Salinas Valley Groundwater Basin
Langley Area Subbasin
Water Year 2021 Annual Report
Submitted in Support of Groundwater Sustainability Plan Implementation

Salinas Valley Basin
Groundwater Sustainability Agency

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ABBREVIATIONS AND ACRONYMS

AF ....acre-feet
AF/yr. ....acre-feet per year
CBI....................Consensus Building Institute
COC ....Constituent(s) of concern
DAC..................Disadvantaged Communities
DDW.................Division of Drinking Water
DWR ....California Department of Water Resources
eWRIMS ....Electronic Water Rights Information Management System
GEMS ....Groundwater Extraction Management System
GSA...................Groundwater Sustainability Agency
GSP or Plan.......Groundwater Sustainability Plan
InSAR ....Interferometric Synthetic-Aperture Radar
ILRP..................Irrigated Lands Regulatory Program
ISW ....interconnected surface waters
JPA....................Joint Powers Authority
MCL..................Maximum Contaminant Level
MCWRA...........Monterey County Water Resources Agency
mg/L..................milligram/Liter
MOU ....Memorandum of Understanding
RMS..................Representative Monitoring Site(s)
SGMA...............Sustainable Groundwater Management Act
SMC..................Sustainable Management Criteria/Criterion
SMCL................Secondary Maximum Contaminant Level
Subbasin............Langley Area Subbasin
SVBGSA...........Salinas Valley Basin Groundwater Sustainability Agency
SVIHM..............Salinas Valley Integrated Hydrologic Model
SWRCB.............State Water Resources Control Board
WY....................Water Year

EXECUTIVE SUMMARY

The Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) is required to submit an annual report for the Langley Area Subbasin (Subbasin) to the California Department of Water Resources (DWR) by April 1 of each year following SVBGSA's 2022 adoption and submittal of its Groundwater Sustainability Plan (GSP or Plan). This Annual Report covers data collected through Water Year (WY) 2021, from October 1, 2019, to September 30, 2021.

As described in the GSP, DWR lists the Subbasin as a medium priority subbasin in overdraft, which indicates that continuation of present water management practices would probably result in significant adverse impacts. The goal of the Langley Subbasin GSP is to balance the needs of all water users in the Subbasin while complying with SGMA.

In WY 2021, groundwater conditions remained similar to conditions in recent years, with slight changes in conditions related to specific sustainability indicators. WY 2021 is classified as a dry year.

The groundwater data for WY 2021 are summarized below:

- Groundwater elevations decreased slightly during this dry water year, with most wells showing elevations above their minimum thresholds but still below their measurable objectives.
- Groundwater extractions for reporting year 2020 (November 1, 2019, through October 31, 2020) were approximately 2,052 acre-feet (AF). Groundwater extraction reporting is lagged by a year because it is not available until after the annual report submittal.
- There is no seawater intrusion in the Subbasin.
- There were 4 groundwater quality constituents of concern (COC) that exceeded their minimum thresholds for the Division of Drinking Water (DDW) municipal wells in WY 2021. The Irrigated Lands Regulatory Program irrigation or on-farm domestic wells in the Subbasin were not sampled in WY 2021.
- No subsidence was detected in the Subbasin.
- There are no existing shallow monitoring wells in the Subbasin to measure interconnected surface water (ISW). SVBGSA will address this data gap during GSP implementation.

SVBGSA has taken numerous actions to implement the GSP. These include:

- **Coordination and engagement** –SVBGSA worked throughout the year with the Langley Subbasin Planning Committee to develop the Langley Subbasin GSP, submitted to DWR in January 2022. In addition, SVBGSA strengthened its relationship with MCWRA, contracted the Consensus-Building Institute (CBI) to develop a work program for meaningful engagement with underrepresented communities, and continued to regularly engage stakeholders through its Advisory Committee and Board of Directors.

- **Data and monitoring** – selecting 2 data gaps to request a monitoring well through DWR's Technical Support Services and begin discussions with MCWRA on expanding and enhancing the Groundwater Extraction Management System (GEMS).
- **Planning activities –** during WY 2021, SVBGSA continued to draft the Langley Area Subbasin GSP through working with the Langley Area Subbasin Planning Committee. SVBGSA reviewed DWR's recommended corrective action on the water quality undesirable result on the 180/400-Foot Aquifer Subbasin GSP, and addressed it in the Langley Subbasin GSP.
- **Project implementation activities –** SVBGSA, MCWRA, and Monterey County moved forward with actions to begin implementing the GSP, including:
    - Continuing to convene the Seawater Intrusion Working Group.
    - Creating the Deep Aquifer Study Cooperative Funding Partnership and releasing the Request for Qualifications for the Study.
    - Funding expansion of the Seawater Intrusion Model in cooperation with the County of Monterey to cover all potentially seawater intruded areas of the Salinas Valley.

1 INTRODUCTION

1.1 Purpose

The 2014 California Sustainable Groundwater Management Act (SGMA) requires that, following adoption of a Groundwater Sustainability Plan (GSP), Groundwater Sustainability Agencies (GSAs) annually report on the condition of the basin and show that the GSP is being implemented in a manner that will likely achieve the sustainability goal for the basin. This report fulfills that requirement for the Salinas Valley – Langley Area Subbasin (Subbasin).

The sustainability goal of the Langley Subbasin is to manage groundwater resources for long-term community, financial, and environmental benefits to the Subbasin's residents and businesses. The goal of this GSP is to ensure long-term viable water supplies while maintaining the unique cultural, community, and business aspects of the Subbasin. It is the express goal of this GSP to balance the needs of all water users in the Subbasin.

This is the first annual report and includes monitoring data for Water Year (WY) 2020 and 2021, which are from October 1, 2019, to September 30, 2021. This Annual Report includes a description of basin conditions through text, hydrographs, groundwater elevation contour maps, calculated estimates of change in groundwater in storage, and maps of the distribution of groundwater extraction across the Subbasin. It compares WY 2021 data to Sustainability Management Criteria (SMC) as a measure of the Subbasin's groundwater conditions with respect to the sustainability goal that must be reached by the end of 2042.

1.2 Langley Area Subbasin Groundwater Sustainability Plan

In 2017, local GSA-eligible entities formed the Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) to develop and implement the GSPs for the Salinas Valley. SVBGSA is a Joint Powers Authority (JPA) with membership comprising the County of Monterey, Monterey County Water Resources Agency (MCWRA), City of Salinas, City of Soledad, City of Gonzales, City of King, Castroville Community Services District, and Monterey One Water.

SVBGSA developed the GSP for the Langley Area Subbasin, identified as California Department of Water Resources (DWR) subbasin 3-004.09. SVBGSA has exclusive jurisdiction of the Langley Subbasin. DWR has designated the Langley Subbasin as a medium priority basin, which indicates that continuation of present water management practices would probably result in significant adverse impacts.

SVBGSA developed the GSP for the Langley Area Subbasin in concert with the 5 other Salinas Valley Subbasin GSPs that fall partially or entirely under its jurisdiction: the 180/400-Foot Aquifer Subbasin (DWR subbasin 3-004.01), the Eastside Aquifer Subbasin

(DWR subbasin 3-004.02) the Forebay Aquifer Subbasin (DWR subbasin 3-004.04), the Upper Valley Aquifer Subbasin (DWR subbasin 3-004.05), and the Monterey Subbasin (DWR subbasin 3-004.10). This Annual Report covers all the 17,600 acres of the Langley Area Subbasin, as shown on Figure 1.

1.3 Organization of This Report

This Annual Report corresponds to the requirements of GSP Regulations § 356.2. The Report first outlines the subbasin conditions, including several components of the Regulations: groundwater elevations, groundwater extractions, surface water use, total water use, and change in groundwater storage. The Report then addresses GSP implementation by reporting on actions taken to implement the Plan, and progress toward interim milestones.

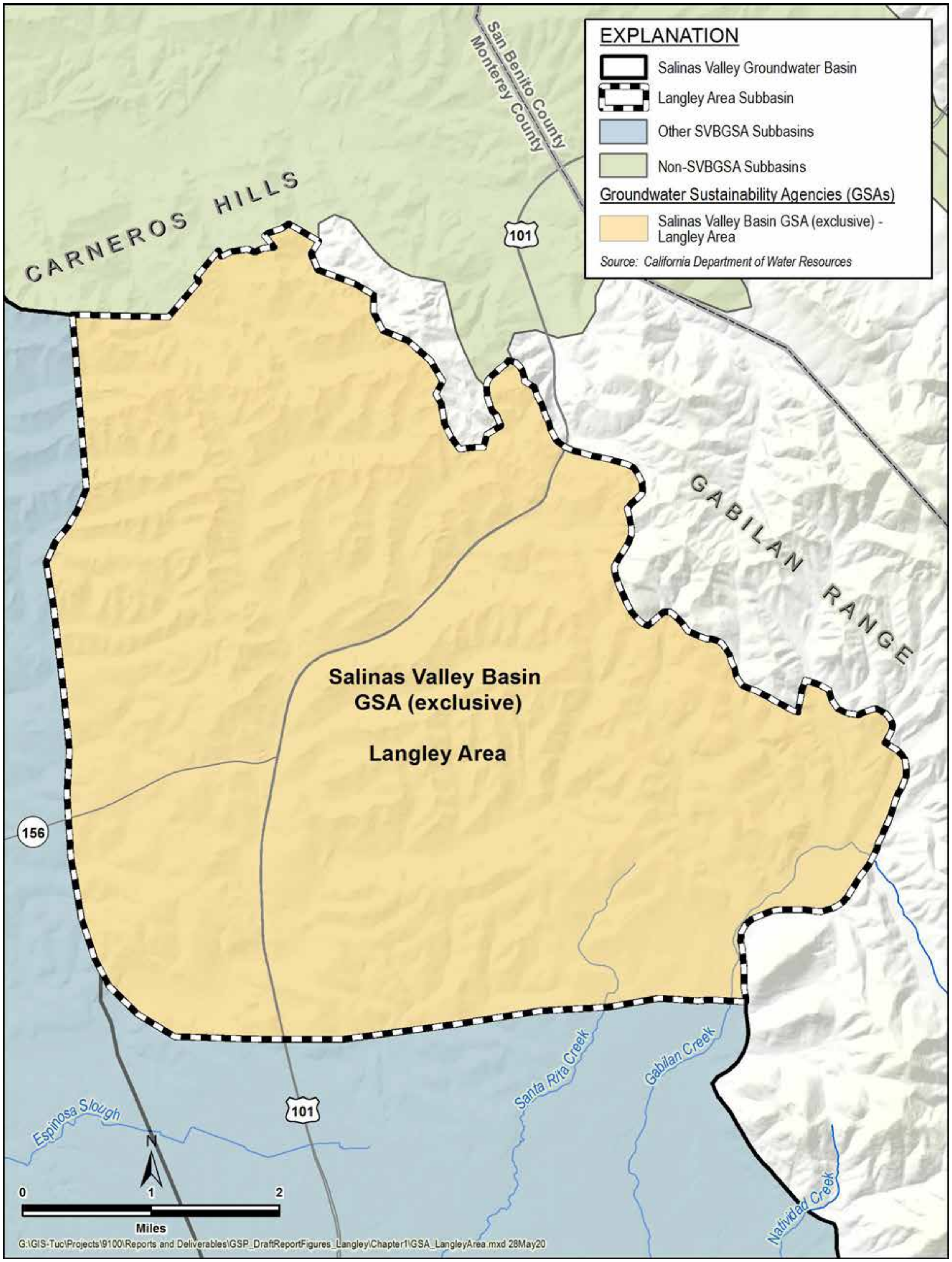

Figure 1. Langley Area Subbasin

2 SUBBASIN SETTING

The Langley Area Subbasin is located in northeastern corner of Monterey County, east of the Gabilan Range and south of the Elkhorn Slough. The Langley Subbasin primarily contains small communities, but no incorporated communities; Prunedale is the largest community in the Subbasin. The primary water use sector is rural residential. There is also some agriculture along the southern boundary of the Subbasin. The geology of the Langley Subbasin is dominated by alluvial fans and sedimentary deposits that form low hills. Surface-water drainages deposited a series of small, interconnected alluvial fans that extend from the Gabilan Range in the northeast to the fluvial deposits that define the boundary with the 180/400-Foot Aquifer Subbasin to the west. The southern boundary with the Eastside Subbasin generally coincides with the boundary of the Aromas Red Sands, which are indicative of the Langley Subbasin (DWR, 2004). Although the Langley Subbasin is not on the valley floor, there are no reported hydraulic barriers separating it from the 180/400-Foot and Eastside Aquifer Subbasins. The eastern boundary of the Subbasin is the contact between the unconsolidated sediments and the Gabilan Range that consists mostly of granitic rocks. To the north, the Langley Subbasin is bounded by the drainage divide with the Pajaro Valley Groundwater Basin that follows the course of a Salinas River paleo-drainage. This abandoned river valley cuts through the Aromas Red Sands and is filled in with fine sediments that may act as a barrier to flow between the 2 groundwater basins (Schwartz, 1983).

2.1 Principal Aquifers and Aquitards

The unconfined sands and gravels of the Aromas Red Sands are the primary water-bearing geologic formation in the Subbasin’s sole principal aquifer. Near the Gabilan Range, some wells are completed in the weathered surface of the granite, fresh granite, or other consolidated formations (Fugro West, Inc., 1995). However, the granite is not a principal aquifer because it does not convey significant and economic quantities of water and the water encountered in the fractured granite is not consistent or reliable since it is drawn from fractures.

2.2 Natural Groundwater Recharge and Discharge

Groundwater can leave the aquifers where surface water and groundwater are interconnected. There are potential locations of interconnected surface water (ISW) and groundwater along the Gabilan Creek and a couple other areas in the Subbasin. In these areas groundwater dependent ecosystems may depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface and may discharge groundwater through evapotranspiration. Natural groundwater recharge occurs through deep percolation of surface water deep percolation of excess applied irrigation water, and deep percolation of precipitation.

2.3 Precipitation and Water Year Type

Precipitation that falls within the Subbasin contributes to runoff and percolation components of the water budget. The precipitation gage at the Salinas Airport (National Oceanographic and Atmospheric Administration Station USW00023233) recorded 9.18 inches of rainfall in WY 2020 and 5.79 inches in WY 2021. For comparison, the average rainfall from WY 1980 to WY 2021 at this gage is 11.98 inches of precipitation.

SVBGSA adopted the methodology used by MCWRA for determining the Subbasin's water year type. MCWRA assigns a water year type of either dry, dry-normal, normal, wet-normal, or wet based on an indexing of annual mean flows at the USGS stream gage on the Arroyo Seco near Soledad (USGS Gage 11152000) (MCWRA, 2005). Using the MCWRA method, WY 2020 was a dry-normal year and WY 2021 was a dry year.

3 2021 DATA AND SUBBASIN CONDITIONS

This section details the Subbasin conditions and WY 2021 data. Where WY 2021 data are not available, it includes the most recent data available. SVBGSA stores monitoring date in a data management system. Monitoring data are included in this Annual Report and are submitted to DWR.

3.1 Water Supply and Use

Within the Subbasin, water is used for rural residential, agricultural, urban, industrial use, and wetlands and native vegetation. Most of the water in the Subbasin is used for rural residential use. Only a relatively small amount of water is used by wetlands and native vegetation.

The water supply in the Langley Subbasin predominantly consists of groundwater. A small amount of surface water is diverted from the Salinas River's tributaries. No recycled water is used in the Subbasin.

3.1.1 Groundwater Extraction

Urban and agricultural groundwater extractions were compiled using MCWRA's Groundwater Extraction Management System (GEMS), which collects data from groundwater wells with an internal discharge pipe diameter greater than 3 inches within Zones 2, 2A, and 2B. However, these zones only cover a small part of the Subbasin, thus, the urban pumping data was supplemented with pumping data collected by State Water Resources Control Board (SWRCB) for public drinking water systems. Agriculture mainly occurs in the area of the Subbasin that overlaps with Zones 2, 2A, and 2B, therefore, GEMS provides adequate coverage of agricultural pumping. Rural domestic pumping in the Langley Subbasin is estimated by applying a constant rate of 0.3 acre-feet per year (AF/yr.) to all non-vacant residential use parcels that are not located in the service area of a public drinking water system. A value of 0.3 AF/yr. per dwelling was associated with lots similar to the median parcel size of 1.25 acres and was selected as the representative annual rate for domestic pumping. Based on a review of available data, there are approximately 2,016 non-vacant residential use parcels units located outside the service areas of public drinking water systems in the Subbasin.

Data from WY 2020 are reported in this Annual Report because WY 2021 groundwater extraction data were not available from GEMS in time to include in this report. The reporting period and submittal deadlines for GEMS data are defined by MCWRA Ordinance No. 3717 and 3718, and do not align with the GSP Annual Report deadline; therefore, groundwater extraction reported in Annual Reports will lag by 1 year until the Ordinances are updated. The GSP identifies GEMS expansion and enhancement as a priority to make groundwater extraction data more complete, accurate, and accessible. As noted in section 4.1.2, SVBGSA and MCWRA have begun conversations on this effort. Likewise, SCWRB pumping data will lag by a year because the reporting period does not begin until March of the following year.

Table 1 presents groundwater extractions by water use sector, including the method of measurement and accuracy of measurement for GEMS pumping in the Langley Area Subbasin. Urban use data from MCWRA aggregates municipal wells, small public water systems, and industrial wells. Pumping data from SWRCB do not include specific measurement method or accuracy but do include whether groundwater use for water systems was metered; 35 of the 48 public drinking water systems that reported 2020 pumping to the SWRCB were metered. Agricultural use accounted for 7% of groundwater extraction in 2020; urban and industrial use accounted for 63%; rural domestic use accounted for 29%. It is important to note that agricultural pumping is reported by MCWRA for the period November 1 through October 31, whereas urban pumping is reported on a calendar year basis. Rural domestic pumping is estimated on a calendar year basis. No groundwater was extracted for managed wetlands or managed recharge. Groundwater use by natural vegetation is assumed to be small and was not estimated for this report. Figure 2 color codes the general location and volume of groundwater extractions in the Subbasin. Urban pumping is represented by the boundaries of the public water systems and the agricultural pumping is represented by circles.

Table 1. 2020 Groundwater Extraction by Water Use Sector (AF/yr.)

<table>
<tr><th>Water Use Sector</th><th>Groundwater Extraction</th><th>Method of Measurement</th><th>Accuracy of Measurement</th></tr>
<tr><td>Rural Domestic Wells</td><td>600</td><td>Estimated by applying a constant rate of 0.3 AF/yr. to all non-vacant residential use parcels.</td><td>Water usage for parcels outside of public drinking water systems ranged from 0.26 to 0.51 AF/yr./dwelling.</td></tr>
<tr><td>Urban</td><td>1,300</td><td rowspan="2">MCWRA's Groundwater Reporting Program allows 3 different reporting methods: water flowmeter, electrical meter, or hour meter. For 2020, 83% of extractions were calculated using a flowmeter, 16% electrical meter and 1%-hour meter.</td><td rowspan="2">MCWRA ordinances 3717 and 3718 require annual flowmeter calibration, and that flowmeters be accurate to within +/- 5%. The same ordinance requires annual pump efficiency tests. SVBGSA assumes an electrical meter accuracy of +/- 5%.</td></tr>
<tr><td>Agricultural</td><td>150</td></tr>
<tr><td>Managed Wetlands</td><td>0</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Managed Recharge</td><td>0</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Natural Vegetation</td><td>0</td><td>De-minimis and not estimated.</td><td>Unknown</td></tr>
<tr><td>Total</td><td>2,050</td><td></td><td></td></tr>
</table>

Note: Agricultural pumping is reported on a MCWRA reporting year basis whereas urban is reported in calendar-year basis. Rural domestic pumping is estimated on a calendar year basis. N/A = Not Applicable.

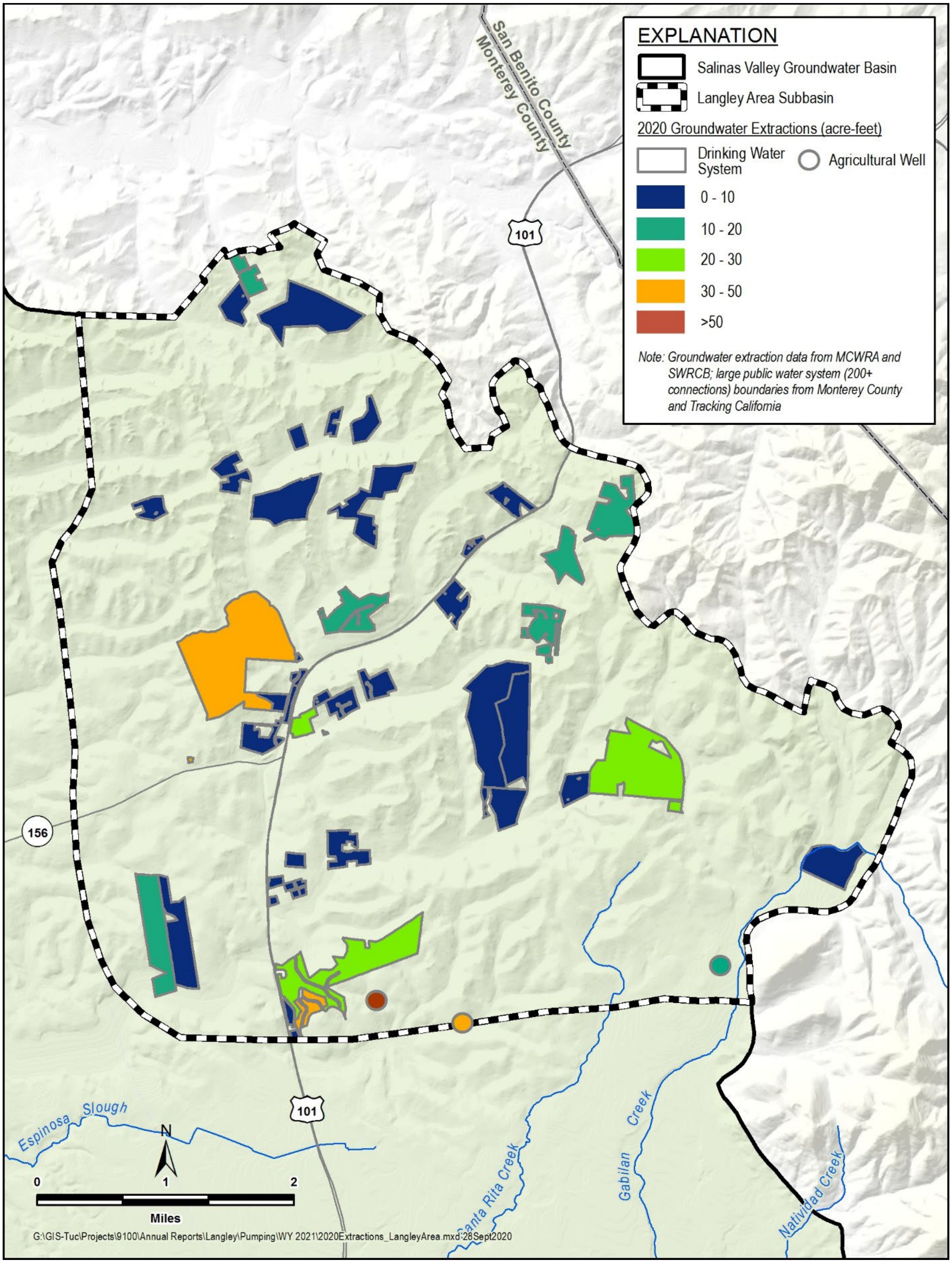

Figure 2. General Location and Volume of Groundwater Extractions

3.1.2 Surface Water Supply

Salinas River diversion data were obtained from the SWRCB Electronic Water Rights Information Management System (eWRIMS) website. These data are reported on an annual basis and are also lagged by 1 year because the reporting period does not begin until February of the following year. Thus, data for WY 2021 were incomplete at the time of this Annual Report. Diversions from the Salinas River were reported to be approximately 2 AF/yr. in WY 2020. The total surface water use for the Subbasin includes all the eWRIMS reported diversions; this accounting is done to calculate the total water use and is not meant to imply that SVBGSA classifies any or all of the reported diversions as surface water. All surface water is used for irrigation.

3.1.3 Total Water Use

Total water use is the sum of groundwater extractions and surface water use and is summarized in Table 2. Total water use was 2,502 AF/yr. in WY 2020.

Many growers and residents have noted that some irrigation is reported both to the SWRCB as Salinas River diversions and to MCWRA as groundwater pumping in other Salinas Valley Groundwater Subbasins. Comparing surface water diversion data to groundwater pumping data is complicated by the fact that diversions and pumping are reported on different schedules. However, an initial analysis indicates that this potential double-counting does not occur in the Langley Subbasin.

Table 2. Total Water Use by Water Use Sector in WY 2020

Water Use Sector	Groundwater Extraction	Surface Water Use	Recycled Water	Method of Measurement	Accuracy of Measurement
Rural Domestic	600	0	0	Estimated	N/A
Urban	1,300	0	0	Direct	Estimated to be +/- 5%.
Agricultural	100	2	0	Direct	Estimated to be +/- 5%.
Managed Wetlands	0	0	0	N/A	N/A
Managed Recharge	0	0	0	N/A	N/A
Natural Vegetation	Unknown	Unknown	Unknown	N/A	N/A
SUBTOTALS	2,050	2	0		
TOTAL		2,502			

Note: Agricultural pumping is reported on the MCWRA reporting year basis whereas urban is reported in calendar-year basis. N/A = Not Applicable.

3.2 Groundwater Elevations

The current groundwater elevation monitoring network in the Langley Area Subbasin contains 16 wells. All 16 wells are representative monitoring sites (RMS) and monitored by MCWRA. Locations of groundwater elevation representative monitoring network wells within the Subbasin are shown on Figure 3.

