

Salinas Valley: 180/400-Foot Aquifer Subbasin Groundwater Sustainability Plan – Amendment 2

VOLUME 2

Chapter 5. Groundwater Conditions

Chapter 6. Water Budgets

Chapter 7. Monitoring Networks

Chapter 8. Sustainable Management Criteria

Prepared for:

Salinas Valley Basin Groundwater Sustainability Agency

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5 GROUNDWATER CONDITIONS

Chapter 5 describes the 180/400 Subbasin groundwater conditions historically and at the beginning of GSP implementation, in accordance with the GSP Regulations § 354.16. This chapter focuses on information required by the GSP regulations and that is important for developing an effective plan to achieve sustainability. Chapter 5 provides a description of groundwater conditions historically and at the start of GSP implementation at a scale and level of detail appropriate for meeting the GSP sustainability requirements under SGMA.

In this GSP, historical conditions are conditions prior to the January 1, 2015, start of SGMA, and current conditions are conditions at the start of GSP implementation – referred to as GSP baseline in this chapter. The GSP baseline includes conditions generally occurring between 2015 and 2020. Where data does not exist for 2015 – 2020, more recent data has been incorporated. Otherwise, more recent data is reported in GSP annual reports and 5-year GSP periodic evaluations.

This chapter is organized to align the groundwater conditions descriptions with the 6 sustainability indicators relevant to this subbasin, including:

1. Chronic lowering of groundwater levels
2. Changes in groundwater storage
3. Seawater intrusion
4. Land subsidence
5. Groundwater quality
6. Depletion of ISW due to pumping

In addition, to meet the GSP Regulations § 356.4 assessment requirements, this chapter includes a section on water use.

5.1 Groundwater Elevations

5.1.1 Data Sources

The assessment of groundwater elevation conditions is largely based on data collected by MCWRA from 1944 through the present. MCWRA's monitoring programs are described in Chapter 3.

- Groundwater elevation data are analyzed and presented with 3 sets of graphics:
- Maps of groundwater elevation contours show the geographic distribution of groundwater elevations at a specific time. These contours represent the elevation of

the groundwater in feet, using the North American Vertical Datum of 1988 (NAVD88). The contour interval is 10 feet, meaning each blue line represents an area where groundwater elevations are either 10 feet higher or 10 feet lower than the next blue line (Figure 5-1 to Figure 5-8).

- Hydrographs of individual wells show the variations in groundwater elevations at individual wells over an extended period of time (Figure 5-9).
- Vertical hydraulic gradients in a single location assess the potential for vertical groundwater flow and its direction, as discussed in Section 5.1.4.

5.1.2 Groundwater Elevation Contours and Horizontal Groundwater Gradients

MCWRA biannually produces groundwater elevation contour maps for the Salinas Valley using data from their annual August trough and fall measurement programs. August groundwater elevations are contoured to assess the driving force of seawater intrusion because this is usually when the aquifers are the most stressed. The August measurements represent seasonal low conditions in the Subbasin.

MCWRA also contours fall groundwater elevations because these measurements are taken from mid-November to December after the end of the irrigation season and before seasonal recharge from winter precipitation increases groundwater levels. The fall measurements represent neutral conditions in the Subbasin. The true seasonal high varies year to year, typically occurring between January and March as a result of winter rain recharge and decreased groundwater pumping from agricultural wells. Some wells monitored during this period may become inaccessible during the rainy season, but the fall measurement program includes more wells and covers a larger geographic extent than the August trough program. Although fall measurements do not represent the true seasonal high, they are used as a surrogate for seasonal high conditions.

In this section, groundwater elevations from 2020 are used to illustrate the GSP baseline conditions at the start of GSP implementation and 1995 is used for historical conditions.

MCWRA has not produced groundwater elevation maps of the Deep Aquifers because there was insufficient data to map flow directions and groundwater elevations in the Deep Aquifers for 1995 and 2020. To address spatial data gaps identified in GSP Amendment 1 and the Salinas Valley Deep Aquifers Study (Montgomery & Associates, 2024b), the SVBGSA installed 3 new monitoring wells in the 180/400 Subbasin portion of the Deep Aquifers in 2023. With the addition of these wells, groundwater elevation contours can be developed for the full extent of the Deep Aquifers in the 180/400 Subbasin. Figure 5-9 and Figure 5-10 show the groundwater elevation contours for the Deep Aquifers for August and fall 2025, respectively, that were produced for the WY 2025 180/400 Subbasin Annual Report.

Table 5-1 lists the groundwater elevation contours presented in this Section for the 180/400 Subbasin. The groundwater elevation contours only cover the portions of the basin monitored by MCWRA. Contours do not always extend to subbasin margins.

Table 5-1. Figures Showing GSP Baseline and Historical Groundwater Elevation Contours

Figure #	Year	Season	Aquifer
Figure 5-1	2020 (GSP Baseline)	August Trough	180-Foot
Figure 5-2	2020 (GSP Baseline)	Fall	180-Foot
Figure 5-3	2020 (GSP Baseline)	August Trough	400-Foot
Figure 5-4	2020 (GSP Baseline)	Fall	400-Foot
Figure 5-5	1995 (Historical)	August Trough	180-Foot
Figure 5-6	1995 (Historical)	Fall	180-Foot
Figure 5-7	1995 (Historical)	August Trough	400-Foot
Figure 5-8	1995 (Historical)	Fall	400-Foot
Figure 5-9	2025	August Trough	Deep Aquifers
Figure 5-10	2025	Fall	Deep Aquifers

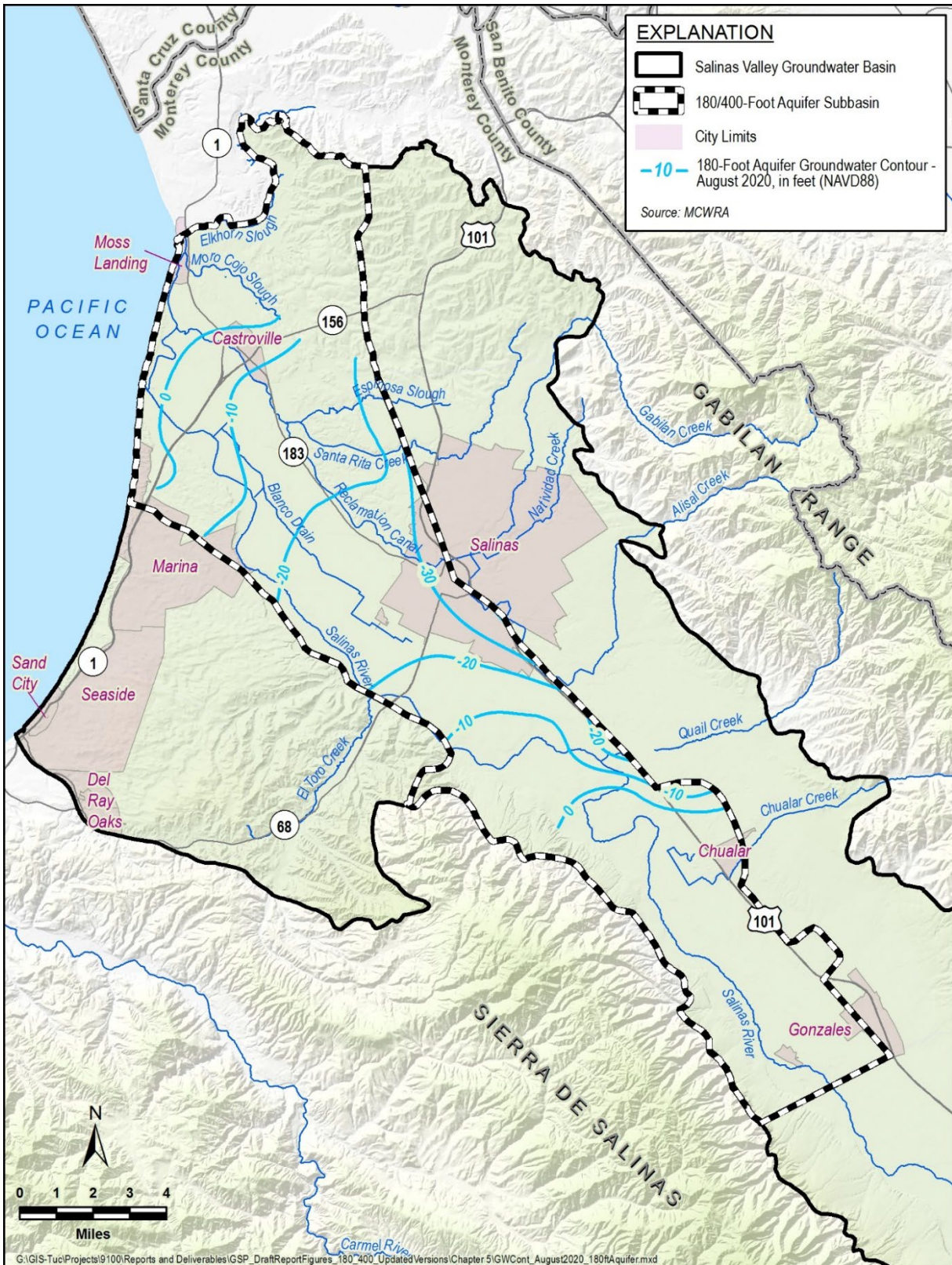


Figure 5-1. August 2020 180-Foot Aquifer Groundwater Elevation Contours

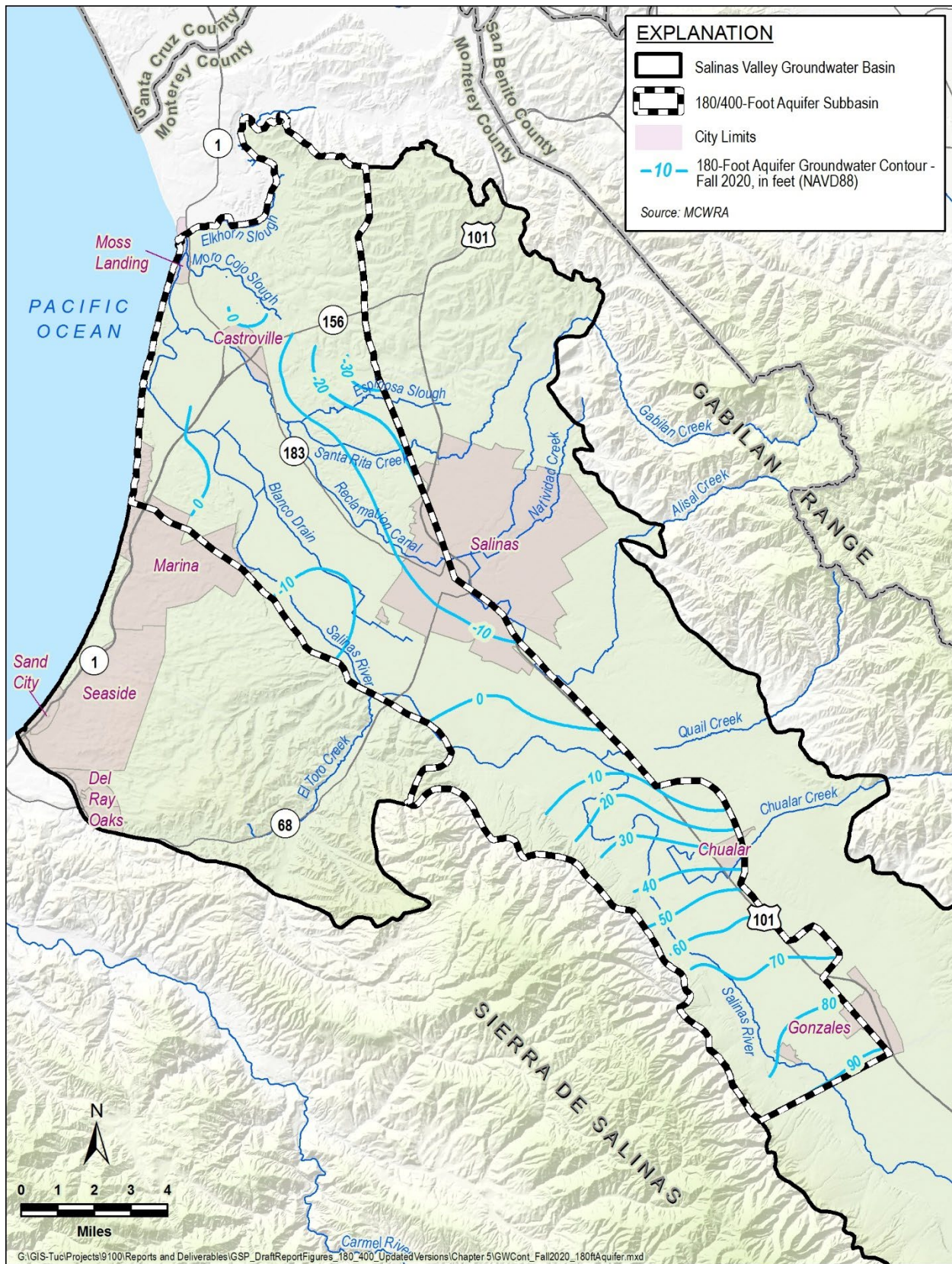


Figure 5-2. Fall 2020 180-Footer Aquifer Groundwater Elevation Contours

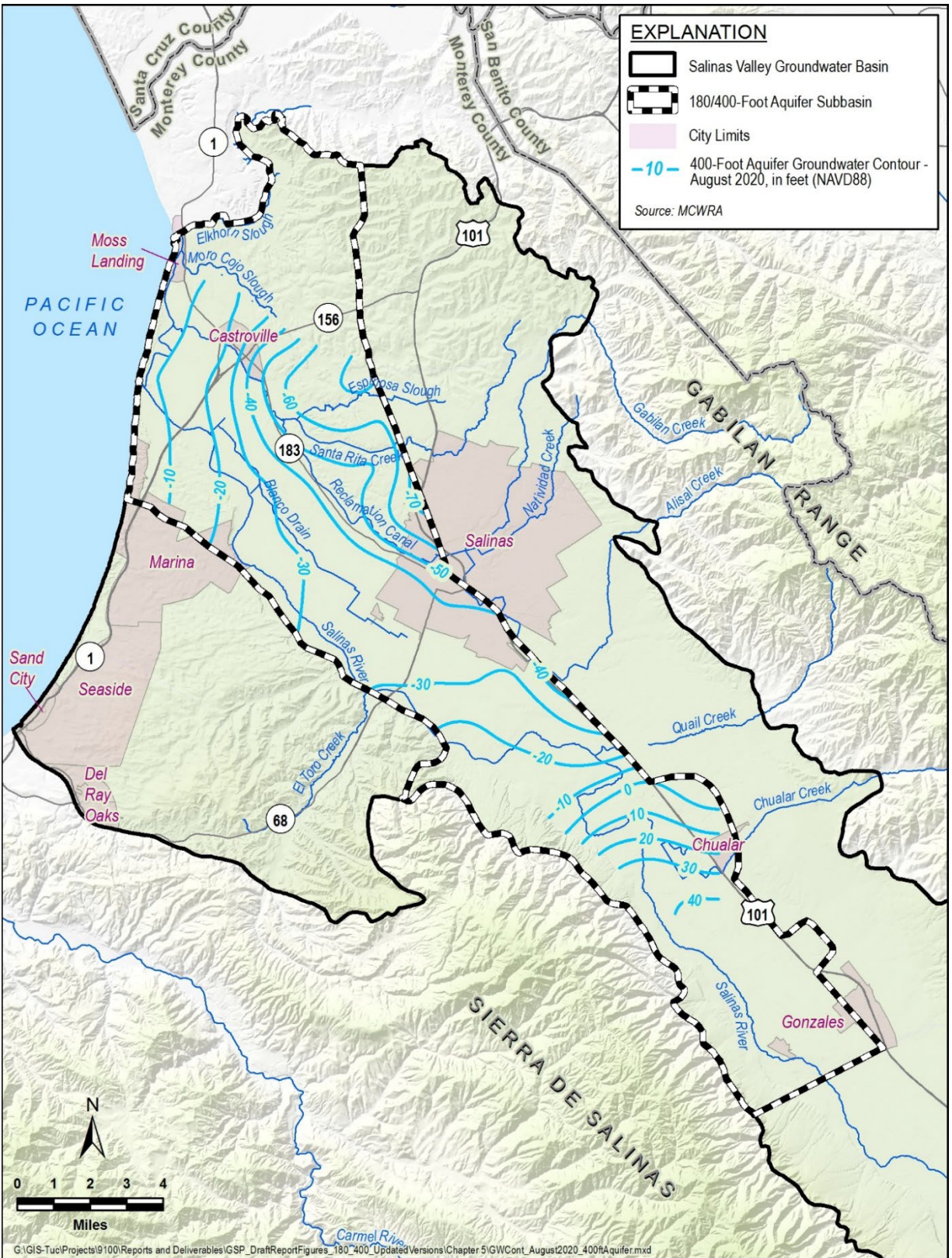


Figure 5-3. August 2020 400-Footer Aquifer Groundwater Elevation Contours

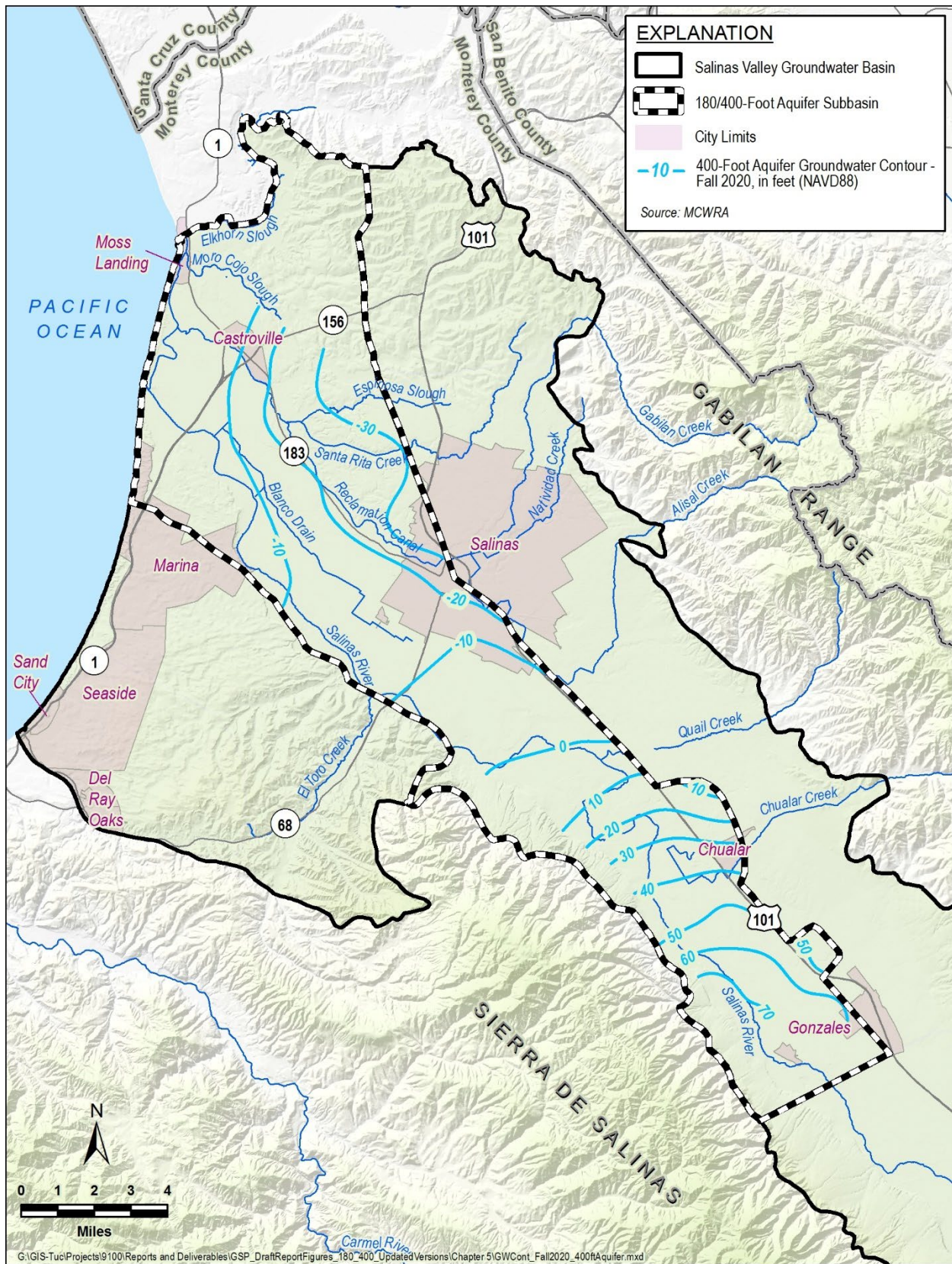


Figure 5-4. Fall 2020 400-Footer Aquifer Groundwater Elevation Contours

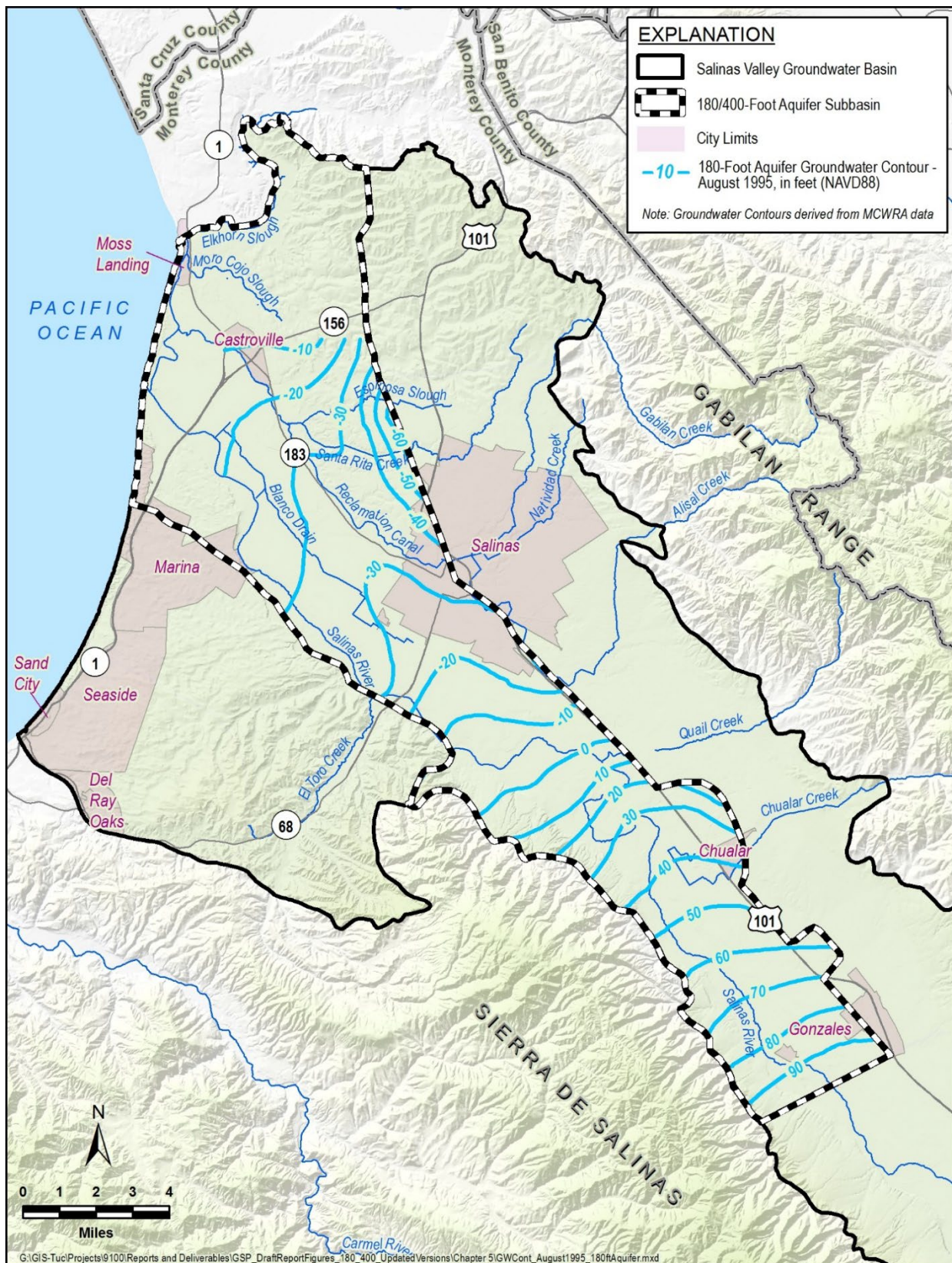


Figure 5-5. August 1995 180-Foot Aquifer Groundwater Elevation Contours

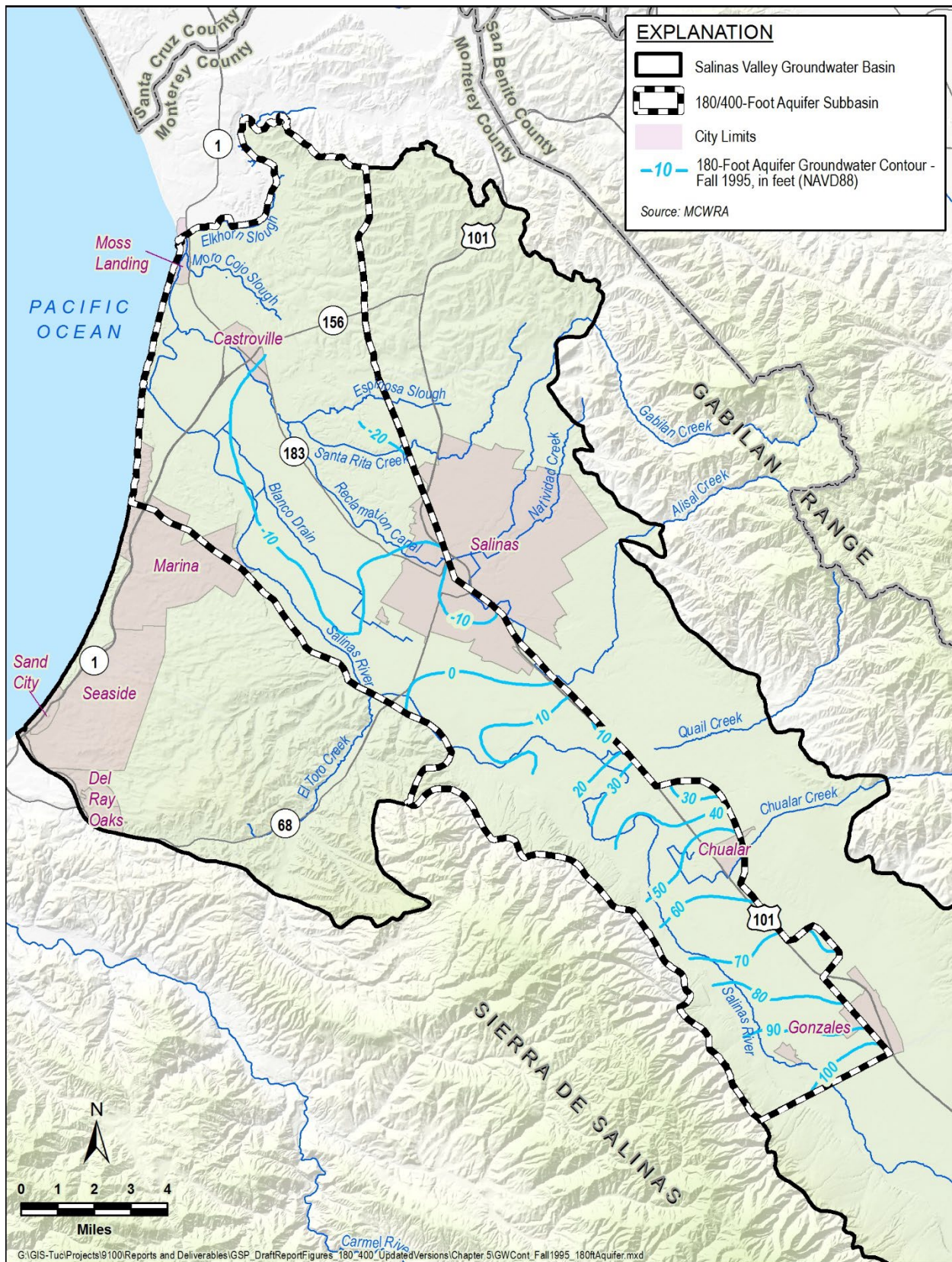


Figure 5-6. Fall 1995 180-Footer Aquifer Groundwater Elevation Contours

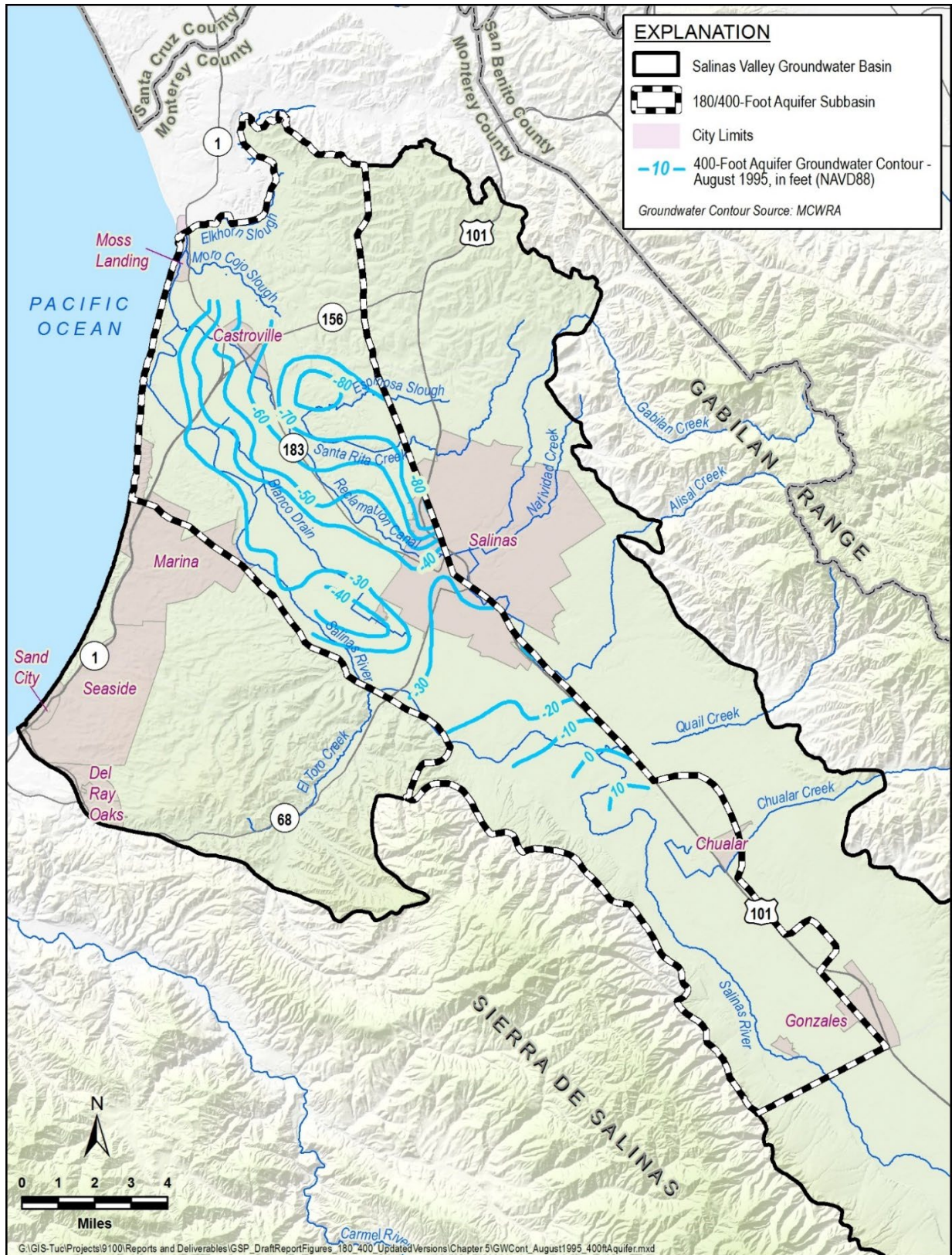


Figure 5-7. Fall 1995 400-Foot Aquifer Groundwater Elevation Contours

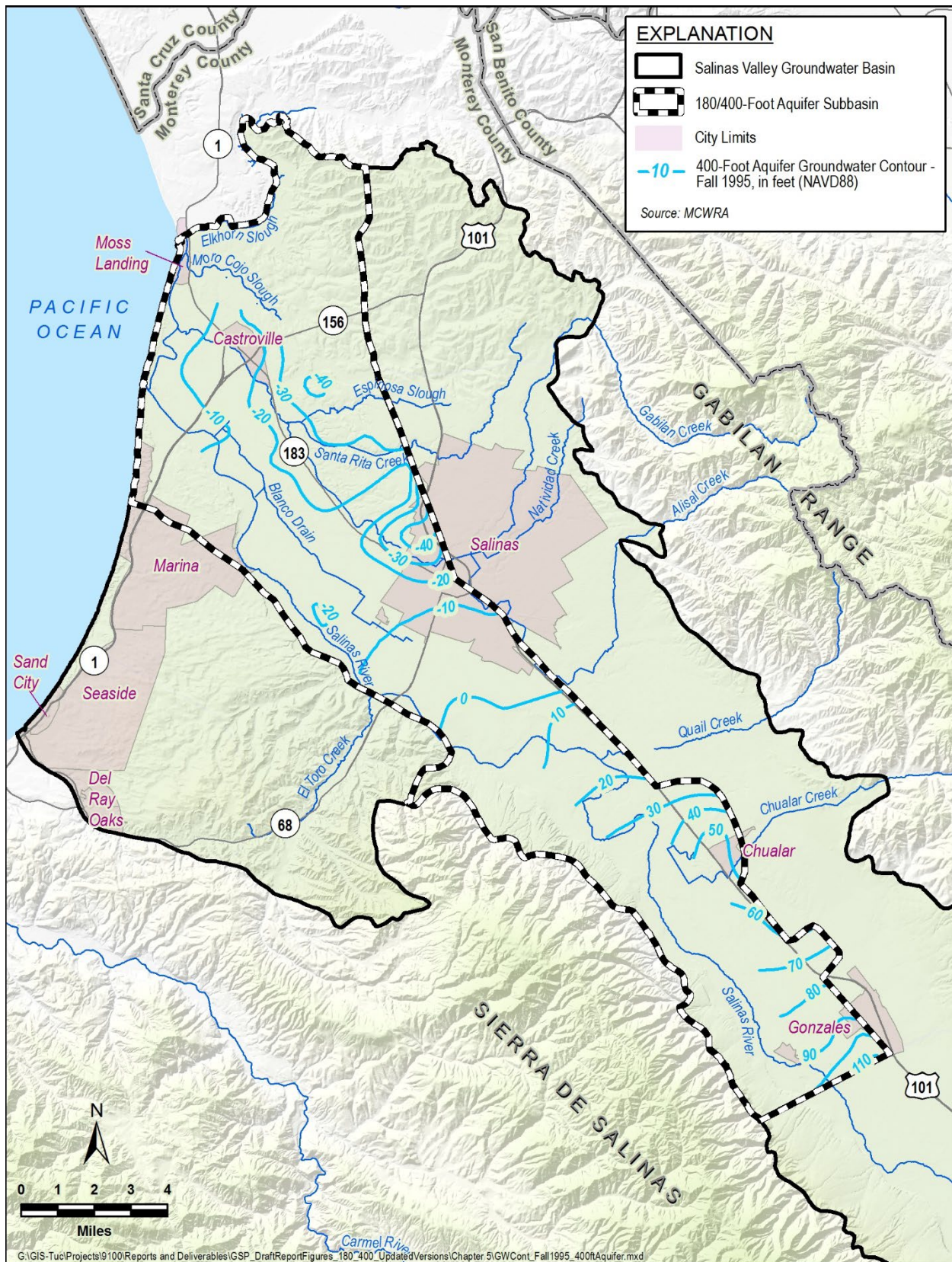


Figure 5-8. Fall 1995 400-Footer Aquifer Groundwater Elevation Contours

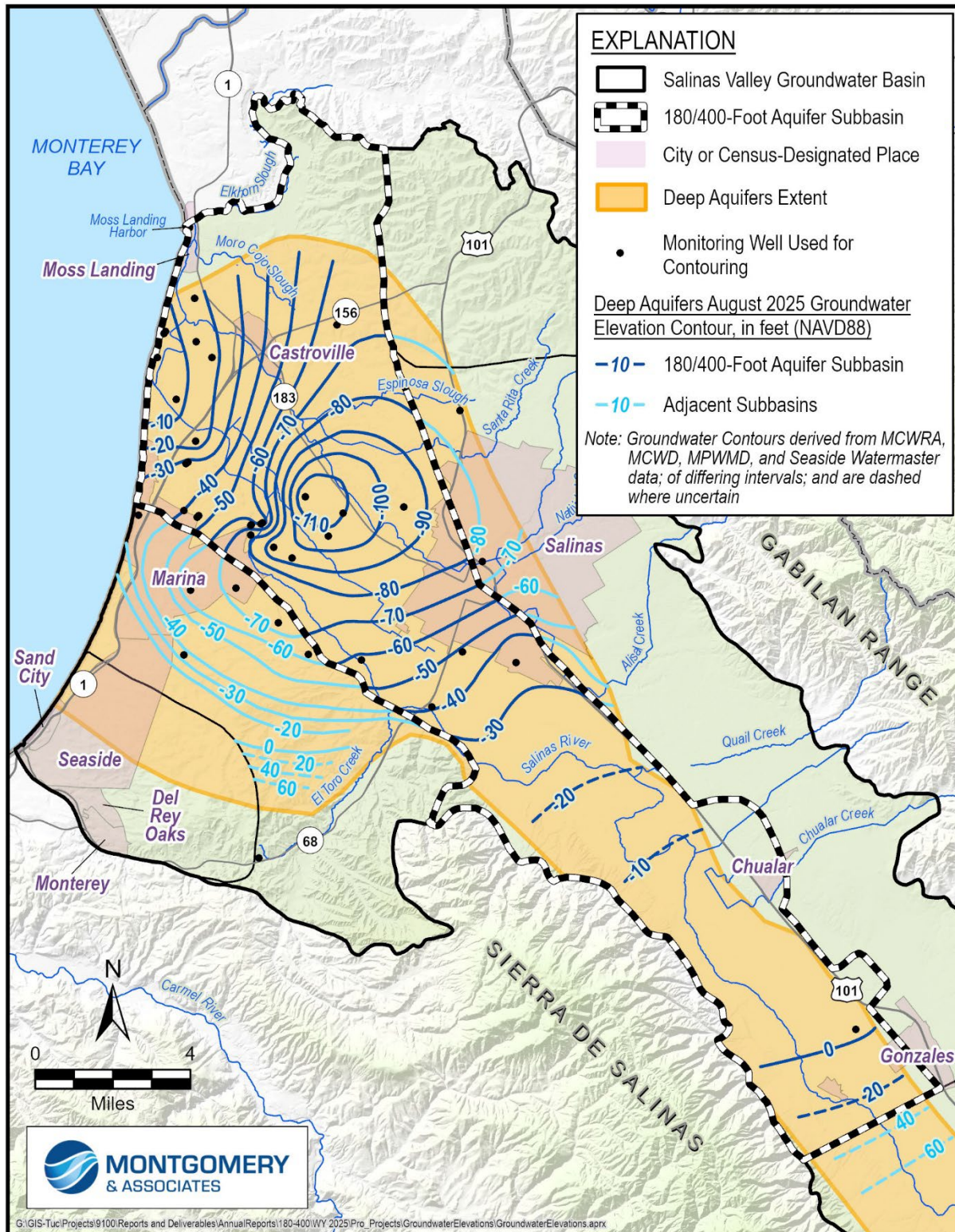


Figure 5-9. August 2025 Deep Aquifers Groundwater Elevation Contours

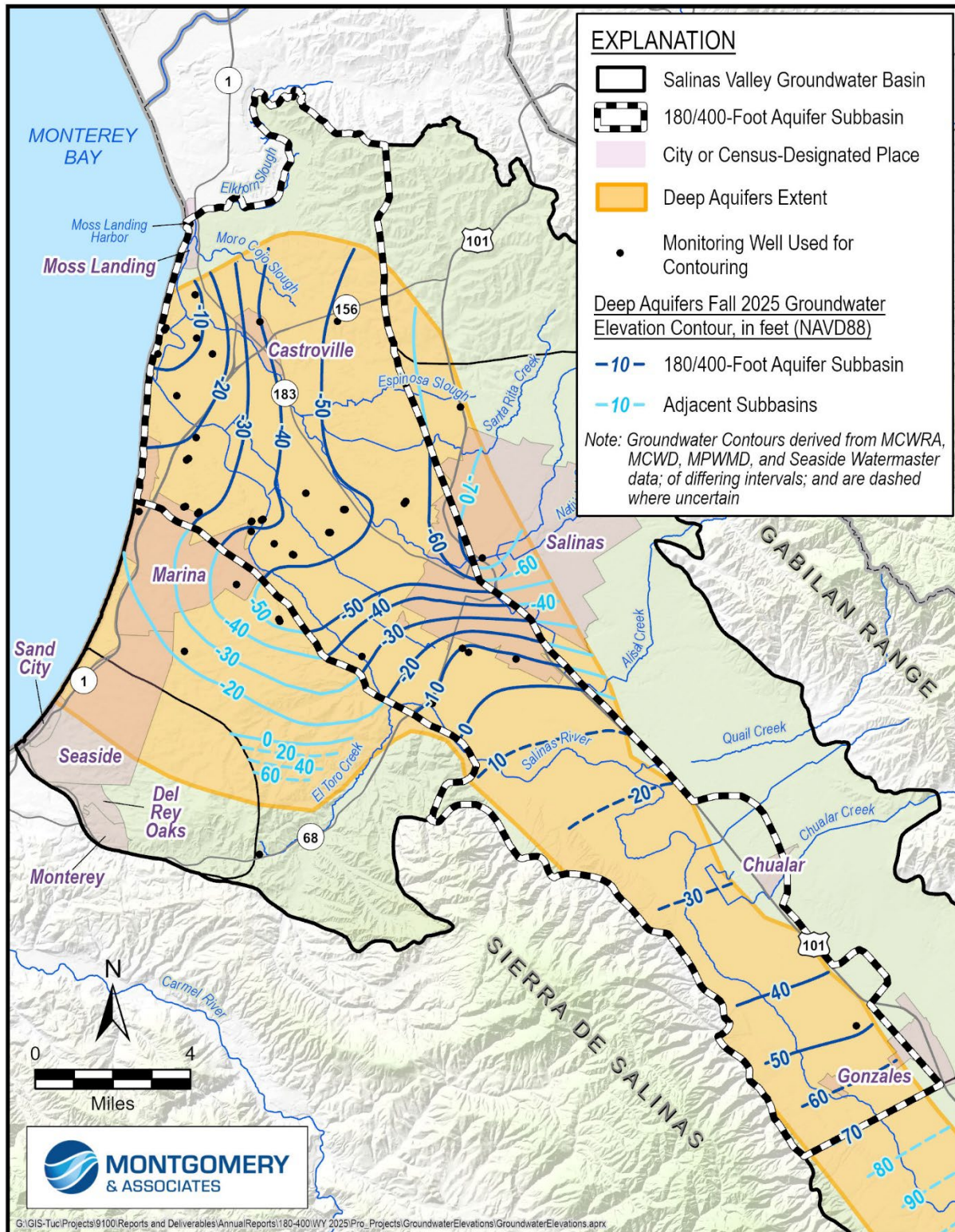


Figure 5-10. Fall 2025 Deep Aquifers Groundwater Elevation Contours

Groundwater generally flows from the south and from adjacent basins toward the north-northwest, with localized depressions around the pumping centers like those along the boundary with the Eastside Subbasin northwest of the City of Salinas. The contours indicate that groundwater flow directions are similar in the 180-Foot and 400-Foot Aquifers. However, based on these contours, groundwater elevations in the 400-Foot Aquifer are generally lower than groundwater elevations in the 180-Foot Aquifer during both 1995 and 2020.

Under GSP baseline conditions (Figure 5-1 to Figure 5-4), groundwater elevations in the northern half of the Subbasin are below sea level, estimated as zero feet NAVD88, as indicated by the negative values on the contour lines. The lowest groundwater elevations for both the 180-Foot and 400-Foot Aquifers occur northwest of the City of Salinas along the boundary with the Eastside Subbasin. In the 180-Foot Aquifer, minimum groundwater elevations are approximately -30 feet NAVD88 during the fall measurements and -40 feet NAVD88 during the August measurements. In the 400-Foot Aquifer, minimum groundwater elevations are approximately -30 feet NAVD88 during the fall measurements and -80 feet NAVD88 during the August measurements. The hydraulic gradients differ throughout the Subbasin and are difficult to quantify based on variable groundwater elevations.

Groundwater elevations in the 180/400 Subbasin increase to the west toward the boundary with the Monterey Bay. They also increase toward the southern boundary with the Forebay Subbasin where groundwater elevations are greater than 90 feet NAVD88 in the 180-Foot Aquifer (Figure 5-1 and Figure 5-2) and greater than 40 feet NAVD88 in the 400-Foot Aquifer (Figure 5-3 and Figure 5-4).

Under the historical conditions of 1995, a similar flow pattern to that of the GSP baseline conditions was present in both the 180-Foot and 400-Foot Aquifers; however, the magnitude of the pumping trough has varied over time. A discussion of historical groundwater elevation changes is presented in Section 5.1.3.

5.1.3 Hydrographs

Representative temporal trends in groundwater elevations can be assessed with hydrographs, which plot changes in groundwater elevations over time. Groundwater elevation data from wells within the Subbasin are available from monitoring conducted and reported by MCWRA.

Figure 5-11 depicts the locations and hydrographs of example monitoring wells in the Subbasin. Larger versions of the hydrographs for these wells, as well as all Representative Monitoring Sites (RMS), are included in Appendix 5A. Chapter 7 provides more information specific to the wells and the monitoring system.

All the example hydrographs show seasonal fluctuation from the summer months when groundwater elevations are the lowest to the winter months when groundwater elevations

recover. Periodic declines in groundwater elevations illustrate times of drought. Some wells show recovery, especially those in the 180-Foot and 400-Foot Aquifers. Other wells, like those in the Deep Aquifers, continue to decline despite wetter climate.

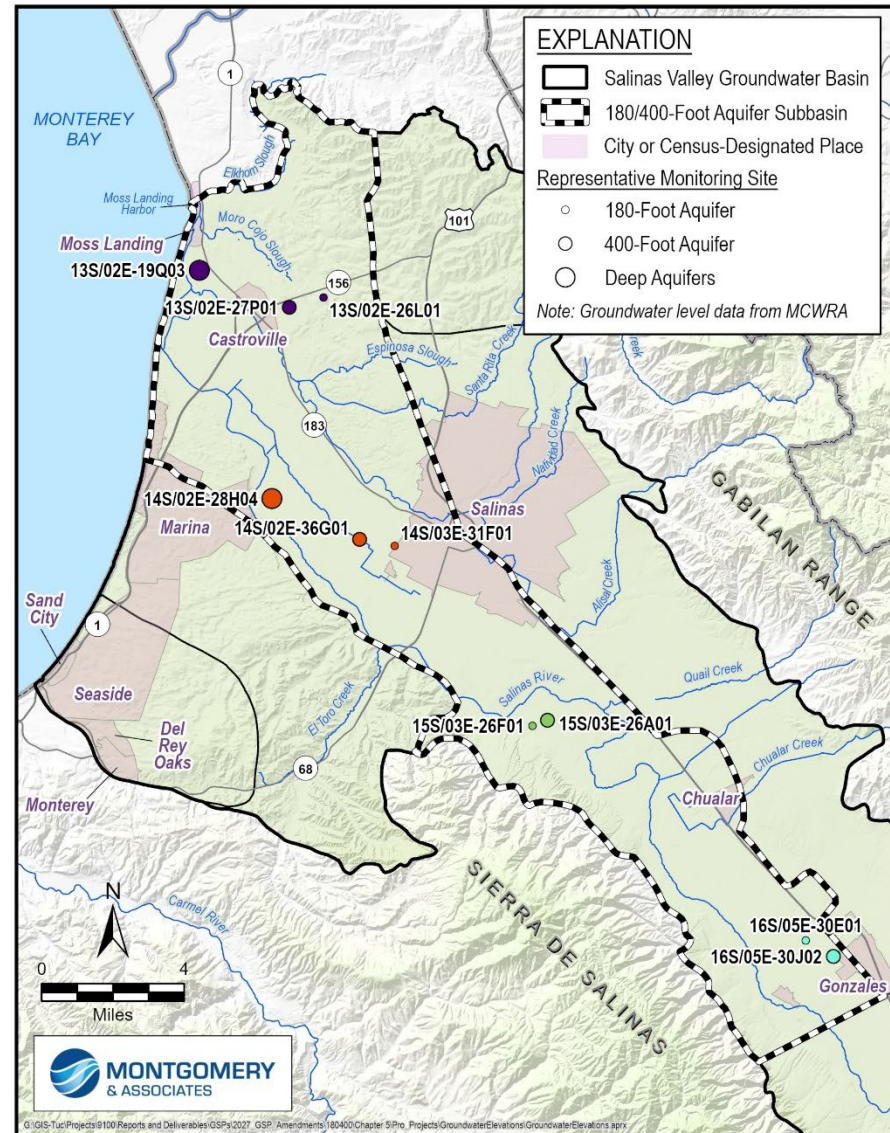
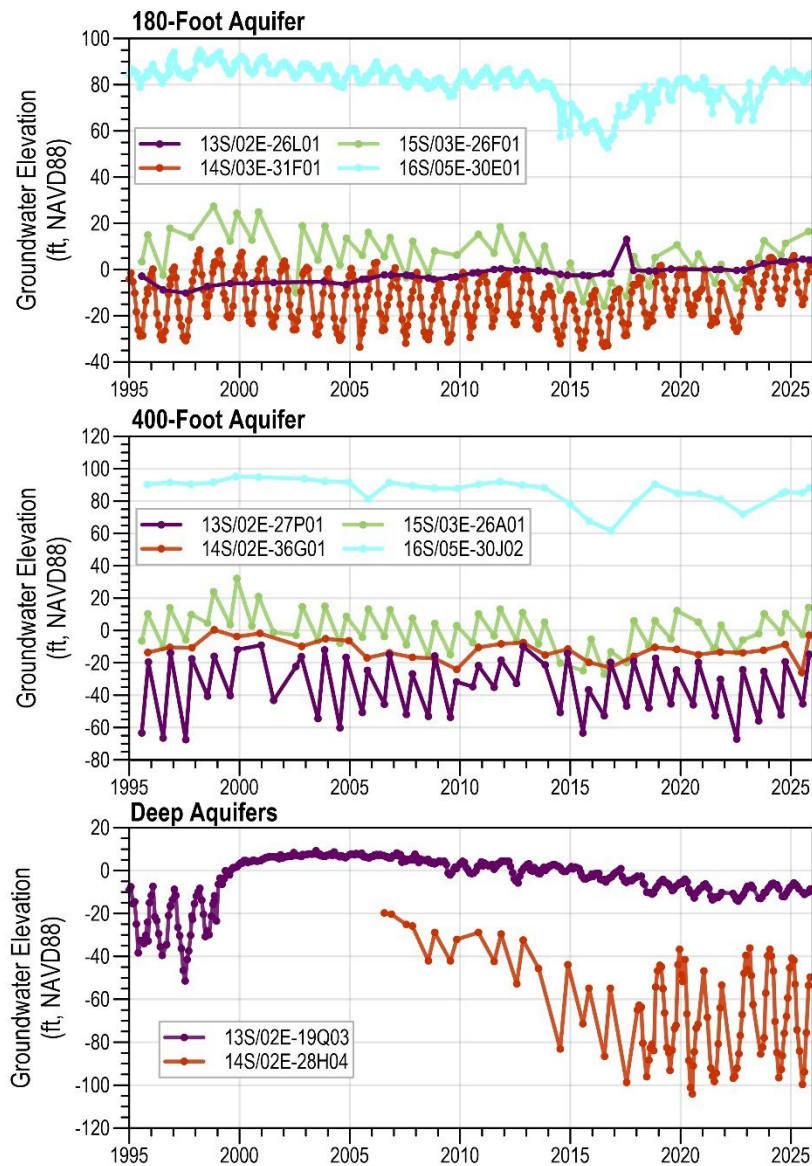
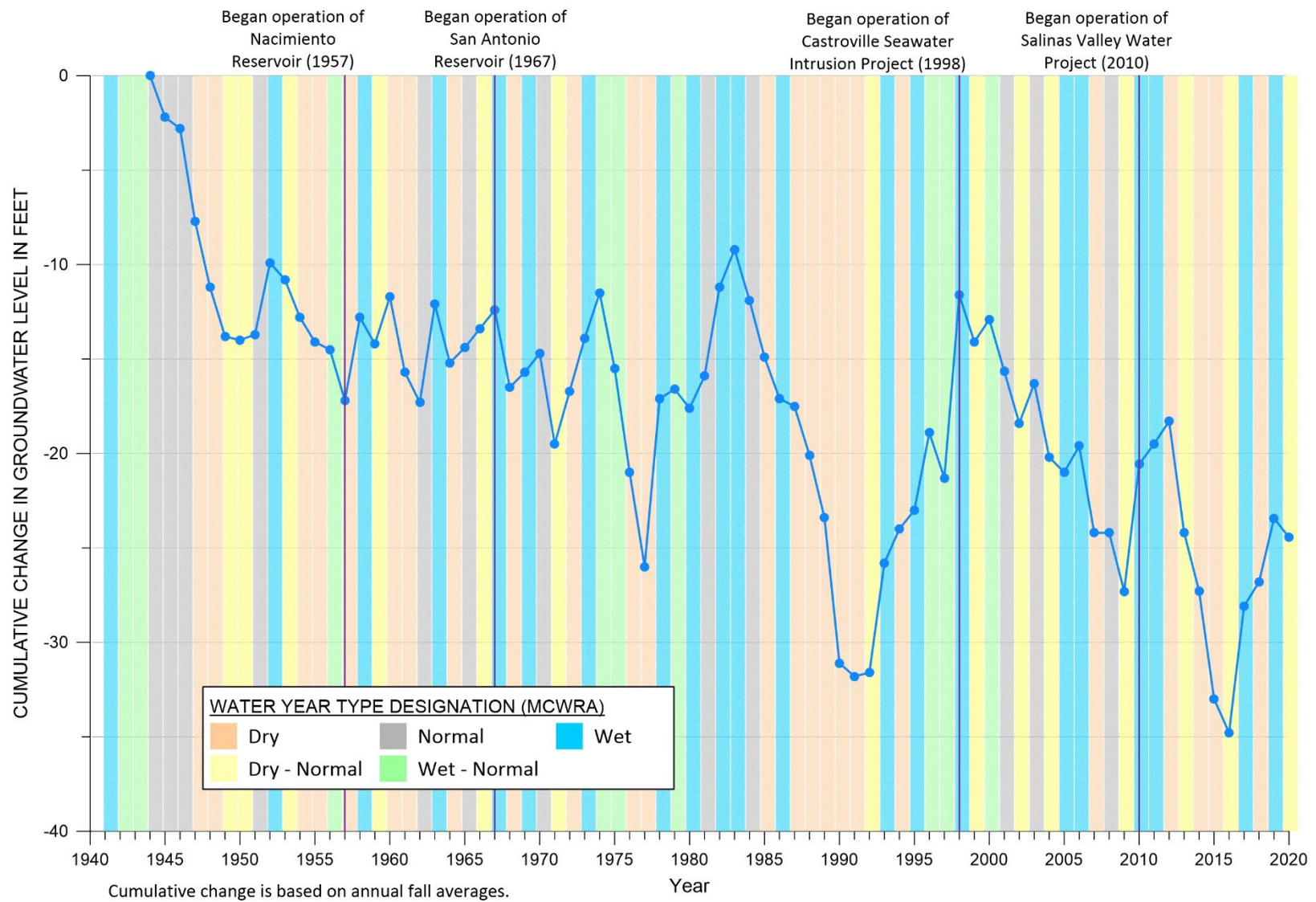


Figure 5-11. Map of Example Hydrographs

Figure 5-12 presents a graph of cumulative groundwater elevation change for the 180/400 Subbasin. The graph was initially developed by MCWRA and is based on average change in fall groundwater elevations for designated wells in the Pressure subarea each year. The Pressure subarea, used by MCWRA for its groundwater elevation change analyses, overlaps the 180/400 Subbasin, small parts of the Eastside Subbasin, and most of the Monterey and Seaside Subbasins (Figure 3-3). The figure was adapted to reflect the cumulative change in groundwater elevations specific to the 180/400 Subbasin.

Fall measurements occur at the end of the irrigation season and before groundwater levels increase due to seasonal recharge by winter rains and/or seasonal decreases in groundwater pumping. These measurements record annual changes in storage reflective of groundwater recharge and withdrawals in the Subbasin. The cumulative groundwater elevation change plot is therefore an estimated average hydrograph for wells in the subarea. Although this plot does not reflect the groundwater elevation change at any specific location, it provides a general illustration of how the average groundwater elevation in the subarea changes in response to climatic cycles, groundwater extraction, and water resources management at the subbasin scale.

The cumulative elevation change graph and the specific hydrographs presented in Appendix 5A show that groundwater elevations in the Subbasin show a long-term decline over time.



(Adapted from 2018 personal communication with MCWRA)

Figure 5-12. Cumulative Groundwater Elevation Change Graph for the 180/400 Subbasin

5.1.4 Vertical Groundwater Gradients

In the 180/400 Subbasin, the laterally extensive aquitards result in notable vertical hydraulic gradients. In some places, groundwater elevations are up to 50 feet lower in deeper wells than in shallower wells. Because the downward vertical gradients are likely caused by pumping, the magnitudes of the vertical gradients in many areas are greater during the irrigation season. However, although vertical gradients are suggested by measured groundwater elevations at grouped wells, the degree of connection between aquifers depends on the conductivity and continuity of the aquitard that separates them.

Figure 5-13 illustrates how vertical gradients at representative well groups vary throughout the Subbasin. Each representative well group consists of 3 adjacent wells—1 in each principal aquifer. The hydrographs for each well group illustrate the difference in groundwater potentiometric elevation between wells of different depths at similar locations. The hydrographs for the 2 northernmost well groups indicate a downward gradient from the 180-Foot to the 400-Foot Aquifer and from the 400-Foot to the Deep Aquifers.

In the northernmost group, the influence of pumping is highlighted by the change in vertical gradients between the 400-Foot and Deep Aquifers. Groundwater pumping from the Deep Aquifers decreased substantially when CSIP came online in 1998 as reflected by the upward gradient in groundwater elevations from the Deep Aquifers to the 400-Foot Aquifer. The gradients switched again after the 2012-2016 drought when Deep Aquifers extraction ramped up again lowering groundwater elevations below those in the 400-Foot Aquifer.

In the southernmost well group, the groundwater elevations of the 180-Foot are slightly lower than those in the 400-Foot Aquifers. The greatest difference in groundwater elevations between the Deep Aquifers and the overlying aquifers is observed at this location.

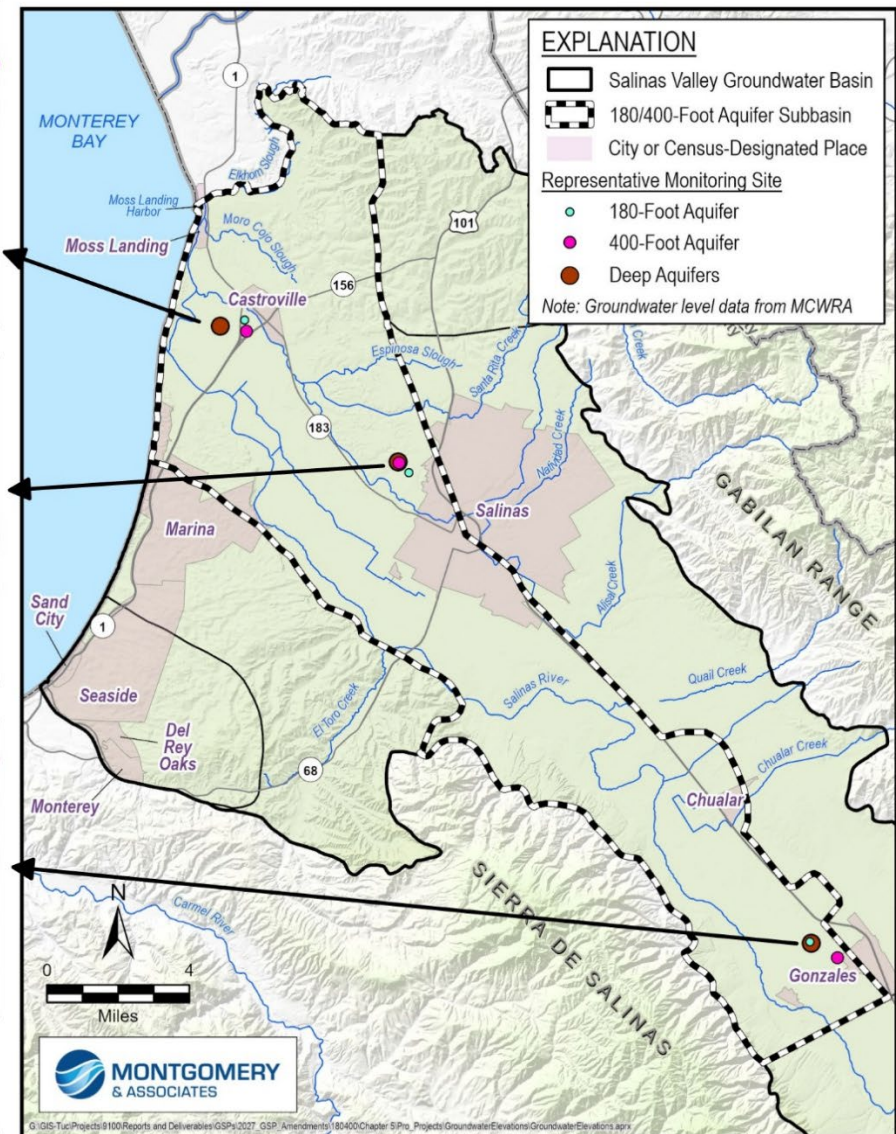
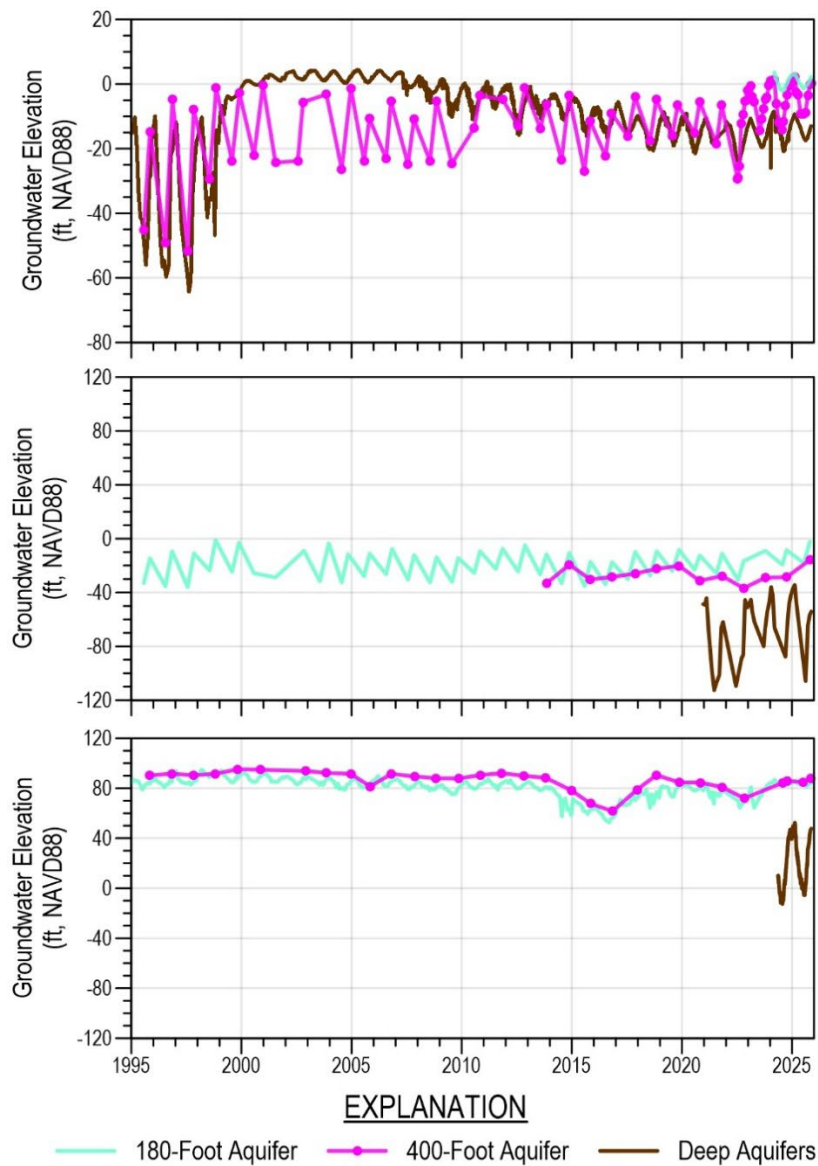


Figure 5-13. Vertical Gradients

5.2 Change in Groundwater Storage

Change in groundwater storage is calculated as the sum of the change in storage due to groundwater elevations outside of the seawater intruded area; and change in storage due to seawater intrusion within the seawater intruded area. This approach calculates the change in usable groundwater in storage rather than a change in total groundwater in storage. This is a common approach that best addresses the intent of SGMA.

