State of California
The Natural Resources Agency
Department of Water Resources
Sustainable Groundwater Management Program

DRAFT

2018 SGMA Basin Prioritization Process and Results

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Acronyms and Abbreviations

APN	Assessor's Parcel Number
Cal-SIMETAW	California Simulation of Evapotranspiration of Applied Water
CASGEM	California Statewide Groundwater Elevation Monitoring
CDFW	California Department of Fish and Wildlife
CIMIS	California Irrigation Management Information System
COD	Critical Overdraft
DOF	California Department of Finance
DWR	California Department of Water Resources
GAMA	Groundwater Ambient Monitoring and Assessment
GSP	Groundwater Sustainability Plan
InSAR	Interferometric Synthetic Aperture Radar
MCL	Maximum Contaminant Level
NASS	National Agricultural Statistics Service
NHD	National Hydrography Dataset
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NWI	National Wetland Inventory
OSWCR	Online System for Well Completion Reports
PLSS	Public Land Survey System
PWSS	Public Water System Statistics
SGMA	Sustainable Groundwater Management Act
SWP	State Water Project

SWRCB	State Water Resources Control Board
UNAVCO	Non-Profit University-Governed Consortium
USDA	United States Department of Agriculture
USDA-FS	United States Department of Agriculture – Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VegCAMP	Vegetation Classification and Mapping Program
WCR	Well Completion Report (DWR Form 188)

I. Purpose of Report

This report describes the 2018 Sustainable Groundwater Management Act (SGMA) Basin Prioritization, including the process followed by the California Department of Water Resources (DWR) to update California's groundwater basin prioritization in accordance with the requirements of SGMA and related law[1] and the results of the prioritization process.

II. Introduction

There are 517 groundwater basins and subbasins in California. The groundwater contribution of these basins to California's annual water supply ranges from 30 percent in a wet water year to 46 percent in a dry water year (California Department of Water Resources 2015). Statewide, approximately 30 million people, or 80 percent of Californians, live in areas overlying groundwater basins (California Department of Water Resources 2015). At the local level, many municipal, agricultural, and disadvantaged communities rely on groundwater for nearly 100 percent of their water supply needs. Readily available quantities of high quality groundwater have provided long-term economic benefits to California and enabled the Central Valley to become a world leader in agricultural production.

It is the policy of the State through SGMA that groundwater resources be managed sustainably for long-term reliability and multiple benefits for current and future beneficial uses, and that sustainable groundwater management is best achieved locally through the development, implementation, and updating of plans and programs based on the best available science.

DWR plays a key role in providing the framework for sustainable groundwater management in accordance with the statutory requirements of SGMA and other provisions within the Water Code. Other State agencies, such as the State Water Resources Control Board (SWRCB) and California Department of Fish and Wildlife (CDFW), also play a role in SGMA implementation and are required to consider SGMA when adopting policies, regulations, or criteria when issuing orders or determinations, where pertinent.[2]

III. Background

Groundwater basin prioritization was first instituted as a result of legislation enacted in California's 2009 Comprehensive Water Package (California Department of Water Resources 2009), which required that groundwater elevations be monitored seasonally in all groundwater basins identified in the Bulletin 118 - 2003 Update[3] (California Department of Water Resources 2003). That legislation required DWR to identify the extent of groundwater elevation monitoring undertaken within each basin and subbasin and directed DWR to prioritize basins for that purpose. In 2014, DWR prioritized groundwater basins through its California Statewide Groundwater Elevation Monitoring (CASGEM) Program, which was established in response to the legislation enacted in California's 2009 Comprehensive Water Package. The 2014 CASGEM Basin Prioritization classified basins as high, medium, low, or very low based on the

[1] *See* Water Code sections 10722.4 and 10933.

[2] *See* Water Code Section 10720.9.

[3] Stats.2009-2010, 7th Ex. Sess., c. 1 (S.B.6), § 1, eff. Feb. 3, 2010.

consideration of the following components:

1. The population overlying the basin.
2. The rate of current and projected growth of the population overlying the basin.
3. The number of public supply wells that draw from the basin.
4. The total number of wells that draw from the basin.
5. The irrigated acreage overlying the basin.
6. The degree to which persons overlying the basin rely on groundwater as their primary source of water.
7. Any documented impacts on the groundwater within the basin, including overdraft, subsidence, saline intrusion, and other water quality degradation.
8. Any other information determined to be relevant by the department, *including adverse impacts on local habitat and local streamflows.* [Note: underline text was added by SGMA]

In 2014, Governor Brown signed into law three bills that formed SGMA.[4] SGMA requires that groundwater in California's high- and medium-priority groundwater basins be managed in accordance with locally-developed Groundwater Sustainability Plans (GSPs) or Alternatives to GSPs (Alternative Plans). SGMA required that DWR establish an initial priority for each basin no later than January 31, 2015, and requires that DWR reassess the prioritization any time DWR updates the Bulletin 118 basin boundaries.[5] DWR adopted the 2014 CASGEM Basin Prioritization as the initial prioritization under SGMA, resulting in the designation of 127 high- and medium-priority basins.

Following the adoption of SGMA and the basin boundary regulations, DWR received 54 requests for basin boundary modifications. In the fall of 2016, DWR completed and released the groundwater basin boundaries, which incorporated numerous statewide jurisdictional and scientific modifications. DWR published Bulletin 118 – Interim Update 2016 (California Department of Water Resources 2016a), which included the boundary modifications, on December 22, 2016.

IV. 2018 SGMA Basin Prioritization

The 2018 SGMA Basin Prioritization process was conducted as a result of basin boundary modifications as required by the Water Code.[6] In addition, DWR identified the need to use updated data and address new considerations in accordance with the Water Code that were not part of 2014 CASGEM Basin Prioritization, but which DWR determined to be relevant to the purposes of SGMA. This includes:

- The updated SGMA provision in component 8 that requires consideration of *"…adverse impacts on local habitat and local stream flows";*
- Other information from a sustainable groundwater management perspective in accordance with the provision *"Any other information determined to be relevant by the Department...";*
- Use of updated datasets and information in accordance with the provision *"…to the extent data are available"*.

The 2018 SGMA Basin Prioritization process followed the Water Code components used for the 2014

[4] Stats.2014, c. 346 (S.B.1168), § 3, c. 347 (A.B.1739), § 18, c. 348 (S.B.1319), § 2, eff. Jan. 1, 2015.

[5] *See* Water Code sections 10722.4(b) and 10722.4(c)

[6] *See* California Water Code Section 10722.4(c)

CASGEM Basin Prioritization. The methods used in most cases are the same and in other cases have been modified to address SGMA requirements which have been specified in this report. The process involved applying datasets and information in a consistent, statewide manner that focused on the core premise that basins meeting the components identified in Water Code Section 10933(b) should be required to use groundwater in accordance with sustainable groundwater management practices (i.e. in accordance with SGMA, under a GSP or Alternative Plan).

Evaluation of groundwater basins at a statewide scale does not necessarily capture the local importance of the smaller size or lower-use groundwater basins. For many of California's low-use basins, groundwater provides close to 100 percent of the local urban and agricultural water demands. Thus, when reviewing the 2018 SGMA Basin Prioritization results, it is important to recognize the findings are not intended to characterize groundwater management practices or diminish the local importance of the smaller size or lower-use groundwater basins; rather, the results are presented as a statewide assessment of the overall importance of groundwater management in meeting urban and agricultural demands, based on the evaluation of the eight required components specified in Water Code Section 10933(b).

Based on the SGMA updates to component 8, the 2018 SGMA Basin Prioritization considered the following four new sub-components:

- Adverse impacts on local habitat and local streamflows
- Adjudicated areas
- Critically overdrafted basins
- Groundwater related transfers

The rationale for evaluating these new sub-components is described below. The process used to evaluate the new sub-components is described in detail within the component 8 section of this report.

Adverse Impacts on Local Habitat and Local Streamflows

DWR has determined that adverse impacts on local habitat and local streamflows are relevant factors in the prioritization of basins for purposes of SGMA because such impacts could indicate the depletion of interconnected surface waters that have significant and unreasonable adverse impacts on beneficial uses of the surface water,[7] and because impacts on groundwater dependent ecosystems are specifically mentioned as a possible component of GSPs.[8] The Legislature specifically mentioned adverse impacts on local habitat and local streamflows as an example of the "other information determined to be relevant by the department" that could be considered by the Department in establishing basin prioritization.[9] However, the law states that DWR is to consider factors "to the extent data are available." In the case of adverse impacts on local habitat and local streamflows, prior to the initial prioritization, DWR determined that there was not sufficient consistent, reliable, state-wide information available. As a result, DWR did not evaluate this factor as part of the 2015 SGMA prioritization. After that prioritization, DWR developed a statewide Natural Communities Commonly Associated with Groundwater (Natural Communities)

[7] *See* Water Code Section 10721(x)(6)

[8] *See* Water Code Section 10727.4(l)

[9] Water Code Section 10933(b)(8)

database that assembles information on the location of seeps, springs, wetlands, rivers, vegetation alliances, and habitat from multiple sources. Utilizing that database, DWR determined sufficient data are available to included impacts to local habitat and local streamflows as a prioritization factor.

Adjudicated Areas

DWR has determined that the presence of an adjudicated area in a basin is a relevant factor in the prioritization of basins for purposes of SGMA because SGMA does not apply to the adjudicated areas identified in the Act.[10] Because these adjudicated areas are not required to develop and adopt a GSP or Alternative Plan, DWR determined that SGMA prioritization should exclude those portions of the basin that were adjudicated. The non-adjudicated areas remain subject to SGMA, but DWR evaluated the non-adjudicated portion of the basin to determine the extent that these areas have the potential to affect groundwater management in the entire basin, in accordance with the consideration of components 1 through 8 of Water Code Section 10933(b).

Critically Overdrafted Basins

DWR has determined that critical overdraft of a basin is a relevant factor in the prioritization of basins for purposes of SGMA because a basin is subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts,[11] and because chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon is an undesirable result.[12]

Groundwater Related Transfers

DWR has determined that groundwater related transfers from a basin is a relevant factor in the prioritization of basins for purposes of SGMA because the basins involved in such transfers, if they are not managed pursuant to a GSP or Alternative Plan, are at greater risk of experiencing a range of significant impacts, including to groundwater levels, depletion of interconnected surface water, and land subsidence. Such impacts, if pervasive, would likely result in a reassessment of the basin as high- or medium-priority based solely upon the enumerated factors.[13] The purpose of this factor is not to discourage water transfers involving groundwater, which are recognized as "one of the water management tools to enhance flexibility in the allocation and use of water in California."[14] But transfers undertaken without an adequate understanding of the changes in groundwater levels, water budget, groundwater-surface water interactions, and land subsidence, and other features considered in a GSP, would leave the basin from which water is transferred and potentially adjacent basins vulnerable to adverse impacts.

