SUSTAINABLE MANAGEMENT CRITERIA

11 INTRODUCTION TO SUSTAINABLE MANAGEMENT CRITERIA

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

☑ **23 CCR § 354.22**

The Sustainable Groundwater Management Act (SGMA) legislation defines "Sustainability Goal" as "the existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure that the applicable basin is operated within its sustainable yield" (California Water Code [CWC] § 10721(u)). SGMA legislation further defines "Sustainable Groundwater Management" as "the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results" (CWC § 10721(v)). Consistent with these regulations, the Basin Groundwater Sustainability Agencies (GSAs) have defined "groundwater management" as GSA actions related to groundwater recharge or extraction within the Basin.

SGMA requires each Groundwater Sustainability Plan (GSP) to develop and implement plans to meet the defined Sustainability Goal (CWC § 10727(a)) and to include Measurable Objectives (MOs) and Interim Milestones (IMs) in increments of five years to achieve the Sustainability Goal within 20 years of the implementation of the 2020 GSPs (CWC § 10727.2(b)(1)).

The SGMA legislation and California Code of Regulations Title 23 (23 CCR) Division 2 Chapter 1.5 Subchapter 2 define terms related to achievement of the Sustainability Goal, including:

- Undesirable Result – "one or more of the following effects caused by groundwater conditions occurring throughout the basin:
  (2) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.
  (3) Significant and unreasonable reduction of groundwater storage.
  (4) Significant and unreasonable seawater intrusion.
  (5) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.
  (6) Significant and unreasonable land subsidence that substantially interferes with surface land uses.

(7) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water." (CWC § 10721(x));

- Minimum Threshold (MT) – "a numeric value for each sustainability indicator used to define undesirable results" (23 CCR § 351(t));
- Measurable Objective – "specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin" (23 CCR § 351(s)); and,
- Interim Milestone – "a target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan" (23 CCR § 351(q)).

Collectively, the Sustainability Goal, Undesirable Results, MTs, MOs, and IMs are referred to herein as Sustainable Management Criteria (SMCs).

The GSP Emergency Regulations specify how GSAs must establish SMCs for each applicable Sustainability Indicator. **Sections 12** and **13** describe the Sustainability Goal, Undesirable Results, MTs, and MOs and IMs developed as part of this GSP.

11.1 Summary of Sustainable Management Criteria

Table SMC-1 summarizes the SMCs for each Sustainability Indicator established for the Delta-Mendota Subbasin (Basin). The SMCs development process and justification are detailed in **Section 13**. Groundwater conditions relative to the established SMCs will be evaluated in the Basin's Annual Reports and monitored within the Basin's Representative Monitoring Network (**Section 14**).

Table SMC-1. Summary of Sustainable Management Criteria

Sustainability Indicator	Undesirable Results Criteria	Minimum Threshold	Measurable Objective
Chronic Lowering of Groundwater Levels	At least one of the following occurs as a result of groundwater management within the Basin: 1. Groundwater levels decline below the established MTs in 25 percent or more of the RMW-WLs for two consecutive years, or 2. More than 10 drinking water wells are reported as dry in any given year, or 3. More than 170 drinking water wells are cumulatively reported dry by 2040 (10 wells per year over 17 years).	2015 Low Groundwater Elevation (Measured or Approximated Based on Available Data and Allowing for a Minimum of 20 Feet of Operational Flexibility Between the MO and MT)	2015 High Groundwater Elevation (Measured or Approximated)
Reduction in Groundwater Storage	Chronic Lowering of Groundwater Levels Used as a Proxy	Chronic Lowering of Groundwater Levels Used as a Proxy	Chronic Lowering of Groundwater Levels Used as a Proxy

Sustainability Indicator	Undesirable Results Criteria	Minimum Threshold	Measurable Objective
Seawater Intrusion	Not Applicable	Not Applicable	Not Applicable
Degraded Water Quality	MTs for a groundwater quality COC are exceeded in 15 percent of the RMW-WQs in three consecutive semiannual monitoring events and are caused by groundwater management within the Basin.	The greater concentration of either: 1. The applicable health-based screening standard (i.e., the MCL). 2. The baseline condition at each RMW-WQ, defined as the average measured concentrations in either: (1) the last calendar year with data in the period of 2010-2014; or if no data are available from 2010-2014, (2) the first calendar year with data after 2014 plus the maximum annual fluctuation range.	MT concentration for each RMW-WQ and COC.
Land Subsidence	The extent or rate of subsidence exceeds the applicable MT at any RMS-LS as a result of groundwater management within the Basin, based on a 5-year moving average.	Extent: 2.0 ft of cumulative subsidence between 2020 and 2040; Rate: Maximum five year moving average rate of 0.2 ft/year of subsidence	Extent: 0.0 ft of cumulative subsidence after 2040 Rate: 0.0 ft/yr of subsidence after 2040
Interconnected Surface Water	MT is exceeded for two consecutive years caused by groundwater extraction within the Basin.	Model-estimated Basin-wide depletion rate of 12,000 AFY.	Model-estimated Basin-wide depletion rate of 6,700 AFY.

Abbreviations:
AFY = Acre-Feet per Year
COC = Constituent of Concern
ft/year = Feet per Year
MO = Measurable Objective
MT = Minimum Thresholds
RMS = Representative Monitoring Site
RMS-LS = Representative Monitoring Site for Land Subsidence
RMW-WL = Representative Monitoring Well for Chronic Lowering of Groundwater Levels
RMW-WQ = Representative Monitoring Well for Degraded Water Quality

12 SUSTAINABILITY GOAL

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

☑ **23 CCR § 354.24**

The Sustainable Groundwater Management Act (SGMA) requires that a Sustainability Goal be defined for each basin (California Water Code [CWC] § 10727(a)). The Sustainability Goal adopted by all of the Groundwater Sustainability Agencies (GSAs) in the Delta-Mendota Subbasin is defined below:

> "The Delta-Mendota Subbasin will manage groundwater resources for the benefit of all users of groundwater in a manner that allows for operational flexibility, ensures resource availability under drought conditions, and does not negatively impact surface water diversion and conveyance and delivery capabilities. This goal will be achieved through the implementation of the proposed projects and management actions to reach identified measurable objectives and milestones through the implementation of the Groundwater Sustainability Plan, and through continued coordination with neighboring subbasins to ensure the absence of undesirable results by 2040."

13 SUSTAINABILITY INDICATORS

13.1 Chronic Lowering of Groundwater Levels

13.1.1 Undesirable Results for Chronic Lowering of Groundwater Levels

§ 354.26. Undesirable Results
(a) Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.
(b) The description of undesirable results shall include the following:
(1) The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.
(2) The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.
(3) Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.
(c) The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.
(d) An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.

☑ **23 CCR § 354.26(a)**

Per the Sustainable Groundwater Management Act (SGMA), Undesirable Results for the Chronic Lowering of Groundwater Levels are defined as a “chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon” (California Water Code [CWC] § 10721(x)(1)). However, it is important to note that SGMA also states that “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” (CWC § 10721(x)(1)).

The Undesirable Result for Chronic Lowering of Groundwater Levels is defined herein as follows:

> *Undesirable Results would be experienced if and when chronic declines in groundwater levels occur as a result of groundwater management within the Basin that diminish access to groundwater, causing significant and unreasonable effects to beneficial uses and users of groundwater.*

Some fluctuations in groundwater levels are expected, and a reduction in the groundwater level alone will not constitute an Undesirable Result. Rather, a decrease in groundwater level will be considered an Undesirable Result if that decrease both occurred over the long term and if the depletion rose to the level of significant and unreasonable as defined by this Groundwater Sustainability Plan (GSP). Consistent with the requirements of SGMA, overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and groundwater recharge are managed to offset this overdraft.

13.1.1.1 Identification of Beneficial Users

Beneficial users of groundwater in the Basin are identified in **Table PA-6** and include two primary groups: groundwater pumpers and environmental beneficial users. As such, the definition of Undesirable Results considers potential impacts to groundwater production wells (including drinking water wells) and groundwater dependent ecosystems (GDEs).

For groundwater pumpers, Undesirable Results may be experienced as water levels declining below pump intakes or the top of screens and/or reductions in well yields. These conditions could be triggered when extended (multi-year) drought conditions and associated severe cutbacks on imported surface water supply lead to extended periods of groundwater pumping in excess of recharge in the Basin. Such conditions could result in the loss or diminishment of water supply for groundwater users and a need for supplemental supplies at a time when they may be unavailable.

If the lowering of groundwater levels results in wells incapable of supporting their beneficial uses, that condition will be viewed as an Undesirable Result. However, it should be noted that other factors – such as well age, poor well design, and well integrity-related impacts – can also affect wells and should not be considered as part of the "significant and unreasonable" determination. For example, over 6 percent of existing Basin wells with production or unknown use were constructed before 1970[38] and would reasonably have to be replaced due to expected average life spans for wells regardless of SGMA implementation or lowering of groundwater levels (**Section 5.1.5**; **Table PA-5**). As such, careful assessments of local water levels and well conditions are needed to determine if any observed well impacts are Undesirable Results that are directly attributable to changes in the groundwater levels in the Basin, and not to some other factor (for example, aging equipment).

For GDEs, Undesirable Results may be experienced as a reduction in soil moisture available for evapotranspiration (ET) when water levels fall below the rooting depth of GDE vegetation. This can induce water stress and adversely affect the overall health, growth, and reproductive capabilities of certain vegetative species.

13.1.1.2 Potential Causes of Undesirable Results

☑ **23 CCR § 354.26(b)(1)**

Potential causes of Undesirable Results related to Chronic Lowering of Groundwater Levels could include increased pumping and/or reduced recharge. Since the primary use of groundwater in the Basin is for agricultural purposes, increased groundwater pumping could occur if water use per acre on irrigated land increases due to a change in the cultivated crop or if the area of irrigated land increases with additional acreage put into agricultural production. Additionally, increased pumping for municipal use could occur if groundwater demand increases to supplement a shortage in imported surface water or due to population

[38] Wells constructed before 1970 are considered likely to have been abandoned or replaced by the adoption date of this GSP. Use of 1970 as the threshold for a typical well lifespan is consistent with screening conducted as part of the Community Water Center's Drinking Water Tool: https://drinkingwatertool.communitywatercenter.org/.

growth (i.e., new development or increased density as a result of redevelopment). Reduced recharge could occur due to increased agricultural irrigation efficiency, climate change that results in decreased precipitation, decreased natural surface water inflows, increased ET, increase in impervious area due to urban development, and/or decreased deliveries of imported surface water supplies.

13.1.1.3 Criteria Used to Define Undesirable Results

☑ **23 CCR § 354.26(b)(2)**
☑ **23 CCR § 354.26(c)**

As discussed further below in **Section 13.1.2** and in **Section 14.2.1**, the Minimum Thresholds (MTs) for groundwater levels have been established at 108 Representative Monitoring Wells for Chronic Lowering of Groundwater Levels (RMW-WLs) in the two principal aquifers with consideration of well depths and groundwater level trends. Per Title 23 of the California Code of Regulations (23 CCR) § 354.26(b)(2), the description of Undesirable Results must include the criteria used to define when and where the effects of groundwater conditions cause Undesirable Results, based on a quantitative description of the combination of MT exceedances that cause significant and unreasonable effects in the Basin.

Based on the significant and unreasonable effects described above, the criteria for Undesirable Results for Chronic Lowering of Groundwater Levels are as follows:

Undesirable Results for Chronic Lowering of Groundwater Levels would be experienced in the Basin if and when at least one of the following conditions occur as a result of groundwater management within the Basin:

1. *Groundwater levels decline below the established MTs in 25 percent or more of the RMW-WLs for two consecutive years (i.e., eight consecutive quarterly measurements), or*
2. *More than 10 drinking water wells are reported as dry in any given year, or*
3. *More than 170 drinking water wells are cumulatively reported dry by 2040 (i.e., the total if 10 drinking water wells are impacted every year from 2023 to 2040).*

The criteria for Undesirable Results are justified based on results from a well impact analysis and analysis of GDE health trends detailed in **Sections 8.8.2** and **13.1.2.4** and summarized below.

Through consideration of economic factors, the Groundwater Sustainability Agencies (GSAs) have determined that it is reasonable to potentially mitigate an average of 10 drinking water wells per year during the next 17 years (i.e., a total of 170 wells through 2040, or approximately 8 percent of existing drinking water wells) through the Basin's Well Mitigation Policy (**Section 16.1.7**). The well impact analysis (**Section 13.1.2.4**) shows that a maximum of 98 drinking water wells could be dewatered if all RMW-WLs exceeded their established MTs, which falls within the reasonable scope (i.e., up to 170 wells) for the GSAs to address through mitigation measures. As such, these Undesirable Results criteria avoid significant and unreasonable effects to groundwater pumpers.

Furthermore, the analysis of GDE trends presented in **Section 8.8.2** indicates that GDE health has generally improved during the recent 10-year period from 2013 to 2022. The MTs for Chronic Lowering of Groundwater Levels are set at each RMW-WL as the lowest groundwater elevation recorded in 2015 (a critically dry year). While declining groundwater levels could cause GDE health to decline relative to current conditions, it is not anticipated that GDE health will deteriorate beyond the observed conditions in 2015 if water levels in only 25 percent of RMW-WLs decrease to 2015 levels. In addition, post-drought water levels have demonstrated a resilience of the aquifer to recover to pre-2015 water levels (**Section 8.2.4.2**). As such, this Undesirable Results criteria is considered protective of significant and unreasonable effects to GDEs.

The component of the criteria requiring two consecutive years of MT exceedances provides for confirmation that the lowering of groundwater levels is chronic and not an anomaly. Additionally, this Undesirable Results definition also requires that an Undesirable Result be caused by groundwater management actions. In the event that an MT exceedance occurs in any individual RMW-WL, the GSAs have committed to taking immediate and responsive action to investigate the potential cause of and mitigate the MT exceedance (**Section 16.1.7**). As discussed in **Section 15**, the GSAs will strive through the use of Projects and/or Management Actions (P/MAs) to maintain water levels at or above the Measurable Objectives (MOs), which are in all cases set above the MTs.

13.1.1.4 Potential Effects of Undesirable Results

☑ **23 CCR § 354.26(b)(3)**

The primary potential effect of Undesirable Results caused by Chronic Lowering of Groundwater Levels is groundwater well dewatering. Well dewatering can be detrimental to wells as it can lead to increased maintenance costs (e.g., well rehabilitation/redevelopment/deepening and/or pump lowering) and reduced well lifespan due to corrosion of well casings and screens. As discussed above, a well impact analysis was conducted to assess which, if any, wells would be potentially dewatered if groundwater levels in RMW-WLs were to decline to the established MTs.

Additional potential effects of long-term declining groundwater levels include increased pumping lift and effects on correlated Sustainability Indicators. Increased pumping lift results in more energy use per unit volume of groundwater pumped and corresponding higher pumping costs, as well as increased wear and tear on well pump motors and reduced well efficiency. Potentially correlated Sustainability Indicators include Reduction of Groundwater Storage, Land Subsidence, Depletion of Interconnected Surface Waters (ISW), and Degraded Water Quality, although the degree of correlation will continue to be explored as part of GSP implementation.

13.1.2 Minimum Thresholds for Chronic Lowering of Groundwater Levels

§ 354.28. Minimum Thresholds

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

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

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

(2) The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.

(3) How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.

(4) How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.

(5) How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.

(6) How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4

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

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

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

(B) Potential effects on other sustainability indicators.

Chronic Lowering of Groundwater Levels is arguably the most fundamental Sustainability Indicator, as it influences several other key Sustainability Indicators, including Reduction of Groundwater Storage, Land Subsidence, Depletions of ISW, and, potentially, Degraded Water Quality. Groundwater levels are also the most readily available and measurable metrics of groundwater conditions, which allows for a systematic, data-driven approach to the development of MTs to be applied.

13.1.2.1 Minimum Threshold Development

☑ **23 CCR § 354.28(a)**
☑ **23 CCR § 354.28(b)(1)**
☑ **23 CCR § 354.28(c)(1)**

Consistent with the 23 CCR § 354.28(c), the definition of MTs for the Chronic Lowering of Groundwater Levels in the Basin is based on the consideration of trends in historical groundwater levels, projected water use in the Basin (i.e., by beneficial users), and the relationship to other Sustainability Indicators. Specifically, the information and criteria relied on to establish MTs for the Chronic Lowering of Groundwater Levels includes historical water level data within the Basin, including data from the 108

RMW-WLs, and well construction information (i.e., for consideration of impacts to beneficial users; **Section 13.1.2.4**).

Per SGMA regulations, "The plan may, but is not required to, address undesirable results that occurred before, and have not been corrected by, January 1, 2015." (CWC § 10727.2(b)(4)). As such, the MT for the Chronic Lowering of Groundwater Levels at each RMW-WL was established as the lowest groundwater level recorded in calendar year 2015[39] ("2015 Low"), which was classified as a critically dry year (California Department of Water Resources' [DWR's] San Joaquin Valley Index). Therefore, the 2015 Low represents a baseline condition of Undesirable Results. A decline of water levels beyond the 2015 Low suggests that Undesirable Results may be occurring.

Some of the RMW-WLs do not have groundwater elevation measurements from 2015. As such, the following methodology was used to establish the MT as either the actual or interpolated 2015 Low at each RMW- WL based on available historical water level data. As discussed further in **Section 13.1.3**, the MO at each RMW-WL was set as the highest groundwater level recorded in calendar year 2015 ("2015 High"). A minimum margin of operational flexibility of 20 feet (ft) was established between the MO and the MT based on the Basin-wide average fluctuation of water levels during the 2012-2016 drought period (**Appendix K**). If the MT set using the methodology above was less than 20 ft below the MO, the MT was lowered to meet the requirement for minimum margin of operational flexibility.

Unless otherwise noted, it is assumed that all MTs are groundwater elevations are in feet above mean sea level (ft msl).

1. **If the RMW-WL has at least two groundwater elevation measurements recorded in 2015**: The MT was set as the 2015 Low and the MO was set as the 2015 High. This method was used to set MTs in 49 out of 108 RMW-WLs. In 19 of these RMW-WLs, the MT was lowered beyond the 2015 Low to allow for at least a 20-foot margin of operational flexibility.

   MT (ft msl) = Recorded 2015 Low

   MO (ft msl) = Recorded 2015 High

2. **If the RMW-WL only has one groundwater elevation measurement recorded in 2015**: The single 2015 measurement was taken as the 2015 High[40] or MO, and the MT was set as the 2015 High minus the minimum margin of operational flexibility (20 ft; see below). This method was used to set MTs in 12 out of 108 RMW-WLs.

   MT (ft msl) = Recorded 2015 High – 20 ft

   MO (ft msl) = Recorded 2015 High

---

[39] In most of the Basin, seasonal low groundwater elevations are observed during the fall (October to December) after the summer irrigation season. One exception is within the Grassland GSA Group region, where groundwater elevations are typically higher during the fall than the spring due to operations at the Grassland National Wildlife Refuge (NWR). A substantial portion of irrigation water is imported, and irrigation of the Grassland NWR continues through late fall. As such, the resulting recharge results in a mounding effect and increases local groundwater elevations in the fall. As such, the 2015 Low considers the entire calendar year, not only the seasonal low historically recorded by DWR in the fall.

[40] The 2015 High is the highest (or only) groundwater level measurement recorded in 2015. The MO was set as the 2015 High, as described in **Section 13.1.3**.

3. **If the RMW-WL does not have a groundwater elevation measurement recorded in 2015 but has groundwater elevation measurements recorded both before and after 2015**: A linear trend was calculated between the most recent measurement prior to January 1, 2015, and the earliest measurement after December 31, 2015. The MT was set as the linearly interpolated elevation for October 2015, and the MO was set at the linear interpolated elevation for March 2015. This method was used to set MTs and MOs in four out of 108 RMW-WLs, and in all four wells, the MTs were lowered to account for at least a 20-foot margin of operational flexibility.

   MT (ft msl) = Interpolated October 2015 Elevation

   MO (ft msl) = Interpolated March 2015 Elevation

4. **If the RMW-WL only has groundwater elevation measurements recorded after 2015 <u>and</u> at least one groundwater elevation measurement recorded in 2022**: The MO was set as the 2022 High, and the MT was set as the 2022 Low if there were at least two 2022 data points, or the 2022 High minus 20 feet if there was only one 2022 data point. 2022 was used as a proxy for 2015 because it was the last critically dry year of a multi-year drought, with similar hydrologic conditions as Water Year (WY) 2015. **Appendix K** plots 2015 and 2022 water levels in RMW-WLs with data available in both years and demonstrates that 2022 is a reasonable proxy when 2015 data are not available. This method was used to set MTs in 16 out of 108 RMW-WLs. In 12 of these RMW-WLs, the MT was lowered beyond the 2022 Low to allow for at least a 20-foot margin of operational flexibility.

   MT = 2022 Low or 2022 High – 20 ft

   MO = 2022 High

5. **If the RMW-WL only has groundwater elevation measurement(s) recorded after 2015 <u>and</u> does not have any measurement recorded in 2022**: The MO was set as the average groundwater elevation recorded after 2015, and the MT was set as the MO minus the minimum margin of operational flexibility (20 ft). This method was used to set MTs in one out of 108 RMW-WLs.

   MT (ft msl) = Post-2015 Average – 20 ft

   MO (ft msl) = Post-2015 Average

6. **If the RMW-WL has no groundwater elevation measurements**: The MO was set as the spatially interpolated[41] 2015 High at the RMW-WL location. The MT was set as the MO minus the minimum margin of operational flexibility (20 ft). Groundwater level MTs set using this method are preliminary and will be revised based on data collected at each RMW-WL during GSP implementation. This method was used to set MTs in 24 out of 108 RMW-WLs.

   MT (ft msl) = Interpolated 2015 High – 20 ft

   MO (ft msl) = Interpolated 2015 High

7. **A minimum depth to water of 30 feet below ground surface (ft bgs) was established for all MTs.** If the MT set using the methodology above was shallower than 30 ft bgs, the MT was set to the

[41] Using RMW-WLs with at least one groundwater elevation measurement recorded in 2015, a 2015 High raster was created using Kriging interpolation.

groundwater elevation corresponding to 30 ft bgs and the MO was set to the groundwater elevation corresponding to 10 ft bgs (i.e., 30 ft bgs plus the 20 ft minimum margin of operational flexibility). This minimum depth requirement is intended to be protective of the root zone, based on guidelines from The Nature Conservancy (TNC) that establish a 30-foot maximum rooting depth for plants in the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset. It is noted that the water table is already within a few feet of the ground surface in many portions of the Basin, and groundwater levels in these areas are often managed to prevent damage to the root zone. This method was used to set MTs in two out of 108 RMW-WLs.

$$MT\ (ft\ bgs) \geq 30$$

$$MO\ (ft\ bgs) \geq 10$$

The MTs for Chronic Lowering of Groundwater Levels at each RMW-WL are summarized in **Table SMC-2** and **Figure SMC-1**. In **Table SMC-2**, MTs are listed as both a groundwater elevation and a depth to water. In **Figure SMC-1**, MTs at each RMW-WL are labeled in terms of groundwater elevation and are mapped separately by Upper Aquifer and Lower Aquifer RMW-WLs. Additionally, **Appendix L** contains hydrographs for each RMW-WL showing the MT and MO groundwater levels in relation to available water level data. MTs set using spatially interpolated 2015 groundwater elevations (Method #6) are considered preliminary and will be reestablished using future data collected at each RMW-WL during GSP implementation. For RMW-WLs constructed in the future, GSAs may establish Sustainable Management Criteria (SMCs) using Method #6 or an equivalent method to estimate 2015 groundwater levels.

13.1.2.2 Relationship to Other Sustainability Indicators

☑ 23 CCR § 354.28(b)(2)

The MTs for Chronic Lowering of Groundwater Levels were established to ensure that they are sufficiently protective of Undesirable Results defined for all other relevant Sustainability Indicators to the Basin, as "setting groundwater level MTs at or above 2015 groundwater elevations will avoid undesirable results for other Sustainability Indicators beyond undesirable results that occurred before, and had not been corrected by, January 1, 2015" (SWRCB, 2024).

The specific relationship between Chronic Lowering of Groundwater Levels and other applicable Sustainability Indicators are discussed below:

- Chronic Lowering of Groundwater Levels and Reduction in Groundwater Storage are directly, if not linearly, related. As described in **Section 13.2**, the MTs for Chronic Lowering of Groundwater Levels will not result in a significant loss in storage.
- As discussed in **Section 8.5.2**, few contemporaneous water level and groundwater quality data exist in the same locations for the Basin's constituents of concern (COCs), and where they do exist, no clear correlation between Chronic Lowering of Groundwater Levels and Degraded Water Quality has been established. The potential relationship between the Sustainability Indicators will be further explored during GSP implementation.
- As discussed in **Section 8.6**, historical inelastic Land Subsidence has been attributed to Chronic Lowering of Groundwater Levels, in part due to pumping from the Lower Aquifer (a significant

portion of the observed subsidence is caused by pumping outside of the Basin). The MTs are set to prevent declines in water levels beyond 2015 conditions and are thus intended to prevent additional inelastic Land Subsidence due to groundwater pumping beyond 2015 levels.

