundwater supply and improve groundwater quality.

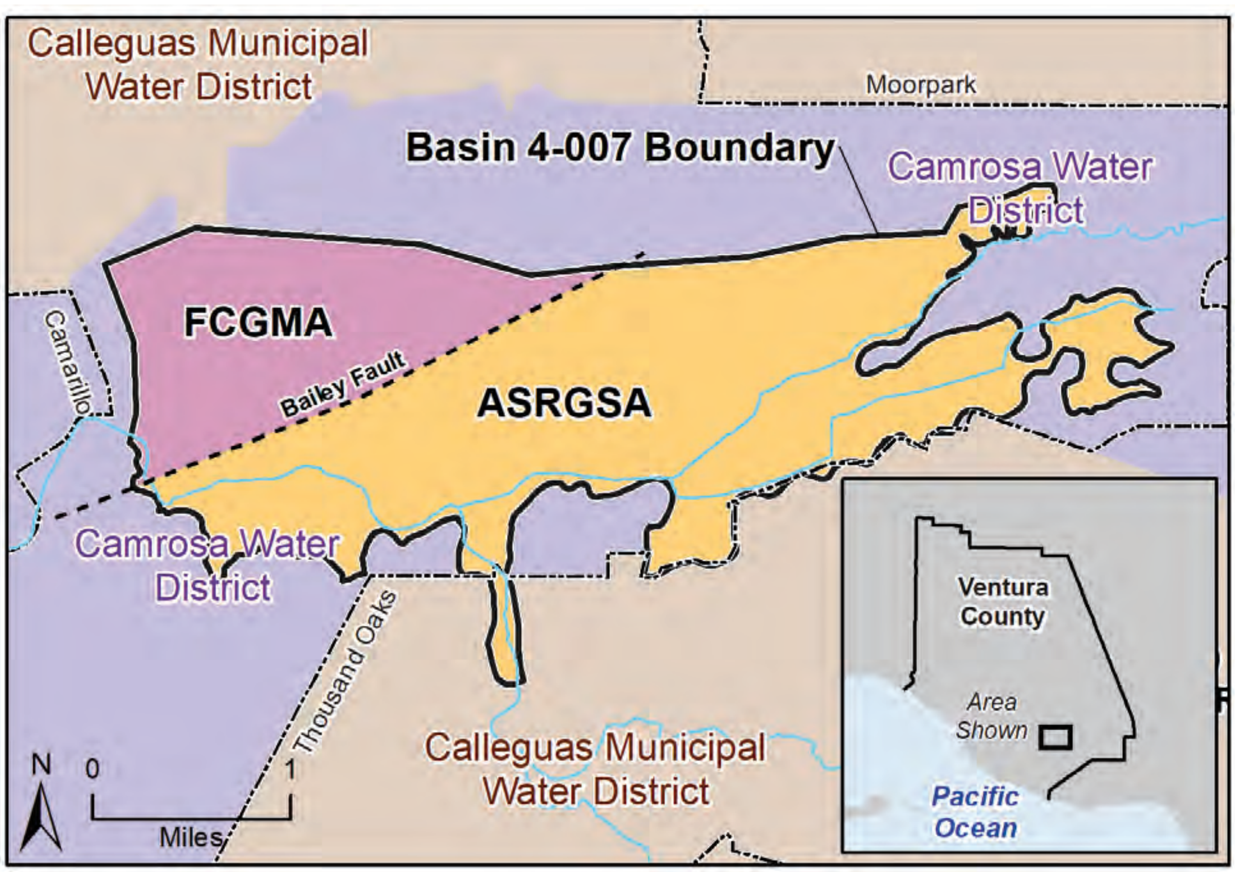

Figure ES-01 Arroyo Santa Rosa Valley Groundwater Basin and Adjacent Water Districts.

The ARSVGB is covered by two GSAs, the FCGMA and ASRGSA (Figure ES-01). The FCGMA is an independent special district formed by the California Legislature in 1982 to manage and protect the aquifers within its jurisdiction for the common benefit of the public and all agricultural, domestic, municipal, and industrial users. FCGMA overlies approximately one third of the northwestern of the Basin, west of the Bailey Fault (Figure ES-01). ASRGSA was formed in 2016 to manage the portion of the Basin located outside of the FCGMA jurisdictional boundary. ASRGSA was formed pursuant to a joint exercise of powers agreement (JPA) between Camrosa Water District (Camrosa WD or Camrosa) and the County of Ventura. Camrosa WD provides retail water services to residential, commercial, and agricultural customers in the Basin and surrounding region. The County of Ventura exercises water management and land use authority on land overlying most of ASRVGB and provides jurisdictional coverage for a small portion of the Basin that lies outside of Camrosa's service area. SGMA identified the FCGMA as the exclusive GSA for basins within its jurisdiction; however, this only included the western portion of the Santa Rosa Valley Basin, west of the Bailey Fault (see ES-3; Basin Setting). The FCGMA also manages the adjacent Pleasant Valley and Las Posas Valley basins pursuant to GSPs.

Following submittal of initial notifications on May 14, 2018, and February 24, 2017, from ASRGSA and FCGMA, respectively, the two GSAs developed this GSP to comply with SGMA's statutory and regulatory requirements and initiated planning by engaging with stakeholders and holding public meetings pursuant to an adopted Stakeholder Engagement Plan.

The goal of this GSP is to sustainably manage the groundwater resources and improve the water quality of the ASRVGB for the benefit of current and anticipated future beneficial users of groundwater, without causing undesirable results under future conditions (Section 4.2). This GSP outlines the approach to maintain a sustainable groundwater resource free of undesirable results pursuant to the SGMA, while establishing long-term reliability no later than 20 years from GSP adoption.

The content of this GSP includes administrative information, description of the Basin setting, development of quantitative sustainable management criteria (SMC) that consider the interests of all beneficial uses and users of groundwater, identification of projects and management actions and monitoring networks that will ensure the Basin is demonstrably managed in a sustainable manner no later than the 20-year sustainability timeframe and for the duration of the entire 50-year planning and implementation horizon.

This GSP is generally organized following DWR guidance documents (DWR, 2016d):

Section 1 - Introduction to Plan Contents

Section 2 - Administrative Information

Section 3 - Basin Setting

Section 4 - Sustainable Management Criteria

Section 5 - Monitoring Networks

Section 6 - Projects and Management Actions

Section 7 - GSP Implementation

Section 8 - References and Technical Studies

ES-1. Plan Area Description

The geographic area covered by this GSP and managed by ASRGSA and FCGMA includes the entire ASRVGB (DWR Basin No. 4-007), as defined by DWR Bulletin No. 118, "California's Groundwater," Update 2020 (DWR, 2020). The Basin is in the southeastern portion of Ventura County near the City of Thousand Oaks and the City of Camarillo (Figure ES-02). The ASRVGB is bordered by the following basins: Tierra Rejada (4-015) to the east, Conejo (4-101) to the south, Pleasant Valley Basin (4-006) to the west, and Las Posas Valley (4-008) to the north.

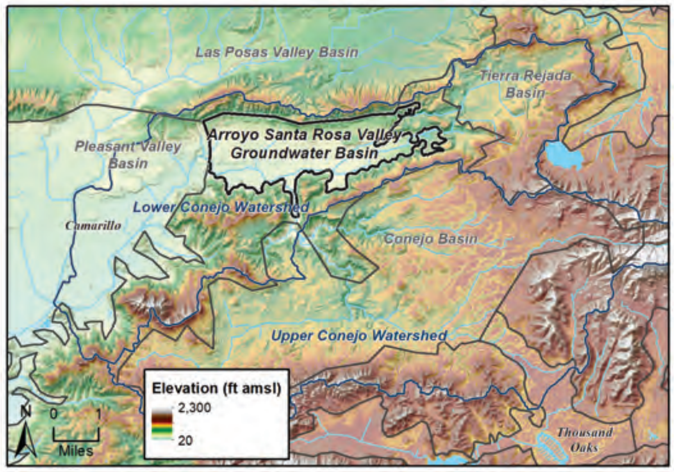

Figure ES-02 Regional Map of ASRVGB and Adjacent Basins.

Land use in the Basin is generally split between agricultural and low-density residential (53% and 35%, respectively), with agricultural land making up most of the western half of the Basin and residential land making up the eastern half of the Basin. Approximately 70% of the Basin is protected land under the Save Open Space & Agricultural Resources (SOAR) program, which includes agricultural, residential, open space, and undeveloped land. Thus, further intensive development is not expected to occur within the Basin for the foreseeable future. The principal land use planning agency in the Basin is the County of Ventura, which recently completed its 2040 General Plan (County of Ventura, 2020).

ES-2. Regional Water Management Framework

Groundwater management pursuant to this GSP complements or overlaps with existing and future potential water management programs in the region. Importantly, certain future monitoring activities may overlap with the GSP monitoring networks. The GSAs will coordinate with these programs to minimize duplication of efforts/costs.

Camrosa Water District

Camrosa WD was established in 1962 with construction of its initial water facilities between 1966 -1969. Its service area covers 31 square miles in southern Ventura County. Currently the District's potable distribution system services 32,100 residents and more than 3,000 acres of agricultural land, as well as businesses and light industry (Camrosa, 2021). In addition to potable water, Camrosa WD provides non-potable surface water and reclaimed water as well as wastewater collection services in certain portions of the service area.

City of Thousand Oaks

In Water Rights Decision No. 1638 (Ventura County, 1997), the SWRCB ordered that unappropriated water by the City of Thousand Oaks is to be provided to Camrosa via the Conejo Creek Project diversion site. SWRCB required a minimum flow of 6.0 cubic feet per second (cfs) at the Conejo Creek Project diversion point for the protection of public trust resources.

Camarillo Sanitary District

Camrosa WD stores and resells surplus recycled water through a purchase agreement with the Camarillo Sanitary District, which estimates an availability of 500-800 acre-feet per year (AFY) (Camrosa, 2021). Any recycled water not delivered to Camrosa is delivered to City of Camarillo customers or discharged by the City to Conejo Creek.

Calleguas Municipal Water District (Calleguas MWD)

Calleguas MWD is the wholesale imported water agency from which Camrosa purchases imported water to supplement local water supplies in the Basin. Calleguas MWD is a member agency of the Metropolitan Water District of Southern California. The Calleguas MWD Urban Water Management Plan (Calleguas MWD, 2021) is a planning tool that generally guides the actions related to water supply issues for the District service area.

Watersheds Coalition of Ventura County Integrated Regional Water Management Plan

The Integrated Regional Water Management Plan (IRWMP) prepared by the Watersheds Coalition of Ventura County (2019) includes several “resource management strategies” that have the potential to directly or indirectly affect water resources management in Ventura County, including the Calleguas Creek Watershed and ASRVGB.

Ventura County Watershed Protection District (VCWPD)

The ASRVGB is within the Calleguas Creek Watershed in Ventura County, which includes programs involving standards for water quality within the Basin. The Non-Coastal Zoning Ordinance by the Ventura County Planning Division (Ventura County, 2023) sets standards for dwellings within groundwater Impact Areas for the Basin to limit impacts from septic systems and animal husbandry/keeping and composting. In addition, the Ventura County Stormwater Quality Monitoring Program requires water quality sampling, watershed assessments, business inspections, and pollution prevention programs.

RWQCB Water Quality Management Programs

ASRVGB falls within the jurisdiction of the Los Angeles Regional Water Quality Control Board (RWQCB), which has established a regional Water Quality Control Plan (i.e., Basin Plan, RWQCB-LA, 2019). The Basin Plan contains the regional water quality regulations and programs to implement these regulations, including the National Pollutant Discharge Elimination System (NPDES) permits issued under federal delegation for discharges to surface water and total maximum daily loads (TMDLs). The Ventura County Stormwater Quality Management Program is implemented to meet the requirements of the Ventura County Stormwater Permits (i.e., Municipal Separate Storm Sewer System [MS4] permit), which includes water quality sampling, watershed assessments, business inspections, and pollution prevention programs. The Ventura County Agricultural Irrigated Lands Group Water Quality Management Plan (VCAILG, 2020) is implemented to comply with the agricultural conditional waiver of waste discharge requirements. The plan addresses measurement and control of discharges from irrigated farmland to protect surface water quality. TMDL monitoring of surface water within the Basin is currently coordinated by the Calleguas Creek Watershed TMDL Compliance Monitoring Program (CCWTMP). The RWQCB Basin Plan and water quality regulatory programs do not limit basin operational flexibility because actions undertaken by RWQCB contribute to maintenance of groundwater quality below the measurable objective concentrations.

Fox Canyon Groundwater Management Agency

FCGMA was formed by the California Legislature in 1982 as an independent special district to manage the aquifers within its jurisdiction (FCGMA, 1982). Beneficial users of groundwater within FCGMA jurisdiction are subject to the Agency's GSPs, ordinances, and policies.

ES-3. Basin Setting and Groundwater Conditions

Overview

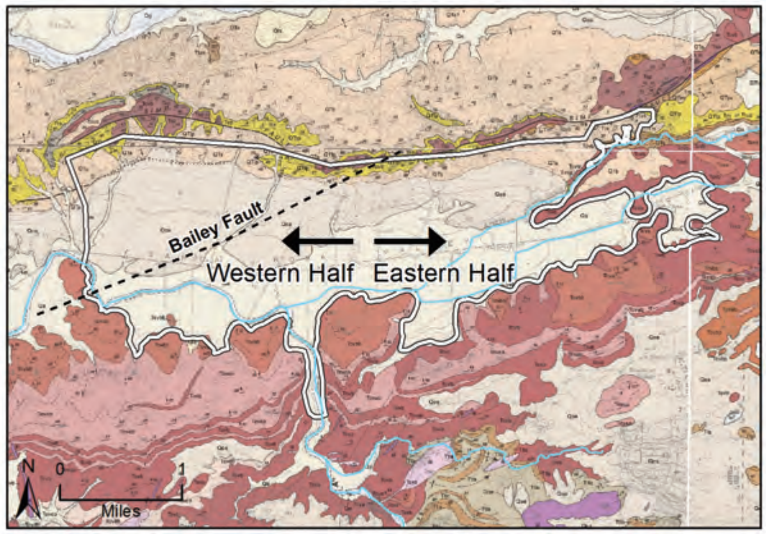

Figure ES-03 Surface Geology for the ASRVGB.

The ASRVGB is in an elongated east-trending valley and consists of multiple layers of alternating fine- and coarse-grained unconsolidated deposits, semi-consolidated deposits, and consolidated formations underlain by volcanic bedrock. The Basin is roughly centered on an east-west oriented structural syncline, and the sedimentary deposits are thickest in the center and westernmost areas, thinning out to the Basin margins. The aquifer system is semi-confined and is characterized by distinct upper and lower groundwater-producing zones in the west with the stratification absent or not apparent to the east; the upper and lower groundwater-producing zones are treated as a single principal aquifer for purposes of sustainable groundwater management in this initial GSP. To facilitate discussion within the GSP, the Basin has been subdivided into two areas, the western half and eastern half. In addition, a key hydraulic feature within the Basin is the Bailey Fault, which acts as a relative barrier to flow, separating the northwestern third of the Basin from the rest of the Basin (Figure ES-03).

Inflow into the Basin comes from mountain-block fracture flow from the Conejo volcanics from the south and east, infiltration of streamflow, recharge as infiltration of precipitation and agricultural and urban return flows, and mountain-front recharge from the north. There is a small component of underflow from the Pleasant Valley Basin to the west, but that component is not well constrained by data and is quantified within the range of uncertainty of the numerical model. The Arroyo Conejo and Conejo Creek are the major surface water features recharging the groundwater in the south-central and southwestern area of the Basin (Figure ES-04) – this surface water system is a perennial creek due to a constant source of effluent from the Hill Canyon Wastewater Treatment Plant (WWTP). The shallow groundwater in the vicinity of the Arroyo Conejo and Conejo Creek consists primarily of recirculated surface water discharges sourced from the Hill Canyon WWTP and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon (Section 3.2.6). Groundwater extraction is the primary outflow component for the Basin, and shallow groundwater also discharges to Conejo Creek in the southwestern area.

Basin Setting Components

Topography and Surface Water Features. The ASRVGB is located within the Lower Conejo Watershed in southern Ventura County, which is part of the larger Calleguas Creek Watershed. The topography of the Basin is generally broad and flat in the west with ground surface elevations as low as ~200 feet (ft) above mean sea level (amsl) increasing to ~400 ft amsl to the east as the valley narrows along Santa Rosa Road, and elevations are as high as ~700 ft amsl along the east-trending ridge of the Las Posas Hills to the north.

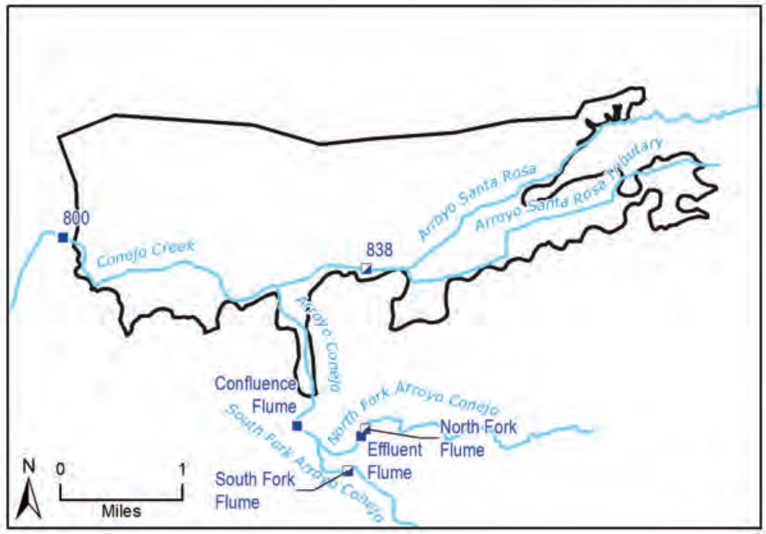

Figure ES-04 Surface Water Bodies and Gages for the ASRVGB.

The ASRVGB is within a Mediterranean-type climatic zone, characterized by a long summer-fall dry season and a cool winter-spring wet season. On average 94% of the precipitation in the ASRVGB usually occurs between November and April with an annual average precipitation of 13.2 inches with rainfall varying from less than 5 inches in the driest years to more than 30 inches in the wettest years. There are three primary surface water features in the ASRVGB with a combined drainage area of ~67 square miles: the Arroyo Santa Rosa, the Arroyo Conejo, and Conejo Creek (Figure ES-04). The Arroyo Santa Rosa is an ephemeral creek, bisecting the Santa Rosa Valley in the eastern half of the Basin, and much of the channel is composed of rectangular reinforced concrete trapezoidal rip rap. The Arroyo Santa Rosa and its tributary primarily flow during storm events. The Arroyo Conejo enters the Arroyo Santa Rosa Valley through the Conejo Hills and Hill Canyon in the southwest, joining the Arroyo Santa Rosa just downstream of the mouth of Hill Canyon. Conejo Creek starts at the confluence of the Arroyo Conejo and the Arroyo Santa Rosa and flows in a westerly direction into the Pleasant Valley Basin and eventually into Calleguas Creek downstream of the ASRVGB. The Arroyo Conejo-Conejo Creek is a perennial creek, primarily due to effluent discharges from the Hill Canyon WWTP.

Geologic Setting and Basin Hydrogeology. The ASRVGB is within the tectonically active Transverse Ranges geomorphic province of California, characterized by mountain ranges and valleys with an east-west orientation. Rocks in this region have been folded into a series of predominantly east-west-trending anticlines and synclines associated with thrust and reverse faults. The Basin is aligned with the east-trending Santa Rosa Syncline, which bisects the Santa Rosa Valley, extending westward into the adjacent Pleasant Valley Basin. The northern edge of the Basin is delineated by the Simi-Santa Rosa Fault Zone along the Las Posas Hills anticline, parallel to the Santa Rosa Syncline (Figure ES-03).

The bottom of the Basin is delineated by the Conejo volcanics, which is the primary bedrock unit underlying the sedimentary formations that comprise the Basin and has a maximum depth of over 1,000 ft in the western part of the Basin, based on the interpretation of lithologic logs. The Basin materials pinch out to the south and east where the Conejo volcanics outcrop along the Conejo Hills and the western margin of the Tierra Rejada Basin, respectively. The synclinal structure of the ASRVGB extends to the west into the Pleasant Valley Basin; however, the alluvial thickness and width of the valley becomes constricted at the western boundary of the ASRVGB by a north-trending ridge of the Conejo volcanics that form a saddle-like structure. Although flow across this western boundary may be limited to the groundwater-producing zones and is considered insignificant, it is interpreted to hydraulically connect the ASRVGB to the Pleasant Valley groundwater basin.

The major hydraulic feature within the Basin is the Bailey fault, which is a northeast-trending vertical fault that acts as a partial hydraulic barrier and political boundary for the Basin, separating the FCGMA from the rest of the Basin to the east. Differences in both groundwater levels (up to ~80 ft) and water quality data (Nitrate and total dissolved solids [TDS] concentrations) across the fault support the hydraulic separation.

Six distinct hydrostratigraphic units (HSUs) were developed for the hydrogeologic conceptual model and numerical model and consist of five layers of sedimentary units and the sixth bottom layer representing the bedrock basement (Figure ES-05). Review of previous studies along with the interpretation of lithologic logs, electrical-logs, and well screen information, supports the identification of upper and lower groundwater-producing zones (HSUs 3 and 5, respectively) separated by semi-confining low-permeability units, primarily in the western half of the Basin. The stratigraphy in the eastern half does not exhibit the same layering that is observed in the well logs and electrical logs of the western half of the Basin, where the alluvial thickness is generally greater than ~700 ft and there are alternating deposits of fine- and coarse-grained materials; the basin-fill sediments to the east are mostly fine grained.

West of Bailey Fault				East of Bailey Fault		
Aquifer Unit	**Hydrostratigraphic Unit (Model Layer)**		Bailey Fault: Barrier to flow, up to ~300 ft offset, upthrown side on east	**Aquifer Unit**	**Hydrostratigraphic Unit (Model Layer)**	
Shallow Alluvium	Shallow Alluvium	1		Shallow Alluvium	Shallow Alluvium	1
Mugu (or age-equivalent)	**Upper Groundwater Producing Zone** (~100-240 ft thick; ~100-440 ft deep)	2		n/a	**Upper Groundwater Producing Zone** (~50-200 ft thick; ~100-400 ft deep)	2
Hueneme		3				3
	Low permeability unit	4			Low permeability unit	4
Fox Canyon	**Lower Groundwater Producing Zone** (~200-550 ft thick; ~100-600 ft deep)	5		Fox Canyon	**Lower Groundwater Producing Zone** (~50-450 ft thick; ~50-400 ft deep)	5
Grimes Canyon/Santa Barbara						
n/a				Unconformity		
Miocene Undifferentiated (Santa Margarita)				**Miocene Undifferentiated** (Santa Margarita)		
Conejo Volcanics	Base Layer (Conejo Volcanics) ~1200 ft max depth	6		Conejo Volcanics	Base Layer (Conejo Volcanics) ~900 ft max depth	6
n/a				n/a		

Figure ES-05 Hydrostratigraphic Units in the ASRVGB.

The principal aquifer in the Basin is considered to be semi-confined due to the discontinuity of the clay layers separating the upper and lower groundwater-producing zones. Transmissivity estimates from aquifer and specific capacity tests and previous studies were used to derive preliminary estimates of hydraulic conductivities for the calibration of the numerical groundwater model. The calibrated hydraulic conductivity for the HSUs within the Basin ranges from ~1-35 ft/day. The final calibrated storage parameters ranged from 0.1 to 0.2 for the specific yield in the unconfined areas of the numerical model (primarily layers 1 and 2), and for the confined areas of the model the specific storage ranged from 10^{-5} to 2×10^{-4} per foot.

The primary sources of groundwater for the ASRVGB are inflow from the Conejo volcanics from the south and east and streamflow percolation (Figure ES-06). The shallow groundwater is recharged by the streamflow, of which perennial flows are primarily sourced by discharges from the Hill Canyon WWTP and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon. Gaining sections of the Arroyo Conejo and Conejo Creek receive shallow groundwater that is primarily recirculated recycled water and urban runoff (Section 3.2.6).

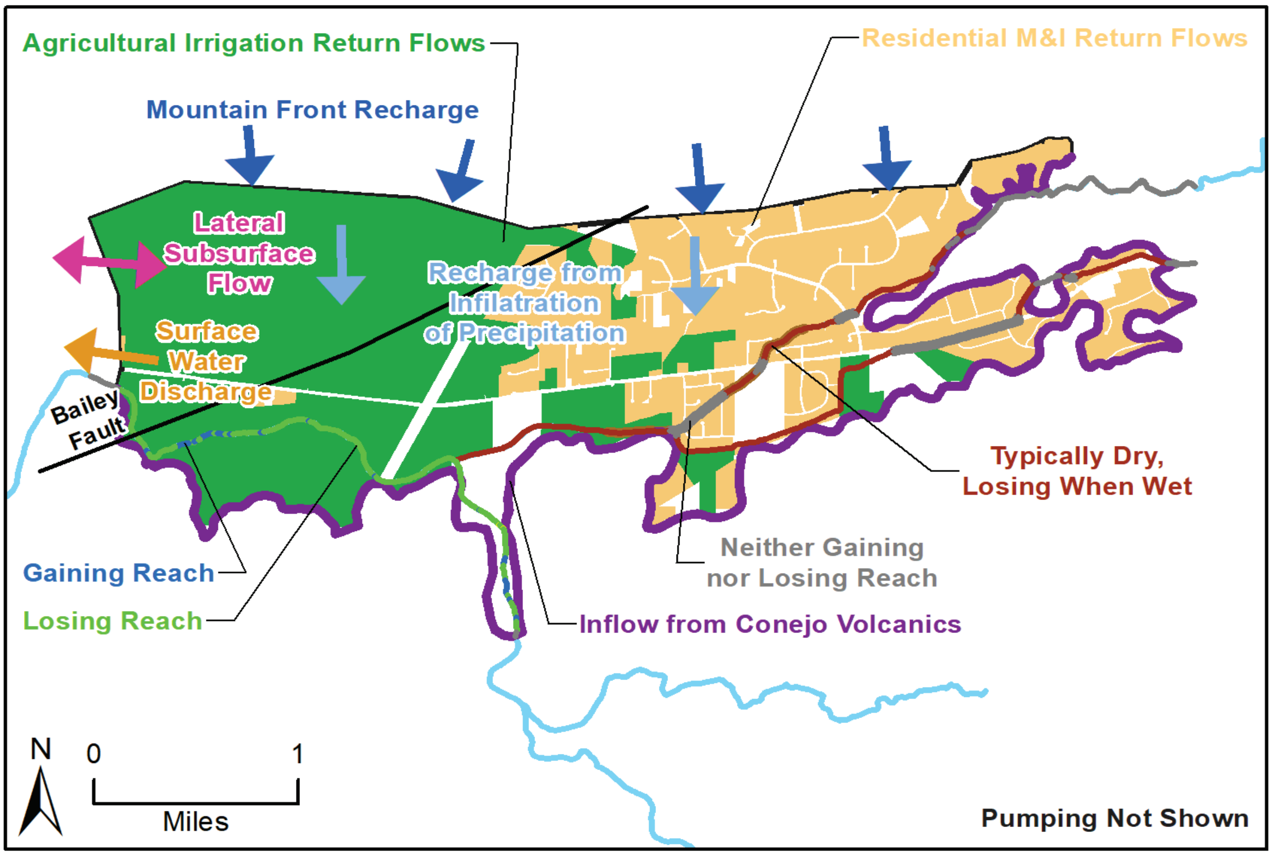

Figure ES-06 Primary Groundwater Recharge and Discharge Areas of the ASRVGB.

Secondary sources of groundwater for the Basin are from irrigation return flows, urban land use return flows (applied water, septic systems, and distribution losses), and infiltration from precipitation. Underflow from the Pleasant Valley Basin has been simulated in the numerical model, but rates are within the range of uncertainty of the model and there is limited data to support this inflow component.

The inflow from the Conejo Volcanic bedrock is conceptualized as a deep source of subsurface recharge to the Basin via fracture-flow, which is evidenced by higher groundwater levels observed in wells completed in the bedrock to the east in areas where the bedrock very shallow or at the land surface.

The Arroyo Conejo and Conejo Creek are a losing stream system and there are likely gaining and losing sections along the stream; however, the infiltration of surface water is an important component of inflow for the groundwater system. To the east, Arroyo Santa Rosa and the Arroyo Santa Rosa Tributary are ephemeral streams with rapid infiltration rates from stormflows and groundwater is not believed to discharge to these streambeds.

Recharge of return flows from irrigation occurs in the areas of the Basin with agricultural land use, and, where applicable, recharge to groundwater occurs through the return flows from applied waters in residential areas, septic system leachate, and water distribution system losses (Figure ES-06). Outcrops of the upper and lower groundwater-producing zones along the northern boundary of the Basin receive direct recharge from precipitation. In addition, direct recharge from precipitation likely occurs in the eastern area of the Basin, as evidenced by water levels responding to precipitation.

The primary groundwater discharge area for the Basin (other than via extraction wells) is in the southwest area before Conejo Creek exits at the western boundary; however, discharge rates are very small (<5%) compared to the overall inflow. Underflow to Pleasant Valley Basin is represented in the numerical model during high groundwater level conditions but is a very minor component (<1% of the total inflows) of the groundwater budget for the Basin, within the range of uncertainty of the model.

Groundwater generally flows from the east to west in the ASRVGB, following the surface drainage and the topographic gradient of the Basin, with localized depressions caused by extraction wells and localized highs in recharge areas (Figure ES-07). Southeast of the Bailey Fault, groundwater flow is

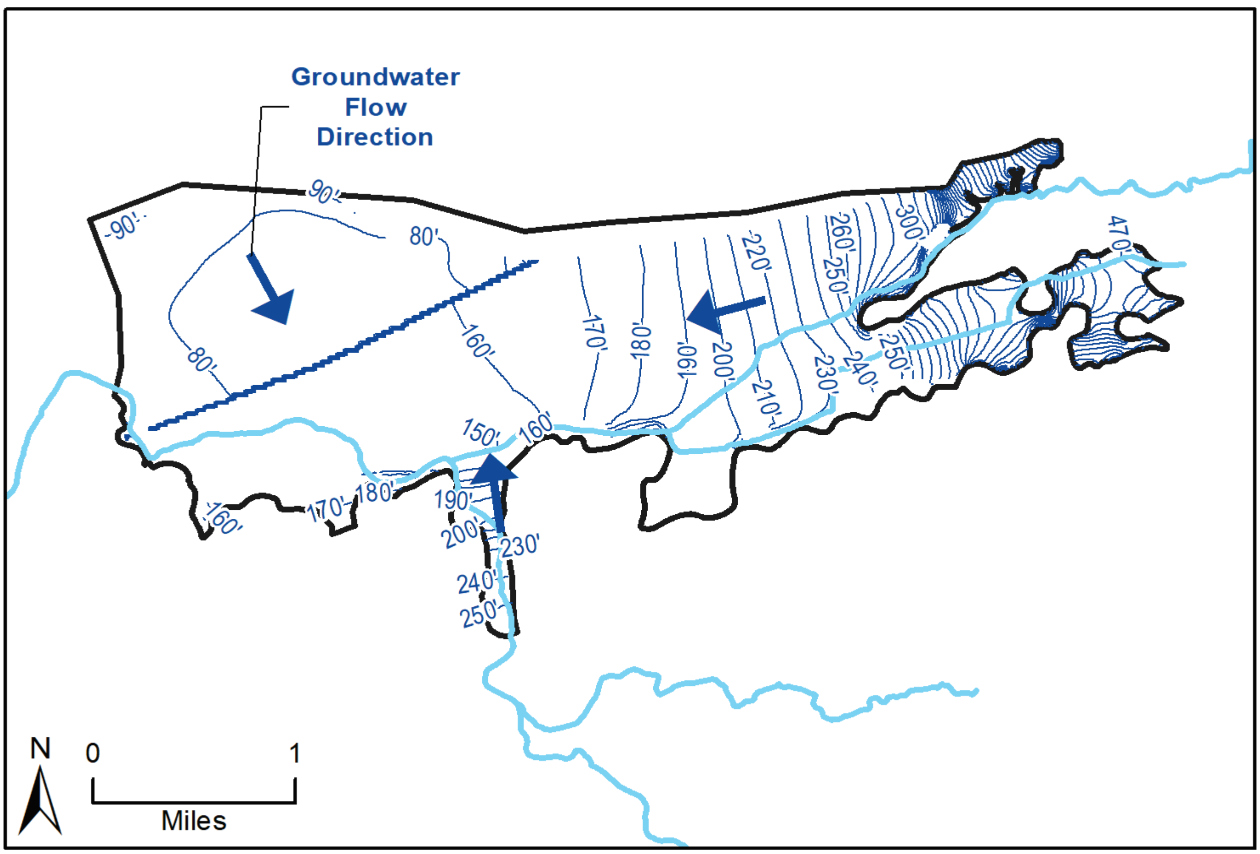

Figure ES-07 **General Groundwater Elevation Contours and Flow Directions.**

generally from an eastern to western direction, but flow from the Hill Canyon area is from the south to north.

To the northwest of the Bailey Fault within the FCGMA, groundwater flow is toward the center of the area. Groundwater levels in the ASRVGB generally fluctuate seasonally with the highest water levels occurring in the winter to early spring and the lowest levels occurring in fall or winter (Figure ES-08). Groundwater levels have generally been slowly declining since the 1990s northwest of the Bailey Fault and overall steady southeast of the Bailey Fault. Groundwater levels have been increasing locally southeast of the Bailey Fault since 2018 due to a significant reduction in Camrosa's pumping due to contamination issues (see well 02N20W25D01S on Figure ES-08). Changes in groundwater storage within the Basin are primarily a function of groundwater pumping. Declines in groundwater storage have been observed in the Basin during prolonged dry conditions; however, the Basin has also shown relatively rapid recovery (particularly southeast of the Bailey Fault) in response to changes in pumping and recharge during wet climate cycles.

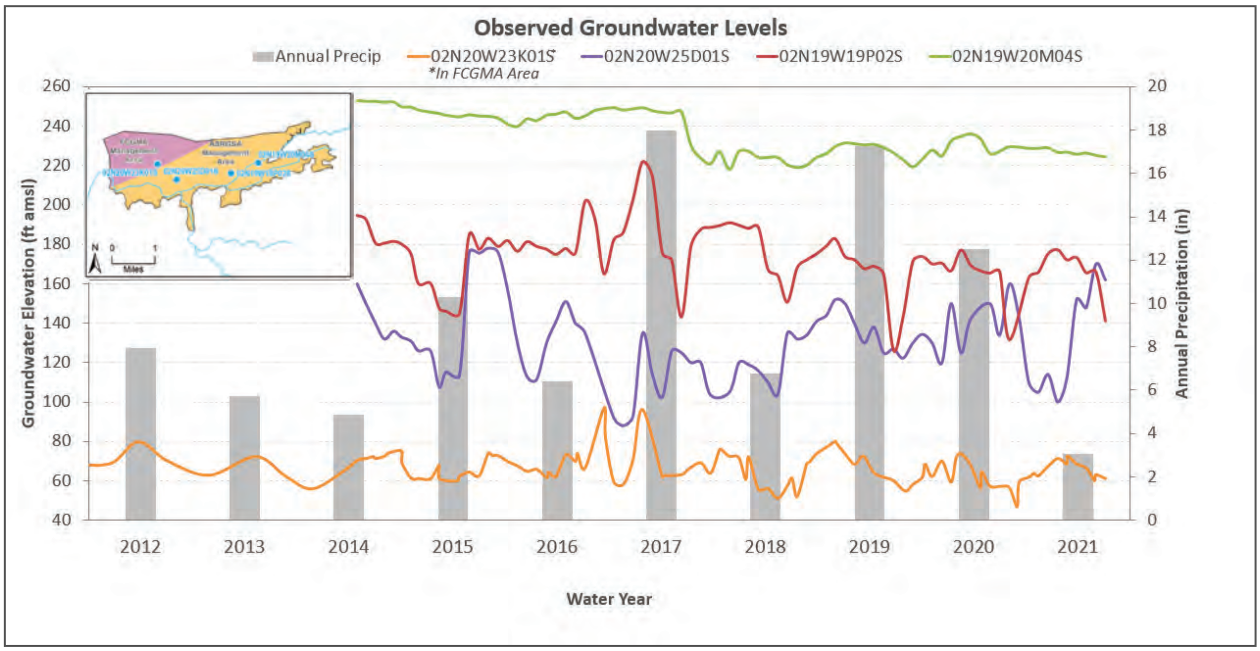

Figure ES-08 **Groundwater Level Seasonal Fluctuations.**

The water quality of the Basin is characterized by elevated nitrate and TDS concentrations, which have been observed in the Basin for several decades. In general, the quality of the groundwater in the ASRVGB is influenced by (a) the leaching of nutrients from fertilizers and manure, (b) percolation of return flows from applied waters and septic system leachate, (c) mineral dissolution, and (d) effluent from the Hill Canyon WWTP. The state-regulated contaminant 1,2,3-trichloropropane (TCP) has also been recently detected within the ASRVGB and has impacted Camrosa WD production wells at levels above the Maximum Contaminant Limit (MCL). There is no known relationship between degraded water quality and groundwater levels or pumping operations within the Basin.

ES-4. Water Budget

The groundwater flow model was used to quantify water budgets for the historical, current, and projected conditions, including the evaluation of uncertainty due to climate change (using climate-change hydrologic datasets provided by DWR), anticipated land use changes, and projected population increase, as required by SGMA (Appendix G). Based on the modeling analysis, the GSAs concluded that these factors are not anticipated to have a material impact on future water demand and the water budgets for the Basin because of land use policies and ordinances that greatly limit the potential for material growth in the Basin (Section 3.3.3). Table ES-01 shows the different demand and supply components for the historical and current water budget of the ASRVGB.

Table ES-01 Estimated Historical Demands and Supplies in the ASRVGB by Category and Source (in acre-feet).

Water Year	Year Type	M&I Demand	Ag Demand	Domestic Demand	Total Demand	M&I GW Supplies‡	Ag GW Supplies*	Domestic GW Supplies	Total GW Supplies	M&I Supplies from Outside ASRVGB**	AG Supplies from Outside ASRVGB†	Total Supplies from Outside ASRVGB	Total Supply
2012	Below Normal	1,964	4,737	2.5	6,703	648	3,160	2.5	3,810	1,316	1,578	2,893	6,703
2013	Critical	2,071	4,837	2.5	6,911	849	3,282	2.5	4,133	1,222	1,556	2,777	6,911
2014	Critical	2,218	5,136	2.5	7,357	865	3,489	2.5	4,357	1,353	1,647	3,000	7,357
2015	Critical	1,725	4,186	2.5	5,914	742	2,829	2.5	3,574	983	1,357	2,340	5,914
2016	Critical	1,724	4,517	2.5	6,243	672	2,886	2.5	3,561	1,051	1,631	2,682	6,243
2017	Above Normal	1,602	3,394	2.5	4,999	865	2,524	2.5	3,392	737	870	1,607	4,999
2018	Below Normal	1,892	3,884	2.5	5,778	984	2,864	2.5	3,850	908	1,020	1,928	5,778
2019	Below Normal	1,625	3,205	2.5	4,832	585	2,307	2.5	2,894	1,040	898	1,938	4,832
2020	Below Normal	1,772	3,557	2.5	5,332	301	2,368	2.5	2,671	1,471	1,190	2,661	5,332
2021	Critical	1,980	3,550	2.5	5,532	238	2,181	2.5	2,421	1,742	1,369	3,111	5,532
Average (2012-2021)		1,885	4,385	2.5	6,272	804	3,005	2.5	3,811	1,081	1,380	2,461	6,272

Notes:

Sums of values may not match averages or totals due to rounding.

* Includes groundwater extracted from all irrigation wells within the ASRVGB.
**Includes both potable and non-potable sources, see Section 3.3.1.1 for additional details.
† Includes non-potable sources, see Section 3.3.1.1 for additional details.
‡ Some groundwater produced for M&I is exported for use outside of the Basin.

The primary sources of groundwater inflow to the ASRVGB were quantified using the numerical model as streamflow percolation, bedrock groundwater inflow from the Conejo volcanics from the south and east, and recharge from infiltration of precipitation and return flows (Figure ES-09).

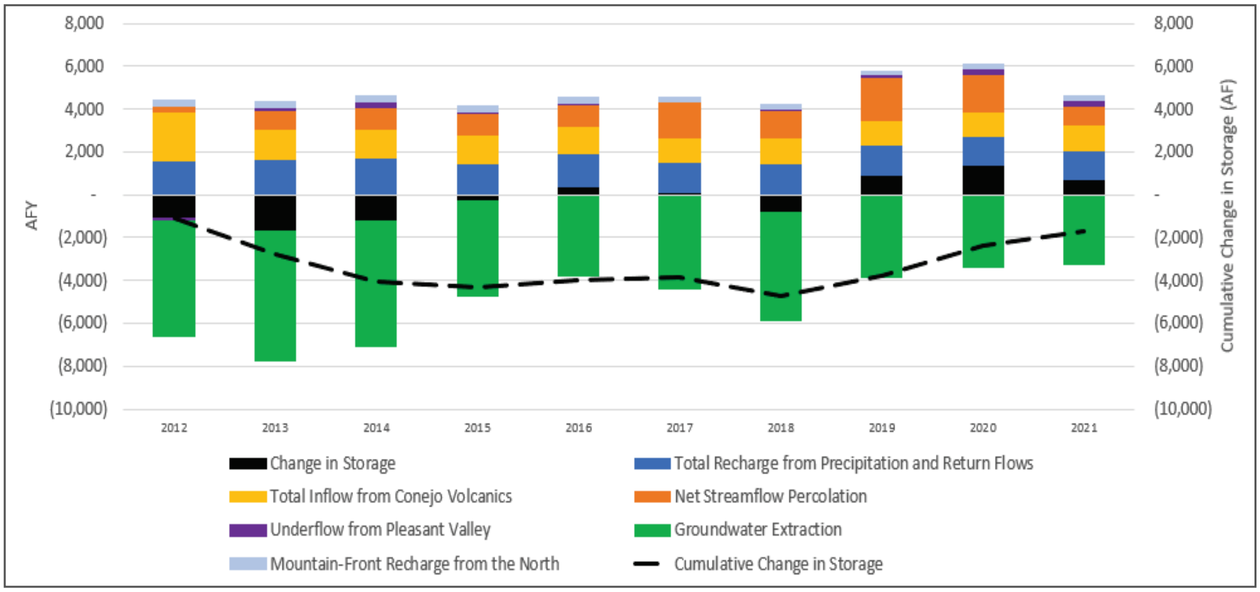

Figure ES-09 Historical and Current Groundwater Inflows and Outflows to/from ASRVGB (acre-feet per year).

Mountain-front recharge from the north was a small inflow component of the groundwater budget. An additional source of inflow includes a minor amount of subsurface inflow from the Pleasant Valley Basin at the western boundary of the ASRVGB; this was derived from the numerical model and there is limited data available to constrain this inflow component. Municipal and Industrial (M&I) pumping constitutes the largest component of groundwater extractions from ASRVGB, followed by agricultural extractions and one domestic well. Overall, groundwater extractions are the largest outflow component for the Basin. The primary source of surface water flows entering the ASRVGB are from the perennial Arroyo Conejo, of which most of the streamflow is sustained by effluent from the Hill Canyon WWTP (see Sections 3.1.1.2 and 3.2.6). Most of the surface water entering the ASRVGB leaves the Basin through Conejo Creek at the western boundary of the Basin, although a portion percolates to the groundwater in the losing reaches of the Arroyo Santa Rosa and the Tributary, Arroyo Conejo, and Conejo Creek.

Table ES-02 summarizes the average total inflows and outflows for the surface water and groundwater budgets for the Basin. Major differences noted in the table are between the historical and current or projected surface water totals; this is due to the historical water budget values average including a historically dry period where flows were consistently low (2012–2016).

Table ES-02 Summary of Average Water Budget Components.

	Surface Water	Groundwater
Historical (2012–2021)		
Total in	16,729	4,493
Total out	-16,729	-4,664
Change in Storage	N/A	-171
Current (2019–2021)		
Total in	21,636	4,565
Total out	-21,636	-3,564
Change in Storage	N/A	1,001

Table ES-02 Summary of Average Water Budget Components.

	Surface Water	Groundwater
Projected (2022–2072)		
Baseline Total in	23,119	5,076
Baseline Total out	-23,120	-5,235
Baseline Change in Storage	N/A	-159
2030 Climate Change Total in	22,592	5,071
2030 Climate Change Total out	-22,592	-5,233
2030 Climate Change in Storage	N/A	-163
2070 Climate Change Total in	22,960	5,072
2070 Climate Change Total out	-22,960	-5,234
2070 Climate Change in Storage	N/A	-162

Note: *All values are acre-feet per year.*

Overdraft Assessment

GSP Emergency Regulations §354.18(b)(5) require quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions if overdraft conditions exist.

Bulletin 118, Update 2003 describes groundwater overdraft as:

> "The condition of a groundwater basin or subbasin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. If overdraft continues for a number of years, significant adverse impacts may occur, including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts."

The water budget results indicate a slight imbalance in the Basin currently and in the future. The annual change in storage is within 10% error in uncertainty of model results, and undesirable results from chronic lowering of groundwater levels have not occurred and are not projected to occur. Numerical model results for the projected water budget also indicate that groundwater levels cyclically recover following droughts. Nonetheless, the GSAs can manage future pumping appropriately through monitoring.

Sustainable Yield

GSP Emergency Regulations §354.18(b)(7) requires an estimate of the sustainable yield for the Basin. Water Code §10721(w) defines "Sustainable yield" as the maximum quantity of water, calculated over a base period representative of long-term conditions in the Basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result.

Modeling results for the future projection period indicate that the projected inflows and outflows will be approximately balanced during the 50-year SGMA implementation period even with climate change considered. Therefore, an estimate of the sustainable yield is the modeled projected groundwater extractions minus the modeled surface water depletions that could potentially cause undesirable results for the depletions of interconnected surface water (ISW) sustainability indicator. This calculation results in an estimated sustainable yield of ~5,300 AFY, depending on climate change assumptions (DWR, 2018).

The projection period (based on historical climate data from 1972-2021) had an average precipitation nearly equal to the overall historical average (1929-2021), so the estimated sustainable yield is representative of the long-term sustainability of the Basin.

Management Areas

Sustainable management of the ASRVGB requires dividing the Basin into two management areas: the area within the FCGMA jurisdictional boundary, and the remaining areas within the Basin managed by ASRGSA (Figure ES-01). These management areas are separated by the Bailey Fault, which acts as a hydraulic barrier between the areas and results in differences in groundwater elevations and groundwater quality.

ES-5. Sustainable Management Criteria

SMC were developed using the best available science and information for the Basin. The GSAs characterized undesirable results and established minimum thresholds, measurable objectives, and interim milestones for each applicable sustainability indicator:

1. Chronic lowering of groundwater levels (Section 4.4).
2. Reduction of groundwater storage (Section 4.5).
3. Degraded water quality (Section 4.7).
4. Land Subsidence (Section 4.8).
5. Depletions of Interconnected Surface Water (Section 4.9).

The seawater intrusion sustainability indicator is not applicable in the Basin because of the significant vertical and horizontal separation between the Basin and the Pacific Ocean.

SMC were developed with input from stakeholders in the Basin. The ASRGSA Board of Directors, FCGMA, and stakeholders reviewed SMC proposals prepared by the GSP consulting team, and presentations were given at Board of Directors meetings and workshops, which included information on SGMA requirements, relevant information from the Basin Setting section, and results of additional analyses completed to support SMC development. Outreach was performed throughout the SMC development process to encourage input on the proposed SMC, including bill stuffers to all Camrosa WD customers, letters to well owners in the Basin, e-mails to the interested parties list, telephone communications with stakeholders, and public notices.

A key part of the SMC development process is defining undesirable results (GSP Emergency Regulations §354.26(a)). The process for defining undesirable results consisted of multiple steps:

1. First, potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects were evaluated and described qualitatively. This was called “qualitative statement of undesirable results.”
2. The qualitative undesirable results statement was then translated into quantitative minimum thresholds at specific monitoring network sites.
3. Lastly, a combination of minimum threshold exceedances representing undesirable results (per GSP Emergency Regulations §354.26(b)(2)) in the Basin was established.

Beneficial users and uses considered during SMC development included municipal and agricultural groundwater beneficial uses and riparian vegetation dependent on surface water. There is also one domestic well in the Basin that was considered. The GSAs concluded there are no groundwater dependent ecosystems (GDEs) in the Basin because the potential GDEs (riparian vegetation along the Arroyo Conejo and Conejo Creek) depend on surface water sourced from wastewater and urban runoff discharges and/or shallow groundwater fed by these discharges (see Sections 3.2.6 and 3.2.7.2), and groundwater production does not occur within the shallow groundwater system. The GSAs do not have jurisdictional authority on land-use, surface water flows, or wastewater discharges from Hill Canyon WWTP that sustain the riparian habitat; hence, the GSP does not address or manage any future changes to surface flows (or beneficial use of the same) from increased recycled water demands or other actions that could decrease the discharge rates. The GSP addresses potential pumping-induced depletions of interconnected surface water by establishing sustainable management criteria that would prevent undesirable results including significant and unreasonable effects on riparian vegetation habitat (Section 4.9). There are currently no active surface water diversions within the Basin. Diversions located downstream of the Basin were considered.

For this GSP and pursuant to GSP Emergency Regulations §354.28(d), a groundwater elevation minimum threshold serves as the metric for the chronic lowering of groundwater levels (Section 4.4), reduction of groundwater storage (Section 4.5), and land subsidence (Section 4.8) sustainability indicators. Adequate evidence demonstrating groundwater levels are a reasonable proxy is presented in Sections 4.4.2, 4.5.2, and 4.8.2.

The GSAs have considered public trust resources in development of this GSP by considering the impacts to ISW and by setting minimum thresholds designed to prevent undesirable results under SGMA.

Chronic Lowering of Groundwater Levels and Reduction of Groundwater Storage. Because groundwater levels and storage are correlated in the ASRVGB, groundwater storage SMC are identical to the chronic lowering of groundwater levels SMC. In addition, SGMA requires that the GSP address potential significant and unreasonable effects that could be caused by pumping during dry periods. The GSAs have developed SMC for the chronic lowering of groundwater levels sustainability indicator to ensure that potential undesirable results related to groundwater extraction are avoided during periods of low groundwater levels and storage. Pursuant to GSP Emergency Regulations §354.28(c)(1), depletion of supply effects on beneficial users and effects on other sustainability indicators were considered when developing the minimum thresholds.

The groundwater level and storage minimum thresholds were selected to prevent potential significant and unreasonable effects, including causing beneficial users to be unable to meet their basic water supply needs with either groundwater or delivered water supplies. It was concluded that potential significant and unreasonable effects may occur if pumping causes groundwater levels to decline below historical low levels because available historical information indicates that undesirable results were not encountered historically. Therefore, minimum thresholds were selected based on the historical low groundwater levels in the monitoring wells (Figure ES-10).

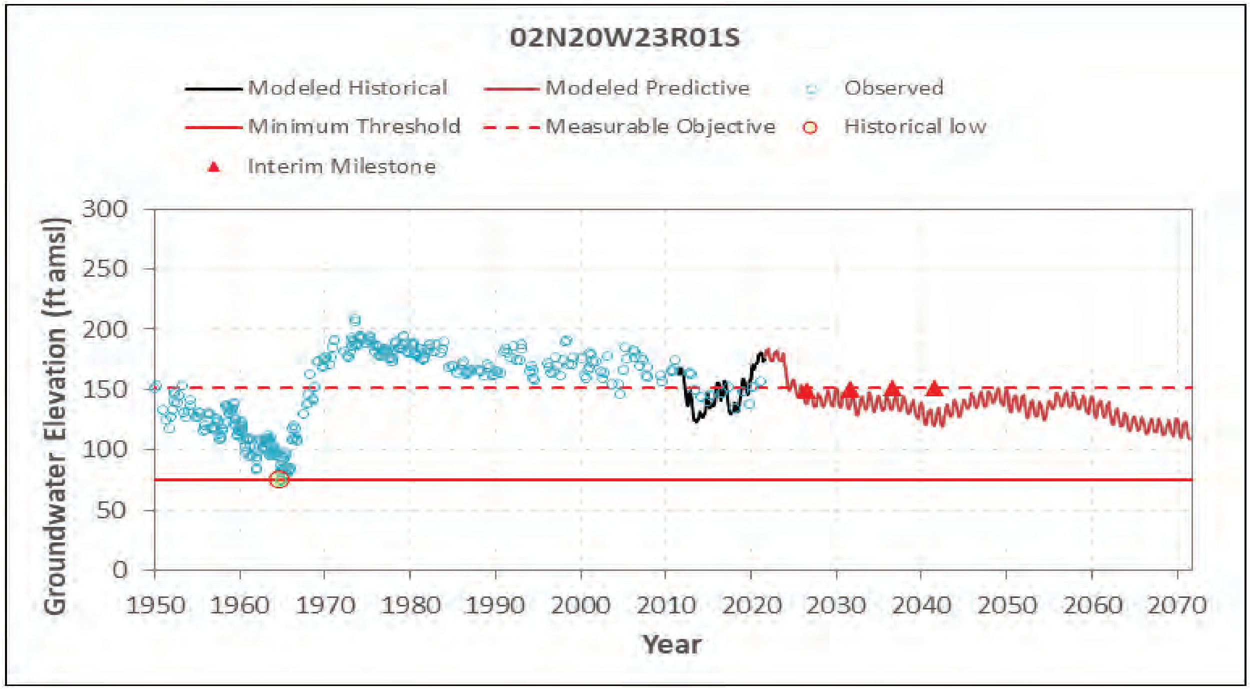

Figure ES-10 Example Minimum Threshold and Measurable Objective for Groundwater Level and Storage Sustainability Indicator.

The combination of minimum threshold exceedances that is deemed to cause significant and unreasonable effects in the Basin for chronic lowering of groundwater levels and depletion of groundwater storage in more than 50% of the groundwater level monitoring sites for either management area for two successive years (Figure ES-11). Two years is a reasonable duration to confirm that any minimum threshold exceedances are not due to seasonal variability or a short-term aberration. If this combination of minimum threshold exceedances occurs, the GSAs will assess whether the minimum threshold exceedances were caused by groundwater extraction.

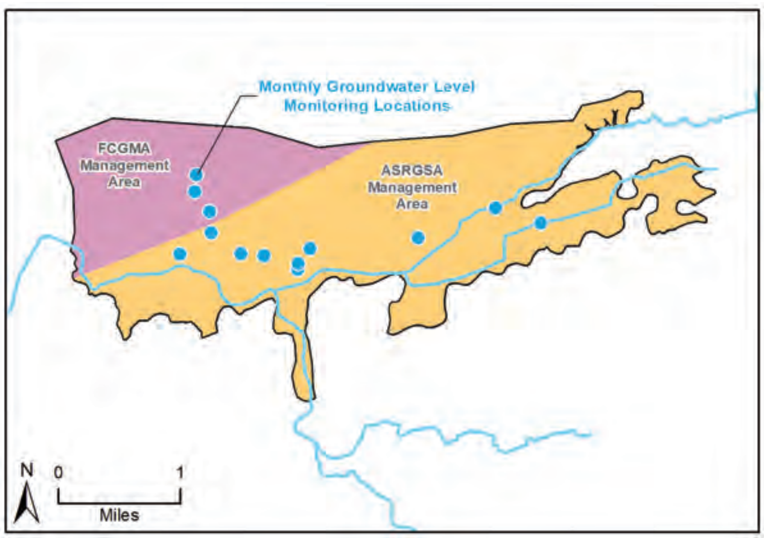

Figure ES-11 Groundwater Level Monitoring Well Locations.

The groundwater level and storage measurable objectives were developed by applying the concept of providing a reasonable margin of operational flexibility under adverse conditions (GSP Emergency Regulations §354.30(c)). Adverse conditions for the ASRVGB include drought-phases of the long-term climatic-driven groundwater level cycles. The reasonable margin of operational flexibility was determined to be groundwater levels from the 50-year modeled projection that are sufficiently high to prevent levels from dropping below the minimum thresholds. The measurable objectives were developed for each monitoring site by evaluating the modeled groundwater level data for the projected period and are intended to apply following wet periods. Failure to meet the measurable objectives during other times shall not be considered failure to sustainably manage the Basin.

Degraded Water Quality. GSP Emergency Regulations 354.28(c)(4) requires GSAs to address significant and unreasonable impacts on beneficial uses caused by groundwater pumping or projects or GSP projects/management actions that spread contaminant plumes or cause dissolved constituent concentrations to increase to levels that significantly and unreasonably impact beneficial uses. The key aspect of the regulation is causation – plume spreading or concentration increases are only significant and unreasonable under SGMA if caused by groundwater pumping or the GSA's implementation of project or management actions.

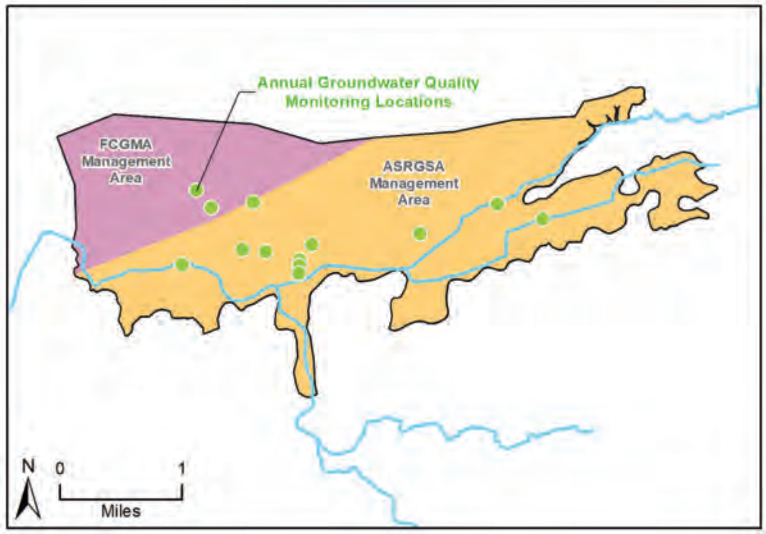

Figure ES-12 Groundwater Quality Monitoring Well Locations.

There are no identified contaminant plumes from point sources in the Basin, and available monitoring well data (Figure ES-12) indicate that concentrations of naturally occurring constituents (indicator constituents include TDS, sulfate, and boron) are controlled by the quality of surface water flowing into the Basin via the Arroyo Conejo, not groundwater pumping.

Nitrate and TCP – non-point source contaminants from above-ground sources and land use – have impacted Camrosa's public supply wells. Elevated concentrations have been mitigated by blending with purchased imported water; however, the low MCL for TCP (5 nanograms per liter [ng/L]) now requires treatment via a granular activated carbon (GAC) treatment plant that is currently under construction. Given the treatment methods in place for nitrate and TCP, SMC were developed specific to these constituents to address feasibility of treatment to drinking water quality standards.

SGMA undesirable results are considered to occur when the average concentration for all representative monitoring wells in either management areas exceed the minimum threshold concentration for a constituent for two consecutive years. Two years is a reasonable duration to confirm that any minimum threshold exceedances are not due to seasonal variability or a short-term aberration.

The degraded water quality measurable objectives are set equal to the minimum thresholds for all constituents to reflect the fact that the GSAs have no ability to improve water quality by managing groundwater pumping due to the lack of a causal relationship between pumping and groundwater quality. SGMA also provides for setting measurable objectives at levels for the purpose of improving conditions, but failure to achieve those measurable objectives is not grounds for a DWR inadequacy determination (§354.30(g)); therefore, a secondary measurable objective for each constituent was established to represent an aspirational goal to improve water quality within the Basin (Table ES-03). The secondary measurable objectives are set at the RWQCB Water Quality Objective (WQO) (TDS, and chloride), MCL (nitrate and TCP), or the upper bound of existing data if existing concentrations are already below the WQO (sulfate and boron) – the latter representing an aspirational goal to not degrade existing water quality for those constituents. Setting the secondary, "aspirational" measurable objectives contributes to achieving the second part of the sustainability goal: "*…The GSAs also desire to collaborate with other agencies and stakeholders within the basin to improve the groundwater quality of the ASRVGB.*" If the minimum threshold or measurable objective is exceeded, the GSAs will investigate to determine if the exceedance is caused by pumping, a GSP project, or a GSP management action.

Table ES-03 Sustainable Management Criteria for the Degradation of Water Quality.

Constituent	MT (mg/L)	MT Rationale	MO (mg/L)	MO Rationale	Secondary MO (mg/L)
Nitrate (as N)	23.4	Preserve ability to blend with imported water for potable uses. Reduce reliance on imported water for blending.	23.4	Preserve ability to blend with imported water for potable uses. Reduce reliance on imported water for blending.	10
TCP	250 (ng/L)	Practical limit of concentration for economical carbon change-out frequency of the GAC system.	250 (ng/L)	Practical limit of concentration for economical carbon change-out frequency of the GAC system.	5 (ng/L)
TDS	1,040	Prevent further degradation of water quality for all beneficial uses.	1,040	Prevent further degradation of water quality for all beneficial uses consistent with RWQCB WQO.	900
Sulfate	300	Preserve existing water quality consistent with RWQCB WQO.	300	Preserve existing water quality.	225
Chloride	180	Prevent further degradation of water quality for agricultural beneficial use.	180	Prevent further degradation of water quality for agricultural beneficial use consistent with RWQCB WQO.	150
Boron	1	Preserve existing water quality for agricultural beneficial use.	1	Preserve existing water quality for agricultural beneficial use.	0.4

Land Subsidence. No land subsidence has been documented historically in the Basin, and the Basin is considered to have a low estimated potential for inelastic land subsidence. Although numerical modeling for the water budget suggests that future groundwater levels will remain above historical low levels (which would prevent inelastic subsidence due to groundwater extraction), sustainable management is prudent because groundwater levels could decline below historical levels and trigger inelastic land subsidence if actual future conditions differ significantly from those assumed in the projected water budget analysis.

GSP Emergency Regulation §354.28(d) allows the use of groundwater levels as a proxy for other sustainability indicators if a significant correlation between groundwater elevations and the other sustainability indicators can be demonstrated. The preconsolidation stress, the effective stress threshold at which inelastic compaction begins, generally is exceeded when groundwater levels decline past historical low levels (California Water Foundation, 2014). Therefore, groundwater levels are an appropriate proxy for monitoring inelastic land subsidence due to groundwater extraction, and the SMC for the chronic lowering of groundwater levels and reduction of groundwater storage sustainability indicators are used for the land subsidence sustainability indicator. In addition to using groundwater levels as a proxy, InSAR data will be reviewed annually, and to determine whether InSAR-indicated land surface elevation changes were caused by groundwater conditions, InSAR data will only be considered when groundwater levels are below historical low levels.

Depletions of Interconnected Surface Water. The Arroyo Conejo and Conejo Creek stream system has primarily losing conditions; however, it is perennial due to the constant source of water from the Hill Canyon WWTP effluent and additional surface water flow from the North and South Fork Arroyo Conejo streams that drain Conejo Valley. The Arroyo Conejo and Conejo Creek are interconnected with the shallow groundwater in the Basin. SMC have been developed for the depletions of ISW sustainability indicator to ensure that potential undesirable results related to groundwater extraction are avoided.

There are two different types of ISW depletion that can potentially affect beneficial uses: direct and indirect depletion. Direct depletion occurs when the cone of depression in the water table from pumping wells near the stream system induces surface water flow directly into the well. Direct depletion is primarily associated with the pumping wells located adjacent to the Arroyo Conejo and Conejo Creek. Indirect depletion is caused by wells located away from the stream system that do not have cones of depression that intersect the streambed. Currently, there are few wells located close enough to interconnected stream reaches to cause significant direct depletion. Indirect depletion of surface water is related to groundwater levels and storage because indirect depletion occurs as a result of the regional groundwater gradient relative to the stream location. Depletion amounts were quantified based on numerical modeling results, and the minimum threshold for depletions of ISW includes both direct and indirect depletion.

Within the Basin there is riparian vegetation dependent on surface water, but no diversions for municipal or agricultural supply. ISW depletion effects on surface water diversions downstream of the Basin boundary were evaluated by reviewing projected depletion rates estimated using the numerical model. Beneficial users relying on surface water diversions from the Conejo Creek downstream have historically met their demands and streamflow bypass requirements (i.e., there have been no reported instances when a beneficial user was unable to meet their water supply needs) and no undesirable results have been documented. Additionally, through engagement with stakeholders and the GSAs, there has not been any evidence presenting impacts to interconnected streamflow; therefore, it was concluded that significant and unreasonable effects have not occurred historically with respect to the ISW sustainability indicator for agricultural, municipal, or domestic beneficial uses, but could potentially occur if groundwater levels decline below historically low levels in the future. Furthermore, any beneficial uses or users located upstream or downstream of the diversions have been protected historically based on the absence of documented impacts. The GSAs determined that the small rates of ISW depletion quantified using the numerical model are neither significant nor unreasonable with respect to the surface water diversions downstream of the Basin boundary.

As discussed above, adverse impacts have not been documented to occur historically; therefore, undesirable results are not expected to occur as long as future depletions do not exceed the maximum historical depletion rate. The maximum historical depletion rate (including both the direct and potential indirect depletion) within the Basin was evaluated using the numerical model results for groundwater level and storage historical lows and was calculated to be 1,150 AFY (~1.6 cfs). Only one ISW depletion minimum threshold is identified in the GSP; therefore, any minimum threshold exceedance is considered to constitute undesirable results for the Basin. The ISW depletion measurable objective is the same as the minimum threshold.

ES-6. Monitoring Networks

The GSP Emergency Regulations require monitoring networks be developed to collect data of sufficient quality, frequency, and spatial distribution to characterize groundwater and related surface water conditions in the Basin, evaluate changing conditions that occur during implementation of the GSP, and for implementation of the SMC for the Basin. Monitoring networks should accomplish the following (§354.34(b)):

- Demonstrate progress toward achieving measurable objectives described in the GSP.
- Monitor impacts to the beneficial uses and users of groundwater.
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.
- Quantify annual changes in water budget components.

Groundwater Levels and Storage Monitoring Network. Groundwater levels are currently monitored in 14 wells across the Basin by Camrosa WD and Ventura County Watershed Protection District (VCWPD) (Figure ES-11).

Groundwater Quality Monitoring Network. Groundwater quality is currently regularly analyzed in 14 wells (Figure ES-12), 5 of which are public supply wells and are sampled in accordance with State of California Division of Drinking Water (DDW) requirements. All wells are sampled for parameters relevant to the degraded water quality SMC (TDS, sulfate, chloride, boron, nitrate, and TCP [Camrosa water supply wells only]) among other analytes useful for tracking water quality (i.e., common ions, etc.).

Land Subsidence Monitoring: Groundwater levels will be used as a proxy to detect and monitor the potential onset of inelastic land subsidence that may result from future groundwater extractions in the Basin (i.e., if groundwater elevations decline below historical low levels). To ensure the best available data is used for monitoring land subsidence, InSAR data will be utilized when groundwater levels are below historical lows.

Streamflow Monitoring. Two active surface water flow gages (gage 800 and Confluence Flume) are maintained by other entities (CCWTMP and Hill Canyon WWTP) (Figure ES-04): gage 800 provides continuous monitoring of streamflow for the Conejo Creek outflow from the Basin, and the Confluence Flume provides streamflow data for the Arroyo Conejo during the summer months. The Arroyo Conejo and Conejo Creek are part of the same surface water system and are a continuous source of streamflow infiltration into the Basin due to effluent from the Hill Canyon WWTP and surface water outflows from the Conejo Valley to the south.

Pursuant to §352.6, monitoring data will be stored in the GSAs' Data Management System. Data will be transmitted to DWR with the GSP, annual reports, and GSP updates electronically on the forms provided by DWR.

ES-7. Projects and Management Actions

The 50-year future modeling projections developed for the projected water budget suggest that the measurable objectives for the applicable sustainability indicators will be met without the need for projects or management actions. However, projects are included to respond to potential changing conditions in the Basin:

- **Groundwater Monitoring Network Enhancement Project**: This project will consist of a survey of the monitoring network wells within the Basin to address GSP Emergency Regulations §352.4 monitoring network data and reporting standards, and potential research of areas of limited coverage to assess the expansion of the monitoring network using existing wells.

- **Water Quality Management Coordination**: This project will consist of coordinating with and supporting the actions of other entities in their efforts to manage and improve groundwater quality in the Basin. These entities include the Camrosa WD, Ventura County (land use, well permitting, agricultural irrigators), the State Municipal Stormwater Program (MS4), the CCWTMP, and the City of Thousand Oaks.
- **Arroyo Santa Rosa Basin Desalter Project**: This project will consist of the construction and operation of a desalter plant for Camrosa WD groundwater production. Desalination of groundwater is a preferred water treatment that would allow Camrosa WD to discontinue their blending operations and significantly reduce their reliance on imported water, in addition to the GSP sustainability goal to "improve the groundwater quality of the ASRVGB." Camrosa WD is currently in the early planning stages for the desalter; therefore, the project yield and other key parameters have not yet been determined.
- **Arroyo Santa Rosa Basin Recharge Project**: This project will consist of numerical modeling and field-scale pilot testing to validate model results, followed by the construction of recharge ponds and a delivery system within the Basin. Camrosa WD is currently in the early planning stages for the recharge project; therefore, the project yield and other key parameters have not yet been determined.

ES-8. Plan Implementation

Implementation of the GSP requires robust administrative and financial structures, with adequate human resources to ensure compliance with SGMA. The activities associated with the GSP implementation are:

1. Agency administration.
2. Legal counsel.
3. Outreach and coordination.
4. Monitoring (groundwater levels, groundwater quality, and surface water).
5. Annual reporting.
6. Developing projects and management actions.
7. Updating the groundwater model.
8. Assessing/updating the GSP every 5 years.
9. Responding to DWR comments.

Estimated costs for the GSP implementation were developed based on the scope items listed above assuming 3% annual cost increases and a 5% contingency. Based on these factors, the estimated total cost of the GSP Implementation over the 20-year planning horizon is $6.21 million. The total estimated cost through the first 5-year assessment is $1.23 million. The estimated costs are based on the best available information at the time of Plan preparation and submittal. It represents the GSA's current understanding of Basin conditions and the current roles and responsibilities of the GSAs under SGMA. The GSAs will coordinate with other entities in the watershed to reduce or eliminate duplicative activities. If any GSP implementation activities are performed by others in the future, the costs for those activities will be removed from the GSP implementation budget at that time.

Funding for FCGMA GSP implementation will be obtained from a groundwater extraction fee implemented pursuant to FCGMA's non-SGMA and SMGA authorities. ASRGSA is currently funded by contributions from its member agencies (Camrosa WD and the County of Ventura). Other funding options may be evaluated over time as the GSP implementation progresses. ASRGSA obtained a $177,081 Proposition 1 Sustainable Groundwater Planning Grant from DWR to fund, in part, development of the GSP. The GSAs will seek additional grants for GSP implementation, although, to be conservative, the budget assumes no additional grant funding.

Key GSP implementation schedule items are as follows:

- GSP adoption by the GSAs in late May 2023 for submittal to DWR in June 2023.
- Most of the budget categories consist of ongoing tasks and efforts that will be conducted throughout GSP implementation (i.e., administration, coordination, outreach, monitoring, etc.).
- GSP reporting will occur on an annual basis following the submittal of the GSP, with reports for the preceding water year due to DWR by April 1.
- Periodic evaluations (every 5 years) and any associated GSP amendments will be submitted to DWR by April 1 at least every 5 years (no later than 2028, 2033, 2038, and 2043).
- The schedule the Groundwater Monitoring Network Enhancement and Water Quality Management Coordination Projects is expected to begin during the initial 5-year implementation period, and schedules for the Desalter and Basin Recharge Projects will be developed as part of preliminary project planning.

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Acronyms and Abbreviations

AFY	acre-feet per year
amsl	above mean sea level
ASR	aquifer storage and recovery
ASRGSA	Arroyo Santa Rosa Basin Groundwater Sustainability Agency
ASRVGB	Arroyo Santa Rosa Valley Groundwater Basin
Basin	Arroyo Santa Rosa Valley Groundwater Basin
BMPs	best-management practices
CALVEG	Classification and Assessment with Landsat of Visible Ecological Groupings
Camrosa WD or Camrosa	Camrosa Water District
CASGEM	California Statewide Groundwater Elevation Monitoring
CCP	Conejo Creek Project
CCR	California Code of Regulations
CCWTMP	Calleguas Creek Watershed TMDL Compliance Monitoring Program
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CGS	California Geological Survey
CMWD	Calleguas Municipal Water District
County	County of Ventura
CRWP	Colorado River Water Project
CWRF	Camrosa Water Reclamation Facility
DBCP	dibromochloropropane
DDW	State of California Division of Drinking Water
DEM	digital elevation model
DMS	Data Management System
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EDB	ethylene dibromide
ENSO	El Nino/Southern Oscillation
ET	Evapotranspiration
EWRIMS	SWRCB Electronic Water Rights Information Management System
FCGMA	Fox Canyon Groundwater Management Agency
ft	feet
GAC	granular activated carbon
GAMA	Groundwater Ambient Monitoring and Assessment
GDEs	groundwater dependent ecosystems
GIS	geographic information system
gpm/ft	gallons pr minute per foot
GPS	global positioning system
GSA	Groundwater Sustainability Agency
GSAs	Arroyo Santa Rosa Basin Groundwater Sustainability Agency and the Fox Canyon Groundwater Management Agency
GSP	Groundwater Sustainability Plan
HCM	hydrogeologic conceptual model
HSUs	Hydrostratigraphic Units

iGDEs	indicators of groundwater dependent ecosystems
InSAR	interferometric synthetic aperture radar
IRWMP	Integrated Regional Water Management Plan
IRWMP	Integrated Regional Water Management Plan
ISW	interconnected surface water
JPA	joint exercise of powers agreement
LARWQCB	Los Angeles Regional Water Quality Control Board
M&I	Municipal and Industrial
MCL.	Maximum Contaminant Limit
mg/L	milligrams per liter
mm	millimeters
MS4	Municipal Separate Storm Sewer System
NAVD88	North American Vertical Datum of 1988
NCCAG	Natural Communities Commonly Associated with Groundwater
ng/L	nanograms per liter
ng/L	nanograms per liter
NPDES	National Pollutant Discharge Elimination System
PCOC	potential contaminant of concern
PDO	Pacific Decadal Oscillation
PFAS	polyfluoroalkyl substances
PMOC	potential media of concern
ppt	parts per trillion
PVCWD	Pleasant Valley County Water District
RWQCB	Regional Water Quality Control Board
SEP	Stakeholder Engagement Plan
SGMA	Sustainable Groundwater Management Act
SMC	sustainable management criteria
SOAR	Save Open Space & Agricultural Resources
SWP	State Water Project
SWRCB	State Water Resources Control Board
TCP	1,2,3-trichloropropane
TDS	total dissolved solids
TMDL	total maximum daily load
TNC	The Nature Conservancy
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UWCD	United Water Conservation District
VCWPD	Ventura County Watershed Protection District
WQO	Water Quality Objective
WWTP	Wastewater Treatment Plant

Definitions of Key SGMA Terms

California Water Code

Sec. 10721

Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) **Adjudication action** means an action filed in the superior or federal district court to determine the rights to extract groundwater from a basin or store water within a basin, including, but not limited to, actions to quiet title respecting rights to extract or store groundwater or an action brought to impose a physical solution on a basin.

(b) **Basin** means a groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Chapter 3 (commencing with Section 10722).

(c) **Bulletin 118** means the department's report entitled California's Groundwater: Bulletin 118 updated in 2003, as it may be subsequently updated or revised in accordance with Section 12924.

(d) **Coordination agreement** means a legal agreement adopted between two or more groundwater sustainability agencies that provides the basis for coordinating multiple agencies or groundwater sustainability plans within a basin pursuant to this part.

(e) **De minimis extractor** means a person who extracts, for domestic purposes, two acre-feet or less per year.

(f) **Governing body** means the legislative body of a groundwater sustainability agency.

(g) **Groundwater** means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels.

(h) **Groundwater extraction facility** means a device or method for extracting groundwater from within a basin.

(i) **Groundwater recharge or recharge** means the augmentation of groundwater, by natural or artificial means.

(j) **Groundwater sustainability agency** means one or more local agencies that implement the provisions of this part. For purposes of imposing fees pursuant to Chapter 8 (commencing with Section 10730) or taking action to enforce a groundwater sustainability plan, groundwater sustainability agency also means each local agency comprising the groundwater sustainability agency if the plan authorizes separate agency action.

(k) **Groundwater sustainability plan or plan** means a plan of a groundwater sustainability agency proposed or adopted pursuant to this part.

(l) **Groundwater sustainability program** means a coordinated and ongoing activity undertaken to benefit a basin, pursuant to a groundwater sustainability plan.

(m) **In-lieu use** means the use of surface water by persons that could otherwise extract groundwater in order to leave groundwater in the basin.

(n) **Local agency** means a local public agency that has water supply, water management, or land use responsibilities within a groundwater basin.

(o) **Operator** means a person operating a groundwater extraction facility. The owner of a groundwater extraction facility shall be conclusively presumed to be the operator unless a satisfactory showing is made to the governing body of the groundwater sustainability agency that the groundwater extraction facility actually is operated by some other person.

(p) **Owner** means a person owning a groundwater extraction facility or an interest in a groundwater extraction facility other than a lien to secure the payment of a debt or other obligation.

(q) **Personal information** has the same meaning as defined in Section 1798.3 of the Civil Code.

(r) **Planning and implementation horizon** means a 50-year time period over which a groundwater sustainability agency determines that plans and measures will be implemented in a basin to ensure that the basin is operated within its sustainable yield.

(s) **Public water system** has the same meaning as defined in Section 116275 of the Health and Safety Code.

(t) **Recharge area** means the area that supplies water to an aquifer in a groundwater basin.

(u) **Sustainability goal** means the existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin is operated within its sustainable yield.

(v) **Sustainable groundwater management** means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.

(w) **Sustainable yield** means the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result.

(x) **Undesirable result** means one or more of the following effects caused by groundwater conditions occurring throughout the basin:

(1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.

(2) Significant and unreasonable reduction of groundwater storage.

(3) Significant and unreasonable seawater intrusion.

(4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.

(5) Significant and unreasonable land subsidence that substantially interferes with surface land uses.

(6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

(y) Water budget means an accounting of the total groundwater and surface water entering and leaving a basin including the changes in the amount of water stored.

(z) Watermaster means a watermaster appointed by a court or pursuant to other law.

(aa) Water year means the period from October 1 through the following September 30,

inclusive.

(ab) Wellhead protection area means the surface and subsurface area surrounding a water well or well field that supplies a public water system through which contaminants are reasonably likely to migrate toward the water well or well field.

Official California Code of Regulations
Title 23. Waters
Division 2. Department of Water Resources
Chapter 1.5. Groundwater Management
Subchapter 2. Groundwater Sustainability Plans
Article 2. Definitions

23 CCR § 351

§ 351. Definitions.

The definitions in the Sustainable Groundwater Management Act, Bulletin 118, and Subchapter 1 of this Chapter, shall apply to these regulations. In the event of conflicting definitions, the definitions in the Act govern the meanings in this Subchapter. In addition, the following terms used in this Subchapter have the following meanings:

(a) “Agency” refers to a groundwater sustainability agency as defined in the Act.

(b) “Agricultural water management plan” refers to a plan adopted pursuant to the Agricultural Water Management Planning Act as described in Part 2.8 of Division 6 of the Water Code, commencing with Section 10800 et seq.

(c) “Alternative” refers to an alternative to a Plan described in Water Code Section 10733.6.

(d) “Annual report” refers to the report required by Water Code Section 10728.

(e) “Baseline” or “baseline conditions” refer to historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin.

(f) “Basin” means a groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Water Code 10722 et seq.

(g) “Basin setting” refers to the information about the physical setting, characteristics, and current conditions of the basin as described by the Agency in the hydrogeologic conceptual model, the groundwater conditions, and the water budget, pursuant to Subarticle 2 of Article 5.

(h) “Best available science” refers to the use of sufficient and credible information and data, specific to the decision being made and the time frame available for making that decision, that is consistent with scientific and engineering professional standards of practice.

(i) “Best management practice” refers to a practice, or combination of practices, that are designed to achieve sustainable groundwater management and have been determined to be technologically and economically effective, practicable, and based on best available science.

(j) “Board” refers to the State Water Resources Control Board.

(k) “CASGEM” refers to the California Statewide Groundwater Elevation Monitoring Program developed by the Department pursuant to Water Code Section 10920 et seq., or as amended.

(l) “Data gap” refers to a lack of information that significantly affects the understanding of the basin setting or evaluation of the efficacy of Plan implementation, and could limit the ability to assess whether a basin is being sustainably managed.

(m) “Groundwater dependent ecosystem” refers to ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.

(n) “Groundwater flow” refers to the volume and direction of groundwater movement into, out of, or throughout a basin.

(o) “Interconnected surface water” refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted.

(p) “Interested parties” refers to persons and entities on the list of interested persons established by the Agency pursuant to Water Code Section 10723.4.

(q) “Interim milestone” refers to a target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan.

(r) “Management area” refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors.

(s) “Measurable objectives” refer to specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin.

(t) “Minimum threshold” refers to a numeric value for each sustainability indicator used to define undesirable results.

(u) “NAD83” refers to the North American Datum of 1983 computed by the National Geodetic Survey, or as modified.

(v) “NAVD88” refers to the North American Vertical Datum of 1988 computed by the National Geodetic Survey, or as modified.

(w) “Plain language” means language that the intended audience can readily understand and use because that language is concise, well-organized, uses simple vocabulary, avoids excessive acronyms and technical language, and follows other best practices of plain language writing.

(x) “Plan” refers to a groundwater sustainability plan as defined in the Act.

(y) “Plan implementation” refers to an Agency's exercise of the powers and authorities described in the Act, which commences after an Agency adopts and submits a Plan or Alternative to the Department and begins exercising such powers and authorities.

(z) “Plan manager” is an employee or authorized representative of an Agency, or Agencies, appointed through a coordination agreement or other agreement, who has been delegated management authority for submitting the Plan and serving as the point of contact between the Agency and the Department.

(aa) “Principal aquifers” refer to aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems.

(ab) “Reference point” refers to a permanent, stationary and readily identifiable mark or point on a well, such as the top of casing, from which groundwater level measurements are taken, or other monitoring site.

(ac) “Representative monitoring” refers to a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin.

(ad) “Seasonal high” refers to the highest annual static groundwater elevation that is typically measured in the Spring and associated with stable aquifer conditions following a period of lowest annual groundwater demand.

(ae) “Seasonal low” refers to the lowest annual static groundwater elevation that is typically measured in the Summer or Fall, and associated with a period of stable aquifer conditions following a period of highest annual groundwater demand.

(af) “Seawater intrusion” refers to the advancement of seawater into a groundwater supply that results in degradation of water quality in the basin, and includes seawater from any source.

(ag) “Statutory deadline” refers to the date by which an Agency must be managing a basin pursuant to an adopted Plan, as described in Water Code Sections 10720.7 or 10722.4.

(ah) “Sustainability indicator” refers to any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results, as described in Water Code Section 10721(x).

(ai) “Uncertainty” refers to a lack of understanding of the basin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed.

(aj) “Urban water management plan” refers to a plan adopted pursuant to the Urban Water Management Planning Act as described in Part 2.6 of Division 6 of the Water Code, commencing with Section 10610 et seq.

(ak) “Water source type” represents the source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface water sources identified as Central Valley Project, the State Water Project, the Colorado River Project, local supplies, and local imported supplies.

(al) “Water use sector” refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation.

(am) “Water year” refers to the period from October 1 through the following September 30, inclusive, as defined in the Act.

(an) “Water year type” refers to the classification provided by the Department to assess the amount of annual precipitation in a basin.

1.0 Introduction to Plan Contents [Article 5 §354]

§354 Introduction to Plan Contents. *This Article describes the required contents of Plans submitted to the Department for evaluation, including administrative information, a description of the basin setting, sustainable management criteria, description of the monitoring network, and projects and management actions.*

In 2014, the State of California enacted the Sustainable Groundwater Management Act (SGMA). This law requires groundwater basins in California that are designated as medium or high priority be managed sustainably. Satisfying the requirements of SGMA generally requires five basic activities:

1. Form one or multiple Groundwater Sustainability Agency(s) (GSAs) to fully cover the basin;
2. Develop one or more Groundwater Sustainability Plan(s) (GSPs) that fully cover the basin;
3. Implement the GSP to achieve sustainable groundwater management;
4. Annual reporting to the California Department of Water Resources (DWR); and
5. Prepare and submit a written assessment of the GSP at least every 5 years to DWR and amend the GSP as necessary.

This GSP addresses the Arroyo Santa Rosa Valley Groundwater Basin (DWR Basin 4-007; ASRVGB or Basin), which is managed jointly by the Arroyo Santa Rosa Basin Groundwater Sustainability Agency (ASRGSA) and the Fox Canyon Groundwater Management Agency (FCGMA). The Basin is located in southeastern Ventura County, north of the City of Thousand Oaks (Figure 1.0-01). ASRGSA is the GSA for the portion of the Basin located east of the Bailey Fault, and FCGMA is the GSA for the portion of the Basin within its jurisdictional boundary, which is the portion of the Basin west of the Bailey Fault (collectively referred to as "the GSAs"). DWR prioritized the Basin as very low, and the GSAs are developing this GSP to undertake management of the Basin voluntarily as is provided for in Water Code § 10720.7 (b).

This GSP provides administrative information, describes the Basin setting, develops quantitative sustainable management criteria (SMC) that consider the interests of all beneficial uses and users of groundwater, identifies projects and management actions and monitoring networks that will ensure the Basin is demonstrably managed in a sustainable manner no later than the 20-year sustainability timeframe (2043) and for the duration of the entire 50-year planning and implementation horizon (2073).

Following submittal of initial notifications from ASRGSA and FCGMA on May 14, 2018, and February 24, 2017, respectively (Appendix A), the GSP was developed to comply with SGMA's statutory and regulatory requirements. As such, the GSP uses the terminology set forth in these requirements (see e.g., Water Code § 10721 and 23 California Code of Regulations (CCR) §351), which is oftentimes different from the terminology utilized in other contexts (e.g., past reports or studies, past analyses, judicial rules, or findings). The definitions from the relevant statutes and regulations are provided in the section titled "Definitions of Key SGMA Terms," provided in preface to this GSP.

The GSP includes all of the required elements of the GSP Emergency Regulations (see Appendix B), organized into eight sections plus tables, figures, and appendices. Each section contains a blue text box at the beginning stating the exact CCR Article text relevant to the section's content.

The GSP sections are organized as follows:

- **Executive Summary** - provides an overview of each of the Plan Sections listed below.
- **Section 1 - Introduction to Plan Contents** provides an overview of SGMA and the plan contents.
- **Section 2 - Administrative Information** provides information about the GSA, a description of the Plan area, and a summary of information relating to notification and communication by the Agency with other agencies and interested parties.
- **Section 3 - Basin Setting** describes the hydrogeologic conceptual model of the Basin, current and historical groundwater conditions, the Basin water budget, and designated management areas within the Basin.
- **Section 4 - Sustainable Management Criteria** describes the Basin sustainability goal and the SMC developed for each of the applicable SGMA sustainability indicators. The seawater intrusion sustainability indicator is not applicable to the Basin. The applicable sustainability indicators for the Basin are
    - chronic lowering of groundwater levels,
    - reduction of groundwater storage,
    - degraded water quality,
    - land subsidence, and
    - depletions of interconnected surface water.
- **Section 5 - Monitoring Networks** describes the monitoring networks that will be utilized to characterize groundwater and surface water conditions in the Basin, evaluate changing conditions that occur through GSP implementation, and demonstrate sustainable management.
- **Section 6 - Projects and Management Actions** describes projects and management actions included in the GSP to meet the sustainability goal for the Basin in a manner that can be maintained over the planning and implementation horizon.
- **Section 7 - Plan Implementation** describes steps to implementation, implementation costs, funding, and schedule.
- **Section 8 - References and Technical Studies**: provides a list of references and technical studies relied upon by the GSA in developing the Plan.

Appendices providing supporting information referred to in the GSP:

- Appendix A provides a copy of ASRGSA's and FCGMA’s Initial Notification to DWR for the GSP.
- Appendix B contains a summary table for the required elements of the Plan.
- The formation of ASRGSA and FCGMA Pursuant to Water Code Section 10723.8 is provided in Appendix C.
- The plan for ASRGSA’s and FCGMA’s engagement with stakeholders is provided in Appendix D.
- A list of public meetings held with the GSAs pursuant to §354.10 is provided in Appendix E.
- Comments and responses regarding the GSP pursuant to §354.10 are provided in Appendix F.

- Appendix G contains a technical memorandum that describes the Numerical Groundwater Model.
- Time-series plots of water quality data with associated minimum thresholds and measurable objectives are provided in Appendix H.
- Hydrographs for all wells with observed water levels in the ASRVGB are provided in Appendix I.
- The approach for developing SMC for the chronic lowering of groundwater levels and associated time-series plots of modeled versus observed groundwater levels are provided in Appendix J.
- The approach to estimating annual change in storage for the Basin is provided in Appendix K.
- The Data Management System (DMS) documentation is provided in Appendix L.

2.0 Administrative Information [Article 5, SubArticle 1]

> **§354.2 Introduction to Administrative Information.** *This Subarticle describes information in the Plan relating to administrative and other general information about the Agency that has adopted the Plan and the area covered by the Plan.*

Section 2 describes information relating to administrative and other general information about ASRGSA and FCGMA and the area covered by the GSP.

2.1 Agency Information [§354.6]

This section describes ASRGSA and FCGMA and their authority in relation to the SGMA. ASRGSA and FCGMA are the GSAs responsible for managing ASRVGB (DWR Basin 4-007, located in southeastern Ventura County (Figure 1.0-01).

The ASRVGB is managed jointly by two GSAs, ASRGSA and FCGMA, which together provide full coverage of the Basin. The two GSAs are also designated as management areas for the Basin (Section 3.4).

ASRGSA was formed in 2016 to manage the portion of the Basin located outside of the FCGMA jurisdictional boundary. ASRGSA was formed pursuant to a joint exercise of powers agreement (JPA) between Camrosa Water District (Camrosa WD or Camrosa) and the County of Ventura (Figure 1.0-01; Appendix C). Camrosa WD provides retail water services to residential, commercial, and agricultural customers in the Basin and surrounding region. The County of Ventura exercises water management and land use authority on land overlying most of ASRVGB and provides jurisdictional coverage for a small portion of the Basin that lies outside of Camrosa WD's service area (Figure 1.0-01).

SGMA identified the FCGMA as the exclusive GSA for basins within its jurisdiction; however, this only includes the portion of the Basin located west of the Bailey Fault (see Section 3.1 for a description of the Basin features). FCGMA is an independent special district formed by the California Legislature in 1982 (i.e., a special act district) to manage and protect the aquifers within its jurisdiction for the common benefit of the public and all agricultural, domestic, and Municipal and Industrial (M&I) users. The FCGMA is also the GSA for the adjacent Pleasant Valley and Las Posas Valley basins.

On January 9, 2015, FCGMA elected to serve as the exclusive GSA within area of the Basin included within its statutory boundary, as provided for in Section 10723(c)(1) of the California Water Code. DWR officially designated FCGMA as a GSA for its portion of the Basin on May 12, 2015. On December 8, 2016, ASRGSA gave notice to DWR of its decision to form a GSA for the remainder of the Basin. DWR officially designated ASRGSA the exclusive GSA for its portion of the Basin on March 8, 2017. Copies of the information required pursuant to Water Code Section 10723.8 for GSA Formation are provided in Appendix C.

2.1.1 Name and Mailing Address [§354.6(a)]

> **§354.6 Agency Information.** *When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:*
>
> ***(a)*** *The name and mailing address of the Agency.*

- GSA Names:
  - Arroyo Santa Rosa Basin Groundwater Sustainability Agency (ASRGSA)
  - Fox Canyon Groundwater Management Agency (FCGMA)
- ASRGSA Mailing Address: 7385 Santa Rosa Road, Camarillo, CA 93012
- FCGMA Mailing Address: 800 South Victoria Avenue, Ventura, CA 93009

2.1.2 Organization and Management Structure [§354.6(b)]

> **§354.6 Agency Information.** *When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:*
>
> ***(b)*** *The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.*

ASRGSA is governed by a six-member board of directors, consisting of five directors appointed by Camrosa and one by the County of Ventura. Information regarding current ASRGSA Board representatives can be found on ASRGSA's website: https://asrgsa.com. Further information about ASRGSA's organization and management structure can be found in the ASRGSA JPA and bylaws, which are included in Appendix C. ASRGSA staffing is provided by Camrosa WD with project management assistance from Bondy Groundwater Consulting, Inc. The Camrosa General Manager, Tony Stafford, serves as the ASRGSA Executive Director.

FCGMA is governed by five Board of Directors (Board) members who represent the (1) County of Ventura (County), (2) the United Water Conservation District (UWCD), (3) seven mutual water companies and water districts within the Agency (Alta Mutual Water Company, Pleasant Valley County Water District, Berylwood Mutual Water Company, Calleguas Municipal Water District (Calleguas MWD), Camrosa WD, Zone Mutual Water Company, and Del Norte Mutual Water Company), (4) the five incorporated cities within the Agency (Ventura, Oxnard, Camarillo, Port Hueneme, and Moorpark), and (5) the farmers (FCGMA 2019). Four of these Board members, representing the County, UWCD, the mutual water companies and water districts, and the incorporated cities, are appointed by their respective organizations or groups. The representative for the farmers is appointed by the other four seated Board members from a list of candidates jointly supplied by the Ventura County Farm Bureau and the Ventura County Agricultural Association. An alternate Board member is selected by each appointing agency or group in the same manner as the regular member and acts in place of the regular member in case of absence or inability to act. Information regarding current FCGMA Board representatives can be found on FCGMA's website: http://www.fcgma.org. FCGMA staffing is provided by contract with the County of Ventura Public Works Department. The County Public Works Director, Jeff Pratt, serves as the FCGMA Executive Director.

2.1.3 Plan Manager and Contact Information [§354.6(c)]

§354.6 Agency Information. *When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:*

(c) *The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.*

- ASRGSA Plan Manager:
  - Tony Stafford
  - Phone Number: (805) 388-0226
  - Email: TonyS@Camrosa.com
  - Mailing Address: 7385 Santa Rosa Road, Camarillo, CA 93012
  - Website: https://asrgsa.com
- FCGMA Plan Manager:
  - Jeff Pratt
  - Phone Number: (805)-654-2073
  - Email: Jeff.Pratt@ventura.org
  - Mailing Address: 800 South Victoria Avenue, Ventura, CA 93009
  - Website: https://fcgma.org

2.1.4 Legal Authority [§354.6(d)]

§354.6 Agency Information. *When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:*

(d) *The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the Plan.*

FCGMA and ASRGSA have legal authority to perform duties, exercise powers, and accept responsibility for managing groundwater sustainably within their respective areas the Basin. Figure 1.0-01 shows the extent of the GSAs, along with the jurisdictional boundary of each of the Member Agencies of ASRGSA's JPA.

FCGMA's legal authority is provided by State legislation (FCGMA, 1982) and SGMA. FCGMA is an independent special district formed by the California Legislature in 1982 to manage and protect the aquifers within its jurisdiction for the common benefit of the public and all agricultural, domestic, and M&I users. FCGMA's jurisdiction was established as the area overlying the FCA and includes portions of the Oxnard Subbasin and the Las Posas Valley, the Pleasant Valley Basin, and the ASRVGB. FCGMA may adopt ordinances for the purpose of regulating, conserving, managing, and controlling the use and extraction of groundwater within its territory (Fox Canyon Groundwater Management Agency Act [FCGMA Act], Section 403). The full text of the FCGMA Act, Assembly Bill 2995, as well as amendments and additional legislation, can be accessed on the FCGMA website: http://www.fcgma.org. FCGMA is identified in SGMA as an agency created by statute to manage groundwater that is the exclusive GSA within its territory with powers to comply with SGMA (SGMA, Section 10723[c][1][D]).

ASRGSA's legal authority comes from the SGMA, the JPA signed by member agencies, and the bylaws. The JPA and bylaws are included in Appendix C. These laws and agreements, taken together, provide the necessary legal authority for the ASRGSA Board to carry out the preparation and implementation of the Basin's GSP. Each of the member agencies is a local agency eligible to become a GSA (Water Code Section 10723(a)). The member agencies are described below:

Ventura County

The County of Ventura was founded in 1873 and has a total area of 2,208 square miles. The County is the land use jurisdiction for most of the land in the Basin. The County does not provide water service but does permit and regulate groundwater wells and staffs the Ventura County Watershed Protection District (VCWPD), which participates in countywide planning and management efforts on a variety of water resource programs including water quality, stormwater management, and flood control.

Camrosa Water District

Camrosa WD was established in 1962 and its initial water facilities were constructed between 1966 - 1969. Its service area covers 31 square miles in southern Ventura County. Currently the District's potable distribution system services 32,100 residents, more than 3,000 acres of agricultural land as well as businesses and light industry (Camrosa, 2021). In addition to potable water, Camrosa WD provides non-potable surface water and reclaimed water, as well as wastewater collection services in certain portions of the service area.

2.2 Description of Plan Area [§354.8]

This section provides a description of the plan area, including a summary of jurisdictional areas and existing water-resources monitoring and management programs in the Basin.

2.2.1 Summary of Jurisdictional Areas and Other Features [§354.8(a)(1),(a)(2),(a)(3),(a)(4),(a)(5), and (b)]

§354.8 Description of Plan Area. *Each Plan shall include a description of the geographic areas covered, including the following information:*

(a) *One or more maps of the basin that depict the following, as applicable:*

- ***(1)*** *The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins.*
- ***(2)*** *Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.*
- ***(3)*** *Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans.*
- ***(4)*** *Existing land use designations and the identification of water use sector and water source type.*
- ***(5)*** *The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.*

(b) *A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.*

The geographic area covered by this GSP and managed by ASRGSA and FCGMA includes the entire ASRVGB (DWR Basin 4-007) as defined by DWR Bulletin No. 118, "California's Groundwater," Update 2020 (DWR, 2020). The extent of ASRVGB is shown on Figure 2.2-01. The Basin is in the southeastern portion of Ventura County near the City of Thousand Oaks and the City of Camarillo. The ASRVGB is bordered by the following basins: Tiera Rejada (4-015) to the east, Conejo (4-010) to the south, Pleasant Valley Basin (4-006) to the west, and Las Posas Valley (4-008) to the north.

Figure 1.0-01 delineates the jurisdictional boundaries of the agencies managing groundwater within the Basin: FCGMA, and ASRGSA, which is a JPA agency comprised of Camrosa WD and Ventura County. Other agencies with water management responsibilities are also depicted and include Calleguas MWD and the City of Thousand Oaks. More information about the water resource management roles of these agencies is provided in Section 2.2.2. There are no adjudicated areas located within the Basin. FCGMA and ASRGSA are not aware of any State or Federal lands within the Basin. The Basin lies within the traditional tribal territory of the Chumash; however, there are no tribal trust lands located within the Basin.

ASRVGB is located in the center of the Calleguas Creek Watershed in the rural unincorporated community of Santa Rosa Valley. The principal land use planning agency in the Basin is the County of Ventura, which recently completed its 2040 General Plan (Count of Ventura, 2020). Land use in the Basin consists primarily of low-density residential and agricultural land uses (Figure 2.2-03). The "water-use sector" for the residential land use designation is referred to in this GSP as "municipal and industrial" (M&I). The source of water for the M&I sector is deliveries by Camrosa WD, which includes a mix of locally sourced groundwater and purchased imported surface water. The agricultural "water-use sector" is supplied by groundwater pumped from local private wells and Camrosa WD deliveries. There is one rural residential property supplied by a domestic well. Details regarding sources and volumes of water use by sectors are provided in Sections 3.1.3.4 and 3.3.1.1.

Figure 2.2-02 shows the density of wells per square mile and locations of known agricultural, M&I, and domestic water supply wells in the Basin. The communities within the Basin are partially dependent upon groundwater from the Basin; local groundwater provides approximately half of the water supply for the Basin. The other source of water supply for the Basin is imported purchases from CMWD, groundwater extracted from wells located in neighboring Tierra Rejada and Pleasant Valley groundwater basins, non-potable surface water, and recycled water piped into the Basin by Camrosa WD from sources in the Pleasant Valley Basin.

2.2.2 Water Resources Monitoring and Management Programs [§354.8(c) and (d)]

2.2.2.1 Existing Water Resource Monitoring Programs [§354.8(c) and (d)]

§354.8 Description of Plan Area. *Each Plan shall include a description of the geographic areas covered, including the following information:*

- ***(c)*** *Identification of existing water resource* ***monitoring*** *and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan.*
- ***(d)*** *A description of how existing water resource* ***monitoring*** *or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.*

Existing water resources monitoring programs are listed in Table 2.2-01.

The water resources monitoring programs that have significant relevance to this GSP are the Camrosa WD and VCWPD groundwater resource monitoring programs and streamflow gaging performed by various entities. Details regarding groundwater monitoring locations and parameters monitored by these agencies/programs are provided in Section 5. Camrosa WD and VCWPD (the California Statewide Groundwater Elevation Monitoring [CASGEM]) are the groundwater level and quality monitoring entities for the Basin. Camrosa WD maintains groundwater level monitoring as part of their normal operations. VCWPD compiles the groundwater level data gathered by Ventura County staff with that gathered by other agencies and uploads the data to the CASGEM website in accordance with CASGEM program requirements. ASRGSA plans to continue coordinating with the other programs/agencies listed in Table 2.2-01 to obtain groundwater elevation and quality data to support GSP development, monitoring, and annual reporting, as detailed in Section 5.

As described in more detail in Sections 3.1.1.2 and 4.9.1, surface water is currently not diverted for beneficial uses from surface water bodies located within the Basin. VCWPD monitors rainfall at four gages located within or immediately adjacent to the ASRVGB (see Section 3.1.1.1). VCWPD also monitors surface water flow at gage 800A on Conejo Creek downstream of the Basin (see Section 3.1.1.2). Surface water flow for the Conejo Creek is also currently monitored at gage 800 by the Calleguas Creek Watershed Total Maximum Daily Load (TMDL) Compliance Monitoring Program (CCWTMP), and for the Arroyo Conejo at the Confluence Flume gage by the City of Thousand Oaks (see Section 3.1.1.2).

The existing water resource monitoring programs do not limit operational flexibility in the Basin.

2.2.2.2 Existing Water Resource Management Programs [§354.8(c) and (d)]

§354.8 Description of Plan Area. *Each Plan shall include a description of the geographic areas covered, including the following information:*

(c) *Identification of existing water resource monitoring and* ***management*** *programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan.*

(d) *A description of how existing water resource monitoring or* ***management*** *programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.*

Existing water resources management programs are listed in Table 2.2-02 and the key agencies are described below.

Camrosa Water District

Camrosa WD was created in 1962 as an independent special district and retail water supplier providing service to the entire ASRVGB and portions of adjacent Basins to the west. Camrosa serves water for M&I and agricultural use throughout its service area via two distribution systems, one drinking water and one non-potable water, which comprises a mix of diverted Conejo Creek water and Santa Rosa Basin groundwater. Three programs manage the non-potable water serving the ASRVGB, two of which are sourced from the Camrosa Water Reclamation Facility and the Conejo Creek Diversion. The third non-potable water supply for the Basin is from the Camarillo Sanitary District, discussed below.

The Camrosa WD Urban Water Management Plan (Camrosa, 2021) describes their existing and planned sources of water supply and demand, as well as their water management programs, including the Water Shortage Contingency Plan, which identifies actions to be taken during the various stages of a water shortage. The Urban Water Management Plan contains certain elements that reduce the likelihood of exceedances of the demand projections used in the development of this GSP:

- **Recycled Water Reuse**: The Camrosa Water Reclamation Facility currently produces approximately 1,500 acre-feet per year (AFY) of tertiary-treated recycled water, two-thirds of which are distributed for agricultural use (Camrosa, 2021). Surplus recycled water from Camarillo Sanitary District is also distributed for agricultural use (see Camarillo Sanitary District below).
- **Conejo Creek Diversion Project**: The Conejo Creek Diversion Project was inaugurated in 2000. The diversion structure and pipelines were jointly constructed by Calleguas MWD and Camrosa, and diversions began in 2002. Non-potable surface water originally discharged from the Hill Canyon Wastewater Treatment Plant (WWTP) is diverted from Conejo Creek downstream of the Basin (near gage 800A; see Section 3.1.1.2) and is augmented with groundwater and used for both landscape and agricultural irrigation in the Basin (Camrosa, 2021).
- **Demand Management Measures**: Existing and planned water conservation measures within Camrosa WD have resulted in reductions in M&I water use in the Basin. This reduced demand has been incorporated into the projections for future water use in ASRVGB in this GSP.
- **Water Shortage Contingency Plan**: This plan provides criteria for when and how voluntary and mandatory water use restrictions are implemented during droughts or other emergency occurred that limited availability of water supply within the Camrosa WD service area. The project will reduce the potential for increased demand for ASRVGB.

Camrosa WD's Urban Water Management Plan (Camrosa, 2021) and related planning programs do not limit operational flexibility in the Basin.

City of Thousand Oaks

In Water Rights Decision No. 1638 (Ventura County, 1997), the California State Water Resources Control Board (SWRCB) ordered that unappropriated water by the City of Thousand Oaks is to be provided to Camrosa via the Conejo Creek Diversion Project diversion site SWRCB required a minimum flow of 6.0 cubic feet per second (cfs) at the Conejo Creek Diversion Project diversion point for the protection of public trust resources.

Camarillo Sanitary District

Camrosa WD stores surplus recycled water through a purchase agreement with the Camarillo Sanitary District, which estimates an availability of 500-800 AFY (Camrosa, 2021). Any recycled water not delivered to Camrosa is delivered to City of Camarillo customers or discharged by the City to the Conejo Creek.

Calleguas Municipal Water District

Calleguas MWD is the wholesale imported water agency from which Camrosa purchases imported water to supplement local water supplies in the Basin. Calleguas MWD is a member agency of the Metropolitan Water District of Southern California. The Calleguas MWD Urban Water Management Plan is a planning tool that generally guides the actions related to water supply issues for the Calleguas MWD service area.

- **Salinity Management Pipeline:** Calleguas MWD maintains the Salinity Management Pipeline. Treated effluent from Camrosa's Water Reclamation Facility is normally discharged to storage ponds and used for irrigation; however, discharge to the Salinity Management Pipeline may occur during wet-weather events. The Salinity Management Pipeline is also planned to be expanded to serve the ASRVGB and would be utilized for brine disposal following Camrosa's planned installation of a desalter.

Watersheds Coalition of Ventura County Integrated Regional Water Management Plan

The Integrated Regional Water Management Plan (IRWMP) prepared by the Watersheds Coalition of Ventura County (2019) includes several "resource management strategies" that have the potential to directly or indirectly affect water resources management in Ventura County, including the Calleguas Creek Watershed and ASRVGB. Some of the management strategies listed in the IRWMP that could potentially affect water resources management by the ASRGSA include the following:

- **Reduce Water Demand**: Includes a list of agricultural water efficiency best management practices (BMPs) for agriculture and notes that urban water use efficiency practices and standards are implemented by urban water suppliers in Urban Water Management Plans.
- **Improve Operational Efficiency and Transfers**: Summarizes the effects of conveyance projects (for importing water from other areas or within ASRVGB), system reoperation, and water transfers.

- **Increase Water Supply**: Describes the benefits of conjunctive-use projects, desalination of seawater or brackish water, precipitation enhancement, municipal recycled water use, surface storage.
- **Improve Water Quality**: Describes several actions or policies that can improve water quality, including drinking water treatment and distribution, groundwater and aquifer remediation, matching water quality to use, pollution prevention, salt and salinity management, and urban stormwater runoff management.
- **Practice Resources Stewardship**: Provides definitions for, and summarizes benefits of, the following activities: agricultural lands stewardship, ecosystem restoration, forest management, land use planning and management, sediment management, and watershed management.
- **People and Water**: Describes approaches for engaging the public in water resources management, including economic incentives, outreach and engagement, “water and culture,” and water-dependent recreation.
- **Other Strategies**: Summarizes potential future sources of supply or strategies for improving water-resources management, including crop idling for water transfers, “dewvaporation” for atmospheric pressure desalination, fog collection, irrigated land retirement, and “rainfed agriculture.”

These IRWMP management strategies are not anticipated to limit operational flexibility.

Ventura County Watershed Protection District

The ASRVGB is within the Calleguas Creek Watershed in Ventura County, which includes programs involving standards for water quality within the Basin:

- **Non-Coastal Zoning Ordinance:** The Ventura County Planning Division (Ventura County, 2023) sets standards for dwellings within groundwater Impact Areas for the Basin to limit impacts from septic systems. Additional standards for Animal Husbandry/Keeping and Waste handling (i.e., composting) are included in the Ordinance. The VCWPD may also require a Manure Management Plan for land developments involving animal husbandry or animal boarding facilities, which includes an assessment of long-term impacts to the area groundwater quality.
- **Ventura County Stormwater Quality Monitoring Program:** Stormwater Permits require water quality sampling, watershed assessments, business inspections, and pollution prevention programs.

RWQCB Water Quality Management Programs

ASRVGB falls within the jurisdiction of the Los Angeles Regional Water Quality Control Board (RWQCB), which has established a regional Water Quality Control Plan (i.e., Basin Plan, RWQCB-LA, 2019). The Basin Plan contains the regional water quality regulations and programs to implement these regulations, including the National Pollutant Discharge Elimination System (NPDES) permits issued under federal delegation for discharges to surface water and TMDLs. Stormwater discharges are regulated through NPDES permits, of which the municipal separate stormwater sewer systems (MS4) is most significant. The MS4 permit identifies discharge prohibitions and sets effluent and receiving water limitations in accordance with Basin Plan water quality standards. In addition, stormwater management program minimum control measures are outlined to manage potential pollutant discharges from the MS4. The

Ventura County Stormwater Quality Management Program is implemented to meet the requirements of the Ventura County Stormwater Permits (i.e., MS4 permit). This includes water quality sampling, watershed assessments, business inspections, and pollution prevention programs. The Ventura County Agricultural Irrigated Lands Group Water Quality Management Plan (VCAILG, 2020) is implemented to comply with the agricultural conditional waiver of waste discharge requirements. The plan addresses measurement and control of discharges from irrigated farmland to protect surface water quality. TMDL was adopted by the Regional Board on December 6, 2012, and approved by the United States Environmental Protection Agency on June 28, 2013. TMDL monitoring of surface water within the Basin is currently coordinated by the CCWTMP. The RWQCB Basin Plan and water quality regulatory programs do not limit basin operational flexibility because actions undertaken by RWQCB contribute to maintenance of groundwater quality below the measurable objective concentrations.

Fox Canyon Groundwater Management Agency

FCGMA was formed by the California Legislature in 1982 as an independent special district to manage the aquifers within its jurisdiction (FCGMA, 1982). Beneficial users of groundwater within FCGMA jurisdiction are subject to the Agency's GSPs, ordinances, and policies.

- **Groundwater Extraction Reporting Program**: Implemented in 1985, well operators within the FCGMA are required to report their groundwater extractions twice per year using FCGMA approved forms, including periodic calibration of meters.
- **Lower Aquifer System Contingency Plan**: Referred as the "lower production zone" within this GSP, this plan contains measures that could be implemented in the event of severe water quality degradation.

2.2.2.3 Conjunctive Use Programs [§354.8(e)]

> **§354.8 Description of Plan Area.** *Each Plan shall include a description of the geographic areas covered, including the following information:*
> ***(e)*** *A description of conjunctive use programs in the basin.*

Conjunctive use is a term used to describe the coordinated use of both surface water and groundwater resources. Conjunctive use in the ASRVGB is achieved by Camrosa WD through its managed use of groundwater resources in conjunction with various water supplies delivered into the Basin from the Conejo Creek Diversion Project, the Camrosa Water Reclamation Facility, the Camarillo Sanitation District, and CMWD. Imported purchases from CMWD supplies roughly half of the potable water for the Basin, depending on water quality, well operations/maintenance, and changes in regulations, and is a critical component of the supply portfolio (Camrosa, 2021). The conjunctive-use operations have been incorporated into the projected water budget for Basin in this GSP (Section 3.3.3).

2.2.3 Land Use/General Plans

The dominant land uses in the Basin are agricultural and residential, accounting respectively for 53% and 35% of the Basin's total area (Figure 2.2-03). The remaining 12% consists of open space, parks, vacant land, institutional and utility property, and impervious road surfaces. There is no commercial or industrial land use in the Basin. The area of the Basin inside the FCGMA boundary is almost entirely agricultural, with small portions of residential lots and roads. The Basin outside of FCGMA is more varied, with agriculture being concentrated in the west and predominantly residential land use to the east. The housing in the Basin is low density, with lot sizes of 1 acre or more being typical. Approximately 70% of the Basin (including the entirety of the agricultural land inside the FCGMA portion of the Basin) is protected land under the Save Open Space & Agricultural Resources (SOAR) program, which includes agricultural, residential, open space, and undeveloped land (Figure 2.2-03). Thus, significant further development is not expected to occur within the Basin in the foreseeable future.

2.2.3.1 Land Use and General Plans Summary [§354.8(f)(1),(f)(2), and (f)(3)]

§354.8 Description of Plan Area. *Each Plan shall include a description of the geographic areas covered, including the following information:*

(f) *A plain language description of the land use elements or topic categories of applicable general plans that includes the following:*

- ***(1)*** *A summary of general plans and other land use plans governing the basin.*
- ***(2)*** *A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects.*
- ***(3)*** *A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon.*

California state law requires that cities and counties prepare and adopt a "comprehensive long-term general plan for the physical development of the county or city" and that "elements and parts [of the plan] comprise an integrated, internally consistent and compatible statement of policies for the adopting agency" (California Government Code, Sections 65300 and 65300.5). Among the required elements of the plan is the conservation, development, and utilization of water developed in coordination with GSAs (California Government Code, Section 65302[d][1]).

All existing general plans and future updates undergo an analysis of environmental impacts under the California Environmental Quality Act (CEQA). In addition, all discretionary projects under municipal, County, and/or state jurisdiction are required to comply with CEQA. In 2019, the Governor's Office of Planning and Research released an update to the CEQA Guidelines that included a new requirement to analyze projects for their compliance with adopted GSPs. Specifically, the applicable significance criteria include the following:

- Would the program or project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
- Would the program or project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Therefore, to the extent general plans allow growth that could have an impact on groundwater supply, such projects would be evaluated for their consistency with adopted GSPs and for whether they adversely impact the sustainable management of the Basin. Under CEQA, potentially significant impacts identified must be avoided or substantially minimized unless significant impacts are unavoidable, in which case the lead agency must adopt a statement of overriding considerations.

The following sections contain a description of the land use plans that are applicable to sustainable groundwater management planning within the ASRVGB, a discussion of the consideration given to the land use plans, and an assessment of how the GSP may affect those plans. The plans included were selected as the plans with the most salient information relating to sustainable management. General plans are considered applicable to the GSP to the extent that they may change water demands within ASRVGB or affect the ability of the GSA to achieve sustainable groundwater management over the planning and implementation horizon.

The General Plan applicable to ASRVGB is the Ventura County General Plan (County of Ventura, 2020) and is described below. In addition to the General Plan, it is important to understand that the agricultural land and open space in the Basin lies is subject to the County of Ventura SOAR voter initiative currently approved through 2050 (SOAR, 2015). The SOAR initiative requires a majority vote of the people to rezone unincorporated open space, agricultural, or rural land for development. The existence of SOAR makes it very unlikely that a material change in land use will occur during the foreseeable future. Because agricultural land and open space are not expected to convert to other uses, it is assumed that there is little potential for new development that could impact basin recharge or water demands. These assumptions will be revisited during each 5-year GSP assessment.

It is noted the small portions of the Basin fall with the land use authority of the City of Thousand Oaks (Figure 1.0-01). However, these areas are almost exclusively open space that is projected by the SOAR initiative. For these reasons, the City of Thousand Oaks general plan is not discussed in detail.

County of Ventura 2040 General Plan

The Ventura County 2040 General Plan (County of Ventura, 2020) applies to the County as a whole and includes area-specific plans for distinct unincorporated areas. The Basin falls within unincorporated areas of the County of Ventura (Figure 1.0-01). The unincorporated areas within the Basin primarily include residential land, agricultural land, and open space (Figure 2.2-03).

Significant areas of agricultural land use exist in the Basin. The County's General Plan includes numerous elements that discourage development in the open space and agricultural areas and/or continued viability of agricultural activities on agricultural land:

Guiding Principle - Land Use and Community Character: Direct urban growth away from agricultural, rural, and open space lands, in favor of locating it in cities and unincorporated communities where public facilities, services, and infrastructure are available or can be provided.

Guiding Principle - Conservation and Open Space: Conserve and manage the County's open spaces and natural resources, including soils, water, air quality, minerals, biological resources, scenic resources, as well as historic and cultural resources.

Guiding Principle - Agriculture: Promote the economic vitality and environmental sustainability of Ventura County's agricultural economy by conserving soils/land while supporting a diverse and globally competitive agricultural industry that depends on the availability of water, land, and farmworker housing.

WR-6: To sustain the agricultural sector by ensuring an adequate water supply through water efficiency and conservation.

WR-6.1 - Water for Agricultural Uses: The County should support the appropriate agencies in their efforts to effectively manage and enhance water quantity and quality to ensure long-term, adequate availability of high quality and economically viable water for agricultural uses, consistent with water use efficiency programs.

WR-6.2 Agricultural Water Efficiency: The County should support programs designed to increase agricultural water use efficiency and secure long-term water supplies for agriculture.

WR-6.3 Reclaimed Water Use: The County should encourage the use of reclaimed irrigation water and treated urban wastewater for agricultural irrigation in accordance with federal and state requirements in order to conserve untreated groundwater and potable water supplies.

from the Ventura County 2040 General Plan

The Ventura County 2040 General Plan includes numerous elements designed to facilitate coordinated planning with ASRGSA and FCGMA, maintain groundwater recharge, protect groundwater quality, and conserve groundwater resources. These elements include:

WR-1: To effectively manage water supply by adequately planning for the development, conservation, and protection of water resources for present and future generations.

WR-1.1 - Sustainable Water Supply: The County should encourage water suppliers, groundwater management agencies, and groundwater sustainability agencies to inventory and monitor the quantity and quality of the county's water resources, and to identify and implement measures to ensure a sustainable water supply to serve all existing and future residents, businesses, agriculture, government, and the environment.

WR-1.2 - Watershed Planning: The County shall consider the location of a discretionary project within a watershed to determine whether or not it could negatively impact a water source. As part of discretionary project review, the County shall also consider local watershed management plans when considering land use development.

WR-1.3 - Portfolio of Water Sources: The County shall support the use of, conveyance of, and seek to secure water from varied sources that contribute to a diverse water supply portfolio. The water supply portfolio may include, but is not limited to, imported water, surface water, groundwater, treated brackish groundwater, desalinated seawater, recycled water, and storm water where economically feasible and protective of the environmental and public health.

WR-1.4 - State Water Sources: The County shall continue to support the conveyance of, and seek to secure water from, state sources.

WR-1.5 - Agency Collaboration: The County shall participate in regional committees to coordinate planning efforts for water and land use that is consistent with the Urban Water Management Planning Act, Sustainable Groundwater Management Act, the local Integrated Regional Water Management Plan, and the Countywide National Pollutant Discharge Elimination System Permit (storm water and runoff management and reuse).

WR-1.6 - Water Supplier Cooperation: The County shall encourage the continued cooperation among water suppliers in the county, through entities such as the Association of Water Agencies of Ventura County and the Watersheds Coalition of Ventura County, to ensure immediate and long-term water needs are met efficiently.

WR-1.7 - Water Supply Inter-Ties: The County shall encourage the continued cooperation among water suppliers in the county, through entities such as Association of Water Agencies of Ventura County and the Watersheds Coalition of Ventura County, to establish and maintain emergency inter-tie projects among water suppliers.

WR-1.9 - Groundwater Basin Use for Water Storage: Where technically feasible, the County shall support the use of groundwater basins for water storage.

WR-1.10 - Integrated Regional Water Management Plan: The County shall continue to support and participate with the Watersheds Coalition of Ventura County in implementing and regularly updating the Integrated Regional Water Management Plan.

WR-1.11 - Adequate Water for Discretionary Development: The County shall require all discretionary development to demonstrate an adequate long-term supply of water.

WR-1.12 - Water Quality Protection for Discretionary Development: The County shall evaluate the potential for discretionary development to cause deposition and discharge of sediment, debris, waste and other pollutants into surface runoff, drainage systems, surface water bodies, and groundwater. The County shall require discretionary development to minimize potential deposition and discharge through point source controls, storm water treatment, runoff reduction measures, best management practices, and low impact development.

WR-1.14 - Discretionary Development and Conditions of Approval: Golf Course Irrigation: The County shall require that discretionary development for new golf courses shall be subject to conditions of approval that prohibit landscape irrigation with water from groundwater basins or inland surface waters identified as Municipal and Domestic Supply or Agricultural Supply in the California Regional Water Quality Control Board's Water Quality Control Plan unless:

1. The existing and planned water supplies for a Hydrologic Area, including interrelated Hydrologic Areas and Subareas, are shown to be adequate to meet the projected demands for existing uses as well as reasonably foreseeable probable future uses within the area; and
2. It is demonstrated that the total groundwater extraction/recharge for the golf course will be equal to or less than the historic groundwater extraction/recharge for the site as defined in the County Initial Study Assessment Guidelines.
    - Further, where feasible, reclaimed water shall be utilized for new golf courses.

WR-2: To implement practices and designs that improve and protect water resources.

WR-2.1 - Identify and Eliminate of Sources of Water Pollution: The County shall cooperate with Federal, State and local agencies in identifying and eliminating or minimizing all sources of existing and potential point and non-point sources of pollution to ground and surface waters, including leaking fuel tanks, discharges from storm drains, dump sites, sanitary waste systems, parking lots, roadways, and mining operations.

WR-2.2 - Water Quality Protection for Discretionary Development: The County shall evaluate the potential for discretionary development to cause deposition and discharge of sediment, debris, waste, and other contaminants into surface runoff, drainage systems, surface water bodies, and groundwater. In addition, the County shall evaluate the potential for discretionary development to limit or otherwise impair later reuse or reclamation of wastewater or storm water. The County shall require discretionary development to minimize potential deposition and discharge through point source controls, storm water treatment, runoff reduction measures, best management practices, and low impact development.

WR-2.3 - Discretionary Development Subject to CEQA Statement of Overriding Considerations – Water Quality and Quantity: The County shall require that discretionary development not significantly impact the quality or quantity of water resources within watersheds, groundwater recharge areas or groundwater basins.

WR-3: To promote efficient use of water resources through water conservation, protection, and restoration.

WR-3.1 - Non-Potable Water Use: The County shall encourage the use of non-potable water, such as tertiary treated wastewater and household graywater, for industrial, agricultural, environmental, and landscaping needs consistent with appropriate regulations.

WR-3.2 - Water Use Efficiency for Discretionary Development: The County shall require the use of water conservation techniques for discretionary development, as appropriate. Such techniques include low-flow plumbing fixtures in new construction that meet or exceed the California Plumbing Code, use of graywater or reclaimed water for landscaping, retention of storm water runoff for direct use and/or groundwater recharge, and landscape water efficiency standards that meet or exceed the standards in the California Model Water Efficiency Landscape Ordinance.

WR-3.3 - Low-Impact Development: The County shall require discretionary development to incorporate low impact development design features and best management practices, including integration of storm water capture facilities, consistent with County's Storm water Permit.

WR-3.4 - Reduce Potable Water Use: The County shall strive for efficient use of potable water in County buildings and facilities through conservation measures, and technological advancements.

WR-4: To maintain and restore the chemical, physical, and biological integrity and quantity of groundwater resources.

WR-4.1 - Groundwater Management: The County shall work with water suppliers, water users, groundwater management agencies, and groundwater sustainability agencies to implement the Sustainable Groundwater Management Act (SGMA) and manage groundwater resources within the sustainable yield of each basin to ensure that county residents, businesses, agriculture, government, and the environment have reliable, high-quality groundwater to serve existing and planned land uses during prolonged drought years.

WR-4.2 - Important Groundwater Recharge Area Protection: In areas identified as important recharge areas by the County or the applicable Groundwater Sustainability Agency, the County shall condition discretionary development to limit impervious surfaces where feasible and shall require mitigation in cases where there is the potential for discharge of harmful pollutants within important groundwater recharge areas.

WR-4.3 - Groundwater Recharge Projects: The County shall support groundwater recharge and multi-benefit projects consistent with the Sustainable Groundwater Management Act and the Integrated Regional Water Management Plan to ensure the long-term sustainability of groundwater.

WR-4.4 - In-Stream and Recycled Water Use for Groundwater Recharge: The County shall encourage the use of in-stream water flow and recycled water for groundwater recharge while balancing the needs of urban and agricultural uses, and healthy ecosystems, including in-stream waterflows needed for endangered species protection.

WR-4.5 - Discretionary Development Subject to CEQA Statement of Overriding Considerations – Water Quantity and Quality: The County shall require that discretionary development shall not significantly impact the quantity or quality of water resources within watersheds, groundwater recharge areas or groundwater basins.

WR-4.7 - Discretionary Development and Conditions of Approval – Oil, Gas, and Water Wells: The County shall require that discretionary development be subject to conditions of approval requiring proper drilling and construction of new oil, gas, and water wells and removal and plugging of all abandoned wells on-site.

WR-4.8 - New Water Wells: The County shall require all new water wells located within Groundwater Sustainability Agency (GSA) boundaries to be compliant with GSAs and adopted Groundwater Sustainability Plans (GSPs).

WR-5: To protect and, where feasible, enhance watersheds and aquifer recharge areas through integration of multiple facets of watershed-based approaches.

WR-5.1 - Integrated Watershed Management: The County shall work with water suppliers, Groundwater Sustainability Agencies (GSAs), wastewater utilities, and storm water management entities to manage and enhance the shift toward integrated management of surface and groundwater, storm water treatment and use, recycled water and conservation, and desalination.

WR-5.2 - Watershed Management Funding: The County shall continue to seek funding and support coordination of watershed planning and watershed-level project implementation to protect and enhance local watersheds.

WR-7.1 - Water for the Environment: The County shall encourage the appropriate agencies to effectively manage water quantity and quality to address long-term adequate availability of water for environmental purposes, including maintenance of existing groundwater-dependent habitats and in-stream flows needed for riparian habitats and species protection.

from the Ventura County 2040 General Plan

2.2.3.1.1 How Land Use Plans May Impact Water Demands and Sustainable Groundwater Management

This GSP is not anticipated to be impacted by the County of Ventura General Plan (County of Ventura, 2020), and the future water demand projections utilized in the GSP have been developed to be consistent with the County's land use plans. The General Plan includes policies that protect the key recharge areas in the Basin (agricultural areas and areas along the Basin margins). Land in the key recharge area is further protected from development by SOAR and County ordinances (see Section 2.2.2.2). The General Plan includes measures that when combined with SOAR greatly limit the potential for new development that would create a material increase in water demand within the ASRVGB.

2.2.3.1.2 How Sustainable Groundwater Management May Affect Water Supply Assumptions of Land Use Plans

This GSP is not anticipated to impact land use planning because the land use plans, when combined with SOAR, greatly limit the potential for new development. Thus, significant new water demands that could be potentially impacted by the GSP are not anticipated.

The GSP will not impact land use plan elements that address recharge areas because the key recharge area is already protected from development by County of Ventura General Plan policies and SOAR.

2.2.3.1.3 Impact of Land Use Plans Outside of Basin on Sustainable Groundwater Management [§354.8(f)(5)]

> **§354.8 Description of Plan Area.** *Each Plan shall include a description of the geographic areas covered, including the following information:*
>
> ***(f)*** *A plain language description of the land use elements or topic categories of applicable general plans that includes the following:*
>
> ***(5)*** *To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.*

Land use planning for the areas immediately surrounding ASRVGB is addressed in the Ventura County 2040 General Plan (County of Ventura, 2020), which is described in Section 2.2.3.1. This GSP is not anticipated to be impacted by these land use plans for the same reasons described in Section 2.2.3.1.1.

2.2.3.2 Well Permitting [§354.8(f)(4)]

> **§354.8 Description of Plan Area.** *Each Plan shall include a description of the geographic areas covered, including the following information:*
>
> ***(f)*** *A plain language description of the land use elements or topic categories of applicable general plans that includes the following:*
>
> ***(4)*** *A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.*

Water well permits are obtained from the Ventura County Groundwater Section, a division of Ventura County Public Works Department. Water well permits are issued pursuant to the requirements of Ventura County Well Ordinance No. 4468. The Ventura County Groundwater Section enforces California's Water Well Standards Bulletins 74-9, 74-81, and 74-90. The Ventura County Groundwater

Section monitors and enforces these standards by requiring drilling contractors with a valid C-57 license to submit permit applications for the construction, modification, reconstruction (i.e., deepening), or destruction of any well within their jurisdiction and through inspections. Pursuant to the County of Ventura 2040 General Plan, Ventura County Groundwater Section will review ASRGSA's GSP and related resolutions and ordinances to ensure the compliance with ASRGSA requirements prior to issuing a water well permits within the Basin boundary.

In addition to County Water Well Ordinance 4468, the County of Ventura 2040 General Plan includes the following policies on well permitting:

- **WR-4.7 - Discretionary Development and Conditions of Approval – Oil, Gas, and Water Wells:** The County shall require that discretionary development be subject to conditions of approval requiring proper drilling and construction of new oil, gas, and water wells and removal and plugging of all abandoned wells on-site.
- **WR-4.8 - New Water Wells:** The County shall require all new water wells located within GSA boundaries to be compliant with GSAs and adopted GSPs.

Standards relating to the construction, maintenance, operation, use, repair, modification, and destruction of wells are regulated under Ventura County Ordinance No. 4184 by the Ventura County Water and Environmental Resources Division, Groundwater Section.

In addition, the FCGMA has implemented multiple ordinances and policies related to the construction of wells and use of groundwater within its jurisdictional area. Requirements include the registration, reporting (including the installation and maintenance of flow meters and reporting of all extractions semi-annually), and pumping fees for wells; new wells must obtain a no-fee permit from the FCGMA.

2.2.4 Additional Plan Elements [§354.8(g)]

§354.8 Description of Plan Area. *Each Plan shall include a description of the geographic areas covered, including the following information:*

(g) *A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate.*

GSP Emergency Regulations [§354.8(g) allows GSAs to include certain "additional plan elements" in the GSP, including:

(a) Control of saline water intrusion.

(b) Wellhead protection areas and recharge areas.

(c) Migration of contaminated groundwater.

(d) A well abandonment and well destruction program.

(e) Replenishment of groundwater extractions.

(f) Activities implementing, opportunities for, and removing impediments to, conjunctive use or underground storage.

(g) Well construction policies.

(h) Measures addressing groundwater contamination cleanup, groundwater recharge, in-lieu use, diversions to storage, conservation, water recycling, conveyance, and extraction projects.

(i) Efficient water management practices, as defined in Section 10902, for the delivery of water and water conservation methods to improve the efficiency of water use.

(j) Efforts to develop relationships with state and federal regulatory agencies.

(k) Processes to review land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity.

(l) Impacts on groundwater dependent ecosystems (GDEs).

The following additional plan elements are appropriate to include in this GSP:

- **Well Destruction Program:** The GSAs will seek to destroy improperly abandoned or constructed wells that act as conduits for migration of poor-quality water from shallow water-bearing units into the primary producing zones. This additional plan element is included in the Water Quality Management Coordination management action, which is described in Section 6.3.
- **Replenishment of Groundwater Extractions:** ASRGSA intends to investigate the feasibility of a managed aquifer recharge project in the Basin. This additional plan element is included in the Arroyo Santa Rosa Basin Recharge Project, which is described in Section 6.5.
- **Well Construction Policies:** The GSAs will coordinate with the County of Ventura to ensure new wells are properly constructed to prevent migration of poor-quality water from shallow water-bearing units into the primary producing zones. This additional plan element is included in the Water Quality Management Coordination management action, which is described in Section 6.3.
- **Measures Addressing Groundwater Contamination:** The GSAs will coordinate with other entities to promote actions that lead to improvement of groundwater quality in the Basin and intends to investigate the feasibility of constructing a groundwater desalter project. This additional plan element is included in the Water Quality Management Coordination management action, which is described in Section 6.3. and the Arroyo Santa Rosa Basin Desalter Project, which is described in Section 6.4.
- **Efficient water management practices, as defined in §10902, for the delivery of water and water conservation methods to improve the efficiency of water use:** The GSAs will seek opportunities to encourage, promote, and support efforts to increase water use efficiency.
- **Processes to review land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity:** The GSAs will coordinate with the County of Ventura on its future general plan updates.

2.3 Notice and Communication [§354.10]

ASRVGB is a small basin with estimated total groundwater extractions of approximately 5,000 AFY. Camrosa operates eight wells that extract more than 2 AFY of groundwater. There are 30 wells that extract groundwater for agricultural beneficial users and one de minimis residential pumper. The Stakeholder Engagement Plan (SEP) (Appendix D) outlines the process to engage with the stakeholders and interested parties towards managing the Basin sustainably, and many of the interests in the Basin have direct representation in the SMGA process by virtue of a director on the ASRGSA Board of Directors.

The SEP (Appendix D) is tailored to the specific stakeholder landscape of the Basin. The SEP encourages the active involvement of individual stakeholders and stakeholder organizations and other interested parties in the development and implementation of the GSP for ASRVGB (Appendix D). The SEP was designed and developed to ensure compliance with Water Code §10723.2, which requires the GSA to "consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans." The SEP identifies stakeholders, stakeholder outreach and engagement methodologies, opportunities for integration with other overlapping local programs and planning processes, and the public meeting process used by the GSAs. The SEP guided notice and communication activities during GSP development and will continue to serve as a guide during GSP implementation. The following sections provide a summary of information relating to notification and communication by the GSAs with other agencies and interested parties, as required by the GSP Emergency Regulations.

2.3.1 Beneficial Uses and Users [§354.10(a)]

> **§354.10 Notice and Communication.** *Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:*
> ***(a)*** *A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.*

Water Code Section 10723.2 requires the GSAs to consider the interests of all beneficial uses and users of groundwater within the Basin. These interests are listed below with a description of the nature of the GSAs' consultation with them.

- **Holders of Overlying Groundwater Rights**:
  - The GSA will engage all well owners and operators in the Basin, from large-volume agricultural users to the one de minimis residential pumper identified in the Basin.
- **Public Water Systems:**
  - Camrosa WD is the primary water supplier in the watershed, providing water to retail customers. Camrosa's service area encompasses the entire ASRVGB. Camrosa's water supply is groundwater, purchased imported water from Calleguas MWD, recycled water produced at Camrosa Water Reclamation Facility, recycled water imported from Camarillo Sanitary District, and non-potable water diverted from the Conejo Creek, outside of the Basin. Camrosa WD is a signatory member to the JPA forming the Agency and is represented on the Agency's Board of Directors.
  - The FCGMA was created by the State of California legislature for preservation of the groundwater resources within the territory of the FCGMA for agricultural and M&I uses. Groundwater extraction wells are located on the FCGMA land within the ASRVGB.
- **Local Land Use Planning Agencies**:
  - City of Thousand Oaks: Small portions of the ASRVB fall within the City of Thousand Oaks sphere of influence. ASRGSA will consult with the City of Thousand Oaks during GSP development.

  - The County of Ventura: Ventura County has land use planning authority on unincorporated land overlying the Basin (Figure 2.2-03). The County is a signatory member to the ASRGSA JPA and is represented on the Agency's Board of Directors.

- **Environmental users of groundwater:** N/A. Analysis performed during GSP development indicated that there are not likely any environmental users of groundwater in the Basin.
- **Surface Water Rightsholders**: There are three entities that have permitted surface water rights to the Conejo Creek; however, none are actively diverting water. Camrosa is the water provider for each of these entities:
  - FitzGerald Ranch LLC
  - Lena M Jones Trust
  - Tres Corderos LLC

- In addition, the following entities have interests in the management of surface water within the Basin:
  - Calleguas Creek Watershed: The watershed group comprises a variety of stakeholders, from private and public utility agencies to environmental non-government organizations to agricultural groups, et cetera, who work together to meet regulatory requirements, seek grant funding, pursue integrated management, and collaborate on projects to benefit the watershed. Members of the JPA are in good standing and work closely with the watershed group, and the GSA welcomes the group's input at public meetings and in the public review period of the GSP.
  - Watersheds Coalition of Ventura County: Linking the Calleguas Creek Watershed group with the other two watersheds in Ventura County, the Watersheds Coalition of Ventura County is primarily interested in integrated water management planning. Members of the JPA are in good standing and work closely with the Watersheds Coalition of Ventura County, and the GSA welcomes the group's input at public meetings and in the public review period of the GSP.
  - Ventura County Watershed Protection District: VCWPD provides for "the control and conservation of flood and stormwaters and for the protection of watercourses, watersheds, public highways, life and property in the district from damage or destruction from these waters," and, as such, will be a valuable resource in developing the GSP. As a branch of the County of Ventura, the VCWPD will be represented on the GSA Board.
  - City of Thousand Oaks: The majority of the water in the Conejo Creek is discharge from the Hill Canyon WWTP, which is a City of Thousand Oaks public works facility. As the City holds water right and use permits for Conejo Creek water, Camrosa and the GSAs will continue to work closely with the City of Thousand Oaks in all matters regarding its use.
  - California Department of Fish and Wildlife: Much of the California Department of Fish and Wildlife's interests in and responsibilities for the watercourses overlaying the Basin are covered by the water right permit for Conejo Creek water held by the City of Thousand Oaks. The department will be consulted as necessary during the development of the GSP, should it involve any lands or activities under the department's jurisdiction.

- **Federal Government:** No land overlying the ASRVGB is managed by the Federal Government.
- **California Native American Tribes:** There are no tribal trust lands located within the Basin.
- **Disadvantaged Communities:** There are no disadvantages communities within the ASRVGB.
- **Entities listed in Section 10927 that Monitor and Report Groundwater Elevations**:
  - The County of Ventura is the designated CASGEM entity for the Basin. The County is a signatory member to the JPA forming the Agency and represented on the Agency's Board of Directors.

2.3.2 Public Meetings [§354.10(b)]

> **§354.10 Notice and Communication.** *Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:*
> ***(b)*** *A list of public meetings at which the Plan was discussed or considered by the Agency.*

A list of all public meetings is included in Appendix E.

2.3.3 Public Comments [§354.10(c)]

> **§354.10 Notice and Communication.** *Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:*
> ***(c)*** *Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.*

Public comments and responses are included in Appendix F.

2.3.4 Communication [§354.10(d)]

2.3.4.1 Decision-Making Process [§354.10(d)(1)]

> **§354.10 Notice and Communication.** *Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:*
> ***(d)*** *A communication section of the Plan that includes the following:*
> ***(1)*** *An explanation of the Agency's decision-making process.*

The JPA that created ASRGSA requires the GSA to hold regularly scheduled public meetings that are noticed and meet all of the requirements of the Ralph M. Brown Act for transparency in California government. With these requirements in mind, the ASRGSA:

- Holds board meetings on a regular schedule (no less frequently that quarterly),
- Provides written notice of meetings with meeting agenda and meeting materials available in accordance with applicable statutory requirements,
- Sends email (and direct mail if requested) meeting reminders to ASRGSA's interested parties list,
- Will utilize sign-in sheets and request feedback from attendees to determine adequacy of public education and productive engagement in the GSP development and implementation process, and

- Posts meeting agenda on https://asrgsa.com/ and at the meeting location prior to the meeting, as required by law.

ASRGSA agendas include general public comments at the beginning of each board meeting. General comments allow community members to raise any groundwater-related issue that is not on the agenda. Public comment time is also given prior to a vote on all agenda items to ensure public opinion can be incorporated into ASRGSA Board of Director decisions.

The ASRGSA Board of Directors directs the Executive Director to fulfill the various requirements of SGMA. To do this, the Executive Director, with support from the GSP Manager and consultants, provides the Board with research and recommendation memos, work plans, technical summaries, budgets, and other work products as required to carry out board decisions. ASRGSA decisions require approval by affirmative vote of a simple majority vote of all Directors in attendance at a meeting and eligible to vote on the matter.

The FCGMA Board is defined by its enabling legislation and is comprised of five members (See Section 2.1.2). Each member has one equal vote on the Board and decisions are approved after noticed public hearings, by a majority vote of the board (FCGMA, 2019).

2.3.4.2 Public Engagement [§354.10(d)(2) and (d)(3)]

§354.10 Notice and Communication. *Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:*

(d) *A communication section of the Plan that includes the following:*

(2) *Identification of opportunities for public engagement and a discussion of how public input and response will be used.*

(3) *A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.*

ASRGSA uses a variety of methods to create opportunities for public engagement and obtain public input for consideration in GSP development and implementation. These methods are presented in the ASRGSA SEP (Appendix D) and include:

- **ASRGSA Board Meetings:** Regular and Special meetings of the ASRGSA Board of Directors provide opportunities for the public to engage with the Board, Executive Director, and consultants and provide direct input. The public is welcomed to comment at each meeting and the ASRGSA Board regularly incorporates public suggestions into its deliberations and the decisions it makes during Board meetings. Meeting notes are kept and submitted to the ASRGSA Board for approval. All meeting minutes and notes are collected on the ASRGSA website along with supporting agendas, packets, and presentation materials.
- **GSP Workshops:** ASRGSA holds public workshops to provide in-depth discussion of the GSP and obtain stakeholder feedback. The workshops include polls to help facilitate public input on key issues and identify which outreach methods are most effective. Public input received during the GSP Workshops is reviewed with ASRGSA Board of Directors during subsequent Board meetings prior to making decisions.
- **Contact with Staff:** The public is welcomed to contact the ASRGSA Executive Director and may do so via telephone, e-mail, or website inquiry (https://asrgsa.com/contact/).

ASRGSA uses a variety of methods to inform stakeholders and encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater pursuant to Water Code Section 10727.8(a). These methods are presented in the ASRGSA SEP (Appendix D) and include:

- **Statement Describing the Manner in which Interested Parties May Participate in the Development and Implementation of the Groundwater Sustainability Plan (Water Code Section 10727.8(a)):** The statement was prepared and posted to DWR's SGMA Portal as part of filing a notice of intent to DWR of the ASRGSA decision to develop a GSP for the Basin on May 14, 2018. The statement is included in Appendix A and was developed into the ASRGSA SEP (Appendix D).
- **Development and Maintenance of an Interested Parties List:** ASRGSA developed an interested parties list prior to electing to become a GSA pursuant to Water Code Section 10723.8(a)(4) and maintained that list after becoming as GSA pursuant to Water Code Section 10723.4. The interested parties list is used to send e-mail meeting notices, agendas, newsletters, and updates.
- **Public Notices:** In accordance with Water Code Sections 10723(b), 10730(b)(1), and 10728.4, ASRGSA published public notices in accordance with Government Code Section 6066 prior to electing to be a GSA, and also publishes notices before imposing or increasing delivery fees, will publish public notices before adopting the GSP.
- **ASRGSA Website:** The ASRGSA website provides SGMA and agency information, includes meeting information, meeting materials, and links to meeting agendas and packets. The website provides links to agency resource materials, maps, newsletters, presentation materials, and meeting recordings.
- **Newsletters:** ASRGSA issues periodic newsletters concerning the Agency status and activities.
- **Existing Outreach Venues:** ASRGSA uses the member agency outreach networks to provide regular updates about the GSP development and, going forward, GSP implementation. This includes information via email newsletters, websites, and bill inserts.
- **Newspaper Articles:** Periodic updates may be provided to the *Ventura County Star* newspapers to advise, educate, and inform the public on SGMA implementation.

Public input was used to help shape GSP development. Input was also used to develop content for ASRGSA meetings, newsletters, and the website. ASRGSA public meetings were designed to encourage input, discussion, and questions. Because the Basin and number of stakeholders is relatively small, the meetings provided ample opportunity for everyone to provide comments and ask questions.

Examples of how public input helped shape the GSP include:

- During the development of the GSP water budget, outreach to Camrosa and FCGMA to learn about the planned future groundwater pumping rates. The estimates provided were incorporated into the planning process.
- Input received from stakeholders about costs helped focus the Agency on ensuring the GSP is appropriate for the Basin and only includes aspects absolutely necessary to maintain sustainable conditions in the Basin.

FCGMA developed a public outreach and engagement plan for all of their GSPs (SEP, Appendix D). The purpose of the plan is to create a common understanding and provide transparency in the GSP planning process and fulfill the SGMA requirements (§ 354.10(d)). The SEP identifies opportunities for public engagement, provides a discussion of the process for public input and response, and describes the method for informing the public on progress, including the status of projects and actions. Regular updates to interested parties are provided through monthly newsletters. Monthly updates and opportunities for public comment are provided at FCGMA Board Meetings. Agendas, minutes, and video recordings of the Board meetings and workshops are made available on the FCGMA website.

2.3.4.3 Progress Updates [§354.10(d)(4)]

§354.10 Notice and Communication. *Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:*

(d) *A communication section of the Plan that includes the following:*

(4) *The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.*

ASRGSA will continue to follow its adopted SEP (Appendix D) to inform the public about progress implementing the GSP, including status of projects and management actions.

3.0 Basin Setting [Article 5, SubArticle 2]

§354.12 Introduction to Basin Setting. *This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.*

This section presents information about the physical setting and characteristics of the ASRVGB, including data gaps and levels of uncertainty, which provide the basis for the SMC, projects, and management actions included in later sections. This section was prepared under the direction of a professional geologist and a professional engineer, with review by a certified hydrogeologist. This section includes sub-sections that describe the hydrogeologic conceptual model (HCM), current and historical groundwater conditions, a water balance, and management areas within the Basin.

The information provided in this section is based on an extensive literature review of existing hydrogeologic studies, basin-specific hydrologic and geologic data collected by many local agencies and investigators since as early as 1933, and numerical modeling performed for the ASRVGB (see Appendix G). The body of cited information and data are based on available data and information known to ASRGSA and FCGMA at the time of GSP preparation. Note, the Basin as shown on figures and discussed in this GSP corresponds to the current Basin boundary, which was modified from the original (DWR, 2003) by ASRGSA (Stantec, 2018) and approved by DWR in 2019 (DWR, 2019).

ASRGSA is committed to updating the Basin Setting periodically following GSP adoption based on additional data or information that may be identified or developed when such updates would result in a material change in the sustainable management of the Basin.

3.1 Hydrogeologic Conceptual Model [§354.14]

§354.14 Hydrogeological Conceptual Model.

(a) *Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.*

Sections 3.1.1 through 3.1.4 below present the HCM of the Basin. The HCM is based on available technical studies, qualified maps, and findings from the numerical modeling that relate to the physical components and interaction of the surface water and groundwater systems in the Basin.

HCM Overview – Key Features of the ASRVGB

The ASRVGB consists of multiple layers of alternating fine- and coarse-grained unconsolidated deposits, semi-consolidated deposits, and consolidated formations underlain by volcanic bedrock. The principal aquifer system is semi-confined and is characterized by distinct upper and lower groundwater-producing zones. These zones are identified as hydrostratigraphic units ([HSUs] Layers 3 and 5 in Section 3.1.3) in the west with the stratification absent or not apparent to the east. Note, available water quality data, namely nitrate, indicates there is hydraulic communication between the upper and lower groundwater-producing zones in at least some portions of the Basin (especially to the east where the stratification is not apparent). For this reason, the GSP treats the upper and lower groundwater-producing zones as a single principal aquifer for purposes of sustainable groundwater management in this initial GSP. This characterization of the Basin is based on previous studies, well construction information, and description of lithologic and geophysical logs.

Shallow groundwater is also present in the upper alluvium (HSU layer 1) in the vicinity of the Arroyo Conejo and Conejo Creek and is fed by infiltrating surface water sourced primarily from discharges from the Hill Canyon WWTP and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon. There are no extraction wells producing groundwater from the shallow groundwater, so it is not part of the principal aquifer system (described above). In certain parts of the Basin (primarily to the west), this shallow groundwater discharges back into Conejo Creek, essentially recirculating the wastewater discharges and urban runoff.

The Basin is roughly centered on an east-west oriented structural syncline and is thickest in the center and westernmost areas. The Basin is bounded by the low-permeability Conejo Volcanic bedrock on the bottom and the southwestern, southern, and eastern boundaries, where the alluvium pinches out. The northern boundary of the Basin is characterized by the Simi-Santa Rosa fault zone, which has multiple parallel strands of near-vertical faults and is aligned with the Las Posas Anticline; these combined structural features are interpreted to create a hydraulic divide between the adjacent Las Posas Valley Basin to the north.

A key hydraulic feature within the Basin is the Bailey Fault (Figure 3.1-08, discussed in more detail in Section 3.1.3), which acts as a relative barrier to flow, separating the northwestern third of the Basin from the rest of the Basin and dividing the Basin into two management areas: the ASRGSA management area and the FCGMA management area (Section 3.4). The lower groundwater-producing zone on the north side of the Bailey Fault (i.e., the FCGMA management area) has been interpreted to contain the Fox Canyon Aquifer. On the south side of the Bailey Fault (i.e., the ASRGSA management area), the lower groundwater-producing zone is interpreted to be a combination of the Fox Canyon and an HSU termed "Miocene Undifferentiated Sedimentary Rocks," which has previously been identified as the Santa Margarita Formation, and contains unconsolidated and consolidated sedimentary rocks derived from volcanics.

To help facilitate discussion of the HCM, the Basin is also segregated into two halves: the western half and the eastern half (Figure 3.1-08, Section 3.1.3), which is based on the Basin thickness and the HSUs present:

1) The western half of the Basin includes areas north and south of the Bailey Fault where the Basin is generally greater than ~700 ft thick, and there is a clear distinction between the upper and lower groundwater-producing zones. This half of the Basin also includes both the ASRGSA and FCGMA management areas.
2) The eastern half of the Basin includes areas where the Basin is generally less than ~700 ft thick, is pinching out toward the south and east, and lacks distinction between the upper and lower groundwater-producing zones. This half of the Basin includes only the ASRGSA management area.

Inflow into the Basin comes from mountain-block fracture flow from the Conejo volcanics from the south and east, infiltration of streamflow, recharge as infiltration of precipitation and agricultural and urban return flows, and mountain-front recharge from the Las Posas Hills in the north. There is an insignificant amount of underflow from the Pleasant Valley Basin to the west and this underflow is not well constrained by data. The Arroyo Conejo and Conejo Creek are the major surface water features recharging the groundwater in the southern and southwestern area of the Basin, and this shallow groundwater discharges back to the Conejo Creek in the southwestern area.

3.1.1 Regional Hydrology

3.1.1.1 Precipitation, Topography and Watershed Boundary [§354.14(d)(1)]

§354.14 Hydrogeological Conceptual Model.
(d) *Physical characteristics of the basin shall be represented on one or more maps that depict the following:*
(1) Topographic information derived from the U.S. Geological Survey or another reliable source.

The ASRVGB is located within the Lower Conejo Watershed in southern Ventura County, which is part of the larger Calleguas Creek Watershed (Figure 3.1-01). The ASRVGB is in an elongated east-trending valley, just north of the City of Thousand Oaks and east of the City of Camarillo. The Lower Conejo Watershed is bounded by the Las Posas Hills on the north, the Conejo Hills on the south, the Tierra Rejada Basin on the east, and the Pleasant Valley Basin on the west. The ASRVGB occupies approximately 6.1 square miles of the watershed.

The topography of the Basin is generally broad and flat in the west with ground surface elevations as low as ~200 ft above mean sea level (amsl) increasing to ~400 ft amsl to the east as the valley narrows along Santa Rosa Road (Figure 3.1-02). The western edge of the valley terminates at a north-trending extension of the Conejo Hills where the Conejo Creek drains into Pleasant Valley. The Basin boundary along the east-trending ridge of the Las Posas Hills to the north have ground surface elevations as high as ~700 ft amsl. Outside of the Basin boundary, the maximum elevation along the Las Posas Hills is ~1,000 ft amsl and Conejo Hills to the south have a maximum elevation of 1,076 ft amsl.

The ASRVGB is within a Mediterranean-type climatic zone, characterized by a long summer-fall dry season and a cool winter-spring wet season. On average 94% of the precipitation in the ASRVGB usually occurs between November and April with an annual average precipitation of 13.2 inches, with rainfall varying from less than 5 inches in the driest years to more than 30 inches in the wettest years. Figure 3.1-03 presents the average annual rainfall distribution in the Basin and neighboring area based on the 30-year climate normal from 1991 to 2020 (PRISM model, 2021), precipitation gage stations, and includes a chart of the mean monthly precipitation for gages within and in proximity of the ASRVGB. The PRISM model is the best available data with continuous spatial coverage, and the range of values shown on Figure 3.1-03 for the 30-year interpolated average annual precipitation (14.9 inches to 16.7 inches) is higher than the annual average precipitation of 13.2 inches derived from gage station data collected from 1929-2021, due to differences in time periods and calculation methods.

Figure 3.1-04 shows annual precipitation since 1929 along with the cumulative departure from mean[1] (~13.2 inches for the period of record) for gages 049, 049A, 500 and 500a within or immediately adjacent to the ASRVGB (Figure 3.1-03). As can be seen in Figure 3.1-04, very few years have an average

[1] Cumulative departure is the sum of the current difference from the mean annual precipitation and all the past differences.

rainfall. Most of the years (especially in the recent decade) have been drier than average, with the intermittent wet years heavily influencing the average. The period from the 1990s to the mid-2000s showed the longest stretch of wetter-than-average years indicated by an upward-trending cumulative departure line, followed by more than a decade of drier-than-average conditions indicated by a downward-trending cumulative departure line.

3.1.1.2 Surface Water Bodies [§354.14(d)(5)]

> **§354.14 Hydrogeological Conceptual Model.**
> ***(d)*** *Physical characteristics of the basin shall be represented on one or more maps that depict the following:*
> ***(5) Surface water bodies that are significant to the management of the basin.***

There are three primary surface water features in the ASRVGB with a combined drainage area of ~67 square miles. These include the Arroyo Santa Rosa, the Arroyo Conejo, and Conejo Creek. Figure 3.1-05 shows the location of these surface water features and streamflow gages, and respective hydrographs are shown on Figure 3.1-06. The Arroyo Santa Rosa originates in and drains the Tierra Rejada Basin (Figure 3.1-01), including the uplands to the northeast of the Basin along the Las Posas Hills, and flows to the southwest toward the Conejo Hills where it joins with the smaller Arroyo Santa Rosa Tributary before joining the Arroyo Conejo to form the Conejo Creek. The north and south forks of the Arroyo Conejo originate to the south of the ASRVGB, draining the northwestern area of Thousand Oaks and combining just downstream of the Hill Canyon WWTP. The Arroyo Conejo enters the Arroyo Santa Rosa Valley through the Conejo Hills and Hill Canyon, joining the Arroyo Santa Rosa just downstream of the mouth of Hill Canyon. Conejo Creek starts at the confluence of the Arroyo Conejo and the Arroyo Santa Rosa and flows in a westerly direction into Pleasant Valley and eventually into Calleguas Creek downstream of the ASRVGB.

The Arroyo Santa Rosa is an ephemeral creek, bisecting the Santa Rosa Valley. A stream gage (Station 838) was installed in 2006 to record peak flows during storm events just upstream of where the Arroyo Santa Rosa joins Conejo Creek. However, due to the inconsistent manual measurements and the incomplete streamflow dataset, the records for gage 838 are not considered to be representative of flows for the Arroyo Santa Rosa and are not used for this GSP. Streamflow for the Arroyo Santa Rosa was estimated for the numerical groundwater model (Appendix G). As shown in Figure 3.1-05, approximately 3,000 ft of the Arroyo Santa Rosa is composed of a rectangular reinforced concrete channel and a trapezoidal rip rap channel. Downstream of the confluence with the Arroyo Santa Rosa Tributary, the channel is an improved trapezoidal channel (not concrete lined) for approximately 2,750 feet (ft).

The Arroyo Conejo flows are gaged at the Confluence Flume gaging station in Hill Canyon (Figure 3.1-05); however, flows are only recorded for the summer months (typically June through September; Figure 3.1-06). The Hill Canyon WWTP discharges effluent into the North Fork Arroyo Conejo which is the largest contributor to flow in Conejo Creek, averaging 50% of the total flow for the Conejo Creek (MWH, 2013). Discharges began in 1961, when the City of Thousand Oaks began operating Hill Canyon WWTP (MWH, 2013). Prior to these discharges, Conejo Creek was an ephemeral stream, and was typically dry in the summer months. However, by 1972, Conejo Creek experienced perennial flow, as recorded by Ventura County's streamflow gage 800, which was installed in 1968. Gage 800 is located just outside of the Basin on the western boundary. In 2011, a new gage was installed at Ridge View Street south of Highway 101 in the Pleasant Valley and named Station 800A (Figure 3.1-05), and Ventura County discontinued gaging streamflow at gage 800 and maintained gaging at 800A. In 2012, streamflow gaging at station 800 resumed by the CCWTMP. Figure 3.1-06 shows the flow data available for the Arroyo Conejo and Conejo Creek system. For the years of record without streamflow for gage 800 (~2011-2012), streamflow was estimated using methods described in the numerical model documentation (Appendix G).

Based on review of the SWRCB Electronic Water Rights Information Management System (EWRIMS), 10 surface water rights have been identified in the Basin; however, none are currently active. Camrosa WD sets the diversion rates for the water rights within the Basin (SWRCB, 1997).

3.1.1.3 Imported Water [§354.14(d)(6)]

§354.14 Hydrogeological Conceptual Model.
(d) *Physical characteristics of the basin shall be represented on one or more maps that depict the following:*
(6) The source and point of delivery for imported water supplies.

Imported water into the ASRVGB consists of water purchased from Calleguas MWD (includes water sourced from the State Water Project [SWP] and, to a lesser extent, Colorado River Water Project [CRWP], and groundwater from the Las Posas aquifer storage and recovery [ASR] wellfields). Additional water from outside of the Basin includes groundwater extracted for potable water supply from the neighboring Tierra Rejada and Pleasant Valley groundwater basins (Camrosa WD has three wells in the Pleasant Valley Basin and one well in the Terra Rejada Basin), non-potable water diverted from Conejo Creek downstream of the Basin, and tertiary-treated recycled water from the Camrosa Water Reclamation Facility. For clarity, these additional sources of water from outside of the Basin are not defined as imported sources within this GSP.

Camrosa WD imports water to supplement its raw well water through its wholesaler, Calleguas MWD, and points of delivery are shown on Figure 3.1-07. Historically, water purchased from Calleguas MWD was imported into the ASRVGB to solely supply agriculture. In 1965, Camrosa WD expanded its water distribution system, and the majority of Calleguas MWD supplies used for agriculture was transferred to M&I use. Presently about 15 percent of Camrosa WD's Calleguas MWD imports are delivered to agricultural customers while the remainder serves M&I uses. Most of the Calleguas MWD delivered water is from the Sacramento-San Joaquin Delta, although Colorado River water is blended when Sacramento-San Joaquin supplies are low. Camrosa WD the Calleguas MWD imports with treated groundwater, pumped from four of its groundwater wells in the ASRVGB to reduce chlorides, nitrates, and other constituents exceeding or close to Maximum Contaminant Limits (MCLs) to meet drinking water standards (Camrosa, 2021).

During its past 10 fiscal years (2010-2020), Camrosa WD has purchased an average of 5,338 AFY of imported water from Calleguas MWD, and imports have ranged from 6,924 AFY in fiscal year 2014 to 3,709 AFY in fiscal year 2017 (Camrosa, 2021). This is significantly less than historical purchases of imported water where the peak purchase of 11,479 AF occurred in 1990 during a drought. In 2020, imports constituted roughly 60 percent of Camrosa WD's potable supply, although during this period the Conejo wellfield (located within the ASRVGB) was offline due to 1,2,3-trichloropropane (TCP) detections. In years when the wellfield is in normal operation, imports constitute an average of about 40 percent of potable supply (Camrosa, 2021). Camrosa WD is actively reducing its reliance on imported water by developing local water supply alternatives with a goal of reducing reliance on imported water to less than 40 percent by 2025. This will help reduce the vulnerability of Camrosa WD's potable water supply by providing a degree of separation from the following risks: climatic variation, the relative health of the

Sacramento-San Joaquin Delta and the SWP's vulnerability to legislative rulings, and possible catastrophic interruptions to service (Camrosa, 2021).

3.1.2 Regional Geology [§354.14(b)(1),(d)(2), and (d)(3)]

§354.14 Hydrogeological Conceptual Model.

(b) *The hydrogeologic conceptual model shall be summarized in a written description that includes the following:*

(1) The regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency.

(c) The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.

(d) *Physical characteristics of the basin shall be represented on one or more maps that depict the following:*

(2) Surficial geology derived from a qualified map including the locations of cross-sections required by this Section.

(3) Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies.

3.1.2.1 Geologic and Structural Setting [§354.14(b)(1),(c),(d)(2)]

The ASRVGB is within the Transverse Ranges geomorphic province, as defined by the California Geological Survey (CGS) Note 36 (CGS, 2002). In general, the faulting and seismicity associated with the Transverse Ranges is the result of the compressional regime associated with the "Big Bend" of the San Andreas Fault Zone. Rocks in this region have been folded into a series of predominantly east-west trending anticlines and synclines associated with thrust and reverse faults.

The ASRVGB is aligned with the east-trending Santa Rosa Syncline, which bisects the Santa Rosa Valley, extending westward into the adjacent Pleasant Valley. The northern edge of the Basin is delineated by the Simi-Santa Rosa Fault Zone along the Las Posas Hills Anticline, parallel to the Santa Rosa Syncline (Figure 3.1-08). The Simi-Santa Rosa Fault Zone is a reverse fault system with some left-lateral movement, with the upthrown Las Posas anticlinal mountain block exhibiting vertical offset ranging 500 to 5,000 ft (Bailey, 1969). The Santa Rosa syncline and fault are part of the regional Camarillo fold belt, which is characterized by a west-plunging fold ax4eis (DeVecchio et al., 2012). The Santa Rosa Syncline and Las Posas Anticline formed prior to the deposition of Saugus Formation sediments, which filled in the ASRVGB. Then the Simi-Santa Rosa fault zone formed and offset the syncline-anticline connecting limb, which resulted in the folding of Saugus Formation deposits and older alluvium (Jakes, 1979; MWH, 2013).

The major fault identified within the Basin is the Bailey Fault, which is a northeast-trending vertical fault that acts as a hydraulic and political boundary for the Basin (See Section 3.1.3.1.2; Boyle, 1997; MWH, 2013). The area to the northwest of the Bailey Fault is located within the FCGMA jurisdictional boundary. The southeast side of the fault zone is uplifted relative to the west side with a vertical offset up to ~300 ft (Mukae and Turner, 1975; MWH, 2013). Although the Bailey Fault has not been mapped on the United States Geological Survey (USGS) quadrangles for the ASRVGB (Dibblee and Ehrenspeck, 1990; 1992), it has been identified by several historical studies (Bailey, 1969; Mukae and Turner, 1975; Boyle, 1987) and is included on the geologic map for the Basin (Figure 3.1-08). The Bailey Fault has been interpreted to relate to a more regional fault system that extends to the southwest along the eastern margin of the Pleasant Valley toward and beyond the coastline (Mukae and Turner, 1975; Hanson et al., 2003).

As mentioned above, the synclinal structure of the ASRVGB extends to the west into Pleasant Valley; however, the alluvial thickness and width of the valley becomes constricted at the western boundary of the ASRVGB by a north-trending ridge of the Conejo volcanics, which form a saddle-like structure. Although flow across this western boundary may be limited to the groundwater-producing zones, it is interpreted to hydraulically connect the ASRVGB to the Pleasant Valley groundwater basin (see Section 3.1.3.1.1). The Conejo volcanics are the primary bedrock unit underlying the formations that comprise the Basin and have a maximum depth of over 1,000 ft in the western part of the Basin, based on the interpretation of lithologic logs. The Basin materials pinch out to the south and east where the Conejo volcanics outcrop along the Conejo Hills and the western margin of the Tierra Rejada Basin, respectively.

The structural Basin is filled with a mixture of unconsolidated, semi-consolidated, and consolidated units that were deposited in both marine and terrestrial settings, ranging from upper Miocene to Holocene in age. The ASRVGB depositional history of the Pleistocene epoch is consistent with the other basins of the Transverse Ranges, with dramatic changes in sea level which produced unconformities between extensive conglomerates, sandstone, and beach sand deposits interbedded with thick sequences of silts and clays. Generally, the gradations observed in the lithologic logs and electrical logs show more coarse-grained deposits at the base of formations with sediments fining upward, separated by unconformities (MWH, 2103). The stratigraphy in the western half of the Basin is separated into the northwest and southeast by the Bailey Fault (Figures 3.1-08 and 3.1-09), but is generally classified from youngest (top) to oldest (bottom) as follows:

- Recent Alluvium – unconsolidated alluvial and fluvial gravels, sands, silts, and clays up to ~200 ft in thickness, including stream-deposited sand and gravel adjacent to Conejo Creek (Mukae and Turner, 1975).
- Lower Holocene/upper Pleistocene older alluvium and terrace deposits – deposits of dissected gravels, sands, and clays are extensive along the southern flank of the Las Posas Hills (Figure 3.1-08) and reach a maximum thickness of ~250 ft (Mukae and Turner, 1975).
- Pleistocene Saugus and/or upper San Pedro Formations consisting of lenticular layers of sand, gravel, silt, and clay of marine and continental origin (Hanson et al., 2003), the uppermost age-equivalent to the Mugu Aquifer of the Oxnard Plain Subbasin. Overall thickness ranges ~50 to 240 ft, and the formation outcrops on in the Las Posas Hills to the north (Figure 3.1-08).
- Middle Pleistocene Saugus and/or San Pedro Formation extensive thick silts and clays up to ~200 ft in thickness, mostly continuous in the western half of the Basin and northwest of the Bailey Fault.
- Lower and Middle Pleistocene San Pedro Formation, also described as the Las Posas Sand (Dibblee and Ehrenspeck, 1990) and the Fox Canyon Formation. Deposits consist of marine sand and gravel beds, interbedded with silts and clays and ranging ~100 to 300 ft in thickness (Hanson et al., 2003), and are less apparent toward the eastern half of the Basin. The overall thickness of the Saugus and San Pedro Formations can be ~300 to 900 ft thick in the central part of the Basin northwest of the Bailey Fault and is exposed in the Las Posas Hills to the north (Figure 3.1-08).
- Lower Pleistocene Santa Barbara Formation consisting of marine sandstone, siltstone, mudstone, and shale of ~20 to 30 ft thickness exclusively on the western end of the Basin, pinching out to the east (Boyle, 1987; MWH 2013).
- Upper Miocene Undifferentiated Sedimentary Rocks derived from marine, terrestrial and volcanic consolidated sediments, consisting of mudstones, siltstones, sandstones, and conglomerates, previously identified as the Santa Margarita Formation (Bailey, 1969; Boyle, 1987; USBR, 1978), and the Upper Topanga and/or detrital volcanic sediments of Lindero

Canyon (Dibblee and Ehrenspeck, 1990; 1992) of variable thickness up to 300 ft. These deposits are mostly present southeast of the Bailey Fault, pinching out toward the east, and can contain thin basaltic lava flows (Boyle, 1987). Some small exposures are present in the northeastern portion of the Basin (Figure 3.1-08).

- Miocene Conejo volcanics and intrusive igneous rocks, forming a basement of predominantly andesitic-basaltic flows and breccias of over 13,000 ft in thickness (Boyle, 1987). The Conejo volcanics are exposed to the south and east (Figure 3.1-08).

The classification approach for the stratigraphic relationships shown on Figure 3.1-09 is based largely on hydrogeologic characteristics, and the corresponding geologic units, and HSUs are presented along with the numerical groundwater model layers (Appendix G). Other researchers have divided these deposits in different ways, based on geomorphological or other characteristics (e.g., Mukae and Turner, 1975; Dibblee and Ehrenspeck, 1990, 1992; Hanson et al., 2003; UWCD, 2018). For example, Figure 3.1-08 shows the surficial geology mapped by Dibblee and Ehrenspeck (1990, 1992) and the geologic units are classified based on lithology and relative age, unique from their hydrogeologic characteristics.

An important distinction for the stratigraphy based on review of previous studies is the identification of the Fox Canyon unit on the southeast side of the Bailey Fault. The presence of seashells (indicative of the Fox Canyon Aquifer in neighboring groundwater Basins) and sandy units from lithologic and electric-log signatures observed on the southeast side of Bailey Fault, in addition to interpretations presented by Mukae and Turner (1975) and USBR (1978) cross sections (depicting the Fox Canyon Aquifer present on both sides of the Bailey Fault) provided the key evidence to include this interpretation in the HCM. In addition, the Las Posas Sand (QTlp; interpreted to be indicative of the Fox Canyon unit) is shown on the surface geology map (Figure 3.1-08) to crop out on the land surface along the northern boundary of the Basin, on both sides of the Bailey Fault. The thickness of the Basin deposits decreases considerably in the eastern half of the Basin, with less evidence of the Saugus and San Pedro formations, and shows recent alluvial and terrace deposits lying unconformably either on the upper Miocene Undifferentiated Sedimentary Rocks or the Conejo volcanics (MWH, 2013).

Two cross sections were created to show the variation in topography, alluvium thickness, HSUs, and bedrock elevations within the ASRVGB: 1) A-A’, oriented north-south across the Bailey Fault in the western half of the Basin (Figures 3.1-08 and 3.1-10a), and 2) B-B’, oriented east-west across the Bailey Fault and the length of the Basin (Figures 3.1-08 and 3.1-10b). Figure 3.1-08 shows the locations of these cross-sections in relation to the surface geology, faults (from Dibblee and Ehrenspeck, 1990, 1992), and surface water features. The location of select wells used to refine the stratigraphy within the ASRVGB are also shown on each cross section inset map.

3.1.2.2 Soil Characteristics [§354.14 (d)(3)]

Figure 3.1-11 presents the soil hydrologic group map based on the United States Department of Agriculture (USDA) Natural Resources Conservation Service Soil Survey Geographic Database (USDA, 2020). The soil hydrologic group is an assessment of soil infiltration rates that is determined by the water-transmitting properties of the soil, including the hydraulic conductivity and percentage of clays in the soil, relative to sands and gravels. Soils are assigned to one of the following four groups according to the rate of water infiltration when the soils are not protected by vegetation, are saturated, and receive precipitation from long-duration storms.

- **Group A.** Soils having a high infiltration rate (low runoff potential); consisting of deep, well-drained to excessively drained sands or gravelly sands.
- **Group B.** Soils having a moderate infiltration rate; consisting of moderately deep or deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture.
- **Group C.** Soils having a slow infiltration rate; consisting of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture.
- **Group D.** Soils having a very slow infiltration rate (high runoff potential); consisting of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material.

In general, the group correlates with the hydraulic conductivity of the underlying geologic units, with the higher soil hydraulic conductivity zones (Group A) corresponding to alluvium along past and active channels or to sandstone-dominated bedrock formations and some stream terrace deposits (Group B), and the lower soil hydraulic conductivity zones corresponding to the colluvium and older alluvial deposits (Group C) and siltstone/shale-dominated bedrock formations (Groups C and D).

Figure 3.1-11 shows that soils within the ASRVGB primarily consist of Group A soils in the central part of the Basin, which consist of deep, well-drained to excessively drained sands or gravelly sands of a high infiltration rate. This area exhibits the lowest runoff potential and the highest infiltration rate. Patches of Group B soils occur in the south-central part of the Basin and along the Arroyo Conejo and Conejo Creek channels, which consists of moderately deep or deep, moderately well-drained or well-drained soils of moderately fine to fine texture. Infiltration rates are moderate. Group C soil predominately occurs in the northern portion of the Basin and along the southern Basin perimeter, consisting of soils of moderate fine to fine texture with slow infiltration rates. Group D soils mainly occur in smaller isolated patches in the northwest portion of the Basin and along the Conejo volcanic outcrops south of the Basin boundary. These soils have a very low infiltration rate.

3.1.3 Principal Aquifers and Aquitards [§354.14(b)(4)(A)]

> **§354.14 Hydrogeological Conceptual Model.**
> ***(b)*** *The hydrogeologic conceptual model shall be summarized in a written description that includes the following:*
> ***(4) Principal aquifers and aquitards, including the following information:***
> ***(A) Formation names, if defined.***

Bulletin 118 defines a “groundwater basin” as an alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and a definable bottom. Rock or sediments with very low permeability or a geologic structure such as a fault act as lateral basin boundaries that significantly impede groundwater flow. Bottom boundaries include rock or sediments of very low permeability if no alluvial aquifers occur below those sediments within the basin (DWR, 2016a).

Bulletin 118 defines an “aquifer” as a body of rock or sediment that yields significant or economic amounts of groundwater to wells or springs. The GSP Emergency Regulations define a “Principal Aquifer” as aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems.

Previous studies state that the ASRVGB is comprised of a single unconfined aquifer system (MWH, 2013) but have separated the water-bearing formations into four groups: 1) alluvium and terrace deposits, 2) Saugus and San Pedro Formations, 3) Santa Margarita Formation, and 4) Conejo volcanics (Boyle, 1987, 1997; Camrosa, 2010; MWH, 2013).

Six distinct HSUs were developed for the HCM and numerical groundwater model and consist of five layers of sedimentary units and the sixth bottom layer representing the bedrock basement (Figure 3.1-09). The six HSUs primarily pertain to the western half of the Basin (see Figures 3.1-08 and 3.1-10b), where the Basin is generally greater than ~700 ft thick. Electrical-log signatures which indicated the lithology is either mostly fine-grained (i.e., silt and clay) or coarse-grained (i.e., sand and gravel) were correlated with the lithologic logs and well screen information to delineate the layer elevations and primary aquifers. The HSUs are less distinct in the east, and the aquifer behaves as one hydraulically connected system in this region. The HSU layers for the western half of the Basin can be observed in the cross sections (Figures 3.1-10a and 3.1-10b), and are summarized below:

1. Layer 1 is assigned to the recent alluvium for the Basin. Shallow groundwater is present in this layer in the vicinity of the Arroyo Conejo and Conejo Creek and is sourced primarily from wastewater flows (discharges from the Hill Canyon WWTP) and urban runoff from Conejo Valley in the Arroyo Conejo where the creek enters the Basin; however, this layer is not a groundwater-producing zone (see Section 3.1.3.2).
2. Layer 2 is assigned to the older alluvium and finer-grained units observed for the upper Saugus/San Pedro Formations and forms a semi-confining unit between the recent alluvium (layer 1) and an upper groundwater-producing zone (layer 3).
3. Layer 3 is assigned to the coarse-grained units and associated screened intervals observed in the Saugus/San Pedro Formations that constitute an upper groundwater-producing zone.
4. Layer 4 is assigned to a thick fine-grained semi-confining unit observed between the upper (layer 3) and lower (layer 5) groundwater-producing zones.
5. Layer 5 is assigned to the Fox Canyon Aquifer (base of the Saugus/San Pedro Formation) and includes the underlying Upper Miocene Undifferentiated Sedimentary Rocks (present primarily on the southeast side of the Bailey Fault), that constitute a lower groundwater-producing zone.
6. Layer 6 is assigned to the Conejo volcanics that underlies the Basin.

The eastern half of the Basin (see Figures 3.1-08 and 3.1-10b) has less detail from lithologic logs and electrical logs compared to the western half of the Basin. The eastern half of the Basin does not show the same distinct hydrostratigraphy as the western half, primarily due to the reduced thickness and pinching out of the more prominent alternating fine- and coarse-grained layers observed in the western half. The eastern half of the Basin is generally characterized by a thin recent alluvium deposited on finer-grained units directly overlying either the Miocene Undifferentiated Sedimentary Rocks or the Conejo volcanics. Much of the groundwater production from the Basin appears to be from the Saugus and/or San Pedro Formations (which is interpreted to include the Fox Canyon Aquifer at the base of the Formation both northwest and southeast of the Bailey Fault), and the Miocene Undifferentiated Sedimentary Rocks (also known as the Santa Margarita and other Formations [see Section 3.1.2.1], i.e., Layers 3 and 5 described above). The underlying Conejo volcanics produce water to a limited number of wells within the eastern half and along the southern edges of the Basin.

Review of previous studies along with the interpretation of lithologic logs, electrical-logs, and well screen information supports the identification of upper (HSU layer 3, Saugus/San Pedro formation) and lower (HSU layer 5, basal Saugus/San Pedro formation and/or Fox Canyon and Miocene Undifferentiated Sedimentary Rocks) groundwater-producing zones separated by semi-confining low-permeability units (Appendix G), particularly in the western half of the Basin (see Figures 3.1-08, 3.1-10a, and 3.1-10b) where the maximum Basin thickness is generally greater than ~700 ft. However, available water quality data, namely nitrate, indicates there is hydraulic communication between the upper and lower groundwater-producing zones in at least some portions of the Basin. For this reason, the GSP treats the upper and lower groundwater-producing zones as a single principal aquifer for purposes of sustainable groundwater management in this initial GSP. The need for separating the upper and lower groundwater-producing zones into distinct principal aquifers for the purposes of sustainable groundwater management will be revisited when additional groundwater level data for each groundwater-producing zone is available after the completion of the Groundwater Monitoring Network Enhancement Project (Section 6.2).

As can be seen on cross section A-A’ (Figure 3.1-10a), the younger Holocene-age alluvium (Layer 1, up to ~200 ft thick) overlies the older Pleistocene-age Saugus and San Pedro Formations (Layers 2 through 5, ~50 to 400’ thick each), which includes the Fox Canyon Aquifer and the Miocene Undifferentiated Sedimentary Rocks on the southeast side of the Bailey Fault. The bottom of the Basin (Miocene Conejo Volcanic Bedrock) is shown as the contact between the bottom of Layer 5 and top of Layer 6. The layer thicknesses are variable, but generally increase toward the center of the Basin and are summarized by geologic formation in Section 3.1.2.1. Cross section B-B’ (Figure 3.1-10b) crosses the entire length of the Basin. As shown in the cross section, the layering is consistent with cross section A-A’ (Figure 3.1-10a) in the western half of the Basin. The thickness of the Basin fill is shown to decrease gradually toward the east where it pinches out at the bedrock. The depth to bedrock decreases sharply at the western end of the cross section (from ~1,200 ft to ~400 ft deep), where the ASRVGB boundary is located.

The hydrostratigraphy southeast of the Bailey Fault has previously been considered to be completely separate from the northwest (Boyle, 1997); however, the Fox Canyon Aquifer is interpreted to be present on the east side of the fault (Mukae and Turner, 1975; USBR, 1978), and there are some lithologic logs with clean sand intervals and seashells (indicative of the Fox Canyon Aquifer) described for the lower groundwater-producing zone on the southeast of the Bailey Fault. There are also alternating thick beds of fine-grained and coarse-grained materials observed in well logs and electrical logs southeast of the Bailey Fault, similar to logs west of the Fault. In addition, the Las Posas Sand (QTlp; interpreted to be indicative of the Fox Canyon Aquifer unit) is shown on the surface geology map (Figure 3.1-06) to crop out on the land surface along the northern boundary of the Basin, on both sides of the Bailey Fault. The eastern half of the Basin is characterized by less agricultural land use and more urban land use. In addition, there are notable stratigraphic changes, and the alluvial thickness decreases substantially to the east as it pinches out toward the easternmost boundary. The stratigraphy in the east does not exhibit the same layering that is observed in the well logs and electrical logs of the western portions of the Basin, where the alluvial thickness is generally greater than ~700 ft and there are alternating deposits of fine-grained and coarse-grained materials; the basin-fill sediments to the east are mostly fine grained.

3.1.3.1 Physical Properties of the Aquifers and Aquitards

3.1.3.1.1 Basin Boundary (Vertical and Lateral Extent of Basin) [§354.14(b)(2),(b)(3),(b)(4)(B)]

> **§ 354.14 Hydrogeological Conceptual Model.**
> ***(b)*** *The hydrogeologic conceptual model shall be summarized in a written description that includes the following:*
> ***(2) Lateral basin boundaries, including major geologic features that significantly affect groundwater flow.***
> ***(3) The definable bottom of the basin.***

The original Basin boundary of the ASRVGB was defined in the DWR Bulletin 118 (2003). The boundary was modified in 2018 to incorporate additional wells located outside the current basin boundary and to improve the alignment with geologic conditions that define the southern and eastern edge of the Basin (Stantec, 2018). The boundary modification was approved by DWR in 2019 (DWR, 2019). Figure 3.1-01 shows the ASRVGB (DWR Basin No. 4-007, Bulletin 118) in relation to the adjacent DWR groundwater basins and hills.

The ASRVGB is within the west-east trending elliptically shaped Arroyo Santa Rosa Valley, laterally bounded by the Simi Fault Zone to the north and bedrock outcrops in the Conejo Hills to the south and east. The western Basin boundary is shared with the Pleasant Valley and is characterized by a north-trending ridge of the Conejo volcanics (see Figures 3.1-08 and 3.1-10a), which forms a relatively shallow subsurface saddle-like structure constricting the alluvium. The Fox Canyon and San Pedro Formations in the ASRVGB and Pleasant Valley Basin both thin toward the western boundary of the ASRVGB; however, there is still interpreted to be a hydraulic connection between the two Basins through these units.

The ASRVGB boundary crosses streamflow entry points for the Arroyo Conejo to the south and the Arroyo Santa Rosa to the east, and the Basin boundary also crosses a streamflow exit point for the Conejo Creek at the western boundary.

The bottom of the Basin is generally defined as the Conejo volcanics (see Section 3.1.2.1). The Basin bottom forms a trough shape that has been folded and faulted extensively, oriented west-east along the axis of the Santa Rosa Syncline and has been defined using well logs and interpretations of cross sections from previous studies (Mukae and Turner, 1975; Boyle, 1987; MWH, 2013; Stantec, 2018). The depth to bedrock ranges from zero at the bedrock outcrops to the south and east to over ~1,000 ft in the western portion of the Basin where the elevation of the top of bedrock has been interpreted to be less than -900 ft amsl (Figure 3.1-12). The Basin thickness coincides with the depth to bedrock with thicknesses ranging from zero to over ~1,000 ft (Figure 3.1-13).

The Basin is hydraulically bounded by the Simi-Santa Rosa Fault Zone to the north and the Conejo volcanics to the south and southeast. The Simi-Santa Rosa Fault Zone runs generally parallel to the crest of the Las Posas Hills and is a regional subvertical reverse fault system which acts as a barrier between the ASRVGB and the Las Posas Valley Basin to the north (Figures 3.1-08 and 3.1-10a). A small amount of mountain-front recharge from the Las Posas Hills is conceptualized to flow into the Basin from the north (See Appendix G). The Conejo Hills to the south and southeast are composed of the massive, relatively impermeable Conejo volcanics, which separates the ASRVGB from the Conejo Basin to the south and the Tierra Rejada Basin to the east (See Figures 3.1-01 and 3.1-08). Although some groundwater is extracted from the Conejo volcanics in the southern and eastern portions of the Basin (likely through fractures), the formation is not considered a principal aquifer and is conceptualized as a barrier to vertical groundwater flow; however, the southern and eastern boundaries of the Basin are interpreted to have groundwater inflow to the Basin, conceptualized as fracture flow through the Conejo volcanics (See Appendix G).

3.1.3.1.2 Groundwater Flow Barriers [§354.14(b)(4)(C)]

§354.14 Hydrogeological Conceptual Model.
(b) *The hydrogeologic conceptual model shall be summarized in a written description that includes the following:*
(4) *Principal aquifers and aquitards, including the following information:*
(C) Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features.

In the western half of the Basin, the principal aquifer is hydraulically divided into two areas by the Bailey Fault (Figure 3.1-08). The Bailey Fault creates a partial hydraulic separation between the northwestern third of the Basin from the rest of the Basin, and differences in both groundwater levels and water quality data across the fault support the hydraulic separation (Mukae and Turner, 1975; Boyle, 1987; MWH 2013). Hydraulic head differences of ~60-80 ft have been observed across the Bailey Fault during high groundwater level conditions (Boyle, 1997; MWH, 2013), and differences in water chemistry data (primarily nitrate and total dissolved solids [TDS]) are also observed (Figure 3.1-14). Hydraulic head differences across the Bailey Fault are less apparent during low groundwater level conditions (Stantec, 2018).

As discussed in Section 3.1.3, the hydrostratigraphy within the Basin changes from west to east, where the separation between an upper and lower groundwater-producing zone is less apparent (see Figure 3.1-10b). Boyle (1997) identifies a zone of low permeability where historical groundwater level fluctuations occur independently from the western part of the Basin. In particular, to the east, groundwater levels are observed to increase during the early to late 1990s, while groundwater levels in the west remained relatively stable (Figure 3.1-15). There is also a period in early 2018 when groundwater levels rapidly declined in the east by ~50 ft, but the same decline was not observed in the west, suggesting a hydraulic separation.

3.1.3.1.3 Hydraulic Properties [§354.14(b)(4)(B)]

§354.14 Hydrogeological Conceptual Model.
(b) *The hydrogeologic conceptual model shall be summarized in a written description that includes the following:*
(4) *Principal aquifers and aquitards, including the following information:*
(B) *Physical properties of aquifers and aquitards, including the vertical and lateral extent,* ***hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information.***

Holocene, Pleistocene, and Miocene units comprise the single principal aquifer in the ASRVGB. There is a high degree of variability in the permeability of units throughout the vertical extent of the Basin. The variable properties combined with the depth and lateral extent of the productive units and variable groundwater levels has a significant impact on groundwater flow and productivity in different areas within the ASRVGB and at different times.

The ability of an aquifer to transmit and store water is characterized by aquifer parameters, including hydraulic conductivity, transmissivity, specific yield, and storativity. Hydraulic conductivity is a measure of an aquifer's capacity to transmit water. It is defined as rate of flow under a unit hydraulic gradient through a unit cross-sectional area of an aquifer.

Aquifer transmissivity is the rate of flow under a unit hydraulic gradient through a unit width of aquifer of given saturated thickness. It is the product of the hydraulic conductivity and aquifer thickness. More transmissive aquifers produce groundwater at higher rates to wells.

Storativity is a dimensionless measure of a volume of water that is discharged from an aquifer, per unit area of the aquifer, per unit reduction in hydraulic head. In an unconfined aquifer, the small effect of rock and fluid compressibilities is neglected, and therefore storativity is essentially equivalent to specific yield. Specific yield is the volume of water that will drain under the force of gravity from unit bulk volume of the aquifer. The most reliable estimates of these parameters are obtained through long-term controlled aquifer or pumping tests (greater than 24 hours) with groundwater level monitoring in nearby non-pumping wells. Estimates may also be obtained through short-term pumping tests and literature values based on soil types and well driller logs.

Within the ASRVGB, limited data is available for estimates of transmissivity and most of the data used to estimate the transmissivity has been derived from specific capacity measurements (specific capacities converted to transmissivity using a conversion factor of 2,000 gallons per day/gallons per minute [gpd/gpm] corresponding to confined aquifers, based on Driscoll [1986]). The lower groundwater-producing zone on either side of the Bailey Fault has previously been identified to be confined (Mukae and Turner, 1975); however, it is considered to be semi-confined due to the discontinuity of the clay layers separating the upper and lower groundwater-producing zones. Figure 3.1-16 shows the location and range in values of transmissivity estimates from driller's logs and previous studies. Specific capacities of wells completed within the Saugus Formation (including the upper and lower groundwater-producing zones) range from ~2 to 100 gallons per minute per foot [gpm/ft] (Boyle, 1987). In addition, Boyle (1987) conducted a pump test within the upper groundwater-producing zone and estimated a transmissivity of ~4,000 gpd/ft (~3 gpm/ft). A pump efficiency test for a well completed within the upper groundwater-producing zone on the southeast side of the Bailey Fault (02N20W24Q03S, Santa Rosa Mutual Well #10) indicated a specific capacity of 18.7 gpm/ft (Boyle, 1987). Specific capacities for wells completed within the lower groundwater-producing zone the southeast side of Bailey Fault (i.e., Undifferentiated Miocene Sedimentary Rocks) ranged from 3 to 75 gpm/ft (Boyle, 1987). Additional review of available well logs indicated a specific capacity of 1.5 gpm/ft for the upper and lower groundwater-producing zones on the northwest side of the Bailey Fault, and 4.5 to 47 gpm/ft for the lower groundwater-producing zone on the southeast side; 1 to 13.5 gpm/ft was shown on well logs for bedrock wells in the southeast.

The transmissivity estimates from aquifer and specific capacity tests, and previous studies were used to derive preliminary estimates of hydraulic conductivities for the numerical groundwater model. Horizontal hydraulic conductivities derived from a previous version of a numerical groundwater model ranged from less than 1 ft/day to 50 ft/day, generally increasing toward the center of the Basin (MWH, 2013). Figure 3.1-17 shows the vertically averaged hydraulic conductivity derived from the numerical model for the Basin. Additional details on the calibration methodology for the numerical model are presented in Appendix G.

Storage parameters have not been estimated for ASRVGB; however, the specific yield was calibrated to values ranging 0.06 to 0.15 in the previous version of the groundwater model (MWH, 2103). Starting values for the specific yield and specific storage were estimated based on representative values obtained from literature (Morris and Johnson, 1967; Domenico, 1972). The final calibrated storage parameters ranged from 0.1 to 0.2 for the specific yield in the unconfined areas of the numerical model (primarily layers 1 and 2) and for the confined areas of the model the specific storage ranged from 10^{-5} to 2 X 10^{-4} per foot (see Appendix G for additional details).

3.1.3.2 Groundwater Recharge and Discharge Areas [§354.14(d)(4)]

> **§354.14 Hydrogeological Conceptual Model.**
> ***(d)*** *Physical characteristics of the basin shall be represented on one or more maps that depict the following:*
> ***(4)*** *Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin.*

The primary sources of groundwater for the ASRVGB are inflow from the Conejo volcanics from the south and east and streamflow percolation. Secondary sources of groundwater for the Basin are from irrigation return flows, urban land use return flows (applied water, septic systems, and distribution losses), underflow from the Pleasant Valley, and infiltration from precipitation. The delineation of recharge and discharge areas are shown on Figure 3.1-18.

As noted in Section 3.1.1.2, there are no mapped seeps or springs within the ASRVGB (USGS National Hydrography Dataset, 2021). Temporary seeps and springs outside of the Basin have been observed in the Conejo Hills following precipitation events, but these are not considered significant. Conceptually, the temporary seeps and springs are expected to infiltrate back into the subsurface and contribute to the inflow from the Conejo volcanics along the south and east of the Basin (Figure 3.1-18). The inflow from the Conejo Volcanic bedrock is conceptualized as a deep source of subsurface recharge to the Basin via fracture-flow, which is evidenced by higher groundwater levels observed in wells completed in the bedrock to the east in areas where the bedrock is very shallow or at the land surface.

Recharge of return flows from irrigation occurs in the areas of the Basin with agricultural land use (Figure 3.1-18). However, owing to the generally semi-confined aquifer conditions, groundwater recharge throughout the basin in response to infiltration of precipitation is not spatially uniform. Primarily in the western half of the Basin northwest of the Bailey Fault (in the FCGMA management area), the Upper San Pedro Formation (HSU layer 2 of the HCM) acts as an aquitard, limiting downward flow through alluvium into the upper and lower groundwater-producing zones (HSU layers 3 and 5 of the HCM). The upper and lower groundwater-producing zones are unconfined where they crop out in the Las Posas Hills along the northern boundary of the ASRVGB (Turner, 1975); therefore, these outcrops can receive direct recharge from precipitation (Figure 3.1-18). In addition, direct recharge from precipitation likely occurs in the eastern half of the Basin, as evidenced by water levels responding to precipitation (see well 02N19W20L01S on Figure 3.1-15).

The Arroyo Conejo and Conejo Creek are generally reported as a net losing stream system (Boyle, 1987; MWH, 2013) and there are likely gaining and losing sections along the stream; however, a comparison of baseflows measured at the Basin inflow of the Arroyo Conejo Confluence Fume and the Basin outflow of the Conejo Creek at gage 800 show small differences indicating small net losses (Figures 3.1-05 and 3.1-06). Numerical modeling indicates an average of ~762 AFY (~1 cfs) of streamflow discharges to the groundwater along the Arroyo Conejo and Conejo Creek (see Section 3.2.6 and Appendix G), and although this amount is small compared to the overall streamflow, it is an important component of inflow for the groundwater system. To the east, Arroyo Santa Rosa and the Arroyo Santa Rosa Tributary are ephemeral and have rapid infiltration rates (Prichard, pers. comm., 2022a). Stormflows from the Arroyo Santa Rosa and Santa Rosa Tributary streams (Figure 3.1-17) are interpreted to infiltrate rapidly; and, due to the absence of baseflows, groundwater is not believed to discharge to these streambeds. Groundwater levels southeast of the Bailey Fault are generally higher (due to vertical stratification observed in the principal aquifer). During high groundwater level conditions, shallow groundwater discharge to Conejo Creek may increase in the southwestern part of the Basin, and during low groundwater level conditions, discharge to the shallow groundwater may increase along sections of the Arroyo Conejo and Conejo Creek (MWH, 2013). A net surface water discharge to the groundwater (net losing streamflow conditions) is expected during typical conditions based on the differences in baseflows between Basin inflow of the Arroyo Conejo at the Confluence Flume and the Basin outflow of the Conejo Creek at gage 800, and numerical modeling results (see Section 3.2.6 and Appendix G). Where applicable, recharge to groundwater occurs through the return flows from applied waters in urban areas, septic system leachate, and water distribution system losses (Figure 3.1-18).

The primary groundwater discharge area for the Basin (other than via extraction wells) is in the southwest area before the Conejo Creek exits at the western boundary; however, discharge rates are very small (<5%) compared to the overall inflow (see Section 3.3.1.3). Underflow to Pleasant Valley Basin is represented in the numerical model during high groundwater level conditions but is a very minor component (<1% of the total inflows) of the groundwater budget for the Basin (see Section 3.3.3.3).

3.1.3.3 Water Quality [§354.14(b)(4)(D)]

> **§354.14 Hydrogeological Conceptual Model.**
> ***(b)*** *The hydrogeologic conceptual model shall be summarized in a written description that includes the following:*
> ***(4)*** *Principal aquifers and aquitards, including the following information:*
> ***(D) General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.***

Available groundwater quality data and existing technical studies were reviewed to understand the spatial and temporal trends in key groundwater quality indicator constituents (consistent with groundwater quality objectives in the Los Angeles RWQCB Basin Plan [RWQCB-LA, 2019]), such as nitrate, TDS, sulfate, and chloride in the upper and lower groundwater-producing zones of the ASRVGB. Boyle (1987) described the groundwater quality in the Basin as calcium bicarbonate in character, with water quality concentrations typically better in the deeper aquifers. Previous studies and investigations indicate that elevated nitrate and TDS concentrations have been observed in the Basin for several decades (USBR, 1978; Boyle, 1987; Boyle, 1997; MWH, 2013). In 2007, FCGMA developed best management objectives in the ASRVGB for nitrate and chloride (based on the RWQCB Water Quality Objectives[WQOs]) for two Camrosa production wells in the western half of the Basin, southeast of the Bailey Fault (FCGMA, 2007). Elevated TDS and nitrate concentrations are known to be influenced by a combination of factors: agricultural operations, septic system discharges, effluent from the Hill Canyon WWTP, and mineral dissolution (Boyle, 1987; Boyle, 1997; MWH, 2013). There is no known relationship between degraded water quality and groundwater levels or pumping operations within the Basin. The contaminant TCP has also been recently detected within the ASRVGB. The state of California considers TCP to be a regulated contaminant that must be monitored, with a MCL of 5 parts per trillion (ppt). Recently within the ASRVGB, TCP has impacted Camrosa WD production wells at levels above the MCL and is further discussed below.

Historical water quality data collected from groundwater wells in the Basin were available from the 1950s through 2020, and Camrosa WD has been collecting and reporting water quality data since 1990. Groundwater quality data are available from wells screened in the upper and lower groundwater-producing zones in ASRVGB, both northwest and southeast of the Bailey Fault. Maps of recent (2020) concentrations of the key indicator constituents and time-series graphs of historical concentrations detected at selected wells compared to the groundwater quality objectives (WQOs, "allowable limits or levels of water quality constituents or characteristics…established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area") are shown on Figures 3.1-19 through 3.1-27.

Nitrate

Nitrate (NO_3 as Nitrogen, N) concentrations for 2020 are shown spatially on Figure 3.1-19. Wells with nitrate concentrations higher than the WQO (10 milligrams per liter [mg/L]) are shown as red symbols. Elevated nitrate concentrations can be seen across the entire Basin; however, the highest concentrations are observed in the southern portion of the Basin (e.g., wells 02N19W20L01S, 02N19W19P02S, 02N20W23R01S, and 02N20W26C02S) with exception to well 02N20W23G03S, which is located on the northwest side of Bailey Fault. Possible additional evidence of the Bailey Fault acting as a barrier to flow can be seen with the contrast in concentrations between two closely spaced wells across the Fault (i.e., well 02N20W23R01S vs. 02N20W23K01S); however, high nitrate concentrations are also observed northwest of the Bailey Fault in the lower groundwater-producing zone well 02N20W23G03S (Figure 3.1-19). Nitrate concentrations within the bedrock are low as can been seen in well 02N19W20M04S. Available historical data for all wells within the ASRVGB from 2000-2020 are shown on Figure 3.1-20. Nitrate concentrations range from 1.9 mg/L to 28.9 mg/L and appear to be relatively stable for most of the wells; however, downward trends are observed for the Camrosa WD's Conejo wells (02N20W25C02S/04S/05S/06S). The historical data also shows that nitrate concentrations observed in the upper groundwater-producing zone are overall higher in comparison to the lower groundwater-producing zone; however, some lower groundwater-producing zone wells are still exceeding the WQO (Figure 3.1-19). In general, the presence of elevated nitrate at depth indicates hydraulic connection between the surface (nitrate sources being primarily associated with above ground anthropogenic activity) and the deeper portions of the ASRVGB. Nitrogen pathways into the deeper subsurface could include areas where the vertical stratification is absent (along the basin edges and to the east) allowing for migration and movement towards groundwater production centers; however, there is no causal relationship apparent between groundwater pumping and increased nitrate concentrations within the Basin. Improperly sealed/capped or abandoned wells may also act as conduits for nitrate migration into the deep subsurface.

Camrosa WD currently chlorinates and blends raw well water with State Water Project imported water in order to meet drinking water standards, and desalination has been considered as a future treatment option (Camrosa, 2021).

Total Dissolved Solids (TDS)

TDS concentrations for 2020 are shown spatially on Figure 3.1-21. Wells with TDS concentrations higher than the WQO (900 mg/L) are shown as red symbols. Similar to nitrate concentrations, elevated TDS concentrations are observed across the entire Basin, and the highest concentrations are in the southwestern areas of the Basin (e.g., wells 02N19W20L01S, 02N20W23R01S, and 02N20W26C02S). TDS concentrations are also generally lower on the northwest side of the Bailey Fault. Available historical data for all wells within the ASRVGB from 2000-2020 are shown on Figure 3.1-22. TDS concentrations range from 590 mg/L to 1,220 mg/L and appear to be relatively stable for most of the wells. Recent TDS concentrations are observed to be generally lower in comparison to the past decade for the Camrosa Conejo wells (02N20W25C02S/04S/05S/06S). The historical data also shows that TDS concentrations observed in the upper groundwater-producing zone are overall higher in comparison to the lower groundwater-producing zone; however, some lower groundwater-producing zone wells are still exceeding the WQO.

Chloride

Chloride concentrations for 2020 are shown spatially on Figure 3.1-23. Wells with chloride concentrations higher than the WQO (150 mg/L) are shown as red symbols. Elevated chloride concentrations are observed across the entire Basin but are intermittent and the highest concentrations are in the southwestern area of the Basin (e.g., wells 02N20W23R01S and 02N20W26C02S), similar to TDS. Available historical data for all wells within the ASRVGB from 2000-2020 are shown on Figure 3.1-24. Chloride concentrations range from 72 mg/L to 211 mg/L and overall, chloride concentrations appear to be relatively stable for most of the wells. Recent chloride concentrations are observed to be declining for the wells with the highest concentrations mentioned above. Chloride concentrations are generally lower in the bedrock and lower groundwater-producing zone wells in comparison to the upper groundwater-producing zone wells, and currently only upper groundwater-producing zone wells are exceeding the WQO.

Sulfate

Sulfate concentrations for 2020 are shown spatially on Figure 3.1-25. Currently there are no wells with sulfate concentrations higher than the WQO (300 mg/L). Similar to TDS and chloride concentrations, the highest concentrations are in the southwestern area of the Basin (e.g., wells 02N20W23R01S and 02N20W26C02S). Sulfate concentrations are also generally lower on the northwest side of the Bailey Fault. Available historical data for all wells within the ASRVGB from 2000-2020 are shown on Figure 3.1-26. Sulfate concentrations range from 73 mg/L to 252 mg/L and appear to be relatively stable for most of the wells. The historical data also shows that Sulfate concentrations observed in the upper groundwater-producing zone wells are overall higher in comparison to the lower groundwater-producing zone and Bedrock wells.

1,2,3-Trichloropropane (TCP)

The constituent TCP is a synthetic organic compound that was an impurity in certain soil fumigants used in agriculture. In 2018, the SWRCB released a new MCL for TCP of 5 ppt. TCP has been detected in Camrosa WD's pumping wells, and currently four extraction wells are offline due to high concentrations exceeding the MCL (Camrosa, 2021). Maximum TCP concentrations for Camrosa wells sampled during 2018 and 2019 are shown on Figure 3.1-27. Due to the very low MCL for TCP, blending has proven to be unsuccessful, and a granular activated carbon (GAC) treatment plant is currently being constructed for Camrosa's production wells and is planned to be completed during 2022 (Camrosa, 2021).

In addition to TCP, detectable concentrations of ethylene dibromide (EDB), dibromochloropropane (DBCP), and other pesticides have been observed in the ASRVGB (MWH, 2013) but are currently not an issue and there are no current regulatory MCLs for drinking water. Another constituent that has been detected at moderate to relatively high concentrations in the ASRVGB include vanadium (Burton et al., 2011). Lastly, the recent widespread monitoring and regulation of per- and polyfluoroalkyl substances (PFAS) has impacted the ASRVGB; however, the full impacts are still under evaluation based on future regulations of the host compounds in consideration.

3.1.3.4 Primary Beneficial Uses [§354.14(b)(4)I]

§354.14 Hydrogeological Conceptual Model.
(b) *The hydrogeologic conceptual model shall be summarized in a written description that includes the following:*
(4) *Principal aquifers and aquitards, including the following information:*
(E) Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.

Groundwater uses in the ASRVGB include municipal, agricultural, and domestic. Groundwater development began in the ASRVGB in the early 1900s primarily for agricultural production. Historically agriculture was the main user of groundwater until the valley began to urbanize and M&I became a significant beneficial use (MWH, 2013). There is currently only one domestic well in use (estimated to extract ~2 AFY), located between Santa Rosa Road and Conejo Creek in the southwest area of the Basin.

Figure 3.1-28 shows the beneficial uses associated with the wells in the ASRVGB and the annual average amount of pumping. Camrosa WD pumping for M&I and agricultural beneficial uses comprise the largest extractions southeast of the Bailey Fault, with combined extraction rates up to 4,747 AFY. Northwest of the Baily Fault, groundwater extractions are for agricultural beneficial uses, regulated by FCGMA. Private well owners report pumping data on a semi-annual basis to the FCGMA and are subject to allocations administered by the FCGMA (Camrosa 2021). Combined groundwater extractions northwest of the Bailey Fault range from 1,034 AFY to 1,676 AFY. For purposes of this GSP, groundwater pumping in areas where rates are not reported was estimated using methods described in the numerical model (Appendix G).

Camrosa WD is the largest groundwater user within the ASRVGB. Its service area encompasses the ASRVGB and portions of neighboring basins. The water district supplies potable water using blended groundwater and imported water purchased from Calleguas MWD (see Section 3.1.1.2). Potable water is used for M&I (primarily urban uses) and agricultural beneficial uses. Camrosa WD also provides non-potable water for agricultural and landscape irrigation through a non-potable distribution system, independent of the potable system. Non-potable water within the ASRVGB consists of extracted groundwater, non-potable surface water from Calleguas Creek, and recycled water from the Camrosa Water Reclamation Facility in the Pleasant Valley Basin (Camrosa, 2021).

Camrosa WD operates eight wells within the ASRVGB, as shown in Figure 3.1-28. In addition to the eight ASRVGB wells, Camrosa WD operates one well in the Tierra Rejada Basin and three wells in the Pleasant Valley Basin. None of the Camrosa WD wells are in the FCGMA portion of the ASRVGB. Within the ASRVGB, five of Camrosa WD’s wells are connected to the potable system and three are connected to the non-potable system. The total design capacity of the District wells in the ASRVGB is 7,720 AFY (Camrosa, 2021). However, actual production is much lower than this with an average production of

2,155 AFY in water years 20–7 - 2021. This lower production is attributed to operational and groundwater quality constraints and consideration of the Basin sustainability. The Penny Well (02N19W20M04S; located in the eastern half of the Basin) returned to service in fiscal years 2016 and 2017, after 20 years of being out of service. However, operations remain limited due to entrained air that leads to aesthetic impairments (Camrosa, 2021). Section 3.2.4 provides more details on Camrosa WD's groundwater quality limitations. Camrosa WD's pumping in the ASRVGB also significantly varies from year to year. The lowest annual extraction of 1,924 AF occurred in 1998 and the highest of 3,913 AF occurred in 2013 (Camrosa, 2021).

As described in Section 3.2.7, riparian vegetation present along Conejo Creek is believed to have been established originally when dry weather surface water flows from the Upper Conejo Watershed began entering the Basin (principally Hill Canyon Treatment Plant effluent discharges). Similarly, the riparian vegetation has been sustained by these surface water outflows from the Upper Conejo Watershed. For these reasons, the riparian vegetation is not considered a beneficial user of groundwater. This is described more fully in Section 3.2.7.

ASRGSA has considered public trust resources in development of this GSP by considering the impacts to riparian and aquatic habitats, and by setting minimum thresholds designed to prevent undesirable results under SGMA.

3.1.4 Data Gaps and Uncertainty [§354.14(b)(5)]

§354.14 Hydrogeological Conceptual Model.

(b) *The hydrogeologic conceptual model shall be summarized in a written description that includes the following:*

(5) Identification of data gaps and uncertainty within the hydrogeologic conceptual model*.*

The GSP Emergency Regulations §351 (Definitions) refers to a "data gap" as a lack of information that significantly affects the understanding of the basin setting or evaluation of the efficacy of Plan implementation, and could limit the ability to assess whether a basin is being sustainably managed. The discussion of data gaps and uncertainty within the HCM of ARSVGB is provided below, organized according to the HCM elements listed in the GSP Emergency Regulations.

Topography [§354.14(d)(1)]

The ground surface elevation for the Basin is based on a 10-meter digital elevation model [DEM] provided by the USGS (USGS, 2019). The development of the groundwater model streamflow package revealed a high amount of variability along the streamflow channels within the Basin, which required adjustments to achieve a stable numerical solution. Surveying the channels would help improve future versions of the model; however, this is not considered a data gap as the term is defined in the GSP Emergency Regulations.

Surface Water Bodies [§354.14(d)(5)]

The primary surface water bodies in the ASRVGB are the Arroyo Conejo and Conejo Creek, which are also a significant source of recharge to and discharge from the Basin (Section 3.1.3.2). Streamflow along the Arroyo Conejo and Conejo Creek is characterized by spatial variability, with different reaches losing or gaining to the aquifer (Sections 3.1.1.2 and 3.1.3.2). Streamflow is gaged at two locations for the

Basin, the Confluence Flume where the Arroyo Conejo flows into the Basin and gage 800 where the Conejo Creek flows out of the Basin.

Numerical modeling (Appendix G) incorporated streamflow data at both gages to assess interconnected surface water (ISW)/groundwater and estimate depletions for the basin. While the existing streamflow data and the numerical model were sufficient for GSP planning purposes, additional data coverage would improve the predictive capabilities of the model. In particular, there is a lack of winter and spring data at the Confluence gage (data is available for baseflow conditions in summer and fall). Additional streamflow data in winter and spring would make the modeled estimates of surface-water gains and losses as well as depletion more robust. Moreover, there is not an active streamflow monitoring gage within the Basin. Additional streamflow data along Arroyo Conejo and/or Conejo Creek would improve the understanding and refine the modeling of streamflows and groundwater-surface water interactions within the ASRVGB, but is not considered a data gap as the term is defined in the GSP Emergency Regulations.

Imported Water [§354.14(d)(6)]

No data gaps or significant uncertainties were identified.

Regional Geology and Structural Setting [§354.14(b)(1), (d)(2)]

The HCM incorporates all available lithologic data from ASRVGB groundwater wells and surface geology and geologic cross-sections from published literature. However, there is sparse geologic/lithologic data within the ASRVGB. Additional geologic/lithologic data would improve the understanding of geology, structure, and stratigraphy, but is not considered a data gap as the term is defined in the GSP Emergency Regulations.

Soil Characteristics [§354.14(d)(3)]

No data gaps or significant uncertainties were identified.

Vertical and Lateral Extent [§354.14(b)(2),(b)(3), (c)]

No significant data gaps or uncertainties were identified.

Groundwater Flow Barriers [§354.14(b)(4)(C) and (c)]

The Bailey Fault has been characterized as a hydraulic barrier to groundwater flow based on groundwater level and water quality analyses (see Section 3.1.4.1.2); however, there are limited data available to characterize the barrier’s location, depth, and angle as well as flow conditions across the fault. Water level measurements from either side of the fault were used to develop and calibrate the numerical model (Appendix G). However, additional water level data at multiple depths on either side along with better geologic mapping of the fault would improve the understanding of this flow barrier and its impact on groundwater conditions on both sides of the Bailey Fault; however, this is not considered a data gap as the term is defined in the GSP Emergency Regulations.

Formation Names and Hydraulic Properties [§354.14(b)(4)(A), (b)(4)(B)]

As noted in Section 3.1.3.1, the best available information for hydraulic properties in the ASRVGB is from specific capacity information from driller's logs and the use of the calibrated numerical flow model (Appendix G). Use of model-derived hydraulic property values is considered appropriate and, therefore, the lack of aquifer tests results is not considered a data gap or uncertainty as those terms are defined in the GSP Emergency Regulations. Going forward, ASRVGB will work with well owners in the Basin to conduct aquifer tests when such opportunities arise, such as when new or replacement wells are constructed.

Groundwater Recharge and Discharge Areas [§354.14(d)(4)]

Groundwater production is the largest outflow from the Basin. Non-FCGMA agricultural pumping was not available for the Basin. Groundwater levels and calibration are highly dependent on pumping. Metering production wells within the Basin would allow for more accurate representation of pumping stresses allowing for more robust model results, but is not considered a data gap as the term is defined in the GSP Emergency Regulations.

As discussed in Section 3.1.3.2, inflow from the Conejo Volcanic bedrock is conceptualized as a deep source of subsurface recharge to the Basin via fracture-flow, which is evidenced by higher groundwater levels observed in wells completed in the bedrock to the east in areas where the bedrock is very shallow or at the land surface. There is a lack of monitoring wells in the bedrock to the south and east to assess gradients within the bedrock and between the bedrock and the lower groundwater-producing zones of the Basin. Additional monitoring wells completed within the bedrock and the lower groundwater-producing zone will reduce the uncertainty in estimates of bedrock inflows. Wells completed within the bedrock will be prioritized to be added to the monitoring network as described in the Groundwater Monitoring Network Enhancement Project (Section 6.2). Additional groundwater quality data could also aid in assessing the interaction between the Conejo volcanic bedrock and the groundwater production zones.

Also described in Section 3.1.3.2 is the underflow across the western boundary of the Basin, between the ASRVGB and the Pleasant Valley. The characterization of this boundary with respect to groundwater flow direction and gradient, in addition to hydraulic properties of the groundwater-producing zones is discussed in the HCM, and additional groundwater level data would be needed to verify the groundwater conditions of this boundary. Based on the calibrated numerical model, the underflow between ASRVGB and Pleasant Valley is not a significant component of the overall water budget, and likely does not impact groundwater conditions or sustainability with the ASRVGB; therefore, this is not considered a data gap or uncertainty as those terms are defined in the GSP Emergency Regulations.

Finally, the numerical model was used to assess gaining and losing segments of the Arroyo Conejo and Conejo Creek. Limitations of this approach were discussed earlier in the Surface Water Bodies discussion.

Water Quality [§354.14(b)(4)(D)]

No data gaps or significant uncertainties were identified.

Primary Beneficial Uses [§354.14(b)(4)(E)]

No data gaps or significant uncertainties were identified.

3.2 Groundwater Conditions [§354.16]

To facilitate discussion within the GSP, the Basin has been subdivided into two areas, the western half and eastern half. In addition, a key hydraulic feature within the Basin is the Bailey Fault, which acts as a relative barrier to flow, separating the northwestern third of the Basin from the rest of the Basin.

3.2.1 Groundwater Elevations [§354.16(a)]

3.2.1.1 Groundwater Elevation Contours [§354.16(a)(1)]

§354.16 Groundwater Conditions. *Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:*

(a) *Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including:*

(1) Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.

Simulated groundwater levels are used to generate the groundwater elevation contours herein this section due to the lack of observed groundwater level data and ability to interpolate groundwater elevation contours for the various HSUs. The numerical groundwater model was calibrated to available observed groundwater elevations, which are provided on the contour maps for reference and differences between modeled and observed groundwater levels are discussed in further detail in Appendix G.

The current seasonal high and low groundwater level contours along with available observed groundwater elevation data within ~1-2 months are represented on Figures 3.2-01a and b and 3.2-02a and b, respectively, which depict wet (e.g., February 2017) and dry (e.g., November 2015) seasons for the Basin upper and lower groundwater-producing zones. A discussion of the differences between modeled and observed groundwater levels is provided in the model documentation (Appendix G). Groundwater level data from water years 2017 and 2015 were selected to represent the current seasonal high and low groundwater conditions, respectively, because groundwater level data after 2018 were affected by certain Camrosa pumping wells being offline, which produced biased high levels not representative of typical Basin conditions. Limited observed groundwater level data are available for the upper groundwater-producing zone. Groundwater generally flows from the east to west in the ASRVGB, following the surface drainage and the topographic gradient of the Basin, with localized depressions caused by extraction wells and localized highs in recharge areas. Groundwater level elevations span from highs of ~500 ft amsl in the eastern half of the Basin to lows of ~40 ft amsl in the western-central part of the Basin (northwest of the Bailey Fault in the FCGMA management area; see Section 3.4). Observed groundwater levels are highest in the eastern half, near the Arroyo Santa Rosa channel in well 02N19W20M04S; however, the highest groundwater levels are modeled to be in the Conejo volcanics to the northeast and east (see Section 3.2.1.2 below). The higher groundwater levels in well 02N19W20M04S, which is located near the drainage channel of the Arroyo Santa Rosa and partially screened into bedrock, are interpreted to represent the groundwater from the Conejo volcanics from the east and northeast. Observed groundwater elevations are similar in the drainage area for the Arroyo Santa Rosa Tributary to the south (i.e., at well 02N19W20L01S). The lowest groundwater levels are observed in the FCGMA management area at well 02N20W23G04S and the lowest modeled groundwater levels are nearby, primarily due to a localized pumping depression. As described in the HCM (Section 3.1), groundwater levels are consistently higher on the southeast side of the Bailey Fault (in the ASRGSA management area; see Section 3.4) compared to the FCGMA management area.

The observed hydraulic gradient across the eastern half of the Basin ranges ~0.01 to 0.04 ft/ft, with the steepest gradient in the direction of the Arroyo Santa Rosa drainage to the northeast. The modeled gradient in the western half shows differences between the upper and lower groundwater-producing zones. Within the lower groundwater-producing zone in the western half of Basin in the ASRGSA management area, gradients are much less (~0.001 to 0.004 ft/ft) than the upper groundwater-producing zone, with localized depressions centered on the Camrosa extraction wells when pumping. Typically, groundwater levels in the ASRGSA management area are lowest at Camrosa's Conejo wellfield (e.g., 02N20W25C05S; Figure 3.2-01b and 3.2-02b). In the FCGMA management area, the gradient is also relatively flat (~0.001 ft/ft), with localized pumping depressions.

3.2.1.2 Groundwater Elevation Hydrographs [§354.16(a)(2)]

§354.16 Groundwater Conditions. *Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:*

(a) *Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including:*

(2) Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.

Figure 3.2-03 shows hydrographs from key wells that collectively provide good spatial and temporal coverage for each management area within the ASRVGB. Historical long-term trends are observed in several wells across the Basin with varying differences depending on location. Select hydrographs are also combined on a single graph to demonstrate the groundwater level trends observed in wells for the ASRGSA and FCGMA management areas (see Section 3.4), shown on Figures 3.2-04a and b, respectively. Annual fluctuations in groundwater levels are observed in most of the wells across the Basin, with spring-highs and fall-lows due to a combination of reduced groundwater extractions and increased recharge from precipitation in the winter and spring and increased groundwater extractions during the summer and fall.

The well with the oldest record for the Basin is in the western half of the Basin in the ASRGSA management area (well 02N20W23R01S) and shows a historical long-term decline (~5 ft/yr) in groundwater levels from the 1940s to the 1960s (Figure 3.2-04a) – this is due to the severe drought during this period (see Figure 3.1-04 [precipitation and cumulative departure chart]). The long-term historical decline in the western part of the ASRGSA management area is followed by a rapid increase in groundwater from the 1960s to the 1970s at a rate of ~10 ft/yr (Figures 3.2-03 and 3.2-04a). This rapid increase reflects increased recharge to the Basin primarily from streamflow in the Arroyo Conejo and Conejo Creek in response to effluent from the Hill Canyon WWTP (which started in 1961); additional factors included a wet period in the mid- to late 1960s, and the introduction of purchased imported water to the region. In the FCGMA management area, well 02N20W23K01S does not show evidence of increases at the same magnitude as the western half of Basin in the ASRGSA management area but shows a longer-term increase in groundwater levels at a rate of ~3 ft/yr from ~1964 to ~1986, interpreted to reflect the effect of increased precipitation during that time (Figure 3.2-04b). The eastern half of the Basin shows a similar long-term increase of ~5 ft/yr from 1964 to 1980, as shown by the water levels in wells 02N19W19R02S and 02N19W20L01S (Figure 3.2-04b), interpreted to be due to increases of recharge from precipitation. As discussed in Section 3.1.3.1.2, the eastern half of the Basin has a rapidly increasing groundwater level trend in the late 1990s (see 02N19W20M04S, 02N19W20L01S, 02N19W19Q02S, and 02N19W19P02S on Figure 3.2-04a) that is not observed in the western half – this difference in trends indicates a difference in hydraulic conditions between the western and eastern half of the Basin and is described further in the numerical model (Appendix G).

Since the 1990s, groundwater levels in the western half of the ASRGSA management area were generally observed to decline by ~50 ft until 2018, when the Camrosa extraction wells in the Conejo wellfield were taken offline due to water quality issues; groundwater levels have recovered by ~50 ft since then (Figure 3.2-04a). In the FCGMA management area, groundwater levels in wells 02N20W23G01S and 02N20W23K01S generally declined at a rate of ~3-5 ft/yr since the 1990s (with seasonal variations due to pumping and precipitation), and well 02N20W23G02S has been generally stable since 2003 with recent observations showing high variability, which is questionable and may be due to changes in pumping (Figure 3.2-04a). Since the late 1990s, groundwater levels in the eastern half of the Basin have been steadily declining, with clear responses to increased precipitation observed in 1998 and 2005. Overall, responses in groundwater levels to increased precipitation are much more pronounced in the eastern half of the Basin compared to the western half of the Basin. Appendix I contains hydrographs for all wells with observed water levels in the ASRVGB.

3.2.2 Change in Storage [§354.16(b)]

§354.16 Groundwater Conditions. *Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:*

(b) A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.

The numerical model (calibrated to observed water levels from water years 2012-2021) was used to estimate the total volume of groundwater in storage and the change in groundwater in storage for the Basin. The total groundwater in storage for the beginning of the historical period (water years 2012-2021) was estimated using the numerical model to be ~200,000 AF. Figure 3.2-05 shows the annual and cumulative change in groundwater storage from water years 2012-2021 between seasonal high groundwater conditions with groundwater use and water year type. A correlation between modeled storage and observed groundwater levels is presented in Appendix K. Declines in groundwater storage have been observed in the Basin during prolonged dry conditions; however, the Basin has also shown relatively rapid recovery (particularly in the western half of the ASRGSA management area) in response to changes in pumping and recharge during wet climate cycles.

3.2.3 Seawater Intrusion [§354.16(c)]

§354.16 Groundwater Conditions. *Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:*

(c) *Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.*

The ASRVGB is an inland groundwater basin, with no connection to the ocean. As seen on Figure 2.1-01, the western boundary of the ASRVGB is over 10 miles inland from the Pacific Ocean. The Basin is hydraulically upgradient and structurally up-dip of the lower Pleasant Valley Basin, which extends west to the Pacific Ocean. The lowest observed groundwater level elevations at the western boundary of the ASRVGB are ~100 ft amsl (Figure 3.2-02a and b). This is above any predictions of sea-level rise (maximum of 5 to 6 ft by 2100 [DWR, 2015]) along the California coast. Seawater intrusion is observed near the coastline in the Oxnard Plain Basin in west Ventura County and seawater would need migrate through the Pleasant Valley Basin before reaching the ASRVGB; therefore, the likelihood of any seawater intrusion for the ASRIGB is extremely low and is included in the GSP as a sustainability indicator.

3.2.4 Groundwater Quality Impacts [§354.16(d)]

§354.16 Groundwater Conditions. *Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:*

(d) Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes

Groundwater supplies for the ASRVGB are important for both urban and agricultural beneficial uses. Groundwater quality in the ASRVGB has historically been impacted most notably by nitrate and TCP, and concentration data is presented in Section 3.1.3.3. Groundwater extracted for potable purposes is regularly monitored and is often blended with imported water to meet drinking water quality standards (Camrosa, 2021). GAC treatment is effective treatment to remove TCP from water, and a treatment plant is currently being constructed for Camrosa's production wells, planned to be completed during 2022 (Camrosa, 2021).

In general, the quality of the groundwater in the ASRVGB is heavily influenced by a combination of the following factors: a) effluent from the Hill Canyon WWTP, b) application of fertilizers, c) livestock operations, d) septic system discharges, and d) mineral dissolution (Boyle, 1987; Boyle, 1997; MWH, 2013). The quality of groundwater is not related to groundwater levels or pumping. The primary groundwater quality indicators for the ASRVGB are nitrate, TDS, chloride, sulfate, and TCP, which have either historically exceeded or currently exceed their respective WQOs included in the RWQCB's Basin Plan (RWQCB-LA, 2019). Section 3.1.3.3 describes the general water quality for the Basin and provides maps of current conditions and historical and current groundwater quality trends for the primary water quality indicators in the ASRVGB in comparison to their respective WQOs. Each constituent and the effect on the beneficial uses of groundwater are described below.

Nitrate

The ASRVGB is impaired for nitrate with observations exceeding the MCL and RWQCB WQO of 10 mg/L (NO_3 as N). As shown in Figures 3.1-19 and 3.1-20, elevated nitrate concentrations above the RWQCB WQO have been observed across the entire Basin with the highest concentrations observed in the southern areas of the Basin. High concentrations of nitrate in drinking water can adversely affect human health, particularly the health of infants (Montrella and Belitz, 2009). Groundwater extracted from the Camrosa WD's Conejo wellfield exceeds the 10 mg/L WQO for nitrate. When in use, three of the four wells are typically blended with imported water at a ratio of 1:1 to 2:1 (imported:local) to improve the water quality prior to distribution for potable uses. Nitrate concentrations in the groundwater vary depending on drought, surrounding agricultural practices, and periodic rains; however, the average blending ratio for 2015-2020 has remained relatively stable at a 1:1 (Camrosa, 2021).

In addition to drinking water, nitrate concentrations exceeding 50 mg/L as N can adversely impact sensitive crops, which can accumulate nitrate, including sugar beets, citrus, avocadoes, apricots, and grapes (USDA, 2018). Severe impacts can be experienced above 30 mg/L (Boyle, 1987). As discussed in Section 3.1.3.3 and shown on Figure 3.1-19, nitrate has not exceeded 50 mg/L throughout the ASRVGB and therefore is not expected to impact sensitive crops; however, nitrate applied with fertilizer injection during irrigation cycles can typically exceed 100 mg/L (Faber, pers. comm., 2022). There are a variety of potential sources for elevated nitrate within the Basin listed above. Modeling indicates migration of recharge from the areas where the lower groundwater-producing zone is in hydraulic connection with the upper units (primarily to the east and south). The model has limited vertical conductivities in the west, so it is unlikely that there is substantial direct vertical recharge through the shallow units, except through wells acting as a conduit. There is also potential for elevated nitrate originating from runoff in the adjacent Tierra Rejada Basin, where there is additional agricultural land use. Lastly, the Hill Canyon WWTP effluent, which discharges to groundwater in the Basin to the south, has slightly elevated nitrate levels; the NPDES Permit effluent limitation for nitrite/nitrate is 9 mg/L and the plant has met limitation with a historical performance of 8.5 mg/L (Gannett Fleming, 2021).

TDS

TDS concentrations exceeding the RWQCB WQO of 900 mg/L are observed in the ASRVGB and concentrations are generally higher southeast of the Bailey Fault (Figure 3.1-21). Current and historical observations are provided in Figures 3.1-21 and 3.1-22, respectively. Sources of TDS are associated with urban and agricultural runoff and natural dissolution of minerals with groundwater flow. Elevated TDS can adversely impact drinking water by increasing hardness leading to added soap and detergent consumption, corrosion, scaling of metal water pipes, added water softening costs, etc. (Boyle, 1987). High TDS concentrations can also decrease productivity and increase production costs for agricultural uses. Camrosa WD’s blending of groundwater with imported water to address nitrate also decreases TDS concentrations within the M&I potable system.

Chloride

Elevated chloride concentrations are observed across the entire Basin but are intermittent and the highest concentrations are in the southwest part of the Basin where current levels exceed the RWQCB WQO of 150 mg/L in a few wells. Current and historical observations are provided in Figures 3.1-23 and 3.1-24, respectively. Potential sources of chloride in the Basin include agricultural application of fertilizers and septic system discharges. Chloride concentrations above the secondary MCL of 250 mg/L can result in taste issues. Camrosa WD’s blending of imported water to address nitrate is also utilized to address chloride concentrations for some agricultural users. While agricultural users have a variety of water quality requirements for irrigation, chloride tends to be the most universal concern. Chloride levels exceeding 100 mg/L can impact crop yields, especially for avocados, and therefore is a constituent of concern in the ASRGSA (Boyle, 1997).

Sulfate

Currently there are no wells with sulfate concentrations higher than the WQO (300 mg/L) and sulfate concentrations range from 73 mg/L to 252 mg/L and appear to be relatively stable for most of the wells (see Section 3.1.3.3). High sulfate concentrations can cause odor and bitter taste in drinking water and can also corrode metal pipes; sulfate will continue to be monitored within the Basin.

Pesticides and Other Constituents

There have been a variety of pesticides and other environmentally harmful constituents observed in the ASRVGB. The most impactful finding is the detection of TCP in the groundwater extracted from Camrosa WD's Conejo wellfield. TCP is a synthetic organic compound that was an impurity in certain soil fumigants used in agriculture. In 2018, the SWRCB released a new MCL for TCP of 5 ppt. TCP has been detected in the four extraction wells in the Conejo Wellfield. These wells are currently offline due to high concentrations exceeding the MCL. Maximum TCP concentrations for Camrosa wells sampled during 2018 and 2019 are shown on Figure 3.1-27. The District's blending of extracted groundwater with imported water has proven to be unsuccessful in treating the problem, given the very low MCL concentration. A GAC treatment plant is currently being constructed to treat the TCP and is planned to be completed during 2022. The Conejo wellfield will remain out of production until treatment is initiated (Camrosa, 2021).

In addition to TCP, detectable concentrations of EDB, DBCP, and other pesticides have been observed in the ASRVGB (MWH, 2013) but are currently not an issue and there are no current regulatory MCLs for drinking water. Another constituent that has been detected at moderate to relatively high concentrations in the ASRVGB include vanadium (Burton et al., 2011). Lastly, the recent widespread monitoring and regulation of PFAS has impacted the ASRVGB; however, the full impacts are still under evaluation based on future regulations of the host compounds in consideration.

The California Water Boards Groundwater Ambient Monitoring and Assessment (GAMA) Groundwater Information System was reviewed to evaluate groundwater contamination in the ASRVGB. The review found five sites that had shallow contamination of gasoline hydrocarbons, which are now all closed. Figure 3.2-06 shows the location and status of these environmental sites. There are five GeoTracker[2] sites within the ASRVGB, all of which are classified as Leaking Underground Storage Tank sites, and all of which are classified as "Completed – Case Closed." These sites are

- T0611100040 Foothill Ranch, the potential contaminant of concern (PCOC) being gasoline, the potential media of concern (PMOC) being soil, and the case was closed on April 20, 1993;
- T0611100715 Santa Rosa School, the PCOC being gasoline, the PMOC being soil, case closed on July 22, 1996;
- T0611101213, Gardena Nursery, the PCOC being gasoline, the PMOC being soil, case closed December 22, 1999;
- T0611113948, the Nicholson property, the PCOC being gasoline, the PMOC being undetermined, case closed on November 7, 2005; and
- T0611130305, Hill Canyon Treatment Plant, the PCOC being diesel, the PMOC being soil, case closed on June 2, 2004. The point location for site T0611130305 is the street address for the Hill Canyon WWTP, which is located outside the ASRVGB.

[2] Geotracker is the California State Water Board's Internet-accessible database system used to track and archive compliance data related to authorized and unauthorized discharges (SWRCB, 2022).

There are no EnviroStor[3] sites within the ASRVGB. No indication of regional groundwater contamination plumes was found in this data review.

3.2.5 Land Subsidence [§354.16(e)]

§354.16 Groundwater Conditions. *Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:*

(e) *The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.*

DWR provides land surface displacement data on their SGMA Data Viewer web-based geographic information system (GIS) viewer (DWR, 2022) to aid GSAs in evaluation of subsidence in groundwater basins. The DWR data includes estimated land surface displacement estimates for the ASVRGB based on interferometric synthetic aperture radar (InSAR) measurements for the period from June 13, 2015, through October 1, 2021 (TRE Altamira, Inc., 2021). This land surface displacement dataset was accessed in GIS software and reviewed and the reported cumulative vertical displacement from the InSAR measurements during 2015 to 2021 at each grid cell averaged 0.018 ft (Figure 3.2-07), with a maximum value of 0.069 ft, which is equivalent to approximately 0.13 inches/year or 3.3 millimeters [mm]/year over the measurement period). DWR has stated that on a statewide level for the total vertical displacement measurements between June 2015 and June 2018, the errors due to measurement are as follows (Paso Robles GSA, 2020):

- The error between InSAR data and continuous global positioning system (GPS) data is 16 mm (0.052 ft) with a 95% confidence level, and
- The measurement accuracy when converting from the raw InSAR data to the maps provided by DWR is 0.048 ft with 95% confidence level.

Therefore, a land surface change of less than 0.1 ft (the cumulative error) is within the noise of the data collection and processing and is considered equivalent to no measurable subsidence in this GSP. Hence, the InSAR-based annual land surface displacement rate of 3.3 mm (0.13 inches) was well below the accuracy range of 0.1 ft (1.2 inches). This indicates that the reported land surface displacement is within the range of uncertainty of the InSAR data, and that there is no indication of land subsidence due to groundwater withdrawal within the ASRVGB.

No historical reports or land surveys have indicated evidence of land subsidence in the ASRVGB. In addition, DWR designated the western ASRVGB as an area that has a low potential for future subsidence, due to the limited extent of compressible sediments in the subsurface. Based on the foregoing, ASRGSA has concluded there is little to no potential for significant and unreasonable land subsidence caused by groundwater withdrawals in the Basin; however, if future water levels decline below the measured historical low there may be the potential for subsidence, so the Basin will continue to be monitored for subsidence with updated InSAR data.

[3] EnviroStor is the California Department of Toxic Substances Control (DTSC) online data management system for tracking cleanup, permitting, enforcement, and investigation efforts at hazardous waste facilities and sites with known or suspected contamination issues (DTSC, 2022).

3.2.6 Interconnected Surface Water Systems [§354.16(f)]

§354.16 Groundwater Conditions. *Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:*

(f) *Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.*

The surface water systems within the ASRVGB are described in detail in Section 3.1.1.1, and include the Arroyo Santa Rosa, Santa Rosa Tributary, Arroyo Conejo, and Conejo Creek. The Arroyo Santa Rosa and the Tributary are ephemeral streams and are concrete or rip-rap lined for much of their reaches (Figure 3.1-05). In addition, historical depth to groundwater measurements in wells located adjacent to these streams are typically deeper than ~20 ft, particularly in the past 10 years, indicating that groundwater is disconnected from these streams. The Arroyo Conejo and Conejo Creek are interconnected with shallow groundwater, interpreted based on available groundwater level data and numerical modeling results (Appendix G). Figures 3.2-08a through 3.2-08c depict the modeled interconnected reaches of the streams under dry, normal, and wet conditions, and indicate the Arroyo Santa Rosa and Tributary are primarily dry or disconnected from the groundwater and are losing to the groundwater with some intermittently connected reaches during stormflow events (Figure 3.2-08c). The Arroyo Conejo and Conejo Creek are predominantly interconnected and losing with gaining reaches where the groundwater levels are very shallow where the Arroyo Conejo enters the Basin and reaches of the Conejo Creek in the southwest area of the Basin (see Figures 3.2-08a through 3.2-08c) and where shallow groundwater tends to mound up. The quantified gains and losses from the streams are presented in the Water Budget Section 3.3 and discussed in further detail below. The Arroyo Conejo and Conejo Creek surface water system is perennial due to a constant source of water from the Hill Canyon WWTP effluent and additional surface water flow from the North and South Fork Arroyo Conejo streams that drain Conejo Valley. For the past 10 years, the Hill Canyon WWTP effluent has made up an average of 80% of total summer surface water streamflow, based on measured flows at the Confluence Flume gaging station (Figure 3.1-05). Baseflows are relatively constant year to year due to the relatively constant discharges from the Hill Canyon WWTP.

GSP Emergency Regulations §354.28(c)(6) specifies that depletions of ISW are specific to reductions in surface water flow caused by groundwater use (i.e., pumping). The streamflow losses described above are not directly related to pumping; the basin naturally receives water from Arroyo Conejo and Conejo Creek in higher elevation areas and discharges it back to the Conejo Creek in lower elevation areas downgradient. The conceptual model for the interconnection between the perennial surface water and shallow groundwater is depicted on Figure 3.2-09 and is summarized by the following points:

1. The shallow groundwater is recharged by the Arroyo Conejo and Conejo Creek, of which perennial flows are primarily sourced by discharges from the Hill Canyon WWTP and urban runoff from Conejo Valley,
2. Gaining sections of the Arroyo Conejo and Conejo Creek receive shallow groundwater that is primarily recirculated recycled water and urban runoff,
3. Riparian vegetation along the Arroyo Conejo and Conejo Creek depends on the surface water and/or shallow groundwater fed by wastewater discharges and Conejo Valley urban runoff (see Section 3.2.7.2),

4. Groundwater production does not occur within the shallow groundwater system,
5. The shallow groundwater is mostly separated from the Upper Aquifer by a semi-confining fine-grained unit (HSU Layer 2; see Section 3.1.3) and has a predominantly downward vertical gradient; however, nearby groundwater extraction from the principal aquifers is demonstrated to deplete the ISW by a minor amount (see discussion below and Appendix G).

The total depletions of ISW were evaluated based on the streamflow losses to the groundwater within the Basin using results from the baseline historical numerical model (Appendix G). Net streamflow losses to groundwater averaged ~1,160 AFY for the historical period. Of this, approximately 383 AFY (33%) came from losing but disconnected reaches along Arroyo Santa Rosa and the Arroyo Santa Rosa Tributary. The remaining 777 (67%) came from Arroyo Conejo (340 AFY) and Conejo Creek (437 AFY). Since the Arroyo Santa Rosa and its tributary are disconnected, pumping-related depletions are not pertinent to these surface water bodies. Arroyo Conejo and Conejo Creek are mostly connected but could get disconnected during dry conditions. Figure 3.2-10 shows the monthly losses from Arroyo Conejo and Conejo Creek for connected and disconnected reaches. Results indicate that losses from disconnected reaches along the Arroyo Conejo and Conejo Creek are a very minor component (averaging ~16 AFY during the historical period). The average streamflow losses for the connected reaches of the Arroyo Conejo and Conejo Creek are ~762 AFY, and the maximum annual rate is ~932 AFY – this value is considered an upper bound for the historical depletions of ISW.

The average losses of ~762 AFY from the interconnected reaches along Arroyo Conejo and Conejo Creek consist of two components: a) direct depletion of surface water by pumping, occurring due to the drawdown cone from proximal pumping wells extending into the streambed and b) potential indirect depletion of surface water due to regional groundwater levels being lower from basin-wide pumping. The numerical model was used to estimate direct depletion of the Arroyo Conejo and Conejo Creek due to pumping by comparing streamflows under the baseline historical period with streamflows from an alternative historical simulation *without* any groundwater extraction from proximal wells (within 1,000 ft) along the Arroyo Conejo and Conejo Creek (all other recharge/discharge processes were kept the same as the calibrated historical model). The difference in streamflows is indicative of direct depletion of surface water due to groundwater pumping. Four extraction wells (see inset map on Figure 3.2-11) were removed for the alternative model and the reduction in extraction rates during the historical period ranged from ~211 AFY to ~343 AFY, averaging ~273 AFY. Figure 3.2-11 and Table 3.2-01 summarize historical surface water flow and streamflow depletions for the Arroyo Conejo and Conejo Creek and show a maximum depletion of ~0.19 cfs (~136 AF/month), with an average of ~0.1 cfs (~74 AFY). Hence, of the 762 AFY of total losses from the Creek and Arroyo, an average of 74 AFY was from direct depletion of surface water from historical pumping in proximal wells.

The remaining 688 AFY can potentially be attributed to indirect depletion. These depletion amounts are <1% of the average streamflow flowing out of the Basin during the historical period (19,843 AFY; see Section 3.3.1.2); therefore, impacts to the surface water due to depletion from ISW are considered negligible. Beneficial users relying on surface water diversions from the Conejo Creek downstream (outside of the Basin) have historically met their demands and streamflow bypass requirements and no undesirable results have been documented; therefore, the depletions of ISW sustainability indicator does not appear to be of great importance. However, given the indication from model results that depletions of ISW are in part due to extraction wells located adjacent to the creeks and the regional lowering of groundwater levels, this GSP includes a plan to monitor and evaluate the depletions of ISW due to pumping (see Section 4.9). Future depletions of ISW in Arroyo Conejo and Conejo Creek will be monitored, assessed, and (if found to be significant) managed to ensure that beneficial uses of surface water do not have significant and unreasonable impacts.

3.2.7 Groundwater Dependent Ecosystems [§354.16(g)]

§354.16 Groundwater Conditions. *Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:*

(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.

3.2.7.1 Assessment of Groundwater Dependent Ecosystems

This section describes the current best available information concerning potential GDEs in the Basin. This understanding is primarily informed by regional information collected from sources including (1) The Nature Conservancy (TNC) and DWR statewide database of indicators of groundwater dependent ecosystems (iGDEs) and supporting data and documentation, (2) descriptions of vegetation alliances from the USDA's Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) which generally correspond with the Natural Communities Commonly Associated with Groundwater (NCCAG) classifications discussed below, (3) review of available reports and studies, and (4) review of aerial photos. Ecosystem and vegetation species data specific to the ASRVGB is limited; however, where possible, effort was made to provide information specific to the ASRVGB (Figure 3.2-12). This GSP describes the riparian vegetation observed within the Basin, which is not considered a beneficial user of groundwater.

3.2.7.2 Riparian Vegetation

Figure 3.2-12 shows wetlands and vegetation species identified for the Basin based on NCCAG classifications, which consists of three types: (1) red willow, (2) giant reed, and (3) California sycamore. In addition, the GSAs identify the Salix laevigata-Salix lasiolepis Superalliance as a vegetation species within the Basin (CDFW 2023; DWR 2023). The Sycamore is mapped in a limited area along the Arroyo Santa Rosa and was not included due to the observed groundwater levels being consistently deeper (>20 ft) than the typical root depth for the tree of ~6 ft (Spengler, 2020; USDA, 2022). The red willow and giant reed were determined to be surface water dependent, due to the perennial surface water flows of the Arroyo Conejo and Conejo Creek and verification through air photos (Figures 3.2-13a through c). The aerial photos indicate there are reaches of the Arroyo Conejo and Conejo Creek channels that had little to no vegetation prior to the construction of the Hill Canyon WWTP in 1961 (which is the current primary source for perennial flows of the surface water system). Figure 3.2-13a shows the western reaches of the Conejo Creek and clearly indicates a difference in the amount of vegetation in the circled area, with little to no vegetation seen in the creek prior to the WWTP. Figure 3.2-13b shows the eastern reaches of the Conejo Creek and indicates vegetation existed prior to the WWTP, but was much less extensive, especially toward the east as seen in the circled area. Figure 3.2-13c shows the Arroyo Conejo reaches within the Basin and indicate vegetation existed prior to the WWTP, but was much less extensive, especially toward the south as seen in the circled area. The California sycamore identified to the northeast near the Arroyo Santa Rosa is likely not dependent on groundwater because the trees are well established and depth to groundwater in this area is typically greater than 20 ft (typical rooting depth), as indicated by continuous measurements in well 02N19W20M04S (see Section 3.2.1).

As discussed in the Interconnected Surface Water Systems above (Section 3.2.6), the pumping in the groundwater-producing zones near the Conejo Creek is not likely to deplete streamflows; therefore, it is not believed that pumping activity will cause significant or unreasonable stress to the riparian vegetation species (Section 3.2.7.3), which are dependent on surface water. In summary, the following factors indicate the riparian vegetation is not dependent on groundwater:

1. Historical aerial photos of the Basin show much less vegetation existed along the Arroyo Conejo and Conejo Creek before the Hill Canyon WWTP was operational (Figure 3.2-13a through c), which indicates much of the riparian vegetation and wetlands were recruited and maintained as a result of the sustained baseflows from the WWTP effluent.
2. The riparian vegetation does not experience stress during periods of low groundwater levels (e.g., the 2012-2016 drought) due to the sustained baseflows of the Conejo Creek from the effluent of the Hill Canyon WWTP.

Based on these factors, the GSP does not consider the riparian vegetation to be GDEs within the Basin and instead considers these primarily surface-water dependent ecosystems.

3.2.7.3 Sensitive Wildlife Species

Sensitive wildlife species supported by the riparian vegetation habitats identified within the Basin are considered in this GSP. The riparian vegetation habitats include phreatophytes and other vegetation communities such as southern riparian forest, Salix laevigata-Salix lasiolepis Superalliance, palustrine scrub, and valley oak woodland (CDFW 2023; DWR 2023). The southern riparian forest, palustrine scrub, and valley oak woodland vegetation communities are consistent with the red willow, giant reed, and California sycamore described in Section 3.2.7.2 above. The sensitive wildlife species considered in this GSP consist of:

- Least Bell's vireo (Vireo bellii pusillus), which has been listed as an endangered species by the federal Endangered Species Act (ESA) and California Endangered Species Act (CESA),
- The southern pond turtle (Actinemys marmorata pallida), which has been listed as a species of concern by the California species of special concern on the California Natural Diversity Data Base (CNDDB 2023), and
- The arroyo chub (Gila orcutti), which has been listed as a species of concern by the California species of special concern (CNDDB 2023).

Depletion of ISW stressing the riparian phreatophytic vegetation could risk the survival of the above-listed sensitive species; however, the depletion of ISW due to groundwater extraction in the Basin is very minor (Section 3.2.6) and the GSP addresses this depletion which could cause undesirable results including significant and unreasonable effects on riparian habitat (Section 4.9). The GSAs do not have jurisdictional authority over potential impacts from other external sources for the surface water sustaining the riparian vegetation habitats (i.e., land-use changes, surface water flows, or wastewater discharges from the Hill Canyon WWTP); hence, the GSP cannot address or manage any future changes to surface flows (or beneficial use of the same) from increased recycled water demands or other actions that could reduce surface water inflows.

ASRGSA has considered public trust resources in development of this GSP by considering the impacts to riparian and aquatic habitats, and by setting minimum thresholds designed to prevent undesirable results under SGMA.

3.3 Water Budget [§354.18]

This section presents the estimated water budget for the ASRVGB, including information required by the GSP Emergency Regulations and information that is important for developing an effective plan to achieve sustainable groundwater management. In accordance with the GSP Emergency Regulations §354.18, the GSP must include a water budget for the basin that provides an accounting and assessment of the total annual volume of surface water and groundwater entering and leaving the basin, including historical, current, and projected water budget conditions, and the change in the volume of water stored. Water budgets must be reported in graphical and tabular formats, where applicable. A description of each water budget term and data sources is provided in the "Water Budget Components" subsection below and the historical, current, and projected (future) quantitative water budgets for ASRVGB are presented in Sections 3.3.1, 3.3.2, and 3.3.3, respectively.

The remainder of this section provides an overview of the approach to the calculation of the historical water budget as well as key surface water and groundwater budget components.

Water Budget Overview

The groundwater flow model was used to assist with quantifying water budgets for the historical, current, and projected conditions, including the evaluation of uncertainty due to climate change (Appendix G). As required by the GSP Emergency Regulations, potential effects of land use change and population growth were evaluated for the projected water budget. It was concluded that these factors are not anticipated to have a material impact on future water demand and the water budgets for the Basin because of land use policies and ordinances that greatly limit the potential for significant growth in the Basin. The projected water budget provides a baseline against which effects of climate change are compared to evaluate uncertainty. The water budget results indicate that climate change is not anticipated to have a significant effect on the projected future surface water and groundwater budgets for the Basin.

The primary sources of groundwater inflow to the ASRVGB are streamflow percolation, bedrock groundwater inflow from the Conejo volcanics from the south and east, and recharge from infiltration of precipitation and return flows (Figure 3.1-18). Additional sources of recharge include recharge from precipitation, mountain-front recharge from the north, and a minor amount of subsurface inflows from the Pleasant Valley Basin at the western boundary of the ASRVGB. The primary source of surface water flows entering the ASRVGB are from the perennial Arroyo Conejo, of which most of the streamflow is sustained by effluent from the Hill Canyon WWTP (see Sections 3.1.1.2 and 3.2.6). Most of the surface water entering the ASRVGB leaves the Basin through Conejo Creek at the western boundary of the Basin, although a portion percolates to the groundwater in the losing reaches of the Arroyo Santa Rosa and the Tributary, Arroyo Conejo, and Conejo Creek. M&I pumping constitutes the largest source of groundwater extractions from ASRVGB followed by agricultural extractions and one domestic well. Overall, groundwater extractions are the largest outflow component for the Basin.

Water Budget Components

In accordance with GSP Emergency Regulations §354.18(e), ASRVGB relied upon the best available information and science to quantify the water budget for the Basin and provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, groundwater-surface water interaction, and subsurface groundwater flow. The numerical flow model (Appendix G) used to help quantify the water budget is based on the best available hydrogeologic information from previous studies of Basin hydrogeologic conditions and current land use data sources. The numerical model gives insight into how the complex hydrologic processes are operating in the Basin and is considered the best tool currently available for estimating the quantities of certain water-budget components.

Estimates and projections made with the numerical model have uncertainty due to limitations in available data and assumptions made to develop the models (Appendix G). Uncertainty was also considered when using the water budgets during the planning process by accounting for impacts from climate change on the water budget components.

In accordance with GSP Emergency Regulations §354.18(d), ASRVGB utilized the following required information provided by DWR or other data of comparable quality, to develop the water budget:

- Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use;
- Current water budget information for temperature, water year type, evapotranspiration, and land use; and
- Projected water budget information for population, population growth, and climate change. Although mentioned in the regulations, sea level rise is not applicable to this Basin.

Precipitation is not a direct groundwater or surface water budget component. However, precipitation is an important parameter that influences several groundwater and surface water budget components directly or indirectly, such as groundwater recharge and surface water flows in streams. Data sources are provided in Table 3.3-01.

Qualitative descriptions of each water budget component, together with explanations of data sources for each component, are described below:

- **Surface water entering and leaving the ASRVGB:** Surface water enters the ASRVGB via the Arroyo Conejo, the Arroyo Santa Rosa, and the Arroyo Santa Rosa Tributary. Surface flows leave the ASRVGB through the Conejo Creek at the western boundary, as shown on Figure 3.1-05. Additional information regarding the characteristics and sources of data are discussed in Section 3.1.1.2 and summarized on Table 3.3-01. The following section summarizes how key surface-water components were incorporated into the water budget:
    - Arroyo Santa Rosa and its tributary: Surface-water flows in the Arroyo Santa Rosa and the Arroyo Santa Rosa Tributary enter the ASRVGB at the eastern boundary (Figure 3.1-05) and combine just upstream of the inactive stream Gage 838, where the Arroyo Santa Rosa channel continues downstream to eventually combine with Arroyo Conejo becoming Conejo Creek thereafter. Arroyo Santa Rosa and its tributary exhibit flow only during storm events and do not have baseflow. Gage 838 is a peak event gage with intermittent data considered to be unreliable, hence stormflows for Arroyo Santa Rosa and its tributary were estimated

based on streamflows measured on Conejo Creek at gages 800 and 800A, and apportioning these to Arroyo Santa Rosa, the Arroyo Santa Rosa tributary, Arroyo Conejo, and Conejo Creek based on the contributing catchment area for each surface water body. The methodology used to estimate stormwater flows is discussed in the numerical model documentation (Appendix G).

- Arroyo Conejo: Surface water flows in the Arroyo Conejo enter at the southern boundary of the Basin in Hill Canyon just downstream of the Confluence Flume stream gage (Figure 3.1-05). The confluence of the north and south forks of the Arroyo Conejo Creek is just downstream of the Hill Canyon WWTP immediately south and upstream of the Confluence Flume. The north and south fork Arroyo Conejo Creeks drain the Conejo Valley, which includes much of the City of Thousand Oaks (Figure 3.1-05). The Arroyo Conejo and its forks do not have any continuous gaging stations, although flows from the Hill Canyon WWTP are known year-round and the City of Thousand Oaks monitors the Confluence Flume during the summer months (see Figure 3.1-06). A combination of gages (800, 800A, and the Confluence Flume) were used to estimate baseflows and stormflows in Arroyo Conejo (see Appendix G).
- Direct runoff contributions to streamflow within the Basin: Direct runoff within the Basin that contributes to streamflow is calculated based on the catchment area that accumulates to the gage 800 location – the area-determined proportion (based on the contributing catchment area between the entry points of the tributaries and gage 800) of stormflows at gage 800 were implemented as runoff spread equally across the modeled streams (see Appendix G).
- Outflows from Conejo Creek: Conejo Creek flows out of the ASRVGB directly to the Pleasant Valley Basin at the southwest boundary. Surface water measurements (primarily from gage 800) were used to represent surface water outflows from the Basin. In periods when flow measurements were not available at gage 800 (e.g., 2011), stormflows from gage 800A and baseflows from the Confluence Flume are used (see Appendix G).
- Evapotranspiration from riparian vegetation (ET): ET of surface water by riparian vegetation is modeled as a surface water outflow component using crop-coefficients to estimate rates (Appendix G).

▪ **Groundwater inflow water source type:** The primary sources of groundwater inflow to the ASRVGB are from the Conejo volcanics, streamflow percolation from losing reaches, and recharge from infiltration of precipitation and return flows. Secondary sources are mountain-front recharge and a minor amount of lateral subsurface inflows from the Pleasant Valley Basin. Data sources for the groundwater components are summarized in Table 3.3-01 and are described below.

  - Recharge from Precipitation and Return Flows: Precipitation or other sources of water that infiltrate into the groundwater system from the ground surface are collectively called recharge. The sources of recharge known to occur in ASRVGB are described in Section 3.1.3.2 of this GSP. Recharge is subject to temporal and spatial variability, and details regarding how recharge rates were estimated for input to the groundwater model (Appendix G) for the region are summarized as follows:

    (a) Agricultural return flows: Farmers apply irrigation water to meet evaporation, transpiration, and salt-leaching requirements on their fields when rainfall is insufficient to meet those demands, with the goal of maintaining acceptable crop yields. The salt-leaching requirement is the percentage of “excess” irrigation water required to control salt concentrations in the root zone of agricultural fields. Water applied to meet the leaching requirement is assumed to flow past the root zone to recharge the shallow groundwater. Agricultural return flows were calculated assuming a constant loss rate of 20% (UCWD, 2021) of applied irrigation amounts derived from a combination of metered agriculture pumping extractions, metered deliveries from Camrosa WD, and estimated non-metered deliveries from non-metered wells (Appendix G).

(b) M&I irrigation return flows: Similar to agricultural return flows, excess urban, municipal, and industrial outdoor irrigation were assumed to be 20% of the estimated potable and non-potable Camrosa water sales in the Basin (See Appendix G for further details).

(c) Infiltration of precipitation: Infiltration from precipitation recharges the shallow groundwater in the ASRVGB. Monthly recharge rates from the California Basin Characterization Model (Flint et al., 2013; USGS, 2017) were utilized to calculate infiltration of precipitation for the groundwater model (Appendix G).

(d) M&I septic system leachate: The ASRVGB is note sewered and instead relies on septic systems. It was assumed that 100% of M&I estimated indoor water use contributes to recharge via septic systems. Estimated indoor water use was based on Camrosa potable water sales within the Basin.

(e) Water distribution system losses: To account for losses from water distribution pipelines, it was assumed that system losses were 4.7% based on the average losses observed from 2017 to 2020 (Appendix G).

- Groundwater Inflow from the Conejo Volcanics: A significant amount of groundwater inflow is anticipated to come from the Conejo volcanics along the south and east boundaries of the Basin because of the fractured nature of the volcanic rocks and groundwater conditions, i.e., sustained high groundwater levels (Appendix G). Based on the calibrated numerical groundwater model developed for the Basin, much of this inflow comes from the bedrock along the eastern edge of the Basin.
- Mountain-front recharge: A small amount of mountain-front recharge from the Las Posas Hills is likely to occur along the northern boundary of the Basin. Results from the California Basin Characterization Model (Flint et al., 2013) model estimate 223 AFY of recharge from October 2011 to September 2021 (Appendix G).
- Streamflow Percolation: Streams within the ASRVGB contain losing reaches of the Arroyo Santa Rosa, Arroyo Santa Rosa Tributary, Arroyo Conejo, and the Conejo Creek, where there is percolation of streamflow into the shallow sediments (Sections 3.1.3.2 and 3.2.6; Figures 3.1-18 and 3.2-08a through c). As described in Section 3.1.3.2, the streams within the Basin are reported as net losing streams meaning that more streamflow enters the Basin than leaves the Basin and is an inflow component to the groundwater system (Boyle, 1987; MWH, 2013). The Arroyo Conejo and Conejo Creek are conceptualized in Figure 3.1-18 as generally losing with some gaining reaches in the south where the Arroyo Conejo enters the Basin and the west where the Conejo Creek intercepts shallow groundwater; seasonal changes in the gaining/losing reaches are depicted on Figures 3.2-08a through c. Streamflow percolation to the shallow water table is quantified using the numerical model (Appendix G)

and is dependent on the difference between river stage and the shallow groundwater elevations, as well as the physical characteristics of the riverbed (width and slope).