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[10] Water Code Section 10720.8

[11] Bulletin 118 – Update 2003

[12] Water Code Section 10721(x)(1)

[13] Water Code Section 10933(b)

[14] *See* Water Transfers, https://www.water.ca.gov/Programs/State-Water-Project/Management/Water-Transfers

Significant and unreasonable land subsidence is not only one of the six undesirable results that define a basin as being unsustainable,[15] but the goal of avoiding or minimizing was declared to be a specific legislative intent in enacting SGMA.[16] Unlike groundwater levels, damage from inelastic subsidence is known to DWR to be permanent and irreversible, causing damage to property, and reducing the capacity of an aquifer to store water.

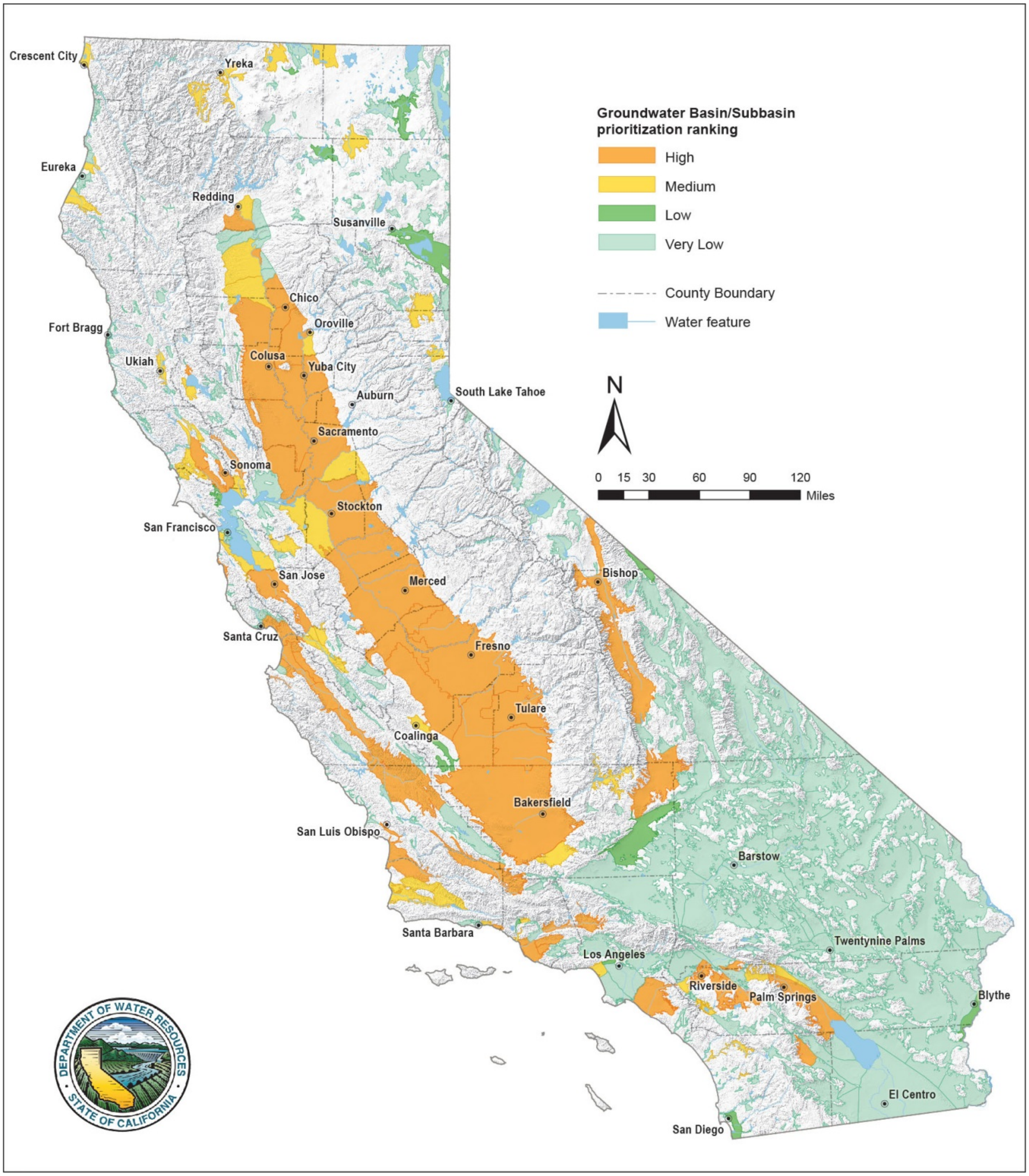
V. Summary of 2018 SGMA Basin Prioritization Results

Of the 517 groundwater basins, 109 are prioritized as high and medium and 408 are prioritized as low and very low (Figure 1). DWR created a web application that spatially and graphically presents the 2018 SGMA Basin Prioritization data and results for each basin. This application can be accessed at https://gis.water.ca.gov/app/bp2018-dashboard. Additional information related to 2018 SGMA Basin Prioritization can be accessed at the following website: https://www.water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization. An explanation of the process used to determine basin priority is provided in subsequent sections of this report.

[15] Water Code Section 10721(x)(5)

[16] Water Code Section 10720.1(e)

Figure 1 **Statewide Map of 2018 SGMA Basin Prioritization Results**



VI. Process

The following data component sections of this document are presented in the same order as the components listed in Water Code Section 10933(b). The basin priority points are described and calculated in the 'Prioritization' section of this document.

The evaluation process for components 6, 7, and 8 included sub-components. The points calculated for the sub-components were used to determine the overall component priority points. Only component priority points were used to determine basin priority.

For example, to develop the priority points for documented impacts (component 7) additional processing of sub-components was required. Points calculated for sub-components 7.d.1 and 7.d.2 were used to develop the points for sub-component 7.d. Points for sub-components 7.a through 7.d were then used to develop the priority points for component 7.

For each of the components described below, the Bulletin 118-Interim Update 2016 basin boundary shapefile (California Department of Water Resources 2016b) was used to delineate each basin. The data source, process, and steps used to evaluate each of the eight components of Water Code Section 10933(b) are described below.

Component 1: The population overlying the basin or subbasin[17]

Data Source

- 2010 United States Census population block data (California)

Process

The consideration of population density as a component of the 2018 SGMA Basin Prioritization used consistent methods and same data from the 2014 CASGEM Basin Prioritization. The 2010 United States Census population block data (United States Census Bureau 2010) was used to calculate the population overlying each groundwater basin using the following methods:

- For population blocks contained wholly within a basin boundary, all population in the block was included in the basin population total.
- For population blocks located wholly outside of a basin boundary, all population in the block was excluded from the basin population total.
- For population blocks located partially within the basin, the proportion of the population included was equal to the proportion of the area of the block contained within the basin and was applied to the basin population total. The proportion of the population equal to the proportion of the area of the block not contained within the basin was excluded from the basin population total. For example, if 60% of the population block was within basin boundaries, then 60% of the reporting block total population was attributed to the total population of the basin and 40% was excluded.

Step 1: The basin's total population was calculated by summing all the included population blocks per

[17] *See* Water Code Section 10933(b)(1)

the three methods described above.

Step 2: The basin's total population was normalized by dividing the total population calculated in Step 1 by the area of the basin, producing a value that represents people per square mile or population density value.

The population density value was used for numerical comparison of the population across all 517 groundwater basins statewide. Priority points were applied to each basin based on the value of population density. Table 1 lists the priority point values and associated ranges of population density.

Table 1 Component 1: Ranges and Priority Points for 2010 Population Density

Priority Points	2010 Population Density (persons/square mile) 'x' = population density
0	$x < 7$
1	$7 \le x < 250$
2	$250 \le x < 1{,}000$
3	$1{,}000 \le x < 2{,}500$
4	$2{,}500 \le x < 4{,}000$
5	$x \ge 4{,}000$

Component 2: The rate of current and projected growth of the population growth of the overlying the basin or subbasin[18]

Data Source

- 2000 and 2010 United States Census population block data (California)
- The 2030 hydrologic region and county projections used in the California Water Plan Update 2018
- California Department of Finance (DOF) current trend 2030 county projections

Process

The consideration of population growth as a component of the 2018 SGMA Basin Prioritization used updated methods and data from the 2014 CASGEM Basin Prioritization.

Part A: Estimating Basin and Non-Basin Population within each Hydrologic Region-County

- The 2000 and 2010 population were estimated for all basins and portions of basins within each Hydrologic Region-County using the methods described for component 1
- The DOF current trend 2030 county total projections were used to project 2030 Basin population
- The Hydrologic Region-County 2000 and 2010 population estimates included in the California Water Plan Update 2018 were used to project 2030 Basin population
- The share of each Basin's population growth over the 2000 to 2010 decade was calculated

[18] *See* Water Code Section 10933(b)(2)

using the formula:

*Percent Growth = (2010 Basin Population –2000 Basin Population) / (2010 Hydrologic Region-County Population - 2000 Hydrologic Region-County Population) * 100*

- The 2030 Basin population and the 2030 non-Basin population were calculated using the formula:

*2030 Basin (or non-Basin) population = 2010 Basin population + [(2030 Hydrologic Region-County Population - 2010 Hydrologic Region-County Population[19]) * Percent Growth]*

- For Basins located in more than one Hydrologic Region-County, the 2030 Basin projections for each portion of a Basin that crossed a county or hydrologic region boundary were summed to produce a 2030 population projection for the entire Basin

The methods cited above characterize the general process for projecting 2030 Basin and non-Basin population within each Hydrologic Region-County; however, throughout the process, intermediate results were evaluated and adjustments were made, as necessary, to conform with DOF current trend 2030 county projection per California Government Code Section 13073(c).

Part B: Determining the Priority Points for Population Growth

Using the percent growth calculated above, the basin was assigned the preliminary priority points identified in Table 2. Before determining the priority points, additional analysis was completed to determine if the basin met the minimum requirements for population growth as defined in the 2014 CASGEM Basin Prioritization process (California Department of Water Resources 2014b):

- Does the basin have zero 2010 Population?
- Does the basin have less than or equal to zero percent growth?
- Is the basin’s 2010 population (component 1) less than 1,000 people and does the basin have growth greater than zero?
- Is the basin’s 2010 basin population less than or equal to 25,000 and is the basin's 2010 population density less than 50 people per square mile?