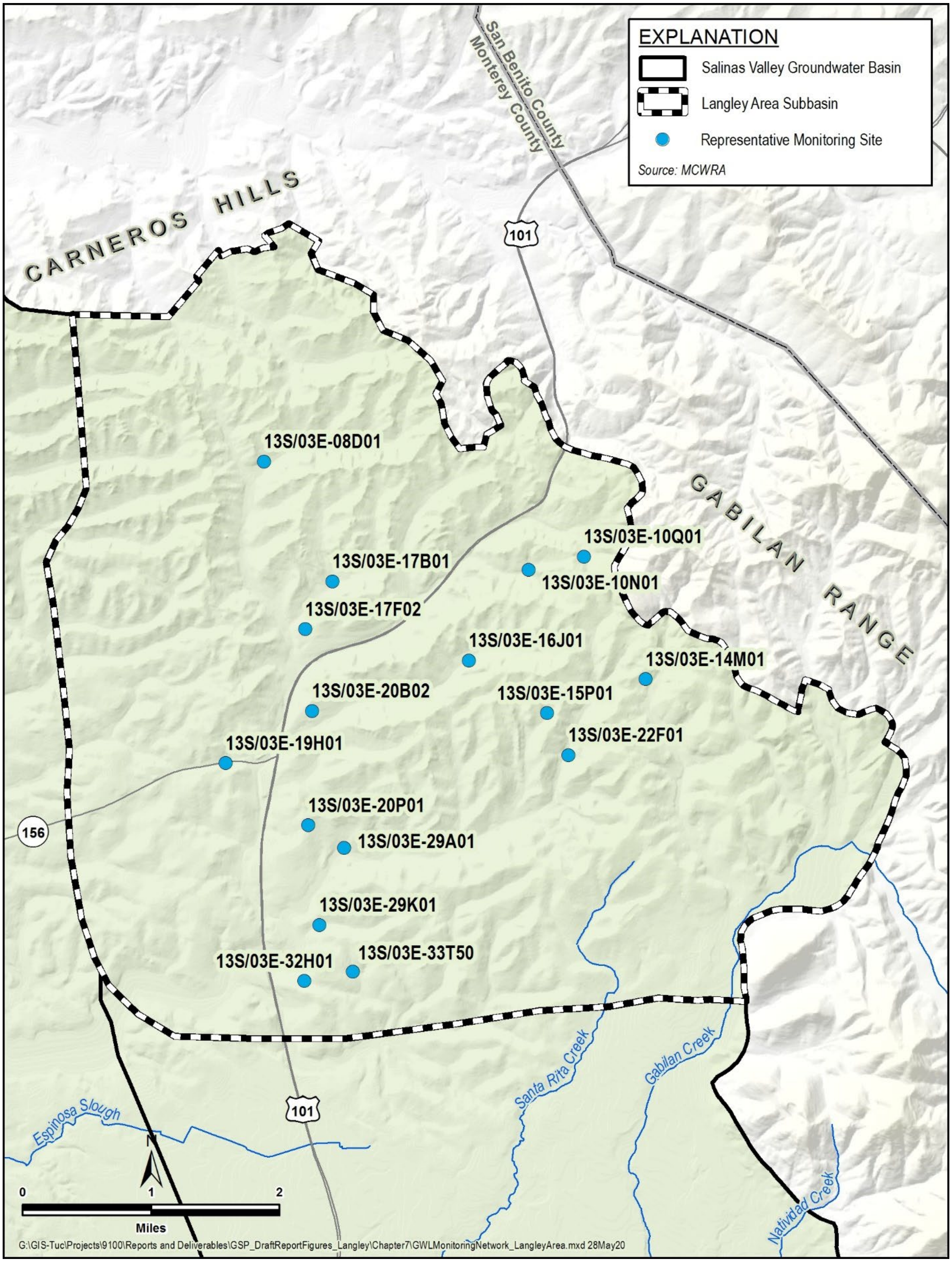

Figure 3. Locations of Representative Groundwater Elevation Monitoring Sites

Fall 2021 groundwater elevation data are presented in Table 3. The fall 2020 groundwater elevations are also included in Table 3 to provide all data since GSP submittal. In accordance with the GSP, this report uses groundwater elevations measured in the fall in order to approximate neutral groundwater conditions that are not heavily influenced by either summer irrigation pumping or winter rainfall recharge. The groundwater elevations are also used to compare to SMC, as described in Section 4.2.1. Fall groundwater elevation measurements are made from November to December and they are used to produce groundwater elevation contours. These fall contours are further discussed in Section 3.2.1.

Table 3. Groundwater Elevation Data

Monitoring Site	WY 2020 Elevation Data (ft)	WY 2021 Elevation Data (ft)
13S/03E-08D01	172.8	172.3
13S/03E-10N01	278.3	278.1
13S/03E-10Q01	438.8	438.6
13S/03E-14M01	352.9	352.9
13S/03E-15P01	80.9*	80.9*
13S/03E-16J01	46.2	46.5
13S/03E-17B01	162.3	161.8
13S/03E-17F02	-38.7	-39.9
13S/03E-19H01	1.8	2.0
13S/03E-20B02	104.3	103.3
13S/03E-20P01	76.7*	76.7*
13S/03E-22F01	82.9	79.0
13S/03E-29A01	-56.5	-59.1
13S/03E-29K01	64.4	61.4
13S/03E-32H01	-45.0	-41.0
13S/03E-33T50	-49.5	-49.5

*Groundwater elevation was estimated.

During GSP implementation, SVBGSA is working to fill data gaps with additional wells to include in the monitoring network.

3.2.1 Groundwater Elevation Contours

MCWRA annually produces groundwater elevation contour maps for the Salinas Valley Groundwater Basin using data from their annual August trough and fall measurement programs. However, because these contours do not extend into the Langley Subbasin, SVBGSA uses MCWRA's groundwater elevation point data to develop contour maps. The August contours represent seasonal low conditions and the fall contours represent seasonal high conditions. The true seasonal high usually occurs between January and March (MCWRA, 2015); however, the

GSP adopts fall groundwater elevations as the seasonal high because GSP monitoring is based on MCWRA's existing monitoring networks that annually monitors groundwater elevations in the fall. SVBGSA used MCWRA's fall 2021 data to develop groundwater elevation contours for the seasonal high. The groundwater elevation contours only cover the portions of the Subbasin monitored by MCWRA. There were no August groundwater elevation measurements taken in Langley in WY 2021; thus, contours were not developed for the seasonal low. The monitoring frequency in the Langley Subbasin is a data gap that will be addressed during GSP implementation.

Groundwater elevation contours for seasonal high groundwater conditions in the Langley Area are shown on Figure 4. Groundwater generally flows from the north-northeast toward the south-southwest corner of the Subbasin. Under current conditions, groundwater elevations in the southwestern half of the Subbasin are generally below sea level, estimated as zero feet NAVD88, as indicated by the negative values on the contour lines. The lowest groundwater elevations in the Subbasin occur near the center of the Subbasin with minimum groundwater elevations of approximately -60 feet NAVD88 during the fall measurements. These low groundwater elevations are related to a depression in groundwater elevations near the center of the Subbasin, similar to the fall 2019 groundwater elevation contours in Section 5.1.2 of the Langley Subbasin GSP. These groundwater elevation contours are based on limited data.

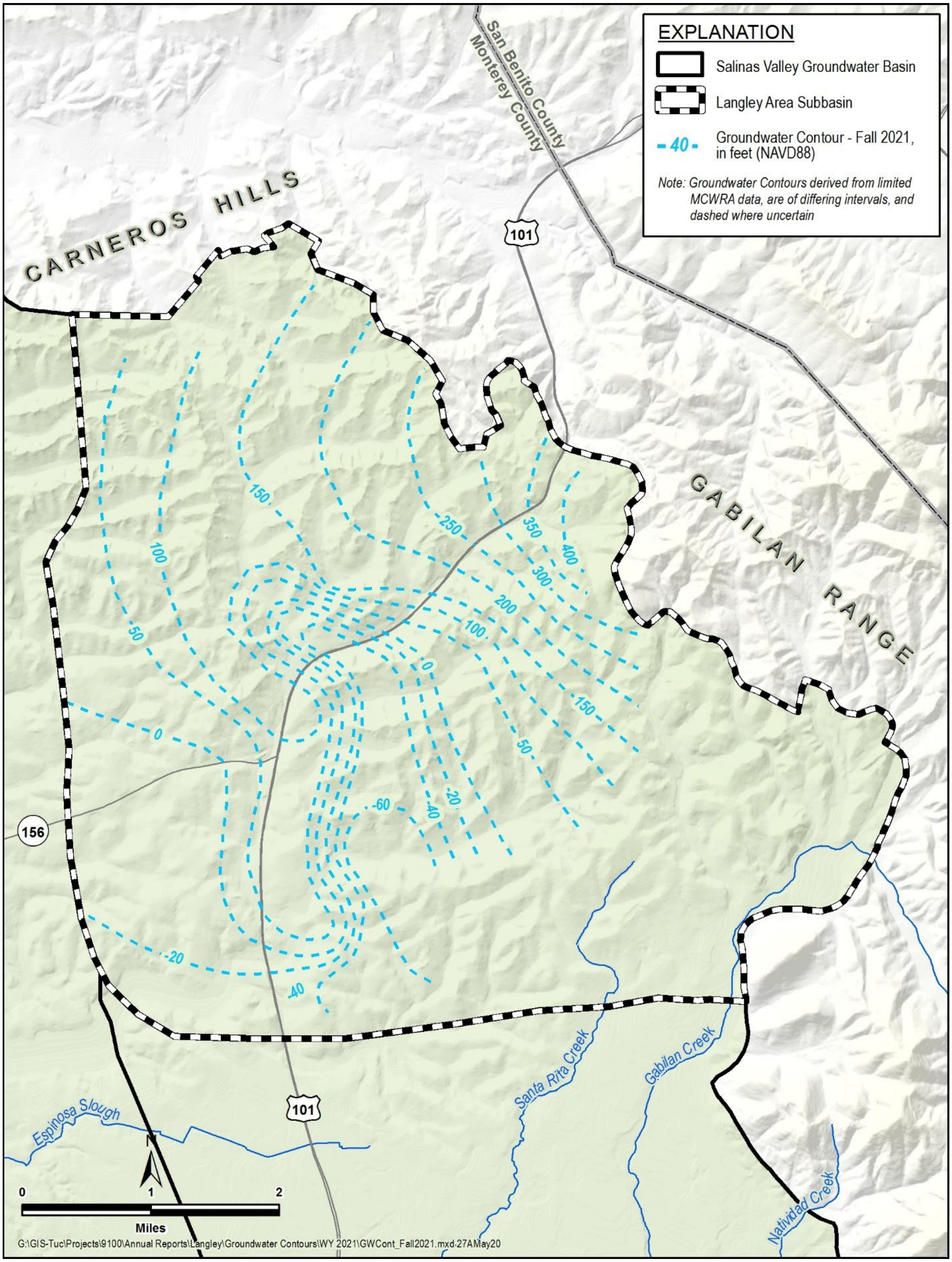

Figure 4. Seasonal High Groundwater Elevation Contour Map for the Langley Area

3.2.2 Groundwater Elevation Hydrographs

Temporal trends in groundwater elevations can be assessed with hydrographs that plot changes in groundwater elevations over time. Hydrographs for selected monitoring wells within the principal aquifer of the Langley Subbasin are shown on Figure 5. These hydrographs were selected to show characteristic trends in groundwater elevation in the aquifer. The hydrographs indicate that, since 2019, groundwater elevations in the principal aquifer have declined in some parts of the Subbasin and remained generally stable in other parts. Hydrographs for all RMS are included in Appendix A.

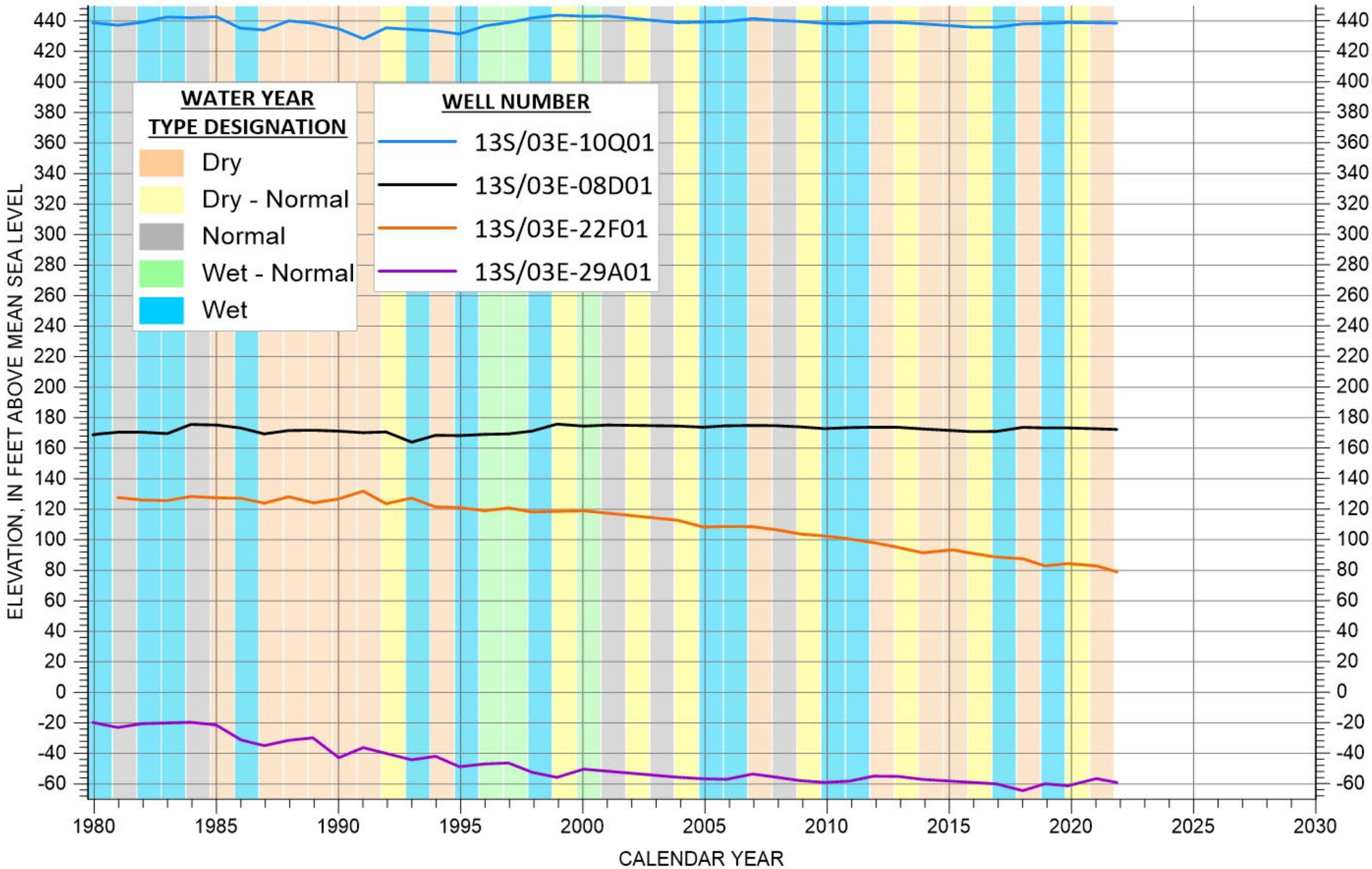

Figure 5. Groundwater Elevation Hydrographs for Selected Monitoring Wells

3.3 Seawater Intrusion

Seawater intrusion does not occur in the Langley Subbasin; however, seawater intrusion does occur in the 180/400-Foot Aquifer and Monterey Subbasins. Figure 6 shows the seawater intrusion contours for the 180-Foot Aquifer that MCWRA annually prepares for the adjacent 180/400-Foot Aquifer Subbasin. Seawater intrusion in the 400-Foot Aquifer did increase in WY 2021 but it extends across a smaller area than in the 180-Foot Aquifer and at a distance farther away from the Langley Subbasin. MCWRA seawater intrusion contours for the Monterey Subbasin are not included on Figure 6 because they are likely less accurate due to lack of monitoring in the Monterey Subbasin. The extent of seawater intrusion is based on the 500 milligram per liter (mg/L) chloride isocontour. Seawater intrusion in the 180-Foot Aquifer did not increase from WY 2020 to WY 2021.

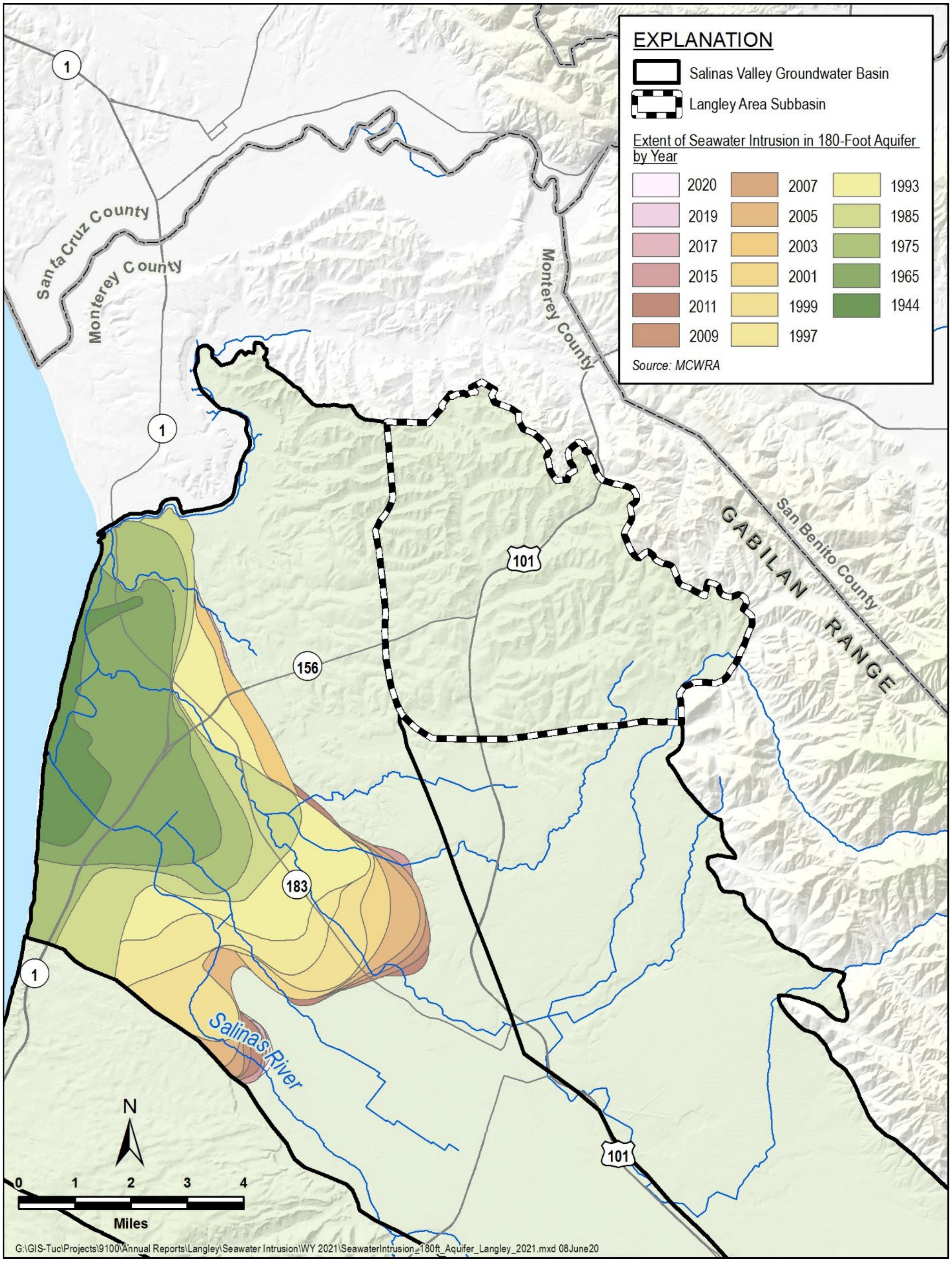

Figure 6. 2020 Seawater Intrusion Contours for the 180-Foot Aquifer

3.4 Change in Groundwater Storage

The Langley Subbasin GSP adopted the concept of change in usable groundwater storage, defined as the annual average increase or decrease in volume of groundwater that can be safely used for municipal, industrial, or agricultural purposes.

The change in storage calculation for the 2 years since GSP submittal was calculated using groundwater elevation contours produced by SVBGSA using data from MCWRA for fall 2019 and fall 2021. MCWRA uses groundwater elevations from November to December to produce their contours. Fall measurements occur at the end of the irrigation season and before groundwater levels increase due to seasonal recharge by winter rains. These measurements record annual changes in storage reflective of groundwater recharge and withdrawals in the Subbasin.

Average annual change in groundwater elevations in the Langley Area Subbasin from WY 2019 to WY 2021 was estimated by subtracting the fall 2019 groundwater elevations shown on Figure 7 from the fall 2021 groundwater elevations (Figure 4). This change was then multiplied by the storage coefficient for the Langley Area. MCWRA's *State of the Basin Report* approximates the storage coefficient to 0.08 for the Eastside Subarea, which covers most of the Langley Subbasin (Brown and Caldwell, 2015). The resulting change in storage represents change over the 2-year period; this value is divided by 2 for the average annual change. The estimated change in storage due to groundwater elevation changes in the Langley Area is depicted in AF per acre on Figure 8. Since the groundwater elevation contours do not extend across the entire Subbasin, the storage change was not calculated in the areas that were not contoured, as indicated by the areas without color on Figure 8.

A summary of components used for estimating change in groundwater storage due to groundwater elevation changes is shown in Table 4. Annual groundwater storage changes due to changes in groundwater elevation from fall 2019 to fall 2021 decreased at an annual average rate of 350 AF/yr. in the Langley Area. The negative signs in Table 4 indicate decline in groundwater levels or loss in storage.

Table 4. Parameters Used for Estimating Change in Groundwater Storage

Component	Values
Area of contoured portion of Subbasin minus seawater intrusion area (acres)	13,800
Storage coefficient	0.08
Average change in groundwater elevation from fall 2019 to fall 2021 (feet)	-0.66
Change in groundwater storage from fall 2019 to fall 2021 (AF)	-700
Total annual change in groundwater storage (AF/yr.)	-350

Note: Negative values indicate loss, positive values indicate gain.