- Historic Depletion of ISW has been attributed to Chronic Lowering of Groundwater Levels, potentially due to pumping within the Basin. MTs for Chronic Lowering of Groundwater Levels are set to prevent declines in water levels beyond 2015 conditions, and thus are intended to prevent additional Depletion of ISW.

13.1.2.3 Relationship to Adjacent Basins

☑ **23 CCR § 354.28(b)(3)**

The MTs were established with consideration of adjacent basins by evaluating potential impacts to groundwater level gradients along the Basin boundaries. **Figure SMC-2** and **Figure SMC-3** show groundwater levels under the Basin's MTs relative to actual Fall 2015 groundwater levels in the Upper Aquifer and Lower Aquifer, respectively. Since the MTs are set at the actual or interpolated 2015 Low groundwater levels, water levels under the MTs do not differ significantly from actual Fall 2015 water levels for both the Upper and Lower Aquifers. Therefore, it is not expected that the MTs will substantially alter groundwater level gradients beyond those experienced in 2015.

13.1.2.4 Consideration of Impacts to Beneficial Users

☑ **23 CCR § 354.28(b)(4)**

As discussed in **Section 13.1.1**, the primary beneficial users of groundwater in the Basin include groundwater pumpers and environmental beneficial users. The MTs were developed in consideration of preventing significant and unreasonable impacts to these groups of groundwater users and are justified by the well impact analysis and analysis of GDE trends presented below.

Well Impact Analysis

One factor to consider when setting MTs for the Chronic Lowering of Groundwater Levels is the potential for the dewatering of wells or well screens (DWR, 2017a). The Basin has two principal aquifers: an unconfined to semi-confined Upper Aquifer and a confined Lower Aquifer. Dewatering of well screens is primarily anticipated to occur in the unconfined to semi-confined Upper Aquifer, while Chronic Lowering of Groundwater Levels in the confined Lower Aquifer would primarily result in increased compaction causing land subsidence. Wells screened in both principal aquifers were included in the well impact analysis.

Through the Basin's Well Mitigation Program (**Section 16.1.7**), the GSAs have determined that it is reasonable for mitigation to be required at an average of 10 drinking water wells per year over the next 17 years (i.e., a total of 170 wells through 2040, or up to approximately 8 percent of existing drinking water wells in the Basin). A well impact analysis was conducted to estimate the number of drinking water wells that would be impacted under the MTs, and whether this number is within the reasonable scope for the GSAs to address through mitigation actions. For completeness, the analysis included an assessment of potential impacts to all production wells, not just drinking water wells.

As discussed in **Section 5.1.5**, DWR's Online System of Well Completion Reports (OSWCR) database was used to estimate the total number of water supply wells in the Basin. It is estimated that there are up to 2,177 domestic wells, 68 public supply wells, 1,292 other production wells, and 1,449 wells of unknown use (4,986 total wells) within the Basin. However, for purposes of well impact analysis, the OSWCR dataset has certain limitations. In particular, records for many wells lack construction information (i.e., total depth and/or screen depth), and it is therefore not possible to assess whether those wells would be impacted at MTs for purposes of this well impact analysis. Further, many of these wells may have already been impacted prior to 2015, which would be considered a "pre-SGMA" Undesirable Result and thus outside of the purview of this GSP to remedy (discussion below).

In consideration of these factors, the following screening process (modified from the process described in **Section 5.1.5**) was employed on the complete OSWCR dataset to establish a subset of wells to use in the well impacts analysis. It should be noted that the screening process described below is used only for estimating the number of drinking water wells expected to be impacted by MT exceedance and will not be used for determining eligibility under the Well Mitigation Program (**Section 16.1.7**).

1. *Remove wells not used for groundwater production (i.e., monitoring, remediation, injection, test, vapor extraction, and cathodic wells)* ***– removed 951 wells***
2. *Remove wells missing well construction information* ***– removed 1,282 wells***

   Exclusion of well records that are missing well construction information is consistent with SWRCB's methodology to assess impacts of proposed MTs in the Tulare Lake Subbasin (SWRCB, 2023e).

3. *Remove wells with unknown use that are less than 50 ft bgs* ***– removed 157 wells***

   Domestic wells are the shallowest production well type in the Basin. However, 97.5 percent of known domestic wells in the Basin are deeper than 50 ft bgs. Therefore, shallow wells with unknown use are not expected to include a high percentage of shallow domestic wells or wells used for production and were therefore removed from the analysis.

4. *Remove wells that were already impacted prior to 2015* ***– removed 205 wells***

   To determine if wells were already impacted prior to 2015, 2014 low groundwater levels were spatially interpolated between all Basin wells with 2014 data provided by the GSAs or available from the California Statewide Groundwater Elevation Monitoring program (CASGEM) using Kriging. The resulting surface was compared with 80 percent of the bottom of screen depth or total depth of each well. A well was considered "impacted" if the interpolated 2014 low depth to groundwater was below 80 percent of the bottom of screen or total well depth[42].

5. *Remove wells constructed before 1970* ***– removed 336 wells***

   Wells constructed before 1970 are considered likely to have been abandoned or replaced by the adoption date of this GSP. Use of 1970 as the threshold for a typical well lifespan is consistent with screening conducted as part of the Community Water Center's Drinking Water Tool: https://drinkingwatertool.communitywatercenter.org/.

[42] Total well depth was used when bottom of screen depth was not available.

Following this screening process, a total of 3,519 wells were considered for this well impact analysis (2,033 domestic wells, 65 public supply wells, 1,149 agricultural production wells, 50 industrial wells, and 222 wells with unknown use type). Construction records for these wells were used to designate wells as Upper or Lower Aquifer[43] and were compared to the spatially interpolated MT values (as a depth below ground surface) across the Basin. A well was considered "impacted" if the interpolated MT depth to groundwater was below 80 percent of the bottom of screen or total well depth. It is recognized that a wide range of well impacts may occur based on the various potential combinations of RMW-WLs that could exceed MTs. As such, the well impact analysis considered the following four scenarios, three of which consider the criteria for Undesirable Results (i.e., 25 percent of RMW-WLs reaching MTs). The analysis presented in this GSP was conducted with the 2,033 domestic wells and 65 public supply wells (2,098 total drinking water wells) since the Well Mitigation Policy is designed to address impacts to drinking water wells. **Appendix L** contains a well impacts analysis that includes all well types, including agricultural and industrial wells.

- *Scenario #1 - Worst Case*: The worst-case well impacts scenario is defined as the number of wells that would be impacted if all 108 RMW-WLs reach their MTs. To evaluate this scenario, the depths of wells within the Basin were compared to the spatially interpolated MT groundwater depth at each well location. Locations of impacted wells under this scenario are shown in **Figure SMC-4.**
- *Scenario #2 - High-End Bracketed Results*: This scenario evaluates the upper range of potential well impacts that would occur under the 25 percent threshold for Undesirable Results (**Section 13.1.1.3**). For this analysis, each impacted well from Scenario #1 was assigned to the nearest RMW-WL. The 25 percent of RMW-WLs with the *highest* number of nearby impacted wells were identified, and the total impacted wells assigned to these RMW-WLs were counted. Results from this scenario are shown in **Figure SMC-5**.
- *Scenario #3 - Low-End Bracketed Results:* Similar to Scenario #2, this scenario evaluated the lower range of potential well impacts that would occur under the 25 percent threshold for Undesirable Results. In this scenario, the 25 percent of RMW-WLs with the *lowest* number of nearby impacted wells were identified, and the total impacted wells assigned to these RMW-WLs were counted. Results from this scenario are shown in **Figure SMC-6**.
- *Scenario #4: Stochastic Prediction*: This scenario evaluates the average well impacts that would occur under the 25 percent threshold for Undesirable Results using stochastic predictive modeling. This analysis considered 5,000 random combinations of the 25 percent of RMW-WLs that exceed MTs to determine a distribution of well impacts. A histogram of the range of well impacts is shown in **Figure SMC-7,** and the average number of impacted wells is shown in **Table SMC-3**.

The results of the well impacts analysis for each scenario are shown in **Table SMC-3** below. These results show that even in the worst-case scenario where all RMW-WLs decline to MT groundwater levels, a maximum of 98 drinking water wells are expected to be impacted, a total which is within the scope of the

[43] Wells were designated as Upper Aquifer if the bottom of screen depth (or 80 percent of the total depth, when bottom of screen depth was not recorded) is shallower than the bottom depth of the Corcoran Clay. Wells were designated as Lower Aquifer if the bottom of screen depth (or 80 percent of the total depth) was deeper than the bottom depth of the Corcoran Clay. This designation conservatively designates more wells as the Upper Aquifer, to be assessed against shallower MTs.

Well Mitigation Policy (**Section 16.1.7**) to address. The well impacts analysis that considers all production well types (**Appendix M**) shows that a maximum of 158 total wells are expected to be impacted Basin-wide.

Table SMC-3. Well Impact Analysis Results – Drinking Water Wells

Scenario	Impacted Drinking Water Well Count[1]	Estimated Depletion of Drinking Water Supply (AFY)[2]	Percentage of WY 2022 Urban Use
#1: Worst Case	98	980	4.5 percent
#2: High-End Bracketed	87	870	4.0 percent
#3: Low-End Bracketed	0	0	0 percent
#4: Stochastic Prediction	25	250	1.1 percent

Abbreviations:
AFY = acre-feet per year
WY = Water Year

Notes:
1. Impacted drinking water wells only include domestic wells. There are not anticipated to be any impacted public supply wells.
2. Average pumping for drinking water wells is conservatively estimated to be 10 AFY. This estimate is derived from WY 2022 pumping rates for domestic and public supply wells. However, it is noted that the impacted wells in **Table SMC-3** only include domestic wells, which typically have a lower average pumping rate than public supply wells and therefore would result in a lower depletion of supply.

Reported WY 2022 pumping volumes (Delta-Mendota GSAs, 2023) and well counts in the OSWCR dataset were used to estimate average annual pumping by well type (Note 2 of **Table SMC-3**). Based on these average pumping values and the number of impacted wells presented in **Table SMC-3**, it was determined that at most (i.e., under Scenario #1: Worst Case), 98 impacted drinking water wells (all domestic wells) would result in a loss of 980 acre-feet per year (AFY) of supply, which is approximately 4.5 percent of the Basin's urban groundwater use. This depletion of supply is not considered to be significant and unreasonable, and the MTs were determined to be sufficiently protective of all groundwater pumpers, including drinking water wells users. Furthermore, the GSAs have adopted a policy to address MT exceedances observed in any individual RMW-WL as they occur (**Section 16.1.7**).

Analysis of GDE Trends

There are a total of 74,308 acres of combined vegetative and wetland GDEs within the Basin, a majority of which (88 percent) are located within the Grassland GSA Group (**Figure GWC-66** and **Figure GWC-67**). As described in **Section 8.8.2**, an analysis of the Normalized Derived Vegetation Index (NDVI) metric was performed to estimate vegetation greenness and provide a proxy for vegetation growth (or overall GDE health) between 2013 and 2022. This analysis indicates that GDE health has generally improved during the recent 10-year period from 2013 to 2022. While GDE health would be expected to decline relative to current conditions if groundwater levels in RMW-WLs reach MTs, due to recent increasing trends, it is expected that the reduction in GDE health will remain within the historical range observed in the post-SGMA period. As such, the MTs are considered to be sufficiently protective of GDEs.

13.1.2.5 Consideration of State, Federal, or Local Standards

☑ **23 CCR § 354.28(b)(5)**

There are no state, federal, or local standards in the Basin that relate to the Chronic Lowering of Groundwater Levels Sustainability Indicator.

13.1.2.6 Measurement of Minimum Thresholds

☑ **23 CCR § 354.28(b)(6)**

Groundwater levels will be measured in each of the 108 RMW-WLs at least quarterly using the monitoring protocols outlined in **Section 14.3.1**.

13.1.3 Measurable Objectives and Interim Milestones for Chronic Lowering of Groundwater Levels

§ 354.30. Measurable Objectives

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

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

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

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

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

(f) Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.

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

13.1.3.1 Measurable Objective Development

☑ **23 CCR § 354.30(a)**
☑ **23 CCR § 354.30(b)**
☑ **23 CCR § 354.30(c)**

The MOs for Chronic Lowering of Groundwater Levels were established based on historical groundwater levels in the Basin's 108 RMW-WLs. Specifically, the MOs are set as the highest groundwater elevation recorded in calendar year 2015 ("2015 High"). Similar to the MT development, when 2015 data were not available at an RMW-WL, the 2015 High was linearly interpolated from historical data or spatially interpolated from 2015 High data in other RMW-WLs. The detailed process for setting of MOs (and MTs) under different conditions of groundwater level data availability is described in **Section 13.1.2.1**.

As described in DWR's *Sustainable Management Criteria Best Management Practices* (BMP) document (DWR, 2017a), MOs should be set such that there is a reasonable margin of operational flexibility (or "margin of safety") between the MT and the MO to accommodate droughts, climate change, conjunctive use operations, or other groundwater management activities. Therefore, the margin of operational flexibility within the Basin is the difference between the MT and the MO. As discussed in **Section 13.1.2.1**, the GSAs determined that a minimum margin of operational flexibility of 20 feet between the MO and MT would be sufficient to accommodate fluctuations in water levels, and the MTs were adjusted accordingly. It should be noted that the MOs do not act as a cap on water levels, and the GSAs may manage groundwater to elevations higher than the MOs. However, it is noted that across many portions of the Basin, the water table is already within a few feet of the ground surface, as shown in the hydrographs for several RMW-WLs (**Appendix L**). Groundwater levels in these areas are often managed to prevent damage to the root zone of the agricultural crops.

The resultant MOs and margins of operational flexibility for each of the RMW-WLs in the Basin are shown in **Table SMC-2** and **Figure SMC-8**. In **Figure SMC-8**, the MOs at each RMW-WL are labeled in terms of groundwater elevation and are mapped separately by Upper Aquifer and Lower Aquifer RMW-WLs.

13.1.3.2 Interim Milestones Development

☑ **23 CCR § 354.30(a)**
☑ **23 CCR § 354.30(e)**

The Interim Milestones (IMs) for Chronic Lowering of Groundwater Levels are defined as follows based on the MTs and MOs and are shown in **Table SMC-2** in five-year increments.

- For RMW-WLs where the most recent groundwater elevation measurement[44] was above the MT, the IM is to maintain water levels above the MT and reach MO groundwater elevation (or higher) by 2040.
- For RMW-WLs where the most recent groundwater elevation measurement was below the MT or for RMW-WLs that do not have a recent groundwater elevation measurement, the IM is to increase water levels above the MT by 2025 and reach MO groundwater elevation (or higher) by 2040.

[44] "Most recent" is defined as WY 2022 or WY 2023. For RMW-WLs that did not have WY 2022 or WY 2023 measurements, the IM is set as a linear glide path between the MT and the MO.

13.2 Reduction of Groundwater Storage

13.2.1 Undesirable Results for Reduction of Groundwater Storage

☑ **23 CCR § 354.26(a)**

Per SGMA, an Undesirable Result for the Reduction of Groundwater Storage means a “significant and unreasonable reduction of groundwater storage” (CWC § 10721(x)(1)). The Undesirable Result for Reduction of Groundwater Storage is defined herein as follows:

> *Undesirable Results would be experienced if and when a reduction in storage in each aquifer negatively affects the long-term viable access to groundwater for the beneficial uses and users within the Basin. Specifically, significant and unreasonable effects would include a reduction in usable groundwater storage of more than 10 percent in each aquifer relative to the Fall 2014 usable groundwater storage volume.*

A reduction in the usable groundwater storage volume of 10 percent corresponds to the change in storage between the Fall 2014 and MT groundwater levels in the Upper Aquifer[45] (see **Section 13.2.3**). As discussed in **Section 13.1.3.1**, MO groundwater levels were set as the 2015 High and provide a reasonable margin of operational flexibility from the MT, which is set as the 2015 Low. Therefore, the change in storage that corresponds to the margin of operational flexibility between the MT and MO is not considered to be significant or unreasonable, as it is tied to average Basin-wide seasonal fluctuation in groundwater storage.

13.2.1.1 Identification of Beneficial Users

The beneficial users for the Reduction of Groundwater Storage Sustainability Indicator are the same as those for Chronic Lowering of Groundwater Levels described in **Section 13.1.1.1**.

13.2.1.2 Potential Causes of Undesirable Results

☑ **23 CCR § 354.26(b)(1)**

Reduction of Groundwater Storage is directly correlated to Chronic Lowering of Groundwater Levels. Therefore, the potential causes of Undesirable Results due to Reduction of Groundwater Storage are generally the same as the potential causes listed above for Undesirable Results due to Chronic Lowering of Groundwater Levels (i.e., increased groundwater pumping and reduced recharge). Because of the direct correlation between groundwater elevation and groundwater storage volume, groundwater levels are used to measure conditions for this Sustainability Indicator.

13.2.1.3 Criteria Used to Define Undesirable Results

☑ **23 CCR § 354.26(b)(2)**
☑ **23 CCR § 354.26(c)**

[45] As discussed below, the available storage in the Lower Aquifer would remain relatively unchanged at MT groundwater levels.

The criteria used to define Undesirable Results for Reduction of Groundwater Storage are consistent with the criteria used to define Undesirable Results for Chronic Lowering of Groundwater Levels, as follows:

Undesirable Results for Chronic Lowering of Groundwater Levels would be experienced in the Basin if and when at least one of the following conditions occur:

1. *Groundwater levels decline below the established MTs in 25 percent or more of the RMW-WLs for two consecutive years (i.e., eight consecutive quarterly measurements), or*
2. *More than 10 drinking water wells are reported as dry in any given year, or*
3. *More than 170 drinking water wells are cumulatively reported dry by 2040 (i.e., the total if 10 drinking water wells are impacted annually from 2023 to 2040).*

As further detailed in **Section 13.2.2** and **Table SMC-4**, this approach is justified based on calculations of the "SGMA Baseline" (i.e., Fall 2014, just before SGMA became effective) storage volume in the Basin and the volume of storage depletion that will occur if groundwater levels were to decline from Fall 2014 elevations to the Chronic Lowering of Groundwater Levels MTs (which are based on the 2015 Low). These calculations indicate that if all RMW-WLs were to decline from Fall 2014 water levels to their Chronic Lowering of Groundwater Level MTs, the percent of usable storage would decrease by approximately 10 percent in the Upper Aquifer and remain relatively unchanged in the Lower Aquifer, which is equivalent to the reduction of storage that is not deemed to be significant and unreasonable. Furthermore, since the criteria for Undesirable Results for Chronic Lowering of Groundwater Levels is based on only 25 percent of RMW-WLs reaching their MTs, the percent reduction in usable storage volume that would occur at the point of Undesirable Results for Chronic Lowering of Groundwater Levels would be less than 10 percent. This analysis, as detailed in **Section 13.2.2**, demonstrates that the SMCs for Chronic Lowering of Groundwater Levels are protective against significant and unreasonable effects for Reduction of Groundwater Storage.

13.2.1.4 Potential Effects of Undesirable Results

☑ **23 CCR § 354.26(b)(3)**

The primary potential effect of Undesirable Results caused by Reduction of Groundwater Storage on beneficial uses and users of groundwater in the Basin would be reduced groundwater supply reliability. The effect will be most significant during periods of reduced surface water supply availability due to, for example, natural drought conditions, regulatory restrictions, natural disasters, or other causes. However, as discussed below in **Section 13.2.2**, there is significant usable groundwater storage within the Basin and these effects are unlikely to occur over the GSP planning and implementation horizon.

13.2.2 Minimum Thresholds for Reduction of Groundwater Storage

§ 354.28. Minimum Thresholds
(c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(2) Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.
(d) An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.

As discussed above, the Undesirable Results definition for Reduction of Groundwater Storage equates to a volumetric decrease in storage amounting to a reduction in 10 percent of usable supply over the planning and implementation horizon, and the criteria for the Undesirable Results are tied to the Undesirable Results criteria for Chronic Lowering of Groundwater Levels. It is logical to tie these two Sustainability Indicators together since the amount of groundwater in storage is directly, if not linearly, related to groundwater levels. Because of the close relationship between these two Sustainability Indicators, and because the MTs for Chronic Lowering of Groundwater Levels are protective of the beneficial uses and users of groundwater (discussed below), the MTs for Chronic Lowering of Groundwater Levels are used as a proxy for the Reduction of Groundwater Storage Sustainability Indicator.

13.2.2.1 Use of Groundwater Levels as Proxy

☑ **23 CCR § 354.28(c)(2)**
☑ **23 CCR § 354.28(d)**

To support the use of MTs for Chronic Lowering of Groundwater Levels as proxy for Reduction of Groundwater Storage, the volume of "usable storage" in the Basin was calculated based on aquifer properties estimated in the Basin's integrated hydrological model (Model; **Section 9**). For each aquifer, the usable storage was assumed to be the average storage coefficient from the Model multiplied by aquifer saturated thickness, based on spatially interpolated water levels from Fall 2014 and at MTs. shows the usable storage volumes calculated using this methodology at both Fall 2014 water levels and at MTs for Chronic Lowering of Groundwater Levels. The estimated usable storage in Fall 2014 is 8,649,619 acre-feet (AF) in the Upper Aquifer and 4,607,156 AF and the Lower Aquifer (13,256,775 AF in total).

If groundwater levels were reduced to the MTs, the reduction of storage would be approximately 893,624 AF (10 percent) in the Upper Aquifer, while storage in the Lower Aquifer would remain relatively unchanged. It is estimated that at average annual pumping rates, the amount of storage available if groundwater levels were reduced to the MTs would be enough to support Basin-wide pumping for at least 32 years in the Upper Aquifer and 20 years from the Lower Aquifer (recognizing that this estimate conservatively does not account for natural recharge).

Table SMC-4. Reduction of Groundwater Storage at Water Level MTs

Aquifer[1]	Usable Storage (AF)			Years of Storage Available at MTs to Support Groundwater Pumping
	Fall 2014	Groundwater Level MTs	Change in Storage (Fall 2014 to MTs)	
Upper Aquifer	8,649,619	7,755,995	-893,624 (-10 percent)	32
Lower Aquifer	4,607,156	4,628,705	21,549 (+0.4 percent)	20

Abbreviations:
AF = acre-feet
AFY = acre-feet per year
MTs = Minimum Thresholds

Since the estimated reduction of storage from Fall 2014 groundwater levels to groundwater level MTs is, at maximum, equivalent to the 10 percent reduction of storage that would constitute an Undesirable Result for Reduction of Groundwater Storage, this demonstrates that the MTs for Chronic Lowering of Groundwater Levels are protective of groundwater storage in the Basin and can be used as proxy for the Reduction of Groundwater Storage Sustainability Indicator. Furthermore, Undesirable Results for Chronic Lowering of Groundwater Levels are triggered when only 25 percent of RMW-WLs reach their MTs. Therefore, the reduction in usable storage that would occur at the point of Undesirable Results for Chronic Lowering of Groundwater Levels would be even lower than 10 percent.

13.2.3 Measurable Objectives and Interim Milestones for Reduction of Groundwater Storage

☑ **23 CCR § 354.30(a)**
☑ **23 CCR § 354.30(c)**
☑ **23 CCR § 354.30(d)**
☑ **23 CCR § 354.30(e)**

Because of the close relationship between the Reduction of Groundwater Storage and Chronic Lowering of Groundwater Levels Sustainability Indicators, SGMA regulation states the MOs for Chronic Lowering of Groundwater Levels may serve as a proxy for Reduction of Groundwater Storage, and it is not necessary to set a unique MO for Reduction of Groundwater Storage. **Table SMC-5** demonstrates that the MOs for Chronic Lowering of Groundwater Levels provide an adequate margin of operational flexibility in terms of groundwater storage (over 850,000 AF in the Upper Aquifer and over 175,000 AF in the Lower Aquifer).

Table SMC-5. Margin of Operational Flexibility in Groundwater Storage

Aquifer[1]	Usable Storage (AF)		
	Groundwater Level MOs	Groundwater Level MTs	Margin of Operational Flexibility
Upper Aquifer	8,615,216	7,755,995	859,221 (10 percent)
Lower Aquifer	4,804,416	4,628,705	175,711 (3.7 percent)

Abbreviations:
AF = acre-feet MO = Measurable Objective MTs = Minimum Thresholds

Notes:
1. Upper Aquifer assumed to be Model layers 1-8; Lower Aquifer assumed to be Model layers 9-13.

13.3 Seawater Intrusion

13.3.1 Undesirable Results for Seawater Intrusion

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

☑ **23 CCR § 354.26(d)**

The GSP Regulations 23 CCR § 354.26(d) state that "An Agency that is able to demonstrate that undesirable results related to one or more Sustainability Indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators". Because the Basin is not located near any saline water bodies, seawater intrusion is not present and not likely to occur. The Seawater Intrusion Sustainability Indicator is therefore not applicable to the Basin, and no Undesirable Results for this Sustainability Indicator are defined herein.

13.3.2 Minimum Thresholds for Seawater Intrusion

§ 354.28. Minimum Thresholds

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

(3) Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following:

(A) Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer.

