



Bulletin 118

Interim Update 2016

BASIN NAME
SMITH RIVER PLAIN
KLAMATH RIVER VALLEY
BUTTE VALLEY
SHASTA VALLEY
WEST RIVER VALLEY
HAYFORK VALLEY
HOOPA VALLEY
MAD RIVER VALLEY
MAD RIVER VALLEY
EUREKA PLAIN
EEL RIVER VALLEY
COVELO ROUND VALLEY
LAYTONVILLE VALLEY
LITTLE LAKE VALLEY
LOWER KLAMATH RIVER VALLEY
HAPPY CAMP TOWN AREA
SEIAD VALLEY
BRAY TOWN AREA
RED ROCK VALLEY
ANDERSON VALLEY
GARCIA RIVER VALLEY
FORT BRAGG TERRACE AREA
FAIRCHILD SWAMP VALLEY
PRAIRIE CREEK AREA
REDWOOD CREEK AREA
BIG LAGOON AREA
MATTOLE RIVER VALLEY
HONEYDEW TOWN AREA
PEPPERWOOD TOWN AREA

California's Groundwater

Working Toward Sustainability

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California's Groundwater

Working Toward Sustainability

December 22, 2016



Acronyms and Abbreviations

BBAT	Basin Boundary Assessment Tool
BBMRS	Basin Boundary Modification Request System
CASGEM	California Statewide Groundwater Level Elevation Monitoring
DWR	California Department of Water Resources
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
SGMA	Sustainable Groundwater Management Act
Water Code	California Water Code

Forward

The Department of Water Resources' (DWR) Bulletin 118 series, *California's Groundwater*, is the state's premier groundwater publication. It is the official compendium of information about the occurrence, characteristics, and management of groundwater in California.

California entered into a new era of water management in 2014 with the passage of the Sustainable Groundwater Management Act (SGMA). SGMA provides for the sustainable management of groundwater through the formation of locally-organized groundwater sustainability agencies, and the development and implementation of groundwater sustainability plans based on groundwater basins identified, delineated, and characterized in Bulletin 118.

The various requirements and deadlines of SGMA necessitate that Bulletin 118 be updated now through this interim update, rather than the comprehensive update of Bulletin 118 scheduled for 2020. Information provided in this interim update—groundwater basins subject to critical conditions of overdraft, groundwater basin boundary modifications, and the priority rankings of California's groundwater basins—is essential to the timely formation of groundwater sustainability agencies, and the development and implementation of groundwater sustainability plans.

This publication is yet another major achievement in fulfilling DWR's commitment to assist local agencies in managing groundwater sustainably. Other recent achievements include landmark regulations for the development of groundwater sustainability plans and regulations for groundwater basin boundary modification requests by local agencies. DWR will also release best management practices for the sustainable management of groundwater by year's end.

There are still many challenges ahead of us as we progress toward the sustainable management of groundwater throughout California. These challenges are significant, but I'm confident that local agencies, with continued support from DWR, will successfully implement SGMA and ensure that California's precious groundwater is sustained for generations to come.



Director, California Department of Water Resources



Edmund G. Brown, Jr.
Governor, State of California

John Laird
*Secretary for Natural Resources,
California Natural Resources Agency*

Mark W. Cowin
*Director,
California Department of Water Resources*

Waiman Yip
Policy Advisor

Carl A. Torgerson
Chief Deputy Director

Cindy Messer
Assistant Chief Deputy Director

Anecita Agustinez
*Government and
Community Liaison*

Kasey Schimke
*Assistant Director
Legislative Affairs Office*

Spencer Kenner
*Chief Counsel
Office of Chief Counsel*

Jeffrey Ingles
*Internal Audits
Office*

Ed Wilson
*Public Affairs
Office*

Stephanie Varrelman
*Office of
Workforce Equality*

Michael Donlon
Safety Program

Russel Stein
*Executive Program
Office*

DEPUTY DIRECTORS

Mark Andersen
State Water Project

Gary Bardini
Integrated Water Management

William Croyle
Statewide Emergency Preparedness and Security

Kathie Kishaba
Business Operations

John Pacheco (Acting)
California Energy Resources Scheduling

Taryn Ravazzini
Special Initiatives

Arthur Hinojosa, Jr.
*Chief
Division of Integrated Regional Water Management*

Prepared under the direction of:

David Gutierrez
Sustainable Groundwater Management Executive Manager

Rich Juricich **Trevor Joseph** **Dan McManus**

Prepared by:

Brett Wyckoff
Bulletin 118 Project Manager

Michael Floyd

Based on content developed by:

Timothy Godwin
Groundwater Basin Boundary Modifications Project Manager

Roy Hull
Groundwater Basin Prioritization Project Manager

Timothy Ross
Critically Overdrafted Groundwater Basins Project Manager

Content development support provided by:

Christina Boggs	Bill Brewster	Aaron Cuthbertson
Michelle Dooley	Bill Ehorn	Siran Eryasian
Benjamin Gooding	Gary Guacci	Julie Haas
John Kirk	Dane Mathis	Cordi McDaniel
Charles McKenzie	Scott Morgan	Jonathan Mulder
Mark Nordberg	Bob Pierotti	Mary Scruggs
Paul Shipman	Erin Smith	Mark Souverville
Steven Springhorn	Jack Tung	Matthew Zimmerman

and:

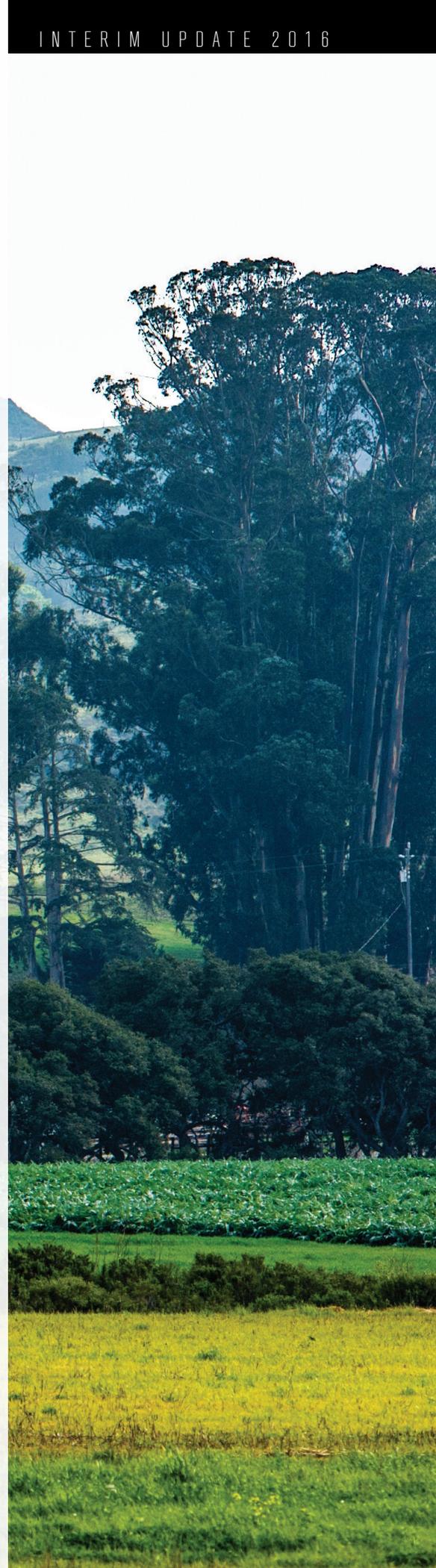
Michael Anderson
State Climatologist

Editorial, design, and production services provided by:

William O'Daly
DWR Publications

Charlie Oliveras
DWR Publications

Robert Peterson
DWR Public Affairs Office





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Matthew Zimmerman, Page 26

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Well drilling near Tule Lake

Introduction

Groundwater is a major part of California's water supply. During average hydrologic conditions, groundwater provides close to 40 percent of the water in California for urban, rural, and agricultural uses. This percentage increases during dry years when water in rivers, streams, and lakes is in short supply. For many areas of the state, groundwater is the only water supply available year-round.

A new era for California's groundwater began in September 2014 with the passage of the Sustainable Groundwater Management Act (SGMA). SGMA established a path for the sustainable management of groundwater through the formation of locally organized groundwater sustainability agencies and locally developed groundwater sustainability plans.

The purpose of this interim update is to provide up-to-date information on groundwater basins subject to critical conditions of overdraft, groundwater basin boundaries, and basin prioritization. That information is essential to the successful implementation of SGMA, including the timely formation of groundwater sustainability agencies and the development of groundwater sustainability plans.

This update is the latest in a series of Bulletin 118 publications that provide important information about California's groundwater. Together with previous updates of Bulletin 118, this update also builds on the body of information about California's groundwater provided by the following recent DWR publications:

- *California's Groundwater Update 2013: A Compilation of Enhanced Content for California Water Plan Update 2013* (<https://water.ca.gov/Programs/California-Water-Plan/Water-Plan-Updates>).
- *Public Update for Drought Response: Groundwater Basins with Potential Water Shortages and Gaps in Groundwater Monitoring (2014)*. (<https://water.ca.gov/-/media/DWR-Website/Web-Pages/Water-Basics/Drought/Files/Publications-And-Reports/Drought-Response-Groundwater-Basins---April-2014.pdf>).

KEY FEATURES OF SGMA

- ▶ *Provides for the sustainable management of groundwater through the formation of groundwater sustainability agencies (GSAs), and the development and implementation of groundwater sustainability plans (GSPs)*
- ▶ *Requires GSAs and GSPs for all groundwater basins identified by the California Department of Water Resources (DWR) as high- or medium-priority.*
- ▶ *Authorizes the intervention of the State Water Resources Control Board in the event that no GSA, or equivalent local authority, is formed for a high- or medium-priority basin, or if an adequate GSP is not submitted for those basins.*
- ▶ *Establishes criteria for the sustainable management of groundwater and authorizes DWR to establish best management practices for groundwater.*

For more information about SGMA, visit: <https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management>

California Water Code Section 12924

(a) The department, in conjunction with other public agencies, shall conduct an investigation of the state's groundwater basins. The department shall identify the state's groundwater basins on the basis of geological and hydrological conditions and consideration of political boundary lines whenever practical. The department shall also investigate existing general patterns of groundwater extraction and groundwater recharge within those basins to the extent necessary to identify basins that are subject to critical conditions of overdraft.