- Underflow from Pleasant Valley Basin: A small amount of lateral groundwater underflow into the ASRVGB groundwater-producing zones from the Pleasant Valley Basin may occur along the western boundary of the Basin (Figure 3.1-18) and is calculated using the numerical model (Appendix G). This underflow component is not well constrained by data and flow rates are within the uncertainty of the numerical model.

▪ **Groundwater outflows from the Basin**: Groundwater outflow components are described below, and data sources are summarized in Table 3.3-01.

    - Groundwater extractions: Historical groundwater extractions in ASRVGB are discussed below in Section 3.3.1. Reported extraction data are available for 20 active wells in the Basin. These include eight M&I wells owned by Camrosa WD, 11 agricultural wells within FCGMA, and one domestic well. Extractions from the 19 active or presumed active agricultural wells located outside of the FCGMA were estimated based on water application rates per acre calculated from reported groundwater extractions and Camrosa irrigation water sales (see Appendix G).
    - Groundwater discharge to surface water: As described in Sections 3.1.3.2 and 3.2.6, the streams within the Basin are reported as a net losing streams (Boyle, 1987; MWH, 2013) and there are gaining and losing sections along the Arroyo Conejo and Conejo Creek streams, depending on seasonality and groundwater levels (Figures 3.2-08a through c.). Groundwater discharge to the streams is calculated by the numerical flow model and is dependent on the difference between river stage and groundwater elevations in the underlying shallow groundwater, as well as the width and riverbed conductance of the channel (Appendix G).
    - Underflow to Pleasant Valley Basin: A very small component of the water budget includes underflow to the Pleasant Valley Basin at the western boundary of the Basin, which only occurred during the first year of the historical water budget period and may be an artifact of the model simulation stabilizing to initial conditions. This amount of underflow is within the range of uncertainty for the numerical model (Appendix G).

▪ **Change in the annual volume of groundwater in storage between seasonal high conditions:** Annual changes in the volume of groundwater in storage in ASRVGB reflect imbalances between inflows and outflows. In years when inflows exceed outflows from the groundwater system, the volume of groundwater in storage increases which manifests as a rise in groundwater levels in wells. Conversely, when outflows exceed inflows, the volume of groundwater in storage decreases (referred to in this GSP as "groundwater released from storage"), and declining groundwater levels are observed in wells. Groundwater storage cannot be directly measured; rather it can only be estimated using measured or modeled groundwater levels and knowledge of the basin geometry and subsurface hydraulic properties or through numerical modeling. The calibrated numerical model is used to estimate the change in storage for the Basin (Appendix G). The change in groundwater in storage is presented in Section 3.2.2 and Figure 3.2-05 shows the annual and cumulative change in groundwater in storage from water years 2012 to 2021 between seasonal high groundwater conditions (i.e., spring) with groundwater use and water year type.

Water Year Types

GSP Emergency Regulations §354.18(b)(6) require presentation of the water year type associated with annual water budget terms. GSP Emergency Regulation §351(an) defines "Water year type" as the "classification provided by the Department to assess the amount of annual precipitation in a basin." DWR provided a "Water Year Type" designation for each water year (from 1931-2021) for the entire Arroyo Santa Rosa Valley watershed (HUC 18070103). The DWR based their designation system on spatially averaged rainfall throughout the watershed in a given year and the previous year, relative to the 30-year moving average rainfall amounts for the region (DWR, 2021). DWR released the water year type dataset in 2022 and are presented on Figure 3.2-05 in addition to the figures and tables depicting the water budget terms in this GSP.

3.3.1 Historical Water Budget [§354.18(c)(2)(B)]

> **§354.18 Water Budget.**
> ***(c)*** *Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:*
> ***(2)*** *Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type.*

GSP Emergency Regulation §354.18(c)(2) require that historical water budget information be evaluated to assess aquifer response to water supply and demand trends as well as evaluate reliability of past surface water supply deliveries. Section 3.3.1.1 presents historical demands, supplies, and the reliability of surface water deliveries. The subsequent sections 3.3.1.2 and 3.3.1.3 present the quantitative historical surface water and groundwater budgets, respectively. The regulations specify that historical surface water and groundwater budgets be based on a minimum of 10 years of historical data. Water years 2012 through 2021 were selected to represent the 10-year historical water budget. The historical period is long enough to cover a range of water year types, hydrologic conditions, as well as demands and supply variations in the basin including the historic 2012-2016 drought. Section 3.3.1.4 discusses the impacts of historical conditions on basin operations.

3.3.1.1 Historical Demands, Supplies, and Reliability of Surface Water Deliveries

> **§354.18 Water Budget.**
> ***(c)*** *Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:*
> ***(2)*** *Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:*
> *(A) A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information.*

Water demands for the ASRVGB consist of M&I, agricultural, and domestic demands, which are met by a mix of groundwater extractions and deliveries for potable and non-potable use from outside of the Basin. Sources of water supplied from outside the ASRVGB are delivered for M&I and agricultural beneficial uses through Camrosa WD's potable and non-potable distribution systems (Figure 3.3-01), and consist of:

- Imported purchases from Calleguas MWD,
- Groundwater extracted from wells located in the neighboring Tierra Rejada and Pleasant Valley groundwater basins,
- Non-potable surface water, which includes:
  - Conejo Creek Project water – diversions from the Conejo Creek Diversion Structure, located on the west bank south of the 101 freeway, near streamflow gage 800A (Figure 3.1-05) which is pumped to the ASRVGB by Camrosa WD.
  - Recycled water from Camrosa WD's Water Reclamation Facility.

Water demands within the ASRVGB were estimated based on Camrosa WD's customer metered potable and non-potable water sales, metered extractions for agricultural wells, and estimated agricultural water use for non-metered wells (Appendix G). Groundwater supplies were estimated based on historical metered pumping in the FCGMA portion of the Basin and estimated agricultural irrigation application for the remainder of the Basin (Appendix G). The historical demand and supply calculations are summarized below and shown on Table 3.3-02.

3.3.1.1.1 Historical Demands

- **M&I Demands:** Camrosa WD is the M&I service provider within the ASRVGB. Camrosa WD's metered potable and non-potable deliveries at the end use customer level were used to estimate M&I demands.
- **Agricultural Demands:** Agricultural demands were estimated using a combination of metered agricultural pumping extractions (from FCGMA), metered non-potable deliveries from Camrosa WD to agricultural customers, and estimated deliveries from non-metered wells outside of the FCGMA. Additional details on how the non-metered deliveries were estimated are provided in the modeling documentation (Appendix G).
- **Domestic Demands:** There is one domestic well in use within the ASRVGB, located in the southwest area of the Basin (Figure 3.1-28). Water well usage statements submitted to the County indicate the well extracts 2.5 AFY.

3.3.1.1.2 Historical Supplies

- **M&I Groundwater Supplies:** Camrosa WD is the sole M&I water provider in the Basin. Camrosa WD operates eight wells within the ASRVGB, one well in the Tierra Rejada Basin and three wells in the Pleasant Valley Basin. Metered extractions from the eight wells in the ASRVGB were used for calculating M&I groundwater supplies.
- **Agricultural Groundwater Supplies:** Groundwater supplies for agricultural irrigation in the ASRVGB are comprised of metered extractions from wells in the FCGMA, metered agricultural water deliveries from Camrosa which includes groundwater extracted from Camrosa wells blended with other water sources (typically 2:1 imported purchased water from Calleguas MWD to extracted groundwater ratio), and unmetered extractions located outside of the FCGMA. For the total historical agricultural groundwater extractions, FCGMA metered wells comprised 33.1%, metered agricultural deliveries from Camrosa WD averaged 51.6% (from which 33% is estimated to be groundwater), and the unmetered estimations comprised the remaining 15.3% (Appendix G).

- **Domestic Groundwater Supplies:** There is one domestic well in use within the ASRVGB. This well is not metered, and extractions are estimated to be 2.5 AFY (Appendix G).
- **M&I Surface Water Supplies:** Surface water supplies are not diverted within the ASRVGB for M&I beneficial use. M&I potable water demands are met through groundwater extractions and imported Calleguas MWD purchases and extracted groundwater, and M&I non-potable water demands are met through non-potable Conejo Creek Project surface water diversions from Conejo Creek and recycled water from outside of the Basin.
- **Agricultural Surface Water Supplies**: Surface water supplies are not diverted within the ASRVGB for agricultural use within the ASRVGB. Agricultural water demands are met through groundwater extractions and imported Calleguas MWD purchased water and downstream Conejo Creek Project surface water diversions from Conejo Creek and recycled water from outside of the Basin. In addition, there is a diversion point (identified through EWRIMS; SWRCB, 2022) assumed to be located just outside of the Basin boundary which may be for agricultural uses within the Basin. The areas that this diversion irrigates is an area of uncertainty to be updated in a GSP update following inquiries with the owner.

3.3.1.1.3 Reliability of Historical Surface Water Deliveries

GSP Emergency Regulations §354.18(c)(2)(A) requires a quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries. Water supply within the ASRVGB relies on groundwater extractions and water from outside of the Basin (Figure 3.3-01). Water from outside of the Basin used for potable purposes consists of a blend of water sources, including groundwater pumped by Camrosa's wells in the Tierra Rejada and Pleasant Valley Basins and imported water purchased from Calleguas MWD, which consists primarily of surface water imported from the State Water Project via Metropolitan Water District of Southern California (MWDSC) (Camrosa, 2021). In addition to serving as a supply source, Calleguas MWD supplies are used to blend with groundwater extracted from Camrosa's Conejo wellfield in the Basin to meet the nitrate MCL. Table 3.3-03 indicates purchases from Calleguas MWD have been consistently less than the available water supply from Calleguas MWD during the historical period, demonstrating the reliability of imported water supplies obtained from Calleguas MWD.

Camrosa's primary resource strategy for the past 20+ years has been to build "self-reliance" by developing local supply alternatives. This strategy has been instrumental in reducing the dependence on imported Calleguas MWD purchased water. In 1997, 85% of the District's demand was met through imported Calleguas MWD purchased supplies and was reduced to 25% by 2018 (Camrosa, 2021). This reduction of imported water use was accomplished primarily through the Conejo Creek Project where agricultural and municipal irrigation demand was shifted from the potable system to the non-potable system supplied via Conejo Creek diversion downstream of the Basin, and additional non-potable water supplied from recycled water from Camrosa's Water Reclamation Facility. Table 3.3-04 shows water purchased water from Calleguas MWD that is imported into Camrosa WD's potable system in the ASRVGB over the historical period. Average annual purchases were 942 AFY which comprised an average of 64% of Camrosa's total potable deliveries. This percentage has fluctuated over this historical period yet has notably increased in recent years due to the Conejo wellfield being offline since 2018 from TCP contamination. Camrosa is in the process of constructing a GAC treatment plant to treat the TCP, which will further reduce Camrosa's dependency on imported Calleguas MWD purchases for blending and water quality purposes (Camrosa, 2021). Table 3.3-04 shows that imported potable water from Calleguas MWD purchases has fluctuated for operational and water quality purposes, but there have been sufficient supplies to meet potable demands over the historical period. Calleguas MWD can draw from MWDSC and water stored in Lake Bard and the Las Posas Aquifer Storage and Recovery Project. These multiple sources provide CMWD options, improving water supply reliability (Calleguas MWD, 2021). Overall, ASRVGB has not faced potable water shortages during the historical period.

Camrosa's non-potable distribution system in the ASRVGB is supplied by Conejo Creek Project water diversions from Conejo Creek downstream of the ASRVGB and recycled water from Camrosa's Water Reclamation Facility. During the historical period, Camrosa's diversions from Conejo Creek have averaged 8,832 AFY, of which 42% was delivered to Pleasant Valley County Water District (Camrosa, 2021). The Camrosa Water Reclamation Facility produces ~1,500 AFY, of which approximately two-thirds are delivered to agricultural customers and one-third is delivered to California State University Channel Islands (Camrosa, 2021). Wastewater effluent from the Hill Canyon WWTP is ~15,000 AFY and is a reliable source of water to Conejo Creek even during periods of drought, given the relatively stable nature of indoor water demands. Camrosa's Conejo Creek Project plans are to continue to divert ~9,000 AFY from the Conejo Creek diversion downstream of the Basin based on a 2013 agreement with the City of Thousand Oaks, which accounts for streamflow losses, environmental protection requirements, bypass, and downstream diversion water rights. An estimation of planned versus actual non-potable water used within ASRVGB by water year during the historical period is provided in Table 3.3-05 and indicates sufficient supplies to meet non-potable demands.

3.3.1.2 Historical Surface Water Budget

§354.18 Water Budget.

(c) *Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:*

(2) *Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:*

(B) A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.

Table 3.3-06 and Figure 3.3-02 quantify the historical surface water budget components for the ASRVGB. Surface water flows in the ASRVGB are the result of runoff from precipitation events and perennial flows sourced from discharge from the Hill Canyon WWTP and urban runoff from Conejo Valley. Section 3.1.1.2 provides details on the surface water within the ASRVGB. The primary surface water features include the Arroyo Santa Rosa and its tributary, the Arroyo Conejo, and Conejo Creek (Figure 3.1-05). The Arroyo Santa Rosa and its tributary are ephemeral streams typically exhibiting flows during/after rainstorm events. The Arroyo Conejo and Conejo Creek are perennial streams with sustained flows due to the Hill Canyon WWTP effluent discharges into the creek.

Surface water inflows leave the basin through Conejo Creek at the western boundary of the ASRVGB and are accounted for in the Stream Outflows term. Stream outflows make up ~92% of the total inflows on average. Stream outflows are consistently less than inflows throughout the historical period indicating that there is a net loss of surface water flows to the groundwater through percolation of streamflow in the losing stream reaches of the Basin (Sections 3.1.3.2 and 3.2.6). There are also reaches within the Arroyo Conejo and Conejo Creek that are gaining, and annual volumes of streamflow losses and gains are calculated by the numerical model (Appendix G). The surface water budget components for the historical period are summarized below:

- The largest component of inflow for the historical surface water budget is the Arroyo Conejo (average of 15,318 AFY).
- The historical average total surface water inflow is 16,729 AFY.
- The average streamflow losses from percolation to groundwater in losing reaches is approximately 1,286 AFY (with a range from 730 AFY to 2,134 AFY) over the historical period.
- The average gains from groundwater discharging to the streams in gaining reaches is approximately 119 AFY (with a range from 62 AFY to 490 AFY) over the historical period.
- The net surface water-groundwater interaction for the streamflows in the ASRVGB is computed by taking the sum of streamflow losses and gains. On average, the result is a net streamflow loss of approximately 1,167 AFY to the groundwater, ranging 240 AFY to 2,061 AFY, depending on the seasonal variability of groundwater levels.
- Evapotranspiration (ET): ET from phreatophytes within the riparian areas of the streams occurs through available surface flow in the streams and ranges from 116 AFY to 146 AFY with an average of 130 AFY for the historical period.

3.3.1.3 Historical Groundwater Budget

§354.18 Water Budget.
(c) *Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:*
(2) *Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:*
(B) A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.

Table 3.3-07 and Figure 3.3-03 quantify the historical groundwater budget components for ASRVGB, of which inflow from the Conejo volcanics and net streamflow percolation constituted the largest inflow components. Agricultural and M&I (septic and outdoor) return flows constituted moderate inflow amounts, while mountain-front recharge, lateral flows from Pleasant Valley Basin, potable and non-potable distribution loss return flows, and recharge from precipitation were minor inflow components. The model generated values for the lateral flows from Pleasant Valley Basin are not well constrained by data. Groundwater extractions from M&I and agricultural pumping (metered and non-metered) comprised the largest outflows from the Basin. Groundwater discharge to gaining stream reaches was relatively minor and the domestic well extraction is negligible. Individual inflow and outflow components from Table 3.3-07 are combined and shown on Figure 3.3-03 and are identified by color. Based on simple calculations and ranges on Table 3.3-07, the historical values for the groundwater budget components are summarized below:

- **Recharge from precipitation:** Precipitation usually occurs in just a few significant annual storms that occur between November and April (Section 3.1.1.1). The natural recharge from precipitation within the Basin ranged from 0 to approximately 177 AFY with an average of approximately 41 AFY.

- **Mountain-front recharge from the North:** Mountain-front recharge from the north, which is derived from precipitation, averages 230 AFY, varying from 174 AFY to 295 AFY.
- **Inflow from the Conejo volcanics**: The Conejo volcanic bedrock to the east (see Figure 3.1-18) is the largest source of inflow in the ASRVGB with an average rate of 1,257 AFY varying from 1,047AFY to 2,078 AFY during the historical period. Inflow from the Conejo volcanics from the south is much less with an average of 93 AFY varying from 51 AFY to 198 AFY.
- **Return flows:** Agricultural return flows constituted the highest inflow amount in this category (average of 703 AFY), and M&I outdoor use (average of 315 AFY), septic return flows (average of 279 AFY), and distribution losses (average of 161 AFY) were much less; however, when combined, the return flows were a significant inflow component, and totals ranged from approximately 1,269 AFY to 1,746 AFY with an average of 1,458 AFY.
- **Groundwater extractions:** M&I extractions were the highest outflow component followed by agricultural extractions, until water year 2019 when M&I extraction rates began to decrease due to TCP contamination. Total groundwater extracted for agricultural, M&I, and domestic use ranged from 3,227 AFY to 6,041 AFY with an average of 4,530 AFY.
- **Underflow to/from Pleasant Valley Basin:** Underflow from Pleasant Valley Basin constitutes the remaining inflow to the ASRVGB. This is modeled to be an average of 114 AFY during the historical period ranging from -144 AFY to 281 AFY. The negative value (outflow) in 2012 is likely an artifact of the numerical model stabilizing from initial conditions. The flows from Pleasant Valley Basin depend on the relative groundwater levels along the western boundary and groundwater levels within the FCGMA management area. Nonetheless, the average flow across this boundary is insignificant (~2% of the average total Basin outflows for the historical period) and is within the range of uncertainty of the numerical model (see Appendix G). In addition, the model generated values for flow across this boundary are not well-constrained by data.
- **Groundwater Exchange with Streamflow:** Surface water-groundwater interactions vary spatially in the ASRVGB (see Sections 3.1.3.2 and 3.2.6). The average inflow to the groundwater system from losing reaches of the streams within the Basin is approximately 1,286 AFY ranging from 730 AFY to 2,134 AFY. The average outflow from the groundwater system to gaining reaches of the streams is approximately 119 AFY (with a range from 62 AFY to 490 AFY) over the historical period. Thus, on average the net surface water-groundwater exchange was ~1,167 AFY of streamflow percolation to the groundwater system. These amounts reflect the surface water budget components described above in Section 3.3.1.2.
- **Groundwater in Storage:** In response to the annual variability in inflows and outflows to the groundwater system in ASRVGB, the volume of groundwater in storage in the Basin has increased or decreased during the historical period, generally due to changes in extraction rates and hydrologic conditions. Table 3.3-07 and Figure 3.3-03 show the annual and cumulative change in groundwater in storage for the Basin. As can be seen in Figure 3.3-03, the change in groundwater in storage is intrinsically linked to extraction rates, which is the primary outflow component for the water budget.

3.3.1.4 Impact of Historical Conditions on Basin Operations [§354.18(c)(2)(C)]

> **§354.18 Water Budget.**
> ***(c)*** *Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:*
> ***(2)*** *Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:*
> ***(C)*** *A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.*

GSP Emergency Regulations §354.18(c)(2)(C) requires a description of how historical water budget conditions have impacted the ability of ASRVGB to operate the Basin within sustainable yield. The estimated sustainable yield for ASRVGB is provided in Section 3.3.4. Prior to adoption of this GSP, ASRGSA has had neither the regulatory authority nor the technical justification to "operate the basin within sustainable yield." Thus, GSP Emergency Regulations §354.18(c)(2)(C) appears inapplicable to the ASRVGB. However, the impacts of historical conditions can provide insight into what challenges ASRGSA may have faced had it existed historically and with authority to manage the Basin.

Review of the historical water budget indicates that groundwater storage declined from 2012-2015, was relatively stable from 2016-2018, and then increased to storage levels in 2021 that are similar to the beginning of the historical period in 2012. However, the observed recovery from 2018-2021 is larger than it may have been otherwise due to the reduction in M&I extractions caused by the Conejo wellfield being offline starting in 2018 because of TCP in groundwater (Section 3.2.2; Figure 3.2-05). The cumulative storage change at the end of the historical period is -1,706 AF, which is a small deficit that is not unexpected due to the considerably dry period. Regardless, ASRGSA is unaware of any documented undesirable results historically.

3.3.2 Current Water Budget [§354.18(c)(1)]

> **§354.18 Water Budget.**
> *(c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:*
> ***(1)*** *Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.*

The GSP Emergency Regulations §354.18(c)(1) require that the current surface water and groundwater budget be based on the most recent hydrology, water supply, water demand, and land use information. Water year 2021 is the last complete water year included in the numerical model (Appendix G). Water years 2019 through 2021 were selected to represent the current water budget, capturing a degree of hydrologic variability by including the wetter year of 2019 (which exceeded average precipitation levels) and drier years in 2020 and 2021 (Section 3.1.1.1; Figure 3.1-04).

3.3.2.1 Current Demands, Supplies, and Reliability of Surface Water Deliveries

The current demands, supplies, and reliability of surface water deliveries are discussed in Section 3.3.1.1 above and demonstrates that Camrosa has overall maintained a reliable supply of water for the Basin, even during drought periods. Table 3.3-04 shows water purchased from Calleguas MWD that is imported into Camrosa WD's potable distribution system for the current period. Average current annual purchased water imported into the Basin is 1,112 AFY, which is 79% of Camrosa WD's metered potable deliveries and is higher than the 10-year historical period of 64%, which is largely attributed to Camrosa WD's increase in purchased imported water to compensate for the temporary closure of the Conejo wellfield from TCP contamination. Camrosa WD is in the process of taking measures to reduce its reliance on imported water supplied by Calleguas MWD, and the construction of a GAC treatment plant to treat the groundwater will further reduce Camrosa's dependency on purchased water for blending and water quality purposes (Camrosa, 2021). Nonetheless, ASRVGB has not faced potable water shortages during the current period. Table 3.3-05 shows imported non-potable water for Camrosa WD's non-potable distribution system and indicates that ASRVGB has not faced non-potable water shortages during the current period.

3.3.2.2 Current Surface Water Budget

The current water budget period (2019-2021) captures a degree of hydrologic variability by including the wetter year of 2019 (which exceeded average precipitation levels) and drier years in 2020 and 2021 (Section 3.1.1.1; Figure 3.1-04). As can be observed on Table 3.3-06 and Figure 3.3-02, additional calculations provide summary comparisons between the current and historical surface water budgets:

- The largest component of inflow for the current surface water budget is the Arroyo Conejo (average of 19,064 AFY), which is consistent with the historical water budget (average of 15,318 AFY) and is slightly higher.
- The current average total surface water inflow is 21,636 AFY compared to the historical period (16,729 AFY).
- The net surface water-groundwater interaction for the streamflows in the ASRVGB is computed by taking the sum of streamflow losses and gains. On average, the result is a net streamflow loss to groundwater of approximately 1,576 AFY for the current period compared to 1,167 for the historical period.
- ET from phreatophytes within the riparian areas of the streams during the current period is generally consistent with the historical period, with an average of 141 AFY.

The current surface water budget begins after a historically dry period where groundwater levels were relatively low. The surface water budget indicates current surface water flows in the Basin are on average higher than historical conditions, which has likely contributed to increasing groundwater in storage and groundwater levels in the Basin, although, to a much lesser degree than the reduction in groundwater extractions (see Current Groundwater Budget below).

3.3.2.3 Current Groundwater Budget

Average annual volumes for each component of the current groundwater budget are quantified in Table 3.3-07 and Figure 3.3-03. Following are key aspects of the current groundwater budget and notable differences compared to the historical groundwater budget, based on simple calculations and ranges taken from Table 3.3-07:

- Current average recharge from precipitation is consistent with the historical average as a very minor source of inflow for the groundwater budget.

- Mountain-front recharge from the north remains a small source of inflow for the groundwater budget but is less in the current period compared to the historical period due to generally drier overall conditions.
- Current average agricultural return flows (589 AFY) are less than the historical period (703 AFY).
- Current average M&I return flows and distribution losses are relatively the same compared to the historical period due to consistent deliveries.
- Current average inflows from the Conejo volcanics (1,151 AFY) are slightly less than the historical period (1,349 AFY).
- Underflow from Pleasant Valley Basin for the current period is more than the historical period but is still insignificant with respect to the overall groundwater budget and within the range of uncertainty of the numerical model.
- Current average net exchange of surface water flows (streamflow losses recharging groundwater) into the Basin of 1,576 AFY is about 400 AFY more than during the historical period.
- Current average groundwater extractions of 3,487 AFY are 1,043 AFY less than the historical period. Approximately 60% of overall extractions are M&I pumping from Camrosa WD, so the decrease reflects the 2018 shutdown of Camrosa's Conejo wellfield.

Groundwater levels have generally increased during the current period, particularly in the western half of the Basin, and groundwater storage has recovered to near 2012 levels. While the current period is slightly wetter relative to the historical period, the decrease in M&I extractions during the 2018 to 2021 period contributed the most to the recovery of storage levels.

3.3.3 Projected Water Budget

GSP Emergency Regulations §354.18(c) require the development of a projected surface water and groundwater budget to estimate future baseline conditions of supply, demand, and aquifer response to GSP implementation. This section describes the methods used to estimate the projected water budget for ASRVGB, quantifies each projected water budget component, and evaluates uncertainty due to effects of future DWR-recommended climate change scenarios.

3.3.3.1 Projected Water Budget Calculation Methods [§354.18(d)(1),(d)(2),(d)(3),(e), and (f)]

§354.18 Water Budget.

(d) *The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:*

(1) *Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use.*

(2) *Current water budget information for temperature, water year type, evapotranspiration, and land use.*

(3) *Projected water budget information for population, population growth, climate change, and sea level rise.*

(e) *Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.*

(f) *The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.*

The projected water budget for ASRVGB was developed using the same tools and methods as the historical and current water budgets, which includes the use of the numerical flow model (Appendix G), modified to incorporate projections of future hydrology and demand, as described in the following subsections.

3.3.3.1.1 Projected Hydrology [§354.18(c)(3)(A)]

§354.18 Water Budget.

(c) *Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:*

(3) *Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:*

(A) *Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.*

In accordance with GSP Emergency Regulations §354.18 (c)(3)(A), the projected water budget was based on 50 years (water years 1972-2021) of historical precipitation, evapotranspiration, and streamflow information, which was incorporated into the predictive numerical model (Appendix G). The selected 50-yr historical period is representative of the long-term hydrologic variability in the Basin and is the best available information for groundwater sustainability planning purposes. The 1972-2021 period includes several wet-dry cycles and has an overall near-average precipitation (13.7 inches versus 13.3 inches for the entire record) and is evidenced by the similar starting and ending values on the cumulative departure from mean annual precipitation line (Figure 3.1-04).

The projected baseline hydrology was based on historical records from basin-specific precipitation gauges, ET stations, and streamflow data from the Conejo Creek and its major contributing tributaries (including the Arroyo Santa Rosa and the Arroyo Conejo). Future scenarios of hydrologic uncertainty associated with climate change were assessed with the 2030 and 2070 climate change scenarios, described below.

Uncertainty in future hydrology associated with potential climate change was evaluated by applying DWR (2018) change factors for precipitation, ET, and streamflow from their 2030 and 2070 central-tendency scenarios for the ASRVGB. Climate change factors were incorporated into historical baseline hydrology based on DWR (2018) guidance. Additional details on how future projections of precipitation, ET, streamflow, recharge, return flows, and pumping were developed are provided in the numerical model documentation (Appendix G).

3.3.3.2 Projected Water Demand, Supply, and Reliability of Surface Water Deliveries [§354.18(c)(3)(B), (c)(3)(C),]

§354.18 Water Budget.

(c) *Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:*

(3) *Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:*

(B) *Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.*

(C) *Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.*

GSP Emergency Regulations §354.18(c)(3)(B) require use of the most recent land use, ET, and crop coefficient information as the baseline condition for estimating future water demand and uncertainty associated with projected changes in local land use planning.

For the purpose of developing a projected water budget for ASRVGB, baseline future water demand in the Basin was accounted for in the numerical flow model (Appendix G) using current (most recent) land use information, agricultural and M&I water-use trends, and assumptions regarding future climatic conditions (including rainfall and ET).

3.3.3.2.1 Projected Demands

- **Land Use and Population Change Effects on Water Demand:** Population growth and land use changes are not expected to drive increased demand in the future. As described in Section 2.2.3, changes in land use that could have a significant impact on groundwater demand are not expected for the foreseeable future due to land use ordinances and policies. Projected change in agricultural and urban water demand due to land use change is not expected for the ASRVGB because most of the agricultural and undeveloped land in the basin lies within the County's SOAR boundaries (Figure 2.2-02). The County's SOAR initiative requires a majority vote of the people to rezone unincorporated open space, agricultural or rural land for development. The initiative is currently approved through 2050. The existence of the SOAR makes it very unlikely that a material change in land use that would affect the GSP analysis will occur during the baseline projection period. Because agricultural land is not expected to convert to other uses, it is assumed that there is little potential for new development and that agricultural activities will continue. Given the historical preponderance of permanent crops, it is assumed that there will not be a significant change in cropping either. The above-listed assumptions and conclusion can be re-visited during the required 5-year GSP updates. Population projections within Camrosa WD's retail service area suggest population growth will be small and will occur in other parts of the District's service area; therefore, population growth will not likely have material impact on water demand in the Basin (Table 3.3-08).
- **Projected Agricultural Demands:** Projected agricultural demands for the baseline scenario are assumed to be the average demand from the historical period, since no appreciable change in agricultural acreage or crop type is expected in the Basin (due to protected SOAR lands and a significant portion of the crops are long-term plantings (e.g., avocado or citrus trees), and there was no apparent correlation between agricultural demand and water year type (see Appendix G).
- **Projected Municipal and Industrial Demands:** Projected M&I demands were assumed to be the average of the monthly indoor and outdoor M&I demands developed for the historical period, since no land use changes are expected due to the SOAR initiatives. The 2030s and 2070s climate change M&I outdoor demands are expected to increase by 4% and 9%, respectively due to projected ET increases. (Appendix G).
- **Domestic Demand:** Domestic demand was assumed to remain constant and equal to historical domestic demand because there is only one domestic well in the Basin and all other domestic water demands are supplied by Camrosa WD.

3.3.3.2.2 Projected Supplies

- **Projected groundwater supplies:** projected pumping estimates were developed by Camrosa WD for their wells (Prichard, pers. comm., 2022b). Projected groundwater supplies were assumed to be equivalent to the agricultural demands discussed above. Domestic supply was assumed to remain constant and equal to historical domestic supply.
- **Projected surface water supplies:** Surface water supplies from imported water from Calleguas MWD purchases are currently not expected to change because they have been reliably met during the historical period and temporary reductions have been addressed with conservation measures (see Section 3.3.1.1). Reliance on imported purchased water may decrease due to projects and management actions and will be updated accordingly. Other sources of surface water from outside the basin includes the Conejo Creek Project water and recycled water (see

Section 3.3.1.1) and are not expected to change because the primary source of the water is Hill Canyon effluent, which is a reliable source of water even during periods of drought, given the relatively stable nature of indoor water demands.

Projected demands and supplies by category and source for the baseline, 2030, and 2070 climate change scenarios are shown on Tables 3.3-09 through 3.3-11.

3.3.3.2.3 Reliability of Projected Surface Water Supply

Future water supply within the ASRVGB is reliant on groundwater extractions and imported water. The Baseline future imported water is based on the historical and current reliability (see Sections 3.3.1.1 and 3.3.2.1) and consists of a blend of imported purchased water from Calleguas MWD, extracted water from wells in the Tierra Rejada and Pleasant Valley basins, and Conejo Creek diversions and recycled water (Figure 3.3-01) (Camrosa 2021).

As discussed in Section 3.3.1.1, the District has historically relied on Calleguas MWD for imported purchased potable water and therefore in meeting MCL requirements. Camrosa intends to further lower its dependency on Calleguas MWD water (Camrosa, 2021). Both Calleguas MWD and MWDSC are making water supply reliability a priority, significantly decreasing the chances of ASRVGB experiencing shortages of imported supplies in the future. Calleguas MWD can draw from MWDSC water stored in the Las Posas Aquifer Storage and Recovery Project. These multiple sources provide Calleguas MWD options, improving water supply reliability. - Furthermore, the ASRVGB comprises a relatively small portion of Calleguas MWD's service area (Figure 1.0-01) and therefore lessens the chance of significant shortages given that ASRVGB comprises a relatively small portion of its demands. MWDSC is also making strides in improving sustainability and reliability of regional supplies by reducing dependency on SWP and Colorado River water through conservation, recycling, storage, and improved supplies. Such efforts include groundwater storage programs through the San Bernardino Valley MWD and Kern-Delta Water District, the Diamond Valley Reservoir, the Las Posas Aquifer Storage and Recovery Project, demand management, and Metropolitan's Water Supply Allocation Plan, which was instituted during the 2015 drought. These programs are intended to improve the sustainability and reliability of water supplies while reducing dependency on SWP and Colorado River water.

3.3.3.3 Projected Water Budget

The projected surface water and groundwater budgets are presented in the following subsections below:

3.3.3.3.1 Projected Surface Water Budget

Average annual volumes for each component of the projected baseline surface water budget in ASRVGB are quantified in Table 3.3-12 and Figure 3.3-04. Following are salient results of the modeled baseline projected surface water budget, with comparison to the historical and current surface water budgets (shown on Table 3.3-06 and Figure 3.3-02):

- The largest component of inflow for the baseline projected surface water budget is the Arroyo Conejo, consistent with the historical and current surface water budgets, and the average projected inflow (19,956 AFY) is higher than the average historical and current values (15,318 AFY and 19,064 AFY, respectively).

- The projected average total surface water inflows are 23,119 AFY compared to the historical and current period (16,729 AFY and 21,636 AFY, respectively).
- The projected average net streamflow losses to the groundwater are 1,717 AFY, which is higher than the historical and current period (1,167 AFY and 1,576 AFY, respectively).

As was described in Section 3.3.3.1.1 of this GSP, the projected surface water budget was also modeled under two climate change scenarios (2030 and 2070) in accordance with DWR guidance §354.18(c)(3)(C). Projected surface water budget components under the 2030 climate change scenario are summarized in Table 3.3-13 and graphically illustrated on Figure 3.3-05. Projected surface water budget components under the 2070 climate change scenario are summarized in Table 3.3-14 and graphically illustrated on Figure 3.3-06. The effect of the simulated climate change scenarios on the projected surface water budget components is small; the largest change in long-term average projected inflows is less than 4% (increase) compared to baseline surface water budget inflows.

3.3.3.3.2 Projected Groundwater Budget

Average annual volumes of groundwater that comprise each component of the baseline projected groundwater budget for the alluvial aquifer are quantified in Table 3.3-15 and Figure 3.3-07. The following are salient results of modeling the baseline projected groundwater budget, with a comparison to the historical and current groundwater budgets (shown on Table 3.3-07 and Figure 3.3-03):

- Projected baseline average recharge from precipitation (235 AFY) is much higher than the historical and current averages (41 AFY and 72 AFY, respectively), but is still a minor source of inflow for the groundwater budget. The projected period (water years 1972-2021) includes more “above normal” and “wet” water years (22 out of 50, 44%), compared to the historical period (2 out of 10, 20%).
- The average mountain-front recharge from the north (244 AFY) remains a small source of inflow for the projected baseline groundwater budget but is slightly higher in comparison to the historical and current averages (230 AFY and 183 AFY, respectively).
- Projected baseline average agricultural return flows (755 AFY) are more than the historical and current averages (698 AFY and 570 AFY, respectively).
- The projected baseline average M&I return flows and distribution losses are relatively the same compared to the historical period.
- The projected baseline average inflow from the Conejo volcanics (1,059 AFY) is slightly less than the historical and current averages (1,349 AFY and 1,151 AFY, respectively).
- The average underflow from Pleasant Valley Basin for the projected baseline groundwater budget (182 AFY) is similar to the historical and current averages (114 AFY and 206 AFY, respectively) and is still an insignificant component of the groundwater budget and within the range of uncertainty of the numerical model.
- The projected baseline average net exchange of surface water flows (streamflow losses recharging groundwater) in the Basin (1,717 AFY) are higher than the historical and current averages of 1,167 AFY and 1,576 AFY, respectively.
- Projected baseline average groundwater extractions of 5,155 AFY are higher than the historical and current averages of 4,530 AFY and 3,487 AFY, respectively. The projected baseline extractions are assumed to return to near full capacity as compared to the current period, when Camrosa’s Conejo wellfield was shut down.

- In response to the annual variability of inflows and outflows to the groundwater system in ASRVGB, the volume of groundwater in storage in the Basin increased or decreased during the projected period and is generally due to changes in recharge and net streamflow percolation. Table 3.3-15 and Figure 3.3-07 show the projected annual and cumulative change in groundwater in storage for the Basin. As can be seen in Figure 3.3-07, the change in groundwater in storage is intrinsically linked to recharge and net streamflow percolation, which are the primary inflow components for the water budget.

As was described in Section 3.3.3.1.1 of this GSP, the projected groundwater budget was also modeled under two climate change scenarios (2030 and 2070) in accordance with DWR (2018) guidance. Projected groundwater budget components under the 2030 climate change scenario are summarized in Table 3.3-16 and Figure 3.3-08. Projected groundwater budget components under the 2070 climate-change scenario are summarized in Table 3.3-17 and Figure 3.3-09. The overall effect of the simulated climate change scenarios on the projected groundwater budget components is relatively small. The largest relative change is the mountain-front recharge from the north which is ~8% less than the baseline for both the 2030 and 2070 climate change scenarios. Other differences for the 2030 and 2070 climate change scenarios compared to the baseline include ~4% increase in recharge from precipitation. The simulated effects of climate change on other groundwater budget components are smaller, ranging from less than 1 percent to a few percent. It should be noted that existing cyclical climate phenomena, such as the El Nino/Southern Oscillation (ENSO) and Pacific Decadal Oscillation (PDO), have historically had a greater effect on groundwater budget components in ASRVGB than the projected effects of the 2030 and 2070 climate change scenarios. In other words, the effects of existing climate cycles (ENSO and PDO) likely will have greater impacts on future groundwater conditions in ASRVGB than the longer-term climate change assumptions recommended by DWR to evaluate potential uncertainty in the projected water budget.

3.3.4 Overdraft Assessment and Sustainable Yield Estimate [§354.18(b)(5) and (b)(7)]

§354.18 Water Budget.

(b) *The water budget shall quantify the following, either through direct measurements or estimates based on data:*

(5) *If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.*

(7) *An estimate of sustainable yield for the basin.*

Overdraft Assessment

GSP Emergency Regulations §354.18(b)(5) requires quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions if overdraft conditions exist. Bulletin 118, Update 2003 (DWR, 2003) describes groundwater overdraft as "[T]he condition of a groundwater basin or subbasin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. If overdraft continues for a number of years, significant adverse impacts may occur, including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts."

The water budget results indicate a slight imbalance in the Basin currently and in the future. The annual change in storage is within 10% error in uncertainty of model results, and undesirable results from chronic lowering of groundwater levels have not occurred and are not projected to occur. Numerical model results for the projected water budget also indicate that groundwater levels cyclically recover following droughts. Nonetheless, ASRGSA can manage future pumping appropriately through monitoring.

Sustainable Yield

GSP Emergency Regulations § 354.18(b)(7) requires an estimate of the sustainable yield for the basin. Water Code Section 10721(w) defines "sustainable yield" as the maximum quantity of water calculated over a base period representative of long-term conditions in the basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result. Modeling results for the projection period indicate that the inflows and outflows will be approximately balanced, even with climate change considered. Therefore, an estimate of the sustainable yield is the average modeled projected groundwater extractions minus the average modeled projected change in groundwater in storage. The resulting sustainable yield estimate is ~5,300 AFY. The projection period (based on historical climate data from 1972-2021) had an average precipitation nearly equal to the overall historical average (1929-2021), so the estimated sustainable yield is representative of the long-term sustainability of the Basin.

3.4 Management Areas [§354.20]

§354.20 Management Areas.

(a) *Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin.*

Sustainable management of the ASRVGB requires dividing the Basin into two management areas: the area within the FCGMA jurisdictional boundary, and the remaining areas within the Basin managed by ASRGSA (i.e., the ASRGSA management area). These management areas are separated by the Bailey Fault, which acts as a hydraulic barrier between the areas and results in ~70-80 ft difference in groundwater elevations and differences in groundwater quality (see Section 3.1.3.1.2). Northwest of the Bailey Fault and outside of the FCGMA management area there are small areas along the northern edges of the Basin boundary and along the Bailey Fault that are a result of differing versions of maps and delineation of basin and agency boundaries (see Figure 3.4-01), and these areas are assumed to be covered by the FCGMA management area for the sake of simplicity for this GSP. Currently there are no wells and/or beneficial uses or users isolated within these small areas, so the inclusion of these areas within the FCGMA management area should not impact the current management structure of FCGMA. The primary difference in groundwater conditions for the FCGMA management area is that is does not receive appreciable infiltration of surface water from the Conejo Creek. Another difference in groundwater conditions is the component of underflow to and from the Pleasant Valley Basin to the west; however, the amount of calculated flow is insignificant and within the uncertainty of the numerical model.

4.0 Sustainable Management Criteria [Article 5, SubArticle 3]

4.1 Introduction to Sustainable Management Criteria [§354.22]

§354.22 Introduction to Sustainable Management Criteria. *This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator.*

This chapter defines the conditions that direct sustainable groundwater management in the ASRVGB. Individual sections discuss the process by which the GSAs of the Basin (ASRGSA and FCGMA) characterized undesirable results and established minimum thresholds, measurable objectives, and interim milestones (SMC) for each applicable sustainability indicator.

This section presents the data and methods used to develop the SMC for the ASRVGB and explains how the SMC affect the interests of beneficial uses and users of groundwater and/or land uses and property interests. As required, the SMC presented in this section were developed using the best available science and information for the Basin. As noted in this GSP, uncertainty and limitations exist for the HCM and numerical model and were considered during SMC development. The SMC will be reevaluated during each required 5-year GSP assessment and potentially modified in the future as new data become available.

SMC were developed for each applicable sustainability indicator, and their order is kept consistent with the GSP Emergency Regulations text for minimum thresholds (§354.28). The following sustainability indicators are applicable in the Basin:

- Chronic lowering of groundwater levels (Section 4.4)
- Reduction in groundwater storage (Section 4.5)
- Degraded water quality (Section 4.7)
- Land subsidence (Section 4.8)
- Depletions of Interconnected Surface Water (Section 4.9)

The seawater intrusion sustainability indictor is not applicable in the ASRVGB for the reasons described in Groundwater Conditions (Section 3.2.3).

The description of each sustainability indicator contains all the information required by Section 354.22 et seq. of the SGMA regulations and outlined in the Sustainable Management Criteria Best Management Practice (BMP) document (DWR, 2017), including:

1. Description of undesirable results:
   - Potential effects on beneficial uses and users of groundwater, on land uses and property interests, and other potential effects (§354.26(b)(3))
   - The cause of groundwater conditions that would lead to or has led to undesirable results (§354.26(b)(1))

- The criteria used to define when and where the effects of groundwater conditions cause undesirable results (i.e., the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin) (§354.26(b)(2))

2. How minimum thresholds were developed:
   - The information and methodology used to develop minimum thresholds (§354.28 (b)(1))
   - The relationship between minimum thresholds and the relationship of these minimum thresholds to other sustainability indicators (§354.28 (b)(2))
   - The effect of minimum thresholds on neighboring basins (§354.28 (b)(3))
   - The effect of minimum thresholds on beneficial uses and users (§354.28 (b)(4))
   - How minimum thresholds relate to relevant Federal, State, or local standards (§354.28 (b)(5))
   - The method for quantitatively measuring minimum thresholds (§354.28 (b)(6))
3. How measurable objectives and interim milestones were developed:
   - The methodology for setting measurable objectives (§354.30)
   - Interim milestones (§354.30 (a), §354.30 (e), §354.34 (g)(3))

4.2 Sustainability Goal [§354.24]

§354.24 Sustainability Goal. *Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.*

The sustainability goal is key to the SMC development process because it provides policy guidance for defining undesirable results and desirable conditions for each applicable sustainability indicator, and for the Basin as a whole. Recognizing the importance of the sustainability goal, the SMC development process began with adopting the sustainability goal. Information from the basin setting used to establish the sustainability goal is described in the subsections for each individual sustainability indicator.

The sustainability goal for the ASRVGB is as follows:

> *The goal of this GSP is to maintain sustainable conditions in the ASRVGB thereby supporting beneficial uses and users of groundwater in the ASRVGB, without causing undesirable results under future conditions. The GSAs also desire to collaborate with other agencies and stakeholders within the basin to improve the groundwater quality of the ASRVGB.*

The measures that will be implemented to ensure that the Basin will be operated sustainably. An explanation of how the sustainability goal is to be maintained through the planning and implementation horizon is presented in Section 6, Projects and Management Actions, and Section 7, Implementation Plan.

4.3 Process for Establishing Sustainable Management Criteria [§354.26(a)]

§354.26 Undesirable Results.
(a) *Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.*

The process for developing SMC included presentations at GSA Board of Directors meetings, which included information on SGMA requirements, relevant information from the Basin Setting section, and results of additional analyses completed to support SMC development. SMC and supporting information were also presented at three GSP workshops held on August 4, 2022, October 24, 2022, and [3rd WORKSHOP DATE TBD].

1. The first GSP Workshop focused on providing foundational information for SMC development, including the basin setting and groundwater model, and SMC requirements overview.
2. The second GSP workshop focused on the sustainability goal, SMC overview, and a detailed SMC proposal for the chronic lowering of groundwater levels, reduction of groundwater storage, degraded water quality, land subsidence, and depletions of ISW sustainability indicators.
3. The third GSP workshop presented the entire draft GSP with a review of the proposed SMC.

The proposed SMC were also subject to review and comment during the Draft GSP comment period. ASRGSA and FCGMA also collaborated to develop the SMC for each management area of the Basin. Outreach was performed throughout the SMC development process to encourage input on the proposed SMC, including bill stuffers to all Camrosa WD customers, letters to well owners in the Basin, emails to the interested parties list, telephone communications with stakeholders, and public notices.

A key part of the SMC development process is defining undesirable results (GSP Emergency Regulations §354.26(a)). The process for defining undesirable results consisted of multiple steps:

1. First, potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects were evaluated and described qualitatively. This was called "qualitative statement of undesirable results."
2. The qualitative undesirable results statement was then translated into quantitative minimum thresholds at specific monitoring network sites.
3. Lastly, a combination of minimum threshold exceedances representing undesirable results (per GSP Emergency Regulations §354.26(b)(2)) in the Basin was established.

For this GSP and pursuant to GSP Emergency Regulations §354.28(d), a groundwater elevation minimum threshold serves as the metric for the chronic lowering of groundwater levels (Section 4.4), reduction of groundwater storage (Section 4.5), and land subsidence (Section 4.8) sustainability indicators. Adequate evidence demonstrating groundwater levels are a reasonable proxy is presented in Sections 4.4.2, 4.5.2, and 4.8.2.

4.4 Chronic Lowering of Groundwater Levels

The SGMA requires that GSAs manage groundwater levels and storage to avoid significant and unreasonable impacts on beneficial uses resulting from a depletion of supply over the 50-year SGMA planning and implementation horizon.

Section 3.2.1.2 presents the groundwater elevation hydrographs and describes the long-term trends within the Basin. Although some declining trends and lower than typically observed groundwater levels have been observed historically in some wells throughout the Basin (see Section 3.2, Appendices I and J) for additional details), most of the wells currently have relatively stable groundwater levels and there are no documented impacts to beneficial uses or users; therefore, undesirable results from chronic lowering of groundwater levels has not occurred within the Basin. Regardless, SMC have been developed for the chronic lowering of groundwater levels sustainability indicator to ensure that potential undesirable results related to groundwater extraction are avoided during periods of low groundwater levels and storage.

Pursuant to GSP Emergency Regulations §354.28(c)(1), two factors must be considered when developing minimum thresholds for the chronic lowering of groundwater levels sustainability indicator:

1. Depletion of supply effects on beneficial users (Section 4.4.1)
2. Effects on other sustainability indicators (Section 4.4.2.5)

These factors were considered during the SMC development process.

4.4.1 Undesirable Results [§354.26(a),(b)(1),(b)(2),(b)(3),(c), and (d)]

§354.26 Undesirable Results.

(a) *Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.*

(b) *The description of undesirable results shall include the following:*

- ***(1)*** *The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.*
- ***(2)*** *The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.*
- ***(3)*** *Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.*

(c) *The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.*

(d) *An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.*

Process and Criteria for Defining Undesirable Results [§354.26(a)]

The overall process relied upon to define undesirable results for this GSP was described in Section 4.3. The specific process and criteria for defining undesirable results applied to the chronic lowering of groundwater levels sustainability indicator are described below.

Evaluation of Potential Effects on Beneficial Uses and Users, Land Uses, and Property Interests [§354.26(b)(3)]

The process for defining undesirable results for chronic lowering of groundwater levels began with considering the potential effects on beneficial uses and users of groundwater, land uses, and property interests that would be caused by depletion of supply. Public trust resources were also assessed in development of this GSP by considering the impacts to riparian and aquatic ecosystems, and by setting minimum thresholds designed to prevent undesirable results under SGMA.

When considering depletion of supply effects, it is important to note that the GSA's purview extends to effects caused by pumping or GSP projects or management actions. As discussed in Section 3.3, groundwater pumping is a significant part of the water balance (see Table 3.3-07 and Figure 3.3-03). Although inflows are generally constant for the Basin regardless of climate conditions, drier years can reduce inflows primarily due to less streamflow percolation from stormflows. During prolonged droughts, lowering of groundwater levels and reduction of groundwater storage caused by pumping could have potential impacts on groundwater supply for the agricultural, municipal, and domestic beneficial users.

The potential effects on groundwater supply were analyzed by evaluating historical groundwater elevation data, well construction information, and numerical modeling results from the historical and 50-year projected water budget (see Appendix G for the details and results of this analysis). The groundwater level analysis results indicate that groundwater levels could decline to historical low levels before a significant and unreasonable depletion of supply would occur. The reason for this available groundwater level decline is related to multiple factors:

1. There have been no documented operational failures of pumping due to water levels at or near the historical low groundwater levels, which, depending on location have either occurred historically in the 1960s or during the most recent drought (see Section 3.2.1 and Appendix G).
2. Most wells are in areas of the Basin where the groundwater-producing zones occur at considerable depths (see Figures 3.1-10a and b, and Figure 3.1-28).
3. There is a consistent source of recharge to the groundwater in the Basin from the infiltration of perennial streamflow in the Arroyo Conejo and underflow from the Conejo volcanics (see Section 3.2).

The analysis results are supported by the lack of reported undesirable results during historical periods of lowered groundwater levels. Significant and unreasonable effects are assumed to occur if wells could no longer be operated as designed. Based on the foregoing, it was concluded that undesirable results for the chronic lowering of groundwater levels sustainability indicator may occur if pumping causes groundwater levels to decline below historical low levels.

Effects on Agricultural, Municipal, and Domestic Beneficial Uses

Significant and unreasonable depletion of supply for agricultural, municipal, or domestic water is the inability to produce water absent an alternative water supply. Although pumping may exacerbate groundwater level declines during prolonged droughts, there have been no reported instances when a beneficial user was unable to meet their basic water supply needs with either groundwater or delivered water supplies. Therefore, it was concluded that significant and unreasonable effects have not occurred historically with respect to the groundwater levels sustainability indicator for agricultural, municipal, or domestic beneficial uses, but could potentially occur if groundwater levels decline below historically low levels in the future. It is noted that there is only one domestic well located in the Basin and the well owner could connect to Camrosa WD if the well is ever unable to provide adequate water domestic supply.

Potential Effects on Land Uses and Property Interests

Potential effects on land uses and property interests include decreased property values resulting from increased costs to purchase water in amounts that are significantly greater than have occurred historically. Increased water costs could cause changes in cropping patterns and acreage planted, which may also impact land values. As discussed in Section 2.2.3.1, agricultural land and open space in the Basin is subject to the County of Ventura SOAR voter initiatives currently approved through 2050 (SOAR, 2015). The SOAR initiatives require a majority vote of the people to rezone unincorporated open space, agricultural, or rural land for development. The existence of SOAR makes it very unlikely that agricultural land could be developed. Therefore, it is important to ensure that agricultural beneficial uses of groundwater are protected by the minimum thresholds because there is no practical alternative land use for most agricultural land in the Basin. Absent groundwater supplies, agricultural property values would likely be significantly impacted. The impact on property values for other land uses and property uses in the Basin is less directly tied to groundwater because the Camrosa WD (water supplier for majority of the non-agricultural areas of the Basin) has a diverse water supply portfolio that includes multiple supplies derived from sources located outside of the Basin.

Effects on Groundwater Dependent Ecosystems

As summarized in Section 3.2.7, riparian vegetation identified along Arroyo Conejo and Conejo Creek are considered to be dependent on perennial surface water discharges from the Conejo Valley and the Hill Canyon WWTP, and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon. Therefore, there are no GDEs to consider. However, the GSP does address depletions of ISW that could cause undesirable results including significant and unreasonable effects on riparian habitat (Section 4.9.1).

Cause of Groundwater Conditions That Could Lead to Undesirable Results [§354.26(b)(1)]

The cause of groundwater conditions that could lead to undesirable results would be pumping that causes groundwater levels to decline below the deepest levels historically observed. The following factors could cause or contribute to groundwater levels declining to such levels:

1. Groundwater extractions, particularly extraction rates that exceed the sustainable yield of the basin.
2. Droughts that exceed the duration and severity of droughts included in the hydrologic period used for the projected water budget analysis.

3. Decreased groundwater inflow from the Conejo volcanic bedrock.
4. Decreased surface water inflow from Conejo Valley and the Hill Canyon WWTP.
5. Combinations of items 1 through 4.

It is noted that the GSAs are only responsible for addressing effects related to groundwater extraction within the ASRVGB (i.e., Factor No. 1).

Criteria Used to Define Undesirable Results [§354.26(b)(2)]

As per SGMA definition (354.26(a)), "undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.” The combination of minimum threshold exceedances that are deemed to cause significant and unreasonable effects for chronic lowering of groundwater levels was specified to be minimum threshold exceedances in more than 50% of the groundwater level monitoring sites for either management area for 2 successive years. Two (2) years is considered to be a reasonable duration to confirm that any minimum threshold exceedances are not due to seasonal variability or a short-term aberration. The definition of undesirable results was based on the fact that even when groundwater conditions were at the minimum thresholds (historical groundwater lows) no undesirable results were reported and all known pump settings are at depths much lower than the minimum thresholds and would continue to operate even when minimum thresholds were reached. The criteria for undesirable results were defined through the review of historical groundwater conditions and documentation on groundwater levels and well construction information (see Appendix J), and discussion and input from stakeholders during meetings and workshops.

4.4.2 Minimum Thresholds [§354.28]

The minimum thresholds for the chronic lowering of groundwater levels are set at the historical low groundwater level for each monitoring well (see Appendix J). The basis, description, and definition for the minimum threshold is discussed in the subsequent sections below.

4.4.2.1 Information and Criteria to Define Minimum Thresholds [§354.28(a),(b)(1),(c)(1)(A),(e), and §354.34(g)(3)]

§354.28 Minimum Thresholds.

(a) *Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.*

(b) *The description of minimum thresholds shall include the following:*

(1) *The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by the uncertainty in the understanding of the basin setting.*

(c) *Minimum thresholds for each sustainability indicator shall be defined as follows:*

(1) *Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following:*

(A) *The rate of groundwater elevation decline based on historical trend, water year type, and projected water use in the basin.*

(e) *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.*

§354.34 Monitoring Network.

(g) *Each Plan shall describe the following information about the monitoring network:*

(3) *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*

The evaluation of potential effects of chronic lowering of groundwater levels on beneficial uses and users, land uses, and property interests was described in Section 4.4.1. Summarizing Section 4.4.1, significant and unreasonable effects from chronic lowering of groundwater levels would be causing municipal, agricultural, or domestic beneficial users to be unable to meet their basic water supply needs with either groundwater or alternative water supplies, or increased costs to purchase supplemental water in amounts that are significantly greater than have occurred historically. Based on this evaluation, coupled with the absence of documented undesirable results, it was concluded that historical low groundwater levels provide an appropriate minimum threshold for each monitoring well within the Basin (see Appendix J for additional detail). Other considerations include the absence of land subsidence within the Basin; keeping groundwater levels above the historical lows would also ensure the prevention of any onset of inelastic land subsidence. The resulting minimum thresholds are provided in Table 4.1-01 and are depicted on the time-series plots (hydrographs) included in Appendix J.

Pursuant to GSP Emergency Regulations §354.28(c)(1)(A), the rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the Basin were also considered during development of the minimum thresholds for chronic lowering of groundwater levels. Groundwater level declines have been observed historically and during drought periods for some wells (Figures 3.2-03 and 3.2-04a through 3.2-04b; Appendix J). Modeling projections of groundwater levels are within the range of historical data and suggest that the proposed minimum thresholds may be occasionally exceeded at some monitoring locations (Appendix J); however, the criterion for undesirable results is not predicted to be triggered during the 50-year GSP implementation period. Projected water use in the Basin is accounted for in the modeling of the 50-year projected period.

4.4.2.1.1 Evaluation of Multiple Minimum Thresholds [§354.26(c)]

> **§354.26 Undesirable Results.**
> ***(c)*** *The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.*

This requirement is not applicable because only one minimum threshold is established for the chronic lowering of groundwater levels sustainability indicator.

4.4.2.1.2 Evaluation of Representative Minimum Thresholds [§354.28(d)]

> **§354.28 Minimum Thresholds.**
> ***(d)*** *An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.*

As discussed in Section 3.3.2 and Appendix J, groundwater levels are related to groundwater storage. Because of this, groundwater level elevations are used as a proxy for the reduction of groundwater storage minimum thresholds. Groundwater level elevations are also used as a proxy for land subsidence minimum thresholds (Section 4.8.2).

4.4.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators [§354.28(b)(2)]

> **§354.28 Minimum Thresholds.**
> ***(b)*** *The description of minimum thresholds shall include the following:*
> ***(2)*** *The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.*

The relationships between the minimum thresholds for the chronic lowering of groundwater levels sustainability indicator and other sustainability indicators are described in Section 4.4.2.5.

4.4.2.3 Minimum Thresholds in Relation to Adjacent Basins [§354.28(b)(3)]

> **§354.28 Minimum Thresholds.**
> ***(b)*** *The description of minimum thresholds shall include the following:*
> ***(3)*** *How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.*

The potential effect on the adjacent Basins is considered negligible because ASRVGB is separated from the adjacent basins by exposed and/or shallow bedrock. The numerical model indicates a small amount of flow between the ASRVGB and the Pleasant Valley Basin; however, this flow is not well-constrained by data and is within the uncertainty of the numerical model (see Appendix G for a discussion on the numerical model uncertainty). The average historical flow across the Basin boundary is 114 AFY (from Pleasant Valley Basin to ASRVGB), which is 2.4% of the average outflow for ASRVGB and 1.3% of the average outflow for Pleasant Valley Basin. Moreover, the FCGMA GSP for Pleasant Valley Basin (FCGMA, 2019; UWCD, 2021) assumed a no-flow boundary between the two basins because the flow across the boundary was considered negligible; hence the SMC for the ASRVGB and the Pleasant Valley Basin GSPs are essentially independent of each other.

4.4.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users [§354.28(b)(4)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
> ***(4)*** *How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.*

The chronic lowering of groundwater levels minimum thresholds may have effects on beneficial users and land uses in the Basin:

Groundwater Beneficial Users (All Types): The minimum thresholds seek to prevent significant and unreasonable depletions of groundwater supply, which will prevent significant operational and financial burdens associated with purchasing additional imported Calleguas MWD potable water than has been necessary historically. Modeling projections for the GSP suggest that the minimum thresholds may be occasionally exceeded at some monitoring locations (Appendix J). However, the criterion for undesirable results (more than 50% of wells with water levels below minimum thresholds for either management area for 2 consecutive years) is not predicted to be triggered during the 50-year GSP implementation period, meaning that pumping reductions, any projects, or other management actions will not be needed to avoid undesirable results for this sustainability indicator. Therefore, the minimum thresholds for this sustainability indicator are not anticipated to limit beneficial uses of groundwater.

Land Uses and Property Interests (All Types): The minimum thresholds seek to prevent significant and unreasonable effects on land uses and property interests by preventing significant operational and financial burdens associated with procuring more imported Calleguas MWD potable water than has been necessary historically, thereby helping maintain property values. As discussed in Section 2.2.3.1, agricultural land and open space in the Basin is subject to the County of Ventura SOAR voter initiatives currently approved through 2050 (SOAR, 2015). The SOAR initiatives require a majority vote of the people to rezone unincorporated open space, agricultural, or rural land for development. The existence of SOAR makes it likely that land use in the Basin would not change significantly in the future. Therefore, it is important to ensure that agricultural beneficial uses of groundwater are protected by the minimum thresholds because there is no practical alternative land use for most agricultural land in the Basin. Absent groundwater supplies, agricultural property values would likely be significantly impacted. The impact on property values for other land uses and property uses in the Basin is less directly tied to groundwater because Camrosa WD (water supplier for the non-agricultural areas of the Basin) has a diverse water supply portfolio that includes multiple supplies derived from sources located outside of the Basin.

Effects on Groundwater Dependent Ecosystems: As summarized in Section 3.2.7, riparian vegetation identified along Arroyo Conejo and Conejo Creek are considered to be dependent on perennial surface water discharges from Conejo Valley and the Hill Canyon WWTP, and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon; therefore, there are no GDEs to consider. However, the GSP does address depletions of ISW that could cause undesirable results including significant and unreasonable effects on riparian habitat (Section 4.9).

4.4.2.5 Potential Effects on other Sustainability Indicators [§354.28(c)(1)(B)]

§354.28 Minimum Thresholds.
(c) *Minimum thresholds for each sustainability indicator shall be defined as follows:*
(1) *Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following:*
(B) *Potential effects on other sustainability indicators.*

Pursuant to GSP Emergency Regulations §354.28(c)(1)(B), potential effects on other sustainability indicators were considered. The following effects were identified:

1. **Reduction of Groundwater Storage:** The reduction of groundwater storage sustainability indicator minimum thresholds are identical to those developed for the chronic lowering of groundwater levels sustainability indicator (Section 4.5).
2. **Seawater Intrusion:** This sustainability indicator is not applicable to the ASRVGB.
3. **Degraded Water Quality:** As discussed in Section 3.1.3.3, there is no known relationship between groundwater levels and groundwater quality.
4. **Land Subsidence:** Historical data do not indicate that land subsidence is an issue for ASRVGB, and minimum thresholds set at the historical low should prevent inelastic land subsidence that occurs when preconsolidation stress is exceeded from groundwater levels falling below historical lows.
5. **Depletions of Interconnected Surface Water:** The chronic lowering of groundwater level minimum thresholds are based on historical low groundwater conditions, which is the same basis for evaluating impacts to establish the minimum threshold for depletions of ISW; therefore, the two SMC are consistent.

4.4.2.6 Current Standards Relevant to Sustainability Indicator [§354.28(b)(5)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(5) *How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.*

The GSAs are unaware of any federal, state, or local standards for chronic lowering of groundwater levels.

4.4.2.7 Measurement of Minimum Thresholds [§354.28(b)(6)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(6) *How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.*

Groundwater elevations will be directly measured to determine their relation to minimum thresholds. Groundwater level monitoring will be conducted in accordance with the monitoring plan outlined in Section 5.

4.4.3 Measurable Objectives and Interim Milestones [§354.30(a),(b),(c),(d),(e),(g), and §354.34(g)(3)]

§354.30 Measurable Objectives.

(a) *Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.*

(b) *Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.*

(c) *Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.*

(d) *An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.*

(e) *Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.*

(g) *An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.*

§354.34 Monitoring Network.

(g) *Each Plan shall describe the following information about the monitoring network:*

(3) *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*

4.4.3.1 Description of Measurable Objectives

The chronic lowering of groundwater levels measurable objectives were developed by applying the concept of providing a reasonable margin of operational flexibility under adverse conditions (GSP Emergency Regulations §354.30(c)). Adverse conditions for the ASRVGB include drought phases of the long-term climatic-driven groundwater level cycles, as described in Section 3.2 (Groundwater Conditions). The reasonable margin of operational flexibility was determined to be groundwater levels from the 50-year modeled projection that are sufficiently high to prevent levels from dropping below the minimum thresholds (Appendix J). The measurable objectives were developed for each monitoring site by evaluating the modeled groundwater level data for the projected period. The maximum modeled groundwater level following the stabilization of groundwater levels (after the public supply wells resume regular operations) was selected to represent the measurable objective to establish the operational range of flexibility (see Appendix J). Currently, Camrosa WD's Conejo wellfield is temporarily out of operation (since 2018) due to TCP concentration levels exceeding the MCL and are scheduled to resume regular operations by 2023, when the GAC treatment facility is complete (see Section 3.2.4). The measurable objectives are intended to apply following wet periods. Failure to meet the measurable objectives during other times shall not be considered failure to sustainably manage the Basin. Time-series plots (hydrographs) showing the measured and modeled groundwater elevation data and measurable objectives are included in Appendix I.

4.4.3.2 Interim Milestones [§354.30(e)]

> **§354.30 Measurable Objective.**
> ***(e)*** *Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin with 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.*

Interim milestones were developed to illustrate a reasonable path to achieve the sustainability goal for the Basin within 20 years of Plan implementation. Development of interim milestones is significantly complicated by the fact that the hydrologic conditions (especially the frequency and intensity of droughts) for the next 20 years are highly uncertain. Currently, groundwater levels for the wells within the vicinity of the public supply wells (7 out of the 13 wells) that were shut down in 2018 are above the measurable objectives, and include the wells located in the western area of the Basin within the ASRGSA management area (southeast of the Bailey Fault). The remaining 6 wells (3 in the eastern half of the Basin and 3 in the FCGMA management area) have current groundwater levels below the measurable objective (but are at or above the minimum thresholds) due to overall dry conditions for much of the past decade. It is anticipated that the measurable objectives will be met at some point during the 20-year GSP planning period and then may fluctuate below the measurable objective thereafter. Because of the uncertainty concerning when the measurable objectives will be met, the interim milestones are shown as a linear path toward the measurable objective over the 20-year sustainability timeframe. This interim milestone path should not be taken literally because it depends on climate and potential changes to future management of the Basin. The interim milestones and path to sustainability will be reviewed during each required 5-year GSP assessment (GSP Emergency Regulations §354.38(a)). The interim milestones are listed in Table 4.1-01 and are plotted on the time-series plots (hydrographs) included in Appendix I.

4.5 Reduction of Groundwater Storage

Numerical modeling of the ASRVGB indicates the range of storage change is small compared to the estimated total volume of groundwater in storage (see Section 3.2.2); however, storage is not directly measured for the Basin and there are no storage targets or goals associated with groundwater use. Storage changes are also estimated to be relatively gradual and are linked to the amount of pumping within the Basin (see Section 3.3 and Figure 3.2-05). The SMC for the reduction of groundwater storage focuses on avoiding potential undesirable results related to groundwater extraction when groundwater levels are near historical lows. Because groundwater storage is related to groundwater levels, the reduction of groundwater storage SMC are identical to those developed for the chronic lowering of groundwater levels sustainability indicator.

4.5.1 Undesirable Results [§354.26(a),(b)(1),(b)(2),(b)(3),(c), and (d)]

§354.26 Undesirable Results.

(a) *Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.*

(b) *The description of undesirable results shall include the following:*

- ***(1)*** *The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.*
- ***(2)*** *The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.*
- ***(3)*** *Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.*

(c) *The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.*

(d) *An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.*

Process and Criteria for Defining Undesirable Results [§354.26(a)]

The overall process relied upon to define undesirable results for this GSP is described in Section 4.3. The specific process and criteria for defining undesirable results applied to the reduction of the groundwater storage sustainability indicator are described below.

Pursuant to Water Code §10721(x)(2), the undesirable result for the reduction of groundwater storage sustainability indicator is a “significant and unreasonable reduction of groundwater storage.” The reduction in the groundwater storage sustainability indicator is measured as the “total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results” (GSP Emergency Regulations §354.28 (c)(2)).

The effects of decreasing groundwater storage manifest as effects for other sustainability indicators; the reduction of groundwater storage is associated with chronic lowering of groundwater levels and land subsidence sustainability.

Based on the foregoing, the qualitative description of undesirable results is reduction of groundwater storage that will likely cause other sustainability indicators to have undesirable results.

Evaluation of Potential Effects on Beneficial Uses and Users, Land Uses, and Property Interests [§354.26(b)(3)]

The evaluation of potential effects on beneficial uses and users, land uses, and property interests for the reduction of groundwater storage sustainability indicator is the same as for chronic lowering of groundwater levels and is incorporated herein by reference.

Cause of Groundwater Conditions That Could Lead to Undesirable Results [§354.26(b)(1)]

The cause of groundwater conditions that could lead to undesirable results would be reduction of groundwater storage that subsequently causes undesirable results for the other sustainability indicators.

The following factors could result in groundwater storage reductions that could lead to undesirable results for the other sustainability indicators:

1. Groundwater extractions, particularly extraction rates that exceed those assumed for the projected water budget analysis.
2. Droughts that exceed the duration and severity of droughts included in the hydrologic period used for the projected water budget analysis.
3. Decreased groundwater inflow from the Conejo volcanic bedrock.
4. Decreased surface water inflow from Conejo Valley and the Hill Canyon WWTP.
5. Combinations of items 1 through 4.

It is noted that the GSAs are only responsible for addressing effects related to groundwater extraction within the Basin (i.e., Factor No. 1).

Criteria Used to Define Undesirable Results [§354.26(b)(2)]

The criteria used to define undesirable results for the reduction of groundwater storage sustainability indicator are based on the qualitative description of undesirable results, which is causing other sustainability indicators to have undesirable results. As explained in Section 4.5.2, groundwater levels will be used as a proxy for the reduction of groundwater storage sustainability indicator minimum thresholds. Based on the foregoing, the combination of minimum threshold exceedances that is deemed to cause significant and unreasonable effects in the Basin for the reduction of groundwater storage sustainability indicator is the same as the combinations deemed to cause undesirable results for the chronic lowering of groundwater levels sustainability indicator (Table 4.4-01).

4.5.2 Minimum Thresholds [§354.28]

4.5.2.1 Information and Criteria to Define Minimum Thresholds [§354.28(a)(b)(1),(c)(2),(d),(e), and §354.34(g)(3)]

§354.28 Minimum Thresholds.

(a) *Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.*

(b) *The description of minimum thresholds shall include the following:*

(1) *The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by the uncertainty in the understanding of the basin setting.*

(c) *Minimum thresholds for each sustainability indicator shall be defined as follows:*

(2) *Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that my lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.*

(d) *An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.*

(e) *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.*

§354.34 Monitoring Network.

(g) *Each Plan shall describe the following information about the monitoring network:*

(3) *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*

Pursuant to GSP Emergency Regulations §354.28(d), groundwater levels may be used as a proxy for other sustainability indicators if a significant correlation between groundwater levels and the other sustainability indicators can be demonstrated. Groundwater levels are related to groundwater storage, as described in Section 3.2.2, 3.3 (under Water Budget Components), and Appendices G and K. Rising groundwater levels indicate an increase in groundwater storage and vice versa. It is also noted that groundwater storage cannot be directly measured; rather it can only be estimated using measured or modeled groundwater levels and knowledge of the basin geometry and subsurface hydraulic properties, and the calibrated numerical model is used to estimate the change in storage for the Basin (Appendix G). The numerical model was used to develop a quantitative relationship between groundwater storage and groundwater levels (Appendix G). Nonetheless, the groundwater levels established for the chronic lowering of groundwater levels minimum thresholds are a more direct and reliable measure of sustainability as compared to estimated storage changes. For these reasons, groundwater levels will be used as a proxy for the reduction of groundwater storage sustainability indicator (Table 4.4-01).

4.5.2.2 Evaluation of Representative Minimum Thresholds [§354.28(d)]

§354.28 Minimum Thresholds. *(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.*

As discussed in Section 3.2.2 and Appendix G, groundwater levels are related to groundwater storage. Because of this, groundwater level elevations are used as a proxy for the reduction of groundwater storage minimum thresholds.

4.5.2.3 Relationships Between Minimum Thresholds and Sustainability Indicators [§354.28(b)(2)]

§354.28 Minimum Thresholds. ***(b)** The description of minimum thresholds shall include the following:* ***(2)** The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.*

The relationships between the minimum thresholds for the reduction of groundwater storage sustainability indicator and other sustainability indicators are the same as the potential effects of the minimum thresholds for the chronic lowering of groundwater levels on the other sustainability indicators and are discussed in Section 4.4.2.5.

4.5.2.4 Minimum Thresholds in Relation to Adjacent Basins [§354.28(b)(3)]

§354.28 Minimum Thresholds. ***(b)** The description of minimum thresholds shall include the following:* ***(3)** How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.*

The potential effect on the adjacent basins is considered to be small because ASRVGB is separated from the adjacent basins by exposed and/or shallow bedrock.

4.5.2.5 Impact of Minimum Thresholds on Beneficial Uses and Users *[§354.28(b)(4)]*

§354.28 Minimum Thresholds. ***(b)** The description of minimum thresholds shall include the following:* ***(4)** How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.*

The effects on beneficial users and land uses in the Basin are the same as analyzed for the chronic lowering of groundwater levels sustainability indicator and are incorporated herein by reference to Section 4.4.2.4.

4.5.2.6 Current Standards Relevant to Sustainability Indicator [§354.28(b)(5)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(5) *How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.*

The GSAs are unaware of any federal, state, or local standards for reduction of groundwater storage.

4.5.2.7 Measurement of Minimum Thresholds [§354.28(b)(6)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(6) *How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.*

Groundwater elevations will be directly measured to determine their relation to minimum thresholds. Groundwater level monitoring will be conducted in accordance with the monitoring plan outlined in Section 5.

4.5.3 Measurable Objectives and Interim Milestones [§354.30(a),(b),(c),(d),(e),(g), and §354.34(g)(3)]

§354.30 Measurable Objectives.
(a) *Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.*
(b) *Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.*
(c) *Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.*
(d) *An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.*
(e) *Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.*
(g) *An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.*

§354.34 Monitoring Network.
(g) *Each Plan shall describe the following information about the monitoring network:*
(3) *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*

Because the chronic lowering of groundwater levels minimum thresholds are a proxy for the reduction of groundwater storage minimum thresholds, the measurable objectives and interim milestones for chronic lowering of groundwater levels are adopted for the reduction of groundwater storage measurable objectives and interim milestones (Table 4.4-01).

4.6 Seawater Intrusion

Seawater intrusion is not an applicable indicator of groundwater sustainability in the ASRVGB and, therefore, no SMC are set. Section 3.2.3 (Seawater Intrusion) provides the evidence for the inapplicability of this sustainability indicator.

4.7 Degraded Water Quality

GSP Emergency Regulations 354.28(c)(4) requires GSAs to address significant and unreasonable impacts on beneficial uses caused by groundwater operations or projects and management actions that spread contaminant plumes or cause dissolved constituent concentrations to increase to levels that significantly and unreasonably impact beneficial uses. The key aspect of the regulation is causation – plume spreading, or concentration increases are only significant and unreasonable under SGMA if caused by groundwater operations or a GSA’s implementation of project or management actions. As discussed in Section 3.1.3.3, Water Quality, and Section 3.2.4, Groundwater Quality Impacts, there are no identified contaminant plumes from point sources in the Basin, and available data indicate that concentrations of naturally occurring constituents (indicator constituents include TDS, chloride, sulfate, and boron) are not caused by or exacerbated by groundwater pumping. The indicator constituents were determined based on the RWQCB WQOs (see Section 3.2.4). Nitrate and TCP – non-point source contaminants from above-ground sources and land use – have impacted Camrosa’s public supply wells. Elevated nitrate and TCP concentrations have been mitigated by blending with imported purchased water; however, the low MCL for TCP (5 ppt) now requires treatment via a GAC treatment plant that is currently under construction. Given the treatment methods in place for nitrate and TCP, SMC were developed specific to these constituents to address feasibility of treatment to drinking water quality standards.

4.7.1 Undesirable Results [§354.26(a),(b)(1),(b)(2),(b)(3),(c), and (d)]

§354.26 Undesirable Results.
(a) *Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.*
(b) *The description of undesirable results shall include the following:*
(1) *The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.*
(2) *The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.*
(3) *Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.*
(c) *The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.*
(d) *An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.*

Process and Criteria for Defining Undesirable Results [§354.26(a)]

The overall process relied upon to define undesirable results for this GSP was described in Section 4.3. The specific process and criteria for defining undesirable results applied to the degraded water quality sustainability indicator are described below.

Evaluation of Potential Effects on Beneficial Uses and Users, Land Uses, and Property Interests [§354.26(b)(3)]

The process for defining undesirable results for degraded water quality began with considering the potential effects on beneficial uses and users of groundwater, land uses, and property interests. Potential effects on municipal beneficial uses associated with water quality degradation could include increased costs for treatment or blending to meet drinking water standards. Potential effects on domestic beneficial uses associated with water quality degradation could include health effects (resulting from elevated nitrate and/or TCP concentrations) and increased costs for alternative water supplies or additional treatment. Potential effects on agricultural beneficial uses could include lower quality crops, implementation of treatment or blending, or use of more expensive alternative sources of water for irrigation. All of the potential effects on agricultural beneficial uses would result in increased costs and potential impacts on land values. Nitrate and TCP do not currently impact agricultural beneficial use of groundwater.

The above-listed potential effects were analyzed by evaluating information about the following:

1. Historical groundwater quality data;
2. Relevant local, state, and federal water quality standards applicable to the Basin; and
3. Local and professional opinion on water quality and treatment issues.

The analysis revealed that the common ion chemistry of the groundwater in the ASRVGB is not ideal but has been and continues to be beneficially used by municipal and agricultural users through the utilization of blending practices. Based on the foregoing, the qualitative description of undesirable results is groundwater quality parameters exceeding historical concentrations due to pumping or GSP implementation that significantly impacts beneficial uses, and in the case of nitrate and TCP, exceedances that can make blending or treatment cost-prohibitive.

Cause of Groundwater Conditions That Could Lead to Undesirable Results [§354.26(b)(1)]

As previously discussed, there are no identified contaminant plumes from point sources in the Basin, and available data indicate that concentrations of naturally occurring constituents (indicator constituents include TDS, chloride, sulfate, and boron) are not caused by or exacerbated by groundwater pumping.

Criteria Used to Define Undesirable Results [§354.26(b)(2)]

The effects of groundwater conditions deemed to cause undesirable results is considered to occur when the average concentration for all representative monitoring wells in either management areas exceed the minimum threshold concentration for a constituent for 2 consecutive years. Two (2) years is considered to be a reasonable duration to confirm that any minimum threshold exceedances are not due to seasonal variability or a short-term aberration.

4.7.2 Minimum Thresholds [§354.28]

4.7.2.1 Information and Criteria to Define Minimum Thresholds [§354.28(b)(1),(c)(4), and (e)]

§354.28 Minimum Thresholds.

(a) *Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.*

(b) *The description of minimum thresholds shall include the following:*

- ***(1)*** *The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by the uncertainty in the understanding of the basin setting.*

(c) *Minimum thresholds for each sustainability indicator shall be defined as follows:*

- ***(4)*** *Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.*

(e) *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.*

Minimum thresholds were developed to address the qualitative description of undesirable results provided in Section 4.7.1: “groundwater quality parameters exceeding historical concentrations due to pumping or GSP implementation that significantly impacts beneficial uses, and in the case of nitrate and TCP, exceedances that can make blending or treatment cost-prohibitive.” The potential effects on beneficial uses and users were considered together with applicable local, state, and federal water quality standards applicable to the Basin.

These criteria were considered when developing the minimum thresholds:

1. **Primary MCLs:** Applicable to nitrate and TCP only. For the municipal wells in the Basin, primary MCLs are achieved in delivered water through blending and/or treatment. There is also one domestic well in the Basin. The ASRGSA is reaching out to the well owner to determine if the well is used to supply drinking water. If yes, ASRGSA will work with the well owner to test the groundwater quality.
2. **Secondary MCLs:** Applicable to TDS, sulfate, and chloride. The California Division of Drinking Water considers concentrations of these constituents in excess of their respective Upper Consumer Acceptance Levels to be acceptable only on a temporary basis for community and municipal water suppliers pending construction of treatment facilities. Because treatment costs are significant, a widespread increase in concentrations to levels exceeding the Upper Consumer Acceptance Level due to pumping or GSP implementation would be considered a significant and unreasonable degradation of water quality.
3. **RWQCB WQOs:** These standards are designed to protect beneficial uses and preserve existing water quality at the time of RWQCB Basin Plan (RWQCB-LA, 2019) development from degradation, consistent with the Porter-Cologne Act and SWRCB Antidegradation Policy (Resolution No. 68-16). RWQCB established WQOs for nitrate, TDS, chloride, sulfate, and boron (Table 4.7-01).
4. **Agricultural Thresholds:** Certain crops grown in the Basin are sensitive to boron and chloride in irrigation water. The RWQCB WQOs were developed, in part to protect agricultural beneficial uses of water. Therefore, widespread chloride or boron concentrations in excess of WQOs for these constituents due to pumping or GSP implementation would be considered a significant and unreasonable effect.
5. **Existing Water Quality:** With the exceptions noted earlier, existing groundwater quality is known to support municipal and agricultural beneficial uses in the Basin through blending practices. Therefore, minimum thresholds should generally be set equal to or greater than existing water quality to recognize the absence of significant and unreasonable effects in the basin at present.
6. **The GSA’s Regulatory Authority to Improve Water Quality**: TDS, sulfate, chloride, and boron are naturally occurring constituents that are derived from groundwater interaction with subsurface sediments and bedrock. Nitrate and TCP are derived from historical and/or current land use activities, such as agricultural return flows and septic system percolation. The GSAs have no regulatory authority to change or improve the water quality in the Basin unless degradation of water quality is related to pumping or Plan implementation. The GSAs are focused on preserving the existing water quality of the Basin in the interest of maintaining sustainability; however, if means become available to improve water quality, aspirational goals are considered for reducing concentrations for naturally occurring constituents.

The minimum thresholds are provided along with their rationale in Table 4.7-01 and are also shown on Table 4.7-02 for each water quality monitoring well, with water quality plots provided in Appendix H. Concentrations for all the constituents except for sulfate and boron have historically been above the WQO or MCL, so the approach for defining the minimum thresholds is based on the premise that any further degradation of the groundwater quality, if caused by groundwater extraction or GSP projects and management actions, would be significant and unreasonable because the WQO/MCL is already exceeded. For nitrate and TCP, the economic infeasibility of treatment and blending is considered to be significant and unreasonable. The water quality constituents of concern within the Basin are described in Sections 3.1.3.3 and 3.2.4, and the information used to define the minimum thresholds for each constituent is provided below.

Nitrate

Elevated nitrate concentrations (expressed throughout the GSP to represent nitrate as nitrogen [N]) have been observed throughout the Basin for decades and have not been an issue for agricultural use; however, nitrate concentrations above 50 mg/L may impact sensitive nursery crops (Faber, pers. comm., 2022). Analytical data for the Basin indicates nitrate has not exceeded 50 mg/L throughout the ASRVGB and therefore is not expected to impact sensitive crops. The public supply wells require blending with imported purchases from Calleguas MWD to meet drinking water standards. The blending ratio has averaged 1:1 (imported:local) for the historical period, and when ratios exceed 2:1 it is no longer economical to use local groundwater, which is considered an undesirable result for the Basin. The concentration limit for nitrate for the blended raw Conejo Wellfield water prior to blending with imported water, has been identified to be 23.4 mg/L (Prichard, pers. comm., 2022c). The Conejo wellfield water is also blended with other groundwater wells which have lower nitrate concentrations prior to blending with imported water, but if the blended Conejo wellfield water is above 23.4 mg/L, blending becomes economically infeasible. Therefore, the minimum threshold has been set to 23.4 mg/L (Appendix H).

TCP

TCP (1,2,3-trichloropropane) concentrations for the public supply wells currently exceed the MCL of 5 ng/L, and the impacted wells have been shut down since 2018 appending construction of a GAC treatment plant. The maintenance for the GAC treatment requires a carbon change-out to remain effective at treating TCP and the frequency of change-out depends on the influent concentrations. If influent concentrations exceed 250 ng/L then the carbon change-out frequency becomes cost-prohibitive (Prichard, pers. comm., 2022d). Therefore, the minimum threshold has been set to 250 ng/L (Appendix H).

Total Dissolved Solids

Although the average TDS concentration for all the representative monitoring sites in the last 10 years is below the RWQCB WQO of 900 mg/L (Table 4.7-01), concentrations have historically exceeded the WQO in some wells. The TDS minimum threshold was set higher than the RWQCB WQO based on the upper range of concentrations observed in representative monitoring wells during the previous 10 years (Appendix H) because the GSAs have no regulatory authority to reduce TDS concentrations in the Basin. Setting the minimum threshold above the RWQCB WQO is not considered an issue because the secondary MCL short-term consumer acceptance level is not exceeded for potable uses and agricultural users manage salinity via blending.

Chloride

Similar to TDS, chloride concentrations in some wells within the Basin have historically exceeded the RWQCB WQO of 150 mg/L; however, the average concentration for all the representative monitoring sites in the last 10 years is below the RWQCB WQO. The chloride minimum threshold was set higher than the RWQCB WQO based on the upper range of concentrations observed in representative monitoring wells during the previous 10 years (Appendix H). Although there may be concern about higher chloride concentrations impacting avocado orchards (see Section 3.2.4), blending with imported purchased potable water has addressed this issue for agricultural users (Prichard, pers. comm., 2022c). In addition, the groundwater within the Basin has historically been used for agricultural purposes and there have been no documented undesirable results regarding elevated chloride concentrations. Note, the elevated chloride concentrations are not caused by pumping and cannot be improved by managing groundwater pumping; however, ASRGSA intends to achieve the sustainability goal of preserving the water quality for the Basin. Setting the minimum threshold above the RWQCB WQO is not considered an issue for potable water because the minimum threshold is less than the secondary MCL recommended consumer acceptance level.

Sulfate

All historical concentrations of sulfate have consistently been below the WQO (300 mg/L); therefore, the minimum threshold has been set to be equal to the WQO to preserve the water quality of the Basin (Appendix H).

Boron

All historical concentrations of boron have consistently been below the WQO (1 mg/L); therefore, the minimum threshold has been set to be equal to the WQO to preserve the water quality of the Basin (Appendix H).

Determination of Minimum Threshold Exceedances

The degraded water quality minimum threshold applies only if the GSAs determine that an exceedance was caused by groundwater pumping or implementation of a GSP project. In other words, the GSAs are not responsible for water quality degradation caused by land use practices or other conditions unrelated to groundwater pumping or implementation of a GSP project. Therefore, exceedances of minimum thresholds do not necessarily constitute significant and unreasonable effects for the Basin.

4.7.2.1.1 Evaluation of Multiple Minimum Thresholds [§354.26(c)]

> **§354.26 Undesirable Results.**
> ***(c)*** *The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.*

This requirement is not applicable because only one minimum threshold is established for each constituent for the degraded water quality sustainability indicator.

4.7.2.1.2 Evaluation of Representative Minimum Thresholds [§354.28(d)]

§354.28 Minimum Thresholds.
(d) *An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.*

The requirement is not applicable to the degraded water quality sustainability indicator because groundwater elevations are not used as a proxy for the minimum thresholds.

4.7.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators [§354.28(b)(2)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(2) *The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.*

The relationships between the minimum thresholds for the degraded water quality and other sustainability indicators are as follows:

1. **Chronic Lowering of Groundwater Levels and Reduction of Groundwater Storage**: As discussed in Section 3.1.3.3, there is no known relationship between groundwater levels and groundwater quality.
2. **Seawater Intrusion**: This sustainability indicator is not applicable to the ASRVGB.
3. **Land Subsidence**: The land subsidence minimum thresholds are designed to minimize future potential inelastic land subsidence. Lower-quality water may be expelled from clays when inelastic subsidence occurs, so minimizing inelastic land subsidence helps prevent significant and unreasonable effects for the degraded water quality sustainability indicator.
4. **Depletions of Interconnected Surface Water**: There is no cause-and-effect relationship between the degraded water quality and depletions of ISW sustainability indictors.

4.7.2.3 Minimum Thresholds in Relation to Adjacent Basins [§354.28(b)(3)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(3) *How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.*

Numerical modeling results for the water budget components presented in Section 3.3 indicate a potential for groundwater flow out of the Basin at the boundary with the Pleasant Valley Basin; however, the flow rate is negligible and within the numerical modeling range of uncertainty.

4.7.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users *[§354.28(b)(4)]*

> **§354.28 Minimum Thresholds.**
> ***(b)*** *The description of minimum thresholds shall include the following:*
> ***(4)*** *How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.*

Degraded water quality minimum thresholds affect beneficial users and land uses in the Basin in the following ways:

Groundwater Beneficial Users (All Types): The minimum thresholds will prevent significant and unreasonable degradation of groundwater quality that would limit the beneficial use of groundwater. Potential effects that are minimized or avoided by the minimum thresholds include:

1. Adverse health effects of elevated nitrate and TCP in drinking water;
2. The potential for increased costs for treatment or blending to meet drinking water standards for municipal beneficial users;
3. Lower quality crops and increased demand for more costly surface water for blending or to replace groundwater for irrigation. The potential effects on agricultural beneficial uses would result in increased costs and potential impacts on land and crop values.

Land Uses and Property Interests (All Types): The minimum thresholds will prevent significant and unreasonable effects on land uses and property interests by preserving water supply for beneficial uses, thereby helping maintain property values. As discussed in Section 2.2.3, agricultural land and open space in the Basin is subject to the County of Ventura SOAR voter initiatives currently approved through 2050 (SOAR, 2015). The SOAR initiatives require a majority vote of the people to rezone unincorporated open space, agricultural or rural land for development. The existence of the SOAR makes it likely that land use in the basin would not change significantly in the near future; therefore, it is important to ensure that agricultural beneficial uses of groundwater are protected by the minimum thresholds because there is no practical alternative land use for most agricultural land in the Basin. Absent useable groundwater supplies, agricultural property values would likely be significantly impacted. The impact on property values for other land uses and property uses in the Basin is less directly tied to the groundwater in the Basin because Camrosa WD has a diverse water supply portfolio that includes multiple supplies derived from sources located outside of the Basin.

Because it is anticipated that pumping restrictions or projects/management actions will not be needed to prevent undesirable results for the degraded water quality sustainability indicator, there are no anticipated impacts on groundwater pumping rates or costs to produce groundwater.

4.7.2.5 Current Standards Relevant to Sustainability Indicator [§354.28(b)(5)]

> **§354.28 Minimum Thresholds.**
> ***(b)*** *The description of minimum thresholds shall include the following:*
> ***(5)*** *How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.*

The state, federal, and local standards applicable to the degraded water quality sustainability indicator are discussed in Section 4.7.2.1.

4.7.2.6 Measurement of Minimum Thresholds [§354.28(b)(6)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(6) *How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.*

Groundwater quality will be directly measured to determine where dissolved constituent concentrations are in relation to minimum thresholds. Groundwater quality monitoring will be conducted in accordance with the monitoring plan outlined in Section 5.

4.7.3 Measurable Objectives and Interim Milestones [§354.30(a),(b),(c),(d),(e),(g)]

§354.30 Measurable Objectives.
(a) *Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.*
(b) *Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.*
(c) *Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.*
(d) *An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.*
(e) *Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.*
(g) *An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.*

The measurable objectives are set equal to the minimum thresholds for all constituents to reflect the fact that the GSAs have no ability to improve water quality by managing groundwater pumping due to the lack of a causal relationship between pumping and groundwater quality (see Section 3.1.3.3).

SGMA also provides for setting measurable objectives at levels for the purpose of improving conditions, but failure to achieve those measurable objectives is not grounds for a DWR inadequacy determination (§354.30(g)); therefore, a secondary measurable objective for each constituent was established to represent an aspirational goal to improve water quality within the Basin. The secondary measurable objectives are set at the WQO (TDS, and chloride), MCL (nitrate and TCP), or the upper bound of existing data if existing concentrations are already below the WQO (sulfate and boron) – the latter representing an aspirational goal to not degrade existing water quality for those constituents. Setting the secondary, “aspirational” measurable objectives contribute to achieving the second part of the sustainability goal: "*…The GSAs also desire to collaborate with other agencies and stakeholders within the basin to improve the groundwater quality of the ASRVGB.*"

The measurable objectives and secondary measurable objectives are provided along with their rationale in Table 4.7-01 and are also shown on Table 4.7-02 for each water quality monitoring well, with water quality plots provided in Appendix H.

4.7.3.1 Interim Milestones [§354.30€]

§354.30 Measurable Objective.
(e) *Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin with 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.*

Interim milestones are used to show the anticipated progress or path to achieving the measurable objectives within 20 years. The GSAs must define the interim milestones using the same metric as the measurable objective in increments of 5 years. In all cases, the measurable objectives are equal to the minimum thresholds because the GSAs currently have no ability to improve existing water quality in the Basin. Thus, interim measures are equal to the measurable objective indicating that the measurable objective is already being met.

4.8 Land Subsidence

As described in Section 3.2.5 Land Subsidence, no land subsidence has been documented historically in the Basin. Section 3.2.5 also explains that the Basin is considered to have a low estimated potential for inelastic land subsidence. Numerical modeling for the water budget suggests that future groundwater levels will remain above historical low levels, which would prevent inelastic subsidence due to groundwater extraction (Appendix G). Despite these factors, sustainable management is prudent because groundwater levels could decline below historical levels and trigger inelastic land subsidence if actual future conditions differ significantly from those assumed in the projected water budget analysis.

4.8.1 Undesirable Results [§354.26(a),(b)(1),(b)(2),(b)(3), and (c)]

§354.26 Undesirable Results.
(a) *Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.*
(b) *The description of undesirable results shall include the following:*
- ***(1)*** *The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.*
- ***(2)*** *The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.*
- ***(3)*** *Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.*

(c) *The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.*

Process and Criteria for Defining Undesirable Results [§354.26(a)]

The overall process relied upon to define undesirable results for this GSP was described in Section 4.3. The specific process and criteria for defining undesirable results applied to the land subsidence sustainability indicator are described below.

Evaluation of Potential Effects on Beneficial Uses and Users, Land Uses, and Property Interests [§354.26(b)(3)]

Due to the lack of subsidence within the Basin, there is low potential for impacts to beneficial uses and users, land uses, and property interests. In addition, significant and unreasonable effects related to subsidence are not likely to occur because future groundwater levels are not expected to be lower than what has been historically observed.

Cause of Groundwater Conditions That Could Lead to Undesirable Results [§354.26(b)(1)]

The cause of groundwater conditions that could lead to undesirable results would be groundwater levels that decline below historical low levels resulting in inelastic land subsidence.

The following factors could result in groundwater levels declining below historical low levels:

1. Groundwater extractions, particularly extraction rates that exceed those assumed for the projected water budget analysis.
2. Droughts that exceed the duration and severity of droughts included in the hydrologic period used for the projected water budget analysis.
3. Decreased groundwater inflow from the Conejo volcanic bedrock.
4. Decreased surface water inflow from Conejo Valley and the Hill Canyon WWTP.
5. Combinations of items 1 through 4.

It is noted that the GSAs are only responsible for addressing effects related to groundwater extraction within the Basin (i.e., Factor No. 1).

Criteria Used to Define Undesirable Results [§354.26(b)(2), (c)]

The criteria used to define when and where the effects of the groundwater conditions cause undesirable results is based on the qualitative description of undesirable result, which is land subsidence impacting existing infrastructure within the Basin and/or that substantially interferes with surface land uses elsewhere in the Basin.

InSAR is the best available method for measuring the rate and extent of land subsidence over large areas, such as a groundwater basin. However, as explained in Section 4.4.2, groundwater levels will be used as a proxy for the land subsidence sustainability indicator minimum thresholds. Based on the foregoing, the combination of minimum threshold exceedances that is deemed to cause significant and unreasonable effects in the Basin for the land subsidence sustainability indicator is the same as the combinations deemed to cause undesirable results for the chronic lowering of groundwater levels sustainability indicator (Table 4.4-01). In addition to groundwater levels, InSAR data will be reviewed annually; and, to determine whether InSAR-indicated land surface elevation changes were caused by groundwater conditions, InSAR data will only be considered when groundwater levels are below historical low levels.

4.8.2 Minimum Thresholds [§354.28]

4.8.2.1 Information and Criteria to Define Minimum Thresholds [§354.26(c), §354.28(a),(b)(1),(c)(5)(A),(c)(5)(B),(d), and (e)]

§354.26 Undesirable Results.

(c) *The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.*

§354.28 Minimum Thresholds.

(a) *Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.*

(b) *The description of minimum thresholds shall include the following:*

(1) *The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by the uncertainty in the understanding of the basin setting.*

(c) *Minimum thresholds for each sustainability indicator shall be defined as follows:*

(5) *Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following:*

(A) *Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects.*

(B) *Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.*

(d) *An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.*

(e) *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.*

Land uses and property interests that would be affected by land subsidence in the Basin were described in the evaluation of undesirable results (Section 4.8.1).

GSP Emergency Regulation §354.28(d) allows the use of groundwater levels as a proxy for other sustainability indicators if a significant correlation between groundwater elevations and the other sustainability indicators can be demonstrated. The preconsolidation stress, the effective stress threshold at which inelastic compaction begins, generally is exceeded when groundwater levels decline past historical low levels (California Water Foundation, 2014). Therefore, groundwater levels are an appropriate proxy for monitoring inelastic land subsidence due to groundwater extraction, and the minimum thresholds for land subsidence are defined as the historical low groundwater levels (Table 4.1-01).

The historical low groundwater elevations which define the minimum thresholds in Basin were established using the approach described in Section 4.4.1.

4.8.2.2 Evaluation of Representative Minimum Thresholds [§354.28(d)]

§354.28 Minimum Thresholds.
(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.

As mentioned above, maintaining groundwater levels above the historical low will prevent inelastic subsidence from occurring in the Basin; therefore, groundwater level elevations are used as a proxy for the reduction of groundwater storage minimum thresholds.

4.8.2.3 Relationships Between Minimum Thresholds and Sustainability Indicators [§354.28(b)(2)]

§354.28 Minimum Thresholds.
***(b)** The description of minimum thresholds shall include the following:*
***(2)** The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.*

The relationships between the minimum thresholds for the land subsidence sustainability indicator and other sustainability indicators are the same as the potential effects of the minimum thresholds for the chronic lowering of groundwater levels on the other sustainability indicators and are discussed in Section 4.4.2.5.

4.8.2.4 Minimum Thresholds in Relation to Adjacent Basins [§354.28(b)(3)]

§354.28 Minimum Thresholds.
***(b)** The description of minimum thresholds shall include the following:*
***(3)** How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.*

The potential effect on the adjacent basins is considered to be small because ASRVGB is separated from the adjacent basins by exposed and/or shallow bedrock, and the calculated underflow between the Basins is insignificant.

4.8.2.5 Impact of Minimum Thresholds on Beneficial Uses and Users *[§354.28(b)(4)]*

§354.28 Minimum Thresholds.
***(b)** The description of minimum thresholds shall include the following:*
***(4)** How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.*

The effects on beneficial users and land uses in the Basin are the same as analyzed for the chronic lowering of groundwater levels sustainability indicator and are incorporated herein by reference to Section 4.4.2.4.

4.8.2.6 Current Standards Relevant to Sustainability Indicator [§354.28(b)(5)]

> **§354.28 Minimum Thresholds.**
> ***(b)*** *The description of minimum thresholds shall include the following:*
> ***(5)*** *How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.*

The GSAs are unaware of any federal, state, or local standards for land subsidence.

4.8.2.7 Measurement of Minimum Thresholds [§354.28(b)(6)]

> **§354.28 Minimum Thresholds.**
> ***(b)*** *The description of minimum thresholds shall include the following:*
> ***(6)*** *How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.*

Groundwater elevations will be directly measured to determine their relation to minimum thresholds. Groundwater level monitoring will be conducted in accordance with the monitoring plan outlined in Section 5.

4.8.3 Measurable Objectives and Interim Milestones [§354.30(a),(b),(c),(d),(e),(g), and §354.34(g)(3)]

> **§354.30 Measurable Objectives.**
> ***(a)*** *Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.*
> ***(b)*** *Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.*
> ***(c)*** *Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.*
> ***(d)*** *An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.*
> ***(e)*** *Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.*
> ***(g)*** *An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.*
>
> **§354.34 Monitoring Network.**
> ***(g)*** *Each Plan shall describe the following information about the monitoring network:*
> ***(3)*** *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*

Because the chronic lowering of groundwater levels minimum thresholds are used as a proxy for the land subsidence minimum thresholds, the measurable objectives and interim milestones for chronic lowering of groundwater levels are adopted for the land subsidence measurable objectives and interim milestones (Table 4.4-01).

4.9 Depletions of Interconnected Surface Water

As discussed in Section 3.2.6, the Arroyo Conejo and Conejo Creek are interconnected with the shallow groundwater in the Basin and a small amount of direct depletions occur due to groundwater pumping adjacent to the creek. The Arroyo Conejo and Conejo Creek stream system has primarily losing conditions; however, it is perennial due to the constant source of water from the Hill Canyon WWTP effluent and additional surface water flow from the North and South Fork Arroyo Conejo streams that drain Conejo Valley. The GSAs have developed SMC for the depletions of ISW sustainability indicator to ensure that potential undesirable results related to groundwater extraction are avoided.

4.9.1 Undesirable Results [§354.26(a),(b)(1),(b)(2),(b)(3),(c), and (d)]

§354.26 Undesirable Results.

(a) *Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.*

(b) *The description of undesirable results shall include the following:*

- ***(1)*** *The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.*
- ***(2)*** *The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.*
- ***(3)*** *Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.*

(c) *The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.*

(d) *An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.*

Process and Criteria for Defining Undesirable Results [§354.26(a)]

The overall process relied upon to define undesirable results for this GSP was described in Section 4.3. The specific process and criteria for defining undesirable results applied to the ISW depletions sustainability indicator are described below.

Evaluation of Potential Effects on Beneficial Uses and Users, Land Uses, and Property Interests [§354.26(b)(3)]

The process for defining undesirable results for the ISW depletions sustainability indicator focused on considering the potential effects on beneficial uses and users of the ISW, land uses, and property interests that would be caused by depletions of ISW. The GSAs have considered public trust resources in development of this GSP by considering the impacts to riparian and aquatic habitats, and by setting minimum thresholds designed to prevent undesirable results under SGMA.

When considering ISW depletion effects, it is important to note that the GSAs are only responsible for addressing effects caused by pumping or GSP projects or management actions. The GSAs do not have jurisdictional authority over potential impacts from other external sources for the surface water sustaining the riparian vegetation habitats (i.e., land-use changes, surface water flows, or wastewater discharges from the Hill Canyon WWTP); hence, the GSP cannot address or manage any future changes to surface flows (or beneficial use of the same) from increased recycled water demands or other actions that could reduce surface water inflows into the Basin.

As discussed in Section 3.3, surface water percolation is a significant inflow component of the water balance for the Basin (see Figure 3.3-02). Although inflows are generally constant for the Basin regardless of climate conditions, drier years can reduce inflows primarily due to less streamflow percolation from stormflows. During prolonged droughts, lowering of groundwater levels and reduction of groundwater storage caused by pumping could have potential impacts on streamflow.

Identified potential beneficial surface water uses of the surface water bodies within and downstream of the Basin include those that have been identified in the RWQCB Basin Plan (RWQCB-LA, 2019):

1. Municipal Supply
2. Agricultural Supply
3. Warm Freshwater Habitat
4. Cold Freshwater Habitat
5. Wildlife Habitat (terrestrial)
6. Migration of Aquatic Organisms
7. Spawning, Reproduction, and/or Early Development
8. Wetland Habitat

Within the Basin there are riparian vegetation habitats dependent on discharges to surface water and the associated shallow groundwater that is sustained by these discharges (Sections 3.2.6 and 3.2.7), but currently there are no active diversions for municipal or agricultural supply. Water Rights Decision 1638 (SWRCB, 1997) addresses diversion rights that are located within the Basin, and Camrosa WD provides water for and sets the rates for these water rights holders (see Section 2.2.2.2). The following beneficial users were identified downstream of the Basin:

1. Surface Water Diversions for Municipal Water Supply – this includes non-potable water uses for irrigation purposes
2. Surface Water Diversions for Agricultural Irrigation Supply

Surface water diversions from the Conejo Creek are located downstream, outside of the Basin, and include the City of Thousand Oaks water rights pertaining to the Conejo Creek Project diversion (see Section 3.3.1.1). The Conejo Creek Project diversion is managed by Camrosa and activities are reported to the City of Thousand Oaks to file annual reports to the SWRCB. Beneficial users relying on surface water diversions from Conejo Creek downstream have historically met their demands and streamflow bypass requirements (i.e., there have been no reported instances when a beneficial user was unable to meet their water supply needs) and no undesirable results have been documented. Additionally, through engagement with stakeholders and the GSAs, there has not been any evidence found presenting impacts to interconnected streamflow; therefore, it was concluded that significant and unreasonable effects have not occurred historically with respect to the ISW sustainability indicator for agricultural, municipal, or domestic beneficial uses, but could potentially occur if groundwater levels decline below historically low levels in the future. Furthermore, any beneficial uses or users located upstream or downstream of the diversions have been protected historically based on the absence of documented impacts. Historical depletions of ISW in Arroyo Conejo and Conejo Creek have been quantified using the numerical model (see Section 3.2.6 and Appendix G), and future depletions will be monitored, assessed, and (if found to be significant) managed to ensure that beneficial uses of surface water do not have significant and unreasonable impacts.

It is important to note that there are two different types of ISW depletion that can potentially affect beneficial uses, direct and indirect depletion. Direct depletion occurs when the cone of depression in the water table from pumping wells near the stream system induces surface water flow directly into the well. Direct depletion is primarily associated with the pumping wells located adjacent to the Arroyo Conejo and Conejo Creek. Indirect depletion is caused by wells located away from the stream system that do not have cones of depression that intersect the streambed. Currently, there are few wells located close enough to interconnected stream reaches to cause significant direct depletion (see Section 3.2.6). Indirect depletions of surface water are related to groundwater levels and storage because indirect depletion occurs as a result of the regional groundwater gradient relative to the stream location. Depletion amounts based on numerical modeling results are quantified in Section 3.2.6. The minimum threshold for the depletions of ISW includes both direct and indirect depletion (see Section 4.9.2). For reasons stated above, the specific amount of direct depletion is not warranted at this time.

Cause of Groundwater Conditions That Could Lead to Undesirable Results [§354.26(b)(1)]

The causes of groundwater conditions that could lead to undesirable results would be pumping that causes ISW depletions in excess of the minimum thresholds.

It is noted that the GSAs are only responsible for addressing effects related to groundwater extraction within the ASRVGB and are not responsible for addressing effects reducing streamflow caused by other factors, such as drought conditions.

Criteria Used to Define Undesirable Results [§354.26(b)(2)]

The GSP must identify the combination of minimum threshold exceedances deemed to cause significant and unreasonable effects in the Basin for each applicable sustainability indicator. Only one ISW depletion minimum threshold is identified in the GSP. Therefore, any minimum threshold exceedance is considered to constitute undesirable results for the Basin.

4.9.2 Minimum Thresholds [§354.28]

4.9.2.1 Information and Criteria to Define Minimum Thresholds [§354.28(b)(1),(c)(6)(A),(c)(6)(B), and (e)]

§354.28 Minimum Thresholds.

(a) *Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.*

(b) *The description of minimum thresholds shall include the following:*

(1) *The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by the uncertainty in the understanding of the basin setting.*

(c) *Minimum thresholds for each sustainability indicator shall be defined as follows:*

(6) *Depletions of Interconnected Surface Water. The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:*

(A) *The location, quantity, and timing of depletions of interconnected surface water.*

(B) *A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.*

(e) *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.*

Pursuant to GSP Emergency Regulations §354.28 (c)(6), the minimum threshold for depletions of ISW shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. Adverse impacts have not been documented to occur historically; therefore, undesirable results are not expected to occur as long as future depletions do not exceed the maximum historical depletion rate. The maximum historical depletion rate within the Basin was evaluated using the numerical model results in which groundwater levels and storage are at historical lows; these conditions were simulated by increasing the pumping across the Basin, and a 25% increase created the best approximation of historical low groundwater conditions. The maximum depletion rate for the Basin at the groundwater level and storage historical lows includes both the direct and potential indirect depletion and was calculated to be 1,150 AF/yr (~1.6 cfs). The calculated annual total depletion rates for the Basin using the numerical model results are presented on Figure 4.9-01.

4.9.2.1.1 Evaluation of Multiple Minimum Thresholds [§354.26(c)]

§354.26 Undesirable Results.

(c) *The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.*

This requirement is not applicable because only one minimum threshold is established for the ISW depletions sustainability indicator.

4.9.2.1.2 Evaluation of Representative Minimum Thresholds [§354.28(d)]

§354.28 Minimum Thresholds.
(d) *An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.*

The requirement is not applicable to the ISW depletions sustainability indicator because groundwater elevations are not used as a proxy for the minimum threshold.

4.9.2.2 Relationships Between Minimum Thresholds and Sustainability Indicators [§354.28(b)(2)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(2) *The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.*

The relationships between the minimum threshold for ISW depletions and the other sustainability indicators are as follows:

1. **Chronic Lowering of Groundwater Levels, Reduction of Groundwater Storage, and Land Subsidence:** Direct depletions of ISW can occur regardless of groundwater level or storage conditions and are therefore not affected by the minimum thresholds for the chronic lowering of groundwater level or reduction of groundwater storage sustainability indicators. Currently, there are few wells located close enough to interconnected stream reaches to cause significant direct depletion (see Section 3.2.6). Indirect depletions of surface water are related to groundwater levels and storage because indirect depletion occurs as a result of the regional groundwater gradient relative to the stream location.
2. **Seawater Intrusion:** This sustainability indicator is not applicable to the ASRVGB.
3. **Degraded Water Quality:** There is very little cause-and-effect relationship between the degraded water quality and the depletions of ISW sustainability indictors. Increased depletion of the Arroyo Conejo and Conejo Creek is not expected to degrade the water quality because the nitrate concentrations of the effluent from the Hill Canyon WWTP are maintained at levels below the WQO, and the background groundwater concentrations are higher than the WQO, on average.

4.9.2.3 Minimum Thresholds in Relation to Adjacent Basins [§354.28(b)(3)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(3) *How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.*

The ISW depletions minimum threshold helps protect the quantity of surface water that leaves the Basin and is available for downstream diversions.

4.9.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users *[§354.28(b)(4)]*

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(4) *How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.*

The ISW depletions minimum threshold may impact agricultural and municipal beneficial uses of surface water because addressing depletions may result in decreased water supply for these beneficial uses and/or increased costs.

Riparian vegetation identified along Arroyo Conejo and Conejo Creek are considered to be dependent on perennial surface water discharges from Conejo Valley and the Hill Canyon WWTP and urban runoff from Conejo Valley. The minimum thresholds for the depletion of ISW are protective of impacts that could cause undesirable results including significant and unreasonable effects on riparian habitat.

Public trust resources were also assessed in development of this GSP by considering the impacts to riparian and aquatic ecosystems, and by setting minimum thresholds designed to prevent undesirable results under SGMA.

4.9.2.5 Current Standards Relevant to Sustainability Indicator [§354.28(b)(5)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(5) *How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.*

The GSAs are unaware of any federal, state, or local standards for ISW depletion.

4.9.2.6 Measurement of Minimum Thresholds [§354.28(b)(6)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(6) *How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.*

As provided for in SGMA, undepleted flows will be determined through a combination monitoring and modeling using the numerical flow model (Appendix G). The surface water flow monitoring network is described in Section 5.8.

4.9.3 Measurable Objectives and Interim Milestones [§354.30(a),(b),(c),(d),(e),(g)]

§354.30 Measurable Objectives.

(a) *Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.*

(b) *Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.*

(c) *Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.*

(d) *An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.*

(e) *Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.*

(g) *An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.*

4.9.3.1 Description of Measurable Objectives

The ISW depletions measurable objective is the same as the minimum threshold. It is noted that the Sustainable Management Criteria Best Management Practice (BMP) document indicates that the measurable objective can be the same as the minimum threshold (DWR, 2017).

4.9.3.2 Interim Milestones [§354.30(e)]

§354.30 Measurable Objective.

(e) *Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin with 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.*

The GSP must include interim milestones in 5-year increments to show the anticipated progress toward achieving the measurable objectives within 20 years. The interim milestones are equal to the measurable objective.

4.10 Measurable Objectives and Interim Milestones for Additional Plan Elements [§354.30(f)]

§354.30 Measurable Objectives.
(f) *Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.*

No additional plan elements that have measurable objectives are included in the GSP.

5.0 Monitoring Networks [Article 5, SubArticle 4]

5.1 Introduction to Monitoring Networks [§354.32]

§354.32 Introduction to Monitoring Networks. *This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.*

Section 5 describes existing monitoring networks and improvements to those monitoring networks that will be developed as part of GSP implementation. Section 5 is prepared in accordance with the GSP Emergency Regulations §354.32 - §354.40 and includes monitoring objectives, monitoring protocols, data reporting requirements, assessment of the monitoring network, and a DMS.

Consistent with GSP Emergency Regulations §354.34(e), the monitoring networks presented in this section are based primarily on existing monitoring sites. The existing monitoring networks in the Basin have been used to collect information to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface water conditions. The monitoring networks include features for the collection of data to monitor the groundwater sustainability indicators applicable to the Basin. The proposed monitoring network is adequate to meet SGMA monitoring needs and assess groundwater conditions, SMC, and potential impacts on beneficial use in the Basin. However, additional monitoring sites may be necessary in the future, depending on groundwater conditions. Future monitoring may also be included to refine the HCM and improve the numerical model.

Monitoring networks are described for each applicable sustainability indicator as appropriate in the following sections. As discussed in Sections 3.2.3 and 4.6, seawater intrusion is not an applicable sustainability indictor in the Basin and no monitoring network is included for seawater intrusion.

5.2 Monitoring Network Objectives and Design Criteria [§354.34(a),(b)(1),(b)(2),(b)(3),(b)(4),(d),(f)(1),(f)(2),(f)(3), and (f)(4)]

§354.34 Monitoring Network.

(a) *Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.*

(b) *Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:*

(1) *Demonstrate progress toward achieving measurable objectives described in the Plan.*

(2) *Monitor impacts to the beneficial uses or users of groundwater.*

(3) *Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.*

(4) *Quantify annual changes in water budget components.*

(d) *The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.*

(f) *The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:*

(1) *Amount of current and projected groundwater use.*

(2) *Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.*

(3) *Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.*

(4) *Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.*

5.2.1 Monitoring Network Objectives

The GSP Emergency Regulations require monitoring networks be developed to collect data of sufficient quality, frequency, and spatial distribution to characterize groundwater and related surface water conditions in the Basin, and to evaluate changing conditions that occur during implementation of the GSP. Monitoring networks should accomplish the following (§354.34(b)):

1. Demonstrate progress toward achieving measurable objectives described in the GSP.
2. Monitor impacts to the beneficial uses and users of groundwater.
3. Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.
4. Quantify annual changes in water budget components.

Each of these objectives is described further below with specific discussion relevant to the planned ASRVGB GSP monitoring network:

1. **Demonstrate progress toward achieving measurable objectives described in Section 4 of this GSP:** As described in Section 4 of this GSP, the seawater intrusion sustainability indictor is not applicable to this basin. The measurable objectives for the degraded water quality, land subsidence, and depletions of ISW sustainability indicators are already met. Therefore, the focus of this objective for the ASRVGB is to demonstrate progress toward meeting the measurable objectives for chronic lowering groundwater levels and groundwater storage reduction.

2. **Monitor impacts to the beneficial uses or users of groundwater:** Key design criteria considered in developing a network to monitor these potential impacts on uses and users of groundwater include the following:

   Monitoring Parameters: Monitoring groundwater levels and quality can indicate trends that could precede potential undesirable results. Monitoring groundwater quality at or near active water supply wells can detect changes in groundwater quality that might affect groundwater users. Groundwater levels can be directly measured at monitoring wells using a manual sounder (where monthly, quarterly, or semi-annual measurement is appropriate) or an installed pressure transducer with datalogger (where high-frequency measurement is needed). In addition, monitoring stream flow rates is important for addressing depletions of ISW.

   Monitoring Locations: As noted in DWR's BMPs for developing monitoring networks (DWR, 2016b), "Areas that are subject to greater groundwater pumping, greater fluctuations in conditions, significant recharge areas, or specific projects may require more monitoring (temporal and/or spatial) than areas that experience less activity or are more static." Under this guidance, appropriate monitoring sites in ASRVGB are near the Basin's active water supply wells, allowing the GSAs to assess necessary sustainability indicators as well as any impacts on beneficial use of groundwater.

   Screened Intervals (depths) of Monitoring Wells: The depth of monitoring is an important consideration. For ASRVGB, this means ensuring monitoring wells are screened in the groundwater production zones from which most of the groundwater is extracted. Most production occurs from the lower production zones, where there are adequate monitoring wells. In addition, monitoring sites screened in the Conejo volcanics bedrock are relevant for the sustainable management of the Basin because the Conejo volcanics have been identified as an important source of groundwater inflow to the Basin. Existing wells completed within the bedrock will be prioritized to be added to the monitoring network as described in the Groundwater Monitoring Network Enhancement Project (Section 6.2).

3. **Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds:** Monitoring of changes in groundwater conditions relative to minimum thresholds and measurable objectives will be accomplished using groundwater level and groundwater quality monitoring and numerical modeling. Monitoring should focus on whether the trend of these parameters is deviating from a pattern that is consistent with maintenance of groundwater conditions relative to the measurable objectives. If a significant change from historical pumping patterns or groundwater quality were to occur in the future (e.g., large changes in pumping rates, or locations or reports of a contaminant release to groundwater), then modifications to the monitoring network may be necessary. Numerical modeling will be needed to evaluate conditions relative to the minimum threshold and measurable objective for depletions of ISW.

4. **Quantify annual changes in water budget components:** As described in Section 3.3 of this GSP, the numerical model is the best tool currently available for estimating the quantities of the water budget components. The numerical model will be updated with data from monitoring wells and continue to be used to quantify the water budget, including annual changes in the water budget components. The following data will be needed to update the numerical model and calculate the water budget components:
   - Groundwater extractions, which are measured by FCGMA, Camrosa, or otherwise estimated.
   - Water deliveries for the Basin to calculate return flows.
   - Groundwater levels, measured from the monitoring network.
   - Surface Water Inflow and Outflow: Surface water flow entering and leaving the Basin are measured by gages.

The above data will be input to the numerical model for calculating future annual changes in subsurface water budget components, groundwater-surface water interaction within the Basin, Basin change in storage, and depletions of ISW.

5.2.2 Monitoring Network Design Criteria

Design criteria are discussed for each sustainability indicator relative to GSP Emergency Regulations §354.34(c)(1) through (6) and are addressed in the subsections that discuss the monitoring networks specific to each sustainability indicator.

GSP Emergency Regulations §354.34(d) adds the overarching design criteria, which echo the third monitoring network objective described in GSP Emergency Regulations §354.34(b)(3) (see no. 3 in Section 5.2.1 above), to "Ensure adequate coverage of sustainability indicators." Two management areas (see Section 3.4) have been established for the Basin, so ensuring the sufficient quantity and density of monitoring sites is addressed for both management areas for each sustainability indicator.

GSP Emergency Regulations §354.34(f) provide additional design considerations for the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:

- Amount of current and projected groundwater use.
- Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.
- Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.
- Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.

Other criteria from DWR's BMPs (2016b) were also considered in developing the monitoring network. These include:

- **Access issues**—Most of the land within the Basin is privately held, including areas along the Arroyo Conejo and Conejo Creek. This does not include wells operated by Camrosa WD, which are owned by the District and can be easily accessed and monitored for GSP purposes. Overall, the proposed monitoring network relies on existing wells, which have historically been deemed adequate for management by the FCGMA under its special act district powers and Camrosa WD under its AB 3030 management efforts to date. Nonetheless, a project study will be undertaken to assess access and monitoring capabilities for additional existing wells that are currently not being actively monitored. Use of existing wells will be prioritized for future monitoring to minimize costs.
- **Consider all sustainability indicators**—DWR (2016b) recognizes that "GSAs should look for ways to efficiently use monitoring sites to collect data for more than one or all of the sustainability indicators," including those indicators that are not currently known to affect (or be affected by) uses and users of groundwater from the principal aquifers. In keeping with DWR (2016b) guidance, to the extent practicable, the monitoring network is designed to collect the most data possible with a minimum of monitoring points/resources.
- **Cost** – Cost is a critical factor for ASRVGB because the Basin is small compared to most other basins. With fewer rate payers than most basins, there is a significantly greater cost burden on each rate payer to fund additional monitoring sites.

5.2.3 Monitoring Network Design Analysis

The objectives and design criteria set forth in the GSP Emergency Regulations were analyzed in a Basin-specific context. The analysis resulted in the following key monitoring network design factors:

1. The degraded water quality sustainability indicator measurable objectives have been met historically and are expected to be met going forward. Therefore, the focus for water quality monitoring is to demonstrate continued compliance with the degraded water quality measurable objectives as opposed to progress toward meeting them.
2. Numerical modeling results suggest that the measurable objectives for the chronic lowering of groundwater levels and reduction of groundwater storage sustainability indicators are expected to be met in the future without the need for projects or management actions. Therefore, additional data do not appear necessary at this time to demonstrate progress toward meeting the measurable objectives.
3. Arroyo Conejo and Conejo Creek are interconnected with the shallow aquifer in the Basin, and streamflow percolation is an important component for the groundwater budget. Therefore, surface water flow monitoring is a critical monitoring network element. Existing surface water monitoring at gage 800 and the Confluence Flume is sufficient to quantify streamflow depletion using the numerical model.
4. Two management areas (see Section 3.4) have been established in this GSP and adequate coverage of the sustainability indicators applies for each management area.
5. The frequency of groundwater quality sampling at or near active water supply wells should be sufficient to detect any long-term trends in water quality. Because most groundwater

quality monitoring sites are public water supply wells, the existing sampling programs implemented for satisfying Division of Drinking Water requirements with selected supplemental sampling by the GSAs is considered adequate for meeting SGMA requirements.

The specific application of the monitoring objectives and design criteria to each sustainable management criterion to develop the GSP monitoring network is described in the following subsections.

5.3 Groundwater Levels Monitoring Network [§354.34(e),(g)(3),(h), and (j)]

§354.34 Monitoring Network.

(e) *A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.*

(g) *Each Plan shall describe the following information about the monitoring network:*

(3) *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*

(h) *The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.*

(j) *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.*

Table 5.3-01 summarizes construction and other information for the 14 existing wells in ASRVGB that have regularly been used for groundwater level monitoring historically. These wells are referred to as the “existing groundwater level monitoring network.” Locations of groundwater level monitoring wells are shown on Figure 5.3-01. Inspection of Table 5.3-01 indicates that most (11) existing groundwater level monitoring wells are known to be screened above bedrock: two wells are screened exclusively in the upper groundwater production zone, six wells are screened exclusively in the lower groundwater production zone, two wells are screened across both the upper and lower groundwater production zones, and one monitoring well is screened across both the lower production zone and the bedrock (02N19W20M04S). The remaining three wells have unknown screen intervals. Four (4) wells are manually monitored on a quarterly basis by VCWPD and 10 wells are manually monitored monthly by Camrosa WD.

5.3.1 Attainment of Monitoring Objectives and Other Requirements [§354.34(c)(1)(A),(c)(1)(B), and (g)(1)]

§354.34 Monitoring Network.

(b) *Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:*

(1) *Demonstrate progress toward achieving measurable objectives described in the Plan.*

(2) *Monitor impacts to the beneficial uses or users of groundwater.*

(3) *Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.*

(4) *Quantify annual changes in water budget components.*

(c) *Each monitoring network shall be designed to accomplish the following for each sustainability indicator:*

(1) *Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:*

(A) *A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.*

(B) *Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.*

(d) *The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.*

(g) *Each Plan shall describe the following information about the monitoring network:*

(1) *Scientific rationale for the monitoring site selection process.*

In accordance with GSP Emergency Regulations §354.34(b) and (d), the groundwater level monitoring network sites are based on available preexisting monitoring sites maintained by VCWPD and Camrosa. The monitoring sites were selected based on available existing wells and scientific judgment to demonstrate progress toward:

1. achieving measurable objectives described in the GSP,
2. monitoring impacts to the beneficial uses and users of groundwater,
3. monitoring changes in groundwater conditions relative to measurable objectives and minimum thresholds,
4. quantifying annual changes in water budget components, and
5. providing adequate coverage of sustainability indicators.

Pursuant to GSP Emergency Regulations §354.34(c)(1)(A), the groundwater level monitoring network sites have been selected to provide a sufficient density of monitoring wells to collect representative measurements in the Basin. The existing groundwater level monitoring wells provide sufficient density for the following scientific and practical reasons consistent with the key Basin-specific monitoring network design factors discussed in Section 5.2:

- The groundwater level monitoring sites were selected to provide monitoring of groundwater levels in the proximity of where most of the groundwater extraction occurs.

- The groundwater level monitoring sites were selected to provide coverage across the Basin to monitor the regional groundwater flow gradient direction over time.
- The groundwater level monitoring sites were selected to provide coverage in areas where groundwater and surface water interaction occurs.
- The groundwater level monitoring sites were selected to assess the vertical gradient between the shallow groundwater, the upper and lower groundwater production zones, and the Conejo volcanic bedrock.

Consistent with GSP Emergency Regulations §354.34(c)(1)(B), static groundwater levels will be measured no less frequently than twice per year to capture the approximate seasonal low and seasonal high groundwater levels. Currently 4 wells are monitored manually on a quarterly basis and the remaining 10 wells are monitored monthly.

Additional factors considered during selection of the groundwater level monitoring sites include:

1. From a scientific perspective, monitoring sites were selected to provide data in areas where groundwater flow into the Basin is conceptualized to come from the Conejo volcanic bedrock. Existing wells completed within the bedrock will also be prioritized to be added to the monitoring network as described in the Groundwater Monitoring Network Enhancement Project (Section 6.2).
2. To the extent practicable, existing wells have been selected as monitoring sites to avoid the cost and public nuisance associated with drilling new wells.
3. DWR's BMPs for developing monitoring networks (2016b) cites guidance stating that the density of monitoring wells should be 6.3 wells per 100 square miles (mi^2) (Sophocleous, 1983) to 4.0 wells per 100 mi^2 (Hopkins, 1994; applies to basins with groundwater extractions of more than 10,000 AF per 100 mi^2). In the groundwater-producing zones of the FCGMA management area in the ASRVGB Basin (which has an area of approximately 1.7 mi^2), there are 3 existing monitoring wells (density of ~176 wells per 100 mi^2). In the groundwater-producing zones of the ASRGSA management area in the ASRVGB Basin (which has an area of approximately 4.4 mi^2), there are 11 existing monitoring wells (density of ~250 wells per 100 mi^2). Therefore, the density of monitoring sites in the existing groundwater level monitoring network for each management area far exceeds the BMP recommendation by DWR.

5.3.2 Data and Reporting Standards [§354.34(g)(2)]

§354.34 Monitoring Network.
(g) *Each Plan shall describe the following information about the monitoring network:*
(2) *Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.*

The groundwater level monitoring sites (Table 5.3-01) are generally consistent with applicable data and reporting standards set forth in GSP Emergency Regulations §352.4. Exceptions to the standards are described below:

- Three monitoring wells have unknown screen intervals. These wells are believed to be completed above the bedrock based on their location and casing depth (for well

02N20W25D01S). The screen interval depth will be surveyed (see Section 5.3.4) to verify which groundwater production zone(s) the well is completed. These wells are still considered reliable to meet SGMA and GSP regulatory requirements once the screen interval is verified.

- All of the monitoring wells require the reference point to be surveyed to establish the reference elevation used to determine the groundwater level elevation.
- Ten monitoring wells do not have assigned CASGEM well identification numbers and will be entered on forms made available by the DWR website.

5.3.3 Monitoring Protocols [§354.34(i)]

§354.34 Monitoring Network.
(i) *The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.*

VCWPD and Camrosa collect and report groundwater elevation data from the groundwater-level monitoring network in general conformance with the CASGEM program's "Procedures for Monitoring Entity Reporting" (DWR, 2010) and DWR's (2016c) BMP for monitoring protocols, standards, and sites. Some key elements of DWR guidance include (but are not limited to) the following:

- Depth to groundwater must be measured relative to an established reference point on the well casing.
- Depth to groundwater must be measured to an accuracy of 0.1 foot below the reference point (it is preferable to measure depth to groundwater to an accuracy of 0.01 foot).

More details are provided in the referenced guidance documents (DWR, 2010, 2016c), and are not repeated in this GSP.

5.3.4 Assessment and Improvement of Monitoring Network [§354.38(a),(b),(c)(1),(c)(2),(d),(e)(1),(e)(2),(e)(3), and (e)(4)]

§354.38 Assessment and Improvement of Monitoring Network.
(a) *Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.*
(b) *Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.*
(c) *If the monitoring network contains data gaps, the Plan shall include a description of the following:*
(1) *The location and reason for data gaps in the monitoring network.*
(2) *Local issues and circumstances that limit or prevent monitoring.*
(d) *Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.*
(e) *Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:*
(1) *Minimum threshold exceedances.*
(2) *Highly variable spatial or temporal conditions.*
(3) *Adverse impacts to beneficial uses and users of groundwater.*
(4) *The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.*

Pursuant to GSP Emergency Regulations §354.38, the GSAs assessed the existing groundwater level monitoring network and determined that the proposed network has sufficient coverage for groundwater sustainability planning relative to the criteria provided in DWR's GSP and CASGEM guidance (DWR, 2016d, 2010). Sections 5.2.3 and 5.3.1 present the analysis of the monitoring network and how it attains the monitoring network objectives with the current wells. To summarize, the spatial extent of the monitoring network is deemed sufficient because:

- The current monitoring network has a much higher density (see Section 5.3.1) than that recommended by the DWR BMPs (2016b).
- The existing wells are located in and around areas with most of the groundwater production (the primary outflow from the basin). As such, monitoring and managing groundwater levels and quality at these wells will allow for the Basin to be managed sustainably. The existing monitoring wells have historically met the needs of Camrosa WD, FCGMA, and VCWPD relative to their objectives for monitoring groundwater conditions.
- Areas (for example in the east and along the western boundary of the Basin) where monitoring wells do not exist or are currently not monitored are areas with minimal water budget contributions (including groundwater pumping) with no known undesirable results.

While no significant data gaps in the spatial coverage of the existing monitoring network have been identified, there are some data gaps in the depth information. For example, three of the proposed monitoring wells do not have screen information, and all of the monitoring wells require accurate reference elevations to be determined to correctly calculate groundwater levels. These data gaps will be addressed through surveys to measure the reference elevation and assess screen information. A single private domestic well exists in the eastern portion of the Basin. Groundwater levels or quality are not available at this well. The GSAs will reach out to the domestic well owner and assess the ability to collect groundwater levels and/or quality. Alternatively, the GSAs may periodically contact the well owner to check on groundwater conditions and any potential impacts on beneficial use of groundwater.

In addition to the data gaps discussed above, uncertainties in the HCM and numerical model exist that may be reduced through additional data collection and monitoring in the future. These uncertainties include inflows from the Conejo volcanics (especially from the east), boundary conditions and underflows from (or to) the Pleasant Valley Basin, and depletions of ISW. As such, the existing monitoring network may be augmented in the future by a) including monitoring at existing wells that are currently not actively monitored, or b) additional monitoring wells in areas with variable groundwater conditions or potential adverse impacts to beneficial uses and users (as enumerated under GSP Emergency Regulations §354.38 (e)) in the future. Monitoring existing wells (where this is feasible) is a low-cost option to augment and expand the current monitoring network.

5.4 Groundwater Storage Monitoring Network [§354.34(e),(g)(3),(h), and (j)]

§354.34 Monitoring Network.
(e) *A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.*
(g) *Each Plan shall describe the following information about the monitoring network:*
(3) *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*
(h) *The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.*
(j) *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.*

As noted in DWR's (2016b) BMPs for monitoring networks, changes in groundwater storage are not a directly measurable condition. Rather, estimation of changes in groundwater storage relies on collection of accurate groundwater levels. Measured groundwater-level changes can then be used in conjunction with numerical or analytical models to calculate changes in storage based on aquifer thickness, specific yield and/or storage coefficient, and hydraulic connectivity (DWR, 2016b). A calibrated numerical model has been developed for the ASRVGB (Appendix G) and has been used to estimate groundwater budget components, including change in storage. Therefore, the "groundwater storage monitoring network" consists of the groundwater level monitoring network (described above in Section 5.3) used in conjunction with the numerical model to assess Basin storage and the change therein.

5.4.1 Attainment of Monitoring Objectives and Other Requirements [§354.34(c)(2) and (g)(1)]

§354.34 Monitoring Network.
(c) *Each monitoring network shall be designed to accomplish the following for each sustainability indicator:*
(2) *Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.*
(g) *Each Plan shall describe the following information about the monitoring network:*
(1) *Scientific rationale for the monitoring site selection process.*

The reduction of groundwater storage monitoring network design criterion provided in GSP Emergency Regulations §354.34(c)(2) is to provide an estimate of the change in annual storage. As noted in Section 5.3, static groundwater levels will be measured at least quarterly to achieve the overall monitoring objectives described in Section 5.2, and additionally to estimate annual change in groundwater in storage.

5.4.2 Data and Reporting Standards [§354.34(g)(2)]

§354.34 Monitoring Network.
(g) *Each Plan shall describe the following information about the monitoring network:*
(2) *Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.*

The data and reporting standards for groundwater storage monitoring are identical to those for groundwater level monitoring because groundwater levels are used to estimate groundwater in storage.

5.4.3 Monitoring Protocols [§354.34(i)]

§354.34 Monitoring Network.
(i) *The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.*

The monitoring protocols for groundwater storage monitoring are identical to those for groundwater levels monitoring (Section 5.3.2) because groundwater levels will be used to estimate aquifer storage.

5.4.4 Assessment and Improvement of Monitoring Network [§354.38(a),(b),(c)(1),(c)(2),(d),(e)(1),(e)(2),(e)(3), and (e)(4)]

§354.38 Assessment and Improvement of Monitoring Network.
(a) *Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.*
(b) *Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.*
(c) *If the monitoring network contains data gaps, the Plan shall include a description of the following:*
(1) *The location and reason for data gaps in the monitoring network.*
(2) *Local issues and circumstances that limit or prevent monitoring.*
(d) *Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.*
(e) *Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:*
(1) *Minimum threshold exceedances.*
(2) *Highly variable spatial or temporal conditions.*
(3) *Adverse impacts to beneficial uses and users of groundwater.*
(4) *The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.*

Assessment and potential improvements of the monitoring network for groundwater storage are identical to those for groundwater level monitoring (Section 5.3.4) because groundwater levels are used to estimate aquifer storage.

5.5 Seawater Intrusion Monitoring Network [§354.34(e),(g)(3),(h), and (j)]

§354.34 Monitoring Network.
(e) *A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.*
(g) *Each Plan shall describe the following information about the monitoring network:*
(3) *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*
(h) *The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.*
(j) *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.*

As was described in Sections 3.2.3 and 4.6, the seawater intrusion sustainability indicator was determined to be not applicable to ASRVGB. Therefore, a monitoring network for seawater intrusion is not required.

5.6 Degraded Water Quality Monitoring Network [§354.34(e),(g)(3),(h), and (j)]

§354.34 Monitoring Network.
(e) *A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.*
(g) *Each Plan shall describe the following information about the monitoring network:*
(3) *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*
(h) *The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.*
(j) *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.*

Table 5.6-01 summarizes information regarding depth, sampling frequency, and purpose of the 14 wells in ASRVGB that have been regularly sampled for water quality analysis. These wells are referred to as the “existing groundwater quality monitoring network.” Well locations are shown on Figure 5.6-01. Inspection of Table 5.6-01 indicates that most (11) existing groundwater quality monitoring sites are screened in the upper or lower groundwater production zones, and three have unknown screen intervals.

Five groundwater quality monitoring sites are public water supply wells, which are sampled according to schedules set forth by the California Division of Drinking Water requirements for general mineral and other parameters (Table 5.6-01). The remaining groundwater quality monitoring sites are agricultural wells sampled by VCWPD and Camrosa on an annual basis, subject to access. All wells are sampled for parameters relevant to the degraded water quality SMC (TDS, sulfate, chloride, boron, nitrate, and TCP [Camrosa water supply wells only]) among other analytes useful for tracking water quality (i.e., common ions, etc.).

The GSAs for the Basin have budgeted to coordinate more frequent sampling than required by California Division of Drinking Water at select wells to ensure adequate data are obtained for evaluating groundwater quality conditions relative to the degraded water quality SMC. In addition, any future monitoring sites identified for groundwater level monitoring network will be incorporated into the groundwater quality monitoring network, as possible. These new wells will be sampled for general minerals annually, subject to access.

5.6.1 Attainment of Monitoring Objectives and Other Requirements [§354.34(c)(4) and (g)(1)]

§354.34 Monitoring Network.
(c) *Each monitoring network shall be designed to accomplish the following for each sustainability indicator:*
(4) *Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.*
(g) *Each Plan shall describe the following information about the monitoring network:*
(1) *Scientific rationale for the monitoring site selection process.*

In accordance with GSP Emergency Regulations §354.34(b) and (d) the groundwater quality monitoring sites were selected based on available preexisting monitoring sites maintained by Camrosa and VCWPD using scientific judgment to demonstrate progress toward:

1. achieving measurable objectives described in the GSP,
2. monitoring impacts to the beneficial uses and users of groundwater,
3. monitoring changes in groundwater conditions relative to measurable objectives and minimum thresholds, and
4. providing adequate coverage of sustainability indicators.

Pursuant to GSP Emergency Regulations §354.34(c)(4), the groundwater quality monitoring network sites have been selected to provide sufficient spatial and temporal data from the upper and lower groundwater production zones for both management areas, and the Conejo volcanic bedrock to determine groundwater quality trends. The groundwater quality monitoring wells are considered to provide sufficient density for the following scientific and practical reasons consistent the key Basin-specific monitoring network design factors discussed in Section 5.2:

- The groundwater quality monitoring sites were selected to provide monitoring of groundwater quality in the proximity of where the majority of groundwater extraction occurs.
- The groundwater quality monitoring sites were selected to provide coverage across the Basin to monitor groundwater quality along the regional groundwater flow direction over time.

Additional factors considered during selection of the groundwater quality monitoring sites include:

1. To the extent practicable, existing wells have been used as monitoring sites to avoid the cost and public nuisance associated with drilling new wells.
2. From a scientific perspective, monitoring sites were selected to provide data in areas where groundwater flow into the Basin is conceptualized to come from the Conejo volcanic bedrock, to assess the sources of groundwater contamination.
3. DWR's BMPs for developing monitoring networks (2016b) cites guidance stating that the density of monitoring wells should be 6.3 wells per 100 square miles (mi^2) (Sophocleous, 1983) to 4.0 wells per 100 mi^2 (Hopkins, 1994; applies to basins with groundwater extractions of more than 10,000 AF per 100 mi^2). In the groundwater-producing zones of the FCGMA management area in the ASRVGB Basin (which has an area of approximately 1.7 mi^2), there are 2 existing monitoring wells (density of ~118 wells per 100 mi^2). In the groundwater-producing zones of the ASRGSA management area in the ASRVGB Basin (which has an area of approximately 4.4 mi^2), there are 12 existing monitoring wells (density of ~273 wells per 100 mi^2). Therefore, the density of monitoring sites in the existing water quality monitoring network for each management area far exceeds the BMP recommendation by DWR.

5.6.2 Data and Reporting Standards [§354.34(g)(2)]

§354.34 Monitoring Network.
(g) *Each Plan shall describe the following information about the monitoring network:*
(2) *Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.*

The groundwater quality monitoring sites are generally consistent with applicable data and reporting standards set forth in GSP Emergency Regulations §352.4. Exceptions to the standards are described below:

- Three groundwater quality monitoring wells do not have well screen information.

5.6.3 Monitoring Protocols [§354.34(i)]

§354.34 Monitoring Network.
(i) *The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.*

Camrosa and VCWPD collect groundwater quality data from wells in the ASRVGB in general conformance with the DWR's BMPs for monitoring protocols, standards, and sites (2016c). Camrosa must meet United States Environmental Protection Agency and California Division of Drinking Water standards for municipal water supply; data and reporting standards for groundwater quality sampling at their municipal water-supply wells typically exceed the recommended standards described in DWR's BMPs (2016c). The key DWR "standardized protocols" for groundwater quality sampling are provided in the referenced guidance document (DWR, 2016c), and are not repeated in this GSP.

5.6.4 Assessment and Improvement of Monitoring Network [§354.38(a),(b),(c)(1),(c)(2),(d),(e)(1),(e)(2),(e)(3), and (e)(4)]

§354.38 Assessment and Improvement of Monitoring Network.
(a) *Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.*
(b) *Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.*
(c) *If the monitoring network contains data gaps, the Plan shall include a description of the following:*
(1) *The location and reason for data gaps in the monitoring network.*
(2) *Local issues and circumstances that limit or prevent monitoring.*
(d) *Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.*
(e) *Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:*
(1) *Minimum threshold exceedances.*
(2) *Highly variable spatial or temporal conditions.*
(3) *Adverse impacts to beneficial uses and users of groundwater.*
(4) *The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.*

Similar to the groundwater level monitoring network, the groundwater quality monitoring network has sufficient spatial coverage to allow for the Basin to be managed towards the sustainability goal. The adequacy, data-gaps, and uncertainty in the groundwater quality monitoring network is very similar to the groundwater level network discussed in Section 5.3.4 due to both monitoring networks sharing most of the same wells. An additional issue identified for the groundwater quality monitoring network is the sampling frequency. Five groundwater quality monitoring sites are public water supply wells, which are sampled according to schedules set forth by the California Division of Drinking Water requirements for general mineral and other parameters (Table 5.6-01). In some cases, the Division of Drinking Water-required sampling frequency may be once every 2 to 3 years. The GSAs for the Basin budgeted to coordinate more frequent sampling than required by Division of Drinking Water to ensure at least one sample is collected per year from each monitoring well (Table 5.6-01). This will ensure that adequate data are obtained for evaluating groundwater quality conditions relative to the degraded water quality SMC.

Note, any existing or new wells added to the groundwater level monitoring network in the future will also be included in the groundwater quality monitoring network (and vice versa), if feasible.

5.7 Land Subsidence Monitoring Network [§354.34(e),(g)(3),(h), and (j)]

> **23 Cal. Code Regs. §354.34 Monitoring Network**.
> ***(e)*** *A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.*
> ***(g)*** *Each Plan shall describe the following information about the monitoring network:*
> ***(3)*** *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*
> ***(h)*** *The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.*
> ***(j)*** *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.*

As described in Section 3.2.5 Land Subsidence, no land subsidence has been documented historically in the Basin and there is a low estimated potential for inelastic land subsidence. Despite these factors, sustainable management is prudent because groundwater levels could decline below historical levels and trigger inelastic land subsidence if actual future conditions differ significantly from those assumed in the projected water budget analysis. Therefore, InSAR data will be monitored to detect land surface elevation changes when groundwater levels are below historical lows (Section 4.8).

5.7.1 Attainment of Monitoring Objectives and Other Requirements [§354.34(c)(5) and (g)(1)]

> **§354.34 Monitoring Network**.
> ***(c)*** *Each monitoring network shall be designed to accomplish the following for each sustainability indicator:*
> ***(5)*** *Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.*
> ***(g)*** *Each Plan shall describe the following information about the monitoring network:*
> ***(1)*** *Scientific rationale for the monitoring site selection process.*

The land subsidence monitoring network design criterion provided in GSP Emergency Regulations §354.34(c)(5) is to identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate methods. Using groundwater levels as a proxy for inelastic land subsidence is an appropriate method because it is mentioned in the GSP Emergency Regulations (§354.36(b)) and because the sustainability goal of no measurable inelastic land subsidence due to groundwater extractions is directly correlated with maintaining groundwater levels above historical low levels. Declining groundwater levels (typically resulting from groundwater extractions) are one potential cause for land subsidence in California, especially when groundwater levels decline below historical lows (Sneed et al., 2013). However, after fine-grained sediments have been compacted during an episode of historically low groundwater levels, there is low probability of additional subsidence unless groundwater elevations decline further—specifically, below the previous historical lows (DWR, 2014). For these reasons, the groundwater level monitoring network will be used to attain the monitoring objectives for the land subsidence monitoring network, with InSAR as an additional tool.

5.7.2 Data and Reporting Standards [§354.34(g)(2)]

§354.34 Monitoring Network.
(g) *Each Plan shall describe the following information about the monitoring network:*
(2) *Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.*

The data and reporting standards for land subsidence monitoring are identical to those for groundwater level monitoring since groundwater levels will be used as a proxy for indicating potential onset of land subsidence. InSAR data acquired from DWR will be reported to an accuracy of at least 0.1 ft relative to North American Vertical Datum of 1988 (NAVD88): 0.1 ft is the total estimated error due to measurement. DWR has stated that on a statewide level for the total vertical displacement measurements between June 2015 and June 2018, the errors are as follows (Paso Robles GSA, 2020):

1. The error between InSAR data and continuous GPS data is 16 mm (0.052 ft) with a 95% confidence level, and
2. The measurement accuracy when converting from the raw InSAR data to the maps provided by DWR is 0.048 ft with 95% confidence level.

Therefore, a land surface change of less than 0.1 ft is within the noise of the data collection and processing and is considered equivalent to no measurable subsidence in this GSP. The InSAR data will be compared with groundwater level data to analyze the rate of ground position decline with variation in groundwater levels to determine subsidence in relation to groundwater levels or extraction rates. Results will be mapped, graphed, and reported consistent with standards described in GSP Emergency Regulations (§352.4 (d)), and provided with the GSP updates.

5.7.3 Monitoring Protocols [§354.34(i)]

23 Cal. Code Regs. §354.34 Monitoring Network.
(i) *The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.*

The monitoring protocols for land subsidence monitoring are identical to those for groundwater level monitoring, as groundwater levels will be used as a proxy for indicating potential onset of land subsidence. InSAR data for the Basin will be acquired from DWR from their SGMA Data Viewer web-based GIS viewer (DWR, 2022), and reviewed.

5.7.4 Assessment and Improvement of Monitoring Network [§354.38(a),(b),(c)(1),(c)(2),(d),(e)(1),(e)(2),(e)(3), and (e)(4)]

§354.38 Assessment and Improvement of Monitoring Network.

(a) *Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.*

(b) *Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.*

(c) *If the monitoring network contains data gaps, the Plan shall include a description of the following:*

- ***(1)*** *The location and reason for data gaps in the monitoring network.*
- ***(2)*** *Local issues and circumstances that limit or prevent monitoring.*

(d) *Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.*

(e) *Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:*

- ***(1)*** *Minimum threshold exceedances.*
- ***(2)*** *Highly variable spatial or temporal conditions.*
- ***(3)*** *Adverse impacts to beneficial uses and users of groundwater.*
- ***(4)*** *The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.*

Assessment and potential improvements of the monitoring network for land subsidence are identical to those for groundwater level monitoring since groundwater levels are used as a proxy for indicating potential onset of land subsidence.

The GSAs have assessed the available InSAR data for the Basin and have considered it generally suitable for estimating land subsidence in the case that groundwater levels are below the historical low. There are some minor gaps in InSAR raster coverage (see Figure 3.2-07) but will not significantly impact the interpolation of the InSAR land displacement.

5.8 Depletions of Interconnected Surface Water Monitoring Network [§354.34(e),(g)(3),(h), and (j)]

§354.34 Monitoring Network.
(e) *A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.*
(g) *Each Plan shall describe the following information about the monitoring network:*
(3) *For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.*
(h) *The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.*
(j) *An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.*

As discussed in Section 3.2.6, the Arroyo Conejo/Conejo Creek and groundwater interactions vary with time and location in the Basin. Surface water gaging stations and the numerical groundwater model are required to fully assess depletions of ISW and to prevent undesirable results (Section 4.9.1). The monitoring network for the depletions of ISW sustainability indicator includes the following elements:

- **Surface Water Gages:** Two active surface water flow gages (gage 800 and Confluence Flume) are maintained by other entities (CCWTMP and Hill Canyon WWTP) (GSP Emergency Regulations §354.34(c)(6)(B)) (Figure 5.8-01 and Table 5.8-01): gage 800 provides continuous monitoring of streamflow for the Conejo Creek outflow from the Basin and the Confluence Flume provides streamflow data for the Arroyo Conejo during the summer months. Arroyo Conejo and Conejo Creek are part of the same surface water system and are a continuous source of streamflow infiltration into the Basin due to effluent from the Hill Canyon WWTP and surface water outflows from the Conejo Valley to the south. There are no surface water gages for the Arroyo Santa Rosa and its tributary in the eastern area of the Basin, due to their ephemerality and disconnection from groundwater (see Section 3.2.6).
- **Groundwater Level Monitoring:** At locations where interconnection exists, the surface water is interconnected with shallow groundwater. Wells in the Basin do not extract water from the shallow groundwater system. Therefore, monitoring of shallow groundwater levels is not necessary to demonstrate sustainable management of the Basin. If future wells extract shallow groundwater, then shallow groundwater monitoring may be warranted at that point in time. The existing surface water data along with the numerical model is deemed sufficient to evaluate streamflow depletions under historical and current conditions, which were not seen to be causing any undesirable results. This monitoring network will be evaluated during every 5-year GSP assessment, and shallow groundwater monitoring may be included in future revisions to the Plan, if warranted.

5.8.1 Attainment of Monitoring Objectives and Other Requirements [§354.34(c)(6)(A),(c)(6)(B),(c)(6)(C),(c)(6)(D), and (g)(1)]

§354.34 Monitoring Network.
(c) *Each monitoring network shall be designed to accomplish the following for each sustainability indicator:*
(6) *Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:*
(A) *Flow conditions including surface water discharge, surface water head, and baseflow contribution.*
(B) *Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.*
(C) *Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.*
(D) *Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.*
(g) *Each Plan shall describe the following information about the monitoring network:*
(1) *Scientific rationale for the monitoring site selection process.*

Pursuant to GSP Emergency Regulations §354.34(c)(6)(A) and §354.34(g), the surface water gage sites have been selected to measure surface water inflows and outflows to and from the Basin and groundwater-surface water interaction within the portions of the Basin where ISW occurs. The existing surface water flow monitoring sites provide sufficient coverage of surface water discharge, surface water stage, and baseflow contribution:

- **Key Surface Water Flows into the Basin:** The Confluence Flume monitors surface water flow into the Basin at the upstream location of Arroyo Conejo under baseflow conditions, typically from June to September. Arroyo Conejo is a continuous (i.e., year-round) source of streamflow infiltration for the Basin, due to effluent from the Hill Canyon WWTP and surface water outflows from the Conejo Valley to the south. The GSAs will evaluate increasing the duration of measurements to include the entire year, if feasible.
- **Surface Water Exiting the Basin:** gage 800 monitors surface water flow existing the ASRVGB at a daily frequency throughout the year.
- **Surface water stage and baseflow contribution:** Consistent with GSP Emergency Regulations §354.34(c)(6)(A), all surface water gages monitor discharge and stage (surface water level); gage 800 is designed to address both stormflow and baseflow, while the Confluence Flume is designed to address baseflow during summer months.

GSP Emergency Regulations §354.34(c)(6)(B) and §354.34(g) are not applicable to Arroyo Conejo and Conejo Creek because they are a perennial stream system, as described above.

Pursuant to GSP Emergency Regulations §354.34(c)(6)(C) and §354.34(g), the monitoring network is designed to quantify temporal changes in conditions due to variations in stream discharge and regional groundwater extraction. The gages are spaced along Arroyo Conejo and Conejo Creek to characterize variations in stream inflows to and outflows from the Basin (Figure 5.8-01).

5.8.2 Data and Reporting Standards [§354.34(g)(2)]

§354.34 Monitoring Network.
(g) *Each Plan shall describe the following information about the monitoring network:*
(2) *Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.*

Existing streamflow gages comply with applicable GSP Emergency Regulations §352.4 requirements (Table 5.8-01).

5.8.3 Monitoring Protocols [§354.34(i)]

§354.34 Monitoring Network.
(i) *The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.*

Streamflow gaging will be conducted in accordance with DWR's BMPs for measuring streamflow (DWR, 2016c).

5.8.4 Assessment and Improvement of Monitoring Network [§354.38(a),(b),(c)(1),(c)(2),(d),(e)(1),(e)(2),(e)(3), and(e)(4)]

§354.38 Assessment and Improvement of Monitoring Network.
(a) *Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.*
(b) *Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.*
(c) *If the monitoring network contains data gaps, the Plan shall include a description of the following:*
(1) *The location and reason for data gaps in the monitoring network.*
(2) *Local issues and circumstances that limit or prevent monitoring.*
(d) *Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.*
(e) *Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:*
(1) *Minimum threshold exceedances.*
(2) *Highly variable spatial or temporal conditions.*
(3) *Adverse impacts to beneficial uses and users of groundwater.*
(4) *The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.*

Pursuant to GSP Emergency Regulations §354.38, the GSAs have assessed the existing surface water monitoring network and determined that combined with the numerical model it has sufficient spatial coverage to assess depletions of ISW within the range of historical and current conditions. Future depletions will be assessed by comparing inflows at the Confluence Flume with outflows at gage 800 along with the numerical model to evaluate ISW and quantify depletions.

At locations where interconnection exists, the surface water is interconnected with shallow groundwater. Wells in the Basin do not extract water from the shallow groundwater system. Therefore, monitoring of shallow groundwater levels is not necessary to demonstrate sustainable management of the Basin. If future wells extract shallow groundwater, then shallow groundwater monitoring may be warranted at that point in time. The existing surface water data along with the numerical model is deemed sufficient to evaluate streamflow depletions under historical and current conditions, which were not seen to be causing any undesirable results. This monitoring network will be evaluated during every 5-year GSP assessment, and shallow groundwater monitoring may be included in future revisions to the Plan, if warranted.

5.9 Representative Monitoring Sites [§354.36(a),(b)(1),(b)(2), and (c)]

§354.36 Representative Monitoring. *Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:*

(a) *Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.*

(b) *Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:*

- ***(1)*** *Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.*
- ***(2)*** *Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.*

(c) *The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.*

At present, the GSAs plan to use data collected from all of the monitoring sites described in Sections 5.3 and 5.6 to monitor relevant groundwater sustainability indicators in the Basin and are not currently designating a subset of monitoring sites as representative of conditions in the Basin.

5.10 Reporting Monitoring Data to the Department (Data Management System) [§354.40]

§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.*

Pursuant to §352.6, monitoring data will be stored in the DMS. Data will be transmitted to DWR with the GSP, annual reports, and GSP updates electronically on the forms provided by DWR. Information concerning the DMS is provided in Appendix L.

6.0 Projects and Management Actions [Article 5, SubArticle 5]

6.1 Introduction [§354.42 and §354.44(a),(b)(2),(b)(9),(c), and (d)]

§354.42 Introduction to Projects and Management Actions. *This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.*

§354.44 Projects and Management Actions

(a) *Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.*

(b) *Each Plan shall include a description of the projects and management actions that include the following:*

(2) *If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.*

(9) *A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.*

(c) *Projects and management actions shall be supported by best available information and best available science.*

(d) *An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.*

This section describes projects and management actions that ASRGSA and FCGMA (the two GSAs for the Basin) have included in the plan to ensure the sustainability goal (Section 4.2) is met and to address the additional plan elements identified in Section 2.2.4. Determination of the projects and management actions is based on the best available science and information and accounts for the level of uncertainty associated with the Basin setting (Section 3).

The GSP Emergency Regulations specifically require the inclusion of projects or management actions to address the following:

- **Overdraft (§354.44(b)(2)):** A description of the projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft, if any overdraft condition is identified through the analysis required by §354.18.
- **Drought Offset Measures §354.44(b)(9):** A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.

As described in Section 3.3.4, the Basin does not currently appear to be in an overdraft condition; therefore, projects or management actions to address overdraft are not required. As described in Section 3.2.6, the Arroyo Conejo and Conejo Creek surface water system is perennial due to a constant source of water from the Hill Canyon WWTP effluent and additional surface water flow from the North and South Fork Arroyo Conejo streams that drain Conejo Valley. A primary inflow component for the ASRVGB is infiltration from Arroyo Conejo-Conejo Creek and the relatively constant baseflows provide a reliable source of inflows for the Basin during droughts (Section 3.3.1); therefore, projects or management actions are not needed to raise groundwater levels and storage following droughts. The need for projects to address any overdraft or drought offset will be evaluated no less frequently than every 5 years, as required by SGMA.

The need for projects and management actions was also guided by analysis of the sustainability indicators:

- **Seawater Intrusion:** As described in Section 3.2.3, seawater intrusion is not an applicable sustainability indicator for the Basin; therefore, projects or management actions to address this sustainability indicator are not needed.
- **Land Subsidence:** Section 3.2.5 describes reported land surface displacement and there is no indication of land subsidence due to groundwater withdrawal within the ASRVGB; therefore, projects or management actions are not needed to address this sustainability indicator.
- **Other Sustainability Indicators:** As described in Sections 4.4, 4.5, 4.7, and 4.9, historical data and the modeling projections indicate that the measurable objectives for the chronic lowering of groundwater levels, reduction of groundwater storage, degraded water quality, and depletions of ISW sustainability indicators will be met without the need for projects or management actions.

Additional considerations for inclusion of projects and management actions included:

- **Compliance with GSP Emergency Regulations:** As described in Section 5.3.2, there are monitoring sites that do not meet the data and reporting standards set forth in GSP Emergency Regulations §352.4. The Groundwater Monitoring Network Enhancement Project is included to address the deficiencies identified for the monitoring network (monitoring well surveying and determination of well construction details).
- **Address Uncertainty:** As described in Sections 3.1.3 and 3.1.4, the GSAs desire to voluntarily enhance the groundwater levels and quality monitoring networks with additional monitoring sites, where feasible and not cost-prohibitive. The Groundwater Monitoring Network Enhancement Project is included to identify opportunities to enhance the groundwater levels and quality monitoring networks via existing wells, where possible.
- **Improve Groundwater Quality:** Additional projects are included to meet the sustainability goal to improve water quality for the Basin: Water Quality Management Coordination Project and the Arroyo Santa Rosa Basin Desalter Project.
- **Increase Basin Yield and Reduce Reliance on Imported Water:** Additional projects are included to increase the basin yield and, thereby, decrease reliance on imported water: Arroyo Santa Rosa Basin Desalter Project and the Arroyo Santa Rosa Basin Recharge Project.

6.2 Groundwater Monitoring Network Enhancement Project [§354.44(b)(1) and (d)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(1) *A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent.*
(d) *An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.*

The Groundwater Monitoring Network Enhancement Project will consist of two phases: (1) a survey of the monitoring network wells within the Basin to address GSP Emergency Regulations §352.4 monitoring network data and reporting standards, and (2) research of areas of limited coverage to assess the expansion of the monitoring network using existing wells.

The survey of the monitoring network wells will be designed to collect information about well construction (well depth, screen interval, casing diameter, reference point information, etc.) and a GPS survey to collect the spatial coordinates, and casing and reference point elevations. There are three wells within the monitoring network which have unknown screen intervals and none of the wells within the network have reference point information (see Section 5.3; Table 5.3-01). Of the three wells with unknown screen intervals, two are agricultural wells and one is a public supply well, and the project assumes the pumps will need to be pulled in order to verify the construction details of the well (using down-hole video equipment) to satisfy the requirements for monitoring network data and reporting standards.

The research for additional wells to expand the monitoring network will initially consist of a desktop assessment identifying candidate existing wells based on location and well construction information, including the collection and review of available well documentation. Access agreements with the well owner to access, inspect, and monitor the well will then be pursued if the well is deemed adequate to add to the monitoring network. Wells added to the monitoring network will be verified and surveyed for GPS spatial coordinates, elevation, and any additional well construction information. This phase of the project may require down-hole videos, which could involve pulling the pumps for any wells identified without well construction information.

6.2.1 Relevant Measurable Objective(s) [§354.44(b)(1)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(1) *A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent.*

The relevant measurable objective for the Groundwater Monitoring Network Enhancement Project is the measurable objective for the chronic lowering of groundwater levels, reduction of groundwater storage, degradation of water quality, and land subsidence sustainability indicators.

6.2.2 Implementation Triggers [§354.44(b)(1)(A)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(1) *The Plan shall include the following:*
(A) *A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.*

The implementation trigger for addressing the well survey and well construction information needs is GSP Emergency Regulations §352.4(b) and (c) monitoring network data and reporting standards. Pursuit of additional monitoring wells is a voluntary action and will be triggered at the discretion of the GSAs.

6.2.3 Public Notice Process [§354.44(b)(1)(B)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(1) *The Plan shall include the following:*
(B) *The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.*

The GSAs will continue to follow the SEP (Appendix D) to inform the public about progress implementing the Groundwater Monitoring Network Enhancement Project.

6.2.4 Permitting and Regulatory Process [§354.44(b)(3)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(3) *A summary of the permitting and regulatory process required for each project and management action.*

No permits or regulatory approvals are required to implement the Groundwater Monitoring Network Enhancement Project.

6.2.5 Implementation Timeline [§354.44(b)(4)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(4) *The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.*

The Groundwater Monitoring Network Enhancement Project is anticipated to be completed during the first 5-year GSP assessment period (i.e., before 2028).

6.2.6 Anticipated Benefits [§354.44(b)(5)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(5) *An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.*

The Groundwater Monitoring Network Enhancement Project will ensure compliance with GSP Emergency Regulations §352.4 monitoring network data and reporting standards and reduce uncertainty in the monitoring of groundwater conditions in the Basin. Benefits will be measured by the number of existing monitoring network sites brought into compliance with GSP Emergency Regulations §352.4 and the number of monitoring sites added to the monitoring networks.

6.2.7 Implementation Approach [§354.44(b)(6)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(6) *An explanation of how the project or management action will be accomplished. If the project or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.*

The Groundwater Monitoring Network Enhancement Project will be implemented by the GSAs and/or consultants through a focused outreach effort to the well owners in the Basin.

6.2.8 Legal Authority [§354.44(b)(7)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(7) *A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.*

The GSAs will rely on the authority provided for under SGMA to conduct the Groundwater Monitoring Network Enhancement Project.

6.2.9 Cost & Funding [§354.44(b)(8)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(8) *A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.*

The estimated total cost for the Groundwater Monitoring Network Enhancement Project is $180,000 over 5 years and is included in the Projects and Management Actions in Section 7.1.6. The first phase of the project assumes $20,000 per well to pull pumps and conduct down-hole video surveys, and $10,000 in additional costs for the land survey, administrative, field supervision, and project management ($70,000 subtotal). The second phase of the project assumes at least 5 additional wells are located and would require down-hole surveys and pump pulling ($20,000 per well, with $15,000 in additional costs;

$110,000 subtotal). The Groundwater Monitoring Network Enhancement Project will be funded by the GSAs through their available funding mechanisms, unless grant funding is available.

6.3 Water Quality Management Coordination Project [§354.44(b)(1) and (d)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(1) *A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent.*
(d) *An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.*

The Water Quality Management Coordination Project will consist of coordinating with and supporting the actions of other entities in their efforts to manage and improve groundwater quality in the Basin, and engaging where there is overlap between the entities' efforts and the GSAs' sustainability goal for the Basin. The existing water quality monitoring programs (i.e., Camrosa and Ventura County; see Section 5.6) are expected to cover most of the efforts to manage and improve the water quality for the Basin but ongoing coordination with other entities is an important aspect of the GSP implementation. The GSAs intend to coordinate with the following entities:

- **Camrosa Water District:** Camrosa WD performs a significant portion of the groundwater quality monitoring in the Basin and manages the quality of water delivered for the potable and non-potable uses in the Basin through blending. Importantly, Camrosa WD is investigating the feasibility of constructing the Arroyo Santa Rosa Basin Desalter Project, which would remove salts and nitrate from the Basin and improve groundwater quality over time.
- **Ventura County (Land Use):** Ventura County Planning Division's Non-Coastal Zoning Ordinance (Ventura County, 2022) sets standards for dwellings within groundwater Impact Areas for the Basin to limit water quality impacts from septic systems. Additional standards for Animal Husbandry/Keeping and Waste handling (i.e., composting) are included in the Ordinance. The VCWPD may also require a Manure Management Plan for land developments involving animal husbandry or animal boarding facilities, which includes an assessment of long-term impacts to the area groundwater quality. The primary concern is the amount of nitrate loading to the groundwater. The GSAs will coordinate with these County agencies to track the management of potential impacts. The GSAs will also coordinate with the County of Ventura on its future general plan updates.
- **Ventura County (Well Permitting):** Ventura County is the well permitting agency for the Basin. The GSAs coordinate with Ventura County to pursue destruction of improperly abandoned or constructed wells that act as conduits for migration of poor-quality water from shallow water-bearing units into the primary producing zones. The GSAs will also coordinate with Ventura County to promote well construction policies that ensure new wells are properly constructed to prevent migration of poor-quality water from shallow water-bearing units into the primary producing zones.

- **State Municipal Stormwater Program (MS4):** The MS4 program regulates stormwater discharges, including the Phase II Permit Program for municipalities less than 100,000 people and the Statewide Stormwater Permit for the State of California Department of Transportation. Ventura County is the permittee for the ASRVGB. The MS4 program is implemented and enforced by the RWQCB. The GSAs will coordinate with the permittees and RWQCB.
- **Total Maximum Daily Loads:** TMDL monitoring of surface water within the Basin is currently coordinated by the CCWTMP. The GSAs will coordinate with the CCWTMP to ensure monitoring and compliance during plan implementation.
- **Ventura County Agricultural Irrigated Lands Group:** The GSAs will coordinate with Ventura County Agricultural Irrigated Lands Group concerning efforts to manage salt and nutrient loading to the Basin.
- **City of Thousand Oaks:** The GSAs will coordinate with the City of Thousand Oaks concerning the quality of surface water entering the Basin from the City in Arroyo Conejo.

6.3.1 Relevant Measurable Objective(s) [§354.44(b)(1)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(1)*** *A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent.*

The relevant measurable objective for the Water Quality Management Coordination Project is the measurable objectives for constituents identified for the degradation of water quality sustainability indicator. Although SMC have been established for the degradation of water quality sustainability indicator, water quality is not impacted by groundwater pumping operations (see Section 4.7).

6.3.2 Implementation Triggers [§354.44(b)(1)(A)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(1) (A)*** *A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.*

The Water Quality Management Coordination Project is a voluntary action and will be triggered at the discretion of the GSAs.

6.3.3 Public Notice Process [§354.44(b)(1)(B)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(1) (B)*** *The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.*

The GSAs will continue to follow the adopted SEP (Appendix D) to inform the public about progress implementing the Water Quality Management Coordination Project.

6.3.4 Permitting and Regulatory Process [§354.44(b)(3)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(3)*** *A summary of the permitting and regulatory process required for each project and management action.*

No permits or regulatory approvals are required to implement the Water Quality Management Coordination Project.

6.3.5 Implementation Timeline [§354.44(b)(4)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(4)*** *The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.*

The Water Quality Management Coordination Project will be completed during the first 5-year GSP assessment period (i.e., before 2028).

6.3.6 Anticipated Benefits [§354.44(b)(5)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(5)*** *An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.*

The Water Quality Management Coordination Project will benefit beneficial users and property interests in the Basin by promoting actions by agencies with regulatory authority to address water quality that ultimately leads to improvement of groundwater quality. Benefits will be evaluated by documenting coordination efforts with the entities listed in Section 6.3.

6.3.7 Implementation Approach [§354.44(b)(6)]

§354.44 Projects and Management Actions. ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:* ***(6)*** *An explanation of how the project or management action will be accomplished. If the project or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.*

The Water Quality Management Coordination Project will be implemented by the GSAs and/or consultants through a focused outreach effort.

6.3.8 Legal Authority [§354.44(b)(7)]

§354.44 Projects and Management Actions. ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:* ***(7)*** *A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.*

The GSAs will rely on the authority provided for under SGMA to conduct the Water Quality Management Coordination Project.

6.3.9 Cost & Funding [§354.44(b)(8)]

§354.44 Projects and Management Actions. ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:* ***(8)*** *A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.*

The Water Quality Management Coordination Project is an ongoing effort that is estimated to cost $5,000 per year to cover communication, outreach, and coordination with other entities. The annual cost does not include any additional technical support, which needs to be scoped out on an as-needed basis. The costs are included in Section 7.1.11. The Water Quality Management Coordination Project will be funded by the GSAs through their available funding mechanisms, unless grant funding is available.

6.4 Arroyo Santa Rosa Basin Desalter Project [§354.44(b)(1) and (d)]

§354.44 Projects and Management Actions. ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:* ***(1)*** *A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent.* ***(d)*** *An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.*

As discussed in Sections 3.2.4 and 4.7, the ASRVGB groundwater has elevated nitrate and TDS concentrations, which have been managed through blending with imported water by Camrosa WD.

Currently, the Camrosa WD GAC treatment plant is being installed to remove TCP from the groundwater; however, it is not designed to reduce the concentrations of nitrate or TDS. Desalination of groundwater is a preferred water treatment that would allow Camrosa WD to discontinue their blending operations and significantly reduce their reliance on imported water (see Section 3.3.1.1.3). The Arroyo Santa Rosa Basin Desalter Project would also remove salts and nutrients from the Basin, thereby improving groundwater quality over time, which contributes to the GSP sustainability goal to "improve the groundwater quality of the ASRVGB" (Section 4.2).

The Arroyo Santa Rosa Basin Desalter Project would involve the construction and operation of a desalter treatment facility. Preliminary design work has been completed for the Salinity Management Pipeline by Calleguas MWD (Calleguas MWD, 2021) to be rerouted into the ASRVGB, which will allow for the discharge of brine waste from the desalter, if constructed. Camrosa WD is currently in the early planning stages for the desalter; therefore, the project yield and other key parameters have not yet been determined.

6.4.1 Relevant Measurable Objective(s) [§354.44(b)(1)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(1)*** *A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent.*

The relevant measurable objective for Arroyo Santa Rosa Basin Desalter Project is the degradation of water quality sustainability indicator.

6.4.2 Implementation Triggers [§354.44(b)(1)(A)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(1)*** *The Plan shall include the following:*
> ***(A)*** *A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.*

The Arroyo Santa Rosa Basin Desalter Project is a voluntary action and will be triggered at the discretion of the implementing agency or agencies.

6.4.3 Public Notice Process [§354.44(b)(1)(B)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(1)*** *The Plan shall include the following:*
> ***(B)*** *The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.*

The GSAs will continue to follow the adopted SEP (Appendix D) to inform the public about progress implementing the Arroyo Santa Rosa Basin Desalter Project.

6.4.4 Permitting and Regulatory Process [§354.44(b)(3)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(3)*** *A summary of the permitting and regulatory process required for each project and management action.*

The permits or regulatory approvals required to develop the Arroyo Santa Rosa Basin Desalter Project will be determined during preliminary design.

6.4.5 Implementation Timeline [§354.44(b)(4)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(4)*** *The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.*

A project implementation timeline will be developed as part of the current preliminary planning effort.

6.4.6 Anticipated Benefits [§354.44(b)(5)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(5)*** *An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.*

The Arroyo Santa Rosa Basin Desalter Project will benefit beneficial users and property interests in the Basin by removing salts and nutrients from groundwater in the basin. In addition, the decreased reliance on imported water for blending will result in an increased reliability of water supply for the Basin and potential savings on water delivery fees. Benefits will be evaluated by documenting the mass of salts and nutrient removed from the Basin and volume of groundwater treated.

6.4.7 Implementation Approach [§354.44(b)(6)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(6)*** *An explanation of how the project or management action will be accomplished. If the project or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.*

The Arroyo Santa Rosa Basin Desalter Project is being pursued by Camrosa WD, an ASRGSA member agency. The project is in the early planning stages. The implementation approach will be developed as part of the current planning effort.

6.4.8 Legal Authority [§354.44(b)(7)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(7) *A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.*

Camrosa WD will rely on the authority provided in the Water Code to implement the Arroyo Santa Rosa Basin Desalter Project.

6.4.9 Cost & Funding [§354.44(b)(8)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(8) *A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.*

No costs have been developed for the Arroyo Santa Rosa Basin Desalter Project. More information is required to understand how the Arroyo Santa Rosa Basin Desalter Project would be funded, but it is currently anticipated that the project will be funded via grants and Camrosa WD water rates.

6.5 Arroyo Santa Rosa Basin Recharge Project [§354.44(b)(1) and (d)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(1) *A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent.*
(d) *An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.*

Recharge basins have been considered by Camrosa WD in the past (MWH, 2013) and preliminary assessments have located potential sites and developed recharge rate estimates. The Arroyo Santa Rosa Basin Recharge Project will consist of numerical modeling and field-scale pilot testing to validate model results, followed by the construction of recharge ponds and a delivery system within the Basin. Additional information will be provided in subsequent updates during the GSP implementation on the details of this project moving forward. Camrosa WD is currently in the early planning stages for the recharge basins; therefore, the project yield and other key parameters have not yet been determined.

6.5.1 Relevant Measurable Objective(s) [§354.44(b)(1)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(1)*** *A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent.*

The relevant measurable objective for the Arroyo Santa Rosa Basin Recharge Project is the measurable objective for the chronic lowering of groundwater levels, reduction of groundwater storage, land subsidence, and degradation of water quality sustainability indicators.

6.5.2 Implementation Triggers [§354.44(b)(1)(A)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(1)*** *The Plan shall include the following:*
> ***(A)*** *A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.*

The Arroyo Santa Rosa Basin Recharge Project is a voluntary action and will be triggered at the discretion of the GSAs.

6.5.3 Public Notice Process [§354.44(b)(1)(B)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(1)*** *The Plan shall include the following:*
> ***(B)*** *The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.*

The GSAs will continue to follow the adopted SEP (Appendix D) to inform the public about progress implementing the Arroyo Santa Rosa Basin Recharge Project.

6.5.4 Permitting and Regulatory Process [§354.44(b)(3)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(3)*** *A summary of the permitting and regulatory process required for each project and management action.*

The permits or regulatory approvals required to develop the Arroyo Santa Rosa Basin Recharge Project will be determined during preliminary design.

6.5.5 Implementation Timeline [§354.44(b)(4)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(4) *The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.*

A project implementation timeline will be developed as part of the current preliminary planning effort.

6.5.6 Anticipated Benefits [§354.44(b)(5)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(5) *An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.*

The Arroyo Santa Rosa Basin Recharge Project will benefit beneficial users and property interests in the Basin by helping avoid undesirable results for groundwater levels and storage and increasing the operational yield of the Basin. Recharging the Basin may also improve groundwater quality.

6.5.7 Implementation Approach [§354.44(b)(6)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(6) *An explanation of how the project or management action will be accomplished. If the project or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.*

The Arroyo Santa Rosa Basin Recharge Project is being pursued by Camrosa WD, an ASRGSA member agency. The project is in the early planning stages. The implementation approach will be developed as part of the current planning effort.

6.5.8 Legal Authority [§354.44(b)(7)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(7) *A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.*

Camrosa WD will rely on the authority provided for in the Water Code to implement the Arroyo Santa Rosa Basin Recharge Project.

6.5.9 Cost & Funding [§354.44(b)(8)]

§354.44 Projects and Management Actions.
(b) *Each Plan shall include a description of the projects and management actions that include the following:*
(8) *A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.*

No costs have been developed for the Arroyo Santa Rosa Basin Recharge Project. It is currently anticipated that the project will be funded via grants and Camrosa WD water rates.

7.0 GSP Implementation

This section presents estimated GSP implementation costs and schedule. Please note that the costs and schedule are approximate estimates based on currently available information and will be reviewed and updated during the GSAs' annual budgeting process.

7.1 Estimate of GSP Implementation Costs [§354.6(e)]

§354.6 Agency Information. *When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:*

(e) *An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.*

This section describes the scope and estimated costs for GSP implementation. Implementation cost considerations include administration of the GSAs, outreach and engagement, coordination with water management efforts by others, monitoring, addressing data gaps, data management, planning for projects and management actions, GSP assessments, GSP updates, maintaining a prudent fiscal reserve, and other costs estimated over the GSP 20-year implementation horizon.

The following sections present estimated costs for each major expense category. The estimated costs include annual costs for ongoing activities and estimated costs for one-time activities. This approach enables calculating costs through the first GSP assessment and update to better inform the GSAs' annual and multiyear budgeting processes. Because costs are based on the best available estimates at the time of preparation, actual costs may vary from those included in the projections below. The GSAs will coordinate GSP implementation with other water management efforts in the watershed (e.g., Project No. 2, Section 6.3) to minimize duplication of effort and costs to the water users of the Basin.

The following sections describe the scope of the various GSP implementation activities. Associated costs are presented in Table 7.1-01. In general, all costs were developed using 2022 dollars and escalated by 3% per year for the remainder of the 20-year GSP implementation period. It is noted that although there are two GSAs a single budget is presented because the GSAs have not yet executed a cost-sharing agreement.

7.1.1 Agency Administration

This category includes administrative staff support, Executive Director, insurance, organizational memberships and conferences, miscellaneous supplies, and materials. The estimated costs are presented in Table 7.1-01. Administrative and accounting support is provided by the County of Ventura under contract (FCGMA) and Camrosa WD (ASRGSA). This budget category includes finance-related costs for routine accounts payable and receivable functions, financial reporting, and financial audits. Administrative costs also include annual liability insurance costs, IT services (website, e-mail, and cloud storage), and incidentals (postage, copies, etc.). Neither FCGMA nor ASRGSA own or lease any office space or office equipment. The estimated first year budget for agency administration is $50,000.

7.1.2 Legal Counsel

Legal services for the GSAs are provided under contract with County of Ventura (FCGMA) and by the Hathaway Law Firm, LLP. (ASRGSA). The first year budget is $15,000 and assumes legal review of contracts and access agreements as well as consultation on other legal matters.

7.1.3 Groundwater Management, Coordination, and Outreach

GSP implementation will require certain management and coordination activities:

- **Ongoing SGMA Outreach and Stakeholder Engagement:** Staff of each GSA will perform ongoing outreach required by SGMA concerning GSP implementation in accordance with the SEP (Appendix D).
- **Monitor and Coordinate with Local Water Management Activities:** Staff of each GSA will monitor activities of the Member Agencies, land use planning agencies, and entities with regulatory authority over water quality within the Basin.
- **SGMA Program:** Staff of each GSA will track DWR updates concerning SGMA and related programs.

This cost category also includes miscellaneous technical support that may be needed to implement the GSP that is not captured in other cost categories. The specific needs and costs are yet to be identified but it is expected, as the initial GSP implementation efforts proceed, that these needs will become evident. Examples of technical support are potential tasks such as ongoing data review (outside of annual reporting and GSP evaluation), day-to-day data management, review of funding mechanisms, development of alternative funding mechanisms (grants), and other technical issues that may arise during Plan implementation. It is envisioned that much of the work will be completed by the staff of each GSA, with support from other consultants, as needed. The first year budget is $30,000.

7.1.4 Monitoring Program

The GSAs' proposed monitoring program is presented in the monitoring section (Section 5). The monitoring program consists of the following elements:

- Groundwater Elevation Monitoring Network
- Groundwater Quality Monitoring Network
- Streamflow Monitoring Network

All monitoring is currently performed by other entities. The GSAs will continue to rely on other entities' monitoring efforts to minimize redundancy and costs. It is assumed that any new monitoring sites added such as those through the Monitoring Network Enhancement Project will be either monitored by the GSAs or incorporated into another entity's monitoring program for a fee. Thus, the budget includes assumed costs for new monitoring sites beginning in fiscal year 2024.

7.1.5 Annual Reporting

SGMA regulations require submittal of annual reports to DWR concerning GSP implementation status and basin conditions. The reporting requirements are presented in GSP Emergency Regulations §356.2. In general, the annual report must include an executive summary, description and graphical presentation of basin conditions (groundwater levels and storage), reporting of groundwater extractions, surface water supplies to the basin, total water use in the basin, and a discussion of the GSP implementation progress relative to the SMC. It is anticipated that the annual reports will be prepared by consultant support. The cost for the first annual report is anticipated to be greater than the cost for subsequent reports because the first report must be developed from scratch and will include several years of data to bridge the gap between data presented in the GSP and water year 2023/2024. The numerical groundwater model (Appendix G) will require annual updates to support the annual reporting since it is used to estimate the ISW depletion rates and change in storage for the Basin; ongoing costs for model updates are included in the annual reporting costs (Table 7.1-01). The first annual report is due in April 2024.

Ongoing costs for maintaining the SMGA-required DMS are included in the annual reporting costs (Table 7.1-01). See Section 5.10 and Appendix L for more information concerning the DMS.

7.1.6 Projects and Management Actions

As discussed in Section 4, it does not appear that any projects or management actions will be needed to meet the measurable objectives for chronic lowering of groundwater levels, groundwater storage reduction, degraded water quality, land subsidence, or depletions of ISW sustainability indictors.

As discussed in Section 5.3.4, the groundwater elevation and water quality monitoring networks will be assessed as part of GSP implementation to address GSP Emergency Regulations §352.4 monitoring network data and reporting standards. In summary, the identification of existing wells (where this is feasible) is a low-cost option to expand the current monitoring network, and incorporating additional existing wells will help improve understanding of Basin conditions and numerical model calibration. The budget includes costs to survey the existing monitoring network wells (GPS coordinates, elevation, and down-hole video surveying) and to assess additional existing wells within the Basin to enhance the monitoring network. For budgeting purposes, it is assumed these wells would be identified and added before 2028. The estimated cost to enhance the monitoring network is $180,000 in 2022 dollars and is assumed to be allocated over the first 5 years of plan implementation ($36,000 per year in 2022 dollars). The estimated cost includes access agreements, permitting, surveying, pulling pumps, down-hole videos, supervision, and project management. This approximate cost is an estimates, as there are uncertainties due to site-specific considerations, which will be updated for each annual report.

The costs for the Water Quality Management Coordination Project and coordination with Camrosa WD for the Arroyo Santa Rosa Basin Desalter and Arroyo Santa Rosa Basin Recharge Projects are included in the Groundwater Management, Coordination, and Outreach budget category (Table 7.1-01).

7.1.7 GSP Evaluations and Amendments

GSP Emergency Regulations §356.4 require GSAs to evaluate the GSP at least every 5 years and in conjunction with any GSP amendments. The initial 5-year GSP evaluation is due to DWR in 2028. It is assumed that any Plan amendments will be timed such that only one GSP evaluation will be performed per 5-year period. GSP evaluations are dependent on maintaining and updating the numerical model.

7.1.7.1 Numerical Model Updates and Simulations

The model will be an important tool to inform the evaluation of GSP implementation over time. The numerical model will require annual updates to calculate the ISW depletion and change in storage values for the annual reports and to help inform ongoing performance assessment of the SMC. The annual numerical model updates require an extension of the model time period to represent the reported water year in the annual report, which includes updates to flow rates and boundary conditions. The costs for annual numerical model updates are included in the annual reporting budget, estimated to be $10,000 per year (in 2022 dollars). In addition, prior to performing each 5-year GSP evaluation, a more extensive update to the numerical flow model will be required to continue to refine and improve the model capabilities and maintain ongoing functionality. This includes incorporating new model tools and features, updates to data, and updates to calibration. Simulations will be performed with the updated model for use during the GSA evaluation and update processes. The first model updates will incorporate new data from the enhanced groundwater monitoring network and model input data collected for each water year. Model updates will also incorporate enhancements identified during GSP implementation to evaluate potential projects and management actions. Each 5-year model update is anticipated to result in recalibration of the model. The estimated cost for each 5-year model update is $40,000 (in 2022 dollars).

7.1.7.2 GSP Evaluation

SGMA regulations require submittal of written evaluation of the GSP to DWR at least once every 5 years. The GSP evaluation requirements are presented in GSP Emergency Regulations §356.4. In general, the GSP evaluation must include a description of groundwater conditions relative to each sustainability indicator, discussion of GSP implementation, proposed revisions to the basin setting and SMC in light of new information or changes in water use, assessment of the monitoring networks, regulatory actions taken by the GSAs, summary of coordination with agencies located within the Basin and adjacent basins, and a description of any proposed or adopted GSP amendments. The estimated cost for the GSP evaluations is $50,000 (in 2022 dollars).

7.1.7.3 GSP Amendments

To control costs, the GSAs will seek to perform any Plan amendments in conjunction with the required 5-year evaluations. Pertinent sections of the GSP will be amended, as appropriate, based on new information, groundwater conditions, monitoring results, water use, land use changes, land use plan updates, and management status of adjacent basins. The estimated cost for the GSP amendments is $150,000 (in 2022 dollars).

7.1.8 Respond to DWR GSP Evaluations and Assessments

The GSAs will address DWR requests for additional information and comments following its review of the adopted GSP. It is assumed that DWR comments on the initial GSP will be received and addressed during fiscal year 2025. The GSAs will respond to DWR comments and requests for information associated with subsequent 5-year GSP assessments. The estimated cost for addressing the DWR assessment comments on the initial GSP in 2025 is $50,000 (in 2022 dollars). The estimated cost for responding to DWR comments following the 5-year GSP evaluations is $25,000 (in 2022 dollars).

7.1.9 Contingencies

Contingency is included in the budget in recognition that GSP implementation is new and there is potential for unanticipated expenses. For the purposes of conservatively estimating the cost to implement the GSP, the budget estimate includes a 5% contingency. Contingency amounts will be reviewed during each annual budgeting process. It is anticipated that contingency amounts will decline over time as the GSAs become more certain about ongoing GSP implementation costs.

7.1.10 Financial Reserves

Prudent financial management requires that the GSAs carry a general reserve in order to manage cash flow. General reserves have no restrictions on the types of expenses they can be used to fund. The reserve will be determined at a future date.

7.1.11 Total Estimated Implementation Costs Through 2043 [§354.6(e)]

§354.6 Agency Information. *When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:*

(e) *An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.*

GSP implementation costs are presented in Table 7.1-01. The estimated costs are presented by the budget categories discussed in Section 7.1. The estimated total cost of the GSP implementation over the 20-year planning horizon is $6.21 million. Costs through the first 5-year evaluation period are also provided as a subtotal of $1.23 million. The annual costs include an annual rate of inflation of 3% factored into the cost projections. These estimated costs are based on the best available information at the time of GSP preparation and represent the GSAs' current understanding of Basin conditions and the current roles and responsibilities of the GSAs under SGMA. The GSAs will coordinate GSP implementation with other water management efforts in the watershed to minimize duplication of effort and costs to the water users of the Basin.

7.2 Funding Sources and Mechanisms [§354.6(e)]

§354.6 Agency Information. *When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:*

(e) *An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.*

Funding for FCGMA GSP implementation will be obtained from a groundwater extraction fee implemented pursuant to FCGMA's non-SGMA and SGMA authorities. ASRGSA is currently funded by contributions from its member agencies (Camrosa WD and County of Ventura). It is currently anticipated that ASRGSA GSP implementation efforts will be funded by Camrosa WD, although other funding options may be evaluated as the GSP implementation progresses. ASRGSA obtained a $177,081 Proposition 1 Sustainable Groundwater Planning Grant from DWR to fund, in part, development of the GSP. The GSAs will seek additional grants for GSP implementation, although, to be conservative, the budget assumes no additional grant funding.

7.3 Implementation Schedule [§354.44(b)(4)]

> **§354.44 Projects and Management Actions.**
> ***(b)*** *Each Plan shall include a description of the projects and management actions that include the following:*
> ***(4)*** *The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.*

GSP adoption is anticipated in late May 2023 for submittal to DWR in June 2023.

Most of the budget categories consist of ongoing tasks and efforts that will be conducted throughout GSP Implementation (i.e., administration, coordination, outreach, monitoring, etc.).

GSP reporting will occur on an annual basis, with reports for the preceding water year due to DWR by April 1.

Periodic evaluations (every 5 years) and any associated GSP amendments will be submitted to DWR by April 1 at least every 5 years (no later than 2028, 2033, 2038, and 2043).

The schedule for Projects and Management Actions is described in Section 6. In summary, the Groundwater Monitoring Network Enhancement and Water Quality Management Coordination Projects are expected to begin during the initial 5-year implementation period. Schedules for the Desalter and Basin Recharge Projects will be developed as part of preliminary project planning.

8.0 References and Technical Studies [§354.4(b)]

§354.4 General Information.

(b) *Each Plan shall include the following general information: A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public.*

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Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Figures

Section 1
Figure

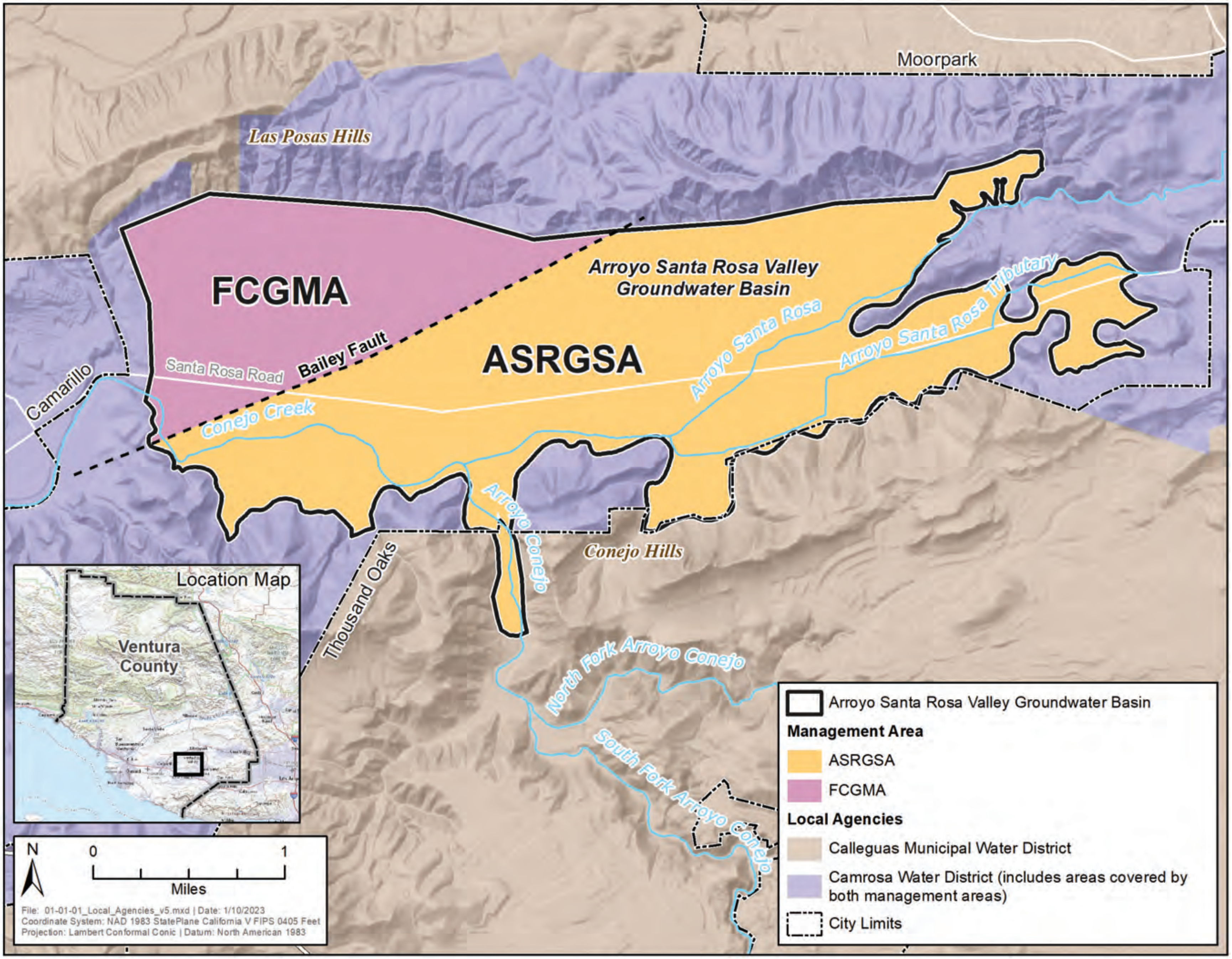


Figure 1.0-01 Arroyo Santa Rosa Valley Groundwater Basin Area and Local Agencies.

Section 2
Figures

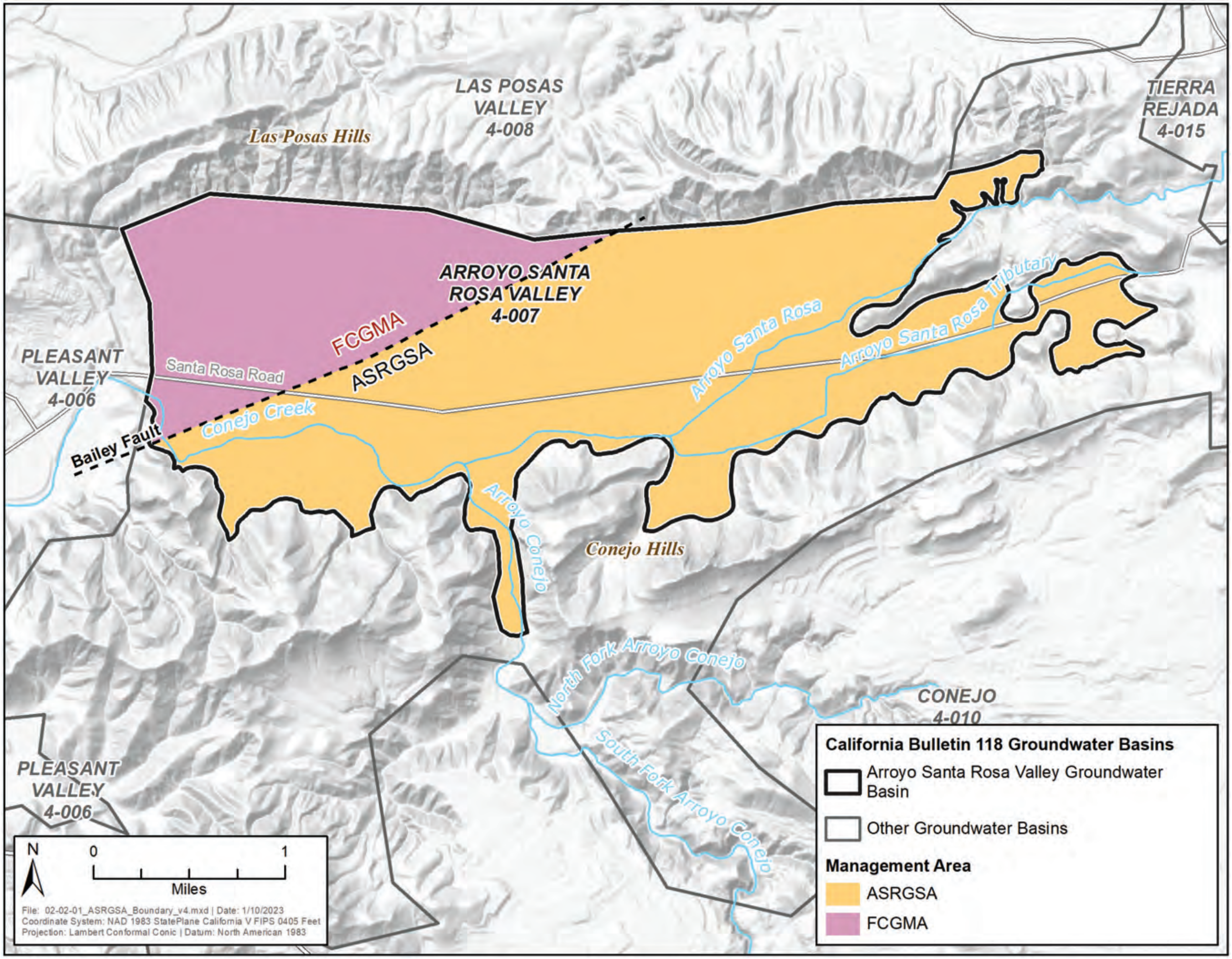


Figure 2.2-01 Arroyo Santa Rosa Valley and Adjacent Groundwater Basins.

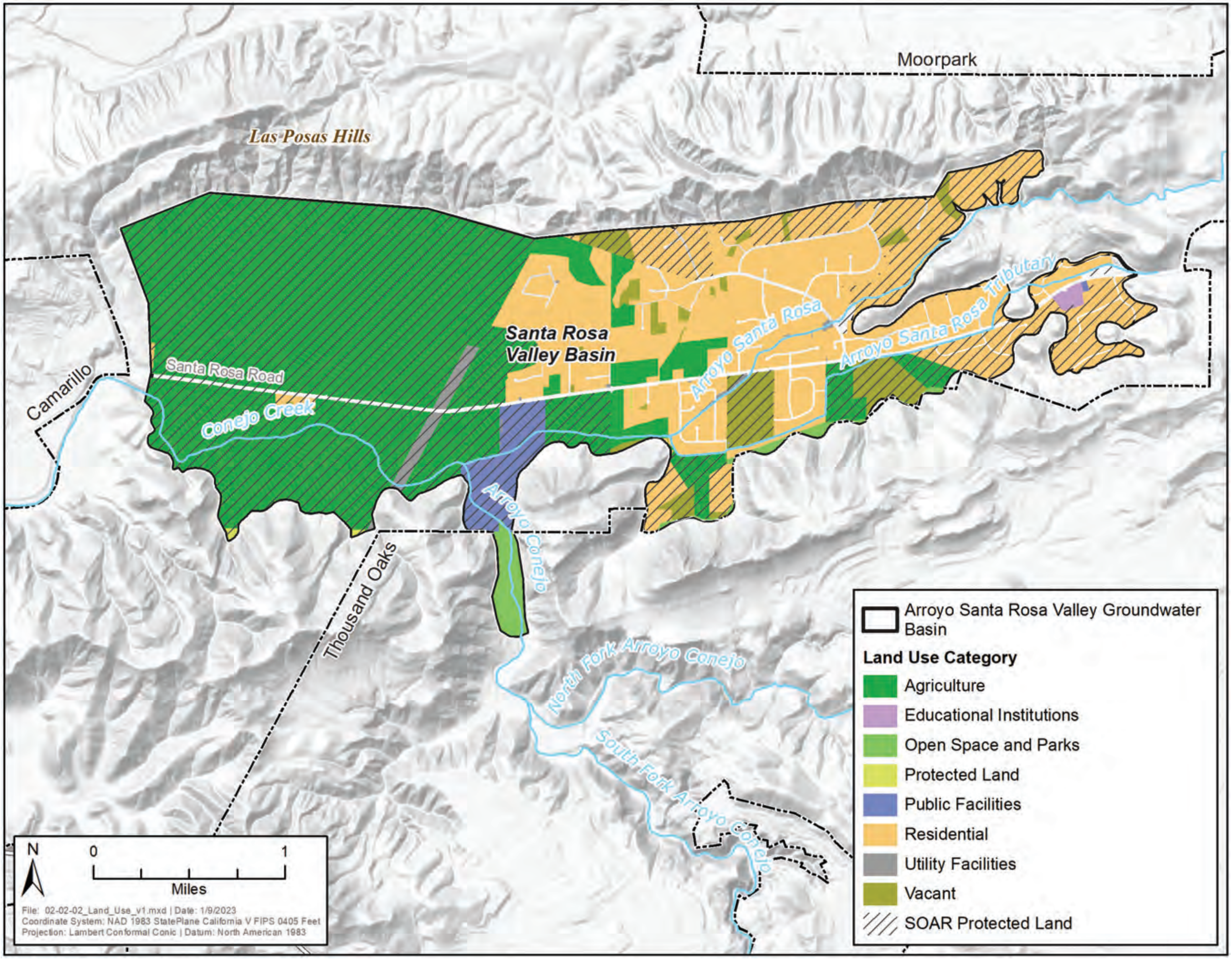


Figure 2.2-02 Arroyo Santa Rosa Valley Groundwater Basin Land Use.

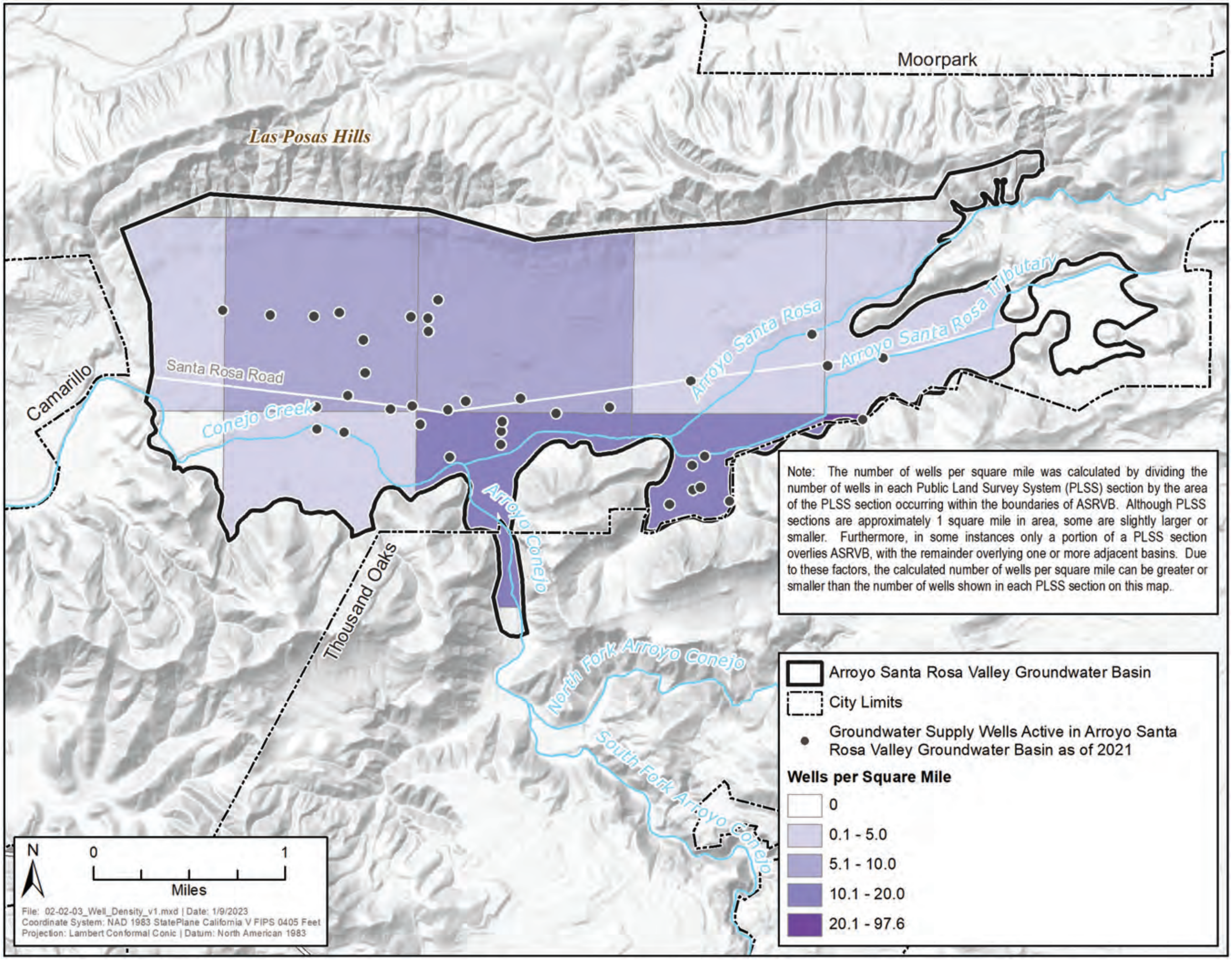


Figure 2.2-03 Groundwater Supply Wells Active in Arroyo Santa Rosa Valley Groundwater Basin.

Section 3
Figures

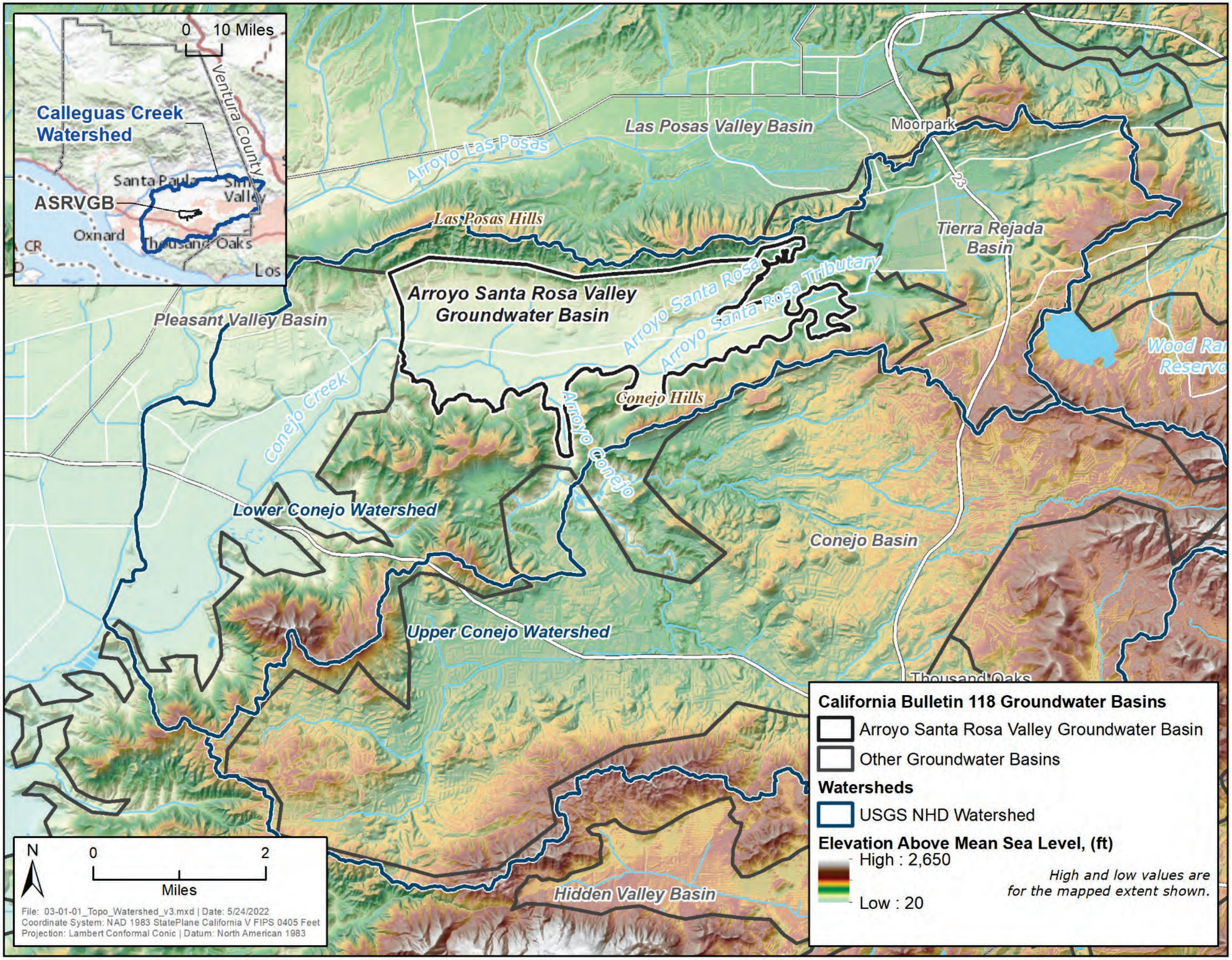


Figure 3.1-01 Watershed Boundaries in the Vicinity of the ASRVGB.

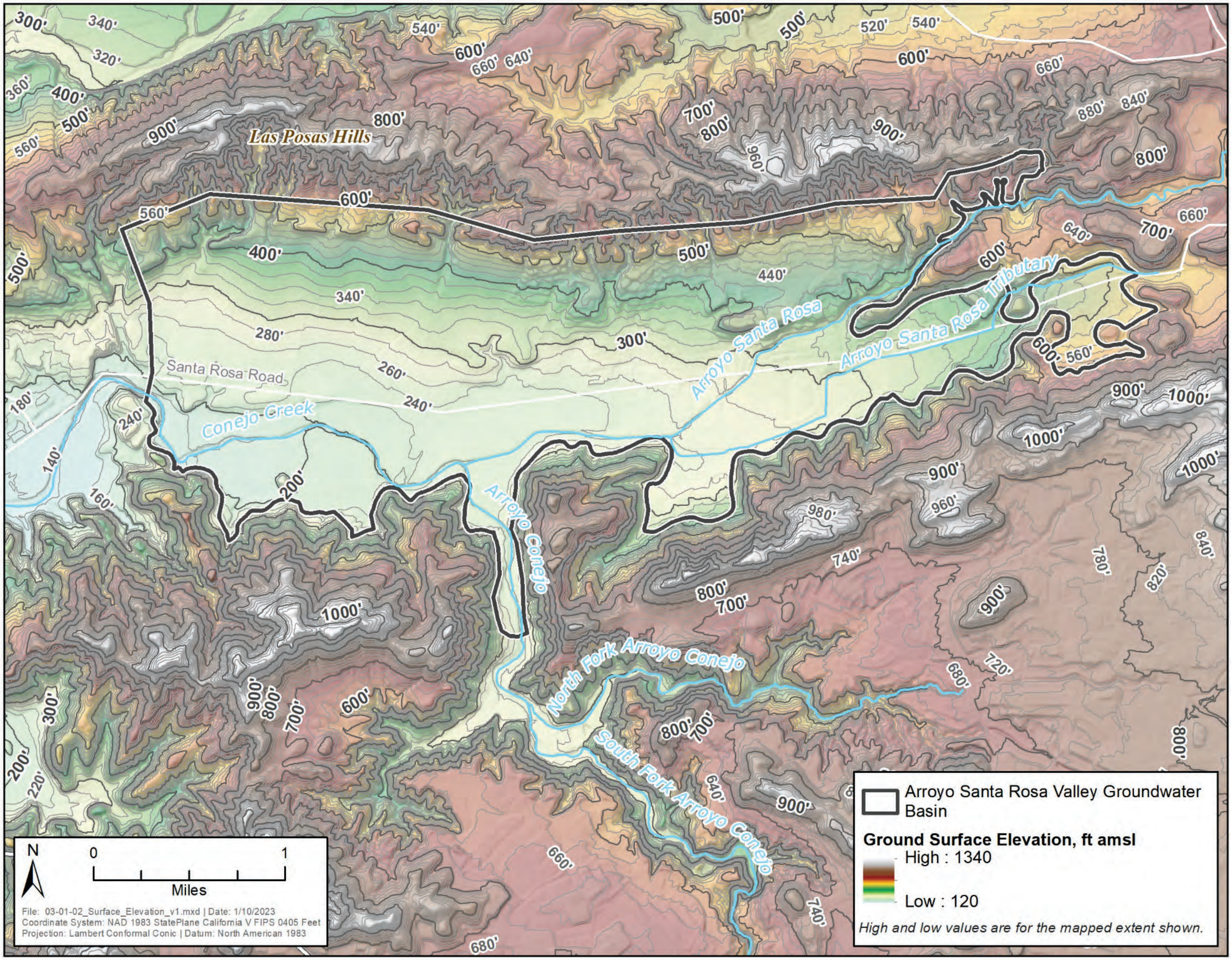


Figure 3.1-02 Basin Topographic Map.

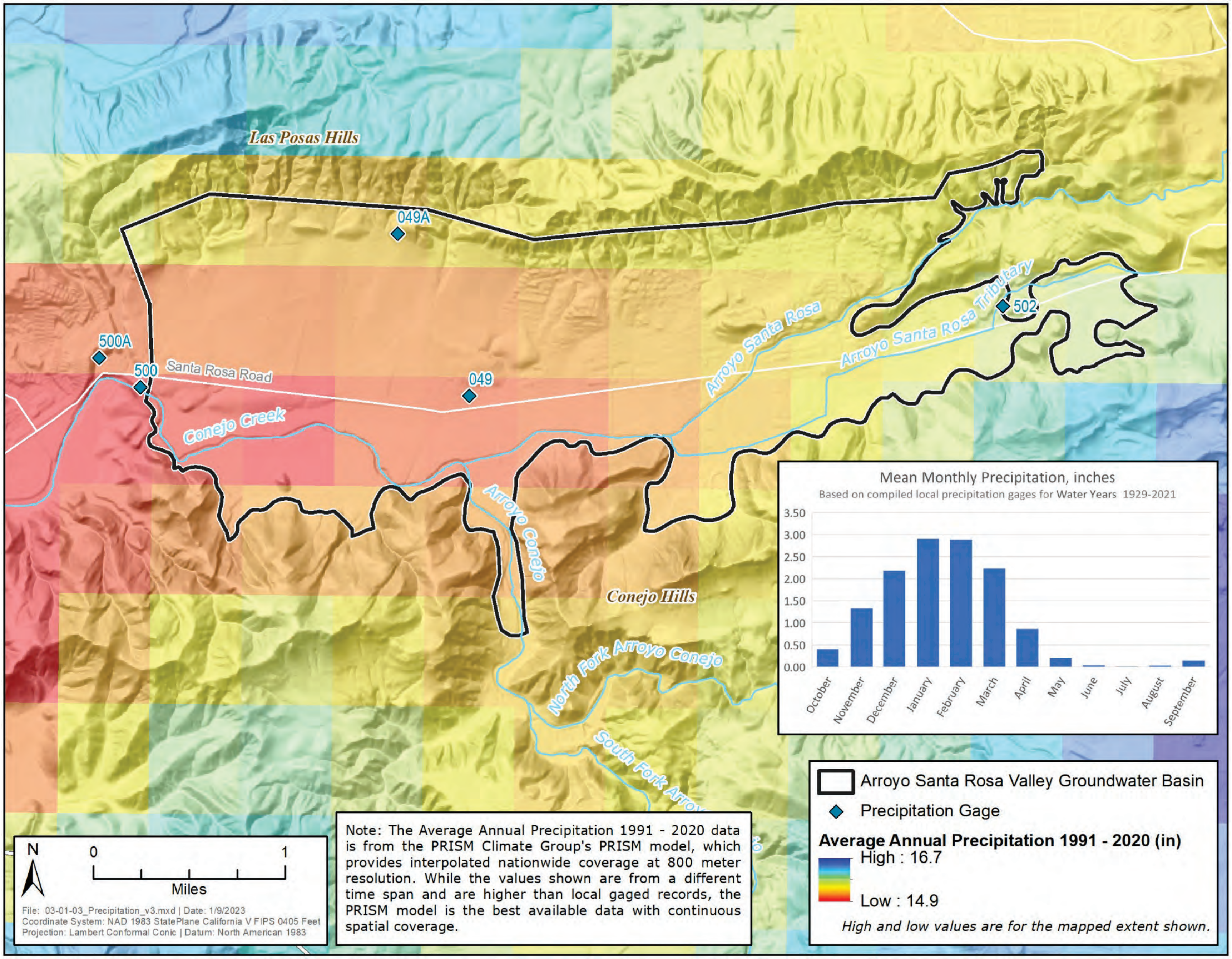
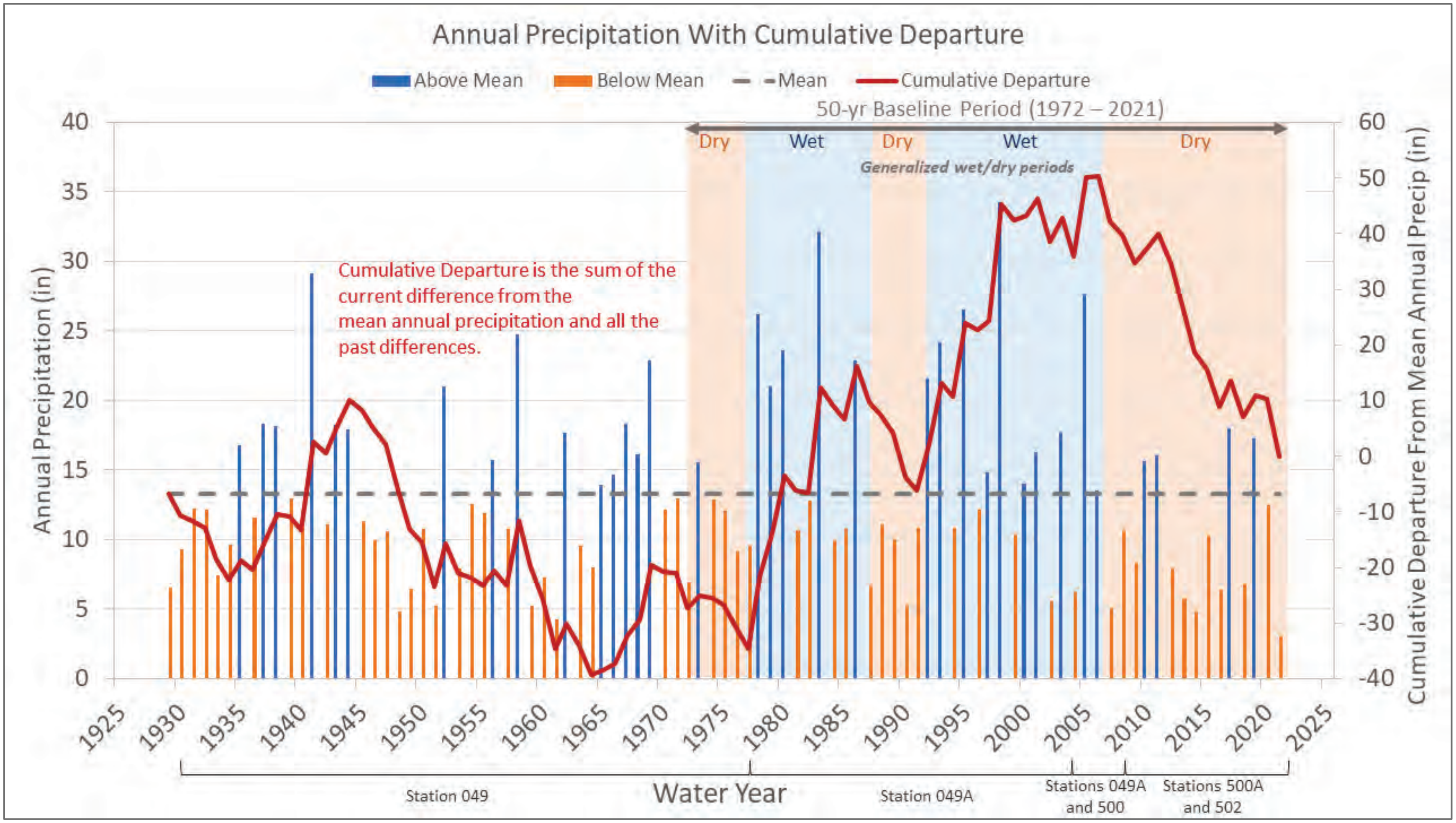


Figure 3.1-03 Precipitation Within the ASRVGB.



See Figure 3.1-03 for gage locations. Data source: Ventura County Water Protection District, 2022

Figure 3.1-04 Annual Precipitation and Cumulative Departure from Mean Precipitation Chart.

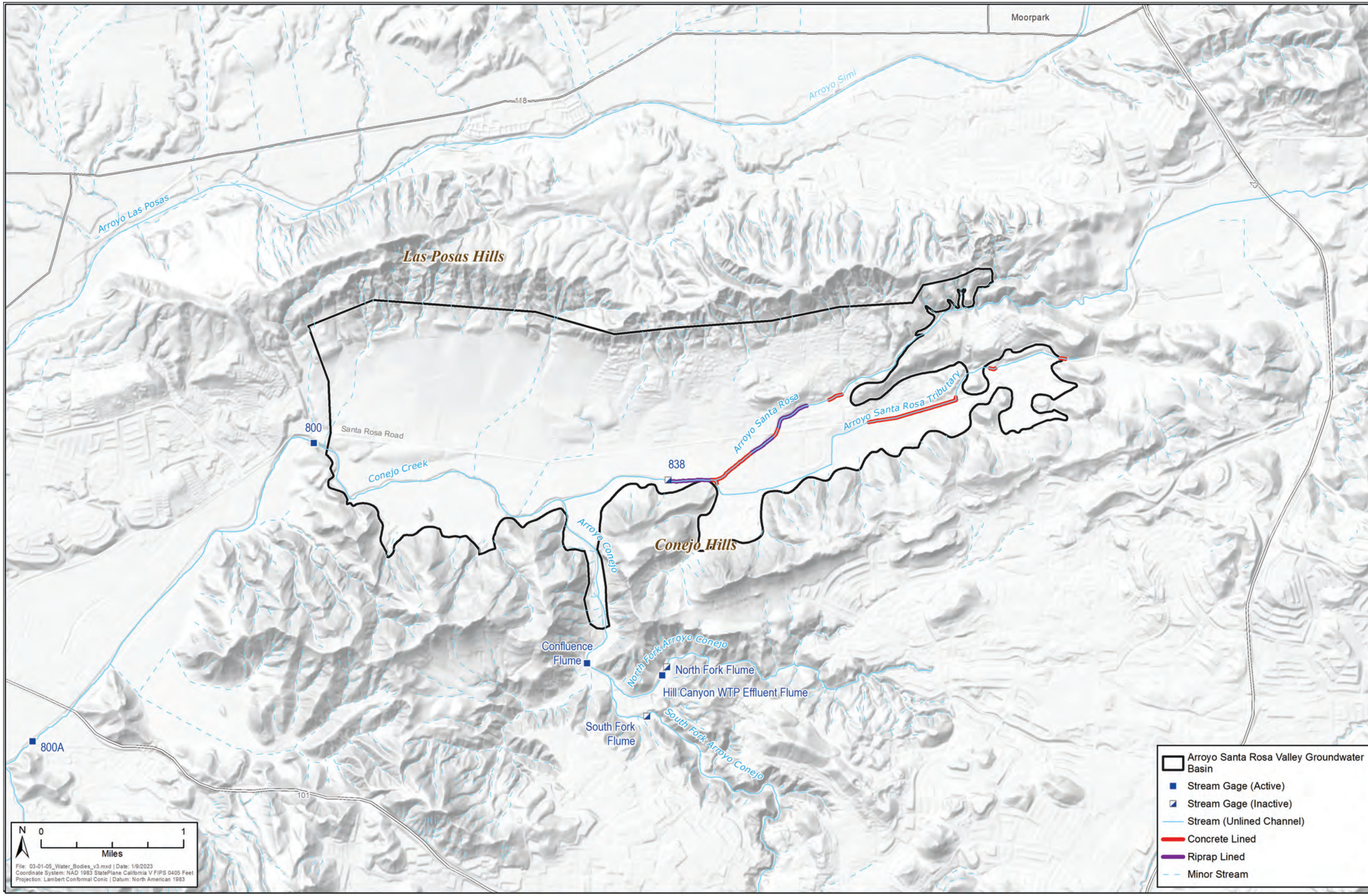


Figure 3.1-05 Surface Water Bodies in the ASRVGB.

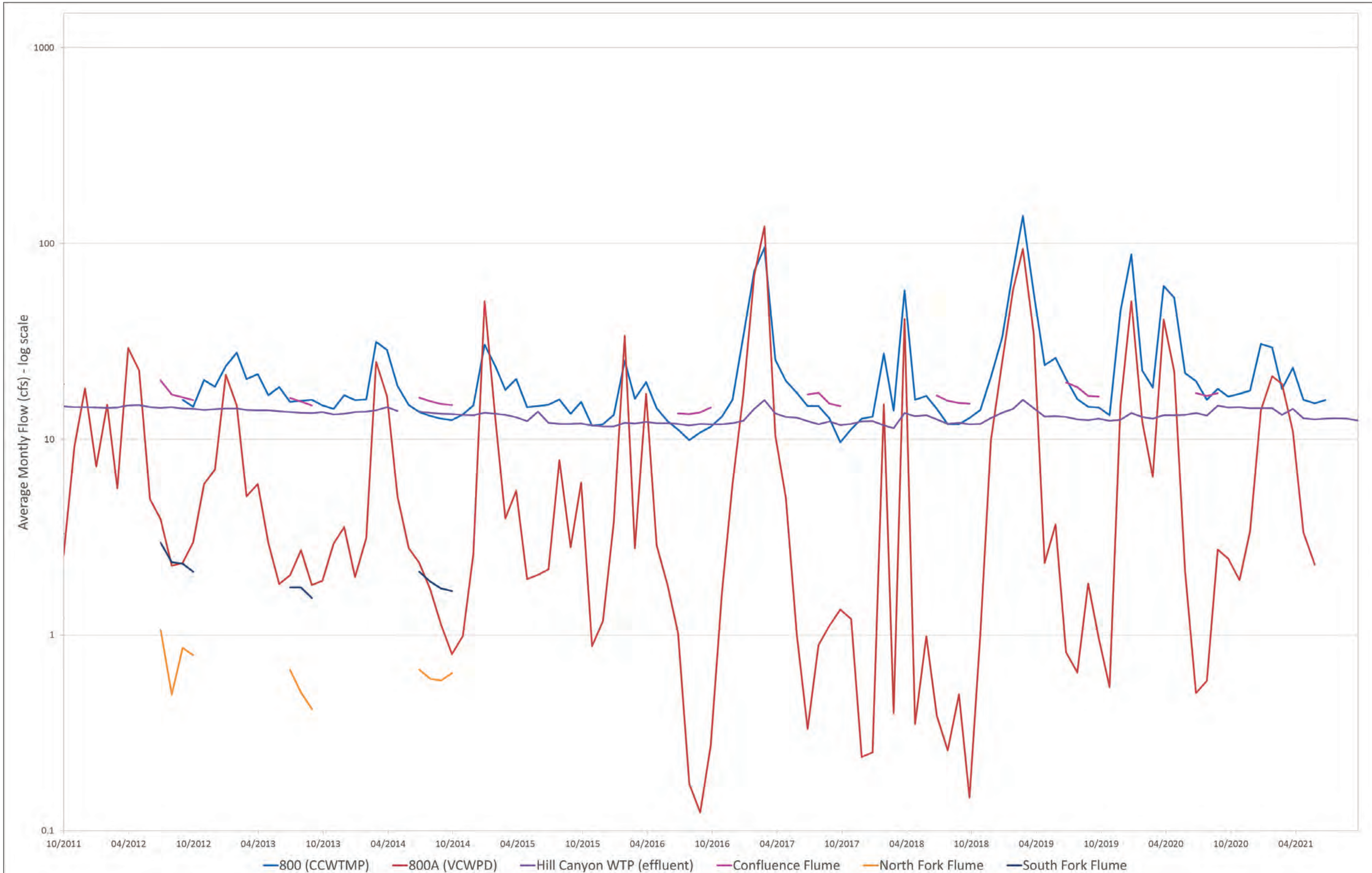


Figure 3.1-06 Available Streamflow Data for the ASRVGB.

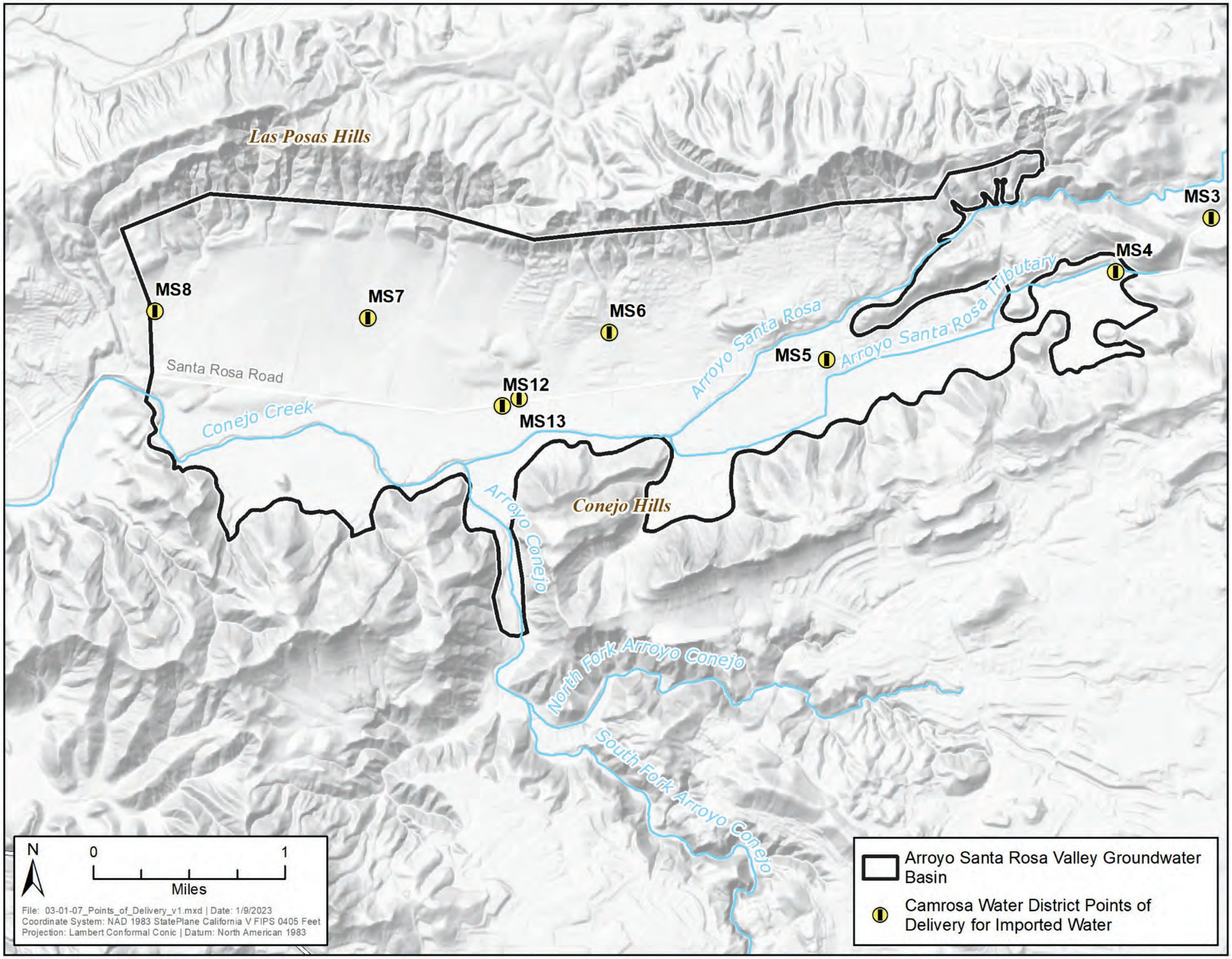


Figure 3.1-07 Points of Delivery for Imported Water in the ASRVGB.

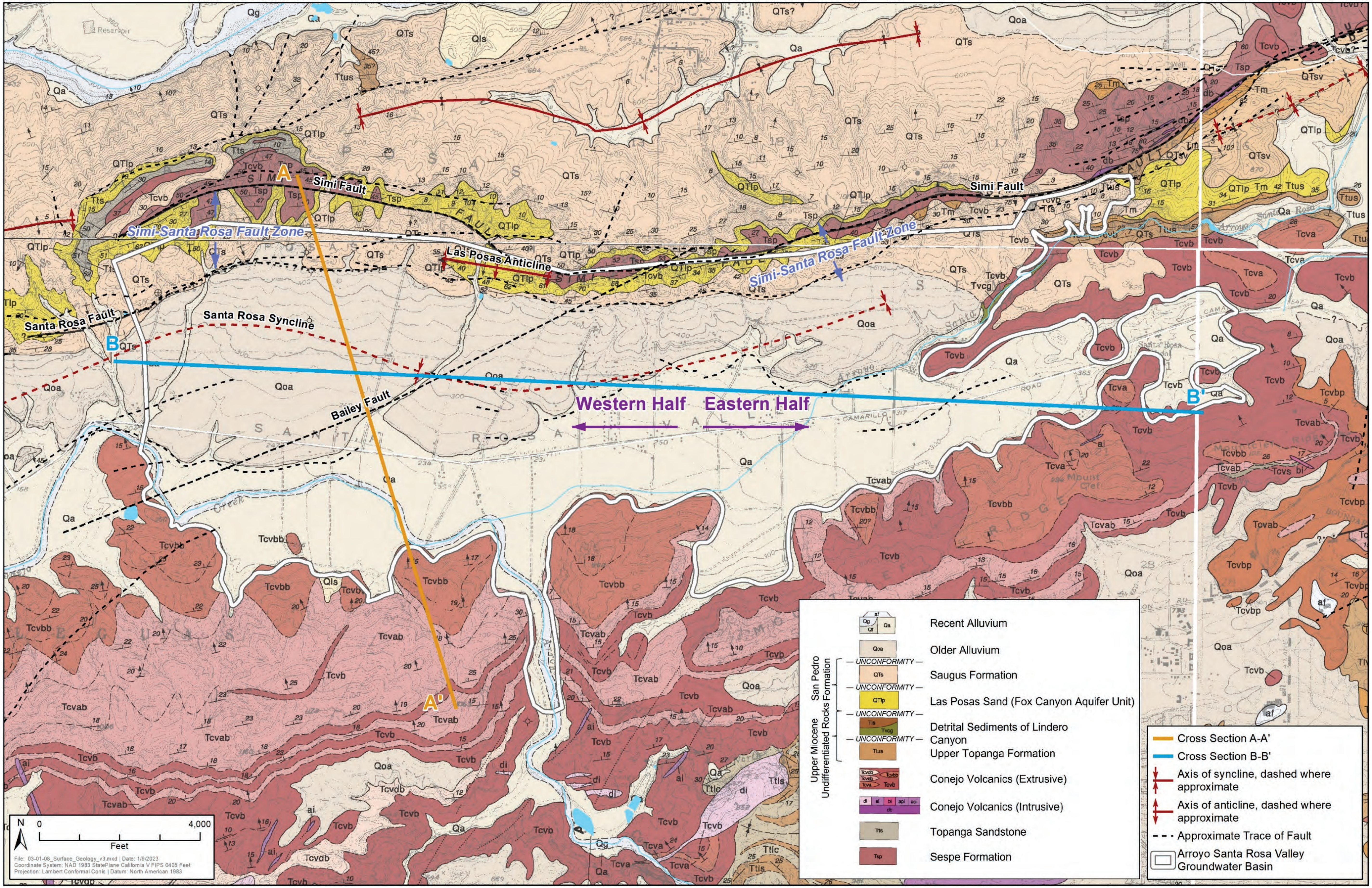


Figure 3.1-08 Regional Surface Geology for the ASRVGB.

		West of Bailey Fault					East of Bailey Fault			
Period	**Epoch**	**Geologic Unit**	**Hydrostratigraphic Unit**	**Layer**		Bailey Fault: Barrier to flow, up to ~300 ft offset, upthrown side on east	**Geologic Unit**	**Hydrostratigraphic Unit**	**Layer**	
Quaternary	Holocene	Recent Alluvium	Shallow Alluvium	Shallow Alluvium	1		Recent Alluvial and Terrace deposits	Shallow Alluvium	Shallow Alluvium	1
	Upper and Middle Pleistocene	Older Alluvium	Mugu (or age-equivalent)	**Upper Groundwater Producing Zone** (~100-240 ft thick; ~100-440 ft deep)	2		Saugus/San Pedro Formation (Sand, silt, and clay)	n/a	**Upper Groundwater Producing Zone** (~50-200 ft thick; ~100-400 ft deep)	2
		Saugus/Upper San Pedro Formation	Hueneme		3					3
	Lower Pleistocene			Low permeability unit	4				Low permeability unit	4
		Las Posas Sand/Lower San Pedro Formation	Fox Canyon	**Lower Groundwater Producing Zone** (~200-550 ft thick; ~100-600 ft deep)	5			Fox Canyon	**Lower Groundwater Producing Zone** (~50-450 ft thick; ~50-400 ft deep)	5
		Santa Barbara Formation	Grimes Canyon/Santa Barbara				n/a			
Tertiary	Pliocene	Unconformity	n/a				Unconformity	Unconformity		
	Miocene	**Miocene Undifferentiated** (Santa Margarita, Upper Topanga, and Lindero Canyon)	**Miocene Undifferentiated** (Santa Margarita)				**Miocene Undifferentiated** (Santa Margarita, Upper Topanga, and Lindero Canyon)	**Miocene Undifferentiated** (Santa Margarita)		
		Conejo Volcanics	Conejo Volcanics	Base Layer (Conejo Volcanics) ~1200 ft max depth	6		Conejo Volcanics and Lower Topanga Formation	Conejo Volcanics	Base Layer (Conejo Volcanics) ~900 ft max depth	6
		Lower Topanga Formation	n/a					n/a		

Names of Hydrostratigraphic Units from Hanson et. al. (2003).

Figure 3.1-09 Schematic Illustration of Geologic Formations, Ages, Aquifer Systems, and Model Layers.

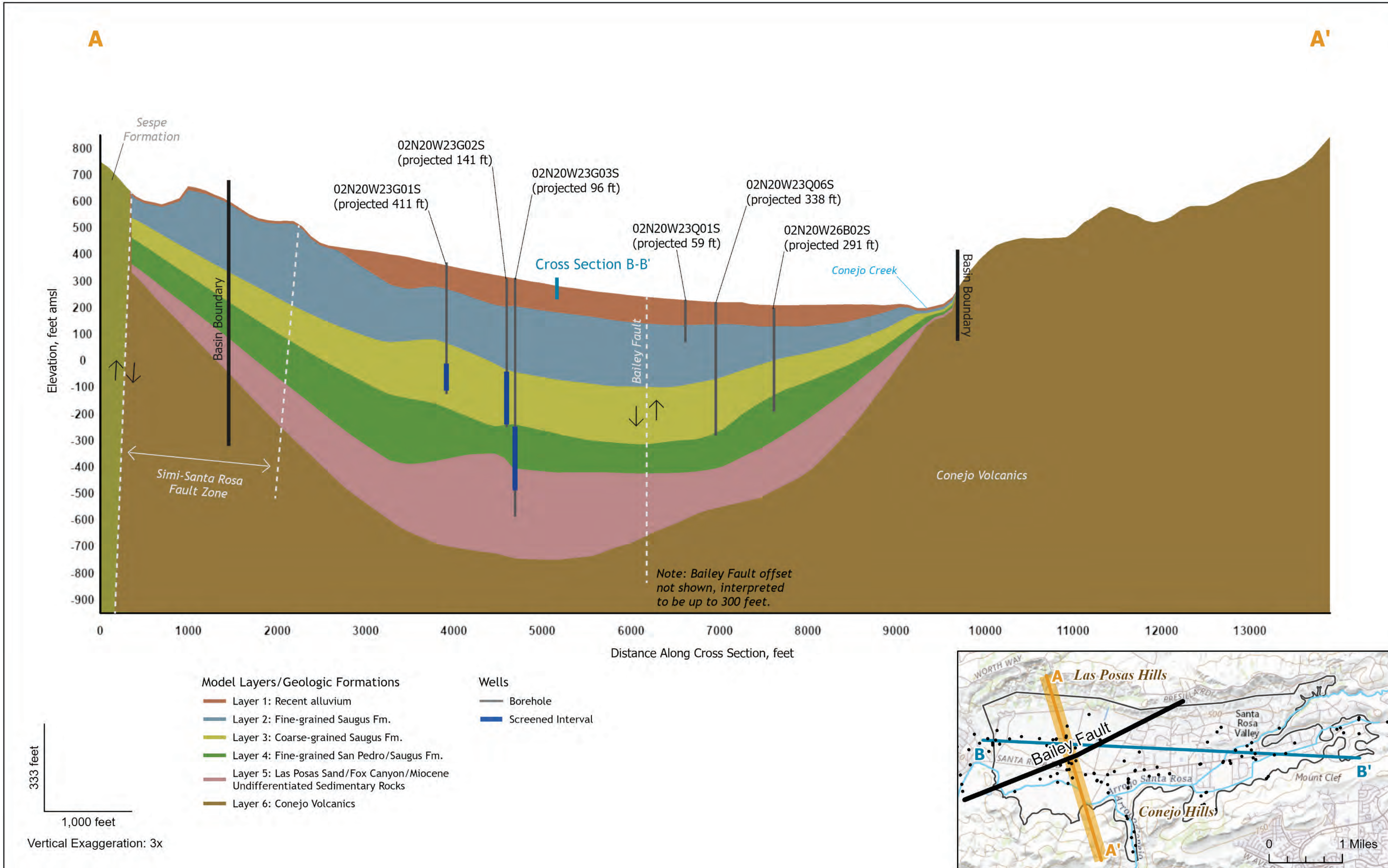


Figure 3.1-10a North-South Cross Section A-A'.

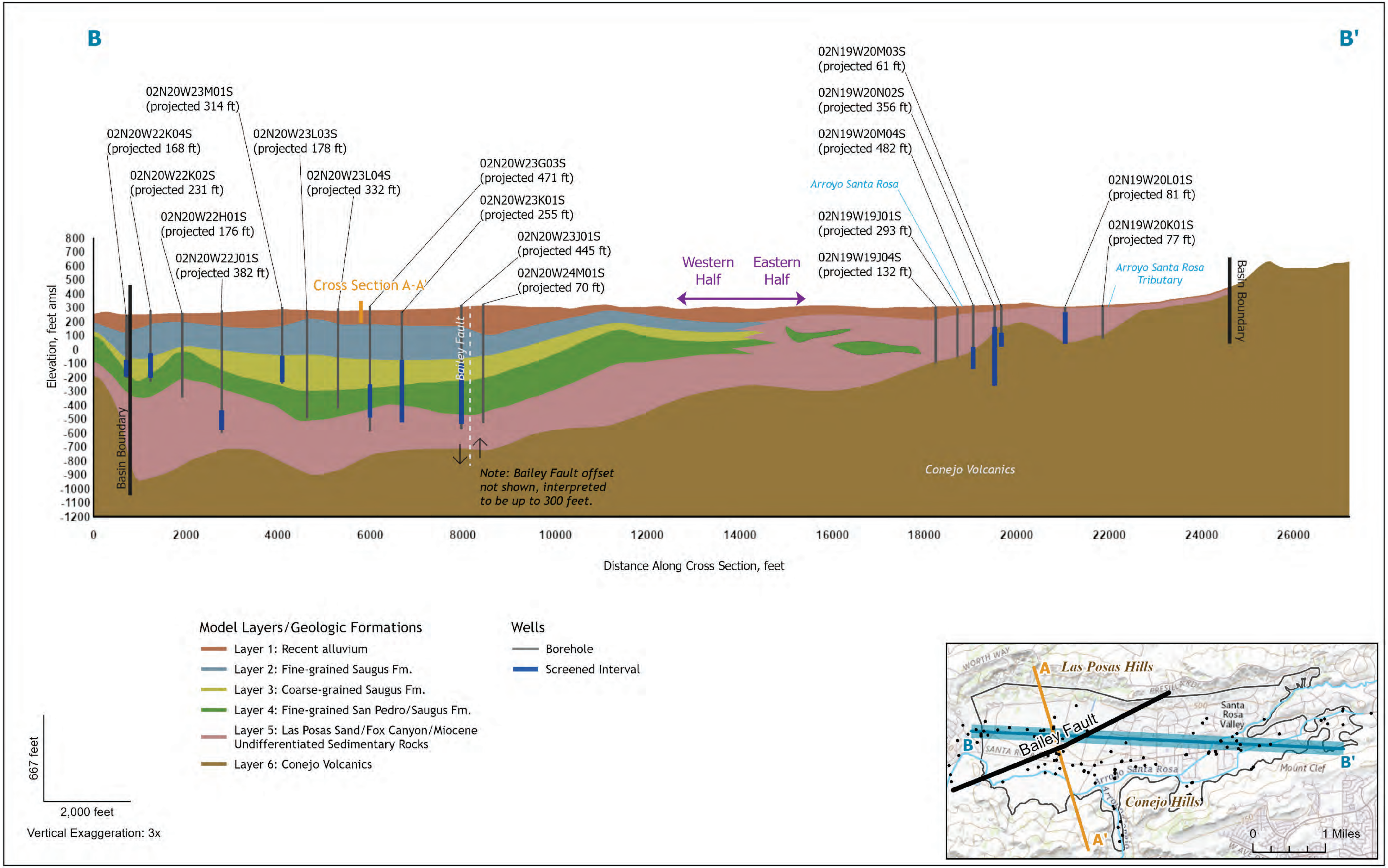


Figure 3.1-10b West-East Cross Section B-B'.

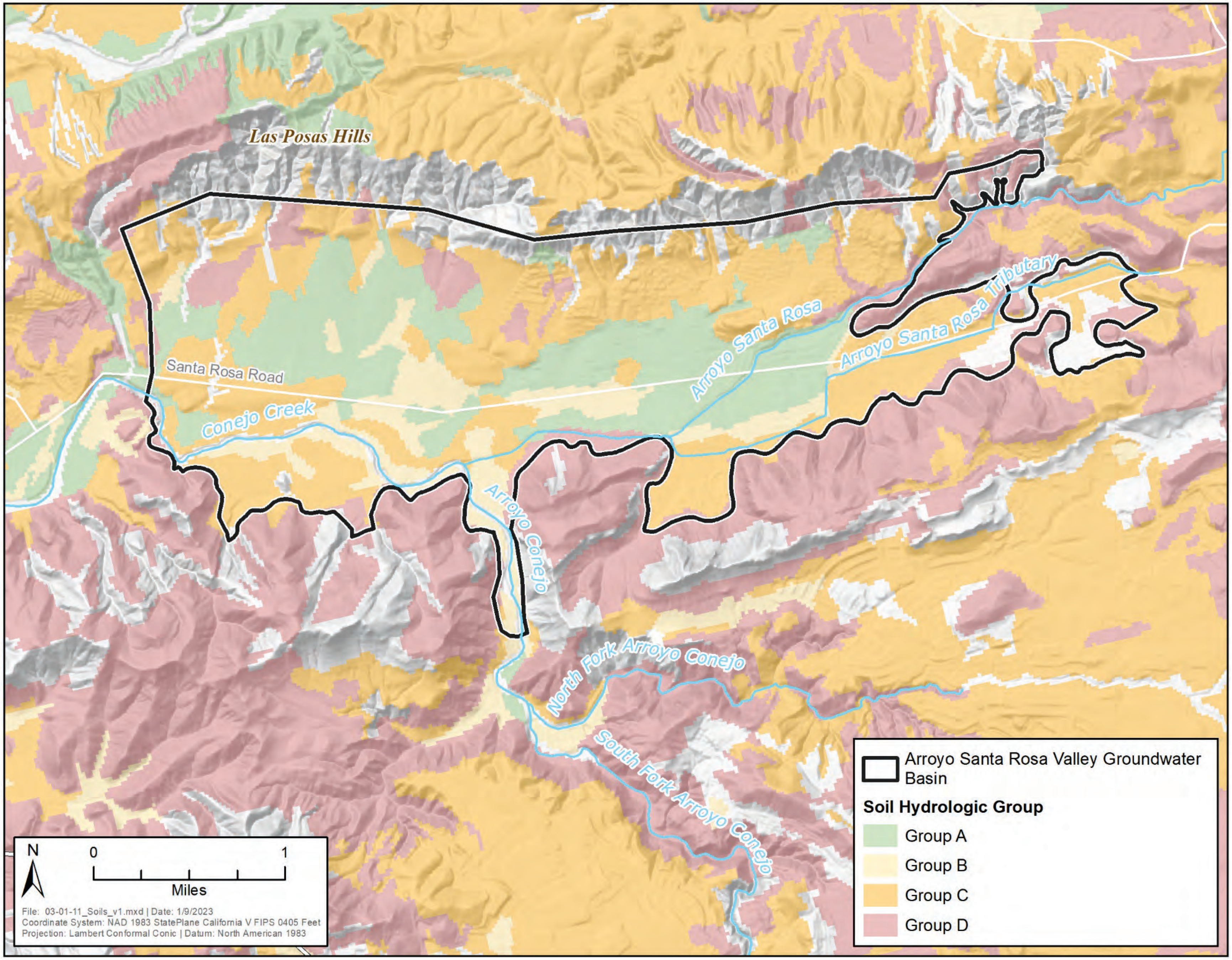


Figure 3.1-11 Soil Characteristics Map.

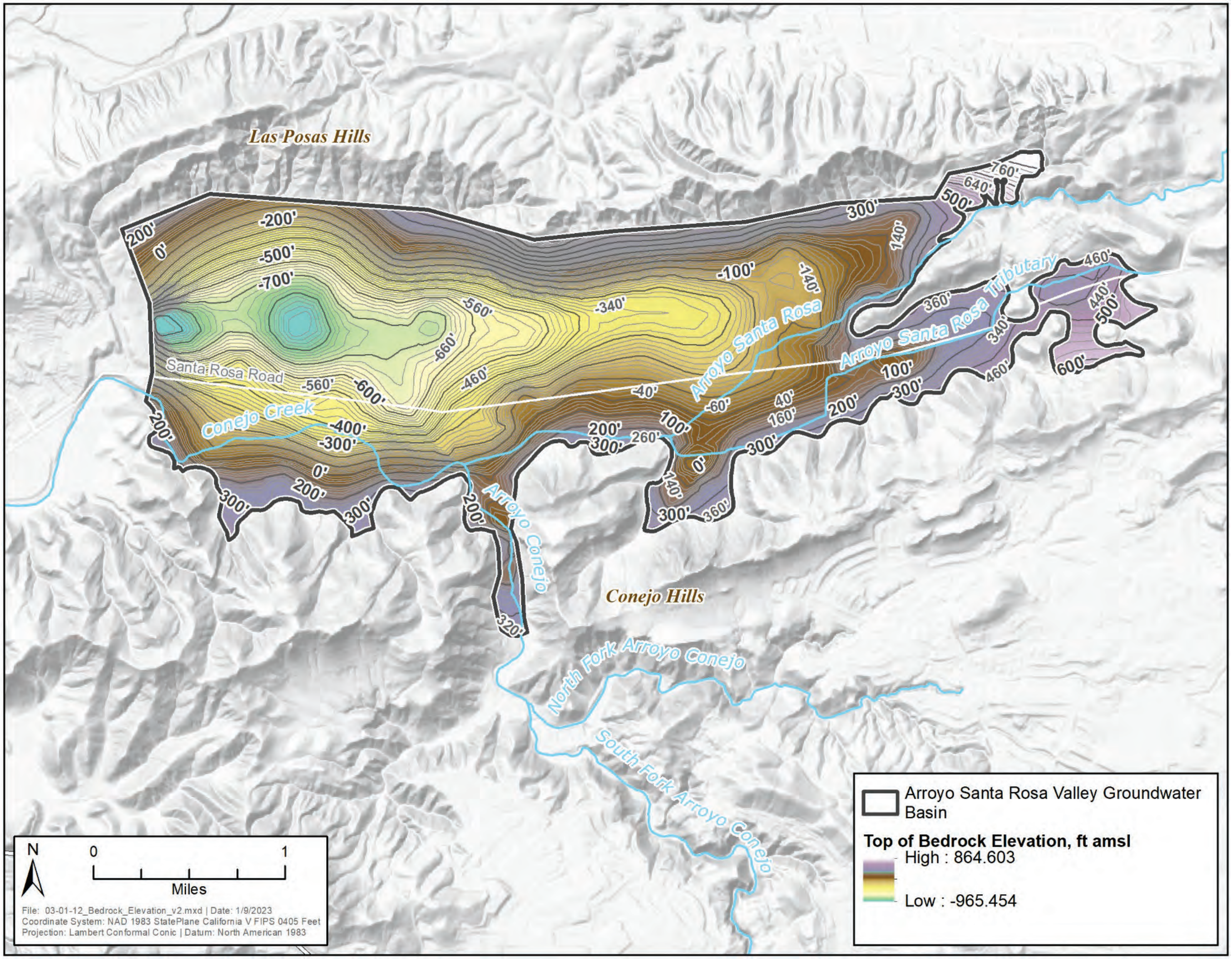


Figure 3.1-12 Bottom of Basin Elevation Map.

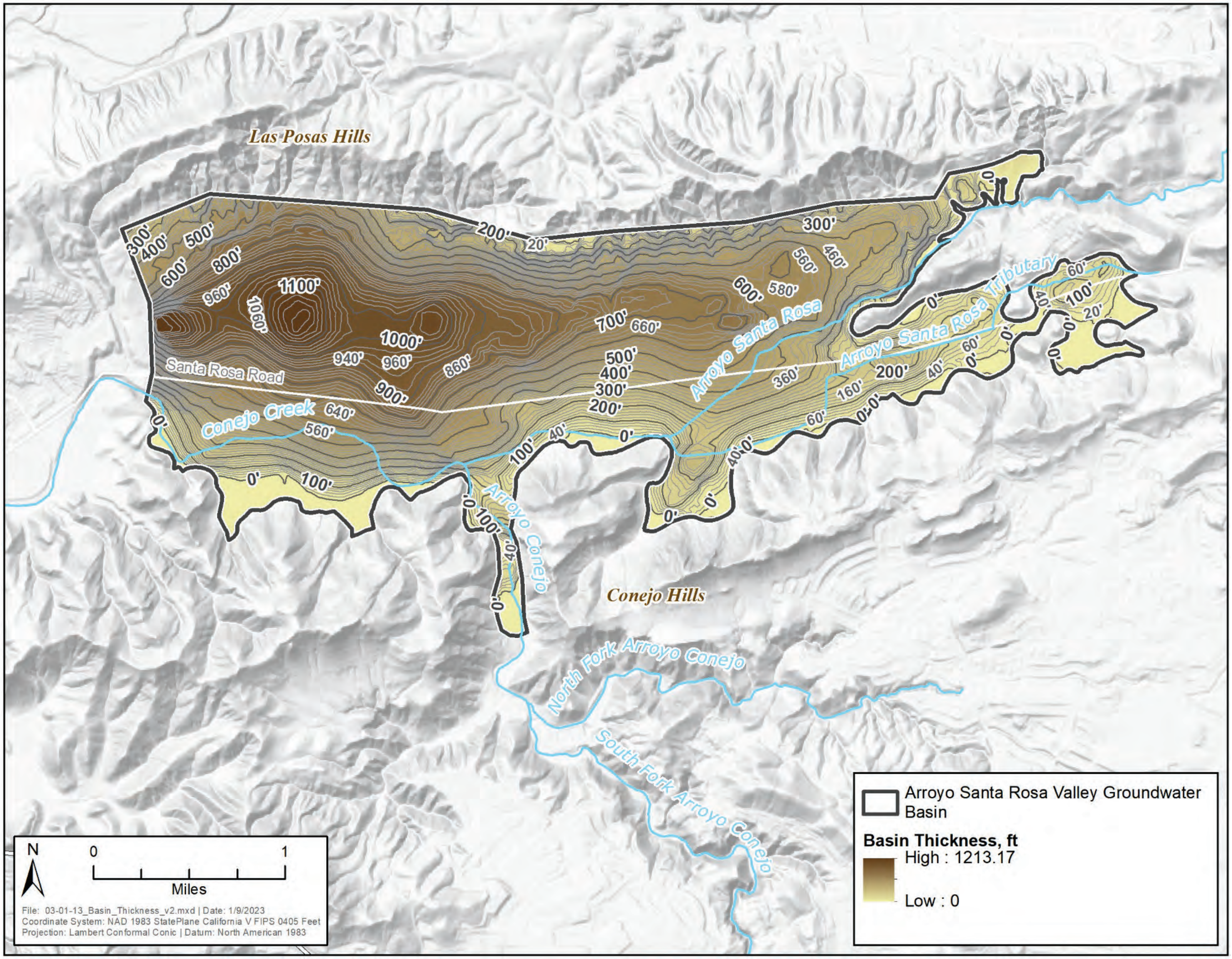


Figure 3.1-13 Basin Thickness Map.