Changes in groundwater elevations directly relate to fluctuation of groundwater storage; thus, the change in storage outside of the seawater intruded area is based on the change in groundwater elevations. As seawater intrusion advances inland, usable groundwater is decreased by the intruding seawater. To estimate the change in storage of the usable portion of the aquifer, the seawater intruded area, as measured by the 500 mg/L chloride isocontour, is considered unusable. Therefore, to calculate the total change in storage (i.e. usable storage) in the Subbasin, the change in storage due to groundwater elevations and seawater intrusion need to be summed together.

5.2.1 Data Sources

Changes in usable storage associated with groundwater elevation changes are estimated using MCWRA's fall groundwater elevation measurements. Fall measurements are used because they are collected after peak irrigation season and before winter precipitation raises groundwater levels, making them representative of annual storage changes caused by groundwater recharge and withdrawals. These groundwater elevation measurements are used to create fall groundwater elevation raster layers to determine the spatial distribution of historical storage changes.

The change in storage from 2019 to 2020 is included in this GSP to describe GSP baseline conditions. However, GSP baseline conditions reflect the change in storage over only a single year, and annual change in storage fluctuates significantly depending on annual groundwater elevation changes. Changes beyond this date will be reported on in annual reports and 5-year GSP periodic evaluations.

Change in storage due to seawater intrusion is based on MCWRA's extent of the 500 mg/L chloride isocontour that is used to define seawater intrusion, as previously mentioned. MCWRA produces maps of the 500 mg/L chloride isocontour annually. The maps identify the inferred extent of the 500 mg/L chloride concentrations in both the 180-Foot and 400-Foot Aquifers. The change in storage calculations assume that all groundwater seaward of the 500 mg/L chloride isocontours is unusable.

5.2.2 Change in Groundwater Storage Due to Groundwater Elevation Changes

GSP Amendment 2 calculates change in storage due to groundwater elevations per aquifer and sums them for a Subbasin total. The calculation of change in storage using groundwater elevation changes for the non-seawater intruded area is based on the following relationship:

$$\Delta S = \Delta WL \times A \times SC$$

Where: ΔS = Annual change in storage volume (AF/yr)

ΔWL = Annual change in average groundwater elevation (ft/yr)

SC = Storage coefficient (ft³/ft³)

A = Non-seawater intruded land area (acres)

Annual change in average groundwater elevations (ΔWL): Annual change in groundwater elevations is calculated by creating separate raster layers of interpolated groundwater elevations for each aquifer using the fall groundwater elevations measured at the RMS wells. Once the raster is created, groundwater elevations within each model cell outside of the seawater intruded area are averaged.

Storage coefficient (SC): The calculation uses specific storage estimates from the SVIHM (version 1, Montgomery & Associates, 2025). These specific storage estimates are multiplied by the thickness of the model layers that represent each principal aquifer per cell; yielding storage coefficients for each cell and model layer that comprise the principal aquifers. The storage coefficients were then averaged weighted on the thickness of the layers if the aquifer spans multiple model layers. This resulted in average storage coefficients of 0.0073, 0.0048, and 0.0106 for the 180-Foot, 400-Foot, and Deep Aquifers, respectively. For the Deep Aquifers layers in the model, which are quite thick, the storativity value is based on the average saturated thickness of the well within the aquifer unit based on reported well depths.

Non-seawater intruded land area of Subbasin (A): Because the storage change is calculated on a cell-by-cell basis using the SVIHM, the area used is that of the model grid cells that do not overlap with the seawater intruded area. The total area used for each individual aquifer calculation differs based on the seawater intruded area.

The total area of the Subbasin was used for the Deep Aquifers. Although the extent of the Deep Aquifers does not fully overlap with the Subbasin area, the whole Subbasin area was used to simplify the calculation since the Deep Aquifer extends across 94% of the Subbasin.

Annual Change in Storage Calculation: The change in storage due to change in groundwater elevations is presented below in 2 ways: 1) a timeseries of cumulative and annual change in storage (Figure 5-14) and 2) maps showing spatial change in storage across the Subbasin (Figure 5-15 to Figure 5-18). Both methods separate the change in storage by principal aquifer;

however, no maps are presented for the Deep Aquifer due to limited historical groundwater elevation measurements.

Method 1: The estimated cumulative and annual change in groundwater storage in the 180/400 Subbasin per principal aquifer is shown on Figure 5-14. This figure also shows total annual groundwater extractions for the Subbasin starting in 1995, which is when groundwater extraction reporting began. The storage changes shown on Figure 5-14 are derived from the cumulative subbasin-wide average change in groundwater elevations from 1944 to 2019 in the 180-Foot and 400-Foot Aquifer and from 1983 to 2019 in the Deep Aquifers. The magnitude of the groundwater storage change is calculated by multiplying the annual groundwater elevation change by a storage coefficient of each principal aquifer and the area of the Subbasin.

Figure 5-14 shows groundwater elevations have fluctuated over this historical period across all aquifers, as indicated by annual change in storage lines. However, all principal aquifers have experienced a long-term decline in groundwater storage due to lowering groundwater elevations. The average annual storage loss due to lowering groundwater elevations between 1944 and 2019 is approximately -100 AF/yr and -80 AF/yr in the 180-Foot and 400-Foot Aquifer, respectively. The Deep Aquifers experienced an estimated loss of -970 AF/yr from 1983 to 2019 based on limited historical data. The chart will be refined accordingly as more data becomes available for the Deep Aquifers. The storage change calculation is a reflection of groundwater elevations in the start and end years, which does not capture groundwater level fluctuations within that period. This method does not exclude the seawater intruded area since all RMS wells in the Subbasin are included in this calculation.

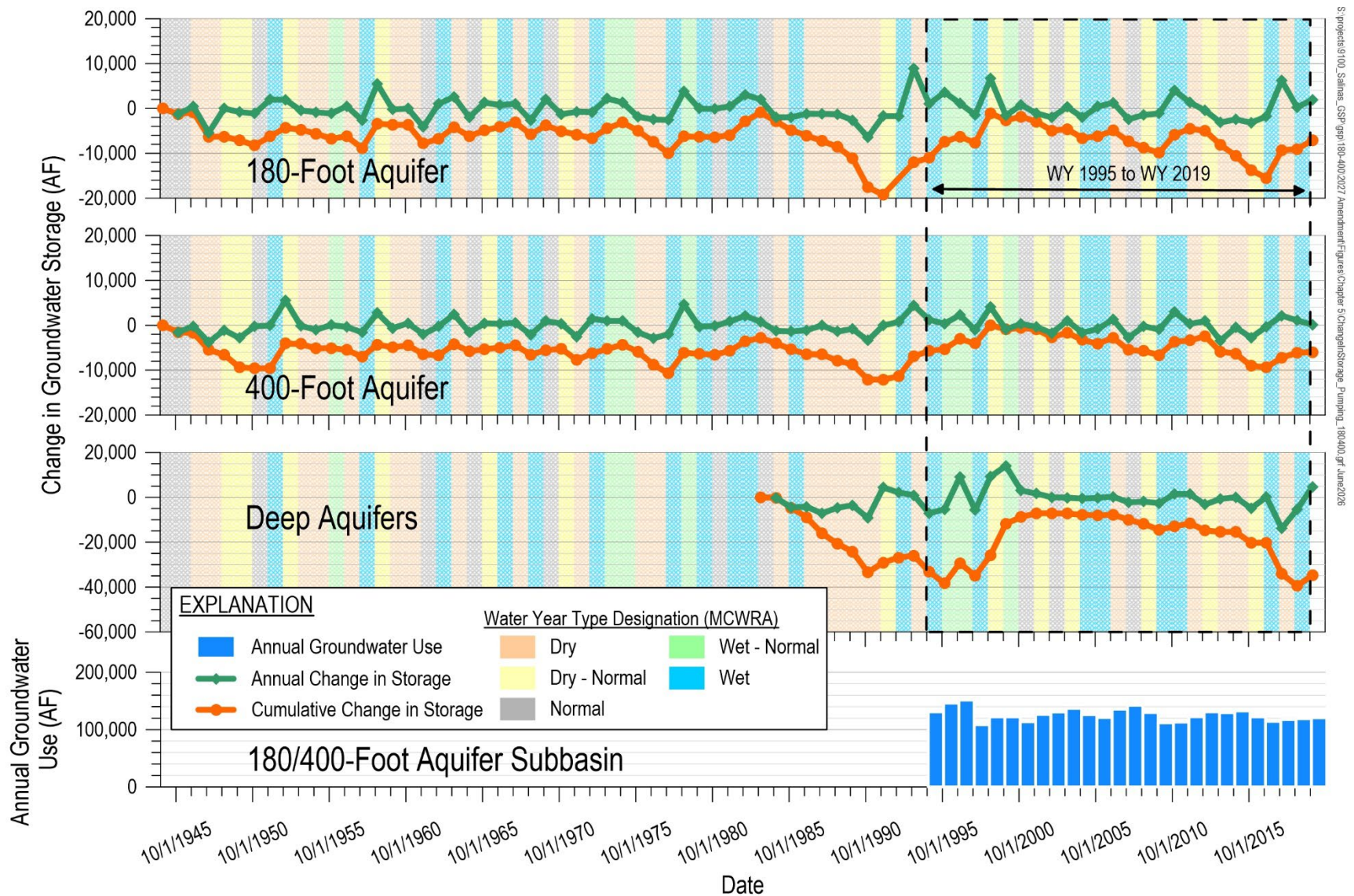


Figure 5-14. Annual and Cumulative Change in Groundwater Storage and Total Annual Groundwater Extraction in the 180/400 Subbasin
Based on Groundwater Elevations

Method 2: For the estimate of change in storage based on spatial distribution of change in elevation, Figure 5-14 shows the estimated change in groundwater storage in the 180-Foot Aquifer from fall 1995 to fall 2019. Figure 5-15 shows the estimated change in groundwater storage from fall 2019 to fall 2020. Similarly, Figure 5-16 and Figure 5-17 show the associated 400-Foot Aquifer change in groundwater storage from fall 1995 to fall 2019 and from fall 2019 to fall 2020, respectively. These maps were not created for the Deep Aquifers because groundwater elevation monitoring has historically only occurred near the coast, and not across the full extent of the Deep Aquifers.

A summary of components used for estimating change in groundwater storage due to groundwater elevation changes is shown in Table 5-2. Average annual groundwater storage loss due to changes in groundwater elevation since 1995 was -20 AF/yr in both the 180-Foot and 400-Foot Aquifers. Table 5-2 does not include the Deep Aquifers due to limited groundwater elevation data. Furthermore, this estimate does not match the storage change estimates calculated using Method 1; however, the 2 estimates are similar enough for the purposes of verifying the calculation shown in Table 5-2.

Table 5-2. Components Used for Estimating Change in Groundwater Storage Due to Groundwater Elevation Changes

Component	1995 to 2019		2019 to 2020	
	180-Foot Aquifer	400-Foot Aquifer	180-Foot Aquifer	400-Foot Aquifer
Area – sum of cells outside Seawater Intrusion Area (acres)	65,700	75,500	65,610	74,440
Storage coefficient – averaged across cells, weighted on layer thickness (ft ³ /ft ³)	0.0073	0.0048	0.0083	0.0053
Average change in groundwater elevation (feet)	-1.1	-1.3	-3.0	-0.1
Change in groundwater storage (AF)	-520	-450	-1,640	-50
Average annual change in groundwater storage (AF/yr)	-20	-20	-1,640	-50
Total average annual change in groundwater storage (AF/yr)	-40		-1,690	

Note: Negative values indicate loss, positive values indicate gain. The change from 1995 to 2019 is included to quantify historical change in storage and to be consistent with the other GSPs in the Salinas Valley. The change in storage from 2019 to 2020 is included in this GSP to describe GSP baseline conditions and because it is based on 1 year it is largely dependent on annual groundwater elevation changes.

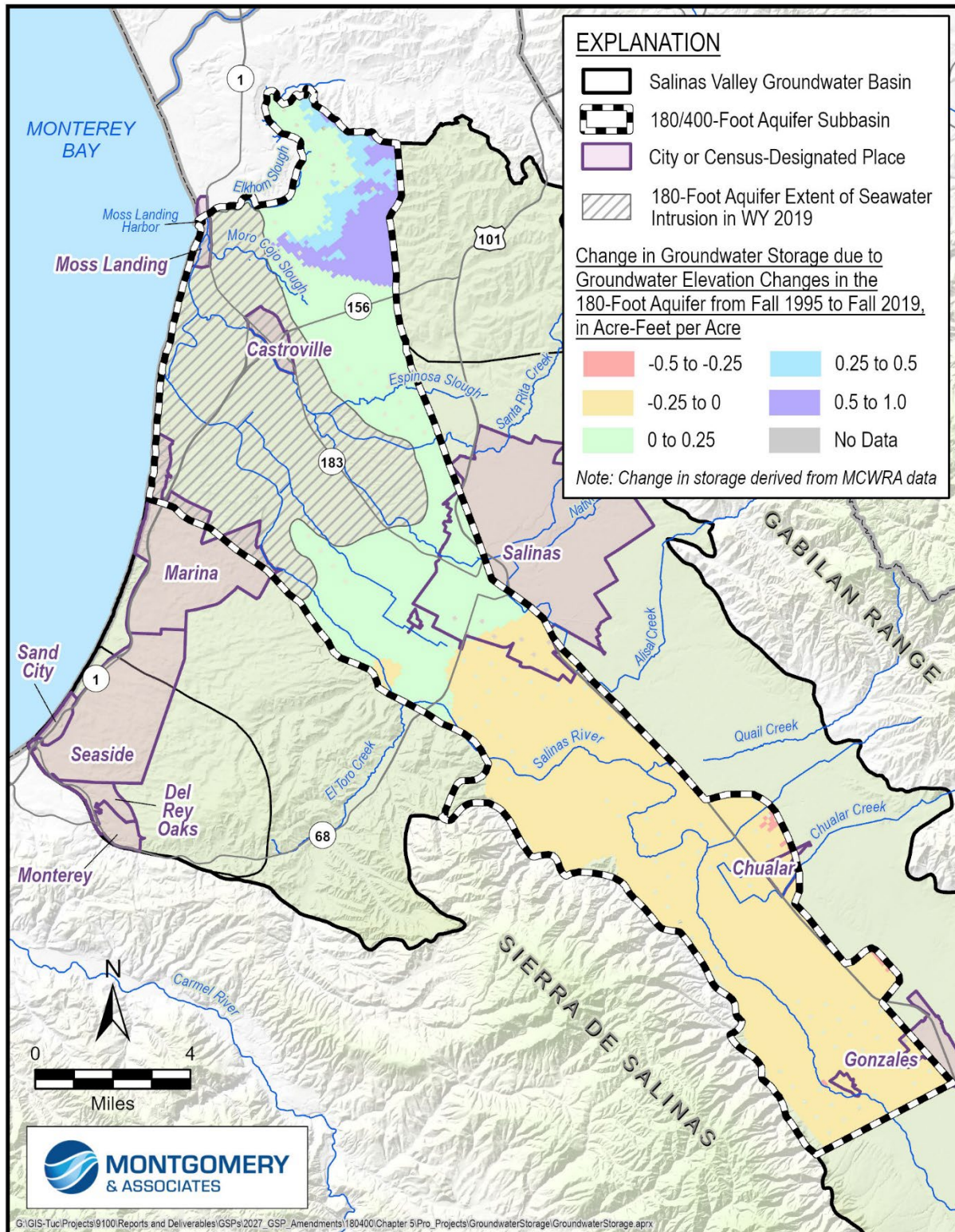


Figure 5-15. Change in Groundwater Storage in the 180-Footer Aquifer from Fall 1995 to Fall 2019

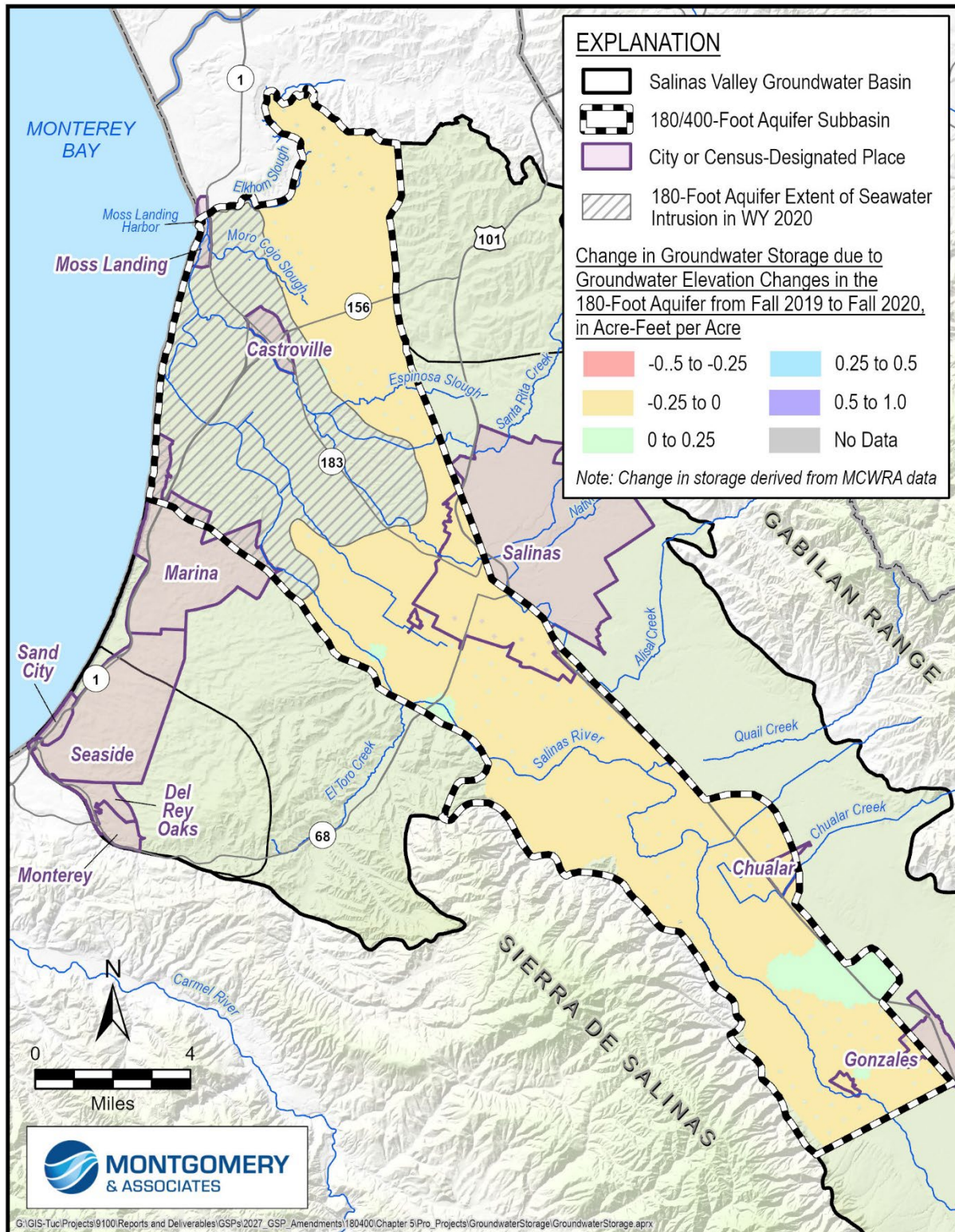


Figure 5-16. Change in Groundwater Storage in the 180-Footer Aquifer from Fall 2019 to Fall 2020

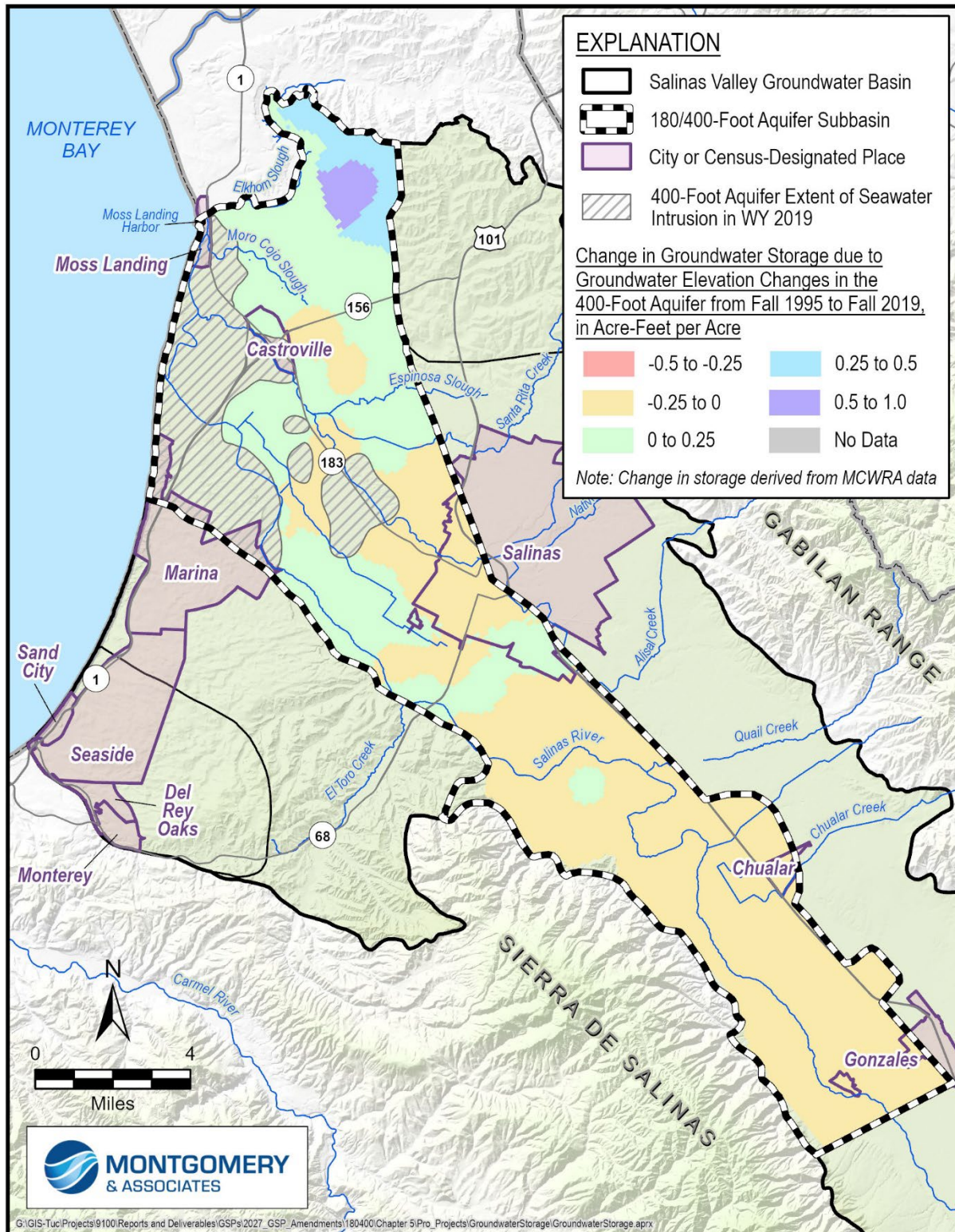


Figure 5-17. Change in Groundwater Storage in the 400-Footer Aquifer from Fall 1995 to Fall 2019

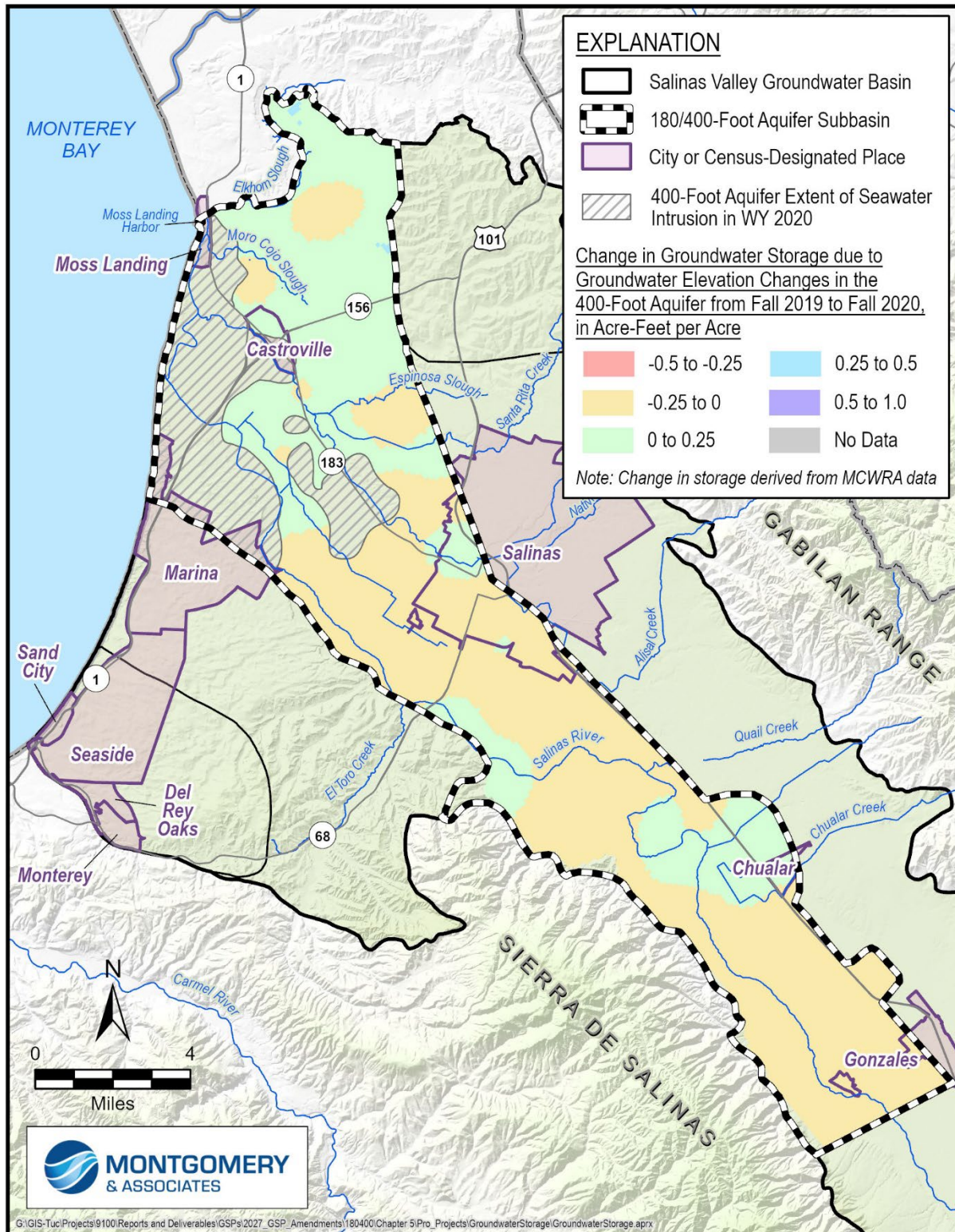


Figure 5-18. Change in Groundwater Storage in the 400-Foot Aquifer from Fall 2019 to Fall 2020

5.2.3 Change in Groundwater Storage Due to Seawater Intrusion

Groundwater storage losses due to seawater intrusion are estimated based on the change in seawater intrusion area, as mapped by MCWRA. The area of change is multiplied by an assumed aquifer thickness and effective porosity of 0.10, which is specified in the SVIHM for the 180-Foot and 400-Foot Aquifers, to estimate the average annual loss of groundwater storage due to seawater intrusion. Average aquifer thickness was derived from the thicknesses of the SVIHM grid cells that overlap with the seawater intruded areas. Average annual groundwater storage loss due to seawater intrusion in the 180/400 Subbasin from 1995 to 2019 is -4,330 AF/yr in the 180-Foot Aquifer and -8,300 AF/yr in the 400-Foot Aquifer. From 2019 to 2020, storage losses due to seawater intrusion are -420 AF/yr in the 180-Foot Aquifer and -5,980 AF/yr in the 400-Foot Aquifer. This analysis considers the average historical change in storage due to seawater intrusion to be -12,630 AF/yr, which is the total of the storage changes for the 180-Foot and 400-Foot Aquifers. This storage loss is in addition to the change in groundwater storage due to changes in groundwater elevations. No seawater intrusion has been reported in the Deep Aquifers, thus, there likely is no change in storage due to seawater intrusion.

Table 5-3. Components Used for Estimating Loss in Groundwater Storage Due to Seawater Intrusion

Component	1995 to 2019		2019 to 2020	
	180-Foot Aquifer	400-Foot Aquifer	180-Foot Aquifer	400-Foot Aquifer
Change in seawater intrusion area (acres)	-6,110	-7,380	-30	-230
Effective porosity	0.10	0.10	0.10	0.10
Approximate aquifer thickness (feet)	170	270	140	260
Loss in groundwater storage (AF/yr)	-103,870	-199,260	-420	-5,980
Average annual loss of storage (AF/yr)	-4,330	-8,300	-420	-5,980
Total average change in storage due to seawater intrusion (AF/yr)	-12,630		-6,400	

Note: Increases in acreage intruded by seawater are indicated by negative values. Negative values indicate loss; positive values indicate gain. The change from 1995 to 2019 is included to quantify historical change in storage and to be consistent with the other GSPs in the Salinas Valley. The change in storage from 2019 to 2020 is included in this GSP to describe GSP baseline conditions.

5.2.4 Total Annual Average Change in Groundwater Storage

The total annual average change in groundwater storage is the sum of the changes in groundwater storage due to groundwater elevation changes and seawater intrusion. Table 5-4 summarizes the total average annual loss in storage from 1995 to 2019 and from 2019 to 2020. From 1995 to 2019, the total change in storage is -12,670 AF/yr and -8,090 AF/yr from 2019 to 2020. These estimates are likely underestimated because the change in storage for the Deep Aquifers is not included. The change in storage for the Deep Aquifers will be included as data improves.

Table 5-4. Total Average Annual Change in Groundwater Storage

Component	1995 to 2019		2019 to 2020	
	180-Foot Aquifer	400-Foot Aquifer	180-Foot Aquifer	400-Foot Aquifer
Annual storage loss due to groundwater elevation decrease (AF/yr)	-20	-20	-1,640	-50
Annual loss due to seawater intrusion (AF/yr)	-4,330	-8,300	-420	-5,980
Total annual loss of storage (AF/yr)	-12,670		-8,090	

Note: Negative values indicate loss, positive values indicate gain. The change from 1995 to 2019 is included to quantify historical change in storage and to be consistent with the other GSPs in the Salinas Valley. The change in storage from 2019 to 2020 is included in this GSP to describe GSP baseline conditions and because it is based on 1 year it is largely dependent on annual groundwater elevation changes.

5.3 Seawater Intrusion

The 180-Foot and 400-Foot Aquifers have been subject to seawater intrusion for more than 70 years, as demonstrated by increased salt concentrations in wells near the Monterey Bay coastline. The negative impact of seawater intrusion on local water resources and the agricultural economy has been the primary motivation for many studies dating back to 1946 (DWR, 1946). MCWRA and others have implemented a series of engineering and management projects including well construction moratoriums, CSIP system development, and SVWP implementation, among other actions to halt seawater intrusion. Although those actions have managed to slow the advance of intrusion and reduce its impacts, seawater intrusion remains an ongoing threat.

5.3.1 Data Sources

The extent and advance of seawater intrusion are monitored and reported by MCWRA. Monitoring seawater intrusion has been ongoing since the Agency formed in 1947, and a network of dedicated monitoring and production wells in the Salinas Valley that are sampled twice annually in June and August. Most of the wells MCWRA monitors are located in the 180/400 Subbasin. The water samples are analyzed for general minerals; and the analytical results are used by MCWRA to analyze and report the following:

- Maps and graphs of historical chloride and specific conductivity trends
- Stiff diagrams and Piper diagrams
- Plots of chloride concentration vs. Na/Cl molar ratio trends

MCWRA publishes estimates of the extent of seawater intrusion every year. SVBGSA uses the MCWRA maps to define the extent of seawater intrusion as the location of the 500 mg/L chloride concentration isocontour. This chloride concentration is significantly lower than the 19,000 mg/L chloride concentration typical of seawater; however, it represents a concentration

that may begin to impact beneficial uses. The 500 mg/L threshold is considered the Upper Limit SMCL for chloride as defined by the Environmental Protection Agency (EPA) and is approximately 10 times the concentration of naturally occurring groundwater in the Subbasin. SVBGSA and MCWDGSA are collaborating closely on the development and implementation of their GSPs for the 180/400 and Monterey Subbasins. MCWDGSA uses an isocontour derived based on a combination of TDS and chloride measurements and geophysical data. There are notable data gaps in the MCWRA seawater intrusion isocontour maps for the Monterey Subbasin; MCWDGSA chose these other data to more accurately map seawater intrusion in the Monterey Subbasin. During implementation, SVBGSA, MCWDGSA, and MCWRA will align the separate data sets with enhanced data sharing and collaboration.

5.3.2 Seawater Intrusion Maps and Cross Section

Figure 5-19 and Figure 5-20 show the MCWRA mapped extents of GSP baseline and historical seawater intrusion in the 180/400 Subbasin in the 180-Foot and 400-Foot Aquifers, respectively. In each of the 2 figures, the maximum extent of the shaded contours represents the extent of groundwater with chloride exceeding 500 mg/L during the 2020 monitoring period. The historical progression of the 500 mg/L extent is also illustrated on these figures through the colored overlays that represent the extent of seawater intrusion observed during selected years. Further updates will be reported on in annual reports and 5-year GSP periodic evaluations.

Figure 5-19 and Figure 5-20 also show the mapped August 2020 groundwater elevations for the 180-Foot and 400-Foot Aquifer and the adjacent Eastside Subbasin. These maps show the groundwater elevations that are persistently below sea levels that, when paired with a pathway, enable seawater intrusion. The groundwater elevation contours show that groundwater travels toward the depression at the northern end of the Eastside Subbasin in both the Shallow and Deep Zones of the Eastside Aquifer that are generally equivalent to the 180-Foot and 400-foot Aquifers, respectively, in the 180/400 Subbasin.

A cross section showing the vertical distribution of seawater intrusion is shown on Figure 5-21. The hydrostratigraphy shown on this cross section is adapted from the *Final Report, Hydrostratigraphic Analysis of the Northern Salinas Valley* (Kennedy/Jenks, 2004). The location of the cross section is also shown on Figure 5-21 as line A-A'. The superposition of the seawater intrusion on the existing hydrostratigraphic cross section was based on the 2020 500 mg/L chloride contour from MCWRA and recent groundwater quality data in the GSP database. The entire saturated thickness of the aquifer was assumed to be seawater intruded if any well in the aquifer indicated seawater intrusion.

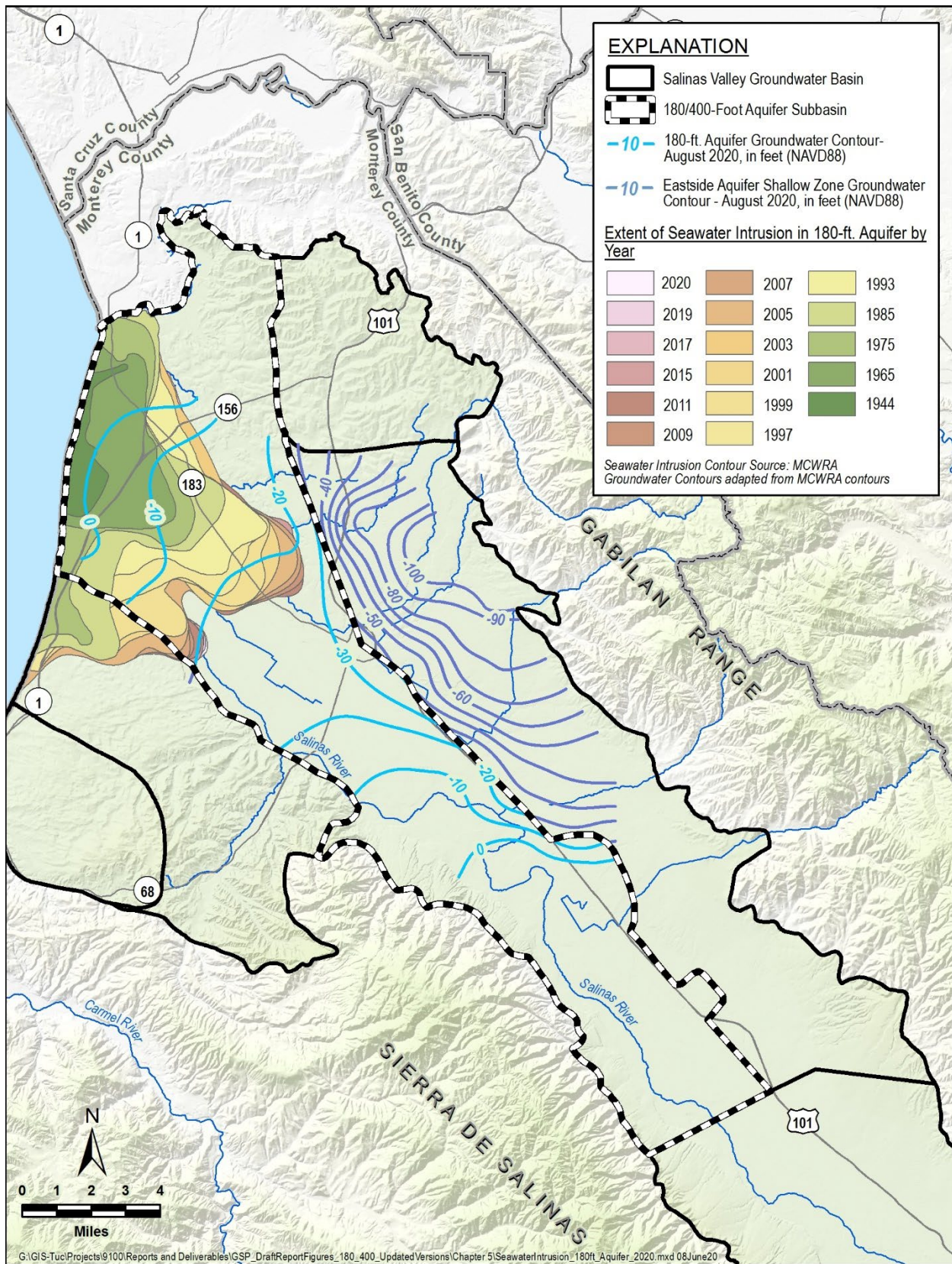


Figure 5-19. Seawater Intrusion in the 180-Footer Aquifer through 2020

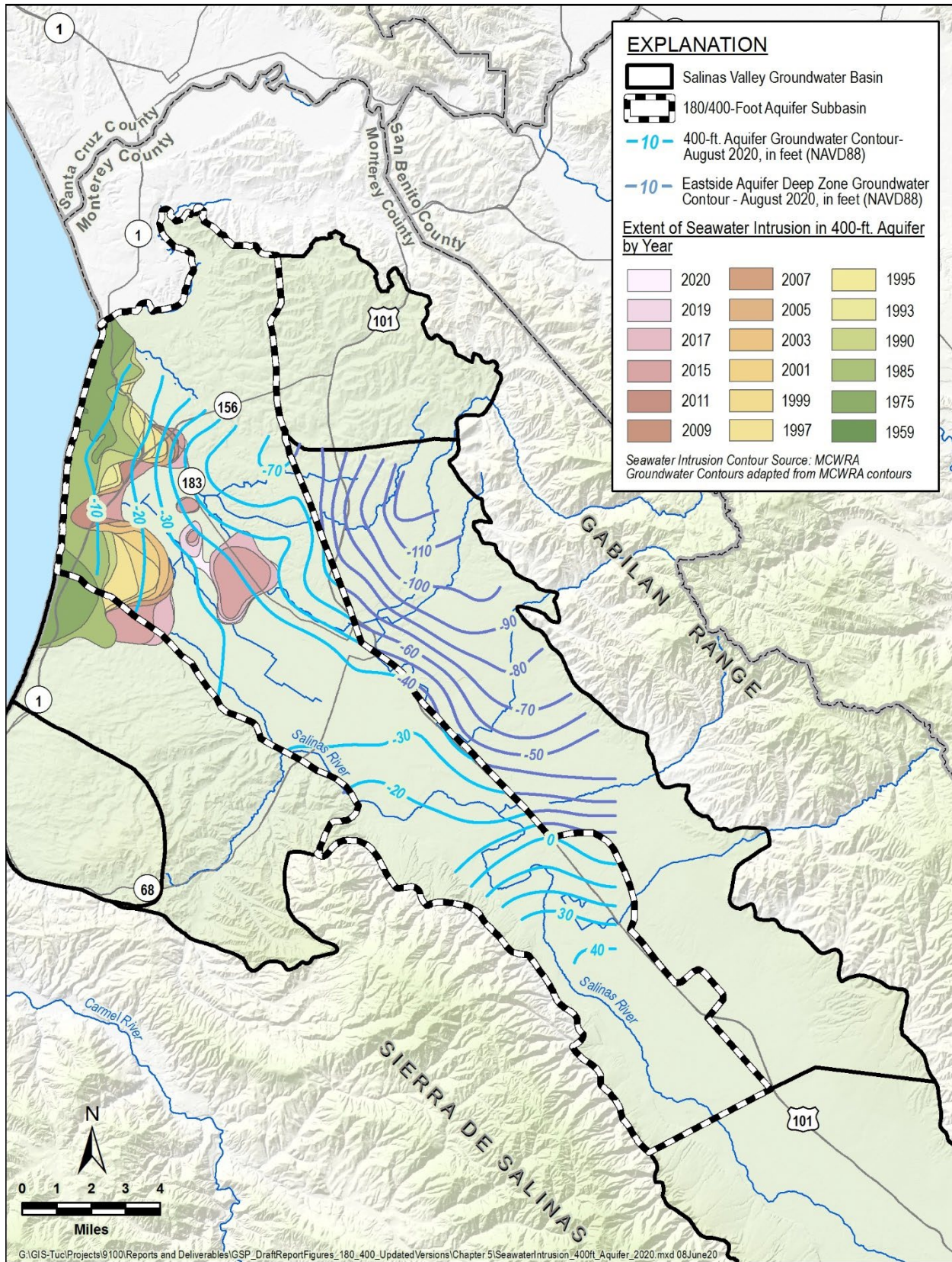


Figure 5-20. Seawater Intrusion in the 400-Foot Aquifer

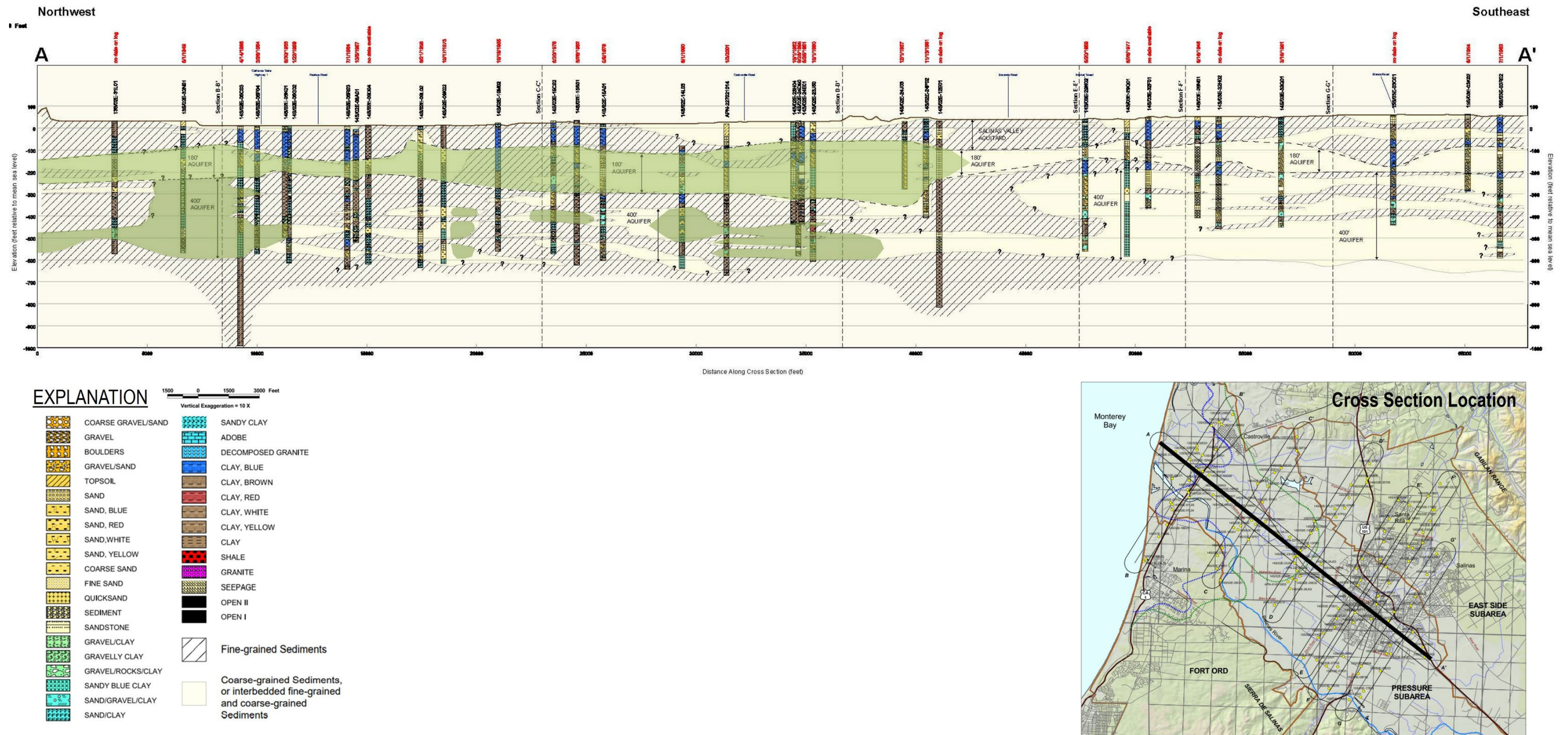


Figure 5-21. Cross Section of Estimated Depth of Seawater Intrusion Based on Mapped 2020 Intrusion (Adapted from Kennedy/Jenks, 2004)

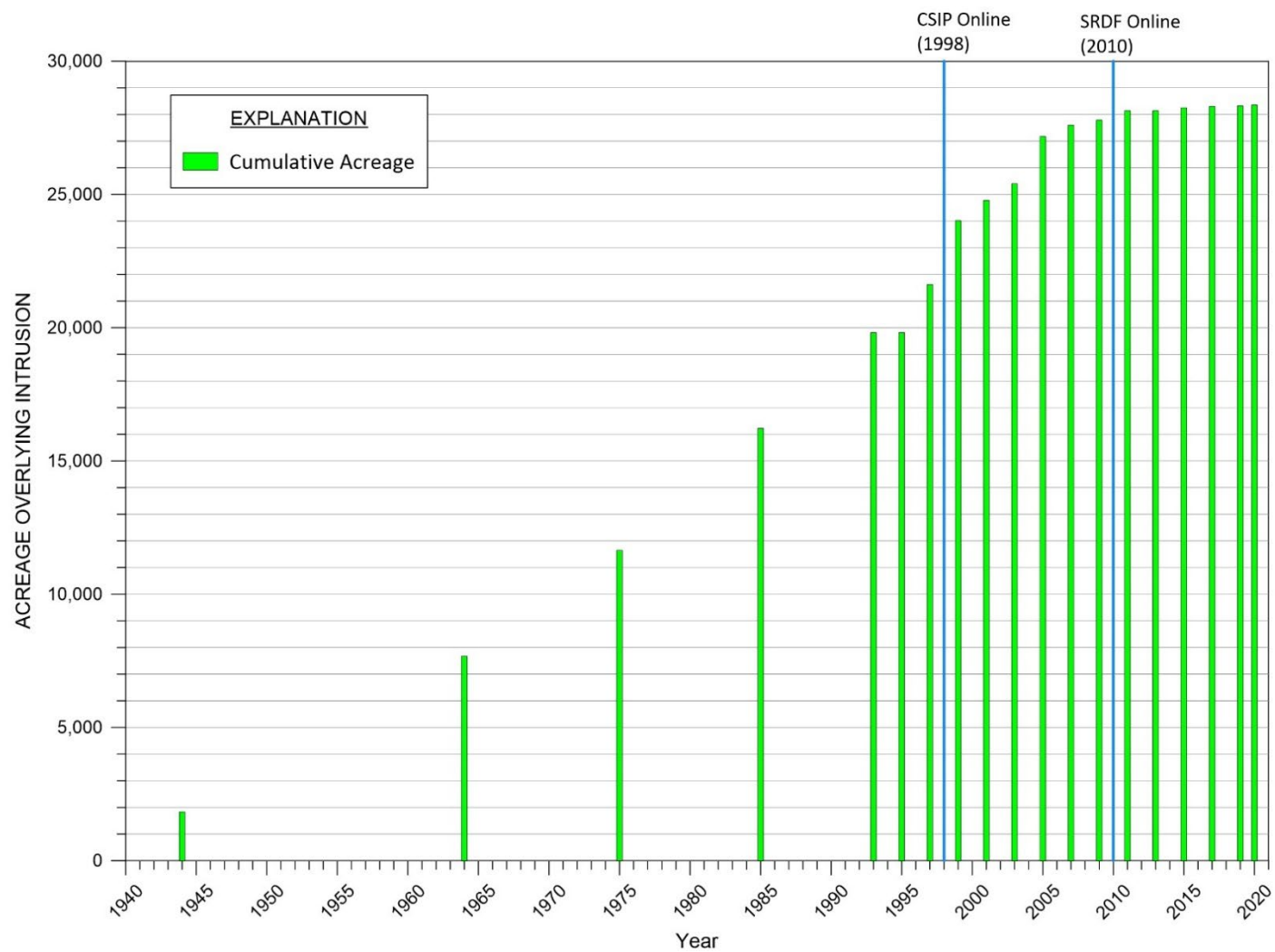
5.3.3 Seawater Intrusion Rates

Figure 5-22 and Figure 5-23 show timeseries graphs of the total acreage that overlies groundwater with chloride concentration greater than 500 mg/L. Figure 5-24 shows the timeseries of acreage overlying seawater intrusion in the 180-Foot Aquifer. In 2020, 85% of this seawater intruded area was in the 180/400 Subbasin and the remainder was in the adjacent Monterey Subbasin. Figure 5-23 shows the timeseries of acreage overlying seawater intrusion in the 400-Foot Aquifer. In 2020, 83% of this seawater intruded area was in the 180/400 Subbasin and the remainder was in the adjacent Monterey Subbasin.

As shown on Figure 5-22, approximately 20,000 acres overlaid seawater intrusion in the 180-Foot Aquifer in 1995 and had expanded to approximately 28,000 acres by 2009. Since then, the rate of expansion has decreased, with an overlying area of approximately 28,300 in 2017 and 28,400 acres in 2020. Figure 5-23 shows that the area overlying seawater intrusion into the 400-Foot Aquifer is not as extensive as that in the 180-Foot Aquifer. The 400-Foot Aquifer had an overlying area of approximately 12,000 acres in 2009. Between 2011 and 2015, the 400-Foot Aquifer experienced a significant increase in the area of seawater intrusion, from approximately 12,600 acres to approximately 15,700 acres; however, some of that increase in acreage was due to the addition of new data points that allowed for measurement of an area that was likely already seawater intruded. The acreage overlying seawater intrusion increased to about 16,900 acres in 2017 and to about 17,400 in 2020. This apparent rapid increase in this area is likely the result of localized downward migration of high chloride groundwater from the 180-Foot Aquifer to the 400-Foot Aquifer.

The process of downward migration between aquifers may be in part attributed to wells that are screened across both aquifers, discontinuous aquitards, or improperly abandoned wells, which can cause the isolated patches of seawater intrusion in the 400-Foot Aquifer. For example, the middle patch that greatly expanded from 2017 to 2019, is associated with a leaky well that connects the 180-Foot and 400-Foot Aquifers. This well was destroyed in November 2019. Regardless of the specific pathways, the presence of vertical downward hydraulic gradients from the 180-Foot Aquifer to the 400-Foot Aquifer presents a risk that eventually the intruded area of the 400-Foot Aquifer will be as large as that of the 180-Foot Aquifer.

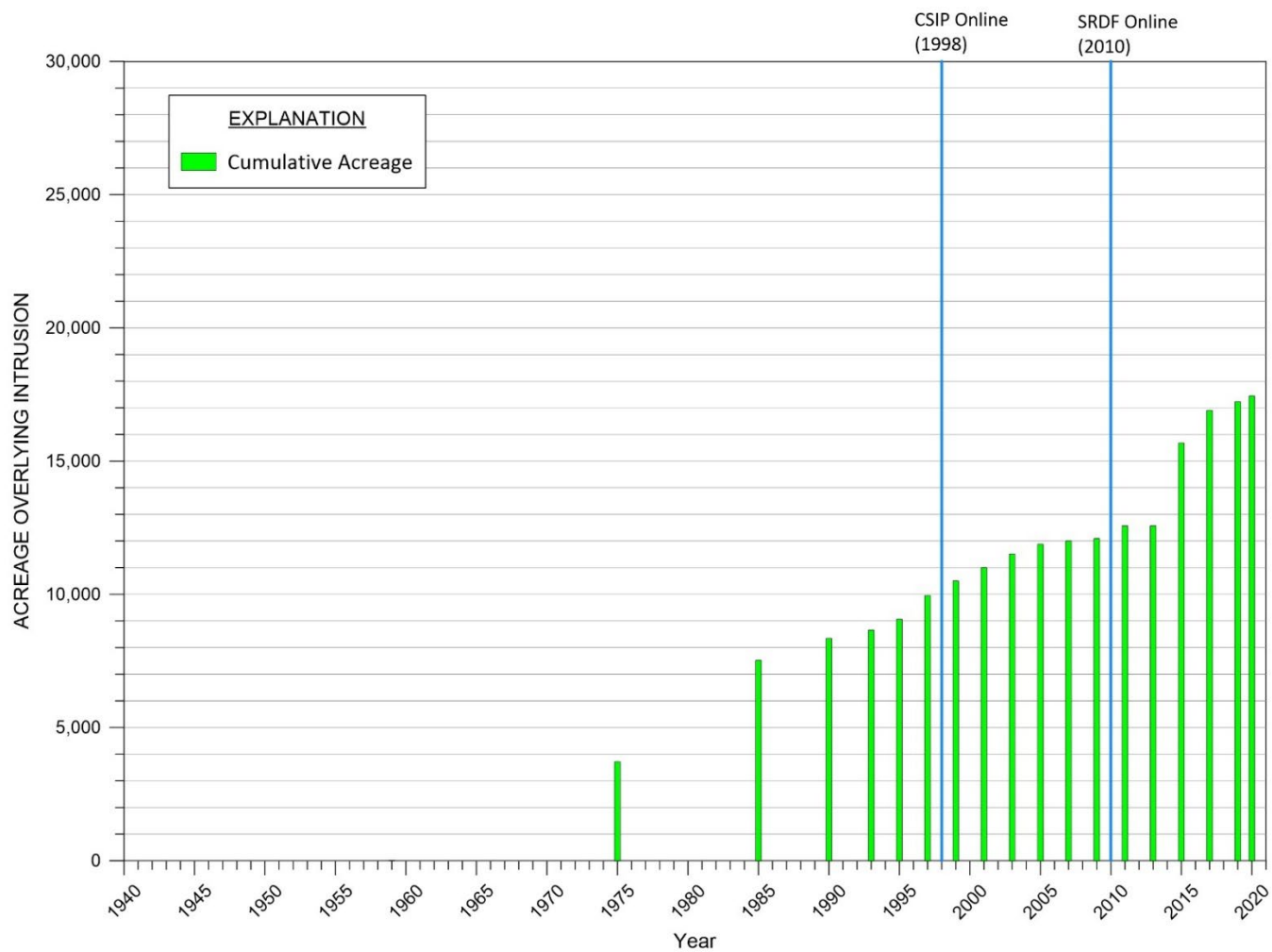
Seawater intrusion has not been reported in the Deep Aquifers.



Source: Special Joint Meeting of MCWRA BOD and Monterey County BOS

(created with data from MCWRA)

Figure 5-22. Acreage Overlying Seawater Intrusion in the 180-Foot Aquifer



Source: Special Joint Meeting of MCWRA BOD and Monterey County BOS

(created with data from MCWRA)

Figure 5-23. Acreage Overlying Seawater Intrusion in the 400-Foot Aquifer

The volume of seawater flowing into the Subbasin every year does not strictly correspond to the acreages overlying the seawater-intruded area that are shown on Figure 5-22 and Figure 5-23. As the seawater intrusion front approaches pumping depressions, the front will slow down and stop at the lowest point in the pumping depression. When the seawater intrusion front stops at a pumping depression, no more acreage will be added every year. However, seawater will continue to flow in from the ocean toward the pumping depression.

The State of the Salinas River Groundwater Basin report estimated that approximately 11,000 acre-feet of seawater flows into the Pressure subarea every year. Previous estimates have ranged between 14,000 and 18,000 AF/yr of seawater intrusion (Brown and Caldwell, 2015). These seawater inflow estimates include portions of the Monterey Subbasin. The length of coastline subject to seawater intrusion is approximately 75% in the 180/400 Subbasin. These rates are similar to the estimates in Section 5.2.3. Estimates of seawater intrusion advancement are refined as part of GSP implementation through the groundwater flow modeling.

5.3.4 Seawater Intrusion Model

The Salinas Valley SWIM was developed by Montgomery & Associates for the SVBGSA and County of Monterey as a tool to assist in designing and assessing PMAs that address seawater intrusion in the Salinas Valley. It builds on existing groundwater models of the region, including the Monterey Subbasin Groundwater Flow Model developed by EKI Environment and Water for MCWDGSA and the SVIHM developed by the USGS for the County of Monterey and updated by Montgomery & Associates for the SVBGSA. Unlike the SVIHM, the SWIM includes the ability to account for transport due to density differences between fresh water, seawater, and brackish water. This capability is very important for simulating and evaluating effects from seawater intrusion. The model allows the evaluation of the timing and magnitude of changes in chloride concentrations in the groundwater within the model area.

SVBGSA, MCWDGSA, MCWRA, and Seaside Watermaster have worked collaboratively to have the SWIM updated during the first phase of GSP implementation. Documentation of the original model development and subsequent versions can be found in the original model report (Montgomery & Associates, 2023a), and model report addendums for each version (Montgomery & Associates, 2023b, 2024c, 2025b, and 2026a).

5.4 Groundwater Quality Distribution and Trends

The SVBGSA does not have regulatory authority over groundwater quality and is not charged with improving groundwater quality in the Salinas Valley. PMAs implemented by the SVBGSA are not required to improve groundwater quality; however, they must not further degrade it.