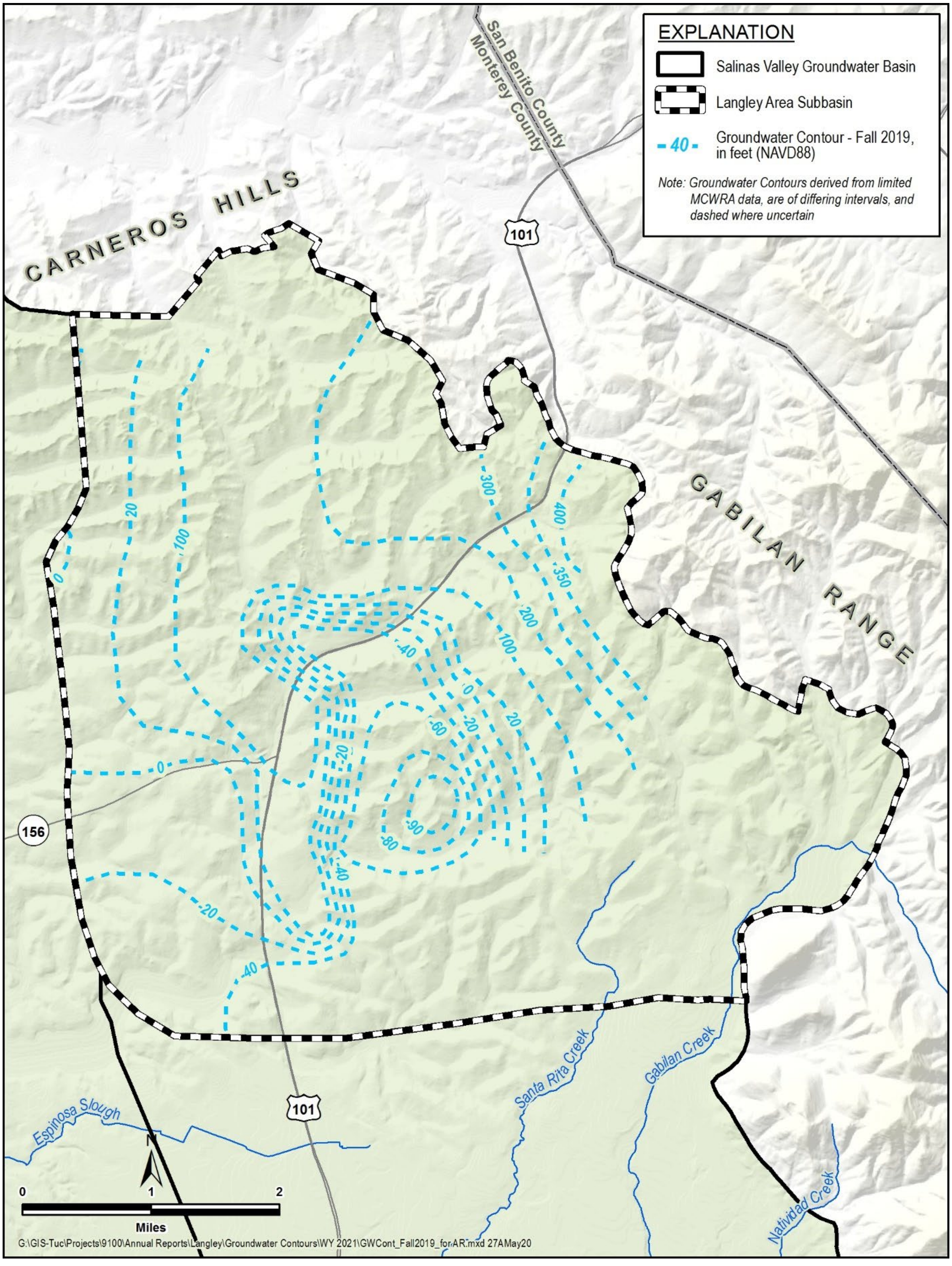

Figure 7. Fall 2019 Groundwater Elevation Contour Map for the Langley Area

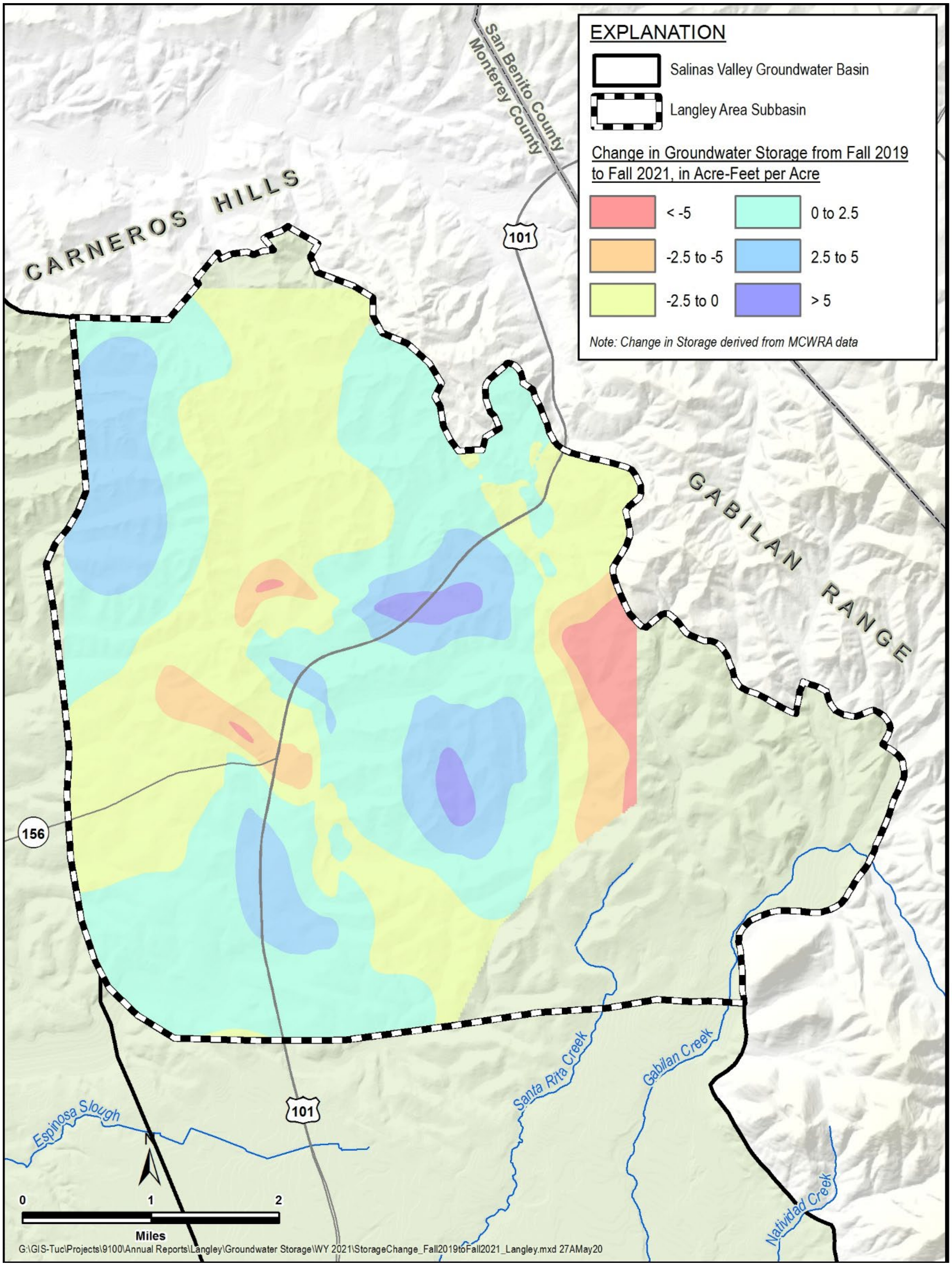

Figure 8. Average Annual Change in Groundwater Storage Between WY 2020 and WY 2021 in the Langley Area

Annual and cumulative changes in groundwater storage based on Subbasin-wide average groundwater elevation changes are plotted on Figure 9. This figure also includes groundwater extraction from 1995 to 2020 (the most current available data), and water year type data. The annual change in storage line shows the change in storage from the previous year. The 1995 change in storage value is based on change in storage from 1994. The cumulative storage change line measures change since 1944 (e.g., zero is the amount of groundwater in storage in 1944).

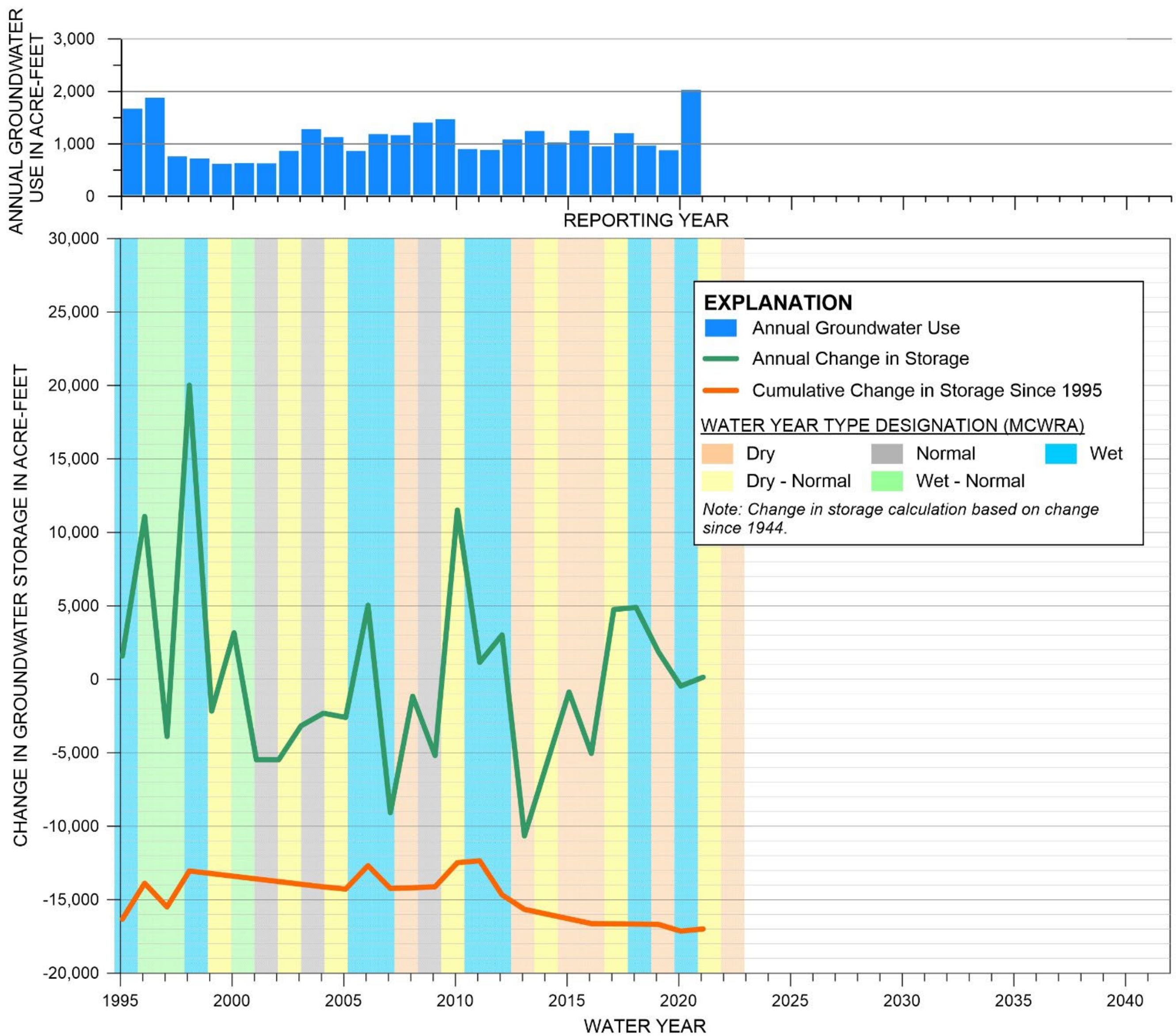

Figure 9. Groundwater Use and Annual and Cumulative Change in Groundwater Storage

3.5 Groundwater Quality

Degradation of groundwater quality is measured in public water system supply wells using data from the SWRCB Division of Drinking Water (DDW). Under the Irrigated Lands Regulatory Program (ILRP), water quality degradation is monitored for on-farm domestic wells and agricultural supply (irrigation) wells. Water quality data for both programs can be found on SWRCB's GAMA Groundwater Information System. The constituents of concern (COC) for municipal public water system supply wells and domestic wells have a Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL) established by the State's Title 22 Regulations. The COCs for agricultural supply wells include those that may lead to reduced crop production and are outlined in the Central Coast Regional Water Quality Control Board's Basin Plan (2019). As discussed in the GSP, each set of wells has its own COCs.
Table 5 and Figure 10 show the number of wells that were sampled and that have exceeded the regulatory standard in WY 2021 for the COCs in the Langley Subbasin listed in the GSP. The COCs that have exceeded the regulatory limit in WY 2021 include arsenic, iron, manganese, and nitrate.

Table 5. WY 2021 Groundwater Quality Data

Constituents of Concern (COC)	Regulatory Exceedance Standard	Standard Units	Number of Wells Sampled for COC in WY 2021	Number of Wells Exceeding Regulatory Standard in WY 2021
DDW Wells				
1,2-Dibromo-3-chloropropane	0.2	UG/L	0	0
1,2,3-Trichloropropane (1,2,3 TCP)	0.005	UG/L	10	0
1,2,4-Trichlorobenzene (1,2,4 TCB)	4	UG/L	2	0
Arsenic	10	UG/L	21	5
Benzo(a)pyrene	0.2	MG/L	6	0
Chloride	500	MG/L	5	0
Di(2-ethylhexyl)phthalate (DEHP)	4	UG/L	6	0
Dinoseb	7	UG/L	8	0
Heptachlor	0.01	UG/L	0	0
Hexachlorobenzene (HCB)	1	UG/L	1	0
Iron	300	UG/L	13	5
Manganese	50	UG/L	14	6
MTBE (Methyl-tert-butyl ether)	13	UG/L	2	0
Nitrate (as nitrogen)	10	MG/L	54	9
Specific Conductance	1600	UMHOS/CM	6	0
Total Dissolved Solids	1000	MG/L	5	0
Vinyl Chloride	0.5	UG/L	2	0
ILRP On-Farm Domestic Wells				
Iron	0.3	MG/L	0	0
Manganese	0.05	MG/L	0	0
ILRP Irrigation Supply Wells				
Manganese	0.2	MG/L	0	0

Note: MG/L= milligram/Liter, UG/L = micrograms/Liter, UMHOS/CM = micromhos/centimeter

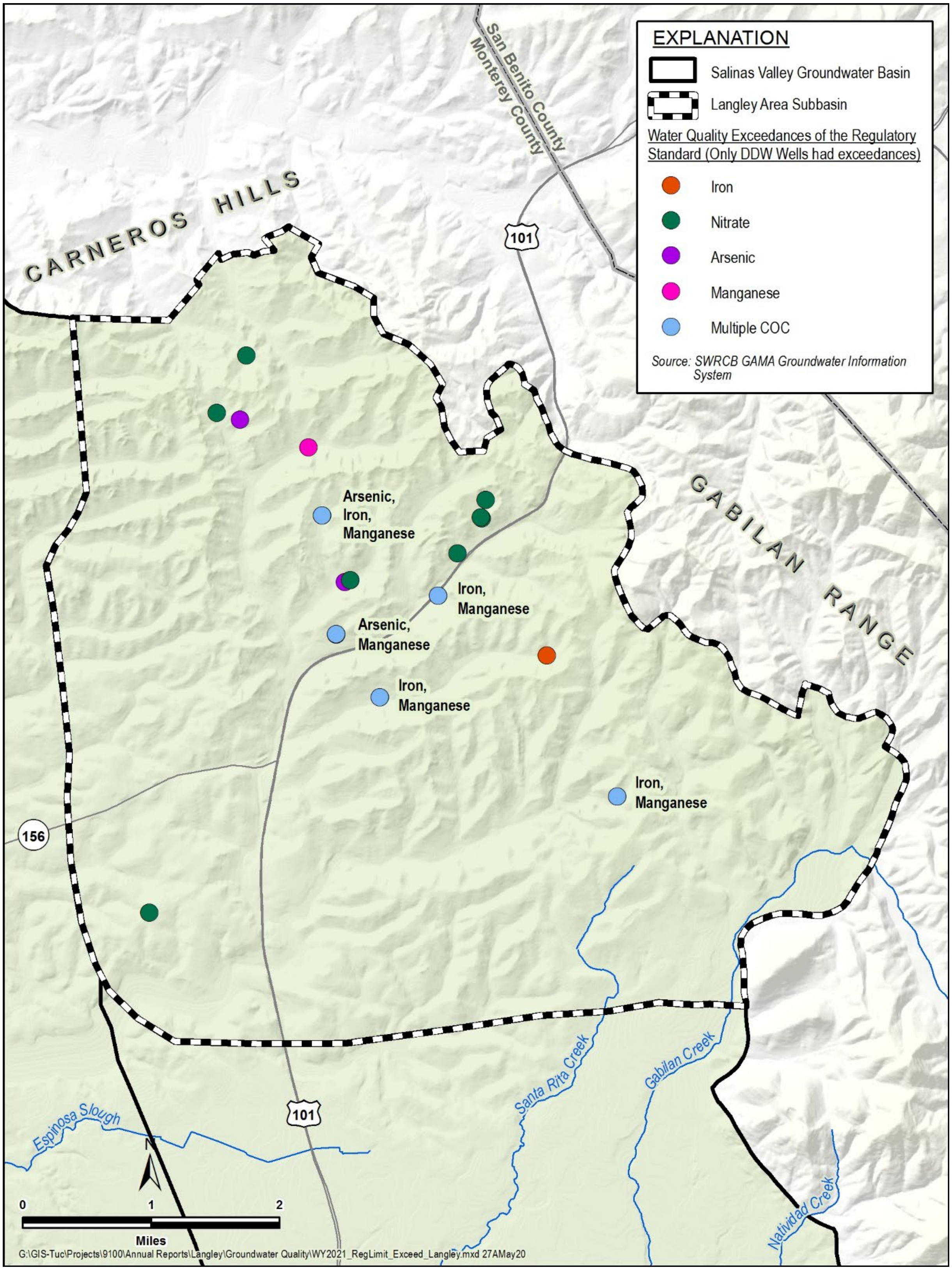

Figure 10. Wells with an Exceedance of the Regulatory Standard in WY 2021

3.6 Subsidence

Subsidence is measured using Interferometric Synthetic-Aperture Radar (InSAR) data. These data are provided by DWR on the SGMA data viewer portal (DWR, 2021). Figure 11 shows the annual subsidence for the Langley Area Subbasin from October 2020 to October 2021. Data continue to show negligible subsidence. All land movement was within the estimated error of measurement of +/- 0.1 foot.

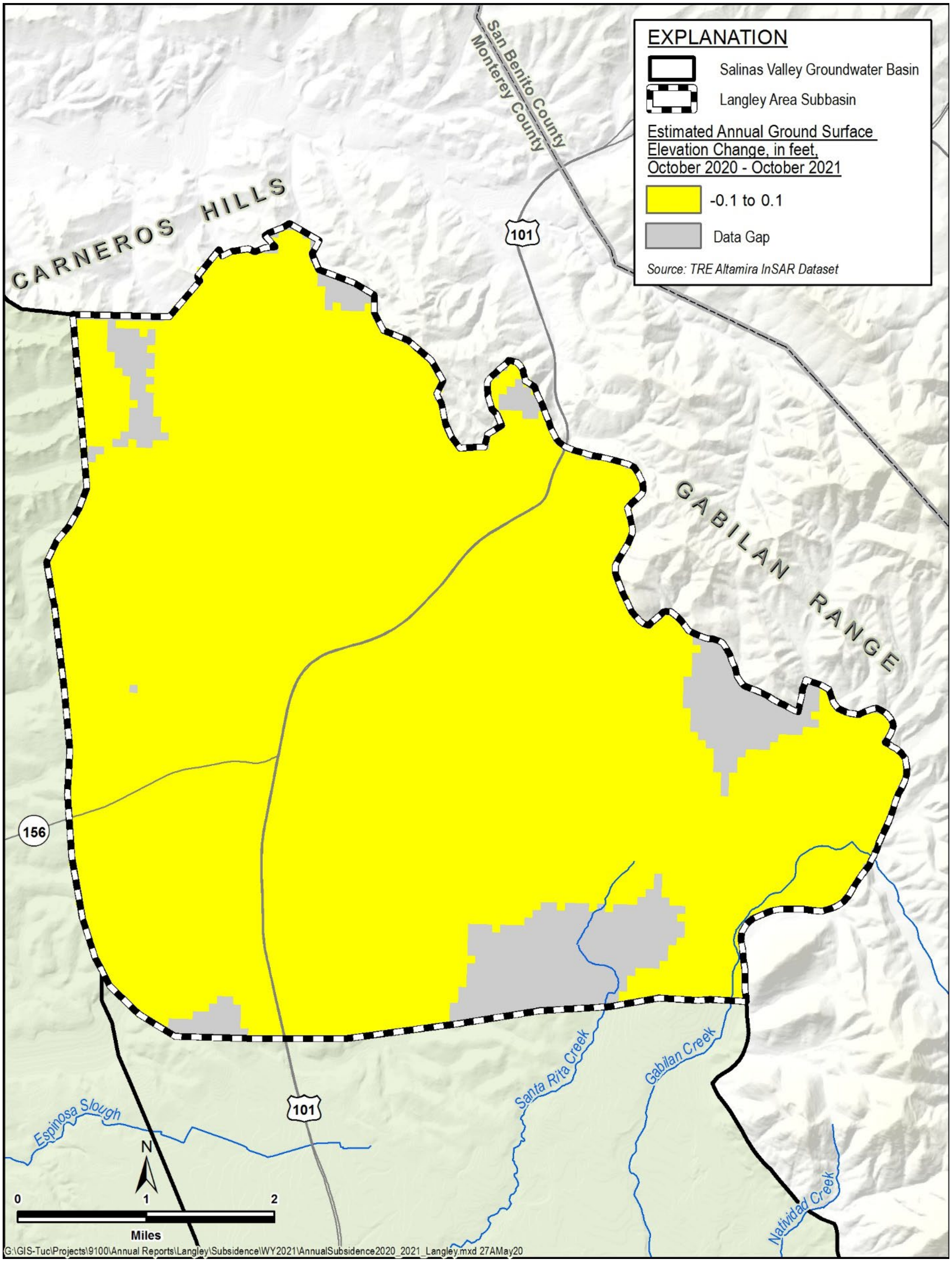

Figure 11. Annual Subsidence

3.7 Depletion of Interconnected Surface Water

As described in Section 4.4.5.1 of the GSP, there are locations of ISW along Gabilan Creek in the Langley Subbasin. SVBGSA is planning on installing a new shallow well along Gabilan Creek in the Eastside Aquifer Subbasin to monitor nearby ISW in the Langley Subbasin and to monitor any future interconnection that could occur within the Eastside Subbasin.

Depletion of ISW along the Salinas River due to groundwater pumping was estimated using the Salinas Valley Integrated Hydrologic Model (SVIHM[1]), as described in Section 5.5.2 of the GSP. Average annual depletion of ISW along surface water bodies in the Subbasin is estimated to be 800 AF/yr.

[1] These data (model and/or model results) are preliminary or provisional and are subject to revision. This model and model results are being provided to meet the need for timely best science. The model has not received final approval by the U.S. Geological Survey (USGS). No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the model and related material nor shall the fact of release constitute any such warranty. The model is provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the model.

4 ANNUAL PROGRESS TOWARDS IMPLEMENTATION OF THE GSP

4.1 WY 2021 Groundwater Management Activities

This section details groundwater management activities that have occurred in WY 2021, independent of GSP implementation. These include activities of SVBGSA and MCWRA that promote groundwater sustainability and are important for reaching the GSP sustainability goal.

In WY 2021, SVBGSA and MCWRA undertook additional activities. Activities are separated into 4 main categories: coordination and engagement, data and monitoring, planning, and project and implementation activities.

4.1.1 Coordination and Engagement

SVBGSA continued robust stakeholder engagement and strengthened collaboration with key agencies and partners. SVBGSA worked throughout the year with the Langley Area Subbasin Planning Committee to develop the Langley Subbasin GSP, submitted to DWR in January 2022.

SVBGSA also identified the need for an Integrated Implementation Committee to guide development of an Integrated Implementation Plan for 6 Subbasins within the Salinas Valley. The Integrated Implementation Committee will provide input on basin wide and regional projects and management actions and resolve neighboring basin concerns. The intent of the Committee is to ensure the Salinas Valley Basin is on a cohesive path to sustainability. Over the course of WY 2021, SVBGSA held 12 Valley-wide Board meetings and 11 Valley-wide Advisory Committee Meetings.

SVBGSA and MCWRA also increased coordination and collaboration through weekly meetings between agency leads and consultants. This resulted in increased awareness of each other's activities, objectives, and challenges. MCWRA and SVBGSA have scoped the roles of the 2 agencies and are developing a Memorandum of Understanding (MOU) to be reviewed by each agency Board. The MOU will further outline how the 2 agencies will coordinate through the implementation of the GSPs.

SVBGSA conducted meetings throughout the year to reach out to additional agencies and stakeholders to coordinate. These included meetings with:

- The National Marine Fisheries Service on the effect of groundwater extraction on surface water depletion and steelhead and its habitat
- Monterey County Health Department on data and the existing well permitting and water quality monitoring programs

- Central Coast Regional Water Quality Control Board on data and future coordination with the multiple agencies involved in water quality
- IRWMP, including coordinating with Central Coast Wetlands Group on watershed coordinator grant.

SVBGSA contracted with Consensus Building Institute (CBI) to conduct a work program to help SVBGSA better define a meaningful engagement strategy with Disadvantaged Communities (DACs) and to develop a work plan that aligned with GSP development and ultimately with SVBGSA long term goals around groundwater sustainability. CBI conducted interviews to gage primary groundwater issues of concern in DACs, identified possible SVBGSA focus with DACs, confirmed barriers to engagement with DACs, and identified outreach and education materials and approaches to achieve success with these communities over the long term. DACs are an important stakeholder for SVBGSA to develop meaningful and long-term relationships with regard to groundwater sustainability.

4.1.2 Data and Monitoring

SVBGSA also undertook several efforts to move data collection and monitoring forward. During WY 2021:

- SVBGSA assessed data gaps and selected 2 to request be filled through DWR's Technical Support Services. SVBGSA evaluated land ownership and access. In doing so, SVBGSA worked with MCWRA to ensure the wells will be strategically located and contribute data that is useful for all agencies.
- SVBGSA and MCWRA began discussions on expanding and enhancing the GEMS program. This effort will primarily take place in 2022 and 2023. These early discussions focused on understanding the challenges to changing the program and steps involved.

4.1.3 Planning

Throughout WY 2021, SVBGSA worked with the 5 members of the Langley Planning Committee to draft the Langley Subbasin GSP. SVBGSA engaged the Committee in an iterative process of chapter development: first educating the Committee on chapter topics, then facilitating discussions on each topic, and finally reviewing draft chapters. Stakeholders were involved in understanding the Subbasin, setting SMC, and developing a list of potential projects and management actions. It received public comments throughout the process and in September 2021 it initiated a 45-day public comment period for the full GSP. At the conclusion of the planning process in August 2021 for the Langley GSP the SVBGSA will have held more than 32 planning meetings and technical workshops on each aspect of the Langley Subbasin GSP.

In addition to regularly scheduled committee meetings, a series of workshops were held for the Langley Subbasin Planning Committee as detailed in Table 6. These workshops were informational for committee members, stakeholders, and the general public and cover pertinent topics to be included in the GSPs. Workshops were timed to specific chapter development for the GSP. Subject matter experts were brought in as necessary to provide the best available information to Subbasin Planning Committee members.

Table 6. Subject Matter Workshops Held During GSP Preparation

Topic	Date
Brown Act and Conflict of Interest	July 22, 2020
Sustainable Management Criteria	July 28, 2020
Water Law	August 10, 2020
Salinas Valley Watershed Overview	August 26, 2020
Web Map Workshop	September 30, 2020
Town Hall – Domestic Wells & Drinking Water	October 28, 2020
Pumping Allocations	November 18, 2020
Funding Mechanisms	January 27, 2021
Water Budgets	February 24, 2021
Communications and Implementation	March 31, 2021
Technical Modeling Workshop – SVIHM & SVOM	June 30, 2021

As an agency, SVBGSA GSP planning efforts during WY 2021 focused on developing 4 additional groundwater sustainability plans besides the Langley GSP and the GSP Update for the adjacent 180/400-Foot Aquifer Subbasin that is currently under development. While SVBGSA developed these plans through a bottom-up process working with subbasin planning committees, it ensured that they aligned with the Langley Subbasin GSP, particularly with regard to selecting SMC that would not prevent the Langley Subbasin from avoiding undesirable results. For example, all adjacent subbasin GSPs selected groundwater level minimum thresholds that are based on not exceeding recent low levels.