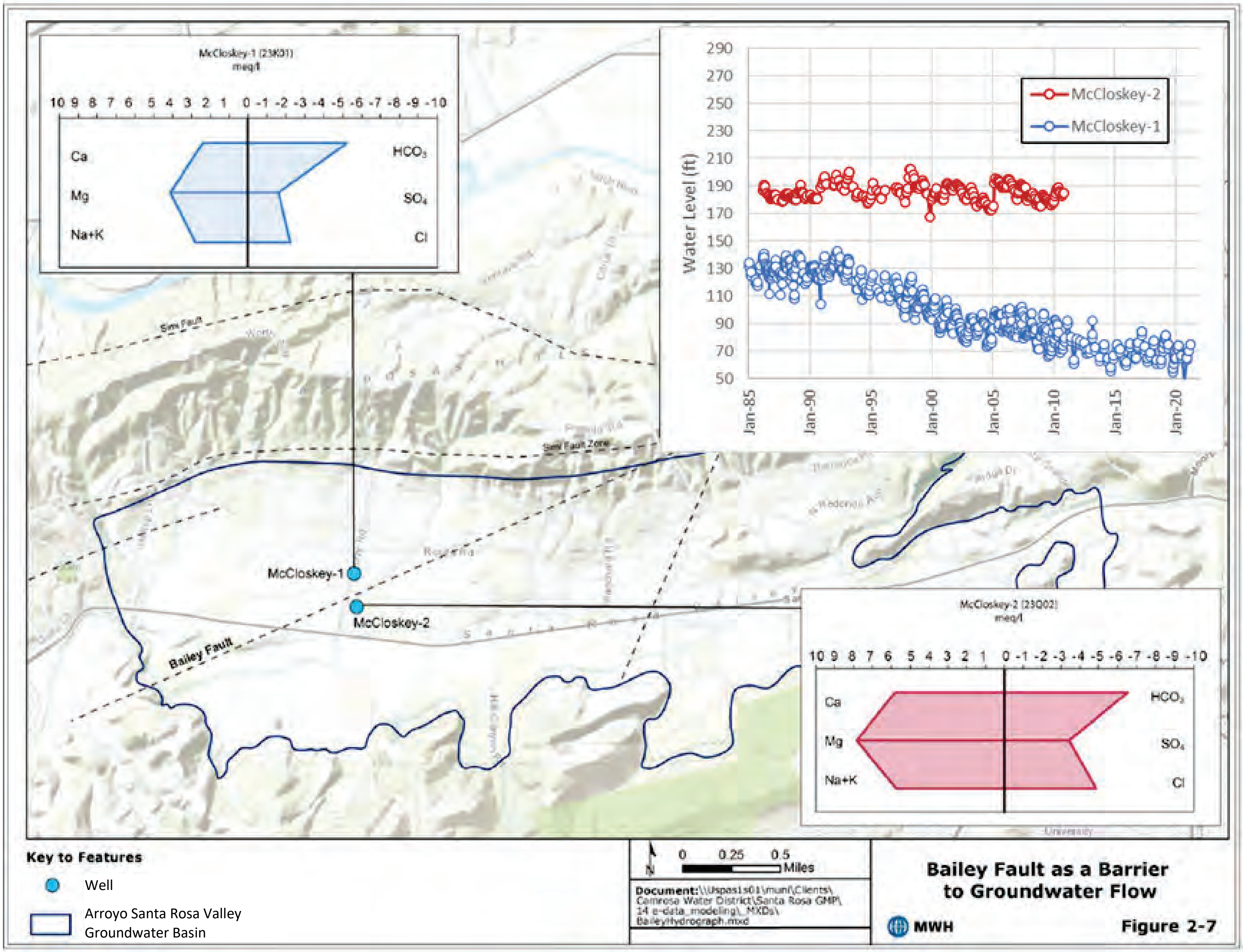


Figure adopted from MWH (2013)

Figure 3.1-14 Groundwater Level and Chemistry Differences Observed Across the Bailey Fault.

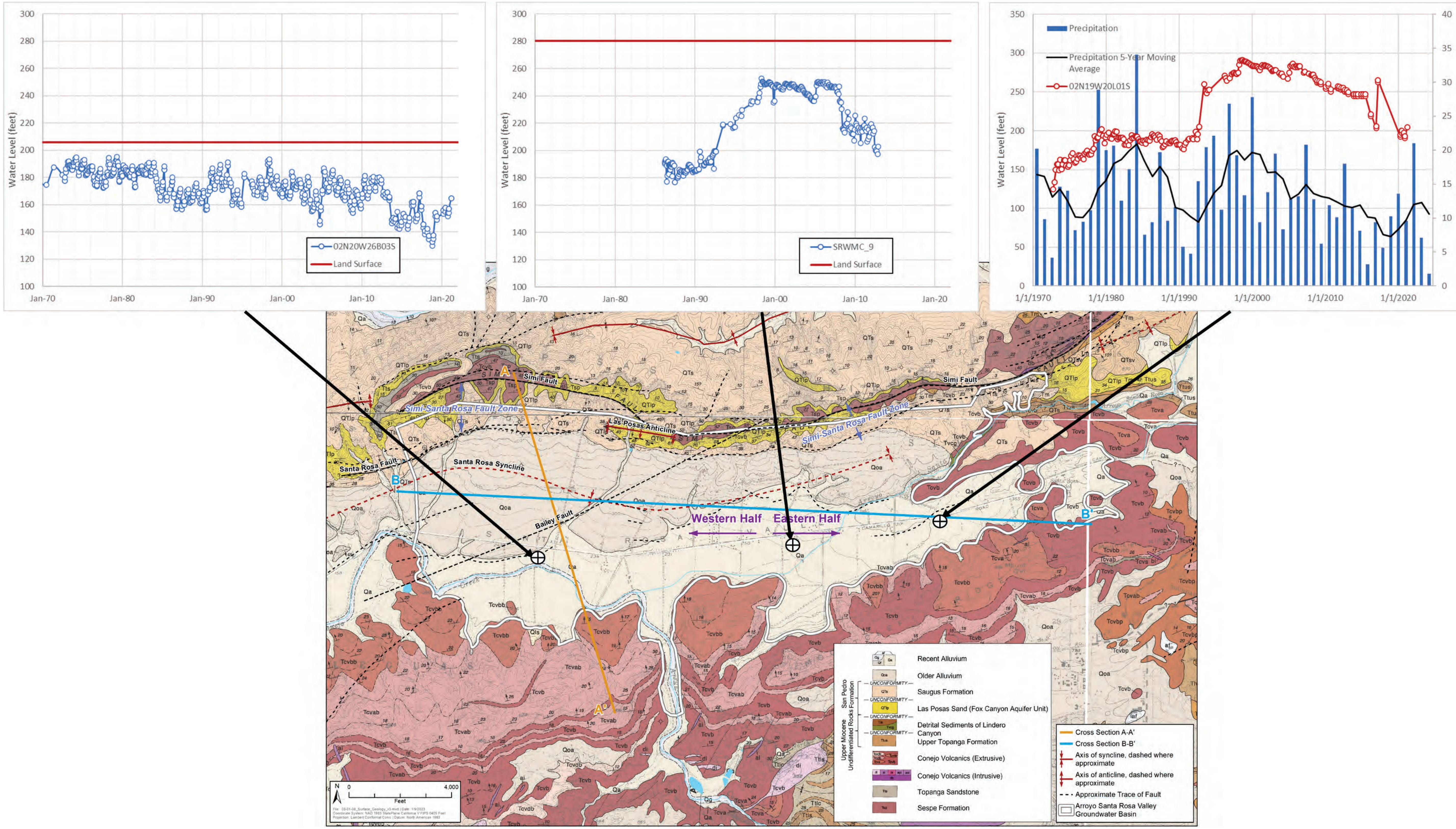


Figure 3.1-15 Hydrographs Across the ASRVGB Showing Hydraulic Differences.

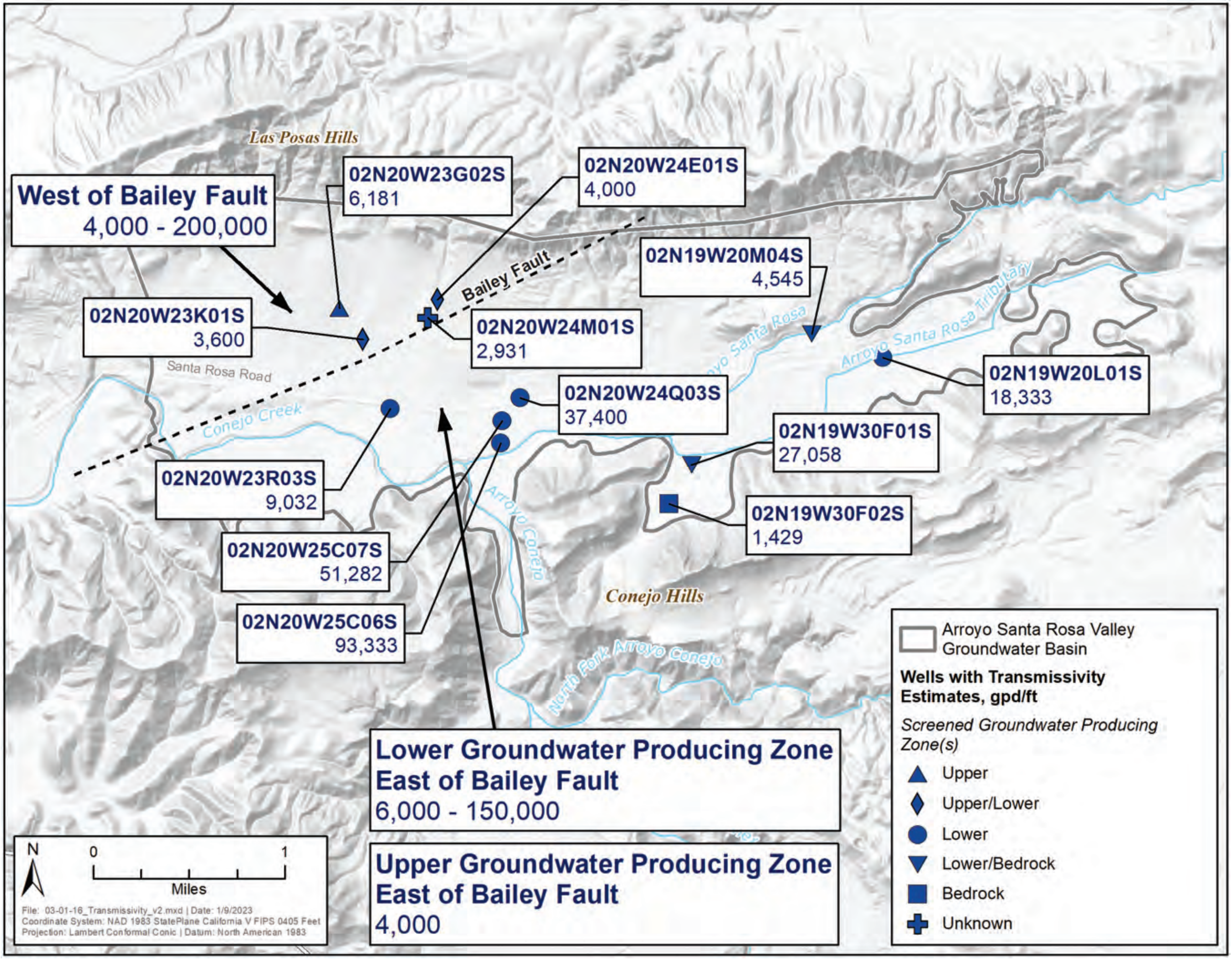


Figure 3.1-16 Transmissivities (in gallons per day per foot) Estimated from Specific Capacity and Pumping Tests.

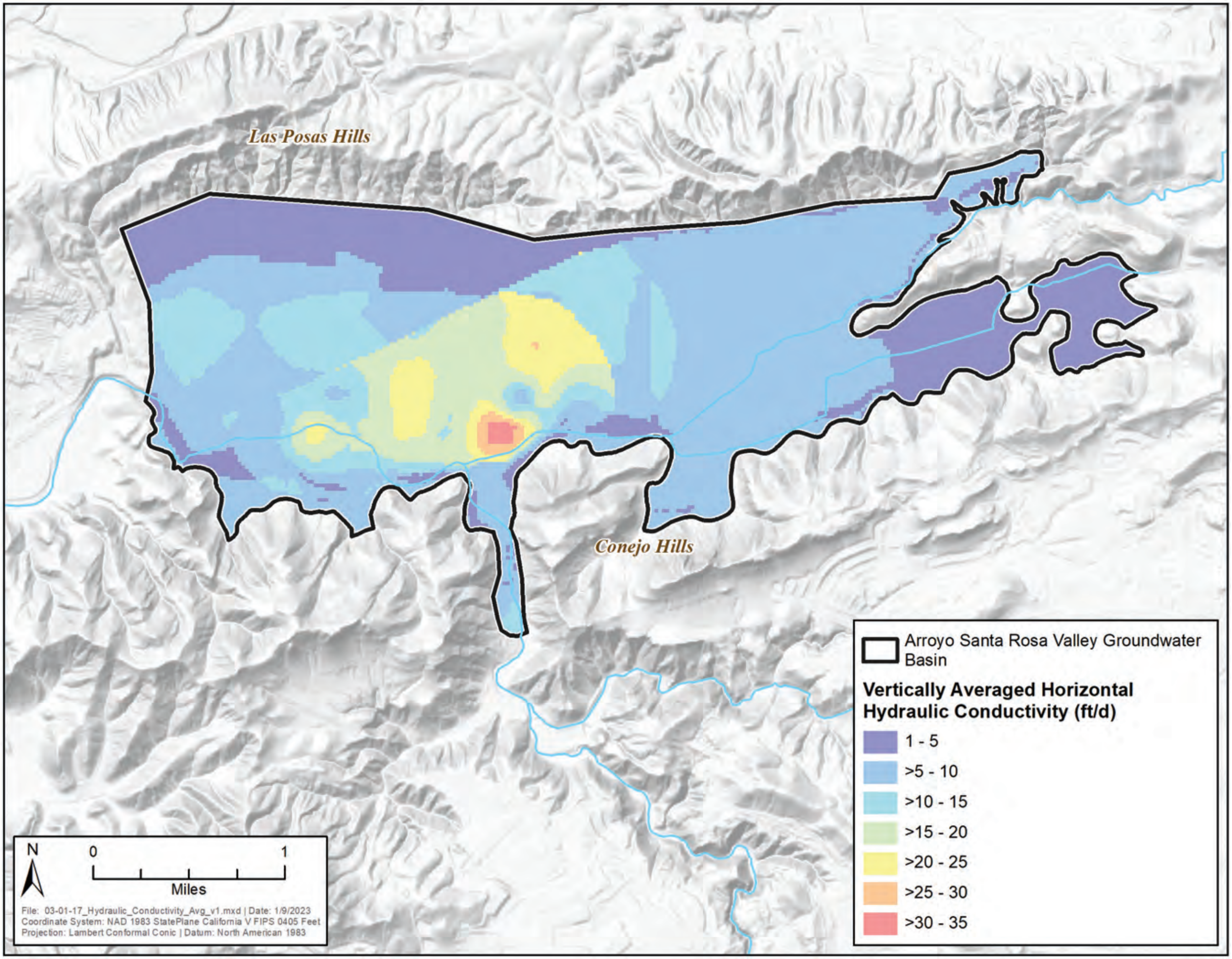


Figure 3.1-17 Vertically Averaged Hydraulic Conductivity Map.

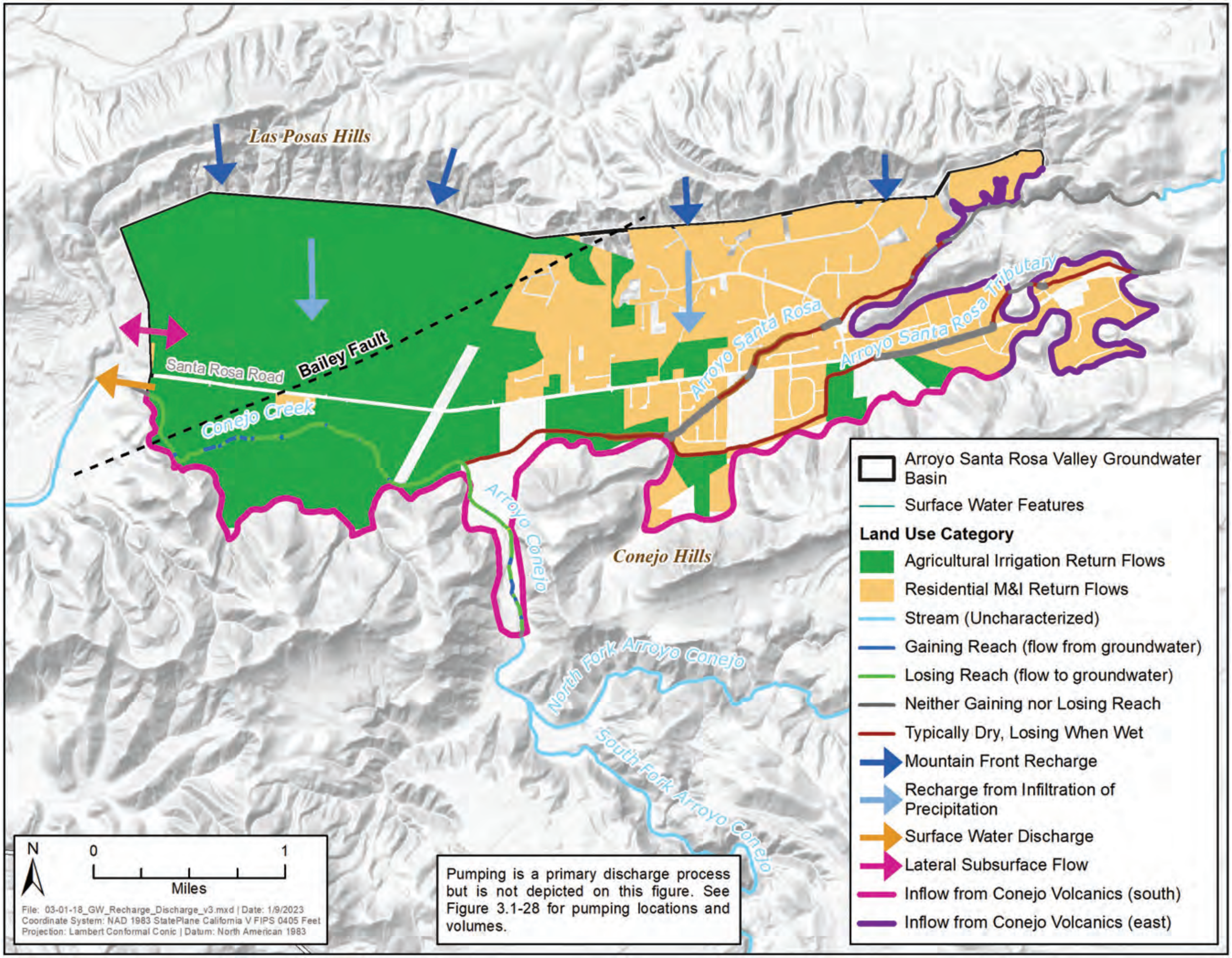


Figure 3.1-18 Primary Groundwater Recharge and Discharge Processes and Areas.

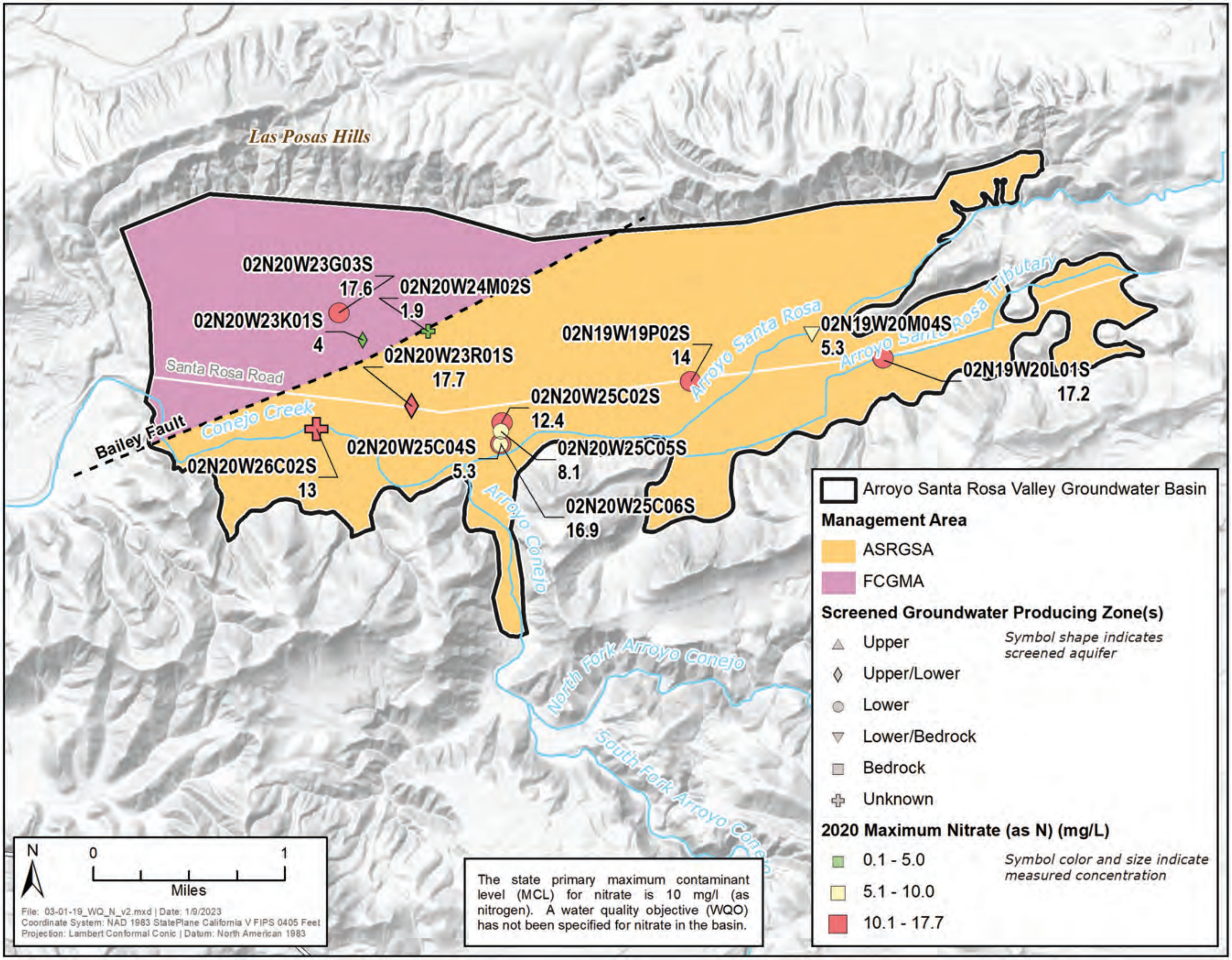


Figure 3.1-19 Nitrate (as N) Concentrations Detected in the ASRVGB during 2020.

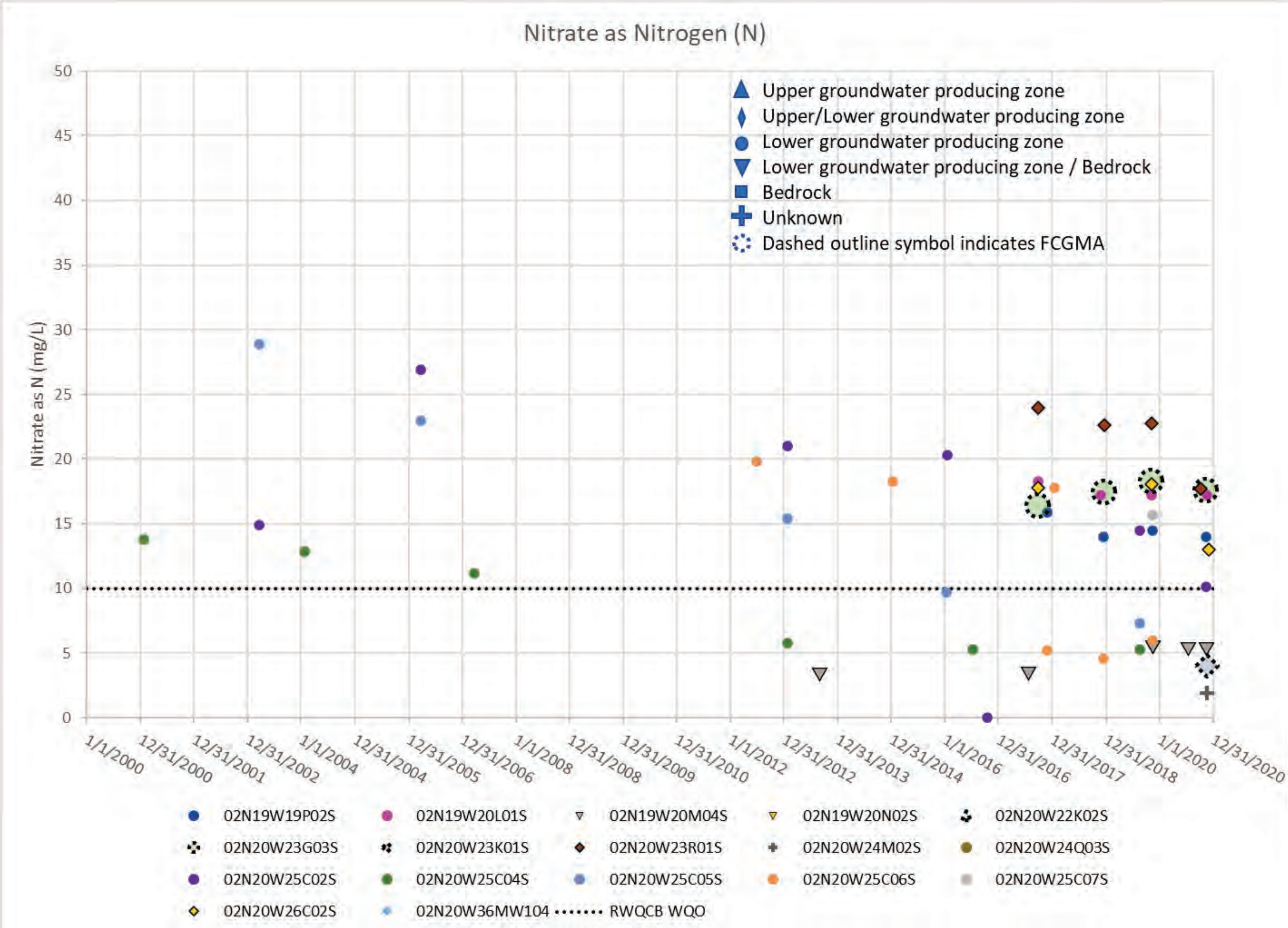


Figure 3.1-20 Time Series Data for Nitrate (as N) in the ASRVGB.

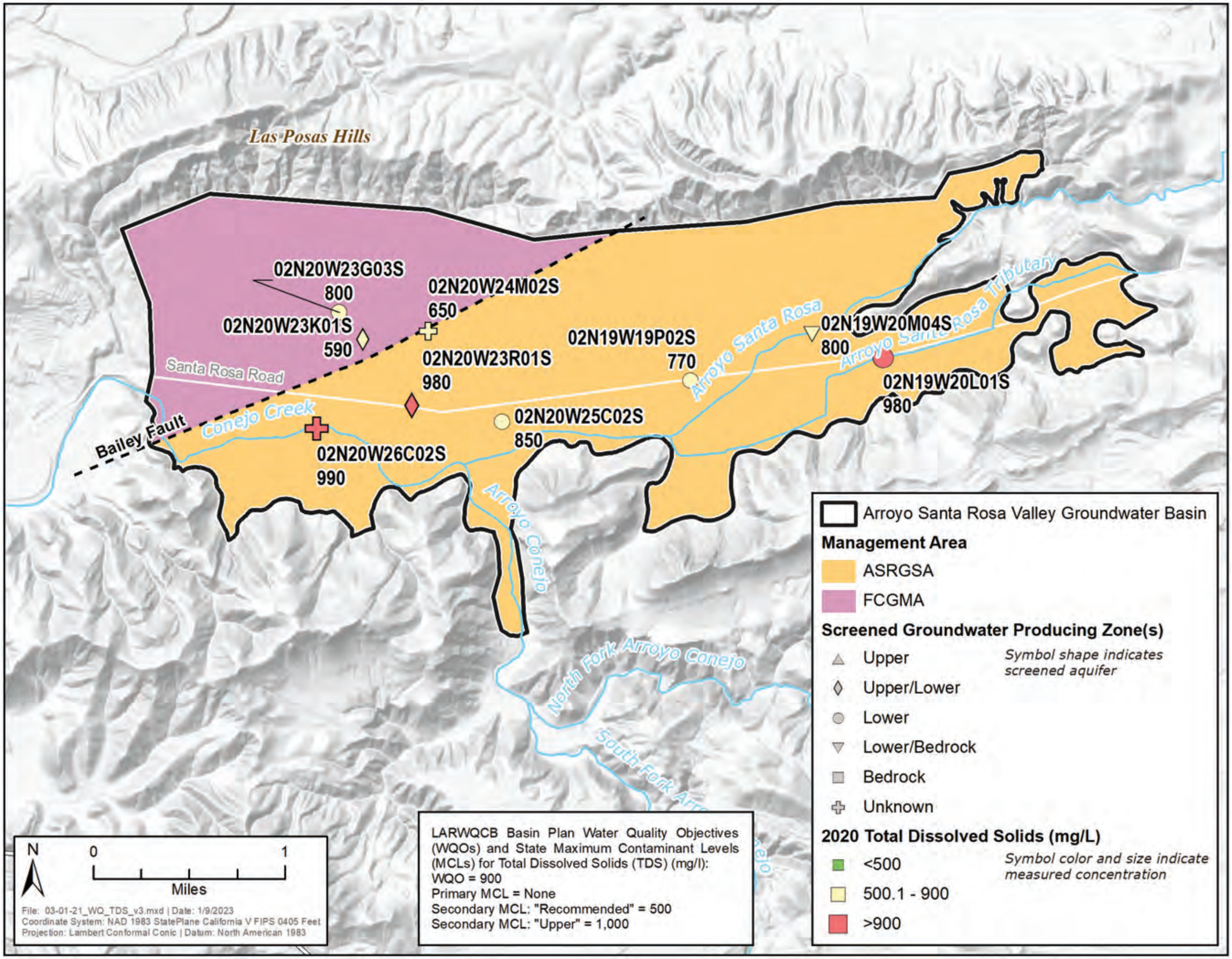


Figure 3.1-21 TDS Concentrations Detected in the ASRVGB during 2020.

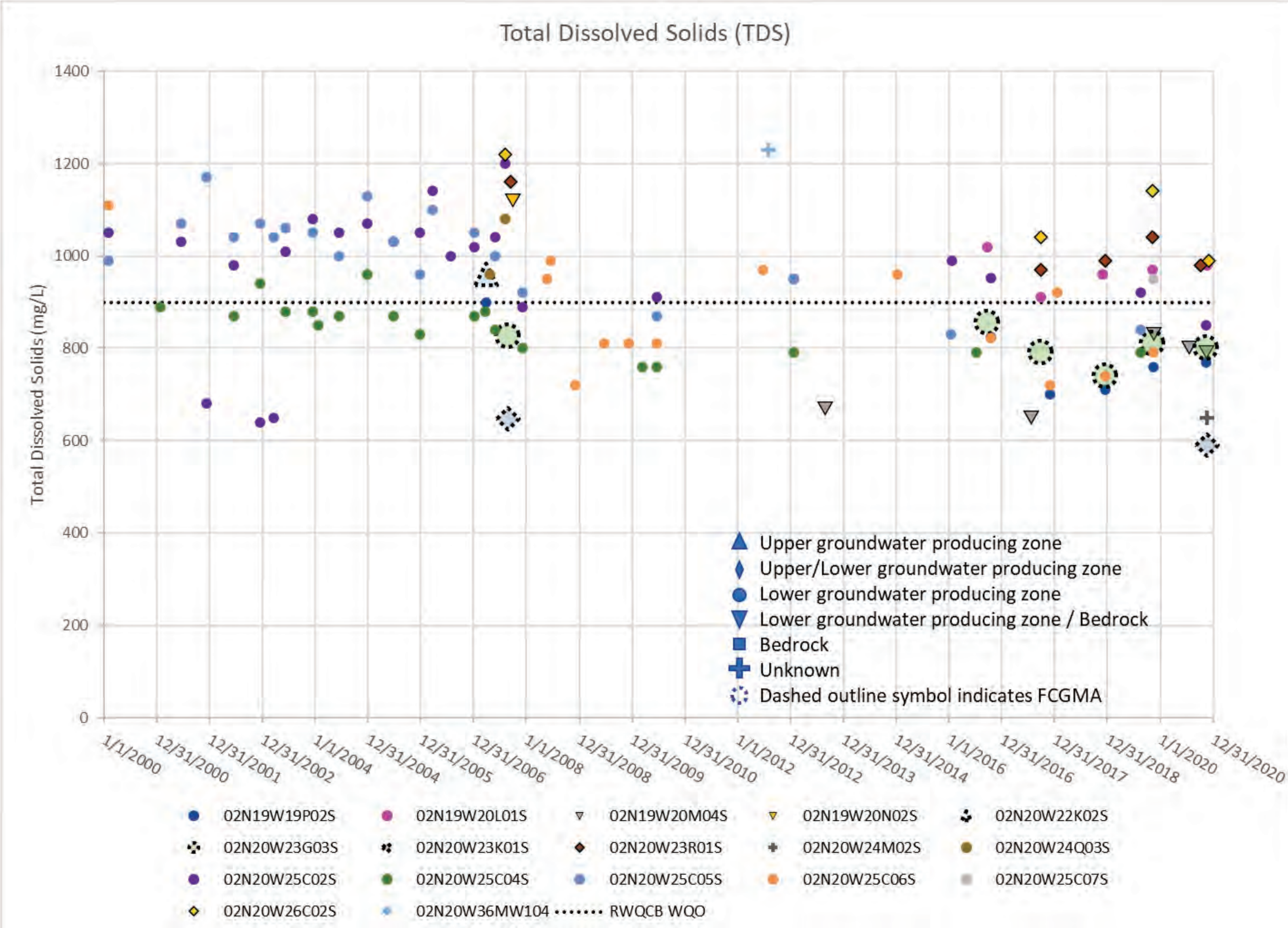


Figure 3.1-22 Time Series Data for TDS in the ASRVGB.

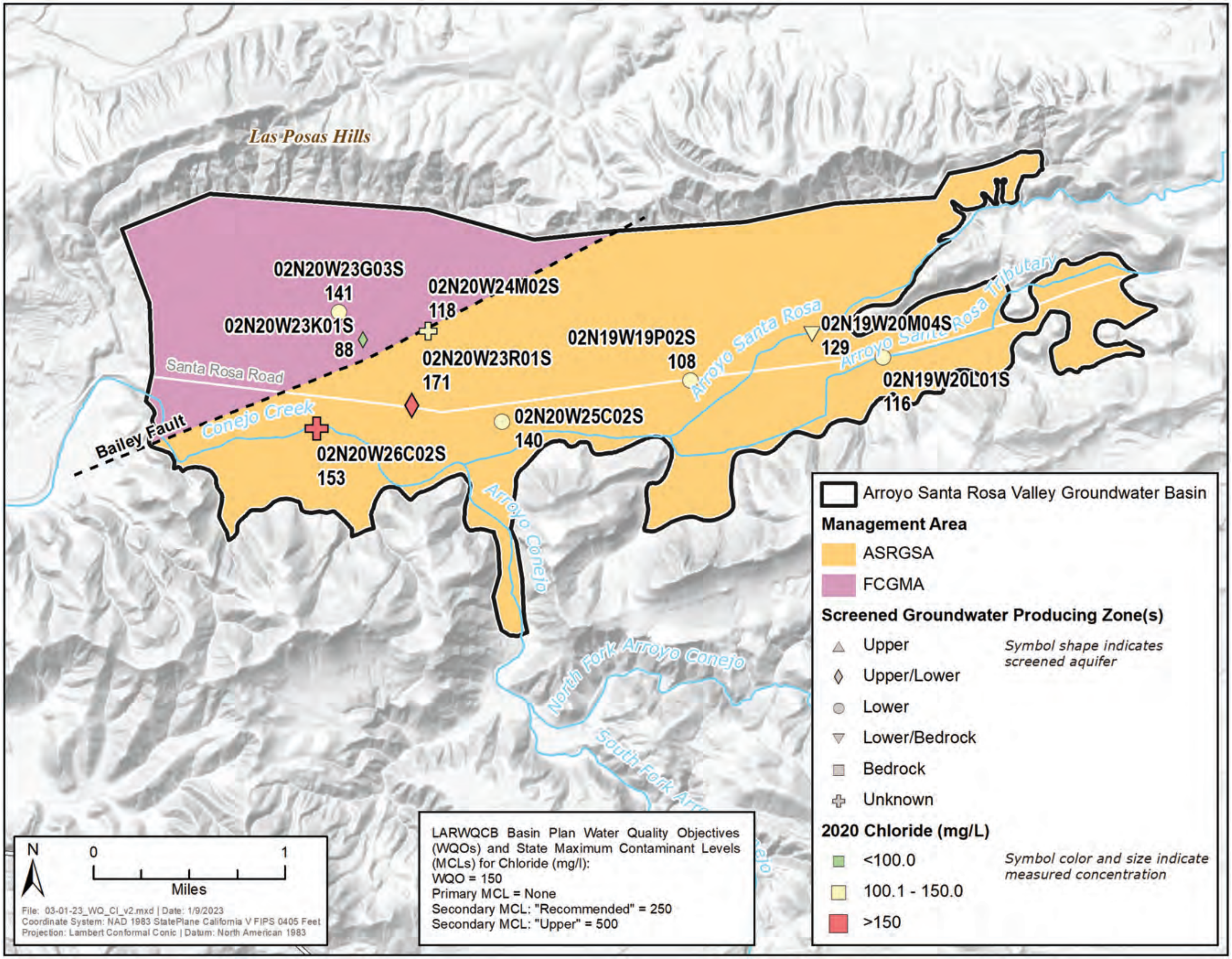


Figure 3.1-23 Chloride Concentrations Detected in the ASRVGB during 2020.

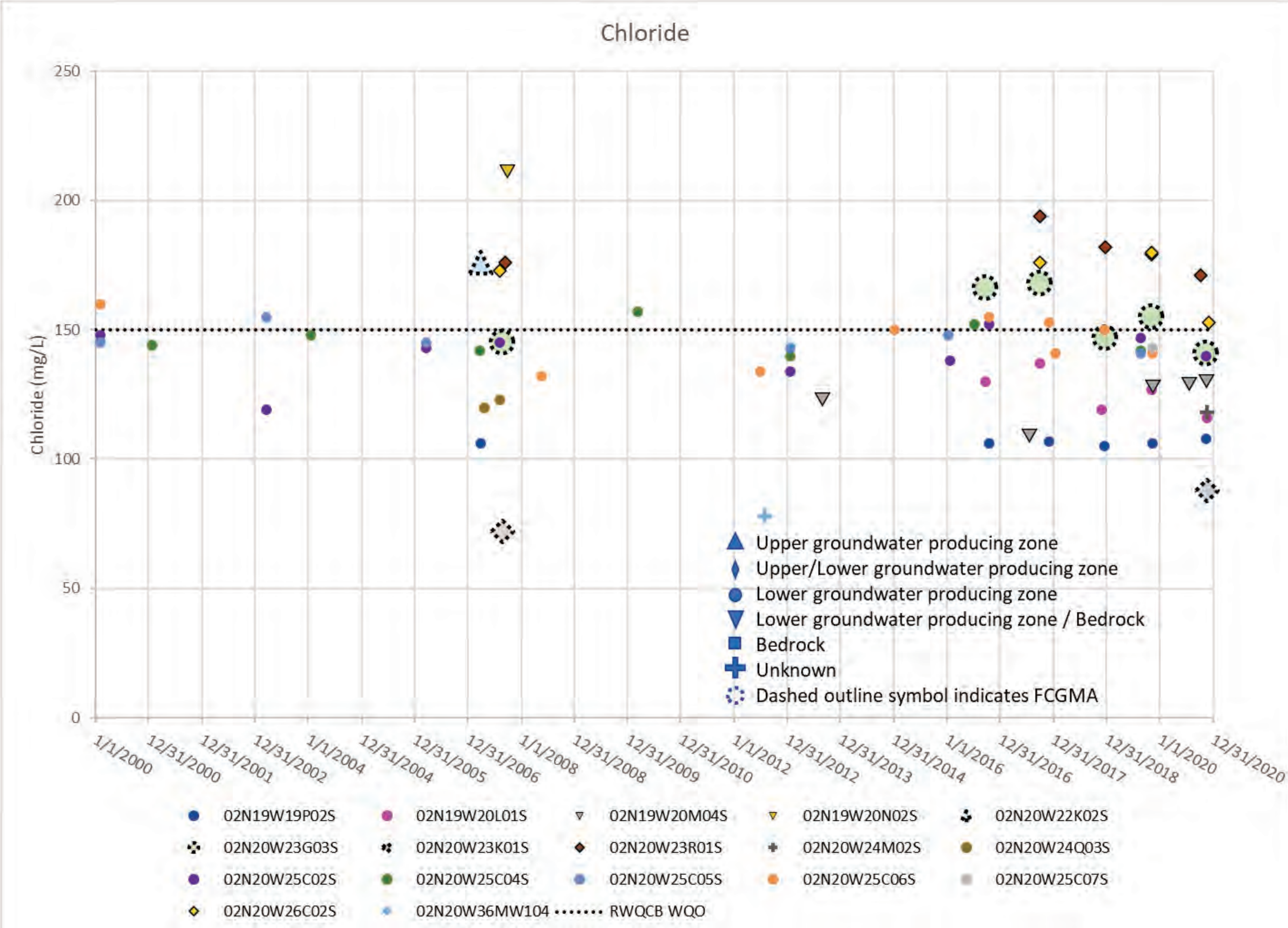


Figure 3.1-24 Time Series Data for Chloride in the ASRVGB.

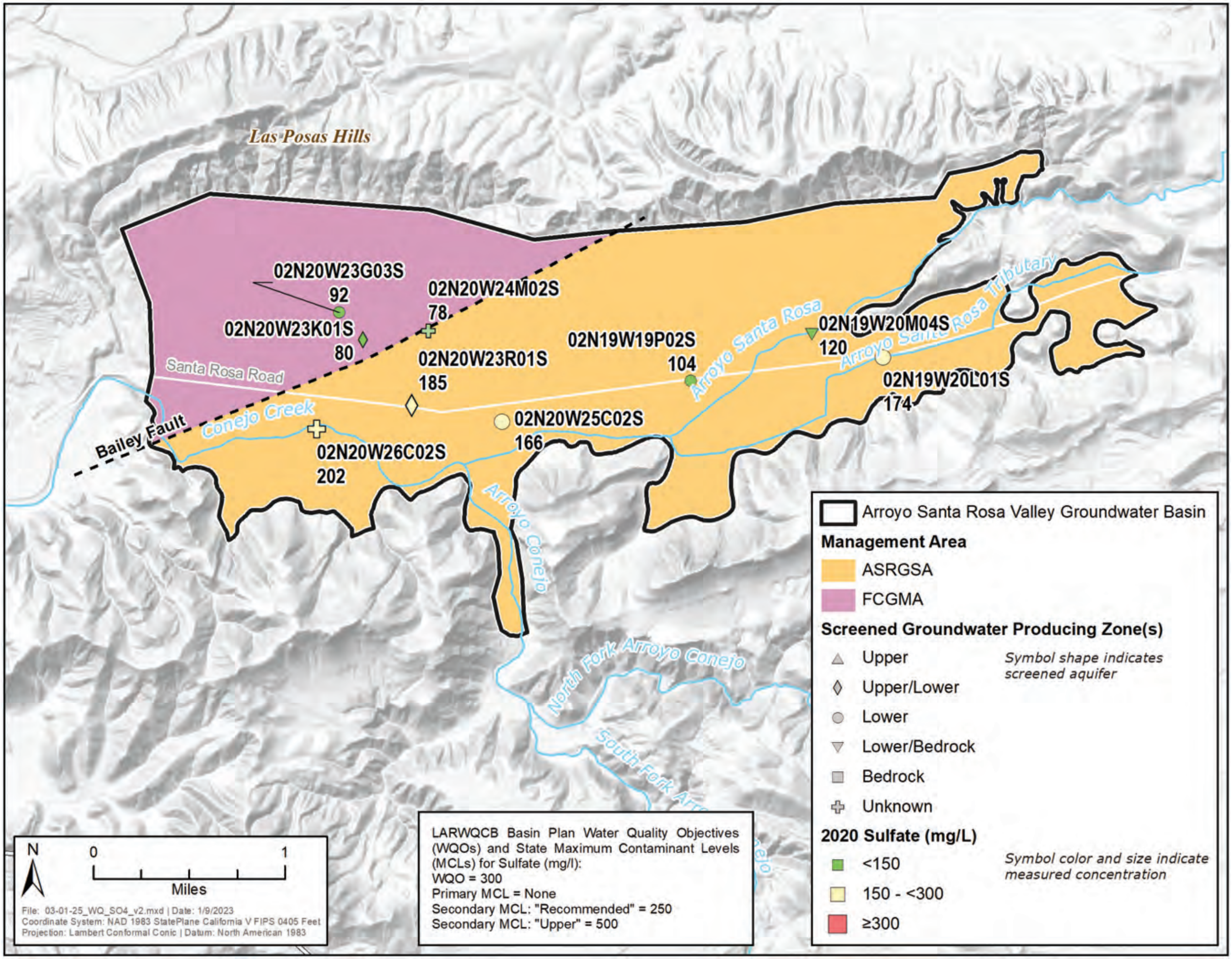


Figure 3.1-25 Sulfate Concentrations Detected in the ASRVGB during 2020.

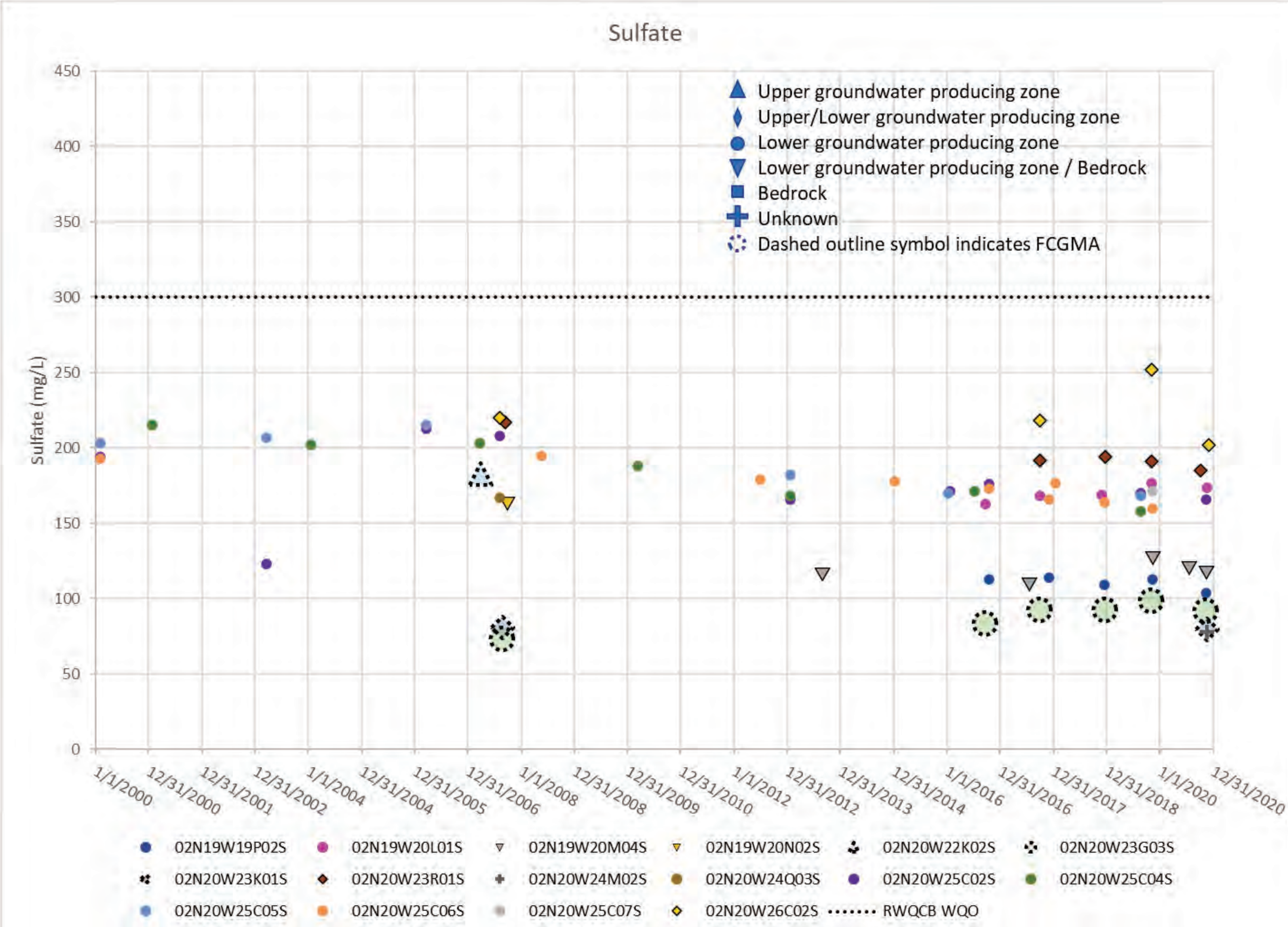


Figure 3.1-26 Time Series Data for Sulfate in the ASRVGB.

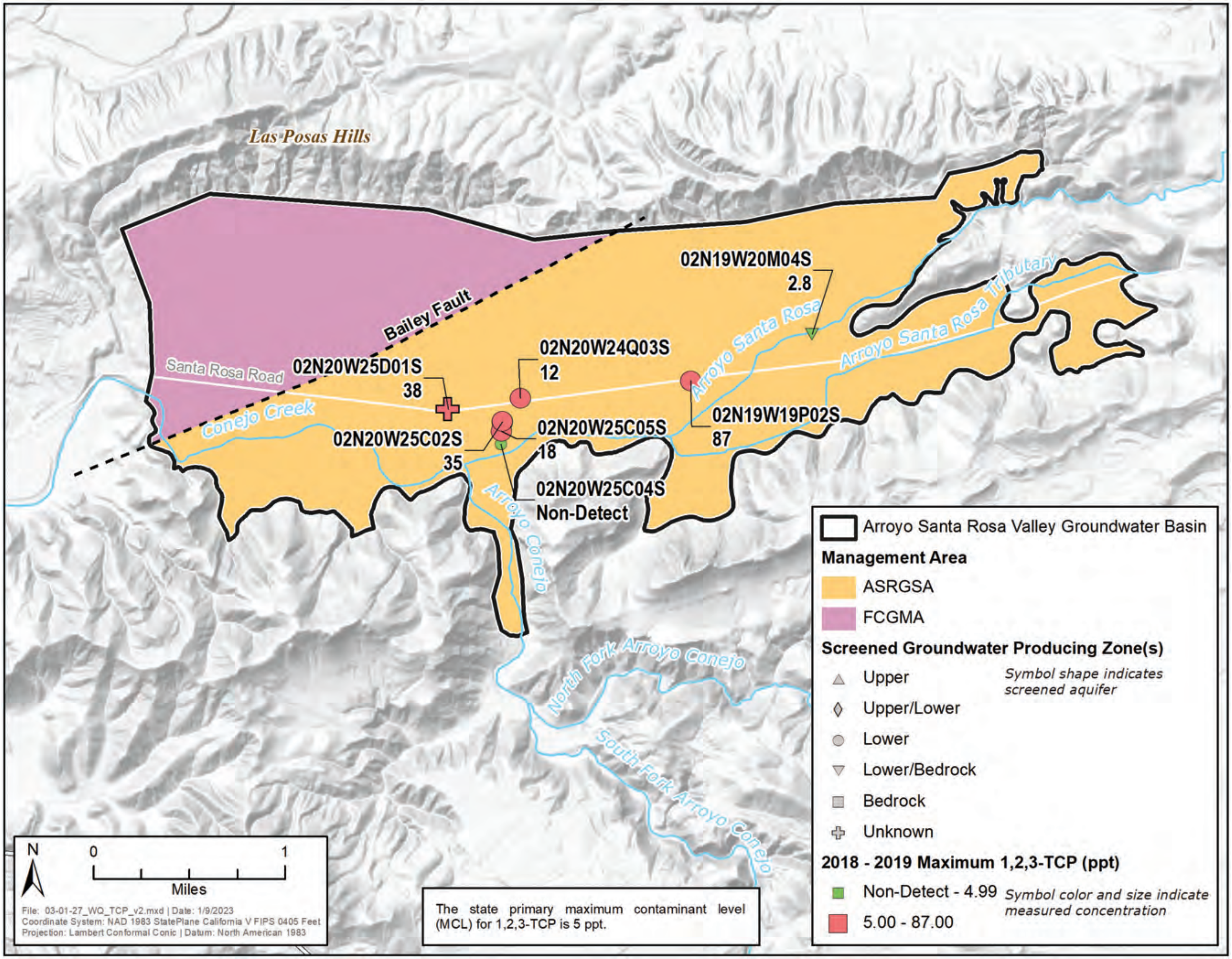


Figure 3.1-27 1,2,3-trichloropropane (TCP) Concentrations Detected in the ASRVGB.

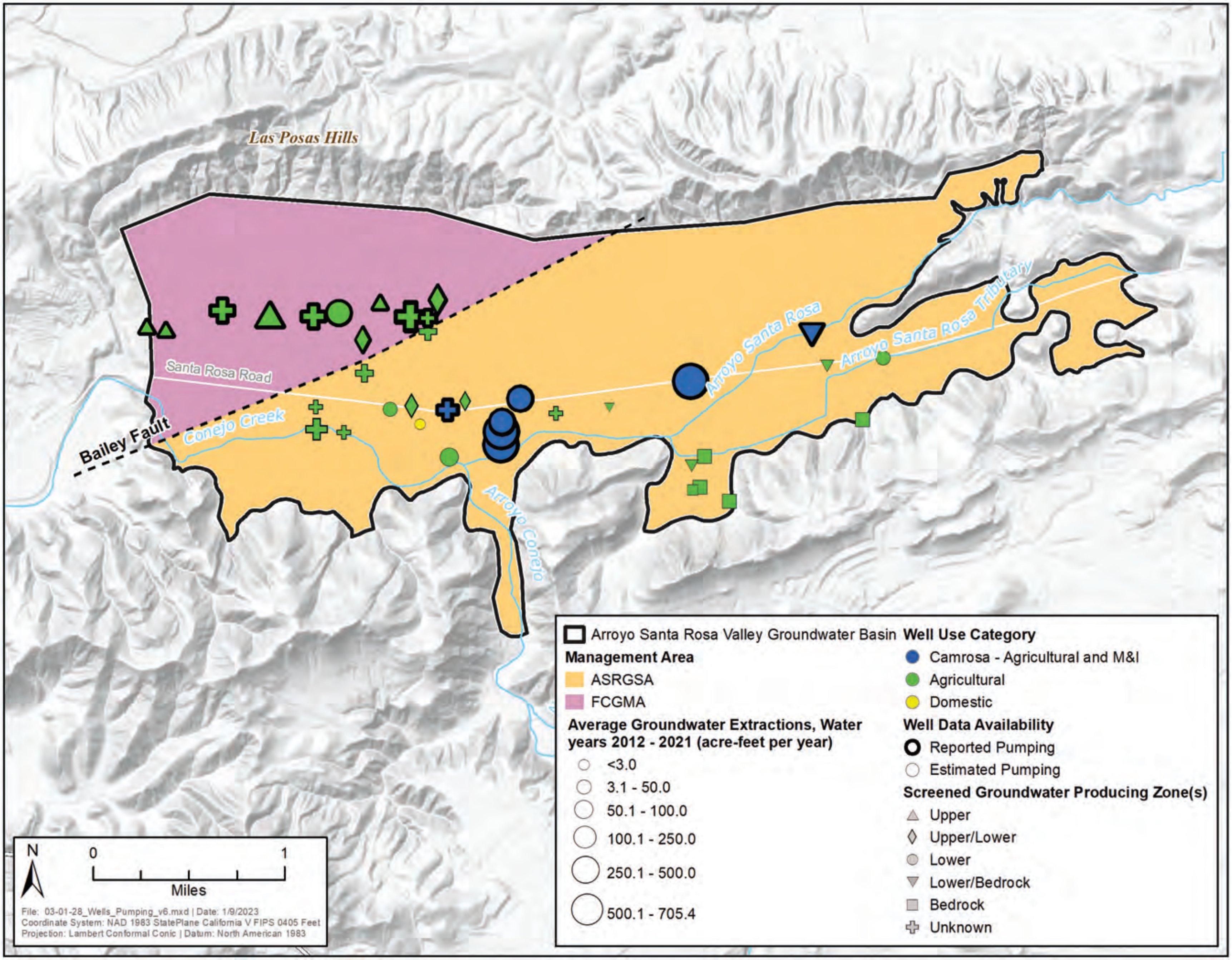


Figure 3.1-28 Pumping Wells and Rates with Beneficial Uses.

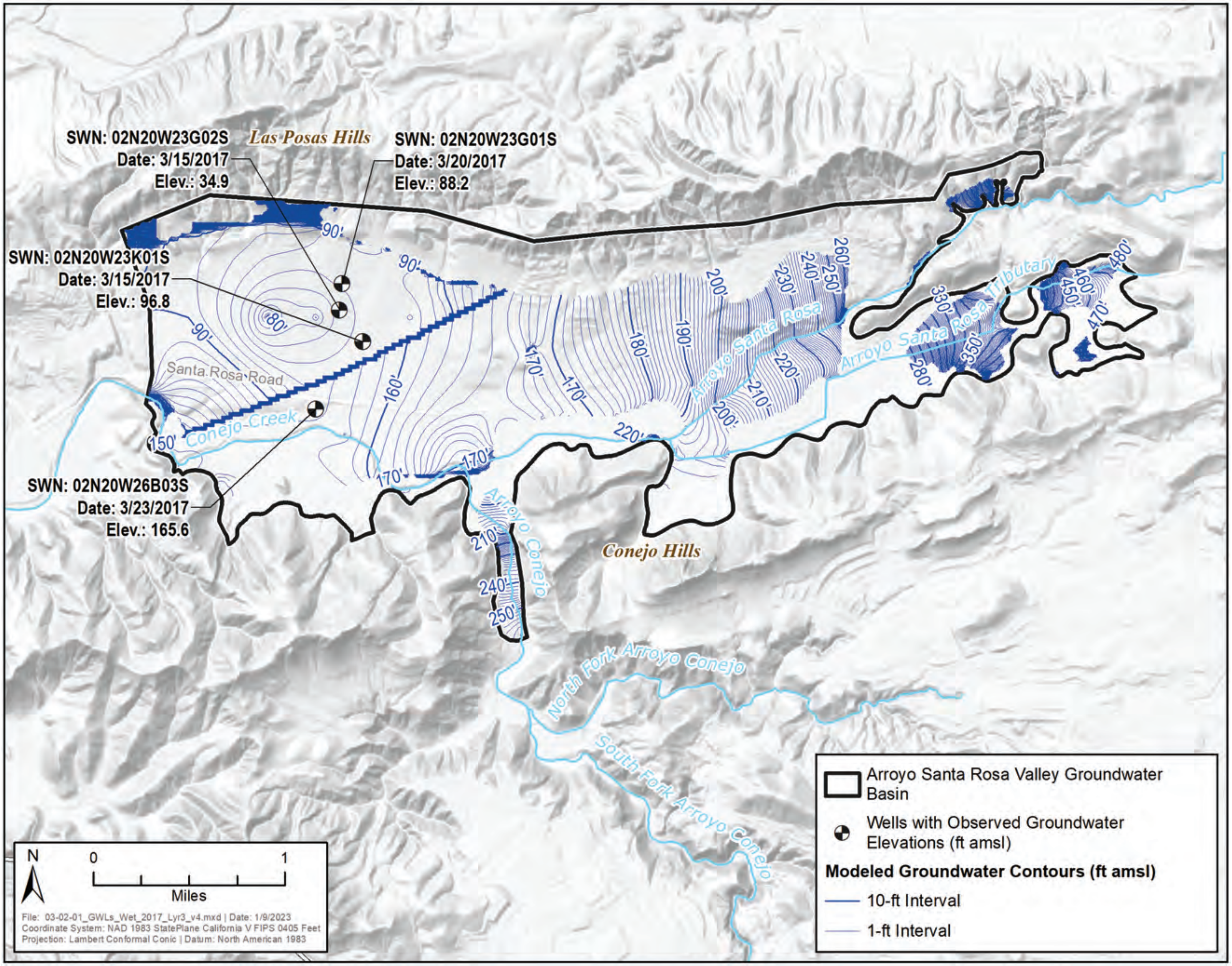


Figure 3.2-01a Contour Map for Seasonal High Modeled Water Levels (Wet Season) in the Upper Groundwater Production Zone - February 2017.

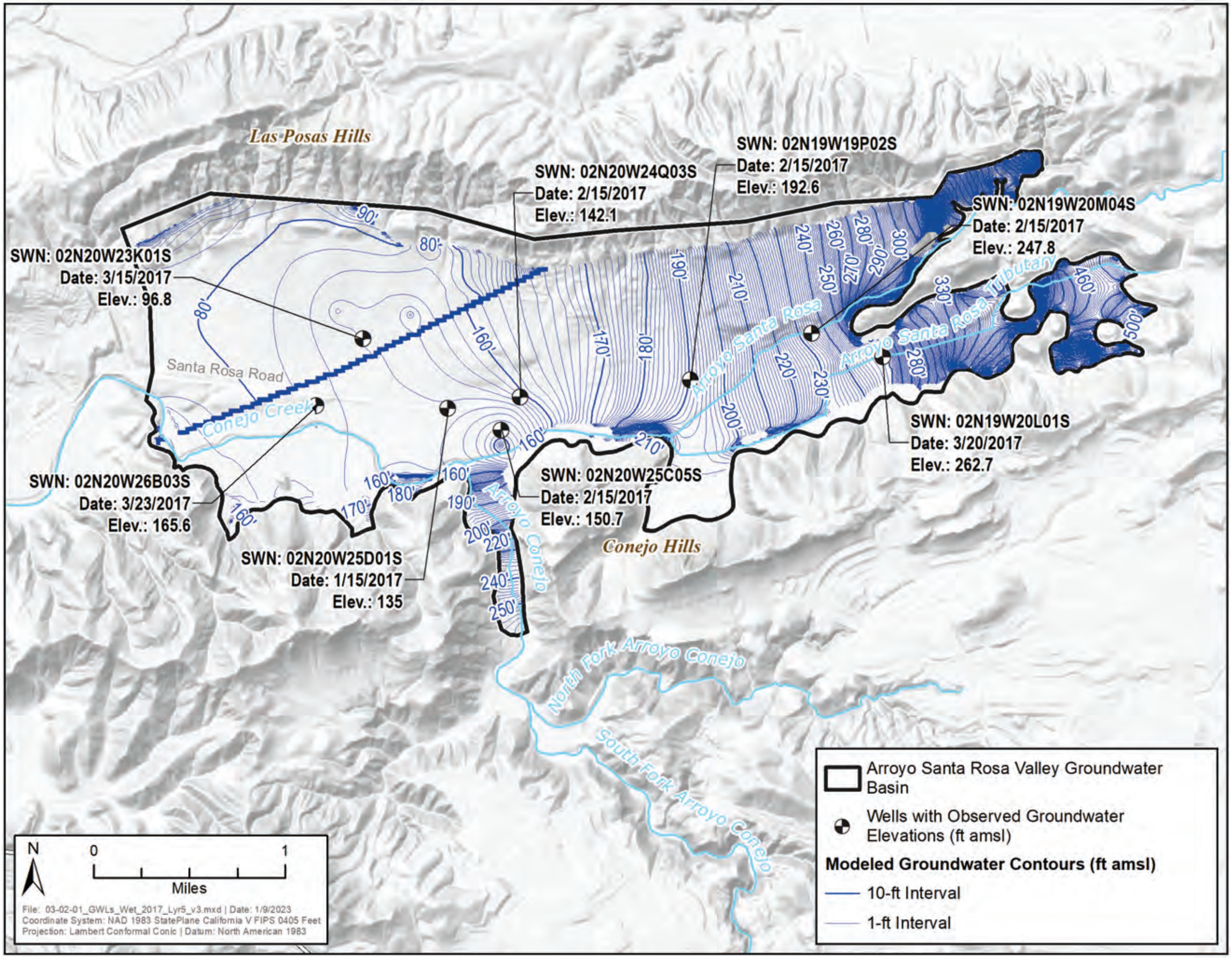


Figure 3.2-01b Contour Map for Seasonal High Modeled Water Levels (Wet Season) in the Lower Groundwater Production Zone - February 2017.

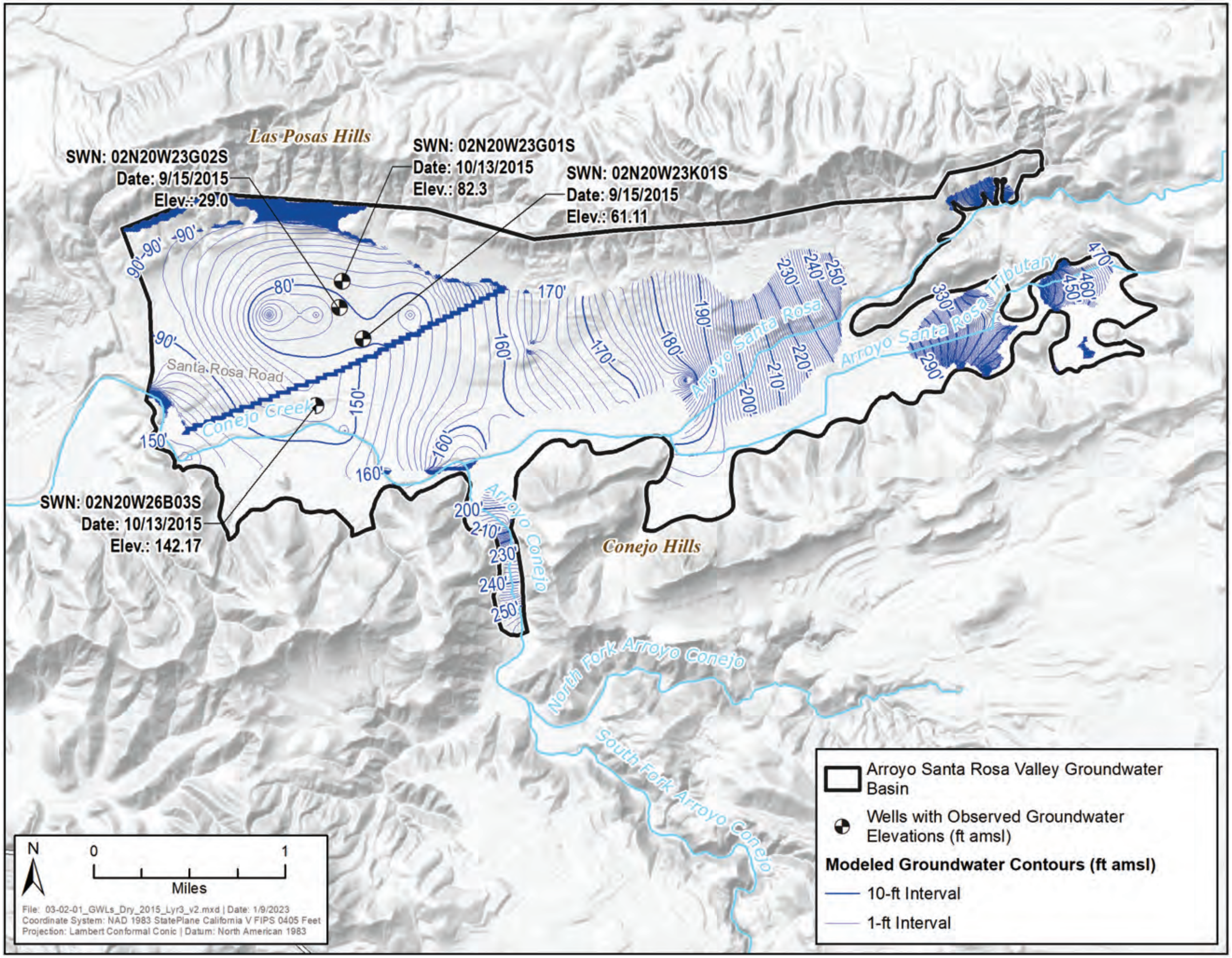


Figure 3.2-02a Contour Map for Seasonal Low Modeled Water Levels (Dry Season) in the Upper Groundwater Production Zone - November 2015.

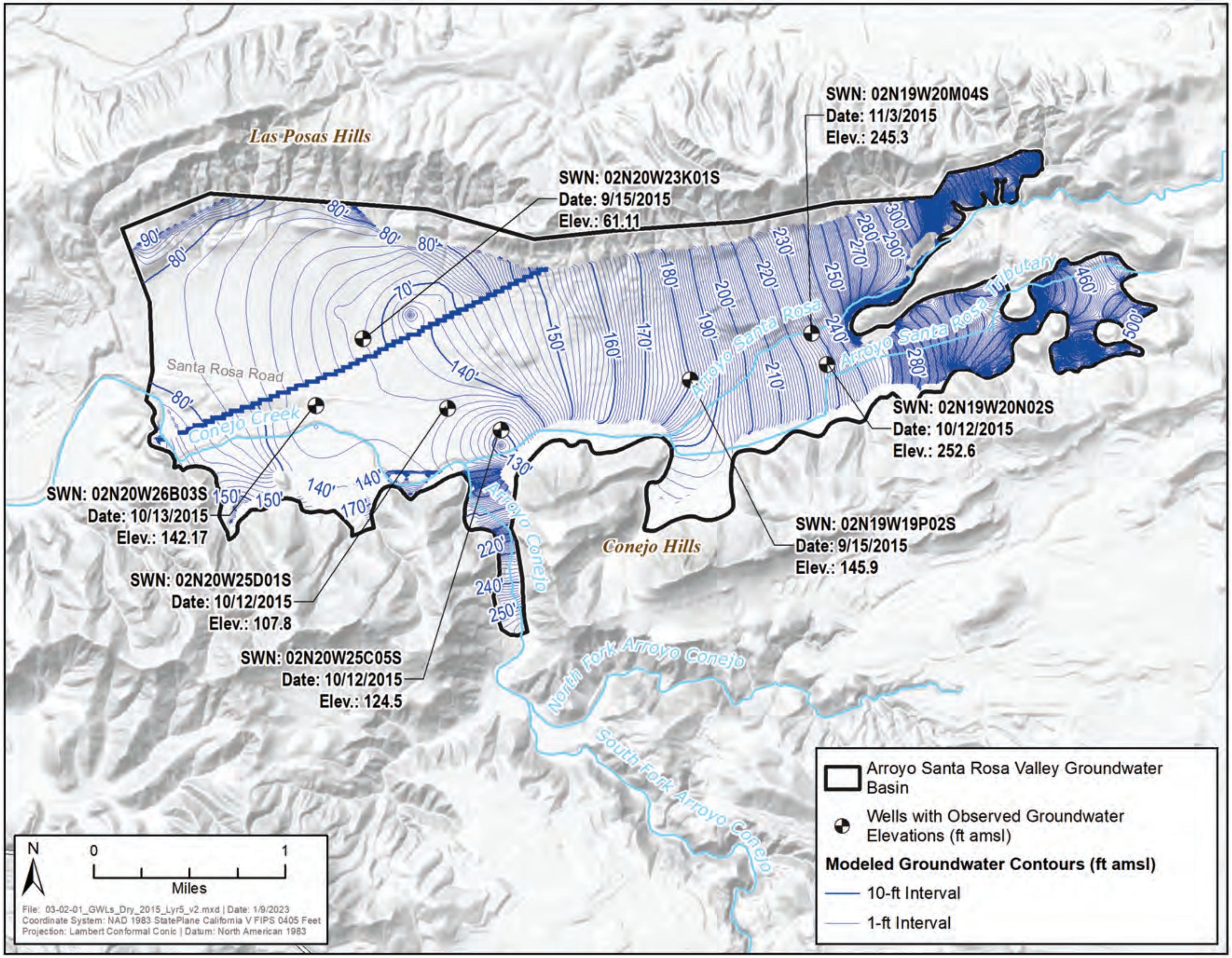


Figure 3.2-02b Contour Map for Seasonal Low Modeled Water Levels (Dry Season) in the Lower Groundwater Production Zone - November 2015.

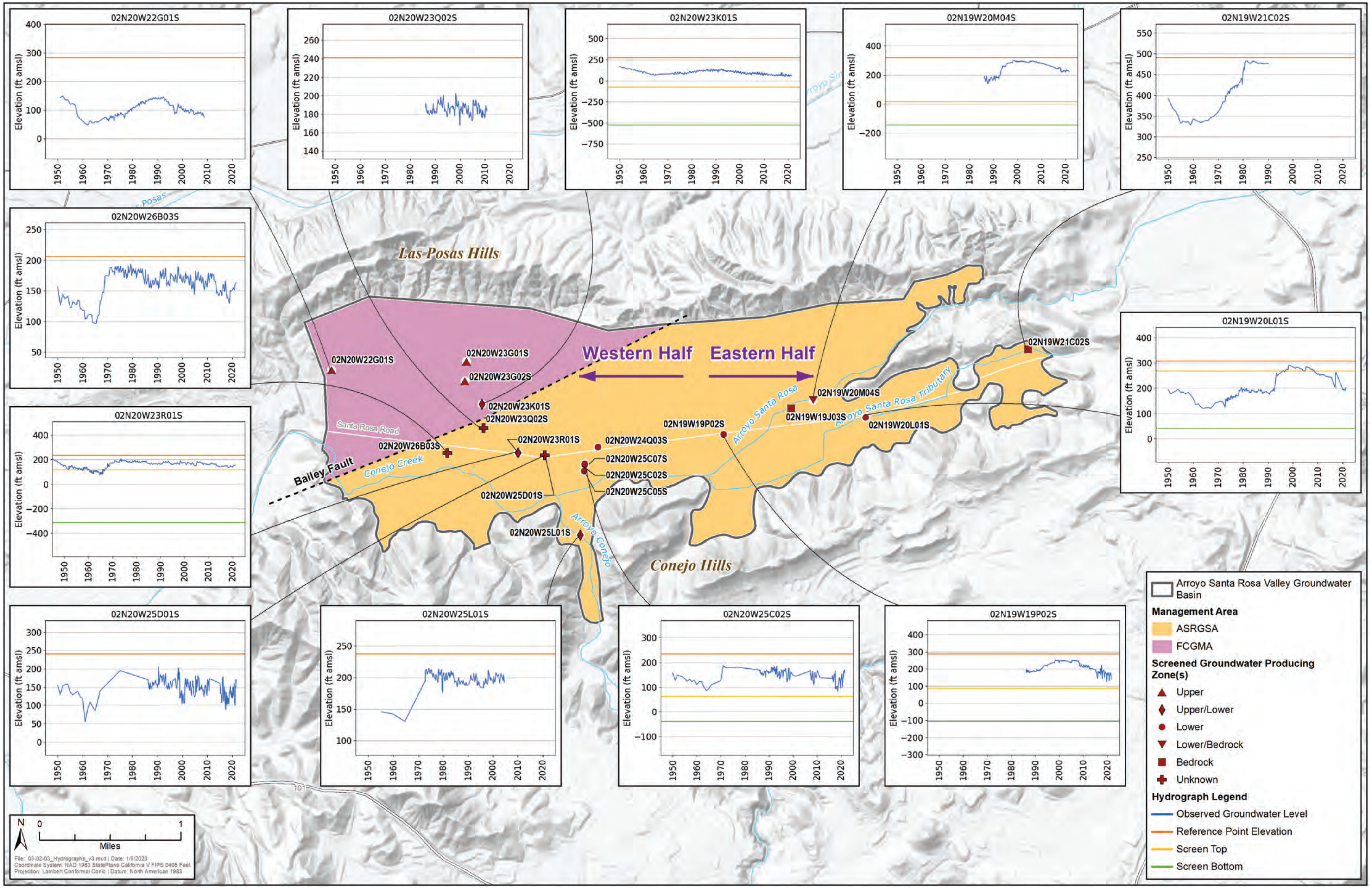


Figure 3.2-03 Groundwater Level Hydrographs for Key Wells in the ASRVGB.

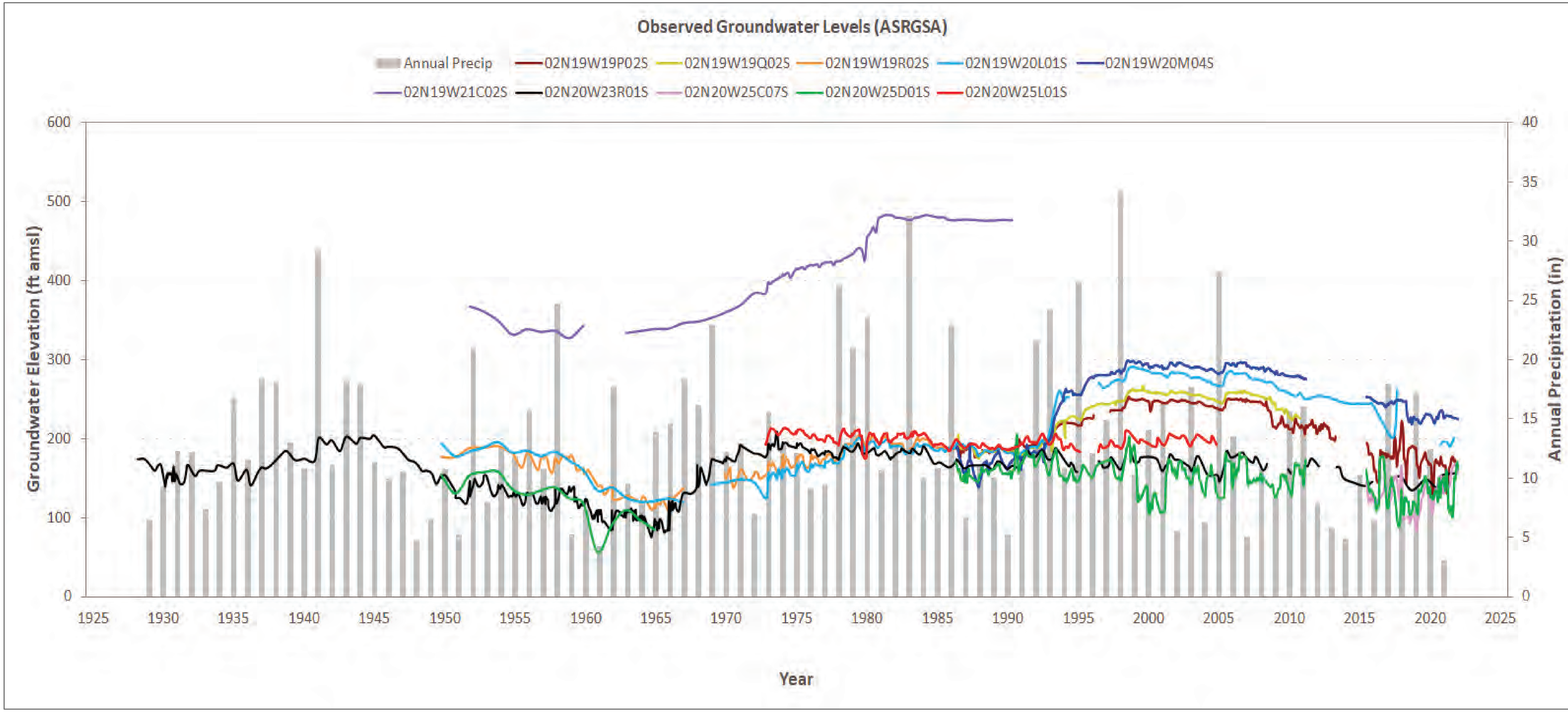


Figure 3.2-04a Combined Hydrographs from Key Wells for ASRGSA.

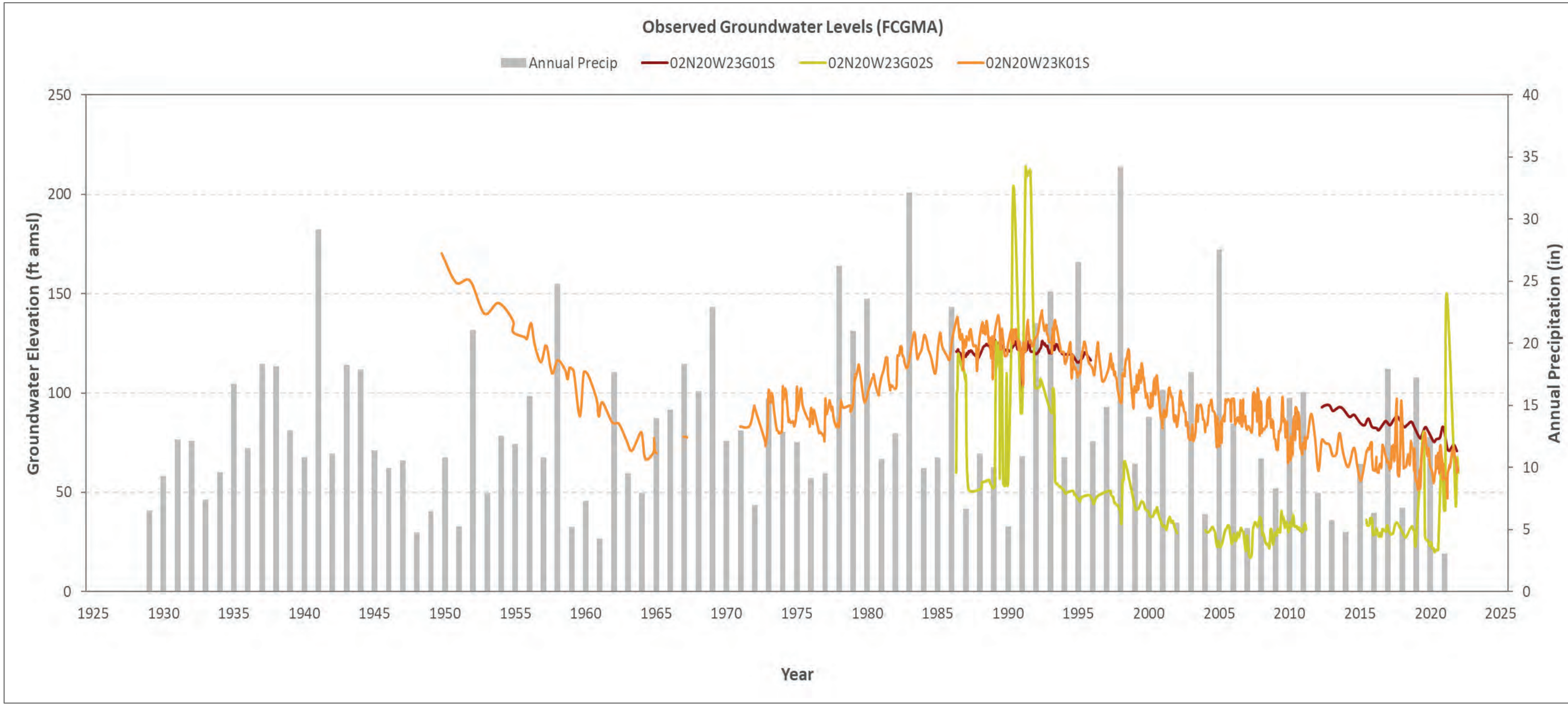


Figure 3.2-04b Combined Hydrographs from Key Wells for FCGMA.

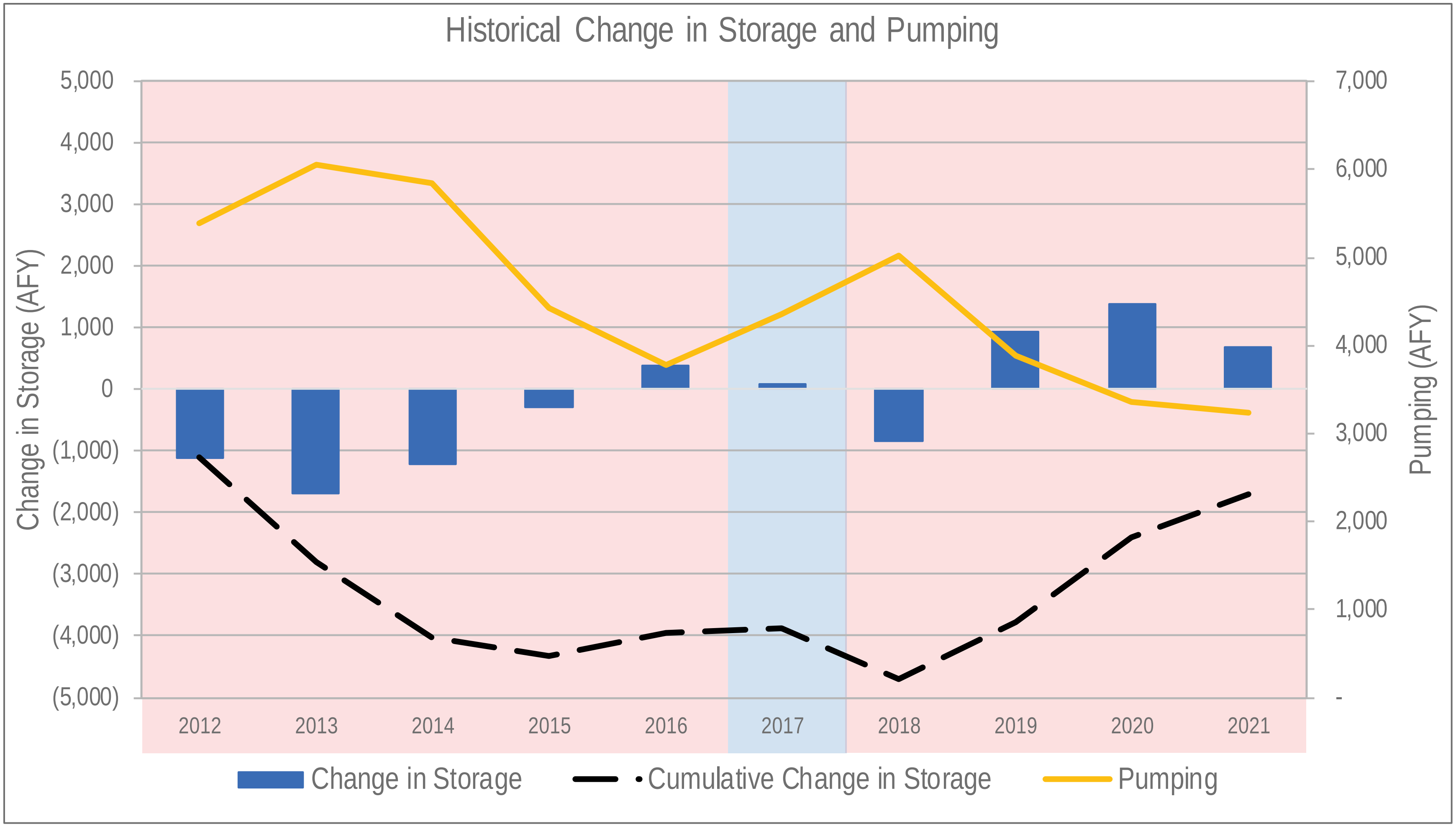


Figure 3.2-05 Historical Change in Groundwater Storage with Annual Groundwater Use and Water Year Type.

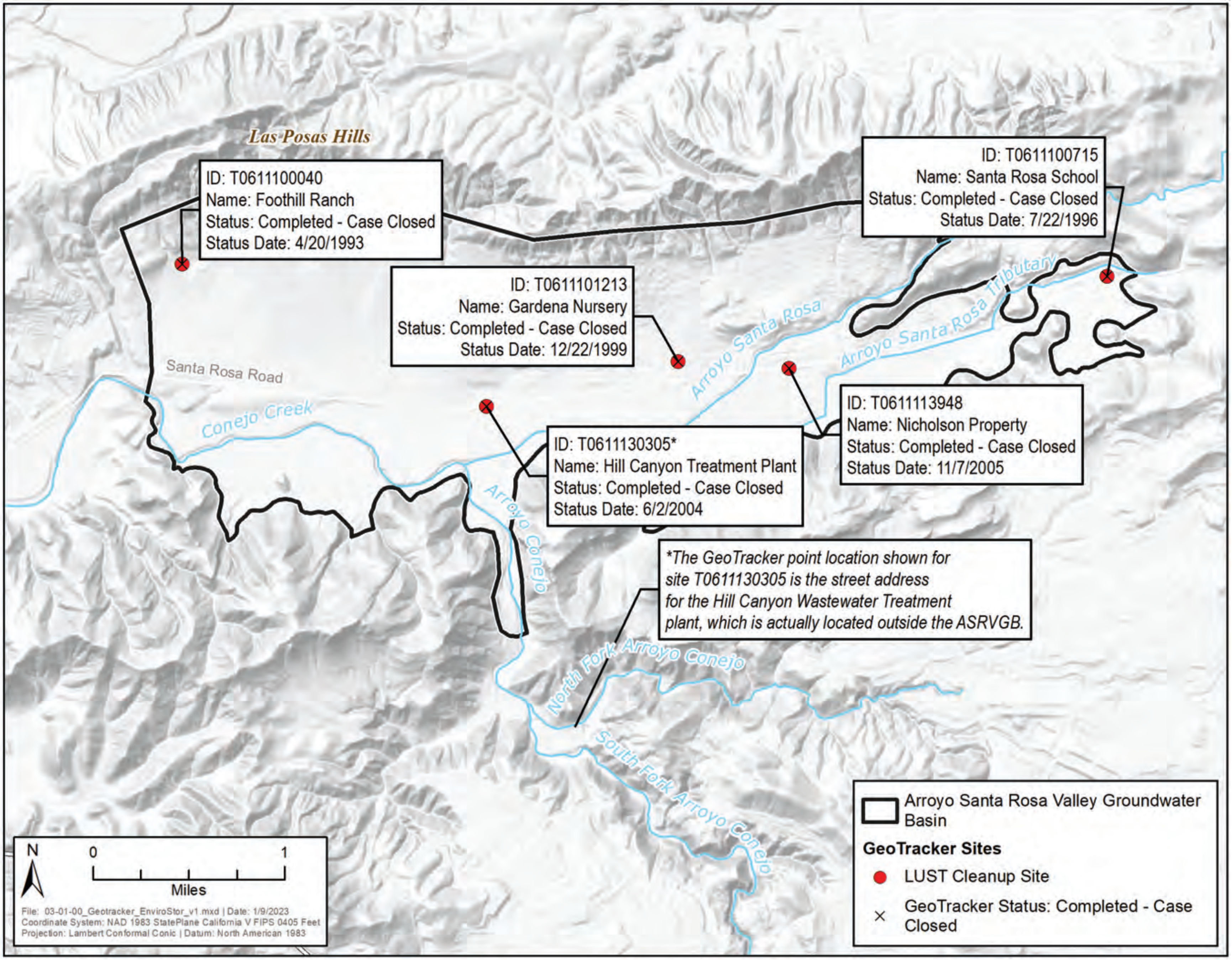


Figure 3.2-06 Location and Status of Environmental Sites within the ASRVGB.

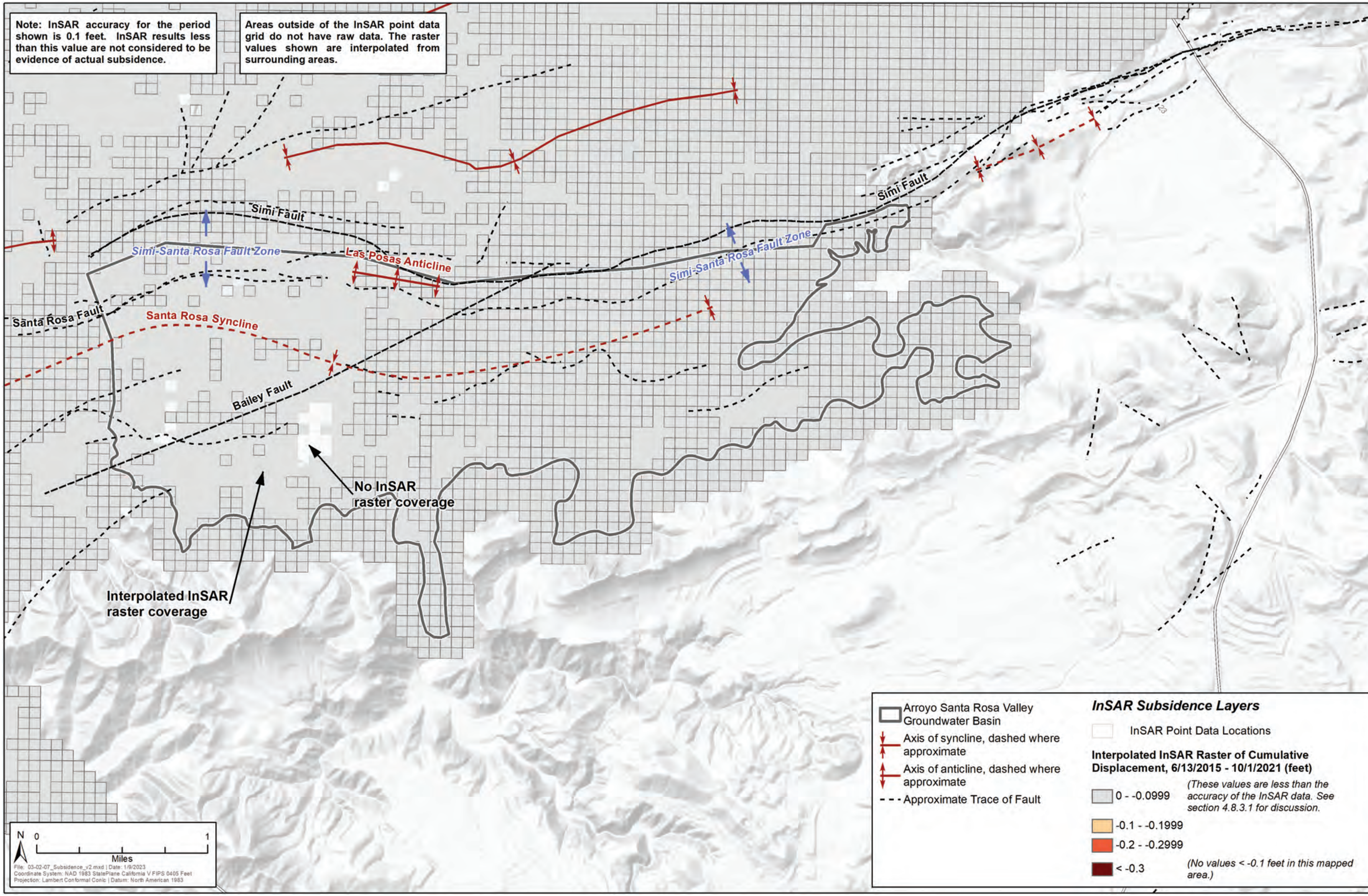


Figure 3.2-07 Land Subsidence in the ASRVGB.

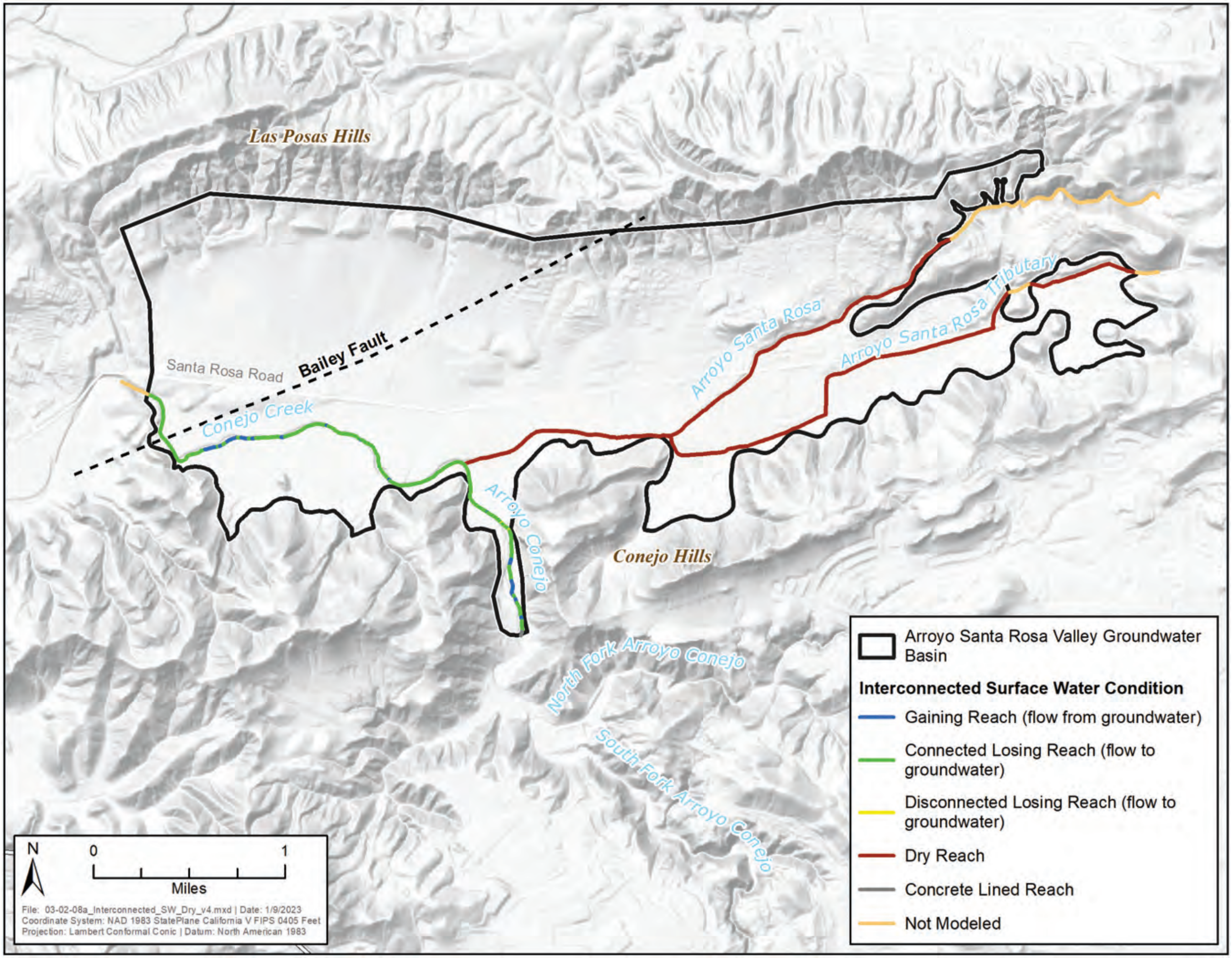


Figure 3.2-08a Gaining and Losing Reaches of the Arroyo Conejo and Conejo Creek During Dry Conditions (November 2015).

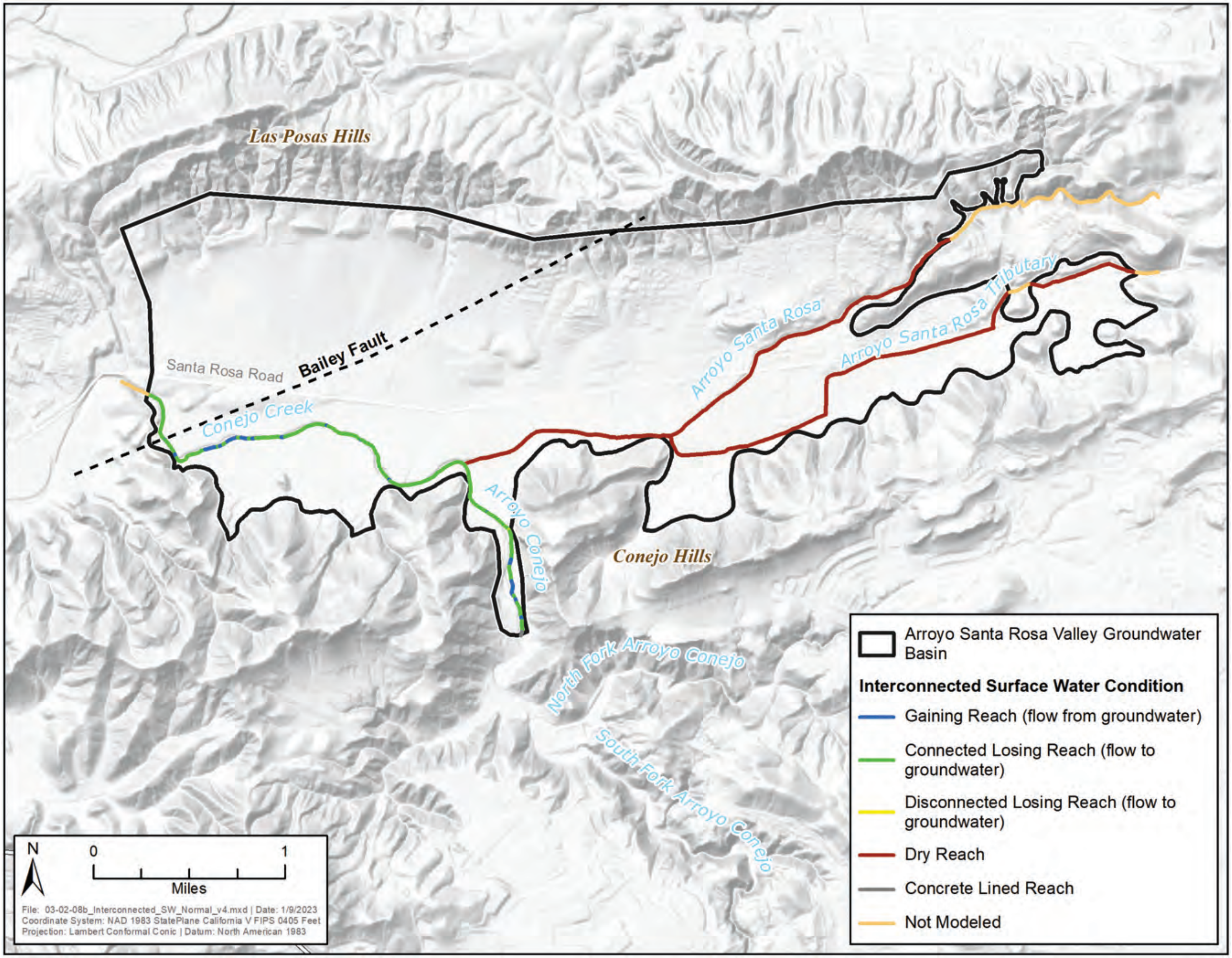


Figure 3.2-08b Gaining and Losing Reaches of the Arroyo Conejo and Conejo Creek During Normal Conditions (June 2017).

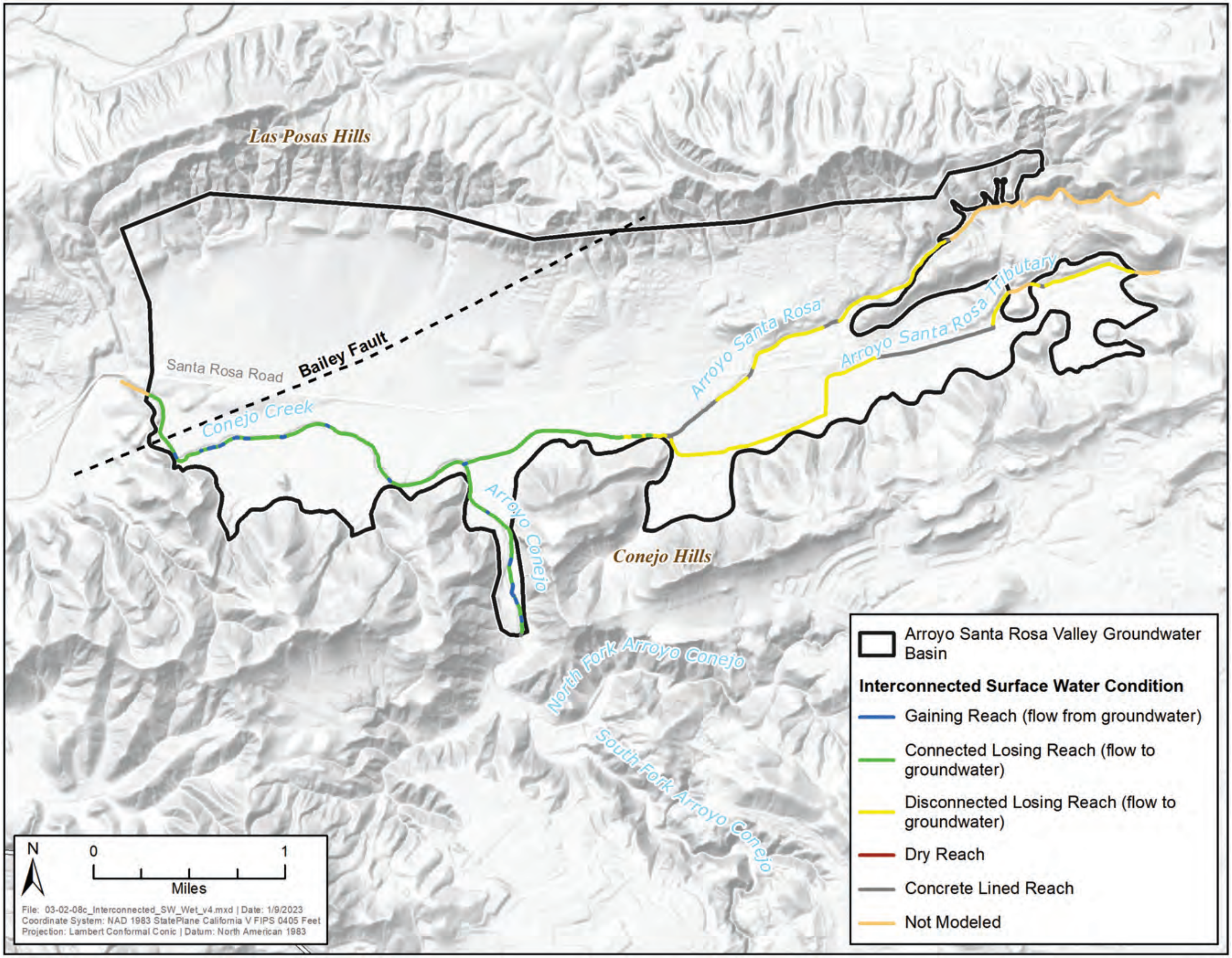


Figure 3.2-08c Gaining and Losing Reaches of the Arroyo Conejo and Conejo Creek During Wet Conditions (February 2017).

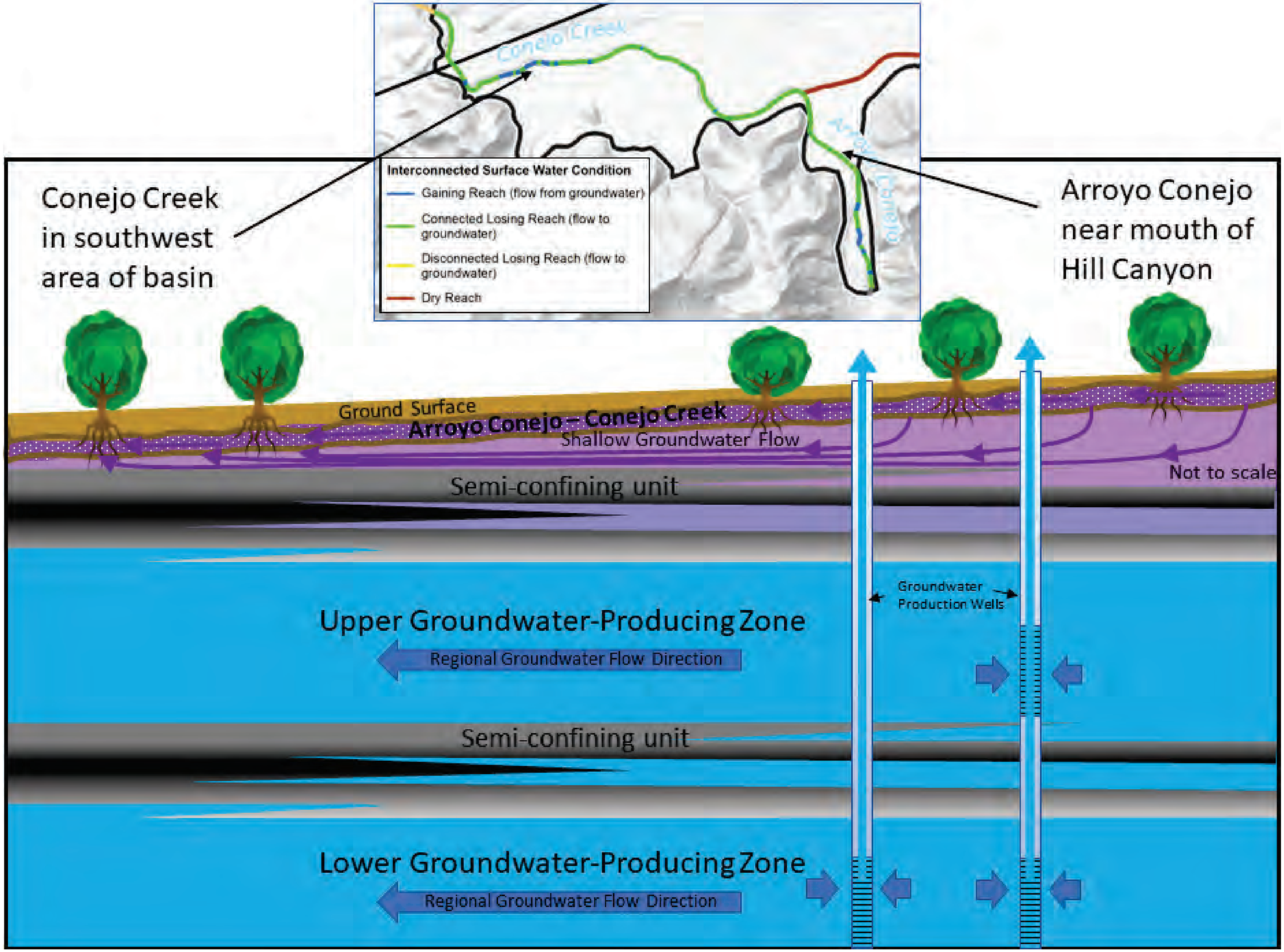


Figure 3.2-09 Schematic for the Interconnection of Surface Water and Shallow Groundwater.

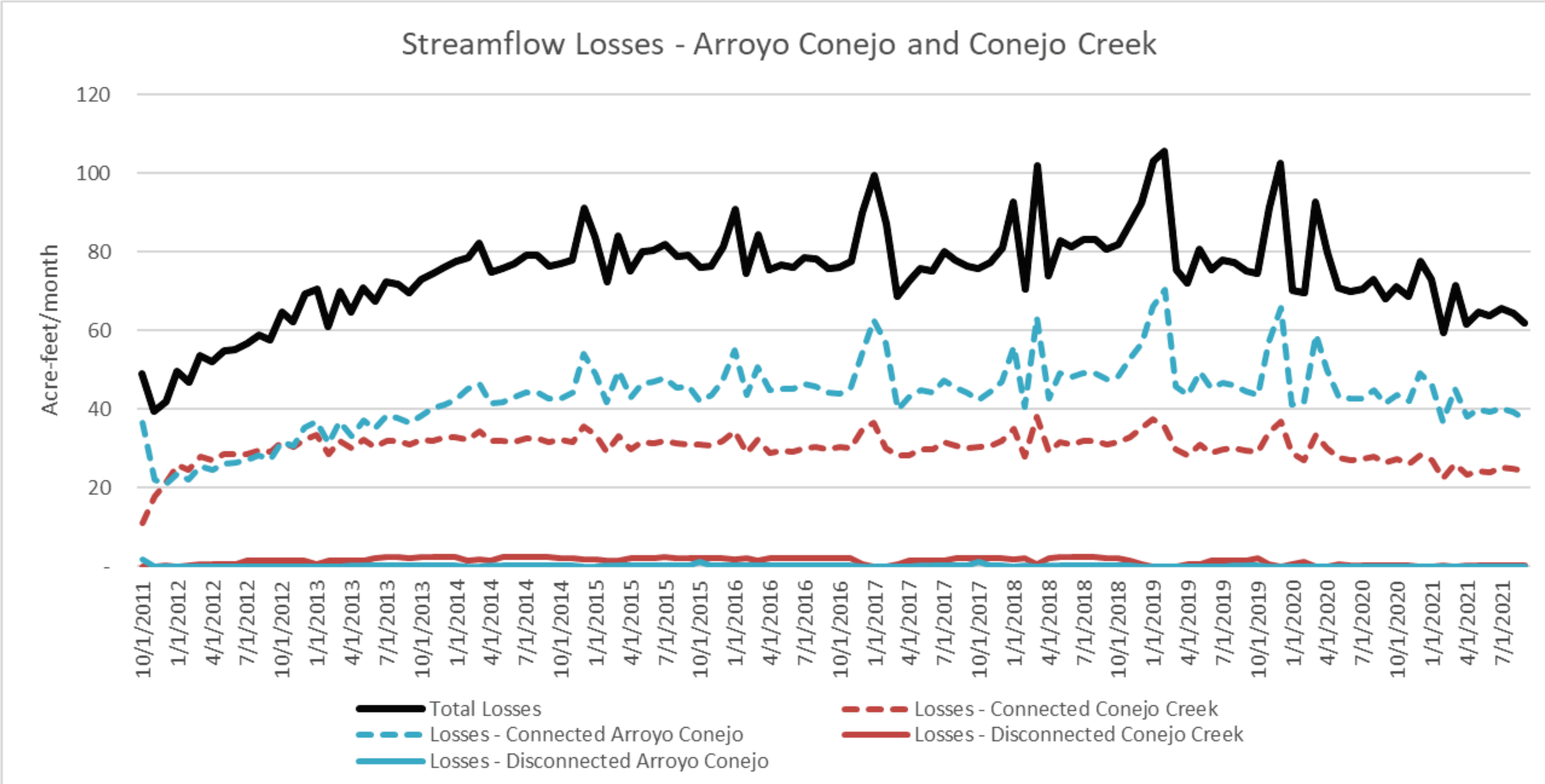


Figure 3.2-10 Streamflow Losses for the Arroyo Conejo and Conejo Creek.

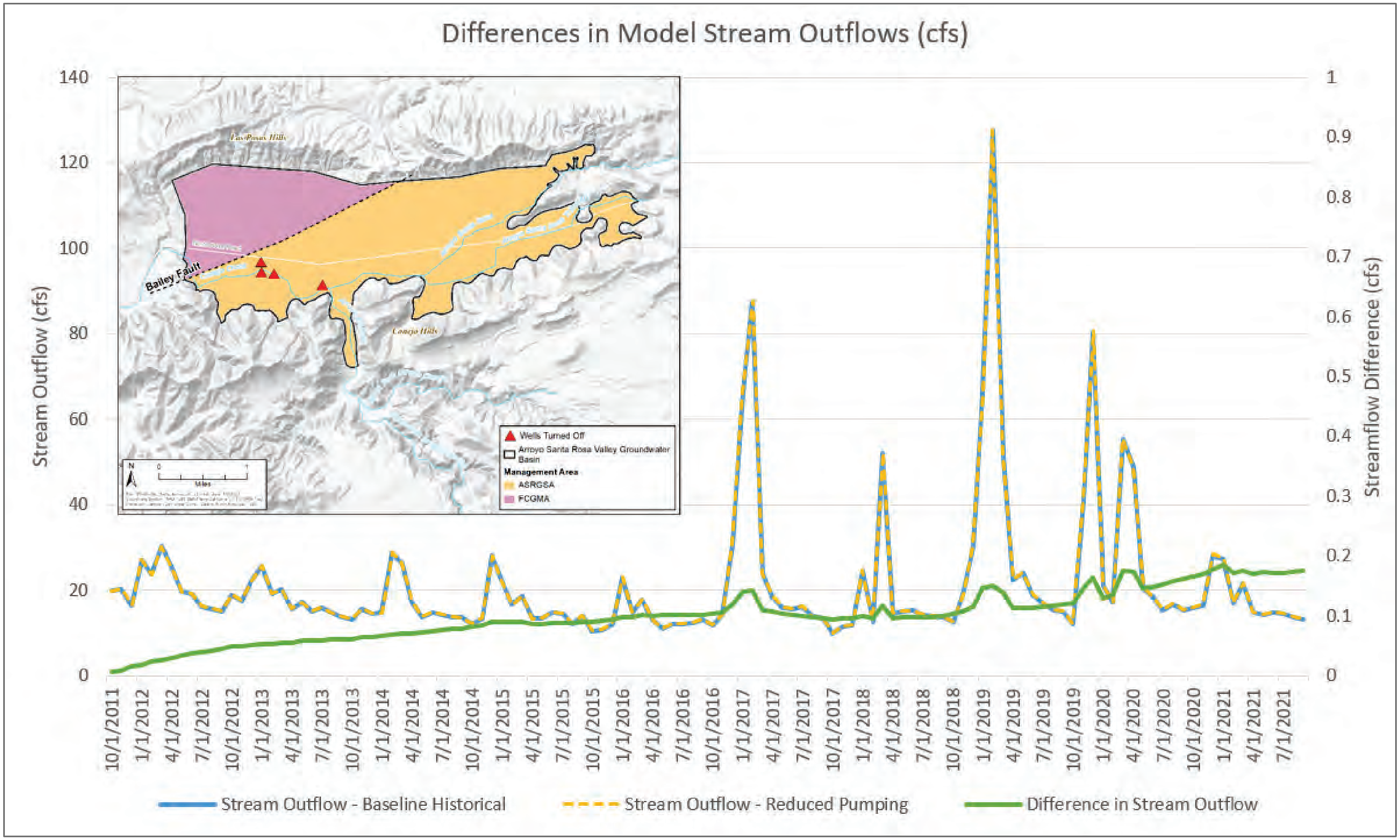


Figure 3.2-11 Modeled Streamflow Depletion Within the ASRVGB.

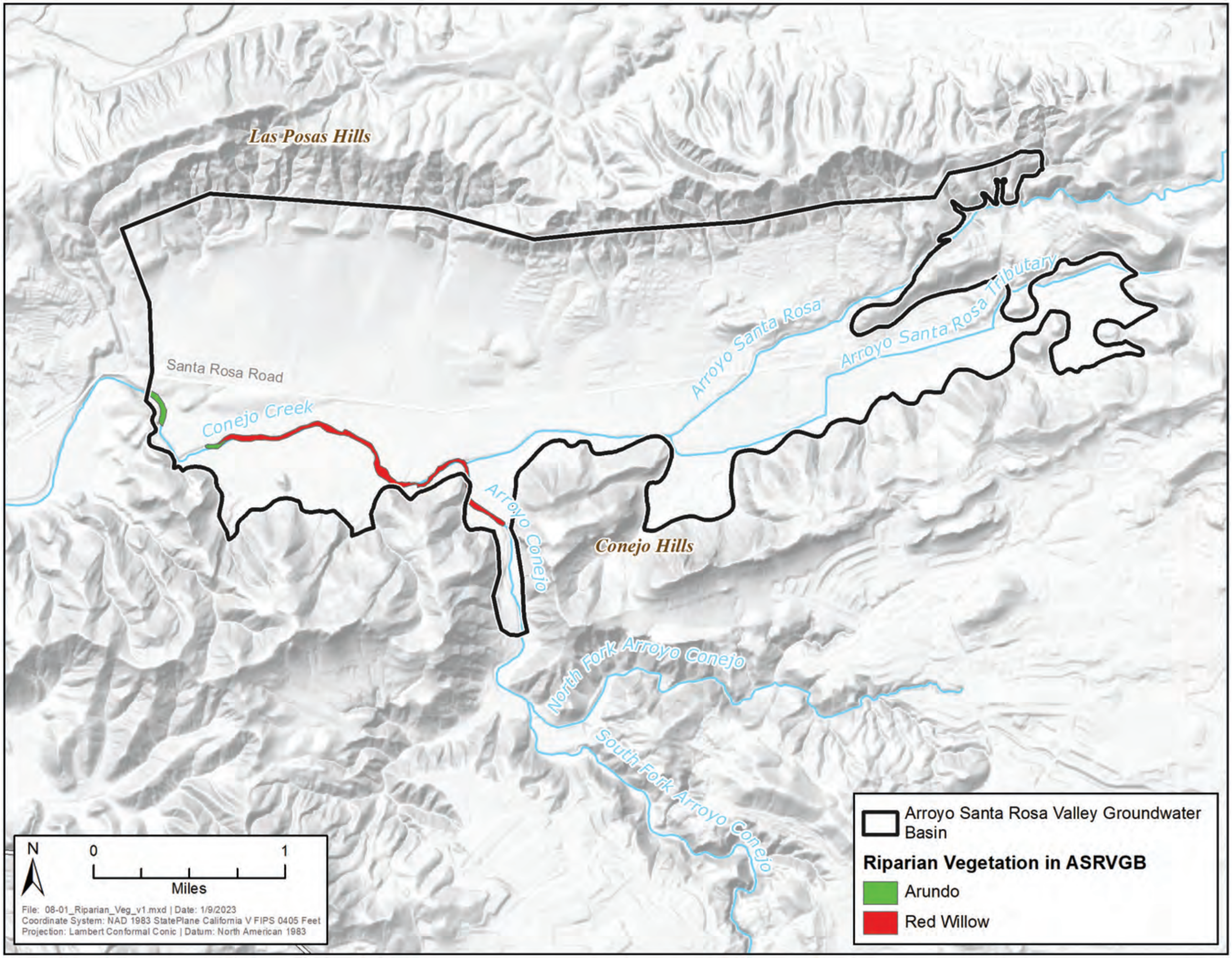


Figure 3.2-12 Potential Groundwater-Dependent Ecosystems.

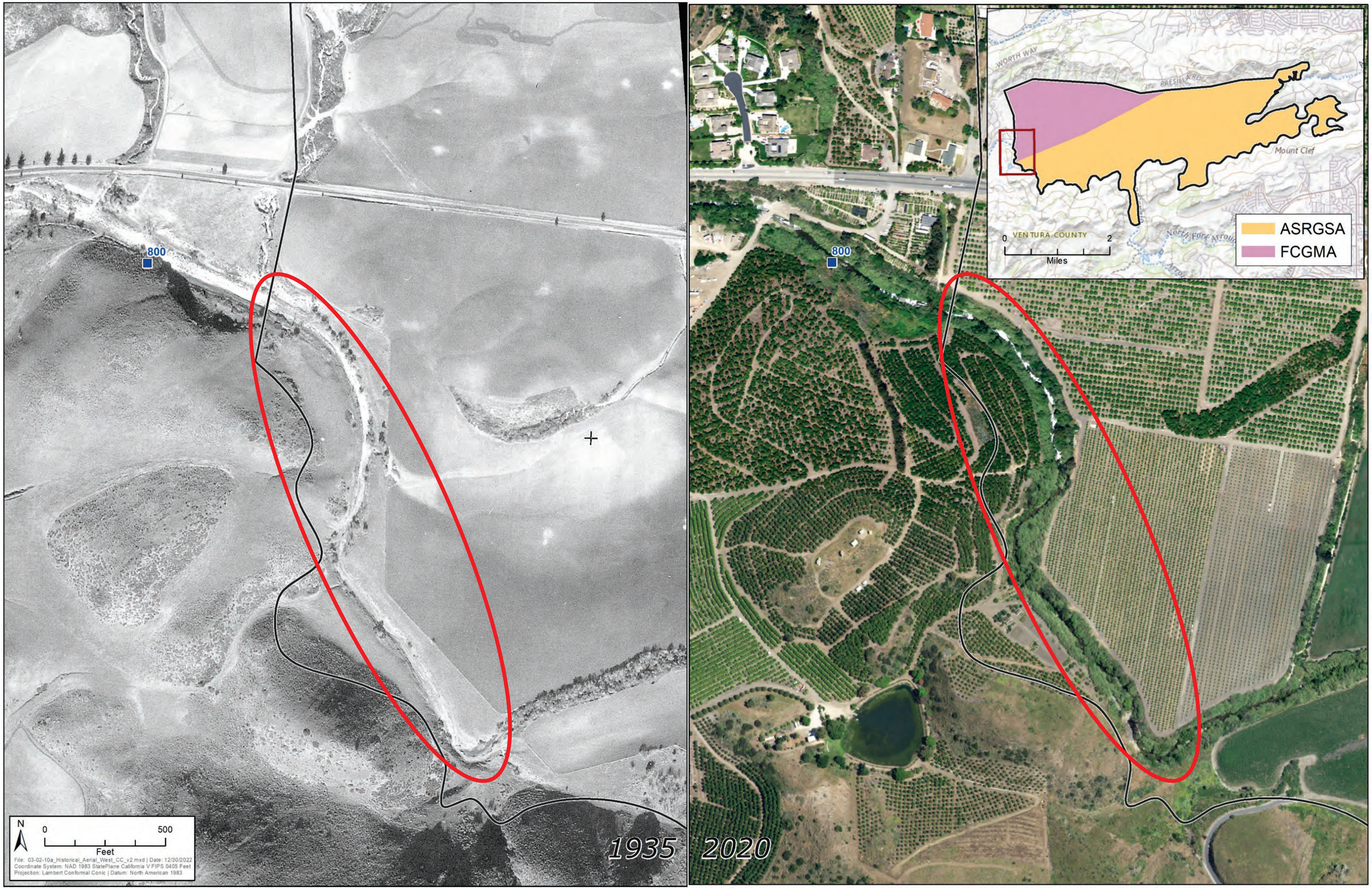


Figure 3.2-13a Historical Aerial Photo Comparison for the Riparian Vegetation in the Western Reaches of the Conjeo Creek.

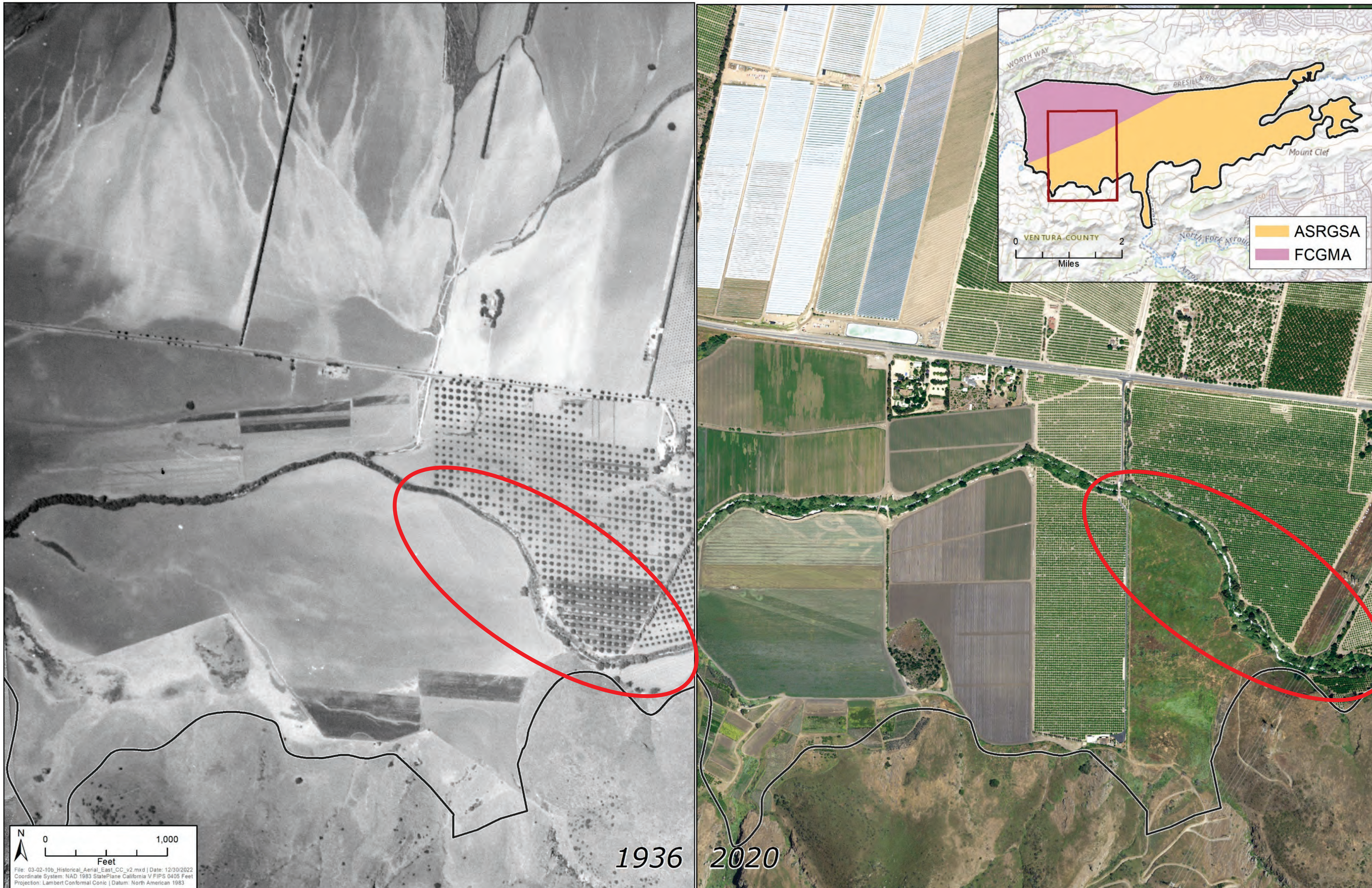


Figure 3.2-13b Historical Aerial Photo Comparison for the Riparian Vegetation in the Eastern Reaches of the Conjeo Creek.

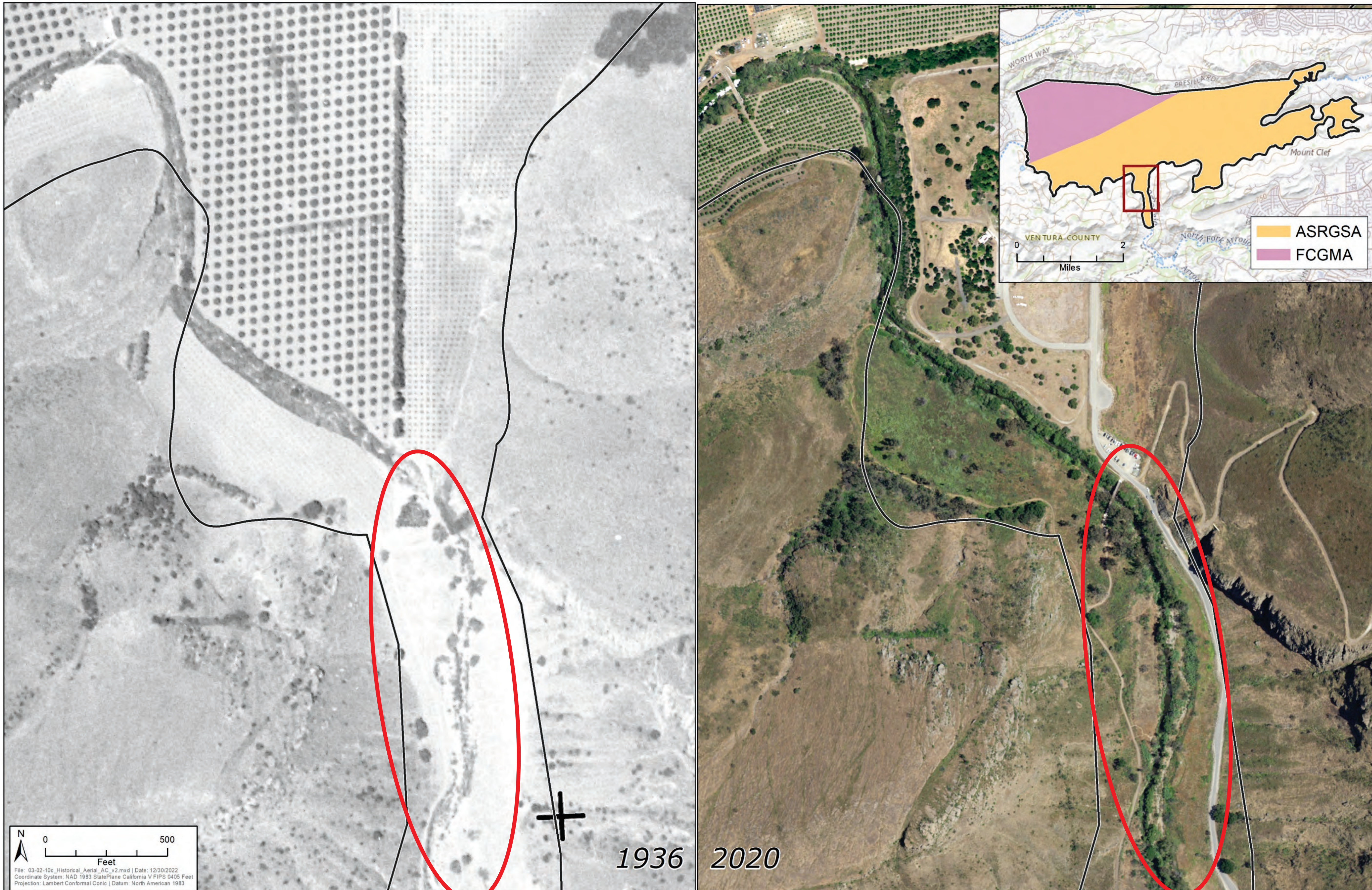
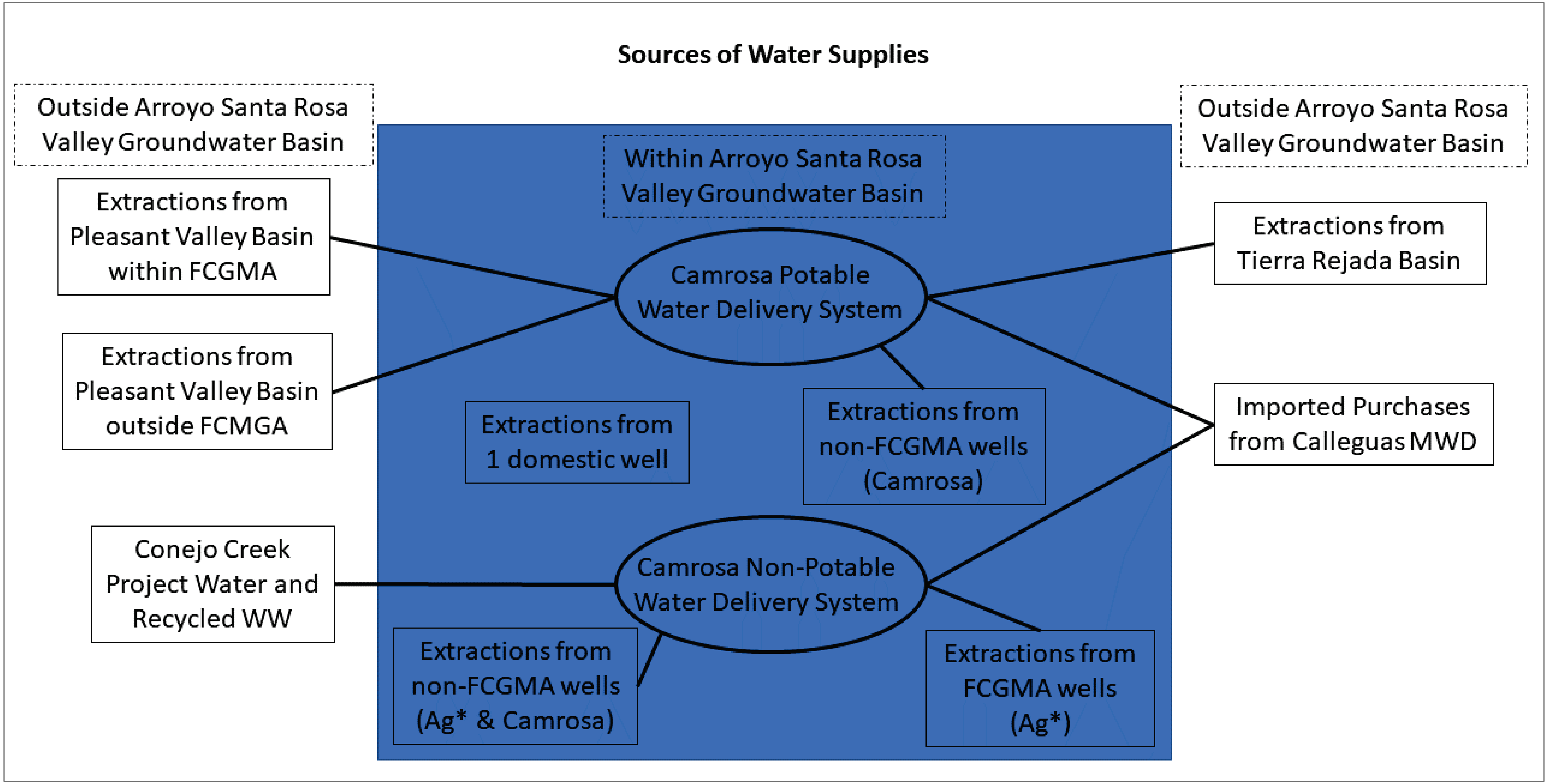
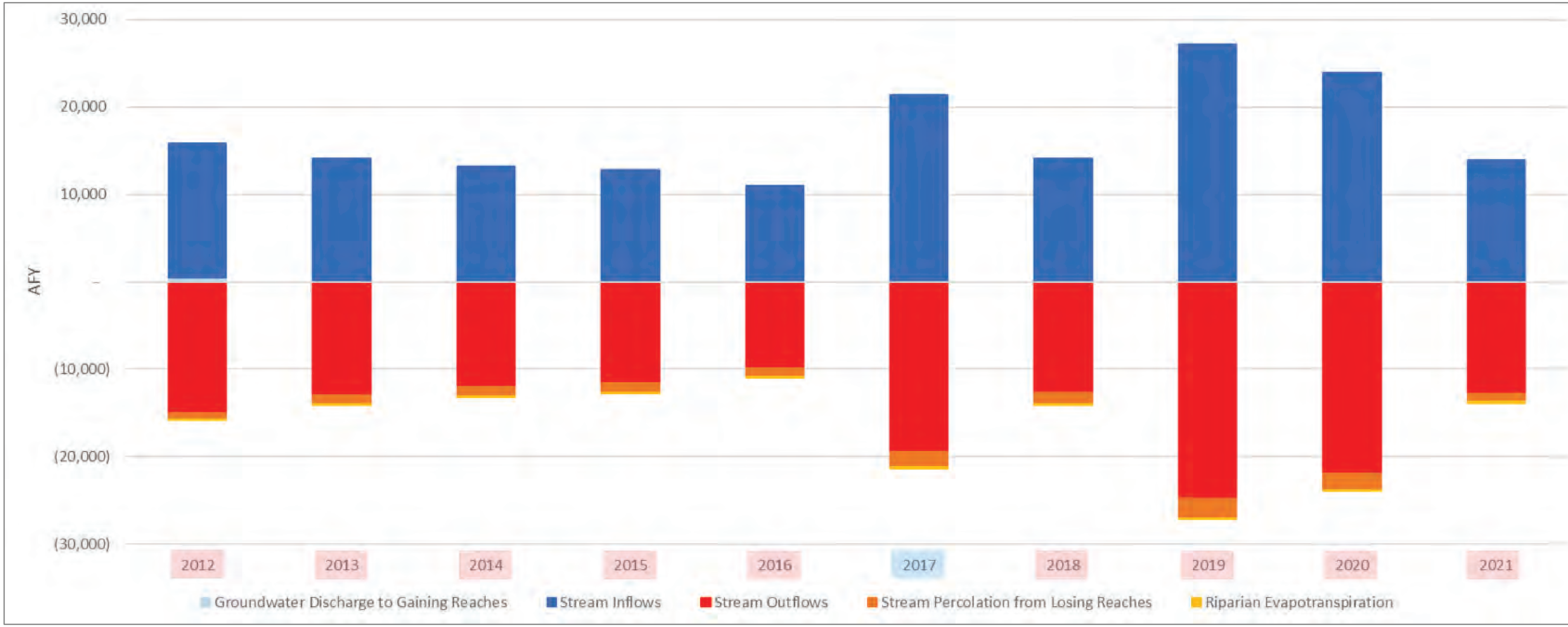


Figure 3.2-13c Historical Aerial Photo Comparison for the Riparian Vegetation in the Arroyo Conejo.



* Private agricultural wells do not supply Camrosa's water delivery system.

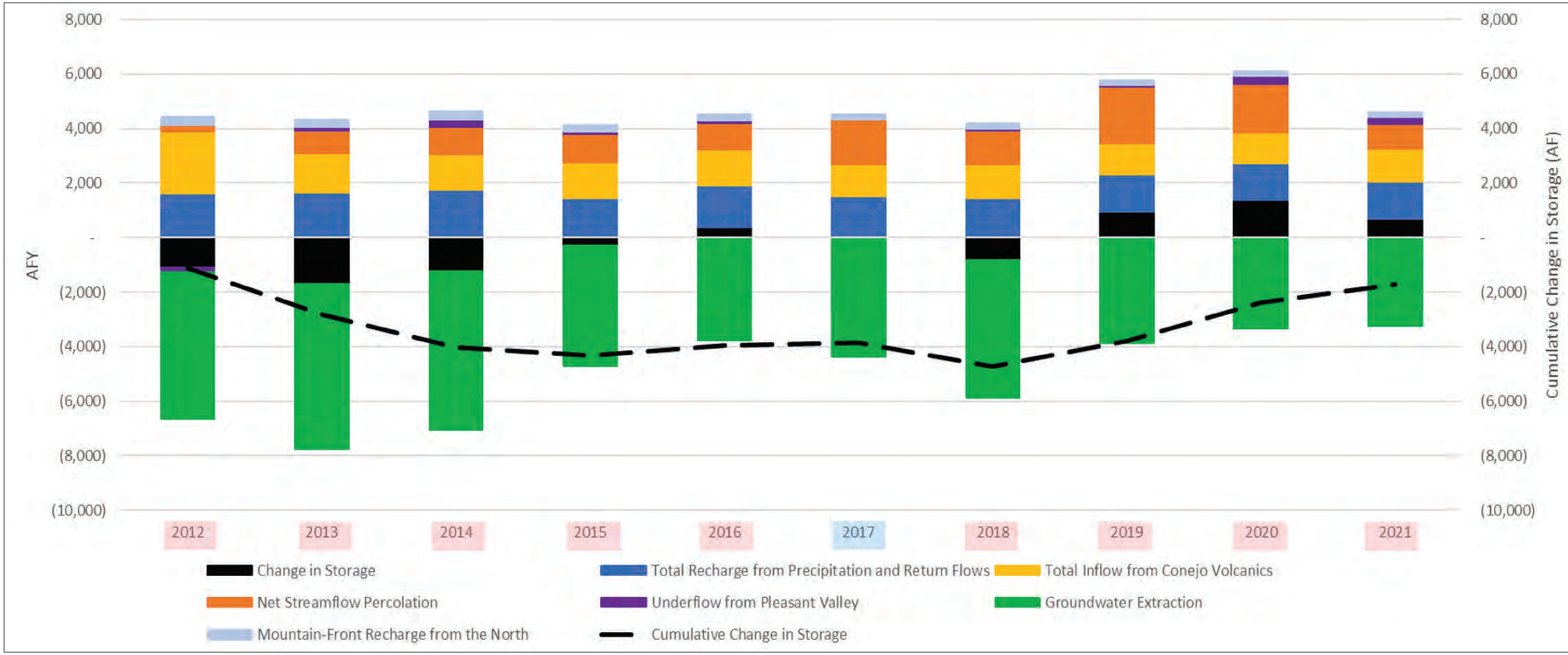
Figure 3.3-01 Sources of Water Supplies for the ASRVGB.



Stream Inflows is the sum of Arroyo Santa Rosa Inflows, Arroyo Santa Rosa Tributary Inflows, Arroyo Conejo Inflows, and Direct Runoff Contributions to Streamflow.

See Table 3.3-06 for individual water budget components.

Figure 3.3-02 Historical and Current Surface Water Inflows and Outflows to/from ASRVGB (acre-feet per year).



Total Recharge from Precipitation and Return Flows is the sum of Recharge from Precipitation, Agricultural Return Flows, M&I Outdoor Return Flows, M&I Septic Return Flows, Non-potable Distribution Losses, and Potable Distribution Losses.

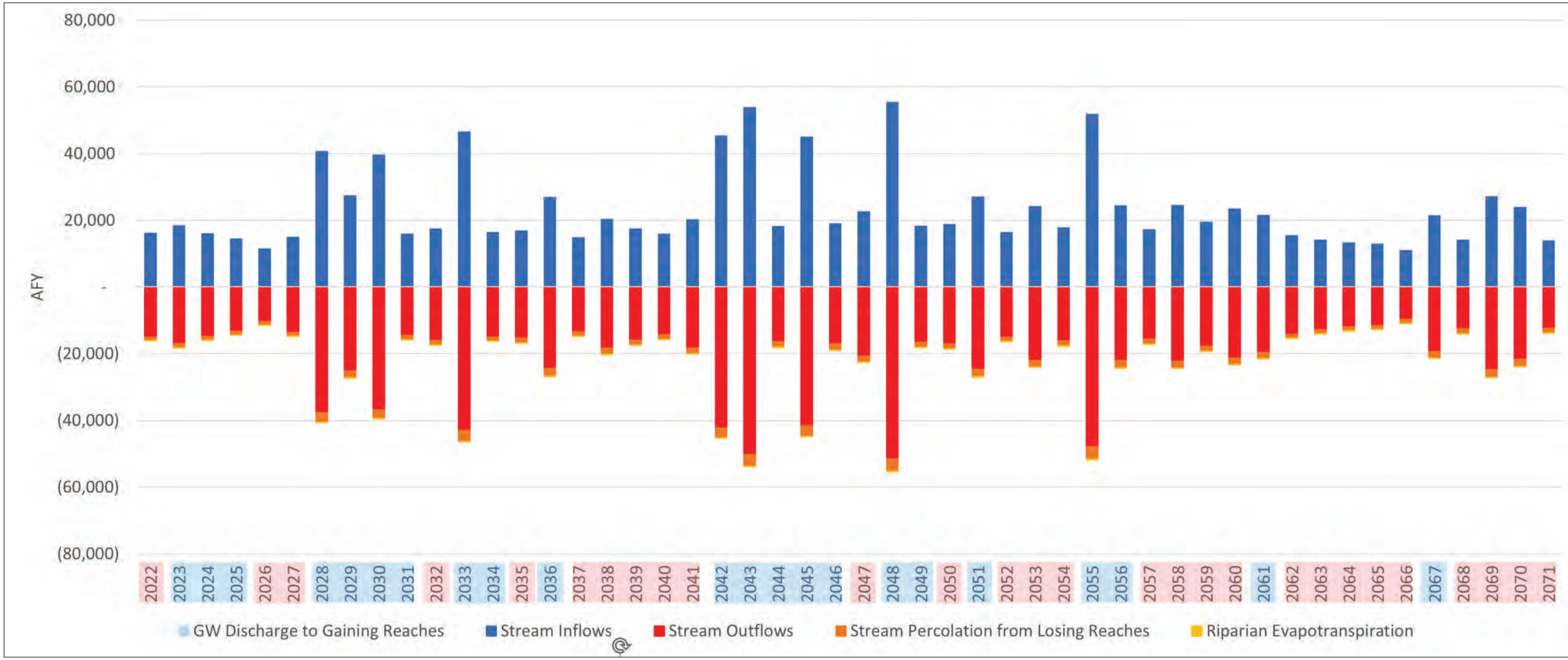
Total Inflows from Conejo Volcanics is the sum of Bedrock Contributions from the South and Bedrock Contributions from the East.

Net Streamflow Percolation is the sum of Streamflow Percolation from Losing Reaches and GW Discharge to Streamflow Gaining Reaches.

Groundwater Extraction is the sum of FCGMA Agricultural Pumping, Non-FCGMA Agricultural Pumping, Domestic Pumping, and M&I Pumping.

See Table 3.3-07 for individual water budget components.

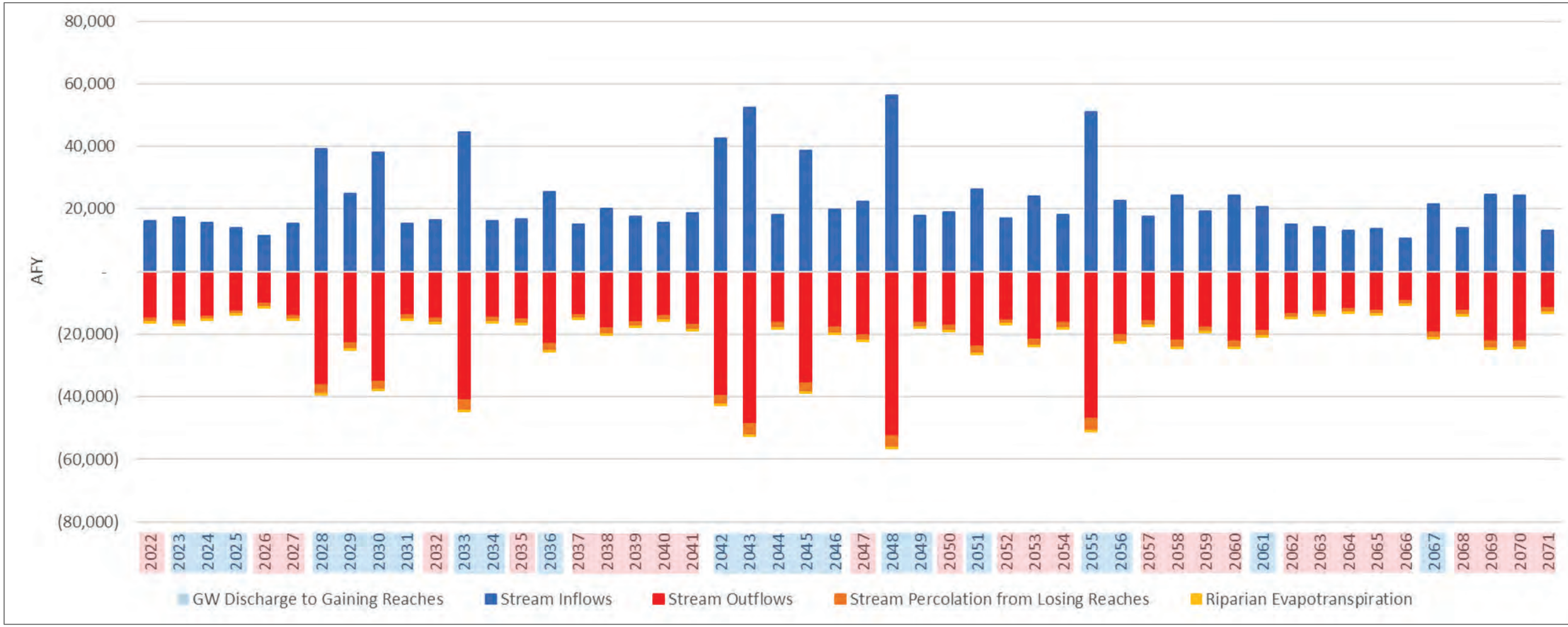
Figure 3.3-03 Historical and Current Groundwater Inflows and Outflows to/from ASRVGB (acre-feet per year).



Stream Inflows is the sum of Arroyo Santa Rosa Inflows, Arroyo Santa Rosa Tributary Inflows, Arroyo Conejo Inflows, and Direct Runoff Contributions to Streamflow.

See Table 3.3-12 for individual water budget components.

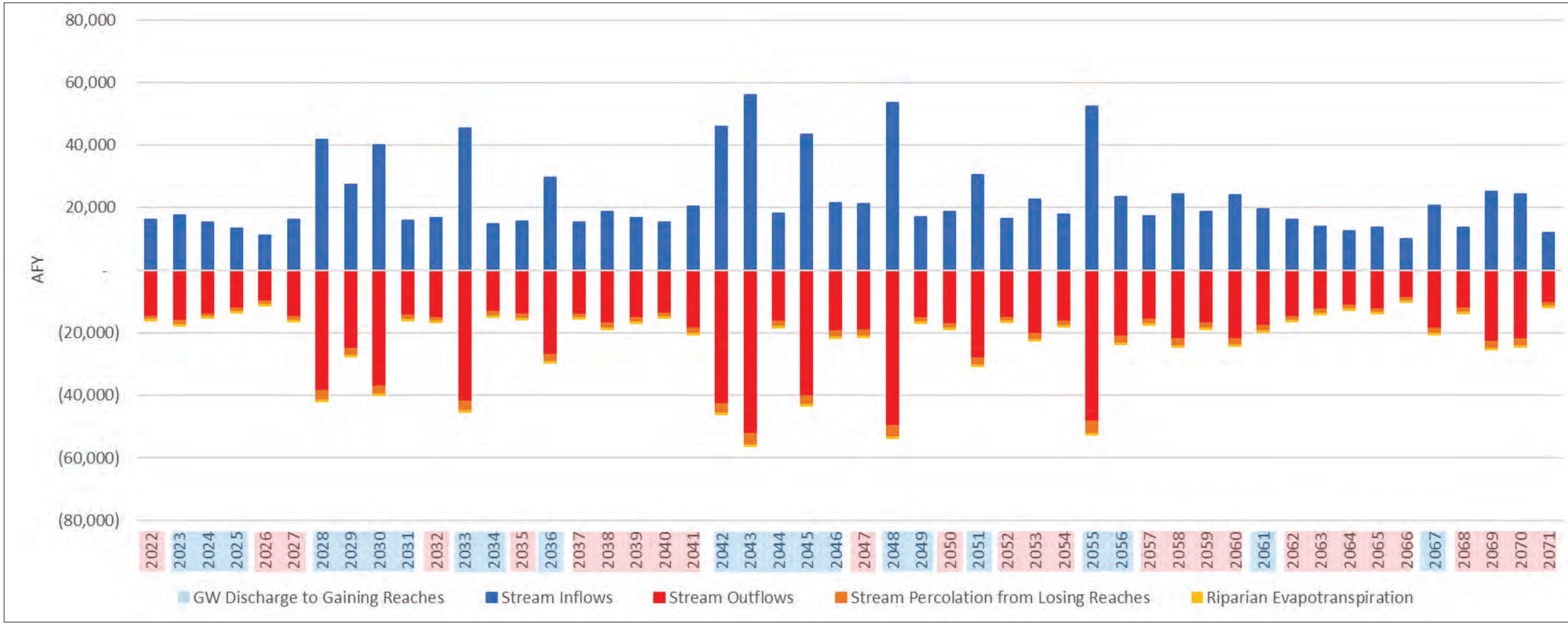
Figure 3.3-04 Baseline Projected Annual Surface Water Inflows (positive values) and Outflows (negative values) to/from ASRVGB.



Stream Inflows is the sum of Arroyo Santa Rosa Inflows, Arroyo Santa Rosa Tributary Inflows, Arroyo Conejo Inflows, and Direct Runoff Contributions to Streamflow.

See Table 3.3-13 for individual water budget components.

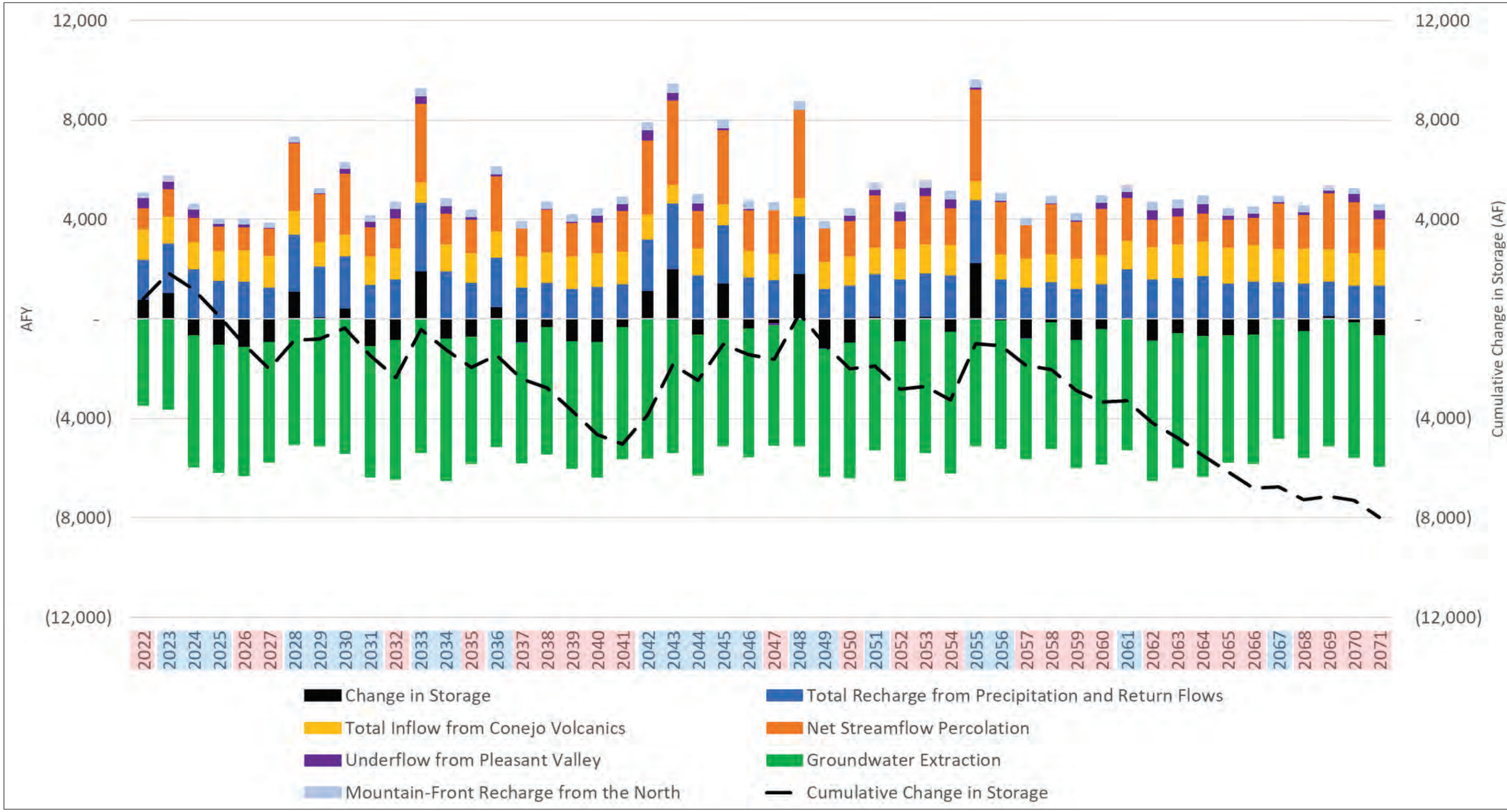
Figure 3.3-05 Projected Surface Water Budget Components under the 2030 Climate Change Scenario.



Stream Inflows is the sum of Arroyo Santa Rosa Inflows, Arroyo Santa Rosa Tributary Inflows, Arroyo Conejo Inflows, and Direct Runoff Contributions to Streamflow.

See Table 3.3-14 for individual water budget components.

Figure 3.3-06 Projected Surface Water Budget Components under the 2070 Climate Change Scenario.



Total Recharge from Precipitation and Return Flows is the sum of Recharge from Precipitation, Agricultural Return Flows, M&I Outdoor Return Flows, M&I Septic Return Flows, Non-potable Distribution Losses, and Potable Distribution Losses.

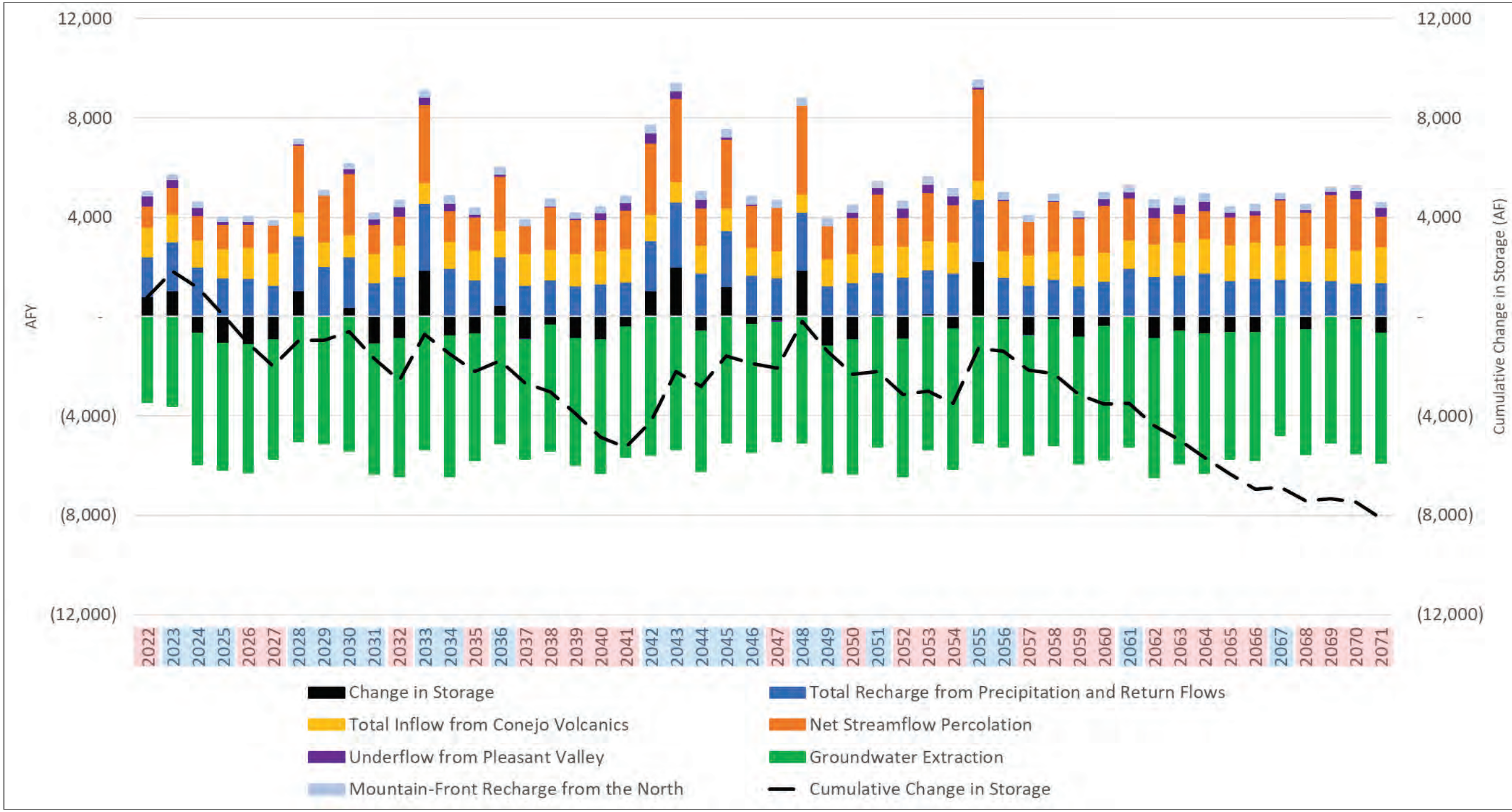
Total Inflows from Conejo Volcanics is the sum of Bedrock Contributions from the South and Bedrock Contributions from the East.

Net Streamflow Percolation is the sum of Streamflow Percolation from Losing Reaches and GW Discharge to Streamflow Gaining Reaches.

Groundwater Extraction is the sum of FCGMA Agricultural Pumping, Non-FCGMA Agricultural Pumping, Domestic Pumping, and M&I Pumping.

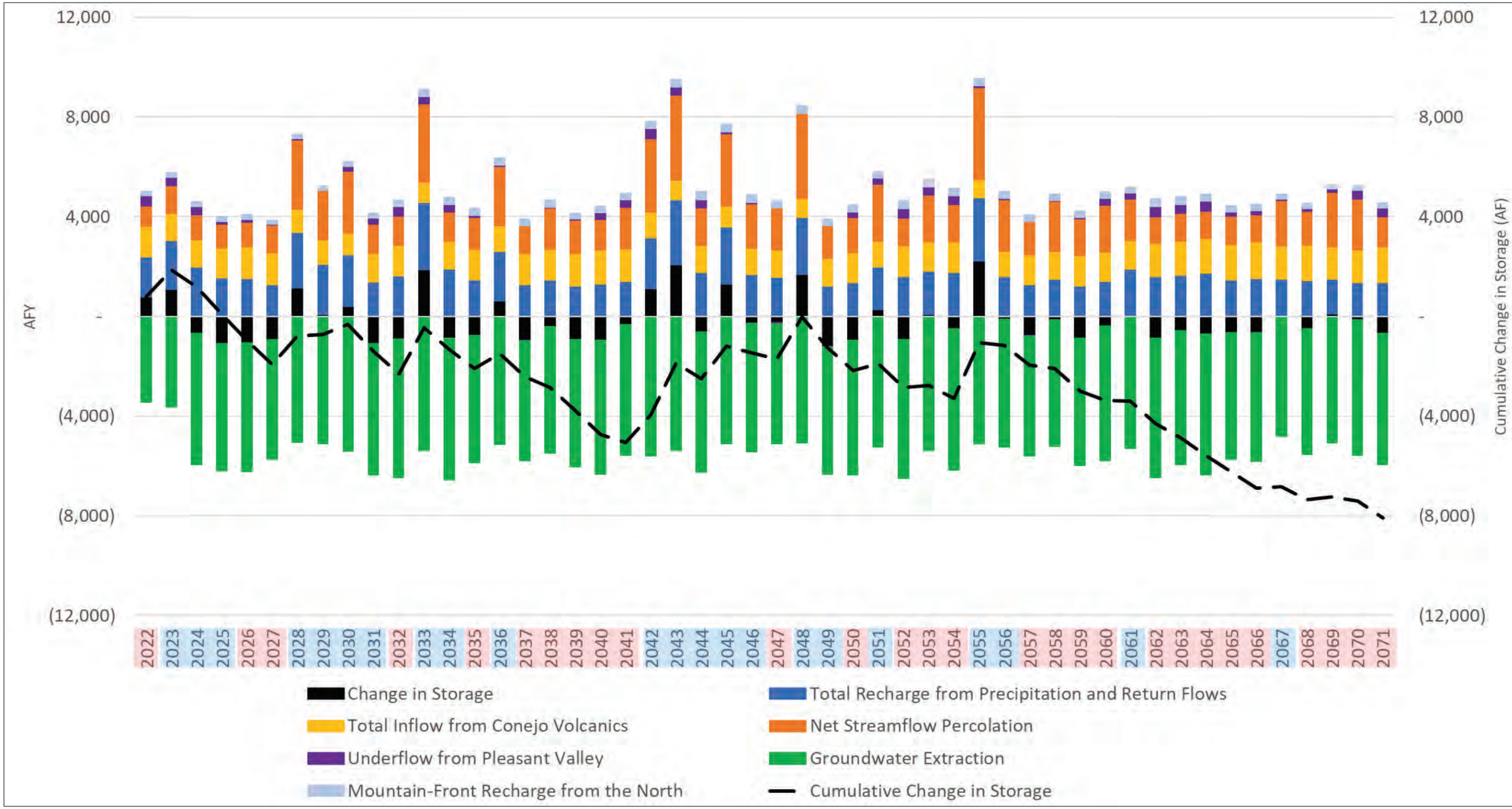
See Table 3.3-15 for individual water budget components.

Figure 3.3-07 Baseline Projected Annual Groundwater Inflows (positive values) and Outflows (negative values) to/from ASRVGB.



Total Recharge from Precipitation and Return Flows is the sum of Recharge from Precipitation, Agricultural Return Flows, M&I Outdoor Return Flows, M&I Septic Return Flows, Non-potable Distribution Losses, and Potable Distribution Losses.
Total Inflows from Conejo Volcanics is the sum of Bedrock Contributions from the South and Bedrock Contributions from the East.
Net Streamflow Percolation is the sum of Streamflow Percolation from Losing Reaches and GW Discharge to Streamflow Gaining Reaches.
Groundwater Extraction is the sum of FCGMA Agricultural Pumping, Non-FCGMA Agricultural Pumping, Domestic Pumping, and M&I Pumping.
See Table 3.3-16 for individual water budget components.

Figure 3.3-08 Projected Groundwater Budget Components under the 2030 Climate Change Scenario.



Total Recharge from Precipitation and Return Flows is the sum of Recharge from Precipitation, Agricultural Return Flows, M&I Outdoor Return Flows, M&I Septic Return Flows, Non-potable Distribution Losses, and Potable Distribution Losses.
Total Inflows from Conejo Volcanics is the sum of Bedrock Contributions from the South and Bedrock Contributions from the East.
Net Streamflow Percolation is the sum of Streamflow Percolation from Losing Reaches and GW Discharge to Streamflow Gaining Reaches.
Groundwater Extraction is the sum of FCGMA Agricultural Pumping, Non-FCGMA Agricultural Pumping, Domestic Pumping, and M&I Pumping.
See Table 3.3-17 for individual water budget components.

Figure 3.3-09 Projected Groundwater Budget Components under the 2070 Climate Change Scenario

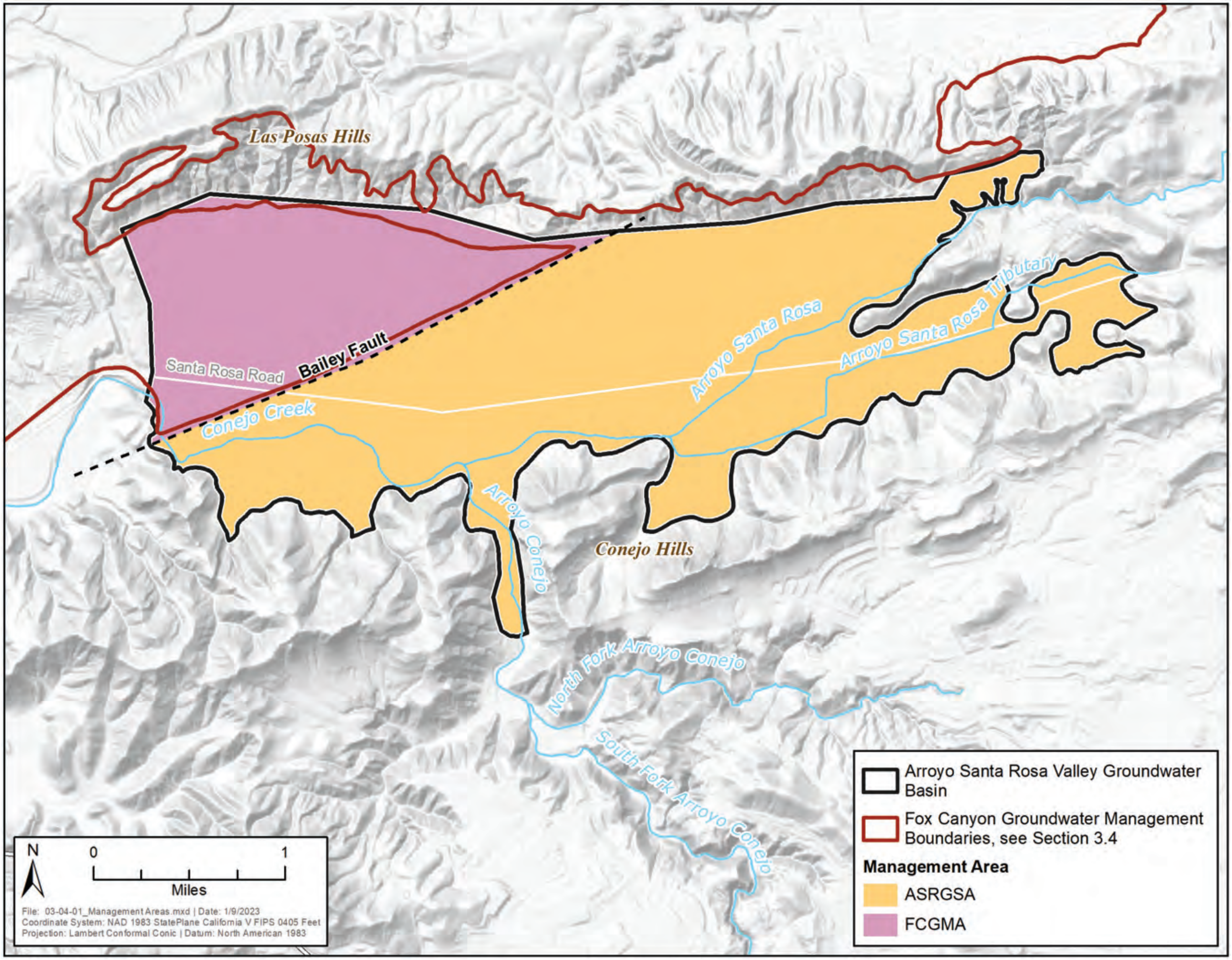


Figure 3.4-01 ASRVGB Management Areas.

Section 4
Figure

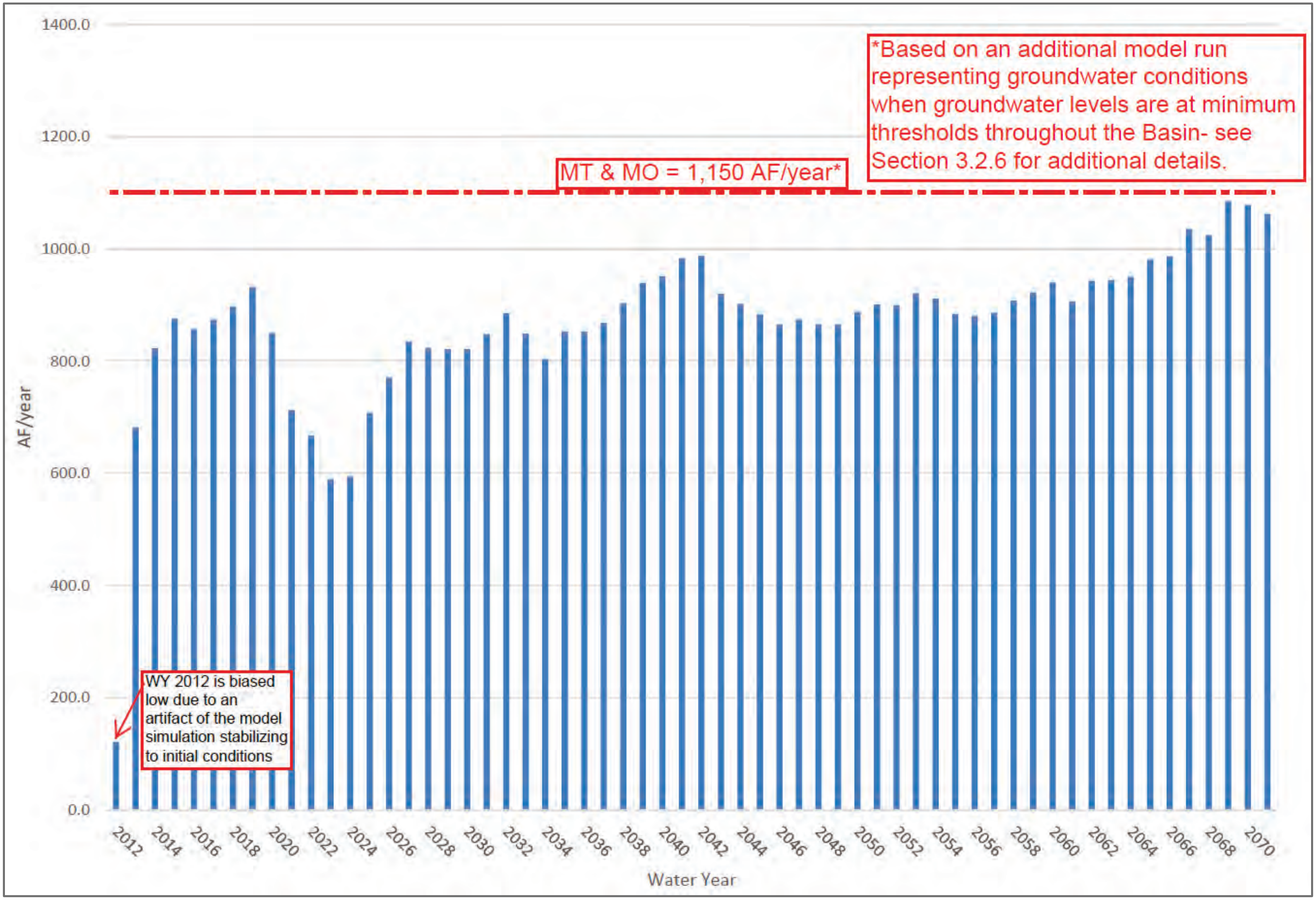


Figure 4.9-01 Annual Streamflow Depletion for Arroyo Conejo and Conejo Creek

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Figures

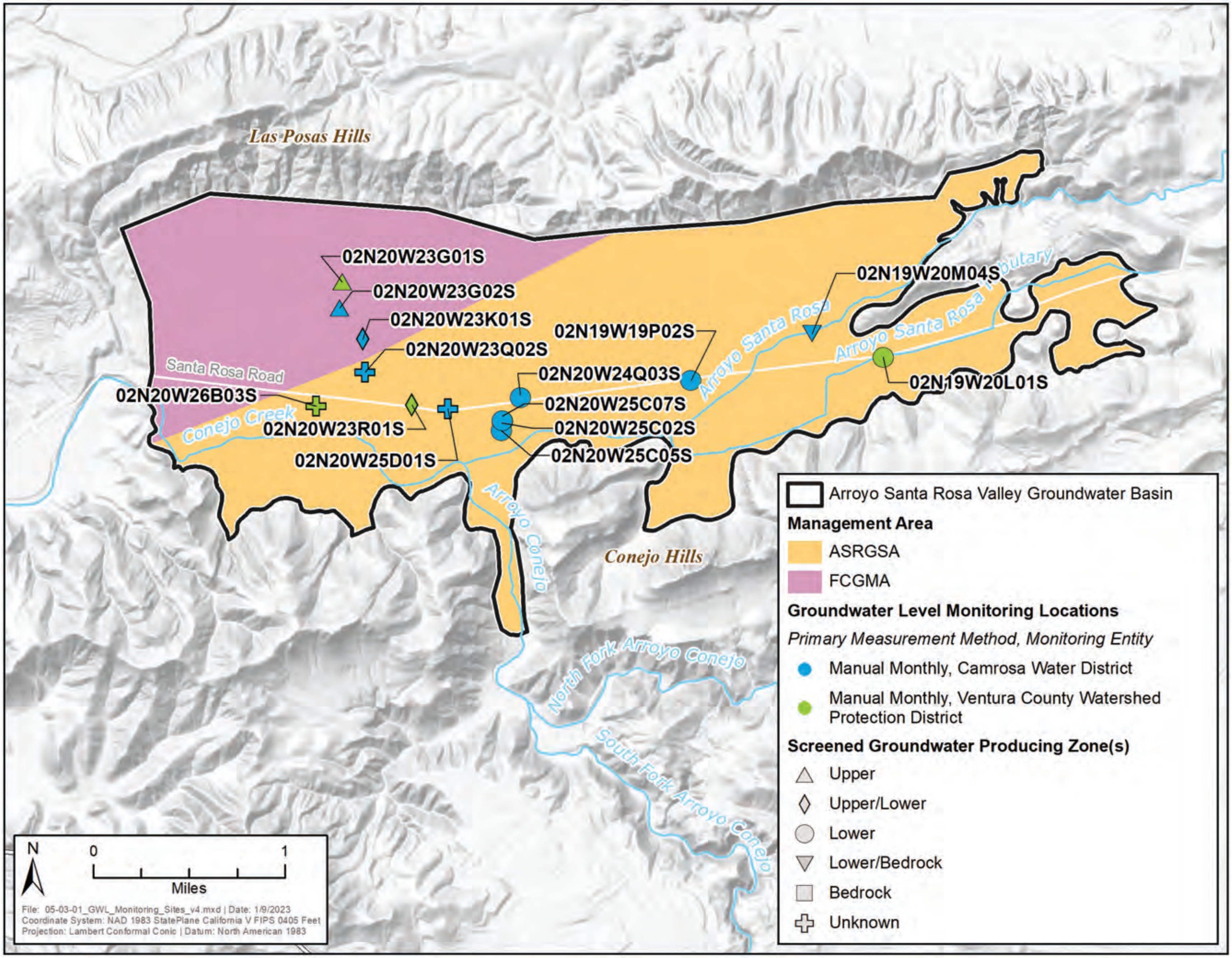

Figure 5.3-01 Groundwater Level Monitoring Network Wells.

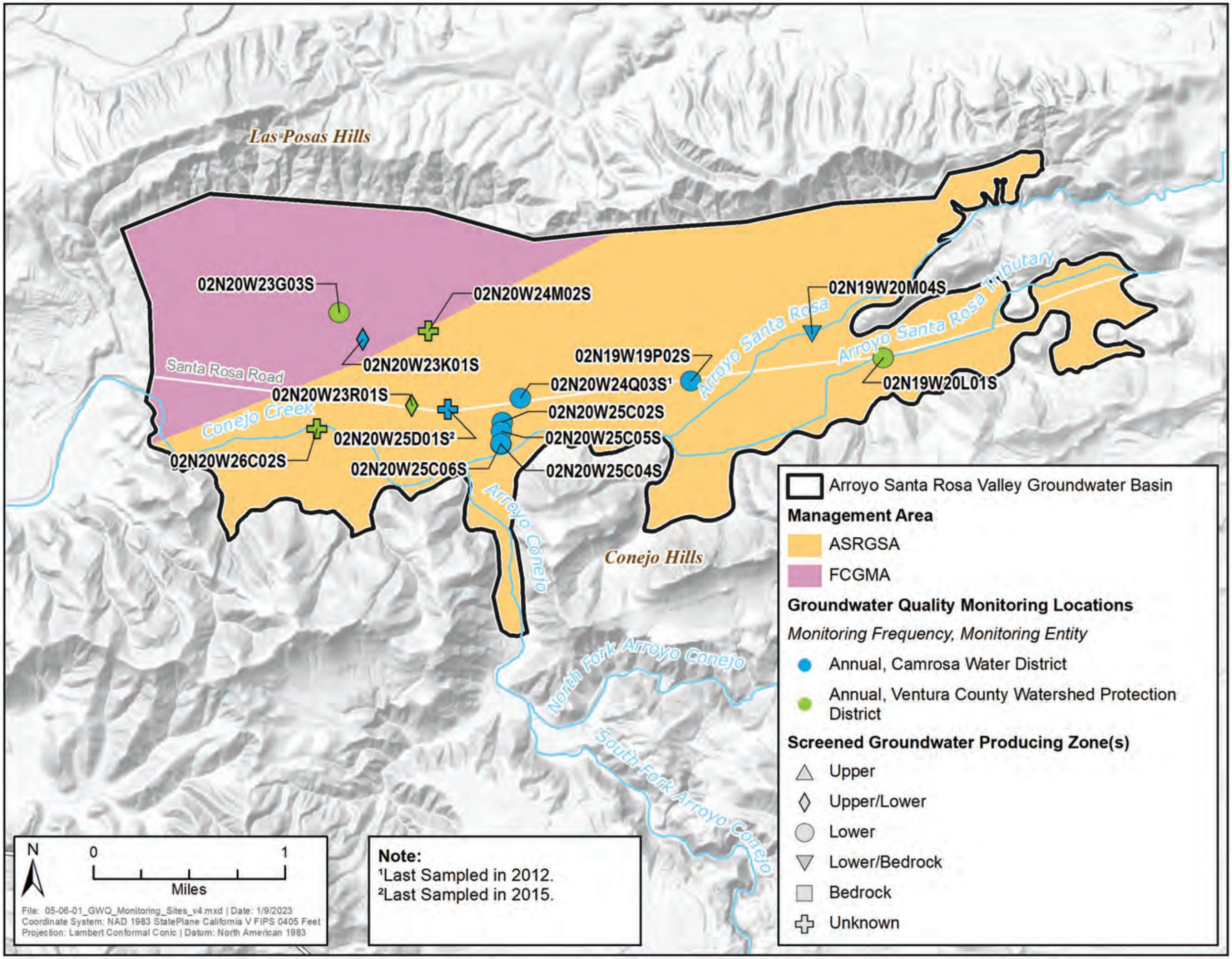

Figure 5.6-01 Water Quality Monitoring Network Wells.

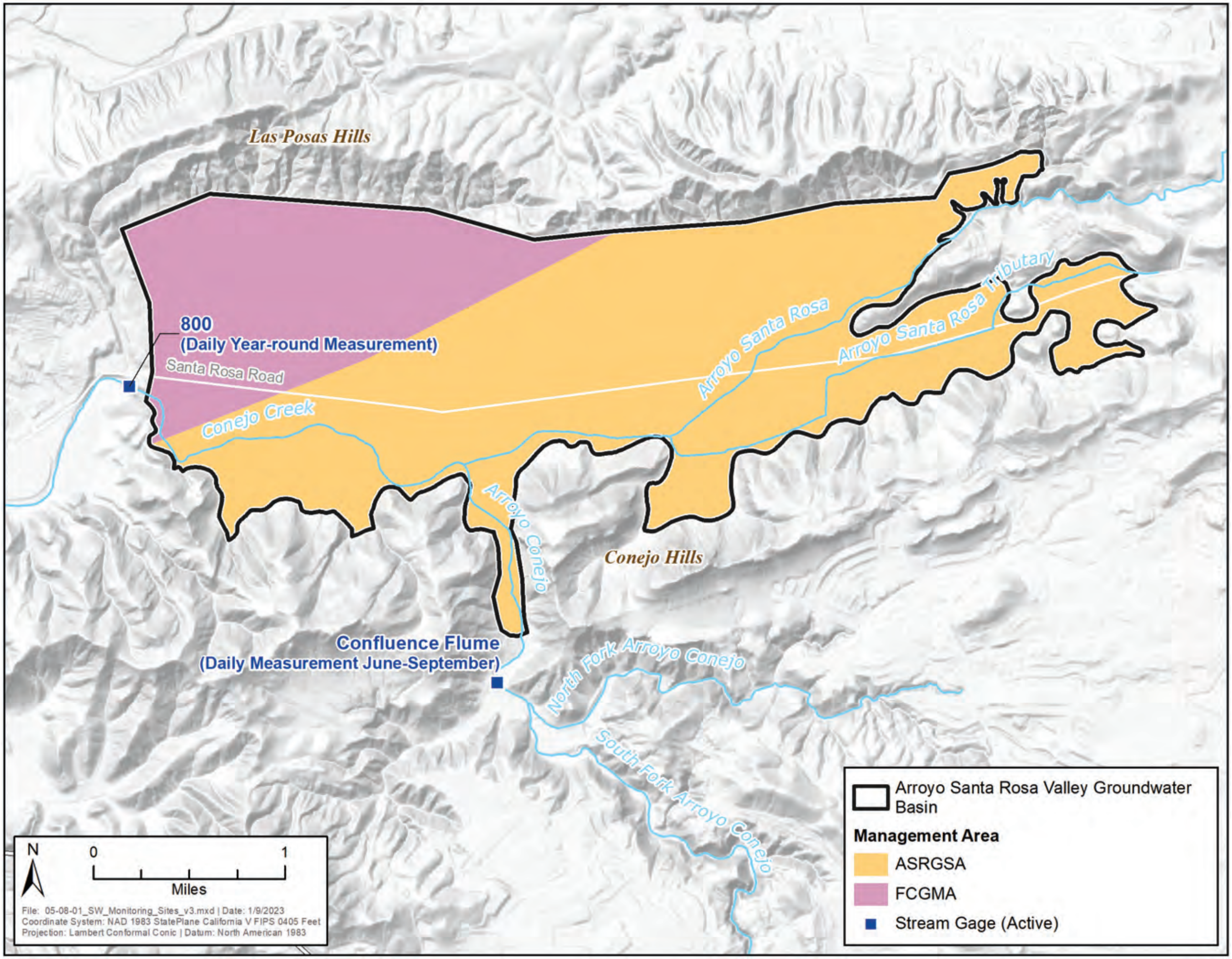

Figure 5.8-01 Surface Water Monitoring Network Gages.

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Tables

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Table 2.2-01 Existing Water Resources Monitoring Programs.

Program	Agency	Parameter(s)	Description	Incorporated into GSP Monitoring Networks	Reference
Member Agency Groundwater Levels	Camrosa Water District	Groundwater Levels	Groundwater level monitoring as part of normal well operations.	Yes	N/A
Countywide Groundwater Monitoring Program	Ventura County Watershed Protection District	Groundwater Levels Groundwater Quality	Countywide groundwater monitoring program	Yes	https://s29422.pcdn.co/wp-content/uploads/2018/08/2015-Annual-Report-Final-Reduced.pdf
Division of Drinking Water Compliance Monitoring	Public Water Suppliers in the Basin	Groundwater Quality	Public water suppliers are required to monitor groundwater quality in potable supply wells in the Basin. Data are reported to the Division of Drinking Water.	Yes	https://sdwis.waterboards.ca.gov/PDWW/ https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/EDTlibrary.html
California Statewide Groundwater Elevation Monitoring (CASGEM)	Ventura County Watershed Protection District	Groundwater Levels	VCWPD is the CASGEM monitoring entity for the Ventura County. Data is compiled from the Countywide Groundwater Monitoring Program and cooperative entities.	Yes	https://water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM
Groundwater Ambient Monitoring and Assessment Program (GAMA)	State Water Resources Control Board	Groundwater Quality	SWRCB Program implemented in 2000 (modified by Assembly Bill 599 in 2001) to monitor and assess groundwater basins throughout the state.	No (currently no GAMA data in last 10 years that is not captured in other data sources)	https://www.waterboards.ca.gov/water_issues/programs/gama/
GeoTracker	State Water Resources Control Board	Groundwater Quality	Records for contamination remediation sites.	No (currently no plumes of concern in ASRVGB)	https://geotracker.waterboards.ca.gov/
Countywide Precipitation Monitoring	Ventura County Watershed Protection District	Precipitation	Countywide rainfall monitoring program (2 active stations located within Basin and three immediately adjacent to Basin See Figure 3.1-03)	Yes	https://www.vcwatershed.net/hydrodata/
Countywide Stream Flow Monitoring	Ventura County Watershed Protection District	Stream flow	Countywide stream flow monitoring program (2 stations [gages 800 and 838] located near western Basin boundary and in center of Basin - See Figure 3.1-05)	Yes	https://www.vcwatershed.net/hydrodata/
TMDL Compliance Monitoring	Calleguas Creek Watershed TMDL Compliance Monitoring Program (CCWTMP)	Stream flow	CCWTMP resumed monitoring when VCWPD discontinued - monitors daily stream flow at Gage 800 on Conejo Creek	Yes	N/A
Hill Canyon WWTP Streamflow Monitoring	City of Thousand Oaks (Hill Canyon WasteWater Treatment Plant)	Stream flow	Hill Canyon WWTP staff monitor streamflow four months out of the year (June-Sept.)	Yes	N/A
Electronic Water Rights Information Management System (eWRIMS)	State Water Resources Control Board	Surface Water Diversions	eWRIMS is a SWRCB database that contains Statements of Water Diversion and Use filed by water diverters.	Yes	https://www.waterboards.ca.gov/waterrights/water_issues/programs/ewrims/index.html
Groundwater Extraction Reporting	Fox Canyon Groundwater Management Agency	Groundwater Extractions	Well operators are required to report their groundwater extractions twice per year using FCGMA approved forms.	Yes	http://www.fcgma.org/public-documents/reports
Countywide Evaporation Monitoring	Ventura County Watershed Protection District	Evaporation	Countywide evaporation monitoring program (no stations located within ASRVGB, but data is useful for estimating conditions in the Basin)	No	https://www.vcwatershed.net/hydrodata/

Table 2.2-02 Existing Water Resources Management Programs.

Program	Agency	Parameter(s)	Description	Incorporation into GSP	Reference
Camrosa Water Reclamation Facility Conejo Creek Diversion (2000)	Camrosa Water District	Water Supply	Reclaimed water from within Camrosa is tertiary treated and distributed for use in agriculture and public landscaping. Nonpotable water from the Hill Canyon WWTP upstream of the Conejo Creek Diversion is used for agricultural irrigation and landscaping.	Details regarding sources and volumes of by water use sectors.	https://www.camrosa.com/uwmp
Camarillo Sanitary District Recycled Water Supply	Camarillo Sanitary District	Water Supply	Reclaimed water from within Camarillo Sanitary District is tertiary treated and discharged to Conejo Creek or delivered to agricultural customers.	Details regarding sources and volumes of by water use sectors.	https://www.camrosa.com/uwmp
Salinity Management Pipeline	Calleguas Municipal Water District	Water Supply	A brine disposal pipeline that collects brine generated by desalting facilities in the Las Posas, Pleasant Valley, and Oxnard and conveys it to an ocean outfall for disposal. Future construction of the pipeline is expected to serve additional facilities including those in the ASRVGB	Potential Arroyo Santa Rosa Basin Desalter Project	https://www.calleguas.com/cmwdfinal2020uwmp.pdf
RWQCB Water Quality Management Programs	Los Angeles Regional Water Quality Control Board	Surface Water and Groundwater Quality	The RWQCB Basin Plan includes water quality objectives (WQOs) for surface water and groundwater. RWQCB operates various water quality regulatory programs to meet the WQOs, including NPDES permits, and the Algae TMDL.	WQOs were used to establish minimum thresholds and measurable objectives for the degraded water quality sustainability indicator. Actions undertaken by RWQCB contribute to maintenance of groundwater quality below the measurable objective concentrations.	https://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/basin_plan_documentation.html
Ventura County Stormwater Quality Monitoring Program	Ventura County Watershed Protection District and City Partners	Surface Water Quality	Program meets the requirements of the Ventura County Stormwater Permits. Includes water quality sampling, watershed assessments, business inspections, and pollution prevention programs.	This program contributes to maintenance of groundwater quality below the measurable objective concentrations.	http://www.vcstormwater.org/
FCGMA Groundwater Extraction Reporting Program	Fox Canyon Groundwater Management Agency	Groundwater Extraction	Since 1985, FCGMA has collected extraction records from well operators. Well operators are required to report their groundwater extractions twice per year using FCGMA approved forms. Requirements include periodic calibration of meters.	Used for extraction rate inputs and estimation for the Water Budget	https://fcgma.org/groundwater-sustainability-plans-gsps/ Pleasant Valley GSP
Lower Aquifer System Contingency Plan	Fox Canyon Groundwater Management Agency	Groundwater Quality	A plan containing measures that could be implemented in the event of severe water quality degradation in the Lower Aquifer System		https://fcgma.org/groundwater-sustainability-plans-gsps/ Pleasant Valley GSP

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Table 3.2-01 Arroyo Conejo and Conejo Creek Depletions (in acre-feet).

Water Year	Losses from Connected Reaches of the Arroyo Conejo and Conejo Creek	Depletions Due to Pumping	Potential Indirect Depletions
2012	120	18	102
2013	681	41	640
2014	823	52	771
2015	876	66	810
2016	856	74	782
2017	873	83	790
2018	897	74	823
2019	932	94	838
2020	850	112	738
2021	712	126	586
Average	762	74	688

Table 3.3-01 Summary of Data Sources for Water Budget Components.

Water Budget Component	Data Source or Estimation Method
Directly measured components:	
Precipitation (i.e., rainfall)	• Historical and current: Precipitation data for stations 049, 049A, 500, 500A, and 502 in Ventura County collected and maintained by Ventura County Watershed Protection District (VCWPD) at https://www.vcwatershed.net/hydrodata/. • Projected: VCWPD precipitation data as noted above (assume baseline period of water year 1972-2021 rainfall amounts), modified in accordance with precipitation climate-change factors for 2030 and 2070, as recommended by California Department of Water Resources (2018).
Surface water diversions	• Historical and current: Reported water use in the State Water Resources Control Board's eWRIMS database. • Projected: Assumed to be 0 based on current eWRIMS data and the agreement of agricultural users along Conejo Creek to purchase water from Camrosa (EWRIMS, 2022; pers. comm. with Camrosa WD, 2022).
Groundwater extractions (pumping)	• Historical and current: Historical monthly groundwater extractions by Camrosa Water District were provided. Agricultural groundwater extractions by wells in the Fox Canyon Groundwater Management Agency (FCGMA) were provided on a biannual basis. The extraction rate of the single domestic well located in the Basin extractions is based on annual usage statements submitted by the well owner to the County of Ventura. • Projected: Camrosa provided estimates of future extraction per well on an annual basis. Agricultural extractions were assumed to equal to the 10-year historical period, repeated over the 50-year predictive period. The domestic well is assumed extract the same as reported historically.
Gaged surface flows entering and exiting Arroyo Santa Rosa Groundwater Basin	• Historical and current: The primary source of year-round daily gaged surface flows is at gage 800 near the western edge of the basin. Flow data was collected by VCWPD from 1971 until 2010, and Calleguas Creek Watershed TMDL from 2012 – 2021. The Hill Canyon Wastewater Treatment Plant (HCWWTP) also operates a flume during the summer months (typically June – September) at the confluence of the North and South Forks of Arroyo Conejo. When they exist, the flume records are the source of baseflow entering the basin. When flume records don't exist, flows at 800 are used for baseflow up to a threshold of 20 cfs, with flows above 20 cfs being treated as storm flows. • Projected: Historical streamflow data (as noted above) was used for the baseline projected simulation from the reference period 1972-2021). The historical data was modified in accordance with the climate-change streamflow change factors for the 2030 and 2070 scenarios, respectively, as recommended by California Department of Water Resources (2018).
Components estimated using related data:	
Ungaged stream flows entering and exiting Arroyo Santa Rosa Groundwater Basin	• Historical and current: Inflows to the basin from Arroyo Santa Rosa and Arroyo Santa Rosa Tributary are ungaged, and Arroyo Conejo is only measured during the summer months. As described above, where Arroyo Conejo flume records do not exist, 800 flows up to 20 cfs are treated as base flows into the basin via Arroyo Conejo. Flows at 800 above 20 cfs are treated as storm flows and are distributed to Arroyo Santa Rosa, Arroyo Santa Rosa Tributary, and Arroyo Conejo based on each stream's contributing catchment area. • Projected: Ungaged flows were computed for the reference historical period (1970-2019) using the method described above with data from VCWPD precipitation gage 20. Ungaged flows for the climate-change scenarios were adjusted using the climate-change streamflow change factors for the 2030 and 2070 scenarios, respectively.
Direct runoff contributions to streamflow within the Basin	• Historical and current: Direct runoff within the Basin that contributes to streamflow is calculated based on the catchment area that accumulates to the gage 800 location – the area-determined proportion (based on the contributing catchment area between the entry points of the tributaries and gage 800) of stormflows at gage 800 were implemented as runoff spread equally across the modeled streams. • Projected: Direct runoff is calculated using the same method for the historical and current using stormflow data from gage 800 for the historical reference period (1972-2021) for the baseline scenario. The runoff data is adjusted by climate-change streamflow change factors for the respective 2030 and 2070 scenarios.
Groundwater extractions (pumping)	• Historical and current: Pumping from active agricultural wells outside of FCGMA was estimated by calculating the crop irrigation duty to agricultural parcels with known pumping and/or Camrosa deliveries and applying that per-acre duty to cropped areas served by these non-FCGMA agricultural wells. See the Numerical Model Technical Memorandum (Appendix G) for more details. Projected: Agricultural extractions were assumed to equal to the 10-year historical period, repeated over the 50-year predictive period.
Components estimated by numerical modeling:	
Interaction (exchanges) of groundwater and surface water	• Historical, current, and projected: The streams within the basin have both gaining and losing reaches. Both stream percolation directly into the aquifer as well as discharge from the aquifer into the river is calculated by the numerical model and is dependent on the difference between river stage and groundwater elevations as well as the width and slope of the riverbed.
Mountain Front Recharge	• Historical and current: Aerial recharge and runoff via precipitation from the BCM model (Flint and Flint, 2014; Flint et al., 2013) was incorporated in the numerical model (Appendix G). • Projected: Areal recharge via precipitation in the period 1972 – 2021 is taken from the BCM data and used to simulate future conditions. For the climate change scenarios, precipitation change factors are used.
Inflow from Conejo Volcanics and Underflow from the Pleasant Valley	• Historical, current, and projected: simulated as a general head boundary within the numerical model (Appendix G).
Recharge (including infiltration of precipitation, water distribution system losses, septic system leachate, and agricultural and M&I return flows)	• Historical and current: Areal recharge via precipitation was taken from the BCM model. M&I return flows were calculated from metered Camrosa water sales to residential parcels. Indoor use was estimated to be 93 gpcd (see Model TM for details [Appendix G]), all of which was assumed to result in return flows via septic leachate because there is no sanitary sewer service within the basin. Deliveries above 93 gpcd were allocated to outdoor landscape irrigation, 20% of which was assumed to result in return flows. Metered Camrosa water sales were also the source for return flows from distribution losses, which was estimated to be 4.7% based on Camrosa's 2015 UWMP (Camrosa, 2016). Return flows from agricultural irrigation were estimated to be 20% of total applied water, whether from groundwater pumping or Camrosa water sales to agricultural parcels. • Projected: Areal recharge via precipitation in the period 1972 – 2021 is taken from the BCM data and used to simulate future conditions. For the climate change scenarios, precipitation and ET change factors are both used. Predictive recharge from agricultural, M&I uses, and distribution losses are assumed to be the same as the 10-year historical period, repeated over the 50-year predictive period.
Direct evapotranspiration (ET) of surface water by riparian vegetation	• Historical and current: ET from non-riparian surfaces and vegetation is already accounted for in the BCM recharge data, therefore only ET from phreatophytes is accounted for in this section. Areas in the basin with riparian vegetation were mapped and used (TNC, 2022). Crop coefficients for different vegetation groups were used to estimate ET rates with a reference ET that relied on a local CIMIS station in Camarillo, which were then applied in the numerical model through the streamflow routing package (i.e., riparian vegetation ET is interpreted to be primarily supplied by surface water). • Projected: The historical and current ET rates were scaled for the climate change scenarios using the ET change factors. Current phreatophyte distribution (with corresponding vegetation type) was assumed for future conditions and applied in the numerical model through the streamflow routing package (Appendix G).

Table 3.3-02 Estimated Historical Demands and Supplies in the ASRVGB by Category and Source (in acre-feet).

Water Year	Year Type	M&I Demand	Ag Demand	Domestic Demand	Total Demand	M&I GW Supplies‡	Ag GW Supplies*	Domestic GW Supplies	Total GW Supplies	M&I Supplies from Outside ASRVGB**	AG Supplies from Outside ASRVGB†	Total Supplies from Outside ASRVGB	Total Supply
2012	Below Normal	1,964	4,737	2.5	6,703	648	3,160	2.5	3,810	1,316	1,578	2,893	6,703
2013	Critical	2,071	4,837	2.5	6,911	849	3,282	2.5	4,133	1,222	1,556	2,777	6,911
2014	Critical	2,218	5,136	2.5	7,357	865	3,489	2.5	4,357	1,353	1,647	3,000	7,357
2015	Critical	1,725	4,186	2.5	5,914	742	2,829	2.5	3,574	983	1,357	2,340	5,914
2016	Critical	1,724	4,517	2.5	6,243	672	2,886	2.5	3,561	1,051	1,631	2,682	6,243
2017	Above Normal	1,602	3,394	2.5	4,999	865	2,524	2.5	3,392	737	870	1,607	4,999
2018	Below Normal	1,892	3,884	2.5	5,778	984	2,864	2.5	3,850	908	1,020	1,928	5,778
2019	Below Normal	1,625	3,205	2.5	4,832	585	2,307	2.5	2,894	1,040	898	1,938	4,832
2020	Below Normal	1,772	3,557	2.5	5,332	301	2,368	2.5	2,671	1,471	1,190	2,661	5,332
2021	Critical	1,980	3,550	2.5	5,532	238	2,181	2.5	2,421	1,742	1,369	3,111	5,532
Historical Average		1,885	4,385	2.5	6,272	804	3,005	2.5	3,811	1,081	1,380	2,461	6,272
Current Average		1,792	3,437	2.5	5,232	375	2,285	2.5	2,662	1,418	1,152	2,570	5,232

* Includes groundwater extracted from all irrigation wells within the ASRVGB.
**Includes both potable and non-potable sources, see Section 3.3.1.1 for additional details.
† Includes non-potable sources, see Section 3.3.1.1 for additional details.
‡ Some groundwater produced for M&I is exported for use outside of the Basin.

Table 3.3-03 Projected and Actual Camrosa District-wide Imports from Calleguas MWD (in acre-feet).

Year	Projected Imported Water Availability	Actual Purchases* (Calendar Year)	Actual Purchases* (Water Year)
2012	7,900	6,083	6,135
2013	7,900	6,992	6,644
2014	7,900	6,415	6,863
2015	7,900	4,539	4,591
2016	7,900	3,884	3,984
2017	7,900	4,242	4,219
2018	7,900	4,364	4,330
2019	7,900	4,766	4,680
2020	7,900	6,190	5,975
2021	7,900	4,908**	5,753

*Purchases less than projected availability typically means need for imported water was less than the projected availability and is not necessarily an indicator of shortages. During periods in which allocations were in effect (Calleguas MWD had allocations in place during 2015 and 2016), reduced imported water availability was addressed through conservation, not increased groundwater use.
**Through October 31.

Table 3.3-04 Imported Purchased Calleguas MWD Water Deliveries to the Basin (in acre-feet).

Water Year	Camrosa Metered Potable Deliveries in ASRVGB	Potable Imported Purchased Water from Calleguas MWD to the ASRVGB	Percentage	Water Supply Shortage Occurrence
2012	1,682	1,126	67%	No occurrences
2013	1,729	1,017	59%	No occurrences
2014	1,775	1,076	61%	No occurrences
2015	1,351	770	57%	No occurrences
2016	1,325	811	61%	No occurrences
2017	1,252	570	46%	No occurrences
2018	1,480	717	48%	No occurrences
2019	1,268	806	64%	No occurrences
2020	1,404	1,162	83%	No occurrences
2021	1,556	1,369	88%	No occurrences
Historical Average	1,482	942	64%	
Current Average	1,409	1,112	79%	

Table 3.3-05 Imported Non-Potable Surface Water Deliveries to the Basin (in acre-feet).

Water Year	Camrosa Metered Non-Potable* Deliveries in ASRVGB	Non-Potable* Imported Water to the ASRVGB	Percentage	Water Supply Shortage Occurrence
2012	2,636	2,134	81%	No occurrences
2013	2,978	2,485	83%	No occurrences
2014	3,143	2,749	87%	No occurrences
2015	2,755	2,447	89%	No occurrences
2016	3,072	2,760	90%	No occurrences
2017	2,242	2,057	92%	No occurrences
2018	2,538	2,328	92%	No occurrences
2019	1,760	1,439	82%	No occurrences
2020	1,802	1,473	82%	No occurrences
2021	1,980	1,600	81%	No occurrences
Historical Average	2,491	2,147	86%	
Current Average	1,847	1,504	81%	

*Non-potable water includes minor amount of reclaimed water and Calleguas purchases.

Table 3.3-06 ASRVGB Surface Water Inflows and Outflows by Water Year, Historical and Current Period (in acre-feet).

Period	Water Year	Year Type	Arroyo Santa Rosa Inflows	Arroyo Santa Rosa Tributary Inflows	Arroyo Conejo Inflows	Direct Runoff Contributions to Streamflow	Groundwater Discharge to Gaining Reaches	Stream Percolation from Losing Reaches	Stream Outflows	Riparian Evapotranspiration	Inflows	Outflows
Historical	2012	Below Normal	154	18	14,998	188	490	(730)	(14,990)	(128)	15,848	(15,848)
	2013	Critical	209	25	13,481	257	121	(971)	(13,000)	(122)	14,093	(14,093)
	2014	Critical	194	23	12,677	238	79	(1,075)	(12,007)	(129)	13,211	(13,211)
	2015	Critical	168	20	12,362	207	68	(1,089)	(11,620)	(116)	12,825	(12,825)
	2016	Critical	110	13	10,634	135	64	(1,027)	(9,812)	(117)	10,956	(10,956)
	2017	Above Normal	1,092	128	18,723	1,340	74	(1,721)	(19,498)	(138)	21,357	(21,357)
	2018	Below Normal	389	46	13,118	477	62	(1,285)	(12,679)	(127)	14,092	(14,092)
Historical/ Current	2019	Below Normal	1,684	198	23,104	2,067	73	(2,134)	(24,854)	(139)	27,126	(27,127)
	2020	Below Normal	1,313	154	20,771	1,611	78	(1,872)	(21,910)	(146)	23,928	(23,928)
	2021	Critical	196	23	13,317	241	78	(952)	(12,765)	(138)	13,855	(13,855)
Historical Average (2012-2021)			551	65	15,318	676	119	(1,286)	(15,313)	(130)	16,729	(16,729)
Current Average (2019-2021)			1,065	125	19,064	1,306	77	(1,653)	(19,843)	(141)	21,636	(21,636)

*Sum of percentages/averages may not equal totals due to rounding.

Table 3.3-07 ASRVGB Groundwater Inflows and Outflows by Water Year, Historical and Current Period (in acre-feet).

Period	Water Year	Year Type	Mountain-Front Recharge from the North	Recharge from Precipitation	Agricultural Return Flows	M&I Outdoor Return Flows	M&I Septic Return Flows	Non-potable Distribution Losses	Potable Distribution Losses	Inflow from the Conejo Volcanics from the South	Inflow from the Conejo Volcanics from the East	Underflow from Pleasant Valley	Streamflow Percolation from Losing Reaches	GW Discharge to Streamflow Gaining Reaches	FCGMA Agricultural Pumping	Non-FCGMA Agricultural Pumping	Domestic Pumping	M&I Pumping	Inflows	Outflows	Change in Storage	Cumulative Change in Storage
Historical	2012	Below Normal	295	6	812	336	279	113	62	198	2,078	(144)	730	(490)	(1,544)	(735)	(3)	(3,101)	4,909	(6,017)	(1,107)	(1,107)
	2013	Critical	284	4	829	357	279	128	63	115	1,299	131	971	(121)	(1,391)	(676)	(3)	(3,972)	4,461	(6,162)	(1,701)	(2,808)
	2014	Critical	285	4	880	387	279	135	65	98	1,203	281	1,075	(79)	(1,597)	(746)	(3)	(3,493)	4,691	(5,917)	(1,226)	(4,034)
	2015	Critical	241	7	718	288	279	118	49	90	1,213	96	1,089	(68)	(1,234)	(554)	(3)	(2,627)	4,188	(4,485)	(297)	(4,331)
	2016	Critical	243	6	774	288	279	132	48	86	1,233	103	1,027	(64)	(1,268)	(565)	(3)	(1,945)	4,220	(3,844)	376	(3,955)
	2017	Above Normal	199	161	582	265	279	96	46	76	1,095	(8)	1,721	(74)	(1,033)	(462)	(3)	(2,857)	4,521	(4,436)	85	(3,870)
	2018	Below Normal	207	4	666	322	279	109	54	80	1,180	60	1,285	(62)	(1,209)	(539)	(3)	(3,272)	4,246	(5,085)	(839)	(4,709)
Historical/ Current	2019	Below Normal	174	177	549	268	279	76	46	73	1,047	69	2,134	(73)	(1,234)	(552)	(3)	(2,094)	4,893	(3,956)	938	(3,771)
	2020	Below Normal	188	38	610	298	279	77	51	62	1,058	272	1,872	(78)	(1,440)	(650)	(3)	(1,259)	4,805	(3,430)	1,375	(2,396)
	2021	Critical	186	0	608	339	279	85	57	51	1,160	276	952	(78)	(1,335)	(611)	(3)	(1,278)	3,995	(3,305)	690	(1,706)
Historical Average (2012-2021)			230	41	703	315	279	107	54	93	1,257	114	1,286	(119)	(1,329)	(609)	(3)	(2,590)	4,493	(4,664)	(171)	
Current Average (2019-2021)			183	72	589	302	279	79	52	62	1,088	206	1,653	(77)	(1,337)	(604)	(3)	(1,544)	4,565	(3,564)	1,001	

*Sum of percentages/averages may not equal totals due to rounding.

Table 3.3-08 Current and Projected Population for Camrosa Water District Service Area.

Unincorporated Ventura County* Population Projection					
	2020	2025	2030	2035	2040
Population	101,255	103,603	105,950	108,298	110,645
Growth Rate (5-year)	1.64%	2.32%	2.27%	2.22%	2.17%

*The population of ASRVGB is unknown and much less than the total for the unincorporated County, but the growth rate is assumed to be the same.

Note: Fields in blue are provided in *Ventura Cities and County 2040 Population Forecast*; 2025 and 2035 are interpolated.

Table 3.3-09 Projected Baseline Demands and Supplies by Category and Source (in acre-feet).

Water Year	Year Type	M&I Demand	Ag Demand	Domestic Demand	Total Demand	M&I GW Supplies	Ag GW Supplies	Domestic GW Supplies	Total GW Supplies	M&I Imported Supplies	AG Imported Supplies	Total Imported Supplies	Total Supply
2022	Dry	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2023	Above Normal	2,071	4,837	2.5	6,911	849	3,282	2.5	4,133	1,222	1,556	2,777	6,911
2024	Above Normal	2,218	5,136	2.5	7,357	865	3,489	2.5	4,357	1,353	1,647	3,000	7,357
2025	Above Normal	1,725	4,186	2.5	5,914	742	2,829	2.5	3,574	983	1,357	2,340	5,914
2026	Dry	1,724	4,517	2.5	6,243	672	2,886	2.5	3,561	1,051	1,631	2,682	6,243
2027	Dry	1,602	3,394	2.5	4,999	865	2,524	2.5	3,392	737	870	1,607	4,999
2028	Wet	1,892	3,884	2.5	5,778	984	2,864	2.5	3,850	908	1,020	1,928	5,778
2029	Wet	1,625	3,205	2.5	4,832	585	2,307	2.5	2,894	1,040	898	1,938	4,832
2030	Wet	1,772	3,557	2.5	5,332	301	2,368	2.5	2,671	1,471	1,190	2,661	5,332
2031	Above Normal	1,980	3,550	2.5	5,532	238	2,181	2.5	2,421	1,742	1,369	3,111	5,532
2032	Dry	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2033	Wet	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2034	Wet	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2035	Dry	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2036	Wet	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2037	Below Normal	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2038	Dry	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2039	Dry	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2040	Critical	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2041	Critical	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532
2042	Wet	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2043	Wet	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2044	Above Normal	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2045	Wet	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2046	Wet	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2047	Below Normal	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2048	Wet	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2049	Wet	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2050	Dry	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2051	Above Normal	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532
2052	Dry	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2053	Below Normal	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2054	Below Normal	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2055	Wet	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2056	Wet	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2057	Critical	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2058	Critical	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2059	Dry	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2060	Below Normal	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2061	Above Normal	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532
2062	Below Normal	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2063	Critical	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2064	Critical	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2065	Critical	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2066	Critical	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2067	Above Normal	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2068	Below Normal	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2069	Below Normal	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2070	Below Normal	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2071	Critical	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532

Table 3.3-10 Projected 2030 Demands and Supplies by Category and Source (in acre-feet).

Water Year	Year Type	M&I Demand	Ag Demand	Domestic Demand	Total Demand	M&I GW Supplies	Ag GW Supplies	Domestic GW Supplies	Total GW Supplies	M&I Imported Supplies	AG Imported Supplies	Total Imported Supplies	Total Supply
2022	Dry	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2023	Above Normal	2,071	4,837	2.5	6,911	849	3,282	2.5	4,133	1,222	1,556	2,777	6,911
2024	Above Normal	2,218	5,136	2.5	7,357	865	3,489	2.5	4,357	1,353	1,647	3,000	7,357
2025	Above Normal	1,725	4,186	2.5	5,914	742	2,829	2.5	3,574	983	1,357	2,340	5,914
2026	Dry	1,724	4,517	2.5	6,243	672	2,886	2.5	3,561	1,051	1,631	2,682	6,243
2027	Dry	1,602	3,394	2.5	4,999	865	2,524	2.5	3,392	737	870	1,607	4,999
2028	Wet	1,892	3,884	2.5	5,778	984	2,864	2.5	3,850	908	1,020	1,928	5,778
2029	Wet	1,625	3,205	2.5	4,832	585	2,307	2.5	2,894	1,040	898	1,938	4,832
2030	Wet	1,772	3,557	2.5	5,332	301	2,368	2.5	2,671	1,471	1,190	2,661	5,332
2031	Above Normal	1,980	3,550	2.5	5,532	238	2,181	2.5	2,421	1,742	1,369	3,111	5,532
2032	Dry	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2033	Wet	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2034	Wet	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2035	Dry	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2036	Wet	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2037	Below Normal	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2038	Dry	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2039	Dry	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2040	Critical	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2041	Critical	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532
2042	Wet	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2043	Wet	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2044	Above Normal	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2045	Wet	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2046	Wet	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2047	Below Normal	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2048	Wet	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2049	Wet	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2050	Dry	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2051	Above Normal	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532
2052	Dry	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2053	Below Normal	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2054	Below Normal	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2055	Wet	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2056	Wet	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2057	Critical	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2058	Critical	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2059	Dry	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2060	Below Normal	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2061	Above Normal	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532
2062	Below Normal	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2063	Critical	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2064	Critical	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2065	Critical	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2066	Critical	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2067	Above Normal	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2068	Below Normal	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2069	Below Normal	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2070	Below Normal	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2071	Critical	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532

Table 3.3-11 Projected 2070 Demands and Supplies by Category and Source (in acre-feet).

Water Year	Year Type	M&I Demand	Ag Demand	Domestic Demand	Total Demand	M&I GW Supplies	Ag GW Supplies	Domestic GW Supplies	Total GW Supplies	M&I Imported Supplies	AG Imported Supplies	Total Imported Supplies	Total Supply
2022	Dry	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2023	Above Normal	2,071	4,837	2.5	6,911	849	3,282	2.5	4,133	1,222	1,556	2,777	6,911
2024	Above Normal	2,218	5,136	2.5	7,357	865	3,489	2.5	4,357	1,353	1,647	3,000	7,357
2025	Above Normal	1,725	4,186	2.5	5,914	742	2,829	2.5	3,574	983	1,357	2,340	5,914
2026	Dry	1,724	4,517	2.5	6,243	672	2,886	2.5	3,561	1,051	1,631	2,682	6,243
2027	Dry	1,602	3,394	2.5	4,999	865	2,524	2.5	3,392	737	870	1,607	4,999
2028	Wet	1,892	3,884	2.5	5,778	984	2,864	2.5	3,850	908	1,020	1,928	5,778
2029	Wet	1,625	3,205	2.5	4,832	585	2,307	2.5	2,894	1,040	898	1,938	4,832
2030	Wet	1,772	3,557	2.5	5,332	301	2,368	2.5	2,671	1,471	1,190	2,661	5,332
2031	Above Normal	1,980	3,550	2.5	5,532	238	2,181	2.5	2,421	1,742	1,369	3,111	5,532
2032	Dry	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2033	Wet	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2034	Wet	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2035	Dry	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2036	Wet	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2037	Below Normal	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2038	Dry	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2039	Dry	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2040	Critical	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2041	Critical	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532
2042	Wet	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2043	Wet	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2044	Above Normal	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2045	Wet	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2046	Wet	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2047	Below Normal	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2048	Wet	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2049	Wet	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2050	Dry	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2051	Above Normal	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532
2052	Dry	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2053	Below Normal	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2054	Below Normal	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2055	Wet	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2056	Wet	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2057	Critical	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2058	Critical	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2059	Dry	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2060	Below Normal	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2061	Above Normal	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532
2062	Below Normal	1,964	4,737	3	6,703	648	3,160	3	3,810	1,316	1,578	2,893	6,703
2063	Critical	2,071	4,837	3	6,911	849	3,282	3	4,133	1,222	1,556	2,777	6,911
2064	Critical	2,218	5,136	3	7,357	865	3,489	3	4,357	1,353	1,647	3,000	7,357
2065	Critical	1,725	4,186	3	5,914	742	2,829	3	3,574	983	1,357	2,340	5,914
2066	Critical	1,724	4,517	3	6,243	672	2,886	3	3,561	1,051	1,631	2,682	6,243
2067	Above Normal	1,602	3,394	3	4,999	865	2,524	3	3,392	737	870	1,607	4,999
2068	Below Normal	1,892	3,884	3	5,778	984	2,864	3	3,850	908	1,020	1,928	5,778
2069	Below Normal	1,625	3,205	3	4,832	585	2,307	3	2,894	1,040	898	1,938	4,832
2070	Below Normal	1,772	3,557	3	5,332	301	2,368	3	2,671	1,471	1,190	2,661	5,332
2071	Critical	1,980	3,550	3	5,532	238	2,181	3	2,421	1,742	1,369	3,111	5,532

Table 3.3-12 ASRVGB Surface Water Inflows and Outflows by Water Year, Future Baseline Conditions (in acre-feet).

Water Year	Year Type	Arroyo Santa Rosa Inflows	Arroyo Santa Rosa Tributary Inflows	Arroyo Conejo Inflows	Direct Runoff Contributions to Streamflow	GW Discharge to Gaining Reaches	Stream Percolation from Losing Reaches	Stream Outflows	Riparian Evapo-transpiration	Inflows	Outflows
2022	Dry	232	27	15,475	285	89	(931)	(15,049)	(129)	16,109	(16,109)
2023	Above Normal	714	84	16,536	875	115	(1,197)	(16,999)	(128)	18,324	(18,324)
2024	Above Normal	519	61	14,644	636	114	(1,083)	(14,768)	(123)	15,974	(15,974)
2025	Above Normal	355	42	13,493	436	91	(1,081)	(13,215)	(121)	14,417	(14,417)
2026	Dry	161	19	10,939	197	75	(983)	(10,293)	(114)	11,391	(11,391)
2027	Dry	318	37	14,035	390	71	(1,159)	(13,567)	(125)	14,851	(14,851)
2028	Wet	3,544	417	32,231	4,348	96	(2,833)	(37,664)	(139)	40,636	(40,636)
2029	Wet	1,706	201	23,236	2,093	89	(2,049)	(25,136)	(140)	27,325	(27,325)
2030	Wet	3,164	372	31,982	3,881	95	(2,559)	(36,793)	(143)	39,495	(39,495)
2031	Above Normal	432	51	14,747	530	70	(1,252)	(14,453)	(125)	15,830	(15,830)
2032	Dry	398	47	16,449	489	69	(1,267)	(16,054)	(132)	17,452	(17,452)
2033	Wet	4,062	478	36,826	4,984	106	(3,288)	(43,013)	(155)	46,456	(46,456)
2034	Wet	556	65	14,899	682	83	(1,295)	(14,863)	(127)	16,284	(16,284)
2035	Dry	640	75	15,221	786	74	(1,416)	(15,257)	(124)	16,797	(16,797)
2036	Wet	2,000	235	22,058	2,454	89	(2,313)	(24,385)	(138)	26,837	(26,837)
2037	Below Normal	309	36	13,980	380	68	(1,183)	(13,464)	(125)	14,773	(14,773)
2038	Dry	1,117	131	17,557	1,370	74	(1,798)	(18,319)	(131)	20,249	(20,249)
2039	Dry	528	62	16,099	648	64	(1,413)	(15,859)	(130)	17,402	(17,402)
2040	Critical	350	41	14,905	430	61	(1,293)	(14,367)	(128)	15,787	(15,787)
2041	Critical	941	111	17,835	1,155	61	(1,699)	(18,276)	(128)	20,103	(20,103)
2042	Wet	3,712	437	36,556	4,554	78	(3,032)	(42,160)	(146)	45,338	(45,338)
2043	Wet	4,937	581	42,124	6,057	94	(3,473)	(50,170)	(149)	53,792	(53,793)
2044	Above Normal	776	91	16,205	952	73	(1,560)	(16,408)	(129)	18,097	(18,097)
2045	Wet	3,978	468	35,445	4,880	97	(3,085)	(41,635)	(147)	44,867	(44,867)
2046	Wet	1,063	125	16,404	1,304	81	(1,717)	(17,131)	(129)	18,976	(18,976)
2047	Below Normal	1,236	145	19,592	1,516	77	(1,815)	(20,618)	(133)	22,566	(22,566)
2048	Wet	5,291	622	42,814	6,491	105	(3,660)	(51,505)	(158)	55,323	(55,323)
2049	Wet	620	73	16,654	761	75	(1,403)	(16,646)	(134)	18,183	(18,183)
2050	Dry	687	81	16,976	843	72	(1,474)	(17,051)	(133)	18,659	(18,659)
2051	Above Normal	1,754	206	22,759	2,152	80	(2,171)	(24,654)	(126)	26,951	(26,951)
2052	Dry	270	32	15,656	331	66	(1,180)	(15,049)	(126)	16,355	(16,355)
2053	Below Normal	1,402	165	20,705	1,720	79	(2,014)	(21,922)	(135)	24,071	(24,071)
2054	Below Normal	730	86	15,959	896	74	(1,535)	(16,077)	(134)	17,746	(17,746)
2055	Wet	4,794	564	40,388	5,882	105	(3,796)	(47,790)	(148)	51,733	(51,733)
2056	Wet	1,701	200	20,245	2,087	86	(2,177)	(22,014)	(129)	24,320	(24,320)
2057	Critical	596	70	15,715	731	75	(1,408)	(15,647)	(131)	17,186	(17,187)
2058	Critical	1,612	190	20,555	1,977	80	(2,086)	(22,188)	(140)	24,413	(24,414)
2059	Dry	765	90	17,532	938	68	(1,561)	(17,698)	(134)	19,393	(19,393)
2060	Below Normal	1,248	147	20,344	1,531	71	(1,899)	(21,314)	(129)	23,342	(23,342)
2061	Above Normal	1,108	130	18,843	1,359	71	(1,785)	(19,606)	(119)	21,510	(21,510)
2062	Below Normal	154	18	14,981	188	60	(1,132)	(14,143)	(126)	15,401	(15,401)
2063	Critical	209	25	13,481	257	62	(1,176)	(12,736)	(121)	14,034	(14,034)
2064	Critical	194	23	12,677	238	57	(1,178)	(11,882)	(129)	13,189	(13,189)
2065	Critical	168	20	12,362	207	56	(1,182)	(11,515)	(116)	12,813	(12,813)
2066	Critical	110	13	10,634	135	52	(1,145)	(9,684)	(116)	10,945	(10,945)
2067	Above Normal	1,092	128	18,723	1,340	60	(1,882)	(19,324)	(137)	21,343	(21,343)
2068	Below Normal	389	46	13,118	477	53	(1,400)	(12,556)	(127)	14,083	(14,083)
2069	Below Normal	1,684	198	23,104	2,067	63	(2,297)	(24,681)	(139)	27,116	(27,116)
2070	Below Normal	1,313	154	20,771	1,611	62	(2,104)	(21,662)	(146)	23,911	(23,911)
2071	Critical	196	23	13,317	241	50	(1,282)	(12,408)	(137)	13,827	(13,827)
Average (2022-2071)		1,317	155	19,956	1,615	77	(1,794)	(21,193)	(132)	23,119	(23,120)

*Sum of percentages/averages may not equal totals due to rounding.

Table 3.3-13 ASRVGB Projected Surface Water Inflows and Outflows by Water Year, 2030 Climate Change Factors (in acre-feet).

Water Year	Year Type	Arroyo Santa Rosa Inflows	Arroyo Santa Rosa Tributary Inflows	Arroyo Conejo Inflows	Direct Runoff Contributions to Streamflow	GW Discharge to Gaining Reaches	Stream Percolation from Losing Reaches	Stream Outflows	Riparian Evapo-transpiration	Inflows	Outflows
2022	Dry	226	27	15,486	277	89	(927)	(15,044)	(135)	16,105	(16,105)
2023	Below Normal	703	83	15,435	862	114	(1,185)	(15,885)	(128)	17,198	(17,198)
2024	Wet	530	62	14,166	650	113	(1,089)	(14,307)	(126)	15,522	(15,522)
2025	Below Normal	340	40	12,957	417	90	(1,070)	(12,649)	(124)	13,843	(13,843)
2026	Below Normal	171	20	10,930	210	75	(994)	(10,295)	(117)	11,407	(11,407)
2027	Dry	338	40	14,581	415	71	(1,178)	(14,135)	(131)	15,445	(15,445)
2028	Wet	3,429	403	31,086	4,208	94	(2,810)	(36,269)	(141)	39,221	(39,220)
2029	Wet	1,568	184	21,112	1,924	86	(1,963)	(22,772)	(140)	24,875	(24,875)
2030	Wet	3,059	360	30,727	3,753	93	(2,528)	(35,318)	(147)	37,992	(37,992)
2031	Wet	402	47	14,334	493	68	(1,237)	(13,978)	(130)	15,344	(15,344)
2032	Dry	366	43	15,487	449	68	(1,245)	(15,032)	(135)	16,412	(16,412)
2033	Wet	3,894	458	35,335	4,777	103	(3,246)	(41,162)	(159)	44,567	(44,567)
2034	Wet	563	66	14,873	691	81	(1,307)	(14,837)	(131)	16,275	(16,275)
2035	Dry	626	74	15,270	768	73	(1,415)	(15,265)	(130)	16,810	(16,810)
2036	Wet	1,897	223	20,939	2,328	87	(2,256)	(23,078)	(141)	25,474	(25,474)
2037	Below Normal	309	36	14,304	380	67	(1,195)	(13,770)	(131)	15,097	(15,097)
2038	Dry	1,118	132	17,407	1,372	73	(1,807)	(18,160)	(136)	20,102	(20,102)
2039	Dry	536	63	16,266	657	64	(1,427)	(16,024)	(135)	17,586	(17,586)
2040	Critical	357	42	14,706	438	60	(1,303)	(14,170)	(131)	15,603	(15,603)
2041	Critical	797	94	16,740	977	60	(1,622)	(16,914)	(131)	18,667	(18,668)
2042	Above Normal	3,488	410	34,411	4,280	76	(2,946)	(39,571)	(149)	42,665	(42,665)
2043	Wet	4,802	565	41,005	5,891	92	(3,445)	(48,755)	(154)	52,354	(52,355)
2044	Above Normal	786	92	16,247	964	71	(1,577)	(16,449)	(134)	18,161	(18,161)
2045	Wet	3,387	399	30,686	4,156	92	(2,885)	(35,686)	(150)	38,720	(38,720)
2046	Above Normal	1,120	132	17,070	1,374	79	(1,772)	(17,869)	(135)	19,775	(19,775)
2047	Below Normal	1,222	144	19,321	1,499	75	(1,820)	(20,303)	(138)	22,260	(22,260)
2048	Wet	5,470	644	43,366	6,712	103	(3,652)	(52,482)	(161)	56,294	(56,294)
2049	Wet	612	72	16,352	751	73	(1,411)	(16,310)	(139)	17,860	(17,860)
2050	Below Normal	711	84	17,241	873	71	(1,506)	(17,337)	(137)	18,980	(18,980)
2051	Above Normal	1,706	201	22,215	2,093	78	(2,159)	(24,005)	(130)	26,293	(26,293)
2052	Dry	268	32	16,236	329	65	(1,192)	(15,605)	(132)	16,930	(16,930)
2053	Below Normal	1,412	166	20,517	1,733	79	(2,024)	(21,745)	(138)	23,907	(23,907)
2054	Dry	758	89	16,302	930	74	(1,567)	(16,448)	(139)	18,153	(18,153)
2055	Wet	4,719	555	39,800	5,790	103	(3,785)	(47,032)	(152)	50,968	(50,968)
2056	Above Normal	1,575	185	18,789	1,932	84	(2,099)	(20,335)	(131)	22,565	(22,565)
2057	Critical	604	71	15,974	740	74	(1,427)	(15,899)	(137)	17,463	(17,463)
2058	Critical	1,621	191	20,445	1,988	79	(2,096)	(22,082)	(145)	24,323	(24,323)
2059	Dry	772	91	17,490	948	67	(1,574)	(17,656)	(139)	19,368	(19,368)
2060	Below Normal	1,310	154	21,104	1,608	71	(1,950)	(22,164)	(134)	24,247	(24,247)
2061	Above Normal	1,059	125	18,231	1,299	70	(1,764)	(18,898)	(121)	20,783	(20,783)
2062	Below Normal	143	17	14,542	175	59	(1,130)	(13,677)	(130)	14,937	(14,936)
2063	Critical	213	25	13,562	262	61	(1,187)	(12,809)	(127)	14,123	(14,123)
2064	Critical	190	22	12,628	233	57	(1,180)	(11,816)	(134)	13,130	(13,130)
2065	Critical	172	20	13,206	210	56	(1,196)	(12,344)	(124)	13,664	(13,664)
2066	Dry	112	13	10,303	138	52	(1,146)	(9,354)	(118)	10,618	(10,618)
2067	Above Normal	1,103	130	18,779	1,353	60	(1,894)	(19,389)	(141)	21,424	(21,425)
2068	Below Normal	362	43	12,997	444	52	(1,384)	(12,382)	(132)	13,898	(13,898)
2069	Above Normal	1,560	184	20,895	1,914	61	(2,216)	(22,260)	(138)	24,613	(24,613)
2070	Above Normal	1,329	156	21,252	1,631	61	(2,128)	(22,151)	(152)	24,431	(24,431)
2071	Critical	192	23	12,664	235	50	(1,278)	(11,745)	(139)	13,163	(13,163)
Average (2022-2071)		1,280	151	19,515	1,571	76	(1,784)	(20,672)	(136)	22,592	(22,592)

*Sum of percentages/averages may not equal totals due to rounding.

Table 3.3-14 ASRVGB Projected Surface Water Inflows and Outflows by Water Year, 2070 Climate Change Factors (in acre-feet).

Water Year	Year Type	Arroyo Santa Rosa Inflows	Arroyo Santa Rosa Tributary Inflows	Arroyo Conejo Inflows	Direct Runoff Contributions to Streamflow	GW Discharge to Gaining Reaches	Stream Percolation from Losing Reaches	Stream Outflows	Riparian Evapotranspiration	Inflows	Outflows
2022	Dry	210	25	15,487	257	89	(916)	(15,010)	(141)	16,068	(16,068)
2023	Above Normal	779	92	15,659	956	115	(1,229)	(16,240)	(132)	17,601	(17,601)
2024	Wet	549	65	13,836	674	113	(1,099)	(14,007)	(131)	15,236	(15,236)
2025	Below Normal	325	38	12,479	399	89	(1,058)	(12,144)	(128)	13,331	(13,331)
2026	Below Normal	252	30	10,550	309	73	(1,055)	(10,050)	(107)	11,212	(11,212)
2027	Below Normal	380	45	15,336	466	73	(1,198)	(14,967)	(134)	16,299	(16,299)
2028	Wet	3,720	438	32,891	4,564	94	(2,881)	(38,680)	(147)	41,707	(41,707)
2029	Wet	1,783	210	23,180	2,188	88	(2,080)	(25,222)	(149)	27,450	(27,450)
2030	Wet	3,306	389	32,065	4,056	95	(2,571)	(37,185)	(153)	39,909	(39,909)
2031	Wet	442	52	14,776	542	69	(1,260)	(14,487)	(134)	15,880	(15,880)
2032	Below Normal	371	44	15,700	455	68	(1,245)	(15,251)	(142)	16,638	(16,638)
2033	Wet	4,056	477	35,691	4,976	105	(3,237)	(41,904)	(164)	45,305	(45,306)
2034	Wet	476	56	13,554	585	80	(1,244)	(13,372)	(135)	14,751	(14,752)
2035	Dry	552	65	14,216	677	73	(1,354)	(14,093)	(135)	15,583	(15,583)
2036	Wet	2,259	266	24,141	2,772	89	(2,464)	(26,913)	(151)	29,527	(29,527)
2037	Below Normal	305	36	14,666	374	69	(1,184)	(14,125)	(139)	15,448	(15,448)
2038	Dry	1,032	121	16,291	1,266	73	(1,735)	(16,907)	(140)	18,782	(18,782)
2039	Dry	483	57	15,542	593	64	(1,384)	(15,213)	(142)	16,739	(16,739)
2040	Critical	365	43	14,318	448	61	(1,300)	(13,801)	(134)	15,236	(15,236)
2041	Dry	989	116	18,110	1,214	61	(1,729)	(18,623)	(138)	20,490	(20,490)
2042	Wet	3,843	452	36,913	4,715	77	(3,021)	(42,822)	(155)	45,999	(45,999)
2043	Wet	5,246	617	43,685	6,437	93	(3,513)	(52,404)	(160)	56,078	(56,078)
2044	Above Normal	801	94	16,132	982	72	(1,578)	(16,364)	(139)	18,081	(18,081)
2045	Wet	3,918	461	34,039	4,807	94	(3,002)	(40,159)	(158)	43,318	(43,319)
2046	Above Normal	1,258	148	18,525	1,543	81	(1,852)	(19,560)	(144)	21,555	(21,555)
2047	Below Normal	1,140	134	18,478	1,399	76	(1,754)	(19,331)	(143)	21,227	(21,227)
2048	Wet	5,203	612	41,218	6,383	103	(3,505)	(49,848)	(166)	53,520	(53,520)
2049	Wet	574	68	15,481	704	73	(1,375)	(15,380)	(145)	16,900	(16,900)
2050	Below Normal	720	85	17,000	883	71	(1,505)	(17,112)	(142)	18,759	(18,759)
2051	Above Normal	2,110	248	25,533	2,589	81	(2,381)	(28,043)	(138)	30,561	(30,562)
2052	Dry	254	30	15,831	311	66	(1,173)	(15,179)	(139)	16,491	(16,491)
2053	Below Normal	1,362	160	19,270	1,671	79	(1,974)	(20,425)	(142)	22,541	(22,541)
2054	Dry	766	90	16,112	940	74	(1,568)	(16,271)	(144)	17,983	(17,983)
2055	Wet	4,905	577	40,750	6,018	104	(3,777)	(48,419)	(159)	52,355	(52,355)
2056	Above Normal	1,648	194	19,557	2,021	85	(2,144)	(21,221)	(139)	23,504	(23,504)
2057	Critical	598	70	15,799	734	74	(1,416)	(15,717)	(144)	17,276	(17,276)
2058	Critical	1,649	194	20,386	2,023	80	(2,096)	(22,085)	(151)	24,333	(24,333)
2059	Dry	744	88	16,889	913	67	(1,546)	(17,011)	(144)	18,701	(18,701)
2060	Below Normal	1,340	158	20,770	1,644	71	(1,954)	(21,889)	(139)	23,982	(23,982)
2061	Above Normal	997	117	17,163	1,223	69	(1,717)	(17,727)	(125)	19,570	(19,570)
2062	Below Normal	157	18	15,735	193	60	(1,143)	(14,880)	(140)	16,162	(16,163)
2063	Critical	218	26	13,339	268	61	(1,185)	(12,595)	(132)	13,912	(13,912)
2064	Critical	168	20	12,077	206	56	(1,158)	(11,229)	(139)	12,526	(12,526)
2065	Critical	175	21	13,271	215	56	(1,196)	(12,413)	(129)	13,738	(13,738)
2066	Dry	115	14	9,724	141	52	(1,140)	(8,786)	(119)	10,045	(10,045)
2067	Above Normal	1,064	125	17,970	1,305	59	(1,866)	(18,511)	(147)	20,524	(20,524)
2068	Below Normal	397	47	12,724	487	52	(1,408)	(12,165)	(135)	13,707	(13,708)
2069	Above Normal	1,636	192	21,322	2,007	61	(2,262)	(22,813)	(143)	25,218	(25,218)
2070	Above Normal	1,318	155	21,195	1,617	61	(2,119)	(22,071)	(157)	24,347	(24,347)
2071	Critical	169	20	11,450	207	49	(1,251)	(10,502)	(141)	11,895	(11,895)
Average (2022-2071)		1,343	158	19,737	1,647	76	(1,796)	(21,023)	(142)	22,960	(22,960)

*Sum of percentages/averages may not equal totals due to rounding.

Table 3.3-15 ASRVGB Projected Groundwater Inflows and Outflows by Water Year, Future Baseline Conditions (in acre-feet).

Water Year	Year Type	Mountain-Front Recharge from the North	Recharge from Precipitation	Agricultural Return Flows	M&I Outdoor Return Flows	M&I Septic Return Flows	Non-potable Distribution Losses	Potable Distribution Losses	Inflow from the Conejo Volcanics from the South	Inflow from the Conejo Volcanics from the East	Underflow from Pleasant Valley	Streamflow Percolation from Losing Reaches	GW Discharge to Streamflow Gaining Reaches	FCGMA Agricultural Pumping	Non-FCGMA Agricultural Pumping	Domestic Pumping	M&I Pumping	Inflows	Outflows	Change in Storage	Cumulative Change in Storage
2022	Dry	178	10	812	336	279	113	62	46	1,164	407	931	(89)	(1,549)	(729)	(3)	(1,169)	4,337	(3,538)	799	799
2023	Above Normal	189	330	829	357	279	128	63	34	1,066	319	1,197	(115)	(1,391)	(674)	(3)	(1,554)	4,793	(3,737)	1,056	1,855
2024	Above Normal	208	262	880	387	279	135	65	35	1,069	325	1,083	(114)	(1,595)	(743)	(2)	(2,943)	4,728	(5,398)	(670)	1,185
2025	Above Normal	179	113	718	288	279	118	49	51	1,133	102	1,081	(91)	(1,234)	(555)	(3)	(3,300)	4,112	(5,182)	(1,070)	115
2026	Dry	192	3	774	288	279	132	48	66	1,204	108	983	(75)	(1,271)	(567)	(3)	(3,307)	4,079	(5,224)	(1,145)	(1,029)
2027	Dry	154	8	582	265	279	96	46	76	1,221	17	1,159	(71)	(1,033)	(462)	(3)	(3,300)	3,904	(4,868)	(964)	(1,993)
2028	Wet	181	845	666	322	279	109	54	61	884	33	2,833	(96)	(1,206)	(538)	(2)	(3,293)	6,266	(5,135)	1,131	(862)
2029	Wet	171	836	549	268	279	76	46	49	921	4	2,049	(89)	(1,234)	(553)	(3)	(3,300)	5,250	(5,178)	71	(790)
2030	Wet	200	785	610	298	279	77	51	41	834	194	2,559	(95)	(1,446)	(651)	(3)	(3,307)	5,929	(5,502)	427	(363)
2031	Above Normal	210	17	608	339	279	85	57	55	1,085	225	1,252	(70)	(1,335)	(611)	(3)	(3,300)	4,213	(5,319)	(1,106)	(1,470)
2032	Dry	250	22	810	335	279	113	61	69	1,164	384	1,267	(69)	(1,538)	(727)	(2)	(3,293)	4,755	(5,630)	(875)	(2,344)
2033	Wet	268	1,087	829	357	279	128	63	50	768	288	3,288	(106)	(1,391)	(674)	(3)	(3,300)	7,406	(5,473)	1,934	(411)
2034	Wet	293	185	882	388	280	135	65	53	1,050	293	1,295	(83)	(1,599)	(748)	(3)	(3,307)	4,918	(5,740)	(822)	(1,232)
2035	Dry	259	23	718	288	279	118	49	68	1,132	88	1,416	(74)	(1,234)	(554)	(3)	(3,300)	4,440	(5,165)	(725)	(1,958)
2036	Wet	276	478	773	288	279	132	48	66	988	65	2,313	(89)	(1,266)	(563)	(2)	(3,293)	5,705	(5,213)	492	(1,466)
2037	Below Normal	243	7	582	265	279	96	46	75	1,182	(39)	1,183	(68)	(1,033)	(462)	(3)	(3,300)	3,959	(4,905)	(946)	(2,412)
2038	Dry	262	49	667	322	280	109	54	79	1,132	21	1,798	(74)	(1,213)	(541)	(3)	(3,307)	4,775	(5,137)	(362)	(2,774)
2039	Dry	235	17	549	268	279	76	46	87	1,211	50	1,413	(64)	(1,234)	(552)	(3)	(3,300)	4,232	(5,153)	(920)	(3,694)
2040	Critical	247	2	608	297	279	77	51	94	1,253	271	1,293	(61)	(1,434)	(648)	(2)	(3,293)	4,473	(5,439)	(966)	(4,660)
2041	Critical	247	49	608	339	279	85	57	98	1,200	290	1,699	(61)	(1,335)	(609)	(3)	(3,300)	4,952	(5,308)	(356)	(5,016)
2042	Wet	290	460	812	336	279	113	62	83	939	410	3,032	(78)	(1,549)	(728)	(3)	(3,307)	6,816	(5,665)	1,151	(3,865)
2043	Wet	307	973	829	357	279	128	63	51	726	302	3,473	(94)	(1,391)	(674)	(3)	(3,300)	7,490	(5,461)	2,029	(1,837)
2044	Above Normal	317	15	880	387	279	135	65	60	1,043	326	1,560	(73)	(1,595)	(743)	(2)	(3,293)	5,066	(5,706)	(640)	(2,477)
2045	Wet	286	906	718	288	279	118	49	48	780	74	3,085	(97)	(1,234)	(555)	(3)	(3,300)	6,633	(5,188)	1,445	(1,032)
2046	Wet	304	159	774	288	279	132	48	55	1,027	48	1,717	(81)	(1,271)	(568)	(3)	(3,307)	4,832	(5,229)	(398)	(1,430)
2047	Below Normal	272	306	582	265	279	96	46	59	1,023	(65)	1,815	(77)	(1,033)	(463)	(3)	(3,300)	4,745	(4,940)	(195)	(1,625)
2048	Wet	296	899	666	322	279	109	54	38	693	(46)	3,660	(105)	(1,206)	(539)	(2)	(3,293)	7,016	(5,192)	1,824	200
2049	Wet	258	12	549	268	279	76	46	48	1,040	(22)	1,403	(75)	(1,234)	(554)	(3)	(3,300)	3,979	(5,187)	(1,209)	(1,009)
2050	Dry	253	55	610	298	279	77	51	63	1,116	218	1,474	(72)	(1,446)	(650)	(3)	(3,307)	4,496	(5,479)	(983)	(1,991)
2051	Above Normal	252	345	608	339	279	85	57	65	1,003	229	2,171	(80)	(1,335)	(611)	(3)	(3,300)	5,435	(5,328)	106	(1,885)
2052	Dry	296	6	810	335	279	113	61	73	1,169	371	1,180	(66)	(1,538)	(727)	(2)	(3,293)	4,692	(5,627)	(934)	(2,820)
2053	Below Normal	290	96	829	357	279	128	63	78	1,095	322	2,014	(79)	(1,391)	(673)	(3)	(3,300)	5,551	(5,446)	106	(2,714)
2054	Below Normal	287	10	882	388	280	135	65	80	1,166	361	1,535	(74)	(1,599)	(747)	(3)	(3,307)	5,191	(5,730)	(539)	(3,253)
2055	Wet	262	1,107	718	288	279	118	49	53	690	86	3,796	(105)	(1,234)	(554)	(3)	(3,300)	7,447	(5,196)	2,251	(1,002)
2056	Wet	277	92	773	288	279	132	48	55	964	56	2,177	(86)	(1,266)	(564)	(2)	(3,293)	5,141	(5,211)	(70)	(1,072)
2057	Critical	233	1	582	265	279	96	46	66	1,132	(29)	1,408	(75)	(1,033)	(462)	(3)	(3,300)	4,109	(4,902)	(793)	(1,864)
2058	Critical	253	70	667	322	280	109	54	69	1,054	26	2,086	(80)	(1,213)	(541)	(3)	(3,307)	4,991	(5,144)	(153)	(2,018)
2059	Dry	226	8	549	268	279	76	46	76	1,143	55	1,561	(68)	(1,234)	(552)	(3)	(3,300)	4,286	(5,157)	(870)	(2,888)
2060	Below Normal	240	109	608	297	279	77	51	79	1,105	259	1,899	(71)	(1,434)	(649)	(2)	(3,293)	5,003	(5,450)	(447)	(3,335)
2061	Above Normal	254	589	608	339	279	85	57	74	1,064	245	1,785	(71)	(1,335)	(610)	(3)	(3,300)	5,379	(5,319)	60	(3,275)
2062	Below Normal	295	6	812	336	279	113	62	87	1,229	388	1,132	(60)	(1,549)	(728)	(3)	(3,307)	4,740	(5,647)	(908)	(4,183)
2063	Critical	284	4	829	357	279	128	63	95	1,262	350	1,176	(62)	(1,391)	(672)	(3)	(3,300)	4,828	(5,427)	(599)	(4,782)
2064	Critical	285	4	880	387	279	135	65	100	1,279	392	1,178	(57)	(1,595)	(741)	(2)	(3,293)	4,984	(5,688)	(704)	(5,486)
2065	Critical	241	7	718	288	279	118	49	107	1,317	168	1,182	(56)	(1,234)	(552)	(3)	(3,300)	4,475	(5,145)	(670)	(6,156)
2066	Critical	243	6	774	288	279	132	48	113	1,353	163	1,145	(52)	(1,271)	(565)	(3)	(3,307)	4,546	(5,199)	(652)	(6,808)
2067	Above Normal	199	161	582	265	279	96	46	112	1,243	49	1,882	(60)	(1,033)	(460)	(3)	(3,300)	4,915	(4,856)	59	(6,748)
2068	Below Normal	207	4	666	322	279	109	54	114	1,312	105	1,400	(53)	(1,206)	(536)	(2)	(3,293)	4,571	(5,090)	(519)	(7,267)
2069	Below Normal	174	177	549	268	279	76	46	112	1,185	120	2,297	(63)	(1,234)	(551)	(3)	(3,300)	5,285	(5,150)	135	(7,132)
2070	Below Normal	188	38	610	298	279	77	51	110	1,206	337	2,104	(62)	(1,446)	(648)	(3)	(3,307)	5,298	(5,466)	(168)	(7,300)
2071	Critical	186	-	608	339	279	85	57	113	1,318	360	1,282	(50)	(1,335)	(609)	(3)	(3,300)	4,629	(5,297)	(668)	(7,968)
Average (2022-2071)		244	235	703	315	279	107	54	72	1,087	182	1,794	(77)	(1,329)	(608)	(3)	(3,216)	5,076	(5,235)	(159)	

*Sum of percentages/averages may not equal totals due to rounding.

Table 3.3-16 ASRVGB Projected Groundwater Inflows and Outflows by Water Year, 2030 Climate Change Factors (in acre-feet).

