3 NUMERICAL MODEL CONSTRUCTION

DWR's best-management practices for modeling include guidance stating that "Models should maintain simplicity and parsimony of hydrogeologic parameters, while simultaneously simulating the important hydrogeologic details that will drive basin sustainability" (Joseph and others, 2016). Although this DWR guidance was published only recently, the simple and economical approach has long been preferred by groundwater modelers, and was used by United during construction of the VRGWFM.

The first step in construction of the VRGWFM was selection of a suitable modeling "platform" (software) and determination of appropriate spatial and temporal limits or boundaries for the model (the domain). The next step was to decide how to subdivide (discretize) both space and time in the model such that the simulation results were produced at an appropriate scale to meet the modeling objectives (described in Section 1), while keeping computing requirements reasonable. Next, estimates of aquifer hydraulic parameters were entered into digital input files ("packages"), completing construction of the basic model framework. Finally, known and estimated aquifer stresses over the calibration period (1985 through 2015) were entered into input files. With this information, together with instructions regarding how the model should process input and output, the modeling software computes heads and flows throughout the model domain based on a numerical solution of the partial-differential equation defining groundwater flow (the continuity equation). Comparison of model-simulated groundwater elevations to measured historical groundwater elevations, typically accompanied by adjustment of modeled aquifer parameters as needed to reduce any differences, is referred to as calibration, which is discussed in Section 4.

3.1 MODEL SOFTWARE SELECTION

The USGS software package MODFLOW-NWT was selected by United to be the modeling platform for initial development of the VRGWFM. MODFLOW-NWT "is a Newton-Raphson formulation for MODFLOW-2005 to improve solution of unconfined groundwater-flow problems" (Niswonger and others, 2011). As described in Section 2, the groundwater system in the study area is influenced by cycles of extended drought and wet periods that cause groundwater levels to fluctuate over 100 feet, requiring a numerical model capable of simulating the desaturation and resaturation (drying and wetting) of portions of the aquifers. MODFLOW-NWT was developed in large part to simulate this type of condition.

The first version of MODFLOW was released to the public in 1984 by the USGS, with the intent of producing a new groundwater flow modeling software package that "could be readily modified, was simple to use and maintain, could be executed on a variety of computers with minimal changes, and was relatively efficient with respect to computer memory and execution time" (McDonald and Harbaugh, 1988). As noted by the USGS, "MODFLOW's modular structure has provided a robust framework for integration of additional simulation capabilities that build on and enhance its original scope. The family of MODFLOW-related programs now includes capabilities to simulate coupled groundwater/surface-water systems, solute transport, variable-density flow (including saltwater), aquifer-system compaction and land subsidence, parameter estimation, and groundwater management" (Anderson and others, 2015). MODFLOW is currently recognized as "the most widely used code for solving groundwater flow problems," and its success is in large part due to the fact that "MODFLOW allows for addition of modules and linking or coupling with other codes; it is freely available with detailed documentation" (Anderson and others, 2015).

Specific MODFLOW-2005 packages used for the historical calibration version of the VRGWFM described in this report include:

- Basic (BAS)—Specifies the type of each grid cell in the model (active, inactive, or constant head) and initial heads throughout the model domain.
- Discretization (DIS)—Defines the spatial and temporal discretization of the model.
- Upstream Weighting (UPW)—Specifies properties controlling flow between model grid cells (e.g., hydraulic conductivity and storage properties).
- Newton Solver (NWT)—Provides parameters for the solution to the finite-difference equations used in each time step of the model period.
- Output Control (OC)—Specifies which head, drawdown, or water budget data will be saved for each model simulation.
- General Head Boundary (GHB)—Simulates head-dependent flux boundaries (i.e., the southwest boundary of the model representing aquifer interaction with the Pacific Ocean, and the northeast boundary of the model representing interaction with the Santa Paula basin).
- Multi-Node Well (MNW2)—Represents wells in the model, and is the preferred package for simulating wells that are screened across multiple layers.
- Recharge (RCH)—Simulates United's artificial recharge operations areal recharge (from deep percolation of precipitation, agricultural irrigation return flows, and M&I return flows), and recharge of treated wastewater via WWTP percolation ponds.
- Well (WEL)—Simulates a specified flux (inflow or outflow) to specific model grid cells for each stress period; used in the VRGWFM along the model's outer active boundary to represent the following:
- Mountain-front recharge (both the "bedrock recharge" and the "ungauged streamflow" described in Section 2.7),
- Underflow of groundwater from the East Las Posas to the Pleasant Valley basin.
- Stream (STR)—Simulates groundwater inflow and outflow to streams with a significant hydraulic connection to shallow groundwater (Santa Clara River, Conejo Creek, and Arroyo Las Posas).
- Horizontal Flow Barrier (HFB)—Simulates faults that have significant influence on groundwater flow patterns (i.e., form a barrier or conduit to flow).
- Drain (DRN)—Simulates the effects of tile drains and other drainage systems present in areas of shallow groundwater.

- Evapotranspiration (EVT)—Simulates the removal of water from the saturated zone via evaporation and transpiration (by phreatophytic plants)

MODFLOW-NWT (and all other MODFLOW versions and packages developed by the USGS) are available to the public at no charge from the USGS, as is the software documentation (https://water.usgs.gov/ogw/modflow-nwt/). Because of this availability, documentation, and abundant peer review, selection of MODFLOW-NWT for the VRGWFM conforms with DWR "guiding principles for models used in support of GSPs," regarding model selection:

1. "Model documentation (documentation of model codes, algorithms, input parameters, calibration, output results, and user instructions) is publicly available at no cost. In particular, the model documentation should explain (or refer to available literature that explains) how the mathematical equations for the various model code components were derived from physical principles and solved, and guidance on limitations of the model code."
2. "The mathematical foundation and model code have been peer reviewed for the intended use. Peer review is not intended to be a "stamp-of-approval" or disapproval of the model code. Instead, the goal of peer review is to inform stakeholders and decision-makers as to whether a given model code is a suitable tool for the selected application, and whether there are limits on the temporal or spatial uses of the model code, or other analytic limits."

United staff felt that due to the large fluctuations observed in groundwater elevations in the study area and the potential for aquifers to fluctuate between confined and unconfined conditions repeatedly over time, MODFLOW-NWT would yield the most efficient solution for each simulation. In the future, the VRGWFM may be adapted to the unstructured-grid version of MODFLOW, "MODFLOW-USG" (Panday and others, 2013), which could provide an even more efficient solution for modeling at a finer spatial resolution in specific areas of interest.

3.2 MODEL DOMAIN, OUTER BOUNDARIES, AND GRID DESIGN

The current active domain of the VRGWFM includes the Forebay, Mound, Oxnard Plain, Pleasant Valley, and West Las Posas basins, part of the Santa Paula basin, and the submarine (offshore) outcrop areas of the principal aquifers that underlie the Oxnard Plain and Mound basins (see Figure 1-2). The active model domain spans approximately 176,000 acres (275 square miles), of which 62 percent (108,000 acres or 170 square miles) is onshore and 38 percent (68,000 acres or 106 square miles) is offshore.

3.2.1 Model Domain and Outer Boundaries

Lateral boundaries of the VRGWFM vary by layer, as shown on Figures 3-1 through 3-13, but can generally be defined as follows:

- The eastern edge of the active model domain in the West Las Posas and Pleasant Valley basins adopts a no-flow boundary coincident with the East Las Posas basin boundary and the Central Las Posas Fault (Figures 1-2 and 2-10). Modeling conducted for Calleguas suggests that groundwater flow from the East to West Las Posas basin is so small as to be negligible (Intera, 2018).
- The northeastern boundary of the active model domain currently terminates just inside Santa Paula basin. In the future, the VRGWFM will extend up the Santa Clara River valley to include the Santa Paula, Piru, and Fillmore basins, eliminating the need for this general-head boundary. This boundary is currently simulated as a general-head boundary in Layers 3 through 11 (Layers 1 and 2 are not known to extend into Santa Paula Basin, and Layers 12 and 13 terminate south east of the Forebay), with groundwater fluxes influenced by historical groundwater elevation data from seven wells, including , 02N22W01M01S, 02N22W02K07S, 02N22W02K09S, 02N22W03K02S, 02N22W03M02S, , 02N22W03M03S, and 02N22W10C02S.
- The northern boundary of the active model domain coincides with the contact of Pleistocene and Holocene alluvial deposits with the San Pedro Formation at the base of the hills along the northern edge of the Mound and West Las Posas basins. Deep percolation of rainfall in the San Pedro Formation in this area recharges the upper San Pedro Formation (Layer 7, corresponding to the Hueneme Aquifer farther south) and Fox Canyon Aquifers (Layers 9 and 11); this process is simulated using the WEL package in model grid cells along this boundary, and recharge catchment areas are calculated based on the extent of the San Pedro Formation outcrop north of the model boundary (discussed further in Section 3.5).
- The southeastern boundary of the active model domain coincides with the contact between Holocene alluvial fill deposits and poorly permeable bedrock of the Conejo Volcanics along the foothills of the Santa Monica Mountains. Mountain-front recharge to the Semi-perched Aquifer is implemented in the model adjacent to this boundary using the WEL package. In the southernmost part of this area, where the Oxnard Plain basin abuts La Jolla Peak, the drainage areas are very small, and are assumed to produce negligible mountain-front recharge.
- The southwestern boundary of the active model domain extends offshore to the submarine outcrop areas of the UAS and LAS. The interaction of seawater with freshwater in aquifers that outcrop under the seafloor and in submarine canyons is implemented as a general-head boundary, as shown on Figures 3-1 through 3-13.
- The northwest boundary of the active model domain corresponds with an assumed hydraulic divide offshore from the western margin of the Mound basin. Little is known regarding the specific hydrogeologic conditions along this boundary, which is not only under the Pacific Ocean, but is up to 10 miles from the nearest water-supply well. However, because this boundary is so far distant from the nearest water-supply well, it is unlikely to have a significant effect on calibration of the model or on simulation of future water-supply scenarios.

3.2.2 Grid Design and Resolution

The domain of the VRGWFM was discretized (subdivided) into finite-difference grid cells and layers such that basin-scale hydrogeologic features, boundaries, and flow patterns could be simulated at an acceptable level of resolution, while keeping model run-times to a reasonable length (typically less than 30 minutes) during calibration and sensitivity analysis. At present, the VRGWFM model-grid spacing is a uniform 2,000 feet (in both the north-south and east-west directions), divided into 13 layers of variable thickness. The uniform grid spacing allows for efficient processing of input and output parameters, and avoids potential numerical issues that can result from having grid cells with high aspect ratios. The model grid currently consists of 137 columns by 75 rows, and is rotated 26 degrees counter-clockwise from true north to align the dominant groundwater flow directions (southwest and southeast) with the primary axes of the model grid, as recommended by the USGS (McDonald and Harbaugh, 1988). The coordinate offsets are 6,151,000 and 1,790,000 feet relative to the NAD 1983 State Plane Zone 5 system. The current active area of the model domain is approximately 18 percent of the total. Initially, the grid size was set at a uniform 2,000-feet per side. The computation time for the 2,000-foot-grid model was reasonable, less than 10 minutes per simulation, and was used for the model calibration and sensitivity analyses described in this report.

3.3 MODEL LAYERING

The VRWGFM includes the seven aquifers and six aquitards occurring in the study area (details provided in Section 2.5) as individual model layers; Figure 3-14 illustrates how the model layers are adapted to the variable hydrostratigraphy in each basin. The top elevations and thicknesses of each aquifer and aquitard in the hydrostratigraphic conceptual model were used to input top and bottom elevations for each model layer. Where HSUs pinch out, the corresponding model layer thickness is set to 1 foot to preserve the integrity of finite difference grid. Where doing so would not interrupt simulation of flow between layers, these "pinched out" areas were set as inactive (typically Layers 1 or 2).

3.4 ASSIGNMENT OF INITIAL AQUIFER PARAMETERS

This section presents the input values to the VRGWFM for horizontal hydraulic conductivity, vertical conductance between layers, specific yield, storage coefficient, and conductance across horizontal flow barriers (faults). Conductance values and other input parameters applied to local-scale features and stresses (e.g. drains or stream channels), are presented in Section 3.5. As noted in Section 2, previous investigators have typically estimated aquifer hydraulic parameters for the UAS and LAS rather than for individual aquifers within those systems. This is because most wells in the study area are screened across multiple aquifers, resulting in a very small number (typically just a few per basin) of aquifer-specific, long-term, multi-well analyses of hydraulic conductivity or storage coefficients within the study area, often separated by distances measured in miles. The more common single-well specific capacity tests in the study area can provide an indication of the general range of hydraulic conductivity in the immediate vicinity of each well, but such values should be considered only as initial estimates applicable within a few hundred feet to yards of each well. Therefore, significant uncertainty regarding aquifer hydraulic parameters exists in the "real world" even before model construction begins, and it is rarely feasible to conduct an aquifer testing program that would eliminate all such data gaps. Rarely is the hydraulic conductivity matrix known with confidence across a basin. The DWR's best-management practices for modeling state that "hydrogeologic parameters such as hydraulic conductivity, specific yield and leakance coefficients are often modified during model calibration" (Joseph and others, 2016). This was United's approach to assigning aquifer hydraulic parameters in the VRGWFM; start with values based on available data (or typical values reported in the literature for the soil and rock types present), then adjust the values as appropriate (within reasonable ranges) during model calibration, as described in Section 4.

3.4.1 Hydraulic Conductivity

A number of aquifer tests and slug tests have been performed within the study area by United and the USGS. The aquifer test results are tabulated in Table 3-1. The slug test results are tabulated in Table 3-2. Inspection of the aquifer test results (Table 3-1) suggests that the hydraulic conductivity for the UAS in the Forebay basin is in the range of 50 to 300 ft/day, and the hydraulic conductivity of the LAS in the Forebay basin is in the range of 10 to 50 ft/day. The slug test results suggest that in the Oxnard Plain basin, the hydraulic conductivity of the UAS ranges from less than 1 ft/day to 128 ft/day, with most results in the range from 20 to 40 ft/day, while hydraulic conductivity in the LAS ranges from 0.01 ft/day to 70 ft/day, with most results in the range from 1.0 to 20 ft/day. The inferred hydraulic conductivity values from the tabulated aquifer and slug tests were used to set the range of initial aquifer parameters in the mode; the initial vertical anisotropy ratio was set to 0.1. The most sensitive parameter influencing calibration of simulated to measured heads is typically hydraulic conductivity; this parameter is typically also subject to the greatest variability and uncertainty. Therefore, hydraulic conductivity commonly receives the greatest degree of adjustment during model calibration. The final calibrated aquifer parameters are more influenced by the transient water level measurements from all the available wells than by individual aquifer tests and slug tests, which are typically representative of only the local area around the wells during the time they were tested. The horizontal hydraulic conductivities ultimately applied to the calibrated model are shown on Figures 3-15 through 3-27.

3.4.2 Specific Yield and Storage Coefficient

The default values for specific yield in Semi-perched Aquifer, UAS aquifers, and LAS aquifers are 0.15, 0.15 and 0.1, respectively. The default value for specific yield in all aquitards is 0.05. The model calibration (Section 4) shows that only the specific yields in Semi-perched Aquifer and UAS aquifers have limited effect on simulated water level. The final calibrated specific yields are the same as the default value. The default values for dimensionless storage coefficient in all aquifers and aquitards is 0.001. After model calibration, the storage coefficient remains 0.001 in semi-perched aquifer and UAS system. The dimensionless storage coefficient in LAS system varies from 0.0005 to 0.002.

3.4.3 Horizontal Flow Barriers (Faults)

Several faults have been documented as affecting groundwater flow in the study area, and were modeled as horizontal flow barriers during previous modeling by the U.S. Geological Survey (Hanson and others, 2003). The fault locations and potential for affecting groundwater flow were reviewed by United geologists, then were implemented in the VRGWFM using the Horizontal Flow Barrier (HFB) package. Figures 3-15 through 3-27 show the locations of faults in each model layer that act as horizontal flow barriers, together with the conductance across those faults.

3.5 ASSIGNMENT OF AQUIFER STRESSES

This section presents the input values to the VRGWFM for aquifer stresses, categorized as recharge or discharge. Table 3-3 summarizes the recharge and discharge rates (as annual averages) input to the model and compares them to the estimated long-term average inflow and outflow components in the study area that were estimated by previous investigators (as discussed in Section 2 and summarized in Table 2-2). Some of inflow and outflow components to the study area are known with a reasonable level of confidence and can be directly translated to the model as recharge and discharge components, on a one-to-one basis (e.g., pumping and artificial recharge rates). However, some of the inflow and outflow components estimated by previous investigators were associated with significant uncertainty due to limited data availability, or were averages for limited time periods in the past that may not be representative for current hydrologic conditions in the region, and thus do not necessarily match model recharge and discharge quantities (e.g., irrigation return flows and ET rates) very closely. In such cases, reasonable application rates were estimated from the previous investigations or from other methods (described below in this section) and applied to current land uses to calculate total recharge or discharge volumes in the model to be used for a starting point. These volumes (or rates) were then adjusted in the calibration process (the final calibrated average flow rates are what is shown in Table 3-3).

Several of the groundwater flow components in the study area are calculated by the model as the product of hydraulic gradients and conductivities, rather than being input directly (e.g., groundwater underflows and seawater intrusion rates). These inflows and outflows are typically among the most difficult to measure or estimate in the field, and are subject to large uncertainty; therefore, groundwater modeling is commonly considered to provide the best estimates. Inflows and outflows calculated by the model, rather than input directly, are shown in Table 3-3 in italics, and are provided solely for comparison purposes.

3.5.1 RECHARGE PROCESSES

Each of the known sources of groundwater recharge within the study area required for input to the VRGWFM is described in this section. The RCH package was used to input artificial recharge, deep infiltration of precipitation, agricultural and M&I return flows, and percolation of treated wastewater (via ponds at two WWTPs) to the VRGWFM. The WEL package was used to input mountain-front recharge, and the STR package was used to simulate stream-channel recharge in the VRGWFM.

Table 3-3. Comparison of Previous Estimates of Groundwater Inflow and Outflow Components in Study Area to VRGWFM Recharge and Discharge Rates for Historic Calibration Period

Groundwater Inflow or Outflow Component	Estimates from Available Data or Previous Investigations (AF/yr)[a]	VRGWFM Recharge and Discharge Rates (AF/yr)
Inflows: (**bold** font used for components that are required as input to the VRGWFM, *italic* font used for flows that are calculated by the VRGWFM [provided solely for comparative purposes])		
Artificial Recharge (at Saticoy and El Rio Spreading Grounds)	**48,000**	**48,000**
Areal Recharge (combined deep infiltration of precipitation and return flows [Ag + M&I])	**38,000 to 43,000**	**48,000[b]**
Mountain-Front Recharge (sum of ungauged streamflow and bedrock recharge)	**3,000**	**7,900[b]**
Percolation of Treated Wastewater at WWTPs	**280**	**280**
Stream-Channel Recharge in Santa Clara River	*8,400*	*9,600*
Stream-Channel Recharge in Arroyo Las Posas	*4,000*	*4,300*
Groundwater Underflow from Santa Paula Basin	*1,800 to 7,400*	*3,800*
Groundwater Underflow from East Las Posas Basin	*700 to 1,900*	*1,600*
Net Seawater Intrusion into UAS and LAS	*12,000*	*9,400*
Outflows: (**bold** font used for components that are required as input to the VRGWFM, *italic* font for flows that are calculated by the VRGWFM [provided solely for comparative purposes])		
Pumping from Water-Supply Wells	**130,000[c]**	**130,000[b]**
Shallow groundwater drainage (to tile and other manmade drain systems)	*8,000 to 12,000*	*12,000*
ET	*15,000*	*9,900*
Discharge of Shallow Groundwater in Semi-perched Aquifer to Santa Clara River	*1,500*	*1,200*
Semi-perched Aquifer Discharge to Pacific Ocean	*No previous estimates*	*1,100*

Notes:

[a] Details regarding sources and calculation methods for averages calculated from existing data or estimated by previous investigators are provided in Section 2.7 and Table 2-2. Most of the averages summarized in this column are for the combined area of the Oxnard Plain, Forebay, Pleasant Valley, Mound, and West Las Posas basins. The relatively small inflow and outflow quantities occurring in the minor area of the active domain of the VRGWFM located outside of those basins (e.g., western margin of Santa Paula basin) are generally not included in the averages presented in this column.

[b] The VRGWFM-input or -calculated quantities listed in this table for these inflows and outflows include the entire active model domain, including small areas outside of the Oxnard Plain, Forebay, Pleasant Valley, Mound, and West Las Posas basins. Therefore, these quantities can be somewhat higher than those listed in the first column of this table, which generally focus specifically on these basins.

[c] Unlike most quantities listed in this column, the estimated total pumping from water-supply wells was calculated for the entire active model domain. Therefore, it is identical to the VRGWFM-input average pumping rate.

3.5.1.1 Artificial Recharge

Monthly artificial recharge rates (measured and recorded by United) at the Saticoy and El Rio spreading basins during the model calibration period (January 1985 through December 2015) were input to the model grid cells representing those basins using the recharge (RCH) package (typically in Layer 3). The time-averaged rates of areal (including artificial) recharge input to each grid cell in the VRGWFM are shown on Figure 3-28. During the model calibration period, the largest time-averaged areal recharge rates have occurred in the Saticoy and El Rio spreading basins. Because artificial recharge rates have been measured by United and reported on a monthly basis, they could be directly entered into the recharge package without modification and without adjustment during the calibration process.

3.5.1.2 Stream-Channel Recharge

Interaction between surface-water and groundwater is known to occur in the Santa Clara River, Arroyo Las Posas, Conejo Creek, and Calleguas Creek. Stream-channel recharge (losing reaches) is the dominant process, but some discharge of groundwater from the Semi-perched Aquifer to surface water (gaining reaches) occurs in the lowest reaches of the Santa Clara River and Calleguas Creek, near the coast. This interaction is modeled with the stream (STR) package in the VRGWFM. Locations (reaches) where the STR package was applied to the model are shown on Figures 3-1 through 3-3.

The monthly stream flow rates estimated for the Santa Clara River are listed in Table 3-4. The stream flows along Arroyo Las Posas from East Las Posas were based on the groundwater modeling by Calleguas (Intera, 2018). Stream-channel recharge was simulated using the stream package (STR). There is also stream-channel recharge in Arroyo Las Posas. This was simulated in the well package (WEL). The monthly inflow for Arroyo Las Posas from 1985 to 2015 is listed in Table 3-5.

The monthly stream flow rates for Conejo Creek (Table 3-6) are based on a stream gauge in the Santa Rosa basin, just outside of the active model domain for the VRGWFM. A portion of the surface water in Conejo Creek is diverted in Pleasant Valley basin, just downstream from U.S. Highway 101 in Camarillo. The monthly volumes diverted are also listed in Table 3-6. Approximately one mile south from Highway 101, a WWTP operated by the Camarillo Sanitation District (CamSan) discharges approximately 4,000 AF/yr of treated wastewater. A portion of the discharge is sent to nearby farms for irrigation. The WWTP discharge to Conejo Creek is estimated to be 2 cubic feet per second (cfs), or about 1450 AF/yr (e-mail communication with Mark Richardson). Calleguas Creek receives the combined flows from Conejo Creek and Arroyo Las Posas.

The STR package requires the input of stream channel hydraulic parameters, including width, slope, and roughness. The stream channels of the Santa Clara River, Arroyo Las Posas, Conejo Creek, and Calleguas Creek vary greatly over time, as storms can significantly change their characteristics. The average active stream channel width for Santa Clara River was assumed to be 100 feet in the Forebay and gradually increase to 120 feet near its mouth at the coast. The channel width for other streams (Arroyo Las Posas, Conejo Creek and Calleguas Creek) is assumed to average 50 feet. The stream slope was calculated based on the stream bed elevation. The Manning's roughness coefficient for each channel is assumed to be 0.035.

3.5.1.3 Deep Infiltration of Precipitation

Monthly precipitation data were collected from 180 rainfall gauge stations across Ventura County (See Table 3-7). The monthly precipitation records were downloaded from the Ventura County Watershed Protection District (http://www.vcwatershed.net/hydrodata/). The Kriging method of geostatistical analysis was used to generate monthly precipitation distributions across Ventura County. Areal recharge from deep infiltration of precipitation was input to the VRGWFM using the RCH package, and was calculated as described below.

After determining the distribution of monthly rainfall across Ventura County, land use (agricultural, urban, or undeveloped) was the primary variable for estimating deep infiltration of precipitation. The baseline for land use was determined using the 2008 Southern California Association of Governments (SCAG) geographic information system (GIS) data for Ventura County (http://gisdata-scag.opendata.arcgis.com/datasets/land-use-ventura). Land-use changes over the years (1984, 1990, 1996, 2002, 2008, and 2012) were obtained from the California Department of Conservation "Farmland Monitoring and Mapping Program" (FMMP) GIS data http://www.conservation.ca.gov/dlrp/fmmp/Pages/Ventura.aspx), and were used to adjust the baseline (2008) land use in the corresponding years (Figure 2-2).

For agricultural land, three recharge rates (the percent of groundwater recharge relative to the precipitation) were considered for estimating deep infiltration of precipitation:

1. A constant percentage of annual precipitation.
2. The Grunsky (1915) method, described in Section 2.7.
3. An adaptation of the Turner (1991) method (also described in Section 2.7), with a minimum monthly rainfall rate that could produce deep infiltration and a maximum percentage of rainfall assigned to deep infiltration.

Of these three potential approaches, the first method assumes a constant percentage of rainfall becomes deep infiltration; this approach, while simple, does not take into account minimum rainfall required to produce deep infiltration, or the greater infiltration rates expected to occur during particularly wet months or years. The second method (Grunsky, 1915) accounts for increasing recharge with increasing rainfall, but relies on annual precipitation totals to establish recharge rates; this approach poorly represents monthly precipitation subtotals in Ventura County (most precipitation falls during a limited number of storms in winter months). For these reasons, deep infiltration of precipitation on agricultural and undeveloped land was input to the VRGWFM using the third approach, adjusted and guided by model calibration. This approach is based on monthly precipitation rather than annual, and the recharge rate increases with monthly precipitation. Specifically, the first 0.75 inch of monthly precipitation is assumed to evaporate or wet the soil matrix in the vadose zone, and does not infiltrate deeply enough to recharge the underlying groundwater. If monthly precipitation in an agricultural or undeveloped area exceeds 0.75 inches, a fraction of that precipitation will infiltrate deeply enough to become recharge, according to the following rules:

- If monthly precipitation is less than 0.75 inch, then no recharge is assigned in that area;
- If monthly precipitation is 0.75 to 1 inch, then recharge is assigned from 0 to 10 percent of precipitation (on a sliding scale);
- If monthly precipitation is 1 to 3 inches, then recharge is assigned from 10 to 30 percent of precipitation
- If monthly precipitation is greater than 3 inches, then recharge is assigned as 30 percent of precipitation.

All three approaches to estimating deep infiltration of precipitation on agricultural land were tested during model development. For the first approach, the constant fraction of precipitation that was assumed to become recharge was specified (after several trial-and-error attempts) as 15 percent. This value yielded the best calibration during dry and average years, but tended to result in simulated groundwater elevations that were higher than measured groundwater elevations in wet years. The second (Grunsky) and third approaches yielded similar results, except in extreme wet years when the simulated groundwater elevations resulting from the Grunsky method tended to be higher than measured values. Therefore, the third approach was applied to the current version of the VRGWFM.

For urban and built-up lands, including residential, commercial, and industrial areas, a fixed percentage of 5 percent of precipitation was used to account for deep percolation of rainfall.

And for the limited area of undeveloped land within the active domain of the VRGWFM, 10 percent of rainfall was assumed to become recharge.

The recharge from deep infiltration of precipitation is implemented using the RCH package. The following example illustrates how precipitation recharge was calculated for each model grid cell; due to the size of each grid cell (2,000 by 2,000 feet), many cells include multiple land use types. Assuming land use in a model cell is 45 percent agricultural, 35 percent urban, and 20 percent undeveloped, and that monthly precipitation is 2.5 inches, the recharge rate for agricultural land use is set at 25 percent of monthly precipitation. Based on these assumptions, the total precipitation recharge to this model cell would be:

Total Monthly Rainfall x (Agricultural Recharge Rate x Percentage of Agricultural Land + Urban Recharge x Percentage of Urban Land + Undeveloped Recharge Rate x Percentage of Undeveloped Land)

= 2.5 inches per month x (0.25 x 0.45 + 0.05 x 0.35 +0.10 x 0.20) = 0.375 inches per month

3.5.1.4 Agricultural Return Flows

Areal recharge resulting from infiltration of agricultural return flows to the underlying aquifer is also simulated in the VRGWFM using the recharge package (RCH). Water for agricultural irrigation in the study area typically comes from three sources: groundwater pumped from nearby wells, groundwater and surface water (diverted from the Santa Clara River) delivered via the PTP and PVP, and surface water diverted from Conejo Creek. Agricultural return flow was calculated based on applied groundwater and surface water in each model grid cell.

Farmers apply irrigation water to meet evaporation, transpiration, and salt-leaching demands on their fields (when rainfall is insufficient to meet those demands), with the goal of maintaining acceptable crop yields. The salt-leaching requirement (LR) is the percentage of "extra" irrigation water required to control salt concentrations in root zone. Water applied to meet the LR is assumed to flow past the root zone and reach the underlying aquifer; most water applied to meet evaporation and transpiration demands are assumed not to reach the aquifer. As described in Section 2.7, the ITRC (2010) lists LRs for various crops in Ventura; using these LRs, United calculated the average LR for the study area (based on crop acreage and the distribution uniformity factor of 0.8) to be 0.14, as listed in Table B3 (United, 2013). This average LR of 14%, was used as the initial value to calculate the recharge resulting from agricultural return flows for the RCH package. During model calibration, the LR values were evaluated basin by basin. The model calibration shows that a LR value of 0.20 is more appropriate for all basins except that the LR value in Oxnard Basin (Oxnard Plain and Oxnard Forebay) is 0.25.

3.5.1.5 Municipal and Industrial Return Flows

Similar to agricultural return flows, areal recharge resulting from infiltration of M&I return flows to the underlying aquifer is simulated in the VRGWFM using the recharge package. As noted in Section 2.7, recharge resulting from deep percolation of M&I return flows was initially assumed to be 5 percent of total M&I water use. During development of the VRGWFM, a study of urban recharge in a portion of Los Angeles County, the adjacent county to the east of Ventura County, was completed by the Water Replenishment District of Southern California (WRD) and the USGS (Hevesi and Johnson, 2016). Their investigation used a daily precipitation-runoff model to estimate recharge and runoff for the greater Los Angeles area, and found average recharge in the urban portion of their study area to be 8 percent of the combined inflow from precipitation and urban irrigation. Applying the Hevesi and Johnson (2016) results to urban portions of the VRGWFM study area, and assuming that 50 percent of M&I water is used for outdoor irrigation (landscaping and parks), the calculated percentage of M&I water that becomes return-flow recharge is 4%, which is close to the 5 percent assumed in the VRGWFM.

3.5.1.6 Mountain-Front Recharge

Mountain-front recharge is input to the model as specified fluxes in the model grid cells adjacent to each small drainage system (sub-watershed) along the margins of the model area, using the WEL package. Mountain-front recharge rates in outcrops of the San Pedro Formation in the northern and northeastern portions of the study area, and at the base of the Santa Monica Mountains (Figure 2-17), are calculated based on monthly precipitation rates and the area of each sub-watershed receiving the precipitation. Model grid cells receiving mountain-front recharge are shown on Figure 3-29. The monthly mountain-front-recharge rates input to the model follow the precipitation/recharge-percentage relationship used for agricultural return flows, but use sub-watershed area (immediately upstream from the active model domain) rather than grid-cell area to calculate monthly volumetric recharge rates. Mountain-front recharge at the base of the Santa Monica Mountains is applied to the uppermost active grid cell. Mountain-front recharge entering the San Pedro Formation along the margins of the Mound, West Las Posas, and Pleasant Valley basins is applied to Layers 7, 9, and 11 (corresponding to the LAS aquifers that receive recharge via outcrops of the San Pedro Formation).