If the answer was ‘yes’ to any of the four questions above, the priority points for component 2 were recorded as zero. If the answer was ‘no’ to all four questions above, the priority points were applied to each basin based on the percentage of population growth. Table 2 lists the priority point values and associated ranges of population growth percentage.

[19] Both numbers were taken from California Water Plan Update 2018

Table 2 Component 2: Ranges and Priority Points for Population Growth

Priority Points	Population Growth (percent) 'x' = Population growth percentage
0	x ≤ 0
1	0 < x < 6
2	6 ≤ x < 15
3	15 ≤ x < 25
4	25 ≤ x < 40
5	x ≥ 40

Component 3: The number of public supply wells that draw from the basin or subbasin[20]

Data Source

- SWRCB, Division of Drinking Water - Public Supply Database, all active wells

Process

The consideration of public supply wells as a component of the 2018 SGMA Basin Prioritization used the same methods and database as the 2014 CASGEM Basin Prioritization.

The SWRCB public supply well database (State Water Resources Control Board 2016) was used to calculate the number of public supply wells that draw from the basin, as it is the only statewide dataset that includes records associated with supply water for the public. The SWRCB public supply well database was accessed during March 2016 for the 2018 SGMA Basin Prioritization process. Each record in the database contains fields for active and inactive systems, water source (groundwater or surface water), and testing location. Different records for the same public supply system can exist due to separate testing locations for water quality. In most cases the only distinction is in the location name. The public supply data was processed by taking the following steps:

Step 1: To calculate the number of individual public supply wells that draw from each basin, the public supply well database was queried for entries classified as 'active', 'groundwater', and that contained the word 'well' in the location name. Only wells active as of the time the data was extracted (March 2016) were included in this analysis.

It is important to note that the query of active wells should be considered an "as-of March 2016" result for active groundwater public supply wells because:

- The operator of any currently active well can change its status at any time from active to inactive due to demand, water quality issues, required maintenance, or abandonment. Status changes can happen multiple times during the operational life of the well. The SWRCB database does not contain information for inactive wells indicating a scheduled return to service or that the inactive well will ever return to service.
- Not all public supply wells are maintained in the SWRCB public supply well database. In many

[20] *See* Water Code Section 10933(b)(3)

cases, where data about a public supply well resides is a function of the number of service connections. The agency that holds the contract for monitoring could be a state or county agency.

Public supply wells can be small, single-connection wells used in parks, rest stops, gas stations, and restaurants, or multi-connection systems serving tens or hundreds of thousands of connections. Because not all wells are under the jurisdiction of the SWRCB Division of Drinking Water, it is assumed that there are additional public supply wells in use and not accounted for in this analysis.

Step 2: Each record was reviewed to identify invalid coordinates, such as missing or incomplete coordinates.

Step 3: Incomplete or missing coordinates were corrected, when possible, using available attributes provided with public supply data. Wells with corrected coordinates were identified as modified.

Step 4: Using Geographic Information System, the number of wells in each basin were counted.

Step 5: The number of public supply wells per square mile (density) were calculated:

Density = Number of Public Supply Wells within the basin / basin square miles

Priority points were applied to each basin based on the calculated public supply well density. Table 3 lists the priority point values and associated ranges of public supply well density.

Table 3 Component 3: Ranges and Priority Points for Public Supply Well Density

Priority Points	Public Supply Well Density (x = wells per square mile)
0	$x = 0$
1	$0 < x < 0.1$
2	$0.1 \le x < 0.25$
3	$0.25 \le x < 0.5$
4	$0.5 \le x < 1.0$
5	$x \ge 1.0$

Component 4: The total number of wells that draw from the basin or subbasin[21]

Data Source

- Online System for Well Completion Reports (OSWCR)
- United States Public Land Survey System (PLSS)
- County, and County Assessor's Parcel Numbers (APN)

[21] *See* Water Code Section 10933(b)(4)

Process

The consideration of production wells as a component of the 2018 SGMA Basin Prioritization used updated methods and data as compared to the 2014 CASGEM Basin Prioritization.

Updated methods included screening for improperly identified productions wells and enhancing the well location determination to make previously unmappable well locations mappable. Both updated methods are further described below.

DWR's new OSWCR database contains the most recent statewide well log data, was used for 2018 SGMA Basin Prioritization. OSWCR was not available at the time of the 2014 CASGEM Basin Prioritization.

Production wells are defined as well installations specifically used to extract groundwater from the subsurface of the groundwater basin. These wells are usually identified as agriculture, domestic, irrigation, municipal, commercial, or industrial. The number and density of production wells that draw from the basin were calculated for each groundwater basin using the DWR OSWCR database (California Department of Water Resources 2017). The OSWCR database was used to identify production wells with a primary purpose of drawing groundwater. Well completion reports (WCRs) maintain key attributes related to well properties and construction such as the type of installation, well use, yield rate, and geographic location. OSWCR well information was extracted on February 2017.

Part A – Identifying Production Wells

Most well logs contain sufficient information to classify a well as being a production well. However, many wells are classified as unknown due to data keying errors, improperly filled out WCRs, or older forms that did not require the necessary information to be submitted by the driller. Therefore, it was necessary to review other information supplied on the log to determine its type of use.

To reclassify "unknown use" wells as production or non-production wells, the following methods were used:

- If the well casing was greater than or equal to 4 inches and the total depth was greater than or equal to 22 feet, the well was classified as a production well.
    - Additionally, well depth, screening intervals, test gallons per minute, general location, and owner information was used to assist in determining if the use was for production.
- If the well casing was less than 4 inches and the total depth was less than 22 feet, the well was classified as a non-production well.
- If the planned use or former use was "other extraction", the well was classified as a production well.

Part B – Determining the Location of Production Wells to the Highest Resolution

The PLSS was used to assign production well locations for this evaluation and is the spatial referencing system used for assigning locations within WCRs statewide. The PLSS provides a gridded index of interpolated townships, ranges, and sections. The PLSS spatial dataset, "plsnet" (California Department of Pesticide Regulation 2017), was used in conjunction with OSWCR for this evaluation. The following steps were taken to determine, as accurately as possible, a location for each identified production well.

Step 1: The majority of the WCRs include township-range-section, baseline meridian, and county information. Many WCRs include coordinate locations that represent the section centroid. In the case where the section is split by a county line, a section centroid was created for each portion of the section, and those WCRs that identified the county location were assigned to the respective county-section centroid. If no county name was provided in the WCR, the well was assigned to the section centroid. The spatial resolution in these cases was <= 1 square mile.

Step 2: For the WCRs in Step 1 that either did not provide a baseline meridian or provided an incorrect baseline meridian, the county location information was relied upon to place the well in the respective county-section centroid. The spatial resolution in these cases was <= 1 square mile.

Step 3: For the WCRs in Step 1 that either did not provide a county or provided an incorrect county, the township-range-section and baseline meridian information was relied on to place the well in its respective section centroid. The spatial resolution in these cases was <= 1 square mile.

Step 4: For the WCR in Step 1 that either did not provide a section or provided an incorrect section, the township-range and baseline meridian information was relied on to place the well in its respective township-range centroid. The spatial resolution in these cases was <= 36 square miles.

Step 5: For the WCRs in Step 4 that either did not provide a section or provided an incorrect section, and for which the township was split by two counties, the county information was relied on to place the well in its respective county-township centroid. The spatial resolution in these cases was <= 36 square miles.

Step 6: For WCRs where no county-township-range-section was provided, but another form of coordinates (such as latitude and longitude) was provided, no centroids were used. The spatial resolution in these cases was assumed to be absolute.

Step 7: For WCRs that only provided the county and APN within the county for location, the spatial resolution was assumed to be variable due to the unpredictable parcel sizes.

Part C – Estimating Number of Production Wells within a Basin

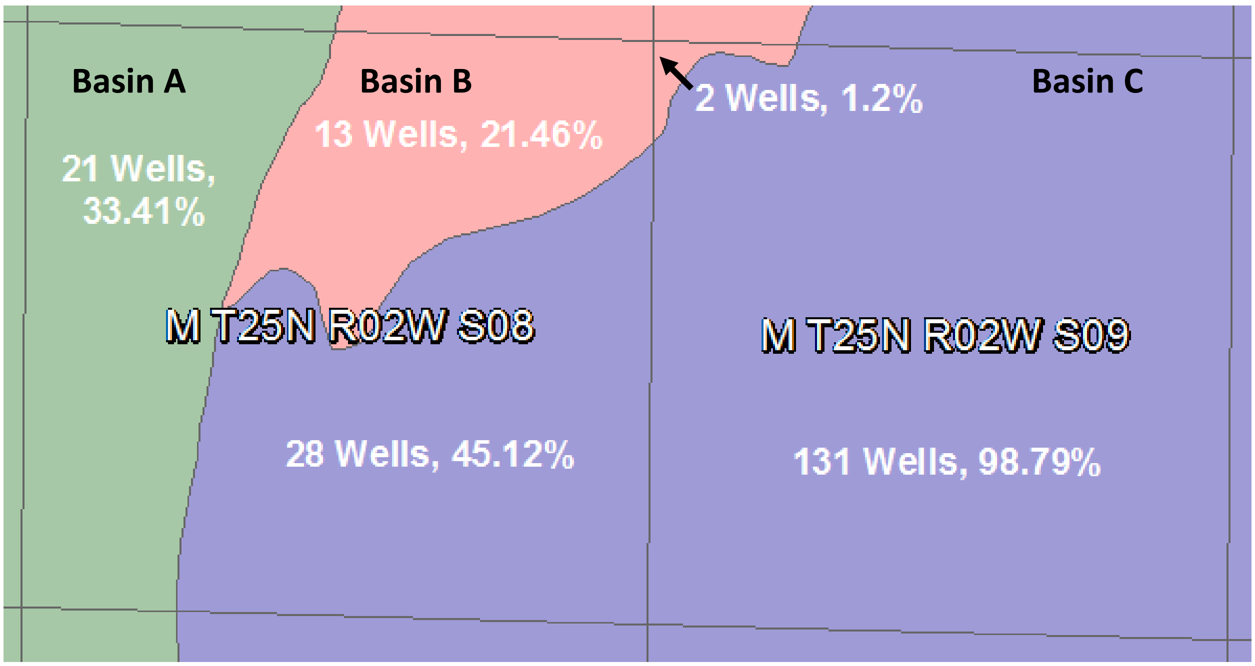
Using spatial overlay methods, well data was attributed to groundwater basins using the methods described below:

- For a well spatial reference area contained wholly within a basin boundary, all production wells located in the reference area were included in the basin production well total.
- For a well spatial reference area located wholly outside of a basin boundary, all production wells located in the reference area were excluded from the basin production well total.
- For a well spatial reference area located partially within a basin, the proportion of production wells equal to the proportion of the reference area contained within the basin were applied to the basin production well total. The proportion of wells equal to the proportion of the reference areas not contained within the basin were excluded from the basin production well total. For example, if 60% of the well spatial reference area was within a basin boundary then 60% of the reporting wells were attributed to the production well total of the basin and 40% of wells were excluded from that basin.