Water Year	Year Type	Mountain-Front Recharge from the North	Recharge from Precipitation	Agricultural Return Flows	M&I Outdoor Return Flows	M&I Septic Return Flows	Non-potable Distribution Losses	Potable Distribution Losses	Inflow from the Conejo Volcanics from the South	Inflow from the Conejo Volcanics from the East	Underflow from Pleasant Valley	Streamflow Percolation from Losing Reaches	GW Discharge to Streamflow Gaining Reaches	FCGMA Agricultural Pumping	Non-FCGMA Agricultural Pumping	Domestic Pumping	M&I Pumping	Inflows	Outflows	Change in Storage	Cumulative Change in Storage
2022	Dry	178	9	812	336	279	113	62	46	1,165	407	927	(89)	(1,549)	(729)	(3)	(1,169)	4,333	(3,538)	795	795
2023	Below Normal	189	324	829	357	279	128	63	34	1,068	320	1,185	(114)	(1,391)	(674)	(3)	(1,554)	4,776	(3,736)	1,040	1,835
2024	Wet	208	252	880	387	279	135	65	35	1,069	326	1,089	(113)	(1,595)	(743)	(2)	(2,943)	4,725	(5,397)	(671)	1,164
2025	Below Normal	179	99	718	288	279	118	49	52	1,136	105	1,070	(90)	(1,234)	(555)	(3)	(3,300)	4,093	(5,181)	(1,088)	76
2026	Below Normal	192	3	774	288	279	132	48	66	1,205	110	994	(75)	(1,271)	(567)	(3)	(3,307)	4,093	(5,223)	(1,130)	(1,054)
2027	Dry	154	8	582	265	279	96	46	76	1,218	18	1,178	(71)	(1,033)	(462)	(3)	(3,300)	3,922	(4,868)	(946)	(2,000)
2028	Wet	181	773	666	322	279	109	54	62	890	36	2,810	(94)	(1,206)	(538)	(2)	(3,293)	6,182	(5,133)	1,048	(952)
2029	Wet	171	804	549	268	279	76	46	51	942	10	1,963	(86)	(1,234)	(553)	(3)	(3,300)	5,160	(5,176)	(16)	(968)
2030	Wet	200	732	610	298	279	77	51	44	853	201	2,528	(93)	(1,446)	(651)	(3)	(3,307)	5,874	(5,500)	374	(594)
2031	Wet	210	15	608	339	279	85	57	58	1,098	232	1,237	(68)	(1,335)	(611)	(3)	(3,300)	4,218	(5,317)	(1,099)	(1,693)
2032	Dry	250	20	810	335	279	113	61	71	1,175	390	1,245	(68)	(1,538)	(727)	(2)	(3,293)	4,749	(5,628)	(879)	(2,572)
2033	Wet	268	1,031	829	357	279	128	63	54	789	294	3,246	(103)	(1,391)	(674)	(3)	(3,300)	7,338	(5,470)	1,868	(704)
2034	Wet	293	185	882	388	280	135	65	55	1,059	300	1,307	(81)	(1,599)	(748)	(3)	(3,307)	4,949	(5,738)	(789)	(1,493)
2035	Dry	259	23	718	288	279	118	49	70	1,142	93	1,415	(73)	(1,234)	(554)	(3)	(3,300)	4,455	(5,163)	(708)	(2,202)
2036	Wet	276	449	773	288	279	132	48	68	1,009	70	2,256	(87)	(1,266)	(563)	(2)	(3,293)	5,649	(5,211)	437	(1,764)
2037	Below Normal	243	7	582	265	279	96	46	78	1,192	(34)	1,195	(67)	(1,033)	(462)	(3)	(3,300)	3,983	(4,898)	(915)	(2,679)
2038	Dry	262	46	667	322	280	109	54	81	1,139	26	1,807	(73)	(1,213)	(541)	(3)	(3,307)	4,795	(5,136)	(341)	(3,020)
2039	Dry	235	17	549	268	279	76	46	89	1,216	55	1,427	(64)	(1,234)	(552)	(3)	(3,300)	4,257	(5,152)	(895)	(3,915)
2040	Critical	247	2	608	297	279	77	51	95	1,257	275	1,303	(60)	(1,434)	(648)	(2)	(3,293)	4,492	(5,438)	(946)	(4,861)
2041	Critical	247	43	608	339	279	85	57	99	1,218	294	1,622	(60)	(1,335)	(609)	(3)	(3,300)	4,893	(5,307)	(414)	(5,275)
2042	Above Normal	290	414	812	336	279	113	62	87	967	416	2,946	(76)	(1,549)	(728)	(3)	(3,307)	6,721	(5,663)	1,058	(4,217)
2043	Wet	307	951	829	357	279	128	63	56	747	309	3,445	(92)	(1,391)	(674)	(3)	(3,300)	7,473	(5,459)	2,014	(2,203)
2044	Above Normal	317	15	880	387	279	135	65	63	1,054	332	1,577	(71)	(1,595)	(742)	(2)	(3,293)	5,104	(5,705)	(601)	(2,804)
2045	Wet	286	804	718	288	279	118	49	55	833	83	2,885	(92)	(1,234)	(554)	(3)	(3,300)	6,399	(5,183)	1,216	(1,588)
2046	Above Normal	304	159	774	288	279	132	48	61	1,043	58	1,772	(79)	(1,271)	(567)	(3)	(3,307)	4,918	(5,228)	(309)	(1,897)
2047	Below Normal	272	294	582	265	279	96	46	64	1,041	(57)	1,820	(75)	(1,033)	(462)	(3)	(3,300)	4,759	(4,929)	(170)	(2,067)
2048	Wet	296	913	666	322	279	109	54	41	713	(40)	3,652	(103)	(1,206)	(539)	(2)	(3,293)	7,044	(5,183)	1,861	(206)
2049	Wet	258	11	549	268	279	76	46	51	1,052	(16)	1,411	(73)	(1,234)	(554)	(3)	(3,300)	4,002	(5,179)	(1,177)	(1,383)
2050	Below Normal	253	53	610	298	279	77	51	66	1,123	224	1,506	(71)	(1,446)	(650)	(3)	(3,307)	4,541	(5,477)	(937)	(2,320)
2051	Above Normal	252	326	608	339	279	85	57	68	1,016	235	2,159	(78)	(1,335)	(610)	(3)	(3,300)	5,424	(5,326)	97	(2,222)
2052	Dry	296	6	810	335	279	113	61	75	1,178	378	1,192	(65)	(1,538)	(727)	(2)	(3,293)	4,723	(5,626)	(903)	(3,126)
2053	Below Normal	290	96	829	357	279	128	63	80	1,101	327	2,024	(79)	(1,391)	(673)	(3)	(3,300)	5,574	(5,445)	129	(2,996)
2054	Dry	287	11	882	388	280	135	65	82	1,169	366	1,567	(74)	(1,599)	(746)	(3)	(3,307)	5,232	(5,729)	(498)	(3,494)
2055	Wet	262	1,061	718	288	279	118	49	56	702	92	3,785	(103)	(1,234)	(554)	(3)	(3,300)	7,411	(5,194)	2,217	(1,277)
2056	Above Normal	277	82	773	288	279	132	48	58	986	63	2,099	(84)	(1,266)	(564)	(2)	(3,293)	5,085	(5,209)	(124)	(1,401)
2057	Critical	233	1	582	265	279	96	46	68	1,142	(23)	1,427	(74)	(1,033)	(462)	(3)	(3,300)	4,140	(4,894)	(754)	(2,155)
2058	Critical	253	64	667	322	280	109	54	71	1,061	32	2,096	(79)	(1,213)	(541)	(3)	(3,307)	5,010	(5,143)	(133)	(2,288)
2059	Dry	226	8	549	268	279	76	46	77	1,148	60	1,574	(67)	(1,234)	(552)	(3)	(3,300)	4,312	(5,156)	(844)	(3,133)
2060	Below Normal	240	110	608	297	279	77	51	80	1,102	263	1,950	(71)	(1,434)	(649)	(2)	(3,293)	5,058	(5,449)	(392)	(3,524)
2061	Above Normal	254	550	608	339	279	85	57	75	1,075	250	1,764	(70)	(1,335)	(610)	(3)	(3,300)	5,337	(5,318)	20	(3,505)
2062	Below Normal	295	6	812	336	279	113	62	89	1,236	394	1,130	(59)	(1,549)	(728)	(3)	(3,307)	4,752	(5,646)	(894)	(4,399)
2063	Critical	284	4	829	357	279	128	63	96	1,266	355	1,187	(61)	(1,391)	(672)	(3)	(3,300)	4,849	(5,427)	(577)	(4,976)
2064	Critical	285	3	880	387	279	135	65	101	1,283	396	1,180	(57)	(1,595)	(740)	(2)	(3,293)	4,994	(5,688)	(693)	(5,670)
2065	Critical	241	7	718	288	279	118	49	108	1,321	171	1,196	(56)	(1,234)	(552)	(3)	(3,300)	4,497	(5,145)	(648)	(6,318)
2066	Dry	243	7	774	288	279	132	48	114	1,356	166	1,146	(52)	(1,271)	(565)	(3)	(3,307)	4,553	(5,198)	(645)	(6,962)
2067	Above Normal	199	163	582	265	279	96	46	113	1,244	51	1,894	(60)	(1,033)	(460)	(3)	(3,300)	4,934	(4,855)	78	(6,884)
2068	Below Normal	207	4	666	322	279	109	54	115	1,318	107	1,384	(52)	(1,206)	(536)	(2)	(3,293)	4,565	(5,089)	(525)	(7,409)
2069	Above Normal	174	166	549	268	279	76	46	114	1,202	123	2,216	(61)	(1,234)	(551)	(3)	(3,300)	5,214	(5,148)	66	(7,343)
2070	Above Normal	188	41	610	298	279	77	51	111	1,211	340	2,128	(61)	(1,446)	(648)	(3)	(3,307)	5,335	(5,466)	(131)	(7,474)
2071	Critical	186	-	608	339	279	85	57	114	1,323	362	1,278	(50)	(1,335)	(609)	(3)	(3,300)	4,632	(5,297)	(665)	(8,139)
Average (2022-2071)		244	224	703	315	279	107	54	74	1,097	187	1,784	(76)	(1,329)	(608)	(3)	(3,216)	5,071	(5,233)	(163)	

*Sum of percentages/averages may not equal totals due to rounding.

Table 3.3-17 ASRVGB Projected Groundwater Inflows and Outflows by Water Year, 2070 Climate Change Factors (in acre-feet).

Water Year	Year Type	Mountain-Front Recharge from the North	Recharge from Precipitation	Agricultural Return Flows	M&I Outdoor Return Flows	M&I Septic Return Flows	Non-potable Distribution Losses	Potable Distribution Losses	Inflow from the Conejo Volcanics from the South	Inflow from the Conejo Volcanics from the East	Underflow from Pleasant Valley	Streamflow Percolation from Losing Reaches	GW Discharge to Streamflow Gaining Reaches	FCGMA Agricultural Pumping	Non-FCGMA Agricultural Pumping	Domestic Pumping	M&I Pumping	Inflows	Outflows	Change in Storage	Cumulative Change in Storage
2022	Dry	178	8	812	336	279	113	62	46	1,167	407	916	(89)	(1,549)	(729)	(3)	(1,169)	4,325	(3,538)	787	787
2023	Above Normal	189	325	829	357	279	128	63	34	1,058	320	1,229	(115)	(1,391)	(674)	(3)	(1,554)	4,812	(3,737)	1,074	1,861
2024	Wet	208	243	880	387	279	135	65	35	1,065	327	1,099	(113)	(1,595)	(743)	(2)	(2,943)	4,722	(5,397)	(674)	1,187
2025	Below Normal	179	98	718	288	279	118	49	51	1,136	105	1,058	(89)	(1,234)	(555)	(3)	(3,300)	4,080	(5,180)	(1,100)	87
2026	Below Normal	192	3	774	288	279	132	48	66	1,201	111	1,055	(73)	(1,271)	(567)	(3)	(3,307)	4,151	(5,221)	(1,070)	(984)
2027	Below Normal	154	8	582	265	279	96	46	75	1,204	18	1,198	(73)	(1,033)	(462)	(3)	(3,300)	3,926	(4,870)	(944)	(1,928)
2028	Wet	181	809	666	322	279	109	54	59	875	35	2,881	(94)	(1,206)	(538)	(2)	(3,293)	6,270	(5,134)	1,137	(791)
2029	Wet	171	817	549	268	279	76	46	47	909	8	2,080	(88)	(1,234)	(554)	(3)	(3,300)	5,251	(5,178)	72	(719)
2030	Wet	200	754	610	298	279	77	51	39	831	198	2,571	(95)	(1,446)	(651)	(3)	(3,307)	5,910	(5,502)	408	(310)
2031	Wet	210	15	608	339	279	85	57	54	1,080	228	1,260	(69)	(1,335)	(611)	(3)	(3,300)	4,216	(5,319)	(1,102)	(1,413)
2032	Below Normal	250	20	810	335	279	113	61	68	1,164	387	1,245	(68)	(1,538)	(727)	(2)	(3,293)	4,732	(5,629)	(896)	(2,309)
2033	Wet	268	1,054	829	357	279	128	63	50	778	291	3,237	(105)	(1,391)	(674)	(3)	(3,300)	7,336	(5,472)	1,864	(446)
2034	Wet	293	152	882	388	280	135	65	54	1,063	299	1,244	(80)	(1,599)	(748)	(3)	(3,307)	4,855	(5,737)	(882)	(1,328)
2035	Dry	259	20	718	288	279	118	49	69	1,148	93	1,354	(73)	(1,234)	(554)	(3)	(3,300)	4,396	(5,163)	(767)	(2,095)
2036	Wet	276	470	773	288	279	132	48	66	968	68	2,464	(89)	(1,266)	(563)	(2)	(3,293)	5,831	(5,213)	618	(1,477)
2037	Below Normal	243	6	582	265	279	96	46	75	1,178	(36)	1,184	(69)	(1,033)	(462)	(3)	(3,300)	3,954	(4,902)	(948)	(2,426)
2038	Dry	262	43	667	322	280	109	54	80	1,141	24	1,735	(73)	(1,213)	(541)	(3)	(3,307)	4,719	(5,136)	(418)	(2,843)
2039	Dry	235	15	549	268	279	76	46	88	1,219	53	1,384	(64)	(1,234)	(552)	(3)	(3,300)	4,213	(5,152)	(939)	(3,782)
2040	Critical	247	2	608	297	279	77	51	94	1,253	274	1,300	(61)	(1,434)	(648)	(2)	(3,293)	4,483	(5,438)	(955)	(4,737)
2041	Dry	247	47	608	339	279	85	57	98	1,198	293	1,729	(61)	(1,335)	(609)	(3)	(3,300)	4,980	(5,308)	(328)	(5,065)
2042	Wet	290	431	812	336	279	113	62	83	947	413	3,021	(77)	(1,549)	(728)	(3)	(3,307)	6,788	(5,664)	1,124	(3,942)
2043	Wet	307	967	829	357	279	128	63	50	729	305	3,513	(93)	(1,391)	(674)	(3)	(3,300)	7,530	(5,461)	2,069	(1,873)
2044	Above Normal	317	14	880	387	279	135	65	59	1,039	328	1,578	(72)	(1,595)	(743)	(2)	(3,293)	5,081	(5,706)	(624)	(2,497)
2045	Wet	286	821	718	288	279	118	49	49	804	79	3,002	(94)	(1,234)	(555)	(3)	(3,300)	6,494	(5,185)	1,309	(1,189)
2046	Above Normal	304	151	774	288	279	132	48	56	1,011	54	1,852	(81)	(1,271)	(568)	(3)	(3,307)	4,949	(5,230)	(281)	(1,469)
2047	Below Normal	272	311	582	265	279	96	46	59	1,033	(61)	1,754	(76)	(1,033)	(463)	(3)	(3,300)	4,698	(4,935)	(236)	(1,705)
2048	Wet	296	868	666	322	279	109	54	39	730	(43)	3,505	(103)	(1,206)	(539)	(2)	(3,293)	6,869	(5,186)	1,683	(23)
2049	Wet	258	10	549	268	279	76	46	50	1,056	(17)	1,375	(73)	(1,234)	(554)	(3)	(3,300)	3,968	(5,181)	(1,213)	(1,236)
2050	Below Normal	253	49	610	298	279	77	51	65	1,120	223	1,505	(71)	(1,446)	(650)	(3)	(3,307)	4,531	(5,478)	(947)	(2,182)
2051	Above Normal	252	332	608	339	279	85	57	65	971	233	2,381	(81)	(1,335)	(611)	(3)	(3,300)	5,604	(5,329)	275	(1,908)
2052	Dry	296	5	810	335	279	113	61	72	1,164	375	1,173	(66)	(1,538)	(727)	(2)	(3,293)	4,683	(5,626)	(943)	(2,851)
2053	Below Normal	290	93	829	357	279	128	63	77	1,096	325	1,974	(79)	(1,391)	(673)	(3)	(3,300)	5,513	(5,445)	68	(2,783)
2054	Dry	287	10	882	388	280	135	65	80	1,161	364	1,568	(74)	(1,599)	(747)	(3)	(3,307)	5,221	(5,730)	(508)	(3,292)
2055	Wet	262	1,084	718	288	279	118	49	53	700	89	3,777	(104)	(1,234)	(554)	(3)	(3,300)	7,420	(5,195)	2,225	(1,067)
2056	Above Normal	277	78	773	288	279	132	48	55	970	60	2,144	(85)	(1,266)	(564)	(2)	(3,293)	5,105	(5,210)	(105)	(1,172)
2057	Critical	233	1	582	265	279	96	46	66	1,135	(25)	1,416	(74)	(1,033)	(462)	(3)	(3,300)	4,120	(4,897)	(778)	(1,950)
2058	Critical	253	57	667	322	280	109	54	70	1,054	30	2,096	(80)	(1,213)	(541)	(3)	(3,307)	4,993	(5,143)	(151)	(2,101)
2059	Dry	226	8	549	268	279	76	46	76	1,146	58	1,546	(67)	(1,234)	(552)	(3)	(3,300)	4,279	(5,156)	(877)	(2,978)
2060	Below Normal	240	110	608	297	279	77	51	79	1,096	262	1,954	(71)	(1,434)	(649)	(2)	(3,293)	5,053	(5,450)	(397)	(3,374)
2061	Above Normal	254	540	608	339	279	85	57	75	1,079	251	1,717	(69)	(1,335)	(610)	(3)	(3,300)	5,284	(5,317)	(33)	(3,407)
2062	Below Normal	295	6	812	336	279	113	62	88	1,233	393	1,143	(60)	(1,549)	(728)	(3)	(3,307)	4,761	(5,647)	(886)	(4,293)
2063	Critical	284	4	829	357	279	128	63	96	1,263	354	1,185	(61)	(1,391)	(672)	(3)	(3,300)	4,843	(5,427)	(584)	(4,878)
2064	Critical	285	3	880	387	279	135	65	101	1,283	395	1,158	(56)	(1,595)	(741)	(2)	(3,293)	4,971	(5,687)	(716)	(5,594)
2065	Critical	241	6	718	288	279	118	49	107	1,319	170	1,196	(56)	(1,234)	(552)	(3)	(3,300)	4,494	(5,145)	(651)	(6,245)
2066	Dry	243	7	774	288	279	132	48	113	1,354	166	1,140	(52)	(1,271)	(565)	(3)	(3,307)	4,545	(5,198)	(653)	(6,898)
2067	Above Normal	199	162	582	265	279	96	46	113	1,248	50	1,866	(59)	(1,033)	(460)	(3)	(3,300)	4,906	(4,855)	52	(6,846)
2068	Below Normal	207	4	666	322	279	109	54	114	1,314	106	1,408	(52)	(1,206)	(536)	(2)	(3,293)	4,583	(5,089)	(507)	(7,353)
2069	Above Normal	174	170	549	268	279	76	46	113	1,190	122	2,262	(61)	(1,234)	(551)	(3)	(3,300)	5,251	(5,148)	103	(7,251)
2070	Above Normal	188	31	610	298	279	77	51	110	1,209	340	2,119	(61)	(1,446)	(648)	(3)	(3,307)	5,313	(5,466)	(153)	(7,403)
2071	Critical	186	-	608	339	279	85	57	114	1,323	363	1,251	(49)	(1,335)	(609)	(3)	(3,300)	4,606	(5,296)	(690)	(8,093)
Average (2022-2071)		244	225	703	315	279	107	54	72	1,088	185	1,796	(76)	(1,329)	(608)	(3)	(3,216)	5,072	(5,234)	(162)	

*Sum of percentages/averages may not equal totals due to rounding.

Section 4
Tables

Table 4.4-01 Sustainable Mangement Criteria for the Chronic Lowering of Groundwater Levels and Reduction of Groundwater Storage.

State Well Identification Number	Groundwater Producing Zones Monitored	Frequency of Groundwater Elevation Measurement 2015-2020	Management Area	Chronic Lowering of GW Levels MT (feet amsl)	Chronic Lowering of GW Levels MO (feet amsl)	IM 5-year (feet amsl)	IM 10-year (feet amsl)	IM 15-year (feet amsl)	IM 20-year (feet amsl)
02N20W23G01S	Upper	Manual quarterly	FCGMA	70.8	92.8	76.3	81.8	87.3	92.8
02N20W23G02S	Upper	Manual monthly	FCGMA	17.3	36.5	24.1	28.3	32.4	36.5
02N20W23K01S	Upper/Lower	Manual monthly	FCGMA	47.0	81.3	66.2	71.2	76.3	81.3
02N19W19P02S	Lower	Manual monthly	ASRGSA	108.0	179.3	150.6	160.1	169.7	179.3
02N19W20L01S	Lower	Manual quarterly	ASRGSA	119.7	259.1	216.0	230.3	244.7	259.1
02N19W20M04S	Lower/Bedrock	Manual monthly	ASRGSA	138.2	236.4	227.3	230.4	233.4	236.4
02N20W23Q02S†	Unknown	Manual monthly	ASRGSA	--	--	--	--	--	--
02N20W23R01S	Upper/Lower	Manual quarterly	ASRGSA	74.9	151.8	149.8	150.4	151.1	151.8
02N20W24Q03S	Lower	Manual monthly	ASRGSA	80.7	148.5	124.0	132.2	140.3	148.5
02N20W25C02S	Lower	Manual monthly	ASRGSA	79.2	145.4	127.1	133.2	139.3	145.4
02N20W25C05S	Lower	Manual monthly	ASRGSA	79.2	143.3	131.0	135.1	139.2	143.3
02N20W25C07S	Lower	Manual monthly	ASRGSA	79.2	145.4	127.5	133.5	139.4	145.4
02N20W25D01S	Unknown	Manual monthly	ASRGSA	84.6	150.9	133.8	139.5	145.2	150.9
02N20W26B03S	Unknown	Manual quarterly	ASRGSA	96.4	157.8	154.6	155.7	156.7	157.8

Notes:

GW = Groundwater
MT = Minimum Threshold
MO = Measurable Objective
IM = Interim Measure

* MT/MO based on land subsidence measurements.
† Well currently not used to define or monitor sustainable management criteria due to lack of reliable information.

Table 4.7-01 Water Quality Constituent Minimum Thresholds and Measurable Objectives.

Constituent	MCL (mg/L)	Sec. MCL (R/U/ST)[1] (mg/L)	RWQCB WQO (mg/L)	Average Conc. Representative Monitoring Wells Last 10 Years (mg/L)	MT[2] (mg/L)	MT Rationale	MO[3] (mg/L)	MO Rationale	Secondary MO[4] (mg/L)
Nitrate (as N)	10	N/A	10	13.1	23.4	Preserve ability to blend with imported water for potable uses. Reduce reliance on imported water for blending.	23.4	Preserve ability to blend with imported water for potable uses. Reduce reliance on imported water for blending.	10
TCP	5 (ng/L)	N/A	5 (ng/L)	13 (ng/L)	250 (ng/L)	Practical limit of concentration for economical carbon change-out frequency of the GAC system.	250 (ng/L)	Practical limit of concentration for economical carbon change-out frequency of the GAC system.	5 (ng/L)
TDS	N/A	500/1,000/1,500	900	858	1,040	Prevent further degradation of water quality for all beneficial uses.	1,040	Prevent further degradation of water quality for all beneficial uses consistent with RWQCB WQO.	900
Sulfate	N/A	250/500/600	300	152	300	Preserve existing water quality consistent with RWQCB WQO.	300	Preserve existing water quality.	225
Chloride	N/A	250/500/600	150	141	180	Prevent further degradation of water quality for agricultural beneficial use.	180	Prevent further degradation of water quality for agricultural beneficial use consistent with RWQCB WQO.	150
Boron	N/A	N/A	1	0.2	1	Preserve existing water quality for agricultural beneficial use.	1	Preserve existing water quality for agricultural beneficial use.	0.4

Notes:
1 Consumer Acceptance Levels, where R = Recommended, U = Upper, and ST = Short Term.
2 Undesirable results are considered to occur when all representative monitoring wells in a principal aquifer exceed the minimum threshold concentration for a constituent for two consecutive years.
3 Sustainability Goal for degraded water quality for a given constituent is considered to be met when the two-year running average concentration for at least one representative monitoring well is below the measurable objective.
4 Secondary MO set as an aspirational goal for the Basin for the purpose of improving overall conditions in the Basin per 354.30(g).

MCL = Maximum Concentration Limit
mg/L = milligrams per liter
MO = Measurable Objective
MT = Minimum Threshold

Table 4.7-02 Sustainable Management Criteria for the Degradation of Water Quality.

State Well Identification Number	Local Well Identifier	Aquifers Monitored	Frequency of Groundwater Quality Sampling 2015-2020	Measurement or Sampling Entity	Degraded WQ Nitrate MT (mg/L)	Degraded WQ Nitrate MO (mg/L)	Degraded WQ TCP MT (ng/L)	Degraded WQ TCP MO (ng/L)	Degraded WQ TDS MT (mg/L)	Degraded WQ TDS MO (mg/L)	Degraded WQ Sulfate MT (mg/L)	Degraded WQ Sulfate MO (mg/L)	Degraded WQ Chloride MT (mg/L)	Degraded WQ Chloride MO (mg/L)	Degraded WQ Boron MT (mg/L)	Degraded WQ Boron MO (mg/L)	IM 5YR	IM 10YR	IM 15YR	IM 20YR	SMC Notes
02N19W19P02S	SRMWC-9	Lower	annual	Camrosa Water District	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N19W20L01S	20L1	Lower	annual	VCWPD	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N19W20M04S	Penny	Lower/Bedrock	semi-annual	Camrosa Water District	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W23G03S	R Gerry/LEG-3	Lower	annual	VCWPD	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W23K01S	McCloskey-1	Upper/Lower	annual	Camrosa Water District	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W23R01S	23R1	Upper/Lower	annual	VCWPD	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W24M02S		Unknown	annual	VCWPD	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W24Q03S	SRMWC-10	Unknown	annual	Camrosa Water District	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W25C02S	Conejo-2	Lower	monthly	Camrosa Water District	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W25C04S	SRMWC-8	Lower	monthly	Camrosa Water District	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W25C05S	Conejo-3	Lower	monthly	Camrosa Water District	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W25C06S		Lower	monthly	Camrosa Water District	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W25D01S	SRMWC-3	Unknown	annual	Camrosa Water District	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	
02N20W26C02S	26C2	Upper	annual	VCWPD	23.4	23.4	250	250	1040	1040	300	300	180	180	1	1	Same as MOs	Same as MOs	Same as MOs	Same as MOs	

Notes:
MO = Measurable Objective
MT = Minimum Threshold
SMC = sustainable management criteria
WQ = water quality

Section 5
Tables

Table 5.3-01 Well Information for the Groundwater Level Monitoring Network Sites.

State Well Identification Number	Local Well Identifier	CASGEM Master Site Code	Year Well Constructed	Longitude[a]	Latitude[a]	Ground Surface Elevation (feet amsl)[b]	Reference Point Elevation (feet amsl)[b]	Reference Point Description	Elevation Measurement Method	Elevation Measurement Accuracy	Reported (Original) Well Use	Well Pumping Status	Well Configuration	Depth of Screened Interval(s) (feet bgs)[c]	Borehole Depth (feet bgs)[c]	Casing Diameter (inches)	Aquifers Monitored	Management Area	Comment
02N20W23G01S	Gerry		1948	-118.94528	34.24463	370.8	370.8	Unknown	Unknown	Unknown	Agricultural	Inactive	Unknown	382 - 389; 470 - 483	496	14	Upper	FCGMA	Manual quarterly, VCWPD
02N20W23G02S	Gerry-2		1950	-118.94547	34.24262	317	317	Unknown	Unknown	Unknown	Agricultural	Inactive	Unknown	350 - 550	560	12	Upper	FCGMA	Manual monthly, Camrosa
02N20W23K01S	McCloskey-1	342400N1189434W001	1950	-118.94332	34.24027	274.11	274.11	Unknown	Unknown	Unknown	Agricultural	Active	Unknown	350 - 800	800	12	Upper/Lower	FCGMA	Manual monthly, Camrosa
02N19W19P02S	SRMWC-9		1940	-118.91337	34.23738	286	286	Unknown	Unknown	Unknown	Public Supply	Active	Unknown	199 - 393	404	16	Lower	ASRGSA	Manual monthly, Camrosa
02N19W20L01S	20L1	342392N1188962W001	1928	-118.89581	34.23925	307.66	307.66	Unknown	Unknown	Unknown	Agricultural	Active	Unknown	40 - 266	266	10	Lower	ASRGSA	Manual quarterly, VCWPD
02N19W20M04S	Penny		1962	-118.90232	34.241	318	318	Unknown	Unknown	Unknown	Public Supply	Active	Unknown	304 - 464	464	10	Lower/Bedrock	ASRGSA	Manual monthly, Camrosa
02N20W23Q02S[d]	McCloskey-2		Unknown	-118.9431	34.23778	241	241	Unknown	Unknown	Unknown	Agricultural	Active	Unknown	Unknown	Unknown	Unknown	Unknown	ASRGSA	Manual monthly, Camrosa
02N20W23R01S	23R1	342353N1189387W001	1961	-118.9388	34.23529	235.21	235.21	Unknown	Unknown	Unknown	Agricultural	Active	Unknown	120 - 225; 465 - 550	555	15	Upper/Lower	ASRGSA	Manual quarterly, VCWPD
02N20W24Q03S	SRMWC-10		1954	-118.92891	34.23595	232	232	Unknown	Unknown	Unknown	Public Supply	Active	Unknown	288 - 360	360	14	Lower	ASRGSA	Manual monthly, Camrosa
02N20W25C02S	Conejo-2		1930	-118.93056	34.23412	233	233	Unknown	Unknown	Unknown	Public Supply	Active	Unknown	170 - 218; 248 - 272	395	12	Lower	ASRGSA	Manual monthly, Camrosa
02N20W25C05S	Conejo-3		1991	-118.93062	34.23345	236.5	236.5	Unknown	Unknown	Unknown	Public Supply	Active	Unknown	160 - 260	260	16	Lower	ASRGSA	Manual monthly, Camrosa
02N20W25C07S	Conejo-4		1995	-118.93055	34.23421	233.5	233.5	Unknown	Unknown	Unknown	Public Supply	Active	Unknown	180 - 390	400	16	Lower	ASRGSA	Manual monthly, Camrosa
02N20W25D01S	SRMWC-3		1928	-118.9355	34.23506	240	240	Unknown	Unknown	Unknown	Public Supply	Active	Unknown	Unknown	460	16	Unknown	ASRGSA	Manual monthly, Camrosa
02N20W26B03S	26B3	342350N1189476W001	1939	-118.94757	34.23517	205.87	205.87	Unknown	Unknown	Unknown	Agricultural	Active	Unknown	Unknown	300	Unknown	Unknown	ASRGSA	Manual quarterly, VCWPD

Notes:

[a] Longitude and latitude are in decimal degrees, North American Datum 1983 (NAD83).

[b] feet amsl = Feet above mean sea level, North American Vertical Datum 1988 (NAVD88).

[c] feet bgs = Feet below ground surface.

[d] Well currently not used to define or monitor sustainable management criteria due to lack of reliable information.

Table 5.6-01 Well Information for the Groundwater Quality Monitoring Network Sites.

State Well Identification Number	Local Well Identifier	CASGEM Master Site Code	Longitude[a]	Latitude[a]	Ground Surface Elevation (feet amsl)[b]	Reference Point Elevation (feet amsl)[b]	Reference Point Description	Elevation Measurement Method	Elevation Measurement Accuracy	Reported Well Use	Depth of Screened Interval (feet bgs)[c]	Total Well Depth (feet bgs)[c]	Aquifers Monitored	Management Area	Casing Diameter (inches)	Minimum Frequency of Groundwater Quality Sampling	Current Monitoring Entity	Analytes for Sampling Events
02N20W23G03S	R Gerry/LEG-3		-118.945522	34.242336	312.88	312.88	Unknown	Digital Elevation Model	Unknown	Agricultural	800 - 900	900	Lower	FCGMA	14	annual	VCWPD	TDS, sulfate, chloride, boron, and nitrate
02N20W23K01S	McCloskey-1	342400N1189434W001	-118.943323	34.24027	274.11	274.11	Unknown	Unknown	Unknown	Agricultural	350 - 800	800	Upper/Lower	FCGMA	12	annual	Camrosa Water District	TDS, sulfate, chloride, boron, and nitrate
02N19W19P02S	SRMWC-9		-118.913365	34.237375	286	286	Unknown	Unknown	Unknown	Agricultural	199 - 393	404	Lower	ASRGSA	16	annual	Camrosa Water District	TDS, sulfate, chloride, boron, and nitrate
02N19W20L01S	20L1	342392N1188962W001	-118.895813	34.239249	307.66	307.66	Unknown	Unknown	Unknown	Agricultural	40 - 266	266	Lower	ASRGSA	10	annual	VCWPD	TDS, sulfate, chloride, boron, and nitrate
02N19W20M04S	Penny		-118.902322	34.241003	318	318	Unknown	Unknown	Unknown	Public Supply	304 - 464	464	Lower/Bedrock	ASRGSA	10	semi-annual	Camrosa Water District	TCP, TDS, sulfate, chloride, boron, and nitrate
02N20W23R01S	23R1	342353N1189387W001	-118.938795	34.23529	235.21	235.21	Unknown	Unknown	Unknown	Agricultural	120 - 225; 465 - 550	555	Upper/Lower	ASRGSA	15	annual	VCWPD	TDS, sulfate, chloride, boron, and nitrate
02N20W24M02S			-118.937349	34.240977	320.65	320.65	Unknown	Digital Elevation Model	Unknown	Agricultural	Unknown	Unknown	Unknown	ASRGSA	Unknown	annual	VCWPD	TDS, sulfate, chloride, boron, and nitrate
02N20W24Q03S	SRMWC-10		-118.928911	34.235947	232	232	Unknown	Unknown	Unknown	Agricultural	288 - 360	360	Lower	ASRGSA	14	annual, last sampled 2012	Camrosa Water District	TCP, TDS, sulfate, chloride, boron, and nitrate
02N20W25C02S	Conejo-2		-118.93056	34.234124	233	233	Unknown	Unknown	Unknown	Public Supply	170 - 218; 248 - 272	395	Lower	ASRGSA	12	monthly	Camrosa Water District	TCP, TDS, sulfate, chloride, boron, and nitrate
02N20W25C04S	SRMWC-8		-118.930642	34.232456	228	228	Unknown	Unknown	Unknown	Public Supply	140 - 240	240	Lower	ASRGSA	14	monthly	Camrosa Water District	TCP, TDS, sulfate, chloride, boron, and nitrate
02N20W25C05S	Conejo-3		-118.930616	34.233453	236.5	236.5	Unknown	Unknown	Unknown	Public Supply	160 - 260	260	Lower	ASRGSA	16	monthly	Camrosa Water District	TCP, TDS, sulfate, chloride, boron, and nitrate
02N20W25C06S			-118.930649	34.232513	260	260	Unknown	Unknown	Unknown	Public Supply	140 - 240	240	Lower	ASRGSA	14	monthly	Camrosa Water District	TCP, TDS, sulfate, chloride, boron, and nitrate
02N20W25D01S	SRMWC-3		-118.935502	34.235057	240	240	Unknown	Unknown	Unknown	Agricultural	Unknown	460	Unknown	ASRGSA	16	annual, last sampled 2015	Camrosa Water District	TCP, sulfate, chloride, and boron
02N20W26C02S	26C2		-118.94746	34.233472	201.63	201.63	Unknown	Unknown	Unknown	Agricultural	Unknown	392	Unknown	ASRGSA	12	annual	VCWPD	TDS, sulfate, chloride, boron, and nitrate

Notes:

[a] Longitude and latitude are in decimal degrees, North American Datum 1983 (NAD83).

[b] feet amsl = Feet above mean sea level, North American Vertical Datum 1988 (NAVD88).

[c] feet bgs = Feet below ground surface.

Table 5.8-01 Current Streamflow Gages in the ASRVGB.

Stream Gage Identifier	Stream Monitored	General Site Location Description	USGS Station ID	Current Monitoring Entity	Longitude[a]	Latitude[a]	Reference Point Elevation (feet amsl)	Minimum Sampling Frequency	Notes
800	Conejo Creek	Conejo Creek above Hwy 101	11106400	Calleguas Creek Watershed TMDL Compliance Monitoring Program	-118.96460	34.23655	145.00	Daily, Year-round	
Confluence Flume	Arroyo Conejo	Arroyo Conejo below Confluence of the North and South Forks of Arroyo Conejo	N/A	Hill Canyon Wastewater Treatment Plant	-118.93078	34.21435	250.00	Daily, June - September	

Notes:
"N/A" = Not applicable
[a] Longitude and latitude are in decimal degrees, North American Datum 1983 (NAD83).

Section 7
Table

Table 7.1-01 ASRGSA 20-Year Budget for GSP (in US dollars).

Fiscal Year	Agency Administration	Legal Counsel	GW Mgmt., Coord., & Outreach	Monitoring Programs	Annual Reports	Projects and Mgmt. Actions	Model Update and Simulations	GSP Evaluation	GSP Update/ Amendments	Respond to DWR Comments and Requests	Contingency (5%)	Total Expenses	Funding to Increase Reserve	Total Budget
2023	$ 50,000	$ 15,000	$ 30,000	$ -	$ -	$ 36,000	$ -	$ -	$ -	$ -	$ 6,550	$ 137,550	$ 132,532	$ 270,082
2024	$ 51,500	$ 15,450	$ 30,900	$ 5,000	$ 55,000	$ 37,080	$ -	$ -	$ -	$ -	$ 9,747	$ 204,677	$ 209	$ 204,885
2025	$ 53,045	$ 15,914	$ 31,827	$ 5,150	$ 42,500	$ 38,192	$ -	$ -	$ -	$ 53,045	$ 11,984	$ 251,657	$ (7,098)	$ 244,559
2026	$ 54,636	$ 16,391	$ 32,782	$ 5,305	$ 43,775	$ 39,338	$ -	$ -	$ -	$ -	$ 9,611	$ 201,838	$ (1,574)	$ 200,264
2027	$ 56,275	$ 16,883	$ 33,765	$ 5,464	$ 45,088	$ 40,518	$ 45,020	$ 56,275	$ -	$ -	$ 14,964	$ 314,254	$ 73	$ 314,327
2028	$ 57,964	$ 17,389	$ 34,778	$ 5,628	$ 46,441	$ -	$ -	$ -	$ 173,891	$ -	$ 16,805	$ 352,895	$ 5,621	$ 358,516
2029	$ 59,703	$ 17,911	$ 35,822	$ 5,796	$ 47,834	$ -	$ -	$ -	$ -	$ 29,851	$ 9,846	$ 206,763	$ 3,293	$ 210,056
2030	$ 61,494	$ 18,448	$ 36,896	$ 5,970	$ 49,269	$ -	$ -	$ -	$ -	$ -	$ 8,604	$ 180,681	$ 2,878	$ 183,559
2031	$ 63,339	$ 19,002	$ 38,003	$ 6,149	$ 50,747	$ -	$ -	$ -	$ -	$ -	$ 8,862	$ 186,102	$ 2,964	$ 189,066
2032	$ 65,239	$ 19,572	$ 39,143	$ 6,334	$ 52,270	$ -	$ 52,191	$ 65,239	$ -	$ -	$ 14,999	$ 314,986	$ 5,017	$ 320,003
2033	$ 67,196	$ 20,159	$ 40,317	$ 6,524	$ 53,838	$ -	$ -	$ -	$ 201,587	$ -	$ 19,481	$ 409,102	$ 6,516	$ 415,618
2034	$ 69,212	$ 20,764	$ 41,527	$ 6,720	$ 55,453	$ -	$ -	$ -	$ -	$ 34,606	$ 11,414	$ 239,695	$ 3,818	$ 243,512
2035	$ 71,288	$ 21,386	$ 42,773	$ 6,921	$ 57,116	$ -	$ -	$ -	$ -	$ -	$ 9,974	$ 209,459	$ 3,336	$ 212,795
2036	$ 73,427	$ 22,028	$ 44,056	$ 7,129	$ 58,830	$ -	$ -	$ -	$ -	$ -	$ 10,273	$ 215,743	$ 3,436	$ 219,179
2037	$ 75,629	$ 22,689	$ 45,378	$ 7,343	$ 60,595	$ -	$ 60,504	$ 75,629	$ -	$ -	$ 17,388	$ 365,155	$ 5,816	$ 370,971
2038	$ 77,898	$ 23,370	$ 46,739	$ 7,563	$ 62,413	$ -	$ -	$ -	$ 233,695	$ -	$ 22,584	$ 474,262	$ 7,554	$ 481,815
2039	$ 80,235	$ 24,071	$ 48,141	$ 7,790	$ 64,285	$ -	$ -	$ -	$ -	$ 40,118	$ 13,232	$ 277,872	$ 4,872	$ 282,744
2040	$ 82,642	$ 24,793	$ 49,585	$ 8,024	$ 66,214	$ -	$ -	$ -	$ -	$ -	$ 11,563	$ 242,821	$ 4,258	$ 247,078
2041	$ 85,122	$ 25,536	$ 51,073	$ 8,264	$ 68,200	$ -	$ -	$ -	$ -	$ -	$ 11,910	$ 250,105	$ 4,386	$ 254,491
2042	$ 87,675	$ 26,303	$ 52,605	$ 8,512	$ 70,246	$ -	$ 70,140	$ 87,675	$ -	$ -	$ 20,158	$ 423,315	$ 7,423	$ 430,737
2043	$ 90,306	$ 27,092	$ 54,183	$ 8,768	$ 72,353	$ -	$ -	$ -	$ 270,917	$ -	$ 26,181	$ 549,799	$ 9,641	$ 559,440
Yrs. 1-5	$ 265,457	$ 79,637	$ 159,274	$ 20,918	$ 186,363	$ 191,129	$ 45,020	$ 56,275	$ -	$ 53,045	$ 52,856	$ 1,109,975	$ 124,143	$ 1,234,118
Yrs. 6-20	$ 1,168,367	$ 350,510	$ 701,020	$ 113,434	$ 936,104	$ -	$ 182,835	$ 228,543	$ 880,090	$ 104,575	$ 233,274	$ 4,898,753	$ 80,828	$ 4,979,581
Total	$ 1,433,824	$ 430,147	$ 860,295	$ 134,352	$ 1,122,467	$ 191,129	$ 227,855	$ 284,819	$ 880,090	$ 157,620	$ 286,130	$ 6,008,728	$ 204,971	$ 6,213,698

Notes:
Section 7.1 activities wholly funded by Member Agencies are not listed in the table.
Costs escalated for inflation at an assumed rate of 3% per year.

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix A

Notification of Intent to Develop a Groundwater Sustainability Plan

Arroyo Santa Rosa Basin
Groundwater Sustainability Agency

ARROYO SANTA ROSA BASIN

GROUNDWATER SUSTAINABILITY AGENCY

Camrosa Water District, 7385 Santa Rosa Road, Camarillo, CA 93012

May 11, 2018

Brian Moniz
California Department of Water Resources
Southern Regional Lead
SGMA Groundwater Management
770 Fairmont Ave., Ste. 102
Glendale, CA 91203

Re: Initial notification of intent to develop an Arroyo Santa Rosa Groundwater Sustainability Plan

Mr. Moniz:

This letter declares the intent of the Arroyo Santa Rosa Groundwater Sustainability Agency (ASRGSA) to develop a groundwater sustainability plan (GSP) for the Arroyo Santa Rosa Basin.

The ASRGSA, upon approval by the GSA Board of Directors, will engage the services of an engineering firm to complete the majority of the technical work associated with the development of the GSP.

Development will require public outreach/engagement with stakeholders and other interested parties, including groundwater producers, residents, stakeholders, affected parties, and the general public.

A mailing list is being compiled to notify interested parties of information regarding plan preparation, meeting announcements, and availability of draft plans, maps, and other relevant documents. Interested parties should contact Ian Prichard, Water Resources Manager at Camrosa Water District, if they would like to be added to that list. Mr. Prichard can be reached by email at IanP@camrosa.com; by phone at 805.482.6562; and at the Camrosa office, 7385 Santa Rosa Road, Camarillo, CA 93012.

Sincerely,

Tony Stafford, Executive Director

Cc: Ventura County Supervisors Steve Bennett, Linda Parks, Kelly Long, Peter Foy, and John Zaragosa

Fox Canyon
Groundwater Management Agency

February 24, 2017

Mr. Trevor Joseph
Sustainable Groundwater Management Section Chief
Department of Water Resources
9001 P Street, Room 213
P.O. Box 942836
Sacramento, CA 94236

SUBJECT: Initial Notification of Groundwater Sustainability Plan Development for the Oxnard Subbasin (4-4.02), Pleasant Valley Basin (4-6), portion of the Arroyo Santa Rosa Valley Basin (4-7), and Las Posas Valley Basin (4-8)

Dear Mr. Joseph:

This letter is to provide initial notification that the Fox Canyon Groundwater Management Agency (Agency) intends to develop Groundwater Sustainability Plans (GSPs) for the subject basins pursuant to Water Code Section 10727.8 and GSP Regulations Section 353.6. The Agency filed notice of intent to serve as the Groundwater Sustainability Agency (GSA) for the portions of the subject basins within the Agency boundaries in January 2015.

The Agency has contracted a hydrogeologic consulting firm to prepare the GSPs. The Agency appointed a seven-member Technical Advisory Group (TAG) to provide guidance and technical review throughout development of the GSPs. The TAG members are practicing geologists and hydrogeologists and consist of an agricultural representative, a representative for the five cities, a representative for special water districts and mutual water companies, a Ventura County representative, a non-governmental/environmental representative, and a public representative. The TAG meetings are publically noticed meetings open to the public. Additionally, the Agency has established several other stakeholder groups to provide an opportunity for input into GSP development.

The Agency hosted an initial GSP public workshop in November 2016 and plans additional workshops to provide a public forum for input into GSP development. The Agency has established an email newsletter for stakeholders and interested parties to stay abreast of GSP development and meeting announcement notification. Draft GSP chapters and other relevant Sustainable Groundwater Management Act (SGMA) information are posted to the Agency's website www.fcgma.org. Additionally, updates on GSP development are provided monthly at publicly noticed Agency Board meetings. Stakeholders should send an email to FCGMA-GSP@ventura.org with questions regarding GSP development or to request to be placed on the GSP email newsletter.

Please feel free to contact Kim Loeb at 805-650-4083 or me at 805-654-2073 if you should have any questions about this initial notification of GSP development.

Sincerely,

Jeff Pratt, P.E.
Executive Officer

Cc: Timothy Ross, DWR
City of Camarillo
City of Moorpark
City of Oxnard
City of Port Hueneme
City of San Buenaventura
County of Ventura

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix B

Sustainable Groundwater Management Act Elements of the Plan

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
§ 354.			**Introduction to Plan Contents**					
			This Article describes the required contents of Plans submitted to the Department for evaluation, including administrative information, a description of the basin setting, sustainable management criteria, description of the monitoring network, and projects and management actions.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
SubArticle 1.			**Administrative Information**					
§ 354.2.			**Introduction to Administrative Information**					
			This Subarticle describes information in the Plan relating to administrative and other general information about the Agency that has adopted the Plan and the area covered by the Plan.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.4.			**General Information**					
			Each Plan shall include the following general information:					
(a)			An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.	3:24	ES			
(b)			A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public.	209:214	8.0			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10733.2 and 10733.4, Water Code.					
§ 354.6.			**Agency Information**					
			When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:					
(a)			The name and mailing address of the Agency.	47	2.1.1			
(b)			The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.	47	2.1.2	1.0-01		
(c)			The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.	48	2.1.3			
(d)			The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the Plan.	48:49	2.1.4			Appendix A. Notification of Intent to Develop a Groundwater Sustainability Plan, Appendix C. Notification of Groundwater Sustainability Agency Formation
(e)			An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.	203:207	7.1:7.2		7.1-01	
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.8, 10727.2, and 10733.2, Water Code.					
§ 354.8.			**Description of Plan Area**					
			Each Plan shall include a description of the geographic areas covered, including the following information:					
(a)			One or more maps of the basin that depict the following, as applicable:					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(1)		The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins.	50:51	2.2.1	2.2-01		
	(2)		Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.	50:51	2.2.1			
	(3)		Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans.	50:51	2.2.1			
	(4)		Existing land use designations and the identification of water use sector and water source type.	50:51	2.2.1	2.2-03		
	(5)		The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.	50:51	2.2.1	2.2-02		
(b)			A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.	50:51	2.2.1			
(c)			Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan.	51:55	2.2.2, 2.2.2.1, 2.2.2.2	2.2-01, 2.2-02	2.2-01, 2.2-02	
(d)			A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.	51:55	2.2.2, 2.2.2.1, 2.2.2.2			
(e)			A description of conjunctive use programs in the basin.	55	2.2.2.3			
(f)			A plain language description of the land use elements or topic categories of applicable general plans that includes the following:					
	(1)		A summary of general plans and other land use plans governing the basin.	56:61	2.2.3.1			
	(2)		A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects	56:61	2.2.3.1			
	(3)		A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon.	56:61	2.2.3.1			
	(4)		A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.	61:62	2.2.3.2			
	(5)		To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.	61	2.2.3.1.3			
(g)			A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate.	62:63	2.2.4			
			Note: Authority cited: Section 10733.2, Water Code.					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			Reference: Sections 10720.3, 10727.2, 10727.4, 10733, and 10733.2, Water Code.					
§ 354.10.			**Notice and Communication**					
			Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:					
(a)			A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.	64:66	2.3.1			
(b)			A list of public meetings at which the Plan was discussed or considered by the Agency.	66	2.3.2			Appendix E List of Public Meetings
(c)			Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.	66	2.3.3			Appendix F GSP Comments and Responses
(d)			A communication section of the Plan that includes the following:					
	(1)		An explanation of the Agency's decision-making process.	66:67	2.3.4.1			Appendix D Stakeholder Engagement Plan
	(2)		Identification of opportunities for public engagement and a discussion of how public input and response will be used.	67:69	2.3.4.2			Appendix D Stakeholder Engagement Plan
	(3)		A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.	67:69	2.3.4.2			Appendix D Stakeholder Engagement Plan
	(4)		The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.	69	2.3.4.3			Appendix D Stakeholder Engagement Plan
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.8, 10728.4, and 10733.2, Water Code					
SubArticle 2.			**Basin Setting**					
§ 354.12.			**Introduction to Basin Setting**					
			This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.14.			**Hydrogeologic Conceptual Model**					
(a)			Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.	70:72	3.1	3.1-08		Appendix G. Technical Memorandum Re: Numerical Model Construction, Calibration, and Predictive Modeling Documentation
(b)			The hydrogeologic conceptual model shall be summarized in a written description that includes the following:					
	(1)		The regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency.	75:78	3.1.2	3.1-08, 3.1-10a, 3.1-10b		

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(2)		Lateral basin boundaries, including major geologic features that significantly affect groundwater flow.	81:82	3.1.3.1.1	3.1-01, 3.1-10a, 3.1-10b, 3.1-12, 3.1-13		
	(3)		The definable bottom of the basin.	81:82	3.1.3.1.1	3.1-12, 3.1-13		
	(4)		Principal aquifers and aquitards, including the following information:					
		(A)	Formation names, if defined.	78:80	3.1.3	3.1-08, 3.1-09		
		(B)	Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information.	82:84	3.1.3.1.3	3.1-16, 3.1-17		
		(C)	Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features.	82	3.1.3.1.2	3.1-08, 3.1-09, 3.1-14, 3.1-15		
		(D)	General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.	85:88	3.1.3.3	3.1-19:3.1-27		
		(E)	Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.	88:89	3.1.3.4	3.1-28		
	(5)		Identification of data gaps and uncertainty within the hydrogeologic conceptual model	89:92	3.1.4			
(c)			The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.	75:78	3.1.2	3.1-08, 3.1-09		
(d)			Physical characteristics of the basin shall be represented on one or more maps that depict the following:					
	(1)		Topographic information derived from the U.S. Geological Survey or another reliable source.	72:73	3.1.1.1	3.1-01, 3.1-02, 3.1-03, 3.1-04		
	(2)		Surficial geology derived from a qualified map including the locations of cross-sections required by this Section.	75:78	3.1.2	3.1-06, 3.1-08		
	(3)		Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies.	75:78	3.1.2	3.1-11		
	(4)		Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin.	84:85	3.1.3.2	3.1-05, 3.1-06, 3.1-17, 3.1-18		
	(5)		Surface water bodies that are significant to the management of the basin.	73:74	3.1.1.2	3.1-05, 3.1-06		
	(6)		The source and point of delivery for imported water supplies.	74:75	3.1.1.3	3.1-07		
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10733, and 10733.2, Water Code.					
§ 354.16.			**Groundwater Conditions**					
			Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
(a)			Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including:					
	(1)		Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.	92:93	3.2.1.1	3.2-01a, 3.2-01b, 3..2-02a, 3.2-02b		
	(2)		Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.	93:94	3.2.1.2	3.1-05, 3.2-03, 3.2-04a, 3.2-04b		Appendix I: Hydrographs of Observed Groundwater Levels
(b)			A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.	94	3.2.2	3.2-05		Appendix K. Development of a "Storage Curve" to Estimate Groundwater Storage in the Using Groundwater Level Data
(c)			Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.	94:95	3.2.3	2.1-01, 3.2-02a, 3.2-02b		
(d)			Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.	95:98	3.2.4	3.1-19:3.1-27, 3.2-06		
(e)			The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	98	3.2.5	3.2-07		Appendix G. Technical Memorandum Re: Numerical Model Construction, Calibration, and Predictive Modeling Documentation
(f)			Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	99:101	3.2.6	3.1-05, 3.2-08a:3.2-08c, 3.2-09, 3.2-10, 3.2-11	3.2-01	Appendix G. Technical Memorandum Re: Numerical Model Construction, Calibration, and Predictive Modeling Documentation
(g)			Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.	101:103	3.2.7	3.2-12, 3.2-13a:3.2-13c		
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, and 10733.2, Water Code.					
§ 354.18.			**Water Budget**					
(a)			Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.	103:108	3.3		3.3-01	
(b)			The water budget shall quantify the following, either through direct measurements or estimates based on data:					
	(1)		Total surface water entering and leaving a basin by water source type.	103:108	3.3			
	(2)		Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems.	103:108	3.3	3.1-05		

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(3)		Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.	103:108	3.3	3.1-05		
	(4)		The change in the annual volume of groundwater in storage between seasonal high conditions.	103:108	3.3	3.2-05		
	(5)		If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.	103:108	3.3, 3.3.4			
	(6)		The water year type associated with the annual supply, demand, and change in groundwater stored.	103:108	3.3	3.2-05	3.2-05	
	(7)		An estimate of sustainable yield for the basin.	103:108	3.3, 3.3.4			
(c)			Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:					
	(1)		Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.	114:116	3.3.2	3.3-02, 3.3-03	3.3-04:3.3-07	
	(2)		Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:					
		(A)	A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information.	108:111	3.3.1.1			
		(B)	A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.	111:114	3.3.1.2, 3.3.1.3	3.3-02, 3.3-03	3.3-06, 3.3-07	
		(C)	A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.	114	3.3.1.4			
	(3)		Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:					
		(A)	Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.	117:118	3.3.3.1.1			

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
		(B)	Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.	118:122	3.3.3.2		3.3.-08:3.3-17	
		(C)	Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.	118:122	3.3.3.2		3.3.-08:3.3-17	
(d)			The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:					
	(1)		Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use.	117	3.3.3.1			
	(2)		Current water budget information for temperature, water year type, evapotranspiration, and land use.	117	3.3.3.1			
	(3)		Projected water budget information for population, population growth, climate change, and sea level rise.	117	3.3.3.1			
(e)			Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.	117	3.3.3.1			
(f)			The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.	117	3.3.3.1			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10723.2, 10727.2, 10727.6, 10729, and 10733.2, Water Code.					
§ 354.20.			**Management Areas**					
(a)			Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin.	123	3.4	3.4-01		
(b)			A basin that includes one or more management areas shall describe the following in the Plan:					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(1)		The reason for the creation of each management area.	123	3.4			
	(2)		The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large.	na				
	(3)		The level of monitoring and analysis appropriate for each management area.	168:170, 171:172, 178:179	5.2.2:5.2.3, 5.3.1, 5.6.1			
	(4)		An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable.	na				
(c)			If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas.	82, 123	3.1.3.1.2, 3.4			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10733.2 and 10733.4, Water Code.					
SubArticle 3.			**Sustainable Management Criteria**					
§ 354.22.			**Introduction to Sustainable Management Criteria**					
			This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.24.			**Sustainability Goal**					
			Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.	125	4.2			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10727, 10727.2, 10733.2, and 10733.8, Water Code.					
§ 354.26.			**Undesirable Results**					
(a)			Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.	126, 137:138, 143:144, 152:153, 157:159	4.3, 4.5.1, 4.7.1, 4.8.1, 4.9.1		4.4-01	
(b)			The description of undesirable results shall include the following:					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(1)		The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.	127:130, 137:138, 143:144, 152:153, 157:159	4.4.1, 4.5.1, 4.7.1, 4.8.1, 4.9.1			
	(2)		The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.	127:130, 137:138, 143:144, 152:153, 157:159	4.4.1, 4.5.1, 4.7.1, 4.8.1, 4.9.1			
	(3)		Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.	127:130, 137:138, 143:144, 152:153, 157:159	4.4.1, 4.5.1, 4.7.1, 4.8.1, 4.9.1			
(c)			The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.	127:130, 132, 137:138, 143:144, 147, 152:153, 154:155, 154:155, 157:159, 160	4.4.1, 4.4.2.1.1, 4.5.1, 4.7.1, 4.7.2.1.1, 4.8.1, 4.8.2.1, 4.9.1, 4.9.2.1.1			
(d)			An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.	127:130, 137:138, 143:144, 148, 157:159, 160	4.4.1, 4.5.1, 4.7.1, 4.7.2.1.2, 4.9.1, 4.9.2.1.2			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10723.2, 10727.2, 10733.2, and 10733.8, Water Code.					
§ 354.28.			**Minimum Thresholds**					
(a)			Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.	131:132, 139, 144:147, 160	4.4.2.1, 4.5.2.1, 4.7.2.1, 4.8.2.1, 4.9.2.1		4.1-01, 4.4-01, 4.7-01, 4.7-02	
(b)			The description of minimum thresholds shall include the following:					
	(1)		The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.	131:132, 139, 144:147, 154:155, 160	4.4.2.1, 4.5.2.1, 4.7.2.1, 4.8.2.1, 4.9.2.1		4.7-01, 4.7-02	

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(2)		The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.	132, 140, 148, 155, 161	4.4.2.2, 4.5.2.3, 4.7.2.2, 4.8.2.3, 4.9.2.2			
	(3)		How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.	132:133, 140, 148, 155, 161	4.4.2.3, 4.5.2.4, 4.7.2.3, 4.8.2.4, 4.9.2.3			
	(4)		How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.	133, 140, 149, 155, 162	4.4.2.4, 4.5.2.5, 4.7.2.4, 4.8.2.5, 4.9.2.4			
	(5)		How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.	134, 141, 149:150, 156, 162	4.4.2.6, 4.5.2.6, 4.7.2.5, 4.8.2.6, 4.9.2.5			
	(6)		How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.	134:135, 141, 150, 156, 162	4.4.2.7, 4.5.2.7, 4.7.2.6, 4.8.2.7, 4.9.2.6			
(c)			Minimum thresholds for each sustainability indicator shall be defined as follows:					
	(1)		Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following:					
		(A)	The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin.	131:132	4.4.2.1			
		(B)	Potential effects on other sustainability indicators.	134	4.4.2.5			
	(2)		Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.	139	4.5.2.1			
	(3)		Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following:					
		(A)	Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer.	na				
		(B)	A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.	na				

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(4)		Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.	144:147	4.7.2.1		4.7-01, 4.7-02	
	(5)		Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following:					
		(A)	Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects.	154:155	4.8.2.1			
		(B)	Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.	154:155	4.8.2.1			
	(6)		Depletions of Interconnected Surface Water. The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:					
		(A)	The location, quantity, and timing of depletions of interconnected surface water.	160	4.9.2.1	4.9-01		
		(B)	A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.	160	4.9.2.1	4.9-01		
(d)			An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.	132, 139, 140, 154:155	4.4.2.1.2, 4.5.2.1, 4.5.2.2, 4.8.2.1, 4.8.2.2			
(e)			An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.	131:132, 139, 144:147, 154:155, 160	4.4.2.1, 4.5.2.1, 4.7.2.1, 4.8.2.1, 4.9.2.1		4.7-01, 4.7-02	
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10733, 10733.2, and 10733.8, Water Code.					
§ 354.30.			**Measurable Objectives**					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
(a)			Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.	135:136, 141:142, 150:151, 156:157, 163	4.4.3, 4.5.3, 4.7.3, 4.8.3, 4.9.3			
(b)			Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.	135:136, 141:142, 150:151, 156:157, 163	4.4.3, 4.5.3, 4.7.3, 4.8.3, 4.9.3			
(c)			Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.	135:136, 141:142, 150:151, 156:157, 163	4.4.3, 4.5.3, 4.7.3, 4.8.3, 4.9.3			
(d)			An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.	135:136, 141:142, 150:151, 163	4.4.3, 4.5.3, 4.7.3, 4.8.3, 4.9.3			
(e)			Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.	135:136, 141:142, 150:151, 156:157, 163	4.4.3, 4.4.3.2, 4.5.3, 4.7.3, 4.8.3, 4.9.3, 4.9.3.2			
(f)			Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.	164	4.10			
(g)			An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.	135:136, 141:142, 150:151, 156:157, 163	4.4.3, 4.5.3, 4.7.3, 4.8.3, 4.9.3			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code.					
SubArticle 4.			**Monitoring Networks**					
§ 354.32.			**Introduction to Monitoring Networks**					
			This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					

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§ 354.34.			**Monitoring Network**					
(a)			Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.	166:170	5.2			
(b)			Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:					
	(1)		Demonstrate progress toward achieving measurable objectives described in the Plan.	166:170, 171:172	5.2, 5.3.1			
	(2)		Monitor impacts to the beneficial uses or users of groundwater.	166:170, 171:172	5.2, 5.3.1			
	(3)		Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.	166:170, 171:172	5.2, 5.3.1			
	(4)		Quantify annual changes in water budget components.	166:170, 171:172	5.2, 5.3.1			
(c)			Each monitoring network shall be designed to accomplish the following for each sustainability indicator:					
	(1)		Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:					
		(A)	A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.	171:172	5.3.1			
		(B)	Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.	171:172	5.3.1			
	(2)		Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.	175:176	5.4.1			
	(3)		Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.	177	5.5			na
	(4)		Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.	178:179	5.6.1			
	(5)		Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.	181:182	5.7.1			

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	(6)		Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:					
		(A)	Flow conditions including surface water discharge, surface water head, and baseflow contribution.	185	5.8.1			
		(B)	Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.	185	5.8.1			
		(C)	Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.	185	5.8.1			
		(D)	Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.	185	5.8.1			
(d)			The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.	166:170, 171:172	5.2, 5.3			
(e)			A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.	170, 175, 177, 178, 181, 184	5.3, 5.4, 5.5, 5.6, 5.7, 5.8	5.3-01, 5.6-01, 5.8-01	5.3-01, 5.6-01, 5.8-01	
(f)			The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:					
	(1)		Amount of current and projected groundwater use.	166:170	5.2			
	(2)		Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.	166:170	5.2			
	(3)		Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.	166:170	5.2			
	(4)		Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.	166:170	5.2			
(g)			Each Plan shall describe the following information about the monitoring network:					
	(1)		Scientific rationale for the monitoring site selection process.	171:172, 175:176, 178:179, 181:182, 185	5.3.1, 5.4.1, 5.6.1, 5.7.1, 5.8.1			
	(2)		Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.	172:173, 176, 179:180, 182, 186	5.3.2, 5.4.2, 5.6.2, 5.7.2, 5.8.2			

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(3)		For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.	131:132, 135:136, 139, 141:142, 156:157, 170, 175, 177, 178, 181, 184	4.4.2.1, 4.4.3, 4.5.2.1, 4.5.3, 4.8.3, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8	5.3-01, 5.6-01, 5.8-01	5.3-01, 5.6-01, 5.8-01	
(h)			The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.	170, 175, 177, 178, 181, 184	5.3, 5.4, 5.5, 5.6, 5.7, 5.8	5.3-01, 5.6-01, 5.8-01	5.3-01, 5.6-01, 5.8-01	
(i)			The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.	173, 176, 180, 182:183, 186	5.3.3, 5.4.3, 5.6.3, 5.7.3, 5.8.3			
(j)			An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.	170, 175, 177, 178, 181, 184	5.3, 5.4, 5.5, 5.6, 5.7, 5.8	5.3-01, 5.6-01, 5.8-01	5.3-01, 5.6-01, 5.8-01	
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, 10728, 10733, 10733.2, and 10733.8, Water Code					
§ 354.36.			**Representative Monitoring**					
			Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:					
(a)			Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.	187	5.9			
(b)			(b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:					
	(1)		Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.	187	5.9			
	(2)		Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.	187	5.9			
(c)			The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.	187	5.9			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2 and 10733.2, Water Code					
§ 354.38.			**Assessment and Improvement of Monitoring Network**					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
(a)			Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.	174:175, 177, 180:181, 183, 186:187	5.3.4, 5.4.4, 5.6.4, 5.7.4, 5.8.4			
(b)			Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.	174:175, 177, 180:181, 183, 186:187	5.3.4, 5.4.4, 5.6.4, 5.7.4, 5.8.4			
(c)			If the monitoring network contains data gaps, the Plan shall include a description of the following:					
	(1)		The location and reason for data gaps in the monitoring network.	174:175, 177, 180:181, 183, 186:187	5.3.4, 5.4.4, 5.6.4, 5.7.4, 5.8.4			
	(2)		Local issues and circumstances that limit or prevent monitoring.	174:175, 177, 180:181, 183, 186:187	5.3.4, 5.4.4, 5.6.4, 5.7.4, 5.8.4			
(d)			Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.	174:175, 177, 180:181, 183, 186:187	5.3.4, 5.4.4, 5.6.4, 5.7.4, 5.8.4			
(e)			Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:					
	(1)		Minimum threshold exceedances.	174:175, 177, 180:181, 183, 186:187	5.3.4, 5.4.4, 5.6.4, 5.7.4, 5.8.4			
	(2)		Highly variable spatial or temporal conditions.	174:175, 177, 180:181, 183, 186:187	5.3.4, 5.4.4, 5.6.4, 5.7.4, 5.8.4			
	(3)		Adverse impacts to beneficial uses and users of groundwater.	174:175, 177, 180:181, 183, 186:187	5.3.4, 5.4.4, 5.6.4, 5.7.4, 5.8.4			

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(4)		The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.	174:175, 177, 180:181, 183, 186:187	5.3.4, 5.4.4, 5.6.4, 5.7.4, 5.8.4			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10728.2, 10733, 10733.2, and 10733.8, Water Code					
§ 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.					
SubArticle 5.			**Projects and Management Actions**					
§ 354.42.			**Introduction to Projects and Management Actions**					
			This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.44.			**Projects and Management Actions**					
(a)			Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.	188:189	6.1			
(b)			Each Plan shall include a description of the projects and management actions that include the following:					
	(1)		A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following:					
		(A)	A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.	191, 194, 197, 200	6.2.2, 6.3.2, 6.4.2, 6.5.2			
		(B)	The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.	191, 195, 197:198, 200	6.2.3, 6.3.3, 6.4.3, 6.5.3			Appendix D

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(2)		If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.	188:189	6.1			
	(3)		A summary of the permitting and regulatory process required for each project and management action.	191, 195, 198, 200	6.2.4, 6.3.4, 6.4.4, 6.5.4			
	(4)		The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.	191, 195, 198, 201, 208	6.2.5, 6.3.5, 6.4.5, 6.5.5, 7.3			
	(5)		An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.	192, 195, 198, 201	6.2.6, 6.3.6, 6.4.6, 6.5.6			
	(6)		An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.	192, 196, 198, 201	6.2.7, 6.3.7, 6.4.7, 6.5.7			
	(7)		A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.	192, 196, 199, 201	6.2.8, 6.3.8, 6.4.8, 6.5.8			
	(8)		A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.	192:193, 196, 199, 202	6.2.9, 6.3.9, 6.4.9, 6.5.9			
	(9)		A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.	188:189	6.1			
(c)			Projects and management actions shall be supported by best available information and best available science.	188:189	6.1			
(d)			An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.	188:189, 190, 193:194, 196:197	6.1, 6.2, 6.3, 6.4, 6.5			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code.					

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix C

Notification of Groundwater Sustainability Agency Formation

Arroyo Santa Rosa Basin
Groundwater Sustainability Agency

California Department of Water Resources
Attn: Mark Nordberg
P.O. Box 942836
Sacramento, CA 94236

November 17, 2016

Re: NOTICE OF INTENT TO BECOME A GROUNDWATER SUSTAINABILITY AGENCY

Mr. Nordberg:

I'm writing today on behalf of the newly created Arroyo Santa Rosa Basin Groundwater Sustainability Agency (GSA), a Joint Powers Agreement between Camrosa Water District and the County of Ventura. This letter serves as notification of the GSA's decision to become the groundwater sustainability agency for the portions of the Arroyo Santa Rosa Basin outside the Fox Canyon Groundwater Management Agency boundaries, as provided for by the Sustainable Groundwater Management Act (SGMA).

The Arroyo Santa Rosa Valley Groundwater Basin underlies Arroyo Santa Rosa Valley in southeastern Ventura County. Bounded on the north by the Santa Rosa fault, on the south and east by the Santa Monica Mountains, and on the west by the Pleasant Valley Groundwater Basin, the entire Santa Rosa Basin lies entirely within the boundaries of both the Camrosa Water District's service area and the unincorporated portion of Ventura County (the two jurisdictions overlap).

On February 18, 2015, Camrosa sent the Department of Water Resources (DWR) notification that Camrosa intended to become the GSA for the Santa Rosa Basin. The County of Ventura did the same on May 11, 2015, as did the City of Camarillo on June 2, 2015. Due to stipulations in the SGMA legislation that prevents the overlap of GSAs, the issue was returned to the three agencies for arbitration. Since that time, the three parties have reached an amicable agreement to rescind their individual notifications (Attachment A). Because Camrosa and the County are the only agencies within the basin that meet the SGMA definition of a "local agency," those two organizations have entered into a Joint Exercise of Powers Agreement (JPA) to manage the basin cooperatively as the Arroyo Santa Rosa Basin Groundwater Sustainability Agency (GSA) (see Attachment B). Due to jurisdictional overlap of the City of Camarillo with other portions of the Camrosa service area and the County limits outside the boundaries of the Santa Rosa Basin, the JPA provides for stakeholder participation on the GSA Board by the City of Camarillo.

The County of Ventura Board of Supervisors voted unanimously to approve the JPA on October 4, 2016 (Attachment C), and the Camrosa Board of Directors did the same on October 13, 2016 (Attachment D).

A portion of the basin overlaps the boundary of the Fox Canyon Groundwater Management Agency (FCGMA), which is defined in Section 10723(c) of SB 1168 as an exclusive GSA within its respective statutory boundary. The FCGMA availed itself of its exclusive right to be the GSA for basins or portions of basins within its boundaries, including the portion of the Santa Rosa Basin, on January 9, 2015 by passing Resolution 2015-01. The mechanism of cooperation between the FCGMA and the Arroyo Santa Rosa GSA has not yet been developed.

The JPA establishing the Arroyo Santa Rosa Basin GSA describes the powers, membership, and governance of the local agency. In general, the JPA may exercise powers common to the two agencies plus those granted local agencies under the provisions of the SGMA. Membership in the JPA is limited to agencies that could "either alone or jointly" act as the GSA; hence the limitation of the JPA to Camrosa and the County. Governance of the GSA rests with the Board of Directors, currently comprising the five-member Camrosa Board of Directors, the Public Works Director of the County of Ventura, and one appointee from the City of Camarillo. The JPA indicates that the treasurer of the GSA is the Camrosa treasurer, and that the agency's auditor/controller be of the same agency. The GSA Board shall appoint an Executive Director who, with input from the Board, shall direct staffing requirements as necessary.

The JPA provides for the power to draft, approve, and amend bylaws, and stipulates that bylaws shall be adopted within one year of the Board's first meeting, but does not enumerate any specifically beyond those described above.

The GSA will convene stakeholder meetings to inform the agency's activities. Pursuant to Section 10723.8(a)(4), the following details those interested parties, the ways the GSA may engage them, and how they will be considered in the implementation of the agency's groundwater sustainability plan:

- **Holders of overlying groundwater rights:** The GSA will engage all well owners and operators in the Arroyo Santa Rosa Basin, from large-volume agricultural users to de minimis residential pumpers.
- **Municipal well operators:** Camrosa Water District is the only municipal well operator in the Santa Rosa Basin.

- **Public water systems:** Camrosa Water District is the only public water system in the Santa Rosa Basin.
- **Local land use planning agencies:**
  - **City of Camarillo:** As the Santa Rosa Basin neighbors the City of Camarillo, and as Camrosa has shared interests and overlapping areas of concern with regard to water supply and demand, the JPA offers a "Stakeholder Director" seat to the City of Camarillo.
  - **Ventura County Resource Management Agency:** The agency is the land use regulator within the portions of the Santa Rosa Basin that lie in unincorporated Ventura County land, and will be represented by the County of Ventura in the JPA.
- **Environmental users of groundwater:** N/A.
- **Surface water users, if there is a hydrologic connection between surface and groundwater bodies:** As a result of its long experience pumping in the Santa Rosa Basin, Camrosa has long assumed fairly direct hydrologic connection between surface flows and the aquifer, and the 2013 Santa Rosa Groundwater Management Plan update confirmed as much. The main watercourse in the valley is the Conejo Creek, which enters the valley right about the midpoint of the underlying basin. As part of the agreements establishing the Conejo Creek Diversion Project, riparian users along the wetted portion of Conejo Creek agreed not to exercise their riparian rights in exchange for surface water deliveries from Camrosa. Thus, while there are a large number of surface water users (because of the size of the surface water distribution system, there are many more such users than the original riparian rights holders), all such supply is delivered by Camrosa. Nevertheless, riparian rights holders will be invited to join the stakeholder group, and, as several of those landowners are also well owners and large agricultural users, we anticipate their active involvement in the GSA. Tributaries to the creek that overlay the Santa Rosa Basin, including the Arroyo Santa Rosa and a handful of other culverts and arroyos, are primarily flood channels that are dry the majority of the year and do not offer sufficient flows for surface water use.
  - **Calleguas Creek Watershed:** The watershed group comprises a variety of stakeholders, from private and public utility agencies to environmental NGOs to agricultural groups, et cetera, who work together to meet regulatory requirements, seek grant funding, pursue integrated management, and collaborate on projects to benefit the watershed. Members of the JPA are in good standing and work closely with the watershed group, and the GSA welcomes the group's input at public meetings and in the public review period of the groundwater sustainability plan.

- **Watersheds Coalition of Ventura County:** Linking the Calleguas Creek Watershed group with the other two watersheds in Ventura County, the WCVC is primarily interested in integrated water management planning. Members of the JPA are in good standing and work closely with the WCVC, and the GSA welcomes the group's input at public meetings and in the public review period of the groundwater sustainability plan.
- **Ventura County Watershed Protection District (WPD):** WPD provides for "the control and conservation of flood and storm waters and for the protection of watercourses, watersheds, public highways, life and property in the district from damage or destruction from these waters," and, as such, will be a valuable resource in developing the GSA's groundwater sustainability plan. As a branch of the County of Ventura, the WPD will be represented on the GSA Board.
- **City of Thousand Oaks:** The majority of the water in the Conejo Creek is discharge from the Hill Canyon Water Treatment Plant, which is a City of Thousand Oaks public works facility. As the City holds water right and use permits for Conejo Creek water, Camrosa and the GSA will continue to work closely with the City in all matters regarding its use.
- **California Department of Fish and Wildlife:** Much of CDFW's interests in and responsibilities for the watercourses overlaying the Santa Rosa Basin are covered by the water right permit for Conejo Creek water held by the City of Thousand Oaks. The department will be consulted as necessary during the development of the groundwater sustainability plan should it involve any lands or activities under the department's jurisdiction.

- **The federal government, including, but not limited to, the military and managers of federal lands:** N/A. There are no federal agencies or federal lands in the areas overlaying the portion of the Santa Rosa Basin outside the boundaries of the FCGMA.
- **California Native American tribes:** N/A. While the Native community is active in other parts of the Camrosa service area, they have historically been silent on issues in the Santa Rosa Valley/Basin. The GSA will continue to include the Native community in all its pertinent public communications, and welcomes their feedback during the development of the groundwater sustainability plan.
- **Disadvantaged communities, including, but not limited to, those served by private domestic wells or small community water systems:** N/A. No area overlaying the Santa Rosa Basin is considered a disadvantaged community.
- **Entities listed in Section 10927 that are monitoring and reporting groundwater elevation in all or a part of a groundwater basin managed by the GSA:** Camrosa monitors groundwater elevation in the portion of the Santa Rosa Basin outside the boundaries of the FCGMA, and reports that information to the County of Ventura. The

president of the Camrosa Water District Board of Directors was recently elected to serve on the board of the FCGMA, so that agency will be directly represented on the GSA.

Should the Department of Water Resources require anything further prior to the acceptance of this notification, please address your concerns to Ian Prichard, Water Resource Manager, care of Camrosa Water District.

Sincerely,

Tony Stafford, General Manager, Camrosa Water District

Cc: Tim Ross, California Department of Water Resources, Southern Region
Chris Bonds, California Department of Water Resources, Sacramento
Sam Bolland-Brien, State Water Resources Control Board
Jeff Pratt, Director of Public Works, Ventura County Public Works Agency
Dave Klotzle, Public Works Director, City of Camarillo

Encl.:
Attachment A—Letter Rescinding Prior GSA Notifications
Attachment B—Joint Exercise of Powers Agreement Creating the Arroyo Santa Rosa Valley Basin Groundwater Sustainability Agency
Attachment C—County of Ventura Resolution Adopting the Arroyo Santa Rosa JPA
Attachment D—Camrosa Water District Resolution Adopting the Arroyo Santa Rosa JPA

CAMROSA
WATER DISTRICT
BUILDING WATER SELF-RELIANCE

City of Camarillo

October 18, 2016

California Department of Water Resources
Attn: Mark Nordberg
P.O. Box 942836
Sacramento, CA 94236

Re: RESCINDING MULTIPLE ARROYO SANTA ROSA GSA NOTIFICATIONS

Mr. Nordberg:

The undersigned agencies—the Camrosa Water District, the County of Ventura, and the City of Camarillo—hereby rescind their notifications declaring their intent to become groundwater sustainability agencies for the Arroyo Santa Rosa Basin, originally submitted on February 18, May 11, and June 2, 2015, respectively.

A submittal packet from the newly formed Arroyo Santa Rosa Basin Groundwater Management Agency (GSA), formed under a Joint Exercise of Power Agreement between the Camrosa Water District and the County of Ventura, declaring that GSA's intent to become the groundwater sustainability agency for the Arroyo Santa Rosa Basin, will follow this letter.

Should you have any questions, please don't hesitate to call Ian Prichard at the Camrosa Water District at (805)482-6562.

Sincerely,

Tony Stafford, General Manager, Camrosa Water District — 11-15-16 Date

Jeff Pratt, Director of Public Works, County of Ventura — 11/14/16 Date

Dave Klotzle, Public Works Director, City of Camarillo — 11/15/16 Date

Exhibit 1

JOINT EXERCISE OF POWERS AGREEMENT

by and among

THE COUNTY OF VENTURA

and

CAMROSA WATER DISTRICT

creating the

ARROYO SANTA ROSA VALLEY BASIN GROUNDWATER SUSTAINABILITY AGENCY

OCTOBER 04, 2016

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JOINT EXERCISE OF POWERS AGREEMENT
THE ARROYO SANTA ROSA VALLEY BASIN GROUNDWATER SUSTAINABILITY AGENCY

This **Joint Exercise of Powers Agreement ("Agreement")** is made and effective on the last date executed ("**Effective Date**"), by and among the County of Ventura, and Camrosa Water District, sometimes referred to herein individually as a "**Member**" and collectively as the "**Members**" for purposes of forming the Arroyo Santa Rosa Valley Basin Groundwater Sustainability Agency ("**Authority**") and setting forth the terms pursuant to which the Authority shall operate. Capitalized defined terms used herein shall have the meanings given to them in Article 1 of this Agreement.

RECITALS

A. Each of the Members is a local agency, as defined by the Sustainable Groundwater Management Act of 2014 ("**SGMA**"), duly organized and existing under and by virtue of the laws of the State of California, and each Member can exercise powers related to groundwater management.

B. For groundwater basins designated by the Department of Water Resources ("**DWR**") as medium- and high-priority but that have not been designated by DWR as subject to critical conditions of overdraft, SGMA requires establishment of a groundwater sustainability agency ("**GSA**") by June 30, 2017 and adoption of a groundwater sustainability plan ("**GSP**") by January 31, 2022.

C. The Arroyo Santa Rosa Valley Basin (designated basin number 4-7 in the DWR's Bulletin No. 118) ("**Basin**") is designated as a medium-priority basin and underlies the Santa Rosa Valley. This Agreement pertains only to the portion of the Basin outside the Fox Canyon Groundwater Management Agency boundary.

D. Under SGMA, a combination of local agencies may form a GSA through a joint powers agreement.

E. The Members have determined that the sustainable management of the Basin pursuant to SGMA may best be achieved through the cooperation of the Members operating through a joint powers agreement.

F. The Joint Exercise of Powers Act of 2000 ("Act") authorizes the Members to create a joint powers agency, and to jointly exercise any power common to the Members and to exercise additional powers granted under the Act.

G. The Act, including the Marks-Roos Local Bond Pooling Act of 1985 (Government Code sections 6584, *et seq.*), authorizes an entity created pursuant to the Act to issue bonds, and under certain circumstances, to purchase bonds issued by, or to make loans to, the Members for financing public capital improvements, working capital, liability and other insurance needs or projects whenever doing so would result in significant public benefits, as determined by the Members. The Act further authorizes and empowers a joint powers authority to sell bonds so issued or purchased to public or private purchasers at public or negotiated sales.

H. Based on the foregoing legal authority, the Members desire to create a joint powers authority for the purpose of taking all actions deemed necessary by the joint powers authority to ensure sustainable management of the Basin as required by SGMA.

I. The governing body of each Member has determined it to be in the Member's best interest and in the public interest that this Agreement be executed.

TERMS OF AGREEMENT

In consideration of the mutual promises and covenants herein contained, the Members agree as follows:

ARTICLE 1
DEFINITIONS

The following terms have the following meanings for purposes of this Agreement:

1.1 "Act" means the Joint Exercise of Powers Act, set forth in Chapter 5 of Division 7 of Title 1 of the Government Code, sections 6500, *et seq.*, including all laws supplemental thereto.

1.2 "Agreement" has the meaning assigned thereto in the Preamble.

1.3 "Auditor" means the auditor of the financial affairs of the Authority appointed by the Board of Directors pursuant to Section 13.3 of this Agreement.

1.4 "Authority" has the meaning assigned thereto in the Preamble.

1.5 "Basin" means that portion of the Arroyo Santa Rosa Valley Basin (designated basin number 4-7 in the DWR's Bulletin No. 118) that lies outside the Fox Canyon Groundwater Management Agency boundary.

1.6 "Board of Directors" or "Board" means the governing body of the Authority as established by Article 6 of this Agreement.

1.7 "Bylaws" means the bylaws, if any, adopted by the Board of Directors pursuant to Article 11 of this Agreement to govern the day-to-day operations of the Authority.

1.8 "Director" and "Alternate Director" mean a director or alternate director appointed pursuant to Sections 6.1, 6.3 and 6.4 of this Agreement.

1.9 "DWR" has the meaning assigned thereto in Recital B.

1.10 "Effective Date" has the meaning assigned thereto in the Preamble.

1.11 "Executive Director" means the chief administrative officer of the Authority to be appointed by the Board of Directors pursuant to Article 10 of this Agreement.

1.12 "GSA" has the meaning assigned thereto in Recital B.

1.13 "GSP" has the meaning assigned thereto in Recital B.

1.14 "Member" has the meaning assigned thereto in the Preamble and further means each party to this Agreement that satisfies the requirements of Section 5.1 of this Agreement, including any new members as may be authorized by the Board, pursuant to Section 5.2 of this Agreement.

1.15 "Officer(s)" means the chair and vice chair/secretary to be appointed by the Board of Directors pursuant to Section 7.1 of this Agreement.

1.16 "SGMA" has the meaning assigned thereto in Recital A.

1.17 "State" means the State of California.

ARTICLE 2
CREATION OF THE AUTHORITY

2.1 Creation of Authority. There is hereby created pursuant to the Act a joint powers authority, which will be a public entity separate from the Members to this Agreement and shall be known as the Arroyo Santa Rosa Valley Basin Groundwater Sustainability Agency ("**Authority**"). Within 30 days after the Effective Date of this Agreement and after any amendment, the Authority shall cause a notice of this Agreement or amendment to be prepared and filed with the office of the California Secretary of State containing the information required by Government Code section 6503.5. Within 10 days after the Effective Date of this Agreement, the Authority shall cause a statement of the information concerning the Authority, required by Government Code section 53051, to be filed with the office of the California Secretary of State and with the County Clerk for the County of Ventura, setting forth the facts required to be stated pursuant to Government Code section 53051(a).

2.2 Purpose of the Authority. Each Member to this Agreement has in common the power to study, plan, develop, finance, acquire, construct, maintain, repair, manage, operate, control, and govern water supply, and each is a local agency eligible to serve as the GSA in the Basin, either alone or jointly through a joint powers agreement as provided for by SGMA. The purpose of this Authority is to serve as the GSA for the Basin and to develop, adopt, and implement the GSP for the Basin pursuant to SGMA and other applicable provisions of law.

ARTICLE 3
TERM

This Agreement shall become effective upon execution by each of the Members and shall remain in effect until terminated pursuant to the provisions of Article 16 (Withdrawal of Members) of this Agreement.

ARTICLE 4
POWERS

The Authority shall possess the power in its own name to exercise any and all common powers of its Members reasonably related to the purposes of the Authority, including but not limited to the powers set forth below. For purposes of Government Code section 6509, and unless the Authority has adopted applicable rules, regulations, policies, bylaws, and procedures, the powers of the Authority shall be exercised subject to the restrictions upon the manner of exercising such powers as are imposed on the Camrosa Water District, and in the event of the withdrawal of the Camrosa Water District as a Member under this Agreement, then the manner of exercising the Authority's powers shall be those restrictions imposed on the County of Ventura.

4.1. To exercise all powers afforded to a GSA pursuant to and as permitted by SGMA.

4.2. To develop, adopt and implement a GSP for the Basin pursuant to SGMA.

4.3. To make and enter contracts necessary to fully exercise the Authority's power.

4.4. To employ, designate, or otherwise contract for the services of, agents, officers, employees, attorneys, engineers, planners, financial consultants, technical specialists, advisors, and independent contractors.

4.5. To cooperate, act in conjunction and contract with the United States, the State of California, or any agency thereof, counties, municipalities, public and private corporations of any kind (including without limitation, investor-owned utilities), and individuals, or any of them, for any and all purposes necessary or convenient for the full exercise of the powers of an Authority.

4.6. To incur debts, liabilities or obligations, to issue bonds, notes, certificates of participation, guarantees, equipment leases, reimbursement obligations and other indebtedness, and to impose assessments groundwater extraction fees or other charges, and other means of financing the Authority as provided in Chapter 8 of SGMA commencing at Section 10730 of the Water Code.

4.7. To apply for, accept and receive licenses, permits, water rights, approvals, agreements, grants, loans, contributions, donations or other aid from any agency of the United States of America, the State of California or other public agencies or private persons or entities necessary for the Authority's purposes.

4.8. To acquire property and other assets by grant, lease, purchase, bequest, devise, gift, or eminent domain, and to hold, enjoy, lease or sell, or otherwise dispose of, property, including real property, water rights, and personal property, necessary for the full exercise of the Authority's powers.

4.9. To sue and be sued in its own name.

4.10. To provide for the prosecution of, defense of, or other participation in actions or proceedings at law or in public hearings in which the Members, pursuant to this Agreement, may have an interest and employ counsel and other expert assistance for these purposes.

4.11. To accumulate operating and reserve funds for the purposes herein stated.

4.12. To invest money that is not required for the immediate necessities of the Authority, as the Authority determines is advisable, in the same manner and upon the same conditions as Members, pursuant to Government Code section 53601, as it now exists or may hereafter be amended.

4.13. To undertake any investigations, studies, and matters of general administration.

4.14. To perform all other acts necessary or proper to carry out fully the purposes of this Agreement.

ARTICLE 5
MEMBERSHIP

5.1 Members. The Members of the Authority shall be the County of Ventura and Camrosa Water District, as long as they have not, pursuant to the provisions hereof, withdrawn from this Agreement.

5.2 New Members. Any local agency (as defined by the SGMA) that is not a Member on the Effective Date of this Agreement may become a Member upon: (a) the unanimous approval of the Board of Directors as specified in Article 9 (Member Voting); (b) payment of a pro rata share of all previously incurred costs that the Board of Directors determines have resulted in benefit to the new Member, and are appropriate for assessment on the new Member; and (c) execution of a written agreement subjecting the new Member to the terms and conditions of this Agreement.

ARTICLE 6
BOARD OF DIRECTORS

6.1 Formation of the Board of Directors. The Authority shall be governed by a Board of Directors ("**Board of Directors**" or "**Board**"). The Board shall consist of seven (7) Directors consisting of representatives who shall be appointed in the manner set forth in Section 6.3:

6.2 Duties of the Board of Directors. The business and affairs of the Authority, and all of the powers of the Authority, including without limitation all powers set forth in Article 4 (Powers), are reserved to and shall be exercised by and through the Board of Directors, except as may be expressly delegated to the Executive Director or others pursuant to this Agreement, Bylaws, or by specific action of the Board of Directors.

6.3 Appointment of Directors. The Directors shall be appointed as follows:

6.3.1 One (1) Director shall be appointed by the City of Camarillo City Council. In the event the City of Camarillo declines to appoint a Director, or vacates the seat, the County of Ventura shall be eligible to appoint a Director to fill this Director position.

6.3.2 One (1) Director shall be appointed by the County of Ventura Board of Supervisors.

6.3.3 The members of the Camrosa Water District Board of Directors will be the five (5) Directors from Camrosa Water District.

6.4 Alternate Directors. The City of Camarillo and the County of Ventura may each appoint one Alternate Director to the Board of Directors. All Alternates shall be appointed in the same manner as set forth in Section 6.3. Unless appearing as a substitute for a Director due to absence or conflict of interest, Alternate Directors shall have no vote, and shall not participate in any discussions or deliberations of the Board. If the Director is not present, or if the Director has a conflict of interest which precludes participation by the Director in any decision-making process of the Board, the Alternate Director appointed to act in his/her place shall assume all rights of the Director, and shall have the authority to act in his/her absence, including casting votes on matters before the Board. Each Alternate Director shall be appointed prior to the third meeting of the Board. Alternates are strongly encouraged to attend all Board meetings and stay informed on current issues before the Board.

6.5 Requirements. Each Director and Alternate Director shall be appointed by their governing body to serve for a term of two years. A Director or Alternate Director may be removed during his or her term or reappointed for multiple terms at the pleasure of the governing body that appointed him or her. No individual Director may be removed in any other manner, including by the affirmative vote of the other Directors.

6.6 Vacancies. A vacancy on the Board of Directors shall occur when a Director resigns or at the end of the Director's term as set forth in Section 6.5. A vacancy shall also occur when a Director or Alternate Director is removed by his or her appointing Member. Members shall submit any changes in Director or Alternate Director positions to the Executive Director in writing and signed by an authorized representative of the Member.

ARTICLE 7
OFFICERS

7.1 Officers. Officers of the Authority shall be a chair and vice chair/secretary selected from among the Directors. A treasurer shall be appointed consistent with the provisions of Section 13.3. The vice chair/secretary shall exercise all powers of the chair in the chair's absence or inability to act.

7.2 Appointment of Officers. Officers shall be elected annually by, and serve at the pleasure of, the Board of Directors. Officers shall be elected at the first Board meeting, and thereafter at the first Board meeting following January 1st of each year. An Officer may serve for multiple consecutive terms, with no term limit. Any Officer may resign at any time upon written notice to the Board, and may be removed and replaced by a simple decision of the Board.

7.3 Principal Office. The principal office of the Authority is Camrosa Water District office headquarters, and may thereafter be changed by a vote of the Board.

ARTICLE 8
DIRECTOR MEETINGS

8.1 Initial Meeting. The initial meeting of the Board of Directors shall be held in the County of Ventura, California within 30 days of the Effective Date of this Agreement.

8.2 Time and Place. The Board of Directors shall meet at least quarterly, at a date, time and place set by the Board within the jurisdictional boundaries of one or more of the Members, and at such times as may be determined by the Board.

8.3 Special Meetings. Special meetings of the Board of Directors may be called by the chair or by a vote of Directors in accordance with the provisions of Government Code section 54956.

8.4 Conduct. All meetings of the Board of Directors, including special meetings, shall be noticed, held, and conducted in accordance with the Ralph M. Brown Act (Government Code sections 54950, *et seq.*). The Board may use teleconferencing in connection with any meeting in conformance with and to the extent authorized by applicable law.

8.5 Local Conflict of Interest Code. The Board of Directors shall adopt a local conflict of interest code pursuant to the provisions of the Political Reform Act of 1974 (Government Code sections 81000, *et seq.*)

ARTICLE 9
MEMBER VOTING

9.1 Quorum. A quorum of any meeting of the Board of Directors shall consist of a majority of the Directors. In the absence of a quorum, any meeting of the Directors may be adjourned by a vote of a simple majority of Directors present, but no other business may be transacted. For purposes of this Article, a Director shall be deemed present if the Director appears at the meeting in person or participates telephonically, provided the telephone appearance is consistent with the requirements of the Ralph M. Brown Act.

9.2 Director Votes. Voting by the Board of Directors shall be made on the basis of one vote for each Director.

9.3 Affirmative Decisions of the Board of Directors. Except as otherwise specified in this Agreement, all decisions of the Board of Directors shall require a quorum to be established and the affirmative vote of a simple majority of all Directors in attendance at the meeting and eligible to vote on the matter.

ARTICLE 10
EXECUTIVE DIRECTOR AND STAFF

10.1 Appointment. The Board of Directors shall appoint an Executive Director, who may be, though need not be, an officer, employee, or representative of one of the Members. The Executive Director's compensation, if any, shall be determined by the Board of Directors.

10.2 Duties. The Executive Director shall be the chief administrative officer of the Authority, shall serve at the pleasure of the Board of Directors, and shall be responsible to the Board for the proper and efficient administration of the Authority. The Executive Director shall have the powers designated by the Board, or otherwise as set forth in the Bylaws.

10.3 Term and Termination. The Executive Director shall serve until he/she resigns or the Board of Directors terminates his/her appointment.

10.4 Staff and Services. The Executive Director may employ such additional full-time and/or part-time employees, assistants and independent contractors who may be necessary from time to time to accomplish the purposes of the Authority, subject to the approval of the Board of Directors. The Authority may contract with a Member or other public agency or private entity for various services, including without limitation, those related to the Authority's finance, purchasing, risk management, information technology and human resources. A written agreement shall be entered between the Authority and the Member or other public agency or private entity contracting to provide such service, and that agreement shall specify the terms on which such services shall be provided, including without limitation, the compensation, if any, that shall be made for the provision of such services.

ARTICLE 11
BYLAWS

The Board of Directors shall cause to be drafted, approve, and amend Bylaws of the Authority to govern the day-to-day operations of the Authority. The Bylaws shall be adopted on or before the first anniversary of the Board's first meeting.

ARTICLE 12
COMMITTEES

The Board of Directors may from time to time appoint one or more advisory committees or establish standing or ad hoc committees to assist in carrying out the purposes and objectives of the Authority. The Board shall determine the purpose and need for such committees and the necessary qualifications for individuals appointed to them. Each standing or ad hoc committee shall include a Director as the chair thereof. However, no committee or participant on such committee shall have any authority to act on behalf of the Authority.

ARTICLE 13
ACCOUNTING PRACTICES

13.1 General. The Board of Directors shall establish and maintain such funds and accounts as may be required by generally accepted public agency accounting practices. The Authority shall maintain strict accountability of all funds and report of all receipts and disbursements of the Authority.

13.2 Fiscal Year. Unless the Board of Directors decides otherwise, the fiscal year for the Authority shall run concurrent with the calendar year.

13.3 Appointment of Treasurer and Auditor; Duties. The treasurer and auditor shall be appointed in the manner, and shall perform such duties and responsibilities, specified in Sections 6505 and 6505.6 of the Act. The treasurer shall be bonded in accordance with the provisions of section 6505.1 of the Act. The treasurer of Camrosa Water District shall be the treasurer of the Authority, to be the depository and have custody of all money of the Authority from whatever source, provided that the Board of Directors may at any time select another treasurer. Said Board shall also select a controller, who shall be of the same public agency as treasurer, and who shall draw all warrants to pay demands against the Authority approved by the Board.

ARTICLE 14
BUDGET AND EXPENSES

14.1 Budget. Within 90 days after the first meeting of the Board of Directors, and thereafter prior to the commencement of each fiscal year, the Board shall adopt a budget for the Authority for the ensuing fiscal year. In the event that a budget is not so approved, the prior year's budget shall be deemed approved for the ensuing fiscal year, and any groundwater extraction fee or assessment(s) of contributions of Members, or both, approved by the Board during the prior fiscal year shall again be assessed in the same amount and terms for the ensuing fiscal year.

14.2 Authority Funding and Contributions. For the purpose of funding the expenses and ongoing operations of the Authority, the Board of Directors shall maintain a funding account in connection with the annual budget process. The Board of Directors may fund the Authority as provided in Chapter 8 of SGMA, commencing with Section 10730 of the Water Code.

14.3 Issuance of Indebtedness. The Authority may issue bonds, notes or other forms of indebtedness, as permitted under Section 4.6, provided such issuance be approved at a meeting of the Board

ARTICLE 15
LIABILITIES

15.1 Liability. In accordance with Government Code section 6507, the debt, liabilities and obligations of the Authority shall be the debts, liabilities and obligations of the Authority alone, and not the Members.

15.2 Indemnity. Funds of the Authority may be used to defend, indemnify, and hold harmless the Authority, each Member, each Director, and any officers, agents and employees of the Authority for their actions taken within the course and scope of their duties while acting on behalf of the Authority. To the fullest extent permitted by law, the Authority agrees to save, indemnify, defend and hold harmless each Member from any liability, claims, suits, actions, arbitration proceedings, administrative proceedings, regulatory proceedings, losses, expenses or costs of any kind, whether actual, alleged or threatened, including attorney's fees and costs, court costs, interest, defense costs, and expert witness fees, where the same arise out of, or are in any way attributable in whole or in part to, acts or omissions of the Authority or its employees, officers or agents or negligent acts or omissions (not including gross negligence or wrongful conduct) of the employees, officers or agents of any Member while acting within the course and scope of a Member relationship with the Authority.

15.3 Privileges and Immunities. All of the privileges and immunities from liability, exemption from laws, ordinances and rules, all pension, relief, disability, workers compensation, and other benefits which apply to the activity of officers, agents, or employees of any of the Members when performing their respective functions shall apply to them to the same degree and extent while engaged in the performance of any of the functions and other duties under this Agreement. None of the officers, agents, or employees appointed by the Board of Directors shall be deemed, by reason of their employment by the Board of Director, to be employed by any of the Members or, by reason of their employment by the Board of Directors, to be subject to any of the requirements of such Members.

ARTICLE 16
WITHDRAWAL OF MEMBERS

16.1 Unilateral Withdrawal. Subject to the Dispute Resolution provisions set forth in Section 17.9, a Member may unilaterally withdraw from this Agreement without causing or requiring termination of this Agreement, effective upon 180 days written notice to the Executive Director.

16.2 Rescission or Termination of Authority. This Agreement may be rescinded and the Authority terminated by unanimous written consent of all Members, except during the outstanding term of any Authority indebtedness.

16.3 Effect of Withdrawal or Termination. Upon termination of this Agreement or unilateral withdrawal, a Member shall remain obligated to pay its share of all debts, liabilities and obligations of the Authority required of the Member pursuant to terms of this Agreement, and that were incurred or accrued prior to the effective date of such termination or withdrawal, including, without limitation, those debts, liabilities and obligations pursuant to Sections 4.6 and 14.3. Any Member who withdraws from the Authority shall have no right to participate in the business and affairs of the Authority or to exercise any rights of a Member under this Agreement or the Act, but shall continue to share in distributions from the Authority on the same basis as if such Member had not withdrawn, provided that a Member that has withdrawn from the Authority shall not receive distributions in excess of the contributions made to the Authority while a Member. The right to share in distributions granted under this Section 16.3 shall be in lieu of any right the withdrawn Member may have to receive a distribution or payment of the fair value of the Member's interest in the Authority.

ARTICLE 17
MISCELLANEOUS PROVISIONS

17.1 No Predetermination or Irretrievable Commitment of Resources. Nothing herein shall constitute a determination by the Authority or any of its Members that any action shall be undertaken or that any unconditional or irretrievable commitment of resources shall be made, until such time as the required compliance with all local, state, or federal laws, including without limitation the California Environmental Quality Act, National Environmental Policy Act, or permit requirements, as applicable, has been completed.

17.2 Notices. Notices to a Director or Member hereunder shall be sufficient if delivered to the Clerk or Board Secretary of the respective Director or Member and addressed to the Director or Member. Delivery may be accomplished by U.S. Postal Service, private mail service or electronic mail.

17.3 Amendments to Agreement. This Agreement may be amended or modified at any time only by subsequent written agreement approved and executed by all of the Members.

17.4 Agreement Complete. The foregoing constitutes the full and complete Agreement of the Members. This Agreement supersedes all prior agreements and understandings, whether in writing or oral, related to the subject matter of this Agreement that are not set forth in writing herein.

17.5 Severability. Should any part, term or provision of this Agreement be decided by a court of competent jurisdiction to be illegal or in conflict with any applicable Federal law or any law of the State of California, or otherwise be rendered unenforceable or ineffectual, the validity of the remaining parts, terms, or provisions hereof shall not be affected thereby, provided, however, that if the remaining parts, terms, or provisions do not comply with the Act, this Agreement shall terminate.

17.6 Withdrawal by Operation of Law. Should the participation of any Member to this Agreement be decided by the courts to be illegal or in excess of that Member's authority or in conflict with any law, the validity of the Agreement as to the remaining Members shall not be affected thereby.

17.7 Assignment. The rights and duties of the Members may not be assigned or delegated without the written consent of all other Members. Any attempt to assign or delegate such rights or duties in contravention of this Agreement shall be null and void.

17.8 Binding on Successors. This Agreement shall inure to the benefit of, and be binding upon, the successors and assigns of the Members.

17.9 Dispute Resolution. In the event that any dispute arises among the Members relating to (i) this Agreement, (ii) the rights and obligations arising from this Agreement, or (iii) a Member proposing to withdraw from membership in the Authority, the aggrieved Member or Member proposing to withdraw from membership shall provide written notice to the other Members of the controversy or proposal to withdraw from membership. Within thirty (30) days thereafter, the Members shall attempt in good faith to resolve the controversy through informal means. If the Members cannot agree upon a resolution of the controversy within thirty (30) days from the providing of written notice specified above, the dispute shall be submitted to mediation prior to commencement of any legal action or prior to withdrawal of a Member proposing to withdraw from membership. The mediation shall be no less than a full day (unless agreed otherwise among the Members) and the cost of mediation shall be paid in equal proportion among the Members. The mediator shall be either voluntarily agreed to or appointed by the Superior Court upon a suit and motion for appointment of a neutral mediator. Upon completion of mediation, if the controversy has not been resolved, any Member may exercise all rights to bring a legal action relating to the controversy or withdraw from membership as otherwise authorized pursuant to this Agreement.

17.10 Counterparts. This Agreement may be executed in counterparts, each of which shall be deemed an original.

17.11 Singular Includes Plural. Whenever used in this Agreement, the singular form of any term includes the plural form and the plural form includes the singular form.

17.12 No Third-Party Rights. Nothing in this Agreement, whether express or implied, is intended to confer any rights or remedies under, or by reason of, this Agreement on any person other than Members and their respective successors and assigns, nor is anything in this Agreement intended to relieve or discharge the obligations or liability of any third person to any Member, nor shall any provision give any third person any right of subrogation or action over or against any Member.

17.13 Member Authorization. The governing bodies of the Members have each authorized execution of this Agreement, as evidenced by the respective signatures below.

IN WITNESS WHEREOF, the Members hereto have executed this Agreement by authorized officials thereof on the dates indicated below, which Agreement may be executed in counterparts.

[Signatures on Following Page]

COUNTY OF VENTURA

DATED: October 13, 2016

APPROVED AS TO FORM:

By: Linda Parks
Title: Chair, Board of Supervisors County of Ventura

By: Lori Gaines
Title: Deputy Clerk of the Board

CAMROSA WATER DISTRICT

DATED: November 17, 2016

APPROVED AS TO FORM:

By: Tony Stafford
Title: GENERAL MANAGER

By: Greg Jones
Title: Camrosa General Counsel

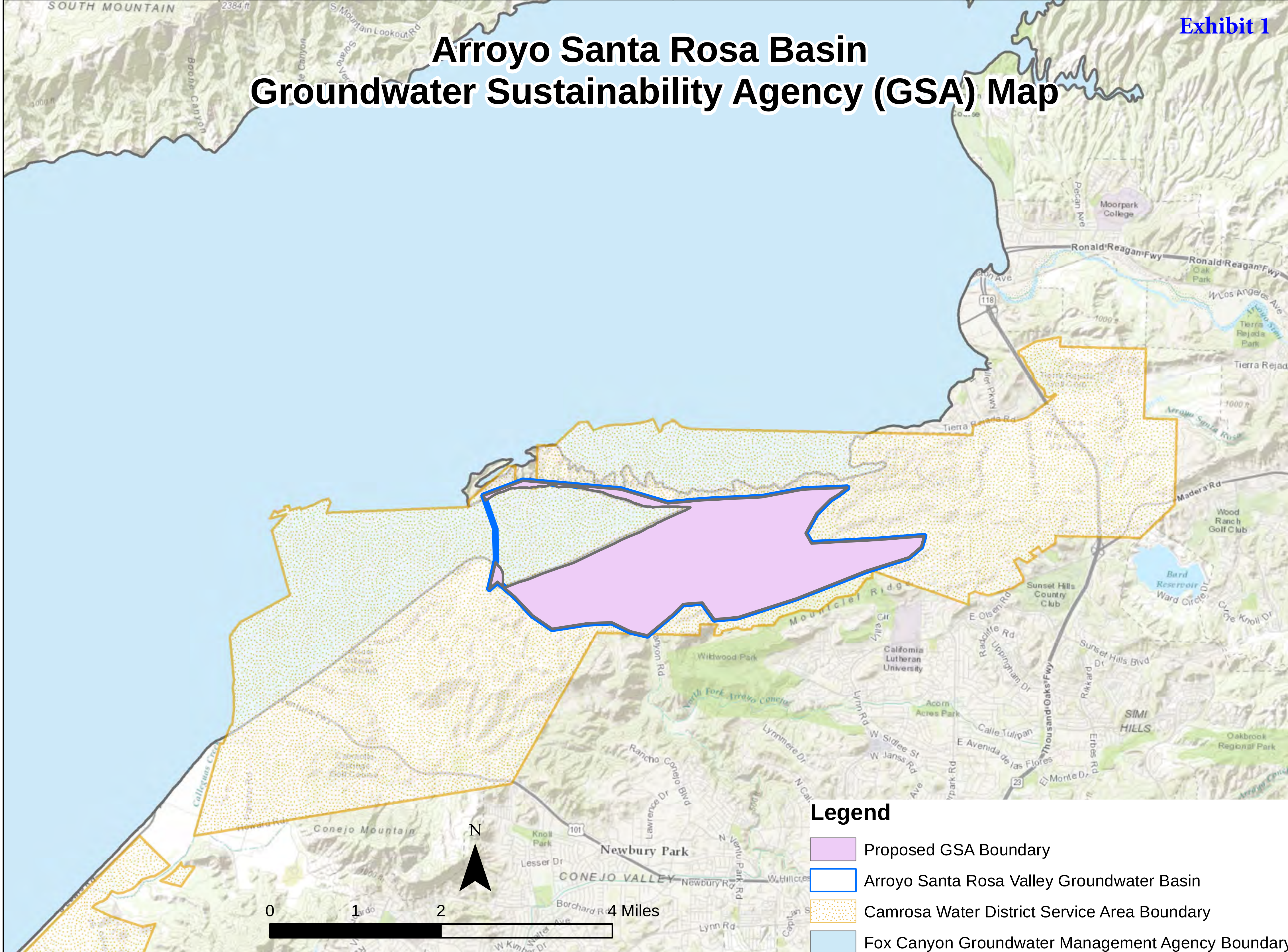


Exhibit 1
Arroyo Santa Rosa Basin
Groundwater Sustainability Agency (GSA) Map
Legend
Proposed GSA Boundary
Arroyo Santa Rosa Valley Groundwater Basin
Camrosa Water District Service Area Boundary
Fox Canyon Groundwater Management Agency Boundary
N
0
1
2
4 Miles
SOUTH MOUNTAIN
Moorpark College
Ronald Reagan Fwy
Tierra Rejada Rd
Madera Rd
Wood Ranch Golf Club
Bard Reservoir
Sunset Hills Country Club
California Lutheran University
Mountclef Ridge
Wildwood Park
Newbury Park
CONEJO VALLEY
Conejo Mountain
SIMI HILLS
Oakbrook Regional Park

RESOLUTION NO. 16 - 105

RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF VENTURA AUTHORIZING AND DIRECTING THE EXECUTION OF A JOINT EXERCISE OF POWERS AGREEMENT CREATING THE ARROYO SANTA ROSA VALLEY BASIN GROUNDWATER AGENCY

WHEREAS, the California Legislature has adopted, and the Governor has signed into law, the Sustainable Groundwater Management Act of 2014 ("SGMA"), which authorizes local agencies to manage groundwater in a sustainable fashion; and

WHEREAS, in order to exercise the authority granted in SGMA, a local agency or combination of local agencies must elect to become a groundwater sustainability agency ("GSA"); and

WHEREAS, the Camrosa Water District and the County of Ventura ("Member Agencies") are all local agencies, as SGMA defines that term; and

WHEREAS, the Member Agencies each exercise jurisdiction upon lands overlying the Arroyo Santa Rosa Valley Basin (designated basin number 4-7 in the California Department of Water Resources' CASGEM groundwater basin system) ("Basin") and are all committed to the sustainable management of the Basin's groundwater resources; and

WHEREAS, the Member Agencies have determined that the sustainable management of the Basin pursuant to SGMA may best be achieved through the cooperation of the Member Agencies operating through a joint powers authority; and

WHEREAS, the County of Ventura ("County") is a local government duly organized and validly existing under the Constitution and laws of the State of California; and

WHEREAS, the County, upon authorization of the Board of Supervisors, may, pursuant to Article 1 (commencing with Section 6500) of Chapter 5 of Division 7 of Title 1 of the Government Code ("JPA Act"), enter into a joint exercise of powers agreement with one or more other public agencies pursuant to which such contracting parties may jointly exercise any power common to them or conferred to them by the JPA Act; and

WHEREAS, all of the Member Agencies are public agencies as defined in the JPA Act; and

WHEREAS, the Member Agencies intend to enter into a joint exercise of powers agreement pursuant to the JPA Act ("JPA Agreement") pursuant to which the Arroyo Santa Rosa Valley Basin Groundwater Agency ("Santa Rosa Groundwater Agency") will be created to, among other things, take all actions deemed necessary by the Santa Rosa Groundwater Agency to ensure sustainable management of the Basin as required by SGMA; and

WHEREAS, under California law and the JPA Agreement, the Santa Rosa Groundwater Agency will be a public entity separate and apart from the parties to the JPA Agreement and the debts, liabilities, and obligations of the Santa Rosa Groundwater Agency will not be the debts, liabilities, or obligations of the County or of the other Member Agencies, or of any representatives of either the County or the other Member Agencies serving on the governing body of the Santa Rosa Groundwater Agency ("Santa Rosa Groundwater Agency Board"); and

WHEREAS, the Board of Supervisors of the County has determined it to be in the County's best interest and in the public interest to execute the JPA Agreement attached to this Resolution as Exhibit 1; and

WHEREAS, adoption of this resolution does not constitute a "project" under California Environmental Quality Act Guidelines Section 15378(b)(5), including organization and administrative activities of government, because there would be no direct or indirect physical change in the environment.

NOW, THEREFORE, BE IT RESOLVED by the Board of Supervisors of the County of Ventura, as follows:

1. The Chair of the Board of Supervisors is hereby authorized to sign the JPA Agreement on behalf of the County of Ventura.
2. The Clerk of the Board of Supervisors is hereby authorized and directed to attest the signature of the authorized signatory, and to affix and attest the seal of the County of Ventura, as may be required or appropriate in connection with the execution and delivery of the JPA Agreement.

Upon motion of Supervisor Parks, seconded by Supervisor Bennett, and duly carried, the Board hereby approves and adopts this resolution on the 4th day of October, 2016.

[signature]

Chair, Board of Supervisors
County of Ventura

ATTEST:

Michael Powers,
Clerk of the Board of Supervisors
County of Ventura, State of California.

By: [signature]
Deputy Clerk of the Board

COUNTY OF VENTURA CALIFORNIA

CAMROSA WATER DISTRICT
BUILDING WATER SELF-RELIANCE

Resolution No: 16-23

A Resolution of the Board of Directors of Camrosa Water District

Authorizing the General Manager to Enter into a Joint Exercise of Powers Agreement with the County of Ventura to Form a Groundwater Sustainability Agency for the Arroyo Santa Rosa Basin

Whereas, the Sustainable Groundwater Management Act (SGMA) of 2014 requires that all high- and medium-priority basins, as determined by the California Statewide Groundwater Elevation Monitoring (CASGEM) program, be governed by a groundwater sustainability agency (GSA); and,

Whereas, the Arroyo Santa Rosa Groundwater Basin was ranked by CASGEM as a medium-priority basin, due primarily to elevated nitrate concentrations; and,

Whereas, the basin lies entirely within the boundaries of the Camrosa Water District service area; and,

Whereas, the entirety of the basin also lies within the jurisdiction of the County of Ventura; and,

Whereas, the portion of the basin west of the Bailey Fault lies within the jurisdiction of the Fox Canyon Groundwater Management Agency (FCGMA), which is named in the SGMA as an agency with an exclusive claim to act as GSA; and,

Whereas, Camrosa Water District and the County of Ventura wish to manage the basin jointly to maximize effectiveness in reaching the SGMA's goal of bringing the basin into sustainability by January 30, 2042;

Now, Therefore, Be It Resolved by the Camrosa Water District Board of Directors that the General Manager is hereby authorized to enter into a Joint Exercise of Powers Agreement with the County of Ventura to form a Groundwater Sustainability Agency for the portion of the Arroyo Santa Rosa Basin outside the boundaries of the FCGMA.

Adopted, Signed and Approved this 13th day of October, 2016.

Eugene F. West, President
Board of Directors
Camrosa Water District

ATTEST:

Tony L. Stafford, Secretary
Board of Directors
Camrosa Water District

Fox Canyon
Groundwater Management Agency

FOX CANYON GROUNDWATER MANAGEMENT AGENCY

A STATE OF CALIFORNIA WATER AGENCY

BOARD OF DIRECTORS
Lynn E. Maulhardt, Chair, *Director, United Water Conservation District*
Charlotte Craven, Vice Chair, *Councilperson, City of Camarillo*
David Borchard, *Farmer, Agricultural Representative*
Steve Bennett, *Supervisor, County of Ventura*
Dr. Michael Kelley, *Director, Zone Mutual Water Company*

EXECUTIVE OFFICER
Jeff Pratt, P.E.

January 26, 2015

Mark Cowin
California Department of Water Resources
PO Box 942836
Sacramento, CA 94236-0001

SUBJECT: NOTICE OF INTENT TO BECOME A GROUNDWATER SUSTAINABILITY AGENCY FOX CANYON GROUNDWATER MANAGEMENT AGENCY

Dear Mr. Cowin:

As outlined in the California Water Code, Part 2.74, Sustainable Groundwater Management Act (Act), Section 10723 (c), the Fox Canyon Groundwater Management Agency (FCGMA) shall be deemed the exclusive Groundwater Sustainability Agency (GSA) within its boundaries with powers to comply with Act. On January 09, 2015 the FCGMA held a public hearing and passed Resolution 2015-01, Attachment 1, wherein the FCGMA elected to become the GSA for the Arroyo Santa Rosa Valley, Las Posas Valley (West, South, and East), Oxnard Forebay, Oxnard Plain and Pleasant Valley Basins within the FCGMA boundaries. Therefore, this letter shall service as the Notice of Intent for the FCGMA to assume the role as the GSA for the aforementioned basins, depicted on Attachment 2.

Per Section 10723.2 of the Act, the GSA shall consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing groundwater sustainability plans. The FCGMA as enacted has a Board of Directors and operating structure that clearly represents the interests of all users and uses of groundwater and surface water within the FCGMA boundaries. The five member Board of the FCGMA is comprised as follows:

- One member shall be chosen by United Water Conservation District, the member's district or divisions must overlie at least in part the territory of the FCGMA;
- One member shall be chosen by the County of Ventura, the member's district must overlie at least in part the territory of the FCGMA;
- One member shall be chosen from the members of the city councils of the cities whose territory at least in part overlies the territory of the FCGMA;
- One member shall be chosen from the members of the governing boards of the following mutual water companies and special districts not governed by the County Board of Supervisors which are engaged in water activities and whose territory at least in part overlies the territory of the FCGMA: the Alta Mutual Water Company, the Anacapa Municipal Water District, the Berylwood Mutual Water Company, the Calleguas Municipal Water District, the Camrosa County Water District, the Del Norte Mutual Water Company, the Pleasant Valley County Water District, and the Zone Mutual Water Company; and
- The fifth member of the Board shall be chosen by the other four members from a list of at least five nominations from the Ventura County Farm Bureau and the Ventura County Agricultural Association acting jointly for a two-year term to represent agricultural interests within the territory

of the FCGMA. The fifth member shall reside and be actively and primarily engaged in agriculture within the territory of the FCGMA.

Acting as a groundwater management agency since 1983 the FCGMA has undertaken a collaborative and inclusive model to include all users and uses of groundwater as it strives to protect this valuable resource. It has enacted numerous policies and ordinances aimed at protecting the resource. A history of the FCGMA and pertinent ordinances and resolutions are available at http://fcgma.org/.

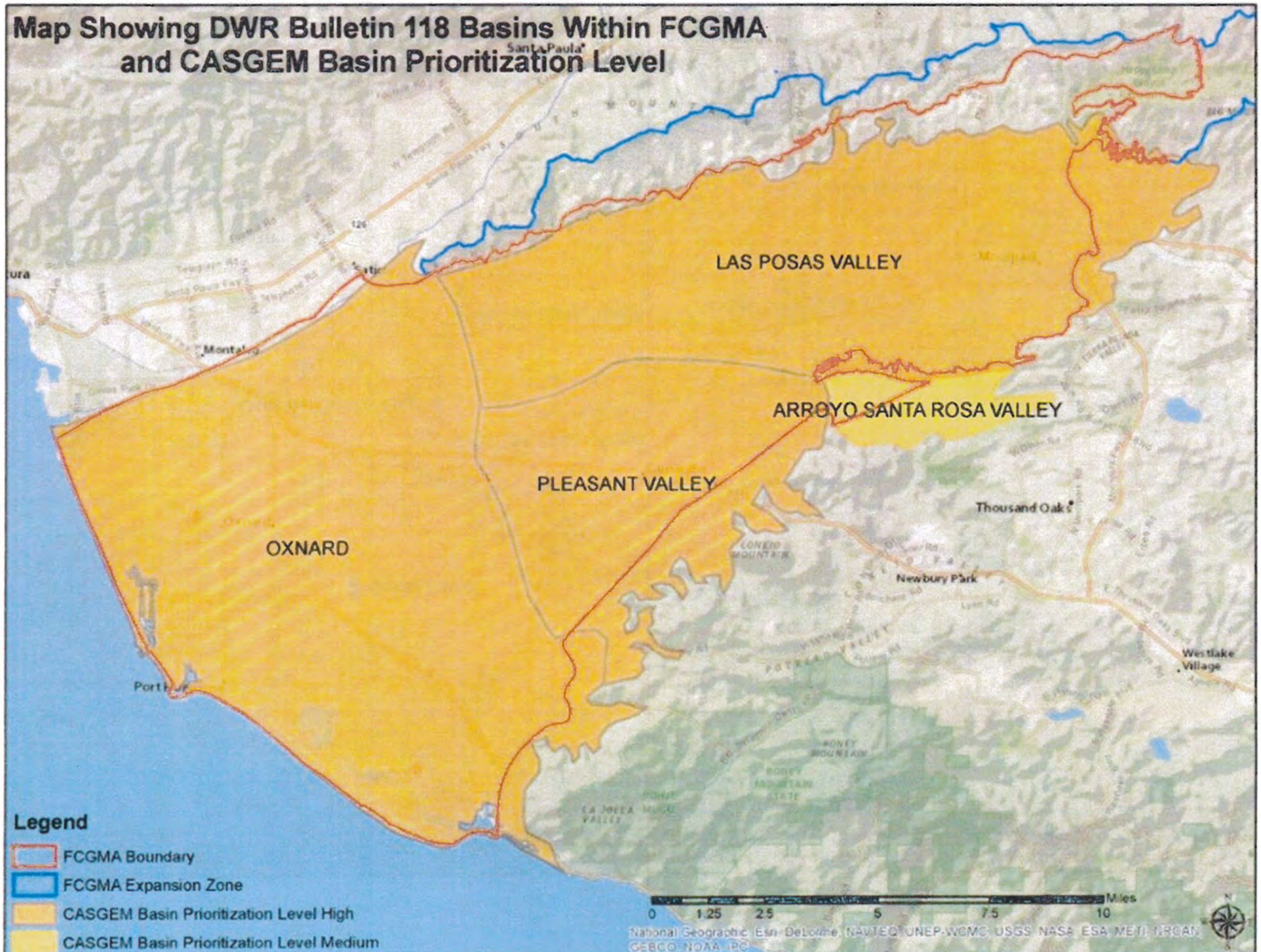
Should you require additional information or a clarification of this Notice of Intent, please contact me at (805) 654-2073.

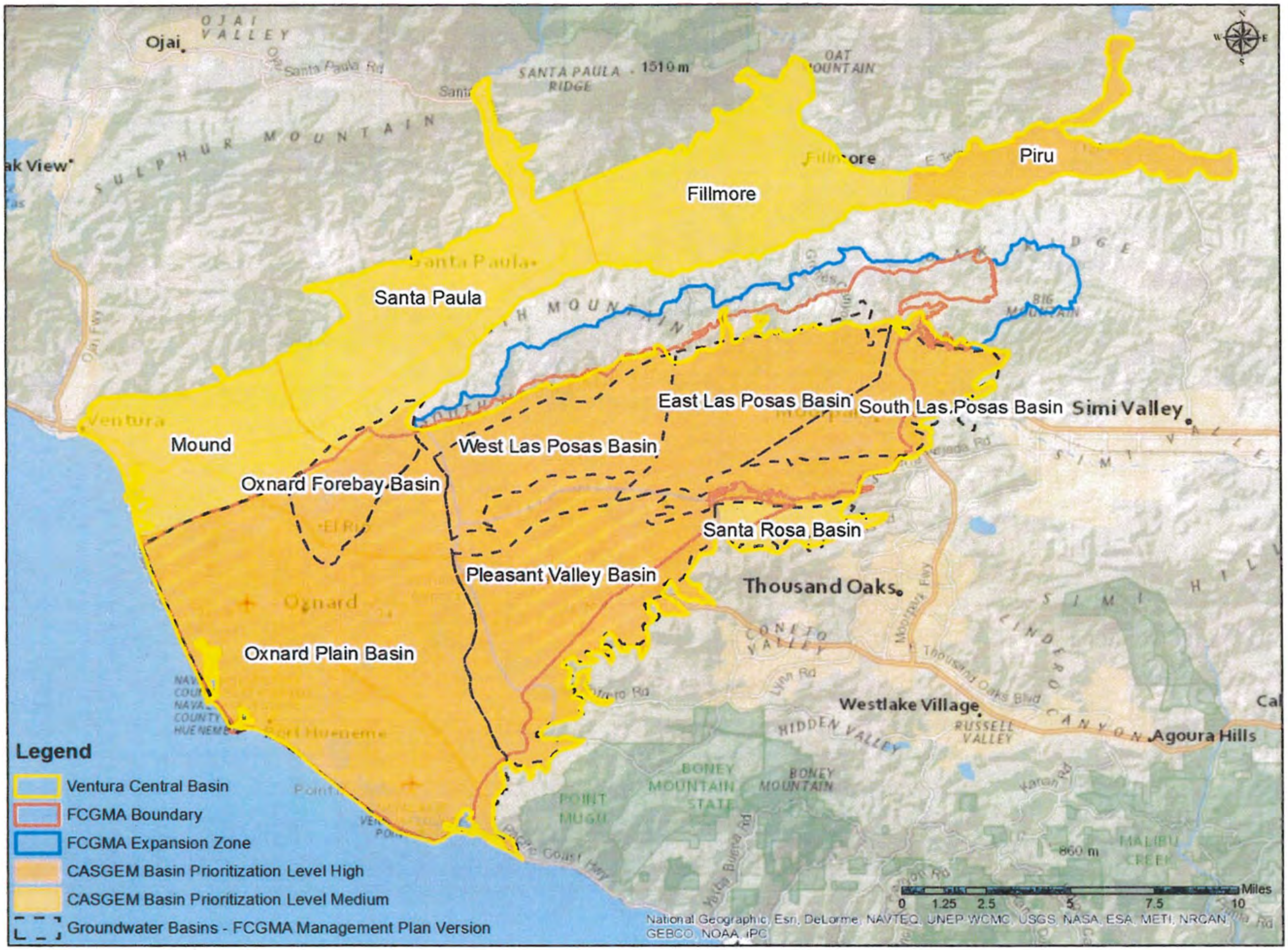
Sincerely,

Jeff Pratt, P.E.
FCGMA Executive Officer

Attachments: (1) FCGMA Resolution 2015-01
(2) FCGMA Boundary and Basins

cc: Bob Pierotti, Supervising Engineering Geologist
California Department of Water Resources
Southern Region
770 Fairmont Avenue, Suite 102
Glendale, CA 91203


Map Showing DWR Bulletin 118 Basins Within FCGMA
and CASGEM Basin Prioritization Level
LAS POSAS VALLEY
ARROYO SANTA ROSA VALLEY
PLEASANT VALLEY
OXNARD
Thousand Oaks
Newbury Park
Westlake Village
Legend
FCGMA Boundary
FCGMA Expansion Zone
CASGEM Basin Prioritization Level High
CASGEM Basin Prioritization Level Medium
Miles
0 1.25 2.5 5 7.5 10



Piru
Fillmore
Santa Paula
Mound
East Las Posas Basin
South Las Posas Basin
West Las Posas Basin
Oxnard Forebay Basin
Santa Rosa Basin
Pleasant Valley Basin
Oxnard Plain Basin
Ojai
Simi Valley
Thousand Oaks
Westlake Village
Agoura Hills
Legend
Ventura Central Basin
FCGMA Boundary
FCGMA Expansion Zone
CASGEM Basin Prioritization Level High
CASGEM Basin Prioritization Level Medium
Groundwater Basins - FCGMA Management Plan Version
0 1.25 2.5 5 7.5 10 Miles
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC

Resolution No. 2015-01
of the
Fox Canyon Groundwater Management Agency

A RESOLUTION ELECTING TO BE THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE ARROYO SANTA ROSA VALLEY, (WEST, SOUTH, EAST) LAS POSAS VALLEY, OXNARD FOREBAY, OXNARD PLAIN, AND PLEASANT VALLEY BASINS WITHIN THE BOUNDARIES OF THE FOX CANYON GROUNDWATER MANAGEMENT AGENCY

WHEREAS, Fox Canyon Groundwater Management Agency was formed for the purpose of preserving the groundwater resources within its statutory boundaries and has such powers granted by its enabling legislation and such other powers as are reasonably implied and necessary and proper to carry out its objectives and purposes; and

WHEREAS, the Agency's statutory boundaries overlie the following groundwater basins identified and defined in the Department of Water Resources report entitled "California's Groundwater: Bulletin 118" updated in 2003: the Arroyo Santa Rosa Valley Groundwater Basin, the Las Posas Valley Groundwater Basin, the Oxnard Sub-basin of the Santa Clara River Valley Groundwater Basin, and the Pleasant Valley Groundwater Basins within the boundaries of the Fox Canyon Groundwater Management Agency; and

WHEREAS, in 2014, the Legislature added the Sustainable Groundwater Management Act to the Water Code which grants the Agency additional authority and technical and financial assistance necessary to sustainably manage groundwater; and

WHEREAS, the Act establishes the Agency as the exclusive local agency within its statutory boundaries unless it elects to opt out of being the exclusive groundwater management agency within those boundaries; and

WHEREAS, the Agency wishes to exercise the powers and authorities of a groundwater sustainability agency granted by the Act and has conducted the public hearing required under section 10723 of the Act.

NOW, THEREFORE, IT IS HEREBY PROCLAIMED AND ORDERED that:

1. Fox Canyon Groundwater Management Agency elects to be the exclusive groundwater management agency within its statutory boundaries with powers to comply with the Sustainable Groundwater Management Act;

and

2. The Executive Officer is authorized to submit to the Department of Water Resources on behalf of the Agency a notice of intent to undertake sustainable groundwater management in accordance with Part 2.74 of the Water Code.

On motion by Director Craven, and seconded by Director Kelley, the foregoing resolution was passed and adopted on January 9, 2015 by the following vote.

AYES – Chair Maulhardt, Directors Craven, Bennett, and Kelley
NOES – None
ABSTAINS – None
ABSENT – Director Borchard

By: ______________________
Lynn E. Maulhardt, Chair, Board of Directors
Fox Canyon Groundwater Management Agency

ATTEST: I hereby certify that the above is a true and correct copy of Resolution No. 2015-01.

By: ______________________
Jessica Kam, Clerk of the Board

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix D

Stakeholder Engagement Plan

Arroyo Santa Rosa Basin
Groundwater Sustainability Agency

STAKEHOLDER ENGAGEMENT PLAN

ARROYO SANTA ROSA VALLEY BASIN

DWR BASIN NO. 4-007

VENTURA COUNTY, CALIFORNIA

SUSTAINABLE GROUNDWATER MANAGEMENT ACT (SGMA) PROGRAM

PREPARED BY THE ARROYO SANTA ROSA BASIN GROUNDWATER SUSTAINABILITY AGENCY

May 26, 2022

Table of Contents

1 INTRODUCTION

This Stakeholder Engagement Plan (Engagement Plan) summarizes the strategies to educate and involve stakeholders (those individuals and representatives of organizations who have a direct stake in the outcome of the planning process) and other interested parties in the preparation and implementation of a Groundwater Sustainability Plan (GSP) for the Arroyo Santa Rosa Valley Basin (ASRVB or Basin) – Department of Water Resources (DWR) Basin No. 4-007 (Figure 1). This GSP will be prepared in accordance with the Sustainable Groundwater Management Act (SGMA), which was signed by Governor Brown in September 2014 and became effective January 1, 2015.

SGMA provides a framework to regulate groundwater for the first time in California's history. SGMA's intent is to strengthen local management of specified groundwater basins that are most critical to the state's water needs by regulating groundwater and land use management activities. SGMA also aims to preserve the jurisdictional authorities of cities, counties and water agencies within groundwater basins while protecting existing surface water and groundwater rights. SGMA is implemented in each applicable basin by the formation of one or more Groundwater Sustainability Agencies (GSAs) that develop and implement one or more Groundwater GSPs for the basin to achieve sustainable groundwater management.

The ARSVB is covered by two GSAs (Figure 1). The Fox Canyon Groundwater Management Agency (FCGMA) is the GSA for 24% of the Basin (Figure 1). FCGMA is an independent special district formed by the California Legislature in 1982 to manage and protect the aquifers within its jurisdiction for the common benefit of the public and all agricultural, domestic, municipal, and industrial users. FCGMA's jurisdiction was established as the area overlying the Fox Canyon Aquifer and includes portions of the Oxnard Subbasin (4-004.02) and the Las Posas Valley Basin (LPVB) (4-008), the Pleasant Valley Basin (PVB) (4-006), and the Arroyo Santa Rosa Valley Basin (4-007). The FCGMA is governed by five Board Members. They represent the (1) County of Ventura, (2) the United Water Conservation District, (3) the seven small water districts within the Agency (Alta Mutual Water Company, Pleasant Valley County Water District, Berylwood Mutual Water Company, Calleguas Municipal Water District, Camrosa Water District, Zone Mutual Water Company, and Del Norte Mutual Water Company), (4) the five incorporated cities within the Agency (Ventura, Oxnard, Camarillo, Port Hueneme, and Moorpark), and (5) the farmers. The Arroyo Santa Rosa Basin Groundwater Sustainability Agency (ASRBGSA) is the GSA for 76% of the Basin (Figure 1). ASRBGSA was formed in 2016 by the County of Ventura (County) and Camrosa Water District (CWD). There was extensive stakeholder engagement during the process of forming ASRBGSA. The ASRBGSA governing board consists of one representative from the County of Ventura and five representatives from CWD. The ASRBGSA is talking the lead on developing a GSP for the entire ASRVB to achieve long-term groundwater sustainability.

2 PURPOSE

SGMA requires and directs GSAs to encourage active involvement of stakeholders and interested parties in the process to sustainability manage the basin. The purpose of the outreach activities described in this Engagement Plan is to encourage the active involvement of individual stakeholders and stakeholder organizations, and other interested parties in the development and implementation of the GSP for the ASRVB. This GSP is scheduled to be adopted in April 2023, consistent with current State grant funding timelines. The projects and management actions necessary to implement the GSP could affect individuals and groups who have a stake in ensuring the basin is sustainably managed as required by SGMA.

In an effort to understand and involve stakeholders and their interests in the decision- making and activities, the ASRBGSA has prepared this Engagement Plan to encourage broad, enduring and productive involvement during the GSP development and implementation phases. This Engagement Plan will assist the ASRBGSA in providing timely information to stakeholders and receive input from interested parties during GSP development. This Engagement Plan will identify stakeholders who have an interest in groundwater in the Basin, and recommend outreach, education, and communication strategies for engaging those stakeholders during the development and implementation of the GSP. The plan also includes an approach for evaluating the overall success of stakeholder engagement and education of both stakeholders and the public. In consideration of the interests of all beneficial uses and users of groundwater in the basin, this Engagement Plan has been developed pursuant to California Water Code Section 10723.2. Additionally, this Engagement Plan has been developed to encourage the active involvement of diverse social, cultural, and economic elements of the population within the Basin, in accordance with GSP Regulations Section 354.10.

3 GENERAL INFORMATION

The following personnel will serve as contacts for the public during GSA formation and GSP preparation.

3.1 Clerk of the Board

For general information about ASRBGSA and the GSP status, contact:

Tony Stafford, Executive Director

Phone: (805) 388-0226

Email: TonyS@camrosa.com

3.2 Executive Director

ASRBGSA's Executive Director will be available for stakeholders and the public seeking specific detailed information about the GSP, contact:

Tony Stafford, Executive Director

Phone: (805) 388-0226

Email: TonyS@camrosa.com

4 OUTREACH ACTIVITIES

ASRBGSA will implement the following outreach activities to maximize stakeholder involvement during the development of the GSP and throughout SGMA implementation.

4.1 Public Notices

To ensure that the general public is apprised of local activities and allow stakeholders to access information, SGMA specifies several public notice requirements for GSAs. Refer to Table 1 in Appendix A for a summary of statutory requirements. Three sections of the California Water Code require public notice before establishing a GSA, adopting (or amending) a GSP, or imposing or increasing fees:

- Section 10723(b). "Before electing to be a groundwater sustainability agency, and after publication of notice pursuant to Section 6066 of the Government Code, the local agency or agencies shall hold a public hearing in the county or counties overlying the basin." On January 9, 2015, the FCGMA Board of Directors elected to serve as the exclusive GSA within area of the Basin included within its statutory boundary, as provided for in Section 10723(c)(1) of the California Water Code. On October 4, 2016 and October 13, 2016, respectively, the County of Ventura and Camrosa Water District approved the joint powers agreement forming the Arroyo Santa Rosa Valley Basin GSA.

- Section 10728.4. "A groundwater sustainability agency may adopt or amend a groundwater sustainability plan after a public hearing, held at least 90 days after providing notice to a city or county within the area of the proposed plan or amendment. …"
- Section 10730(b)(1). "Prior to imposing or increasing a fee, a groundwater sustainability agency shall hold at least one public meeting, at which oral or written presentations may be made as part of the meeting....(3) At least 10 days prior to the meeting, the groundwater sustainability agency shall make available to the public data upon which the proposed fee is based."
- Future noticing will occur as required by SGMA.

4.2 Stakeholder Identification

Pursuant to Water Code Sections 10723.8(a)(4) and 10723.2, the Agency will consider the interests of all beneficial uses and users of groundwater, as well as those responsible for implementing a GSP.

ASRBGSA has engaged stakeholders in the development of the Agency to serve as the GSA. For example, during development of the joint powers authority agreement ("JPA Agreement") forming the Agency, the signatory members held numerous public meetings to discuss important terms to be included in the JPA Agreement.

The Agency plans to continue its practice of seeking broad stakeholder engagement in management of the ASRVB groundwater resources as it undertakes the process to develop and implement the Plan for the Basin.

SGMA mandates that a GSA establish and maintain a list of persons interested in receiving notices regarding plan preparation, meeting announcements, and availability of draft plans, maps, and other relevant documents. FCGMA and ASRBGSA compiled lists of interested persons for this purpose that will be maintained throughout the GSA formation and GSP development phases. An initial list of stakeholders and interested parties include, but are not limited to, the following:

- **Other GSAs in the Basin:** There are two GSAs in the Basin: FCGMA and ASRBGSA. ASRBGSA is taking the lead on GSP development and will work closely with FCGMA during GSP development. Both GSAs must adopt the GSP to provide coverage over the entire Basin.

- **Holders of overlying groundwater rights:** The GSA will engage all well owners and operators in the Basin, from large-volume agricultural users to the one *de minimis* residential pumper identified in the Basin.

- **Municipal well operators:** Camrosa Water District is the only municipal well operator in the Basin.

- **Public water systems:** Camrosa Water District is the only public water system in the Basin.

- **Local land-use planning agencies:**
  - **City of Thousand Oaks:** Small positions of the ASRVB falls within the City of Thousand Oaks sphere of influence. ASRBGSA will consult with the City of Thousand Oaks during GSP development.

  - **Ventura County:** The County of Ventura has land-use planning authority on land overlying the most of the Basin. The County of Ventura is a signatory members to the JPA Agreement forming the Agency and is represented on the Agency's Board of Directors.

- **Environmental users of groundwater:** N/A. Preliminary analysis indicates that there are not likely and environmental users of groundwater in the Basin. This will be further evaluated during GSP development.

- **Surface water users, if there is a hydrologic connection between surface and groundwater bodies:** Based on review of the State Water Resources Control Board (SWRCB) Electronic Water Rights Information Management System (EWRIMS), there are 10 surface water diversions identified in the Basin. In addition, the following entities have interests in the management of surface water within the Basin:

  - **Calleguas Creek Watershed:** The watershed group comprises a variety of stakeholders, from private and public utility agencies to environmental NGOs to agricultural groups, et cetera, who work together to meet regulatory requirements, seek grant funding, pursue integrated management, and collaborate on projects to benefit the watershed. Members of the JPA are in good standing and work closely with the watershed group, and the GSA welcomes the group's input at public meetings and in the public review period of the groundwater sustainability plan.

    The Calleguas Creek Watershed Group is actively involved in the community on a wide range of issues affecting the watershed, including the Basin including compliance with Total Maximum Daily Loads (TMDLs) adopted by the Regional Board and approved by the United States Environmental Protection Agency. TMDL monitoring of surface water within the Basin is currently coordinated by the Calleguas Creek Watershed (CCW) TMDL Compliance Monitoring Program (CCWTMP). Since this group provides a forum for the discussion of issues that are important to the community, it is important for this group to be well informed throughout GSP development. Representatives from the ASRBGSA will attend the watershed group meetings and provide up-to-date information and hear feedback from its members.

- **Watersheds Coalition of Ventura County:** Linking the Calleguas Creek Watershed group with the other two watersheds in Ventura County, the WCVC is primarily interested in integrated water management planning. Members of the JPA are in good standing and work closely with the WCVC, and the GSA welcomes the group's input at public meetings and in the public review period of the groundwater sustainability plan.

- **Ventura County Watershed Protection District (WPD):** WPD provides for "the control and conservation of flood and storm waters and for the protection of watercourses, watersheds, public highways, life and property in the district from damage or destruction from these waters," and, as such, will be a valuable resource in developing the GSA's groundwater sustainability plan. As a branch of the County of Ventura, the WPD will be represented on the GSA Board.

- **City of Thousand Oaks:** The majority of the water in the Conejo Creek is discharge from the Hill Canyon Water Treatment Plant, which is a City of Thousand Oaks public works facility. As the City holds water right and use permits for Conejo Creek water, Camrosa and the GSA will continue to work closely with the City in all matters regarding its use.

- **California Department of Fish and Wildlife:** Much of CDFW's interests in and responsibilities for the watercourses overlaying the Santa Rosa Basin are covered by the water right permit for Conejo Creek water held by the City of Thousand Oaks. The department will be consulted as necessary during the development of the groundwater sustainability plan should it involve any lands or activities under the department's jurisdiction.

- **The federal government, including, but not limited to, the military and managers of federal lands:** N/A. There are no federal agencies or federal lands in the areas overlaying the portion of the Basin outside the boundaries of the FCGMA.

- **California Native American tribes:** N/A. There are no tribal trust lands located within the Basin.

- **Disadvantaged communities, including, but not limited to, those served by private domestic wells or small community water systems:** N/A. No area overlaying the Basin is considered a disadvantaged community.

- **Entities listed in Section 10927 that are monitoring and reporting groundwater elevation in all or a part of a groundwater basin managed by the GSA:** The County is the designated California Statewide Groundwater Elevation Monitoring ("CASGEM") entity for the Basin. The County is a signatory member to the JPA Agreement forming the Agency and represented on the Agency's Board of Directors.

ASRBGSA intends to work cooperatively with partner agencies, stakeholders, and interested parties to develop and implement the GSP for the Basin and will maintain a list of stakeholders and interested parties to be included in the formation of the GSP.

A person can be added to the interested parties list by the Clerk of the Board.

4.3 Integrated Regional Water Management

The Watershed Coalition of Ventura County (WCVC) prepared an Integrated Regional Water Management Plan (IRWMP) in 2006 and has been updated multiple times since. The IRWMP includes several "resource management strategies" that have the potential to directly or indirectly affect water resources management in Ventura County, including the Calleguas Creek Watershed and ASRVGB. The management strategies listed in the IRWMP that could potentially affect water-resources management by the ASRBGSA will be discussed in the Groundwater Sustainability Plan.

4.4 Public Hearings/Meetings

4.4.1 Planning Commission

Periodic updates on SGMA implementation may be provided to the Ventura County Planning Commission and the public will be invited to listen.

4.4.2 Public Meetings

Comprehensive stakeholder involvement will include regularly scheduled public meetings to aid in developing and implementing the GSP. Logical subdivisions of the GSP will be the subject of public meetings to receive comments prior to approval. In addition to signing up to receive information about GSP development, interested parties may participate in the development and implementation of the GSP by attending and participating in public meetings (Water Code Section 10727.8(a)). Public meetings are generally been held at Camrosa Water District, 7385 Santa Rosa Rd., Camarillo, CA 93012. Future public meetings will generally be held at this location, although some meetings may be moved to other locations depending on meeting room availability. Each meeting will have a scheduled time for public comments. While the California Governor's Executive Stay at Home Order and the County of Ventura Health Officer Declared Local Health Emergency and Be Well at Home Order remain in effect, meetings will be held on-line. When appropriate, on-line meetings will include polling features to facilitate stakeholder input. Information about upcoming meetings can be found on the ASRBGSA website: https://www.camrosa.com/srgsa.

4.4.3 Local Agency Meetings

To ensure their constituency is kept informed of the progress of GSP development and implementation, the Directors representing ASRBGA member agencies, which consist of the County of Ventura and Camrosa Water District have committed to providing periodic updates during their regularly scheduled board meetings. These meetings offer a chance for the public to receive information and provide comment. Information about upcoming meetings is provided on the following agency websites, or by the means each agency currently meets its legal noticing requirements, whichever is appropriate:

https://asrgsa.com/

http://ventura.org (Board of Supervisors)

4.5 Direct Mailings/Email

Public meetings and project information will be disseminated through email, from the Agency office, or direct mail under special circumstances if requested. This communication will provide information for the community, public agencies, and other interested persons/organizations about milestones, meetings, and the progress of GSP development. Property owners with groundwater wells within the basin are notified via email and/or direct mailings about the establishment of an interested persons list and given the opportunity to receive future notices.

4.6 Newsletters/Columns

Periodic GSP newsletters may be developed and sent to the interested parties and posted on the website. Periodic updates may be provided to the *Ventura County Star* newspapers to advise, educate, and inform the public on SGMA implementation.

4.7 ASRBGSA Website

Regular updates on the GSP development and implementation will be provided on the ASRBGSA website. This information will include maps, timelines, frequently asked questions, groundwater information, and schedules/agenda of upcoming meetings and milestones. This information will be accessible on the ASRBGSA website: https://asrgsa.com/. ASRBGSA staff will update the website regularly and invite users to request information or be added to the interested persons list.

4.8 Database

To distribute information about GSP development, an email list has been compiled into a database of interested persons and stakeholders. The database will be updated regularly to add names of attendees at public meetings along with those requesting information via email or the through the ASRBGA website.

4.9 Tribal Engagement

There are no tribal trust lands located within the Basin.

4.10 Additional Opportunities

Additional opportunities for stakeholder participation (e.g., an advisory committee) will be considered as GSP development progresses and as stakeholder interests evolve.

5 EVALUATION

To determine the level of success of the Engagement Plan, the ASRBGA will implement the following measures:

5.1 Attendance/Participation

A record of those attending public meetings will be maintained throughout the GSP development process. ASRBGA will utilize sign-in sheets and request feedback from attendees to determine adequacy of public education and productive engagement in the GSP development and implementation process. Meeting minutes will also be prepared and will be provided on the ASRBGA website once approved.

5.2 Polling

Polls will be used to determine how stakeholders are receiving notices about GSP status and meetings and if any stakeholder categories require additional outreach. Polls will also be used to determine topics of most interest and the level of information that is desired for specific topics.

Outreach methods will be tailored based on polling response.

5.3 Adherence to Schedule

Public participation in developing sustainable management criteria and projects and management actions for inclusion in the GSP is instrumental to the success of the GSP. Keeping these tasks on schedule will be an important indicator of stakeholder involvement. GSP development updates will be provided at each Regular Board of Directors meeting. A GSP development schedule will be developed and updated monthly.

5.4 Plan Update

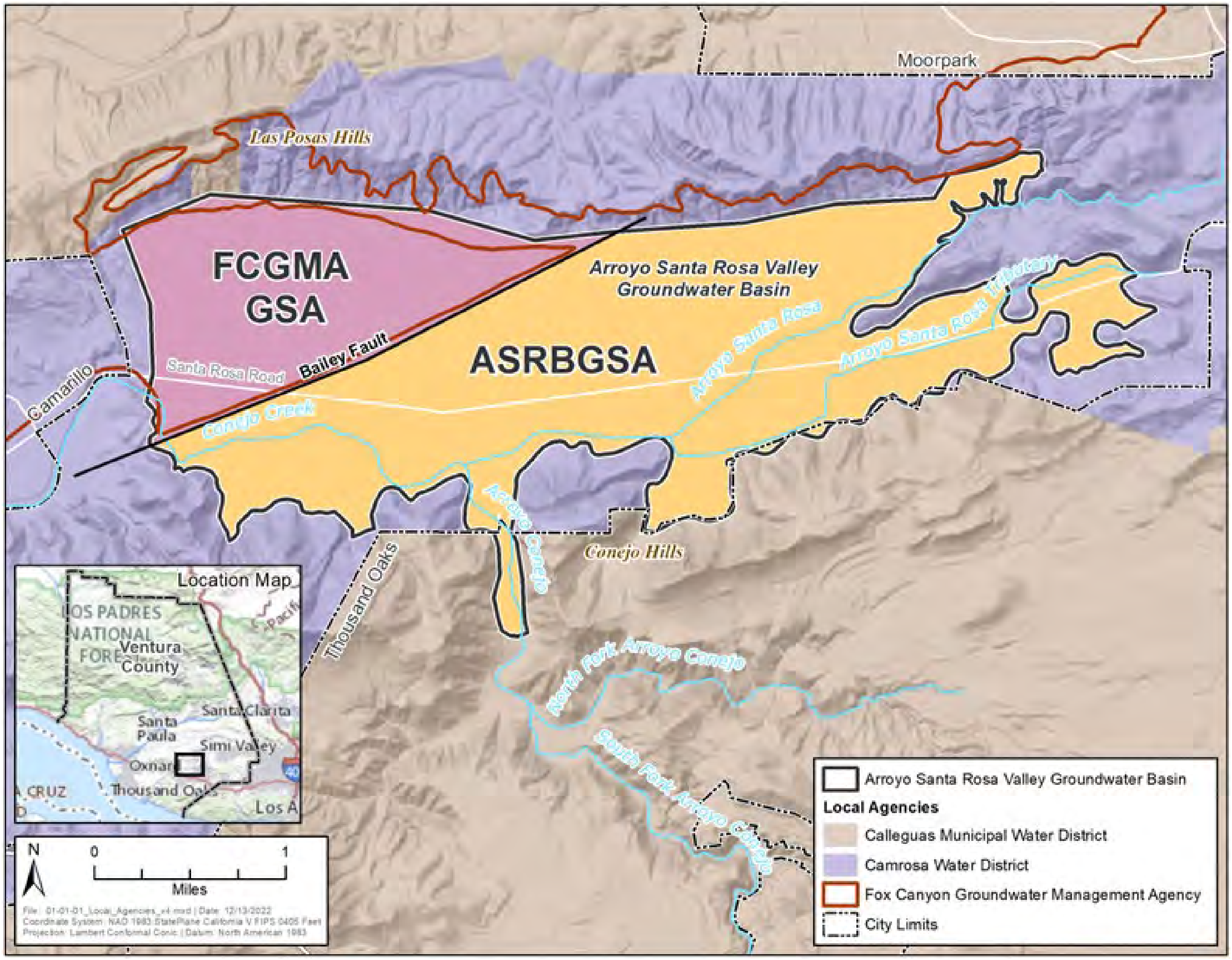
This Plan will be updated at least annually.

APPENDIX A

TABLE 1

During GSA Formation:	
"Before electing to be a groundwater sustainability agency... the local agency or agencies shall hold a public hearing."	Water Code Sec. 10723 (b)
"A list of interested parties [shall be] developed [along with] an explanation of how their interests will be considered."	Water Code Sec. 10723.8.(a)(4)
During GSP Development and Implementation:	
"A groundwater sustainability agency may adopt or amend a groundwater sustainability plan after a public hearing."	Water Code Sec. 10728.4
"Prior to imposing or increasing a fee, a groundwater sustainability agency shall hold at least one public meeting."	Water Code Sec. 10730(b)(1)
"The groundwater sustainability agency shall establish and maintain a list of persons interested in receiving notices regarding plan preparation, meeting announcements, and availability of draft plans, maps, and other relevant documents."	Water Code Sec. 10723.4
"Any federally recognized Indian Tribe... may voluntarily agree to participate in the preparation or administration of a groundwater sustainability plan or groundwater management plan... A participating Tribe shall be eligible to participate fully in planning, financing, and management under this part."	Water Code Sec. 10720.3(c)
"The groundwater sustainability agency shall make available to the public and the department a written statement describing the manner in which interested parties may participate in the development and implementation of the groundwater sustainability plan."	Water Code Sec. 10727.8(a)
Throughout SGMA Implementation:	
"The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater."	Water Code Sec. 10723.2
"The groundwater sustainability agency shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin."	Water Code Sec. 10727.8(a)

FIGURE 1


Moorpark
Las Posas Hills
FCGMA
GSA
Arroyo Santa Rosa Valley
Groundwater Basin
ASRBGSA
Bailey Fault
Santa Rosa Road
Camarillo
Conejo Creek
Arroyo Santa Rosa
Arroyo Santa Rosa Tributary
Arroyo Conejo
Conejo Hills
Thousand Oaks
North Fork Arroyo Conejo
South Fork Arroyo Conejo
Location Map
Ventura County
Santa Clarita
Santa Paula
Simi Valley
Oxnard
Thousand Oaks
N
0
1
Miles
Arroyo Santa Rosa Valley Groundwater Basin
Local Agencies
Calleguas Municipal Water District
Camrosa Water District
Fox Canyon Groundwater Management Agency
City Limits

Fox Canyon
Groundwater Management Agency

PUBLIC OUTREACH AND ENGAGEMENT PLAN

Prepared for:

Fox Canyon Groundwater Management Agency
800 South Victoria Ave
Ventura, CA 93009

Prepared by:

DUDEK
621 Chapala Street
Santa Barbara, California 93101

NOVEMBER 2017

Printed on 30% post-consumer recycled material.

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FIGURES

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GLOSSARY OF TERMS/ABBREVIATIONS

Acronym/Abbreviation	Definition
SGMA	Sustainable Groundwater Management Act of 2014
GSP	Groundwater Sustainability Plan
DWR	California Department of Water Resources
FCGMA	Fox Canyon Groundwater Management Agency
TAG	Technical Advisory Group
Aquifer	An underground layer of water-bearing permeable rock, rock fractures or unconsolidated materials (gravel, sand, or silt) from which groundwater can be extracted using a water well.
Stakeholder	An individual with interest in the FCGMA GSP
Engagement	Efforts made to understand and involve stakeholders and their concerns in the activities and decision-making of the FCGMA

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EXECUTIVE SUMMARY

In recognition that groundwater resources are a critical asset to the environmental, ecological, economic, and security of the state of California, the California Legislature passed the Sustainable Groundwater Management Act (SGMA) of 2014. In average years, California's 515 alluvial groundwater basins and subbasins provide about 38% of the total statewide water supply. In dry years and years of drought, these same basins provide upwards of 46% of the annual supply statewide. Moreover, many populations, municipalities, disadvantaged communities, agricultural areas, and rural communities depend on groundwater for 100% of their water needs. Current groundwater extraction throughout the state is in excess of the natural and managed recharge within many of the state's 515 alluvial basins and subbasins. SGMA addresses this by requiring the formation of Groundwater Sustainability Agencies (GSAs) and development of Groundwater Sustainability Plans (GSPs) to better manage these groundwater resources.

This Public Outreach and Engagement Plan (Plan) is being prepared by Dudek under authorization of the Fox Canyon Groundwater Management Agency (FCGMA) in response to the passage of the SGMA. FCGMA is required under SGMA to prepare a GSP for each groundwater basin within its jurisdiction. These GSPs will guide future management decisions including the amount of water that can be pumped from each basin without causing undesirable results, and the development of new projects to enhance water resource management. SGMA, as well as the state agencies implementing SGMA, namely the California Department of Water Resources (DWR) and the State Water Resources Control Board (SWRCB) , have mandated public and stakeholder outreach and engagement as necessary in the development of GSPs.

The FCGMA has a longstanding commitment to transparency and public involvement. FCGMA recognizes that stakeholder driven engagement is the most effective, and that the mechanisms for engagement need to be adapted to meet the needs of the beneficial users in the basin as the GSPs are developed. This Plan is intended to be a guiding framework that will be updated as needed throughout the GSP process. This plan serves as an update to the FCGMA Communications Guide (May 24, 2016) and includes ongoing, current, and future planned opportunities for engagement.

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1 BACKGROUND ON FCGMA

The Fox Canyon Groundwater Management Agency (FCGMA) is an independent Special Act District established by the California Legislature, separate from the County of Ventura or any city government. The FCGMA enabling legislation known as the FCGMA Act, Assembly Bill (AB) No. 2995, was passed on September 13, 1982, and became effective January 1, 1983. The FCGMA was created in response to declining groundwater levels and increasingly poor water quality from wells in the southern part of the Oxnard Plain, conditions that were first recognized in the 1950s. Prior to the creation of the FCGMA, the SWRCB issued a Seawater Intrusion Abatement Project grant to the County of Ventura and the United Water Conservation District (UWCD) to develop a Groundwater Management Plan. The initial Groundwater Management Plan was developed in 1985 to balance water supply and demand in both the Upper Aquifer System (UAS) and the Lower Aquifer System (LAS). The most recent FCGMA Groundwater Management Plan Update is dated May 2007 and is currently available on the FCGMA website.

The boundary of the FCGMA (Figure 1) was established by Resolution of the Ventura County Board of Supervisors on December 21, 1982. The boundary was defined to include all area overlying the Fox Canyon Aquifer and was revised in 1991 to reflect updated knowledge of the extent of the aquifer. Groundwater pumped from aquifers within the FCGMA jurisdictional boundaries accounts for more than half of the water demand of the 700,000 residents in the cities of Ventura, Oxnard, Port Hueneme, Camarillo and Moorpark, and the unincorporated communities of Saticoy, El Rio, Somis, Moorpark Home Acres, Nyeland Acres, Point Mugu and Montalvo; and the majority of the water needs for the 58,649 acres of productive agriculture.

The California Department of Water Resources (DWR) maintains a catalog of groundwater basins known as Bulletin 118 that includes the status and boundaries of each groundwater basin in California. There are four groundwater basins or subbasins within the FCGMA service area: Las Posas, Oxnard, Pleasant Valley, and Arroyo Santa Rosa.

1.1 FCGMA Decision Making Process

The FCGMA Board is defined by its enabling legislation and is comprised of five members representing the following interests:

(1) County of Ventura,

(2) United Water Conservation District,

(3) the seven small water districts existing within the FCGMA at the time of its formation (Alta Mutual Water Company, Pleasant Valley County Water District, Berylwood Mutual

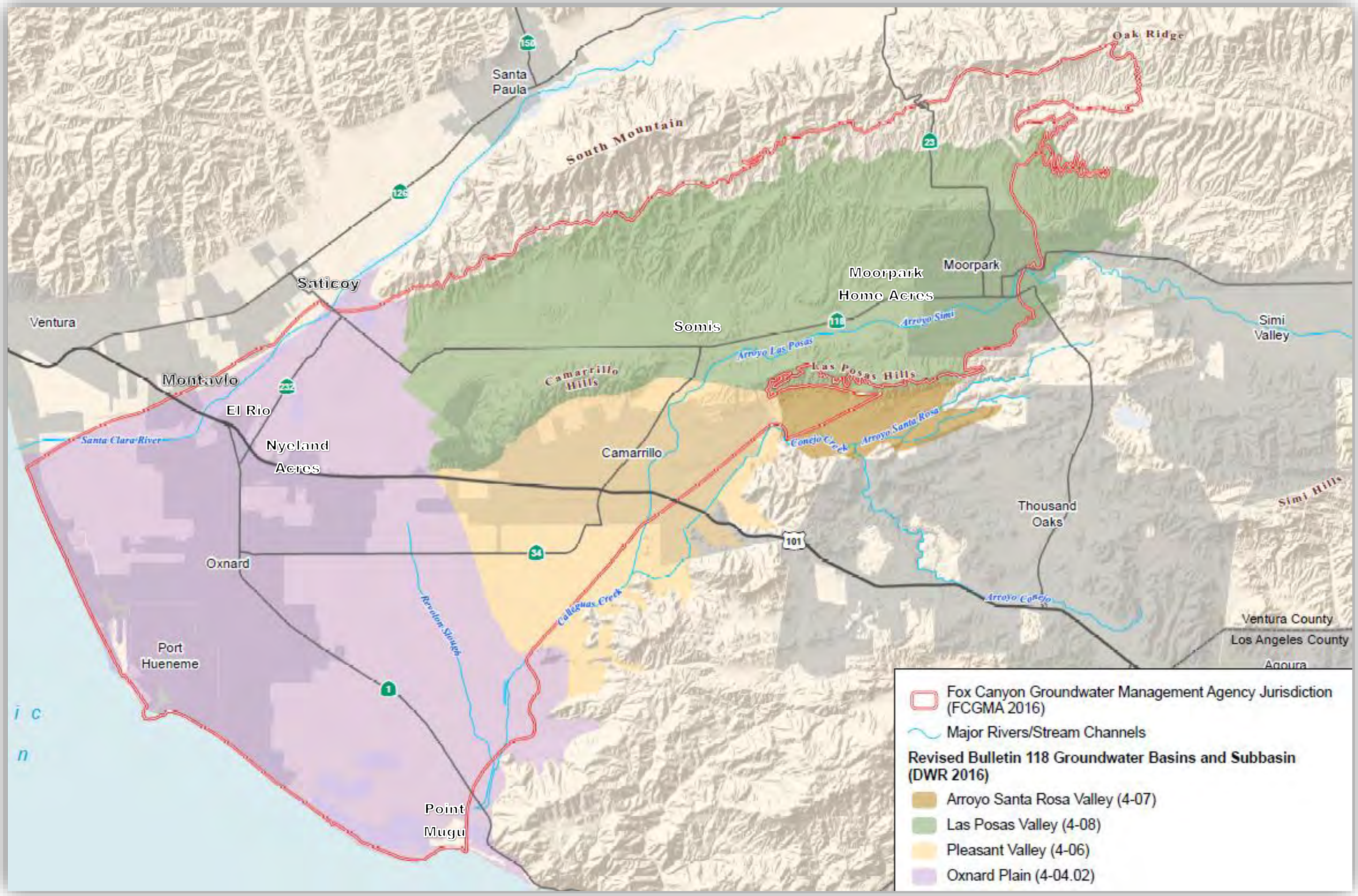
Water Company, Calleguas Municipal Water District, Camrosa Water District, Zone Mutual Water Company, and Del Norte Mutual Water Company),

(4) the five incorporated cities whose territory at least in part overlies the territory of the FCGMA (Ventura, Oxnard, Camarillo, Port Hueneme, and Moorpark), and

(5) agriculture.

Each Board member has an alternate and all members serve a two-year term. All Board Members are appointed by their respective organizations or groups, except for the agricultural representative. The agricultural representative is appointed by the other four seated members from a list of at least five candidates jointly supplied by the Ventura County Farm Bureau (VCFB) and the Ventura County Agricultural Association (VCAA). Board Members are not paid by the FCGMA. Each member has one equal vote on the Board. The Board adopts ordinances for the purpose of regulating, conserving, managing, and controlling the use and extraction of groundwater within the territory of the agency. Ordinances are adopted, after noticed public hearings, by a majority vote of the board.

Figure 1: FCGMA Jurisdiction and Basin Boundaries



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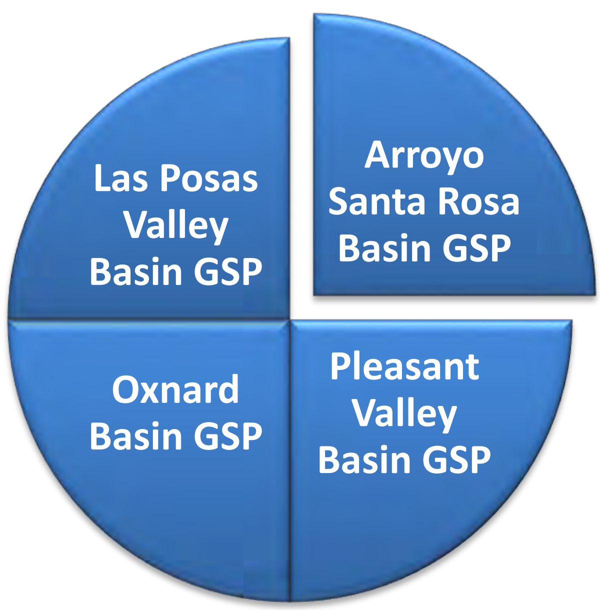
2 BACKGROUND ON GROUNDWATER SUSTAINABILITY PLANS

The SGMA of 2014 requires the creation of GSAs and provides that they develop, adopt and implement GSPs by 2022 for basins that the DWR has designated as either high or medium priority and by 2020 for critically overdrafted basins. All four of the groundwater basins within the FCGMA have been designated high or medium priority by DWR. The Oxnard and Pleasant Valley Basins have additionally been designated by DWR as critically overdrafted.

SGMA requires local public agencies to define a course of action to achieve sustainable groundwater management within 20 years of plan adoption. GSPs must identify local undesirable results and identify management actions to minimize undesirable results as well as milestones to track progress. A groundwater monitoring program must be developed and used to demonstrate improved conditions within the basins leading to sustainable management.

On January 26, 2015, the FCGMA provided DWR with notification of its intent to become a GSA for four groundwater basins: Las Posas, Oxnard, Pleasant Valley, and Arroyo Santa Rosa. Preliminary work began to develop a specific GSP for each of the four basins within the purview of the FCGMA in late 2015. In early 2017, it was determined that the Santa Rosa Basin GSP will move forward separately from the other three GSPs due to the need for additional coordination with the newly formed Arroyo Santa Rosa Basin Groundwater Sustainability Agency, which has jurisdiction over the eastern two-thirds of that groundwater basin.



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3 PURPOSE OF THE DOCUMENT

The purpose of this document is to outline the procedures used to create a common understanding and transparency throughout the groundwater sustainability planning process. The FCGMA encourages active involvement of diverse social, cultural, and economic elements of the population to ensure that all relevant and interested stakeholders and the public are involved throughout the GSP development.

3.1 The Importance of Public or Stakeholder Engagement

The FCGMA recognizes that stakeholder engagement can improve management of shared resources and has a track-record of successful stakeholder participation in FCGMA decision making.

3.1.1 Why Public Engagement is Important

The basins within the FCGMA jurisdiction underlie a variety of land uses and communities with varying needs and interests relating to sustainable management of groundwater resources. Participation from a diverse group of stakeholders will allow the FCGMA to make management decisions that take into account the varying needs and interests in the Basin.

3.1.2 SGMA Requirements

This document is designed to assist the public and FCGMA in developing a mutual understanding of how FCGMA will fulfill the requirements of SGMA as they relate to public engagement. Specifically, this plan addresses the following requirements of SGMA Section 354.10 (d).

> *Section 354.10(d) A communication section of the Plan that includes the following:*
>
> > *(1) An explanation of the Agency's decision-making process.*
> >
> > *(2) Identification of opportunities for public engagement and a discussion of how public input and response will be used.*
> >
> > *(3) A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.*
> >
> > *(4) The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.*

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4 OPPORTUNITIES FOR PUBLIC INVOLVEMENT AND ENGAGEMENT

The FCGMA Board has a longstanding commitment to public involvement and engagement in decision-making. FCGMA encourages members of the public to communicate directly with staff during regular business hours, and provide public comments at meetings. FCGMA provides ample time for public consideration of policy decisions through advanced noticing of public meetings. The FCGMA is committed to continuing to provide opportunities for public involvement and engagement throughout the GSP development and implementation processes. FCGMA recognizes that adapting involvement strategies to the needs of the public throughout the process is critical to effective engagement. This plan serves to update to the FCGMA Communications Guide (May 24, 2016) with ongoing, current, and future planned opportunities for engagement.

4.1 Meeting Opportunities

Opportunities for public comment are provided at all FCGMA Board meetings, Technical Advisory Group (TAG) meetings, Board appointed Committee meetings, and workshops.

4.1.1 Public Notices

All FCGMA Board, TAG meetings, Board appointed Committee meetings, and Board special workshops are noticed in accordance with the Brown Act. FCGMA Board meeting agendas are generally posted on the FCGMA website 5-7 days prior to each meeting to allow for additional time for public review. TAG meeting agendas are also posted as soon as they are completed. All public meeting agendas and minutes are posted on the FCGMA website, and sent directly via email to individuals that have requested meeting notices.

4.1.2 Board Meetings and Hearings

FCGMA Board meetings are typically held from 1:30pm to 4:00pm on the fourth Wednesday of each month. There typically is not an August meeting, and the November and December meetings are typically combined into an early December meeting. A calendar of meeting dates is published each year at www.FCGMA.org. Special Board meetings are scheduled by the Board as needed and generally fall on the second Wednesday or Friday of the month.

4.1.3 Workshops

The FCGMA held two GSP focused public workshops in November 2016 and September 2017. The workshops were well attended with over eighty-five participants representing individuals, municipalities, elected officials, water agencies, disadvantaged communities, mutual water companies, businesses, agriculture and environmental organizations.

4.2 Collaborative Opportunities

Many people including farmers, businesspersons, attorneys, water company employees, and elected officials volunteer their time and energy to work with FCGMA staff to resolve the critical issues and policies that affect beneficial users within the FCGMA.

Well owners and operators play a key role in that they are responsible for "self-reporting" groundwater extractions to the FCGMA accurately and in a timely manner (e.g. twice per year, once in January and once in August).

Several agencies also have a critical partnering role including UWCD, Camrosa Water District and the County of Ventura. All three agencies exercise shared responsibility with the FCGMA for the stewardship of the groundwater basins within the FCGMA territory. The Calleguas Municipal Water District (CMWD) is also an important partner agency.

4.2.1 Stakeholder Groups

The importance of groundwater to local stakeholders, as well as the FCGMA's commitment to work collaboratively with stakeholders, has catalyzed the establishment of several stakeholder groups that have come together to coordinate and articulate their positions on various issues to the FCGMA Board. Stakeholder groups in the Las Posas, Oxnard, and Pleasant Valley basins have organized themselves to form and make recommendations to the FCGMA Board regarding groundwater pumping in the basins. FCGMA staff is dedicated to working with organized groups of stakeholders and providing opportunities for their voices to be heard in open public forums before the FCGMA Board.

4.2.2 Technical Advisory and Charter Groups

The Technical Advisory Group (TAG) was developed by FCGMA to provide technical guidance for development of basin sustainable yield estimates and review for the four GSPs. Each Board Member selected a TAG member and two additional TAG members were selected by the full Board to represent the public and nongovernmental/environmental interests. All TAG meetings are conducted in accordance with the Brown Act and agendas are posted on the FCGMA website and emailed to members of the public who have requested to receive notifications.

The FCGMA has also established formal roles for some groups participating in the GSP process through Charters. More information about each of the Charter groups is available on the GSP page of the FCGMA website including the point of contact for each group and a copy of the signed Charter.

One long-established stakeholder group, the Las Posas Basin User Group (LPUG), has been meeting to discuss localized groundwater issues specific to the Las Posas Valley Basin since before SGMA. The LPUG requested their advisory role to the FCGMA be formally recognized through a Charter, effective as of April 2016. The LPUG continues to meet regularly to discuss aspects of the GSP including recommended groundwater allocations.

Another stakeholder group that was established and operates within an FCGMA Charter is the Water Market Group. The Water Market Group is a diverse group of stakeholders that came together to explore the feasibility of water markets as a tool for improving groundwater management. The FCGMA has initiated a pilot study that combines the findings of this chartered group with the Advanced Metering Infrastructure pilot study to further explore the potential benefits and drawbacks of a water market.

4.2.3 Regional Water Management Groups

FCGMA staff has actively engaged with broader regional water management groups since the initiation of the GSP process. Staff has given multiple presentations to the Santa Clara River Watershed Committee (Committee), a diverse group of stakeholders that collaborates on Integrated Regional Water Management (IRWM) through the countywide umbrella organization of Watersheds Coalition of Ventura County (WCVC). FCGMA staff regularly communicates with WCVC staff regarding the GSP progress and outreach opportunities. Public workshop notices are distributed to the stakeholder lists for both WCVC and the Committee.

FCGMA staff has also given targeted presentations to other regional groups and individual water-management agency boards. FCGMA staff continues to be available to give presentations to regional water-management groups as requested.

4.3 Communication with the Fox Canyon GMA

FCGMA is committed to an open and transparent process for GSP development including multiple mechanisms for ongoing broad communication as well as targeted outreach for feedback on specific GSP components. The FCGMA Board recognizes that the GSPs are highly technical documents moving forward on an ambitious schedule. The FCGMA Board is committed to moving the GSP process forward as quickly as reasonable in recognition that the completed GSPs will inform key groundwater management decisions that are time sensitive and important to stakeholders.

FCGMA Staff are available during regular business hours through email, phone, and in person communication. The FCGMA office is centrally located within the Ventura County Watershed Protection District office in the Ventura County Government Center Hall of Administration located at 800, South Victoria Ave, in Ventura CA. The meetings of the FCGMA Board and TAG include opportunities for public comment on every agenda.

The FCGMA has set up a dedicated GSP development page on the website and has established a GSP dedicated email address to increase response time for GSP specific questions and comments.

4.4 Opportunities for Tribal Communities

According to the US Bureau of Indian Affairs California Tribal Homelands and Trust Land Map, updated in 2011, and available from the Department of Water Resources website, the entire FCGMA boundary is within the Chumash Tribal/Cultural area. There are not currently any federally recognized tribes, Indian land currently or historically held in Trust by the United States Government or smaller Reservation or Rancheria areas.

FCGMA recognizes that the Chumash culture and associated cultural resources are important in Ventura County. Several active local groups and individuals representing the interests of tribal communities in Ventura County have been added to the list of interested parties including representatives from the Barbareno/Ventureno Band of Mission Indians (Chumash) and the Wishtoyo Chumash Foundation.

FCGMA has reached out to the Department of Water Resources Southern Region Office Tribal Liason, Jennifer Wong, and added her to the list of interested parties. The San Gabriel Band of Mission Indians has also shown an interest in the groundwater sustainability planning process and has been added to the list of interested parties.

4.5 Opportunities for DAC Communities

The majority of the Disadvantaged Communities (DACs) within the FCGMA jurisdictional boundary receive water from cities, special districts, or mutual water companies. The FCGMA works closely with these water agencies and mutual that represent the interests of the DACs. The Watersheds Coalition of Ventura County (WCVC) has established a DAC Involvement Committee to discuss DAC Community needs and project opportunities related to Integrated Regional Water Management (IRWM). FCGMA staff participates in the DAC Committee. The DAC Committee will oversee work conducted through a Proposition 1 IRWM grant to involve DAC members in water resources decision making and identify water resource needs in DAC communities. There are several DACs within the FCGMA jurisdiction, and representatives of those communities will have the opportunity to participate in this process. As part of the grant-funded DAC involvement, process participants will identify their needs and potential projects to improve water resource management in these areas. Some of those projects could be incorporated into the GSPs. Proposition 1 includes grant funding for projects that benefit DACs and these funds may be a resource in implementing key projects identified in the GSPs. FCGMA staff will continue to participate in the WCVC DAC Committee throughout the GSP process. Other members of the WCVC DAC Committee participated in the first FCGMA public stakeholder workshops and subscribe to the stakeholder list.

4.6 Stakeholder Email List

The FCGMA maintains a list of stakeholders interested in the GSP process, known as the *List of Interested Parties (List).* A monthly newsletter, meeting notices, and notices of GSP documents available for review are sent electronically to the List. There are currently over 400 individuals subscribed to the List representing a wide range of interests including agriculture, fisheries, municipalities, water agencies, tribal interest, and individual property owners. The List is continuously updated with individuals that request in writing to be placed on the list of interested parties. Written requests and questions can be sent via email to fcgma-gsp@ventura.org. Subscribers to the List can choose to unsubscribe at any time.

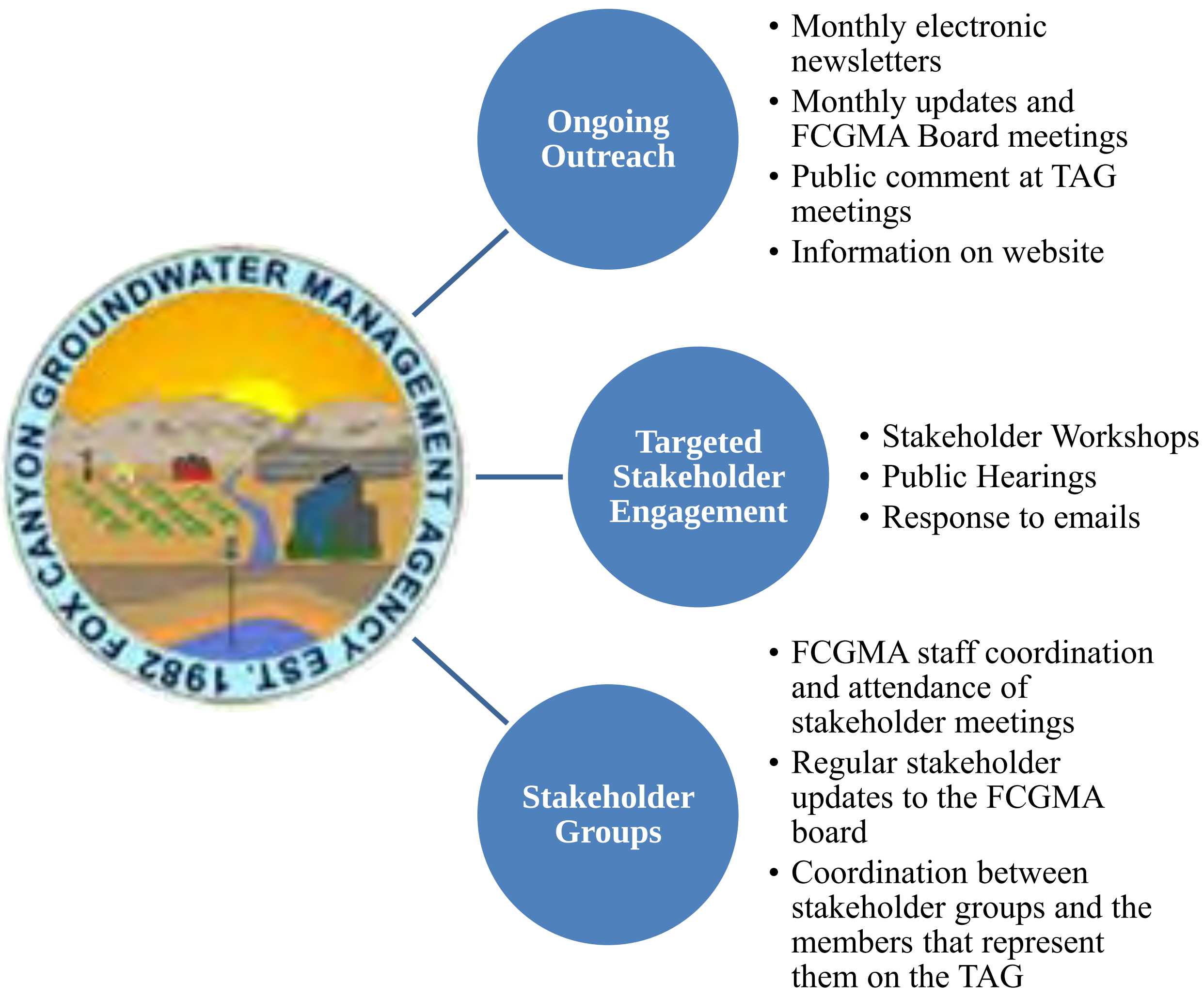
4.7 Online Resources

The FCGMA has a longstanding commitment to transparency of information and decision-making. All FCGMA Board meetings are broadcasted live online and available for later viewing at www.FCGMA.org. Meeting schedules, agendas, and minutes are posted on the website as soon as they are available for all FCGMA Board meetings, TAG meetings, and Board appointed Committee meetings. As draft documents are created for each of the GSPs, they are posted on the FCGMA website. A monthly newsletter, meeting notices, and notices of GSP documents available for review are sent electronically to the List.

4.8 Characterization of Current Communication

The FCGMA currently communicates with the public and interested stakeholders through ongoing outreach, targeted stakeholder engagement, and stakeholder group meetings (Figure 2). Ongoing outreach is used to continually update stakeholders regarding the progress of GSP development and is carried out through monthly electronic newsletters, monthly updates at FCGMA Board meetings, public comment opportunities at TAG meetings, and information made available on the FCGMA website. Targeted stakeholder engagement is when the FCGMA solicits feedback from the public or responds to specific comments or concerns that are raised through public workshops, public hearings and emails. Stakeholder group meetings are meetings that are initiated by interested parties outside of the FCGMA process; however, FCGMA staff is available to coordinate as appropriate with these groups to help them understand the GSP development process.

Figure 2: Diagram of Communication Structure

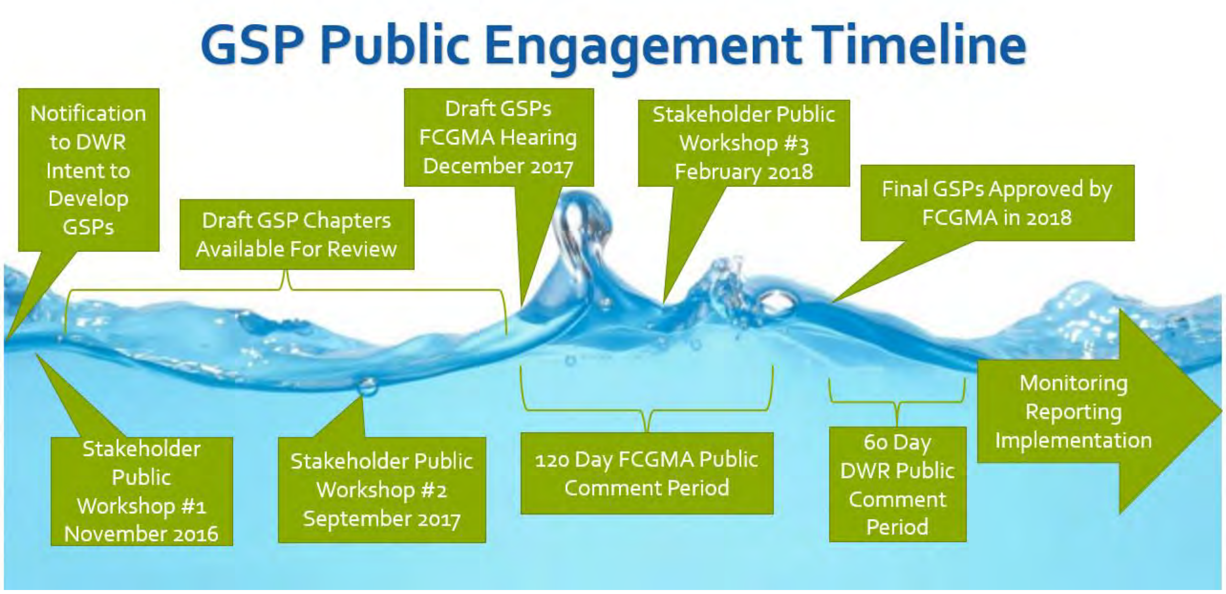


5 STAKEHOLDER AND PUBLIC ENGAGEMENT TIMELINE

The initial Stakeholder Workshop #1 was held in November 2016 to give an introduction to the FCGMA, an overview of the SGMA, the GSPs and process. The primary objective of this meeting was to introduce the process and solicit public comments. A second set of Stakeholder Workshops were held to present preliminary results and provide an opportunity for members of the public to ask questions and provide comments. The workshops were held in September 2017 and focused on the identification of undesirable results, including discussions of what is significant and unreasonable, measureable objectives and sustainable yield. Ongoing stakeholder engagement has continued through regular FCGMA Board meeting updates, newsletters, TAG meetings, and draft documents made available on the FCGMA website.

The draft GSPs will be brought before the FCGMA Board in December 2017. The Board will consider opening a 120-day public comment period. The draft GSPs will be updated based on comments with subsequent adoption of the final GSPs by the FCGMA Board. After the final GSPs are adopted by the FCGMA Board, DWR will accept public comments in another 60-day public comment period. After the final GSPs are adopted by the FCGMA Board, regular monitoring and reporting will be conducted as required by DWR and outlined in the GSPs. A detailed schedule of the GSP process including stakeholder review opportunities can be found on the FCGMA website and is updated as needed. Below is a summary table of key GSP engagement opportunities for the public (Figure 3).

Figure 3: GSP Public Engagement Timeline



6 CONCLUSION

This document serves as a tool for facilitating public engagement in the GSP development process. It is designed to be a living document that is updated as needed to reflect current mechanism of engagement. The GSP Implementation notification and communication phase will begin once the FCGMA submits the final GSP to DWR. This phase will include engagement with the public and beneficial users regarding the progress of monitoring and report, establishment of fees, and the development and implementation of management strategies including projects and actions as needed. FCGMA will continue to use the communication tools outlined in this document as necessary through the implementation phase of the GSP.

For additional information regarding the FCGMA and the GSP, Please Contact:

Jeff Pratt, P.E., Executive Officer of the FCGMA.
Phone: 805.654.2073
Email: Jeff.Pratt@ventura.org

Or

Keely Royas, Clerk of the FCGMA Board
Phone: 805.654.2014
Email: keely.royas@ventura.org

Mailing Address:
Fox Canyon Groundwater Management Agency
800 South Victoria Avenue
Ventura, California 93009-1610

Website: www.FCGMA.org

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix E

Documentation of Public Meetings

Appendix E. Public Meeting Information
ASRGSA and FCGMA
Historical Information on Public Meetings Related to the GSP Development
(Time Period: January 2021 through May 2023)

ASRGSA Arroyo Santa Rosa Basin Groundwater Sustainability Agency

MEETING DATE	MEETING TYPE (Regular, Special, Workshop)	ACTION ITEM (Agenda Item Title)	RECOMMENDED ACTION (Agenda Item Description)	ACTION TAKEN (Approved, No Motion, Deferred, Continued)
January 28, 2021	Regular	GSP Scoping Contract	Motion to enter into the GSP scoping contract with Stantec for scoping meetings and additional data-collection tasks.	Approved
August 12, 2021	Special Meeting	GSP Contract	Presentation given by Stantec and Director Foreman on GSP scope. Motion to enter into the GSP scoping contract with Stantec did not reach majority and died. Motion to pursue the GSP as described by Director Foreman also did not reach majority and died. President West directed staff to meet with Director Foreman to develop a specific course of action regarding the development of a GSP and the engagement of a project manager for the duration of the GSP process and to return to the Board for deliberation at a future Board meeting.	Deferred
October 6, 2021	Special Meeting	GSP Consultant GSP Project Manager	The Board authorized the Executive Director to enter into an agreement with and issue a purchase order to INTERA Incorporated and Bondy Groundwater Consulting, Inc. to complete the Arroyo Santa Rosa Basin Groundwater Sustainability Plan and the motions carried unanimously.	Approved
April 13, 2022	Special Meeting	GSP Update	Bryan Bondy of Bondy Groundwater, Inc., the consulting project manager for the ASRGSA groundwater sustainability plan (GSP), gave an update on the GSP.	No Motion
June 29, 2022	Special Meeting	GSP Update	Bryan Bondy of Bondy Groundwater, Inc., the consulting project manager for the ASRGSA groundwater sustainability plan (GSP), gave an update on the GSP.	No Motion
August 4, 2022	Virtual Stakeholder Engagement	Stakeholder Engagement Workshop #1	Bryan Bondy of Bondy Groundwater, Inc., and Abhishek Singh of INTERA Incorporated gave an update on the GSP.	No Motion
September 29, 2022	Special Meeting	GSP Update	Bryan Bondy of Bondy Groundwater, Inc., the consulting project manager for the ASRGSA groundwater sustainability plan (GSP), gave an update on the GSP.	No Motion
October 24, 2022	Special Meeting	Stakeholder Engagement Workshop #2	Bryan Bondy of Bondy Groundwater, Inc., and Abhishek Singh of INTERA Incorporated gave an update on the GSP.	No Motion
January 26, 2023	Regular Meeting	Set Stakeholder Workshop No. 3	The Board set a stakeholder workshop for February 28, 2023.	Approved
February 28, 2023	Special Meeting	Stakeholder Engagement Workshop #3	Bryan Bondy made a presentation giving stakeholders an overview and summary of the Groundwater Sustainability Plan, and providing stakeholders an opportunity to ask questions and make comments.	No Motion
May 25, 2023	Regular Meeting	GSP Public Hearing GSP Numerical Groundwater Model Update Management of the Arroyo Santa Rosa Valley Basin Sustainability Plan MOU	Motions to 1) conduct a public hearing to consider adoption of the GSP, 2) enter into an agreement with Intera Inc. to update the numerical model presented in the GSP, and 3) enter into a MOU with Fox Canyon Groundwater Management Agency (FCGMA) regarding the management of the ASRVB Groundwater Basin.	Approved

Appendix E. Public Meeting Information
ASRGSA and FCGMA
Historical Information on Public Meetings Related to the GSP Development
(Time Period: January 2021 through May 2023)

MEETING DATE	MEETING TYPE (Regular, Special, Workshop)	ACTION ITEM (Agenda Item Title)	RECOMMENDED ACTION (Agenda Item Description)	ACTION TAKEN (Approved, No Motion, Deferred, Continued)
January 25, 2023	Regular Hybrid Meeting	Arroyo Santa Rosa Valley Basin Draft GSP	Receive an update from Agency staff on release of the draft Groundwater Sustainability Plan for the Arroyo Santa Rosa Valley Basin for public comment.	No Motion
April 26, 2023	Board Hybrid	Presentation on Arroyo Santa Rosa Valley Basin Groundwater Sustainability Plan	Receive a presentation from Agency staff regarding groundwater management in the Arroyo Santa Rosa Valley Basin (ASRVB) under the draft Groundwater Sustainability Plan (GSP); 2) Receive a presentation from the consultant that prepared the ASRVB GSP; 3) Provide feedback and direction.	No Motion
May 24, 2023	Regular Hybrid Meeting	Adopt Resolution 2023-02 Adopting the Groundwater Sustainability Plan for the Arroyo Santa Rosa Valley Basin and Authorize Executive Officer to Sign a Memorandum of Understanding between the Arroyo Santa Rosa Groundwater Sustainability Agency and Fox Canyon Groundwater Management Agency	1) Receive a presentation from Agency staff regarding the draft Groundwater Sustainability (GSP) Plan for the Arroyo Santa Rosa Valley Basin (ASRVB); 2) Conduct a public hearing; 3) Adopt Resolution 2023-02 adopting the GSP for the ASRVB; and 4) Authorize the Officer to sign a Memorandum of Understanding (MOU) with the Arroyo Santa Rosa Groundwater Sustainability Agency (ASRGSA) addressing management of the ASRVB	Approved

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix F

Documentation of Public Comments

Responses to Comments Table

Comment Number	Entry Date	First Name	Last Name	Email Address	Phone Number	Mailing Address	GSP Referenced	Comment/Question	Response
1	3/11/2023	Landy	Johnson	landyjoh@gmail.com	508-847-8896	2396 Rondell Road Camarillo, CA 93012-8962	General comment	I appreciate the inclusion of measures addressing the improvement of groundwater quality. I'm glad that TCP and Nitrate are being monitored, and that a plan for treating TCP contamination is under way. I will be interested in seeing what happens with PFAS once more is known about how that will be regulated.	Thank you for your comment.
2	Same as above						General comment	The water budget is extremely thorough. It was interesting to see the impact of SOAR on planning.	Thank you for your comment.
3	Same as above						4.4.3.1 Description of Measurable Objectives 4.5.1 Undesirable Results General comment	I was surprised that the plan only requires meeting measurable objectives during wet periods. Is this typical for California? I have only been in the state for seven months, so I'm still learning about local conditions. Though it does say on page 95 that it is only required that the plan address the effects of groundwater extractions, so maybe the wet period/dry period distinction is moot.	Measurable objectives for the chronic lowering of groundwater levels are set based on the maximum projected groundwater levels, which would occur during wet periods. Groundwater levels go through seasonal and inter-annual changes and as long as they rebound to high water levels during wet periods the basin would maintain sustainability. This follows DWR Best Management Practice (BMP) on MTs and MOs that state *"Measurable objectives should be set such that there is a reasonable margin of operational flexibility between the minimum threshold and measurable objective that will accommodate droughts, climate change, conjunctive use operations, or other groundwater management activities"*.
4	3/13/2023	Kevin	Cannon	ca.avoking@gmail.com			General comment	It's news to me that "The ASRVGB priority assigned by DWR was reduced from medium to very low in 2019, making SGMA compliance optional." Why did our basin's priority get reduced? We were priority 4 initially due to high nitrates. Did nitrates go away? Now that we are optional what is our GSA's plan for participating in the future regulatory requirements and deadlines that all the higher priority GSAs must follow where compliance is not optional? Being good stewards is one thing, but at what costs to rate payers?	Nitrates didn't go away and are a very important part of the plan. When DWR re-ranked the basins (DWR, 2020 – Sustainable Groundwater Management Act 2019 Basin Prioritization), ASRGSA fell below the threshold for the low priority basins. Local water resources are vital to the region and are sustainable. Alternatives to local water resources are more expensive than importing water from outside the region. The GSP and associated costs are intended to ensure the basin maintains sustainability and avoids future expenses from importing water. ASRBGSA has opted-in to develop a Groundwater Sustainability Plan and intends to follow the same regulatory requirements as higher priority basins to maintain consistency with plan implementation.
5	Same as above						ES-3. Basin Setting and Groundwater Conditions	On page ES-10 it states, "There is no known relationship between degraded water quality and groundwater levels or pumping operations within the Basin." Are there any future plans to formally start studying those relationships now?	The GSAs will continue to evaluate groundwater level and quality data collected during plan implementation to confirm that a relationship does not exist.
6	Same as above						ES-4. Water Budget	The ES-4 Water Budget paragraph on page ES-10 states. "The groundwater flow model was used to quantify water budgets for the historical, current, and projected conditions, including the evaluation of uncertainty due to climate change, anticipated land use changes, and projected population increase, as required by SGMA (Appendix G). It was concluded that these factors are not anticipated to have a material impact on future water demand…" Who concluded that? But later in the report they do consider Climate Change (see Table ES-02 on page ES-12). And in the Sustainable Yield paragraph on page ES-13 it states, "Modeling results for the future projection period indicate that the projected inflows and outflows will be approximately balanced during the 50-year SGMA implementation period even with climate change considered." It goes on to state, "This calculation results in an estimated sustainable yield of ~5,300 AFY, depending on climate change assumptions." But nowhere does it state what those assumptions are (at least not in the Exec Summary).	The conclusion was based on the analysis of climate change effects presented in the GSP, which is described in more detail in Section 3.3.3. The text on ES-10 has been clarified. A reference to the climate change assumptions will be provided following this statement in the GSP text to clarify.

ASRGSA Arroyo Santa Rosa Basin Groundwater Sustainability Agency

Comment Number	Entry Date	First Name	Last Name	Email Address	Phone Number	Mailing Address	GSP Referenced	Comment/Question	Response
7	Same as above						ES-4. Water Budget	There is a big assumption in this conclusion at the end of the Sustainable Yield paragraph, “The projection period (based on historical climate data from 1972-2021) had an average precipitation nearly equal to the overall historical average (1929-2021), so the estimated sustainable yield is representative of the long term sustainability of the Basin.” In my mind recent acceleration of global warming equals more and more drought years going forward which would necessitate more and more pumping unless we want to remain dependent on imported water which is counter to the District goal. The answer to that seems to be “Well, we won’t let it get lower than its historical low, even during drought years”. So what is the actual plan if and when we do hit the historical low? Will we have time then for more consultants, outreach and workshops? It also says the definition of “Sustainable yield” is the maximum quantity of water, calculated over a base period representative of long-term conditions in the Basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result. On appearance it does not seem you’ve considered the possible withdrawal of any temporary surpluses anywhere in the calculation.	The projection period used to assess future conditions in the basin incorporates best available data (provided by DWR) on climate change impacts on precipitation, evapotranspiration, and streamflows; the analysis of the projected water budget also included climate change analysis provided by the DWR. The GSA is unaware of any surplus being pumped within the basin; any available information on surplus will be considered in future GSP updates.
8	Same as above						ES-5. Sustainable Management Criteria	The statement in the top paragraph on page ES-16 states, “The measurable objectives were developed for each monitoring site by evaluating the modeled groundwater level data for the projected period and are intended to apply following wet periods. Failure to meet the measurable objectives during other times shall not be considered failure to sustainably manage the Basin.” One would hope we always strive to meet the degraded water quality measurable objectives and show progress year over year to improve overall basin health. If we are only concerned about meeting that objective following a wet period, then what happens to the water quality during extended drought periods which are happening more and more frequently? And this last sentence on page ES-16 really bugs me, “The degraded water quality measurable objectives are set equal to the minimum thresholds for all constituents to reflect the fact that the GSAs have no ability to improve water quality by managing groundwater pumping due to the lack of a causal relationship between pumping and groundwater quality.” Wouldn’t less pumping mean that more water would remain in the basin to dilute the pollutant levels?	The statement in the top paragraph on page ES-16 refers to the measurable objectives developed for the Chronic Lowering of Groundwater Levels and Reduction of Groundwater Storage sustainability indicators, not Degraded Water Quality. The available data currently do not indicate that periods of reduced pumping improve groundwater quality.

Comment Number	Entry Date	First Name	Last Name	Email Address	Phone Number	Mailing Address	GSP Referenced	Comment/Question	Response
9	3/17/2023	Erin	Wilson-Olgin	Erinn.Wilson-Olgin@wildlife.ca.gov	858-467-4201	State of California Department of Fish and Wildlife South Coast Region 3883 Ruffin Road San Diego, CA 92123	3.2.7 Groundwater Dependent Ecosystems	1. Comment #1: Groundwater Dependent Ecosystems (Section 3.2.7 of Draft GSP, Starting on Page 58). The Draft GSP does not include minimum thresholds or measurable objectives to protect GDEs. a. ***Issue***: Page 59 of the Draft GSP discusses the Hill Canyon Wastewater Treatment Plant's (WWTP) effluent discharge which states, "In summary, the following factors indicate the riparian vegetation is not dependent on groundwater: i. Historical aerial photos of the Basin show much less vegetation existed along the Arroyo Conejo and Conejo Creek before the Hill Canyon WWTP was operational (Figure 3.2-12a through c), which indicates much of the riparian vegetation and wetlands were recruited and maintained as a result of the sustained baseflows from the WWTP effluent. ii. The riparian vegetation does not experience stress during periods of low groundwater levels (e.g., the 2012-2016 drought) due to the sustained baseflows of the Conejo Creek from the effluent of the Hill Canyon WWTP. Based on these factors, the GSP does not consider the riparian vegetation to be GDEs within the Basin and instead considers these primarily surface-water dependent ecosystems." b. ***Concern***: CDFW is concerned with the Draft GSP's disregard for potential GDEs in the Basin. Page 57 of the Draft GSP states, "The Arroyo Conejo and Conejo Creek are predominantly interconnected and losing with gaining reaches where the groundwater levels are very shallow where the Arroyo Conejo enters the Basin and reaches of the Conejo Creek in the southwest area of the Basin (see Figures 3.2-08a through 3.2-08c) and where shallow groundwater tends to mound up. The quantified gains and losses from the streams are presented in the Water Budget Section 3.3 and discussed in further detail below. The Arroyo Conejo and Conejo Creek surface water system is perennial due to a constant source of water from the Hill Canyon WWTP effluent and additional surface water flow from the North and South Fork Arroyo Conejo streams that drain Conejo Valley." Based on the hydrogeological conceptual model and hydrograph studies, the ASRGSA determined these areas are not reliant on water from a principal aquifer in the Basin. The ASRGSA is arguing that the primary sources of water for these habitats come from the effluent of the Hill Canyon WWTP. CDFW believes the shallow aquifer and perched zones rely on surplus water from other external sources to keep them recharged. There is concern that these external sources, such as treated wastewater discharged from the Hill Canyon WWTP, could reduce as the overall demand for recycled water increases. A reduction in wastewater discharge would impact shallow groundwater recharge and have the potential to adversely affect these GDEs. CDFW believes the shallow groundwater although rarely used for a water supply is extremely important to the ecological communities or species that depend on groundwater emerging from all aquifers or from groundwater occurring near the surface within the Basin. Various sensitive species (see Comment #3) utilize the riparian vegetation and riverine features identified in the draft GSP. The riparian vegetation and riverine features should be considered as GDEs in the final GSP. Mapping GDEs and other beneficial uses is an essential component in the consideration, development, and implementation of GSPs (Water Code §10723.2) and in assessing the potential effects on groundwater beneficial uses. c. ***Recommendation***: Pursuant to 23 CCR § 354.16 – Groundwater Conditions, CDFW recommends the mapping, monitoring and protection of riparian vegetation under SGMA. ASRGSA has not provided enough data to disregard riparian vegetation as potential GDEs.	The GSA disagrees with the statement that potential GDEs have been disregarded in the GSP. Potential GDEs have been mapped on Figure 3.2-11. However, Figure 3.2-12a- c indicate that the riparian habitat along the Arroyo Conejo and Conejo Creek have built up over time following the introduction of sustained discharges of wastewater from the Hill Canyon WWTP and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon. Therefore, the GSP concludes the riparian habitat is dependent on these discharges, not the Basin groundwater. Additional text and a new figure has been included in the GSP to further clarify these points (new Figure 3.2-09; See Sections 3.1, 3.1.3, and 3.2.6). Riparian habitat has been explicitly included as beneficial use, primarily relying on surface water sustained by the discharges. The GSP is protective of significant and unreasonable impacts on the riparian habitat through the undesirable results and SMCs defined for the depletion of interconnected surface water sustainability indicator (Sections 4.9.1, and 4.9.2.4 – some text has been added to these sections to further clarify). The minimum thresholds and measurable objectives were designed to prevent significant and unreasonable impacts on beneficial uses (including riparian habitat along the Arroyo Conejo and Conejo Creek). CDFW's description of the sources for shallow groundwater agrees with the GSA's understanding: "external sources" include the WWTP discharges and urban runoff – these are all non-native – groundwater does not supply the shallow groundwater system; rather the non-native discharges do. Any changes to the WWTP discharges would be addressed through the permitting process with the SWRCB, not the GSA. Regarding the comment that the GSA should protect the riparian habitat, the GSA does not have jurisdictional authority on land-use, surface water flows, or wastewater discharges from Hill Canyon WWTP that sustain the riparian habitat. Hence, the GSP cannot address or manage any future changes to surface flows (or beneficial use of the same) from increased recycled water demands. However, the GSP does address depletions of interconnected surface water that could cause undesirable results including significant and unreasonable effects on riparian habitat (Section 4.9).

ASRGSA Arroyo Santa Rosa Basin Groundwater Sustainability Agency

Comment Number	Entry Date	First Name	Last Name	Email Address	Phone Number	Mailing Address	GSP Referenced	Comment/Question	Response
10	Same as above						5.3.1 Attainment of Monitoring Objectives and Other Requirements	2. Comment #2 Groundwater Monitoring Wells (Section 5.3.1 of Draft GSP, Starting on Page 128). Shallow groundwater monitoring wells are lacking. a. ***Issue***: The current monitoring network lacks a representative distribution of shallow groundwater monitoring wells that is insufficient to monitor impacts to environmental beneficial uses and users of groundwater pursuant to 23 CCR 354.34(2). b. ***Concern***: Few monitoring wells are near interconnected surface waters or near riparian vegetation that CDFW considers as potential GDEs. CDFW is concerned with a lack of data points on shallow groundwater level trends. This information would assist in the understanding of groundwater management impacts on fish and wildlife beneficial uses and users of groundwater, including GDEs and interconnected surface water habitats. c. ***Recommendation***: CDFW recommends a plan to install shallow groundwater monitoring wells near potential GDEs and interconnected surface waters to monitor impacts to environmental beneficial uses and users of groundwater pursuant to 23 CCR 354.34(d)-(j). Monitoring wells paired with streamflow gauges will improve the understanding of surface water to shallow groundwater interconnectivity.	The monitoring networks for the basin are designed for management of the groundwater resources. Because the shallow groundwater is not a groundwater resource for the Basin (there are no shallow pumping wells), it does not require monitoring. Surface water gaging stations (Section 5.8) and the numerical groundwater model (Appendix G) are required to fully assess depletions of interconnected surface water and to prevent undesirable results (Section 4.9.1), which includes impacts to riparian vegetation habitat. Section 5.8 in the GSP addresses the recommendation to install shallow groundwater monitoring wells: "Wells in the Basin do not extract water from the shallow groundwater system. Therefore, monitoring of shallow groundwater levels is not necessary to demonstrate sustainable management of the Basin. If future wells extract shallow groundwater, then shallow groundwater monitoring may be warranted at that point in time. Surface water data and the numerical model will be used to the existing surface water data along with the numerical model is deemed sufficient to evaluate streamflow depletions under historical and current conditions, which were not seen to be causing any undesirable results. This monitoring network will be evaluated during every 5-year GSP assessment, and shallow groundwater monitoring may be included in future revisions to the Plan, if warranted."
11	Same as above						3.2.7.2 Riparian Vegetation	3. Comment #3: Sensitive Species (Section 3.2.7.2 of Draft GSP, Starting on Page 58). The Draft GSP does not list terrestrial or aquatic special-status species that occur within the Basin. a. ***Issue***: The Draft GSP does not list any sensitive species occurring within the Basin. The Santa Rosa Valley provides habitat, that CDFW considers potential GDEs, that supports several sensitive species throughout their life cycles, including the federal Endangered Species Act (ESA) listed and California Endangered Species Act (CESA) listed least Bell's vireo (Vireo bellii pusillus), the California species of special concern (SSC) southwestern pond turtle (Actinemys marmorata pallida), and the arroyo chub (Gila orcutti), also an SSC (CNDDB 2023). b. ***Concern***: According to CNDDB, habitats that support these species consist of phreatophytes and other vegetation communities such as southern riparian forest, Salix laevigata-Salix lasiolepis Superalliance, palustrine scrub, and valley oak woodland (CDFW 2023; DWR 2023). These vegetation communities are likely dependent on the groundwater in the Basin that support surface water in each of these systems. Phreatophytic vegetation is a critical contributor to nesting and foraging habitat for a wide range of species and is sensitive to depth to groundwater threshold impacts (Naumburg et al. 2005; Froend et al. 2010). This sensitivity to groundwater level thresholds means that localized pumping and recharge actions altering groundwater level thresholds can impact the health and extent of phreatophyte vegetation health. Both decreasing (drying out) or increasing (drowning) groundwater elevation has the potential to stress phreatophytes depending on the plant species and the groundwater elevation and duration (e.g., short term wetness/dryness versus prolonged wetness/dryness). Stressed phreatophytic vegetation is an early indicator of a lowered groundwater table that may risk the survival of sensitive species, such as the southwestern pond turtle, arroyo chub, and least Bell's vireo. The ASRGSA determined the riparian vegetation in the Basin are not reliant on the principal aquifer. The ASRGSA is arguing that the primary sources of water for these habitats come from shallow groundwater and surface water. Based on the information provided in the Draft GSP, CDFW believes that there are areas of interconnected surface waters between the shallow groundwater and principal aquifer. CDFW also believes the shallow groundwater rely on surplus water from other external sources to keep them recharged. There is concern that these external sources could diminish or dry up which would adversely affect these GDEs. c. ***Recommendation #1***: CDFW recommends ASRGSA add monitoring and management criteria to address potential for adverse impacts to the following sensitive species and sensitive vegetation to the final GSP: least Bell's vireo, southwestern pond turtle, arroyo chub, southern riparian forest, Salix laevigata- Salix lasiolepis Superalliance, palustrine scrub, and valley oak woodland.	Please see above response to Comment #1 regarding the source of the shallow groundwater being discharges from the WWTP. More text and a new figure was added to Section 3.2.6 to address the conceptualization of the shallow groundwater system. See above response to Comment #2 regarding the monitoring and management criteria – the sustainable management criteria for the depletion of interconnected surface water sustainability indicator addresses potential for adverse impacts to riparian habitat. Southern riparian forest, palustrine scrub, and valley oak woodland are considered to be represented by the red willow, giant reed, and California sycamore species identified in Section 3.2.7.2. The sensitive wildlife species have been added to the GSP text in Section 3.2.7.2 and as a new subsection 3.2.7.3 Sensitive Wildlife Species.

ASRGSA Arroyo Santa Rosa Basin Groundwater Sustainability Agency

Comment Number	Entry Date	First Name	Last Name	Email Address	Phone Number	Mailing Address	GSP Referenced	Comment/Question	Response
12	Same as above							4. Comment #4: Draft GSP vs. Final GSP. Any changes made to the Draft GSP should be highlighted in the Final GSP. a. ***Issue***: ASRGSA may need to revise the GSP to address CDFW comments or other comments before its finalized and adopted by ASRGSA. b. ***Recommendation***: CDFW recommends ASRGSA provide a red-lined version of the final GSP to understand the changes made between the Draft GSP and final GSP. Alternatively, CDFW recommends ASRGSA provide a summary of changes made and comments addressed by ASRGSA in preparation of a final GSP.	Appendix F documents the changes to the GSP based on responses to comments. A track changes version of the GSP is included in Appendix F highlighting the changes made addressing CDFW's comments.

Landy Johnson Comments (3-11-2023)

From: Tony Stafford
To: Bryan Bondy; Steven Humphrey; Abhishek Singh
Cc: Tamara Sexton
Subject: FW: Comments on Draft GSP
Date: Tuesday, March 21, 2023 3:17:13 PM

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See below

From: Donnie Alexander <DonnieA@camrosa.com>
Sent: Tuesday, March 21, 2023 12:59 PM
To: Tony Stafford <TonyS@camrosa.com>
Subject: FW: Comments on Draft GSP

Hi Tony,

Here are Landy Johnson's GSP comments.

Donnie Alexander
Camrosa Water District
☎: (805) 482-8514
✉: DonnieA@camrosa.com
Website: www.camrosa.com

From: Landy Johnson <landyjoh@gmail.com>
Sent: Saturday, March 11, 2023 4:05 PM
To: Donnie Alexander <DonnieA@camrosa.com>
Subject: Comments on Draft GSP

[**EXTERNAL EMAIL-- USE CAUTION** clicking **links** and **attachments**.]

Donnie,

Thank you very much for the opportunity to comment on the draft Arroyo Santa Rosa Basin Groundwater Sustainability Plan. I enjoyed attending the latest public session by Zoom as a Camrosa customer and interested resident. I am a retired environmental economist focusing on land use and am interested in water issues generally.

I appreciate the inclusion of measures addressing the improvement of groundwater quality. I'm glad that TCP and Nitrate are being monitored, and that a plan for treating TCP contamination is under way. I will be interested in seeing what happens with PFAS once more is known about how that will be regulated. 1

The water budget is extremely thorough. It was interesting to see the impact of SOAR on planning. 2

I was surprised that the plan only requires meeting measurable objectives during wet periods. Is this typical for California? I have only been in the state for seven months, so I'm still learning about local conditions. Though it does say on page 95 that it is only required that the plan address the effects of groundwater extractions, so maybe the wet period/dry period distinction is moot. 3

I skipped most of Section 5 on monitoring, lacking the expertise to evaluate it. There are certainly vast amounts of data to manage! No wonder the cost of data analysis is the largest part of the budget (encompassing multiple columns of Table 7.1-01.

I will continue to follow the progress of this plan on the web site, and I appreciate having had notices about it in my water bill.

Landy Johnson

--

from Landy Johnson, MPA, Ph.D.
2396 Rondell Road
Camarillo, CA 93012-8962
508-847-8896
landyjoh@gmail.com

Kevin Cannon Comments (3-13-2023)

From: Tony Stafford
To: Bryan Bondy; Abhishek Singh; Steven Humphrey
Cc: Tamara Sexton
Subject: FW: 2/28 Arroyo Santa Rosa Valley Basin GSA Special Meeting - Stakeholder Engagement Workshop #3
Date: Tuesday, March 21, 2023 3:18:51 PM

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Below the second of three.

From: ca.avoking@gmail.com <ca.avoking@gmail.com>
Sent: Monday, March 13, 2023 9:01 PM
To: Donnie Alexander <DonnieA@camrosa.com>
Cc: Tony Stafford <TonyS@camrosa.com>
Subject: RE: 2/28 Arroyo Santa Rosa Valley Basin GSA Special Meeting - Stakeholder Engagement Workshop #3

[**EXTERNAL EMAIL-- USE CAUTION** clicking **links** and **attachments**.]

Hello Donnie,

I was not able to attend Workshop #3 unfortunately. But I did take time to look over the draft GSP Executive Summary document. Here are my thoughts/comments/questions:

It's news to me that "The ASRVGB priority assigned by DWR was reduced from medium to very low in 2019, making SGMA compliance optional." Why did our basin's priority get reduced? We were priority 4 initially due to high nitrates. Did nitrates go away? Now that we are optional, what is our GSA's plan for participating in the future regulatory requirements and deadlines that all the higher priority GSAs must follow where compliance is not optional? Being good stewards is one thing, but at what costs to rate payers? 4

On page ES-10 it states, "There is no known relationship between degraded water quality and groundwater levels or pumping operations within the Basin." Are there any future plans to formally start studying those relationships now? 5

The ES-4 Water Budget paragraph on page ES-10 states. "The groundwater flow model was used to quantify water budgets for the historical, current, and projected conditions, including the evaluation of **uncertainty due to climate change**, anticipated land use changes, and projected population increase, as required by SGMA (Appendix G). It was concluded that these factors are **not anticipated to have a material impact on future water demand**…" Who concluded that? 6

But later in the report they do consider Climate Change (see Table ES-02 on page ES-12). And in the Sustainable Yield paragraph on page ES-13 it states, "Modeling results for the future projection period indicate that the projected inflows and outflows will be approximately balanced during the 50-year SGMA implementation period **even with climate change considered**." It goes on to state, "This calculation results in an estimated sustainable yield of ~5,300 AFY, **depending on climate change assumptions**." But nowhere does it state what those assumptions are (at least not in the Exec Summary). 6

There is a big assumption in this conclusion at the end of the Sustainable Yield paragraph, "The projection period (based on historical climate data from 1972-2021) had an average precipitation nearly equal to the overall historical average (1929-2021), so the **estimated sustainable yield is representative of the long-term sustainability of the Basin**." In my mind recent acceleration of global warming equals more and more drought years going forward which would necessitate more and more pumping unless we want to remain dependent on imported water which is counter to the District goal. The answer to that seems to be "Well, we won't let it get lower than its historical low, even during drought years". So what is the actual plan if and when we do hit the historical low? Will we have time then for more consultants, outreach and workshops? 7

It also says the definition of "Sustainable yield" is the maximum quantity of water, calculated over a base period representative of long-term conditions in the Basin and **including any temporary surplus** that can be withdrawn annually from a groundwater supply without causing an undesirable result. On appearance it does not seem you've considered the possible withdrawal of any temporary surpluses anywhere in the calculation.

The statement in the top paragraph on page ES-16 states, "The measurable objectives were developed for each monitoring site by evaluating the modeled groundwater level data for the projected period and are **intended to apply following wet periods**. Failure to meet the measurable objectives during other times **shall not be considered failure** to sustainably manage the Basin." One would hope we always strive to meet the degraded water quality measurable objectives and show progress year over year to improve overall basin health. If we are only concerned about meeting that objective following a wet period, then what happens to the water quality during extended drought periods which are happening more and more frequently? 8

And this last sentence on page ES-16 really bugs me, "The degraded water quality measurable objectives are set equal to the minimum thresholds for all constituents to reflect the fact that the GSAs have no ability to improve water quality by managing groundwater pumping **due to the lack of a causal relationship between pumping and groundwater quality**." Wouldn't less pumping mean that more water would remain in the basin to dilute the pollutant levels?

My final thought: Why have we paid for this expensive study that seems to simply conclude with "Let's monitor the level of the basin and jump into action if it ever hits its historical low."

Kevin Cannon

From: Donnie Alexander <DonnieA@camrosa.com>
Sent: Friday, February 24, 2023 3:25 PM
To: Donnie Alexander <DonnieA@camrosa.com>
Cc: Tony Stafford <TonyS@camrosa.com>; Tamara Sexton <Tamara@camrosa.com>
Subject: 2/28 Arroyo Santa Rosa Valley Basin GSA Special Meeting - Stakeholder Engagement Workshop #3

Good afternoon all,

Attached is the agenda packet for the upcoming ASRVBGSA Special Meeting – Stakeholder Engagement Workshop #3 on **Tuesday, February 28th at 6pm.** This meeting will be held in-person and virtually via Zoom.

To join this meeting via Zoom, please click on the following link:
https://us02web.zoom.us/j/9235309144

Donnie Alexander
Camrosa Water District
☎: (805) 482-8514
🖂: DonnieA@camrosa.com
Website: www.camrosa.com

State of California – Natural Resources Agency
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www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

March 17, 2023

Via Electronic Mail and Online Submission

California Department of Fish and Wildlife Comments (3-17-2023)

Mr. Donnie Alexander
Communications Specialist
Arroyo Santa Rosa Basin Groundwater Sustainability Agency
7385 Santa Rosa Road
Camarillo, CA 93012
DonnieA@camrosa.com

Subject: Comments on the Arroyo Santa Rosa Basin Draft Groundwater Sustainability Plan

Dear Mr. Donnie Alexander:

The California Department of Fish and Wildlife (CDFW) is providing comments on the Arroyo Santa Rosa Basin Groundwater Sustainability Agency's (ASRGSA) Draft Groundwater Sustainability Plan (Draft GSP) in Ventura County. The Draft GSP was prepared pursuant to the Sustainable Groundwater Management Act (SGMA). As trustee agency for the State's fish and wildlife resources, CDFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of such species (Fish & Game Code §§ 711.7 and 1802).

CDFW is writing to support ecosystem preservation and enhancement in compliance with SGMA and its implementing regulations based on CDFW expertise and best available information and science. As trustee agency for the State's fish and wildlife resources, CDFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of such species (Fish & Game Code §§ 711.7 and 1802).

Development and implementation of GSPs under SGMA represents a new era of California groundwater management. CDFW has an interest in the sustainable management of groundwater, as many sensitive ecosystems, species, and public trust resources depend on groundwater and interconnected surface waters (ISWs).

SGMA and its implementing regulations afford ecosystems and species specific statutory and regulatory consideration, including the following as pertinent to GSPs:

- GSPs must **consider impacts to groundwater dependent ecosystems** (GDEs) (Water Code § 10727.4(l); see also 23 CCR § 354.16(g));
- GSPs must consider the interests of all beneficial uses and users of groundwater, including environmental users of groundwater (Water Code § 10723.2) and GSPs must **identify and consider potential effects on all beneficial uses and users of**

groundwater (23 CCR §§ 354.10(a), 354.26(b)(3), 354.28(b)(4), 354.34(b)(2), and 354.34(f)(3));

- GSPs must **establish sustainable management criteria that avoid undesirable results** within 20 years of the applicable statutory deadline, including **depletions of ISW that have significant and unreasonable adverse impacts on beneficial uses of the surface water** (23 CCR § 354.22 *et seq*. and Water Code §§ 10721(x)(6) and 10727.2(b)) and describe monitoring networks that can identify adverse impacts to beneficial uses of ISWs (23 CCR § 354.34(c)(6)(D)); and,
- GSPs must **account for groundwater extraction for all water use sectors,** including managed wetlands, managed recharge, and native vegetation (23 CCR §§ 351(al) and 354.18(b)(3)).

In the context of SGMA statutes and regulations, and Public Trust Doctrine considerations, groundwater planning should carefully consider and protect environmental beneficial uses and users of groundwater, including fish and wildlife and their habitats, GDEs, and ISWs.

Furthermore, the Public Trust Doctrine imposes a related but distinct obligation to consider how groundwater management affects public trust resources, including navigable surface waters and fisheries. Groundwater hydrologically connected to surface waters is also subject to the Public Trust Doctrine to the extent that groundwater extractions or diversions affect or may affect public trust uses. (*Environmental Law Foundation v. State Water Resources Control Board* (2018), 26 Cal. App. 5th 844; *National Audubon Society v. Superior Court* (1983), 33 Cal. 3d 419.) The GSA has "an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible." (*National Audubon Society*, *supra*, 33 Cal. 3d at 446.) Accordingly, groundwater plans should consider potential impacts to and appropriate protections for ISWs and their tributaries, and ISWs that support fisheries, including the level of groundwater contribution to those waters.

CDFW is providing comments and recommendations on the Draft GSP (Attachment A). CDFW appreciates the opportunity to provide comments on the ASRGSA Draft GSP. If you have any questions or comments regarding this letter, please contact Mary Ngo, Senior Environmental Scientist (Specialist), at Mary.Ngo@wildlife.ca.gov.

Sincerely,

DocuSigned by:

B6E58CFE24724F5...

Erinn Wilson-Olgin
Environmental Program Manager I
South Coast Region 5

Enclosure(s): Attachment A, Attachment B ec: California Department of Fish and Wildlife

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Arroyo Santa Rosa Basin GSA

Donnie Alexander
Communications Specialist
DonnieA@camrosa.com

Attachment A

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE COMMENTS ON DRAFT ARROYO SANTA ROSA BASIN GROUNDWATER SUSTAINABILITY PLAN

CDFW's comments are as follows:

SPECIFIC COMMENTS AND RECOMMENDATIONS

CDFW's comments are as follows:

1. **Comment #1: Groundwater Dependent Ecosystems (Section 3.2.7 of Draft GSP, Starting on Page 58).** The Draft GSP does not include minimum thresholds or measurable objectives to protect GDEs. 9

   a. <u>Issue</u>: Page 59 of the Draft GSP discusses the Hill Canyon Wastewater Treatment Plant's (WWTP) effluent discharge which states, *"In summary, the following factors indicate the riparian vegetation is not dependent on groundwater:*
      i. *Historical aerial photos of the Basin show much less vegetation existed along the Arroyo Conejo and Conejo Creek before the Hill Canyon WWTP was operational (Figure 3.2-12a through c), which indicates much of the riparian vegetation and wetlands were recruited and maintained as a result of the sustained baseflows from the WWTP effluent.*
      ii. *The riparian vegetation does not experience stress during periods of low groundwater levels (e.g., the 2012-2016 drought) due to the sustained baseflows of the Conejo Creek from the effluent of the Hill Canyon WWTP. Based on these factors, the GSP does not consider the riparian vegetation to be GDEs within the Basin and instead considers these primarily surface-water dependent ecosystems."*

   b. <u>Concern</u>: CDFW is concerned with the Draft GSP's disregard for potential GDEs in the Basin. Page 57 of the Draft GSP states, "*The Arroyo Conejo and Conejo Creek are predominantly interconnected and losing with gaining reaches where the groundwater levels are very shallow where the Arroyo Conejo enters the Basin and reaches of the Conejo Creek in the southwest area of the Basin (see Figures 3.2-08a through 3.2-08c) and where shallow groundwater tends to mound up. The quantified gains and losses from the streams are presented in the Water Budget Section 3.3 and discussed in further detail below. The Arroyo Conejo and Conejo Creek surface water system is perennial due to a constant source of water from the Hill Canyon WWTP effluent and additional surface water flow from the North and South Fork Arroyo Conejo streams that drain Conejo Valley.*"

      Based on the hydrogeological conceptual model and hydrograph studies, the ASRGSA determined these areas are not reliant on water from a principal aquifer in the Basin. The ASRGSA is arguing that the primary sources of water for these habitats come from the effluent of the Hill Canyon WWTP. CDFW believes the shallow aquifer and perched zones rely on surplus water from other external sources to keep them recharged. There is concern that these external sources, such as treated wastewater discharged from the Hill Canyon WWTP, could reduce as the overall demand for recycled water increases. A reduction in wastewater discharge would impact shallow groundwater recharge and have the potential to adversely affect these GDEs. CDFW believes the shallow groundwater although rarely used for a water supply is extremely important to the ecological communities or species that depend on groundwater emerging from all aquifers or from groundwater occurring near the surface within the Basin. Various sensitive species (see Comment #3) utilize the riparian vegetation and riverine features identified in the draft GSP. The riparian vegetation and riverine features should be considered as GDEs in the final GSP. Mapping GDEs and other beneficial uses is an essential component in the consideration, development, and implementation of GSPs (Water Code §10723.2) and in assessing the potential effects on groundwater beneficial uses. 9

c. *Recommendation:* Pursuant to 23 CCR § 354.16 - Groundwater Conditions, CDFW recommends the mapping, monitoring and protection of riparian vegetation under SGMA. ASRGSA has not provided enough data to disregard riparian vegetation as potential GDEs.

2. **CDFW Comment #2 Groundwater Monitoring Wells (Section 5.3.1 of Draft GSP, Starting on Page 128).** Shallow groundwater monitoring wells are lacking. 10

   a. *Issue:* The current monitoring network lacks a representative distribution of shallow groundwater monitoring wells that is insufficient to monitor impacts to environmental beneficial uses and users of groundwater pursuant to 23 CCR 354.34(2).

   b. *Concern:* Few monitoring wells are near interconnected surface waters or near riparian vegetation that CDFW considers as potential GDEs. CDFW is concerned with a lack of data points on shallow groundwater level trends. This information would assist in the understanding of groundwater management impacts on fish and wildlife beneficial uses and users of groundwater, including GDEs and interconnected surface water habitats.

   c. *Recommendation:* CDFW recommends a plan to install shallow groundwater monitoring wells near potential GDEs and interconnected surface waters to monitor impacts to environmental beneficial uses and users of groundwater pursuant to 23 CCR 354.34(d)-(j). Monitoring wells paired with streamflow gauges will improve the understanding of surface water to shallow groundwater interconnectivity.

3. **Comment #3: Sensitive Species (Section 3.2.7.2 of Draft GSP, Starting on Page 58).** The Draft GSP does not list terrestrial or aquatic special-status species that occur within the Basin. 11

   a. *Issue:* The Draft GSP does not list any sensitive species occurring within the Basin. The Santa Rosa Valley provides habitat, that CDFW considers potential GDEs, that supports several sensitive species throughout their life cycles, including the federal Endangered Species Act (ESA) listed and California

Endangered Species Act (CESA) listed least Bell's vireo (*Vireo bellii pusillus*), the California species of special concern (SSC) southwestern pond turtle (*Actinemys marmorata pallida*), and the arroyo chub (*Gila orcutti*), also an SSC (CNDDB 2023).

b. *<u>Concern</u>:* According to CNDDB, habitats that support these species consist of phreatophytes and other vegetation communities such as southern riparian forest, *Salix laevigata-Salix lasiolepis* Superalliance, palustrine scrub, and valley oak woodland (CDFW 2023; DWR 2023). These vegetation communities are likely dependent on the groundwater in the Basin that support surface water in each of these systems. Phreatophytic vegetation is a critical contributor to nesting and foraging habitat for a wide range of species and is sensitive to depth to groundwater threshold impacts (Naumburg et al. 2005; Froend et al. 2010). This sensitivity to groundwater level thresholds means that localized pumping and recharge actions altering groundwater level thresholds can impact the health and extent of phreatophyte vegetation health. Both decreasing (drying out) or increasing (drowning) groundwater elevation has the potential to stress phreatophytes depending on the plant species and the groundwater elevation and duration (e.g., short term wetness/dryness versus prolonged wetness/dryness). Stressed phreatophytic vegetation is an early indicator of a lowered groundwater table that may risk the survival of sensitive species, such as the southwestern pond turtle, arroyo chub, and least Bell's vireo.

The ASRGSA determined the riparian vegetation in the Basin are not reliant on the principal aquifer. The ASRGSA is arguing that the primary sources of water for these habitats come from shallow groundwater and surface water. Based on the information provided in the Draft GSP, CDFW believes that there are areas of interconnected surface waters between the shallow groundwater and principal aquifer. CDFW also believes the shallow groundwater rely on surplus water from other external sources to keep them recharged. There is concern that these external sources could diminish or dry up which would adversely affect these GDEs.

c. *<u>Recommendation #1</u>:* CDFW recommends ASRGSA add monitoring and management criteria to address potential for adverse impacts to the following sensitive species and sensitive vegetation to the final GSP: least Bell's vireo, southwestern pond turtle, arroyo chub, southern riparian forest, *Salix laevigata-Salix lasiolepis* Superalliance, palustrine scrub, and valley oak woodland.

4. **Comment #4: Draft GSP vs. Final GSP.** Any changes made to the Draft GSP should be highlighted in the Final GSP. 12

a. *<u>Issue</u>:* ASRGSA may need to revise the GSP to address CDFW comments or other comments before its finalized and adopted by ASRGSA.

b. *<u>Recommendation</u>:* CDFW recommends ASRGSA provide a red-lined version of the final GSP to understand the changes made between the Draft GSP and final GSP. Alternatively, CDFW recommends ASRGSA provide a summary of changes made and comments addressed by ASRGSA in preparation of a final GSP.

CONCLUSION

In conclusion, the Draft GSP does not comply with all aspects of SGMA statute and regulations, and CDFW deems the Draft GSP inadequate to protect fish and wildlife beneficial users of groundwater for the following reasons:

1. The assumptions, criteria, findings, and objectives, including the sustainability goal, undesirable results, minimum thresholds, measurable objectives, and interim milestones are not reasonable and/or not supported by the best available information and best available science. [CCR § 355.4(b)(1)] (See Comments # 1 and 3);

2. The Draft GSP does not identify reasonable measures and schedules to eliminate data gaps. [CCR § 355.4(b)(2)] (See Comments # 1 and 3);

3. The sustainable management criteria and projects and management actions are not commensurate with the level of understanding of the basin setting, based on the level of uncertainty, as reflected in the Draft GSP. [CCR § 355.4(b)(3)] (See Comments # 1, 2, and 3); and,

4. The interests of the beneficial uses that are potentially affected by the use of groundwater in the basin, have not been considered. [CCR § 355.4(b)(4)] (See Comments # 1, 2, and 3).

Attachment B

LITERATURE CITED

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Froend, R. and B. Sommer. 2010. Phreatophytic vegetation response to climatic and abstraction-induced groundwater drawdown: Examples of long-term spatial and temporal variability in community response. Ecological Engineering 36:1191:1200.

Naumburg E., Mata-Gonzalez, R., Hunter, R.G., McLendon, T., Martin, D.W. 2005. Phreatophytic vegetation and groundwater fluctuations: a review of current research and application of ecosystem response modeling with an emphasis on great basin vegetation. Environment Management 35(6):726-40.

Selected GSP pages showing tracked changes responding to comments

Fox Canyon Groundwater Management Agency

FCGMA was formed by the California Legislature in 1982 as an independent special district to manage the aquifers within its jurisdiction (FCGMA, 1982). Beneficial users of groundwater within FCGMA jurisdiction are subject to the Agency's GSPs, ordinances, and policies.

ES-3. Basin Setting and Groundwater Conditions

Overview

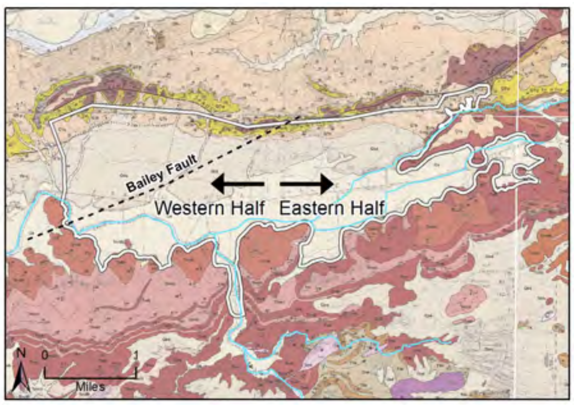

Figure ES-03 Surface Geology for the ASRVGB.

The ASRVGB is in an elongated east-trending valley and consists of multiple layers of alternating fine- and coarse-grained unconsolidated deposits, semi-consolidated deposits, and consolidated formations underlain by volcanic bedrock. The Basin is roughly centered on an east-west oriented structural syncline, and the sedimentary deposits are thickest in the center and westernmost areas, thinning out to the Basin margins. The aquifer system is semi-confined and is characterized by distinct upper and lower groundwater-producing zones in the west with the stratification absent or not apparent to the east; the upper and lower groundwater-producing zones are treated as a single principal aquifer for purposes of sustainable groundwater management in this initial GSP. To facilitate discussion within the GSP, the Basin has been subdivided into two areas, the western half and eastern half. In addition, a key hydraulic feature within the Basin is the Bailey Fault, which acts as a relative barrier to flow, separating the northwestern third of the Basin from the rest of the Basin (Figure ES-03).

Inflow into the Basin comes from mountain-block fracture flow from the Conejo volcanics from the south and east, infiltration of streamflow, recharge as infiltration of precipitation and agricultural and urban return flows, and mountain-front recharge from the north. There is a small component of underflow from the Pleasant Valley Basin to the west, but that component is not well constrained by data and is quantified within the range of uncertainty of the numerical model. The Arroyo Conejo and Conejo Creek are the major surface water features recharging the groundwater in the south-central and southwestern area of the Basin (Figure ES-04) – this surface water system is a perennial creek due to a constant source of effluent from the Hill Canyon Wastewater Treatment Plant (WWTP). The shallow groundwater in the vicinity of the Arroyo Conejo and Conejo Creek consists primarily of recirculated surface water discharges sourced from the Hill Canyon WWTP and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon (Section 3.2.6). Groundwater extraction is the primary outflow component for the Basin, and shallow groundwater also discharges to Conejo Creek in the southwestern area.

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conductivity for the HSUs within the Basin ranges from ~1-35 ft/day. The final calibrated storage parameters ranged from 0.1 to 0.2 for the specific yield in the unconfined areas of the numerical model (primarily layers 1 and 2), and for the confined areas of the model the specific storage ranged from 10^{-5} to 2×10^{-4} per foot.

The primary sources of groundwater for the ASRVGB are inflow from the Conejo volcanics from the south and east and streamflow percolation (Figure ES-06). The shallow groundwater is recharged by the streamflow, of which perennial flows are primarily sourced by discharges from the Hill Canyon WWTP and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon. Gaining sections of the Arroyo Conejo and Conejo Creek receive shallow groundwater that is primarily recirculated recycled water and urban runoff (Section 3.2.6).

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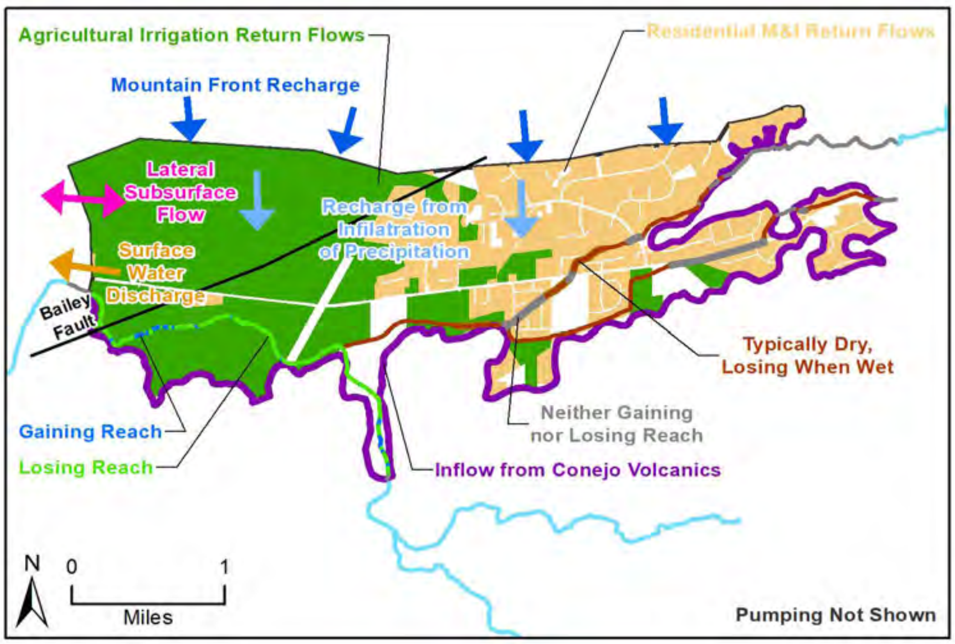

Figure ES-06 Primary Groundwater Recharge and Discharge Areas of the ASRVGB.

Secondary sources of groundwater for the Basin are from irrigation return flows, urban land use return flows (applied water, septic systems, and distribution losses), and infiltration from precipitation. Underflow from the Pleasant Valley Basin has been simulated in the numerical model, but rates are within the range of uncertainty of the model and there is limited data to support this inflow component.

The inflow from the Conejo Volcanic bedrock is conceptualized as a deep source of subsurface recharge to the Basin via fracture-flow, which is evidenced by higher groundwater levels observed in wells completed in the bedrock to the east in areas where the bedrock very shallow or at the land surface. The Arroyo Conejo and Conejo Creek are a losing stream system and there are likely gaining and losing sections along the stream; however, the infiltration of surface water is an important component of inflow for the

To the northwest of the Bailey Fault within the FCGMA, groundwater flow is toward the center of the area. Groundwater levels in the ASRVGB generally fluctuate seasonally with the highest water levels occurring in the winter to early spring and the lowest levels occurring in fall or winter (Figure ES-08). Groundwater levels have generally been slowly declining since the 1990s northwest of the Bailey Fault and overall steady southeast of the Bailey Fault. Groundwater levels have been increasing locally southeast of the Bailey Fault since 2018 due to a significant reduction in Camrosa's pumping due to contamination issues (see well 02N20W25D01S on Figure ES-08). Changes in groundwater storage within the Basin are primarily a function of groundwater pumping. Declines in groundwater storage have been observed in the Basin during prolonged dry conditions; however, the Basin has also shown relatively rapid recovery (particularly southeast of the Bailey Fault) in response to changes in pumping and recharge during wet climate cycles.

Figure ES-08 Groundwater Level Seasonal Fluctuations.

The water quality of the Basin is characterized by elevated nitrate and TDS concentrations, which have been observed in the Basin for several decades. In general, the quality of the groundwater in the ASRVGB is influenced by (a) the leaching of nutrients from fertilizers and manure, (b) percolation of return flows from applied waters and septic system leachate, (c) mineral dissolution, and (d) effluent from the Hill Canyon WWTP. The state-regulated contaminant 1,2,3-trichloropropane (TCP) has also been recently detected within the ASRVGB and has impacted Camrosa WD production wells at levels above the Maximum Contaminant Limit (MCL). There is no known relationship between degraded water quality and groundwater levels or pumping operations within the Basin.

ES-4. Water Budget

The groundwater flow model was used to quantify water budgets for the historical, current, and projected conditions, including the evaluation of uncertainty due to climate change (using climate-change hydrologic datasets provided by DWR),~~,~~ anticipated land use changes, and projected population increase, as required by SGMA (Appendix G). Based on the modeling analysis, the GSAs~~It was~~ concluded that these factors are not anticipated to have a material impact on future water demand and the water budgets for

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Table ES-02 Summary of Average Water Budget Components.

	Surface Water	Groundwater
Projected (2022–2072)		
Baseline Total in	23,119	5,076
Baseline Total out	-23,120	-5,235
Baseline Change in Storage	N/A	-159
2030 Climate Change Total in	22,592	5,071
2030 Climate Change Total out	-22,592	-5,233
2030 Climate Change in Storage	N/A	-163
2070 Climate Change Total in	22,960	5,072
2070 Climate Change Total out	-22,960	-5,234
2070 Climate Change in Storage	N/A	-162

Note: *All values are acre-feet per year.*

Overdraft Assessment

GSP Emergency Regulations §354.18(b)(5) require quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions if overdraft conditions exist.

Bulletin 118, Update 2003 describes groundwater overdraft as:

> "The condition of a groundwater basin or subbasin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. If overdraft continues for a number of years, significant adverse impacts may occur, including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts."

The water budget results indicate a slight imbalance in the Basin currently and in the future. The annual change in storage is within 10% error in uncertainty of model results, and undesirable results from chronic lowering of groundwater levels have not occurred and are not projected to occur. Numerical model results for the projected water budget also indicate that groundwater levels cyclically recover following droughts. Nonetheless, the GSAs can manage future pumping appropriately through monitoring.

Sustainable Yield

GSP Emergency Regulations §354.18(b)(7) requires an estimate of the sustainable yield for the Basin. Water Code §10721(w) defines "Sustainable yield" as the maximum quantity of water, calculated over a base period representative of long-term conditions in the Basin and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result.

Modeling results for the future projection period indicate that the projected inflows and outflows will be approximately balanced during the 50-year SGMA implementation period even with climate change considered. Therefore, an estimate of the sustainable yield is the modeled projected groundwater extractions minus the modeled surface water depletions that could potentially cause undesirable results for the depletions of interconnected surface water (ISW) sustainability indicator. This calculation results in an estimated sustainable yield of ~5,300 AFY, depending on climate change assumptions (DWR, 2018). The projection period (based on historical climate data from 1972-2021) had an average precipitation

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domestic well in the Basin that was considered. The GSAs concluded there are no groundwater dependent ecosystems (GDEs) in the Basin because the potential GDEs (riparian vegetation along the Arroyo Conejo and Conejo Creek) depend on surface water sourced from wastewater and urban runoff discharges and/or shallow groundwater fed by these discharges (see Sections 3.2.6 and 3.2.7.2), and groundwater production does not occur within the shallow groundwater system. The GSAs do not have jurisdictional authority on land-use, surface water flows, or wastewater discharges from Hill Canyon WWTP that sustain the riparian habitat; hence, the GSP does not address or manage any future changes to surface flows (or beneficial use of the same) from increased recycled water demands or other actions that could decrease the discharge rates. The GSP addresses potential pumping-induced depletions of interconnected surface water by establishing sustainable management criteria that would prevent undesirable results including significant and unreasonable effects on riparian vegetation habitat (Section 4.9).. There are currently no active surface water diversions within the Basin. Diversions located downstream of the Basin were considered.

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For this GSP and pursuant to GSP Emergency Regulations §354.28(d), a groundwater elevation minimum threshold serves as the metric for the chronic lowering of groundwater levels (Section 4.4), reduction of groundwater storage (Section 4.5), and land subsidence (Section 4.8) sustainability indicators. Adequate evidence demonstrating groundwater levels are a reasonable proxy is presented in Sections 4.4.2, 4.5.2, and 4.8.2.

The GSAs have considered public trust resources in development of this GSP by considering the impacts to ISW and by setting minimum thresholds designed to prevent undesirable results under SGMA.

Chronic Lowering of Groundwater Levels and Reduction of Groundwater Storage. Because groundwater levels and storage are correlated in the ASRVGB, groundwater storage SMC are identical to the chronic lowering of groundwater levels SMC. In addition, SGMA requires that the GSP address potential significant and unreasonable effects that could be caused by pumping during dry periods. The GSAs have developed SMC for the chronic lowering of groundwater levels sustainability indicator to ensure that potential undesirable results related to groundwater extraction are avoided during periods of low groundwater levels and storage. Pursuant to GSP Emergency Regulations §354.28(c)(1), depletion of supply effects on beneficial users and effects on other sustainability indicators were considered when developing the minimum thresholds.

The groundwater level and storage minimum thresholds were selected to prevent potential significant and unreasonable effects, including causing beneficial users to be unable to meet their basic water supply needs with either groundwater or delivered water supplies. It was concluded that potential significant and unreasonable effects may occur if pumping causes groundwater levels to decline below historical low levels because available historical information indicates that undesirable results were not encountered historically. Therefore, minimum thresholds were selected based on the historical low groundwater levels in the monitoring wells (Figure ES-10).

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~~logs.~~ Note, available water quality data, namely nitrate, indicates there is ~~significant~~ hydraulic communication between the upper and lower groundwater-producing zones in at least some portions of the Basin (especially to the east where the stratification is not apparent). For this reason, the GSP treats the upper and lower groundwater-producing zones as a single principal aquifer for purposes of sustainable groundwater management in this initial GSP. This characterization of the Basin is based on previous studies, well construction information, and description of lithologic and geophysical logs.

Shallow groundwater is also present in the upper alluvium (HSU layer 1) in the vicinity of the Arroyo Conejo and Conejo Creek and is fed by infiltrating surface water sourced primarily from discharges from the Hill Canyon WWTP and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon. There are no extraction wells producing groundwater from the shallow groundwater, so it is not part of the principal aquifer system (described above). In certain parts of the Basin (primarily to the west), this shallow groundwater discharges back into Conejo Creek, essentially recirculating the wastewater discharges and urban runoff.

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The Basin is roughly centered on an east-west oriented structural syncline and is thickest in the center and westernmost areas. The Basin is bounded by the low-permeability Conejo Volcanic bedrock on the bottom and the southwestern, southern, and eastern boundaries, where the alluvium pinches out. The northern boundary of the Basin is characterized by the Simi-Santa Rosa fault zone, which has multiple parallel strands of near-vertical faults and is aligned with the Las Posas Anticline; these combined structural features are interpreted to create a hydraulic divide between the adjacent Las Posas Valley Basin to the north.

A key hydraulic feature within the Basin is the Bailey Fault (Figure 3.1-08, discussed in more detail in Section 3.1.3), which acts as a relative barrier to flow, separating the northwestern third of the Basin from the rest of the Basin and dividing the Basin into two management areas: the ASRGSA management area and the FCGMA management area (Section 3.4). The lower groundwater-producing zone on the north side of the Bailey Fault (i.e., the FCGMA management area) has been interpreted to contain the Fox Canyon Aquifer. On the south side of the Bailey Fault (i.e., the ASRGSA management area), the lower groundwater-producing zone is interpreted to be a combination of the Fox Canyon and an HSU termed "Miocene Undifferentiated Sedimentary Rocks," which has previously been identified as the Santa Margarita Formation, and contains unconsolidated and consolidated sedimentary rocks derived from volcanics.

To help facilitate discussion of the HCM, the Basin is also segregated into two halves: the western half and the eastern half (Figure 3.1-08, Section 3.1.3), which is based on the Basin thickness and the HSUs present:

1) The western half of the Basin includes areas north and south of the Bailey Fault where the Basin is generally greater than ~700 ft thick, and there is a clear distinction between the upper and lower groundwater-producing zones. This half of the Basin also includes both the ASRGSA and FCGMA management areas.
2) The eastern half of the Basin includes areas where the Basin is generally less than ~700 ft thick, is pinching out toward the south and east, and lacks distinction between the upper and lower groundwater-producing zones. This half of the Basin includes only the ASRGSA management area.

Inflow into the Basin comes from mountain-block fracture flow from the Conejo volcanics from the south and east, infiltration of streamflow, recharge as infiltration of precipitation and agricultural and urban aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems.

Previous studies state that the ASRVGB is comprised of a single unconfined aquifer system (MWH, 2013) but have separated the water-bearing formations into four groups: 1) alluvium and terrace deposits, 2) Saugus and San Pedro Formations, 3) Santa Margarita Formation, and 4) Conejo volcanics (Boyle, 1987, 1997; Camrosa, 2010; MWH, 2013).

Six distinct HSUs were developed for the HCM and numerical groundwater model and consist of five layers of sedimentary units and the sixth bottom layer representing the bedrock basement (Figure 3.1-09). The six HSUs primarily pertain to the western half of the Basin (see Figures 3.1-08 and 3.1-10b), where the Basin is generally greater than ~700 ft thick. Electrical-log signatures which indicated the lithology is either mostly fine-grained (i.e., silt and clay) or coarse-grained (i.e., sand and gravel) were correlated with the lithologic logs and well screen information to delineate the layer elevations and primary aquifers. The HSUs are less distinct in the east, and the aquifer behaves as one hydraulically connected system in this region. The HSU layers for the western half of the Basin can be observed in the cross sections (Figures 3.1-10a and 3.1-10b), and are summarized below:

1. Layer 1 is assigned to the recent alluvium for the Basin. Shallow groundwater is present in this layer in the vicinity of the Arroyo Conejo and Conejo Creek and is sourced primarily from wastewater flows (discharges from the Hill Canyon WWTP) and urban runoff from Conejo Valley in the Arroyo Conejo where the creek enters the Basin; however, this layer is not a groundwater-producing zone (see Section 3.1.3.2). ~~Layer 1 is assigned to the recent alluvium for the Basin.~~
2. Layer 2 is assigned to the older alluvium and finer-grained units observed for the upper Saugus/San Pedro Formations and forms a semi-confining unit between the recent alluvium (layer 1) and an upper groundwater-producing zone (layer 3).
3. Layer 3 is assigned to the coarse-grained units and associated screened intervals observed in the Saugus/San Pedro Formations that constitute an upper groundwater-producing zone.
4. Layer 4 is assigned to a thick fine-grained semi-confining unit observed between the upper (layer 3) and lower (layer 5) groundwater-producing zones.
5. Layer 5 is assigned to the Fox Canyon Aquifer (base of the Saugus/San Pedro Formation) and includes the underlying Upper Miocene Undifferentiated Sedimentary Rocks (present primarily on the southeast side of the Bailey Fault), that constitute a lower groundwater-producing zone.
6. Layer 6 is assigned to the Conejo volcanics that underlies the Basin.

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The eastern half of the Basin (see Figures 3.1-08 and 3.1-10b) has less detail from lithologic logs and electrical logs compared to the western half of the Basin. The eastern half of the Basin does not show the same distinct hydrostratigraphy as the western half, primarily due to the reduced thickness and pinching out of the more prominent alternating fine- and coarse-grained layers observed in the western half. The eastern half of the Basin is generally characterized by a thin recent alluvium deposited on finer-grained units directly overlying either the Miocene Undifferentiated Sedimentary Rocks or the Conejo volcanics. Much of the groundwater production from the Basin appears to be from the Saugus and/or San Pedro Formations (which is interpreted to include the Fox Canyon Aquifer at the base of the Formation both northwest and southeast of the Bailey Fault), and the Miocene Undifferentiated Sedimentary Rocks (also known as the Santa Margarita and other Formations [see Section 3.1.2.1], i.e., Layers 3 and 5 described

3.2.6 Interconnected Surface Water Systems [§354.16(f)]

§354.16 Groundwater Conditions. *Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:*

(f) *Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.*

The surface water systems within the ASRVGB are described in detail in Section 3.1.1.1, and include the Arroyo Santa Rosa, Santa Rosa Tributary, Arroyo Conejo, and Conejo Creek. The Arroyo Santa Rosa and the Tributary are ephemeral streams and are concrete or rip-rap lined for much of their reaches (Figure 3.1-05). In addition, historical depth to groundwater measurements in wells located adjacent to these streams are typically deeper than ~20 ft, particularly in the past 10 years, indicating that groundwater is disconnected from these streams. The Arroyo Conejo and Conejo Creek are interconnected with shallow groundwater, interpreted based on available groundwater level data and numerical modeling results (Appendix G). Figures 3.2-08a through 3.2-08c depict the modeled interconnected reaches of the streams under dry, normal, and wet conditions, and indicate the Arroyo Santa Rosa and Tributary are primarily dry or disconnected from the groundwater and are losing to the groundwater with some intermittently connected reaches during stormflow events (Figure 3.2-08c). The Arroyo Conejo and Conejo Creek are predominantly interconnected and losing with gaining reaches where the groundwater levels are very shallow where the Arroyo Conejo enters the Basin and reaches of the Conejo Creek in the southwest area of the Basin (see Figures 3.2-08a through 3.2-08c) and where shallow groundwater tends to mound up. The quantified gains and losses from the streams are presented in the Water Budget Section 3.3 and discussed in further detail below. The Arroyo Conejo and Conejo Creek surface water system is perennial due to a constant source of water from the Hill Canyon WWTP effluent and additional surface water flow from the North and South Fork Arroyo Conejo streams that drain Conejo Valley. For the past 10 years, the Hill Canyon WWTP effluent has made up an average of 80% of total summer surface water streamflow, based on measured flows at the Confluence Flume gaging station (Figure 3.1-05). Baseflows are relatively constant year to year due to the relatively constant discharges from the Hill Canyon WWTP.

GSP Emergency Regulations §354.28(c)(6) specifies that depletions of ISW are specific to reductions in surface water flow caused by groundwater use (i.e., pumping). The streamflow losses described above are not directly related to pumping; the basin naturally receives water from Arroyo Conejo and Conejo Creek in higher elevation areas and discharges it back to the Conejo Creek in lower elevation areas downgradient. The conceptual model for the interconnection between the perennial surface water and shallow groundwater is depicted on Figure 3.2-09 and is summarized by the following points:

1. The shallow groundwater is recharged by the Arroyo Conejo and Conejo Creek, of which perennial flows are primarily sourced by discharges from the Hill Canyon WWTP and urban runoff from Conejo Valley,

2. Gaining sections of the Arroyo Conejo and Conejo Creek receive shallow groundwater that is primarily recirculated recycled water and urban runoff,

3. Riparian vegetation along the Arroyo Conejo and Conejo Creek depends on the surface water and/or shallow groundwater fed by wastewater discharges and Conejo Valley urban runoff (see Section 3.2.7.2),

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4. Groundwater production does not occur within the shallow groundwater system,

5. The shallow groundwater is mostly separated from the Upper Aquifer by a semi-confining fine-grained unit (HSU Layer 2; see Section 3.1.3) and has a predominantly downward vertical gradient; however, nearby groundwater extraction from the principal aquifers is demonstrated to deplete the ISW by a minor amount (see discussion below and Appendix G).

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Response to comment #9

The total depletions of ISW were evaluated based on the streamflow losses to the groundwater within the Basin using results from the baseline historical numerical model (Appendix G). Net streamflow losses to groundwater averaged ~1,160 AFY for the historical period. Of this, approximately 383 AFY (33%) came from losing but disconnected reaches along Arroyo Santa Rosa and the Arroyo Santa Rosa Tributary. The remaining 777 (67%) came from Arroyo Conejo (340 AFY) and Conejo Creek (437 AFY). Since the Arroyo Santa Rosa and its tributary are disconnected, pumping-related depletions are not pertinent to these surface water bodies. Arroyo Conejo and Conejo Creek are mostly connected but could get disconnected during dry conditions. Figure 3.2-10~~09~~ shows the monthly losses from Arroyo Conejo and Conejo Creek for connected and disconnected reaches. Results indicate that losses from disconnected reaches along the Arroyo Conejo and Conejo Creek are a very minor component (averaging ~16 AFY during the historical period). The average streamflow losses for the connected reaches of the Arroyo Conejo and Conejo Creek are ~762 AFY, and the maximum annual rate is ~932 AFY – this value is considered an upper bound for the historical depletions of ISW.

The average losses of ~762 AFY from the interconnected reaches along Arroyo Conejo and Conejo Creek consist of two components: a) direct depletion of surface water by pumping, occurring due to the drawdown cone from proximal pumping wells extending into the streambed and b) potential indirect depletion of surface water due to regional groundwater levels being lower from basin-wide pumping. The numerical model was used to estimate direct depletion of the Arroyo Conejo and Conejo Creek due to pumping by comparing streamflows under the baseline historical period with streamflows from an alternative historical simulation *without* any groundwater extraction from proximal wells (within 1,000 ft) along the Arroyo Conejo and Conejo Creek (all other recharge/discharge processes were kept the same as the calibrated historical model). The difference in streamflows is indicative of direct depletion of surface water due to groundwater pumping. Four extraction wells (see inset map on Figure 3.2-11~~10~~) were removed for the alternative model and the reduction in extraction rates during the historical period ranged from ~211 AFY to ~343 AFY, averaging ~273 AFY. Figure 3.2-11~~10~~ and Table 3.2-01 summarize historical surface water flow and streamflow depletions for the Arroyo Conejo and Conejo Creek and show a maximum depletion of ~0.19 cfs (~136 AF/month), with an average of ~0.1 cfs (~74 AFY). Hence, of the 762 AFY of total losses from the Creek and Arroyo, an average of 74 AFY was from direct depletion of surface water from historical pumping in proximal wells.

The remaining 688 AFY can potentially be attributed to indirect depletion. These depletion amounts are <1% of the average streamflow flowing out of the Basin during the historical period (19,843 AFY; see Section 3.3.1.2); therefore, impacts to the surface water due to depletion from ISW are considered negligible. Beneficial users relying on surface water diversions from the Conejo Creek downstream (outside of the Basin) have historically met their demands and streamflow bypass requirements and no undesirable results have been documented; therefore, the depletions of ISW sustainability indicator does not appear to be of great importance. However, given the indication from model results that depletions of ISW are in part due to extraction wells located adjacent to the creeks and the regional lowering of groundwater levels, this GSP includes a plan to monitor and evaluate the depletions of ISW due to pumping (see Section 4.9). Future depletions of ISW in Arroyo Conejo and Conejo Creek will be monitored, assessed, and (if found to be significant) managed to ensure that beneficial uses of surface water do not have significant and unreasonable impacts.

3.2.7 Groundwater Dependent Ecosystems [§354.16(g)]

§354.16 Groundwater Conditions. *Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:*

(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.

3.2.7.1 Assessment of Groundwater Dependent Ecosystems

This section describes the current best available information concerning potential GDEs in the Basin. This understanding is primarily informed by regional information collected from sources including (1) The Nature Conservancy (TNC) and DWR statewide database of indicators of groundwater dependent ecosystems (iGDEs) and supporting data and documentation, (2) descriptions of vegetation alliances from the USDA's Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) which generally correspond with the Natural Communities Commonly Associated with Groundwater (NCCAG) classifications discussed below, (3) review of available reports and studies, and (4) review of aerial photos. Ecosystem and vegetation species data specific to the ASRVGB is limited; however, where possible, effort was made to provide information specific to the ASRVGB (Figure 3.2-1211). This GSP describes the riparian vegetation observed within the Basin, which is not considered a beneficial user of groundwater.

3.2.7.2 Riparian Vegetation

Figure 3.2-1211 shows wetlands and vegetation species identified for the Basin based on NCCAG classifications, which consists of three types: (1) red willow, (2) giant reed, and (3) California sycamore. In addition, the GSAs identify the Salix laevigata-Salix lasiolepis Superalliance as a vegetation species within the Basin (CDFW 2023; DWR 2023). The Sycamore is mapped in a limited area along the Arroyo Santa Rosa and was not included due to the observed groundwater levels being consistently deeper (>20 ft) than the typical root depth for the tree of ~6 ft (Spengler, 2020; USDA, 2022). The red willow and giant reed were determined to be surface water dependent, due to the perennial surface water flows of the Arroyo Conejo and Conejo Creek and verification through air photos (Figures 3.2-13a12a through c). The aerial photos indicate there are reaches of the Arroyo Conejo and Conejo Creek channels that had little to no vegetation prior to the construction of the Hill Canyon WWTP in 1961 (which is the current primary source for perennial flows of the surface water system). Figure 3.2-13a12a shows the western reaches of the Conejo Creek and clearly indicates a difference in the amount of vegetation in the circled area, with little to no vegetation seen in the creek prior to the WWTP. Figure 3.2-13b12b shows the eastern reaches of the Conejo Creek and indicates vegetation existed prior to the WWTP, but was much less extensive, especially toward the east as seen in the circled area. Figure 3.2-13c12c shows the Arroyo Conejo reaches within the Basin and indicate vegetation existed prior to the WWTP, but was much less extensive, especially toward the south as seen in the circled area. The California sycamore identified to the northeast near the Arroyo Santa Rosa is likely not dependent on groundwater because the trees are well established and depth to groundwater in this area is typically greater than 20 ft (typical rooting depth), as indicated by continuous measurements in well 02N19W20M04S (see Section 3.2.1).