3.5.1.7 Percolation of Treated Wastewater

Recharge of treated wastewater occurring in percolation ponds at the Saticoy and Montalvo WWTPs is simulated in the VRGWFM using the recharge package (RCH). The monthly percolation volumes reported to in the State's GeoTracker system (as described in Section 2.7) are simply added to other areal recharge rates specified for the model grid cells corresponding to the WWTP percolation-pond sites. As noted in Section 2.7, the small volume of percolation from septic tanks (1,000 AF/yr total, distributed across the entire study area) represents approximately 1 percent of the estimated total recharge in the study area, and is implicitly included with agricultural or municipal/industrial return flows, rather than attempting to simulate each domestic septic system as a distinct source of recharge.

3.5.2 Discharge Processes

Each component of groundwater discharge required for input to the VRGWFM is described in this section.

3.5.2.1 Pumping from Water-Supply Wells

Of the 1,790 water-supply wells for which United and the FCGMA have extraction records, 943 are present in the active model domain of the current version of the VRGWFM. Most of the extraction records for these wells consist of reported pumping volumes for 6-month periods (most, but not all, are for the periods January-June, and July-December). To estimate monthly pumping from each well based on these records, a precipitation-weighted formula was used. The volume pumped in a particular month was assumed to be inversely proportional to the precipitation for that month. When monthly precipitation was less than 0.6 inch (0.05 feet), the monthly precipitation is assumed to be 0.6 inch for the purpose of estimating monthly pumping from each well.

Groundwater withdrawals from wells in the study area were implemented using the multi-node well (MNW2) package. The location and construction information for each well is tabulated in Table 3-8. In the MNW2 package, the option "SPECIFYcwc" is used. The minimum conductance is set to be 2,000 square feet. If the well casing diameter is larger than 12 inches, the conductance is increased proportionally.

3.5.2.2 Drainage

Tile drains were implemented using MODFLOW's drain package (DRN). Model grid cells with simulated tile drains in the uppermost active layer are shown on Figure 3-30, corresponding with agricultural areas where tile drains are known or suspected to exist, as discussed in Section 2.7 and shown on Figure 2-24. The tile drain depths are set at 7 feet below ground surface (see Section 2.7 for rationale). The conductance for drains is assumed to be 10,000 square feet.

3.5.2.3 Evapotranspiration

ET was implemented using MODFLOW's evapotranspiration package (EVT). Model grid cells with simulated evapotranspiration in the uppermost active layer are shown on Figure 3-30, corresponding with areas of mapped wetlands fed by shallow groundwater (as discussed in Section 2.7 and shown on Figure 2-24). The maximum ET flux is 0.010 feet per day (3.65 ft/yr) for model grid cells that are subject to ET over their entire area, slightly higher than the midpoint of USGS-estimates of ET from wetlands in the study area. The maximum ET flux is scaled down proportionally for grid cells that are only partially occupied by wetlands. The ET surface elevation is set at 3 feet below ground surface, and the ET extinction depth is set at 5 feet.

3.5.3 Groundwater/Seawater Interface Parameters

Groundwater/seawater interaction—outflow of groundwater from the aquifers of the Oxnard Plain and Mound basins to the Pacific Ocean, and inflow of seawater to those aquifers when hydraulic gradients are reversed—is simulated using a general head boundary along the southwestern (offshore) margin of the active model domain. Groundwater/seawater interaction is allowed in all aquifers except the Grimes Canyon Aquifer, which is not known to crop out offshore within the study area. The Grimes Canyon Aquifer is known to extend offshore, but outcrops have not been mapped in the Hueneme and Mugu submarine canyons where seawater intrusion is likely to occur. Groundwater/seawater interaction on the seafloor is assumed to be insignificant within the six aquitards due to their much lower hydraulic conductivities compared to the aquifers; however, once seawater enters the aquifer system, the model allows lateral and vertical groundwater flow within and through the aquitards. Groundwater/seawater interaction at the aquifer/ocean interface is currently simulated using a general-head boundary, as this approach is significantly less numerically intensive than attempting to model variable-density flow for the 31-year historical calibration period of the VRGWFM. In addition, insufficient data are currently available to define the current extents and sources of saline groundwater in each aquifer, let alone historical extents, with the level of accuracy that would be needed to construct and calibrate a variable-density flow model. At present, simulating seawater intrusion as a general-head boundary is suitable for United's intended uses of the VRGWFM. In the future, should the need arise to conduct a detailed simulation of variable-density flow in the study area—and assuming additional groundwater quality data are obtained in the area of suspected seawater intrusion to justify such an effort—a MODFLOW-compatible seawater-intrusion package could potentially be applied to the VRGWFM.

In the Semi-perched (uppermost) Aquifer, represented by Layer 1 of the model, the interaction with seawater is assumed to take place on the seafloor adjacent to the coast. In the Oxnard and Mugu Aquifers (UAS), represented by model Layers 3 and 5, groundwater/seawater interaction is assumed to occur at the depth and location of the Mugu Aquifer submarine outcrop (Figure 3-5). In the Hueneme, main Fox Canyon, and basal Fox Canyon Aquifers (LAS), represented by model Layers 7, 9, and 11, groundwater/seawater interaction is assumed to occur at the depth and location of the San Pedro Formation submarine outcrop (Figures 3-7, 3-9, and 3-11), each layer's location varying slightly with depth.

Actual mean sea level along the Ventura County coast is 2.73 feet above the 1988 NAVD datum, which is used to define elevations in the VRGWFM (including land surface). Therefore, the prescribed head for the general-head boundary representing the Pacific Ocean is increased above 0 feet msl to account for the greater density of seawater compared to fresh water, as follows:

$$\text{prescribed head (feet)} = 2.73 + 0.0245*(2.73 - \text{cell elevation})$$

The modeled conductance of the general-head boundary representing the Pacific Ocean was initially set to 1,000 feet squared per day (ft^2/day) in Layers 3, 5, 7, 9, and 11. In Layer 1, initial conductance was set to 10,000 ft^2/day, reflecting the larger contact area present between the ocean and the Semi-perched Aquifer on the gently sloping Ventura and Hueneme-Mugu Shelves, compared to the deeper aquifers that crop out primarily along steeper slopes farther offshore and in the walls of the Hueneme and Mugu submarine canyons.

3.6 ASSIGNMENT OF INITIAL HEADS

The starting water level on January 1st, 1985 for the transient flow model was iteratively modified in the model calibration. Initially the water level measurements for UAS and LAS in December 1984 were selected to calculate the starting water level by Kriging. The Kriged groundwater levels for the UAS and LAS form the initial heads matrix for the transient flow model simulation. In model calibration, a portion of the December 1984 groundwater level measurements were adjusted and more control points were added to modify the Kriged initial head. The final initial heads for the Semi-perched Aquifer, the UAS, and the LAS are shown on Figures 3-31, 3-32, and 3-33, respectively.

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4 RESULTS OF MODEL CALIBRATION AND SENSITIVITY ANALYSIS

By comparing simulated groundwater levels with measured groundwater levels, and adjusting model input parameters (as described in Section 3) to minimize the differences, a set of calibrated input parameters was determined to yield a reasonably good fit, while remaining consistent with the hydrogeologic conceptual model. The DWR's BMPs for modeling (Joseph and others, 2016) note that:

> *"Calibration is performed to demonstrate that the model reasonably simulates known, historical conditions. Calibration generally involves iterative adjustments of various model aspects until the model results match historical observations within an agreed-to tolerance. Hydrogeologic parameters such as hydraulic conductivity, specific yield and leakance coefficients are often modified during model calibration... Aspects of the water budget, such as recharge rate or private pumping rate, may also be modified during calibration."*

Input parameters that were adjusted during calibration of the VRGWFM included:

- hydraulic conductivity
- specific yield and storage coefficient
- stream-channel conductance
- general-head boundary conductance
- horizontal flow barrier conductance
- areal recharge rates
- multi-node well parameters

Following calibration, sensitivity analysis of the VRGWFM was conducted to identify model input parameters and boundary conditions that have a particularly strong influence on model output. As suggested by DWR, "Parameters that are both highly sensitive and poorly constrained may be good candidates for future data collection" (Joseph and others, 2016). Results of both the calibration process and sensitivity analysis for the VRGWFM are described below.

4.1 CALIBRATION

Few groundwater basins in agricultural regions have been studied and monitored to the extent that the basins in the study area for the VRGWFM have. The location, timing, and magnitude of the major inflow (artificial recharge) and outflow (groundwater pumping) components to and from the principal aquifers in the study area are known (since 1980 and 1985) to a much higher degree of accuracy than is typical in most basins, and groundwater elevation data are available from an extensive network of monitoring wells. This data richness not only provides for understanding of the environmental setting (conceptual model) for groundwater flow in the study area, but also allows extensive calibration of the numerical model, reducing the potential for non-uniqueness of model solutions and the uncertainty in model output. When construction of the VRGWFM began in 2013, the calibration period was intended to include January 1985 through December 2012, with monthly stress periods consisting of a single time step each. The model calibration period was selected in consideration of the following:

- Pumping records for individual wells became available over most of the study area in 1985. United began requiring reporting of semi-annual pumping rates in their service area in 1980, and the FCGMA required reporting of semi-annual pumping rates at wells in their service area by 1985. United's and the FCGMA's service areas overlie most of the active domain of the VRGWFM.
- Reporting of groundwater level elevations became more frequent and widespread starting in the early- to mid-1980s.
- The late-1980s was a drought period in southern California, associated with record-setting groundwater-level declines, which was then followed by the wettest period on record in the region (1992 through 2005), resulting in rapid recovery of groundwater elevations. Calibrating the VRGWFM to these widely varying hydrogeologic conditions was thought to increase the likelihood that the model would be capable of forecasting groundwater elevations and flow rates under a broad range of potential future climate and water-supply scenarios.

Another major drought began in 2012 in the region, resulting in new record-low groundwater levels in the study area. In 2016, the model-calibration period was extended through December 2015, to include groundwater elevation changes observed during this latest drought. Currently the calibration period of the VRGWFM is from January 1985 through December 2015, with 372 monthly stress periods.

An extensive groundwater level monitoring network in Ventura County has been maintained by FCGMA and UWCD for decades. This network includes wells screened in the UAS, LAS and across both aquifer systems. There are also production wells being monitored for water level measurements. For evaluation of water level changes over time (hydrographs), wells with more than 100 water level measurements were selected to adequately cover the modeling area. Where coverage by wells with 100 and more measurements was poor, wells with less than 100 measurements were selected. In the case of monitoring wells screened across multiple aquifers (and, therefore, model layers), the maximum of simulated water levels from the layers the well is screened through was used for calibration target in most instances. If some cases, the water levels measured in multiple-aquifer wells appeared to be primarily representative of one specific aquifer (based on comparison to surrounding wells); in these cases, the simulated water level from the model layer representing that specific aquifer was used as the calibration target. It is also important to note that the simulated water level from production wells is based on the simulated water level in the aquifers adjacent to each well's screened interval, not the simulated water level output from the MNW2 package of MODFLOW, because most water level measurements from production wells were obtained while the production wells were turned off (to measure a static groundwater level representative of the water level in the aquifer).

The USGS recognizes that "most models of specific ground-water systems…are calibrated by matching observed heads and flows," and recommends that "the evaluation of the adequacy of the calibration of a model should be based more on the insight of the investigators and the appropriateness of the conceptual model rather than the exact value of the various measures of goodness of fit" (Reilly and Harbaugh, 2004). United calibrated the VRGWFM by comparing simulated to measured groundwater elevations and flow rates, and adjusting selected model input parameters (listed above) within a reasonable range as necessary and appropriate, such that simulation results better matched measured values. Following are the primary comparison approaches used during calibration of the VRGWFM:

- Simulated groundwater elevations in each aquifer at specific times were plotted on contour maps and compared to measured groundwater levels at those times, to qualitatively evaluate the model's ability to simulate overall groundwater flow pattern within the study area.
- Simulated groundwater elevations over time at specific wells were plotted together with measured groundwater levels at those wells, using hydrographs, to evaluate the model's ability to simulate groundwater-level declines and recoveries during past droughts and wet periods.
- Simulated groundwater elevations at each calibration well were compared against groundwater elevations measured at those wells, using scatterplots, to evaluate the model's overall ability to simulate the range of groundwater elevations that occurred within the study area during the calibration period.
- Residuals (the difference between simulated and measured groundwater elevations) were plotted on maps, to evaluate whether significant spatial bias was present in the model (e.g., areas where the model consistently under- or over-predicted groundwater elevations).
- Simulated groundwater underflows between basins and at the boundaries of the study area were compared to each other and to available information (which was often limited) for actual underflows within the study area to qualitatively evaluate how well the numerical model simulated overall trends of groundwater movement within the study area.

As DWR cautions in their modeling BMPs, "No model is perfectly calibrated, and establishing desired calibration accuracy *a priori* is difficult" (Joseph and others, 2016). Despite this difficulty, United felt that setting an initial, specific calibration target for groundwater-elevation residuals during development of the model was important, to provide a quantitative measure of how well each model run (using a different set of input parameters) compared to real-world conditions. Therefore, an initial goal during model calibration was to target an absolute residual mean (ARM) of 20 feet or smaller—additional, related calibration statistics are presented in the following subsections. This ARM target is 5 percent of the observed range of groundwater elevations (from -200 to +200 ft msl) in the study area, substantially smaller than the industry standard of 10 percent.

The following subsections describe the degree to which the resultant, calibrated numerical model compares to, or "fits," the hydrogeologic conceptual model based on the qualitative and quantitative approaches described above.

4.1.1 Simulated Groundwater Levels

Simulated groundwater elevations (commonly referred to as hydraulic heads, or simply “heads”) were contoured for each the seven aquifers in the study area at two key historical times—October 1991 (near the end of previous major drought in the region), and October 2006 (a year of high groundwater elevations following record-setting rainfall in 2005 and associated recharge in 2005 and 2006). In addition, simulated groundwater elevations were contoured for December 2015, which is the most recent month in the model-calibration period and falls in another major drought period. These groundwater-elevation contours are shown on Figures 4-01 through 4-21.

Figures 4-02, 4-05, 4-09, 4-12, 4-16, and 4-19, which show simulated groundwater-elevation contours for Layer 3 (representing the Oxnard Aquifer) and Layer 9 (representing the Fox Canyon Aquifer), also show contours in the UAS and LAS, respectively, prepared by United staff from measured groundwater elevation during fall of the corresponding year in the Oxnard Plain and Pleasant Valley basins. United staff prepared the UAS contours based on groundwater elevations measured at wells screened partially or completely through the Oxnard Aquifer, Mugu Aquifer, or both aquifers; United did not extend these contours into the Pleasant Valley basin as there are few UAS wells there. United staff prepared the LAS contours based on groundwater elevations measured at wells screened partially or completely through the Hueneme, Fox Canyon (main and basal), and Grimes Canyon Aquifers. Because many of the measured groundwater elevations were obtained from wells screened partially through an aquifer, or across more than one aquifer, the corresponding contours drawn by United for the UAS and LAS can only be considered to be approximately representative of actual groundwater elevations within the Oxnard Aquifer and the main Fox Canyon Aquifer, and would not be expected to perfectly match simulated groundwater elevations in Layers 3 or 9. In addition, there are some data gaps between well locations and other issues that require significant interpretation and professional judgment when the measured groundwater levels are contoured.

Despite these differences between simulated contours for specific model layers versus contours drawn by United staff more generally for the UAS and LAS, the overall trends are qualitatively similar, confirming that the VRGWFM reasonably simulates overall patterns of groundwater flow in these aquifer systems during periods of both high and low groundwater elevations. The largest differences between model-derived contours and the hand-drawn contours occur in Layer 9 near the El Rio Spreading Grounds (Figures 4-05, 4-09, and 4-12). In this area, there are typically large differences between measured groundwater elevations in the Hueneme Aquifer and the main Fox Canyon Aquifer. United draws its LAS contours based on measured groundwater elevations in the Hueneme Aquifer, rather than the main Fox Canyon Aquifer, near the El Rio Spreading Grounds. Therefore, the LAS contours are not expected to be similar to simulated groundwater elevations in Layer 9 better represent groundwater elevations in the main Fox Canyon Aquifer in this area than the hand-drawn contours for the LAS. Historically, there have been notable differences between measured groundwater elevations in the UAS versus those in the LAS; however, measured groundwater elevation differences between aquifers that comprise the UAS are typically relatively small (this is true for the LAS, as well, except in the Hueneme Aquifer near El Rio Spreading Grounds, as noted above). Therefore, groundwater elevations in Layer 5 of the model (Mugu Aquifer) would be expected to be similar to those in Layer 3 (Oxnard Aquifer) except in the vicinity of Mugu Lagoon, where measured groundwater elevations in the Mugu Aquifer are typically lower than those in the Oxnard Aquifer. Similarly, groundwater elevations in Layers 7, 11, and 13 (Hueneme, basal Fox Canyon, and Grimes Canyon Aquifers) would be expected to be similar to those in Layer 9 (main Fox Canyon Aquifer). Figures 4-02 through 4-21 indicate that these expected similarities are reflected in the output from the VRGWFM.

United does not prepare groundwater elevation contour maps for the Semi-perched Aquifer, and is not aware of mapping by others of groundwater elevations in the Semi-perched Aquifer at a basinwide scale suitable for comparison to simulated groundwater elevation contours for Layer 1. The patterns of the simulated Layer 1 contours are generally consistent over time, as shown on Figures 4-01, 4-08, and 4-15: groundwater elevations rise gently from the coastline to the interior of the Oxnard coastal plain, then rise more steeply in the Mound and the West Las Posas basins, in general conformance with land surface elevations. This is consistent with the historical groundwater elevation trends measured in the Semi-perched Aquifer, as described in Section 2.8.

4.1.2 Hydrographs at Selected Wells

In transient groundwater flow models, it is important to compare simulated to observed (measured) groundwater elevations over time to evaluate how well the model simulates aquifer reaction to short- and long-term changes in stresses (chiefly recharge and pumping). Time-series hydrographs comparing simulated to measured groundwater elevations were prepared for selected wells in the study area, as discussed above in Section 4.1. Wells screened in the UAS, LAS, or both aquifer systems and used for model calibration are shown on Figures 4-22 through 4-24. Hydrographs showing simulated and measured groundwater elevations over time at selected, representative wells in each basin or sub-basin in the study area (in the Semi-perched Aquifer, UAS, and LAS) are shown on Figures 4-25 through 4-35. Due to space limitations, not all hydrographs used or considered during model calibration could be plotted on these figures at a readable size. Hydrographs that show simulated and measured water levels for all wells used for model calibration are provided in Appendix B.

In the Forebay, the simulated hydrographs are mostly in close agreement with measured water levels (Figures 4-25 and 4-26). A notable exception is well 02N22W26B03S (Appendix B, page B-9), screened in the LAS, has simulated water levels similar to measured water levels in the UAS. This apparent discrepancy may simply be indicative of well construction that allows transmission of UAS hydraulic heads to the screened interval of this well (e.g., leaky casing or a gravel pack that extends above the screened interval into an aquifer of the UAS).

In the Oxnard Plain basin, simulated hydrographs are also generally in good agreement with measured water levels (Figures 4-28 through 4-31). The UAS and LAS show distinct patterns in timing and magnitude of fluctuations in groundwater levels; this is reflected in simulated groundwater levels at most wells. However, there are a few wells reportedly screened in UAS with water-level trends similar to the LAS (e.g., 01N21W32Q05S and 01S22W01H03S). There are also some wells reportedly screened in LAS with water-level trends similar to the UAS (e.g., 01N22W03F05S and 01N22W20J05S). At these wells with anomalous measured water-level trends, simulated heads can deviate substantially from measured heads. However, it is not always clear whether the anomalous measured groundwater levels accurately represent heads in the aquifer system the well is believed to be screened across. In other words, there is sometimes uncertainty regarding which aquifer a ***measured*** groundwater level is representative of. In these cases, differences between measured and simulated groundwater levels may indicate inaccurate or misinterpreted data rather than numerical-model issues. It is important to note that the VRGWFM is appropriately calibrated to the majority of wells in the Oxnard Plain basin (and the study area, overall).

In the Pleasant Valley basin, simulated hydrographs again are generally in good agreement with measured water levels (Figures 4-32 and 4-33). It is notable that the pronounced groundwater mounding observed from 1993 to 2015 in the northern Pleasant Valley basin (resulting from increased Arroyo Las Posas flows during that period, as described in Section 2) was accurately simulated (e.g., wells 02N20W19F04S and 02N20W19L05S). Similar to the Oxnard Plain basin, there are some wells reportedly screened in the UAS that have patterns of water-level fluctuation more consistent with wells in the LAS (e.g., 01N20W06C01S and 02N21W34G05S), resulting in substantial residuals. A significant effort was made to improve the calibration at these wells. However, it was found that when the calibration for these particular wells were improved, calibration of a large percentage of other wells suffered. Ultimately, these larger residuals were accepted at this small number of UAS wells to preserve the calibration at the majority of the remaining LAS wells, since most water-supply wells in Pleasant Valley are screened in the LAS.

In the Mound basin, because of its small area and largely urbanized (rather than agricultural) land use, there are fewer wells compared to other basins in the study area. Most wells in the Mound basin are screened in the LAS. The simulated hydrographs are generally in good agreement with measured water levels (Figure 4-27). Most residual means (discussed further in Section 4.1.4) in this basin are less than 10 feet, and the ARM is less than 20 feet. However, two Mound basin wells screened in the UAS (i.e., 02N23W15J03S and 02N22W07M03S) have relatively "flat" measured water levels through both wet years and dry years, inconsistent with trends at most other wells in the study area. Review of well construction logs indicated that these wells were screened in fine-grained materials, leading to uncertainty regarding whether measured water levels at these two wells are truly reflective of actual heads in the aquifer. Due to this uncertainty, these two wells were excluded as targets for calibration. There are three wells where simulated hydrographs match poorly with measured water levels, which are also of short duration; these wells are 02N22W09K05S, 02N22W09L03S, and 02N22W09L04S (Appendix B). These wells are located near well 02N22W09K04S, which is well-calibrated. All four wells of these wells are screened in the Hueneme Aquifer (model Layer 7). However the water levels in 02N22W09K04S are much lower than the other three wells (02N22W09K05S, 02N22W09L03S, and 02N22W09L04S), and well 02N22W09K04S is located up-gradient of those three wells. It was decided that adjustment of model parameters to improve model calibration at the three wells (02N22W09K05S, 02N22W09L03S, and 02N22W09L04S) with short periods of record and anomalously low water levels, at the expense of calibration at other wells, would not be appropriate at this time.

In the West Las Posas basin, there are three distinct hydrogeologic features that influenced the water-level calibration effort. First, the UAS of the Oxnard Plain basin does not extend into West Las Posas basin, being replaced by a shallow alluvial aquifer (Figure 3-14). Second, the Hueneme Aquifer of the Oxnard Plain basin does extend into the West Las Posas basin. Third, faults known or suspected to influence groundwater flow (Section 2.4) are present along the southern flank of South Mountain (La Loma, Fox Canyon, Berylwood Faults), and the Springville Fault occurs along the south margin of West Las Posas basin. Three corresponding "signatures" can be discerned in measured water levels in the West Las Posas basin (Figures 4-34 and 4-35). Water levels in the shallow alluvial and the upper San Pedro Formation are relatively stable and typically greater than 100 ft msl (e.g., wells 02N21W01L01S, 02N21W11J06S, 02N21W11A02S, and 02N21W16J01S). Simulated hydrographs match measured water levels reasonably well in the shallow alluvial aquifer (except in well 02N21W16J01S). Measured water levels in the LAS fluctuate substantially between wet and dry years, ranging from below -200 to 0 ft msl. The groundwater model was able to mimic the trends in measured water levels in the LAS, and the simulated hydrographs fit well with measured water levels in a majority of wells screened in the LAS. Most of the measured water levels near the faults along South Mountain fluctuate seasonally, except at well 02N21W03L01S (Appendix B), which exhibits an increasing water level trend, perhaps influenced by unknown local geologic features that have not been incorporated into the hydrogeologic conceptual model. The groundwater model was able to simulate water levels in a number of wells in the area near the southern flank of South Mountain (e.g., 02N21W08L02S, 03N21W35P01S, and 03N21W35P02S), while simulated water levels in wells 02N21W08G01S, 02N21W09D02S, 03N20W32G02S, and 03N20W32F02S are close to the measured data. Overall, the groundwater model was able to simulate water level trends in most shallow and LAS wells, but not in wells 02N21W03L01S and 02N21W16J01S. It should be noted that the wells near the boundary between Oxnard Plain and West Las Posas basins (i.e., 02N21W08D01S, 02N21W07Q01S, 02N21W07R01S, 02N21W18H03S, 02N21W19A03S, 02N21W19B02S, 02N21W20F02S, and 02N21W29L02S) are well calibrated, which should provide accurate simulation of underflow between the Oxnard Plain and West Las Posas basins.

4.1.3 Scatter Plots

All measured groundwater levels from 1985 to 2015 within the model domain are compared with simulated groundwater levels in scatter plots, which are shown (organized by groundwater basin) on Figures 4-36 through 4-40. The scatter plots are further divided based on the aquifer system each well is screened in (UAS, LAS, or both).

Figure 4-36 shows the scatter plots for wells in the Forebay. For wells screened in the UAS, the simulated water levels fit very well with the water level measurements. For wells screened in the LAS, the simulated water levels also fit well with the water level measurements, except the simulated water levels in one production well 02N22W26B03S (El Rio #14) are significantly lower than measured water levels (as discussed further in Section 4.1.2). For wells screened in both the UAS and the LAS, the simulated water levels are consistent with measured water levels.

Figure 4-37 shows the scatter plots for wells in the Oxnard Plain basin. For wells screened in the UAS, the simulated water levels are similar to measured water levels, except for a few wells (e.g., 01N21W32Q05S and 01N21W32Q07S) screened in Mugu Aquifer (model Layer 5), which have measured water levels that are more consistent with the LAS than the UAS (discussed in more detail in Section 4.1.2). Simulated water levels at these wells are fairly stable at approximately 0 ft msl, while measured water levels are lower. For wells screened in the LAS and in both the UAS and LAS, most of the simulated water levels are within 20 feet of measured water levels and there is little to no significant bias apparent in the scatter plots.

Figure 4-38 shows the scatter plots for wells in the Pleasant Valley basin. For wells screened in the UAS, many of the simulated water levels are greater than the measured water levels, consistent with the discussion in Section 4.1.2. Efforts to further reduce the residuals in the UAS led to greater residuals in LAS (where the vast majority of production wells in the Pleasant Valley basin are screened), thus were halted during calibration of this version of the VRGWFM. For wells screened in the LAS (and across both the UAS and LAS), most of the simulated water levels are within 20 feet of measured water levels, and there is no obvious bias.

Figure 4-39 shows scatter plots for wells in the Mound basin. Relatively few measured water levels are available from a handful of wells in the Mound basin, and this paucity of data is reflected in the scatter plot. The majority of simulated water levels are similar to measured water levels, except for the anomalous measured water levels as noted in Section 4.1.2.

Figure 4-40 shows the scatter plots for wells in the West Las Posas basin. Note that the range between the highest to lowest measured groundwater levels in the West Las Posas basins is much greater than all other basins in the study area. This is reflected in the scales for the horizontal and vertical axes of Figure 4-40. Similar to the Mound basin, historical water level data are limited in the West Las Posas basin. Because there are no calibration wells screened solely within the shallow alluvial aquifer, only scatter plots for wells screened across the LAS, and both the shallow alluvial and the LAS, are included. The scatter plots indicate that the majority of simulated water levels are similar to measured water levels, although there are some wells with substantial differences between simulated and measured water levels, as mentioned in Section 4.1.2.

4.1.4 Residual Plots

To evaluate the potential for spatial bias of model residuals, the mean residual (the mean of measured minus simulated water levels) at each well used for model calibration is shown in map view on Figures 4-41 through 4-43. A positive mean residual indicates measured water levels are, on average, higher than simulated water levels. Conversely, a negative mean residual indicates that measured water levels are, on average, lower than simulated water levels. Wells with fewer than 100 water level measurements were excluded from these maps, so that wells with limited data would not have undue influence. The wells with at least 100 water level data were further divided into three groups: UAS, LAS, and both aquifer systems, based on the well screen interval.

Figure 4-41 shows the mean residuals at UAS wells. The mean residuals at the majority of UAS wells are small (between -10 and +10 feet), and most of the remainder are within the target range (-20 to +20 feet). This is consistent with calibration measures discussed in previous subsections. There are two UAS wells in the Pleasant Valley basin and one in the Oxnard Plain basin with mean residuals exceeding +/-30 feet (Figure 4-41); further discussion of the larger differences between simulated and measured water levels is provided in the preceding subsections. In the southern Oxnard Plain basin (near Mugu Lagoon) and eastern Pleasant Valley basin, the mean residuals in the UAS that exceed +/-10 feet are all negative, indicating simulated water levels are, on average, somewhat higher than measured water levels in these areas.

Figure 4-42 shows the mean residuals at LAS wells. Similar to the UAS, the majority of mean residuals in the LAS fall in the +/-10-foot range or the the +/-20-foot range. Several wells have mean residuals falling in the +/-30-foot range. Two LAS wells in the Pleasant Valley basin and one in the Oxnard Plain basin have mean residuals that fall outside of the +/-30-foot range (Figure 4-42).

Figure 4-43 shows the mean residuals at wells screened across both the UAS and the LAS. A relatively small number of wells that are screened across both the UAS and LAS meet the minimum number of water-level measurements for plotting on Figure 4-43. The mean residuals that are plotted mostly fall in the +/-10-foot range or the +/-20-foot range, with two falling in the +/-30-foot range.

Overall these mean residual plots suggest no overall trends of spatial bias across the study area that would indicate basinwide problems with the hydrogeologic conceptual model or numerical-model calibration. The larger mean residuals (greater than +/-30 feet) present at a few locations can mostly be attributed to uncertainty regarding well construction, rather than numerical model problems.

4.1.5 Flow Budget

The flow budget from a groundwater model may serve as an important verification of the conceptual model as well as a tool to better understand groundwater flow dynamics, particularly in areas of inter-basin flow and flow at basin boundaries. The flow budget of the VRGWFM is summarized below by zone—Forebay, Oxnard Plain, Pleasant Valley, Mound, and Las Posas basins—as well as by aquifer system (shallow/Semi-perched, UAS, and LAS). These flow-budget zones are slightly different from the areas of the groundwater basins, as the active domain of the VRGWFM commonly extends beyond the traditional basin boundaries as defined by DWR or United. Also, the flow-budget zone for Las Posas basin includes the boundary between the Pleasant Valley basin and both the East and West Las Posas basins north of Camarillo. The calculated flux between Las Posas and Pleasant Valley in the flow budget is actually the flow budget between the Somis area in East Las Posas and Pleasant Valley. Figure 4-44 shows the flow-budget zones discussed in this section.

Monthly flow quantities from January 1985 through December 2015 output from the model for each flow budget zone (basin) are provided in Appendix C. In this section, annual-average flow budgets for each zone (basin) are discussed and presented in Tables 4-1 through 4-5. It should be noted that the annual flow budgets provide an approximate description of groundwater interaction within basins and between basins. To fully understand the groundwater flow dynamics, the monthly budgets provided in Appendix C show the variability in a basin's flow budget from wet to dry periods.