In June 2021, SVBGSA received DWR's review and approval of the 180/400-Foot Aquifer Subbasin GSP. Since the Langley Subbasin GSP and other Salinas Valley GSPs were under development, SVBGSA took action immediately to address the corrective action on the water quality undesirable result. SVBGSA sought legal advice, revised the undesirable result for the GSPs, and brought the revised language to the partner GSAs, subbasin planning committees, Advisory Committee, and Board of Directors for approval. This language was included in the Langley Subbasin GSP.

4.1.4 GSP Implementation Activities

SVBGSA submitted the Langley Subbasin GSP in January 2022. SVBGSA and MCWRA undertook several activities during WY 2021 that contribute to GSP Implementation:

Deep Aquifers Study: In WY 2021, SVBGSA solicited contributions to fund the Deep Aquifers Study from local agencies and stakeholders. In October 2021, SVBGSA secured the $850,000 needed for the study when the Board approved the Agreement for Contribution to Funding the Deep Aquifer Investigation to be entered into with the following agencies and entities for the Deep Aquifers Study: Monterey County; Monterey County Water Resources Agency; Castroville Community Services District; Marina Coast Water District; City of Salinas; Alco Water; California Water Service; and irrigated agriculture entities include the Salinas Valley Water Coalition. SVBGSA drafted the Request for Qualifications and released it in September 2021.

Seawater Intrusion Model Expansion: SVBGSA began development on a Seawater Intrusion Model in the Monterey Subbasin through a Proposition 68 grant; however, most of the seawater-intruded area of the Valley is within the 180/400-Foot Aquifer Subbasin and if it advances there is risk to the Langley Subbasin. SVBGSA and Monterey County decided to co-fund the expansion of the Model to cover the entire intruded or potentially intruded area within the Salinas Valley Groundwater Basin, including the Langley Subbasin. The model is a variable density USG-TRANSPORT model. The SVIHM/SVOM developed by the USGS does not currently have the capability of assessing how seawater interacts with groundwater based on their differing densities. This Seawater Intrusion Model will provide a critical tool in assessing which projects and management actions can adequately address seawater intrusion and assist with scoping them.

4.2 Sustainable Management Criteria

The Langley Subbasin GSP includes descriptions of significant and unreasonable conditions, minimum thresholds, interim milestones, measurable objectives, and undesirable results for each of DWR's 6 sustainability indicators. SVBGSA determined locally defined significant and unreasonable conditions based on public meetings and staff discussions. The SMC are individual criterion that will each be met simultaneously, rather than in an integrated manner. A brief comparison of the data presented in Section 3 and the SMC criteria are included for each sustainability indicator in the following sections.

Since the GSP addresses long-term groundwater sustainability, some of the metrics for the sustainability indicators may not be applicable in each individual future year. The GSP is developed to avoid undesirable results—under average hydrogeologic conditions—with long-term, deliberate management of groundwater. Pursuant to SGMA regulations (California Water Code § 10721(w)(1)), "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." Therefore, groundwater levels may temporarily exceed minimum thresholds during prolonged droughts, which could be more extreme than those that have been anticipated based on historical data and anticipated climate change conditions. Such temporary exceedances do not constitute an undesirable result.

Average hydrogeologic conditions are the anticipated future groundwater conditions in the Subbasin, averaged over the planning horizon and accounting for anticipated climate change. Future groundwater conditions are based on historical precipitation, evapotranspiration, and streamflow, as well as reasonably anticipated climate change and sea level rise. The average hydrogeologic conditions include reasonably anticipated wet and dry periods.

The 2 solid green lines on Figure 12 show the anticipated average precipitation for 2030 and 2070, accounting for reasonable future climatic change (DWR, 2018). Measured annual precipitation for WY 2020 and 2021 are shown as the 2 blue dots, and the dashed blue line shows the average measured precipitation since GSP implementation. This figure shows that WY 2021 was below the average hydrologic conditions expected for the Subbasin. Furthermore, average rainfall since GSP implementation has not risen to the anticipated future average conditions. As a result, it is not anticipated that all measurable objectives have been achieved this year because these measurable objectives were based on managing to average future climatic conditions. This does not mean that minimum thresholds should be exceeded. However, WY 2021 was dry, and therefore it is more likely that minimum thresholds are exceeded in 2021. Because the Subbasin is not expected to achieve sustainability until 2042, the current minimum threshold exceedances do not imply unsustainable groundwater management. However, areas with current minimum threshold exceedances should be monitored, and should demonstrate progress towards measurable objectives as conditions approach expected average conditions.

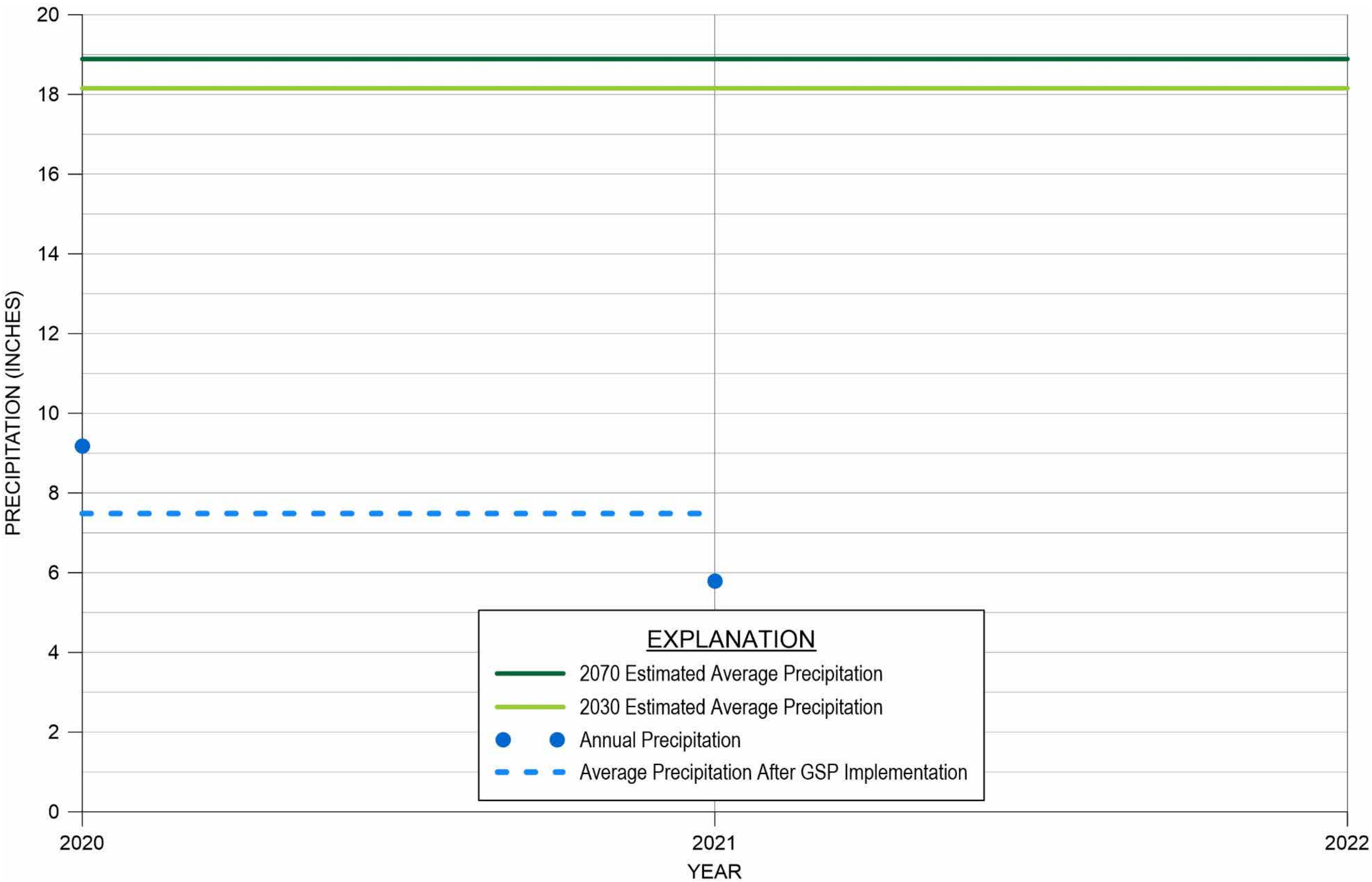

Figure 12. Comparison of Average Precipitation Since GSP Implementation and Estimated Future Average Precipitation

4.2.1 Chronic Lowering of Groundwater Levels SMC

4.2.1.1 Minimum Thresholds

Section 8.6.2.1 of the Langley Subbasin GSP describes the information and methodology used to establish minimum thresholds for chronic lowering of groundwater levels. In the Langley Subbasin, the minimum thresholds were set to 2019 groundwater elevations. The minimum threshold values for each well within the groundwater elevation monitoring network are provided in Table 7. Fall groundwater elevation data are color-coded on this table: red cells mean the groundwater elevation is below the minimum threshold, yellow cells mean the groundwater elevation is above the minimum threshold but below the measurable objective, and green cells mean the groundwater elevation is above the measurable objective. In WY 2021, three wells in the Subbasin exceeded their minimum thresholds as indicated by the red cells below.

Table 7. Groundwater Elevation Data, Minimum Thresholds, and Measurable Objectives (in feet)

Below Minimum Threshold		Above Minimum Threshold		Above Measurable Objective	
Monitoring Site	Minimum Threshold	WY 2020 Elevation Data	WY 2021 Elevation Data	Interim Milestone at Year 2027	Measurable Objective (goal to reach at 2042)
13S/03E-08D01	170.0*	172.8	172.3	171.3	175.0*
13S/03E-10N01	273.2*	278.3	278.1	274.6	278.8
13S/03E-10Q01	435.9*	438.8	438.6	437.2	440.9*
13S/03E-14M01	356.0	352.9	352.9*	358.7	366.9
13S/03E-15P01	80.9	80.9*	80.9*	83.3	90.6
13S/03E-16J01	41.3*	46.2	46.5	43.0	48.1
13S/03E-17B01	163.4*	162.3	161.8	164.7	168.4*
13S/03E-17F02	-41.4	-38.7	-39.9	-38.9	-31.4*
13S/03E-19H01	-0.8*	1.8	2.0	0.5	4.2*
13S/03E-20B02	100.1*	104.3	103.3	101.4	105.1*
13S/03E-20P01	71.1*	76.7*	76.7*	72.7	77.3
13S/03E-22F01	84.4	82.9	79.0	88.5	100.6
13S/03E-29A01	-61.2	-56.5	-59.1	-58.7	-51.2*
13S/03E-29K01	58.8	64.4	61.4	61.3	68.8*
13S/03E-32H01	-47.0	-45.0	-41.0	-44.8	-38.0
13S/03E-33T50	-50.0	-49.5	-49.5	-48.8	-45.0

*Groundwater elevation was estimated.

4.2.1.2 Measurable Objectives and Interim Milestones

The measurable objectives for chronic lowering of groundwater levels represent target groundwater elevations that are higher than the minimum thresholds. These measurable objectives provide operational flexibility to ensure that the Subbasin can be managed sustainably over a reasonable range of hydrologic variability. Measurable objectives for the chronic lowering of groundwater levels are summarized in Table 7. None of the RMS wells had groundwater elevations higher than their measurable objective in WY 2021.

To help reach measurable objectives, SVBGSA set interim milestones at 5-year intervals. The 2027 interim milestones for groundwater elevations are also shown in Table 7. The WY 2021 groundwater elevations in 9 wells are already higher than the 2027 interim milestones.

4.2.1.3 Undesirable Result

The chronic lowering of groundwater levels undesirable result is a quantitative combination of groundwater elevation minimum threshold exceedances. For the Subbasin, the groundwater elevation undesirable result is:

> *More than 15% of the groundwater elevation minimum thresholds are exceeded.*

Based on the data in Table 7, 19% of wells exceed their minimum threshold and therefore exceed the 20-year planning horizon undesirable result. Groundwater elevation minimum threshold exceedances, compared with the 2042 undesirable result, is shown on Figure 13. If a value is in the shaded red area, it would constitute undesirable result in 2042. This graph will be updated annually with new data to demonstrate the sustainability indicator’s direction toward sustainability.

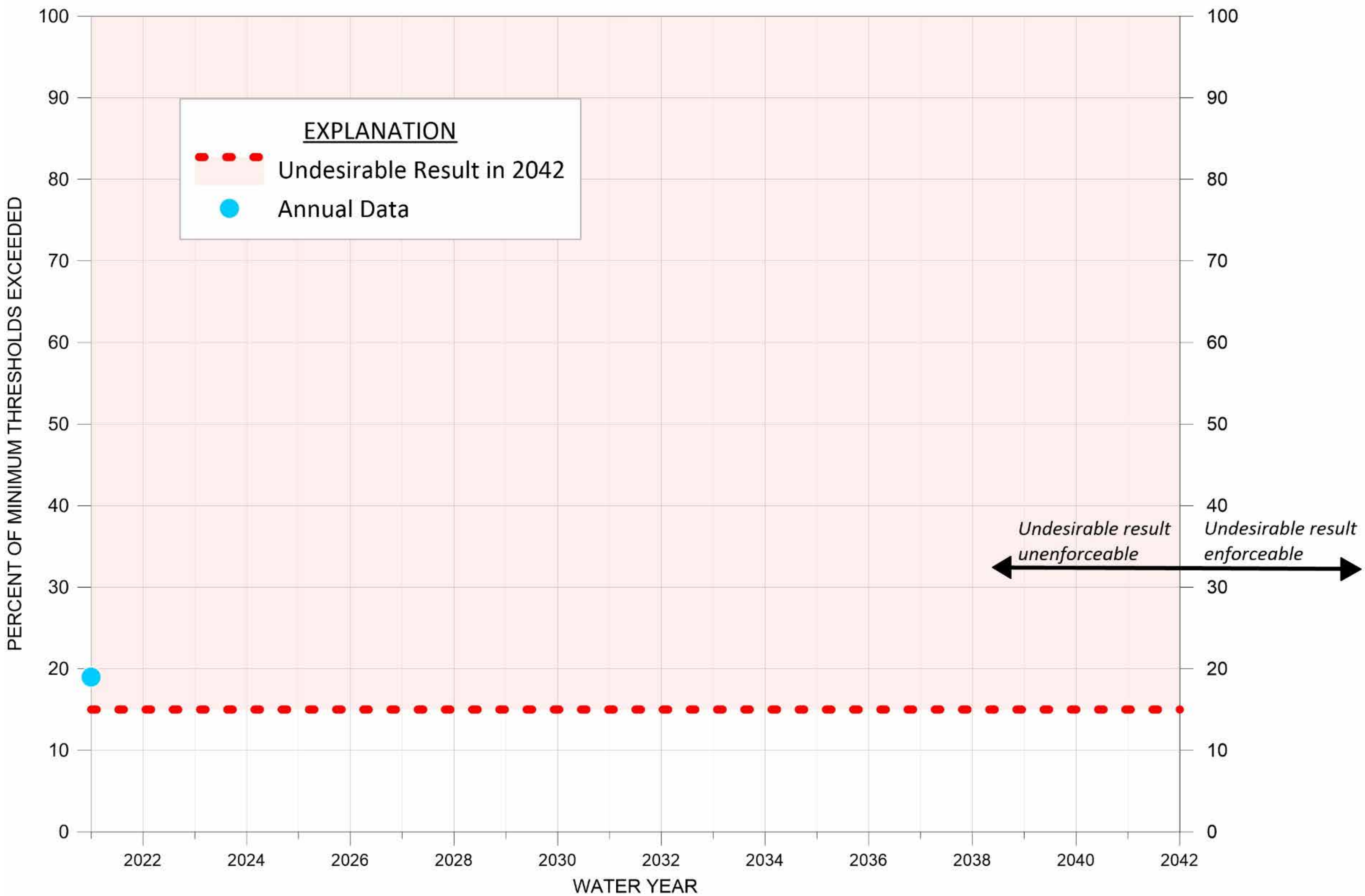

Figure 13. Groundwater Elevation and Storage Exceedances Compared to 2042 Undesirable Result

4.2.2 Reduction in Groundwater Storage SMC

4.2.2.1 Minimum Thresholds

The reduction in groundwater storage SMC is established by proxy using groundwater elevations. The minimum thresholds for reduction in groundwater storage are measured using groundwater elevations as proxies; therefore, the minimum thresholds are identical to the minimum thresholds for groundwater level RMS wells, which are those described in Section 4.3.1.1.

4.2.2.2 Measurable Objective and Interim Milestones

The measurable objectives and interim milestones for reduction in groundwater storage are the same as those for groundwater elevations that are described in Section 4.3.1.2.

4.2.2.3 Undesirable Result

The criteria used to define undesirable results for reduction of groundwater storage are based on minimum thresholds established for chronic lowering of groundwater levels. The reduction of storage undesirable result is:

> *More than 15% of groundwater elevation minimum thresholds are exceeded. The undesirable result for reduction in groundwater storage is established by proxy using groundwater elevations.*

Based on the groundwater elevation data presented in Section 4.3.1, more than 15% of wells exceeded their minimum thresholds. The 2021 groundwater storage as measured by proxy using groundwater elevations exceeded the 20-year planning horizon undesirable result as shown on Figure 13. If a value is in the shaded red area, it would constitute an undesirable result in 2042.

4.2.3 Seawater Intrusion SMC

4.2.3.1 Minimum Thresholds

The minimum threshold for seawater intrusion is defined by a chloride concentration isocontour of 500 mg/L for the principal aquifer where seawater intrusion may lead to undesirable results. Section 8.8.2.1 of the Langley Area Subbasin GSP describes the information and methodology used to establish minimum thresholds for chronic seawater intrusion. The Subbasin boundary is adopted as the seawater intrusion minimum threshold as depicted by the red line on Figure 14.

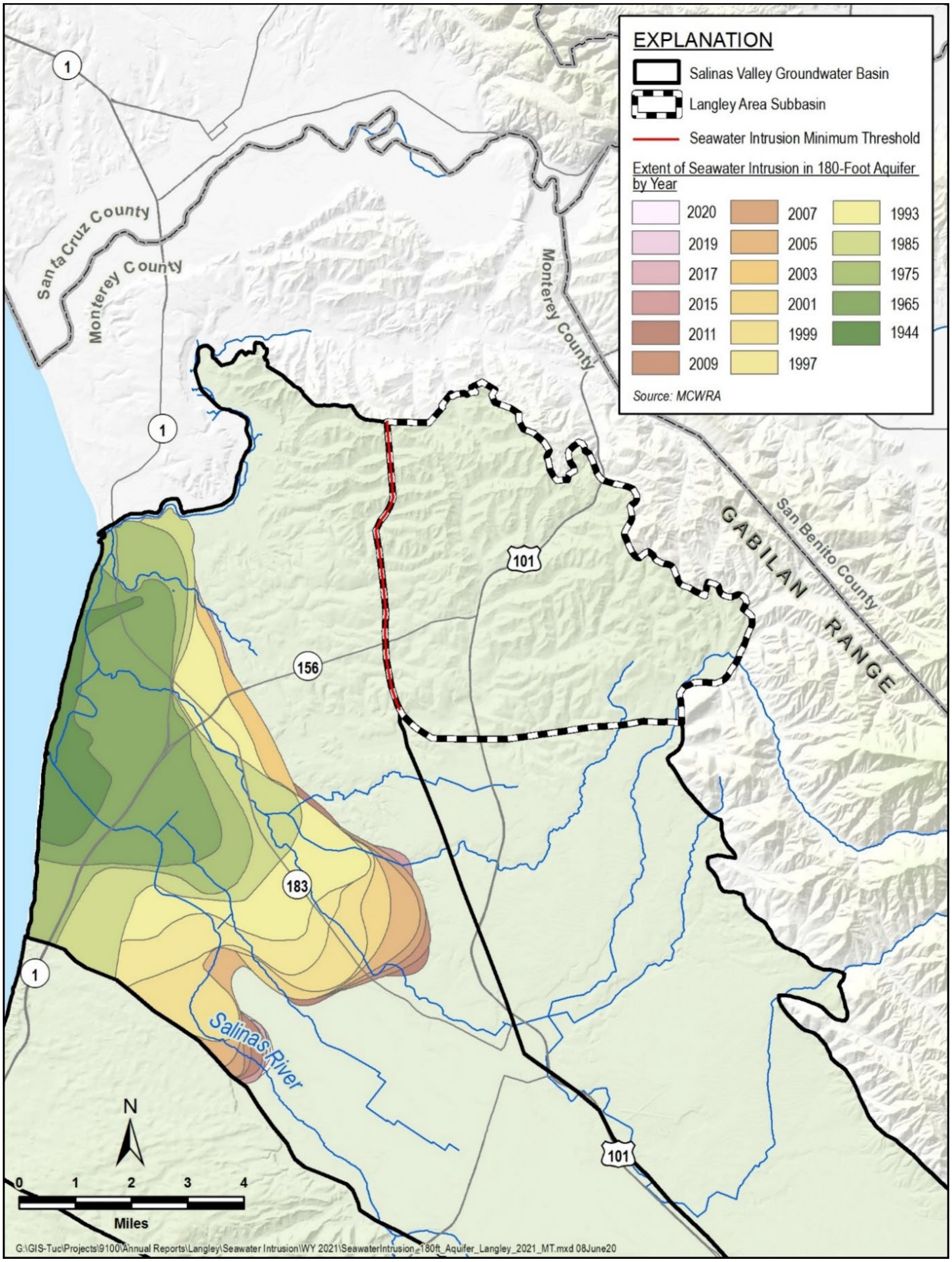

Figure 14. Seawater Intrusion Compared to the Seawater Intrusion Minimum Threshold, 2042 Undesirable Result, and Measurable Objective

4.2.3.2 Measurable Objectives and Interim Milestones

The measurable objective for seawater intrusion is identical to the minimum threshold that is shown on Figure 14.

4.2.3.3 Undesirable Result

The seawater intrusion undesirable result is a quantitative combination of chloride concentrations minimum threshold exceedances. Because even localized seawater intrusion is not acceptable, the subbasin-wide undesirable result is zero exceedances of minimum thresholds. For the Subbasin, the seawater intrusion undesirable result is:

> *Any exceedance of the minimum threshold, resulting in mapped seawater intrusion within the Subbasin boundary.*

There is no seawater intrusion in the Langley Subbasin thus an undesirable result does not exist.

4.2.4 Degraded Groundwater Quality SMC

4.2.4.1 Minimum Thresholds

The degraded groundwater quality minimum threshold for each COC is based on the number of supply wells monitored that had higher concentrations of constituents than the regulatory standards for drinking water and irrigation water during the last sampling. Section 8.9.2.1 of the Langley Subbasin GSP describes the information and methodology used to establish minimum thresholds for degraded groundwater quality. The minimum threshold values for each well within the groundwater quality monitoring network are provided in Table 8. Table 8 also shows the WY 2021 exceedances of the regulatory standards discussed in Section 3.5 and the running total of regulatory standard exceedances used to measure against the minimum thresholds, which were established based on 2019 exceedances of the regulatory standard. Only the latest sample for each COC at each well is used for the running total. The minimum thresholds are set at zero additional exceedances of each constituent, based on the exceedances in 2019. These conditions were determined to be significant and unreasonable because groundwater quality in exceedance of these will cause a financial burden on groundwater users. Public water systems with COC concentrations above the MCL or SMCL are required to add treatment to the drinking water supplies or drill new wells. Agricultural wells with COCs that significantly reduce crop production will reduce grower’s yields and profits.

In WY 2021, there were 4 exceedances of the minimum thresholds established for DDW public water system supply wells and none for the ILRP on-farm domestic and irrigation wells. The last column in Table 8 includes the number of exceedances above the minimum thresholds, the COCs that exceeded the minimum threshold are highlighted in orange. The negative numbers in the last column indicate wells that once exceeded the regulatory limit are no longer exceeding the limit.

Table 8. Minimum Thresholds and Measureable Objectives for Degradation of Groundwater Quality

Constituents of Concern (COC)	Minimum Threshold/ Measurable Objective (existing exceedances of Regulatory Standard in 2019)	WY 2021 Exceedances of Regulatory Standard (new exceedances based on wells monitored in WY 2021)	Total of Exceedances of Regulatory Standard	Number of Exceedances above Minimum Threshold
DDW Wells				
1,2,3-Trichloropropane (1,2,3 TCP)	6	0	6	0
1,2,4- Trichlorobenzene (1,2,4 TCB)	1	0	1	0
1,2-Dibromo-3-chloropropane	6	0	6	0
Arsenic	3	5	10	7
Benzo(a)pyrene	1	0	1	0
Chloride	2	0	2	0
Di(2-ethylhexyl)phthalate (DEHP)	1	0	1	0
Dinoseb	8	0	8	0
Heptachlor	2	0	2	0
Hexachlorobenzene (HCB)	1	0	1	0
Iron	17	5	22	5
Manganese	15	6	20	5
MTBE (Methyl-tert-butyl ether)	1	0	1	0
Nitrate (as nitrogen)	14	9	22	8
Specific Conductance	2	0	2	0
Total Dissolved Solids	2	0	2	0
Vinyl Chloride	88	0	88	0
ILRP On-Farm Domestic Wells				
Iron	1	0	1	0
Manganese	1	0	1	0
ILRP Irrigation Supply Wells				
Manganese	1	0	1	0

4.2.4.2 Measurable Objectives and Interim Milestones

The measurable objectives for degradation of groundwater quality represent a target number of groundwater quality exceedances in the Subbasin. SGMA does not require the improvement of groundwater quality. Therefore, the Langley GSP includes measurable objectives identical to the as defined in Table 8. Interim milestones are also set at the minimum threshold levels. Although there were 4 groundwater quality minimum threshold exceedances in WY 2021, the groundwater quality data already meet the 2027 interim milestones because these exceedances are not due to GSA actions.