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As discussed in the Interconnected Surface Water Systems above (Section 3.2.6), the pumping in the groundwater-producing zones near the Conejo Creek is not likely to deplete streamflows; therefore, it is not believed that pumping activity will cause significant or unreasonable stress to the riparian vegetation species (Section 3.2.7.3),, which are dependent on surface water. In summary, the following factors indicate the riparian vegetation is not dependent on groundwater:

1. Historical aerial photos of the Basin show much less vegetation existed along the Arroyo Conejo and Conejo Creek before the Hill Canyon WWTP was operational (Figure 3.2-13a12a through c), which indicates much of the riparian vegetation and wetlands were recruited and maintained as a result of the sustained baseflows from the WWTP effluent.
2. The riparian vegetation does not experience stress during periods of low groundwater levels (e.g., the 2012-2016 drought) due to the sustained baseflows of the Conejo Creek from the effluent of the Hill Canyon WWTP.

Based on these factors, the GSP does not consider the riparian vegetation to be GDEs within the Basin and instead considers these primarily surface-water dependent ecosystems.

3.2.7.3 Sensitive Wildlife Species

Sensitive wildlife species supported by the riparian vegetation habitats identified within the Basin are considered in this GSP. The riparian vegetation habitats include phreatophytes and other vegetation communities such as southern riparian forest, Salix laevigata-Salix lasiolepis Superalliance, palustrine scrub, and valley oak woodland (CDFW 2023; DWR 2023). The southern riparian forest, palustrine scrub, and valley oak woodland vegetation communities are consistent with the red willow, giant reed, and California sycamore described in Section 3.2.7.2 above. The sensitive wildlife species considered in this GSP consist of:

- Least Bell's vireo (Vireo bellii pusillus), which has been listed as an endangered species by the federal Endangered Species Act (ESA) and California Endangered Species Act (CESA),

- The southern pond turtle (Actinemys marmorata pallida), which has been listed as a species of concern by the California species of special concern on the California Natural Diversity Data Base (CNDDB 2023), and

- The arroyo chub (Gila orcutti), which has been listed as a species of concern by the California species of special concern (CNDDB 2023).

Depletion of ISW stressing the riparian phreatophytic vegetation could risk the survival of the above-listed sensitive species; however, the depletion of ISW due to groundwater extraction in the Basin is very minor (Section 3.2.6) and the GSP addresses this depletion which could cause undesirable results including significant and unreasonable effects on riparian habitat (Section 4.9). The GSAs do not have jurisdictional authority over potential impacts from other external sources for the surface water sustaining the riparian vegetation habitats (i.e., land-use changes, surface water flows, or wastewater discharges from the Hill Canyon WWTP); hence, the GSP cannot address or manage any future changes to surface flows (or beneficial use of the same) from increased recycled water demands or other actions that could reduce surface water inflows.

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supplies to meet potable demands over the historical period. Calleguas MWD can draw from MWDSC and water stored in Lake Bard and the Las Posas Aquifer Storage and Recovery Project. These multiple sources provide CMWD options, improving water supply reliability (Calleguas MWD, 2020). Overall, ASRVGB has not faced potable water shortages during the historical period.

Camrosa's non-potable distribution system in the ASRVGB is supplied by Conejo Creek Project water diversions from Conejo Creek downstream of the ASRVGB and recycled water from Camrosa's Water Reclamation Facility. During the historical period, Camrosa's diversions from Conejo Creek have averaged 8,832 AFY, of which 42% was delivered to Pleasant Valley County Water District (Camrosa, 2021). The Camrosa Water Reclamation Facility produces ~1,500 AFY, of which approximately two-thirds are delivered to agricultural customers and one-third is delivered to California State University Channel Islands (Camrosa, 2021). Wastewater effluent from the Hill Canyon WWTP is ~15,000 AFY and is a reliable source of water to Conejo Creek even during periods of drought, given the relatively stable nature of indoor water demands. Camrosa's Conejo Creek Project plans are to continue to divert ~9,000 AFY from the Conejo Creek diversion downstream of the Basin based on a 2013 agreement with the City of Thousand Oaks, which accounts for streamflow losses, environmental protection requirements, bypass, and downstream diversion water rights. An estimation of planned versus actual non-potable water used within ASRVGB by water year during the historical period is provided in Table 3.3-05 and indicates sufficient supplies to meet non-potable demands.

3.3.1.2 Historical Surface Water Budget

§354.18 Water Budget.

(c) Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:

(2) Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:

(B) A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.

Table 3.3-06 and Figure 3.3-02 quantify the historical surface water budget components for the ASRVGB. Surface water flows in the ASRVGB are the result of runoff from precipitation events and perennial flows sourced from discharge from the Hill Canyon WWTP and urban runoff from Conejo Valley. Section 3.1.1.2 provides details on the surface water within the ASRVGB. The primary surface water features include the Arroyo Santa Rosa and its tributary, the Arroyo Conejo, and Conejo Creek (Figure 3.1-05). The Arroyo Santa Rosa and its tributary are ephemeral streams typically exhibiting flows during/after rainstorm events. The Arroyo Conejo and Conejo Creek are perennial streams with sustained flows due to the Hill Canyon WWTP effluent discharges into the creek.

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Surface water inflows leave the basin through Conejo Creek at the western boundary of the ASRVGB and are accounted for in the Stream Outflows term. Stream outflows make up ~92% of the total inflows on average. Stream outflows are consistently less than inflows throughout the historical period indicating that there is a net loss of surface water flows to the groundwater through percolation of streamflow in the losing stream reaches of the Basin (Sections 3.1.3.2 and 3.2.6). There are also reaches within the Arroyo Conejo and Conejo Creek that are gaining, and annual volumes of streamflow losses and gains are

Effects on Agricultural, Municipal, and Domestic Beneficial Uses

Significant and unreasonable depletion of supply for agricultural, municipal, or domestic water is the inability to produce water absent an alternative water supply. Although pumping may exacerbate groundwater level declines during prolonged droughts, there have been no reported instances when a beneficial user was unable to meet their basic water supply needs with either groundwater or delivered water supplies. Therefore, it was concluded that significant and unreasonable effects have not occurred historically with respect to the groundwater levels sustainability indicator for agricultural, municipal, or domestic beneficial uses, but could potentially occur if groundwater levels decline below historically low levels in the future. It is noted that there is only one domestic well located in the Basin and the well owner could connect to Camrosa WD if the well is ever unable to provide adequate water domestic supply.

Potential Effects on Land Uses and Property Interests

Potential effects on land uses and property interests include decreased property values resulting from increased costs to purchase water in amounts that are significantly greater than have occurred historically. Increased water costs could cause changes in cropping patterns and acreage planted, which may also impact land values. As discussed in Section 2.2.3.1, agricultural land and open space in the Basin is subject to the County of Ventura SOAR voter initiatives currently approved through 2050 (SOAR, 2015). The SOAR initiatives require a majority vote of the people to rezone unincorporated open space, agricultural, or rural land for development. The existence of SOAR makes it very unlikely that agricultural land could be developed. Therefore, it is important to ensure that agricultural beneficial uses of groundwater are protected by the minimum thresholds because there is no practical alternative land use for most agricultural land in the Basin. Absent groundwater supplies, agricultural property values would likely be significantly impacted. The impact on property values for other land uses and property uses in the Basin is less directly tied to groundwater because the Camrosa WD (water supplier for majority of the non-agricultural areas of the Basin) has a diverse water supply portfolio that includes multiple supplies derived from sources located outside of the Basin.

Effects on Groundwater Dependent Ecosystems

As summarized in Section 3.2.7, riparian vegetation identified along Arroyo Conejo and Conejo Creek are considered to be dependent on perennial surface water discharges from the Conejo Valley and the Hill Canyon WWTP, and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon. Therefore, there are no GDEs to consider. However, the GSP does address depletions of ISW that could cause undesirable results including significant and unreasonable effects on riparian habitat (Section 4.9.1).

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Cause of Groundwater Conditions That Could Lead to Undesirable Results [§354.26(b)(1)]

The cause of groundwater conditions that could lead to undesirable results would be pumping that causes groundwater levels to decline below the deepest levels historically observed.

The following factors could cause or contribute to groundwater levels declining to such levels:

1. Groundwater extractions, particularly extraction rates that exceed the sustainable yield of the basin.
2. Droughts that exceed the duration and severity of droughts included in the hydrologic period used for the projected water budget analysis.

average outflow for Pleasant Valley Basin. Moreover, the FCGMA GSP for Pleasant Valley Basin (FCGMA, 2019; UWCD, 2021) assumed a no-flow boundary between the two basins because the flow across the boundary was considered negligible; hence the SMC for the ASRVGB and the Pleasant Valley Basin GSPs are essentially independent of each other.

4.4.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users [§354.28(b)(4)]

§354.28 Minimum Thresholds.
(b) *The description of minimum thresholds shall include the following:*
(4) *How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.*

The chronic lowering of groundwater levels minimum thresholds may have effects on beneficial users and land uses in the Basin:

Groundwater Beneficial Users (All Types): The minimum thresholds seek to prevent significant and unreasonable depletions of groundwater supply, which will prevent significant operational and financial burdens associated with purchasing additional imported Calleguas MWD potable water than has been necessary historically. Modeling projections for the GSP suggest that the minimum thresholds may be occasionally exceeded at some monitoring locations (Appendix J). However, the criterion for undesirable results (more than 50% of wells with water levels below minimum thresholds for either management area for 2 consecutive years) is not predicted to be triggered during the 50-year GSP implementation period, meaning that pumping reductions, any projects, or other management actions will not be needed to avoid undesirable results for this sustainability indicator. Therefore, the minimum thresholds for this sustainability indicator are not anticipated to limit beneficial uses of groundwater.

Land Uses and Property Interests (All Types): The minimum thresholds seek to prevent significant and unreasonable effects on land uses and property interests by preventing significant operational and financial burdens associated with procuring more imported Calleguas MWD potable water than has been necessary historically, thereby helping maintain property values. As discussed in Section 2.2.3.1, agricultural land and open space in the Basin is subject to the County of Ventura SOAR voter initiatives currently approved through 2050 (SOAR, 2015). The SOAR initiatives require a majority vote of the people to rezone unincorporated open space, agricultural, or rural land for development. The existence of SOAR makes it likely that land use in the Basin would not change significantly in the future. Therefore, it is important to ensure that agricultural beneficial uses of groundwater are protected by the minimum thresholds because there is no practical alternative land use for most agricultural land in the Basin. Absent groundwater supplies, agricultural property values would likely be significantly impacted. The impact on property values for other land uses and property uses in the Basin is less directly tied to groundwater because Camrosa WD (water supplier for the non-agricultural areas of the Basin) has a diverse water supply portfolio that includes multiple supplies derived from sources located outside of the Basin.

Effects on Groundwater Dependent Ecosystems: As summarized in Section 3.2.7, riparian vegetation identified along Arroyo Conejo and Conejo Creek are considered to be dependent on perennial surface water discharges from ~~the~~ Conejo Valley and the Hill Canyon WWTP, and urban runoff from Conejo Valley, both of which enter the Basin via Hill Canyon~~Wastewater Treatment Plant~~; therefore, there are no GDEs to consider. However, the GSP does address depletions of ISW that could cause undesirable results including significant and unreasonable effects on riparian habitat (Section 4.9).

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that would be caused by depletions of ISW. The GSAs have considered public trust resources in development of this GSP by considering the impacts to riparian and aquatic habitats, and by setting minimum thresholds designed to prevent undesirable results under SGMA.

When considering ISW depletion effects, it is important to note that the GSAs are only responsible for addressing effects caused by pumping or GSP projects or management actions. The GSAs doare not have jurisdictional authority over potential impacts from other external sourcesresponsible for the total amount of surface water sustaining the riparian vegetation habitats (i.e., land-use changes, surface water flows, or wastewaterflowing at any given time that are more driven by hydrology and anthropogenic discharges from the Hill Canyon WWTP); hence, the GSP cannot address or manage any future changes to surface flows (or beneficial use of the same) from increased recycled water demands or other actions that could reduce surface water inflows into the Basin..

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As discussed in Section 3.3, surface water percolation is a significant inflow component of the water balance for the Basin (see Figure 3.3-02). Although inflows are generally constant for the Basin regardless of climate conditions, drier years can reduce inflows primarily due to less streamflow percolation from stormflows. During prolonged droughts, lowering of groundwater levels and reduction of groundwater storage caused by pumping could have potential impacts on streamflow.

Identified potential beneficial surface water uses of the surface water bodies within and downstream of the Basin include those that have been identified in the RWQCB Basin Plan (RWQCB-LA, 2019):

1. Municipal Supply
2. Agricultural Supply
3. Warm Freshwater Habitat
4. Cold Freshwater Habitat
5. Wildlife Habitat (terrestrial)
6. Migration of Aquatic Organisms
7. Spawning, Reproduction, and/or Early Development
8. Wetland Habitat

Within the Basin there areis riparian vegetation habitats dependent on discharges to surface water and the associated shallow groundwater that is sustained by these discharges (Sections 3.2.6 and 3.2.7),, but currently there are no active diversions for municipal or agricultural supply. Water Rights Decision 1638 (SWRCB, 1997) addresses diversion rights that are located within the Basin, and Camrosa WD provides water for and sets the rates for these water rights holders (see Section 2.2.2.2). The following beneficial users were identified downstream of the Basin:

1. Surface Water Diversions for Municipal Water Supply – this includes non-potable water uses for irrigation purposes
2. Surface Water Diversions for Agricultural Irrigation Supply

Surface water diversions from the Conejo Creek are located downstream, outside of the Basin, and include the City of Thousand Oaks water rights pertaining to the Conejo Creek Project diversion (see Section 3.3.1.1). The Conejo Creek Project diversion is managed by Camrosa and activities are reported to the City of Thousand Oaks to file annual reports to the SWRCB. Beneficial users relying on surface water diversions

4.9.2.4 Impact of Minimum Thresholds on Beneficial Uses and Users *[§354.28(b)(4)]*

§354.28 Minimum Thresholds. ***(b)*** *The description of minimum thresholds shall include the following:* ***(4)*** *How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.*

The ISW depletions minimum threshold may impact agricultural and municipal beneficial uses of surface water because addressing depletions may result in decreased water supply for these beneficial uses and/or increased costs.

Riparian vegetation identified along Arroyo Conejo and Conejo Creek are considered to be dependent on perennial surface water discharges from Conejo Valley and the Hill Canyon WWTP and urban runoff from Conejo Valley. The minimum thresholds for the depletion of ISW are protective of impacts that could cause undesirable results including significant and unreasonable effects on riparian habitat.

Public trust resources were also assessed in development of this GSP by considering the impacts to riparian and aquatic ecosystems, and by setting minimum thresholds designed to prevent undesirable results under SGMA.

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4.9.2.1 Current Standards Relevant to Sustainability Indicator [§354.28(b)(5)]

§354.28 Minimum Thresholds. ***(b)*** *The description of minimum thresholds shall include the following:* ***(5)*** *How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.*

The GSAs are unaware of any federal, state, or local standards for ISW depletion.

4.9.2.2 Measurement of Minimum Thresholds [§354.28(b)(6)]

§354.28 Minimum Thresholds. ***(b)*** *The description of minimum thresholds shall include the following:* ***(6)*** *How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.*

As provided for in SGMA, undepleted flows will be determined through a combination monitoring and modeling using the numerical flow model (Appendix G). The surface water flow monitoring network is described in Section 5.8.

8.0 References and Technical Studies [§354.4(b)]

§354.4 General Information.
(b) *Each Plan shall include the following general information: A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public.*

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Department of Water Resources (DWR), California. 2016c. Best Management Practices for the Sustainable Management of Groundwater—Monitoring Protocols, Standards, and Sites BMP, December.

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Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix G

Technical Memorandum

Arroyo Santa Rosa Valley Groundwater Basin Numerical Model Construction, Calibration, and Predictive Modeling Documentation

TECHNICAL MEMORANDUM

To: Arroyo Santa Rosa Groundwater Sustainability Agency (ASRGSA)

From: Abhishek Singh, PhD, PE; Nathan Hatch; Erick Fox; Steven Humphrey, PG; INTERA Incorporated
Bryan Bondy, PG, CHG; Bondy Groundwater Consulting, Incorporated

Date: June 2023

Re: **Arroyo Santa Rosa Valley Groundwater Basin Numerical Model Construction, Calibration, and Predictive Modeling Documentation**

1.0 INTRODUCTION

This technical memorandum provides the documentation for the numerical model constructed and calibrated for development of the groundwater sustainability plan (GSP) for the Arroyo Santa Rosa Valley Groundwater Basin (ASRVGB).

The Sustainable Groundwater Management Act (SGMA) requires all groundwater and surface water models used for a GSP to meet the following standards (CCR 352.4(f)):

(1) The model shall include publicly available supporting documentation.

(2) The model shall be based on field or laboratory measurements, or equivalent methods that justify the selected values, and calibrated against site specific field data.

(3) Groundwater and surface water models developed in support of a Plan after the effective date of these regulations shall consist of public domain opensource software.

The ASRVGB Model addresses the above-listed SGMA requirements. This memorandum provides the required supporting documentation. The model utilizes publicly available Unites States Geological Survey (USGS) public-domain code MODFLOW and was developed using best available science and data for the ASRVGB, including basin-specific groundwater field data such as geologic/lithologic data, geophysical data, streamflow, and groundwater levels. The ASRVGB Model simulates key surface water and groundwater processes within the ASRVGB and simulates three-dimensional, transient groundwater levels and flows within the Basin. The model was calibrated to available historical (Water Years 2012 - 2021) groundwater levels and streamflow data and exceeds industry calibration standards. The model development and calibration process followed ASTM International (ASTM) standards D5447[1] and D5891[2].

The calibrated ASRVGB Model was used to assess historical (Water Years 2012 - 2021) groundwater levels, flows and depletions of interconnected surface water from Conejo Creek, Arroyo Conejo, and Arroyo Santa Rosa, and develop the historical water budget for the GSP. In addition, climate change datasets (provided by California Department of Water Resources (DWR) for SGMA planning purposes) and projections for future water use and pumping were incorporated into the model to develop predictive scenarios to assess the future water levels, river flows and depletions, and groundwater budget, as required by SGMA and the GSP Emergency Regulations.

This memorandum is organized as follows:

- Section 1 – Introduction
- Section 2 – Basin Setting and Hydrogeology
- Section 3 – Model Design
- Section 4 – Model Domain
- Section 5 –Model Discretization and Simulation Period
- Section 6 – Model Boundary Conditions
- Section 7 – Initial Heads
- Section 8 – Model Hydraulic Properties
- Section 9 – Model Calibration
- Section 10 – Model Results
- Section 11 – Predictive Model
- Section 12 – Model Uncertainty and Limitations
- Section 13 – References

2.0 BASIN SETTING AND HYDROGEOLOGY

The hydrogeologic conceptual model (HCM), including the basin setting, hydrogeology, and water budget, are described in detail in Section 3 of the GSP. Key figures from GSP Sections 3.1 and 3.2 are included here for reference. Key aspects of the HCM relevant to model development and calibration are summarized below:

- The ASRVGB is located within the Lower Conejo Watershed in southern Ventura County, which is part of the larger Calleguas Creek Watershed. The ASRVGB is in an elongated east-trending valley, just north of the City of Thousand Oaks and east of the City of Camarillo. The Lower Conejo watershed is bounded by the Las Posas Hills on the north, the Conejo Hills on the south,

[1]ASTM D5447: Standard Guide for Application of a Numerical Groundwater Flow Model to a Site-Specific Problem
[2]ASTM D5981: Standard Guide for Calibrating a Groundwater Flow Model Application

the Tierra Rejada Basin on the east, and the Pleasant Valley on the west. The ASRVGB occupies approximately 6.1 square miles of the watershed.

- The Basin is roughly centered on an east-west oriented structural syncline and is thickest in the center and westernmost areas. The Basin is bounded by the low-permeability Conejo Volcanic bedrock on the bottom, southern, and eastern boundaries, where the alluvium pinches out. The northern boundary of the Basin is characterized by the Simi-Santa Rosa fault zone, which has multiple parallel strands of near-vertical faults and is aligned with the Las Posas Anticline; these combined structural features are interpreted to create a hydraulic divide between the adjacent Las Posas Valley Basin to the north. Figure 2.1 shows the surface geology and major fault systems within and surrounding the ASRVGB.
- The ASRVGB consists of multiple layers of alternating fine- and coarse-grained unconsolidated and semi-consolidated deposits, and consolidated formations underlain by volcanic bedrock. The aquifer system is semi-confined and is characterized by distinct upper and lower groundwater-producing zones in the west, with the stratification absent or not apparent to the east. Available water quality data, namely for nitrate, indicate there is significant hydraulic communication between the upper and lower groundwater-producing zones in portions of the Basin (especially to the east where the stratification is not apparent). Figure 2.2 shows the geologic and hydrostratigraphic units and their model layer representations. Cross sections created from the model layers are shown in Figures 2.3a and 2.3b.
- A key hydraulic feature within the Basin is the Bailey Fault, which acts as a relative barrier to flow, separating the northwestern third of the Basin from the rest of the Basin. The lower groundwater-producing zone on the north side of the Bailey Fault has been interpreted to contain the Fox Canyon Aquifer. On the south side of the Bailey Fault, the lower groundwater-producing zone is interpreted to be a combination of the Fox Canyon Aquifer and a hydrostratigraphic unit termed "Miocene Undifferentiated Sedimentary Rocks," which has previously been identified as the Santa Margarita Formation, and contains unconsolidated and consolidated sedimentary rocks derived from volcanics.
- Inflow into the Basin comes from recharge as agricultural and landscape return flows, septic return flows, water distribution system losses, mountain-front recharge from the north, mountain-block fracture flow from the Conejo volcanics from the south and east, and infiltration of precipitation and streamflow.
- The surface water system is mapped in Figure 2.4, consisting of Conejo Creek and its tributaries. The Arroyo Santa Rosa and Tributary recharge the groundwater system to the east, the Arroyo Conejo recharges the groundwater where it enters the Basin in the southern area, Conejo Creek recharges the groundwater but also has reaches (in the west where the Creek exits the Basin) where groundwater can discharge to Conejo Creek. Flow conditions and areas with salient surface water/groundwater interactions are discussed in detail in GSP Sections 3.1 and 3.2.

3.0 MODEL DESIGN

MODFLOW-NWT (Niswonger et al., 2011) was selected as the numerical code for the ASRVGB Model. MODFLOW is a finite-difference groundwater-flow code that solves the three-dimensional form of the continuity equation that governs flow through saturated porous media. The benefits of using MODFLOW include (1) MODFLOW incorporates the necessary physics of groundwater flow, which are the bases for the HCM (described in Sections 3 to 5 of this report); (2) MODFLOW is the most widely accepted groundwater flow code in use today; (3) MODFLOW was written and is supported by the USGS and is public domain; (4) MODFLOW is well documented (Harbaugh et al., 2000); (5) MODFLOW has a large user group; and (6) there are several mature graphical user interface programs written for use with MODFLOW.

MODFLOW-NWT is a Newton-Raphson formulation for MODFLOW-2005 (Harbaugh, 2005), which improves the solution of the unconfined groundwater flow systems. MODFLOW-NWT treats nonlinearities of cell drying and rewetting by use of a continuous function of groundwater head (even under unsaturated conditions), rather than the discrete approach of drying and rewetting used by earlier versions of MODFLOW. Unlike older versions of MODFLOW that either inactivated unsaturated cells or used rewetting functions (that can introduce mass-balance errors and numerical instabilities), MODFLOW-NWT uses the "Upstream-Weighting" (UPW) package to calculate intercell conductance, hydraulic heads, and flow in (but not out of) unsaturated cells. MODFLOW-NWT was selected to simulate unconfined groundwater flow conditions. The solver used for the model was the Orthomin/stabilized conjugate-gradient χMD solver. Default values for solver settings, corresponding to "complex" models (see Niswonger et al., 2011, for details) were chosen for this model. Head- and flux-convergence tolerance were set at 0.1 feet (ft) and 7500 cubic feet per day (ft^3/day), respectively.

The MODFLOW datasets were developed to be compatible with Groundwater Vistas for Windows Version 8.04 (Rumbaugh and Rumbaugh, 2017). Groundwater Vistas was used to visualize model properties and results. Changes to static model properties (such as hydraulic conductivities and storage coefficients) were made in Groundwater Vistas. Spatio-temporal input packages—Stream Flow River (SFR), Well (WEL), General Head Boundary (GHB), and Recharge (RCH)—were created and modified using Python scripts outside Groundwater Vistas. Since the model utilizes input packages created outside Groundwater Vistas, it was run outside Groundwater Vistas using the Windows Command Prompt and the MODFLOW-NWT executable.

4.0 MODEL DOMAIN

The ASRVGB is bounded on the north by the Simi-Santa Rosa Fault Zone, which cuts through the Las Posas Hills (Jennings and Strand, 1969; DWR, 2003), on the east and south by the Conejo volcanics, and on the west by the Pleasant Valley Basin, where a constriction occurs in the alluvium (GSP Section 3.1.2.1). Figures 4.1a and 4.1b show the lateral model domain and the active areas within the model domain, where groundwater levels and flow are simulated. (See Section 5.0 for details on model layering). The original basin boundary of the ASRVGB was delineated in Bulletin 118 in 2003 (DWR, 2003). The boundary was modified (Stantec, 2018), and the modification was approved by DWR in 2019. The active model boundary corresponds to the 2018 DWR Basin boundary within the limits of the model's 100-ft grid cell dimensions. Model grid cells in the northern portion of layer 1 were inactivated to improve model convergence and run-times, as this area consistently had dry cells during preliminary model runs.

The vertical extent of the model was defined based on the thickness of the alluvium and undifferentiated sedimentary deposits overlying the Conejo volcanics bedrock unit, which forms the base of the ASRVGB (as described in GSP Section 3.1.2.1 and 3.1.3.1). The top of layer 1 represents ground surface elevation, based on a 10-meter (m) digital elevation model [DEM] (Figure 4.2; USGS, 2019). The bottom of layer 5 represents the interface between the alluvium/sedimentary and the underlying Conejo volcanics. Figure 4.3 shows the bottom of the alluvium/sedimentary units and the top of bedrock (bottom of layer 5). An additional layer (layer 6) was included in the model to simulate pumping and fractured bedrock inflow (from generalized head boundaries, as described below) from the Conejo volcanics. There is not sufficient data to characterize the thickness of the bedrock. As such, the thickness of layer 6 was nominally set at 100 ft for most of the model domain. Note, this layer is not meant to represent the entire thickness of the bedrock unit, and only acts as a boundary layer to allow for groundwater flow from bedrock into wells completed in the bedrock and inflow to the alluvial/sedimentary units. Figure 4.4 shows the thickness of the ASRVGB model (inclusive of the nominal bedrock thickness).

5.0 MODEL DISCRETIZATION AND SIMULATION PERIOD

MODFLOW requires a rectilinear grid. Figure 5.1 shows the model grid used for the ASRVGB Model. The ASRVGB model grid has a north-south/east-west orientation, with an origin at 1,916,381.876 ft northing and 6,269,913.565 ft easting in the California State Plane, North American Datum of 1983 (NAD 83), Zone 5 coordinate system. The grid spacing is 100 ft by 100 ft across the entire model domain. The model has 134 rows, 286 columns, and 6 layers for a total of 229,944 cells; 98,400 of which are active.

Given the hydrogeology of the ASRVGB, the model was split into six layers. Table 5.1 shows the model layer, layer type, and active cells for all model layers. Figure 2.2 shows the correspondence of the model layers with the various geologic and hydrostratigraphic units. These are summarized below:

- Layer 1 represents the shallow (less than 250-ft deep) Holocene-age alluvium. Note, northern portions of this layer were inactivated in areas where dry cells were consistently encountered during preliminary model runs. Figures 5.2a and 5.2b show the top and the thickness of layer 1.
- Layer 2 represents the top half of the upper groundwater-producing zone consisting of the Saugus/San Pedro formation. The upper portions of the Saugus/San Pedro formation tend to be lower permeability in the western portion of the basin and is undifferentiated from the other alluvial/sedimentary deposits to the east. Figures 5.3a and 5.3b show the top and the thickness of layer 2.
- Layer 3 represents the bottom half of the upper groundwater-producing zone consisting of the Saugus/San Pedro formation. This is the interval where most wells completed in the Saugus/San Pedro formation are screened. This interval tends to be higher permeability in the western portion of the basin and is undifferentiated from the other alluvial/sedimentary deposits to the east. Figures 5.4a and 5.4b show the top and the thickness of layer 3.
- Layer 4 represents a distinct low-permeability clay interval (separating the Saugus/San Pedro from the underlying Fox Canyon Aquifer) in the west, which terminates and is undifferentiated from the other alluvial/sedimentary deposits to the east. Figures 5.5a and 5.5b show the top and the thickness of layer 4.
- Layer 5 represents the lower groundwater-producing zone consisting of the Fox Canyon Aquifer and portions of the Miocene Undifferentiated Sedimentary Rocks. Most of the groundwater

wells in the Basin are screened in this layer. Figures 5.6a and 5.6b show the top and the thickness of layer 5.

- Layer 6 represents the upper portions (100 ft or less) of the Miocene-age Conejo volcanics, which are in hydraulic communication with the overlying Fox Canyon and Santa Margarita formations. Figures 5.7a and 5.7b show the top and the thickness of layer 6.

The historical model simulates (and was calibrated to) surface water flow and groundwater level data from October 2011 to September 2021. This period was chosen as it was the most recent 10-year period with the reliable data for Camrosa Water District (Camrosa WD) deliveries, which were necessary to estimate return flows and pumping outside the Fox Canyon Groundwater Management Agency (FCGMA) area (as discussed in Sections 6.1.2 and 6.5).

Model stress periods represent time intervals when transient inputs (such as streamflows) and boundary conditions (such as pumping) are held constant. Inputs and boundary conditions can change from one stress period to another. Monthly stress periods were used for the entirety of the historical model, leading to a total of 120 stress periods. By default, each stress period used four time steps (with up to 500 iterations to solve for groundwater heads and flows for each time step).

6.0 MODEL BOUNDARY CONDITIONS

The ASRVGB model includes appropriate boundary conditions to represent flows into or out of the groundwater basin. These are summarized below:

- The MODFLOW Recharge (RCH) package (Harbaugh et al., 2000; Harbaugh, 2005), which applies a specified rate of recharge for each model stress period, was used to simulate areal recharge to the groundwater system from percolating precipitation (discussed in Section 6.1.1) and return-flows (discussed in Section 6.1.2).
- The ASRVGB is conceptualized to get a small amount of mountain-front recharge from the Las Posas Hills in the north (GSP Section 3.1.3.1). These are represented by specified flux cells as part of the MODFLOW Well (WEL) package (discussed in Section 6.2). The specified flux cells were added to layer 3, as that was the primary exposed layer along the mountain front.
- Fractured bedrock inflows are conceptualized to flow into the ASRVGB from the Conejo volcanics in the east and south. These are represented by general head boundary (GHB) cells in the bedrock layer (layer 6) along the eastern and southern boundary of the model (discussed in Section 6.3).
- Limited flows are conceptualized between the ASRVGB and the Pleasant Valley Basin to the west. These are represented by GHB cells along the western boundary for the primary groundwater producing layers 3 and 5 (discussed in Section 6.4).
- Surface water flows were simulated using the MODFLOW SFR2 package (Prudic et al., 2004; Niswonger and Prudic, 2005), which routes surface flows along the stream channel and dynamically simulates surface water/groundwater interactions based on the relative elevations of the stream stage and groundwater table at each reach (discussed in Section 6.4). The SFR2

package also includes evapotranspiration uptake from riparian vegetation (discussed in Section 6.4.1).

- Groundwater pumping was simulated using the MODFLOW WEL package (Harbaugh et al., 2000; Harbaugh, 2005), which applies a specified extraction rate to each model cell with groundwater wells (discussed in Section 6.5).

Figures 6.1a through 6.1d show the locations of the boundary conditions for the different model layers.

6.1 Recharge Package

Recharge was modeled using the MODFLOW RCH package (Harbaugh et al., 2000; Harbaugh, 2005), which applies a given rate of recharge to the topmost active cell. The recharge components simulated by the RCH package include infiltration of precipitation and return flows from agriculture, municipal and industrial (M&I) applications, pipeline distribution losses, and septic systems. These recharge components are described in the sub-sections below.

6.1.1 Recharge from Precipitation

Recharge from direct precipitation was estimated using the Basin Characterization Model (BCM), a publicly available model and dataset for the California hydrologic region that includes all basins in the state (Flint, et al., 2013; USGS, 2017). The BCM is a distributed grid-based regional model that calculates the water balance (**Figure 6.2**) for any time step or spatial scale by using climate inputs, precipitation, and minimum and maximum air temperature. Potential evapotranspiration is calculated from solar radiation with topographic shading and cloudiness, and excess water moves through the soil profile, changing the soil water storage. Changes in soil water are used to calculate actual evapotranspiration, and when subtracted from potential evapotranspiration calculates climatic water deficit. Depending on soil properties and the permeability of underlying bedrock, water may become recharge or runoff. Inputs to the BCM include (1) a 270-m DEM, (2) spatially distributed monthly Parameter-elevation Regressions on Independent Slopes Model (PRISM) precipitation (Daly, 2008), (3) the National Land Cover Database, (4) atmospheric conditions including minimum and maximum air temperature, (5) Soil Survey Geographic (SSURGO) database (USDA NRCS, 2020), and (6) mapped surficial geology. Outputs from the BCM include temporally varying (monthly) and gridded in-place runoff (precipitation that does not infiltrate into the ground) and in-place recharge (precipitation that infiltrates below the root zone).

The BCMv8 (USGS, 2017) version contains historical recharge for water years 1896 – 2020. For the historical model, the BCM data were used for monthly recharge from October 2011 – September 2020. To evaluate the months beyond the BCM simulation period (October 2020 – September 2021), monthly precipitation totals from Ventura County Watershed Protection District's (VCWPD) stations 500, 500A, and 502 were correlated to BCM recharge. These stations were chosen for their locations on the eastern and western edges of the ASRVGB and their collective temporal coverage (water years 2004 – 2021) of the historical model period. For periods of data overlap between 500A and 502 (water years 2010 – 2021), the two monthly precipitation values were averaged. This combined precipitation time series is shown in Figure 6.3. The maximum monthly precipitation in the months beyond the BCM simulation period was 1.14 inches in December 2020 and 1.13 inches in January 2021. Figure 6.4 shows a scatterplot of BCM recharge and monthly precipitation for all months with less than 2 inches of precipitation. Of the 174 months shown, only 3 months had recharge above 0.0001 ft/day. Since December 2020 and January 2021 had approximately 1 inch, a simplifying assumption was made that there was no groundwater recharge for those months. The other months in this period did not have any recorded precipitation, hence no recharge was specified for those months, either.

Figures 6.5 through 6.8 shows BCM recharge for several example months. 2017 was chosen as representative wet year and 2014 as a dry year, and February and August were chosen as representative wet and dry months, respectively. Because the ASRVGB historically receives almost no precipitation during the months of June, July, and August, BCM recharge is typically close to zero in these months, even in years of above-average annual precipitation. Because BCM does not account for soil moisture due to irrigation, the contribution to recharge from precipitation is likely underestimated in irrigated areas. Note, BCM also calculates in-place runoff, which could subsequently become recharge. This was a small number for this watershed (approximately 80 acre-feet per year [AFY]) and was not included in the recharge package. Direct runoff to the streams was calculated separately, as described in Section 6.4.

6.1.2 Recharge from Return Flows

Recharge from return flows was categorized into four different terms: (1) water distribution system losses, (2) M&I septic return flows, (3) M&I outdoor use, and (4) agricultural.

M&I recharge terms (1), (2), and (3) were derived from monthly metered water delivery data from 2011 – 2021 provided by Camrosa WD. The water was metered at the point of delivery and was categorized as potable or non-potable. Parcel boundaries and meter locations were provided by Camrosa WD with additional attributes linking the parcels and meters to account and meter IDs and classified based on their dominant land use as rural residential, agricultural, agricultural nursery, or other (typically open space, rights of way, and one school) (Figure 6.9). Six parcel groups were reclassified from rural residential to agricultural based on the presence of active agricultural wells on those properties. Agricultural parcels were placed into groups known to Camrosa WD as having a common source of water, which aided in matching water sources for parcels that may not have an on-site well or meter connection to Camrosa WD (Figure 6.10). The meter location information also included an attribute linking some of the meters to the assessor’s parcel number (APN) using Camrosa WD’s customer information database. Based on guidance from Camrosa WD, the tabular metered delivery data was first matched to the parcels using the customer account ID, with a secondary match using the meters’ APN attribute if necessary. By linking the delivery data to the parcels in this manner, 98.1% of annual average deliveries were able to be matched to the parcels with the remaining 1.9% of deliveries (74 AFY) unable to be matched (Table 6.1). Deliveries to parcels classified as “other” and the unmatched deliveries were apportioned to M&I and agricultural return flows based on the distribution of matched deliveries.

6.1.2.1 Recharge from Water Distribution System Losses

Distribution losses that contribute to return flows are conceptualized as the water that is lost in distribution from central water supply locations on its way to endpoints such as residential or agricultural facilities due to leaks in pipes. Shapefiles of the potable and non-potable pipeline distribution networks were provided by Camrosa WD. These networks were filtered to exclude service laterals, and the remaining distribution mains were spatially intersected with the model grid (Figures

6.11a and 6.11b). The 2015 Urban Water Management Plan for Camrosa WD (2016) states there is a 4.7% distribution loss on gross deliveries. As the metered endpoint delivery data provided by Camrosa WD was net of distribution losses, the delivered volume was divided by 0.953 then multiplied by 0.047 to result in losses on gross deliveries. These losses were calculated separately for the potable and non-potable systems at monthly timesteps and applied evenly to all model cells that contained a segment of the distribution mains. The distribution mains outside the basin boundary but within the model domain (located primarily to the north and east) transport purchased water into the basin, and so were included in the allocation of distribution losses. These losses were conceptualized as entering the basin through subsurface flow and were accounted for in the model using inflow cells (included as injection wells in the WEL package) on the boundary of the basin.

6.1.2.2 M&I Septic Return Flows

Septic return flows are conceptualized as water leachate from septic systems. There is no sewage collection in the ASRVGB, and the entirety of the Basin relies on septic systems. The portion of metered Camrosa WD water delivery data that is estimated to be used indoors, and therefore end up in septic tanks, is estimated as follows. From rural residential parcels that receive both potable and non-potable deliveries, 100% of the potable portion (77 AFY) is assumed to be used indoors (**Table 6.1**). This volume was converted to 93 gallons per capita per day (gpcd) using the Census value of 3.1 persons per household in Ventura County (US Census Bureau, 2021). The total number of persons in ASRVGB is estimated to be 2,689 (US Census Bureau 2020), resulting in an annual indoor use of approximately 279 AFY. Indoor use from the one active domestic well in the ASRVGB was estimated to be 0.32 AFY, using the same values of 3.1 persons per household and 93 gpcd.

M&I indoor use is assumed to be constant over time, and 100% of this water is assumed to result in return flows to groundwater via septic leakage. Septic return flows were distributed spatially by intersecting the rural residential parcels with the model grid. Cells with rural residential land that comprised ≥50% of the total cell area were classified as rural residential, as was the cell containing the active domestic well (Figure 6.12). Septic return flows were distributed equally across all rural residential cells. Some parcels were classified as rural residential but were surrounded by agricultural parcels (orange parcels in the predominantly green area to the west in Figure 6.9). For purposes of allocating return flows, these parcels were handled as agricultural areas as described below in Section 6.1.2.4.

6.1.2.3 M&I Outdoor Use Return Flows

M&I outdoor return flows were conceptualized as landscape irrigation in excess of plant needs that is assumed to percolate to the water table.

The M&I indoor use as calculated above was subtracted from total Camrosa WD deliveries to rural residential parcels on a monthly time step, and the remainder was allocated to outdoor use. It was assumed that 20% of this water resulted in return flows to groundwater. This was consistent with other regional models, such as the groundwater model of the Pleasant Valley and Western Las Posas Subbasins (UWCD, 2018). These return flows were distributed equally across the rural residential model grid cells as described above.

6.1.2.4 Recharge from Agricultural Return Flows

Agricultural return flows were conceptualized as irrigation in excess of plant needs that is assumed to percolate to the water table. Agricultural return flows were assumed to be 20% of applied water. This was consistent with other regional models such as the groundwater model of the Pleasant Valley and Western Las Posas Subbasins (UWCD, 2018) Agricultural irrigation in the ASRVGB is supplied by three sources of water: metered non-potable deliveries from Camrosa WD, metered pumping in the FCGMA area, and unmetered agricultural wells located outside of the FCGMA area. The method for determining unmetered agricultural pumping is described in Section 6.5, Groundwater Pumping. Camrosa WD metered deliveries were matched to the agricultural parcels using the method described above, which maintains the monthly variability present in the data. 20% of pumping from each agricultural well (FCGMA or non-FCGMA) was applied to the irrigated portions of agricultural parcels associated with each well, as described in Section 6.5 (Figures 6.13 and 6.14). The cropped area of the agricultural parcels was intersected with the model grid, and cells with a cropped area of ≥50% were classified as agricultural (**Figure 6.14**). Because some agricultural parcels extend outside the ASRVGB, the ratio of cropped land inside and outside the basin was calculated in order to estimate only the portion of agricultural water that was applied within the Basin.

6.1.3 Total Recharge

Total recharge is the sum of recharge from direct precipitation, distribution system losses, and return flows. Note, both precipitation-based recharge and return flows vary over time, hence different stress periods can have different total recharge. Table 6.2 shows the annual recharge components for each water year in the ASRVGB Model simulation period, excluding the mountain-front recharge.

6.2 Specified Flux Boundary In The North

A small amount of mountain-front recharge from the Las Posas Hills is conceptualized to flow into the Basin from the north. The mountain-front recharge was implemented in the model as a specified inflows through the well (WEL) package (Harbaugh et al., 2000; Harbaugh, 2005). Figure 6.1b shows the spatial distribution of mountain-recharge cells. Mountain front recharge was conceptualized to include precipitation-based recharge and return flows from the inactive model domain north of the Basin boundary (Figure 5.1).

Inflow rates for mountain front recharge were estimated based on BCM recharge in the catchment area north of the ASRVGB. The BCM provides recharge values calculated based on HUC12 basin areas. The ASRVGB is within the Lower Conejo Arroyo HUC12 basin (ID 180701030105). The area to the north of the ASRVGB within the Lower Conejo Arroyo HUC12 basin is considered as the area that contributes to mountain-front recharge (blue zone in Figure 6.15). For each month, a 20-year (backward-looking) moving average of BCM recharge for this representative area was calculated as the total volumetric rate of mountain-front recharge from the north (Figure 6.16). The total monthly volumetric rate was distributed evenly in space along the northern boundary (spread over 93 cells) for each stress period. In addition, return flows associated with agriculture and water distribution system losses were calculated (as detailed in Section 6.1.2) for the model area outside the Basin to the north and included in the mountain-front recharge term. These return flows were applied to the nearest cell along the northern boundary based on the spatial distribution of agricultural parcels (Figure 6.9), the potable distribution network (Figure 6.11a), and the non-potable distribution network (Figure 6.11b). Mountain-front recharge specified flux inflows were applied to active model cells up to a depth of 100 ft.

6.3 General Head Boundaries in the East, South, and West

Inflows from the Conejo volcanics to the east and south and underflows across the western boundary of the ASRVGB were simulated using general head boundary (GHB) cells. GHB includes a specified head and a conductance, with the flow to or from the GHB and the model grid cell dependent on the difference between the GHB head and the groundwater head in the cell as well as the GHB conductance.

The Conejo volcanics is the bedrock unit underlying the formations that comprise the Basin and have a maximum depth of over 1,000 ft in the western part of the Basin, based on the interpretation of lithologic logs. The underlying Conejo volcanics produce water to a limited number of wells within the eastern half and along the southern edges of the Basin. The Basin materials pinch out to the south and east where the Conejo volcanics outcrop along the Conejo Hills and the western margin of the Tierra Rejada Basin, respectively. The southern and eastern boundaries of the basin are interpreted to have mountain-block recharge, conceptualized as fracture flow through the Conejo volcanics, and GHB cells were placed in layer 6 to simulate this fracture flow (**Figure 6.1d**). The southern and eastern boundaries were divided into four zones (**Figure 6.17**) based on observed depth to water (DTW) in wells completed in bedrock. Observed DTWs were averaged and generalized for each zone to be 50 ft, 100 ft, 50 ft, and 40 ft, respectively. The GHB head for each cell was determined based on the difference of ground surface elevation and the assumed DTW for the given zone in which the GHB cell was located. The conductances for the GHBs were adjusted during model calibration. For the GHB in Zones 1, 2, and 3 conductance was calibrated to 1 ft^2/day as observed water levels (in layer 5) in these zones were much lower than the GHB heads (in layer 6). Observed heads in the east are higher and closer to the GHB heads in zone 4. Hence, the conductance for the GHB cells in Zone 4 was set higher (20,000 ft^2/day) to allow the simulated water levels to equilibrate freely to the GHB heads along the model boundary in this area and calibrate to observed water levels in the east and southeast. With this high of a conductance, the GHB effectively behaves like a specified head boundary. Note, that there is anecdotal evidence of artesian conditions in Conejo volcanics to the east of the ASRVGB (personal communication with Mr. Bryan Bondy). As such, it is possible that bedrock wells are actually higher than those specified for the GHBs in this area. Overall, the head and conductivity of the bedrock along the Basin boundary remains an uncertainty and may be revised once additional data become available in the future.

The structure of the ASRVGB extends towards the west into Pleasant Valley; however, the alluvial thickness and width of the valley within the ASRVGB becomes constricted at the western boundary of the ASRVGB by a north-trending ridge of the Conejo formation. Although flow across this western boundary may be limited to the groundwater-producing zones, it is interpreted to hydraulically connect the ASRVGB to the Pleasant Valley groundwater basin. To simulate the flow across the western boundary of the basin in the groundwater production zones, GHB cells were placed in layers 3 and 5 along this portion of the Basin boundary. The heads and conductance were adjusted during calibration to match simulated and observed heads in the respective layers. Calibrated heads were set to a constant of 90 ft in layer 3 and 80 ft in layer 5. Calibrated conductance for the GHB cells were set to 10,000 ft^2/day in layer 3 and 100,000 ft^2/day in layer 5. Note, that due to the lack of water level and geologic data along the western boundary, there is uncertainty with respect to this boundary and the direction and magnitude of underflows across the two basins.

6.4 Streamflow Package

The MODFLOW streamflow routing (SFR2) package (Prudic et al., 2004; Niswonger and Prudic, 2005) was selected to simulate the interaction between surface water and groundwater along the Arroyo Santa Rosa, the Arroyo Santa Rosa Tributary, Arroyo Conejo, and Conejo Creek. The SFR2 package uses the continuity (conservation of mass) equation to route surface water flow through one or more simulated rivers, streams, canals, or ditches. Streams are divided into segments, and segments are divided into reaches where reaches are specified for an individual model cell. Each reach can have different physical properties (such as length, elevation, slope, streambed thickness, streambed conductivity). Reach properties can be spatially varying but cannot change from one stress-period to another. A stream segment represents a set of reaches that can have different time-variant inputs and properties. For each stream segment, SFR2 allows for inflows, outflows, diversions, tributary contributions, and other gains/losses (such as direct precipitation gains or evapotranspiration losses) to be specified for each stress-period. SFR2 also allows for several approaches (such as Manning Coefficients, rating curves, 8-point cross-section, or a lookup table) to define time-varying flow-width and flow-depth relationships for each segment. Different options may be used for different segments of the stream and may change from one stress period to another.

SFR2 routes the surface water inflows and outflows from one reach to the next (downstream reach), including tributary contributions and apportioning diversion flows based on the diversion rules specified. For each reach, SFR2 uses the flow-width/flow-depth relationship (for the given segment) to calculate the channel width and stage. The channel width is used in the calculation of riverbed conductance, which also accounts for the riverbed thickness and conductivity. Groundwater gains and losses are iteratively calculated based on the riverbed conductance and the relative elevations of the stream stage and groundwater elevations:

- When groundwater elevations are higher than the stage, the river reach gains groundwater proportional to the riverbed conductance and the difference between the groundwater table and stage.
- When groundwater elevations are below the stage but above the river bottom, the river reach loses surface water to groundwater proportional to the riverbed conductance and the difference between the stage and the groundwater table.
- When the groundwater elevation is below the river bottom, the river reach loses surface water to groundwater at a constant rate proportional to the riverbed conductance (i.e. the groundwater table is disconnected from the river and surface water losses are independent of the water table elevations).

Figure 6.18 shows different surface water/groundwater interaction scenarios and the relationship between flow, river stage, and groundwater elevations. Recharge from or discharge to the stream is dependent on the difference between the hydraulic head in the river and the underlying aquifer as well as the riverbed conductance, based on the following equations:

$$Q = \frac{KA}{T}(H_{GW} - H_{Riv}) \quad \text{if } H_{GW} > R_{BOT} \quad \text{[Equation 1]}$$

$$Q = \frac{KA}{T}(H_{GW} - R_{BOT}) \quad \text{if } H_{GW} < R_{BOT} \quad \text{[Equation 2]}$$

Where H_{GW} is the groundwater head, H_{Riv} is the head in the river, K is the riverbed conductivity, A is the surface area of the riverbed, and T is the thickness of the riverbed. The surface area of the riverbed (A) is based on the length and width of the river channel and can change based on flows and the flow-width relationship. The term KA/T is also referred to as the riverbed conductance.

The United States Geological Survey's (USGS) National Hydrography Dataset (NHD) was used to delineate the streamflow lines for Conejo Creek, Arroyo Conejo, and Arroyo Santa Rosa. The Arroyo Santa Rosa Tributary was not present in the NHD and was manually digitized using high-resolution aerial imagery and DEM. These flow lines were divided into six distinct segments: (1) Arroyo Santa Rosa above its confluence with the Arroyo Santa Rosa Tributary, (2) the Arroyo Santa Rosa Tributary, (3) Arroyo Santa Rosa below its confluence with the Arroyo Santa Rosa Tributary, (4) Arroyo Conejo, (5) Conejo Creek where Arundo is absent, and (6) Conejo Creek where Arundo is present (Figure 6.19a).

Figure 6.19b shows available surface water flow data for Conejo Creek and Arroyo Conejo. Inflow to the Basin arrives via Arroyo Conejo to the south and Arroyo Santa Rosa and the Arroyo Santa Rosa Tributary from the east (Figure 6.19a). Gage 800, near the Basin exit point of Conejo Creek, has daily records from October 1971 – December 2010 via the VCWPD and from August 2012 – June 2021 via the Calleguas Creek Watershed TMDL Compliance Monitoring Program. Gage 800A, downstream of 800, has daily records from October 2009 – May 2021 via VCWPD. Hill Canyon Wastewater Treatment Plant (WWTP) operates a flume near the Basin entry point at the confluence of the North Fork and South Fork of Arroyo Conejo, with daily records during the summer months (typically June – September) from 2011 – 2020. The Confluence Flume includes effluent from the Hill Canyon WWTP and flows from the North Fork and South Fork tributaries to the Arroyo Conejo. Gage 838 located on Arroyo Santa Rosa just upstream of the confluence with Arroyo Conejo had episodic (peak) flow data from 1985 – 2014, which was found to be too sporadic and short term to be used for the model with monthly stress periods. A point to note is the similar baseflows observed at the Confluence Flume and the gage 800, indicating relatively low net gains/losses along Arroyo Conejo and Conejo Creek.

The various segments were subdivided into reaches by intersection with the model grid. A USGS ground surface DEM was sampled for reach elevations and the reach length was calculated in GIS. Because the NHD streamflow lines and the DEM were created independently, the DEM elevations that are assigned to the reaches sometimes result in an "uphill" section, where the subsequent reach has a higher elevation than the previous. A Python script was developed and executed to correct the elevations to ensure an appropriate stream channel gradient between reaches. Figure 6.20 shows elevation cross sections along the five segments. Some reaches were determined to be lined with concrete or rip rap based on input from Camrosa WD and validation through high-resolution aerial imagery. Hydraulic conductivity for the concrete lined reaches was set to 0 ft/day, and all other reaches were calibrated to 10 ft/day (Figure 6.21). The riverbed thickness (T in equations 1 and 2) was set at 1 ft. Note, that the SFR package dynamically calculates the net streambed conductance (KA/T in equations 1 and 2) based on the streambed conductivity, thickness, and area (dynamically calculated by SFR based on the channel width and reach length), which in turn is based on the channel width (itself a function of flow in the reach). Calibration entailed adjusting the streambed conductivity to match simulated and observed groundwater levels at wells near the surface water bodies and streamflows at gage 800.

Baseflows into the Basin were estimated as follows. Based on local knowledge of ASRGSA and verification with high resolution historical aerial photography, Arroyo Santa Rosa and the Arroyo Santa Rosa Tributary exhibit flow only during storm events and did not have any observable baseflows. Therefore, baseflows were assumed to enter into the ASRVGB only from the south via Arroyo Conejo. For periods having records at the Confluence Flume, those data were used directly to represent baseflow in Arroyo Conejo at the entry point to the Basin (no gain/losses to baseflows were assumed between the Confluence Flume and the entry point to the Basin). If there were no Confluence Flume data, but there were records at gage 800, then gage 800 was used for baseflows up to a maximum of 20 cubic feet per second (cfs). This was based on the observed baseflows at gage 800 and the Confluence Flume being very similar in the period of overlap between the two datasets. The 20 cfs threshold was used based on professional judgment to isolate baseflow from stormflows in the gage 800 data. If measured flows at gage 800 were not available (October 2011 – May 2012 and July 2021 – September 2021), then a synthetic time series was created using a) baseflows (for summer and fall months) from adjacent years when data was available, and b) stormflows (flows greater than 20 cfs) from downstream gage 800A flows with a 73% factor applied based on the linear correlation between measured stormflows at the two gages (Figure 6.24). Where measured baseflows were not available for the Confluence Flume, the missing data were filled as follows. The Flume data from June – September 2011 was extrapolated forward linearly through November 30, then held constant for the month of December. Data from June – September 2012 was extrapolated backward linearly to January 1 (**Figure 6.22)**. Confluence Flume records were not available for 2021, so 2013 was identified as an analogous year based on precipitation patterns (**Figure 6.3**), and so flows from June 1 – August 31, 2013, were used for 2021 baseflows, with forward and backward extrapolation applied in the same manner as above (**Figure 6.23**).

Because the Confluence Flume is only deployed during the summer months and Arroyo Santa Rosa and Arroyo Santa Rosa Tributary were ungaged, gage 800 was the primary source of stormflow measurements for the Basin (episodic/peak flow data from gage 838 was too sporadic to be used for the model). Because percolation of stormflows is small compared the stormflows, the stormflows at gage 800 (measured or estimated as described above) were used to establish the stormflows entering the Basin. The gage 800 stormflows were distributed to Basin entry points for Arroyo Santa Rosa, Arroyo Santa Rosa Tributary, and Arroyo Conejo based on the relative percentage of each tributary's upstream contributing catchment area, as shown in Figure 6.19a. Catchment areas were computed at the tributary entry points shown in Figure 6.19a in ArcGIS from the USGS DEM using the Flow Accumulation and Watershed functions. The catchment area in the ASRVGB that accumulates to gage 800 was implemented as runoff spread equally across all segments, with runoff calculated as the area-determined proportion (based on the contributing catchment area between the entry points of the tributaries and gage 800) of stormflows at gage 800. Note, that this methodology for stormflow apportionment is based on the simplifying assumption that stormflows entering the basin could be apportioned linearly based on the catchment area alone, assuming minimal gains or losses. With the lack of streamflow data along the tributaries and given that gains and losses within the ASRVGB would be simulated by the MODFLOW SFR2 package, this was thought to be a reasonable first order estimate for stormflows for the model, with the understanding that the stormflows for the ungauged tributaries could be adjusted during calibration to match simulated and observed stormflows at gage 800.

SFR2 uses time-varying flow-width and flow-depth relationships for each segment to dynamically calculate stream stage and channel width based on the routed flow (accounting for groundwater gains/losses, runoff, and ET losses) in reach. Runoff within the basin is also distributed to each segment equally. Figures 6.25 and 6.26 show the calibrated flow-width and flow-depth relationships used in the model. Note, that the flow-width/flow-depth relationships need to account for surface water/groundwater dynamics at the given model scale. The ASRVGB has monthly stress periods, hence flows assigned to the SFR2 segments represent average monthly flows. Baseflows in the ASRVGB are fairly constant at that time scale. However, stormflows in this region can be highly dynamic, with storms occurring over a few hours or days during the wet months, providing limited time for the water to percolate into the subsurface. Hence, the stage and width for the higher flow rates needed to be scaled down to account for the intermittent nature of these flows, and avoid excessive recharge during the stormflow months. Model calibration consisted of adjusting the flow-width/flow-depth relationships to match observed and simulated groundwater levels at wells near the surface water bodies as well as stormflows at gage 800.

6.4.1 Evapotranspiration From Riparian Vegetation

Evapotranspiration (ET) from riparian vegetation in the ASRVGB primarily relies on surface water flowing through the Arroyo Conejo and Conejo Creek (see **Sections 3.2.6 and 3.2.7 of the GSP** for details on interconnected surface water and groundwater dependent ecosystems). ET uptake from riparian vegetation was accounted for in the SFR2 package as a surface water ET (ETSW) loss term, which reduces segment inflows for each time-step by a given volume before routing the water downstream. Note, that if the specified ETSW loss term exceeds inflows into a particular segment, then SFR2 caps ETSW at the rate of inflows before ETSW was deducted, thus ensuring mass balance for each segment.

Figure 6.27 shows the riparian vegetation in the ASRVGB, which could uptake groundwater based on root depth and water table elevation. The riparian vegetation consists of native plants and trees classified as and are divided into two vegetation classes: California Sycamore and Red Willow. Riparian vegetation also includes the invasive species *Arundo donax* (Arundo), a significant source of riparian transpiration in the ASRVGB. The Sycamore is mapped in a limited area along the Arroyo Santa Rosa and was not simulated to uptake groundwater due to the observed groundwater levels being consistently deeper (>20 ft) than the typical root depth for the tree of ~6 ft (Spengler, 2020; USDA, 2022). In total, counting Arundo, two vegetation groups were included in the ETSW component of the SFR2 package in the ASRVGB.

The SFR2 ETSW component requires a single input: a rate of ET per segment for each stress period in units of ft/day. The ET rate is known to be dependent on vegetation characteristics (plant type, crop coefficients, rooting depth, vegetation density) and environmental factors (temperature, relative humidity, wind, and soil moisture availability). Reference ET was collected from the nearest California Irrigation Management Information System (CIMIS) station (Station Number 152 in Camarillo), which has data available from January 21, 2000, through the present at a daily frequency. This station was accepted as a representative location for estimating ET rates. Static crop coefficients (K_c) were estimated for each riparian vegetation class. K_c values were estimated based on University of California Cooperative Extension estimation methods (2000) and review of other GSPs in Ventura County. K_c values were applied to each area and related reach of the SFR2 model package. ETSW rates used for each segment were adjusted by two factors: a) the fraction of the segment with the given vegetation class, and b) the ratio of the total area of riparian vegetation and the open channel area (as simulated by SFR2). The first factor accounted for the occurrence and density of a certain vegetation class along the surface water body. The second factor accounted for the fact that ET uptake occurs not just within the surface water body but within the riparian corridor where the vegetation occurs immediately adjacent to the channel. The ratio was calculated as the total Natural Communities Commonly Associated with Groundwater (NCCAG) area over the representative open water area, with the representative open water area determined by calculating a representative channel width and multiplying it by the total length of SFR2 reaches that intersect with the NCCAG locations. Table 6.3 shows the area weighted and scaled K_c values used for each vegetation class and segment in the SFR2 package. The area-weighted and scaled K_c were applied to the average monthly reference ET rate to calculate the ET losses for each monthly stress-period. Note, while the reference ET rate varied over time, the spatial coverage, area, and K_c of native vegetation and Arundo were kept constant for the entire simulation period.

6.5 GROUNDWATER PUMPING

Groundwater pumping was modeled using the WEL package (Harbaugh et al., 2000; Harbaugh, 2005). A total of 39 wells were included in the historical ASRVGB Model: one domestic well, eight wells owned by Camrosa WD[1], 11 agricultural wells within the FCGMA area, and 19 agricultural wells outside the FCGMA area. **Figure 6.28** shows the groundwater wells in the ASRVGB by average extraction rates, water use type, and data availability. The pumping data and modeled pumping rates for different categories of groundwater wells are summarized below:

- Pumping records were not available for the one domestic well, but it was confirmed to be active based on Ventura County well GIS data and annual water well usage statements submitted to the County. Annual water use was estimated to be 2.5 AFY.
- Monthly pumping records for Camrosa WD wells were available for the entire historical model period. These records were used as-is in the ASRVGB Model.
- Semi-annual pumping records were available for FCGMA wells from 1983 – 2020. Through 2013, the reporting periods for FCGMA agricultural pumping were January – June and July – December, and from 2014 were January – July and August – December (Bondy, pers. comm., 2021). FCGMA pumping was distributed from the semi-annual reporting period to monthly time steps using the methodology used for the adjacent Pleasant Valley groundwater model (UWCD, 2018). Precipitation at the CIMIS station 152 in Camarillo was aggregated monthly, and months with precipitation less than 0.6 inches were set to 0.6. Then the synthetic series was summed per water year, and the proportion of each month to the water year total was calculated. See Table 6.4 for an example using water year 2012. The semi-annual FCGMA pumping records were then distributed to monthly time steps using these proportions. The average volume for each

[1] Camrosa WD wells serve both agricultural and M&I users.

calendar month from this resulting time series was then used to extend FCGMA pumping through water year 2021.

- Pumping records were not available for non-FCGMA agricultural wells. These wells were identified using active agricultural wells in the Ventura County well GIS data. To estimate pumping for these wells, the first step was to determine an irrigation crop duty in acre-feet/ acre for agricultural land in ASRVGB. First, agricultural parcel groups (Figure 6.10) with known total water supply were identified. This includes groups with Camrosa WD metered deliveries and FCGMA wells on-site as well as groups with metered Camrosa WD deliveries and no active wells on-site (**Table 6.5**). Because not all of the area of a given agricultural parcel may be dedicated to agricultural use, the cropped area was determined using the California Natural Resources Agency's 2016 Statewide Crop Mapping GIS data (CNRA, 2020). An additional 17 acres of cropped land were digitized from historical Google Earth imagery in several agricultural parcels where the statewide GIS coverage did not capture some smaller nursery operations (Figure 6.13). The crop layer was intersected with the agricultural parcel groups to obtain total cropped acreage, and the irrigation crop duty was calculated from total agricultural water supply divided by cropped acreage. This resulted in 2.1 acre-feet/acre for groups with both Camrosa WD deliveries and FCGMA pumping, and 2.3 acre-feet/acre for groups with only Camrosa WD deliveries, with an average value of 2.2 acre-feet/acre. The average annual pumping volume needed to meet this crop duty on agricultural groups with active non-FCGMA wells was then calculated using the cropped acreage described above, equaling 619 AFY. To create a synthetic time series from this annual average, the annual departure from average for FCGMA pumping was calculated and this departure was applied to non-FCGMA wells (Table 6.6). This water supply was pro-rated to each well based on the cropped acreage in the agricultural group on which it is located. Finally, these annual amounts were distributed to a synthetic monthly time step to semi-annual to match the monthly pattern of the FCGMA pumping time series.

Figure 6.29 shows the monthly pumping volumes by category for the ASRVGB Model.

Note that MODFLOW-NWT reduces groundwater extractions for cells as they get desaturated and no extraction is simulated for dry cells (even if groundwater pumping is specified for those cells). This represented a minimal (approximately 3%, on average) difference in simulated and specified extraction rates over the historical simulation period. This is well within the uncertainty in the estimated pumping volumes specified in the model.

7.0 INITIAL HEADS

The model requires initial heads (groundwater levels) to be specified for October 2011 (beginning of the model simulation period). Preliminary model runs were set up with initial heads at the top of the model layer. The model was then run recursively several times, by taking the head from the last stress period and specifying these as initial heads for the next simulation. This allowed the heads to equilibrate to the other model stresses and have hydrologically consistent surfaces. The equilibrated heads were then changed locally to incorporate observed groundwater levels from prior to October 2011 (professional judgment was used to generalize observed water levels to initial heads in and around the wells with observation data). Finally, calibration consisted of adjusting initial heads to match observed and simulated water levels across the Basin. Calibrated initial heads are shown in Figures 7.1a to 7.1f.

8.0 MODEL HYDRAULIC PROPERTIES

Hydraulic properties for the model include hydraulic conductivity, specific yield, and specific storage. Model hydraulic properties were adjusted during calibration to match simulated and observed groundwater levels at key wells (**Figure 9.1**) and surface water flows at gage 800, while maintaining consistency with the HCM (**Section 2.0**).

Figures 8.1a to 8.1f show the final calibrated horizontal conductivities for layers 1 through 6, respectively. In general, the hydrostratigraphic units (layers 1 to 5) are less separated in the east, hence horizontal conductivity values for all model layers were kept the same at 10 ft/day in the eastern half of the Basin. Lower conductivities (1 ft/day) were needed in the southeastern "lobe" to calibrate to higher observed heads in wells in that part of the Basin. Horizontal conductivity in layer 1 (**Figure 8.1a**) was kept at 10 ft/day for much of the model domain, with 1 ft/day along the northern foothills to reduce the occurrence of dry cells in this area. Layer 2 (**Figure 8.1b**) represents the lower permeability intervals of the upper groundwater production zone in the west; hence, a conductivity value of 1 ft/day was used for this area. Note, that the low-permeability layer does not extend to the east, and the higher default values were maintained there. Layer 3 (**Figure 8.1c**) represents the more permeable intervals of the upper groundwater production zone in the west; hence, conductivities ranging from 5 to 20 ft/day were used for layer 3 in this area. The highest conductivities (20 ft/day) were used in areas with the majority of production wells (northwest of the Bailey Fault) screened in layer 3. The higher conductivity in this area was needed to calibrate to key well (02N20W23G01S), screened exclusively in layer 3. Layer 4 (Figure 8.1d) represents the low-permeability unit between the upper and lower groundwater production zones in the west. As such, horizontal conductivity was set to 1 ft/day in the western portion of the model. Note that the low-permeability layer does not extend to the east, and the higher default values were maintained in that area. Layer 5 (Figure 8.1e) represents the lower groundwater production zone, with much of the pumping wells screened in this layer. The layer also had the maximum amount of observed water levels. Horizontal conductivities ranged from 1 ft/day (along the northern foothills) to 50 ft/day (southeast of the Bailey fault where most of the production wells are located). Layer 6 (Figure 8.1f) represents the upper bedrock unit. A uniform horizontal conductivity of 1 ft/day was used for this layer. Due to the lack of water level data in this layer, the hydraulic properties for this layer were not adjusted during calibration.

Figures 8.2a to 8.2f show the vertical conductivities for each of the model layers. By default, a vertical anisotropy ratio of 1/10 was used to calculate the vertical conductivities based on the specified horizontal conductivity values. The vertical conductivities were further adjusted during calibration to match observed and simulated water levels in wells screened in different layers. Vertical conductivity adjustments in layers 1 and 2 were also necessary to simulate groundwater gains/losses to match simulated and observed flows at gage 800. Finally, vertical conductivity adjustments were needed to avoid excess flooding or mounding of shallow groundwater levels. Vertical conductivities for layers 3, 5, and 6 (**Figures 8.2c, 8.2e, 8.2f**) were kept at the 1/10 anisotropy ratio. Vertical conductivity for layer 1 (**Figure 8.2a**) was reduced in the west to raise heads in the shallow alluvium and constrain surface water losses/gains to groundwater to better match observed and simulated streamflows at gage 800. Vertical conductivity in layer 2 (**Figure 8.2b**) was further reduced to 0.005 ft/day in a large zone in the west to limit recharge and lower water levels in wells screened in deeper layers to better match observed and simulated water levels in these wells. Vertical conductivities in layer 4 (**Figure 8.2d**) were also reduced to

0.005 ft/day in a zone northwest of the Bailey Fault and 0.01 ft/day in a zone to the west but south of the Bailey Fault to lower water levels in wells screened in layer 5 (while keeping heads high in the layer 3 above) to better match observed and simulated water levels in the lower groundwater production zone. Since layers 2 and 4 consist of lower permeability clay units in the west, the lower vertical conductivities are consistent with the HCM and the geologic data in this area.

Figures 8.3a and 8.3b show specific yields for layers 1 and 2, which remain mostly unconfined. Specific yield of 0.2 was used for layer 1 (representing the more permeable and porous sediments) and 0.1 for layer 2 (representing lower permeability and less porous sediments). Figures 8.4a to 8.4e show the specific storage for layers 2 through 6. Layer 1 is always unconfined and does not use the specific storage parameter for storage calculations; hence, specific storage for this layer is not reported. The default specific storage for all layers was kept at $1x10^{-5}$ 1/ft for all layers. The specific storage was increased to $1x10^{-4}$ 1/ft in layer 2 to dampen the recharge signal in the deeper layers and improve the match between observed and simulated water levels (especially seasonal/interannual variation) in the lower layers. The specific storage in layer 5 was increased to $2x10^{-5}$ 1/ft east of the Bailey Fault for the same reason.

The Bailey Fault acts as a hydraulic barrier to flow in the ASRVGB based on observed water levels across the fault. The Bailey Fault was modeled as a linear hydraulic flow barrier (HFB) in all layers. HFBs reduce the effective hydraulic conductivity between model grid cells. HFBs were placed along the alignment of the Bailey Fault in all layers, except layer 1 since no surface manifestation of the Bailey Fault has been mapped, and it is unlikely to impede flow in the shallow alluvium. A uniform hydraulic conductivity of $1x10^{-4}$ ft/d was used for the HFB cells in layers 2 through 4 (**Figures 8.5a**), and $1x10^{-5}$ ft/d in layers 5 and 6 (**Figures 8.5a**). The HFBs were adjusted during calibration and were critical to simulating observed groundwater lateral gradients across the Bailey Fault.

9.0 MODEL CALIBRATION

Model calibration entailed adjusting model hydraulic parameters via trial and error to match simulated and observed groundwater levels and streamflow over the historical period from October 2011 – September 2021. Model parameters adjusted during calibration included: spatially varying hydraulic conductivities for six layers; specific yields for the upper two layers; riverbed conductance (specified in the SFR2 package); river flow-stage and flow-width relationships; GHB heads and conductance; and HFB conductivities. Adjustments made to each of the model properties and boundary conditions are summarized in the sections above.

Historical groundwater elevation observations for the model simulation period (Water Year 2012 through 2021) were available from 17 groundwater wells in the Basin. Of these, 10 wells were selected as key calibration wells (Figure 9.1) based on the spatial distribution and screened interval of wells (ensuring coverage across the basin and across multiple model layers), the period of record, and reliability of data. Observed and simulated hydrographs at key wells were inspected during calibration to ensure a good match. Note, calibration statistics were calculated using all the data used for calibration (not just key wells).

Wells 02N20W23K01S and 02N20W23R01S (Figure 9.1) are screened in both layers 3 and 5. Observed water levels at 02N20W23K01S were much lower than observed water levels at nearby well

02N20W23G01S, which is exclusively screened in layer 3. Hence, the water levels from 02N20W23K01S were associated with simulated water levels from model layer 5 (which matched the observed water levels). Well 02N20W26B03S is screened in layer 3; however low water levels were indicative of observed water levels in layer 5, indicating either a localized mergence between the two production zones in this area, or incorrect well depth or screen information. Hence, water levels from both model layer 3 and 5 were compared to the observed water levels during calibration. Well 02N19W19P02S is screened in layer 4; however, it is located in the eastern portion of the basin where the stratification between layers is less distinct. Well 02N19W19P02S is a production well (screened in layer 4), and the lower than observed simulated water levels in the summer and fall, may indicate an overestimation of pumping for those months. Note, that pumping in the non-FCGMA area is estimated (based on the approach described in Section 6.5), and was also distributed across the 6-month FCGMA reporting period based on monthly precipitation (Section 6.5). As such, there is uncertainty in the monthly pumping rates used in the model, especially for the non-FCGMA wells. Hence, calibration focused on matching the general trend and magnitudes of water levels rather than matching water levels at the monthly scale. Furthermore, the observed water levels at several wells showed significant intra-annual variability, indicating that some of the (lower) observed water levels were either pumping or pumping-impacted (from neighboring wells) water levels. While these water levels were retained in the calibration dataset, the seasonal-high water levels were considered more representative of static conditions for calibration purposes.

Figures 9.2a through 9.2k show simulated versus observed water levels for the key wells. Where available, pre-2011 observed water levels are also shown to provide additional context to model results. The simulated water levels match the magnitude and trend of observed water levels reasonably well. In general, the low water levels are overpredicted by the model for the reasons summarized above.

Figure 9.3 shows a scatter plot for observed and simulated water levels for all wells used for model calibration. As can be seen from the figure, the observed and simulated water levels are well correlated, indicating a good level of model calibration. The plot also identifies the cluster of potentially pumping-impacted or pumping-impacted water levels where the model simulates higher than observed water levels.

Table 9.1 shows model calibration statistics for observed versus simulated groundwater levels. The mean error (simulated water level — observed water level) was 7.43, indicating a net positive bias in the simulated water levels, which is expected due to the pumping-impacted observed water levels. The mean absolute error (MAE) and root mean square error (RMSE) — measures of model error — are approximately 14.7 and 19.8 ft, respectively. The scaled MAE/RMSE (ratio of the model error metric to the range of observed water levels) is 6.9% and 9.2%, respectively. This is less than the industry calibration standard of 10% scaled MAE or RMSE (Spitz and Moreno, 1996; Rumbaugh and Rumbaugh, 2017). Given the uncertainty in the pumping estimates as well as the variability/noise in the observed water levels, this was deemed an acceptable level of calibration.

Observed streamflow records are available at gage 800. **Figures 9.4** shows observed versus simulated streamflow at gage 800. Overall, the model captures observed stormflows and baseflows in Conejo Creek. Baseflows match very closely, indicating that the model accurately simulates surface water gains and losses along Arroyo Conejo and Conejo Creek. Peak stormflows are slightly underestimated by the model. Note, that stormflow measurements were not available for the tributaries flowing into the

ASRVGB and were estimated based on measured stormflows at gage 800. Given the uncertainty in stormflows, the level of surface water calibration was deemed sufficient for the model.

10.0 MODEL RESULTS

Figures 10.1a through 10.3b show simulated water level contours in the upper and lower production zones (layers 3 and 5, respectively) for low (November 2015), average (June 2017), and high (February 2017) water level conditions. Observed water levels for select wells for the chosen periods are also indicated. In general, the model simulates the flow of water from the east to west. Production wells in the upper groundwater production zone (layer 3) create a subregional drawdown cone of depression northwest of the Bailey Fault. Similarly, production wells in the lower groundwater production (layer 5) zone create subregional cones of depression on either side of the Bailey Fault. The model simulates lateral groundwater gradients across the Bailey Fault in both the upper and lower groundwater production zones.

Figures 10.4a to 10.4c show surface water/groundwater interactions under low, normal, and high water level conditions. As can be seen, Arroyo Santa Rosa and the tributary to Arroyo Santa Rosa are simulated as dry during low and normal water level conditions. During wet winter months with stormflows, the Arroyo Santa Rosa becomes losing but disconnected (with the groundwater level being below the streambed). In some wet months, the Arroyo Santa Rosa downstream of the confluence with its tributary can become losing and connected (upgradient of the confluence with Arroyo Conejo). Note, this transient connection along the western section of Arroyo Santa Rosa is intermittent and occurs due to localized mounding of percolating stormwater along the Arroyo only during some wet months. The mounding dissipates after the storms and the Arroyo quickly becomes disconnected from the groundwater system as the groundwater levels recede (Figure 10.4b). For example, the Arroyo returns to almost dry and disconnected conditions in March 2017 (the month after the high water level period). Arroyo Conejo, which provides much of the baseflow to the Basin, was simulated as connected with variably gaining/losing reaches depending on flow conditions in the Arroyo and underlying groundwater levels. Conejo Creek was simulated as connected and losing in the eastern section transitioning to connected and variably gaining or losing in the west. Note that during the wet winter months the western portions of Conejo Creek were mostly losing due to relatively higher stage in the Creek. More gaining reaches were simulated in the dry summer and fall months. The gaining reaches are driven by shallow and constricting bedrock in the west leading to groundwater levels rising up in the west and draining into the Conejo Creek. Note that much of the groundwater draining into the Creek is derived from surface water that percolates into the shallow groundwater system in the upstream reaches. Hence, much of the surface water that percolates into the shallow subsurface from Conejo Creek flows back into Conejo Creek, which explains the similar baseflows at the Confluence Flume and gage 800 (Figure 6.9b).

Figures 10.5a and 10.5b show the simulated annual groundwater and surface water budgets for the historical model. Tables 10.1 and 10.2 show the values for the different water budget terms for each water year. As can be seen from the groundwater budget, pumping (an average of approximately 4,500 AFY for the 10-year simulation period) was the primary groundwater outflow from the basin with inflows split between groundwater from the Conejo volcanics (primarily from the east), streamflow percolation, and recharge return flows. Groundwater storage declined at the beginning of the drought period (2012 – 2014), but then stabilized with the reductions in groundwater pumping from 2015 – 2017. Increased pumping in 2018, again reduced storage, which then recovered due to reduced pumping from 2019 – 2021. The pumping reductions were due to several Camrosa WD wells going offline in this period due groundwater quality challenges. Other minor groundwater budget terms include lateral flows from Pleasant Valley (average of 155 AFY), and mountain-front recharge from the north (223 AFY). The surface water budget shows that the bulk of water entering the basin exits the basin as outflows, with a relatively small proportion of the overall inflows (an average of 1,161 AFY out of an inflow of 16,730 AFY) percolating into the Basin.

11.0 PREDICTIVE MODEL

The calibrated historical model was used as the basis to develop predictive model simulations to assess future surface and groundwater budgets, groundwater elevations, and surface flows in the creek for the GSP. Three future scenarios were developed for this purpose – a baseline scenario consisting of a repeat of the last 50 years of historical hydrology (water years 1972 – 2021); climate change scenario consisting of the last 50 years of historical hydrology (water years 1972 – 2021) altered based on near-term (2030) climate change factors (provided by DWR for SGMA planning purposes); and a second climate change scenario consisting of the last 50 years of historical hydrology (water years 1972 – 2021) altered based on long-term (2070) climate change factors (provided by DWR [2018] for SGMA planning purposes).

Each future model scenario incorporated future anthropogenic factors such as pumping and return flows, accounting for impacts from climate change, as needed. Table 11.1 summarizes key model inputs and assumptions for the predictive model scenarios. Table 11.2 summarizes future water use assumptions that were the basis for pumping and return flows for the predictive scenarios. GSP Section 3.3.3.2 includes discussion of future water demands and supplies. A key point to note is that historical outdoor water use in the Basin did not seem correlated with the water year type. Figure 11.4 shows agricultural groundwater pumping and outdoor water use for the historical period against the DWR Water Year types. Overall, neither agricultural nor outdoor water use showed an ostensible correlation with water year type. Hence, future agricultural water use was assumed to be the average of historical water use over the 10-year period. Higher ET losses in the future would increase agricultural and outdoor water consumptive use; however, it was assumed (based on discussion with ASRGSA staff) that these would likely be offset by conservation measures and gains in irrigation efficiencies.

DWR climate change factors and methodology (DWR, 2018) were used to scale the baseline hydrology to future climate-change impacted conditions. DWR climate change factors were available from 1915 to 2011. Climate change ET/precipitation change factors were compiled for the period from 1929 to 2011 based on the intersecting period of record of change factors and precipitation data. Streamflow change factors were compiled from 1972 to 2011 based on available streamflow records. Climate change factors for the remaining 2012-2021 were determined by finding analogous years (based on monthly precipitation patterns or monthly streamflow behavior, pertaining to the ET/precipitation change factor dataset or the streamflow change factor dataset, respectively). The analogous years were determined by finding the year with the minimum monthly variance and minimum annual absolute difference when compared to each year from 2012-2021. Figures 11.1 and 11.2 show the 2030 and 2070 precipitation and ET change factors used for the predictive models. On average, computed precipitation decreases by approximately 0.2% for the 2030 scenarios and increases by approximately 0.5% for the 2070 scenario. On average computed ET increases by 3.9% and 8.9% for the 2030 and 2070 scenarios, respectively.

Streamflow change factors were adjusted using the Second-Order Change Factor tool provided by DWR using computed stormflows. Note, this methodology separates baseflows (which are mostly anthropogenic and likely not impacted by climate change in this basin) and stormflows (which are impacted by climate). After filling in the analogous years to estimate preliminary change factors for years 2012-2021, the flows were adjusted. Computed stormflows decrease on average by approximately 2.7% for the 2030 scenario and increase by approximately 0.7% for the 2070 scenario. Figure 11.3 shows DWR streamflow change factors used for the analysis.

11.1 Predictive Recharge

Similar to the historical model, the predictive recharge package consisted of precipitation-based recharge and return flows from agricultural irrigation, distribution losses, and M&I use.

11.1.1 Recharge from Precipitation

As with the historical (calibration) model, recharge from precipitation for the predictive model was estimated based on BCM values (Flint et al., 2013; USGS, 2017). Recharge for the baseline hydrology (water years 1972 — 2021) were taken from the BCM monthly recharge dataset from October 1971 – September 2021. For the climate change scenarios, the recharge values are multiplied by the monthly precipitation climate change factor provided by DWR (2018). It was assumed that recharge was inversely correlated with ET and the scaled recharge values from above were subsequently divided by the monthly ET change factors to account for higher temperatures (and less recharge) in the future. Note, the assumed linear relationship between precipitation, recharge, and ET (allowing for the scaling of recharge by precipitation and ET change factors) is a simplification of reality, wherein precipitation, recharge, and ET have complex and non-linear relationships depending on the surficial soil-water and energy budget. A more comprehensive approach would have been rerunning BCM with the future precipitation and temperature time-series to estimate future recharge; however, this was beyond the scope of this project. Moreover, given the (a) relatively small changes in future precipitation and ET and (b) uncertainty in future climate forcings, the linear scaling approach was deemed to be sufficient to capture general trends in terms of climate change impacts on areal recharge.

11.1.2 Return Flows

Table 11.2 summarizes future water use assumptions that were the basis for return flows for the predictive scenarios. Agricultural return flows are a function of applied water from groundwater pumping and from metered Camrosa WD deliveries to agricultural parcels. Predictive agricultural applied water was estimated to be the same as the historical period due to the lack of correlation with precipitation historically (Figure 11.4). Any increase in ET (and hence agricultural demands) due to climate change is assumed to be offset by conservation measures. The 10-year historical time series was therefore repeated over the 50-year predictive period. The percent of applied agricultural water that results in return flows was kept at the same 20% amount as in the historical model.

As with agricultural water use, historical M&I deliveries are assumed to be representative of future deliveries and the 10-year historical time series was repeated over the predictive period. 100% of indoor M&I water use results in septic return flows, and 20% of outdoor M&I results in irrigation return flows. This is unchanged from the historical model.

Distribution losses are a function of total metered deliveries, whether agricultural or M&I. The loss rate of 4.7% that was used in the historical model was held constant for the predictive model.

11.2 Predictive Streamflow and Diversions

The SFR2 package segment relationships as well as data for reaches and flow-stage-width relationships were all kept the same as for the historical model. Inflows and diversions, however, were modeled differently.

Daily historic flow records from the baseline period (October 1972 – September 2021) were used for the baseline simulation. The same method to create a daily streamflow timeseries as in the historical model was used. Daily gage data for gage 800 was available from 1972 – 2010 and from August 2012 – September 2021 so there was only a small period (20 months: December 2010 – August 2012) where a synthetic method based on interpolation of baseflows from Arroyo Conejo and correlation with gage 800A was used to estimate flows at gage 800. Baseflows from the most recent 10-year period (October 2012 – September 2021) were chosen to represent best future baseflow conditions and were cycled five times over the 50-year simulation period. Stormflows were then subsequently recalculated as the difference between the historic flow records and the predictive baseflow time-series and apportioned over the different SFR entry points as described in Section 6.4.

Baseflows were modeled the same in the climate change scenarios as in the baseline predictive scenario as baseflows are largely sources from wastewater discharges which are not anticipated to fluctuate in accordance with DWR's climate change factors. Baseline stormflows were adjusted for the climate change scenarios using the second-order corrected streamflow change factors for the Calleguas Creek watershed (designated HUC8_18070103 by DWR), using the methodology for application of time series change factor data described in DWR (2018) guidance. Note, the DWR streamflow change factors change the volume and the timing of streamflow using annual and monthly change factors. The methodology was applied to the daily flow data using the same methods as recommended for monthly data. Similar to the precipitation factors, streamflow change factors for water years 2012 – 2019 were selecting from analogous years from the 1972 — 2011 period (with available streamflow change factors) based on matching gaged streamflow (gage 800) for the 2012 – 2021 water years with observed streamflow from the 1972 – 2011 period. **Figure 11.3** shows the streamflow change factors for the 2030 and 2070 scenarios used for the ASRVGB predictive model. On average, computed stormflows decrease by approximately 2.7% for the 2030 scenario and increase by approximately 0.7% for the 2070 scenario.

11.3 Predictive Pumping

Table 11.2 summarizes future water use assumptions that were the basis for pumping for the predictive scenarios. As described in Section 10.1.2, future agricultural demands and pumping are assumed to be the same as the historical period, and the 10-year historical agricultural pumping time series was repeated over the 50-year predictive period. This allows for the temporal variability seen in agricultural pumping seen in historical conditions to be reflected in the future scenarios. Note, that agricultural pumping did not show ostensible correlation with water years type, hence no adjustments were made to future agricultural pumping for different future water year types. The one domestic well was assumed to pump at the same rate as in the historical model.

Predictive M&I pumping by Camrosa WD was provided by the district on an annual basis for the predictive model period. The Conejo wellfield (Conejo-2, -3, -4, and SRMWC-8) was given a combined total for each year. The distribution of pumping volumes among these four wells was calculated from the historical model in order to disaggregate the Conejo wellfield predicted volumes. Water years 2019-2021 were not used in this calculation, as the wellfield was shut down due to 1,2,3-trichloropropane (TCP) concentrations. To create a monthly time series from the annual volumes, the average monthly distribution of pumping with respect to the water year was calculated for each Camrosa WD well from the historical model and applied to the annual predictive volumes. The predictive pumping by Camrosa WD was not scaled by the climate change factors, because future pumping was directly provided by Camrosa WD, and it was assumed these estimates accounted for any changes in future water demands. The actual daily, monthly, and annual future Camrosa WD pumping amounts by Camrosa WD may be affected by various operational factors as well as water availability from other sources. It was beyond the scope of this model to account for these operational and source factors in the future.

11.4 Predictive Evapotranspiration

For the predictive climate change scenarios, the ETSW rate was multiplied by the corresponding monthly ET factor from the DWR climate change dataset. The predictive model assumed that spatial vegetation and Arundo coverage remained constant as in the historical model.

11.5 Predictive Model Results

Future groundwater levels, streamflow, and water budgets were simulated for each of the predictive scenarios (baseline, 2030, and 2070). Figures 11.5a – 11.5k show future water levels for the baseline, 2030, and 2070 scenarios for select groundwater wells. Future water levels for all three scenarios are very similar to each other, indicating that future climate change does not have a significant influence on future groundwater levels in the Basin. In general, future groundwater level trends are similar to historical groundwater levels and within the uncertainty of the model inputs and predictions. Figure 11.6 shows streamflow at gage 800, for the historical baseline (observed flows at gage 800 for the same historical period as the future baseline scenarios) and the three predictive scenarios. As can be seen, the future streamflows are very similar to the historical baseline flows, indicating that climate change impacts are not significant for surface water flows in the basin.

Figures 11.7a – 11.7c show the groundwater budget for the baseline, 2030, and 2070 scenarios. Tables 11.3a – 11.3c show the detailed groundwater budget components for each of the scenarios. Figures 11.8a – 11.8c show the surface water budget for the three future scenarios, with Tables 11.4a – 11.4c showing the surface water budget components. Both the surface water and groundwater budgets are very similar across the three scenarios. Basin storage is seen to be stable for all predictive scenarios, with groundwater storage (levels) declining during dry years but rebounding with subsequent wet months/years, with an average storage change off approximately 100 AFY over the 50-year predictive period.

12.0 MODEL UNCERTAINTY AND LIMITATIONS

While the model represents the best available basin-specific predictive tool, there remain some numerical and data limitations that must be understood as they relate to limitations of the model's ability to simulate the hydrologic conditions in the ASRVGB:

- Surface water and groundwater flows are strongly influenced by geology and basin stratigraphy. The model incorporates all available lithologic data from ASRVGB groundwater wells and surface geology and geologic cross-sections from published literature. However, there is sparse geologic/lithologic data within the ASRVGB. Additional geologic/lithologic data would improve the understanding of geology and stratigraphy and increase confidence in surface water and groundwater predictions in the area.
- Streamflows were only available at the upstream Confluence Flume on Arroyo Conejo and gage 800 on Conejo Creek. Arroyo Santa Rosa and its tributary are ungauged. No continuous surface water measurements were available within the ASRVGB boundary. Additional gages on contributing tributaries as well as within the basin would validate/refine the streamflow estimates.
- Groundwater elevations from wells within the ASRVGB were used to calibrate groundwater levels and surface water/groundwater interactions within the ASRVGB. Few groundwater observations were available in the shallow subsurface. Relatively few groundwater level measurements were available in the northern portion of the basin within the FCGMA area. Additional groundwater levels in the shallow subsurface and in the FCGMA area would improve understanding and refine model results for surface water/groundwater conditions and groundwater levels and flows in the FCGMA area.
- Groundwater production is the largest outflow from the basin. Non-FCGMA agricultural pumping was not available for the basin. Groundwater levels and calibration are highly dependent on pumping. Metering production wells within the basin would allow for more accurate representation of pumping stresses allowing for more robust model results.
- A key uncertainty is the magnitude of inflows from fractured bedrock. These were a significant component of the water budget. However, sparse data was available to specify the GHB heads or validate the bedrock inflows. Deeper geologic logs and water levels in the bedrock would allow for better characterization and simulation of bedrock geology and flows. Water quality data from wells in the bedrock may also help improve our understanding of inflows from the Conejo volcanics to the basin. Note, both the historical and the predictive model assumed constant GHB heads. The historical model was calibrated to this assumption. However, it is not certain if these GHB heads will remain representative of bedrock water levels in the future with changes to regional groundwater flow conditions from climate change, land use change, or pumping stresses outside ASRVGB.
- Underflows to or from the Pleasant Valley are also uncertain. The model uses GHBs to simulate these underflows; however water levels along this boundary were not available. While the historical model calibrated to the specified heads and GHB conductance, the predictive model

assumed constant heads in the future. This assumption may not be correct if future regional heads across the ASRVGB and Pleasant Valley change significantly.

- The groundwater model used monthly stress periods. Monthly stress periods limit the ability of the model to simulate spring and summer stormflow and baseflow conditions. A future update of the model could potentially incorporate shorter (weekly or daily) stress periods, once additional data are available to refine and calibrate the model at that scale.
- The predictive modeling was based on reasonable assumptions based on the current understanding of future water supplies and demands, incorporating DWR-provided climate change datasets. These future scenario assumptions and climate change factors are subject to uncertainty, given that future conditions are not perfectly known. Moreover, actual future hydrology, water supplies, demands, and basin pumping will likely have more variability and transience than what is reflected in the predictive modeling. As such, the predictive model results are reflective of expected average long-term future water levels and budgets trends.

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FIGURES

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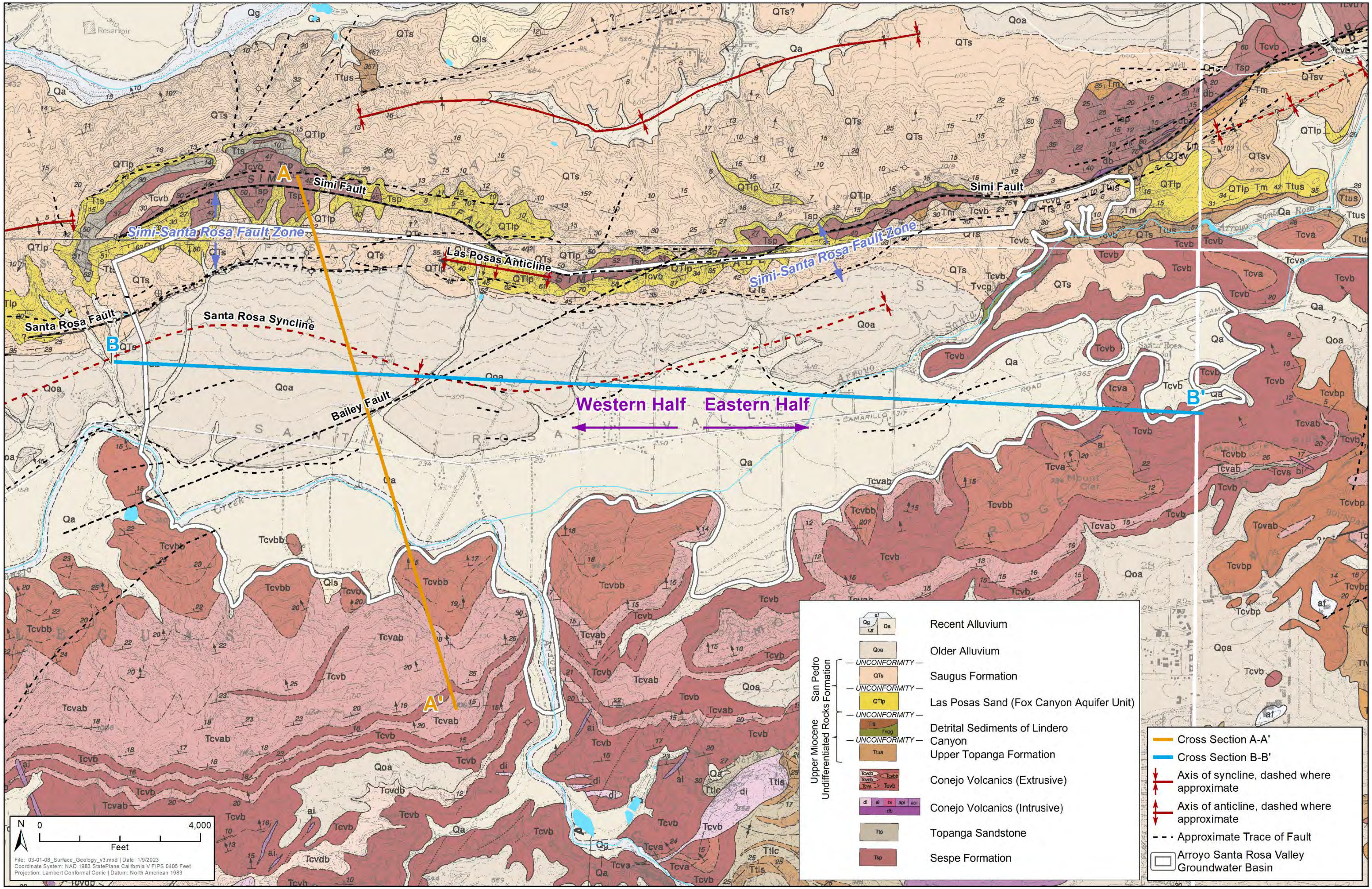


Figure 2.1 Regional Surface Geology for the ASRVGB

Surface Geology: Dibblee and Eherenspeck, 1992.

		West of Bailey Fault					East of Bailey Fault			
Period	**Epoch**	**Geologic Unit**	**Hydrostratigraphic Unit**	**Layer**			**Geologic Unit**	**Hydrostratigraphic Unit**	**Layer**	
Quaternary	Holocene	Recent Alluvium	Shallow Alluvium	Shallow Alluvium	**1**	Bailey Fault: Barrier to flow, up to ~300 ft offset, upthrown side on east	Recent Alluvial and Terrace deposits	Shallow Alluvium	Shallow Alluvium	**1**
	Upper and Middle Pleistocene	Older Alluvium	Mugu (or age-equivalent)	**Upper Groundwater Producing Zone** (~100-240 ft thick; ~100-440 ft deep)	**2**		Saugus/San Pedro Formation (Sand, silt, and clay)	n/a	**Upper Groundwater Producing Zone** (~50-200 ft thick; ~100-400 ft deep)	**2**
		Saugus/Upper San Pedro Formation	Hueneme		**3**					**3**
	Lower Pleistocene			Low permeability unit	**4**				Low permeability unit	**4**
		Las Posas Sand/Lower San Pedro Formation	Fox Canyon	**Lower Groundwater Producing Zone** (~200-550 ft thick; ~100-600 ft deep)	**5**			Fox Canyon	**Lower Groundwater Producing Zone** (~50-450 ft thick; ~50-400 ft deep)	**5**
		Santa Barbara Formation	Grimes Canyon/Santa Barbara				n/a			
Tertiary	Pliocene	Unconformity	n/a				Unconformity	Unconformity		
	Miocene	**Miocene Undifferentiated** (Santa Margarita, Upper Topanga, and Lindero Canyon)	**Miocene Undifferentiated** (Santa Margarita)				**Miocene Undifferentiated** (Santa Margarita, Upper Topanga, and Lindero Canyon)	**Miocene Undifferentiated** (Santa Margarita)		
		Conejo Volcanics	Conejo Volcanics	Base Layer (Conejo Volcanics) ~1200 ft max depth	**6**		Conejo Volcanics and Lower Topanga Formation	Conejo Volcanics	Base Layer (Conejo Volcanics) ~900 ft max depth	**6**
		Lower Topanga Formation	n/a					n/a		

Names of Hydrostratigraphic Units from Hanson et. al. (2003).

Figure 2.2 Schematic Illustration of Geologic Formations, Ages, Hydrostratigraphic Units, and Model Layers

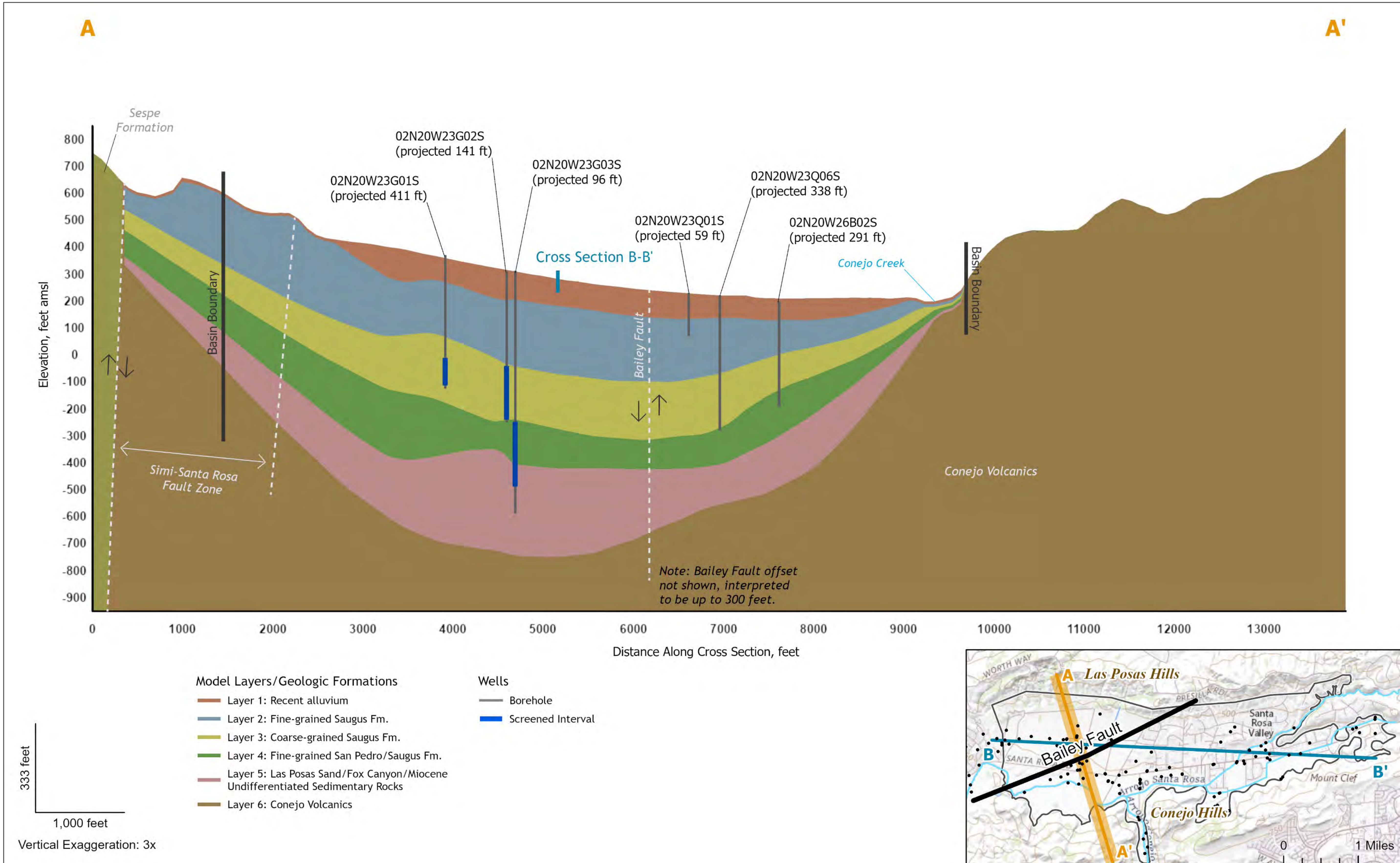


Figure 2.3a North-south Cross Section A-A'

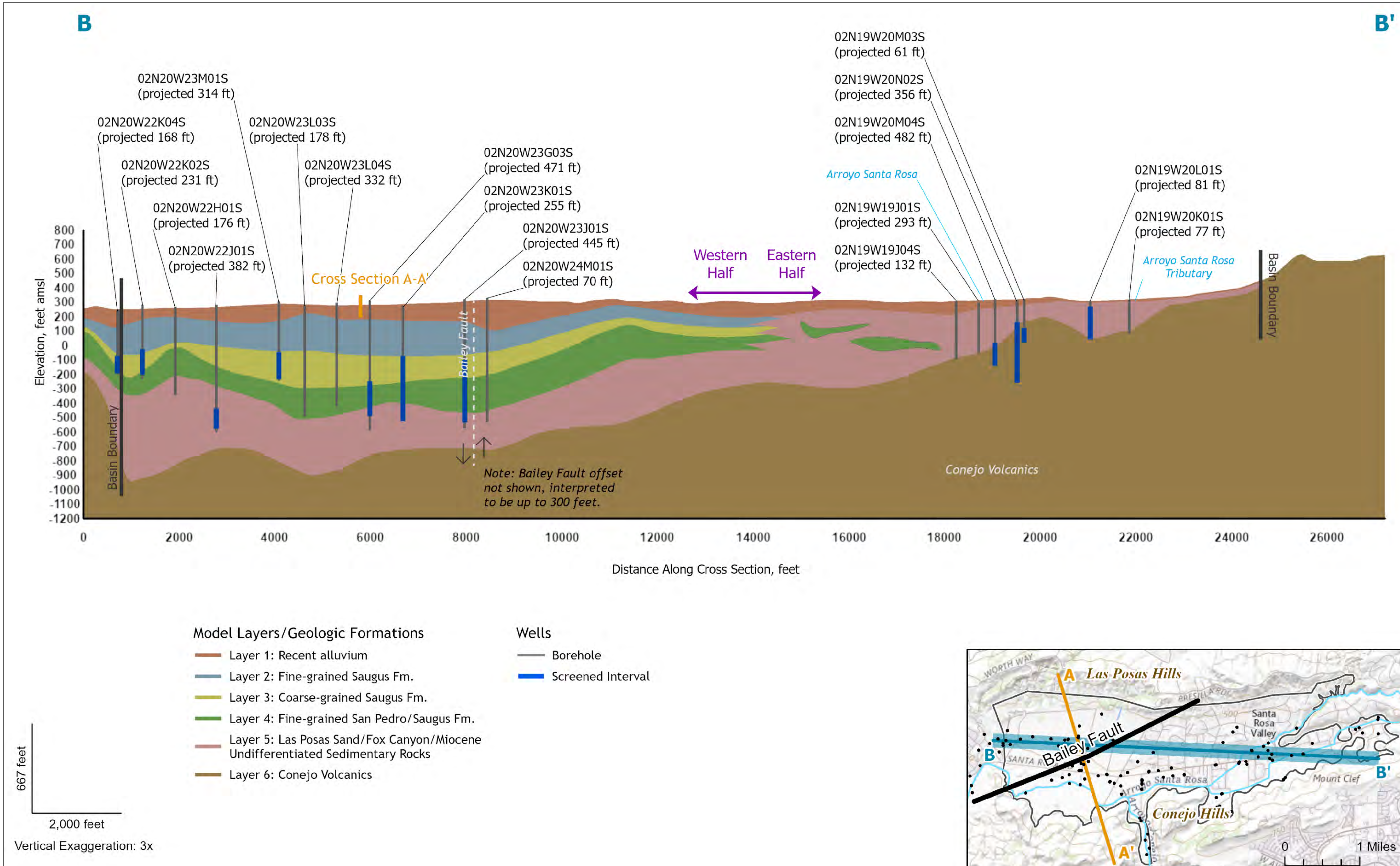


Figure 2.3b West-east Cross Section B-B'

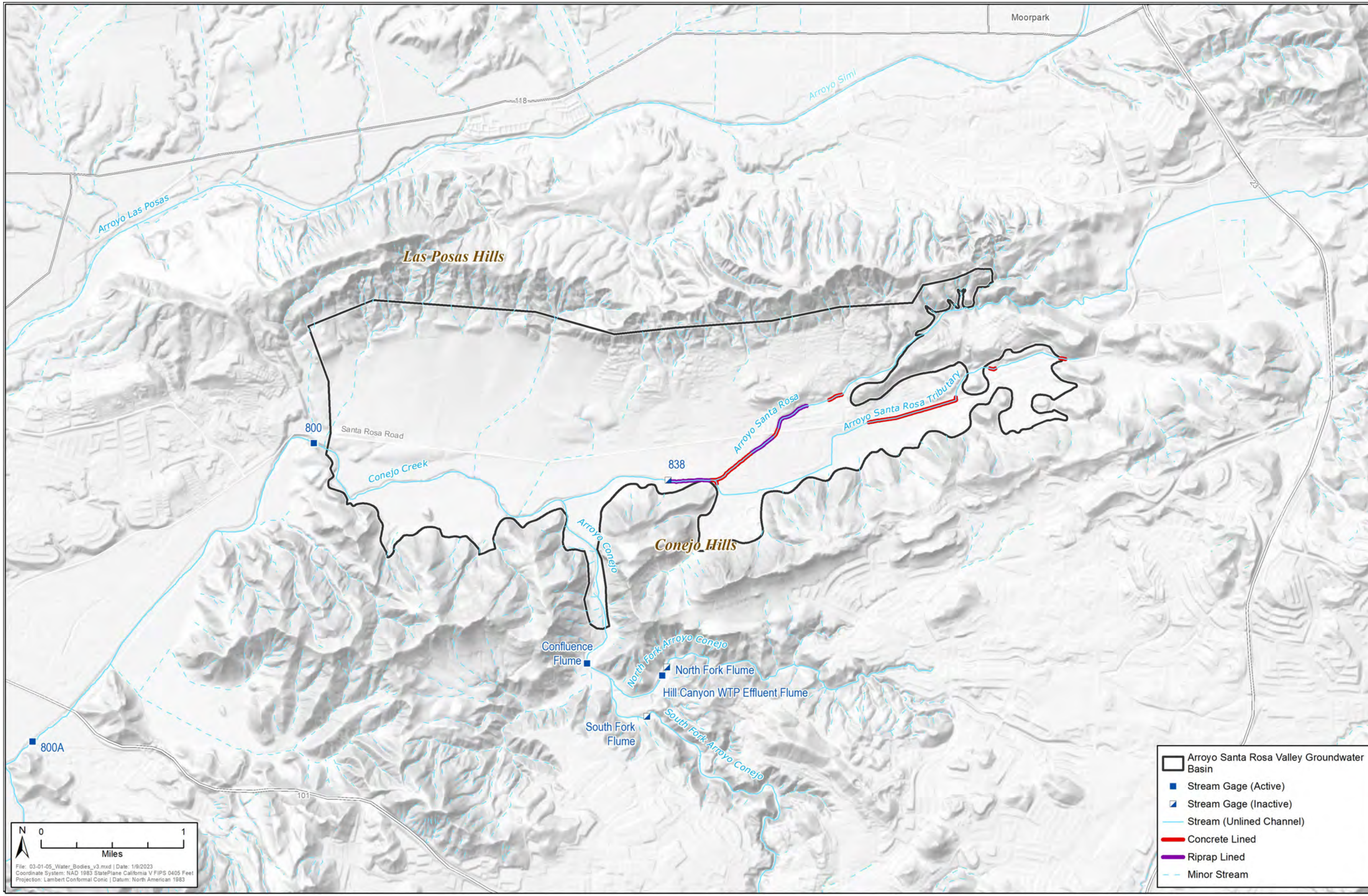


Figure 2.4 Surface Water Bodies in the ASRVGB

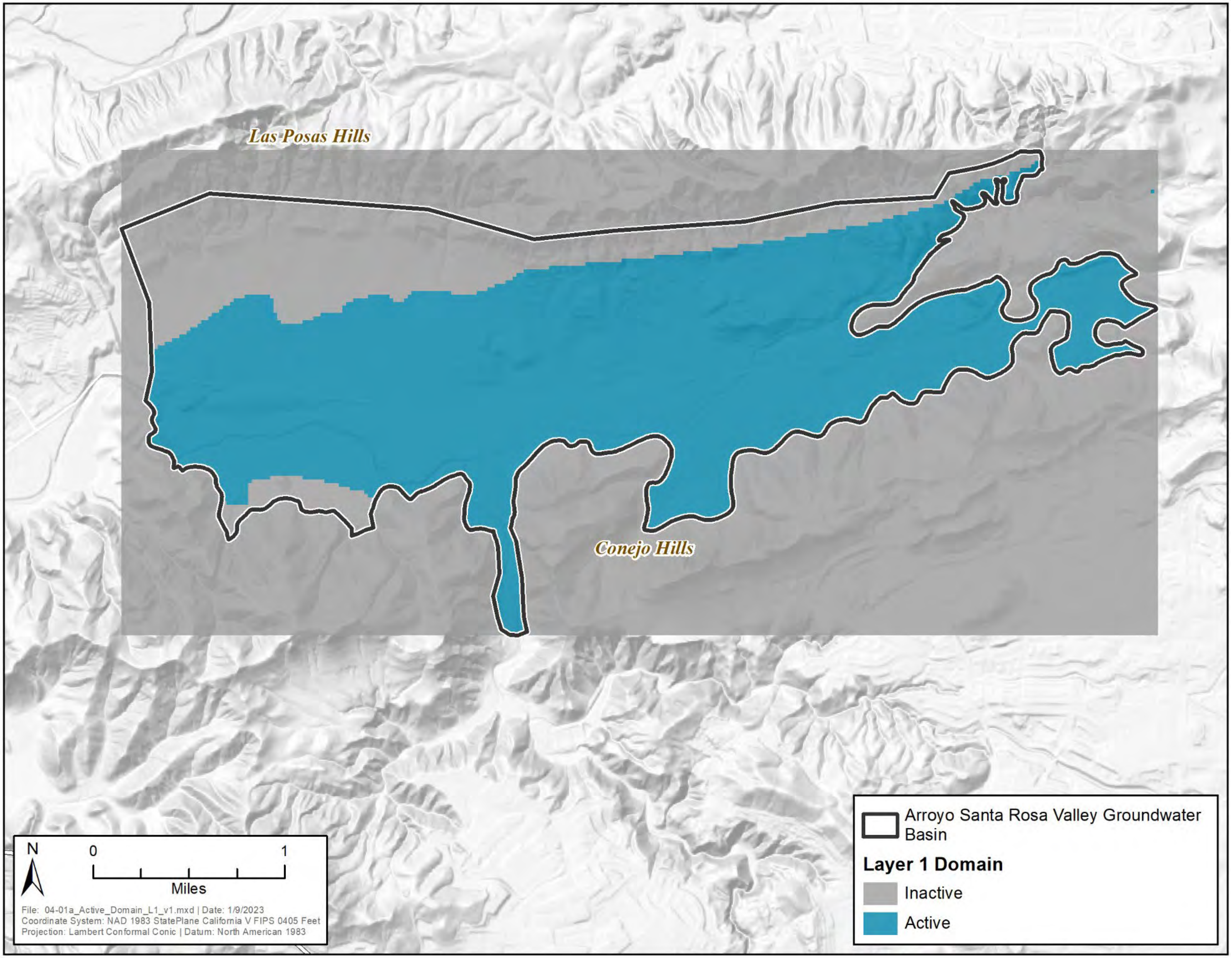


Figure 4.1a Model Domain for Layer 1

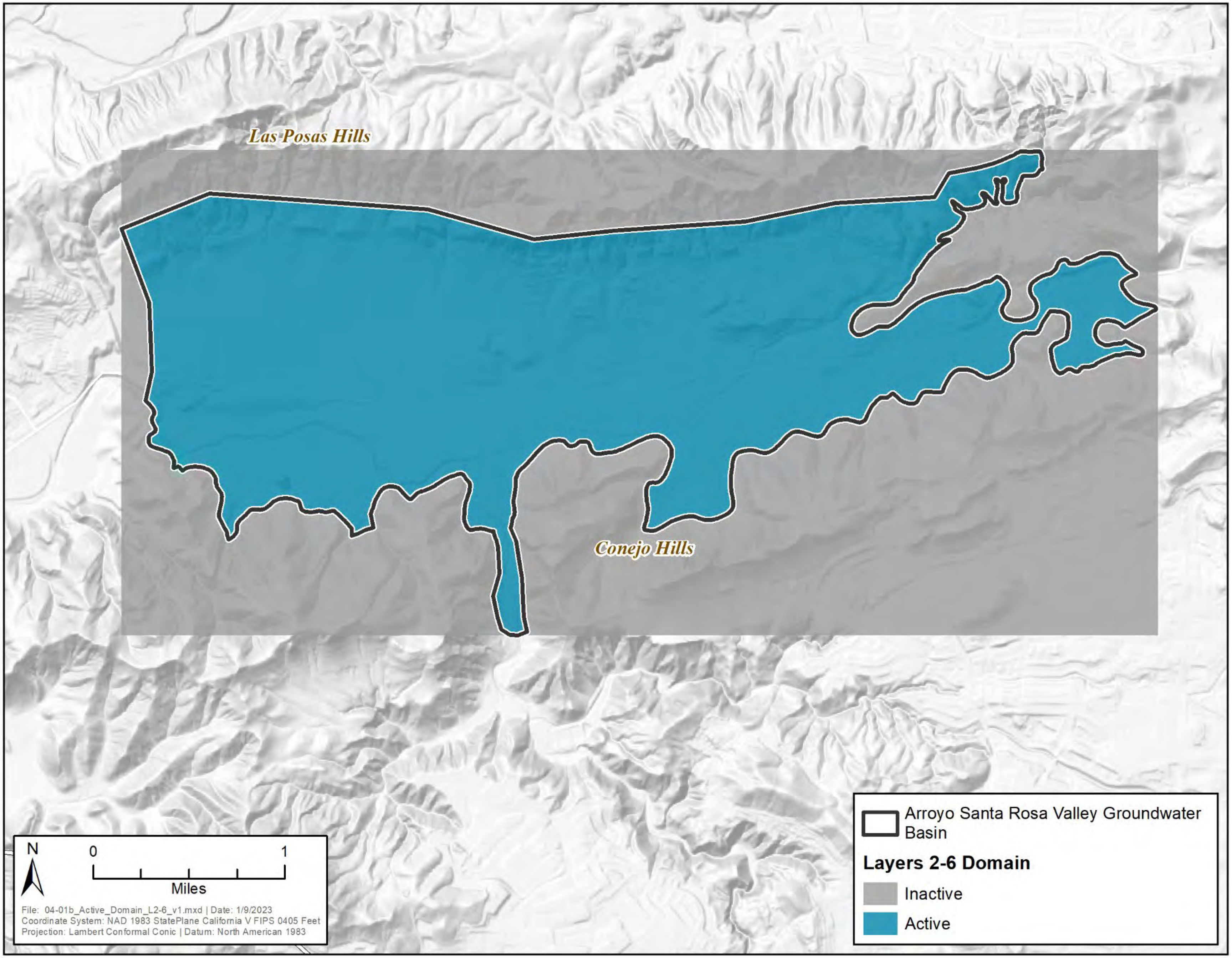


Figure 4.1b Model Domain for Layers 2 - 6

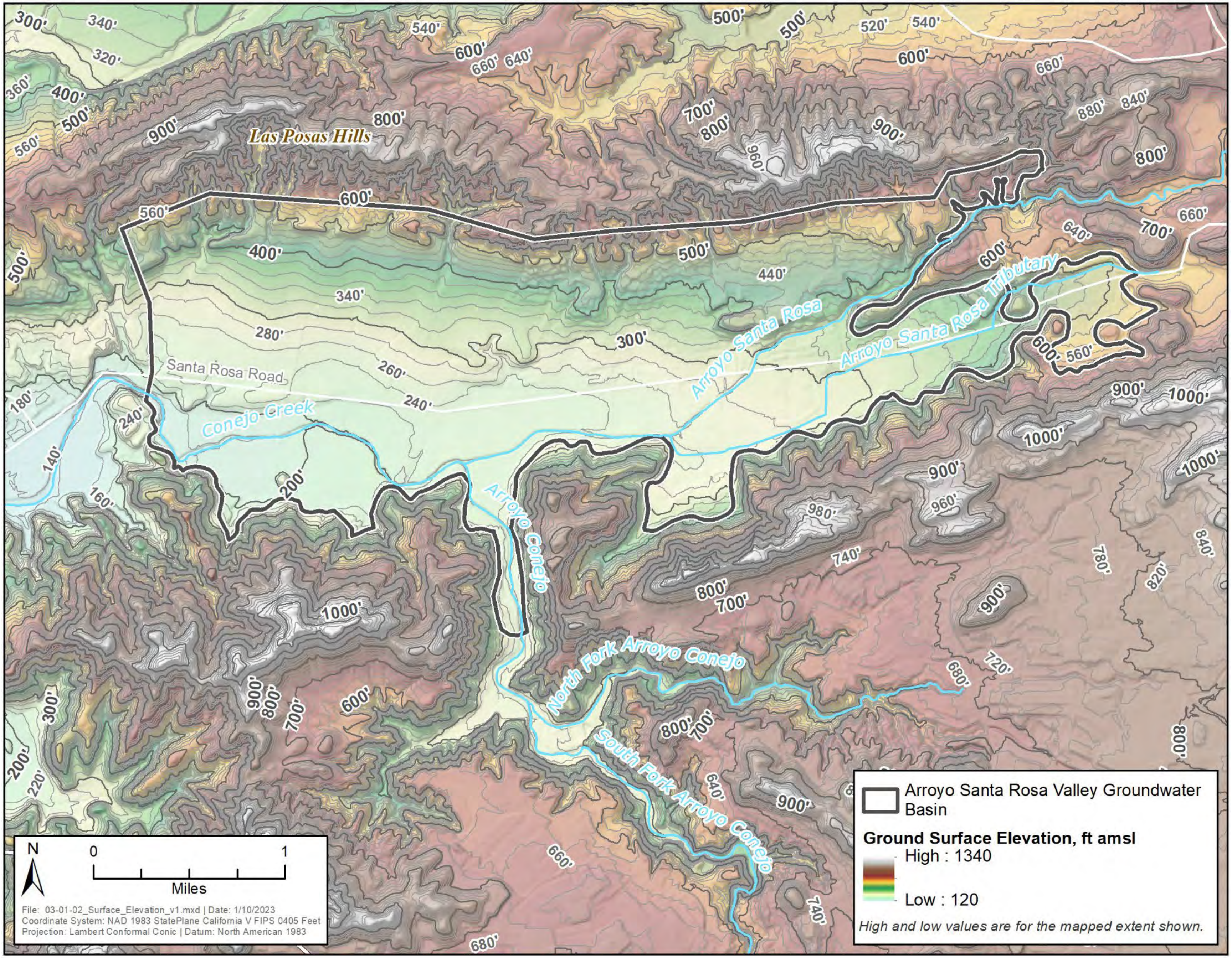


Figure 4.2 Ground Surface Elevation

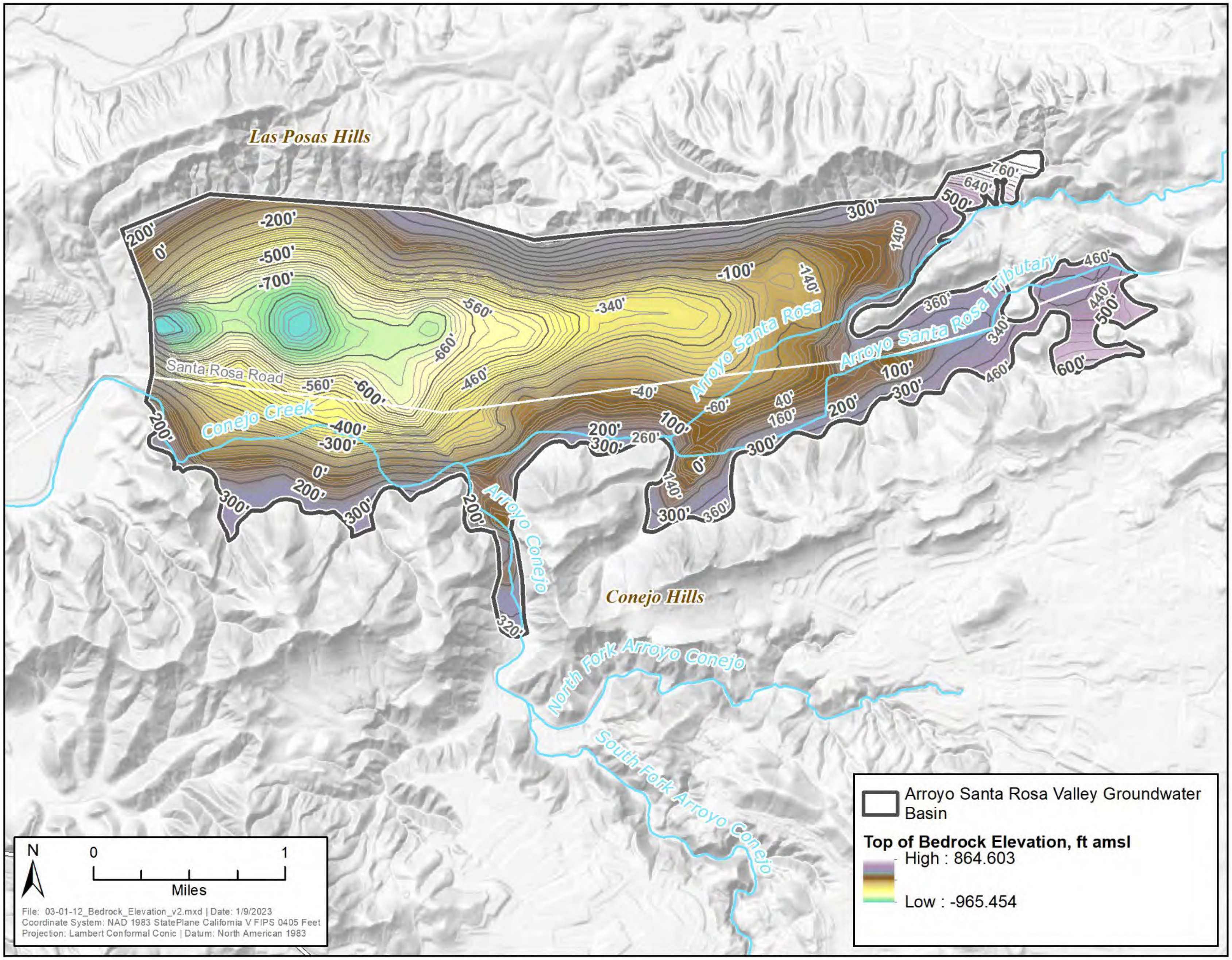


Figure 4.3 Top of Bedrock Elevation

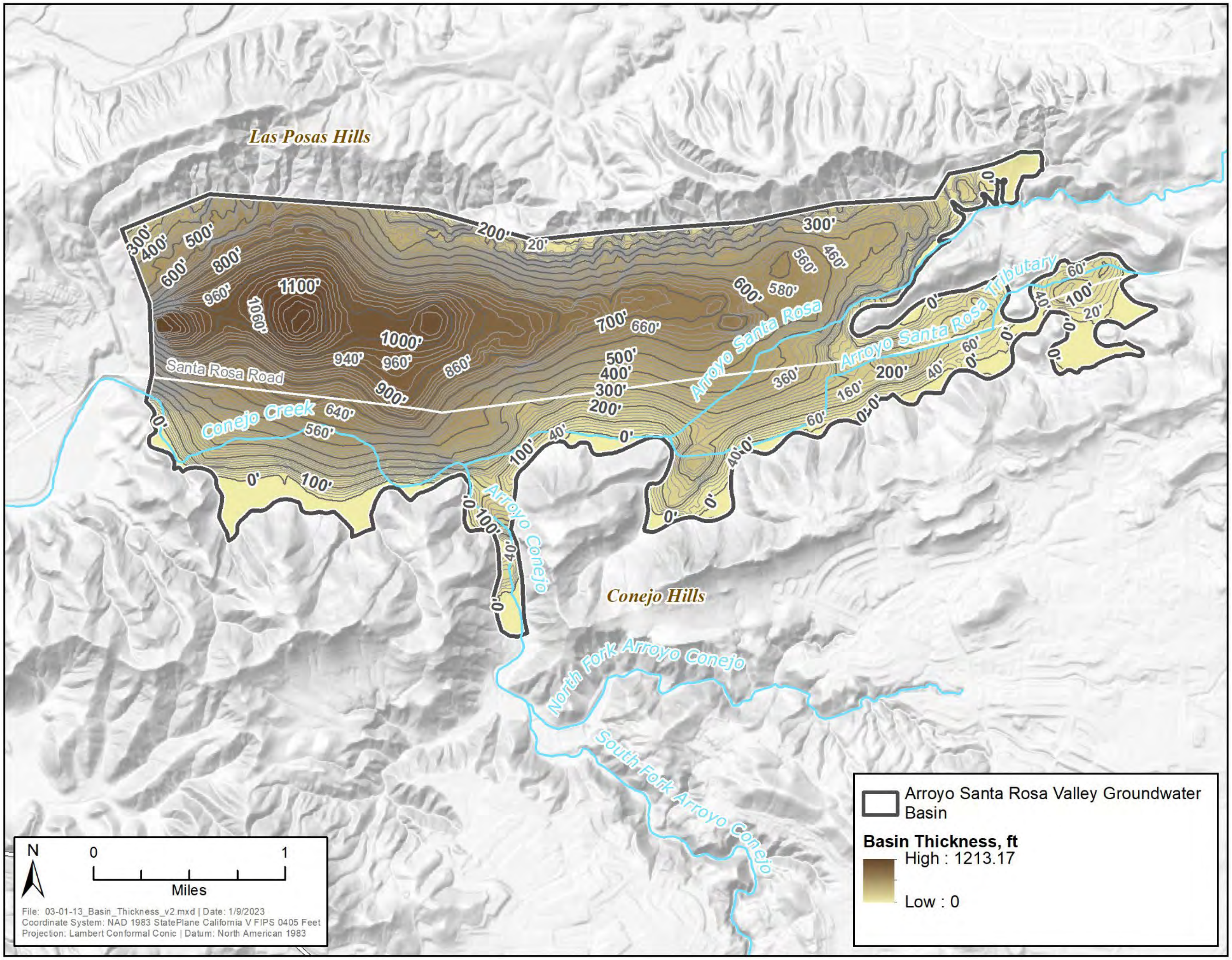


Figure 4.4 Model Thickness (Top of Layer 1 – Bottom of Layer 6)

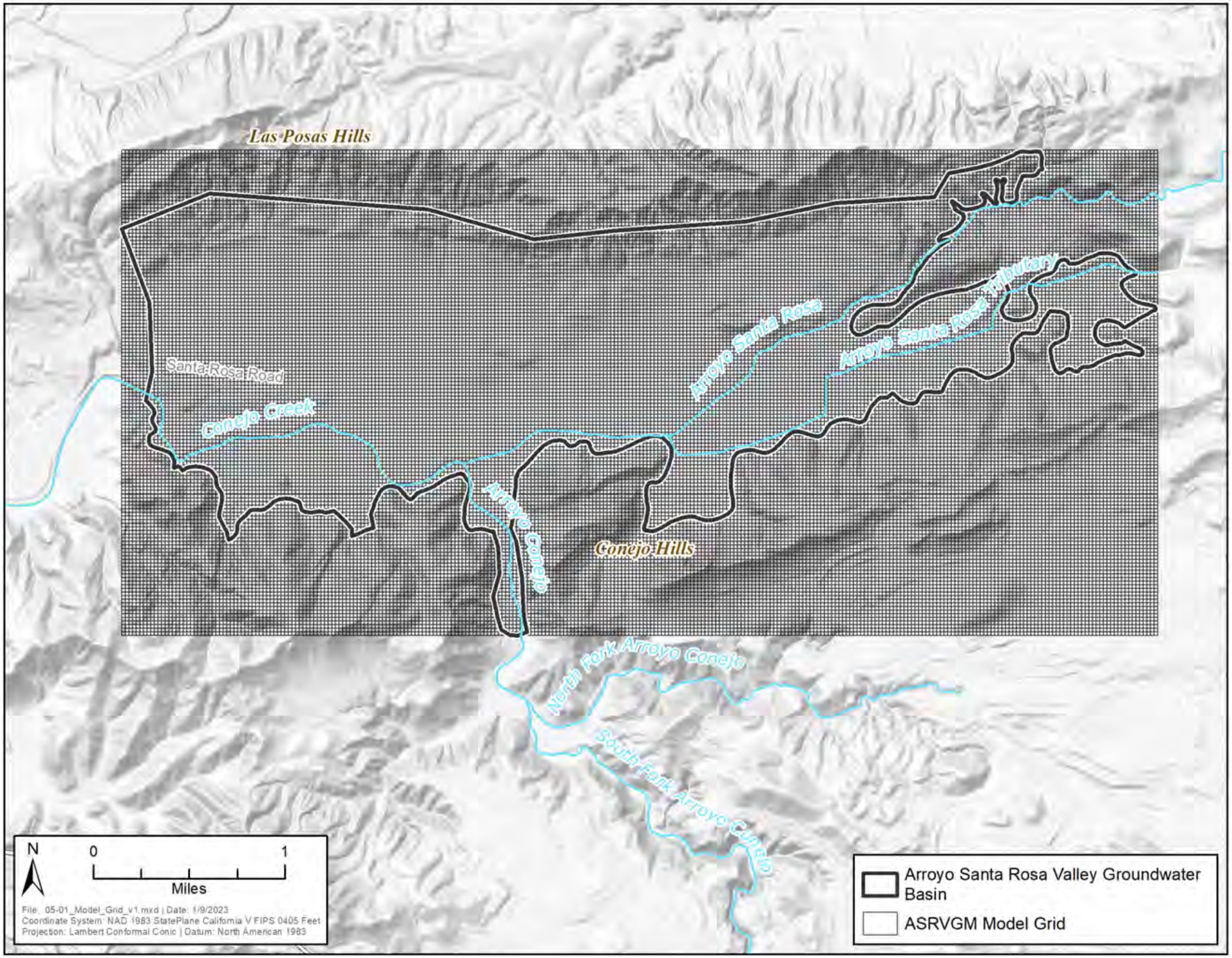


Figure 5.1 Model Grid

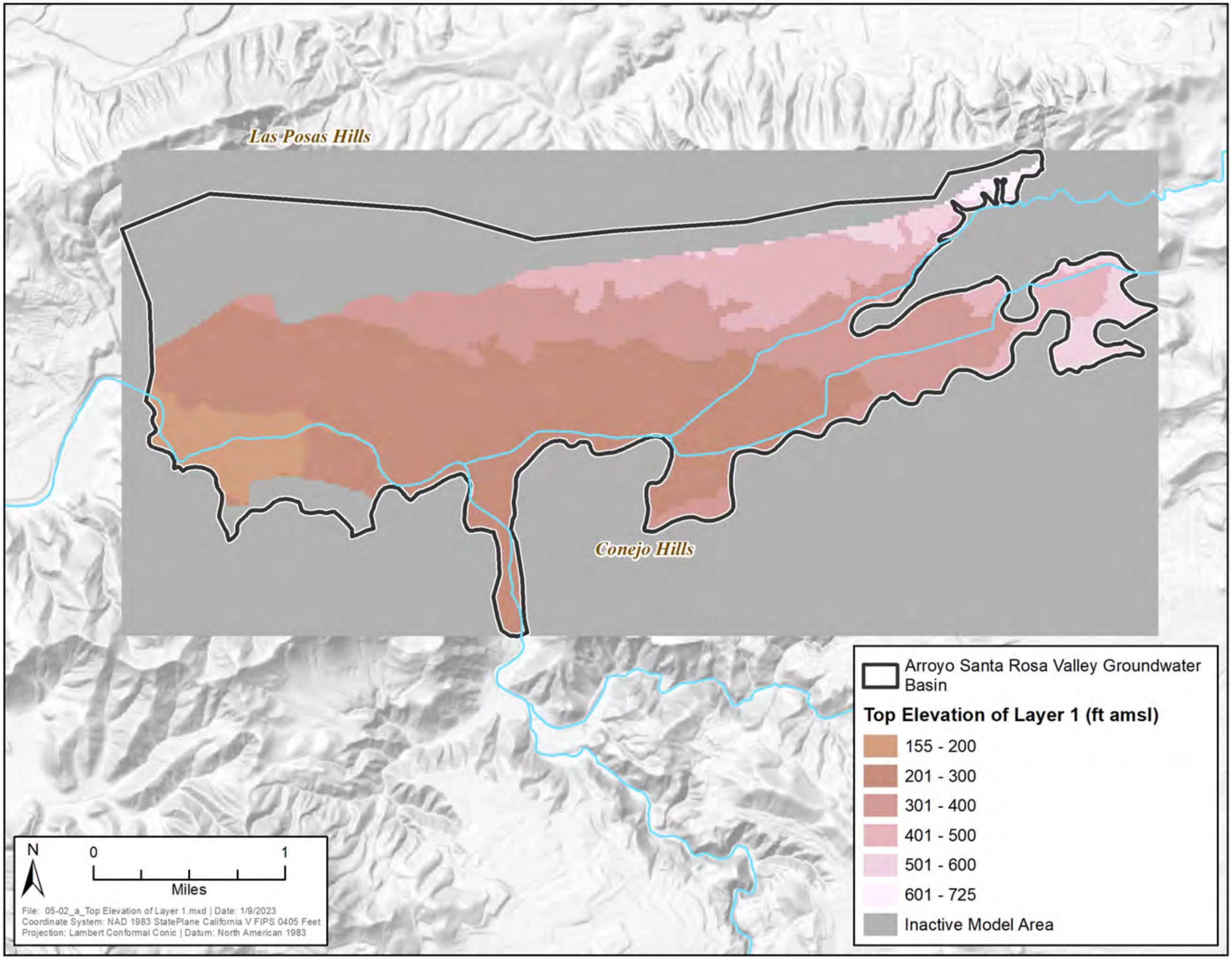


Figure 5.2a Top Elevation of Layer 1

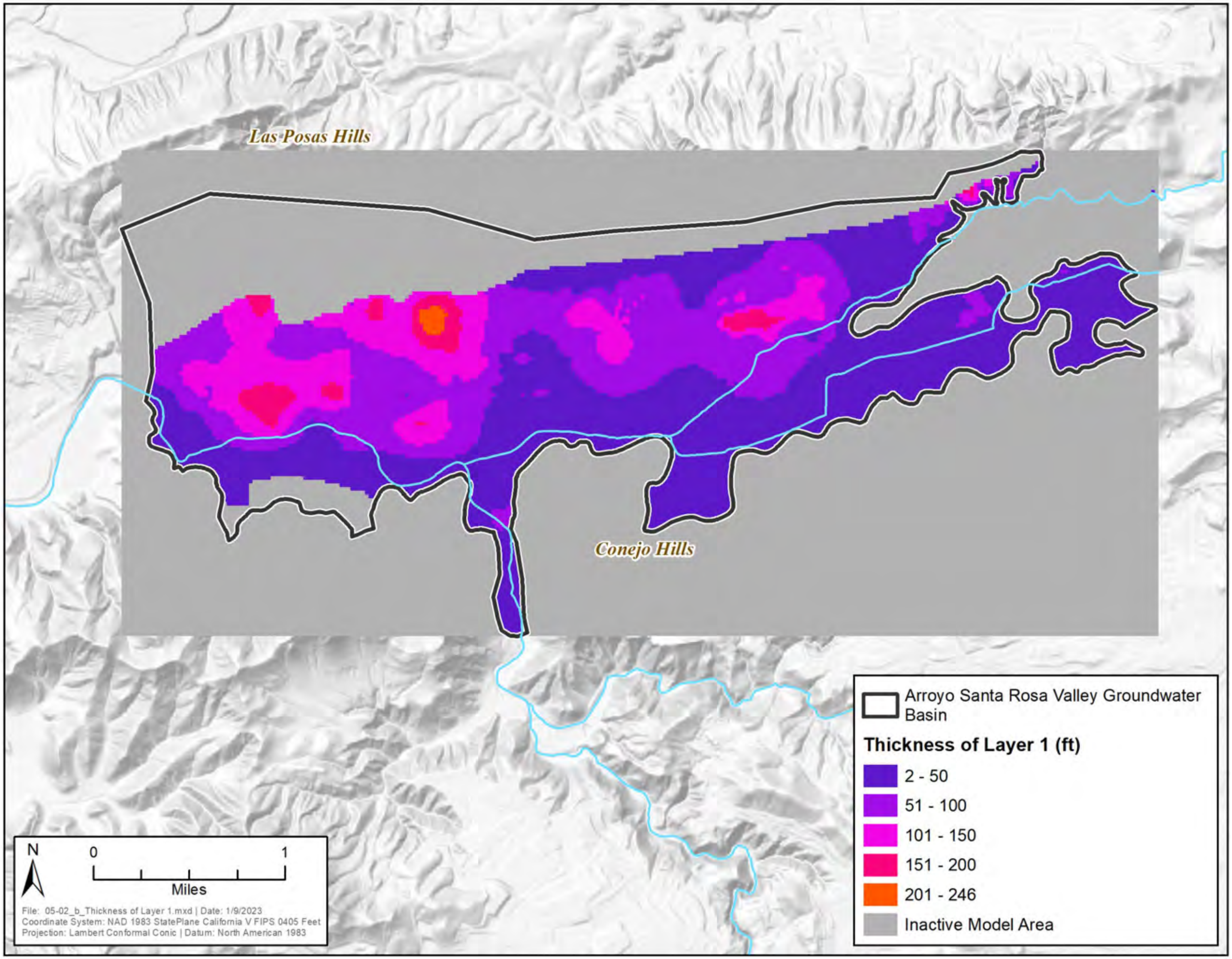


Figure 5.2b Thickness of Layer 1

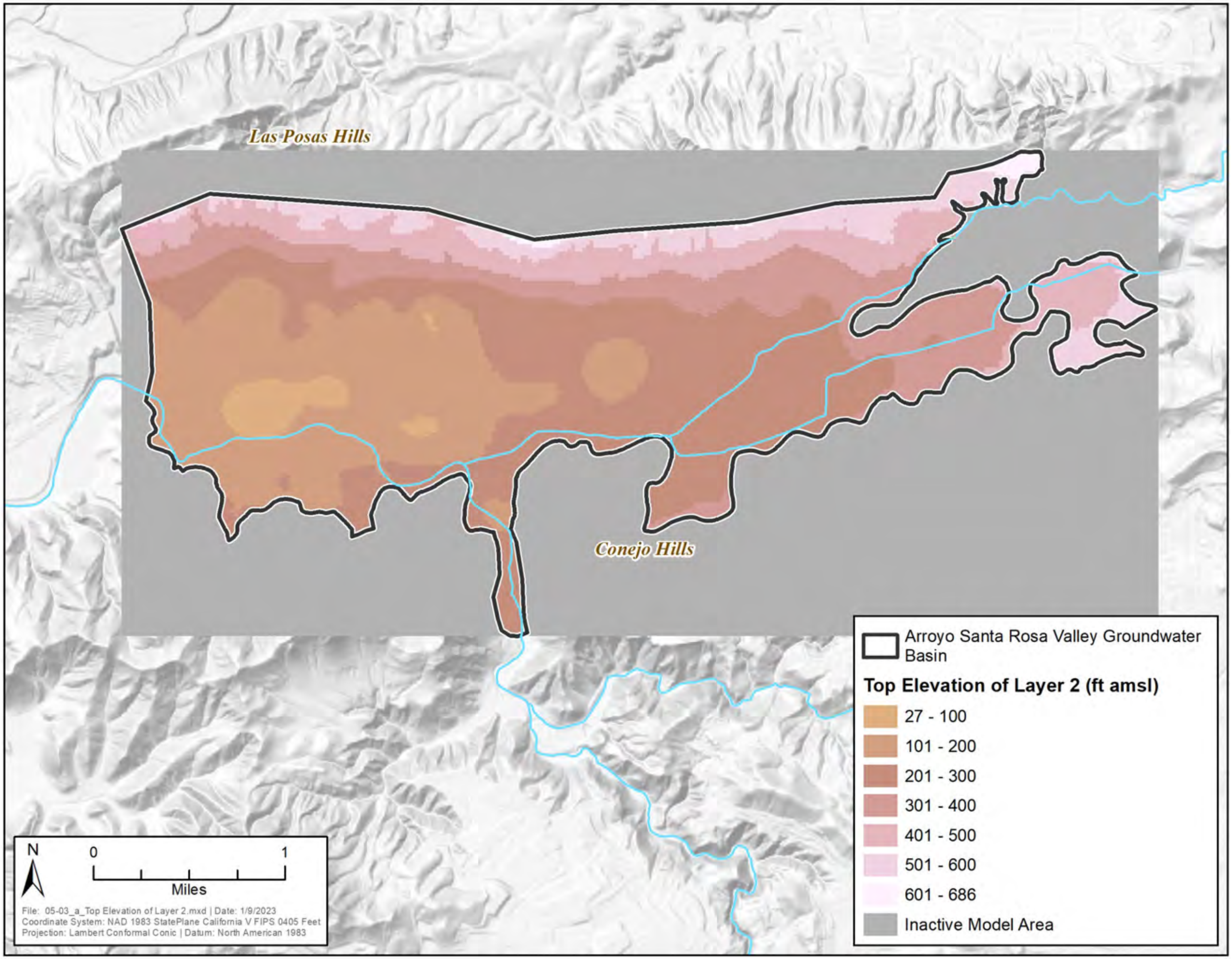


Figure 5.3a Top Elevation of Layer 2

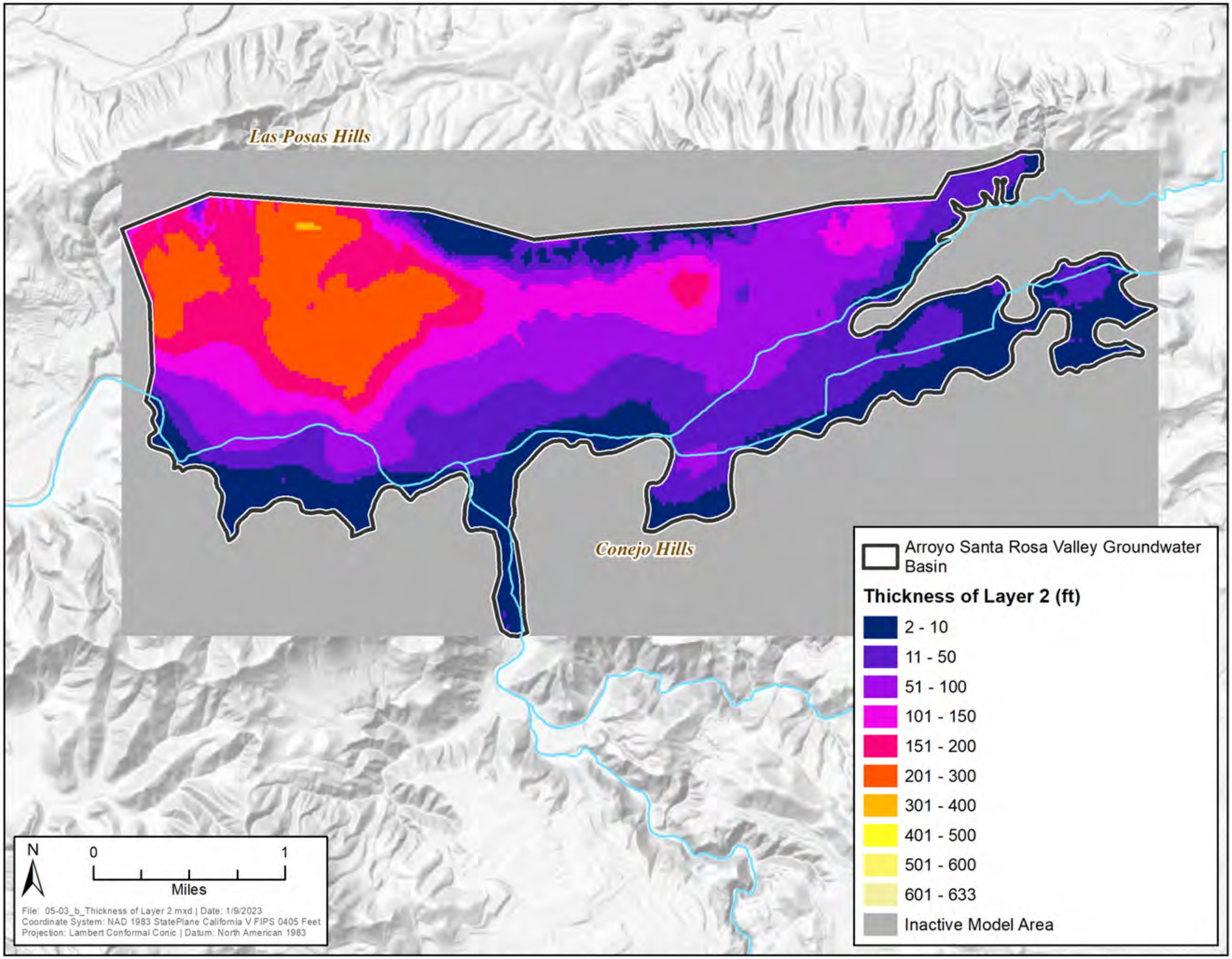


Figure 5.3b Thickness of Layer 2

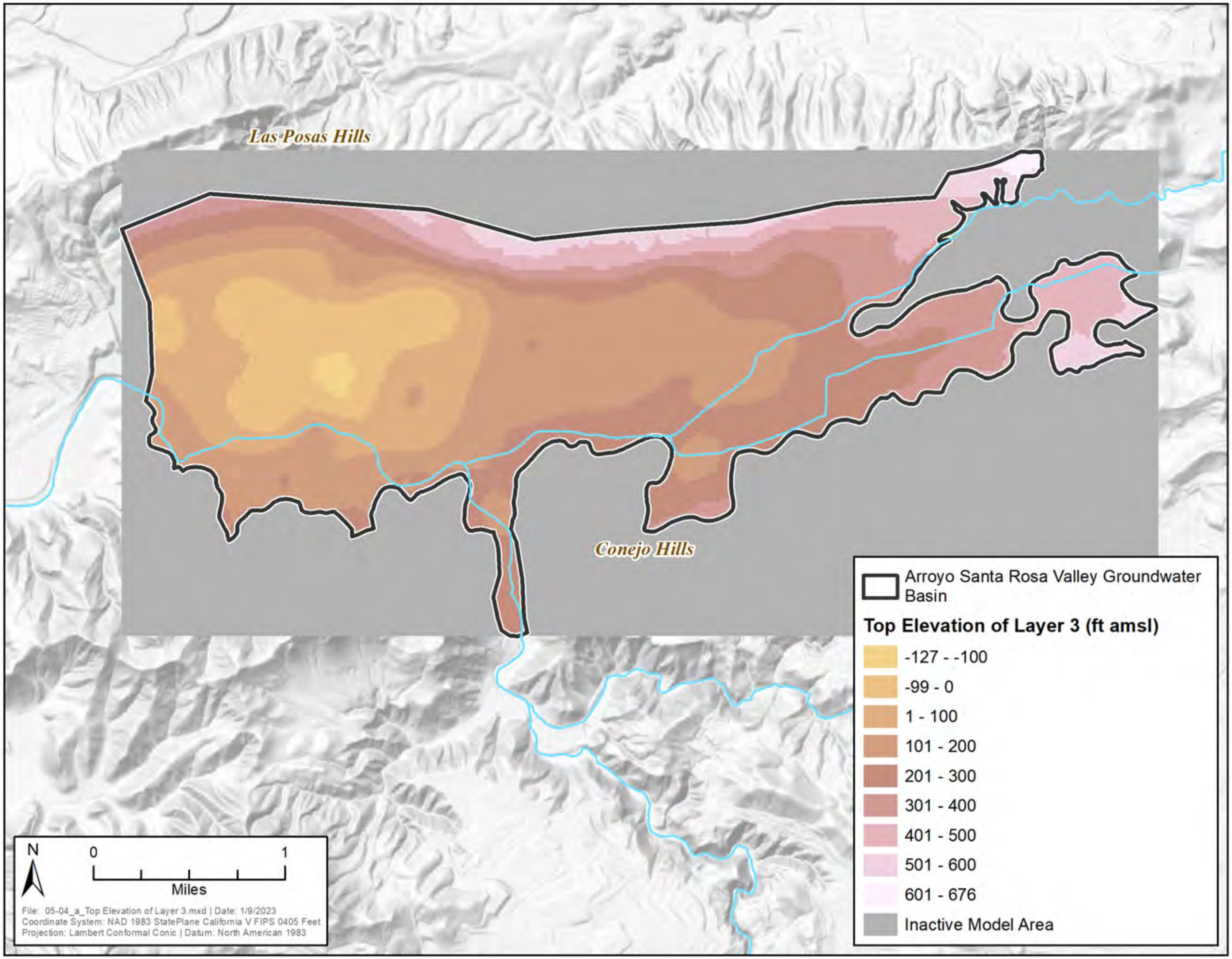


Figure 5.4a Top Elevation of Layer 3

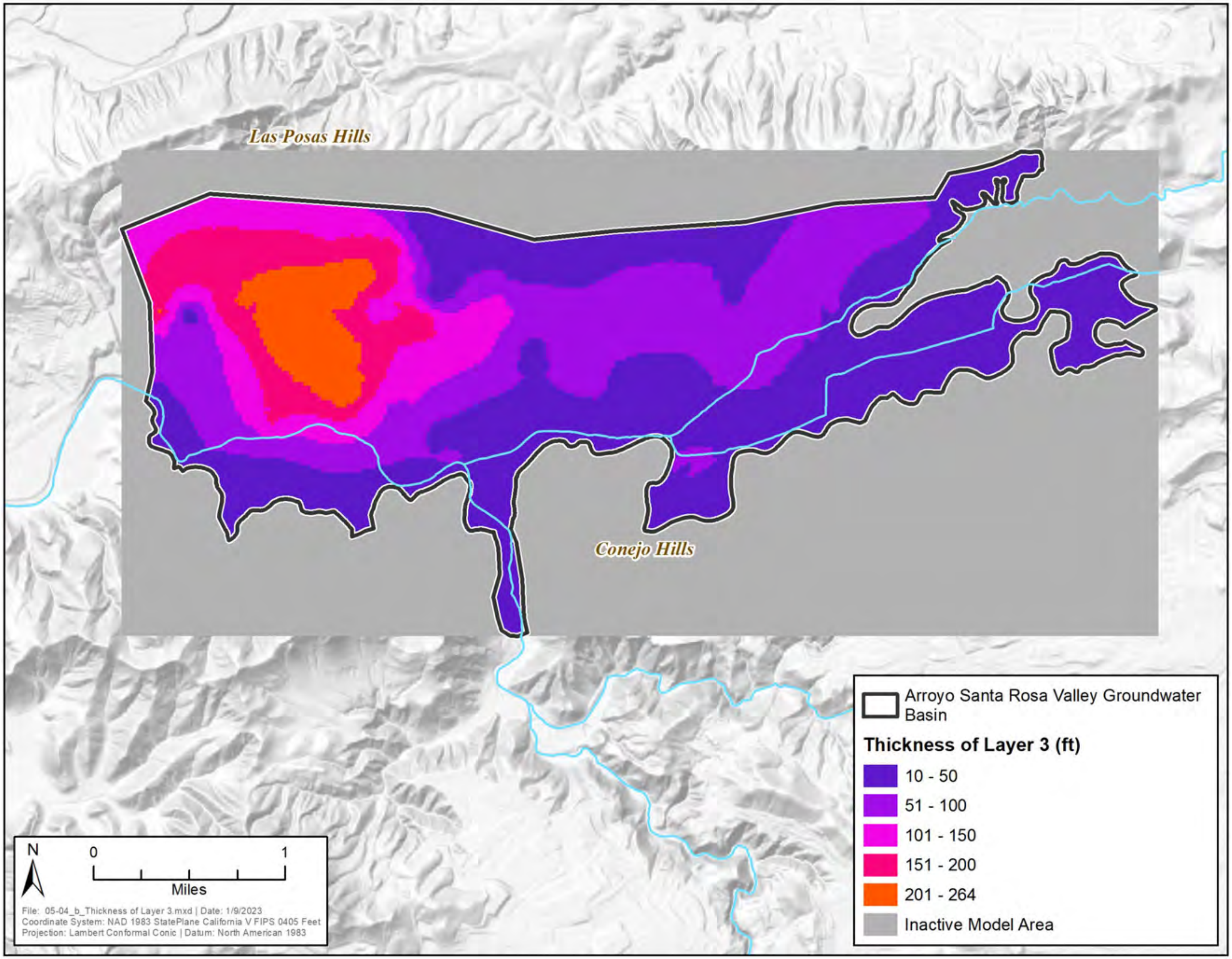


Figure 5.4b Thickness of Layer 3

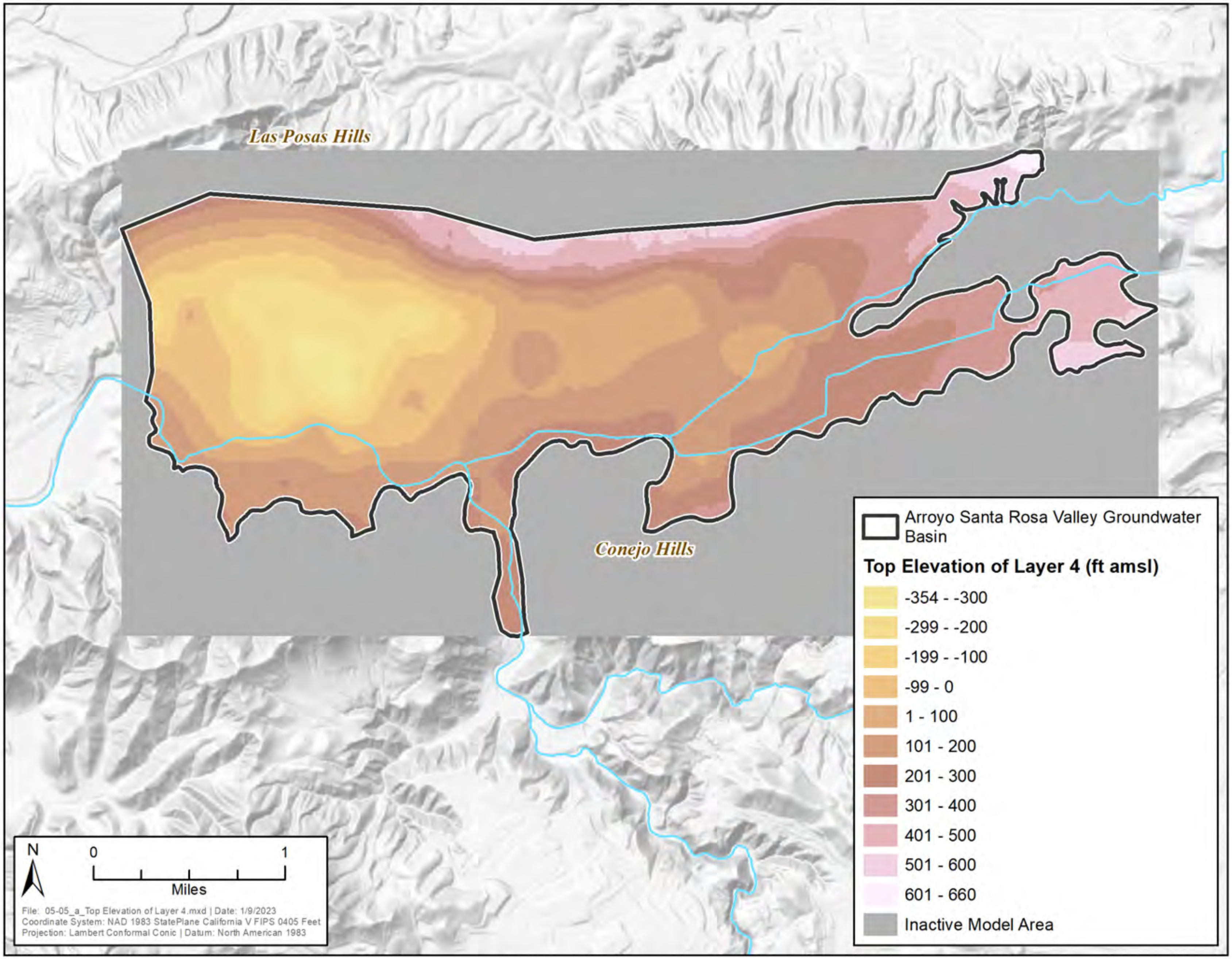


Figure 5.5a Top Elevation of Layer 4

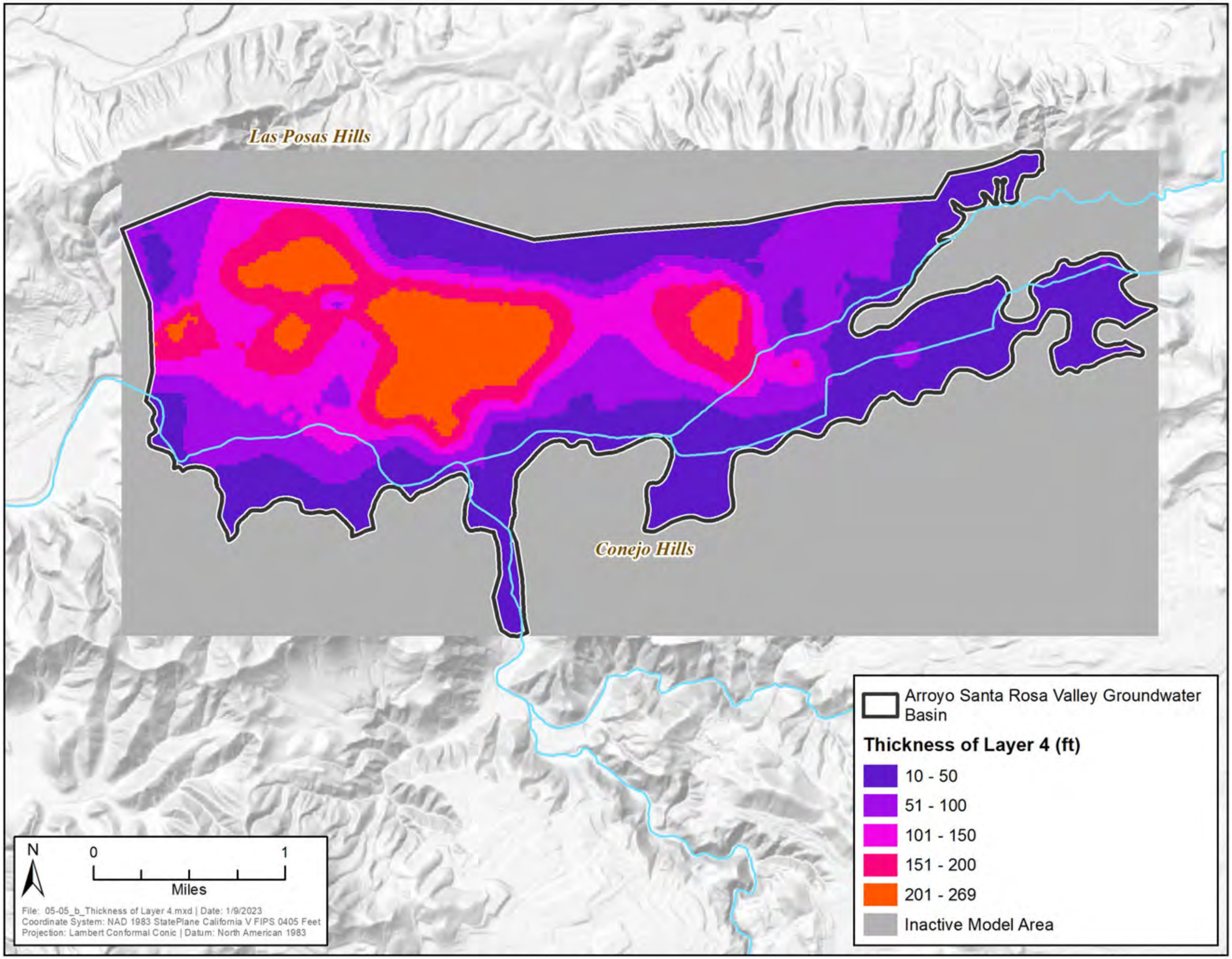


Figure 5.5b Thickness of Layer 4

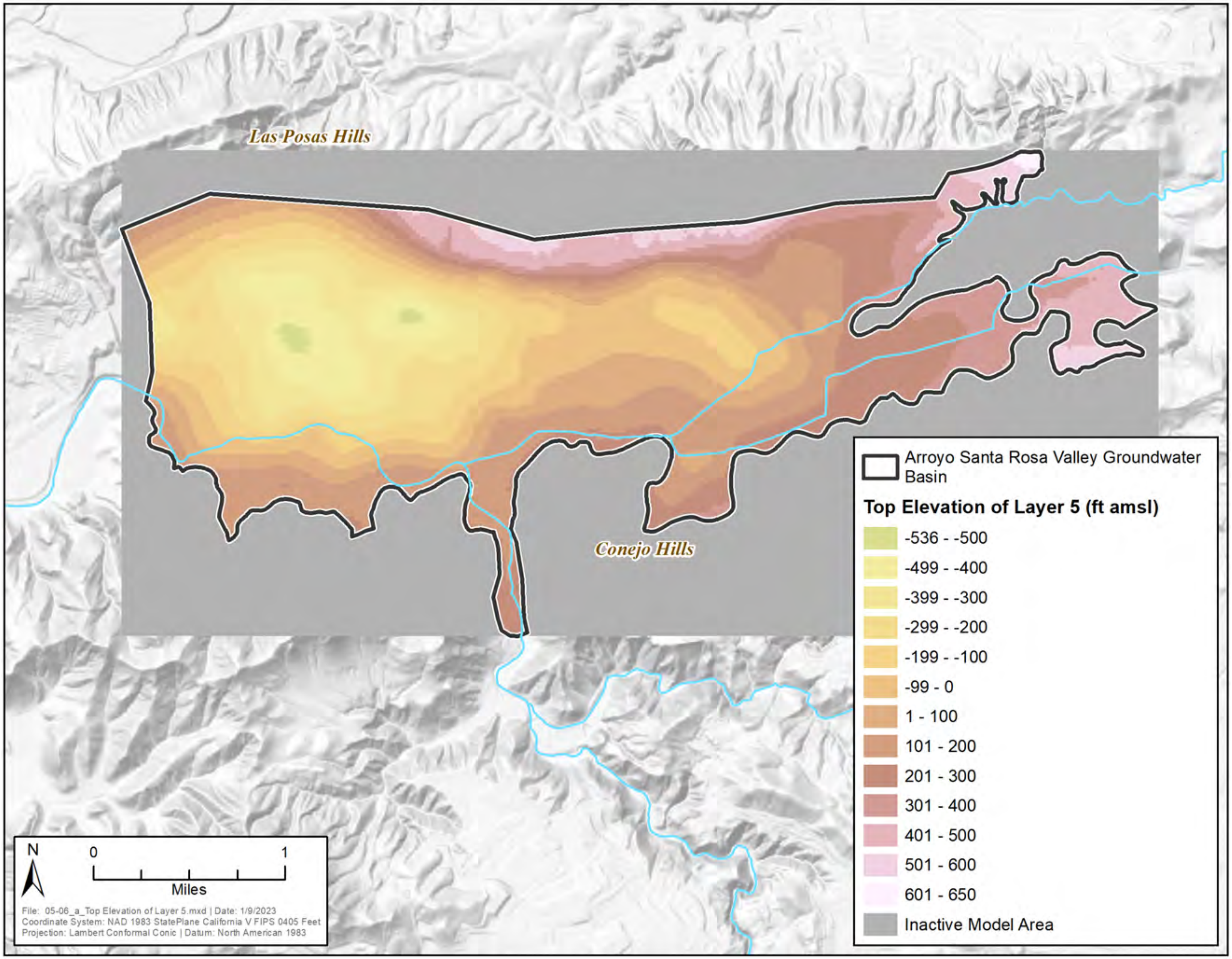


Figure 5.6a Top Elevation of Layer 5

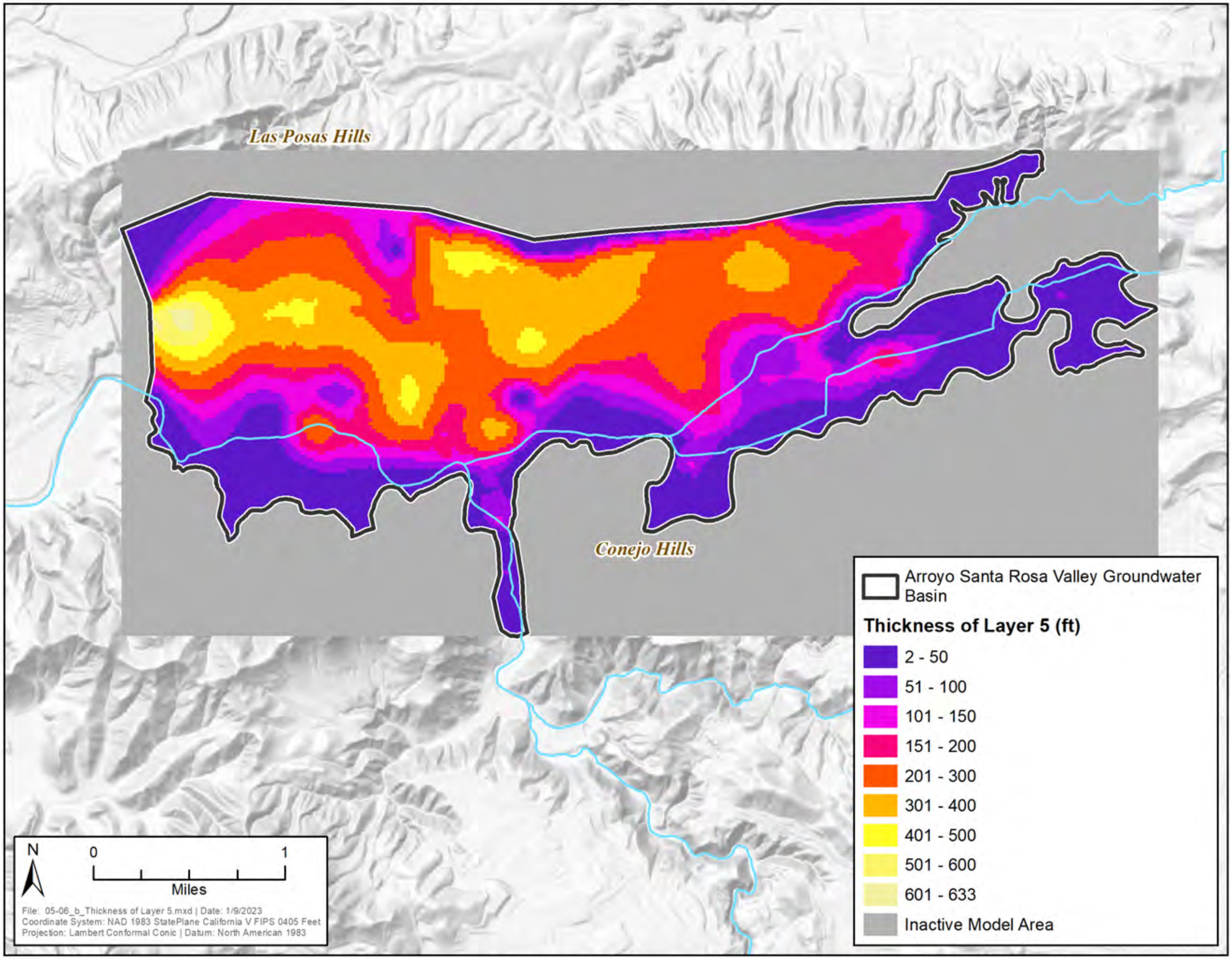


Figure 5.6b Thickness of Layer 5

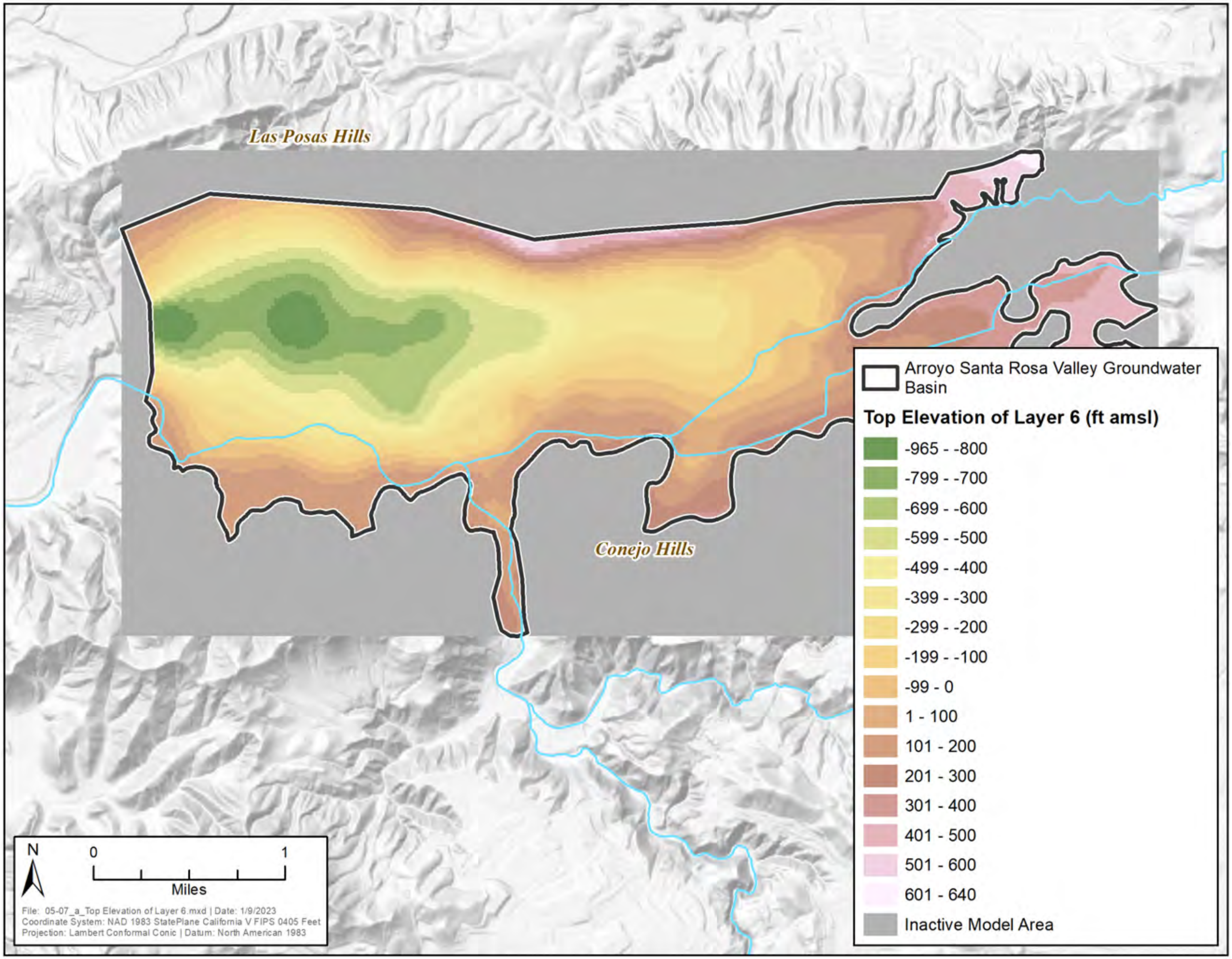


Figure 5.7a Top Elevation of Layer 6

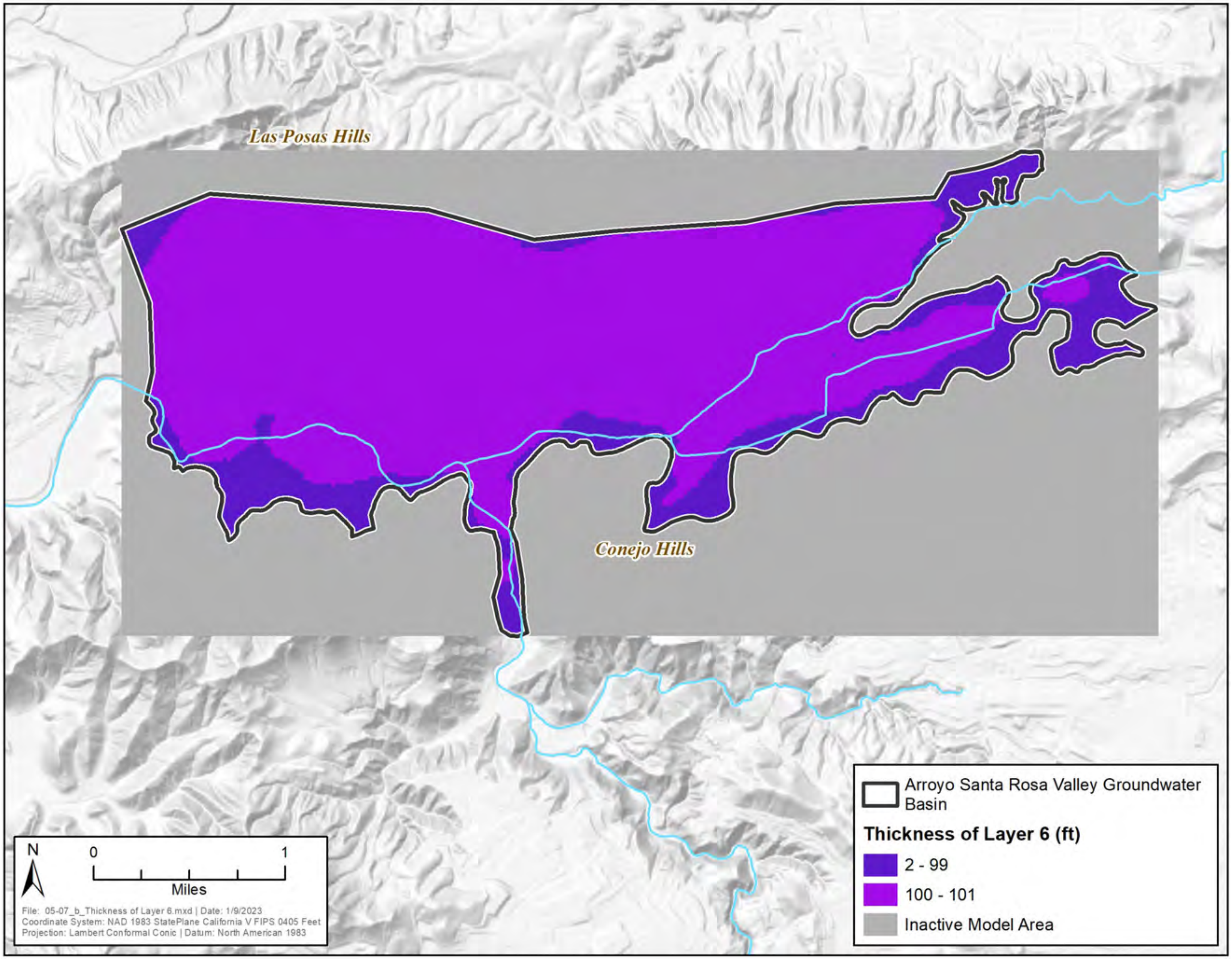
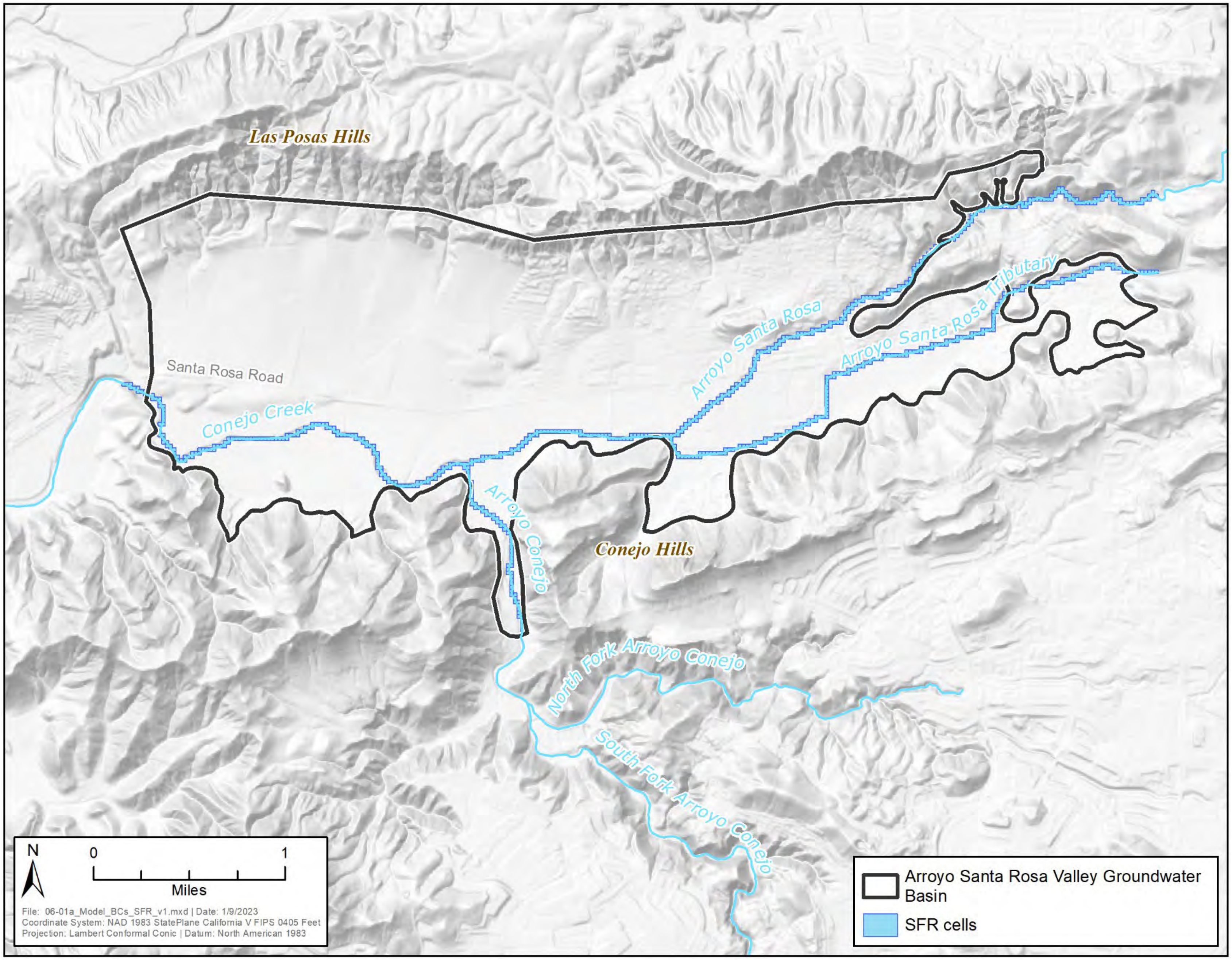
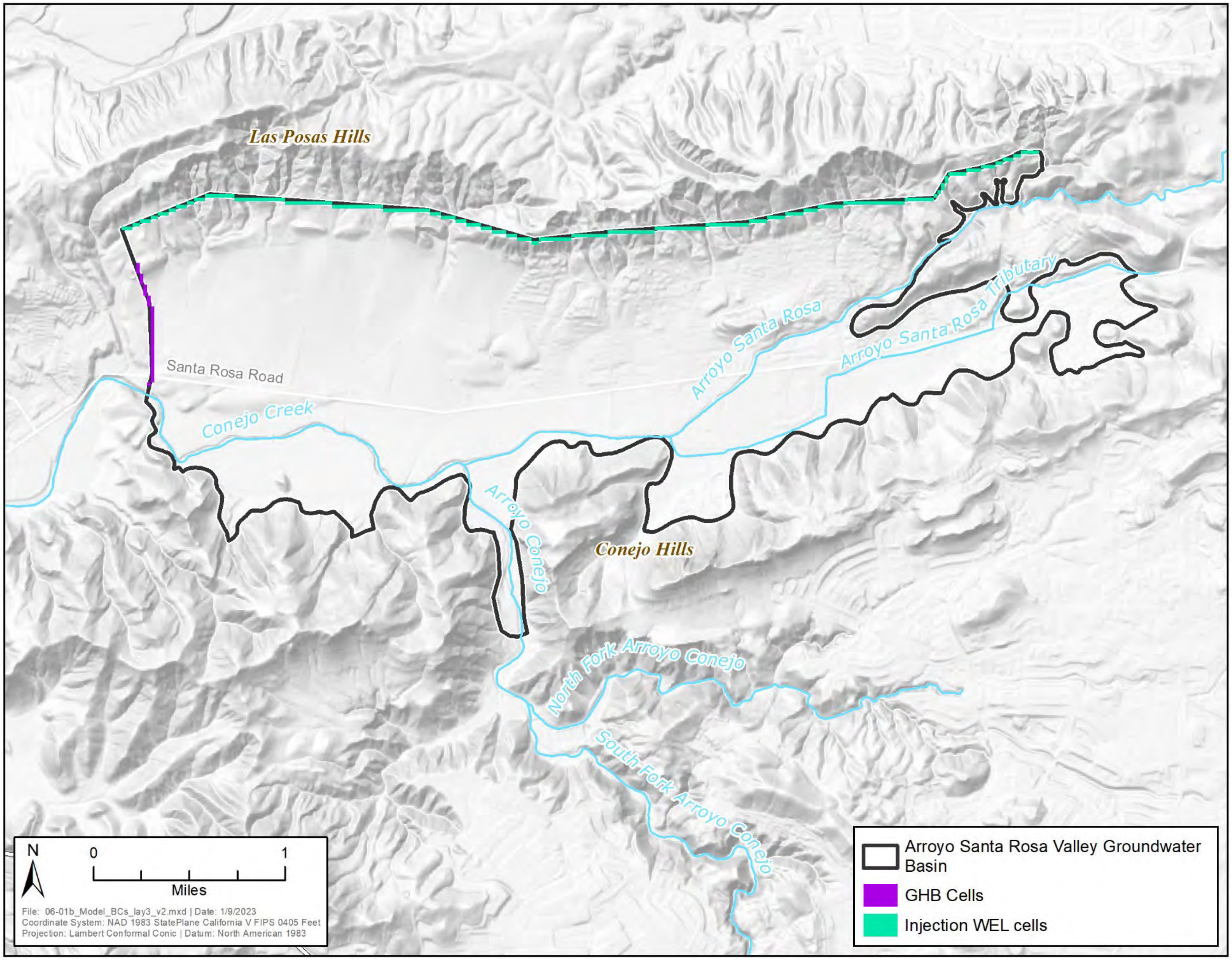


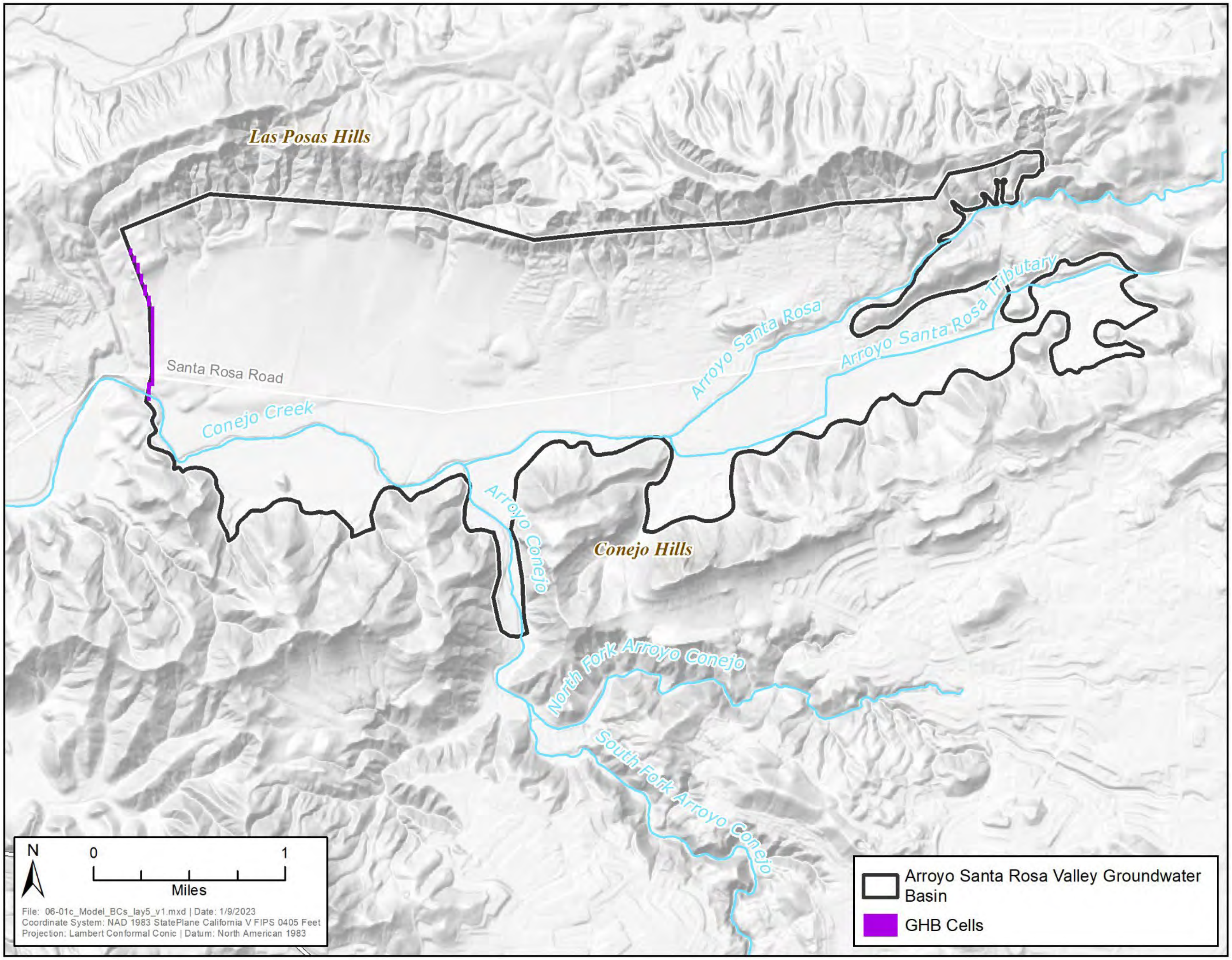
Figure 5.7b Thickness of Layer 6



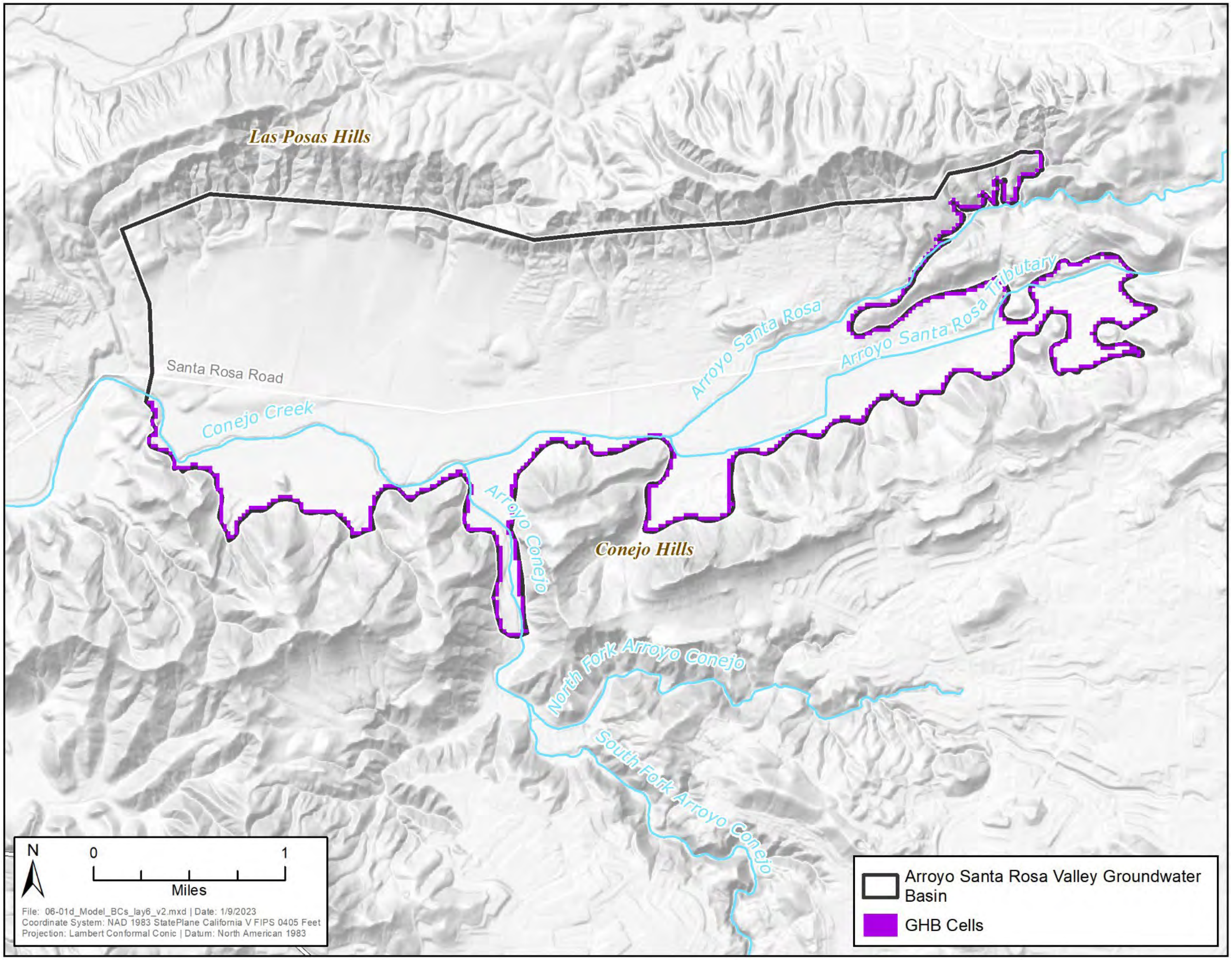
Figures 6.1a Boundary Conditions used in the Model: Layer 1



Figures 6.1b Boundary Conditions used in the Model: Layer 3



Figures 6.1c Boundary Conditions used in the Model: Layer 5



Figures 6.1d Boundary Conditions used in the Model: Layer 6

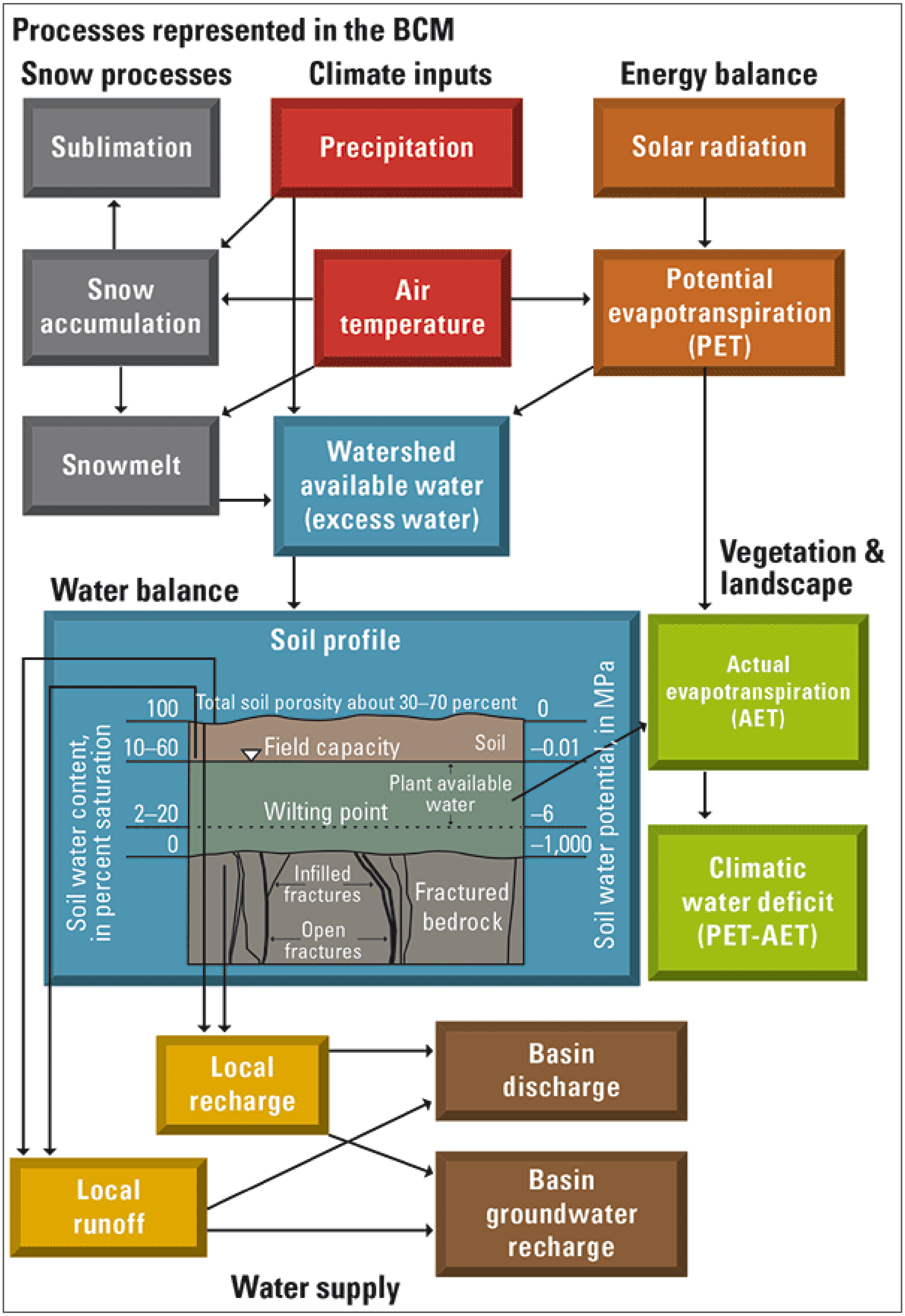


Figure 6.2 Basin Characterization Model (BCM)

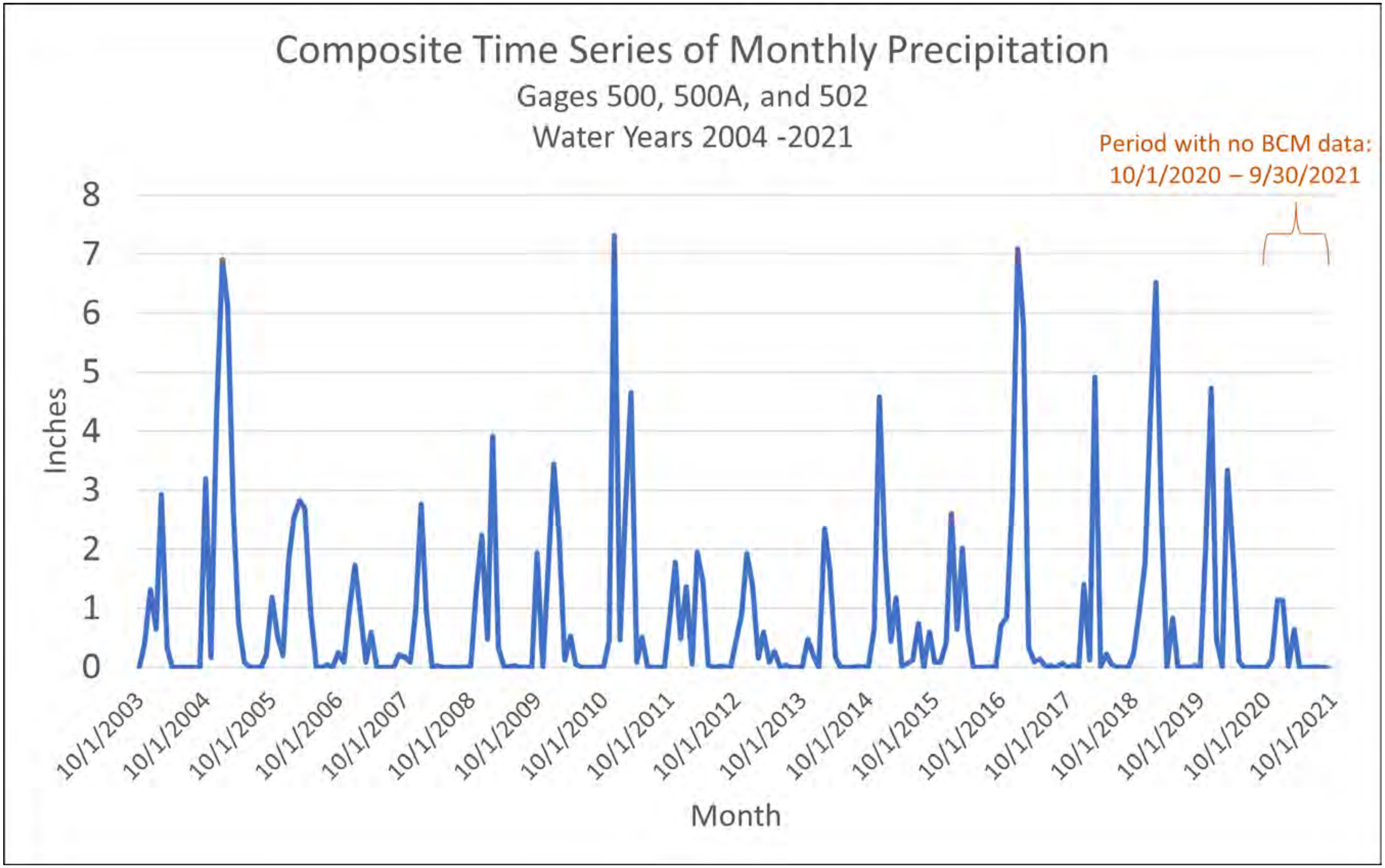


Figure 6.3 Composite Time Series of Monthly Precipitation

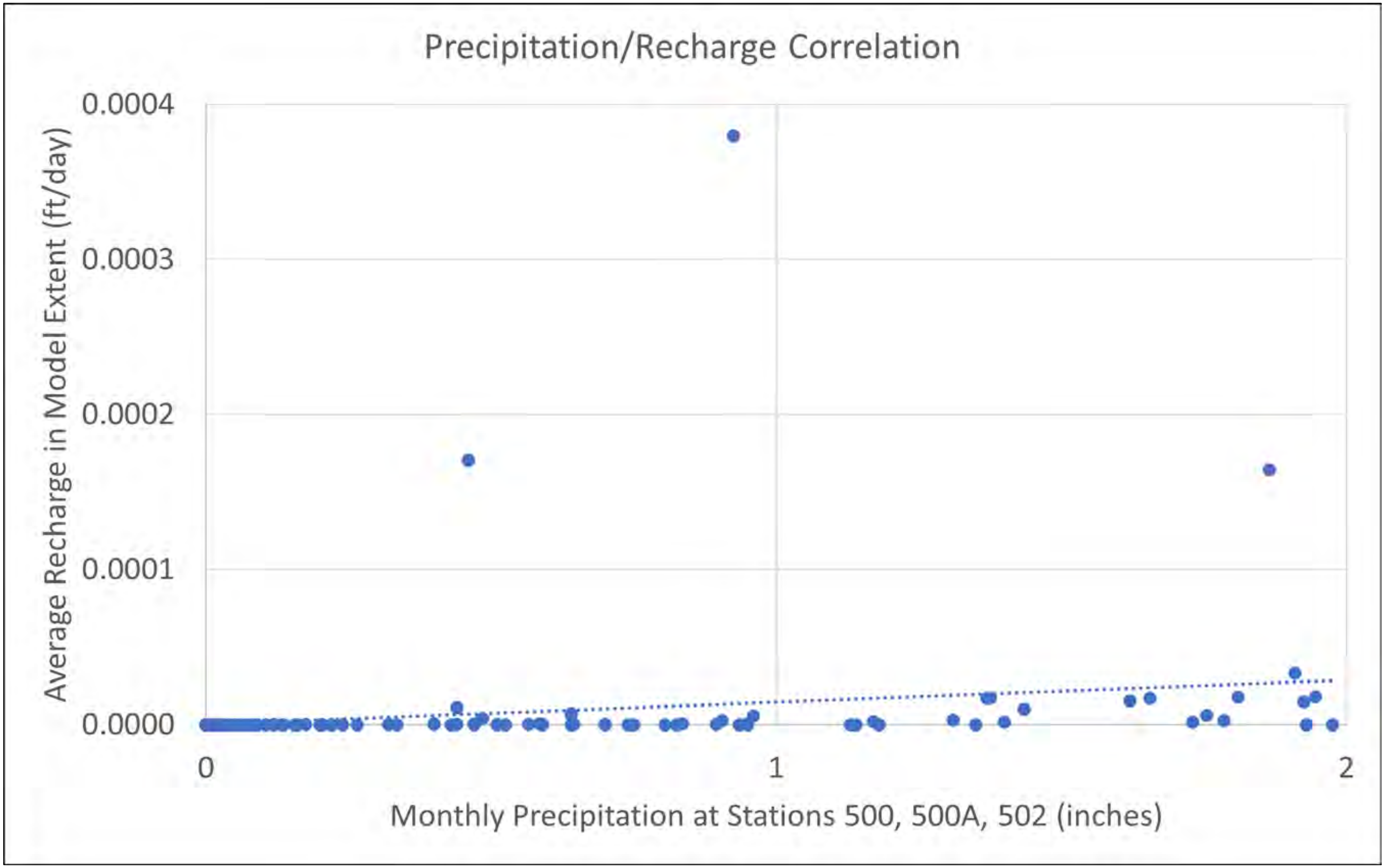


Figure 6.4 Precipitation/Recharge Correlation

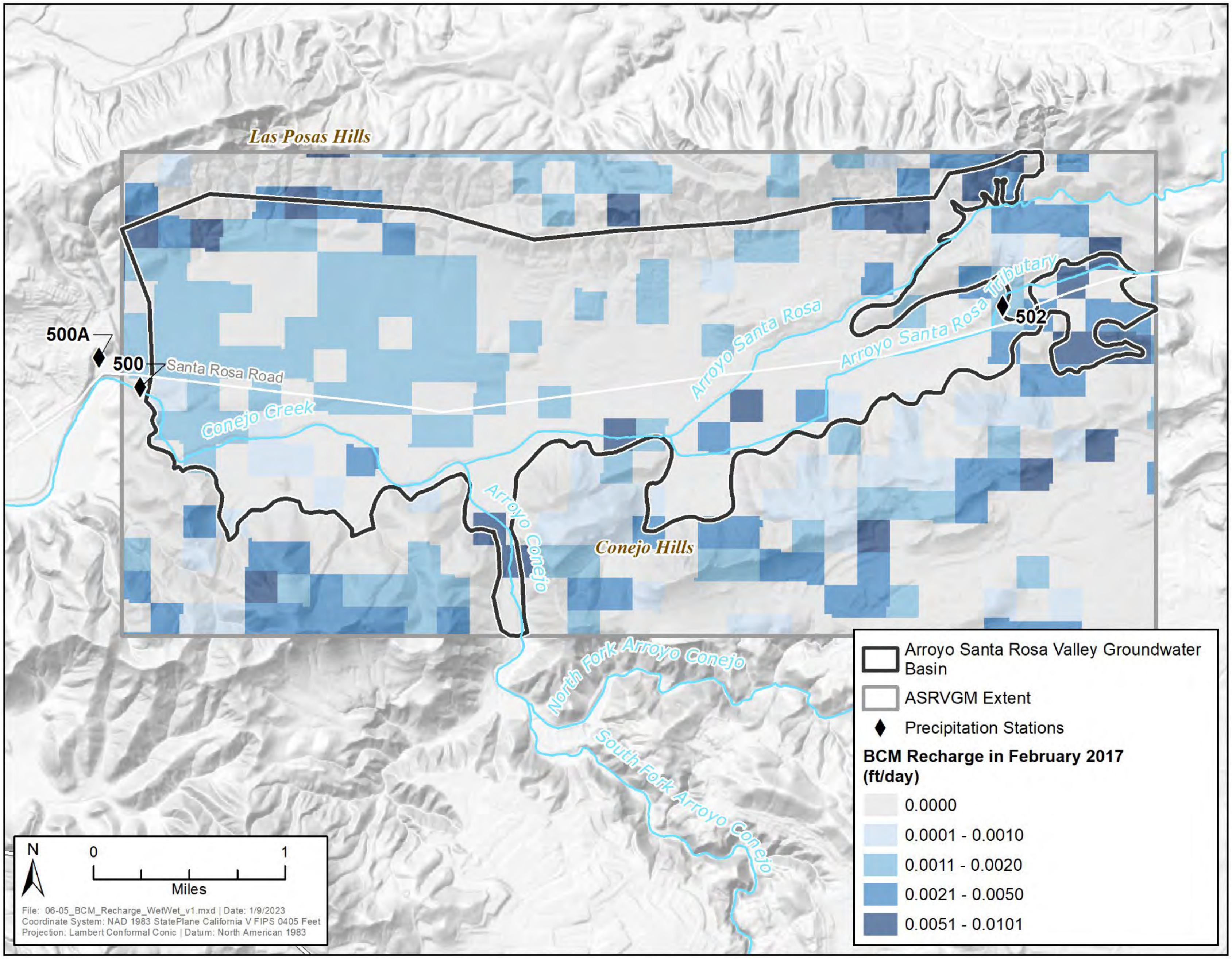


Figure 6.5 BCM Recharge, Wet Year/Wet Month

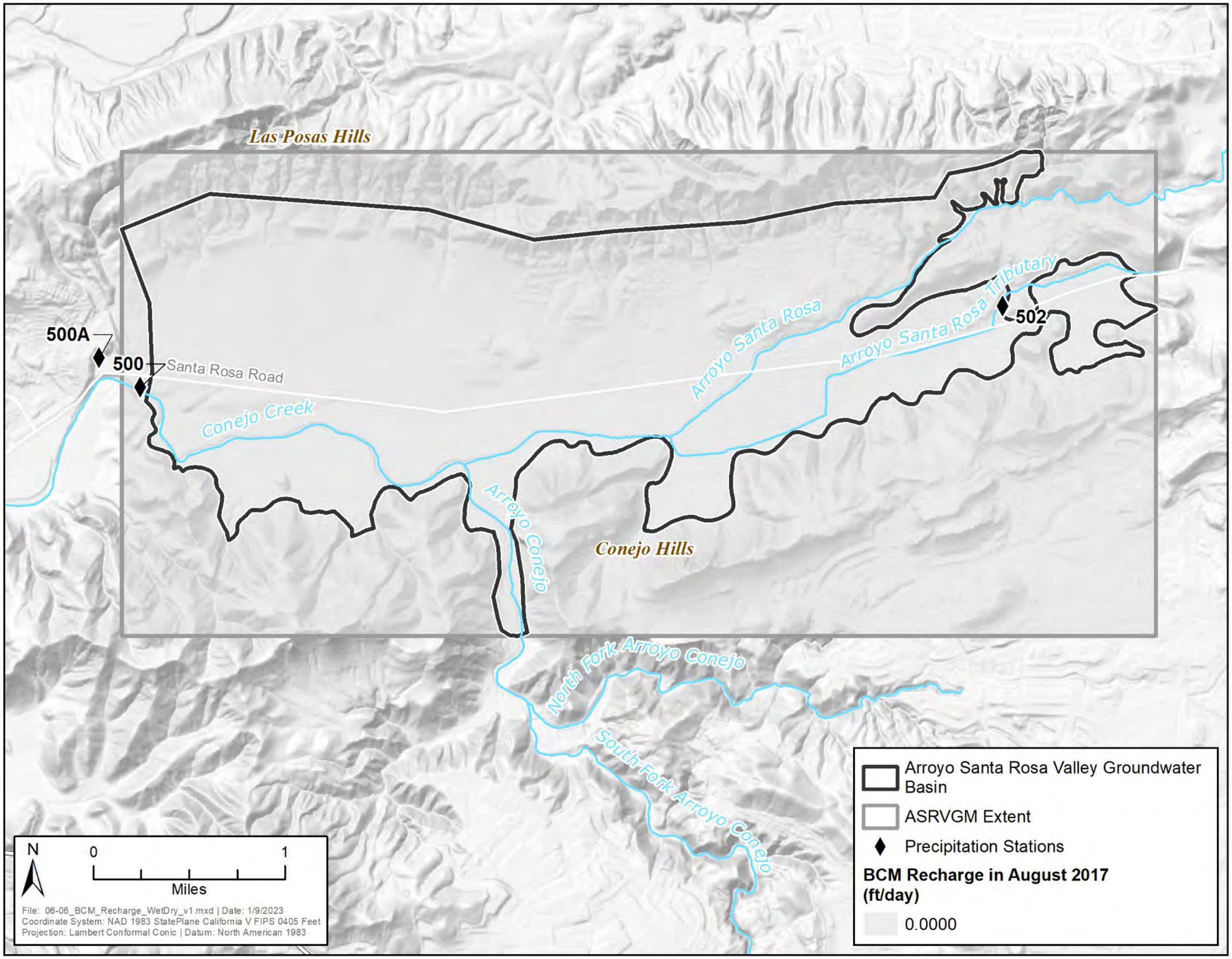


Figure 6.6 BCM Recharge, Wet Year/Dry Month

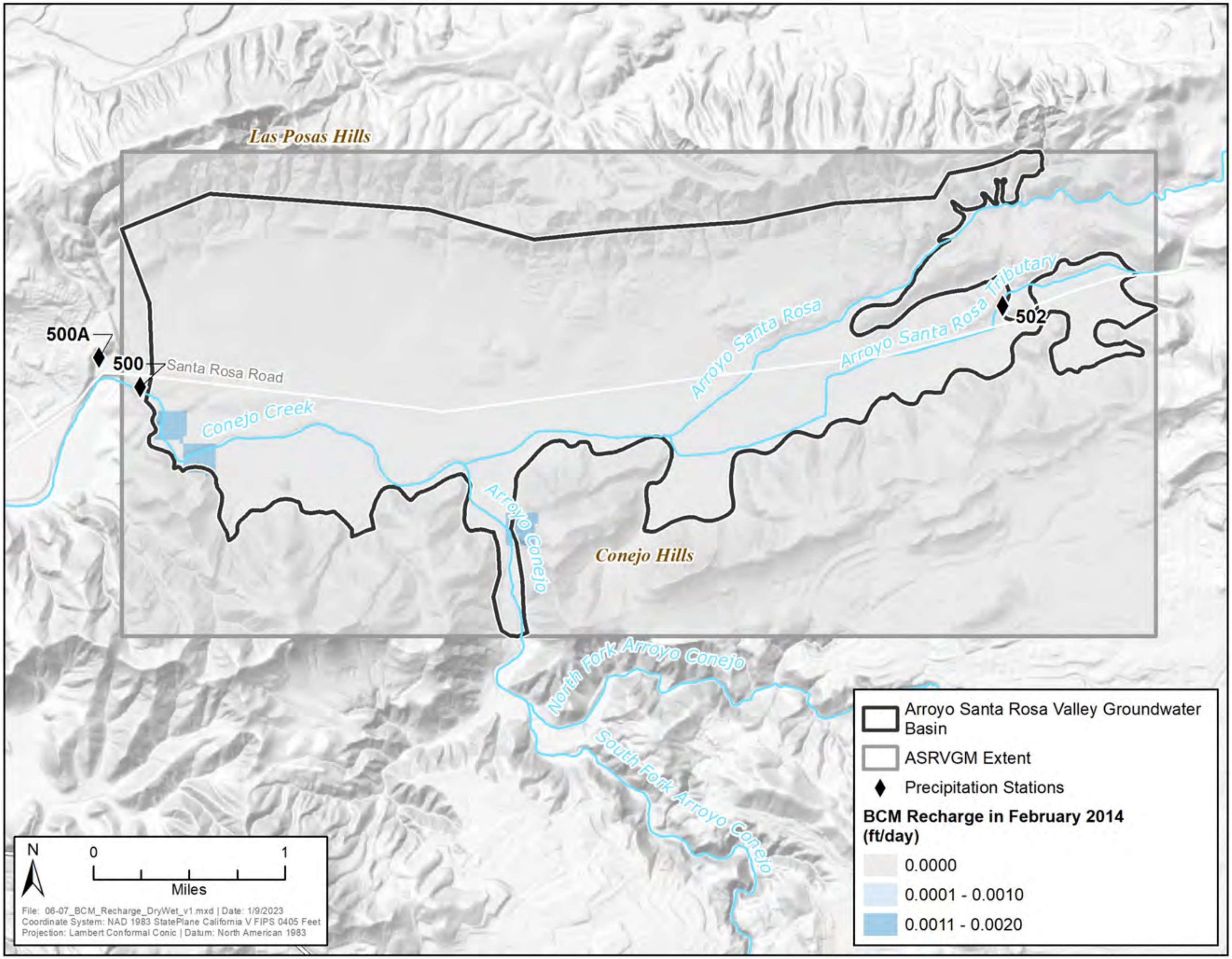


Figure 6.7 BCM Recharge, Dry Year/Wet Month

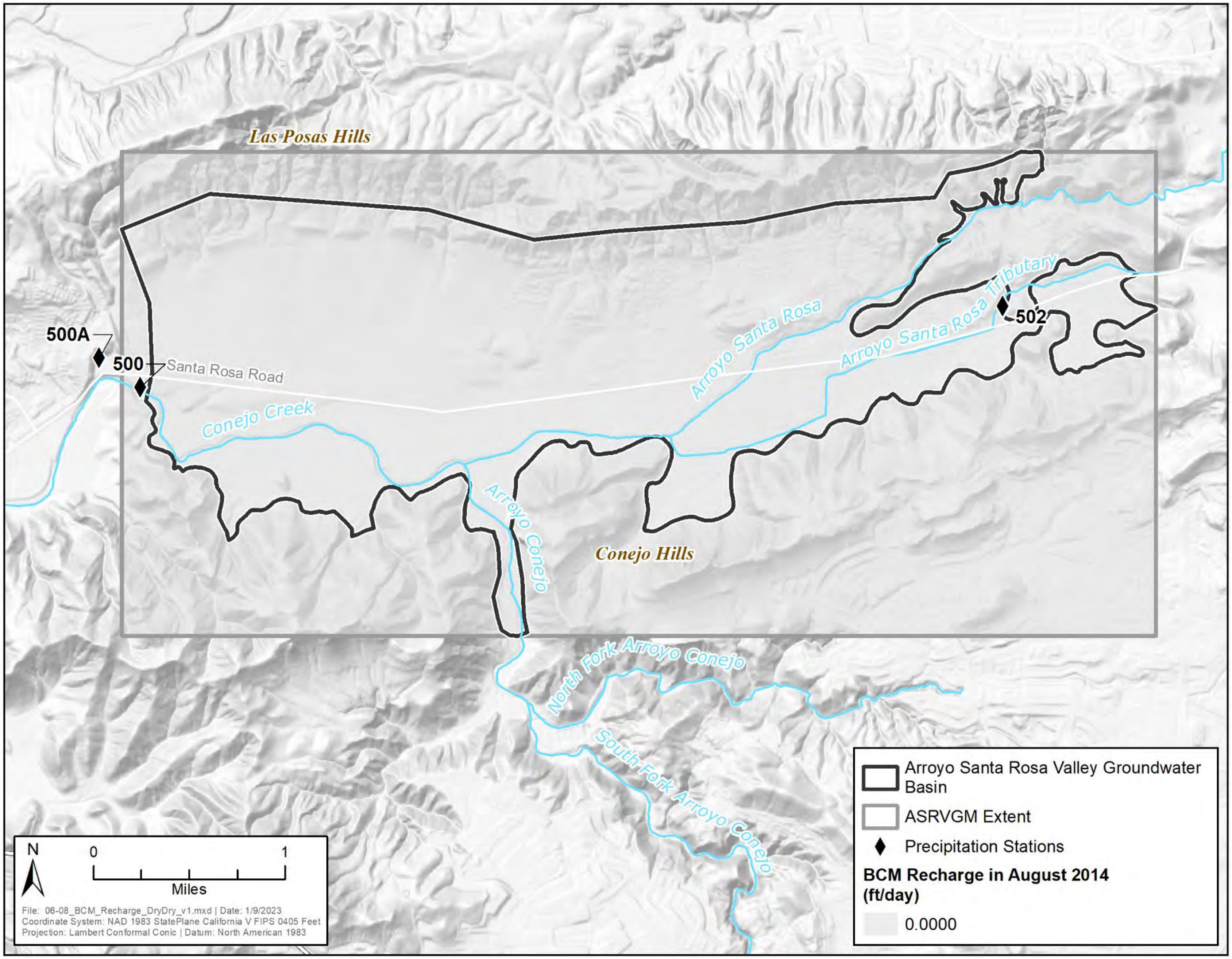


Figure 6.8 BCM Recharge, Dry Year/Dry Month

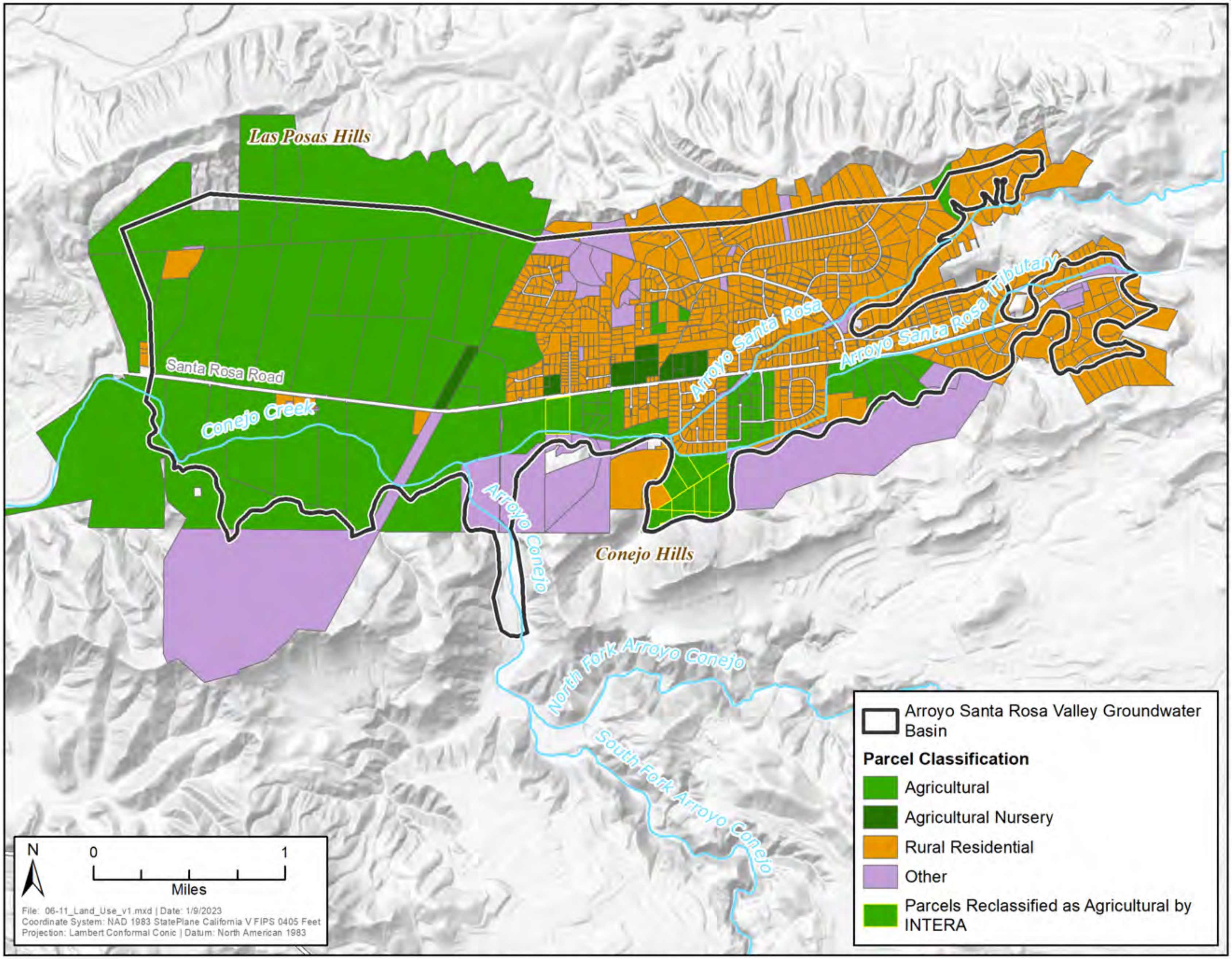


Figure 6.9 Parcel Land Used\

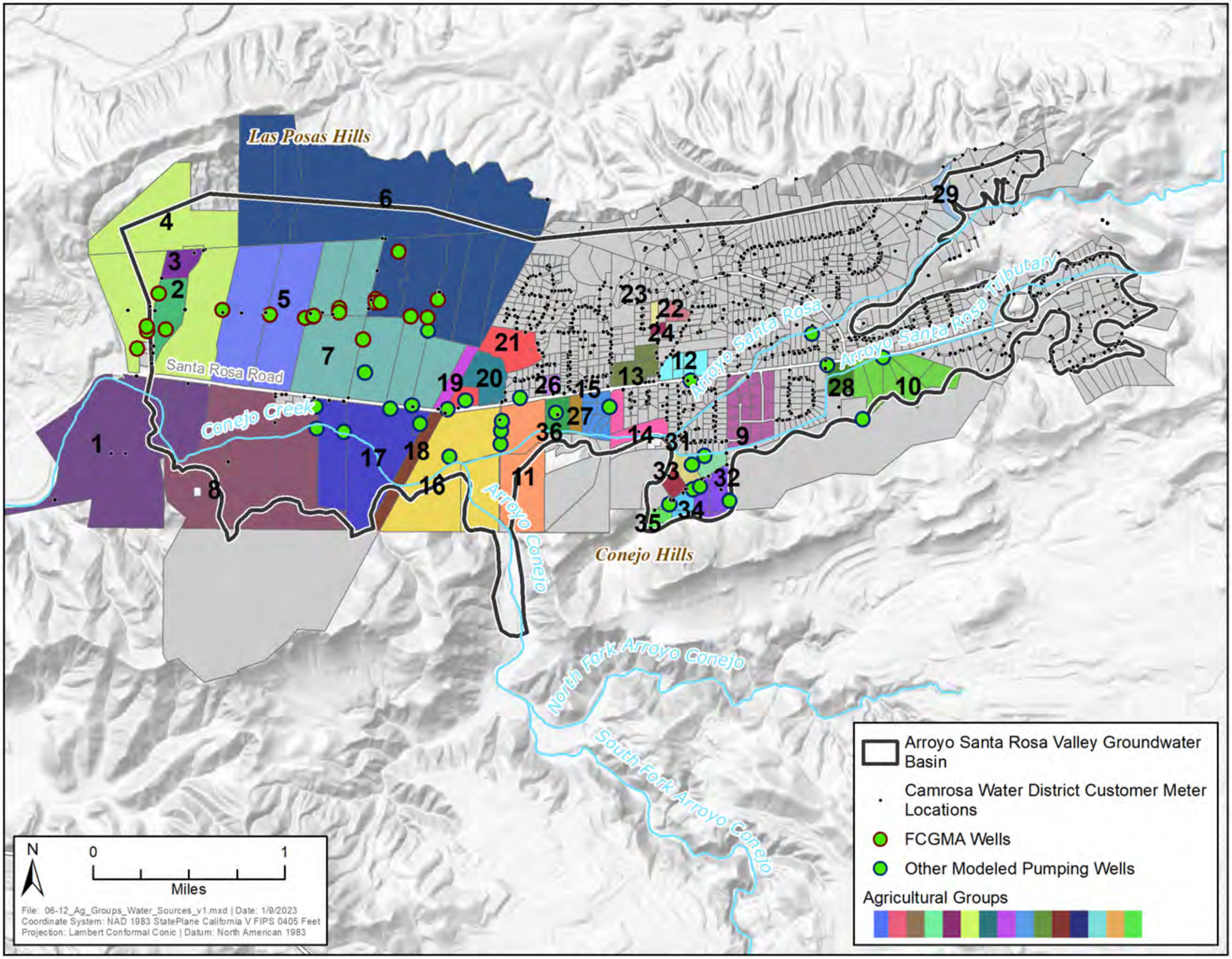


Figure 6.10 Agricultural Groups and Water Sources

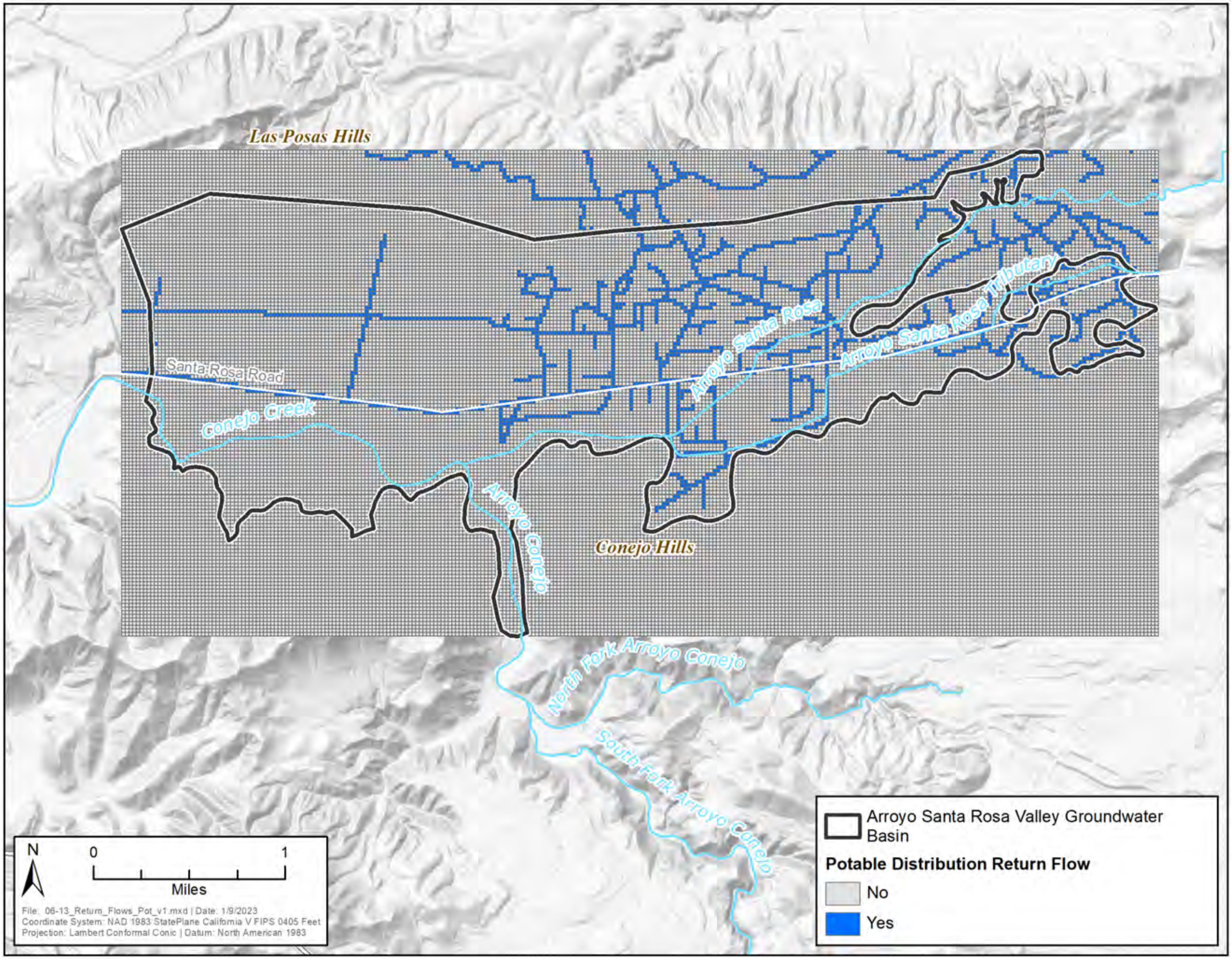


Figure 6.11a Return Flows, Potable Distribution System Losses

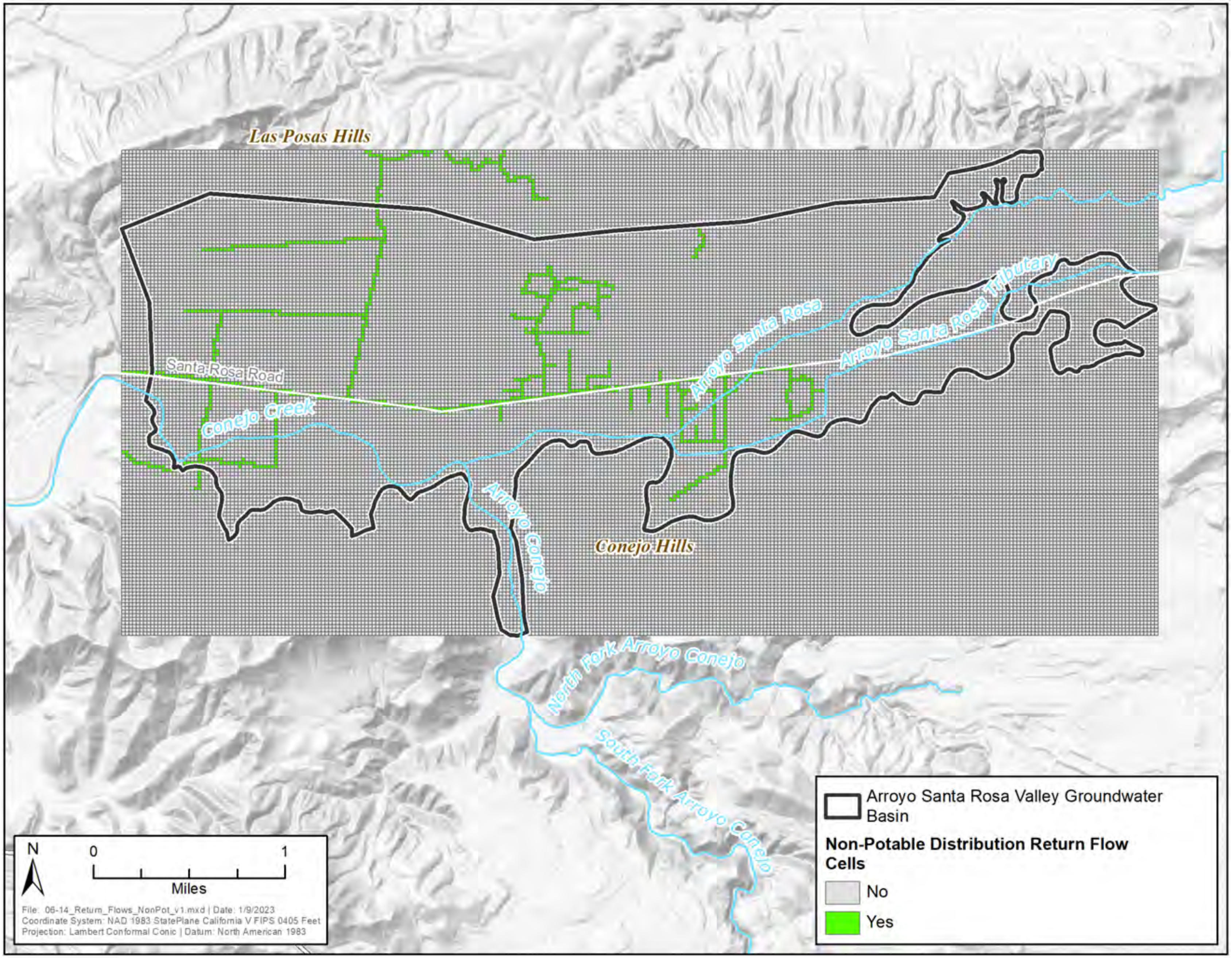


Figure 6.11b Return Flows, Non-Potable Distribution System Losses

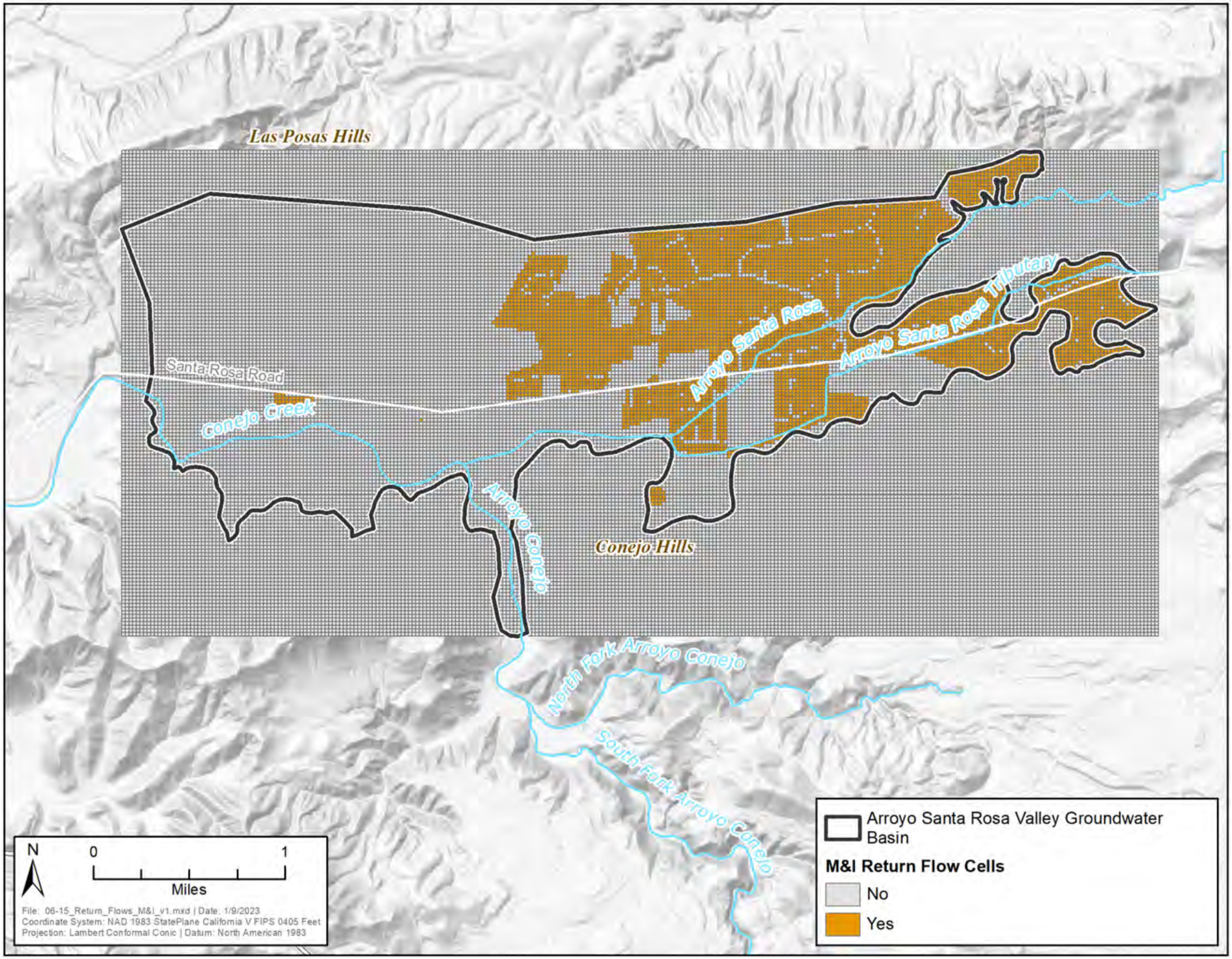


Figure 6.12 Septic Return Flows

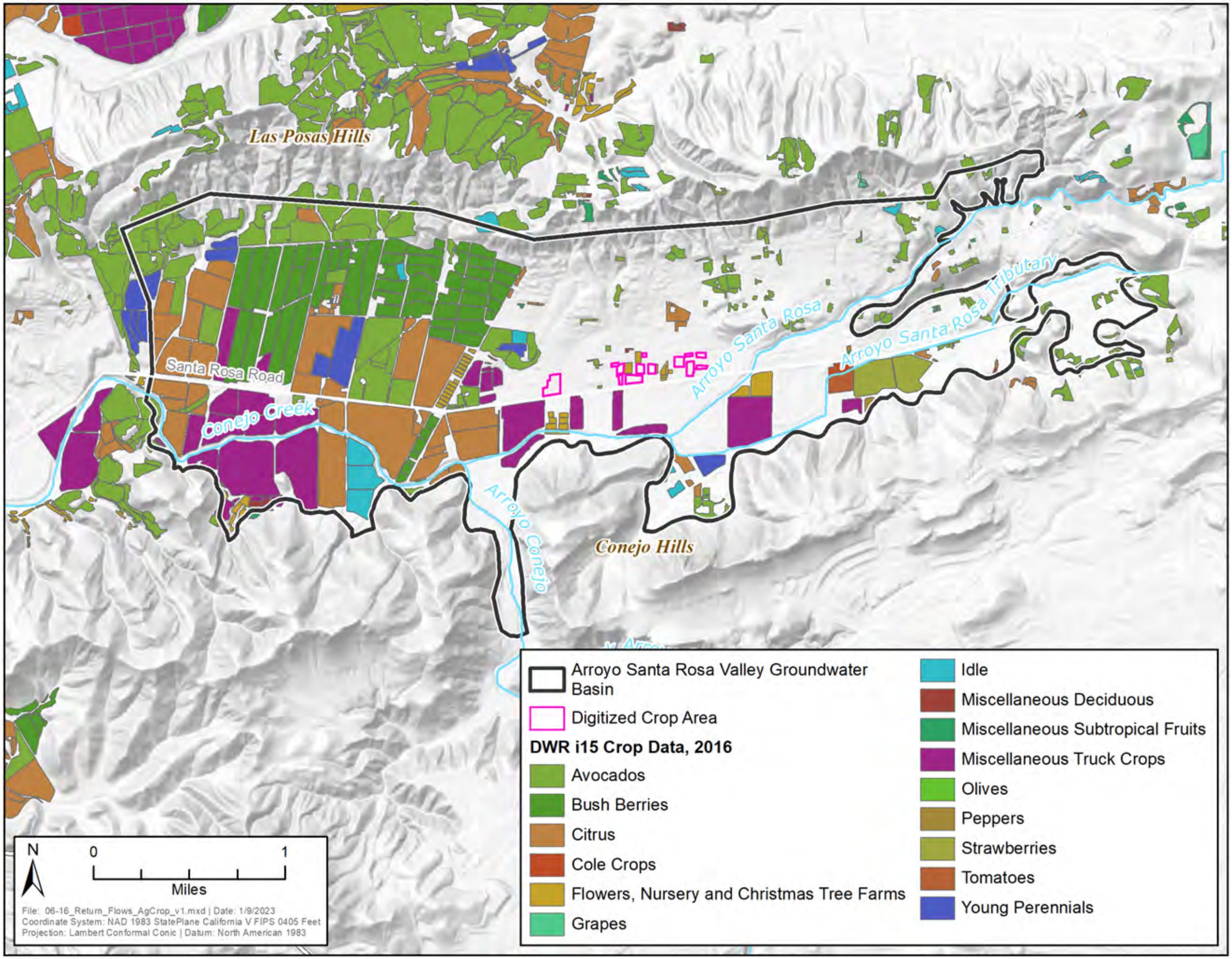


Figure 6.13 DWR Crop Layer

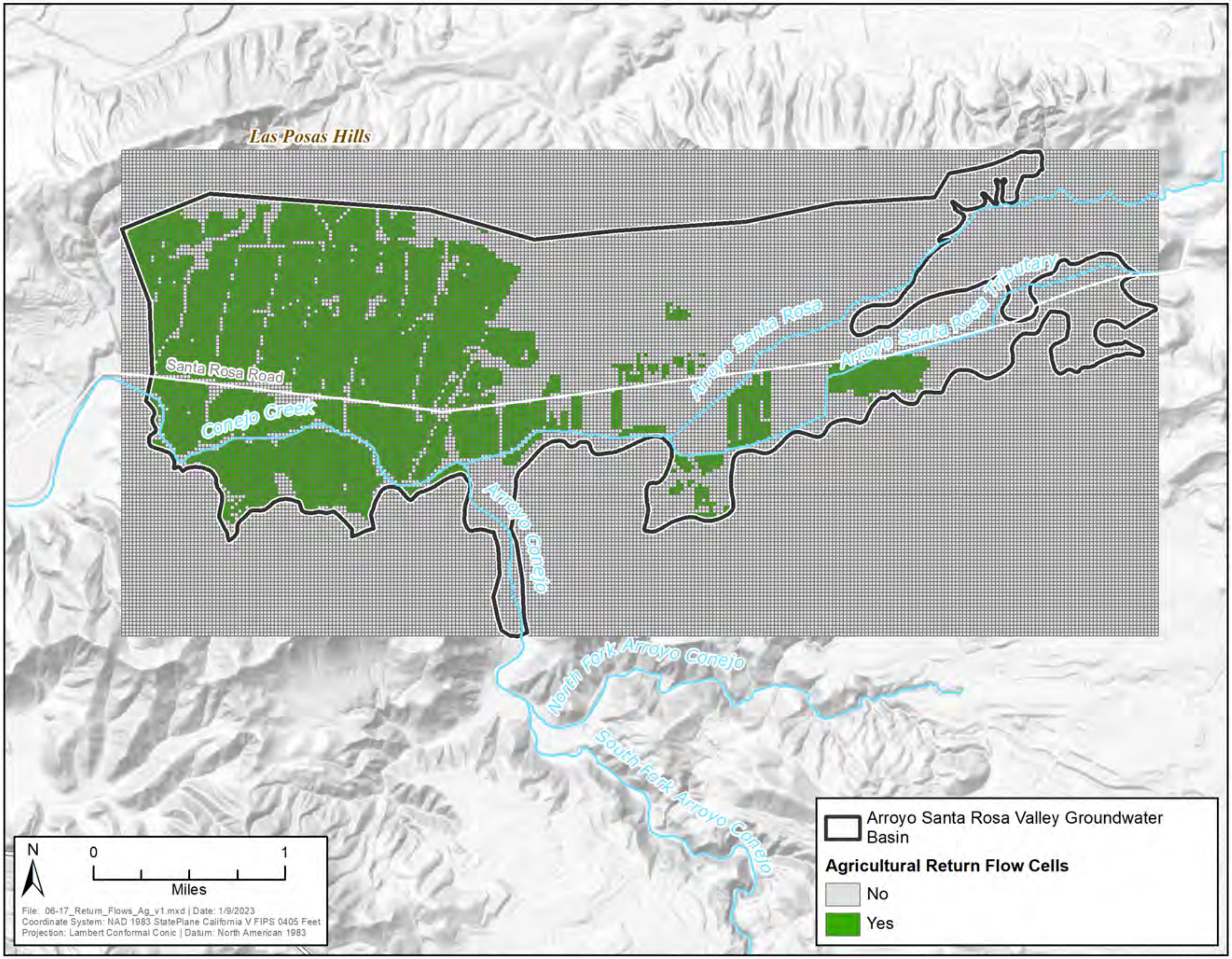


Figure 6.14 Return Flows, Agricultural Use

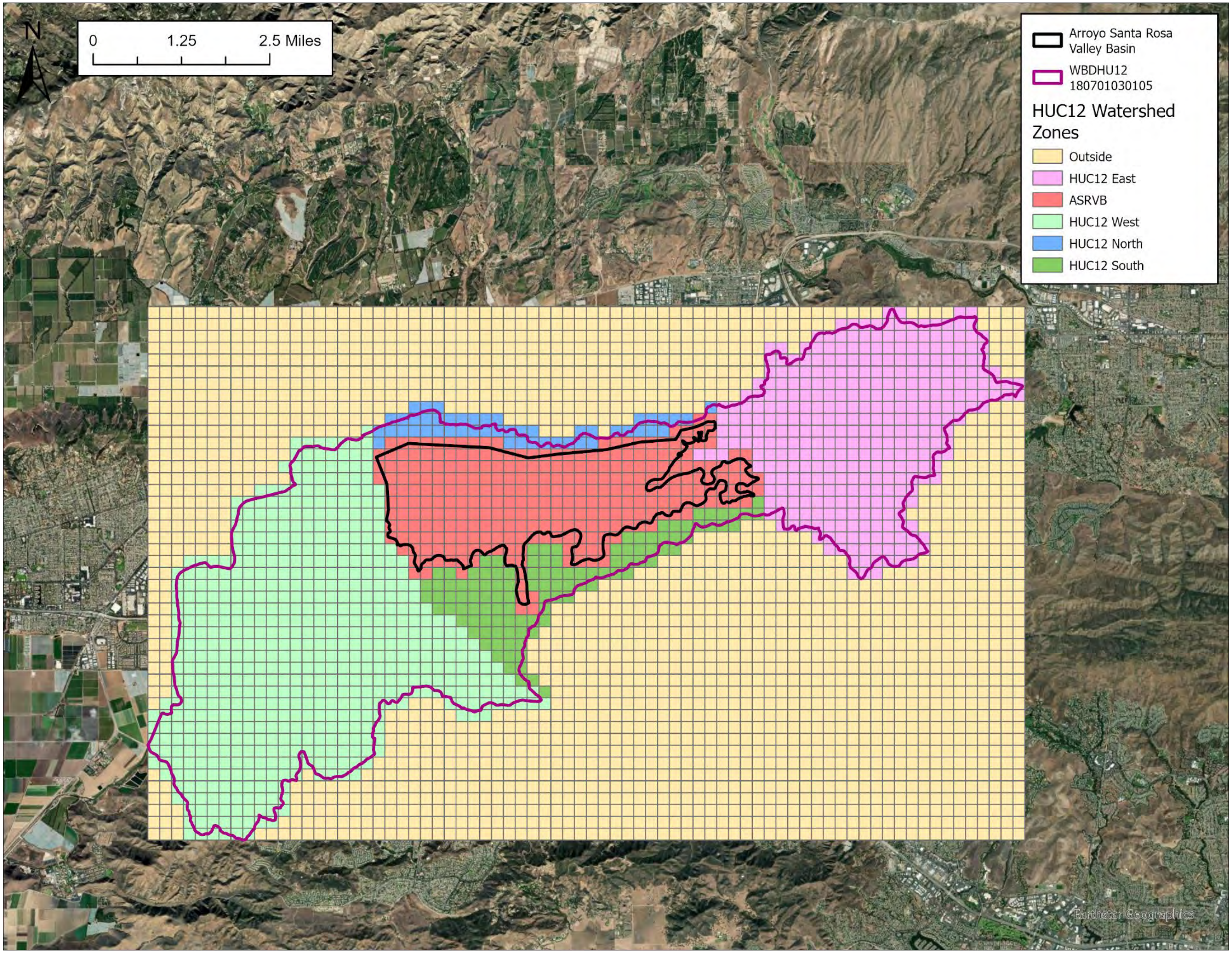


Figure 6.15 Mountain Front Recharge Zones

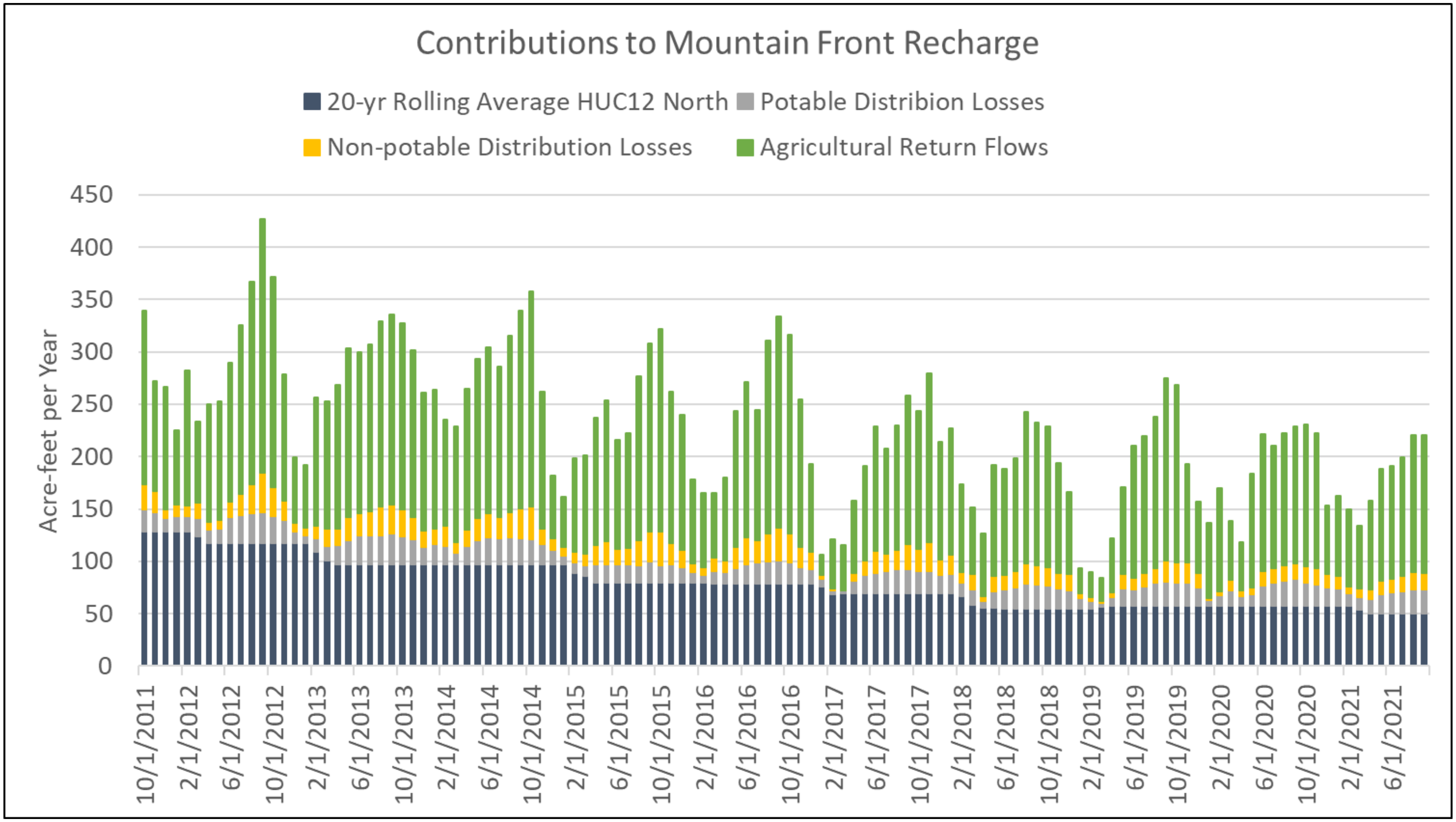


Figure 6.16 Contributions to Specified Flux Boundary in the North

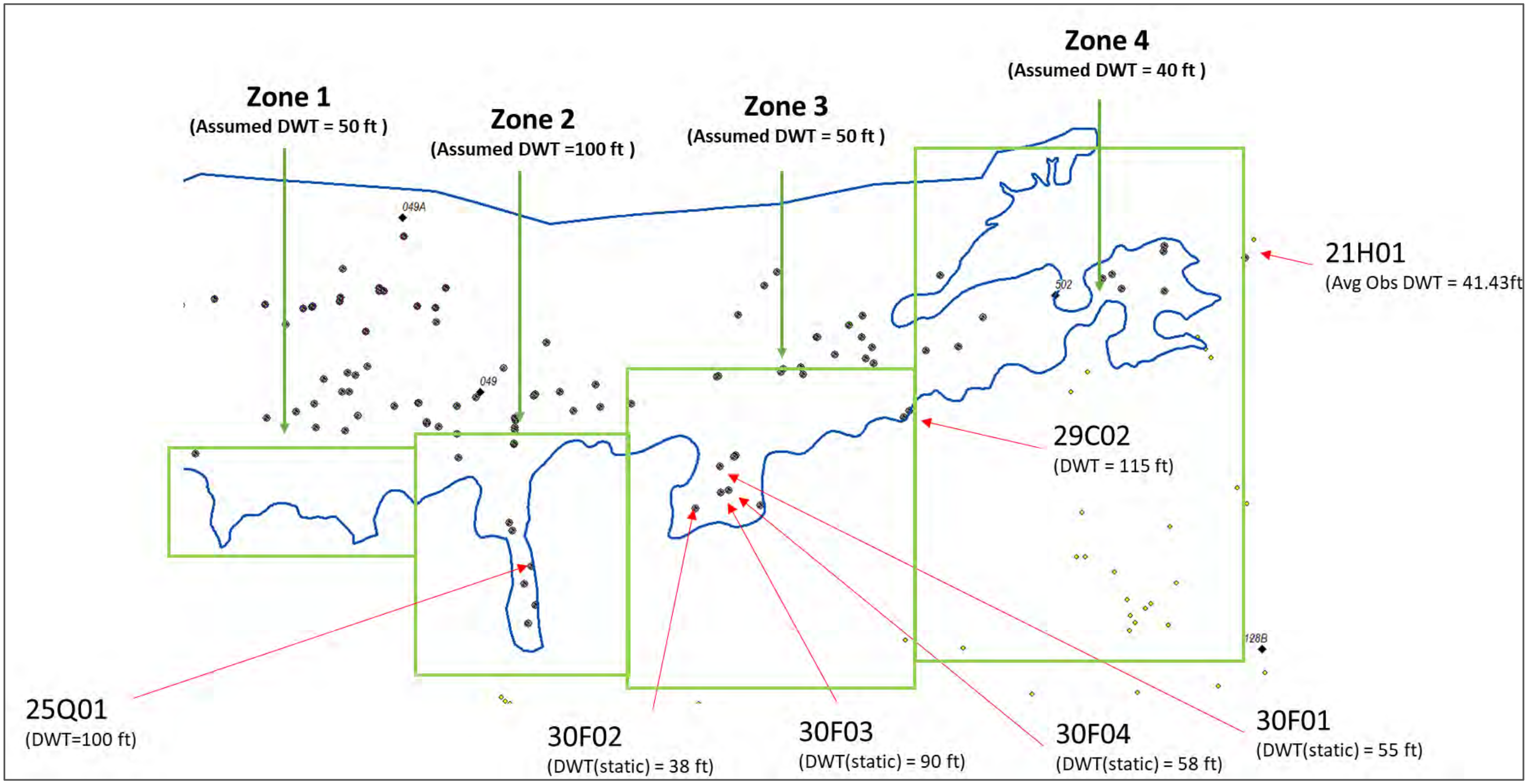


Figure 6.17 Zones Based on Observed Depth to Water (DTW) in Bedrock Wells Used to Specify Heads for GHBs in the East and South