An example of how these methods were applied is shown in Figure 2. Green represents Basin A, salmon represents Basin B, and purple represents Basin C. The figure shows that:

- Mount Diablo Meridian ("M"), Township 25N, Range 02W, Section 08 was identified as having 62 production wells and includes portions of three basins, A (33.41%), B (21.46%), and C (45.12%). Using the method described above, the 62 production wells would be allocated to the three basins as follows: 21 to basin A, 13 to basin B, and 28 to basin C.
- In Section 09, 133 production wells were identified and distributed between two basins, as follows: two wells to basin B (1.2%) and 131 wells to basin C (98.79%).

Figure 2 Example of Production Well Distribution within Groundwater Basins using the Public Land Survey System



Part D: Determining the Basin Production Well Total and Density

Groundwater basin production well totals were determined by combining the totals for all sections, section portions, and sections with allocated proportions associated with a basin. Once production well totals were calculated for each basin, well totals were normalized by dividing the total number of production wells by the area of the basin to produce a value that represents production wells per square mile, or production well density value.

The production well density value was used for numerical comparison of the production wells across all 517 groundwater basins statewide. Table 4 lists the priority point values and associated ranges of production well density.

Table 4 Component 4: Ranges and Priority Points for Total Production Well Density

Priority Points	Production Well Density (x = wells per square mile)
0	x = 0
1	0 < x < 2
2	2 ≤ x < 5
3	5 ≤ x < 10
4	10 ≤ x < 20
5	x ≥ 20

Component 5: The irrigated acreage overlying the basin or subbasin[22]

Data Source

- Statewide Crop Mapping 2014

Process

The consideration of irrigated acreage as a component of the 2018 SGMA Basin Prioritization used the same methods and updated data as compared to the 2014 CASGEM Basin Prioritization. The 2014 CASGEM Basin Prioritization used DWR Land Use mapping data to determine irrigated acres. However, the land use data represented multiple years of survey efforts throughout the State. For the 2018 SGMA Basin Prioritization, the Statewide Crop Mapping 2014 dataset was used to provide statewide coverage for a single year. The Statewide Crop Mapping 2014 dataset is a statewide, comprehensive field-level assessment of summer-season agriculture, managed wetlands, and urban boundaries for the 2014 year (California Department of Water Resources 2014c).

For the purposes of basin prioritization, all agriculture identified in the Statewide Crop Mapping 2014 dataset (California Department of Water Resources 2014c) was identified as irrigated unless an agricultural field had been previously identified by DWR as dry-farmed. Only irrigated acreage inside the basin boundaries was included in the calculation and analysis. This was accomplished by overlying the spatial crop mapping data on groundwater basin boundaries to determine total agricultural field acreage overlying the basin.

Irrigated acreage data were normalized by dividing the total irrigated acres by the area of the groundwater basin (in square miles) to determine the basin's irrigation density. Table 5 lists the priority point values and associated ranges of density of irrigated acres.

[22] *See* Water Code Section 10933(b)(5)

Table 5 Component 5: Ranges and Priority Points for Density of Irrigated Acres

Priority Points	Density of Irrigated Acres (x = acres per square mile)
0	x < 1
1	1 ≤ x < 25
2	25 ≤ x < 100
3	100 ≤ x < 200
4	200 ≤ x < 350
5	x ≥ 350

Component 6: The degree to which persons overlying the basin or subbasin rely on groundwater as their primary source of water[23]

Sub-component 6.a: Evaluating volume of groundwater use

The consideration of groundwater use as a sub-component of 2018 SGMA Basin Prioritization groundwater reliance component used updated methods and updated data as compared to the 2014 CASGEM Basin Prioritization. For the same reasons discussed for component 5, the 2018 SGMA Basin Prioritization calculated agricultural groundwater use using the Statewide Crop Mapping 2014 dataset instead of the DWR Land Use mapping data that was used for 2014 CASGEM Basin Prioritization. The data processing method was updated by using the California Simulation of Evapotranspiration of Applied Water (Cal-SIMETAW) v3.2 model for consistency with the California Water Plan. 2014 CASGEM Basin Prioritization used a DWR agricultural model to calculate applied water.

The updated process for this sub-component also included the use of water year 2014 for both agricultural applied water and urban water used. Water year 2014 was used because the Statewide Crop Mapping 2014 dataset was the only year available at the time of processing, and a bench mark of water use prior to the enactment of SGMA (January 2015) needed to be established. The 2014 CASGEM Basin Prioritization used water year 2010 that was applied to cropping data that spanned approximately 25 years.

Part A: Estimating Agricultural Groundwater Use

Data Source

- California Simulation of Evapotranspiration of Applied Water v3.2
- Statewide Crop Mapping 2014
- California Water Plan Update 2018

Process

Agricultural groundwater use was estimated using the most recent statewide crop mapping survey (California Department of Water Resources 2014c) for land use acreages and the Cal-SIMETAW v3.2 model (Morteza et al. 2013), which incorporates local soil information, growth dates, crop coefficients,

[23] *See* Water Code Section 10933(b)(6)

and evapotranspiration data from the Spatial California Irrigation Management Information System (CIMIS) for water use demand estimates. Estimates were calculated using the following steps:

Step 1: The DWR Statewide Crop Mapping 2014 acreage data were overlaid on groundwater basin boundaries to determine the total acres of each DWR-defined major crop class (see Appendix 1) within the groundwater basins.

Step 2: The Cal-SIMETAW model was used to determine the volume of applied water for the DWR-defined major crop classes within the groundwater basins. Applied water per single acre of each DWR-defined major crop class was then estimated within each basin.

Step 3: The estimates of applied water per single acre for each major crop class (Step 2) were multiplied by the total acres of DWR-defined major crop classes (Step 1) to estimate the total applied water for each crop class. The total applied water for each crop class was added to determine the total applied water for agriculture in the basin.

Step 4: The total applied water from Step 3 represents the combination of surface water and groundwater. The portion that is considered groundwater was estimated by multiplying the total applied water (Step 3) by the groundwater percentage of total applied water provided in the California Water Plan Update 2018.

Part B: Estimating Urban Groundwater Use

Data Source

- Public Water System Statistics (PWSS) database
- Water purveyor boundaries (multiple sources)
- United States Department of Agriculture (USDA) National Agricultural Statistics Service (NASS) CropScape and Cropland data layers (Urban portion) 2014
- Land Use surveys (Urban portion) (2000 through 2014)
- Groundwater Basin population data (2014)

Process

Urban groundwater use was estimated within each groundwater basin using the data sources listed above. The data sources were processed using the following methods:

Step 1: Urban water purveyors' PWSS water use data (California Department of Water Resources 2014d) were linked to their respective service area boundaries. Service area boundaries were determined using multiple sources including an DWR database, direct inquiries, and information included in Urban Water Management Plans. The service area boundaries were refined based on the urban land use data (U.S. Department of Agriculture 2014; California Department of Water Resources 2000 through 2014) and overlaid on groundwater basin boundaries.

Step 2: The purveyors within a groundwater basin were identified and their water use data was used to generate an average per-capita estimate for the number of customers served by the purveyors for that groundwater basin. For groundwater basins with no organized water purveyors, DWR provided an estimated average per-capita use.

Step 3: Actual census population block data and DOF estimates are only available for years ending in a zero. DWR required 2014 population data to process the urban groundwater volumes. To obtain the 2014 estimates, DWR accessed a third-party demographics software (Nielsen Claritas 2014) that estimated the population based on groundwater basin boundaries.

Step 4: Groundwater basin per-capita estimates (Step 2) were multiplied by the groundwater basin 2014 population (Step 3) to produce an estimated population-based urban water demand.

Step 5: The urban water purveyors' PWSS data (California Department of Water Resources 2014d) also reports the source of water used in their systems. DWR used this information to calculate the volume and percent of total for surface water and groundwater.

Step 6: Self-supplied groundwater use was calculated by multiplying the water per-capita determined in Step 2 by the self-supplied population. DWR determined the source of supply for the self-supplied population to be groundwater in most cases.

Step 7: Additional urban water uses (such as golf courses, parks, and self-supplied industrial) were calculated if data were available from local sources such as Urban Water Management Plans.

Step 8: The groundwater amounts calculated in Step 5, 6, and 7 were combined to obtain the total urban groundwater use.

Part C: Calculating Total Groundwater Use

Total groundwater use was calculated by adding agricultural groundwater use (Part A, Step 4) and urban groundwater use (Part B, Step 8). Total groundwater use (volume in acre-feet) data was normalized by dividing the total groundwater use by the area of the groundwater basin (in acres) to determine the basin's groundwater density. Table 6 lists the point values and associated ranges of groundwater volume density.

Table 6 Component 6.a: Ranges and Points for Groundwater Volume Density

Points	Groundwater Volume Density (x = acre-feet per acre)
0	$x < 0.03$
1	$0.03 \le x < 0.1$
2	$0.1 \le x < 0.25$
3	$0.25 \le x < 0.5$
4	$0.5 \le x < 0.75$
5	$x \ge 0.75$

Sub-component 6.b: Evaluating overall supply met by groundwater

Data Source

- Sub-component 6.a

Process

The consideration of overall supply met by groundwater (percent) as a component of the 2018 SGMA Basin Prioritization used the same methods and data as the 2014 CASGEM Basin Prioritization.

After developing the total groundwater volume for the groundwater basin (see sub-component 6.a Evaluation of Volume of Groundwater Use), the percentage of groundwater supply was derived as the ratio of total groundwater volume to total applied water.

Step 1: Agricultural groundwater use was added to urban groundwater use to determine the total groundwater use for each basin (sub-component 6.a).

Step 2: Agricultural applied water (surface water and groundwater) was added to urban total supply (surface water and groundwater) to determine total water used within each basin.

