

## California Groundwater Units



Data Series 796



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By Tyler D. Johnson and Kenneth Belitz

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**U.S. Department of the Interior**  
**U.S. Geological Survey**

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## Conversion Factors

SI to Inch/Pound

Multiply	By	To obtain
Length		
meter (m)	3.281	foot (ft)
meter (m)	1.094	yard (yd)
kilometer (km)	0.6214	mile (mi)
kilometer (km)	0.5400	mile, nautical (nmi)
Area		
square kilometer (km <sup>2</sup> )	247.1	acre
square kilometer (km <sup>2</sup> )	0.3861	square mile (mi <sup>2</sup> )

## **Abbreviations and Acronyms**

DEM	Digital Elevation Model
CDWR	California Department of Water Resources
GAMA	Groundwater Ambient Monitoring and Assessment Program
Gb	Groundwater basin
GU	Groundwater Unit
Hgb	Highland area – Groundwater-basin based
Hp	Highland area – Province-based
ID	Identification number
USGS	U.S. Geological Survey

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## Abstract

The California Groundwater Units dataset classifies and delineates areas within the State of California into one of three groundwater-based polygon units: (1) those areas previously defined as alluvial groundwater basins or subbasins, (2) highland areas that are adjacent to and topographically upgradient of groundwater basins, and (3) highland areas not associated with a groundwater basin, only a hydrogeologic province. In total, 938 Groundwater Units are represented. The Groundwater Units dataset relates existing groundwater basins with their newly delineated highland areas which can be used in subsequent hydrologic studies. The methods used to delineate groundwater-basin-associated highland areas are similar to those used to delineate a contributing area (such as for a lake or water body); the difference is that highland areas are constrained to the immediately surrounding upslope (upstream) area. Upslope basins have their own delineated highland. A geoprocessing tool was created to facilitate delineation of highland areas for groundwater basins and subbasins and is available for download.

## Introduction

The California Groundwater Units dataset is a digital geospatial representation of areas within the State of California that have been classified and delineated into one of three groundwater-based polygon units: (1) those areas defined as alluvial groundwater basins or subbasins (Gb), initially on the basis of California Department of Water Resources (CDWR) Bulletin 118 (California Department of Water Resources, 2002); (2) highland areas that are adjacent to and topographically upgradient of groundwater basins (Hgb); and (3) highland areas associated with the hydrogeologic province they are within (Hp) instead of a groundwater basin. Four hundred and sixty-three (463) existing groundwater basins (some were termed “subbasins” by the CDWR) were

identified, of which 453 have an associated highland area. Ten groundwater basins did not have an associated highland area delineated because the basin was either surrounded by other groundwater basins or adjacent to the ocean. In addition to the 453 highland areas, 22 highland areas not topographically upgradient of groundwater basins previously defined by the CDWR are instead associated with the hydrogeologic province they are located within (as defined in Johnson and Belitz, 2003). In total, 938 Groundwater Units are represented ([table 1](#)).

The highland areas that were associated with groundwater basins (453) were delineated on the basis of the surficial contributing area (watershed) immediately adjacent to and upstream of each groundwater basin. The method of delineation is comparable to that used for delineating the contributing area for a lake or water body. Highland areas are not intended to represent the entire surficial contributing area for a groundwater basin, however, because adjacent upslope (upstream) groundwater basins (and their surficial contributing areas) are not included in the delineation of highland areas.

A custom geoprocessing tool, the Highland tool, was created to automate the highland delineation process and is provided for download (appendix). This tool can be used to delineate a highland area if a flow-direction grid (defined in the Methodology and Discussion section) and two or more groundwater basin polygons are provided. The Highland tool is not designed to identify contributing areas; rather, it is designed to identify the local highlands adjacent to and upslope (upstream) of a groundwater basin.

The highland areas that were associated with a hydrogeologic province (22) consisted of those remaining portions of the State that did not have any previously defined groundwater basin located within them, and therefore did not have an associated groundwater-based highland area. These highland areas were assigned the province they were located within and were not delineated by use of any tool. These areas were located at the margins of California that bordered neighboring States, Mexico, or the Pacific Ocean.

## Purpose and Scope

The Groundwater Unit spatial dataset was developed to classify and delineate all areas of California into three categories for use in subsequent hydrologic studies. Many studies and reports use the CDWR groundwater basin/subbasin boundaries as the basic study area extent, including the Groundwater Ambient Monitoring and Assessment (GAMA) Program of the California Priority Basin Project (Kulongoski and Belitz, 2004); however, this approach leaves areas of the State outside of groundwater basins unclassified. With the Groundwater Unit dataset, relating existing groundwater basins to their newly delineated highland areas is possible. Highland areas not associated with a groundwater basin were also identified such that all areas of California are now classified into one of three Groundwater Units (463 Gb, 453 Hgb, and 22 Hp).

The purposes of this report are to (1) document and describe the creation of the California Groundwater Unit geospatial dataset and (2) document and describe the Highland tool that was used to generate highland areas. The dataset and the tool are available for download along with this report. Areas outside of California were not considered for this report. Generated highland areas were restricted to the State boundaries, even though a highland could have extended into neighboring States and Mexico if allowed.

## Methodology and Discussion

Identification and delineation of the groundwater units involved three primary steps: (1) identify the predefined alluvial groundwater basins within the State; (2) delineate the associated highland areas of those basins, if any; and (3) assign the remaining highland portions of the State that are not associated with a California groundwater basin to a regional hydrogeologic province.

Step 1 was accomplished by identifying the alluvial groundwater basins established by the CDWR. Because the CDWR basin boundary dataset is periodically updated and because consistency with the GAMA Program is needed, the groundwater basins used by the GAMA Program (Belitz and others, 2003) generally were used for this report. For the GAMA Program, CDWR basin boundaries from 2002 (California Department of Water Resources, 2002) were used to identify groundwater basin units, except in the Central Valley hydrogeologic province, where the subbasin boundaries were used. The Redding area was the sole exception to this

rule in the Central Valley hydrogeologic province where the basin boundary was used instead of the subbasin boundary.

Groundwater basins identified in this report deviate from those used by Belitz and others (2003) in a few instances. Volcanic basins, previously defined as a type of groundwater basin, were not included because they have since been redefined by CDWR as “source-areas” (California Department of Water Resources, 2012). Another deviation occurred in the Salinas Valley, which was formerly identified as a single groundwater basin. For the purposes of distinguishing the highland areas of the Paso Robles area from those of the Monterey Bay and Forebay areas, subbasins were grouped to define three groundwater basin units. To reconstruct the Belitz and others (2003) basin designations, these three Groundwater Units may be recombined.

The name and the identification number (ID) for a groundwater basin was taken from either the CDWR basin or subbasin ID. The exception is in the Salinas Valley, where the groundwater subbasins were grouped. In this area, the Groundwater Units are identified as 3-4.1 and 3-4.2, with Paso Robles being its own preexisting stand-alone subbasin (3-4.06). (The CDWR basin ID for Salinas Valley is 3-4.) The names and IDs of the subbasins that were grouped to form 3-4.1 and 3-4.2 are listed in [table 1](#).

Step 2 was accomplished by developing a custom tool (hereinafter referred to as the Highland geoprocessing tool, described in the appendix) in Esri’s ArcGIS Model Builder software (Esri, 2011a) to automate the highland delineation process. The tool invokes a number of processes, but primarily uses the Watershed tool (Esri, 2011b) to create a highland polygon for any given groundwater basin using the basin boundary dataset described in step 1 and a flow-direction grid (described below) as inputs. The Highland tool delineates one highland area for each groundwater basin, as appropriate. At least two basins must be included in the input because the tool is designed to delineate a highland area with one or more upgradient (upslope) basins. The Watershed tool is sufficient for delineating a highland with no upgradient (upslope) basins. The Highland tool iterates through each basin one at a time, delineating the highland areas. Once highland areas were created for the appropriate basins, they were merged together into one geodataset in a separate process outside of the Highland tool.

One of the two datasets required for the Highland tool is a flow-direction grid. A flow-direction grid is a pixel-based dataset that identifies which direction a hypothetical drop of water would flow in each cell within a gridded extent. Every cell within the grid will therefore have a direction of flow assigned to it. The flow-direction grid is derived from



a digital elevation model (DEM). Therefore, a DEM must be sufficiently large to capture the entire extent. DEMs were downloaded from the National Hydrography Dataset Plus website (<http://www.horizon-systems.com/nhdplus/index.php>). Three DEMs were merged together (also known as “mosaicing”) to attain a single DEM that covered the entire State. Due to the large size of California, and consequently very large file size and processing times, the DEM was downscaled (using bilinear interpolation) (Esri, 2011c) from 30-meter (m) to 300-m grid cells.

The scale (pixel size) used to develop the dataset was partly determined by the size of the CDWR groundwater basin units. The smallest CDWR groundwater basin was less than 1.4 square kilometers (km<sup>2</sup>), therefore, a scale smaller than this was needed to properly delineate a contributing highland. Scale was also limited by the processing time and computational resources available to calculate a dataset on a statewide extent. Therefore, a 300-m pixel size was chosen as an acceptable balance. The smallest highland area delineated was less than 0.5 km<sup>2</sup>. Choosing an appropriate pixel size is important when delineating highland areas to avoid incomplete highland areas when the pixel size is too small or overly generalized highland areas when the pixel size is too large.

One downside of scaling a DEM to a larger cell size is that flat or low-lying areas, such as stream channels or lakes, can become generalized, resulting in situations where water no longer flows through the digital representation of the flow system, or flows in incorrect directions. In order to retain hydrologic continuity, a regional stream dataset (polyline) and a lakes dataset (polygon) (both acquired from Esri) were used to “burn” the hydrologic flow back into the DEM. This burning process effectively forces the flow to follow the stream channels and proceed through lakes by lowering the cell elevations in these areas by a specified amount. The cell values for lakes and streams were lowered by 20 m using a conditional expression with the Raster Calculator tool (Esri, 2011d). Lakes smaller than 1 km<sup>2</sup> were excluded, as well as all canals, ditches, and ice masses. Finally, any remaining “sinks,” or imperfections in the DEM that prevent flow out of the cell were “filled” by raising their elevation to the surrounding cell values using the “Fill” tool (Esri, 2011e). The Fill tool was allowed to fill sinks unrestrained. Once a hydrologically consistent DEM is built, a flow-direction grid can be created using the Flow Direction tool (Esri, 2011f).

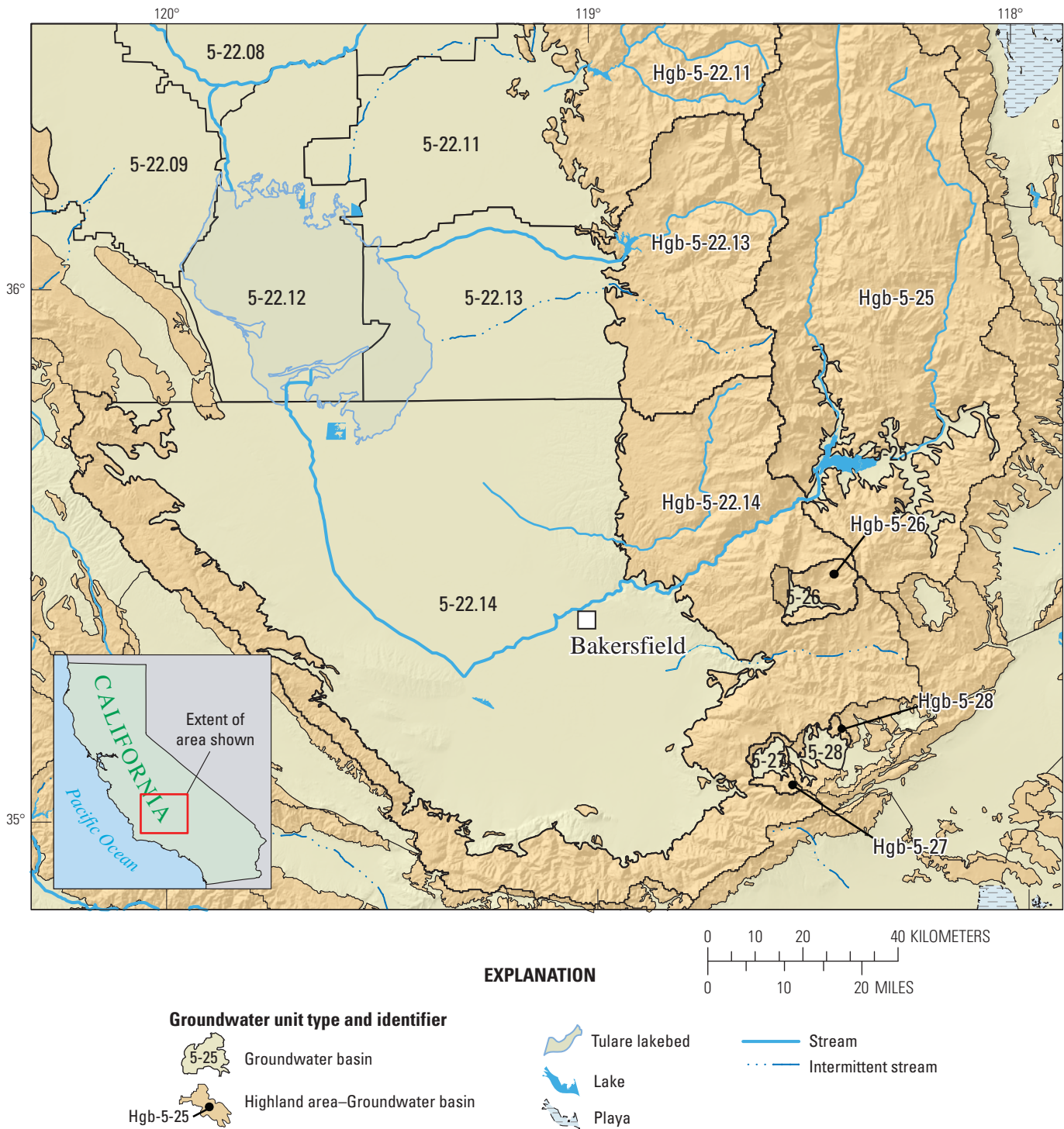
Many groundwater basins in the Central Valley hydrogeologic province are separated by a river: one groundwater basin along the right bank, and another along the left bank. Therefore, each groundwater basin has its own

highland area delineated for each side of the river, which can be desirable, especially when the geologic content of the two highland areas are different. An example of this is in the Central Valley hydrogeologic province where the San Joaquin and Sacramento Rivers bisect groundwater basins into left- and right-bank basins. The geology in the Sierra Nevada hydrogeologic province differs from the geology of the Northern and Southern Coast Ranges hydrogeologic provinces; therefore, dividing basins into western and eastern portions may be beneficial in identifying correlations between source rocks and water quality. Conversely, it may not be desirable to subdivide basins where the surrounding rocks are similar. In these cases, highland areas and basins can be grouped to create more generalized Groundwater Units.

Due to the nature of the pixel-based methodology, a river and all of its contributing upslope highland area could be focused into a single downstream pixel where it encounters two groundwater basins on either side of the river (pixel). However, this pixel can be assigned to only one groundwater basin. As a result, one groundwater basin could possibly receive all of the upslope contributing highland area rather than both basins receiving it. In these cases, it may be beneficial to combine the groundwater basins and, likewise, the corresponding highland areas.