Table 4-1 summarizes the annual average flow budget for the Forebay flow-budget zone. Artificial recharge (by United) is the dominant source of inflow, while underflow to the Oxnard Plain basin and pumping from wells in the Forebay represent the major sources of outflow. Underflow to the Mound basin, while much smaller than underflow to the Oxnard Plain, is also a significant outflow component from the Forebay. This observation underscores the importance of United's spreading operations as a major source of recharge not only to the Forebay, but also to the adjacent Oxnard Plain and Mound basins as groundwater underflow, consistent with the hydrogeologic conceptual model (Section 2).

Table 4-2 summarizes the annual average flow budget for the Oxnard Plain flow-budget zone. Underflow from the Forebay represents the largest inflow component, while pumping from wells represents the largest outflow component. Areal recharge (from precipitation and return flows), ET, and discharge to tile drains also represent fairly large inflow and outflow components, respectively, but they occur primarily in the Semi-perched Aquifer. The combined net flux crossing the coastline (including both seawater and freshwater from the offshore extension of the aquifers) is the third largest inflow component, and is divided into three segments in Table 4-2 (from the Mound basin boundary to Channel Islands Harbor, Channel Islands Harbor to Arnold Road, and Arnold Road to Point Mugu). The large majority of simulated coastal influx across the coastline occurs between Channel Islands Harbor and Point Mugu, consistent with the hydrogeologic conceptual model.

Table 4-3 summarizes the annual average flow budget for the Pleasant Valley flow-budget zone. The majority of the inflow consists of the combined percolation of streamflow from Arroyo Las Posas, Conejo Creek, and Calleguas Creek, while the vast majority of outflow occurs as pumping from wells. Similar to the Oxnard Plain, areal recharge (from precipitation and return flows), ET, and discharge to tile drains also represent fairly large inflow and outflow components, respectively, in Pleasant Valley, but they occur primarily in the shallow aquifer system (including the Semi-perched Aquifer). A small component of outflux from Pleasant Valley to Las Posas is indicated (980 AF/yr), correlating with the timing and presence of groundwater mounding in the northern Pleasant Valley basin. However, it is uncertain what fraction of this small flux represents actual northward underflow of groundwater from the Pleasant Valley to the Las Posas basins in this area and how much is just an artifact of simulation of this boundary using a numerical model with 2,000-foot grid cells, which can only calculate fluxes orthogonally to the primary axes of the model grid.

Table 4-4 summarizes the annual average flow budget for the Mound flow-budget zone. Underflow from the Santa Paula basin represents the largest inflow component, with areal recharge (from precipitation and return flows), mountain-front recharge (from the San Pedro Formation outcrops to the north), and influx of underflow from the Forebay each contributing nearly as much. Pumping from wells represents the largest outflow component, while discharge from the Semi-perched Aquifer to the lower reach of the Santa Clara River represents a smaller, but important outflux. There is also a small net outflux of groundwater across the coastline to the offshore portions of the aquifer systems.

Table 4-5 summarizes the annual average flow budget for the Las Posas flow-budget zone, which is the combination of the West Las Posas basin and a small part of the East Las Posas basin. Areal recharge represents the largest inflow component, with mountain-front recharge (from the San Pedro Formation along the margins of the basin) and underflow from the Oxnard Plain contributing smaller inflows. "Release" of groundwater from storage contributes a significant fraction of the simulated total influx to the Las Posas flow-budget zone, and is a result of the net decline in groundwater levels from the beginning to the end of the model calibration period (1985-2015), which is apparent in the hydrographs shown on Figures 4-34 and 4-35. Pumping from wells is the dominant groundwater outflux component in the Las Posas flow-budget zone.

4.2 SENSITIVITY ANALYSIS

The input parameters to the VRGWFM were calibrated to optimally fit the measured groundwater elevations at wells in the study area, and to be consistent with the hydrogeologic conceptual model of groundwater flow directions and rates, to the extent they are known. However, as noted by the National Groundwater Association (NGWA), "modelers recognize groundwater models are not unique representations of a particular hydrogeologic system, and therefore will have a degree of uncertainty" (Bean and others, 2017). To better define the effects of parameter uncertainty on calibration results, a sensitivity analysis was conducted on the VRGWFM. The sensitivity analysis was conducted by adjusting key model input parameters and quantitatively evaluating the impact of each adjustment on the resulting simulated groundwater elevations and flow budget.

The spatially varied parameters in each layer used during sensitivity analysis for the VRGWFM are distributed by zones, which are shown on Figures 4-45 through 4-57. In each layer, the zones have a corresponding number linked to a value (see Table 4-6). Each zone value was adjusted by a factor one at a time during the sensitivity analysis. Each adjustment corresponds to one simulation of the calibration period with the VRGWFM, and production of a set of residual statistics (for groundwater levels) and a flow budget. To evaluate the effect of changing each input parameter on output from the VRGWFM, the residual statistics, including residual mean (RM), ARM, and root mean square residual (RMS), were compared in each of the five basins within the active model domain (Forebay, Oxnard Plain, Pleasant Valley, West Las Posas, and Mound). The effects on key model flow budget components were also evaluated, including inter-basin flows and fluxes across the coastline.

The effect on model calibration as well as on the flow budget by parameter variation may be categorized into four groups, or "types:"

- Type I - Low sensitivity:
    - Model Calibration
        - RM change less than 2 feet, and

        - RMS change less than 1 foot, and
        - ARM change less than 1 foot
    - Flow Budget: The range of flow budget variation is less than 1,000 AF/yr
- Type II - Low sensitivity in model calibration but high sensitivity in flow budget
    - Model Calibration
        - RM change less than 2 feet, and
        - RMS change less than 1 foot, and
        - ARM change less than 1 foot
    - Flow Budget: The range of flow budget variation is larger than 1,000 AF/yr
- Type III - High sensitivity in model calibration but low sensitivity in flow budget
    - Model Calibration
        - RM change larger than 2 feet, or
        - RMS change larger than 1 foot, or
        - ARM change larger than 1 foot
    - Flow Budget: The range of flow budget variation is less than 1,000 AF/yr
- Type IV - High Sensitivity
    - Model Calibration
        - RM change larger than 2 feet, or
        - RMS change larger than 1 foot, or
        - ARM change larger than 1 foot
    - Flow Budget: The range of flow budget variation is larger than 1,000 AF/yr

Input parameters with a Type I sensitivity do not have a strong influence on simulated groundwater elevations or flow budget. Therefore, the model is considered to be relatively insensitive to changes in the values input to these parameters. Input parameters with a Type VI sensitivity are considered to have a potentially significant impact on both simulated groundwater levels and flow budget. Input parameters with a Type II sensitivity may lead to significant uncertainty in flow budget while the model is still calibrated with regard to groundwater levels. Parameters with a Type II sensitivity are important when evaluating the uncertainty in flow budget. Parameters with a Type III sensitivity may have a significant impact on calibration to groundwater levels, but do not have significant effects on the flow budget. In terms of model calibration to groundwater levels, the parameters with a Type III or Type VI sensitivity have the largest influence. In terms of flow budget, parameters with a Type II sensitivity are important to consider, because they can cause significant changes to inflows and outflows without having significant impact on calibration of the model to groundwater levels.

In the following subsections, parameters with Type II, III, and IV sensitivity are the primary focus, as they have the greatest effect on simulated groundwater elevations and flow budgets. The changes in residual statistics and the flow budget resulting from each parameter adjustment are tabulated in Appendix D, Tables D-1 through D-20. The residual statistics and flow budget components from the calibrated VRGWFM (as described Section 3) are listed in the first row under "default," for comparison. The rows below "default" are ordered by model layer and zone number. For ease of finding parameters with the greatest sensitivity, the changes in residual statistics are highlighted in red when the residual statistic change is greater than 1.0 foot, and in yellow when the residual statistic change is less than -1.0 foot. The changes in flow budget are highlighted in red when the flow budget change is greater than 500 AF/yr, and in yellow when the flow budget change is less than -500 AF/yr.

4.2.1 Horizontal Hydraulic Conductivity

The horizontal hydraulic conductivity (HHK) in each zone and in each layer was adjusted by factors of 0.1, 0.5, 5.0, and 10.0 during the sensitivity analysis. Review of Appendix D, Tables D-1 and D-2, indicates that most adjustments of HHK were Type I (low sensitivity). Table 4-7 summarizes the adjustments to HHK that produce Type II, III, and IV sensitivities in the VRGWFM. In Layers 1 and 2, there are more Type II sensitivities to HHK than in other layers. This sensitivity is likely a result of HHK in the uppermost model layers directly affecting the ability of surface water recharge to reach the UAS. The VRGWFM is sensitive to changes in HHK in Zone 11 of Layers 1, 6, 7, and 9 because this area is near the cone of depression between Oxnard Plain and Pleasant Valley basins, and thus influences groundwater flow between the two basins. The model is sensitive (Type IV) to HHK in parameter Zone 9 of Layers 3 and 5 (representing the UAS) under the Forebay, as this area influences the rate at which water artificially recharged to the UAS by United can flow outward to other basins. Model Layers 6 and 7 (representing the Mugu-Hueneme aquitard and the Hueneme Aquifer) have the most zones with Type IV sensitivity to HHK, as these two layers play a critical role in vertical movement of groundwater between the UAS and LAS. The model is also sensitive (Type IV) to HHK in Zone 4 (Oxnard Plain) and Zone 5 (Mound basin) of Layers 7 and 9.

4.2.2 Vertical Anisotropy

Similar to HHK, the vertical anisotropy ratio (ratio of horizontal hydraulic conductivity to vertical hydraulic conductivity) in each zone and in each layer was adjusted by factors of 0.1, 0.5, 5.0, and 10.0. The changes in residual statistics and flow budgets resulting from adjusting vertical anisotropy are tabulated in Appendix D, Tables D-3 and D-4. Table 4-8 summarizes the adjustments to vertical anisotropy that produce Type II, III, and IV sensitivities in the VRGWFM. Type IV sensitivities to vertical anisotropy are most common in Layer 6 of the model. Layer 6 represents the Mugu-Hueneme aquitard across most of the study area, and vertical anisotropy in this layer is a key factor influencing vertical flux of groundwater between the UAS and LAS. Vertical anisotropy in Zone 12 (West Las Posas basin) in Layer 7 (representing the upper San Pedro Formation in that area) also has a Type IV sensitivity.

4.2.3 Storage Coefficient

The storage coefficient in each zone and in each layer was adjusted by factors of 0.01, 0.1, 10, and 100. The changes in residual statistics and flow budgets resulting from adjusting storage coefficient are tabulated in Appendix D, Tables D-5 and D-6. Table 4-9 summarizes the adjustments to storage coefficient that produce Type II and III sensitivities in the VRGWFM. A great majority of storage coefficient adjustments resulted in in Type I (low) sensitivity. There were no zones or layers with Type IV sensitivity to storage coefficient. Zone 12 (West Las Posas basin) in Layers 8 to 11 and 13 has a Type III sensitivity to storage coefficient, and Zone 9 (Forebay) in Layers 4 and 5 has a Type II sensitivity to storage coefficient.

4.2.4 Specific Yield

The specific yield in each zone and in each layer was adjusted by factors of 0.33, 0.67, 1.33, 1.67, and 2. The changes in residual statistics and flow budgets resulting from adjusting specific yield are tabulated in Appendix D, Tables D-7 and D-8. Table 4-10 summarizes the adjustments to specific yield that produce Type II, III, and IV sensitivities in the VRGWFM. Similar to storage coefficient, a majority of specific yield adjustments resulted in Type I (low) sensitivity. This is partly because specific yield only affects unconfined aquifers (most of the aquifers in the study area are confined), and partly because changing specific yield mostly affects groundwater-level fluctuation rather than long-term trends. However, Zone 9 in Layer 3 (Oxnard Aquifer in the Forebay) has a Type IV sensitivity to specific yield. The Oxnard Aquifer is unconfined in the Forebay, and the amount of recharge in this area can vary substantially over time due to United's spreading operations.

4.2.5 Recharge

As described in Section 3, recharge was applied the VRGWFM as a function of water source (precipitation vs. applied water) and land use (agricultural or M&I). The sensitivity analysis for recharge was performed by adjusting the recharge rates resulting from precipitation and applied water on agricultural and M&I lands, within each of the five basins in the study area. Each recharge component was multiplied by factors of 0.0, 0.5, 1.5, 2, 2.5, and 3 in each basin. The changes in residual statistics and flow budgets resulting from adjusting recharge components are tabulated in Appendix D, Tables D-9 and D-10. Table 4-11 summarizes the adjustments to recharge that produce Type II, III, and IV sensitivities in the VRGWFM. Of the 30 adjusted recharge scenarios simulated during the sensitivity analysis, 18 produced Type I (low) sensitivity. Only changes in recharge on agricultural land resulted in Type IV sensitivities in the VRGWFM, likely due to the much larger agricultural return flows compared to M&I return flows.

4.2.6 Horizontal Flow Barriers

The faults simulated by the horizontal flow barrier (HFB) package in MODFLOW are listed in Table 4-12. The conductance along each fault was adjusted by factors of 0.01, 0.1, 10, and 100. The changes in residual statistics and flow budgets resulting from adjusting fault conductance are tabulated in Appendix D, Tables D-11 and D-12. Table 4-13 summarizes the adjustments to fault conductance that produce Type II, III, and IV sensitivities in the VRGWFM. Most (12 out of 17) adjustments to fault conductance result in Type I (low) sensitivity. Adjustment of conductivity along the Oak Ridge Fault results in a Type IV sensitivity, likely because these changes affect how much groundwater outflow from the Forebay can reach the Mound basin (the remainder flows into the Oxnard Plain basin).

4.2.7 Streambed Conductance

There are four streams simulated with the stream package (STR) in the VRGWFM: Arroyo Las Posas, Conejo Creek, Calleguas Creek, and the Santa Clara River. The streambed conductance in each of these streams was adjusted by factors of 0.01, 0.1, 10, and 100. The changes in residual statistics and flow budgets resulting from adjusting streambed conductance are tabulated in Appendix D, Tables D-13 and D-14. Table 4-14 summarizes the adjustments to streambed conductance that produce Type IV sensitivities in the VRGWFM (there were no Type II or III sensitivities to streambed conductance). Adjustment of conductivity along all four stream channels results in Type IV sensitivity, because the conductivity is a key factor controlling how much interaction occurs between surface water and groundwater in the study area (particularly stream-channel recharge).

4.2.8 General Head Boundary Conditions

GHBs were used in the VRGWFM to simulate groundwater exchanges occurring between the study area and: a) the Santa Paula basin, and b) the Pacific Ocean. The boundary with the Pacific Ocean is divided into two GHBs based on location. The GHB in Layer 1 represents a "blanket" of model grid cells below mean sea level interacting with seawater on the sea floor. A deeper GHB represents the submarine outcrop areas for aquifers of the UAS and LAS (Layers 3, 5, 7, 9, and 11). The conductance of each of the GHBs was adjusted by factors of 0.01, 0.1, 10 and 100. The changes in residual statistics and flow budgets resulting from adjusting GHB conductance are tabulated in Appendix D, Tables D-15 and D-16. Table 4-15 summarizes the Type I, II, and IV sensitivities to GHB conductance in the VRGWFM. Adjustment of conductivity of the GHBs representing interaction of the Semi-perched Aquifer and deeper aquifers with the Pacific Ocean result in Type II and Type IV sensitivities, respectively.

4.2.9 Tile Drains

Tile drains in the study area are simulated by the drain package (DRN) in the VRGWFM. The conductance applied to tile drains in the VRGWFM is 10,000 feet squared. This conductance was adjusted by factors of 0.01, 0.1, 10, and 100 for the sensitivity analysis. The results of these four sensitivity analysis simulations are provided in Appendix D, Tables D-17 and D-18. The results of all four simulations indicate that adjustment to drain conductance results in Type I (low) sensitivity.

4.2.10 Evapotranspiration

Discharge of groundwater from shallow aquifers via ET in the study area was simulated by the evapotranspiration package (EVT) in the VRGWFM. Two parameters in the EVT package, evapotranspiration rate (EVTR) and ET extinction depth (EXDP), were adjusted during the sensitivity analysis. EVTR was adjusted by factors of 0.01, 0.1, 10, and 100, and EXDP was replaced by four different depths: 2.5, 10, 15, and 20 feet (default value in the VRGWFM was 5 feet). The results of these eight sensitivity analysis simulations are provided in Appendix D, Tables D-19 and D-20. Adjustment of both EVTR and EXDP result in Type II sensitivities, indicating that the simulated flow budget (but not groundwater elevations), can be sensitive to ET.

5 REVIEW

This section summarizes the goals, processes, and results of internal and external reviews of the VRGWFM. The primary goal of the review process was to evaluate the suitability of the VRGWFM for its intended uses, which are described in Section 1.

5.1 INTERNAL

The VRGWFM was first reviewed by selected members of United's Groundwater Department staff with experience in local hydrogeologic conditions. This internal review included comparison of model input files to available data in the study area. The goal of the internal review was to ensure that reasonable values were input to the model and that model output (primarily groundwater levels) throughout the calibration period were consistent with measured values. During construction of the VRGWFM, United's hydrogeologists conducted ongoing review of model input files, to verify that reported quantities and values, such as groundwater recharge and discharge components, were accurately entered into the model. United hydrogeologists also reviewed calibration results to evaluate potential causes for substantial deviations between measured and simulated groundwater elevations—in some cases, reported groundwater elevation measurements were rejected as likely being erroneous or the result of damage to the well in which the measurement was obtained, and in other cases changes were required in either the hydrostratigraphic model or as input to the numerical model. United hydrogeologists and hydrologists reviewed other model output, such as simulated groundwater-elevation contours and stream gains or losses, to verify that the model did reasonably well at simulating groundwater elevation trends and patterns in the basin, in addition to simulating changes in head at individual wells. The process of internal review and refinement of both the conceptual and numerical models for the VRGWFM was iterative and occurred frequently from 2013 through 2018.

5.2 FCGMA/TAG REVIEW AND OUTREACH TO OTHER STAKEHOLDERS

Since 2015, United has led and participated in several workshops, presentations, and meetings designed to provide information and solicit input from the FCGMA and other stakeholders in the study area regarding development of the VRGWFM. DWR guidance states that "Stakeholder input is an important component of model development; specifically, during the early planning phase of model development when the purpose and objectives of the model are being considered and near the end of the modeling process when various modeling scenarios are being considered." By summer 2015, United had incorporated its revised hydrostratigraphic conceptual model for the Oxnard Plain (including Forebay) and Pleasant Valley basins into the VRGWFM and completed the first model calibration for those basins. Also during that summer, the FCGMA formed the TAG for the GSPs for the Oxnard Plain and Pleasant Valley basins. Although United anticipated that it would take a year or longer (from 2015) to complete calibration and documentation of the model in the study area, it was thought to be beneficial to share information with stakeholders regarding model construction, calibration, and potential use as a forecasting tool early in the process of calibrating and documenting the model. Such early stakeholder involvement would allow scientists and engineers with knowledge of hydrogeologic conditions in the study area to help review and provide input that could be used to refine the VRGWFM before completion of model calibration and documentation.

United's first workshop-style extended meeting to share details of the VRGWFM was held with FCGMA technical staff in August 2015, shortly after United implemented the revised hydrostratigraphic conceptual model for the Oxnard Plain and Pleasant Valley basins. Calleguas MWD technical staff and their consultant, CH2M HILL, were also invited to that workshop because they were developing a hydrostratigraphic conceptual model for the East and South Las Posas basins, and had plans to develop a numerical model that could be used to simulate groundwater and surface water fluxes adjacent to the study area for the VRGWFM. At this workshop, United provided an overview of the VRGWFM hydrostratigraphic conceptual model, numerical model calibration results, and a summary of the types of additional information that would be needed to use the model to forecast future water-use scenarios for the study area.

United provided the TAG with occasional updates on the VRGWFM in 2016, and in December 2016 some TAG members requested an extended meeting with United to learn more details regarding input parameters and early calibration results from the model. In response, United held an all-day "TAG-review workshop" in coordination with the FCGMA as a TAG "special meeting" during March 2017, open to interested regional stakeholders and the public. Questions were raised and input provided by the TAG and stakeholders on several issues, but at the conclusion of discussion of model calibration, no "fatal flaws" in the VRGWFM were noted by the TAG. TAG members concurred that the calibration of the VRGWFM generally was a significant improvement compared to the USGS model, and that including 13 model layers in the VRGWFM should prove valuable for simulating potential future water-supply projects (United, 2017c). The TAG had additional questions regarding how the VRGWFM incorporated the Pleasant Valley basin, and asked if a second workshop could be held to further discuss this topic. United agreed to hold a half-day "Pleasant Valley workshop" as part of another TAG special meeting in April 2017.

The goal of the Pleasant Valley workshop was for United to provide additional information about the VRGWFM, with specific emphasis on key aspects of hydrogeology in the Pleasant Valley basin as requested by some TAG members at the previous (March 2017) workshop. The Pleasant Valley workshop was structured as a "round-table" discussion, with a suggested list of discussion topics rather than an agenda, and no formal presentations. Key discussion topics and action items from this workshop included (United, 2017d):

- The TAG discussed the complexity of the faults and folds in the northern Pleasant Valley basin, and agreed that the United conceptual model was appropriate. Unless data became available indicating otherwise, use of United's conceptual model was not expected to produce significantly different results than previous conceptual models for the area.

- Two TAG members felt that it might make sense to shift the "picks" for the UAS HSUs upward in some portions of the Pleasant Valley basin, but there was significant uncertainty regarding the stratigraphy in those areas. It was noted that United's reduced horizontal hydraulic conductivity values in the upper three layers of the VRGWFM in the Pleasant Valley basin (compared to those for the adjacent Oxnard Plain basin) effectively achieved the desired result of making the UAS in the Pleasant Valley basin somewhat "disconnected" from the UAS in the Oxnard Plain basin. Upon subsequent review, United made a few minor adjustments to the geometry of the HSUs in the western part of the Pleasant Valley basin.
- United and Calleguas MWD agreed to continue collaborating on estimated surface and groundwater flowrates from East Las Posas basin (being modeled by Calleguas MWD) to the Pleasant Valley basin.
- United would seek review by its Expert Panel of vertical flow through active wells that are screened across both the UAS to the LAS.
- United would continue reviewing dry-weather streamflow and other related information in Arroyo Las Posas for possible incorporation into the VRGWFM.
- United would continue reviewing groundwater elevations in the Semi-perched Aquifer for possible incorporation into the VRGWFM.

Following the TAG-review and Pleasant Valley workshops described above, United regularly updated the TAG on modeling progress during monthly TAG meetings, and met separately with individual members of the TAG and other stakeholder representatives on several occasions to further discuss various aspects of the VRGWFM and its potential future uses. In addition, United staff gave several presentations to stakeholder groups in Ventura County regarding VRGWFM construction, calibration, and how it could potentially be applied to future evaluation of sustainable yield and water-supply projects in the study area. Feedback from those meetings was noted and given consideration as model development progressed.

5.3 EXPERT PANEL

To provide an additional level of confidence that the VRGWFM would be capable of meeting the modeling objectives and ultimately become a valid, reliable tool for evaluating groundwater supply options in the study area, United contracted with the members of the Expert Panel in 2016 to conduct peer review of the VRGWFM, to be followed with continuing input and review during planning and implementation of predictive modeling for future water-use scenarios. The Expert Panel review was conducted by three groundwater modeling experts focused on appropriateness of model construction, as well as the procedures used by United to convert raw data to model-input files, conduct calibration, and evaluate model sensitivity to the different input parameters. One member of the Expert Panel was selected based on both his extensive applied modeling experience in western U.S. groundwater basins, and his familiarity with the hydrogeology of the study area. The other two members of the Expert Panel were selected based on their theoretical understanding of groundwater modeling and their extensive experience with developing groundwater modeling software tools and applying those tools to projects across the U.S. The Expert Panel included:

- Dr. Sorab Panday, of GSI Environmental, Inc., co-author of the two most recent versions of MODFLOW: MODFLOW-NWT and MODFLOW-USG;
- Jim Rumbaugh, of Environmental Simulations Inc., creator of the widely used MODFLOW pre- and post-processor, Groundwater Vistas; and,
- John Porcello, of GSI Water Solutions, Inc., a consultant with extensive experience in groundwater modeling in general, and specific experience with hydrogeologic conditions in Ventura County.

The Expert Panel was tasked with providing ongoing peer review starting in 2016 (after the hydrostratigraphic conceptual model was largely completed and the basic framework of the numerical model was in development). During their initial review, the Expert Panel was asked to consider whether the VRGWFM was capable of achieving the modeling objectives defined in Section 1.3 and if United's model construction and calibration efforts conformed with USGS and ASTM guidance for these activities. The Expert Panel was also asked to review and provide comment on the following model components and activities:

- Model extent, grid size, discretization, and orientation
- Model layering compared to conceptual stratigraphic model
- Time discretization
- Numerical convergence criteria and closure
- Aquifer parameters, including horizontal hydraulic conductivity and vertical anisotropy, storage coefficient/specific yield
- Boundary conditions, including no-flow, constant-flux, constant-head, and general-head boundaries within model, as well as initial head configuration and horizontal-flow barriers representing geologic faults
- Implementation of transient aquifer stresses, including pumping, recharge from various sources, drains, surface-water/groundwater interaction (including groundwater interaction with seawater)
- Water budget results over time, including groundwater underflow between basins, between aquifers, and discharge and recharge to/from surface-water bodies (e.g., rivers and ocean)
- Calibration data and representativeness of calibration period
- Calibration results, methods of evaluation, bias (geographically and by layer)
- Consistency of calibrated input parameters and water-budget results with conceptual models
- Overall suitability of the model for the intended purposes, and potential limitations on its use.

Following their initial review of the model, the expert panel provided "the following key observations regarding the model's significant and most substantive simulation capabilities" in a preliminary review memorandum (Porcello and others, 2016):

- "The model's layering and choice of boundary conditions is appropriate for simulation of the very complex geologic and hydrostratigraphic conditions that exist in the Oxnard and Pleasant Valley groundwater basins – specifically the discrete multiple layered aquifers and aquitards; the moderate to strong compartmentalization of certain aquifers by faults; the significant well-to-well variability in the depths and aquifers which are furnishing groundwater to production wells in each groundwater basin; the strong influence of UWCD's managed aquifer recharge programs (spreading basins) on groundwater elevations and flow directions; and the complex three-dimensional nature of the ocean interface and its interaction with each shallow and deep aquifer zone along the coast and offshore.

- The model provides an accounting of groundwater budgets and flow conditions for current land use and water use conditions. This includes the conditions that have been observed during the current drought, which began during the end of the calibration period and has continued through the period being used for model verification (2013 through 2015).
- The model is well-calibrated to changes in groundwater levels over time, including through multiple series of drought years (1985 through 1991; 1999 through 2003; 2012 to present) and above-normal rainfall years (1992-1993, 1997-1998, 2004-2005) which together comprise a hydrologic cycle composed of highly variable rainfall and streamflow conditions. Additionally, the calibration time period accounts for the gradual historical increase in dry-weather baseflows that occurred in Arroyo Las Posas from the late 1980s through the 1990s, which has substantially increased the annual volume of groundwater recharge to the Pleasant Valley basin.
- UWCD has invested considerable time and resources in updating and refining the hydrostratigraphic model, creating a new model with discrete representation of each aquifer and aquitard, and estimating the detailed recharge processes of a nearly three-decade time period. This effort has had a direct beneficial effect on the ability of the model to simulate the historical fluctuations in groundwater levels that have occurred in the past. Model-simulated hydrographs of groundwater level changes and scatter plots of the groundwater-level-change residuals (the differences between modeled and measured changes) indicate that the model is simulating the month-by-month and year-by-year aquifer system responses to fluctuating natural hydrologic conditions (rainfall and streamflows), groundwater pumping, and managed aquifer recharge quite well, though in a few areas it was noted that groundwater level recovery during high-rainfall years is under-predicted."

Although the Expert Panel concluded that the VRGWFM was "nearly ready for use in planning studies" at the time of their initial review, they recommended additional "activities be conducted as part of the final stages of the model development and documentation effort," including the following:

- Turn on the evapotranspiration (ET) package in MODFLOW along the Santa Clara River, and possibly along Conejo Creek and Calleguas Creek;
- Conduct localized refinements in the Mound Basin;
- Conduct localized refinements in the eastern portion of the Pleasant Valley Basin;
- Refine the initial conditions;
- Evaluate potential means of improving the match to absolute groundwater elevations, and not just changes in groundwater elevations;
- Use two additional types of targets for calibration (vertical head differences and stream baseflow);
- Test the model using PEST;
- Conduct qualitative assessments of the model's calibration quality;
- Convert to MODFLOW-USG rather than using MODFLOW-NWT with finer grid spacing;
- Release the final modeling report before, or simultaneously with, the model.

During subsequent discussions, the Expert Panel noted that not all of the above recommendations were required to complete construction and calibration of the VRGWFM, as some of the activities were just suggestions for long-term model development (e.g. convert the model to MODFLOW-USG), particularly with regard to future predictive simulations. United staff spent the remainder of 2016 and most of 2017 implementing many of the Expert Panel's recommendation, while simultaneously updating the hydrostratigraphic conceptual model and data for surface-water imports in the West Las Posas basin.

In fall 2017 through spring 2018, United asked its Expert Panel to again review the VRGWFM, which had been updated since the initial 2016 review. The updated model incorporated many of the Expert Panel's recommendations (listed above) as well as other modifications implemented by United (e.g. the updated hydrostratigraphic conceptual model for West Las Posas basin). Key components of the Expert Panel's second (2017/18) review (Porcello and others, 2018) included, but were not limited to, qualitative and quantitative evaluation of model calibration, and consideration of whether the VRGWFM was suitable for its intended uses. Selected, relevant comments from the Expert Panel on these topics include the following:

- Overall Opinion: "In summary, the expert panel finds the model to be a well-designed and well-calibrated tool, and a tool that is a substantial enhancement and upgrade over previously available tools. Version 1.0 of the VRGWFM provides a newly robust and detailed method of evaluating how the multiple aquifers in the region behave and how they might respond to the design and implementation of specific regional management programs and specific projects in the five groundwater basins that the model currently simulates in southern Ventura County."
- Qualitative Review: "The qualitative analysis consisted of visual inspection of hydrographs prepared by UWCD, from which the panel identified the total number of wells with good versus poor matches in each groundwater basin and for the entire model domain."
    - "Of 277 hydrographs reviewed, only 34 were judged to be of poor quality and 41 were adequate. Most hydrographs (202, or 73%) showed a good match between modeled and measured values. The largest number of poor matches (14) was in West Las Posas, basin where some wells are screened in the lithologically complex San Pedro Formation, which contains lenses of unknown lateral continuity within a thick sequence of fine-grained sediments. The other basins, which have more discrete and continuous aquifers and aquitards, typically had between 0 and 3 poor matches."
    - "In our opinion, matching a high percentage of available hydrographs is difficult to do and means the calibration is very good."
- Quantitative Review: "The quantitative assessment was accomplished by the panel using residual statistics for groundwater elevations, residual statistics of changes in groundwater elevations over time, and maps of the locations of the worst matches in each model layer (to look for any spatial bias in the locations of poorly matched wells)."
    - "In our experience, scaled statistics less than 0.1 (i.e., 10 percent) are indicative of good calibration. The scaled groundwater elevation statistics for this model (for residual mean, residual standard deviation, RMS error, and absolute residual mean) are in the 2 to 4 percent range when considering groundwater elevations themselves (i.e., are water levels too high or too low) and in the 2 to 3 percent range when considering month-to-month changes in groundwater elevations over time (i.e., is the model simulating the fluctuations in water levels that occur). In our experience, having a good match to both absolute elevations and to changes in elevation is not often achieved and points again to the fact that the VRGWFM is very well calibrated (as previously suggested by the hydrographs)."