Step 3: Total groundwater used (Step 1) was divided by total water used (Step 2) to calculate the groundwater portion of the total water supply.

Table 7 lists the point values and associated ranges of percent of total water supply met by groundwater.

Table 7 Component 6.b: Ranges and Points for Percent of Total Water Supply Met by Groundwater

Points	Total Supply Met by Groundwater (x = Groundwater Percent)
0	x = 0
1	0 < x < 20
2	20 ≤ x < 40
3	40 ≤ x < 60
4	60 ≤ x < 80
5	x ≥ 80

Calculating the Total Priority Points for Groundwater Reliance

Priority Points for the degree to which persons overlying the basin rely on groundwater as their primary source of water was calculated by averaging the sum of the points for groundwater volume density and percent of total water supply met by groundwater.

Component 7: Any documented impacts on the groundwater within the basin or subbasin, including overdraft, subsidence, saline intrusion, and other water quality degradation[24]

The consideration of documented impacts as a component of the 2018 SGMA Basin Prioritization used an updated method and updated data as compared to the 2014 CASGEM Basin Prioritization. The 2014 CASGEM Basin Prioritization used an approach that considered all four of the sub-components together

[24] *See* Water Code Section 10933(b)(7)

and assigned points ranging from 1 to 5 based on the effects of the combined impacts within each basin. The updated method included assigning basins identified with similar documented impacts the same number of points. Based on the combined total of points, the priority points were assigned to the basin. For example, if 10 basins were identified as having current subsidence, each of the 10 basins were assigned the same number of points (10 points) for that sub-component.

The 2018 SGMA Basin Prioritization identified water quality degradation by using statewide data from the GeoTracker Groundwater Ambient Monitoring and Assessment (GAMA) database, which includes public supply well water quality results.

Except for the water quality degradation impact, each of the remaining three impacts was assigned a certain number of points using a yes/no approach. Each of the four impacts in component 7 were assigned different maximum points based on the severity of the impact (subsidence being the most severe and receiving the most points) and the applicability to all basins (saline intrusion is only found in the coastal and San Francisco Bay area basins and therefore received the least points). Water quality degradation was the only one of the four impacts that was compared between basins and given 0 to 5 points. See each section below for additional details on the evaluations and assigned points.

To determine the priority points for documented impacts, the combined total of points for the four sub-components were applied to ranges with associated priority point values.

Sub-component 7.a: Documented overdraft (groundwater level decline)

Data Source

The assessment of whether a basin is in overdraft required information that was not available for most basins, resulting in the reporting of trends that indicated declining groundwater levels. Declining groundwater levels were evaluated by reviewing available groundwater level data published over the last 20 years. Evaluation also consisted of reviewing available hydrographs, groundwater management plans, annual reports, grant applications, professional studies, Bulletin 118 – Update 2003 (California Department of Water Resources 2003), California Water Plan Update 2013 (California Department of Water Resources 2015), Alternative Plans submitted pursuant to the SGMA, published environmental documents, and professional correspondence.

Process

Water Code Section 10933(a)(7) identifies overdraft as one of the four documented impacts DWR needs to consider under Basin Prioritization. According to the CASGEM database, only 282 basins monitor groundwater levels per the CASGEM database as of early 2017. Other factors that would be needed to determine overdraft include recharge information and water balance/budget details that are not available for all basins. DWR evaluated declining groundwater levels as a key indicator of overdraft.

After reviewing hydrographs or similar data for each basin, groundwater levels were documented as being stable, rising, or declining. To make this determination, each piece of data was viewed back in time as far as possible. In many cases, data limited the review time frames to six to ten years, while other data extended back 20 years or more. In most cases, multiple hydrographs were used to support the overall basin determination concerning the status of groundwater levels.

No determination was made to differentiate between the severity of individual groundwater level impacts because there are too many variables to consider, and this differentiation is beyond the scope of basin prioritization, which only requires DWR to identify if the condition exists. As such, 7.5 points were assigned to any basin that exhibited declining groundwater levels.

Sub-component 7.b: Documented subsidence

Data Source

Evaluation of subsidence consisted of reviewing hydrographs, extensometer data, land use data, groundwater management plans, annual reports, grant applications, professional studies from the NASA Jet Propulsion Laboratory and United State Geological Survey (USGS), Interferometric synthetic aperture radar (InSAR) via Sentinel-1A satellite, UNAVCO Plate Boundary Observatory, Bulletin 118 – Update 2003 (California Department of Water Resources 2003), California Water Plan Update 2013 (California Department of Water Resources 2015), Alternative Plans submitted pursuant to SGMA, environmental documents, and professional correspondence.

Process

When reviewing the subsidence data, data that were related to groundwater extractions were focused on and evaluated to determine if subsidence was current or historical. To reach one of these determinations, each piece of data was viewed back in time as far as possible. In many cases the time frames were six to ten years for current conditions, while historical analyses required going back 20 years or more. In most cases the basin yielded more than one piece of data to support the overall basin decision. Professional judgement was used to evaluate if the data were sufficient to determine if the basin had historical or current subsidence. In some cases, the basin had evidence of both historical and current subsidence. In order to have both, there needed to be a long period between the multiple instances where no subsidence was detected. Also, the individual instances could be in distinct parts of the basin. In the few cases where there were historical and current subsidence detected, only the current subsidence was considered for this sub-component.

No determination was made to differentiate between the severity of the individual subsidence impacts because there are too many variables to consider, and this differentiation is beyond the scope of basin prioritization, which only requires DWR to identify that the condition exists in the basin. As such, 10.0 points were assigned to any basin that exhibited current subsidence, and 3.75 points were assigned to any basin where subsidence occurred in the past and there was no evidence that subsidence was still occurring. The 10.0 points assigned for current subsidence was the highest point value out of the possible points for the four documented impacts. The justification for the higher points for subsidence is 1) subsidence is not limited to any area of the State, 2) subsidence has the biggest potential for infrastructure impacts, 3) subsidence reduces the storage capacity of groundwater, and 4) subsidence is commonly understood to be non-reversible.

Sub-component 7.c: Documented saline intrusion

Data Source

Saline intrusion was evaluated by reviewing available data published over the last 20 years. Evaluation consisted of reviewing hydrographs, groundwater management plans, annual reports, grant applications, professional studies by USGS, Bulletin 118 – Update 2003 (California Department of Water Resources

2003), California Water Plan Update 2013 (California Department of Water Resources 2015), Alternative Plans submitted pursuant to SGMA, county hazards reports, and environmental documents.

Process

Saline intrusion in the coastal and Delta groundwater basins, as defined in Bulletin 118 – Interim Update 2016 (California Department of Water Resources 2016a), was determined by researching available documents for references of past or present excess salinity problems.

The primary source of information used was local reports and studies that focused on the challenges of saline intrusion within individual basins. The reports and studies directed at managing or preventing saline intrusions were related to:

- Water quality analyses.
- Projects designed to stop or reverse current or past intrusions.
- Groundwater management re-operation that reduced or shifted current operations to other parts of the basin, or invested in enhanced groundwater and surface water conjunctive management.

No determination was made to differentiate between the severity of individual saline intrusion impacts because there are too many variables to consider and this differentiation is beyond the scope of basin prioritization, which only requires DWR to identify that the condition exists in the basin. As such, 5.0 points were assigned to any basin that exhibited impacts of saline intrusion.

Sub-component 7.d: Documented Water Quality Degradation

Data Source

- SWRCB, Division of Drinking Water – Public Supply Database, all active wells (March 2016)
- SWRCB – GeoTracker Groundwater Ambient Monitoring and Assessment (GAMA) secure database (Division of Drinking Water, reported Water Quality results (as of April 4, 2017)
- SWRCB – Maximum Contaminate Level (MCL) list (as of November 2017)

Process

To conduct a statewide assessment of a wide range of water quality constituents, the SWRCB Division of Drinking Water's water quality database was used. Data was processed using the following methods:

- Water quality testing data was queried statewide in the GeoTracker GAMA secure database (State Water Resources Control Board 2017) for each constituent with a MCL (Appendix 2).
- Data with a sample date between January 1, 2000 and April 4, 2017 and with a constituent concentration greater than the minimum reporting level were included in the evaluation.
- The location/coordinate data for each water quality sample record was assigned to a groundwater basin as defined in Bulletin 118 – Interim Update 2016 (California Department of Water Resources 2016a) using the well location data associated with each sample record in the GeoTracker GAMA database.
- Constituent concentrations were compared to MCLs, secondary MCLs, and Public Health Goals as defined in the California Code of Regulations. Records with constituent concentrations that exceeded water quality criteria were retained for further evaluation.

Data was then evaluated for both the magnitude of documented groundwater contamination and extent of impact to public drinking water.

Sub-component 7.d.1: Evaluating the Magnitude of Documented Groundwater Contamination

To compare the magnitude of groundwater contamination across multiple constituents with varying MCL values, the relative MCL exceedance was calculated for each sample record that exceeded the MCL value.

- The relative MCL exceedance was calculated by dividing the measured constituent concentration for each sample record that was equal to or exceeded the regulatory MCL by the regulatory MCL value. For example, a data value that exceeded the regulatory MCL value by twice the limit would have a relative MCL exceedance of 2.
- For each basin, relative MCL exceedances for all constituents were averaged to generate an average relative MCL exceedance for the entire basin.

Table 8 lists the point values and associated ranges of average relative MCL exceedance values for sub-component 7.d.1.

Table 8 Sub-component 7.d.1: Ranges and Points for Documented Impacts – Water Quality Degradation – Average Relative MCL Exceedance

Points	Average Relative MCL Exceedance X = Average Exceedance
0	x ≤ 1
1	1 < x < 2
2	2 ≤ x < 3
3	3 ≤ x < 4
4	4 ≤ x < 6
5	x ≥ 6

Sub-component 7.d.2: Evaluating the Extent of Documented Groundwater Contamination

The extent (how wide-spread) of contamination in groundwater used as public drinking water in each basin was evaluated by dividing the number of unique wells with MCL exceedances within each basin by the number of public water supply wells in the basin (from component 3). Because the selected water quality data set spanned more than 16 years, the actual number of public water supply wells in a basin would likely have varied as new wells went into service and other wells went offline. The number of public water supply wells calculated for component 3 was determined to most accurately represent the number of public water supply wells for the purposes of this evaluation.