(b) The department may revise the boundaries of groundwater basins identified in subdivision (a) based on its own investigations or information provided by others.

(c) The department shall report its findings to the Governor and the Legislature not later than January 1, 2012, and thereafter in years ending in 5 or 0

- *Public Update for Drought Response: Groundwater Basins with Potential Water Shortages, Gaps in Groundwater Monitoring, Monitoring of Land Subsidence, and Agricultural Land Fallowing (2014)* (<https://water.ca.gov/LegacyFiles/cagroundwater/docs/November%202014%20Public%20Update%20for%20Drought%20Response.pdf>).

A comprehensive update of Bulletin 118 is scheduled for 2020 in accordance with California Water Code Section 12924 and the California Water Action Plan (www.resources.ca.gov/california_water_action_plan/). The 2020 update will build on information provided by this interim update, the rest of the Bulletin 118 series, and the reports listed in the previous paragraph. It will also include an inventory and assessment of efforts by groundwater sustainability agencies and the State to implement SGMA, information on groundwater management successes and challenges, and recommendations for the future. More information about the 2020 update is provided in the final section of this update.

California State Capitol



Previous Bulletin 118 Publications

DWR has long recognized the need to provide information about California's groundwater to improve understanding about the resource and inform water management decisions. DWR's Bulletin 118 series serves as the State's official compendium of information about groundwater resources throughout California, including the definition, boundaries, and characteristics of the state's groundwater basins.

Three statewide versions of Bulletin 118, California's Groundwater were published prior to this interim update:

Bulletin 118, 1975

Bulletin 118, 1975 is the first publication of the Bulletin 118 series that is statewide in scope. It identifies over 400 groundwater basins and subbasins in California and provides some summary information on basin and aquifer characteristics, groundwater use, and water quality concerns.

Bulletin 118, Update 1980

This update provides information on changes to some of the groundwater basin boundaries identified in Bulletin 118, 1975 along with summary information on basin characteristics, groundwater use, and other information. This update identifies 11 groundwater basins as being subject to critical conditions of overdraft. Additional basins and areas are identified as being of "special concern."

Bulletin 118, 2003

Update 2003 includes online technical descriptions and geographic information system compatible maps for 515 groundwater basins and subbasins in California. Update 2003 also includes information about groundwater management in the state and provides recommendations for the future. The list of groundwater basins subject to critical conditions of overdraft, published in the 1980 update of Bulletin 118, was not reevaluated for Update 2003.

These three Bulletin 118 publications were preceded by *Water Quality Investigations Report No. 3, Ground Water Basins in California*, published in 1952 by the California Department of Public Works and Division of Water Resources (the predecessor to DWR). This report identifies alluvial basins and other areas believed to contain usable groundwater.

In addition to the statewide Bulletin 118 publications several regional versions of Bulletin 118 were published in the past that focus on individual areas of the state. The regional versions of Bulletin 118 address the groundwater resources of Sonoma County, South San Francisco Bay Area, Livermore and Sunol valleys, Sacramento Valley, and Sacramento County.

The documents discussed above can be accessed at: <https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118>



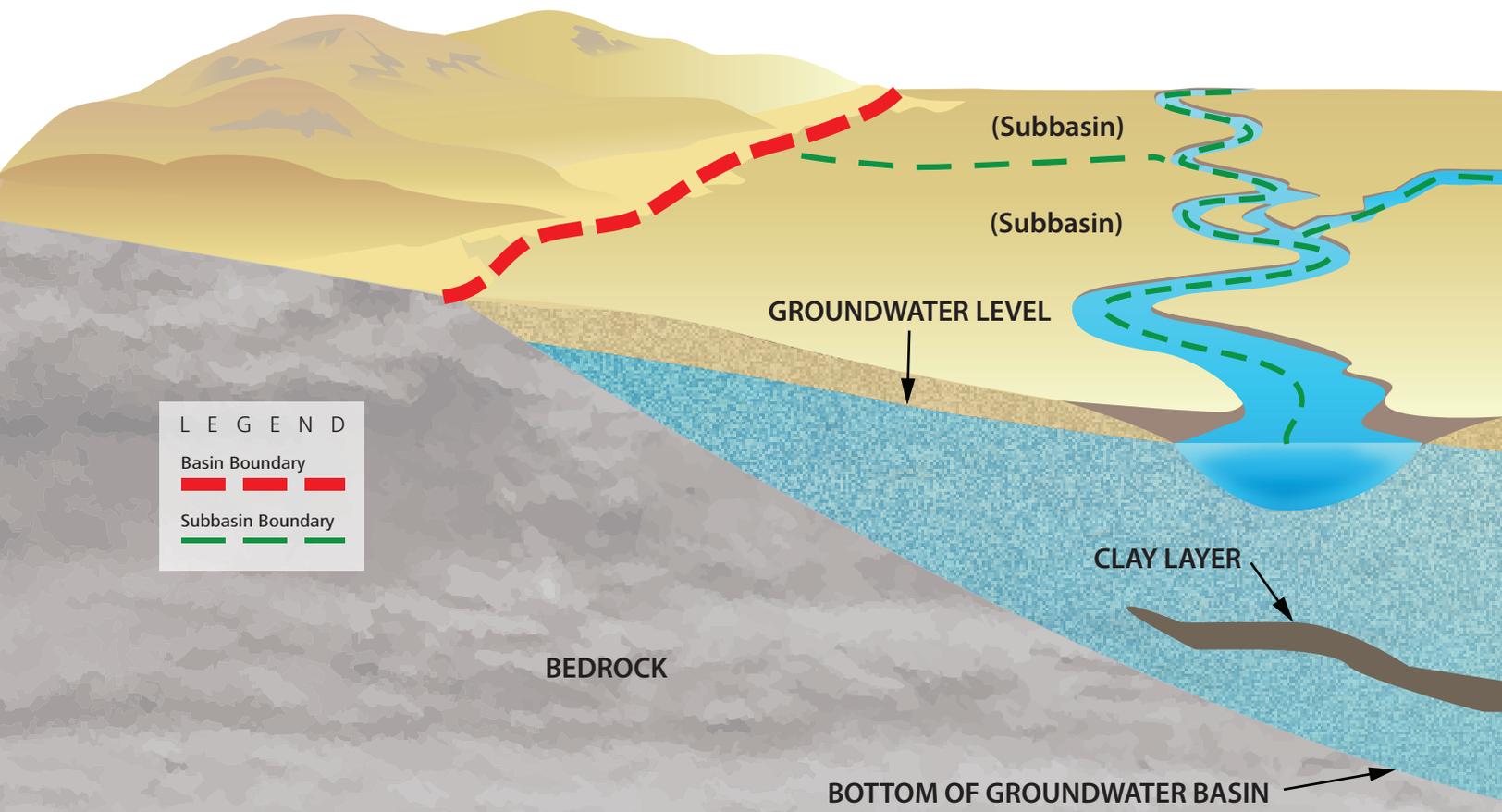
Agricultural well near Marysville

What is a groundwater basin^a?

Title 23, Division 2, Chapter 1.5, Subchapter 1, Article 2, Section 341(g)(1) of the California Code of Regulations refers to a groundwater basin as an:

“ . . . aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom . . . ”

The diagram below is an illustration of a groundwater basin in its most basic sense. The lateral boundaries of the illustrated basin are located where porous sediments deposited in the valley, such as sand, gravel, and silt, meet the bedrock that comprises the neighboring mountains. The physical bottom of the basin occurs where the porous valley deposits contact the underlying bedrock. For groundwater management purposes, the effective bottom of a groundwater basin is sometimes defined as the depth below which generally only unsuitable brackish or saline groundwater can be found^b.



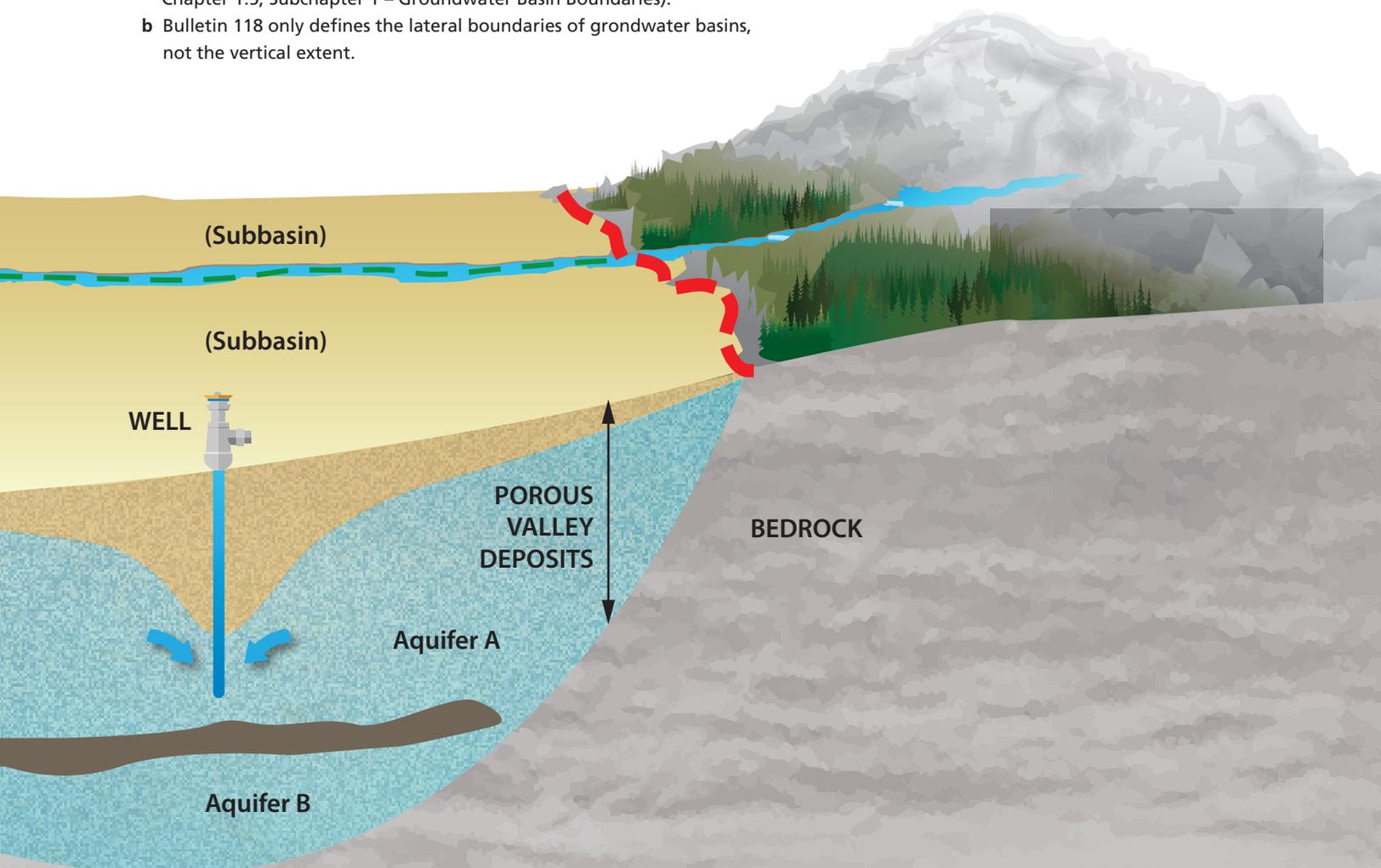
The spaces between individual grains of the valley deposits hold water that has percolated down from the land surface. Accumulated groundwater can flow laterally to a well. Groundwater can also flow out into depressions in the land surface, such as a river channel, where the groundwater level is high. The layer of clay shown in the diagram separates the porous valley deposits into two aquifers.