By using the flow-direction grid and the 463 CDWR basin boundaries, 453 highland areas were delineated by using the Highland tool. The identifying number for a highland area is derived from using the corresponding groundwater basin ID and adding “Hgb-” for “Highland area – Groundwater Basin based” as a prefix. Similarly, the name for a highland area is derived by adding “Highlands” as a suffix to the name of the corresponding groundwater basin. For example, groundwater basin “6-12, Owens Valley” will have a corresponding highland area named “Hgb-6-12, Owens Valley Highlands.”

A number of groundwater basins and their highland areas are shown in [figure 1](#). Notice that the delineated highland area for groundwater basin 5-22.14 does not include the highland area delineated for groundwater basins 5-25, 5-26, 5-27, or 5-28. In a normal watershed delineation procedure, all of these groundwater basins and highlands would be included in the highland delineation for 5-22.14 because they all flow into it. Similarly, 5-22.14 would flow into both 5-22.12 and 5-22.13, and so on, up the San Joaquin Valley. Instead, the highland area for 5-22.14 contains only its immediate contributing area, stopping at any adjacent Groundwater Unit. Groundwater basin 5-22.12 does not have a highland area delineated because it is surrounded by other groundwater basins.



**Figure 1.** California Groundwater Units: southern San Joaquin Valley and southern Sierra Nevada shown. (For figure clarity, not all groundwater basins and highlands are labeled.)

Step 3 involved identifying and classifying the remaining areas of the State that were not part of either a groundwater basin or a groundwater basin highland. These areas were identified by using the California State boundary (California Department of Fish and Game, 2004) to enclose any areas that were not identified as belonging to a California groundwater basin or groundwater basin highland. These areas were at the coastline and at the borders of adjacent States and Mexico. The polygons were then assigned and named by using

the local hydrogeologic province and a local feature. The Groundwater Unit identification numbers for these areas are derived from the names of the 10 hydrogeologic provinces of California (fig. 2) and preceded with an “Hp” to indicate “Highland area – Province based.” Numbering is sequential from north to south, with the first number indicating the province and the number after the decimal place indicating the subarea. For example, Hp-1.4 is in the first province (Northern Coast Ranges) and is the fourth subarea (Point Reyes).



Shaded relief derived from U.S. Geological Survey  
National Elevation Dataset, 2006,  
Albers Equal Area Conic Projection

Provinces from Belitz and others, 2003

**Figure 2.** Hydrogeologic provinces of California.



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After merging the groundwater basins and highland areas into one geodataset, small sliver “artifact” polygons resulted. These occurred mostly because the highland areas, which were derived from a 300-m-pixel grid, did not match up with the detailed coastline of California, which is a polyline dataset.

These artifacts were removed wherever possible. [Figure 3](#) shows the three types of Groundwater Units delineated for the entire State. A digital geospatial representation of the Groundwater Units, which can be viewed in a GIS software package, is available for download at <http://pubs.usgs.gov/ds/796/>.



Figure 3. California Groundwater Units: Statewide map.

## Summary

Three types of Groundwater Units have been defined for the State of California: (1) alluvial groundwater basins, (2) highland areas associated with a groundwater basin, and (3) highland areas not associated with a groundwater basin. The established CDWR groundwater basin and subbasin boundaries formed the origin of the groundwater basin units. The highland areas were delineated by identifying topographically upgradient areas for each groundwater basin. To facilitate this process, a modified DEM and flow-direction grid were created for the State, and a custom tool was built to automate the delineation process. Areas along the edges of the State that did not belong to a groundwater basin or a delineated highland were classified as a province-based highland area. The Groundwater Units dataset and the Highland tool are available for download along with this report at <http://pubs.usgs.gov/ds/796/>.

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## 8 California Groundwater Units

**Table 1.** California Groundwater Units.

[GU ID is the unique groundwater unit identifier. GU name is the groundwater unit name. GU names in uppercase are the same names as those used in CDWR 2002 groundwater basin map publication except for the word “HIGHLANDS” when appended. GU type identifies one of three types of groundwater units: Groundwater basin, Highland area - Gb (groundwater-basin-based highland), or Highland area - Province (province-based highland). Related Gb references the basin-ID or subbasin-ID in the CDWR 2002 groundwater basin map publication. CDWR, California Department of Water Resources; km<sup>2</sup>, square kilometer; —, no data]

GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
1-1	SMITH RIVER PLAIN	Groundwater Basin	163.8	1-1
1-10	EEL RIVER VALLEY	Groundwater Basin	298.4	1-10
1-11	COVELO ROUND VALLEY	Groundwater Basin	66.4	1-11
1-12	LAYTONVILLE VALLEY	Groundwater Basin	20.3	1-12
1-13	LITTLE LAKE VALLEY	Groundwater Basin	40.6	1-13
1-14	LOWER KLAMATH RIVER VALLEY	Groundwater Basin	28.4	1-14
1-15	HAPPY CAMP TOWN AREA	Groundwater Basin	11.2	1-15
1-16	SEIAD VALLEY	Groundwater Basin	9.1	1-16
1-17	BRAY TOWN AREA	Groundwater Basin	32.5	1-17
1-18	RED ROCK VALLEY	Groundwater Basin	36.4	1-18
1-19	ANDERSON VALLEY	Groundwater Basin	20.1	1-19
1-2	KLAMATH RIVER VALLEY	Groundwater Basin	652.9	1-2
1-20	GARCIA RIVER VALLEY	Groundwater Basin	9.1	1-20
1-21	FORT BRAGG TERRACE AREA	Groundwater Basin	97.5	1-21
1-22	FAIRCHILD SWAMP VALLEY	Groundwater Basin	13.3	1-22
1-25	PRAIRIE CREEK AREA	Groundwater Basin	81.0	1-25
1-26	REDWOOD CREEK AREA	Groundwater Basin	8.1	1-26
1-27	BIG LAGOON AREA	Groundwater Basin	54.0	1-27
1-28	MATTOLE RIVER VALLEY	Groundwater Basin	12.8	1-28
1-29	HONEYDEW TOWN AREA	Groundwater Basin	9.6	1-29
1-3	BUTTE VALLEY	Groundwater Basin	322.7	1-3
1-30	PEPPERWOOD TOWN AREA	Groundwater Basin	25.5	1-30
1-31	WEOTT TOWN AREA	Groundwater Basin	14.8	1-31
1-32	GARBerville TOWN AREA	Groundwater Basin	8.6	1-32
1-33	LARABEE VALLEY	Groundwater Basin	3.9	1-33
1-34	DINSMORES TOWN AREA	Groundwater Basin	9.2	1-34
1-35	HYAMPOM VALLEY	Groundwater Basin	5.5	1-35
1-36	HETTENSHAW VALLEY	Groundwater Basin	3.4	1-36
1-37	COTTONEVA CREEK VALLEY	Groundwater Basin	3.1	1-37
1-38	LOWER LAYTONVILLE VALLEY	Groundwater Basin	8.7	1-38
1-39	BRANSCOMB TOWN AREA	Groundwater Basin	5.6	1-39
1-4	SHASTA VALLEY	Groundwater Basin	792.9	1-4
1-40	TEN MILE RIVER VALLEY	Groundwater Basin	6.0	1-40
1-41	LITTLE VALLEY	Groundwater Basin	3.3	1-41
1-42	SHERWOOD VALLEY	Groundwater Basin	4.7	1-42
1-43	WILLIAMS VALLEY	Groundwater Basin	6.7	1-43
1-44	EDEN VALLEY	Groundwater Basin	5.6	1-44
1-45	BIG RIVER VALLEY	Groundwater Basin	6.8	1-45

**Table 1.** California Groundwater Units.—Continued

[GU ID is the unique groundwater unit identifier. GU name is the groundwater unit name. GU names in uppercase are the same names as those used in CDWR 2002 groundwater basin map publication except for the word “HIGHLANDS” when appended. GU type identifies one of three types of groundwater units: Groundwater basin, Highland area - Gb (groundwater-basin-based highland), or Highland area - Province (province-based highland). Related Gb references the basin-ID or subbasin-ID in the CDWR 2002 groundwater basin map publication. CDWR, California Department of Water Resources; km<sup>2</sup>, square kilometer; —, no data]

GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
1-46	NAVARRO RIVER VALLEY	Groundwater Basin	3.1	1-46
1-48	GRAVELLY VALLEY	Groundwater Basin	12.0	1-48
1-49	ANNAPOLIS OHLSON RANCH FM HIGHLANDS	Groundwater Basin	35.0	1-49
1-5	SCOTT RIVER VALLEY	Groundwater Basin	258.3	1-5
1-50	KNIGHTS VALLEY	Groundwater Basin	16.5	1-50
1-51	POTTER VALLEY	Groundwater Basin	33.4	1-51
1-52	UKIAH VALLEY	Groundwater Basin	151.9	1-52
1-53	SANEL VALLEY	Groundwater Basin	22.6	1-53
1-54	ALEXANDER VALLEY	Groundwater Basin	125.5	1-54
1-55	SANTA ROSA VALLEY	Groundwater Basin	409.1	1-55
1-56	McDOWELL VALLEY	Groundwater Basin	6.0	1-56
1-57	BODEGA BAY AREA	Groundwater Basin	10.8	1-57
1-59	WILSON GROVE FORMATION HIGHLANDS	Groundwater Basin	349.9	1-59
1-6	HAYFORK VALLEY	Groundwater Basin	13.3	1-6
1-60	LOWER RUSSIAN RIVER VALLEY	Groundwater Basin	26.9	1-60
1-61	FORT ROSS TERRACE DEPOSITS	Groundwater Basin	34.4	1-61
1-62	WILSON POINT AREA	Groundwater Basin	2.9	1-62
1-7	HOOPA VALLEY	Groundwater Basin	15.8	1-7
1-8	MAD RIVER VALLEY	Groundwater Basin	160.2	1-8
1-9	EUREKA PLAIN	Groundwater Basin	151.5	1-9
2-1	PETALUMA VALLEY	Groundwater Basin	186.5	2-1
2-10	LIVERMORE VALLEY	Groundwater Basin	281.5	2-10
2-11	SUNOL VALLEY	Groundwater Basin	67.3	2-11
2-19	KENWOOD VALLEY	Groundwater Basin	20.8	2-19
2-2	NAPA-SONOMA VALLEY	Groundwater Basin	530.4	2-2
2-22	HALF MOON BAY TERRACE	Groundwater Basin	37.2	2-22
2-24	SAN GREGORIO VALLEY	Groundwater Basin	4.3	2-24
2-26	PESCADERO VALLEY	Groundwater Basin	11.8	2-26
2-27	SAND POINT AREA	Groundwater Basin	5.7	2-27
2-28	ROSS VALLEY	Groundwater Basin	7.1	2-28
2-29	SAN RAFAEL VALLEY	Groundwater Basin	3.5	2-29
2-3	SUISUN-FAIRFIELD VALLEY	Groundwater Basin	540.6	2-3
2-30	NOVATO VALLEY	Groundwater Basin	83.1	2-30
2-31	ARROYO DEL HAMBRE VALLEY	Groundwater Basin	3.2	2-31
2-32	VISITACION VALLEY	Groundwater Basin	23.6	2-32
2-33	ISLAIS VALLEY	Groundwater Basin	24.0	2-33
2-35	WESTSIDE	Groundwater Basin	102.8	2-35
2-36	SAN PEDRO VALLEY	Groundwater Basin	2.8	2-36



## 10 California Groundwater Units

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
2-37	SOUTH SAN FRANCISCO	Groundwater Basin	8.8	2-37
2-38	LOBOS	Groundwater Basin	9.6	2-38
2-39	MARINA	Groundwater Basin	8.9	2-39
2-4	PITTSBURG PLAIN	Groundwater Basin	47.0	2-4
2-40	DOWNTOWN	Groundwater Basin	30.9	2-40
2-5	CLAYTON VALLEY	Groundwater Basin	72.2	2-5
2-6	YGNACIO VALLEY	Groundwater Basin	62.6	2-6
2-7	SAN RAMON VALLEY	Groundwater Basin	28.6	2-7
2-8	CASTRO VALLEY	Groundwater Basin	7.4	2-8
2-9	SANTA CLARA VALLEY	Groundwater Basin	1,470.5	2-9
3-1	SOQUEL VALLEY	Groundwater Basin	10.2	3-1
3-12	SANTA MARIA	Groundwater Basin	745.3	3-12
3-13	CUYAMA VALLEY	Groundwater Basin	978.2	3-13
3-14	SAN ANTONIO CREEK VALLEY	Groundwater Basin	331.4	3-14
3-15	SANTA YNEZ RIVER VALLEY	Groundwater Basin	827.5	3-15
3-16	GOLETA	Groundwater Basin	37.3	3-16
3-17	SANTA BARBARA	Groundwater Basin	24.9	3-17
3-18	CARPINTERIA	Groundwater Basin	32.9	3-18
3-19	CARRIZO PLAIN	Groundwater Basin	852.4	3-19
3-2	PAJARO VALLEY	Groundwater Basin	356.6	3-2
3-20	ANO NUEVO AREA	Groundwater Basin	8.2	3-20
3-21	SANTA CRUZ PURISIMA FORMATION	Groundwater Basin	162.6	3-21
3-22	SANTA ANA VALLEY	Groundwater Basin	11.0	3-22
3-23	UPPER SANTA ANA VALLEY	Groundwater Basin	5.8	3-23
3-24	QUIEN SABE VALLEY	Groundwater Basin	19.0	3-24
3-25	TRES PINOS VALLEY	Groundwater Basin	13.7	3-25
3-26	WEST SANTA CRUZ TERRACE	Groundwater Basin	31.8	3-26
3-27	SCOTTS VALLEY	Groundwater Basin	3.1	3-27
3-28	SAN BENITO RIVER VALLEY	Groundwater Basin	98.0	3-28
3-29	DRY LAKE VALLEY	Groundwater Basin	5.7	3-29
3-3	GILROY-HOLLISTER VALLEY	Groundwater Basin	744.5	3-3
3-30	BITTER WATER VALLEY	Groundwater Basin	130.4	3-30
3-31	HERNANDEZ VALLEY	Groundwater Basin	11.6	3-31
3-32	PEACH TREE VALLEY	Groundwater Basin	39.6	3-32
3-33	SAN CARPOFORO VALLEY	Groundwater Basin	4.3	3-33
3-34	ARROYO DE LA CRUZ VALLEY	Groundwater Basin	4.2	3-34
3-35	SAN SIMEON VALLEY	Groundwater Basin	2.3	3-35
3-36	SANTA ROSA VALLEY	Groundwater Basin	14.3	3-36