(B) A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.

…

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

☑ **23 CCR § 354.28(c)(3)**
☑ **23 CCR § 354.28(e)**

The Seawater Intrusion Sustainability Indicator is not applicable for the Basin; therefore, no MTs for this Sustainability Indicator are defined.

13.3.3 Measurable Objectives and Interim Milestones for Seawater Intrusion

The Seawater Intrusion Sustainability Indicator is not applicable for the Basin; therefore, no MOs or IMs for this Sustainability Indicator are defined.

13.4 Degraded Water Quality

13.4.1 Undesirable Results for Degraded Water Quality

☑ **23 CCR § 354.26(a)**

SGMA defines an Undesirable Result for Degraded Water Quality as "significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies" (CWC § 10721(x)).

The Undesirable Result for Degraded Water Quality is defined herein as follows:

> *Undesirable Results would be experienced if and when significant and unreasonable degradation of water quality occurs as a result of groundwater management within the Basin.*

The Basin's approach to Degraded Water Quality reflects the fact that SGMA does not require GSPs to address Undesirable Results that occurred before and have not been corrected by January 1, 2015. (CWC § 10727.2(b)(4)) and that "Sustainable groundwater management" means "the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results." (CWC §10721(v)) (emphasis added). As such, the Undesirable Results definition appropriately focuses on whether water quality conditions have degraded as a result of water management actions since the enactment of SGMA on January 1, 2015. As discussed in **Section 11**, the Basin GSAs have defined "groundwater management" as GSA actions related to groundwater recharge or extraction within the Basin.

Regulatory oversight authority for drinking water quality served by public water systems rests with the SWRCB while regulatory oversight related to discharges of waste that may impact water quality rests with Regional Water Quality Control Boards, as stated in the Porter-Cologne Water Quality Control Act (CWC § 13001):

> *It is the intent of the Legislature that the state board and each regional board shall be the principal state agencies with primary responsibility for the coordination and control of water quality.*

Therefore, measures to address drinking water quality served by public water systems to their respective ratepayers are generally beyond the purview of this GSP, except where directly impacted as a result of groundwater management within the GSAs' control. Specifically, CWC §10726.2-4 authorizes GSAs to do the following to manage water quality in a Basin:

- *Acquire, transport, or import surface water or groundwater*;
- *Transport, reclaim, purify, desalinate, treat, or otherwise manage and control polluted water, wastewater, or other waters for subsequent use in a manner that is necessary or proper to carry out the purposes of this part*; and
- *Regulate groundwater extractions*.

Regulatory oversight and enforcement actions have and will occur on their own mandated timelines and in accordance with SWRCB Division of Drinking Water's permitting, reporting, and enforcement processes. Water quality issues related to discharges of constituents onto the ground or into groundwater are regulated separately by the Central Valley Regional Water Quality Control Board (CVRWQCB) and the United States Environmental Protection Agency (USEPA). The above notwithstanding, the Basin GSAs will continue to coordinate with these entities and programs in the collection, sharing, and analysis of applicable data.

13.4.1.1 Identification of Beneficial Users

The Basin GSAs have identified all drinking water users (i.e., domestic, public supply, and small community wells) as the beneficial users most sensitive and potentially vulnerable to the Degraded Water Quality Sustainability Indicator due to the potential adverse impacts that Degraded Water Quality could have on human health. Per CWC §106.3(a), all drinking water users of groundwater are considered beneficial users with a human "right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes."

By prioritizing the protection of the most vulnerable groundwater users, the Degraded Water Quality SMCs are inherently designed to ensure the protection of all beneficial users in the Basin. The MTs for Degraded Water Quality are set at the higher of state drinking water standards or baseline (i.e., pre-SGMA) conditions, which GSAs are not required remedy per CWC § 10727.2(b)(4)). Other beneficial uses of groundwater, such as for agricultural irrigation, are considered to be sufficiently protected by Title 22 drinking water quality standards, which are consistent with the groundwater Water Quality Objectives for domestic or municipal supply (MUN) in the CVRWQCB Water Quality Control Plan (Basin Plan) (CVRWQCB, 2019) [46]. Furthermore, this GSP establishes a water quality monitoring network with sufficient Basin-wide coverage to monitor impacts to all beneficial users (see **Section 14.2.4**).

13.4.1.2 Potential Causes of Undesirable Results

☑ **23 CCR § 354.26(b)(1)**

Undesirable Results caused by Degraded Water Quality are the result of increases in concentrations of COCs in groundwater above the MTs. These increases in concentration can occur through a variety of processes, some of which are causatively related to groundwater management activities and under the purview of the GSAs, and some of which are not. The following are examples of potential actions that may lead to degraded groundwater quality:

- Lateral migration from adjacent areas with poorer quality groundwater;
- Leaching from internal sources such as fine-grained, clay-rich interbeds;
- Recharge from managed recharge projects;

[46] Some crops may be sensitive to salinity at concentrations below the drinking water Upper Secondary MCL, and therefore more vulnerable to degradation of water quality. However, the Basin Plan does not specify a groundwater Water Quality Objective for agricultural supply. Per 23 CCR § 354.28, the MTs in this GSP are tied to existing regulatory thresholds; therefore, drinking water users are considered the most vulnerable beneficial user.

- Deep percolation of some portion of ineffective precipitation;
- Irrigation system backflow into wells and flow through well gravel pack and screens from one formation to another;
- Deep percolation of excess applied irrigation water and other water applied for cultural practices (e.g., for soil leaching); and,
- Natural occurrence and prevalence from geologic formations. It is noted that wells screened in portions of the Subbasin with naturally degraded water quality are not within the purview of the GSAs to remedy.

13.4.1.3 Criteria Used to Define Undesirable Results

☑ **23 CCR § 354.26(b)(2)**
☑ **23 CCR § 354.26(c)**

Based on the significant and unreasonable effects described above, the criteria for Undesirable Results for Degraded Water Quality are as follows:

Undesirable Results for Degraded Water Quality are defined to occur within the Basin if and when MTs for a groundwater quality COC are exceeded in 15 percent of the Representative Monitoring Wells for Degraded Water Quality (RMW-WQs) in three consecutive semiannual monitoring events and are caused by groundwater management within the Basin.

The 15 percent threshold for Undesirable Results was established to provide flexibility in recognition that significant portions of the Basin have naturally degraded water quality conditions and that approximately 12 percent of all Basin wells (and 15 percent of Upper Aquifer wells) already exhibited increasing TDS concentrations prior to January 1, 2015 (see **Section 8.5.2.5**). Furthermore, any MT exceedance or degradation of water quality is significant, but if this degradation reflects existing regional conditions beyond GSA control, it may not be unreasonable. As explained in **Section 8.5.2**, concentrations of TDS and nitrate, the Basin's best documented COCs, often rise and fall independently of local water levels, indicating that they are not driven by pumping or recharge in the Basin. The requirement of three consecutive MT exceedances allows the GSAs to collect at least two data points from the same season of two consecutive years, in addition to one measurement from the opposite season for comparison. This is necessary to evaluate whether the measurements are representative, particularly given the variability of concentrations of COCs such as TDS. Collecting three data points enables the GSAs to assess whether water quality impacts are a result of declining water levels or groundwater management actions, or if increases in concentrations of COCs are isolated occurrences or related to sampling, well construction, discharges from other entities, or other factors. Since the samples are collected approximately once every six months, the time elapsed between the first and third measurements needed to identify an Undesirable Result will be approximately one year, enabling a prompt response.

As discussed in **Section 13.4.2**, the MTs have or will be established at all RMW-WQs for all SWRCB-identified COCs[47] in the Basin (SWRCB, 2022), which include arsenic, nitrate (as nitrogen or N), total, total dissolved solids (TDS), 1,2,3-trichloropropane (1,2,3-TCP), gross alpha radioactivity, and hexavalent chromium (chromium VI). The GSAs have committed to taking immediate and responsive action in the event of any MT exceedance through the Basin's Water Quality MT Exceedance Policy (see **Section 16.1.7**), which requires evaluation of the MT exceedance to determine if Degraded Water Quality is occurring as a result of groundwater management actions in the Basin.

13.4.1.4 Potential Effects of Undesirable Results

☑ **23 CCR § 354.26(b)(3)**

The potential effects of Undesirable Results caused by Degraded Water Quality on beneficial uses and users of groundwater may include:

- Increased costs to treat groundwater to drinking water standards if it is to be used as a potable supply source or secure another source of drinking water if treatment options are not available;
- Increased costs to blend relatively poor-quality groundwater with higher quality sources for drinking water users; and,
- Potential reduction in the usable volume of groundwater in the Basin if large areas are impaired to the point that they cannot be used to support beneficial uses and users.

13.4.2 Minimum Thresholds for Degraded Water Quality

§ 354.28. Minimum Thresholds
(c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(4) Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.

The GSP Regulations 23 CCR § 354.28(c) state that the MT for Degraded Water Quality shall be the "degradation of water, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results". The GSP Emergency Regulations further state that the MT "shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin", and that "the Agency shall consider local, state, and federal water quality standards applicable to the basin." This language indicates that MTs for Degraded Water Quality can reasonably be based on concentrations of water quality COCs, as quantified by sampling measurements at RMW-WQs.

[47] MTs were established for all analytes identified by SWRCB except for nitrate + nitrite. As shown in **Appendix I**, exceedances of nitrate + nitrite primarily coincide with nitrate exceedances. Therefore, nitrate is considered to be the dominant species and MTs set for nitrate should be sufficiently protective of nitrate + nitrite.

As discussed in **Section 13.4.1**, the process for developing SMCs for COCs considers the role the regulatory authority granted to GSAs to affect sustainable groundwater management under SGMA, which includes the management of the quantity, location, and timing of groundwater pumping and recharge. The Basin set MTs for all SWRCB-identified COCs for the Basin, which include arsenic, nitrate as N, TDS, 1,2,3-TCP, gross alpha radioactivity, and chromium VI (SWRCB, 2022).

The MTs for Degraded Water Quality are or will be set at the Basin's 90 RMW-WQs. The MTs are tied to regulatory water quality standards – namely, the Basin Plan Water Quality Objectives for groundwater, which, at minimum, require groundwater quality to meet existing CCR Title 22 Drinking Water Standards for each COC. As discussed above, it is consistent with GSP regulations to try to maintain concentrations of each COC at or below regulatory drinking water quality standards, or for wells that were already impacted before the SGMA effective date, to try and maintain concentrations at their pre-SGMA baseline levels.

13.4.2.1 Minimum Threshold Development

☑ **23 CCR § 354.28(a)**
☑ **23 CCR § 354.28(b)(1)**
☑ **23 CCR § 354.28(c)(4)**

The MT for Degraded Water Quality is set as the greater concentration of either: (1) the applicable health-based screening standard (**Table SMC-6**), or (2) the baseline condition at each RMW-WQ, as defined below.

Baseline conditions are defined as the average measured concentrations in either: (1) the last calendar year with data in the period of 2010-2014 plus the maximum annual fluctuation range observed at each RMW-WQ; or (2) if no data are available from 2010-2014, the first calendar year with data after 2014 plus the maximum annual fluctuation range observed at each RMW-WQ. An illustrative example using the baseline condition to set the MT is provided in **Figure SMC-9**.

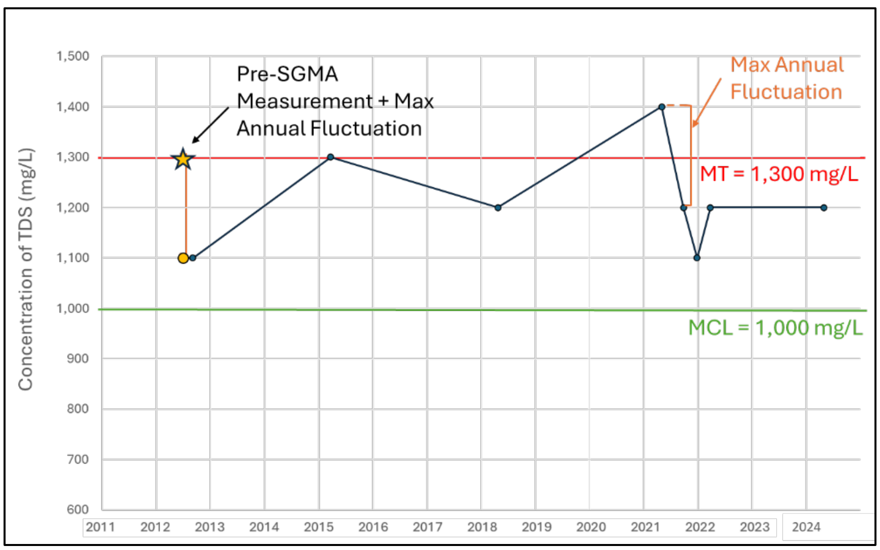


Figure SMC-9. Illustrative Example of Water Quality MT Methodology

Use of a baseline condition acknowledges that a significant portion of the Basin has historically degraded water quality (**Section 8.5.2**), and that "the plan may, but is not required to, address undesirable results that occurred before, and have not been corrected by, January 1, 2015." (CWC § 10727.2(b)(4)). Additionally, **Appendix I** demonstrates that for several RMW-WQs with sufficient historical data, concentrations of COCs in the last year with data from calendar years 2010-2014 and the first year with data after 2014 are relatively similar. This finding justifies the use of the first calendar year with data after

2014 (i.e., a post-SGMA measurement) as the baseline condition when data from calendar years 2010-2014 are not available.

Table SMC-6. Health-Based Screening Standards for COCs

COC	MO	Type
TDS (mg/L)	1,000	Upper Secondary MCL
Nitrate (mg/L)	10	Primary MCL
Arsenic (μg/L)	10	Primary MCL
1,2,3-TCP (μg/L)	0.005	Primary MCL
Gross Alpha (pCi/L)	15	Primary MCL
Hexavalent Chromium (μg/L)	10	Primary MCL

Several RMW-WQs have been added to the Basin's Representative Monitoring Network (RMN) as part of this GSP development process and do not have historical sampling data that can be used to establish a baseline condition. Additionally, SMCs have been set for several additional COCs that were not previously sampled in the Basin's RMN. For these RMW-WQs, the MTs will be established per the methodology described above after the first year of sampling using the concentration from the first year of sampling as the baseline condition. Since each RMW-WQ will be sampled twice annually, a maximum and annual range can be determined for each well currently lacking data. The numbers of RMW-WQs for which MTs for Degraded Water Quality are established by each of the above methods are shown in **Table SMC-7**.

The MTs, as applicable for each RMW-WQ, are shown in **Table SMC-8**.

Table SMC-7. Summary of Degraded Water Quality MT Methodology

MT Method	Count of RMW-WQs					
	TDS	Nitrate	Arsenic	1,2,3-TCP	Gross Alpha	Chromium VI
MT from MCL	41	28	1	1	1	0
MT from pre-SGMA Baseline plus fluctuation range	2	6	0	0	0	1
MT from post-SGMA Baseline plus fluctuation range	17	6	0	0	0	0
Insufficient Data to establish MT	30	50	89	89	89	89

13.4.2.2 Relationship to Other Sustainability Indicators

☑ **23 CCR § 354.28(b)(2)**

The MTs for Degraded Water Quality were designed to ensure that they are sufficiently protective of Undesirable Results defined for all other relevant Sustainability Indicators in the Basin. The specific relationship between Degraded Water Quality and other applicable Sustainability Indicators is discussed below.

- Few contemporaneous and collocated water level and groundwater quality data exist for the Basin's COCs, and where they do exist, no clear correlation between Degraded Water Quality and Chronic Lowering of Groundwater Levels (and Reduction of Groundwater Storage, by proxy), has been established. The relationship (or lack thereof) between water levels and water quality for each COC is described in detail in **Section 8.5.2**. The Basin's proposed monitoring will further clarify the potential relationship between water quality and groundwater management during GSP implementation.
- Land subsidence has been hypothesized to increase arsenic concentrations due to the release of water from clay minerals (Smith et al., 2018). However, this has not been observed in most of the Central Valley, including the Basin (Haugen et al., 2021). Potential increases in arsenic due subsidence will be monitored and managed per the MT for arsenic established at each RMW-WQ. There has been no observed correlation between Land Subsidence and other water quality COCs in the Basin.
- Changes in surface water-groundwater interaction are likely to impact the Upper Aquifer's water quality in areas primarily impacted by San Joaquin River's seepage due to the different water qualities of the River and the underlying Upper Aquifer. However, due to lack of sufficient data, no direct correlation could be discerned between Depletion of ISW and Degraded Water Quality. As more data are gathered from the Representative Monitoring Sites for Depletion of Interconnected Surface Water (RMS-ISW) and RMW-WQ, these correlations will be reassessed and considered.

13.4.2.3 Relationship to Adjacent Basins

☑ **23 CCR § 354.28(b)(3)**

The MTs for Degraded Water Quality are not expected to impact adjacent basins' ability to achieve their sustainability goals, as MTs are set based on regulatory thresholds or baseline concentrations. All adjacent basins have similarly committed to preventing further groundwater quality degradation beyond Maximum Contaminant Levels (MCLs) and/or baseline conditions.

Additionally, the water level MTs are not expected to cause significant changes to existing local groundwater gradients (**Section 13.1.2.3**) and are thus anticipated to be protective in terms of preventing migration of poor-quality water from the Basin.

13.4.2.4 Consideration of Impacts to Beneficial Users

☑ **23 CCR § 354.28(b)(4)**

As identified in **Section 13.4.1.1**, the SMCs for Degraded Water Quality are set to protect drinking water users, who have been identified by the Basin GSAs as the most vulnerable beneficial users. The MTs are set in consideration of regulatory drinking water thresholds, which are considered protective of other beneficial users in the Basin (see **Section 13.4.1.1**).

An analysis was conducted to calculate the number of wells within the Basin in the OSWCR database potentially impacted by COCs during both the pre- and post-SGMA periods. It is noted that nitrate and TDS were the only COCs with sufficient Basin-wide historical water quality records to determine potential well impacts. Other COCs either do not have sufficient spatial coverage (i.e., sampling data are isolated or largely non-detect) or do not have water quality data from both pre- and post-SGMA periods. Impacts of these COCs will be investigated as additional monitoring data are collected during GSP implementation. Historical conditions and known impacts for all COCs are discussed in detail in **Section 8.5.2**.

For these analyses, data compiled from the GSAs and from the SWRCB's Groundwater Ambient Monitoring and Assessment Program (GAMA) Groundwater Information System were used to develop concentration contours based on the methodology from the Central Valley-Salinity Alternatives for Long-term Sustainability's (CV-SALTS') *Region 5: Updated Groundwater Quality Analysis and High Resolution Mapping for Central Valley Salt and Nitrate Management Plan* (San Joaquin Valley Drainage Authority, 2016). Two sets of contours for each COC were developed by averaging data from calendar years 2005-2014 (i.e., pre-SGMA) and 2015-2023 (i.e., post-SGMA) by Public Land Survey System (PLSS) section and interpolating across the Basin. The OSWCR dataset was then overlaid onto the concentration contours, and OSWCR wells in areas of the Basin with concentrations in exceedance of the applicable MCL were considered "impacted". Results of this analysis for nitrate and TDS are presented below.

- **Nitrate: Figure SMC-10** and **Figure SMC-11** show pre-SGMA and post-SGMA concentrations of nitrate in the Upper Aquifer and Lower Aquifer, respectively. As illustrated in these figures, it is estimated that approximately 13 percent of Basin wells are located in areas of the Basin with concentrations of nitrate greater than the primary MCL of 10 milligrams per liter (mg/L as N) for both the pre- and post-SGMA periods. These results indicate that the extent of nitrate contamination in wells is largely a pre-SGMA occurrence, and at a Basin-level, there has not been a significant increase in the number of impacted wells during the SGMA implementation period.
- **Total Dissolved Solids:** During the pre-SGMA period, it is estimated that approximately 46 percent of Basin wells are located in areas with concentrations of TDS greater than the Upper Secondary MCL of 1,000 mg/L, and 5 percent of Basin wells are located in areas with concentrations of TDS greater than 3,000 mg/L. **Figure SMC-12** and **Figure SMC-13** show pre-SGMA and post-SGMA concentrations of TDS in the Upper Aquifer and Lower Aquifer, respectively. As illustrated in these figures, the count of impacted wells in the pre-SGMA period is similar to the count of impacted wells in the post-SGMA period, which indicates that 48 percent and 6 percent of the Basin's wells are located in areas with concentrations of TDS greater than 1,000 mg/L and 3,000 mg/L, respectively. These results indicate a slight increase in impacted wells during the SGMA implementation period and primarily in the eastern portion of the Basin due to the continued migration of the "Western Saline Front" (see **Section 8.5.2.5**).

The water quality well impact analysis demonstrates that a significant number of the Basin wells experienced water quality degraded with TDS and nitrate prior to SGMA's effective date of 2015. As previously discussed, Degraded Water Quality SMCs are established to prevent additional water quality degradation from pre-SGMA conditions. Results from this analysis indicate that since 2015, the percentage of Basin wells impacted by TDS and nitrate have remained relatively unchanged during SGMA implementation.

13.4.2.5 Consideration of State, Federal, or Local Standards

☑ **23 CCR § 354.28(b)(5)**

The State of California and the USEPA set Primary MCLs for constituents that may pose potential human health risks. The SWRCB and the CVRWQCB regulate discharges of waste, including agricultural runoff or percolation, to groundwater or waters of the State through their authority under Porter-Cologne. When regulating discharges of waste, the water boards must implement the Basin Plan (CVRWQCB, 2019), which includes Water Quality Objectives to protect beneficial uses. To protect beneficial uses, the water boards issue waste discharge requirements, which are designed to ensure that discharges of waste do not cause or contribute to exceedances of applicable Water Quality Objectives. Further, public water systems are regulated by the USEPA and SWRCB Division of Drinking Water (DDW) to ensure that water served meets Primary MCLs.

Given that Basin Plan Water Quality Objectives for domestic and municipal supply, which are set as Title 22 drinking water standards, are the most stringent water quality standards regulating groundwater quality in the Basin, it is not appropriate to consider setting the MTs lower than the MCLs. The MTs for Degraded Water Quality are therefore set at the regulatory health-based screening standards (i.e., MCLs); however, compliance with GSP does not excuse GSAs or other entities from any other water quality requirements to which they may be subject. It should be noted that monitoring for all COCs will continue to be conducted at all RMW-WQs, as discussed in **Section 14.3.2**. The Basin GSAs will continue to coordinate (e.g., through data-sharing) with the ILRP, CV-SALTS, and public water systems to support the protection of beneficial uses and users of groundwater.

13.4.2.6 Measurement of Minimum Thresholds

☑ **23 CCR § 354.28(b)(6)**

Compliance with the Degraded Water Quality MTs will be based on monitoring data collected semiannually for the Basin's 90 RMW-WQs in accordance with the monitoring protocols described in **Section 14.3.2**.

13.4.3 Measurable Objectives and Interim Milestones for Degraded Water Quality

☑ **23 CCR § 354.30(a)**
☑ **23 CCR § 354.30(b)**
☑ **23 CCR § 354.30(c)**
☑ **23 CCR § 354.30(e)**

13.4.3.1 Measurable Objective Development

As with the MTs, the MOs for Degraded Water Quality are defined at all RMW-WQs in the Basin for the six COCs: arsenic, nitrate, TDS, 1,2,3-TCP, gross alpha radioactivity, and chromium VI. The MO for Degraded Water Quality is set as the MT concentration for each COC, as shown in **Table SMC-8**, for all RMW-WQs. This MO will allow the Basin to achieve its Sustainability Goal, which is to "…ensure the absence of undesirable results by 2040" (**Section 12**).

13.4.3.2 Interim Milestones Development

Since MOs and MTs are set to the same concentration for each COC, IMs for Degraded Water Quality are also set as the MT concentration for each COC as shown in **Table SMC-8**. These MOs and IMs are set in recognition that several portions of the Basin had degraded water quality prior to 2015, and that it is the GSAs' objective to prevent further degradation of water quality beyond 2015 concentrations.

13.5 Land Subsidence

13.5.1 Undesirable Results for Land Subsidence

☑ **23 CCR § 354.26(a)**

SGMA defines an Undesirable Result for Land Subsidence as "significant and unreasonable land subsidence that substantially interferes with surface land uses" (CWC § 10721(x)). The Undesirable Result for Land Subsidence is defined herein as follows:

> *Undesirable Results would be experienced if and when inelastic land subsidence occurs as a result of groundwater management within the Basin and adversely impacts the ability to use existing critical infrastructure within the Basin. Significant and unreasonable effects associated with Undesirable Results would occur when inelastic land subsidence exceeds protective design standards that have been established for critical infrastructure within the Basin that assume 2.0 feet of additional inelastic subsidence will occur by 2040.*

The above definition of significant and unreasonable effects is tied to existing design and mitigation plans for key infrastructure in the Basin, including the Delta-Mendota Canal (DMC), recognizing that small amounts of subsidence could occur in some locations without negatively affecting the ability to use the critical infrastructure, and that only to the extent that subsidence causes a loss of functional capacity does it qualify as significant and unreasonable. Furthermore, the portion of the definition that specifies land subsidence must occur *"as a result of groundwater extraction within the Basin"* (emphasis added) in order to constitute an Undesirable Result was developed in recognition that subsidence in the southeast portion of the Basin is largely attributed to groundwater extractions occurring in neighboring basins (**Section 8.6**), and management of groundwater extractions outside of the Basin do not fall under the authority of the Basin GSAs granted by SGMA. Nonetheless, the Basin GSAs have taken an active role in mitigating some of the subsidence impacts that occur due to groundwater extractions outside of the Basin, as discussed in **Sections 8.6** and **13.5.2.3**. The Basin GSAs intend to continue coordination with surrounding basins to reverse land subsidence trends that affect the Basin.