    - "Except for some outliers (shown in red ellipse) the degree of scatter about the 45 degree line is good and does not indicate the existence of any significant spatial or temporal bias."

- Adequacy for Intended Uses: "Version 1.0 of the VRGWFM is viewed by the expert panel as being ready for use in regional and local planning efforts, and is of sufficient quality to support development of GSPs under SGMA, including conducting water budget analyses, estimating the sustainable yield of the regional aquifers under various long-term management alternatives, and evaluating the ability of specific projects and management actions to meet minimum threshold levels that will be established in basin-specific GSPs."

5.4 LIMITATIONS

The DWR noted in their best-management practice for groundwater modeling that "there should be no expectation that a single 'true' model exists. All models and model results will have some level of uncertainty" (Joseph and others, 2016). The National Groundwater Association listed potential root causes of modeling "errors" that lead to uncertainty (Luis and others, 2017), summarized as follows:

- Conceptual model error, resulting from assumptions that have to be made about the hydrogeologic system prior to input to the model—conceptual model errors can be classified as follows:
- Incorrect hypotheses (e.g., assuming that an aquifer is confined, when it may not be)
- Missing processes (e.g., ignoring a water-budget component that provides a significant fraction of recharge or discharge in the study area)
- Structural complexity (or oversimplification; e.g., treating different depth zones in a HSU as a single layer with uniform properties)
- Temporal complexity (or oversimplification; e.g., failing to recognize the significance of changes in aquifer stresses, such as pumping, that occur in a smaller time scale than the time discretization of the model)
- Parameter error, resulting from error or uncertainty in the input values or aquifer stresses that are applied to the model—parameter errors can be classified as follows:
- Measurement errors (e.g., under- or over-reporting of pumping rates)
- Interpolation errors (e.g. assuming and applying hydraulic conductivities to model grid cells located far from wells where hydraulic conductivities have been measured)
- Scaling errors (e.g. assigning a local-scale hydraulic conductivity value from a site-specific aquifer test to a much wider area of the model, without allowing adjustment of that hydraulic conductivity value during calibration)
- Structural noise, resulting from "the imperfect nature of a model to simulate reality" (can be quantified as the difference between measured and simulated values that is not attributable to measurement error).
- Predictive error ("scenario uncertainty"), resulting from incorrect assumptions about future conditions (e.g., changes in land use result in less actual groundwater pumping in the future than simulated); this source of uncertainty is not applicable to the historical model calibration described in this report

And USGS guidance provides this caution regarding the potential for non-unique configurations of model parameters to produce reasonably good calibration statistics, but not necessarily yield a good model:

> *"Just because a model is constructed and calibrated, does not ensure that it is an accurate representation of the system. The appropriateness of the boundaries and the system conceptualization is frequently more important than achieving the smallest differences between simulated and observed heads and flows"* (Reilly and Harbaugh, 2004).

This issue is of particular concern in models where calibration data are limited over space or time. Fortunately, abundant pumping, groundwater-level, and aquifer-parameter data have been collected over the past several decades in the VRGWFM study area. These data have allowed development of a detailed conceptualization of the groundwater systems in the study area, while also providing a spatially—and temporally—extensive calibration dataset. This combination greatly reduces both the potential for conceptual model error and the number of possible alternative configurations of model input parameters that could produce a similar result. Results of sensitivity analysis indicate that the VRGWFM is most sensitive to changes in the following input parameters:

- Hydraulic conductivity in Layer 6 (the aquitard between the UAS and LAS).
- Agricultural return flows.
- Streambed conductance of the Santa Clara River, Conejo Creek, Arroyo Las Posas, and Calleguas Creek.
- Conductance of the general head boundary representing interaction between the Pacific Ocean and the aquifers of the UAS and LAS.

Similar to the USGS model of the Santa Clara-Calleguas watersheds, the VRGWFM is a regional-scale model. Therefore, the following important limitation noted by Hanson and others (2003) for the USGS model also applies to the VRGWFM: "...regional models can be useful for simulating subregional and regional performance of a flow system and for providing boundary information for more detailed local-scale models even though the results of the regional model for a local scale may not be appropriate for site-specific problems such as the performance at a particular well." In other words, models such as the VRGWFM that represent aquifer systems of more than 200 square miles in areal extent and thicknesses exceeding 1,000 feet should not be applied to questions about well performance at individual farms or contaminant-transport at corner gas station sites, for example, unless finer discretization is applied to the model and site-specific data are reviewed (and incorporated into the model, as appropriate). However, as noted previously, the VRGWFM incorporates a significant update of hydrostratigraphic conceptual model for the study area and discretely simulates individual aquifers and aquitards, and thus represents a major upgrade from the previously available tools and information available for understanding hydrogeologic conditions and forecasting effects of future aquifer stresses. As needed for future simulations, the VRGWFM can be further discretized or otherwise modified to more precisely or elegantly simulate actual groundwater flow processes that occur in specific areas of interest.

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TABLES

Tables 2-1, 2-2, and 3-3 are embedded in Sections 2 and 3 of the report.

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Table 3-1. Aquifer Test Results

Well ID	Aquifer System	Reported Top of Perfs. (ft bgs)	Reported Bottom of Perfs. (ft bgs)	Reported Well Depth (ft bgs)	Reported Casing Depth (ft bgs)	Reported Casing Diameter (inches)	Reported Screen Length (feet)	Estimated Hydraulic Cond. (ft/day)	Estimated Trans. (gpd/ft)	Estimated Trans. (ft^2/day)	K (ft/day)	Reported Specific Capacity (gpm/ft)	Reported Specific Capacity (ft^3/d/ft)	Reported Hydraulic Cond. (ft/day)	Notes
01N21W06J05S	LAS	750	1,290	1,410	1,310	18	540	10	40,600	5,427	10	19	3,658		PTP #3
01N21W06J05S	LAS	750	1,290	1,410	1,310	18	540		42,240	5,647	10				PTP #3 (recovery)
01N21W07J02S	LAS	590	1,280	1,370	1,300	18	690	26	101,540	13,574	20	43	8,278		PTP #1
01N21W07J02S	LAS	590	1,280	1,370	1,300	18	690		165,000	22,057	32				PTP #1 (recovery)
01N21W31A05S	LAS	720	740	0	0	2	20	76.9						76.9	GP1
01N21W31A06S	LAS	440	460	0	0	2	20	1.85						1.85	GP1
01N21W31A07S	UAS	295	315	0	0	2	20	3.55						3.55	GP1
01N21W31A08S	UAS	220	240	0	0	2	20	42.4						42.4	GP1
01N22W01M03S	LAS	730	1,480	1,560	1,500	18	750	16	83,400	11,149	15	27	5,198		PTP #4
01N22W01M03S	LAS	730	1,480	1,560	1,500	18	750		93,170	12,455	17				PTP #4 (recovery)
01N22W13D03S	LAS	600	1,200	1,240	1,220	18	600	21	87,000	11,630	19	35.1	6,757		PTP #5
01N22W13D03S	LAS	600	1,200	1,240	1,220	18	600		99,000	13,234	22				PTP #5
02N21W07L07S	Uncertain (probably UAS)	70	250	360	280	20	45	181	100,350	13,415	298	66.9	12,878		SATICOY #3
02N21W07L07S	Uncertain (probably UAS)	70	250	360	280	20	105		50,800	6,791	65				SATICOY #3
02N21W32E01S	LAS	716	1,266	1,400	1,286	18	550	36	220,000	29,410	53	26	5,005		PTP #2
02N21W32E01S	LAS	716	1,266	1,400	1,286	18	550		73,300	9,799	18	25	4,813		PTP #2 (recovery)
02N22W01P01S	Uncertain	310	480	705	490	16	170	79	100,000	13,368	79	49	9,433		COUNTY YARD #1
02N22W02K08S	Uncertain	24	108	240	240	14	240	35	63,723	8,519	35				VANONI
02N22W12H01S	Uncertain	100	365	390	375	18	133	59	91,500	12,232	92	61	11,743		SATICOY #1 (unconfined)
02N22W12H01S	Uncertain	100	365	390	375	18	133		25,800	3,449	26	12.9	2,483		SATICOY #1 (confined)
02N22W13N02S	LAS	752	1,092	1,220	1,112	18	340	9	19,000	2,540	7	11.5	2,214		El RIO #12
02N22W13N02S	LAS	752	1,092	1,220	1,112	18	340		29,000	3,877	11				El RIO #12 (recovery)
02N22W23G04S	UAS	115	340	457	340	18	225	236	397,500	53,138	236				El RIO #16
02N22W23H04S	LAS	850	1,390	1,442	1,410	18	540	10	37,000	4,946	9				El RIO #13
02N22W23H04S	LAS	850	1,390	1,442	1,410	18	540		42,000	5,615	10				El RIO #13 (recovery)
02N22W26B03S	LAS	575	1,475	1,722	1,495	18	900		62,000	8,288	9				El RIO #14
02N22W26B03S	LAS	575	1,475	1,722	1,495	18	900		74,000	9,892	11				El RIO #14 (recovery)
B-1	Uncertain						41		4,550	608	15				Freeman Diversion

Data from USGS and United, as described in Section 3.

Notes:
ft bgs = feet below ground surface
ft/day = feet per day
gpd/ft = gallons per day per foot
ft^2/day = feet squared per day
gpm/ft = gallons per minute per foot
ft^3/d/ft = cubic feet per day per foot

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
01S21W08L03S	CM1a#1	525-565	7.4	10.7
			13.8	
			7.6	
			14.1	
01S21W08L04S	CM1a#2	200-220	3.4	3.7
			5.5	
			2.2	
			3.6	
			2.9	
			4.6	
			2.8	
			4.5	
01N22W29D01S	CM2#1	830-870	0.32	0.43
			0.54	
			0.32	
			0.53	
01N22W29D02S	CM2#2	720-760	7.1	8.1
			12.8	
			6	
			11.1	
			7.1	
			12.8	
			6.8	
			1.3	
01N22W29D03S	CM2#3	500-520	19	25.7
			33	
			18.6	
			32.2	
01N22W29D04S	CM2#4	260-280	59.3	60.0
			97.7	
			47.1	
			79	
			32.3	
			55.1	
			41	
			68.8	
01N23W01C02S	CM3#1	1390-1410	0.86	1.0
		1430-1450	1.45	
		1470-1490	0.65	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			1.11	
01N23W01C03S	CM3#2	965-1065	3.97	5.7
			7.36	
			4.07	
			7.53	
01N23W01C04S	CM3#3	630-695	2.72	2.4
			4.73	
			0.8	
			1.37	
			1.67	
			2.86	
01N23W01C05S	CM3#4	120-145	0.19	0.2
			0.33	
			0.04	
			0.08	
01N22W28G01S	CM4#1	1295-1395	1.6	2.4
			3.2	
01N22W28G02S	CM4#2	995-1095	1.3	2.0
			2.7	
			1.7	
			3.6	
			0.96	
			2.1	
			1.1	
			2.4	
01N22W28G03S	CM4#3	720-760	0.06	0.1
			0.1	
			0.03	
			0.06	
01N22W28G04S	CM4#4	255-275	14.6	19.6
			26	
			13.6	
			24.3	
01N22W28G05S	CM4#5	180-200	59.3	79.4
			97.7	
			60.7	
			100	
01N22W35E01S	CM5#1	1140-1200	0.35	0.7
			0.95	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			0.49	
			0.84	
01N22W35E02S	CM5#2	840-900	1.41	2.2
			2.97	
01N22W35E03S	CM5#3	420-470	7.97	11.5
			14.9	
			7.97	
			14.9	
			7.97	
			14.9	
			8.15	
			15.3	
01N22W35E04S	CM5#4	300-320	20.3	27.6
			35.6	
			19.8	
			34.8	
01N22W35E05S	CM5#5	200-220	23.2	31.5
			36.7	
			25.5	
			40.5	
02N21W34G02S	PV1#1	938-998	2.9	3.0
			4.9	
			1.7	
			2.8	
			3	
			5.1	
			1.5	
			2.7	
			2.2	
			3.8	
			1.8	
			3.1	
02N21W34G03S	PV1#2	800-860	1.9	2.4
			3.3	
			1.7	
			3	
			1.7	
			2.9	
			1.8	
			3.1	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			1.9	
			2.3	
02N21W34G04S	PV1#3	360-380	0.14	0.2
			0.24	
			0.13	
			0.22	
			0.13	
			0.23	
			0.13	
			0.23	
02N21W34G05S	PV1#4	170-190	6.8	9.2
			10.8	
			7.4	
			11.8	
			7	
			11.2	
			7.2	
			11.4	
01N22W27K05S	DP#1	680-700	14.7	20.2
			25.1	
			15	
			25.7	
			15	
			25.7	
			15	
			25.7	
01N22W36K05S	DP#2	540-580	18.4	25.0
			31.9	
			18.4	
			31.9	
			18	
			31.2	
			18.4	
			31.9	
01N22W36K07S	DP#3	410-450	7.1	8.8
			11.5	
			6.5	
			10.6	
			7	
			11.6	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			6	
			10	
01N22W36K08S	DP#4	310-330	14.7	20.5
			26.6	
			14.7	
			26.6	
			14.7	
			26.6	
			14.7	
			26.6	
			14.7	
			26.6	
			14.1	
			25.4	
01N22W36K09S	DP#5	175-195	26	35.3
			45.9	
			26.6	
			46.9	
			22.4	
			39.7	
			27.2	
			48	
02N21W07L03S	SAT#1	640-700	2.7	3.4
			4.6	
			2.3	
			3.9	
			2.8	
			4.6	
			2.3	
			3.8	
			3	
			5.1	
			2.3	
			3.8	
02N21W07L04S	SAT#2	500-540	0.66	1.0
			1.11	
			0.82	
			1.36	
			0.78	
			1.3	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			0.78	
			1.3	
02N21W07L05S	SAT#3	270-310	2.2	1.8
			3.6	
			1.1	
			1.8	
			1.1	
			1.9	
			1	
			1.7	
			1.1	
			2	
02N21W07L06S	SAT#4	135-155	2.6	3.3
			4.1	
			2.4	
			3.8	
			2.7	
			4	
01N22W26J03S	SWIFT#1	310-350	19.6	31.1
			38.4	
			22.5	
			44	
01N22W26J04S	SWIFT#2	185-205	3.2	4.3
			5.1	
			3	
			4.8	
			3.5	
			5.6	
			3.4	
			5.4	
01N22W26J05S	SWIFT#3	55-65	2.7	2.7
			4.4	
			1.4	
			2.4	
01N22W27C02S	SEAWEED1	275-295	12.1	17.1
			22.2	
			13	
			23.8	
			11.9	
			21.7	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			11.9	
			21.7	
			11.9	
01N22W27C02S *(continued)*	SEAWEED1	275-295	21.7	
			11.9	
			21.7	
01N22W27C03S	SEAWEED2	175-195	20	28.4
			35.4	
			20.9	
			37.1	
01N22W27C04S	SEAWEED3	55-65	16.1	22.1
			24.8	
			22	
			34.2	
			13.2	
			20.4	
			18.3	
			28.1	
02N20W16A02S	TKS#1	260-280	1.54	1.80
			2.46	
			1.21	
			1.97	
02N20W16A03S	TKS#2	170-180	1.56	2.43
			2.45	
02N20W16A03S *(continued)*	TKS#2	170-180	2.23	
			3.49	
02N20W16A03S	TKS#3	90-100	0.48	0.62
			0.75	
01S22W01H01S	CM6#1	490-550	0.0078	0.011
			0.014	
01S22W01H02S	CM6#2	380-400	14.1	20.1
			25.1	
			15.5	
			27.5	
			13.8	
			24.5	
01S22W01H03S	CM6#3	310-330	3.9	6.1
			6.2	
			5.2	
			8.2	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			4.7	
			7.4	
			5.1	
			8.2	
01S22W01H03S *(continued)*	CM6#3	310-330	4.4	
			7.1	
			4.9	
			7.7	
01S22W01H04S	CM6#4	180-200	6.8	9.2
			10.9	
			7.47	
			12	
			6.9	
			10.9	
01N22W27R03S	CM7#1	330-350	30.1	40.4
			50.6	
			30.1	
			50.6	
			30.1	
			50.6	
			30.1	
			50.6	
01N22W27R04S	CM7#2	170-190	22.9	32.1
			40.6	
			26.1	
			45.9	
			20.9	
			37.1	
01N22W27R04S *(continued)*	CM7#2	170-190	22.9	
			40.6	
01N22W27R05S	CM7#3	100-110	2.06	3.5
			3.24	
			3.36	
			5.22	
03N20W35R02S	P7#1	1050-1110	0.078	0.17
			0.139	
			0.17	
			0.3	
03N20W35R03S	P7#2	800-900	2.4	2.3
			4.2	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			1.4	
			2.5	
			1.3	
			2.4	
			1.5	
03N20W35R03S	P7#2	800-900	2.6	
03N20W35R04S	P7#3	490-530	0.29	0.32
			0.47	
			0.22	
			0.36	
			0.21	
			0.35	
01N22W20J04S	A1#1	870-890	7.8	9.6
		910-930	8.8	
			7.5	
			13.2	
			7	
			12.3	
			7.2	
			12.6	
01N22W20J05S	A1#2	640-680	11.2	19.1
			21.8	
			11.2	
			21.8	
			16.1	
			27.5	
			14.7	
			25.1	
			14.7	
			25.1	
			14.7	
			25.1	
01N22W20J06S	A1#3	385-425	0.17	0.15
			0.29	
			0.09	
			0.17	
			0.07	
			0.13	
			0.1	
			0.17	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
01N22W20J07S	A1#4	280-320	13.9	21.5
			24.6	
			13.9	
			24.6	
			14.3	
			25.2	
01N22W20J07S *(continued)*	A1#4	280-320	18.2	
			32.3	
			17.4	
			30.8	
01N22W20J08S	A1#5	155-195	18	28.0
			30.5	
			18.8	
			32	
			18	
			30.5	
			22.9	
			40.6	
			22.4	
			39.7	
			22.4	
			39.7	
01N22W20M01S	A2#1	900-940	0.56	0.79
			0.95	
			0.62	
			1.04	
01N22W20M02S	A2#2	700-740	22.3	21.4
			38.4	
			14.4	
			24.9	
			14.4	
			24.9	
			13.7	
			23.8	
			13.7	
			23.8	
01N22W20M03S	A2#3	520-560	3.1	3.6
			5.1	
			2.6	
			4.3	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			2.4	
			4	
01N22W20M04S	A2#4	300-320	25.3	39.4
			43.4	
			31.5	
			54.2	
			30.1	
01N22W20M04S	A2#4	300-320	51.8	
01N22W20M05S	A2#5	150-170	73	128.6
			120.9	
			134.3	
			217	
			104	
			168	
			107	
			172	
			71.3	
			118	
01N22W20M06S	A2#6	50-70	20.3	28.9
			32.5	
			25.3	
			37.6	
01N21W19L10S	SCE#1	394-414	51.9	70.5
			85.8	
			54.4	
			89.9	
			53.1	
			87.8	
01N21W19L11S	SCE#2	300-320	5	8.0
			7.9	
			7	
			10.8	
			4.7	
			7.4	
			6.7	
			10.6	
			4.9	
			7.8	
			8.8	
			14	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
01N21W19L12S	SCE#3	200-220	39.7	45.4
			67.7	
			41.6	
			70.9	
			26.8	
			46.3	
			25.6	
			44.2	
01N21W19L13S	SCE#4	110-130	41.1	53.4
			65.7	
01N21W19L14S	SCE#5	18-38	0.75	0.90
			1.22	
			0.56	
			0.91	
			0.69	
			1.1	
			0.76	
			1.21	
01N21W32O02S	O2#1	930-970	0.34	0.36
			0.57	
			0.25	
			0.42	
			0.2	
			0.34	
			0.32	
			0.55	
			0.2	
			0.36	
01N21W32O03S	O2#2	800-840	15.3	23.2
			26.6	
			15.3	
			26.6	
			15	
			26	
			18.6	
			31.7	
			18.6	
			31.7	
			19.4	
			33.2	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
01N21W32O04S	O2#3	600-640	7.2	10.2
			13.4	
			6.6	
			12.2	
			6.4	
			12.2	
			7.7	
			14.1	
			7.7	
01N21W32O04S	O2#3	600-640	14.1	
01N21W32O05S	O2#4	330-370	18.8	28.9
			33	
			24.4	
			42.3	
			18.8	
			33	
			24.4	
			42.3	
			18.8	
			33	
01N21W32O06S	O2#5	180-220	13.1	19.1
			23.8	
			14.1	
			25.5	
01N21W32O07S	O2#6	275-285	45.7	66.0
			77.2	
			44.7	
			75.5	
			54.3	
			92.5	
			51.8	
			86.3	
02N22W33B03S	SG#1	1210-1250	3.7	5.3
			6.1	
			4.8	
			7.9	
			3.6	
			5.9	
			4.4	
			7.2	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			3.6 5.9	
02N22W33B04S	SG#2	1110-1150	1.57 2.66 1.54 2.57	2.1
02N22W33B05S	SG#3	830-870	2 3.3 1.9 3.1	2.6
02N22W33B05S *(continued)*	SG#3	830-870	1.9 3 1.9 3.1 3.2 2.3 1.9 3.2	
02N22W33B06S	SG#4	460-500	5.4 10.3 5.1 9.6 5.6 10.6	7.8
02N22W33B07S	SG#5	260-300	3.48 5.72 3.95 6.5 4.34 7.15	5.19
02N21W11J03S	LP#1	1020-1080	3.71 7.09 4.67 8.92	6.10
02N21W11J04S	LP#2	615-655	very low	
02N21W11J05S	LP#3	340-380	0.14 0.25 0.14 0.24 0.14	0.20

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
			0.25	
			0.16	
			0.27	
04N18W31D03S	RP1#1	590-610	5.46	7.10
			8.77	
			5.45	
			8.73	
04N18W31D05S	RP1#2	310-330	24.7	28.4
			42.7	
			16.7	
			29.5	
04N18W31D05S	RP1#3	220-240	27.6	35.6
			47.9	
			19.9	
			35.1	
			43.2	
			58.7	
			18.9	
			33.5	
04N18W31D06S	RP1#4	140-160	29.8	36.5
			52.3	
			25.9	
			45.7	
			23.7	
			41.7	
04N18W31D08S	RP1#5	50-70	16.6	24.5
			29.2	
			18.1	
			34.1	
03N21W15G01S	SP1#1	660-680	47.9	44.3
			44.3	
			42.3	
			42.7	
03N21W15G02S	SP1#2	520-540	12.3	29.7
			121.6	
			11.4	
			20.3	
			10.9	
			19.4	
			11.9	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
03N21W15G03S	SP1#3	370-390	65.4	73.0
			106.8	
			46.1	
			73.4	
			55.6	
			90.9	
03N21W15G04S	SP1#4	260-280	13.5	21.9
			24.6	
			21.3	
			38.3	
			12.1	
			21.8	
03N21W15G05S	SP1#5	60-80	50.6	67.3
			89.1	
			48.9	
03N21W15G05S	SP1#5	60-80	86.1	
(continued)			46.7	
			82.2	
03N21W16H06S	SP2#1	530-550	20.4	28.6
			34.9	
			21.5	
			36.7	
			24.1	
			40.9	
			18.4	
			31.5	
03N21W16H07S	SP2#2	290-310	20.6	30.7
			36.3	
			22.3	
			39.3	
			23.2	
			40.4	
			23.3	
			40.4	
03N21W16H08S	SP2#3	150-170	65	94.9
			109.1	
			99.3	
			163.3	
			49.1	
			83.6	

Table 3-2. Slug Test Results

Well ID	Other Name	Perforated Interval (ft bgs)	Estimated Hydraulic Cond. (ft/day)	Average Hydraulic Cond. (ft/day)
03N21W16H09S	SP2#4	60-70	67.9 106.7	87.3

Data from USGS and United, as described in Section 3.

Notes: ft bgs = feet below ground surface
ft/day = feet per day

Table 3-4. Monthly Discharge, Santa Clara River

Year	January	February	March	April	May	June	July	August	September	October	November	December
1985	7.1	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6
1986	205.1	1,692.6	706.3	69.5	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0
1987	0.6	0.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.2
1988	45.7	143.3	136.1	43.2	0.0	0.0	10.1	13.6	0.0	2.6	0.0	6.2
1989	1.3	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1990	0.0	28.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1991	0.0	26.4	1,234.8	36.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.9
1992	49.0	3,060.4	940.8	246.4	0.0	0.0	0.0	0.0	0.0	16.2	0.5	120.5
1993	3,599.6	6,182.7	2,764.5	1,030.0	263.2	181.9	60.7	0.0	0.0	0.0	10.3	6.9
1994	15.0	553.6	232.6	17.8	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
1995	4,108.4	607.5	1,653.6	571.4	164.6	18.6	0.0	0.0	2.6	16.1	23.2	18.9
1996	50.3	664.3	152.5	0.0	0.0	0.0	0.0	0.0	0.0	76.1	41.2	474.4
1997	560.6	118.4	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	7.8	406.2
1998	72.1	7,124.8	1,066.0	1,610.0	1,101.8	206.2	7.7	0.0	0.0	0.0	30.1	0.0
1999	137.6	121.7	82.1	127.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000	0.7	511.4	231.2	128.3	0.4	0.0	3.9	0.0	0.1	5.4	1.0	0.0
2001	113.2	515.0	1,781.3	78.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2002	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.5	0.2	67.7	34.8
2003	0.0	271.3	213.4	122.8	122.4	0.4	0.0	0.1	0.0	0.0	5.0	19.4
2004	0.0	420.4	22.1	0.0	0.0	0.0	0.0	0.0	0.0	127.2	0.0	945.6
2005	8,196.6	5,987.3	1,443.7	398.8	184.2	5.7	2.8	1.4	4.1	40.6	1.3	0.6
2006	337.8	264.9	260.4	1,406.8	113.9	6.1	0.5	1.0	1.1	2.6	0.4	0.5
2007	3.7	0.0	0.5	4.0	0.0	0.4	0.0	0.0	0.0	1.3	0.0	16.6
2008	1,955.1	385.1	92.7	21.8	0.0	0.3	0.0	0.0	0.9	1.5	21.6	0.6
2009	0.0	350.5	66.1	0.0	0.0	0.0	0.1	0.1	0.2	30.5	0.2	80.1
2010	817.6	307.4	127.6	138.4	0.0	1.2	0.2	0.2	0.0	0.3	13.5	544.7
2011	10.1	160.6	1,538.0	239.2	108.6	25.6	0.0	0.0	0.1	0.0	0.8	0.0
2012	0.0	0.0	94.0	69.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2013	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2014	0.0	0.0	306.3	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.0	37.0
2015	0.0	0.0	0.0	0.1	2.1	0.0	0.0	0.0	0.0	0.0	1.0	5.0

Estimates derived from United monitoring data.

Units are cubic feet per second.

Table 3-5. Monthly Groundwater Recharge in Arroyo Las Posas in Northern Pleasant Valley Basin

	January		February		March		April		May		June		July		August		September		October		November		December	
Year	Surface Water	Ground water	Surface Water	Ground water	Surface Water	Ground water	Surface Water	Ground water	Surface Water	Ground water	Surface Water	Ground water	Surface Water	Ground water	Surface Water	Ground water	Surface Water	Ground water	Surface Water	Ground water	Surface Water	Ground water	Surface Water	Ground water
1985	10	18	15	15	10	16	4	13	4	12	4	10	5	8	5	7	4	5	5	4	144	26	11	15
1986	379	40	1,219	56	900	74	26	59	11	53	12	49	11	51	11	51	22	51	13	50	54	60	14	53
1987	33	55	25	48	33	55	17	50	19	51	15	48	17	51	23	53	20	51	194	73	66	72	603	87
1988	469	91	265	86	27	77	363	86	33	78	22	68	25	68	23	66	34	65	20	63	42	66	420	84
1989	21	70	296	77	40	78	22	68	24	69	14	62	15	62	14	59	17	56	20	57	25	55	24	56
1990	289	81	296	83	23	81	22	76	34	82	19	77	18	78	14	77	13	72	16	74	22	72	14	72
1991	38	80	272	88	1,352	117	23	102	20	97	16	91	16	90	14	86	13	81	12	81	12	76	653	101
1992	445	110	9,455	137	3,484	160	156	149	66	144	58	132	63	132	50	128	44	120	144	130	38	119	858	136
1993	7,220	166	8,714	158	1,951	179	251	166	232	165	229	156	181	156	141	152	116	144	173	147	146	141	307	147
1994	319	148	1,023	140	758	157	206	150	209	154	116	147	93	149	79	147	68	140	46	139	100	137	218	145
1995	9,488	174	383	156	6,411	184	494	174	387	175	276	166	184	168	162	165	131	157	104	160	81	152	449	160
1996	171	158	1,319	156	691	168	213	160	147	163	140	156	140	161	143	161	154	156	384	165	549	162	1,782	179
1997	1,515	181	262	158	219	169	197	158	199	161	197	154	174	157	164	155	175	149	282	155	651	152	2,583	172
1998	1,342	177	17,347	168	2,464	190	1,026	182	1,326	187	678	177	465	178	395	174	446	165	341	168	522	161	383	164
1999	658	162	534	145	836	162	947	158	413	162	290	154	253	157	260	155	258	148	201	151	348	145	318	149
2000	493	148	1,892	149	764	158	778	151	314	153	239	145	242	156	245	160	255	156	351	162	249	156	272	161
2001	1,747	172	3,421	168	3,182	191	731	181	567	183	400	174	384	172	376	167	374	159	442	162	767	158	621	163
2002	640	154	442	133	478	143	418	136	382	138	368	132	325	149	315	157	291	156	303	163	1,054	165	1,231	176
2003	326	175	2,881	171	1,171	190	708	181	601	184	300	175	266	179	265	176	263	169	258	172	285	165	650	171
2004	368	170	1,789	169	366	178	341	170	241	173	193	165	203	169	173	167	190	161	2,002	179	288	171	3,616	189
2005	12,259	195	14,806	179	1,971	199	851	188	740	190	529	181	428	184	390	182	321	175	665	180	497	174	454	179
2006	1,003	182	934	167	1,142	187	1,163	184	578	188	386	179	338	183	360	181	312	173	311	177	327	170	463	174
2007	527	174	568	158	390	174	545	169	373	174	363	168	338	173	376	172	499	167	319	171	272	165	551	171
2008	4,501	189	707	175	322	182	308	172	287	175	251	168	211	171	202	170	198	163	219	168	430	163	575	170
2009	237	168	1,599	161	308	176	315	168	153	170	129	162	146	166	170	165	245	160	495	167	165	159	811	167
2010	3,334	185	1,520	171	369	183	497	173	452	176	242	168	196	170	179	168	199	161	436	168	275	162	2,500	182
2011	458	179	1,259	164	3,246	191	515	180	493	181	255	171	183	172	144	168	131	159	331	165	587	161	286	166
2012	368	165	171	153	822	167	685	163	143	164	128	156	148	160	117	157	97	150	114	154	136	148	352	156
2013	333	157	133	139	324	155	137	148	71	149	48	138	30	134	28	129	27	121	31	123	51	122	24	119
2014	194	131	51	116	622	138	499	137	41	133	36	122	46	125	36	121	31	114	39	118	49	117	230	130
2015	388	136	379	126	29	127	28	117	48	123	23	113	22	113	16	109	14	102	17	104	24	101	15	100

Estimated from Intera (2018) model, as discussed in Section 3.

Units are in acre-feet.