**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
3-37	VILLA VALLEY	Groundwater Basin	5.5	3-37
3-38	CAYUCOS VALLEY	Groundwater Basin	1.4	3-38
3-39	OLD VALLEY	Groundwater Basin	4.8	3-39
3-4.1	180/400 FOOT AQUIFER; EAST SIDE AQUIFER; SEASIDE AREA; LANGLEY AREA; CORRAL DE TIERRA AREA	Groundwater Basin	831.2	3-4.01; 3-4.02; 3-4.08; 3-4.09; 3-4.10
3-4.2	FOREBAY AQUIFER; UPPER VALLEY AQUIFER	Groundwater Basin	778.0	3-4.04; 3-4.05
3-4.06	PASO ROBLES AREA	Groundwater Basin	2,415.7	3-4.06
3-40	TORO VALLEY	Groundwater Basin	2.9	3-40
3-41	MORRO VALLEY	Groundwater Basin	2.6	3-41
3-42	CHORRO VALLEY	Groundwater Basin	6.3	3-42
3-43	RINCONADA VALLEY	Groundwater Basin	10.4	3-43
3-44	POZO VALLEY	Groundwater Basin	27.7	3-44
3-45	HUASNA VALLEY	Groundwater Basin	19.0	3-45
3-46	RAFAEL VALLEY	Groundwater Basin	12.1	3-46
3-47	BIG SPRING AREA	Groundwater Basin	29.6	3-47
3-49	MONTECITO	Groundwater Basin	25.4	3-49
3-5	CHOLAME VALLEY	Groundwater Basin	161.2	3-5
3-50	FELTON AREA	Groundwater Basin	4.7	3-50
3-51	MAJORS CREEK	Groundwater Basin	1.5	3-51
3-52	NEEDLE ROCK POINT	Groundwater Basin	1.9	3-52
3-53	FOOTHILL	Groundwater Basin	12.6	3-53
3-6	LOCKWOOD VALLEY	Groundwater Basin	242.6	3-6
3-7	CARMEL VALLEY	Groundwater Basin	20.9	3-7
3-8	LOS OSOS VALLEY	Groundwater Basin	28.3	3-8
3-9	SAN LUIS OBISPO VALLEY	Groundwater Basin	51.5	3-9
4-1	UPPER OJAI VALLEY	Groundwater Basin	15.4	4-1
4-10	CONEJO	Groundwater Basin	76.1	4-10
4-11	COASTAL PLAIN OF LOS ANGELES	Groundwater Basin	1,274.2	4-11
4-12	SAN FERNANDO VALLEY	Groundwater Basin	586.1	4-12
4-13	SAN GABRIEL VALLEY	Groundwater Basin	512.7	4-13
4-15	TIERRA REJADA	Groundwater Basin	18.6	4-15
4-16	HIDDEN VALLEY	Groundwater Basin	8.9	4-16
4-17	LOCKWOOD VALLEY	Groundwater Basin	88.2	4-17
4-18	HUNGRY VALLEY	Groundwater Basin	21.5	4-18
4-19	THOUSAND OAKS AREA	Groundwater Basin	12.6	4-19

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
4-2	OJAI VALLEY	Groundwater Basin	27.7	4-2
4-20	RUSSELL VALLEY	Groundwater Basin	12.5	4-20
4-22	MALIBU VALLEY	Groundwater Basin	2.5	4-22
4-23	RAYMOND	Groundwater Basin	106.0	4-23
4-3	VENTURA RIVER VALLEY	Groundwater Basin	51.5	4-3
4-4	SANTA CLARA RIVER VALLEY	Groundwater Basin	775.4	4-4
4-5	ACTON VALLEY	Groundwater Basin	33.5	4-5
4-6	PLEASANT VALLEY	Groundwater Basin	87.4	4-6
4-7	ARROYO SANTA ROSA VALLEY	Groundwater Basin	15.1	4-7
4-8	LAS POSAS VALLEY	Groundwater Basin	170.9	4-8
4-9	SIMI VALLEY	Groundwater Basin	49.2	4-9
5-1	GOOSE LAKE	Groundwater Basin	220.1	5-1
5-10	AMERICAN VALLEY	Groundwater Basin	27.5	5-10
5-11	MOHAWK VALLEY	Groundwater Basin	76.8	5-11
5-12	SIERRA VALLEY	Groundwater Basin	514.7	5-12
5-13	UPPER LAKE VALLEY	Groundwater Basin	29.4	5-13
5-14	SCOTTS VALLEY	Groundwater Basin	29.6	5-14
5-15	BIG VALLEY	Groundwater Basin	98.1	5-15
5-16	HIGH VALLEY	Groundwater Basin	9.5	5-16
5-17	BURNS VALLEY	Groundwater Basin	11.6	5-17
5-18	COYOTE VALLEY	Groundwater Basin	26.4	5-18
5-19	COLLAYOMI VALLEY	Groundwater Basin	26.3	5-19
5-2	ALTURAS AREA	Groundwater Basin	737.1	5-2
5-20	BERRYESSA VALLEY	Groundwater Basin	5.6	5-20
5-21.50	RED BLUFF	Groundwater Basin	1,079.3	5-21.50
5-21.51	CORNING	Groundwater Basin	832.1	5-21.51
5-21.52	COLUSA	Groundwater Basin	3,716.6	5-21.52
5-21.53	BEND	Groundwater Basin	84.0	5-21.53
5-21.54	ANTELOPE	Groundwater Basin	75.7	5-21.54
5-21.55	DYE CREEK	Groundwater Basin	112.2	5-21.55
5-21.56	LOS MOLINOS	Groundwater Basin	134.2	5-21.56
5-21.57	VINA	Groundwater Basin	504.5	5-21.57
5-21.58	WEST BUTTE	Groundwater Basin	734.8	5-21.58
5-21.59	EAST BUTTE	Groundwater Basin	1,074.2	5-21.59
5-21.60	NORTH YUBA	Groundwater Basin	417.6	5-21.60
5-21.61	SOUTH YUBA	Groundwater Basin	423.0	5-21.61
5-21.62	SUTTER	Groundwater Basin	531.6	5-21.62
5-21.63	WEST SUTTER	Groundwater Basin	416.9	5-21.63

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
5-21.64	NORTH AMERICAN	Groundwater Basin	1,377.1	5-21.64
5-21.65	SOUTH AMERICAN	Groundwater Basin	1,002.9	5-21.65
5-21.66	SOLANO	Groundwater Basin	1,720.1	5-21.66
5-21.67	YOLO	Groundwater Basin	913.9	5-21.67
5-21.68	CAPAY VALLEY	Groundwater Basin	101.1	5-21.68
5-22.01	EASTERN SAN JOAQUIN	Groundwater Basin	2,861.8	5-22.01
5-22.02	MODESTO	Groundwater Basin	997.5	5-22.02
5-22.03	TURLOCK	Groundwater Basin	1,404.6	5-22.03
5-22.04	MERCED	Groundwater Basin	1,987.2	5-22.04
5-22.05	CHOWCHILLA	Groundwater Basin	644.4	5-22.05
5-22.06	MADERA	Groundwater Basin	1,590.8	5-22.06
5-22.07	DELTA-MENDOTA	Groundwater Basin	3,021.3	5-22.07
5-22.08	KINGS	Groundwater Basin	3,949.0	5-22.08
5-22.09	WESTSIDE	Groundwater Basin	2,590.3	5-22.09
5-22.10	PLEASANT VALLEY	Groundwater Basin	589.5	5-22.10
5-22.11	KAWEAH	Groundwater Basin	1,802.6	5-22.11
5-22.12	TULARE LAKE	Groundwater Basin	2,119.9	5-22.12
5-22.13	TULE	Groundwater Basin	1,898.0	5-22.13
5-22.14	KERN COUNTY	Groundwater Basin	7,871.9	5-22.14
5-22.15	TRACY	Groundwater Basin	1,396.2	5-22.15
5-22.16	COSUMNES	Groundwater Basin	1,135.3	5-22.16
5-23	PANOCH VALLEY	Groundwater Basin	133.9	5-23
5-25	KERN RIVER VALLEY	Groundwater Basin	321.3	5-25
5-26	WALKER BASIN CREEK VALLEY	Groundwater Basin	31.0	5-26
5-27	CUMMINGS VALLEY	Groundwater Basin	40.5	5-27
5-28	TEHACHAPI VALLEY WEST	Groundwater Basin	72.7	5-28
5-29	CASTAC LAKE VALLEY	Groundwater Basin	14.4	5-29
5-3	JESS VALLEY	Groundwater Basin	27.1	5-3
5-30	LOWER LAKE VALLEY	Groundwater Basin	9.7	5-30
5-31	LONG VALLEY	Groundwater Basin	11.3	5-31
5-35	MCCLOUD AREA	Groundwater Basin	86.3	5-35
5-36	ROUND VALLEY	Groundwater Basin	29.4	5-36
5-37	TOAD WELL AREA	Groundwater Basin	13.6	5-37
5-38	PONDOSA TOWN AREA	Groundwater Basin	8.4	5-38
5-4	BIG VALLEY	Groundwater Basin	372.6	5-4
5-40	HOT SPRINGS VALLEY	Groundwater Basin	9.7	5-40
5-41	EGG LAKE VALLEY	Groundwater Basin	16.6	5-41
5-43	ROCK PRAIRIE VALLEY	Groundwater Basin	23.2	5-43

## 14 California Groundwater Units

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
5-44	LONG VALLEY	Groundwater Basin	4.4	5-44
5-45	CAYTON VALLEY	Groundwater Basin	5.3	5-45
5-46	LAKE BRITTON AREA	Groundwater Basin	56.9	5-46
5-47	GOOSE VALLEY	Groundwater Basin	17.0	5-47
5-48	BURNEY CREEK VALLEY	Groundwater Basin	9.5	5-48
5-49	DRY BURNEY CREEK VALLEY	Groundwater Basin	12.4	5-49
5-5	FALL RIVER VALLEY	Groundwater Basin	219.0	5-5
5-50	NORTH FORK BATTLE CREEK	Groundwater Basin	51.6	5-50
5-51	BUTTE CREEK VALLEY	Groundwater Basin	13.1	5-51
5-52	GRAYS VALLEY	Groundwater Basin	22.0	5-52
5-53	DIXIE VALLEY	Groundwater Basin	19.7	5-53
5-54	ASH VALLEY	Groundwater Basin	24.3	5-54
5-56	YELLOW CREEK VALLEY	Groundwater Basin	9.4	5-56
5-57	LAST CHANCE CREEK VALLEY	Groundwater Basin	18.8	5-57
5-58	CLOVER VALLEY	Groundwater Basin	67.9	5-58
5-59	GRIZZLY VALLEY	Groundwater Basin	54.4	5-59
5-6	REDDING AREA	Groundwater Basin	1,579.3	5-6
5-60	HUMBUG VALLEY	Groundwater Basin	40.4	5-60
5-61	CHROME TOWN AREA	Groundwater Basin	5.7	5-61
5-62	ELK CREEK AREA	Groundwater Basin	5.8	5-62
5-63	STONYFORD TOWN AREA	Groundwater Basin	26.1	5-63
5-64	BEAR VALLEY	Groundwater Basin	36.9	5-64
5-65	LITTLE INDIAN VALLEY	Groundwater Basin	5.1	5-65
5-66	CLEAR LAKE CACHE FORMATION	Groundwater Basin	120.4	5-66
5-68	POPE VALLEY	Groundwater Basin	29.1	5-68
5-69	YOSEMITE VALLEY	Groundwater Basin	30.2	5-69
5-7	LAKE ALMANOR VALLEY	Groundwater Basin	29.0	5-7
5-70	LOS BANOS CREEK VALLEY	Groundwater Basin	19.6	5-70
5-71	VALLECITOS CREEK VALLEY	Groundwater Basin	61.1	5-71
5-8	MOUNTAIN MEADOWS VALLEY	Groundwater Basin	33.0	5-8
5-82	CUDDY CANYON VALLEY	Groundwater Basin	13.4	5-82
5-83	CUDDY RANCH AREA	Groundwater Basin	17.0	5-83
5-84	CUDDY VALLEY	Groundwater Basin	14.0	5-84
5-85	MIL POTRERO AREA	Groundwater Basin	9.3	5-85
5-86	JOSEPH CREEK	Groundwater Basin	18.0	5-86
5-87	MIDDLE FORK FEATHER RIVER	Groundwater Basin	17.6	5-87
5-88	STONY GORGE RESERVOIR	Groundwater Basin	4.3	5-88
5-89	SQUAW FLAT	Groundwater Basin	5.2	5-89

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
5-9	INDIAN VALLEY	Groundwater Basin	119.0	5-9
5-90	FUNKS CREEK	Groundwater Basin	12.2	5-90
5-91	ANTELOPE CREEK	Groundwater Basin	8.3	5-91
5-92	BLANCHARD VALLEY	Groundwater Basin	9.0	5-92
5-93	NORTH FORK CACHE CREEK	Groundwater Basin	14.1	5-93
5-94	MIDDLE CREEK	Groundwater Basin	2.9	5-94
5-95	MEADOW VALLEY	Groundwater Basin	23.2	5-95
6-1	SURPRISE VALLEY	Groundwater Basin	924.0	6-1
6-10	ADOBE LAKE VALLEY	Groundwater Basin	161.3	6-10
6-100	SECRET VALLEY	Groundwater Basin	136.2	6-100
6-101	BULL FLAT	Groundwater Basin	73.4	6-101
6-104	LONG VALLEY	Groundwater Basin	189.4	6-104
6-105	SLINKARD VALLEY	Groundwater Basin	18.3	6-105
6-106	LITTLE ANTELOPE VALLEY	Groundwater Basin	10.1	6-106
6-107	SWEETWATER FLAT	Groundwater Basin	19.2	6-107
6-11	LONG VALLEY	Groundwater Basin	290.7	6-11
6-12	OWENS VALLEY	Groundwater Basin	2,675.0	6-12
6-13	BLACK SPRINGS VALLEY	Groundwater Basin	124.5	6-13
6-14	FISH LAKE VALLEY	Groundwater Basin	194.8	6-14
6-15	DEEP SPRINGS VALLEY	Groundwater Basin	121.1	6-15
6-16	EUREKA VALLEY	Groundwater Basin	521.1	6-16
6-17	SALINE VALLEY	Groundwater Basin	591.6	6-17
6-18	DEATH VALLEY	Groundwater Basin	3,725.2	6-18
6-19	WINGATE VALLEY	Groundwater Basin	288.5	6-19
6-2	MADELINE PLAINS	Groundwater Basin	631.7	6-2
6-20	MIDDLE AMARGOSA VALLEY	Groundwater Basin	1,577.2	6-20
6-21	LOWER KINGSTON VALLEY	Groundwater Basin	970.2	6-21
6-22	UPPER KINGSTON VALLEY	Groundwater Basin	715.3	6-22
6-23	RIGGS VALLEY	Groundwater Basin	354.2	6-23
6-24	RED PASS VALLEY	Groundwater Basin	389.8	6-24
6-25	BICYCLE VALLEY	Groundwater Basin	362.0	6-25
6-26	AVAWATZ VALLEY	Groundwater Basin	111.7	6-26
6-27	LEACH VALLEY	Groundwater Basin	247.6	6-27
6-28	PAHRUMP VALLEY	Groundwater Basin	376.0	6-28
6-29	MESQUITE VALLEY	Groundwater Basin	356.6	6-29
6-3	WILLOW CREEK VALLEY	Groundwater Basin	47.3	6-3
6-30	IVANPAH VALLEY	Groundwater Basin	801.2	6-30
6-31	KELSO VALLEY	Groundwater Basin	1,030.7	6-31