Numerous groundwater basins in California have been divided into smaller units, referred to as *subbasins*. The lateral boundaries of subbasins are established by DWR based on geologic factors, hydraulic considerations, or institutional boundaries.

Additional information on the various types of groundwater basins and subbasins, and their boundaries, is included in Bulletin 118, Update 2003 (pages 88 through 90), available at: <https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118>

NOTES

- a This information is for general understanding purposes only and does not supplant regulations established by DWR (California Code of Regulations Title 23, Division 2, Chapter 1.5, Subchapter 1 – Groundwater Basin Boundaries).
- b Bulletin 118 only defines the lateral boundaries of groundwater basins, not the vertical extent.





Agricultural well in the San Joaquin Valley

Groundwater Basins Subject to Critical Conditions of Overdraft

BACKGROUND

The first statewide version of Bulletin 118 was published in 1975. Bulletin 118, 1975 includes information about groundwater basins in overdraft and the adverse effects that could occur from overdraft.

In 1978, the California Water Code (Water Code) was amended tasking DWR with investigating the State's groundwater basins, defining their boundaries, and identifying basins "subject to critical conditions of overdraft" (Section 12924). DWR released the first update of the statewide version of Bulletin 118 in 1980. That update defined the terms "overdraft" and "subject to critical conditions of overdraft," and listed 11 groundwater basins as being subject to critical conditions of overdraft. The next statewide update of Bulletin 118, in 2003, did not revise the 1980 list because no comprehensive assessment of groundwater overdraft conditions was performed.

APPROACH

DWR began a statewide assessment of groundwater basin overdraft conditions in 2015 to update the 1980 list of basins subject to critical conditions of overdraft. The assessment was based on readily available information on groundwater conditions and observed effects of overdraft.

Time Period Selection

The first step of the assessment effort was the selection of a suitable time period for evaluating groundwater basin conditions. After a review of past overdraft analyses by DWR, the following criteria were used for the selection of the time period for evaluating groundwater basin conditions:

- It should not include the current drought which began in 2012.
- It should be as recent as possible.
- Mean annual statewide precipitation over the time period should be equivalent to the long-term mean annual precipitation.

BASINS SUBJECT TO CRITICAL CONDITIONS OF OVERDRAFT AND SGMA

SGMA mandates that all groundwater basins identified by DWR as high- or medium-priority by January 31, 2015, must have groundwater sustainability agencies established by June 30, 2017. The act also requires that all high- and medium-priority basins classified as being subject to critical conditions of overdraft in Bulletin 118, as of January 1, 2017, be covered by groundwater sustainability plans, or their equivalent, by January 31, 2020. Groundwater sustainability plans, or their equivalent, must be established for all other high- and medium-priority basins by January 31, 2022

For more information about SGMA, visit: <https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management>

What is *Groundwater Overdraft*?

Bulletin 118, Update 2003 describes groundwater overdraft as:

“... the condition of a groundwater basin or subbasin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. If overdraft continues for a number of years, significant adverse impacts may occur, including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts.” (Page 96)

What is a *Groundwater Basin Subject to Critical Conditions of Overdraft*?

Bulletin 118, Update 1980 defines a groundwater basin subject to critical conditions of overdraft as:

“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.” (Page 3)

- The time period should be a minimum of 10 years in duration and include both wet and dry years.
- The net change in water in storage in the unsaturated zone over the entire time period should be minimal.

DWR evaluated statewide precipitation data obtained from the Western Regional Climate Center for Water Years 1895 through 2014 to determine a suitable time period for evaluating groundwater basin conditions. Figure 1 is a graph of the cumulative departure of annual statewide precipitation from the long-term mean annual statewide precipitation of 22.19 inches, from Water Years 1895 through 2014.

Following the time-period selection criteria listed in the preceding paragraph, it was determined that the time period for the assessment of critical conditions of overdraft would be Water Years 1989 through 2009. The selected assessment period:

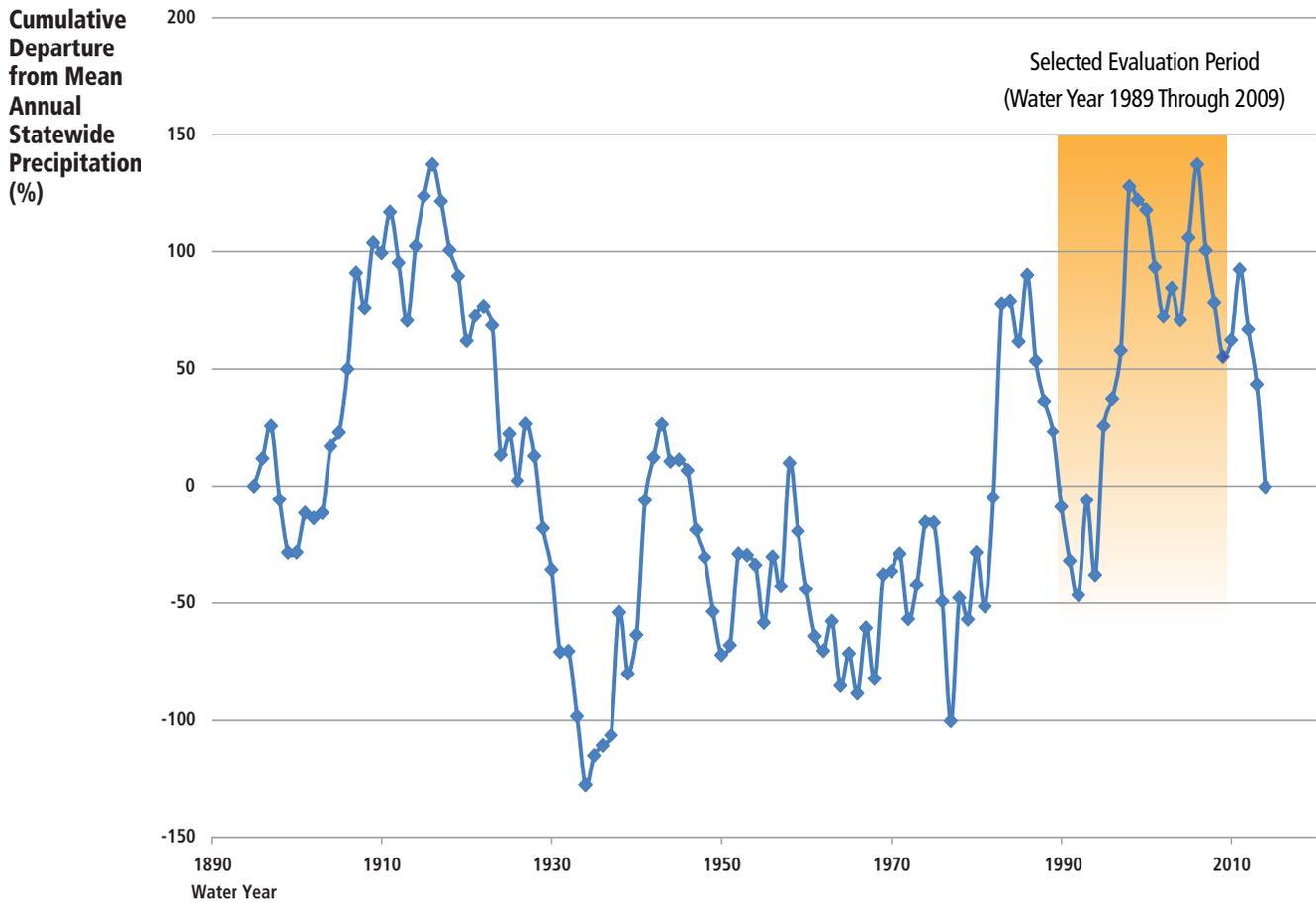


FIGURE 1 – Cumulative Departure of Annual Statewide Precipitation from the Long-Term Mean Annual Statewide Precipitation of 22.19 inches from Water Years 1895–2014

- Does not include the current drought.
- Has a mean annual statewide precipitation of 22.39 inches (only about 1 percent more than the long-term mean).
- Includes two wet periods when annual statewide precipitation exceeded the long-term mean precipitation for multiple years; the first lasting four consecutive years and the second lasting two consecutive years.
- Includes three dry periods when annual statewide precipitation was less than the long-term mean precipitation; the first, second, and third dry periods lasting three, four, and three consecutive years, respectively.
- Starts and ends after three consecutive years of below-average precipitation, thereby minimizing the impact of a possible net difference in unsaturated zone water content over the entire assessment period.