13.5.1.1 Identification of Beneficial Users

Critical infrastructure is not defined as a beneficial user in CWC § 10723.2 but is still considered as a land use and property interest in the development of SMCs for Land Subsidence. In this GSP, critical infrastructure refers to essential facilities within the Basin whose loss of functionality due to land subsidence will have significant impacts to beneficial users. As recommended in the *Conceptual Master Plan for Subsidence Monitoring and Management* (Subsidence Master Plan), "subsidence criteria should be set with the consideration of infrastructure tolerance and performance, including new and improved infrastructure" (GSI Environmental Inc., 2022). The primary critical infrastructure in the Basin includes the

DMC, California Aqueduct, Chowchilla Bypass, Fresno Slough, Mendota Pool, and San Joaquin River, which are shown on **Figure SMC-14**.

As discussed below, based on the best available data and information and in close consultation with the entities involved in managing and operating these key critical infrastructure (e.g., the San Luis & Delta Mendota Water Authority [SLDMWA]), the MTs for Land Subsidence were developed based on the protective design standards for some of the most critical infrastructure (e.g., the DMC) but are applied and monitored uniformly throughout the Basin. Therefore, Land Subsidence SMCs are protectively set for all infrastructure in the Basin, not just the most critical infrastructure. Representative Monitoring Sites for Land Subsidence (RMS-LS) have been established along the DMC, California Aqueduct, Chowchilla Bypass, the San Joaquin River and several local canals and other local infrastructure. Additionally, Land Subsidence will be monitored across the entire Basin using Interferometric Synthetic Aperture Radar (InSAR) data published annually by DWR. Additional information about the RMN for Land Subsidence is provided in **Section 14.2.5**.

13.5.1.2 Potential Causes of Undesirable Results

☑ **23 CCR § 354.26(b)(1)**

Land subsidence can be caused by several mechanisms, but the mechanism most relevant to sustainable groundwater management activities under the authority of GSAs is the depressurization of aquifers and aquitards due to lowering of groundwater levels, which can lead to compaction of compressible strata and lowering of the ground surface. Therefore, the potential causes of Undesirable Results due to Land Subsidence are generally the same as the potential causes listed above for Undesirable Results due to Chronic Lowering of Groundwater Levels (i.e., increased pumping and/or reduced recharge).

13.5.1.3 Criteria Used to Define Undesirable Results

☑ **23 CCR § 354.26(b)(2)**
☑ **23 CCR § 354.26(c)**

As discussed in **Section 8.6**, while land subsidence has occurred within the Basin, the most significant subsidence hotspots have occurred outside of the Basin and are associated with cones of groundwater depression in adjacent groundwater basins. By setting SMCs for Land Subsidence, the GSAs are committed to preventing significant and unreasonable effects to beneficial users due to inelastic land subsidence caused by groundwater extraction within the Basin, specifically by not significantly and unreasonably impacting the functionality of critical infrastructure.

Based on the significant and unreasonable effects described above, the criteria for Undesirable Results for Land Subsidence are as follows:

> *Undesirable Results for Land Subsidence would be experienced in the Basin if and when the extent or rate of inelastic subsidence exceeds the applicable MT at any RMS-LS as a result of groundwater management within the Basin, based on a 5-year moving average.*

These criteria for Undesirable Results are justified because the MTs for Land Subsidence are tied back to the design standards for critical infrastructure that assume a maximum of two feet of additional inelastic subsidence by 2040 and elastic subsidence throughout the canal's lifetime (USBR & SLDMWA, 2023). An MT exceedance at any RMS-LS would indicate that land subsidence is locally progressing at a rate that could surpass the permissible extent of subsidence set by protective design standards and interfere with the functionality of that critical infrastructure. The component of the criteria requiring MT exceedances to be based on a 5-year moving average ensures that the rate of land subsidence is long-term and is not due to groundwater level fluctuations or pumping patterns associated with drought or elastic subsidence. In the event of any MT exceedance, the GSAs have committed to taking immediate and responsive action to address subsidence caused by GSA actions within the Basin (**Section 16.1.1.5**).

13.5.1.4 Potential Effects of Undesirable Results

☑ **23 CCR § 354.26(b)(3)**

Potential effects of Undesirable Results caused by inelastic Land Subsidence could include a reduction in conveyance capacity of critical infrastructure (e.g., California Aqueduct, DMC, Chowchilla Bypass, Fresno Slough, Mendota Pool, and San Joaquin River). Land subsidence can also cause damage to other infrastructure, including local conveyance facilities, pumping wells, roads and highways, and gas and petroleum pipelines. For example, subsidence around pumping wells has the potential to affect groundwater heads, damage wellhead facilities, or cause casing failure. Damage to both critical and other infrastructure may increase costs for maintenance, lead to service disruptions, or impact public safety (Borchers et al., 2014). Additionally, potential effects of land subsidence may include a non-recoverable loss of groundwater storage and reductions in transmissive rates of flow through fine-grained layers as compaction occurs in fine-grained layers.

13.5.2 Minimum Thresholds for Land Subsidence

§ 354.28. Minimum Thresholds
(c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(5) Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following:
(A) Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects.
(B) Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.

The MTs for Land Subsidence are defined herein as levels of land subsidence that, if they occurred, would result in significant and unreasonable impacts to critical infrastructure and surface land uses. As discussed above, the California Aqueduct, DMC, Chowchilla Bypass, Fresno Slough, Mendota Pool, and San Joaquin River have been identified as critical infrastructure because a loss of significant functionality due to land subsidence would have significant impacts to beneficial users. The MTs defined below are in terms of total vertical extent of inelastic land subsidence (in feet) as well as a corresponding average annual rate of inelastic subsidence (in feet per year [ft/yr]) measured over a rolling 5-year monitoring period.

13.5.2.1 Minimum Threshold Development

☑ **23 CCR § 354.28(a)**
☑ **23 CCR § 354.28(b)(1)**
☑ **23 CCR § 354.28(c)**

Historical and recent rates of subsidence measured within the Basin in proximity to the critical infrastructure listed above are discussed in **Section 8.6**. The MT extent for Land Subsidence is defined as 2.0 ft of total (cumulative) subsidence between 2020 and 2040. This threshold is based on the extent of subsidence being planned for along the DMC by the DMC Subsidence Correction Project (USBR & SLDMWA, 2023), which is intended to maintain restored capacity in the DMC for at least 50 years (i.e., beyond the SGMA implementation period). Limiting further inelastic land subsidence to 2.0 ft relative to 2020 is also expected to be generally protective of minimum freeboard in the California Aqueduct (DWR, 2017, 2024). The MT rate for Land Subsidence is 0.2 ft/yr for subsidence that is attributable to groundwater management within the Basin, which is intended to be ramped down as outlined in **Table SMC-9** to remain under the MT extent. The MT rate is assessed as an average annual rate over a rolling 5-year monitoring period.

The MT (both as a rate and extent) applies to all 42 of the Basin's Land Subsidence RMS-LS and to the entire Basin based on ongoing local and regional surveys and mapping and InSAR data reported by DWR. Additional information about the RMN for Land Subsidence is provided in **Section 14.2.5**.

13.5.2.2 Relationship to Other Sustainability Indicators

☑ **23 CCR § 354.28(b)(2)**

The MTs for Land Subsidence were established to ensure that they are sufficiently protective of Undesirable Results defined for all other relevant Sustainability Indicators to the Basin. The specific relationship between Land Subsidence and other applicable Sustainability Indicators are discussed below:

- Historical inelastic land subsidence has been attributed to Chronic Lowering of Groundwater Levels, particularly due to pumping from the Lower Aquifer outside of and within the Basin. The MTs for Chronic Lowering of Groundwater Levels are set to prevent declines in water levels beyond 2015 conditions, thus intended to prevent additional Land Subsidence due to pumping within the Basin.
- A potential effect of Undesirable Results due to Land Subsidence is a Reduction of Groundwater Storage due to compaction that can occur in fine-grained layers during groundwater pumping, especially from the Lower Aquifer. As discussed in **Section 13.2**, the Chronic Lowering of Groundwater Levels MTs are used as a proxy for Reduction of Groundwater Storage and were demonstrated to be protective of Undesirable Results due to Reduction of Groundwater Storage. Chronic Lowering of Groundwater Level SMCs are also protective of Undesirable Results due to Land Subsidence. Through the correlation with Chronic Lowering of Groundwater Level SMCs, it is reasonable to conclude that Land Subsidence MTs will not cause an unreasonable Reduction of Groundwater Storage.

- Land subsidence has been predicted to increase arsenic concentrations due to the release of water from clay minerals (Smith et al., 2018; however, this has not been observed in most of the Central Valley, including the Basin (Haugen et al., 2021). Potential increases in arsenic due to subsidence will be monitored and managed per the SMCs established for Degraded Water Quality. There has been no observed correlation between Land Subsidence and other water quality COCs in the Basin.
- No direct correlation has been discerned between ISW and Land Subsidence.

13.5.2.3 Relationship to Adjacent Basins

☑ **23 CCR § 354.28(b)(3)**

The SMCs for Land Subsidence were set to prevent additional inelastic subsidence from occurring after 2040 due to Subbasin groundwater management. This approach is generally consistent with the approach taken in the adjacent Chowchilla and Merced Subbasins. As discussed in **Section 8.6**, higher rates of subsidence in the southeast portion of Basin are associated with the subsidence hotspot in the El Nido-Red Top area in the adjacent Merced Subbasin. In recognition that avoidance of Undesirable Results due to Land Subsidence in the Basin depends crucially on successful management of subsidence hotspots in adjacent basins, the San Joaquin River Exchange Contractors (SJREC) GSA Group has historically taken an active role in subsidence mitigation outside of the Basin (see discussion of the Red Top Subsidence Mitigation Project in **Section 8.6.2**). Coordination regarding the management of the El Nido-Red Top hotspot was also one of the recommendations of the Subsidence Master Plan (GSI Environmental Inc., 2022). The Basin GSAs will continue to coordinate with agencies in adjacent basins during GSP implementation to address subsidence hotspots.

13.5.2.4 Consideration of Impacts to Beneficial Users

☑ **23 CCR § 354.28(b)(4)**

As discussed above, the MT extent of subsidence defined herein is based on the protective design standards established in the DMC Subsidence Correction Project (USBR & SLDMWA, 2023). Limiting further inelastic land subsidence to 2.0 ft relative to 2020 is also expected to be generally protective of minimum freeboard in the California Aqueduct (DWR, 2017b, 2024a). Based on the best available information, these MTs are considered protective of the functionality of the Basin's critical infrastructure and surface land uses. Additionally, subsidence will be monitored relative to the MTs throughout the entire Basin based on InSAR data reported by DWR. Therefore, the subsidence MTs cover all infrastructure in the Basin.

13.5.2.5 Consideration of State, Federal, or Local Standards

☑ **23 CCR § 354.28(b)(5)**

There are no state, federal, or local standards pertaining to land subsidence in the Basin. As previously mentioned, the MTs for Land Subsidence were established to be consistent with the protective design standards for critical infrastructure. Subbasin GSAs have also coordinated closely with key entities in the development of this GSP, including staff from USBR, SLDMWA and GSAs that are responsible for operation of key critical infrastructure within the Basin.

13.5.2.6 Measurement of Minimum Thresholds

☑ **23 CCR § 354.28(b)(6)**

The RMN for Land Subsidence consists of 42 RMS-LS, including 35 survey points, four extensometers, and three continuous Global Positioning System (CGPS) points. Additionally, Land Subsidence will be monitored for the entire Basin using InSAR data published by DWR. The RMN for Land Subsidence will be monitored in accordance with the monitoring protocols outlined in **Section 14.3.3**, which is consistent with the Basin's Conceptual Master Plan (GSI Environmental Inc., 2022).

13.5.3 Measurable Objectives and Interim Milestones for Land Subsidence

13.5.3.1 Measurable Objective Development

☑ **23 CCR § 354.30(a)**
☑ **23 CCR § 354.30(b)**
☑ **23 CCR § 354.30(c)**

The MO for Land Subsidence is set to prevent long-term impacts from subsidence by allowing no additional inelastic subsidence to occur after 2040 as a result of groundwater management in the Basin. The MO extent is set as 0.0 ft after 2040, and the corresponding MO rate is 0.0 ft/yr after 2040.

13.5.3.2 Interim Milestones Development

☑ **23 CCR § 354.30(a)**
☑ **23 CCR § 354.30(e)**

The IMs for Land Subsidence are set in 5-year increments in consideration of the MT and MO subsidence extents (**Table SMC-9**). The IMs ramp down the total allowable subsidence from 1.0 ft between 2020 to 2025 to 0.0 ft after 2040, with a maximum cumulative amount of inelastic subsidence of 2.0 ft from 2020 to 2040 (equal to the MT).

The IMs were developed in recognition that residual subsidence impacts may occur throughout the SGMA implementation period due to the continued compaction of aquifer materials. During the post-SGMA period (2015-2023), the most impacted areas in the southeast portion of the Basin experienced an average annual rate of subsidence of up to 0.37 ft/yr. For these areas of the Basin, the established IM rates are below actual observed rates, highlighting the immediate need for GSA action to address subsidence impacts, both in the Basin and by GSAs in adjacent basins.

Table SMC-9. Land Subsidence SMCs

Criteria	Time Interval	Total Extent (ft)	5-Year Average Rate (ft/yr)
Minimum Threshold	2020 – 2040	2.0	0.2
Measurable Objective	After 2040	0.0	0.0
Interim Milestones	2020 – 2025	1.0	0.2
	2025 – 2030	0.5	0.1
	2030 – 2035	0.25	0.05
	2035 – 2040	0.25	0.05
	After 2040	0.0	0.0

13.6 Interconnected Surface Water

13.6.1 Undesirable Results for Interconnected Surface Water

☑ **23 CCR § 354.26(a)**

SGMA defines an Undesirable Result for Depletion of ISW as "Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water" (CWC § 10721(x)). The Undesirable Result for Depletion of ISW is defined herein as follows:

> *Depletions of ISW as a direct result of groundwater pumping that cause significant and unreasonable impacts on natural resources or downstream beneficial uses and users.*

The Basin's approach to Depletion of ISW reflects the fact that SGMA does not require GSPs to address Undesirable Results that occurred before and have not been corrected by January 1, 2015 (CWC § 10727.2(b)(4)) and that "Sustainable groundwater management" means "the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results." (CWC §10721(v)) (emphasis added). As such, the Undesirable Results definition appropriately focuses on whether ISW has been depleted as a result of water management actions since the enactment of SGMA on January 1, 2015. As discussed in **Section 11**, the Basin GSAs have defined "groundwater management" as GSA actions related to groundwater recharge or pumping within the Basin.

13.6.1.1 Identification of Beneficial Users

ISW within the Basin is identified in **Section 8.7**, consistent with the processes, methodology, and sources articulated in the applicable DWR guidance documents (DWR, 2024b). Beneficial users of surface water in the Basin include surface water rights holders who divert and beneficially use surface water supplies and environmental beneficial users of the surface water in creeks, rivers (including the San Joaquin River), and various refuge areas (DWR, 2017a).

Surface water rights holders within and outside of the Basin divert and distribute water from the San Joaquin River system at various locally controlled surface water diversion points (i.e., intakes) along the river. For these identified beneficial users, Undesirable Results may be experienced as excessive Depletion of ISW that negatively affects the volumes that can be diverted from permitted diversion points from the

San Joaquin River. Additionally, excessive seepage losses from the San Joaquin River could obligate the USBR to release more water from Friant Dam to supply the minimum flows required by the San Joaquin River Restoration Project, making less water available for other uses (US District Court Eastern District of California, 2006).

Environmental beneficial users of surface water rely in whole or in part on surface water to support vegetation and habitat, either directly as in the case of fisheries and riparian vegetation, or indirectly via diversions and deliveries of imported surface water to refuge areas. For these beneficial users, Undesirable Results caused by Depletion of ISW can induce adverse effects on the overall health of those habitats and refuges that rely on streams, rivers, and other ISW features.

13.6.1.2 Potential Causes of Undesirable Results

☑ **23 CCR § 354.26(b)(1)**

Reduced flows in surface water systems can occur for a number of reasons, including hydrology, reduced surface water supply released into the San Joaquin River, reduced recharge, changes to runoff characteristics, increased diversions, reduced return flows, transpiration by non-native vegetation and increased evaporation, and potentially from depletion of ISW caused by increases in groundwater pumping. Quantitative data are currently limited regarding the nature and impacts of these conditions on depletion of ISW features within the Basin.

It should be noted that only depletion of ISW caused by groundwater use are considered Undesirable Results; other causes of depletion are outside of the purview of the GSAs to manage under SGMA. These conditions could be triggered by extended (multi-year) drought conditions and associated surface water management decisions that would impact both in-stream flows and depletion. Such conditions could result in the loss or diminishment of water supply for surface water rights holders and environmental beneficial users, irrespective of groundwater use.

13.6.1.3 Criteria Used to Define Undesirable Results

☑ **23 CCR § 354.26(b)(2)**
☑ **23 CCR § 354.26(c)**

By setting SMCs for Depletion of ISW, the GSAs are committed to preventing significant and unreasonable effects to beneficial users due to depletion of ISW caused by groundwater pumping within the Basin.

Per Section 354.26(b)(2) of the GSP Emergency Regulations, the description of Undesirable Results must include a quantitative description of the combination of MT exceedances that constitute an Undesirable Result. Based on the significant and unreasonable effects described above, the criteria for Undesirable Results for Depletion of ISW are as follows:

> *Undesirable Results for Depletion of ISW would be experienced in the Basin if and when the MT is exceeded for two consecutive years caused by groundwater extraction within the Basin.*

These criteria for Undesirable Results are justified because the MTs for Depletion of ISW (**Section 13.6.2**) are tied back to the surface water depletion rate caused by groundwater extraction (pumping) within the Basin prior to the enactment of SGMA on January 1, 2015. The component of the criteria requiring two consecutive years of MT exceedances provides for confirmation that the Depletion of ISW is chronic and not an anomaly. As described above, the relationship between ISW impacts and groundwater conditions and use has not been definitively determined and the ability of GSAs within the Basin to manage ISW is limited given the significant other factors that could potentially impact beneficial uses and users of ISW (e.g., climate, hydrology, upstream releases, diversions by entities outside of the Basin, pumping in adjacent basins, etc.).

13.6.1.4 Potential Effects of Undesirable Results

☑ **23 CCR § 354.26(b)(3)**

Potential effects of Undesirable Results from Depletion of ISW may include impacts to beneficial users of surface water. Reduced surface flows can negatively affect the ability of surface water rights holders to divert surface water from the San Joaquin River. Moreover, environmental users of surface water may be impacted by reduced flows, including surface flows required for fish migration and cold water habitat. Accordingly, beneficial users of surface water in the Basin were considered by the SMC development for ISW.

13.6.2 Minimum Thresholds for Interconnected Surface Water

§ 354.28. Minimum Thresholds
(c) Minimum thresholds for each sustainability indicator shall be defined as follows:
(6) Depletions of Interconnected Surface Water. The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:
(A) The location, quantity, and timing of depletions of interconnected surface water.
(B) A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.

The GSP Regulations (23 CCR § 354.28(c)) state that the MT for Depletion of ISW "shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." These regulations also state that groundwater and surface water models can be used to quantify surface water depletion. Estimates of depletions within the Basin therefore rely on application of the numerical surface water-groundwater flow model (Model) that has been developed for the Basin (**Section 9**). Accordingly, depletion rates caused by groundwater use within the Basin estimated by the Model were utilized to determine the SMCs for the Depletion of ISW.

13.6.2.1 Minimum Threshold Development

☑ **23 CCR § 354.28(a)**
☑ **23 CCR § 354.28(b)(1)**
☑ **23 CCR § 354.28(c)(6)**

The Historical and Current ISW depletion rates caused by groundwater pumping within the Basin are estimated by the Model as discussed in **Section 8.7**. **Table GWC-10** shows the Model-calculated depletions for ISW and **Table GWC-11** shows the estimated annual historical depletion of ISW caused by groundwater pumping within the Basin for WY 2014 (pre-SGMA conditions), the Historical water budget period (WY 2003-2018), and Current water budget period (WY 2019-2023).

Since SGMA does not require GSPs to address Undesirable Results that occurred before and have not been corrected by January 1, 2015, the MT for Depletion of ISW is defined as the Model-estimated depletion rate of 12,000 AFY within the interconnected portion of the San Joaquin River, as identified in **Section 8.7,** in the Summer and Fall of 2014 caused by groundwater use within the Basin, which reflects the most significant pre-SGMA depletion conditions.

ISW depletion rates and volumes depend on stream characteristics and flow regimes. If significant modifications are made to the San Joaquin River's flow regime or its physical characteristics compared to its historical conditions, GSAs will revisit and revise the defined SMC accordingly.

The Basin's RMS-ISWs will collect water level and stream flow data to update the Model and support refined estimate of ISW depletion volume. Additional information about the RMN for Depletion of ISW is provided in **Section 14.2.6**.

13.6.2.2 Relationship to Other Sustainability Indicators

☑ 23 CCR § 354.28(b)(2)

The MT for Depletion of ISW was established to ensure that they are sufficiently protective of Undesirable Results defined for all other relevant Sustainability Indicators to the Basin. The specific relationship between Depletion of ISW and other applicable Sustainability Indicators are discussed below:

- MTs for Chronic Lowering of Groundwater Levels are set to prevent declines in water levels beyond 2015 conditions, and thus are intended to prevent additional Depletion of ISW.
- As discussed in **Section 13.2**, the Chronic Lowering of Groundwater Levels MTs are used as a proxy for Reduction of Groundwater Storage and were demonstrated to be protective of Undesirable Results due to Reduction of Groundwater Storage. Chronic Lowering of Groundwater Level SMCs are also protective of Undesirable Results due to Depletion of ISW. Through the correlation with Chronic Lowering of Groundwater Level SMCs, it is reasonable to conclude that Depletion of ISW MT will not cause an Unreasonable Reduction of Groundwater Storage.
- Changes in surface water-groundwater interaction are likely to impact the Upper Aquifer's water quality in areas primarily impacted by San Joaquin River's seepage due to the different water qualities of the River and the underlying Upper Aquifer. However, due to lack of sufficient data, no direct correlation could be discerned between Depletion of ISW and Degraded Water Quality. As more data are gathered from the RMS-ISW and RMW-WQ, these correlations will be reassessed and considered.
- No direct correlation has been discerned between Depletion of ISW and Land Subsidence.

13.6.2.3 Relationship to Adjacent Basins

☑ **23 CCR § 354.28(b)(3)**

The MTs for Depletion of ISW are not expected to impact adjacent basins' ability to achieve their sustainability goals, as MTs are set based on pre-SGMA depletion conditions. Additionally, the Chronic Lowering of Groundwater Levels MTs are not expected to cause significant changes to existing local groundwater gradients (**Section 13.1.2.3**) and are thus anticipated to be protective in terms of preventing additional Depletion of ISW due to groundwater pumping.

13.6.2.4 Consideration of Impacts to Beneficial Users

☑ **23 CCR § 354.28(b)(4)**

As discussed above, the MTs defined herein are based on the rate of surface water depletions caused by pre-SGMA groundwater use. Based on the best available information, these MTs are considered protective of the Basin's ISW and identified beneficial uses and users.

13.6.2.5 Consideration of State, Federal, or Local Standards

☑ **23 CCR § 354.28(b)(5)**

There are no state, federal, or local standards directly pertaining to Depletion of ISW in the Basin. As previously mentioned, the MT for Depletion of ISW was established to be consistent with the GSP Regulations (23 CCR § 354.28(c)). The SJRRP manages seepage from the San Joaquin River and has established maximum groundwater elevation thresholds above which additional Interim or Restoration flows are not to be released (SJRRP, 2009, 2014). It is not anticipated that maintaining ISW depletion rates below the MT will have adverse impacts on SJRRP activities; however, if problems are observed, the GSAs will collaborate with USBR to revise the MT.

13.6.2.6 Measurement of Minimum Thresholds

☑ **23 CCR § 354.28(b)(6)**

The RMN for Depletion of ISW consists of 34 RMS-ISW, including 25 monitoring wells and nine stream gauges. The RMN for Depletion of ISW will be monitored in accordance with the monitoring protocols outlined in **Section 14.3.4**. Data collected from the RMN (water level and stream flow data) will be used to update the Model and support refined estimate of ISW depletion volumes due to groundwater use.