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
6-32	BROADWELL VALLEY	Groundwater Basin	371.8	6-32
6-33	SODA LAKE VALLEY	Groundwater Basin	1,538.0	6-33
6-34	SILVER LAKE VALLEY	Groundwater Basin	142.5	6-34
6-35	CRONISE VALLEY	Groundwater Basin	511.1	6-35
6-36	LANGFORD VALLEY	Groundwater Basin	120.6	6-36
6-37	COYOTE LAKE VALLEY	Groundwater Basin	356.5	6-37
6-38	CAVES CANYON VALLEY	Groundwater Basin	295.3	6-38
6-4	HONEY LAKE VALLEY	Groundwater Basin	1,260.9	6-4
6-40	LOWER MOJAVE RIVER VALLEY	Groundwater Basin	1,155.3	6-40
6-41	MIDDLE MOJAVE RIVER VALLEY	Groundwater Basin	855.2	6-41
6-42	UPPER MOJAVE RIVER VALLEY	Groundwater Basin	1,670.7	6-42
6-43	EL MIRAGE VALLEY	Groundwater Basin	307.1	6-43
6-44	ANTELOPE VALLEY	Groundwater Basin	4,088.4	6-44
6-45	TEHACHAPI VALLEY EAST	Groundwater Basin	97.0	6-45
6-46	FREMONT VALLEY	Groundwater Basin	1,356.6	6-46
6-47	HARPER VALLEY	Groundwater Basin	1,657.2	6-47
6-48	GOLDSTONE VALLEY	Groundwater Basin	113.7	6-48
6-49	SUPERIOR VALLEY	Groundwater Basin	486.9	6-49
6-5	TAHOE VALLEY	Groundwater Basin	92.7	6-5
6-50	CUDDEBACK VALLEY	Groundwater Basin	384.1	6-50
6-51	PILOT KNOB VALLEY	Groundwater Basin	560.9	6-51
6-52	SEARLES VALLEY	Groundwater Basin	797.3	6-52
6-53	SALT WELLS VALLEY	Groundwater Basin	119.3	6-53
6-54	INDIAN WELLS VALLEY	Groundwater Basin	1,544.7	6-54
6-55	COSO VALLEY	Groundwater Basin	103.4	6-55
6-56	ROSE VALLEY	Groundwater Basin	172.1	6-56
6-57	DARWIN VALLEY	Groundwater Basin	178.7	6-57
6-58	PANAMINT VALLEY	Groundwater Basin	1,049.3	6-58
6-6	CARSON VALLEY	Groundwater Basin	43.3	6-6
6-61	CAMEO AREA	Groundwater Basin	37.6	6-61
6-62	RACE TRACK VALLEY	Groundwater Basin	57.1	6-62
6-63	HIDDEN VALLEY	Groundwater Basin	72.6	6-63
6-64	MARBLE CANYON AREA	Groundwater Basin	41.9	6-64
6-65	COTTONWOOD SPRING AREA	Groundwater Basin	15.8	6-65
6-66	LEE FLAT	Groundwater Basin	82.1	6-66
6-67	MARTIS VALLEY	Groundwater Basin	147.1	6-67
6-68	SANTA ROSA FLAT	Groundwater Basin	67.9	6-68
6-69	KELSO LANDER VALLEY	Groundwater Basin	45.2	6-69

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
6-7	ANTELOPE VALLEY	Groundwater Basin	81.3	6-7
6-70	CACTUS FLAT	Groundwater Basin	28.4	6-70
6-71	LOST LAKE VALLEY	Groundwater Basin	94.1	6-71
6-72	COLES FLAT	Groundwater Basin	11.9	6-72
6-73	WILD HORSE MESA AREA	Groundwater Basin	13.4	6-73
6-74	HARRISBURG FLATS	Groundwater Basin	100.9	6-74
6-75	WILDROSE CANYON	Groundwater Basin	20.8	6-75
6-76	BROWN MOUNTAIN VALLEY	Groundwater Basin	87.9	6-76
6-77	GRASS VALLEY	Groundwater Basin	40.4	6-77
6-78	DENNING SPRING VALLEY	Groundwater Basin	29.3	6-78
6-79	CALIFORNIA VALLEY	Groundwater Basin	235.2	6-79
6-8	BRIDGEPORT VALLEY	Groundwater Basin	131.5	6-8
6-80	MIDDLE PARK CANYON	Groundwater Basin	7.0	6-80
6-81	BUTTE VALLEY	Groundwater Basin	35.6	6-81
6-82	SPRING CANYON VALLEY	Groundwater Basin	19.4	6-82
6-84	GREENWATER VALLEY	Groundwater Basin	242.1	6-84
6-85	GOLD VALLEY	Groundwater Basin	13.0	6-85
6-86	RHODES HILL AREA	Groundwater Basin	63.0	6-86
6-88	OWL LAKE VALLEY	Groundwater Basin	90.0	6-88
6-89	KANE WASH AREA	Groundwater Basin	24.1	6-89
6-9	MONO VALLEY	Groundwater Basin	699.7	6-9
6-90	CADY FAULT AREA	Groundwater Basin	32.2	6-90
6-91	COW HEAD LAKE VALLEY	Groundwater Basin	22.7	6-91
6-92	PINE CREEK VALLEY	Groundwater Basin	38.6	6-92
6-93	HARVEY VALLEY	Groundwater Basin	18.2	6-93
6-94	GRASSHOPPER VALLEY	Groundwater Basin	71.5	6-94
6-95	DRY VALLEY	Groundwater Basin	26.3	6-95
6-96	EAGLE LAKE AREA	Groundwater Basin	51.4	6-96
6-97	HORSE LAKE VALLEY	Groundwater Basin	15.5	6-97
6-98	TULEDAD CANYON VALLEY	Groundwater Basin	20.9	6-98
6-99	PAINTERS FLAT	Groundwater Basin	25.9	6-99
7-1	LANFAIR VALLEY	Groundwater Basin	633.4	7-1
7-10	TWENTYNINE PALMS VALLEY	Groundwater Basin	252.0	7-10
7-11	COPPER MOUNTAIN VALLEY	Groundwater Basin	122.5	7-11
7-12	WARREN VALLEY	Groundwater Basin	96.1	7-12
7-13	DEADMAN VALLEY	Groundwater Basin	478.6	7-13
7-14	LAVIC VALLEY	Groundwater Basin	413.9	7-14
7-15	BESSEMER VALLEY	Groundwater Basin	158.1	7-15



**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
7-16	AMES VALLEY	Groundwater Basin	438.8	7-16
7-17	MEANS VALLEY	Groundwater Basin	60.5	7-17
7-18	JOHNSON VALLEY	Groundwater Basin	453.5	7-18
7-19	LUCERNE VALLEY	Groundwater Basin	596.6	7-19
7-2	FENNER VALLEY	Groundwater Basin	1,831.1	7-2
7-20	MORONGO VALLEY	Groundwater Basin	29.3	7-20
7-21	COACHELLA VALLEY	Groundwater Basin	1,963.6	7-21
7-22	WEST SALTON SEA	Groundwater Basin	426.5	7-22
7-24	BORREGO VALLEY	Groundwater Basin	617.4	7-24
7-25	OCOTILLO-CLARK VALLEY	Groundwater Basin	899.5	7-25
7-26	TERWILLIGER VALLEY	Groundwater Basin	32.4	7-26
7-27	SAN FELIPE VALLEY	Groundwater Basin	94.6	7-27
7-28	VALLECITO-CARRIZO VALLEY	Groundwater Basin	493.0	7-28
7-29	COYOTE WELLS VALLEY	Groundwater Basin	589.4	7-29
7-3	WARD VALLEY	Groundwater Basin	2,256.5	7-3
7-30	IMPERIAL VALLEY	Groundwater Basin	3,876.4	7-30
7-31	OROCOPIA VALLEY	Groundwater Basin	389.4	7-31
7-32	CHOCOLATE VALLEY	Groundwater Basin	522.5	7-32
7-33	EAST SALTON SEA	Groundwater Basin	788.5	7-33
7-34	AMOS VALLEY	Groundwater Basin	525.8	7-34
7-35	OGILBY VALLEY	Groundwater Basin	539.0	7-35
7-36	YUMA VALLEY	Groundwater Basin	501.6	7-36
7-37	ARROYO SECO VALLEY	Groundwater Basin	1,038.1	7-37
7-38	PALO VERDE VALLEY	Groundwater Basin	295.3	7-38
7-39	PALO VERDE MESA	Groundwater Basin	910.2	7-39
7-4	RICE VALLEY	Groundwater Basin	761.1	7-4
7-40	QUIEN SABE POINT VALLEY	Groundwater Basin	101.7	7-40
7-41	CALZONA VALLEY	Groundwater Basin	325.9	7-41
7-42	VIDAL VALLEY	Groundwater Basin	557.1	7-42
7-43	CHEMEHUEVI VALLEY	Groundwater Basin	1,100.5	7-43
7-44	NEEDLES VALLEY	Groundwater Basin	355.7	7-44
7-45	PIUTE VALLEY	Groundwater Basin	708.6	7-45
7-46	CANEBRAKE VALLEY	Groundwater Basin	21.9	7-46
7-47	JACUMBA VALLEY	Groundwater Basin	9.9	7-47
7-48	HELENDALE FAULT VALLEY	Groundwater Basin	10.6	7-48
7-49	PIPES CANYON FAULT VALLEY	Groundwater Basin	13.7	7-49
7-5	CHUCKWALLA VALLEY	Groundwater Basin	2,434.5	7-5
7-50	IRON RIDGE AREA	Groundwater Basin	21.2	7-50



**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
7-51	LOST HORSE VALLEY	Groundwater Basin	70.0	7-51
7-52	PLEASANT VALLEY	Groundwater Basin	39.0	7-52
7-53	HEXIE MOUNTAIN AREA	Groundwater Basin	45.0	7-53
7-54	BUCK RIDGE FAULT VALLEY	Groundwater Basin	28.0	7-54
7-55	COLLINS VALLEY	Groundwater Basin	28.6	7-55
7-56	YAQUI WELL AREA	Groundwater Basin	60.6	7-56
7-59	MASON VALLEY	Groundwater Basin	22.3	7-59
7-6	PINTO VALLEY	Groundwater Basin	738.3	7-6
7-61	DAVIES VALLEY	Groundwater Basin	14.4	7-61
7-62	JOSHUA TREE	Groundwater Basin	110.0	7-62
7-63	VANDEVENTER FLAT	Groundwater Basin	27.2	7-63
7-7	CADIZ VALLEY	Groundwater Basin	1,092.0	7-7
7-8	BRISTOL VALLEY	Groundwater Basin	2,010.5	7-8
7-9	DALE VALLEY	Groundwater Basin	860.1	7-9
8-1	COASTAL PLAIN OF ORANGE COUNTY	Groundwater Basin	899.1	8-1
8-2	UPPER SANTA ANA VALLEY	Groundwater Basin	1,932.3	8-2
8-4	EL SINORE	Groundwater Basin	104.1	8-4
8-5	SAN JACINTO	Groundwater Basin	758.3	8-5
8-6	HEMET LAKE VALLEY	Groundwater Basin	67.5	8-6
8-7	BIG MEADOWS VALLEY	Groundwater Basin	57.3	8-7
8-8	SEVEN OAKS VALLEY	Groundwater Basin	16.5	8-8
8-9	BEAR VALLEY	Groundwater Basin	79.0	8-9
9-1	SAN JUAN VALLEY	Groundwater Basin	67.6	9-1
9-10	SAN PASQUAL VALLEY	Groundwater Basin	18.3	9-10
9-11	SANTA MARIA VALLEY	Groundwater Basin	49.7	9-11
9-12	SAN DIEGUITO CREEK	Groundwater Basin	14.4	9-12
9-13	POWAY VALLEY	Groundwater Basin	10.0	9-13
9-14	MISSION VALLEY	Groundwater Basin	29.7	9-14
9-15	SAN DIEGO RIVER VALLEY	Groundwater Basin	40.0	9-15
9-16	EL CAJON VALLEY	Groundwater Basin	28.9	9-16
9-17	SWEETWATER VALLEY	Groundwater Basin	23.9	9-17
9-18	OTAY VALLEY	Groundwater Basin	27.6	9-18
9-19	TIA JUANA	Groundwater Basin	29.9	9-19
9-2	SAN MATEO VALLEY	Groundwater Basin	12.1	9-2
9-22	BATIKUITOS LAGOON VALLEY	Groundwater Basin	3.0	9-22
9-23	SAN ELIJO VALLEY	Groundwater Basin	3.6	9-23
9-24	PAMO VALLEY	Groundwater Basin	6.1	9-24
9-25	RANCHITA TOWN AREA	Groundwater Basin	12.6	9-25

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
9-27	COTTONWOOD VALLEY	Groundwater Basin	15.5	9-27
9-28	CAMPO VALLEY	Groundwater Basin	14.3	9-28
9-29	POTRERO VALLEY	Groundwater Basin	8.2	9-29
9-3	SAN ONOFRE VALLEY	Groundwater Basin	5.1	9-3
9-32	SAN MARCOS AREA	Groundwater Basin	8.6	9-32
9-4	SANTA MARGARITA VALLEY	Groundwater Basin	32.2	9-4
9-5	TEMECULA VALLEY	Groundwater Basin	355.1	9-5
9-6	CAHUILLA VALLEY	Groundwater Basin	73.7	9-6
9-7	SAN LUIS REY VALLEY	Groundwater Basin	120.1	9-7
9-8	WARNER VALLEY	Groundwater Basin	97.0	9-8
9-9	ESCONDIDO VALLEY	Groundwater Basin	11.7	9-9
—	Subtotal	463	160,977	—
Hgb-1-1	SMITH RIVER PLAIN HIGHLANDS	Highland area - Gb	1,528.8	1-1
Hgb-1-10	EEL RIVER VALLEY HIGHLANDS	Highland area - Gb	917.9	1-10
Hgb-1-11	COVELO ROUND VALLEY HIGHLANDS	Highland area - Gb	145.1	1-11
Hgb-1-12	LAYTONVILLE VALLEY HIGHLANDS	Highland area - Gb	64.6	1-12
Hgb-1-13	LITTLE LAKE VALLEY HIGHLANDS	Highland area - Gb	119.1	1-13
Hgb-1-14	LOWER KLAMATH RIVER VALLEY HIGHLANDS	Highland area - Gb	5,022.4	1-14
Hgb-1-15	HAPPY CAMP TOWN AREA HIGHLANDS	Highland area - Gb	891.6	1-15
Hgb-1-16	SEIAD VALLEY HIGHLANDS	Highland area - Gb	2,600.5	1-16
Hgb-1-17	BRAY TOWN AREA HIGHLANDS	Highland area - Gb	304.9	1-17
Hgb-1-18	RED ROCK VALLEY HIGHLANDS	Highland area - Gb	201.5	1-18
Hgb-1-19	ANDERSON VALLEY HIGHLANDS	Highland area - Gb	457.8	1-19
Hgb-1-2	KLAMATH RIVER VALLEY HIGHLANDS	Highland area - Gb	2,399.3	1-2
Hgb-1-20	GARCIA RIVER VALLEY HIGHLANDS	Highland area - Gb	17.9	1-20
Hgb-1-21	FORT BRAGG TERRACE AREA HIGHLANDS	Highland area - Gb	798.3	1-21
Hgb-1-22	FAIRCHILD SWAMP VALLEY HIGHLANDS	Highland area - Gb	63.7	1-22
Hgb-1-25	PRAIRIE CREEK AREA HIGHLANDS	Highland area - Gb	12.7	1-25
Hgb-1-26	REDWOOD CREEK AREA HIGHLANDS	Highland area - Gb	658.7	1-26
Hgb-1-27	BIG LAGOON AREA HIGHLANDS	Highland area - Gb	128.9	1-27
Hgb-1-28	MATTOLE RIVER VALLEY HIGHLANDS	Highland area - Gb	234.4	1-28
Hgb-1-29	HONEYDEW TOWN AREA HIGHLANDS	Highland area - Gb	480.2	1-29
Hgb-1-3	BUTTE VALLEY HIGHLANDS	Highland area - Gb	641.7	1-3
Hgb-1-30	PEPPERWOOD TOWN AREA HIGHLANDS	Highland area - Gb	333.1	1-30
Hgb-1-31	WEOTT TOWN AREA HIGHLANDS	Highland area - Gb	5,599.0	1-31
Hgb-1-32	GARBerville TOWN AREA HIGHLANDS	Highland area - Gb	1,093.6	1-32
Hgb-1-33	LARABEE VALLEY HIGHLANDS	Highland area - Gb	29.4	1-33
Hgb-1-34	DINSMORES TOWN AREA HIGHLANDS	Highland area - Gb	183.6	1-34