Table 3-6. Monthly Discharge and Diversions, Conejo Creek

Year	January		February		March		April		May		June		July		August		September		October		November		December	
	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)	Conejo Creek Inflow (cfs)	Diversion (acre-ft)
1985	24.2	-	26.1	-	21.3	-	14.5	-	14.1	-	12.8	-	14.1	-	14.0	-	14.8	-	15.6	-	44.4	-	21.4	-
1986	49.1	-	108.5	-	87.6	-	28.7	-	21.3	-	18.8	-	16.8	-	16.0	-	20.1	-	16.6	-	32.4	-	14.5	-
1987	25.7	-	22.5	-	21.2	-	16.0	-	15.0	-	14.1	-	14.2	-	15.0	-	13.4	-	38.4	-	26.4	-	56.7	-
1988	44.2	-	33.3	-	20.7	-	28.5	-	14.9	-	15.7	-	14.3	-	13.5	-	16.3	-	16.7	-	16.5	-	46.9	-
1989	21.7	-	45.6	-	24.1	-	17.4	-	16.3	-	16.2	-	15.0	-	16.2	-	18.6	-	20.6	-	18.0	-	17.5	-
1990	43.1	-	28.7	-	14.5	-	15.3	-	13.7	-	12.5	-	11.6	-	12.2	-	11.7	-	13.2	-	17.8	-	15.4	-
1991	18.2	-	36.3	-	115.0	-	17.9	-	12.3	-	12.2	-	10.6	-	10.3	-	11.9	-	13.9	-	10.2	-	65.4	-
1992	42.3	-	333.2	-	147.1	-	31.9	-	23.5	-	21.7	-	15.7	-	15.8	-	15.7	-	21.4	-	16.5	-	60.9	-
1993	303.6	-	281.5	-	80.5	-	34.1	-	24.9	-	21.0	-	19.4	-	18.5	-	17.1	-	23.2	-	24.3	-	33.0	-
1994	20.6	-	59.8	-	37.1	-	18.9	-	16.4	-	15.1	-	14.5	-	14.0	-	19.1	-	17.1	-	18.7	-	20.3	-
1995	326.6	-	40.0	-	147.9	-	43.4	-	32.5	-	27.8	-	20.1	-	17.9	-	19.1	-	19.2	-	18.8	-	40.7	-
1996	33.5	-	66.6	-	31.1	-	21.7	-	17.2	-	16.6	-	13.4	-	17.7	-	16.6	-	26.4	-	37.7	-	82.1	-
1997	73.1	-	23.9	-	17.4	-	16.0	-	13.7	-	14.6	-	17.5	-	18.4	-	18.3	-	20.5	-	44.4	-	100.2	-
1998	52.5	-	437.3	-	86.9	-	56.7	-	45.8	-	29.7	-	25.5	-	22.5	-	23.3	-	20.9	-	26.6	-	27.4	-
1999	30.5	-	31.0	-	39.1	-	29.4	-	19.8	-	18.2	-	15.2	-	15.7	-	18.6	-	16.2	-	22.8	-	17.3	-
2000	22.6	-	58.4	-	34.0	-	41.4	-	21.6	-	19.5	-	17.2	-	15.4	-	14.7	-	19.3	-	16.8	-	19.5	-
2001	57.0	-	84.4	-	118.1	-	32.3	-	23.6	-	20.1	-	20.1	-	17.8	-	18.0	-	19.5	-	32.6	-	25.0	-
2002	25.0	-	20.5	-	19.6	-	18.7	-	18.1	-	16.7	-	17.1	-	19.2	-	17.6	-	19.5	-	48.2	-	37.5	-
2003	22.7	-	78.0	-	48.5	-	33.5	-	33.8	-	21.8	620	20.5	549	18.5	456	19.0	540	19.8	698	19.8	545	25.9	565
2004	24.8	587	52.5	501	26.9	670	22.0	588	18.3	493	22.4	329	20.3	315	20.1	373	20.5	471	55.9	340	27.3	537	87.9	593
2005	210.1	181	228.9	132	73.2	261	41.6	485	36.2	529	31.7	538	28.1	246	23.8	550	21.1	672	34.2	507	26.4	737	25.4	819
2006	48.9	642	48.3	700	43.9	371	48.5	133	34.5	407	24.3	776	23.0	522	22.8	527	22.5	520	22.1	586	21.1	683	27.0	573
2007	29.6	669	30.6	432	24.1	718	25.1	581	21.6	519	20.7	471	19.7	467	20.4	359	22.0	379	22.2	314	21.5	569	25.5	563
2008	127.8	381	47.5	522	25.9	801	24.0	516	21.5	589	22.1	473	21.0	374	21.0	142	21.6	318	21.7	169	29.2	288	34.3	46.7
2009	23.2	330	74.9	215	27.0	447	22.7	434	19.2	533	17.7	326	15.8	318	15.5	162	15.6	92.8	29.4	291	19.1	512	40.2	338
2010	94.5	347	53.6	111	25.5	583	32.0	477	19.1	431	17.1	610	16.3	535	15.9	228	16.0	354	31.7	473	12.1	411	15.5	319
2011	36.2	512	90.9	605	293.4	452	35.2	572	28.8	609	22.5	541	16.8	567	15.4	457	14.7	398	21.8	515	41.6	561	23.8	639
2012	35.6	510	21.0	557	56.1	463	49.4	518	20.4	609	15.2	414	12.9	338	10.8	171	11.9	197	14.4	155	18.4	285	34.7	189
2013	24.6	281	19.4	478	22.4	506	14.8	327	13.3	323	14.7	313	10.7	39.8	7.8	76.7	8.6	117	10.9	191	15.9	276	13.9	325
2014	11.6	230	26.5	230	53.9	386	14.5	129	8.4	11.7	8.4	94.0	8.8	131	7.3	113	6.0	63.9	7.2	131	13.9	242	92.3	272
2015	45.4	510	18.1	500	25.4	478	8.4	109	8.1	74.5	9.5	140	15.9	118	6.1	10.8	9.8	0.0	5.0	39.4	5.7	110	11.9	285

Notes: cfs = cubic feet per second
acre-ft = acre-feet

Table 3-7. Precipitation Stations Used for Input to VRGWFM

Site Id	Station Name	Start Date	End Date	Easting	Northing
6	Ventura-Del Mar Ranch	9/30/1924	9/30/1998	6,198,325	1,925,847
18	Santa Paula-Limoneira Ranch	9/30/1904	9/30/1997	6,220,526	1,944,999
19	Santa Paula - Agriculture Office	9/30/1930	9/30/1991	6,240,820	1,952,865
25	Piru-Newhall Ranch	9/30/1927	9/30/2013	6,343,141	1,969,243
32	Oxnard-Water Department	9/30/1902	9/30/2003	6,206,388	1,897,748
39	Fillmore-Rancho Sespe	6/30/1912	10/21/2009	6,271,274	1,963,376
44	Santa Ana Valley-Selby Ranch	9/30/1927	9/30/1993	6,153,312	1,979,698
59	Ojai-Thacher School	9/30/1915	12/12/2013	6,205,925	1,994,199
65	Upper Ojai Summit-County Fire Station	9/30/1924	10/1/2001	6,219,699	1,983,122
85	Canada Larga	6/30/1934	12/11/2013	6,190,638	1,963,041
96	Bardsdale-Young Ranch	9/30/1931	10/1/1985	6,276,484	1,956,047
122	Ventura-Kingston Reservoir	9/30/1934	9/30/2013	6,170,771	1,949,845
140	Oak View-County Fire Station	9/30/1949	12/12/2013	6,169,169	1,968,671
152	Piedra Blanca Guard Station	9/30/1949	10/7/2013	6,210,340	2,028,317
160	Piru-Temescal Guard Station	9/30/1949	9/30/2013	6,332,365	1,995,808
163	Sulphur Mountain - Meher Mount	9/30/1956	10/1/1985	6,209,042	1,974,247
165	Ojai-Stewart Canyon	9/30/1956	12/12/2013	6,185,302	1,992,224
167	Ventura-Hall Canyon	9/30/1956	10/11/2013	6,181,215	1,926,764
168	Oxnard Airport	9/30/1956	10/10/2013	6,196,562	1,897,865
169	Thousand Oaks-Weather Station	9/30/1956	1/10/2011	6,304,417	1,888,572
171	Fillmore-Fish Hatchery	9/30/1956	10/15/2013	6,294,770	1,966,699
172	Piru Canyon	9/30/1956	10/16/2013	6,333,477	2,009,953
175	Saticoy Fire Station	9/30/1956	7/23/2008	6,212,616	1,928,105
177	Camarillo-Pacific Sod	9/30/1956	10/1/2004	6,235,271	1,881,047
187	Susana Knolls-County Fire Station	9/30/1955	10/1/2007	6,359,562	1,918,381
189	Somis-Deboni	9/30/1955	10/14/2013	6,237,536	1,927,829
190	Somis-Bard	9/30/1955	10/14/2013	6,257,159	1,926,615
191	Moorpark-Downing Ranch	9/30/1955	11/17/2008	6,291,452	1,942,263
194	Camarillo-Adohr	9/30/1955	10/1/1998	6,255,532	1,898,427
199	Fillmore-County Fire Station	9/30/1959	10/1/2009	6,282,484	1,970,246
204	Lake Casitas-Upper	9/30/1959	9/30/2012	6,158,542	1,976,191
209	Lockwood Valley-County Yard	9/30/1960	9/30/1993	6,230,432	2,091,075
215	Channel Islands Harbor	9/30/1963	9/30/2013	6,191,851	1,883,566
218	Meiners Oaks-County Fire Station	9/30/1964	12/12/2013	6,174,260	1,986,601
225	Wheeler Canyon	6/30/1966	12/6/2013	6,215,991	1,966,484
227	Lake Bard	9/18/1966	3/19/2013	6,311,245	1,911,766
230	Ventura-Sexton Canyon	9/30/1971	9/30/1998	6,191,101	1,939,177
231	El Rio-County Yard	9/30/1966	10/1/2006	6,205,970	1,912,210

Table 3-7. Precipitation Stations Used for Input to VRGWFM

Site Id	Station Name	Start Date	End Date	Easting	Northing
232	Santa Monica Mts-Deals Flat	9/30/1968	10/29/2013	6,268,564	1,856,142
235	Piru-L.A./Ventura County Line	9/30/1993	9/30/2006	6,349,338	1,968,492
238	South Mountain-Shell Oil	9/30/1970	10/14/2013	6,257,088	1,944,610
239	El Rio-UWCD Spreading Grounds	9/30/1972	11/26/2013	6,213,264	1,911,417
241	Cerro Noroeste	9/30/1984	10/1/1985	6,144,154	2,147,145
242	Tripas Canyon	9/30/1971	10/15/2013	6,330,897	1,956,898
243	Santa Paula-Dawes	9/30/1973	10/1/1987	6,227,197	1,949,070
244	Cuddy Valley-Cuddy Ranch	9/30/1974	9/30/2013	6,243,775	2,129,753
245	Santa Paula-UWCD	9/30/1960	9/30/1986	6,236,679	1,949,674
246	Simi Sanitation Plant NWS	9/30/1986	9/30/2008	6,316,653	1,926,683
248	Simi Hills-Burro Flat	9/30/1976	10/1/1985	6,347,433	1,912,298
249	Simi Hills-Rocketdyne Lab	9/30/1958	10/1/2003	6,357,651	1,908,689
250	Moorpark-Happy Camp Canyon	9/30/1976	10/14/2013	6,305,016	1,949,525
254	Casitas Station - Station Canyon	8/31/1979	12/12/2013	6,148,201	1,973,600
257	Oxnard South-Vance	9/30/1979	10/1/1989	6,201,137	1,887,094
258	Oak View-Raap	9/30/1981	9/30/1992	6,170,329	1,967,544
259	Camarillo-PVWD	9/30/1981	9/30/2013	6,238,347	1,901,536
260	Ventura-Emma Wood State Bch	9/30/1982	9/30/1995	6,164,189	1,927,589
261	Saticoy-Recharge Facility	9/30/1984	9/30/2013	6,222,407	1,925,770
262	Moorpark College	9/30/1985	10/1/1990	6,309,744	1,933,310
263	Camarillo-Leisure Village	9/30/1984	10/1/2004	6,262,135	1,903,516
264	Wheeler Gorge	9/30/1982	12/12/2013	6,179,190	2,012,317
267	Ormond Beach-Occidental Chemical	9/30/1989	10/1/1993	6,207,390	1,875,597
268	Last Chance (Type C)	9/30/2003	11/30/2011	6,245,374	2,003,466
271	Lockwood Valley nr Seymour Creek	9/30/1998	10/1/2002	6,247,917	2,103,121
272	Sage Ranch	9/30/2002	3/19/2013	6,357,157	1,910,209
278	Sespe - Dough Flat (Type B)	9/30/2003	2/29/2012	6,292,588	2,013,524
279	Borracho Saddle (Type C)	9/30/2006	11/30/2011	6,287,925	2,043,792
280	Circle X Ranch (Type B)	9/30/1997	1/10/2012	6,278,137	1,863,532
281	Cheeseboro RAWS	9/30/2005	12/31/2013	6,344,089	1,890,992
300	Senior Gridley Canyon (Type B)	9/30/1992	12/7/2011	6,197,452	1,999,860
301	Old Man Mountain (Type C)	9/30/1998	12/13/2011	6,128,011	2,008,963
302	Canada Larga-Verde Canyon (Type B)	9/30/1998	11/30/2011	6,195,218	1,953,483
303	Nordhoff Ridge (Type C)	9/30/1997	12/20/2011	6,190,964	2,010,149
304	Matilija Hot Springs at No Fork (Type B)	9/30/1998	5/23/2012	6,168,038	2,004,170
305	La Granada Mountain (Type B)	9/30/2004	12/1/2011	6,132,168	1,977,361
306	White Ledge Peak (Type C)	9/30/2004	10/1/2011	6,142,078	1,997,240
307	Upper Matilija Canyon (Type C)	9/30/2004	11/30/2011	6,148,528	2,022,122

Table 3-7. Precipitation Stations Used for Input to VRGWFM

Site Id	Station Name	Start Date	End Date	Easting	Northing
308	Red Mountain (Type B)	9/30/2002	11/28/2011	6,157,216	1,952,146
400	Fillmore-Grand Ave (Type B)	9/30/1998	6/11/2012	6,282,112	1,984,403
401	Sycamore Canyon (Type C)	9/30/1997	12/7/2011	6,237,440	2,036,305
402	Tommys Creek (Type C)	9/30/1998	12/7/2011	6,194,057	2,044,282
403	Silverstrand Alert (Type B)	9/30/2008	7/12/2012	6,192,902	1,880,116
404	Sisar North ALERT (Type C)	9/30/2004	12/7/2011	6,219,069	2,008,908
405	Choro Grande (Type C)	9/30/1998	11/30/2011	6,159,642	2,046,337
406	Fagan Canyon West (Type B)	9/30/2004	10/28/2010	6,233,868	1,961,229
407	Fagan Canyon East (Type B)	9/30/2004	10/28/2010	6,238,182	1,956,937
408	Rose Valley Alert (Type C)	9/30/2000	8/30/2012	6,204,831	2,022,215
409	Hopper Mountain (Type C)	9/30/2000	11/17/2011	6,301,076	1,998,286
410	Pyramid Lake Visitors Center (Type B)	9/30/2006	2/28/2012	6,331,876	2,063,545
411	Piru Creek above Pyramid Lake (Type B)	9/30/2006	2/28/2012	6,308,629	2,070,706
412	El Rio - Mesa School APCD	6/30/2012	12/31/2013	6,216,257	1,916,135
500	Santa Rosa Valley - Conejo (Type B)	9/30/2003	9/30/2008	6,270,425	1,909,805
501	Rocky Peak (Type B)	9/30/2003	5/1/2012	6,367,273	1,929,754
502	Santa Rosa Valley - Basin 2	9/30/2007	10/10/2013	6,294,289	1,912,011
503	Oxnard Plain - Laguna Rd (Type B)	6/30/2008	9/30/2010	6,229,045	1,888,191
504	South Mountain West (Type B)	9/30/2002	12/31/2011	6,230,637	1,926,286
505	Camarillo - CSUCI (Type B)	9/30/2003	10/28/2013	6,247,289	1,889,109
506	Wood Ranch - Sycamore Canyon Dam (Type B)	9/30/2003	11/8/2011	6,320,092	1,915,839
507	South Mountain East (Type B)	9/30/2002	11/11/2010	6,246,072	1,933,703
508	Moorpark - Home Acres ALERT (Type B)	9/30/2004	6/13/2012	6,282,295	1,922,330
509	Spanish Hills - Las Posas Res (Type B)	9/30/2003	6/15/2012	6,233,360	1,906,442
510	Lang Ranch (Type B)	9/30/2004	2/8/2012	6,314,074	1,898,399
512	Camarillo - Upland (Type B)	9/30/2012	3/27/2013	6,257,171	1,911,047
605	San Antonio Creek at Hwy 33	10/1/2011	10/1/2012	6,168,094	1,963,326
004A	Casitas Dam	9/30/1956	12/12/2013	6,160,073	1,958,881
017B	Port Hueneme - USN	9/30/1982	10/1/1996	6,197,414	1,877,838
017C	Port Hueneme - Oxnard Sewer Plant	9/30/1996	10/11/2013	6,202,687	1,876,057
018A	Santa Paula-Limoneira Ranch	10/1/1997	10/1/2010	6,220,526	1,944,999
018B	Santa Paula-Limoneira Ranch	9/30/2010	9/30/2013	6,217,431	1,945,640
020A	Rancho Matilija - West	9/30/1972	9/30/1989	6,165,809	1,980,947
020B	Ventura River County Water District	9/30/1989	9/30/2013	6,170,755	1,981,085
030D	Ojai-County Fire Station	9/30/1979	12/31/2013	6,190,521	1,987,711
032A	Oxnard Civic Center	9/30/2003	10/21/2013	6,204,787	1,897,261
036A	Piru-County Fire Station	9/30/1966	10/11/2013	6,321,391	1,973,755
049A	Santa Rosa Valley-Worthington Ranch	9/30/1977	9/30/2008	6,277,516	1,914,084

Table 3-7. Precipitation Stations Used for Input to VRGWFM

Site Id	Station Name	Start Date	End Date	Easting	Northing
063B	Upper Sespe - Pine Mountain Inn NWS	1/2/1971	11/25/2011	6,151,125	2,046,957
063C	Upper Sespe - Pine Mountain Inn	5/5/2013	7/22/2013	6,150,543	2,047,167
064B	Upper Ojai-Happy Valley	9/30/1970	12/12/2013	6,202,952	1,983,619
065A	Upper Ojai Summit-County Fire Station	9/30/2001	10/7/2013	6,219,449	1,983,226
066C	Ventura-Downtown (County Schools)	9/30/1978	10/1/1990	6,171,486	1,927,191
066D	Ventura-Downtown (Vista Bldg)	9/30/1990	10/1/2000	6,170,819	1,927,503
066E	Ventura-Downtown (City Hall-Historic Courthouse)	9/30/2000	10/17/2013	6,171,241	1,927,699
094B	Fillmore-Double H-N Ranch	9/30/1972	10/1/1987	6,306,180	1,968,420
094C	Fillmore-Fairview Ranch	9/30/1987	10/16/2008	6,302,241	1,968,150
096A	Bardsdale-Lander Ranch	9/30/1985	10/21/2009	6,274,887	1,955,456
101A	Piru-Camulos Ranch	9/30/1974	10/11/2013	6,333,350	1,970,933
106A	Piru RAWS	9/30/2001	12/31/2013	6,317,425	1,970,450
121C	Lake Sherwood-County Fire Station	9/30/1963	12/7/2013	6,296,566	1,874,790
126A	Moorpark - Ventura County Yard	7/31/2008	12/24/2013	6,296,552	1,930,997
128B	Thousand Oaks-County Fire Station	9/30/1972	10/1/2009	6,299,583	1,902,968
128C	Thousand Oaks APCD APCD	9/30/2008	12/31/2013	6,298,549	1,899,944
130A	Chuchupate Ranger Station NWS	9/30/1968	4/29/2009	6,258,076	2,117,878
132A	Saticoy-Buenaventura Lemon Co	9/30/1990	10/1/2003	6,215,886	1,927,764
132B	Saticoy-County Yard	9/30/2006	9/30/2008	6,217,299	1,926,636
134B	Matilija Dam	9/30/1977	12/24/2013	6,168,247	2,000,933
141A	Moorpark-County Fire Station	9/30/1965	10/1/2008	6,295,520	1,928,074
153A	Ojai-Bower Tree Farm	9/30/1976	9/30/2013	6,193,255	1,985,252
154B	Simi-County Fire Station	9/30/1971	10/1/2008	6,347,644	1,930,290
163A	Sulphur Mountain	9/30/1985	10/1/1988	6,207,601	1,972,848
163B	Sulphur Mountain	9/30/1988	9/30/1998	6,205,192	1,974,595
163C	Sulphur Mountain	9/30/1998	12/12/2013	6,207,356	1,973,357
169A	Thousand Oaks - Civic Center	9/30/2010	12/24/2013	6,304,991	1,887,152
173A	Santa Paula Canyon-Ferndale Ranch	9/30/1979	10/3/2013	6,233,982	1,979,527
174A	Ozena Guard Station (NWS)	9/30/1979	11/25/2011	6,154,910	2,073,497
175A	Saticoy-County Yard	9/30/2008	10/17/2013	6,217,048	1,926,639
177A	Camarillo-Pacific Sod	9/30/2004	12/10/2013	6,237,116	1,880,623
180A	Ortega Hill (Type C)	9/30/1998	9/18/2013	6,169,667	2,032,962
182A	Newbury Park-Rancho Sierra Vista	9/30/1972	10/1/1989	6,270,807	1,879,474
188A	Newbury Park-County Fire Station #35	9/30/1981	12/10/2013	6,280,414	1,891,413
192A	Moorpark-Everett	9/30/1980	9/30/2008	6,306,818	1,914,633
193A	Santa Susana	9/30/1980	12/10/2013	6,347,324	1,920,588
194A	Camarillo-Adohr (Sanitation Plant)	9/30/1998	10/10/2013	6,258,610	1,895,464
196B	Tapo Canyon	9/30/1977	9/30/2008	6,344,788	1,941,734

Table 3-7. Precipitation Stations Used for Input to VRGWFM

Site Id	Station Name	Start Date	End Date	Easting	Northing
196C	Tapo Canyon - County Park	9/30/2008	12/10/2013	6,347,046	1,940,707
199A	Fillmore Sanitation	9/30/2009	10/1/2013	6,278,167	1,965,737
206B	Somis-Fuller	9/30/1977	10/14/2013	6,265,819	1,936,942
207A	Matilija Canyon	9/30/1963	10/1/1985	6,153,533	2,008,507
207B	Matilija Canyon	9/30/1985	9/30/2008	6,153,949	2,008,300
207C	Matilija Canyon	9/30/2008	12/12/2013	6,153,857	2,007,694
209A	Lockwood Valley-County Yard	9/30/1993	6/18/2013	6,230,098	2,091,079
211A	Alamo Mountain	9/30/2009	9/18/2013	6,266,757	2,067,446
216A	Ventura Marina-CINP	9/30/1983	10/1/1989	6,179,140	1,915,265
216B	Ventura Marina-Port District	9/30/1989	10/1/2008	6,179,156	1,916,478
216C	Ventura Harbor	9/30/2008	10/10/2013	6,179,326	1,916,678
219A	Camarillo-Hauser	9/30/1972	9/30/2013	6,251,284	1,910,196
221B	Sea Cliff - County Fire Station	9/30/1982	10/10/2013	6,133,053	1,951,062
222A	Ventura-County Government Center	9/30/1977	10/16/2013	6,195,759	1,921,834
223A	Point Mugu-USN	10/1/1976	10/1/2013	6,222,825	1,865,310
224A	Sespe-Westates	9/30/1976	10/17/2013	6,295,797	1,997,927
230A	Ventura-Sexton Canyon	9/30/1998	12/6/2013	6,191,510	1,938,262
231A	El Rio - Riverpark	9/30/2006	8/18/2008	6,204,812	1,913,740
234A	Las Llajas Canyon	9/30/1970	10/1/2002	6,353,281	1,932,778
234B	Las Llajas Canyon	9/30/2002	12/10/2013	6,353,282	1,932,980
235A	Piru-L.A./Ventura County Line	9/30/2006	10/11/2013	6,349,002	1,968,494
245A	Santa Paula-UWCD	9/30/1986	10/27/2010	6,240,648	1,952,462
245B	Santa Paula - Wilson Ranch	9/30/2010	10/1/2013	6,243,151	1,959,209
246A	Simi Sanitation Plant	7/2/2008	12/10/2013	6,316,485	1,926,684
262A	Moorpark College (Type B)	9/30/1999	9/30/2008	6,309,743	1,933,209
263A	Camarillo-Leisure Village CIMIS 152	9/30/2004	5/31/2013	6,261,717	1,903,723
273A	Oxnard NWS	7/28/2010	10/21/2013	6,217,833	1,899,638
500A	Camrosa Water District	9/30/2009	10/11/2013	6,269,340	1,910,624

Station information and precipitation data downloaded from Ventura County Watershed Protection District, as described in Section 3.