What is a water year?

A water year starts October 1 and ends September 30 of the following calendar year (*California Water Code Section 10721 [aa]*). A water year is designated by the calendar year it ends on. For example, the water year that started on October 1, 2015, and ended September 30, 2016, is referred to as Water Year 2016.

Groundwater-Level Trend Assessment

A groundwater-level trend assessment was performed using readily accessible data for groundwater basins delineated in Bulletin 118, Update 2003. Data were not available for all basins.

The trend assessment was performed to identify basins that experienced a consistent trend of declining groundwater levels through the entire assessment period. Groundwater level data after Water Year 2009 were also reviewed for any evidence that groundwater level declines and overdraft had ceased to continue after the assessment period. The overall goal of the groundwater level trend assessment was to help identify groundwater basins that might have experienced adverse impacts of overdraft during the assessment period. Adverse impacts of overdraft are described below.

The primary source of groundwater-level data for the trend assessment was DWR's Water Data Library (<http://wdl.water.ca.gov/waterdatalibrary/>). DWR used additional sources of data, such as published reports where available, and data from the California Statewide Groundwater Level Elevation Monitoring (CASGEM) Program database (<https://water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM>), to supplement Water Data Library data.

Adverse Impacts of Overdraft

The deciding factor for the identification of groundwater basins subject to critical conditions of overdraft was the documented observation of one or more adverse impacts of overdraft, including:

- Land subsidence.
- Sea water intrusion into a coastal basin aquifer.
- Water of unusable quality being caused to migrate and make a groundwater supply unusable.
- Groundwater levels declining during a period of normal or above-normal water supply.

DWR collected readily available information on observed adverse impacts of overdraft in basins to determine where such impacts had been reported during the assessment period. This information was obtained from federal, State, and local agency publications, and from reports by private consultants. If adverse impacts of overdraft had been reported in a portion of a groundwater basin during the assessment period, then the adverse impact was assigned to the entire basin for classification purposes.



Nested monitoring wells (multiple casings in a single borehole)

RESULTS

Preliminary Determination

After the groundwater basin overdraft assessment effort was completed, DWR developed a preliminary list of basins determined to be subject to critical conditions of overdraft. This list included all groundwater basins identified in Bulletin 118-1980 as subject to critical conditions of overdraft and additional basins newly identified as subject to critical conditions of overdraft.

During July 2015, DWR contacted counties and major water agencies associated with basins identified in the preliminary list and encouraged them to provide additional information that DWR could consider for the draft and final determinations of basin conditions. In response, several organizations provided additional information and entered into discussions with DWR. Changes were made to the preliminary list of groundwater basins subject to critical conditions of overdraft after the newly submitted information was considered by DWR.

Draft and Final Determinations

In August 2015, DWR released a draft list of 21 groundwater basins identified as being subject to critical conditions of overdraft. The draft list was announced through a news release and through DWR's website. The list was also presented at a public meeting of the California Water Commission and at a DWR-hosted and webcasted public meeting in the city of Clovis.

Public comments on the draft list were collected for more than 30 days. Fifteen sets of comments were submitted pertaining to eight of the 21 identified basins. Comments in favor and against the draft designations were received.

In January 2016, following the review of comments received for the draft list, DWR released the final list of groundwater basins subject to critical conditions of overdraft. No changes were made between the August 2015 draft list and the January 2016 final list. The January 2016 final list of basins subject to critical conditions of overdraft is presented in Table 1.

Groundwater Basins Subject to Critical Conditions of Overdraft and Basin Boundary Modifications

In response to the requirements of SGMA, DWR developed emergency regulations in 2015, and instituted a process in early 2016, for local agencies to submit groundwater basin boundary modification requests to DWR. The basin boundary modification request submittal and review process was completed with the final approval of the basin boundary modifications by DWR on October 18, 2016. Boundary changes were made to correct known errors and inconsistencies in basin boundaries (referred to as "administrative adjustments") and to address jurisdictional, geologic, hydrologic, and other considerations. The basin boundary modification regulations, process, and results are discussed in the following section.



DWR staff measuring the groundwater level in a monitoring well

Of the 21 groundwater basins identified in January 2016 as being subject to critical conditions of overdraft, six basins received major boundary modifications, 13 basins underwent relatively minor boundary changes, and the boundaries of two basins remained unchanged as the result of the boundary modification process. None of the modifications moved an area of a basin with adverse impacts of overdraft to a basin that is not identified as subject to critical conditions of overdraft.

Table 2 summarizes the relative scope of boundary modifications for each of the basins identified in January 2016 as being subject to critical conditions of overdraft. Table 3 provides summary descriptions of the boundary modifications for the six overdrafted basins that received major modifications. The locations of all groundwater basins subject to critical conditions of overdraft are shown in Figure 2.

TABLE 1 – Groundwater Basins Subject to Critical Conditions of Overdraft – January 2016

Basin Number ^a	Basin/Subbasin Name ^a
3-1	Soquel Valley
3-2	Pajaro Valley
3-4.01	180/400-Foot Aquifer
3-4.06	Paso Robles Area
3-8	Los Osos Valley
3-13	Cuyama Valley
4-4.02	Oxnard
4-6	Pleasant Valley
5-22.01	Eastern San Joaquin
5-22.04	Merced
5-22.05	Chowchilla
5-22.06	Madera
5-22.07	Delta-Mendota
5-22.08	Kings
5-22.09	Westside
5-22.11	Kaweah
5-22.12	Tulare Lake
5-22.13	Tule
5-22.14	Kern County
6-54	Indian Wells Valley
7-24	Borrego Valley

^a As identified and delineated in Bulletin 118: *California's Groundwater*, Update 2003.

TABLE 2 – Relative Scope of Boundary Modifications for Each Groundwater Basin Identified as Subject to Critical Conditions of Overdraft

Basin Number (Bulletin 118, Update 2013) ^a	Basin Number (2016)	Basin/Subbasin Name (2016)	Relative Scope of Changes ^b
3-1	3-001	San Cruz Mid-County ^c	Major
3-2	3-002.01	Pajaro Valley	Major
3-4.01	3-004.01	180/400-Foot Aquifer	Major
3-4.06	3-004.06	Paso Robles Area	Major
3-8	3-008	Los Osos Valley	Minor
3-13	3-013	Cuyama Valley	None
4-4.02	4-004.02	Oxnard	Minor
4-6	4-006	Pleasant Valley	Minor
5-22.01	5-022.01	Eastern San Joaquin	Minor
5-22.04	5-022.04	Merced	Minor
5-22.05	5-022.05	Chowchilla	Minor
5-22.06	5-022.06	Madera	Minor
5-22.07	5-022.07	Delta-Mendota	Minor
5-22.08	5-022.08	Kings	Minor
5-22.09	5-022.09	Westside	Minor
5-22.11	5-022.11	Kaweah	Minor
5-22.12	5-022.12	Tulare Lake	Minor
5-22.13	5-022.13	Tule	Minor
5-22.14	5-022.14	Kern County	Major
6-54	6-054	Indian Wells Valley	None
7-24	7-024.01	Borrego Springs ^d	Major

NOTES

a As identified in Bulletin 118, *California’s Groundwater*, Update 2003

b Major changes involved relatively large areas being added to, or removed from, a basin. Minor changes included small adjustments in the location of a basin boundary and relatively small areas being added to, or removed from, a basin.

c Formerly “Soquel Valley”

d Formerly “Borrego Valley”



Agriculture near Oxnard

TABLE 3 – Summary of Major Boundary Changes for Groundwater Basins Subject to Critical Conditions of Overdraft

Basin Number (2016)	Basin/Subbasin Name (2016)	Summary of Changes
3-001	San Cruz Mid-County Basin	The former Soquel Valley Basin (3-1) was expanded to include portions of three adjacent basins— West Santa Cruz Terrace Basin (3-026), the former Santa Cruz Purisima Formation Basin (3-21), and the original Pajaro Valley Basin (3-2). The Soquel Valley Basin was then renamed to be the San Cruz Mid-County Basin.
3-002.01	Pajaro Valley Subbasin	Various portions of the original Pajaro Valley Basin were moved to three adjacent subbasins/basins-- 180/400 Foot Aquifer Subbasin (3-004.01), Langley Area Subbasin (3-004.09), and the newly formed San Cruz Mid-County (3-001) Basin. A portion of the former Santa Cruz Purisima Formation Basin (3-21) was added to this basin. The Pajaro Valley Basin was also reclassified as a subbasin.
3-004.01	180/400-Foot Aquifer Subbasin	A portion of the original 180/400-Foot Aquifer subbasin was moved to the Pajaro Valley Subbasin (3-002.01).
3-004.06	Paso Robles Area Subbasin	A new subbasin, "Atascadero Area"(3-004.11), was created from a portion of the original Paso Robles Area Subbasin. The Atascadero Area Subbasin is not subject to critical conditions of overdraft.
5-022.14	Kern County Subbasin	A new subbasin, "White Wolf" (5-022.18), was created from a portion of the original Kern County Subbasin. The White Wolf Subbasin is not subject to critical conditions of overdraft.
7-024.01	Borrego Springs Subbasin	The Borrego Valley Basin (7-24) was divided into 2 new subbasins; "Borrego Springs" (7-024.01) and "Ocotillo Wells" (7-024.02). The Borrego Springs Subbasin is subject to critical conditions of overdraft whereas the Ocotillo Wells Subbasin is not.

FIGURE 2 – Groundwater Basins Subject to Critical Conditions of Overdraft





Agriculture in the Salinas Valley

Groundwater Basin Boundary Modifications

BACKGROUND

In 2014, with the passage of SGMA, Section 10722.2 was added to the Water Code allowing local agencies, or an entity directed by the court in an adjudication action, to request that DWR revise the boundaries of a groundwater basin, including the establishment of new subbasins. Section 10722.2 does not affect DWR's existing authority to revise basin boundaries under Water Code Section 12924.