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-1-35	HYAMPOM VALLEY HIGHLANDS	Highland area - Gb	1,244.7	1-35
Hgb-1-36	HETTENSHAW VALLEY HIGHLANDS	Highland area - Gb	12.2	1-36
Hgb-1-37	COTTONEVA CREEK VALLEY HIGHLANDS	Highland area - Gb	29.7	1-37
Hgb-1-38	LOWER LAYTONVILLE VALLEY HIGHLANDS	Highland area - Gb	25.2	1-38
Hgb-1-39	BRANSCOMB TOWN AREA HIGHLANDS	Highland area - Gb	93.4	1-39
Hgb-1-4	SHASTA VALLEY HIGHLANDS	Highland area - Gb	1,190.2	1-4
Hgb-1-40	TEN MILE RIVER VALLEY HIGHLANDS	Highland area - Gb	308.9	1-40
Hgb-1-41	LITTLE VALLEY HIGHLANDS	Highland area - Gb	30.5	1-41
Hgb-1-42	SHERWOOD VALLEY HIGHLANDS	Highland area - Gb	24.7	1-42
Hgb-1-43	WILLIAMS VALLEY HIGHLANDS	Highland area - Gb	120.1	1-43
Hgb-1-44	EDEN VALLEY HIGHLANDS	Highland area - Gb	39.2	1-44
Hgb-1-45	BIG RIVER VALLEY HIGHLANDS	Highland area - Gb	514.6	1-45
Hgb-1-46	NAVARRO RIVER VALLEY HIGHLANDS	Highland area - Gb	342.2	1-46
Hgb-1-48	GRAVELLY VALLEY HIGHLANDS	Highland area - Gb	97.7	1-48
Hgb-1-49	ANNAPOLIS OHLSON RANCH FM HIGHLANDS	Highland area - Gb	13.9	1-49
Hgb-1-5	SCOTT RIVER VALLEY HIGHLANDS	Highland area - Gb	1,426.3	1-5
Hgb-1-50	KNIGHTS VALLEY HIGHLANDS	Highland area - Gb	40.2	1-50
Hgb-1-51	POTTER VALLEY HIGHLANDS	Highland area - Gb	145.1	1-51
Hgb-1-52	UKIAH VALLEY HIGHLANDS	Highland area - Gb	611.0	1-52
Hgb-1-53	SANEL VALLEY HIGHLANDS	Highland area - Gb	139.1	1-53
Hgb-1-54	ALEXANDER VALLEY HIGHLANDS	Highland area - Gb	772.2	1-54
Hgb-1-55	SANTA ROSA VALLEY HIGHLANDS	Highland area - Gb	730.5	1-55
Hgb-1-56	McDOWELL VALLEY HIGHLANDS	Highland area - Gb	61.8	1-56
Hgb-1-57	BODEGA BAY AREA HIGHLANDS	Highland area - Gb	57.9	1-57
Hgb-1-59	WILSON GROVE FORMATION HIGHLANDS	Highland area - Gb	131.1	1-59
Hgb-1-6	HAYFORK VALLEY HIGHLANDS	Highland area - Gb	577.6	1-6
Hgb-1-60	LOWER RUSSIAN RIVER VALLEY HIGHLANDS	Highland area - Gb	394.1	1-60
Hgb-1-61	FORT ROSS TERRACE DEPOSITS HIGHLANDS	Highland area - Gb	86.0	1-61
Hgb-1-62	WILSON POINT AREA HIGHLANDS	Highland area - Gb	106.2	1-62
Hgb-1-7	HOOPA VALLEY HIGHLANDS	Highland area - Gb	5,663.8	1-7
Hgb-1-8	MAD RIVER VALLEY HIGHLANDS	Highland area - Gb	1,380.6	1-8
Hgb-1-9	EUREKA PLAIN HIGHLANDS	Highland area - Gb	299.5	1-9
Hgb-2-1	PETALUMA VALLEY HIGHLANDS	Highland area - Gb	177.9	2-1
Hgb-2-10	LIVERMORE VALLEY HIGHLANDS	Highland area - Gb	785.8	2-10
Hgb-2-11	SUNOL VALLEY HIGHLANDS	Highland area - Gb	434.7	2-11
Hgb-2-19	KENWOOD VALLEY HIGHLANDS	Highland area - Gb	51.8	2-19
Hgb-2-2	NAPA-SONOMA VALLEY HIGHLANDS	Highland area - Gb	888.6	2-2
Hgb-2-22	HALF MOON BAY TERRACE HIGHLANDS	Highland area - Gb	146.4	2-22

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-2-24	SAN GREGORIO VALLEY HIGHLANDS	Highland area - Gb	126.7	2-24
Hgb-2-26	PESCADERO VALLEY HIGHLANDS	Highland area - Gb	198.4	2-26
Hgb-2-27	SAND POINT AREA HIGHLANDS	Highland area - Gb	0.5	2-27
Hgb-2-28	ROSS VALLEY HIGHLANDS	Highland area - Gb	75.9	2-28
Hgb-2-29	SAN RAFAEL VALLEY HIGHLANDS	Highland area - Gb	17.1	2-29
Hgb-2-3	SUISUN-FAIRFIELD VALLEY HIGHLANDS	Highland area - Gb	335.1	2-3
Hgb-2-30	NOVATO VALLEY HIGHLANDS	Highland area - Gb	149.6	2-30
Hgb-2-31	ARROYO DEL HAMBRE VALLEY HIGHLANDS	Highland area - Gb	39.4	2-31
Hgb-2-35	WESTSIDE HIGHLANDS	Highland area - Gb	33.0	2-35
Hgb-2-36	SAN PEDRO VALLEY HIGHLANDS	Highland area - Gb	19.5	2-36
Hgb-2-4	PITTSBURG PLAIN HIGHLANDS	Highland area - Gb	57.5	2-4
Hgb-2-5	CLAYTON VALLEY HIGHLANDS	Highland area - Gb	70.7	2-5
Hgb-2-6	YGNACIO VALLEY HIGHLANDS	Highland area - Gb	165.0	2-6
Hgb-2-7	SAN RAMON VALLEY HIGHLANDS	Highland area - Gb	100.7	2-7
Hgb-2-8	CASTRO VALLEY HIGHLANDS	Highland area - Gb	122.2	2-8
Hgb-2-9	SANTA CLARA VALLEY HIGHLANDS	Highland area - Gb	1,395.3	2-9
Hgb-3-12	SANTA MARIA HIGHLANDS	Highland area - Gb	2,122.4	3-12
Hgb-3-13	CUYAMA VALLEY HIGHLANDS	Highland area - Gb	1,145.2	3-13
Hgb-3-14	SAN ANTONIO CREEK VALLEY HIGHLANDS	Highland area - Gb	132.8	3-14
Hgb-3-15	SANTA YNEZ RIVER VALLEY HIGHLANDS	Highland area - Gb	1,644.5	3-15
Hgb-3-16	GOLETA HIGHLANDS	Highland area - Gb	96.1	3-16
Hgb-3-17	SANTA BARBARA HIGHLANDS	Highland area - Gb	9.9	3-17
Hgb-3-18	CARPINTERIA HIGHLANDS	Highland area - Gb	86.7	3-18
Hgb-3-19	CARRIZO PLAIN HIGHLANDS	Highland area - Gb	305.4	3-19
Hgb-3-2	PAJARO VALLEY HIGHLANDS	Highland area - Gb	110.3	3-2
Hgb-3-20	ANO NUEVO AREA HIGHLANDS	Highland area - Gb	13.3	3-20
Hgb-3-21	SANTA CRUZ PURISIMA FORMATION HIGHLANDS	Highland area - Gb	108.9	3-21
Hgb-3-22	SANTA ANA VALLEY HIGHLANDS	Highland area - Gb	37.8	3-22
Hgb-3-23	UPPER SANTA ANA VALLEY HIGHLANDS	Highland area - Gb	37.3	3-23
Hgb-3-24	QUIEN SABE VALLEY HIGHLANDS	Highland area - Gb	79.1	3-24
Hgb-3-25	TRES PINOS VALLEY HIGHLANDS	Highland area - Gb	11.3	3-25
Hgb-3-26	WEST SANTA CRUZ TERRACE HIGHLANDS	Highland area - Gb	42.5	3-26
Hgb-3-27	SCOTTS VALLEY HIGHLANDS	Highland area - Gb	2.5	3-27
Hgb-3-28	SAN BENITO RIVER VALLEY HIGHLANDS	Highland area - Gb	264.3	3-28
Hgb-3-29	DRY LAKE VALLEY HIGHLANDS	Highland area - Gb	276.2	3-29
Hgb-3-3	GILROY-HOLLISTER VALLEY HIGHLANDS	Highland area - Gb	1,640.4	3-3
Hgb-3-30	BITTER WATER VALLEY HIGHLANDS	Highland area - Gb	337.7	3-30
Hgb-3-31	HERNANDEZ VALLEY HIGHLANDS	Highland area - Gb	202.7	3-31

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-3-32	PEACH TREE VALLEY HIGHLANDS	Highland area - Gb	168.8	3-32
Hgb-3-33	SAN CARPOFORO VALLEY HIGHLANDS	Highland area - Gb	93.6	3-33
Hgb-3-34	ARROYO DE LA CRUZ VALLEY HIGHLANDS	Highland area - Gb	113.4	3-34
Hgb-3-35	SAN SIMEON VALLEY HIGHLANDS	Highland area - Gb	84.0	3-35
Hgb-3-36	SANTA ROSA VALLEY HIGHLANDS	Highland area - Gb	109.2	3-36
Hgb-3-37	VILLA VALLEY HIGHLANDS	Highland area - Gb	44.7	3-37
Hgb-3-38	CAYUCOS VALLEY HIGHLANDS	Highland area - Gb	5.4	3-38
Hgb-3-39	OLD VALLEY HIGHLANDS	Highland area - Gb	29.3	3-39
Hgb-3-4.1	180/400 FOOT AQUIFER; EAST SIDE AQUIFER; SEASIDE AREA; LANGLEY AREA; CORRAL DE TIERRA AREA HIGHLANDS	Highland area - Gb	493.3	3-4.1
Hgb-3-4.2	FOREBAY AQUIFER; UPPER VALLEY AQUIFER HIGHLANDS	Highland area - Gb	2,040.8	3-4.2
Hgb-3-4.06	PASO ROBLES AREA HIGHLANDS	Highland area - Gb	2,366.8	3-4.06
Hgb-3-40	TORO VALLEY HIGHLANDS	Highland area - Gb	37.9	3-40
Hgb-3-41	MORRO VALLEY HIGHLANDS	Highland area - Gb	60.0	3-41
Hgb-3-42	CHORRO VALLEY HIGHLANDS	Highland area - Gb	108.9	3-42
Hgb-3-43	RINCONADA VALLEY HIGHLANDS	Highland area - Gb	28.7	3-43
Hgb-3-44	POZO VALLEY HIGHLANDS	Highland area - Gb	217.7	3-44
Hgb-3-45	HUASNA VALLEY HIGHLANDS	Highland area - Gb	254.2	3-45
Hgb-3-46	RAFAEL VALLEY HIGHLANDS	Highland area - Gb	154.6	3-46
Hgb-3-47	BIG SPRING AREA HIGHLANDS	Highland area - Gb	54.0	3-47
Hgb-3-49	MONTECITO HIGHLANDS	Highland area - Gb	44.3	3-49
Hgb-3-5	CHOLAME VALLEY HIGHLANDS	Highland area - Gb	306.3	3-5
Hgb-3-50	FELTON AREA HIGHLANDS	Highland area - Gb	268.3	3-50
Hgb-3-51	MAJORS CREEK HIGHLANDS	Highland area - Gb	17.8	3-51
Hgb-3-52	NEEDLE ROCK POINT HIGHLANDS	Highland area - Gb	4.1	3-52
Hgb-3-53	FOOTHILL HIGHLANDS	Highland area - Gb	33.6	3-53
Hgb-3-6	LOCKWOOD VALLEY HIGHLANDS	Highland area - Gb	592.0	3-6
Hgb-3-7	CARMEL VALLEY HIGHLANDS	Highland area - Gb	646.6	3-7
Hgb-3-8	LOS OSOS VALLEY HIGHLANDS	Highland area - Gb	49.7	3-8
Hgb-3-9	SAN LUIS OBISPO VALLEY HIGHLANDS	Highland area - Gb	166.3	3-9
Hgb-4-1	UPPER OJAI VALLEY HIGHLANDS	Highland area - Gb	48.2	4-1
Hgb-4-10	CONEJO HIGHLANDS	Highland area - Gb	26.9	4-10
Hgb-4-11	COASTAL PLAIN OF LOS ANGELES HIGHLANDS	Highland area - Gb	219.2	4-11
Hgb-4-12	SAN FERNANDO VALLEY HIGHLANDS	Highland area - Gb	756.3	4-12
Hgb-4-13	SAN GABRIEL VALLEY HIGHLANDS	Highland area - Gb	946.7	4-13
Hgb-4-15	TIERRA REJADA HIGHLANDS	Highland area - Gb	2.0	4-15
Hgb-4-16	HIDDEN VALLEY HIGHLANDS	Highland area - Gb	30.5	4-16

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-4-17	LOCKWOOD VALLEY HIGHLANDS	Highland area - Gb	91.4	4-17
Hgb-4-18	HUNGRY VALLEY HIGHLANDS	Highland area - Gb	69.6	4-18
Hgb-4-19	THOUSAND OAKS AREA HIGHLANDS	Highland area - Gb	31.1	4-19
Hgb-4-2	OJAI VALLEY HIGHLANDS	Highland area - Gb	63.2	4-2
Hgb-4-20	RUSSELL VALLEY HIGHLANDS	Highland area - Gb	44.3	4-20
Hgb-4-22	MALIBU VALLEY HIGHLANDS	Highland area - Gb	157.8	4-22
Hgb-4-23	RAYMOND HIGHLANDS	Highland area - Gb	141.4	4-23
Hgb-4-3	VENTURA RIVER VALLEY HIGHLANDS	Highland area - Gb	420.3	4-3
Hgb-4-4	SANTA CLARA RIVER VALLEY HIGHLANDS	Highland area - Gb	3,022.3	4-4
Hgb-4-5	ACTON VALLEY HIGHLANDS	Highland area - Gb	65.3	4-5
Hgb-4-6	PLEASANT VALLEY HIGHLANDS	Highland area - Gb	26.2	4-6
Hgb-4-7	ARROYO SANTA ROSA VALLEY HIGHLANDS	Highland area - Gb	12.4	4-7
Hgb-4-8	LAS POSAS VALLEY HIGHLANDS	Highland area - Gb	82.6	4-8
Hgb-4-9	SIMI VALLEY HIGHLANDS	Highland area - Gb	172.4	4-9
Hgb-5-1	GOOSE LAKE HIGHLANDS	Highland area - Gb	452.2	5-1
Hgb-5-10	AMERICAN VALLEY HIGHLANDS	Highland area - Gb	238.0	5-10
Hgb-5-11	MOHAWK VALLEY HIGHLANDS	Highland area - Gb	226.3	5-11
Hgb-5-12	SIERRA VALLEY HIGHLANDS	Highland area - Gb	905.8	5-12
Hgb-5-13	UPPER LAKE VALLEY HIGHLANDS	Highland area - Gb	199.6	5-13
Hgb-5-14	SCOTTS VALLEY HIGHLANDS	Highland area - Gb	156.7	5-14
Hgb-5-15	BIG VALLEY HIGHLANDS	Highland area - Gb	219.7	5-15
Hgb-5-16	HIGH VALLEY HIGHLANDS	Highland area - Gb	20.6	5-16
Hgb-5-17	BURNS VALLEY HIGHLANDS	Highland area - Gb	8.9	5-17
Hgb-5-18	COYOTE VALLEY HIGHLANDS	Highland area - Gb	142.1	5-18
Hgb-5-19	COLLAYOMI VALLEY HIGHLANDS	Highland area - Gb	166.7	5-19
Hgb-5-2	ALTURAS AREA HIGHLANDS	Highland area - Gb	2,085.5	5-2
Hgb-5-20	BERRYESSA VALLEY HIGHLANDS	Highland area - Gb	50.5	5-20
Hgb-5-21.50	RED BLUFF HIGHLANDS	Highland area - Gb	467.3	5-21.50
Hgb-5-21.51	CORNING HIGHLANDS	Highland area - Gb	729.2	5-21.51
Hgb-5-21.52	COLUSA HIGHLANDS	Highland area - Gb	1,233.6	5-21.52
Hgb-5-21.53	BEND HIGHLANDS	Highland area - Gb	192.7	5-21.53
Hgb-5-21.54	ANTELOPE HIGHLANDS	Highland area - Gb	410.3	5-21.54
Hgb-5-21.55	DYE CREEK HIGHLANDS	Highland area - Gb	179.0	5-21.55
Hgb-5-21.56	LOS MOLINOS HIGHLANDS	Highland area - Gb	1,015.9	5-21.56
Hgb-5-21.57	VINA HIGHLANDS	Highland area - Gb	666.3	5-21.57
Hgb-5-21.58	WEST BUTTE HIGHLANDS	Highland area - Gb	291.2	5-21.58
Hgb-5-21.59	EAST BUTTE HIGHLANDS	Highland area - Gb	4,416.5	5-21.59
Hgb-5-21.60	NORTH YUBA HIGHLANDS	Highland area - Gb	418.6	5-21.60