4.2.4.3 Undesirable Result

The degradation of groundwater quality undesirable result is a quantitative combination of groundwater quality minimum threshold exceedances. Any groundwater quality degradation as a direct result of GSP implementation is unacceptable. Some groundwater quality changes are expected to occur independent of SGMA activities; because these changes are not related to SGMA activities they do not constitute an undesirable result. The degradation of groundwater quality undesirable result is:

> *Future or new minimum thresholds exceedances are caused by a direct result of GSA groundwater management action(s), including projects or management actions and regulation of groundwater extraction.*

Table 8 shows 4 constituents exceeded its minimum threshold in WY 2021. Since SVBGSA has yet to implement any projects or management actions in the Subbasin, these exceedances are not due to GSA actions. Therefore, the groundwater quality data do not exceed the 20-year planning horizon undesirable result. The groundwater quality minimum threshold exceedances, compared with the 2042 undesirable results, are shown on Figure 15. If a value is in the shaded red area, it would constitute an undesirable result in 2042 This graph is updated annually with new data to demonstrate the sustainability indicator’s direction toward sustainability.

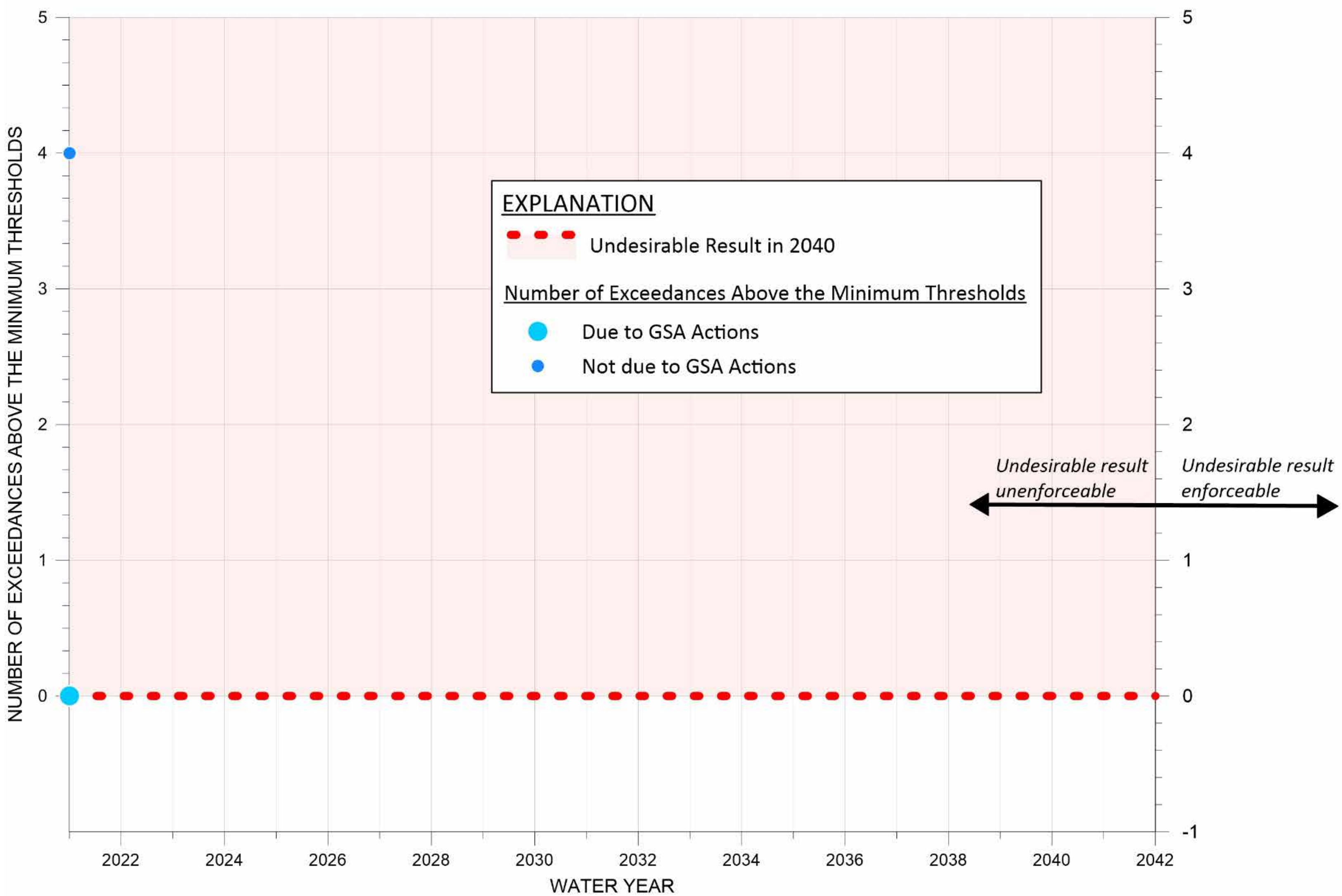

Figure 15. Groundwater Quality Minimum Threshold Exceedances Compared to the 2042 Groundwater Quality Undesirable Result

4.2.5 Land Subsidence SMC

4.2.5.1 Minimum Thresholds

Accounting for measurement errors in the InSAR data, the minimum threshold for land subsidence in the GSP is zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement to account for InSAR errors. Section 8.10.2.1 of the Langley Area Subbasin GSP describes the information and methodology used to establish minimum thresholds for subsidence. A single minimum threshold is set for the entire Subbasin. Annual subsidence data from October 2020 to October 2021 demonstrated less than the minimum threshold of 0.1 foot per year, as shown on Figure 11.

4.2.5.2 Measurable Objectives and Interim Milestones

The measurable objectives for ground surface subsidence represent target subsidence rates in the Subbasin. Because the minimum threshold of zero net long-term subsidence is the best achievable outcome, the measurable objectives are identical to the minimum thresholds: zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement to account for InSAR errors. Figure 11 demonstrates that data from October 2020 to October 2021 showed less than the measurable objective of no more than 0.1 foot per year of measured subsidence is being met. The interim milestones are identical to minimum threshold of 0.1 foot per year. The latest subsidence data shows that the 2027 subsidence interim milestone is already being met.

4.2.5.3 Undesirable Result

The ground surface subsidence undesirable result is a quantitative combination of subsidence minimum threshold exceedances. For the Langley Subbasin, no long-term subsidence is acceptable. Therefore, the land subsidence undesirable result is:

> *There is an exceedance of the minimum threshold for land subsidence due to lowered groundwater elevations.*

Data from October 2020 to October 2021 showed subsidence was below the minimum threshold of 0.1 foot per year. The latest land subsidence data, therefore, does not exceed the 20-year planning horizon undesirable result. Maximum measured subsidence in the Subbasin, compared with the 2042 change in subsidence undesirable results goal, is shown on Figure 16. If a value is in the shaded red area, it would constitute undesirable result in 2042.

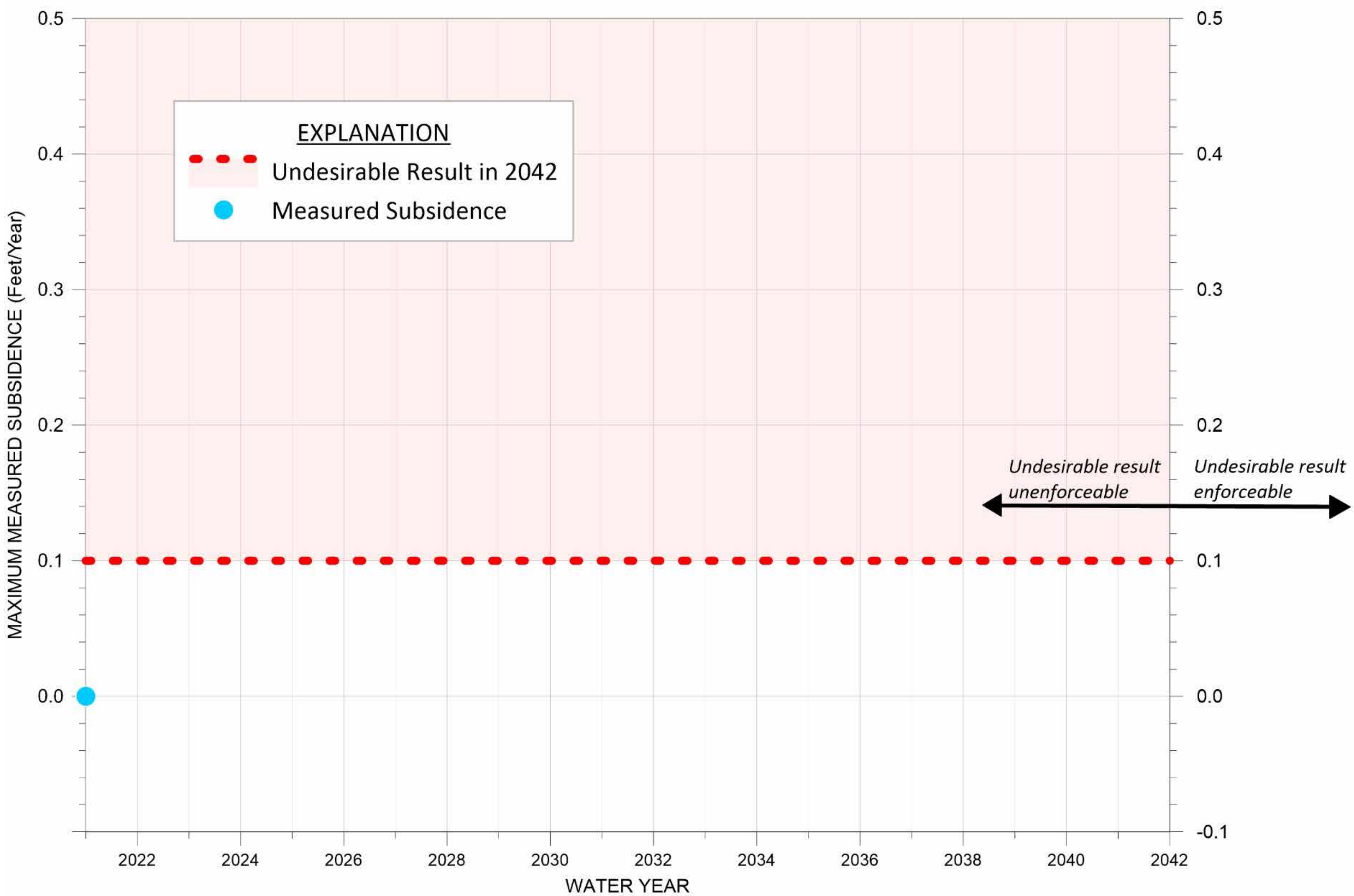

Figure 16. Maximum Measured Subsidence Compared to the 2042 Undesirable Result

4.2.6 Depletion of Interconnected Surface Water SMC

As mentioned in Section 3.7, there are no existing shallow wells that can be used to monitor ISW in the Langley Subbasin. When ISW monitoring wells are drilled in the Subbasin, the current conditions will be compared to the SMC presented below.

4.2.6.1 Minimum Thresholds

The minimum thresholds for depletion of ISW are established by proxy using shallow groundwater elevations and are established to maintain consistency with chronic lowering of groundwater elevation and reduction in groundwater storage minimum thresholds. Minimum thresholds at shallow groundwater monitoring wells will be established when the monitoring network is developed by interpolating values from the groundwater elevation contour maps. Measurable Objectives and Interim Milestones

The measurable objectives for depletion of ISW target groundwater elevations that are higher than the minimum thresholds. The measurable objectives are established to maintain consistency with the chronic lowering of groundwater elevation and reduction in groundwater storage minimum thresholds, which are also established based on groundwater elevations.

4.2.6.2 Undesirable Result

The depletion of ISW undesirable result is a quantitative combination of minimum threshold exceedances. The undesirable result for depletion of ISW is:

> *There is an exceedance of the minimum threshold in a shallow groundwater monitoring well used to monitor interconnected surface water.*

As stated in Section 3.7, the shallow groundwater monitoring network for ISW is not developed. Therefore, there are no data from WY 2021 to compare to the 2042 planning horizon undesirable result at this point.

5 CONCLUSION

This 2021 Annual Report updates data and information for the Langley Area Subbasin GSP from WY 2019 to WY 2021 with the best available data. It covers GSP implementation activities up to September 30, 2021. All GSP implementation and annual reporting meets the regulations set forth in the SGMA GSP Regulations.

Results show little change in groundwater sustainability indicators when compared to the current conditions described in the GSP. WY 2021 was classified as dry. Groundwater elevations decreased in all the RMS in the monitoring network in WY 2021, with most wells showing elevations above their minimum thresholds but all wells were below their measurable objectives. Change in groundwater storage, as measured by groundwater elevation changes, decreased from WY 2019 and WY 2021. There is still no seawater intrusion in the Subbasin in WY 2021. Groundwater quality data showed 4 exceedances of minimum thresholds in DDW wells only. Negligible subsidence was observed in WY 2021. Finally, there are no existing monitoring wells for depletion of ISW; therefore, there is no ISW data presented in this Annual Report.

Since GSP submittal, SVBGSA has continued to actively engage stakeholders and has started planning activities to implement the GSP. SVBGSA continues to engage stakeholders through its participatory subbasin planning committees, Advisory Committee, Board of Directors, and Seawater Intrusion Working Group. It has also begun to fill data gaps to start implementing the Langley Area Subbasin GSP.

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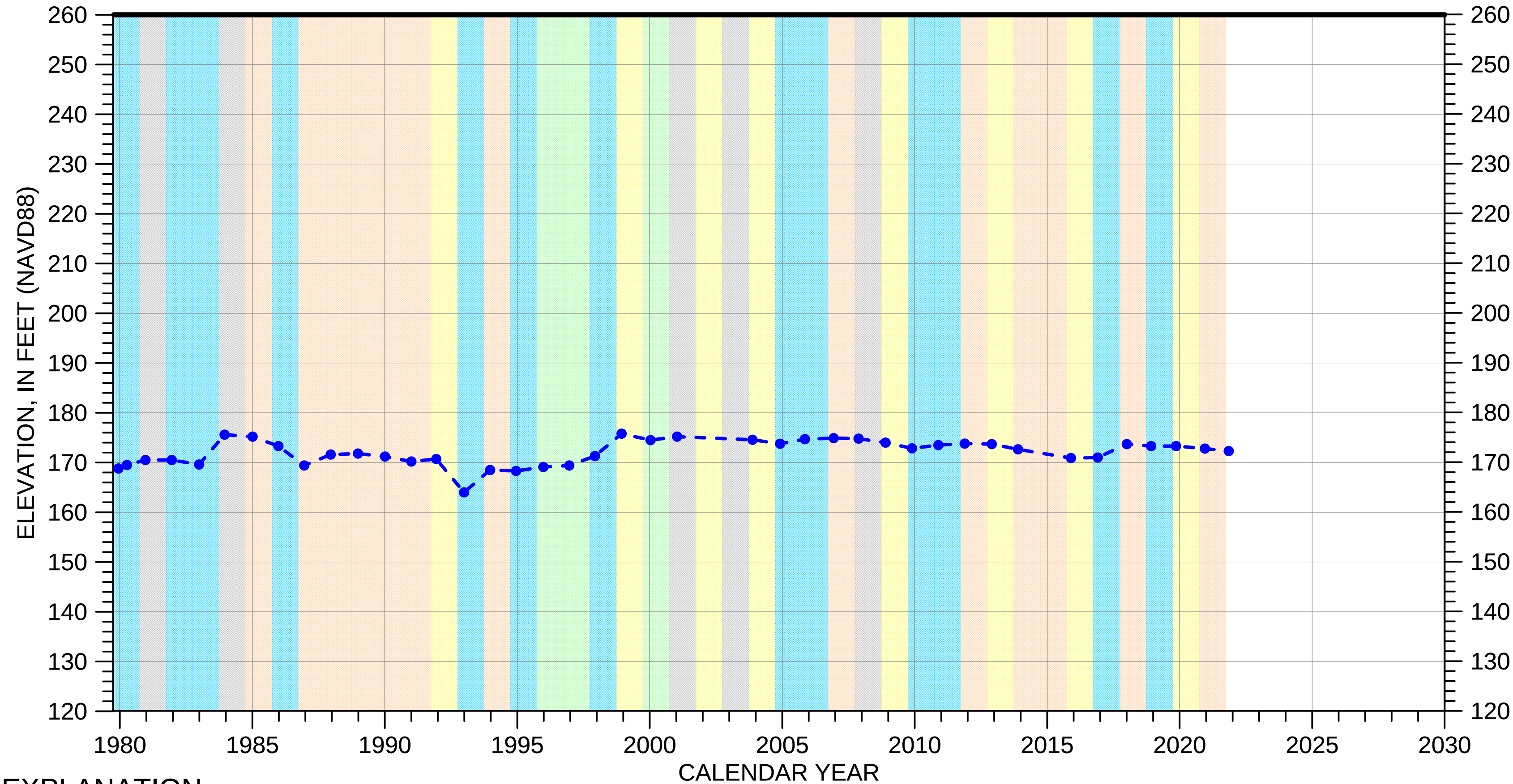
APPENDIX A: Hydrographs of Representative Monitoring Site Wells

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-08D01

Langley Area Subbasin



EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface

WATER YEAR TYPE DESIGNATION

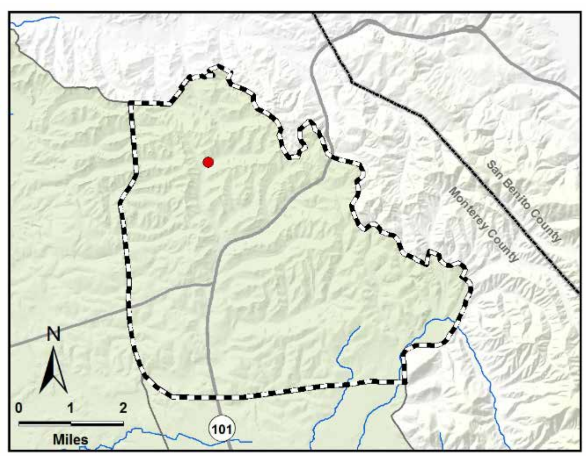
DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET



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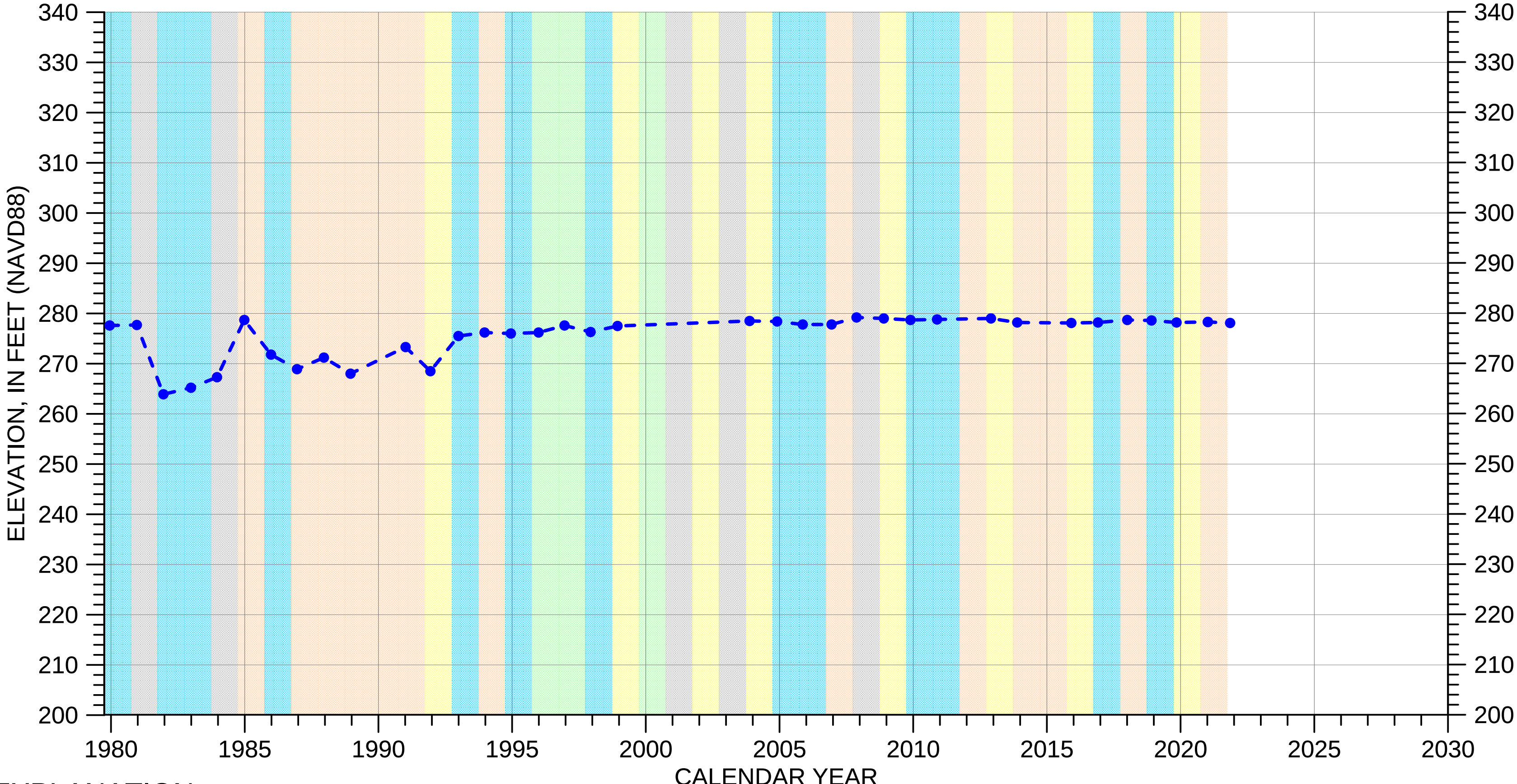
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-10N01

Langley Area Subbasin



EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface (383 FT MSL)

WATER YEAR TYPE DESIGNATION

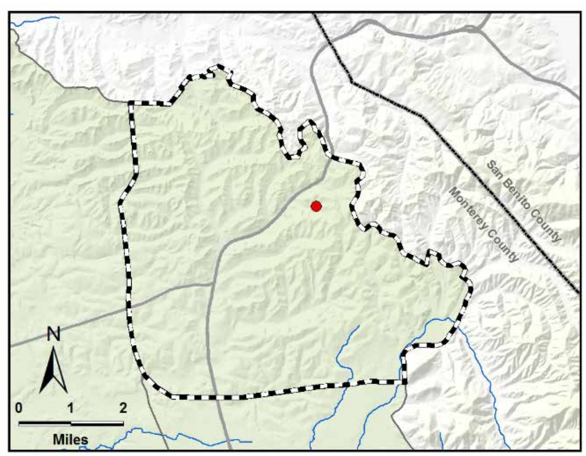
DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET

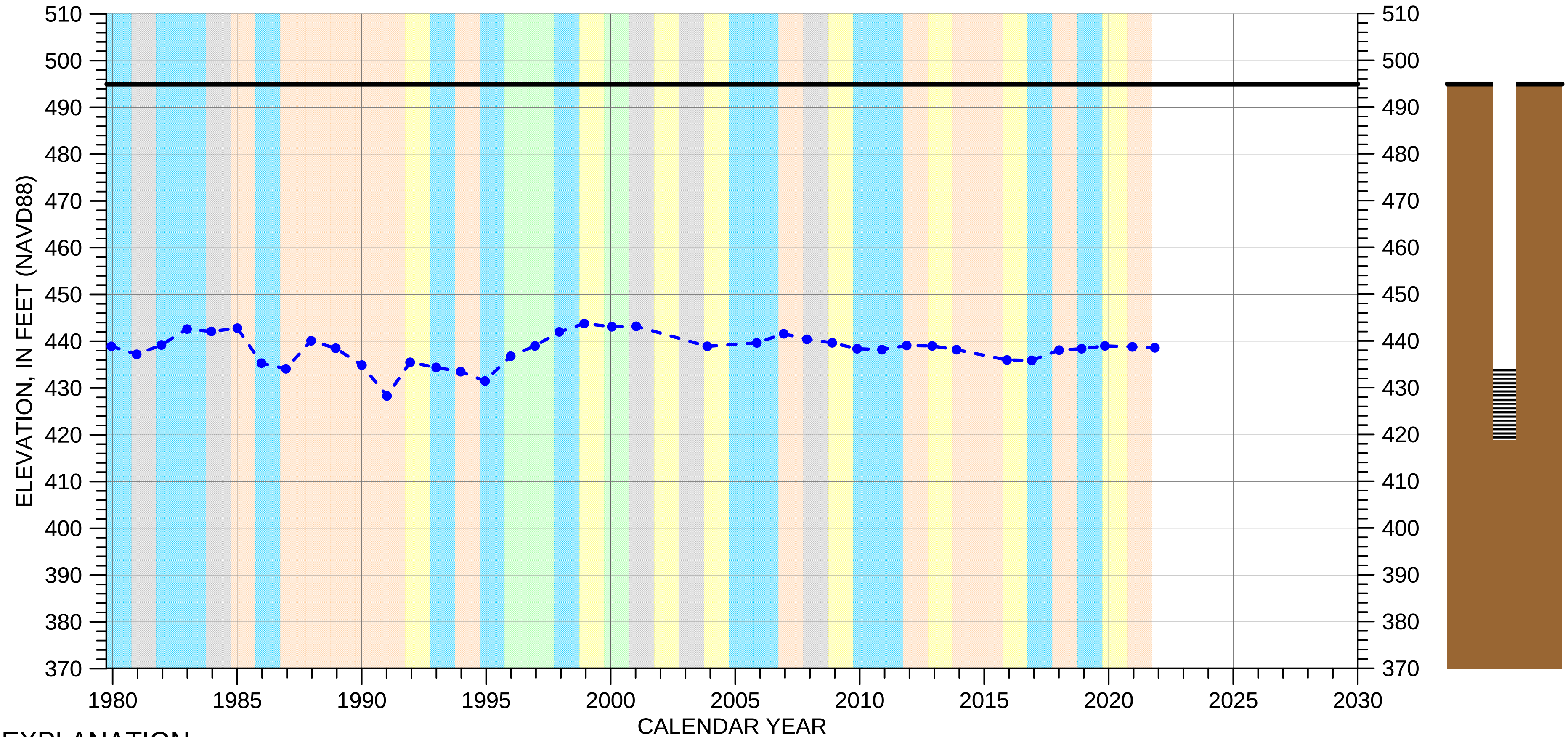


Perforated interval unknown

\\tuc-data\public\projects\9100_Salinas_GSP\ProjectData\Analysis\water_levels\Hydrographs_MCWRA\NEWGRFs_Ch5\13S_03E-10N01.grf