An exception to this method was made if the basin prioritization data indicated that there were no public water supply wells in the basin (component 3), but the water quality data received indicated an MCL exceedance in one or more public water supply wells in the basin. Another exception to this method was made if all the public supply wells in the basin were classified as inactive at the time that component 3 was calculated and resulted in a total number of public supply wells in the basin equal to zero. In these cases, it was assumed that one public water supply well was present in the basin so that the calculation of extent of documented groundwater contamination could be made as previously described.

The calculated extent of the impact value for the basin was then assigned points. Table 9 lists the point values and associated ranges of extent of impact values for sub-component 7.d.2.

Table 9 Sub-component 7.d.2: Ranges and Points for Documented Impacts – Water Quality Degradation – Extent of Groundwater Contamination

Points	Extent of Groundwater Contamination X = Extent
0	x = 0
1	0 < x < 0.5
2	0.5 ≤ x < 0.75
3	0.75 ≤ x < 1
4	x = 1
5	x > 1

Sub-component 7.d: Calculating Total Points for Documented Water Quality Degradation

To obtain the points for documented water quality degradation, the points for average relative MCL exceedance and points for extent of groundwater contamination were combined; the total was then assigned points. Table 10 lists the point values and associated range of water quality degradation values.

Table 10 Sub-component 7.d: Ranges and Points for Documented Impacts – Water Quality Degradation

Points	Documented Impacts – Water Quality Degradation X = Water Quality Points
0	x = 0
1	0 < x < 5
2	5 ≤ x < 6
3	6 ≤ x < 7
4	7 ≤ x < 8
5	x ≥ 8

Calculating the Total Priority Points for Documented Impacts

After each of the four types of documented impacts were assigned a value, the cumulative total of points was calculated. Table 11 lists the priority point values and associated ranges of cumulative totals for documented impacts.

Table 11 Component 7: Ranges and Priority Points for Documented Impacts – Cumulative Total

Priority Points	Cumulative Total – Documented Impacts
0	x < 3
1	3 ≤ x < 7
2	7 ≤ x < 11
3	11 ≤ x < 15
4	15 ≤ x < 19
5	x ≥ 19

Component 8: Any other information determined to be relevant by the department, including adverse impacts on local habitat and local streamflows[25]

Sub-component 8.a - Evaluating adverse impacts on local habitat and local streamflows

Water Code section 10933(b)(8) was amended in 2014 by the same legislation that created SGMA to include, under other information, the specific example of adverse impacts on local habitat and local streamflows. DWR had not evaluated this sub-component during the development of the 2014 CASGEM prioritization, and determined that because of a lack of reliable state-wide data, there was insufficient information available to include this sub-component in the initial SGMA prioritization in 2015. Subsequent to that prioritization, DWR has developed a statewide Natural Communities database that assembles information on the location of springs, lakes, rivers, species, and habitat from multiple sources. Utilizing that database, DWR included impacts to local habitat and local streamflows as a new sub-component.

Data Source

- Natural Communities Commonly Associated with Groundwater Dataset
- USGS National Hydrography Dataset (NHD)

The following process was used to determine if there is a possibility of adverse impacts occurring within the basin.

Part A: Identifying Habitat and Streamflow in the Basin

For the 2018 SGMA Basin Prioritization, DWR evaluated if habitat or streamflow exists in the basin. To do so, DWR used the Natural Communities and National Hydrography datasets (California Department of Water Resources 2018c; United States Geological Survey 2016) to determine if one or more habitats commonly associated with groundwater or streamflow exist within a groundwater basin. No statewide measure of adverse impacts to habitat or stream flow exists that would allow DWR to rank the severity of those impacts. Habitat and streamflow were identified within the basins using the following method:

- After consulting the Natural Communities dataset, if it was determined that there are one or more polygons representing vegetation, wetland, seep, or spring habitat in the basin the basin was assigned one point for habitat.
- After consulting the NHD dataset, if it was determined that one or more perennial or permanent streams were located within or adjacent to the basin, the basin was assigned on point for streamflow.

Part B: Determining if Potential Adverse Impacts on Habitat and Streamflow are Occurring in the Basin

The habitat and/or streamflow point(s) were not applied to basin prioritization until it was determined that one or more of the habitats and/or streamflows were potentially being adversely impacted. Potential adverse impacts to habitat and streamflow resulting from groundwater activities were determined by

[25] *See* Water Code Section 10933(b)(8)

evaluating the amount of groundwater pumping and groundwater level monitoring occurring in each basin. To determine if there was a possible adverse impact to habitats and streamflows, the following two steps were used:

Step 1: Exceed normalized groundwater pumping and have declining groundwater levels

If groundwater pumping exceeded 0.16 acre-feet per basin acre (sub-component 6.a: Evaluation of Volume of Use) and groundwater level monitoring indicated that groundwater levels were declining (component 7.a), then the habitat and streamflow points assigned in Part A were applied to the basin's priority points basin prioritization.

Step 2: Exceed normalized groundwater pumping and no data is available to indicate that the basin groundwater monitoring is occurring

If groundwater pumping exceeded 0.16 acre-feet per basin acre (sub-component 6.a: Evaluation of Volume of Use) and groundwater level monitoring was not being performed in the basin, the habitat and streamflow point(s) assigned in Part A were applied to the basin's priority points.

Part C: Documented adverse habitat and streamflow impacts

If the results from Part B indicated that there were no potential adverse impacts to habitat or streamflow in the basin, but there was documentation to support that habitat and/or streamflow were being adversely impacted by groundwater activities in the basin, the habitat and/or streamflow priority point(s) assigned in Part A were applied to basin prioritization.

Other documentation reviewed included, but not limited to, groundwater levels, hydrologic models, hydrologic studies, and court judgements to determine if the habitat or streamflow are being adversely impacted.

Sub-component 8.b – Basin-level evaluation of "other information determined to be relevant by the department"

The consideration of basin-level evaluation of "other information determined to be relevant by the department" as an element of the 2018 SGMA Basin Prioritization used an updated method and existing data as used in the 2014 CASGEM Basin Prioritization. The basin analysis performed is the same as the prior prioritization but the method for apply points is different. 2014 CASGEM Basin Prioritization applied points relative to the seriousness of the additional information. Due to the difficulties to assessing various levels of impact the 2018 SGMA Basin Prioritization applied the number points.

Each basin was reviewed based on the individual basin's hydrology, geology, land use, and challenges to determine if there are groundwater-related actual or potential impacts to unique features (such as surface water, wetlands, and head waters) or actual or potential challenges for groundwater management within the basin. Basins with actual or potential impacts to unique features that could result in an unrecoverable loss and basins facing groundwater management challenges that could be serious enough to impact the sustainability of the basin if the necessary groundwater management is not applied to the basin were assigned 5 points.

Sub-components 8.c and 8.d: Statewide-level evaluation of "other information determined to be relevant by the department"

Sub-components 8.c and 8.d evaluations were applied uniformly to all basins during the prioritization process, and included additional analysis of conditions that, if present, caused basins to be excluded or included in SGMA, regardless of the accumulated points from components 1 through 8.b. The sections below (sub-components 8.c.1 through 8.d.2) describe the additional conditions analyzed prior to the prioritization. The purpose of the additional analysis was to evaluate other information that was determined to be relevant by DWR. Beginning with sub-component 8.c.1, the analyses were performed in the order listed in Table 12 until a condition was met. After the result was applied the analysis stopped and the processing continued to Basin Priority, where the priority for each basin was determined. Table 12 describes the additional analysis process, the types of basins that the analysis applied to, and the resulting priority.

Table 12 Sub-components 8.c and 8.d: Additional Conditions Analyzed Prior to Priority Determination

Sub-Component	Basin Applicability	Condition	If True, Result
8.c.1	All	Less than or equal to 2,000 ac-ft. of groundwater per year	Priority = Very Low (0 points)
8.c.2	All	Greater than 2,000 and less than or equal to 9,500 acre-feet with no documented impacts	Priority = Very Low (0 points)
8.c.3	Basins with Adjudications	Basin's non-adjudicated portion extract less than or equal to 9,500-acre feet of groundwater	Priority = Very Low (0 points)
8.d.1	Critically Overdrafted basins	Basin considered to be in Critical Overdraft	Priority = High (42 points)
8.d.2	All	Groundwater related transfers (groundwater substitution transfers or out-of-basin groundwater transfers)	Priority = High (42 points)

The analyses above were performed in the order listed in Table 12 and only continued until they reached a condition where the result was true. When the true condition was reached, the remaining analysis steps listed in Table 12 were bypassed and the processing for the basin proceeded to Basin Priority with the updated priority points. The accumulated points pre-Table 12 analysis were retained. The basins that did not meet a true condition listed in Table 12 proceeded to determining Basin Priority based on the accumulated points from components 1 through 8.b.

Sub-component 8.c.1: Does the basin use less than or equal to 2,000-acre feet of Groundwater?

Data Source

- Basin Prioritization 2018 Volume of Groundwater Use (sub-component 6.a)

Process

The consideration of "basin uses less than or equal to 2,000-acre feet of Groundwater" as an element of the 2018 SGMA Basin Prioritization is the same method and data source as used in the 2014 CASGEM Basin Prioritization.

Using an approach similar to the GAMA Program, DWR selected the groundwater volume portion of the groundwater reliance component data (sub-component 6.a) as the primary component for the initial review and screening in the groundwater basin prioritization process. DWR considers any basin that uses less than or equal to 2,000 ac-ft. of groundwater per year to be low priority with respect to sustainability management. Basins that pump less than or equal to 2,000 ac-ft. of groundwater per year were automatically ranked as a SGMA very low Priority groundwater basin, meaning the overall basin priority points was adjusted to zero. All data and results compiled for these basins were retained for review and for potential future analysis.

Sub-component 8.c.2: Does the basin use greater than 2,000-acre feet and less than or equal to 9,500-acre feet AND have no documented impacts (component 7 and 8)?

Data Source

- Basin Prioritization 2018 Volume of Groundwater Use (sub-component 6.a)
- Basin Prioritization 2018 Documented Impacts (component 7.a and sub-components 8.a and 8.b)

Process

The consideration of "basin uses greater than 2,000-acre feet and less than or equal to 9,500-acre feet and have no documented impacts" as an element of the 2018 SGMA Basin Prioritization used the same method and data source as the 2014 CASGEM Basin Prioritization.

Groundwater basins with an estimated groundwater use per year of greater than 2,000 and less than or equal to 9,500 acre-feet with no documented impacts are considered low priority.