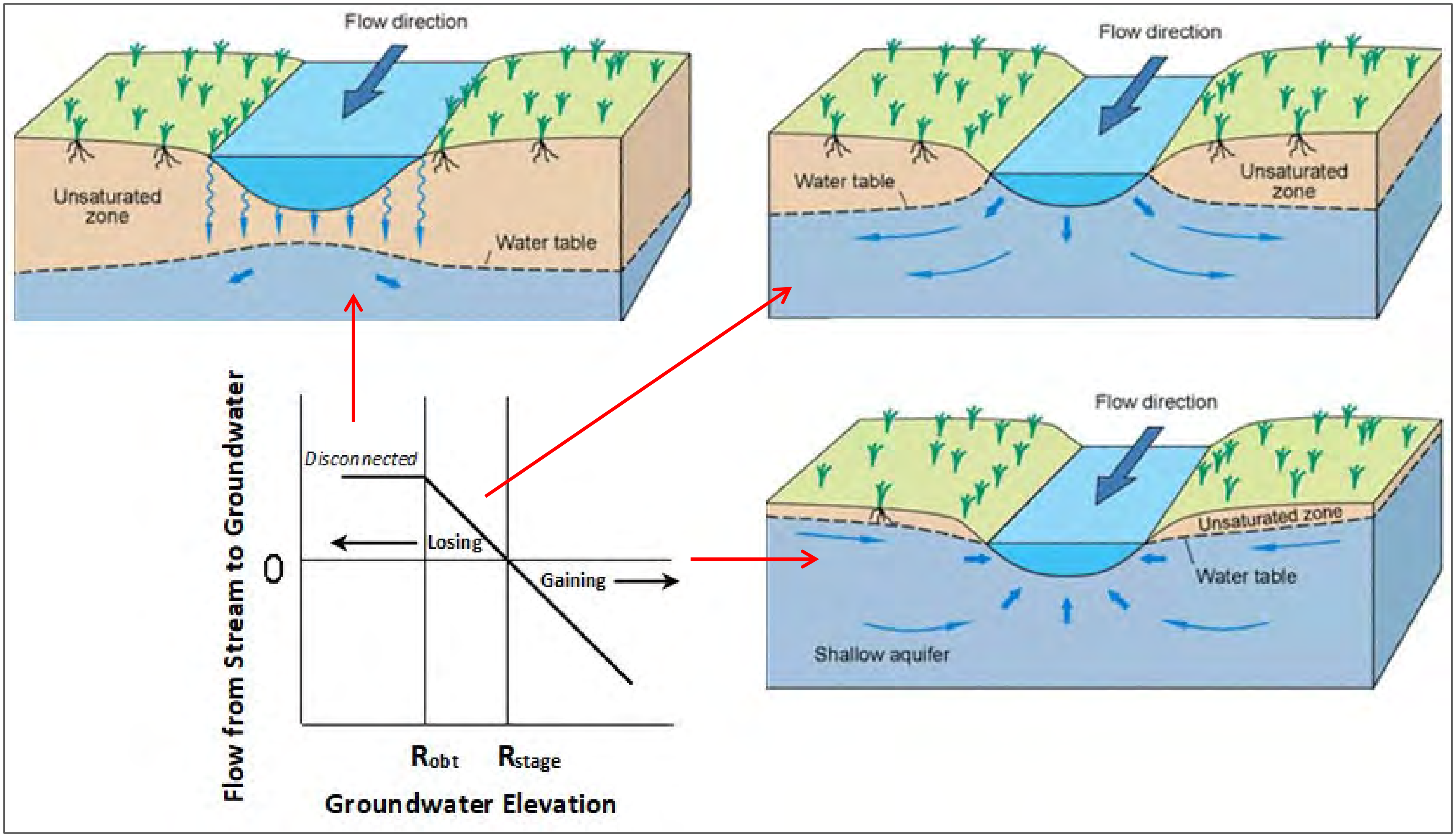


Figure 6.18 Surface / Groundwater Interactions

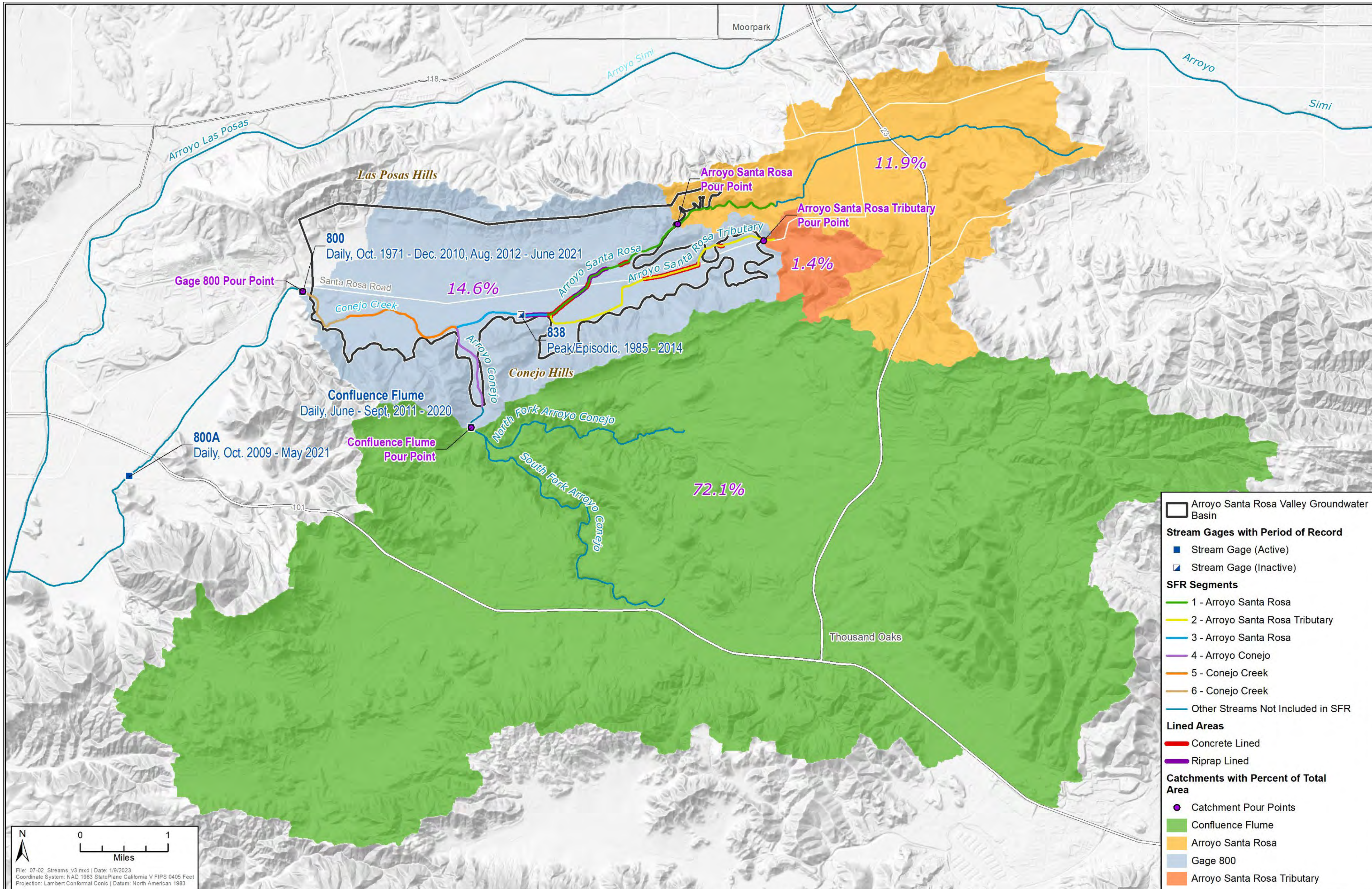


Figure 6.19a SFR Segments and Reaches, Stream Gages, Catchments

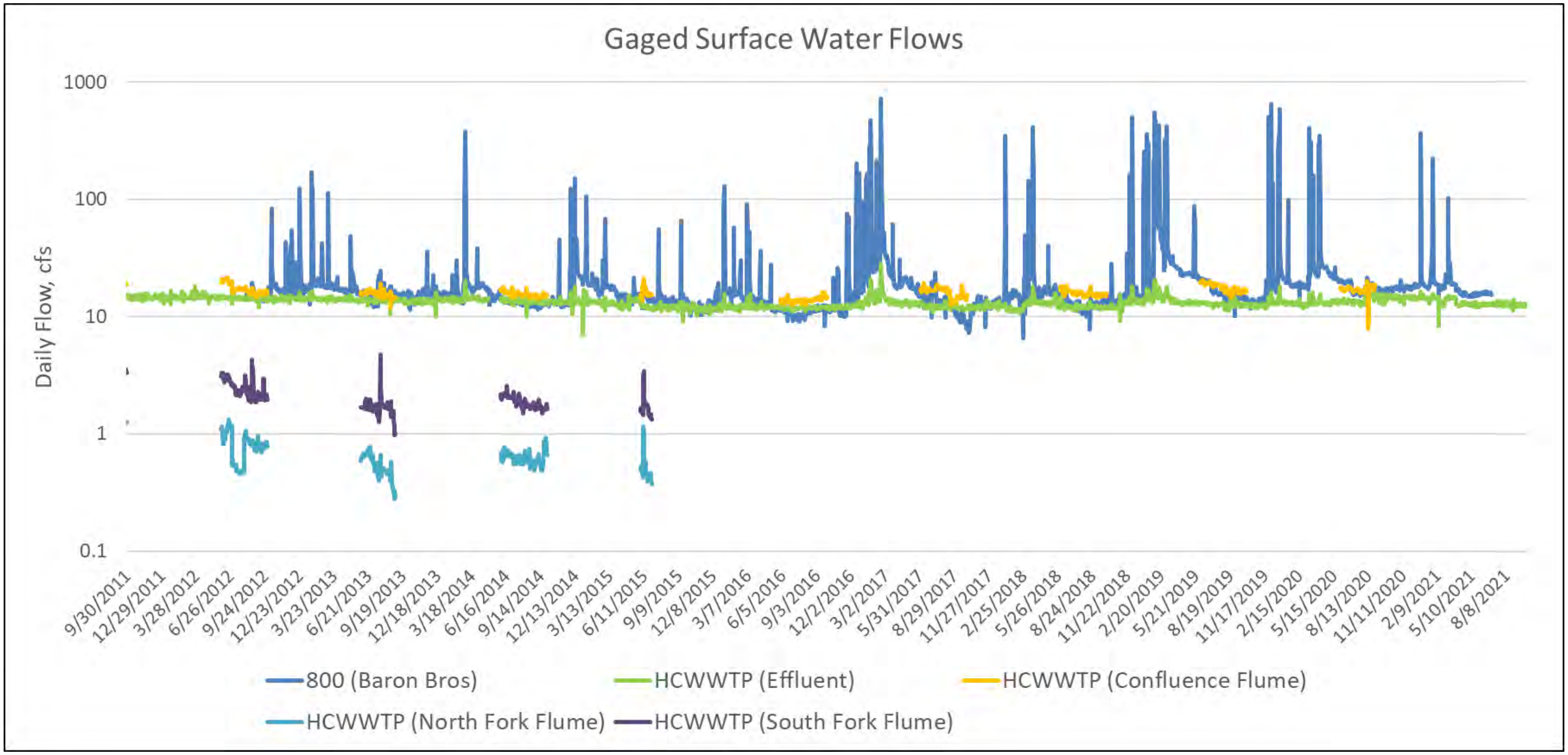


Figure 6.19b Gaged Surface Water Data for the Model Simulation Period (Water Year 2011 - 2021)

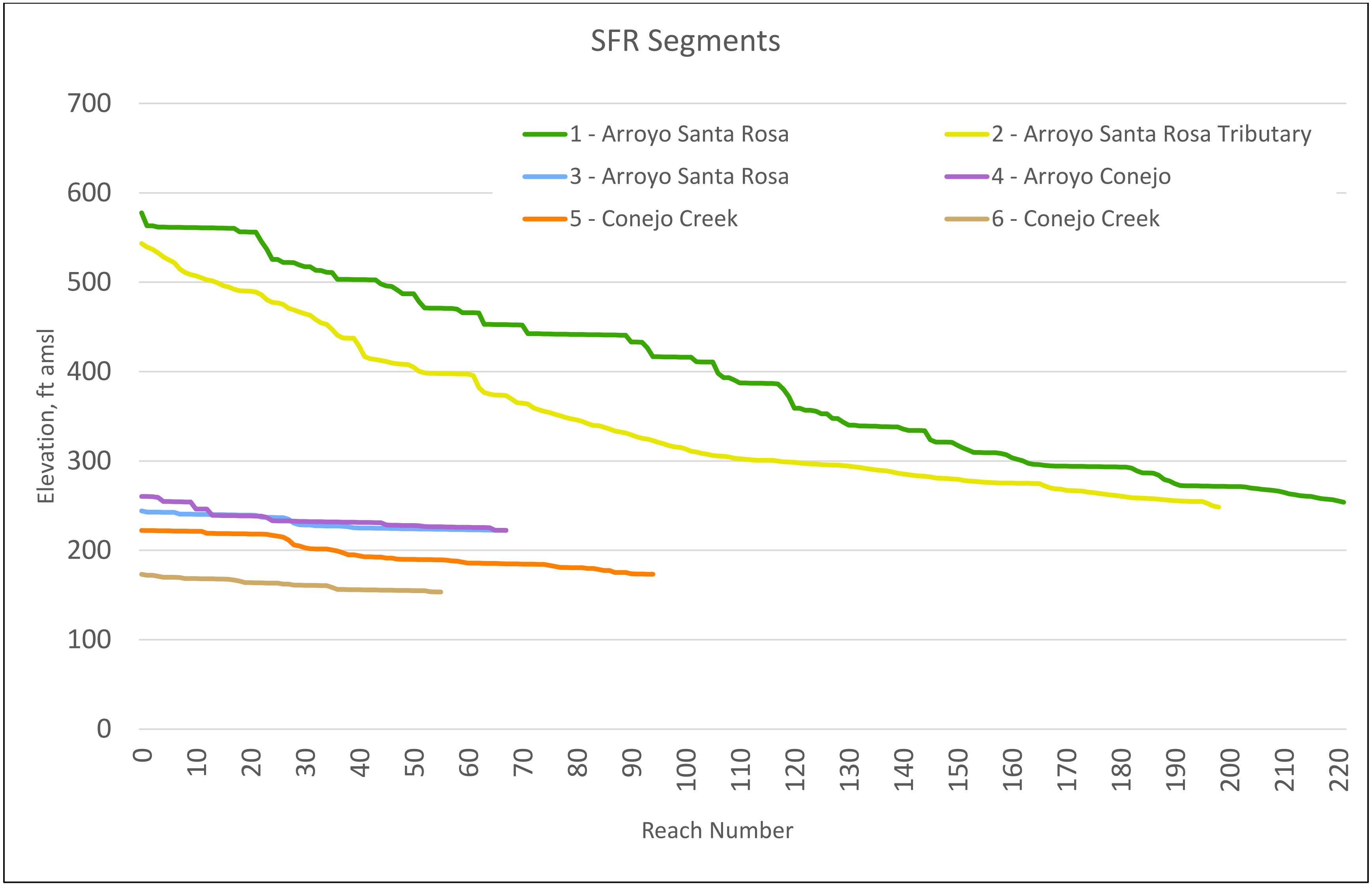


Figure 6.20 SFR Segment Elevation Cross Section

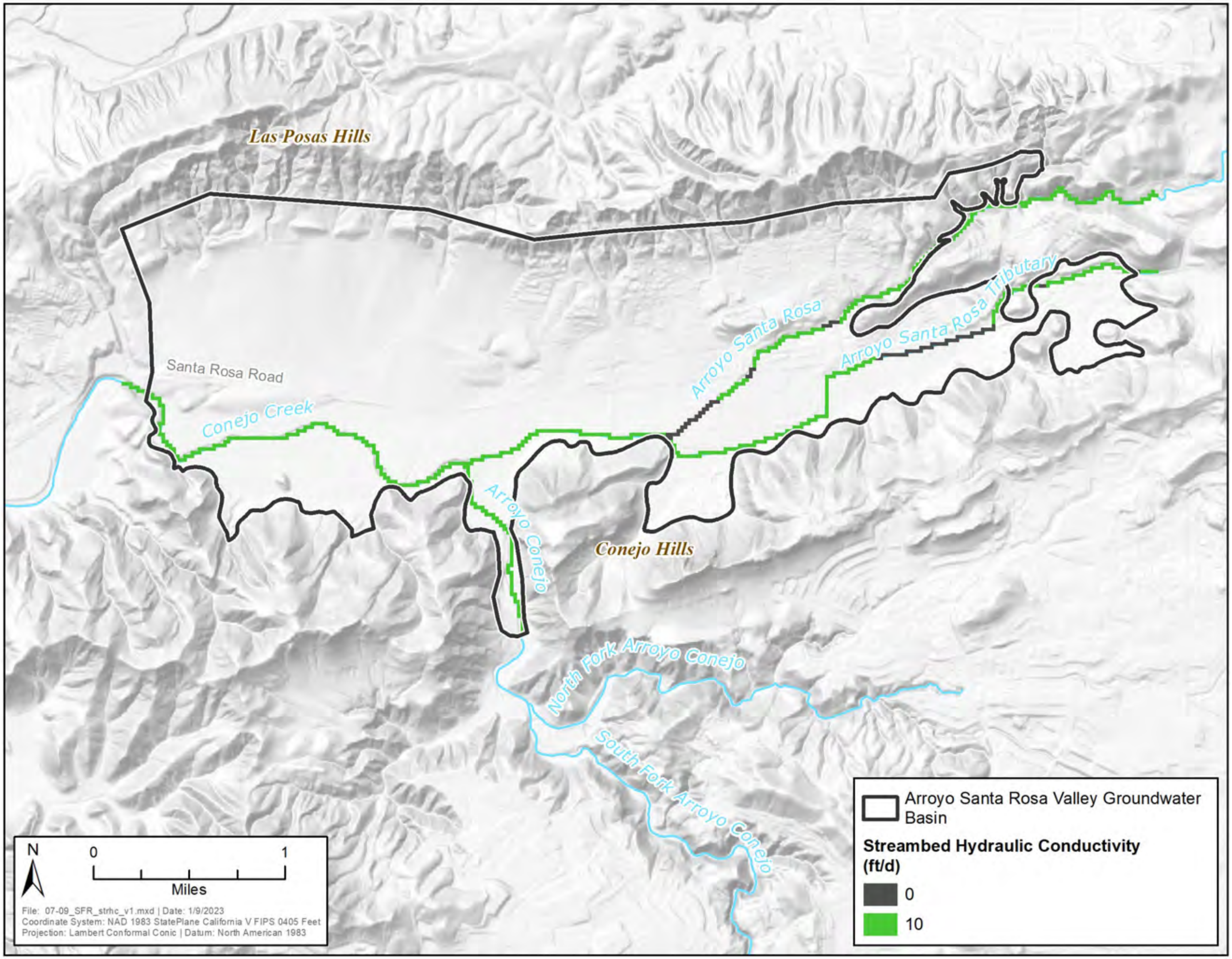


Figure 6.21 Streambed Conductivity

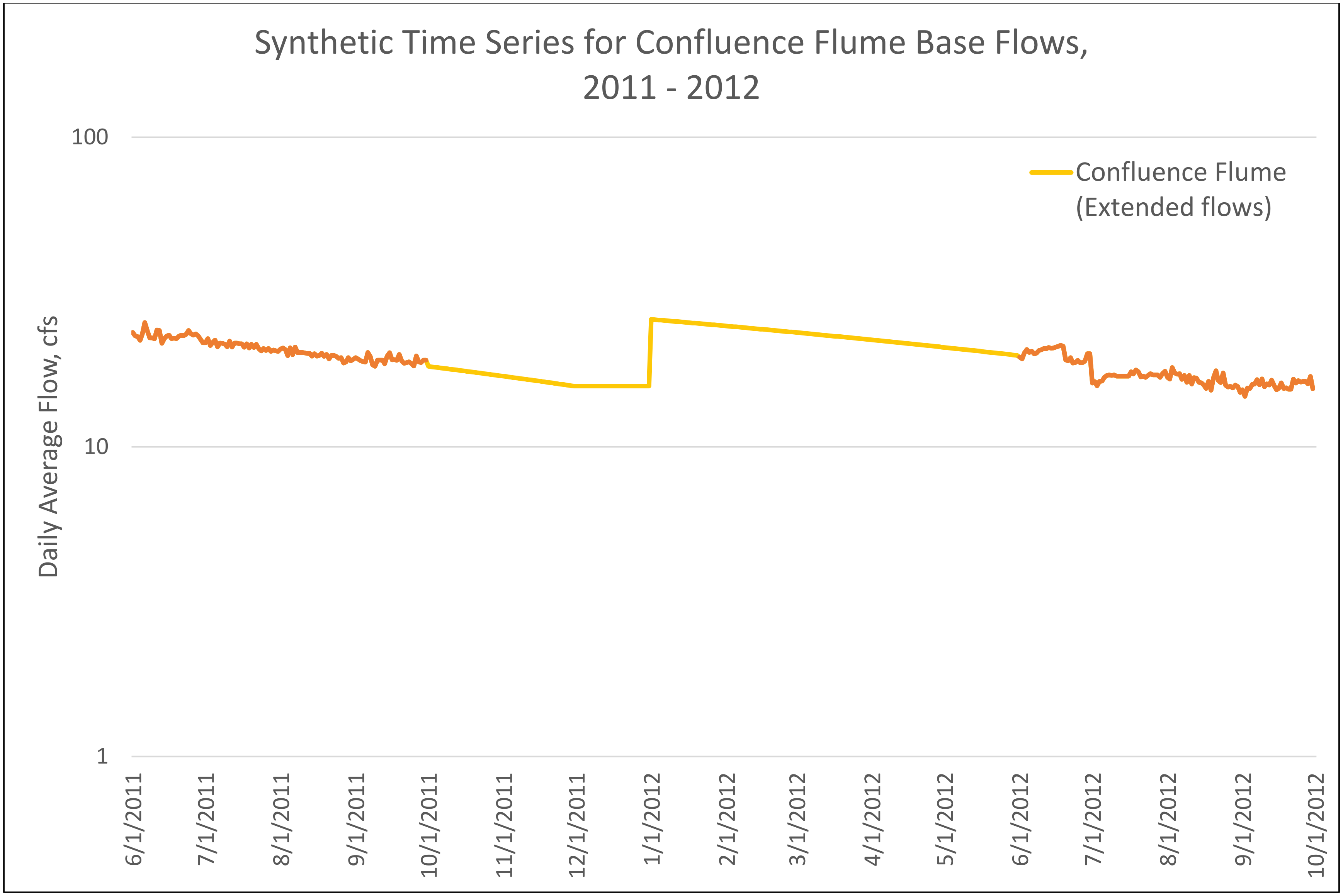


Figure 6.22 Confluence Flume Baseflows for 2011 - 2012

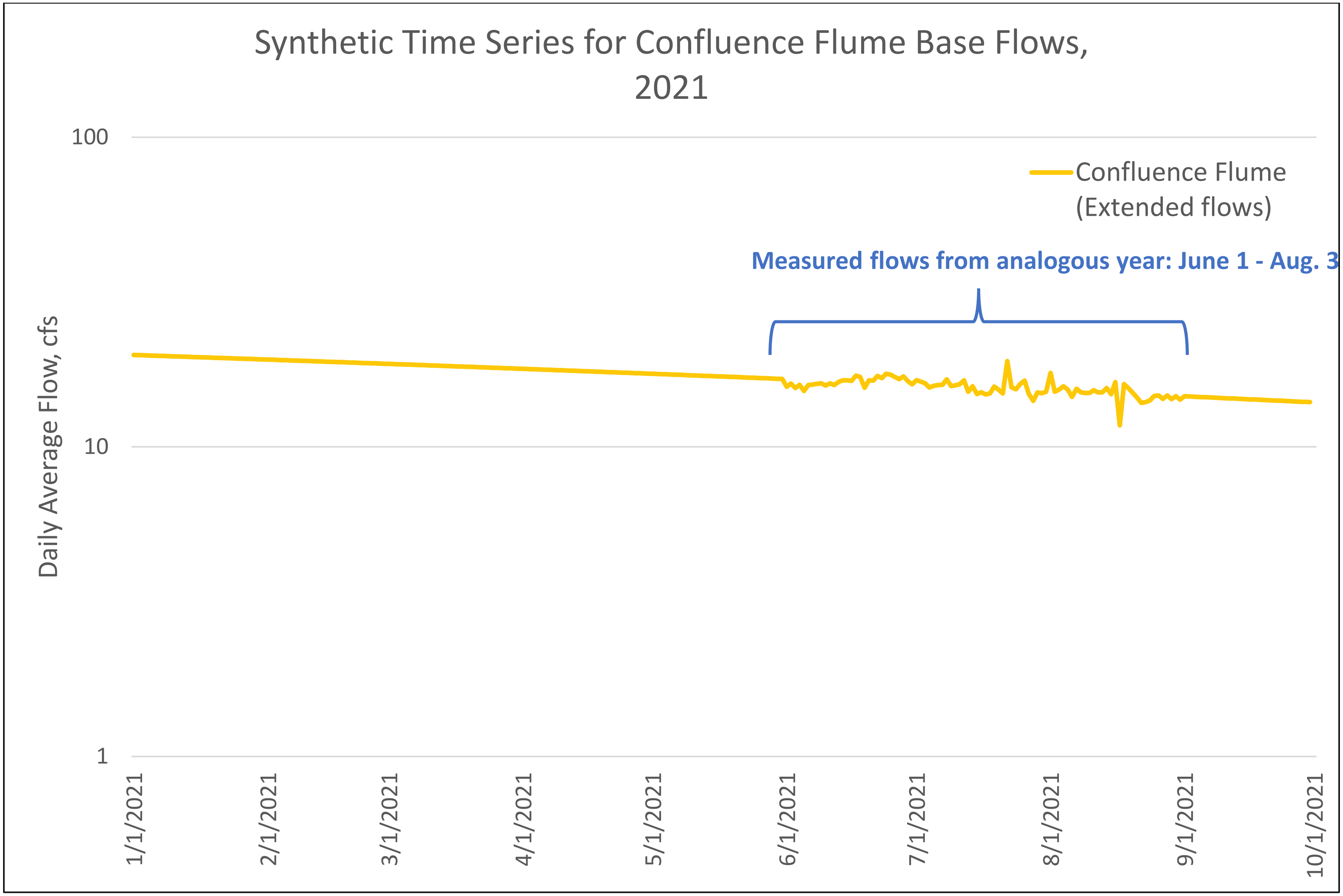


Figure 6.23 Confluence Flume Baseflows for 2021

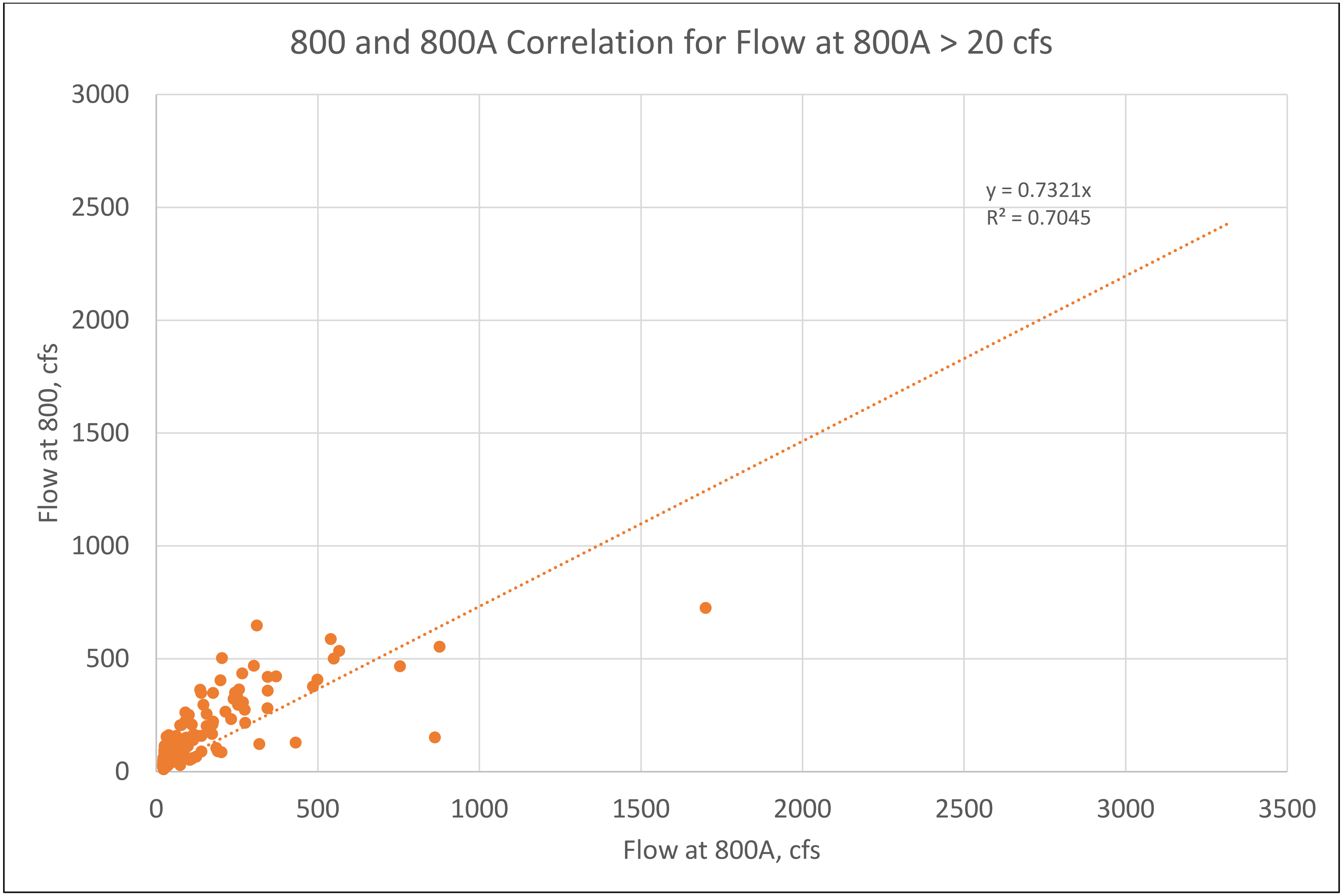


Figure 6.24 Correlation for 800 and 800A

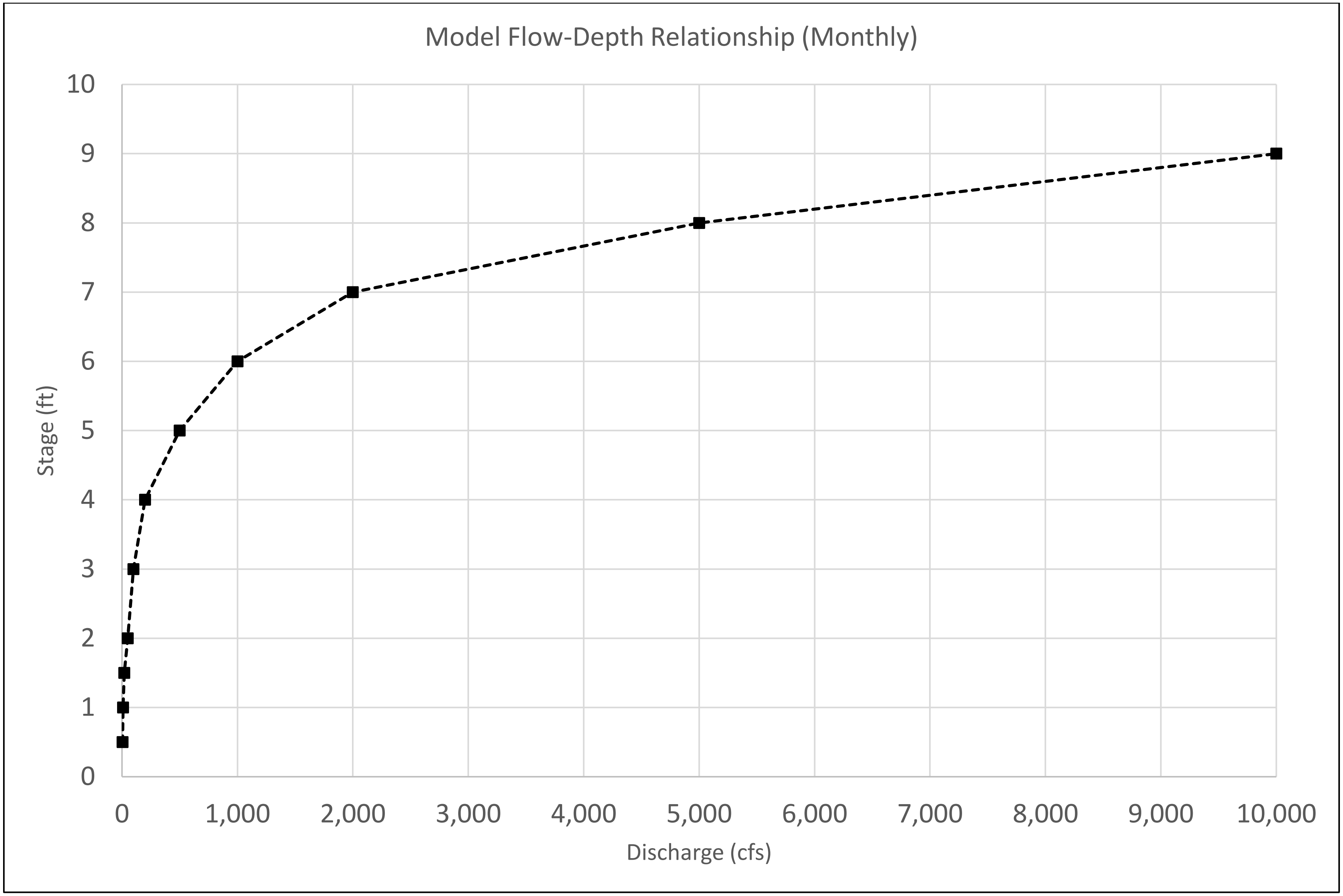


Figure 6.25 Flow-Depth Relationship

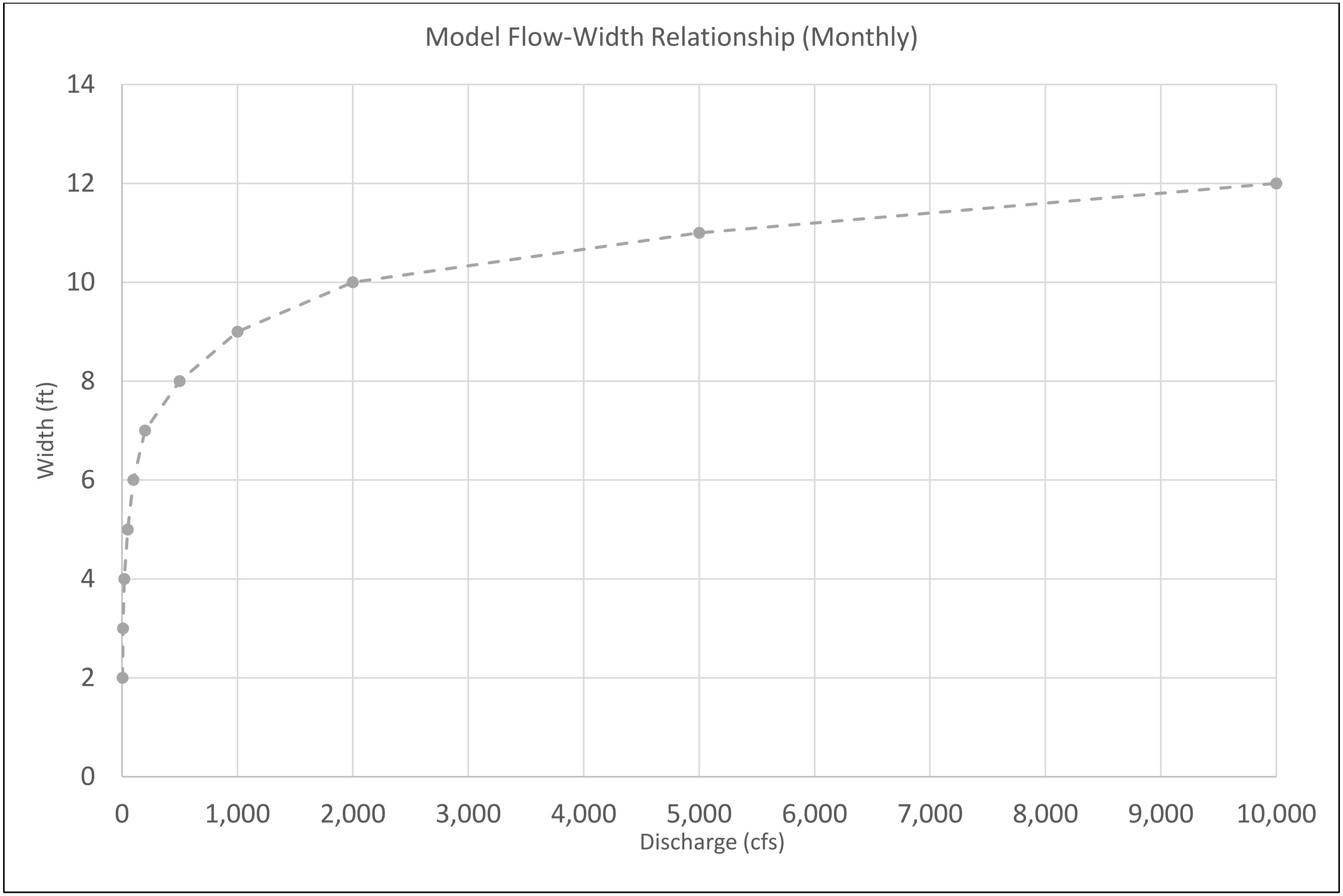


Figure 6.26 Flow-Width Relationship

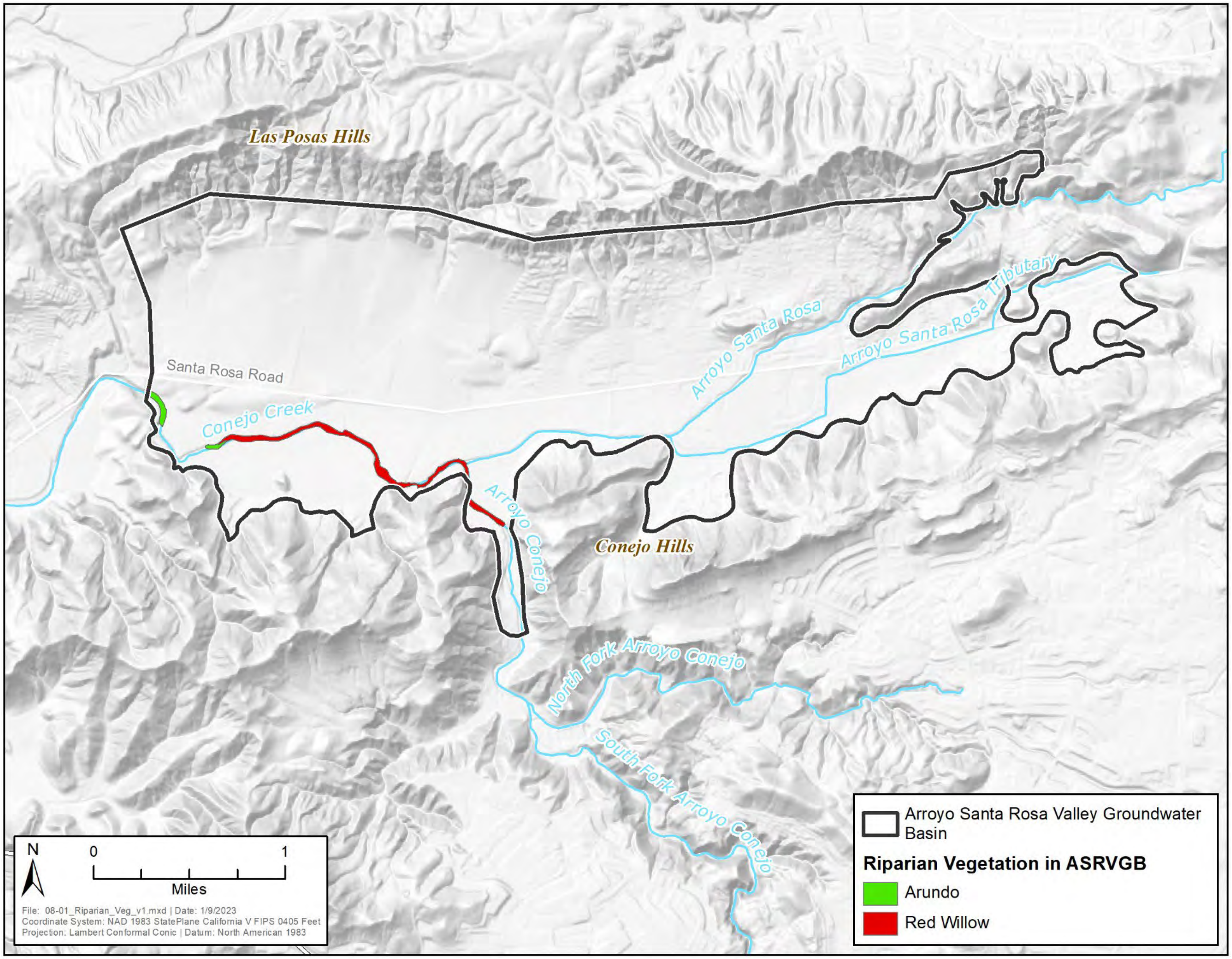


Figure 6.27 Riparian Vegetation in the ASRVGB

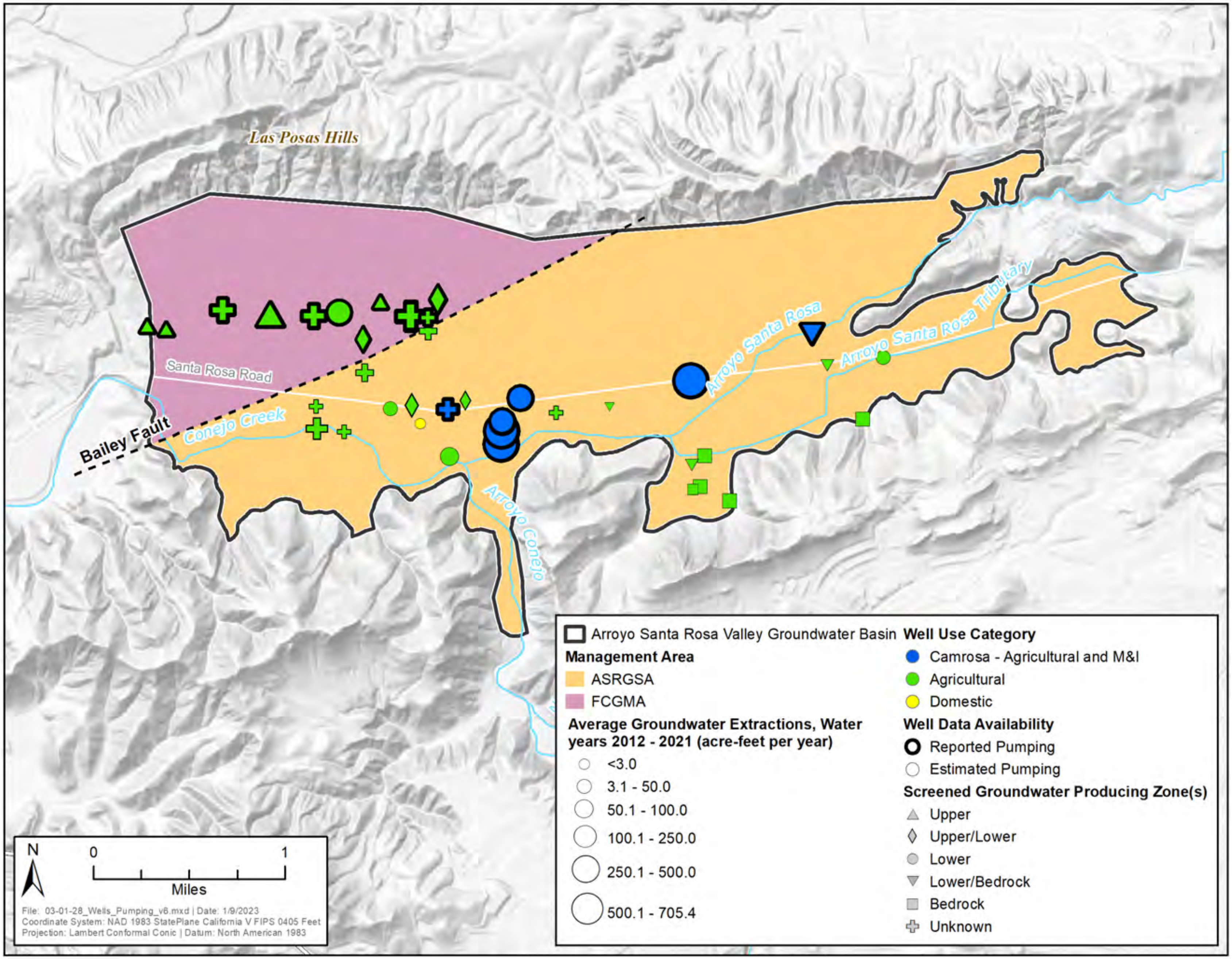


Figure 6.28 Modeled Pumping Wells

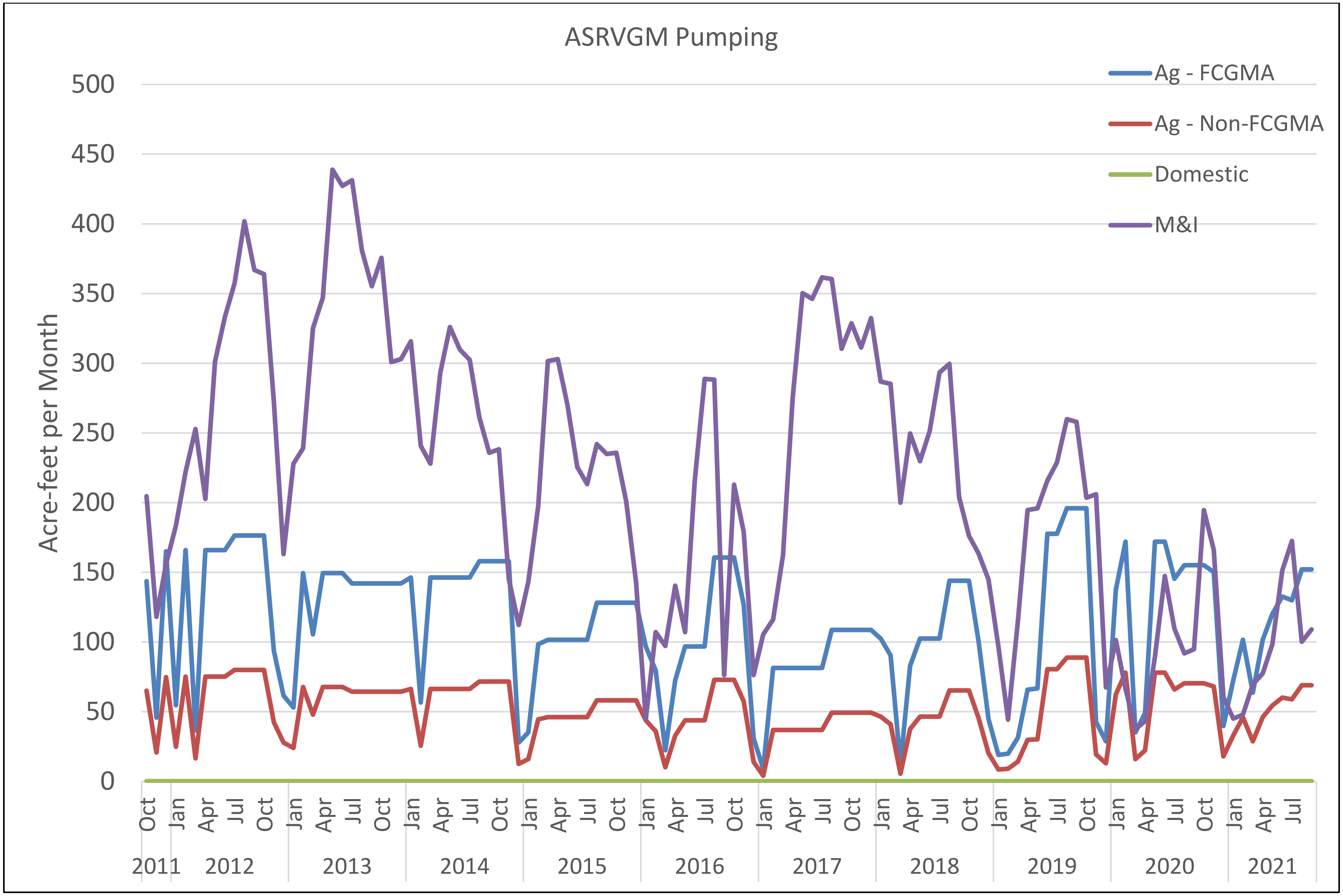


Figure 6.29 ASRVG Model Pumping

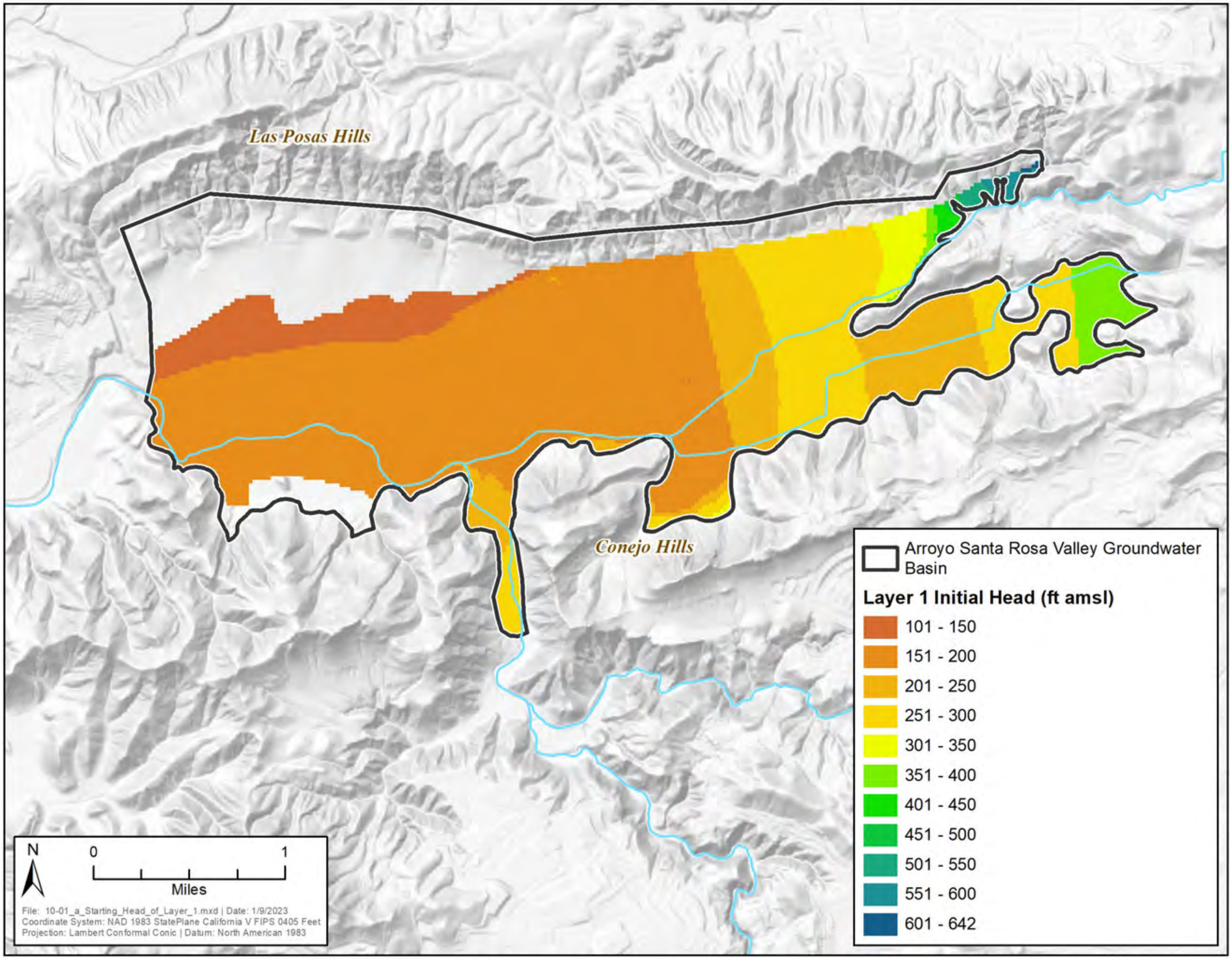


Figure 7.1a Initial Heads for the Model - Layer 1

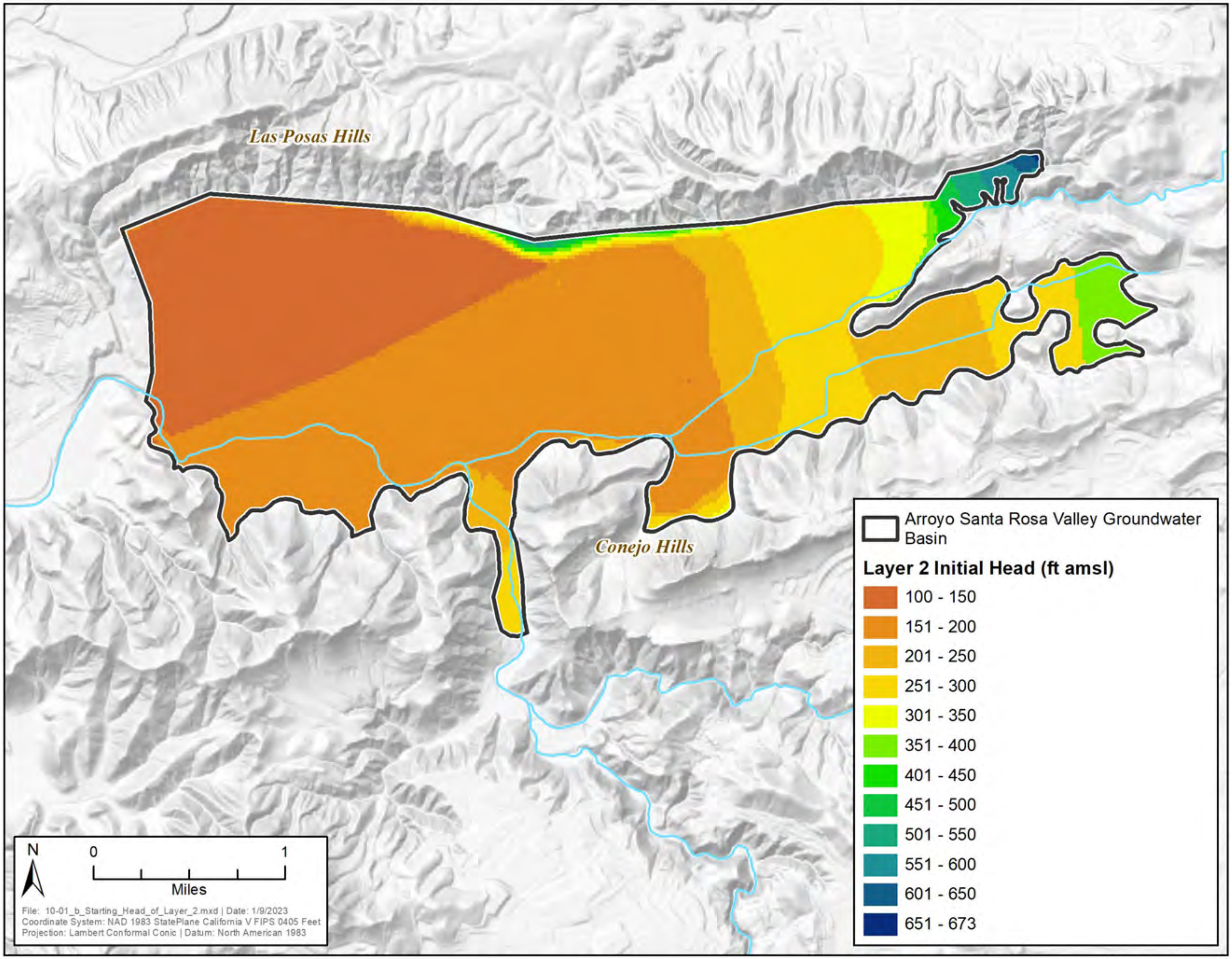


Figure 71b Initial Heads for the Model - Layer 2

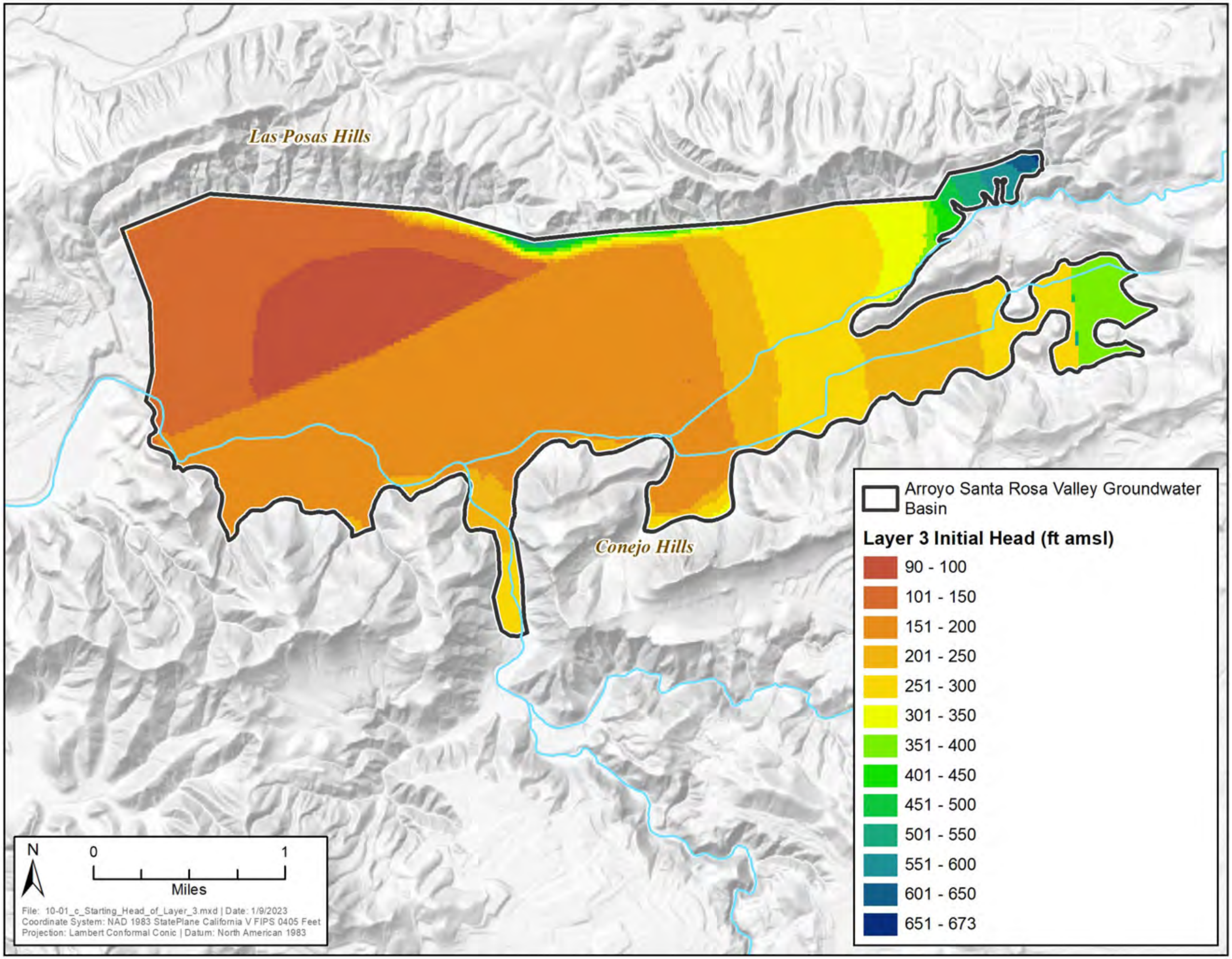


Figure 7.1c Initial Heads for the Model - Layer 3

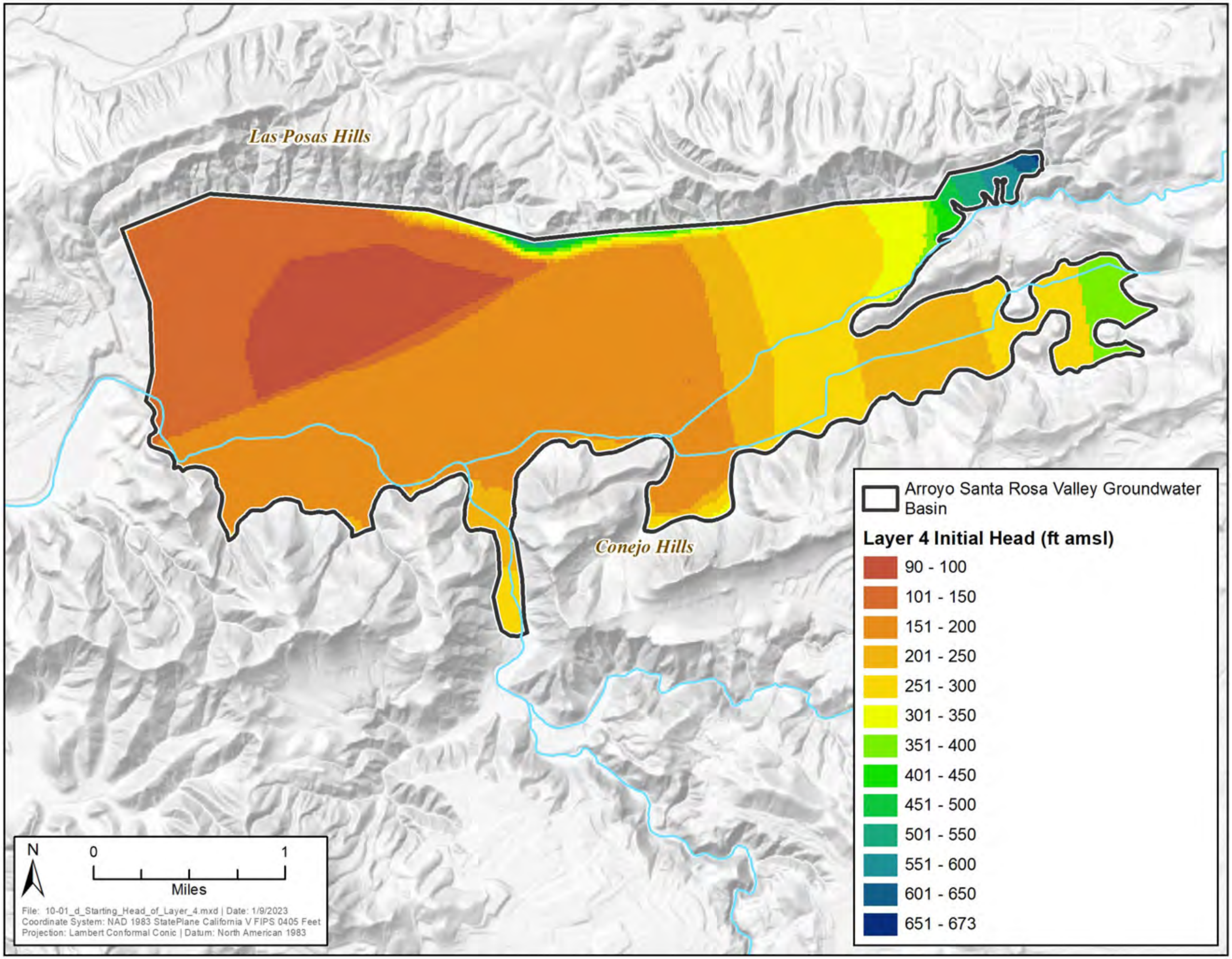


Figure 7.1d Initial Heads for the Model - Layer 4

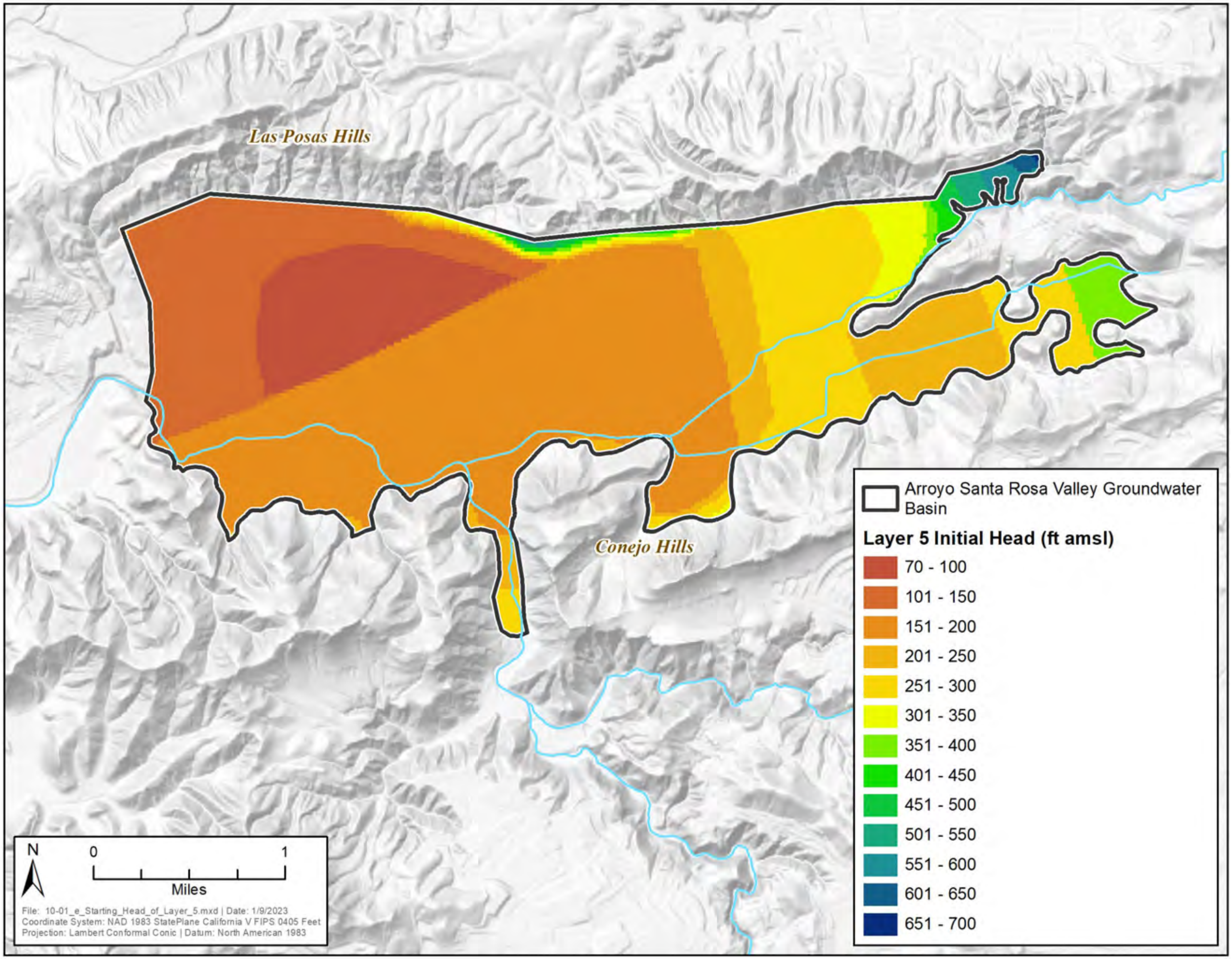


Figure 7.1e Initial Heads for the Model - Layer 5

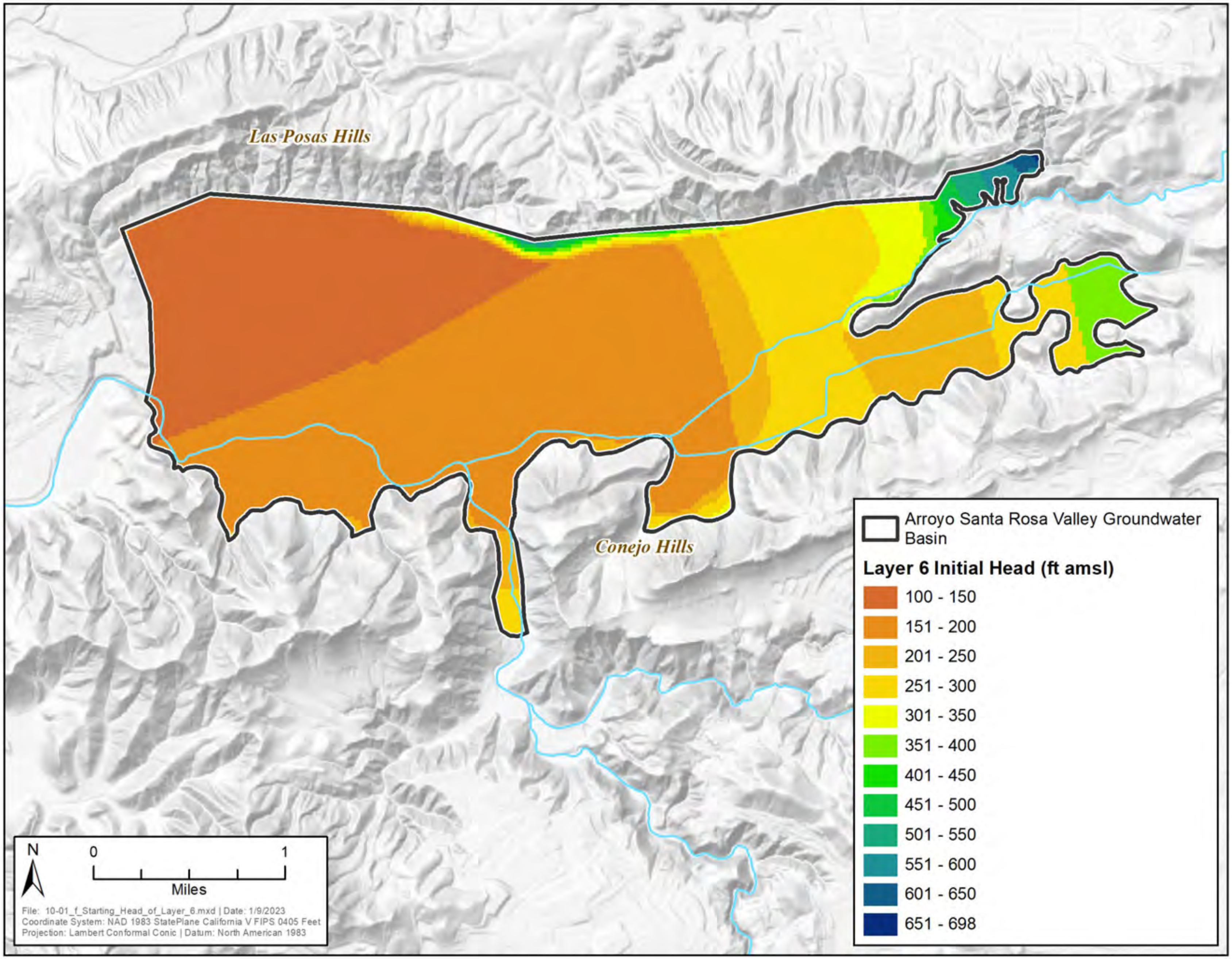


Figure 7.1f Initial Heads for the Model - Layer 6

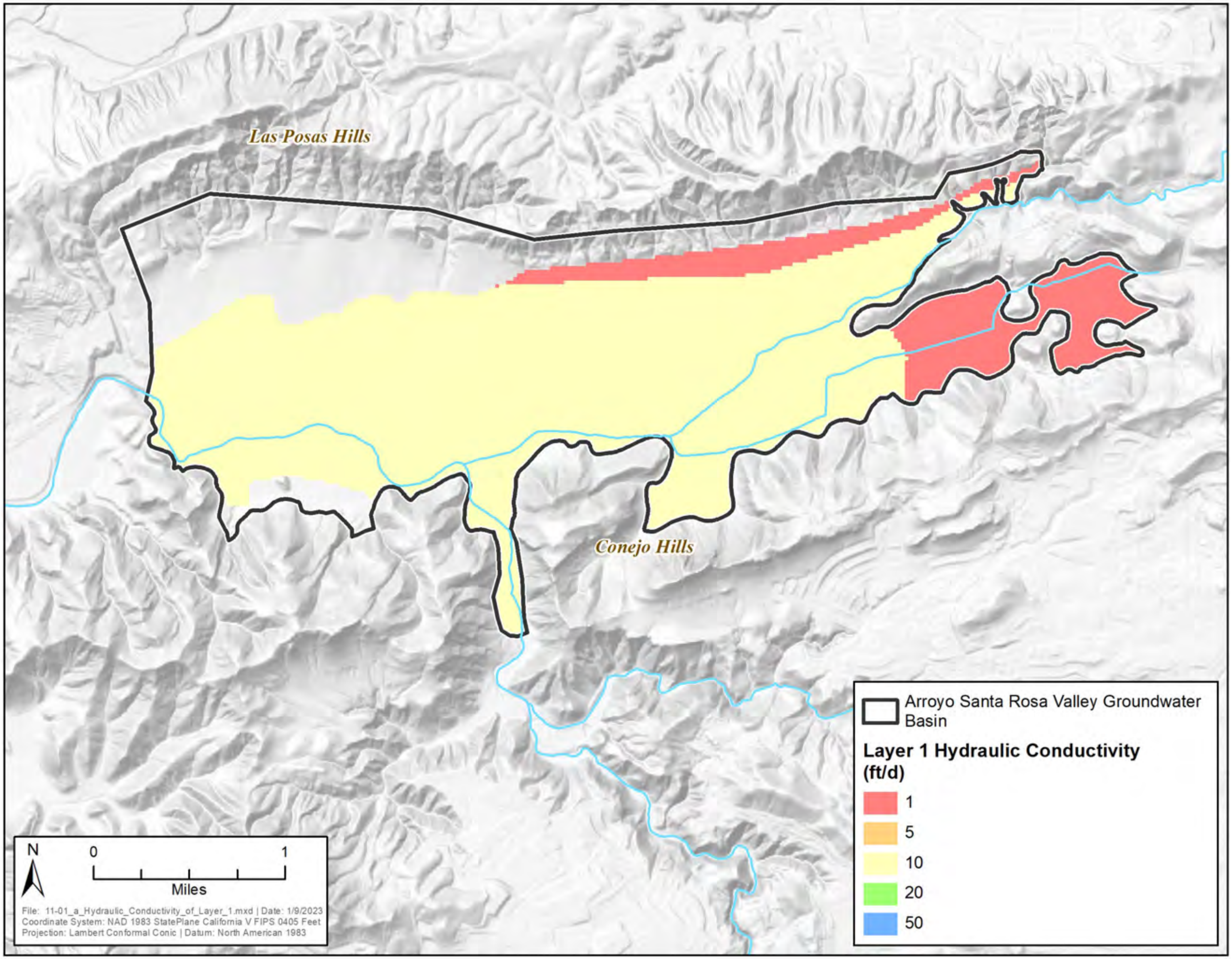


Figure 8.1a Horizontal Hydraulic Conductivity - Layer 1

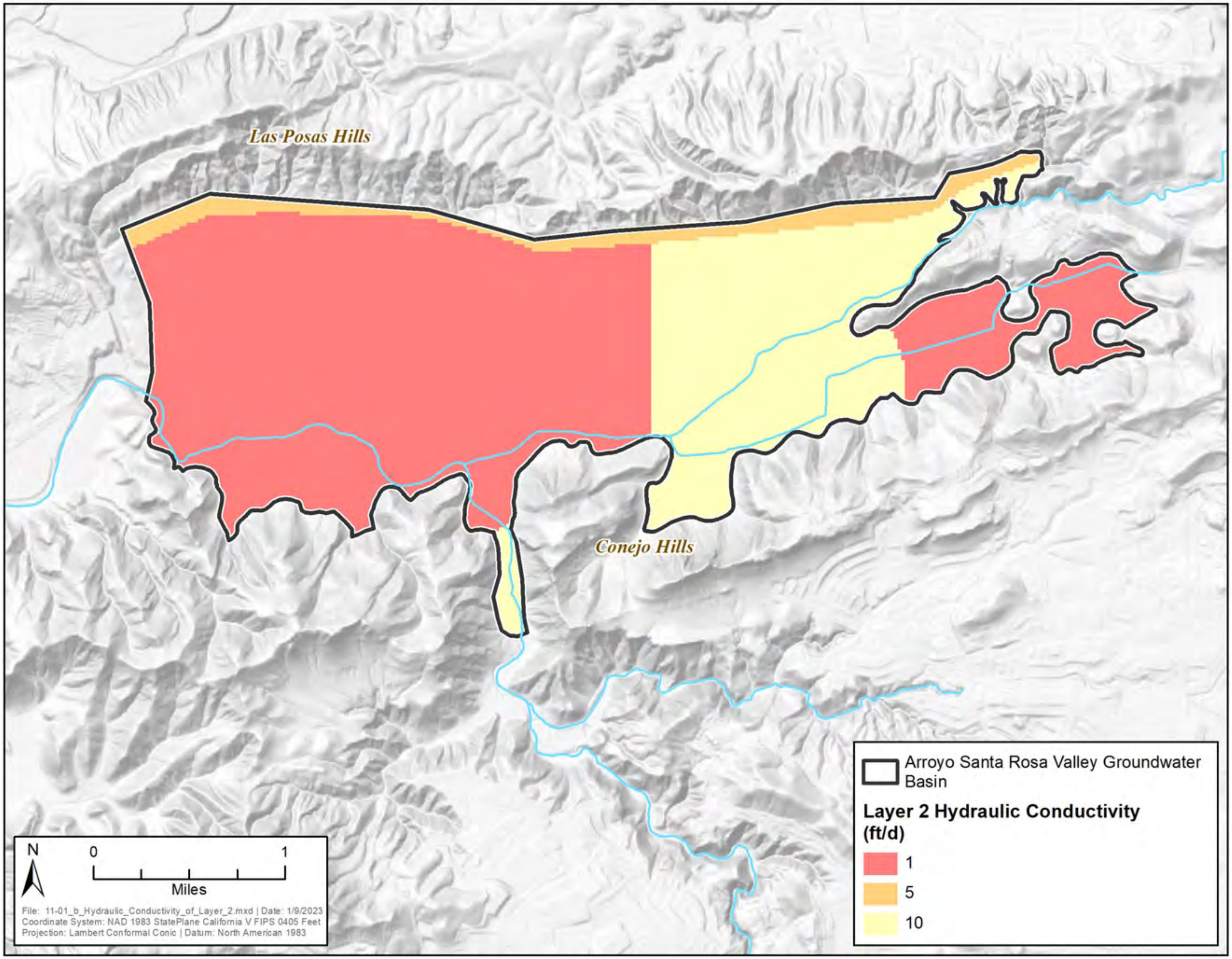


Figure 8.1b Horizontal Hydraulic Conductivity - Layer 2

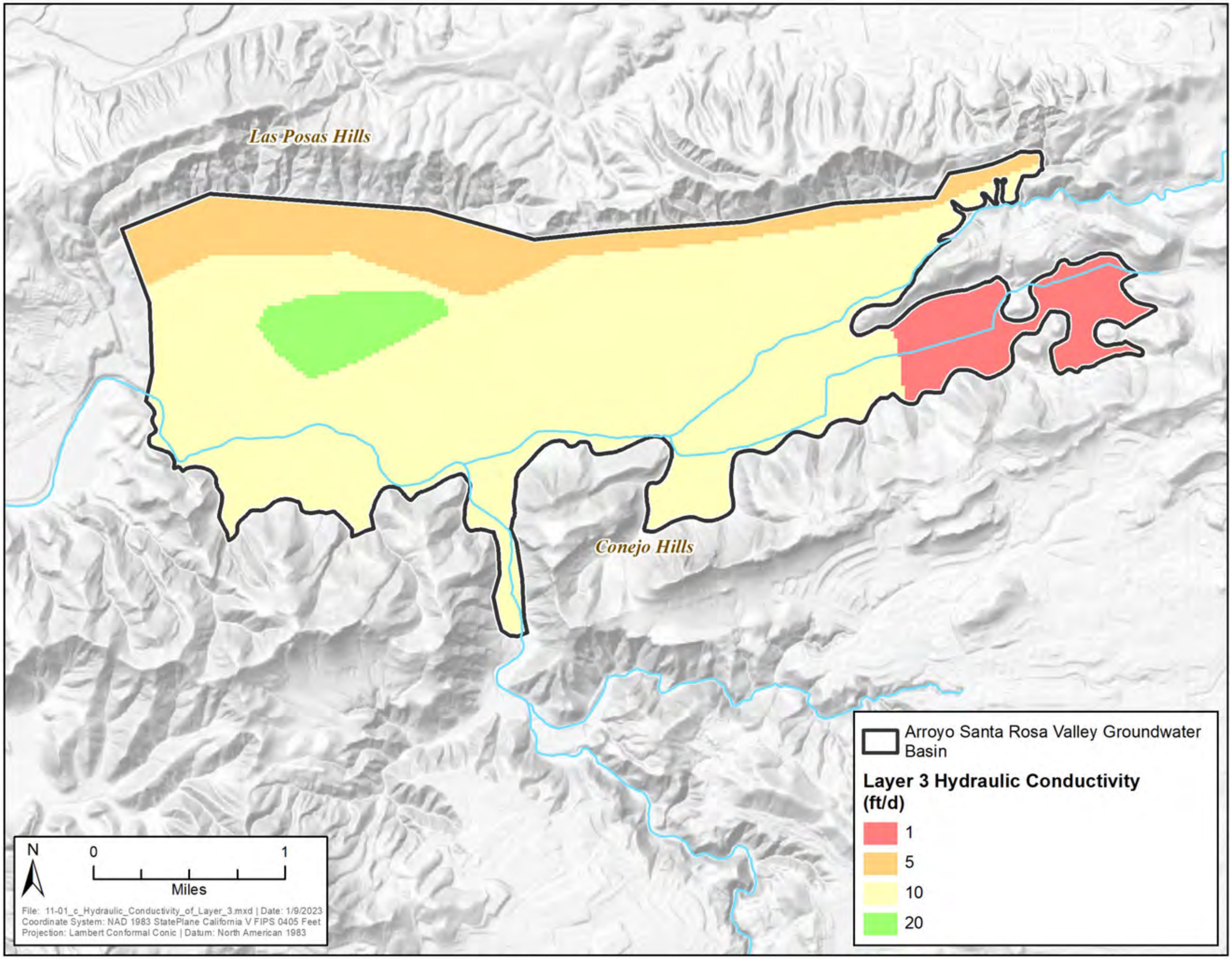


Figure 8.1c Horizontal Hydraulic Conductivity - Layer 3

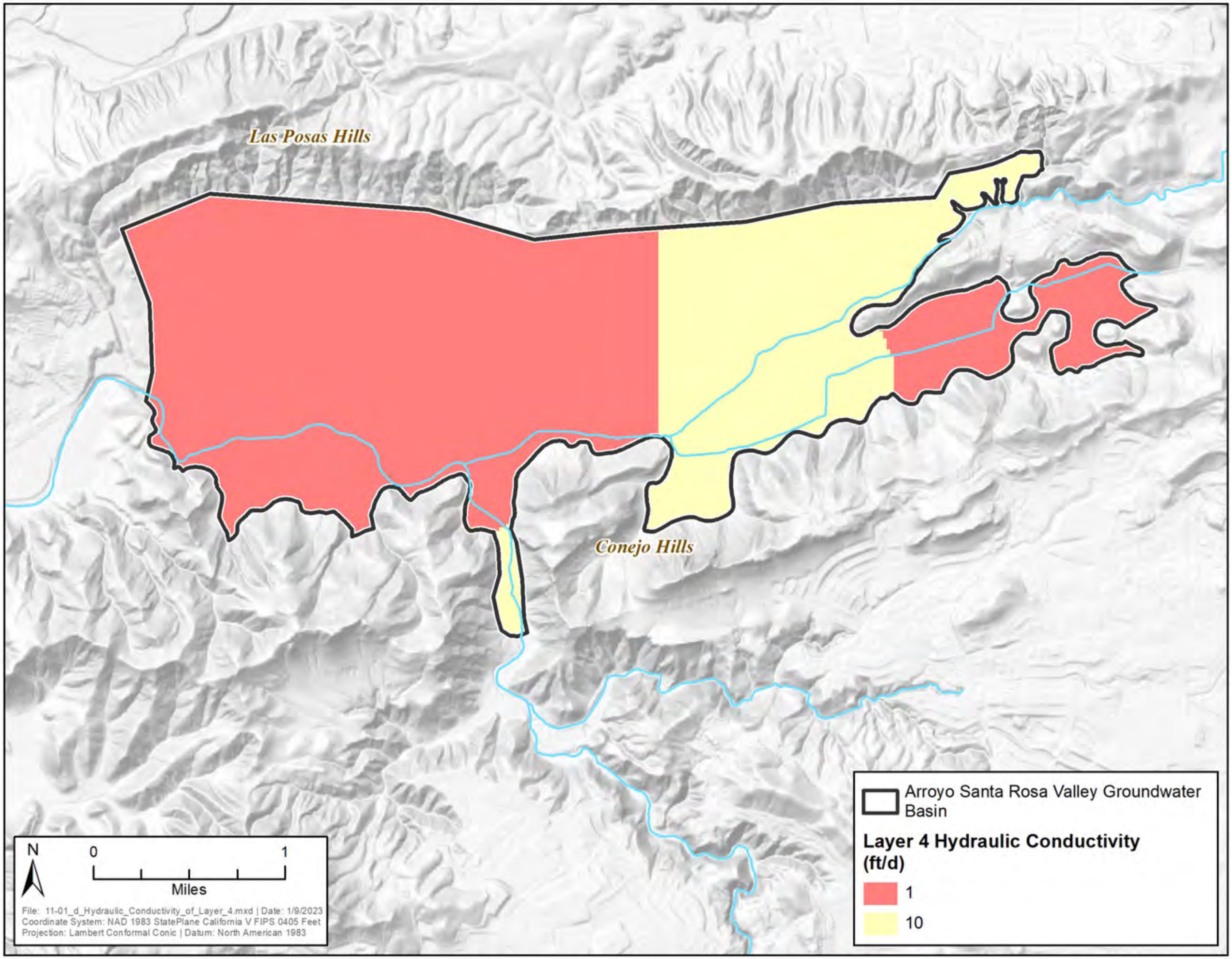


Figure 8.1d Horizontal Hydraulic Conductivity - Layer 4

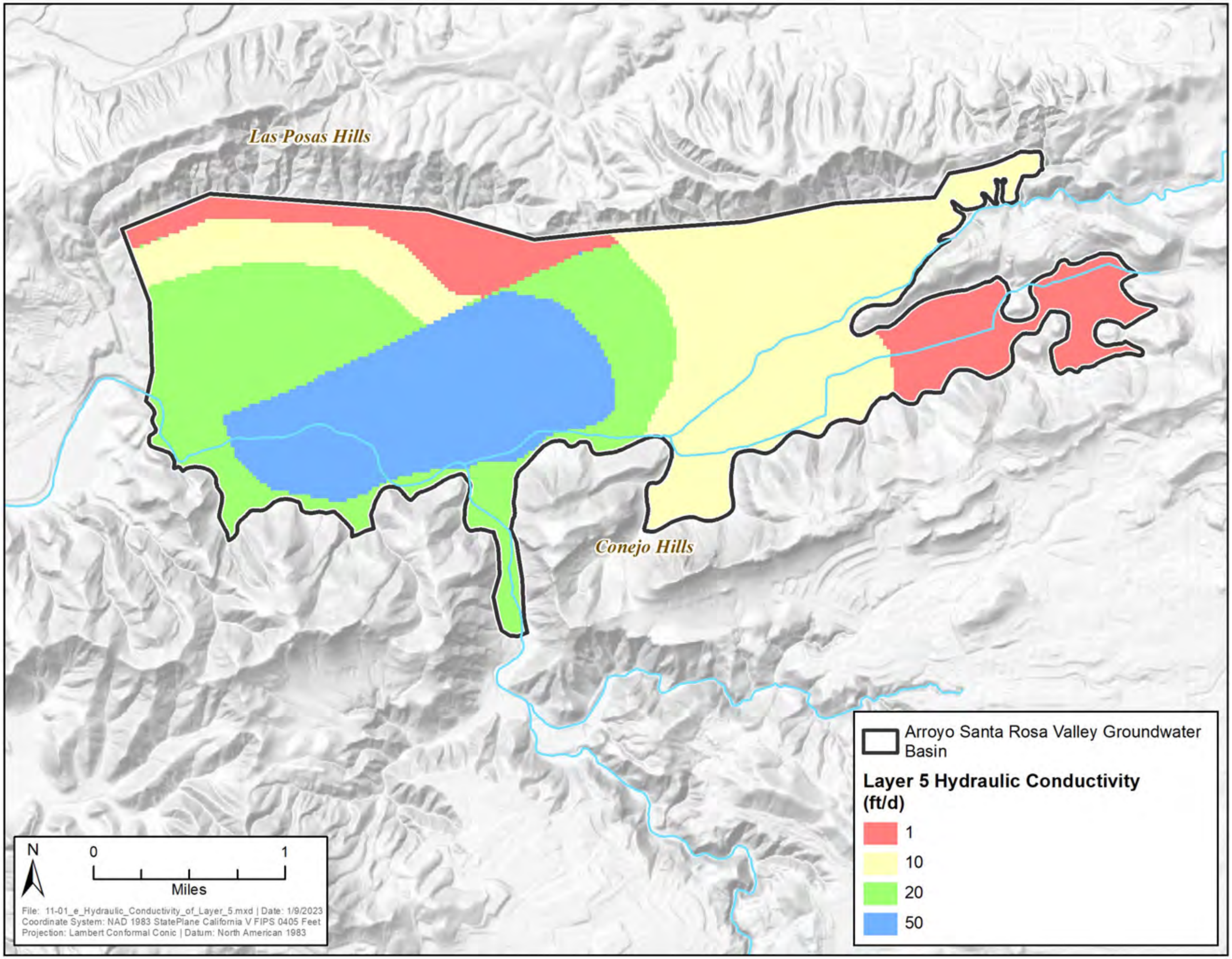


Figure 8.1e Horizontal Hydraulic Conductivity - Layer 5

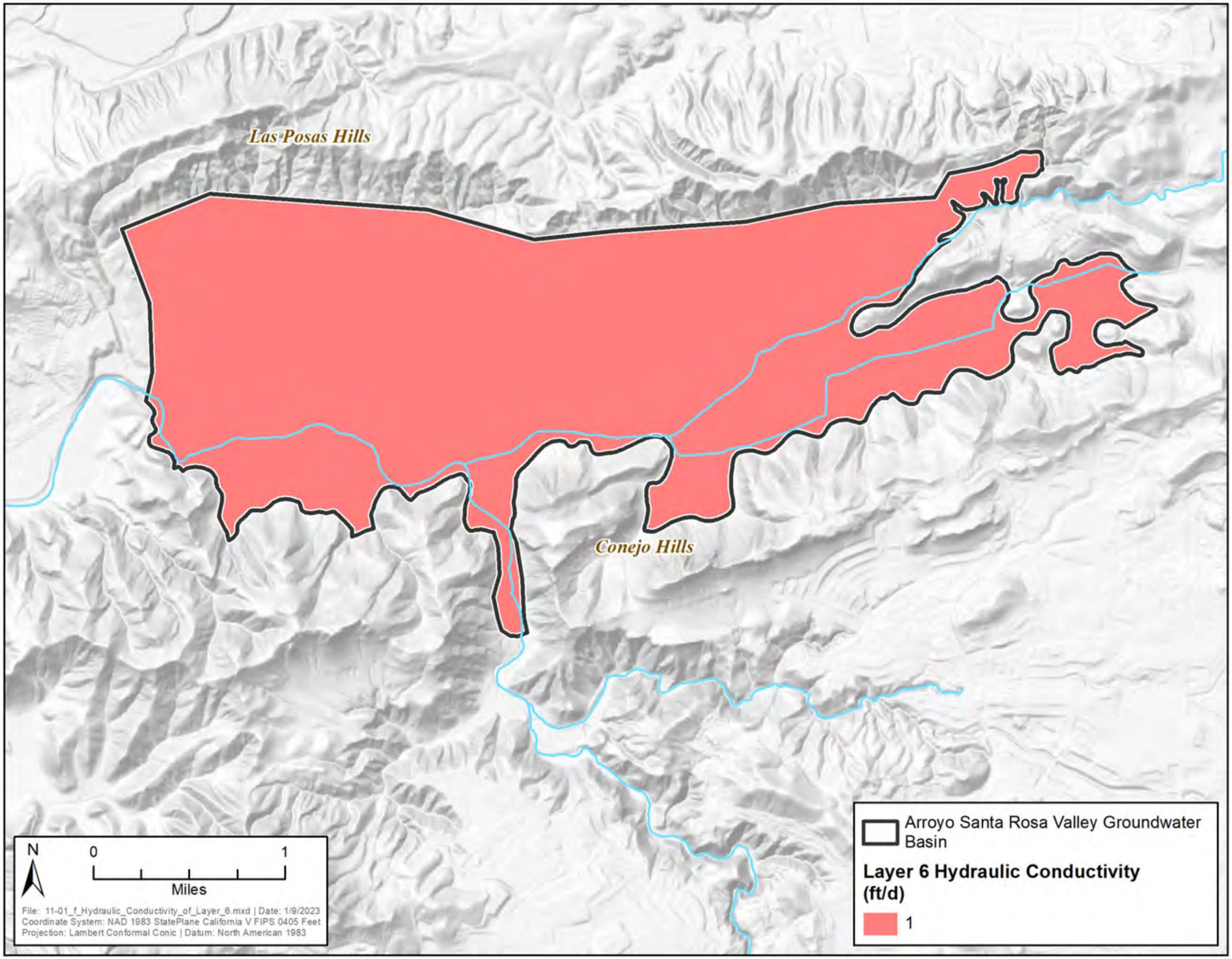


Figure 8.1f Horizontal Hydraulic Conductivity - Layer 6

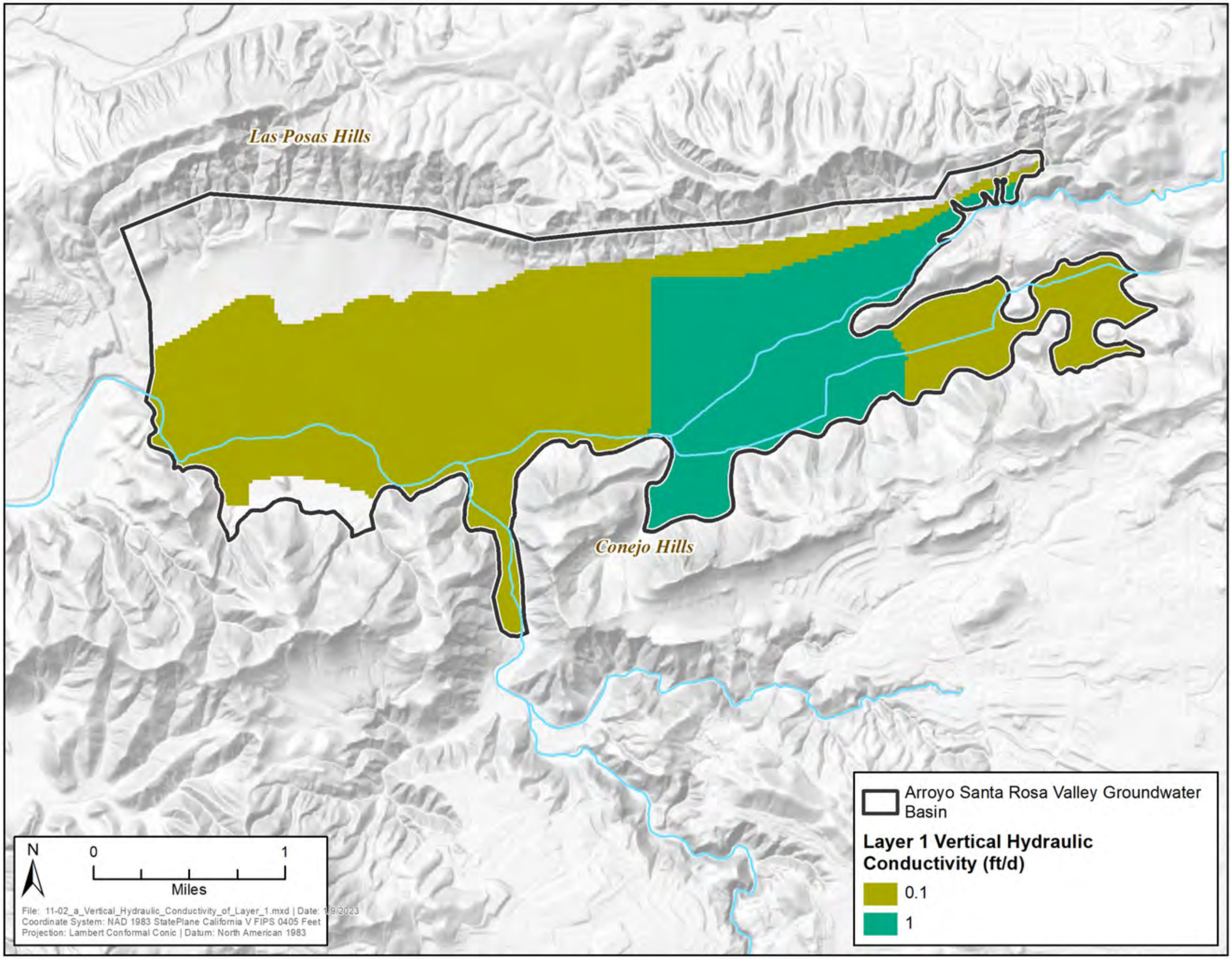


Figure 8.2a Vertical Hydraulic Conductivity - Layer 1

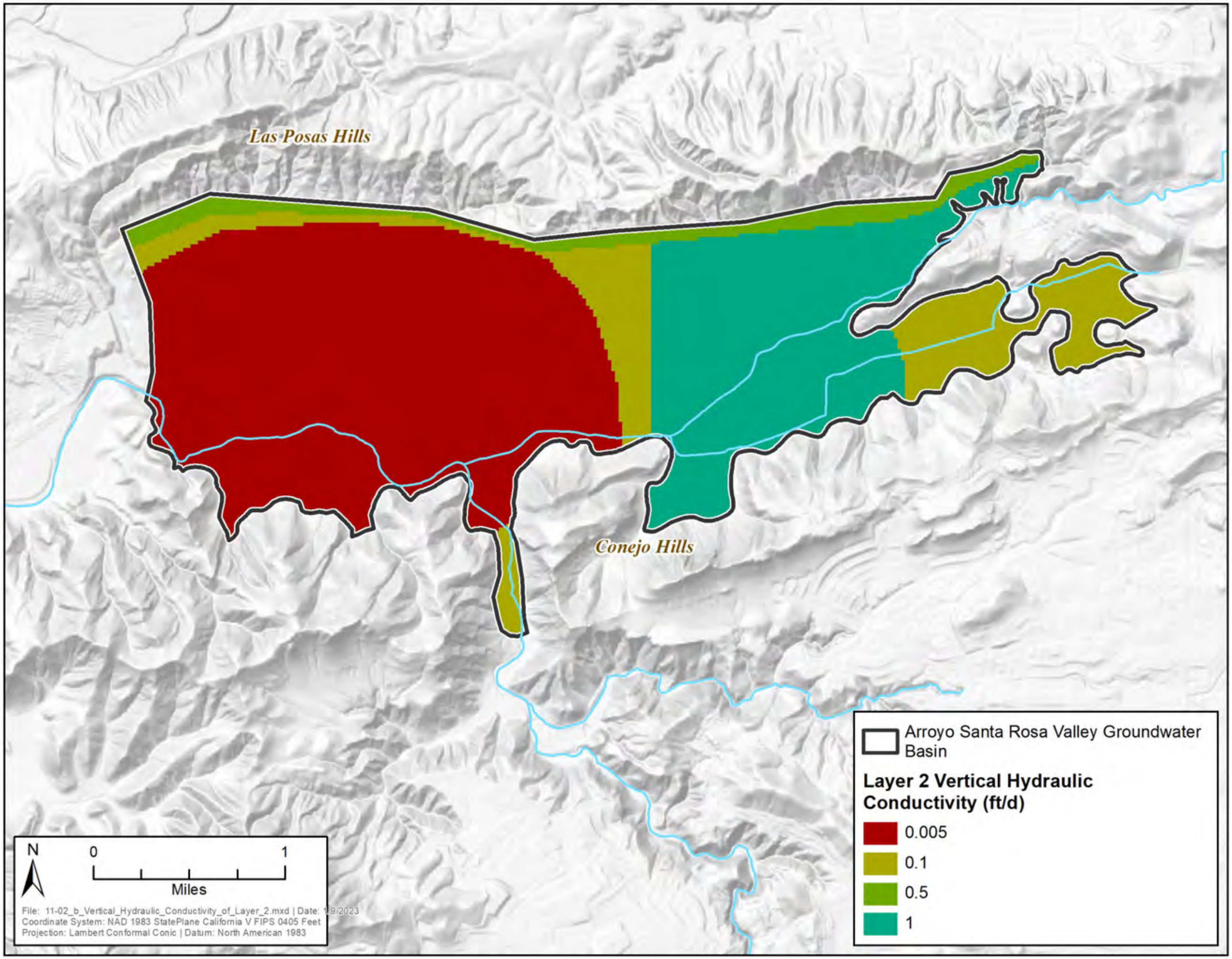


Figure 8.2b Vertical Hydraulic Conductivity - Layer 2

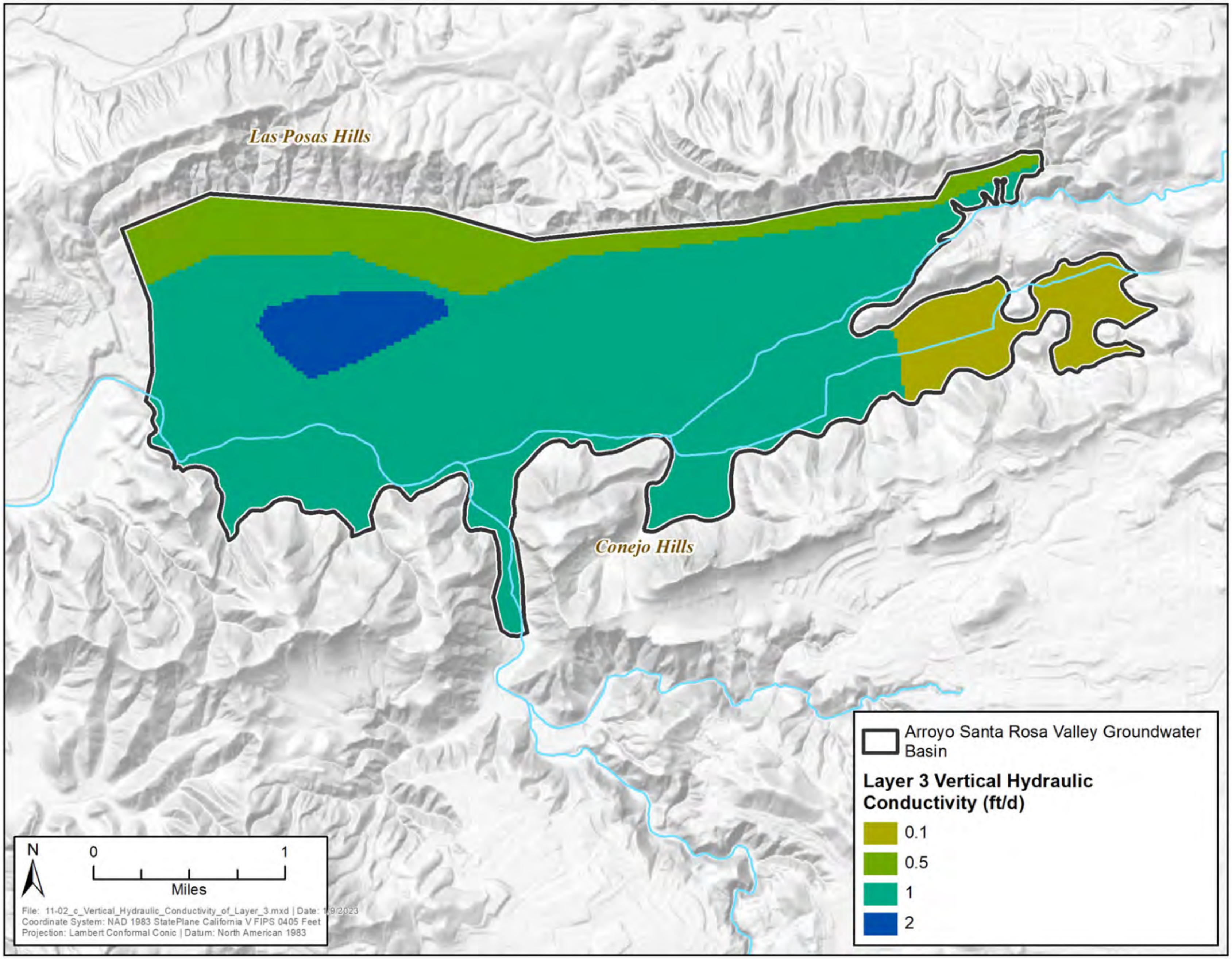


Figure 8.2c Vertical Hydraulic Conductivity - Layer 3

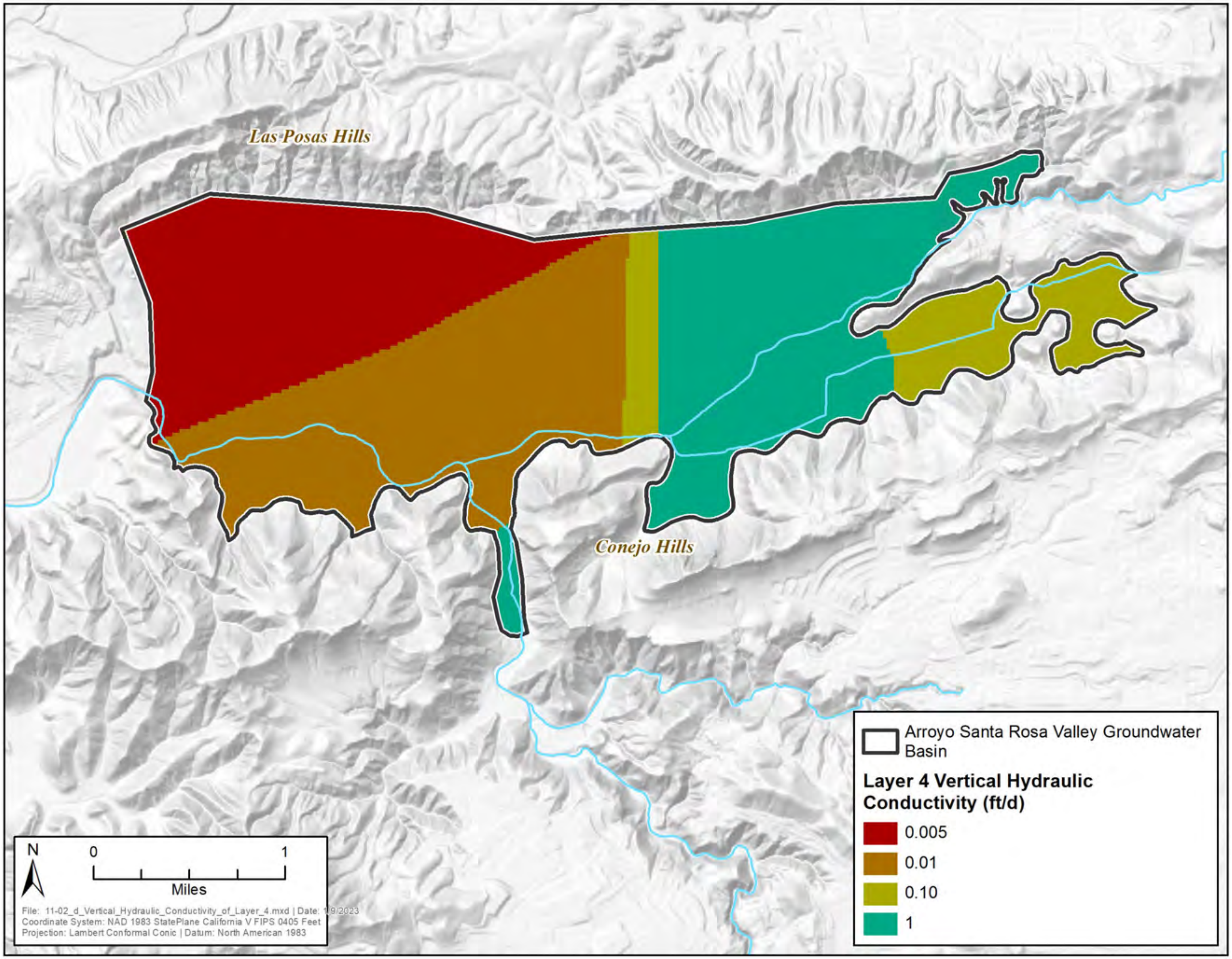


Figure 8.2d Vertical Hydraulic Conductivity - Layer 4

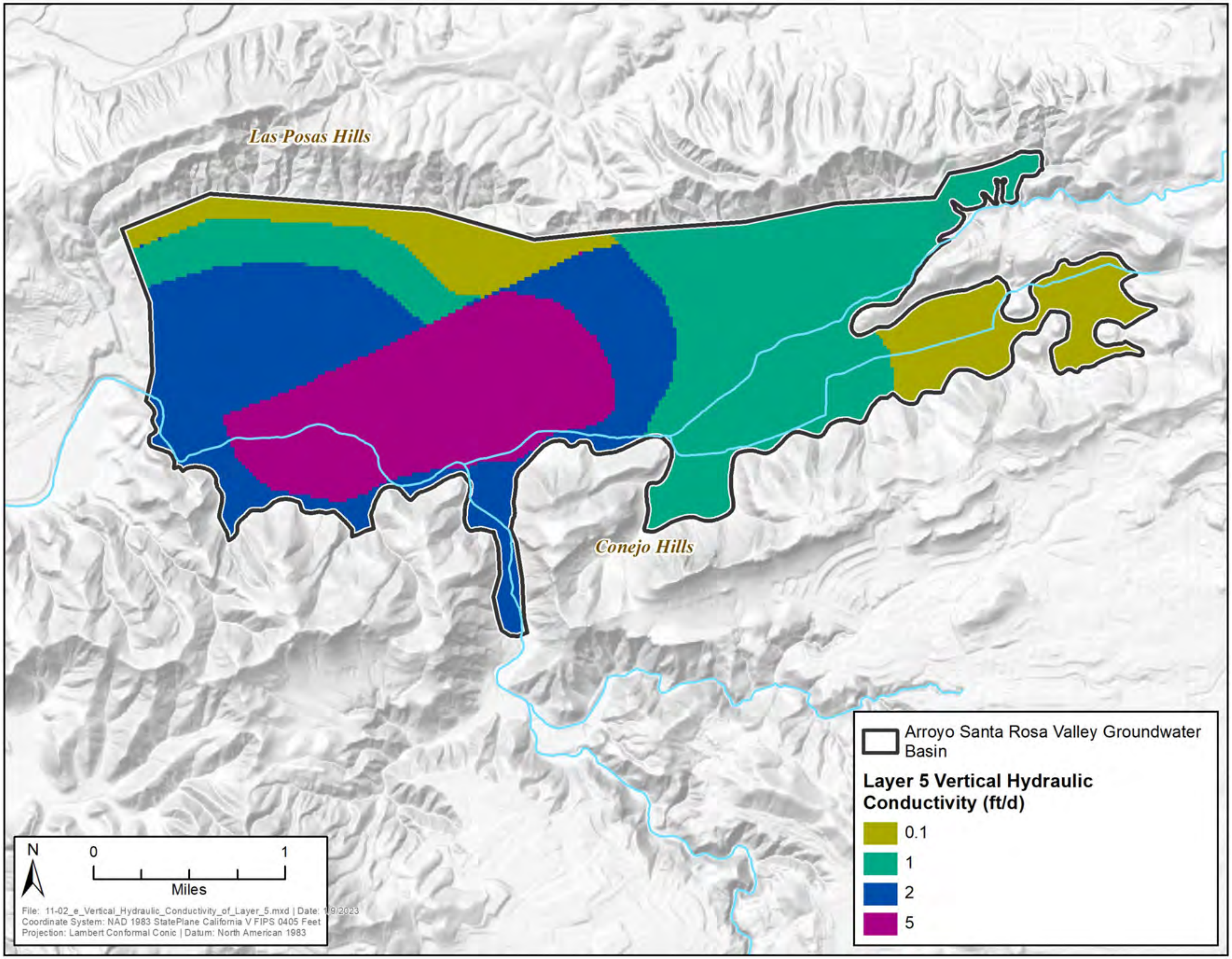


Figure 8.2e Vertical Hydraulic Conductivity - Layer 5

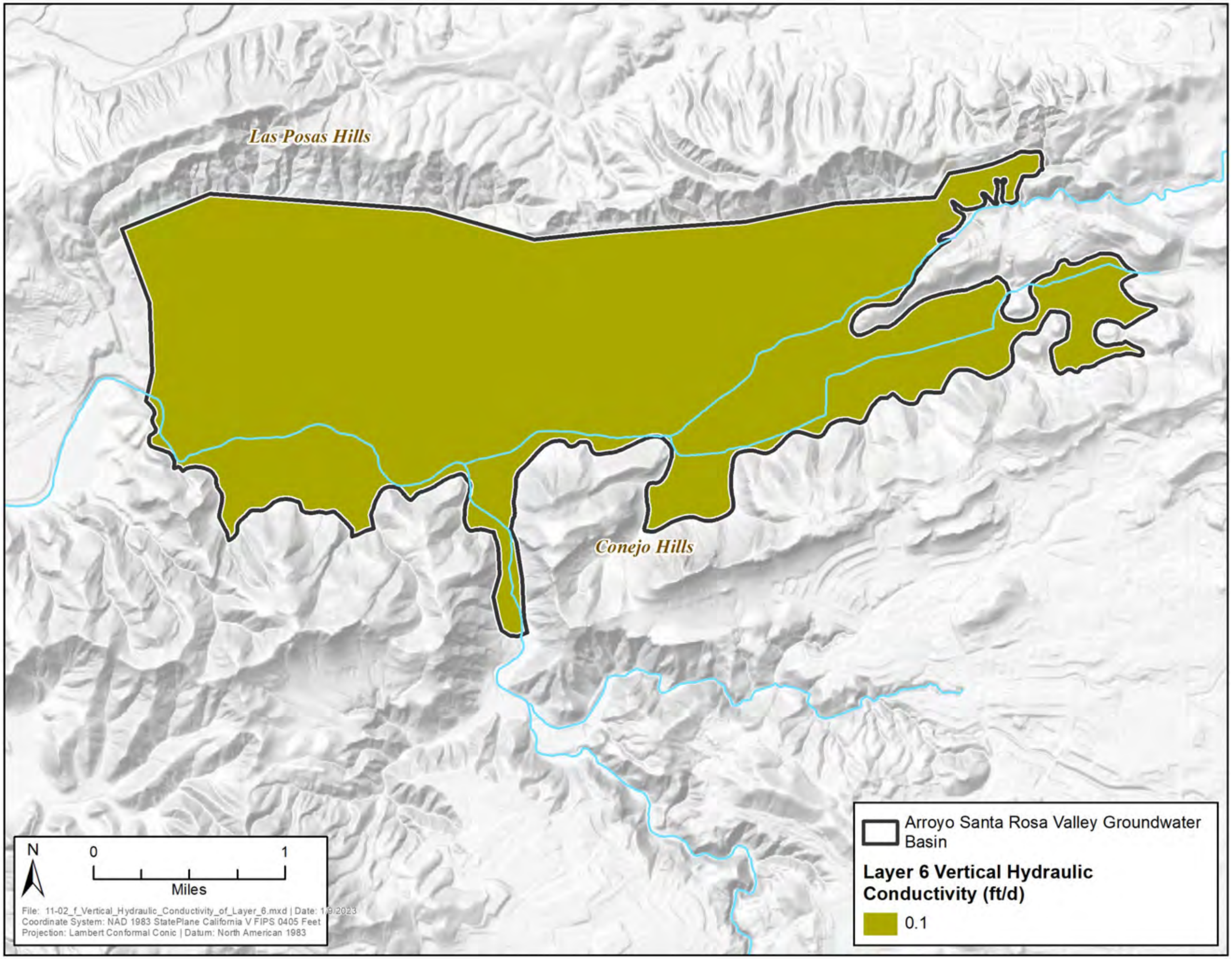


Figure 8.2f Vertical Hydraulic Conductivity - Layer 6

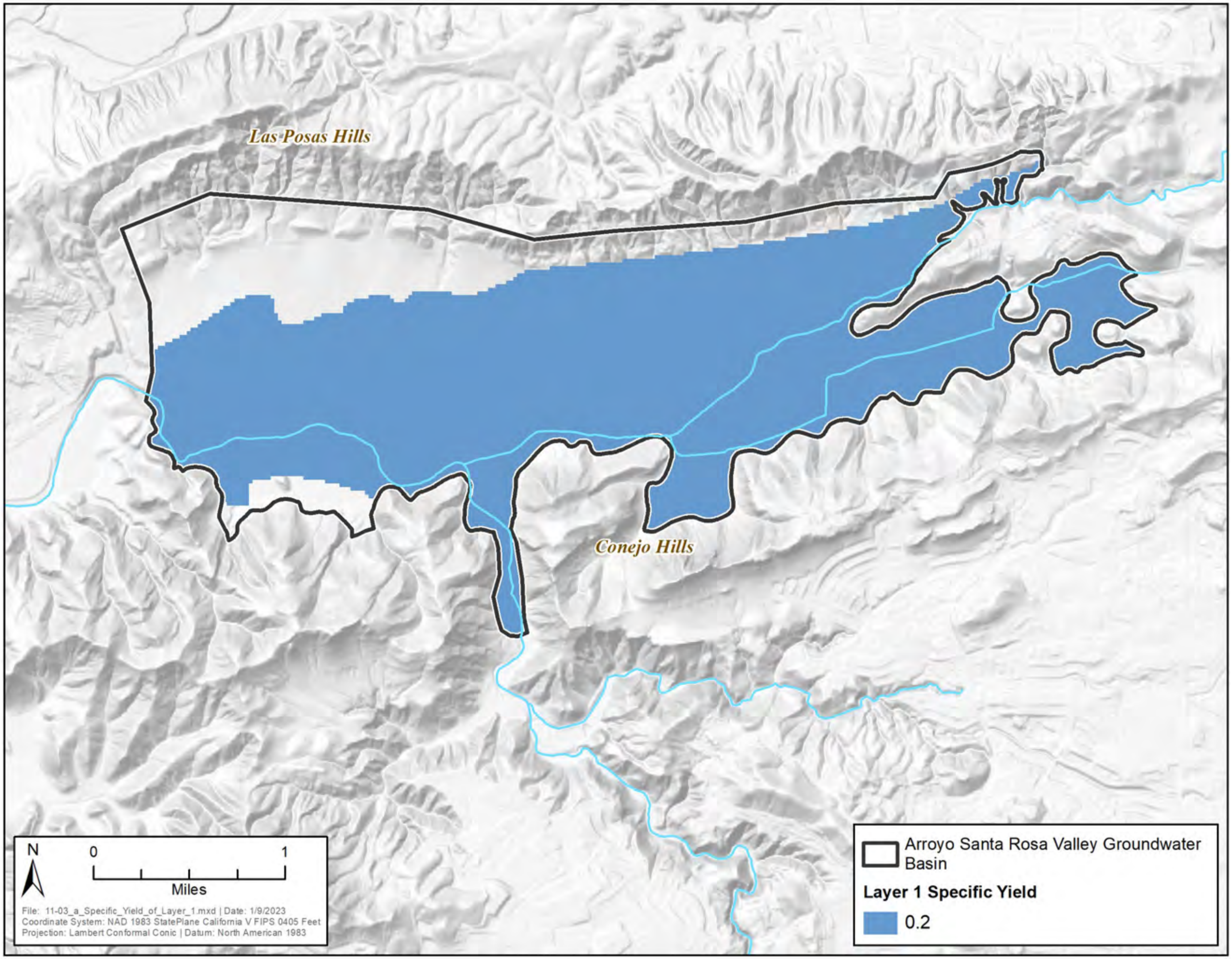


Figure 8.3a Specific Yield – Layer 1

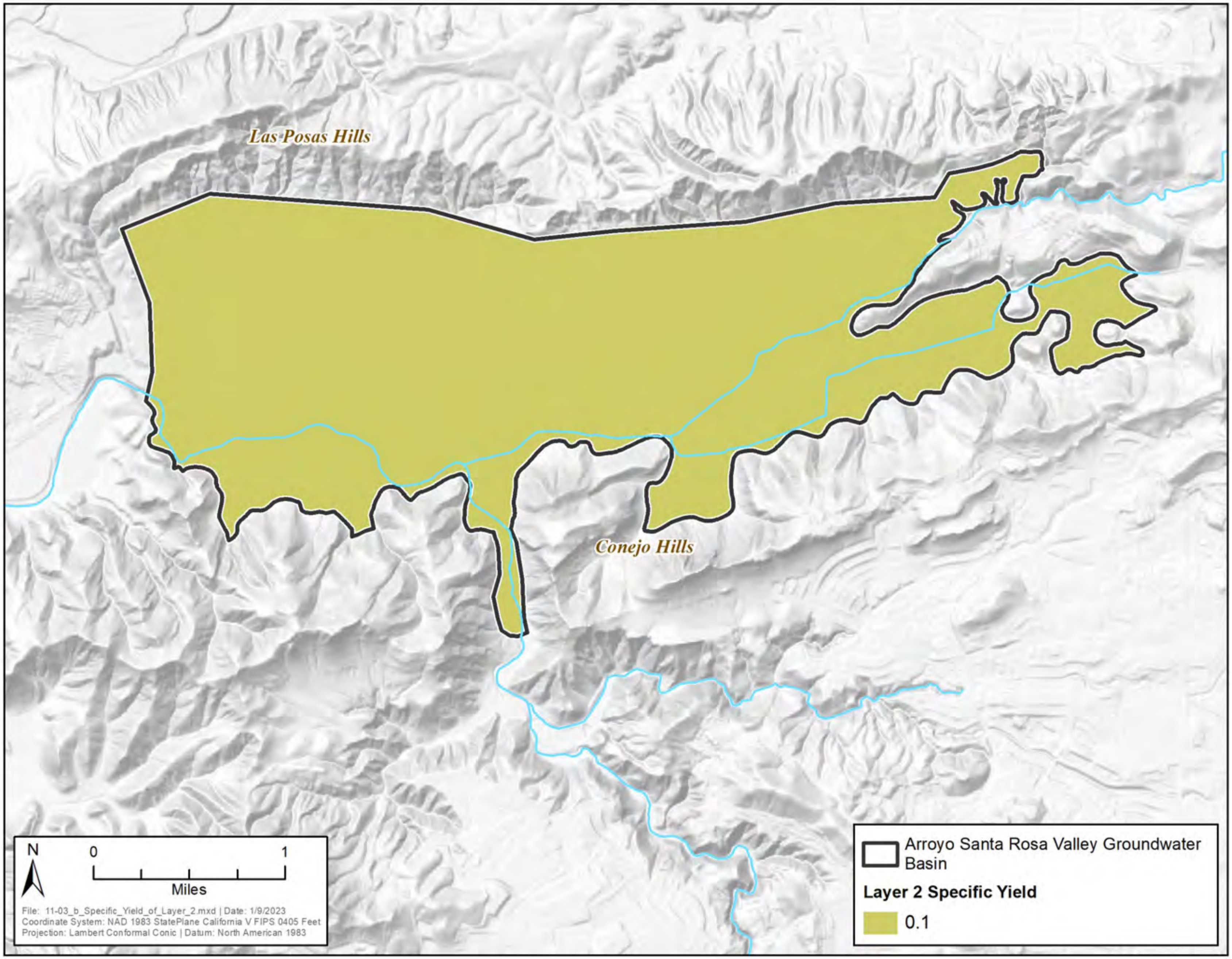


Figure 8.3b Specific Yield – Layer 2

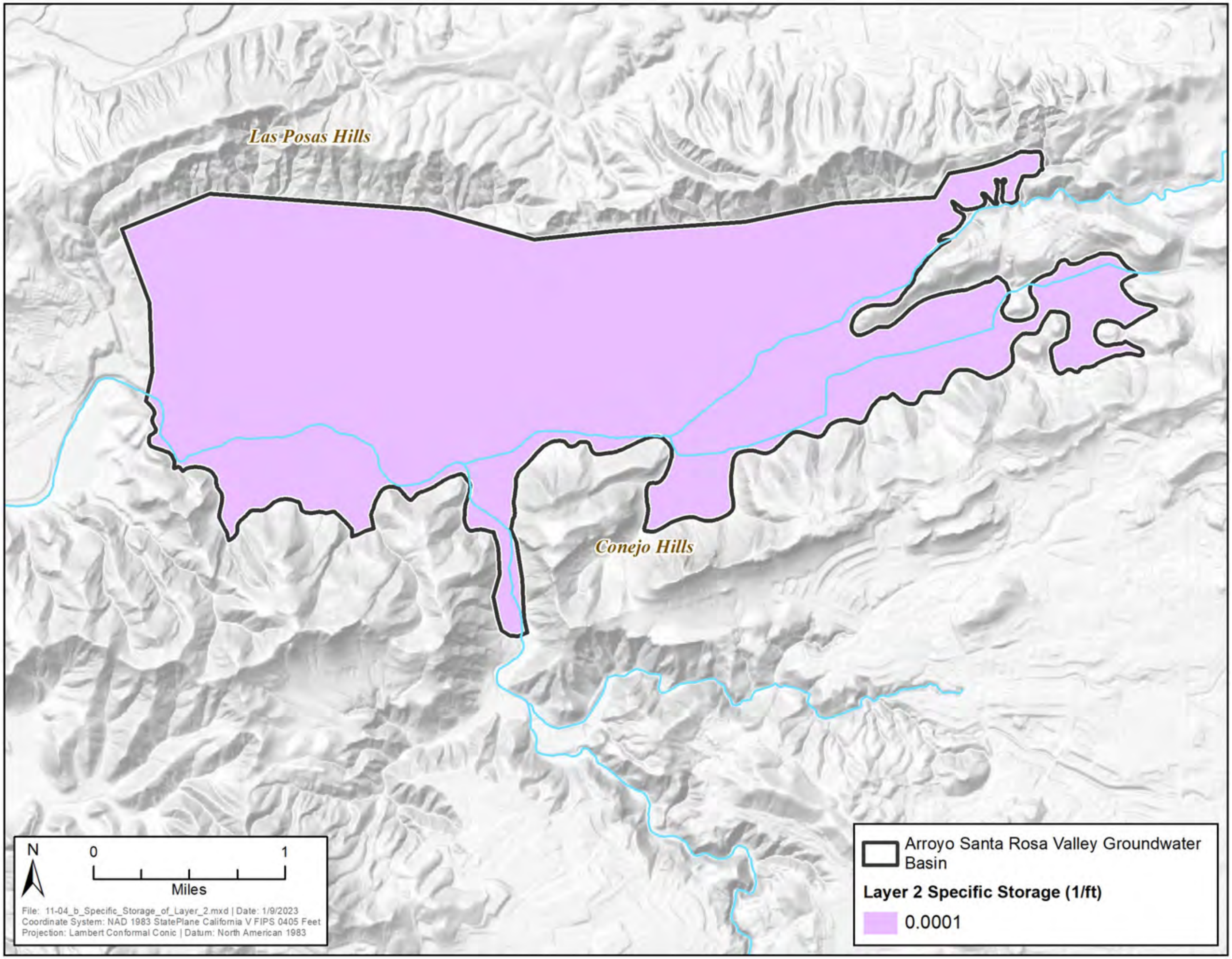


Figure 8.4a Specific Storage – Layer 2

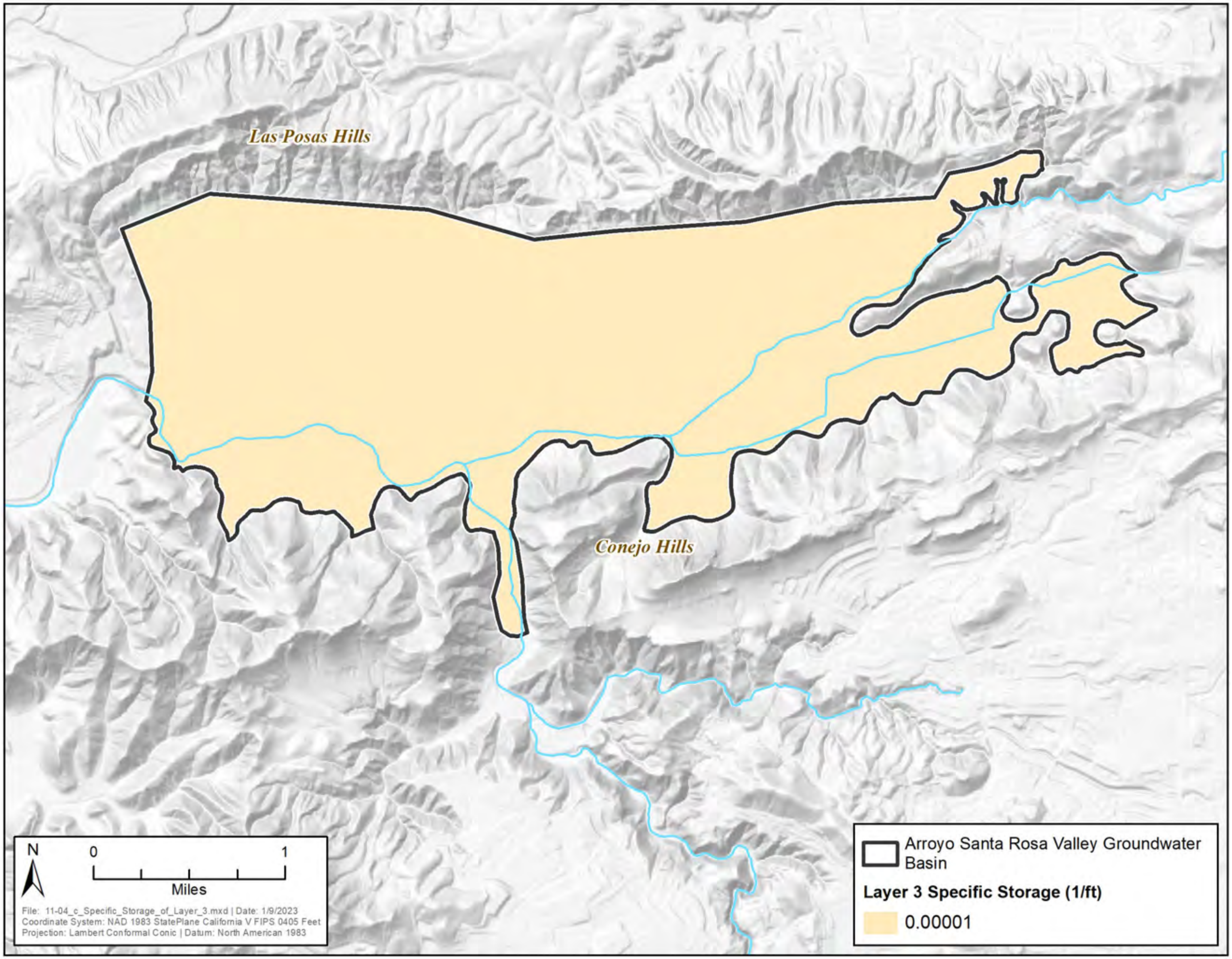


Figure 8.4b Specific Storage – Layer 3

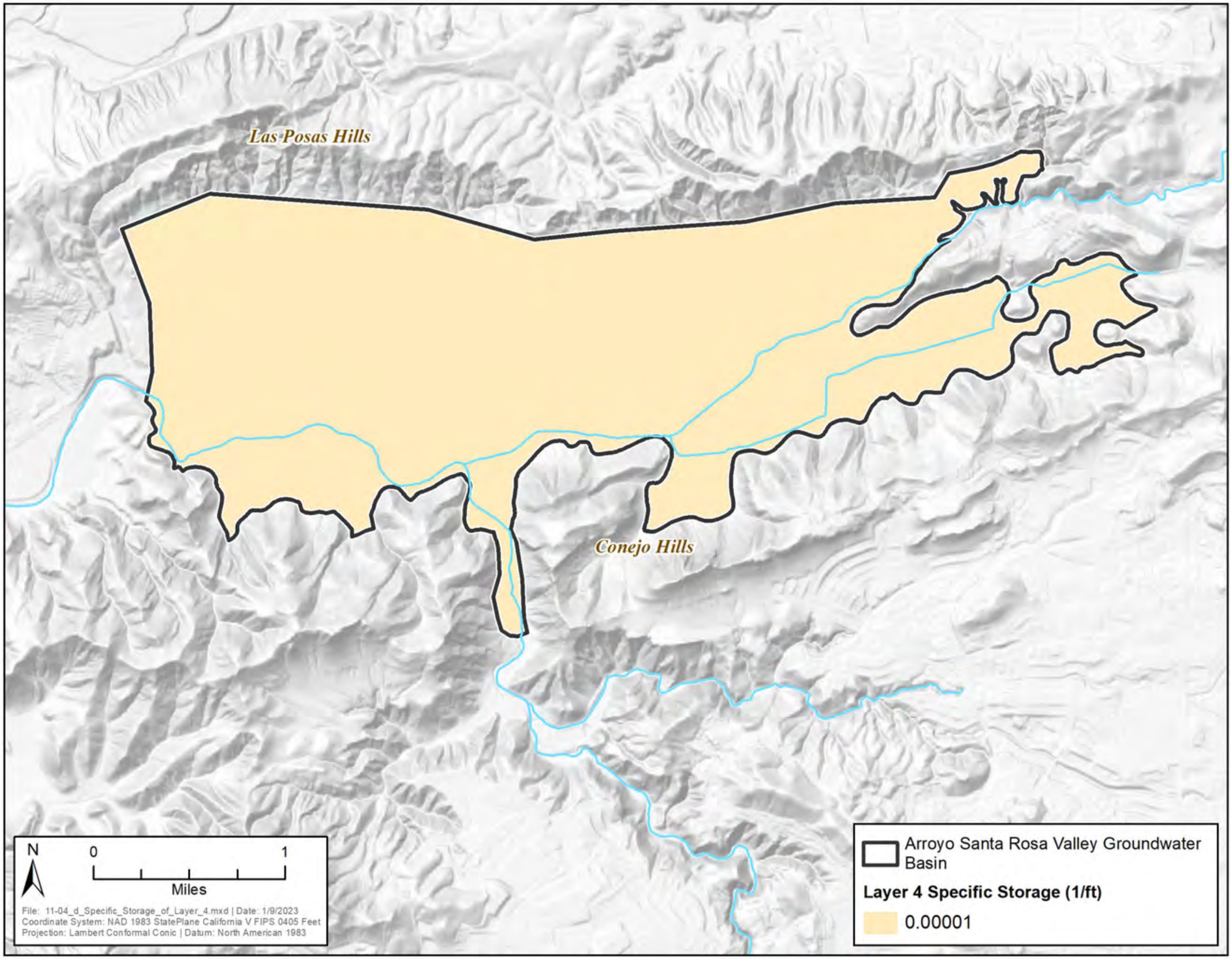


Figure 8.4c Specific Storage – Layer 4

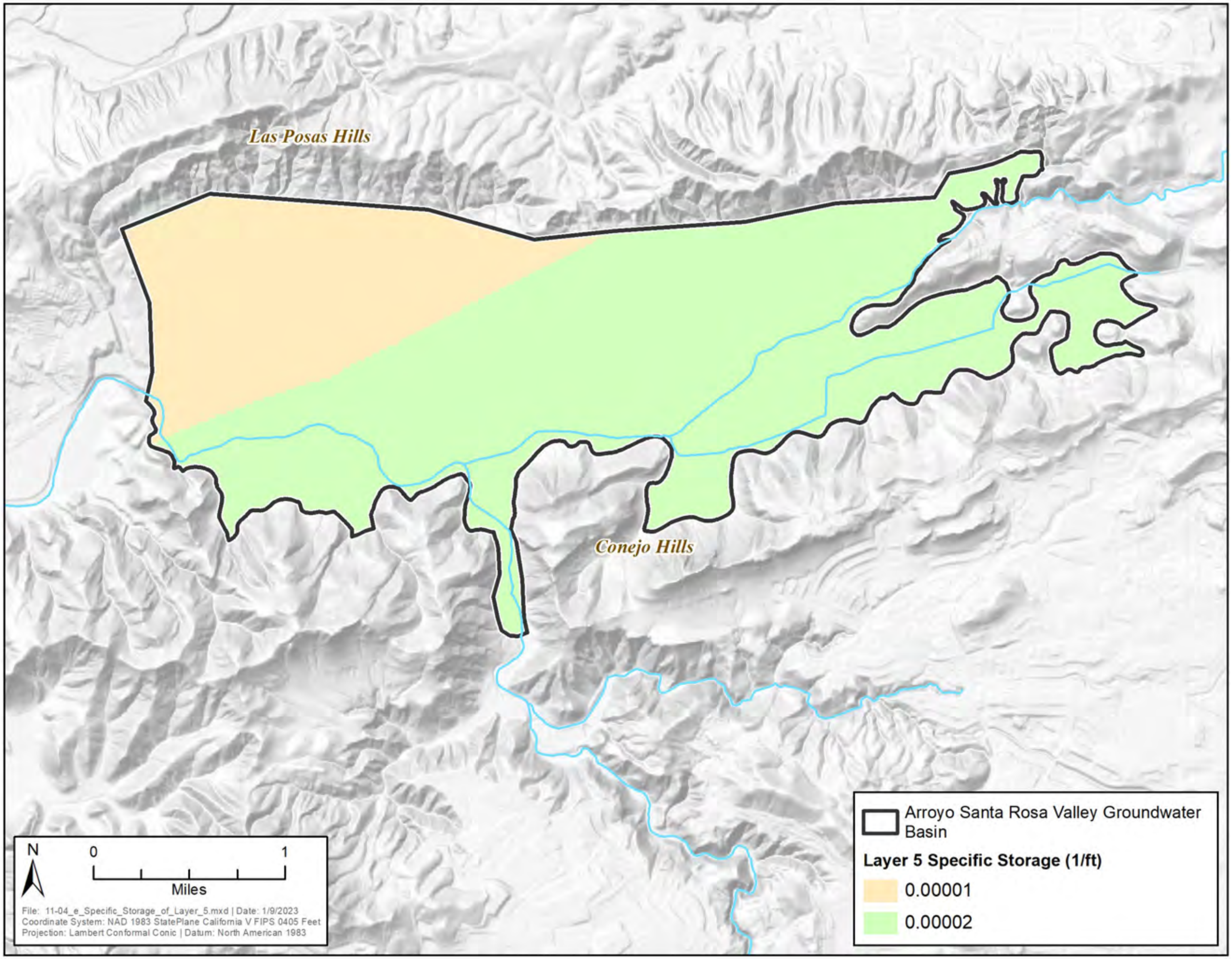


Figure 8.4d Specific Storage – Layer 5

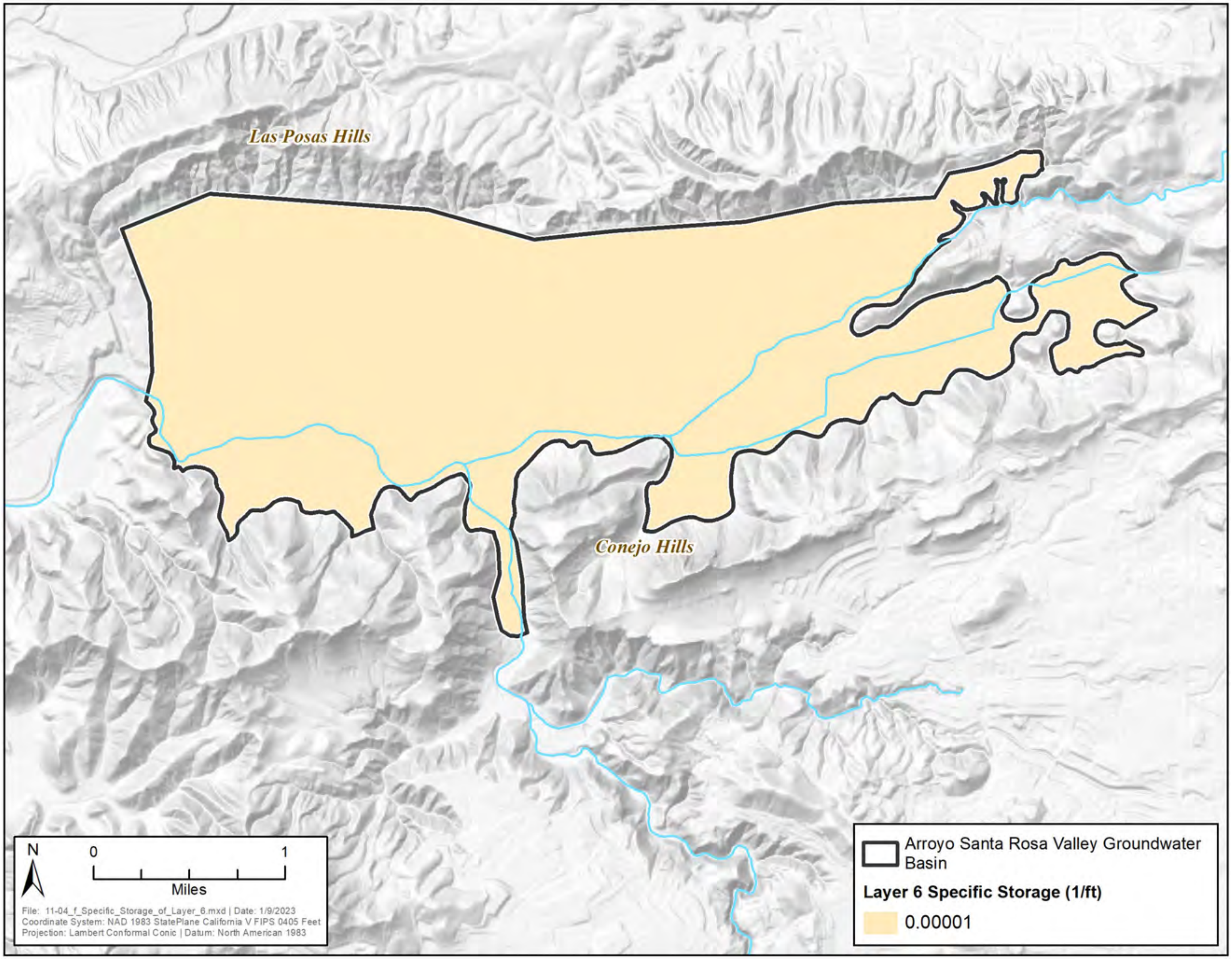


Figure 8.4e Specific Storage – Layer 6

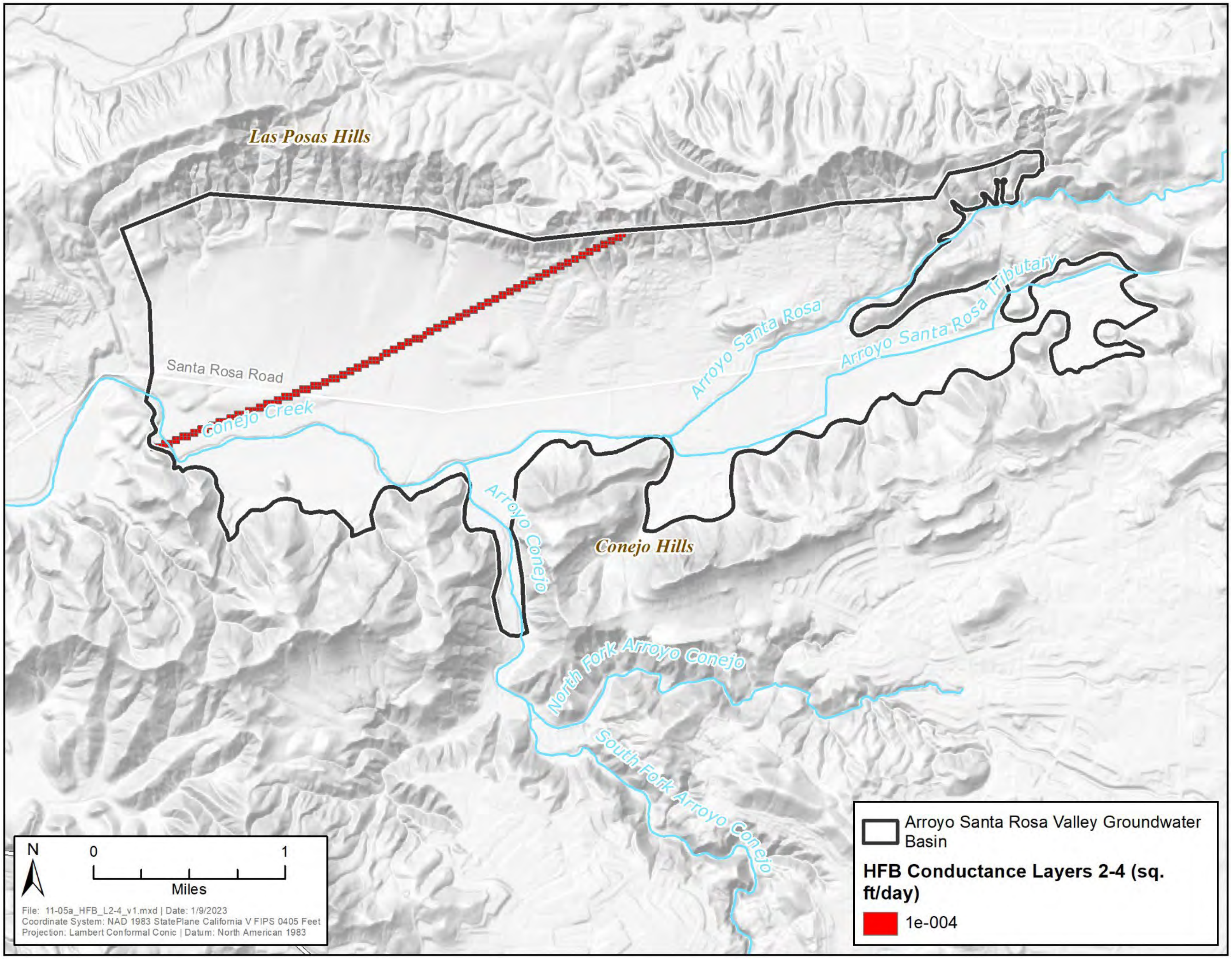


Figure 8.5a Horizontal Flow Boundaries – Layers 2-4

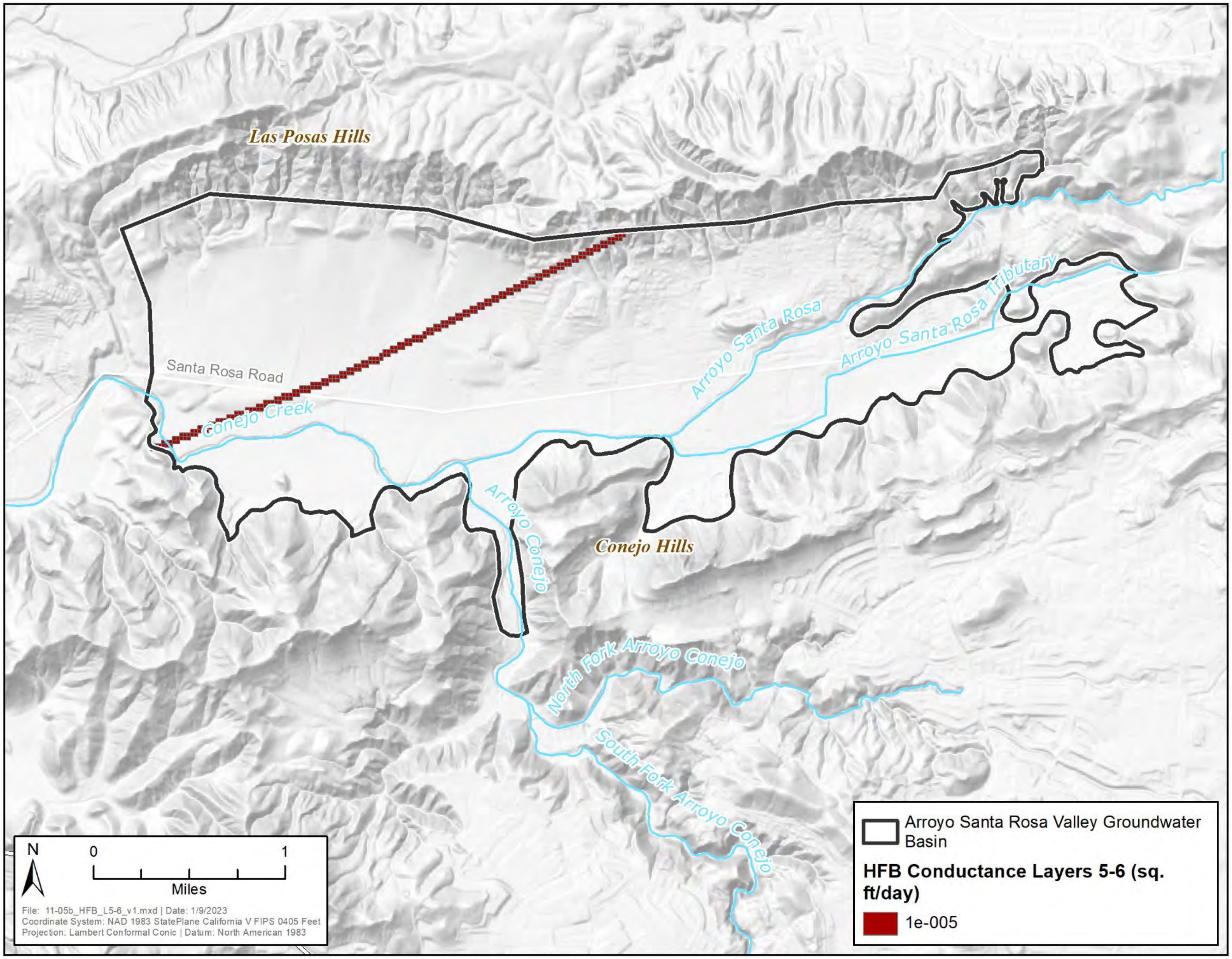


Figure 8.5b Horizontal Flow Boundaries – Layers 5-6

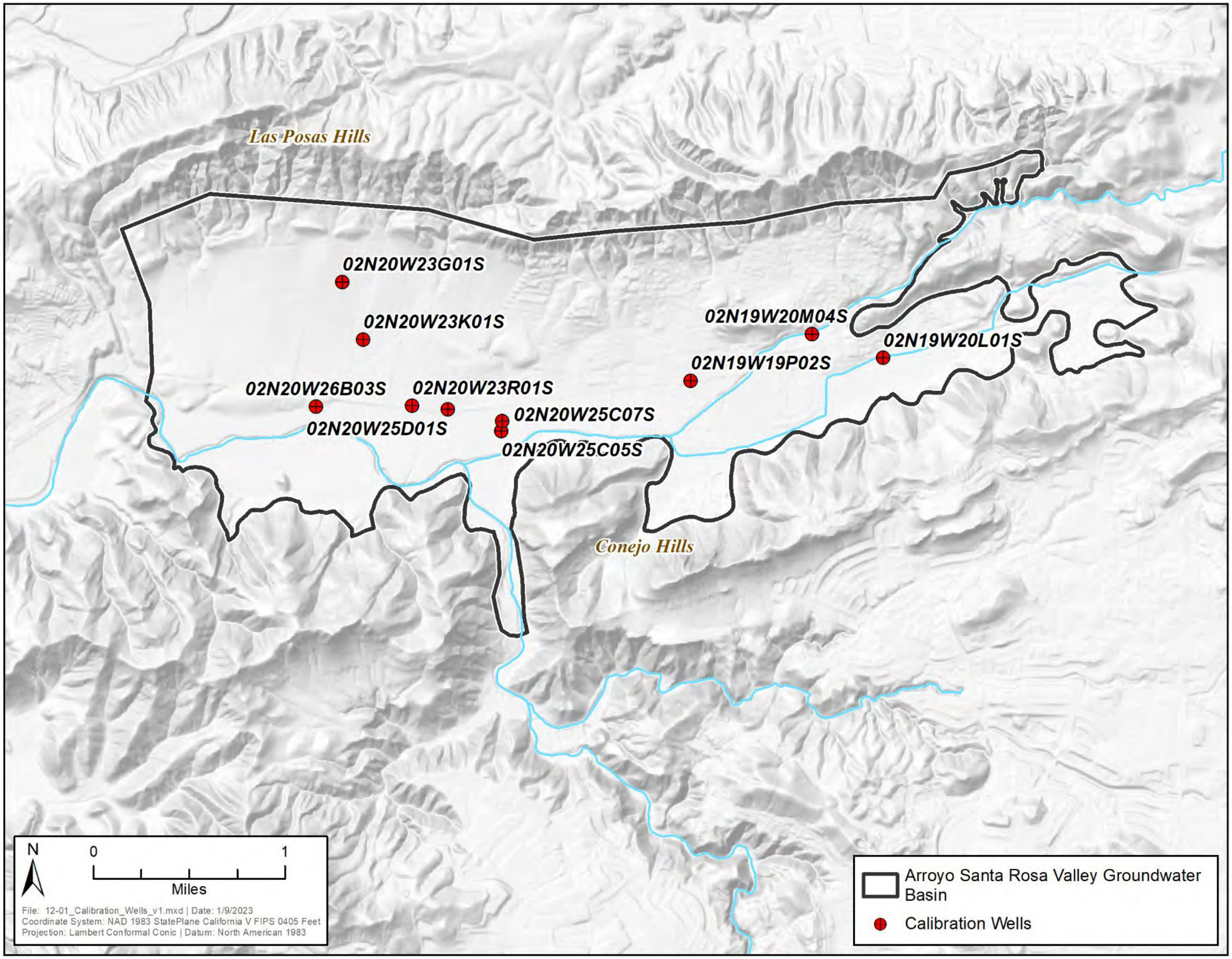


Figure 9.1 Map of Key Calibration Target Wells

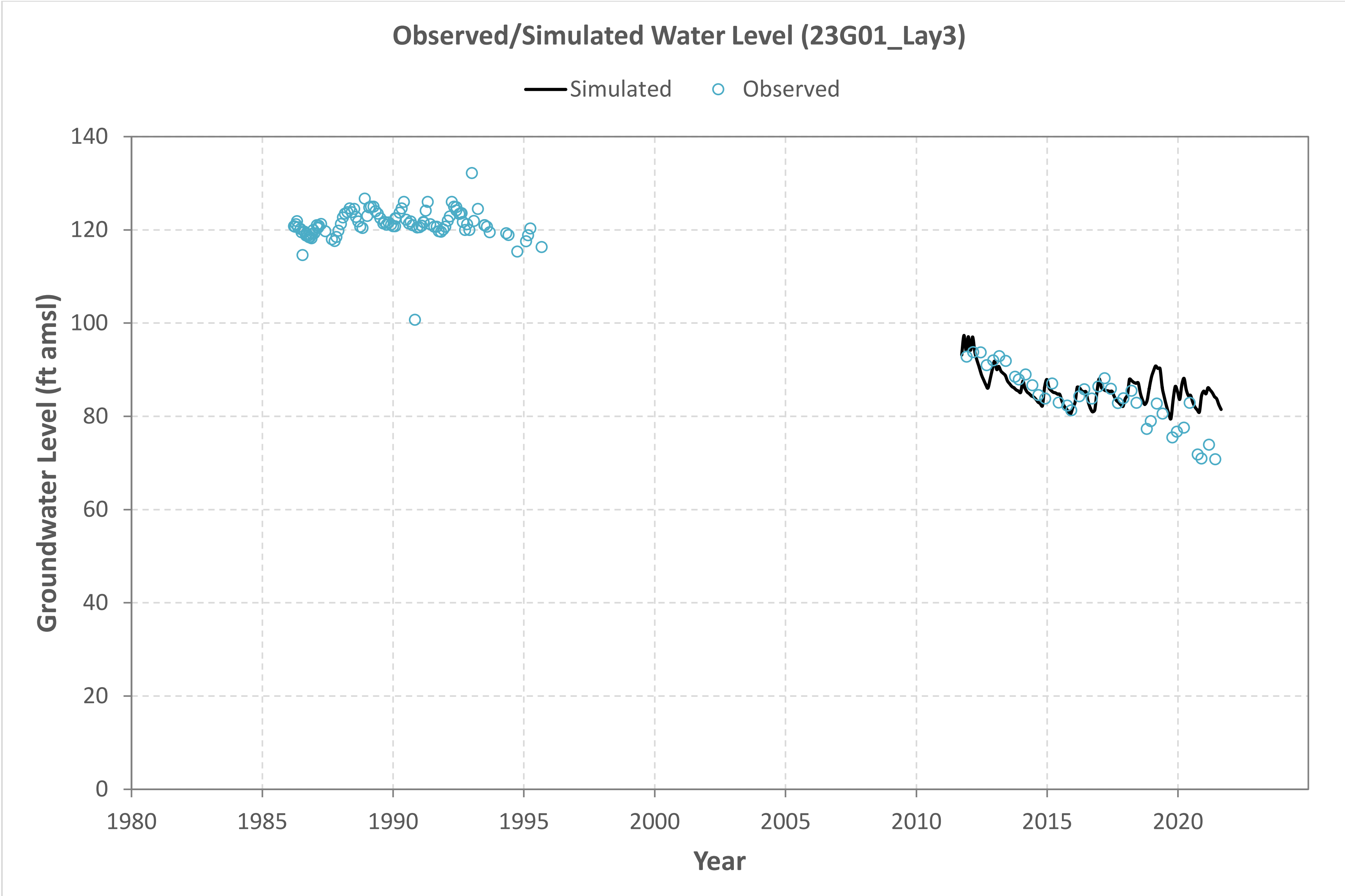
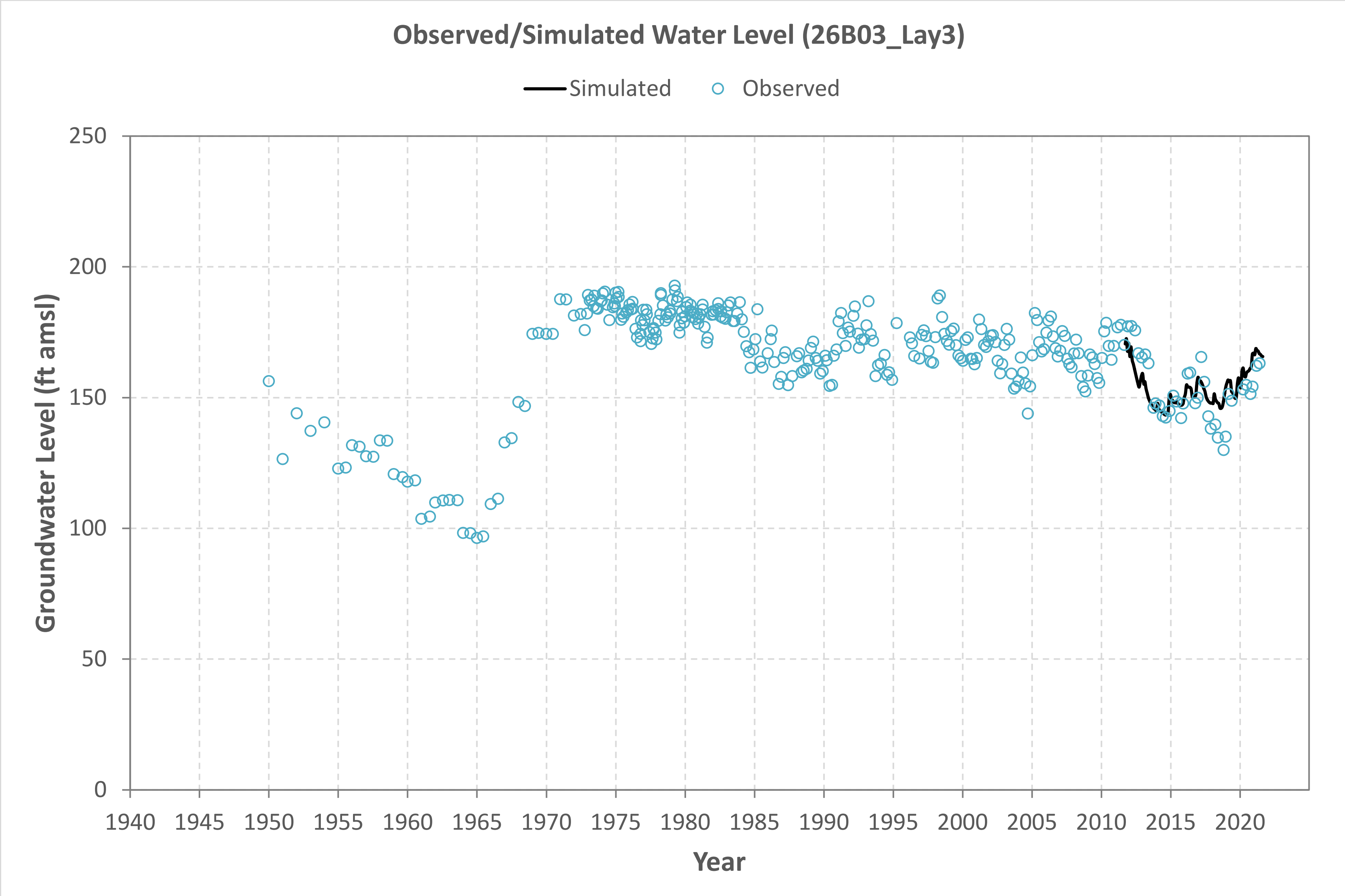
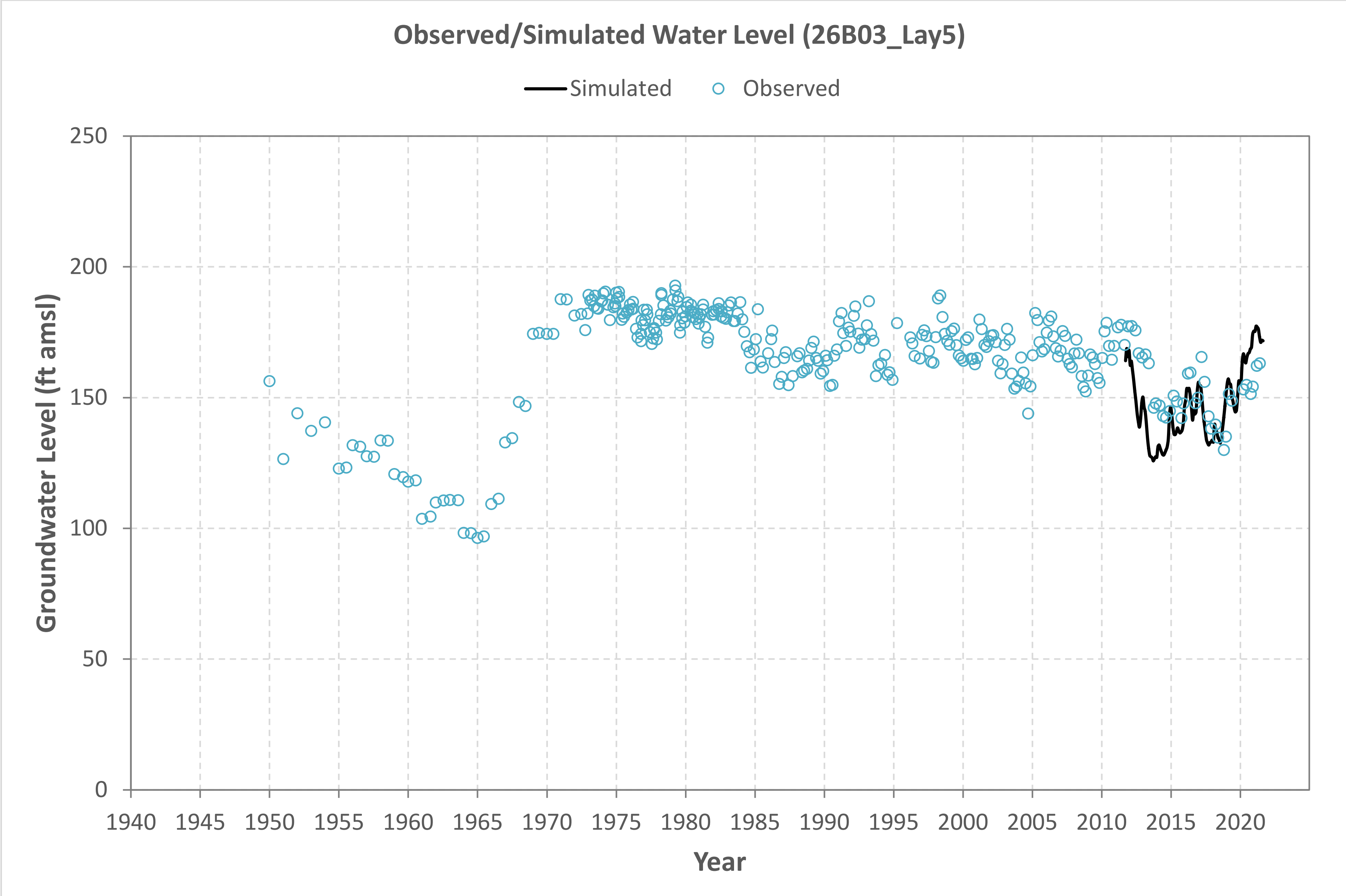


Figure 9.2a Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N20W23G01S Layer 3)



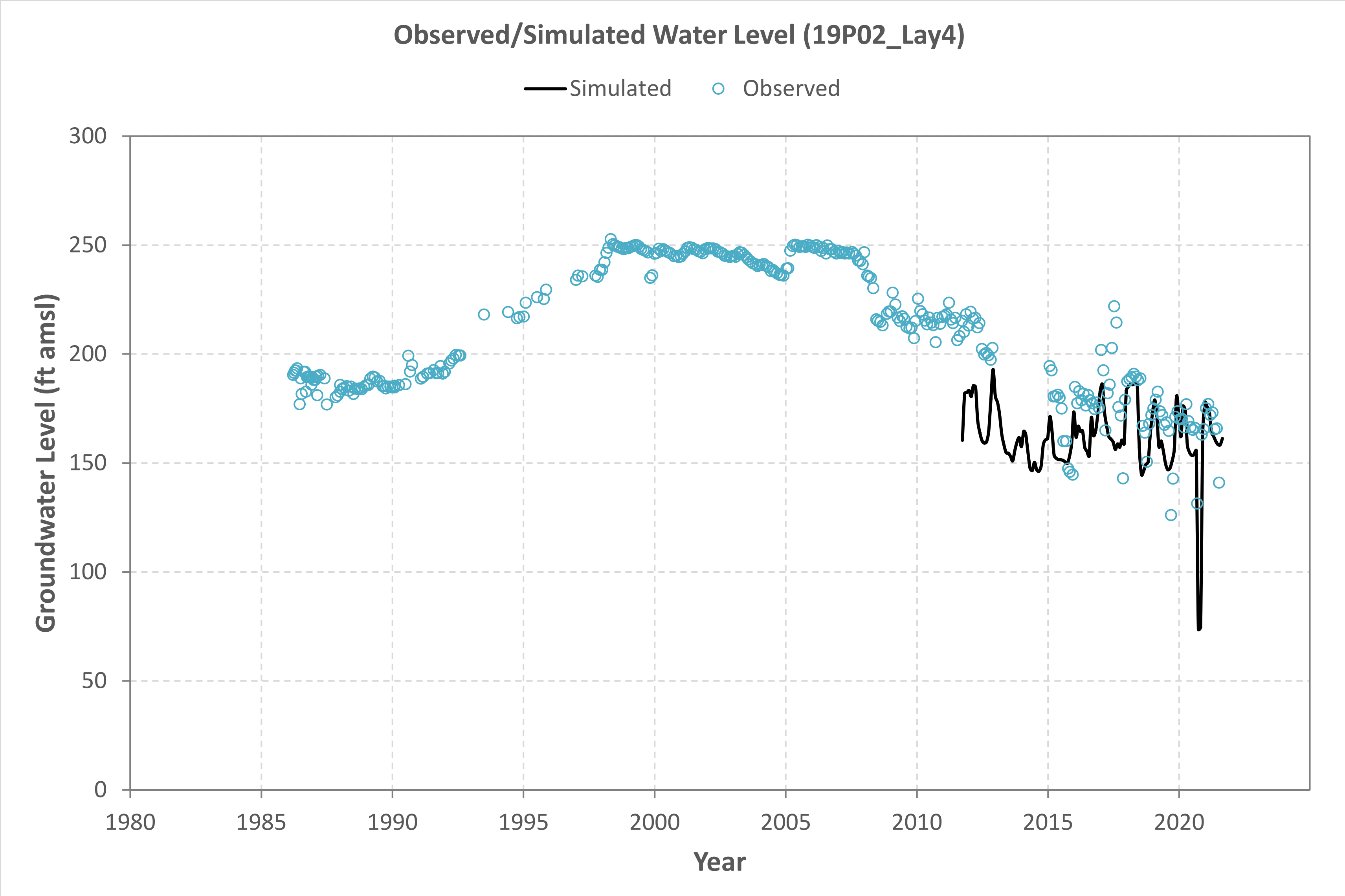
*Well 02N20W26B03S is screened in layer 3; however, low water levels were indicative of observed water levels in layer 5, indicating either a localized mergence between the two production zones in this area or incorrect well-depth or screen information. Hence, water levels from both model layers 3 and 5 were compared to the observed water levels during calibration.

Figure 9.2b Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N20W26B03S Layer 3)



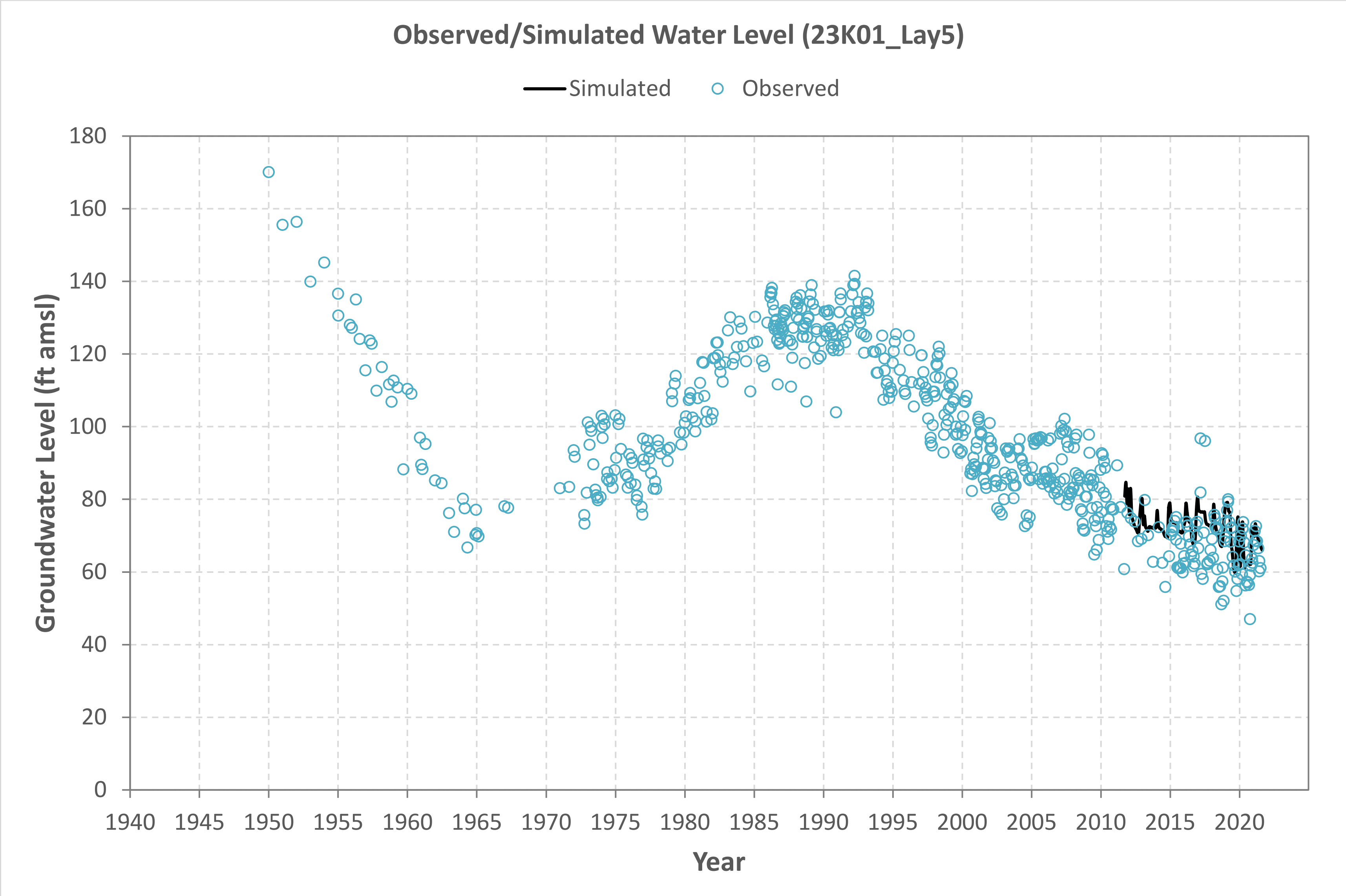
*Well 02N20W26B03S is screened in layer 3; however, low water levels were indicative of observed water levels in layer 5, indicating either a localized mergence between the two production zones in this area or incorrect well-depth or screen information. Hence, water levels from both model layers 3 and 5 were compared to the observed water levels during calibration.

Figure 9.2c Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N20W26B03S Layer 5)



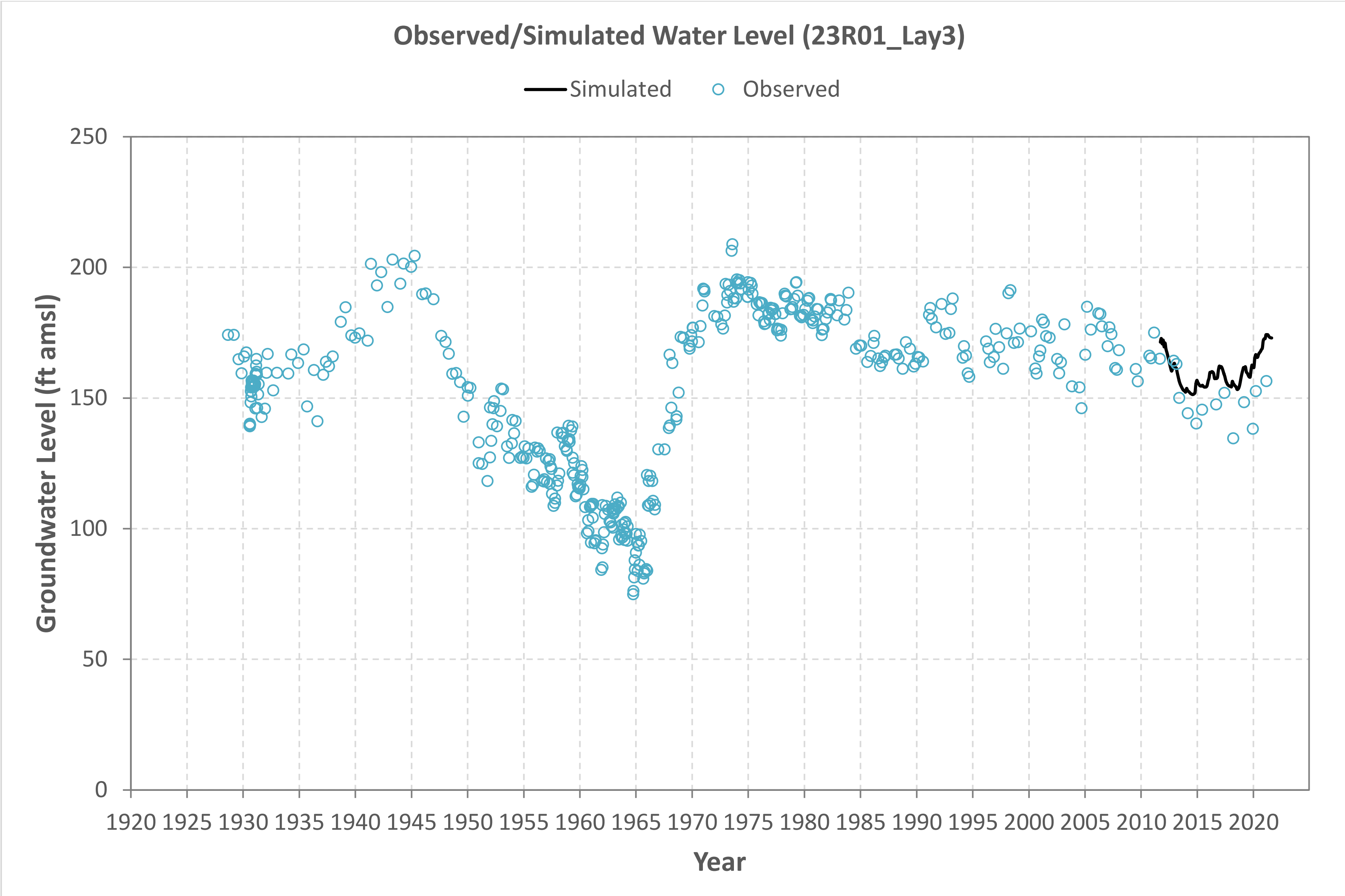
*Well 02N19W19P02S is screened in layer 4; however, it is located in the eastern portion of the basin where the stratification between layers is less distinct. Well 02N19W19P02S is a production well, and the lower than observed simulated water levels in the summer and fall may indicate an overestimation of pumping for those months.

Figure 9.2d Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N19W19P02S Layer 4)



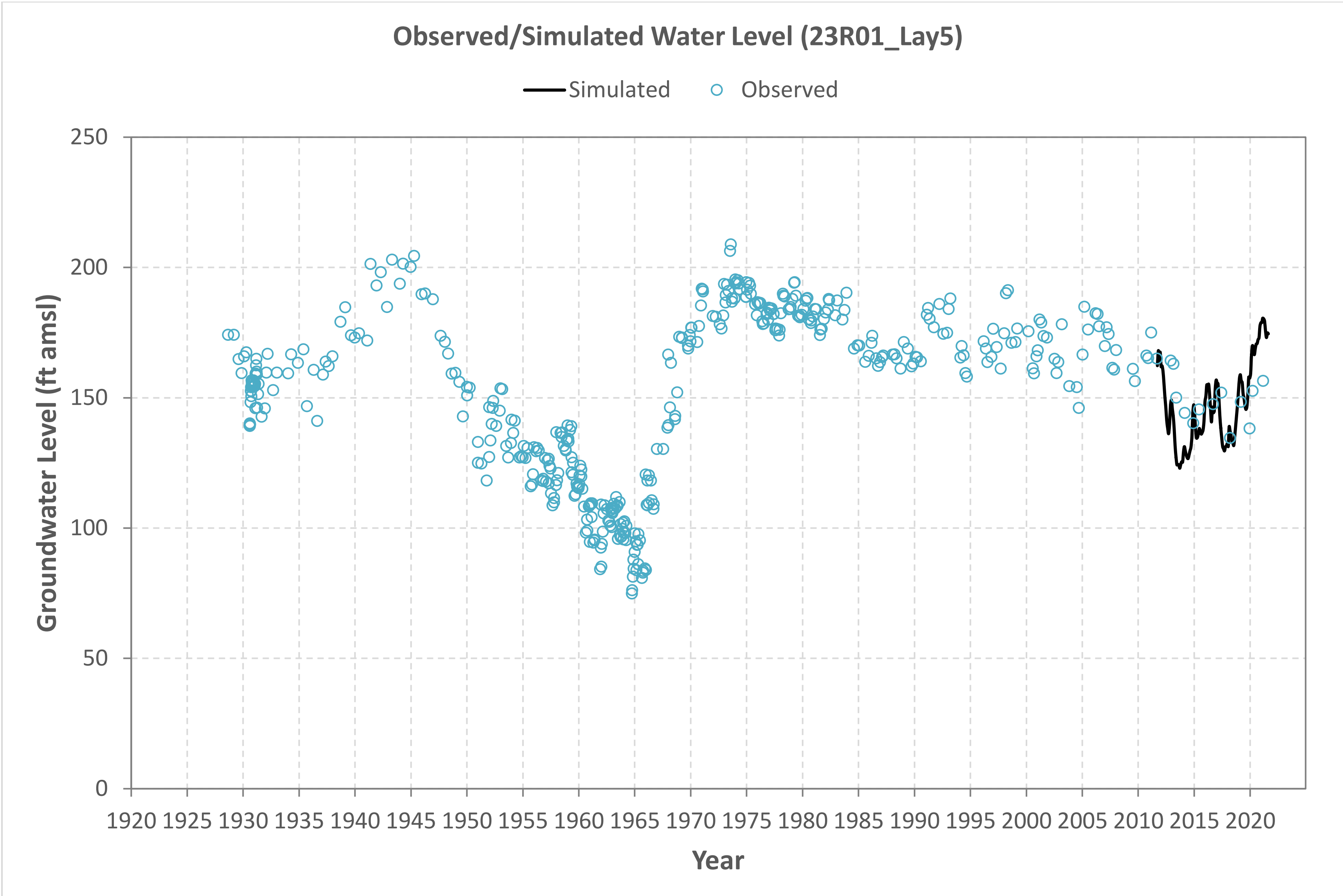
*Well 02N20W23K01S is screened in both layers 3 and 5. Observed water levels at 02N20W23K01S were much lower than observed water levels at nearby well 02N20W23G01S (Figure 9.2a), which is exclusively screened in layer 3. Hence, the water levels from 02N20W23K01S were associated with simulated water levels from model layer 5 (which matched the observed water levels).

Figure 9.2e Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N20W23K01S Layer 5)



*Well 02N20W23R01S is screened in both layers 3 and 5.

Figure 9.2f Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N20W23R01S Layer 3)



*Well 02N20W23R01S is screened in both layers 3 and 5.

Figure 9.2g Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N20W23R01S Layer 5)

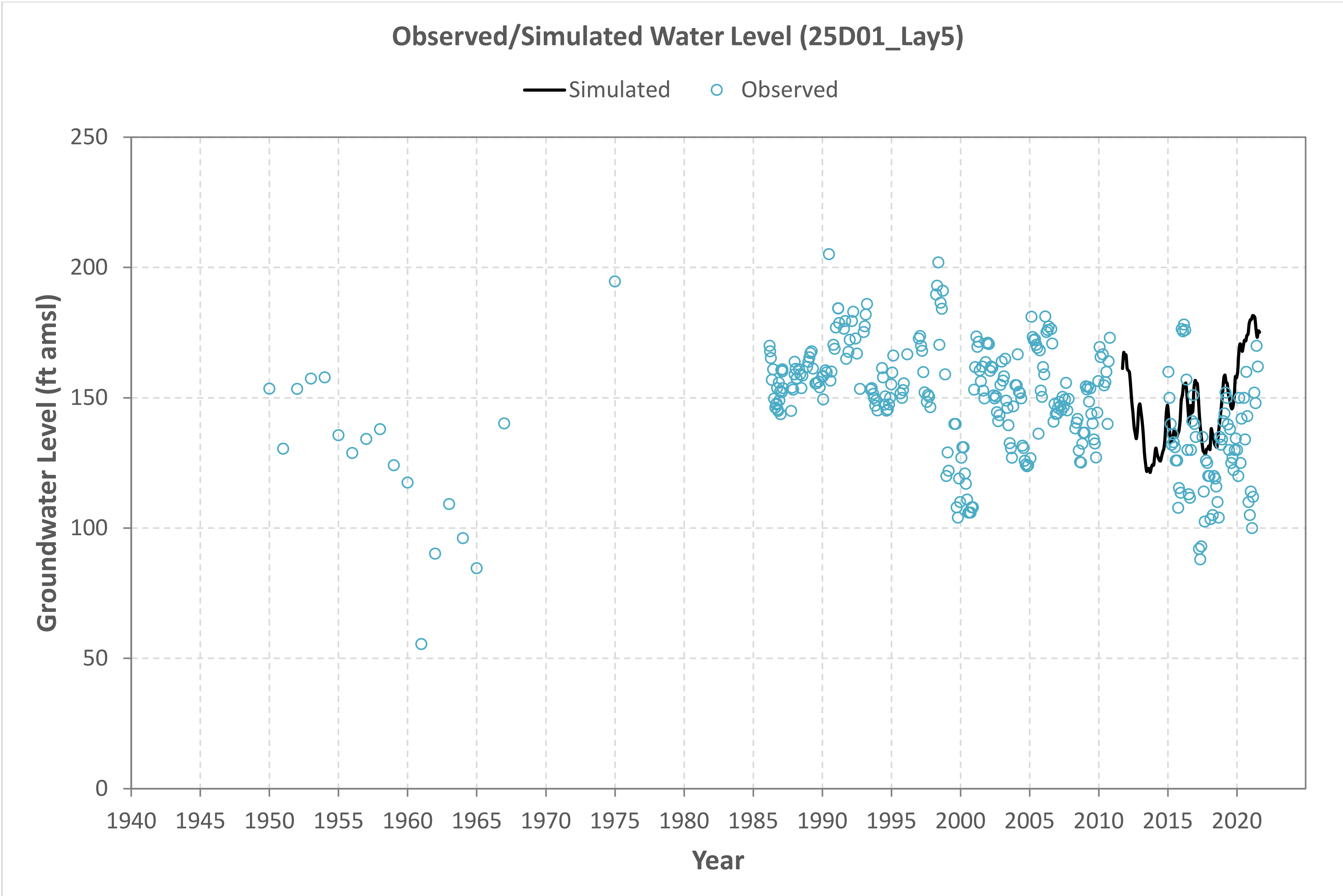


Figure 9.2h Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N20W25D01S Layer 5)

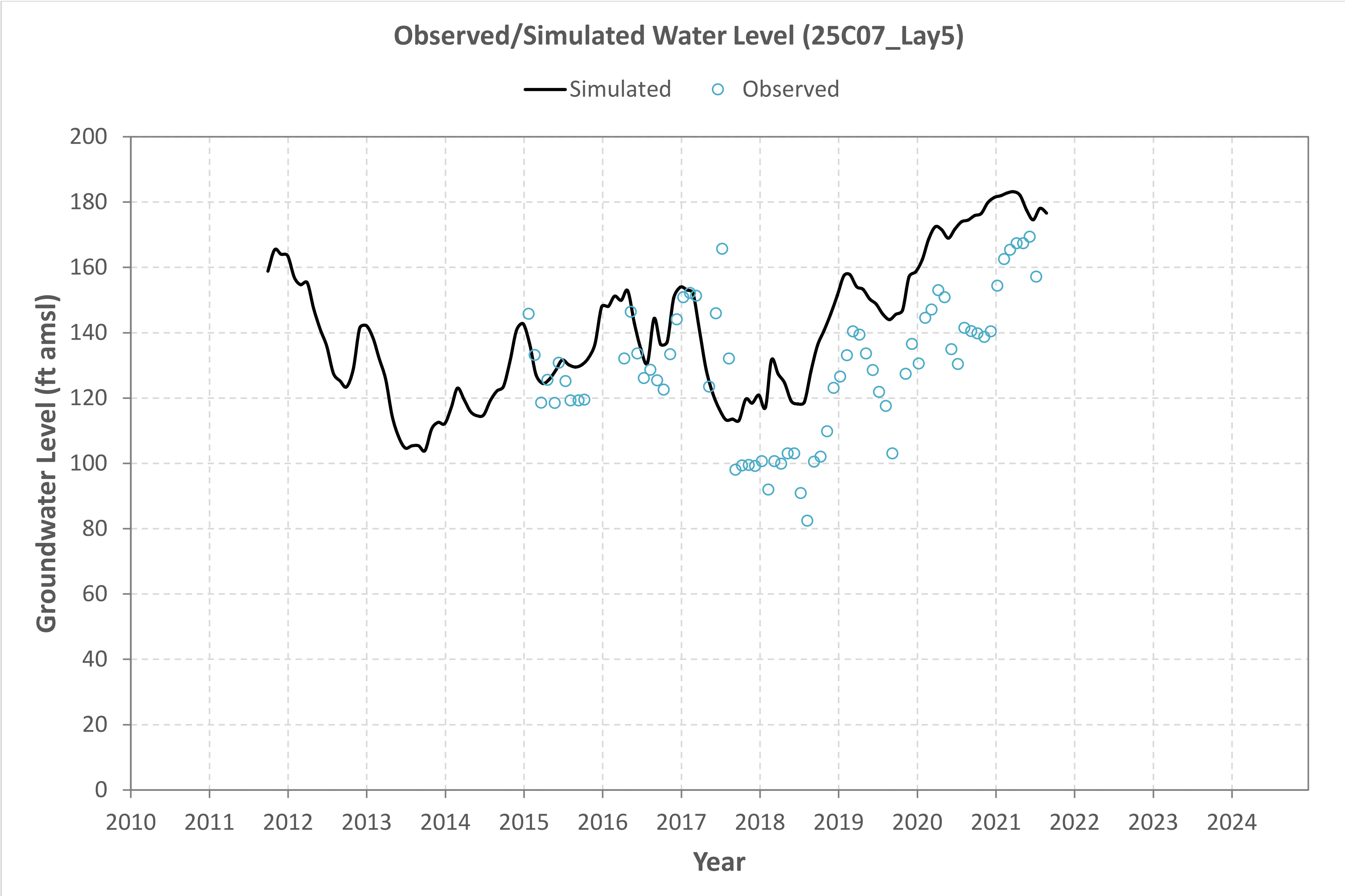


Figure 9.2i Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N20W25C07S Layer 5)

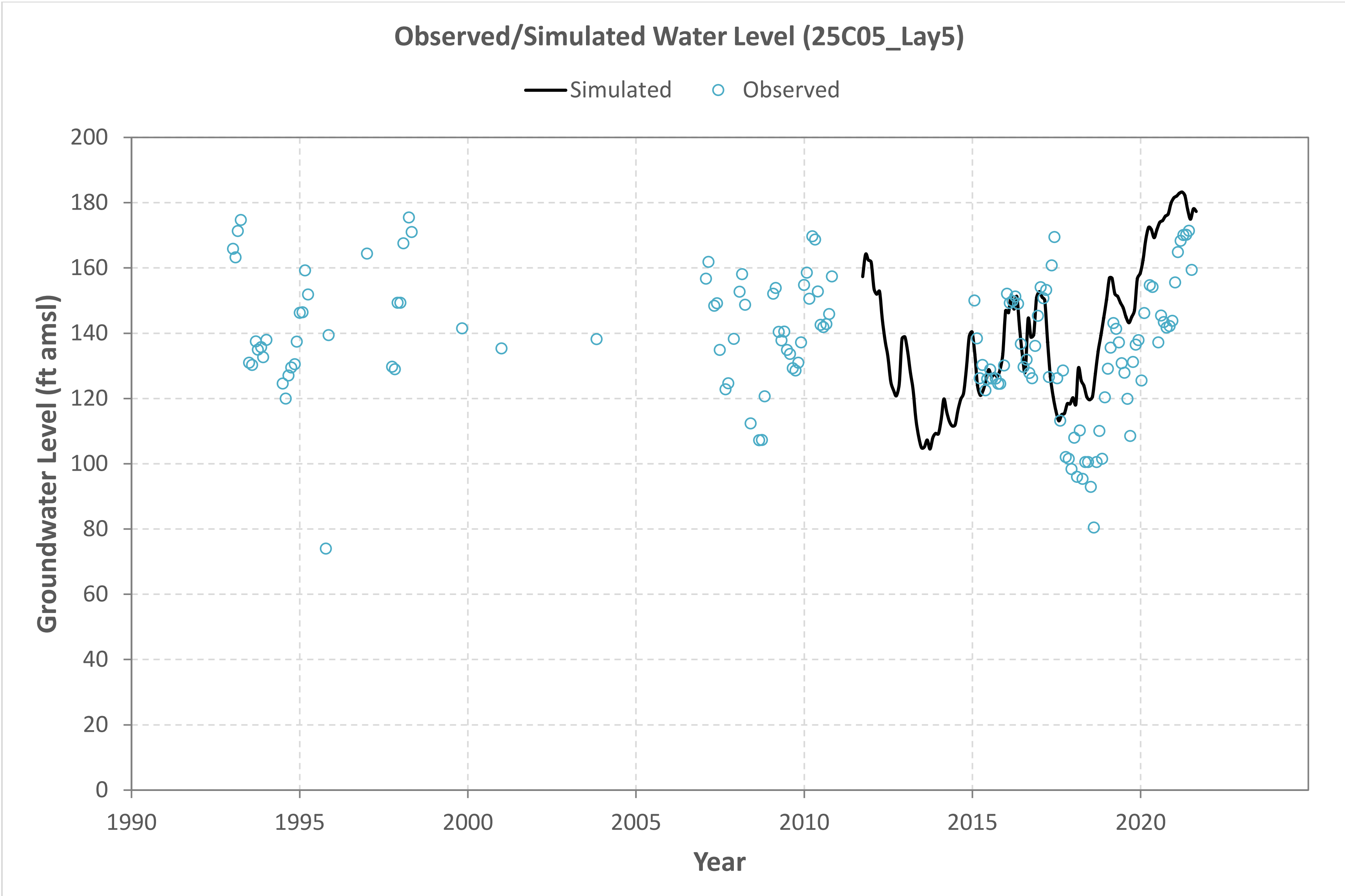


Figure 9.2j Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N20W25C05S Layer 5)

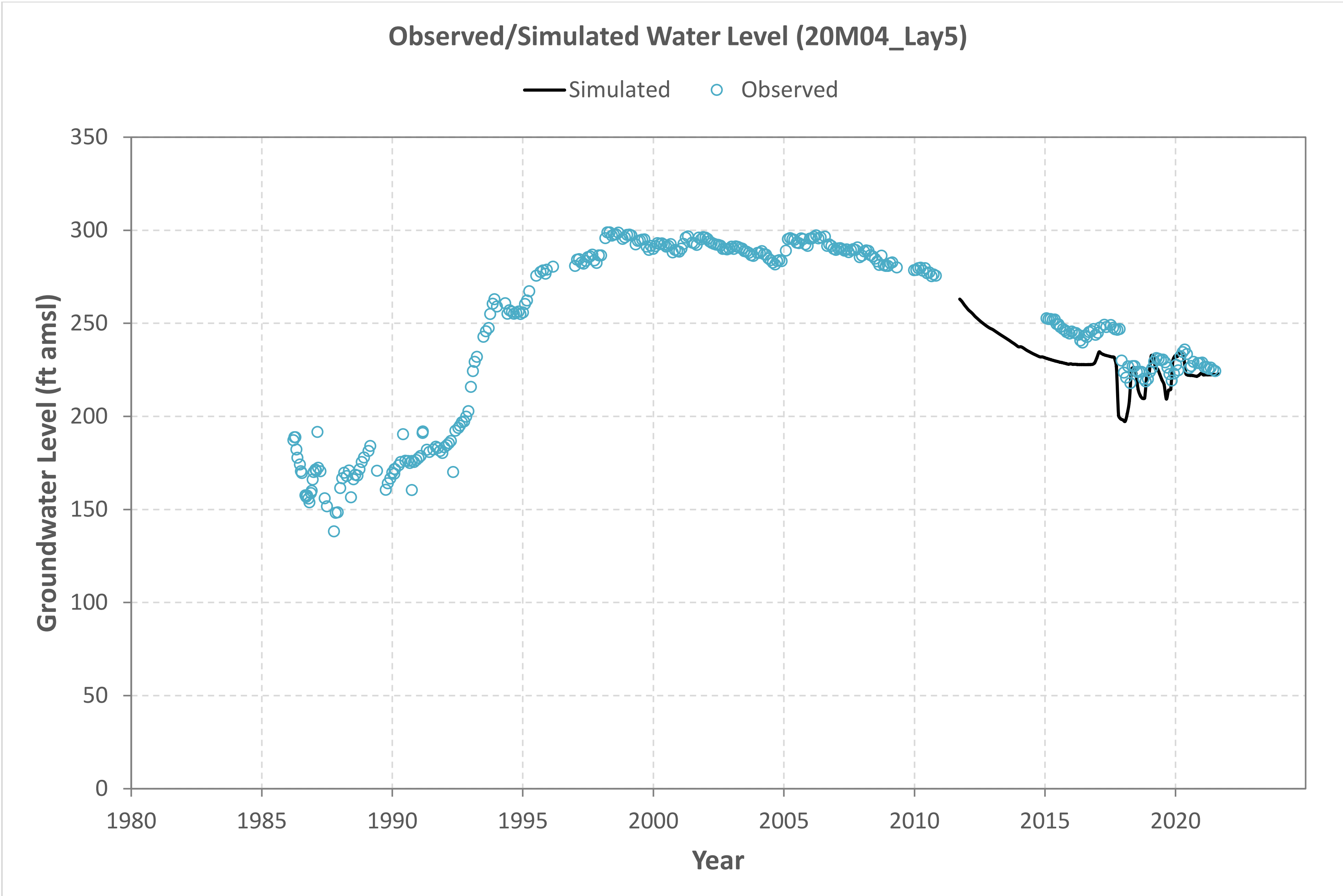


Figure 9.2k Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N19W20M04S Layer 5)

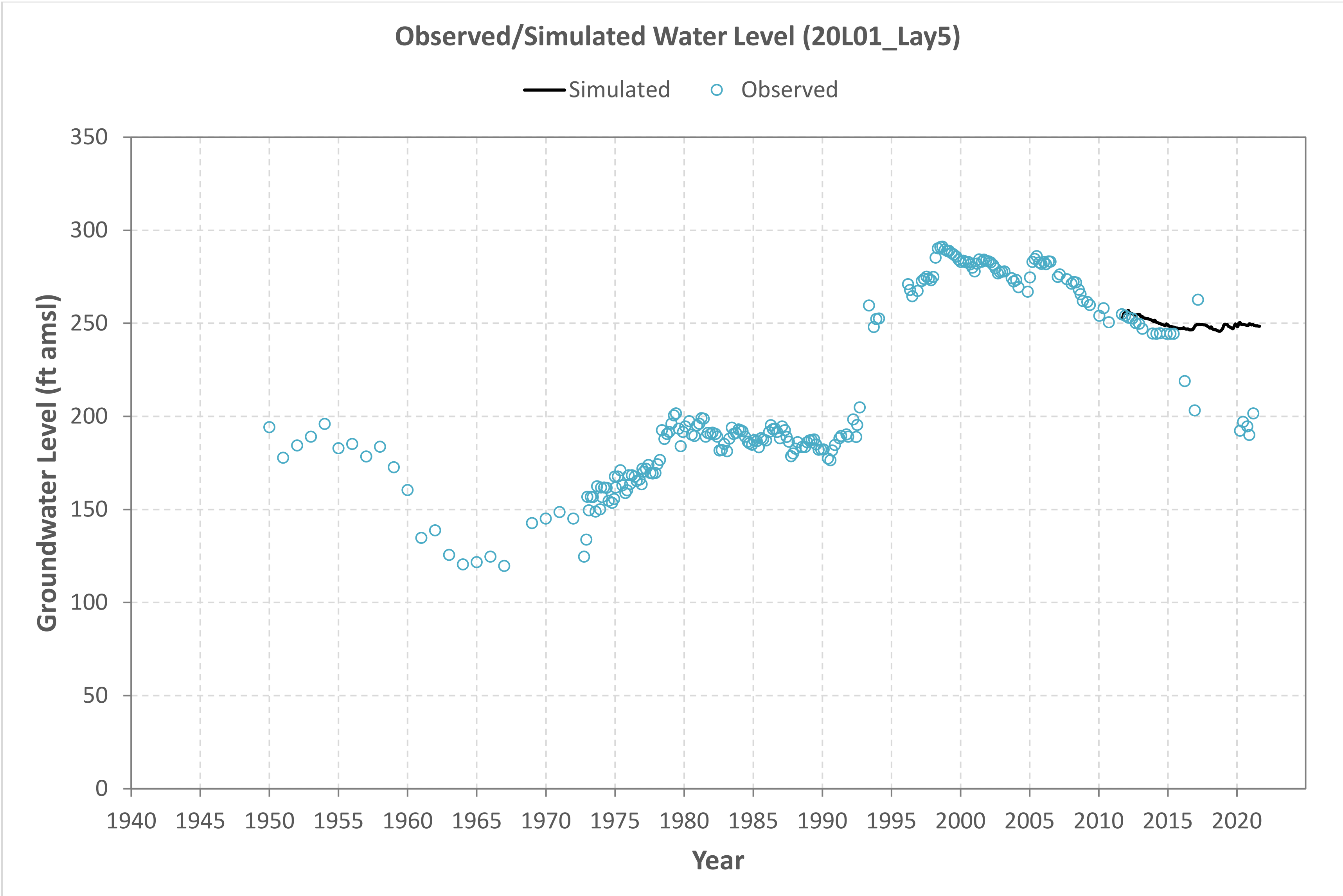


Figure 9.2l Simulated Historical vs Observed Water Levels for Key Calibration Wells (02N19W20L01S Layer 5)

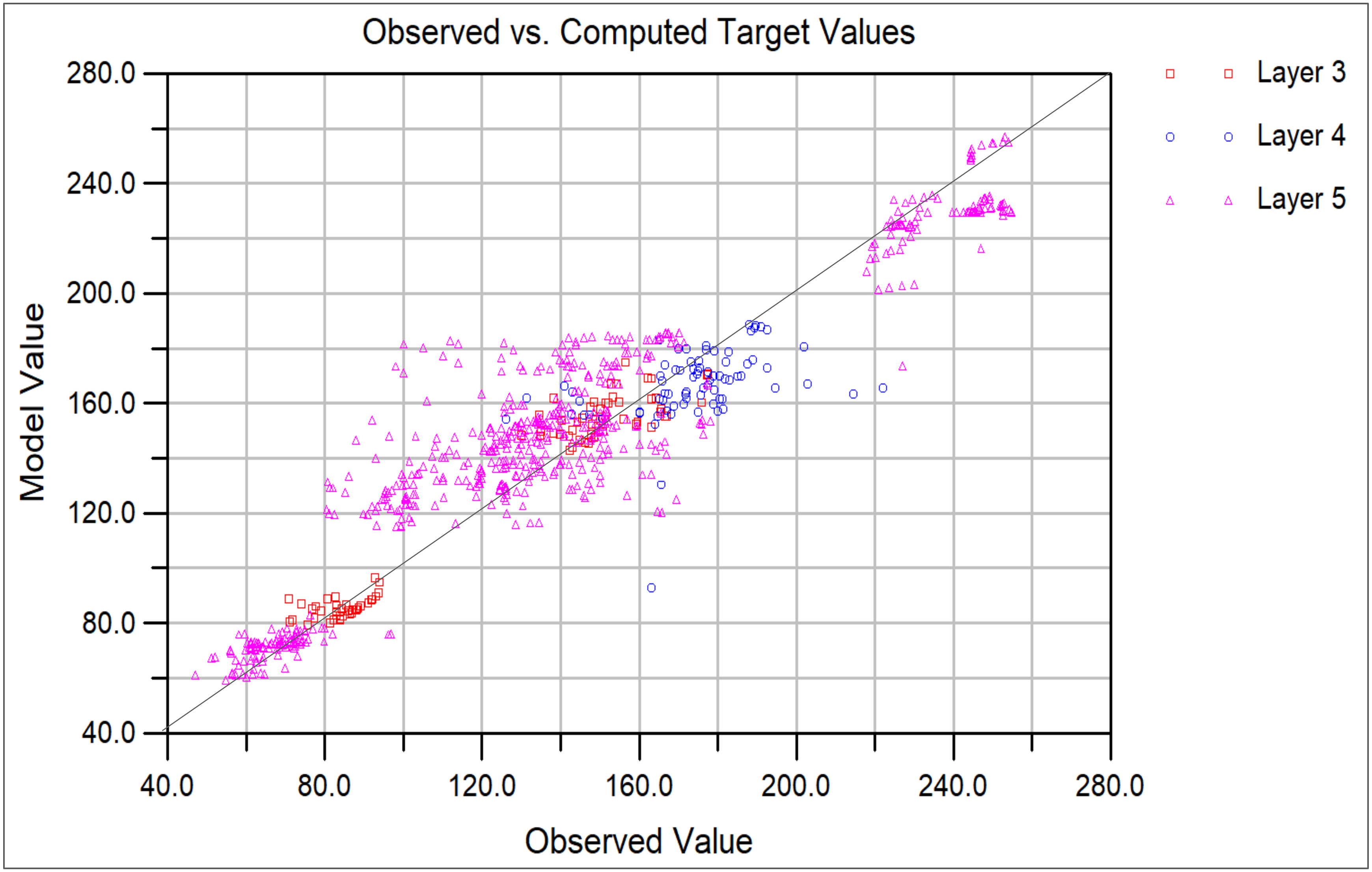


Figure 9.3 Observed vs Simulated Groundwater Levels

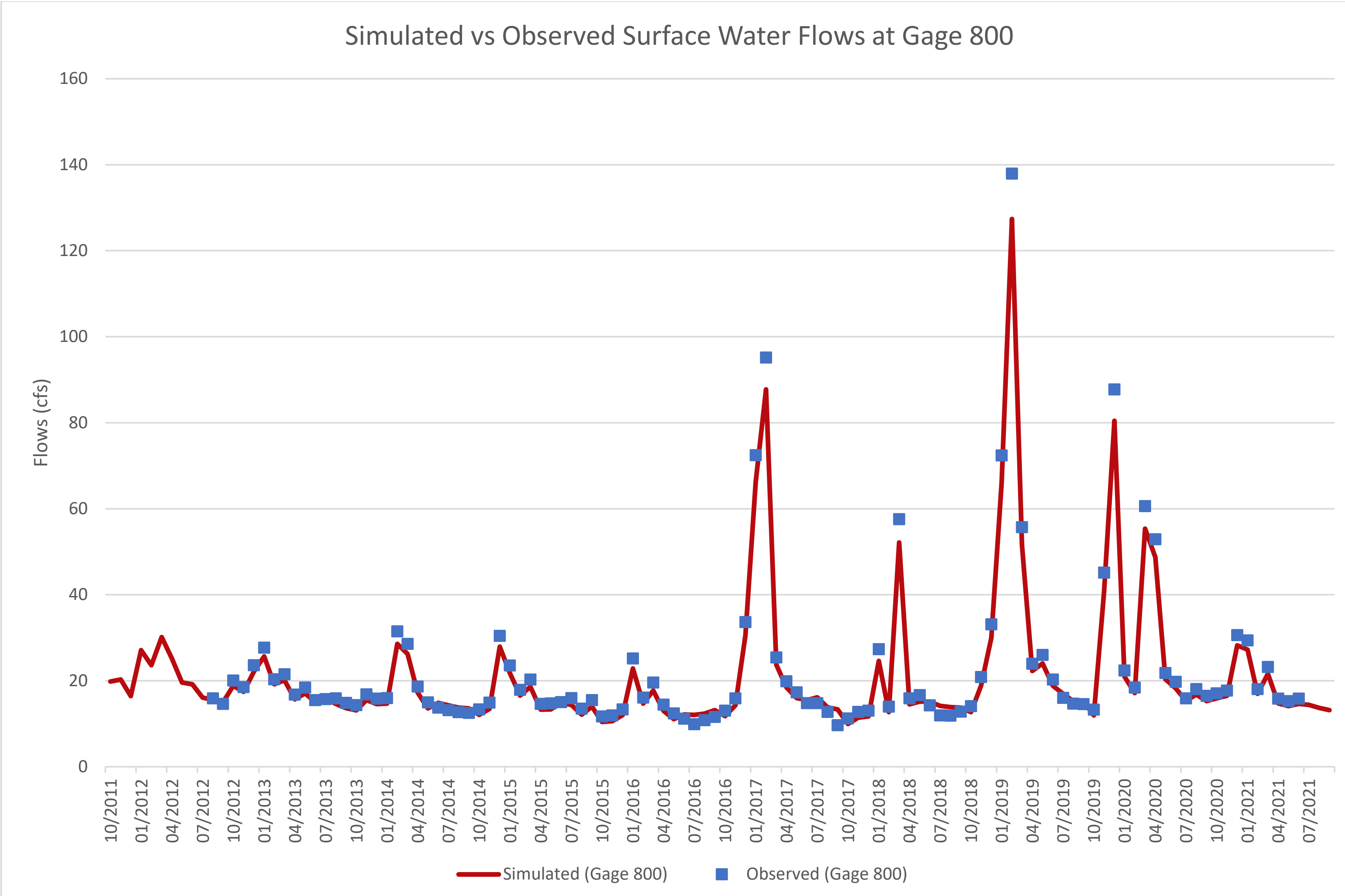


Figure 9.4 Simulated vs Observed Surface Water Flows at Gage 800

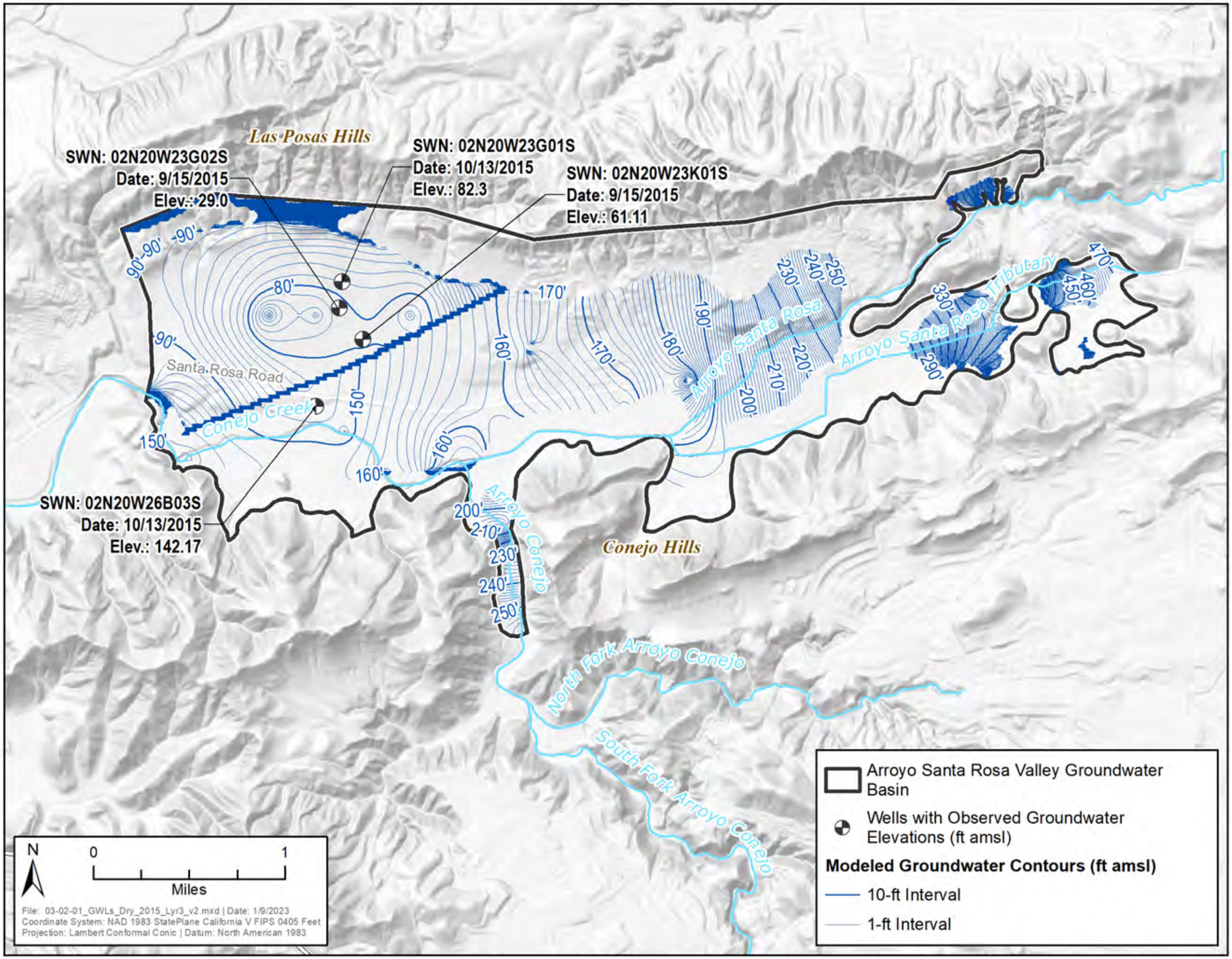


Figure 10.1a Simulated Water Level Contours for Low Water Level Conditions (November 2015, Layer 3)

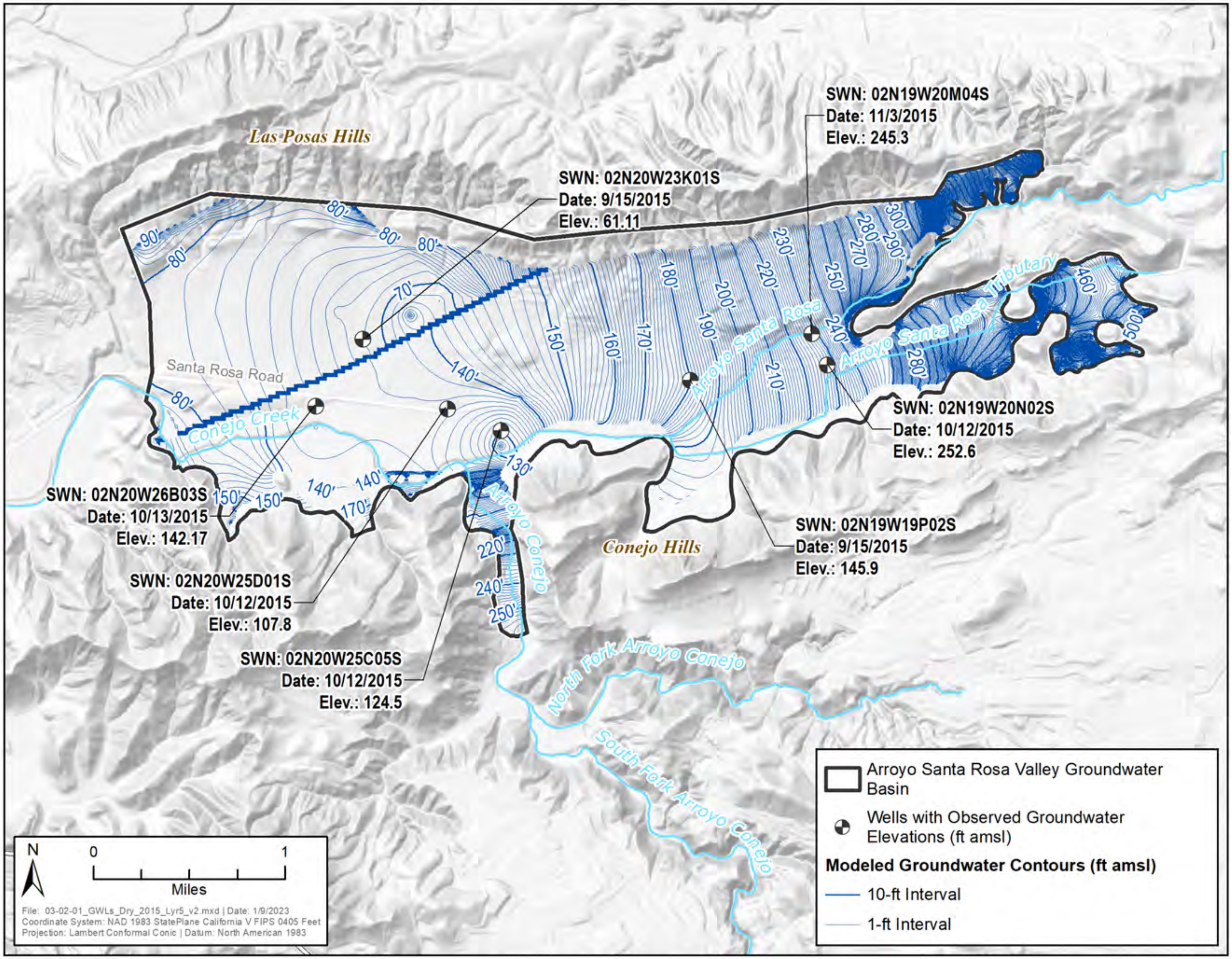


Figure 10.1b Simulated Water Level Contours for Low Water Level Conditions (November 2015, Layer 5)

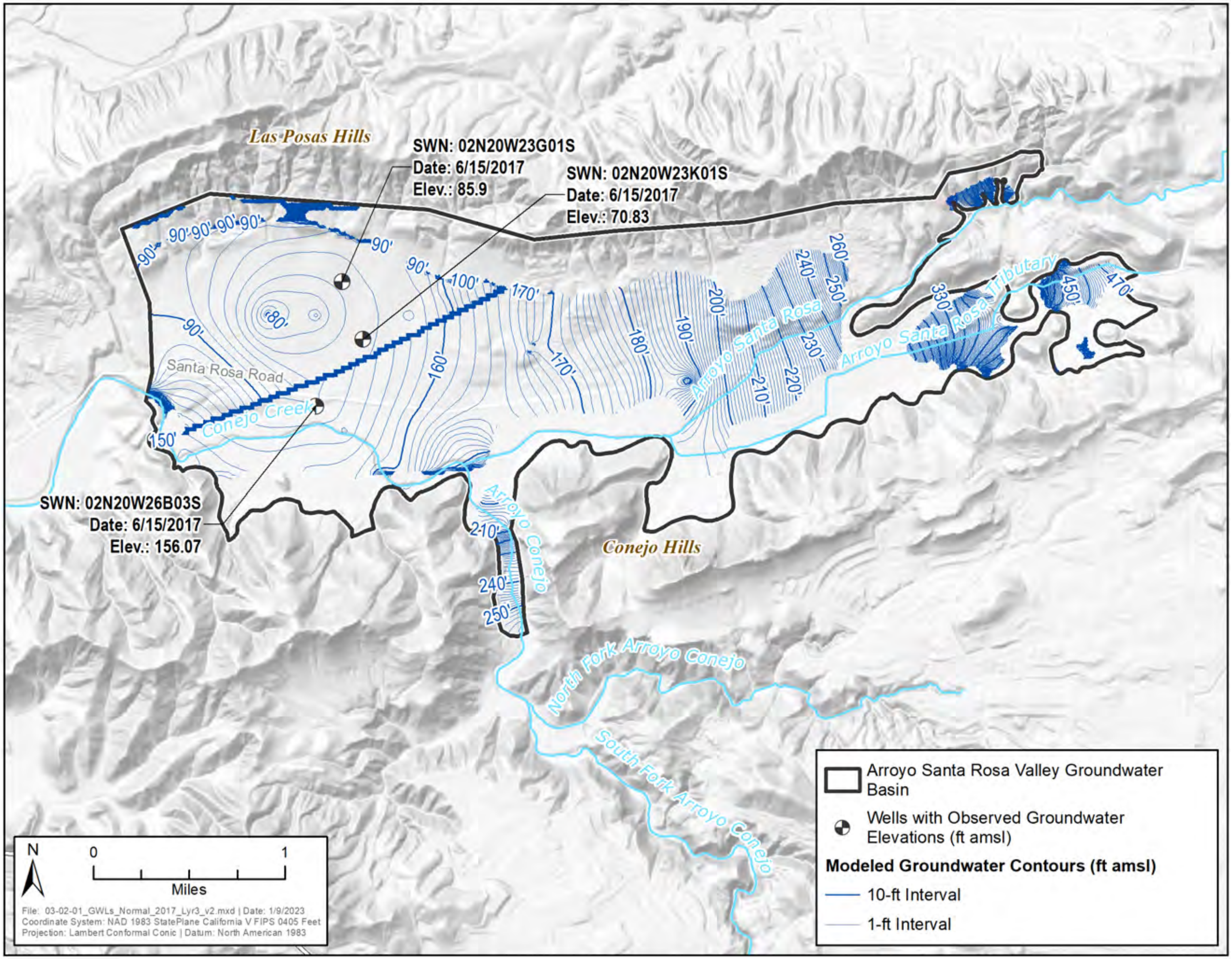


Figure 10.2a Simulated Water Level Contours for Normal Water Level Conditions (June 2017, Layer 3)

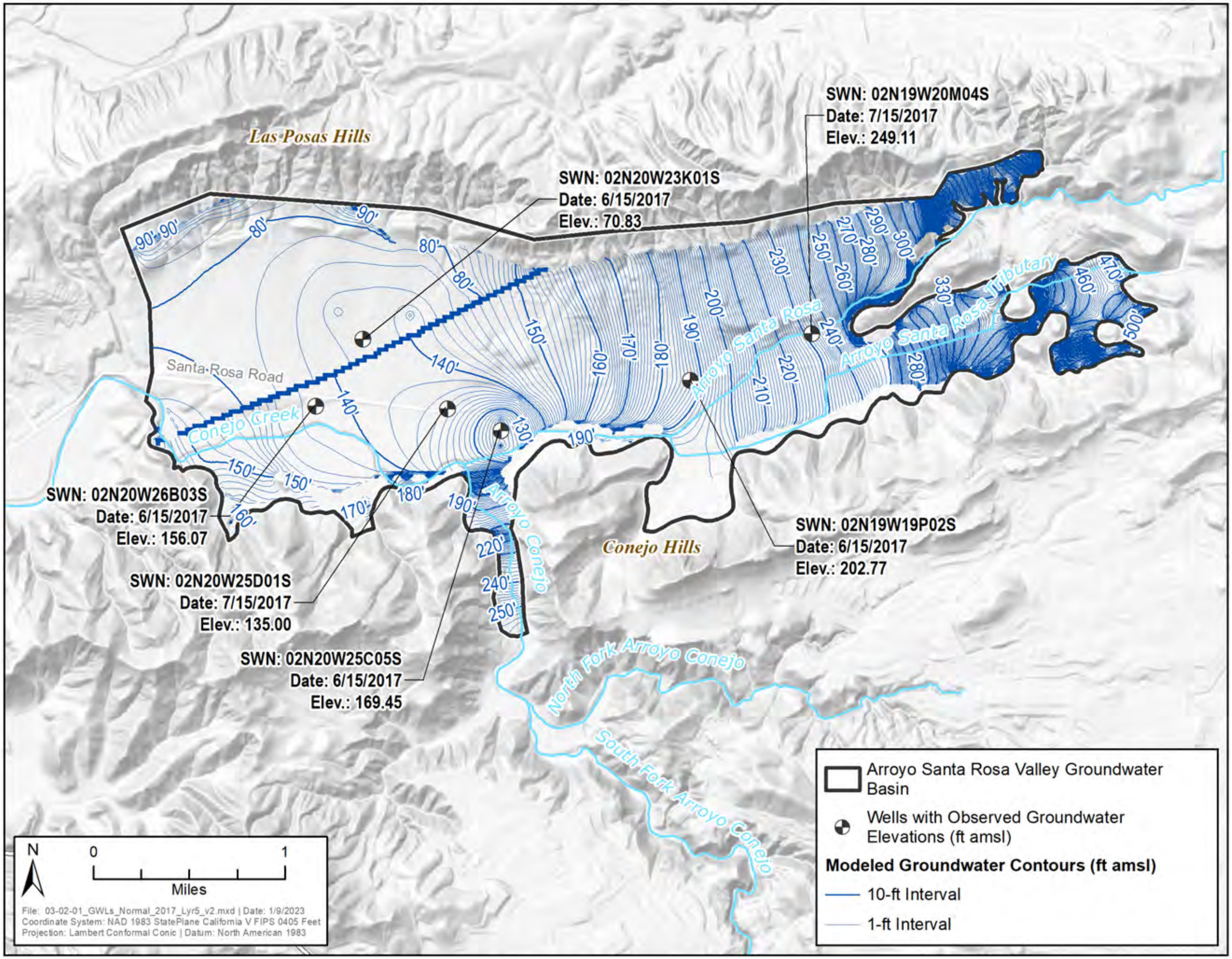


Figure 10.2b Simulated Water Level Contours for Normal Water Level Conditions (June 2017, Layer 5)

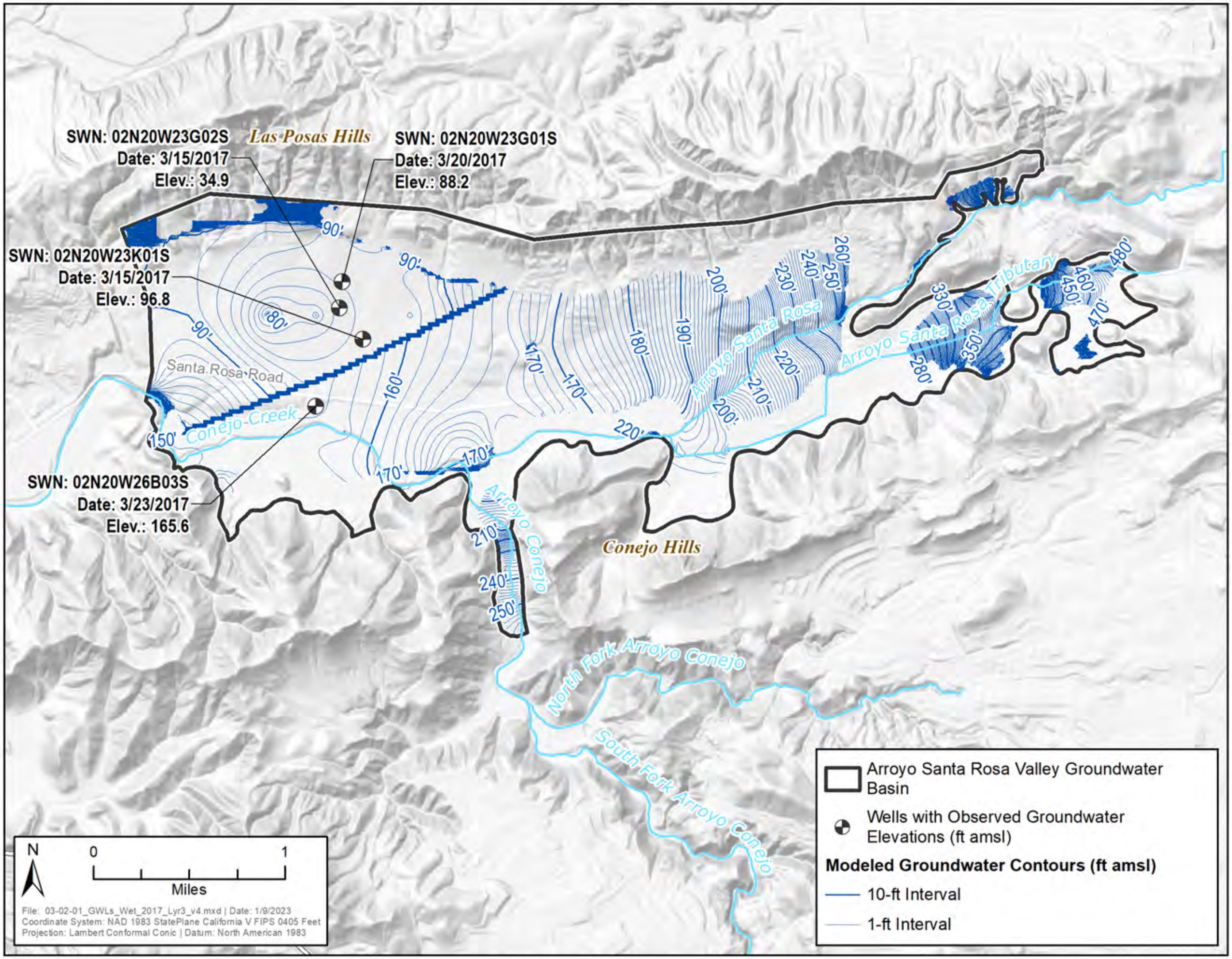


Figure 10.3a Simulated Water Level Contours for High Water Level Conditions (February 2017, Layer 3)

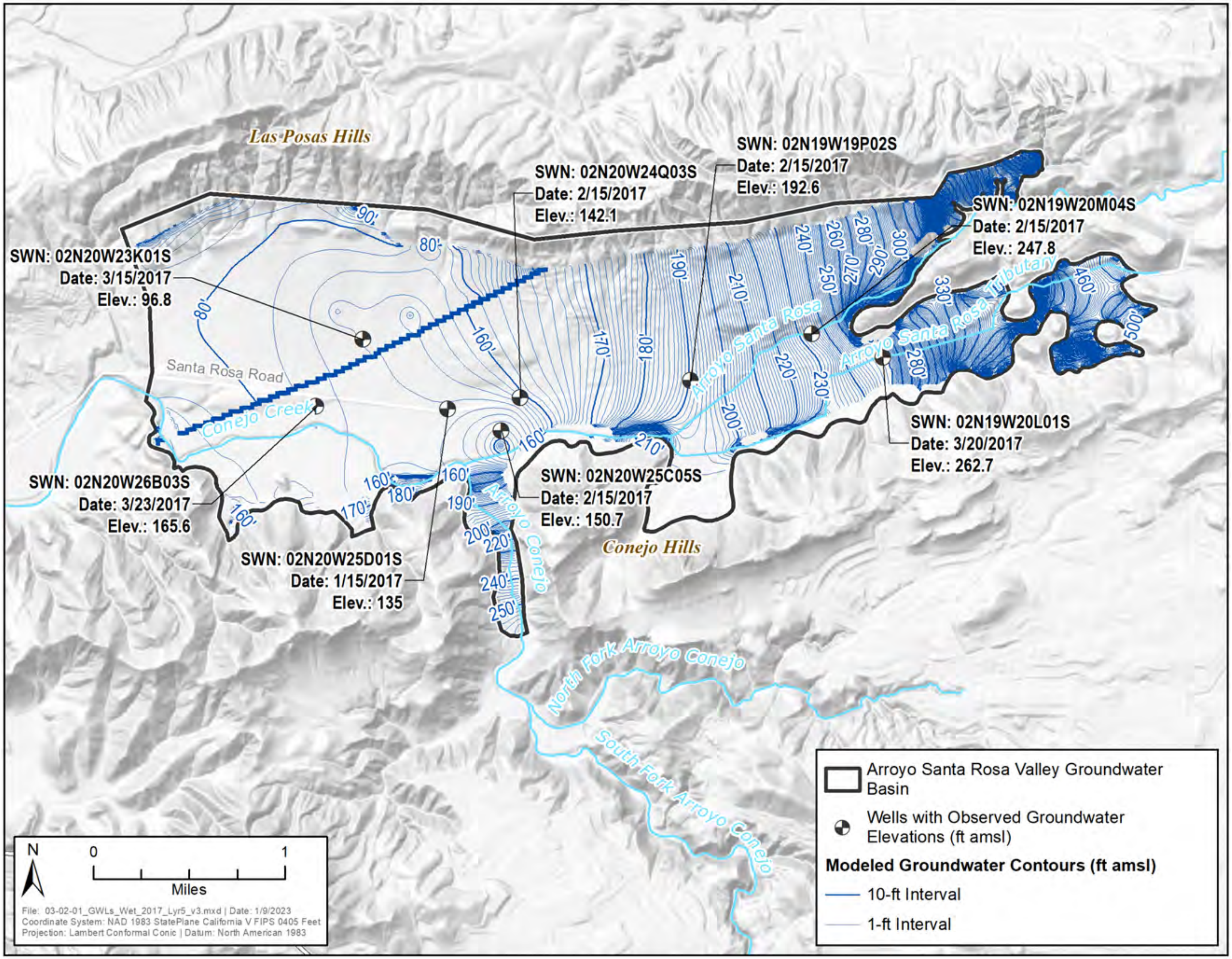


Figure 10.3b Simulated Water Level Contours for High Water Level Conditions (February 2017, Layer 5)

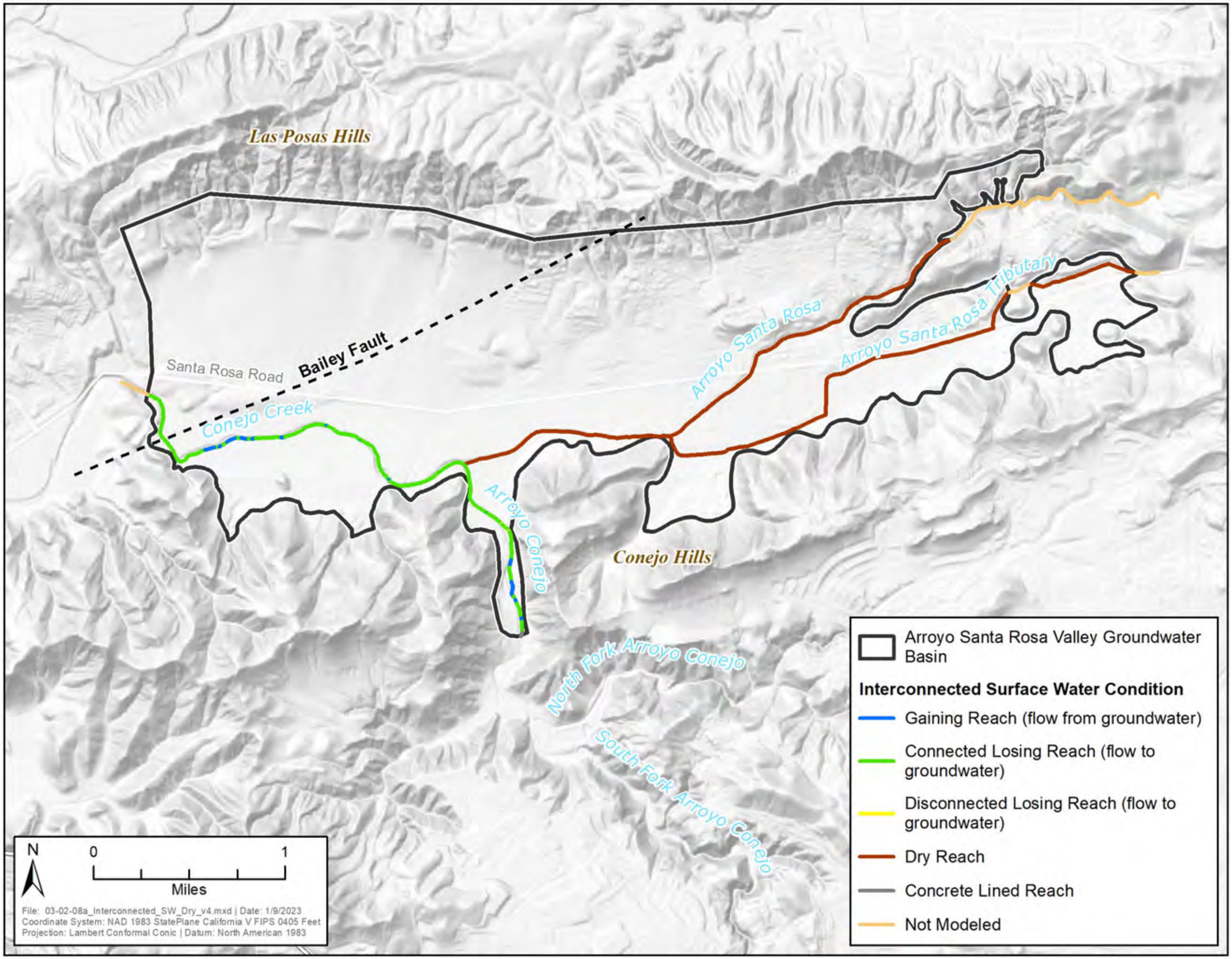


Figure 10.4a SFR Segments – Low Water Level Conditions (November 2015)

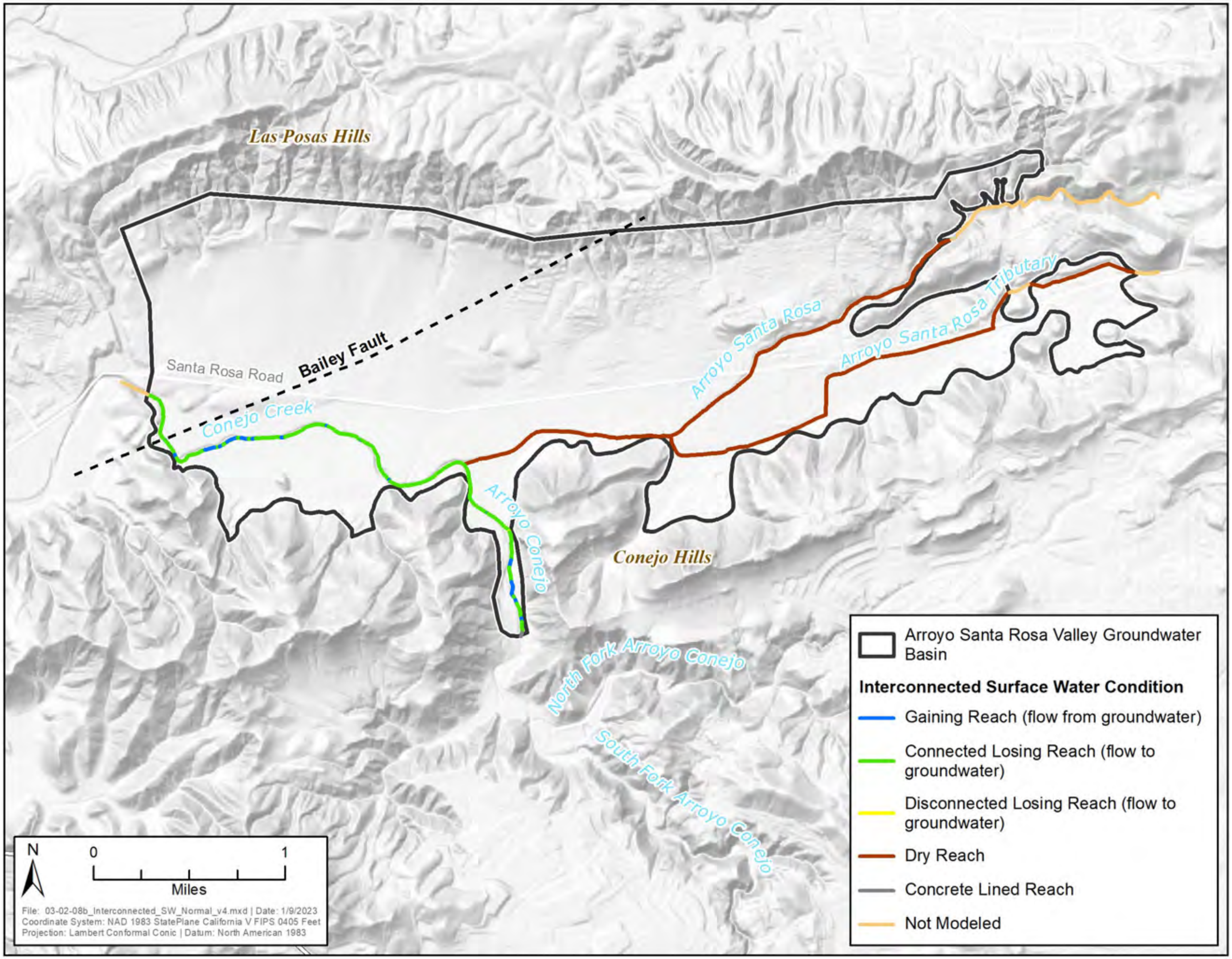


Figure 10.4b SFR Segments – Normal Water Level Conditions (June 2017)

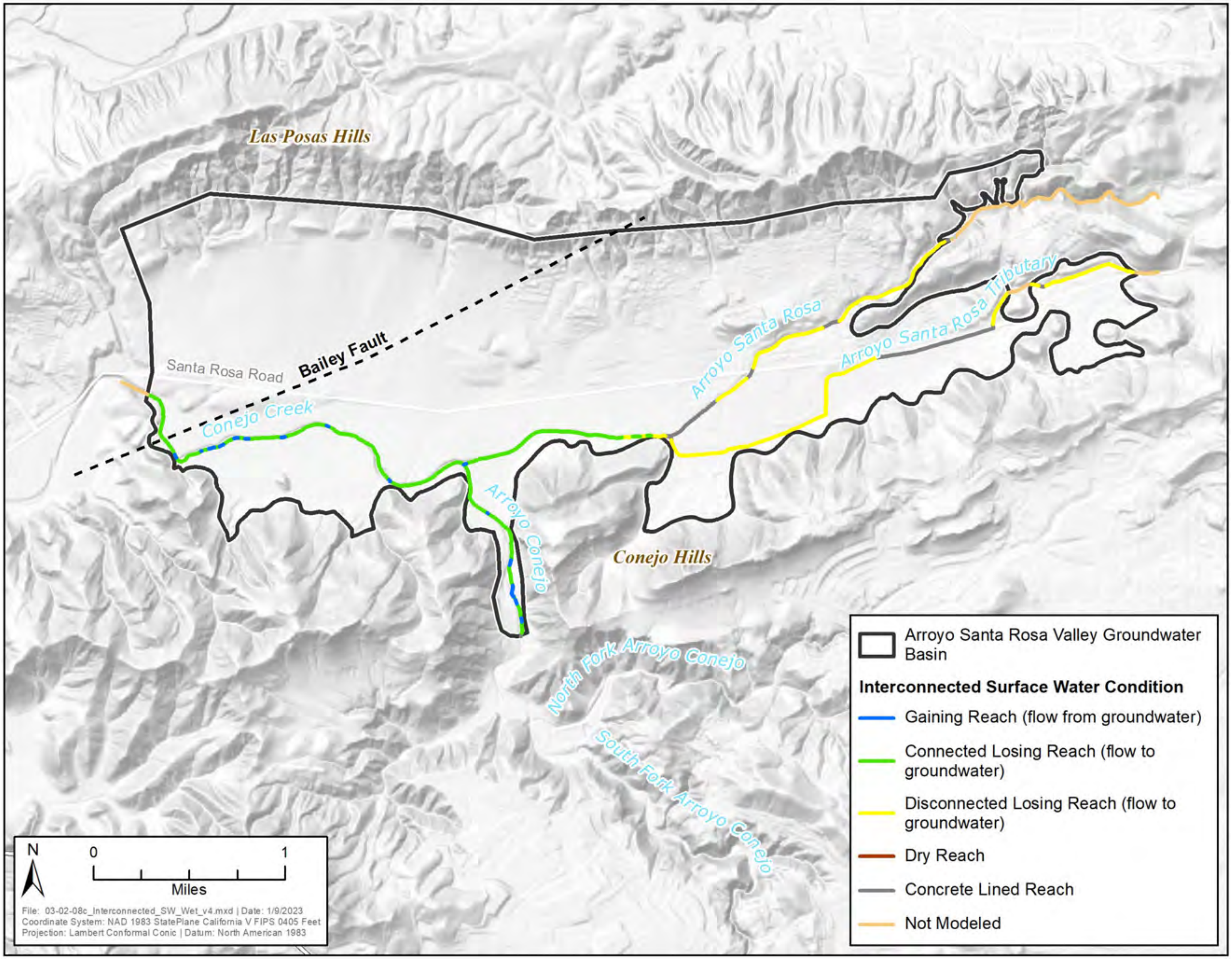
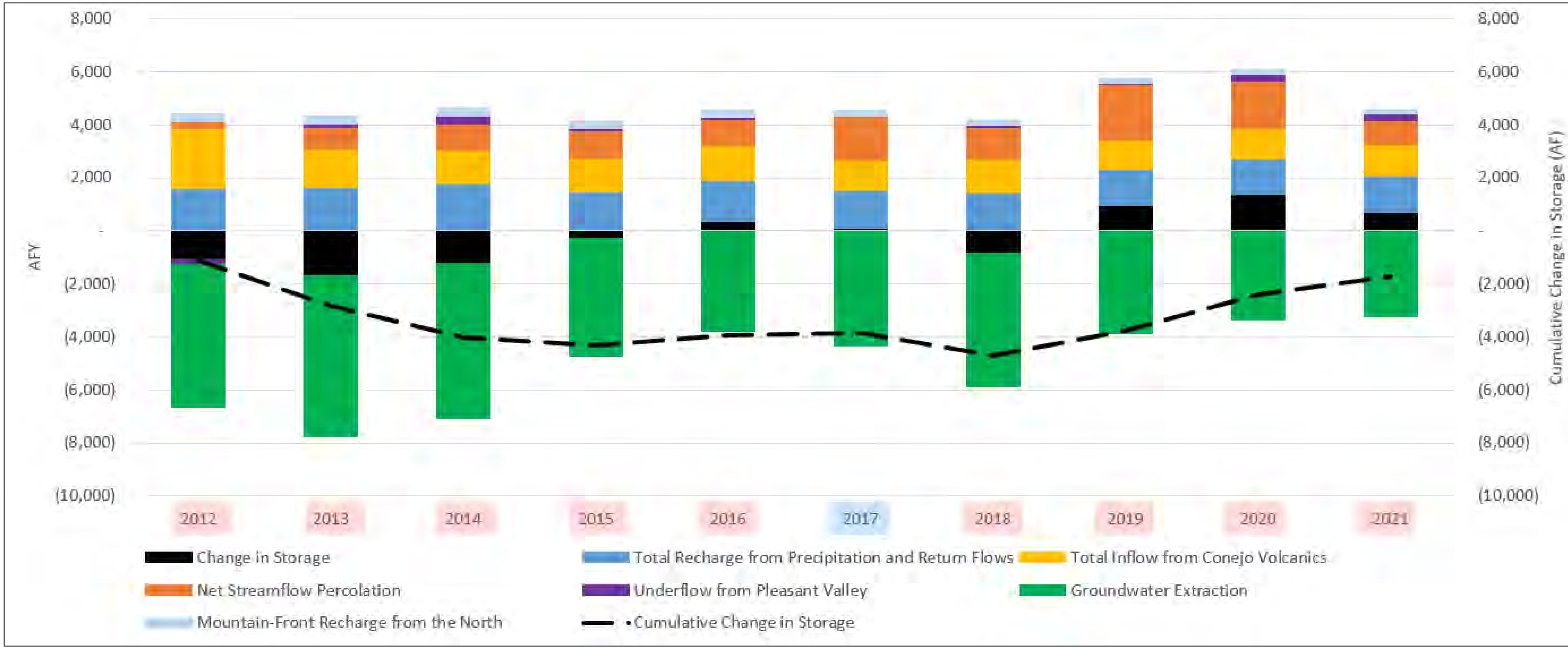


Figure 10.4c SFR Segments – High Water Level Condition (February 2017)



Total Recharge from Precipitation and Return Flows is the sum of Recharge from Precipitation, Agricultural Return Flows, M&I Outdoor Return Flows, M&I Septic Return Flows, Non-potable Distribution Losses, and Potable Distribution Losses.

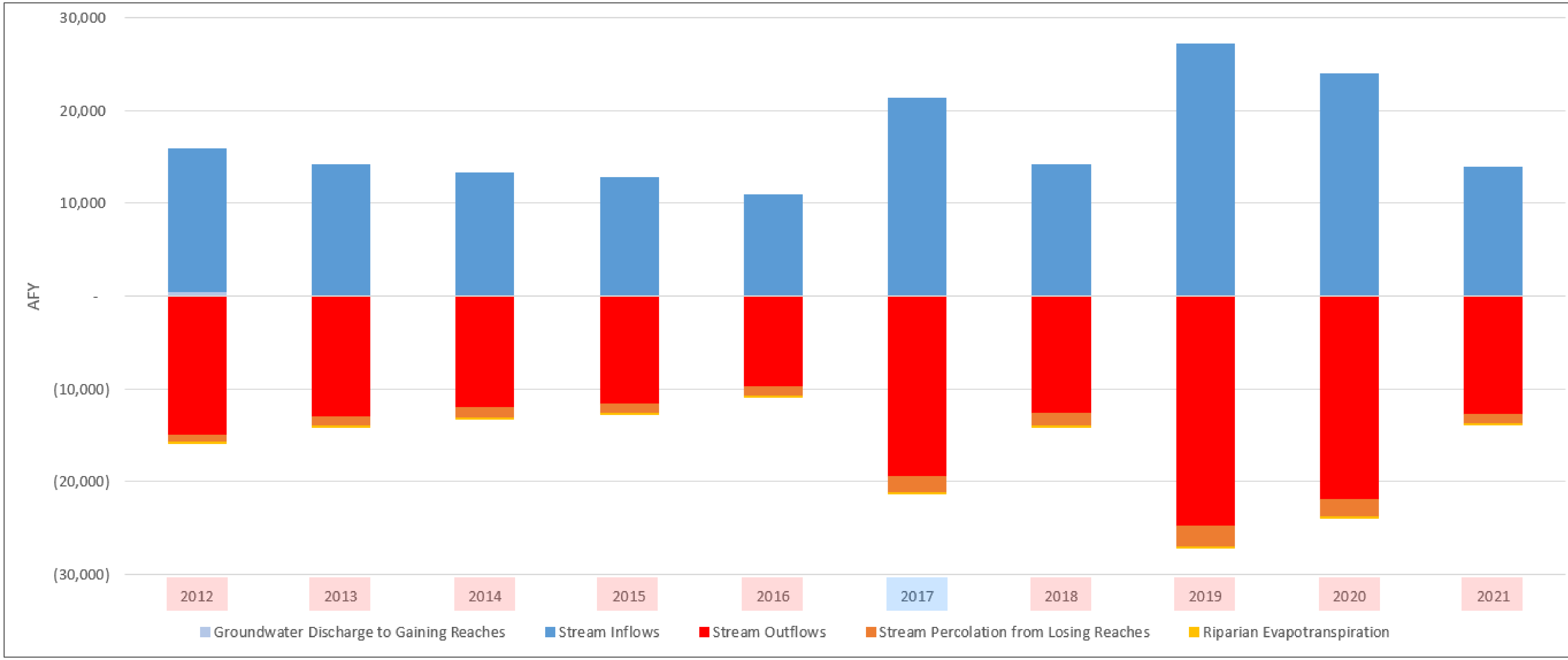
Total Inflows from Conejo Volcanics is the sum of Bedrock Contributions from the South and Bedrock Contributions from the East.

Net Streamflow Percolation is the sum of Streamflow Percolation from Losing Reaches and GW Discharge to Streamflow Gaining Reaches.

Groundwater Extraction is the sum of FCGMA Agricultural Pumping, Non-FCGMA Agricultural Pumping, Domestic Pumping, and M&I Pumping.

See Table 10.1 for individual water budget components.

Figure 10.5a Groundwater Budget for the Model



Stream Inflows is the sum of Arroyo Santa Rosa Inflows, Arroyo Santa Rosa Tributary Inflows, Arroyo Conejo Inflows, and Direct Runoff Contributions to Streamflow.

See Table 10.2 for individual water budget components.