Section 10722.2 requires that local agency basin boundary modification requests include information justifying and supporting requested modifications. Water Code Section 10722.2 also requires that, by January 1, 2016, DWR adopt emergency regulations for the submittal, processing, and consideration of modification requests.

Regulations Development

In 2015, DWR initiated efforts to develop emergency regulations for local agencies to request groundwater basin boundary modifications. A comprehensive, multi-phased public engagement process was followed during the development of the regulations. Outreach efforts included news releases, web announcements, advisory group meetings, public meetings, and multiple updates to the California Water Commission.

On October 21, 2015, DWR presented draft final groundwater basin boundary regulations to the California Water Commission for adoption. The regulations (California Code of Regulations Title 23, Division 2, Chapter 1.5, Subchapter 1) were adopted by the commission and became effective November 16, 2015, after being submitted to the State Office of Administrative Law. In general, the adopted regulations address:

- The types of groundwater basin boundary modification requests DWR will consider
- Procedures for submitting boundary modification requests and related public input
- Information necessary for supporting modification requests
- Methods and criteria used by DWR to evaluate modification requests
- DWR's procedures for adopting boundary modifications.

Figure 3 provides a general overview of two categories of groundwater basin modifications covered by the regulations — “scientific” and “jurisdictional.” Another category, referred to as “other,” was included in the regulations to cover any basin boundary modifications not addressed by aforementioned categories. Additional information about the basin boundary regulations and their development is available at: http://water.ca.gov/groundwater/sgm/bb_development.cfm.

APPROACH

Groundwater basin boundary modifications were conducted in two phases. The first phase consisted of “administrative adjustments” to basin boundaries to correct known inconsistencies and errors. During the second phase, local agency basin boundary modification requests were received and reviewed by DWR in accordance with the regulations discussed in the previous paragraphs. Boundary modifications were completed for all basins with approved modification requests.

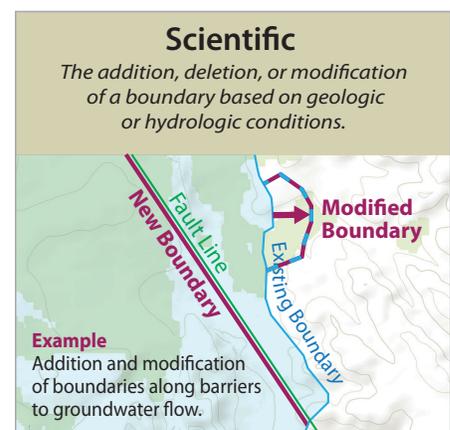
Administrative Adjustments

DWR made administrative adjustments to groundwater basin boundaries to address known inconsistencies and errors. The administrative adjustments were made to conform the graphical location and configuration of basin boundaries to the corresponding written basin boundary descriptions provided in Bulletin 118, Update 2003. Administrative adjustments were based on information from the following sources:

- Waterways: National Hydrography Dataset created by U.S. Geological Survey in cooperation with the U.S. Environmental Protection Agency, U.S. Department of Agriculture, Forest Service, and other federal, State, and local partners. (Version: NHDH_CA_931v220)
- County boundaries: CAL FIRE dataset created by the California Department of Forestry and Fire Protection. (File: cpty24k15_1, published November, 2015)

FIGURE 3 – Overview of Scientific and Jurisdictionally Based Groundwater Basin Boundary Modifications

The illustrations to the right depict the general types of basin boundary modifications requested by local agencies. Additional information about the various types of basin boundary modifications can be found at <https://water.ca.gov/Programs/Groundwater-Management/Basin-Boundary-Modifications>.





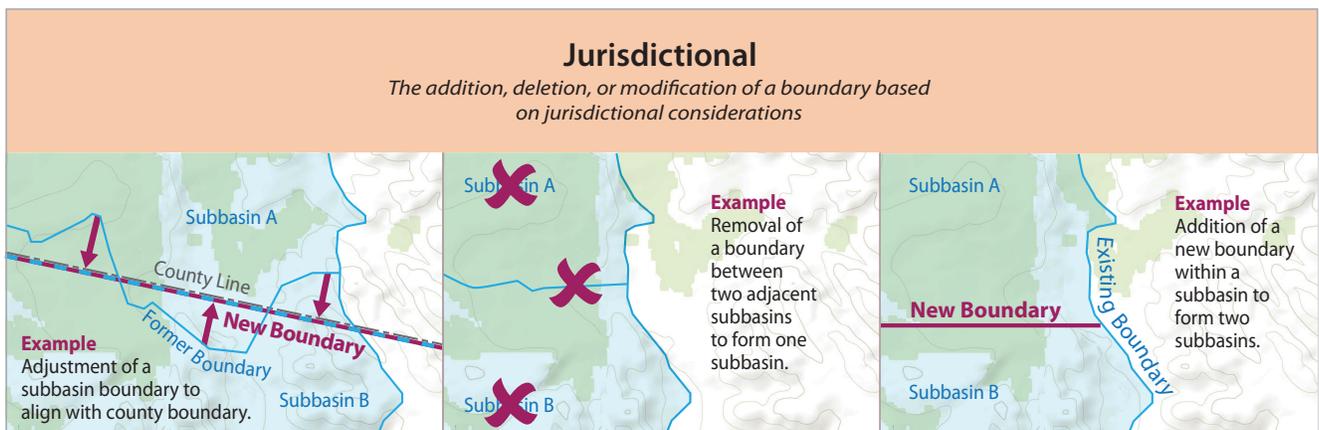
Hollywood looking toward downtown Los Angeles

- Geologic boundaries: California Geological Survey (CGS) 1:250,000 scale maps, (CGS Regional Geologic Map Series and CGS Geologic Atlas of California). U.S. Geological Survey Maps published as of September 1, 2016.

The administrative adjustments were completed prior to the period established for the submission of local agency basin boundary modification requests. All administrative adjustments were posted on DWR’s website and were discussed during public meetings held for the development of the basin boundary regulations.

Groundwater Basin Boundary Modification Requests

The time period established by DWR for the submission of local agency basin boundary modification requests, and related public comments,



was January 1, 2016, through March 31, 2016. The request submission period was followed by a 30-day public comment period.

In general, all modification requests were required to include information about:

- The requesting agency
- The proposed modification and affected basin
- Efforts to consult with affected agencies and affected systems, and input received
- Public notices and meetings where the proposed modifications were discussed or considered
- Public input that was received

Scientifically based modification requests were also required to include technical information supporting the modification request. Jurisdictionally based modification requests were required to include information about groundwater management efforts and considerations, including how the proposed modification would promote sustainable groundwater management.

Process Support Tools

DWR established the Basin Boundary Modification Request System (BBMRS) to enable local agencies to submit groundwater basin boundary modification requests online, and for the public and other stakeholders to review those requests and provide comments. All of the basin boundary modification requests, supporting information, and public comments submitted during the 2016 boundary modification effort can be viewed using the BBMRS at: <http://sgma.water.ca.gov/basinmod/>.

DWR also established the Basin Boundary Assessment Tool (BBAT) to support local agencies during the 2016 basin boundary modification effort by providing online map-based information for the formulation of boundary modification requests. Information available from the BBAT included:

- Groundwater basin boundaries and descriptions published in Bulletin 118, Update 2003, along with all administrative adjustments
- The locations and boundaries of adjudicated basins
- Basin priority
- Geology
- Boundaries of counties, watersheds, water agencies, federal lands, and tribal lands



Agricultural well in the Salinas Valley



Pacoima spreading grounds (groundwater recharge facility)—San Fernando Valley

Groundwater Basin Boundary Modification Request Review

Fifty-four basin boundary modification requests were received. Thirty-nine requests were approved, 12 were denied, and 3 were not accepted because they were incomplete. Appendix A lists the 39 basins where local agency-requested boundary modifications were approved, along with information about the type of modifications. The 15 basins where boundary modifications were received, but were denied or incomplete, are also listed.

Draft modifications for the approved requests were released to the public July 1, 2016, and were presented at a series of public meetings in mid-July 2016, together with information about the modification submittal and review process. The draft basin boundary modifications, along with comments received during the mid-July public meetings, were presented to the California Water Commission for comment on July 20, 2016.

RESULTS

DWR evaluated comments received for the draft groundwater basin boundary modifications and finalized the modifications on October 18, 2016. As a result of the basin boundary modification process, there are now 517 identified groundwater basins and subbasins in California. Current boundaries for California's groundwater basins and subbasins are shown in Appendix B. Scalable views and information about the basins and subbasins, including their descriptions, are available using the DWR Groundwater Information Center Interactive Map at: <https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer>.



Agriculture in San Luis Obispo County

Groundwater Basin Prioritization

BACKGROUND

In 2009, Senate Bill X7-6 added Part 2.11 to Division 6 of the Water Code (Section 10920 et seq.) establishing provisions and requirements for local agencies to conduct groundwater-level monitoring. Water Code Section 10933 requires that DWR identify the extent of groundwater-level monitoring within each of the groundwater basins identified by DWR and to prioritize those basins. The legislation directed DWR to consider all of the following criteria for basin prioritization:

1. Population overlying the basin;
2. Rate of current and projected growth of the population overlying the basin;
3. Number of public supply wells that draw from the basin;
4. Total number of wells that draw from the basin;
5. Irrigated acreage overlying the basin;
6. 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.

DWR prioritized the state's groundwater basins identified in Bulletin 118, Update 2003 into four categories: high, medium, low, and very low. DWR released the draft list in December 2013. The final list was published in June 2014 after public comments were received and considered. The June 2014 basin priority list, and information pertaining to the prioritization process completed in 2014, are available at: <https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization>.



Vineyard in the Paso Robles area



Vineyard in Kern County

GROUNDWATER BASIN PRIORITY AND THE CALIFORNIA STATEWIDE GROUNDWATER ELEVATION MONITORING (CASGEM) PROGRAM

In 2009, Senate Bill X7-6 added provisions for groundwater monitoring to the California Water Code (Section 10920 et seq.). The bill authorized DWR to establish permanent, locally managed, groundwater-elevation monitoring and reporting for all groundwater basins identified in Bulletin 118.