5.4.1 Data Sources

Groundwater quality samples have been collected and analyzed in the Subbasin for various studies and programs. Groundwater quality samples have also been collected on a regular basis for compliance with regulatory programs. Groundwater quality data for this GSP were collected from:

- The Northern Counties Groundwater Characterization report (CCGC, 2015)
- The USGS' Groundwater Ambient Monitoring and Assessment Program (GAMA) reports (Kulongoski and Belitz, 2005; Burton and Wright, 2018)
- SWRCB GeoTracker Data Management System (SWRCB, 2026a)
- SWRCB GAMA Groundwater Information System (SWRCB, 2021b)
- The California Department of Toxic Substances Control (DTSC) EnviroStor data management system (DTSC, 2026)
- CCRWQCB's ILP data (CCRWQCB, 2024)

5.4.2 Point Sources of Groundwater Contaminants

Clean-up and monitoring of point source pollutants may be under the responsibility of either the CCRWQCB or the DTSC. GeoTracker is the SWRCB's data management system for sites that may affect water quality, particularly groundwater. It tracks locations that require environmental cleanup, such as leaking underground storage tank (LUST) sites, Department of Defense sites, and other cleanup program sites. GeoTracker also includes information on regulated and unregulated facilities and projects, including irrigated lands, oil and gas production sites, permitted underground storage tanks, and land disposal sites.

EnviroStor is used by the DTSC to track hazardous waste facilities and contaminated sites, including the agency's cleanup, permitting, enforcement, and investigation activities. EnviroStor contains information on sites with known contamination as well as locations that may require further environmental investigation.

Table 5-5 and Figure 5-24 provide a summary of the active or open contamination sites within the Subbasin. Not all the constituents listed in Table 5-5 are part of the monitoring network described in Chapter 7. However, the status of these constituents at these sites will continue to be monitored by the DTSC or the CCRWQCB.

Table 5-5. Active Contamination Sites

Label	Site Name	Address	City	Site Type	Status	Constituents Found at Site
1	908 South Main Street Salinas	908 South Main Street	Salinas	Cleanup Program Site	Open - Remediation	None Specified
2	Former Selby Petroleum	356 West Market	Salinas	Cleanup Program Site	Open - Site Assessment	Diesel, MTBE / TBA / Other Fuel Oxygenates
3	Former Uni-Kool Facility	308 & 336 John Street	Salinas	Cleanup Program Site	Open - Site Assessment	Benzene, Diesel, Gasoline, MTBE / TBA / Other Fuel Oxygenates, Naphthalene
4	Moss Landing Energy Storage Facility - Vistra Corporation Battery and Electronics Fire	7301 Highway 1	Moss Landing	Cleanup Program Site	Open - Site Assessment	None Specified
5	Sturdy Oil Company Pfas	1511 Abbott Street	Salinas	Cleanup Program Site	Open - Site Assessment	Per- and Polyfluoroalkyl Substances (PFAS)
6	Monterey Peninsula Class III Landfill	14201 Del Monte Boulevard	Marina	Land Disposal Site	Open - Operating	Other Chlorinated Hydrocarbons, Other inorganic / salt, Other Metal
7	Regen Monterey Composting Facility	14201 Del Monte Blvd	Salinas	Land Disposal Site	Open - Operating	None Specified
8	11125 Commercial Parkway	11125 Commercial Parkway	Castroville	LUST Cleanup Site	Open - Site Assessment	Benzene, Diesel, Other Petroleum
9	Markley Industrial Park	12 Boronda Road	Salinas	Voluntary Cleanup	Active	Arsenic; Dieldrin
10	PG&E, Salinas MGP	2 Bridge Street	Salinas	Voluntary Cleanup	Active	Arsenic, lead, mercury and compounds

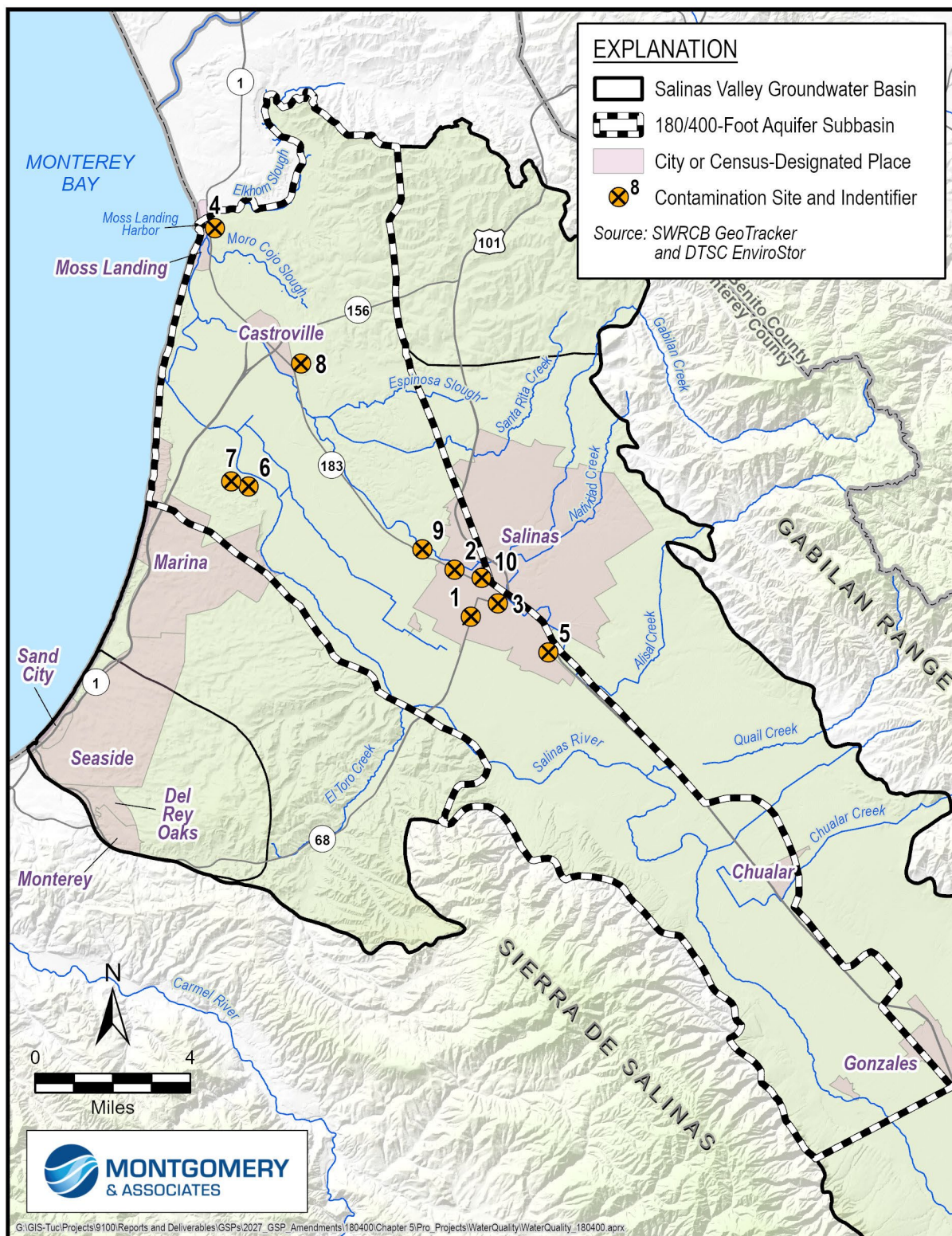


Figure 5-24. Active Contamination Sites as of 2026

5.4.3 Distribution and Concentrations of Diffuse or Natural Groundwater Constituents

In addition to the point sources described above, the CCRWQCB monitors and regulates activities and discharges that can contribute to non-point pollutants, which are constituents that are released to groundwater over large areas.

5.4.3.1.1 Previous Studies

In the Subbasin, the most prevalent non-point water quality concern is nitrate. The current distribution of nitrate was extensively monitored and evaluated by the CCGC and documented in a report submitted to the CCRWQCB (CCGC, 2015).

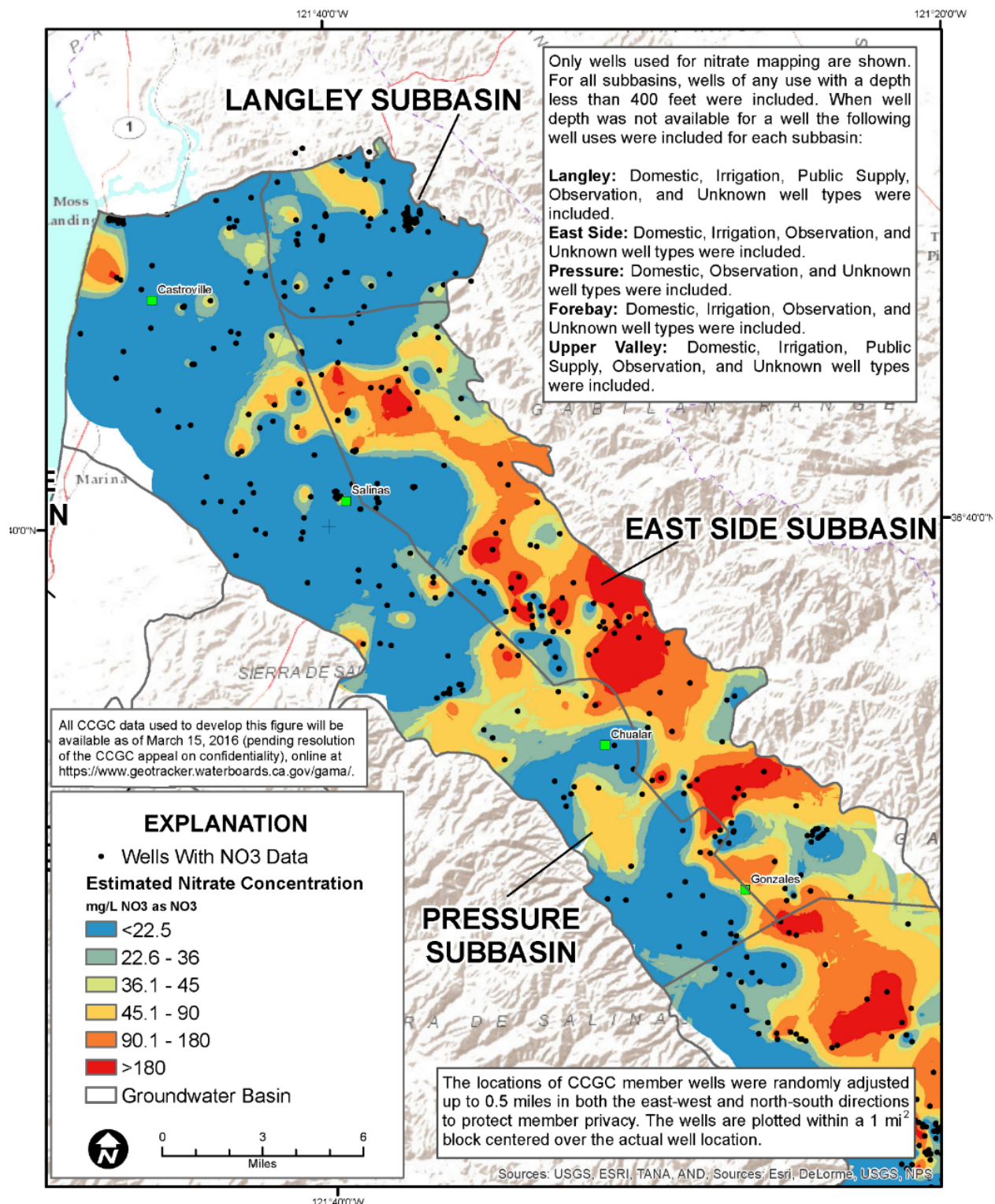
Figure 5-25 shows a map of nitrate distribution in the Subbasin prepared by CCGC. The orange and red areas illustrate the portions of the Subbasin where groundwater has nitrate concentrations above the drinking water MCL of 45 mg/L NO₃.

Figure 5-26 shows maps of measured nitrate concentration from 6 decades of monitoring for the entire Salinas Valley. These maps, prepared by MCWRA, indicate that elevated nitrate concentrations in groundwater were locally present in the 1960s, but significantly increased in 1970s and 1980s. Extensive distribution of nitrate concentrations above the drinking water MCL, as shown on Figure 5-25, has been present in the 180/400 Subbasin for 20 to 30 years.

A May 2018 staff report to the CCRWQCB included a summary of nitrate concentrations throughout the Central Coast Region, including the Salinas Valley. The staff report includes data from 2008 to 2018, collected at 2,235 wells in the Salinas Valley, during Agricultural Orders 2.0 and 3.0 sampling events. The report states that 26% of on-farm domestic wells in the 180/400 Subbasin exceeded the drinking water MCL, with a mean concentration of 52.7 mg/L NO₃. In addition, 21% of irrigation supply wells in the Subbasin exceeded this MCL with a mean concentration of 29.7 mg/L NO₃ (CCRWQCB, 2018).

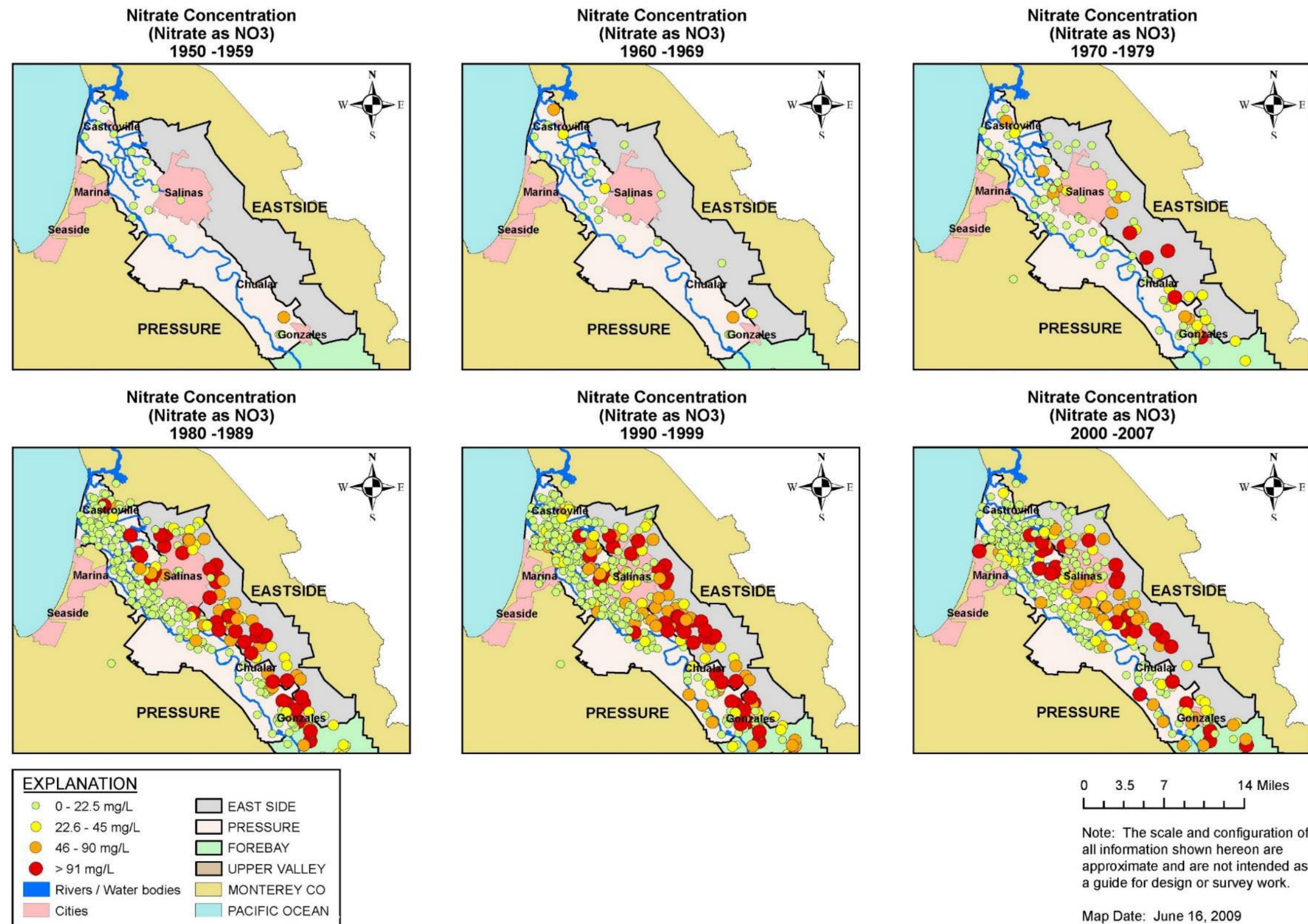
In response to a Recommended Corrective Action from DWR on the other SVBGSA GSPs, SVBGSA analyzed the relationship between groundwater extraction, declining groundwater levels, and groundwater quality degradation in the 180/400 Subbasin to maintain consistency with evaluations completed for the other subbasins (Montgomery & Associates, 2026b). The analysis analyzed 30 years (1995–2024) of nitrate, arsenic, gross alpha radioactivity (gross alpha), hexavalent chromium, groundwater elevation, and extraction data using Mann-Kendall trend tests and Pearson's correlation. Results show that nitrate trends are increasing in roughly half the wells analyzed and no significant trend was identified for the other constituent or groundwater elevations in most wells. Statistical testing found no significant correlation between nitrate trends and groundwater elevation trends ($r_p = -0.1$, $p\text{-value} = 0.6$) or between nitrate trends and annual average extraction rates ($r_p = 0.03$, $p\text{-value} = 0.8$). No statistically significant correlation was identified between arsenic and groundwater elevations or extraction ($r_p = -0.1$, p -

value = 0.6; $r_p = 0.2$, p-value = 0.4, respectively). Gross alpha concentrations also did not show a significant correlation to groundwater elevations or extraction ($r_p = 0.3$, p-value = 0.2; $r_p = 0.3$, p-value = 0.08, respectively). Finally, no statistically significant correlation was identified between hexavalent chromium and groundwater elevations or extraction ($r_p = 0.5$, p-value = 0.2; $r_p = -0.4$, p-value = 0.3, respectively). These findings indicate that, at the subbasin scale, groundwater pumping and groundwater level declines are not driving changes in water quality variability.



(source: CCGC, 2015)

Figure 5-25. Estimated Nitrate Concentrations



(source: MCWRA, 2009)

Figure 5-26. Nitrate Concentrations, 1950 to 2007

Additional groundwater quality conditions in the Basin are summarized in 2 USGS water quality studies in the Salinas Valley. The USGS 2005 GAMA study characterized deeper groundwater resources used for public water supply (Kulongoski and Belitz, 2005). The USGS 2018 GAMA study focused on domestic well water quality (Burton and Wright, 2018). The source data used in these 2 studies and additional publicly available water quality data was accessed through the SWRCB GAMA groundwater information system at:

https://www.waterboards.ca.gov/water_issues/programs/gama/online_tools.html.

5.4.3.1.2 Water Quality Constituent Assessment

The GAMA groundwater information system includes groundwater quality data for public water system supply wells from the SWRCB Division of DDW, and on-farm domestic wells and irrigation supply wells from CCRWQCB's ILP. This GSP relies on established thresholds for constituents: MCLs and SMCLs established by the State's Title 22 drinking water standards for public water system supply wells and on-farm domestic wells, and levels that may lead to reduced crop production for irrigation supply wells, as outlined in the CCRWQCB's Basin Plan (CCRWQCB, 2019). If a constituent is monitored for Title 22 and the Basin Plan, then the stricter of the 2 limits is used. The Basin Plan only had stricter limits for chloride, sodium, and boron. These drinking water and agricultural water quality criteria are jointly defined herein as concentration level of concern.

Table 5-6 reports the constituents that have historically occurred in the active wells in the 180/400 Subbasin. The number of wells that exceed the level of concern for any given constituent is based on the last sample for each well in the monitoring network. Not all wells have been sampled for all constituents. Therefore, the percentage of wells with exceedances is the number of wells that exceed the concentration level of concern divided by the total number of wells that have ever been sampled for that constituent. Additionally, Table 5-6 does not report all of the constituents that are monitored, it only includes the constituents that have historically exceeded a Title 22 regulatory standard or Basin Plan water quality objective. Furthermore, it is possible that the exceedances above the level of concern for both sets of ILP wells are overestimated, because historical changes in well-naming conventions may have caused some wells to be counted more than once. ILP has corrected this issue and has consistent naming conventions for data from WY 2022 forward. The locations of wells that exceeded the level of concern for any of the constituents listed in Table 5-6 are provided in Appendix 5C.

Table 5-6 indicates that groundwater quality concerns in the Subbasin are primarily associated with nitrate contamination and salinity-related constituents. Among DDW wells, chloride exhibited the highest frequency of exceedance, occurring in 27% of sampled wells, followed by hexavalent chromium (19%). Exceedances of nitrate, specific conductivity, and total dissolved solids were less common, each occurring in about 7% of wells, while other constituents such as arsenic, selenium, manganese, aluminum, sulfate, and 1,2,3-trichloropropane (1,2,3-TCP) exceeded levels of concern in relatively few wells. In contrast, agricultural wells showed

substantially higher exceedance rates. On-farm domestic wells had exceedances in 27% of wells for nitrate plus nitrite and 26% for specific conductance, indicating concerns related to both nutrient loading and salinity. Irrigation wells exhibited the highest exceedance rates overall, with nitrate plus nitrite exceeding the level of concern in 43% of sampled wells, sodium in 34%, and chloride in 22% of wells. Overall, groundwater quality impacts are most pronounced in agricultural areas and are characterized primarily by elevated nitrate concentrations and salinity-related constituents, while most trace contaminants appear to be relatively localized and less widespread.

This GSP relies on data from existing monitoring programs to measure changes in groundwater quality. Therefore, the GSA is dependent on the monitoring density and frequency of the DDW and ILP. The monitoring system is further defined in Chapter 7.

Table 5-6. Water Quality Constituents and Exceedances

Constituent	Concentration Level of Concern	Standard Units	Data up to WY 2017		
			Number of Wells Sampled	Number of Wells Exceeding Level of Concern in the Last Sample	Percentage of Wells with Exceedances
DDW Wells (Data from August 1986 to September 2017)					
1,2,3-Trichloropropane (1,2,3 TCP)	0.005	µg/L	78	4	5%
Aluminum	1000	µg/L	90	1	1%
Arsenic	10	µg/L	91	2	2%
Chloride	106	mg/L	83	22	27%
Chromium, Hexavalent (Cr6)	10	µg/L	86	16	19%
Gross Alpha radioactivity	15	pCi/L	82	4	5%
Iron	300	µg/L	79	7	9%
Manganese	50	µg/L	79	2	3%
Nitrate as N	10	mg/L	126	9	7%
Selenium	0.5	mg/L	90	1	1%
Specific Conductivity	1600	µmhos/cm	92	6	7%
Sulfate	500	mg/L	79	1	1%
Total Dissolved Solids	1000	mg/L	82	6	7%
ILP On-Farm Domestic Wells (Data from December 2012 to September 2017)					
Nitrate + Nitrite (sum as nitrogen)	10	mg/L	59	16	27%
Specific Conductance	1600	µmhos/cm	58	15	26%
ILP Irrigation Wells (Data from December 2012 to September 2017)					
Chloride	106	mg/L	99	22	22%
Nitrate+Nitrite (sum as nitrogen)	10	mg/L	7	3	43%
Sodium	69	mg/L	99	34	34%
Specific Conductivity	1600	µmhos/cm	99	8	8%
Total Dissolved Solids	1000	mg/L	72	9	13%

5.5 Subsidence

Land subsidence is the lowering of the ground surface elevation. This is often caused by pumping below thick clay layers. Land subsidence can be elastic or inelastic. Elastic subsidence is called elastic because the small, lowering and rising of the ground surface is reversible. Inelastic subsidence, which is generally irreversible, is the focus of this GSP.

5.5.1 Data Sources

To estimate subsidence, DWR has made Interferometric Synthetic Aperture Radar (InSAR) satellite data available on their SGMA Data Viewer web map: <https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#landsub>. These are the only data used for estimating subsidence in this GSP.

5.5.2 Subsidence Mapping

Figure 5-27 presents a map showing the average annual InSAR subsidence data in the 180/400 Subbasin between June 2015 and June 2020 (DWR, 2020a). The yellow area on the map is the area with measured average annual changes in ground elevation of between -0.1 and 0.1 foot. As discussed in Section 8.9.2.1, because of measurement error in this methodology, any measured ground level changes between -0.1 and 0.1 foot are considered an area of no subsidence. The white areas on the map are areas with no available data. The map shows that no measurable subsidence has been recorded anywhere in the Subbasin.

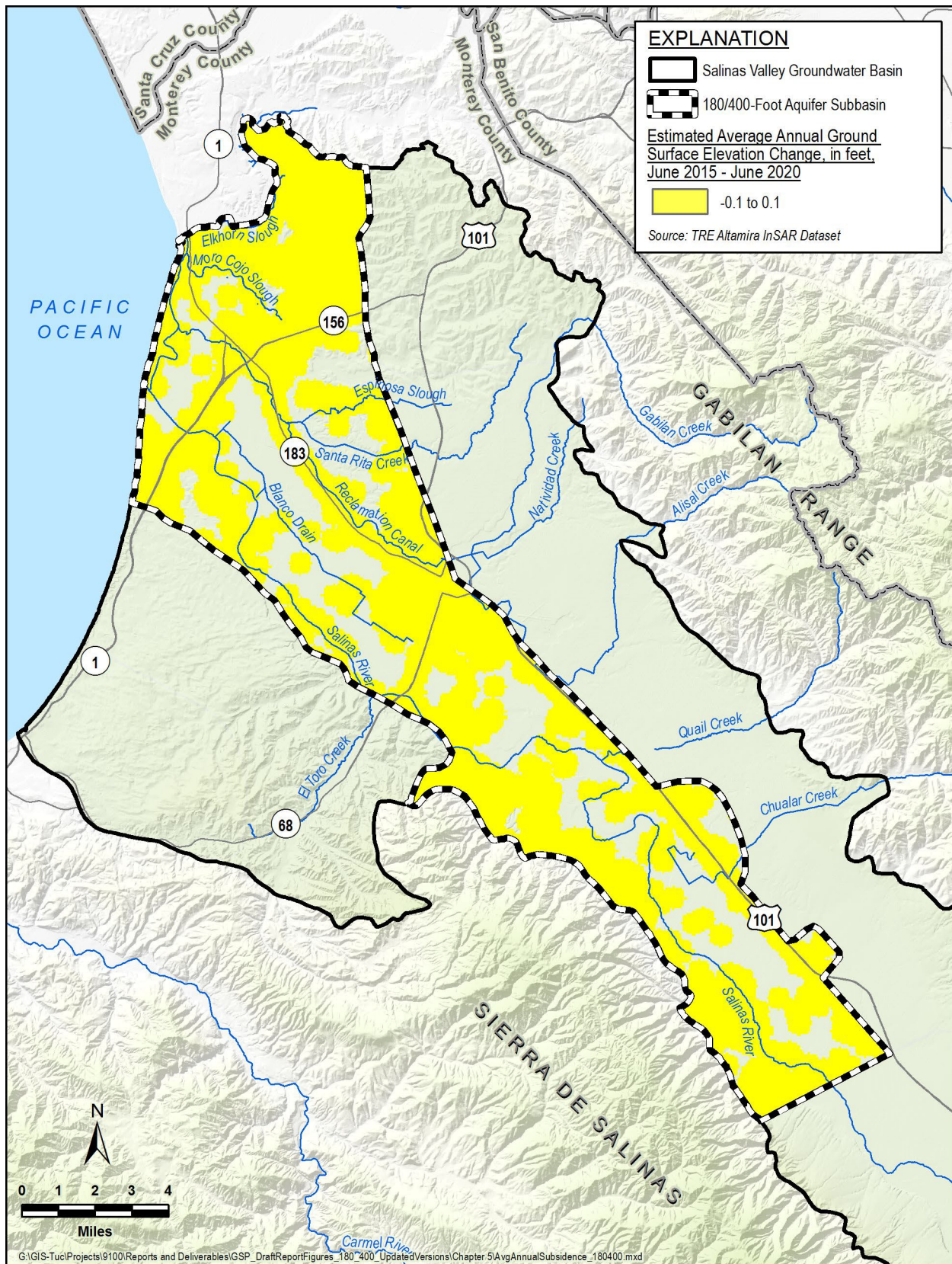
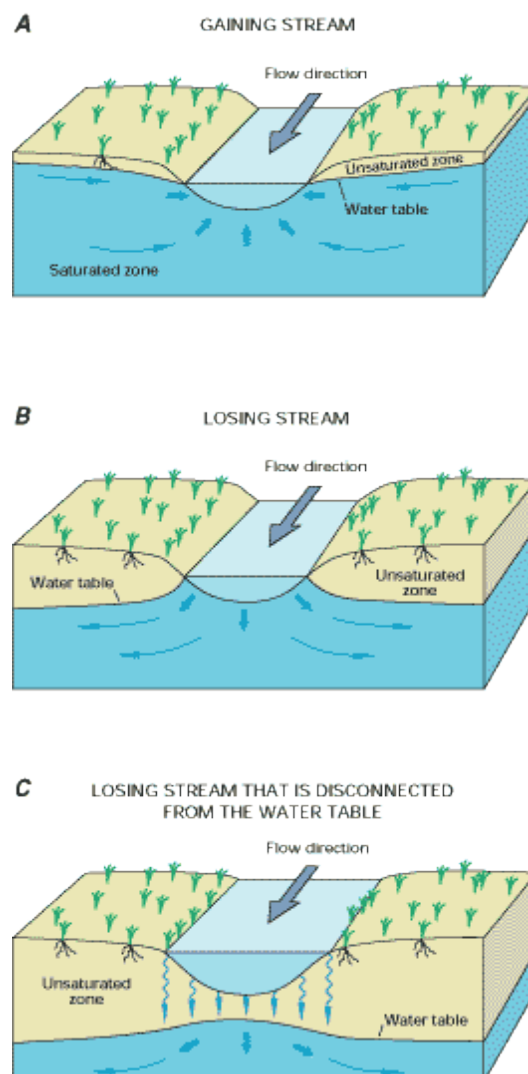


Figure 5-27. Estimated Average Annual InSAR Subsidence in Subbasin 2015 - 2020

5.6 Interconnected Surface Water

ISW is surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water. If groundwater elevations are higher than the water level in the stream, the stream is said to be a gaining stream because it gains water from the surrounding groundwater. If the groundwater elevation is lower than the water level in the stream, it is termed a losing stream because it loses water to the surrounding groundwater. If the groundwater elevation is below the streambed elevation, the stream and groundwater are disconnected. SGMA does not require that disconnected stream reaches be analyzed or managed. These concepts are illustrated on Figure 5-28.



(source: Winter *et al.*, 1999)

Figure 5-28. Conceptual Representation of ISW

Historically, the Salinas River has been a losing stream in the subbasin, as indicated by net stream exchange going from surface water to groundwater in water budgets presented in Chapter 6. For a losing stream, interconnection is largely dependent on surface water availability. Groundwater levels, stream stage, and streambed conductance are also factors in interconnection; but surface water availability plays a dominant role in a losing stream system. In addition to winter precipitation, surface water availability along the Salinas River is dependent on water released from upstream reservoirs during the April to October Conservation Release Period when the reservoirs are managed in part for groundwater recharge. Without reservoir releases, the river would be more disconnected, particularly during the summer season when natural surface water flows are minimal.

5.6.1 Data Sources

The updated SVIHM (version 1; Montgomery & Associates, 2025) is used to map the potential locations of ISW, as described in Chapter 4 and shown on Figure 4-11. There is no observed data that verifies the location and extent of surface water connection to groundwater in most parts of the valley, nor the extent to which groundwater extraction depletes surface water. Therefore, this section describes the hydraulic principles that establish the relationship between surface water and groundwater, upon which the GSP baseline conditions and monitoring network are based, and summarizes the use of the SVIHM to estimate and evaluate historical ISW depletions due to pumping.

5.6.2 Evaluation of Surface Water and Groundwater Interconnection

Groundwater extraction can alter flows between surface water and groundwater. Flow changes related to interconnected surface and groundwater could be due to reductions in groundwater discharge to surface water, or increases in surface water recharge to groundwater. These 2 changes together constitute the change in the amount of surface water depletion due to pumping. However, as previously described, the hydrology of the Salinas Valley is also influenced by operations of the San Antonio and Nacimiento Reservoirs. Releases from the reservoirs during the MCWRA conservation release period ensures water is available in downstream reaches for rediversion at the SRDF, environmental purposes, and groundwater recharge. Recharge from reservoir releases is an expected and planned result of reservoir operations and is a substantial component of the subbasin's water budget.

During the conservation release period when reservoir releases provide water in the river, ISW depletion represents the pumping-related change in flow exchange between surface water and groundwater under those managed flow conditions along those locations of ISW. Less water is present along the river during drought years, especially in the summer, when little or no water is released from the reservoirs. This results in less recharge as well. Without the releases, and under the same pumping conditions, there would be less interconnection between surface water and

groundwater. Because reservoir releases affect the amount and timing of water available in the river, they also influence the timing and magnitude of simulated stream leakage and surface water depletion described herein.

For this GSP, ISW depletions are reductions in ISW flows due to groundwater pumping, and is estimated by evaluating the change in the modeled stream leakage (loss or gain in river flow) with and without pumping. A model simulation without any groundwater pumping (i.e., SVIHM with no pumping) was compared to the model simulation with groundwater pumping (i.e., SVIHM with pumping). The difference in stream leakage between the 2 simulations is the depletion attributed to groundwater pumping. However, this can be misleading because stream leakage, and thus depletions, along the Salinas River is dynamic and depends on both pumping and reservoir releases. During the conservation release period when reservoir releases provide water in the river, the difference in stream leakage represents the pumping-related change in flow exchange between surface water and groundwater under those managed flow conditions. ISW depletions are only estimated for the interconnected segments identified on Figure 4-13.

This analysis evaluates ISW depletions along the Salinas River and other streams as an annual average, as well as monthly average and also during the conservation release period when reservoir releases are made in part for groundwater recharge. Releases also occur during the non-conservation period but for different purposes. Depletion along interconnected sections of the Salinas River is estimated separately for the conservation release period of April through October, and the non-conservation release period of November through March. Evaluating depletion separately for the conservation release and the non-conservation release period helps distinguish differences in stream leakage (recharge) associated with managed reservoir releases. Table 5-7 shows the estimated Water Year average depletion of ISW due to groundwater pumping along the stream segments in the Subbasin for the historical modeling period from WY 1980 to WY 2022. Since 2010 when the SVWP began, annual average rate of depletion along Salinas River is 35,100 AF/yr, with 17,000 AF/yr occurring during the conservation release period. A relatively small amount of depletions occurs along other ISW stream reaches in the northern part of the Subbasin near Castroville. Depletions are similar during the conservation release period and the non-conservation release period.

**Table 5-7. Average SVIHM Simulated Depletion of ISW due to Pumping
in the 180/400 Subbasin**

	Annual Average WY 1980-2022 (AF/yr)	Conservation Release Period Average WY 2010-2022 (AF/yr)	Non-Conservation Release Period Average WY 2010-2022 (AF/yr)
Salinas River	36,400	17,000	18,100
Other Surface Waters	9,200	N/A	N/A

Figure 5-29 shows annual ISW depletions for the historical model period from WY 1980 through WY 2022. The analysis indicates that annual depletions vary from year to year, with large, short-term changes related to droughts. Consistent with trends described in Appendix 4A, ISW depletions sharply declined during drought periods (1990, 2015, 2022) even though groundwater pumping increased slightly during the same time. The expectation is that depletions would increase during droughts due to increased pumping. However, the opposite occurs. This is likely the result of little or no reservoir releases occurring during droughts, leaving very little or no water in the river which results in less leakage (recharge) to the aquifer. Depletions decline because the decrease in surface water availability overwhelms the effects of increased groundwater pumping. Depletions increase dramatically immediately after drought periods when reservoir releases resume and streamflow recovers, the lower groundwater levels can increase the downward gradient between stream and aquifer and thus result in more recharge and ultimately more depletions. This relationship illustrates the important role that reservoir releases have on ISW and depletions.

In addition to annual variability, seasonal conditions influence ISW depletions in the Subbasin. Figure 5-30 compares average monthly depletions with average monthly groundwater pumping in the Subbasin. ISW depletions are relatively consistent throughout the year, with slight fluctuations occurring during and after the conservation release period, which coincides with the irrigation pumping season in the Valley. This monthly pattern indicates that seasonal depletion is influenced by both groundwater pumping and the availability of streamflow during managed reservoir release periods. Stream leakage, and thus depletions, declines slightly during the conservation release period because the increase of surface water availability from reservoir releases mitigates the effects of pumping.

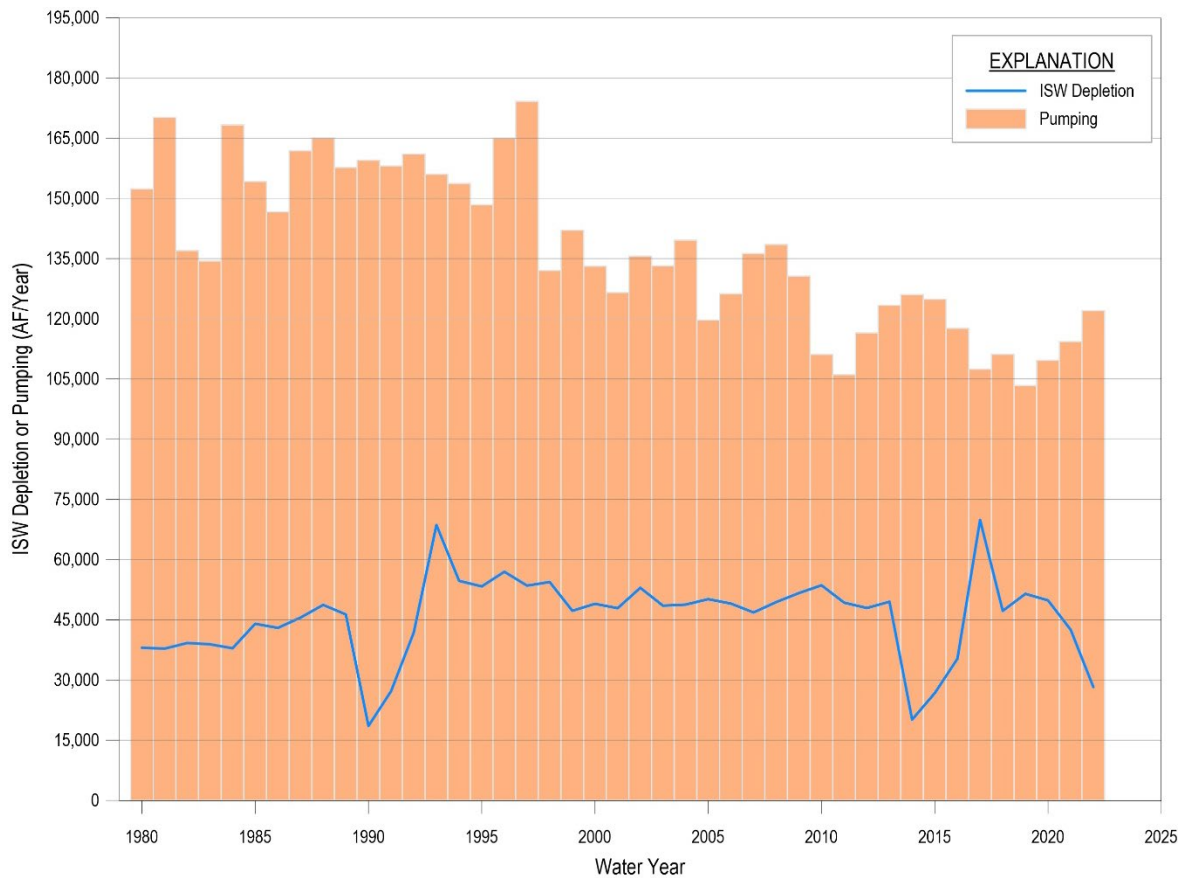


Figure 5-29. Average Annual ISW Depletions and Annual Groundwater Pumping in 180/400 Subbasin

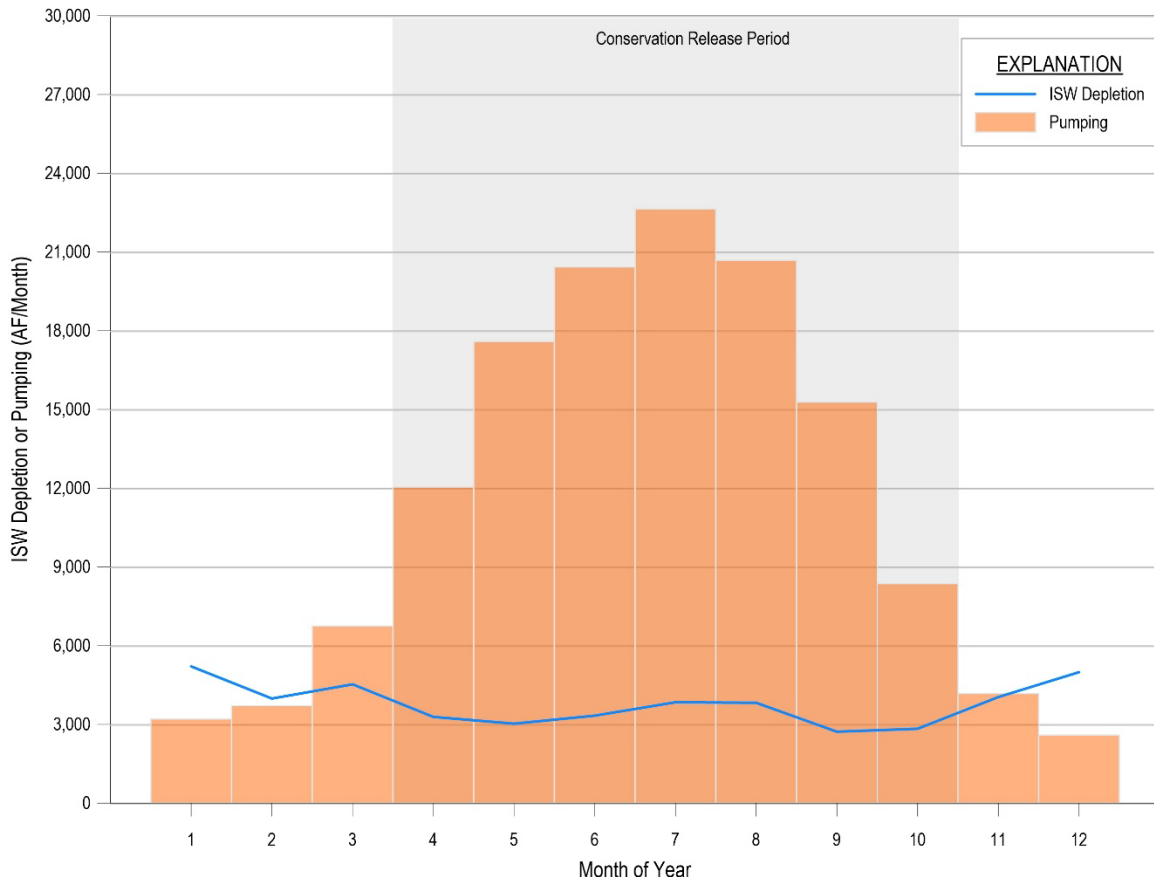


Figure 5-30. Monthly Average Pumping and ISW Depletion in 180/400 Subbasin

5.7 Water Use and Supply

Agricultural use accounts for the majority of water demand within the Subbasin, followed by urban and industrial uses, and then rural domestic use. Water use by wetlands and native vegetation represents a relatively small portion of total demand and is not quantified.

Water supplies in the 180/400 Subbasin are derived from a combination of groundwater, surface water, and recycled water, with groundwater providing the majority of supply. The CSIP delivers a combination of groundwater, re-diverted stored reservoir water, and recycled water from M1W to the coastal farmland surrounding Castroville. Some growers also report surface water use to the SWRCB. A small amount of recycled water is also used to irrigate horse pastures and lawns.

5.7.1 Data Sources

The extraction data presented in this section was collected by MCWRA through GEMS, which is part of the GMP, under which groundwater extraction data from non-*de minimis* wells within the SVBGSA subbasins are reported to MCWRA. Until WY 2025, agricultural and urban

groundwater extraction data was collected for wells with discharge pipes with an internal diameter greater than 3 inches within Zones 2, 2A, and 2B.

Rural domestic pumping is estimated using the number of drinking water connections based on data compiled for water systems and 2024 County of Monterey parcel data. To estimate water use, the approximate number of connections is multiplied by a constant pumping rate of 0.35 AF/yr per connection.

Surface water diversions from the Salinas River collected by eWRIMS and SRDF make up the surface water supplies in the Subbasin. In 2025, eWRIMS was replaced by the CalWATRS. SVRP provides most of the recycled water in the Subbasin.

5.7.2 Groundwater Use

Table 5-8 provides groundwater extraction by water use sector for the 180/400 Subbasin from 2021 to 2025. Agricultural pumping was historically reported by MCWRA for the period November 1 through October 31, whereas urban pumping was reported on a calendar-year basis. As of WY 2025, groundwater extraction reported under the GMP aligns with the water year (October 1 through September 30). Rural domestic pumping is estimated on a calendar year basis.

Urban use data from MCWRA aggregates municipal wells, small public water systems, and industrial wells. On average, agricultural use accounted for 90% of groundwater extraction from 2017 to 2020; urban and industrial use accounted for 10%. The GMP allows 3 different reporting methods: water flowmeter, electrical meter, or hour meter. On average, 83% of extractions from 2017 to 2020 were calculated using a flowmeter, 16% electrical meter, and <1%-hour meter. MCWRA ordinance number 5426 requires flowmeters be calibrated every 5 years and be accurate to within +/- 10%. The same ordinance requires annual pump efficiency tests for wells using the electrical meter method. SVBGSA assumes an electrical meter accuracy of +/- 5%.

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.

Table 5-8. WY 2021 to 2025 Groundwater Use

	Groundwater Use (AF/yr)				
	2021	2022	2023	2024	2025
Rural Domestic	660	660	660	660	660
Urban (includes industrial)	12,300	11,300	11,000	11,430	10,020
Agricultural	114,500	118,600	84,400	91,890	94,020
Managed Wetlands	0	0	0	0	0
Managed Recharge	0	0	0	0	0
Natural Vegetation	0	0	0	0	0
Total	127,460	130,560	96,060	103,980	104,700

5.7.3 Surface Water Supply

Annual Salinas River watershed diversion data can be obtained from the SWRCB's eWRIMS website, which was replaced by CalWATRS in 2025 (SWRCB, 2024; 2026b). Table 5-9 shows the surface water diversions from 2021 to 2025 in the 180/400 Subbasin, including annual SRDF diversions to calculate the total surface water in the Subbasin. The Appropriative diversions do not include SRDF, only those that occur at Blanco Drain and Reclamation Ditch. All surface water is used for irrigation.

Table 5-9. WY 2021 to 2025 Surface Water Use

	Surface Water Diversions (AF/yr)				
	2021	2022	2023	2024	2025
SRDF	4,200	5,300	7,600	6,700	
eWRIMS/CalWATRS - Appropriative	700	300	1,100	1,010	1,340
eWRIMS/CalWATRS - Statement of Diversion and Use	6,500	7,600	6,300	7,420	7,720
Total	12,260	7,900	14,720	16,100	17,020

5.7.4 Recycled Water Supply

In addition to groundwater and surface water, a third water source type in the 180/400 Subbasin is recycled water. Monterey One Water treats and delivers this SVRP recycled water to the coastal farmland surrounding Castroville through the CSIP system. Recycled water deliveries are summarized in Table 5-10.

Table 5-10. WY 2017 to 2020 Recycled Water Use

	Recycled (AF/yr)
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	2021	2022	2023	2024	2025
SVRP-Recycled	12,300	11,120	9,630	10,740	10,610

5.7.5 Total Water Use

Total water use is the sum of groundwater extractions, surface water use, and recycled water use and is summarized in Table 5-11 and Figure 5-31.

Many growers and residents have noted that some irrigation water use is reported both to the SWRCB as Salinas River diversions and to the MCWRA as groundwater pumping. For WY 2024 and earlier, because no direct information on reporting overlap was available, all surface water reported as a Statement of Diversion and Use was assumed to be duplicative and was excluded from the Subbasin total water use calculation. As a result, total surface water use includes only the SRDF and Appropriative diversions reported to SWRCB. It is possible that not all of the surface water diversions excluded are being reported to both SWRCB and MCWRA, in which case total water use may be up to that amount greater than calculated here. This accounting is done to calculate the total water use and is not meant to imply that SVBGSA classifies any or all the reported diversions as groundwater.

Beginning in WY 2025, MCWRA revised its GMP reporting process to allow reporters to indicate whether they also report surface water use to SWRCB. Based on this self-reported data, approximately 33,840 AF/yr out of the total agricultural groundwater extraction reported to MCWRA was also reported to the SWRCB. Because this amount exceeds the total surface water diversions reported within the 180/400 Subbasin to SWRCB, it is assumed that it encompasses those diversions. However, it is possible that this assumption is incorrect, in which case total water use may be up to 7,720 AF/yr greater than calculated here.

SVBGSA will continue to work with stakeholders to refine the method used to resolve double counting.

Table 5-11. WY 2021 to 2025 Total Water Use by Water Source Type and Water Use Sector

	Total Water Use (AF/yr)														
	2021			2022			2023			2024			2025		
Water Use Sector	Groundwater	Surface Water	Recycled Water	Groundwater	Surface Water	Recycled Water	Groundwater	Surface Water	Recycled Water	Groundwater	Surface Water	Recycled Water	Groundwater	Surface Water	Recycled Water
Rural Domestic	660	0	0	660	0	0	660	0	0	660	0	0	660	0	0
Urban	12,300	0	0	11,300	0	0	11,000	0	0	11,430	0	0	10,020	0	0
Agricultural	114,500	5,760	12,300	118,600	300	11,120	84,400	8,420	9,630	91,890	8,680	10,740	94,020	9,300	10,610
SUBTOTALS	127,460	5,760	12,300	130,560	300	11,120	96,060	8,420	9,630	103,980	8,680	10,740	104,700	9,300	10,610
TOTAL	145,520			141,980			114,110			123,400			124,610		

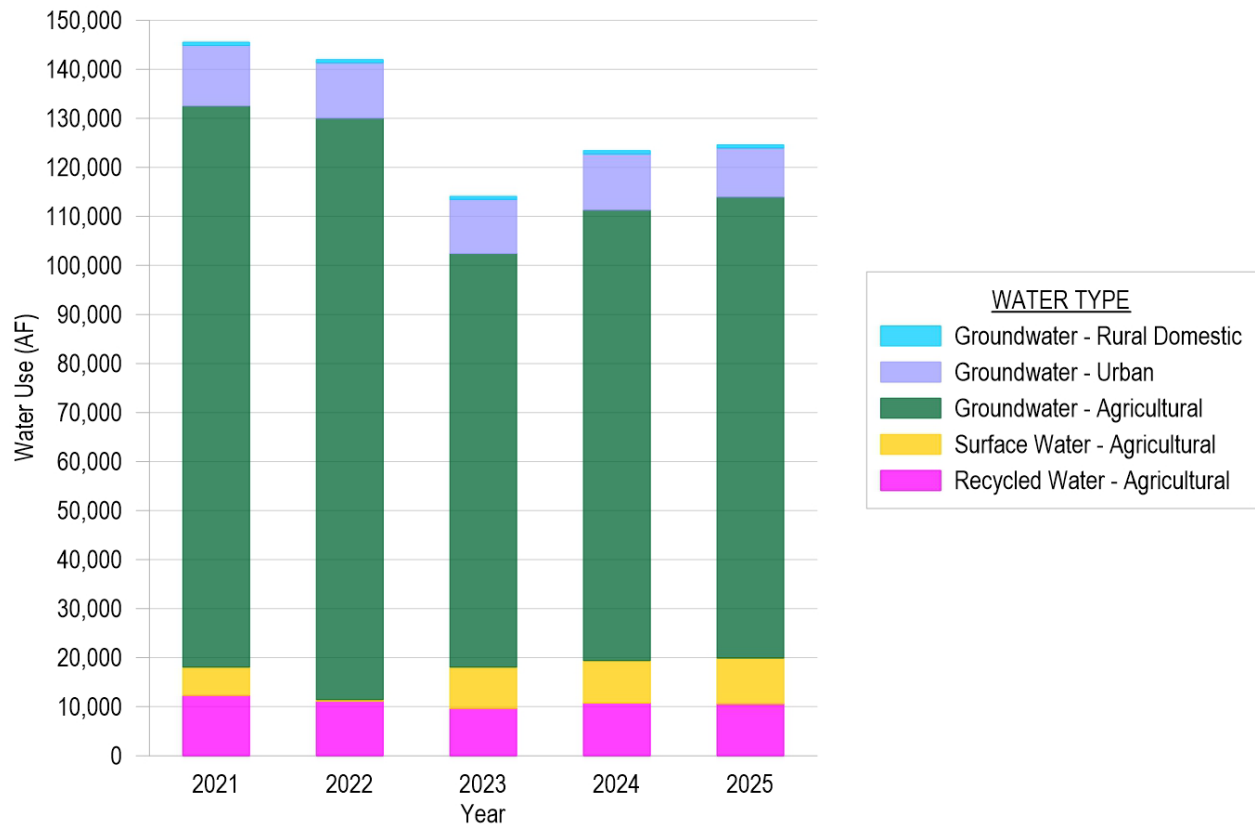


Figure 5-31. WY 2021 to 2025 Total Water Use by Water Source Type and Water Use Sector

6 WATER BUDGETS

This chapter summarizes the estimated water budgets for the 180/400 Subbasin, including information required by the GSP Regulations and additional content needed to support effective groundwater sustainability planning. In accordance with the SGMA Regulations §354.18, this water budget 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 groundwater in storage. For the purposes of this chapter, historical is WY 2003-2020 and current is the last 2 years in the SVIHM, WY 2021-2022. Water budgets are reported in graphical and tabular formats, where applicable.

The previous water budgets described in the approved GSP were developed using best tools and methods available at the time. Since the release and approval of the original GSP, groundwater models were updated. Updating the water budgets for this Subbasin using these new, best available tools is important for maintaining consistency with adjacent Subbasins managed by the SVBGSA. This section describes the water budgets for this Subbasin in a manner consistent with GSPs for other subbasins in the Valley.

6.1 Overview of Water Budget Development

The water budgets are presented in 2 subsections: (1) historical and current water budgets and (2) future water budgets. Historical/current and projected water budgets are developed using similar methods, but with different groundwater models. For each period, surface water and groundwater budgets are developed together but evaluated and presented separately.

Historical and current water budgets are developed using the SVIHM, initially developed by the USGS and subsequently updated by the SVBGSA. The water budgets presented herein are based on results from the updated SVIHM version 1 (Montgomery & Associates, 2025). The SVIHM is a numerical groundwater-surface water model that is constructed using version 2 of the MODFLOW One-Water Hydrologic Flow Model (MODFLOW-OWHM) code (Boyce *et al.*, 2020). This code is a version of the USGS groundwater flow code MODFLOW that estimates agricultural supply and demand through the Farm Process (U. S. Geological Survey, 2026).

The model area covers the Salinas Valley from the Monterey-San Luis Obispo County Line in the south to the Pajaro Basin in the north, including the offshore extent of the major aquifers. The model includes operations of the San Antonio and Nacimiento reservoirs. The SVIHM is supported by 2 sub models: a geologic model known as the Salinas Valley Geologic Model (SVGM) and a watershed model known as the Hydrologic Simulation Program – Fortran (HSPF). Additional details on the original model development and calibration are provided by U.S. Geological Survey (2026), and a summary of model updates and recalibration is described in Montgomery & Associates (2025a).

Future water budgets are developed using the Salinas Valley Operational Model (SVOM), which was initially developed by the USGS and MCWRA and subsequently updated by SVBGSA. The SVOM uses a similar framework and processes as the SVIHM, but is specifically designed to simulate future scenarios. It incorporates complex surface water operations through the Surface Water Operations module. Information on model inputs, design, and results is summarized in U.S. Geological Survey (2026), and initial updates are documented by Montgomery & Associates (2026c).

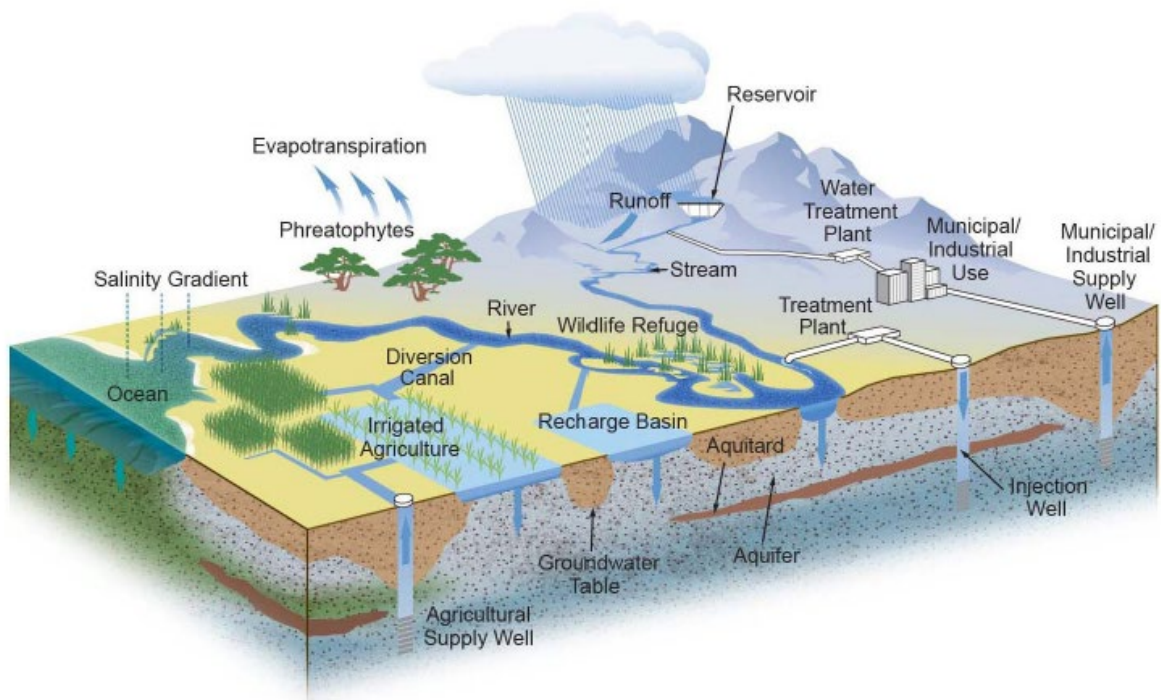
In accordance with SGMA Regulations § 354.18, for each water budget period, an integrated groundwater budget is developed for each principal aquifer. The 180/400 Subbasin comprises 3 principal aquifers—the 180-Foot, 400-Foot, and Deep Aquifers.

6.1.1 Water Budget Components

The water budget is an inventory of the Subbasin’s surface water and groundwater inflows and outflows. Some components of the water budget can be measured, such as groundwater pumping from metered wells, precipitation, and surface water diversions. Other components are not easily measured and can be estimated using groundwater models such as the SVIHM; these include unmetered agricultural pumping, recharge from precipitation and applied irrigation, and change in groundwater in storage. Figure 6-1 presents a general schematic diagram of the hydrogeologic conceptual model that is included in the water budget (DWR, 2020c). Figure 6-2 delineates the zones and boundary conditions of the SVIHM.

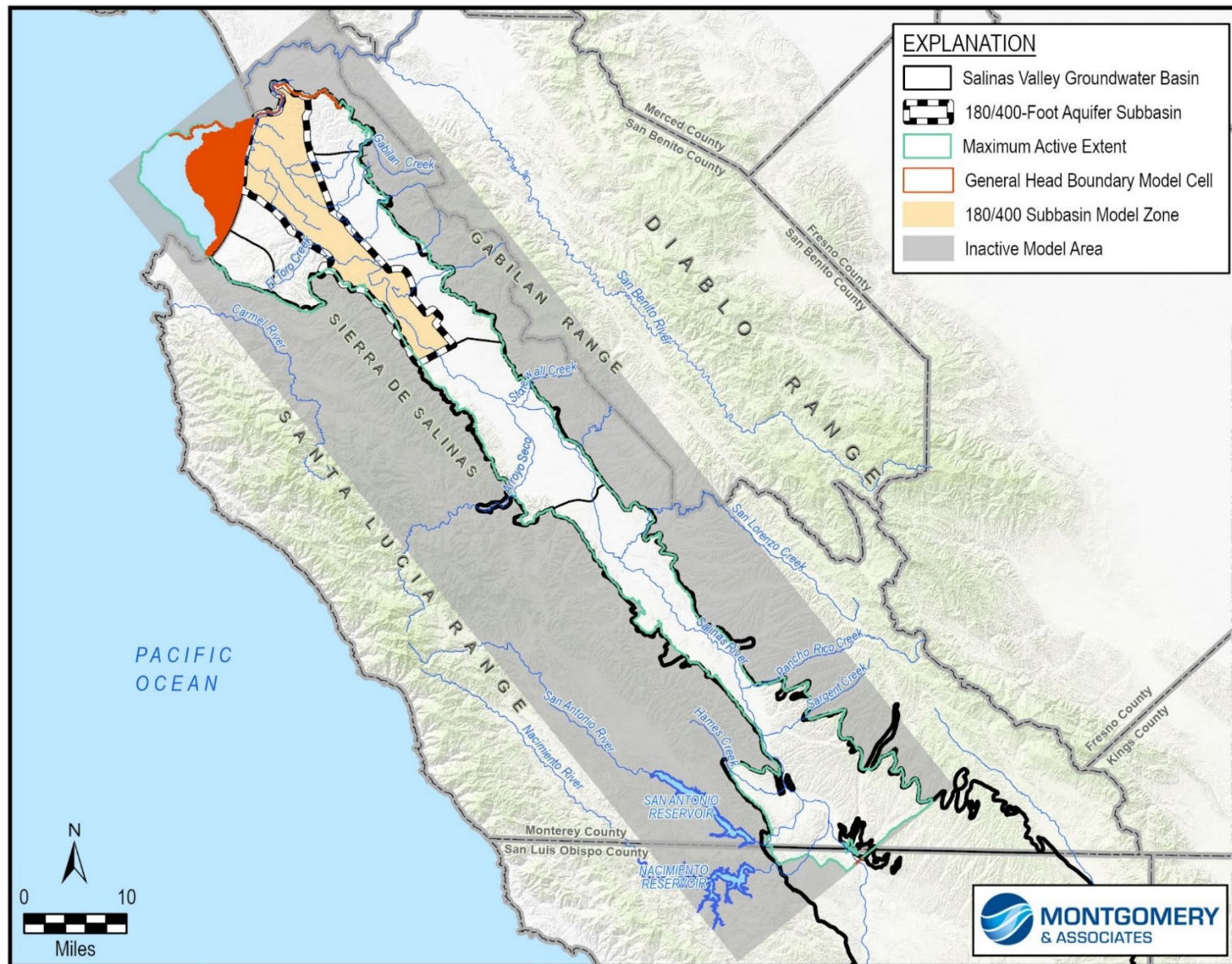
The water budgets for the Subbasin are calculated within the following boundaries:

- **Lateral boundaries.** The perimeter of the 180/400 Subbasin within the SVIHM is shown on Figure 6-2.
- **Bottom.** The base of the groundwater subbasin is described in the HCM, which has been updated with new data, and still largely follows the previous surface. It is defined as both the contact with crystalline rocks of the Gabilan and Sierra de Salinas Ranges where they may occur in the Subbasin, and the base of the usable and productive unconsolidated sediments where crystalline rocks contact below where groundwater is produced (Durbin *et al.*, 1978). This ranges from less than 800 feet below ground surface in the far north of the Subbasin to almost 2,600 feet deep along the Subbasin’s southwestern edge. The bedrock contact HCM updates primarily focused on the offshore geology and geometry of the Monterey Formation to where it intercepts Monterey Canyon under the Bay. The water budget is not sensitive to the exact definition of this base elevation because the base is defined as a depth below where there is not significant inflow, outflow, or change in storage.
- **Top.** The top of the water budget area is above the ground surface, so that surface water is included in the water budget.