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N20W06E01S	240	---	550	---	Pleasant Valley	27	96.5	2,604	709	2000	1	2013	2
01N21W01A01S	315	---	418	---	Pleasant Valley	21	0	0	0	2003	1	2013	2
01N21W01A03S	260	---	390	---	Pleasant Valley	58	103	5,993	217	1983	2	2013	2
01N21W01B01S	---	---	---	---	Pleasant Valley	59	207	12,236	1,499	1984	1	2014	2
01N21W01B03S	---	---	---	---	Pleasant Valley	14	71.9	1,007	202	1979	2	1997	2
01N21W01B04S	820	---	1,150	---	Pleasant Valley	48	59.7	2,865	377	1983	2	2013	2
01N21W01B05S	585	---	910	---	Pleasant Valley	21	145	3,035	247	2004	1	2015	2
01N21W01C02S	224	---	504	---	Pleasant Valley	75	144	10,789	640	1979	2	2016	2
01N21W01D01S	350	---	371	---	Pleasant Valley	75	1.2	89.8	5.0	1979	2	2016	2
01N21W01D02S	107	---	437	---	Pleasant Valley	5	93.9	469	123	1979	2	1997	2
01N21W01D05S	313	---	440	---	Pleasant Valley	49	42.0	2,060	205	1979	2	2003	2
01N21W01F02S	325	---	374	---	Pleasant Valley	60	60.4	3,622	459	1986	1	2015	2
01N21W01J01S	240	---	550	---	Pleasant Valley	10	59.9	599	152	2004	1	2015	2
01N21W01M02S	1,070	---	1,200	---	Pleasant Valley	6	274	1,645	549	2014	1	2016	2
01N21W01N02S	267	---	435	---	Pleasant Valley	7	19.0	133	62.5	1979	2	1997	2
01N21W02H04S	240	---	540	---	Pleasant Valley	24	69.7	1,674	158	2005	1	2016	2
01N21W02H05S	95	---	155	---	Pleasant Valley	14	0.4	6.0	1.0	2010	1	2016	2
01N21W02J01S	---	---	---	---	Pleasant Valley	75	0.6	45.6	1.0	1979	2	2016	2
01N21W02J02S	178	---	373	---	Pleasant Valley	75	54.4	4,078	349	1979	2	2016	2
01N21W02J03S	304	---	707	---	Pleasant Valley	75	57.7	4,326	134	1979	2	2016	2
01N21W02J04S	310	---	450	---	Pleasant Valley	8	0.6	4.4	1.0	2013	1	2016	2
01N21W03A02S	710	---	1,060	---	Pleasant Valley	9	0	0	0	1982	1	1997	2
01N21W03C01S	956	---	1,216	---	Pleasant Valley	19	43.2	821	113	1979	2	1989	2
01N21W03D01S	336	---	1,300	---	Pleasant Valley	75	70.9	5,320	449	1979	2	2016	2
01N21W03H02S	615	---	895	---	Pleasant Valley	24	171	4,114	681	2005	1	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N21W03J01S	658	---	1,090	---	Pleasant Valley	61	129	7,864	584	1979	2	2016	2
01N21W03K01S	403	---	1,433	---	Pleasant Valley	71	586	41,613	1,428	1981	2	2016	2
01N21W03L03S	674	---	990	---	Pleasant Valley	25	110	2,761	274	2004	2	2016	2
01N21W03N01S	712	---	1,036	---	Pleasant Valley	74	110	8,142	310	1979	2	2016	1
01N21W03N02S	688	---	883	---	Pleasant Valley	19	10.5	199	47.4	1980	1	1997	2
01N21W03P02S	430	---	980	---	Pleasant Valley	75	140	10,494	499	1979	2	2016	2
01N21W03R01S	443	---	1,013	---	Pleasant Valley	71	480	34,076	1,001	1981	2	2016	2
01N21W04A02S	800	---	1,160	---	Pleasant Valley	52	43.7	2,271	287	1991	1	2016	2
01N21W04C01S	613	---	1,003	---	Pleasant Valley	13	31.4	408	136	1979	2	2016	2
01N21W04D03S	100	---	175	---	Oxnard Plain	74	0.6	47.0	1.0	1979	1	2016	2
01N21W04D04S	571	---	1,321	---	Oxnard Plain	71	306	21,736	966	1981	2	2016	2
01N21W04K01S	400	---	1,220	---	Pleasant Valley	71	183	12,962	871	1981	2	2016	2
01N21W04M01S	522	---	1,290	---	Oxnard Plain	75	27.5	2,066	344	1979	1	2016	2
01N21W04M02S	---	---	---	---	Oxnard Plain	29	0.6	18.7	0.8	2002	2	2016	2
01N21W05A02S	120	---	208	---	Oxnard Plain	68	0.2	15.9	1.0	1979	2	2015	1
01N21W05F01S	120	---	200	---	Oxnard Plain	73	9.4	684	140	1979	2	2016	2
01N21W05G01S	106	---	170	---	Oxnard Plain	75	39.2	2,937	136	1979	2	2016	2
01N21W05K01S	102	---	178	---	Oxnard Plain	51	4.5	232	68.8	1991	2	2016	2
01N21W06A02S	---	---	---	---	Oxnard Plain	2	0	0	0	2013	1	2013	2
01N21W06C02S	105	---	130	---	Oxnard Plain	75	61.9	4,640	193	1979	2	2016	2
01N21W06G01S	980	---	1,030	---	Oxnard Plain	62	1.4	87.3	10.2	1984	1	2016	2
01N21W06H01S	110	---	200	---	Oxnard Plain	75	16.0	1,198	129	1979	2	2016	2
01N21W06J02S	106	---	192	---	Oxnard Plain	75	80.6	6,045	545	1979	2	2016	2
01N21W06J05S	750	---	1,290	---	Oxnard Plain	64	138	8,859	625	1985	1	2016	2
01N21W06L02S	150	---	173	---	Oxnard Plain	10	0.1	1.0	1.0	1979	2	1984	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N21W06L04S	110	---	182	---	Oxnard Plain	75	28.1	2,109	330	1979	2	2016	2
01N21W06L05S	624	---	964	---	Oxnard Plain	75	109	8,210	312	1979	2	2016	2
01N21W06R01S	98	---	196	---	Oxnard Plain	2	0	0	0	2001	1	2008	2
01N21W06R03S	138	---	158	---	Oxnard Plain	75	0.5	34.6	1.0	1979	2	2016	2
01N21W06R04S	130	---	423	---	Oxnard Plain	74	109	8,038	316	1979	2	2016	2
01N21W07A01S	125	---	150	---	Oxnard Plain	76	0.5	37.2	1.4	1979	1	2016	2
01N21W07H01S	125	---	176	---	Oxnard Plain	75	40.1	3,008	323	1979	2	2016	2
01N21W07H04S	122	---	170	---	Oxnard Plain	75	26.2	1,964	65.0	1979	2	2016	2
01N21W07J01S	136	---	198	---	Oxnard Plain	15	32.6	489	84.0	1979	2	1997	2
01N21W07J02S	590	---	1,280	---	Oxnard Plain	64	183	11,710	821	1985	1	2016	2
01N21W07P01S	80	---	154	---	Oxnard Plain	75	4.4	327	7.2	1979	2	2016	2
01N21W07R02S	120	---	202	---	Oxnard Plain	75	1.3	99.0	9.0	1979	2	2016	2
01N21W08A01S	700	---	1,300	---	Oxnard Plain	75	0.8	61.9	3.5	1979	2	2016	2
01N21W08A02S	670	---	1,190	---	Oxnard Plain	55	88.5	4,866	303	1979	2	2006	2
01N21W08D02S	268	---	716	---	Oxnard Plain	64	1.1	72.1	6.0	1984	2	2016	2
01N21W08D05S	700	---	1,200	---	Oxnard Plain	55	97.7	5,371	374	1979	2	2006	2
01N21W08F02S	663	---	1,163	---	Oxnard Plain	48	174	8,356	588	1979	2	2003	1
01N21W08F03S	700	---	1,170	---	Oxnard Plain	26	27.4	713	189	2003	2	2016	2
01N21W08N03S	700	---	1,140	---	Oxnard Plain	2	0	0	0	2016	1	2016	2
01N21W08R01S	603	---	1,363	---	Oxnard Plain	71	323	22,967	1,038	1981	2	2016	2
01N21W09C03S	700	---	1,120	---	Pleasant Valley	24	131	3,140	446	1979	2	1997	2
01N21W09C04S	720	---	1,120	---	Pleasant Valley	51	66.2	3,375	209	1991	2	2016	2
01N21W09D02S	131	---	251	---	Oxnard Plain	42	6.2	262	10.4	1979	2	2000	1
01N21W09D03S	120	---	260	---	Oxnard Plain	33	9.9	326	135	2000	2	2016	2
01N21W09J01S	474	---	954	---	Pleasant Valley	45	149	6,685	432	1979	2	2001	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N21W09J03S	480	---	960	---	Pleasant Valley	41	407	16,683	657	1996	2	2016	2
01N21W09M03S	160	---	300	---	Oxnard Plain	76	1.5	117	3.0	1979	1	2016	2
01N21W09M04S	766	---	1,270	---	Oxnard Plain	54	74.8	4,038	283	1979	2	2006	1
01N21W09M05S	860	---	1,160	---	Oxnard Plain	3	210	631	239	2015	2	2016	2
01N21W10A02S	240	---	320	---	Pleasant Valley	74	0.6	41.4	1.4	1980	1	2016	2
01N21W10G01S	420	---	1,000	---	Pleasant Valley	71	531	37,687	1,191	1981	2	2016	2
01N21W10L01S	900	---	1,050	---	Pleasant Valley	6	147	884	211	2014	1	2016	2
01N21W11B03S	---	---	---	---	Pleasant Valley	40	117	4,670	242	1997	1	2016	2
01N21W11D02S	284	---	1,000	---	Pleasant Valley	75	37.3	2,799	241	1979	2	2016	2
01N21W11G04S	270	---	730	---	Pleasant Valley	41	119	4,861	384	1979	2	1999	2
01N21W11P01S	403	---	843	---	Pleasant Valley	74	86.9	6,432	383	1980	1	2016	2
01N21W12C04S	250	---	400	---	Pleasant Valley	16	6.9	110	32.3	1979	2	1997	2
01N21W12C06S	240	---	390	---	Pleasant Valley	14	17.8	250	19.2	2010	1	2016	2
01N21W12D01S	253	---	414	---	Pleasant Valley	75	130	9,762	405	1979	2	2016	2
01N21W12E02S	---	---	---	---	Pleasant Valley	8	0.9	7.0	2.0	2013	1	2016	2
01N21W12F01S	---	---	---	---	Pleasant Valley	14	0.5	7.4	4.2	1980	1	1997	2
01N21W14C01S	270	---	880	---	Pleasant Valley	25	139	3,472	369	1979	2	1991	2
01N21W15B01S	336	---	852	---	Pleasant Valley	45	58.6	2,636	264	1979	2	2001	2
01N21W15B02S	340	---	880	---	Pleasant Valley	50	92.1	4,607	247	1992	1	2016	2
01N21W15C01S	128	---	671	---	Pleasant Valley	14	0	0	0	1995	1	2001	2
01N21W15C02S	---	---	---	---	Pleasant Valley	22	0.4	8.8	3.6	1979	2	1997	2
01N21W15D02S	383	---	1,083	---	Pleasant Valley	71	347	24,670	1,072	1981	2	2016	2
01N21W15H01S	120	---	200	---	Pleasant Valley	65	0.6	37.4	1.0	1984	2	2016	2
01N21W15J04S	377	---	857	---	Pleasant Valley	66	106	7,002	581	1982	1	2016	2
01N21W15L01S	256	---	282	---	Pleasant Valley	24	0	0	0	1995	1	2006	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N21W15L02S	354	---	904	---	Pleasant Valley	76	119	9,049	574	1979	1	2016	2
01N21W15M01S	492	---	892	---	Pleasant Valley	58	155	9,016	333	1988	1	2016	2
01N21W15P02S	520	---	1,015	---	Pleasant Valley	76	138	10,495	398	1979	1	2016	2
01N21W16A04S	434	---	916	---	Pleasant Valley	76	98.7	7,497	433	1979	1	2016	2
01N21W16A05S	620	---	770	---	Pleasant Valley	21	222	4,654	362	2006	2	2016	2
01N21W16B02S	257	---	377	---	Pleasant Valley	54	1.6	86.2	2.2	1979	1	2006	1
01N21W16B03S	640	---	900	---	Pleasant Valley	75	64.1	4,805	341	1979	2	2016	2
01N21W16E03S	314	---	602	---	Oxnard Plain	76	65.5	4,975	226	1979	1	2016	2
01N21W16M01S	240	---	1,194	---	Oxnard Plain	75	86.8	6,507	675	1979	2	2016	2
01N21W16M03S	620	---	1,100	---	Oxnard Plain	26	148	3,861	325	2004	1	2016	2
01N21W16N01S	418	---	893	---	Oxnard Plain	37	262	9,692	499	1998	2	2016	2
01N21W16P03S	750	---	1,050	---	Pleasant Valley	76	57.5	4,366	525	1979	1	2016	2
01N21W16P04S	600	---	1,000	---	Pleasant Valley	59	151	8,888	538	1987	2	2016	2
01N21W17B01S	175	---	450	---	Oxnard Plain	75	18.7	1,405	124	1979	2	2016	2
01N21W17B02S	600	---	1,100	---	Oxnard Plain	12	213	2,554	394	2011	1	2016	2
01N21W17C01S	128	---	470	---	Oxnard Plain	35	1.5	53.1	3.0	1999	2	2016	2
01N21W17C02S	128	---	200	---	Oxnard Plain	75	9.4	704	42.8	1979	2	2016	2
01N21W17D02S	114	---	186	---	Oxnard Plain	75	15.0	1,124	72.5	1979	2	2016	2
01N21W17E01S	119	---	335	---	Oxnard Plain	71	8.4	593	109	1979	2	2014	2
01N21W17G02S	176	---	488	---	Oxnard Plain	75	36.9	2,771	196	1979	2	2016	2
01N21W17G03S	554	---	1,104	---	Oxnard Plain	66	213	14,054	584	1984	1	2016	2
01N21W17K01S	540	---	940	---	Oxnard Plain	6	171	1,028	203	2014	1	2016	2
01N21W18A03S	114	---	186	---	Oxnard Plain	75	18.6	1,395	134	1979	2	2016	2
01N21W18A04S	130	---	400	---	Oxnard Plain	75	57.7	4,328	220	1979	2	2016	2
01N21W18D01S	380	---	660	---	Oxnard Plain	58	47.7	2,769	100	1988	1	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N21W18G02S	130	---	182	---	Oxnard Plain	75	89.4	6,704	187	1979	2	2016	2
01N21W18J01S	132	---	180	---	Oxnard Plain	41	67.5	2,769	404	1979	2	2016	2
01N21W18L03S	130	---	170	---	Oxnard Plain	75	3.7	279	7.8	1979	2	2016	2
01N21W18L04S	136	---	200	---	Oxnard Plain	53	47.7	2,530	173	1979	2	2005	2
01N21W18L05S	383	---	923	---	Oxnard Plain	72	60.4	4,352	170	1981	1	2016	2
01N21W18Q02S	150	---	190	---	Oxnard Plain	75	1.8	137	21.4	1979	2	2016	2
01N21W18Q03S	100	---	200	---	Oxnard Plain	5	35.4	177	49.8	2014	2	2016	2
01N21W19B01S	128	---	466	---	Oxnard Plain	75	101	7,547	304	1979	2	2016	2
01N21W19B03S	160	---	240	---	Oxnard Plain	70	2.3	161	5.2	1982	1	2016	2
01N21W19C01S	200	---	218	---	Oxnard Plain	38	7.8	298	83.4	1979	2	2015	2
01N21W19C02S	440	---	800	---	Oxnard Plain	72	29.7	2,139	154	1981	1	2016	2
01N21W19F01S	380	---	490	---	Oxnard Plain	52	4.7	244	16.0	1991	1	2016	2
01N21W19J04S	115	---	275	---	Oxnard Plain	18	0.9	15.5	1.5	1979	2	1997	2
01N21W19J05S	600	---	800	---	Oxnard Plain	75	14.6	1,096	70.9	1979	2	2016	2
01N21W19J06S	520	---	820	---	Oxnard Plain	54	103	5,587	225	1990	1	2016	2
01N21W19K03S	141	---	180	---	Oxnard Plain	71	1.6	117	8.8	1979	2	2016	2
01N21W19K08S	174	---	200	---	Oxnard Plain	71	5.3	374	16.8	1979	2	2016	2
01N21W19K09S	120	---	172	---	Oxnard Plain	75	2.3	175	7.3	1979	2	2016	2
01N21W19K10S	140	---	228	---	Oxnard Plain	75	0.7	53.1	1.5	1979	2	2016	2
01N21W19K11S	280	---	400	---	Oxnard Plain	10	0.6	5.9	2.3	2011	1	2016	2
01N21W19L07S	212	---	502	---	Oxnard Plain	68	33.7	2,290	254	1979	2	2015	1
01N21W19L08S	400	---	540	---	Oxnard Plain	75	1.5	109	3.2	1979	2	2016	2
01N21W19N02S	400	---	1,020	---	Oxnard Plain	19	85.0	1,615	157	1993	2	2002	2
01N21W19P03S	750	---	900	---	Oxnard Plain	47	43.1	2,023	102	1993	2	2016	2
01N21W19P05S	303	---	693	---	Oxnard Plain	28	88.1	2,466	504	2003	1	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N21W19Q01S	170	---	390	---	Oxnard Plain	25	74.6	1,864	109	2004	2	2016	2
01N21W20B01S	540	---	930	---	Oxnard Plain	15	255	3,831	397	2009	2	2016	2
01N21W20C05S	235	---	255	---	Oxnard Plain	75	87.4	6,555	782	1979	2	2016	2
01N21W20D02S	112	---	435	---	Oxnard Plain	71	51.4	3,646	234	1979	2	2014	2
01N21W20K02S	600	---	840	---	Oxnard Plain	69	63.3	4,367	147	1982	2	2016	2
01N21W20K03S	600	---	880	---	Oxnard Plain	51	123	6,253	334	1991	2	2016	2
01N21W20L02S	123	---	214	---	Oxnard Plain	75	12.0	897	82.6	1979	2	2016	2
01N21W20N07S	120	---	190	---	Oxnard Plain	70	0.5	36.2	1.7	1981	2	2016	2
01N21W20P02S	150	---	400	---	Oxnard Plain	6	66.3	398	98.9	2014	1	2016	2
01N21W20P03S	---	---	---	416	Oxnard Plain	75	51.9	3,895	359	1979	2	2016	2
01N21W20P04S	160	---	300	---	Oxnard Plain	24	40.9	983	59.8	2005	1	2016	2
01N21W20R01S	195	---	415	---	Oxnard Plain	42	43.6	1,831	276	1979	2	2002	2
01N21W21D02S	150	---	400	---	Oxnard Plain	61	13.4	816	711	1979	1	2009	2
01N21W21D03S	312	---	400	---	Oxnard Plain	75	6.5	490	14.0	1979	2	2016	2
01N21W21H01S	138	---	622	---	Pleasant Valley	76	2.9	217	53.8	1979	1	2016	2
01N21W21H02S	503	---	863	---	Pleasant Valley	71	362	25,696	1,106	1981	2	2016	2
01N21W21H03S	540	---	620	---	Pleasant Valley	18	11.1	201	21.5	2008	1	2016	2
01N21W21K01S	146	---	620	---	Oxnard Plain	75	1.4	107	2.0	1979	2	2016	2
01N21W21K03S	265	---	624	---	Oxnard Plain	75	106	7,954	325	1979	2	2016	2
01N21W21N02S	120	---	400	---	Oxnard Plain	28	67.5	1,889	121	2003	1	2016	2
01N21W21P01S	355	---	610	---	Oxnard Plain	45	83.0	3,737	165	1979	2	2001	2
01N21W22A01S	115	---	391	---	Pleasant Valley	75	117	8,796	435	1979	2	2016	2
01N21W22B02S	332	---	860	---	Pleasant Valley	75	24.3	1,824	236	1979	2	2016	2
01N21W22C01S	443	---	1,003	---	Pleasant Valley	71	391	27,792	1,198	1981	2	2016	2
01N21W22K02S	403	---	883	---	Pleasant Valley	30	77.9	2,336	247	2002	1	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N21W22L01S	505	---	996	---	Pleasant Valley	19	20.4	388	103	1979	2	1997	2
01N21W22P01S	400	---	872	---	Pleasant Valley	60	116	6,972	441	1979	2	2009	1
01N21W23A02S	38	---	108	---	Pleasant Valley	69	0.3	22.8	1.0	1979	2	2015	2
01N21W23E02S	86	---	348	---	Pleasant Valley	45	0.6	25.1	1.0	1979	2	2001	2
01N21W23E03S	140	---	370	---	Pleasant Valley	30	1.1	33.4	1.2	2002	1	2016	2
01N21W23G01S	230	---	650	---	Pleasant Valley	12	15.8	190	109	1979	2	1997	2
01N21W23G02S	220	---	625	---	Pleasant Valley	71	0.9	62.1	37.8	1979	2	2016	2
01N21W23H01S	---	---	---	---	Pleasant Valley	69	17.8	1,229	177	1979	2	2015	2
01N21W25M01S	---	---	---	---		45	3.9	177	42.4	1979	2	2001	2
01N21W26G01S	---	---	---	---	Pleasant Valley	75	42.3	3,170	217	1979	2	2016	2
01N21W26M01S	140	---	380	---	Pleasant Valley	3	8.6	25.8	12.7	2015	2	2016	2
01N21W27E01S	250	---	752	---	Pleasant Valley	75	97.7	7,328	459	1979	2	2016	2
01N21W27F02S	270	---	736	---	Pleasant Valley	54	54.4	2,936	488	1979	2	2006	1
01N21W28C01S	125	---	750	---	Oxnard Plain	55	53.3	2,934	473	1979	2	2006	2
01N21W28D01S	463	---	923	---	Oxnard Plain	71	464	32,940	1,239	1981	2	2016	2
01N21W28D02S	---	---	---	---	Oxnard Plain	71	0.2	15.2	1.0	1979	2	2016	2
01N21W28E01S	309	---	600	---	Oxnard Plain	20	0.1	1.4	1.4	1979	2	1997	2
01N21W28F02S	162	---	334	---	Oxnard Plain	21	0.2	4.8	1.6	1979	2	1997	2
01N21W28G01S	115	---	371	---	Oxnard Plain	75	52.4	3,928	224	1979	1	2016	2
01N21W28G03S	464	---	680	---	Oxnard Plain	75	58.1	4,357	315	1979	2	2016	2
01N21W28G04S	450	---	810	---	Oxnard Plain	59	134	7,895	531	1987	2	2016	2
01N21W28H02S	420	---	820	---	Oxnard Plain	60	152	9,092	682	1987	1	2016	2
01N21W28H03S	305	---	805	---	Oxnard Plain	26	166	4,304	341	2004	1	2016	2
01N21W28H04S	250	---	740	---	Pleasant Valley	11	270	2,966	482	2011	2	2016	2
01N21W28M01S	400	---	810	---	Oxnard Plain	75	203	15,225	476	1979	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N21W29B03S	190	---	415	---	Oxnard Plain	75	72.4	5,433	208	1979	2	2016	2
01N21W29B06S	480	---	740	---	Oxnard Plain	76	145	11,045	440	1979	1	2016	2
01N21W29C01S	128	---	343	---	Oxnard Plain	21	4.3	91.0	6.9	1979	2	1997	2
01N21W29C02S	229	---	301	---	Oxnard Plain	21	3.6	76.1	22.4	1979	2	1997	2
01N21W29C03S	131	---	242	---	Oxnard Plain	21	0.2	5.0	1.9	1979	2	1997	2
01N21W29D03S	210	---	552	---	Oxnard Plain	20	127	2,531	210	1979	2	1997	2
01N21W29G01S	93	---	280	---	Oxnard Plain	72	0.8	59.8	2.0	1979	2	2016	2
01N21W29K02S	160	---	230	---	Oxnard Plain	75	1.1	83.1	2.2	1979	2	2016	2
01N21W30A02S	370	---	574	---	Oxnard Plain	75	123	9,217	304	1979	2	2016	2
01N21W30C03S	260	---	600	---	Oxnard Plain	75	57.5	4,314	351	1979	2	2016	2
01N21W30C04S	130	---	390	---	Oxnard Plain	24	90.4	2,169	146	2005	1	2016	2
01N21W30F02S	170	---	478	---	Oxnard Plain	75	65.3	4,897	115	1979	2	2016	2
01N21W30K01S	160	---	459	---	Oxnard Plain	75	141	10,600	330	1979	2	2016	2
01N21W30L01S	400	---	520	---	Oxnard Plain	45	69.5	3,127	242	1994	2	2016	2
01N21W31A01S	190	---	230	---	Oxnard Plain	75	127	9,523	1,100	1979	2	2016	2
01N21W31J01S	---	---	---	---	Oxnard Plain	46	0	0	0	1994	1	2016	2
01N21W31L01S	350	---	972	---	Oxnard Plain	46	0.1	3.0	3.0	1994	1	2016	2
01N21W32A01S	650	---	750	---	Oxnard Plain	46	2.3	105	30.7	1994	1	2016	2
01N21W32C01S	469	---	721	---	Oxnard Plain	63	41.3	2,604	172	1983	2	2016	2
01N21W32K01S	460	---	593	---	Oxnard Plain	46	0	0	0	1994	1	2016	2
01N21W33A01S	227	---	567	---	Oxnard Plain	17	157	2,667	368	2008	2	2016	2
01N22W01A01S	112	---	174	---	Oxnard Plain	60	44.8	2,687	281	1979	1	2008	2
01N22W01D01S	110	---	220	---	Oxnard Plain	20	288	5,766	505	1979	2	1997	2
01N22W01F01S	110	---	192	---	Oxnard Plain	49	58.1	2,847	230	1979	2	2003	2
01N22W01M01S	105	---	180	---	Oxnard Plain	75	137	10,261	387	1979	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N22W01M02S	272	---	397	---	Oxnard Plain	75	33.1	2,483	168	1979	2	2016	2
01N22W01M03S	730	---	1,480	---	Oxnard Plain	64	393	25,144	1,449	1985	1	2016	2
01N22W01M04S	125	---	300	---	Oxnard Plain	3	63.2	190	149	2015	2	2016	2
01N22W02A02S	---	218	386	---	Oxnard Plain	12	52.5	630	95.8	1979	2	1997	2
01N22W02G01S	130	---	190	---	Oxnard Plain	16	62.1	994	154	1979	2	1997	2
01N22W02K01S	150	---	180	---	Oxnard Plain	74	105	7,776	271	1980	1	2016	2
01N22W02K03S	140	---	400	---	Oxnard Plain	49	47.5	2,326	231	1979	2	2003	2
01N22W02K04S	158	---	178	---	Oxnard Plain	65	0.7	47.6	2.0	1984	2	2016	2
01N22W02N03S	145	---	218	---	Oxnard Plain	37	2.1	78.6	4.4	1998	1	2016	2
01N22W03F01S	125	---	235	---	Oxnard Plain	66	23.0	1,516	253	1979	1	2011	2
01N22W03F02S	120	---	220	---	Oxnard Plain	66	25.9	1,710	285	1979	1	2011	2
01N22W03F03S	130	---	230	---	Oxnard Plain	25	5.7	143	31.4	1979	2	1991	2
01N22W03F04S	141	---	232	---	Oxnard Plain	71	18.6	1,317	273	1979	1	2014	1
01N22W03F05S	526	---	1,106	---	Oxnard Plain	61	405	24,721	2,266	1984	2	2016	2
01N22W03F06S	528	---	1,108	---	Oxnard Plain	57	252	14,341	1,838	1987	2	2016	1
01N22W03F07S	120	---	220	---	Oxnard Plain	52	461	23,952	2,408	1991	1	2016	2
01N22W03F08S	120	---	220	---	Oxnard Plain	51	424	21,600	2,182	1991	2	2016	2
01N22W03F12S	120	---	230	---	Oxnard Plain	17	662	11,250	1,746	2008	2	2016	2
01N22W03F13S	120	---	230	---	Oxnard Plain	15	488	7,319	1,605	2009	2	2016	2
01N22W03F14S	135	---	235	---	Oxnard Plain	17	408	6,934	1,429	2008	2	2016	2
01N22W03J02S	---	126	---	237	Oxnard Plain	19	122	2,313	585	1979	2	1997	2
01N22W03R01S	489	---	944	---	Oxnard Plain	69	273	18,854	929	1982	2	2016	2
01N22W04C01S	128	---	200	---	Oxnard Plain	17	3.8	64.0	6.1	1979	2	1997	2
01N22W04D01S	---	---	---	---	Oxnard Plain	75	3.8	286	12.5	1979	2	2016	2
01N22W04D03S	187	---	214	---	Oxnard Plain	15	0.7	11.0	1.0	1979	2	1997	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N22W04D07S	---	---	---	---	Oxnard Plain	74	1.3	98.9	5.2	1979	2	2016	2
01N22W04D08S	105	---	145	---	Oxnard Plain	74	1.6	116	5.0	1979	2	2016	2
01N22W04D09S	---	---	---	---	Oxnard Plain	75	1.3	95.6	2.0	1979	2	2016	2
01N22W04D10S	122	---	148	---	Oxnard Plain	74	1.1	81.0	1.5	1979	2	2016	1
01N22W04D11S	173	---	203	---	Oxnard Plain	75	0.8	60.9	3.1	1979	2	2016	2
01N22W04F02S	---	---	---	---	Oxnard Plain	69	4.9	335	16.9	1979	2	2013	2
01N22W04F04S	507	---	1,179	---	Oxnard Plain	23	3.0	70.0	30.9	1979	2	1990	2
01N22W04K01S	105	---	220	---	Oxnard Plain	20	32.7	654	65.2	1979	2	1997	2
01N22W04M01S	184	---	219	---	Oxnard Plain	32	43.3	1,385	120	1979	2	1997	2
01N22W05B01S	146	---	207	---	Oxnard Plain	75	148	11,116	300	1979	2	2016	2
01N22W05B04S	200	---	292	---	Oxnard Plain	75	23.2	1,737	76.6	1979	2	2016	2
01N22W05C02S	164	---	208	---	Oxnard Plain	75	116	8,705	204	1979	2	2016	2
01N22W05C03S	160	---	250	---	Oxnard Plain	1	124	124	124	2016	2	2016	2
01N22W05D01S	166	---	198	---	Oxnard Plain	75	23.8	1,787	65.6	1979	2	2016	2
01N22W05H01S	117	---	223	---	Oxnard Plain	13	0.8	11.0	1.0	1979	2	1997	2
01N22W05H02S	110	---	230	---	Oxnard Plain	72	25.1	1,807	128	1979	2	2015	2
01N22W05K01S	77	---	212	---	Oxnard Plain	20	57.4	1,148	112	1979	2	1997	2
01N22W05K03S	100	---	215	---	Oxnard Plain	26	55.8	1,452	238	1991	1	2003	2
01N22W05M01S	189	---	227	---	Oxnard Plain	49	70.8	3,471	174	1979	2	2003	2
01N22W06A02S	170	---	270	---	Oxnard Plain	72	48.4	3,484	220	1979	1	2014	2
01N22W06A04S	160	---	300	---	Oxnard Plain	76	51.5	3,914	109	1979	1	2016	2
01N22W06A05S	280	---	420	---	Oxnard Plain	68	21.5	1,462	53.5	1983	1	2016	2
01N22W06A06S	280	---	420	---	Oxnard Plain	68	50.4	3,424	110	1983	1	2016	2
01N22W06B01S	154	---	234	---	Oxnard Plain	75	58.7	4,400	93.5	1979	2	2016	2
01N22W06J04S	240	---	380	---	Oxnard Plain	75	142	10,634	484	1979	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N22W06R02S	240	---	380	---	Oxnard Plain	75	165	12,357	484	1979	2	2016	2
01N22W07A03S	240	---	370	---	Oxnard Plain	57	119	6,773	391	1979	2	2008	1
01N22W07H02S	260	---	380	---	Oxnard Plain	57	65.9	3,755	268	1979	2	2008	1
01N22W08B07S	146	---	206	---	Oxnard Plain	12	8.3	100	14.9	1979	2	1997	2
01N22W08N01S	124	---	220	---	Oxnard Plain	45	19.6	881	103	1979	2	2001	2
01N22W10A03S	134	---	242	---	Oxnard Plain	58	2.4	140	11.7	1987	1	2016	2
01N22W10B02S	635	---	1,430	---	Oxnard Plain	66	1.2	76.4	71.1	1979	1	2011	2
01N22W10B03S	182	---	562	---	Oxnard Plain	66	8.2	539	333	1979	1	2011	2
01N22W10H01S	131	---	253	---	Oxnard Plain	15	86.1	1,291	192	1979	2	1997	2
01N22W10N03S	500	---	600	---	Oxnard Plain	75	4.8	363	8.9	1979	2	2016	2
01N22W11A01S	140	---	197	---	Oxnard Plain	75	60.1	4,510	372	1979	2	2016	2
01N22W11A03S	150	---	197	---	Oxnard Plain	51	0.6	32.2	1.0	1991	2	2016	2
01N22W11A05S	130	---	350	---	Oxnard Plain	3	21.5	64.5	50.0	2015	2	2016	2
01N22W11B01S	160	---	205	---	Oxnard Plain	66	0.8	52.7	2.4	1984	1	2016	2
01N22W11B03S	129	---	204	---	Oxnard Plain	75	14.4	1,080	75.2	1979	2	2016	2
01N22W11C02S	164	---	204	---	Oxnard Plain	71	43.0	3,052	508	1979	2	2016	2
01N22W11C03S	125	---	250	---	Oxnard Plain	4	66.7	267	121	2015	1	2016	2
01N22W11D01S	148	---	230	---	Oxnard Plain	17	84.5	1,437	221	1979	2	1997	2
01N22W11D03S	130	---	270	---	Oxnard Plain	3	13.7	41.1	23.0	2015	2	2016	2
01N22W11E01S	188	---	228	---	Oxnard Plain	15	59.0	885	120	1979	2	1997	2
01N22W12A02S	712	---	962	---	Oxnard Plain	16	144	2,299	370	2009	1	2016	2
01N22W12C02S	318	---	450	---	Oxnard Plain	46	50.3	2,312	125	1979	2	2016	2
01N22W12C03S	318	---	450	---	Oxnard Plain	66	142	9,359	324	1979	2	2012	1
01N22W12C04S	134	---	214	---	Oxnard Plain	12	2.9	34.9	4.2	2011	1	2016	2
01N22W12C05S	770	---	1,015	---	Oxnard Plain	9	149	1,339	276	2012	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N22W12F01S	310	---	460	---	Oxnard Plain	76	41.5	3,156	282	1979	1	2016	2
01N22W12H02S	596	---	988	---	Oxnard Plain	60	84.4	5,065	292	1979	2	2009	1
01N22W12J01S	152	---	183	---	Oxnard Plain	50	84.2	4,208	568	1979	2	2004	2
01N22W12J03S	120	---	406	---	Oxnard Plain	54	69.6	3,761	395	1979	2	2006	1
01N22W12M01S	120	---	249	---	Oxnard Plain	76	68.4	5,202	352	1979	1	2016	2
01N22W12N03S	602	---	1,122	---	Oxnard Plain	59	126	7,418	305	1987	2	2016	2
01N22W12P01S	169	---	210	---	Oxnard Plain	75	26.7	2,005	238	1979	2	2016	2
01N22W12P02S	146	---	193	---	Oxnard Plain	75	34.3	2,575	138	1979	2	2016	2
01N22W12Q01S	145	---	385	---	Oxnard Plain	55	87.8	4,828	237	1979	2	2006	2
01N22W12Q02S	155	---	395	---	Oxnard Plain	13	58.6	762	98.4	2007	2	2013	2
01N22W12Q03S	150	---	360	---	Oxnard Plain	8	287	2,299	450	2013	1	2016	2
01N22W12R01S	430	---	1,220	---	Oxnard Plain	53	184	9,743	426	1990	2	2016	2
01N22W13D02S	175	---	210	---	Oxnard Plain	16	85.3	1,365	199	1979	2	1987	1
01N22W13D03S	600	---	1,200	---	Oxnard Plain	64	237	15,148	912	1985	1	2016	2
01N22W13E03S	156	---	404	---	Oxnard Plain	75	45.6	3,419	540	1979	2	2016	2
01N22W13E04S	297	---	377	---	Oxnard Plain	75	1.2	88.4	8.2	1979	2	2016	2
01N22W13E05S	600	---	1,060	---	Oxnard Plain	74	60.9	4,506	172	1980	1	2016	2
01N22W13F01S	148	---	209	---	Oxnard Plain	75	68.8	5,160	109	1979	2	2016	2
01N22W13H01S	124	---	199	---	Oxnard Plain	75	17.3	1,298	60.3	1979	2	2016	2
01N22W13H03S	160	---	400	---	Oxnard Plain	20	65.8	1,316	154	1979	2	1997	2
01N22W13J01S	91	---	200	---	Oxnard Plain	15	24.5	367	119	1979	2	1997	2
01N22W13J04S	120	---	196	---	Oxnard Plain	75	45.7	3,429	254	1979	2	2016	2
01N22W13K01S	187	---	347	---	Oxnard Plain	75	2.6	194	5.0	1979	2	2016	2
01N22W13K02S	313	---	433	---	Oxnard Plain	75	24.6	1,843	106	1979	2	2016	2
01N22W13K04S	310	---	430	---	Oxnard Plain	76	20.3	1,541	91.2	1979	1	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N22W13L01S	162	---	205	---	Oxnard Plain	17	34.6	589	60.0	1979	2	1997	2
01N22W13N02S	160	---	202	---	Oxnard Plain	64	16.7	1,068	25.6	1985	1	2016	2
01N22W13Q01S	100	---	215	---	Oxnard Plain	18	9.8	176	40.1	1979	2	1997	2
01N22W13Q02S	280	---	402	---	Oxnard Plain	74	8.2	608	18.6	1979	2	2016	2
01N22W14C02S	164	---	208	---	Oxnard Plain	18	19.7	354	78.0	1981	1	1997	2
01N22W14D03S	150	---	220	---	Oxnard Plain	43	15.1	650	55.0	1979	2	2000	2
01N22W14R03S	155	---	220	---	Oxnard Plain	71	4.2	299	11.6	1979	2	2014	2
01N22W14R04S	185	---	235	---	Oxnard Plain	71	3.8	271	15.8	1979	2	2014	2
01N22W15C01S	131	---	250	---	Oxnard Plain	62	0.2	12.3	8.0	1986	1	2016	2
01N22W16D04S	520	---	940	---	Oxnard Plain	75	0.3	22.7	5.3	1979	2	2016	2
01N22W17B01S	554	---	1,079	---	Oxnard Plain	16	0	0	0	1994	1	2001	2
01N22W17C03S	520	---	1,100	---	Oxnard Plain	67	216	14,453	546	1983	2	2016	2
01N22W18L02S	496	---	781	---	Oxnard Plain	75	84.6	6,346	308	1979	2	2016	2
01N22W19A01S	610	---	738	---	Oxnard Plain	75	85.3	6,397	382	1979	2	2016	2
01N22W20E02S	940	---	974	---	Oxnard Plain	49	79.3	3,886	184	1979	2	2003	2
01N22W21B03S	535	---	950	---	Oxnard Plain	57	0.9	50.2	46.6	1980	1	2016	2
01N22W21B06S	720	---	1,180	---	Oxnard Plain	75	1.8	136	14.8	1979	2	2016	2
01N22W23A02S	156	---	201	---	Oxnard Plain	72	0.3	20.6	10.3	1979	2	2015	1
01N22W23A05S	333	---	483	---	Oxnard Plain	75	75.8	5,683	133	1979	2	2016	2
01N22W23J01S	---	---	---	---	Oxnard Plain	8	1.2	9.5	8.4	1979	2	1997	2
01N22W23N02S	120	---	240	---	Oxnard Plain	7	6.9	48.0	18.0	1979	2	1997	2
01N22W23R02S	460	---	660	---	Oxnard Plain	51	59.3	3,022	116	1991	2	2016	2
01N22W24A01S	170	---	197	---	Oxnard Plain	75	7.5	559	57.2	1979	2	2016	2
01N22W24A03S	410	---	550	---	Oxnard Plain	58	23.2	1,344	83.0	1987	1	2016	2
01N22W24B02S	126	---	358	---	Oxnard Plain	5	97.5	487	126	1979	2	1997	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N22W24B03S	154	---	204	---	Oxnard Plain	8	1.8	14.7	2.9	1998	2	2016	2
01N22W24B04S	444	---	1,022	---	Oxnard Plain	71	92.1	6,542	273	1981	2	2016	2
01N22W24C01S	---	---	---	---	Oxnard Plain	55	1.1	60.7	3.6	1979	2	2006	2
01N22W24C02S	160	---	320	---	Oxnard Plain	19	0.4	6.9	3.3	2007	2	2016	2
01N22W24C03S	330	---	450	---	Oxnard Plain	75	128	9,603	376	1979	2	2016	2
01N22W24D03S	315	---	450	---	Oxnard Plain	75	51.0	3,821	144	1979	2	2016	2
01N22W24H01S	136	---	188	---	Oxnard Plain	75	1.8	132	8.2	1979	2	2016	2
01N22W24M03S	330	---	470	---	Oxnard Plain	76	156	11,849	456	1979	1	2016	2
01N22W24P03S	458	---	618	---	Oxnard Plain	75	97.4	7,308	341	1979	2	2016	2
01N22W24Q01S	420	---	600	---	Oxnard Plain	53	45.6	2,417	126	1990	2	2016	2
01N22W25A02S	196	---	493	---	Oxnard Plain	6	91.3	548	114	1979	2	1997	2
01N22W25A03S	413	---	753	---	Oxnard Plain	70	118	8,239	295	1982	1	2016	2
01N22W25B04S	441	---	661	---	Oxnard Plain	49	122	5,982	221	1992	2	2016	2
01N22W25J02S	380	---	540	---	Oxnard Plain	64	191	12,214	296	1985	1	2016	2
01N22W25K01S	186	---	270	---	Oxnard Plain	26	0.8	20.0	1.0	2004	1	2016	2
01N22W25K02S	446	---	606	---	Oxnard Plain	75	217	16,311	393	1979	2	2016	2
01N22W25L02S	---	---	---	---	Oxnard Plain	49	0.9	43.6	1.0	1979	2	2003	2
01N22W26D02S	---	---	---	---	Oxnard Plain	9	0	0	0	1980	1	1997	2
01N22W26D05S	480	---	680	---	Oxnard Plain	26	379	9,866	693	2004	1	2016	2
01N22W26H02S	471	---	591	---	Oxnard Plain	75	70.6	5,297	130	1979	2	2016	2
01N22W26K03S	524	---	620	---	Oxnard Plain	75	222	16,663	374	1979	2	2016	2
01N22W26K04S	560	---	650	---	Oxnard Plain	75	113	8,480	345	1979	2	2016	2
01N22W26M03S	432	---	480	---	Oxnard Plain	75	184	13,787	391	1979	2	2016	2
01N22W26P02S	523	---	652	---	Oxnard Plain	75	222	16,658	434	1979	2	2016	2