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-10Q01

Langley Area Subbasin



EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface

WATER YEAR TYPE DESIGNATION

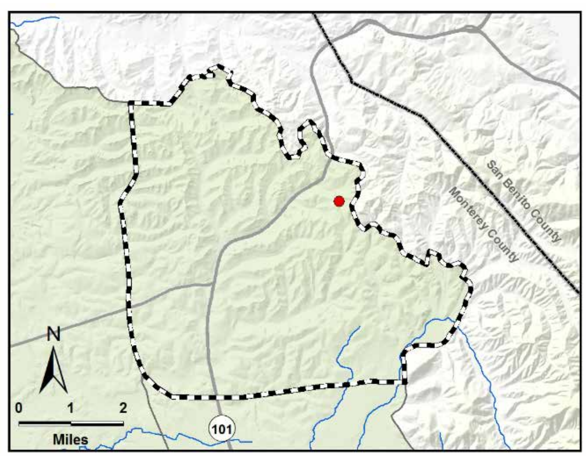
DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET



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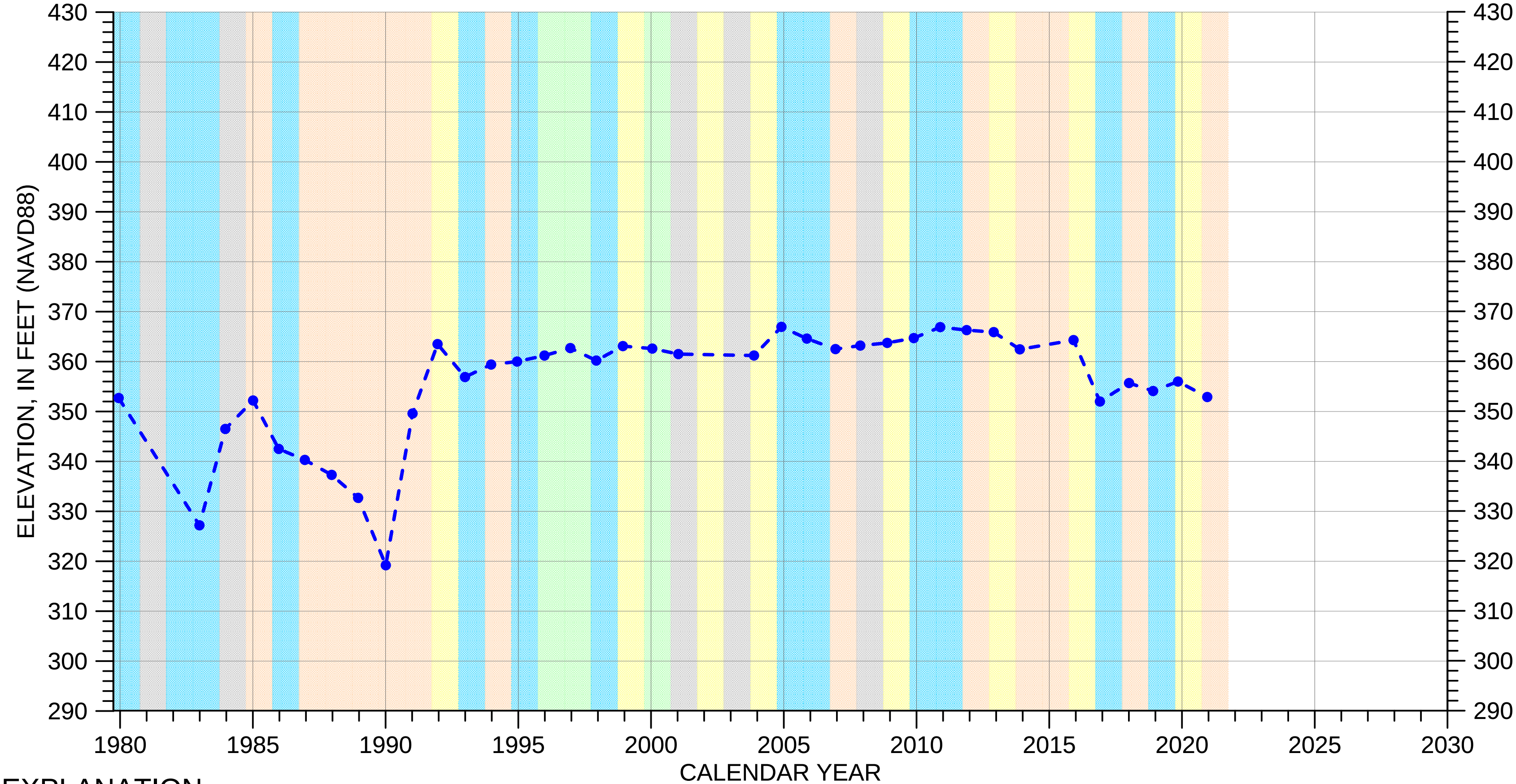
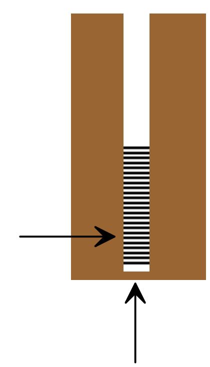
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-14M01

Langley Area Subbasin



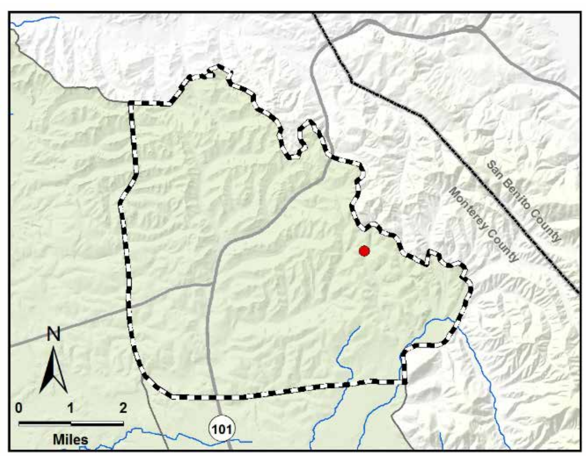


EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface (453 FT MSL)



Perforated from 133 to 51 feet msl

Well bottom 51 feet msl

WATER YEAR TYPE DESIGNATION

DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET

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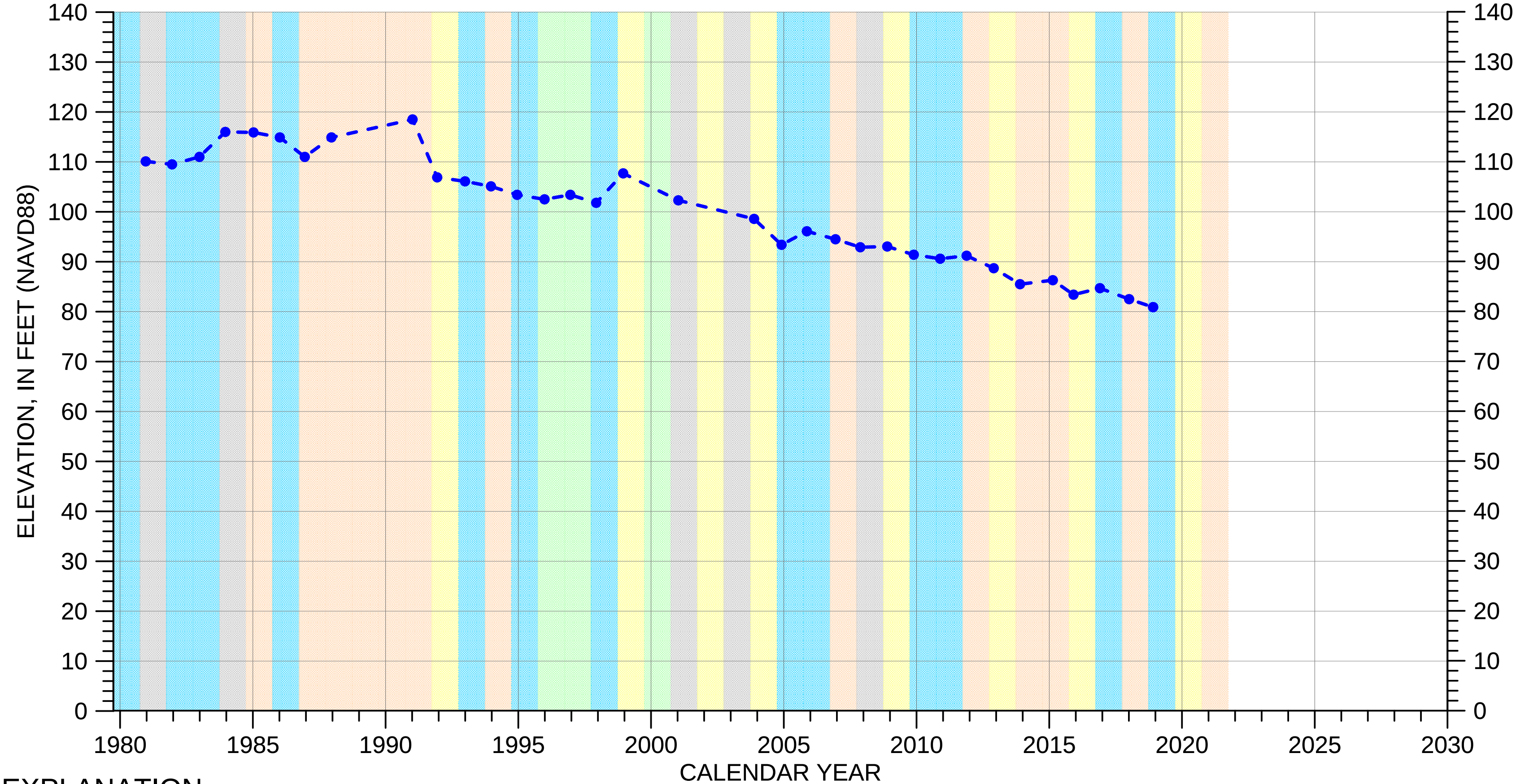
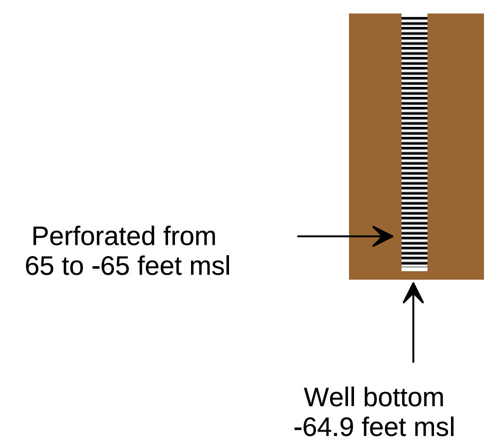
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-15P01

Langley Area Subbasin





EXPLANATION

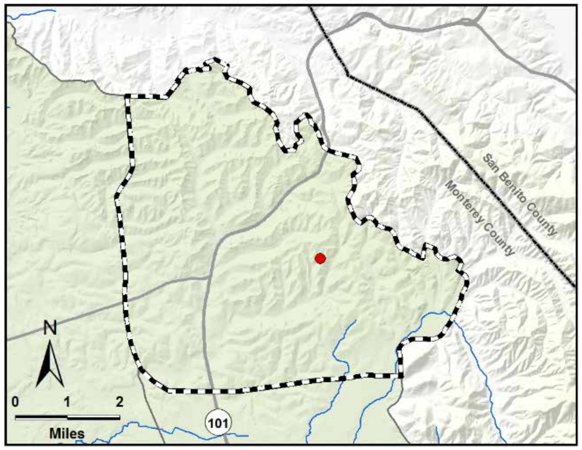
Groundwater Elevation

Suspect Measurement

Land Surface (365 FT MSL)

WATER YEAR TYPE DESIGNATION

DRY
DRY - NORMAL
NORMAL
WET - NORMAL
WET



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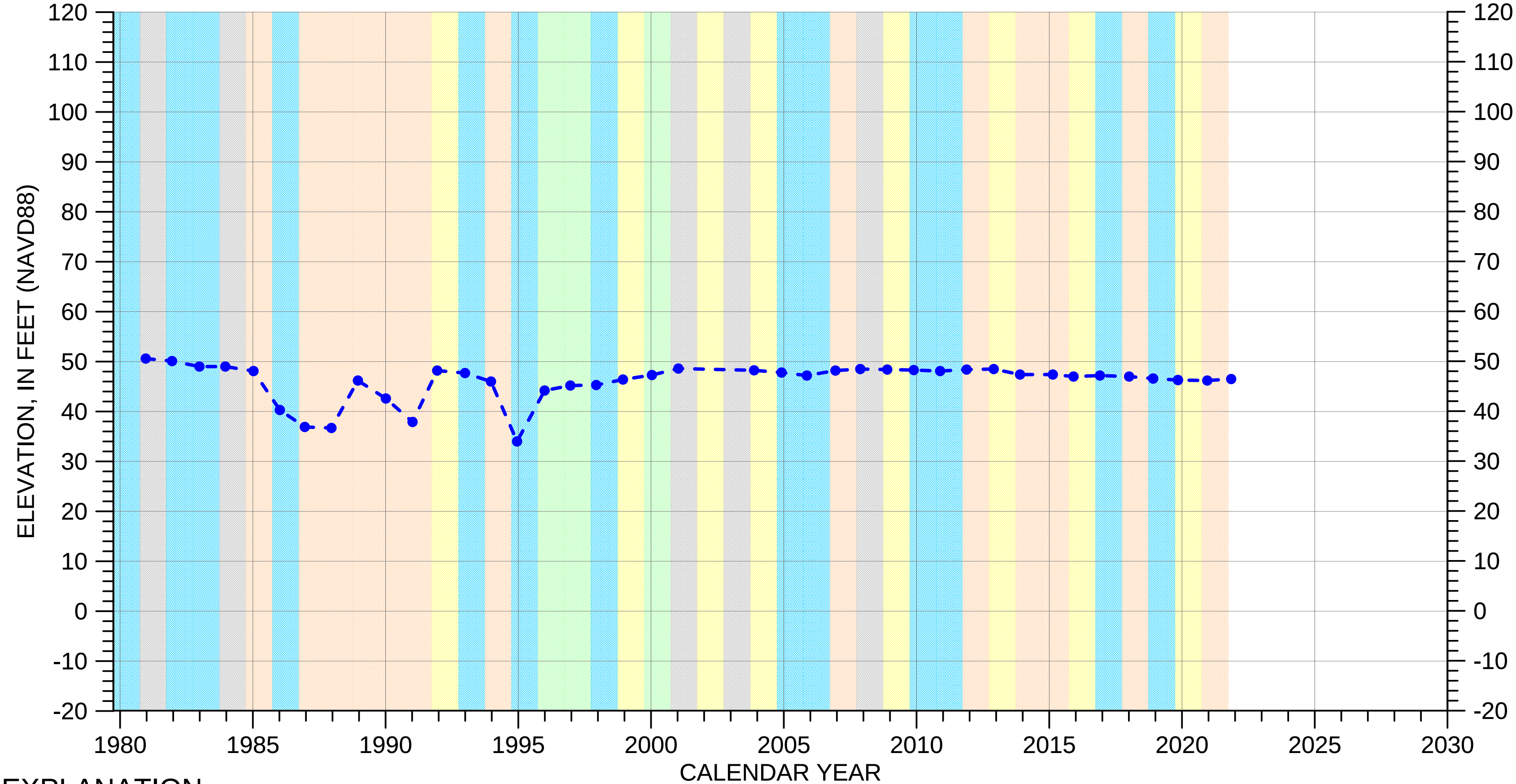
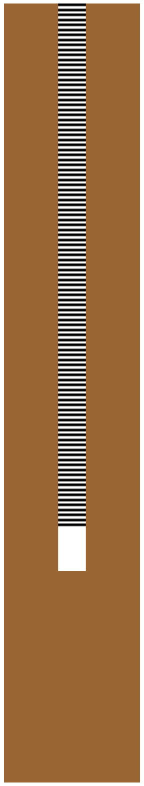
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-16J01

Langley Area Subbasin





EXPLANATION

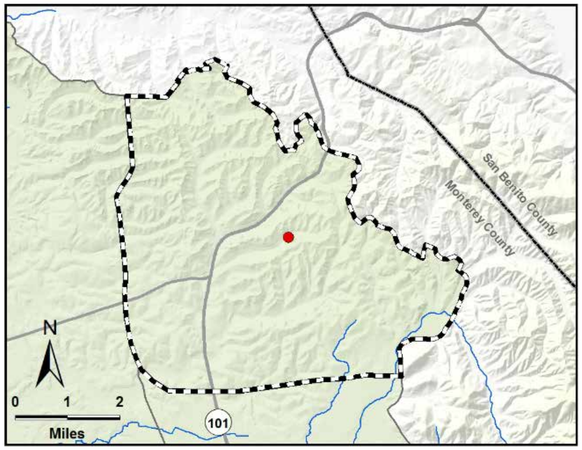
Groundwater Elevation

Suspect Measurement

Land Surface (270 FT MSL)

WATER YEAR TYPE DESIGNATION

DRY
DRY - NORMAL
NORMAL
WET - NORMAL
WET



Perforated from 166 to 26 feet msl

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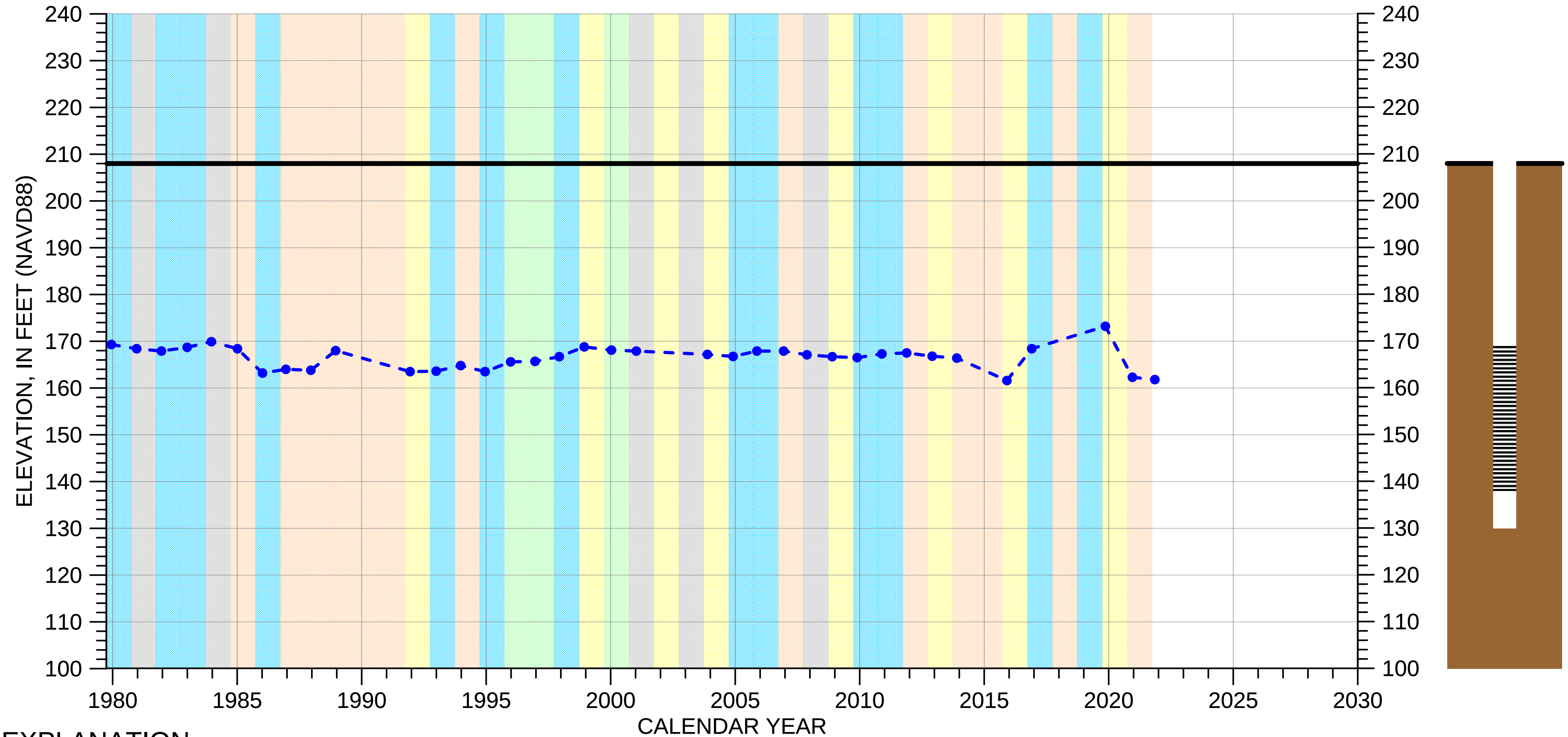
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-17B01

Langley Area Subbasin



EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface

WATER YEAR TYPE DESIGNATION

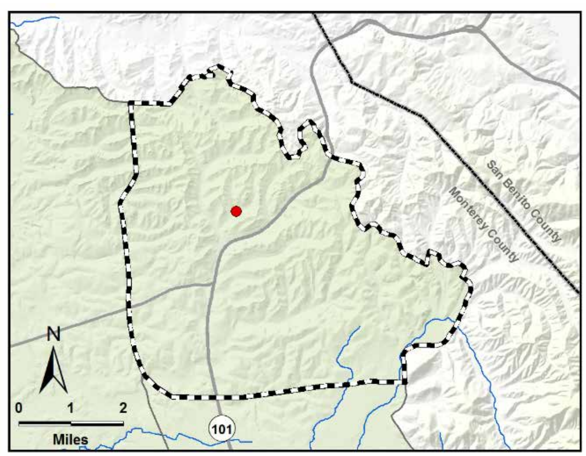
DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET



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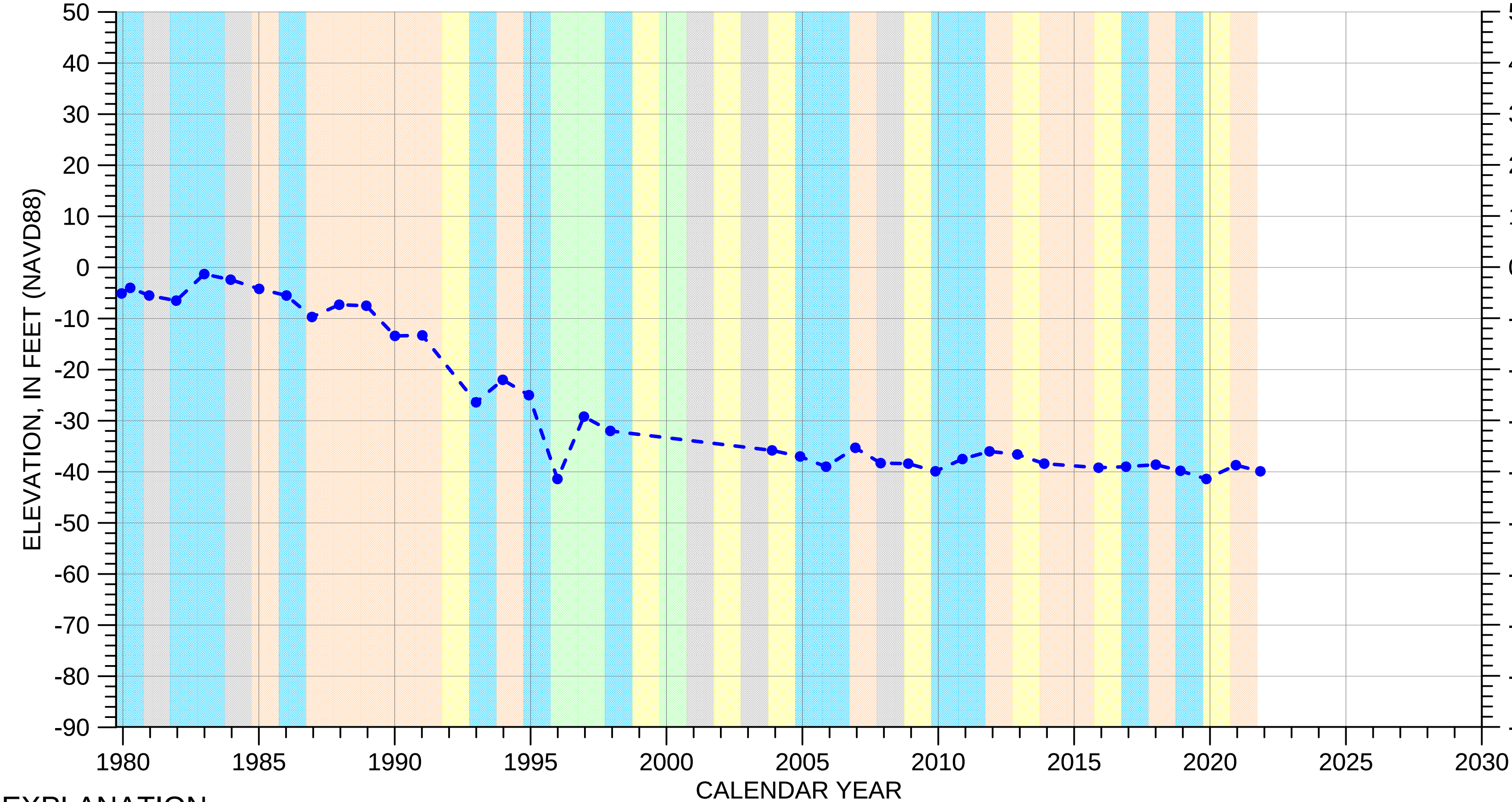
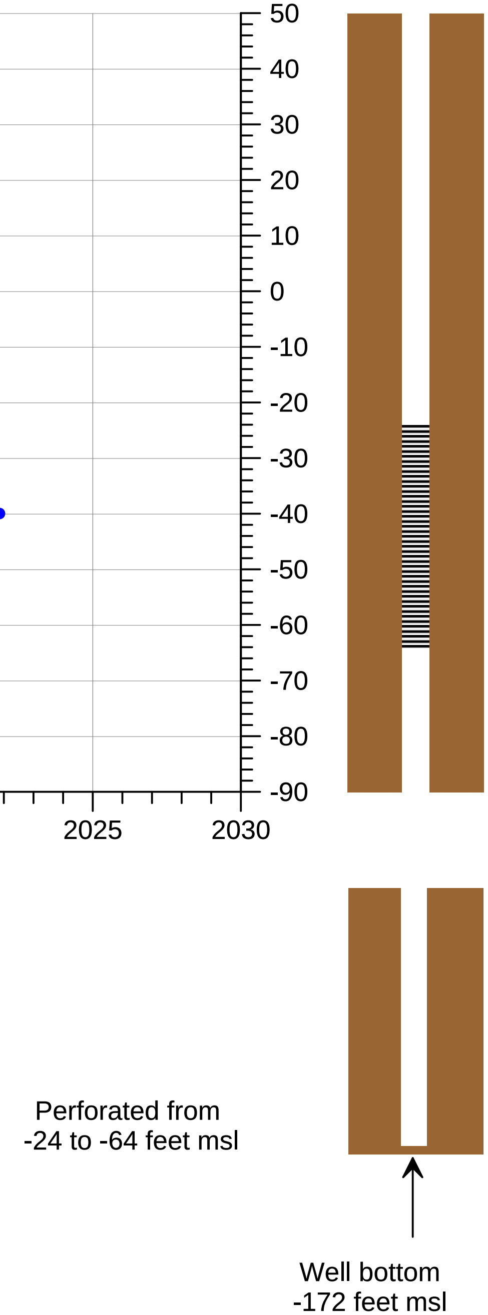
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-17F02

Langley Area Subbasin





EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface (221 FT MSL)

WATER YEAR TYPE DESIGNATION

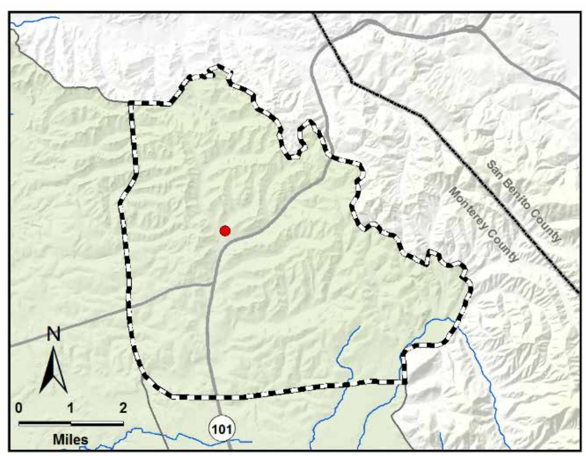
DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET



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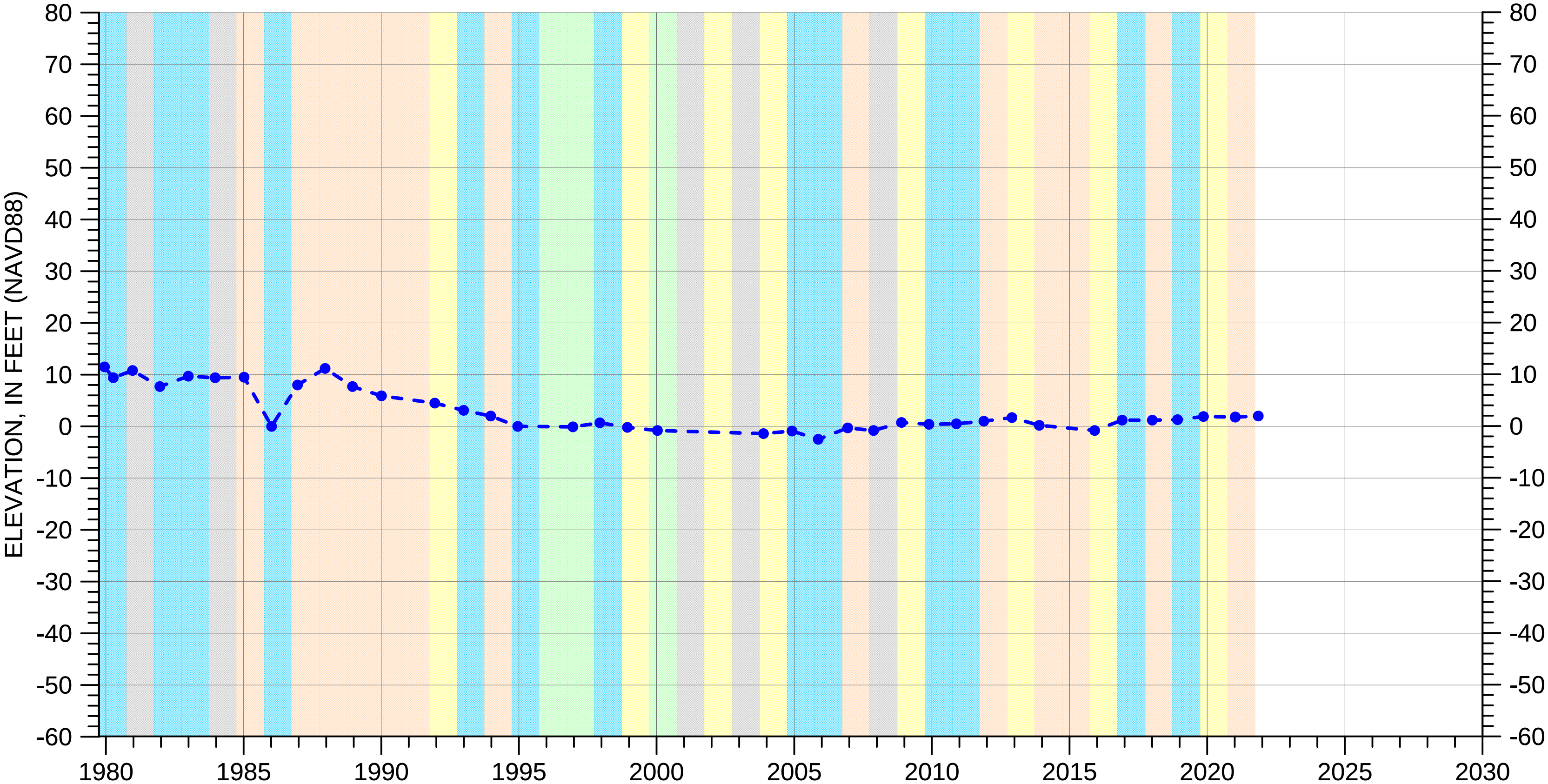
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-19H01

Langley Area Subbasin



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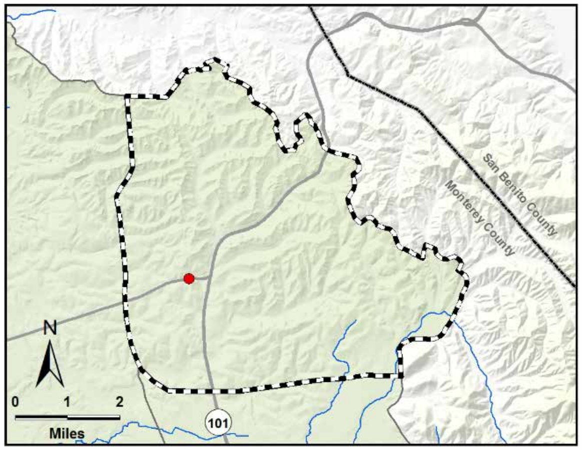
EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface (140 FT MSL)

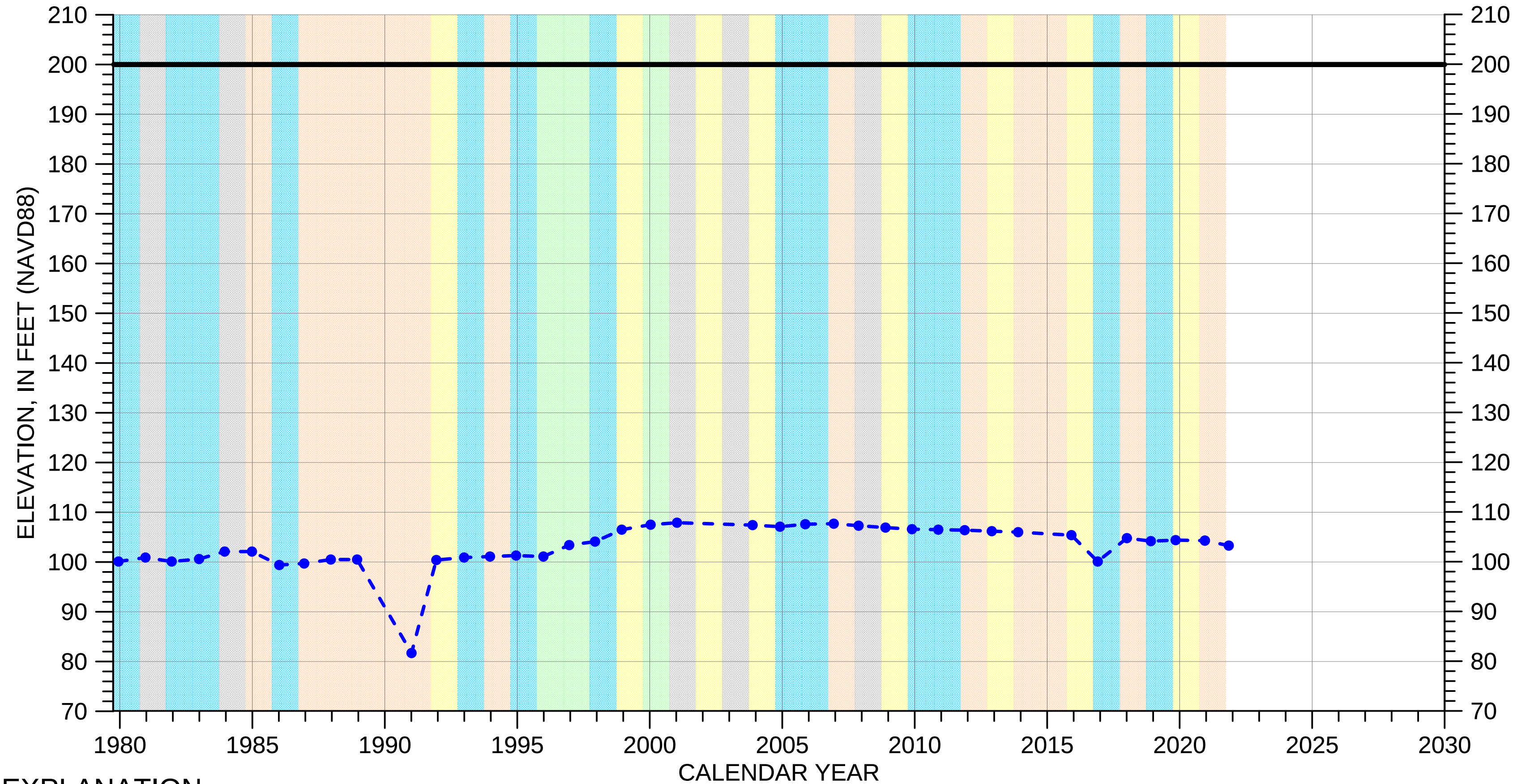


WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-20B02

Langley Area Subbasin



EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface

WATER YEAR TYPE DESIGNATION

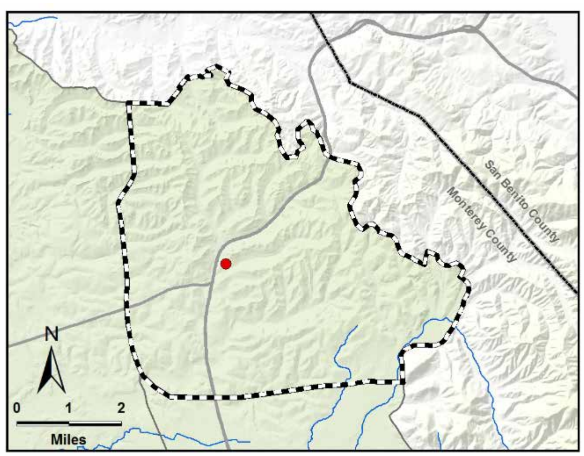
DRY

DRY - NORMAL

NORMAL

WET - NORMAL

WET



Perforated interval unknown

Well bottom elevation unknown

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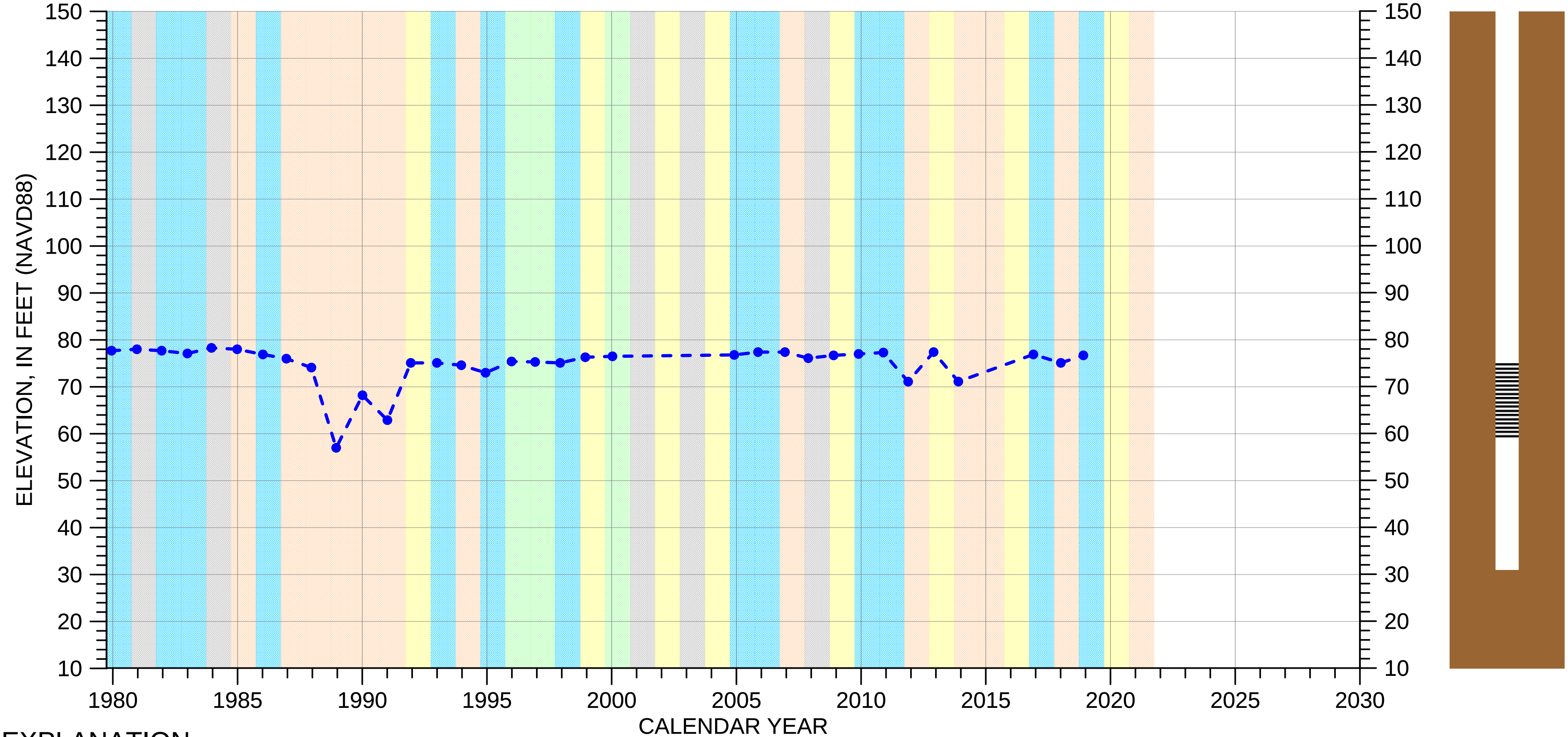
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-20P01

Langley Area Subbasin

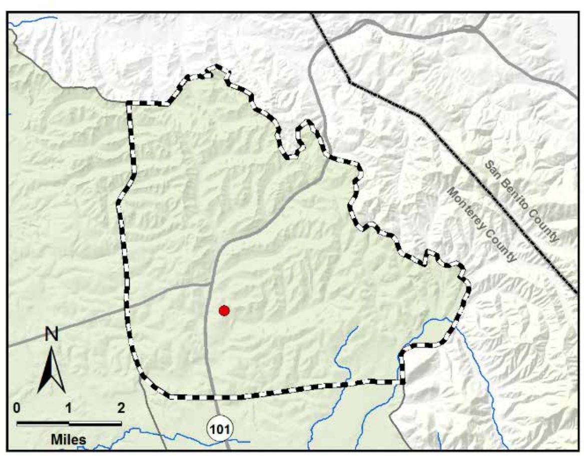


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface (223 FT MSL)

WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



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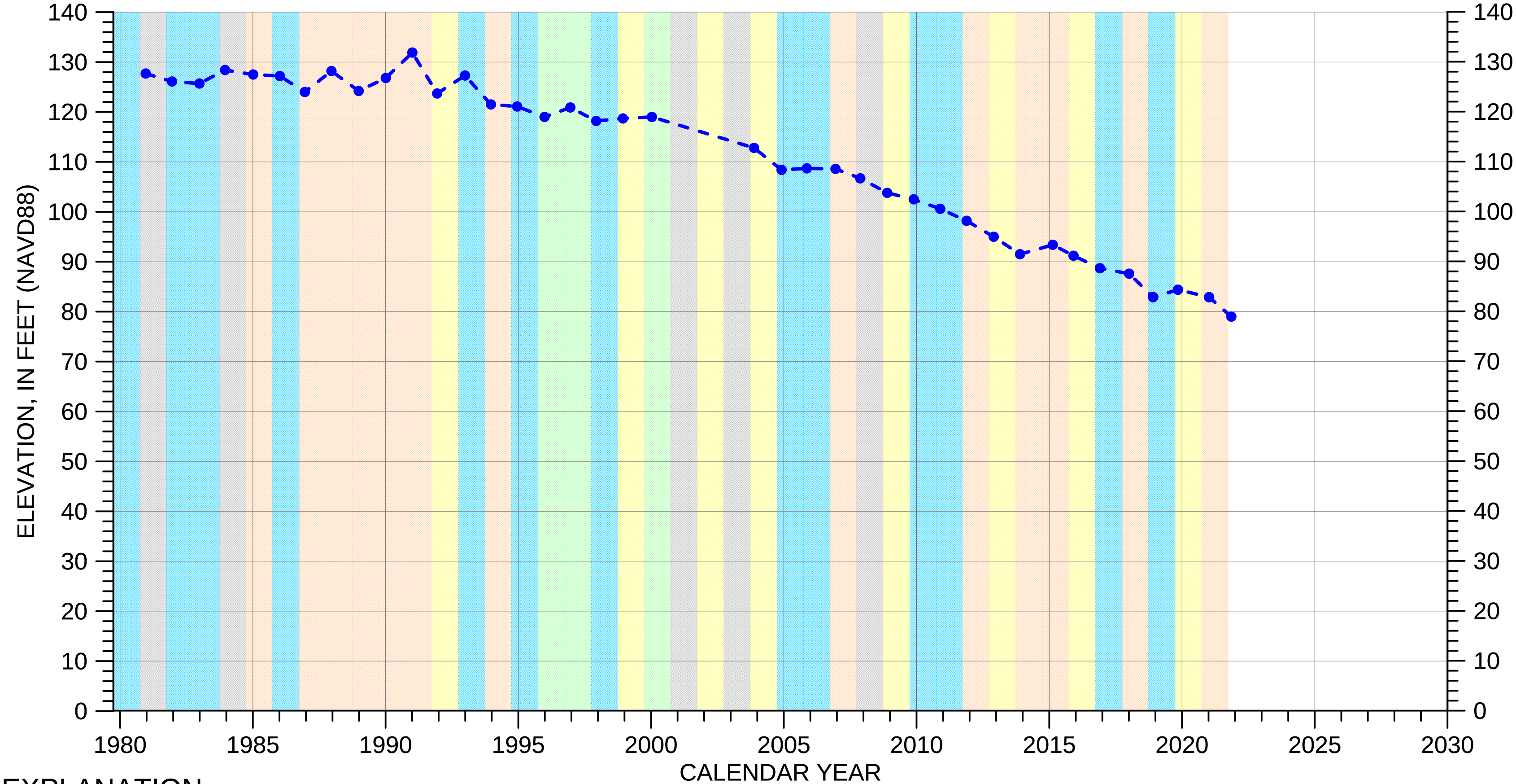
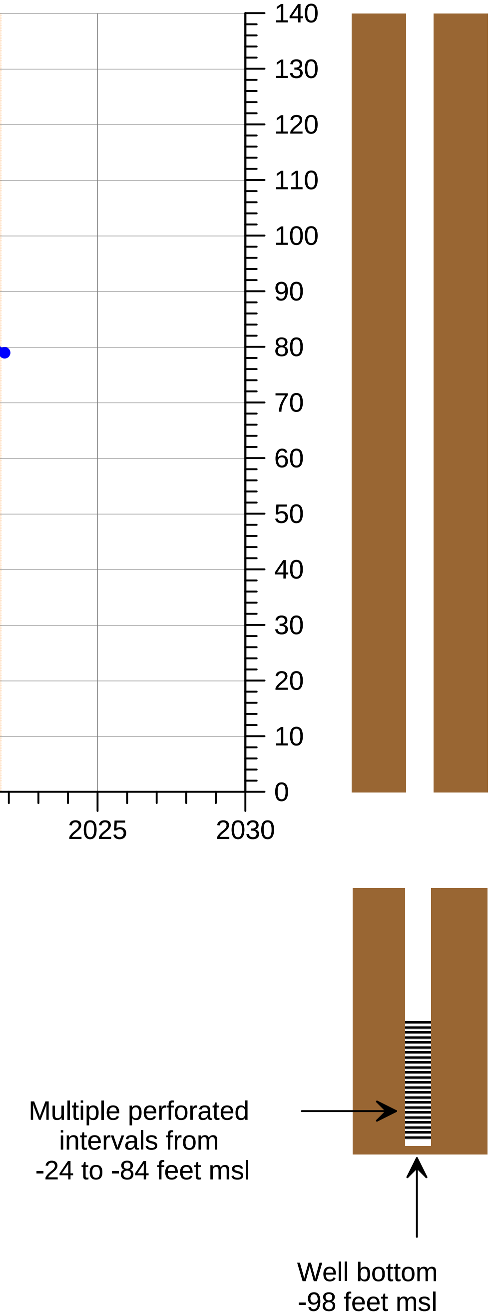
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-22F01

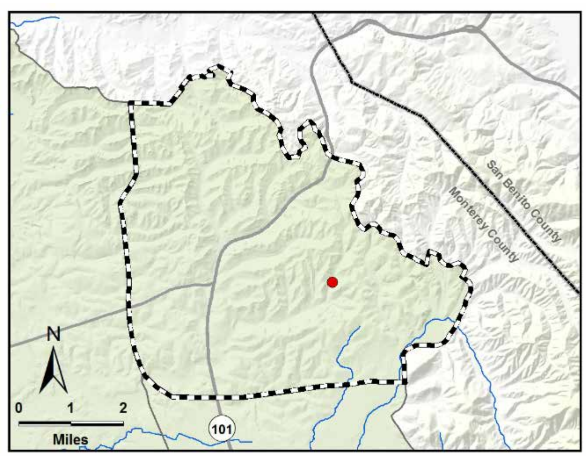
Langley Area Subbasin





EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface (236 FT MSL)



WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET

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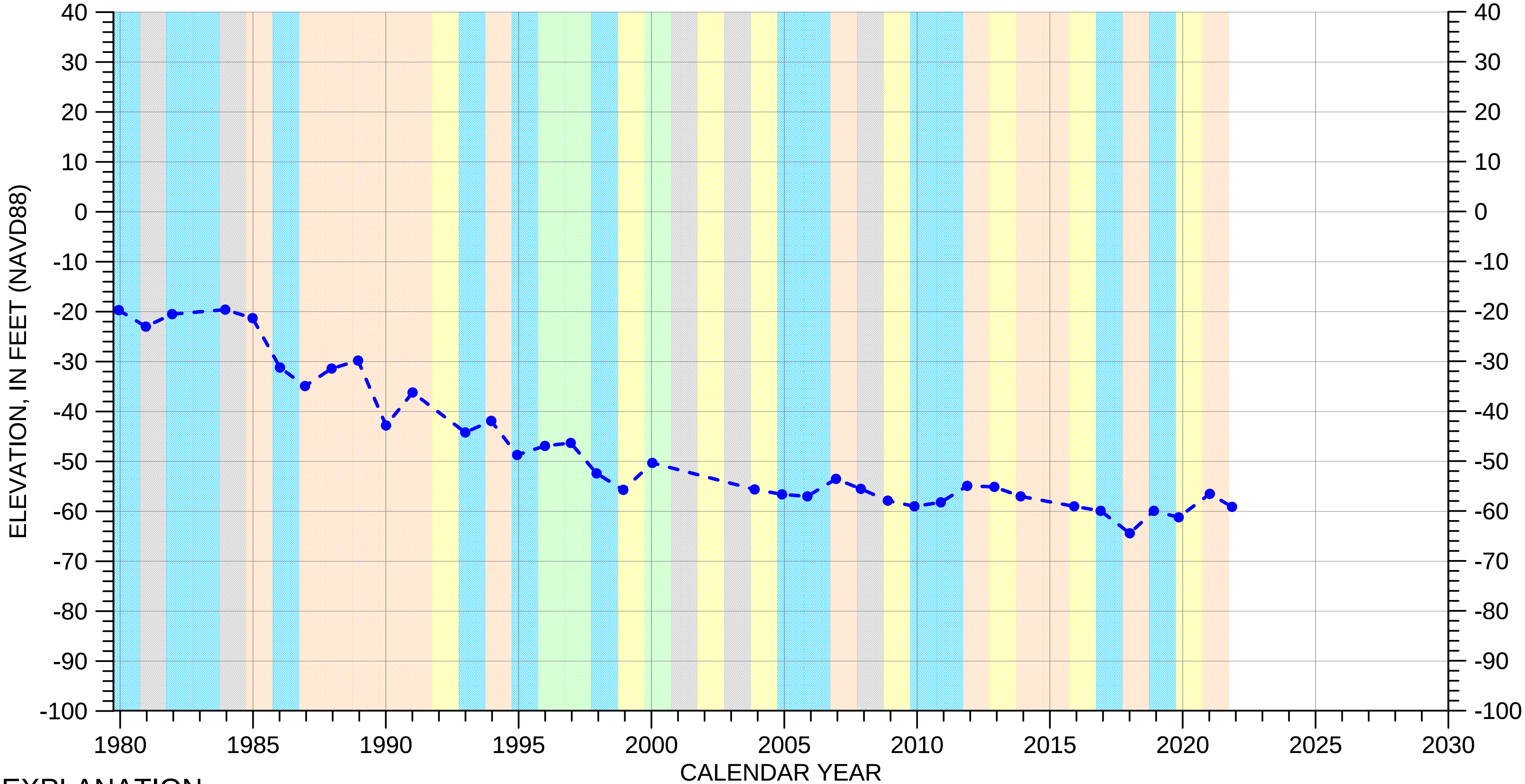
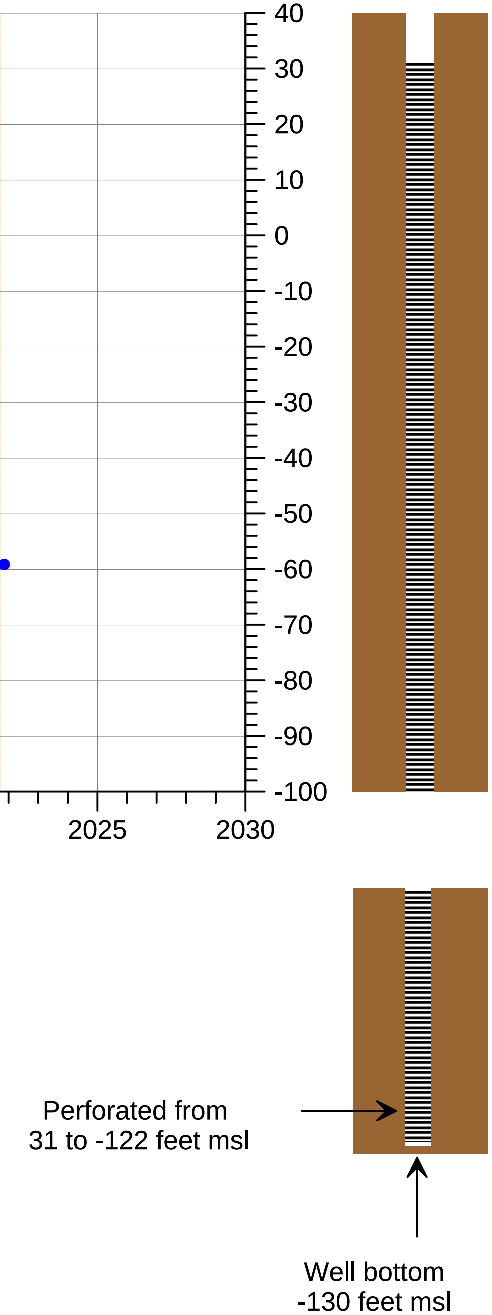
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-29A01

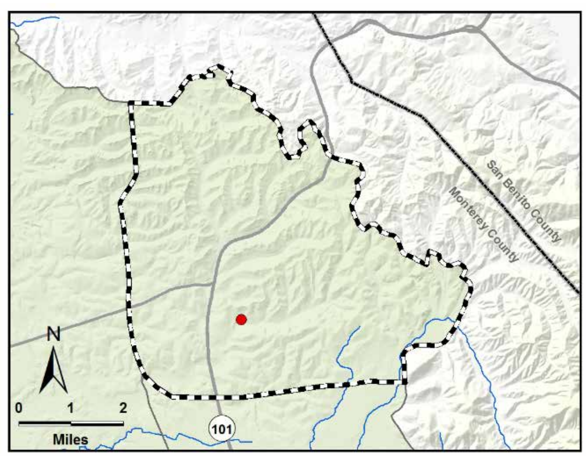
Langley Area Subbasin





EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface (71 FT MSL)



WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET

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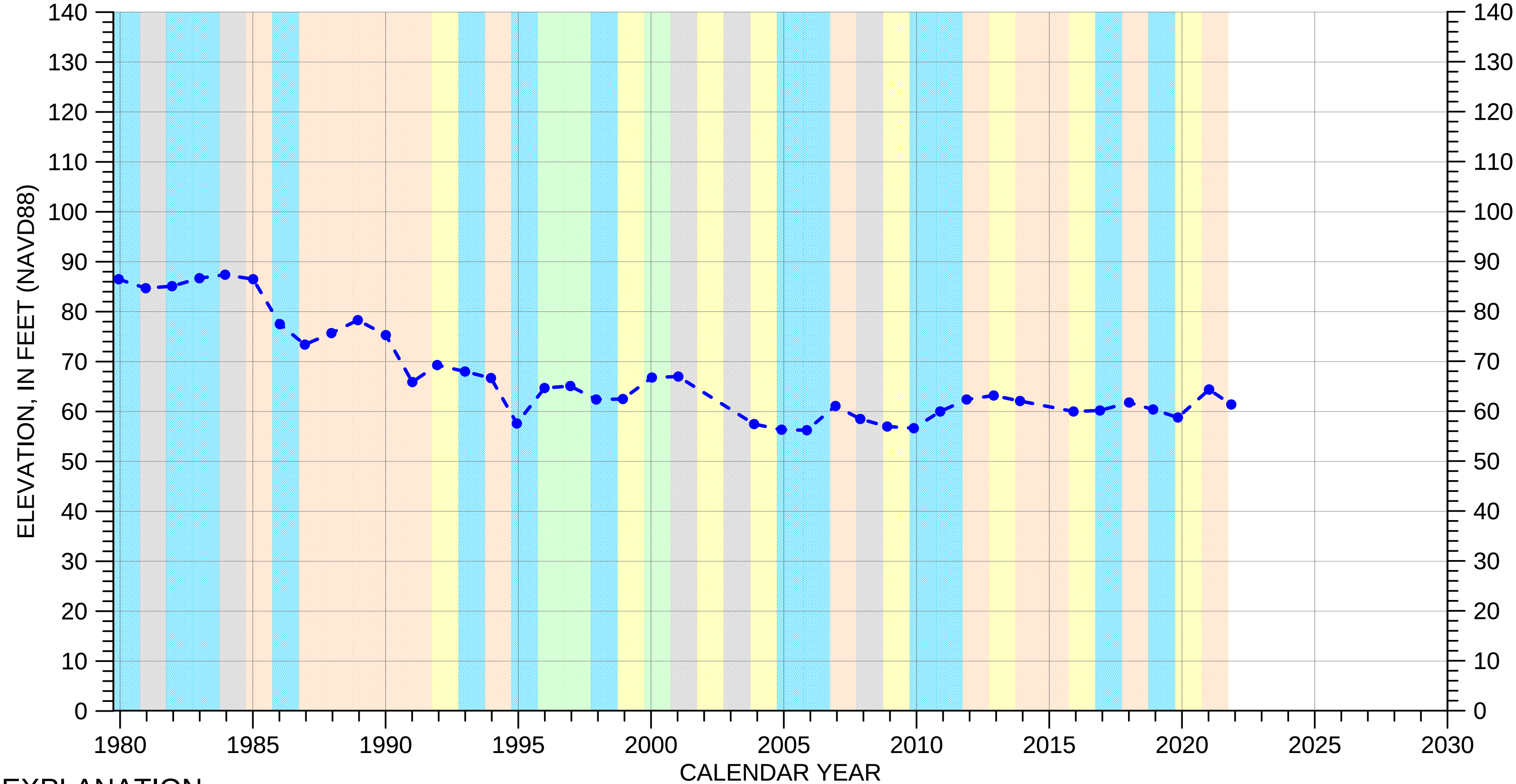
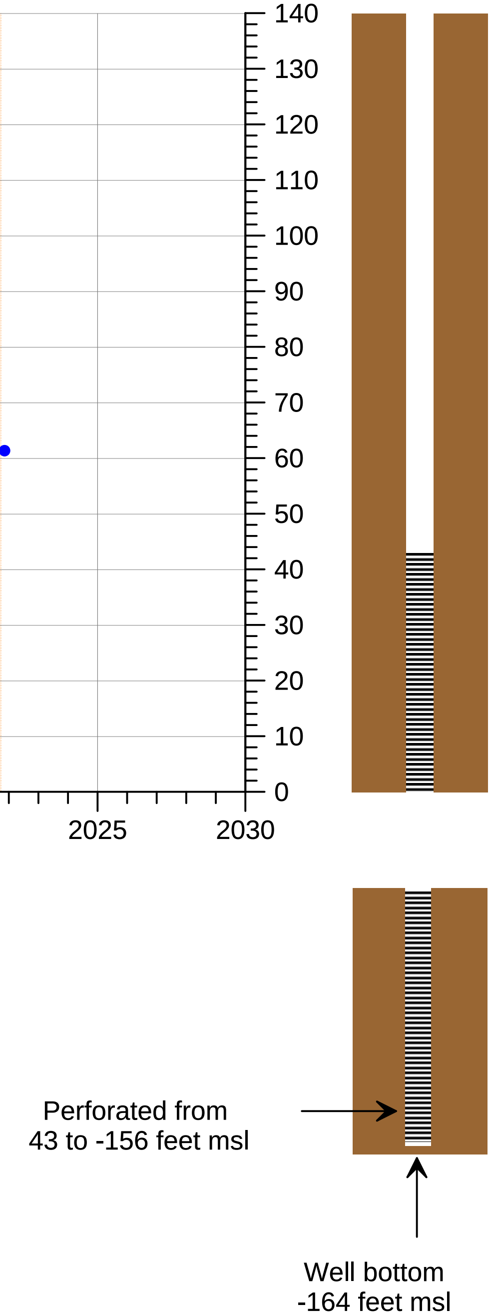
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-29K01

Langley Area Subbasin



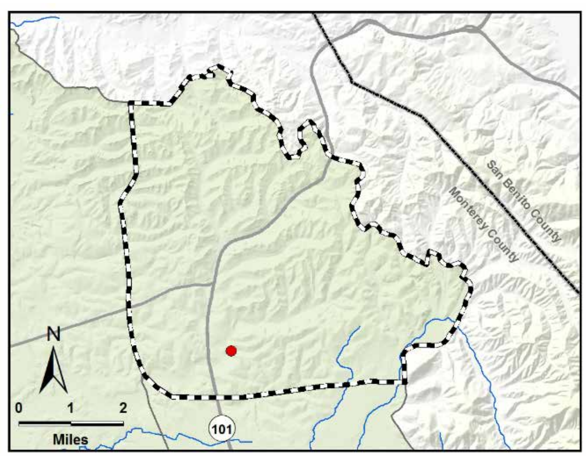


EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface (171 FT MSL)



WATER YEAR TYPE DESIGNATION

DRY
DRY - NORMAL
NORMAL
WET - NORMAL
WET

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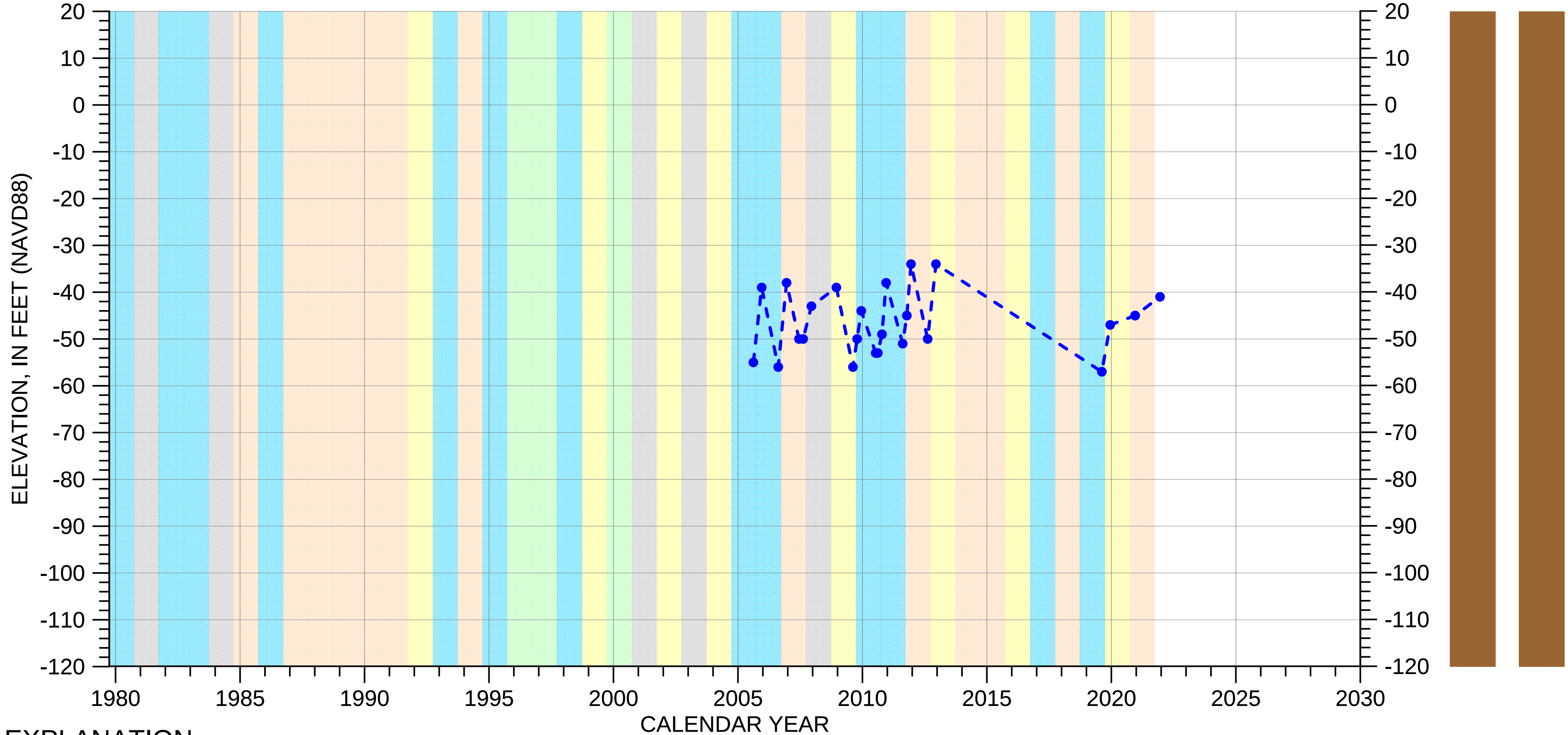
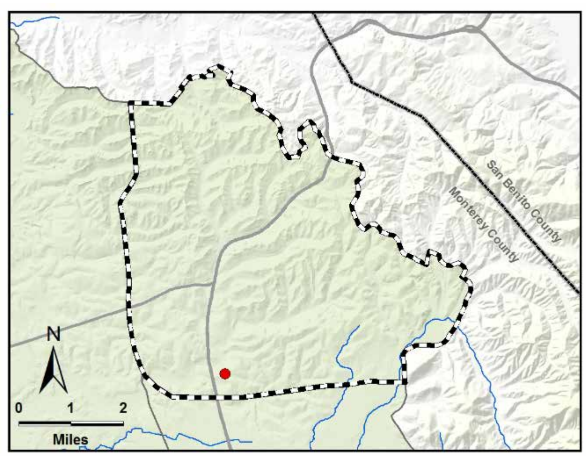
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-32H01

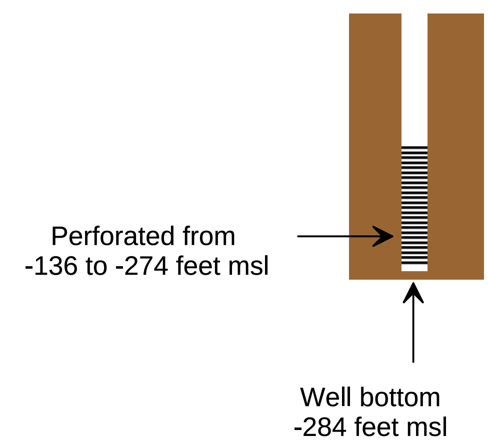
Langley Area Subbasin



EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface (116 FT MSL)





WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET

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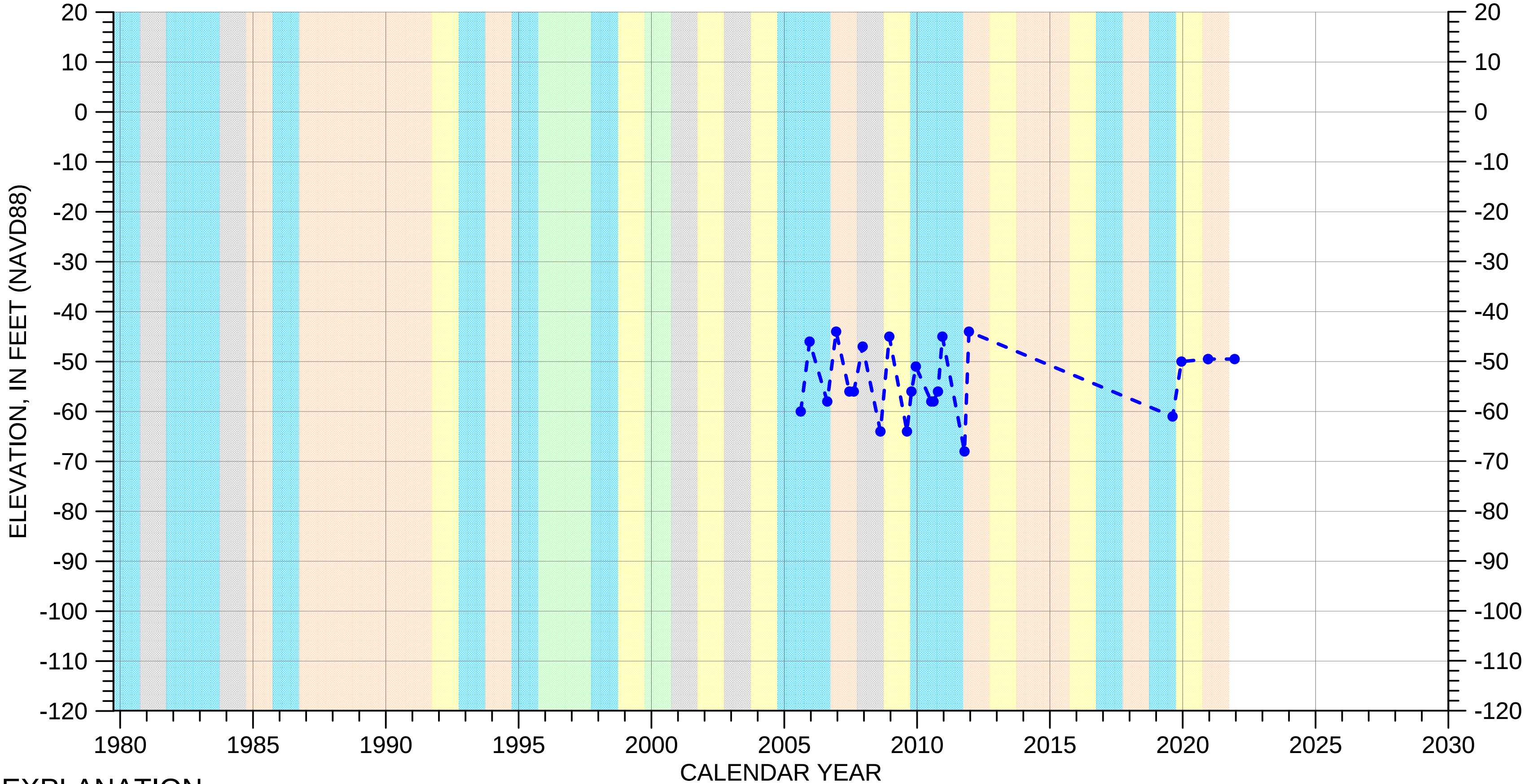
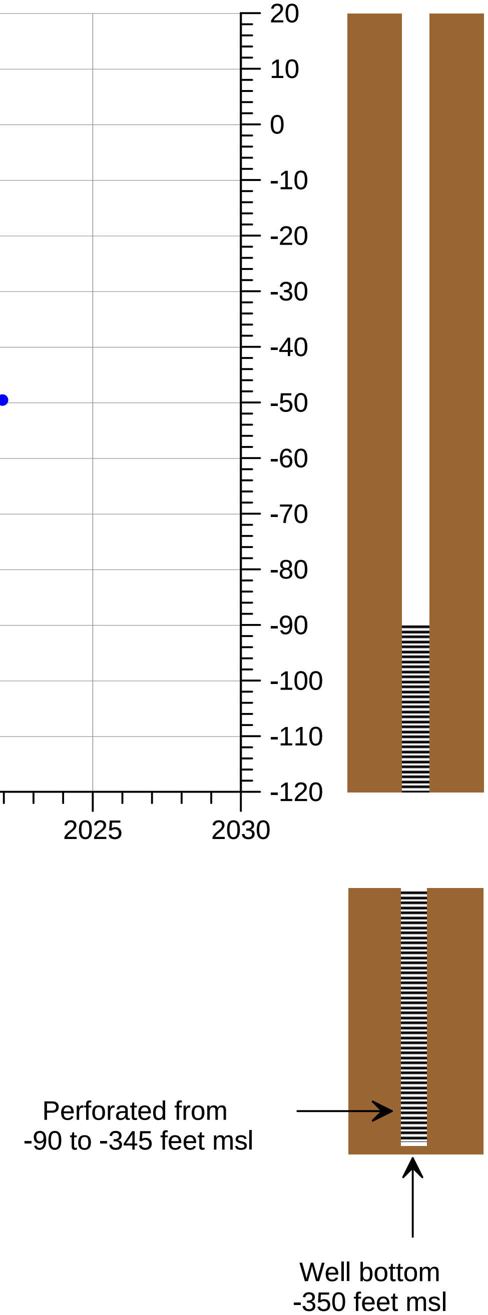
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/03E-33T50

Langley Area Subbasin



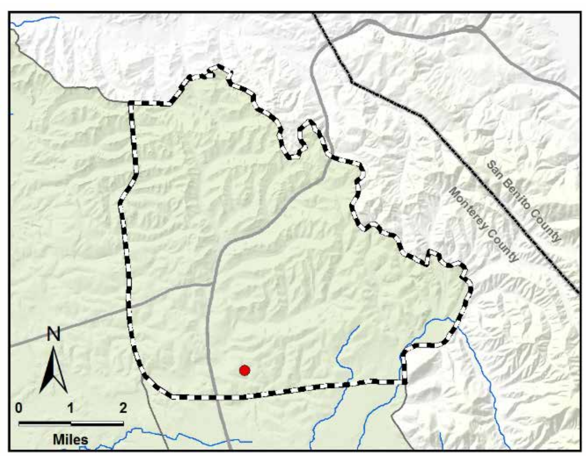


EXPLANATION

Groundwater Elevation

Suspect Measurement

Land Surface (150 FT MSL)



WATER YEAR TYPE DESIGNATION

DRY
DRY - NORMAL
NORMAL
WET - NORMAL
WET

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