(source: DWR, 2020b)

Figure 6-1. Schematic Hydrogeologic Conceptual Model



The 180/400 Subbasin water budget includes the following components:

Surface Water Budget

- Inflows
 - Precipitation runoff
 - Surface water inflows from streams and canals that enter the subbasin, including Salinas River, Chualar Creek, Quail Creek, Alisal Creek, Salinas Reclamation Canal, Santa Rita Creek, and several other smaller creeks
 - Groundwater discharge to streams
- Outflows
 - Stream discharge to groundwater
 - Stream diversions
 - Outflow to the ocean and neighboring subbasins from the Salinas River and other smaller streams

Groundwater Budget

- Inflows
 - Deep percolation from precipitation and applied irrigation
 - Stream discharge to groundwater
 - Subsurface inflows, including:
 - Inflow from the Forebay Subbasin
 - Inflow from the Langley Subbasin
 - Inflow from the Eastside Subbasin
 - Inflow from the Pajaro Valley Subbasin
 - Inflow from the Monterey Subbasin
 - Inflow from the Pacific Ocean (seawater intrusion)
 - Inflow from the surrounding watershed that are not in other DWR subbasins
- Outflows
 - Evapotranspiration (ET) from groundwater
 - Groundwater pumping, including municipal, industrial, and agricultural

- Groundwater discharge to streams
- Subsurface outflows, including:
 - Outflow to the Forebay Subbasin
 - Outflow to the Langley Subbasin
 - Outflow to the Eastside Subbasin
 - Outflow to the Pajaro Valley Subbasin
 - Outflow to the Monterey Subbasin
 - Outflows to the Pacific Ocean
 - Outflow to surrounding watershed that are not in other DWR subbasins

The difference between groundwater inflows and outflows is equal to the change of groundwater in storage.

6.1.2 Water Budget Timeframes

The GSP Regulations require development of water budgets for 3 periods: historical, current, and projected. These timeframes are defined as follows:

- The historical water budget evaluates how past water use and supply availability has affected aquifer conditions and the ability of groundwater users to operate within the sustainable yield. GSP Regulations require that the historical water budget start with the most recently available information and extend back a minimum of 10 years of water budget information. DWR's Water Budget Best Management Practices (BMP) document further states that the historical water budget should help develop an understanding of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability to operate the basin within the sustainable yield. Accordingly, historical conditions should include the most reliable historical data that are available for GSP development and water budgets calculations.
- The current water budget characterizes recent conditions, helping the GSA and DWR understand existing supply, demand, and change in storage under recent population, land use, and hydrologic conditions. While DWR does not define a specific timeframe, current conditions are generally the most recent conditions for which adequate data are available and may include an average over a few recent years with various climatic and hydrologic conditions. Current, as used here in this GSP

Amendment 2, is defined by the last 2 years in the SVIHM, WY 2021 and WY 2022. These years were drier than normal and do not represent average hydrologic conditions. More recent periods during GSP implementation will be included in 5-year GSP periodic evaluations.

- The projected water budget is intended to quantify the estimated future baseline conditions without additional PMAs. The projected water budget estimates the future baseline conditions concerning hydrology, water demand, and surface water supply over a 50-year planning and implementation horizon. It is based on historical trends in hydrologic conditions that are used to project forward 50 years, without climate change. Uncertainty associated with climate change is addressed at the end of the chapter.

Although there is a significant variation between wet and dry seasons, the GSP does not consider separate seasonal water budgets for the groundwater budget. All water budgets are developed for complete WYs. Selected time periods for the historical and current water budgets are summarized in Table 6-1 and on Figure 6-3 and described in Sections 6.1.2.1 and 6.1.2.2.

Table 6-1. Summary of Historical and Current Water Budget Time Periods

Time Period	Proposed Date Range	Water Year Types Represented in Time Period	Rationale
Historical	Water years 2003 through 2020	Dry: 5 Dry-Normal: 5 Normal: 2 Wet-Normal: 0 Wet: 6	Provides insights on water budget response to a wide range of variations in climate and groundwater use over an extensive period of record. Throughout this period, changes in water use efficiency and cropping patterns remain relatively stable.
Current	Water years 2021 and 2022	Dry: 1 Dry-Normal: 1	Last years in SVIHM. Best reflection of current land use and recent water use conditions based on best available data.

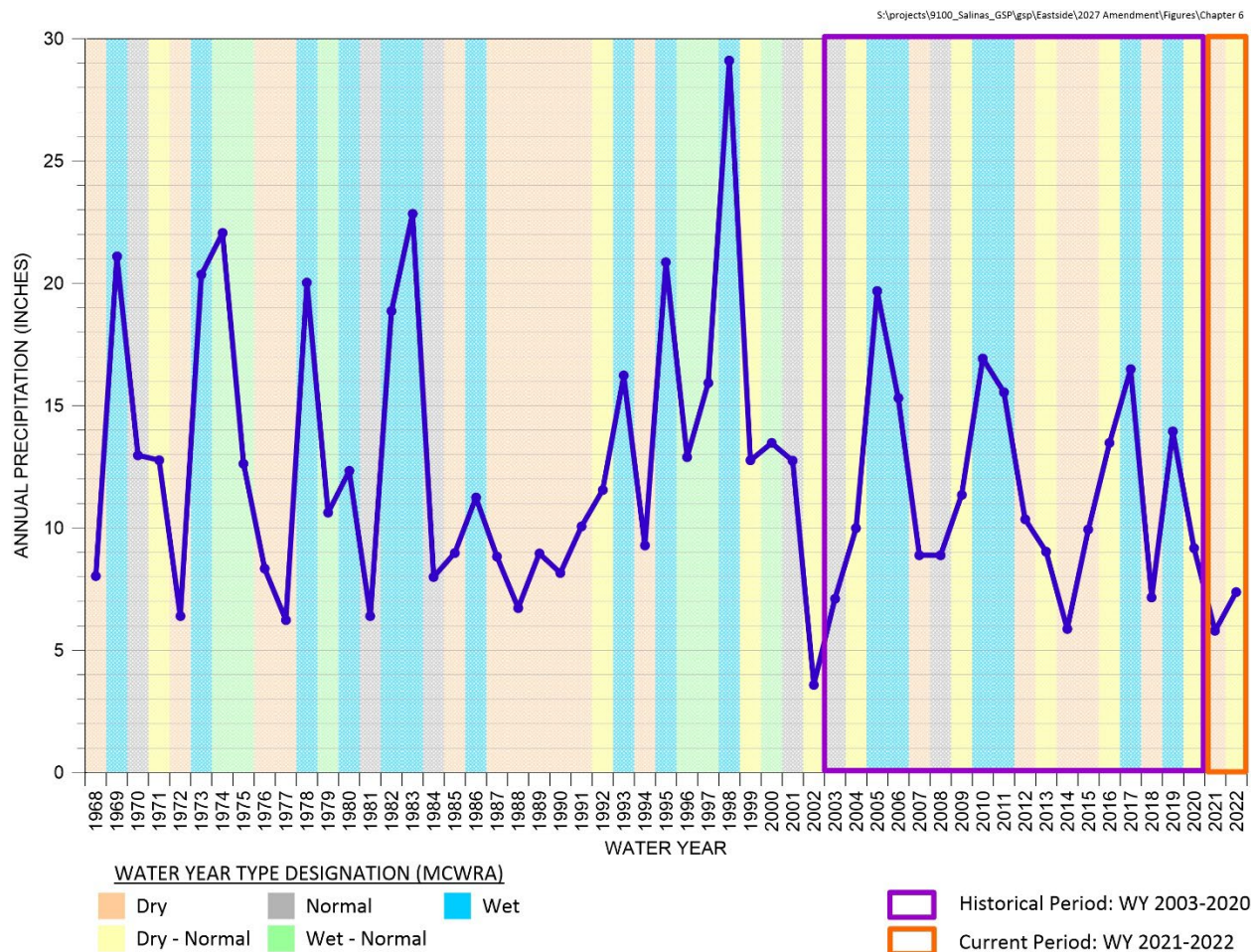


Figure 6-3. Climate and Precipitation for Historical and Current Water Budget Time Periods

6.1.2.1 Historical Water Budgets Time Period

The historical water budget is developed for WY 2003 through WY 2020 (October 2002 through September 2020). Although the SVIHM simulation covers WYs 1967 through 2022, the water budget focuses on WY 2003 through 2020 because this period includes relatively stable water use efficiency and cropping patterns across the Salinas Valley. Therefore, this historical period more closely represents current water use practices. WYs 2003 through 2020 comprise a representative time period with both wet and dry periods in the Subbasin (Table 6-1, Figure 6-3).

6.1.2.2 Current Water Budget Time Period

The current water budget covers WYs 2021 and 2022, the last 2 years included in the SVIHM. While these years appropriately meet the regulatory requirement for using the most recent hydrology, water supply, water demand, and land use information for which there is data available, the years are classified as dry and dry-normal, respectively, and thus do not represent average hydrology.

6.1.2.3 Future Projected Water Budgets Time Period

Future projected conditions are based on model simulations using the updated SVOM groundwater flow model, which incorporates current reservoir operation rules and a baseline climate sequence derived from historical conditions. A repeating 25-year projected climate sequence is used to represent long-term variability. Using this approach, Montgomery & Associates developed a projected baseline scenario that represents status quo conditions. This scenario includes estimated sea level rise but does not incorporate broader climate change effects, which are incorporated later in the chapter. The projected baseline serves as the reference for assessing potential PMAs.

6.2 Overview of Model Assumptions for Water Budget Development

Table 6-2 provides detailed water budget components and known model assumptions and limitations for each. A few water budget components are directly measured, but most water budget components are either estimated as input to the model or simulated by the model. Both estimated and simulated values in the water budgets are underpinned by certain assumptions. These assumptions can lead to uncertainty in the water budget. However, inputs to the SVIHM were carefully selected using best available data, reducing the level of uncertainty.

No model is a perfect representation of natural condition and level of calibration. However, the updated SVIHM's calibration error is within reasonable bounds, and it is the best available scientific tool for estimating water budgets for the GSP.

Table 6-2. Summary of Water Budget Component Data Source from the SVIHM and Other Sources

Water Budget Component	Source of Component Data	Limitations
Precipitation	Incorporated in calibrated model as part of land use process	
Surface Water Inflows		
Inflow from Streams Entering Basin	Simulated from calibrated model for all creeks	Not all creeks are gauged
Groundwater Discharge to Streams	Simulated from calibrated model	Based on calibration of streamflow to available data from gauged creeks
Overland Runoff	Simulated from calibrated model	Based on land use, precipitation, and soils specified in model
Surface Water Outflows		
Streambed Recharge to Groundwater	Simulated from watershed model for all creeks	Based on calibration of streamflow to available data from gauged creeks and groundwater level data from nearby wells
Diversions	Simulated from original model	Some input data are uncertain
Outflow to Streams Leaving Basin	Simulated from calibrated model for all creeks	Not all creeks are gauged
Groundwater Inflows		
Streambed Recharge to Groundwater	Simulated from calibrated model	Based on calibration of streamflow to available data from gauged creeks and groundwater level data from nearby wells
Deep Percolation of Precipitation and Irrigation Water	Simulated from calibrated model based on demands based on crop, acreage, temperature, and soil zone processes	No measurements available; based on assumed parameters for crops and soils
Subsurface Inflow from Adjacent Basins and Surrounding Watershed Other than Neighboring Basins	Simulated from calibrated model	Limited groundwater calibration data at adjacent subbasin boundaries
Subsurface Inflow from Ocean	Simulated from calibrated model	Seawater intrusion assumed equal to groundwater flow from the ocean across coastline
Groundwater Outflows		
Groundwater Pumping	Reported GEMS data for historical urban pumping, and some small water systems. Estimated data for urban pumping pre-1995. Simulated agricultural pumping calibrated to reported data. Rural domestic pumping for the Langley Subbasin is estimated based on population and per capita assumptions.	Rural residential pumping within MCWRA Zone 2A is not simulated in model
Groundwater Discharge to Streams	Simulated from calibrated model	Based on calibration of streamflow to available data from gauged creeks and groundwater level data from nearby wells
Groundwater Discharge to Drains	Simulated from calibrated model	Based on calibration of the surface water network and groundwater level data from nearby wells
Subsurface Outflow to Adjacent Basins and Ocean	Simulated from calibrated model	Limited calibration data at adjacent subbasin boundaries

Water Budget Component	Source of Component Data	Limitations
Evapotranspiration from groundwater	Simulated from calibrated model	Based on representative plant group and uniform extinction depth

6.3 Historical and Current Water Budgets

Water budgets for the historical and current periods are presented below. The surface water budgets are presented first, followed by the groundwater budgets. Water budgets will be updated in future GSP periodic evaluations.

6.3.1 Historical and Current Surface Water Budget

The surface water budget accounts for the inflows and outflows for the streams within the Subbasin. This includes flows from rivers and tributaries entering and exiting the Subbasin, precipitation that falls directly onto streams, overland runoff to streams, diversions from streams, and stream-aquifer interactions. Evapotranspiration by riparian vegetation along stream channels is estimated by the SVIHM as part of the groundwater system and is accounted for in the groundwater budget.

Figure 6-4 shows the model grid cells for the surface water network simulated in the SVIHM. The model accounts for surface water flowing in and out across the subbasin boundary. For this water budget, boundary inflows and outflows are the sum of all locations that cross the Subbasin boundary. In some instances, a simulated stream might enter and exit the Subbasin boundary at multiple locations, such as Salinas River, Chualar Creek, and Natividad Creek/Reclamation Canal. The Salinas Valley Aquitard, which extends over much of the Subbasin, limits connectivity between surface water and principal aquifers where present.

Figure 6-5 shows the surface water budget for the historical period and current period in AF/yr. Table 6-3 shows the average values for components of the surface water budget for the historical and current periods. Positive values are inflows to the stream system and negative values are outflows from the stream system. Boundary stream inflows and boundary stream outflows are at least 1 order of magnitude greater than any other component of the surface water budget. The flow between surface water and groundwater (streamflow exchange) in the Subbasin is net negative, which indicates more deep percolation of streamflow to groundwater than groundwater discharge to streams. The historical average diversions value in Table 6-3 is the average annual diversion since 2010 when the SRDF began diverting Salinas River water. Annual diversions ranged from 0 AF/yr (no diversions) in 2015, 2016, and 2022 to almost 6,400 AF/yr in 2013, with an historical average of about 3,600 AF/yr. Annual diversions since 2018 have been greater than 5,000 AF/yr, except for 2022 when no diversions occurred.

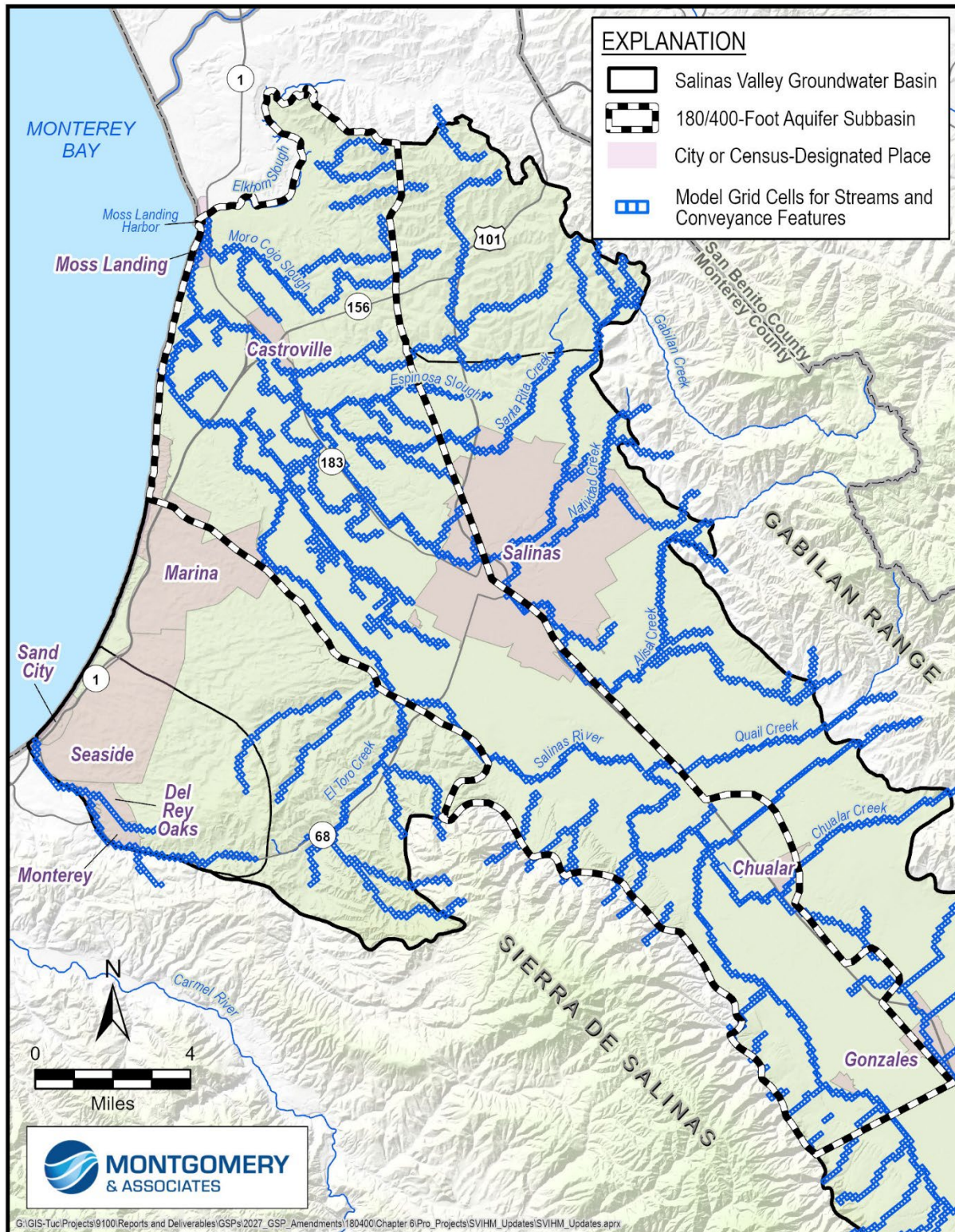


Figure 6-4. Surface Water Network in the 180/400 Subbasin from the SVIHM

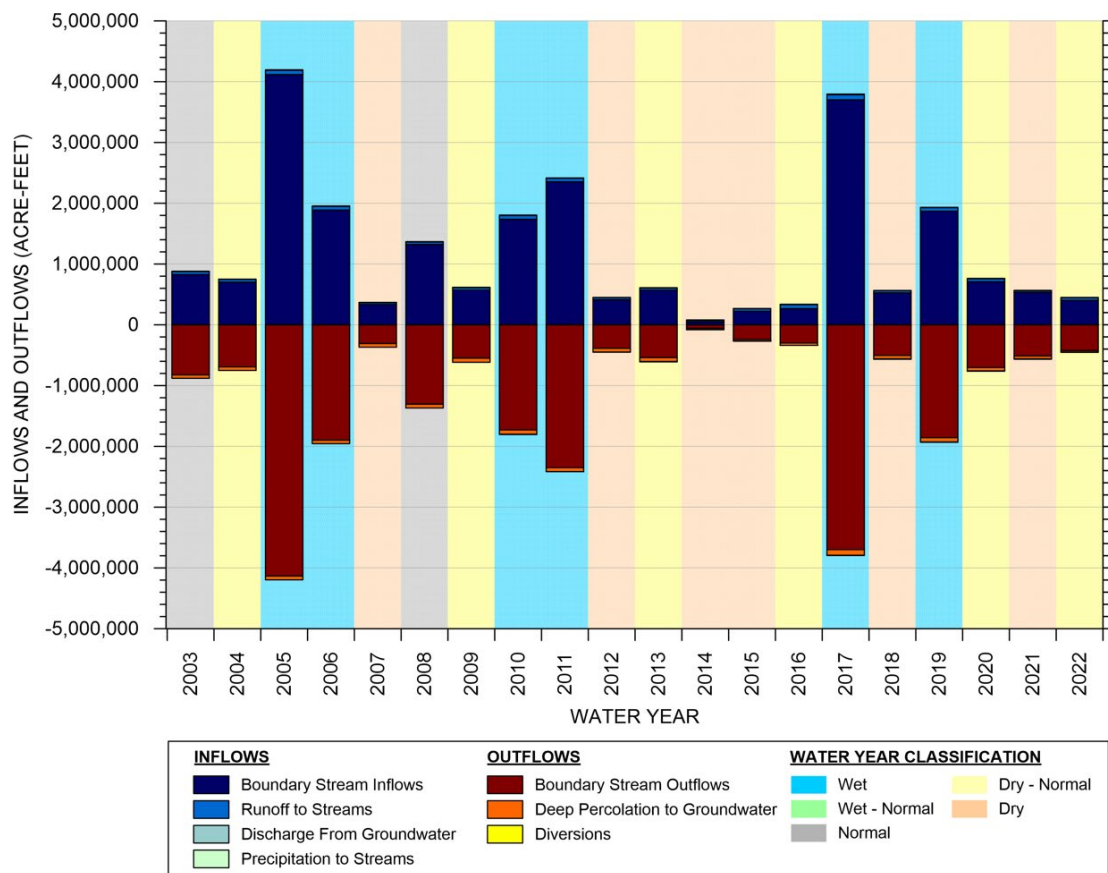


Figure 6-5. Historical and Current Surface Water Budget

Table 6-3. SVIHM-Simulated Surface Water Budget Summary

	Historical Average WY 2003-2020 (AF/yr)	Current WY 2021-2022 (AF/yr)
Boundary Stream Inflows	1,230,500	467,300
Precipitation to Streams	1,900	900
Net Flow between Surface Water and Groundwater	-51,900	-31,100
Overland Runoff to Streams	48,400	35,300
Diversions¹	-3,600	-2,500
Boundary Stream Outflows	-1,226,900	-469,900

¹ Historical average value represents post-2010, when SRDF began operations

6.3.2 Historical and Current Groundwater Budget

The groundwater budget accounts for the inflows and outflows to and from the Subbasin's aquifers, based on results from the SVIHM. This includes subsurface inflows and outflows of groundwater at the Subbasin boundaries, recharge, pumping, evapotranspiration, and net flow between surface water and groundwater. The net effect of these inflows and outflows is reflected in the change in storage.

6.3.2.1 Groundwater Inflow and Outflow Components

Generally, groundwater inflows into the Subbasin are evenly distributed among 3 main inflows: (1) deep percolation of precipitation and irrigation water, (2) subsurface inflow from adjacent DWR groundwater basins and subbasins, and (3) stream recharge. Inflow from the ocean is 2 orders of magnitude smaller than the other inflows. Groundwater pumping is the predominant groundwater outflow; almost a third of total outflows go to the Eastside Subbasin. Other smaller outflows include ET and discharge to streams.

Much of the 180/400 Subbasin is confined by the Salinas Valley Aquitard. As such, much of the deep percolation remains above the aquitard and does not recharge the principal aquifers.

Figure 6-6 shows SVIHM-estimated annual groundwater inflows for the historical and current time periods. Total average inflow for the historical period is about 189,500 AF/yr. Throughout the historical period, inflows are fairly evenly distributed. On average the largest and most consistent groundwater flow into the Subbasin is subsurface flows from adjacent basins.

WY 2017, which was a wet year, had the highest deep percolation of streamflow of the historical period. In all other years, deep percolation of streamflow and subsurface inflows from adjacent subbasins are relatively stable, while the greatest variable is deep percolation of precipitation and applied irrigation. Across most of the 180/400 Subbasin, the Salinas Valley Aquitard inhibits deep percolation to the principal aquifers (recharge) and there are few calibration points in above the aquitard; therefore, the deep percolation component of the water budget has uncertainty.

Table 6-4 provides average groundwater inflows for the historical and current period. The current period, which consists of 2 dry years, has less deep percolation of precipitation and applied irrigation and less deep percolation of streamflow than the historical period representing the largest difference between the historical and current periods. Subsurface flow from the ocean is counted as an inflow even though it is not usable. Seawater inflows across the coastal boundary comprise roughly 3% of the total inflow into the Subbasin during the historical period. These seawater inflows are less than the change in usable storage due to seawater intrusion, as calculated in Chapter 5, because the inflow represents full-strength seawater. However, the seawater mixes with fresh groundwater, and the unusable amount of groundwater is much greater than the full-strength seawater.

Figure 6-7 shows the SVIHM-estimated groundwater outflows for the historical and current time periods. Groundwater pumping, which includes municipal, industrial, and agricultural water users, is the largest outflow in the Subbasin. Table 6-5 provides the SVIHM-simulated average groundwater outflows of the historical and current periods. Averaged over the historical period, groundwater pumping accounts for more than 60% of all groundwater outflows in the Subbasin. Total average annual groundwater outflow is about 121,200 AF for the historical period and 118,200 AF for the current period. All outflows are shown as negative values.

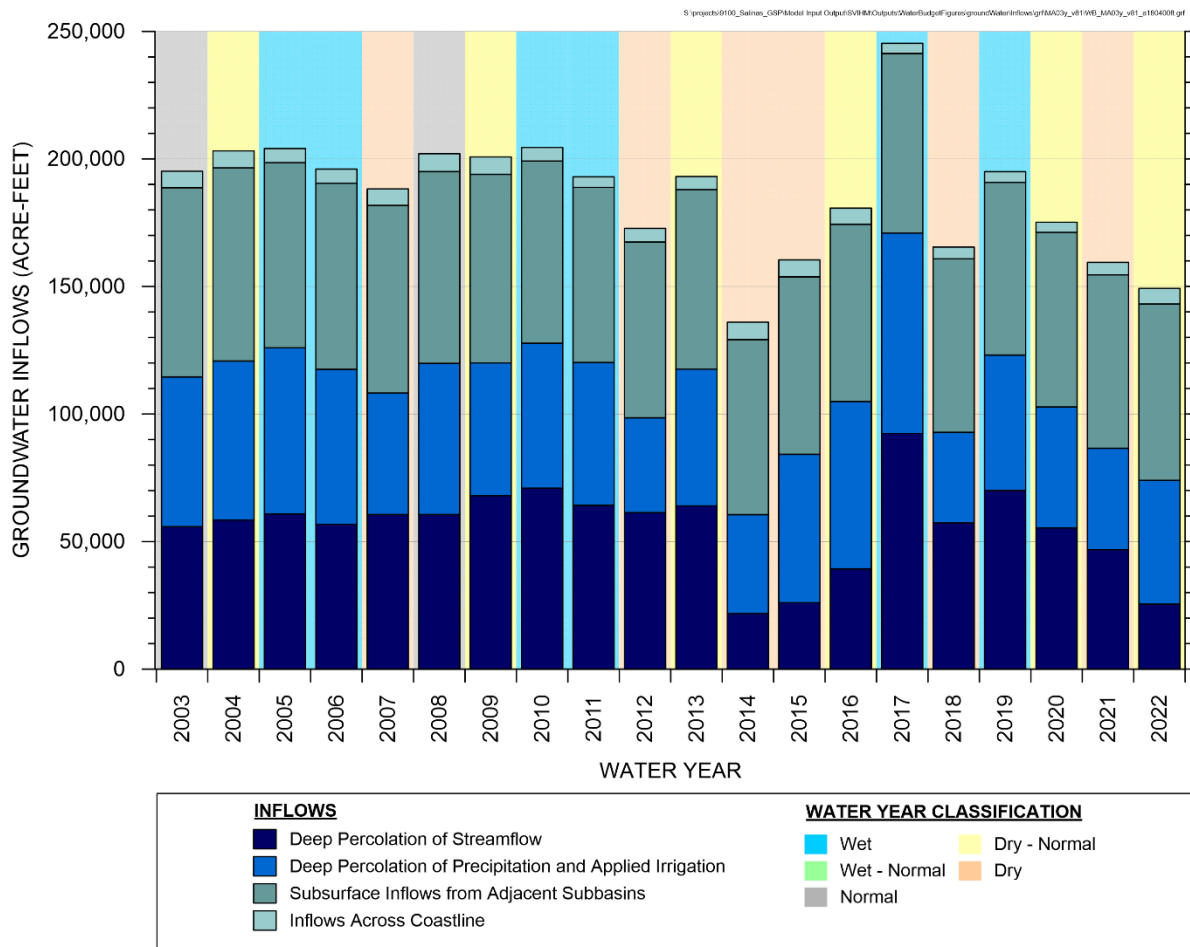


Figure 6-6. SVIHM-Simulated Inflows to the Groundwater System

Table 6-4. SVIHM-Simulated Groundwater Inflows Summary

	Historical Average WY 2003-2020 (AF/yr)	Current WY 2021-2022 (AF/yr)
Deep Percolation of Streamflow	58,000	36,200
Deep Percolation of Precipitation and Applied Irrigation	54,800	44,100
Subsurface Inflow from Adjacent Subbasins	77,100	68,600
Inflow Across Coastline	5,600	5,500
Total Inflows	189,500	154,400

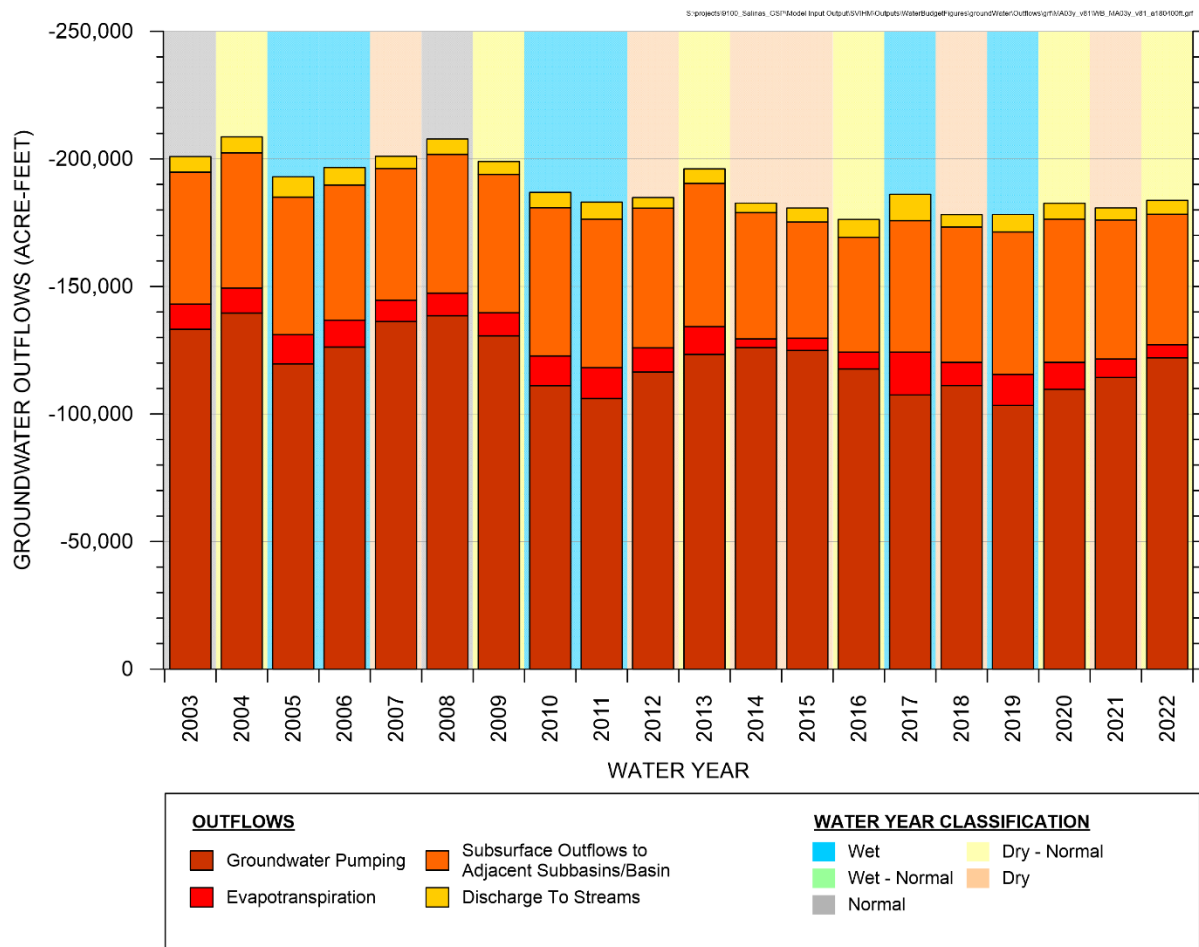


Figure 6-7. SVIHM-Simulated Outflows from the Groundwater System

Table 6-5. SVIHM-Simulated Groundwater Outflows Summary

	Historical Average WY 2003-2020 (AF/yr)	Current WY 2021-2022 (AF/yr)
Groundwater Pumping	-121,200	-118,200
Groundwater Evapotranspiration	-9,800	-6,200
Subsurface Outflows to Adjacent Subbasins	-53,100	-52,800
Subsurface Outflows to Ocean	-800	-600
Discharge to Streams	-6,100	-5,100
Total Outflows	-191,000	-182,900

Figure 6-8 and Table 6-6 show SVIHM-simulated groundwater pumping by water use sector. Groundwater pumping decreased slightly over the historical period. Current period groundwater pumping is similar to the historical average. About 90% of groundwater pumping in the Subbasin is used for agricultural purposes. Urban and agricultural pumping are simulated in the SVIHM. Urban pumping includes municipal and industrial pumping. However, rural domestic pumping in the Subbasin, including *de minimis* pumping, is not simulated in the model because it is a relatively small portion of overall groundwater pumping. Therefore, rural domestic groundwater use is assumed to be negligible in the 180/400 Subbasin and is not included in this water budget.

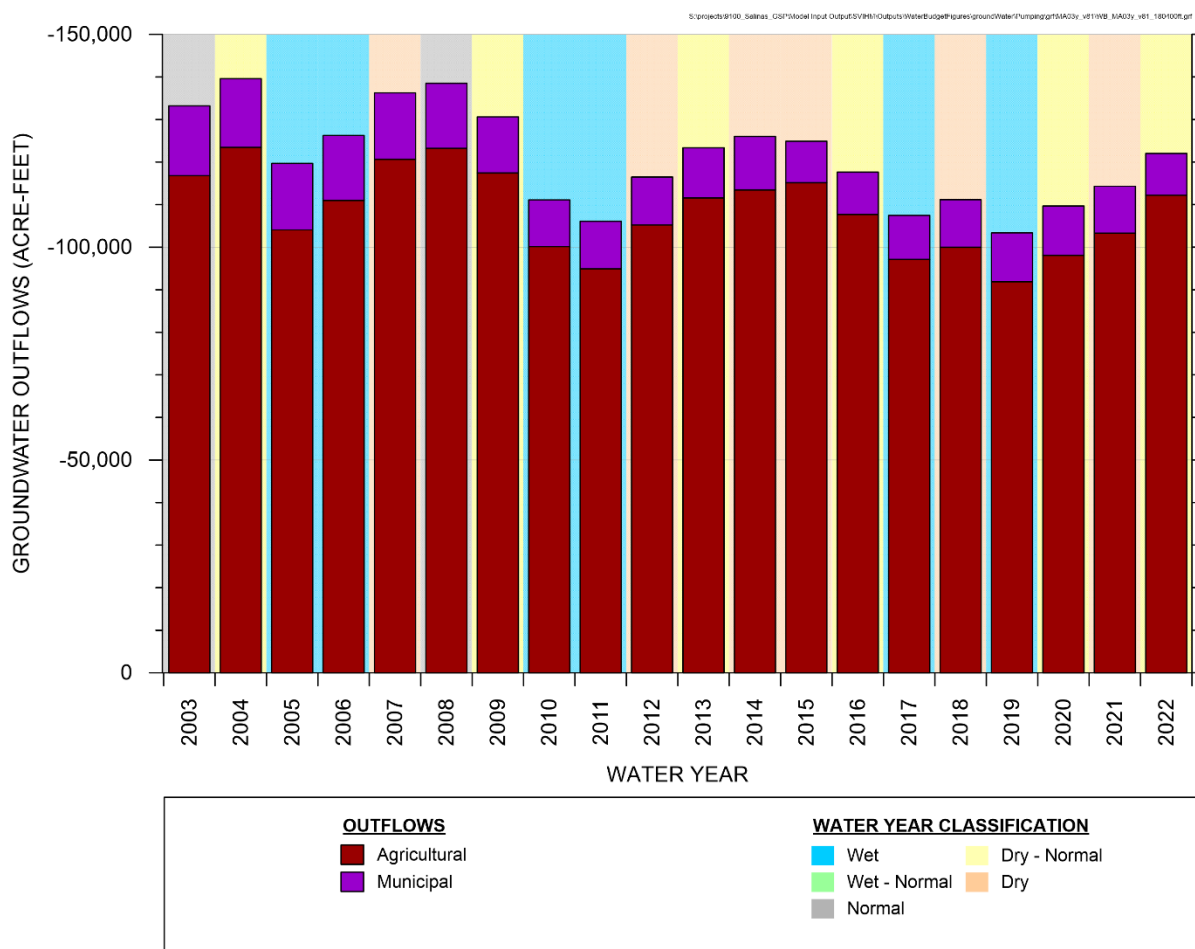


Figure 6-8. SVIHM-Simulated Groundwater Pumping by Water Use Sector

Table 6-6. SVIHM-Simulated Groundwater Pumping by Water Use Sector

	Historical Average WY 2003-2020 (AF/yr)	Current WY 2021-2022 (AF/yr)
Municipal and Industrial	-12,800	-10,400
Agricultural	-108,400	-107,800
Total Pumping	-121,200	-118,200

Figure 6-9 shows SVIHM-simulated net subsurface flows entering and exiting the Subbasin by watershed and neighboring subbasin. Historically, the Subbasin's subsurface inflows have been about 18,500 AF greater than its outflows. Table 6-7 shows SVIHM-simulated historical and current subsurface flows. The largest inflow comes from the Forebay and Monterey Subbasins and the largest outflow is to the Eastside Subbasin. The outflow to the Eastside Subbasin is roughly 70% of the total subsurface inflow into the 180/400 Subbasin during the historical period.

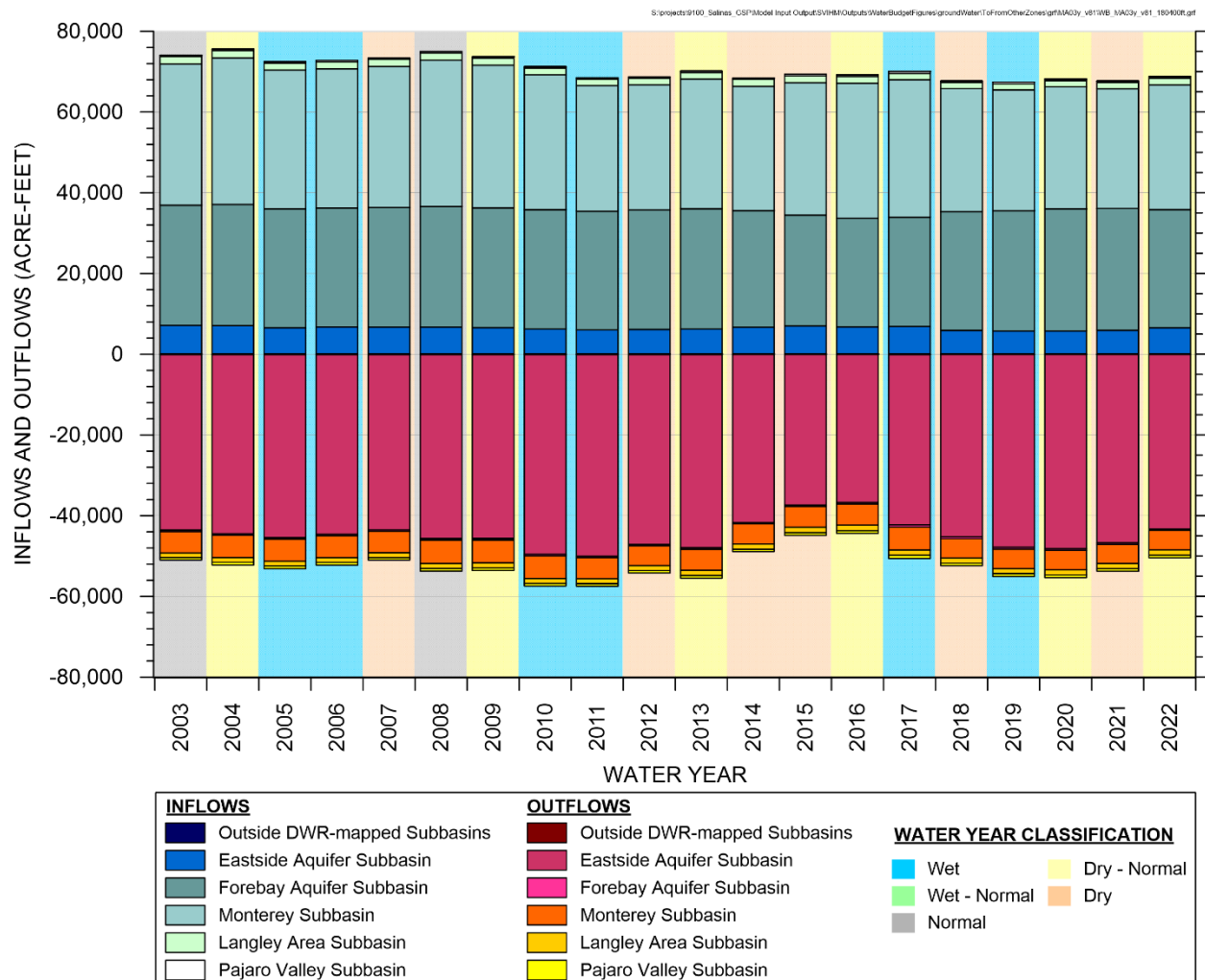


Figure 6-9. SVIHM-Simulated Subsurface Inflows and Outflows from Watershed Areas and Neighboring Basins/Subbasins

Table 6-7. SVIHM-Simulated Net Subbasin Boundary Flows

	Historical Average WY 2003-2020 (AF/yr)	Current WY 2021-2022 (AF/yr)
Eastside Subbasin	-38,300	-38,900
Forebay Subbasin	28,800	29,400
Monterey Subbasin	27,800	25,500
Langley Subbasin	500	300
Pajaro Valley Subbasin	-300	-300

6.3.2.2 Change in Groundwater in Storage

In the 180/400 Subbasin, change in groundwater storage has 2 components: change in storage due to groundwater level changes and change in storage due to seawater intrusion. Seawater intrusion degrades groundwater quality. Seawater that flows into the Subbasin mixes with fresh water and renders it unusable for most municipal or agricultural uses, typically when the chloride concentration is above 500 mg/L.

The water budget inflows and outflows listed above only relate to the change in storage due to groundwater level changes. However, total change in usable groundwater storage is estimated with the sum of change in usable storage from seawater intrusion and the change in storage from groundwater level changes outside of the seawater intruded area. Each component is discussed separately below.

Figure 6-10 shows the cumulative and annual change in groundwater storage along with the entire annual groundwater budget from the SVIHM. A comparison of the historical and current groundwater budgets is shown in Table 6-8. The values in the table are based on the inflows and outflows presented in previous tables. Negative values indicate outflows or depletions. Particularly, a negative change in groundwater storage due to groundwater level changes indicates groundwater storage depletion associated with lower groundwater levels; while a positive value indicates groundwater storage accretion associated with higher groundwater levels. The SVIHM estimates the historical average loss of groundwater storage to be 1,400 AF/yr in the 180/400 Subbasin. The average change in storage for the current period is significantly larger than the historical average, which is mainly due to the decrease in streambed recharge that occurred over the 2 dry years of the current period. Inflow across the coastline is shown in Table 6-8 as an inflow because it is represented in the models as seawater flow into the Subbasin at the coastline; however, seawater intrusion into the Subbasin contributes to the loss in usable storage. Model results represent storage loss from all aquifer layers, including the Deep Aquifers.

The change in groundwater storage calculated by the SVIHM is not comparable to, and should not be equated with, the calculated change in usable groundwater in storage. The SVIHM water budget is an accounting of all flows across the Subbasin boundaries, not an estimate of usable groundwater. Usable groundwater with respect to seawater intrusion is estimated based on observed seawater intrusion for the historical and current water budgets, and use of the SWIM for the projected water budget. Change in usable storage is calculated separately for the seawater intruded areas and non-seawater intruded areas, as shown in Table 6-9. Change in storage due to seawater intrusion is calculated from MCWRA's annual seawater intrusion maps, and change in storage due to groundwater levels is based on simulated groundwater levels in the principal aquifers outside of the seawater intruded extent. Mapped contours indicate that the rate of loss of usable groundwater storage is greater than the simulated groundwater flow rate across the coastal

boundary. This is because the simulated rate of groundwater flow across the coastal boundary represents the amount of full-strength seawater entering the Valley, but much more groundwater than the full-strength seawater is unusable as it mixes with fresh water. Historical average decline in usable storage (overdraft) is 10,600 AF/yr, which is the sum of seawater intrusion (about 10,400 AF/yr loss) and net storage loss due to groundwater level changes (about 200 AF/yr) as summarized in Table 6-9.

During the historical period, 98% of the loss in usable storage was due to the advancement of seawater intrusion. In the current period, this percentage decreased to 78%. This change was partly because seawater intrusion did not expand in the 180-Foot Aquifer during the current period. More significantly, loss in usable storage due to declining groundwater elevations was an order of magnitude larger than the historical period. The current period consists of 2 consecutive dry years, leading to a greater decline in usable storage due to groundwater elevation drops (in part due to decreased stream recharge) compared to the historical period.

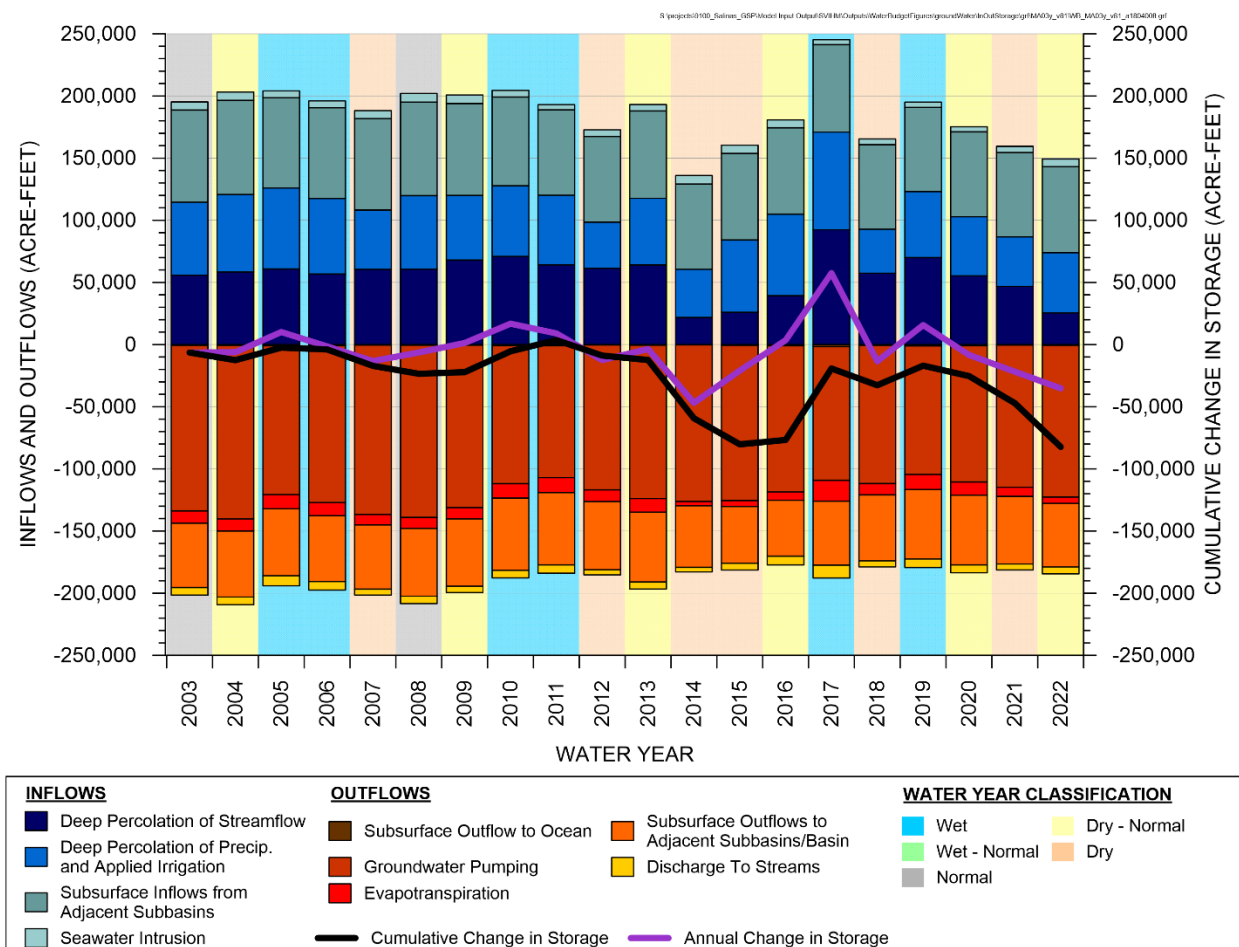


Figure 6-10. SVIHM-Simulated Historical and Current Groundwater Budget

Table 6-8. Summary of Simulated Groundwater Budget

	Historical Average WY 2003-2020 (AF/yr)	Current WY 2021-2022 (AF/yr)
Net Inflows	129,500	95,900
Net Stream Exchange	51,900	31,100
Deep Percolation of Precipitation and Applied Irrigation	54,800	44,100
Net Flow from Adjacent Subbasins/Basin	18,000	15,800
Net Coastal Inflow	4,800	4,900
Net Outflows	-131,000	-124,400
Groundwater Pumping	-121,200	-118,200
Groundwater Evapotranspiration	-9,800	-6,200
Net Storage Gain (+) or Loss (-) (Change in Storage)¹	-1,400	-28,500

Note: Due to rounding, net storage values may differ by 100 AF/yr from sum of inflows and outflows.

¹ SVIHM-simulated net change in storage, which includes groundwater flow across the coastal boundary, but not loss of usable storage due to seawater intrusion.

Table 6-9. Summary of Change in Usable Groundwater Storage

	Historical Average WY 2003-2020 (AF/yr)	Current WY 2021-2022 (AF/yr)
Storage Change from Groundwater Levels	-210	-3,370
180-Foot Aquifer	-190	-1,910
400-Foot Aquifer	-50	-1,240
Deep Aquifers	30	-220
Storage Change from Seawater Intrusion	-10,410	-11,800
180-Foot Aquifer	-1,770	0
400-Foot Aquifer	-8,640	-11,800
Deep Aquifers	0	0
Change in Usable Storage (Net Storage Gain (+) or Loss (-))	-10,630	-15,170
180-Foot Aquifer	-1,970	-1,910
400-Foot Aquifer	-8,690	-13,040
Deep Aquifers	30	-220

Note: The storage loss due to the advancement of seawater intrusion is calculated based on the observed 500 mg/L chloride isocontour. Storage loss due to groundwater levels is based on simulated groundwater level change in the principal aquifers outside of the seawater intruded extent.

6.3.3 Historical and Current Sustainable Yield

The sustainable yield is the amount of groundwater that can be withdrawn without causing long-term harm to the aquifer. Typically, when undesirable results are avoided, it is the pumping that can be sustained without causing change in storage to decrease based on groundwater levels.

However, just stabilizing groundwater levels would not have stopped the advancement of seawater intrusion. There is no true estimate of the historical and current sustainable yield because elimination of pumping would have caused other flows to change. However, GSP

Regulations require inclusion of a sustainable yield, and this represents an estimate based on the water budget. As discussed below, it is likely an overestimate due to seawater intrusion.

In addition to change in storage due to groundwater levels, in the 180/400 Subbasin, intruded seawater reduces the amount of available water in storage that can be considered part of the sustainable yield. The sustainable yield can be estimated as:

$$\text{Sustainable yield} = \text{pumping} + \text{change in storage due to groundwater levels} + \text{change in storage due to seawater intrusion}$$

For this sustainable yield discussion and associated computations, groundwater pumping outflows are reported as positive values, which is opposite of how the values are reported in the water budget tables. As a subbasin-wide calculation, the sustainable yield obscures geographic differences within the Subbasin. To avoid undesirable results, pumping reductions may need to occur in some parts of the Subbasin but not in other parts.

Table 6-10 shows the estimated historical and current sustainable yields for the Subbasin, both of which are less than historical and current period pumping. These estimates reflect total simulated storage change in the Subbasin, and do not relay geographic variability in groundwater levels, nor the ability to meet SMC.

Table 6-10. Historical and Current Sustainable Yield for the 180/400 Subbasin

	Historical Average WY 2003-2020 (AF/yr)	Current WY 2021-2022 (AF/yr)
Total Subbasin Pumping	121,200	118,200
Change in Usable Storage due to Groundwater Levels	-200	-3,400
Change in Usable Storage due to Seawater Intrusion	-10,400	-11,800
Estimated Sustainable Yield	110,600	103,000

Note: Pumping is shown as positive value for this computation. Change in storage value is based on simulated groundwater levels and seawater intrusion is based on mapped areas of intrusion, as previously described in the text. Change in storage values are rounded to nearest 100 AF/yr.

6.4 Projected Water Budgets

Projected water budgets are extracted from the updated SVOM, which simulates future hydrologic conditions for a representative sequence of potential climate years. Using a repeating 25-year projected climate period, a projected baseline scenario representing status quo conditions. The SVOM simulation period extends from the end of the historical model and runs from WY 2023 through WY 2072.

The baseline averaging period is defined as WY 2040 through 2064, a 25-year window during which project and management actions are anticipated to be operational. This baseline water budget serves as the reference condition against which potential PMAs are evaluated. The baseline scenario reflects a single plausible climate sequence. Although evaluating multiple climate sequences would provide a broader understanding of potential future variability, this approach establishes a consistent baseline that allows project simulations to be directly compared and differenced to isolate project-specific effects.

Model information and assumptions are summarized in the SVOM model update summary report by Montgomery & Associates (2026c). Since the SVOM does not simulate seawater intrusion, the SWIM is used for the projection of advancement of seawater intrusion and loss of usable storage due to seawater intrusion (Montgomery & Associates, 2026a).

6.4.1 Assumptions Used in Projected Water Budget Development

The assumptions incorporated into the SVOM for the projected water budget simulations include:

- **Land Use:** Agricultural land use is assumed to be static, aside from a semi-annual change to represent crop seasonality. The annual pattern repeats 2022 land use every year in the model.
- **Urban growth** according to Association of Monterey Bay Area Governments (AMBAG) projections is included in this simulation. It assumes urban growth is infill, keeping the same urban footprint. If urban growth replaces agriculture, the effect on extraction will also depend on the location of agricultural water use replaced.
- **Reservoir Operations:** The reservoir operations reflect MCWRA's current approach to reservoir management, as described in MCWRA's Nacimiento Dam Operation Policy (MCWRA, 2018). The implementation of MCWRA operational rules in the previous SVOM is described in Wood Environment & Infrastructure Solutions (2023); only minor modifications were made in the current update. Those refinements were intended to better represent natural variability in stream inflow, align operational rules with

MCWRA's operational approach, and remain consistent with MCWRA's preparation of the Salinas River Operations HCP.

- **Stream Diversions:** The SVOM explicitly simulates only 2 stream diversions in the Salinas Valley Basin: Clark Colony and the SRDF. The Clark Colony diversion is located along Arroyo Seco and diverts stream water to an agricultural area nearby. The SRDF came online in 2010 and rediverts stored reservoir water to the CSIP area. Clark Colony diversions are repeated from the historical record to match the water year. SRDF diversions are made throughout the duration of the SVOM whenever reservoir storage and streamflow conditions allow during the period from April through October according to the reservoir operational rules. For purposes of the projected water budgets, SRDF diversions occur at up to a rate of 36 cubic feet per second.
- **Recycled Water Deliveries:** Recycled water has been delivered to the CSIP area since 1998 as irrigation supply. The SVOM includes continued recycled water deliveries throughout the duration of the model similar to the last years of the historical model.

6.4.2 Projected Surface Water Budget

As with the historical and current periods, the projected surface water budget accounts for the inflows and outflows for the streams within the Subbasin. This includes flow from rivers and tributaries entering and exiting the Subbasin, precipitation that falls directly onto streams, overland runoff to streams, and stream-aquifer interactions. ET by riparian vegetation along stream channels is estimated by the updated SVOM as part of the groundwater system and is accounted for in the groundwater budget.

Figure 6-11 shows the surface water budget for the projected period. Table 6-11 shows the average values for components of the surface water budget for the projected period. Positive values are inflows to the stream system, and negative values are outflows from the stream system. Overall trends are the same as the historical surface water budget. Boundary inflows and outflows dominate the surface water budget in all but the driest years. The flow between surface water and groundwater in the Subbasin is generally net negative, which indicates more seepage from the streams to groundwater, rather than discharge of groundwater to streams.

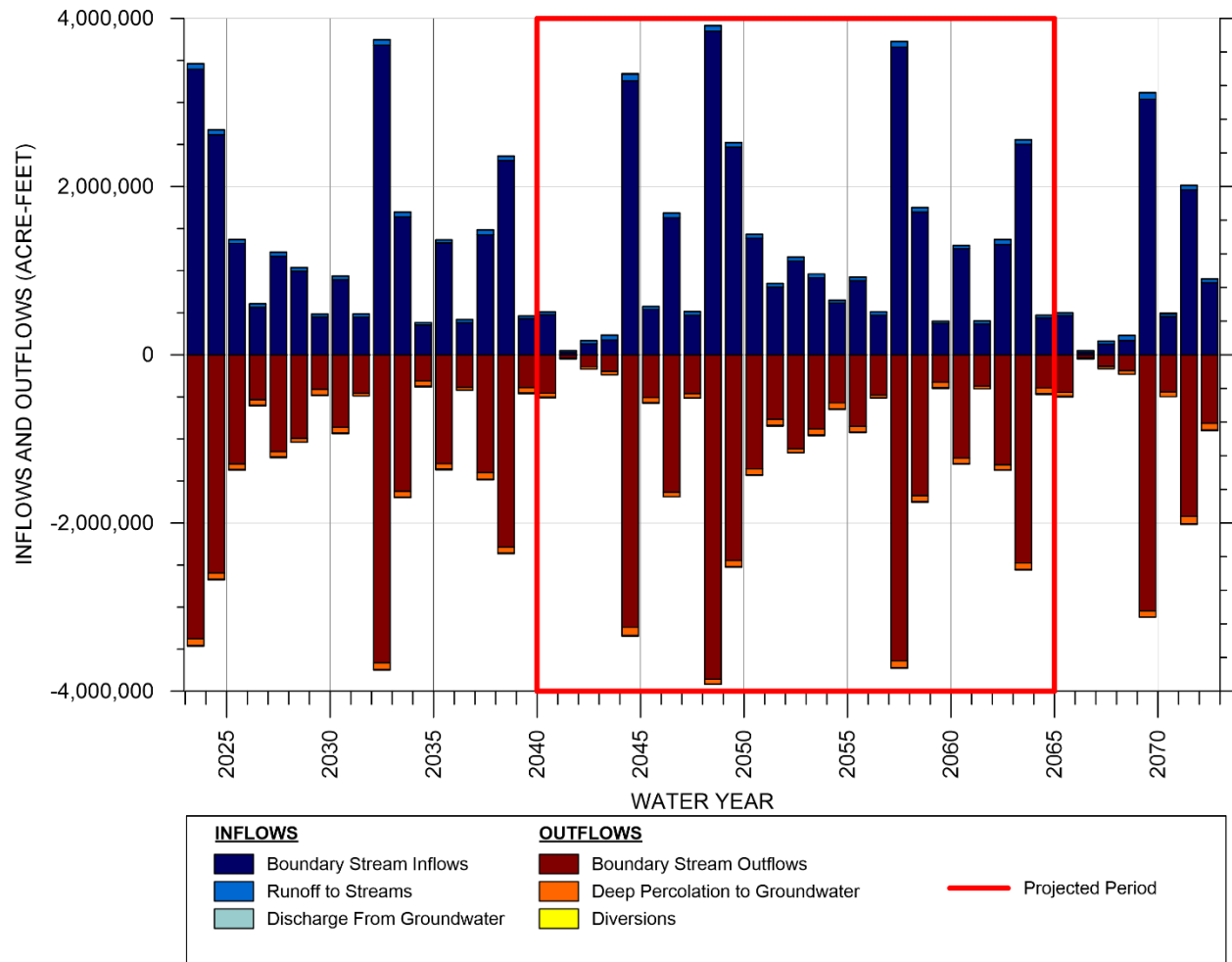


Figure 6-11. SVOM-Simulated Projected Surface Water Budget

Table 6-11: SVOM-Simulated Projected Surface Water Budget Summary

Surface Water Budget Components	Average Flow WY 2040-2064 (AF/yr)
Boundary Inflows	1,233,300
Boundary Outflows	-1,216,700
Net Flow Between Surface Water and Groundwater	-55,400
Overland Runoff to Streams	43,900
Diversions from Streams	-5,100

6.4.3 groundwater Budget

Figure 6-12 shows the SVOM-simulated projected groundwater budget. Average groundwater budget components for the projected period are quantified in Table 6-12. In most years, the 3 greatest inflows are about equal. The 3 greatest inflows are deep percolation of streamflow, deep percolation of precipitation and irrigation, and subsurface inflows. The 2 greatest outflows are groundwater pumping and subsurface outflows. Not including water lost to seawater intrusion, average change in groundwater storage is -500 AF/yr.