13.6.3 Measurable Objectives and Interim Milestones for Interconnected Surface Water

13.6.3.1 Measurable Objective Development

☑ **23 CCR § 354.30(a)**
☑ **23 CCR § 354.30(b)**
☑ **23 CCR § 354.30(c)**

The MO for Depletion of ISW is set as the Model-estimated Historical average (WY 2003-2018) ISW depletion of 6,700 AFY caused by groundwater use within the Basin (**Table GWC-11**). As described in

DWR's *Sustainable Management Criteria BMP* document (DWR, 2017a), MOs should be set such that there is a reasonable margin of operational flexibility (or "margin of safety") between the MT and the MO to accommodate droughts, climate change, conjunctive use operations, or other groundwater management activities. The historical average ISW depletion over the period WY 2003-2018, which includes various water year types, reflects a representative pattern of ISW depletion that captures numerous significant factors that impact ISW's occurrence and health (e.g., climate, hydrology, diversion from entities outside of the Basin, pumping in adjacent basins, etc.).

ISW depletion rates and volumes depend on stream characteristics and flow regimes. If significant modifications are made to the San Joaquin River's flow regime or its physical characteristics compared to its historical conditions, GSAs will revisit and revise the defined SMC accordingly.

13.6.3.2 Interim Milestones Development

☑ **23 CCR § 354.30(a)**
☑ **23 CCR § 354.30(e)**

The IMs for Depletion of ISW are set to be the same annual volume as the MO, which is 6,700 AFY of depletion from ISW caused by groundwater use within the Basin.

Table SMC-2: Groundwater Level SMCs

DMS ID	Local Site ID	State Well ID	Aquifer	Latitude	Longitude	MT (ft msl)	MO (ft msl)	MT Method	Interim Milestones (ft msl)			
									2025	2030	2035	2040
01-004	MC10-2	07S08E28R002M	Upper	37.2907	-121.0875	141.9	161.9	2	157.5	158.9	160.4	161.9
01-005	MP058.28L	08S08E15G001M	Upper	37.240656	-121.07519	78.3	98.3	3	78.3	85.0	91.7	98.3
01-128	Merc_9		Upper	37.220131	-121.0558	103.6	123.6	6	103.6	110.3	116.9	123.6
01-129	Merc_11		Upper	37.234383	-121.04344	95.3	115.3	6	95.3	102.0	108.6	115.3
02-009	Keystone well		Upper	37.477183	-121.16722	-6.2	30.8	1	16.3	21.2	26.0	30.8
02-109	Floragold Well		Upper	37.469795	-121.15038	10.4	30.4	6	10.4	17.1	23.8	30.4
03-001	MW-2	Unknown	Upper	37.501461	-121.10113	10.7	30.7	2	30.7	30.7	30.7	30.7
03-002	MW-3	Unknown	Upper	37.48156	-121.13503	6.4	26.4	3	22.2	23.6	25.0	26.4
03-003	WSJ003	Unknown	Upper	37.494	-121.0862	17.0	37.0	4	32.9	34.3	35.6	37.0
03-008	ISW-2 Planned		Upper	37.497103	-121.08325	10.6	30.6	6	10.6	17.3	23.9	30.6
04-006	Grayson Well 274		Upper	37.562343	-121.17676	8.8	28.8	4	21.8	24.1	26.5	28.8
04-210	WSID Planned #1		Upper	37.652731	-121.31102	41.8	61.8	6	41.8	48.5	55.2	61.8
05-124			Upper	37.362568	-121.06959	22.7	42.7	6	22.7	29.4	36.0	42.7
05-127			Upper	37.596234	-121.22098	13.5	33.5	6	13.5	20.2	26.9	33.5
06-002	P259-3	06S08E09E003M	Upper	37.43139	-121.0994	62.5	82.5	2	63.3	69.7	76.1	82.5
07-003	MC15-2	10S10E32L002M	Upper	37.0173	-120.8999	68.6	89.9	1	68.6	75.7	82.8	89.9
07-009	KRCDTID03		Upper	36.60276	-120.23201	49.3	75.3	1	49.3	58.0	66.7	75.3
07-010	KRCDTID02		Upper	36.65	-120.25	67.3	101.2	1	70.8	80.9	91.0	101.2
07-017	Well 1		Upper	37.092944	-120.92581	45.8	87.2	4	73.4	78.0	82.6	87.2
07-018	WSJ001		Upper	36.6098	-120.26264	63.7	83.7	4	72.6	76.3	80.0	83.7
07-031	CDMGSA-01C		Upper	36.817599	-120.73073	118.8	138.8	4	133.5	135.3	137.0	138.8
07-033	TW-4 Upper		Upper	36.642944	-120.2405	42.5	87.7	1	42.5	57.6	72.6	87.7
07-035	MP098.74L		Upper	36.887097	-120.63545	-22.9	-2.9	2	-2.9	-2.9	-2.9	-2.9
07-170	AGC100012335-GDACX00005		Upper	36.848851	-120.67171	72.3	92.3	6	72.3	78.9	85.6	92.3
07-425	MC18-2	12S12E16E02AM	Upper	36.8896	-120.6702	-29.8	50.7	1	50.7	50.7	50.7	50.7
08-002	MP102.04L		Upper	36.879012	-120.57835	50.7	83.7	1	76.1	78.6	81.1	83.7
09-001	2480-72	12S15E32B002M	Upper	36.847966	-120.35053	51.3	114.3	1	51.3	72.3	93.3	114.3
09-002	12S16E31G001M	12S16E31G001M	Upper	36.8439	-120.2611	-2.9	17.1	2	10.5	12.7	14.9	17.1
09-003	13S15E14M001M	13S15E14M001M	Upper	36.7986	-120.3092	32.9	52.9	2	46.5	48.6	50.7	52.9
09-004	13S16E30A001M	13S16E30A001M	Upper	36.776138	-120.2593	41.4	61.4	2	41.4	48.1	54.8	61.4
10-009	TSS-MW-325		Upper	36.76386	-120.32586	3.4	83.7	4	63.1	70.0	76.8	83.7
11-013	1PU-1		Upper	37.14347	-120.87239	56.8	76.8	2	76.8	76.8	76.8	76.8
11-023	1PU-2		Upper	37.046361	-120.811	77.5	97.5	2	92.7	94.3	95.9	97.5
12-001	SPRECK-MW-7	T13S/R15E-34	Upper	36.74963	-120.31976	79.0	99.0	2	99.0	99.0	99.0	99.0
13-001	HANS-7C1	T14S/R15E-7C1	Upper	36.734	-120.37915	100.5	120.5	2	120.5	120.5	120.5	120.5
13-003	TL-HS-3	T13S/R15E-29F2	Upper	36.77304	-120.36233	57.4	116.1	1	111.8	113.3	114.7	116.1

Table SMC-2: Groundwater Level SMCs

DMS ID	Local Site ID	State Well ID	Aquifer	Latitude	Longitude	MT (ft msl)	MO (ft msl)	MT Method	Interim Milestones (ft msl)			
									2025	2030	2035	2040
13-012	MW1UA Planned		Upper	36.71124	-120.25874	89.4	109.4	6	89.4	96.0	102.7	109.4
14-001	CCID Well #2		Upper	37.307	-121.054	28.5	48.5	2	48.5	48.5	48.5	48.5
14-002	1005		Upper	36.786891	-120.37704	96.5	125.7	1	96.5	106.2	116.0	125.7
14-003	1006		Upper	37.0157	-120.667	70.0	90.0	7	90.0	90.0	90.0	90.0
14-004	1008	10S10E28A001M	Upper	37.0409	-120.891	72.6	92.6	2	92.6	92.6	92.6	92.6
14-005	1011	11S13E17E001M	Upper	36.9783	-120.58	86.2	106.2	2	106.2	106.2	106.2	106.2
14-006	1014	09S09E05R001M	Upper	37.173597	-120.99553	78.2	98.2	2	96.7	97.2	97.7	98.2
14-007	1043	11S13E34E001M	Upper	36.932003	-120.542	73.5	98.5	1	98.5	98.5	98.5	98.5
14-008	2410	10S12E13L001M	Upper	37.06	-120.612	78.5	98.5	2	98.5	98.5	98.5	98.5
14-022	Elrod #4 Well #21		Upper	36.85206	-120.3996	85.7	105.7	2	91.7	96.4	101.0	105.7
14-026	SDMW West - Upper Aquifer		Upper	36.98352	-120.50053	72.0	92.0	2	92.0	92.0	92.0	92.0
14-027	CLB Well #10		Upper	37.05317	-120.826	39.0	59.0	2	59.0	59.0	59.0	59.0
15-001	Firebaugh Well #17		Upper	36.85422	-120.4418	93.3	113.3	6	93.3	100.0	106.6	113.3
16-001	CLB Well #12		Upper	37.05231	-120.8684	65.7	85.7	2	85.7	85.7	85.7	85.7
16-002	CLB Well #8		Upper	37.080722	-120.83084	70.0	90.0	7	70.0	76.7	83.3	90.0
17-001	Mendota City #7		Upper	36.78405	-120.34527	74.2	94.2	6	74.2	80.9	87.5	94.2
19-002	2PU-1		Upper	37.307928	-120.98812	28.9	48.9	2	41.5	44.0	46.4	48.9
19-005	2MU-1		Upper	37.310139	-120.94883	28.9	48.9	2	48.9	48.9	48.9	48.9
19-008	2MU-4		Upper	37.299139	-120.94467	32.7	52.7	7	51.5	51.9	52.3	52.7
19-009	2MU-5		Upper	37.308333	-120.93264	33.6	53.6	2	52.4	52.8	53.2	53.6
19-010	1PU-3		Upper	37.31892	-120.9841	3.3	23.3	2	19.2	20.5	21.9	23.3
20-001	TIWD #17		Upper	37.15494	-120.75037	-7.5	12.5	5	-7.5	-0.8	5.8	12.5
22-002	Gustine City #6		Upper	37.25735	-120.99682	57.6	77.6	6	57.6	64.3	71.0	77.6
23-004	SDMW East - Upper Aquifer		Upper	36.98381	-120.49899	77.2	97.2	2	97.2	97.2	97.2	97.2
01-001	MP030.43R	04S06E36C001M	Lower	37.550862	-121.26092	-44.9	-12.3	1	-28.1	-22.8	-17.6	-12.3
01-002	MP033.71L	05S07E05F001M	Lower	37.53138	-121.22431	-54.7	-34.7	2	-34.7	-34.7	-34.7	-34.7
01-003	MP045.78R	06S08E20D002M	Lower	37.406198	-121.12127	-21.8	62.3	1	-21.8	6.2	34.3	62.3
01-006	91	Unknown	Lower	37.26042	-121.0611	53.8	73.8	4	66.6	69.0	71.4	73.8
01-007	MP021.12L	Unknown	Lower	37.642858	-121.36512	22.3	56.7	1	22.3	33.8	45.2	56.7
01-008	MP051.66L	Unknown	Lower	37.332953	-121.08571	-44.9	2.4	1	-34.5	-22.2	-9.9	2.4
02-002	WELL 02 - NORTH 5TH ST	Unknown	Lower	37.471196	-121.13283	-0.3	33.9	1	13.9	20.5	27.2	33.9
03-009	ISW-2 Planned		Lower	37.497103	-121.08325	2.6	22.6	6	2.6	9.3	16.0	22.6
04-001	121	Unknown	Lower	37.6129	-121.2942	-37.6	-17.6	2	-17.6	-17.6	-17.6	-17.6
04-007	Grayson Well 274A		Lower	37.55	-121.17644	-2.5	17.5	6	-2.5	4.2	10.9	17.5
04-008	ARRA 28		Lower	37.579962	-121.2771	-15.1	19.0	4	13.1	15.0	17.0	19.0

Table SMC-2: Groundwater Level SMCs

DMS ID	Local Site ID	State Well ID	Aquifer	Latitude	Longitude	MT (ft msl)	MO (ft msl)	MT Method	Interim Milestones (ft msl)			
									2025	2030	2035	2040
04-211	WSID Planned #1		Lower	37.652731	-121.31102	35.7	55.7	6	35.7	42.4	49.0	55.7
05-128			Lower	37.359006	-121.05825	-5.3	14.7	6	-5.3	1.4	8.1	14.7
06-001	P259-1	06S08E09E001M	Lower	37.43139	-121.0994	-21.9	46.1	1	9.9	22.0	34.1	46.1
07-002	MC15-1	10S10E32L001M	Lower	37.0173	-120.8999	-9.2	10.8	2	2.0	5.0	7.9	10.8
07-005	MP091.68R	12S11E03Q001M	Lower	36.9097	-120.7554	-84.7	-41.8	1	-84.7	-70.4	-56.1	-41.8
07-007	MC18-1	12S12E16E003M	Lower	36.8896	-120.6702	-53.4	-21.2	1	-41.7	-34.8	-28.0	-21.2
07-014	TW-4		Lower	36.642944	-120.2405	-123.5	-47.2	1	-123.5	-98.1	-72.6	-47.2
07-015	TW-5		Lower	36.675786	-120.26784	-142.0	-27.4	1	-118.2	-87.9	-57.7	-27.4
07-016	Well 01		Lower	37.100426	-121.00725	-2.4	74.6	1	48.6	57.2	65.9	74.6
07-028	MP093.27L (Well 500)		Lower	36.906406	-120.72764	-88.2	-64.8	1	-88.2	-80.4	-72.6	-64.8
07-032	CDMGSA-01D		Lower	36.817599	-120.73073	121.4	141.4	4	136.6	138.2	139.8	141.4
07-036	PWD Well 20		Lower	36.7707	-120.64828	-186.3	-55.3	1	-103.3	-87.3	-71.3	-55.3
07-189	Well 18		Lower	36.807618	-120.61143	-27.9	-7.9	6	-27.9	-21.2	-14.5	-7.9
07-212	Well 31		Lower	36.822135	-120.65364	-39.8	-19.8	6	-39.8	-33.2	-26.5	-19.8
09-011	Aliso-South Planned		Lower	36.782626	-120.26268	-20.9	-0.9	6	-20.9	-14.2	-7.6	-0.9
09-012	Aliso-North Planned		Lower	36.9012	-120.28235	-30.2	-10.2	6	-30.2	-23.5	-16.9	-10.2
10-010	TSS-MW-485		Lower	36.76386	-120.32606	-44.3	-12.9	4	-44.3	-33.8	-23.3	-12.9
11-005	1ML-5		Lower	37.106152	-120.93611	-0.6	19.4	2	11.9	14.4	16.9	19.4
11-006	1ML-6		Lower	37.107496	-120.93136	3.6	23.6	3	4.6	10.9	17.2	23.6
11-010	1PL-1		Lower	37.182023	-120.9065	-1.0	19.0	4	14.0	15.7	17.3	19.0
11-019	3PL-2		Lower	37.216619	-120.88951	17.1	37.1	6	17.1	23.7	30.4	37.1
11-020	1PL-6		Lower	37.1635	-120.81814	-9.6	10.4	2	-9.6	-2.9	3.8	10.4
11-021	1PL-5		Lower	37.253719	-120.94015	31.6	51.6	2	33.6	39.6	45.6	51.6
11-022	1PL-4		Lower	37.105651	-120.83528	-8.5	11.5	4	10.5	10.8	11.2	11.5
11-024	1PL-7		Lower	37.11378	-120.78279	1.1	21.1	4	6.8	11.6	16.4	21.1
13-004	USGS-31J6	13S15E31J006M	Lower	36.75517	-120.3732	-50.6	-27.0	1	-41.5	-36.7	-31.8	-27.0
13-011	MW1LA Planned		Lower	36.71124	-120.25874	-73.8	-53.8	6	-73.8	-67.2	-60.5	-53.8
14-019	1050		Lower	37.373654	-121.05724	-5.1	14.9	4	14.9	14.9	14.9	14.9
14-020	1027		Lower	37.173458	-121.0184	23.4	43.4	4	28.8	33.7	38.5	43.4
14-021	1056		Lower	37.031767	-120.83356	-0.8	19.2	4	17.7	18.2	18.7	19.2
14-023	26B		Lower	36.860673	-120.51073	19.8	39.8	6	19.8	26.4	33.1	39.8
14-024	CCID 2723		Lower	36.86125	-120.51044	19.8	39.8	6	19.8	26.4	33.1	39.8
14-025	SDMW West - Lower Aquifer		Lower	36.98352	-120.50053	12.8	52.3	1	12.8	26.0	39.1	52.3
18-001	Newman City #6		Lower	37.31809	-121.03062	-18.5	30.5	1	-18.5	-2.2	14.2	30.5
18-002	Newman City #8		Lower	37.32212	-121.01333	-16.5	10.5	1	-16.5	-7.5	1.5	10.5

Table SMC-2: Groundwater Level SMCs

DMS ID	Local Site ID	State Well ID	Aquifer	Latitude	Longitude	MT (ft msl)	MO (ft msl)	MT Method	Interim Milestones (ft msl)			
									2025	2030	2035	2040
22-001	Gustine City #5		Lower	37.25248	-120.99326	14.2	34.2	6	14.2	20.9	27.6	34.2
23-003	SDMW East - Lower Aquifer		Lower	36.98381	-120.49899	1.8	39.5	1	1.8	14.3	26.9	39.5

Abbreviations:
ft = feet
ft msl = Feet Above Mean Sea Level
GSP = Groundwater Sustainability Plan
MO = Measurable Objective
MT = Minimum Threshold
RMW-WL = Representative Monitoring Well for Chronic Lowering of Groundwater Levels
SMC = Sustainable Management Criteria

Notes:
1. MT methods correspond to the numbering and descriptions in Section 13.1.2.1.
2. SMCs set by Method #6 are preliminary and will be revised using future data collected at each RMW-WL during GSP Implementation.

Table SMC-8: Degraded Water Quality SMCs

DMS ID	Local ID	Aquifer	Minimum Threshold						Measurable Objective					
			Gross Alpha (pCi/L)	Arsenic (ug/L)	Cr6 (ug/L)	Nitrate (mg/L)	1,2,3-TCP (ug/L)	TDS (mg/L)	Gross Alpha (pCi/L)	Arsenic (ug/L)	Cr6 (ug/L)	Nitrate (mg/L)	1,2,3-TCP (ug/L)	TDS (mg/L)
01-004	MC10-2	Upper	TBD	TBD	TBD	12.4*	TBD	1,000	TBD	TBD	TBD	12.4	TBD	1,000
01-128	Merc_9	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
01-129	Merc_11	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
02-009	Keystone well	Upper	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
03-001	MW-2	Upper	TBD	TBD	TBD	11.1**	TBD	1,530**	TBD	TBD	TBD	11.1	TBD	1,530
03-007	MW-1	Upper	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
03-008	ISW-2 Planned	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
04-006	Grayson Well 274	Upper	15.0	10.0	26.5*	27.5*	0.005	1,300*	15.0	10.0	26.5	27.5	0.005	1,300
04-210	WSID Planned #1	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
05-124		Upper	TBD	TBD	TBD	12.0**	TBD	1,000	TBD	TBD	TBD	12.0	TBD	1,000
05-127		Upper	TBD	TBD	TBD	10.0	TBD	1,160**	TBD	TBD	TBD	10.0	TBD	1,000
06-002	P259-3	Upper	TBD	TBD	TBD	14.0*	TBD	1,000	TBD	TBD	TBD	14.0	TBD	1,000
07-003	MC15-2	Upper	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
07-017	Well 1	Upper	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
07-018	WSJ001	Upper	TBD	TBD	TBD	10.0	TBD	2,300**	TBD	TBD	TBD	10.0	TBD	2,300
07-031	CDMGSA-01C	Upper	TBD	TBD	TBD	12.0**	TBD	1,500**	TBD	TBD	TBD	12.0	TBD	1,500
07-033	TW-4 Upper	Upper	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
07-170	AGC100012335-GDACX00005	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
07-425	MC18-2	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
08-002	MP102.04L	Upper	TBD	TBD	TBD	10.0	TBD	3,210**	TBD	TBD	TBD	10.0	TBD	3,210
09-002	12S16E31G001M	Upper	TBD	TBD	TBD	10.0	TBD	TBD	TBD	TBD	TBD	10.0	TBD	TBD
09-003	13S15E14M001M	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
09-005	Aliso 1	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
09-196	Well 52	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
10-009	TSS-MW-325	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
11-018	3PU-1	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
12-006	SPRECK-MW-32	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
13-012	MW1UA Planned	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
14-001	CCID Well #2	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
14-002	1005	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
14-003	1006	Upper	TBD	TBD	TBD	TBD	TBD	1,400**	TBD	TBD	TBD	TBD	TBD	1,400
14-004	1008	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
14-005	1011	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
14-006	1014	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
14-007	1043	Upper	TBD	TBD	TBD	TBD	TBD	1,200**	TBD	TBD	TBD	TBD	TBD	1,200
14-008	2410	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
14-022	Elrod #4 Well #21	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
14-026	SDMW West - Upper Aquifer	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
14-027	CLB Well #10	Upper	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
15-001	Firebaugh Well #17	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
16-001	CLB Well #12	Upper	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
16-002	CLB Well #8	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
17-001	Mendota City #7	Upper	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
19-004	2PU-4	Upper	TBD	TBD	TBD	TBD	TBD	2,100**	TBD	TBD	TBD	TBD	TBD	2,100
20-001	TIWD #17	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
22-002	Gustine City #6	Upper	TBD	TBD	TBD	42.0*	TBD	1,000	TBD	TBD	TBD	42.0	TBD	1,000
23-004	SDMW East - Upper Aquifer	Upper	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
01-001	MP030.43R	Lower	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
01-002	MP033.71L	Lower	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000

Table SMC-8: Degraded Water Quality SMCs

			Minimum Threshold						Measurable Objective					
DMS ID	Local ID	Aquifer	Gross Alpha (pCi/L)	Arsenic (ug/L)	Cr6 (ug/L)	Nitrate (mg/L)	1,2,3-TCP (ug/L)	TDS (mg/L)	Gross Alpha (pCi/L)	Arsenic (ug/L)	Cr6 (ug/L)	Nitrate (mg/L)	1,2,3-TCP (ug/L)	TDS (mg/L)
01-003	MP045.78R	Lower	TBD	TBD	TBD	10.0	TBD	1,400**	TBD	TBD	TBD	10.0	TBD	1,400
01-006	91	Lower	TBD	TBD	TBD	15.0**	TBD	1,000	TBD	TBD	TBD	15.0	TBD	1,000
01-007	MP021.12L	Lower	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
01-008	MP051.66L	Lower	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
02-002	WELL 02 - NORTH 5TH ST	Lower	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
02-109	Floragold Well	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
03-009	ISW-2 Planned	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
04-001	121	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
04-007	Grayson Well 274A	Lower	TBD	TBD	TBD	TBD	TBD	1,700**	TBD	TBD	TBD	TBD	TBD	1,700
04-008	ARRA 28	Lower	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
04-211	WSID Planned #1	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
06-001	P259-1	Lower	TBD	TBD	TBD	12.9*	TBD	1,000	TBD	TBD	TBD	12.9	TBD	1,000
07-002	MC15-1	Lower	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
07-007	MC18-1	Lower	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
07-014	TW-4	Lower	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
07-015	TW-5	Lower	TBD	TBD	TBD	10.0	TBD	1,000	TBD	TBD	TBD	10.0	TBD	1,000
07-016	Well 01	Lower	TBD	TBD	TBD	10.0	TBD	1,028*	TBD	TBD	TBD	10.0	TBD	1,028
07-028	MP093.27L (Well 500)	Lower	TBD	TBD	TBD	10.0	TBD	1,190**	TBD	TBD	TBD	10.0	TBD	1,190
07-032	CDMGSA-01D	Lower	TBD	TBD	TBD	10.0	TBD	1,900**	TBD	TBD	TBD	10.0	TBD	1,900
07-034	MP092.20R	Lower	TBD	TBD	TBD	10.0	TBD	1,300**	TBD	TBD	TBD	10.0	TBD	1,300
07-036	PWD Well 20	Lower	TBD	TBD	TBD	10.0	TBD	1,400**	TBD	TBD	TBD	10.0	TBD	1,400
07-189	Well 18	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
07-212	Well 31	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
09-012	Aliso-North Planned	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
09-011	Aliso-South Planned	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
10-010	TSS-MW-485	Lower	TBD	TBD	TBD	10.0	TBD	1,400**	TBD	TBD	TBD	10.0	TBD	1,400
11-010	1PL-1	Lower	TBD	TBD	TBD	TBD	TBD	1,550**	TBD	TBD	TBD	TBD	TBD	1,550
11-011	1PL-2	Lower	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
11-021	1PL-5	Lower	TBD	TBD	TBD	TBD	TBD	1,600**	TBD	TBD	TBD	TBD	TBD	1,600
13-011	MW1LA Planned	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
14-019	1050	Lower	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
14-020	1027	Lower	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
14-021	1056	Lower	TBD	TBD	TBD	TBD	TBD	1,000	TBD	TBD	TBD	TBD	TBD	1,000
14-024	CCID 2723	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
14-025	SDMW West - Lower Aquifer	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
18-001	Newman City #6	Lower	TBD	TBD	TBD	20.0**	TBD	1,000	TBD	TBD	TBD	20.0	TBD	1,000
18-002	Newman City #8	Lower	TBD	TBD	TBD	11.0**	TBD	1,000	TBD	TBD	TBD	11.0	TBD	1,000
22-001	Gustine City #5	Lower	TBD	TBD	TBD	15.0*	TBD	1,000	TBD	TBD	TBD	15.0	TBD	1,000
05-128		Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
07-234		Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
23-003	SDMW East - Lower Aquifer	Lower	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Table SMC-8: Degraded Water Quality SMCs