**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-5-21.61	SOUTH YUBA HIGHLANDS	Highland area - Gb	3,733.2	5-21.61
Hgb-5-21.62	SUTTER HIGHLANDS	Highland area - Gb	33.7	5-21.62
Hgb-5-21.64	NORTH AMERICAN HIGHLANDS	Highland area - Gb	3,816.6	5-21.64
Hgb-5-21.65	SOUTH AMERICAN HIGHLANDS	Highland area - Gb	2,469.1	5-21.65
Hgb-5-21.66	SOLANO HIGHLANDS	Highland area - Gb	1,096.1	5-21.66
Hgb-5-21.67	YOLO HIGHLANDS	Highland area - Gb	88.8	5-21.67
Hgb-5-21.68	CAPAY VALLEY HIGHLANDS	Highland area - Gb	461.4	5-21.68
Hgb-5-22.01	EASTERN SAN JOAQUIN HIGHLANDS	Highland area - Gb	1,312.3	5-22.01
Hgb-5-22.02	MODESTO HIGHLANDS	Highland area - Gb	2,797.6	5-22.02
Hgb-5-22.03	TURLOCK HIGHLANDS	Highland area - Gb	4,077.3	5-22.03
Hgb-5-22.04	MERCED HIGHLANDS	Highland area - Gb	2,684.6	5-22.04
Hgb-5-22.06	MADERA HIGHLANDS	Highland area - Gb	6,074.8	5-22.06
Hgb-5-22.07	DELTA-MENDOTA HIGHLANDS	Highland area - Gb	1,914.2	5-22.07
Hgb-5-22.08	KINGS HIGHLANDS	Highland area - Gb	4,984.4	5-22.08
Hgb-5-22.09	WESTSIDE HIGHLANDS	Highland area - Gb	643.8	5-22.09
Hgb-5-22.10	PLEASANT VALLEY HIGHLANDS	Highland area - Gb	1,510.6	5-22.10
Hgb-5-22.11	KAWEAH HIGHLANDS	Highland area - Gb	2,304.5	5-22.11
Hgb-5-22.13	TULE HIGHLANDS	Highland area - Gb	1,718.3	5-22.13
Hgb-5-22.14	KERN COUNTY HIGHLANDS	Highland area - Gb	4,522.9	5-22.14
Hgb-5-22.15	TRACY HIGHLANDS	Highland area - Gb	819.2	5-22.15
Hgb-5-22.16	COSUMNES HIGHLANDS	Highland area - Gb	3,535.0	5-22.16
Hgb-5-23	PANOCH VALLEY HIGHLANDS	Highland area - Gb	242.5	5-23
Hgb-5-25	KERN RIVER VALLEY HIGHLANDS	Highland area - Gb	5,143.2	5-25
Hgb-5-26	WALKER BASIN CREEK VALLEY HIGHLANDS	Highland area - Gb	152.8	5-26
Hgb-5-27	CUMMINGS VALLEY HIGHLANDS	Highland area - Gb	51.1	5-27
Hgb-5-28	TEHACHAPI VALLEY WEST HIGHLANDS	Highland area - Gb	65.5	5-28
Hgb-5-29	CASTAC LAKE VALLEY HIGHLANDS	Highland area - Gb	63.7	5-29
Hgb-5-3	JESS VALLEY HIGHLANDS	Highland area - Gb	245.0	5-3
Hgb-5-30	LOWER LAKE VALLEY HIGHLANDS	Highland area - Gb	415.5	5-30
Hgb-5-31	LONG VALLEY HIGHLANDS	Highland area - Gb	120.2	5-31
Hgb-5-35	MCCLOUD AREA HIGHLANDS	Highland area - Gb	957.9	5-35
Hgb-5-36	ROUND VALLEY HIGHLANDS	Highland area - Gb	397.4	5-36
Hgb-5-37	TOAD WELL AREA HIGHLANDS	Highland area - Gb	127.5	5-37
Hgb-5-38	PONDOSA TOWN AREA HIGHLANDS	Highland area - Gb	83.6	5-38
Hgb-5-4	BIG VALLEY HIGHLANDS	Highland area - Gb	1,238.5	5-4
Hgb-5-40	HOT SPRINGS VALLEY HIGHLANDS	Highland area - Gb	136.8	5-40
Hgb-5-41	EGG LAKE VALLEY HIGHLANDS	Highland area - Gb	328.5	5-41
Hgb-5-43	ROCK PRAIRIE VALLEY HIGHLANDS	Highland area - Gb	90.8	5-43

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-5-44	LONG VALLEY HIGHLANDS	Highland area - Gb	11.2	5-44
Hgb-5-45	CAYTON VALLEY HIGHLANDS	Highland area - Gb	60.4	5-45
Hgb-5-46	LAKE BRITTON AREA HIGHLANDS	Highland area - Gb	1,282.4	5-46
Hgb-5-47	GOOSE VALLEY HIGHLANDS	Highland area - Gb	73.4	5-47
Hgb-5-48	BURNEY CREEK VALLEY HIGHLANDS	Highland area - Gb	187.8	5-48
Hgb-5-49	DRY BURNEY CREEK VALLEY HIGHLANDS	Highland area - Gb	66.1	5-49
Hgb-5-5	FALL RIVER VALLEY HIGHLANDS	Highland area - Gb	2,131.4	5-5
Hgb-5-50	NORTH FORK BATTLE CREEK HIGHLANDS	Highland area - Gb	254.9	5-50
Hgb-5-51	BUTTE CREEK VALLEY HIGHLANDS	Highland area - Gb	397.1	5-51
Hgb-5-52	GRAYS VALLEY HIGHLANDS	Highland area - Gb	75.0	5-52
Hgb-5-53	DIXIE VALLEY HIGHLANDS	Highland area - Gb	573.7	5-53
Hgb-5-54	ASH VALLEY HIGHLANDS	Highland area - Gb	220.9	5-54
Hgb-5-56	YELLOW CREEK VALLEY HIGHLANDS	Highland area - Gb	78.8	5-56
Hgb-5-57	LAST CHANCE CREEK VALLEY HIGHLANDS	Highland area - Gb	201.8	5-57
Hgb-5-58	CLOVER VALLEY HIGHLANDS	Highland area - Gb	208.7	5-58
Hgb-5-59	GRIZZLY VALLEY HIGHLANDS	Highland area - Gb	84.6	5-59
Hgb-5-6	REDDING AREA HIGHLANDS	Highland area - Gb	8,237.2	5-6
Hgb-5-60	HUMBUG VALLEY HIGHLANDS	Highland area - Gb	136.0	5-60
Hgb-5-61	CHROME TOWN AREA HIGHLANDS	Highland area - Gb	33.5	5-61
Hgb-5-62	ELK CREEK AREA HIGHLANDS	Highland area - Gb	281.4	5-62
Hgb-5-63	STONYFORD TOWN AREA HIGHLANDS	Highland area - Gb	331.5	5-63
Hgb-5-64	BEAR VALLEY HIGHLANDS	Highland area - Gb	92.9	5-64
Hgb-5-65	LITTLE INDIAN VALLEY HIGHLANDS	Highland area - Gb	94.9	5-65
Hgb-5-66	CLEAR LAKE CACHE FORMATION HIGHLANDS	Highland area - Gb	122.9	5-66
Hgb-5-68	POPE VALLEY HIGHLANDS	Highland area - Gb	159.4	5-68
Hgb-5-69	YOSEMITE VALLEY HIGHLANDS	Highland area - Gb	889.0	5-69
Hgb-5-7	LAKE ALMANOR VALLEY HIGHLANDS	Highland area - Gb	403.0	5-7
Hgb-5-70	LOS BANOS CREEK VALLEY HIGHLANDS	Highland area - Gb	307.4	5-70
Hgb-5-71	VALLECITOS CREEK VALLEY HIGHLANDS	Highland area - Gb	205.4	5-71
Hgb-5-8	MOUNTAIN MEADOWS VALLEY HIGHLANDS	Highland area - Gb	211.7	5-8
Hgb-5-82	CUDDY CANYON VALLEY HIGHLANDS	Highland area - Gb	37.3	5-82
Hgb-5-83	CUDDY RANCH AREA HIGHLANDS	Highland area - Gb	26.7	5-83
Hgb-5-84	CUDDY VALLEY HIGHLANDS	Highland area - Gb	30.2	5-84
Hgb-5-85	MIL POTRERO AREA HIGHLANDS	Highland area - Gb	25.6	5-85
Hgb-5-86	JOSEPH CREEK HIGHLANDS	Highland area - Gb	124.0	5-86
Hgb-5-87	MIDDLE FORK FEATHER RIVER HIGHLANDS	Highland area - Gb	141.4	5-87
Hgb-5-88	STONY GORGE RESERVOIR HIGHLANDS	Highland area - Gb	280.7	5-88
Hgb-5-89	SQUAW FLAT HIGHLANDS	Highland area - Gb	29.8	5-89



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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-5-9	INDIAN VALLEY HIGHLANDS	Highland area - Gb	1,232.0	5-9
Hgb-5-90	FUNKS CREEK HIGHLANDS	Highland area - Gb	114.9	5-90
Hgb-5-91	ANTELOPE CREEK HIGHLANDS	Highland area - Gb	77.8	5-91
Hgb-5-92	BLANCHARD VALLEY HIGHLANDS	Highland area - Gb	108.5	5-92
Hgb-5-93	NORTH FORK CACHE CREEK HIGHLANDS	Highland area - Gb	306.0	5-93
Hgb-5-94	MIDDLE CREEK HIGHLANDS	Highland area - Gb	110.4	5-94
Hgb-5-95	MEADOW VALLEY HIGHLANDS	Highland area - Gb	139.4	5-95
Hgb-6-1	SURPRISE VALLEY HIGHLANDS	Highland area - Gb	826.0	6-1
Hgb-6-10	ADOBE LAKE VALLEY HIGHLANDS	Highland area - Gb	538.3	6-10
Hgb-6-100	SECRET VALLEY HIGHLANDS	Highland area - Gb	506.8	6-100
Hgb-6-101	BULL FLAT HIGHLANDS	Highland area - Gb	445.2	6-101
Hgb-6-104	LONG VALLEY HIGHLANDS	Highland area - Gb	173.6	6-104
Hgb-6-105	SLINKARD VALLEY HIGHLANDS	Highland area - Gb	53.8	6-105
Hgb-6-106	LITTLE ANTELOPE VALLEY HIGHLANDS	Highland area - Gb	22.5	6-106
Hgb-6-107	SWEETWATER FLAT HIGHLANDS	Highland area - Gb	124.7	6-107
Hgb-6-11	LONG VALLEY HIGHLANDS	Highland area - Gb	670.5	6-11
Hgb-6-12	OWENS VALLEY HIGHLANDS	Highland area - Gb	4,321.1	6-12
Hgb-6-13	BLACK SPRINGS VALLEY HIGHLANDS	Highland area - Gb	165.1	6-13
Hgb-6-14	FISH LAKE VALLEY HIGHLANDS	Highland area - Gb	351.3	6-14
Hgb-6-15	DEEP SPRINGS VALLEY HIGHLANDS	Highland area - Gb	392.7	6-15
Hgb-6-16	EUREKA VALLEY HIGHLANDS	Highland area - Gb	833.0	6-16
Hgb-6-17	SALINE VALLEY HIGHLANDS	Highland area - Gb	928.6	6-17
Hgb-6-18	DEATH VALLEY HIGHLANDS	Highland area - Gb	3,493.6	6-18
Hgb-6-19	WINGATE VALLEY HIGHLANDS	Highland area - Gb	249.7	6-19
Hgb-6-2	MADELINE PLAINS HIGHLANDS	Highland area - Gb	1,138.9	6-2
Hgb-6-20	MIDDLE AMARGOSA VALLEY HIGHLANDS	Highland area - Gb	767.4	6-20
Hgb-6-21	LOWER KINGSTON VALLEY HIGHLANDS	Highland area - Gb	277.6	6-21
Hgb-6-22	UPPER KINGSTON VALLEY HIGHLANDS	Highland area - Gb	402.9	6-22
Hgb-6-23	RIGGS VALLEY HIGHLANDS	Highland area - Gb	246.7	6-23
Hgb-6-24	RED PASS VALLEY HIGHLANDS	Highland area - Gb	148.0	6-24
Hgb-6-25	BICYCLE VALLEY HIGHLANDS	Highland area - Gb	189.2	6-25
Hgb-6-26	AVAWATZ VALLEY HIGHLANDS	Highland area - Gb	83.3	6-26
Hgb-6-27	LEACH VALLEY HIGHLANDS	Highland area - Gb	187.8	6-27
Hgb-6-28	PAHRUMP VALLEY HIGHLANDS	Highland area - Gb	129.9	6-28
Hgb-6-29	MESQUITE VALLEY HIGHLANDS	Highland area - Gb	177.8	6-29
Hgb-6-3	WILLOW CREEK VALLEY HIGHLANDS	Highland area - Gb	590.0	6-3
Hgb-6-30	IVANPAH VALLEY HIGHLANDS	Highland area - Gb	327.3	6-30
Hgb-6-31	KELSO VALLEY HIGHLANDS	Highland area - Gb	556.3	6-31