DWR established the CASGEM online system in 2011 as the means for local agencies to submit groundwater elevation information and to provide for public access to that information. CASGEM Program participation is essentially required for high- and medium-priority basins under Executive Order B-29-15.

More information on the CASGEM Program can be found at: <https://water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM/>

Groundwater Basin Prioritization under the Sustainable Groundwater Management Act

In 2014, Water Code Section 10933(b)(8) was amended adding adverse impacts on local habitat and local streamflows to the list of factors to be used for the prioritization of California's groundwater basins.

SGMA requires that, by January 31, 2015, DWR establish an initial priority of the state's groundwater basins using the amended list of prioritization factors. The act further requires DWR to reassess the priority of the state's groundwater basins any time the boundaries of basins defined in Bulletin 118 are modified (Water Code Section 10722.4).

Initial Prioritization

DWR determined that information relating to adverse impacts on local habitat and streamflows from groundwater extractions was not readily available to allow the reprioritization of groundwater basins by January 31, 2015. As a result, the June 2014 basin prioritization was adopted by DWR as the initial basin priority for the purposes of SGMA.

APPROACH

Following the completion of the groundwater basin boundary modification effort on October 18, 2016, DWR began a reassessment of the priority of the state's groundwater basins in accordance with Water Code Section 10722.4.

NOTICE

The reassessment of the prioritization of California's groundwater basins was still underway when this interim update was published in 2016. This update will be amended in 2017 to include the approach for, and results of, the basin reprioritization upon completion of that effort.

The basin priority update process will include public meetings and workshops to solicit input. More information about the reprioritization of California's groundwater basins is available at: <https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization>.



Windmill and storage tank in Cuyama Valley

Bulletin 118—Comprehensive Update 2020

The most recent comprehensive update of Bulletin 118 was published in 2003. Since that time, much has changed in relation to water management in California, including the ongoing drought which began in 2012, and passage of SGMA in 2014.

Water Code Section 12924 requires DWR to update Bulletin 118 in years ending in “5 and 0.” The California Water Action Plan also directs DWR to update Bulletin 118 (www.resources.ca.gov/california_water_action_plan/). The next comprehensive update of Bulletin 118 is scheduled for 2020.

The 2020 comprehensive update will build on previous Bulletin 118 updates and other DWR groundwater-related publications. Reports by various federal, State and local agencies, including groundwater sustainability plans and related publications by groundwater sustainability agencies, will serve as an important source of information for the update. Table 4 provides a general summary of content planned for the 2020 update.

Efforts to develop the 2020 comprehensive update of Bulletin 118 are scheduled to begin in 2017. DWR will coordinate the development of the 2020 update with other federal, State, and local agencies, and will hold a series of public workshops to provide information about the development effort and receive public input.



A vineyard drip irrigation system supplied by groundwater

TABLE 4 – Summary of Planned Content for Bulletin 118, Update 2020

<p style="text-align: center;">Updated information on the occurrence and characteristics of groundwater in California</p>
<ul style="list-style-type: none"> ✓ Groundwater basin boundaries, including information provided in this interim update and any subsequent basin boundary modifications. ✓ Hydrologic and geologic characteristics of the state’s groundwater basins. ✓ Information on groundwater quality conditions, including naturally occurring contaminants and impacts related to anthropogenic chemicals, sea water intrusion, and salinity accretion.
<p style="text-align: center;">Updated Information on Groundwater Management and Related Topics</p>
<ul style="list-style-type: none"> ✓ Status of Sustainable Groundwater Management Act (SGMA) implementation efforts and an assessment of progress toward achieving the sustainable management of groundwater, including case studies. ✓ Status of groundwater management efforts for areas not covered by SGMA, such as adjudicated groundwater basins. ✓ Groundwater use and managed recharge. ✓ Groundwater level conditions, including impacts related to drought. ✓ The occurrence and effects of groundwater overdraft, including updated information on land subsidence. ✓ Interaction of groundwater and surface water and related impacts. ✓ Groundwater dependent ecosystems. ✓ Projected impacts of climate change on groundwater resources and related management considerations. ✓ Groundwater monitoring efforts and data management systems. ✓ Updated groundwater basin priority determinations. ✓ New groundwater laws and regulatory requirements.
<p style="text-align: center;">Opportunities for the Future</p>
<ul style="list-style-type: none"> ✓ Recommendations for eliminating knowledge and technology gaps that impede proper understanding and the sustainable management of California’s groundwater. ✓ Groundwater management recommendations, including legislation. ✓ Recommendations for Bulletin 118, Update 2025.

“DWR will coordinate the development of the 2020 update with other federal, State and local agencies . . .”

Appendix A

**Summary of 2016
Groundwater
Basin Boundary
Modification Requests**

TABLE A-1 – Summary of 2016 Groundwater Basins Boundary Modification Requests^a

Basin/Subbasin (2003 Basin Numbers and Designations)	Requesting Agency	Requested Modification Type(s)	Decision^b
1-2.01 Klamath River Valley – Tule Lake	Tulelake Irrigation District	Scientific	Approved
2-9.01 Santa Clara Valley – Niles Cone 2-9.04 Santa Clara Valley – East Bay Plain	Alameda County Water District	Jurisdictional	Approved
3-1 Soquel Valley 3-2 Pajaro Valley 3-21 Santa Cruz Purisima Formation 3-26 West Santa Cruz Terrace	Soquel-Aptos Groundwater Management Committee	Scientific & Jurisdictional	Approved
3-2 Pajaro Valley 3-4.01 Salinas Valley – 180/400-Foot Aquifer 3-4.09 Salinas Valley – Langley Area 3-21 Santa Cruz Purisima Formation	Pajaro Valley Water Management Agency	Jurisdictional	Approved
3-3.01 Gilroy-Hollister Valley— Llagas Area	Santa Clara Valley Water District	Scientific	Approved
3-4.06 Salinas Valley – Paso Robles Area	Heritage Ranch Community Service District	Scientific	Denied
3-4.06 Salinas Valley – Paso Robles Area	Monterey County Water Resources Agency	Jurisdictional	Denied
3-4.06 Salinas Valley – Paso Robles Area	Templeton Community Services District	Scientific	Approved
3-4.10 Salinas Valley – Corral De Tierra Area 3-4.08 Salinas Valley – Seaside Area	Monterey Peninsula Water Management District	Scientific	Approved
3-8 Los Osos Valley	San Luis Obispo County	Scientific	Denied
3-13 Cuyama Valley	Santa Barbara County Water Agency	Scientific	Denied
3-14 San Antonio Creek Valley	Santa Barbara County Water Agency	Scientific & Jurisdictional	Approved
3-18 Carpinteria 3-49 Montecito	Carpinteria Valley Water District	Scientific	Denied
3-21 Santa Cruz Purisima Formation 3-27 Scotts Valley 3-50 Felton Area	Scotts Valley Water District	Scientific & Jurisdictional	Approved
3-53 Foothill	City of Santa Barbara	Scientific	Approved
4-2 Ojai Valley	Ojai Basin Groundwater Management Agency	Scientific	Approved
4-3.01 Ventura River Valley – Upper Ventura River	Ventura River Water District	Scientific	Approved
4-4.02 Santa Clara River Valley – Oxnard 4-6 Pleasant Valley 4-8 Las Posas Valley	Fox Canyon Groundwater Management Agency	Scientific & Jurisdictional	Approved
4-4.07 Santa Clara River Valley – Santa Clara River Valley East	Castaic Lake Water Agency	Scientific	Approved

TABLE A-1 – Summary of 2016 Groundwater Basins Boundary Modification Requests^a (continued)

Basin/Subbasin (2003 Basin Numbers and Designations)	Requesting Agency	Requested Modification Type(s)	Decision ^b
5-4 Big Valley	Lassen County	Scientific	Denied
5-21.51 Sacramento Valley – Corning 5-21.52 Sacramento Valley – Colusa	Tehama County Flood Control & Water Conservation District	Jurisdictional	Approved
5-21.52 Sacramento Valley – Colusa 5-21.66 Sacramento Valley – Solano 5-21.67 Sacramento Valley – Yolo 5-21.68 Sacramento Valley – Capay Valley	Yolo County Flood Control & Water Conservation District	Jurisdictional	Approved
5-21.60 Sacramento Valley – North Yuba	Yuba County Water Agency	Other	Approved
5-21.61 Sacramento Valley – South Yuba 5-21.64 Sacramento Valley – North American	Placer County	Jurisdictional	Approved
5-21.65 Sacramento Valley – South American 5-22.16 San Joaquin Valley – Cosumnes	Omochumne-Hartnell Water District	Scientific & Jurisdictional	Denied
5-22.01 San Joaquin Valley – Eastern San Joaquin 5-22.16 San Joaquin Valley – Cosumnes	Eastern San Joaquin County Groundwater Basin Authority	Jurisdictional	Approved
5-22.05 San Joaquin Valley – Chowchilla	Chowchilla Water District	Jurisdictional	Approved
5-22.05 San Joaquin Valley – Chowchilla 5-22.06 San Joaquin Valley – Madera	New Stone Water District	Jurisdictional	Approved
5-22.06 San Joaquin Valley – Madera 5-22.07 San Joaquin Valley – Delta-Mendota	Aliso Water District	Jurisdictional	Approved
5-22.06 San Joaquin Valley – Madera 5-22.07 San Joaquin Valley – Delta-Mendota 5-22.08 San Joaquin Valley – Kings 5-22.09 San Joaquin Valley - Westside 5-22.15 San Joaquin Valley - Tracy	San Luis and Delta-Mendota Water Authority	Jurisdictional	Approved
5-22.08 San Joaquin Valley – Kings	Kings River Conservation District	Jurisdictional	Approved
5-22.09 San Joaquin Valley - Westside	Westlands Water District	Jurisdictional	Approved
5-22.09 San Joaquin Valley – Westside 5-22.10 San Joaquin Valley – Pleasant Valley	Pleasant Valley Water District	Scientific & Jurisdictional	Approved
5-22.10 San Joaquin Valley – Pleasant Valley 5-22.14 San Joaquin Valley – Kern County	Devils Den Water District	Jurisdictional	Approved
5-22.11 San Joaquin Valley – Kaweah 5-22.12 San Joaquin Valley – Tulare Lake	Corcoran Irrigation District	Jurisdictional	Approved
5-22.12 San Joaquin Valley – Tulare Lake	Kings River Conservation District	Jurisdictional	Approved
5-22.12 San Joaquin Valley – Tulare Lake	Tulare Lake Basin Water Storage District	Jurisdictional	Approved
5-22.13 San Joaquin Valley – Tule 5-22.14 San Joaquin Valley – Kern County	Delano-Earlimart Irrigation District	Jurisdictional	Approved