The basins must not have any of the following conditions to meet the criteria of sub-component 8.c.2:

1. Declining groundwater levels (sub-component 7.a)
2. Subsidence from groundwater extractions (sub-component 7.b)
3. Saline intrusion (sub-component 7.c)
4. Groundwater water quality issues that warranted the assignment of water quality degradation points (sub-component 7.d)
5. Documented adverse habitat and streamflow impacts (sub-component 8.a Part C)
6. Other basin-specific impacts or challenges (sub-component 8.b)

The following steps were applied when evaluating this sub-component 8.c.2:

Step 1: Does the basin pump greater than 2,000 and less than or equal to 9,500 acre-feet of groundwater? If no, then this step does not apply to the basin.

Step 2: Are documented impacts (see list above) identified in the basin? If yes, then this step does not apply to the basin.

Step 3: If yes in Step 1 and no in Step 2, the basin was automatically ranked as a SGMA very low priority groundwater basin and the overall basin priority points was adjusted to zero. All data and results compiled for these basins were retained for review and for potential future analysis.

Sub-component 8.c.3: For basin's that have adjudicated area within the basin, does the basin's non-adjudicated portion pump less than or equal to 9,500-acre feet of groundwater?

Data Source

- California Department of Water Resources, (2018). Adjudicated Areas (shapefile)
- Basin Prioritization Groundwater Volume for non-groundwater extraction adjudicated areas, 2018 (Appendix 3)
- Basin Prioritization 2010 Population for non-groundwater extraction adjudicated areas, 2018

Process

Groundwater pumping within the non-adjudicated portion of a basin is a new consideration of the 2018 SGMA Basin Prioritization.

The results of the basin prioritization were based on the analysis of the entire basin, including the adjudicated area. If the basin was determined to be a medium or high priority under the 2018 SGMA Basin Prioritization, the full requirements of SGMA only applied to the non-adjudicated portion of the basin. Appendix 4 provides a complete listing of 37 basins that are covered completely or partially by a groundwater adjudication.

The adjudication analysis was only performed on basins with adjudicated area (Appendix 4) and was only applied to the portion or combined portions of the basin that are not covered by groundwater adjudication. The following steps were applied when evaluating sub-component 8.c.3:

Step 1: A shapefile was created to represent the non-adjudicated portion or portions of the basins listed in Appendix 4 by cutting out the portion(s) of the basin that are adjudicated.

Step 2: The 2010 population in the non-adjudicated portion or portions were determined, and the urban water demands and ultimately the urban groundwater volume were processed, as calculated for sub-component 6.a.

Step 3: The 2014 land use in the non-adjudicated portion or portions was determined and the agricultural water demands and groundwater volume were processed, as calculated in sub-component 6.a.

Step 4: The urban and agricultural groundwater amounts were combined to establish the total groundwater used in the non-adjudicated portion of the basin (see Appendix 3).

Step 5: If the groundwater volume computed in Step 4 was less than or equal to 9,500-acre feet, then the entire basin was automatically ranked as a SGMA very low priority groundwater basin, and the overall basin priority points was adjusted to zero.

Step 6: If the groundwater volume computed in Step 4 was greater than 9,500-acre feet, no other adjudication analyses were applied to the basin, and the evaluation continued to the determination of Basin Priority.

Sub-component 8.d.1: Is the basin considered to be in critical overdraft?

Data Source

- Bulletin 118 - Interim Update 2016, Table 2

The consideration of critically overdrafted basins as an element of the 2018 SGMA Basin Prioritization used an updated method and data source as compared to the 2014 CASGEM Basin Prioritization.

The 2018 SGMA Basin Prioritization process flagged each of the 21 basins in critical overdraft and adjusted the overall basin priority points for these basins by assigning the maximum points possible (42).

Sub-component 8.d.2: Does the basin participate in groundwater related transfers (groundwater substitution transfers or out-of-basin groundwater transfers)?

Groundwater related transfers (groundwater substitution transfers or out-of-basin groundwater transfers) is a new consideration in the 2018 SGMA Basin Prioritization.

The consideration of groundwater related transfers (groundwater substitution transfers or out-of-basin groundwater transfers) included reviewing groundwater substitution records over the last 10 years. Data from the most recent 10 years is consistent with Water Budget requirements within the GSP regulation.

The two types of groundwater transfer are described as follows:

- DWR defines groundwater substitution transfers when surface water is made available for transfer by reducing surface water diversions and replacing that water with groundwater pumping. The rationale is that surface water demands are reduced because a like amount of groundwater is used to meet the demands. The resulting increase in available surface water supplies can be transferred to other users. DWR is only considered those groundwater substitution transfers that are out-of-basin. Basin Prioritization refers to these transfers as Type A.
- Out-of-basin groundwater transfers are transfers that pump percolating groundwater from a source basin and convey the pumped water to a location outside the source basin to be used in ways that does not benefit the source basin. Basin Prioritization refers to these transfers as Type B.

Groundwater related transfers were evaluated by reviewing available published data in DWR Bulletin 132 Management of the California State Water Project covering the last 10 years. Additionally, SGMA watermaster annual reports, basin annual reports, and hydrologic studies were consulted to determine if groundwater related transfers occurred.

The analysis of out-of-basin transfers was not performed for basins with adjudications (sub-component 8.c.3) that met the criteria of the non-adjudicated area analysis and were determined to be SGMA very low priority. The non-adjudicated area analysis took precedence over the analysis of out-of-basin groundwater transfers or out-of-basin groundwater substitution transfers.

Table 13 identifies the basins that participate in Type A or B groundwater transfers.

Table 13 Sub-component 8.d.2: Groundwater Basins Identified with Groundwater Related Transfers

Groundwater Basin ID	Groundwater Basin / Subbasin Name	Type of Groundwater Related Transfer
5-006.03	Redding Area / Anderson	A
5-021.52	Sacramento Valley / Colusa	A
5-021.58	Sacramento Valley / West Butte	A
5-021.59	Sacramento Valley / East Butte	A
5-021.60	Sacramento Valley / North Yuba	A
5-021.61	Sacramento Valley / South Yuba	A
5-021.62	Sacramento Valley / Sutter	A
5-021.64	Sacramento Valley / North American	A
5-021.67	Sacramento Valley / Yolo	A
6-012.01	Owens Valley / Owens Valley	B

The maximum points (42) were applied to each of the basins in Table 13 and as a result are high priority.

Hierarchy of Points for Sub-Components 8.c.3, 8.d.1, and 8.d.2

If more than one of the sub-components listed below applied to a basin, the consideration of adjudication took precedence over the critically overdrafted status and groundwater related transfers, and critically overdrafted status took precedence over groundwater related transfers.

1. Adjudication (sub-component 8.c.3)
2. Critically overdrafted (sub-component 8.d.1)
3. Groundwater related transfers (sub-component 8.d.2)

VII. Basin Priority

All basins were processed for all eight components. Prior to determining the basins priority, adjustments were made, as describe above (see Components 8c and 8d) that would automatically result in a high or very low classification. Even in cases where basins were automatically assigned very low or high priority, the calculation of points was completed and retained.

The basin priority determination for each basin as an element of the 2018 SGMA Basin Prioritization used the same data and an updated method as compared to the 2014 CASGEM Basin Prioritization. For the 2014 CASGEM Basin Prioritization, the threshold value between low and medium priority was set at 13.42 and was based on a maximum of 40 points. For the 2018 SGMA Basin Prioritization, DWR adjusted the threshold value to account for the two additional points added for the adverse impacts on local habitat and local streamflow. The approach was a simple ratio calculation that increased the medium priority threshold value to 14.1.

The total possible points for the 2018 SGMA Basin Prioritization range from zero to 42 in increments of

0.5 points. The new priority threshold value for medium priority was set to greater than 14. The other threshold values were evenly distributed from the 14-point value in multiples of 7. The basin priority ranks of basins were determined using the value ranges listed in Table 14, including basins that had their total priority points adjusted to zero (very low) or forty-two (high).

Table 14 2018 SGMA Basin Prioritization Priority Based on Total Priority Points

Priority	Total Priority Point Ranges X = Cumulative Priority Points
Very Low	$0 \le x \le 7$
Low	$7 < x \le 14$
Medium	$14 < x \le 21$
High	$21 < x \le 42$

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Appendix 1: DWR standard land use legend (adapted for remote sensing crop mapping) used during evaluation of component 6.a.

G - GRAIN AND HAY CROPS

- Wheat
- Miscellaneous grain and hay

R - RICE

- Rice
- Wild rice

F - FIELD CROPS

- Cotton
- Safflower
- Corn (field & sweet), sorghum and Sudan
- Beans (dry)
- Sunflowers

P - PASTURE

- Alfalfa & alfalfa mixtures
- Mixed pasture
- Miscellaneous grasses (includes Bermuda grass, ryegrass, turf grass, etc.)

Y – YOUNG PERRENNIAL

- Young perennial fruits and nuts (includes young orchards and vineyards)

T - TRUCK, NURSERY, AND BERRY CROPS

- Cole crops (includes broccoli, cauliflower, cabbage, brussel sprouts, mixed cole crops or cole crops not specifically listed in the legend)
- Carrots
- Lettuce/leafy greens
- Melons, squash, and cucumbers (all types)
- Onions and garlic
- Potatoes and sweet potatoes
- Tomatoes (processing and fresh)

- Flowers, nursery & Christmas tree farms
- Bush berries (includes blueberries, blackberries, raspberries, and other bush berries)
- Strawberries
- Peppers (chili, bell, etc.)
- Miscellaneous truck (a truck crop not specifically listed in the legend)

D - DECIDUOUS FRUITS AND NUTS

- Apples
- Cherries
- Peaches/nectarines
- Pears
- Plums, prunes, and apricots
- Almonds
- Walnuts
- Pistachios
- Pomegranates
- Miscellaneous deciduous (a type of deciduous orchard not specifically listed in the legend)

C - CITRUS AND SUBTROPICAL

- Citrus
- Dates
- Avocados
- Olives
- Kiwis
- Miscellaneous subtropical fruits

V - VINEYARDS

- Grapes

I – IDLE

- Idle (recent and longer-term fallow/idle)

Appendix 2. List of chemicals used in the evaluation of documented water quality degradation (component 7.d)