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-6-32	BROADWELL VALLEY HIGHLANDS	Highland area - Gb	241.6	6-32
Hgb-6-33	SODA LAKE VALLEY HIGHLANDS	Highland area - Gb	840.9	6-33
Hgb-6-34	SILVER LAKE VALLEY HIGHLANDS	Highland area - Gb	88.1	6-34
Hgb-6-35	CRONISE VALLEY HIGHLANDS	Highland area - Gb	150.5	6-35
Hgb-6-36	LANGFORD VALLEY HIGHLANDS	Highland area - Gb	66.1	6-36
Hgb-6-37	COYOTE LAKE VALLEY HIGHLANDS	Highland area - Gb	290.2	6-37
Hgb-6-38	CAVES CANYON VALLEY HIGHLANDS	Highland area - Gb	75.6	6-38
Hgb-6-4	HONEY LAKE VALLEY HIGHLANDS	Highland area - Gb	1,705.4	6-4
Hgb-6-40	LOWER MOJAVE RIVER VALLEY HIGHLANDS	Highland area - Gb	572.9	6-40
Hgb-6-41	MIDDLE MOJAVE RIVER VALLEY HIGHLANDS	Highland area - Gb	351.6	6-41
Hgb-6-42	UPPER MOJAVE RIVER VALLEY HIGHLANDS	Highland area - Gb	870.1	6-42
Hgb-6-43	EL MIRAGE VALLEY HIGHLANDS	Highland area - Gb	94.6	6-43
Hgb-6-44	ANTELOPE VALLEY HIGHLANDS	Highland area - Gb	1,700.5	6-44
Hgb-6-45	TEHACHAPI VALLEY EAST HIGHLANDS	Highland area - Gb	154.6	6-45
Hgb-6-46	FREMONT VALLEY HIGHLANDS	Highland area - Gb	914.4	6-46
Hgb-6-47	HARPER VALLEY HIGHLANDS	Highland area - Gb	565.6	6-47
Hgb-6-48	GOLDSTONE VALLEY HIGHLANDS	Highland area - Gb	161.8	6-48
Hgb-6-49	SUPERIOR VALLEY HIGHLANDS	Highland area - Gb	387.1	6-49
Hgb-6-5	TAHOE VALLEY HIGHLANDS	Highland area - Gb	459.2	6-5
Hgb-6-50	CUDDEBACK VALLEY HIGHLANDS	Highland area - Gb	250.1	6-50
Hgb-6-51	PILOT KNOB VALLEY HIGHLANDS	Highland area - Gb	390.7	6-51
Hgb-6-52	SEARLES VALLEY HIGHLANDS	Highland area - Gb	524.6	6-52
Hgb-6-53	SALT WELLS VALLEY HIGHLANDS	Highland area - Gb	44.5	6-53
Hgb-6-54	INDIAN WELLS VALLEY HIGHLANDS	Highland area - Gb	1,101.4	6-54
Hgb-6-55	COSO VALLEY HIGHLANDS	Highland area - Gb	405.4	6-55
Hgb-6-56	ROSE VALLEY HIGHLANDS	Highland area - Gb	319.9	6-56
Hgb-6-57	DARWIN VALLEY HIGHLANDS	Highland area - Gb	269.4	6-57
Hgb-6-58	PANAMINT VALLEY HIGHLANDS	Highland area - Gb	1,261.7	6-58
Hgb-6-6	CARSON VALLEY HIGHLANDS	Highland area - Gb	279.5	6-6
Hgb-6-61	CAMEO AREA HIGHLANDS	Highland area - Gb	158.2	6-61
Hgb-6-62	RACE TRACK VALLEY HIGHLANDS	Highland area - Gb	210.9	6-62
Hgb-6-63	HIDDEN VALLEY HIGHLANDS	Highland area - Gb	118.4	6-63
Hgb-6-64	MARBLE CANYON AREA HIGHLANDS	Highland area - Gb	195.5	6-64
Hgb-6-65	COTTONWOOD SPRING AREA HIGHLANDS	Highland area - Gb	57.3	6-65
Hgb-6-66	LEE FLAT HIGHLANDS	Highland area - Gb	104.3	6-66
Hgb-6-67	MARTIS VALLEY HIGHLANDS	Highland area - Gb	798.5	6-67
Hgb-6-68	SANTA ROSA FLAT HIGHLANDS	Highland area - Gb	101.6	6-68
Hgb-6-69	KELSO LANDER VALLEY HIGHLANDS	Highland area - Gb	52.9	6-69

**Table 1.** California Groundwater Units.—Continued

[GU ID is the unique groundwater unit identifier. GU name is the groundwater unit name. GU names in uppercase are the same names as those used in CDWR 2002 groundwater basin map publication except for the word “HIGHLANDS” when appended. GU type identifies one of three types of groundwater units: Groundwater basin, Highland area - Gb (groundwater-basin-based highland), or Highland area - Province (province-based highland). Related Gb references the basin-ID or subbasin-ID in the CDWR 2002 groundwater basin map publication. CDWR, California Department of Water Resources; km<sup>2</sup>, square kilometer; —, no data]

GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-6-7	ANTELOPE VALLEY HIGHLANDS	Highland area - Gb	791.1	6-7
Hgb-6-70	CACTUS FLAT HIGHLANDS	Highland area - Gb	84.8	6-70
Hgb-6-71	LOST LAKE VALLEY HIGHLANDS	Highland area - Gb	99.8	6-71
Hgb-6-72	COLES FLAT HIGHLANDS	Highland area - Gb	19.6	6-72
Hgb-6-73	WILD HORSE MESA AREA HIGHLANDS	Highland area - Gb	43.3	6-73
Hgb-6-74	HARRISBURG FLATS HIGHLANDS	Highland area - Gb	62.5	6-74
Hgb-6-75	WILDROSE CANYON HIGHLANDS	Highland area - Gb	44.5	6-75
Hgb-6-76	BROWN MOUNTAIN VALLEY HIGHLANDS	Highland area - Gb	100.8	6-76
Hgb-6-77	GRASS VALLEY HIGHLANDS	Highland area - Gb	25.9	6-77
Hgb-6-78	DENNING SPRING VALLEY HIGHLANDS	Highland area - Gb	38.2	6-78
Hgb-6-79	CALIFORNIA VALLEY HIGHLANDS	Highland area - Gb	115.5	6-79
Hgb-6-8	BRIDGEPORT VALLEY HIGHLANDS	Highland area - Gb	801.9	6-8
Hgb-6-80	MIDDLE PARK CANYON HIGHLANDS	Highland area - Gb	5.4	6-80
Hgb-6-81	BUTTE VALLEY HIGHLANDS	Highland area - Gb	44.7	6-81
Hgb-6-82	SPRING CANYON VALLEY HIGHLANDS	Highland area - Gb	69.6	6-82
Hgb-6-84	GREENWATER VALLEY HIGHLANDS	Highland area - Gb	172.8	6-84
Hgb-6-85	GOLD VALLEY HIGHLANDS	Highland area - Gb	36.1	6-85
Hgb-6-86	RHODES HILL AREA HIGHLANDS	Highland area - Gb	109.3	6-86
Hgb-6-88	OWL LAKE VALLEY HIGHLANDS	Highland area - Gb	96.8	6-88
Hgb-6-89	KANE WASH AREA HIGHLANDS	Highland area - Gb	37.2	6-89
Hgb-6-9	MONO VALLEY HIGHLANDS	Highland area - Gb	1,092.2	6-9
Hgb-6-90	CADY FAULT AREA HIGHLANDS	Highland area - Gb	30.7	6-90
Hgb-6-91	COW HEAD LAKE VALLEY HIGHLANDS	Highland area - Gb	37.0	6-91
Hgb-6-92	PINE CREEK VALLEY HIGHLANDS	Highland area - Gb	243.6	6-92
Hgb-6-93	HARVEY VALLEY HIGHLANDS	Highland area - Gb	85.8	6-93
Hgb-6-94	GRASSHOPPER VALLEY HIGHLANDS	Highland area - Gb	189.2	6-94
Hgb-6-95	DRY VALLEY HIGHLANDS	Highland area - Gb	34.5	6-95
Hgb-6-96	EAGLE LAKE AREA HIGHLANDS	Highland area - Gb	280.7	6-96
Hgb-6-97	HORSE LAKE VALLEY HIGHLANDS	Highland area - Gb	205.1	6-97
Hgb-6-98	TULEDADE CANYON VALLEY HIGHLANDS	Highland area - Gb	131.4	6-98
Hgb-6-99	PAINTERS FLAT HIGHLANDS	Highland area - Gb	52.3	6-99
Hgb-7-1	LANFAIR VALLEY HIGHLANDS	Highland area - Gb	284.3	7-1
Hgb-7-10	TWENTYNINE PALMS VALLEY HIGHLANDS	Highland area - Gb	17.1	7-10
Hgb-7-11	COPPER MOUNTAIN VALLEY HIGHLANDS	Highland area - Gb	31.8	7-11
Hgb-7-12	WARREN VALLEY HIGHLANDS	Highland area - Gb	128.2	7-12
Hgb-7-13	DEADMAN VALLEY HIGHLANDS	Highland area - Gb	121.8	7-13
Hgb-7-14	LAVIC VALLEY HIGHLANDS	Highland area - Gb	247.8	7-14
Hgb-7-15	BESSEMER VALLEY HIGHLANDS	Highland area - Gb	129.5	7-15

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-7-16	AMES VALLEY HIGHLANDS	Highland area - Gb	313.6	7-16
Hgb-7-17	MEANS VALLEY HIGHLANDS	Highland area - Gb	29.9	7-17
Hgb-7-18	JOHNSON VALLEY HIGHLANDS	Highland area - Gb	259.1	7-18
Hgb-7-19	LUCERNE VALLEY HIGHLANDS	Highland area - Gb	282.0	7-19
Hgb-7-2	FENNER VALLEY HIGHLANDS	Highland area - Gb	751.4	7-2
Hgb-7-20	MORONGO VALLEY HIGHLANDS	Highland area - Gb	142.8	7-20
Hgb-7-21	COACHELLA VALLEY HIGHLANDS	Highland area - Gb	2,159.9	7-21
Hgb-7-22	WEST SALTON SEA HIGHLANDS	Highland area - Gb	414.5	7-22
Hgb-7-24	BORREGO VALLEY HIGHLANDS	Highland area - Gb	384.9	7-24
Hgb-7-25	OCOTILLO-CLARK VALLEY HIGHLANDS	Highland area - Gb	433.5	7-25
Hgb-7-26	TERWILLIGER VALLEY HIGHLANDS	Highland area - Gb	19.9	7-26
Hgb-7-27	SAN FELIPE VALLEY HIGHLANDS	Highland area - Gb	169.9	7-27
Hgb-7-28	VALLECITO-CARRIZO VALLEY HIGHLANDS	Highland area - Gb	568.0	7-28
Hgb-7-29	COYOTE WELLS VALLEY HIGHLANDS	Highland area - Gb	189.0	7-29
Hgb-7-3	WARD VALLEY HIGHLANDS	Highland area - Gb	680.9	7-3
Hgb-7-30	IMPERIAL VALLEY HIGHLANDS	Highland area - Gb	204.1	7-30
Hgb-7-31	OROCOPIA VALLEY HIGHLANDS	Highland area - Gb	306.6	7-31
Hgb-7-32	CHOCOLATE VALLEY HIGHLANDS	Highland area - Gb	286.3	7-32
Hgb-7-33	EAST SALTON SEA HIGHLANDS	Highland area - Gb	262.7	7-33
Hgb-7-34	AMOS VALLEY HIGHLANDS	Highland area - Gb	184.2	7-34
Hgb-7-35	OGILBY VALLEY HIGHLANDS	Highland area - Gb	110.0	7-35
Hgb-7-36	YUMA VALLEY HIGHLANDS	Highland area - Gb	194.3	7-36
Hgb-7-37	ARROYO SECO VALLEY HIGHLANDS	Highland area - Gb	420.5	7-37
Hgb-7-38	PALO VERDE VALLEY HIGHLANDS	Highland area - Gb	50.5	7-38
Hgb-7-39	PALO VERDE MESA HIGHLANDS	Highland area - Gb	240.1	7-39
Hgb-7-4	RICE VALLEY HIGHLANDS	Highland area - Gb	204.4	7-4
Hgb-7-40	QUIEN SABE POINT VALLEY HIGHLANDS	Highland area - Gb	98.8	7-40
Hgb-7-41	CALZONA VALLEY HIGHLANDS	Highland area - Gb	137.9	7-41
Hgb-7-42	VIDAL VALLEY HIGHLANDS	Highland area - Gb	176.2	7-42
Hgb-7-43	CHEMEHUEVI VALLEY HIGHLANDS	Highland area - Gb	665.6	7-43
Hgb-7-44	NEEDLES VALLEY HIGHLANDS	Highland area - Gb	393.0	7-44
Hgb-7-45	PIUTE VALLEY HIGHLANDS	Highland area - Gb	343.3	7-45
Hgb-7-46	CANEBRAKE VALLEY HIGHLANDS	Highland area - Gb	58.9	7-46
Hgb-7-47	JACUMBA VALLEY HIGHLANDS	Highland area - Gb	38.8	7-47
Hgb-7-48	HELENDAL FAULT VALLEY HIGHLANDS	Highland area - Gb	39.6	7-48
Hgb-7-49	PIPES CANYON FAULT VALLEY HIGHLANDS	Highland area - Gb	56.3	7-49
Hgb-7-5	CHUCKWALLA VALLEY HIGHLANDS	Highland area - Gb	909.9	7-5
Hgb-7-50	IRON RIDGE AREA HIGHLANDS	Highland area - Gb	18.3	7-50

**Table 1.** California Groundwater Units.—Continued

[GU ID is the unique groundwater unit identifier. GU name is the groundwater unit name. GU names in uppercase are the same names as those used in CDWR 2002 groundwater basin map publication except for the word “HIGHLANDS” when appended. GU type identifies one of three types of groundwater units: Groundwater basin, Highland area - Gb (groundwater-basin-based highland), or Highland area - Province (province-based highland). Related Gb references the basin-ID or subbasin-ID in the CDWR 2002 groundwater basin map publication. CDWR, California Department of Water Resources; km<sup>2</sup>, square kilometer; —, no data]

GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-7-51	LOST HORSE VALLEY HIGHLANDS	Highland area - Gb	114.4	7-51
Hgb-7-52	PLEASANT VALLEY HIGHLANDS	Highland area - Gb	87.7	7-52
Hgb-7-53	HEXIE MOUNTAIN AREA HIGHLANDS	Highland area - Gb	30.1	7-53
Hgb-7-54	BUCK RIDGE FAULT VALLEY HIGHLANDS	Highland area - Gb	52.1	7-54
Hgb-7-55	COLLINS VALLEY HIGHLANDS	Highland area - Gb	256.8	7-55
Hgb-7-56	YAQUI WELL AREA HIGHLANDS	Highland area - Gb	179.9	7-56
Hgb-7-59	MASON VALLEY HIGHLANDS	Highland area - Gb	75.2	7-59
Hgb-7-6	PINTO VALLEY HIGHLANDS	Highland area - Gb	785.7	7-6
Hgb-7-61	DAVIES VALLEY HIGHLANDS	Highland area - Gb	31.2	7-61
Hgb-7-62	JOSHUA TREE HIGHLANDS	Highland area - Gb	177.5	7-62
Hgb-7-63	VANDEVENTER FLAT HIGHLANDS	Highland area - Gb	33.5	7-63
Hgb-7-7	CADIZ VALLEY HIGHLANDS	Highland area - Gb	386.9	7-7
Hgb-7-8	BRISTOL VALLEY HIGHLANDS	Highland area - Gb	879.4	7-8
Hgb-7-9	DALE VALLEY HIGHLANDS	Highland area - Gb	451.6	7-9
Hgb-8-1	COASTAL PLAIN OF ORANGE COUNTY HIGHLANDS	Highland area - Gb	563.4	8-1
Hgb-8-2	UPPER SANTA ANA VALLEY HIGHLANDS	Highland area - Gb	1,333.6	8-2
Hgb-8-4	ELSINORE HIGHLANDS	Highland area - Gb	278.9	8-4
Hgb-8-5	SAN JACINTO HIGHLANDS	Highland area - Gb	833.8	8-5
Hgb-8-6	HEMET LAKE VALLEY HIGHLANDS	Highland area - Gb	115.0	8-6
Hgb-8-7	BIG MEADOWS VALLEY HIGHLANDS	Highland area - Gb	125.6	8-7
Hgb-8-8	SEVEN OAKS VALLEY HIGHLANDS	Highland area - Gb	32.5	8-8
Hgb-8-9	BEAR VALLEY HIGHLANDS	Highland area - Gb	119.8	8-9
Hgb-9-1	SAN JUAN VALLEY HIGHLANDS	Highland area - Gb	404.0	9-1
Hgb-9-10	SAN PASQUAL VALLEY HIGHLANDS	Highland area - Gb	236.0	9-10
Hgb-9-11	SANTA MARIA VALLEY HIGHLANDS	Highland area - Gb	103.5	9-11
Hgb-9-12	SAN DIEGUITO CREEK HIGHLANDS	Highland area - Gb	184.4	9-12
Hgb-9-13	POWAY VALLEY HIGHLANDS	Highland area - Gb	76.9	9-13
Hgb-9-14	MISSION VALLEY HIGHLANDS	Highland area - Gb	145.0	9-14
Hgb-9-15	SAN DIEGO RIVER VALLEY HIGHLANDS	Highland area - Gb	977.8	9-15
Hgb-9-16	EL CAJON VALLEY HIGHLANDS	Highland area - Gb	29.3	9-16
Hgb-9-17	SWEETWATER VALLEY HIGHLANDS	Highland area - Gb	557.8	9-17
Hgb-9-18	OTAY VALLEY HIGHLANDS	Highland area - Gb	363.3	9-18
Hgb-9-19	TIA JUANA HIGHLANDS	Highland area - Gb	12.4	9-19
Hgb-9-2	SAN MATEO VALLEY HIGHLANDS	Highland area - Gb	334.9	9-2
Hgb-9-22	BATIQUITOS LAGOON VALLEY HIGHLANDS	Highland area - Gb	54.7	9-22
Hgb-9-23	SAN ELIJO VALLEY HIGHLANDS	Highland area - Gb	75.6	9-23
Hgb-9-24	PAMO VALLEY HIGHLANDS	Highland area - Gb	282.7	9-24
Hgb-9-25	RANCHITA TOWN AREA HIGHLANDS	Highland area - Gb	17.0	9-25

**Table 1.** California Groundwater Units.—Continued

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GU ID	GU Name	GU Type	Area (km <sup>2</sup> )	Related Gb
Hgb-9-27	COTTONWOOD VALLEY HIGHLANDS	Highland area - Gb	213.9	9-27
Hgb-9-28	CAMPO VALLEY HIGHLANDS	Highland area - Gb	178.1	9-28
Hgb-9-29	POTRERO VALLEY HIGHLANDS	Highland area - Gb	36.4	9-29
Hgb-9-3	SAN ONOFRE VALLEY HIGHLANDS	Highland area - Gb	100.1	9-3
Hgb-9-32	SAN MARCOS AREA HIGHLANDS	Highland area - Gb	63.6	9-32
Hgb-9-4	SANTA MARGARITA VALLEY HIGHLANDS	Highland area - Gb	378.4	9-4
Hgb-9-5	TEMECULA VALLEY HIGHLANDS	Highland area - Gb	894.4	9-5
Hgb-9-6	CAHUILLA VALLEY HIGHLANDS	Highland area - Gb	140.5	9-6
Hgb-9-7	SAN LUIS REY VALLEY HIGHLANDS	Highland area - Gb	837.2	9-7
Hgb-9-8	WARNER VALLEY HIGHLANDS	Highland area - Gb	366.5	9-8
Hgb-9-9	ESCONDIDO VALLEY HIGHLANDS	Highland area - Gb	110.8	9-9
—	Subtotal	453	234,431	—
Hp-1.1	Northern Coast Ranges - North Coast	Highland area - Province	164.3	None
Hp-1.2	Northern Coast Ranges - Central Coast	Highland area - Province	803.3	None
Hp-1.3	Northern Coast Ranges - Southern Coast	Highland area - Province	1,122.5	None
Hp-1.4	Northern Coast Ranges - Point Reyes	Highland area - Province	839.8	None
Hp-2	Klamath Mountains	Highland area - Province	479.1	None
Hp-3	Modoc Plateau and Cascades	Highland area - Province	2,418.0	None
Hp-4.1	Sierra Nevada - Tahoe	Highland area - Province	604.2	None
Hp-4.2	Sierra Nevada - Alpine County	Highland area - Province	863.6	None
Hp-5	Basin and Range	Highland area - Province	649.4	None
Hp-6	Northern and Southern Coast Ranges – San Francisco Bay and Delta	Highland area - Province	584.5	None
Hp-7.1	Southern Coast Ranges - Santa Cruz / Half Moon Bay	Highland area - Province	379.2	None
Hp-7.2	Southern Coast Ranges - Big Sur/Carmel	Highland area - Province	802.8	None
Hp-7.3	Southern Coast Ranges - San Luis Obispo	Highland area - Province	425.3	None
Hp-8.1	Transverse and Selected Peninsular Ranges - Santa Barbara	Highland area - Province	563.1	None
Hp-8.2	Transverse and Selected Peninsular Ranges - Malibu	Highland area - Province	345.2	None
Hp-8.3	Transverse and Selected Peninsular Ranges - Palos Verdes	Highland area - Province	49.1	None
Hp-9.1	San Diego Drainages- North San Diego Coastal	Highland area - Province	382.9	None
Hp-9.2	San Diego Drainages - South San Diego Coastal	Highland area - Province	582.5	None
Hp-9.3	San Diego - South San Diego	Highland area - Province	695.7	None
Hp-10.1	Desert - Eastern	Highland area - Province	701.2	None
Hp-10.2	Desert - Southern	Highland area - Province	49.6	None
Hp-11	Southern Cal Islands (Group)	Highland area - Province	903.0	None
—	Subtotal	22	14,408	—
—	Grand Total	938	409,817	—

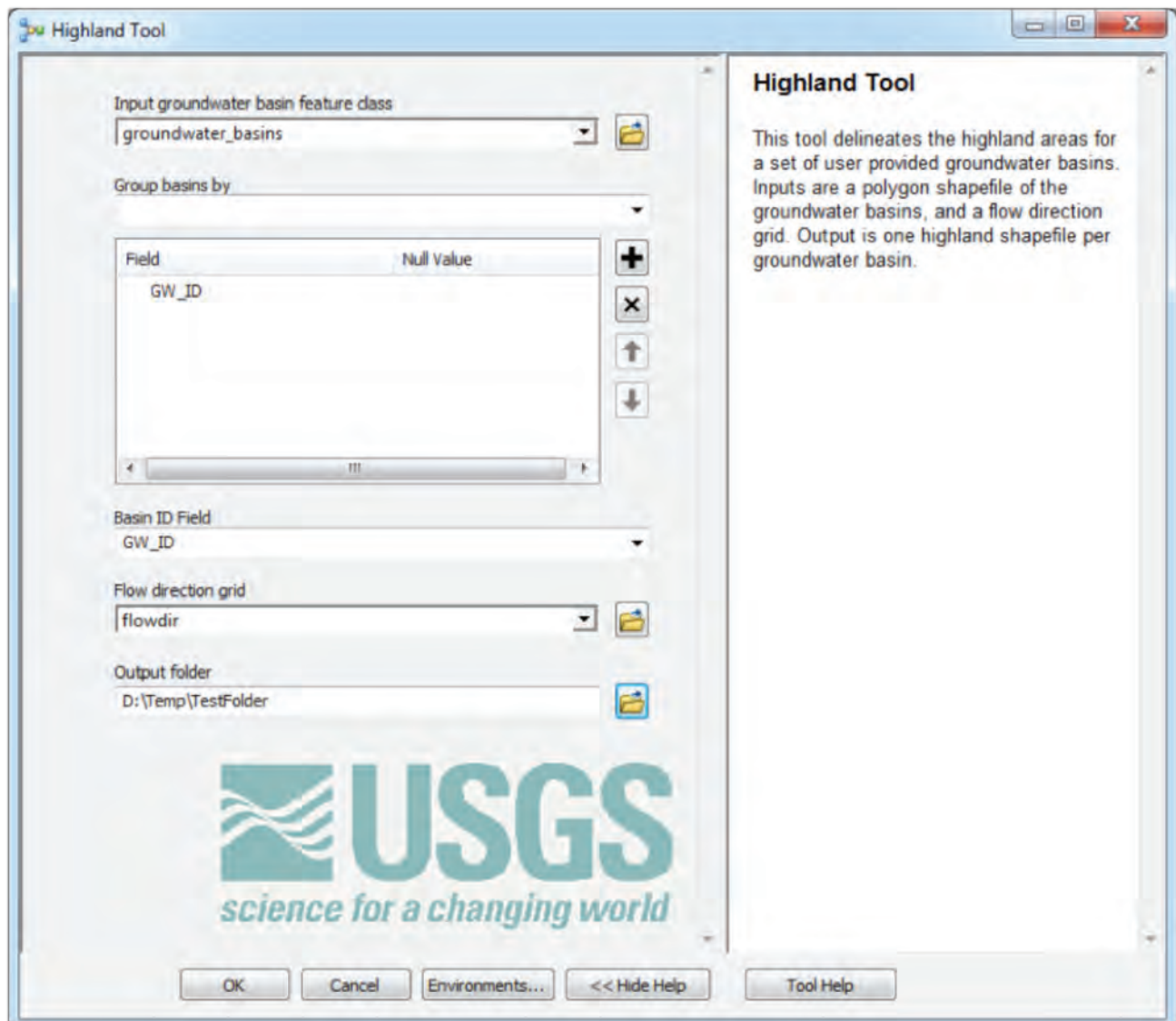


## Appendix: Highland Geoprocessing Tool

The Highland geoprocessing tool was developed to assist with the automated delineation of groundwater basin highland areas. The tool was written for use in Esri's ArcGIS 10.1 software. The following is the documentation for the tool. The tool interface can be seen in [figure A1](#), and the ModelBuilder schematic is displayed in [figure A2](#). Two input datasets are required for the tool to operate: a flow-direction grid and a polygon feature class of groundwater basin boundaries.

The Highland tool selects the first basin in the groundwater basin input file and then temporarily codes all the other basins to a value of "1000." The tool uses the newly changed basin values to recode the cell values of the flow-direction grid to "1000" for these non-participating basins. This will effectively stop flow from moving through these reclassified basins. The net effect is a localized flow-direction

grid for each selected basin that excludes any flow that will be captured by an upslope basin. Next, the tool uses Esri's Watershed tool to delineate a single drainage basin based upon this newly created, custom flow-direction grid, effectively creating a highland area for the groundwater basin. The Highland tool then selects the next basin and restarts the process. The tool will iterate through the entire input dataset until a highland has been delineated for each groundwater basin for which one should exist. Some basins may be completely surrounded by other groundwater basins, and therefore, no highland area will be created. Once highland areas have been created for all appropriate basins, they can be merged together into a single geodataset in a separate process outside of the Highland tool. The tool does not delineate province-based highland areas.



**Figure A1.** Example of Highland tool interface within ArcGIS.

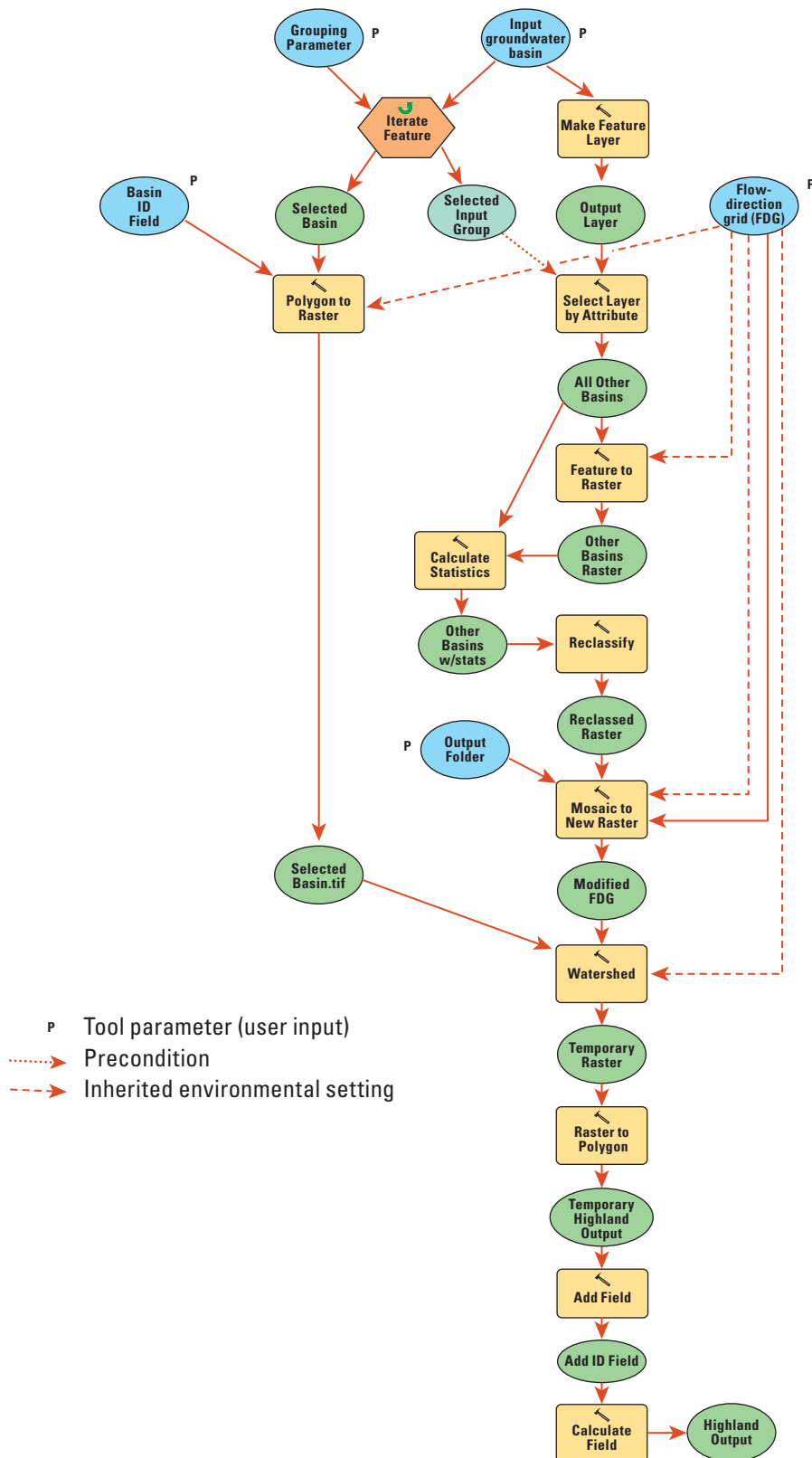


Figure A2. ArcGIS ModelBuilder (Esri) schematic of the Highland tool.



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