01N22W26Q01S	310	---	476	---	Oxnard Plain	75	107	7,994	410	1979	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
01N22W26Q02S	440	---	640	---	Oxnard Plain	26	0	0	0	1991	1	2003	2
01N22W26Q03S	420	---	560	---	Oxnard Plain	51	178	9,076	400	1991	2	2016	2
01N22W27H02S	470	---	630	---	Oxnard Plain	65	103	6,718	236	1984	2	2016	2
01N22W35C01S	180	---	230	---	Oxnard Plain	62	0.2	11.0	1.0	1984	1	2016	2
01N22W35G01S	192	---	220	---	Oxnard Plain	11	10.6	117	20.2	1979	2	1997	2
01N22W36B01S	600	---	700	---	Oxnard Plain	75	106	7,955	462	1979	2	2016	2
01N22W36B02S	593	---	680	---	Oxnard Plain	75	190	14,228	454	1979	2	2016	2
01N22W36H01S	437	---	572	---	Oxnard Plain	53	217	11,515	639	1990	2	2016	2
01N22W36J03S	421	---	521	---	Oxnard Plain	75	149	11,202	553	1979	2	2016	2
01N22W36K03S	155	---	210	---	Oxnard Plain	39	55.5	2,164	354	1991	2	2010	2
01N22W36K04S	407	---	719	---	Oxnard Plain	74	222	16,457	952	1980	1	2016	2
01N22W36L01S	126	---	208	---	Oxnard Plain	40	31.2	1,249	197	1979	2	1999	2
02N20W05D01S	720	---	1,080	---	West Las Posas	2	0	0	0	2013	1	2013	2
02N20W06D01S	560	---	1,000	---	West Las Posas	58	20.0	1,162	87.0	1983	2	2013	2
02N20W06J01S	973	---	1,373	---	West Las Posas	65	257	16,727	648	1983	2	2015	2
02N20W06N01S	1,269	---	1,579	---	West Las Posas	45	86.0	3,870	222	1983	2	2007	2
02N20W06R01S	1,090	---	1,512	---	West Las Posas	64	374	23,965	895	1983	2	2015	2
02N20W06R03S	1,041	---	1,381	---	West Las Posas	49	110	5,400	419	1991	2	2015	2
02N20W07F01S	1,240	---	1,600	---	West Las Posas	39	231	8,994	526	1983	2	2003	1
02N20W07L01S	1,246	---	1,567	---	West Las Posas	13	89.7	1,167	153	2009	1	2015	2
02N20W07R02S	960	---	1,360	---	West Las Posas	45	278	12,531	751	1993	2	2015	2
02N20W08B01S	1,050	---	1,300	---	West Las Posas	63	319	20,119	1,110	1983	2	2015	2
02N20W08E01S	1,041	---	1,481	---	West Las Posas	59	368	21,740	928	1986	2	2015	2
02N20W08F01S	752	---	1,406	---	West Las Posas	65	281	18,246	609	1983	2	2015	2
02N20W08H01S	870	---	1,300	---	East Las Posas	33	68.1	2,248	449	1983	2	2013	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N20W08M01S	1,040	---	1,400	---	West Las Posas	47	232	10,903	677	1992	1	2015	2
02N20W08Q01S	657	---	1,053	---	East Las Posas	54	103	5,573	382	1983	2	2015	2
02N20W16R01S	300	---	605	---		1	0	0	0	2015	2	2015	2
02N20W17E01S	448	---	748	---		24	51.2	1,228	178	2002	2	2015	2
02N20W17F01S	318	---	1,113	---	East Las Posas	53	213	11,310	576	1983	2	2015	1
02N20W17L01S	280	---	580	---	East Las Posas	14	662	9,270	1,364	2009	1	2015	2
02N20W18A01S	782	---	1,192	---	West Las Posas	62	204	12,653	463	1983	2	2014	1
02N20W19A01S	555	---	855	---	Pleasant Valley	24	213	5,119	427	2001	2	2013	2
02N20W19B01S	400	---	650	---	Pleasant Valley	16	73.1	1,169	225	2008	1	2015	2
02N20W19B02S	400	---	650	---	Pleasant Valley	4	109	434	165	2014	1	2015	2
02N20W19E01S	564	---	864	---	Pleasant Valley	65	202	13,133	410	1983	2	2015	2
02N20W19F04S	459	---	759	---	Pleasant Valley	65	714	46,422	1,383	1983	2	2015	2
02N20W19H01S	500	---	880	---	Pleasant Valley	29	112	3,244	393	1994	2	2013	2
02N20W19J02S	604	---	876	---	Pleasant Valley	27	250	6,751	506	1983	2	1997	2
02N20W19L05S	467	---	830	---	Pleasant Valley	65	280	18,214	1,068	1983	2	2015	2
02N20W19M05S	654	---	990	---	Pleasant Valley	54	123	6,635	487	1983	2	2013	2
02N20W19M06S	540	---	800	---	Pleasant Valley	42	201	8,436	344	1993	2	2015	2
02N20W20E02S	479	---	875	---	Pleasant Valley	48	43.2	2,075	335	1983	2	2013	2
02N20W20F01S	---	---	---	---	Pleasant Valley	22	0	0	0	2003	1	2013	2
02N20W20M04S	630	---	800	---	Pleasant Valley	22	0	0	0	2003	1	2013	2
02N20W20M05S	480	---	680	---	Pleasant Valley	45	89.2	4,013	148	1993	1	2015	2
02N20W21M01S	---	---	---	---	Pleasant Valley	7	0	0	0	2003	2	2012	1
02N20W29B02S	395	---	740	---	Pleasant Valley	40	363	14,523	702	1996	1	2015	2
02N20W31F03S	451	---	970	---	Pleasant Valley	16	92.9	1,487	254	1993	1	2004	2
02N21W01L01S	590	---	1,030	---	West Las Posas	59	232	13,678	590	1986	2	2015	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N21W03L01S	726	---	1,185	---	West Las Posas	10	137	1,370	172	1979	2	1997	2
02N21W04Q01S	300	---	1,089	---	West Las Posas	53	47.6	2,521	215	1990	1	2016	2
02N21W04Q02S	689	---	1,054	---	West Las Posas	33	117	3,846	241	2000	2	2016	2
02N21W07F01S	80	---	400	---	Oxnard Forebay	52	101	5,235	220	1991	1	2016	2
02N21W07G01S	182	---	452	---	Oxnard Forebay	6	92.3	554	175	2014	1	2016	2
02N21W07K01S	78	---	150	---	Oxnard Forebay	43	137	5,878	486	1979	2	2000	2
02N21W07K02S	250	---	750	---	Oxnard Plain	14	26.6	373	64.0	1982	2	1997	2
02N21W07K03S	377	---	842	---	Oxnard Forebay	6	166	996	214	2014	1	2016	2
02N21W07L07S	70	---	250	---	Oxnard Forebay	20	130	2,602	660	2007	1	2016	2
02N21W07M03S	360	---	720	---	Oxnard Forebay	45	148	6,675	868	1979	2	2001	2
02N21W07M04S	100	---	350	---	Oxnard Forebay	20	165	3,302	682	2007	1	2016	2
02N21W07N02S	565	---	965	---	Oxnard Forebay	54	98.7	5,329	609	1990	1	2016	2
02N21W07P02S	192	---	856	---	Oxnard Forebay	10	180	1,803	337	1979	2	1997	2
02N21W07P03S	550	---	1,000	---	Oxnard Forebay	66	121	7,974	402	1984	1	2016	2
02N21W07P04S	420	---	820	---	Oxnard Forebay	56	90.8	5,082	429	1989	1	2016	2
02N21W07Q01S	740	---	1,260	---	Oxnard Plain	75	57.9	4,339	161	1979	2	2016	2
02N21W07R01S	520	---	1,244	---	Oxnard Plain	75	41.8	3,133	379	1979	2	2016	2
02N21W08G02S	540	---	1,027	---	West Las Posas	49	214	10,484	448	1979	2	2003	2
02N21W08G04S	666	---	1,066	---	West Las Posas	34	196	6,652	417	2000	1	2016	2
02N21W08H03S	635	---	1,340	---	West Las Posas	4	333	1,330	452	2015	1	2016	2
02N21W08L01S	650	---	1,015	---	West Las Posas	75	50.3	3,776	204	1979	2	2016	2
02N21W08L02S	641	---	1,041	---	West Las Posas	53	146	7,755	221	1990	2	2016	2
02N21W08L03S	625	---	1,030	---	West Las Posas	6	162	972	184	2014	1	2016	2
02N21W09D01S	430	---	1,016	---	West Las Posas	17	84.5	1,437	245	1981	2	1997	2
02N21W09D02S	650	---	800	---	West Las Posas	55	144	7,938	376	1989	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N21W10F01S	---	---	---	---	West Las Posas	27	14.6	393	74.6	1988	2	2001	2
02N21W10G03S	1,080	---	1,560	---	West Las Posas	30	25.9	776	59.7	2002	1	2016	2
02N21W10Q03S	960	---	1,660	---	West Las Posas	75	80.5	6,040	309	1979	2	2016	2
02N21W10Q04S	1,290	---	1,610	---	West Las Posas	30	163	4,880	244	2002	1	2016	2
02N21W11A02S	407	---	740	---	West Las Posas	65	237	15,388	720	1983	2	2015	2
02N21W11A03S	880	---	1,630	---	West Las Posas	13	159	2,067	329	2009	2	2015	2
02N21W11H02S	352	---	460	---	West Las Posas	64	52.9	3,389	131	1983	2	2015	2
02N21W11J02S	375	---	1,150	---	West Las Posas	18	78.5	1,414	138	1983	2	1992	1
02N21W12G01S	---	---	---	---	West Las Posas	52	63.6	3,305	119	1990	1	2015	2
02N21W12H01S	928	---	1,765	---	West Las Posas	62	107	6,650	173	1985	1	2015	2
02N21W13A01S	1,290	---	1,590	---	West Las Posas	14	112	1,564	205	2009	1	2015	2
02N21W15M03S	406	---	1,030	---	West Las Posas	31	86.2	2,672	583	1983	2	2013	2
02N21W15M04S	524	---	1,044	---	West Las Posas	61	219	13,333	629	1983	2	2015	2
02N21W15M05S	550	---	900	---	West Las Posas	64	106	6,808	165	1984	1	2015	2
02N21W16A01S	---	---	---	---	West Las Posas	51	1.0	48.4	1.0	1991	2	2016	2
02N21W16J01S	182	---	295	---	West Las Posas	4	0.2	0.8	0.2	1979	2	1997	2
02N21W16J03S	560	---	1,120	---	West Las Posas	52	144	7,512	315	1991	1	2016	2
02N21W16K01S	370	---	900	---	West Las Posas	29	25.2	731	220	1979	2	1997	2
02N21W16N01S	---	---	---	---	West Las Posas	50	59.2	2,960	206	1979	1	2003	2
02N21W16N03S	610	---	830	---	West Las Posas	24	101	2,426	168	2005	1	2016	2
02N21W16R02S	240	---	814	---	West Las Posas	4	0	0	0	1979	2	1997	2
02N21W17D03S	100	---	215	---	Oxnard Plain	35	0	0	0	1979	2	1997	2
02N21W17F04S	156	---	174	---	Oxnard Plain	75	1.1	79.8	1.6	1979	2	2016	2
02N21W17F05S	525	---	1,105	---	Oxnard Plain	59	86.6	5,109	212	1987	2	2016	2
02N21W17M02S	95	---	330	---	Oxnard Plain	49	74.4	3,643	159	1979	2	2003	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N21W17M03S	120	---	360	---	Oxnard Plain	36	139	5,005	338	1999	1	2016	2
02N21W17N01S	85	---	182	---	Oxnard Plain	51	34.5	1,761	156	1979	2	2004	2
02N21W17N03S	190	---	410	---	Oxnard Plain	32	59.7	1,910	229	2001	1	2016	2
02N21W17R01S	520	---	960	---	West Las Posas	75	21.5	1,609	86.4	1979	2	2016	2
02N21W17R02S	520	---	860	---	West Las Posas	26	69.5	1,807	162	2004	1	2016	2
02N21W18A01S	98	---	138	---	Oxnard Plain	75	33.6	2,523	167	1979	2	2016	2
02N21W18A02S	824	---	1,424	---	Oxnard Plain	7	58.3	408	73.5	1983	2	1997	2
02N21W18B01S	70	---	160	---	Oxnard Plain	75	103	7,724	254	1979	2	2016	2
02N21W18B02S	552	---	1,101	---	Oxnard Plain	61	63.7	3,883	196	1986	2	2016	2
02N21W18H03S	98	---	151	---	Oxnard Plain	75	388	29,066	1,361	1979	2	2016	2
02N21W18H05S	80	---	122	---	Oxnard Plain	71	249	17,673	748	1981	2	2016	2
02N21W18H06S	90	---	150	---	Oxnard Plain	76	40.2	3,059	201	1979	1	2016	2
02N21W18H07S	120	---	300	---	Oxnard Plain	75	5.4	403	37.4	1979	2	2016	2
02N21W18H10S	606	---	1,310	---	Oxnard Plain	72	76.3	5,491	745	1981	1	2016	2
02N21W18H11S	762	---	1,302	---	Oxnard Plain	75	107	8,009	301	1979	2	2016	2
02N21W18H12S	600	---	1,300	---	Oxnard Plain	54	270	14,591	1,143	1990	1	2016	2
02N21W18H13S	510	---	590	---	Oxnard Plain	14	1.0	14.7	2.4	2010	1	2016	2
02N21W18H14S	1,105	---	1,275	---	Oxnard Plain	15	350	5,247	518	2009	2	2016	2
02N21W18P01S	100	---	200	---	Oxnard Plain	15	47.9	719	64.0	2009	2	2016	2
02N21W18Q02S	445	---	1,003	---	Oxnard Plain	24	183	4,394	410	1980	1	1997	2
02N21W18Q03S	400	---	1,000	---	Oxnard Plain	51	242	12,337	425	1991	1	2016	2
02N21W18R01S	98	---	310	---	Oxnard Plain	15	85.8	1,288	161	1979	2	1997	2
02N21W19A01S	95	---	147	---	Oxnard Plain	75	86.6	6,493	344	1979	2	2016	2
02N21W19A02S	100	---	212	---	Oxnard Plain	48	89.6	4,303	245	1979	2	2003	1
02N21W19A03S	528	---	1,007	---	Oxnard Plain	75	60.7	4,554	256	1979	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N21W19B02S	99	---	137	---	Oxnard Plain	74	19.4	1,433	64.5	1979	2	2016	2
02N21W19G01S	64	---	220	---	Oxnard Plain	75	65.6	4,917	542	1979	2	2016	2
02N21W19G02S	120	---	147	---	Oxnard Plain	74	97.4	7,210	294	1979	2	2016	1
02N21W19G03S	575	---	785	---	Oxnard Plain	5	174	868	234	2014	2	2016	2
02N21W19L01S	---	---	---	212	Oxnard Plain	70	37.3	2,609	248	1979	2	2015	2
02N21W19L02S	103	---	175	---	Oxnard Plain	74	95.5	7,065	264	1979	2	2016	2
02N21W19P01S	641	---	1,201	---	Oxnard Plain	26	122	3,185	321	2004	1	2016	2
02N21W20A01S	520	---	800	---	West Las Posas	24	18.5	444	59.2	2005	1	2016	2
02N21W20E02S	550	---	900	---	Oxnard Plain	75	54.6	4,093	163	1979	2	2016	2
02N21W20J02S	640	---	920	---	West Las Posas	75	99.1	7,433	380	1979	2	2016	2
02N21W20M02S	100	---	160	---	Oxnard Plain	55	1.1	61.7	2.0	1989	2	2016	2
02N21W20M03S	128	---	200	---	Oxnard Plain	75	11.1	836	57.7	1979	2	2016	2
02N21W20M04S	760	---	1,100	---	Oxnard Plain	51	84.1	4,289	398	1991	2	2016	2
02N21W20M05S	820	---	1,160	---	Oxnard Plain	24	157	3,779	558	2005	1	2016	2
02N21W20M06S	670	---	880	---	Oxnard Plain	18	97.1	1,749	267	2008	1	2016	2
02N21W20Q04S	600	---	1,055	---	West Las Posas	58	54.5	3,159	221	1979	2	2008	1
02N21W20Q05S	600	---	950	---	West Las Posas	31	113	3,491	218	2000	1	2016	2
02N21W21D04S	590	---	830	---	West Las Posas	30	58.2	1,745	167	2002	1	2016	2
02N21W21E01S	540	---	800	---	West Las Posas	34	204	6,946	329	1999	2	2016	2
02N21W22A01S	780	---	1,400	---		39	91.5	3,568	262	1995	1	2014	2
02N21W22E01S	1,000	---	1,370	---		40	139	5,557	450	1983	2	2013	2
02N21W22G01S	603	---	903	---		59	205	12,098	397	1986	2	2015	2
02N21W23D01S	662	---	1,202	---		13	0	0	0	2009	1	2015	1
02N21W26R02S	157	---	491	---	Pleasant Valley	64	20.8	1,328	58.6	1983	2	2015	2
02N21W28A02S	550	---	800	---		19	203	3,862	349	2006	2	2015	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N21W28C01S	700	---	1,160	---		26	104	2,706	216	2003	1	2015	2
02N21W28D01S	513	---	867	---		58	67.2	3,897	340	1983	2	2013	2
02N21W28P02S	---	---	---	---	Pleasant Valley	9	40.0	360	96.0	1983	2	2013	2
02N21W28P07S	520	---	1,000	---	Pleasant Valley	23	116	2,678	214	2003	2	2015	1
02N21W28Q04S	510	---	1,140	---	Pleasant Valley	43	62.0	2,666	164	1991	2	2013	2
02N21W29C01S	150	---	266	---	Oxnard Plain	48	77.4	3,717	184	1979	2	2003	1
02N21W29E02S	640	---	1,080	---	Oxnard Plain	19	85.3	1,622	162	2007	2	2016	2
02N21W29E03S	640	---	1,200	---	Oxnard Plain	27	133	3,592	261	2003	2	2016	2
02N21W29G01S	---	---	---	---	Oxnard Plain	52	0.1	4.6	4.6	1991	1	2016	2
02N21W29K01S	100	---	150	---	Oxnard Plain	30	0.8	23.0	1.0	2002	1	2016	2
02N21W29K02S	597	---	679	---	Oxnard Plain	45	35.9	1,616	191	1979	2	2001	2
02N21W29L01S	85	---	150	---	Oxnard Plain	75	0.7	52.6	1.5	1979	2	2016	2
02N21W29L04S	641	---	1,161	---	Oxnard Plain	70	98.8	6,919	276	1982	1	2016	2
02N21W29M02S	630	---	1,130	---	Oxnard Plain	3	194	583	279	2015	2	2016	2
02N21W29N03S	100	---	150	---	Oxnard Plain	75	43.6	3,267	479	1979	2	2016	2
02N21W29N04S	110	---	146	---	Oxnard Plain	6	0	0	0	1982	1	1984	2
02N21W29N05S	115	---	146	---	Oxnard Plain	73	0.5	36.2	2.7	1979	2	2016	2
02N21W29N06S	105	---	300	---	Oxnard Plain	3	3.3	10.0	9.8	2015	2	2016	2
02N21W29P03S	102	---	166	---	Oxnard Plain	20	62.2	1,244	152	1979	2	1997	2
02N21W29Q01S	689	---	776	---		45	0.7	32.0	1.0	1979	2	2001	2
02N21W30A01S	600	---	1,240	---	Oxnard Plain	75	43.5	3,264	197	1979	2	2016	2
02N21W30F02S	630	---	1,200	---	Oxnard Plain	24	123	2,947	196	2005	1	2016	2
02N21W30G01S	103	---	155	---	Oxnard Plain	75	229	17,205	643	1979	2	2016	2
02N21W30P02S	102	---	162	---	Oxnard Plain	41	46.4	1,903	188	1979	2	1999	2
02N21W30R01S	115	---	146	---	Oxnard Plain	75	19.6	1,471	178	1979	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N21W30R03S	110	---	146	---	Oxnard Plain	73	28.7	2,094	239	1979	2	2016	2
02N21W30R04S	120	---	140	---	Oxnard Plain	73	0.5	34.6	2.1	1979	2	2016	2
02N21W31L01S	700	---	1,200	---	Oxnard Plain	64	40.3	2,579	382	1985	1	2016	2
02N21W31P03S	713	---	967	---	Oxnard Plain	13	126	1,634	262	1979	2	1985	2
02N21W31P06S	743	---	943	---	Oxnard Plain	75	181	13,601	370	1979	1	2016	2
02N21W31R01S	118	---	174	---	Oxnard Plain	75	18.6	1,395	247	1979	2	2016	2
02N21W32C01S	84	---	200	---	Oxnard Plain	40	34.6	1,385	181	1997	1	2016	2
02N21W32E01S	716	---	1,266	---	Oxnard Plain	64	254	16,255	925	1985	1	2016	2
02N21W32J01S	640	---	1,270	---	Pleasant Valley	64	190	12,138	458	1985	1	2016	2
02N21W32J03S	570	---	990	---	Pleasant Valley	26	9.7	253	60.0	2004	1	2016	2
02N21W33A01S	120	---	244	---	Pleasant Valley	14	0	0	0	1979	2	1997	2
02N21W33P02S	801	---	1,149	---	Pleasant Valley	13	135	1,749	458	1982	2	1997	2
02N21W33R02S	801	---	1,051	---	Pleasant Valley	54	62.1	3,356	770	1990	1	2016	2
02N21W34C01S	700	---	890	---	Pleasant Valley	60	862	51,735	1,246	1986	1	2015	2
02N21W34D02S	712	---	900	---	Pleasant Valley	43	6.3	272	35.0	1979	2	2000	2
02N21W34G01S	403	---	1,463	---	Pleasant Valley	71	430	30,526	1,590	1981	2	2016	2
02N21W34H02S	160	---	861	---	Pleasant Valley	49	6.4	316	80.0	1979	2	2004	1
02N21W34J02S	532	---	892	---	Pleasant Valley	70	21.1	1,476	159	1982	1	2016	2
02N21W34L01S	822	---	944	---	Pleasant Valley	18	0	0	0	1979	2	1997	2
02N21W34L02S	252	---	1,000	---	Pleasant Valley	37	36.5	1,351	80.9	1990	1	2008	1
02N21W35D02S	644	---	810	---	Pleasant Valley	14	56.2	787	134	1979	2	1997	2
02N21W35J01S	169	---	980	---	Pleasant Valley	72	0.4	32.0	1.0	1979	2	2015	1
02N21W35M01S	717	---	1,113	---	Pleasant Valley	43	33.0	1,420	289	1979	2	2000	2
02N21W35M02S	700	---	1,100	---	Pleasant Valley	38	7.3	277	123	1998	1	2016	2
02N21W35P01S	285	---	325	---	Pleasant Valley	51	0.5	27.3	1.0	1991	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N21W36G02S	---	---	---	---	Pleasant Valley	37	41.6	1,538	217	1983	2	2002	2
02N21W36G03S	610	---	1,060	---	Pleasant Valley	30	151	4,539	367	1987	2	2003	2
02N21W36G04S	600	---	1,060	---	Pleasant Valley	23	98.7	2,271	226	1995	2	2013	2
02N21W36L02S	618	---	1,242	---	Pleasant Valley	75	4.1	310	70.9	1979	2	2016	2
02N21W36N01S	280	---	437	---	Pleasant Valley	28	3.5	98.4	46.9	2003	1	2016	2
02N22W01J01S	40	---	100	---	Oxnard Forebay	24	3.7	88.1	4.8	2005	1	2016	2
02N22W01J02S	60	---	160	---	Oxnard Forebay	24	2.3	55.0	4.8	2005	1	2016	2
02N22W01M01S	70	---	107	---	Santa Paula	21	35.6	748	40.8	1993	1	2003	1
02N22W01M02S	83	---	109	---	Santa Paula	28	6.1	172	40.8	2003	1	2016	2
02N22W01M03S	---	---	---	---	Santa Paula	48	0	0	0	1979	2	2003	1
02N22W01M04S	---	---	---	---	Santa Paula	51	44.9	2,290	48.0	1979	2	2004	2
02N22W01P01S	310	---	480	---	Oxnard Forebay	14	14.1	197	102	2010	1	2016	2
02N22W02G01S	72	---	121	---	Santa Paula	75	58.5	4,388	195	1979	2	2016	2
02N22W02H02S	312	---	652	---	Santa Paula	5	979	4,896	1,689	2014	2	2016	2
02N22W02J03S	94	---	154	---	Santa Paula	12	15.8	190	42.3	2011	1	2016	2
02N22W02J04S	94	---	154	---	Santa Paula	63	6.3	397	9.6	1979	2	2010	2
02N22W02K02S	92	---	113	---	Santa Paula	49	38.8	1,900	161	1979	2	2003	2
02N22W02K06S	110	---	290	---	Santa Paula	19	110	2,095	751	1979	2	1997	2
02N22W02K07S	168	---	698	---	Santa Paula	69	420	29,002	2,494	1979	2	2013	2
02N22W02K08S	24	---	108	---	Santa Paula	49	68.6	3,363	141	1979	2	2003	2
02N22W02K09S	300	---	400	---	Santa Paula	57	536	30,529	1,489	1988	2	2016	2
02N22W02K10S	125	---	700	---	Santa Paula	6	597	3,580	799	2014	1	2016	2
02N22W02N01S	---	---	---	---	Santa Paula	39	3.3	127	9.6	1979	2	1998	2
02N22W02N04S	---	---	---	---	Santa Paula	74	0.5	35.5	1.0	1979	2	2016	1
02N22W02Q01S	---	---	---	---	Santa Paula	75	0.5	37.5	1.0	1979	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W02R04S	106	---	501	---	Oxnard Forebay	15	715	10,730	2,494	1979	2	1997	2
02N22W02R05S	106	---	520	---	Oxnard Forebay	65	625	40,656	1,450	1984	2	2016	2
02N22W03B01S	208	---	268	---	Santa Paula	65	34.1	2,219	47.5	1979	2	2011	2
02N22W03B02S	320	---	360	---	Santa Paula	15	32.3	484	55.1	2009	2	2016	2
02N22W03E01S	266	---	723	---	Santa Paula	75	168	12,637	262	1979	2	2016	2
02N22W03F02S	---	---	---	---	Santa Paula	75	50.1	3,760	80.9	1979	2	2016	2
02N22W03K02S	---	115	164	---	Santa Paula	75	35.5	2,660	118	1979	2	2016	2
02N22W03K03S	160	---	420	---	Santa Paula	46	1.6	75.0	2.8	1994	1	2016	2
02N22W03K04S	120	---	297	---	Santa Paula	12	0	0	0	2011	1	2016	2
02N22W03L01S	175	---	400	---	Santa Paula	56	18.0	1,010	67.0	1989	1	2016	2
02N22W03M03S	354	---	568	---	Santa Paula	20	18.5	370	28.5	1979	2	1989	1
02N22W03Q01S	---	---	---	---	Santa Paula	75	12.2	914	15.5	1979	2	2016	2
02N22W03Q02S	230	---	248	---	Santa Paula	40	14.0	559	51.3	1979	2	1999	2
02N22W03R02S	---	145	---	205	Santa Paula	17	77.2	1,312	173	1979	2	1987	2
02N22W07P01S	460	---	580	---	Mound	32	39.8	1,272	501	2001	1	2016	2
02N22W08F01S	580	---	1,180	---	Mound	37	1,180	43,655	2,331	1998	2	2016	2
02N22W08G01S	580	---	650	---	Mound	28	653	18,284	1,530	2003	1	2016	2
02N22W08L01S	460	---	1,405	---	Mound	75	550	41,277	2,391	1979	2	2016	2
02N22W08N01S	554	---	720	---	Mound	49	78.9	3,865	130	1979	2	2003	2
02N22W08P01S	160	---	321	---	Mound	15	4.9	73.4	23.8	1979	2	1997	2
02N22W09K01S	236	---	336	---	Mound	75	52.5	3,936	133	1979	2	2016	2
02N22W09K03S	424	---	545	---	Mound	52	85.1	4,423	200	1979	2	2005	1
02N22W09K05S	625	---	1,455	---	Mound	76	78.3	5,954	399	1979	1	2016	2
02N22W09K06S	420	---	560	---	Mound	1	12.7	12.7	12.7	2003	2	2003	2
02N22W09K07S	640	---	1,440	---	Mound	25	128	3,209	217	2004	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W09K08S	224	---	465	---	Mound	13	67.5	877	103	2010	2	2016	2
02N22W10N01S	200	---	300	---	Mound	49	73.0	3,579	151	1979	2	2003	2
02N22W10N02S	200	---	354	---	Mound	75	94.5	7,086	267	1979	2	2016	2
02N22W10N03S	200	---	280	---	Mound	25	51.6	1,291	92.5	2004	2	2016	2
02N22W11A01S	75	---	155	---	Oxnard Forebay	22	31.1	684	94.2	2006	1	2016	2
02N22W11C03S	180	---	470	---	Oxnard Forebay	22	4.3	94.9	12.0	1979	2	1997	2
02N22W11D02S	---	---	208	---	Santa Paula	12	11.7	140	20.0	1979	2	1997	2
02N22W11M01S	100	---	410	---	Oxnard Forebay	45	37.2	1,676	56.3	1979	2	2001	2
02N22W11R01S	95	---	142	---	Oxnard Forebay	3	0	0	0	1983	2	1997	2
02N22W11R02S	284	---	404	---	Oxnard Forebay	11	0	0.5	0.5	1979	2	1997	2
02N22W11R03S	290	---	410	---	Oxnard Forebay	73	41.0	2,994	166	1979	2	2016	2
02N22W12A02S	40	---	121	---	Oxnard Forebay	74	4.4	328	12.7	1979	2	2016	2
02N22W12B07S	130	---	350	---	Oxnard Forebay	35	14.1	495	16.8	1986	2	2003	2
02N22W12B08S	115	---	355	---	Oxnard Forebay	34	0.8	25.6	4.6	1999	2	2016	2
02N22W12E02S	205	---	355	---	Oxnard Forebay	23	512	11,781	665	1979	2	1997	2
02N22W12E04S	140	---	464	---	Oxnard Forebay	46	206	9,491	659	1990	1	2012	2
02N22W12E05S	160	---	480	---	Oxnard Forebay	8	12.4	99.0	22.6	2013	1	2016	2
02N22W12G03S	80	---	141	---	Oxnard Forebay	75	5.3	400	20.1	1979	2	2016	2
02N22W12G04S	110	---	230	---	Oxnard Forebay	2	10.2	20.4	13.4	2016	1	2016	2
02N22W12H01S	100	---	365	---	Oxnard Forebay	20	139	2,772	531	2007	1	2016	2
02N22W12J04S	100	---	320	---	Oxnard Forebay	20	174	3,476	708	2007	1	2016	2
02N22W12K02S	90	---	172	---	Oxnard Forebay	34	39.1	1,331	122	1979	2	1997	2
02N22W12K05S	68	---	233	---	Oxnard Forebay	75	62.3	4,675	423	1979	2	2016	2
02N22W12L02S	140	---	260	---	Oxnard Forebay	13	23.3	303	69.3	1990	1	1997	2
02N22W12L04S	60	---	317	---	Oxnard Forebay	34	42.5	1,446	76.8	1979	2	1997	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W12M02S	204	---	348	---	Oxnard Forebay	75	6.1	459	35.8	1979	2	2016	2
02N22W12M03S	40	---	300	---	Oxnard Forebay	12	29.3	352	58.3	2011	1	2016	2
02N22W12N03S	276	---	456	---	Oxnard Forebay	75	35.1	2,632	120	1979	2	2016	2
02N22W12N04S	192	---	336	---	Oxnard Forebay	75	40.6	3,045	183	1979	2	2016	2
02N22W12N07S	50	---	110	---	Oxnard Forebay	33	0.8	26.4	5.2	1984	2	2000	2
02N22W12N08S	160	---	560	---	Oxnard Forebay	52	10.9	567	27.2	1991	1	2016	2
02N22W12Q04S	120	---	148	---	Oxnard Forebay	75	6.2	466	73.8	1979	2	2016	2
02N22W12Q05S	243	---	703	---	Oxnard Forebay	75	60.8	4,560	244	1979	2	2016	2
02N22W12R03S	320	---	680	---	Oxnard Forebay	73	19.4	1,413	66.1	1979	2	2016	2
02N22W12R05S	340	---	715	---	Oxnard Forebay	4	7.7	30.7	22.8	2015	1	2016	2
02N22W13A04S	274	---	694	---	Oxnard Forebay	48	84.7	4,067	250	1979	2	2003	1
02N22W13B01S	420	---	790	---	Oxnard Forebay	15	152	2,273	282	2009	2	2016	2
02N22W13D01S	340	---	540	---	Oxnard Forebay	75	49.0	3,677	207	1979	2	2016	2
02N22W13G02S	80	---	190	---	Oxnard Forebay	45	66.6	2,996	631	1979	2	2001	2
02N22W13H02S	100	---	500	---	Oxnard Forebay	40	341	13,651	602	1997	1	2016	2
02N22W13K02S	95	---	308	---	Oxnard Forebay	75	82.6	6,192	418	1979	2	2016	2
02N22W13K04S	100	---	500	---	Oxnard Forebay	33	124	4,083	255	2000	2	2016	2
02N22W13L01S	95	---	215	---	Oxnard Forebay	75	103	7,705	263	1979	2	2016	2
02N22W13L03S	100	---	175	---	Oxnard Forebay	75	12.0	901	38.5	1979	2	2016	2
02N22W13L04S	120	---	244	---	Oxnard Forebay	20	54.8	1,097	120	1983	1	1997	2
02N22W13L05S	120	---	210	---	Oxnard Forebay	75	123	9,228	299	1979	2	2016	2
02N22W13L06S	120	---	520	---	Oxnard Forebay	51	13.1	668	23.8	1991	2	2016	2
02N22W13L07S	160	---	640	---	Oxnard Forebay	50	103	5,163	198	1992	1	2016	2
02N22W13M01S	---	---	178	---	Oxnard Forebay	42	40.3	1,691	152	1979	2	2000	1
02N22W13N02S	752	---	1,092	---	Oxnard Forebay	64	63.4	4,056	865	1985	1	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W13N03S	110	---	260	---	Oxnard Forebay	52	0	0	0	1991	1	2016	2
02N22W13N04S	350	---	620	---	Oxnard Forebay	33	28.5	941	273	2000	2	2016	2
02N22W14A02S	120	---	152	---	Oxnard Forebay	75	0.7	56.2	5.0	1979	2	2016	2
02N22W14A03S	---	---	---	---	Oxnard Forebay	66	0.9	60.6	1.6	1984	1	2016	2
02N22W14A04S	100	---	185	---	Oxnard Forebay	74	8.2	607	30.9	1979	2	2016	2
02N22W14A05S	119	---	179	---	Oxnard Forebay	75	21.8	1,635	231	1979	2	2016	2
02N22W14A08S	120	---	180	---	Oxnard Forebay	75	1.3	97.4	2.9	1979	2	2016	2
02N22W14B01S	414	---	762	---	Oxnard Forebay	75	36.7	2,750	244	1979	2	2016	2
02N22W14H02S	98	---	170	---	Oxnard Forebay	15	0	0	0	2009	2	2016	2
02N22W14H03S	128	---	178	---	Oxnard Forebay	75	77.9	5,840	135	1979	2	2016	2
02N22W14J01S	84	---	190	---	Oxnard Forebay	26	2.5	64.4	3.6	1979	2	1997	2
02N22W14J02S	145	---	410	---	Oxnard Forebay	75	130	9,763	294	1979	2	2016	2
02N22W14J03S	600	---	760	---	Oxnard Forebay	26	3.9	100	22.4	1991	1	2003	2
02N22W14L02S	100	---	200	---	Oxnard Forebay	75	9.5	712	21.1	1979	2	2016	2
02N22W14L04S	250	---	268	---	Oxnard Forebay	17	18.7	318	52.1	1979	2	1997	2
02N22W14L05S	164	---	404	---	Oxnard Forebay	75	32.2	2,415	85.3	1979	2	2016	2
02N22W14L06S	---	---	---	---	Oxnard Forebay	31	2.7	82.3	5.0	2001	2	2016	2
02N22W14P02S	149	---	277	---	Oxnard Forebay	75	659	49,414	2,011	1979	2	2016	2
02N22W14P03S	162	---	306	---	Oxnard Forebay	69	18.3	1,259	48.4	1982	2	2016	2
02N22W14Q01S	60	---	260	---	Oxnard Forebay	71	0.3	24.0	1.6	1979	2	2014	2
02N22W14Q02S	60	---	260	---	Oxnard Forebay	76	53.5	4,069	166	1979	1	2016	2
02N22W14Q03S	200	---	400	---	Oxnard Forebay	76	186	14,134	392	1979	1	2016	2
02N22W15B01S	352	---	442	---	Oxnard Forebay	20	104	2,088	179	2006	1	2016	2
02N22W15D02S	227	---	379	---	Mound	75	45.7	3,424	72.1	1979	2	2016	2
02N22W15E02S	120	---	320	---	Mound	4	6.3	25.2	12.0	2015	1	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W15M01S	160	---	400	---	Oxnard Forebay	48	97.2	4,664	176	1993	1	2016	2
02N22W15Q01S	78	---	150	---	Oxnard Forebay	55	278	15,316	691	1979	2	2006	2
02N22W15Q03S	206	---	314	---	Oxnard Forebay	42	155	6,528	295	1979	2	2000	1
02N22W15R01S	130	---	242	---	Oxnard Forebay	44	12.7	559	69.7	1979	2	2001	1
02N22W16H01S	---	---	---	---	Mound	75	58.8	4,409	220	1979	2	2016	2
02N22W16K01S	292	---	345	---	Mound	75	12.0	902	64.2	1979	2	2016	2
02N22W16Q01S	136	---	578	---	Oxnard Plain	75	62.5	4,685	139	1979	2	2016	2
02N22W16Q03S	180	---	350	---	Oxnard Plain	75	79.5	5,959	207	1979	2	2016	2
02N22W17M01S	440	---	600	---	Mound	20	39.4	787	65.4	1992	1	2001	2
02N22W17M02S	550	---	850	---	Mound	30	53.2	1,596	83.7	2002	1	2016	2
02N22W17Q05S	360	---	478	---	Mound	66	38.7	2,551	213	1982	1	2016	2
02N22W18N01S	660	---	1,200	---	Mound	75	117	8,805	332	1979	2	2016	2
02N22W19J02S	160	---	500	---	Oxnard Plain	75	214	16,073	632	1979	2	2016	2
02N22W19J03S	410	---	690	---	Oxnard Plain	40	149	5,941	505	1997	1	2016	2
02N22W19K02S	200	---	230	---	Mound	70	0.3	22.0	0.5	1979	2	2016	2
02N22W19K03S	450	---	600	---	Mound	16	134	2,152	266	2009	1	2016	2
02N22W19L02S	---	---	---	---	Mound	54	55.9	3,021	160	1988	1	2016	2
02N22W19M03S	350	---	625	---	Mound	30	41.8	1,255	106	1990	1	2004	2
02N22W19M04S	343	---	493	---	Mound	24	110	2,637	247	2005	1	2016	2
02N22W19P01S	160	---	300	---	Oxnard Plain	41	84.0	3,445	185	1996	2	2016	2
02N22W20B02S	180	---	320	---	Mound	8	106	848	224	1979	2	1997	2
02N22W20E01S	462	---	818	---	Mound	51	33.5	1,706	163	1991	2	2016	2
02N22W20J01S	310	---	910	---	Oxnard Plain	20	1,262	25,246	1,726	1979	2	1989	1
02N22W20K01S	403	---	853	---	Oxnard Plain	56	1,079	60,416	1,749	1989	1	2016	2
02N22W20L02S	354	---	830	---	Oxnard Plain	73	427	31,165	1,627	1979	2	2015	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W20L03S	403	---	853	---	Oxnard Plain	56	699	39,145	1,656	1989	1	2016	2
02N22W20M02S	365	---	927	---	Oxnard Plain	72	3.0	217	131	1979	2	2016	2
02N22W20M06S	319	---	600	---	Oxnard Plain	72	30.0	2,157	131	1979	2	2016	2
02N22W20M07S	352	---	552	---	Oxnard Plain	73	35.1	2,560	151	1979	2	2016	2
02N22W20Q01S	187	---	664	---	Oxnard Plain	75	10.6	795	140	1979	2	2016	2
02N22W21D02S	190	---	280	---	Oxnard Plain	49	0	0	0	1979	2	2003	2
02N22W21D03S	193	---	313	---	Oxnard Plain	54	17.6	951	23.6	1979	2	2006	1
02N22W21H01S	---	---	---	210	Oxnard Forebay	55	144	7,893	421	1979	2	2006	2
02N22W21J03S	200	---	308	---	Oxnard Forebay	19	60.7	1,153	204	1979	2	1997	2
02N22W21M01S	160	---	300	---	Oxnard Plain	64	62.5	4,002	183	1985	1	2016	2
02N22W21Q01S	143	---	178	---	Oxnard Plain	27	77.6	2,096	203	1979	2	1997	2
02N22W22G01S	120	---	200	---	Oxnard Forebay	51	100	5,079	335	1979	2	2004	2
02N22W22H01S	96	---	208	---	Oxnard Forebay	56	9.1	512	38.2	1979	1	2006	2
02N22W22J02S	124	---	200	---	Oxnard Forebay	55	79.8	4,389	172	1979	2	2006	2
02N22W22M04S	86	---	246	---	Oxnard Forebay	4	0.8	3.0	1.0	1979	2	1997	2
02N22W22Q01S	100	---	142	---	Oxnard Forebay	48	4.9	233	16.0	1979	2	2003	1
02N22W22Q02S	140	---	182	---	Oxnard Forebay	24	6.0	145	19.4	1979	2	1997	2
02N22W22Q03S	110	---	268	---	Oxnard Forebay	24	12.7	304	26.8	1979	2	1997	2
02N22W22Q05S	460	---	640	---	Oxnard Forebay	12	5.4	65.0	14.7	2011	1	2016	2
02N22W22R04S	120	---	290	---	Oxnard Forebay	75	154	11,556	257	1979	2	2016	2
02N22W23B01S	100	---	277	---	Oxnard Forebay	75	525	39,345	2,129	1979	2	2016	2
02N22W23B02S	163	---	277	---	Oxnard Forebay	75	524	39,265	2,003	1979	2	2016	2
02N22W23C01S	100	---	300	---	Oxnard Forebay	72	768	55,288	2,153	1979	2	2015	1
02N22W23C02S	139	---	290	---	Oxnard Forebay	75	933	69,953	2,250	1979	2	2016	2
02N22W23C03S	556	---	1,092	---	Oxnard Forebay	42	1.2	50.1	10.0	1979	2	2000	1