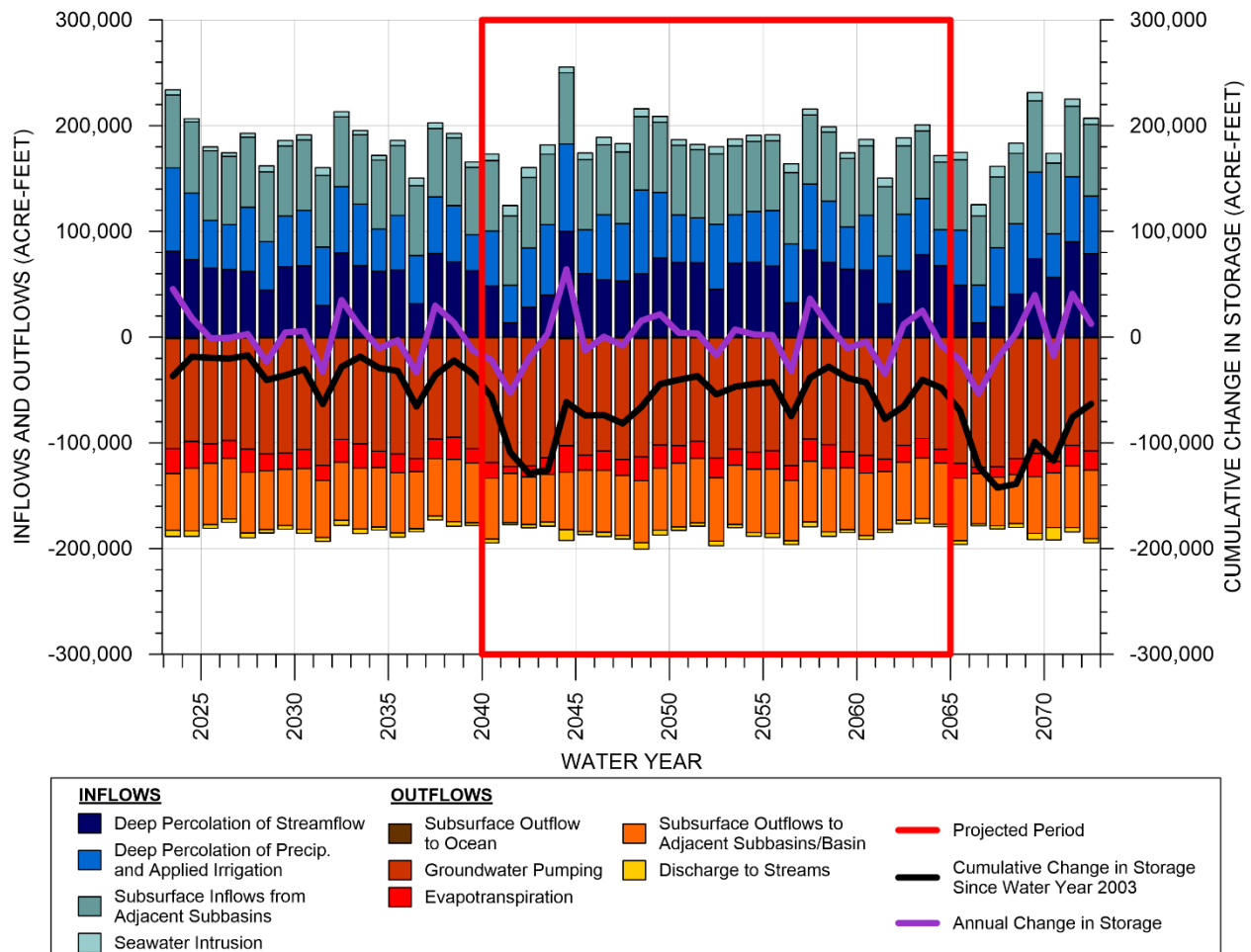


Figure 6-12. SVOM-Simulated Projected Groundwater Budget

Table 6-12. SVOM-Simulated Projected Groundwater Budget Summary

Groundwater Budget Components	Average Flow WY 2040-2064 (AF/yr)
Groundwater Pumping	-108,400
Net Stream Exchange	55,400
Deep Percolation of Precipitation and Irrigation	53,600
Groundwater Evapotranspiration	-16,500
Net Flow to Eastside Subbasin	-41,400
Net Flow from Forebay Subbasin	29,900
Net Flow from Monterey Subbasin	21,100
Net Flow from Ocean	5,900
Net Flow to Pajaro Valley Basin	-600
Net Flow from Langley Subbasin	500
Net Flow from Outside Areas	0
Net Storage Gain (+) or Loss (-) ¹	-500

¹ SVOM-simulated net change in storage, which includes groundwater flow across the coastal boundary, but not loss of usable storage due to seawater intrusion

SVOM projected groundwater pumping by water use sector is summarized in Table 6-13. As in the historical and current periods, agricultural use is expected to account for about 90% of pumping.

Table 6-13. SVOM-Simulated Projected Groundwater Pumping

Water Use Sector	Average Pumping WY 2040-2064 (AF/yr)
Agricultural	-98,300
Municipal & Industrial	-10,100
Total Pumping	-108,400

As described in Section 6.3.2.2, the water budget inflows and outflows listed above only account for the change in storage due to groundwater level changes. In contrast, total change in usable groundwater storage in the 180/400 Subbasin is estimated as the sum of (1) change in storage due to the advancement of seawater intrusion and (2) change in storage due to groundwater level changes outside the seawater intruded area. Therefore, the SVOM water budget represents an accounting of flows across Subbasin boundaries rather than an estimate of usable groundwater storage, and the 2 metrics are not directly comparable. For this approximation, usable change in storage is calculated over the entire predictive model period (WY 2023-2072). Future estimates

of seawater intrusion are uncertain and using seawater intrusion estimates from the SWIM projected baseline through 2072 provides a conservative long-term estimate of the potential loss of useable storage (Montgomery & Associates, 2026a). Compared to the amount of groundwater pumping in the Subbasin, the loss of useable storage due to seawater intrusion accounts for a relatively small portion of the sustainable yield estimate.

Change in usable storage is calculated separately for the seawater intruded areas and non-seawater intruded areas, as shown in Table 6-14. The SVOM remains the basis for this analysis; however, since it does not simulate seawater intrusion, the advancement of the 500 mg/L chloride isocontour is derived from the SWIM version 4. Storage change due to groundwater levels is based on simulated groundwater levels in the principal aquifers outside of the seawater intruded extent. These contours indicate that the rate of loss of usable groundwater storage is greater than the simulated groundwater flow rate across the coastal boundary. The simulated coastal boundary flow only reflects the volume of full-strength seawater entering the Valley. However, as this seawater mixes with fresh groundwater, a substantially larger volume of groundwater becomes too saline for beneficial use, resulting in a greater loss of usable groundwater storage.

Projected average decline in usable storage (overdraft) is 7,660 AF/yr, which is the sum of the storage loss due to seawater intrusion (about 7,740 AF/yr loss) and storage change due to groundwater level changes (about 80 AF/yr gain) as summarized in Table 6-14. Like in the historical period, the advancement of seawater intrusion drives the loss in usable storage.

Table 6-14. Summary of Projected Change in Usable Groundwater Storage

	Average Change (WY 2023-2072) (AF/yr)
Storage Change from Groundwater Levels	80
180-Foot Aquifer	50
400-Foot Aquifer	30
Deep Aquifers	0
Storage Change from Seawater Intrusion¹	-7,740
180-Foot Aquifer	-2,040
400-Foot Aquifer	-5,700
Deep Aquifers	0
Change in Usable Storage¹ (Net Storage Gain [+] or Loss [-])	-7,660
180-Foot Aquifer	-1,990
400-Foot Aquifer	-5,670
Deep Aquifers	0

¹ The storage loss due to the advancement of seawater intrusion is calculated based on the observed 500 mg/L chloride isocontour from the SWIM. Storage loss

due to groundwater levels is based on the SVOM's simulated groundwater level change in the principal aquifers outside of the seawater intruded extent.

6.4.4 Projected Sustainable Yield

The projected sustainable yield is the amount of groundwater that can be withdrawn without causing long-term harm to the aquifer. Typically, when undesirable results are avoided, it is the pumping that can be sustained without causing change in storage to decrease from lowered groundwater levels. However, just stabilizing groundwater levels will not stop the advancement of seawater intrusion. Seawater intrusion is a more complicated interaction in the aquifer than solely groundwater flow and it will be addressed through project modeling during GSP implementation. However, GSP Regulations require inclusion of a sustainable yield, and this represents an estimate based on the water budget. As discussed in Section 6.3.3, it is likely an overestimate due to seawater intrusion.

In addition, 180/400 Subbasin groundwater conditions depend in part on precipitation, streamflow, and reservoir releases. The actual amount of pumping that can be sustained in the future will depend on climate, reservoir operations, and the success of management actions and projects.

To maintain consistency with the historical sustainable yield, projected sustainable yield can be estimated by subtracting the average loss in storage from both groundwater levels and seawater intrusion from the average annual pumping. This represents the change in pumping that results in no change in storage of usable groundwater, assuming no other projects or management actions are implemented. For this sustainable yield discussion and associated calculations, groundwater pumping outflows are reported as positive values, which is opposite of how the values are reported in the water budget tables.

Although the sustainable yield values provide guidance for achieving sustainability, simply reducing pumping to within the sustainable yield is not proof of sustainability and will not stop the expansion of seawater intrusion. Table 6-15 provides estimates of the future sustainable yield using estimated future pumping (Table 6-14), storage loss from groundwater levels (Table 6-12), and storage loss due to seawater intrusion (Table 6-14). It is based on the climate, streamflow, and land use assumptions within the baseline modeling scenario, and if future conditions vary, the projected sustainable yield may differ. However, sustainability must be demonstrated through the SMC. This approximation of the subbasin-wide projected sustainable yield does not capture geographic variation, nor account for the dynamic interaction between pumping, groundwater levels, and recharge.

Table 6-15. Projected Sustainable Yield for the 180/400 Subbasin

	Projected Sustainable Yield
Groundwater Pumping	108,400
Change in Storage due to Seawater Intrusion	-7,700
Change in Storage due to Groundwater Levels	-500
Projected Sustainable Yield	100,200

All values in AF/yr

Note: Pumping is shown as positive value for this computation. Change in storage value is based on observed groundwater measurements and seawater intrusion is based on mapped areas of intrusion, as previously described in the text for historical water budgets.

The sustainable yield estimate can further be constrained using results from Demand Management scenarios (Montgomery & Associates, 2026d). Multiple scenarios were developed using the SVOM, where agricultural pumping was reduced in each subbasin in approximately 10% intervals. Additional model simulations were completed where multiple subbasins had reduced pumping. The sustainable yield based on groundwater levels can be estimated from these model runs by identifying at what amount of reduced pumping results in a zero change in storage for the Subbasin. Depending on whether only the 180/400 Subbasin alone has pumping reductions, or other subbasins also reduce pumping, a zero change in storage occurs when pumping is between 84,000 and 98,000 AF/yr. Compared to the primary aquifers, Layer 1 of the SVOM, which represents the shallow sediments, has minimal pumping, but accounts for the majority of the change in storage. If Layer 1 is excluded from this analysis, sustainable yield ranges from 78,000 to 91,000 AF/yr. These estimates do not factor in loss of usable water due to seawater intrusion so the sustainable yield would likely be less than these values. Additional details on this analysis are provided in Appendix 6A.

6.5 Climate Change Scenarios

The projected water budget was developed based on future hydrologic conditions representative of historical conditions. To help understand the potential effect of climate change on future conditions, 3 sets of climate change factors were applied to the projected baseline:

1. Central Tendency
2. Wet-Moderate Warming
3. Dry-Extreme Warming

These future climate change scenarios used DWR-provided datasets consisting of monthly scaling factors for precipitation, reference evapotranspiration (ET_o), and streamflow. Scaling factors were also applied to tributary inflows and reservoir inflows to maintain alignment across

all hydrologic inputs. These factors were applied multiplicatively to the future baseline model climate (precipitation and ETo) or hydrologic (tributary and reservoir inflows) inputs. These scaling factors vary both spatially and temporally (year to year). This approach preserves the temporal sequencing of wet and dry periods from the baseline model while adjusting the magnitude of precipitation, ETo, and surface water inputs to reflect projected future conditions. Since the DWR scaling factors are provided for climate change at 2070, the scaling factor applied in a given water year was calculated as a linear interpolation between baseline and 2070 conditions. The linearized monthly precipitation and ETo change factors from DWR were provided spatially as a grid with a lower resolution than the future baseline model grid whereas surface water inputs were scaled based on 8-digit hydrologic unit code (HUC-8) watersheds, which are much larger than the baseline model grid resolution.

Table 6-16 shows the average annual water budget for the 180/400 Subbasin for water years 2040-2064 for the projected baseline and 3 climate scenarios run with the SVOM. Positive values represent groundwater inflows and negative values represent groundwater outflows from the subbasin. All 3 climate scenarios result in greater deep percolation, groundwater evapotranspiration and groundwater extraction than the baseline scenario. Of the 3 climate scenarios tested, the Dry-Extreme Warming scenario represents the worst-case scenario for sustainability. Increased pumping and decreased stream recharge drive a greater loss in storage than the other 3 scenarios. Deep percolation is greater in the Dry-Extreme scenario due to higher overall precipitation, as well as increased return flow from increased irrigation pumping. Lower water levels allow for more inflows from streams. The Wet-Moderate Warming scenario and the Central Tendency scenario show a similar but slightly increased annual change in storage compared to the baseline. However, regardless of the scenario, the annual change in storage is a small percentage of the total inflows and outflows. These scenarios represent potential futures to help understand the uncertainty associated with climate change; however, the exact variation of future years is unknown.

Table 6-16. Average Water Budget Comparison for Climate Change Scenarios for WY2040-2064: 180/400 Subbasin

Water Budget Component	Projected Baseline	Central Tendency	Dry-Extreme Warming	Wet-Moderate Warming
Deep Percolation	53,600	56,600	57,100	61,700
Net Stream Exchange	55,400	58,500	56,900	53,400
Net Seawater Exchange	5,900	5,900	6,900	4,500
Net Subsurface Inflows	9,400	9,000	9,700	10,300
Groundwater ET	-16,500	-17,900	-16,900	-21,000
GW Extraction	-108,400	-112,200	-117,000	-109,100
Net Storage Change	-500	-100	-1,900	0

6.6 Overdraft Assessment

Groundwater level trends in the 180-Foot, 400-Foot, and Deep Aquifers were evaluated using several annual metrics—annual maximum, minimum, and fall water levels—over the most recent 15 and 20 years. This window is long enough to give a dependable view of long-term trends rather than short-term variability, yet short enough to reflect current conditions, including variable pumping demand and conditions in adjacent, hydrologically connected subbasins. A 10-year window was judged too short, as it begins in the trough of a drought and largely tracks recovery from it rather than longer-term conditions. Similarly, periods of 25 years or more were excluded, as unusually high 1990s levels paired with drought-driven lows of the 2010s can also produce misleading long-term trends.

Water level observations indicate that the Deep Aquifers are experiencing overdraft. All 7 wells with sufficient data show declining trends, consistent with a broader pattern of mostly decreasing water levels across the aquifer. Already-low groundwater levels and observed change in storage provide additional evidence.

Water level observations show only a modest imbalance toward decline in the 400-Foot Aquifer; however, a closer examination at where those trends occur points toward overdraft. Of the 100 wells with sufficient data, the large majority (78%) show no clear trend, with slightly more wells showing decreasing than increasing water level trends (13% vs. 9%). Wells with declining trends tending to be more clearly established than the increasing ones; water level trends generally increase towards the coast and decrease further inland. However, many of the coastal wells showing increasing or flat trends lie in areas where agricultural pumping has already been limited by seawater intrusion and alternative supplies are available, and the coastal well network is considerably denser than inland. These considerations, together with the water budget, tip the balance toward the conclusion that the 400-Foot Aquifer is likely in overdraft.

Water level observations indicate that the 180-Foot Aquifer is not experiencing overdraft, though trends vary by location and pumping in this aquifer has been nearly eliminated within the CSIP area. Of the 55 wells with sufficient data, the majority (64%) show no clear trend, while slightly more wells show increasing than decreasing trends (22% vs. 15%). This is broadly consistent with a spatial pattern of increasing water levels along the coast and more mixed to decreasing trends further inland. Taken together, the weight of the trend evidence and the water budget indicate no long-term decline in water levels that would result in overdraft of the 180-Foot Aquifer. See Appendix 6B for more details of the analysis.

6.7 Subbasin Water Supply Availability and Reliability

Water is not imported into the 180/400 Subbasin. However, a significant portion of the Subbasin's recharge is derived from MCWRA's reservoir releases that regulate a portion of

Salinas River streamflow. The historical water budget incorporates years when there was little availability of surface water flow and groundwater elevations declined as a result. Figure 6-5 shows that when Salinas River flows were low, deep percolation to groundwater was also low. Declines in groundwater levels during these years contributed to chronic groundwater storage loss and seawater intrusion during the historical period. The projected water budgets are developed with the SVOM, which is based on historical surface water flows and groundwater conditions, and therefore projected water budgets incorporate reasonable fluctuations in water supply availability. MCWRA is preparing a Salinas River Operations the HCP, which may change the current reservoir release schedule and could influence the reliability of groundwater recharge.

6.8 Uncertainties in Water Budgets and Climate Change Scenarios

Models are mathematical representations of physical systems, and as such cannot perfectly replicate real-world conditions. Their accuracy is limited both by the simplifications inherent in representing complex physical processes and by constraints in the available input data. There is also inherent uncertainty in groundwater flow modeling itself, models can only approximate physical systems and have limitations in how they compute data. However, as recognized by DWR (2018), despite these limitations, models remain powerful tools that provide valuable insights into system behavior and support informed water resources management decisions.

The level of accuracy and certainty is highly variable between water budget components. A few water budget components are directly measured, but most water budget components are either estimated inputs to the model or simulated by the model. Additional model uncertainty stems from an imperfect representation of natural conditions and this is reflected by the model calibration error. However, inputs to the models are carefully selected using best available data, the model's calculations represent established science for groundwater flow. The model calibration error is within acceptable bounds.

There is additional inherent uncertainty involved in projecting water budgets given that actual future climate conditions and the sequence of wet and dry years are unknown. The 25-year repeated projected climate sequence was based on historical data. Because the SVOM is not intended to forecast specific future weather events, model projections should not be interpreted as year-by-year predictions; instead, multi-year averages should be used to evaluate how groundwater levels and basin water budgets may respond to average future climate conditions. The model only represents a single climate realization. This baseline serves as a best-available reference against which potential PMAs can be evaluated.

7 MONITORING NETWORKS

This chapter describes the networks that will monitor the SMC discussed in Chapter 8. This description of the monitoring networks has been prepared in accordance with the GSP Regulations §354.32 *et seq.* to include monitoring objectives, monitoring protocols, and data reporting requirements.

7.1 Introduction

7.1.1 Monitoring Objectives

SGMA requires monitoring networks to collect data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the Subbasin, and to evaluate changing conditions that occur as the Plan is implemented. The monitoring networks are intended to:

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

7.1.2 Approach to Monitoring Networks

Monitoring networks are developed for each of the 6 sustainability indicators that are relevant to the 180/400 Subbasin:

1. Chronic lowering of groundwater levels
2. Reduction in groundwater storage
3. Seawater intrusion
4. Degraded water quality
5. Land subsidence
6. Depletion of ISW

Other monitoring networks, such as groundwater extraction, that are necessary to comply with GSP Regulations are also included in this chapter. RMS are a subset of the monitoring networks to provide the most representative information about groundwater conditions in the Subbasin.

The SVBGSA estimated the density of monitoring sites and the frequency of measurements required to demonstrate short-term, seasonal, and long-term trends. If the required monitoring site density does not exist, the SVBGSA will continue to expand monitoring networks for some sustainability indicators during GSP implementation. Filling data gaps and developing more extensive and complete monitoring networks during the first phase of GSP implementation has improved the SVBGSA's ability to demonstrate sustainability and refine the existing conceptual and numerical hydrogeologic models. The SVBGSA will review the monitoring network in each 5-year assessment, including a determination of uncertainty and whether there are remaining data gaps that could affect the ability of the Plan to achieve the sustainability goal for the Subbasin.

7.1.3 Management Areas

No management areas are defined within the 180/400 Subbasin.

7.2 Groundwater Level Monitoring Network

The sustainability indicator for chronic lowering of groundwater levels is evaluated by assessing groundwater elevations in a designated monitoring network. GSP Regulations require a network of monitoring wells sufficient to demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features.

There are 171 wells in the Subbasin monitored by MCWRA for groundwater elevations that are used to develop groundwater elevation contours and that have publicly available data on the SVBGSA Web Map. As agreed to by DWR, RMS wells are monitored biannually in the fall and August. SVBGSA will report spring groundwater level measurements, but will not monitor all RMS wells in the spring. Of these wells, 32 in the 180-Foot Aquifer, 47 in the 400-Foot Aquifer, and 21 in the Deep Aquifers are selected as groundwater level monitoring RMS wells. Generally, the criteria for selecting RMS wells include:

- RMS wells must have known depths and well completion data.
- RMS wells should have a relatively long period of historical data. If no other nearby wells exist, wells that do not meet this requirement may be used.
- Hydrographs of RMS wells should be visually representative of the hydrographs from surrounding wells.
- RMS locations must cover the basin and provide data near basin boundaries.
- RMS should be selected for each aquifer. There are 3 principal aquifers in the 180/400 Subbasin.

- Data from RMS wells are public data and will be used for groundwater elevation maps and analysis. SVBGSA notified well owners of intent to include their wells in the monitoring network.

The RMS wells in the groundwater level monitoring network are listed in Table 7-1 and Figure 7-1, Figure 7-2, and Figure 7-3 for the 180-Foot, 400-Foot, and Deep Aquifers, respectively. Both the table and maps include the new monitoring wells the SVBGSA installed since GSP Amendment 1. They are marked with an asterisk in Table 7-1. For simplicity, the new wells will also be referred to as RMS wells although they do not have SMC yet.

As recommended in the Salinas Valley Deep Aquifers Study, the RMS wells in the Study located within the 180/400 Subbasin were adopted as the RMS wells for the Deep Aquifers (Montgomery & Associates, 2024b). Appendix 5A provides well construction information and historical hydrographs for each RMS well.

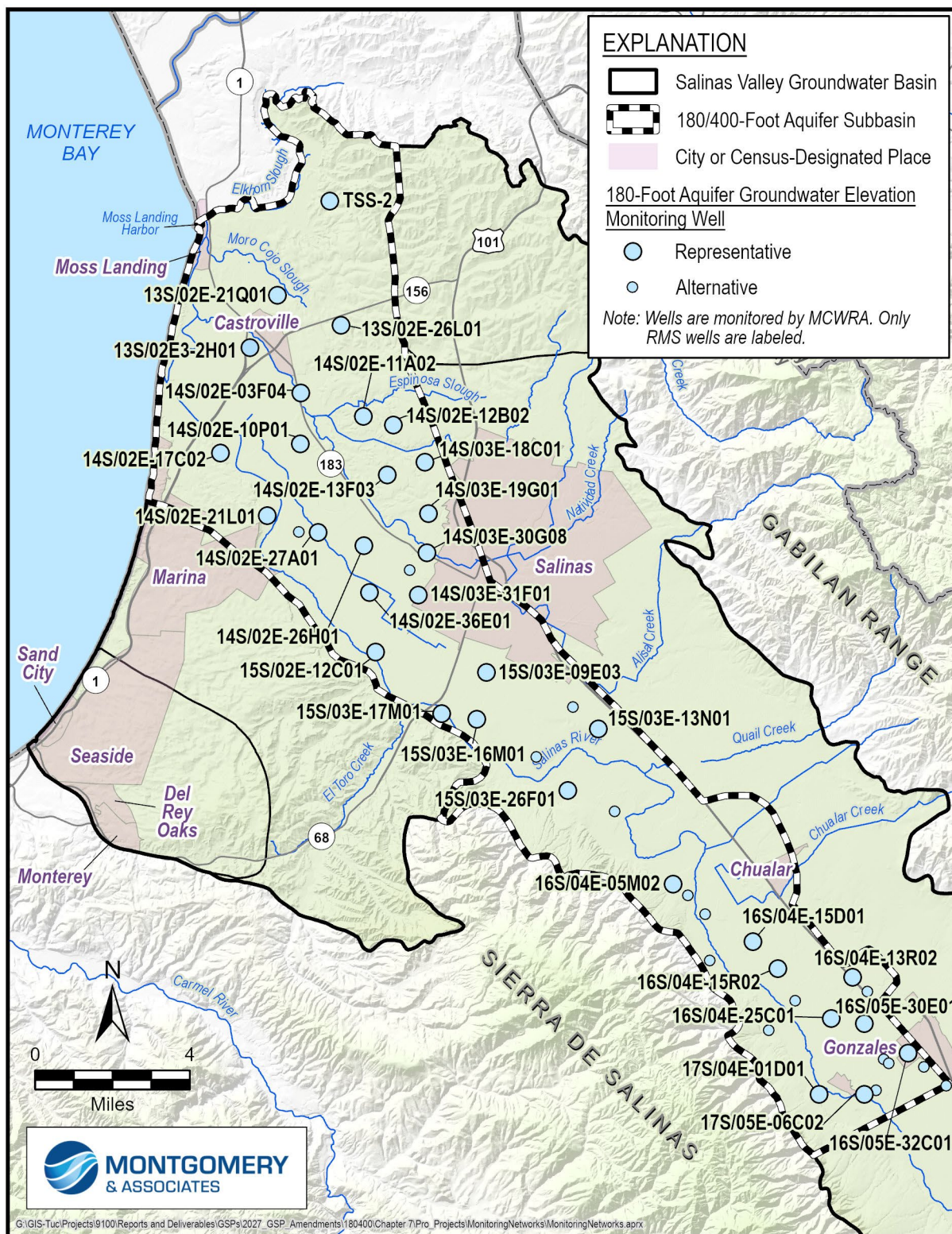


Figure 7-1. 180-Footer Aquifer Groundwater Levels Representative Monitoring Network

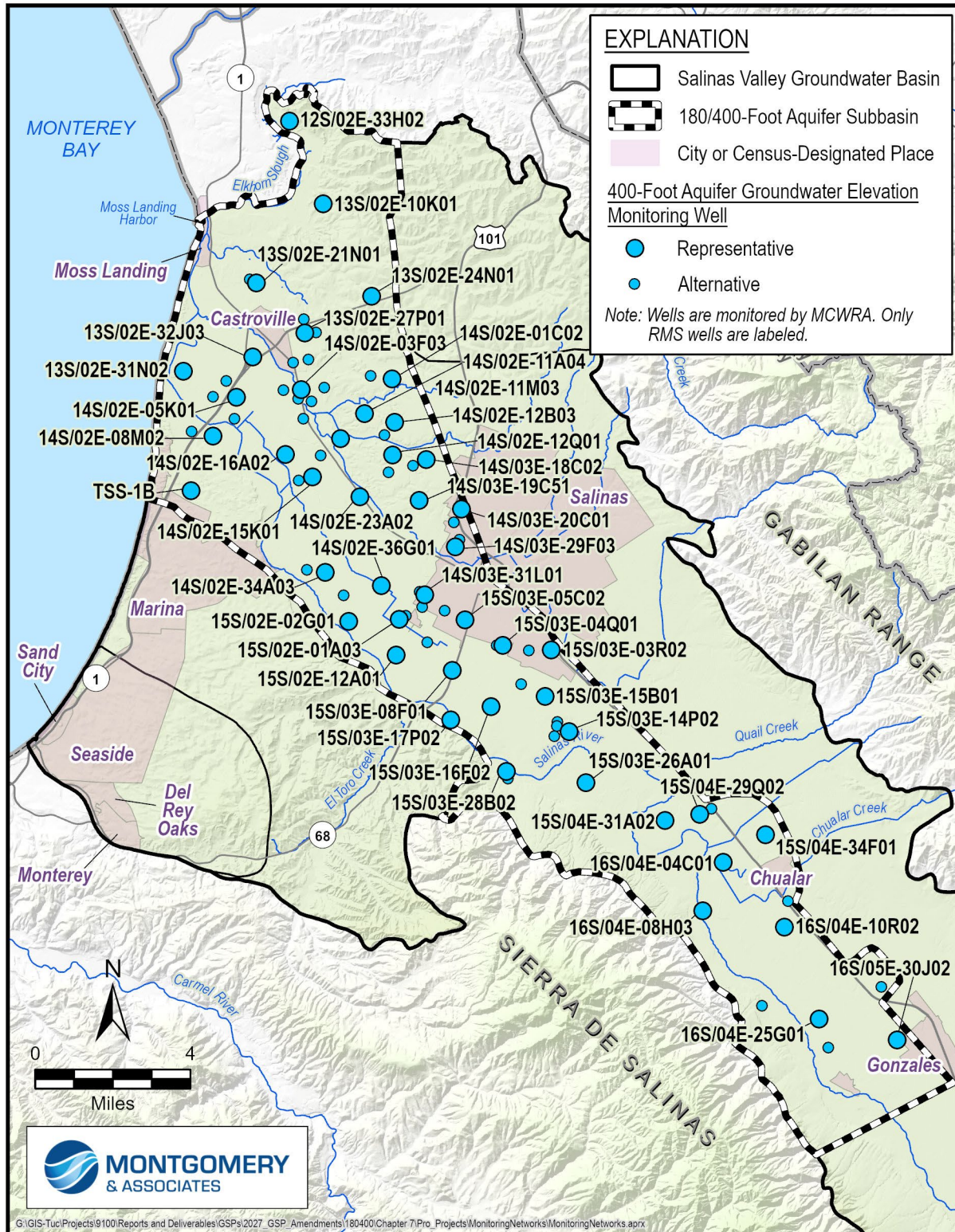


Figure 7-2. 400-Foot Aquifer Groundwater Levels Representative Monitoring Network

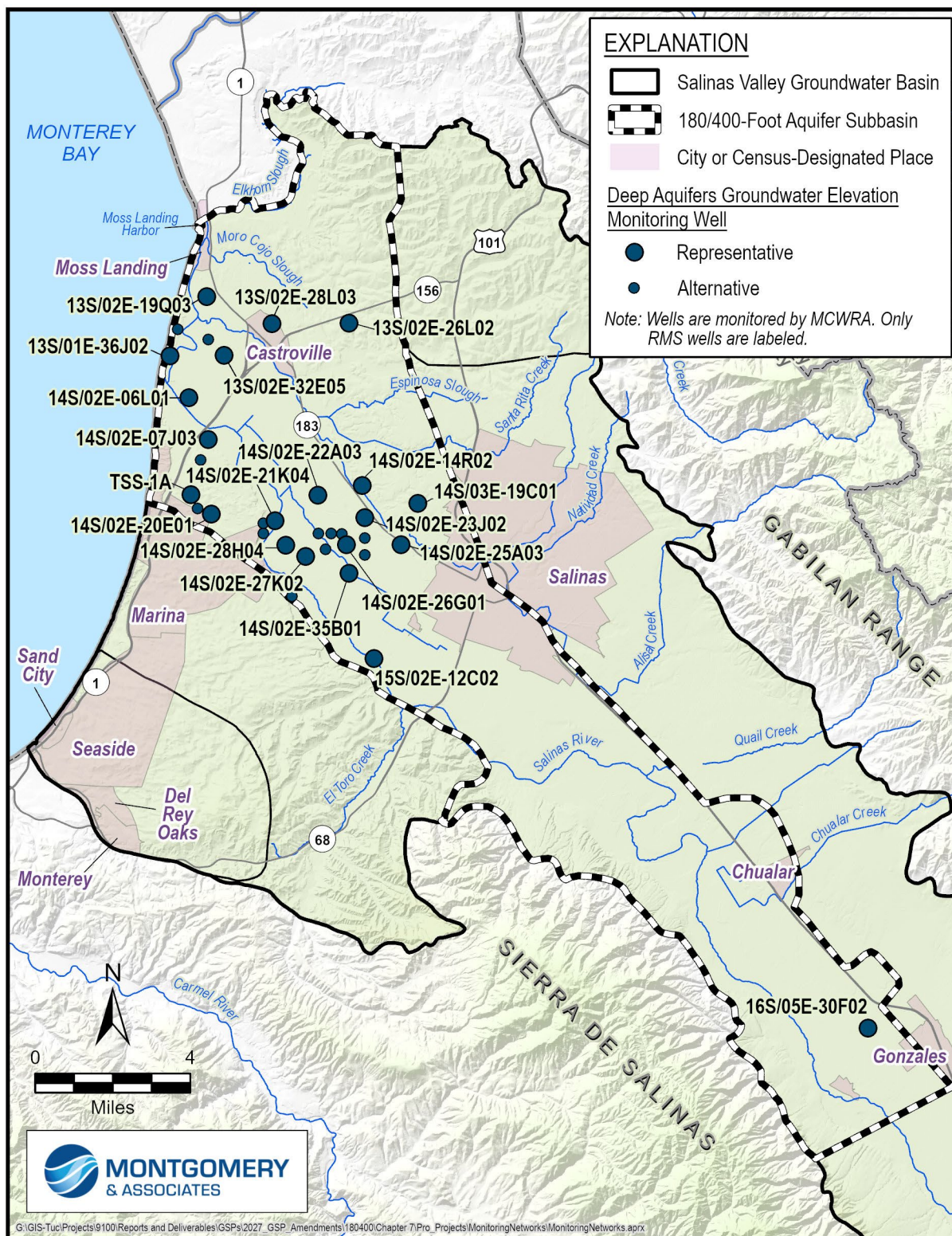


Figure 7-3. Deep Aquifers Groundwater Levels Representative Monitoring Network

Table 7-1. 180/400 Subbasin Groundwater Level Representative Monitoring Site Network

State Well Number	SGMA Site Code	Local Well Designation	Well Use	Total Well Depth (ft)	Reference Point (ft, NAVD88)	Latitude (NAD 83)	Longitude (NAD 83)
180-Foot Aquifer							
13S/02E-21Q01	367816N1217514W001	SELA22633	Observation	157	2.6	36.78164	-121.75139
13S/02E-32H01*	N/A	27094	Observation	160	15.2	36.76172	-121.76366
13S/02E-26L01	367711N1217215W001	11028	Unknown	250	112.6	36.77117	-121.72152
14S/02E-03F04	367454N1217393W001	ESPA22636	Observation	205	21.6	36.74539	-121.73931
14S/02E-10P01	367263N1217389W001	2657	Irrigation	186	22.8	36.72633	-121.73896
14S/02E-11A02	367371N1217098W001	14478	Observation	250	62.5	36.73713	-121.70981
14S/02E-12B02	367343N1216958W001	RODA14455	Observation	265	53.5	36.73432	-121.69585
14S/02E-13F03	367156N1216980W001	14469	Observation	280	46.7	36.71562	-121.69801
14S/02E-21L01	366990N1217533W001	862	Irrigation	250	28.5	36.69906	-121.75333
14S/02E-26H01	366889N1217079W001	AMST22651	Observation	339	39.1	36.68888	-121.70793
14S/02E-27A01	366933N1217294W001	MCFD22632	Observation	293	22.7	36.69330	-121.72944
14S/02E-36E01	366713N1217046W001	331	Irrigation	198	33.8	36.67135	-121.70460
14S/03E-18C01	367207N1216806W001	BORA15009	Observation	225	55.8	36.72072	-121.68056
14S/03E-19G01	367015N1216783W001	10269	Irrigation	Unknown	57.7	36.70157	-121.67836
14S/03E-30G08	366869N1216785W001	MKTC22650	Observation	293	46.8	36.68688	-121.67852
14S/03E-31F01	366709N1216818W001	10280	Domestic	201	40.6	36.67094	-121.68183
15S/02E-12C01	366489N1217009W001	1070	Irrigation	182	44.0	36.64898	-121.70095
15S/03E-09E03	366426N1216491W001	183	Irrigation	249	56.5	36.64265	-121.64916
15S/03E-13N01	366226N1215964W001	147	Irrigation	275	76.2	36.62262	-121.59642
15S/03E-16M01	366250N1216532W001	1359	Irrigation	Unknown	58.4	36.62498	-121.65310
15S/03E-17M01	366265N1216692W001	1480	Irrigation	271	49.0	36.62677	-121.66949
15S/03E-26F01	365992N1216099W001	648	Irrigation	316	70.0	36.59928	-121.60997
16S/04E-05M02	365651N1215597W001	38	Irrigation	261	82.6	36.56519	-121.55970
16S/04E-13R02	365320N1214752W001	447	Irrigation	286	118.0	36.53200	-121.47523
16S/04E-15D01	365444N1215220W001	BRME10389	Irrigation	384	105.1	36.54441	-121.52201
16S/04E-15R02	365346N1215099W001	576	Irrigation	300	109.3	36.53463	-121.50995
16S/04E-25C01	365164N1214846W001	391	Irrigation	Unknown	116.8	36.51640	-121.48464

State Well Number	SGMA Site Code	Local Well Designation	Well Use	Total Well Depth (ft)	Reference Point (ft, NAVD88)	Latitude (NAD 83)	Longitude (NAD 83)
16S/05E-30E01	365147N1214691W001	394	Irrigation	263	122.7	36.51479	-121.46918
16S/05E-32C01	N/A	939	Irrigation	Unknown	130.8	36.50414	-121.44857
17S/04E-01D01	364878N1214893W001	254	Irrigation	310	147.3	36.48783	-121.48936
17S/05E-06C02	364883N1214684W001	GZWA21202	Observation	115	127.1	36.48832	-121.46840
TSS-2*	N/A	TSS-2	Observation	TBD	TBD	36.81756	-121.72841
400-Foot Aquifer							
12S/02E-33H02	368455N1217485W001	25861	Irrigation	580	52.4	36.84559	-121.74852
13S/02E-10K01	368152N1217319W001	22934	Observation	660	114.4	36.81520	-121.73190
13S/02E-21N01	367847N1217618W001	2432	Irrigation	550	19.9	36.78483	-121.76181
13S/02E-24N01	367812N1217080W001	1824	Domestic	600	162.0	36.78123	-121.70802
13S/02E-27P01	367666N1217387W001	1720	Irrigation	606	59.3	36.76668	-121.73870
13S/02E-31N02	367512N1217946W001	1682	Irrigation	576	13.0	36.75120	-121.79461
13S/02E-32J03	367571N1217623W001	2429	Irrigation	576	14.7	36.75718	-121.76239
14S/02E-02C03	367499N1217192W001	1716	Irrigation	835	63.3	36.74997	-121.71928
14S/02E-03F03	367455N1217395W001	ESPB22635	Observation	455	21.8	36.74548	-121.73949
14S/02E-05K01	367418N1217695W001	1157	Irrigation	510	17.3	36.74188	-121.76954
14S/02E-08M02	367275N1217803W001	239	Irrigation	500	14.5	36.72729	-121.77995
14S/02E-11A04	367371N1217098W002	14480	Observation	490	62.9	36.73716	-121.70989
14S/02E-11M03	367275N1217207W001	1705	Irrigation	660	43.9	36.72754	-121.72074
14S/02E-12B03	367343N1216959W001	RODB14456	Observation	390	53.5	36.73428	-121.69586
14S/02E-12Q01	367221N1216965W001	1707	Domestic/ Irrigation	619	68.9	36.72211	-121.6964
14S/02E-15K01	367129N1217332W001	2662	Irrigation	600	28.6	36.71295	-121.73318
14S/02E-16A02	367210N1217460W001	353	Irrigation	669	24.5	36.72107	-121.74608
14S/02E-23A02	367061N1217108W001	21550	Irrigation	702	35.1	36.70615	-121.71085
14S/02E-34A03	366775N1217259W001	1060	Irrigation	670	35.2	36.67750	-121.72599
14S/02E-36G01	366731N1216997W001	370	Irrigation	416	32.4	36.67315	-121.69976
14S/03E-18C02	367207N1216805W001	BORB15010	Observation	395	56.4	36.72074	-121.68053
14S/03E-19C51	367054N1216834W001	23134	Irrigation	614	66.5	36.70543	-121.68343
14S/03E-20C01	367025N1216634W001	1814	Municipal	701	62.0	36.70257	-121.66349

State Well Number	SGMA Site Code	Local Well Designation	Well Use	Total Well Depth (ft)	Reference Point (ft, NAVD88)	Latitude (NAD 83)	Longitude (NAD 83)
14S/03E-29F03	366883N1216658W001	1147	Municipal	650	52.0	36.68836	-121.66587
14S/03E-31L01	366701N1216794W001	374	Municipal	640	44.0	36.67019	-121.67945
15S/02E-01A03	366607N1216909W001	1357	Irrigation	480	35.8	36.66078	-121.69099
15S/02E-02G01	366593N1217143W001	888	Irrigation	404	38.8	36.65936	-121.71436
15S/02E-12A01	366474N1216920W001	197	Irrigation	549	46.4	36.64744	-121.69200
15S/03E-03R02	366507N1216200W001	1808	Municipal	635	62.0	36.65079	-121.62006
15S/03E-04Q01	366520N1216425W001	375	Municipal	540	62.0	36.65203	-121.64257
15S/03E-05C02	366611N1216605W001	536	Municipal	614	45.0	36.66116	-121.66053
15S/03E-08F01	366422N1216656W001	1821	Domestic/ Irrigation	449	49.0	36.64222	-121.66568
15S/03E-14P02	366204N1216109W001	388	Irrigation	606	71.0	36.62049	-121.61090
15S/03E-15B01	366334N1216223W001	1007	Irrigation	452	70.5	36.63344	-121.62235
15S/03E-16F02	366292N1216474W001	1862	Irrigation	592	57.5	36.62911	-121.64745
15S/03E-17P02	366238N1216658W001	1838	Domestic	760	52.0	36.62380	-121.66583
15S/03E-26A01	366017N1216024W001	924	Irrigation	570	62.2	36.60172	-121.60246
15S/03E-28B02	366049N1216393W001	1841	Domestic	490	57.9	36.60497	-121.63931
15S/04E-29Q02	365909N1215491W001	1877	Irrigation	555	88.8	36.59097	-121.54916
15S/04E-31A02	365882N1215651W001	15S04E31A002M	Irrigation	335	74.2	36.58824	-121.56514
16S/04E-04C01	365732N1215377W001	441	Irrigation	466	74.2	36.57326	-121.53778
16S/04E-08H03	365550N1215465W001	CHEB21205	Observation	295	91.8	36.55503	-121.54655
16S/04E-10R02	365495N1215086W001	546	Irrigation	484	90.0	36.54958	-121.50864
16S/04E-25G01	365156N1214915W001	1882	Irrigation	560	104.1	36.51568	-121.49156
16S/05E-30J02	365085N1214551W001	1790	Irrigation	443	111.3	36.50857	-121.45516
TSS-1B*	N/A	TSS-1B	Observation	TBD	TBD	36.70650	-121.78929
Deep Aquifers							
13S/01E-36J02	367582N1218010W001	22681	Domestic	1,364	23.0	36.75821	-121.80101
13S/02E-19Q03	367808N1217847W001	75	Irrigation	1,562	18.0	36.78080	-121.78457
13S/02E-26L02	N/A	180/400-DA-3	Observation	1,210	96.2	36.77235	-121.71814
13S/02E-28L03	367713N1217539W001	22928	Irrigation	1,460	12.2	36.77132	-121.75396
13S/02E-32E05	367589N1217757W001	10164	Observation	1,650	18.8	36.75890	-121.77573

State Well Number	SGMA Site Code	Local Well Designation	Well Use	Total Well Depth (ft)	Reference Point (ft, NAVD88)	Latitude (NAD 83)	Longitude (NAD 83)
14S/02E-06L01	367428N1217916W001	1672	Irrigation	1,560	8.0	36.74286	-121.79169
14S/02E-20E01	366995N1217796W001	26394	Irrigation	2,020	77.5	36.69959	-121.77964
14S/02E-22A03	N/A	24033	Irrigation	1,640	29.0	36.70771	-121.73043
14S/02E-07J03	366995N1217796W001	22755	Industrial	1,573	31.0	36.75890	-121.77572
14S/02E-14R02	367077N1217304W001	26994	Observation	1,690	49.5	36.72741	-121.78209
14S/02E-21K04	367589N1217757W002	26103	Irrigation	1,800	28.3	36.70157	-121.78617
14S/02E-23J02	367274N1217820W001	26989	Irrigation	1,690	37.8	36.69352	-121.72966
14S/02E-25A03	367015N1217861W001	26988	Irrigation	1,700	39.2	36.69346	-121.71863
14S/02E-26G01	366936N1217237W001	26974	Irrigation	1,710	33.8	36.69360	-121.72371
14S/02E-27K02	366876N1217260W001	26674	Irrigation	1,700	32.9	36.68761	-121.72609
14S/02E-28H04	366846N1217352W001	22929	Irrigation	1,180	30.6	36.68466	-121.73528
14S/02E-35B01	366697N1217411W001	26993	Observation	1,690	30.7	36.66970	-121.74113
14S/03E-19C01	366789N1217149W001	26655	Irrigation	1,723	66.7	36.67893	-121.71497
15S/02E-12C02	N/A	180/400-DA-1	Observation	1,010	38.4	36.64735	-121.70226
16S/05E-30F02	N/A	180/400-DA-2	Observation	1,090	125.7	36.51421	-121.46848
TSS-1A*	N/A	TSS-1A	Observation	TBD	TBD	36.70650	-121.78929

Note: Asterisk symbolizes monitoring wells that have not yet been installed. Wells without SGMA Site Codes have not yet been assigned a SGMA Site Code because they are new to the monitoring network and must have established SMC to be entered into SGMA Portal.

N/A = Not available

TBD = To be determined

7.2.1 Groundwater Level Monitoring Protocols

Chapter 4 of the MCWRA CASGEM monitoring plan includes a description of existing groundwater elevation monitoring procedures (MCWRA, 2015). The CASGEM groundwater elevation monitoring protocols established by MCWRA are adopted by this GSP and are included in Appendix 7A. Groundwater elevation measurements are collected at least 2 times per year to characterize seasonal low and seasonal high groundwater conditions. The monitoring protocols described in Appendix 7A cover multiple monitoring methods for collecting data by hand and by automated pressure transducers. These protocols are consistent with data and reporting standards described in GSP Regulations § 352.4.

7.2.2 Groundwater Level Monitoring Network Data Gaps

Based on GSP Regulations and BMPs published by DWR on monitoring networks (DWR, 2016b), a visual analysis of the existing monitoring network was performed using professional judgment to evaluate whether there are data gaps in the groundwater level monitoring network.

While there is no definitive requirement on monitoring well density, the BMP cites several studies (Heath, 1976; Sophocleous, 1983; Hopkins and Anderson, 2016) that recommend 0.2 to 10 wells per 100 square miles. The BMP notes that professional judgment should be used to design the monitoring network to account for high-pumping areas, proposed projects, and other subbasin-specific factors.

The 180/400 Subbasin encompasses 132 square miles. If the BMP guidance recommendations are applied to the Subbasin, the well network should include between 1 and 13 wells in each of the 180-Foot, 400-Foot, and Deep Aquifers. Since the RMS network includes 32 wells in the 180-Foot Aquifer, 46 wells in the 400-Foot Aquifer, and 21 wells in the Deep Aquifers, the number of groundwater level monitoring wells in each principal aquifer in the Subbasin surpasses the range of the BMP guidance.

However, well count alone does not guarantee adequate spatial coverage. Visual inspection of Figure 7-3 indicates that only the 400-Foot Aquifer has sufficient geographic distribution to avoid a significant spatial data gap. By contrast, visual inspection of the RMS network in the 180-Foot and Deep Aquifers indicates that additional wells would be helpful to adequately characterize the Subbasin. Figure 7-4 shows the 180-Foot Aquifer groundwater elevations monitoring wells and the existing data gap in the southwestern corner of the Subbasin near the Monterey Subbasin boundary. SVBGSA is currently working with partner agencies to fill the data gap in the 180-Foot Aquifer. Figure 7-5 shows the locations of existing groundwater elevation monitoring wells and the generalized locations where monitoring wells are needed in the Deep Aquifers, according to the 2025 Monitoring Plan for the Deep Aquifers (MCWRA, 2025).

The generalized locations for new monitoring wells were based on addressing the criteria listed in the monitoring BMP including:

- Providing adequate data to produce seasonal potentiometric maps
- Providing adequate data to map groundwater depressions and recharge areas
- Providing adequate data to estimate change in groundwater storage
- Demonstrating conditions at Subbasin boundaries

Some of the wells in the monitoring network have unknown well construction information. SVBGSA will continue to work with MCWRA to incorporate well construction information during GSP implementation through MCWRA's well registration effort.

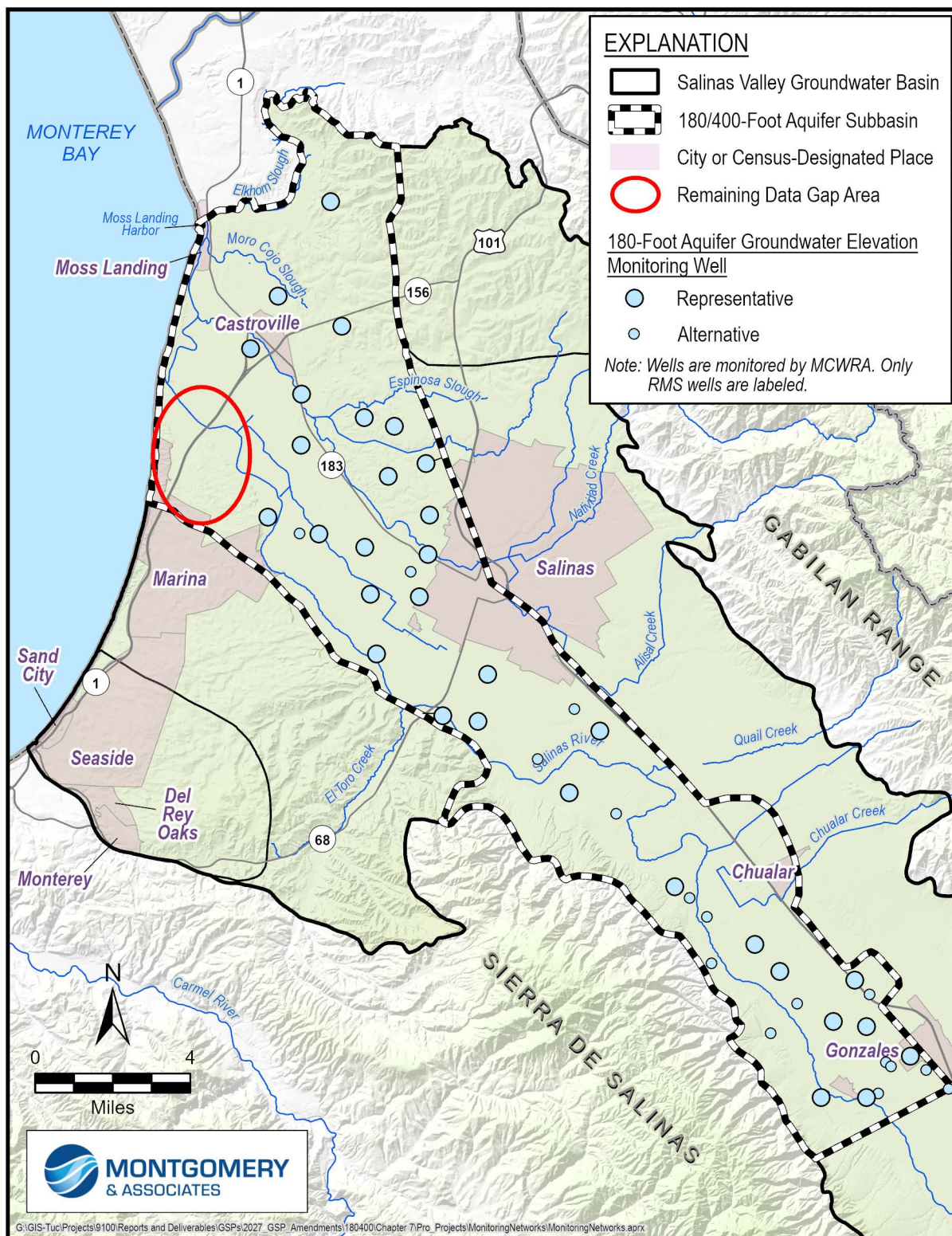


Figure 7-4. Data Gaps in the 180-Footer Aquifer Groundwater Level Monitoring Network

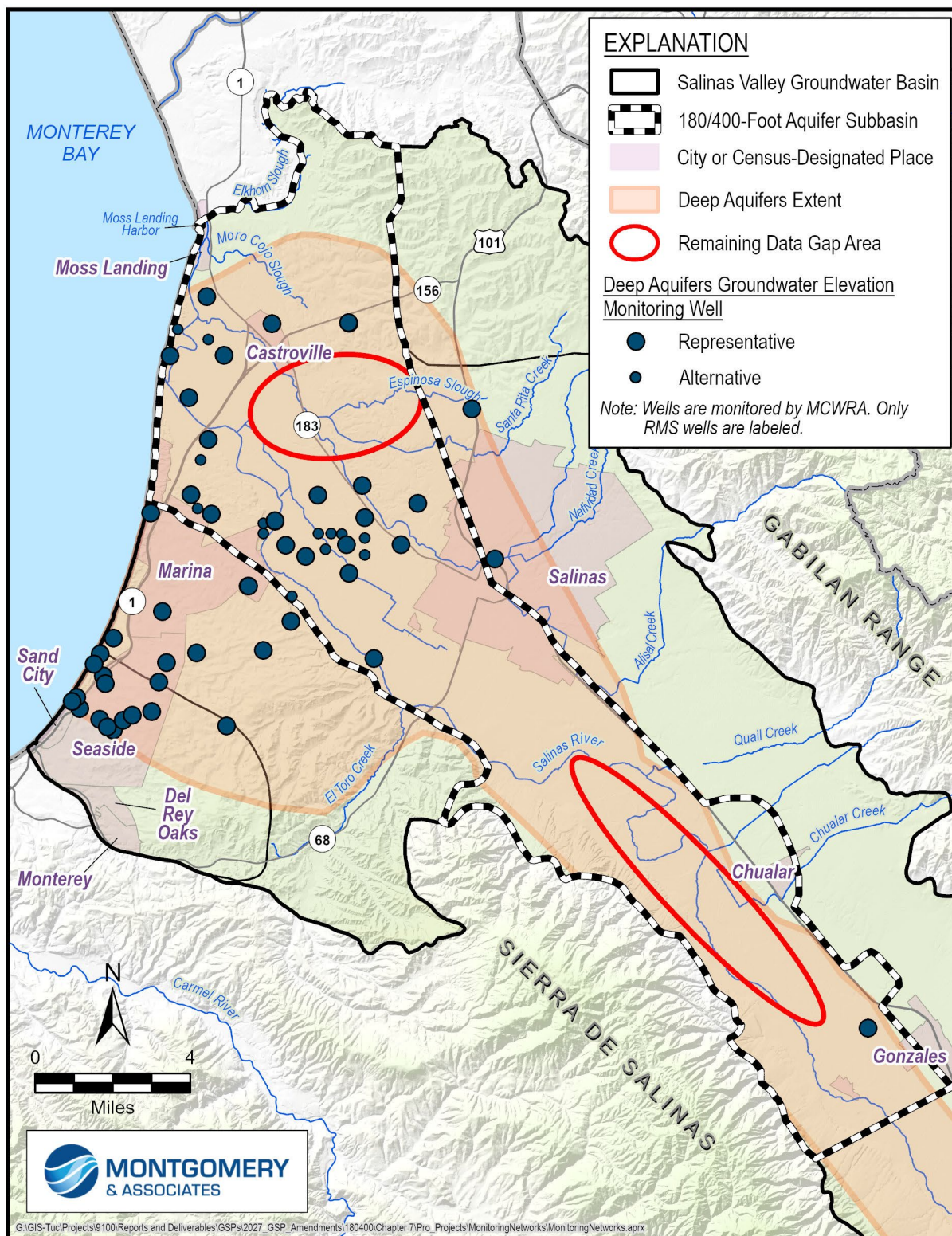


Figure 7-5. Generalized Locations for Additional Monitoring Wells in the Deep Aquifers

7.3 Groundwater Storage Monitoring Network

As discussed in Chapter 8, the sustainability indicator for reduction of groundwater storage is measured using groundwater elevations and the advancement of the seawater intrusion front to calculate change in storage. Therefore, the groundwater storage monitoring network is the same as the groundwater levels monitoring network and seawater intrusion monitoring network. Separate calculations of change in storage will be done for the area where seawater has intruded and the area where seawater has not intruded.

7.4 Seawater Intrusion Monitoring Network

The sustainability indicator for seawater intrusion is evaluated using the location of the 500 mg/L chloride isocontour. MCWRA develops annual maps of the 500 mg/L chloride isocontour (Figure 5-19 and Figure 5-20) based on chloride concentration measured at a network of monitoring wells. The seawater intrusion monitoring network only includes wells where the data is publicly available. The existing seawater intrusion monitoring network may need to be expanded over time and will be refined through the seawater intrusion response plan (see Section 9.4.6).

Table 7-2 and Figure 7-6 show the wells used by MCWRA to monitor seawater intrusion in the 180/400 Subbasin. SVBGSA adopts MCWRA's network as it exists, except for the wells that are not completed in the principal aquifers. No seawater intrusion has been detected in the Deep Aquifers in the 180/400 Subbasin to date. The monitoring wells in the Deep Aquifers will help detect seawater intrusion if it begins to occur.