<table>
<tr><th rowspan="3">DMS ID</th><th rowspan="3">Local ID</th><th colspan="24">Interim Milestones</th></tr>
<tr><th colspan="4">Gross Alpha (pCi/L)</th><th colspan="4">Arsenic (ug/L)</th><th colspan="4">Cr6 (ug/L)</th><th colspan="4">Nitrate (mg/L)</th><th colspan="4">1,2,3-TCP (ug/L)</th><th colspan="4">TDS (mg/L)</th></tr>
<tr><th>2025</th><th>2030</th><th>2035</th><th>2040</th><th>2025</th><th>2030</th><th>2035</th><th>2040</th><th>2025</th><th>2030</th><th>2035</th><th>2040</th><th>2025.0</th><th>2030.0</th><th>2035.0</th><th>2040.0</th><th>2025</th><th>2030</th><th>2035</th><th>2040</th><th>2025</th><th>2030</th><th>2035</th><th>2040</th></tr>
<tr><td>01-004</td><td>MC10-2</td><td colspan="4" rowspan="7">TBD</td><td colspan="4" rowspan="7">TBD</td><td colspan="4" rowspan="7">TBD</td><td>12.4</td><td>12.4</td><td>12.4</td><td>12.4</td><td colspan="4" rowspan="7">TBD</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>01-128</td><td>Merc_9</td><td colspan="4" rowspan="2">TBD</td><td colspan="4" rowspan="2">TBD</td></tr>
<tr><td>01-129</td><td>Merc_11</td></tr>
<tr><td>02-009</td><td>Keystone well</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>03-001</td><td>MW-2</td><td>11.1</td><td>11.1</td><td>11.1</td><td>11.1</td><td>1,530</td><td>1,530</td><td>1,530</td><td>1,530</td></tr>
<tr><td>03-007</td><td>MW-1</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>03-008</td><td>ISW-2 Planned</td><td colspan="4">TBD</td><td colspan="4">TBD</td></tr>
<tr><td>04-006</td><td>Grayson Well 274</td><td>15.0</td><td>15.0</td><td>15.0</td><td>15.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>26.5</td><td>26.5</td><td>26.5</td><td>26.5</td><td>27.5</td><td>27.5</td><td>27.5</td><td>27.5</td><td>0.005</td><td>0.005</td><td>0.005</td><td>0.005</td><td>1,300</td><td>1,300</td><td>1,300</td><td>1,300</td></tr>
<tr><td>04-210</td><td>WSID Planned #1</td><td colspan="4" rowspan="41">TBD</td><td colspan="4" rowspan="41">TBD</td><td colspan="4" rowspan="41">TBD</td><td colspan="4">TBD</td><td colspan="4" rowspan="41">TBD</td><td colspan="4">TBD</td></tr>
<tr><td>05-124</td><td></td><td>12.0</td><td>12.0</td><td>12.0</td><td>12.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>05-127</td><td></td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>1,160</td><td>1,160</td><td>1,160</td><td>1,160</td></tr>
<tr><td>06-002</td><td>P259-3</td><td>14.0</td><td>14.0</td><td>14.0</td><td>14.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>07-003</td><td>MC15-2</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>07-017</td><td>Well 1</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>07-018</td><td>WSJ001</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>2,300</td><td>2,300</td><td>2,300</td><td>2,300</td></tr>
<tr><td>07-031</td><td>CDMGSA-01C</td><td>12.0</td><td>12.0</td><td>12.0</td><td>12.0</td><td>1,500</td><td>1,500</td><td>1,500</td><td>1,500</td></tr>
<tr><td>07-033</td><td>TW-4 Upper</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>07-170</td><td>AGC100012335-GDACX00005</td><td colspan="4" rowspan="2">TBD</td><td colspan="4" rowspan="2">TBD</td></tr>
<tr><td>07-425</td><td>MC18-2</td></tr>
<tr><td>08-002</td><td>MP102.04L</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>3,210</td><td>3,210</td><td>3,210</td><td>3,210</td></tr>
<tr><td>09-002</td><td>12S16E31G001M</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td colspan="4" rowspan="4">TBD</td></tr>
<tr><td>09-003</td><td>13S15E14M001M</td><td colspan="4" rowspan="19">TBD</td></tr>
<tr><td>09-005</td><td>Aliso 1</td></tr>
<tr><td>09-196</td><td>Well 52</td></tr>
<tr><td>10-009</td><td>TSS-MW-325</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>11-018</td><td>3PU-1</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>12-006</td><td>SPRECK-MW-32</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>13-012</td><td>MW1UA Planned</td><td colspan="4">TBD</td></tr>
<tr><td>14-001</td><td>CCID Well #2</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>14-002</td><td>1005</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>14-003</td><td>1006</td><td>1,400</td><td>1,400</td><td>1,400</td><td>1,400</td></tr>
<tr><td>14-004</td><td>1008</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>14-005</td><td>1011</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>14-006</td><td>1014</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>14-007</td><td>1043</td><td>1,200</td><td>1,200</td><td>1,200</td><td>1,200</td></tr>
<tr><td>14-008</td><td>2410</td><td colspan="4">TBD</td></tr>
<tr><td>14-022</td><td>Elrod #4 Well #21</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>14-026</td><td>SDMW West - Upper Aquifer</td><td colspan="4">TBD</td></tr>
<tr><td>14-027</td><td>CLB Well #10</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>15-001</td><td>Firebaugh Well #17</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>16-001</td><td>CLB Well #12</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>16-002</td><td>CLB Well #8</td><td colspan="4" rowspan="4">TBD</td><td colspan="4">TBD</td></tr>
<tr><td>17-001</td><td>Mendota City #7</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>19-004</td><td>2PU-4</td><td colspan="4" rowspan="2">TBD</td></tr>
<tr><td>20-001</td><td>TIWD #17</td></tr>
<tr><td>22-002</td><td>Gustine City #6</td><td>42.0</td><td>42.0</td><td>42.0</td><td>42.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>23-004</td><td>SDMW East - Upper Aquifer</td><td colspan="4">TBD</td><td colspan="4">TBD</td></tr>
<tr><td>01-001</td><td>MP030.43R</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
<tr><td>01-002</td><td>MP033.71L</td><td>10.0</td><td>10.0</td><td>10.0</td><td>10.0</td><td>1,000</td><td>1,000</td><td>1,000</td><td>1,000</td></tr>
</table>

Table SMC-8: Degraded Water Quality SMCs

DMS ID	Local ID	Interim Milestones																							
		Gross Alpha (pCi/L)				Arsenic (ug/L)				Cr6 (ug/L)				Nitrate (mg/L)				1,2,3-TCP (ug/L)				TDS (mg/L)			
		2025	2030	2035	2040	2025	2030	2035	2040	2025	2030	2035	2040	2025.0	2030.0	2035.0	2040.0	2025	2030	2035	2040	2025	2030	2035	2040
01-003	MP045.78R													10.0	10.0	10.0	10.0					1,400	1,400	1,400	1,400
01-006	91													15.0	15.0	15.0	15.0					1,000	1,000	1,000	1,000
01-007	MP021.12L													10.0	10.0	10.0	10.0					1,000	1,000	1,000	1,000
01-008	MP051.66L													10.0	10.0	10.0	10.0					1,000	1,000	1,000	1,000
02-002	WELL 02 - NORTH 5TH ST													10.0	10.0	10.0	10.0					1,000	1,000	1,000	1,000
02-109	Floragold Well																								
03-009	ISW-2 Planned													TBD								TBD			
04-001	121																								
04-007	Grayson Well 274A																					1,700	1,700	1,700	1,700
04-008	ARRA 28													10.0	10.0	10.0	10.0					1,000	1,000	1,000	1,000
04-211	WSID Planned #1													TBD								TBD			
06-001	P259-1													12.9	12.9	12.9	12.9					1,000	1,000	1,000	1,000
07-002	MC15-1													10.0	10.0	10.0	10.0					1,000	1,000	1,000	1,000
07-007	MC18-1													10.0	10.0	10.0	10.0					1,000	1,000	1,000	1,000
07-014	TW-4													10.0	10.0	10.0	10.0					1,000	1,000	1,000	1,000
07-015	TW-5													10.0	10.0	10.0	10.0					1,000	1,000	1,000	1,000
07-016	Well 01													10.0	10.0	10.0	10.0					1,028	1,028	1,028	1,028
07-028	MP093.27L (Well 500)													10.0	10.0	10.0	10.0					1,190	1,190	1,190	1,190
07-032	CDMGSA-01D													10.0	10.0	10.0	10.0					1,900	1,900	1,900	1,900
07-034	MP092.20R													10.0	10.0	10.0	10.0					1,300	1,300	1,300	1,300
07-036	PWD Well 20	TBD				TBD				TBD				10.0	10.0	10.0	10.0	TBD				1,400	1,400	1,400	1,400
07-189	Well 18																								
07-212	Well 31													TBD								TBD			
09-012	Aliso-North Planned																								
09-011	Aliso-South Planned																								
10-010	TSS-MW-485													10.0	10.0	10.0	10.0					1,400	1,400	1,400	1,400
11-010	1PL-1																					1,550	1,550	1,550	1,550
11-011	1PL-2																					1,000	1,000	1,000	1,000
11-021	1PL-5																					1,600	1,600	1,600	1,600
13-011	MW1LA Planned																					TBD			
14-019	1050													TBD								1,000	1,000	1,000	1,000
14-020	1027																					1,000	1,000	1,000	1,000
14-021	1056																					1,000	1,000	1,000	1,000
14-024	CCID 2723																					TBD			
14-025	SDMW West - Lower Aquifer																								
18-001	Newman City #6													20.0	20.0	20.0	20.0					764	764	764	764
18-002	Newman City #8													11.0	11.0	11.0	11.0					812	812	812	812
22-001	Gustine City #5																								
05-128														TBD								TBD			
07-234																									
23-003	SDMW East - Lower Aquifer																								

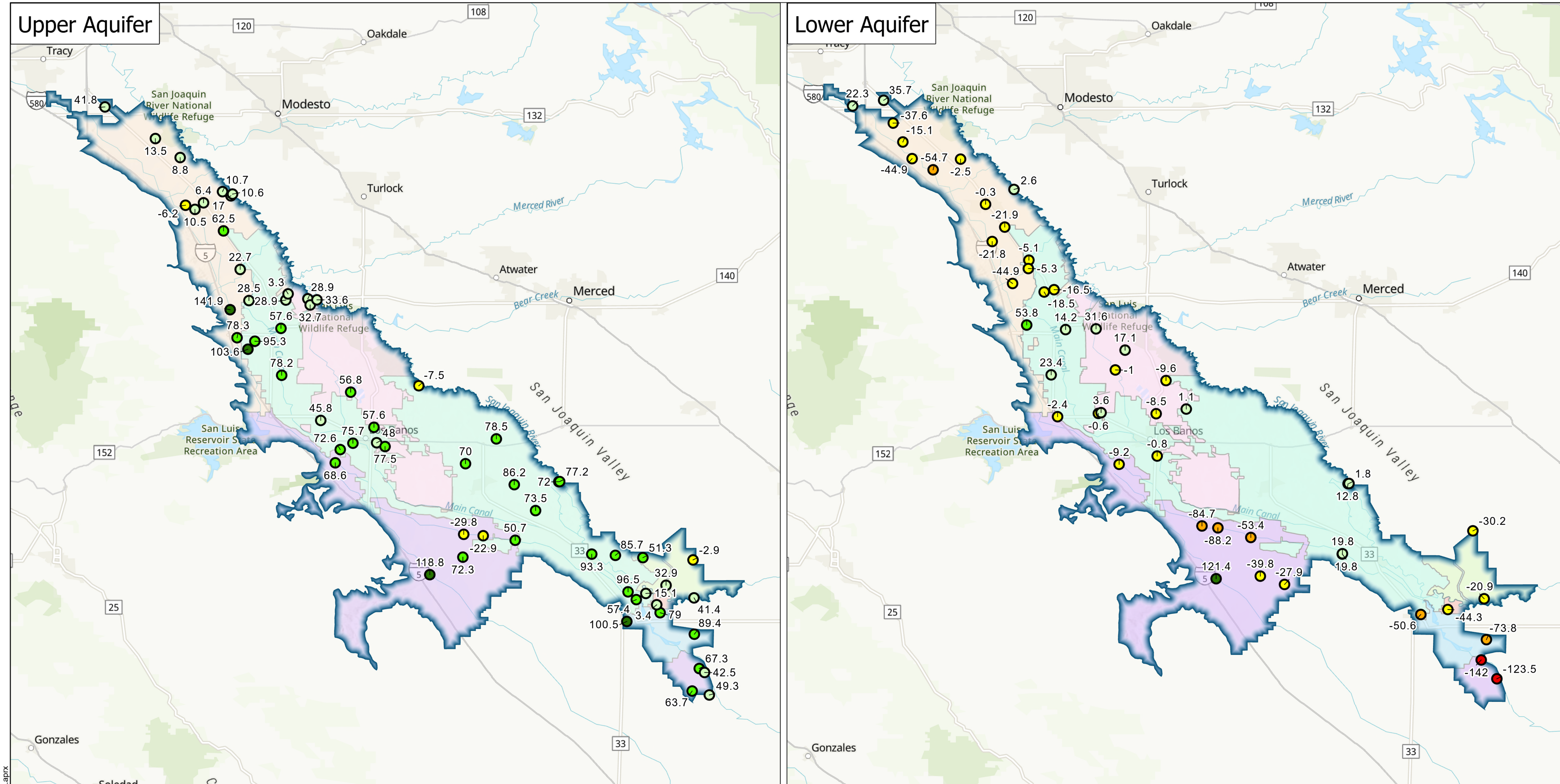
Table SMC-8: Degraded Water Quality SMCs

Notes:

1. The MT for Degraded Water Quality is set as the greater concentration of: (1) the applicable health-based screening standard , or (2) the baseline concentration at each RMW-WQ (see Notes 2, 3, and 4).
2. MTs are assumed to be set as the applicable health-based screening standard, except as otherwise noted in Notes 3 and 4. The applicable health-based standard is the SWRCB DDW's MCL for all constituents.
3. * indicates that the MT was set as the baseline condition based on the last year in the 2010-2014 period with data.
4. ** indicates that the MT was set as the baseline condition based on the first year with data after 2014.
5. RMW-WQs with MTs "TBD" do not have sufficient historical data to establish a baseline condition. MTs for these wells will be set after the first sampling event.

Abbreviations:

1,2,3-TCP = 1,2,3-trichloropropane
CASGEM = California Statewide Groundwater Elevation Monitoring
Cr6 = hexavalent chromium
DDW = Department of Drinking Water
MCL = Maximum Contaminant Level
mg/L = milligrams per liter
MT = Minimum Threshold
ND = not detected
pCi/L = picocuries per liter
RMW-WQ = Representative Monitoring Well for Degraded Water Quality
SMC = Sustainable Management Criteria
SWRCB = State Water Resources Control Board
TBD = to be determined (see Note 5)
TDS = total dissolved solids
ug/L = micrograms per liter



Legend

Delta-Mendota Subbasin (DWR Basin No. 5-022.07)

MT (ft msl)

- <-150
- -150 - -100
- -100 - -50
- -50 - 0
- 0 - 50
- 50 - 100
- 100 - 150
- >150

GSA Group

- Aliso Water District
- Central Delta-Mendota
- Farmers Water District
- Fresno County
- Grassland Water District
- Northern Delta-Mendota
- San Joaquin River Exchange Contractors

Abbreviations

DWR = California Department of Water Resources
ft msl = Feet above Mean Sea Level
GSA = Groundwater Sustainability Agency
MT = Minimum Threshold
SGMA = Sustainable Groundwater Management Act

Notes

1. All Locations are approximate.
2. Labels show MT in ft msl.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.

N

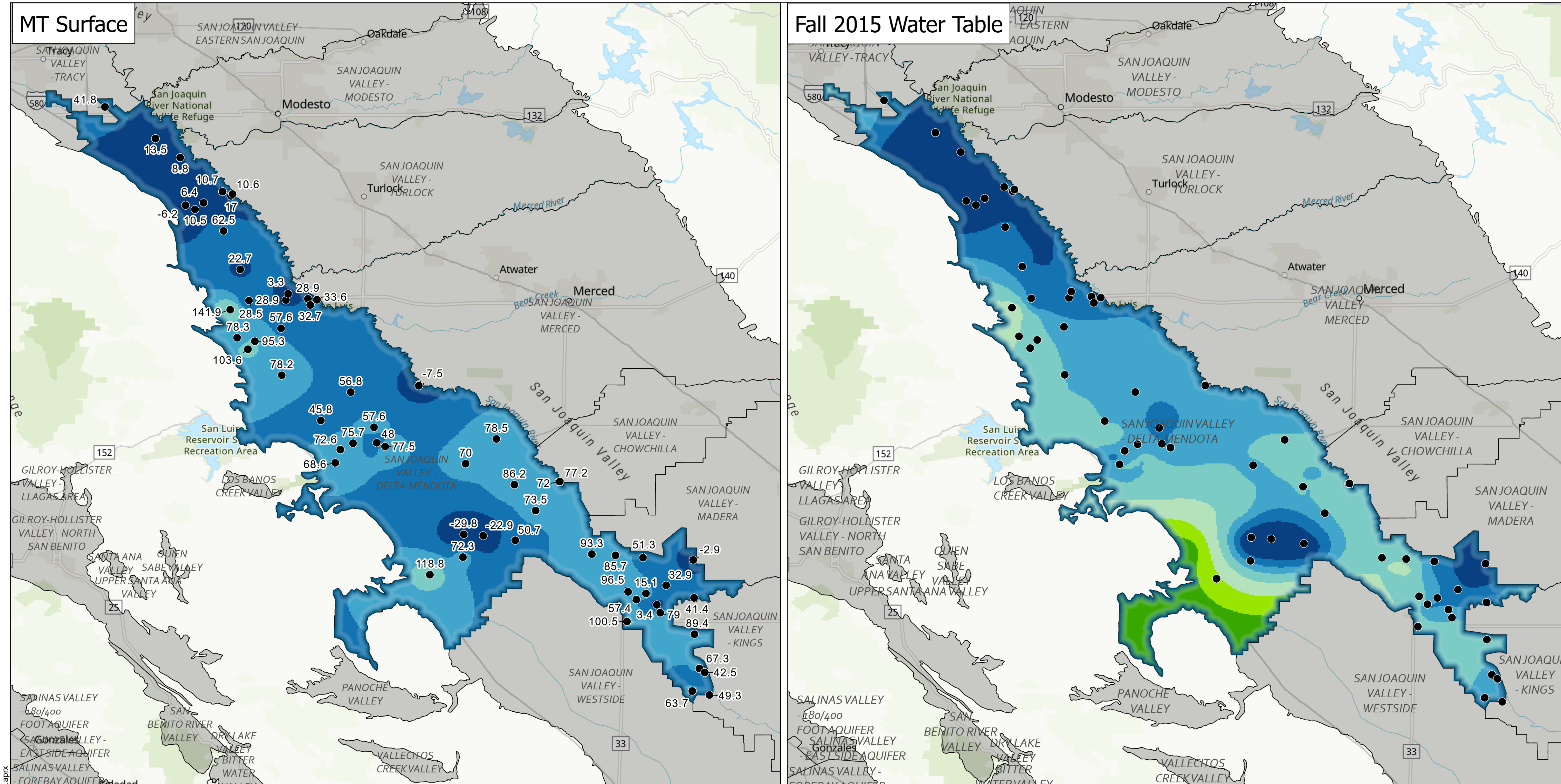
0 14 28
Miles

Water Level Minimum Thresholds

eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09
Figure SMC-1

Path: X:\C00041\Maps\2024\3\Well Impacts\FigureSMC1-8_v2.aprx



Legend

- ● Upper Aquifer RMW-WL
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- Groundwater Basins

Water Surface Elevation (ft msl)

- <30
- 30 - 61
- 61 - 91
- 91 - 131
- 131 - 181
- 181 - 230
- > 230

Abbreviations

DWR = California Department of Water Resources
ft msl = Feet above Mean Sea Level
GSA = Groundwater Sustainability Agency
MT = Minimum Threshold
RMW-WL = Representative Monitoring Well for Chronic Lowering of Groundwater Levels
SGMA = Sustainable Groundwater Management Act

Notes

1. All Locations are approximate.
2. Labels show proposed MT in ft msl.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

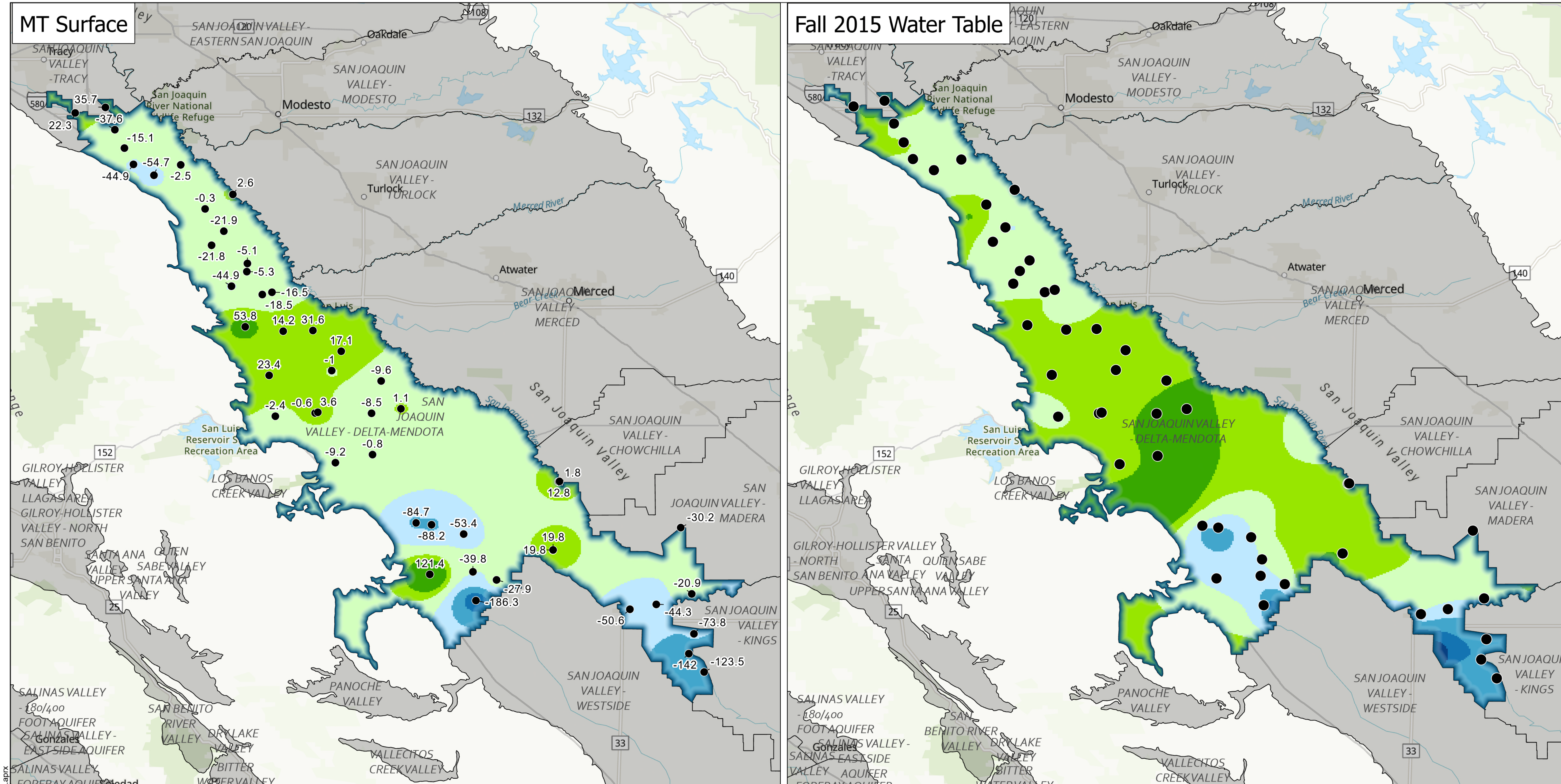
1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.