TABLE A-1 – Summary of 2016 Groundwater Basins Boundary Modification Requests^a (continued)

Basin/Subbasin (2003 Basin Numbers and Designations)	Requesting Agency	Requested Modification Type(s)	Decision ^b
5-22.14 San Joaquin Valley – Kern County	Olcese Water District	Scientific	Denied
5-22.14 San Joaquin Valley – Kern County	Tejon-Castac Water District	Scientific	Approved
5-22.15 San Joaquin Valley – Tracy	City of Brentwood	Scientific and Jurisdictional	Denied
6-12 Owens Valley	Inyo County Water Department	Scientific	Denied
7-21.01 Coachella Valley – Indio	Mission Springs Water District	Scientific	Incomplete (denied)
7-24 Borrego Valley	Borrego Water District	Scientific	Approved
8-1 Coastal Plain of Orange County	City of La Habra	Scientific & Jurisdictional	Incomplete (denied)
8-1 Coastal Plain of Orange County	Orange County Water District	Scientific	Approved
8-2.01 Upper Santa Ana Valley – Chino	Inland Empire Utilities Agency	Scientific & Jurisdictional	Approved
8-2.03 Upper Santa Ana Valley – Riverside-Arlington	Western Municipal Water District of Riverside	Jurisdictional	Denied
8-2.03 Upper Santa Ana Valley – Riverside-Arlington 8-2.04 Upper Santa Ana Valley – Rialto-Colton 8-2.06 Upper Santa Ana Valley – Bunker Hill 8-2.07 Upper Santa Ana Valley – Yucaipa	San Bernardino Valley Municipal Water District	Jurisdictional	Approved
8-2.08 Upper Santa Ana Valley – San Timoteo	Yucaipa Valley Water District	Jurisdictional	Incomplete (denied)
8-2.09 Upper Santa Ana Valley – Temescal 8-4 Elsinore	City Of Corona	Scientific & Jurisdictional	Approved
8-5 San Jacinto	Eastern Municipal Water District	Scientific	Approved
9-7 San Luis Rey Valley	City of Oceanside	Scientific & Jurisdictional	Denied
9-17 Sweetwater Valley 9-18 Otay Valley 9-19 Tijuana Basin	City of San Diego	Scientific	Approved

NOTES

a Additional information about the boundary modification requests is available at: <https://water.ca.gov/Programs/Groundwater-Management/Basin-Boundary-Modifications>

b Some requests were approved in part, or as amended/changed.

Appendix B

Groundwater Basins and Subbasins (2016)

FIGURE B-1 – California Groundwater Basins and Subbasins and DWR Hydrologic Regions



FIGURE B-2 – California Groundwater Basins/Subbasins Numbering System

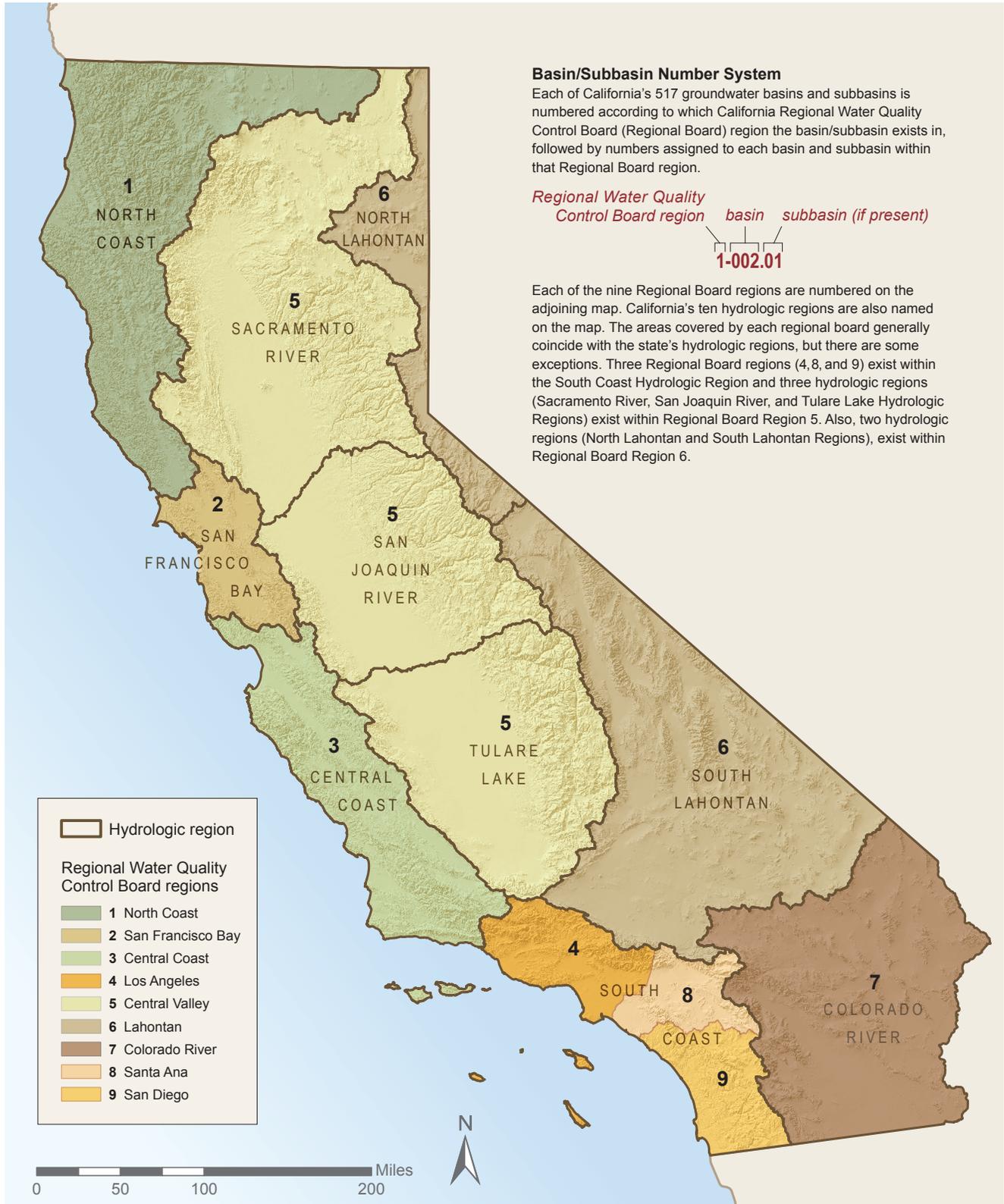


FIGURE B-3 – Groundwater Basins and Subbasins within the North Coast Hydrologic Region



FIGURE B-4 – Groundwater Basins and Subbasins within the San Francisco Bay Hydrologic Region



FIGURE B-5 – Groundwater Basins and Subbasins within the Central Coast Hydrologic Region

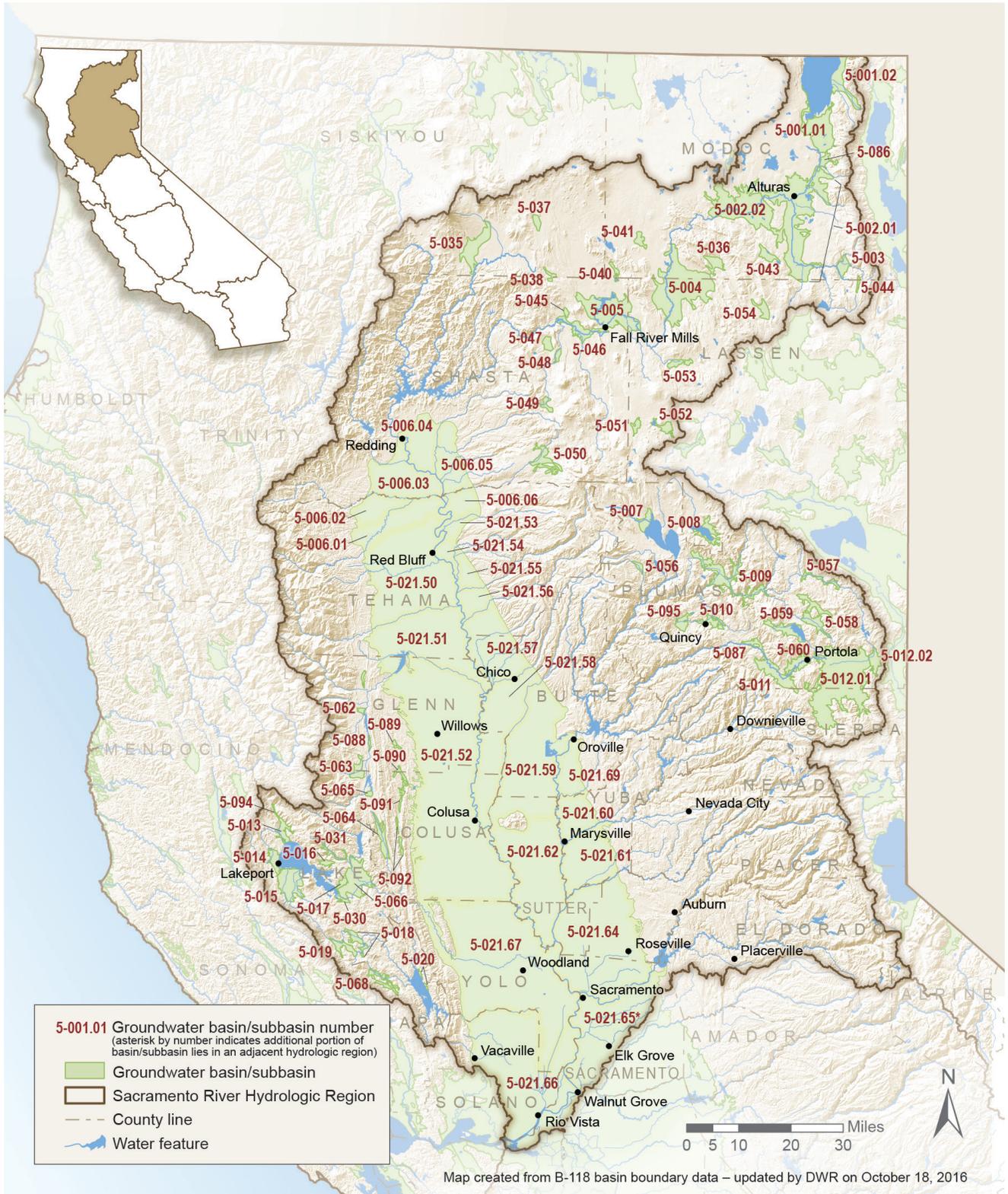


Map created from B-118 basin boundary data – updated by DWR on October 18, 2016

FIGURE B-6 – Groundwater Basins and Subbasins within the South Coast Hydrologic Region