Figure 10.5b Surface Water Budget for the Model

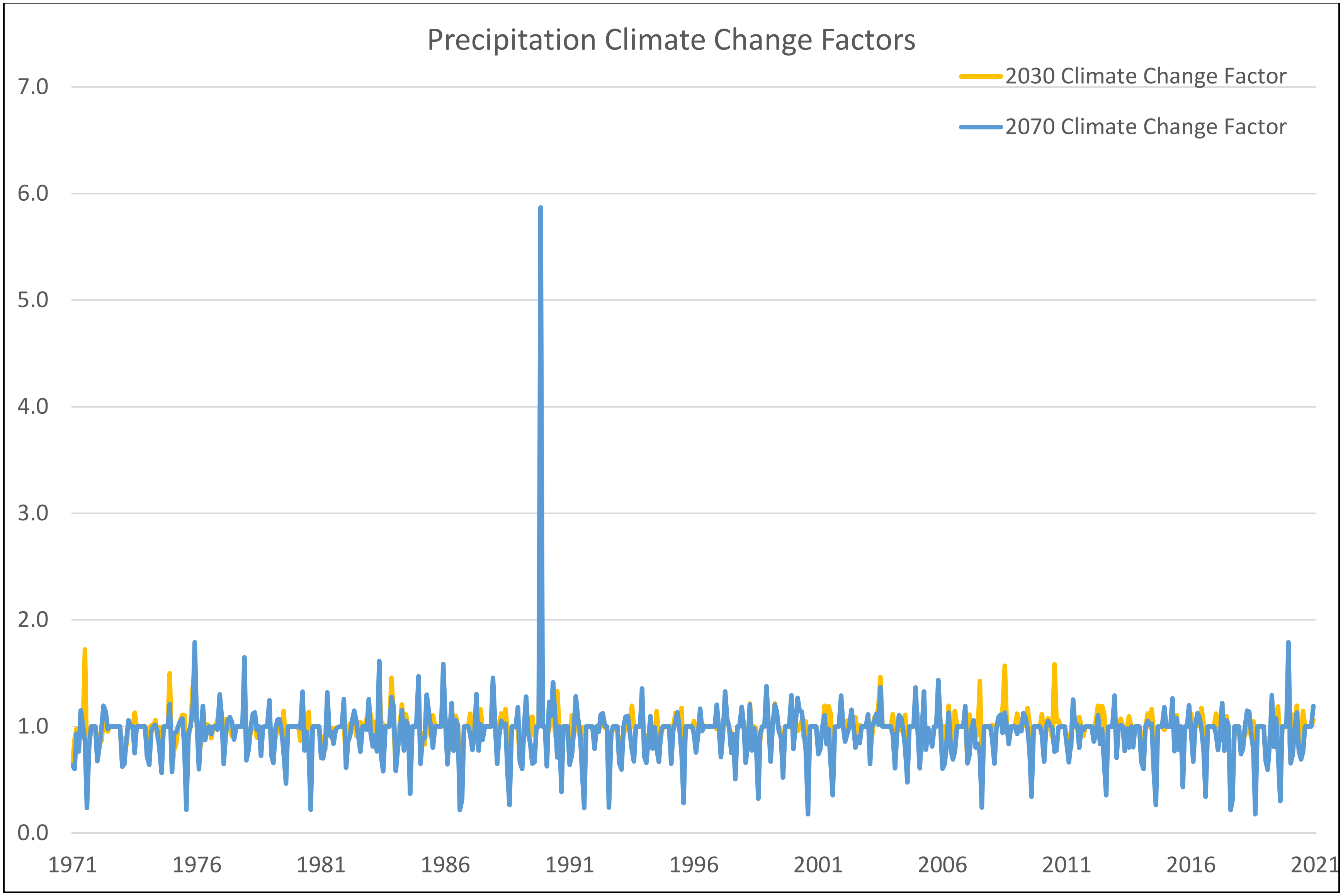


Figure 11.1 Time Series of Precipitation Change Factors

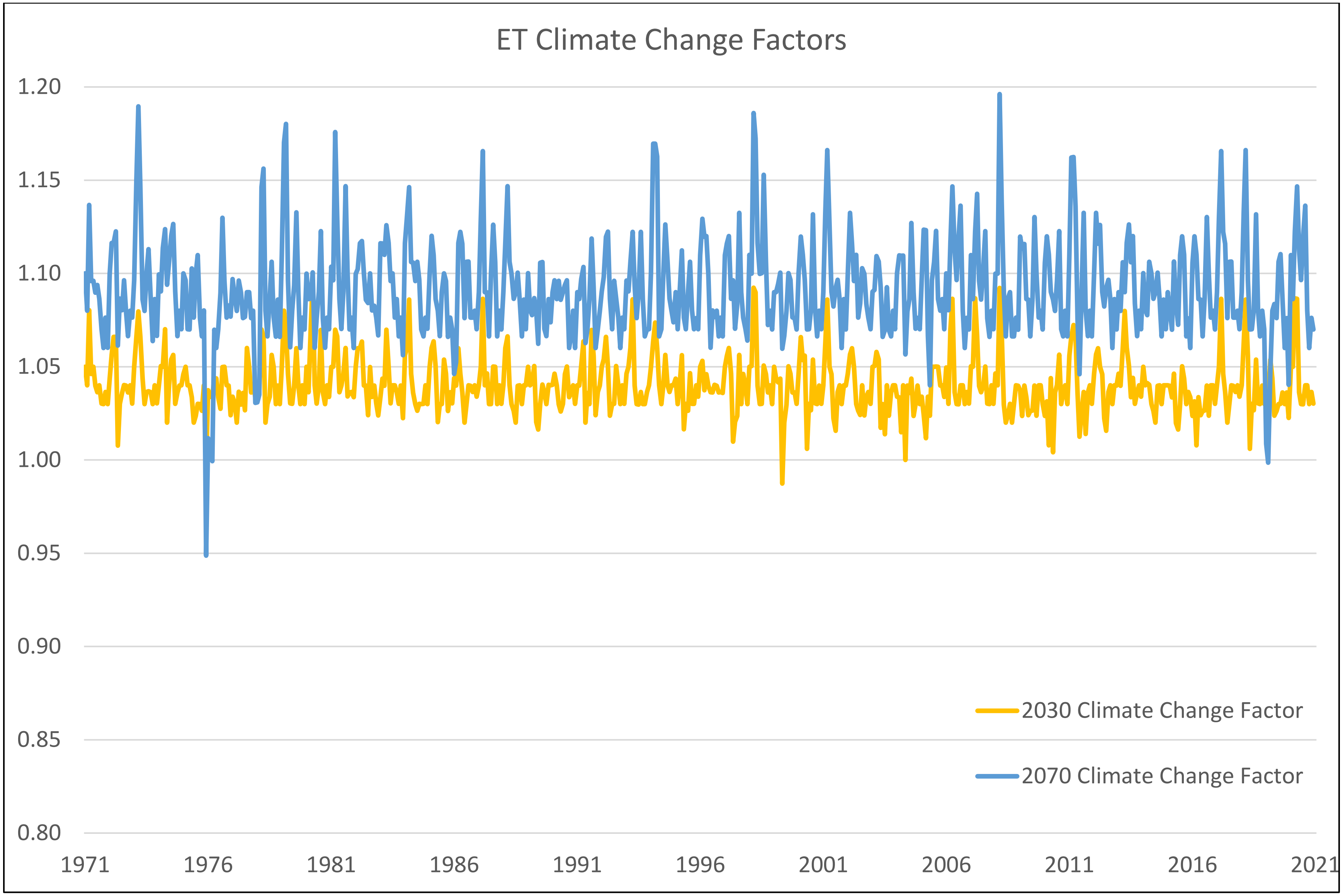


Figure 11.2 Time Series of Evapotranspiration Change Factors

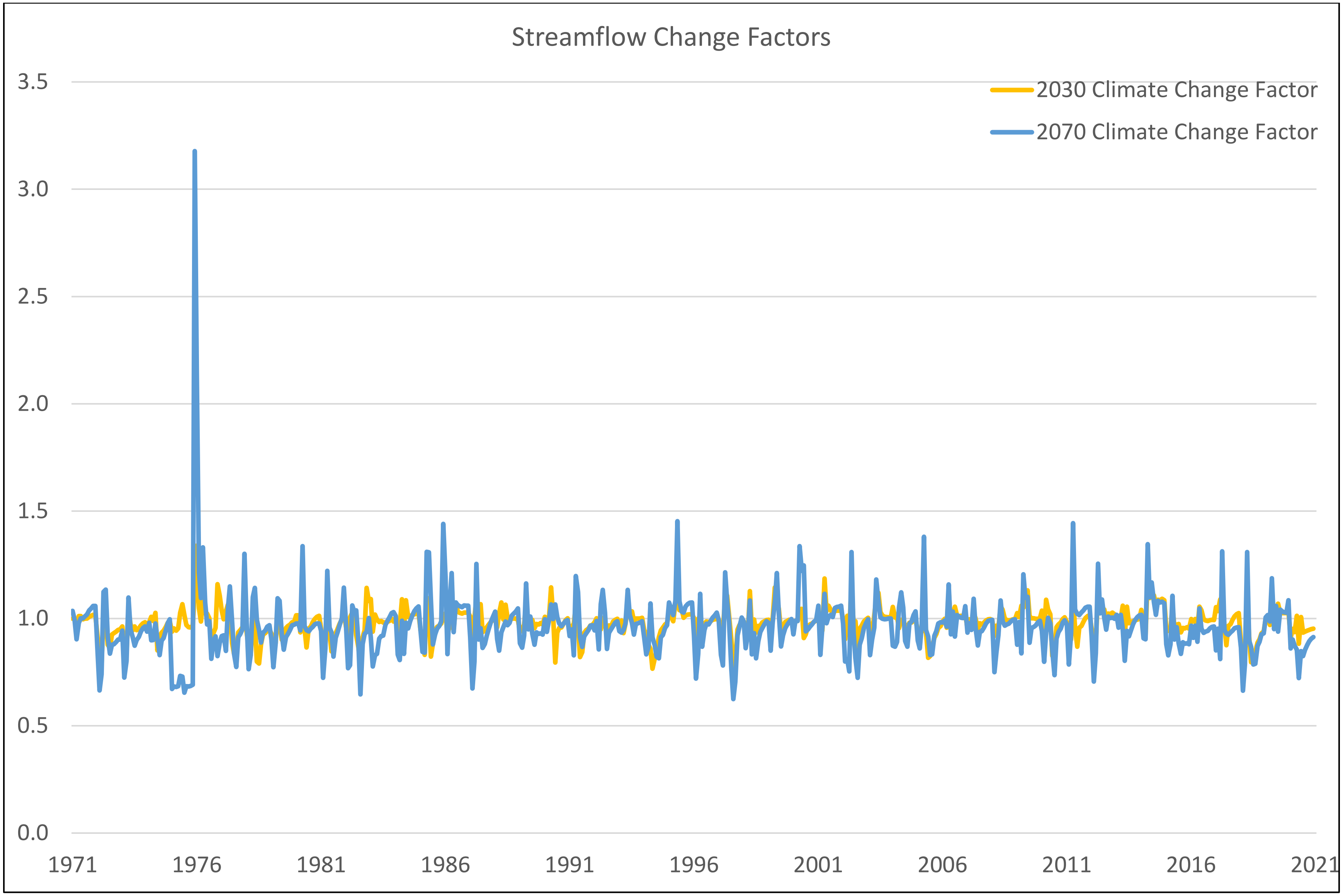


Figure 11.3 Time Series of Streamflow Change Factors

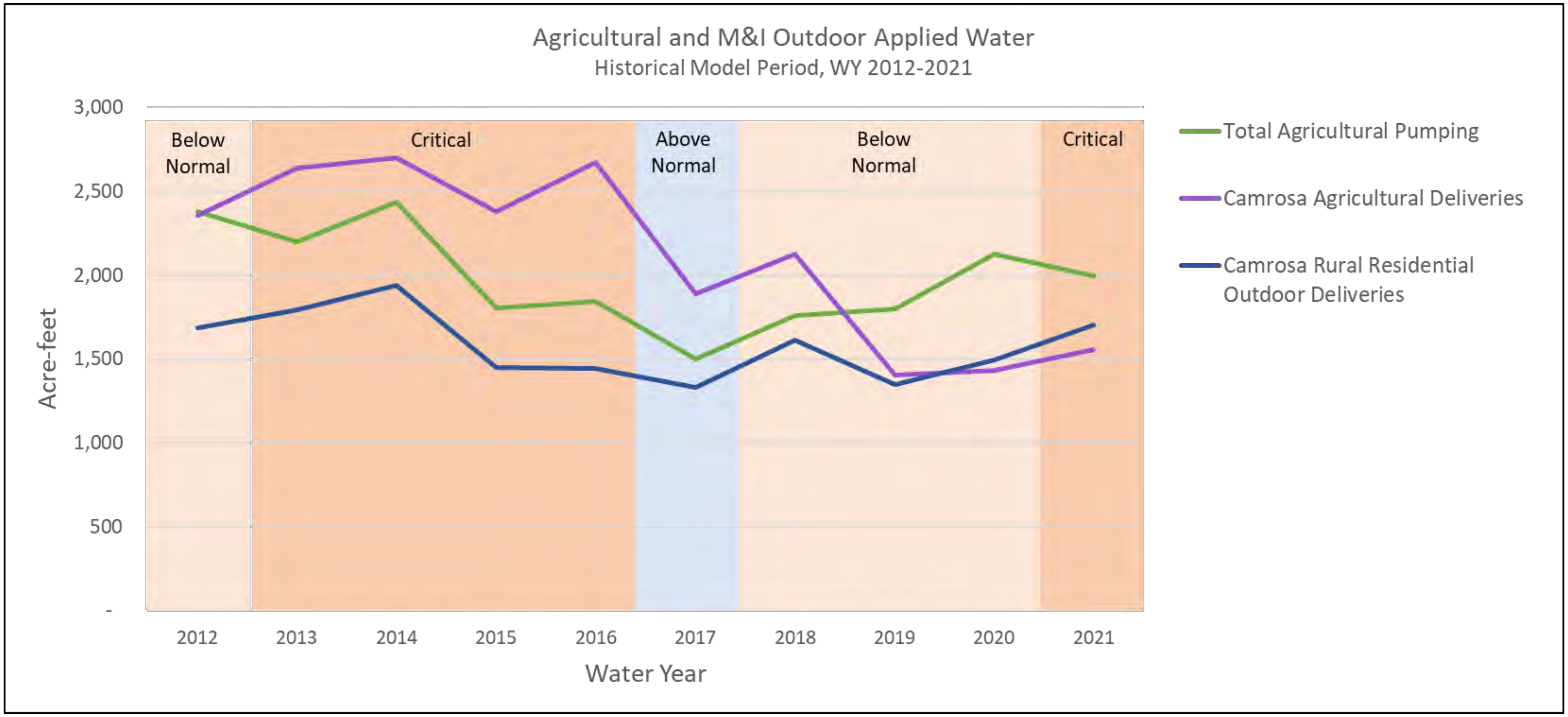
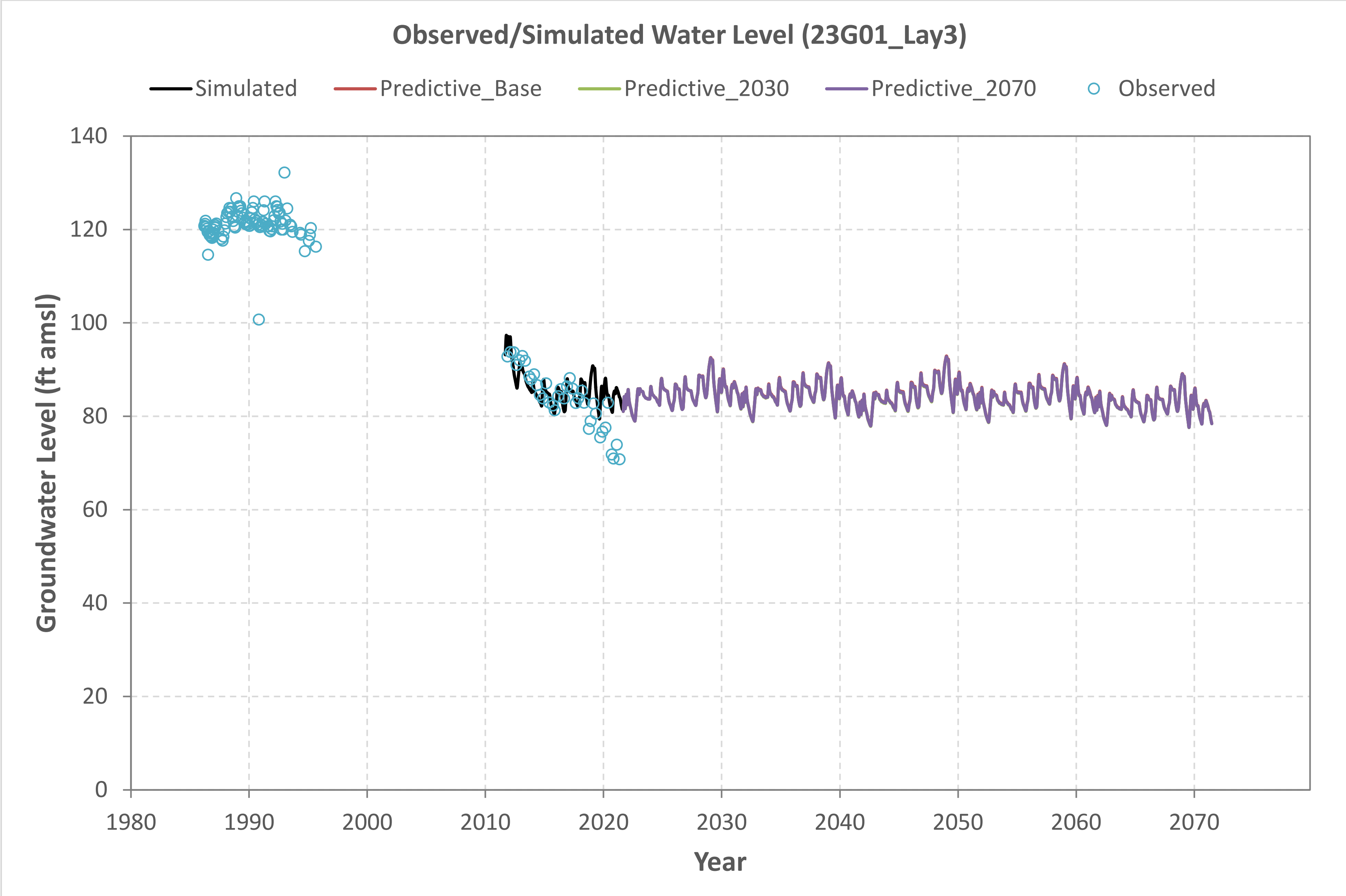
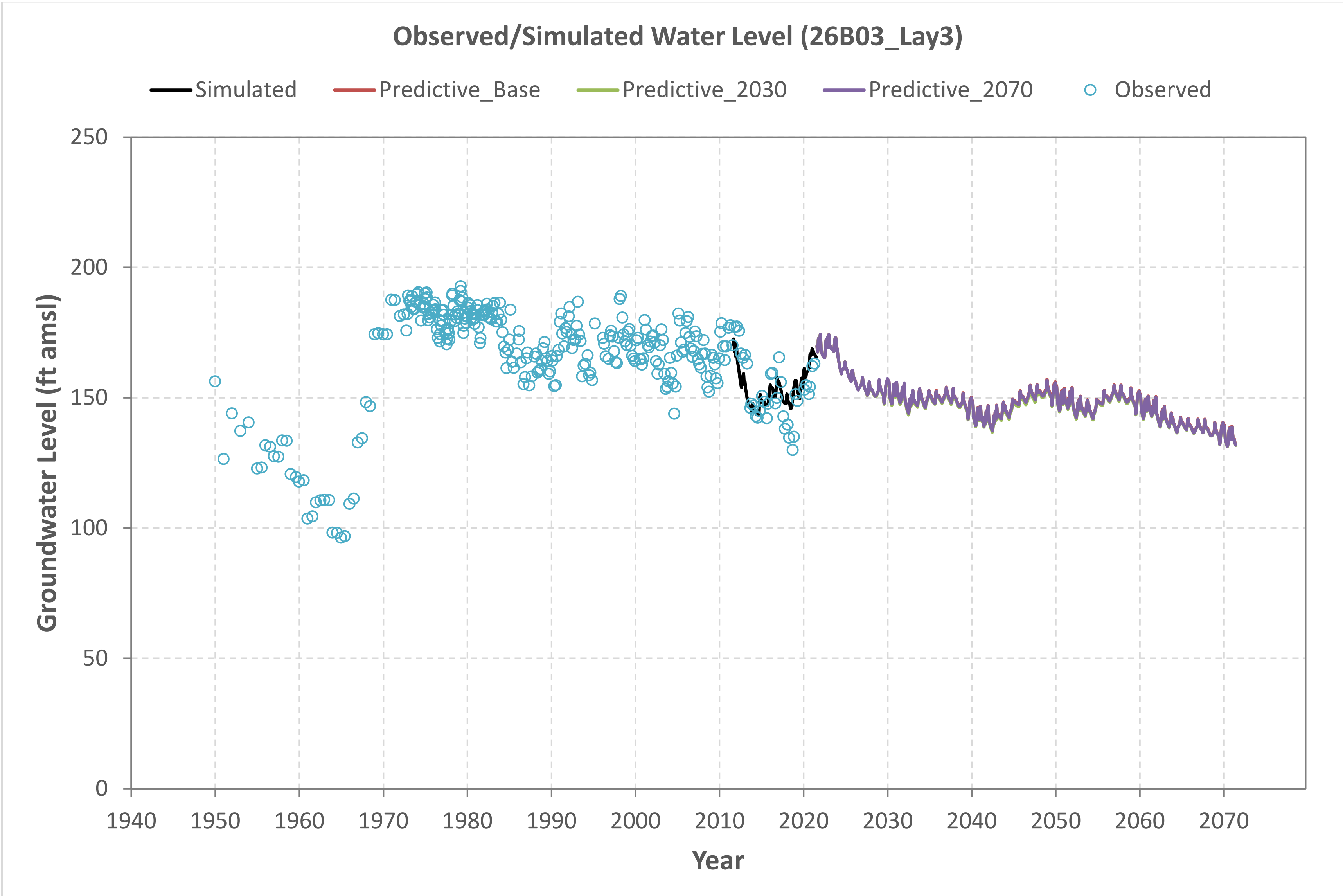


Figure 11.4 DWR Water Year Types vs Historical Demands



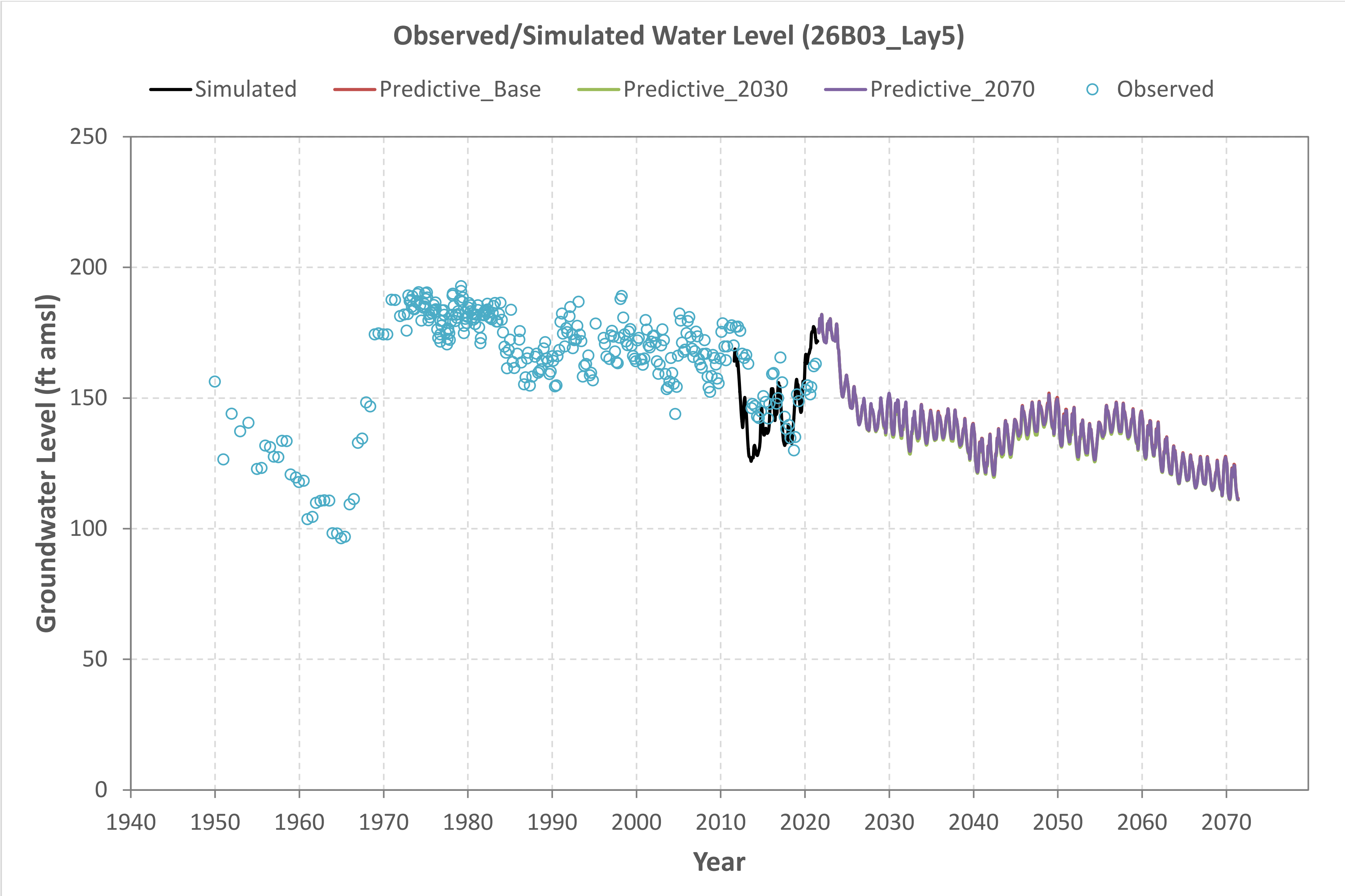
*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5a Simulated vs Observed Water Levels for Key Calibration Wells (02N20W23G01S Layer 3)



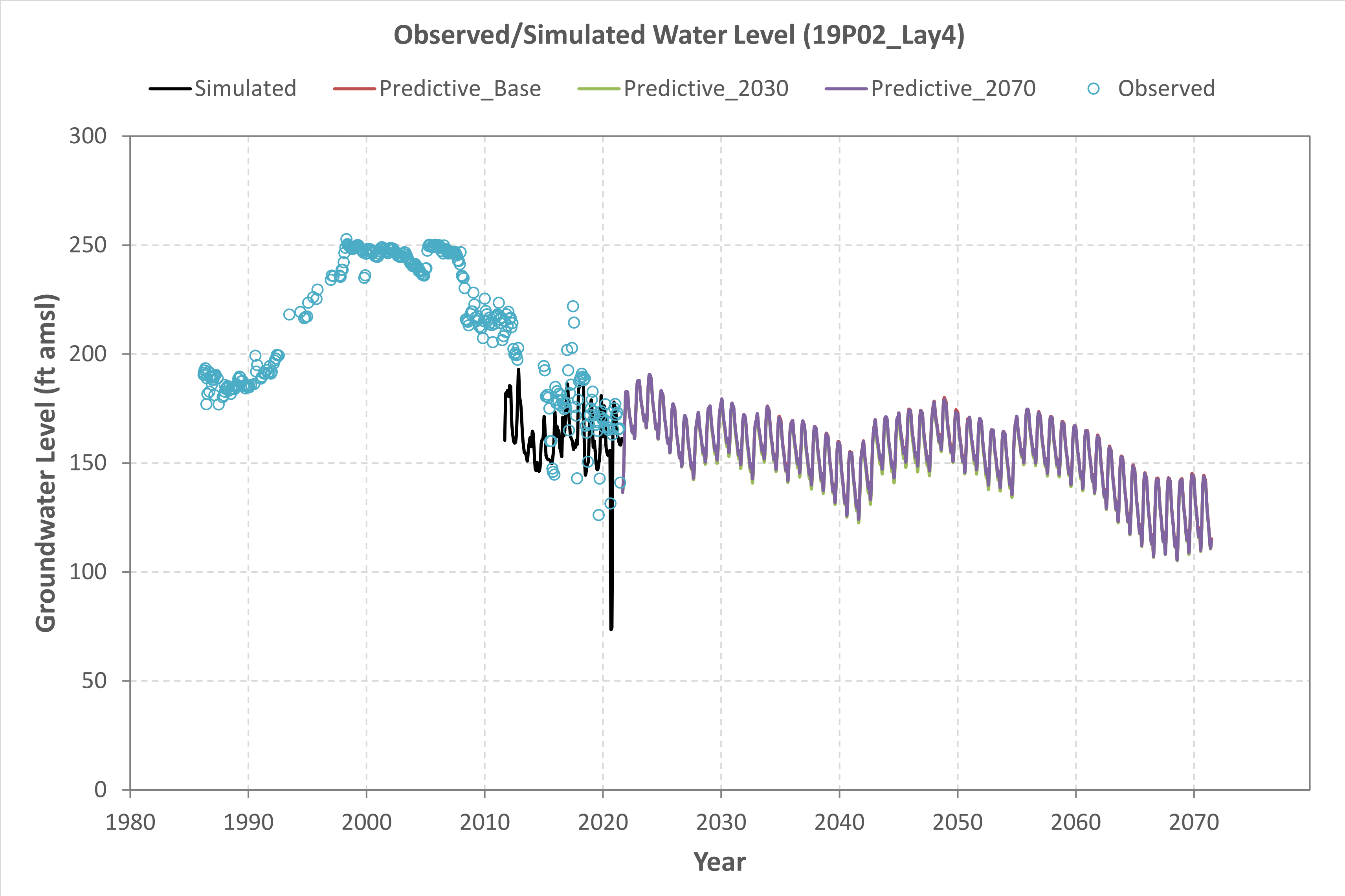
*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5b Simulated vs Observed Water Levels for Key Calibration Wells (02N20W26B03S Layer 3)



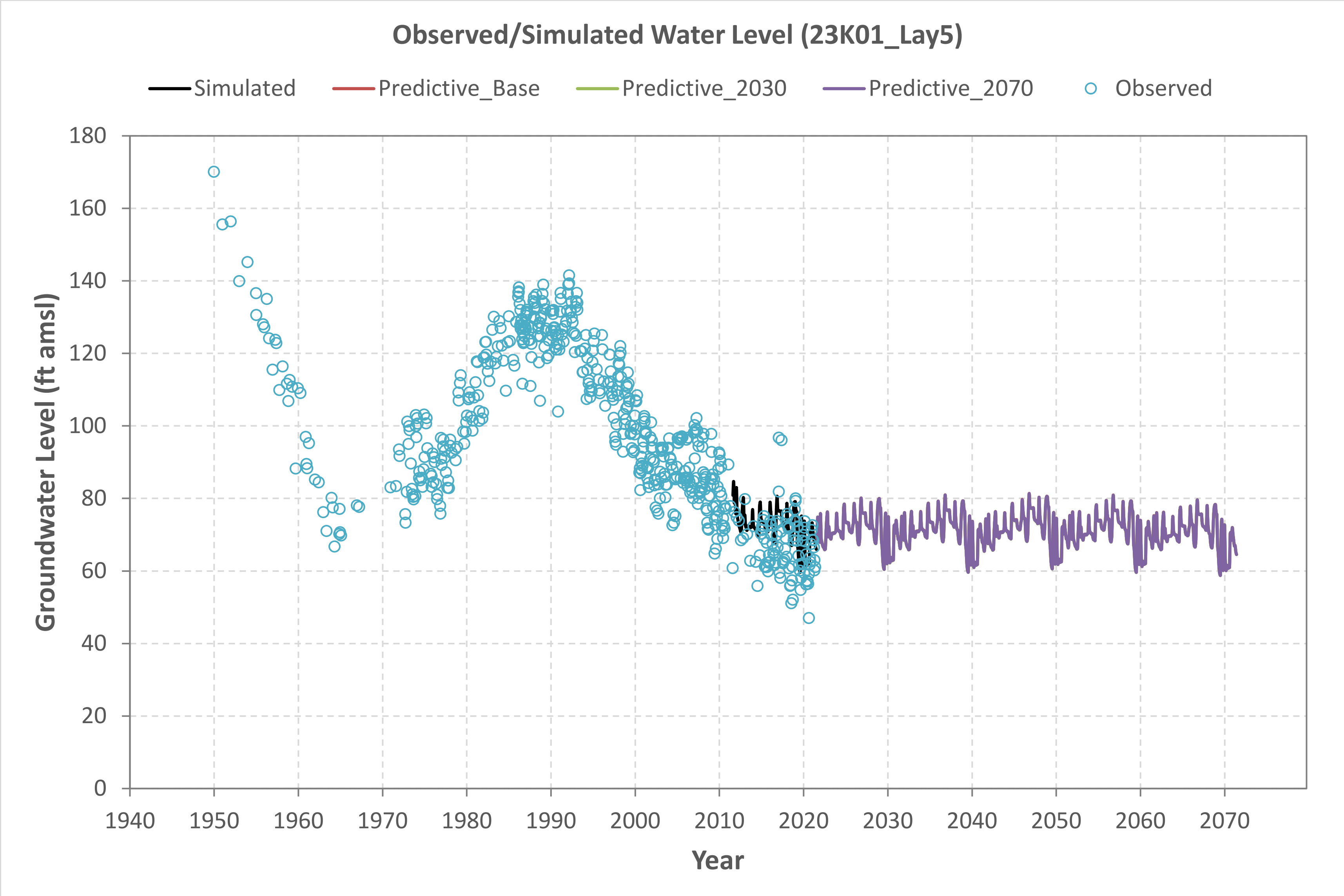
*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5c Simulated vs Observed Water Levels for Key Calibration Wells (02N20W26B03S Layer 5)



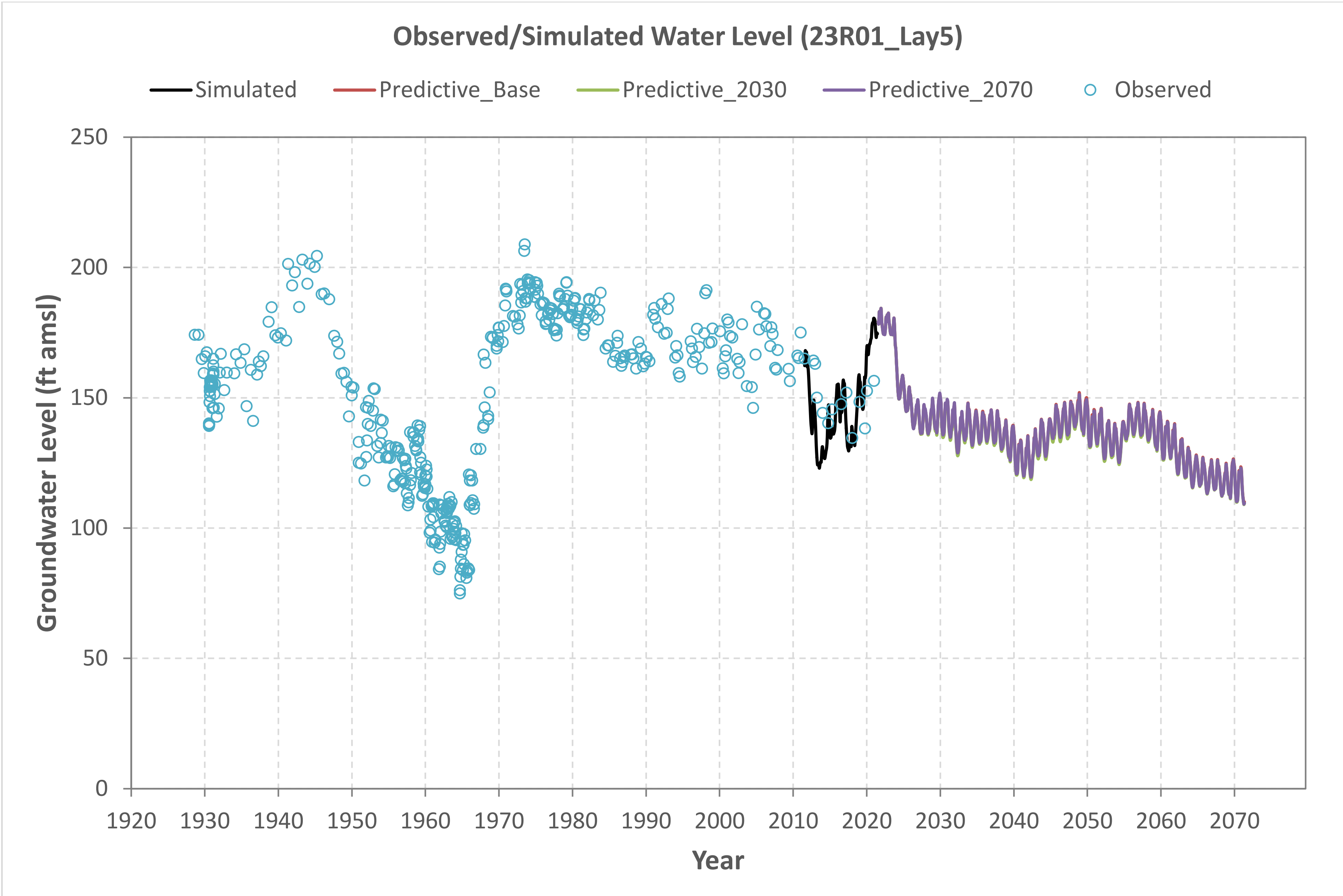
*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5d Simulated vs Observed Water Levels for Key Calibration Wells (02N19W19P02S Layer 4)



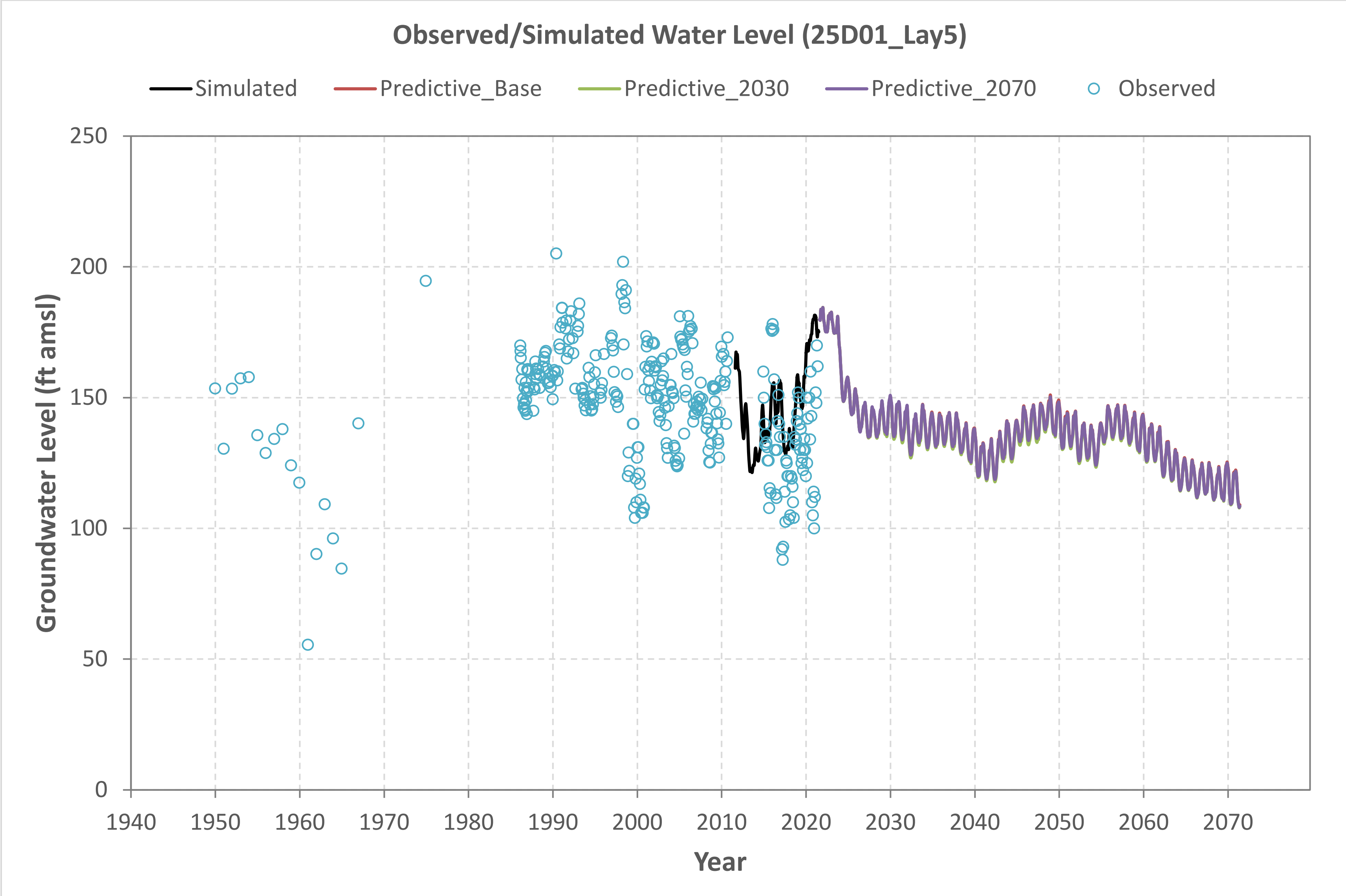
*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5e Simulated vs Observed Water Levels for Key Calibration Wells (02N20W23K01S Layer 5)



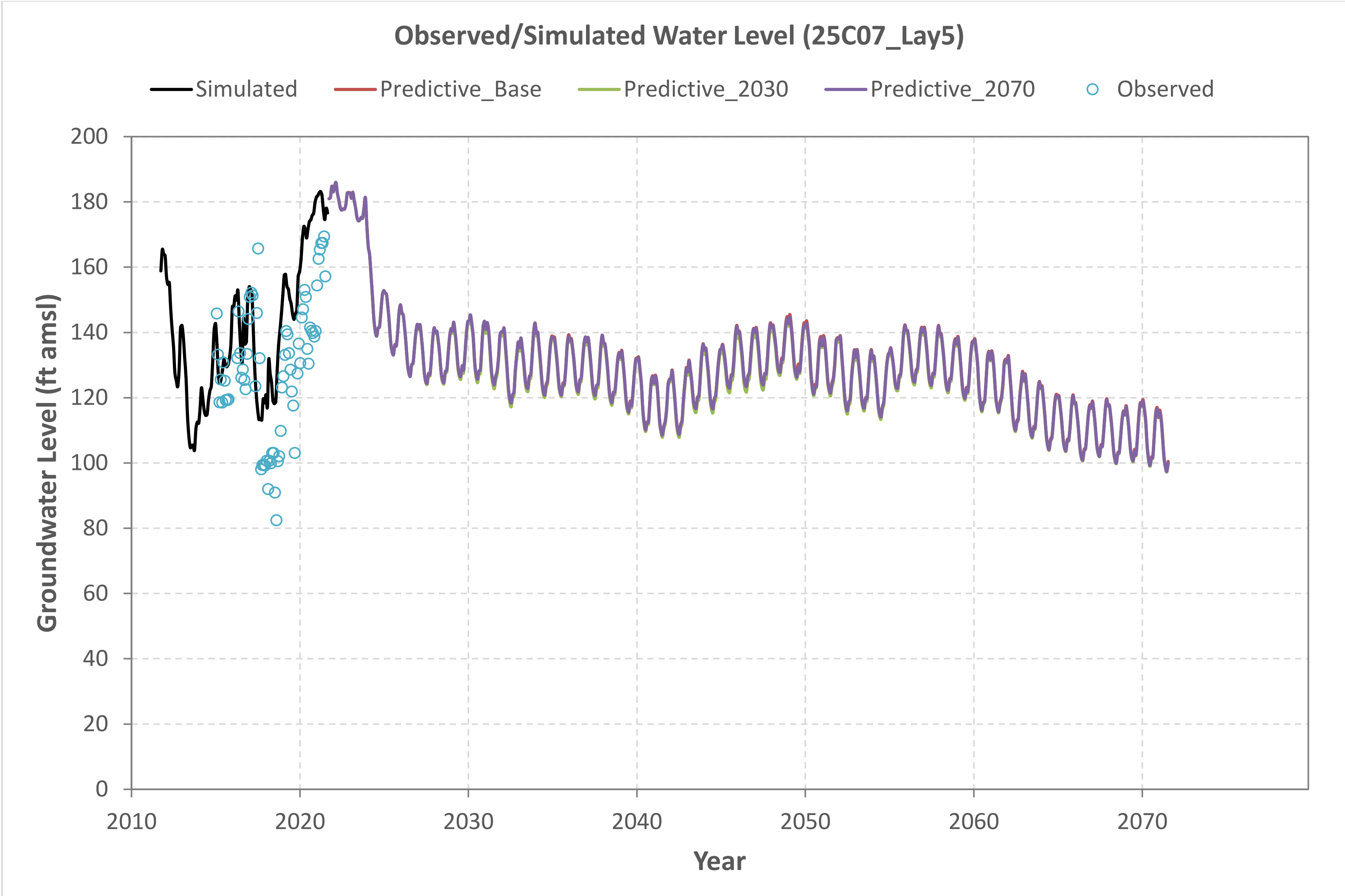
*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5f Simulated vs Observed Water Levels for Key Calibration Wells (02N20W23R01S Layer 5)



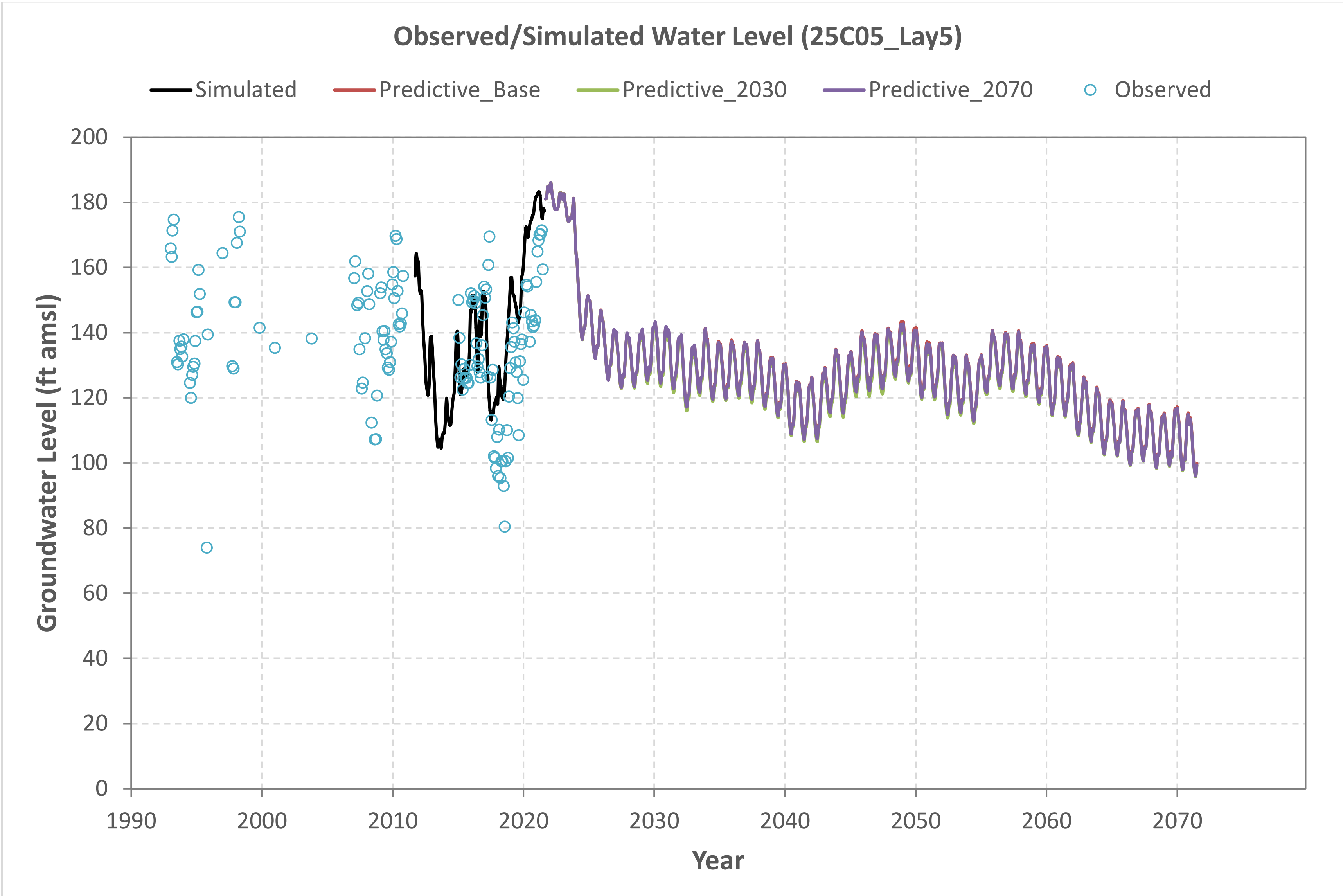
*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5g Simulated vs Observed Water Levels for Key Calibration Wells (02N20W25D01S Layer 5)



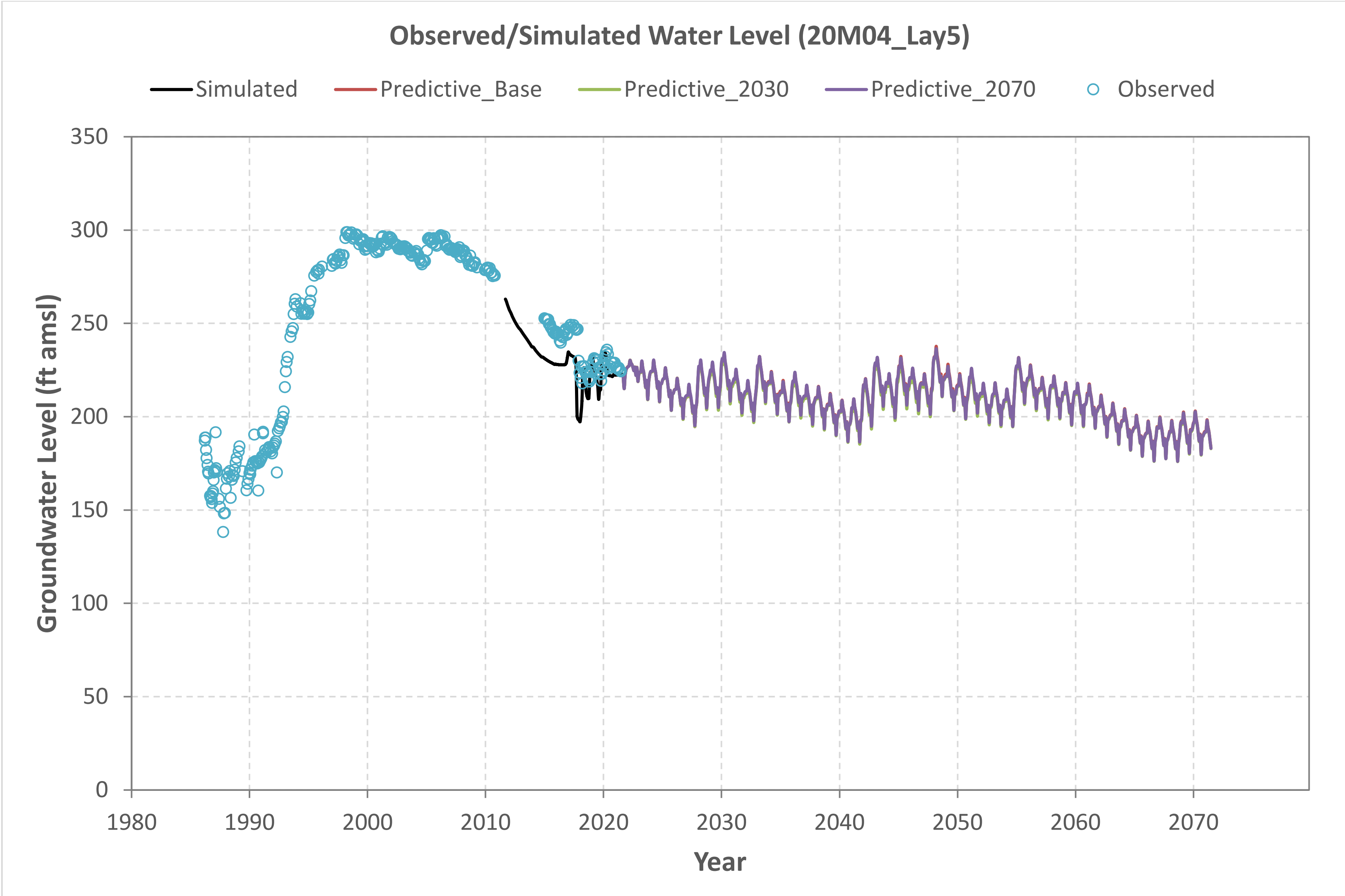
*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5h Simulated vs Observed Water Levels for Key Calibration Wells (02N20W25C07S Layer 5)



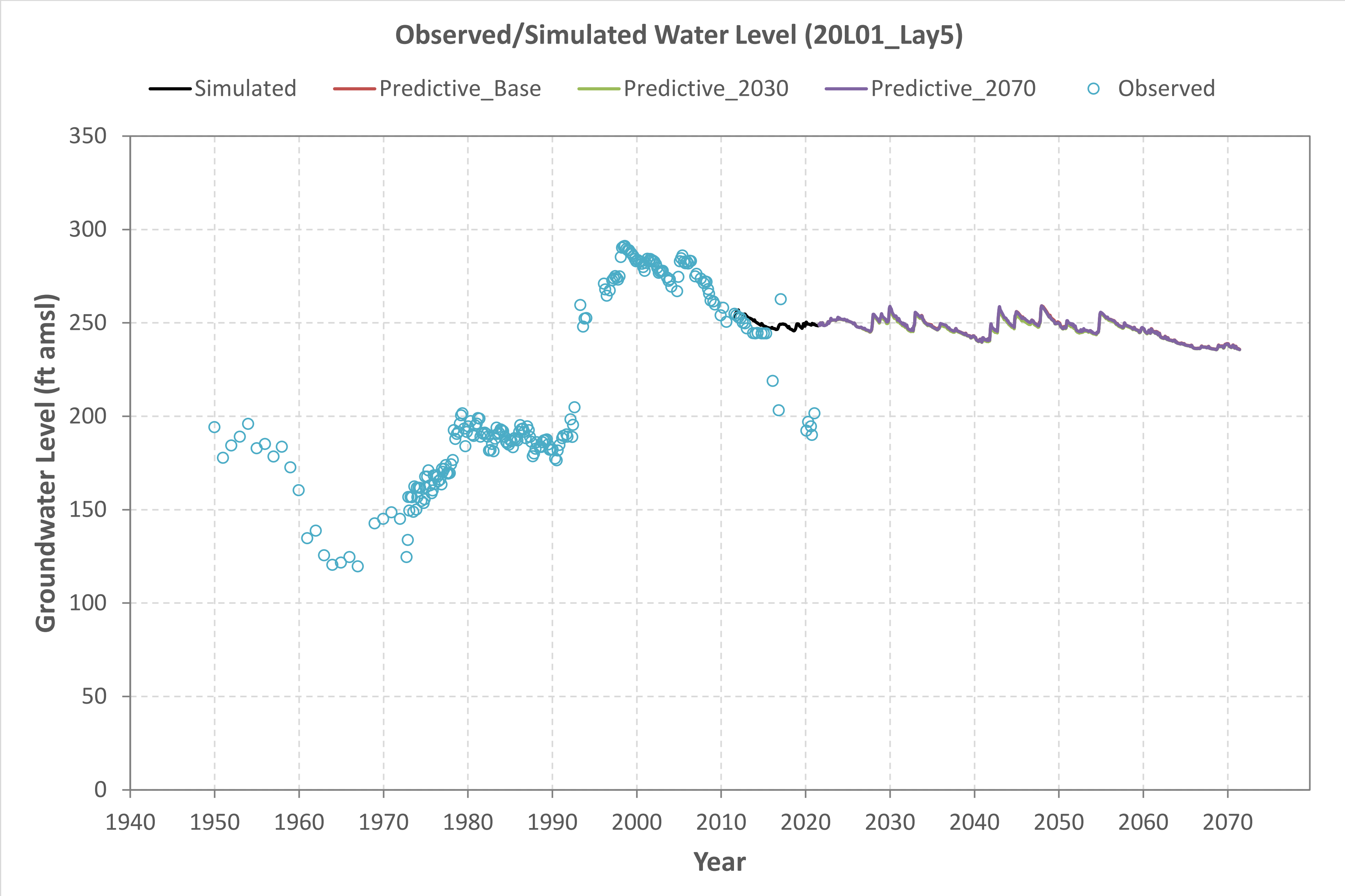
*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5i Simulated vs Observed Water Levels for Key Calibration Wells (02N20W25C05S Layer 5)



*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5j Simulated vs Observed Water Levels for Key Calibration Wells (02N19W20M04S Layer 5)



*Three future scenarios plot on top of each other (no difference at scale of graph).

Figure 11.5k Simulated vs Observed Water Levels for Key Calibration Wells (02N19W20L01S Layer 5)

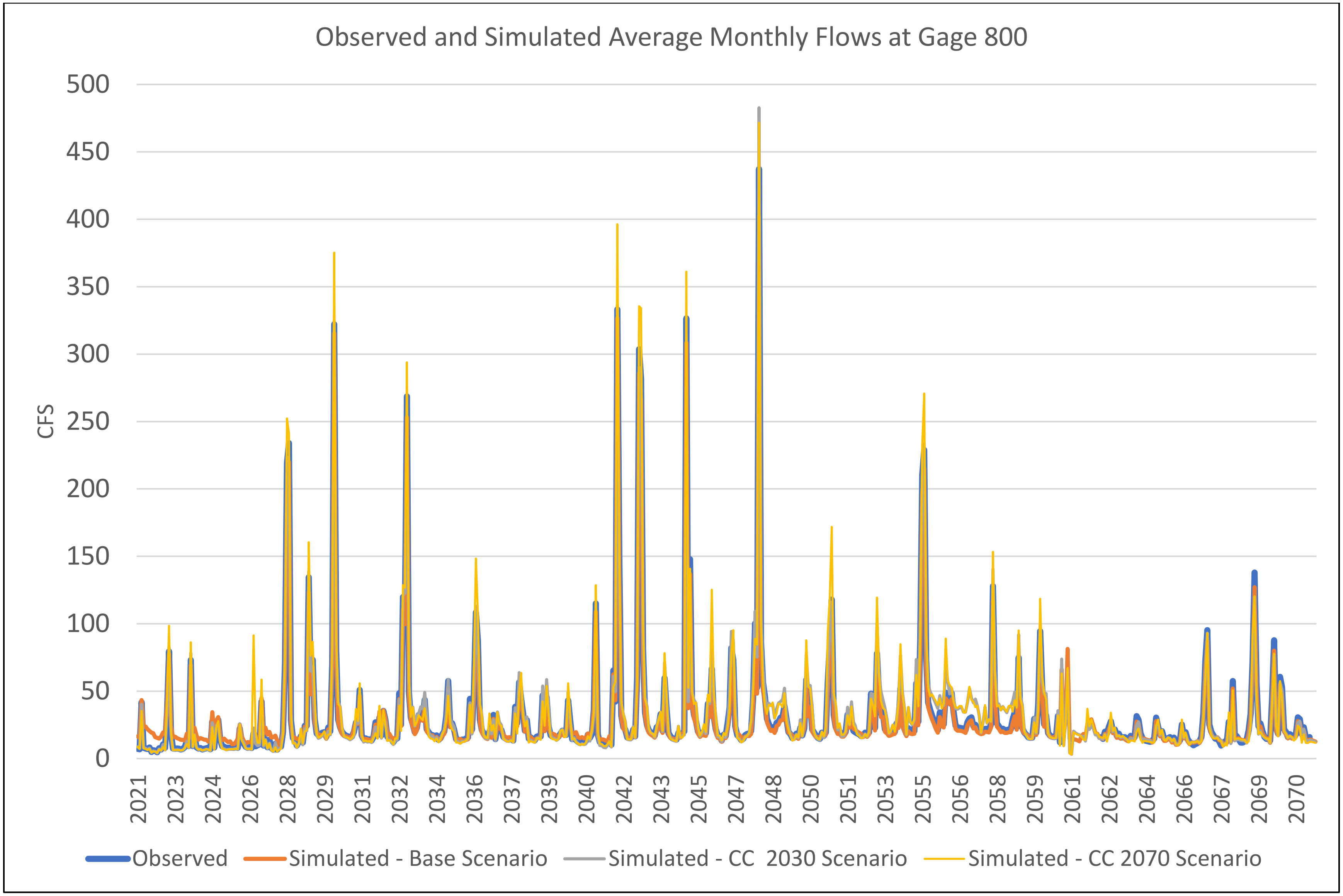
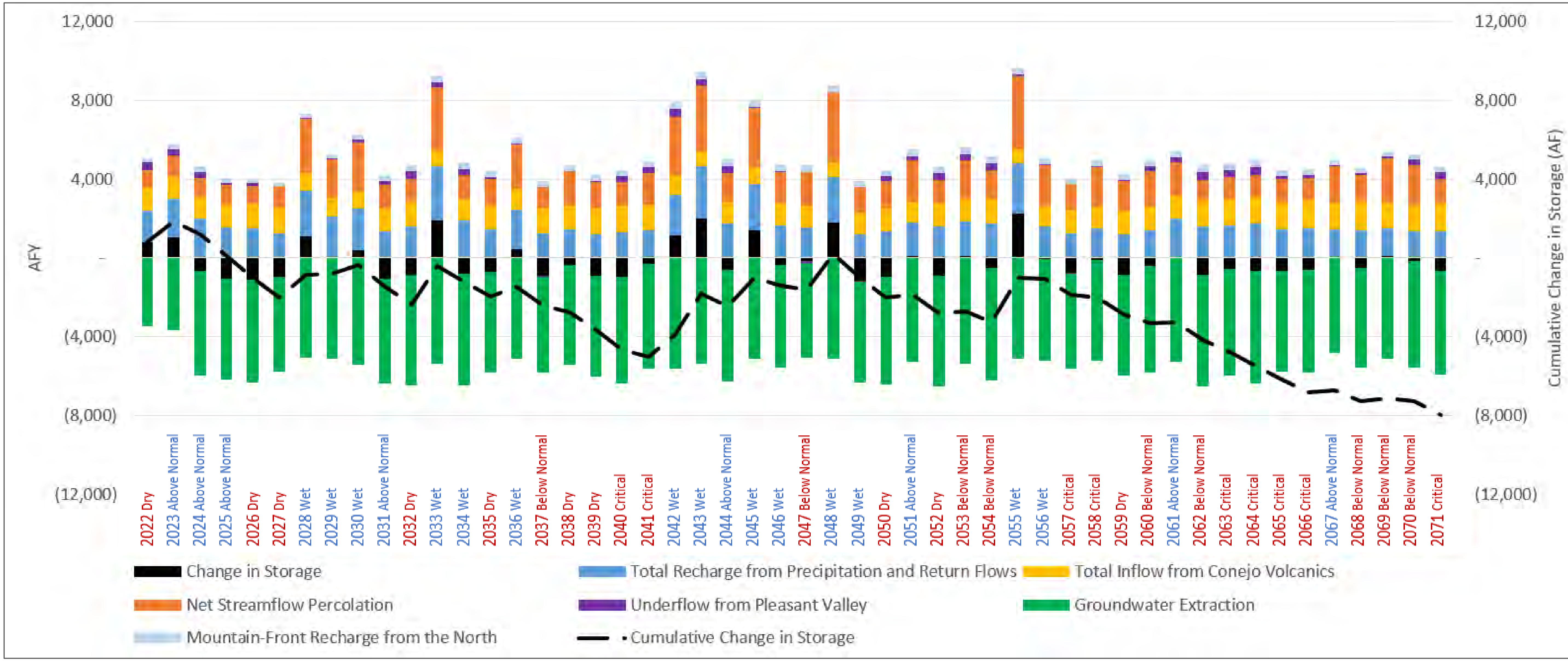


Figure 11.6 Predictive Streamflows at Gage 800



Total Recharge from Precipitation and Return Flows is the sum of Recharge from Precipitation, Agricultural Return Flows, M&I Outdoor Return Flows, M&I Septic Return Flows, Non-potable Distribution Losses, and Potable Distribution Losses.

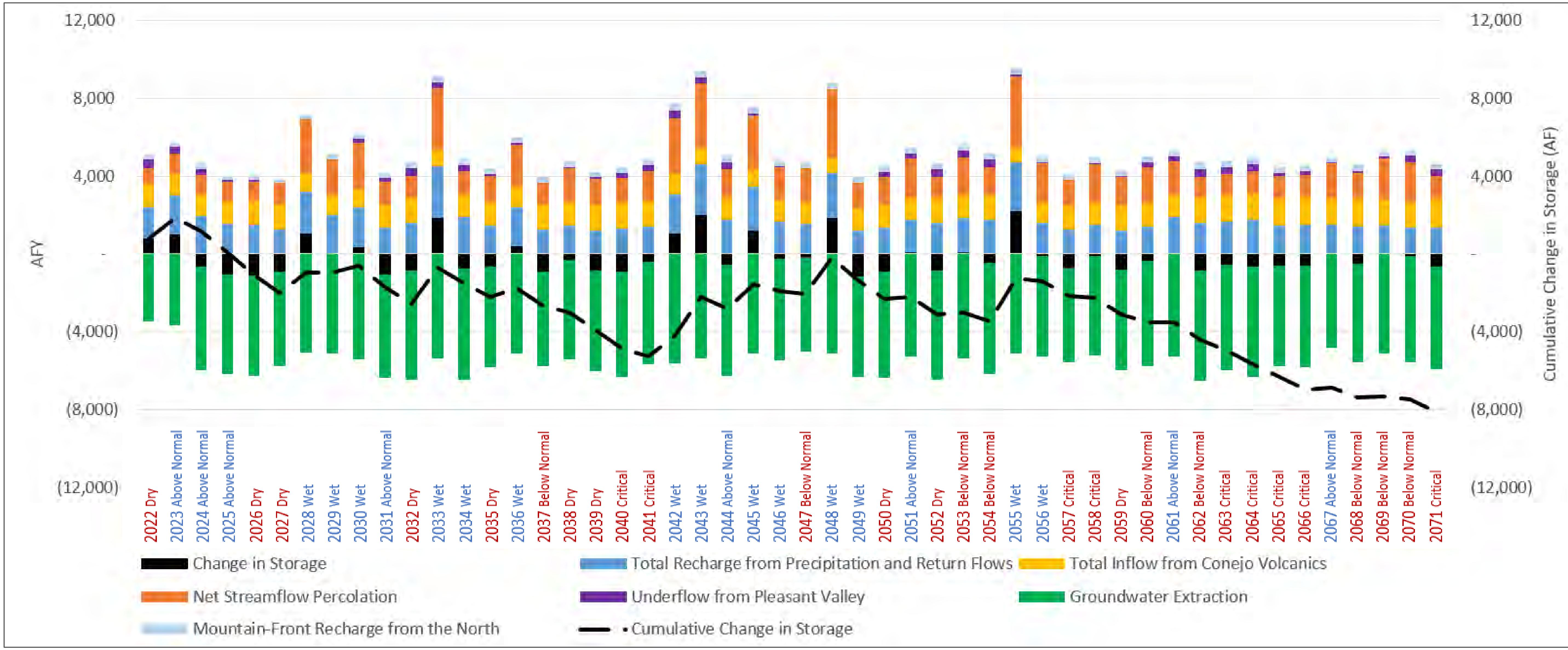
Total Inflows from Conejo Volcanics is the sum of Bedrock Contributions from the South and Bedrock Contributions from the East.

Net Streamflow Percolation is the sum of Streamflow Percolation from Losing Reaches and GW Discharge to Streamflow Gaining Reaches.

Groundwater Extraction is the sum of FCGMA Agricultural Pumping, Non-FCGMA Agricultural Pumping, Domestic Pumping, and M&I Pumping.

See Table 11.3a for individual water budget components.

Figure 11.7a Baseline Projected Annual Groundwater Inflows (positive values) and Outflows (negative values) to/from ASRVGB (acre-feet per year)



Total Recharge from Precipitation and Return Flows is the sum of Recharge from Precipitation, Agricultural Return Flows, M&I Outdoor Return Flows, M&I Septic Return Flows, Non-potable Distribution Losses, and Potable Distribution Losses.

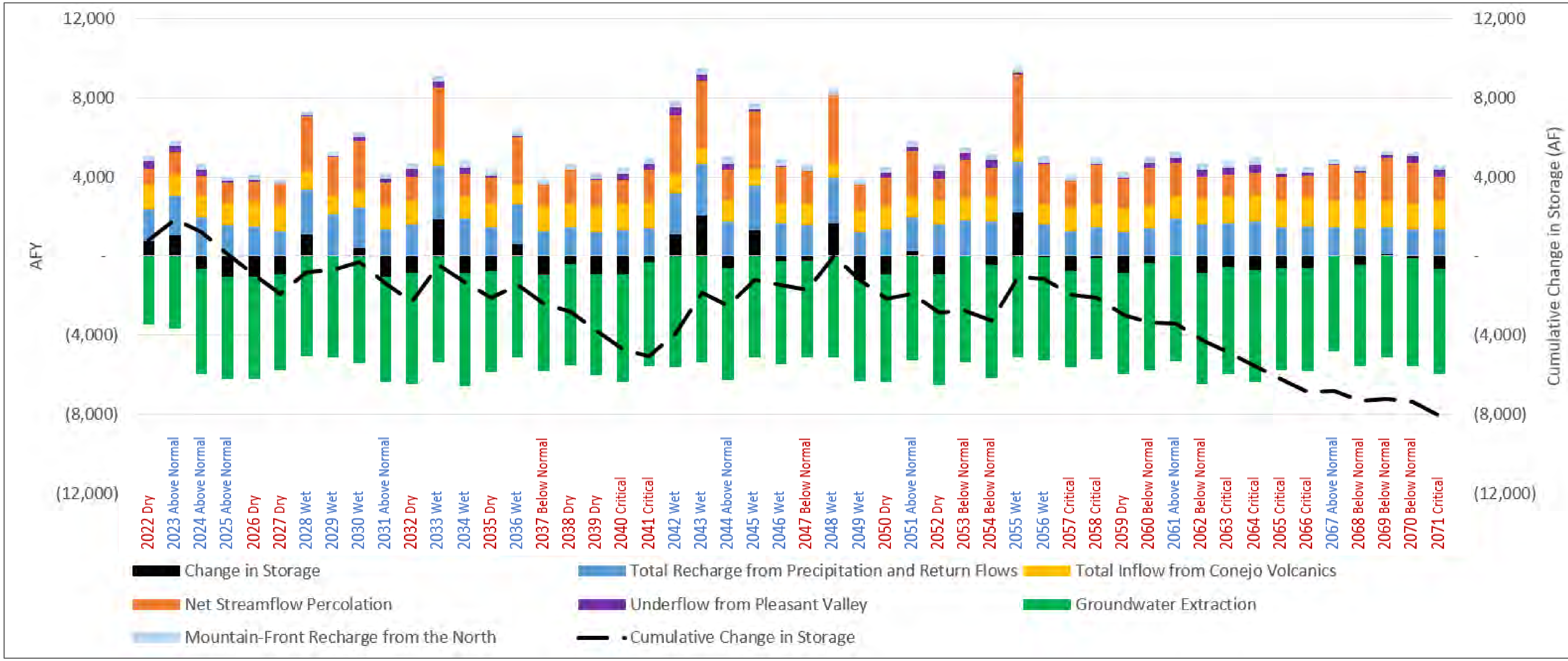
Total Inflows from Conejo Volcanics is the sum of Bedrock Contributions from the South and Bedrock Contributions from the East.

Net Streamflow Percolation is the sum of Streamflow Percolation from Losing Reaches and GW Discharge to Streamflow Gaining Reaches.

Groundwater Extraction is the sum of FCGMA Agricultural Pumping, Non-FCGMA Agricultural Pumping, Domestic Pumping, and M&I Pumping.

See Table 11.3b for individual water budget components.

Figure 11.7b Projected Groundwater Budget Components under the 2030 Climate Change Scenario



Total Recharge from Precipitation and Return Flows is the sum of Recharge from Precipitation, Agricultural Return Flows, M&I Outdoor Return Flows, M&I Septic Return Flows, Non-potable Distribution Losses, and Potable Distribution Losses.

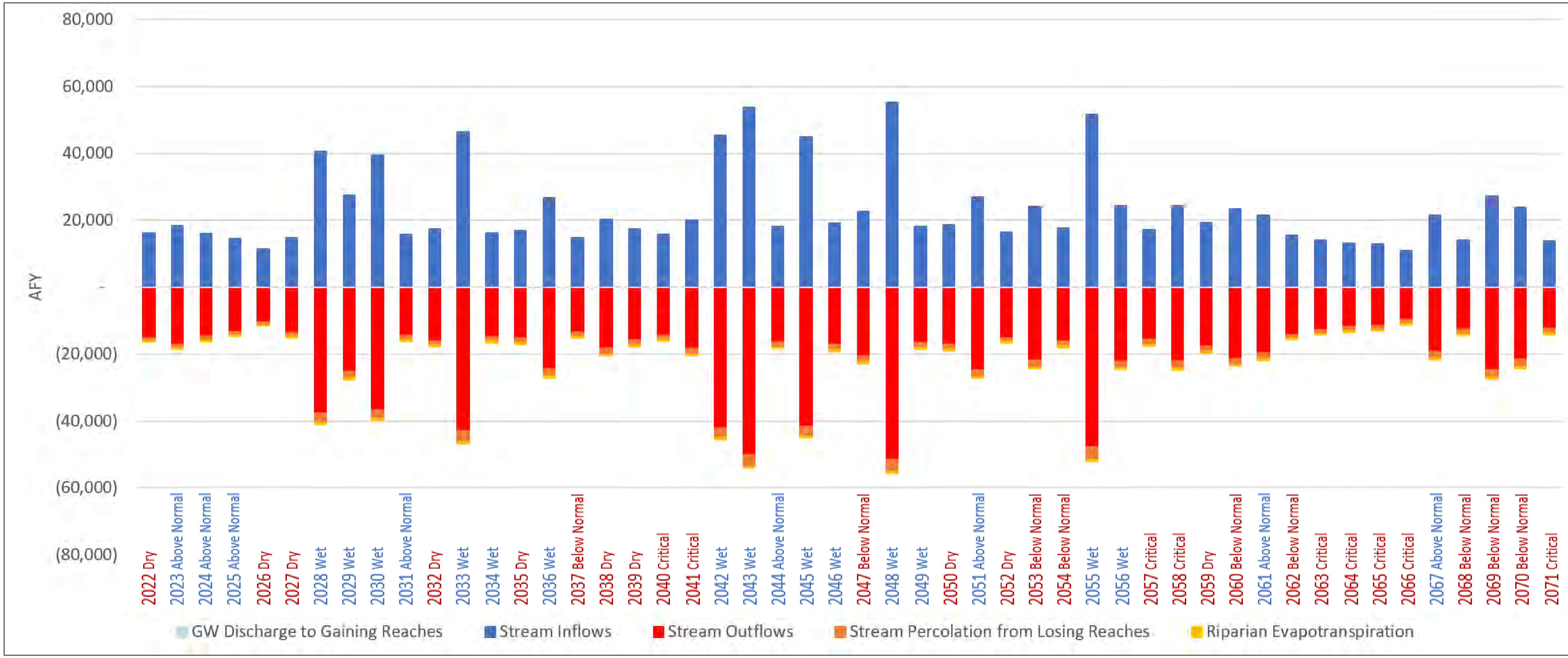
Total Inflows from Conejo Volcanics is the sum of Bedrock Contributions from the South and Bedrock Contributions from the East.

Net Streamflow Percolation is the sum of Streamflow Percolation from Losing Reaches and GW Discharge to Streamflow Gaining Reaches.

Groundwater Extraction is the sum of FCGMA Agricultural Pumping, Non-FCGMA Agricultural Pumping, Domestic Pumping, and M&I Pumping.

See Table 11.3c for individual water budget components.

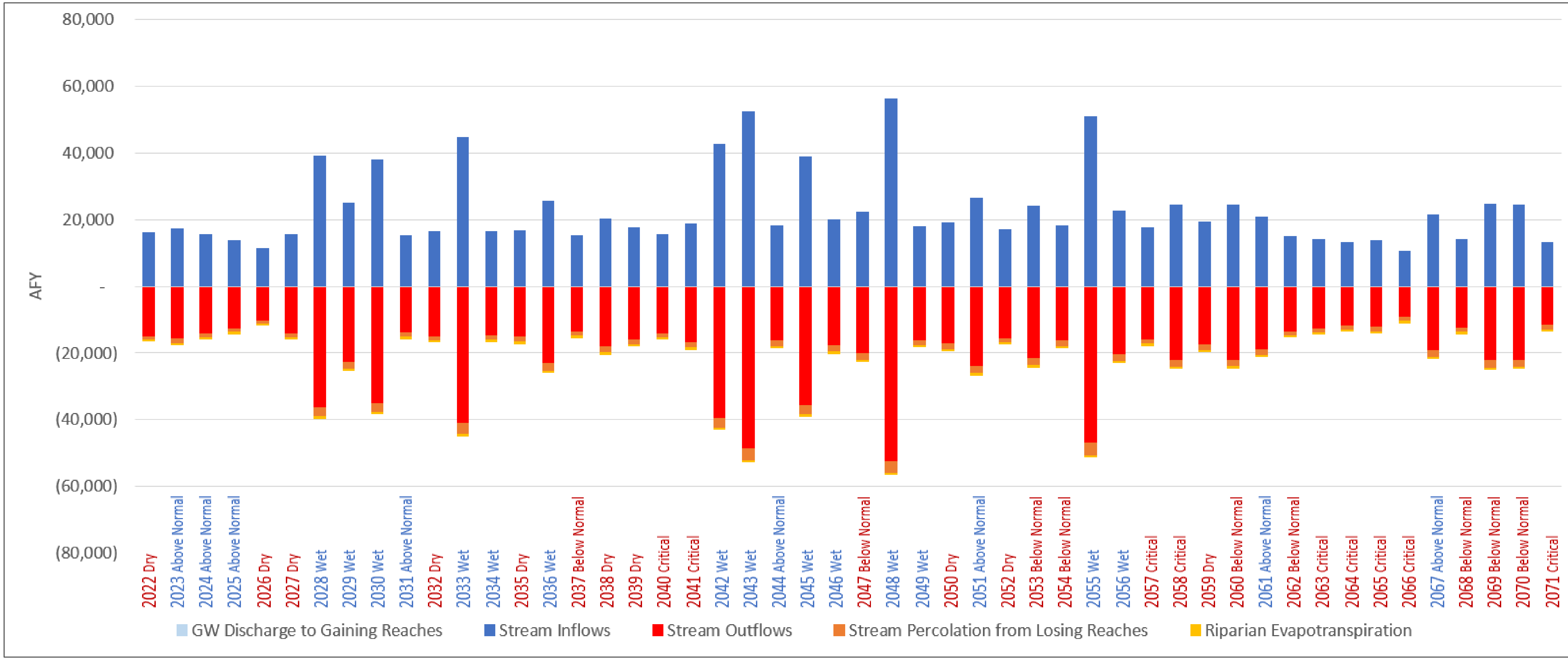
Figure 11.7c Projected Groundwater Budget Components under the 2070 Climate Change Scenario



Stream Inflows is the sum of Arroyo Santa Rosa Inflows, Arroyo Santa Rosa Tributary Inflows, Arroyo Conejo Inflows, and Direct Runoff Contributions to Streamflow.

See Table 11.4a for individual water budget components.

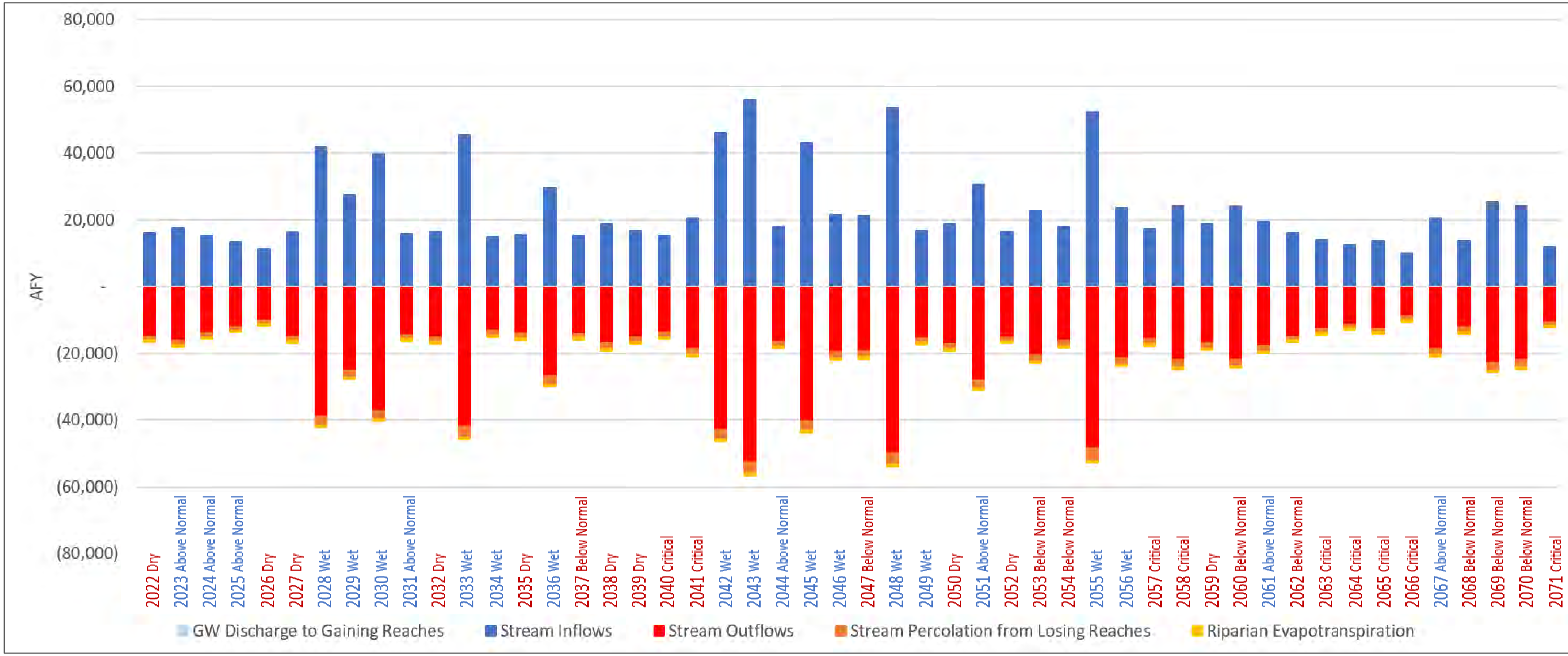
Figure 11.8a Baseline Projected Annual Surface Water Inflows (positive values) and Outflows (negative values) to/from ASRVGB (acre-feet per year)



Stream Inflows is the sum of Arroyo Santa Rosa Inflows, Arroyo Santa Rosa Tributary Inflows, Arroyo Conejo Inflows, and Direct Runoff Contributions to Streamflow.

See Table 11.4b for individual water budget components.

Figure 11.8b Projected Surface Water Budget Components under the 2030 Climate Change Scenario



Stream Inflows is the sum of Arroyo Santa Rosa Inflows, Arroyo Santa Rosa Tributary Inflows, Arroyo Conejo Inflows, and Direct Runoff Contributions to Streamflow.

See Table 11.4c for individual water budget components.

Figure 11.8c Projected Surface Water Budget Components under the 2070 Climate Change Scenario

TABLES

Table 5.1 Model Layer Type and Active Cells

Layer	Layer Type	Active Cells
1	Unconfined	12,920
2	Convertible	17,096
3	Convertible	17,096
4	Convertible	17,096
5	Convertible	17,096
6	Convertible	17,096
All		98,400

Table 6.1 Average Camrosa Metered Deliveries to ASRVGB Over the Historical Model Period

Land Use & Camrosa Water Delivery Type	Potable Deliveries per Year, acre-feet	Non-Potable Deliveries per Year, acre-feet	Total Deliveries per Year, acre-feet	Potable Deliveries, gpcd
Agricultural	56	1,927	1,984	
Potable Only	47	-	47	
Non-Potable Only	-	1,846	1,846	
Potable & Non-Potable	9	82	91	
Agricultural Nursery	19	90	109	
Potable Only	9	-	9	
Non-Potable Only	-	37	37	
Potable & Non-Potable	10	53	63	
Other	19	-	19	
Potable Only	19	-	19	
Rural Residential	1,338	449	1,787	447
Potable Only	1,261	-	1,261	585
Non-Potable Only	-	9	9	-
Potable & Non-Potable	77	440	517	93
Unmatched Deliveries	50	24	74	
Potable Only	49	-	49	
Non-Potable Only	-	21	21	
Potable & Non-Potable	2	3	4	
Grand Total	1,482	2,491	3,973	

Note: Totals may not match sums of individual values due to rounding.

Table 6.2 Recharge and Return Flows Summary

Water Year	Recharge from Precipitation	Return Flows from Agriculture	Return Flows from Non-Potable Distribution Losses	Return Flows from Potable Distribution Losses	Return Flows from Outdoor M&I	Return Flows from Indoor M&I (Septic)	Total Recharge and Return Flows
2012	6	812	113	62	336	279	1,602
2013	4	829	128	63	357	279	1,657
2014	4	880	135	65	387	279	1,746
2015	7	718	118	49	288	279	1,453
2016	6	774	132	48	288	279	1,522
2017	161	582	96	46	265	279	1,269
2018	4	666	109	54	322	279	1,430
2019	177	549	76	46	268	279	1,219
2020	38	610	77	51	298	279	1,316
2021	-	608	85	57	339	279	1,369
Total	407	7,028	1,070	542	3,148	2,794	14,582

Table 6.3 Kc by Vegetation Type and Segment

Vegetation Name	Kc	Area-weighted Scaled Kc by Segment					
		1	2	3	4	5	6
Arundo (Giant Reed)	4.5	-	-	-	-	-	37.5
Red Willow	0.8	-	-	-	7.4	18.1	3.6

Table 6.4 Monthly Pumping Distribution Example, Water Year 2012

Date	Raw Precipitation, inches	Synthetic Precipitation, inches	Inverse Synthetic Precipitation	Monthly Percentage
10/1/2011	0.69	0.69	1.45	9.0%
11/1/2011	2.16	2.16	0.46	2.9%
12/1/2011	0.48	0.6	1.67	10.3%
1/1/2012	1.82	1.82	0.55	3.4%
2/1/2012	0.08	0.6	1.67	10.3%
3/1/2012	2.72	2.72	0.37	2.3%
4/1/2012	0.47	0.6	1.67	10.3%
5/1/2012	0	0.6	1.67	10.3%
6/1/2012	0	0.6	1.67	10.3%
7/1/2012	0	0.6	1.67	10.3%
8/1/2012	0	0.6	1.67	10.3%
9/1/2012	0	0.6	1.67	10.3%

Table 6.5 Non-FCGMA Agricultural Pumping

Agricultural Water Supply		Camrosa Deliveries (avg afy, 2012-2021)	FCGMA Pumping (avg afy, WY 2012-2021)	Cropped Acres in 2016	Total Known Applied Water (avg afy)	Average Acre-Feet/Acre (cropped area only)	Estimated Additional Acre-feet/acre	Estimated Additional afy	Total Average afy
Known	Camrosa Deliveries and FCGMA Pumping Known	775	1,366	1,012	2,141	**2.1**	-	-	2,141
	Camrosa Deliveries Known, No Active Well(s) Onsite	739	-	326	739	**2.3**	-	-	739
Partially Known	Camrosa Deliveries Known, Active Well(s) Onsite	599	-	447	599	**1.3**	**0.9**	403	1,002
	Active Well(s) Onsite	-	-	53	-	-	**2.2**	118	118
Unknown	Source of Water Unknown	-	-	45	-	-	**2.2**	99	99
Grand Total		**2,113**	**1,366**	**1,884**	**3,479**	**-**	**-**	**619**	**4,098**

Table 6.6 Non-FCGMA Agricultural Pumping Annual Time Series

Water Year	FCGMA Pumping (af)	FCGMA Departure from the Average (af)	FCGMA Departure from the Average (%)	Non-FCGMA Pumping (af)
2012	1,639	273	20%	743
2013	1,514	149	11%	687
2014	1,676	311	23%	760
2015	1,242	(123)	-9%	563
2016	1,268	(97)	-7%	575
2017	1,034	(332)	-24%	469
2018	1,210	(156)	-11%	549
2019	1,239	(126)	-9%	562
2020	1,461	96	7%	663
2021	1,372	6	0%	622
Total	13,657	-	-	6,193
Average	1,366	-	-	619

[a]Derived from Table 6.5.

Table 9.1 Calibration Statistics for the Groundwater Model

Calibration Metric	Value
Mean Error[1]	7.43
Mean Absolute Error (MAE)	14.74
Root Mean Square Error (RMSE)	19.83
Number of Observations	765
Range of Observations	214.2
Scaled MAE[2]	6.9%
Scaled RMSE[2]	9.3%

[1]Error = (Simulated – Observed) Groundwater Level
[2]10% scaled MAE/RMSE is the industry calibration standard (Spitz and Moreno, 1996; Rumbaugh and Rumabugh, 2005)

Table 10.1 Historical Model Groundwater Budget (rounded to the nearest acre-feet)

Period	Water Year	Year Type	Mountain-Front Recharge from the North	Recharge from Precipitation	Agricultural Return Flows	M&I Outdoor Return Flows	M&I Septic Return Flows	Non-potable Distribution Losses	Potable Distribution Losses	Inflow from the Conejo Volcanics from the South	Inflow from the Conejo Volcanics from the East	Underflow from Pleasant Valley	Streamflow Percolation from Losing Reaches	GW Discharge to Streamflow Gaining Reaches	FCGMA Agricultural Pumping	Non-FCGMA Agricultural Pumping	Domestic Pumping	M&I Pumping	Inflows	Outflows	Change in Storage	Cumulative Change in Storage
Historical	2012*	Below Normal	295	6	812	336	279	113	62	198	2,078	(144)	730	(490)	(1,544)	(735)	(3)	(3,101)	4,614	(6,017)	(1,107)	(1,107)
	2013	Critical	284	4	829	357	279	128	63	115	1,299	131	971	(121)	(1,391)	(676)	(3)	(3,972)	4,177	(6,162)	(1,701)	(2,808)
	2014	Critical	285	4	880	387	279	135	65	98	1,203	281	1,075	(79)	(1,597)	(746)	(3)	(3,493)	4,406	(5,917)	(1,226)	(4,034)
	2015	Critical	241	7	718	288	279	118	49	90	1,213	96	1,089	(68)	(1,234)	(554)	(3)	(2,627)	3,947	(4,485)	(297)	(4,331)
	2016	Critical	243	6	774	288	279	132	48	86	1,233	103	1,027	(64)	(1,268)	(565)	(3)	(1,945)	3,977	(3,844)	376	(3,955)
	2017	Above Normal	199	161	582	265	279	96	46	76	1,095	(8)	1,721	(74)	(1,033)	(462)	(3)	(2,857)	4,322	(4,436)	85	(3,870)
	2018	Below Normal	207	4	666	322	279	109	54	80	1,180	60	1,285	(62)	(1,209)	(539)	(3)	(3,272)	4,039	(5,085)	(839)	(4,709)
Historical/ Current	2019	Below Normal	174	177	549	268	279	76	46	73	1,047	69	2,134	(73)	(1,234)	(552)	(3)	(2,094)	4,719	(3,956)	938	(3,771)
	2020	Below Normal	188	38	610	298	279	77	51	62	1,058	272	1,872	(78)	(1,440)	(650)	(3)	(1,259)	4,618	(3,430)	1,375	(2,396)
	2021	Critical	186	0	608	339	279	85	57	51	1,160	276	952	(78)	(1,335)	(611)	(3)	(1,278)	3,808	(3,305)	690	(1,706)
Historical Average (2012-2021)			230	41	703	315	279	107	54	93	1,257	114	1,286	(119)	(1,329)	(609)	(3)	(2,590)	4,263	(4,664)	(171)	
Current Average (2019-2021)			183	72	589	302	279	79	52	62	1,088	206	1,653	(77)	(1,337)	(604)	(3)	(1,544)	4,382	(3,564)	1,001	

*Note, the water budget for the initial stress-periods (first few months of WY 2012) may be impacted by uncertainty in initial conditions and numerical convergence issues.

Table 10.2 Historical Model Surface Water Budget (rounded to the nearest acre-feet)

Period	Water Year	Year Type	Arroyo Santa Rosa Inflows	Arroyo Santa Rosa Tributary Inflows	Arroyo Conejo Inflows	Conejo Creek Runoff	Net Groundwater Discharge to Gaining Reaches	Net Stream Percolation from Losing Reaches	Stream Outflows	Riparian Evapotranspiration	Inflows	Outflows
Historical	2012	Below Normal	154	18	14,998	188	490	(730)	(14,990)	(128)	15,848	(15,848)
	2013	Critical	209	25	13,481	257	121	(971)	(13,000)	(122)	14,093	(14,093)
	2014	Critical	194	23	12,677	238	79	(1,075)	(12,007)	(129)	13,211	(13,211)
	2015	Critical	168	20	12,362	207	68	(1,089)	(11,620)	(116)	12,825	(12,825)
	2016	Critical	110	13	10,634	135	64	(1,027)	(9,812)	(117)	10,956	(10,956)
	2017	Above Normal	1,092	128	18,723	1,340	74	(1,721)	(19,498)	(138)	21,357	(21,357)
	2018	Below Normal	389	46	13,118	477	62	(1,285)	(12,679)	(127)	14,092	(14,092)
Historical/ Current	2019	Below Normal	1,684	198	23,104	2,067	73	(2,134)	(24,854)	(139)	27,126	(27,127)
	2020	Below Normal	1,313	154	20,771	1,611	78	(1,872)	(21,910)	(146)	23,928	(23,928)
	2021	Critical	196	23	13,317	241	78	(952)	(12,765)	(138)	13,855	(13,855)
Historical Average (2012-2021)			551	65	15,318	676	119	(1,286)	(15,313)	(130)	16,729	(16,729)
Current Average (2019-2021)			1,065	125	19,064	1,306	77	(1,653)	(19,843)	(141)	21,636	(21,636)

Table 11.1 Predictive Model Scenarios Assumptions

Scenario	Simulation Period (Water Year)	Hydrology	Land-Use	(Natural) Areal Recharge	(Natural) Stream Recharge	Mountain Front Recharge	Managed Recharge	Inflows from the Conejo Volcanics	Return Flows (Ag)	Return Flows (M&I)	Surface Water ET (Riparian)	Pumping within ASRGSA		
												M&I	AG	Domestic
Baseline (Future with no Climate Change)	50 yrs: 1972 - 2021	Historical Conditions/ Baseflows repeating most recent 10 years (2012-2021)	No change expected (Future = current) due to SOAR Ordinance	Based on Historical Precip/ET	Based on Historical Hydrology	Based on Historical Precip	None	Based on Historical Hydrology	Repeat 10-year historical time series for the duration of the 50-year predictive period	Repeat 10-year historical time series for the duration of the 50-year predictive period	Based on Historical ET	Predictive pumping annual time series provided by Camrosa	Repeat 10-year historical time series for the duration of the 50-year predictive period	Same as historical period (1 well)
2030s Climate Change	Same as Baseline	Historical stormflows impacted by DWR 2030s climate change factors	Same as Baseline	Historical impacted by DWR 2030 climate change factors	Historical impacted by DWR 2030 climate change factors	Based on DWR climate change factors	None	Same as Baseline	Same as Baseline	Same as Baseline	Based on DWR 2030s climate change factors ET	Same as Baseline	Same as Baseline	Same as Baseline
2070s Climate Change	Same as Baseline	Historical stormflows impacted by DWR 2070s climate change factors	Same as Baseline	Historical impacted by DWR 2070 climate change factors	Historical impacted by DWR 2070 climate change factors	Based on DWR 2070 climate change factors	None	Same as Baseline	Same as Baseline	Same as Baseline	Based on DWR 2070s climate change factors ET	Same as Baseline	Same as Baseline	Same as Baseline

Table 11.2 Future Water Use Assumptions

Future Water Use Assumptions		
Scenario	Agricultural	M&I
Baseline	Cropped area based on DWR data as described in Section 6 - same as historical model. Applied water assumed to be the same as the 10-year historical period, repeating for the duration of the 50-year predictive period.	Return flow areas based on rural residential parcel coverage, same as historical model. Water use assumed to be same as the 10-year historical period, repeating for the duration of the 50-year predictive period.
CC 2030	Cropped area same as baseline. Water usage same as baseline.	Coverage same as baseline. Water use same as baseline.
CC 2070	Cropped area same as baseline. Water usage same as baseline.	Coverage same as baseline. Water use same as baseline.

Table 11.3a ASRVGB Projected Groundwater Inflows and Outflows by Water Year, Future Baseline Conditions (rounded to the nearest acre-feet)

Water Year	Year Type	Mountain-Front Recharge from the North	Recharge from Precipitation	Agricultural Return Flows	M&I Outdoor Return Flows	M&I Septic Return Flows	Non-potable Distribution Losses	Potable Distribution Losses	Inflow from the Conejo Volcanics from the South	Inflow from Conejo Volcanics from the East	Underflow from Pleasant Valley	Streamflow Percolation from Losing Reaches	GW Discharge to Streamflow Gaining Reaches	FCGMA Agricultural Pumping	Non-FCGMA Agricultural Pumping	Domestic Pumping	M&I Pumping	Inflows	Outflows	Change in Storage	Cumulative Change in Storage
2022	Dry	178	10	812	336	279	113	62	46	1,164	407	931	(89)	(1,549)	(729)	(3)	(1,169)	4,159	(3,538)	799	799
2023	Above Normal	189	330	829	357	279	128	63	34	1,066	319	1,197	(115)	(1,391)	(674)	(3)	(1,554)	4,604	(3,737)	1,056	1,855
2024	Above Normal	208	262	880	387	279	135	65	35	1,069	325	1,083	(114)	(1,595)	(743)	(2)	(2,943)	4,521	(5,398)	(670)	1,185
2025	Above Normal	179	113	718	288	279	118	49	51	1,133	102	1,081	(91)	(1,234)	(555)	(3)	(3,300)	3,934	(5,182)	(1,070)	115
2026	Dry	192	3	774	288	279	132	48	66	1,204	108	983	(75)	(1,271)	(567)	(3)	(3,307)	3,887	(5,224)	(1,145)	(1,029)
2027	Dry	154	8	582	265	279	96	46	76	1,221	17	1,159	(71)	(1,033)	(462)	(3)	(3,300)	3,750	(4,868)	(964)	(1,993)
2028	Wet	181	845	666	322	279	109	54	61	884	33	2,833	(96)	(1,206)	(538)	(2)	(3,293)	6,086	(5,135)	1,131	(862)
2029	Wet	171	836	549	268	279	76	46	49	921	4	2,049	(89)	(1,234)	(553)	(3)	(3,300)	5,078	(5,178)	71	(790)
2030	Wet	200	785	610	298	279	77	51	41	834	194	2,559	(95)	(1,446)	(651)	(3)	(3,307)	5,729	(5,502)	427	(363)
2031	Above Normal	210	17	608	339	279	85	57	55	1,085	225	1,252	(70)	(1,335)	(611)	(3)	(3,300)	4,003	(5,319)	(1,106)	(1,470)
2032	Dry	250	22	810	335	279	113	61	69	1,164	384	1,267	(69)	(1,538)	(727)	(2)	(3,293)	4,505	(5,630)	(875)	(2,344)
2033	Wet	268	1,087	829	357	279	128	63	50	768	288	3,288	(106)	(1,391)	(674)	(3)	(3,300)	7,138	(5,473)	1,934	(411)
2034	Wet	293	185	882	388	280	135	65	53	1,050	293	1,295	(83)	(1,599)	(748)	(3)	(3,307)	4,626	(5,740)	(822)	(1,232)
2035	Dry	259	23	718	288	279	118	49	68	1,132	88	1,416	(74)	(1,234)	(554)	(3)	(3,300)	4,181	(5,165)	(725)	(1,958)
2036	Wet	276	478	773	288	279	132	48	66	988	65	2,313	(89)	(1,266)	(563)	(2)	(3,293)	5,429	(5,213)	492	(1,466)
2037	Below Normal	243	7	582	265	279	96	46	75	1,182	(39)	1,183	(68)	(1,033)	(462)	(3)	(3,300)	3,716	(4,905)	(946)	(2,412)
2038	Dry	262	49	667	322	280	109	54	79	1,132	21	1,798	(74)	(1,213)	(541)	(3)	(3,307)	4,513	(5,137)	(362)	(2,774)
2039	Dry	235	17	549	268	279	76	46	87	1,211	50	1,413	(64)	(1,234)	(552)	(3)	(3,300)	3,997	(5,153)	(920)	(3,694)
2040	Critical	247	2	608	297	279	77	51	94	1,253	271	1,293	(61)	(1,434)	(648)	(2)	(3,293)	4,226	(5,439)	(966)	(4,660)
2041	Critical	247	49	608	339	279	85	57	98	1,200	290	1,699	(61)	(1,335)	(609)	(3)	(3,300)	4,706	(5,308)	(356)	(5,016)
2042	Wet	290	460	812	336	279	113	62	83	939	410	3,032	(78)	(1,549)	(728)	(3)	(3,307)	6,526	(5,665)	1,151	(3,865)
2043	Wet	307	973	829	357	279	128	63	51	726	302	3,473	(94)	(1,391)	(674)	(3)	(3,300)	7,183	(5,461)	2,029	(1,837)
2044	Above Normal	317	15	880	387	279	135	65	60	1,043	326	1,560	(73)	(1,595)	(743)	(2)	(3,293)	4,749	(5,706)	(640)	(2,477)
2045	Wet	286	906	718	288	279	118	49	48	780	74	3,085	(97)	(1,234)	(555)	(3)	(3,300)	6,346	(5,188)	1,445	(1,032)
2046	Wet	304	159	774	288	279	132	48	55	1,027	48	1,717	(81)	(1,271)	(568)	(3)	(3,307)	4,527	(5,229)	(398)	(1,430)
2047	Below Normal	272	306	582	265	279	96	46	59	1,023	(65)	1,815	(77)	(1,033)	(463)	(3)	(3,300)	4,472	(4,940)	(195)	(1,625)
2048	Wet	296	899	666	322	279	109	54	38	693	(46)	3,660	(105)	(1,206)	(539)	(2)	(3,293)	6,720	(5,192)	1,824	200
2049	Wet	258	12	549	268	279	76	46	48	1,040	(22)	1,403	(75)	(1,234)	(554)	(3)	(3,300)	3,721	(5,187)	(1,209)	(1,009)
2050	Dry	253	55	610	298	279	77	51	63	1,116	218	1,474	(72)	(1,446)	(650)	(3)	(3,307)	4,243	(5,479)	(983)	(1,991)
2051	Above Normal	252	345	608	339	279	85	57	65	1,003	229	2,171	(80)	(1,335)	(611)	(3)	(3,300)	5,182	(5,328)	106	(1,885)
2052	Dry	296	6	810	335	279	113	61	73	1,169	371	1,180	(66)	(1,538)	(727)	(2)	(3,293)	4,397	(5,627)	(934)	(2,820)
2053	Below Normal	290	96	829	357	279	128	63	78	1,095	322	2,014	(79)	(1,391)	(673)	(3)	(3,300)	5,261	(5,446)	106	(2,714)
2054	Below Normal	287	10	882	388	280	135	65	80	1,166	361	1,535	(74)	(1,599)	(747)	(3)	(3,307)	4,904	(5,730)	(539)	(3,253)
2055	Wet	262	1,107	718	288	279	118	49	53	690	86	3,796	(105)	(1,234)	(554)	(3)	(3,300)	7,185	(5,196)	2,251	(1,002)
2056	Wet	277	92	773	288	279	132	48	55	964	56	2,177	(86)	(1,266)	(564)	(2)	(3,293)	4,864	(5,211)	(70)	(1,072)
2057	Critical	233	1	582	265	279	96	46	66	1,132	(29)	1,408	(75)	(1,033)	(462)	(3)	(3,300)	3,876	(4,902)	(793)	(1,864)
2058	Critical	253	70	667	322	280	109	54	69	1,054	26	2,086	(80)	(1,213)	(541)	(3)	(3,307)	4,738	(5,144)	(153)	(2,018)
2059	Dry	226	8	549	268	279	76	46	76	1,143	55	1,561	(68)	(1,234)	(552)	(3)	(3,300)	4,061	(5,157)	(870)	(2,888)
2060	Below Normal	240	109	608	297	279	77	51	79	1,105	259	1,899	(71)	(1,434)	(649)	(2)	(3,293)	4,763	(5,450)	(447)	(3,335)
2061	Above Normal	254	589	608	339	279	85	57	74	1,064	245	1,785	(71)	(1,335)	(610)	(3)	(3,300)	5,125	(5,319)	60	(3,275)
2062	Below Normal	295	6	812	336	279	113	62	87	1,229	388	1,132	(60)	(1,549)	(728)	(3)	(3,307)	4,444	(5,647)	(908)	(4,183)
2063	Critical	284	4	829	357	279	128	63	95	1,262	350	1,176	(62)	(1,391)	(672)	(3)	(3,300)	4,544	(5,427)	(599)	(4,782)
2064	Critical	285	4	880	387	279	135	65	100	1,279	392	1,178	(57)	(1,595)	(741)	(2)	(3,293)	4,699	(5,688)	(704)	(5,486)
2065	Critical	241	7	718	288	279	118	49	107	1,317	168	1,182	(56)	(1,234)	(552)	(3)	(3,300)	4,234	(5,145)	(670)	(6,156)
2066	Critical	243	6	774	288	279	132	48	113	1,353	163	1,145	(52)	(1,271)	(565)	(3)	(3,307)	4,303	(5,199)	(652)	(6,808)
2067	Above Normal	199	161	582	265	279	96	46	112	1,243	49	1,882	(60)	(1,033)	(460)	(3)	(3,300)	4,716	(4,856)	59	(6,748)
2068	Below Normal	207	4	666	322	279	109	54	114	1,312	105	1,400	(53)	(1,206)	(536)	(2)	(3,293)	4,364	(5,090)	(519)	(7,267)
2069	Below Normal	174	177	549	268	279	76	46	112	1,185	120	2,297	(63)	(1,234)	(551)	(3)	(3,300)	5,111	(5,150)	135	(7,132)
2070	Below Normal	188	38	610	298	279	77	51	110	1,206	337	2,104	(62)	(1,446)	(648)	(3)	(3,307)	5,111	(5,466)	(168)	(7,300)
2071	Critical	186	-	608	339	279	85	57	113	1,318	360	1,282	(50)	(1,335)	(609)	(3)	(3,300)	4,442	(5,297)	(668)	(7,968)
Average (2022-2071)		244	235	703	315	279	107	54	72	1,087	182	1,794	(77)	(1,329)	(608)	(3)	(3,216)	4,832	(5,235)	(159)	

Table 11.3b ASRVGB Projected Groundwater Inflows and Outflows by Water Year, 2030 Climate Change Factors (rounded to the nearest acre-feet)

Water Year	Year Type	Mountain-Front Recharge from the North	Recharge from Precipitation	Agricultural Return Flows	M&I Outdoor Return Flows	M&I Septic Return Flows	Non-potable Distribution Losses	Potable Distribution Losses	Inflow from the Conejo Volcanics from the South	Inflow from Conejo Volcanics from the East	Underflow from Pleasant Valley	Streamflow Percolation from Losing Reaches	GW Discharge to Streamflow Gaining Reaches	FCGMA Agricultural Pumping	Non-FCGMA Agricultural Pumping	Domestic Pumping	M&I Pumping	Inflows	Outflows	Change in Storage	Cumulative Change in Storage
2022	Dry	178	9	812	336	279	113	62	46	1,165	407	927	(89)	(1,549)	(729)	(3)	(1,169)	4,155	(3,538)	795	795
2023	Below Normal	189	324	829	357	279	128	63	34	1,068	320	1,185	(114)	(1,391)	(674)	(3)	(1,554)	4,588	(3,736)	1,040	1,835
2024	Wet	208	252	880	387	279	135	65	35	1,069	326	1,089	(113)	(1,595)	(743)	(2)	(2,943)	4,518	(5,397)	(671)	1,164
2025	Below Normal	179	99	718	288	279	118	49	52	1,136	105	1,070	(90)	(1,234)	(555)	(3)	(3,300)	3,915	(5,181)	(1,088)	76
2026	Below Normal	192	3	774	288	279	132	48	66	1,205	110	994	(75)	(1,271)	(567)	(3)	(3,307)	3,900	(5,223)	(1,130)	(1,054)
2027	Dry	154	8	582	265	279	96	46	76	1,218	18	1,178	(71)	(1,033)	(462)	(3)	(3,300)	3,768	(4,868)	(946)	(2,000)
2028	Wet	181	773	666	322	279	109	54	62	890	36	2,810	(94)	(1,206)	(538)	(2)	(3,293)	6,001	(5,133)	1,048	(952)
2029	Wet	171	804	549	268	279	76	46	51	942	10	1,963	(86)	(1,234)	(553)	(3)	(3,300)	4,989	(5,176)	(16)	(968)
2030	Wet	200	732	610	298	279	77	51	44	853	201	2,528	(93)	(1,446)	(651)	(3)	(3,307)	5,674	(5,500)	374	(594)
2031	Wet	210	15	608	339	279	85	57	58	1,098	232	1,237	(68)	(1,335)	(611)	(3)	(3,300)	4,008	(5,317)	(1,099)	(1,693)
2032	Dry	250	20	810	335	279	113	61	71	1,175	390	1,245	(68)	(1,538)	(727)	(2)	(3,293)	4,499	(5,628)	(879)	(2,572)
2033	Wet	268	1,031	829	357	279	128	63	54	789	294	3,246	(103)	(1,391)	(674)	(3)	(3,300)	7,070	(5,470)	1,868	(704)
2034	Wet	293	185	882	388	280	135	65	55	1,059	300	1,307	(81)	(1,599)	(748)	(3)	(3,307)	4,657	(5,738)	(789)	(1,493)
2035	Dry	259	23	718	288	279	118	49	70	1,142	93	1,415	(73)	(1,234)	(554)	(3)	(3,300)	4,196	(5,163)	(708)	(2,202)
2036	Wet	276	449	773	288	279	132	48	68	1,009	70	2,256	(87)	(1,266)	(563)	(2)	(3,293)	5,373	(5,211)	437	(1,764)
2037	Below Normal	243	7	582	265	279	96	46	78	1,192	(34)	1,195	(67)	(1,033)	(462)	(3)	(3,300)	3,740	(4,898)	(915)	(2,679)
2038	Dry	262	46	667	322	280	109	54	81	1,139	26	1,807	(73)	(1,213)	(541)	(3)	(3,307)	4,533	(5,136)	(341)	(3,020)
2039	Dry	235	17	549	268	279	76	46	89	1,216	55	1,427	(64)	(1,234)	(552)	(3)	(3,300)	4,022	(5,152)	(895)	(3,915)
2040	Critical	247	2	608	297	279	77	51	95	1,257	275	1,303	(60)	(1,434)	(648)	(2)	(3,293)	4,245	(5,438)	(946)	(4,861)
2041	Critical	247	43	608	339	279	85	57	99	1,218	294	1,622	(60)	(1,335)	(609)	(3)	(3,300)	4,646	(5,307)	(414)	(5,275)
2042	Above Normal	290	414	812	336	279	113	62	87	967	416	2,946	(76)	(1,549)	(728)	(3)	(3,307)	6,431	(5,663)	1,058	(4,217)
2043	Wet	307	951	829	357	279	128	63	56	747	309	3,445	(92)	(1,391)	(674)	(3)	(3,300)	7,166	(5,459)	2,014	(2,203)
2044	Above Normal	317	15	880	387	279	135	65	63	1,054	332	1,577	(71)	(1,595)	(742)	(2)	(3,293)	4,787	(5,705)	(601)	(2,804)
2045	Wet	286	804	718	288	279	118	49	55	833	83	2,885	(92)	(1,234)	(554)	(3)	(3,300)	6,113	(5,183)	1,216	(1,588)
2046	Above Normal	304	159	774	288	279	132	48	61	1,043	58	1,772	(79)	(1,271)	(567)	(3)	(3,307)	4,614	(5,228)	(309)	(1,897)
2047	Below Normal	272	294	582	265	279	96	46	64	1,041	(57)	1,820	(75)	(1,033)	(462)	(3)	(3,300)	4,487	(4,929)	(170)	(2,067)
2048	Wet	296	913	666	322	279	109	54	41	713	(40)	3,652	(103)	(1,206)	(539)	(2)	(3,293)	6,749	(5,183)	1,861	(206)
2049	Wet	258	11	549	268	279	76	46	51	1,052	(16)	1,411	(73)	(1,234)	(554)	(3)	(3,300)	3,744	(5,179)	(1,177)	(1,383)
2050	Below Normal	253	53	610	298	279	77	51	66	1,123	224	1,506	(71)	(1,446)	(650)	(3)	(3,307)	4,287	(5,477)	(937)	(2,320)
2051	Above Normal	252	326	608	339	279	85	57	68	1,016	235	2,159	(78)	(1,335)	(610)	(3)	(3,300)	5,171	(5,326)	97	(2,222)
2052	Dry	296	6	810	335	279	113	61	75	1,178	378	1,192	(65)	(1,538)	(727)	(2)	(3,293)	4,427	(5,626)	(903)	(3,126)
2053	Below Normal	290	96	829	357	279	128	63	80	1,101	327	2,024	(79)	(1,391)	(673)	(3)	(3,300)	5,284	(5,445)	129	(2,996)
2054	Dry	287	11	882	388	280	135	65	82	1,169	366	1,567	(74)	(1,599)	(746)	(3)	(3,307)	4,944	(5,729)	(498)	(3,494)
2055	Wet	262	1,061	718	288	279	118	49	56	702	92	3,785	(103)	(1,234)	(554)	(3)	(3,300)	7,148	(5,194)	2,217	(1,277)
2056	Above Normal	277	82	773	288	279	132	48	58	986	63	2,099	(84)	(1,266)	(564)	(2)	(3,293)	4,808	(5,209)	(124)	(1,401)
2057	Critical	233	1	582	265	279	96	46	68	1,142	(23)	1,427	(74)	(1,033)	(462)	(3)	(3,300)	3,907	(4,894)	(754)	(2,155)
2058	Critical	253	64	667	322	280	109	54	71	1,061	32	2,096	(79)	(1,213)	(541)	(3)	(3,307)	4,757	(5,143)	(133)	(2,288)
2059	Dry	226	8	549	268	279	76	46	77	1,148	60	1,574	(67)	(1,234)	(552)	(3)	(3,300)	4,086	(5,156)	(844)	(3,133)
2060	Below Normal	240	110	608	297	279	77	51	80	1,102	263	1,950	(71)	(1,434)	(649)	(2)	(3,293)	4,818	(5,449)	(392)	(3,524)
2061	Above Normal	254	550	608	339	279	85	57	75	1,075	250	1,764	(70)	(1,335)	(610)	(3)	(3,300)	5,084	(5,318)	20	(3,505)
2062	Below Normal	295	6	812	336	279	113	62	89	1,236	394	1,130	(59)	(1,549)	(728)	(3)	(3,307)	4,457	(5,646)	(894)	(4,399)
2063	Critical	284	4	829	357	279	128	63	96	1,266	355	1,187	(61)	(1,391)	(672)	(3)	(3,300)	4,565	(5,427)	(577)	(4,976)
2064	Critical	285	3	880	387	279	135	65	101	1,283	396	1,180	(57)	(1,595)	(740)	(2)	(3,293)	4,709	(5,688)	(693)	(5,670)
2065	Critical	241	7	718	288	279	118	49	108	1,321	171	1,196	(56)	(1,234)	(552)	(3)	(3,300)	4,256	(5,145)	(648)	(6,318)
2066	Dry	243	7	774	288	279	132	48	114	1,356	166	1,146	(52)	(1,271)	(565)	(3)	(3,307)	4,310	(5,198)	(645)	(6,962)
2067	Above Normal	199	163	582	265	279	96	46	113	1,244	51	1,894	(60)	(1,033)	(460)	(3)	(3,300)	4,735	(4,855)	78	(6,884)
2068	Below Normal	207	4	666	322	279	109	54	115	1,318	107	1,384	(52)	(1,206)	(536)	(2)	(3,293)	4,358	(5,089)	(525)	(7,409)
2069	Above Normal	174	166	549	268	279	76	46	114	1,202	123	2,216	(61)	(1,234)	(551)	(3)	(3,300)	5,040	(5,148)	66	(7,343)
2070	Above Normal	188	41	610	298	279	77	51	111	1,211	340	2,128	(61)	(1,446)	(648)	(3)	(3,307)	5,147	(5,466)	(131)	(7,474)
2071	Critical	186	-	608	339	279	85	57	114	1,323	362	1,278	(50)	(1,335)	(609)	(3)	(3,300)	4,446	(5,297)	(665)	(8,139)
Average(2022-2071)		244	224	703	315	279	107	54	74	1,097	187	1,784	(76)	(1,329)	(608)	(3)	(3,216)	4,827	(5,233)	(163)	

Table 11.3c ASRVGB Projected Groundwater Inflows and Outflows by Water Year, 2070 Climate Change Factors (rounded to the nearest acre-feet)

Water Year	Year Type	Mountain-Front Recharge from the North	Recharge from Precipitation	Agricultural Return Flows	M&I Outdoor Return Flows	M&I Septic Return Flows	Non-potable Distribution Losses	Potable Distribution Losses	Inflow from the Conejo Volcanics from the South	Inflow from Conejo Volcanics from the East	Underflow from Pleasant Valley	Streamflow Percolation from Losing Reaches	GW Discharge to Streamflow Gaining Reaches	FCGMA Agricultural Pumping	Non-FCGMA Agricultural Pumping	Domestic Pumping	M&I Pumping	Inflows	Outflows	Change in Storage	Cumulative Change in Storage
2022	Dry	178	8	812	336	279	113	62	46	1,167	407	916	(89)	(1,549)	(729)	(3)	(1,169)	4,147	(3,538)	787	787
2023	Above Normal	189	325	829	357	279	128	63	34	1,058	320	1,229	(115)	(1,391)	(674)	(3)	(1,554)	4,623	(3,737)	1,074	1,861
2024	Wet	208	243	880	387	279	135	65	35	1,065	327	1,099	(113)	(1,595)	(743)	(2)	(2,943)	4,515	(5,397)	(674)	1,187
2025	Below Normal	179	98	718	288	279	118	49	51	1,136	105	1,058	(89)	(1,234)	(555)	(3)	(3,300)	3,902	(5,180)	(1,100)	87
2026	Below Normal	192	3	774	288	279	132	48	66	1,201	111	1,055	(73)	(1,271)	(567)	(3)	(3,307)	3,958	(5,221)	(1,070)	(984)
2027	Below Normal	154	8	582	265	279	96	46	75	1,204	18	1,198	(73)	(1,033)	(462)	(3)	(3,300)	3,772	(4,870)	(944)	(1,928)
2028	Wet	181	809	666	322	279	109	54	59	875	35	2,881	(94)	(1,206)	(538)	(2)	(3,293)	6,090	(5,134)	1,137	(791)
2029	Wet	171	817	549	268	279	76	46	47	909	8	2,080	(88)	(1,234)	(554)	(3)	(3,300)	5,079	(5,178)	72	(719)
2030	Wet	200	754	610	298	279	77	51	39	831	198	2,571	(95)	(1,446)	(651)	(3)	(3,307)	5,710	(5,502)	408	(310)
2031	Wet	210	15	608	339	279	85	57	54	1,080	228	1,260	(69)	(1,335)	(611)	(3)	(3,300)	4,006	(5,319)	(1,102)	(1,413)
2032	Below Normal	250	20	810	335	279	113	61	68	1,164	387	1,245	(68)	(1,538)	(727)	(2)	(3,293)	4,482	(5,629)	(896)	(2,309)
2033	Wet	268	1,054	829	357	279	128	63	50	778	291	3,237	(105)	(1,391)	(674)	(3)	(3,300)	7,067	(5,472)	1,864	(446)
2034	Wet	293	152	882	388	280	135	65	54	1,063	299	1,244	(80)	(1,599)	(748)	(3)	(3,307)	4,563	(5,737)	(882)	(1,328)
2035	Dry	259	20	718	288	279	118	49	69	1,148	93	1,354	(73)	(1,234)	(554)	(3)	(3,300)	4,137	(5,163)	(767)	(2,095)
2036	Wet	276	470	773	288	279	132	48	66	968	68	2,464	(89)	(1,266)	(563)	(2)	(3,293)	5,555	(5,213)	618	(1,477)
2037	Below Normal	243	6	582	265	279	96	46	75	1,178	(36)	1,184	(69)	(1,033)	(462)	(3)	(3,300)	3,711	(4,902)	(948)	(2,426)
2038	Dry	262	43	667	322	280	109	54	80	1,141	24	1,735	(73)	(1,213)	(541)	(3)	(3,307)	4,456	(5,136)	(418)	(2,843)
2039	Dry	235	15	549	268	279	76	46	88	1,219	53	1,384	(64)	(1,234)	(552)	(3)	(3,300)	3,978	(5,152)	(939)	(3,782)
2040	Critical	247	2	608	297	279	77	51	94	1,253	274	1,300	(61)	(1,434)	(648)	(2)	(3,293)	4,236	(5,438)	(955)	(4,737)
2041	Dry	247	47	608	339	279	85	57	98	1,198	293	1,729	(61)	(1,335)	(609)	(3)	(3,300)	4,733	(5,308)	(328)	(5,065)
2042	Wet	290	431	812	336	279	113	62	83	947	413	3,021	(77)	(1,549)	(728)	(3)	(3,307)	6,498	(5,664)	1,124	(3,942)
2043	Wet	307	967	829	357	279	128	63	50	729	305	3,513	(93)	(1,391)	(674)	(3)	(3,300)	7,223	(5,461)	2,069	(1,873)
2044	Above Normal	317	14	880	387	279	135	65	59	1,039	328	1,578	(72)	(1,595)	(743)	(2)	(3,293)	4,765	(5,706)	(624)	(2,497)
2045	Wet	286	821	718	288	279	118	49	49	804	79	3,002	(94)	(1,234)	(555)	(3)	(3,300)	6,208	(5,185)	1,309	(1,189)
2046	Above Normal	304	151	774	288	279	132	48	56	1,011	54	1,852	(81)	(1,271)	(568)	(3)	(3,307)	4,645	(5,230)	(281)	(1,469)
2047	Below Normal	272	311	582	265	279	96	46	59	1,033	(61)	1,754	(76)	(1,033)	(463)	(3)	(3,300)	4,426	(4,935)	(236)	(1,705)
2048	Wet	296	868	666	322	279	109	54	39	730	(43)	3,505	(103)	(1,206)	(539)	(2)	(3,293)	6,573	(5,186)	1,683	(23)
2049	Wet	258	10	549	268	279	76	46	50	1,056	(17)	1,375	(73)	(1,234)	(554)	(3)	(3,300)	3,710	(5,181)	(1,213)	(1,236)
2050	Below Normal	253	49	610	298	279	77	51	65	1,120	223	1,505	(71)	(1,446)	(650)	(3)	(3,307)	4,278	(5,478)	(947)	(2,182)
2051	Above Normal	252	332	608	339	279	85	57	65	971	233	2,381	(81)	(1,335)	(611)	(3)	(3,300)	5,351	(5,329)	275	(1,908)
2052	Dry	296	5	810	335	279	113	61	72	1,164	375	1,173	(66)	(1,538)	(727)	(2)	(3,293)	4,387	(5,626)	(943)	(2,851)
2053	Below Normal	290	93	829	357	279	128	63	77	1,096	325	1,974	(79)	(1,391)	(673)	(3)	(3,300)	5,223	(5,445)	68	(2,783)
2054	Dry	287	10	882	388	280	135	65	80	1,161	364	1,568	(74)	(1,599)	(747)	(3)	(3,307)	4,934	(5,730)	(508)	(3,292)
2055	Wet	262	1,084	718	288	279	118	49	53	700	89	3,777	(104)	(1,234)	(554)	(3)	(3,300)	7,157	(5,195)	2,225	(1,067)
2056	Above Normal	277	78	773	288	279	132	48	55	970	60	2,144	(85)	(1,266)	(564)	(2)	(3,293)	4,828	(5,210)	(105)	(1,172)
2057	Critical	233	1	582	265	279	96	46	66	1,135	(25)	1,416	(74)	(1,033)	(462)	(3)	(3,300)	3,887	(4,897)	(778)	(1,950)
2058	Critical	253	57	667	322	280	109	54	70	1,054	30	2,096	(80)	(1,213)	(541)	(3)	(3,307)	4,740	(5,143)	(151)	(2,101)
2059	Dry	226	8	549	268	279	76	46	76	1,146	58	1,546	(67)	(1,234)	(552)	(3)	(3,300)	4,053	(5,156)	(877)	(2,978)
2060	Below Normal	240	110	608	297	279	77	51	79	1,096	262	1,954	(71)	(1,434)	(649)	(2)	(3,293)	4,813	(5,450)	(397)	(3,374)
2061	Above Normal	254	540	608	339	279	85	57	75	1,079	251	1,717	(69)	(1,335)	(610)	(3)	(3,300)	5,031	(5,317)	(33)	(3,407)
2062	Below Normal	295	6	812	336	279	113	62	88	1,233	393	1,143	(60)	(1,549)	(728)	(3)	(3,307)	4,466	(5,647)	(886)	(4,293)
2063	Critical	284	4	829	357	279	128	63	96	1,263	354	1,185	(61)	(1,391)	(672)	(3)	(3,300)	4,558	(5,427)	(584)	(4,878)
2064	Critical	285	3	880	387	279	135	65	101	1,283	395	1,158	(56)	(1,595)	(741)	(2)	(3,293)	4,686	(5,687)	(716)	(5,594)
2065	Critical	241	6	718	288	279	118	49	107	1,319	170	1,196	(56)	(1,234)	(552)	(3)	(3,300)	4,253	(5,145)	(651)	(6,245)
2066	Dry	243	7	774	288	279	132	48	113	1,354	166	1,140	(52)	(1,271)	(565)	(3)	(3,307)	4,302	(5,198)	(653)	(6,898)
2067	Above Normal	199	162	582	265	279	96	46	113	1,248	50	1,866	(59)	(1,033)	(460)	(3)	(3,300)	4,707	(4,855)	52	(6,846)
2068	Below Normal	207	4	666	322	279	109	54	114	1,314	106	1,408	(52)	(1,206)	(536)	(2)	(3,293)	4,376	(5,089)	(507)	(7,353)
2069	Above Normal	174	170	549	268	279	76	46	113	1,190	122	2,262	(61)	(1,234)	(551)	(3)	(3,300)	5,077	(5,148)	103	(7,251)
2070	Above Normal	188	31	610	298	279	77	51	110	1,209	340	2,119	(61)	(1,446)	(648)	(3)	(3,307)	5,125	(5,466)	(153)	(7,403)
2071	Critical	186	-	608	339	279	85	57	114	1,323	363	1,251	(49)	(1,335)	(609)	(3)	(3,300)	4,420	(5,296)	(690)	(8,093)
Average (2022-2071)		244	225	703	315	279	107	54	72	1,088	185	1,796	(76)	(1,329)	(608)	(3)	(3,216)	4,828	(5,234)	(162)	

Table 11.4a ASRVGB Surface Water Inflows and Outflows by Water Year, Future Baseline Conditions (rounded to the nearest acre-feet)

Water Year	Year Type	Arroyo Santa Rosa Inflows	Arroyo Santa Rosa Tributary Inflows	Arroyo Conejo Inflows	Conejo Creek Runoff	GW Discharge to Gaining Reaches	Stream Percolation from Losing Reaches	Stream Outflows	Riparian Evapotranspiration	Inflows	Outflows
2022	Dry	232	27	15,475	285	89	(931)	(15,049)	(129)	16,109	(16,109)
2023	Above Normal	714	84	16,536	875	115	(1,197)	(16,999)	(128)	18,324	(18,324)
2024	Above Normal	519	61	14,644	636	114	(1,083)	(14,768)	(123)	15,974	(15,974)
2025	Above Normal	355	42	13,493	436	91	(1,081)	(13,215)	(121)	14,417	(14,417)
2026	Dry	161	19	10,939	197	75	(983)	(10,293)	(114)	11,391	(11,391)
2027	Dry	318	37	14,035	390	71	(1,159)	(13,567)	(125)	14,851	(14,851)
2028	Wet	3,544	417	32,231	4,348	96	(2,833)	(37,664)	(139)	40,636	(40,636)
2029	Wet	1,706	201	23,236	2,093	89	(2,049)	(25,136)	(140)	27,325	(27,325)
2030	Wet	3,164	372	31,982	3,881	95	(2,559)	(36,793)	(143)	39,495	(39,495)
2031	Above Normal	432	51	14,747	530	70	(1,252)	(14,453)	(125)	15,830	(15,830)
2032	Dry	398	47	16,449	489	69	(1,267)	(16,054)	(132)	17,452	(17,452)
2033	Wet	4,062	478	36,826	4,984	106	(3,288)	(43,013)	(155)	46,456	(46,456)
2034	Wet	556	65	14,899	682	83	(1,295)	(14,863)	(127)	16,284	(16,284)
2035	Dry	640	75	15,221	786	74	(1,416)	(15,257)	(124)	16,797	(16,797)
2036	Wet	2,000	235	22,058	2,454	89	(2,313)	(24,385)	(138)	26,837	(26,837)
2037	Below Normal	309	36	13,980	380	68	(1,183)	(13,464)	(125)	14,773	(14,773)
2038	Dry	1,117	131	17,557	1,370	74	(1,798)	(18,319)	(131)	20,249	(20,249)
2039	Dry	528	62	16,099	648	64	(1,413)	(15,859)	(130)	17,402	(17,402)
2040	Critical	350	41	14,905	430	61	(1,293)	(14,367)	(128)	15,787	(15,787)
2041	Critical	941	111	17,835	1,155	61	(1,699)	(18,276)	(128)	20,103	(20,103)
2042	Wet	3,712	437	36,556	4,554	78	(3,032)	(42,160)	(146)	45,338	(45,338)
2043	Wet	4,937	581	42,124	6,057	94	(3,473)	(50,170)	(149)	53,792	(53,793)
2044	Above Normal	776	91	16,205	952	73	(1,560)	(16,408)	(129)	18,097	(18,097)
2045	Wet	3,978	468	35,445	4,880	97	(3,085)	(41,635)	(147)	44,867	(44,867)
2046	Wet	1,063	125	16,404	1,304	81	(1,717)	(17,131)	(129)	18,976	(18,976)
2047	Below Normal	1,236	145	19,592	1,516	77	(1,815)	(20,618)	(133)	22,566	(22,566)
2048	Wet	5,291	622	42,814	6,491	105	(3,660)	(51,505)	(158)	55,323	(55,323)
2049	Wet	620	73	16,654	761	75	(1,403)	(16,646)	(134)	18,183	(18,183)
2050	Dry	687	81	16,976	843	72	(1,474)	(17,051)	(133)	18,659	(18,659)
2051	Above Normal	1,754	206	22,759	2,152	80	(2,171)	(24,654)	(126)	26,951	(26,951)
2052	Dry	270	32	15,656	331	66	(1,180)	(15,049)	(126)	16,355	(16,355)
2053	Below Normal	1,402	165	20,705	1,720	79	(2,014)	(21,922)	(135)	24,071	(24,071)
2054	Below Normal	730	86	15,959	896	74	(1,535)	(16,077)	(134)	17,746	(17,746)
2055	Wet	4,794	564	40,388	5,882	105	(3,796)	(47,790)	(148)	51,733	(51,733)
2056	Wet	1,701	200	20,245	2,087	86	(2,177)	(22,014)	(129)	24,320	(24,320)
2057	Critical	596	70	15,715	731	75	(1,408)	(15,647)	(131)	17,186	(17,187)
2058	Critical	1,612	190	20,555	1,977	80	(2,086)	(22,188)	(140)	24,413	(24,414)
2059	Dry	765	90	17,532	938	68	(1,561)	(17,698)	(134)	19,393	(19,393)
2060	Below Normal	1,248	147	20,344	1,531	71	(1,899)	(21,314)	(129)	23,342	(23,342)
2061	Above Normal	1,108	130	18,843	1,359	71	(1,785)	(19,606)	(119)	21,510	(21,510)
2062	Below Normal	154	18	14,981	188	60	(1,132)	(14,143)	(126)	15,401	(15,401)
2063	Critical	209	25	13,481	257	62	(1,176)	(12,736)	(121)	14,034	(14,034)
2064	Critical	194	23	12,677	238	57	(1,178)	(11,882)	(129)	13,189	(13,189)
2065	Critical	168	20	12,362	207	56	(1,182)	(11,515)	(116)	12,813	(12,813)
2066	Critical	110	13	10,634	135	52	(1,145)	(9,684)	(116)	10,945	(10,945)
2067	Above Normal	1,092	128	18,723	1,340	60	(1,882)	(19,324)	(137)	21,343	(21,343)
2068	Below Normal	389	46	13,118	477	53	(1,400)	(12,556)	(127)	14,083	(14,083)
2069	Below Normal	1,684	198	23,104	2,067	63	(2,297)	(24,681)	(139)	27,116	(27,116)
2070	Below Normal	1,313	154	20,771	1,611	62	(2,104)	(21,662)	(146)	23,911	(23,911)
2071	Critical	196	23	13,317	241	50	(1,282)	(12,408)	(137)	13,827	(13,827)
	Average (2022-2071)	1,317	155	19,956	1,615	77	(1,794)	(21,193)	(132)	23,119	(23,120)

Table 11.4b ASRVGB Projected Surface Water Inflows and Outflows by Water Year, 2030 Climate Change Factors (rounded to the nearest acre-feet)

Water Year	Year Type	Arroyo Santa Rosa Inflows	Arroyo Santa Rosa Tributary Inflows	Arroyo Conejo Inflows	Conejo Creek Runoff	GW Discharge to Gaining Reaches	Stream Percolation from Losing Reaches	Stream Outflows	Riparian Evapotranspiration	Inflows	Outflows
2022	Dry	226	27	15,486	277	89	(927)	(15,044)	(135)	16,105	(16,105)
2023	Below Normal	703	83	15,435	862	114	(1,185)	(15,885)	(128)	17,198	(17,198)
2024	Wet	530	62	14,166	650	113	(1,089)	(14,307)	(126)	15,522	(15,522)
2025	Below Normal	340	40	12,957	417	90	(1,070)	(12,649)	(124)	13,843	(13,843)
2026	Below Normal	171	20	10,930	210	75	(994)	(10,295)	(117)	11,407	(11,407)
2027	Dry	338	40	14,581	415	71	(1,178)	(14,135)	(131)	15,445	(15,445)
2028	Wet	3,429	403	31,086	4,208	94	(2,810)	(36,269)	(141)	39,221	(39,220)
2029	Wet	1,568	184	21,112	1,924	86	(1,963)	(22,772)	(140)	24,875	(24,875)
2030	Wet	3,059	360	30,727	3,753	93	(2,528)	(35,318)	(147)	37,992	(37,992)
2031	Wet	402	47	14,334	493	68	(1,237)	(13,978)	(130)	15,344	(15,344)
2032	Dry	366	43	15,487	449	68	(1,245)	(15,032)	(135)	16,412	(16,412)
2033	Wet	3,894	458	35,335	4,777	103	(3,246)	(41,162)	(159)	44,567	(44,567)
2034	Wet	563	66	14,873	691	81	(1,307)	(14,837)	(131)	16,275	(16,275)
2035	Dry	626	74	15,270	768	73	(1,415)	(15,265)	(130)	16,810	(16,810)
2036	Wet	1,897	223	20,939	2,328	87	(2,256)	(23,078)	(141)	25,474	(25,474)
2037	Below Normal	309	36	14,304	380	67	(1,195)	(13,770)	(131)	15,097	(15,097)
2038	Dry	1,118	132	17,407	1,372	73	(1,807)	(18,160)	(136)	20,102	(20,102)
2039	Dry	536	63	16,266	657	64	(1,427)	(16,024)	(135)	17,586	(17,586)
2040	Critical	357	42	14,706	438	60	(1,303)	(14,170)	(131)	15,603	(15,603)
2041	Critical	797	94	16,740	977	60	(1,622)	(16,914)	(131)	18,667	(18,668)
2042	Above Normal	3,488	410	34,411	4,280	76	(2,946)	(39,571)	(149)	42,665	(42,665)
2043	Wet	4,802	565	41,005	5,891	92	(3,445)	(48,755)	(154)	52,354	(52,355)
2044	Above Normal	786	92	16,247	964	71	(1,577)	(16,449)	(134)	18,161	(18,161)
2045	Wet	3,387	399	30,686	4,156	92	(2,885)	(35,686)	(150)	38,720	(38,720)
2046	Above Normal	1,120	132	17,070	1,374	79	(1,772)	(17,869)	(135)	19,775	(19,775)
2047	Below Normal	1,222	144	19,321	1,499	75	(1,820)	(20,303)	(138)	22,260	(22,260)
2048	Wet	5,470	644	43,366	6,712	103	(3,652)	(52,482)	(161)	56,294	(56,294)
2049	Wet	612	72	16,352	751	73	(1,411)	(16,310)	(139)	17,860	(17,860)
2050	Below Normal	711	84	17,241	873	71	(1,506)	(17,337)	(137)	18,980	(18,980)
2051	Above Normal	1,706	201	22,215	2,093	78	(2,159)	(24,005)	(130)	26,293	(26,293)
2052	Dry	268	32	16,236	329	65	(1,192)	(15,605)	(132)	16,930	(16,930)
2053	Below Normal	1,412	166	20,517	1,733	79	(2,024)	(21,745)	(138)	23,907	(23,907)
2054	Dry	758	89	16,302	930	74	(1,567)	(16,448)	(139)	18,153	(18,153)
2055	Wet	4,719	555	39,800	5,790	103	(3,785)	(47,032)	(152)	50,968	(50,968)
2056	Above Normal	1,575	185	18,789	1,932	84	(2,099)	(20,335)	(131)	22,565	(22,565)
2057	Critical	604	71	15,974	740	74	(1,427)	(15,899)	(137)	17,463	(17,463)
2058	Critical	1,621	191	20,445	1,988	79	(2,096)	(22,082)	(145)	24,323	(24,323)
2059	Dry	772	91	17,490	948	67	(1,574)	(17,656)	(139)	19,368	(19,368)
2060	Below Normal	1,310	154	21,104	1,608	71	(1,950)	(22,164)	(134)	24,247	(24,247)
2061	Above Normal	1,059	125	18,231	1,299	70	(1,764)	(18,898)	(121)	20,783	(20,783)
2062	Below Normal	143	17	14,542	175	59	(1,130)	(13,677)	(130)	14,937	(14,936)
2063	Critical	213	25	13,562	262	61	(1,187)	(12,809)	(127)	14,123	(14,123)
2064	Critical	190	22	12,628	233	57	(1,180)	(11,816)	(134)	13,130	(13,130)
2065	Critical	172	20	13,206	210	56	(1,196)	(12,344)	(124)	13,664	(13,664)
2066	Dry	112	13	10,303	138	52	(1,146)	(9,354)	(118)	10,618	(10,618)
2067	Above Normal	1,103	130	18,779	1,353	60	(1,894)	(19,389)	(141)	21,424	(21,425)
2068	Below Normal	362	43	12,997	444	52	(1,384)	(12,382)	(132)	13,898	(13,898)
2069	Above Normal	1,560	184	20,895	1,914	61	(2,216)	(22,260)	(138)	24,613	(24,613)
2070	Above Normal	1,329	156	21,252	1,631	61	(2,128)	(22,151)	(152)	24,431	(24,431)
2071	Critical	192	23	12,664	235	50	(1,278)	(11,745)	(139)	13,163	(13,163)
Average (2022-2071)		1,280	151	19,515	1,571	76	(1,784)	(20,672)	(136)	22,592	(22,592)

Table 11.4c ASRVGB Projected Surface Water Inflows and Outflows by Water Year, 2070 Climate Change Factors (rounded to the nearest acre-feet)

Water Year	Year Type	Arroyo Santa Rosa Inflows	Arroyo Santa Rosa Tributary Inflows	Arroyo Conejo Inflows	Conejo Creek Runoff	GW Discharge to Gaining Reaches	Stream Percolation from Losing Reaches	Stream Outflows	Riparian Evapotranspiration	Inflows	Outflows
2022	Dry	210	25	15,487	257	89	(916)	(15,010)	(141)	16,068	(16,068)
2023	Above Normal	779	92	15,659	956	115	(1,229)	(16,240)	(132)	17,601	(17,601)
2024	Wet	549	65	13,836	674	113	(1,099)	(14,007)	(131)	15,236	(15,236)
2025	Below Normal	325	38	12,479	399	89	(1,058)	(12,144)	(128)	13,331	(13,331)
2026	Below Normal	252	30	10,550	309	73	(1,055)	(10,050)	(107)	11,212	(11,212)
2027	Below Normal	380	45	15,336	466	73	(1,198)	(14,967)	(134)	16,299	(16,299)
2028	Wet	3,720	438	32,891	4,564	94	(2,881)	(38,680)	(147)	41,707	(41,707)
2029	Wet	1,783	210	23,180	2,188	88	(2,080)	(25,222)	(149)	27,450	(27,450)
2030	Wet	3,306	389	32,065	4,056	95	(2,571)	(37,185)	(153)	39,909	(39,909)
2031	Wet	442	52	14,776	542	69	(1,260)	(14,487)	(134)	15,880	(15,880)
2032	Below Normal	371	44	15,700	455	68	(1,245)	(15,251)	(142)	16,638	(16,638)
2033	Wet	4,056	477	35,691	4,976	105	(3,237)	(41,904)	(164)	45,305	(45,306)
2034	Wet	476	56	13,554	585	80	(1,244)	(13,372)	(135)	14,751	(14,752)
2035	Dry	552	65	14,216	677	73	(1,354)	(14,093)	(135)	15,583	(15,583)
2036	Wet	2,259	266	24,141	2,772	89	(2,464)	(26,913)	(151)	29,527	(29,527)
2037	Below Normal	305	36	14,666	374	69	(1,184)	(14,125)	(139)	15,448	(15,448)
2038	Dry	1,032	121	16,291	1,266	73	(1,735)	(16,907)	(140)	18,782	(18,782)
2039	Dry	483	57	15,542	593	64	(1,384)	(15,213)	(142)	16,739	(16,739)
2040	Critical	365	43	14,318	448	61	(1,300)	(13,801)	(134)	15,236	(15,236)
2041	Dry	989	116	18,110	1,214	61	(1,729)	(18,623)	(138)	20,490	(20,490)
2042	Wet	3,843	452	36,913	4,715	77	(3,021)	(42,822)	(155)	45,999	(45,999)
2043	Wet	5,246	617	43,685	6,437	93	(3,513)	(52,404)	(160)	56,078	(56,078)
2044	Above Normal	801	94	16,132	982	72	(1,578)	(16,364)	(139)	18,081	(18,081)
2045	Wet	3,918	461	34,039	4,807	94	(3,002)	(40,159)	(158)	43,318	(43,319)
2046	Above Normal	1,258	148	18,525	1,543	81	(1,852)	(19,560)	(144)	21,555	(21,555)
2047	Below Normal	1,140	134	18,478	1,399	76	(1,754)	(19,331)	(143)	21,227	(21,227)
2048	Wet	5,203	612	41,218	6,383	103	(3,505)	(49,848)	(166)	53,520	(53,520)
2049	Wet	574	68	15,481	704	73	(1,375)	(15,380)	(145)	16,900	(16,900)
2050	Below Normal	720	85	17,000	883	71	(1,505)	(17,112)	(142)	18,759	(18,759)
2051	Above Normal	2,110	248	25,533	2,589	81	(2,381)	(28,043)	(138)	30,561	(30,562)
2052	Dry	254	30	15,831	311	66	(1,173)	(15,179)	(139)	16,491	(16,491)
2053	Below Normal	1,362	160	19,270	1,671	79	(1,974)	(20,425)	(142)	22,541	(22,541)
2054	Dry	766	90	16,112	940	74	(1,568)	(16,271)	(144)	17,983	(17,983)
2055	Wet	4,905	577	40,750	6,018	104	(3,777)	(48,419)	(159)	52,355	(52,355)
2056	Above Normal	1,648	194	19,557	2,021	85	(2,144)	(21,221)	(139)	23,504	(23,504)
2057	Critical	598	70	15,799	734	74	(1,416)	(15,717)	(144)	17,276	(17,276)
2058	Critical	1,649	194	20,386	2,023	80	(2,096)	(22,085)	(151)	24,333	(24,333)
2059	Dry	744	88	16,889	913	67	(1,546)	(17,011)	(144)	18,701	(18,701)
2060	Below Normal	1,340	158	20,770	1,644	71	(1,954)	(21,889)	(139)	23,982	(23,982)
2061	Above Normal	997	117	17,163	1,223	69	(1,717)	(17,727)	(125)	19,570	(19,570)
2062	Below Normal	157	18	15,735	193	60	(1,143)	(14,880)	(140)	16,162	(16,163)
2063	Critical	218	26	13,339	268	61	(1,185)	(12,595)	(132)	13,912	(13,912)
2064	Critical	168	20	12,077	206	56	(1,158)	(11,229)	(139)	12,526	(12,526)
2065	Critical	175	21	13,271	215	56	(1,196)	(12,413)	(129)	13,738	(13,738)
2066	Dry	115	14	9,724	141	52	(1,140)	(8,786)	(119)	10,045	(10,045)
2067	Above Normal	1,064	125	17,970	1,305	59	(1,866)	(18,511)	(147)	20,524	(20,524)
2068	Below Normal	397	47	12,724	487	52	(1,408)	(12,165)	(135)	13,707	(13,708)
2069	Above Normal	1,636	192	21,322	2,007	61	(2,262)	(22,813)	(143)	25,218	(25,218)
2070	Above Normal	1,318	155	21,195	1,617	61	(2,119)	(22,071)	(157)	24,347	(24,347)
2071	Critical	169	20	11,450	207	49	(1,251)	(10,502)	(141)	11,895	(11,895)
	Average (2022-2071)	1,343	158	19,737	1,647	76	(1,796)	(21,023)	(142)	22,960	(22,960)

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix H

Time Series Graphs of Water Quality Parameters

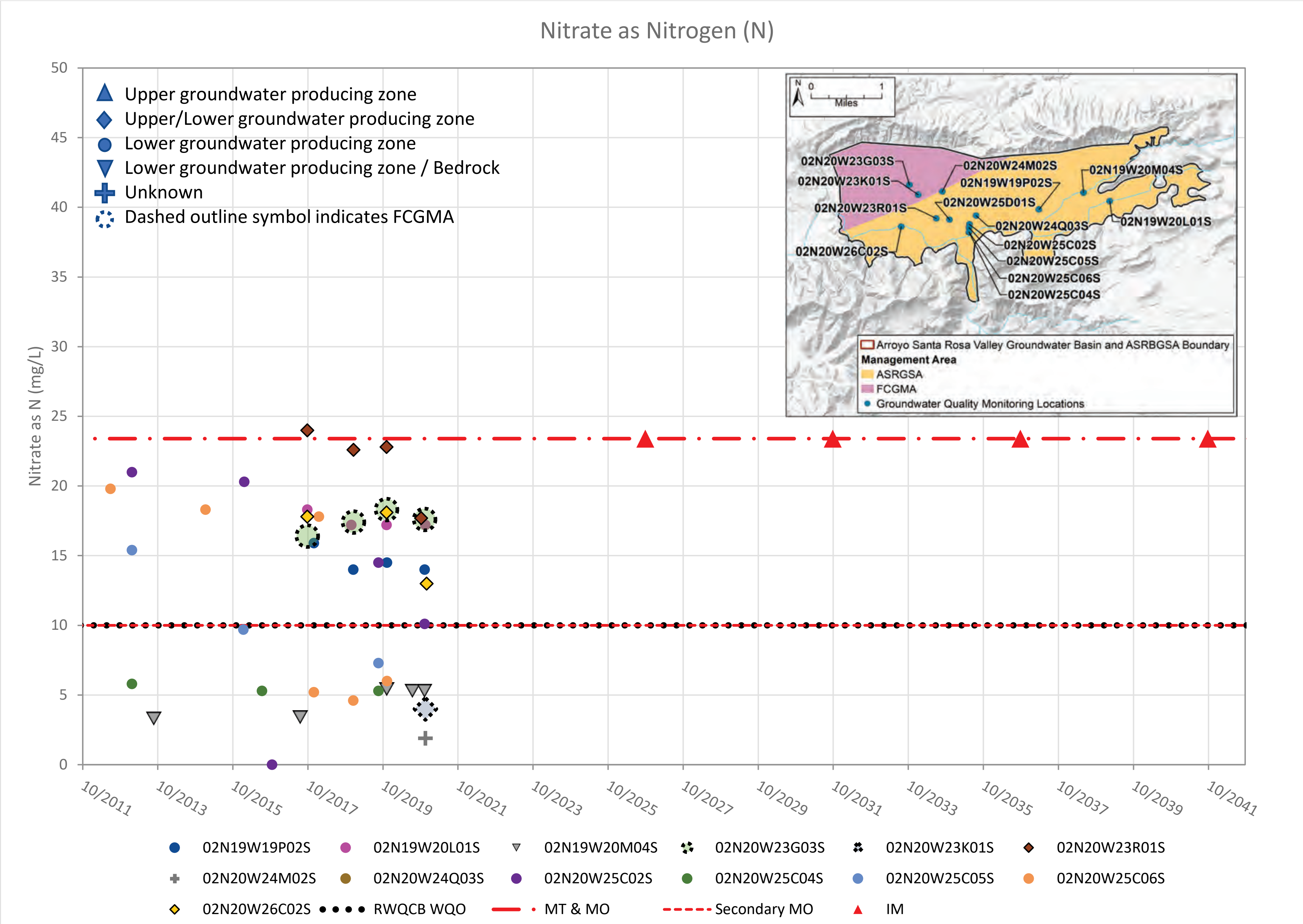


Figure H-01. Nitrate as N.

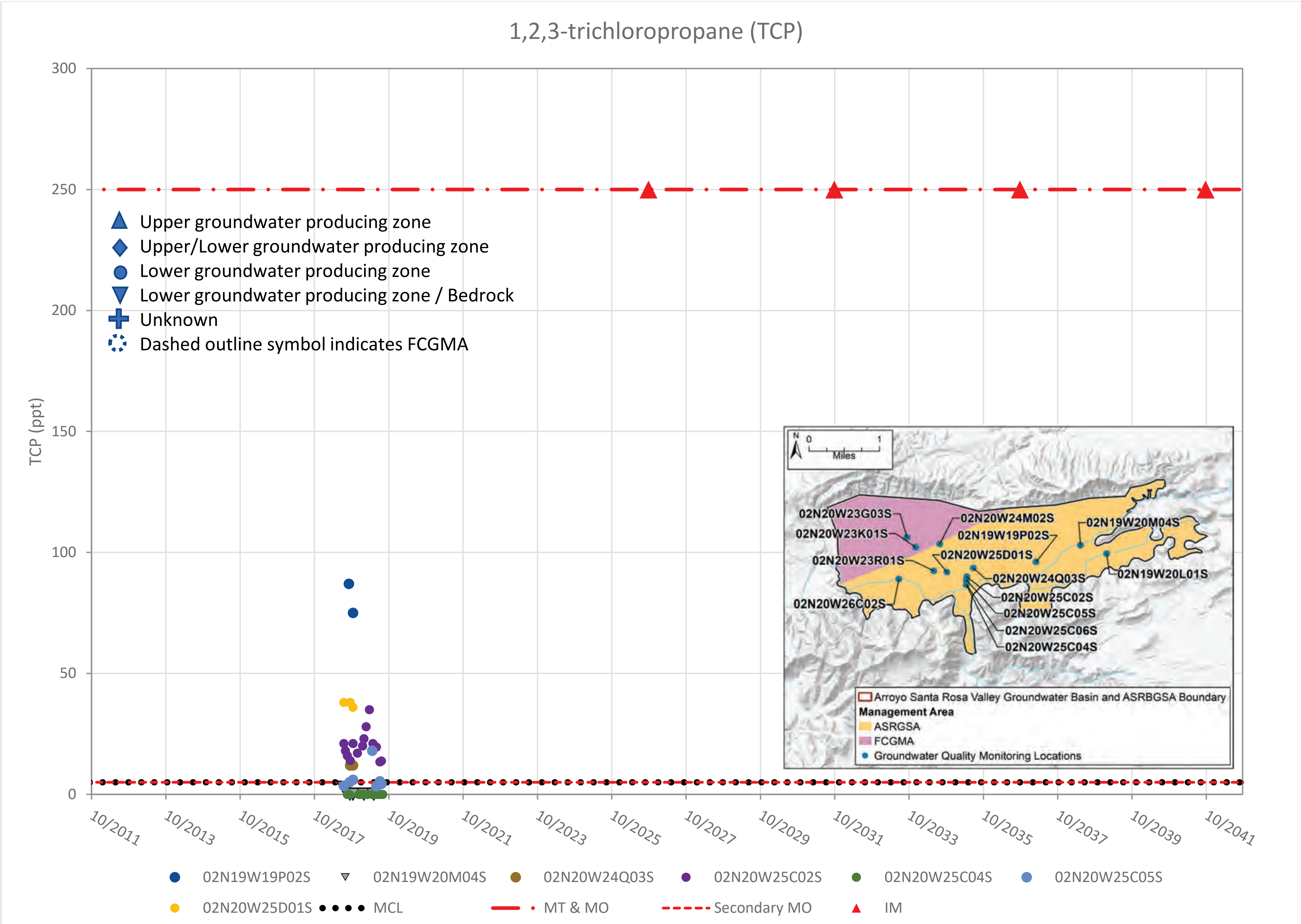


Figure H-02 1,2,3-trichloropropane (TCP).

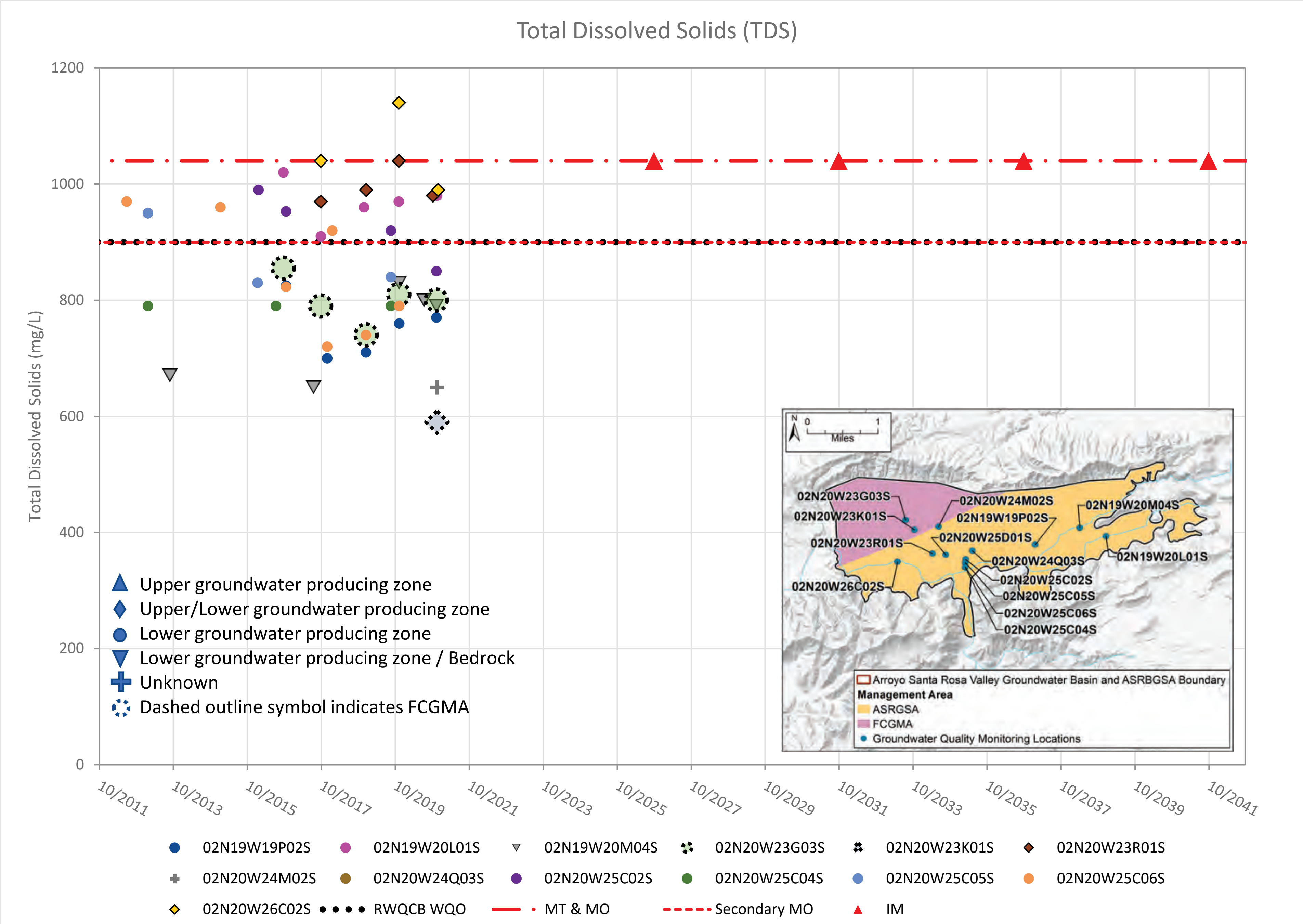


Figure H-03 Total Dissolved Solids (TDS).

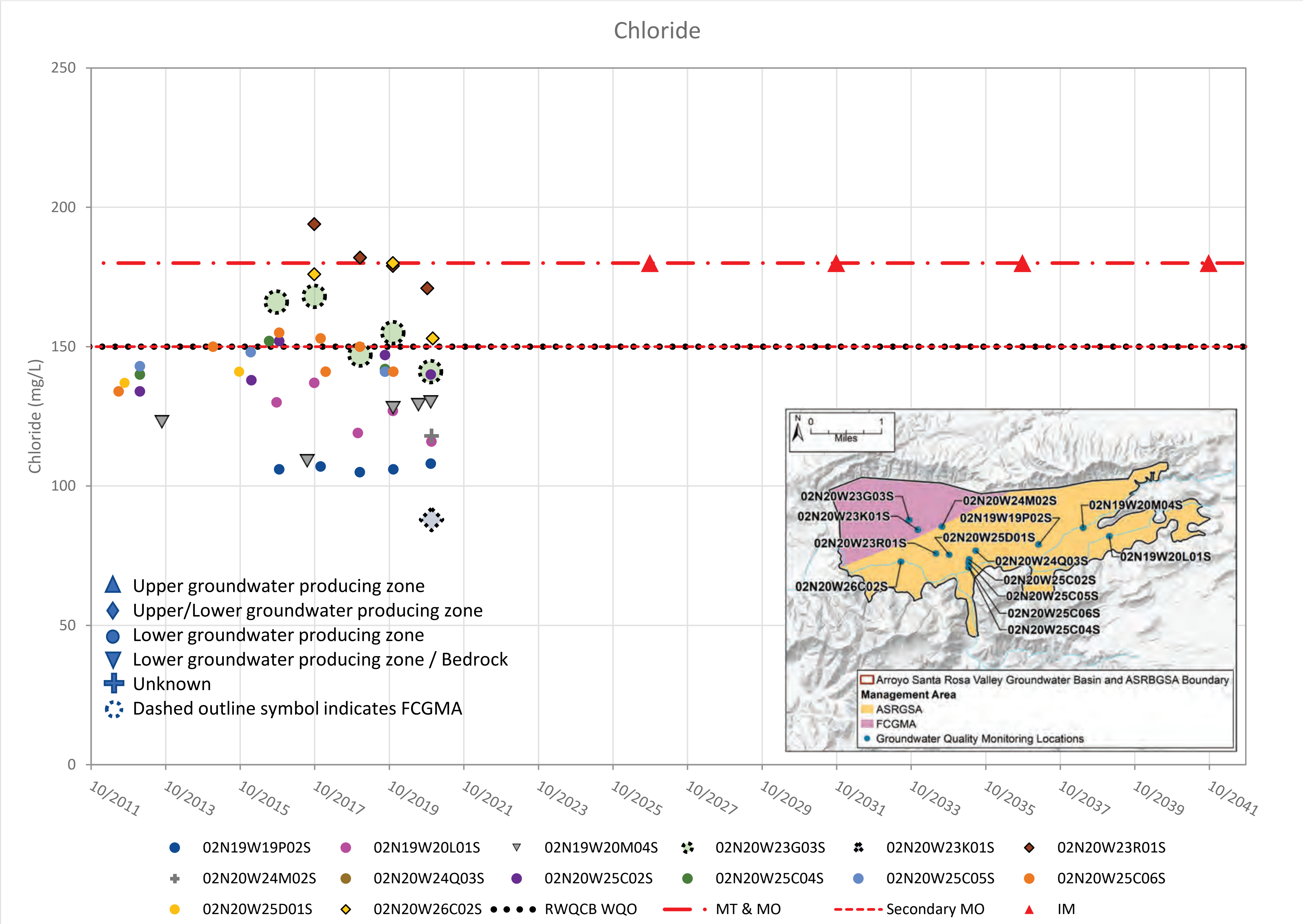


Figure H-04 Chloride.

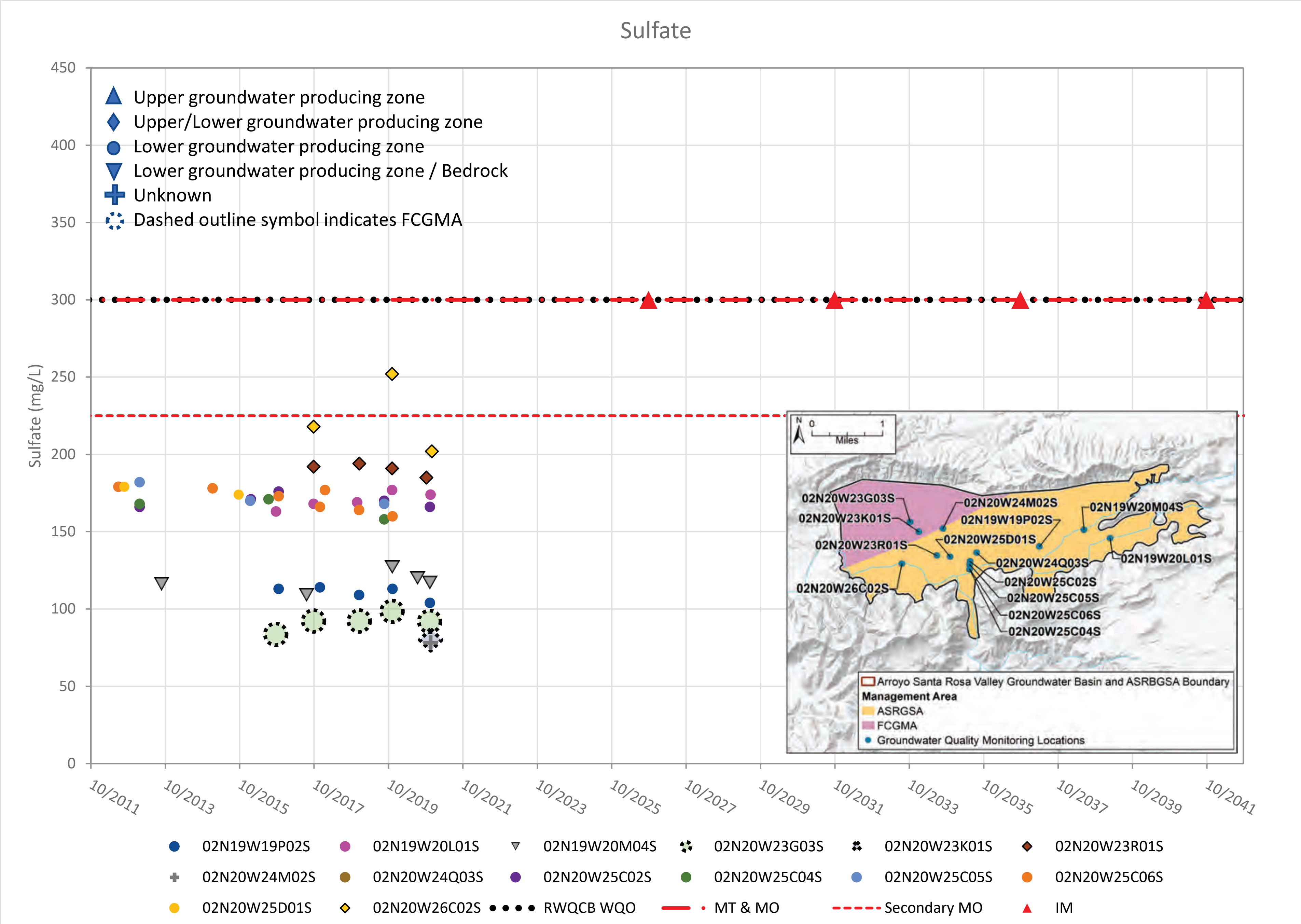


Figure H-05 Sulfate.

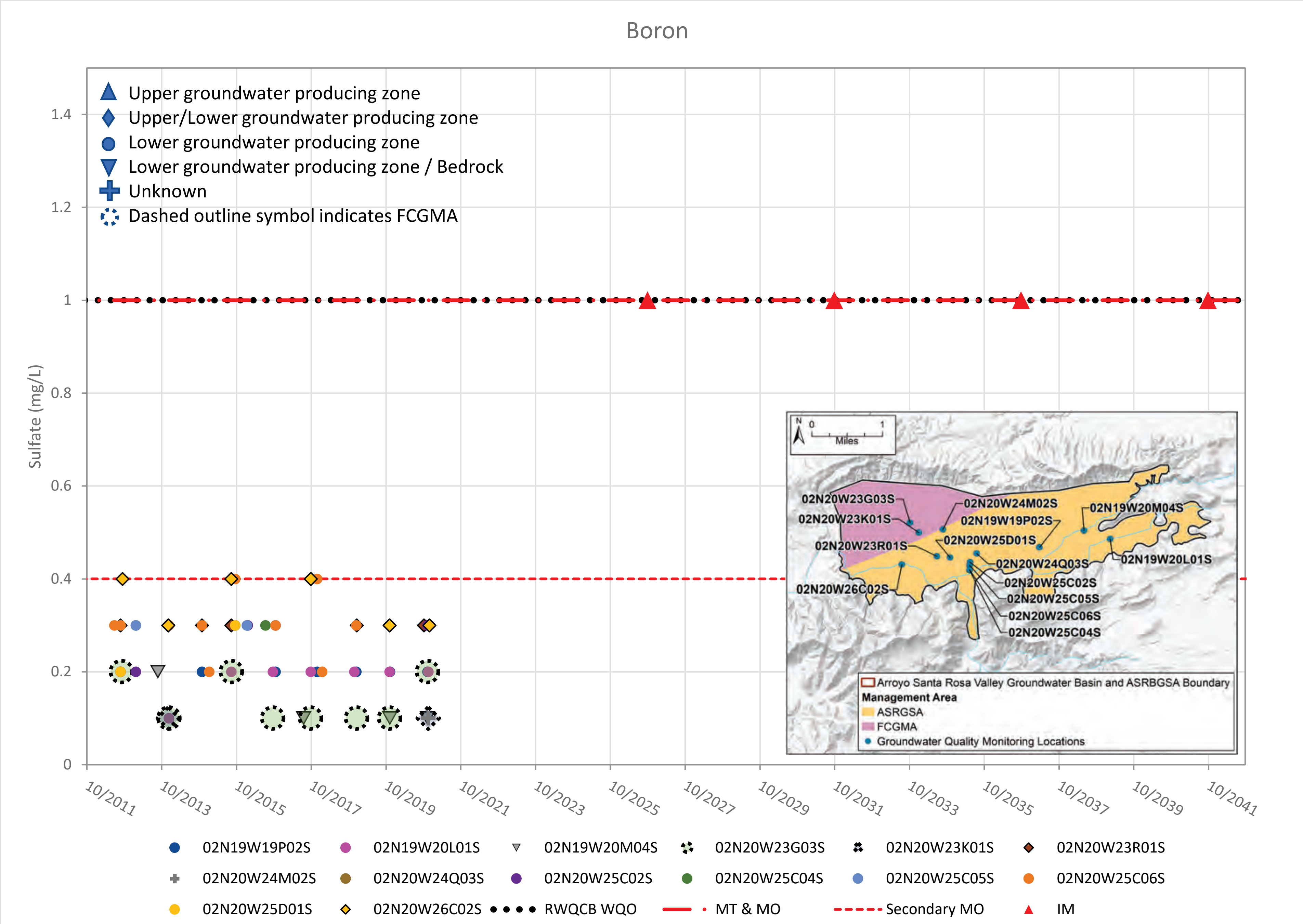


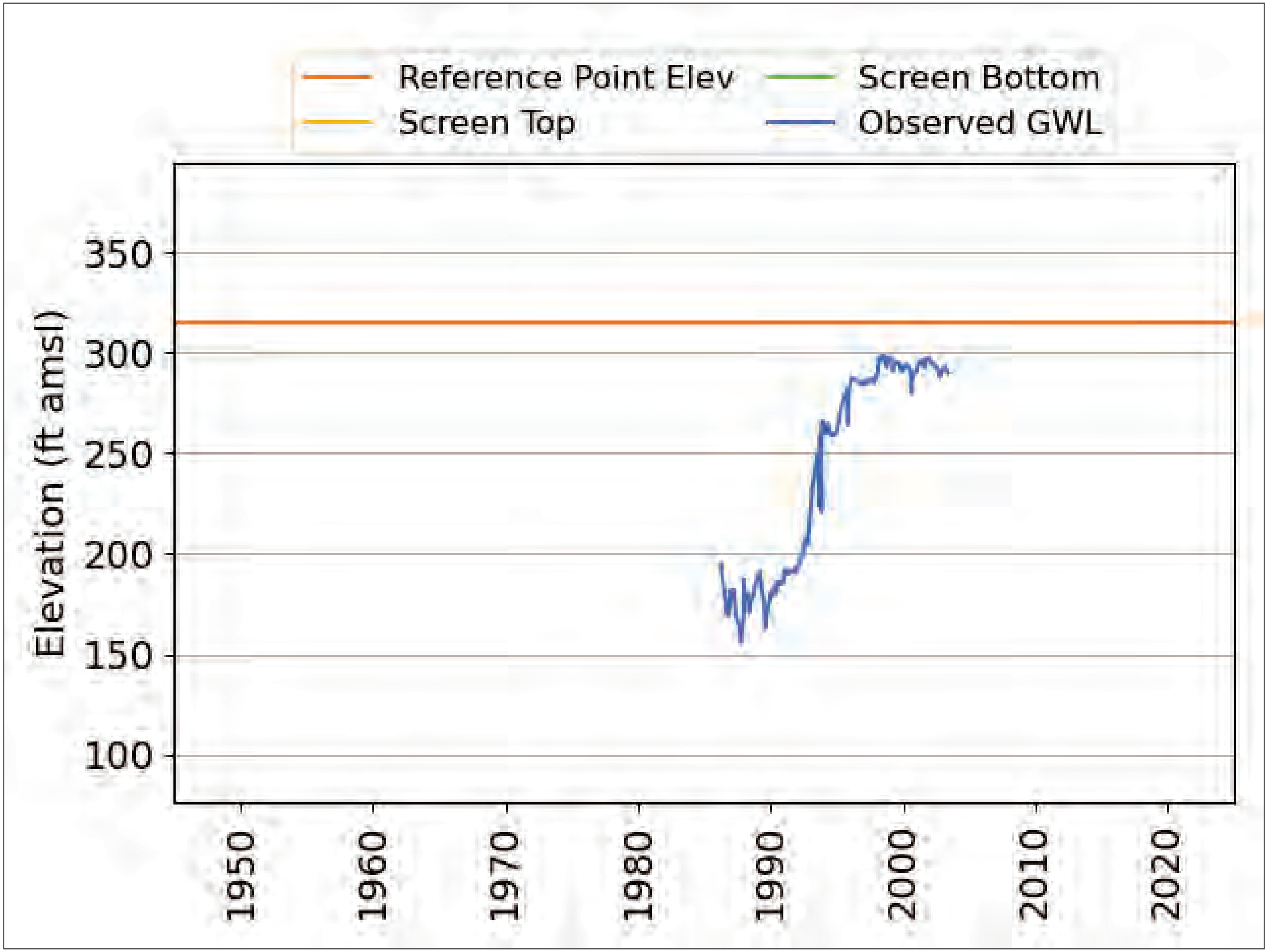
Figure H-06 Boron.

Arroyo Santa Rosa Valley Groundwater Basin

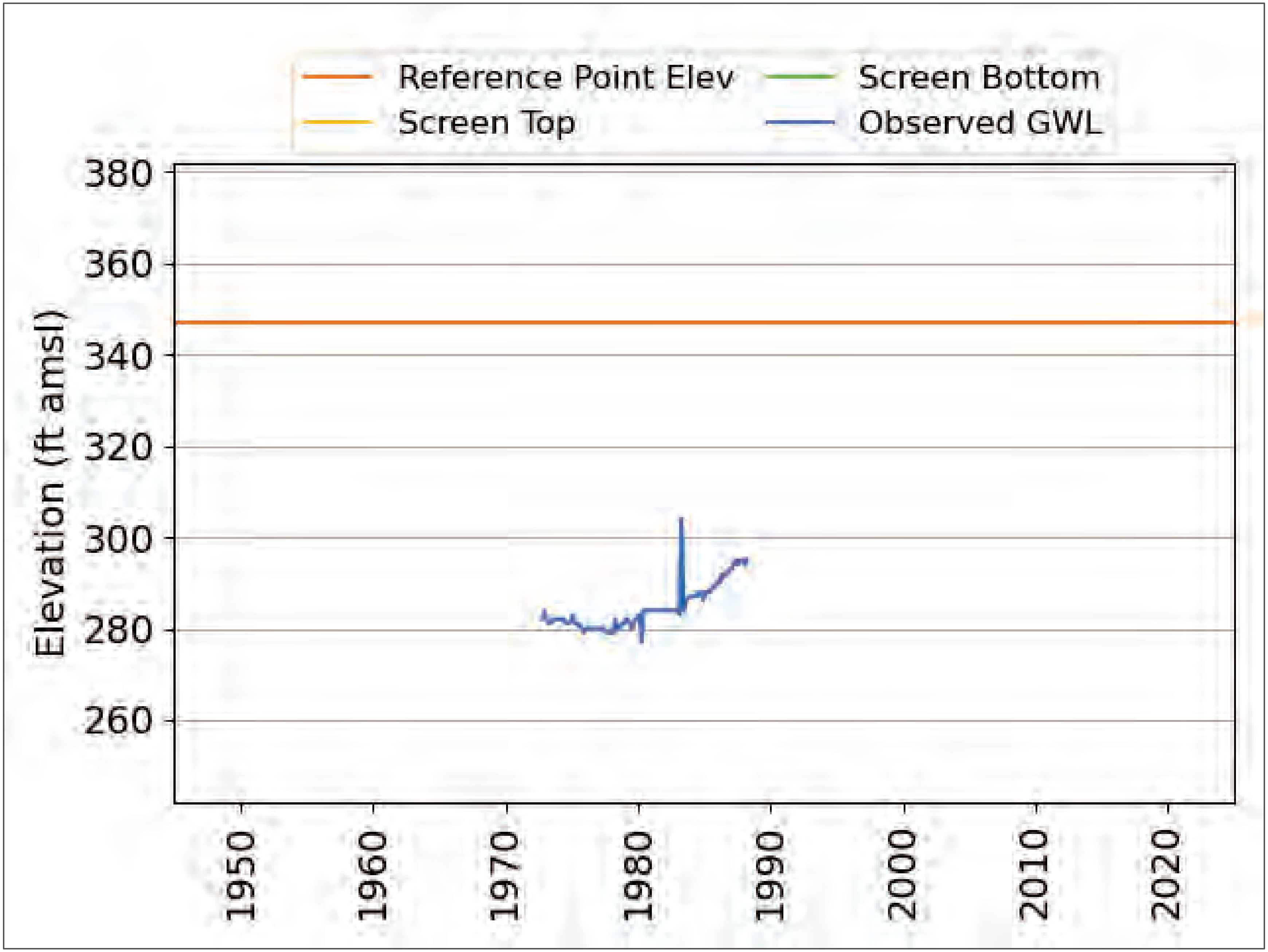
Groundwater Sustainability Plan

Appendix I

Hydrographs of Observed Groundwater Levels



I-01 Observed Groundwater Level (02N19W19J03S).



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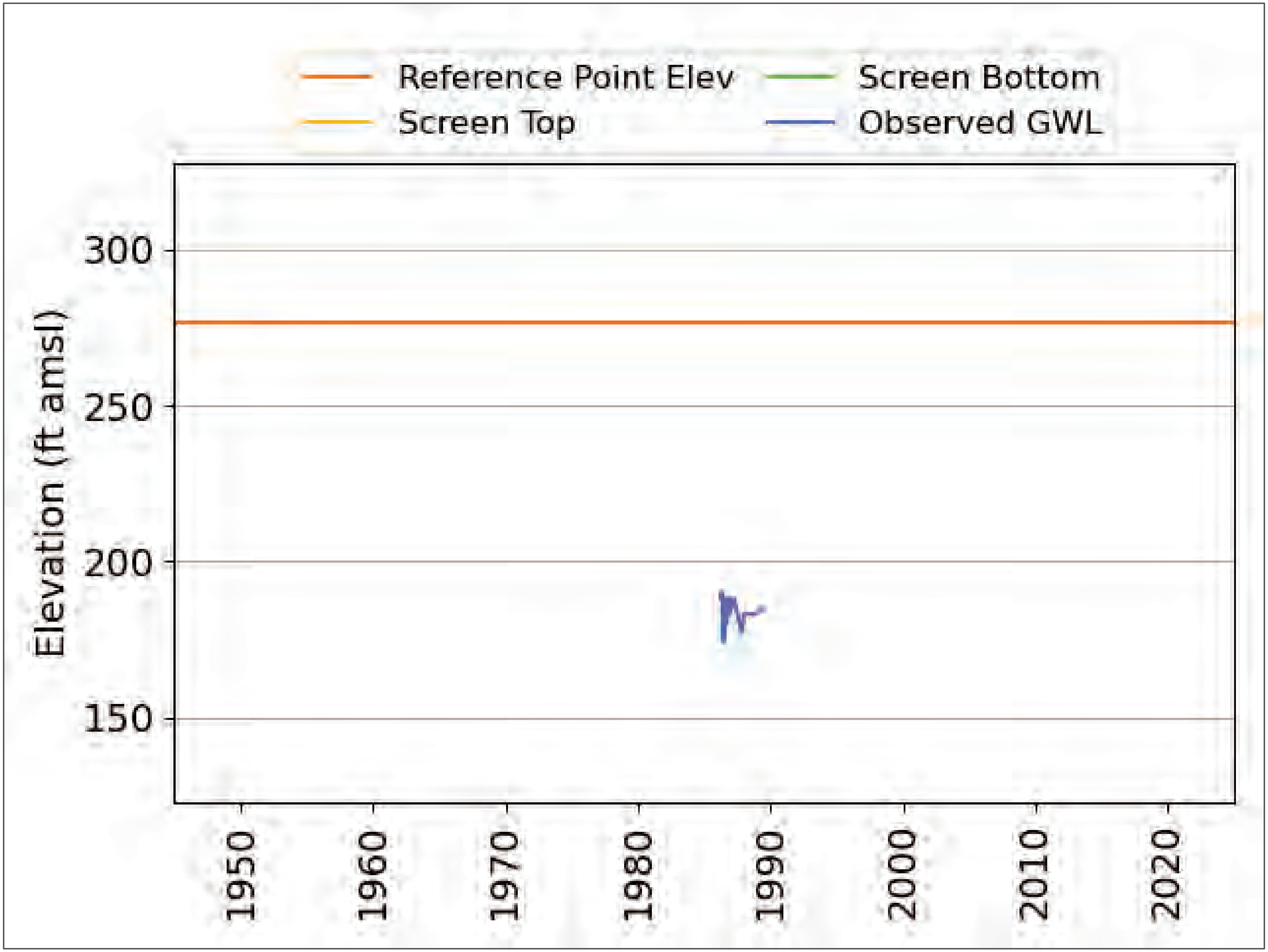

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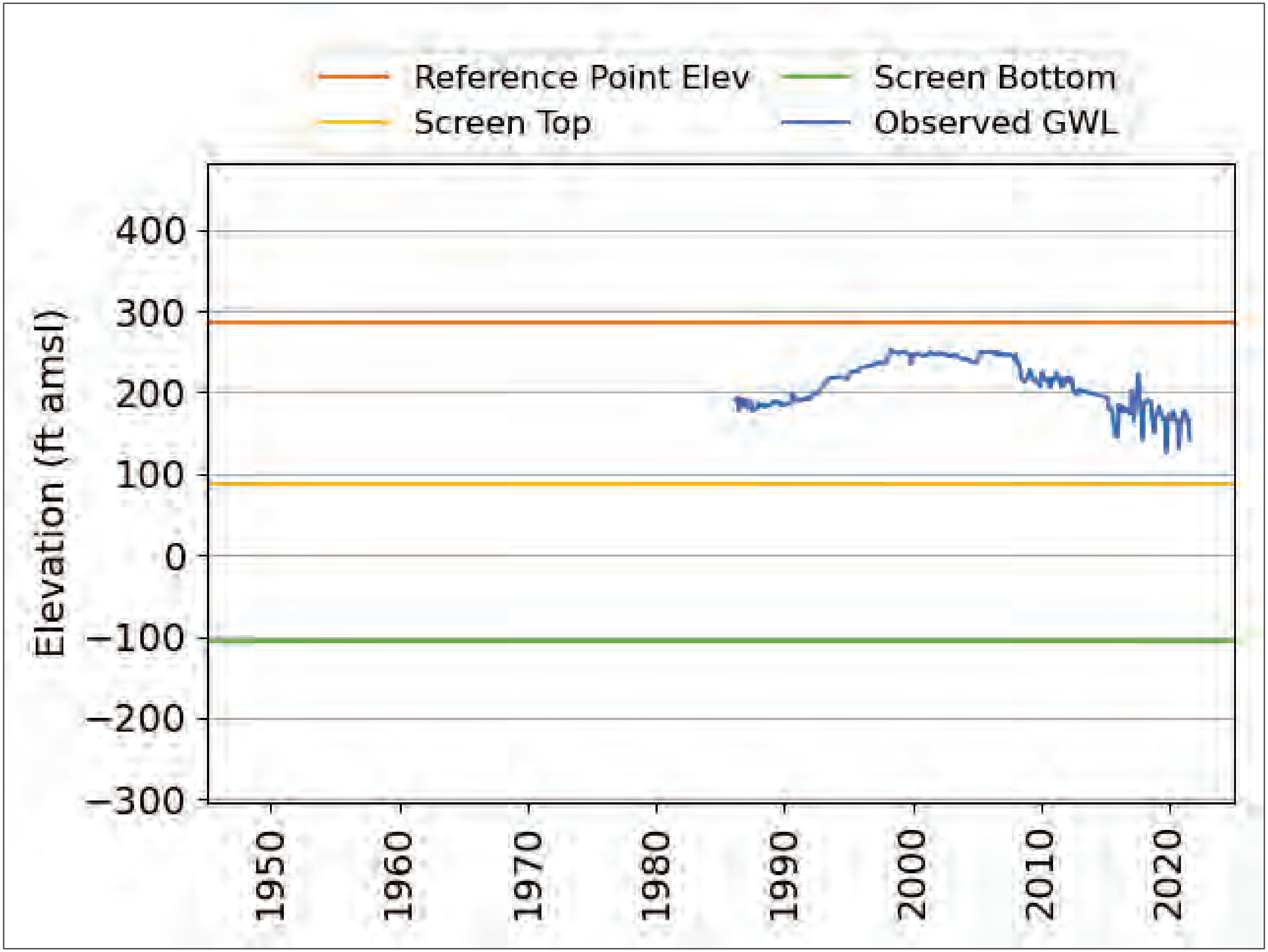

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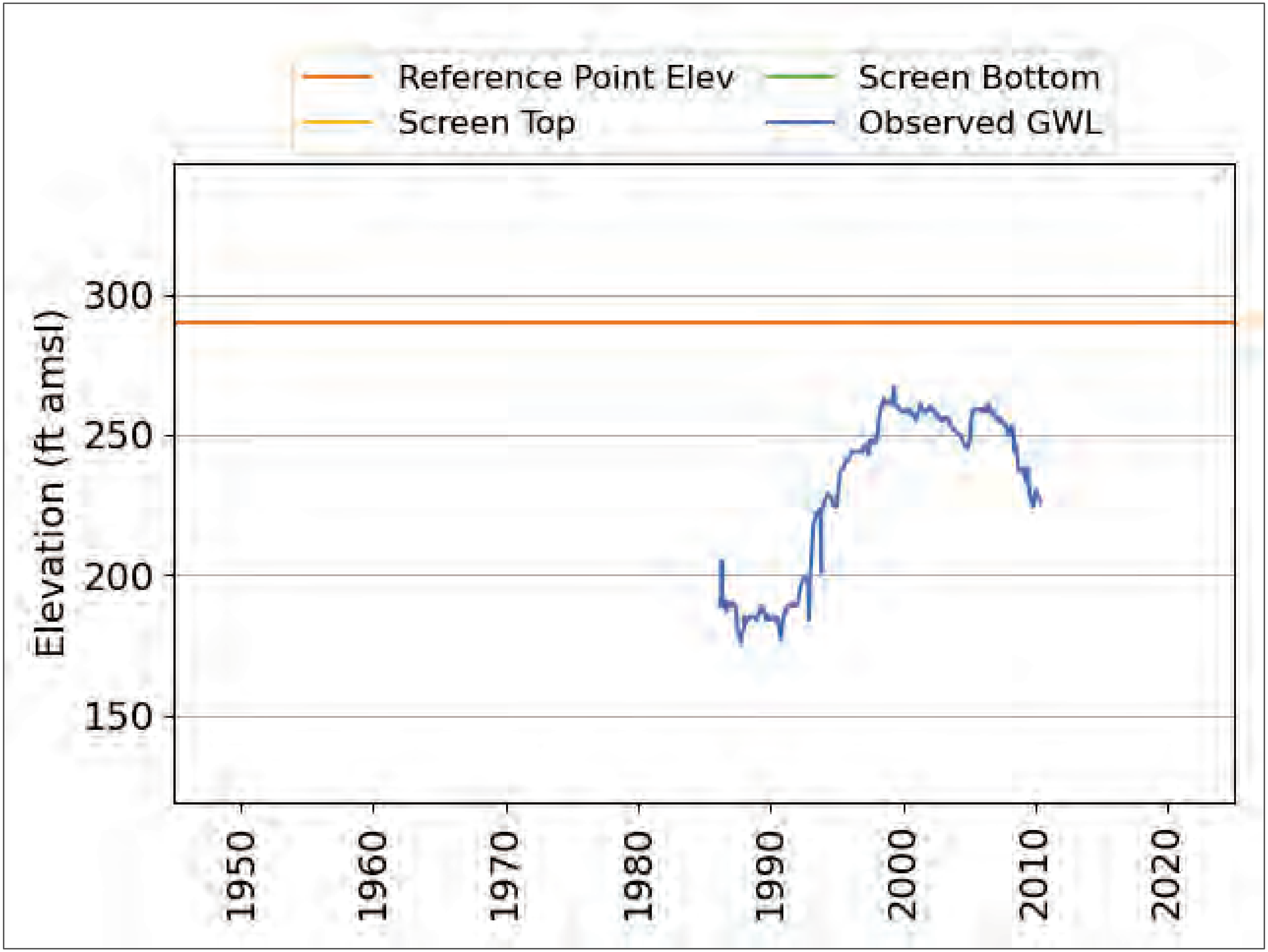

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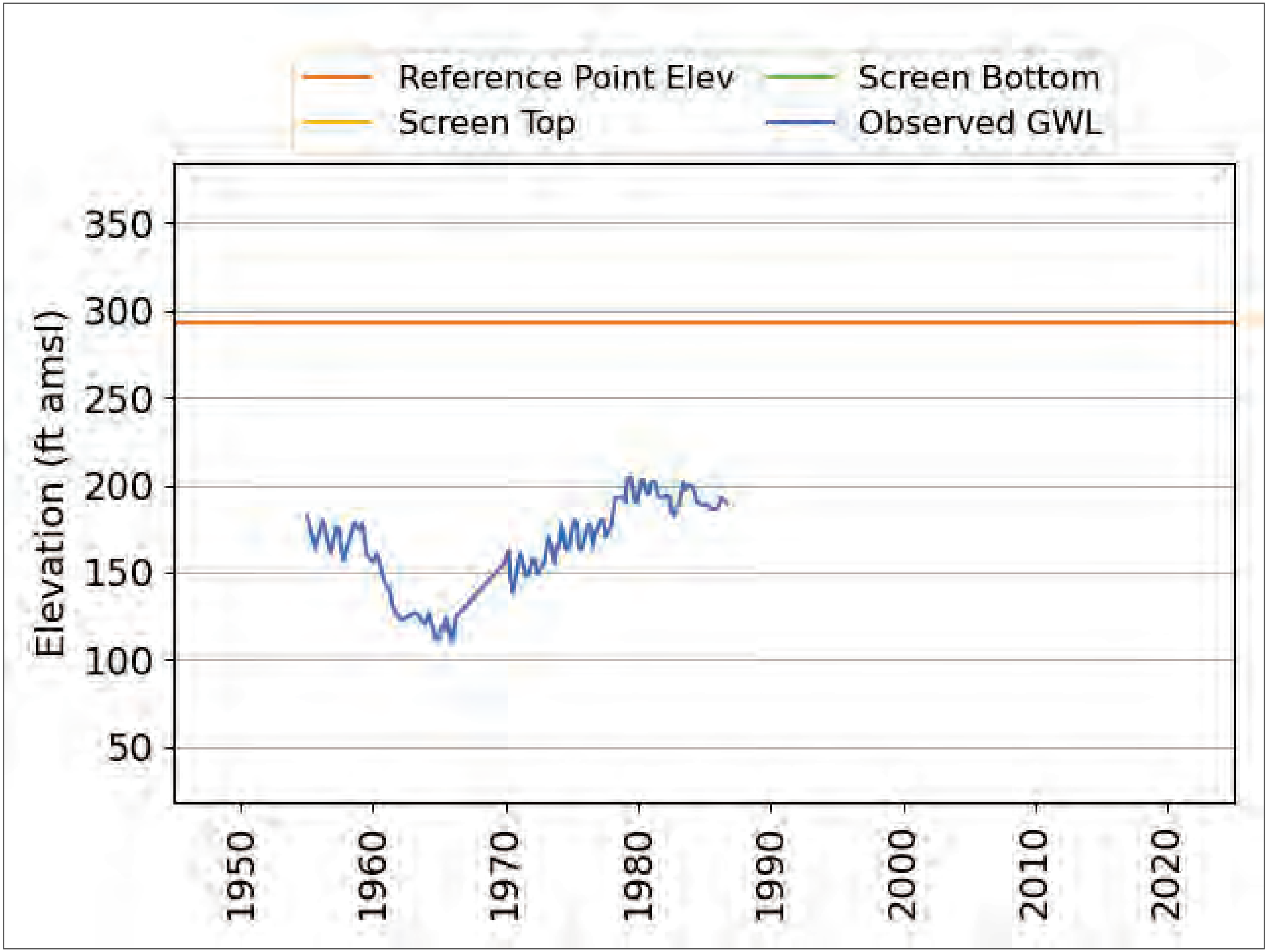

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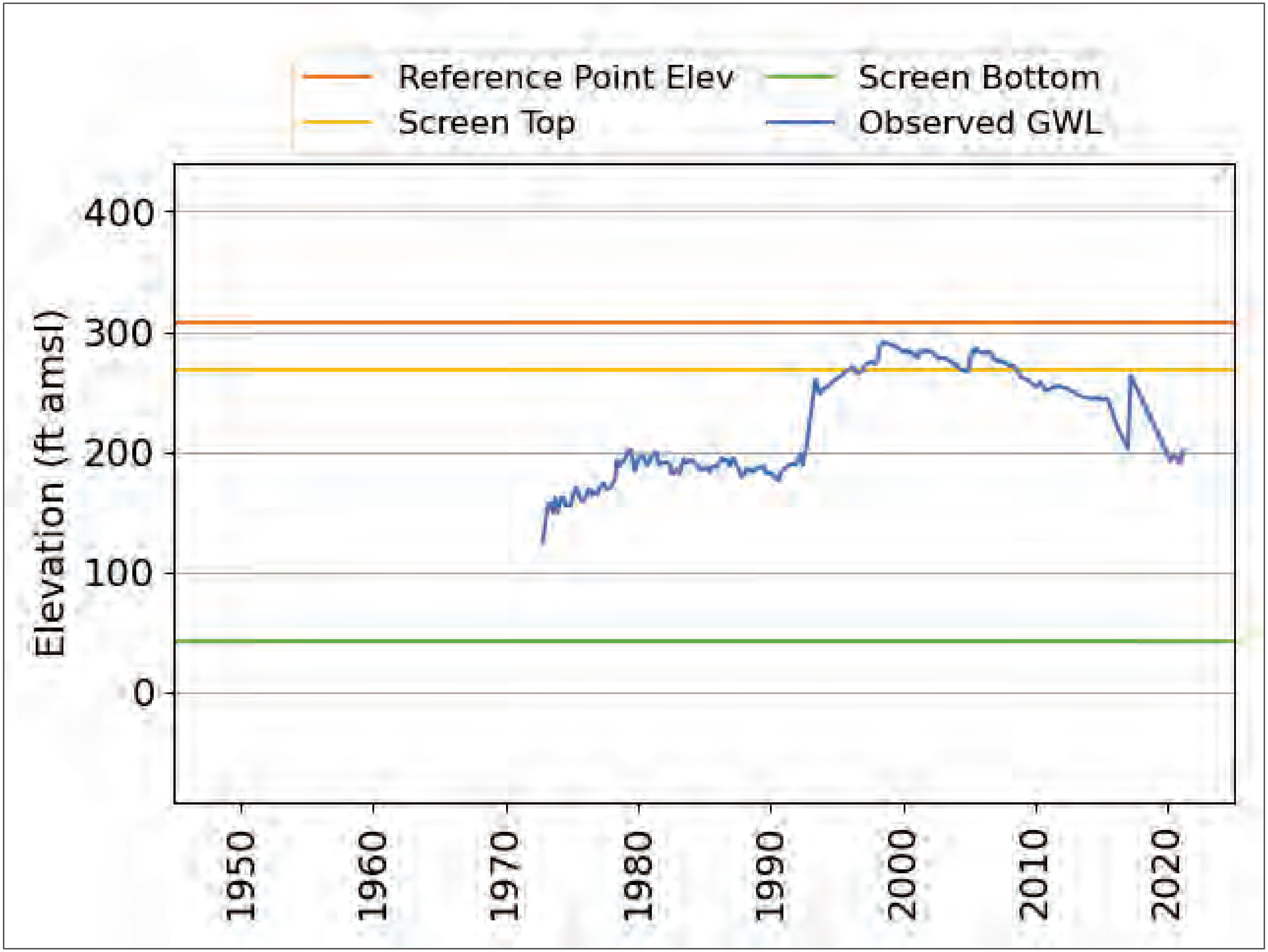

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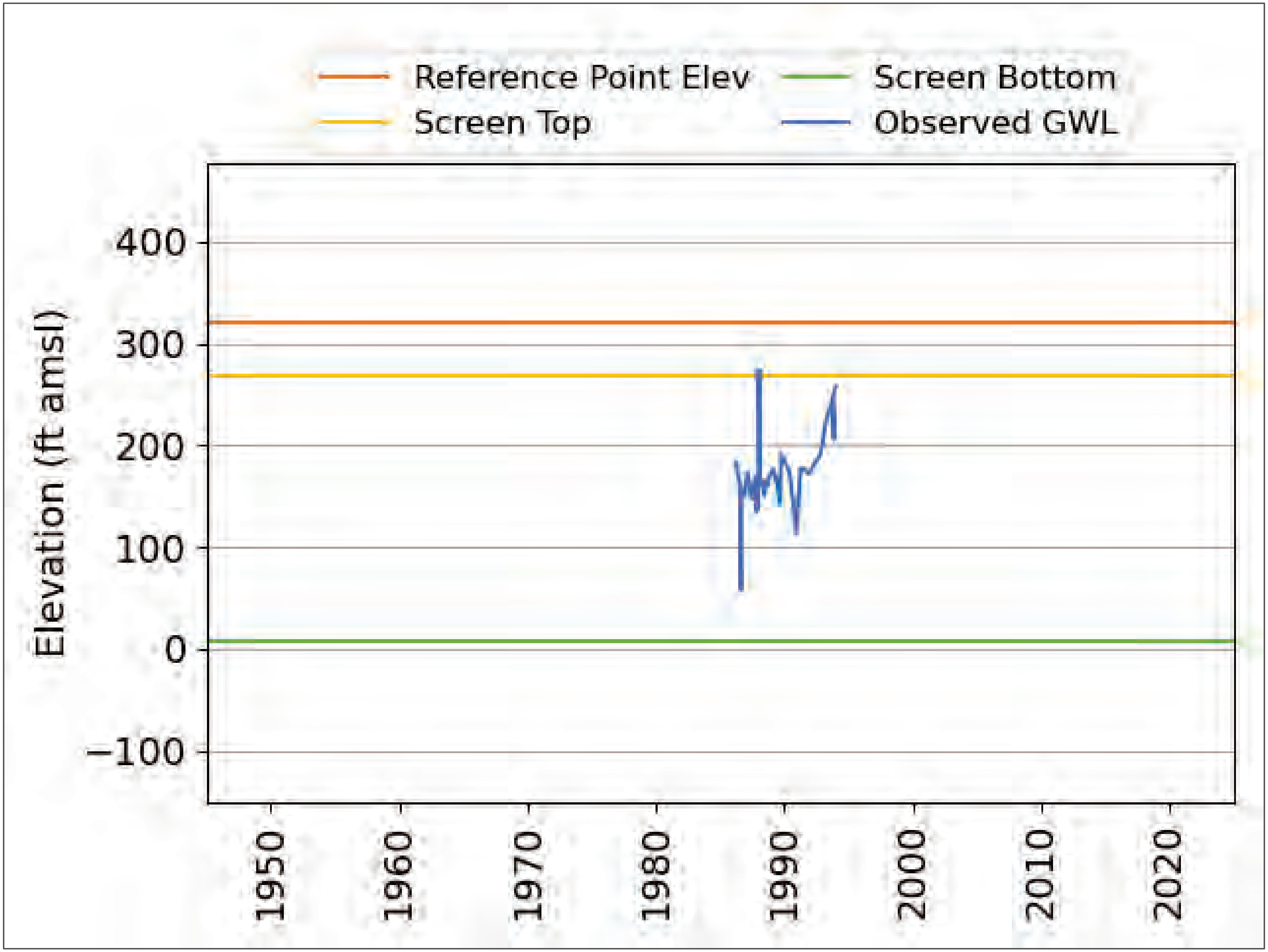

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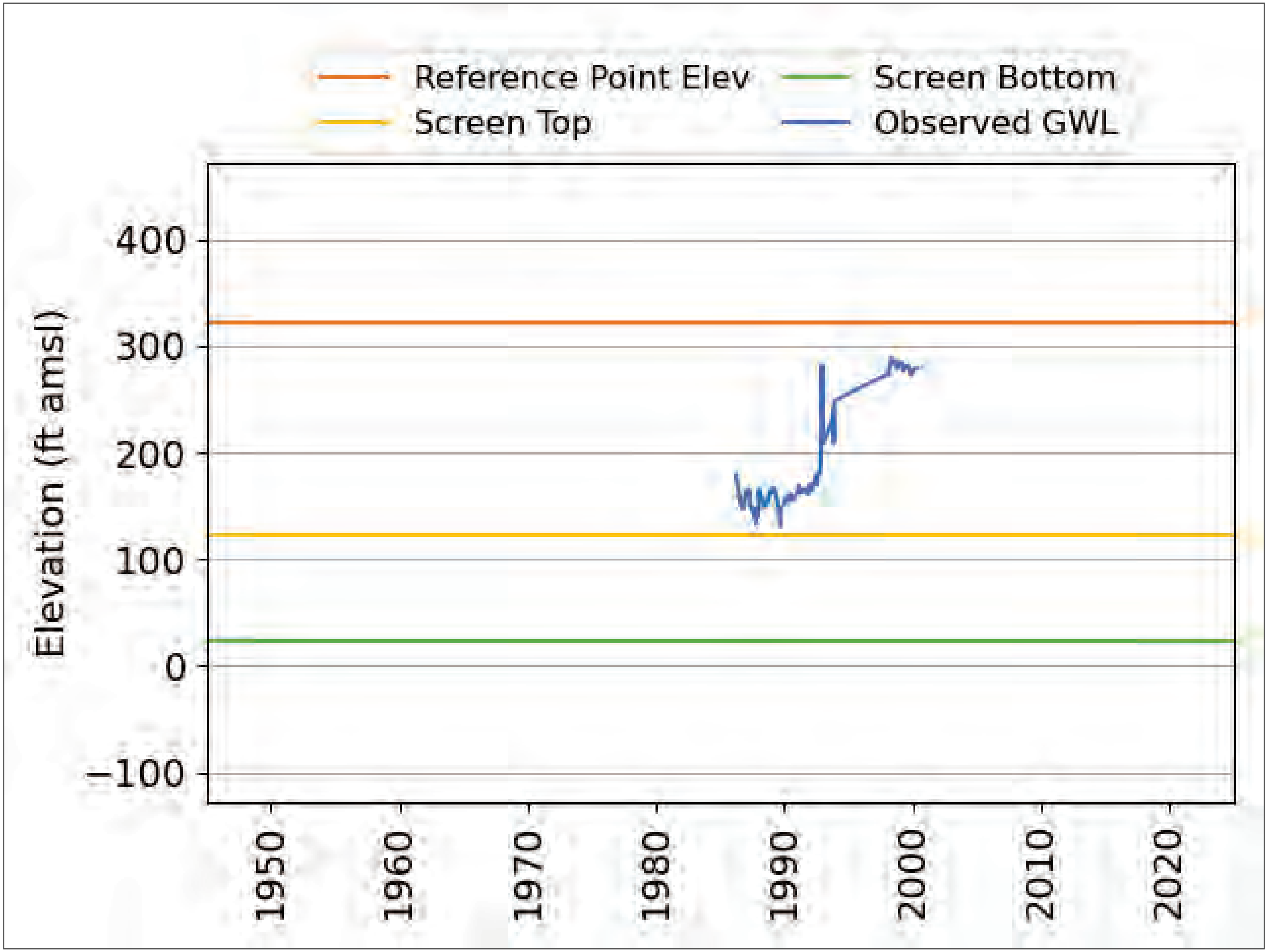

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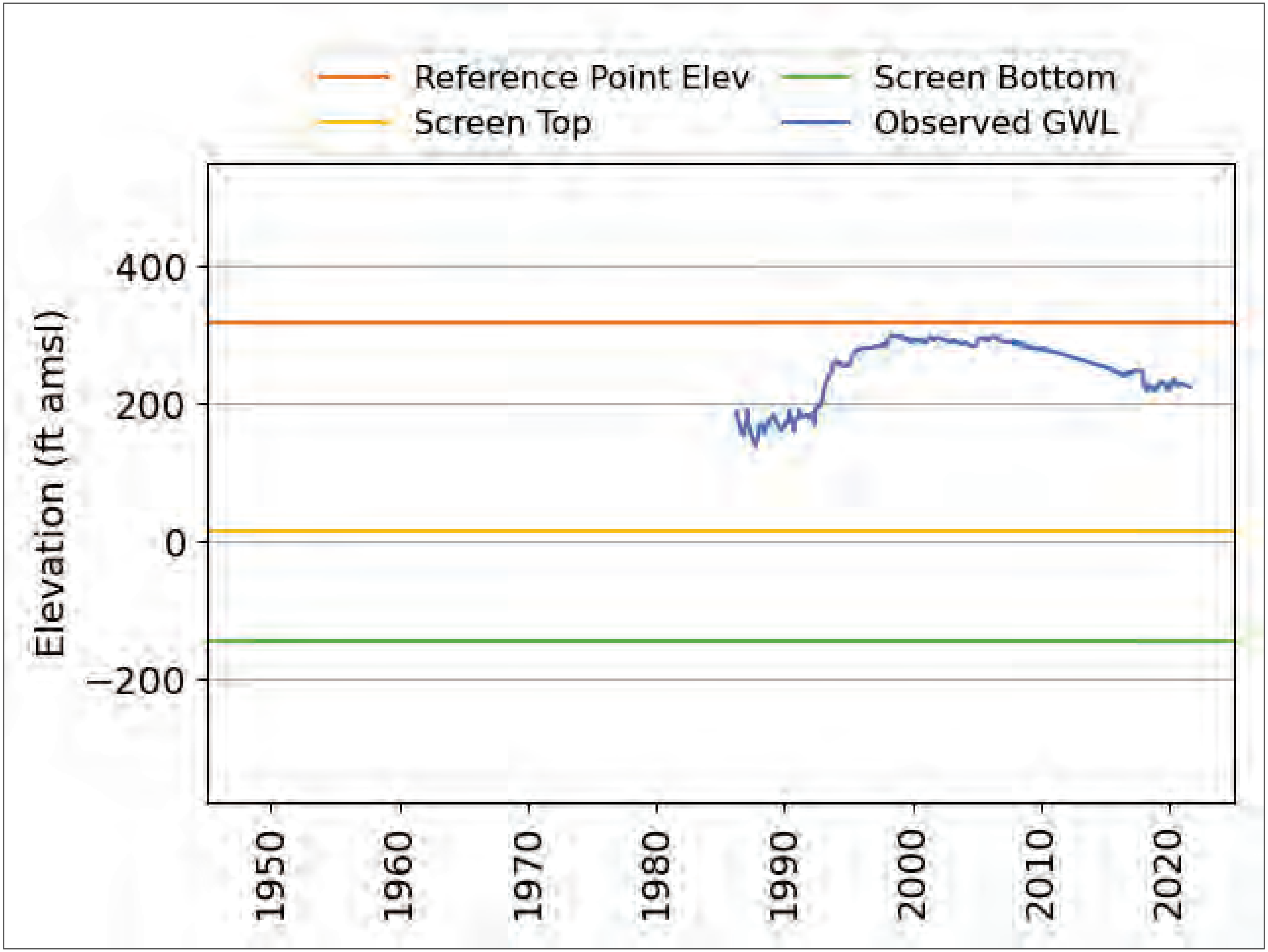

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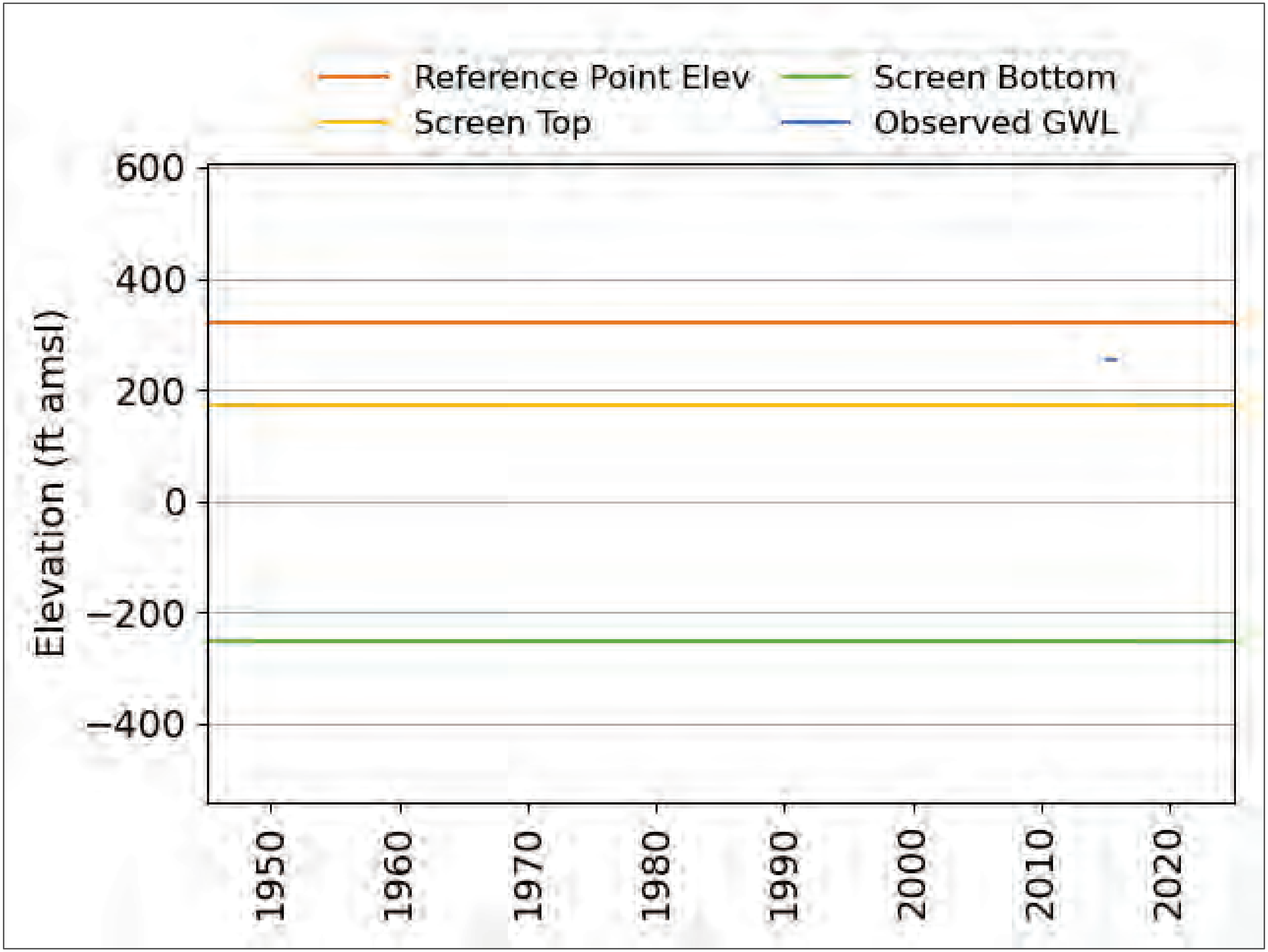

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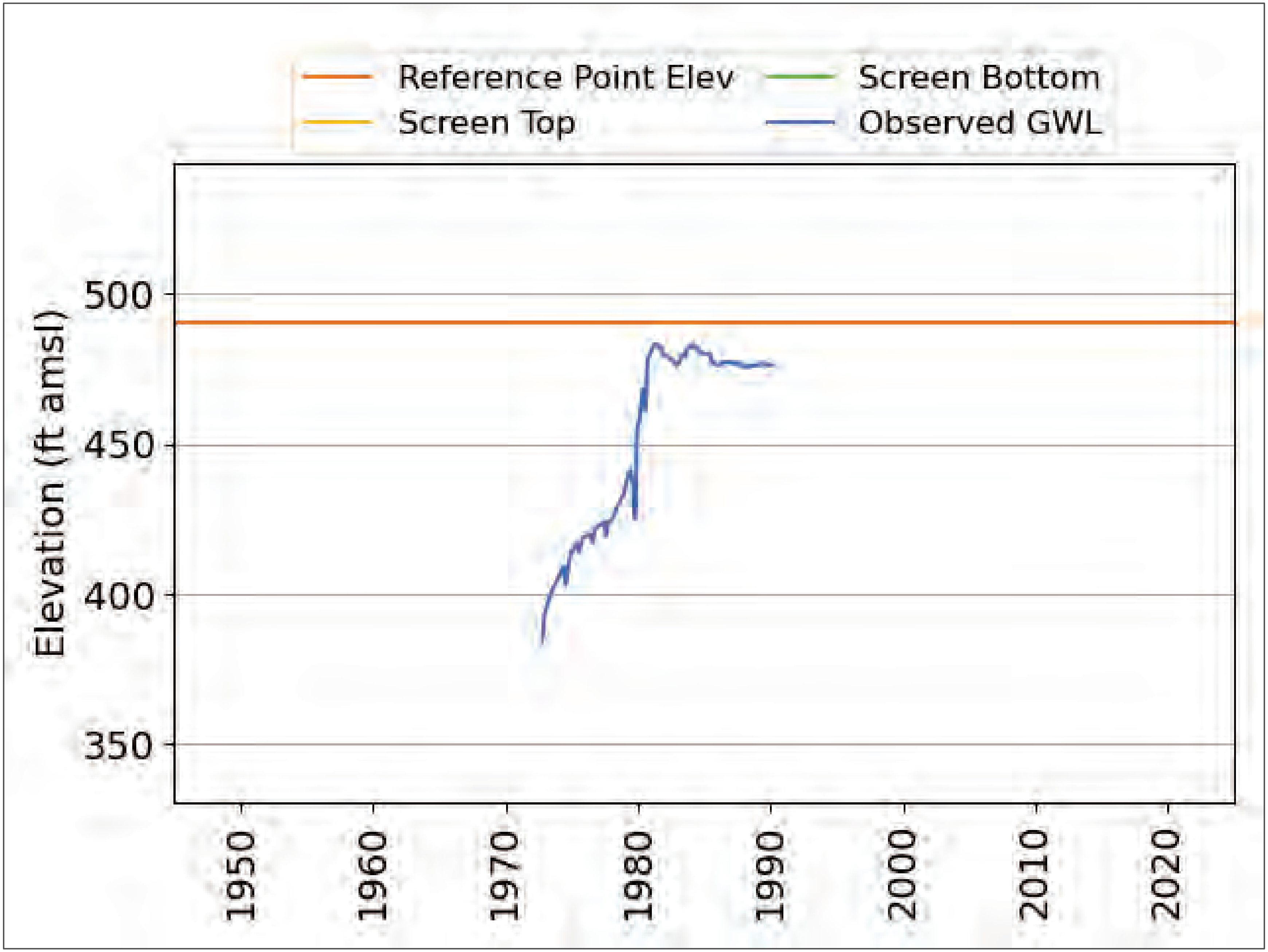

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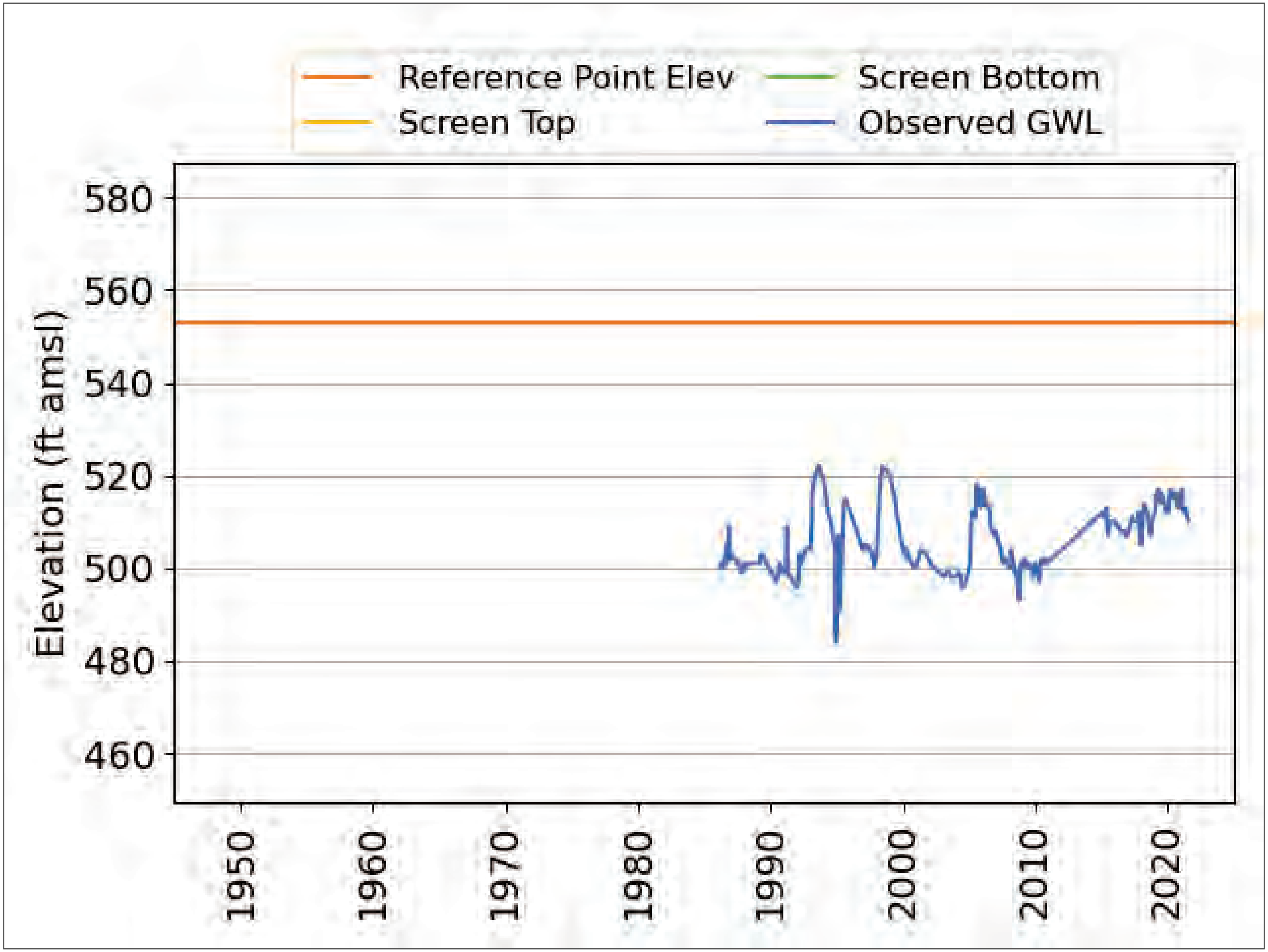

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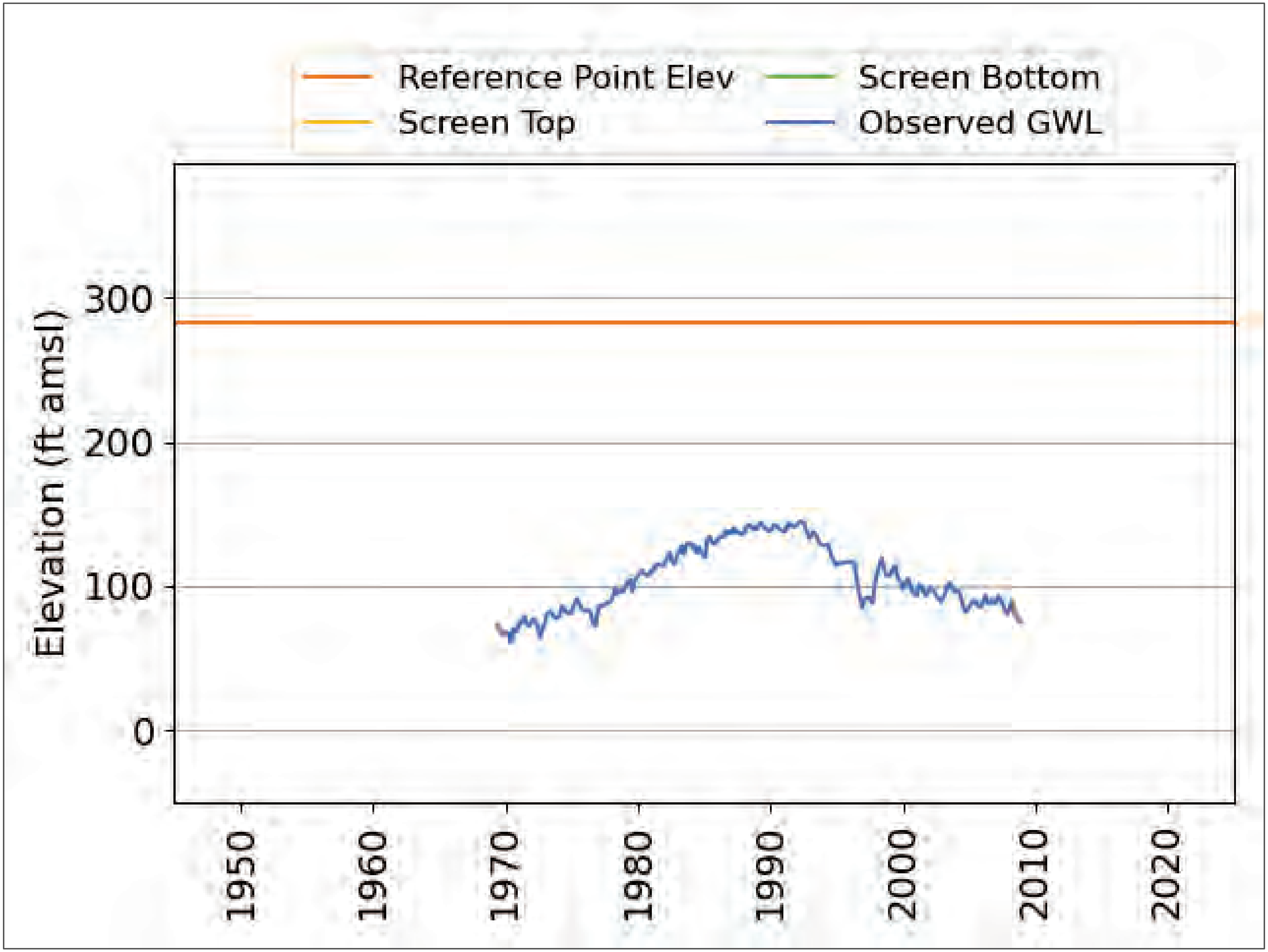

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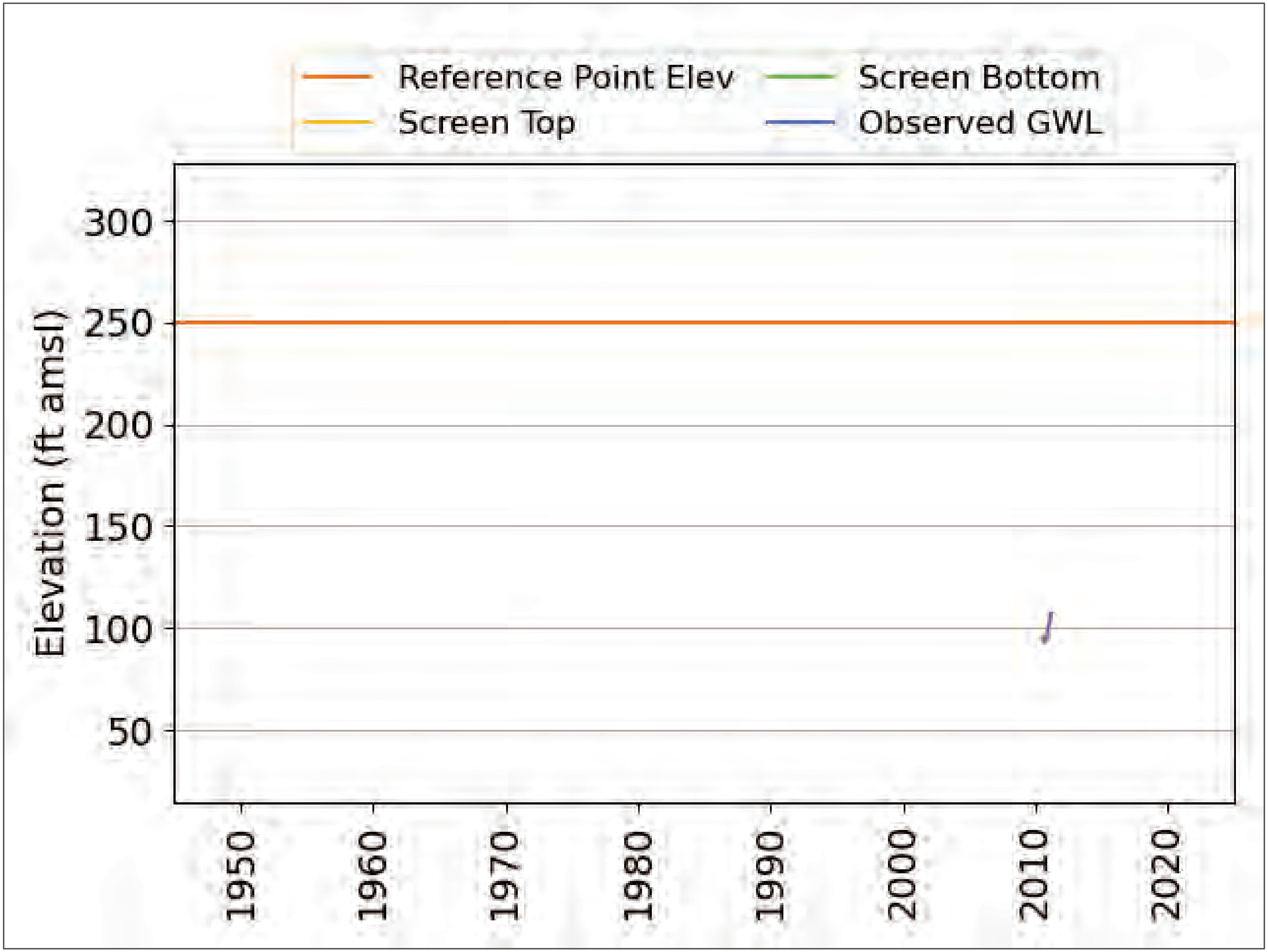

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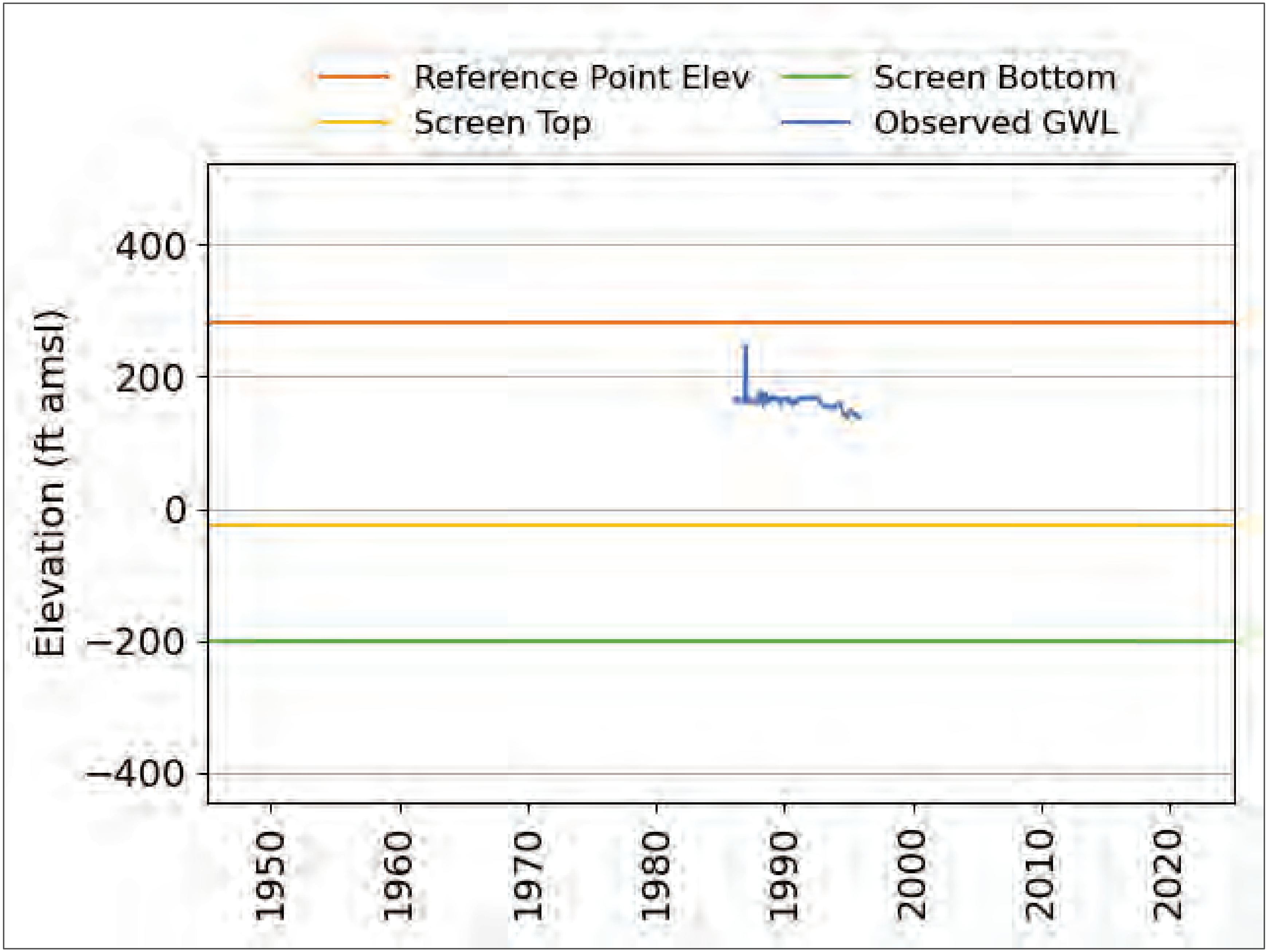

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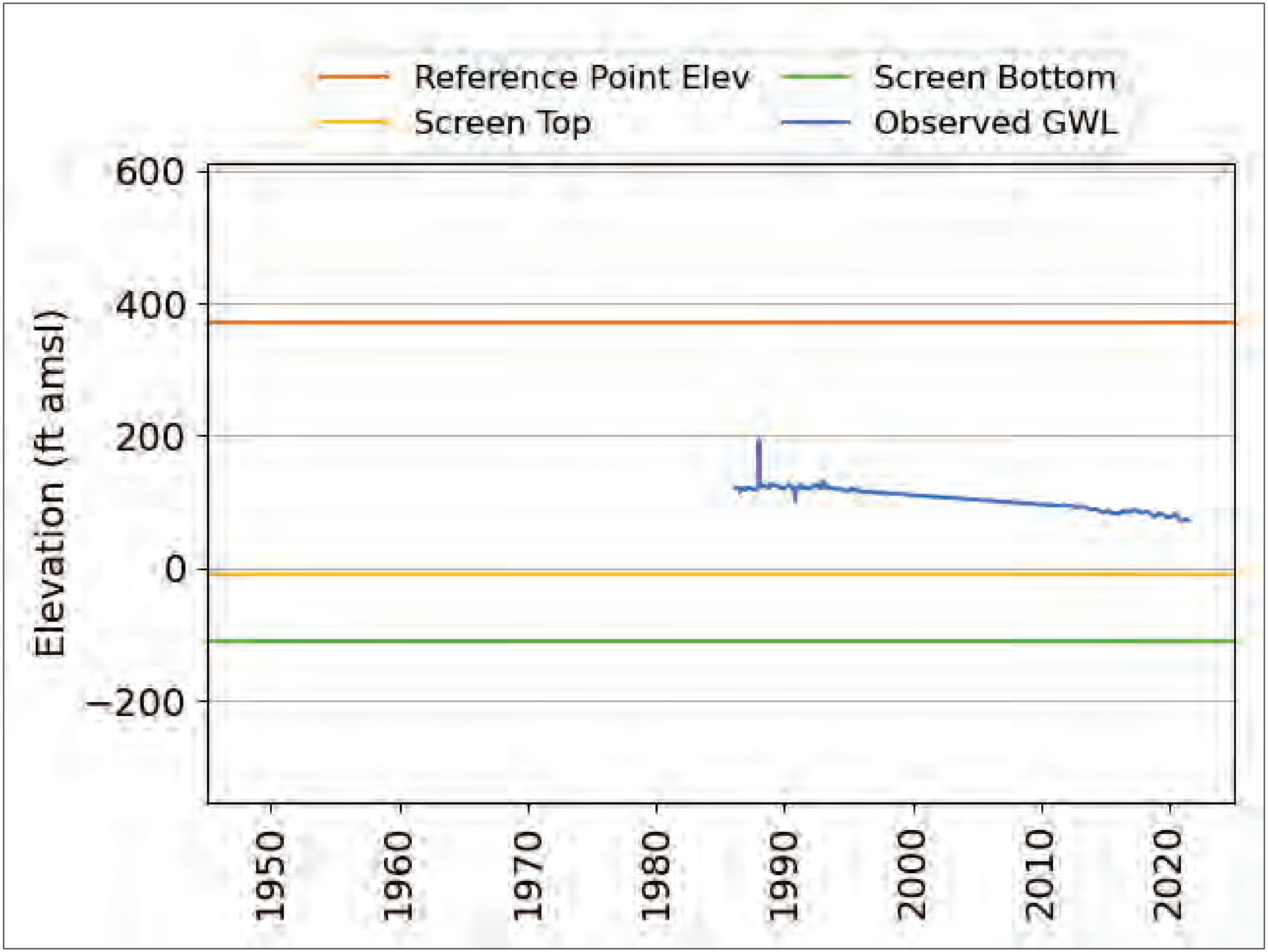

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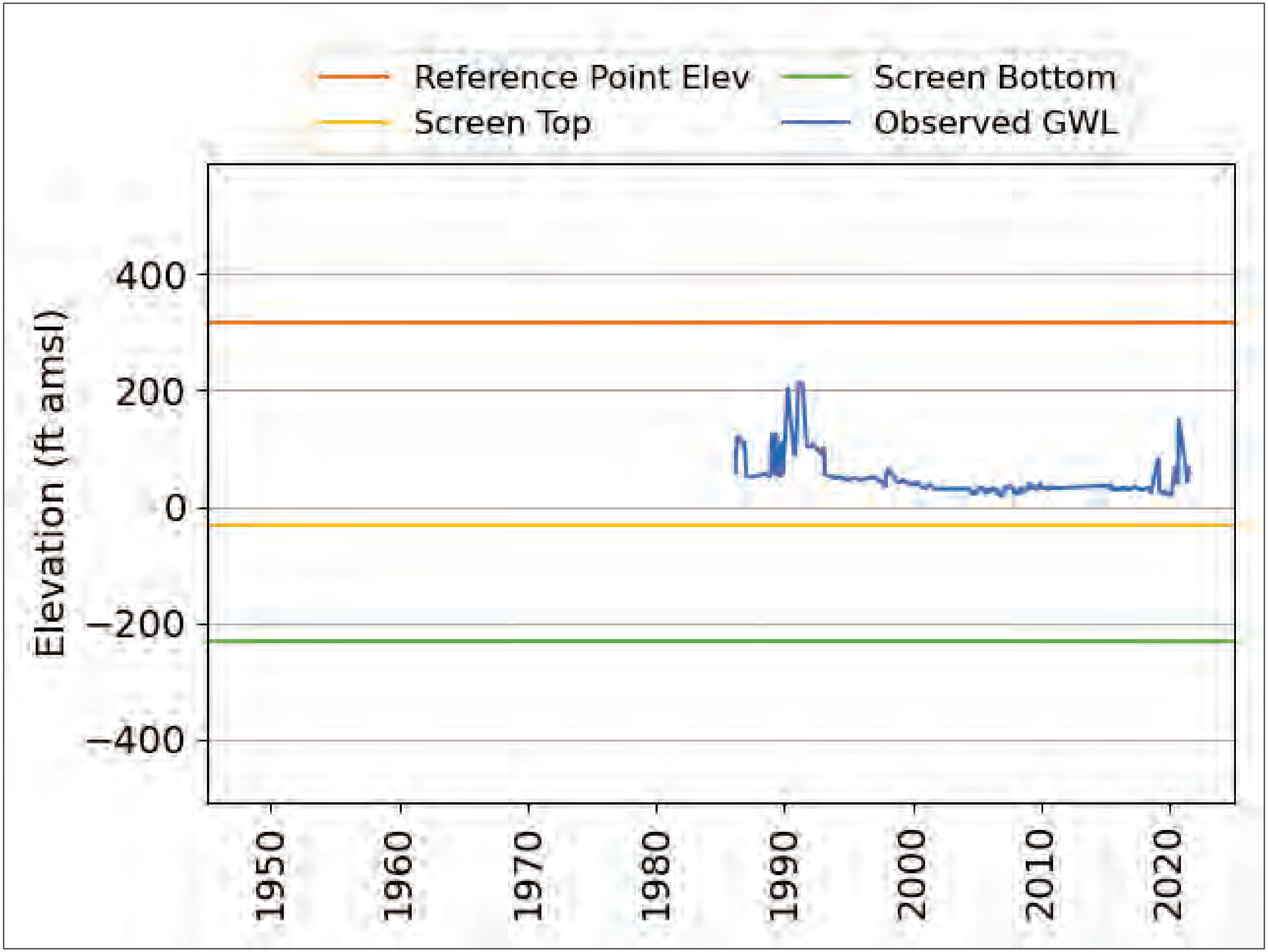

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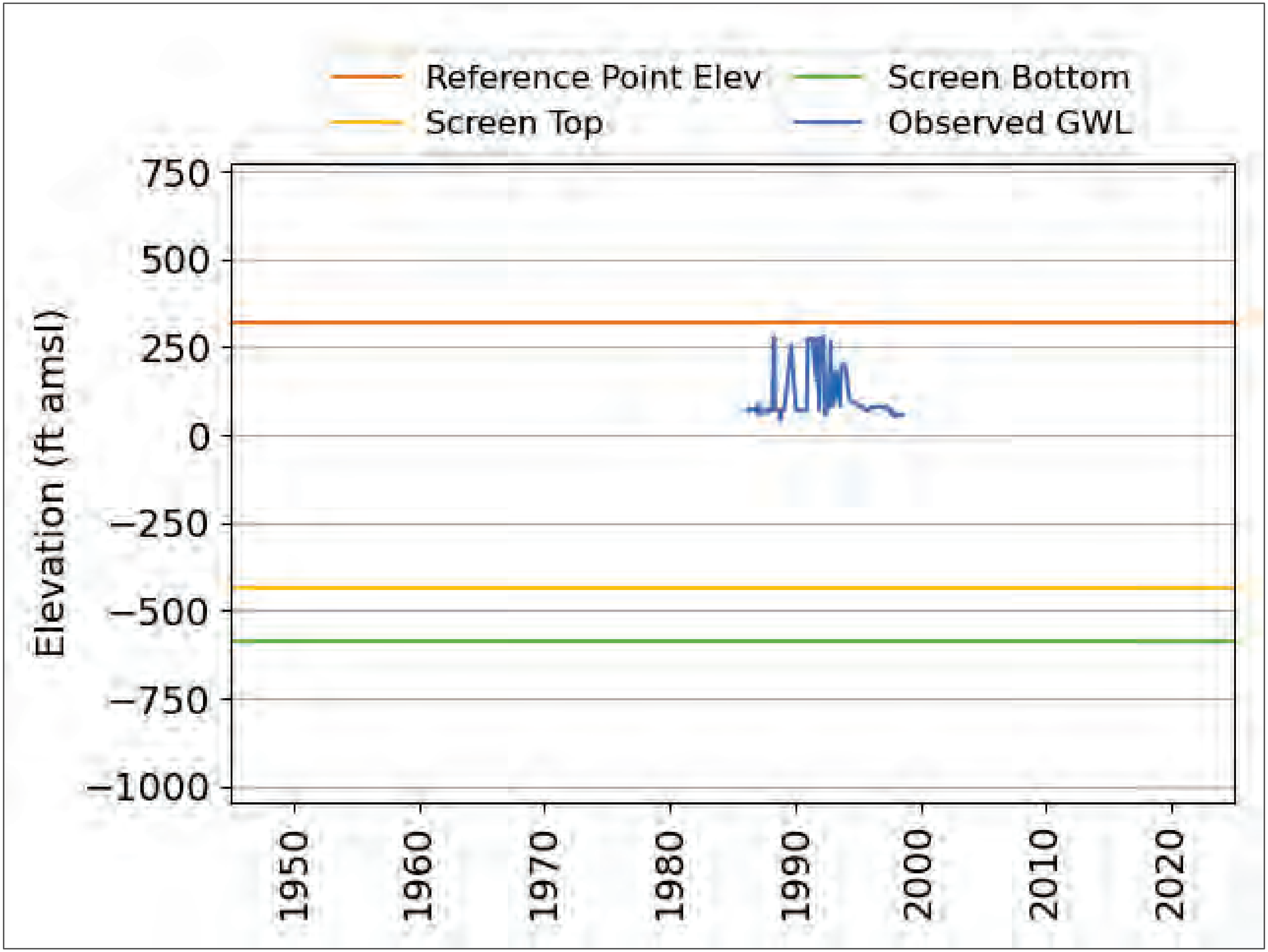

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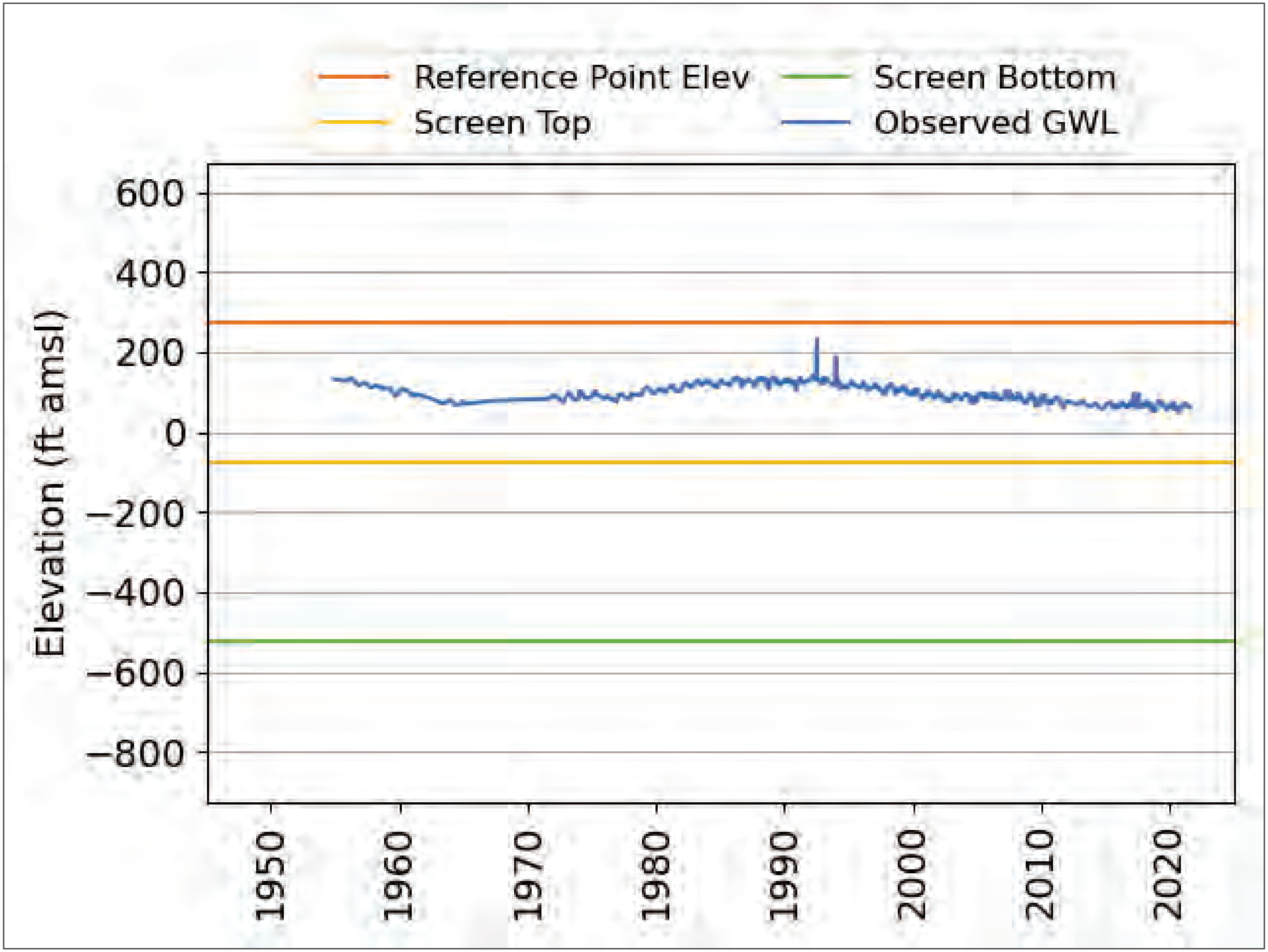

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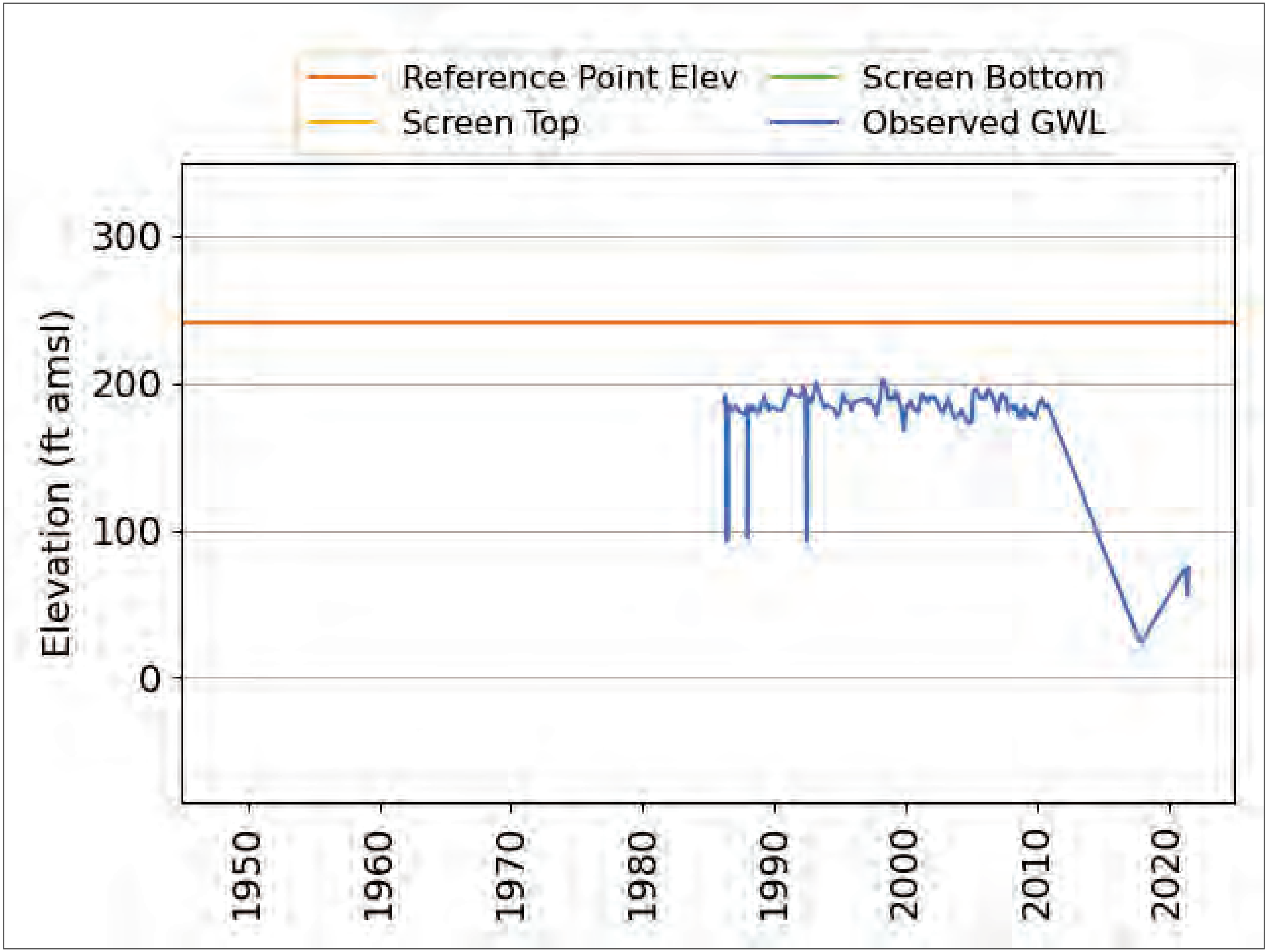

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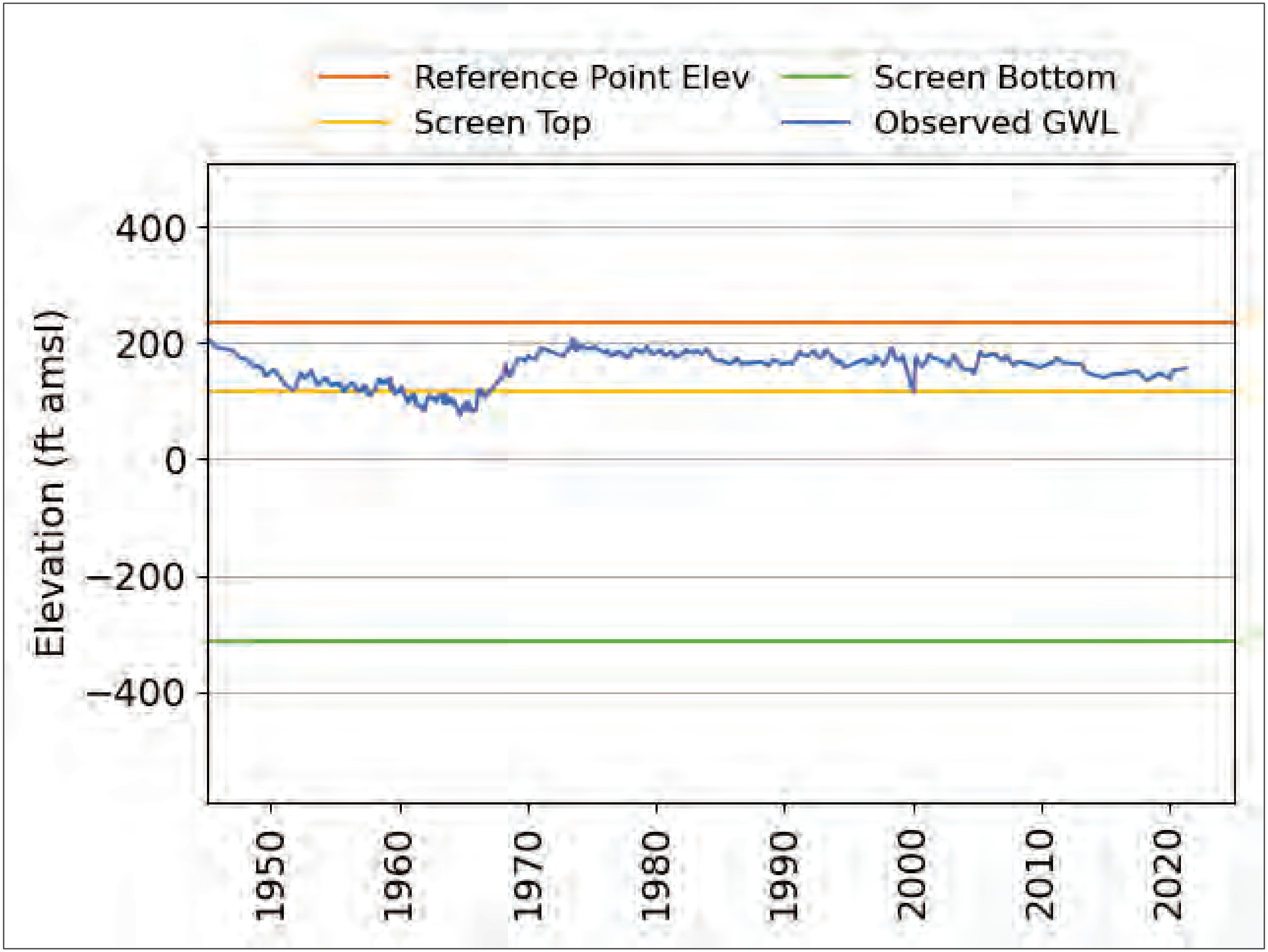

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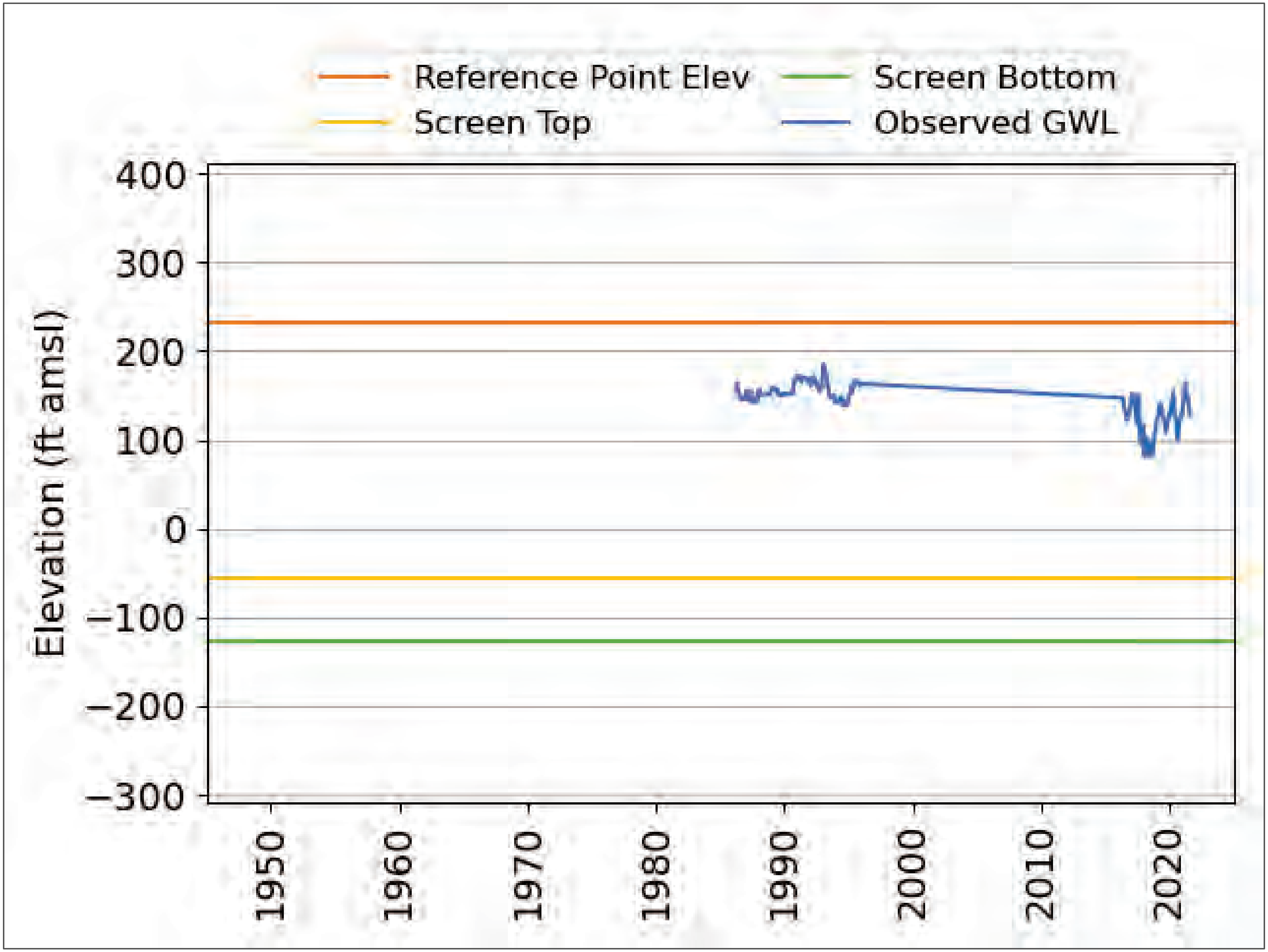
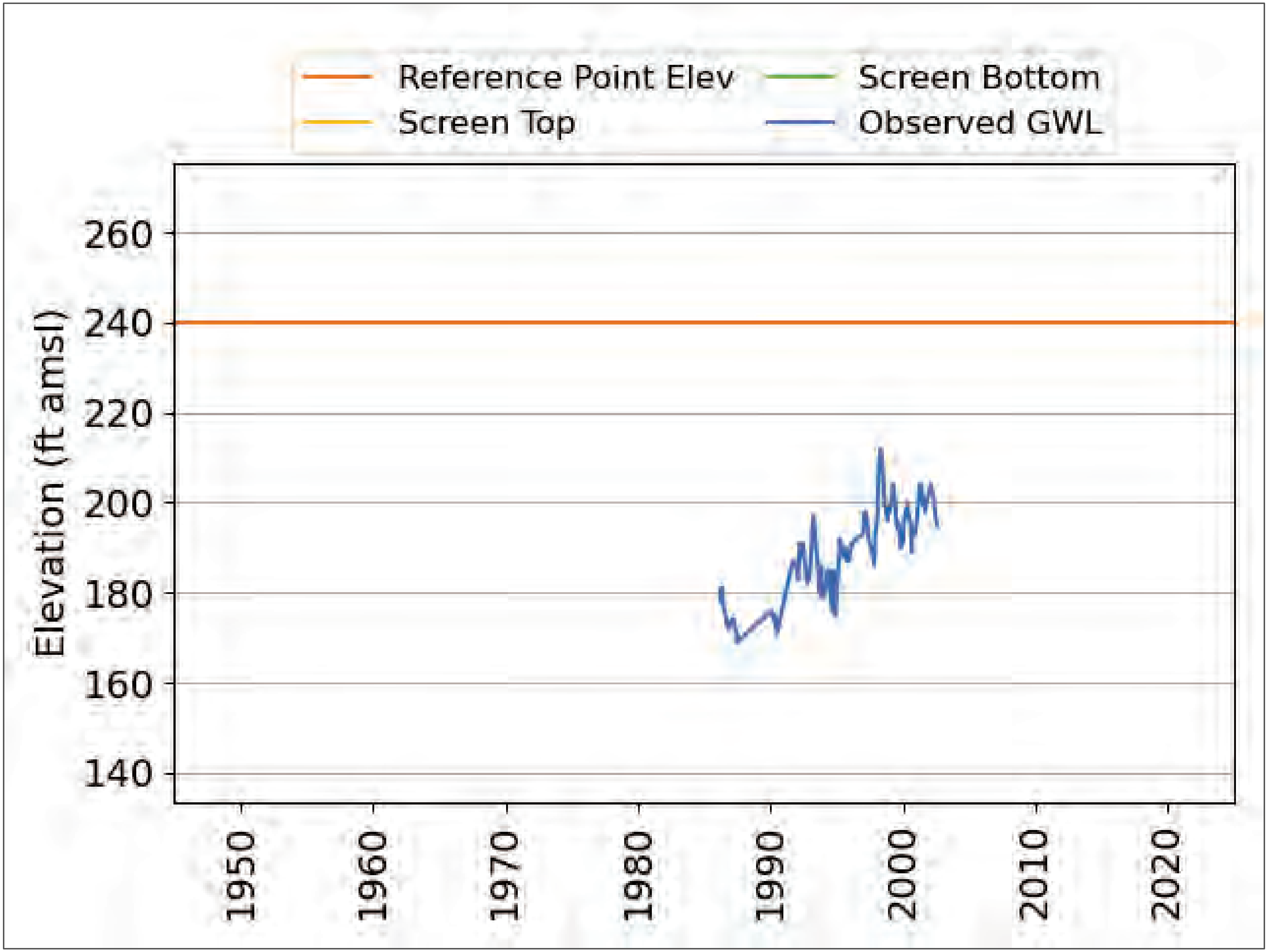


I-23 Observed Groundwater Level (02N20W24Q03S).