Groundwater Elevations Under Proposed MTs
Upper Aquifer

eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09
Figure SMC-2

Path: X:\C00041\Maps\2024\3\Well Impacts\FigureSMC1-8_v2.aprx



Legend

- ● Lower Aquifer RMW-WL
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- Groundwater Basins

Water Surface Elevation (ft msl)

- < -200
- -199 - -140
- -139 - -80
- -79 - -40
- -39 - 0
- 0 - 30
- >30

Abbreviations

DWR = California Department of Water Resources
ft msl = Feet above Mean Sea Level
GSA = Groundwater Sustainability Agency
MT = Minimum Threshold
RMW-WL = Representative Monitoring Well for Chronic Lowering of Groundwater Levels
SGMA = Sustainable Groundwater Management Act

Notes

1. All Locations are approximate.
2. Labels show MT in ft msl.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.

N

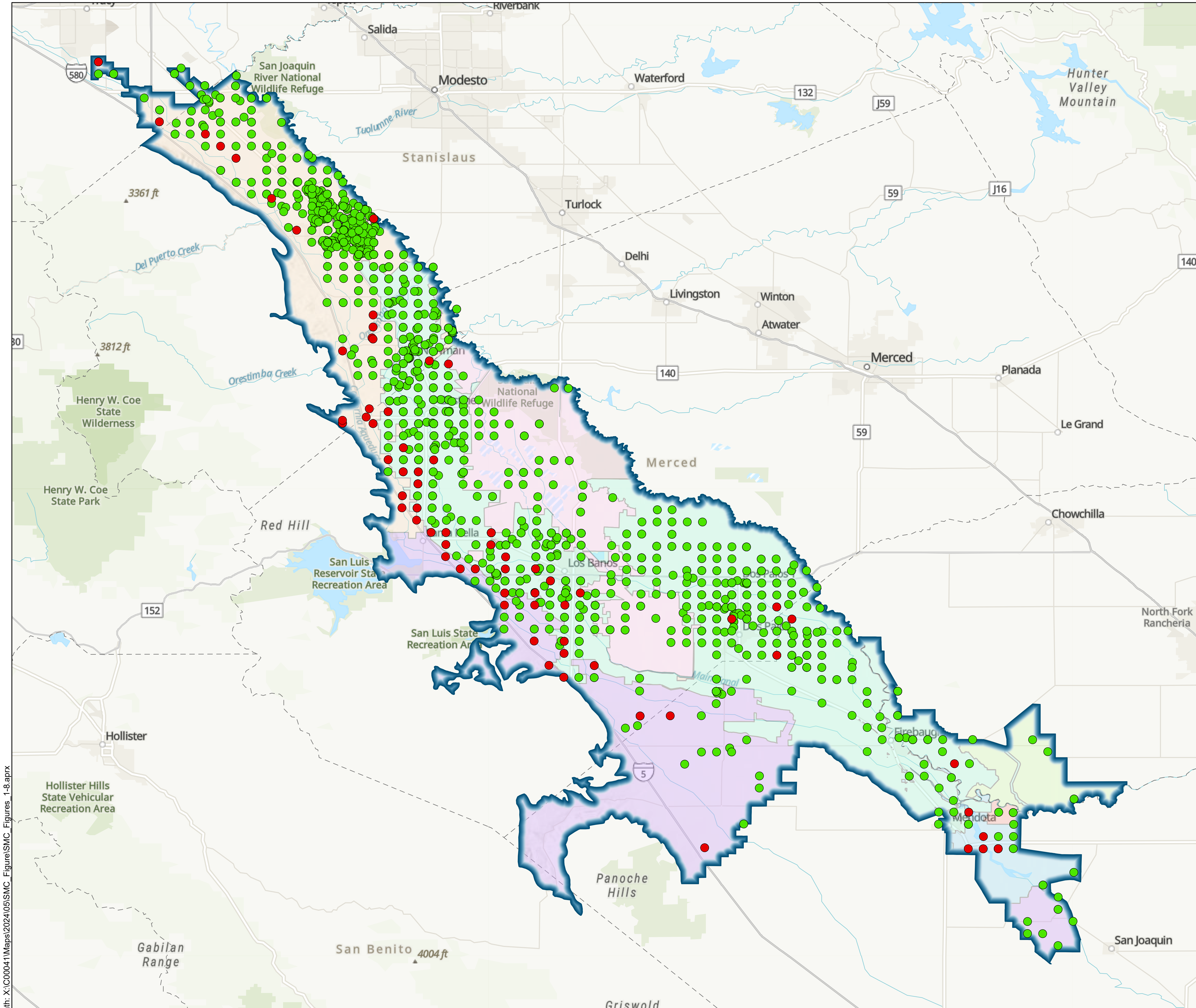
0 14 28 Miles

Groundwater Elevations Under MTs
Lower Aquifer

eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09
Figure SMC-3

Path: X:\C00041\Maps\2024\13\Well Impacts\FigureSMC1-8_v2.aprx

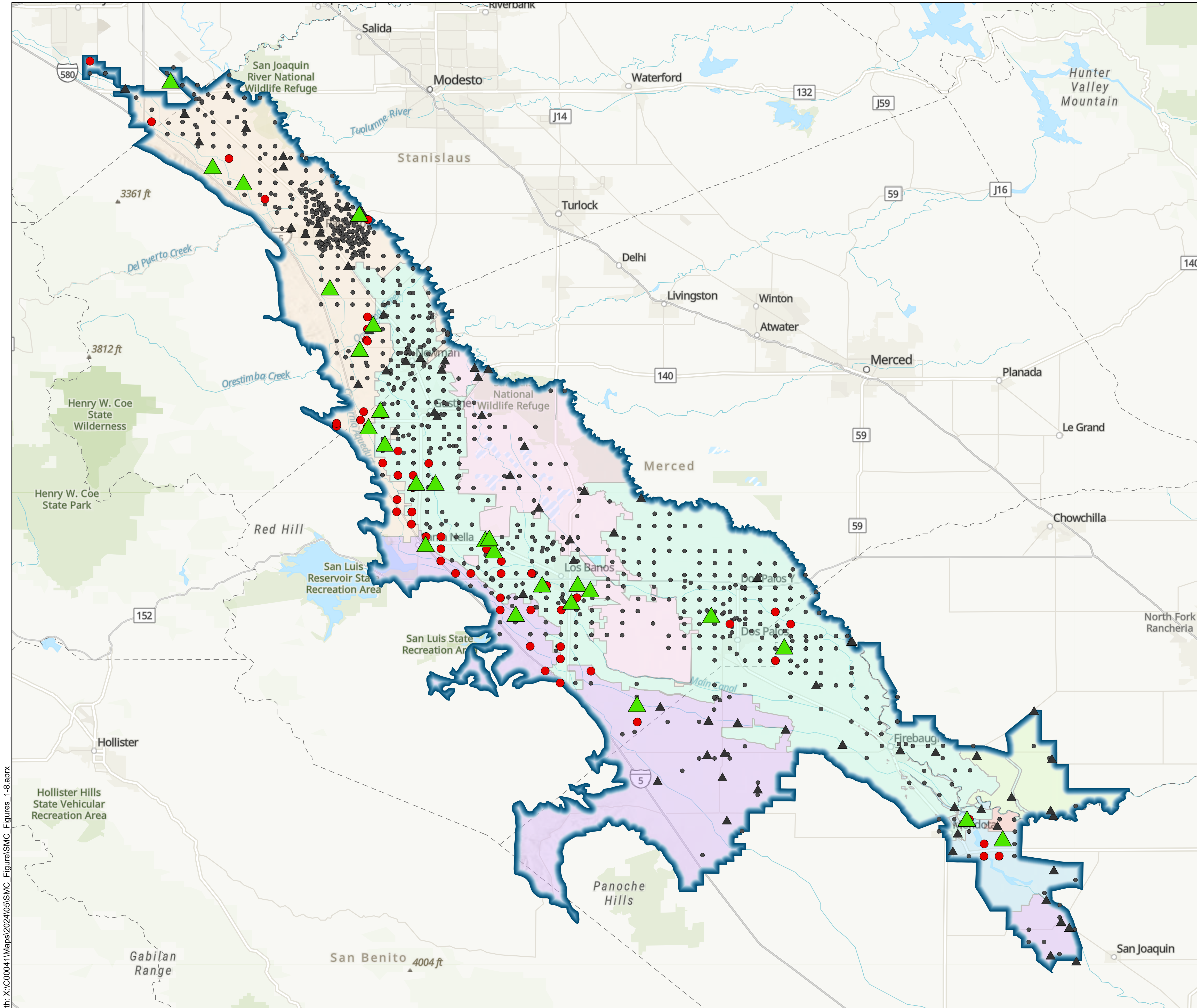


Well Impacts Analysis: Worst Case

Delta-Mendota Subbasin
July 2024
C00041.09

eki environment & water

Figure SMC-4



Legend

- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- Selected RMW (See Note 1)
- Other RMW

Drinking Water Well Status

- Impacted
- Not Impacted

GSA Group

- Aliso Water District
- Central Delta-Mendota
- Farmers Water District
- Fresno County
- Grassland Water District
- Northern Delta-Mendota
- San Joaquin River Exchange Contractors

Abbreviations

DWR = California Department of Water Resources
ft msl = Feet above Mean Sea Level
GSA = Groundwater Sustainability Agency
OSWCR = DWR's Online System of Well Completion Reports
RMW = Representative Monitoring Well
SGMA = Sustainable Groundwater Management Act

Notes

1. Selected RMWs include the 25% of RMWs with the highest density of impacted wells.
2. All locations are approximate.
3. Drinking water wells that were already dewatered prior to 2015 or constructed before 1970 were filtered out for this analysis.
4. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.
3. OSWCR Impacted Wells data obtained from California Department of Water Resources Well Completion Reports, dated October 2023.

N

0 8 16
Miles

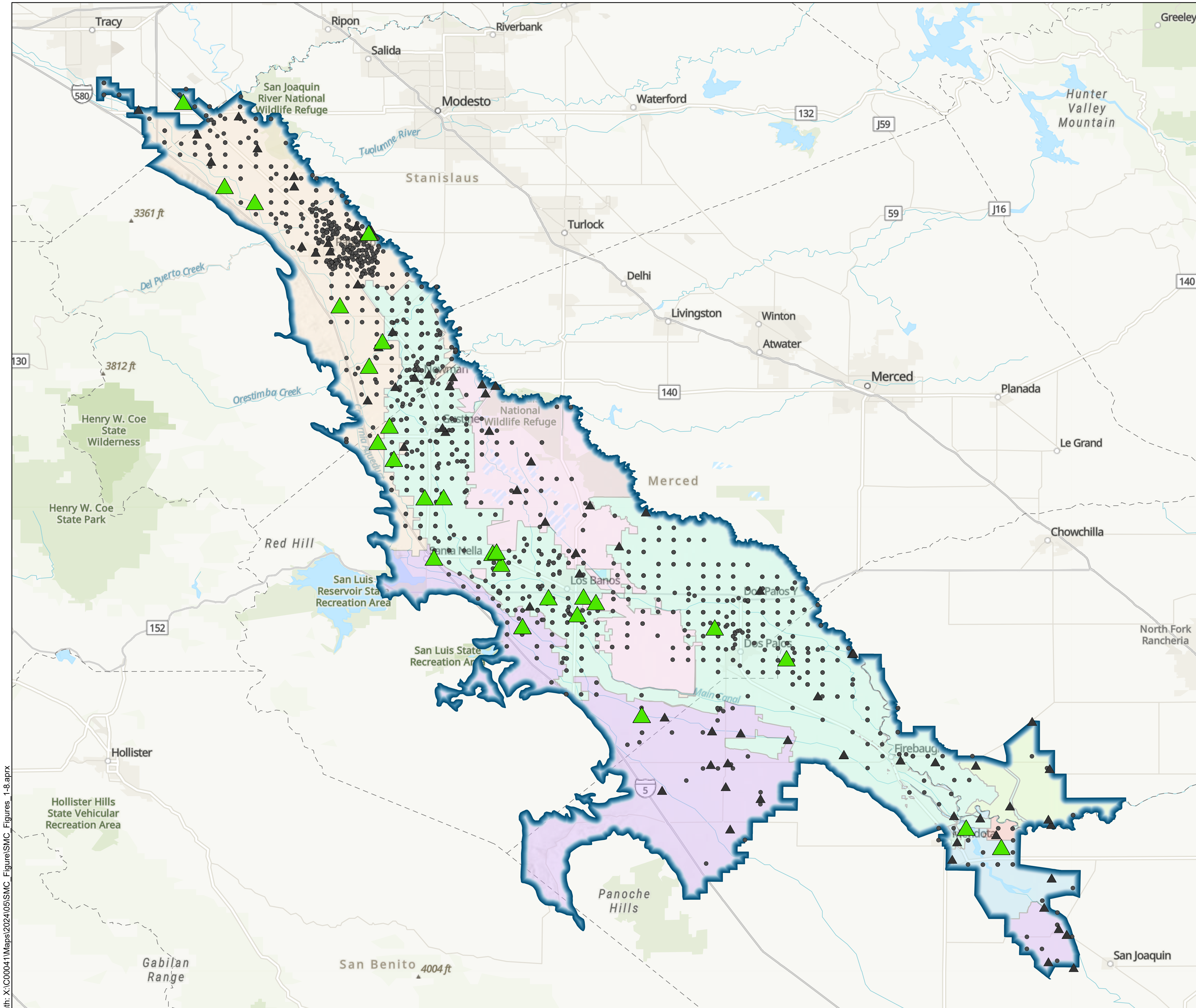
Well Impacts Analysis: High-End Bracketed

eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09

Figure SMC-5

Path: X:\C00041\Maps\2024\05\SMC_Figures\SMC_Figures_1-8.aprx



Legend

Delta-Mendota Subbasin (DWR Basin No. 5-022.07)

Selected RMW (See Note 1)

Other RMW

Drinking Water Well Status

Impacted

Not Impacted

GSA Group

Aliso Water District

Central Delta-Mendota

Farmers Water District

Fresno County

Grassland Water District

Northern Delta-Mendota

San Joaquin River Exchange Contractors

Abbreviations

DWR = California Department of Water Resources
ft msl = Feet above Mean Sea Level
GSA = Groundwater Sustainability Agency
OSWCR = DWR's Online System of Well Completion Reports
RMW = Representative Monitoring Well
SGMA = Sustainable Groundwater Management Act

Notes

1. Selected RMWs include the 25% of RMWs with the lowest density of impacted wells.
2. All locations are approximate.
3. Drinking water wells that were already dewatered prior to 2015 or constructed before 1970 were filtered out for this analysis.
4. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.
3. OSWCR Impacted Wells data obtained from California Department of Water Resources Well Completion Reports, dated October 2023.

N

0 8 16

Miles

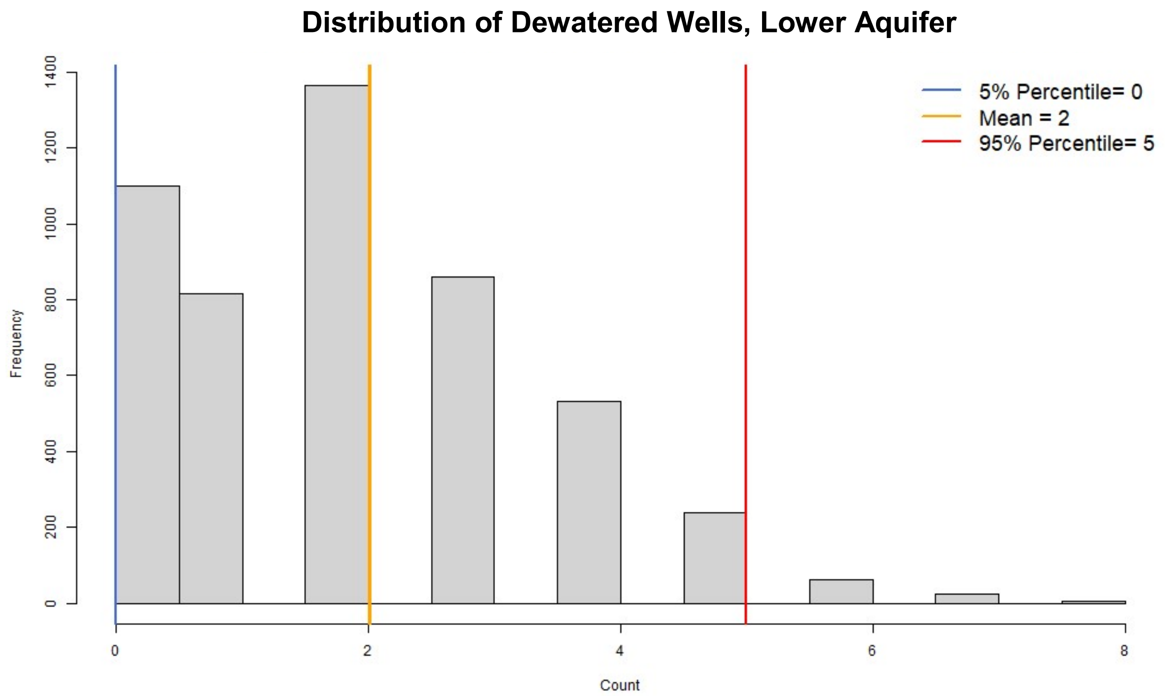
Well Impacts Analysis: Low-End Bracketed

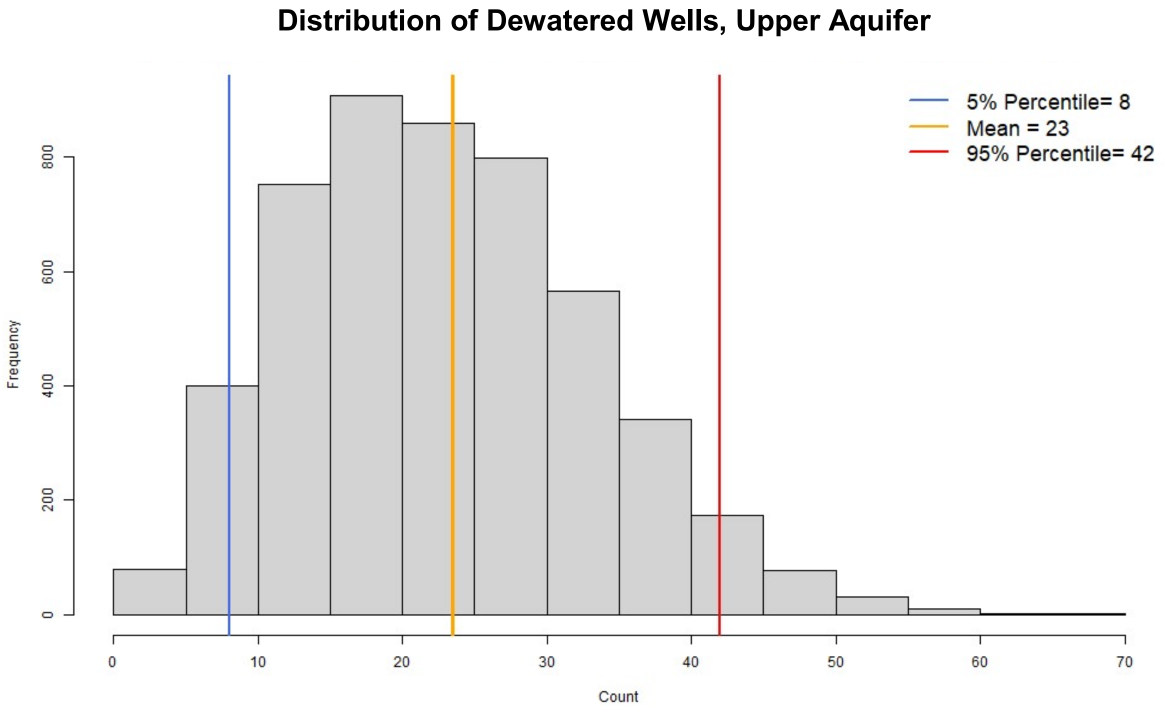
eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09

Figure SMC-6

Path: X:\C00041\Maps\2024\05\SMC_Figure\SMC_Figures_1-8.aprx





Notes

1. Stochastic prediction considered 5,000 random combinations of the 25% of RMWs that exceed MTs to determine a distribution of well impacts.
2. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Abbreviations

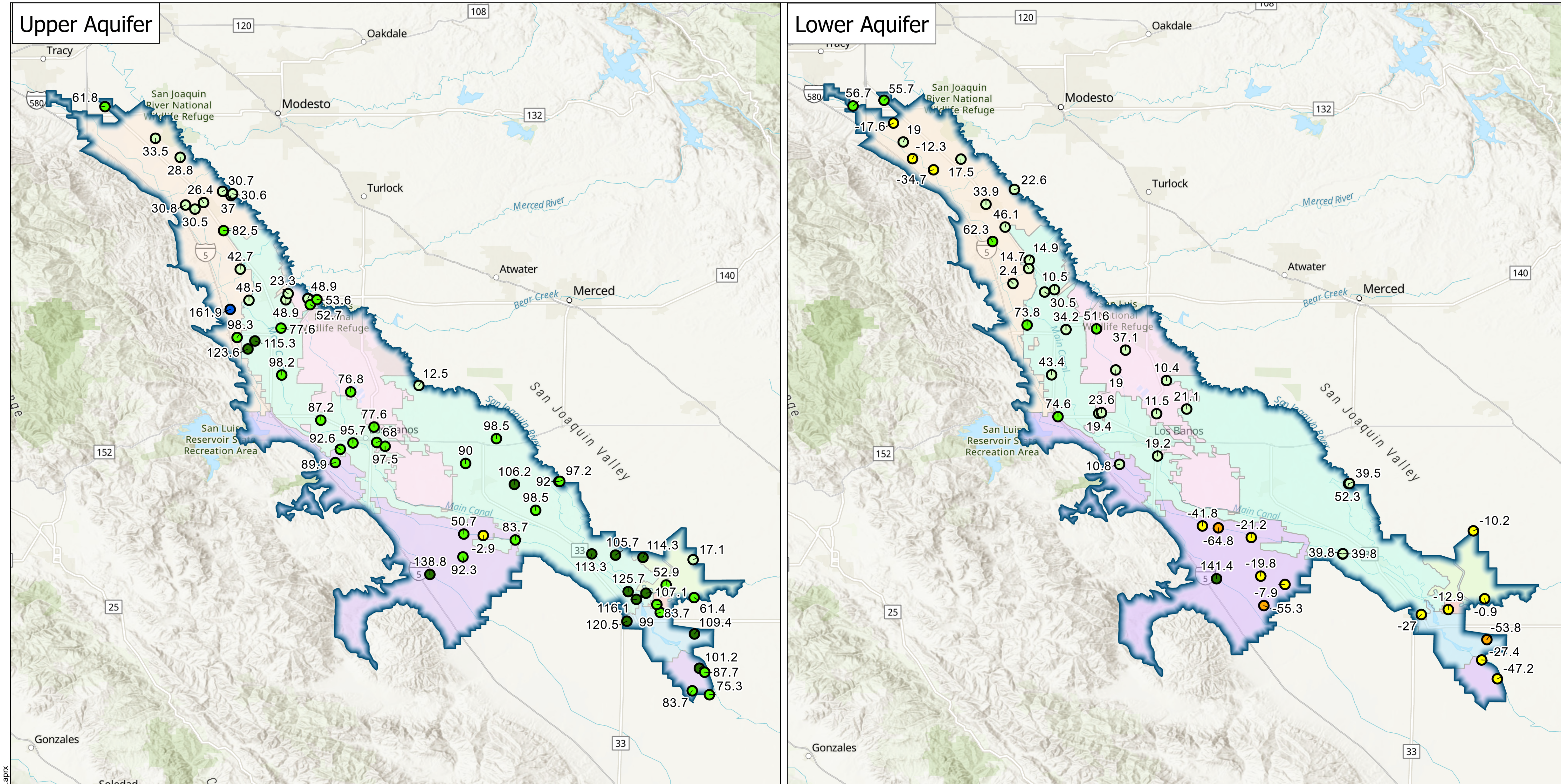
RMW = Representative Monitoring Well

Well Impacts Analysis: Stochastic Prediction

Delta-Mendota Subbasin
July 2024
C00041.09

eki environment & water

Figure SMC-7



Legend

MO (ft msl)

- <-150
- -150 - -100
- -100 - -50
- -50 - 0
- 0 - 50
- 50 - 100
- 100 - 150
- >150

Delta-Mendota Subbasin (DWR Basin No. 5-022.07)

GSA Group

- Aliso Water District
- Central Delta-Mendota
- Farmers Water District
- Fresno County
- Grassland Water District
- Northern Delta-Mendota
- San Joaquin River Exchange Contractors

Abbreviations

DWR = California Department of Water Resources
ft msl = feet above mean sea level
GSA = Groundwater Sustainability Agency
MO = Measurable Objectives
SGMA = Sustainable Groundwater Management Act