FIGURE B-7 – Groundwater Basins and Subbasins within the Sacramento River Hydrologic Region



Prepared by California Department of Water Resources for *Bulletin 118, Interim Update 2016*.

FIGURE B-8 – Groundwater Basins and Subbasins within the San Joaquin River Hydrologic Region



FIGURE B-9 – Groundwater Basins and Subbasins within the Tulare Lake Hydrologic Region



FIGURE B-10 – Groundwater Basins and Subbasins within the North Lahontan Hydrologic Region

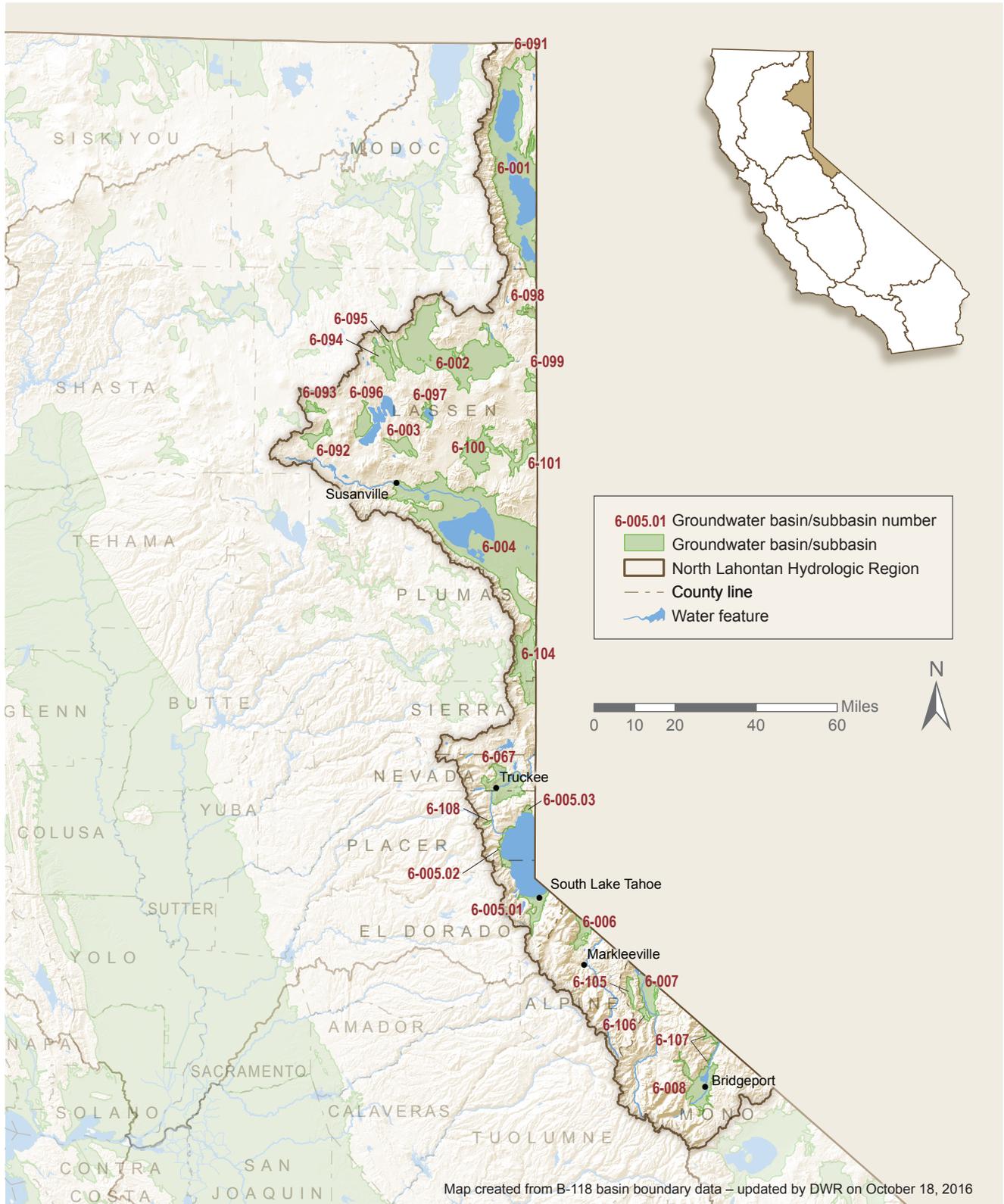


FIGURE B-11 – Groundwater Basins and Subbasins within the South Lahontan Hydrologic Region

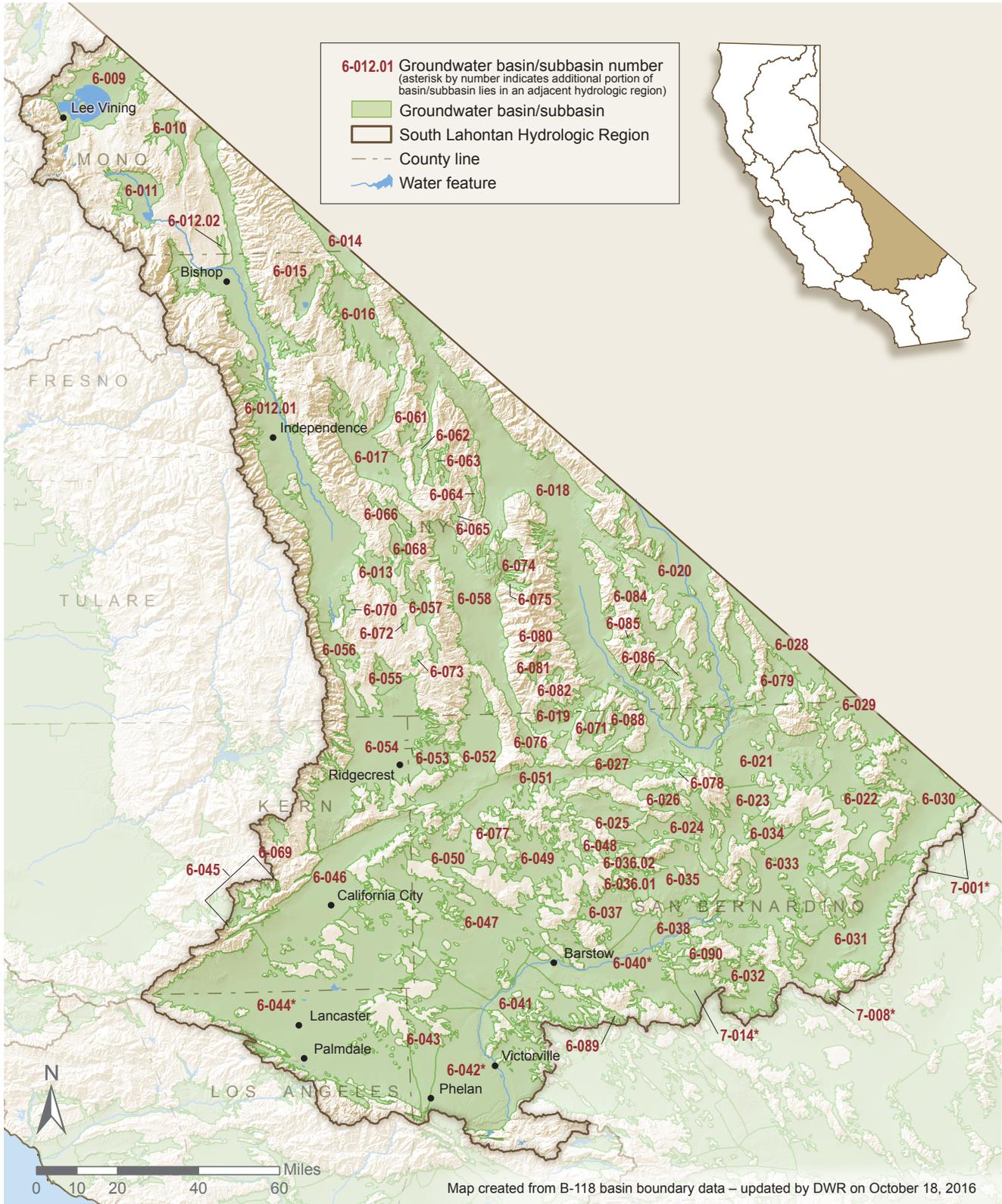


FIGURE B-12 – Groundwater Basins and Subbasins within the Colorado River Hydrologic Region





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P.O. Box 942836
Sacramento, CA 94236-0001
(916) 653-1097



CALIFORNIA DEPARTMENT OF WATER RESOURCES

1416 NINTH STREET

P.O. BOX 94236-0001

SACRAMENTO, CA 94236-0001