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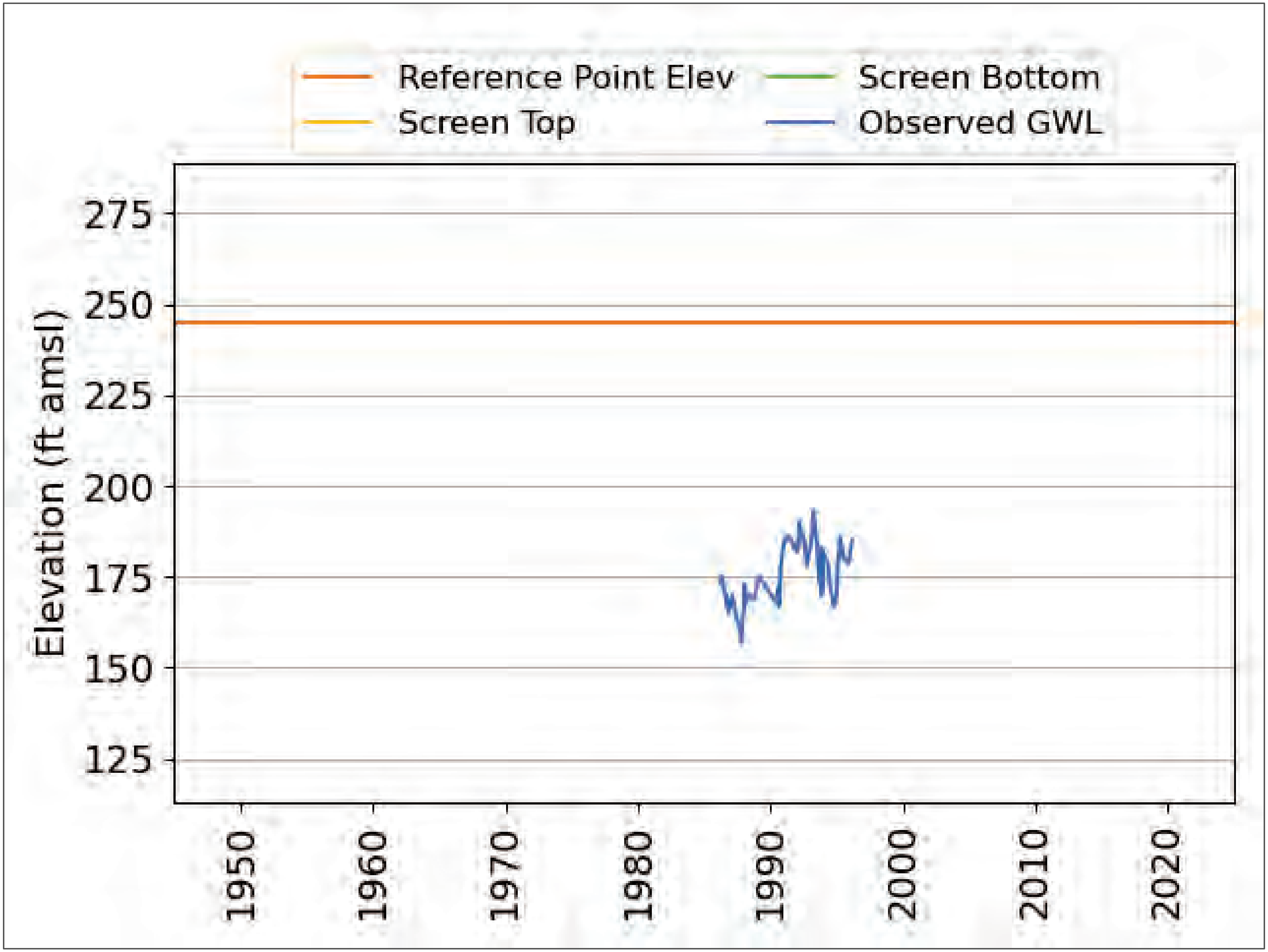

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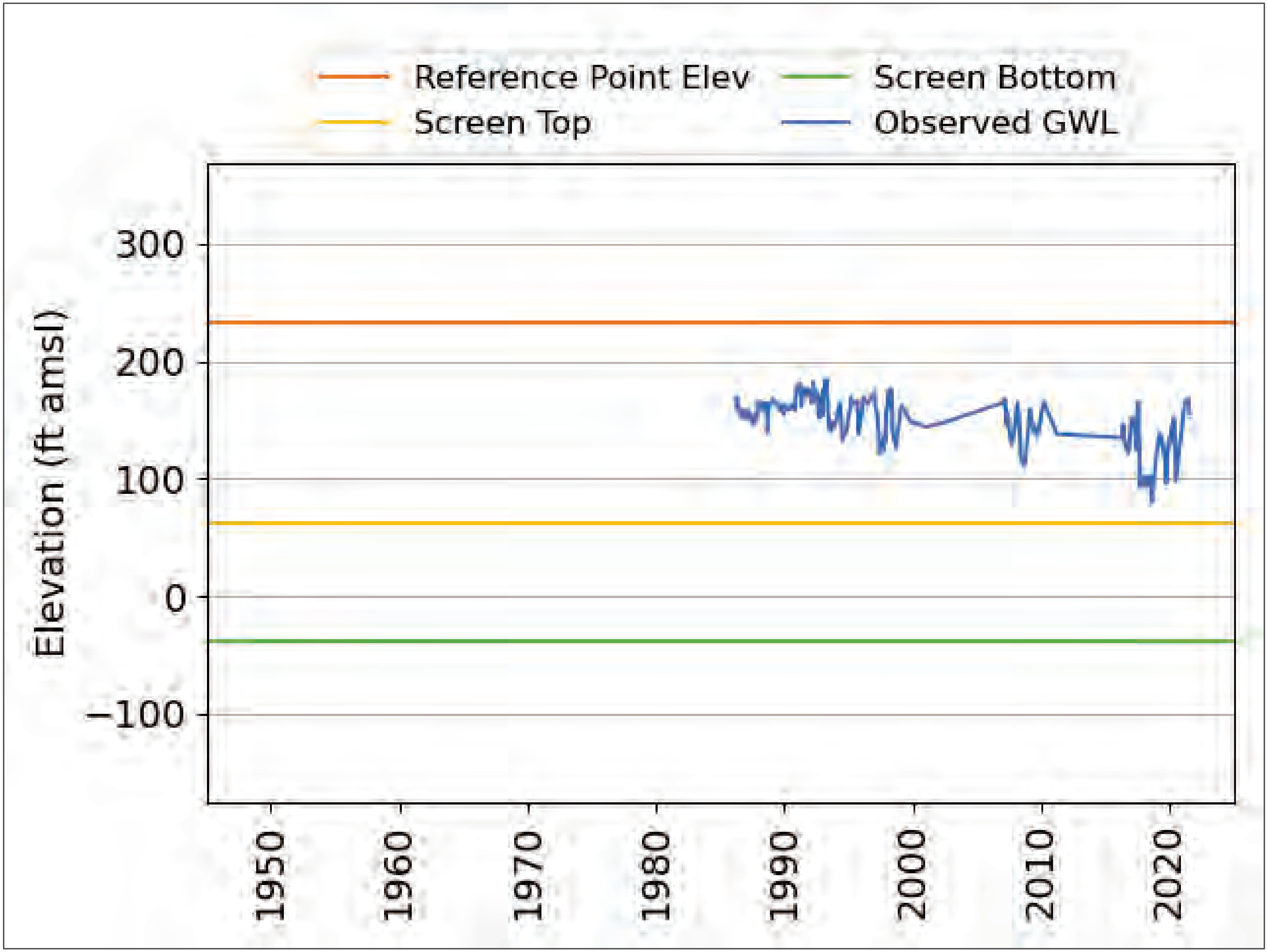

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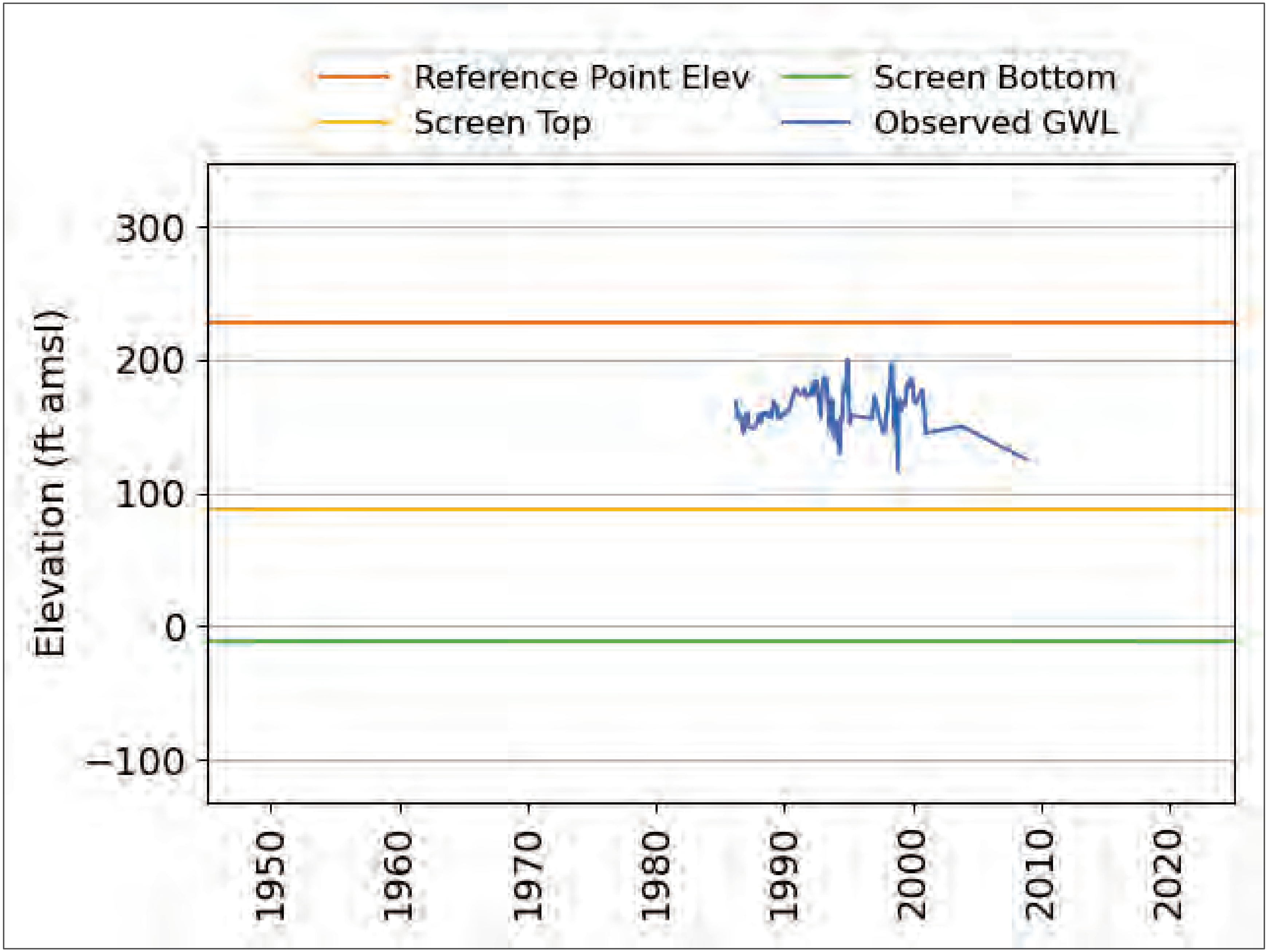

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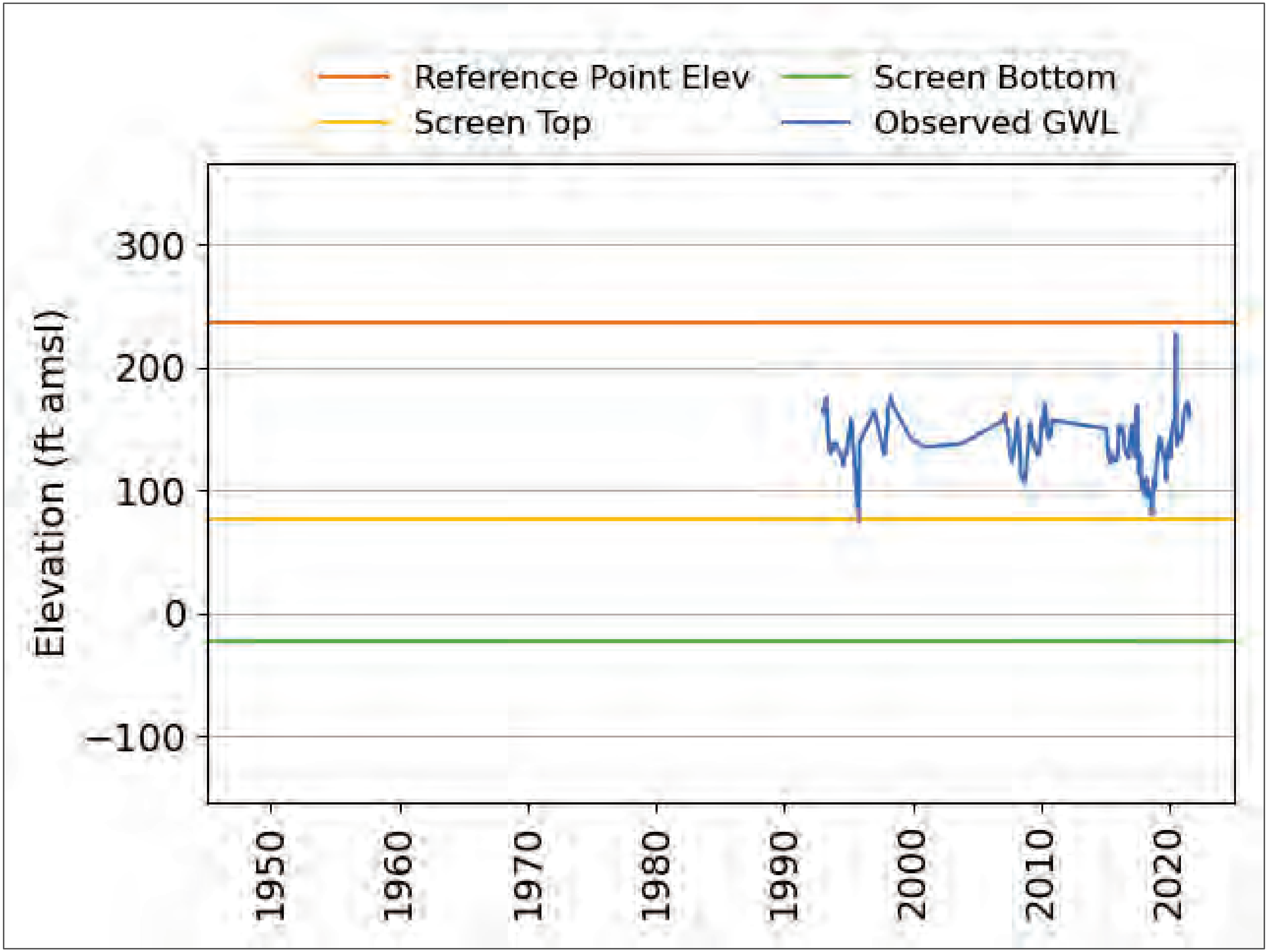

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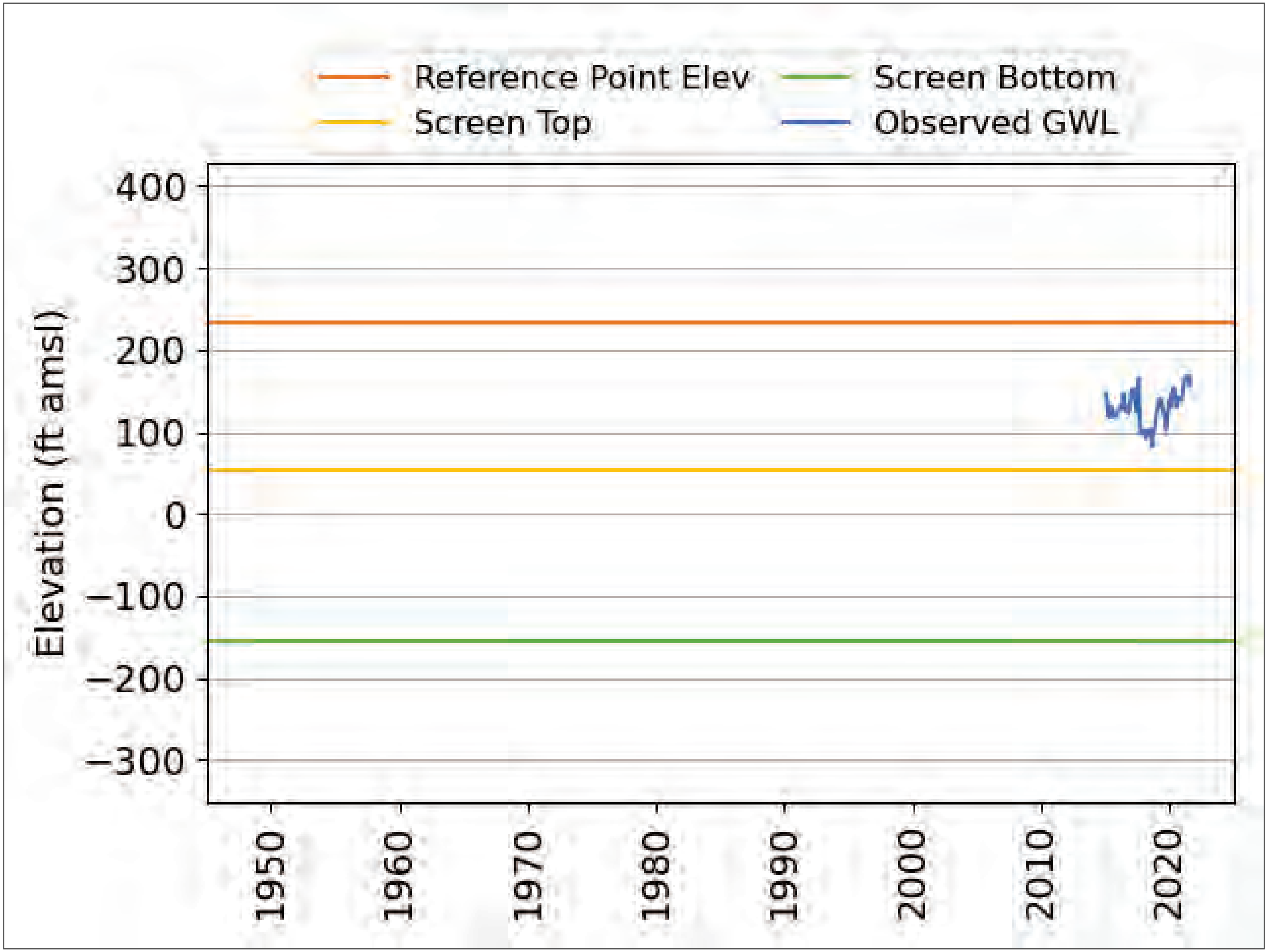

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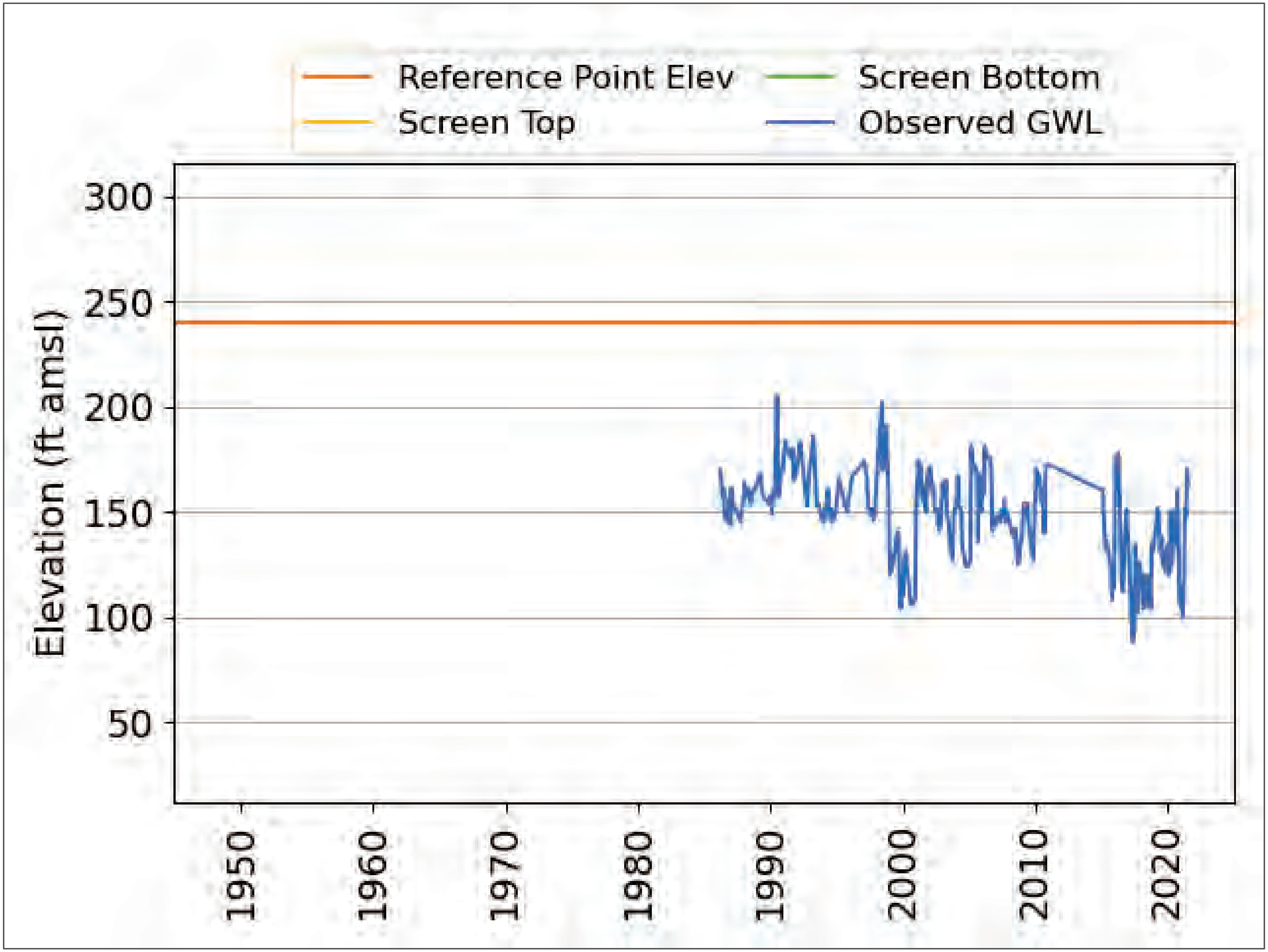

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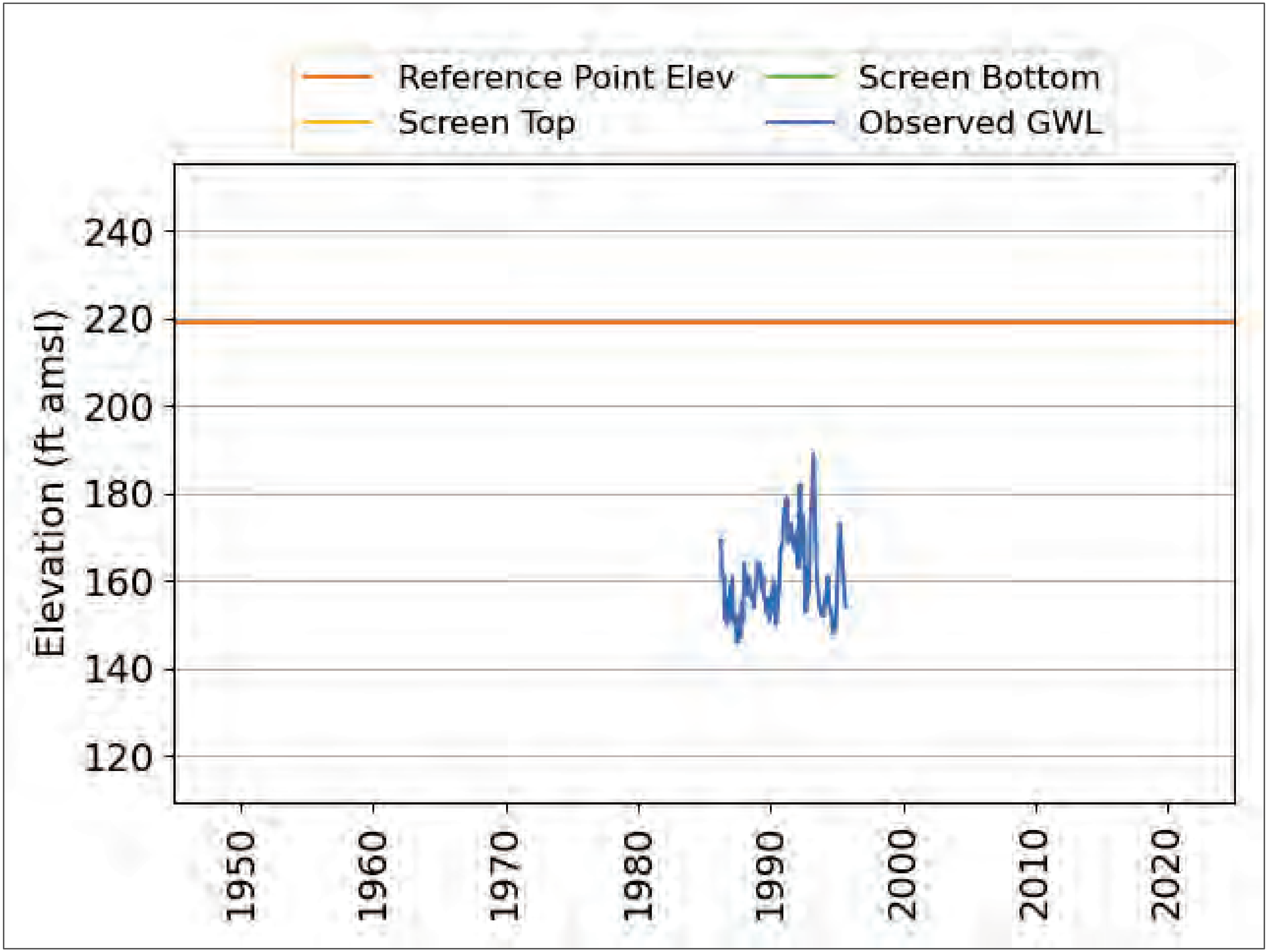

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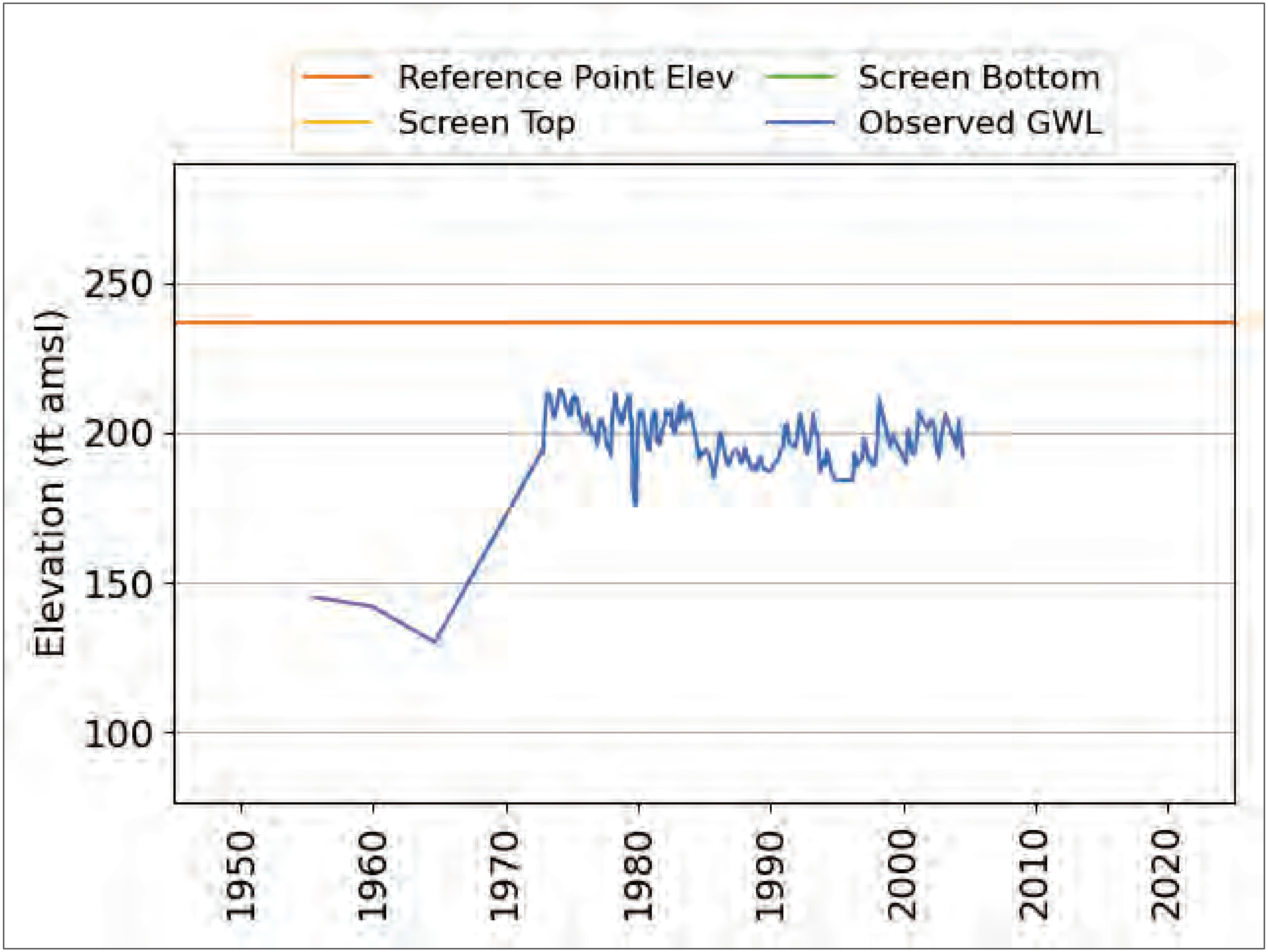
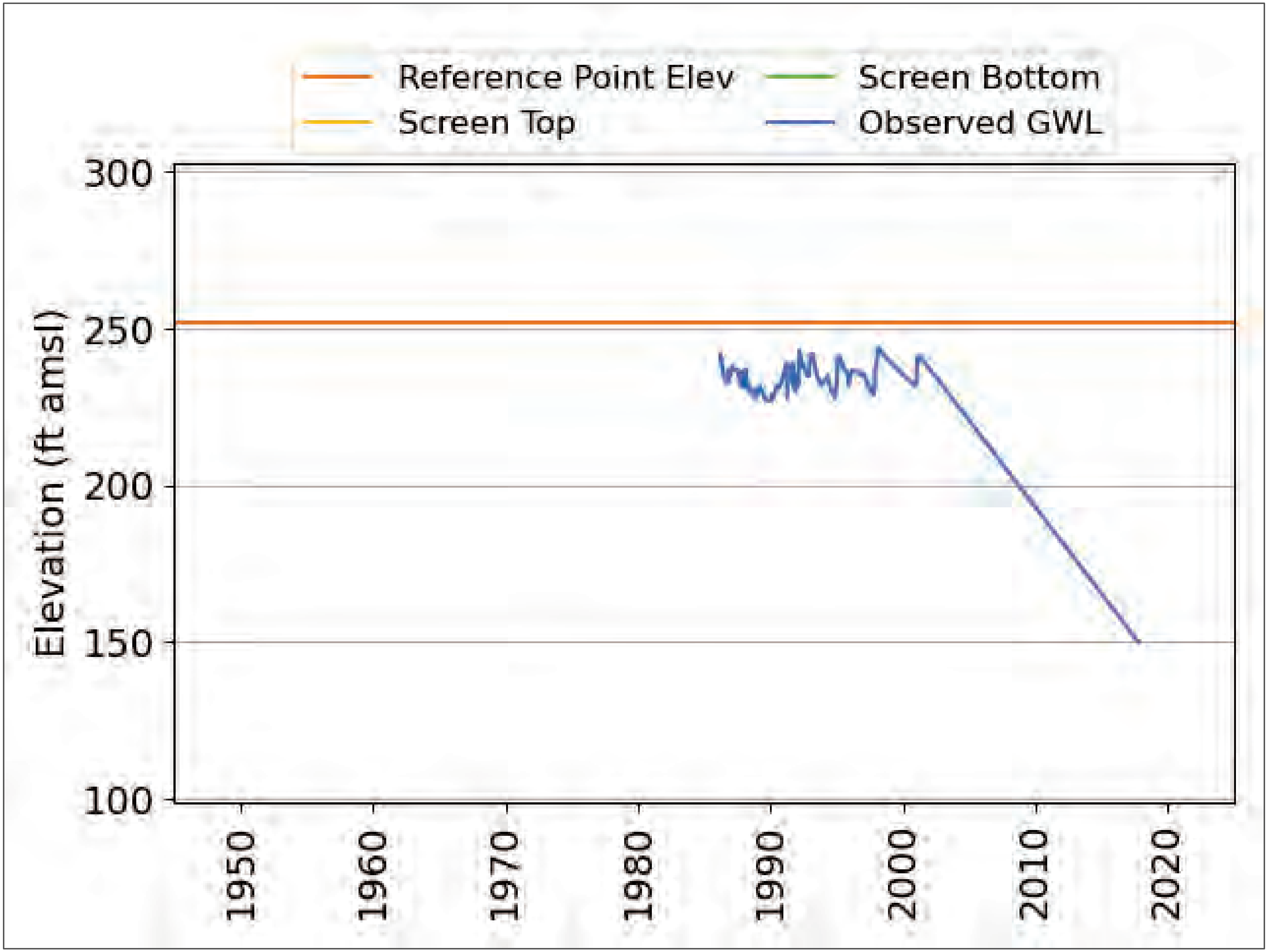


I-32 Observed Groundwater Level (02N20W25L01S).



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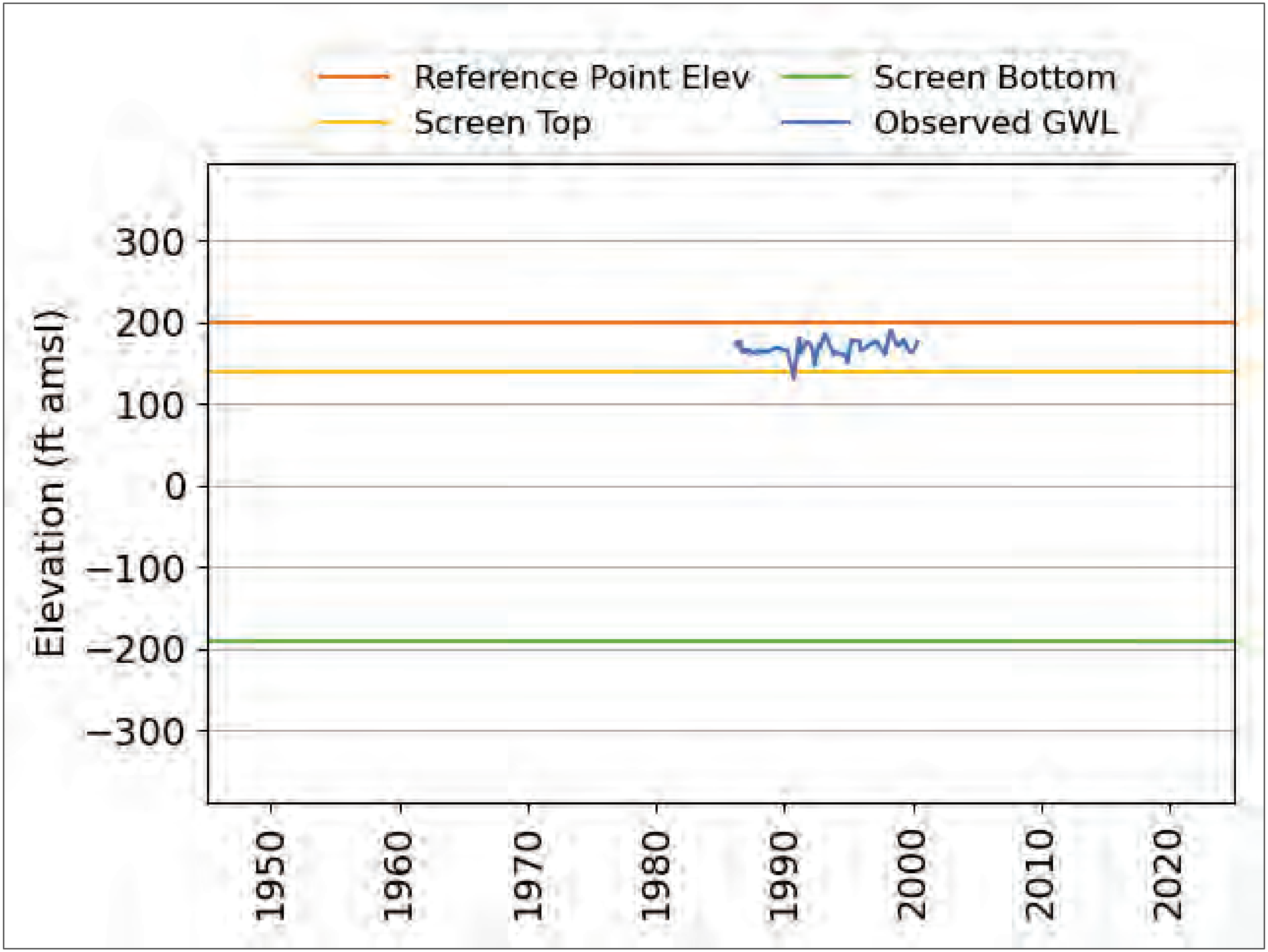
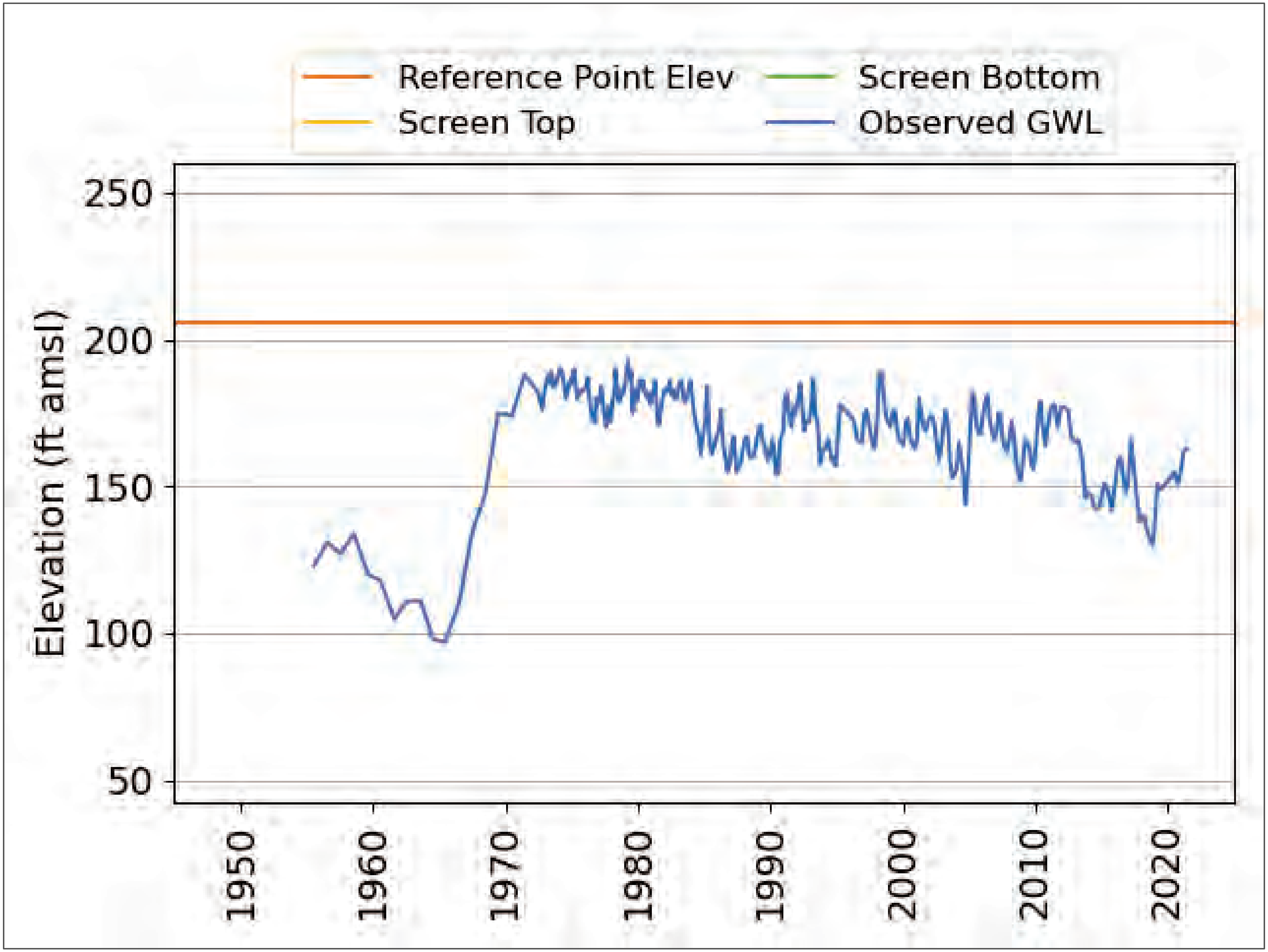


I-34 Observed Groundwater Level (02N20W26B02S).



I-35 Observed Groundwater Level (02N20W26B03S).

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix J

Method for Establishing Sustainable Management Criteria for the Chronic Lowering of Groundwater Levels Sustainability Indicator

APPENDIX J

Method for Establishing Sustainable Management Criteria for the Chronic Lowering of Groundwater Levels Sustainability Indicator

This appendix summarizes the analysis of groundwater levels for the monitoring wells within the Arroyo Santa Rosa Valley Groundwater Basin (ASRVGB or Basin), which led to the definition of sustainable management criteria (SMC) for the chronic lowering of groundwater levels sustainability indicator.

The potential effects of low groundwater levels on groundwater supply were analyzed by evaluating historical reports, historical groundwater elevation data, well construction information, feedback from well owners in the Basin, including Camrosa Water District (Camrosa WD), and numerical modeling results from the historical and 50-year projected water budget (see Appendix G of the GSP document). The purpose of the groundwater level analysis presented herein was to evaluate whether historical low groundwater levels could appropriately be used as minimum thresholds for the chronic lowering of groundwater levels sustainability indicator. Because undesirable results due to chronic lowering of groundwater levels have not been documented in the Basin, the overall concept is that significant and unreasonable effects will likely be avoided if groundwater levels are managed such that they do not decline below the lowest elevations observed historically.

Section 3.2.1.2 of the GSP summarizes the groundwater level data for the Basin, which indicates a historical low condition was observed during the 1960s in most areas of the Basin. Available historical groundwater level data from local sources (e.g., see hydrographs 02N20W22G01S, 02N20W26B03S, 02N20W23R01S, 02N20W23K01S, 02N19W19R02S, 02N19W21C02S, 02N19W20L01S on Figure J-01), in addition to groundwater level data acquired separately from a United States Bureau of Reclamation (1978) report, provided a general sense of groundwater conditions across the Basin during the 1960s but the data was limited. The lowest groundwater level measurements from the 1960s were compiled and mapped to interpolate contours for the Basin, based on existing contours and interpretations developed by the California Department of Water Resources (1954) and MWH (2013), and groundwater modeling results (Figure J-02). The contours were utilized to estimate groundwater levels for monitoring network wells without data from the 1960s; however, groundwater levels could not be estimated for some well locations due to the inadequate spatial coverage of available data from the 1960s. Therefore, historical low measurements for different time periods were also evaluated and compared to the 1960s measured and estimated values (see Table J-01).

Groundwater levels observed in the 1960s do not represent the historical low condition for all wells across the Basin; thus a combination of measurements from the 1960s and more recent measurements since that period were evaluated to indicate the representative historical low at each well location in the monitoring network. In the ASRGSA management area (southeast of the Bailey Fault), the historical low is generally observed in the 1960s, but some wells had similar or slightly lower levels measured more recently.

In summary, the historical lows for six out of the 11 wells in the ASRGSA management area were established based on either measured or estimated values from the 1960s data:

1. 02N19W19P02S (estimated)
2. 02N19W20L01S (measured)
3. 02N19W20M04S (estimated)
4. 02N20W23R01S (measured)
5. 02N20W25D01S (measured)
6. 02N20W26B03S (measured)

For the remaining five wells in the ASRGSA management area, four wells (02N20W24Q03S, 02N20W25C02S, 02N20W25C05S, 02N20W25C07S) had recent groundwater levels that were slightly lower than the 1960s data – these included the three closely spaced Conejo wellfield wells (i.e., 25C-series), for which the recent historical low was averaged for the three wells and used as a representative historical low value (Table J-01). The historical low for well 02N20W24Q03S was observed in 2018. Well 02N20W23Q02S did not have reliable data to estimate the historical low and was omitted from the analysis; monitoring at this well will continue as scheduled (see GSP Section 5.3), and when more information is acquired (i.e., well construction data), SMC parameters will be updated to include this well.

For the three wells in the FCGMA management area (02N20W23G01S, 02N20W23G02S, 02N20W23K01S), the limited data suggest that recent groundwater levels represent the historical low and the FCGMA management area may have chronically declining groundwater levels (e.g., groundwater levels continued to decline despite overall wet conditions between approximately 1991-2011).

Hydrographs for each well in the monitoring network (except 02N20W23Q02S) are presented along with their selected sustainable management criteria on Figures J-03 through J-15.

The review of available well construction, screen interval, and pump setting information for the monitoring network wells indicated that groundwater levels could decline to the representative historical low levels before any significant and unreasonable effects (i.e., depletion of supply and/or damage to wells) would occur because the historical low groundwater levels were sufficiently above the top of the screen and/or pump setting given well losses and expected drawdown (see Table J-01 for comparison); this is also supported by the absence of any documented undesirable results within the Basin during historical lows. Therefore, the representative historical low selected for each well was determined to be appropriate for the minimum threshold. The combination of minimum threshold exceedances that would signify undesirable results is >50% of wells exceeding minimum thresholds in either management area for 2 consecutive years. Two years is considered to be a reasonable duration to confirm that any minimum threshold exceedances are not due to seasonal variability or a short-term aberration.

The maximum modeled groundwater level following the stabilization of groundwater levels (after the public supply wells are scheduled to resume regular operations) was selected to represent the measurable objective to establish the operational range of flexibility. Currently, Camrosa WD’s Conejo wellfield is temporarily out of operation (since 2018, resulting in a localized increase of groundwater levels) due to TCP concentration levels exceeding the Maximum Contaminant Level and are scheduled to resume regular operations by 2023, when the construction of a Granular Activated Carbon treatment facility is complete (see Section 3.2.4). Failure to meet the measurable objectives during other times shall not be considered failure to sustainably manage the Basin. The measurable objective is not intended to be met all the time; rather, the measurable objective should be met at the end of wet periods. Interim milestones are shown beginning at current levels and rising linearly in 5-year increments toward the measurable objective. This interim milestone path should not be taken literally because it depends on climate and potential changes to future management of the Basin. The interim milestones and path to sustainability will be reviewed during each required 5-year GSP assessment (GSP Emergency Regulations §354.38(a)). Some wells have current groundwater levels above the measurable objective due to the 2018 water supply well shut down (e.g., 02N20W23R01S, 02N20W24Q03S, 02N20W25C02S, 02N20W25C05S, 02N20W25C07S, 02N20W25D01S, and 02N20W26B03S) so the average observed groundwater level before 2018 were selected for the starting value of the IMs (see Table J-01). Hydrographs for each well in the monitoring network are presented along with their selected sustainable management criteria on Figures J-03 through J-15.

Table J-01 Summary of Well Construction Information, Historical Low, and Sustainable Management Criteria for the Monitoring Network Wells.

State Well Identification Number	Year Well Constructed	Reported (Original) Well Use	Mgmt area	Aquifers Monitored	Ground Surface Elevation (feet amsl)	Borehole Depth (feet bgs)	Depth of Screened Interval(s) (feet bgs)	TOS elevation (ft amsl)	Pump setting elevation (ft amsl)	1960s HL Measured from USBR (ft amsl)	1960s HL Estimated from Contour Map (ft amsl)	HL Derived from Post-1960s Data (ft amsl)	MT (ft amsl)	MO (ft amsl)	IM start (ft amsl)	IM 5-year (ft amsl)	IM 10-year (ft amsl)	IM 15-year (ft amsl)	IM 20-year (ft amsl)
02N20W23G01S	1948	Agricultural	FCGMA	Upper	370.8	496	382 - 389; 470 - 483	-11.2	no data	no data	no data	70.8	70.8	92.8	70.8	76.3	81.8	87.3	92.8
02N20W23G02S	1950	Agricultural	FCGMA	Upper	317	560	350 - 550	-33.0	no data	no data	no data	17.3	17.3	36.5	20.0	24.1	28.3	32.4	36.5
02N20W23K01S	1950	Agricultural	FCGMA	Upper/Lower	274.11	800	350 - 800	-75.9	no data	70.7	n/a	47.0	47.0	81.3	61.1	66.2	71.2	76.3	81.3
02N19W19P02S	1940	Public Supply	ASRGSA	Lower	286	404	199 - 393	87.0	26.0	no data	108.0	126.1	108.0	179.3	141.0	150.6	160.1	169.7	179.3
02N19W20L01S	1928	Agricultural	ASRGSA	Lower	307.66	266	40 - 266	267.7	no data	119.7	n/a	n/a	119.7	259.1	201.6	216.0	230.3	244.7	259.1
02N19W20M04S	1962	Public Supply	ASRGSA	Lower/Bedrock	318	464	304 - 464	14.0	no data	no data	138.0	138.2	138.0	236.4	224.3	227.3	230.4	233.4	236.4
02N20W23Q02S*	Unknown	Agricultural	ASRGSA	Unknown	241	Unknown	Unknown	Unknown	no data	no data	no data	--	--	--	--	--	--	--	--
02N20W23R01S	1961	Agricultural	ASRGSA	Upper/Lower	235.21	555	120 - 225; 465 - 550	115.2	no data	74.9	n/a	74.9	74.9	151.8	149.1	149.8	150.4	151.1	151.8
02N20W24Q03S	1954	Public Supply	ASRGSA	Lower	232	360	288 - 360	-56.0	-58.0	88.0	n/a	80.7	80.7	148.5	115.8	124.0	132.2	140.3	148.5
02N20W25C02S	1930	Public Supply	ASRGSA	Lower	233	395	170 - 218; 248 - 272	63.0	-23.0	93.1	n/a	81.0	79.2	145.4	121.1	127.1	133.2	139.3	145.4
02N20W25C05S	1991	Public Supply	ASRGSA	Lower	236.5	260	160 - 260	76.5	-22.5	no data	93.1	74.0	79.2	143.3	126.9	131.0	135.1	139.2	143.3
02N20W25C07S	1995	Public Supply	ASRGSA	Lower	233.5	400	180 - 390	53.5	-1.5	no data	93.1	82.5	79.2	145.4	121.5	127.5	133.5	139.4	145.4
02N20W25D01S	1928	Public Supply	ASRGSA	Unknown	240	460	Unknown	40.0	-67.0	84.6	n/a	n/a	84.6	150.9	128.1	133.8	139.5	145.2	150.9
02N20W26B03S	1939	Agricultural	ASRGSA	Unknown	205.87	Unknown	Unknown	55.9	no data	96.4	n/a	n/a	96.4	157.8	153.6	154.6	155.7	156.7	157.8

TOS: top of screen
HL: historical low
MT: minimum threshold
MO: measurable objective
IM: interim milestone
*Well currently not used to define or monitor sustainable management criteria due to lack of reliable information.

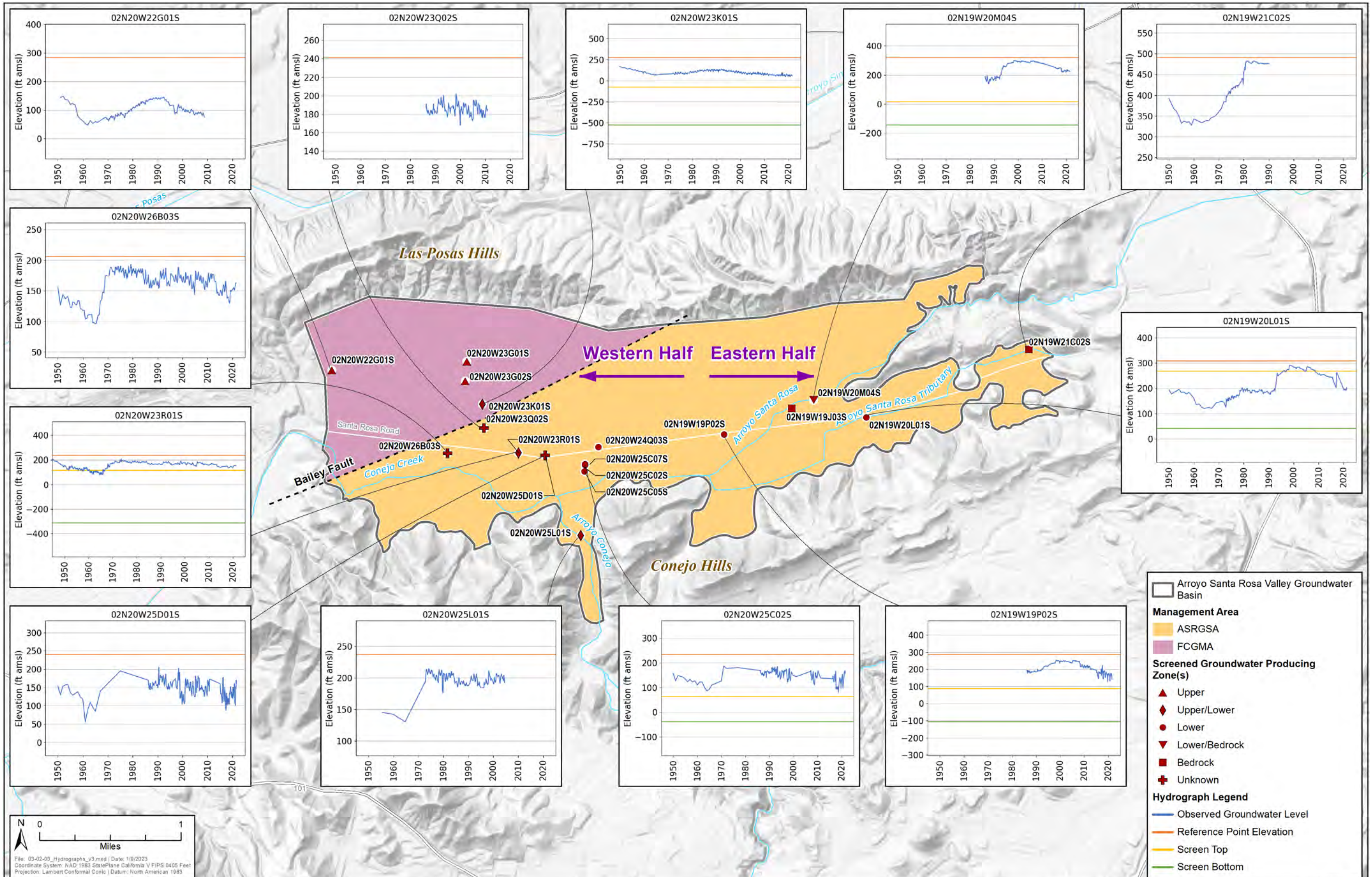


Figure J-01 Groundwater Level Hydrographs for Key Wells in the ASRVGB.

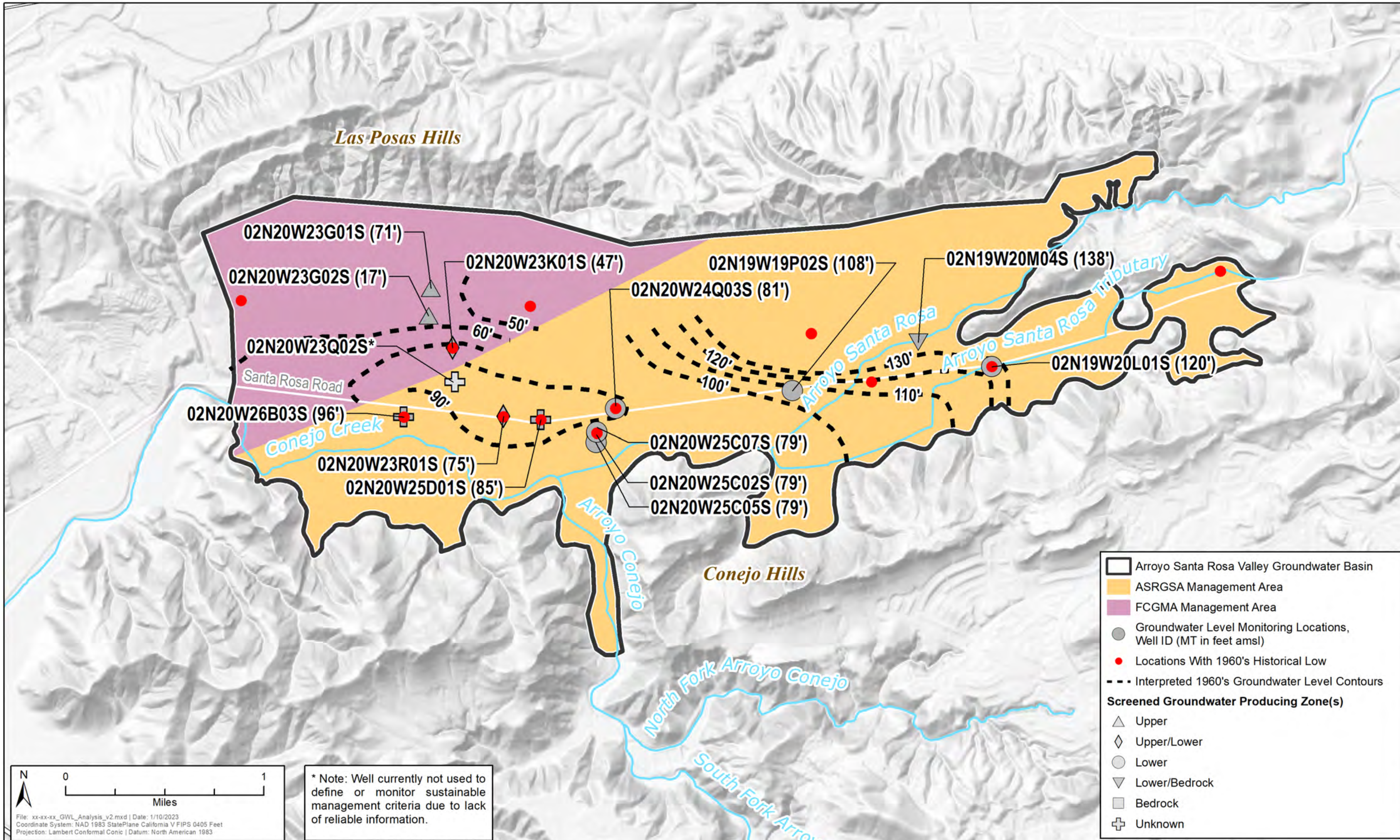


Figure J-02 Map Showing the Groundwater Elevation Monitoring Network with Interpreted 1960s Historical Low Groundwater Elevation Contours.

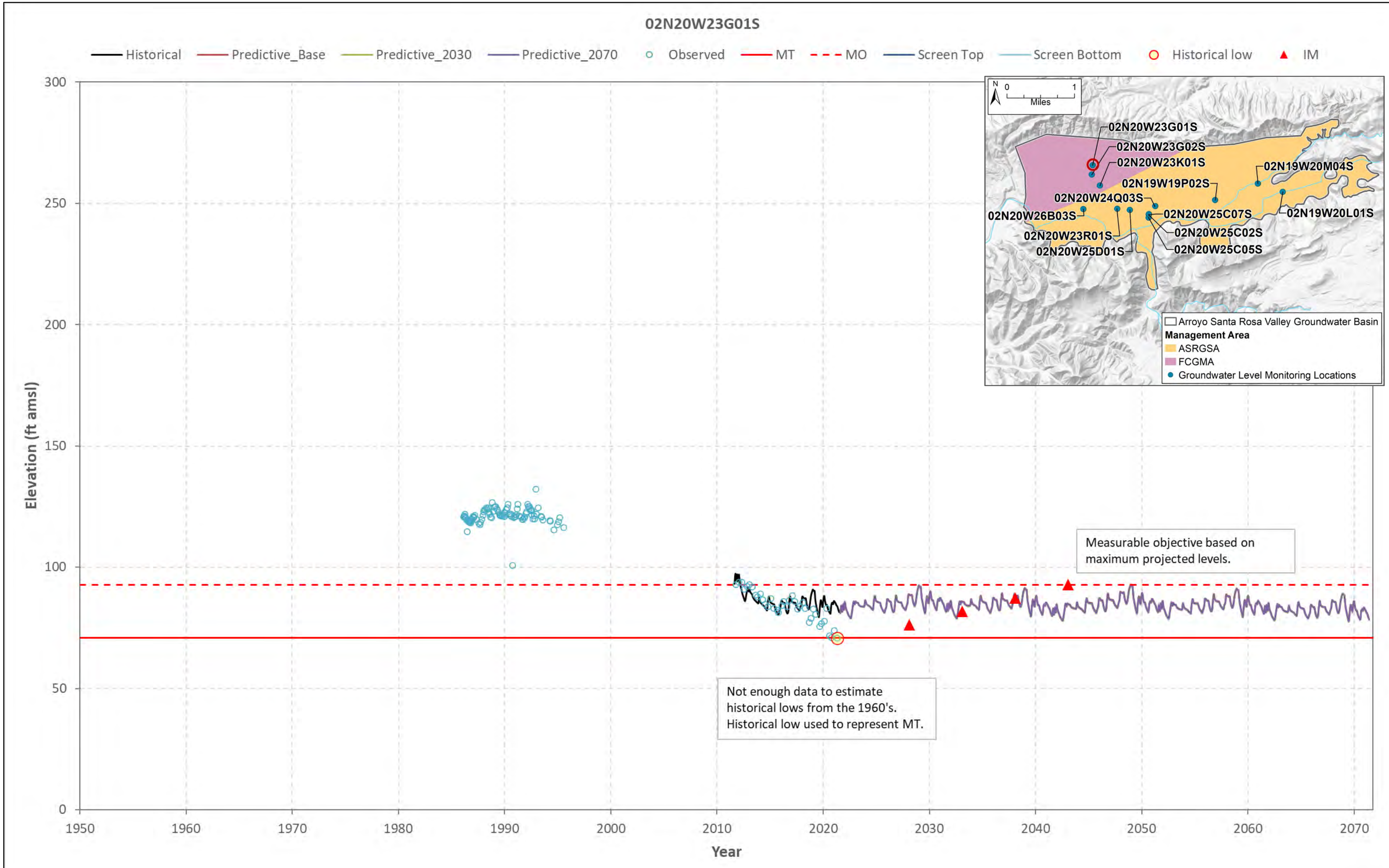


Figure J-03 ASRGSA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N20W23G01S).

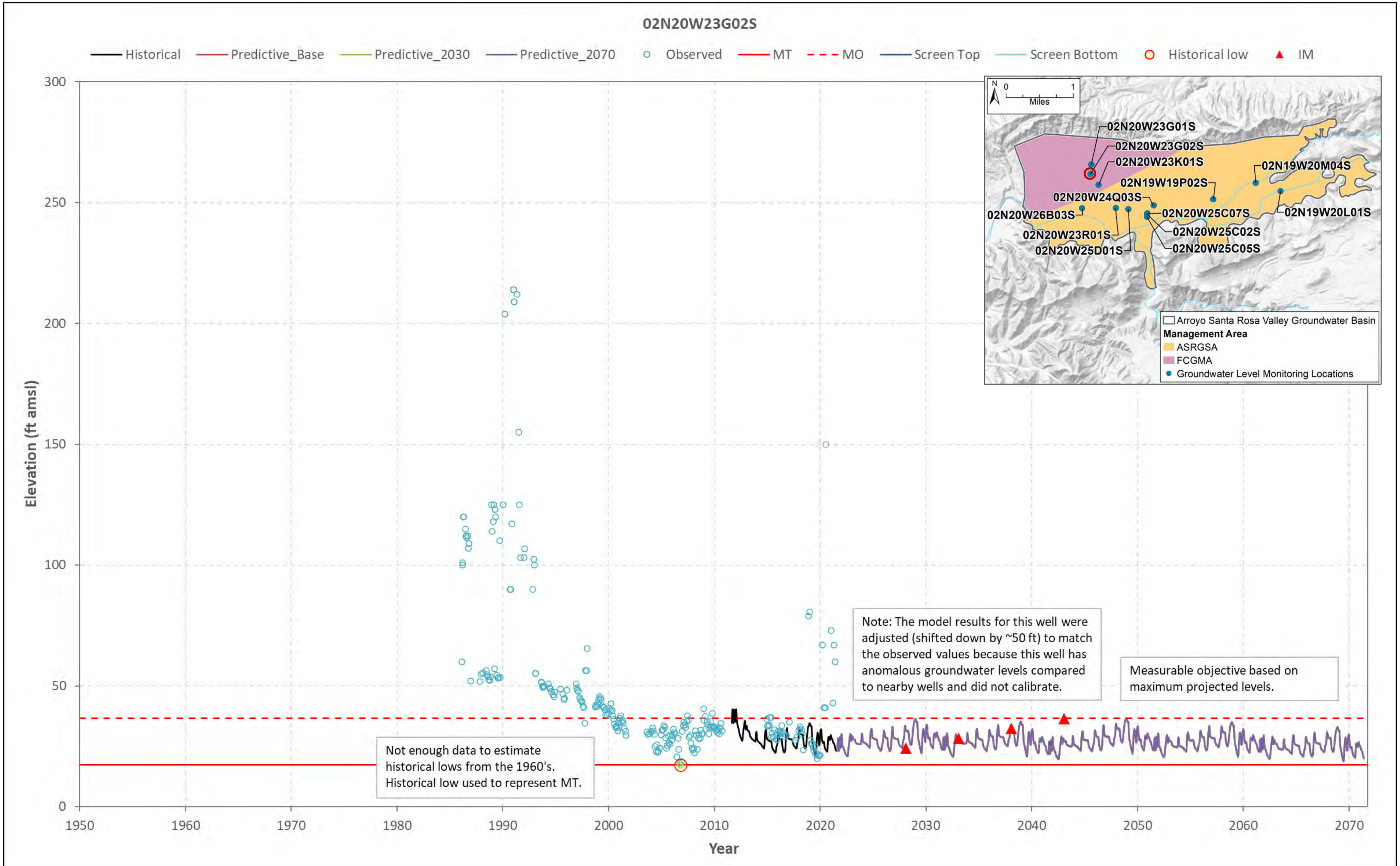


Figure J-04 ASRGSA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N20W23G02S).

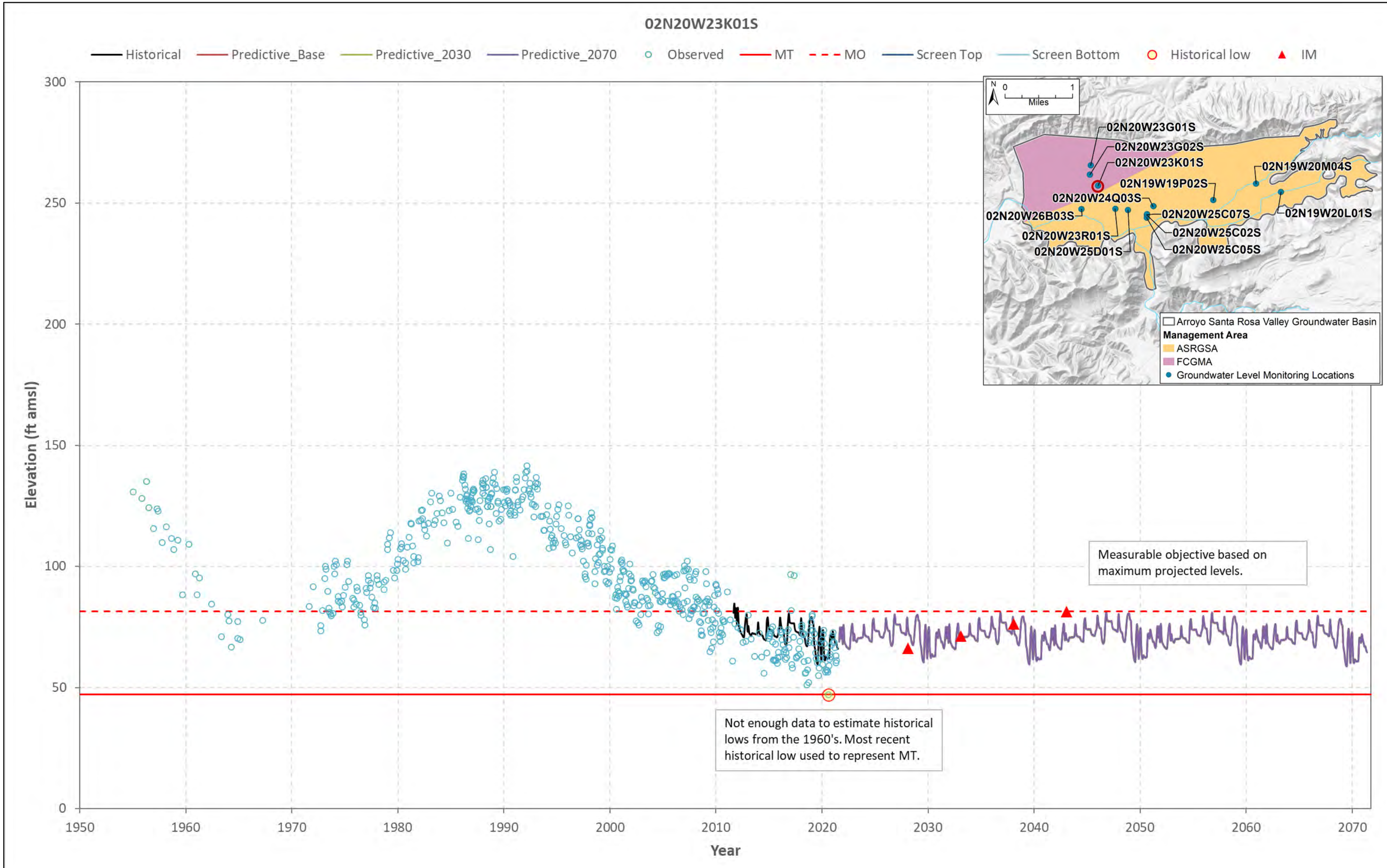


Figure J-05 ASRGSA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N20W23K01S).

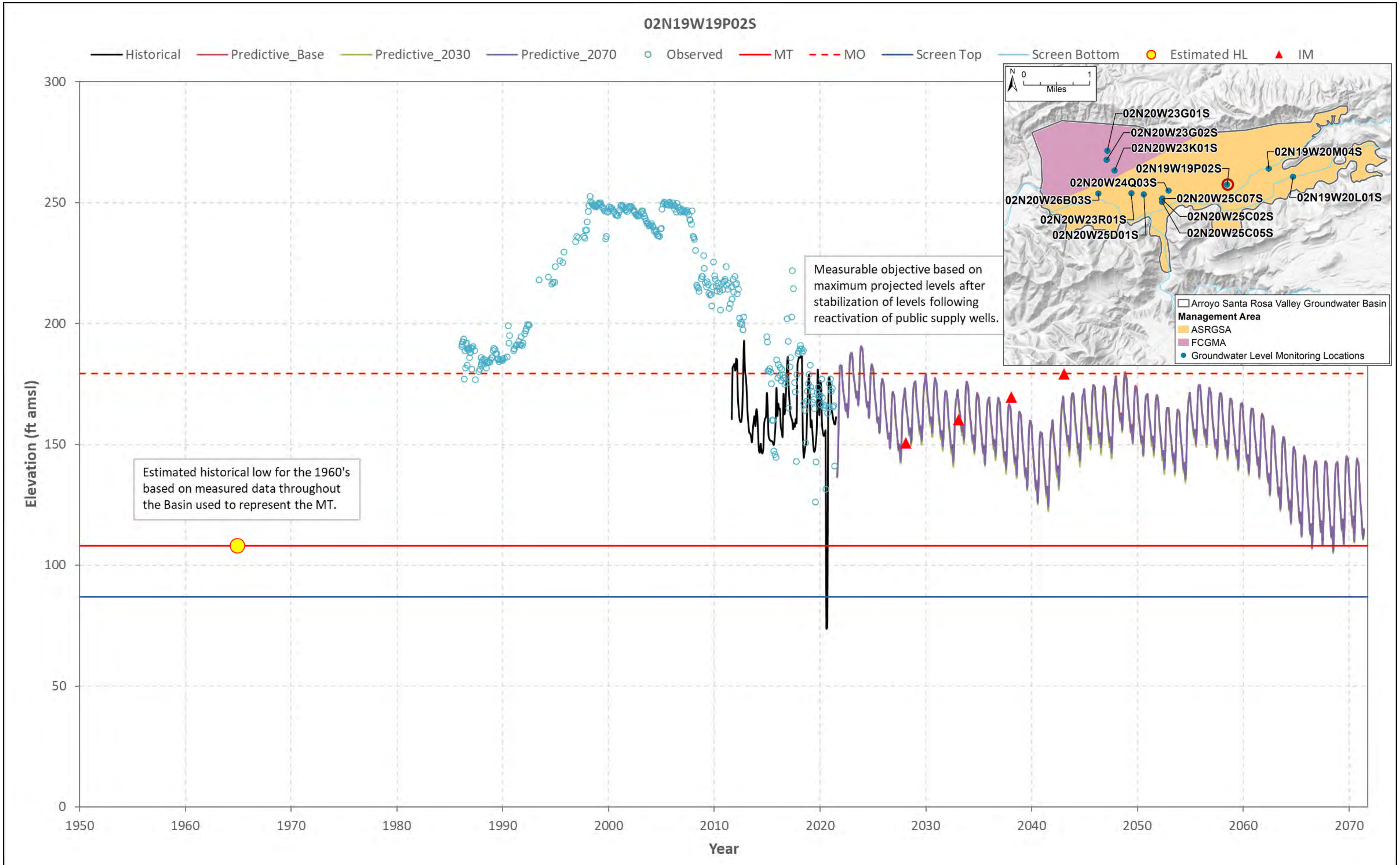


Figure J-06 ASRGSA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N19W19P02S).

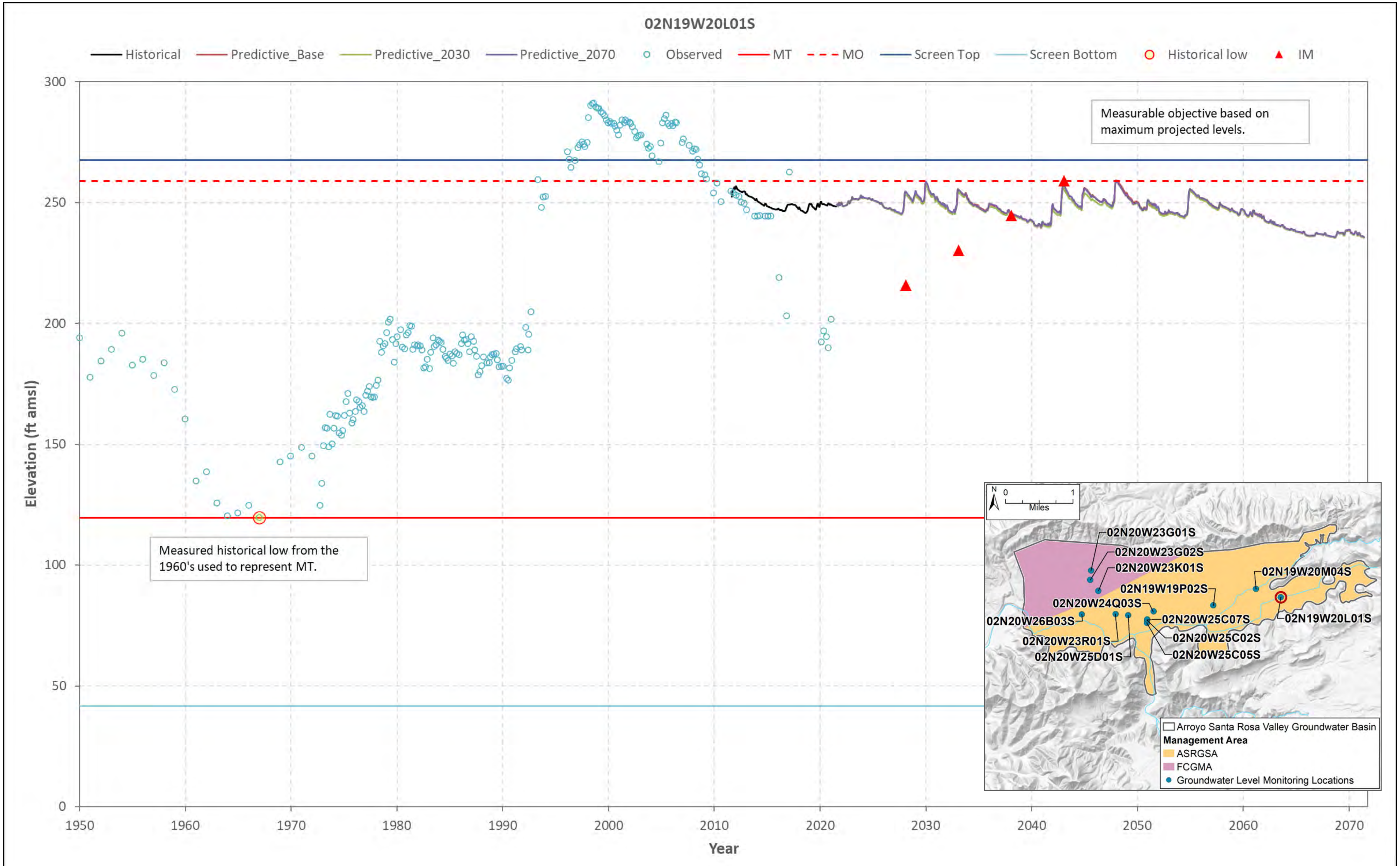


Figure J-07 ASRGSA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N19W20L01S).

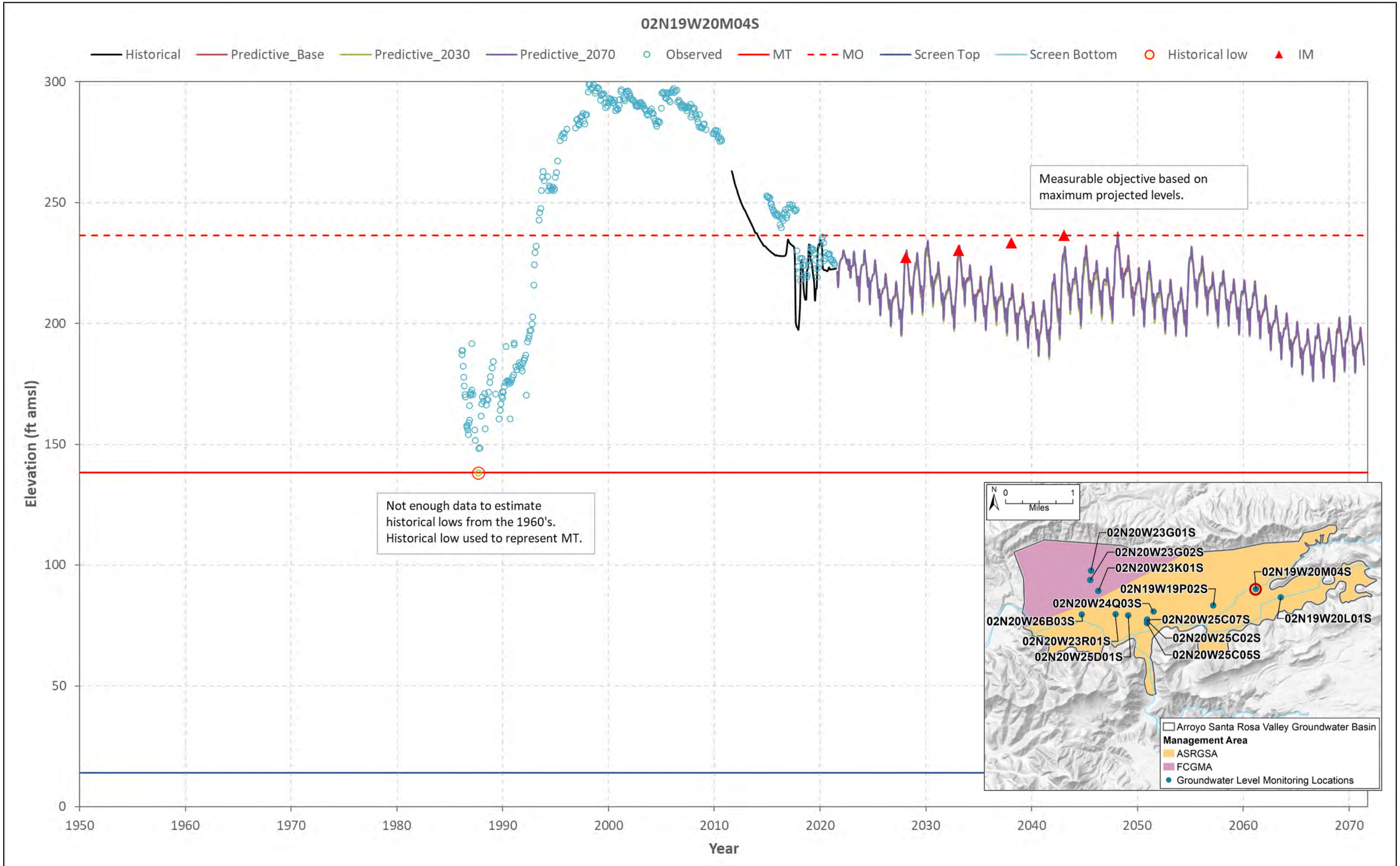


Figure J-08 ASRGSA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N19W20M04S).

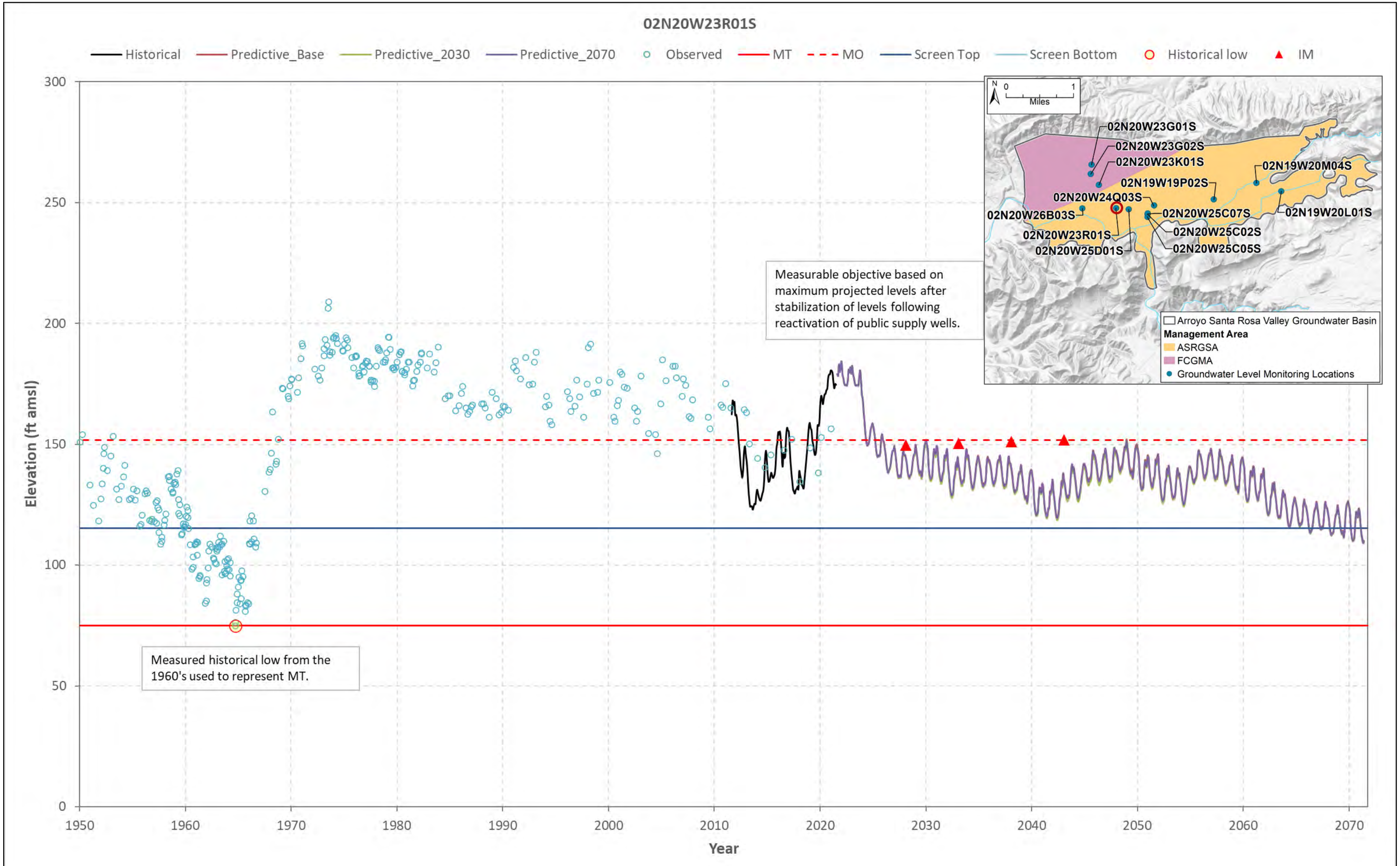


Figure J-09 ASRGSA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N20W23R01S).

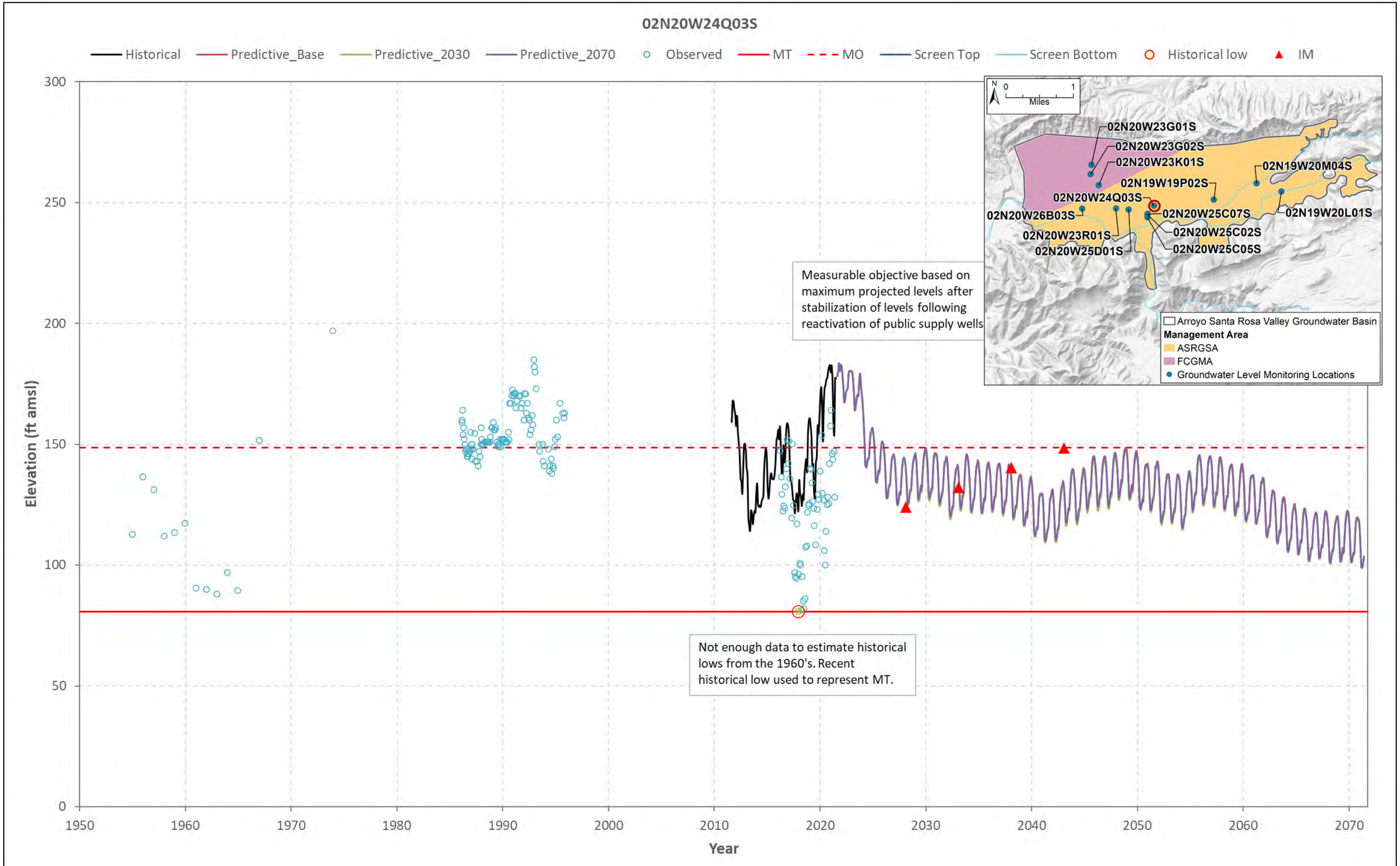


Figure J-10 ASRGSA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N20W24Q03S).

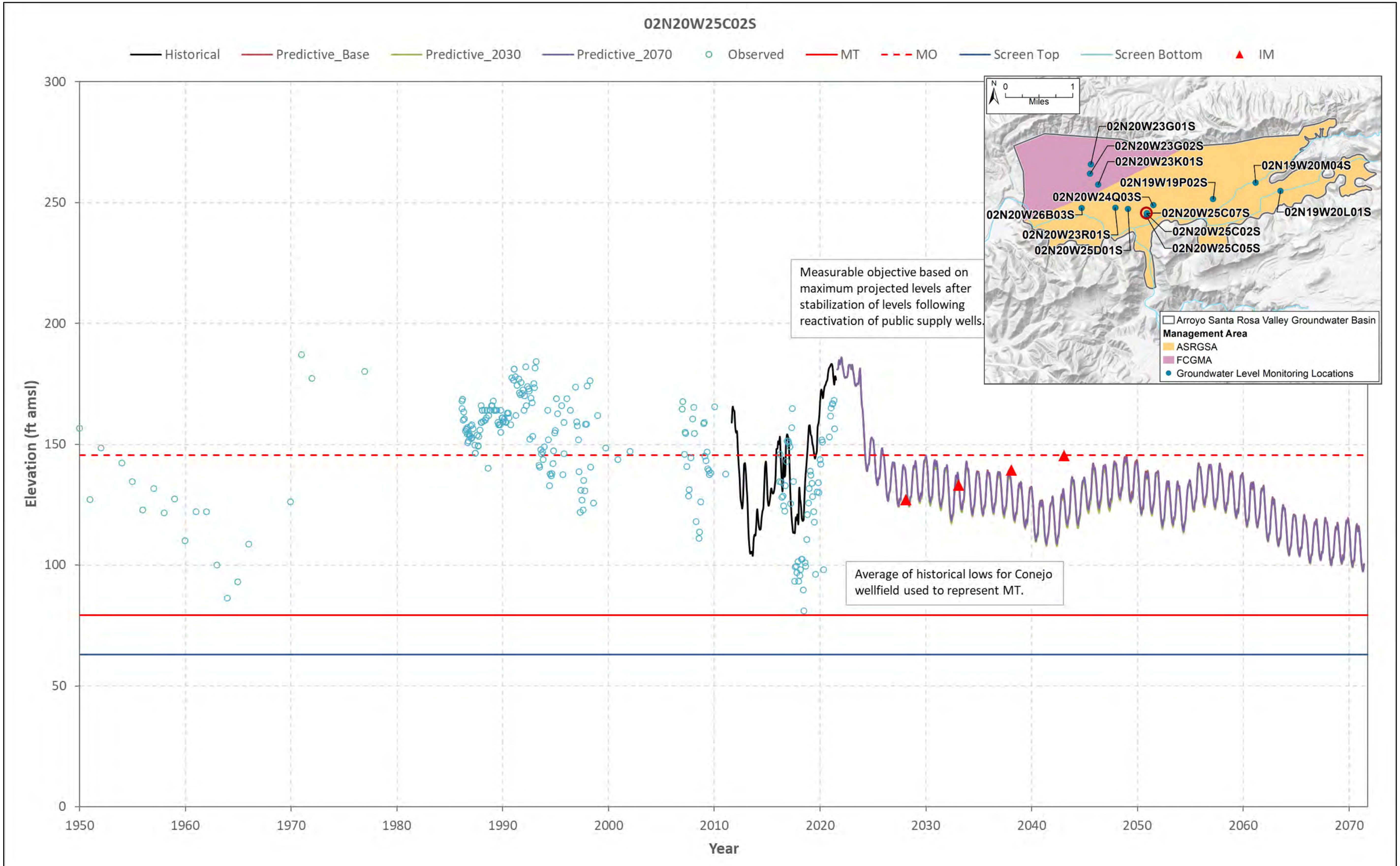


Figure J-11 ASRGSA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N20W25C02S).

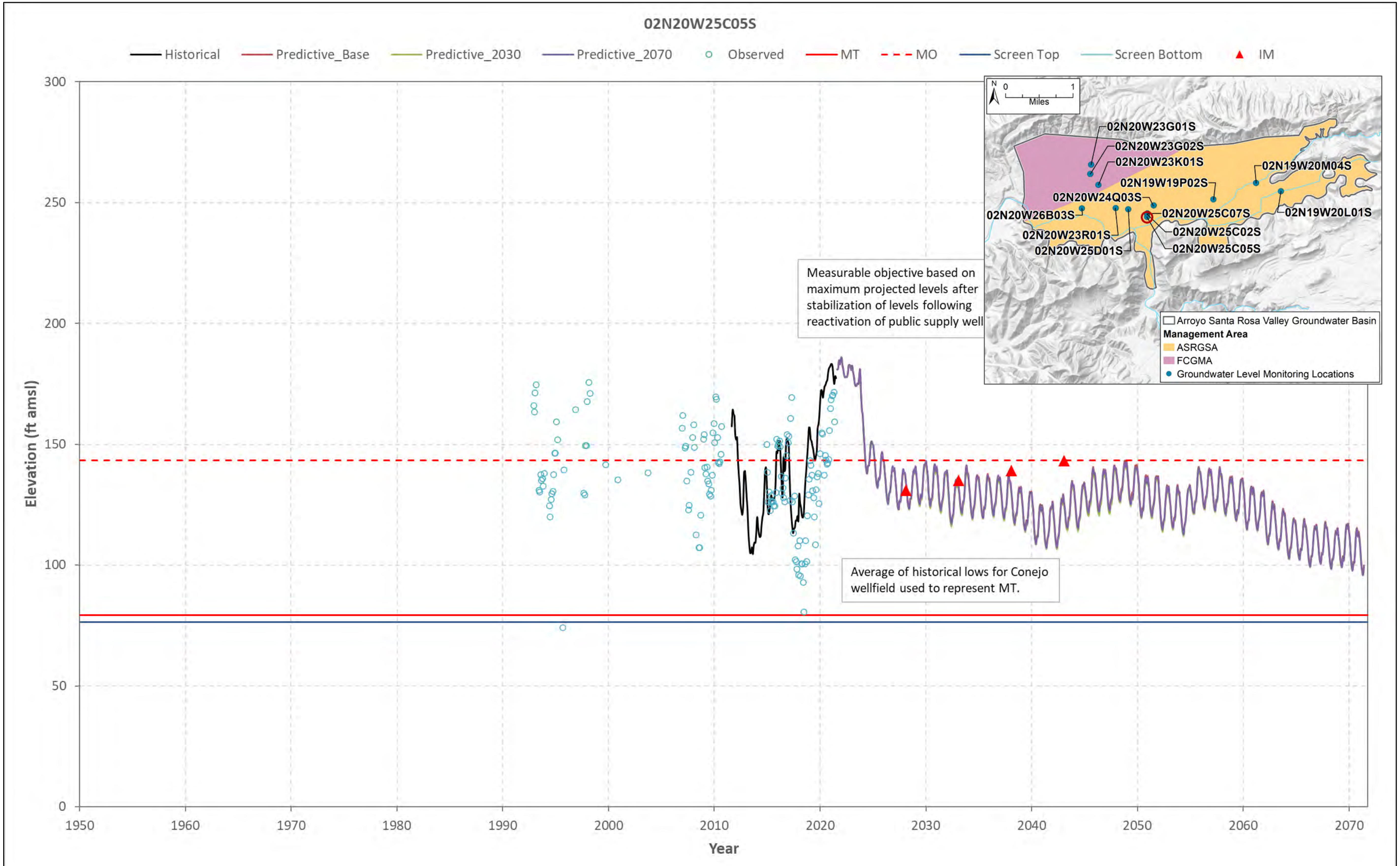


Figure J-12 ASRGSA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N20W25C05S).

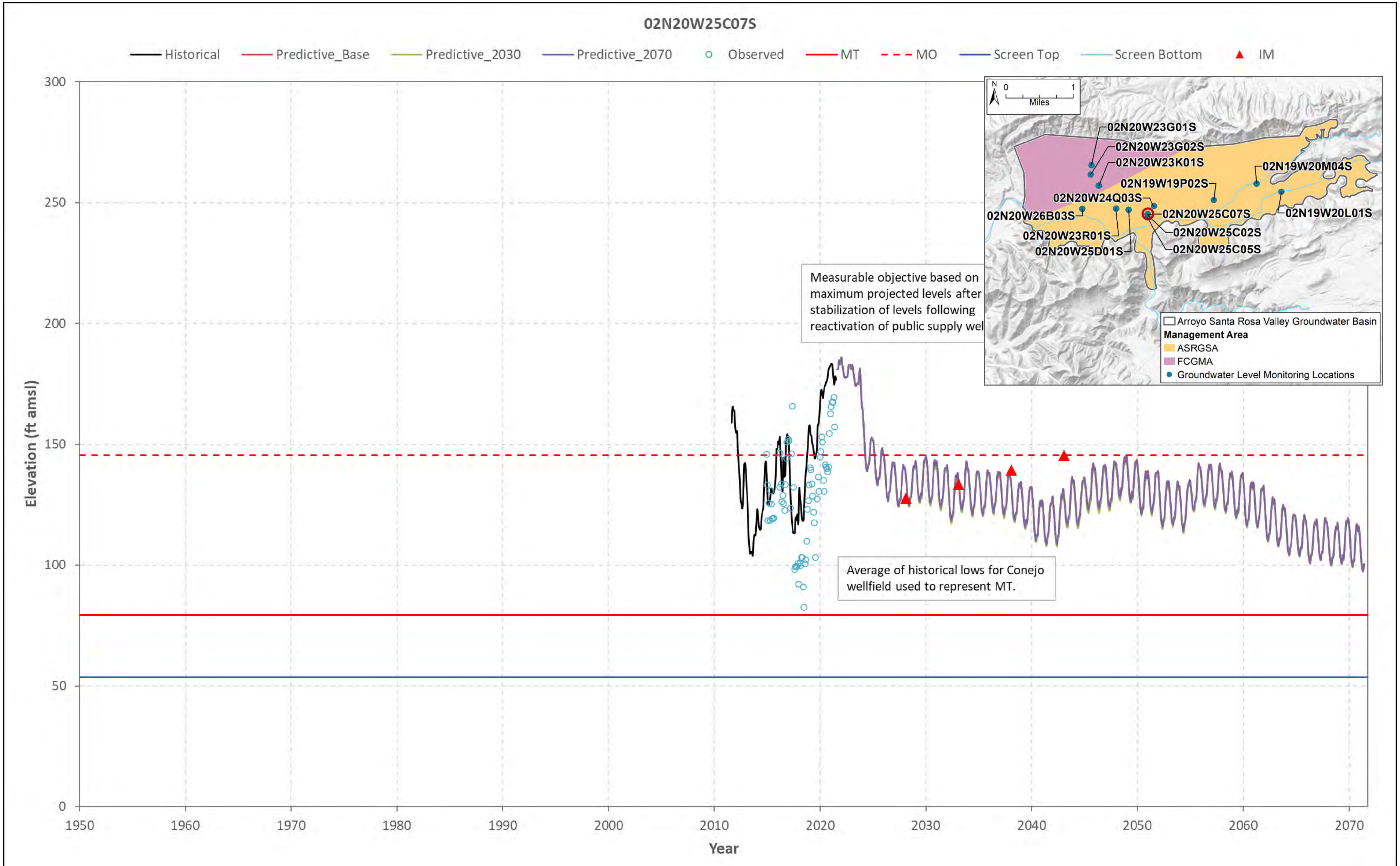


Figure J-13 FCGMA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N20W25C07S).

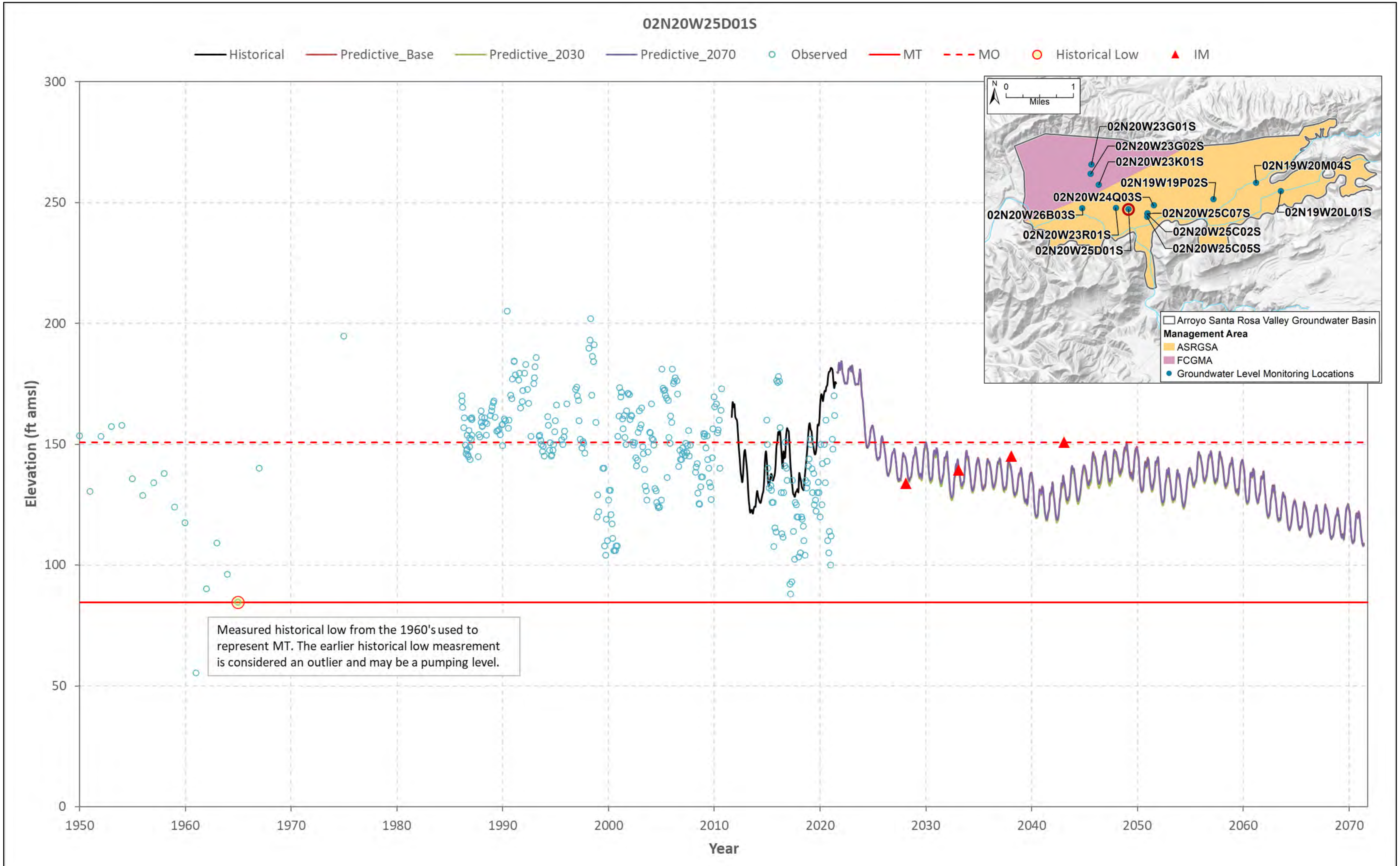


Figure J-14 FCGMA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N20W25D01S).

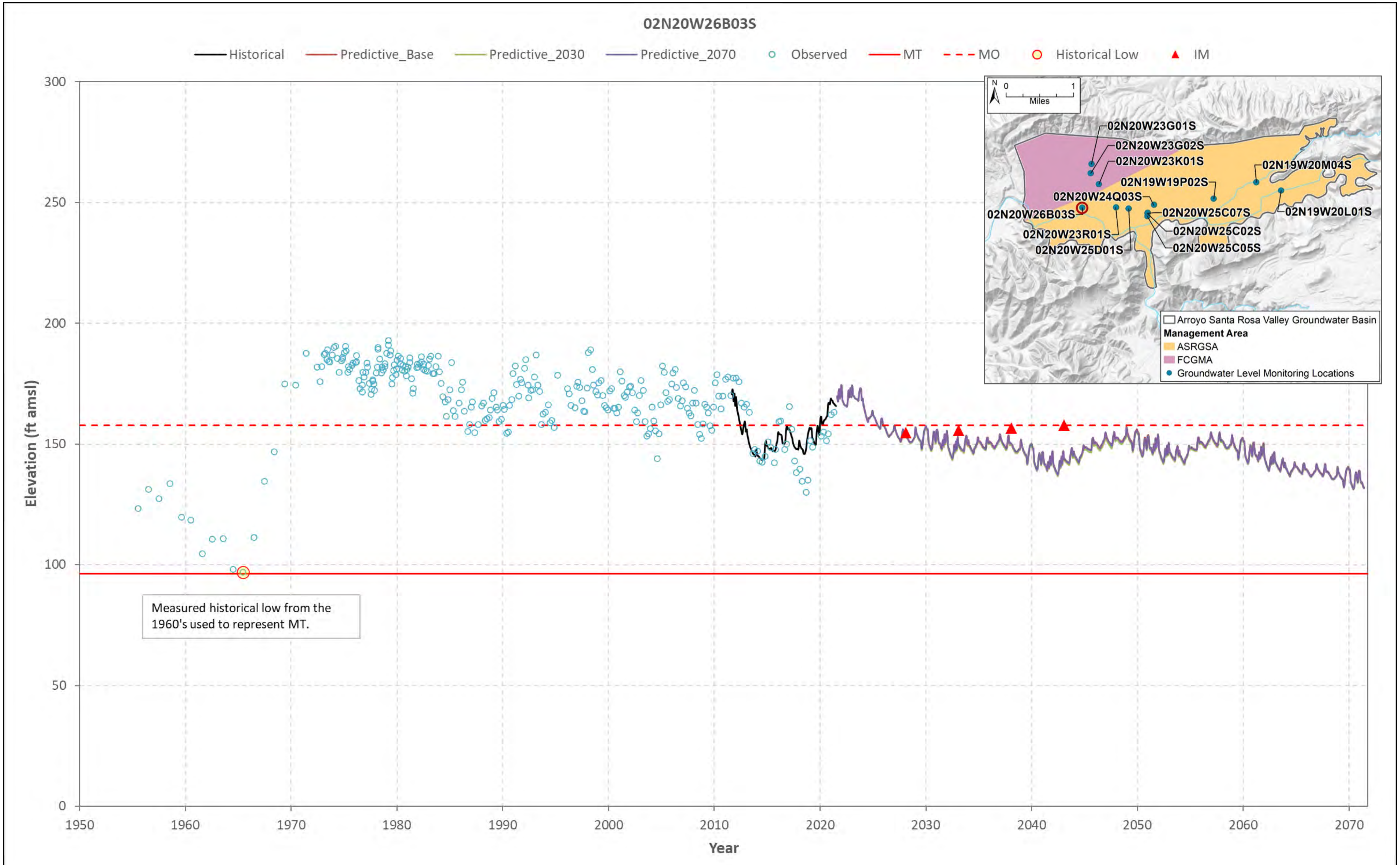


Figure J-15 FCGMA Management Area: Simulated/Observed Water Level and Sustainable Management Criteria (Well 02N20W26B03S).

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix K

Development of a “Storage Curve” to Estimate Groundwater Storage in the Arroyo Santa Rosa Valley Groundwater Basin Using Groundwater Level Data

Appendix K

Development of a “Storage Curve” to Estimate Groundwater Storage in the Arroyo Santa Rosa Valley Groundwater Basin Using Groundwater Level Data

Introduction/Background

This appendix provides data and methodology used to develop a relationship between the historical groundwater levels measured in the Arroyo Santa Rosa Valley Groundwater Basin (ASRVGB) and corresponding modeled groundwater storage (herein referred to as a “storage curve”). The storage curve will be used to calculate the annual storage changes in ASRVGB for the purpose of annual reporting required under the Sustainable Groundwater Management Act (SGMA) during years between future model updates (currently anticipated to occur approximately every 5 years). The sections below present the analysis of groundwater levels with modeled basin groundwater storage performed to develop the storage curve.

Data Sources and Review

Groundwater elevation data available in the ASRVGB data management system were reviewed and selected for this analysis based on the following characteristics:

- Selected wells represent areas across the entire Basin.
- Selected wells are completed within the lower groundwater production zone from which most of the groundwater production occurs.
- Wells have well construction information available.
- Wells are measured within a reasonable timeframe of each other (in many cases all wells are measured on the same day).

The monitoring wells 02N19W19P02S, 02N19W20M04S, 02N20W23K01S, 02N20W25C07S, and 02N20W25D01S currently fit the criteria best (Figure K-01). It is noted that well 02N20W25D01S does not have screen interval data but is assumed to be completed within the lower groundwater production zone based on borehole depth, which is similar to nearby well 02N20W25C07S. Data prior to 2015 is unavailable to fit the criterion of representing areas across the entire Basin, so data from 2015 through 2021 were used for this evaluation. The arithmetic mean (average) of the groundwater elevations for the spring high measurement was calculated from the five selected wells. The month of each spring high measurement was used for the correlation with storage values.

Groundwater storage in ASRVGB was calculated using the groundwater flow model, which is based on the model grid geometry, layer porosity, and simulated groundwater levels (Appendix G).

Storage Curve Correlation Results

A scatterplot of groundwater elevation versus groundwater in storage in ASRVGB is shown on Figure K-02. The best-fit linear regression calculated for this relationship is:

Storage (acre-feet) = 334 (acre-feet/foot) x Average groundwater elevation (feet) + 152,114 (acre-feet)

The coefficient of determination (R^2) for this relationship is 0.76. The y-intercept of this relationship is approximately -455 ft which means that at an average elevation of -455 ft for the selected wells, it is estimated there is zero groundwater storage in the basin. This elevation is a reasonable approximation for the average elevation of the bedrock in the thickest portions of the model, along the west-to-east axis of the Basin (for reference, the average bedrock elevation at the selected wells is -230 ft).

Groundwater storage can be approximated using this relationship and groundwater elevation data collected from wells 02N19W19P02S, 02N19W20M04S, 02N20W23K01S, 02N20W25C07S, and 02N20W25D01S. The storage curve will be reviewed and potentially modified when the numerical model is updated.

Groundwater storage change between any two water level conditions may be calculated by looking up the corresponding basin storage for the given water level condition and taking the difference between the two (Figure K-02).

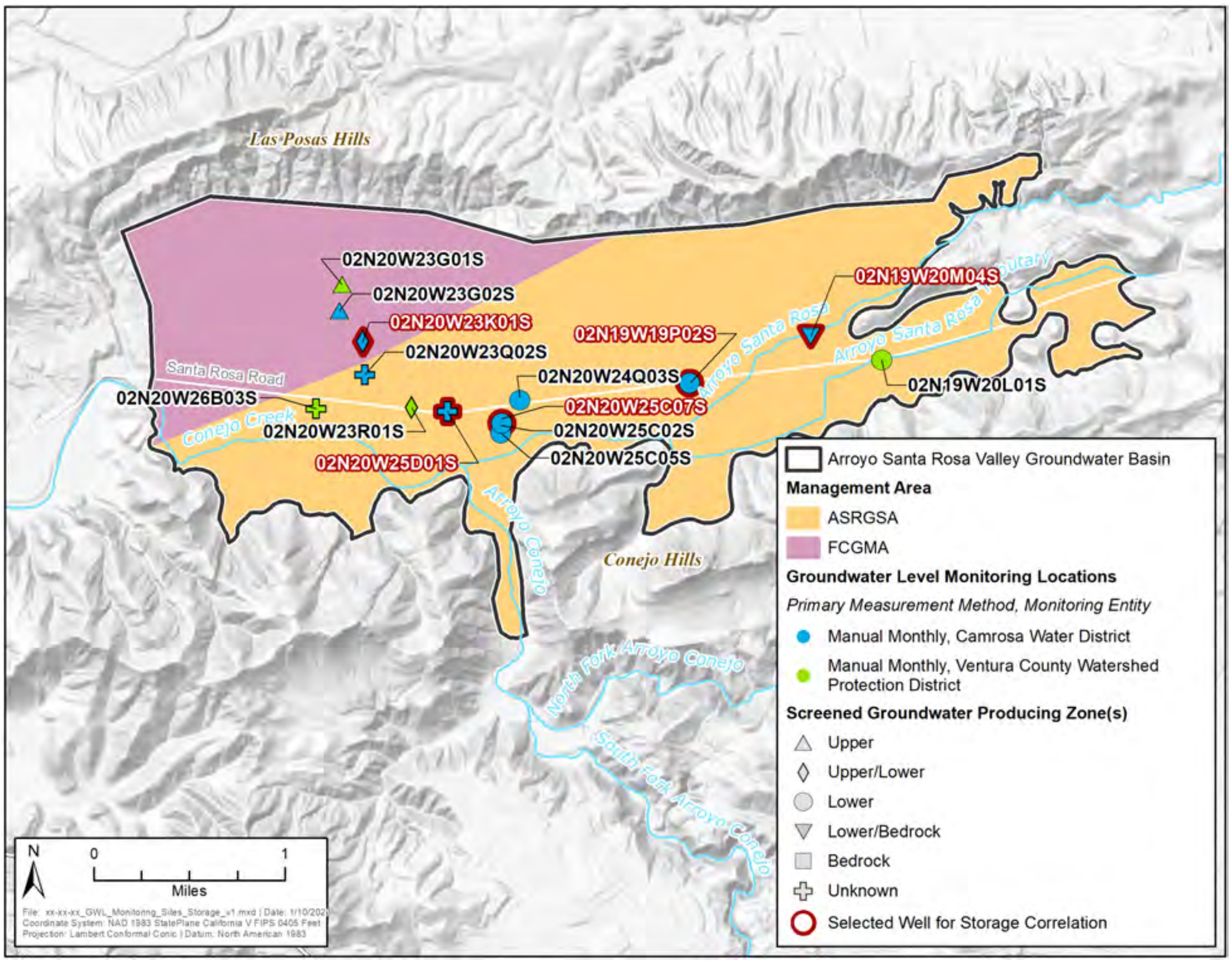


Figure K-01: Representative Groundwater Level Monitoring Wells.

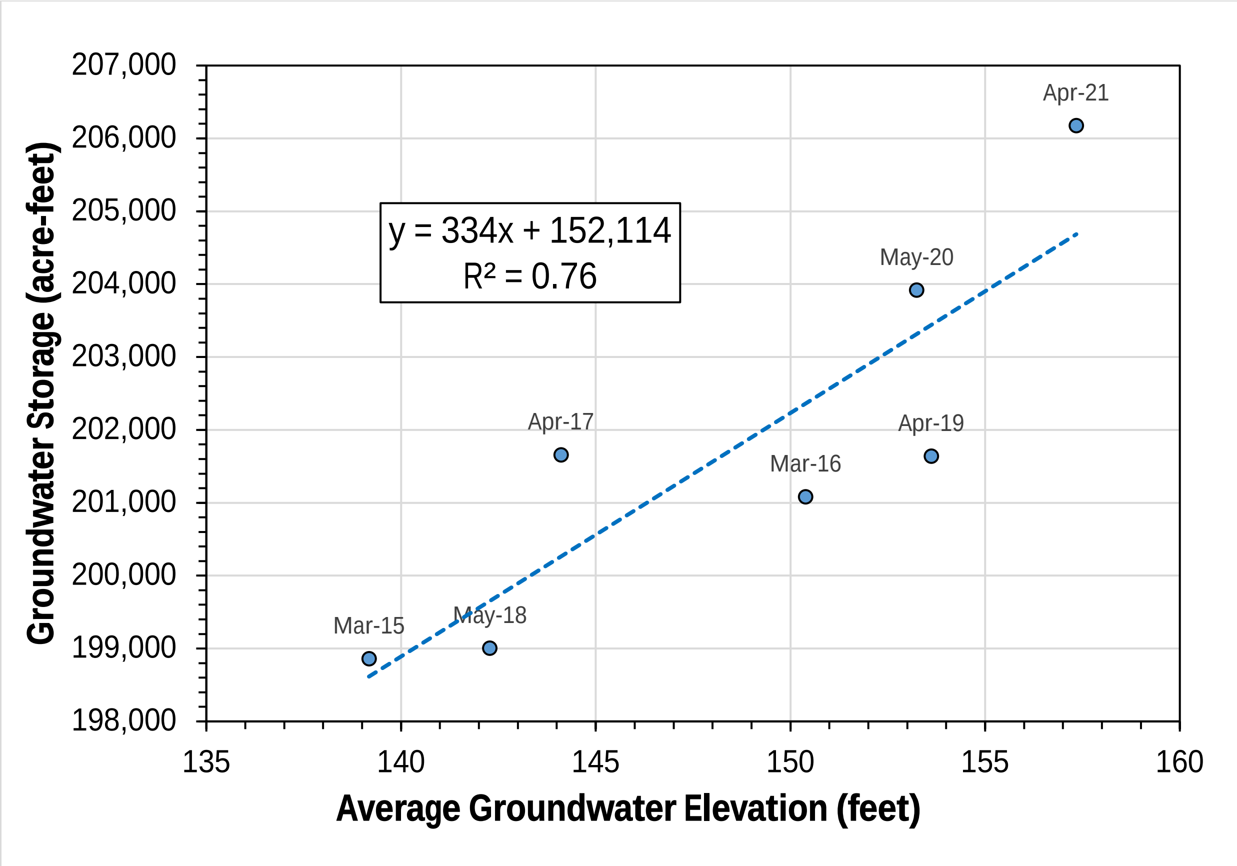


Figure K-02: Correlation Between Average Groundwater Elevations and Storage in the ASRVGB

Arroyo Santa Rosa Valley Groundwater Basin

Groundwater Sustainability Plan

Appendix L

Data Management System Documentation

Overview

This data management system (DMS) was developed for the purpose of "storing and reporting information relevant to the development or implementation of the Plan and monitoring of the basin", per section 352.6 of the GSP regulations. The DMS was developed for use by the Arroyo Santa Rosa Basin Groundwater Sustainability Agency (ASRGSA).

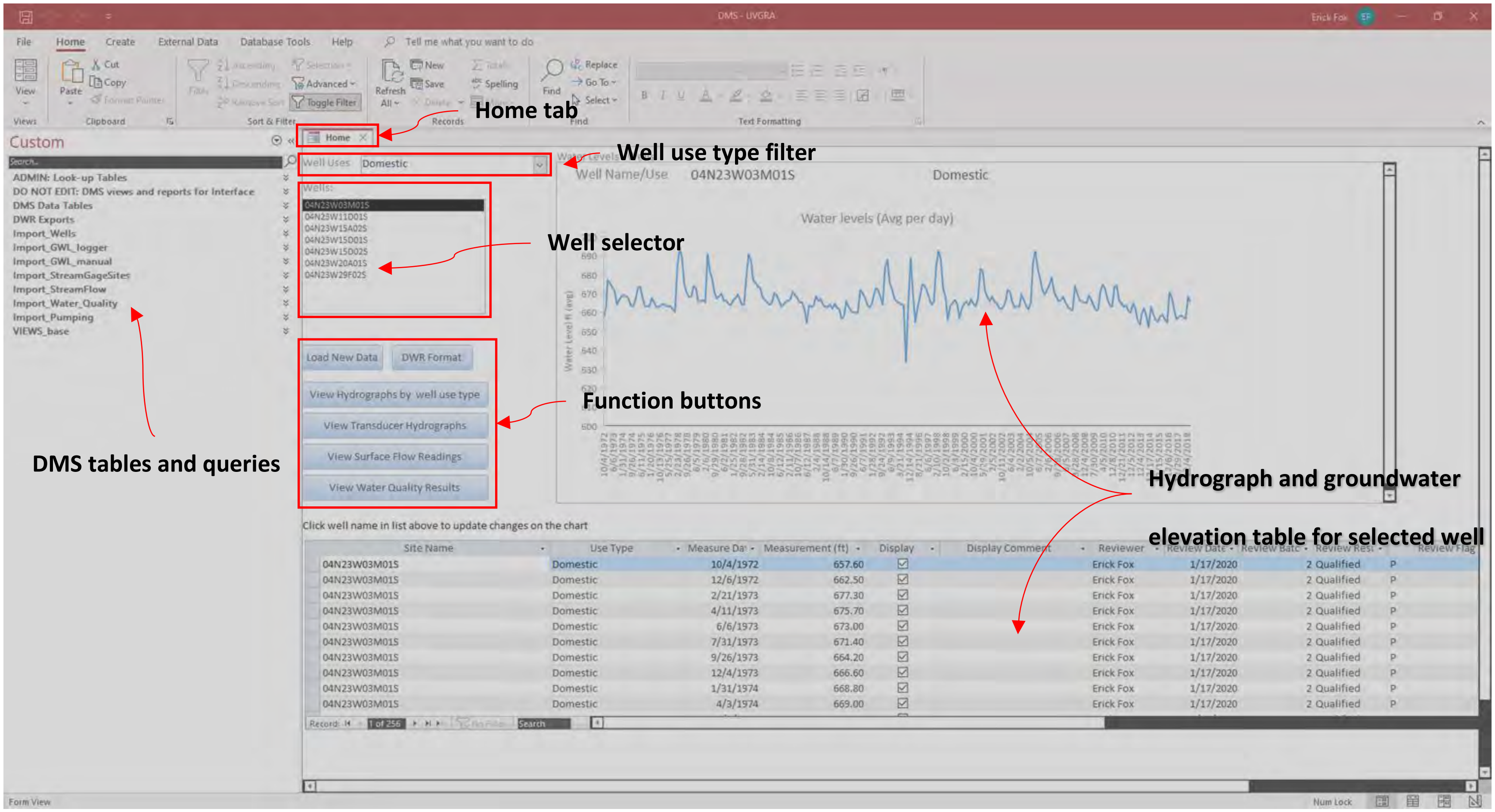
The DMS is housed in an Access database, which has the ability to import data from Excel, perform filtering and charting for some data, and export to Excel tables that are formatted according to DWR templates for upload with the GSP. The data in the DMS have undergone quality control checks prior to import.

The DMS is designed to contain the following data:

- Well construction details
- Groundwater level elevations (manual measurements and logger data)
- Water quality
- Pumping
- Stream gages
- Streamflow data

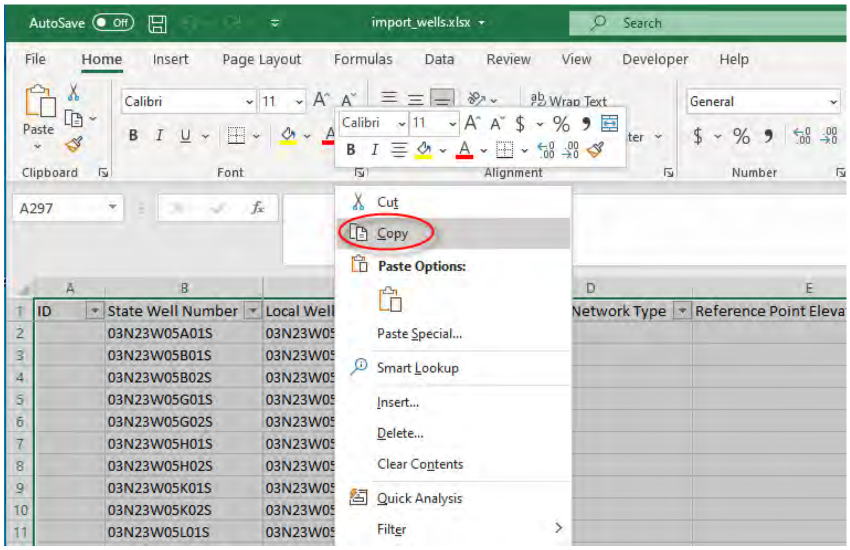
In addition to the data tables that hold the above information, the DMS also contains a number of tables and queries that are used for importing, data format verification, and other backend functions. See DMS Object Description (attached) for a description of these tables and queries. DMS Object Map (attached) shows how these tables and queries are used for the import and export functions.

The default starting view shows the Home tab that contains a dropdown list of wells filtered by use type, a hydrograph and groundwater elevation data table for the selected well, and several buttons that can be used to access certain functions of the DMS—see screenshot next page. (If the Home tab is not visible, expand the DMS views and reports for Interface group in the table of contents on the left hand side of the screen, and open chart_WaterLevels_wells.)

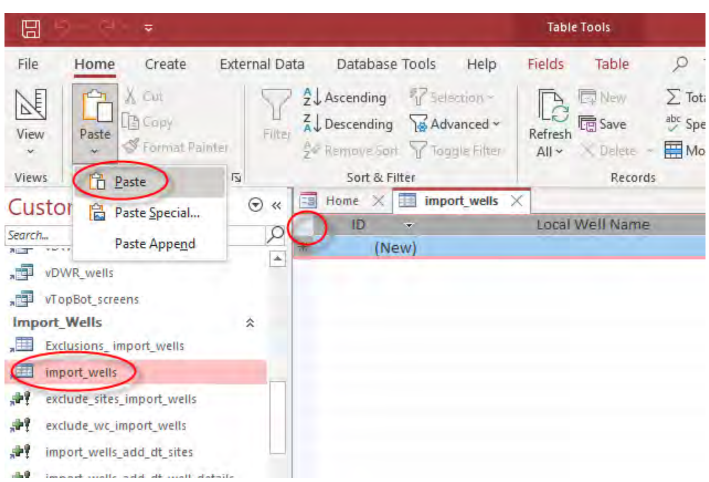

Home tab
Well use type filter
Well selector
Function buttons
DMS tables and queries
Hydrograph and groundwater
elevation table for selected well
Load New Data
DWR Format
View Hydrographs by well use type
View Transducer Hydrographs
View Surface Flow Readings
View Water Quality Results
Click well name in list above to update changes on the chart
Water levels (Avg per day)
Well Name/Use
04N23W03M01S
Domestic

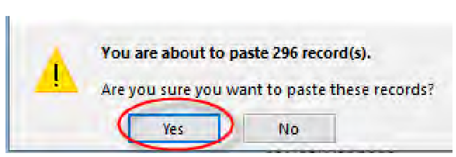
Importing Well Site Details

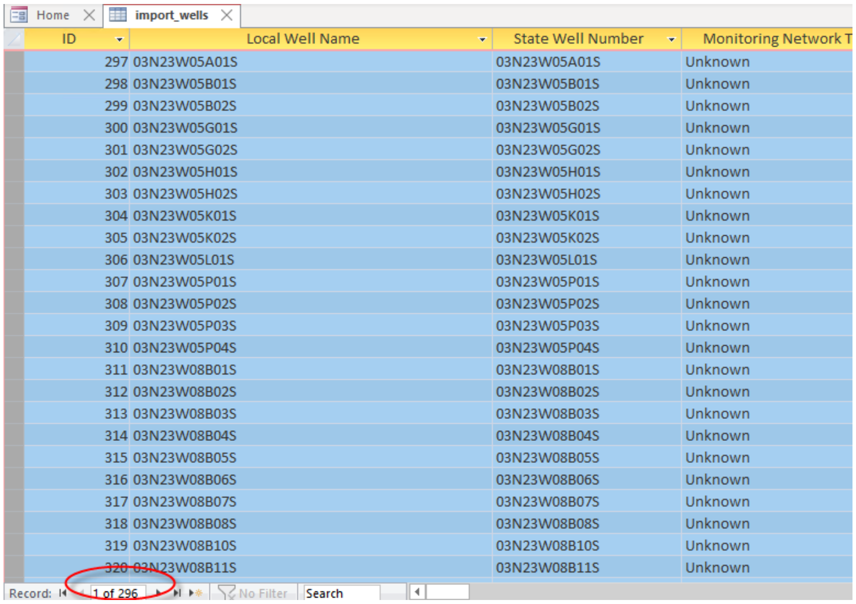
1. Format the data in Excel according to the "import_wells.xlsx" file. Select and copy the data to be imported to DMS (including column headers).



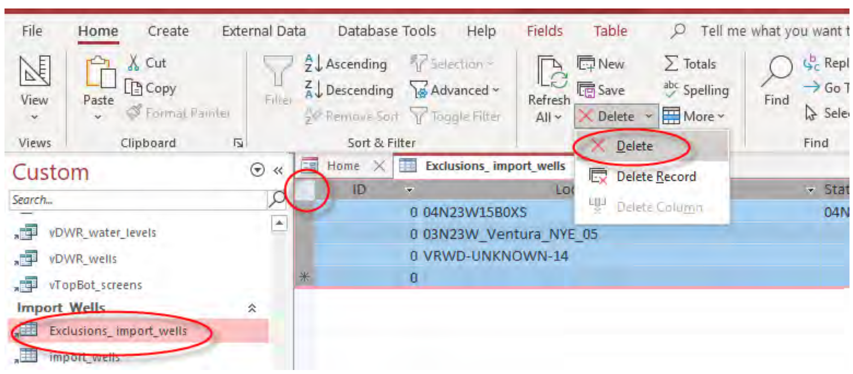
2. Import to DMS by opening the "import_wells" table in Access, clicking the top left corner of the table, and pasting the copied data from Step 1. Click "Yes" to confirm. After pasting the data, verify that the number of records in the "import_wells" table is equal to the number of rows copied from Excel.



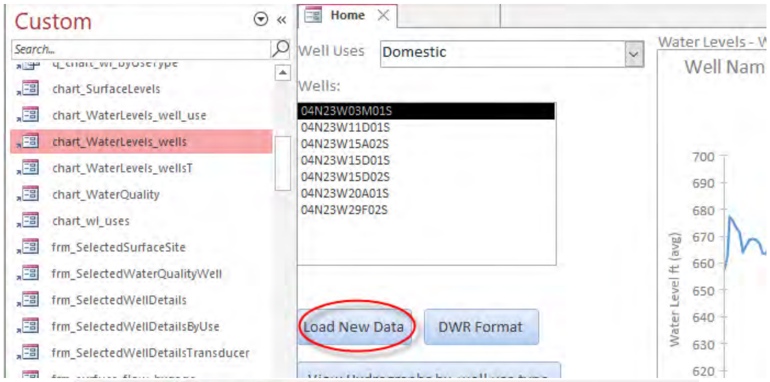


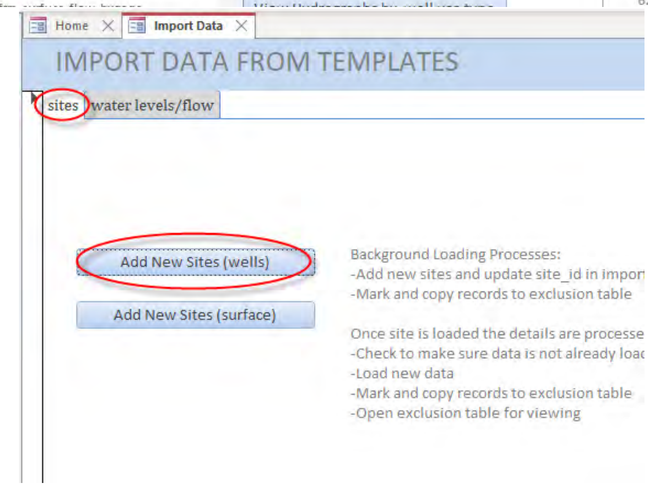


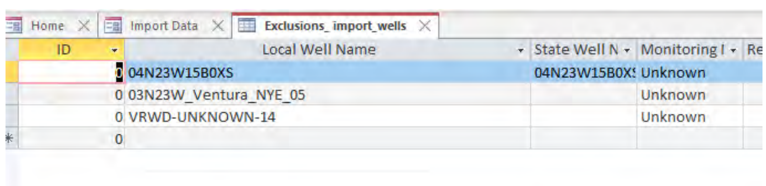
3. Open the “Exclusions_import_wells” table. If the table is not empty, then delete all records in it. After making sure that it is empty, close the table.



4. Open the “chart_WaterLevels_wells” form, i.e. the Home tab (if not already open). Click the “Load New Data” button and then the “Add New Sites (wells)” button under the “Sites” tab. This adds the new acceptable data from the “import_wells” table to the master “dt_sites” and “dt_well_details” tables and opens the “Exclusions_import_wells” table to show which new data were not added to the master tables due to missing information.



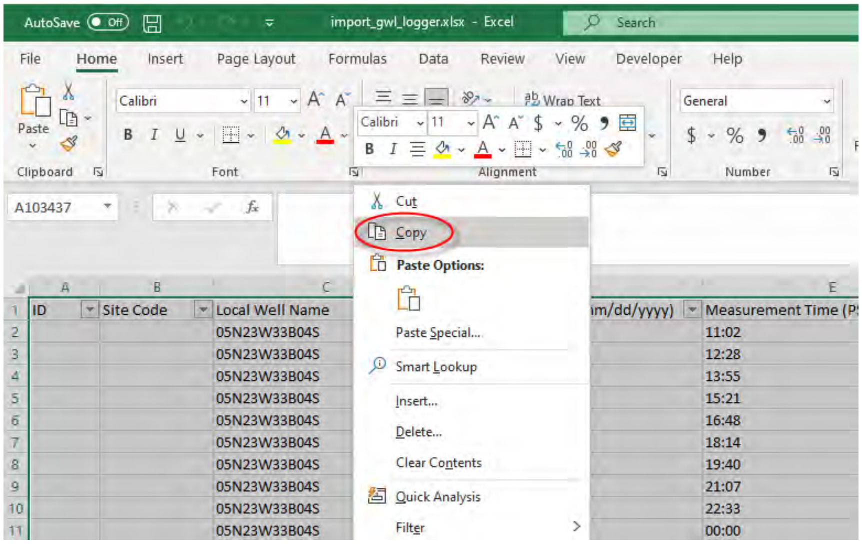




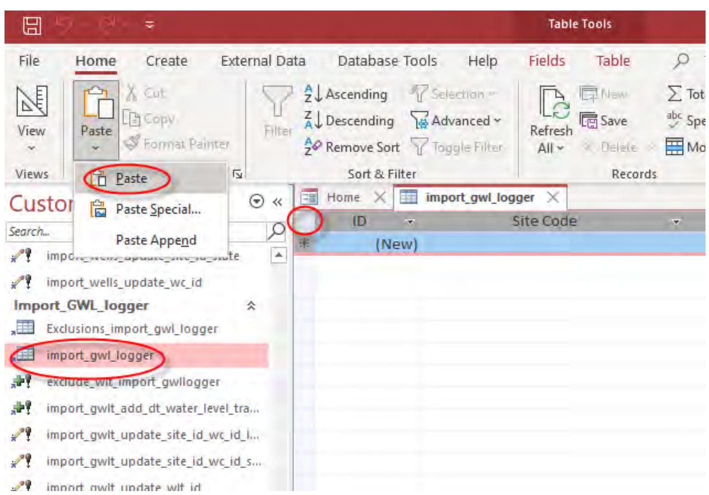
5. For the new data that were not added to the master "dt_sites" and "dt_well_details" tables (i.e., records showing up in the "Exclusions_import_wells" table), go back to the Excel template in Step 1, add the missing details (e.g., latitude, longitude, coordinates method, coordinates accuracy, and county), and repeat Steps 1 – 4.

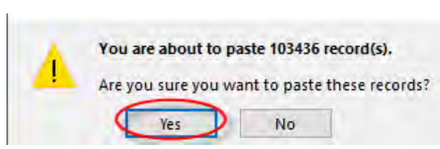
Importing Electronic Logger GWL Data

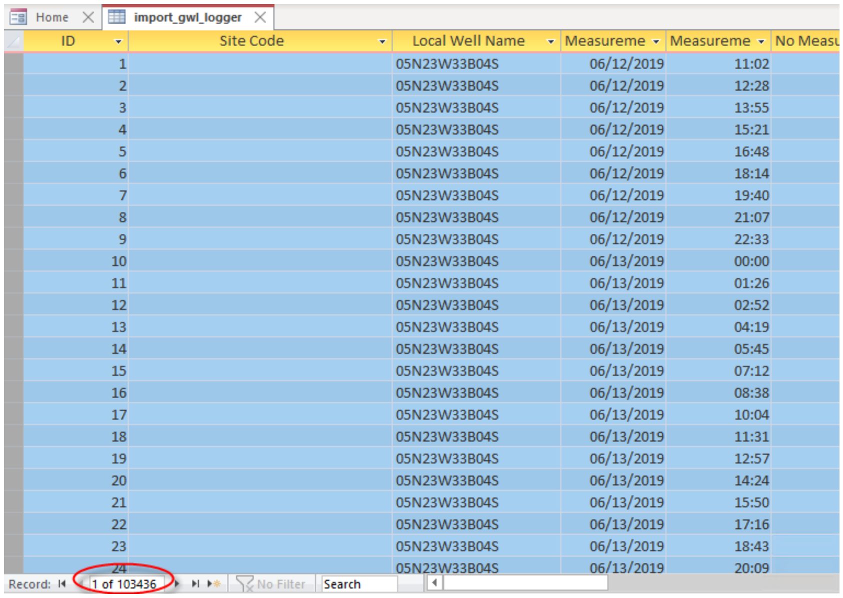
1. Format the data in Excel according to the "import_gwl_logger.xlsx" file. Make sure that the Measurement Date is in the correct format. Select and copy the data to be imported to DMS (including column headers).



2. Import to DMS by opening the "import_gwl_logger" table in Access, clicking the top left corner of the table, and pasting the copied data from Step 1. This may take a few minutes if the number of records is large. Click "Yes" to confirm. After pasting the data, verify that the number of records in the "import_gwl_logger" table is equal to the number of rows copied from Excel.

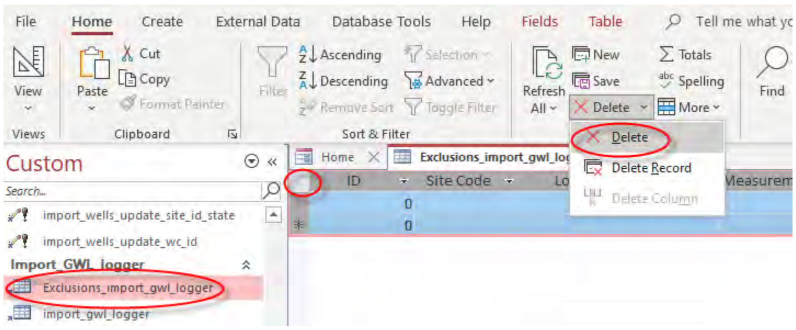




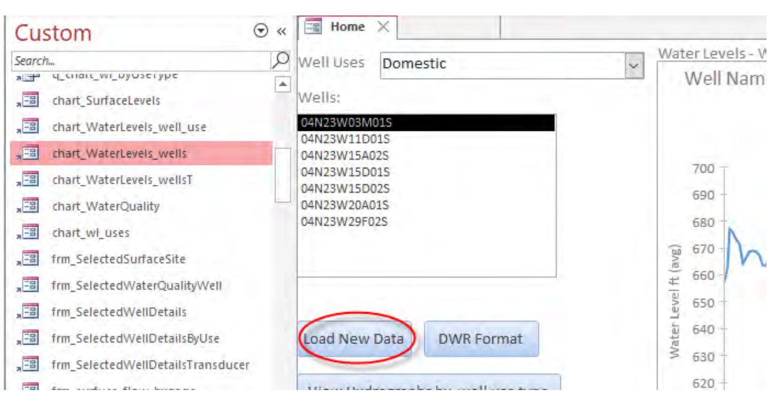


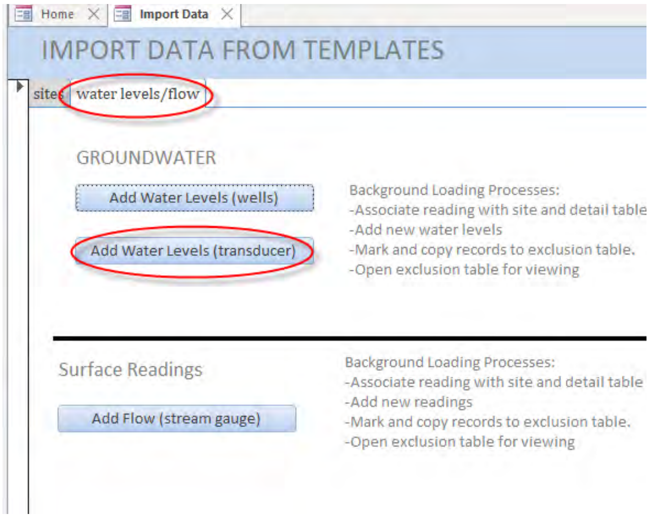
ID	Site Code	Local Well Name	Measureme	Measureme	No Measu
1		05N23W33B04S	06/12/2019	11:02	
2		05N23W33B04S	06/12/2019	12:28	
3		05N23W33B04S	06/12/2019	13:55	
4		05N23W33B04S	06/12/2019	15:21	
5		05N23W33B04S	06/12/2019	16:48	
6		05N23W33B04S	06/12/2019	18:14	
7		05N23W33B04S	06/12/2019	19:40	
8		05N23W33B04S	06/12/2019	21:07	
9		05N23W33B04S	06/12/2019	22:33	
10		05N23W33B04S	06/13/2019	00:00	
11		05N23W33B04S	06/13/2019	01:26	
12		05N23W33B04S	06/13/2019	02:52	
13		05N23W33B04S	06/13/2019	04:19	
14		05N23W33B04S	06/13/2019	05:45	
15		05N23W33B04S	06/13/2019	07:12	
16		05N23W33B04S	06/13/2019	08:38	
17		05N23W33B04S	06/13/2019	10:04	
18		05N23W33B04S	06/13/2019	11:31	
19		05N23W33B04S	06/13/2019	12:57	
20		05N23W33B04S	06/13/2019	14:24	
21		05N23W33B04S	06/13/2019	15:50	
22		05N23W33B04S	06/13/2019	17:16	
23		05N23W33B04S	06/13/2019	18:43	
24		05N23W33B04S	06/13/2019	20:09	

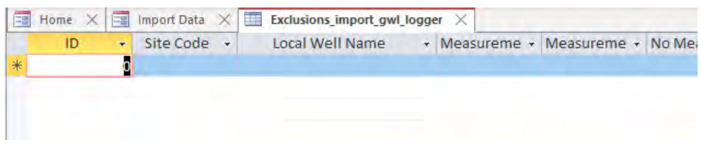
3. Open the "Exclusions_import_gwl_logger" table. If the table is not empty, then delete all records in it. After making sure that it is empty, close the table.



4. Open the "chart_WaterLevels_wells" form, i.e. the Home tab (if not already open). Click the "Load New Data" button and then the "Add Water Levels (transducer)" button under the "water levels/flow" tab. This adds the new acceptable data from the "import_gwl_logger" table to the master "dt_water_levels_transducer" table and opens the "Exclusions_import_gwl_logger" table to show which new data were not added to the master table due to missing information.







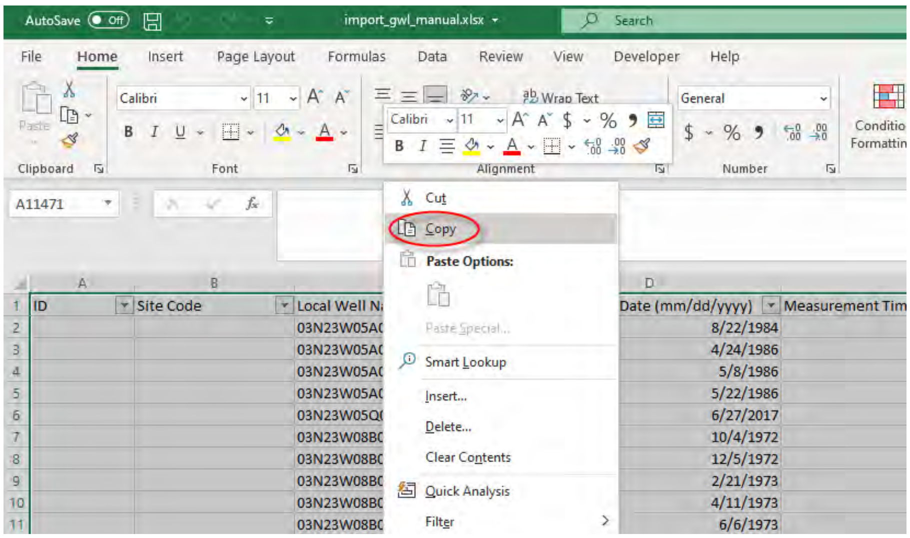
5. For the new data that were not added to the master "dt_water_levels_transducer" table (i.e., records showing up in the "Exclusions_import_gwl_logger" table), check the Site Code and Local Well Name and make sure that they exist in the "dt_sites" and "dt_well_details" tables.

   If the Site Code, Local Well Name, or any field in the GWL logger data needs to be corrected, then go back to the Excel template in Step 1, edit the information, and repeat Steps 1 – 4.

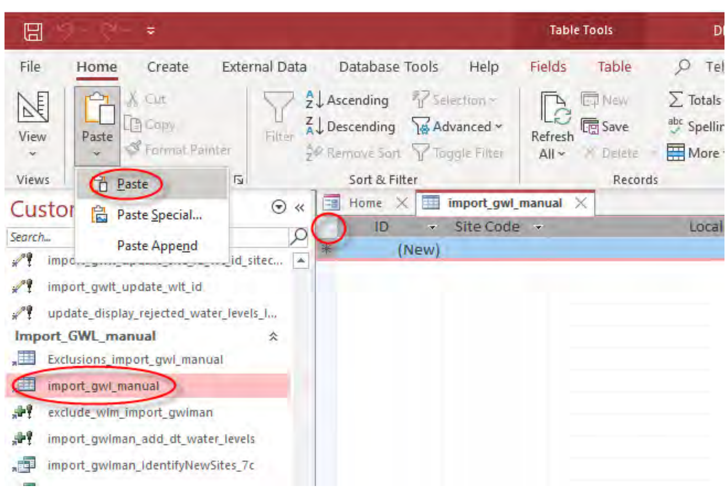
   If the well information does not exist in the "dt_sites" or "dt_well_details" table, then follow the steps for "Importing Well Data."

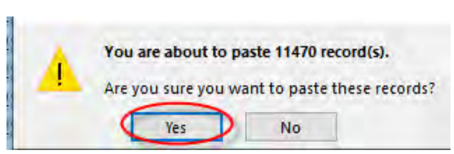
Importing Manual GWL Data

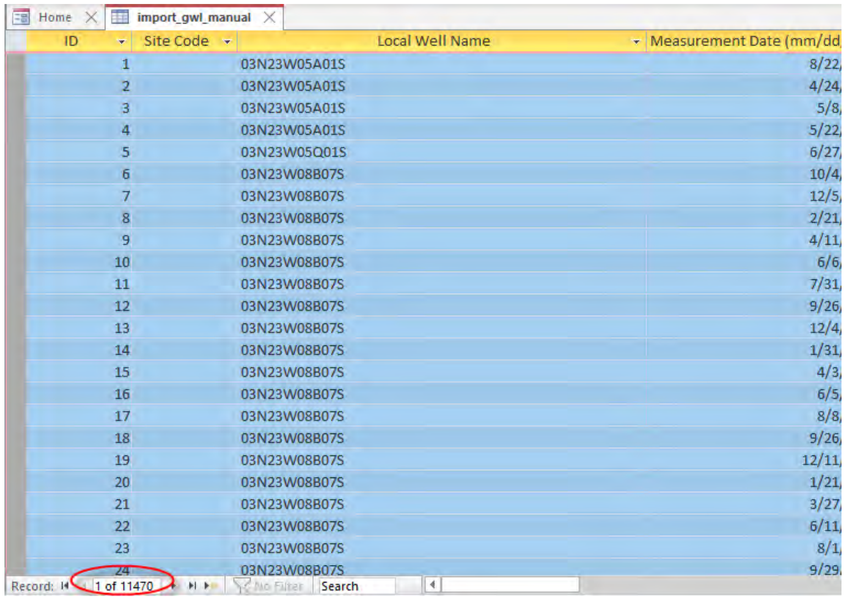
1. Format the data in Excel according to the "import_gwl_manual.xlsx" file. Make sure that the Measurement Date is in the correct format. Select and copy the data to be imported to DMS (including column headers).



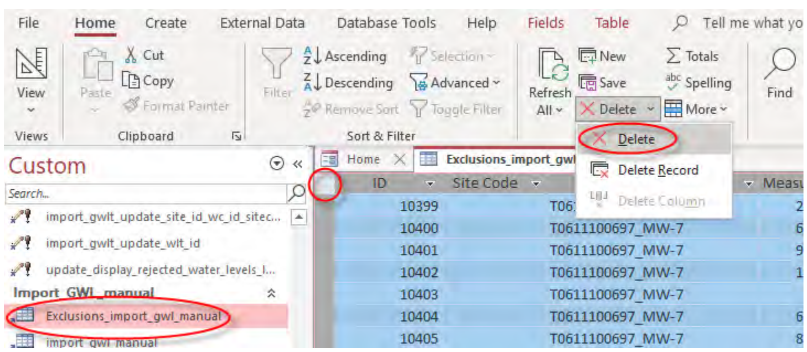
2. Import to DMS by opening the "import_gwl_manual" table in Access, clicking the top left corner of the table, and pasting the copied data from Step 1. This may take a few minutes if the number of records is large. Click "Yes" to confirm. After pasting the data, verify that the number of records in the "import_gwl_manual" table is equal to the number of rows copied from Excel.



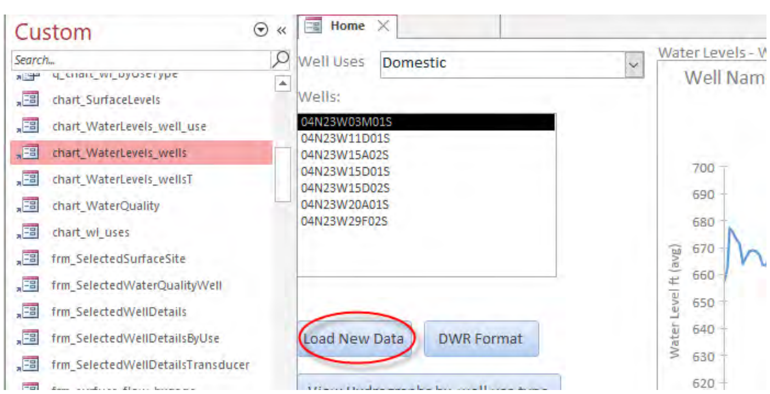


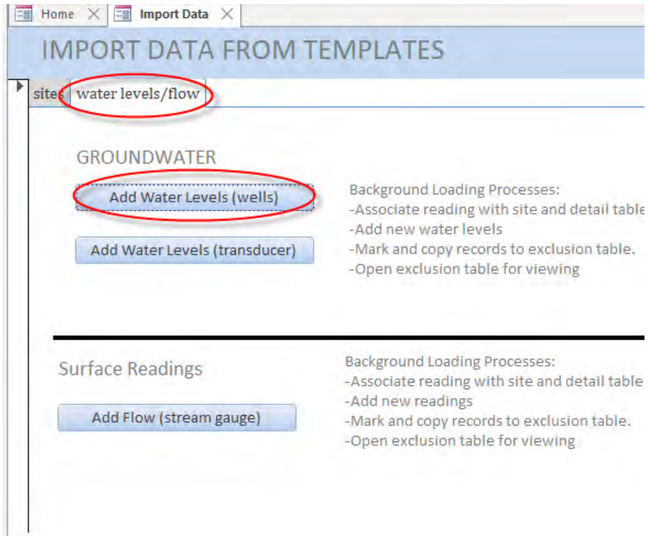


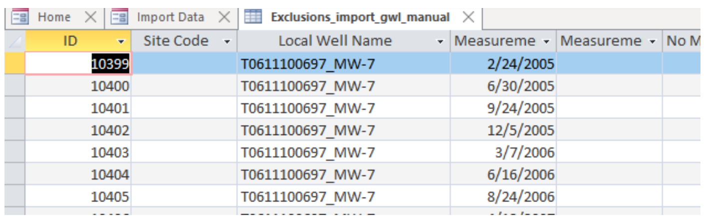
3. Open the “Exclusions_import_gwl_manual” table. If the table is not empty, then delete all records in it. After making sure that it is empty, close the table.



4. Open the “chart_WaterLevels_wells” form, i.e. the Home tab (if not already open). Click the “Load New Data” button and then the “Add Water Levels (wells)” button under the “water levels/flow” tab. This adds the new acceptable data from the “import_gwl_manual” table to the master “dt_water_levels” table and opens the “Exclusions_import_gwl_manual” table to show which new data were not added to the master table due to missing information.







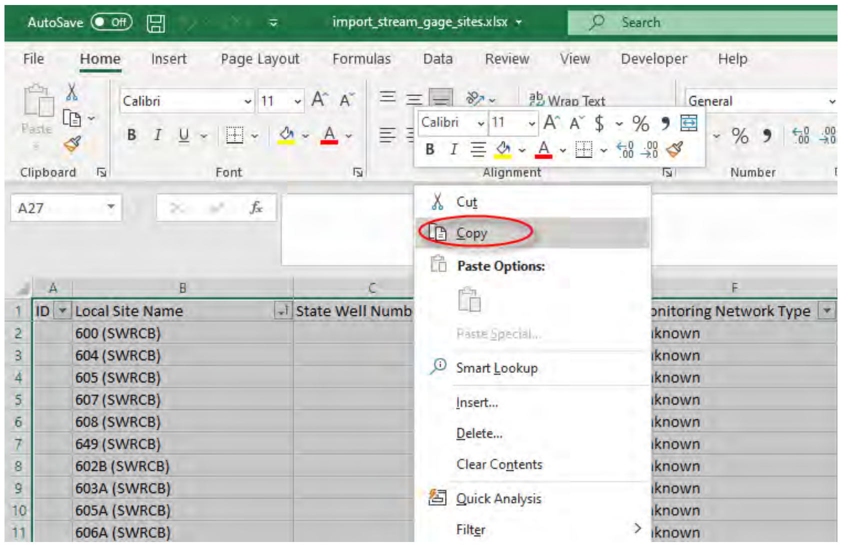
5. For the new data that were not added to the master "dt_water_levels" table (i.e., records showing up in the "Exclusions_import_gwl_manual" table), check the Local Well Name and make sure that it exists in the "dt_sites" and "dt_well_details" tables.

   If the Local Well Name or any field in the GWL manual data needs to be corrected, then go back to the Excel template in Step 1, edit the information, and repeat Steps 1 – 4.

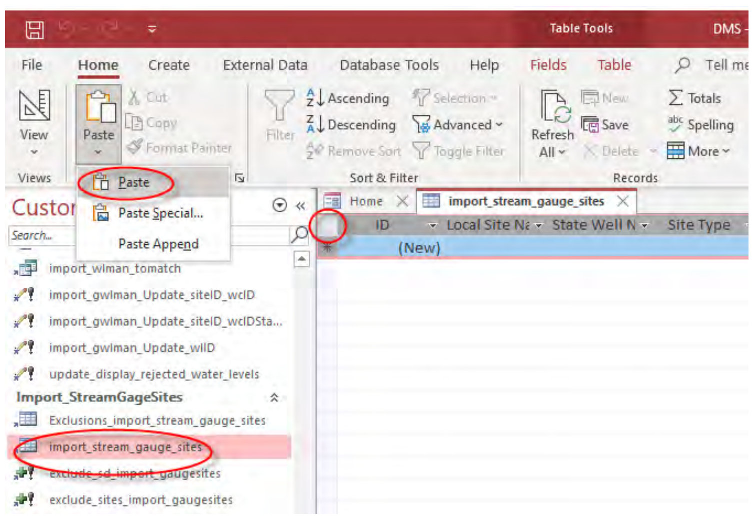
   If the well information does not exist in the "dt_sites" or "dt_well_details" table, then follow the steps for "Importing Well Data."

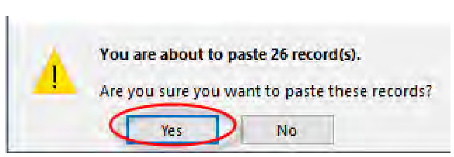
Importing Stream Gage Site Details

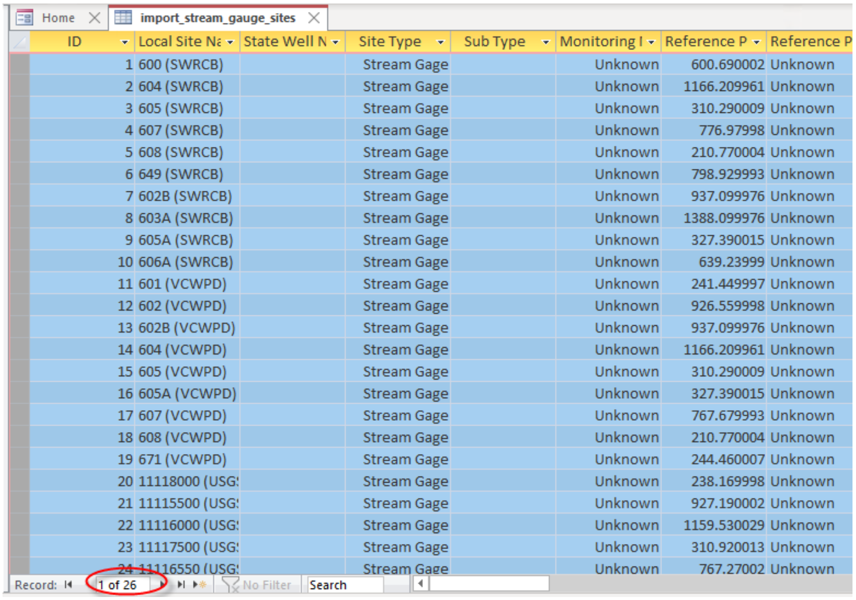
1. Format the data in Excel according to the "import_stream_gage_sites.xlsx" file. Select and copy the data to be imported to DMS (including column headers).



2. Import to DMS by opening the "import_stream_gauge_sites" table in Access, clicking the top left corner of the table, and pasting the copied data from Step 1. Click "Yes" to confirm. After pasting the data, verify that the number of records in the "import_stream_gauge_sites" table is equal to the number of rows copied from Excel.





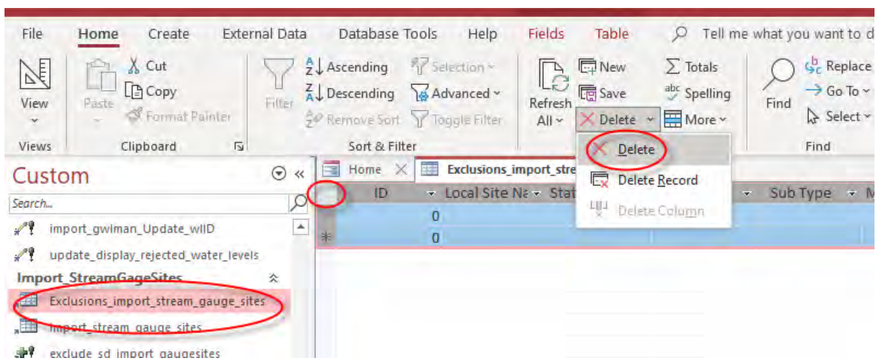


Home | import_stream_gauge_sites

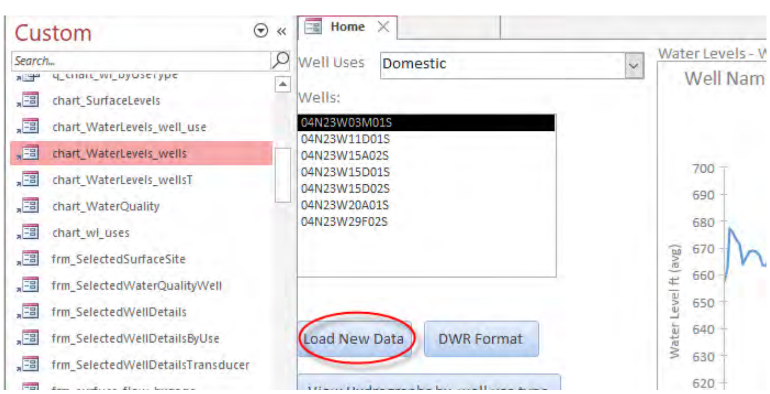
ID	Local Site Na	State Well N	Site Type	Sub Type	Monitoring I	Reference P	Reference P
1	600 (SWRCB)		Stream Gage		Unknown	600.690002	Unknown
2	604 (SWRCB)		Stream Gage		Unknown	1166.209961	Unknown
3	605 (SWRCB)		Stream Gage		Unknown	310.290009	Unknown
4	607 (SWRCB)		Stream Gage		Unknown	776.97998	Unknown
5	608 (SWRCB)		Stream Gage		Unknown	210.770004	Unknown
6	649 (SWRCB)		Stream Gage		Unknown	798.929993	Unknown
7	602B (SWRCB)		Stream Gage		Unknown	937.099976	Unknown
8	603A (SWRCB)		Stream Gage		Unknown	1388.099976	Unknown
9	605A (SWRCB)		Stream Gage		Unknown	327.390015	Unknown
10	606A (SWRCB)		Stream Gage		Unknown	639.23999	Unknown
11	601 (VCWPD)		Stream Gage		Unknown	241.449997	Unknown
12	602 (VCWPD)		Stream Gage		Unknown	926.559998	Unknown
13	602B (VCWPD)		Stream Gage		Unknown	937.099976	Unknown
14	604 (VCWPD)		Stream Gage		Unknown	1166.209961	Unknown
15	605 (VCWPD)		Stream Gage		Unknown	310.290009	Unknown
16	605A (VCWPD)		Stream Gage		Unknown	327.390015	Unknown
17	607 (VCWPD)		Stream Gage		Unknown	767.679993	Unknown
18	608 (VCWPD)		Stream Gage		Unknown	210.770004	Unknown
19	671 (VCWPD)		Stream Gage		Unknown	244.460007	Unknown
20	11118000 (USG:		Stream Gage		Unknown	238.169998	Unknown
21	11115500 (USG:		Stream Gage		Unknown	927.190002	Unknown
22	11116000 (USG:		Stream Gage		Unknown	1159.530029	Unknown
23	11117500 (USG:		Stream Gage		Unknown	310.920013	Unknown
24	11116550 (USG:		Stream Gage		Unknown	767.27002	Unknown

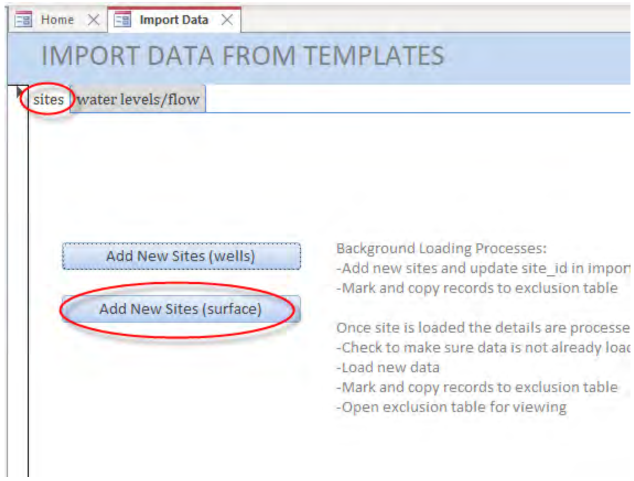
Record: 1 of 26 | No Filter | Search

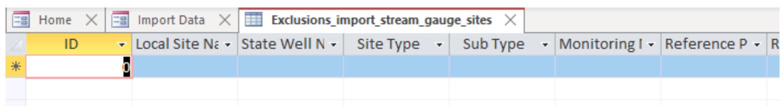
3. Open the "Exclusions_import_stream_gauge_sites" table. If the table is not empty, then delete all records in it. After making sure that it is empty, close the table.



4. Open the "chart_WaterLevels_wells" form, i.e. the Home tab (if not already open). Click the "Load New Data" button and then the "Add New Sites (surface)" button under the "Sites" tab. This adds the new acceptable data from the "import_stream_gauge_sites" table to the master "dt_sites" and "dt_site_details" tables and opens the "Exclusions_import_stream_gauge_sites" table to show which new data were not added to the master tables due to missing information.



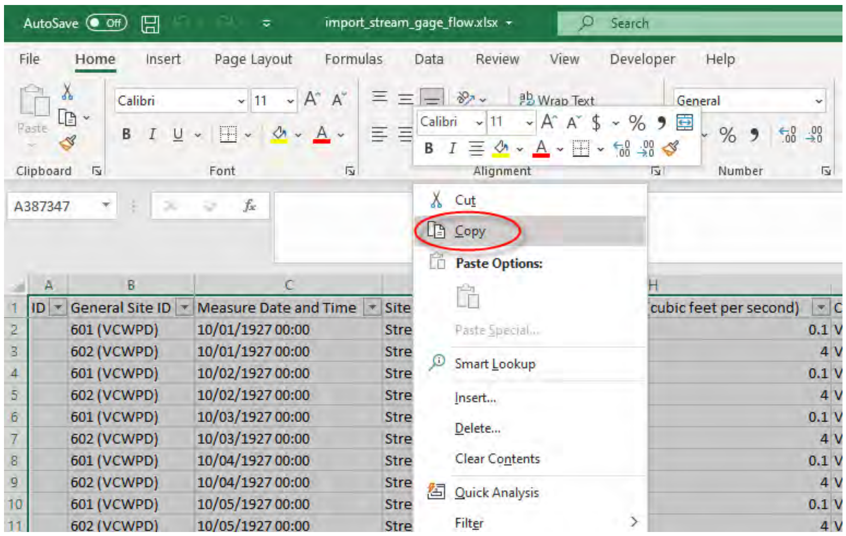




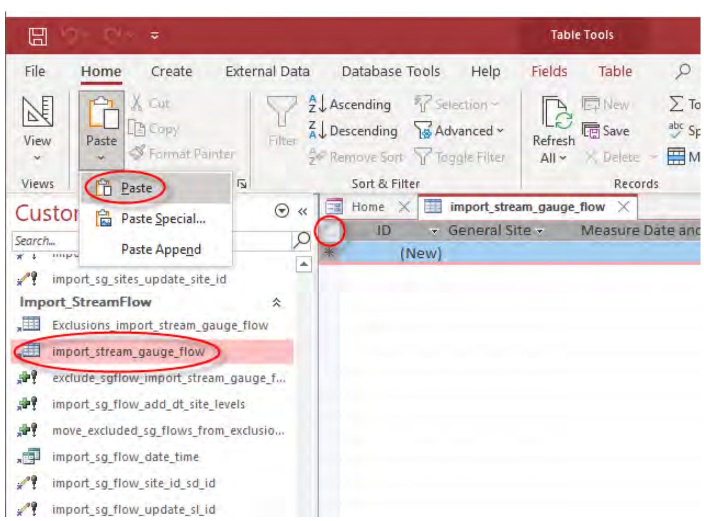
5. For the new data that were not added to the master "dt_sites" and "dt_site_details" tables (i.e., records showing up in the "Exclusions_import_stream_gauge_sites" table), go back to the Excel template in Step 1, add the missing details (e.g., latitude, longitude, coordinates method, coordinates accuracy, and county), and repeat Steps 1 – 4.

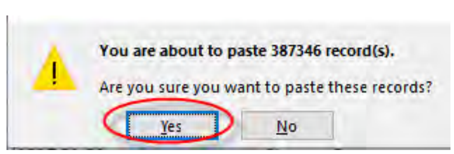
Importing Streamflow Data

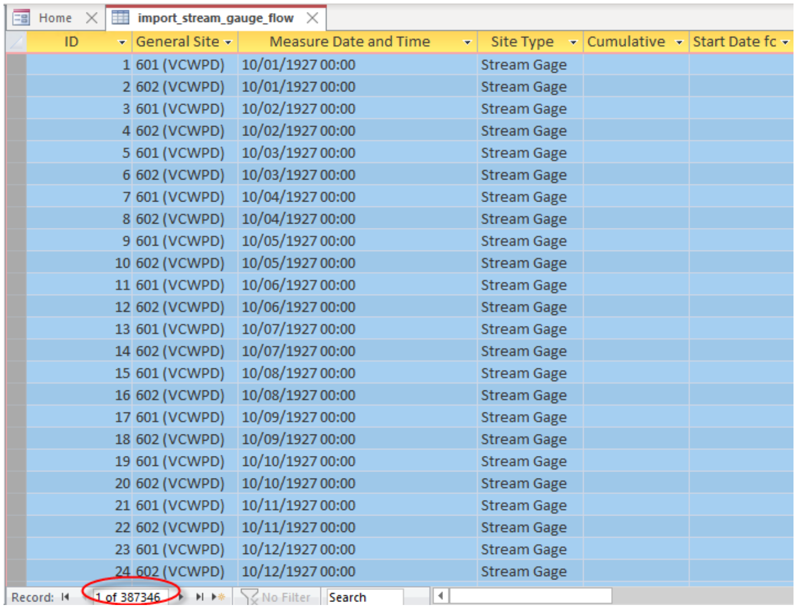
1. Format the data in Excel according to the "import_stream_gage_flow.xlsx" file. <u>Make sure that the Measure Date and Time is in the correct format and that the Surface Water Discharge (cubic feet per second) is not missing.</u> Select and copy the data to be imported to DMS (including column headers).



2. Import to DMS by opening the "import_stream_gauge_flow" table in Access, clicking the top left corner of the table, and pasting the copied data from Step 1. This may take a few minutes if the number of records is large. Click "Yes" to confirm. After pasting the data, verify that the number of records in the "import_stream_gauge_flow" table is equal to the number of rows copied from Excel.





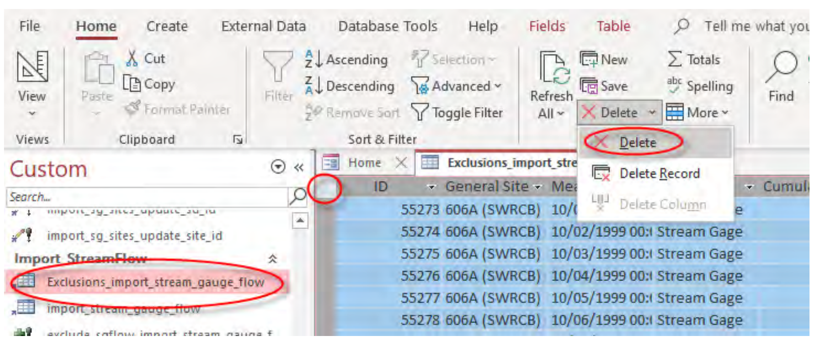


Home | import_stream_gauge_flow

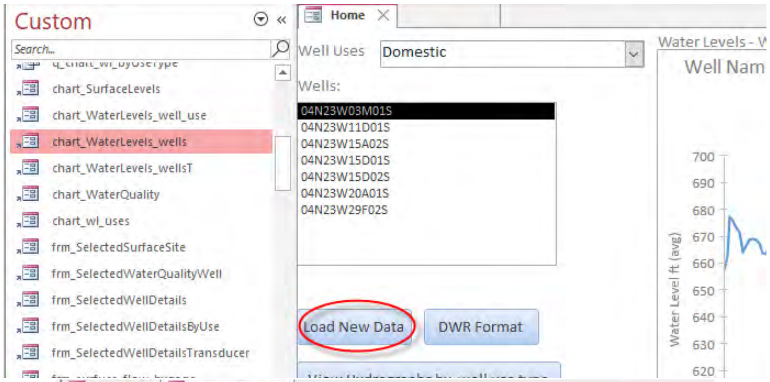
ID	General Site	Measure Date and Time	Site Type	Cumulative	Start Date fc
1	601 (VCWPD)	10/01/1927 00:00	Stream Gage		
2	602 (VCWPD)	10/01/1927 00:00	Stream Gage		
3	601 (VCWPD)	10/02/1927 00:00	Stream Gage		
4	602 (VCWPD)	10/02/1927 00:00	Stream Gage		
5	601 (VCWPD)	10/03/1927 00:00	Stream Gage		
6	602 (VCWPD)	10/03/1927 00:00	Stream Gage		
7	601 (VCWPD)	10/04/1927 00:00	Stream Gage		
8	602 (VCWPD)	10/04/1927 00:00	Stream Gage		
9	601 (VCWPD)	10/05/1927 00:00	Stream Gage		
10	602 (VCWPD)	10/05/1927 00:00	Stream Gage		
11	601 (VCWPD)	10/06/1927 00:00	Stream Gage		
12	602 (VCWPD)	10/06/1927 00:00	Stream Gage		
13	601 (VCWPD)	10/07/1927 00:00	Stream Gage		
14	602 (VCWPD)	10/07/1927 00:00	Stream Gage		
15	601 (VCWPD)	10/08/1927 00:00	Stream Gage		
16	602 (VCWPD)	10/08/1927 00:00	Stream Gage		
17	601 (VCWPD)	10/09/1927 00:00	Stream Gage		
18	602 (VCWPD)	10/09/1927 00:00	Stream Gage		
19	601 (VCWPD)	10/10/1927 00:00	Stream Gage		
20	602 (VCWPD)	10/10/1927 00:00	Stream Gage		
21	601 (VCWPD)	10/11/1927 00:00	Stream Gage		
22	602 (VCWPD)	10/11/1927 00:00	Stream Gage		
23	601 (VCWPD)	10/12/1927 00:00	Stream Gage		
24	602 (VCWPD)	10/12/1927 00:00	Stream Gage		

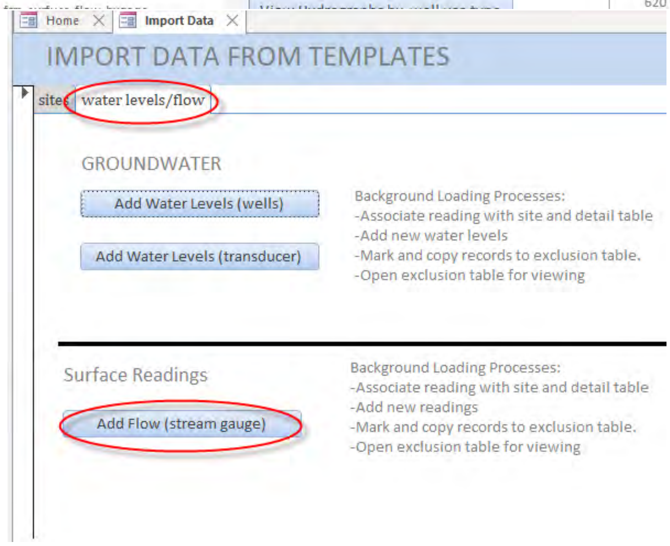
Record: 1 of 387346 | No Filter | Search

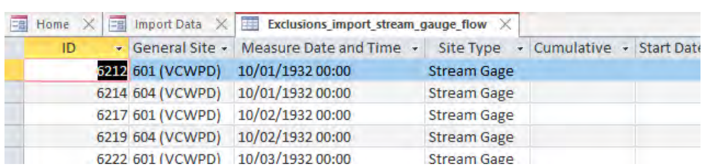
3. Open the "Exclusions_import_stream_gauge_flow" table. If the table is not empty, then delete all records in it. After making sure that it is empty, close the table.



4. Open the "chart_WaterLevels_wells" form, i.e. the Home tab (if not already open). Click the "Load New Data" button and then the "Add Flow (stream gauge)" button under the "water levels/flow" tab. This adds the new acceptable data from the "import_stream_gauge_flow" table to the master "dt_site_levels" table and opens the "Exclusions_import_stream_gauge_flow" table to show which new data were not added to the master table due to missing information.







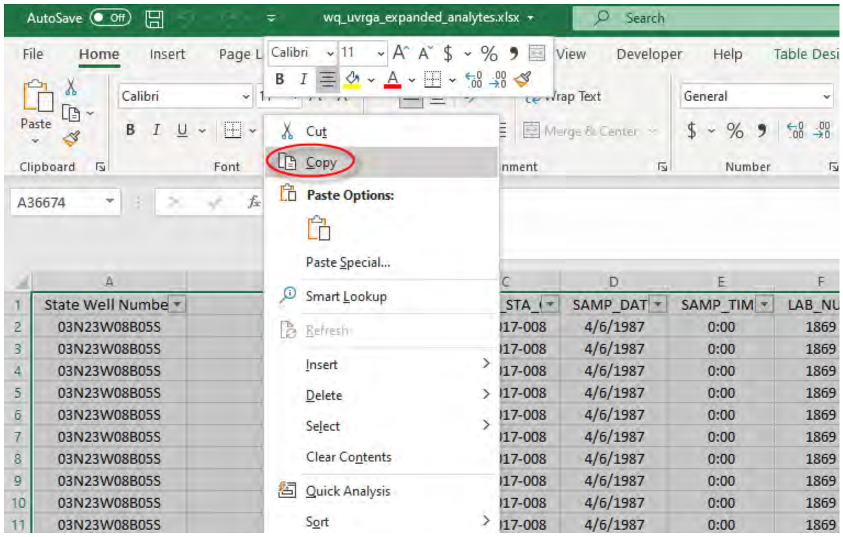
5. For the new data that were not added to the master "dt_site_levels" table (i.e., records showing up in the "Exclusions_import_stream_gauge_flow" table), check the General Site ID and make sure that it exists in the "dt_sites" and "dt_site_details" tables.

   If the General Site ID or any field in the streamflow data needs to be corrected, then go back to the Excel template in Step 1, edit the information, and repeat Steps 1 – 4.

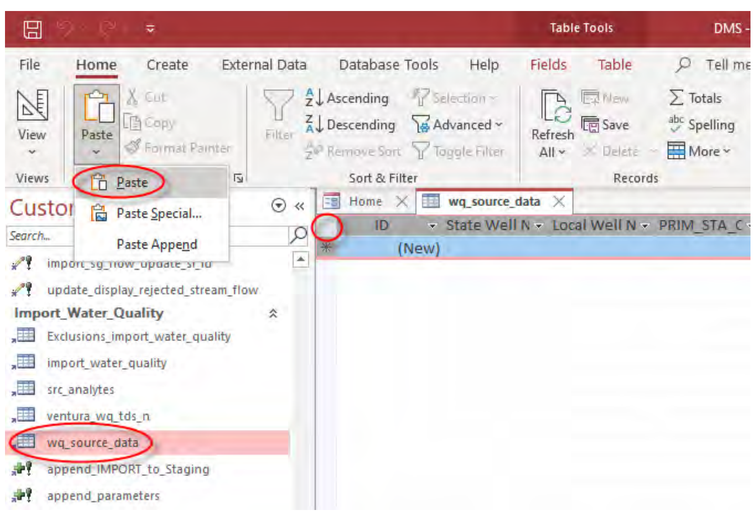
   If the site information does not exist in the "dt_sites" or "dt_site_details" table, then follow the steps for "Importing Stream Gage Site Data."

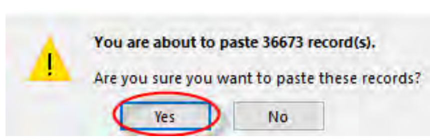
Importing Water Quality Data

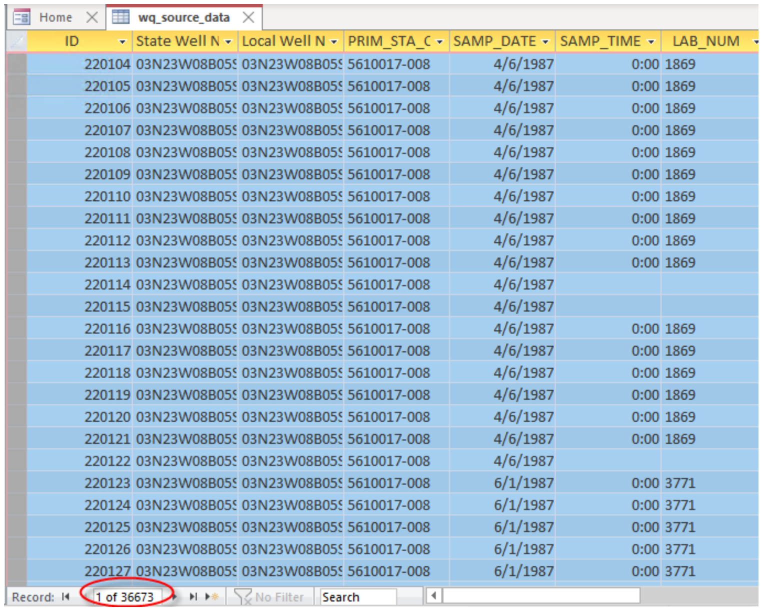
1. Format the data in Excel according to the "import_wq.xlsx" file. Select and copy the data to be imported to DMS (including column headers).



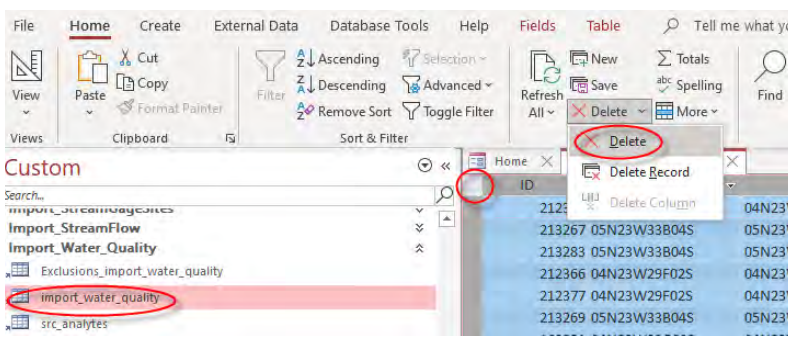
2. Import to DMS by opening the "wq_source_data" table in Access, clicking the top left corner of the table, and pasting the copied data from Step 1. This may take a few minutes if the number of records is large. Click "Yes" to confirm. After pasting the data, verify that the number of records in the "wq_source_data" table is equal to the number of rows copied from Excel.



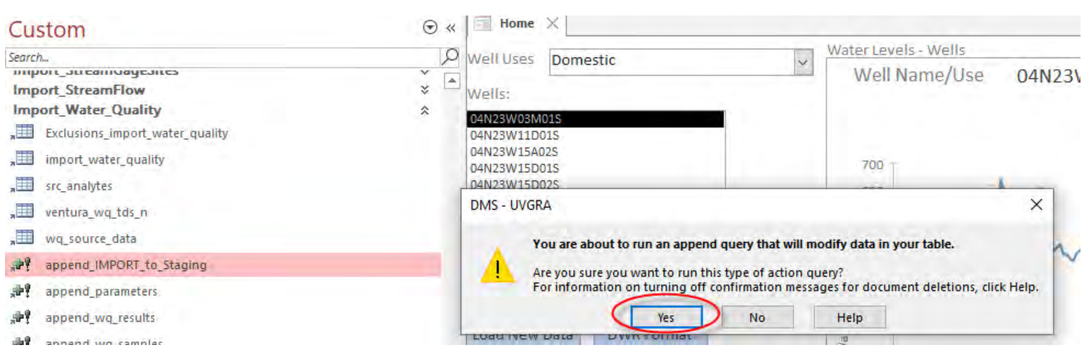


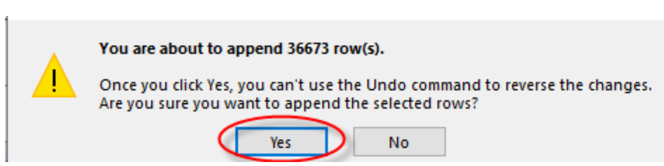


3. Open the "import_water_quality" table. If the table is not empty, then delete all records in it. After making sure that it is empty, close the table.

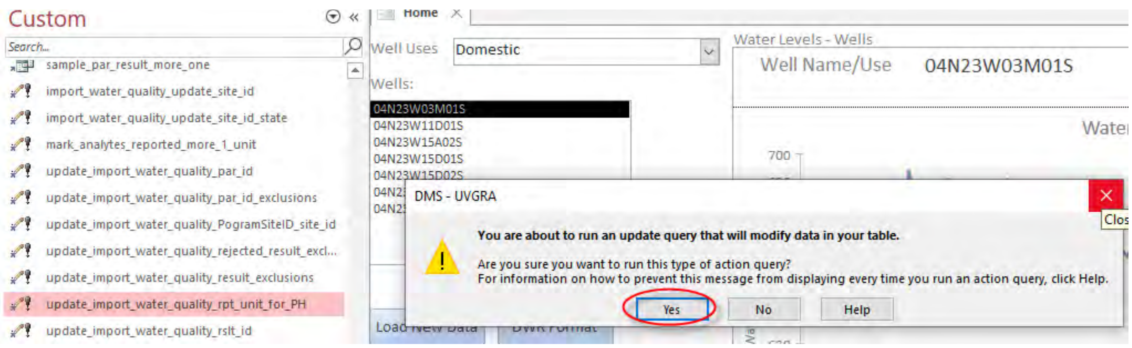


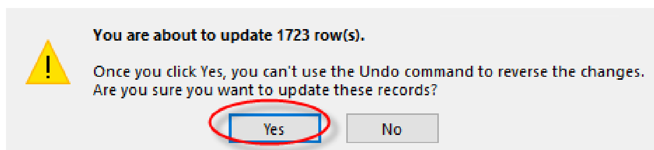
4. Run the "append_IMPORT_to_Staging" query. Click "Yes" to confirm. This adds the source data from the "wq_source_data" table to the "import_water_quality" table.





5. Run the "update_import_water_quality_rpt_unit_for_PH" query. Click "Yes" to confirm. This assigns the unit S.U. to the PH laboratory analytes.

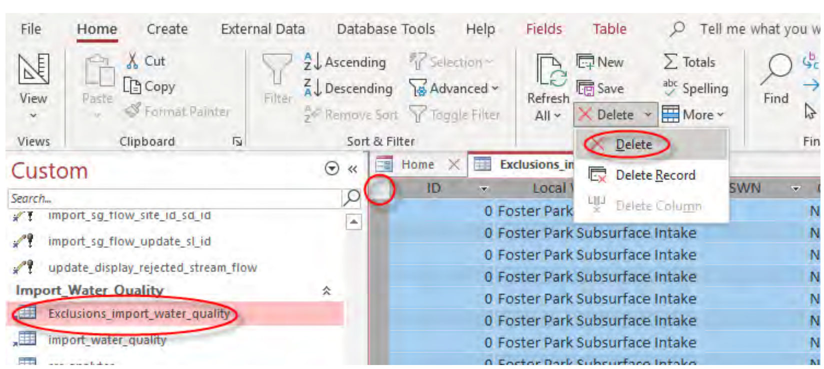




6. Run the following queries:
check_each_chem_reported_in_one_unit – to check the unit of each analyte.
chemicals_results_multiple_units – to identify the analytes reported in more than one unit.

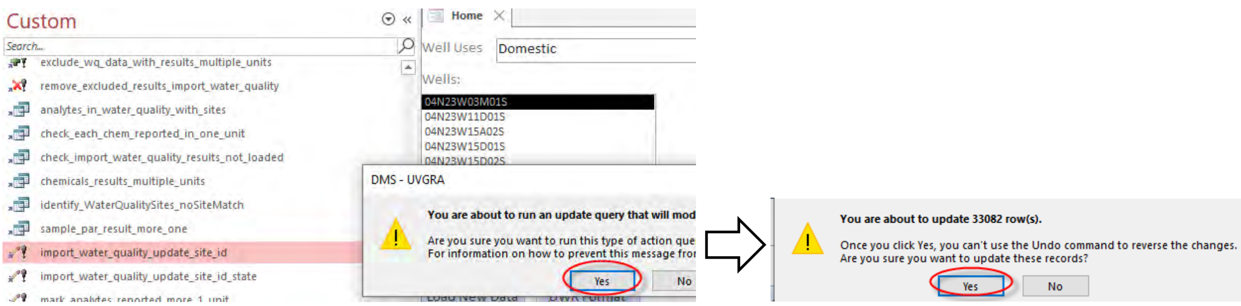
If the units need to be corrected, then go back to the Excel template in Step 1, edit the information, and repeat Steps 1 – 5.

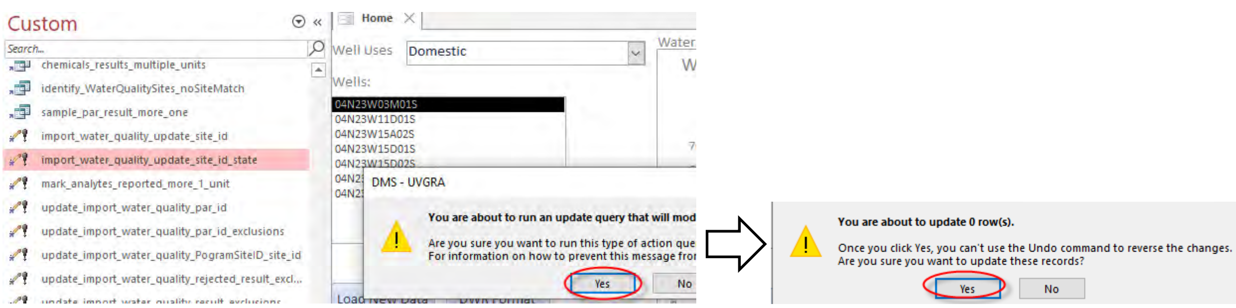
7. Open the "Exclusions_import_water_quality" table. If the table is not empty, then delete all records in it. After making sure that it is empty, close the table.

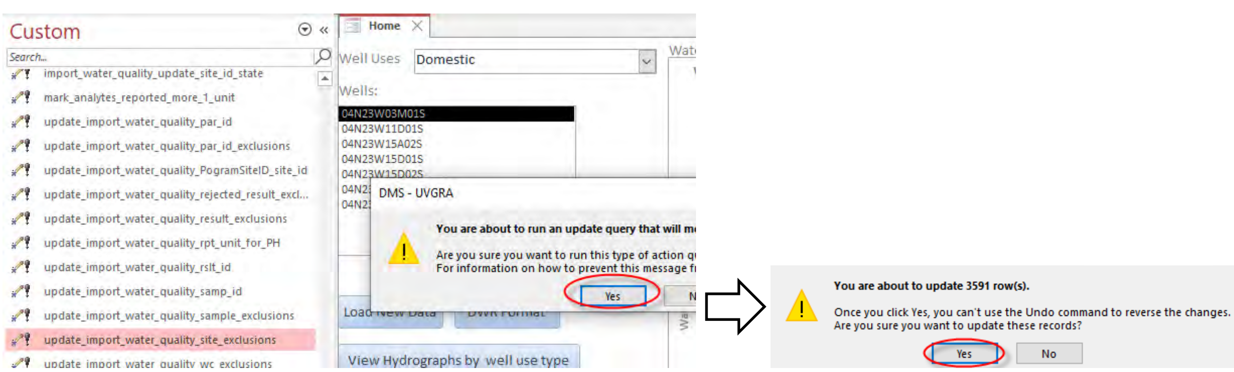


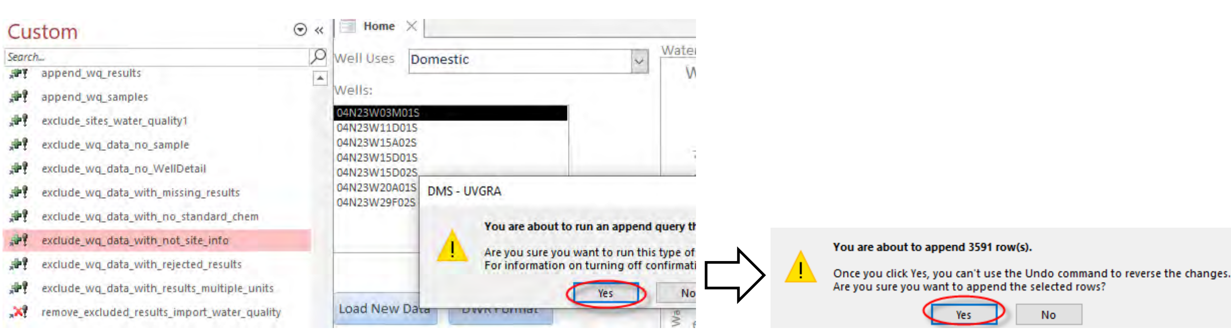
8. Run the following queries in the order shown:
   import_water_quality_update_site_id
   → import_water_quality_update_site_id_state
   → update_import_water_quality_site_exclusions
   → exclude_wq_data_with_not_site_info

   This marks the records in the "import_water_quality" table for which neither Local Well Name nor SWN exists in the "dt_sites" table and adds those records to the "Exclusions_import_water_quality" table.









9. Similar to Step 8, run the following queries in the order shown:
update_site_wc_ids_inimport
→ update_import_water_quality_wc_exclusions
→ exclude_wq_data_no_WellDetail

   This marks the records in the "import_water_quality" table for which neither Local Well Name nor SWN exists in the "dt_well_details" table and adds those records to the "Exclusions_import_water_quality" table.

10. Similar to Step 8, run the following queries in the order shown:
update_import_water_quality_par_id
→ update_import_water_quality_par_id_exclusions
→ exclude_wq_data_with_no_standard_chem

   This marks the records in the "import_water_quality" table for which the CHEMICAL does not exist in the "lu_parameters" table and adds those records to the "Exclusions_import_water_quality" table.

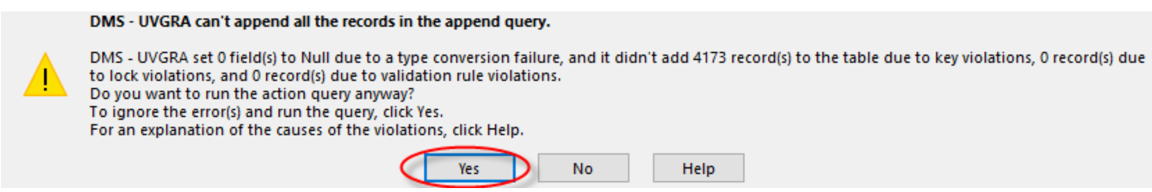
11. Similar to Step 8, run the following queries in the order shown:
update_import_water_quality_rejected_result_exclusions
→ exclude_wq_data_with_rejected_results

   This marks the records in the "import_water_quality" table for which the Review_Result is Rejected and adds those records to the "Exclusions_import_water_quality" table.

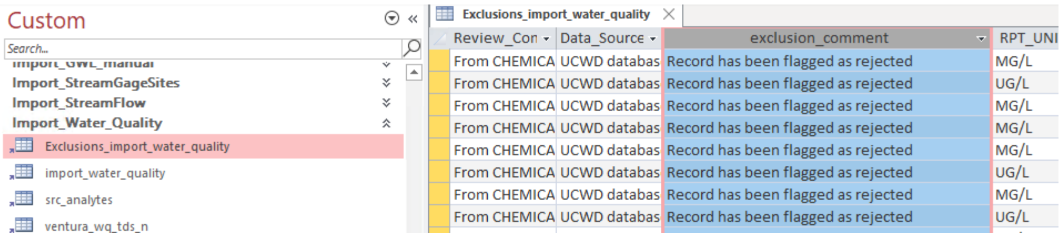
12. Similar to Step 8, run the following queries in the order shown:
update_import_water_quality_samp_id
→ append_wq_samples
→ update_import_water_quality_samp_id
→ update_import_water_quality_sample_exclusions
→ exclude_wq_data_no_sample

   This adds the new acceptable data from the "import_water_quality" table to the master "dt_samples" table.

   Note: Click "Yes" if the message below appears while running the queries.



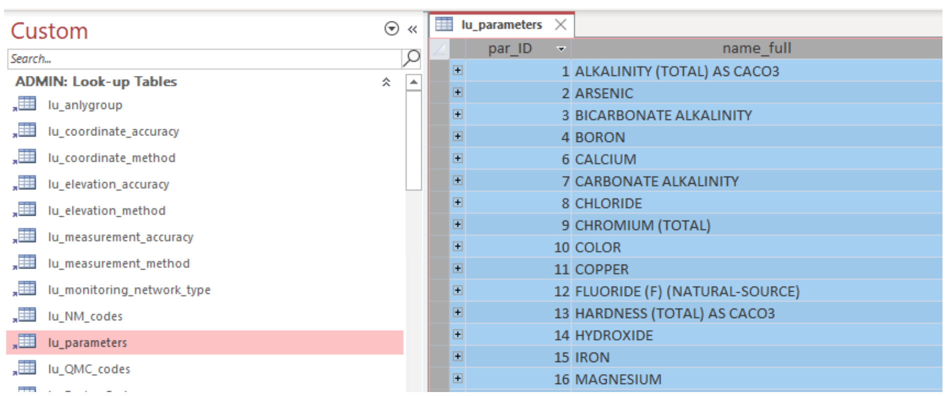
13. Open the "Exclusions_import_water_quality" table to see which new data were not added to the master "dt_samples" table and check the exclusion_comment.



If any field in the water quality data needs to be corrected, then go back to the Excel template in Step 1, edit the information, and repeat Steps 1 – 12.

If the well information does not exist in the "dt_sites" or "dt_well_details" table, then follow the steps for "Importing Well Data."

If the chemical information does not exist in the "lu_parameters" table, then update the "lu_parameters" table accordingly. If the chemical information exists in the "lu_anlygroup" table, then run the "update_lu_parameter_anlygroup_from_lu_anlygroup" query to copy that information to the "lu_parameters" table.



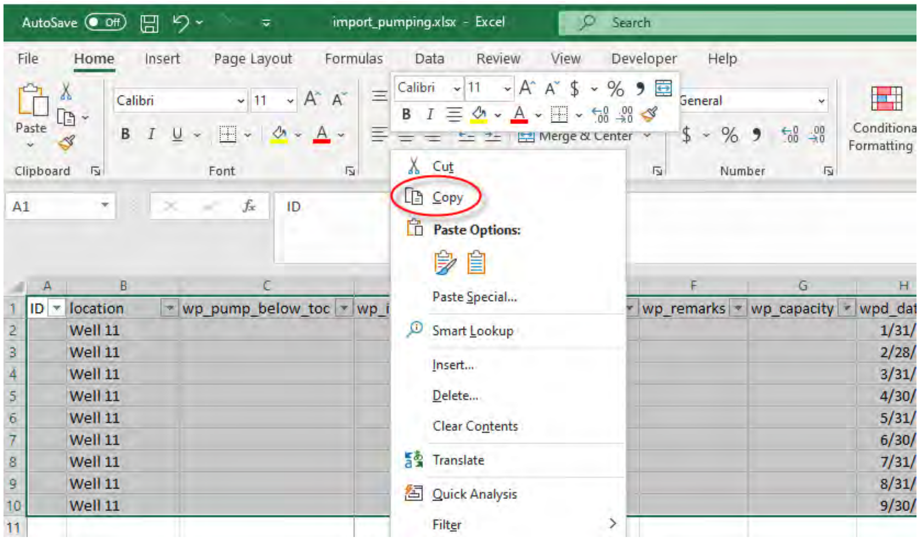
14. Similar to Step 12, run the following queries in the order shown:
update_import_water_quality_result_exclusions
→ update_import_water_quality_rslt_id
→ append_wq_results
→ update_import_water_quality_rslt_id

This adds the new acceptable data from the "import_water_quality" table to the master "dt_results" table.

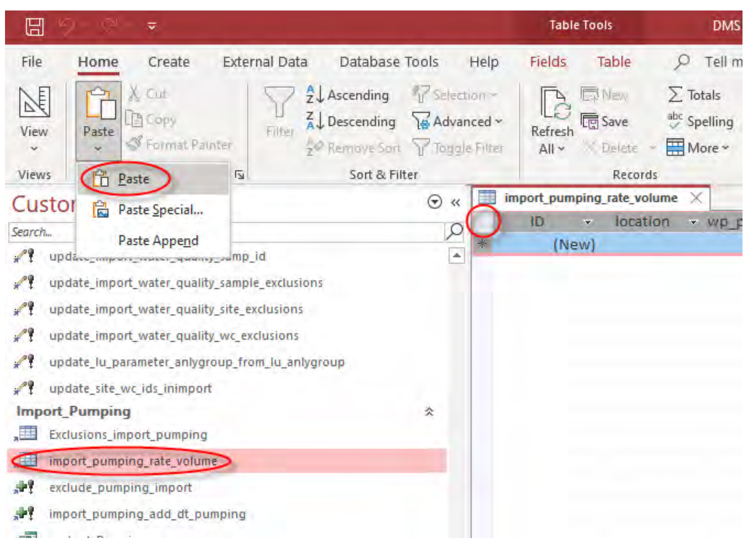
15. Run the "check_import_water_quality_results_not_loaded" query to see which new data were not added to the master "dt_results" table.

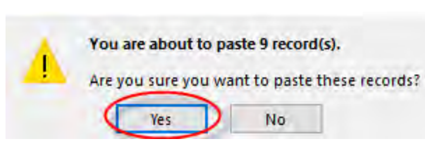
Importing Pumping Data

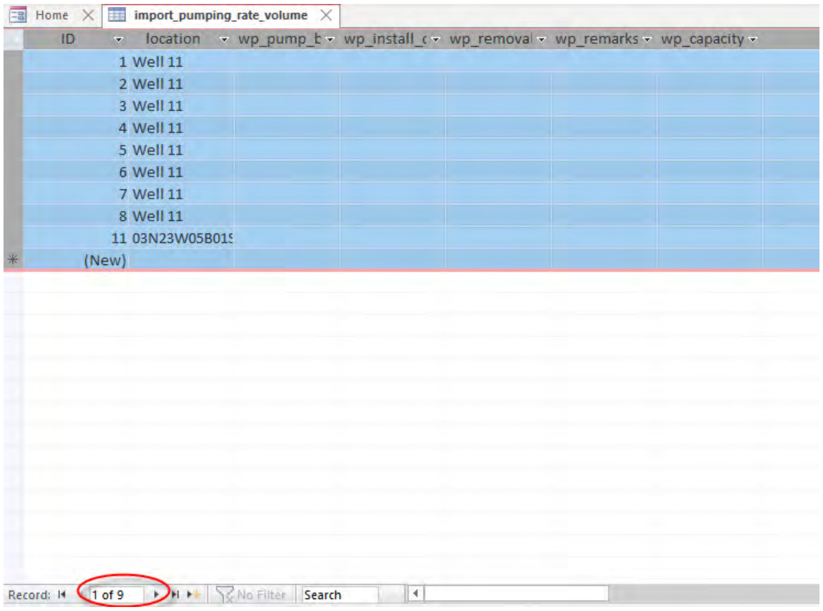
1. Format the data in Excel according to the "import_pumping.xlsx" file. Select and copy the data to be imported to DMS (including column headers).



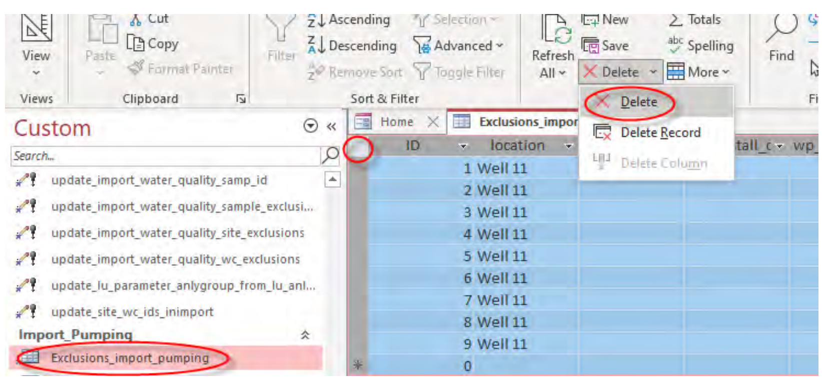
2. Import to DMS by opening the "import_pumping_rate_volume" table in Access, clicking the top left corner of the table, and pasting the copied data from Step 1. This may take a few minutes if the number of records is large. Click "Yes" to confirm. After pasting the data, verify that the number of records in the "import_pumping_rate_volume" table is equal to the number of rows copied from Excel.



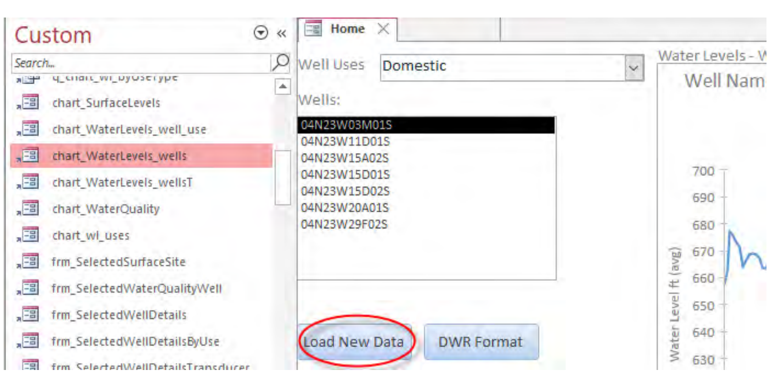


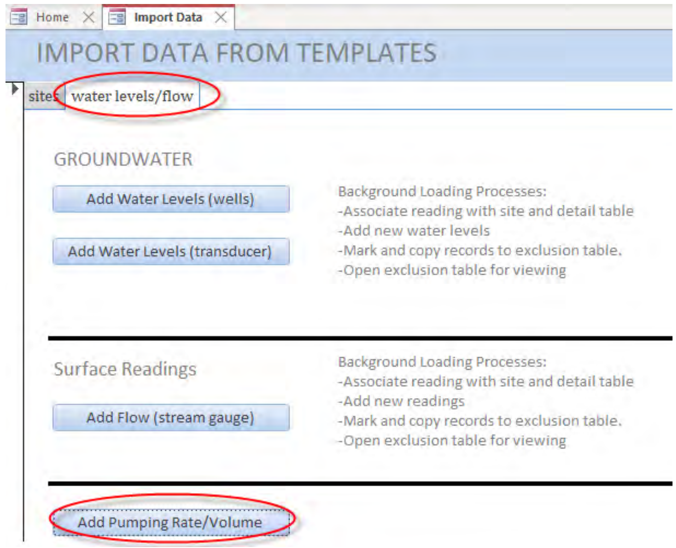


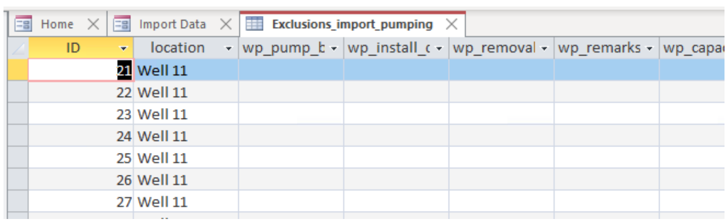
3. Open the "Exclusions_import_pumping" table. If the table is not empty, then delete all records in it. After making sure that it is empty, close the table.



4. Open the "chart_WaterLevels_wells" form, i.e. the Home tab (if not already open). Click the "Load New Data" button and then the "Add Pumping Rate/Volume" button under the "water levels/flow" tab. This adds the new acceptable data from the "import_pumping_rate_volume" table to the master "dt_pumping" table and opens the "Exclusions_import_pumping" table to show which new data were not added to the master table due to missing information.







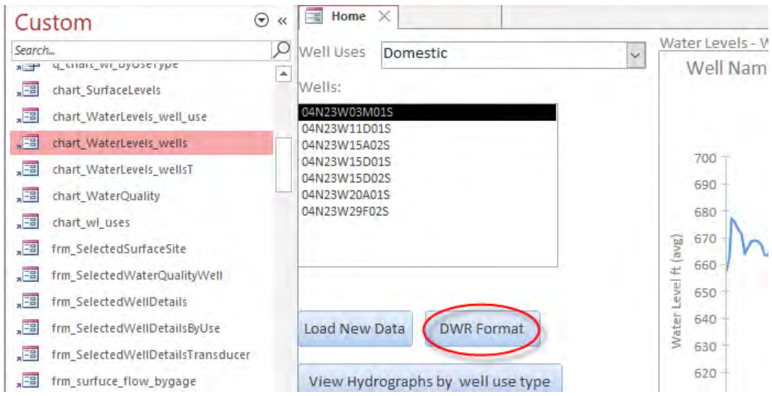
5. For the new data that were not added to the master "dt_pumping" table (i.e., records showing up in the "Exclusions_import_pumping" table), check the location and make sure that it exists in the "dt_sites" and "dt_well_details" tables.

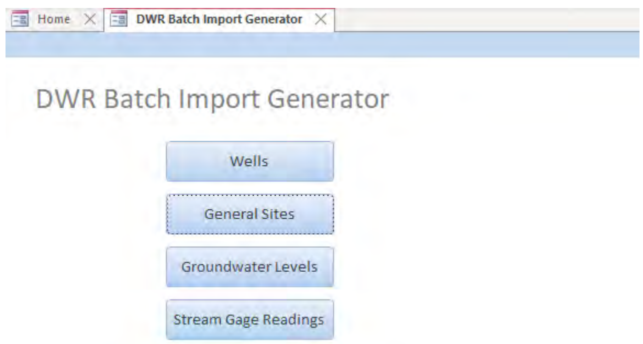
   If the location or any field in the pumping data needs to be corrected, then go back to the Excel template in Step 1, edit the information, and repeat Steps 1 – 4.

   If the well information does not exist in the "dt_sites" or "dt_well_details" table, then follow the steps for "Importing Well Data."

Exporting to DWR Templates

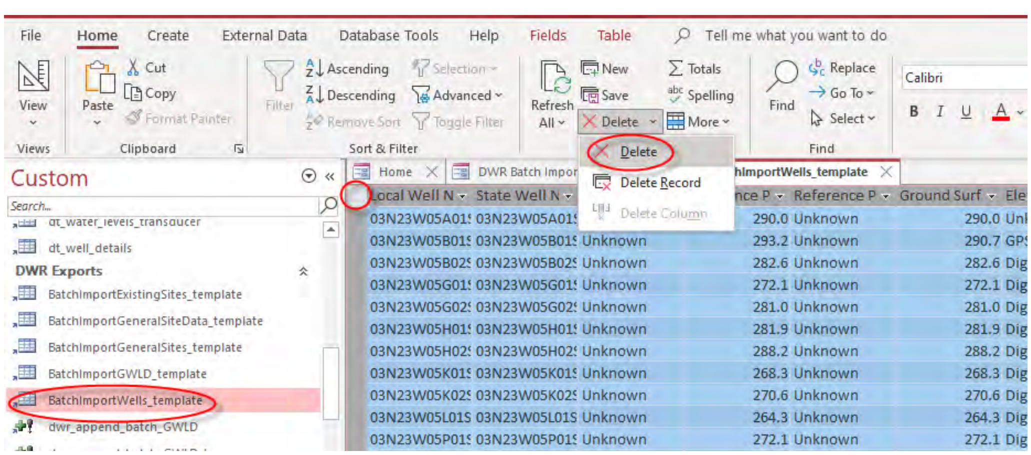
1. Open the "chart_WaterLevels_wells" form, i.e. the Home tab (if not already open). Click the "DWR Format" button. This opens the "DWR Batch Import Generator" form.





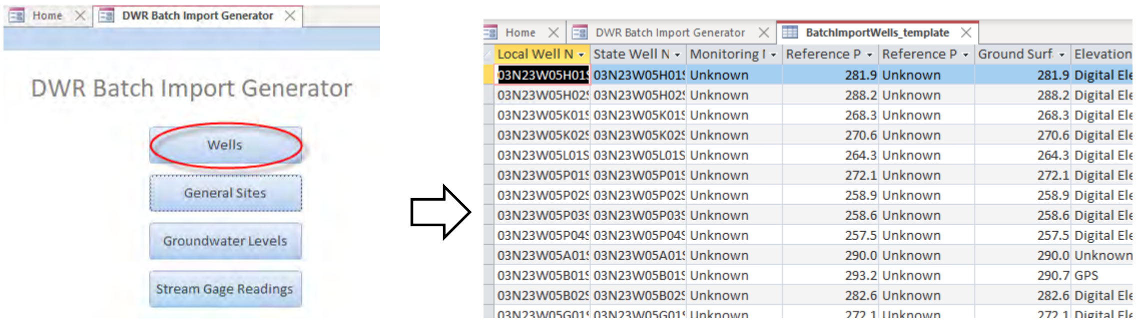
2. For the well template, open the "BatchImportWells_template" table.
   For the general site template, open the "BatchImportGeneralSites_template" table.
   For the groundwater level template, open the "BatchImportGWLD_template" table.
   For the stream gage reading template, open the "BatchImportGeneralSiteData_template" table.

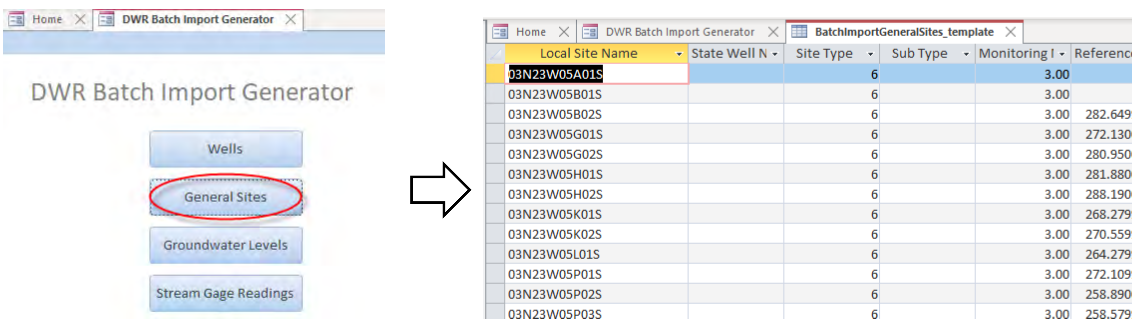
   If the table is not empty, then delete all records in it. After making sure that it is empty, close the table and go back to the "DWR Batch Import Generator" form.

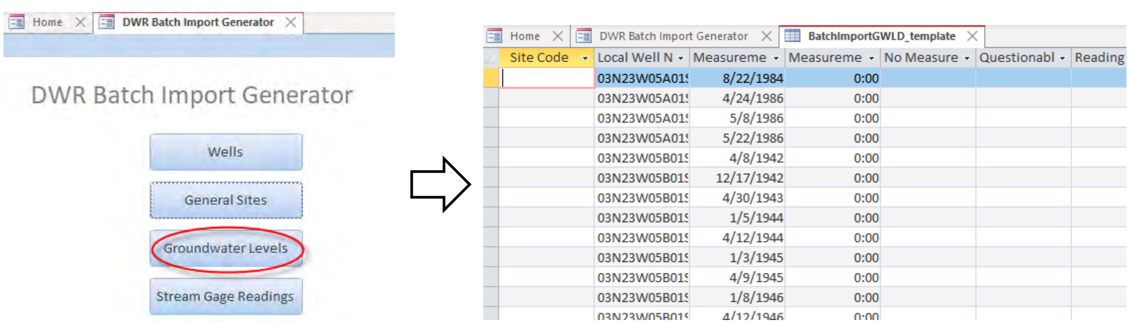


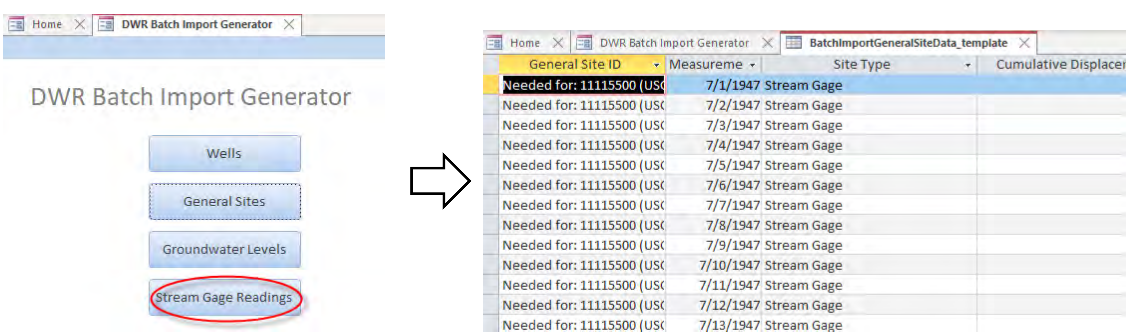
3. For the well template, click the “Wells” button.
   For the general site template, click the “General Sites” button.
   For the groundwater level template, click the “Groundwater Levels” button.
   For the stream gage reading template, click the “Stream Gage Readings” button.

   Click “Yes” to confirm. This fills the corresponding template table emptied in Step 2. The data from the template table may be copied and pasted to Excel.



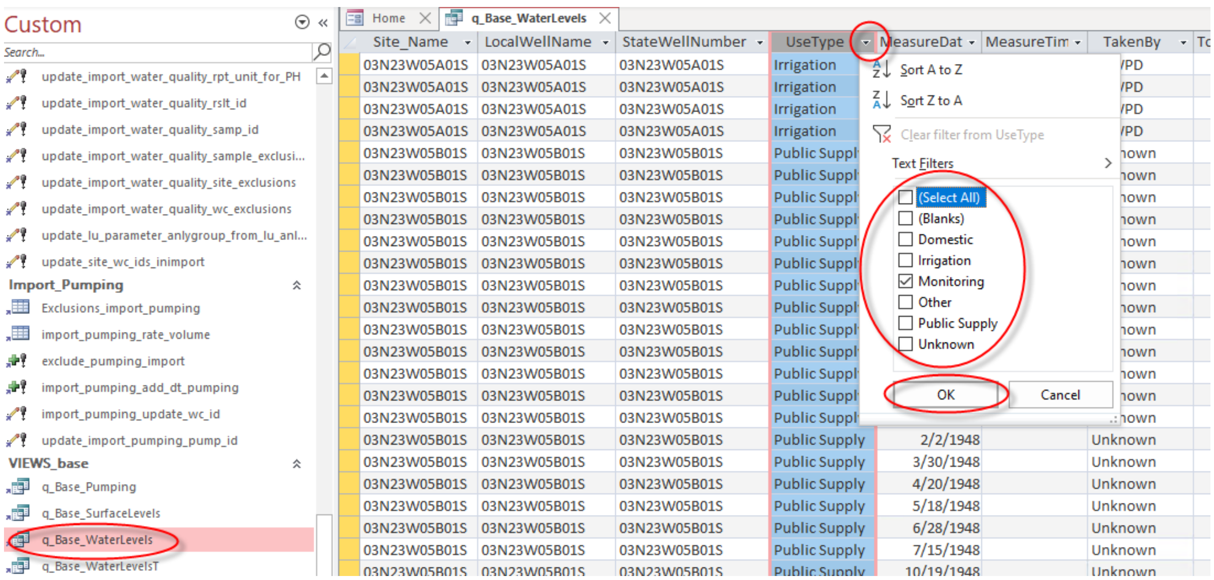


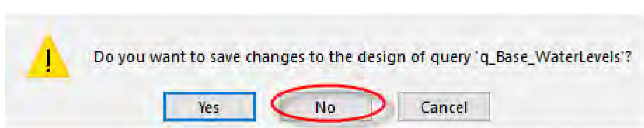




Viewing the Data Tables

1. The queries under the "VIEWS_base" group can be used to view the data saved in the production data tables. Open the query of interest and click the arrow next to the field name to see the drop-down list. The data can be filtered by checking/unchecking boxes in the drop-down list and clicking "OK." When closing the query, click "No" so that the filter criteria are not saved.





DMS OBJECT DESCRIPTION

Group	Object Name	Object Type	Description
ADMIN: Look-up Tables	lu_anlygroup	Table	Reference table.
	lu_coordinate_accuracy	Table	Reference table.
	lu_coordinate_method	Table	Reference table.
	lu_elevation_accuracy	Table	Reference table.
	lu_elevation_method	Table	Reference table.
	lu_measurement_accuracy	Table	Reference table.
	lu_measurement_method	Table	Reference table.
	lu_monitoring_network_type	Table	Reference table.
	lu_NM_codes	Table	Reference table.
	lu_parameters	Table	Reference table.
	lu_QMC_codes	Table	Reference table.
	lu_ReviewCodes	Table	Reference table.
	lu_SG_codes	Table	Reference table.
	lu_site_type	Table	Reference table.
	lu_well_completion_type	Table	Reference table.
	lu_well_status	Table	Reference table.
	lu_well_type	Table	Reference table.
	lu_well_use_type	Table	Reference table.
	map_well_status	Table	Reference table.
	map_well_use	Table	Reference table.
DMS Data Tables	dt_pumping	Table	Table for storing the pumping data.
	dt_results	Table	Table for storing the water quality results.
	dt_samples	Table	Table for storing the water quality sample data.
	dt_site_details	Table	Table for storing the gage site details.
	dt_site_levels	Table	Table for storing the streamflow data from gages.
	dt_sites	Table	Table for storing the well/gage site info.
	dt_sources	Table	Table for storing the source info.
	dt_water_levels	Table	Table for storing the water level data from wells.
	dt_water_levels_transducer	Table	Table for storing the water level data from transducers.
	dt_well_details	Table	Table for storing the well site details.
DWR Exports	BatchImportGeneralSiteData_template	Table	Table for exporting the streamflow data in DWR format.
	BatchImportGeneralSites_template	Table	Table for exporting the general well/gage site info in DWR format.
	BatchImportGWLD_template	Table	Table for exporting the water level data in DWR format.
	BatchImportWells_template	Table	Table for exporting the well site info in DWR format.
	dwr_append_batch_GWLD	Append Query	Formats the water level data from the "dt_water_levels" table and adds them to the "BatchImportGWLD_template" table.
	dwr_append_batch_GWLD_loggers	Append Query	Formats the water level data from the "dt_water_levels_transducer" table and adds them to the "BatchImportGWLD_template" table.
	dwr_append_batchGeneralSitesGages	Append Query	Formats the gage site info from the "dt_sites" and "dt_site_details" tables and adds it to the "BatchImportGeneralSites_template" table.
	dwr_append_batchGeneralSitesWells	Append Query	Formats the well site info from the "dt_sites" and "dt_well_details" tables and adds it to the "BatchImportGeneralSites_template" table.
	dwr_append_batchGenSitesData_gage	Append Query	Formats the streamflow data from the "dt_site_levels" table and adds them to the "BatchImportGeneralSiteData_template" table.
	dwr_append_batchWells	Append Query	Formats the well site info from the "vDWR_wells" query and adds it to the "BatchImportWells_template" table.
	vDWR_wells	Select Query	Extracts the well site info from the "dt_sites" and "dt_well_details" tables if SiteType = 6. Used as an intermediate step for the "dwr_append_batchWells" query.
	vTopBot_screens	Select Query	Extracts the screening info from the "dt_well_details" table. Used as an intermediate step for the "dwr_append_batchGeneralSitesWells" query.
Import_Wells	Exclusions_ import_wells	Table	Table for viewing the records from the "import_wells" table that have not been loaded to the "dt_sites" or "dt_well_details" table.
	import_wells	Table	Table for importing the well site info.

Group	Object Name	Object Type	Description
	exclude_sites_import_wells	Append Query	Adds the records from the "import_wells" table to the "Exclusions_ import_wells" table if the required well site info (e.g., latitude/longitude, coordinates method/accuracy, county) is missing.
	exclude_wc_import_wells	Append Query	Adds the records from the "import_wells" table to the "Exclusions_ import_wells" table if the required well site details are missing.
	import_wells_add_dt_sites	Append Query	Formats the well site info from the "import_wells" table and adds it to the "dt_sites" table. Does not add if a record with the same Local Well Name/State Well Number already exists in the "dt_sites" table.
	import_wells_add_dt_well_details	Append Query	Formats the well site details from the "import_wells" table and adds them to the "dt_well_details" table. Does not add if a record with the same Local Well Name/State Well Number already exists in the "dt_well_details" table.
	import_wells_update_site_id	Update Query	Adds site_id to the records in the "import_wells" table if the matching Local Well Name is found in the "dt_sites" table.
	import_wells_update_site_id_state	Update Query	Adds site_id to the records in the "import_wells" table if the matching State Well Number is found in the "dt_sites" table.
	import_wells_update_wc_id	Update Query	Adds wc_id to the records in the "import_wells" table if the matching site_id is found in the "dt_well_details" table.
Import_GWL_logger	Exclusions_import_gwl_logger	Table	Table for viewing the records from the "import_gwl_logger" table that have not been loaded to the "dt_water_levels_transducer" table.
	import_gwl_logger	Table	Table for importing the water level data from transducers.
	exclude_wlt_import_gwllogger	Append Query	Adds the records from the "import_gwl_logger" table to the "Exclusions_import_gwl_logger" table if the required well site info is missing.
	import_gwlt_add_dt_water_level_trans	Append Query	Formats the water level data from the "import_gwl_logger" table and adds them to the "dt_water_levels_transducer" table. Does not add if a record with the same Local Well Name/Site Code and Measurement Date/Time already exists in the "dt_water_levels_transducer" table.
	import_gwlt_update_site_id_wc_id_localname	Update Query	Adds site_id and wc_id to the records in the "import_gwl_logger" table if the matching Local Well Name is found in the "dt_sites" table.
	import_gwlt_update_site_id_wc_id_sitecode	Update Query	Adds site_id and wc_id to the records in the "import_gwl_logger" table if the matching Site Code is found in the "dt_sites" table.
	import_gwlt_update_wlt_id	Update Query	Adds wlt_id to the records in the "import_gwl_logger" table if the matching wc_id and Measurement Date/Time are found in the "dt_water_levels_transducer" table.
	update_display_rejected_water_levels_logger	Update Query	Sets use_flag = 0 in the "dt_water_levels_transducer" table if Review_Result = "Rejected."
Import_GWL_manual	Exclusions_import_gwl_manual	Table	Table for viewing the records from the "import_gwl_manual" table that have not been loaded to the "dt_water_levels" table.
	import_gwl_manual	Table	Table for importing the water level data from wells.
	exclude_wlm_import_gwlman	Append Query	Adds the records from the "import_gwl_manual" table to the "Exclusions_import_gwl_manual" table if the required well site info is missing.
	import_gwlman_add_dt_water_levels	Append Query	Formats the water level data from the "import_gwl_manual" table and adds them to the "dt_water_levels" table. Does not add if a record with the same Local Well Name and Measurement Date already exists in the "dt_water_levels" table.
	import_wlman_tomatch	Select Query	Formats Measurement Date in the "import_gwl_manual" table. Used as an intermediate step for the "import_gwlman_Update_wlID" query.

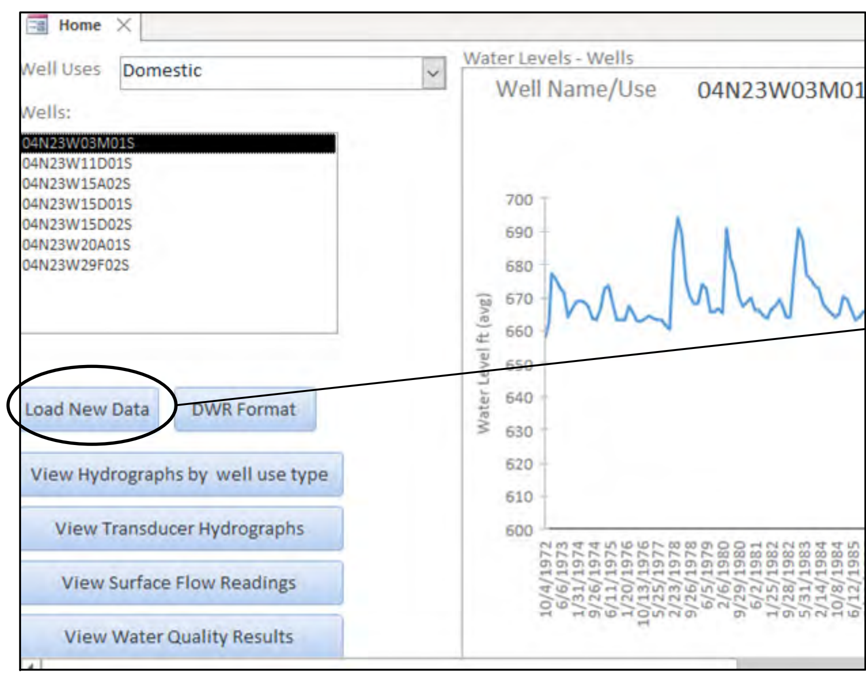
Group	Object Name	Object Type	Description
	import_gwlman_Update_siteID_wcID	Update Query	Adds site_id and wc_id to the records in the "import_gwl_manual" table if the matching Local Well Name is found in the "dt_sites" table.
	import_gwlman_Update_siteID_wcIDStateWell	Update Query	Adds site_id and wc_id to the records in the "import_gwl_manual" table if the matching Local Well Name is found in the "dt_well_details" table.
	import_gwlman_Update_wlID	Update Query	Adds wl_id to the records in the "import_gwl_manual" table if the matching wc_id and Measurement Date are found in the "dt_water_levels" table.
	update_display_rejected_water_levels	Update Query	Sets use_flag = 0 in the "dt_water_levels" table if Review_Result = "Rejected."
Import_StreamGageSites	Exclusions_import_stream_gauge_sites	Table	Table for viewing the records from the "import_stream_gage_sites" table that have not been loaded to the "dt_sites" or "dt_site_details" table.
	import_stream_gauge_sites	Table	Table for importing the gage site info.
	exclude_sd_import_gaugesites	Append Query	Adds the records from the "import_stream_gauge_sites" table to the "Exclusions_import_stream_gauge_sites" table if the required gage site details are missing.
	exclude_sites_import_gaugesites	Append Query	Adds the records from the "import_stream_gauge_sites" table to the "Exclusions_import_stream_gauge_sites" table if the required gage site info (e.g., latitude/longitude, coordinates method/accuracy, county) is missing.
	import_sg_sites_add_dt_site_details	Append Query	Formats the gage site details from the "import_stream_gauge_sites" table and adds them to the "dt_site_details" table. Does not add if a record with the same Local Site Name already exists in the "dt_site_details" table.
	import_sg_sites_add_dt_sites	Append Query	Formats the gage site info from the "import_stream_gauge_sites" table and adds it to the "dt_sites" table. Does not add if a record with the same Local Site Name already exists in the "dt_sites" table.
	import_sg_sites_update_sd_id	Update Query	Adds sd_id to the records in the "import_stream_gauge_sites" table if the matching site_id is found in the "dt_site_details" table.
	import_sg_sites_update_site_id	Update Query	Adds site_id to the records in the "import_stream_gauge_sites" table if the matching Local Site Name is found in the "dt_sites" table.
Import_StreamFlow	Exclusions_import_stream_gauge_flow	Table	Table for viewing the records from the "import_stream_gauge_flow" table that have not been loaded to the "dt_site_levels" table.
	import_stream_gauge_flow	Table	Table for importing the streamflow data from gages.
	exclude_sgflow_import_stream_gauge_flow	Append Query	Adds the records from the "import_stream_gauge_flow" table to the "Exclusions_import_stream_gauge_flow" table if the required gage site info or Surface Water Discharge (cubic feet per second) is missing.
	import_sg_flow_add_dt_site_levels	Append Query	Formats the streamflow data from the "import_stream_gauge_flow" table and adds them to the "dt_site_levels" table. Does not add if a record with the same General Site ID and Measure Date and Time already exists in the "dt_site_levels" table.
	import_sg_flow_date_time	Select Query	Formats Measure Date and Time in the "import_stream_gauge_flow" table. Used as an intermediate step for the "import_sg_flow_update_sl_id" query.
	import_sg_flow_site_id_sd_id	Update Query	Adds site_id and sd_id to the records in the "import_stream_gauge_flow" table if the matching General Site ID is found in the "dt_sites" table.
	import_sg_flow_update_sl_id	Update Query	Adds sl_id to the records in the "import_stream_gauge_flow" table if the matching sd_id and Measure Date and Time are found in the "dt_site_levels" table.
	update_display_rejected_stream_flow	Update Query	Sets use_flag = 0 in the "dt_site_levels" table if Review_Result = "Rejected."
Import_Water_Quality	Exclusions_import_water_quality	Table	Table for viewing the records from the "import_water_quality" table that have not been loaded to the "dt_samples" table.

Group	Object Name	Object Type	Description
	import_water_quality	Table	Contents from the "wq_source_data" table plus Data_Source.
	wq_source_data	Table	Table for importing the water quality data.
	append_IMPORT_to_Staging	Append Query	Adds all records from the "wq_source_data" table to the "import_water_quality" table.
	append_wq_results	Append Query	Formats the water quality data from the "import_water_quality" table and adds them to the "dt_results" table. Does not add if a record with the same Local Well Name/SWN, SAMP DATE, and CHEMISTRY already exists in the "dt_results" table.
	append_wq_samples	Append Query	Formats the water quality data from the "import_water_quality" table and adds them to the "dt_samples" table. Does not add if a record with the same Local Well Name/SWN and SAMP DATE already exists in the "dt_samples" table.
	exclude_wq_data_no_sample	Append Query	Adds the records from the "import_water_quality" table to the "Exclusions_import_water_quality" table if the matching wc_id and SAMP DATE are not found in the "dt_samples" table.
	exclude_wq_data_no_WellDetail	Append Query	Adds the records from the "import_water_quality" table to the "Exclusions_import_water_quality" table if neither Local Well Name nor SWN is found in the "dt_well_details" table.
	exclude_wq_data_with_no_standard_chem	Append Query	Adds the records from the "import_water_quality" table to the "Exclusions_import_water_quality" table if the matching CHEMISTRY is not found in the "lu_parameters" table.
	exclude_wq_data_with_not_site_info	Append Query	Adds the records from the "import_water_quality" table to the "Exclusions_import_water_quality" table if neither Local Well Name nor SWN is found in the "dt_sites" table.
	exclude_wq_data_with_rejected_results	Append Query	Adds the records from the "import_water_quality" table to the "Exclusions_import_water_quality" table if Review_Result = "Rejected."
	check_each_chem_reported_in_one_unit	Select Query	Shows the unit of each analyte.
	check_import_water_quality_results_not_loaded	Select Query	Shows the records from the "import_water_quality" table that have not been loaded to the "dt_results" table.
	chemicals_results_multiple_units	Select Query	Shows the analytes reported in more than one unit.
	import_water_quality_update_site_id	Update Query	Adds site_id to the records in the "import_water_quality" table if the matching Local Well Name is found in the "dt_sites" table.
	import_water_quality_update_site_id_state	Update Query	Adds site_id to the records in the "import_water_quality" table if the matching SWN is found in the "dt_sites" table.
	update_import_water_quality_par_id	Update Query	Adds par_id to the records in the "import_water_quality" table if the matching CHEMISTRY is found in the "lu_parameters" table.
	update_import_water_quality_par_id_exclusions	Update Query	Adds exclusion_comment to the records in the "import_water_quality" table if the matching CHEMISTRY is not found in the "lu_parameters" table.
	update_import_water_quality_rejected_result_exclusions	Update Query	Adds exclusion_comment to the records in the "import_water_quality" table if Review_Result = "Rejected."
	update_import_water_quality_result_exclusions	Update Query	Adds exclusion_comment to the records in the "import_water_quality" table if the matching samp_id and par_id are not found in the "dt_results" table.
	update_import_water_quality_rpt_unit_for_PH	Update Query	Sets rpt_unit = "S.U." in the "import_water_quality" table if CHEMICAL = "PH, LABORATORY."
	update_import_water_quality_rslt_id	Update Query	Adds rslt_id to the records in the "import_water_quality" table if the matching samp_id and par_id are found in the "dt_results" table.
	update_import_water_quality_samp_id	Update Query	Adds samp_id to the records in the "import_water_quality" table if the matching wc_id and SAMP DATE are found in the "dt_samples" table.
	update_import_water_quality_sample_exclusions	Update Query	Adds exclusion_comment to the records in the "import_water_quality" table if the matching wc_id and SAMP DATE are not found in the "dt_samples" table.

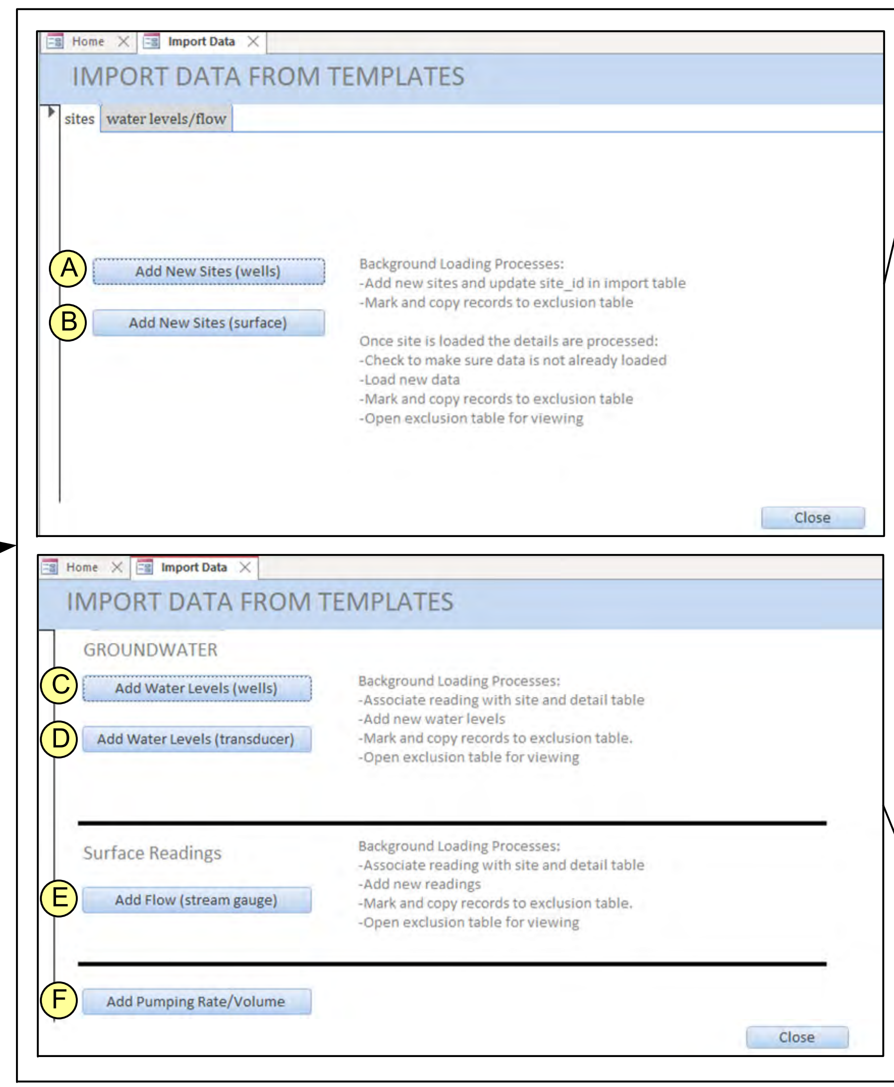
Group	Object Name	Object Type	Description
	update_import_water_quality_site_exclusions	Update Query	Adds exclusion_comment to the records in the "import_water_quality" table if neither Local Well Name nor SWN is found in the "dt_sites" table.
	update_import_water_quality_wc_exclusions	Update Query	Adds exclusion_comment to the records in the "import_water_quality" table if neither Local Well Name nor SWN is found in the "dt_well_details" table.
	update_lu_parameter_anlygroup_from_lu_anlygroup	Update Query	Copies the chemical info from the "lu_anlygroup" table to the "lu_parameters" table.
	update_site_wc_ids_inimport	Update Query	Adds wc_id to the records in the "import_water_quality" table if the matching Local Well Name/SWN is found in the "dt_well_details" table.
Import_GWL_logger	Exclusions_import_pumping	Table	Table for viewing the records from the "import_pumping_rate_volume" table that have not been loaded to the "dt_pumping" table.
	import_pumping_rate_volume	Table	Table for importing the pumping data.
	exclude_pumping_import	Append Query	Adds the records from the "import_pumping_rate_volume" table to the "Exclusions_import_pumping" table if the required well site info is missing.
	import_pumping_add_dt_pumping	Update Query	Formats the pumping data from the "import_pumping_rate_volume" table and adds them to the "dt_pumping" table. Does not add if a record with the same location, wpd_date, wpd_vol, wpd_vol_unit, and wpd_vol_period already exists in the "dt_pumping" table.
	import_pumping_update_wc_id	Update Query	Adds site_id and sd_id to the records in the "import_stream_gauge_flow" table if the matching location is found in the "dt_sites" table.
	update_import_pumping_pump_id	Update Query	Adds pump_id to the records in the "import_pumping_rate_volume" table if the matching wc_id, wpd_date, wpd_vol, wpd_vol_unit, and wpd_vol_period are found in the "dt_pumping" table.
VIEWS_base	q_Base_Pumping	Select Query	Shows the contents of select fields in the "dt_pumping" table.
	q_Base_SurfaceLevels	Select Query	Shows the contents of select fields in the "dt_site_levels" table.
	q_Base_WaterLevels	Select Query	Shows the contents of select fields in the "dt_water_levels" table.
	q_Base_WaterLevelsT	Select Query	Shows the contents of select fields in the "dt_water_levels_transducer" table.
	q_Base_WaterQuality	Select Query	Shows the contents of select fields in the "dt_samples" and "dt_results" tables.

DMS Object Map: Importing Data

"chart_WaterLevels_wells" Form



"frmImportData" Form



A

Input Tables:	Queries (run in order shown):	Output Tables:
• import_wells • lu_monitoring_network_type • lu_site_type	import_wells_update_site_id import_wells_update_site_id_state import_wells_add_dt_sites import_wells_update_site_id import_wells_update_site_id_state exclude_sites_import_wells import_wells_update_wc_id import_wells_add_dt_well_details import_wells_update_wc_id exclude_wc_import_wells	• dt_sites • dt_well_details • Exclusions_ import_wells

B

Input Tables:	Queries (run in order shown):	Output Tables:
• import_stream_gauge_sites • lu_monitoring_network_type • lu_site_type	import_sg_sites_update_site_id import_sg_sites_add_dt_sites import_sg_sites_update_site_id exclude_sites_import_gaugesites import_sg_sites_update_sd_id import_sg_sites_add_dt_site_details import_sg_sites_update_sd_id exclude_sd_import_gaugesites	• dt_sites • dt_site_details • Exclusions_import_stream _gauge_sites

C

Input Tables:	Queries (run in order shown):	Output Tables:
• import_gwl_manual • dt_sites • dt_well_details	import_gwlman_Update_siteID_wcID import_gwlman_Update_siteID_wcIDState Well import_gwlman_Update_wlID import_gwlman_add_dt_water_levels import_gwlman_Update_wlID exclude_wlm_import_gwlman update_display_rejected_water_levels	• dt_water_levels • Exclusions_import_gwl _manual

D

Input Tables:	Queries (run in order shown):	Output Tables:
• import_gwl_logger • dt_sites • dt_well_details	import_gwlt_update_site_id_wc_id_localname import_gwlt_update_site_id_wc_id_sitecode import_gwlt_update_wlt_id import_gwlt_add_dt_water_level_trans import_gwlt_update_wlt_id exclude_wlt_import_gwllogger update_display_rejected_water_levels_logger	• dt_water_levels_transducer • Exclusions_import_gwl _logger

E

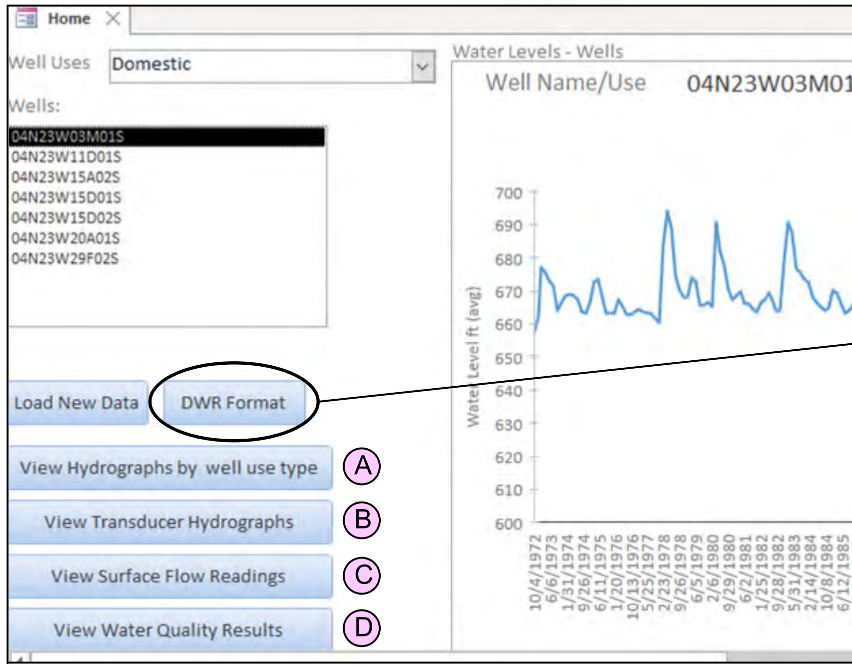
Input Tables:	Queries (run in order shown):	Output Tables:
• import_stream_gauge_flow • dt_sites • dt_site_details	import_sg_flow_site_id_sd_id import_sg_flow_add_dt_site_levels import_sg_flow_update_sl_id exclude_sgflow_import_stream_gauge_flow update_display_rejected_stream_flow	• dt_site_levels • Exclusions_import_stream _gauge_flow

F

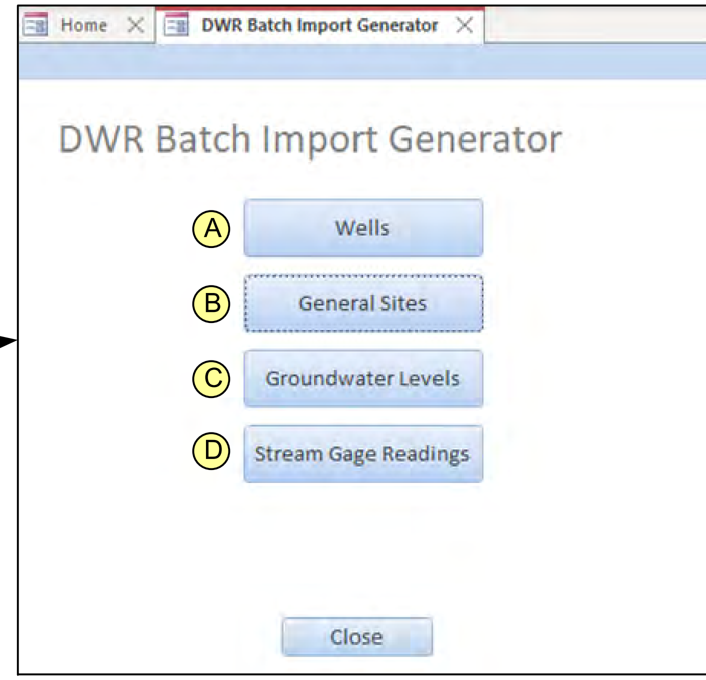
Input Tables:	Queries (run in order shown):	Output Tables:
• import_pumping_rate _volume • dt_sites • dt_well_details • dt_sources	import_pumping_update_wc_id update_import_pumping_pump_id import_pumping_add_dt_pumping update_import_pumping_pump_id exclude_pumping_import	• dt_pumping • Exclusions_import_pumping

DMS Object Map: Formatting Data & Graphing

"chart_WaterLevels_wells" Form

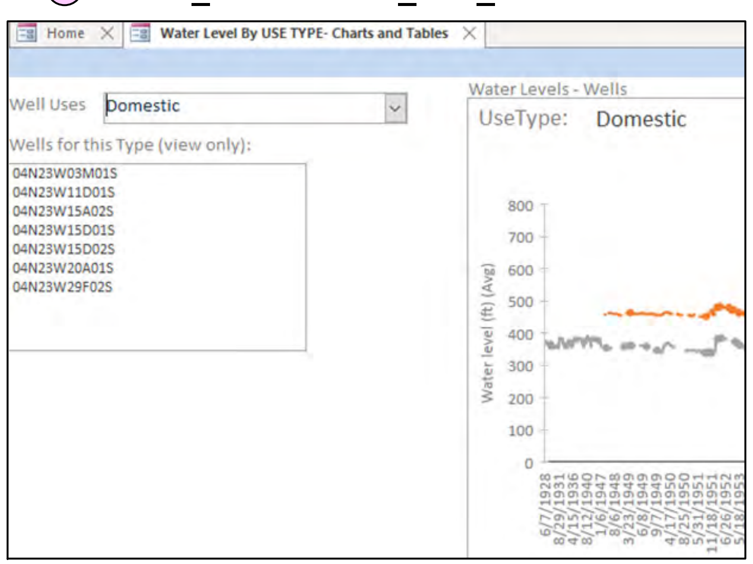


"frmDWR_Exports" Form

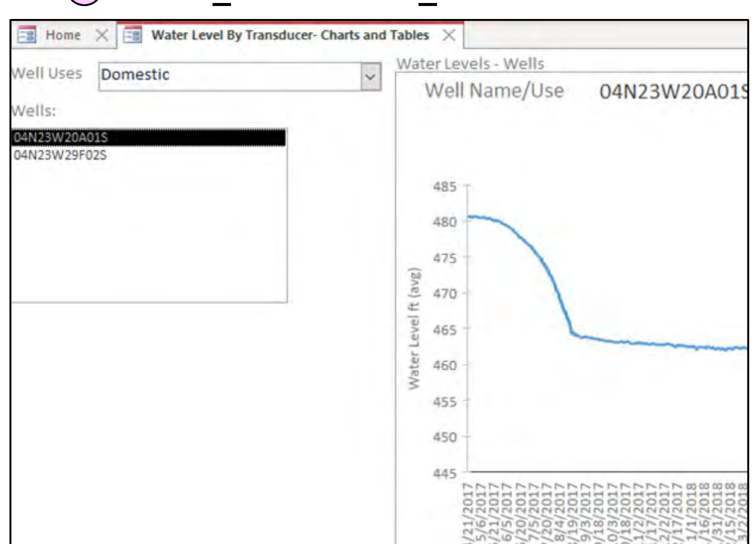


	Input Tables:	Queries (run in order shown):	Output Tables:
A	• dt_sites • dt_well_details • lu_monitoring_network_type	dwr_append_batchWells	• BatchImportWells_template
B	• dt_sites • dt_site_details • dt_well_details	dwr_append_batchGeneralSitesGages dwr_append_batchGeneralSitesWells	• BatchImportGeneralSites _template
C	• dt_sites • dt_well_details • dt_water_levels • dt_water_levels_transducer	dwr_append_batch_GWLD dwr_append_batch_GWLD_loggers	• BatchImportGWLD_template
D	• dt_sites • dt_site_details • dt_site_levels • lu_site_type	dwr_append_batchGenSitesData_gage	• BatchImportGeneralSiteData _template

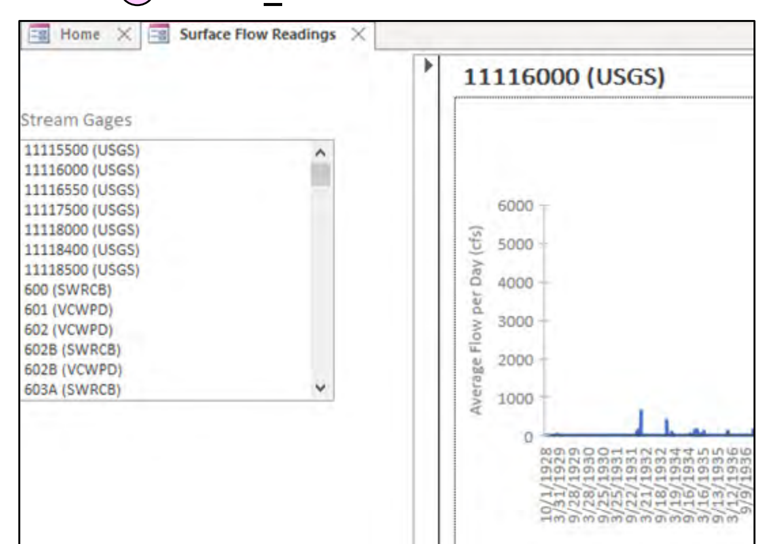
Ⓐ **"chart_WaterLevels_well_use" Form**



Ⓑ **"chart_WaterLevels_wellsT" Form**



Ⓒ **"chart_SurfaceLevels" Form**



Ⓓ **"chart_WaterQuality" Form**