Notes

1. All Locations are approximate.
2. Labels show MO in ft msl.
3. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.

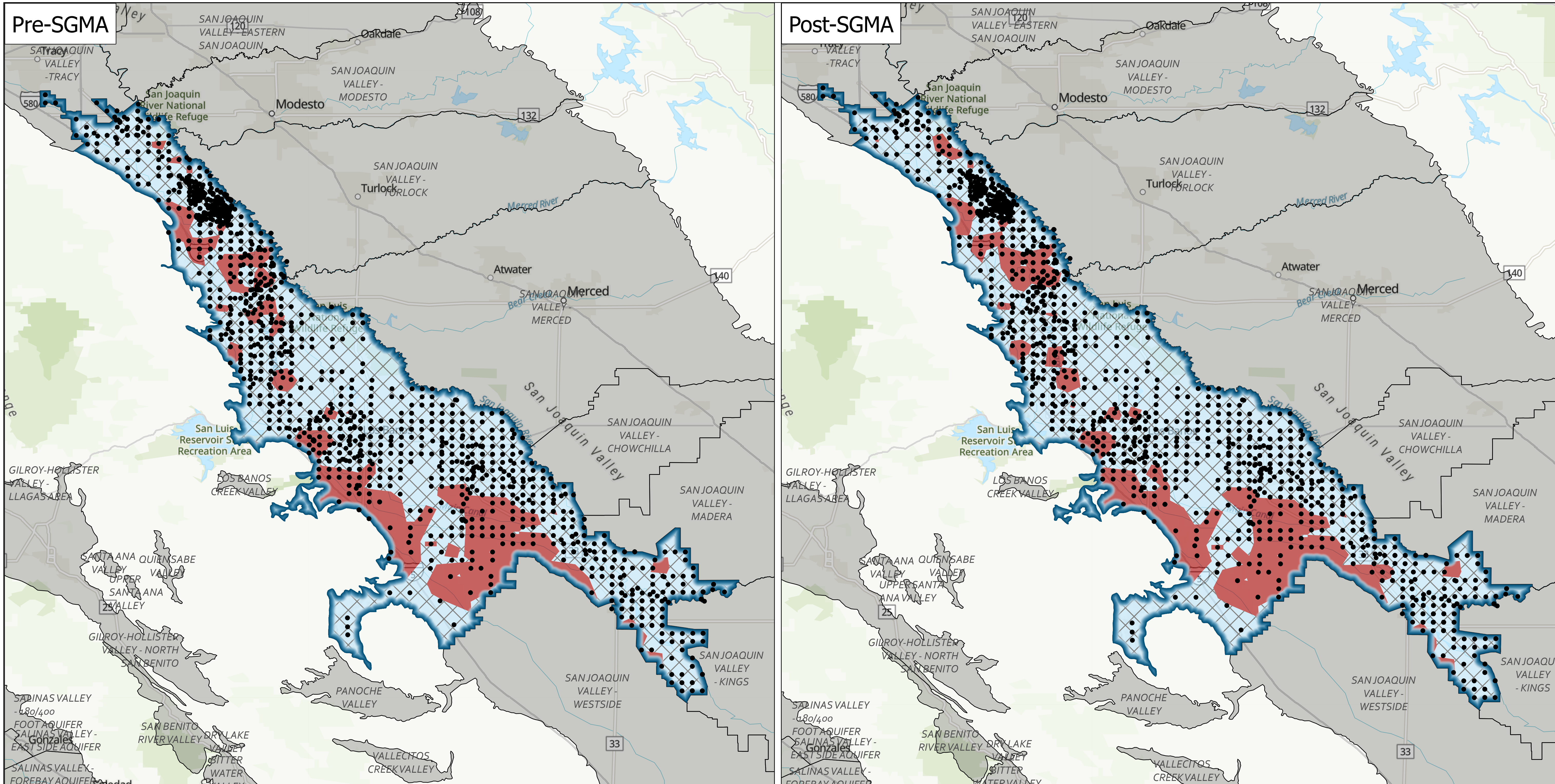
N
0 14 28
Miles

Water Level Measurable Objectives

eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09
Figure SMC-8

Path: X:\C00041\Maps\2024\3\Well Impacts\FigureSMC1-8_v2.aprx



Legend

- OSWCR Drinking Water Wells
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- Groundwater Basins

Concentration of NO3 (mg/L as Nitrogen)

- 0 - 10
- > 10

Abbreviations

DWR = California Department of Water Resources
GSA = Groundwater Sustainability Agency
MCL = Maximum Concentration Level
mg/L = milligrams per Liter
NO3 = Nitrate
OSWCR =Online System of Well Completion Reports
SGMA = Sustainable Groundwater Management Act

Notes

1. All Locations are approximate.
2. The "pre-SGMA" period is defined as 2005-2014. The post-SGMA period is defined as 2015-2023.
3. The Primary MCL for NO3 is 10 mg/L.
4. NO3 concentration contours are spatially interpolated from GAMA and GSA-provided data for the relevant time period.
5. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.
3. OSWCR wells are obtained from California DWR Well Completion Reports.
4. Water Quality data obtained from the Groundwater Ambient Monitoring Assessment (GAMA) program of California and from the GSAs.

N

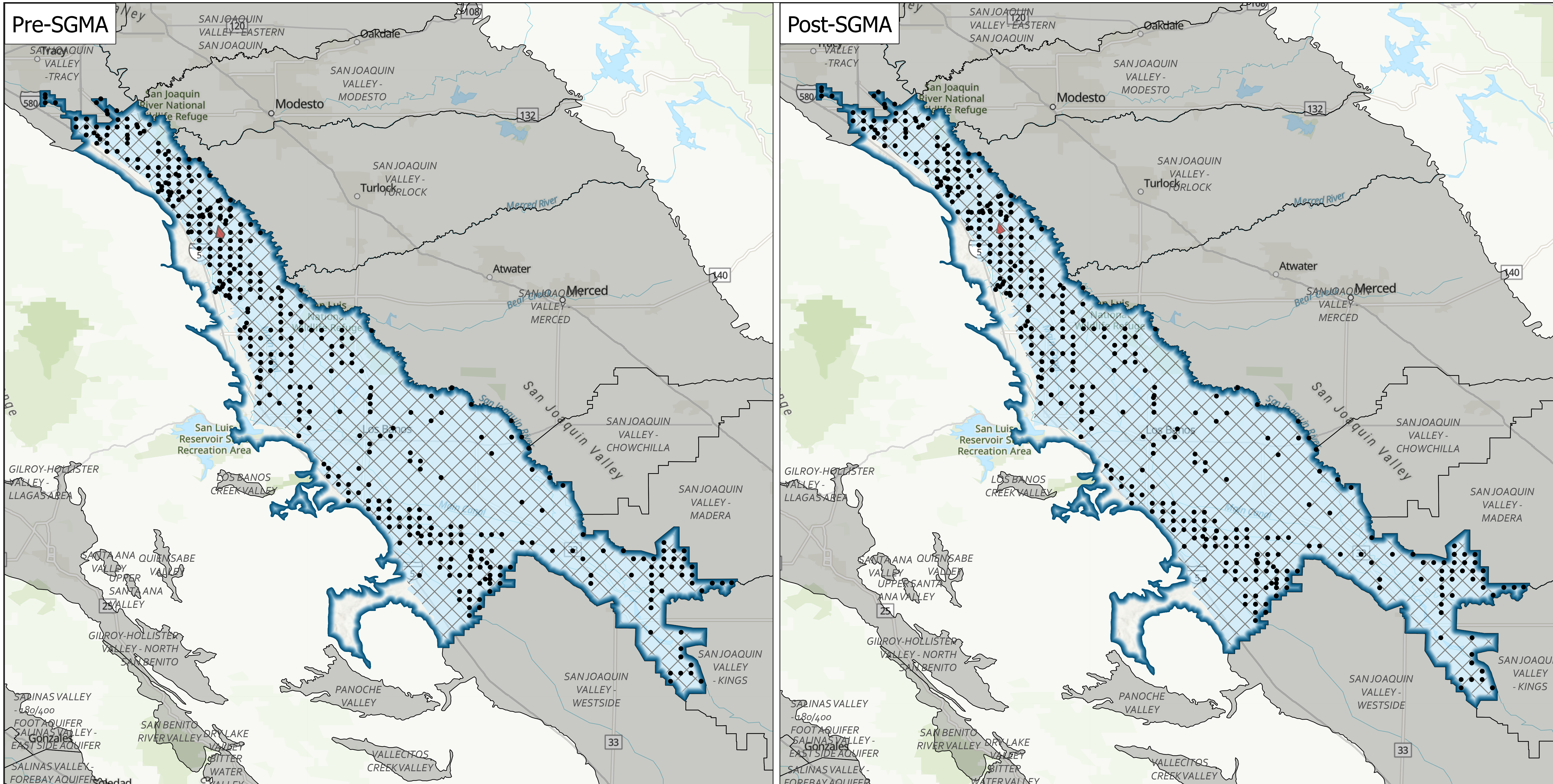
0 14 28
Miles

Water Quality Well Impacts: Nitrate, Upper Aquifer

eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09
Figure SMC-10

Path: X:\C00041\Maps\2024\11\SMC\Figure_SMC9-12.aprx



Legend

- OSWCR Drinking Water Wells
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- Groundwater Basins

Concentration of NO3 (mg/L as Nitrogen)

- 0 - 10
- > 10

Abbreviations

DWR = California Department of Water Resources
GSA = Groundwater Sustainability Agency
MCL = Maximum Concentration Level
mg/L = milligrams per Liter
NO3 = Nitrate
OSWCR =Online System of Well Completion Reports
SGMA = Sustainable Groundwater Management Act

Notes

1. All Locations are approximate.
2. The "pre-SGMA" period is defined as 2005-2014. The post-SGMA period is defined as 2015-2023.
3. The Primary MCL for NO3 is 10 mg/L.
4. NO3 concentration contours are spatially interpolated from GAMA and GSA-provided data for the relevant time period.
5. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.
3. OSWCR wells are obtained from California DWR Well Completion Reports.
4. Water Quality data obtained from the Groundwater Ambient Monitoring Assessment (GAMA) program of California and from the GSAs.

N

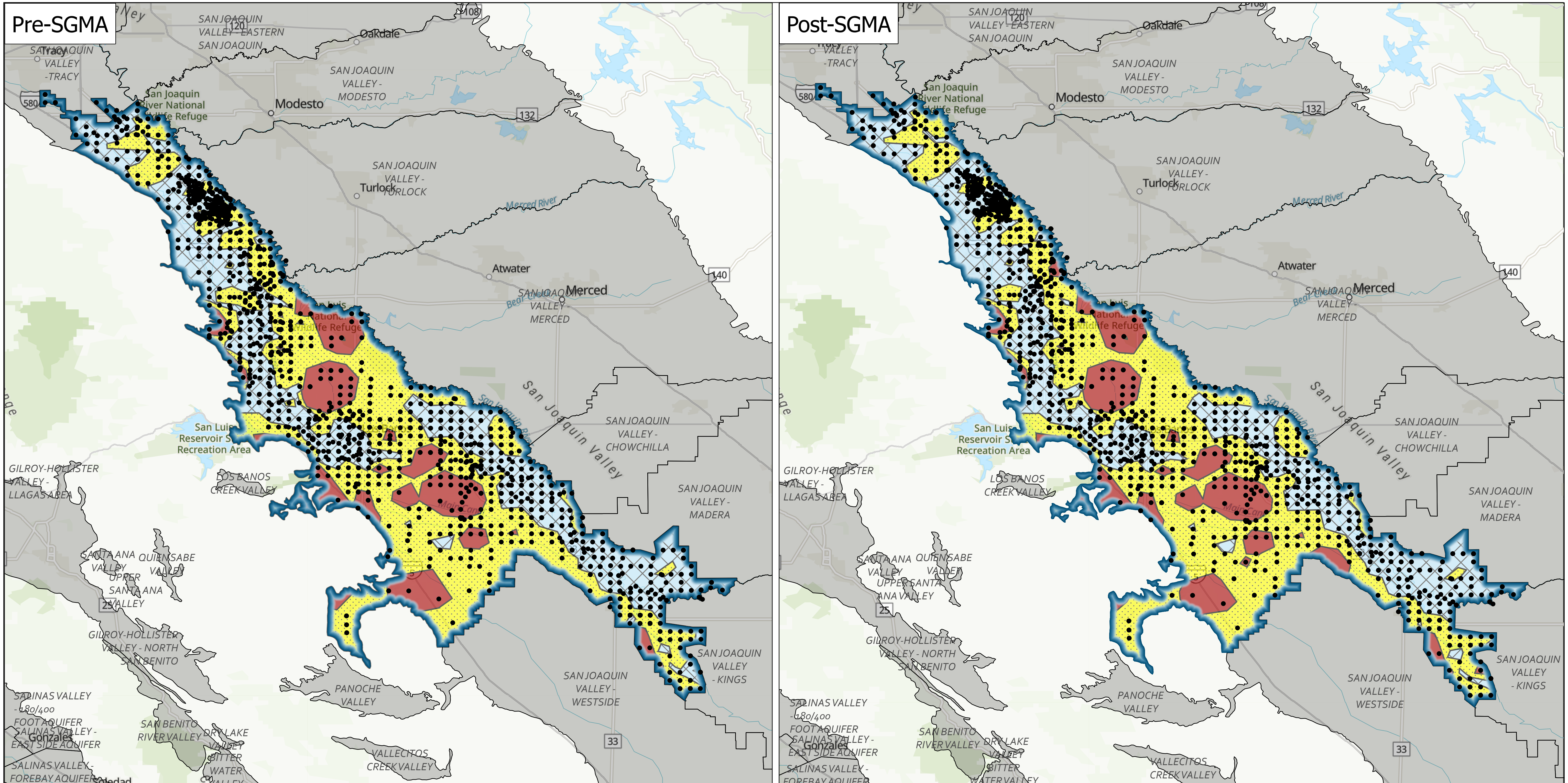
0 14 28
Miles

Water Quality Well Impacts: Nitrate, Lower Aquifer

eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09
Figure SMC-11

Path: X:\C00041\Maps\2024\11\SMC\Figure_SMC9-12.aprx



Legend

- OSWCR Drinking Water Wells
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- Groundwater Basins

Concentration of TDS (mg/L)

- 0 - 1000
- 1,000 - 3000
- > 3,000

Abbreviations

DWR = California Department of Water Resources
GSA = Groundwater Sustainability Agency
MCL = Maximum Concentration Level
mg/L = milligrams per Liter
OSWCR =Online System of Well Completion Reports
SGMA = Sustainable Groundwater Management Act
TDS = Total Dissolved Solids

Notes

1. All Locations are approximate.
2. The "pre-SGMA" period is defined as 2005-2014. The post-SGMA period is defined as 2015-2023.
3. The Upper Secondary MCL for TDS is 1,000 mg/L.
4. TDS concentration contours are spatially interpolated from GAMA data and GSA-provided for the relevant time period.
5. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.
3. OSWCR wells are obtained from California DWR Well Completion Reports.
4. Water Quality data obtained from the Groundwater Ambient Monitoring Assessment (GAMA) program of California and from the GSAs.

N

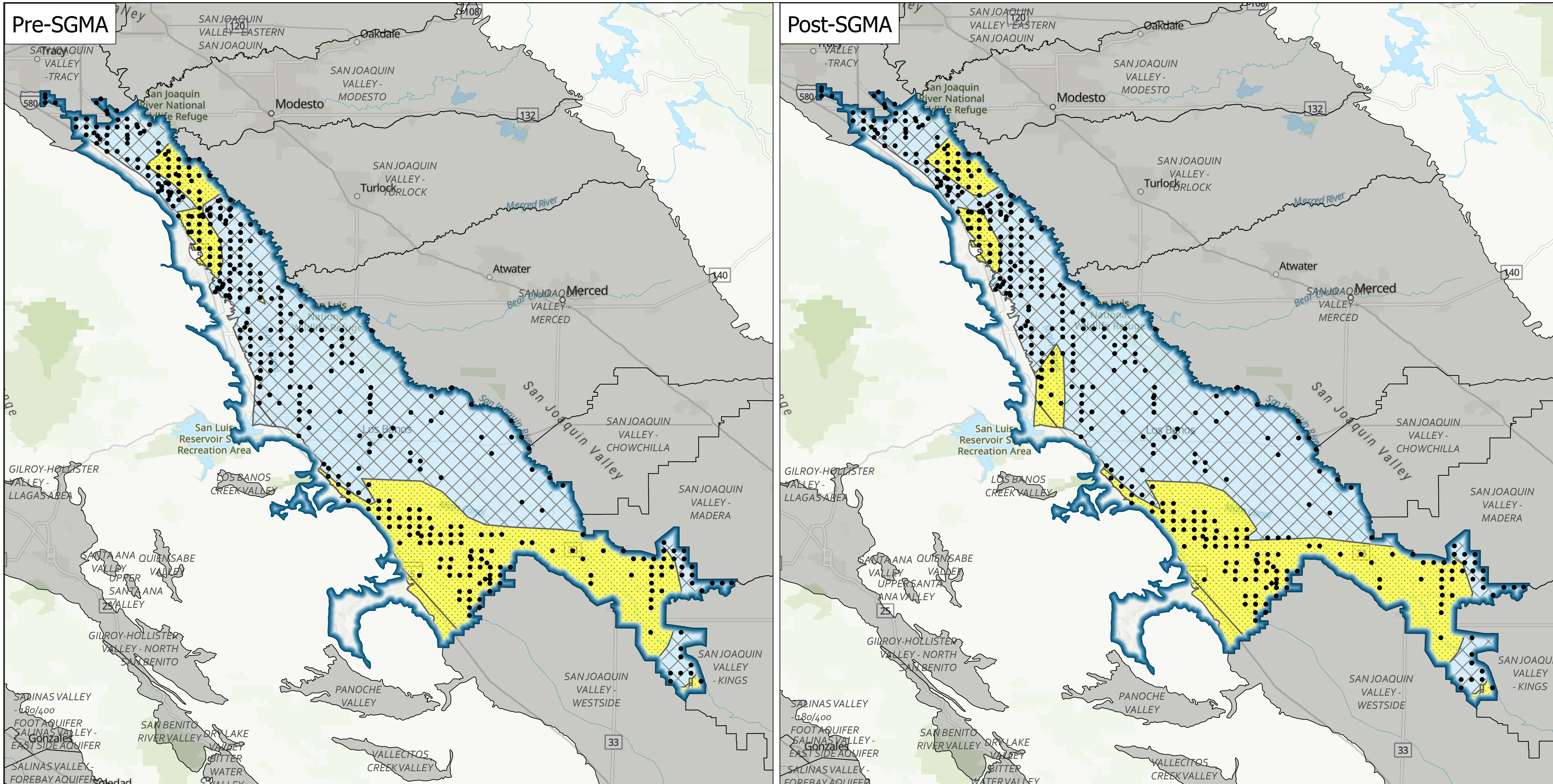
0 14 28
Miles

Water Quality Well Impacts: Total Dissolved Solids, Upper Aquifer

Delta-Mendota Subbasin
July 2024
C00041.09

eki environment & water

Figure SMC-12



Legend

- OSWCR Drinking Water Wells
- Delta-Mendota Subbasin (DWR Basin No. 5-022.07)
- Groundwater Basins

Concentration of TDS (mg/L)

- 0 - 1000
- 1,000 - 3000

Abbreviations

DWR = California Department of Water Resources
GSA = Groundwater Sustainability Agency
MCL = Maximum Concentration Level
mg/L = milligrams per Liter
OSWCR =Online System of Well Completion Reports
SGMA = Sustainable Groundwater Management Act
TDS = Total Dissolved Solids

Notes

1. All Locations are approximate.
2. The "pre-SGMA" period is defined as 2005-2014. The post-SGMA period is defined as 2015-2023.
3. The Upper Secondary MCL for TDS is 1,000 mg/L.
4. TDS concentration contours are spatially interpolated from GAMA data and GSA-provided for the relevant time period.
5. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.
3. OSWCR wells are obtained from California DWR Well Completion Reports.
4. Water Quality data obtained from the Groundwater Ambient Monitoring Assessment (GAMA) program of California and from the GSAs.

N

0 14 28

Miles

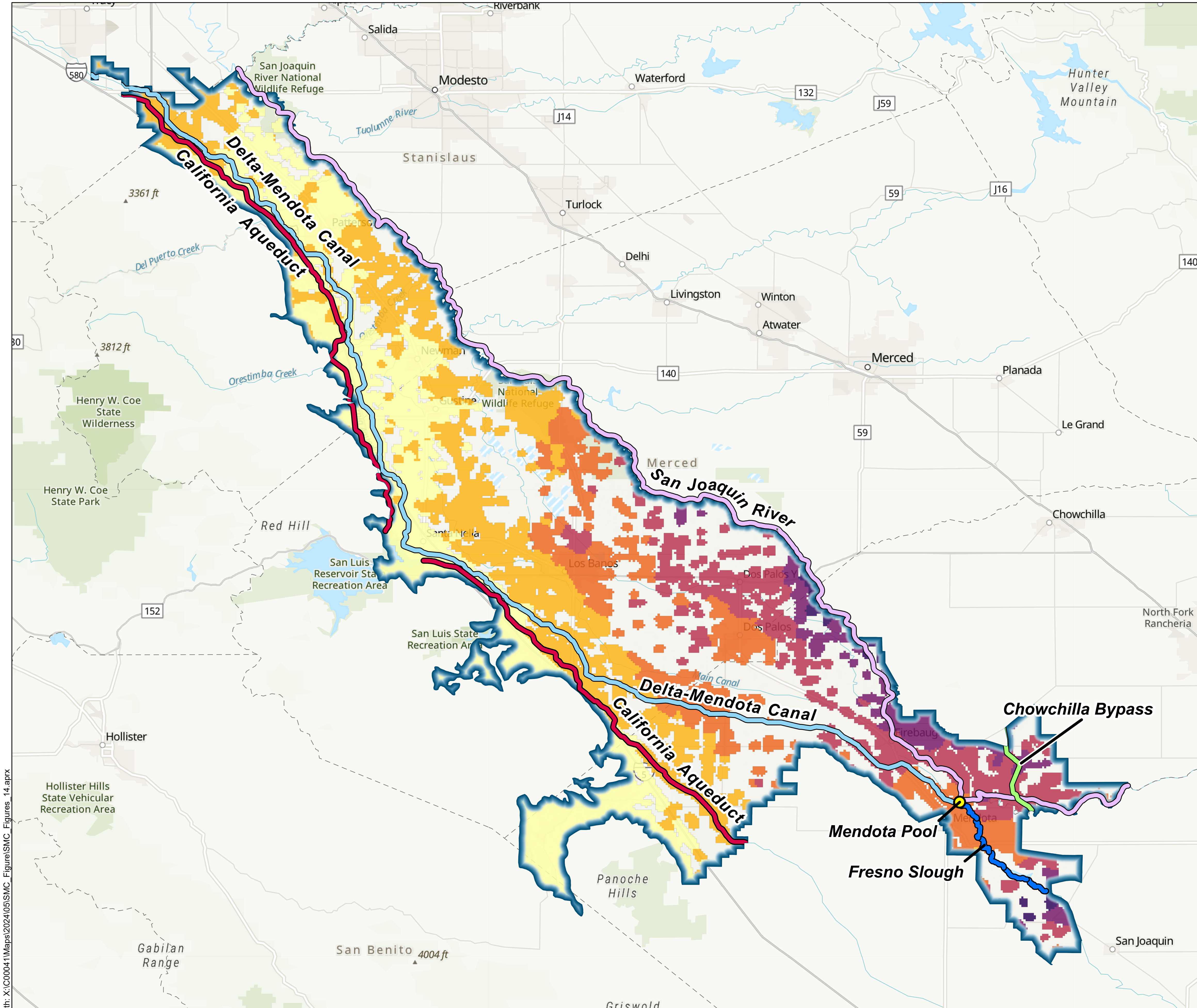
Water Quality Well Impacts: Total Dissolved Solids, Lower Aquifer

Delta-Mendota Subbasin
July 2024
C00041.09

eki environment & water

Figure SMC-13

Path: X:\C00041\Maps\2024\11\SMC\Figure_SMC9-12.aprx



Legend

Delta-Mendota Subbasin (DWR Basin No. 5-022.07)

Critical Infrastructure

- California Aqueduct
- Delta-Mendota Canal
- Chowchilla Bypass
- Fresno Slough
- San Joaquin River
- Mendota Pool

2015 - 2023 Vertical Displacement (ft)

- <- -2.5
- -2.5 - -2
- -2 - -1.5
- -1.5 - -1
- -1 - -0.5
- -0.5 - 0
- > 0

Abbreviations

DWR = California Department of Water Resources
ft = feet
GSA = Groundwater Sustainability Agency
InSAR = Interferometric Synthetic Aperture Radar
SGMA = Sustainable Groundwater Management Act

Notes

1. All locations are approximate.
2. If accommodation or alternative format is needed for this figure, please contact the Plan Manager for assistance.

Sources

1. Basemap is ESRI's ArcGIS Online world topographic map, obtained 8 September 2023.
2. DWR Groundwater basins are based on the boundaries defined in California's Groundwater Bulletin 118 - Final Prioritization, dated February 2019.
3. DWR. (2023). TRE ALTAMIRA InSAR Dataset [Raster]. (https://sgma.water.ca.gov/webgis/config/custom/html/SGMADataViewer/doc/#tre-altamira-insar-dataset)

N

0 8 16
Miles

Critical Infrastructure in the Delta-Mendota Subbasin

eki environment & water

Delta-Mendota Subbasin
July 2024
C00041.09

SMC-14