Table 7-2. 180/400 Subbasin Seawater Intrusion Well Network

State Well Number	SGMA Site Code	Local Well Designation	Well Use	Total Well Depth (ft)	Latitude (NAD 83)	Longitude (NAD 83)
180-Foot Aquifer						
13S/02E-15R03	N/A	21048	Observation	205	36.79763	-121.72886
13S/02E-21Q01	367816N1217514W001	SELA22633	Observation	157	36.78165	-121.75140
13S/02E-32H01	N/A	27094	Observation	175	36.76175	-121.76360
14S/02E-03F04	367454N1217393W001	ESPA22636	Observation	205	36.74540	-121.73933
14S/02E-11A02	367371N1217098W001	14S02E11A002M	Observation	250	36.73713	-121.70982
14S/02E-12B02	367343N1216958W001	RODA14455	Observation	265	36.73432	-121.69586
14S/02E-13F03	367156N1216980W001	14S02E13F003M	Observation	280	36.71563	-121.69803
14S/02E-15L02	N/A	14501	Domestic	200	36.71176	-121.74018
14S/02E-20B01	N/A	14530	Industrial	350	36.70568	-121.76873
14S/02E-22P02	N/A	766	Irrigation	304	36.69326	-121.73830
14S/02E-24Q01	N/A	10229	Domestic	Unknown	36.69382	-121.69400
14S/02E-26H01	366889N1217079W001	AMST22651	Observation	339	36.68888	-121.70795

State Well Number	SGMA Site Code	Local Well Designation	Well Use	Total Well Depth (ft)	Latitude (NAD 83)	Longitude (NAD 83)
14S/02E-26N03	N/A	757	Irrigation	162	36.68155	-121.72539
14S/02E-26N50	N/A	966	Irrigation	336	36.67956	-121.72582
14S/02E-26P01	N/A	10234	Domestic	Unknown	36.67909	-121.71881
14S/02E-27A01	366933N1217294W001	MCFD22632	Observation	293	36.69330	-121.72945
14S/02E-27F02	N/A	717	Irrigation	354	36.68705	-121.73510
14S/02E-34B03	366782N1217344W001	14S02E34B003M	Irrigation	346	36.67822	-121.73450
14S/02E-36E01	366713N1217046W001	14S02E36E001M	Irrigation	198	36.67136	-121.70462
14S/03E-07P02	N/A	20769	Domestic	296	36.72467	-121.68180
14S/03E-18C01	367207N1216806W001	BORA15009	Observation	225	36.72073	-121.68057
14S/03E-30F01	N/A	625	Irrigation	Unknown	36.68834	-121.68129
14S/03E-30G08	366869N1216785W001	MKTC22650	Observation	293	36.68688	-121.67853
14S/03E-31B01	N/A	1543	Irrigation	175	36.67565	-121.67846
15S/02E-02A01	N/A	723	Irrigation	242	36.66245	-121.71091
15S/02E-12C01	366489N1217009W001	15S02E12C001M	Irrigation	182	36.64899	-121.70097
16S/04E-08H04	365550N1215466W001	CHEA21208	Observation	140	36.55503	-121.54657
16S/05E-31P02	364891N1214676W001	16S05E31P002M	Observation	115	36.48917	-121.46767
13S/02E-35G01	N/A	224	Irrigation	330	36.76296	-121.71850
14S/02E-13P04	N/A	27251	Observation	520	36.70829	-121.70071
14S/02E-25A01	N/A	1977	Irrigation	150	36.69060	-121.69280
14S/03E-19A01	N/A	606	Irrigation	0	36.70517	-121.67429
14S/03E-30B02	N/A	833	Irrigation	210	36.69243	-121.67932
TSS-2*	N/A	TSS-2	Observation	TBD	36.81756	-121.72841
400-Foot Aquifer						
13S/02E-15M01	N/A	521	Domestic	1,014	36.79880	-121.74570
13S/02E-15R02	N/A	21047	Observation	585	36.79763	-121.72881
13S/02E-20J01	N/A	2697	Domestic	600	36.78620	-121.76502
13S/02E-28M02	N/A	2455	Irrigation	767	36.77262	-121.75992
13S/02E-32H02	N/A	27095	Observation	610	36.76173	-121.76362
13S/02E-34G01	N/A	2445	Municipal	765	36.75682	-121.73654
13S/02E-34G02	N/A	0	Irrigation	Unknown	36.75949	-121.73400
13S/02E-34J50	N/A	NULL	Irrigation	Unknown	36.75660	-121.72902
13S/02E-35H01	N/A	22801	Irrigation	440	36.75968	-121.70934
13S/02E-36F50	N/A	22687	Irrigation	660	36.75920	-121.70180
14S/02E-02A02	N/A	1706	Irrigation	810	36.75136	-121.70755
14S/02E-03F03	367455N1217395W001	ESPB22635	Observation	455	36.74549	-121.73951
14S/02E-03H01	N/A	1685	Irrigation	800	36.74657	-121.72882
14S/02E-03M02	N/A	1851	Irrigation	587	36.74213	-121.74086
14S/02E-03P01	N/A	22833	Irrigation	614	36.74126	-121.73972
14S/02E-03R02	N/A	944	Irrigation	638	36.74010	-121.72779
14S/02E-04H01	N/A	1849	Irrigation	512	36.74512	-121.74778
14S/02E-05C03	N/A	1162	Irrigation	580	36.74792	-121.77459

State Well Number	SGMA Site Code	Local Well Designation	Well Use	Total Well Depth (ft)	Latitude (NAD 83)	Longitude (NAD 83)
14S/02E-08C03	N/A	1466	Irrigation	556	36.73402	-121.77012
14S/02E-09D04	N/A	2659	Irrigation	785	36.73640	-121.76010
14S/02E-09N02	N/A	2419	Irrigation	622	36.72484	-121.76009
14S/02E-10H01	N/A	1704	Irrigation	640	36.73142	-121.73098
14S/02E-10M02	N/A	780	Irrigation	585	36.72736	-121.74326
14S/02E-10N51	N/A	659	Irrigation	580	36.72646	-121.74362
14S/02E-11A04	367371N1217098W002	14S02E11A004M	Observation	490	36.73717	-121.70990
14S/02E-11M03	367275N1217207W001	14S02E11M003M	Irrigation	660	36.72755	-121.72075
14S/02E-12B03	367343N1216959W001	RODB14456	Observation	390	36.73429	-121.69588
14S/02E-13E50	N/A	22828	Irrigation	596	36.71645	-121.69918
14S/02E-13F02	N/A	14468	Observation	480	36.71561	-121.69803
14S/02E-15A01	N/A	1055	Irrigation	623	36.72116	-121.72966
14S/02E-15N01	N/A	859	Irrigation	552	36.71077	-121.74380
14S/02E-15P01	N/A	861	Irrigation	595	36.71150	-121.73958
14S/02E-22R01	N/A	24833	Irrigation	672	36.69352	-121.72602
14S/02E-24E01	N/A	886	Irrigation	467	36.70348	-121.70667
14S/02E-24P02	N/A	1282	Irrigation	454	36.69388	-121.70175
14S/02E-26C50	N/A	446	Irrigation	594	36.69292	-121.72026
14S/02E-34A03	366775N1217259W001	14S02E34A003M	Irrigation	670	36.67750	-121.72600
14S/02E-34A04	N/A	1072	Irrigation	352	36.67887	-121.72922
14S/02E-36F03	N/A	24834	Irrigation	602	36.67450	-121.70292
14S/02E-36G01	366731N1216997W001	14S02E36G001M	Irrigation	416	36.67315	-121.69977
14S/03E-07D50	N/A	214	Irrigation	600	36.73549	-121.68475
14S/03E-07K51	N/A	1698	Irrigation	600	36.72946	-121.67610
14S/03E-07P50	N/A	22656	Irrigation	1140	36.72325	-121.67990
14S/03E-18C02	367207N1216805W001	BORB15010	Observation	395	36.72074	-121.68054
14S/03E-18E04	N/A	15014	Observation	495	36.71833	-121.68657
14S/03E-30E03	N/A	1542	Irrigation	430	36.68631	-121.68644
14S/03E-31F02	N/A	1794	Irrigation	518	36.67134	-121.68200
15S/02E-01Q50	N/A	2318	Irrigation	524	36.65195	-121.69826
15S/02E-03B05	N/A	26594	Irrigation	Unknown	36.66368	-121.73296
15S/03E-07K01	N/A	24520	Irrigation	570	36.64223	-121.68046
15S/03E-08L01	N/A	24840	Irrigation	656	36.63957	-121.66398
16S/04E-08H03	365550N1215465W001	CHEB21205	Observation	295	36.55504	-121.54656
16S/04E-11D51	365594N1215073W001	16S04E11D051M	Irrigation	1,000	36.55944	-121.50738
13S/02E-28E01	N/A	114	Irrigation	0	36.77379	-121.76154
13S/02E-32J03	367571N1217623W001	2429	Irrigation	576	36.75719	-121.76240
14S/02E-01C02	N/A	27070	Irrigation	660	36.75055	-121.69747
14S/02E-05K01	367418N1217695W001	1157	Irrigation	510	36.74188	-121.76956
14S/02E-07L04	N/A	1257	Irrigation	560	36.72609	-121.79126
14S/02E-07L05	N/A	1255	Irrigation	610	36.72898	-121.79135

State Well Number	SGMA Site Code	Local Well Designation	Well Use	Total Well Depth (ft)	Latitude (NAD 83)	Longitude (NAD 83)
14S/02E-13P05	N/A	27252	Observation	520	36.70829	-121.70071
14S/02E-25E02	N/A	1401	Irrigation	488	36.69030	-121.70719
14S/02E-27G50	N/A	1393	Irrigation	642	36.68602	-121.73475
14S/02E-35F02	N/A	444	Irrigation	400	36.67242	-121.71713
14S/03E-19C51	367054N1216834W001	23134	Irrigation	614	36.70543	-121.68343
15S/02E-01E01	N/A	27601	Irrigation	500	36.65847	-121.70752
TSS-1B*	N/A	TSS-1B	Observation	TBD	36.70650	-121.78929
Deep Aquifers						
13S/01E-25R01	N/A	2261	Domestic	1,393	36.76814	-121.79768
13S/01E-36J02	367582N1218010W001	13S01E36J002M	Domestic	1,364	36.75821	-121.80103
13S/02E-19Q03	367808N1217847W001	75	Irrigation	1,562	36.78081	-121.78458
13S/02E-28L03	367713N1217539W001	13S02E28L003M	Irrigation	1,460	36.77132	-121.75397
13S/02E-31A02	N/A	1153	Irrigation	1,600	36.76469	-121.78331
14S/02E-07J03	367589N1217757W002	22755	Industrial	1,573	36.72742	-121.78210
14S/02E-14R02	367274N1217820W001	26994	Observation	1,690	36.71190	-121.70990
14S/02E-18B01	367195N1217854W001	14S02E18B001M	Irrigation	1,700	36.71959	-121.78542
14S/02E-19G01	N/A	26473	Irrigation	1,910	36.70157	-121.78618
14S/02E-20E01	366995N1217796W001	26394	Irrigation	2,020	36.69959	-121.77965
14S/02E-21K04	367015N1217861W001	26103	Irrigation	1,800	36.69771	-121.75001
14S/02E-21L02	N/A	26127	Irrigation	1,780	36.69665	-121.75525
14S/02E-22A03	367077N1217304W001	14S02E22A003M	Irrigation	1,640	36.70772	-121.73045
14S/02E-22J02	N/A	26854	Irrigation	1,620	36.69352	-121.72967
14S/02E-23G02	N/A	26397	Irrigation	1,560	36.70218	-121.71200
14S/02E-23J02	366935N1217296W001	26989	Irrigation	Unknown	36.69978	-121.70822
14S/02E-23P02	N/A	26954	Irrigation	1,620	36.69346	-121.71864
14S/02E-25A03	366934N1217186W001	26988	Irrigation	Unknown	36.69004	-121.69113
14S/02E-26A10	N/A	26973	Irrigation	Unknown	36.69232	-121.70811
14S/02E-26D01	N/A	26677	Irrigation	1,645	36.69361	-121.72372
14S/02E-26G01	366936N1217237W001	26974	Irrigation	Unknown	36.68951	-121.71649
14S/02E-26J04	N/A	26975	Irrigation	Unknown	36.68585	-121.70771
14S/02E-27J02	N/A	26955	Irrigation	Unknown	36.68761	-121.72610
14S/02E-27K02	366876N1217260W001	26674	Irrigation	1,700	36.68466	-121.73530
14S/02E-28C02	366929N1217552W001	14S02E28C002M	Irrigation	1,160	36.69290	-121.75522
14S/02E-28H04	366846N1217352W001	22929	Irrigation	1,180	36.68866	-121.74455
14S/02E-29C01	N/A	25973	Irrigation	1,780	36.69276	-121.77145
14S/02E-34M01	N/A	26934	Irrigation	1,645	36.66971	-121.74115
14S/02E-35B01	366697N1217411W001	26993	Observation	1,690	36.67893	-121.71499
14S/03E-19C01	366789N1217149W001	26655	Irrigation	1,723	36.70576	-121.68396
15S/03E-03N58	N/A	22666	Industrial	682	36.65330	-121.63144
15S/03E-05R52	N/A	22905	Irrigation	840	36.65007	-121.65287
15S/03E-10D04	366480N1216306W001	15S03E10D004M	Municipal	980	36.64806	-121.63068

State Well Number	SGMA Site Code	Local Well Designation	Well Use	Total Well Depth (ft)	Latitude (NAD 83)	Longitude (NAD 83)
16S/04E-03K01	N/A	26134	Irrigation	1,060	36.56521	-121.51297
13S/02E-26L02	N/A	27085	Observation	1,210	36.77235	-121.71814
15S/02E-12C02	N/A	27084	Observation	1,010	36.64735	-121.70226
16S/05E-30F02	N/A	27104	Observation	1,090	36.51421	-121.46848
TSS-1A*	N/A	TSS-1A	Observation	TBD	36.70650	-121.78929
In Multiple Principal Aquifers						
13S/02E-28L02	N/A	2446	Municipal	600	36.77122	-121.75438
14S/02E-13G01	N/A	1687	Irrigation	676	36.71771	-121.69444
14S/02E-17C02	367219N1217759W001	14S02E17C002M	Domestic	140	36.72192	-121.77598
14S/02E-27C02	N/A	104	Irrigation	483	36.68955	-121.73567

Note: Asterisk symbolizes monitoring wells that have not yet been installed. Wells without SGMA Site Codes have not yet been assigned a SGMA Site Code.

N/A = Not available

TBD = To be determined

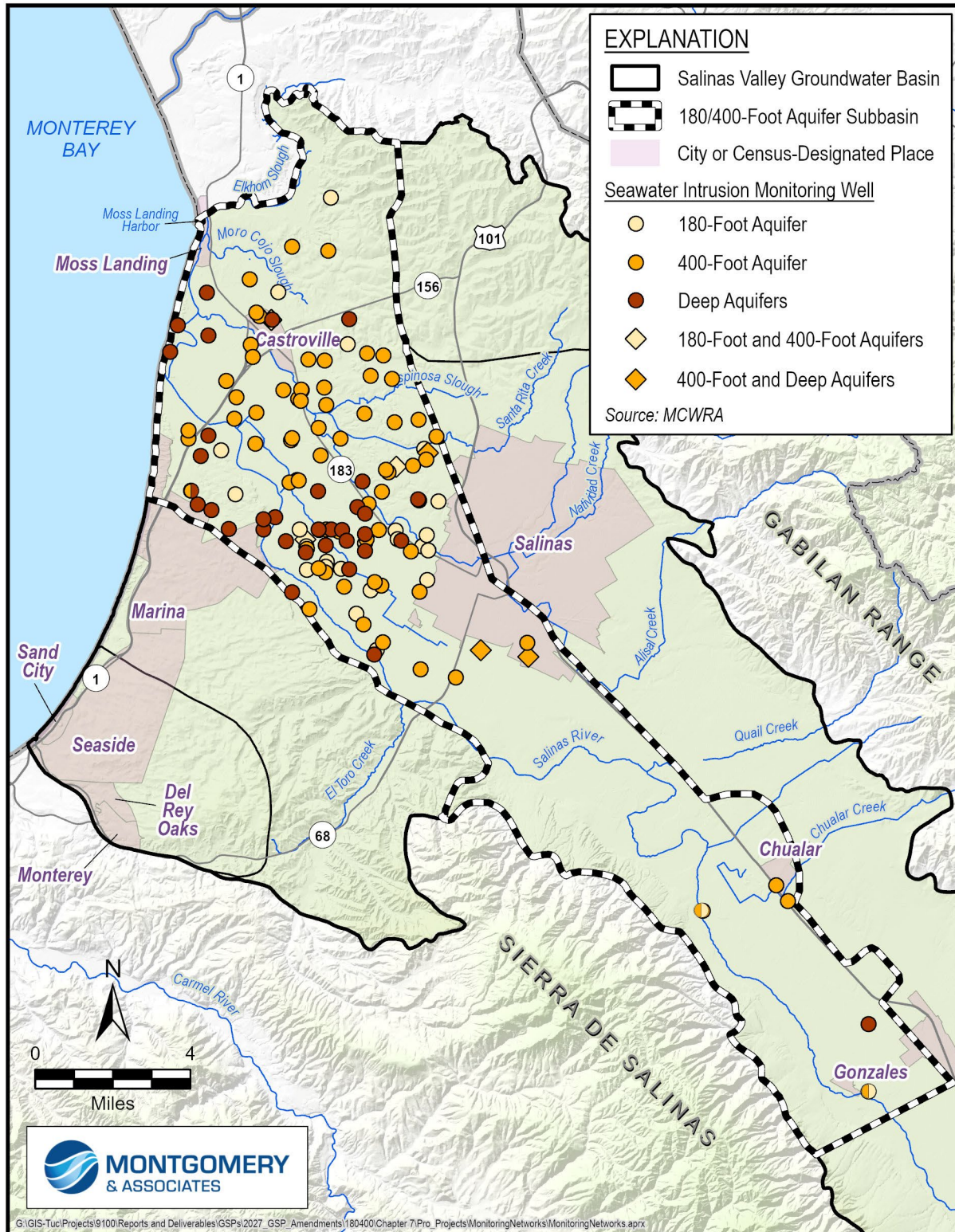


Figure 7-6. Seawater Intrusion Monitoring Network

7.4.1 Seawater Intrusion Monitoring Protocols

The protocols established by MCWRA for collecting groundwater quality data from monitoring wells and analyzing those data for seawater intrusion are adopted by this GSP. The groundwater quality data and seawater intrusion monitoring protocols are available in the Monterey County Quality Assurance Project Plan and included in Appendix 7B. MCWRA also established chloride data contouring protocols to establish the isocontour map, provided in Appendix 7C. These protocols are consistent with data and reporting standards described in GSP Regulations § 352.4.

7.4.2 Seawater Intrusion Monitoring Data Gaps

The network of wells with publicly available data for monitoring chloride concentrations includes an adequate number and distribution of wells in the 180-Foot and the 400-Foot Aquifers (Figure 7-6). However, the 250 mg/L chloride isocontour has advanced substantially in the northern 180-Foot Aquifer east of the Elkhorn Slough. SVBGSA, through MCWRA's monitoring, will continue to track the advancement of chloride concentration in this area.

7.5 Groundwater Quality Monitoring Network

The sustainability indicator for degraded water quality is evaluated at wells monitored for established water quality regulatory programs. The SVBGSA adopts the active public water system supply wells monitored under the SWRCB DDW, and the wells monitored under the CCRWQCB ILP for Ag Order 4.0 compliance. The Subbasin's groundwater quality network is shown on Figure 7-7 and the wells in the network are listed in Appendix 7D.

The public water system supply wells included in the monitoring network were identified by reviewing data from the SWRCB DDW. The SWRCB collects data for municipal systems; community water systems; non-transient, non-community water systems; and non-community water systems that provide drinking water to at least 15 service connections or serve an average of at least 25 people for at least 60 days a year. Only active DDW wells are included in the SVBGSA's groundwater quality network.

Water quality for agricultural supply wells is monitored through the CCRWQCB ILP, which regulates discharge from irrigated agricultural lands. Ag Order 4.0 established 2 main monitoring requirements: 1) the creation of a monitoring plan to assess groundwater quality trends, and 2) monitoring of all on-farm domestic wells for the presence of 1,2,3-trichloropropane (1,2,3-TCP) and nitrate. Central Coast Water Quality Preservation Inc., the third-party that conducts most CCRWQCB ILP compliance sampling in the Salinas Valley, is developing the Groundwater Quality Trend Monitoring (GQTM) Workplan to address the trend monitoring requirement of the Ag Order 4.0 requirements. The GQTM Workplan will evaluate nitrate and major cations and anions trends in select wells. All ILP wells currently sampled by

Preservation Inc. are provisionally included in the Subbasin's monitoring network until the GQTM Workplan is approved by the CCRWQCB. Once it is approved, the SVBGSA's monitoring network will comprise the wells in the GQTM Workplan and additional on-farm domestic wells sampled for 1,2,3-TCP and nitrate.

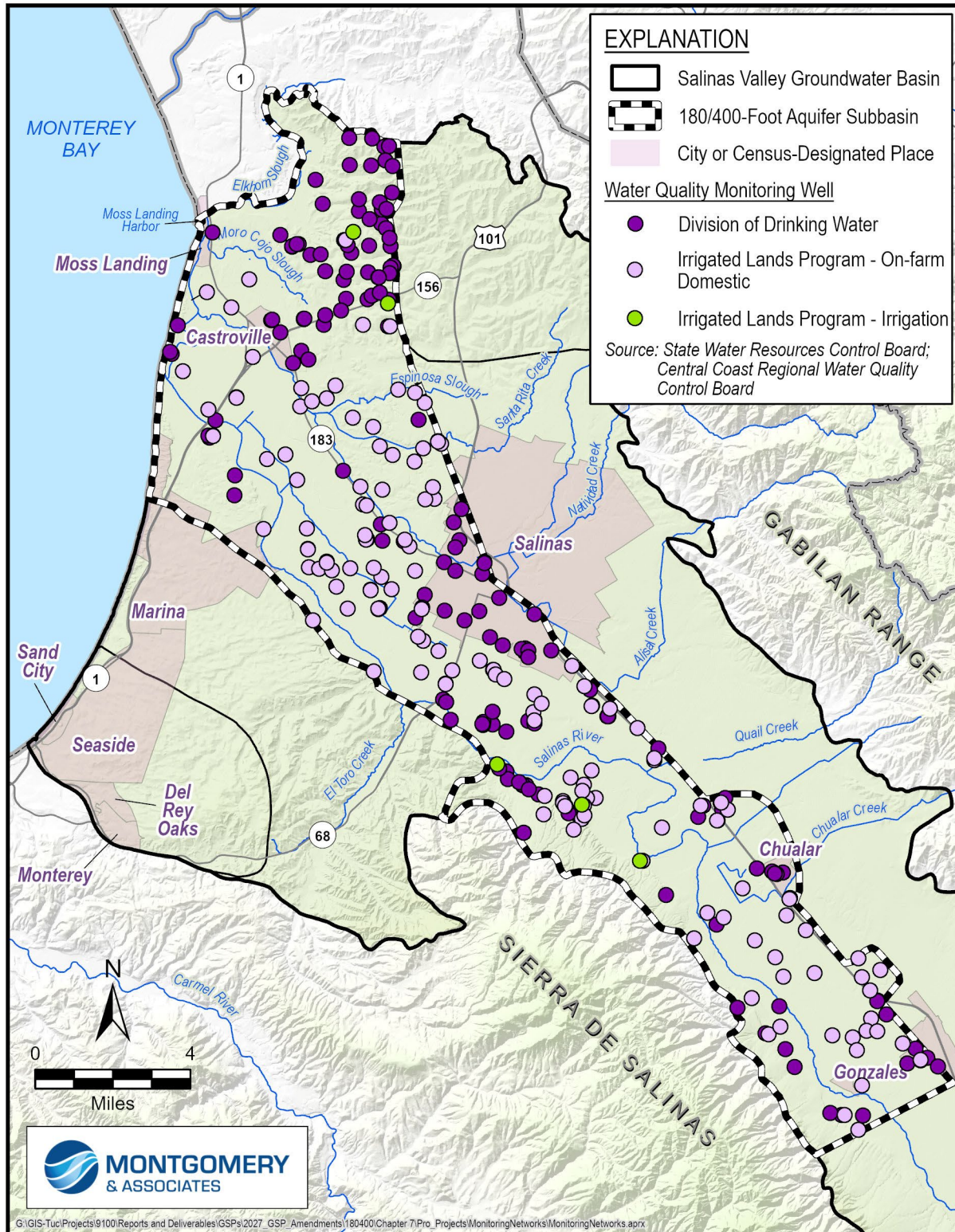


Figure 7-7. Groundwater Quality Monitoring Network

7.5.1 Groundwater Quality Monitoring Protocols

The SVBGSA does not independently sample wells for any COC. Instead, SVBGSA analyzes water quality data that are collected through the DDW and ILP. Therefore, the GSA is dependent on the monitoring density and frequency of DDW and ILP.

Water quality data from public water systems are collected, analyzed, and reported in accordance with protocols that are reviewed and approved by the SWRCB DDW, in accordance with the state and federal Safe Drinking Water Acts. Monitoring protocols may vary by agency.

The ILP data are collected annually under CCRWQCB Ag Order 4.0. A copy of Ag Orders 4.0 monitoring and reporting programs are included in Appendix 7E and are incorporated into this GSP. These protocols are consistent with data and reporting standards described in GSP Regulations § 352.4.

7.5.2 Groundwater Quality Monitoring Data Gaps

The DDW and ILP monitoring network provide sufficient spatial and temporal data to determine groundwater quality trends for water quality indicators to address known water quality issues. Additionally, there is adequate spatial coverage in the water quality monitoring network to assess impacts to beneficial uses and users.

7.6 Land Subsidence Monitoring Network

As described in Section 5.5, DWR collects land subsidence data using InSAR satellite data and makes these data available to GSAs. This subsidence dataset represents the best available science for the 180/400 Subbasin and is therefore used as the subsidence monitoring network.

7.6.1 Land Subsidence Monitoring Protocols

Land Subsidence monitoring protocols are the ones used by DWR for InSAR measurements and interpretation. DWR adapted their methods to measure subsidence on hard surfaces only and interpolate between them to minimize the change in land surface elevation captures in soft surfaces that are likely not true subsidence. The cell size of this interpolated surface is 302 feet by 302 feet. If the annual monitoring indicates subsidence is occurring at a rate greater than the minimum thresholds, then additional investigation and monitoring may be warranted. In particular, the GSAs will implement a study to assess if the observed subsidence can be correlated to groundwater elevations, and whether a reasonable causality can be established. These protocols are consistent with data and reporting standards described in GSP Regulations § 352.4.

7.6.2 Land Subsidence Data Gaps

There are no data gaps associated with the subsidence monitoring network.

7.7 Interconnected Surface Water Monitoring Network

The sustainability indicator for the depletion of ISW due to groundwater pumping is evaluated by monitoring shallow groundwater levels in monitoring wells adjacent to the Salinas River in the Subbasin. The ISW monitoring network in the Salinas Valley is based on the approach recommended by the Environmental Defense Fund (EDF, 2018), which uses groundwater elevations as surrogates for streamflow depletion rates. EDF notes that the change in hydraulic gradient between stream stage and surrounding groundwater elevations is representative of variance in interconnection between surface water and groundwater. Thus, monitoring the gradient also monitors interconnection. The gradient will be monitored by measured shallow groundwater elevations.

Table 7-3 and Figure 7-8 shows the ISW monitoring network. These shallow monitoring wells were chosen based on proximity to a USGS stream gage or MCWRA River Series measurement site, well depth, and proximity to the Salinas River. Furthermore, the wells are also located near locations of ISW determined by the SVIHM. This allows for monitoring of groundwater elevations near the rivers in the Subbasin and may provide insight about the relationship between streamflow and groundwater elevations. Additionally, the combined use of groundwater elevation and streamflow data will allow SVBGSA to assess temporal changes in conditions due to variations in stream discharge and regional groundwater extraction. This can also help evaluate other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water as discussed in Chapter 8. All ISW monitoring wells are classified as RMS.

Following GSP Amendment 1, SVBGSA installed a new ISW well indicated with an asterisk in Table 7-3. For simplicity, these new wells will also be referred to as RMS wells although they do not have SMC yet.

Table 7-3. Shallow Wells in the ISW Monitoring Network

State Well Number	SGMA Site Code	Local Well Designation	Well Use	Total Well Depth (feet)	Latitude (NAD 83)	Longitude (NAD 83)
15S/03E-26E02*	N/A	180/400-ISW-1	Observation	95	36.59975	-121.61654
16S/05E-31P02	364891N1214676W001	16S05E31P002M	Observation	115	36.48916	-121.46768

Note: Asterisk symbolizes new monitoring wells that do not have SGMA Site Codes because RMS wells must have established SMC to be entered into SGMA Portal. N/A = Not available

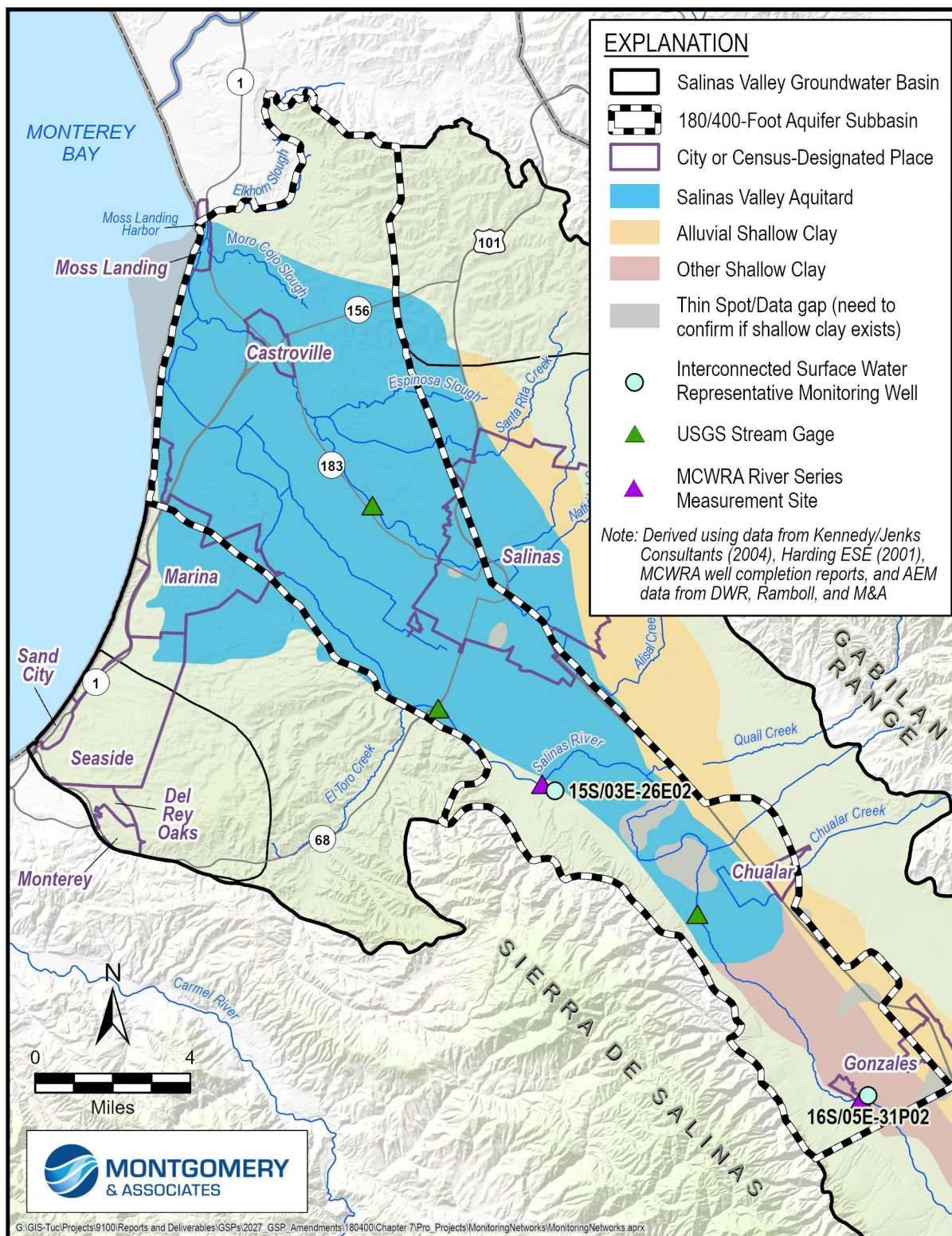


Figure 7-8. ISW Monitoring Network

7.7.1 Interconnected Surface Water Monitoring Protocols

Monitoring protocols for shallow wells monitoring ISW will be identical to MCWRA's current groundwater elevation monitoring protocols, included in Appendix 7A. These protocols are consistent with data and reporting standards described in GSP Regulations § 352.4. The SVBGSA installed 1 ISW monitoring well in 2024 that is equipped with a datalogger that allows SVBGSA to assess if seasonal pumping is resulting in streamflow depletions.

7.7.2 Interconnected Surface Water Data Gaps

There are no data gaps in the ISW monitoring network in the 180/400 Subbasin.

7.8 Other Monitoring Networks

The following monitoring networks are needed in addition to the monitoring networks outlined above for sustainability indicators. SGMA requires that annual reports include annual groundwater extractions and surface water diversions in order to report total water use for the Subbasin. These include monitoring of GDEs at identified locations throughout the Subbasin, as well as monitoring and reporting of annual groundwater extractions and surface water diversions, which are required under SGMA to document total water use within the Subbasin.

7.8.1 Groundwater Dependent Ecosystems Monitoring Network

Central Coast Wetlands Group will monitor and assess GDEs to detect if their conditions are declining. When such declines in condition are detected, the GDE must be flagged for further investigation into the root cause of the decline to determine if it is related to groundwater management activities. For the purposes of GDE monitoring in the Salinas Valley, ecosystem condition is primarily defined through vegetation health and vigor since this metric can be most readily tied to groundwater conditions. If groundwater levels are lowered below a depth that vegetation roots can access, a decline in vegetation vigor due to the loss of the water source would be an expected result and defined as an adverse impact.

7.8.1.1 Groundwater Dependent Ecosystems Monitoring Protocols

The GDE monitoring methodology uses a 2-pronged approach including an annual desktop-based component and a 5-year interval field-based component. A change in GDE vegetation vigor could be related to many factors, so a subsequent hydrogeological analysis is required to investigate groundwater level trends around potential GDEs to understand if GDE health is related to groundwater management.

7.8.1.2 Groundwater Dependent Ecosystems Monitoring Data Gaps

There are no GDE monitoring data gaps in the 180/400 Subbasin.

7.8.2 Groundwater Extraction Monitoring Network

MCWRA's GEMS MCWRA's GEMS is part of the GMP used to monitor extraction in the Subbasin. Monthly extractions for agricultural and urban water use are reported annually to MCWRA under MCWRA 5426. Urban water use includes larger public water systems and industrial water use. Historically, most pumping in the Salinas Valley was only reported for Zones 2, 2A, and 2B, which mainly overlaps with the Subbasin as depicted on Figure 3-3, but had not included the predominantly rural residential area in the northernmost part of the Subbasin. Extraction is self-reported by well owners or operators on a water year basis (October 1 to September 30).

SVBGSA will work with MCWRA to obtain the GMP data through a coordinated reporting program such that well owners can provide a single annual report to fulfill the requirements of both the GSP and the existing County Ordinance 5426.

SVBGSA prepared an estimate of rural domestic pumping across the Valley. Rural domestic pumping is estimated using the number of drinking water connections based on data compiled for water systems and 2024 Monterey County parcel data. After estimating the number of connections, the connections were multiplied by a constant value 0.35 AF/yr per connection across all subbasins to estimate water use. This constant was verified using reported urban pumping to assess the accuracy of the connections and water use estimates. This estimate will be revised during GSP implementation based on the results of MCWRA well registration and GMP reporting.

7.8.2.1 Groundwater Extraction Monitoring Protocols

Groundwater extraction monitoring is accomplished using the GMP data provided by MCWRA.

7.8.2.2 Groundwater Storage Monitoring Data Gaps

Accurate assessment of the amount of pumping requires a complete count of the number of municipal, agricultural, and domestic wells in the GSP area. As discussed in Chapter 9, MCWRA has an ongoing well registration program to catalogue existing and active groundwater wells, including their locations, depths, and whether the well is active, abandoned, or destroyed.

The accuracy and reliability of groundwater pumping reported through the GMP. SVBGSA will continue to work with MCWRA to assure data quality control.

7.8.3 Salinas River Watershed Diversions

Salinas River watershed monthly diversion data are collected annually by the SWRCB. Prior to WY 2025, the SWRCB used eWRIMS which has been replaced with CalWATRS. CalWATRS is used to track information of water rights in the state on a water year basis and is publicly accessible at <https://calwatsr.waterboards.ca.gov/portal/s/search-information>. These data include diversions from the Salinas River and its tributaries.

These data are used in the Annual Reports to account for surface water use in the Salinas Valley. However, many stakeholders have noted that a portion of the agricultural water use in the Valley has been reported to MCWRA as groundwater extraction and to the SWRCB as surface water diversions as mentioned in Chapter 3. To help reduce any potential double-counting in the Annual Reports, the GMP requires every well owner or well operator reporting groundwater extraction to the SWRCB to report that same information to MCWRA and indicate whether those data are reported to both agencies.

7.8.3.1 Salinas River Watershed Diversions Monitoring Protocols

Salinas River watershed diversion monitoring protocols are established by the SWRCB for the collection of water right information. These protocols are consistent with data and reporting standards described in GSP Regulations § 352.4.

7.8.3.2 Salinas River Watershed Diversions Monitoring Data Gaps

There are no data gaps in the Salinas River watershed diversion monitoring in the 180/400 Subbasin.

7.9 Data Management System and Data Reporting

The SVBGSA has developed a Data Management System (DMS) in adherence to GSP Regulations § 352.6 and § 354.40 that is used to store, review, and upload data collected as part of the GSP development and implementation.

The SVBGSA DMS consists of 2 Structured Query Language (SQL) databases. The HydroSQL database stores information about each well and water level and extraction timeseries data. Fields in the HydroSQL database include:

- Subbasin
- Cadastral coordinates
- Planar coordinates
- Well owner

- Well name
- Well status
- Well depth
- Screened interval top and bottom
- Well type
- Water level elevation
- Annual pumping volume

Well owner and annual well-specific pumping information will be stored in HydroSQL; however, neither will be publicly accessible due to confidentiality requirements. Real-time streamflow data for USGS gages is automatically uploaded to the HydroSQL database via a live link to the USGS website.

Water quality data are stored in the EnviroData SQL database, which is linked to the HydroSQL for data management purposes. EnviroData SQL contains fields such as:

- Station
- Parameter
- Sample Date
- Detection (detect or non-detect)
- Value
- Unit

The data used to populate the SVBGSA DMS are listed in Table 7-4. Categories marked with an X indicate datasets that are used in populating the DMS, including data that are publicly accessible or that are available to SVBGSA from MCWRA. Some data such as groundwater extraction are confidential and cannot be made publicly accessible by SVBGSA unless aggregated.

Table 7-4. Datasets Available for Use in Populating the DMS

Data Sets	Data Category					
	Well and Site Information	Well Construction	Water Level	Groundwater Extraction ¹	Streamflow	Water Quality
MCWRA	X	X	X	X		
GAMA Groundwater Information System (DDW)	X					X
CCRWQCB (ILP)						X
USGS Gage Station					X	

¹ Pumping data not publicly accessible

Data are compiled and reviewed to comply with quality objectives. The review included the following checks:

- Removing or flagging questionable data being uploaded in the DMS. This includes identifying outliers that may have been introduced during the original data entry process and plotting each well hydrograph to identify and remove anomalous data points.
- Loading into the database and checking for errors and missing data.

Well log information is entered for selected wells, and other information will be added as it is acquired to satisfy the requirements of the SGMA regulations.

The DMS includes a publicly accessible web map hosted on the SVBGSA website accessible at <https://svbgsa.org/gsp-web-map-and-data/>. This web map allows users to visualize and interact with the data stored in the DMS. This web map provides interested parties with access to non-confidential technical information used in the development of the GSP and annual reports. It includes public well data and analysis such as water level contour maps and seawater intrusion maps, as well as various local administrative boundaries. In addition, it has functionalities to be able to graph timeseries of water levels and search for specific wells in the database. This web map is regularly updated as new information is made available to the SVBGSA.

8 SUSTAINABLE MANAGEMENT CRITERIA

This chapter defines the conditions that constitute sustainable groundwater management; and establishes minimum thresholds, measurable objectives, and undesirable results for each sustainability indicator. The minimum thresholds, measurable objectives, and undesirable results detailed in this chapter define how the Subbasin's sustainability is measured, informing the PMAs that may be needed to achieve these criteria. This chapter includes adequate data to explain how SMC were developed and how they influence all beneficial uses and users.

The chapter is structured to address all the GSP Regulations § 354.22 *et. seq* regarding SMC. To retain an organized approach, the SMC are grouped by each sustainability indicator. The discussion follows a consistent format that contains all the information required by the GSP Regulations, and as further clarified in the SMC BMP (23 California Code of Regulations § 352.22 *et seq.*; DWR, 2017).

8.1 Definitions

Key terms relevant to the SMC are repeated from the SGMA legislation and GSP Regulations below. Where there is no definition in the Regulations, additional explanatory text is added.

- **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 § 10721(x).

The 6 sustainability indicators relevant to this subbasin include chronic lowering of groundwater levels; reduction of groundwater storage; degraded water quality; land subsidence; seawater intrusion; and depletion of ISW.

- **Significant and unreasonable** is not defined in the Regulations. However, the definition of undesirable results states, “Undesirable results occur when significant and unreasonable effects ... are caused by groundwater conditions....” This GSP adopts the phrase significant and unreasonable to be the qualitative description of undesirable conditions due to inadequate groundwater management. Minimum thresholds are the quantitative measurement of the significant and unreasonable conditions.
- **Minimum threshold** refers to numeric value(s) for each sustainability indicator used to define undesirable results. Minimum thresholds are indicators of an unreasonable condition.

- **Measurable objective** refers to specific, quantifiable goal(s) 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.

Measurable objectives are goals that the GSP is designed to achieve for each sustainability indicator.

- **Interim milestone** refers to a target value representing measurable groundwater conditions, in increments of 5 years, set by an Agency as part of a Plan.

Interim milestones are targets such as groundwater elevations that will be achieved every 5 years to demonstrate progress towards sustainability.

- **Undesirable result** is not defined in the Regulations. However, the description of undesirable result states that it should be a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the subbasin. An example undesirable result is more than 15% of the measured groundwater elevations being lower than the minimum thresholds. Undesirable results should not be confused with significant and unreasonable conditions. Significant and unreasonable conditions are qualitative descriptions of conditions to be avoided; an undesirable result is a quantitative assessment based on minimum thresholds.

8.2 Sustainability Goal

The sustainability goal of the 180/400 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.

Several PMAs are included in this GSP and detailed in Chapter 9. It is not necessary to implement all projects and actions listed in this GSP to achieve sustainability. However, some combination of these will be implemented to ensure the Subbasin is operated within its sustainable yield and achieves sustainability. Chapter 10 describes the prioritized PMAs as of GSP Amendment 2. This portfolio of PMAs provide sufficient options to achieve sustainability in the 180/400 Subbasin throughout GSP implementation.

The management actions and projects are designed to achieve sustainability within 20 years by 1 or more of the following means:

- Educating stakeholders and prompting changes in behavior to improve chances of achieving sustainability.

- Increasing awareness of groundwater pumping impacts to promote voluntary reductions in groundwater use through improved water use practices or fallowing crop land.
- Increasing basin recharge, including through injections into the confined aquifers.
- Creating barriers to the expansion of seawater intrusion.
- Developing new alternative water supplies for use in the Subbasin to offset groundwater pumping.

8.3 Achieving Long-Term Sustainability

The GSP addresses long-term groundwater sustainability. Correspondingly, the SVBGSA has developed SMC to avoid undesirable results under future hydrologic conditions. The understanding of future conditions is based on historical precipitation, evapotranspiration, streamflow, and reasonable anticipated climate change, which have been estimated based on the best available climate science (DWR, 2018). These parameters underpin the estimated future water budget over the planning horizon (see Section 6.4). The average hydrologic conditions include reasonably anticipated wet and dry periods. Groundwater conditions that are the result of extreme climatic conditions and are worse than those anticipated do not constitute an undesirable result. However, SMC may be modified in the future to reflect observed future climate conditions.

The GSA tracks hydrologic conditions as an ongoing GSP implementation activity. These observed hydrologic conditions are used to develop values for average hydrologic conditions, which are compared to predicted future hydrologic conditions. This information is used to interpret the Subbasin's performance against SMC. Year-by-year micro-management is not the intent of this GSP; this GSP is developed to avoid undesirable results with long-term, deliberate groundwater management. For example, groundwater extractions may experience variations caused by reasonably anticipated hydrologic fluctuations, and GSP PMAs consider these factors.

Because the GSP addresses long-term groundwater sustainability, exceedance of some SMC during an individual year does not constitute an undesirable result by itself. 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 fall below 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.

The SMC presented in this chapter are developed based on historically observed hydrologic conditions and, in most cases, reasonably anticipated climate change. These SMC may be updated in future amendments to reflect changes in anticipated climate conditions and climate change based upon groundwater modeling results or changes in anticipated monitoring trends.

8.4 General Process for Establishing Sustainable Management Criteria

The SMC presented in this chapter were developed using publicly available information during development of the original GSP and subsequent amendments. The process has included feedback gathered during public meetings, hydrogeologic analysis, and coordination with other agencies. The general process to develop the initial SMC included:

- Presentations to the Board of Directors on the SMC requirements and implications.
- Presentations to the Advisory Committee and Subbasin Specific working groups outlining the approach to developing SMC and discussing initial SMC ideas. The Advisory Committee and working groups provided feedback and suggestions for the development of initial SMC.
- Discussions with GSA staff and various Board Members.
- Modifying minimum thresholds and measurable objectives based on input from GSA staff and Board Members.

During GSP Amendments 1 and 2, the process included:

- Presenting to the Subbasin Committee on the general SMC requirements and implications. These presentations outlined the original approach to developing SMC.
- Presenting to the Subbasin Committee on lessons learned on SMC since 2020, including DWR's review and assessment of the original 180/400 Subbasin GSP and Amendment 1, DWR's reviews of other GSPs, and legal consultation and Board direction during the development of the 2022 Salinas Valley GSPs for the SVBGSA's 5 other Subbasins. This updated GSP incorporates DWR's suggested corrective actions into the SMC where appropriate.
- Discussions on updates to the approach to SMC in the GSP Amendments and receiving feedback from the Subbasin Committees and public.
- Modifying SMC approach for the storage and ISW SMC based on input from the Subbasin Committee and Board approval of the amendments.
- Receiving public comments on the GSP Update SMC Chapter, and discussing public comments with the Subbasin Committee and Board.

- Considering the preferred portfolio of PMAs to be able to achieve SMC within SGMA timeframes.¹

8.5 Sustainable Management Criteria Summary

Table 8-1 provides a summary of the SMC for each of the 6 sustainability indicators. Measurable objectives are the goals that reflect SVBGSA's desired groundwater conditions in the Subbasin for each sustainability indicator. The measurable objectives provide operational flexibility above the minimum thresholds. The minimum thresholds are quantitative indicators of the Subbasin's locally defined significant and unreasonable conditions. An undesirable result is a combination of minimum threshold exceedances that show a significant and unreasonable condition across the Subbasin as a whole. This GSP is designed to not only avoid undesirable results, but to achieve sustainability goals within 20 years, along with interim milestones every 5 years to demonstrate progress. The preferred portfolio of management actions and projects is selected to maintain conditions above minimum thresholds or reach the measurable objectives within 20 years and maintain those conditions for 30 years for all 6 sustainability indicators. Chapter 9 also includes contingency projects to provide sufficient options for reaching and maintaining sustainability as defined by the SMC. The rationale and background for developing these criteria are described in detail in the following sections.

Minimum thresholds are selected to avoid undesirable results for other sustainability indicators, with the exception of groundwater level minimum thresholds avoiding seawater intrusion. Seawater intrusion requires projects and/or management actions to address within the SGMA timeframe, and depending on those selected and their design, seawater intrusion may not be addressed by protective groundwater elevations. The SMC presented in Table 8-1 are part of the GSA's 50-year management plan: SGMA allows for 20 years to reach sustainability and requires the Subbasin have no undesirable results for the subsequent 30 years.

¹ As projects and management actions are refined and further developed, modifications to the SMC may be necessary based on changes to the preferred portfolio of projects and management actions, and further analysis feasibility, effectiveness, and potential impacts to beneficial uses and users with changes.

Table 8-1. Sustainable Management Criteria Summary

Sustainability Indicator	Measurement	Minimum Threshold	Measurable Objective	Undesirable Result
Chronic lowering of groundwater levels	Measured through groundwater level representative monitoring well network.	Minimum thresholds are set to 1 foot above 2015 groundwater elevations. See Table 8-2.	Measurable objectives are set to 2003 groundwater elevations. See Table 8-2	More than 15% of groundwater elevation minimum thresholds are exceeded.
Reduction in groundwater storage	Measured by proxy through groundwater level representative monitoring well network.	Minimum threshold is set to 15,700 AF below the measurable objective. This reduction is based on the groundwater level and seawater intrusion minimum thresholds. This number will be refined as the groundwater level SMC for new monitoring wells are established.	Measurable objective is set to zero when the groundwater elevations are held at the groundwater level and seawater intrusion measurable objectives. Since the goal is to manage to the measurable objective, additional water in storage is needed until groundwater elevations are at their measurable objectives.	There is an exceedance of the minimum threshold.
Seawater intrusion	Seawater intrusion maps developed by MCWRA.	Minimum threshold is the 2017 extent of the 500 mg/L chloride isocontour as developed by MCWRA for the 180-Foot and 400-Foot Aquifers. The minimum threshold is the line defined by Highway 1 for the Deep Aquifers.	Measurable objective is identical to the minimum threshold for the 180-Foot and 400-Foot, and no seawater intrusion in the Deep Aquifers.	Any exceedance of the minimum threshold.
Degraded groundwater quality	Groundwater quality data downloaded annually from GAMA groundwater information system for DDW wells and requested annually from CCRWQCB for ILP wells.	Minimum threshold is zero additional exceedances of either the regulatory drinking water standards or the Basin Plan objectives for groundwater quality COC. Exceedances are only measured in public water system supply wells and ILRP on-farm domestic and irrigation supply wells. See Table 8-5. See Table 8-5	Measurable objective is identical to the minimum threshold.	Future or new minimum thresholds exceedances are caused by a direct result of extraction or GSA groundwater management action(s), including projects or management actions and regulation of groundwater extraction, unless minimum threshold exceedances are managed to provide a water supply (i.e. treated, blended, or replaced) or beneficial users are not potentially harmed.
Land subsidence	Measured using DWR provided InSAR data.	Minimum threshold is zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement to account for InSAR errors.	Measurable objective is identical to the minimum threshold, resulting in zero net long-term subsidence.	There is an exceedance of the minimum threshold for subsidence due to lowered groundwater elevations.

Sustainability Indicator	Measurement	Minimum Threshold	Measurable Objective	Undesirable Result
Depletion of ISW	Groundwater elevations in shallow wells adjacent to locations of ISW identified using the SVIHM.	Minimum thresholds are established by proxy using shallow groundwater elevations 1 foot about those observed in 2015 near locations of ISW.	Measurable objectives are established by proxy using shallow groundwater elevations observed in 2003 near locations of ISW.	There is an exceedance of the minimum threshold in a shallow groundwater monitoring well used to monitor ISW.

8.6 Chronic Lowering of Groundwater Levels SMC

8.6.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable groundwater elevations in the Subbasin are those that:

- Are at or below the observed groundwater elevations in 2015. Public and stakeholder input identified these historical groundwater elevations as significant and unreasonable.
- Cause significant financial burden to local agricultural interests
- Interfere with other sustainability indicators, with the exception of seawater intrusion, which will be addressed through PMAs rather than protective groundwater elevations

These significant and unreasonable conditions were determined during development of the original GSP.

8.6.2 Minimum Thresholds

The minimum thresholds for chronic lowering groundwater levels are set to 1 foot above 2015 groundwater elevations in this Subbasin.

The minimum threshold values for each well within the groundwater elevation representative monitoring network are provided in Table 8-2. The minimum threshold contour maps, along with the RMS well locations for the 180/400 Subbasin are shown on Figure 8-1 and Figure 8-2 for the 180-Foot and 400-Foot Aquifers, respectively. The tables and maps shown below do not include the 9 new monitoring wells SVBGSA added to the monitoring network between 2022 and 2026, after GSP Amendment 1. Once these wells have approximately 5 years of groundwater elevation measurements, SMC will be established for each and will be documented through annual reports. Minimum threshold contours for the Deep Aquifers will not be developed until SMC are established for the new monitoring wells.

As of 2020, in the 180-Foot Aquifer, groundwater elevations in 3 of the 30 RMS wells (10%) were below the minimum threshold in fall 2020 groundwater elevation measurements. In the 400-Foot Aquifer, groundwater elevations for 6 out of 44 RMS wells (14%) were below the minimum threshold, and in the Deep Aquifers 12 out of 16 RMS (75%) wells were below the minimum threshold in fall 2020. These percentages are not based on the total number of RMS per aquifer, but on those that were sampled in 2020.

Table 8-2. Chronic Lowering of Groundwater Levels Minimum Thresholds and Measurable Objectives

Monitoring Site	2020 Groundwater Elevation (feet)	Minimum Threshold (feet)	Measurable Objective (feet)
180-Foot Aquifer			
13S/02E-21Q01	1.6	-0.7	1.5
13S/02E-26L01	0.0	-2.7	0.5
14S/02E-03F04	-5.6	-8.3	-4.9
14S/02E-10P01	-15.6	-14.0	-2.6
14S/02E-11A02	-5.6	-8.0	-3.4
14S/02E-12B02	-9.6	-13.4	-4.6
14S/02E-13F03	-4.0	-7.2	-1.7
14S/02E-21L01	-3.6	-6.0	-1.0
14S/02E-26H01	-5.8	-12.3	-6.2
14S/02E-27A01	-7.0	-9.9	-3.1
14S/02E-36E01	-15.4	-18.6	-6.2
14S/03E-18C01	12.5	7.6	12.4
14S/03E-19G01	-12.5	-16.0	-3.3
14S/03E-30G08	-8.4	-12.2	-3.8
14S/03E-31F01	-9.6	-13.8	-4.6
15S/02E-12C01	-6.9	-7.2	-2.2
15S/03E-09E03	-1.2	-11.9	6.1
15S/03E-13N01	-0.2	1.2	24.0
15S/03E-16M01	0.0	-6.0	11.5
15S/03E-17M01	5.7	0.8	17.3
15S/03E-26F01	6.6	-1.8	18.8
16S/04E-05M02	29.3	12.2	41.4
16S/04E-13R02	76.4	66.1	87.5
16S/04E-15D01	50.1	32.4	60.4
16S/04E-15R02	61.4	41.3	70.6
16S/04E-25C01	76.2	58.1	82.7
16S/05E-30E01	80.1	63.6	87.9
16S/05E-32C01	83.3	67.8	79.8
17S/04E-01D01	87.0	88.4	113.4
17S/05E-06C02	79.5	72.7	99.1
400-Foot Aquifer			
12S/02E-33H02	-0.8	-3.0	3.0
13S/02E-10K01	0.0	-4.9	-3.5
13S/02E-21N01	-3.5	-3.7	-0.4
13S/02E-24N01	-2.0	-7.0	0.0
13S/02E-27P01	-19.7	-35.7	-12.0
13S/02E-31N02	0.3	-2.9	1.7
13S/02E-32J03	-5.5	-10.4	-3.2
14S/02E-03F03	-16.0	-17.2	-9.4
14S/02E-05K01	1.6	-11.3	3.1
14S/02E-08M02	-2.2	-5.0	-1.0
14S/02E-11A04	-23.4	-21.8	-14.2

Monitoring Site	2020 Groundwater Elevation (feet)	Minimum Threshold (feet)	Measurable Objective (feet)
14S/02E-11M03	-17.9	-23.9	-13.9
14S/02E-12B03	-30.6	-30.2	-20.9
14S/02E-12Q01	-4.0	-6.7	-1.7
14S/02E-15K01	-6.5	-26.3	-3.2
14S/02E-16A02	-12.8	-17.9	-6.2
14S/02E-23A02	-23.2	-25.0	-20.0
14S/02E-34A03	-9.2	-8.2	-3.3
14S/02E-36G01	-14.9	-18.8	-5.2
14S/03E-18C02	-17.0	-19.7	-12.5
14S/03E-19C51	-31.3	-29.4	-20.4
14S/03E-20C01	-42.5	-41.0	-35.0
14S/03E-29F03	-13.9	-16.9	-5.9
14S/03E-31L01	-9.4	-9.0	-3.0
15S/02E-01A03	-15.8	-18.4	-3.8
15S/02E-02G01	-17.1	-22.1	-5.3
15S/02E-12A01	-10.1	-13.4	-1.0
15S/03E-03R02	-9.0	-17.0	-1.0
15S/03E-04Q01	-4.4	-9.4	1.6
15S/03E-05C02	-20.3	-20.3	-9.3
15S/03E-08F01	-18.5	-20.9	-8.3
15S/03E-14P02	0.3	-3.8	16.3
15S/03E-15B01	1.5	-7.1	12.8
15S/03E-16F02	-0.6	-6.5	5.0
15S/03E-17P02	1.3	-7.7	7.3
15S/03E-26A01	5.2	-4.5	15.0
15S/03E-28B02	16.1	-0.5	15.0
15S/04E-29Q02	24.0	12.4	40.5
15S/04E-31A02	25.2	11.1	36.0
16S/04E-04C01	33.2	10.5	46.0
16S/04E-08H03	43.9	26.1	55.8
16S/04E-10R02	50.3	36.0	62.5
16S/04E-25G01	71.9	52.9	78.0
16S/05E-30J02	84.5	68.7	92.2
	Deep Aquifers		
13S/01E-36J02	-9.1	-4.2	2.0
13S/02E-19Q03	-8.4	-2.4	6.3
13S/02E-28L03	-34.3	-20.4	-15.4
13S/02E-32E05	-14.8	-9.2	1.6
14S/02E-06L01	-11.5	-7.2	3.0
14S/02E-20E01	-32.3	-23.7	-18.7
14S/02E-22A03	-104.3	-45.1	-40.1
14S/02E-07J03	-13.8	-9.5	-4.5
14S/02E-14R02	-29.9	-30.8	-25.8
14S/02E-21K04	-36.3	-44.4	-39.4
14S/02E-23J02	-40.9	-42.2	-37.2

Monitoring Site	2020 Groundwater Elevation (feet)	Minimum Threshold (feet)	Measurable Objective (feet)
14S/02E-25A03	0.0	-31.5	-26.5
14S/02E-26G01	-35.4	-31.3	-26.3
14S/02E-27K02	-39.3	-33.8	-28.8
14S/02E-28H04	-71.7	-58.0	-43.0
14S/02E-35B01	-34.6	-28.8	-23.8
14S/03E-19C01	-48.6	-51.7	-46.7

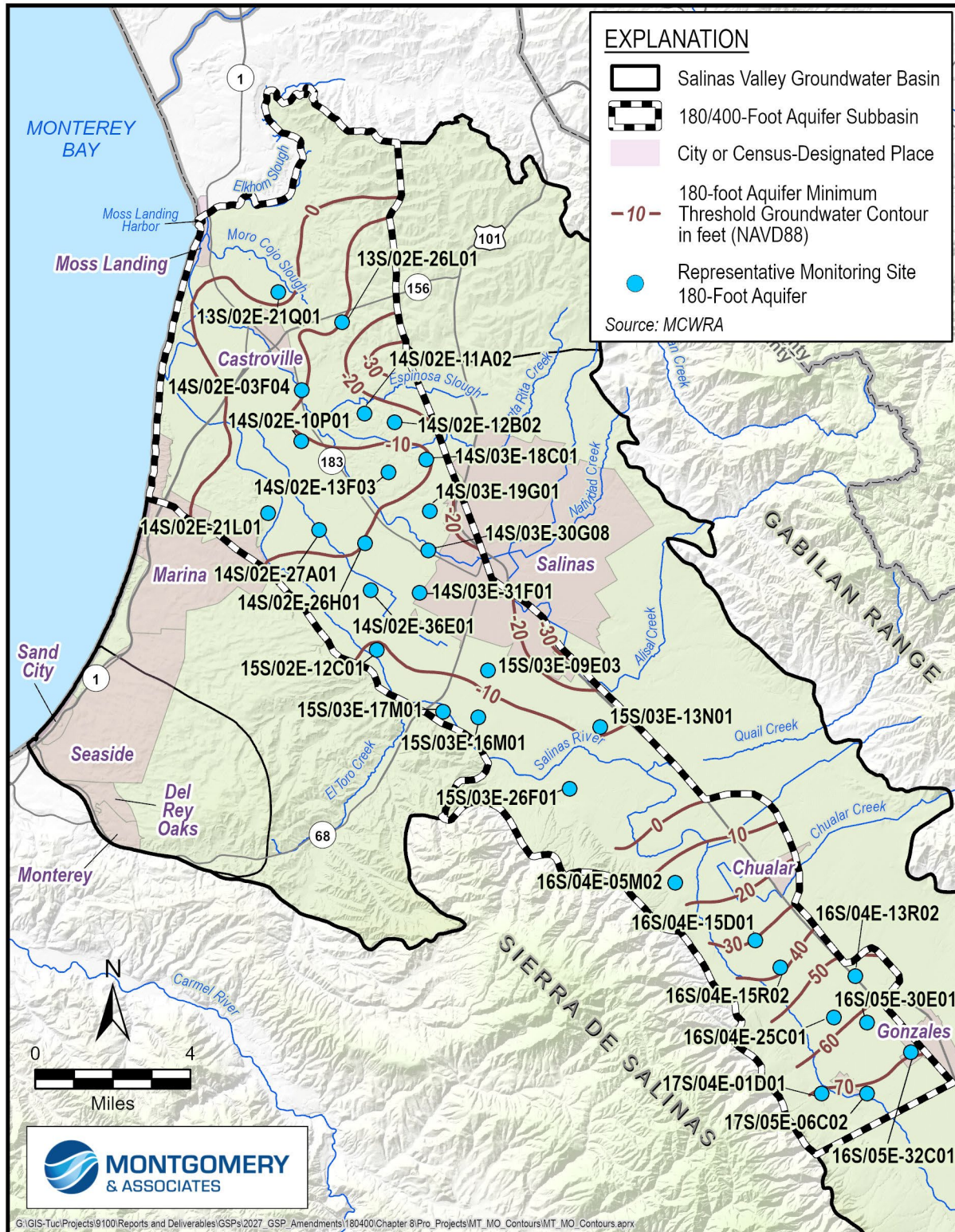


Figure 8-1. Groundwater Elevation Minimum Threshold Contour Map for the 180-Foot Aquifer

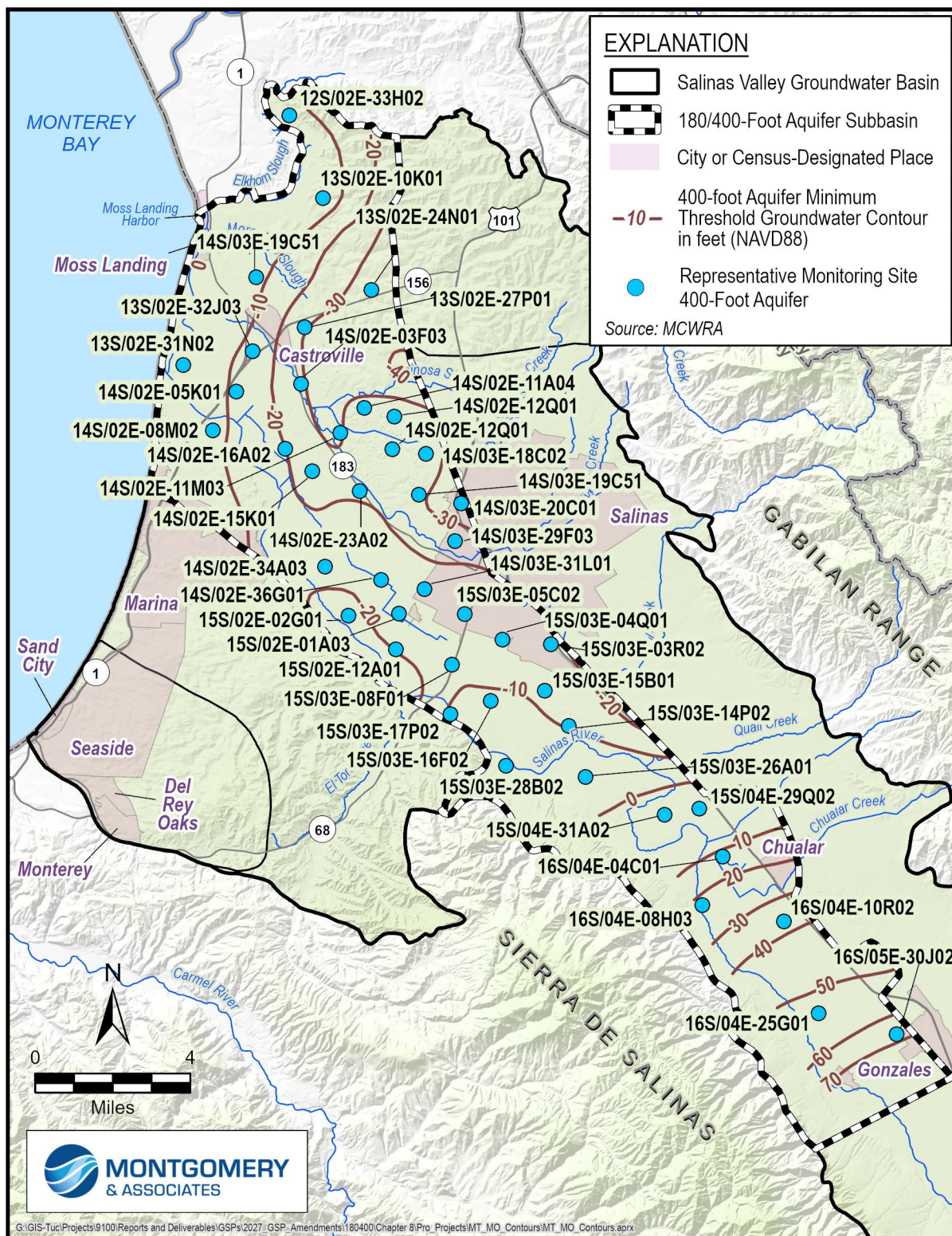


Figure 8-2. Groundwater Elevation Minimum Threshold Contour Map for the 400-Foot Aquifer

8.6.2.1 Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives

The development of both minimum thresholds and measurable objectives followed similar processes and are described in this section. The information used includes:

- Feedback from discussions with the Subbasin Committee on challenges and goals
- Historical groundwater elevation data and hydrographs from wells monitored by the MCWRA
- Maps of current and historical groundwater elevation data
- Analysis of the impact of groundwater elevations on domestic wells
- The general steps for developing minimum thresholds and measurable objectives during development of the original GSP included the following:
 1. SVBGSA presented options to the Subbasin Committee and recommended an approach and criteria to set the groundwater level minimum thresholds and measurable objectives, which was approved by the Board through GSP adoption.
 2. SVBGSA used MCWRA's average groundwater elevation change hydrographs to select representative years that could define minimum thresholds and measurable objectives for the Subbasin. Groundwater elevations like those experienced during the representative climatic cycle between 1967 and 1998 were used to identify minimum thresholds and measurable objectives to ensure that they were achievable under reasonably expected climatic conditions. This representative period corresponds to important water management milestones for the Salinas Valley; water year 1967 marks the beginning of operations at San Antonio Reservoir, with first water releases in November 1966. The Castroville Seawater Intrusion Project (CSIP) began operating in 1998.