GAMA Storenum	Units	MCL	Chemical Name	GAMA Storenum	Units	MCL	Chemical Name
Primary MCL							
TCA111	UG/L	200	1,1,1-Trichloroethane	ENDOTHAL	UG/L	100	Endothal
PCA	UG/L	1	1,1,2,2-Tetrachloroethane	ENDRIN	UG/L	2	Endrin
FC113	MG/L	1.2	1,1,2-Trichloro-1,2,2-Trifluoroethane	EBZ	UG/L	300	Ethylbenzene
TCA112	UG/L	5	1,1,2-Trichloroethane	F	MG/L	2	Fluoride (F)
DCA11	UG/L	5	1,1-Dichloroethane	ALPHA	pCi/L	15	Gross Alpha
DCE11	UG/L	6	1,1-Dichloroethylene	HEPTACHLOR	UG/L	0.01	Heptachlor
TCB124	UG/L	5	1,2,4-Trichlorobenzene	HCLBZ	UG/L	1	Hexachlorobenzene
DCBZ12	UG/L	600	1,2-Dichlorobenzene	HCCP	UG/L	50	Hexachlorocyclopentadiene
DCA12	UG/L	0.5	1,2-Dichloroethane	PB	UG/L	15	Lead
DCPA12	UG/L	5	1,2-Dichloropropane	BHCGAMMA	UG/L	0.2	Lindane
DCP13	UG/L	0.5	1,3-Dichloropropene (Total)	HG	UG/L	2	Mercury
DCBZ14	UG/L	5	1,4-Dichlorobenzene	MTXYCL	UG/L	30	Methoxychlor
SILVEX	UG/L	50	2,4,5-Tp (Silvex)	MTBE	UG/L	13	Methyl-Tert-Butyl-Ether (Mtbe)
24D	UG/L	70	2,4-D	MOLINATE	UG/L	20	Molinate
ALACL	UG/L	2	Alachlor	NI	UG/L	100	Nickel
AL	UG/L	1000	Aluminum	NO3N	MG/L	10	Nitrate (As N)
SB	UG/L	6	Antimony	OXAMYL	UG/L	50	Oxamyl
AS	UG/L	10	Arsenic	PCP	UG/L	1	Pentachlorophenol
ATRAZINE	UG/L	1	Atrazine	PCATE	UG/L	6	Perchlorate
BA	MG/L	1	Barium	PICLORAM	MG/L	0.5	Picloram
BTZ	UG/L	18	Bentazon	PCB1016	UG/L	0.5	Polychlorinated Biphenyls
BZ	UG/L	1	Benzene	SE	UG/L	50	Selenium
BZAP	UG/L	0.2	Benzo (A) Pyrene	SIMAZINE	UG/L	4	Simazine
BE	UG/L	4	Beryllium	SR-90	pCi/L	8	Strontium-90
BRO3	UG/L	10	Bromate	STY	UG/L	100	Styrene
CD	UG/L	5	Cadmium	PCE	UG/L	5	Tetrachloroethylene
CTCL	UG/L	0.5	Carbon Tetrachloride	TL	UG/L	2	Thallium
CHLORITE	MG/L	1	Chlorite	THIOBENCARB	UG/L	70	Thiobencarb
CLBZ	UG/L	70	Chlorobenzene (Monochlorobenzene)	BZME	UG/L	150	Toluene
CR	UG/L	50	Chromium (Total)	THM	UG/L	80	Total Trihalomethanes

DCE12C	UG/L	6	Cis-1,2-Dichloroethylene	DCE12T	UG/L	10	Trans-1,2-Dichloroethylene
CN	UG/L	150	Cyanide	TCE	UG/L	5	Trichloroethylene
DALAPON	UG/L	200	Dalapon	FC11	UG/L	150	Trichlorofluoromethane
DOA	MG/L	0.4	Di(2-Ethylhexyl)Adipate	H-3	pCi/L	20000	Tritium
BIS2EHP	UG/L	4	Di(2-Ethylhexyl)Phthalate	U	pCi/L	20	Uranium
DCMA	UG/L	5	Dichloromethane	VC	UG/L	0.5	Vinyl Chloride
DINOSEB	UG/L	7	Dinoseb	XYLENES	UG/L	1750	Xylenes (Total)
Secondary MCL							
CU	MG/L	1	Copper	ZN	MG/L	5	Zinc
FOAMAGENTS	MG/L	0.5	Foaming Agents (Mbas)	CL	MG/L	500	Chloride
FE	UG/L	300	Iron	SO4	MG/L	500	Sulfate
MN	UG/L	50	Manganese	TDS	MG/L	1000	Total Dissolved Solids
AG	UG/L	100	Silver				

Source: State Water Resources Control Board 2017

Key: GAMA = groundwater ambient monitoring and assessment; UG/L = microgram per liter; MG/L = milligram per liter; pCi/L = picocuries per liter

Note: The water quality data query of the SWRCB GAMA database and the initial basin prioritization water quality analysis was performed on and soon after April 4, 2017. Hexavalent chromium (CR6) was included on the above list as a Primary MCL and used in the initial analysis. In September 2017, CR6 was removed from the MCL Primary list on court order. The water quality analysis for basin prioritization was corrected to reflect this change and consequently does not include any CR6 records.

Appendix 3. Computed groundwater volume for non-adjudication portion(s) of basins with adjudicated area used during evaluation of component 8.c.3.

Basin Number	Basin/Subbasin Name	Groundwater volume (acre-feet) of non-adjudicated portion of basin (from Step 4 of Component #8.c.3)
1-005	Scott River Valley	27,496
3-004.08	Salinas Valley/Seaside	0
3-008	Los Osos Valley	1,027
3-012	Santa Maria	13,137
3-016	Goleta	557
4-004.04	Santa Clara River Valley/ Santa Paula	497
4-011.03	Coastal Plain of Los Angeles/ West Coast	60
4-011.04	Coastal Plain of Los Angeles/ Central	0
4-012	San Fernando Valley	1,025
4-013	San Gabriel Valley	7,000
4-023	Raymond	1
5-027	Cummings Valley	63
5-028	Tehachapi Valley West	222
5-080	Brite Valley	8
6-012.01	Owens Valley/Owens Valley	24,228
6-037	Coyote Lake Valley	1
6-038	Caves Canyon Valley	2
6-040	Lower Mojave River Valley	0
6-041	Middle Mojave River Valley	0
6-042	Upper Mojave River Valley	5
6-043	El Mirage Valley	526
6-044	Antelope Valley	2,631
6-045	Tehachapi Valley East	55
6-047	Harper Valley	7
6-089	Kane Wash Area	0
7-012	Warren Valley	698
7-019	Lucerne Valley	0
8-002.01	Upper Santa Ana Valley/ Chino	2,553
8-002.02	Upper Santa Ana Valley/ Cucamonga	1
8-002.03	Upper Santa Ana Valley/ Riverside-Arlington	31,431
8-002.04	Upper Santa Ana Valley/ Rialto-Colton	2,349
8-002.06	Upper Santa Ana Valley/ Bunker Hill	216
8-002.08	Upper Santa Ana Valley/ San Timoteo	4,526
8-005	San Jacinto	33,935
9-004	Santa Margarita Valley	0
9-005	Temecula Valley	29
9-006	Cahuilla Valley	10

Appendix 4. Breakdown of area in basins with adjudications used during evaluation of component 8.c.3

Basin	Basin /Subbasin Name	Basin Area (Acres)	Adjudicated Acres	Percent Adjudicated	Non-Adjudicated Acres	Percent Non-Adjudicated
1-005	Scott River Valley	63,831	10,015	15.69%	53,816	84.31%
3-004.08	Salinas Valley/Seaside	14,489	14,489	100.00%	0	0.00%
3-008	Los Osos Valley	7,008	4,592	65.52%	2,417	34.48%
3-012	Santa Maria	184,072	162,036	88.03%	22,036	11.97%
3-016	Goleta	9,217	8,034	87.16%	1,183	12.84%
4-004.04	Santa Clara River Valley/ Santa Paula	22,845	19,945	87.31%	2,900	12.69%
4-011.03	Coastal Plain of Los Angeles/ West Coast	92,997	92,532	99.50%	465	0.50%
4-011.04	Coastal Plain of Los Angeles/ Central	177,770	149,067	83.85%	28,703	16.15%
4-012	San Fernando Valley	144,837	143,363	98.98%	1,474	1.02%
4-013	San Gabriel Valley	126,379	122,603	97.01%	3,776	2.99%
4-023	Raymond	26,049	26,047	99.99%	2	0.01%
5-027	Cummings Valley	10,019	9,213	91.95%	807	8.05%
5-028	Tehachapi Valley West	14,803	13,085	88.40%	1,718	11.60%
5-080	Brite Valley	3,170	2,845	89.73%	326	10.27%
6-012.01	Owens Valley/Owens Valley	660,935	231,276	34.99%	429,659	65.01%
6-037	Coyote Lake Valley	88,102	80,890	91.81%	7,212	8.19%
6-038	Caves Canyon Valley	72,962	27,201	37.28%	45,761	62.72%
6-040	Lower Mojave River Valley	285,486	260,561	91.27%	24,925	8.73%
6-041	Middle Mojave River Valley	211,321	206,613	97.77%	4,707	2.23%
6-042	Upper Mojave River Valley	412,841	405,091	98.12%	7,750	1.88%
6-043	El Mirage Valley	75,896	70,298	92.62%	5,598	7.38%
6-044	Antelope Valley	1,010,269	904,447	89.53%	105,822	10.47%
6-045	Tehachapi Valley East	23,967	11,658	48.64%	12,310	51.36%
6-047	Harper Valley	409,502	351,094	85.74%	58,408	14.26%
6-089	Kane Wash Area	5,954	5,954	100.00%	0	0.00%
7-012	Warren Valley	23,751	14,029	59.07%	9,722	40.93%
7-019	Lucerne Valley	147,432	145,964	99.00%	1,468	1.00%
8-002.01	Upper Santa Ana Valley/ Chino	153,762	146,652	95.38%	7,110	4.62%
8-002.02	Upper Santa Ana Valley/ Cucamonga	9,028	9,012	99.82%	17	0.18%
8-002.03	Upper Santa Ana Valley/ Riverside-Arlington	56,563	37,217	65.80%	19,346	34.20%
8-002.04	Upper Santa Ana Valley/ Rialto-Colton	24,794	23,636	95.33%	1,158	4.67%
8-002.06	Upper Santa Ana Valley/ Bunker Hill	92,488	87,485	94.59%	5,003	5.41%

8-002.08	Upper Santa Ana Valley/ San Timoteo	66,433	14,374	21.64%	52,059	78.36%
8-005	San Jacinto	181,455	60,109	33.13%	121,346	66.87%
9-004	Santa Margarita Valley	5,215	5,191	99.54%	24	0.46%
9-005	Temecula Valley	87,753	87,386	99.58%	367	0.42%
9-006	Cahuilla Valley	18,202	17,850	98.07%	351	1.93%