The average groundwater elevation change hydrograph with preliminary minimum threshold and measurable objectives lines for the 180/400 Subbasin are shown on Figure 8-3. The average 2015 groundwater elevations in the 180/400 Subbasin are considered significant and unreasonable. When looking at the groundwater elevation changes within the representative climatic cycle, the historical lowest elevations occurred in 1991, at approximately 1 foot higher than 2015 elevations. The minimum thresholds were therefore set 1 foot above the 2015 groundwater elevations. The measurable objective is set to 2003 groundwater elevations, which is an achievable goal for the Subbasin under reasonably expected climatic conditions.

3. SVBGSA identified the appropriate minimum thresholds and measurable objectives on the respective monitoring well hydrographs. Each hydrograph was visually

inspected to check if the minimum threshold and measurable objective was reasonable. If an RMS did not have measurements from the minimum threshold or measurable objective years, the SMC were estimated using the hydrographs. Moreover, if the SMC seemed unreasonable for an RMS, they were adjusted based on historic water levels. The interpolated or adjusted minimum thresholds and measurable objectives are indicated by an asterisk in Table 8-2.

Hydrographs with well completion information showing minimum thresholds for each RMS are included in Appendix 8A.

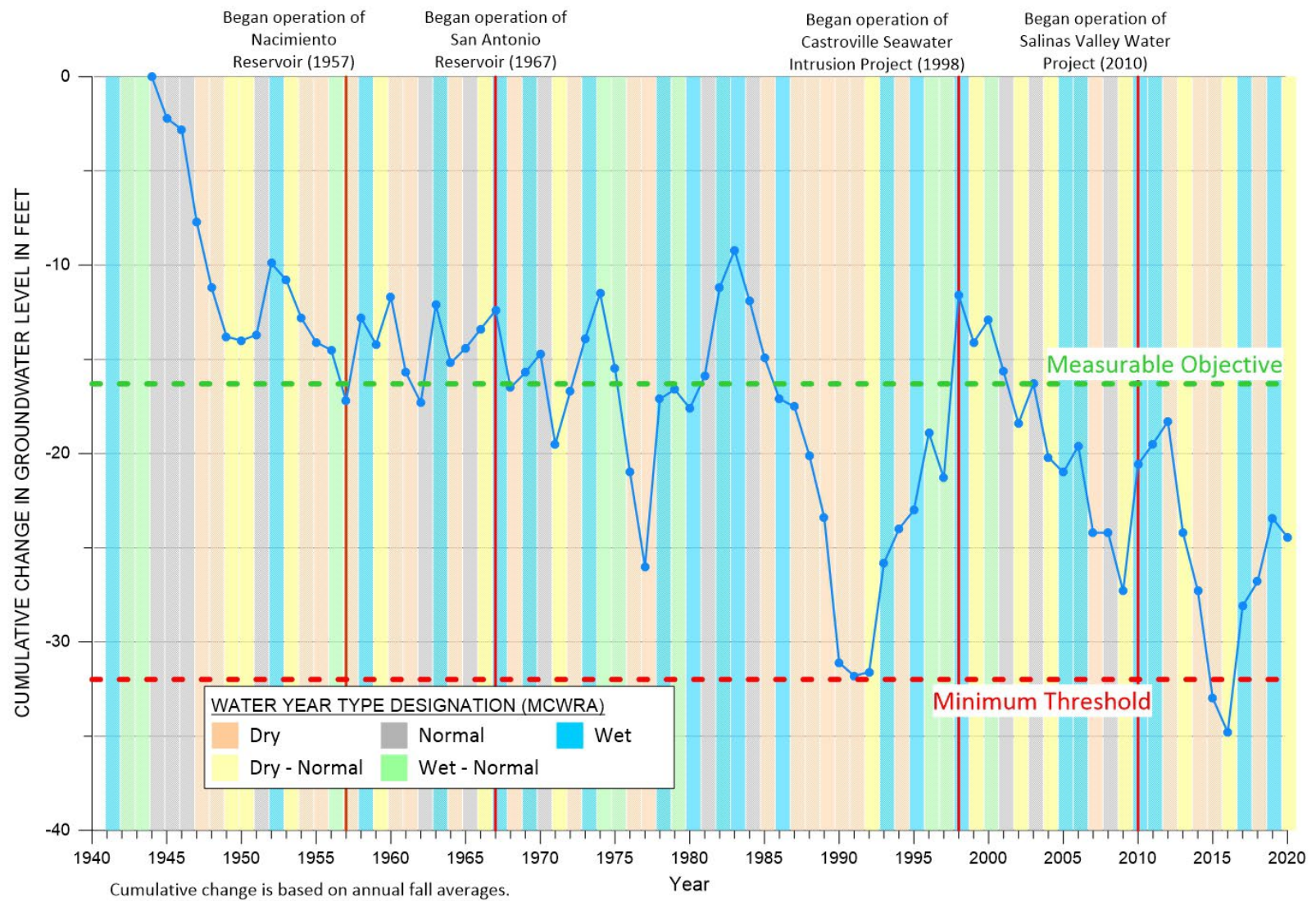


Figure 8-3. Cumulative Groundwater Elevation Change Hydrograph with Selected Measurable Objective and Minimum Threshold for the 180/400 Subbasin

8.6.2.2 Minimum Thresholds Impact on Domestic Wells

To address the human right to water, minimum thresholds for groundwater elevations are compared to the range of domestic well depths in the Subbasin using DWR's OSWCR database. This check was done to assure that the minimum thresholds maintain operability in a reasonable percentage of domestic wells. The proposed minimum thresholds for groundwater levels do not necessarily protect all domestic wells because it is impractical to manage a groundwater basin in a manner that fully protects the shallowest wells. However, domestic wells are an important beneficial user. Well completion reports that were reported as domestic were included; however, some may support multiple households.

The OSWCR database is used to check that most domestic wells are covered by the groundwater level monitoring network. Wells drilled in the shallow sediments above the Salinas Valley Aquitard may not be covered because the shallow sediments are not a principal aquifer. The average computed depth of domestic wells in the Subbasin is 362 feet using the Public Land Survey System sections data in the OSWCR database. The sections were screened for those with domestic wells below 100 feet, since wells deeper than 100 feet are likely drilled in the 180-Foot Aquifer. Only 1.4% of the domestic wells in the Subbasin (10 out of the 691 wells) are likely drilled into the shallow sediments above the Aquitard. The remaining 98.6% of domestic wells are likely covered by the monitoring network because they are either drilled into a principal aquifer or drilled in an area where the Salinas Valley Aquitard likely is not present, such as the northern area of the Subbasin where most domestic wells are located.

Some adjustments to the analysis in the original GSP have been made to improve the accuracy of the analysis. Considerations included:

- The OSWCR database may include wells that have been abandoned, destroyed, or replaced, such as if the user switched to a water system, and abandoned or destroyed wells would have no detrimental impacts from lowered groundwater levels.
- Well registration under the GMP further informs the analysis.
- Only wells likely to be in the principal aquifers were considered; the 1.4% domestic wells may draw water from shallow, perched groundwater are not included.
- Only wells that had accurate locations were included, since some wells in the OSWCR database are not accurately located, it could lead to inaccurate estimations of depth to water in the wells.
- The depth to water is derived from a smoothly interpolated groundwater elevation contour map. So only wells that fall within the contoured portion of the Subbasin were used in the analysis. Additionally, errors in the map may result in errors in groundwater elevation at the selected domestic wells.

Given the limitations listed above, the analysis of minimum threshold impacts on domestic wells included 14 wells with accurate locations out of the total 294 OSWCR domestic wells in the 180-Foot and 400-Foot Aquifers. The analysis showed that 83% of domestic wells in the 180-Foot Aquifer have at least 25 feet of water in them as long as groundwater elevations remain above minimum thresholds; and all domestic wells in the 180-Foot Aquifer will have at least 25 feet of water in them when measurable objectives are achieved. In the 400-Foot Aquifer, 88% of domestic wells will have at least 25 feet of water in them if groundwater elevations remain above minimum thresholds and when measurable objectives are achieved. These percentages were considered reasonable given the limitations listed above.

An additional analysis was completed using MCWRA well database, which includes 64 active domestic wells. Of these, 27 wells (9 in the 180-Foot Aquifer and 18 in the 400-Foot Aquifer) had construction information and were used to compare to the minimum thresholds. All 27 domestic wells will have at least 25 feet of water in them as long as groundwater elevations remain above minimum thresholds; and will also have at least 25 feet of water in them when measurable objectives are achieved. If more wells with construction information are registered, the assessment may be redone.

For both sets of domestic wells used for the analysis, the depth to water is derived from a smoothly interpolated groundwater elevation contour map and a digital elevation model of land surface elevation. Such regional interpolation maps are the best estimate of the groundwater elevations between measured points in the subbasin; however, site-specific groundwater elevations may not match precisely. Uncertainty in the regional map may result in discrepancies in groundwater elevations at the selected domestic wells.

8.6.2.3 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

SVBGSA compared minimum thresholds between RMS to understand the relationship between RMS wells (i.e., describe why or how a groundwater level minimum threshold set at a particular RMS is similar to or different from groundwater level thresholds in nearby RMS). The groundwater elevation minimum thresholds are derived from historical and/or smoothly interpolated groundwater elevations in the Subbasin. Therefore, the minimum thresholds are unique at every well, but when combined represent a reasonable and potentially realistic groundwater elevation map. Because the underlying groundwater elevation map is a reasonably achievable condition, the individual minimum thresholds at RMS wells do not conflict with each other.

Groundwater level minimum thresholds are set to avoid undesirable results for other sustainability indicators, with the exception of seawater intrusion. Seawater intrusion requires projects and/or management actions to address within the SGMA timeframe, and depending on those selected and their design, seawater intrusion may not be addressed by protective

groundwater elevations. Relationships between groundwater level minimum thresholds and the other sustainability indicators are:

- **Reduction in groundwater storage.** The chronic lowering of groundwater levels minimum thresholds are identical to the groundwater storage minimum thresholds. Thus, the groundwater level minimum thresholds will not result in an undesirable loss of groundwater storage.
- **Seawater intrusion.** The chronic lowering of groundwater level minimum thresholds are set above historical lows. Therefore, the groundwater elevation minimum thresholds are not set to prevent additional seawater intrusion. Seawater intrusion may be mitigated by either lowering groundwater elevations near the coast to capture seawater intrusion or raising groundwater elevations inland of the intrusion to drive seawater intrusion towards the coast. PMAs may result in lower or higher groundwater elevations to manage seawater intrusion depending on the type of project. The groundwater elevation minimum threshold was not set to solve seawater intrusion in this GSP, but rather to not exacerbate seawater intrusion, without intervention. This relationship may need to be re-evaluated during the next phase of project and management action development.
- **Degraded water quality.** The chronic lowering of groundwater levels minimum threshold could affect groundwater quality through 2 processes:
 1. Changes in groundwater elevation could change groundwater gradients, which could cause poor quality groundwater to flow toward production and domestic wells that would not have otherwise been impacted. These groundwater gradients, however, are only dependent on differences between groundwater elevations, not on the groundwater elevations themselves. Therefore, the minimum threshold groundwater elevations do not directly lead to a significant and unreasonable degradation of groundwater quality in production and domestic wells.
 2. Decreasing groundwater elevations may mobilize COC that are concentrated at depth, such as arsenic. The groundwater level minimum thresholds are near or above historical lows at the start of SGMA. Therefore, any depth-dependent constituents have previously been mobilized by historical groundwater levels. Maintaining groundwater elevations above the minimum thresholds is intended to assure that no new depth dependent COC are mobilized, and are therefore protective of beneficial uses and users.
- **Land subsidence.** The chronic lowering of groundwater levels minimum thresholds are set at or above recent low groundwater elevations. Thus, they are set at levels that will not induce the dewatering and compaction of clay-rich sediments that causes subsidence in response to lowering groundwater elevations. Where groundwater

levels are consistently below minimum thresholds, such as in the Deep Aquifers, land subsidence is a risk.

- **Depletion of ISW.** The chronic lowering of groundwater levels minimum thresholds are identical to the ISW minimum thresholds. Therefore, the groundwater level minimum thresholds will not result in a significant or unreasonable depletion of ISW.

8.6.2.4 Effect of Minimum Thresholds on Neighboring Basins and Subbasins

The 180/400 Subbasin has 4 neighboring subbasins within the Salinas Valley:

- The Langley Subbasin to the north
- The Eastside Subbasin to the east
- The Forebay Subbasin to the south
- The Monterey Subbasin to the southwest

The SVBGSA is either the exclusive GSA or is one of the coordinating GSAs for all adjacent Subbasins. Because SVBGSA's jurisdiction includes all these subbasins, the SVBGSA coordinates the development of the minimum thresholds and measurable objectives for all these subbasins. The 180/400 Subbasin GSP was submitted in 2020, was approved in 2022, and GSP Amendment 1 was submitted in 2025. GSPs for the other Salinas Valley subbasins were submitted in 2022 and approved in 2023. Amendments for all Salinas Valley subbasins have been developed together for submittal in 2027. Minimum thresholds for this Subbasin have been reviewed relative to information developed for the neighboring subbasins' GSPs to ensure that these minimum thresholds will not prevent the neighboring subbasins from achieving sustainability. SVBGSA GSPs have been developed with consistent methods and SMC.

SVBGSA and MCWDGSA have coordinated closely in developing and implementing the GSPs for the 180/400 and Monterey Subbasins. While SVBGSA and MCWDGSA have identified slightly different groundwater level minimum thresholds for the same aquifers, the groundwater levels across the boundary in the Monterey Subbasin are closely monitored to ensure both subbasins' minimum thresholds are met. Data development and management will continue to be a part of a collaborative relationship during implementation to ensure both subbasins reach sustainability.

The Pajaro Valley Basin lies directly to the north of the Subbasin. Because the minimum thresholds in the 180/400 Subbasin are above historical low groundwater elevations, it is likely that the minimum thresholds will not prevent the Pajaro Basin from achieving and maintaining sustainability. The SVBGSA will coordinate closely with the Pajaro Valley Water Agency to ensure that the basins do not prevent each other from achieving sustainability.

8.6.2.5 Effects on Beneficial Users and Land Uses

The groundwater level minimum thresholds may have several effects on beneficial users and land uses in the Subbasin.

Agricultural land uses and users. The groundwater elevation minimum thresholds prevent continued lowering of groundwater elevations in the Subbasin. Unless sufficient PMAs are undertaken, this may have the effect of limiting the amount of groundwater pumping in the Subbasin and the amount and type of crops that can be grown in the Subbasin. The groundwater elevation minimum thresholds could therefore limit expansion of the Subbasin's agricultural economy. This could have various effects on beneficial users and land uses:

- Agricultural land currently under irrigation may become more valuable as bringing new lands into irrigation becomes more difficult and expensive.
- Agricultural land not currently under irrigation may become less valuable or converted to another land use because it may be too difficult and expensive to irrigate.
- Keeping groundwater elevations above historical lows will help prevent greater electricity demand associated with pumping at lower elevations.

Urban land uses and users. The groundwater level minimum thresholds may reduce the amount of groundwater pumping in the Subbasin. This may limit urban growth, or result in urban areas obtaining alternative sources of water. This may result in higher water costs for public drinking water systems. Keeping groundwater elevations above historical lows will help prevent greater electricity demand associated with pumping at lower elevations.

Domestic land uses and users. The groundwater level minimum thresholds are intended to protect most domestic wells, including small local system wells. Therefore, the minimum thresholds will likely have an overall beneficial effect on existing domestic land uses by protecting the ability to pump from domestic wells. However, domestic wells may become dry if they are shallow, groundwater elevations in their vicinity are very low, or pump capacity is low, which may require deeper wells, higher capacity pumps, or joining a water system, if capacity is available. Maintaining groundwater levels above historical lows also helps prevent problems associated with elevations below well screens, such as mechanical damage to wells such as cavitation, reduced pump efficiency, and microbial growth.

Ecological land uses and users. The groundwater level minimum thresholds may limit the amount of groundwater pumping in the Subbasin and may limit both urban and agricultural growth. This outcome may benefit ecological land uses and users by curtailing the conversion of native vegetation to agricultural or domestic uses, and by reducing pressure on existing ecological land caused by declining groundwater elevations. Maintaining groundwater levels

above historical lows helps protect GDEs whose rooting depths may be exceeded at deeper levels.

8.6.2.6 Relevant Federal, State, or Local Standards

No federal, state, or local standards exist for chronic lowering of groundwater levels.

8.6.2.7 Method for Quantitative Measurement of Minimum Thresholds

Groundwater level minimum thresholds will be directly measured from the representative monitoring well network. The groundwater elevation monitoring will be conducted in accordance with the monitoring plan outlined in Chapter 7. Furthermore, the groundwater elevation monitoring will meet the requirements of the technical and reporting standards included in the GSP Regulations.

As noted in Chapter 7, the current groundwater elevation representative monitoring network in the Subbasin includes 92 wells with SMC. Remaining data gaps are identified in Chapter 7 and will continue to be resolved during implementation of this GSP.

8.6.3 Measurable Objectives

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.

The measurable objectives for the chronic lowering of groundwater levels are set to 2003 groundwater elevations.

The measurable objectives are summarized in Table 8-2 and are also shown on the hydrographs for each RMS in Appendix 5A.

8.6.3.1 Methodology for Setting Measurable Objectives

The methodology for establishing measurable objectives is described in detail in Section 8.6.2.1. A year from the relatively recent past was selected for setting measurable objectives to ensure that objectives are achievable. Figure 8-3 shows that there was a slow downward trend in average groundwater elevations through 2003. Since 2003, water elevations have consistently decreased at a more rapid rate. Groundwater elevations from 2003 were selected as representative of the measurable objectives for the 180/400 Subbasin. The measurable objective contour maps for the 180/400 Subbasin along with the representative monitoring network wells are shown on Figure 8-4 and Figure 8-5 for the 180-Foot and 400-Foot Aquifers, respectively. Measurable objective contours for the Deep Aquifers will not be developed until SMC are established for the new monitoring wells.

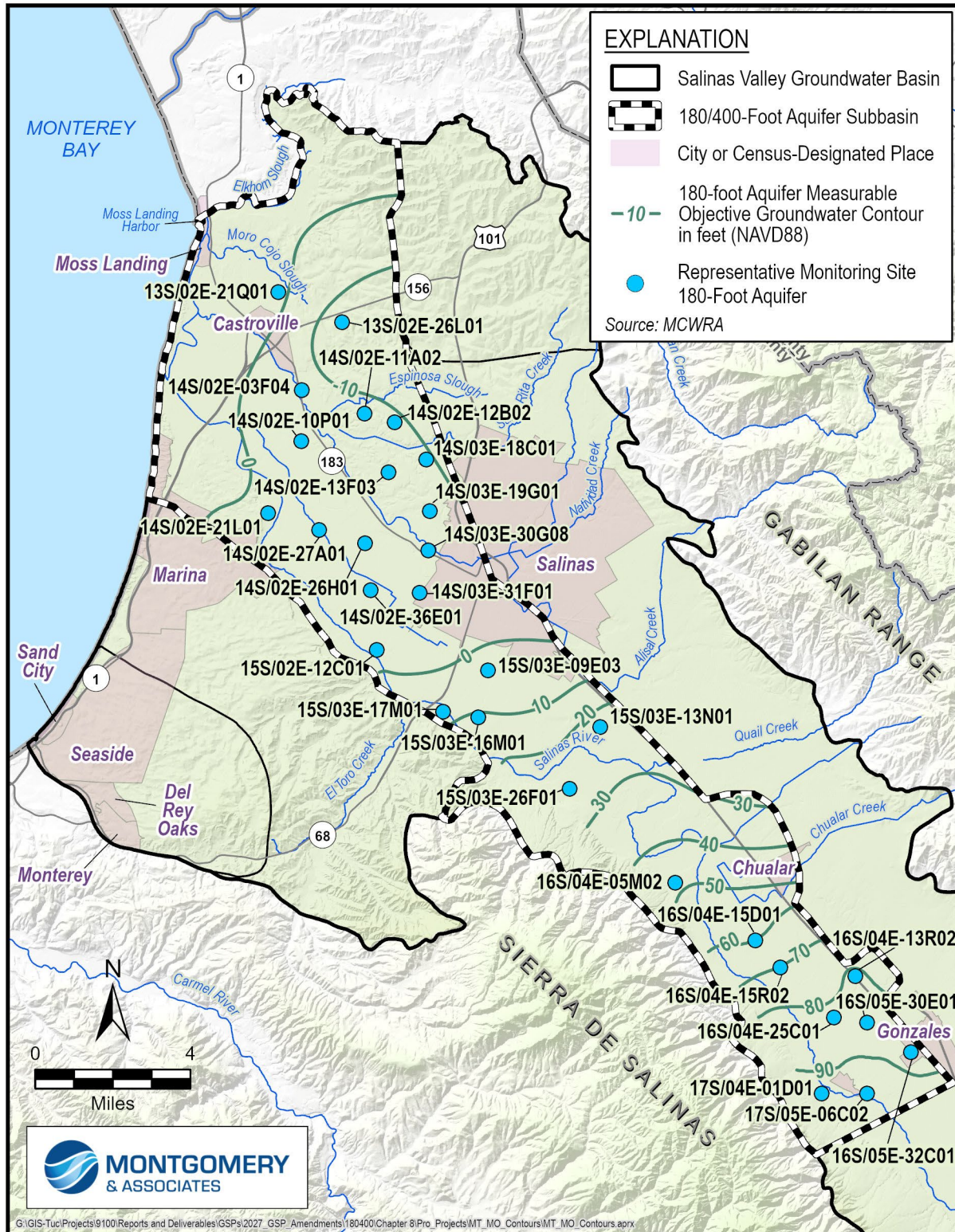


Figure 8-4. Groundwater Elevation Measurable Objective Contour Map for the 180-Footer Aquifer

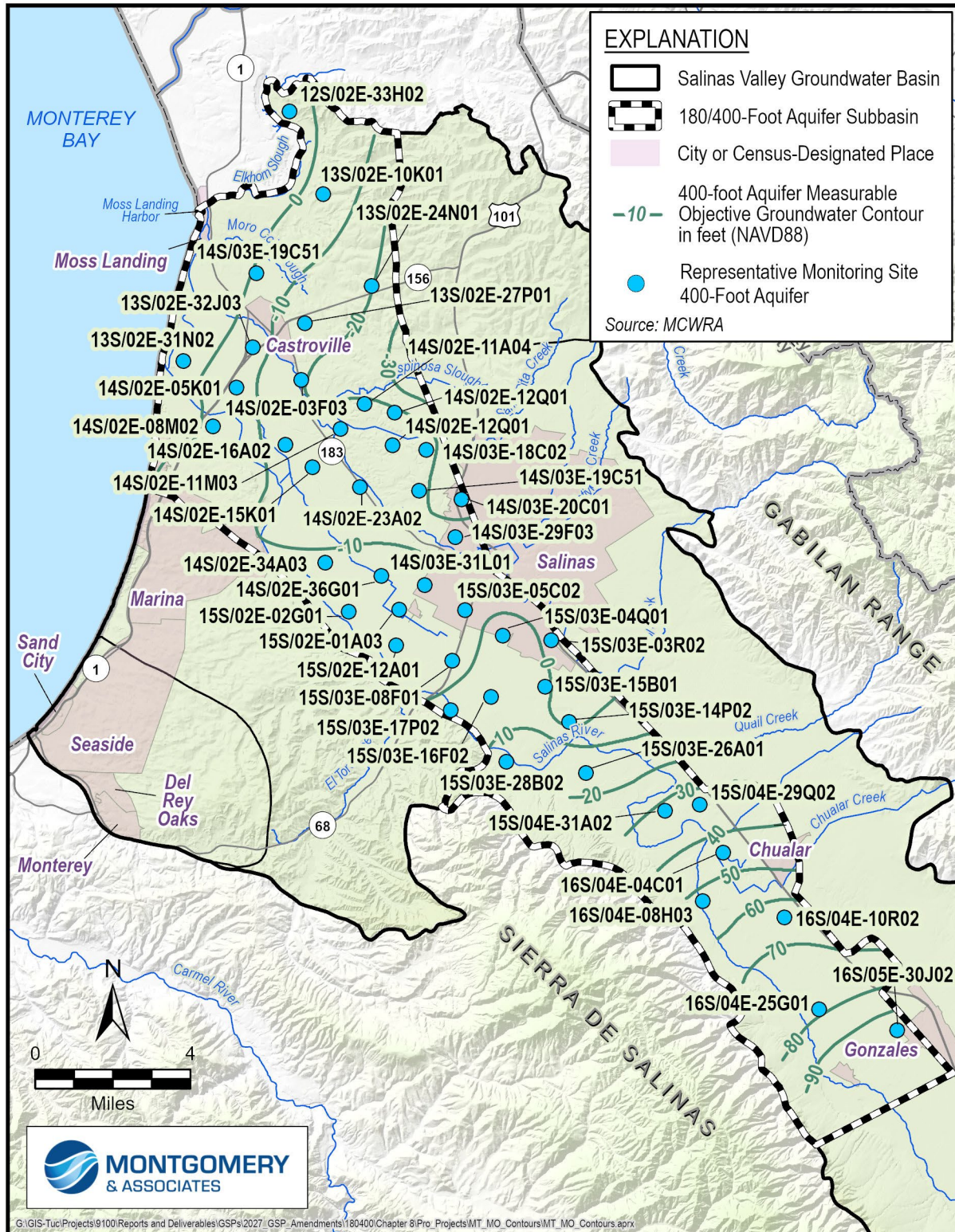


Figure 8-5. Groundwater Elevation Measurable Objective Contour Map for the 400-Footer Aquifer

8.6.3.2 Interim Milestones

Interim milestones for groundwater elevations are shown in Table 8-3. These are only initial estimates of interim milestones. Interim milestones for groundwater levels will be modified as better data, analyses, and project designs become available.

Table 8-3. Chronic Lowering of Groundwater Levels Interim Milestones

Monitoring Site	Current (2020) Groundwater Elevation (feet)	Interim Milestone at Year 2025 (feet)	Interim Milestone at Year 2030 (feet)	Interim Milestone at Year 2035 (feet)	Measurable Objective (feet) (goal to reach at 2040)
180-Foot Aquifer					
13S/02E-21Q01	1.6	1.6	1.5	1.5	1.5
13S/02E-26L01	0.0	0.0	-0.4	-0.1	0.5
14S/02E-03F04	-5.6	-5.6	-5.4	-5.3	-4.9
14S/02E-10P01	-15.6	-15.6	-12.6	-9.3	-2.6
14S/02E-11A02	-5.6	-5.6	-4.2	-3.6	-3.4
14S/02E-12B02	-9.6	-9.6	-5.5	-4.1	-4.6
14S/02E-13F03	-4.0	-4.0	-5.5	-5.0	-1.7
14S/02E-21L01	-3.6	-3.6	-3.0	-2.5	-1.0
14S/02E-26H01	-5.8	-5.8	-8.7	-7.9	-6.2
14S/02E-27A01	-7.0	-7.0	-6.3	-5.2	-3.1
14S/02E-36E01	-15.4	-15.4	-8.9	-6.6	-6.2
14S/03E-18C01	12.5	12.5	12.0	12.1	12.4
14S/03E-19G01	-12.5	-12.5	-10.1	-7.8	-3.3
14S/03E-30G08	-8.4	-8.4	-6.8	-5.6	-3.8
14S/03E-31F01	-9.6	-9.6	-3.2	-1.9	-4.6
15S/02E-12C01	-6.9	-6.9	-5.7	-4.8	-2.2
15S/03E-09E03	-1.2	-1.2	-0.1	1.8	6.1
15S/03E-13N01	-0.2	-0.2	3.9	9.9	24.0
15S/03E-16M01	0.0	0.0	5.6	7.6	11.5
15S/03E-17M01	5.7	5.7	6.3	8.1	17.3
15S/03E-26F01	6.6	6.6	11.4	14.4	18.8
16S/04E-05M02	29.3	29.3	32.3	34.6	41.4
16S/04E-13R02	76.4	76.4	79.2	81.3	87.5
16S/04E-15D01	50.1	50.1	52.7	54.6	60.4
16S/04E-15R02	61.4	61.4	62.7	64.7	70.6
16S/04E-25C01	76.2	76.2	77.7	79.4	82.7
16S/05E-30E01	80.1	80.1	82.1	83.5	87.9
16S/05E-32C01	83.3	83.3	82.4	81.6	79.8
17S/04E-01D01	87.0	87.0	93.1	99.7	113.4
17S/05E-06C02	79.5	79.5	87.2	92.1	99.1
400-Foot Aquifer					
12S/02E-33H02	-0.8	0.2	0.9	1.4	3.0
13S/02E-10K01	0.0	-5.4	-4.9	-4.6	-3.5
13S/02E-21N01	-3.5	-2.7	-2.0	-1.2	-0.4
13S/02E-24N01	-2.0	-1.5	-1.0	-0.5	0.0

Monitoring Site	Current (2020) Groundwater Elevation (feet)	Interim Milestone at Year 2025 (feet)	Interim Milestone at Year 2030 (feet)	Interim Milestone at Year 2035 (feet)	Measurable Objective (feet) (goal to reach at 2040)
13S/02E-27P01	-19.7	-17.8	-15.9	-13.9	-12.0
13S/02E-31N02	0.3	0.7	1.0	1.4	1.7
13S/02E-32J03	-5.5	-4.9	-4.4	-3.8	-3.2
14S/02E-03F03	-16.0	-13.9	-12.2	-10.6	-9.4
14S/02E-05K01	1.6	-2.1	-1.8	-1.4	3.1
14S/02E-08M02	-2.2	-2.7	-2.1	-1.6	-1.0
14S/02E-11A04	-23.4	-20.4	-18.1	-15.8	-14.2
14S/02E-11M03	-17.9	-20.6	-19.6	-18.6	-13.9
14S/02E-12B03	-30.6	-25.5	-23.1	-20.6	-20.9
14S/02E-12Q01	-4.0	-3.4	-3.0	-2.7	-1.7
14S/02E-15K01	-6.5	-10.0	-7.8	-5.5	-3.2
14S/02E-16A02	-12.8	-9.6	-7.9	-6.3	-6.2
14S/02E-23A02	-23.2	-23.3	-22.2	-21.1	-20.0
14S/02E-34A03	-9.2	-9.2	-7.8	-6.3	-3.3
14S/02E-36G01	-14.9	-10.0	-7.6	-5.1	-5.2
14S/03E-18C02	-17.0	-16.9	-15.4	-14.0	-12.5
14S/03E-19C51	-31.3	-28.6	-25.8	-23.1	-20.4
14S/03E-20C01	-42.5	-39.5	-38.0	-36.5	-35.0
14S/03E-29F03	-13.9	-21.0	-19.0	-17.0	-5.9
14S/03E-31L01	-9.4	-7.5	-6.0	-4.5	-3.0
15S/02E-01A03	-15.8	-9.9	-6.9	-3.9	-3.8
15S/02E-02G01	-17.1	-11.3	-8.3	-5.4	-5.3
15S/02E-12A01	-10.1	-8.1	-5.9	-3.6	-1.0
15S/03E-03R02	-9.0	-6.3	-4.5	-2.8	-1.0
15S/03E-04Q01	-4.4	-4.5	-3.0	-1.5	1.6
15S/03E-05C02	-20.3	-13.3	-10.5	-7.8	-9.3
15S/03E-08F01	-18.5	-12.9	-10.3	-7.8	-8.3
15S/03E-14P02	0.3	4.8	8.8	12.8	16.3
15S/03E-15B01	1.5	4.8	7.7	10.5	12.8
15S/03E-16F02	-0.6	1.6	2.7	3.9	5.0
15S/03E-17P02	1.3	-6.5	-5.0	-3.5	7.3
15S/03E-26A01	5.2	7.6	10.1	12.5	15.0
15S/03E-28B02	16.1	6.8	9.5	12.3	15.0
15S/04E-29Q02	24.0	28.3	32.5	36.6	40.5
15S/04E-31A02	25.2	30.6	33.3	36.0	36.0
16S/04E-04C01	33.2	36.4	38.8	40.6	46.0
16S/04E-08H03	43.9	47.3	50.2	53.2	55.8
16S/04E-10R02	50.3	52.8	55.8	58.9	62.5
16S/04E-25G01	71.9	74.8	76.4	77.9	78.0
16S/05E-30J02	84.5	86.1	88.1	90.0	92.2
Deep Aquifers					
13S/01E-36J02	-9.6	-6.7	-3.8	-0.9	2.0*
13S/01E-36J02	-9.1	-6.7	-3.8	-0.9	2.0

Monitoring Site	Current (2020) Groundwater Elevation (feet)	Interim Milestone at Year 2025 (feet)	Interim Milestone at Year 2030 (feet)	Interim Milestone at Year 2035 (feet)	Measurable Objective (feet) (goal to reach at 2040)
13S/02E-19Q03	-8.4	-5.1	-1.3	2.5	6.3
13S/02E-28L03	-34.3	-29.6	-24.9	-20.1	-15.4
13S/02E-32E05	-14.8	-10.6	-6.6	-2.5	1.6
14S/02E-06L01	-11.5	-10.3	-5.9	-1.4	3.0
14S/02E-20E01	-32.3	-26.1	-23.7	-21.2	-18.7
14S/02E-22A03	-104.3	-87.4	-71.7	-55.9	-40.1
14S/02E-07J03	-13.8	-15.2	-11.6	-8.1	-4.5
14S/02E-14R02	-29.9	-35.1	-32.0	-28.9	-25.8
14S/02E-21K04	-36.3	-47.1	-44.6	-42.0	-39.4
14S/02E-23J02	-40.9	-46.8	-43.6	-40.4	-37.2
14S/02E-25A03	0.0	-37.0	-33.5	-30.0	-26.5
14S/02E-26G01	-35.4	-36.2	-32.9	-29.6	-26.3
14S/02E-27K02	-39.3	-38.3	-35.1	-31.9	-28.8
14S/02E-28H04	-71.7	-67.6	-59.4	-51.2	-43.0
14S/02E-35B01	-34.6	-34.5	-30.9	-27.4	-23.8
14S/03E-19C01	-48.6	-57.2	-53.7	-50.2	-46.7

8.6.4 Undesirable Result

8.6.4.1 Criteria for Defining Chronic Lowering of Groundwater Levels Undesirable Result

The chronic lowering of groundwater levels undesirable result is a quantitative combination of groundwater level minimum threshold exceedances. The undesirable result is:

More than 15% of the groundwater elevation minimum thresholds are exceeded in any single aquifer.

Since the GSP addresses long-term groundwater sustainability, exceedances of groundwater levels minimum thresholds during a drought do not constitute an undesirable result. 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 droughts, and do not constitute an undesirable result, as long as groundwater levels rebound.

Undesirable results provide flexibility in defining sustainability. Increasing the percentage of allowed minimum threshold exceedances provides more flexibility but may lead to significant and unreasonable conditions for some beneficial users. Reducing the percentage of allowed minimum threshold exceedances ensures strict adherence to minimum thresholds but reduces

flexibility due to unanticipated hydrogeologic conditions. The undesirable result was set at 15% to balance the interests of beneficial users with the practical aspects of groundwater management under uncertainty.

Based on the RMS wells that have SMC as of GSP Amendment 2, the 15% limit on minimum threshold exceedances in the undesirable result allows for 5 exceedances in the 180-Foot Aquifer, 7 exceedances in the 400-Foot Aquifer, and 3 in the Deep Aquifers. These percentages of minimum threshold exceedances will be adjusted in any given year based on the RMS wells monitored that have SMC set. This was considered a reasonable number of exceedances given the hydrogeologic uncertainty of the Subbasin. If the monitoring system grows, additional exceedances will be allowed.

8.6.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include the following:

- **Localized pumping clusters.** Even if regional pumping is maintained within the sustainable yield, clusters of high-capacity or heavily utilized wells may cause excessive localized drawdowns that lead to undesirable results.
- **Departure from the GSP's climatic assumptions, including extensive, unanticipated drought.** Minimum thresholds were established based on historical groundwater elevations and reasonable estimates of future climatic conditions and groundwater elevations. Departure from the GSP's climatic assumptions or extensive, unanticipated droughts may lead to excessively low groundwater elevations and undesirable results.
- **Reservoir operations.** Operation of Nacimiento and San Antonio Reservoirs affect the timing and quantity of surface water flows. This affects groundwater levels in the subbasin both directly from recharge of surface water in the Subbasin and indirectly from subsurface flows after recharge in adjacent subbasins. In addition, surface water redirection at the SRDF, along with recycled water availability, affect CSIP groundwater demand.
- **Subsurface flows with adjacent subbasins.** The 180/400 Subbasin is hydraulically connected with the adjacent Monterey, Forebay, Eastside, and Langley Subbasins. Groundwater levels in those subbasins may affect the potential for undesirable results in the 180/400 Subbasin.

8.6.4.3 Effects on Beneficial Users and Land Uses

Undesirable results for groundwater levels could have negative effects on beneficial users and land uses. Domestic wells are the most vulnerable due to their shallower depths. Low groundwater levels may result in higher pumping costs, the need to lower well pumps,

mechanical problems, microbial contamination, or the need to drill deeper replacement wells. While municipal and agricultural production wells tend to be deeper, their electricity demand and the cost of pumping still increases at lower groundwater levels. Lowering the pump or drilling a deeper well in the same location is not a solution because the levels will only continue to drop, unless the well is replaced in a deeper aquifer. As of GSP Amendment 2, the Deep Aquifers have had the most undesirable results of any aquifer and additional pumping will make it even more difficult to raise groundwater levels. Rural residential domestic users are the most vulnerable, as they tend to have the shallowest wells that are the first to be affected.

GDEs have the potential to be impacted if the depth to groundwater falls below their rooting depths.

The lower the groundwater levels are, the more it increases the risk that seawater intrusion advances inland, as well as vertically migrates to aquifers with lower groundwater levels. The Groundwater Level SMC was not set to prevent seawater intrusion; however, lower groundwater levels could cause greater advancement of seawater intrusion, either laterally or vertically. As of GSP Amendment 2, groundwater levels in the Deep Aquifers were lower than in the 400-Foot Aquifer, which adds pressure for vertical migration of seawater intrusion downwards.

Groundwater levels below historical levels also increases the risk of subsidence where clay layers may be depressurized, such as the Deep Aquifers.

8.7 Reduction in Groundwater Storage SMC

8.7.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions in groundwater storage in the Subbasin are those that:

- Lead to chronic, long-term reduction in groundwater storage, or
- Interfere with other sustainability indicators

These significant and unreasonable conditions were determined based on input collected during Subbasin Committee meetings and discussions with GSA staff.

8.7.2 Minimum Thresholds

The minimum threshold for reduction in groundwater storage is 15,700 acre-feet below the measurable objective in the 180/400 Subbasin. This reduction is based on the groundwater level and seawater intrusion minimum thresholds.

Although not the metric for establishing change in groundwater storage, the GSAs are committed to pumping at or less than the Subbasin's long-term sustainable yield, as measured based on long-term groundwater level and storage trends. The projected long-term sustainable yield within Chapter 6 is based on a similar climate to what historically occurred; however, if the climate or other conditions that occur differ, the long-term amount that can be pumped while maintaining stable groundwater level trends may also differ. Further, it does not reflect the pumping at which seawater intrusion is stopped. This will be further analyzed during GSP implementation as PMAs are refined and modeling is updated to assess groundwater storage effects and benefits. SGMA allows 20 years to reach sustainability. Under GSP baseline conditions (2020), groundwater storage is 2,600 AF below the minimum threshold, which is based on observed groundwater elevations and seawater intrusion, as explained below.

8.7.2.1 Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives

The groundwater storage minimum threshold and measurable objective rely on the groundwater elevation and seawater intrusion minimum thresholds. The methodologies used to establish those 2 minimum thresholds are detailed in Section 8.6.2.1 and Section 8.8.2.1. The GSP Regulations § 354.36 (b) states that "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." The general relationship between groundwater storage and groundwater elevations is discussed in greater detail in Chapter 4, Section 4.4.2.

Figure 8-6 compares the Subbasin's cumulative change in storage, plotted on the black line, with the average annual change in groundwater elevation, plotted on the blue line. Groundwater elevation change data are derived from the groundwater level monitoring network; the cumulative change in groundwater storage is derived from the SVIHM. Although the data come from 2 sources, the data generally show similar patterns between 1980 and 2022.

Figure 8-7 shows a scatter plot of simulated cumulative change in storage and average change in observed groundwater elevations. The comparison between 1980 and 2022 yields a strong positive correlation ($R^2=0.777$). The correlation for the 1980 to 2022 period is sufficient to show that groundwater elevations are an adequate proxy for groundwater storage. Additionally, the relationships shown on Figure 8-6 and Figure 8-7 also demonstrate that, when paired with SVIHM storage parameters, long term trends in measured change in groundwater elevations can be used to approximate trends in storage change.

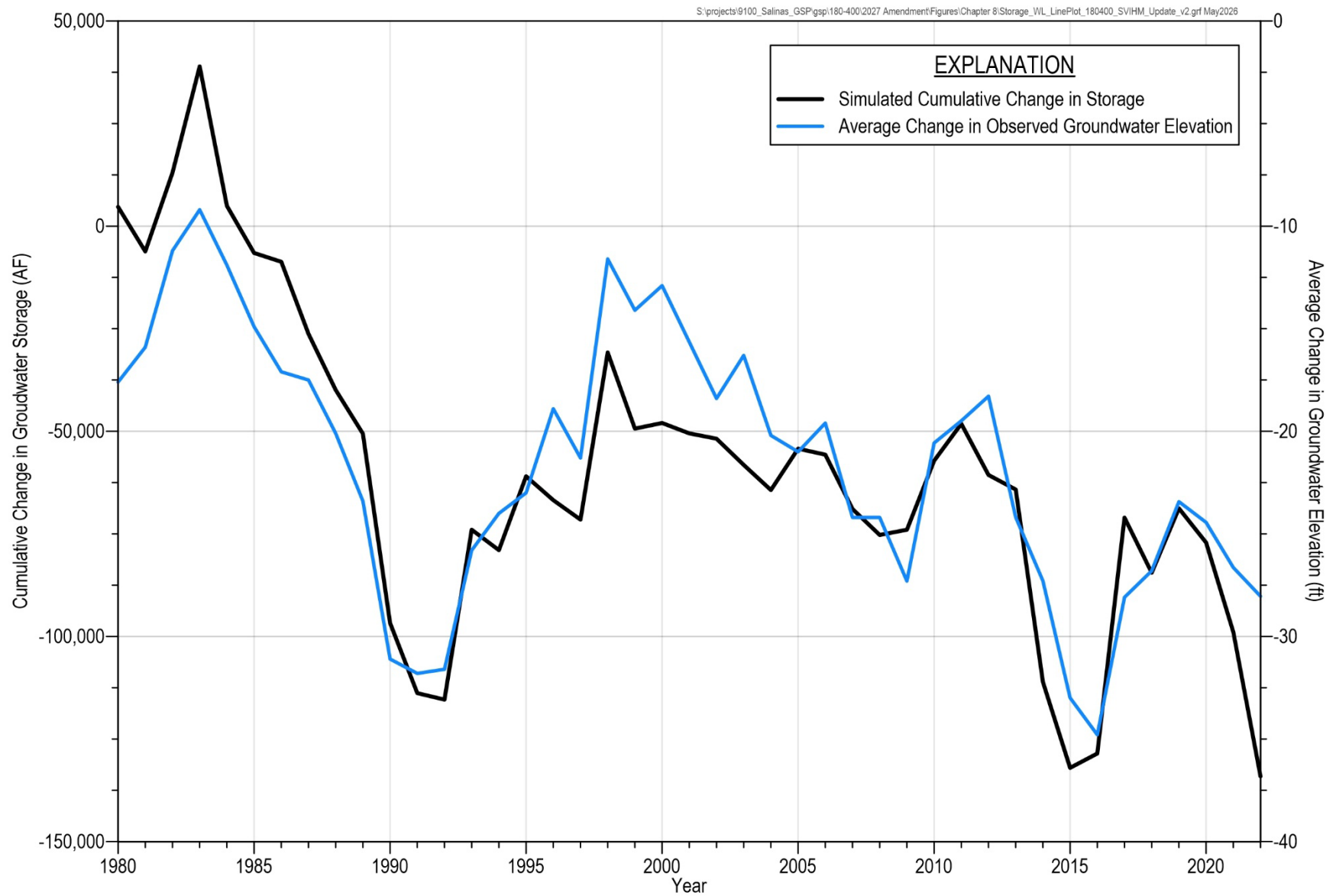
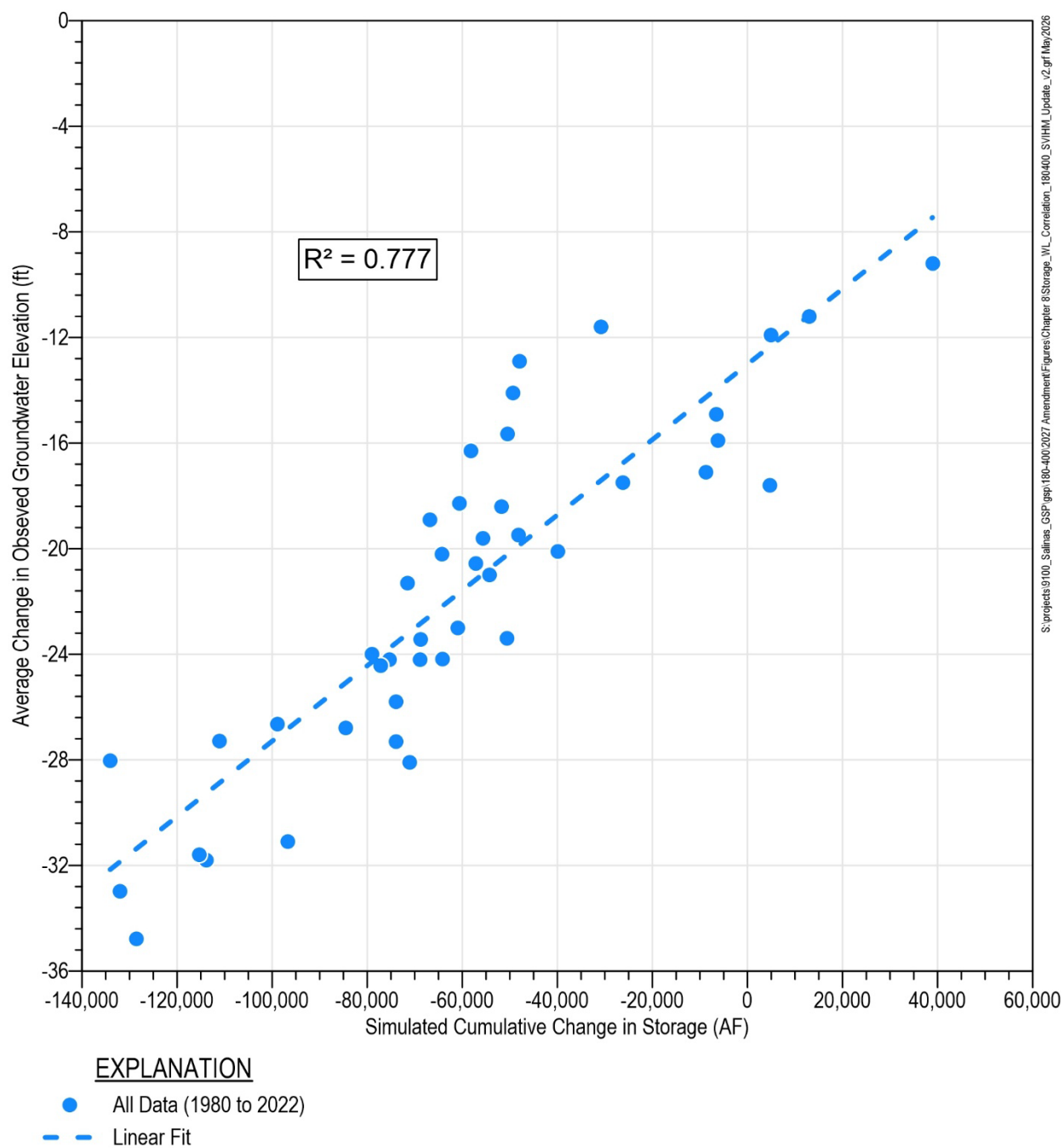


Figure 8-6. Cumulative Change in Storage and Average Change in Groundwater Elevation in the 180/400 Subbasin



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Figure 8-7. Correlation Between Cumulative Change in Storage and Average Change in Groundwater Elevation

With groundwater elevations established as a proxy for storage, the calculation of storage change follows the methodology outlined in Section 5.2, the groundwater storage change resulting from changes in groundwater elevations is computed on a cell-by-cell basis and summed to obtain a total for each principal aquifer. The calculation is completed separately for each principal aquifer, and the results are then summed to obtain a Subbasin total. The storage change is based on the groundwater elevation difference between the minimum thresholds and measurable objectives.

Minimum threshold and measurable objective groundwater elevations at RMS wells were each interpolated to create raster layers. The measurable objective surface was subtracted from the minimum threshold surface, and the resulting elevation difference was multiplied by SVIHM grid cell area to estimate an aquifer volume between the 2 elevation surfaces. This calculation was applied to the portion of the Subbasin not affected by seawater intrusion in 2017, except for in the Deep Aquifers, which were evaluated across the entire Subbasin because they are not affected by seawater intrusion. The aquifer volume is then multiplied by the average storage properties of the model layers weighted by layer thickness to estimate the total amount of water in storage between the minimum thresholds and measurable objectives, which defines the SMC for reduction of groundwater storage.

Because the seawater intrusion minimum threshold and measurable objective are identical, there is no difference in groundwater storage associated with seawater intrusion conditions (0 AF). As a result, the reduction of groundwater storage SMC is based entirely on the change in storage associated with groundwater elevations in the 3 principal aquifers.

The difference in groundwater storage between minimum threshold conditions and measurable objective conditions is 15,700 AF when summed across the principal aquifers. This volume represents the amount of groundwater storage that separates the minimum threshold from the measurable objective. In other words, if groundwater storage increased by 15,700 AF from minimum threshold conditions, the measurable objective would be reached. Therefore, 15,700 AF defines the SMC for reduction of groundwater storage.

8.7.2.2 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The minimum threshold for reduction in groundwater storage is a single value for the entire Subbasin. Therefore, the concept of potential conflict between minimum thresholds at different locations is not applicable.

The reduction in groundwater storage minimum threshold could influence other sustainability indicators. The reduction in groundwater storage minimum threshold is selected to avoid undesirable results for other sustainability indicators, as outlined below.

- **Chronic lowering of groundwater levels.** The reduction in storage minimum threshold is calculated from the groundwater level and seawater intrusion minimum thresholds. Therefore, the minimum threshold for reduction in groundwater storage is consistent with, and will not result in, a significant or unreasonable impact on groundwater elevations.
- **Seawater intrusion.** The reduction in storage minimum threshold is based on the groundwater level and seawater intrusion minimum thresholds. Therefore, the minimum threshold for reduction in groundwater storage will not result in a significant increase in seawater intrusion. However, keeping reduction of groundwater storage at the minimum threshold may not, by itself, stop all seawater intrusion.
- **Degraded water quality.** The reduction in storage minimum threshold is established to maintain groundwater elevations above historical lows. The change in storage minimum threshold will not directly lead to any additional degradation of groundwater quality.
- **Land subsidence.** The reduction in storage minimum threshold is established to maintain groundwater elevations above historical lows. Therefore, the change in storage minimum threshold will not induce any additional dewatering of clay-rich sediments; and will not induce additional subsidence.
- **Depletion of ISW.** The reduction in storage minimum threshold is established to maintain groundwater elevations above historical lows. Therefore, the change in storage minimum threshold will not induce additional depletion of ISW beyond those lows, which are set to 1 foot above 2015 levels in this Subbasin.

8.7.2.3 Effect of Minimum Thresholds on Neighboring Basins and Subbasins

The 180/400 Subbasin has 4 neighboring subbasins within the Salinas Valley:

- The Langley Subbasin to the north
- The Eastside Subbasin to the east
- The Forebay Subbasin to the south
- The Monterey Subbasin to the southwest

The SVBGSA is either the exclusive GSA or is one of the coordinating GSAs for the adjacent Subbasins. Because the SVBGSA's jurisdiction includes all these subbasins, it is coordinating the development of the minimum thresholds and measurable objectives for all these subbasins. The 180/400 Subbasin GSP was submitted in 2020, was approved in 2022, and GSP Amendment 1 was submitted in 2025. GSPs for the other Salinas Valley subbasins were submitted in 2022

and approved in 2023. Amendments for all Salinas Valley subbasins have been developed together for submittal in 2027. Minimum thresholds for this Subbasin have been reviewed relative to information developed for the neighboring subbasins' GSPs to ensure that these minimum thresholds will not prevent the neighboring subbasins from achieving sustainability.

The Pajaro Valley Basin lies directly to the north. Because the minimum thresholds in the 180/400 Subbasin are set at the long-term future sustainable yield, it is likely that the minimum thresholds will not prevent the Pajaro Basin from achieving and maintaining sustainability under their Alternative Plan. The SVBGSA will coordinate with the Pajaro Valley Water Agency to ensure that the basins do not prevent each other from achieving sustainability.

8.7.2.4 Effect on Beneficial Uses and Users

The reduction in groundwater storage minimum threshold is based on a combination of the groundwater level and seawater intrusion minimum thresholds and might limit the amount of sustainable groundwater pumping in the Subbasin or increase the cost of PMAs.

Agricultural land uses and users. The groundwater storage minimum thresholds help protect agricultural water users by maintaining groundwater in storage for future use. Limiting the amount of groundwater pumping to a sustainable level or funding PMAs, however, may affect agricultural production in the Subbasin.

Urban land uses and users. The groundwater storage minimum thresholds help protect urban water users by maintaining groundwater in storage for future use. Limiting the amount of groundwater pumping to a sustainable level or funding PMAs, however, may affect urban users in the Subbasin.

Domestic land uses and users. The groundwater storage minimum thresholds help protect domestic water users by maintaining groundwater in storage for future use. .

Ecological land uses and users. Limiting the amount of pumping may generally benefit the environmental groundwater uses nearby where pumping is limited in areas where GDEs are present.

8.7.2.5 Relation to State, Federal, or Local Standards

No federal, state, or local standards exist for reductions in groundwater storage.

8.7.2.6 Method for Quantitative Measurement of Minimum Threshold

The amount of groundwater in storage will be calculated by calculating the change between groundwater elevation contour maps. The change in storage estimates will also be checked periodically when the SVIHM model is updated during GSP implementation.

8.7.3 Measurable Objectives

The measurable objective for reduction in groundwater storage measurable objective is 0 when groundwater levels and seawater intrusion are at their measurable objectives.

Since the goal is to manage to the measurable objective, additional water in storage is needed until groundwater elevations are at their measurable objectives.

8.7.3.1 Methodology for Setting Measurable Objectives

The measurable objective for reduction in groundwater storage was calculated as described in Section 8.6.2.1.

8.7.3.2 Interim Milestones

The reduction in storage interim milestones are shown in Table 8-4 for each of the 5-year intervals, consistent with the minimum thresholds and the measurable objectives. At 2020 groundwater elevations from the original GSP, the groundwater in storage is about -2,600 AF below the minimum threshold and 18,300 AF below the measurable objective. A gain of 4,575 AF in groundwater storage needs to occur every 5 years until 2040 to achieve the measurable objective.

Table 8-4. Reduction in Groundwater Storage Interim Milestones

Gain in Storage needed to Reach Measurable Objective (AF)	At GSP Baseline Conditions (2020)	At Interim Milestone Year 2025	At Interim Milestone Year 2030	At Interim Milestone Year 2035	At Measurable Objective Year 2040
5-year incremental change	-18,300	4,575	4,575	4,575	0
Cumulative change	-18,300	-13,725	-9,150	-4,575	0

8.7.4 Undesirable Result

8.7.4.1 Criteria for Defining Reduction in Groundwater Storage Undesirable Result

The reduction in groundwater storage undesirable result is:

There is an exceedance of the minimum threshold.

Since the GSP addresses long-term groundwater sustainability, exceedances of groundwater storage minimum thresholds during a drought do not constitute an undesirable result. 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 storage may temporarily exceed minimum thresholds during droughts, and do not constitute an undesirable result, as long as groundwater levels rebound.

8.7.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result for the reduction in groundwater storage sustainability indicator include the following:

- **Expansion of agricultural or municipal pumping.** Additional agricultural or municipal pumping may result in lowered groundwater elevations, lower recharge of the principal aquifers from precipitation or streamflow, or additional seawater intrusion that reduce groundwater in storage to an undesirable result.
- **Departure from the GSP’s climatic assumptions, including extensive, unanticipated drought.** The undesirable result is established based on reasonable anticipated future climatic conditions and groundwater elevations. Departure from the GSP’s climatic assumptions or extensive, unanticipated droughts may lead to excessively low groundwater recharge and unanticipated high pumping rates that could reduce groundwater in storage to an undesirable result.
- **Reservoir operations.** Operation of Nacimiento and San Antonio Reservoirs affect the timing and quantity of surface water flows. This affects groundwater levels in the subbasin both directly from recharge of surface water in the Subbasin and indirectly from subsurface flows after recharge in adjacent subbasins. In addition, surface water redirection at the SRDF, along with recycled water availability, affect CSIP groundwater demand.
- **Subsurface flows with adjacent subbasins.** The 180/400 Subbasin is hydraulically connected with the adjacent Monterey, Forebay, Eastside, and Langley Subbasins. Groundwater levels in those subbasins may affect the potential for undesirable results in the 180/400 Subbasin

8.7.4.3 Effects on Beneficial Users and Land Use

The practical effect of the reduction in groundwater storage undesirable result is a chronic, long-term net loss of groundwater in storage. Therefore, beneficial uses and users would not have access to a similar amount of water in storage that currently exists, and the undesirable result would have an additional negative effect on the beneficial users and uses of groundwater.

8.8 Seawater Intrusion SMC

8.8.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable seawater intrusion in the Subbasin is defined as follows:

- Any additional seawater intrusion in the Subbasin since 2017 is significant and unreasonable.

This significant and unreasonable condition was determined based on input collected during Subbasin Committee meetings and discussions with GSA staff during development of the original GSP.

8.8.2 Minimum Thresholds

The minimum threshold for seawater intrusion is defined as the 2017 extent of the 500 mg/L chloride concentration isocontour for the 180-Foot and 400-Foot Aquifers, and as the line defined by Highway 1 for the Deep Aquifers.

Figure 8-8 and Figure 8-9 present the minimum threshold, shown in red, for seawater intrusion in the 180-Foot and 400-Foot Aquifers, respectively, as represented by the 2017 extent of the 500 mg/L chloride concentration isocontour. The purple lines on the 2 figures show the 2020 extent of seawater intrusion in the 180-Foot and 400-Foot Aquifers at the time of the original GSP. Under GSP baseline conditions in this GSP Amendment 2, 180-Foot and 400-Foot Aquifers seawater intrusion extents exceed the minimum thresholds.

Figure 8-10 shows the minimum threshold for the Deep Aquifers in red that is defined by Highway 1. There is no reported seawater intrusion in the Deep Aquifers in the 180/400 Subbasin.

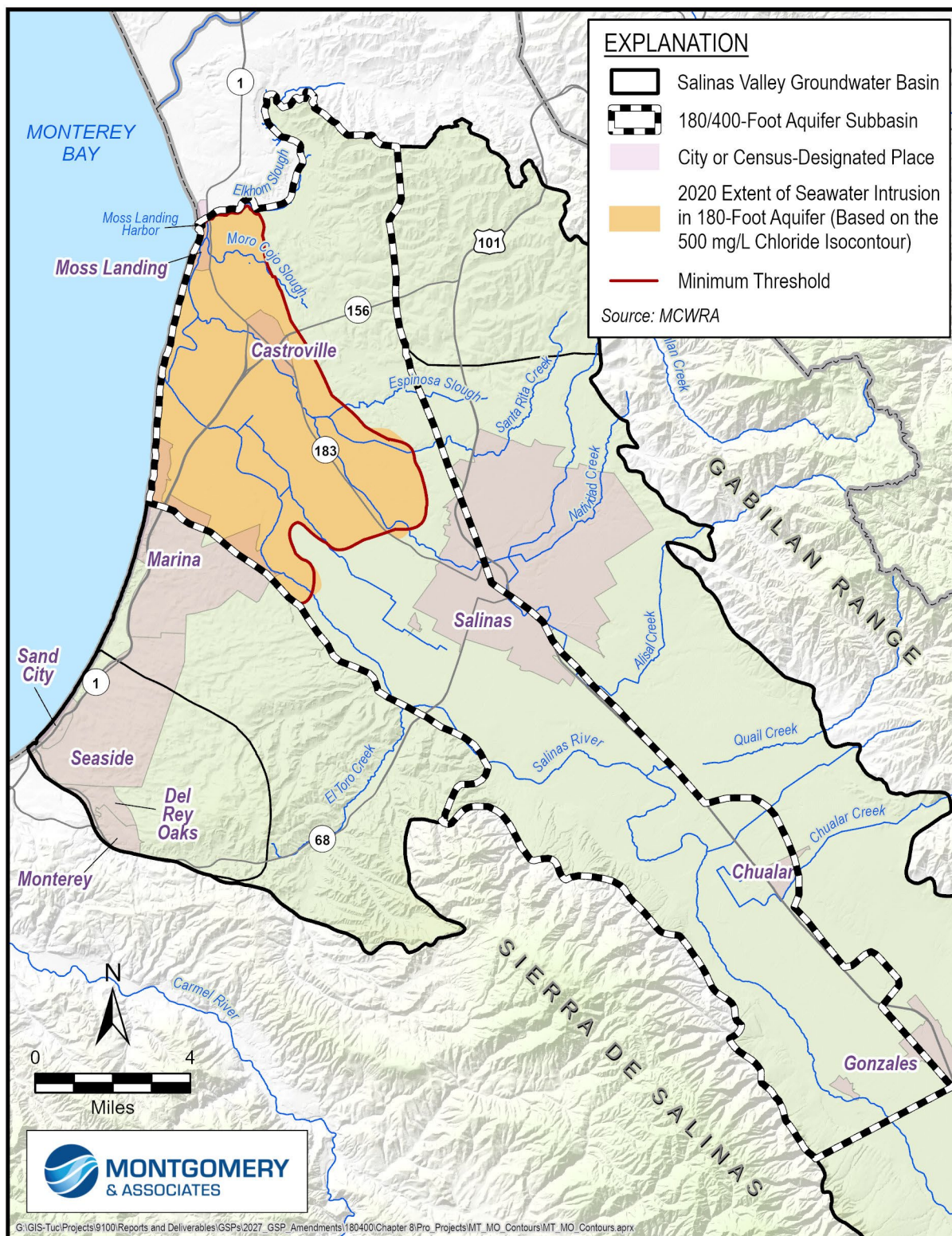


Figure 8-8. Minimum Threshold for Seawater Intrusion in the 180-Foot Aquifer

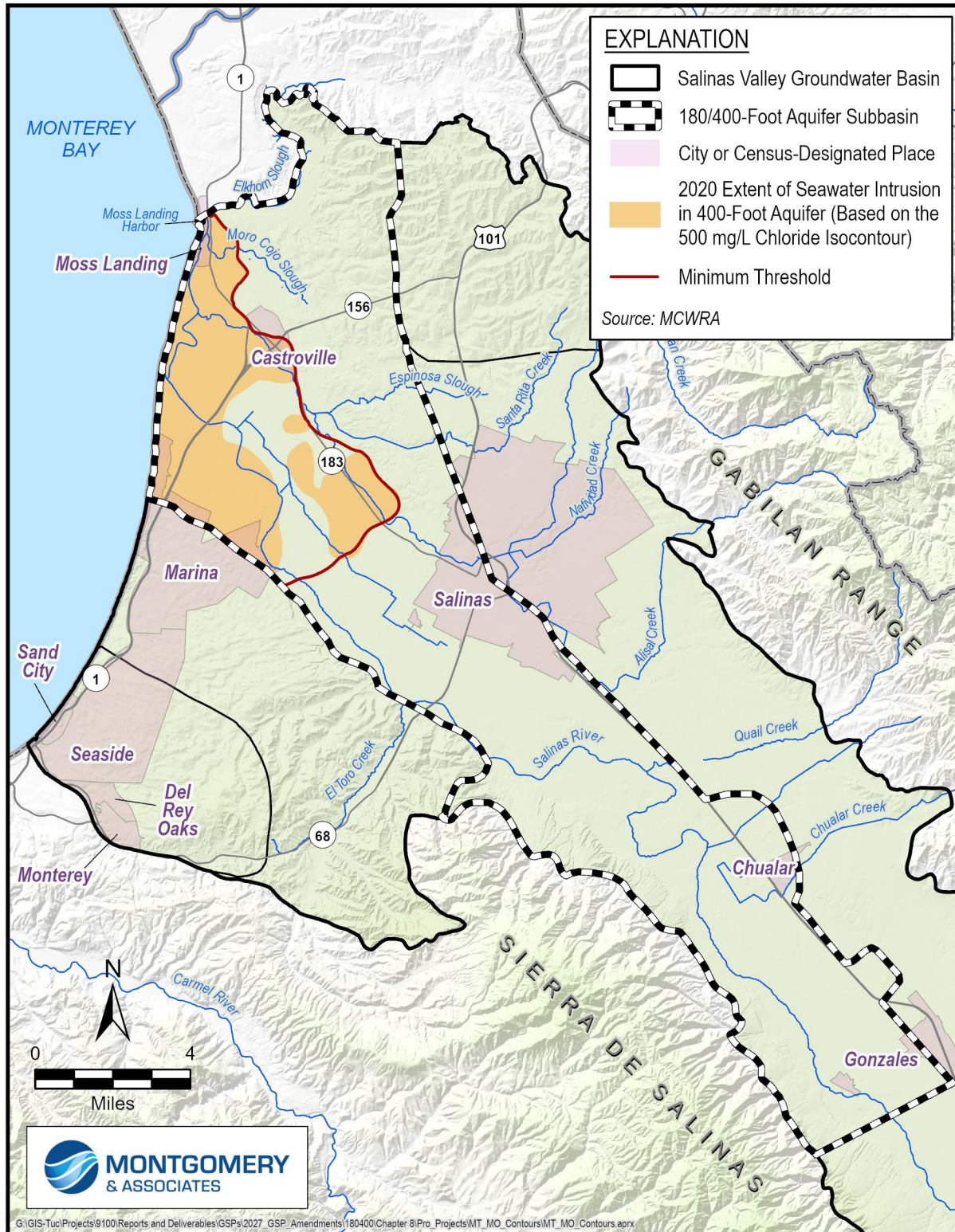


Figure 8-9. Minimum Threshold for Seawater Intrusion in the 400-Foot Aquifer

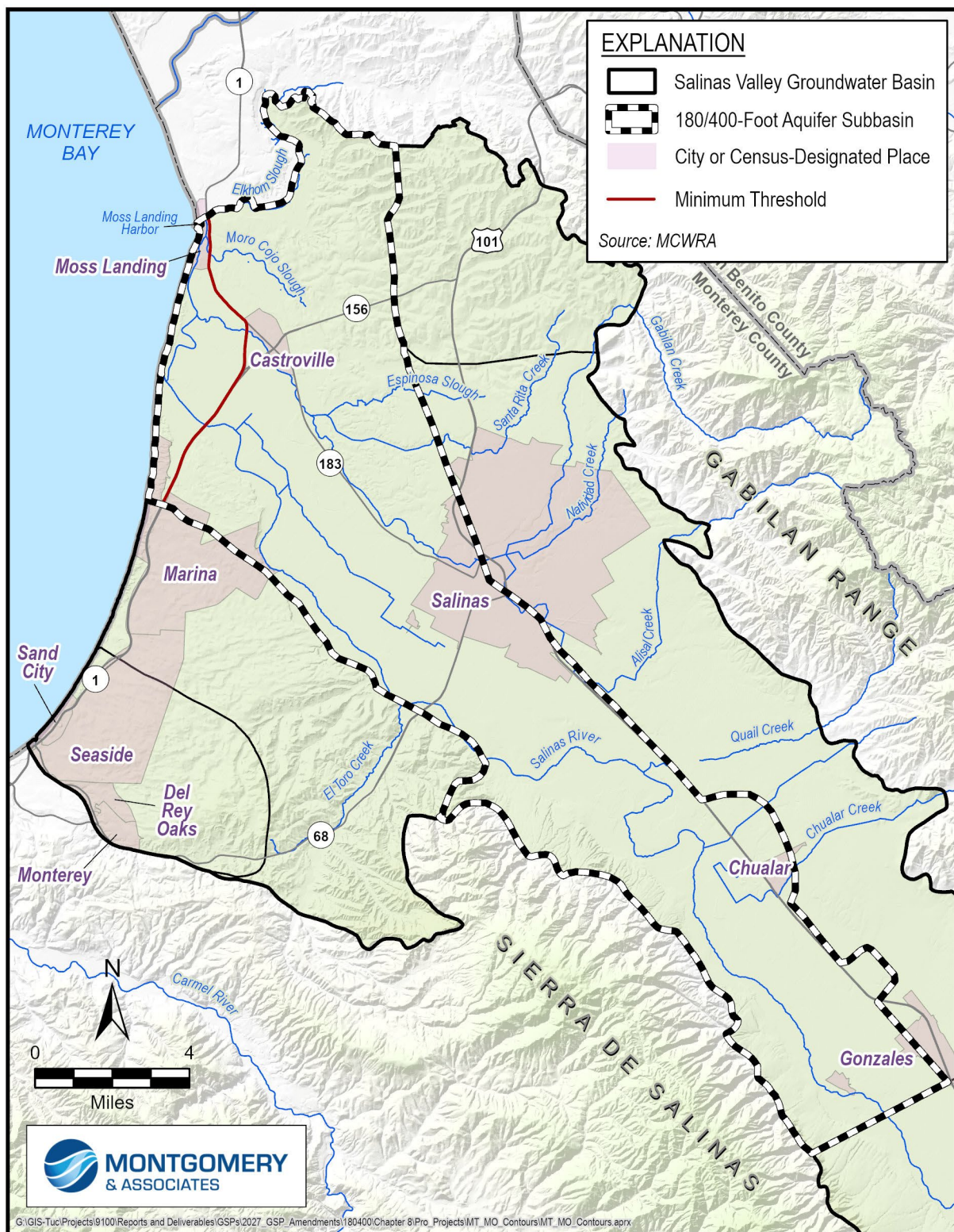


Figure 8-10. Minimum Threshold for Seawater Intrusion in the Deep Aquifers

8.8.2.1 Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives

The seawater intrusion minimum threshold is based on seawater intrusion maps developed by MCWRA. MCWRA publishes estimates of the extent of seawater intrusion every year. The MCWRA maps define the extent of seawater intrusion as the inferred location of the 500 mg/L chloride isocontour. These maps are developed through analysis and contouring of groundwater quality measured at privately-owned wells and dedicated seawater intrusion monitoring wells. The maps of historical and GSP baseline seawater intrusion is included in Chapter 5.

The groundwater models used to assess the effectiveness of PMAs on seawater intrusion specifically incorporate assumptions for future sea level rise. Therefore, actions to avoid undesirable results will include sea level rise assumptions in their design and development. Future development of PMAs in the next phase of GSP implementation may warrant further review and modification of the seawater intrusion minimum threshold based on their ultimate timing, scale, configuration and anticipated benefits and effects.

8.8.2.2 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The relationship between the seawater intrusion minimum threshold and other sustainability indicators are as follows:

- **Chronic lowering of groundwater levels.** The seawater intrusion minimum threshold does not promote additional pumping that could cause groundwater elevations to decrease in the Subbasin. Therefore, the seawater intrusion minimum threshold will not result in significant or undesirable groundwater elevations.
- **Reduction in groundwater storage.** The seawater intrusion minimum threshold does not promote additional pumping or lowering of groundwater elevations that will lead to a reduction in storage. Therefore, the seawater intrusion minimum threshold will not result in an exceedance of the groundwater storage minimum threshold.
- **Degraded water quality.** The seawater intrusion minimum threshold does not promote decreasing groundwater elevations that could lead to exceedances of groundwater quality minimum thresholds. In fact, the seawater intrusion minimum threshold may have a beneficial impact on groundwater quality by preventing increases in chloride concentrations in supply wells.
- **Land subsidence.** The seawater intrusion minimum threshold does not promote additional pumping that could cause subsidence. Therefore, the seawater intrusion minimum threshold will not result in an exceedance of the subsidence minimum threshold.

- **Depletion of ISW.** The seawater intrusion minimum threshold does not promote additional pumping or lower groundwater elevations adjacent to ISW. Therefore, the seawater intrusion minimum threshold will not result in a significant or unreasonable depletion of ISW.

8.8.2.3 Effect of Minimum Threshold on Neighboring Basins and Subbasin

The 180/400 Subbasin has 4 neighboring subbasins within the Salinas Valley:

- The Langley Subbasin to the north
- The Eastside Subbasin to the east
- The Forebay Subbasin to the south
- The Monterey Subbasin to the southwest

The SVBGSA is either the exclusive GSA or is one of the coordinating GSAs for the adjacent Subbasins. Because the SVBGSA's jurisdiction includes all these subbasins, the SVBGSA is coordinating the development of the minimum thresholds and measurable objectives for all these subbasins. The 180/400 Subbasin GSP was submitted in 2020, was approved in 2022, and GSP Amendment 1 was submitted in 2025. GSPs for the other Salinas Valley subbasins were submitted in 2022 and approved in 2023. Amendments for all Salinas Valley subbasins have been developed together for submittal in 2027. Minimum thresholds for this Subbasin have been reviewed relative to information developed for the neighboring subbasins' GSPs to ensure that these minimum thresholds will not prevent the neighboring subbasins from achieving sustainability.

SVBGSA and MCWDGSA are close collaborators in developing and implementing their GSPs for the 180/400 and Monterey Subbasins. Although SVBGSA uses the seawater intrusion isocontour developed by MCWRA, and MCWDGSA uses an isocontour derived based on a combination of TDS and chloride measurements and geophysical data, the seawater across the Subbasin boundary will continue to be closely monitored to ensure both subbasin minimum thresholds are met. The MCWRA seawater intrusion isocontour for the Monterey Subbasin has notable data gaps, which is why MCWDGSA chose other data for more accuracy in the Monterey Subbasin.

The Pajaro Valley Basin has an Alternative Plan. Because the minimum thresholds in the 180/400 Subbasin is no further intrusion beyond the 2017 chloride isocontour, the minimum threshold is not likely to prevent the Pajaro Basin from achieving and maintaining sustainability. The SVBGSA will coordinate closely with the Pajaro Valley Water Agency as it sets minimum thresholds to ensure that the basins do not prevent each other from achieving sustainability.

8.8.2.4 Effects on Beneficial Users and Land Uses

Agricultural land uses and users. The seawater intrusion minimum threshold generally provides positive benefits to the Subbasin’s agricultural water users. Preventing seawater intrusion further into the Subbasin ensures that a supply of usable groundwater will exist for agricultural use.

Urban land uses and users. The seawater intrusion minimum threshold generally provides positive benefits to the Subbasin’s urban water users. Preventing seawater intrusion further into the Subbasin will help ensure an adequate supply of groundwater for municipal supplies.

Domestic land uses and users. The seawater intrusion minimum threshold generally provides positive benefits to the Subbasin’s domestic water users. Preventing seawater intrusion further into the Subbasin will help ensure an adequate supply of groundwater for domestic supplies.

Ecological land uses and users. Although the seawater intrusion minimum threshold does not directly benefit ecological uses, it can be inferred that the seawater intrusion minimum thresholds provide generally positive benefits to the Subbasin’s ecological water uses. Preventing further seawater intrusion into the Subbasin will help prevent unwanted high salinity levels from impacting ecological groundwater uses.

8.8.2.5 Relevant Federal, State, or Local Standards

No federal, state, or local standards exist for seawater intrusion.

8.8.2.6 Method for Quantitative Measurement of Minimum Threshold

Chloride concentrations are measured in groundwater samples collected from the MCWRA’s seawater intrusion monitoring network. These samples are used to develop the inferred location of the 500 mg/L chloride isocontour. The methodology and protocols for collecting samples and developing the 500 mg/L chloride isocontour are detailed in Appendix 7B and Appendix 7C.

8.8.3 Measurable Objectives

The measurable objective for seawater intrusion is defined as the 2017 extent of the 500 mg/L chloride concentration isocontour for the 180-Foot and 400-Foot Aquifers, and no seawater intrusion in the Deep Aquifers.

8.8.3.1 Methodology for Setting Measurable Objectives

In the 180/400 Subbasin, the measurable objective for the seawater intrusion SMC is the same as the minimum threshold for the 180-Foot and 400-Foot Aquifers and no seawater intrusion into the Deep Aquifers. This will improve the Subbasin’s groundwater quality and provide access to usable groundwater to additional beneficial users. This measurable objective may be modified as

the projects and actions to address seawater intrusion are refined. The methodology used to set measurable objectives is discussed in Section 8.8.2.1.

8.8.3.2 Interim Milestones

The interim milestones for seawater intrusion are:

1. 2025: identical to GSP baseline conditions
2. 2030: one-third of the way to the measurable objective
3. 2035: two-thirds of the way to the measurable objective

These are estimates of interim milestones for seawater intrusion.. Future development of PMAs in the next phase of GSP implementation may warrant further review and modification of the seawater intrusion interim milestones based on their ultimate timing, scale, configuration and anticipated benefits and effects.

8.8.4 Undesirable Result

8.8.4.1 Criteria for Defining Seawater Intrusion Undesirable Result

The seawater intrusion undesirable result is a quantitative combination of chloride concentrations minimum threshold exceedances. There is only one minimum threshold for each of the 3 aquifers. Because expansion of seawater intrusion is not acceptable, the basin-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 beyond the 2017 extent of the 500 mg/L chloride.

8.8.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include the following:

- Groundwater levels below sea level and an inland flow gradient
- Vertical migration downward from an overlying intruded aquifer
- Increased pumping, such as during droughts, that lowers groundwater levels inland of the seawater intrusion front and causes additional intrusion
- Unanticipated high sea level rise

8.8.4.3 Effects on Beneficial Users and Land Use

The primary detrimental effect on beneficial users and land uses from allowing seawater intrusion to increase in the Subbasin is that the pumped groundwater may become saltier, which can impact crop production and may cause potential exceedances of secondary MCLs. This may necessitate treatment or blending of water, or drilling wells deeper, or limit the amount or type of crops that can be grown. Agricultural land may become less valuable because it may be too difficult and expensive to irrigate. Reduced yields may have a ripple effect on the local economy and may negatively affect land values. Thus, preventing further seawater intrusion into the Subbasin prevents greater impacts to domestic, municipal, and agricultural wells and associated land uses.

8.9 Degraded Water Quality SMC

8.9.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable changes in groundwater quality resulting from a direct result of extraction or GSA groundwater management that either:

- Increase the number of potable water supply wells in which COC concentrations are above an established MCL or SMCL, or
- Increase in the number of agricultural supply wells in which COC concentrations may lead to significantly reduced crop production based on the water quality objectives from the Water Quality Basin Plan for the Central Coastal Basin (CCRWQCB, 2019).

These are not considered significant and unreasonable if they are managed to provide drinking water supply (i.e. treated, blended, or replaced) or if beneficial users are not potentially impacted. Significant and unreasonable conditions were determined with input from the Subbasin Committee, other coordinating GSAs, and discussions with GSA staff, and for GSP Amendment 2, the CCRWQCB. These conditions were determined to be significant and unreasonable because groundwater quality in exceedance of these could cause a financial burden on groundwater users or otherwise harm them. 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.

8.9.2 Minimum Thresholds

The minimum thresholds for degraded water quality are zero additional exceedances of the regulatory drinking water standards or Basin Plan objectives beyond those observed in 2017 for groundwater quality constituents of concern.

The minimum thresholds for all wells in the monitoring network reflect California's Title 22 drinking water standards and the water quality objectives listed in the Basin Plan (CCRWQCB, 2019). The minimum threshold values are based on data up to September 30, 2017. While SGMA states that undesirable results that occur after January 1, 2015, should be addressed for groundwater quality, 2017 was selected because it was the last year of data available when the original GSP was drafted and there was no substantial difference from 2015 water quality data. Full discussion of these GSP baseline conditions is included in Chapter 5 and comparison between 2015 and 2017 quality is included in the 2027 GSP Periodic Evaluation. Because the minimum thresholds reflect no additional exceedances, the minimum thresholds are set to the percentage of exceedances in 2017. Surpassing the percentage of existing exceedances for any of the listed constituents will lead to an undesirable result. Not all wells in the monitoring network are sampled for every COC.

The constituents listed in Table 8-5 comprise the constituent watchlist for the 180/400 Subbasin. Table 8-5 expands upon the water quality assessment presented in Table 5-6. A subset of these constituents defines the COCs for which SMC are established. Several constituents were not sampled prior to WY 2017; however, these constituents exceed the Title 22 regulatory standard or Basin Plan water quality objective during the WY 2021 to WY 2025 period. Therefore, this amendment updates what needs to be included in the constituent watchlist. The table shows the criteria used to select COC in the fourth to sixth columns. To be a COC, a constituent had to be found above the level of concern in 3 out of 5 years from WY 2021 to WY 2025, exist in at least 10% of wells, and occur in at least 5 wells averaged over this period (Section 8.9.2.1). The constituents that meet the COC criteria for the purposes of this GSP are highlighted in orange in Table 8-5. Hexavalent chromium does not meet the last criterion to be a COC, however, sampling for this COC is expected to increase based on the MCL has been established.

Only constituents that meet the criteria in Section 8.9.2.1 are designated as COC; however, all monitored constituents included in the watchlist are reviewed as part of annual reports. As part of 5-year periodic evaluations, the list of COCs are reassessed and SMC are added for additional constituents if they meet the COC criteria. This enables identification of persistent constituents, rather than year-to-year fluctuations. If any new COC are identified during the periodic evaluation, the minimum threshold is either: 1) set to 0% if it was sampled for and there were no exceedances of the level of concern for the COC in WY 2017, or 2) set after initial years of monitoring if it was not historically sampled.

Table 8-5. Water Quality Constituent Watchlist and Minimum Thresholds

Constituent	Concentration Level of Concern	Standard Units	Data from WY 2021 to WY 2025 for COC Criteria			Data up to WY 2017		
			Number of Years with Level of Concern Exceedances (COC >3)	Average Percentage of Wells with Exceedances (COC >10%)	Average Number of Wells with Exceedances (COC >5)	Number of Wells Sampled	Number of Wells Exceeding Level of Concern in the Last Sample	Minimum Threshold/ Measurable Objective – Percent of Wells Exceeding Level of Concern
DDW Wells								
1,2,3-Trichloropropane (1,2,3 TCP)	0.005	µg/L	4	4%	2	78	4	5%
Aluminum	1000	µg/L	0	0%	0	90	1	1%
Arsenic	10	µg/L	5	5%	1	91	2	2%
Chloride	106	mg/L	5	25%	5	83	22	27%
Chromium, Hexavalent (Cr6)	10	µg/L	4	21%	3	86	16	19%
Gross Alpha radioactivity	15	pCi/L	5	9%	2	82	4	5%
Iron	300	µg/L	5	9%	2	79	7	9%
Manganese	50	µg/L	4	7%	2	79	2	3%
Nitrate as N	10	mg/L	5	11%	10	126	9	7%
Perchlorate	6	µg/L	2	2%	1	84	0	0%
Selenium	0.5	mg/L	0	0%	0	90	1	1%
Specific Conductivity	1600	µmhos/cm	5	10%	3	92	6	7%
Sulfate	500	mg/L	0	0%	0	79	1	1%
Total Dissolved Solids	1000	mg/L	5	12%	3	82	6	7%
ILP On-Farm Domestic Wells								
1,2,3-Trichloropropane (1,2,3 TCP)	0.005	µg/L	4	5%	2	0	0	-
Nitrate + Nitrite (sum as nitrogen)	10	mg/L	5	25%	31	59	16	27%
Specific Conductance	1600	µmhos/cm	4	24%	33	58	15	26%

Constituent	Concentration Level of Concern	Standard Units	Data from WY 2021 to WY 2025 for COC Criteria			Data up to WY 2017		
			Number of Years with Level of Concern Exceedances (COC >3)	Average Percentage of Wells with Exceedances (COC >10%)	Average Number of Wells with Exceedances (COC >5)	Number of Wells Sampled	Number of Wells Exceeding Level of Concern in the Last Sample	Minimum Threshold/ Measurable Objective – Percent of Wells Exceeding Level of Concern
ILP Irrigation Wells (Data from December 2012 to September 2017)								
Chloride	106	mg/L	2	33%	2	99	22	22%
Nitrate+Nitrite (sum as nitrogen)	10	mg/L	4	20%	45	7	3	43%
Sodium	69	mg/L	1	13%	1	99	34	34%
Specific Conductivity	1600	µmhos/cm	4	9%	20	99	8	8%
Total Dissolved Solids	1000	mg/L	5	15%	25	72	9	13%

8.9.2.1 Information and Methodology Used to Establish Water Quality Minimum Thresholds and Measurable Objectives

As noted in the GSP Regulations, minimum thresholds are based on a degradation of groundwater quality, not an improvement of groundwater quality (23 California Code of Regulations § 354.28 (c)(4)). Therefore, this GSP is designed to avoid taking any action that may inadvertently move groundwater constituents already in the Subbasin in such a way that the constituents have a significant and unreasonable impact that would not otherwise occur. The constituents that have historically occurred in the Subbasin up to 2025 were reviewed and were included as COCs if they met the following criteria:

1. They must have an established level of concern such as an MCL or SMCL for drinking water, or a level known to affect crop production.
2. They must have been found in the Subbasin at levels above the level of concern in at least 3 years from WY 2021 to WY 2025.
3. They must have been found in the Subbasin at levels above the level of concern in 10% or more of the wells sampled on average between WY 2021 and WY 2025.
4. They must occur at levels above the level of concern in at least 5 wells in the monitoring network.

Based on the review of groundwater quality in Chapter 5, the COC that may affect drinking water supply wells or are known to cause reductions in crop production are listed in Table 8-5. The other constituents discussed in Chapter 5 that do not meet the COC criteria will be monitored under the constituent watchlist but are not used to define the SMC.

8.9.2.2 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

Preventing degradation of groundwater quality may affect other sustainability indicators or may limit activities needed to achieve minimum thresholds for other sustainability indicators as described below:

- **Chronic lowering of groundwater levels.** The degradation of groundwater quality minimum thresholds could influence groundwater level minimum thresholds by limiting the types of water that can be used for recharge to maintain or raise groundwater elevations.
- **Reduction in groundwater storage.** The degradation of groundwater quality minimum thresholds could influence groundwater storage minimum thresholds by limiting the types of water that can be used for recharge to maintain or raise groundwater elevations.

- **Seawater intrusion.** The degradation of groundwater quality minimum thresholds do not promote additional pumping that could exacerbate seawater intrusion. Therefore, the groundwater quality minimum thresholds will not result in an exceedance of the seawater intrusion minimum threshold.
- **Land subsidence.** The degradation of groundwater quality minimum thresholds do not promote additional pumping that could cause subsidence. Therefore, the groundwater quality minimum thresholds will not result in an exceedance of the subsidence minimum threshold.
- **Depletion of ISW.** The degradation of groundwater quality minimum thresholds do not promote additional pumping or lower groundwater elevations adjacent to ISW. Therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable depletion of ISW.

8.9.2.3 Effect of Minimum Thresholds on Neighboring Basins and Subbasins

The 180/400 Subbasin has 4 neighboring subbasins within the Salinas Valley:

- The Langley Subbasin to the north
- The Eastside Subbasin to the east
- The Forebay Subbasin to the south
- The Monterey Subbasin to the southwest

The SVBGSA is either the exclusive GSA or is one of the coordinating GSAs for the adjacent Subbasins. Because SVBGSA's jurisdiction includes all these subbasins, the SVBGSA is coordinating the development of the minimum thresholds and measurable objectives for all these subbasins. The 180/400 Subbasin GSP was submitted in 2020, was approved in 2022, and GSP Amendment 1 was submitted in 2025. GSPs for the other Salinas Valley subbasins were submitted in 2022 and approved in 2023. Amendments for all Salinas Valley subbasins have been developed together for submittal in 2027. Minimum thresholds for this Subbasin have been reviewed relative to information developed for the neighboring subbasins' GSPs to ensure that these minimum thresholds will not prevent the neighboring subbasins from achieving sustainability.

The Pajaro Valley Basin lies directly to the north of the Subbasin. Because the minimum thresholds in the 180/400 Subbasin are set to prevent degradation of water quality, it is likely that the minimum thresholds will not prevent the Pajaro Basin from achieving and maintaining sustainability. The SVBGSA will coordinate closely with the Pajaro Valley Water Agency as it sets minimum thresholds to ensure that the basins do not prevent each other from achieving sustainability.

8.9.2.4 Effect on Beneficial Uses and Users

Agricultural land uses and users. The groundwater quality minimum thresholds generally provide positive benefits to the Subbasin's agricultural water users. The minimum thresholds help ensure extraction or GSA actions do not degrade groundwater quality such that it would reduce crop production. This helps protect groundwater supplies for agricultural production.

Urban land uses and users. The groundwater quality minimum thresholds generally provide positive benefits to the Subbasin's urban water users. The minimum thresholds help ensure extraction or GSA actions do not degrade groundwater quality such that it would cause more drinking water wells to violate drinking water standards. This helps provide adequate groundwater quality for public water system supplies.

Domestic land uses and users. The groundwater quality minimum thresholds generally provide positive benefits to the Subbasin's domestic water users by helping ensure extraction and GSA actions do not degrade groundwater quality such that it would cause more drinking water wells to violate drinking water standards. This helps provide adequate groundwater quality for domestic supplies.

Ecological land uses and users. Although the groundwater quality minimum thresholds do not directly benefit ecological uses, it can be inferred that the degradation of groundwater quality minimum thresholds provide generally positive benefits to the Subbasin's ecological water uses. GDEs could potentially become impacted if contaminated groundwater is taken up by GDEs. Some effects may be indirect, such as elevated nitrates stimulating additional aquatic growth, resulting in depressed dissolved oxygen levels. Species-specific tolerance levels for each COC is unknown, so minimum thresholds help protect ecological uses by preventing further degradation due to extraction or GSA action.

8.9.2.5 Relation to State, Federal, or Local Standards

The groundwater quality minimum thresholds specifically incorporate state and federal water quality standards for drinking water and basin plan objectives.

8.9.2.6 Method for Quantitative Measurement of Minimum Thresholds

Degradation of groundwater quality minimum thresholds will be directly measured from active wells in the Subbasin. Groundwater quality will be evaluated based on SWRCB GAMA groundwater information system data submitted through the DDW and data received from CCRWQCB ILP and GQTM Workplan once approved, as discussed in Chapter 7.

Exceedances of MCLs and SMCLs and water quality objectives for crop production will be reviewed annually. This review will be centered around the COC identified above. Every 5 years, in line with Periodic Evaluations, water quality data will be reassessed to determine

whether any additional constituents meet the COC criteria listed above. If so, these additional constituents will be added to the list of COC for the Subbasin.

8.9.3 Measurable Objectives

The measurable objectives for degradation of groundwater quality represent target groundwater quality distributions in the Subbasin. SGMA does not mandate the improvement of groundwater quality. Therefore, the measurable objectives are based on no groundwater quality degradation and are identical to the minimum thresholds, as defined in 8.9.2.1.

The measurable objectives for degraded water quality are zero additional exceedances of the regulatory drinking water standards or Basin Plan objectives beyond those observed in 2017 for groundwater quality constituents of concern.

8.9.3.1 Methodology for Setting Measurable Objectives

As described above, measurable objectives are set to be identical to the minimum thresholds and therefore follow the same method as detailed in Section 8.9.2.1.

8.9.3.2 Interim Milestones

There is no anticipated degradation of groundwater quality during GSP implementation that results from the implementation of PMAs as described in Chapter 9. Therefore, the expected interim milestones are identical to GSP baseline conditions. However, there may be some temporary exceedances while development and initial implementation of PMAs are underway.

8.9.4 Undesirable Result

8.9.4.1 Criteria for Defining Undesirable Result

Water quality degradation that results in a minimum threshold exceedance becomes an undesirable result when it is a direct result of GSP implementation. Some groundwater quality changes are expected to occur independent of SGMA activities; because these changes are not related to SGMA activities or GSA management, they do not constitute an undesirable result. Additionally, SGMA states that GSAs are not responsible for addressing water quality degradation that was present before January 1, 2015 (California Water Code § 10727.2(b)(4)). Therefore, the degradation of groundwater quality reaches an undesirable result when:

Future or new minimum thresholds exceedances are caused by a direct result of extraction or GSA groundwater management action(s), including projects or management actions and regulation of groundwater extraction, unless minimum threshold exceedances are managed to provide a water supply (i.e. treated, blended, or replaced) or beneficial users are not potentially harmed.

The groundwater level SMC is designed and intended to help protect groundwater quality. Setting the groundwater level minimum thresholds at or above historical lows assures that no new depth dependent constituents of water quality concern are mobilized. The GSA may pursue projects or management actions to ensure that groundwater levels do not fall below groundwater level minimum thresholds.

This undesirable result recognizes there is an existing regulatory framework in the form of the California Porter Cologne Act and the federal Clean Water Act that addresses water quality management; and considers existing federal, state, and local groundwater quality standards, which were used in the development of minimum thresholds in the GSP. SVBGSA is not responsible for enforcing drinking water requirements or for remediating violations of those requirements that were caused by others (Moran and Belin, 2019). The existing regulatory regime does not require nor obligate the GSAs to take any affirmative actions to manage or control existing groundwater quality. However, the GSAs are committed to monitoring and disclosing changes in groundwater quality and ensuring its groundwater management actions do not cause drinking water or irrigation water to be unusable.

SVBGSA will work closely with the Central Coast Regional Water Quality Control Board and other entities that have regulatory authority over water quality. SVBGSA will lead the Water Quality Coordination Group, as described in Chapter 9, which includes meeting annually with these partner agencies to review the status of water quality data and discuss any action needed to address water quality degradation.

If minimum thresholds are exceeded, SVBGSA will review the potential causes, groundwater quality, and groundwater gradients to assess if the exceedance resulted from extraction or GSA action, or was independent of GSA activities. Both the implementation of actions and assessment of exceedances will occur throughout the GSP timeframe of 50 years as required by SGMA. The evaluation of whether a minimum threshold exceedance constitutes an undesirable result includes:

Step 1: Desktop Assessment

Conduct initial screening of whether the exceedance is likely caused by extraction or GSA groundwater management action, is not managed, and is not associated with seawater intrusion.

Step 2: Coordination and Verification

Consult with the Water Quality Coordination Group.

Step 3: Evaluate Potential Impacts on Beneficial Uses and Users

If the exceedance is likely attributable to extraction or GSA actions, assess whether there are beneficial users that could potentially be harmed.

Step 4: Assess Data Needs

Evaluate whether additional sampling is needed to confirm conditions or better understand causes, considering existing monitoring programs (e.g., Preservation, Inc., MCWRA, SWRCB reporting).

Step 5: Identify Potential Actions to Address Water Quality Degradation

If degradation is linked to extraction or GSA actions, consider appropriate responses, such as:

- Additional data collection and/or analysis
- Modifications to projects or management actions
- Extraction management
- Well mitigation measures

Figure 8-11 outlines these steps and some of the specific considerations within them. Steps 1-3 will be conducted as part of the GSP annual report process. Steps 4 and 5 require more time and will be conducted afterwards. GSP 5-year periodic evaluations will summarize results of all steps, as well as if any management was added after annual reports to address undesirable results.

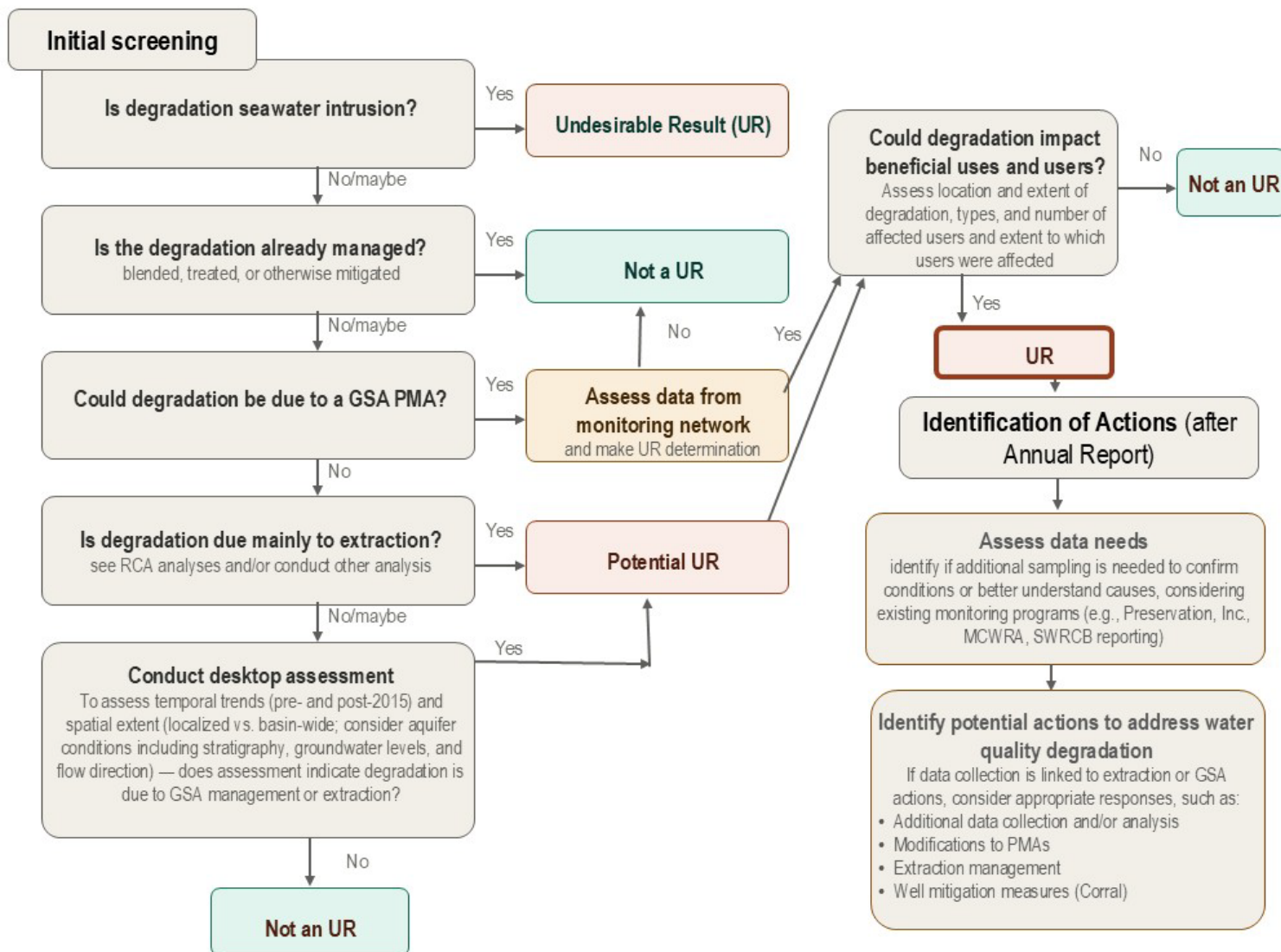


Figure 8-11. Process to Determine if Minimum Threshold Exceedances Constitute an Undesirable Result

For SGMA compliance, undesirable results for groundwater quality are not caused by (1) lack of action, unless due to pumping; (2) GSA required reductions in pumping; (3) exceedances in groundwater quality minimum thresholds that occur, if there are fewer exceedances than if there had been a lack of management; (4) exceedances in groundwater quality minimum thresholds that would have occurred independent of pumping or PGSA action; (5) past harm.

8.9.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include the following:

- **Required Changes to Subbasin Pumping.** If the location and rates of groundwater pumping change as a result of projects implemented under the GSP, these changes could alter hydraulic gradients and associated flow directions, and cause movement of one of the COC towards a supply well at concentrations that exceed relevant standards.
- **Groundwater Recharge.** Active recharge of imported water or captured runoff could modify groundwater gradients and move one of the COC towards a supply well in concentrations that exceed relevant limits.
- **Recharge of Poor Quality Water.** Recharging the Subbasin with water that exceeds an MCL, SMCL, or level that reduces crop production could lead to an undesirable result.

8.9.4.3 Effects on Beneficial Users and Land Use

Groundwater quality degradation caused by pumping or GSA action could negatively affect beneficial users. Degradation could necessitate treatment for drinking water, reduce crop yields, or limit the types or amount of crops that can be grown. These could increase the cost of water or production. This undesirable result does not apply to groundwater quality changes that occur due to other causes.

8.10 Land Subsidence SMC

8.10.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable subsidence in the Subbasin is defined as follows:

- Any inelastic land subsidence that is caused by lowering of groundwater elevations in the Subbasin or
- Any inelastic subsidence that causes an increase of flood risk.

These significant and unreasonable conditions were determined based on input collected during Subbasin Committee meetings and discussions with GSA staff.

Subsidence can be elastic or inelastic. Elastic subsidence is the small, reversible lowering and rising of the ground surface. Inelastic subsidence is generally irreversible. This SMC only concerns inelastic subsidence.

8.10.2 Minimum Threshold

The minimum threshold for subsidence is zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement measured subsidence between June of one year and June of the subsequent year to account for InSAR measurement errors.

The 2020 subsidence data from GSP Amendment 1, described in Chapter 5, did not exceed the subsidence minimum threshold.

8.10.2.1 Information Used and Methodology for Establishing Subsidence Minimum Thresholds

The minimum threshold was established using InSAR data available from DWR. The general minimum threshold is for no long-term irreversible subsidence in the Subbasin. The InSAR data provided by DWR, however, is subject to measurement error. DWR stated that, on a statewide level, for the total vertical displacement measurements between June 2015 and June 2019, the errors are as follows (DWR, 2019, personal communication):

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

By adding errors 1 and 2, the combined error is 0.1 foot. While this is not a robust statistical analysis, it does provide an estimate of the potential error in the InSAR maps provided by DWR.

Additionally, the InSAR data provided by DWR reflects both elastic and inelastic subsidence. While it is difficult to compensate for elastic subsidence, visual inspection of monthly changes in ground elevations suggest that elastic subsidence is largely seasonal. To minimize the influence of elastic subsidence on the assessment of long-term, permanent subsidence, changes in ground level will only be measured annually from June of one year to June of the following year.

8.10.2.2 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The subsidence minimum threshold has little or no impact on other minimum thresholds, as described below:

- **Chronic lowering of groundwater levels.** The land subsidence minimum threshold will not decrease groundwater elevations and therefore will not result in significant or unreasonable groundwater elevations.
- **Reduction in groundwater storage.** The land subsidence minimum threshold will not change the amount of pumping and therefore will not result in a significant or unreasonable change in groundwater storage.
- **Seawater intrusion.** The land subsidence minimum threshold does not promote additional pumping that could exacerbate seawater intrusion. Therefore, the subsidence minimum threshold will not induce additional advancement of seawater intrusion along the coast.
- **Degraded water quality.** The land subsidence minimum threshold does not promote decreasing groundwater elevations that lead to exceedance of water quality minimum thresholds and therefore will not result in significant or unreasonable degradation of water quality.
- **Depletion of ISW.** The land subsidence minimum threshold does not promote additional pumping or lower groundwater elevations adjacent to ISW. Therefore, the subsidence minimum threshold will not result in a significant or unreasonable depletion of ISW.

8.10.2.3 Effect of Minimum Thresholds on Neighboring Basins and Subbasins

The 180/400 Subbasin has 4 neighboring subbasins within the Salinas Valley:

- The Langley Subbasin to the north
- The Eastside Subbasin to the east
- The Forebay Subbasin to the south
- The Monterey Subbasin to the southwest

The SVBGSA is either the exclusive GSA or is one of the coordinating GSAs for the adjacent Subbasins. Because SVBGSA's jurisdiction includes all these subbasins, the SVBGSA is coordinating the development of the minimum thresholds and measurable objectives for all these subbasins. The 180/400 Subbasin GSP was submitted in 2020, was approved in 2022, and GSP Amendment 1 was submitted in 2025. GSPs for the other Salinas Valley subbasins were submitted in 2022 and approved in 2023. Amendments for all Salinas Valley subbasins have been developed together for submittal in 2027. Minimum thresholds for this Subbasin have been reviewed relative to information developed for the neighboring subbasins' GSPs to ensure that these minimum thresholds will not prevent the neighboring subbasins from achieving sustainability.

The Pajaro Valley Basin lies directly to the north of the Subbasin. Because the minimum threshold in the 180/400 Subbasin is zero subsidence, it is likely that the minimum threshold will not prevent the Pajaro Basin from achieving and maintaining sustainability.

8.10.2.4 Effects on Beneficial Uses and Users

The subsidence minimum threshold is set to prevent any inelastic land subsidence. Available data indicate that as of GSP Amendment 2, there has been no inelastic subsidence occurring in the Subbasin. The subsidence minimum threshold helps prevent damage to critical infrastructure, such as roads, drinking water systems, and supply wells.

8.10.2.5 Relation to State, Federal, or Local Standards

There are no federal, state, or local regulations related to subsidence.

8.10.2.6 Method for Quantitative Measurement of Minimum Threshold

The minimum threshold will be assessed using DWR-supplied InSAR data.

8.10.3 Measurable Objective

The measurable objective for subsidence represents a target subsidence rates in the Subbasin. Because the minimum threshold of zero net long-term subsidence is the best achievable outcome, the measurable objective is identical to the minimum threshold.

The measurable objective for land subsidence is zero net long-term subsidence, with no more than 0.1 foot per year of estimated land movement measured subsidence to account for InSAR measurement errors.

8.10.3.1 Methodology for Setting Measurable Objectives

The measurable objective will be assessed using DWR-supplied InSAR data.

8.10.3.2 Interim Milestones

The subsidence measurable objective is set at GSP baseline condition of no long-term subsidence. There is no change between GSP baseline conditions and sustainable conditions. Therefore, the interim milestones are identical to GSP baseline conditions of zero long-term subsidence, and annual measurements of no more than 0.1 foot of subsidence per year.

8.10.4 Undesirable Result

8.10.4.1 Criteria for Defining Undesirable Result

By regulation, the land subsidence undesirable result is a quantitative combination of subsidence minimum threshold exceedances. For the 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.

Should potential subsidence be observed, the SVBGSA will first assess whether the subsidence may be due to elastic subsidence. If the subsidence is not elastic, the SVBGSA will undertake a program to assess whether the subsidence is caused by lowered groundwater elevations. The first step in the assessment will be to check if groundwater elevations have dropped below historical lows. If groundwater elevations remain above historical lows, the GSA shall assume that any observed subsidence was not caused by lowered groundwater levels. If groundwater levels have dropped below historical lows, the GSA will attempt to correlate the observed subsidence with measured groundwater elevations. Additionally, if the Subbasin experiences subsidence in multiple consecutive years that are due to InSAR measurement error, the GSAs will confirm if the error is not actually net long-term subsidence.

8.10.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include a shift in pumping locations. Increasing pumping by a significant amount in an area that is susceptible to subsidence could trigger subsidence that has not been observed before.

8.10.4.3 Effects on Beneficial Users and Land Use

An undesirable result for subsidence would occur if any subsidence were to occur in the Subbasin. Land subsidence can harm critical infrastructure that affects land use and water use, such as roads, drinking water supply systems, diversion structures, and wells.

8.11 Depletion of Interconnected Surface Water SMC

Areas with ISW occur where shallow groundwater may be connected to the surface water system. This SMC applies only to locations of ISW, as shown on Figure 4-13.

The SVIHM is used to identify the locations of ISW and to develop an estimate of the quantity and timing of stream depletions due to pumping during historical and GSP baseline groundwater conditions. Shallow groundwater and surface water levels simulated by the SVIHM are used to identify the location of interconnection and evaluate the frequency with which different stream

reaches are connected with groundwater in the underlying aquifer. The magnitude of stream depletions in relation to shallow groundwater elevations in interconnected reaches are evaluated in Chapter 5.

As described in Chapter 7, depletion of ISW due to pumping is monitored and assessed based on shallow groundwater levels near locations of ISW.

8.11.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable depletion of ISW in the Subbasin is defined as:

- Depletion from groundwater extraction that would result in a significant and unreasonable impact on other beneficial uses and users such as riparian water rights holders, appropriative surface water rights holders, ecological surface water users, and recreational surface water uses.
- Shallow groundwater levels near locations of ISW below those observed in 2015. While a documented determination of whether past depletions was significant is not available, staying above 2016 groundwater levels was determined to be a reasonable balance for all the beneficial uses and users.

These significant and unreasonable conditions were determined based on input collected during the development of 2022 GSPs, the 180/400 Subbasin Committee, and discussions with GSA staff. There is no data that determines what level of depletion from groundwater extraction or what groundwater levels have a significant adverse effect on steelhead trout or other beneficial use or user of. Should there be a determination regarding what level of depletion from groundwater extraction is significant, SVBGSA will take that into consideration as it reviews how it locally defines significant and unreasonable conditions for the SMC in the 5-Year periodic evaluation.

8.11.2 Minimum Thresholds

The minimum thresholds 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.

The minimum thresholds for depletion of ISW are shallow groundwater elevations 1 foot higher than those observed in 2015 near locations of ISW.

No minimum thresholds are established for times when flow in a river is due to conservation releases from a reservoir. One purpose for these conservation releases is to recharge the Salinas Valley. Therefore, depletion of conservation releases is a desired outcome, and the minimum thresholds and measurable objectives do not apply to these flows.

As discussed in Chapter 7, the monitoring network for ISW is composed of shallow groundwater monitoring well(s). The monitoring network is dependent on the location of ISW established in Chapter 4. Table 8-7 includes the minimum thresholds and measurable objectives for the existing ISW RMS well. This well did not have exceedance of the minimum threshold in 2020. This table does not include the new monitoring well SVBGSA added to the monitoring network, after GSP Amendment 1 was drafted. Once this well has approximately 5 years of groundwater elevation measurements, SMC will be established.

Table 8-6. Depletion of ISW Minimum Thresholds and Measurable Objectives

Monitoring Site	GSP Baseline (2020) Groundwater Elevation (feet)	Minimum Threshold (feet)	Measurable Objective (feet)
16S/05E-31P02	89.3	80.0*	94.7

*Groundwater elevation estimated

8.11.2.1 Information Used and Methodology for Establishing Depletion of Interconnected Surface Water Minimum Thresholds

8.11.2.1.1 Establishing Groundwater Elevations as Proxies

The GSP Regulations §354.28(d) states that: “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 evaluation of ISW in the Salinas Valley is based on an approach recommended by the Environmental Defense Fund (EDF, 2018) that uses groundwater elevations as surrogates for streamflow depletion rates caused by groundwater use. Basic hydraulic principles state that groundwater flow is proportional to the difference between groundwater elevations at different locations along a flow path. Using this basic principle, groundwater flow to a stream, or conversely seepage from a stream to the underlying aquifer, is proportional to the difference between water elevation in the stream and groundwater elevations at locations away from the stream. Assuming the elevation in the stream is relatively stable, changes in interconnectivity between the stream and the underlying aquifer is determined by changes in groundwater levels in the aquifer. Thus, the change in hydraulic gradient between stream elevation and surrounding groundwater elevations is representative of change in interconnection between surface water and groundwater. Monitoring the hydraulic gradient in the aquifer adjacent to the stream monitors the interconnectivity between stream and aquifer. Therefore, the gradient can be monitored by measuring and evaluating groundwater elevations at selected shallow monitoring wells near streams. No existing estimations of the quantity and timing of depletions of ISW exist, nor data available to make estimations, so the hydraulic principles provide the best available information.

8.11.2.1.2 Review of Beneficial Uses and Users of Surface Water

The various beneficial uses and users of surface waters were addressed when setting the ISW depletion minimum thresholds. The classes of beneficial uses and users that were reviewed include riparian rights holders, appropriative rights holders, ecological surface water users, and recreational surface water users. This is not a formal analysis of public trust doctrine, but it is a reasonable review all uses and users in an attempt to balance all interests. This was not an assessment about what constitutes a reasonable beneficial use under Article X, Section 2 of the California Constitution. The minimum thresholds for depletion of ISW are developed using the definition of significant and unreasonable conditions described above, public information about critical habitat, locations of ISW derived from the SVIHM, and public information about water rights described below.

Riparian water rights holders. Table 8-7 provides a summary of water diversions reported to the SWRCB by water rights holders on the Salinas River and its tributaries within the 180/400 Subbasin. The diversion data were obtained from queries of the SWRCB eWRIMS water rights management system. The diversion data are self-reported by water-rights holders with points of diversion located within the Subbasin. Some of the diversions shown in Table 8-8 are also reported to MCWRA as groundwater pumping.

The SVBGSA is not aware of any current water rights litigation or water rights enforcement complaints by any riparian water rights holders in the Subbasin. Therefore, SVBGSA assumes that the minimum threshold level of depletion has not injured any riparian water rights holders in the Subbasin.

Table 8-7. Reported Annual Surface Water Diversions in the 180/400 Subbasin

Diversions (Acre-Feet)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Statement of Diversion and Reported Riparian Diversions	6,524	7,205	9,172	8,912	8,251	7,628	7,786	7,842	7,118	7,756

Appropriative water rights holders. MCWRA is the only appropriative water right holder in the 180/400 Subbasin. The SVBGSA is not aware of any current water rights litigation or water rights enforcement complaints by any appropriative rights holders in the Subbasin. Therefore, SVBGSA assumes that the minimum threshold level of depletion has not injured any appropriative water rights holders in the Subbasin.

Ecological surface water users. Review of MCWRA's Nacimiento Dam Operation Policy (MCWRA, 2018) and MCWRA's water rights indicates MCWRA operates the Dam in a manner

that meets downstream demands and considers ecological surface water users. Since the reservoir operations consider ecological surface water users and reflect reasonable existing surface water depletion rates, this GSP infers that stream depletion from existing groundwater pumping is not unreasonable. If further river management guidelines are developed to protect ecological surface water users, the SMC in this GSP will be revisited.

Recreational surface water users. No recreational activities such as boating regularly occur on surface water bodies in the Subbasin.

As shown by the analysis above, the minimum threshold rate of surface water depletion is not having a known unreasonable impact on the various surface water uses and users in the Subbasin. Therefore, the minimum thresholds are based on 2015 groundwater elevations, when surface water depletions were not unreasonable.

8.11.2.2 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The minimum thresholds for depletion of ISW are set to 1 foot above 2015 groundwater elevations in the shallow monitoring wells within the Subbasin. The minimum thresholds all reference the same historical year and have existed simultaneously in the past. Therefore, no conflict exists between minimum thresholds measured at various locations within the Subbasin.

The depletion of ISW minimum threshold could influence other sustainability indicators as follows:

- **Chronic lowering of groundwater levels.** The depletion of ISW minimum thresholds are set at the groundwater level minimum thresholds. Therefore, the ISW minimum thresholds will not result in chronic lowering of groundwater elevations.
- **Reduction in groundwater storage.** The depletion of ISW minimum thresholds are set at the change in storage minimum thresholds, which are the same as the groundwater level minimum thresholds. Therefore, the ISW minimum thresholds will not result in an undesirable loss of groundwater storage.
- **Seawater intrusion.** The depletion of ISW minimum thresholds do not promote additional pumping that could exacerbate seawater intrusion. Therefore, seawater intrusion will not be affected by the depletion of ISW minimum thresholds.
- **Degraded water quality.** The depletion of ISW minimum thresholds do not promote decreasing groundwater elevations that lead to exceedance of groundwater quality minimum thresholds. Therefore, groundwater quality will not be affected by the ISW minimum thresholds.

- **Land subsidence.** The depletion of ISW minimum thresholds do not promote additional pumping that could cause subsidence. Therefore, subsidence will not be affected by the ISW minimum thresholds.

8.11.2.3 Effect of Minimum Thresholds on Neighboring Basins and Subbasins

The 180/400 Subbasin has 4 neighboring subbasins within the Salinas Valley:

- The Langley Subbasin to the north
- The Eastside Subbasin to the east
- The Forebay Subbasin to the south
- The Monterey Subbasin to the southwest

The SVBGSA is either the exclusive GSA or is one of the coordinating GSAs for the adjacent Subbasins. Because SVBGSA jurisdiction includes all these subbasins, the SVBGSA is coordinating the development of the minimum thresholds and measurable objectives for all these subbasins. The 180/400 Subbasin GSP was submitted in 2020, was approved in 2022, and GSP Amendment 1 was submitted in 2025. GSPs for the other Salinas Valley subbasins were submitted in 2022 and approved in 2023. Amendments for all Salinas Valley subbasins have been developed together for submittal in 2027. Minimum thresholds for this Subbasin have been reviewed relative to information developed for the neighboring subbasins' GSPs to ensure that these minimum thresholds will not prevent the neighboring subbasins from achieving sustainability.

The Pajaro Valley Basin lies directly to the north of the Subbasin. Although a small portion of the 180/400 Subbasin does drain into Elkhorn Slough to the north, there are no locations of ISW between the Pajaro Valley and the 180/400 Subbasin due to clay in the Elkhorn Slough that inhibits recharge to groundwater. Therefore, the minimum thresholds for depletion of ISW does not influence the ability of Pajaro Valley to achieve sustainability.

8.11.2.4 Effect on Beneficial Uses and Users

The *Salinas River Long-Term Management Plan* (MCWRA, 2019) includes a list of 18 different designated beneficial uses on certain reaches of the Salinas River. In general, the major beneficial uses on the Salinas River are:

- Surface water diversions for agricultural supply
- Groundwater pumping from recharged surface water
- Freshwater habitat
- Rare, threatened, or endangered species, such as the Steelhead Trout

The depletion of ISW minimum thresholds may have varied effects on beneficial users and land uses in the Subbasin.

Agricultural land uses and users. The depletion of ISW minimum thresholds prevent lowering of groundwater elevations adjacent to certain parts of streams and rivers beyond historical lows. The measurable objectives are higher than the minimum thresholds, providing flexibility for groundwater extraction needed during droughts or periods of low reservoir releases. These minimum thresholds are considered less restrictive for agricultural land users than higher thresholds and help protect downstream users. However, pumping limitations may be needed to maintain groundwater levels above minimum thresholds if there are insufficient PMAs available.

Urban land uses and users. The depletion of ISW minimum thresholds prevents lowering of groundwater elevations adjacent to certain parts of streams and rivers below historical lows. The measurable objectives are higher than the minimum thresholds, providing flexibility for groundwater extraction needed during droughts or periods of low reservoir releases. Minimum thresholds higher than historical levels help protect downstream users, but they may limit the amount of urban pumping near rivers and streams. However, pumping limitations may be needed to maintain groundwater levels above minimum thresholds if there are insufficient PMAs implemented. If pumping is limited beyond historical levels, municipalities may have to obtain alternative sources of water to achieve urban growth goals. If this occurs, this may result in higher water costs for municipal water users.

Domestic land uses and users. The depletion of ISW minimum thresholds help protect existing domestic land users and uses near locations of ISW from groundwater elevation declines below historical lows by maintaining shallow groundwater elevations near streams and protecting the operability of relatively shallow domestic wells.

Ecological land uses and users. The depletion of ISW minimum thresholds help address ecological uses and users by preventing low groundwater levels near locations of ISW beyond what was historically experienced. Additionally, by setting future groundwater levels at or above recent lows, there should be less impact to ecological users than experienced at the start of SGMA.

8.11.2.5 Relation to State, Federal, or Local Standards

There are no explicit federal, state, or local standards for depletion of ISW. However, both state and federal provisions call for the protection and restoration of conditions necessary for endangered and threatened species.

8.11.2.6 Method for Quantitative Measurement of Minimum Threshold

The SVIHM is used to identify areas of ISW and will help determine when any flow in a river is primarily due to conservation releases from Nacimiento and San Antonio reservoirs. Groundwater elevations measured in shallow wells adjacent to these areas of ISW will serve as the primary approach for monitoring depletion of ISW. As discussed in Chapter 7, existing shallow wells will be added, or new shallow wells will be installed to monitor groundwater elevations adjacent to surface water bodies during GSP implementation. There may be areas in the 180/400 Subbasin that this approach may not be applicable, and additional analysis may need to be conducted from these areas.

New shallow monitoring wells installed pursuant to the GSP will not have data from 2015. Minimum thresholds for those wells will be estimated based on the first few years of groundwater elevation measurements.

8.11.3 Measurable Objectives

The measurable objectives for depletion of ISW target groundwater elevations that are higher than the minimum thresholds. The measurable objectives are consistent with the chronic lowering of groundwater elevation and reduction in groundwater storage measurable objectives.

The measurable objectives for depletion of ISW are shallow groundwater elevations observed in 2003 near locations of ISW.

8.11.3.1 Methodology for Setting Measurable Objectives

The depletion of ISW measurable objectives are set to be identical to the groundwater level measurable objectives. The methodology for establishing measurable objectives is outlined in Section 8.6.2.1. Groundwater elevations from 2003 were selected as representative of the measurable objectives for the 180/400 Subbasin.

8.11.3.2 Interim Milestones

The interim milestones leading to the depletion of ISW measurable objectives are included in Table 8-8 for the existing well in the ISW monitoring network.

Table 8-8. Depletion of ISW Interim Milestones

Monitoring Site	GSP Baseline (2020) Groundwater Elevation (feet)	Interim Milestone at Year 2025 (feet)	Interim Milestone at Year 2030 (feet)	Interim Milestone at Year 2035 (feet)	Measurable Objective (feet) (goal to reach at 2040)
16S/05E-31P02	89.3	90.6	90.6	92.0	93.3

8.11.4 Undesirable Result

8.11.4.1 Criteria for Defining Undesirable Result

By regulation, 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 ISW depletion.

Streamflow depletion in the Subbasin is complicated by many factors, such as reservoir releases, recharge of the aquifer from streamflow, losses to vegetation, and ET. The ISW SMC applies to depletion of ISW from groundwater use and is monitored by proxy through groundwater elevations. For SGMA compliance purposes, the default assumption is that groundwater elevations below 2015 levels near locations of ISW represent depletions that are not significant and unreasonable. Any additional groundwater level declines would likely be an undesirable result that must be addressed under SGMA. There is currently no biological opinion or habitat conservation plan that indicates additional protection is needed for species protected under the Endangered Species Act; however, if it is determined that additional protection is needed and streamflow loss is due to groundwater extraction, not surface water flows, SVBGSA will adapt as necessary to adhere to environmental laws.

8.11.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result for the depletion of ISW include the following:

- **Localized pumping increases.** Even if the Subbasin is adequately managed at the Subbasin scale, increases in localized pumping near ISW bodies could reduce shallow groundwater elevations.
- **Expansion of riparian water right water use.** Riparian water rights holders pump from wells adjacent to streams. Pumping by riparian water rights holder users is not regulated under this GSP. Additional riparian pumping near interconnected reaches of rivers and streams may result in excessive localized surface water depletion.
- **Changes in Nacimiento and San Antonio Reservoir Releases.** Since the Salinas River is dependent on reservoir releases for sustained flows for SRDF operations and minimum flow requirements for environmental purposes, releases at low levels could cause undesirable results. The ability to avoid undesirable results for ISW is partially dependent on reservoir operations.
- **Departure from the GSP's climatic assumptions, including extensive, unanticipated drought.** Minimum thresholds were established based on anticipated future climatic conditions. Departure from the GSP's climatic assumptions or

extensive, unanticipated droughts may lead to excessively low groundwater elevations that increase surface water depletion rates.

8.11.4.3 Effects on Beneficial Users and Land Use

Undesirable results for depletion of ISW due to pumping could have negative effects on beneficial users and land uses. Groundwater levels below historical lows near locations of ISW could reduce surface water available for riparian water rights holders, appropriative water rights holders, ecological water uses, and recreational water uses.

SVBGSA will work with MCWRA and state and federal agencies, including National Marine Fisheries Service (NMFS), to further evaluate the effects of shallow groundwater levels near locations of ISW on surface water users and land uses.