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W23C05S	140	---	310	---	Oxnard Forebay	32	1,579	50,516	3,123	2001	1	2016	2
02N22W23C06S	150	---	290	---	Oxnard Forebay	4	691	2,764	824	2015	1	2016	2
02N22W23D04S	76	---	180	---	Oxnard Forebay	43	63.5	2,729	154	1979	2	2000	2
02N22W23D05S	80	---	227	---	Oxnard Forebay	75	5.8	434	31.3	1979	1	2016	2
02N22W23D06S	130	---	370	---	Oxnard Forebay	51	35.7	1,822	242	1991	2	2016	2
02N22W23F01S	100	---	300	---	Oxnard Forebay	26	6.8	176	8.0	2004	1	2016	2
02N22W23F04S	124	---	250	---	Oxnard Forebay	49	5.7	280	8.0	1979	2	2003	2
02N22W23F05S	300	---	412	---	Oxnard Forebay	75	131	9,807	168	1979	2	2016	2
02N22W23F06S	80	---	250	---	Oxnard Forebay	56	54.3	3,043	161	1980	2	2016	2
02N22W23G02S	100	---	277	---	Oxnard Forebay	59	689	40,674	1,713	1979	2	2008	2
02N22W23G03S	100	---	300	---	Oxnard Forebay	75	875	65,629	2,130	1979	2	2016	2
02N22W23G04S	115	---	340	---	Oxnard Forebay	15	707	10,606	1,672	2009	2	2016	2
02N22W23H03S	120	---	182	---	Oxnard Forebay	75	124	9,326	242	1979	2	2016	2
02N22W23H04S	850	---	1,390	---	Oxnard Forebay	64	34.0	2,176	415	1985	1	2016	2
02N22W23J01S	116	---	206	---	Oxnard Forebay	75	91.6	6,872	169	1979	2	2016	2
02N22W23K01S	124	---	250	---	Oxnard Forebay	48	178	8,528	1,213	1979	2	2003	1
02N22W23K02S	133	---	232	---	Oxnard Forebay	74	105	7,738	222	1979	1	2016	2
02N22W23K04S	710	---	1,777	---	Oxnard Forebay	48	3.4	164	77.0	1979	2	2003	1
02N22W23K05S	144	---	336	---	Oxnard Forebay	74	894	66,171	3,090	1980	1	2016	2
02N22W23Q01S	98	---	162	---	Oxnard Forebay	75	90.7	6,799	281	1979	2	2016	2
02N22W23Q04S	301	---	501	---	Oxnard Forebay	26	159	4,141	271	2004	1	2016	2
02N22W24A01S	120	---	320	---	Oxnard Plain	75	184	13,793	445	1979	2	2016	2
02N22W24A02S	100	---	240	---	Oxnard Plain	14	156	2,186	259	2010	1	2016	2
02N22W24D01S	130	---	258	---	Oxnard Forebay	75	92.2	6,912	159	1979	2	2016	2
02N22W24K01S	80	---	150	---	Oxnard Plain	75	60.2	4,518	245	1979	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W24P01S	290	---	480	---	Oxnard Plain	75	132	9,877	321	1979	2	2016	2
02N22W24P02S	300	---	1,210	---	Oxnard Plain	70	159	11,101	327	1982	1	2016	2
02N22W24Q02S	183	---	195	---	Oxnard Plain	75	0.7	54.0	1.2	1979	2	2016	2
02N22W24R01S	100	---	200	---	Oxnard Plain	75	8.1	610	26.0	1979	2	2016	2
02N22W24R02S	100	---	160	---	Oxnard Plain	68	0.4	26.2	1.0	1983	1	2016	2
02N22W25A02S	---	124	---	174	Oxnard Plain	74	15.3	1,133	54.1	1979	2	2016	2
02N22W25A03S	112	---	205	---	Oxnard Plain	75	147	11,046	334	1979	2	2016	2
02N22W25E01S	108	---	184	---	Oxnard Plain	26	85.0	2,211	190	2004	1	2016	2
02N22W25F01S	130	---	190	---	Oxnard Plain	75	0.4	32.1	2.0	1979	2	2016	2
02N22W25J01S	400	---	820	---	Oxnard Plain	46	70.4	3,240	109	1993	2	2016	2
02N22W25L02S	106	---	172	---	Oxnard Plain	49	52.9	2,591	130	1979	2	2003	2
02N22W25L03S	110	---	172	---	Oxnard Plain	75	3.0	225	30.0	1979	2	2016	2
02N22W25L05S	400	---	820	---	Oxnard Plain	40	101	4,055	139	1997	1	2016	2
02N22W25M01S	122	---	225	---	Oxnard Plain	24	8.7	209	13.0	1979	2	1997	2
02N22W25N03S	120	---	202	---	Oxnard Plain	20	5.6	112	17.0	1979	2	1997	2
02N22W25P01S	120	---	434	---	Oxnard Plain	61	114	6,939	418	1979	2	2009	2
02N22W25P04S	115	---	210	---	Oxnard Plain	68	146	9,961	400	1983	1	2016	2
02N22W25Q01S	100	---	180	---	Oxnard Plain	42	30.2	1,268	75.7	1979	2	2000	2
02N22W25Q04S	100	---	180	---	Oxnard Plain	16	6.1	97.2	16.8	1979	2	1997	2
02N22W25Q05S	220	---	390	---	Oxnard Plain	14	196	2,749	310	2010	1	2016	2
02N22W25R02S	104	---	162	---	Oxnard Plain	75	71.8	5,384	318	1979	2	2016	2
02N22W26B03S	575	---	1,475	---	Oxnard Forebay	64	205	13,119	2,174	1985	1	2016	2
02N22W26C01S	90	---	180	---	Oxnard Forebay	75	25.4	1,906	143	1979	2	2016	2
02N22W26C03S	98	---	220	---	Oxnard Forebay	75	27.6	2,069	53.3	1979	2	2016	2
02N22W26C05S	200	---	324	---	Oxnard Forebay	75	47.1	3,532	254	1979	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W26E01S	150	---	292	---	Oxnard Forebay	75	11.7	879	29.9	1979	2	2016	2
02N22W26F02S	150	---	324	---	Oxnard Forebay	75	41.1	3,083	121	1979	2	2016	2
02N22W26H01S	120	---	266	---	Oxnard Plain	16	108	1,732	340	1979	2	1997	2
02N22W26H02S	440	---	680	---	Oxnard Plain	75	83.5	6,261	211	1979	2	2016	2
02N22W26M01S	150	---	180	---	Oxnard Forebay	31	21.5	668	39.4	1979	2	1997	2
02N22W26Q01S	127	---	193	---	Oxnard Plain	45	33.1	1,490	142	1979	2	2001	2
02N22W26R01S	140	---	190	---	Oxnard Plain	15	53.9	808	88.0	1979	2	1997	2
02N22W26R02S	145	---	175	---	Oxnard Plain	24	0.8	20.0	1.0	1979	2	1997	2
02N22W26R05S	140	---	185	---	Oxnard Plain	44	57.3	2,521	197	1979	1	2000	2
02N22W27A01S	100	---	150	---	Oxnard Forebay	1	0	0	0	2016	1	2016	1
02N22W27A02S	100	---	230	---	Oxnard Forebay	2	31.4	62.9	32.4	2016	1	2016	2
02N22W27A03S	140	---	230	---	Oxnard Forebay	75	102	7,678	147	1979	2	2016	2
02N22W27B01S	145	---	230	---	Oxnard Forebay	65	8.2	534	29.0	1979	2	2011	2
02N22W27D01S	100	---	180	---	Oxnard Plain	11	0	0	0	1979	2	1997	2
02N22W27K01S	130	---	246	---	Oxnard Forebay	75	76.3	5,721	198	1979	2	2016	2
02N22W27L01S	107	---	242	---	Oxnard Forebay	75	36.1	2,705	155	1979	2	2016	2
02N22W27M01S	102	---	288	---	Oxnard Plain	4	29.3	117	85.8	1979	2	1997	2
02N22W27M02S	180	---	212	---	Oxnard Plain	73	2.7	198	5.7	1979	2	2015	2
02N22W28A03S	100	---	180	---	Oxnard Plain	28	3.6	100	19.4	2003	1	2016	2
02N22W28C06S	170	---	430	---	Oxnard Plain	75	197	14,787	422	1979	2	2016	2
02N22W28H02S	125	---	280	---	Oxnard Plain	75	14.1	1,057	31.2	1979	2	2016	2
02N22W28L01S	186	---	286	---	Oxnard Plain	27	58.5	1,579	206	1979	2	1997	2
02N22W29D04S	22	---	52	---	Oxnard Plain	55	2.1	117	30.0	1989	2	2016	2
02N22W29D05S	185	---	255	---	Oxnard Plain	51	24.0	1,224	198	1991	2	2016	2
02N22W29D08S	200	---	290	---	Oxnard Plain	14	37.5	525	49.8	2010	1	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W29G01S	190	---	254	---	Oxnard Plain	11	82.3	905	161	1979	2	1997	2
02N22W29M01S	200	---	280	---	Oxnard Plain	52	155	8,047	395	1979	1	2004	2
02N22W29Q03S	97	---	238	---	Oxnard Plain	35	54.5	1,908	376	1984	2	2001	2
02N22W29R01S	---	---	---	---	Oxnard Plain	9	67.7	609	140	1980	2	1997	2
02N22W29R02S	202	---	310	---	Oxnard Plain	11	100	1,096	266	1979	2	1997	2
02N22W30C05S	22	---	52	---	Oxnard Plain	55	2.6	141	26.5	1989	2	2016	2
02N22W30C06S	22	---	52	---	Oxnard Plain	55	0.7	40.1	9.4	1989	2	2016	2
02N22W30F03S	452	---	653	---	Oxnard Plain	61	168	10,264	393	1986	2	2016	2
02N22W30J01S	230	---	280	---	Oxnard Plain	75	3.0	222	12.4	1979	2	2016	2
02N22W30J07S	295	---	485	---	Oxnard Plain	25	154	3,849	430	2004	2	2016	2
02N22W30K01S	190	---	250	---	Oxnard Plain	71	7.9	561	88.2	1981	2	2016	2
02N22W30L02S	35	---	75	---	Oxnard Plain	71	5.7	405	59.8	1981	2	2016	2
02N22W30P01S	100	---	200	---	Oxnard Plain	9	113	1,016	223	1986	2	1997	2
02N22W30P02S	202	---	401	---	Oxnard Plain	76	309	23,479	585	1979	1	2016	2
02N22W30P03S	370	---	490	---	Oxnard Plain	75	31.7	2,377	97.9	1979	2	2016	2
02N22W30Q01S	390	---	510	---	Oxnard Plain	64	17.0	1,089	45.8	1985	1	2016	2
02N22W30Q02S	390	---	510	---	Oxnard Plain	75	37.4	2,804	64.7	1979	2	2016	2
02N22W31A02S	114	---	254	---	Oxnard Plain	49	49.5	2,423	89.9	1979	2	2003	2
02N22W31A03S	200	---	500	---	Oxnard Plain	75	141	10,541	306	1979	1	2016	2
02N22W31B01S	100	---	300	---	Oxnard Plain	76	105	7,965	494	1979	1	2016	2
02N22W31C02S	186	---	292	---	Oxnard Plain	76	108	8,201	213	1979	1	2016	2
02N22W31D01S	130	---	430	---	Oxnard Plain	28	155	4,337	323	1979	2	1997	2
02N22W31D02S	220	---	400	---	Oxnard Plain	49	164	8,026	298	1992	2	2016	2
02N22W31K01S	125	---	235	---	Oxnard Plain	75	61.1	4,582	232	1979	2	2016	2
02N22W31N01S	168	---	342	---	Oxnard Plain	75	330	24,786	906	1979	2	2016	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W31Q01S	120	---	240	---	Oxnard Plain	72	36.5	2,626	77.0	1981	1	2016	2
02N22W31R04S	168	---	240	---	Oxnard Plain	53	4.7	250	36.8	1990	2	2016	2
02N22W31R05S	320	---	440	---	Oxnard Plain	75	79.9	5,992	175	1979	1	2016	2
02N22W32A02S	120	---	308	---	Oxnard Plain	20	223	4,463	527	1979	2	1997	2
02N22W32C01S	100	---	250	---	Oxnard Plain	76	120	9,087	468	1979	1	2016	2
02N22W32C04S	220	---	310	---	Oxnard Plain	53	107	5,697	220	1990	2	2016	2
02N22W32D01S	210	---	480	---	Oxnard Plain	27	80.1	2,164	140	2003	2	2016	2
02N22W32M01S	---	---	---	---	Oxnard Plain	46	57.1	2,627	122	1979	2	2002	2
02N22W32M03S	218	---	318	---	Oxnard Plain	28	79.0	2,211	173	2003	1	2016	2
02N22W32Q01S	160	---	296	---	Oxnard Plain	17	80.1	1,361	177	1979	2	1997	2
02N22W32Q03S	180	---	280	---	Oxnard Plain	59	47.0	2,772	156	1987	2	2016	2
02N22W33A01S	---	---	---	---	Oxnard Plain	20	0	0	0	1979	2	1997	2
02N22W33L03S	138	---	198	---	Oxnard Plain	58	0.6	32.4	1.5	1979	2	2008	1
02N22W33M02S	164	---	218	---	Oxnard Plain	24	6.9	165	27.0	1979	2	1997	2
02N22W33M03S	168	---	302	---	Oxnard Plain	19	49.9	947	198	1979	2	1997	2
02N22W33N04S	181	---	293	---	Oxnard Plain	51	86.2	4,395	189	1979	2	2004	2
02N22W33N05S	175	---	295	---	Oxnard Plain	67	45.2	3,027	172	1982	2	2016	2
02N22W34A02S	62	---	198	---	Oxnard Plain	38	92.6	3,520	155	1981	1	1999	2
02N22W34A03S	200	---	218	---	Oxnard Plain	43	101	4,345	243	1979	2	2000	2
02N22W34B01S	75	---	213	---	Oxnard Forebay	45	29.4	1,324	138	1979	2	2001	2
02N22W34B03S	80	---	200	---	Oxnard Plain	40	10.3	411	23.0	1979	2	1999	2
02N22W34H01S	150	---	242	---	Oxnard Plain	51	51.8	2,642	145	1979	2	2004	2
02N22W34J01S	80	---	200	---	Oxnard Plain	73	0.2	17.7	1.0	1979	1	2015	1
02N22W34K02S	171	---	251	---	Oxnard Plain	59	87.9	5,187	229	1979	2	2008	2
02N22W35A01S	135	---	185	---	Oxnard Plain	23	70.9	1,630	141	1979	2	1997	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N22W35B02S	128	---	198	---	Oxnard Plain	58	21.8	1,267	125	1979	2	2008	2
02N22W35C01S	96	---	192	---	Oxnard Plain	45	1.2	55.6	1.4	1979	2	2001	2
02N22W35C02S	415	---	540	---	Oxnard Plain	30	192	5,757	486	1979	2	1997	2
02N22W35C03S	660	---	1,620	---	Oxnard Plain	37	0	0	0	1987	2	2005	2
02N22W35C04S	441	---	741	---	Oxnard Plain	37	21.8	807	87.3	1993	2	2011	2
02N22W35C05S	135	---	185	---	Oxnard Plain	22	0	0	0	1996	1	2006	2
02N22W35K01S	134	---	293	---	Oxnard Plain	61	149	9,094	561	1979	2	2009	2
02N22W35K02S	460	---	700	---	Oxnard Plain	44	179	7,897	391	1984	2	2006	2
02N22W35K03S	361	---	711	---	Oxnard Plain	14	114	1,594	155	2010	1	2016	2
02N22W35M01S	384	---	534	---	Oxnard Plain	70	71.1	4,978	208	1980	2	2015	1
02N22W35P01S	119	---	173	---	Oxnard Plain	18	0	0	0	1979	2	1997	2
02N22W36E02S	475	---	580	---	Oxnard Plain	21	586	12,303	1,471	2006	2	2016	2
02N22W36E03S	360	---	420	---	Oxnard Plain	21	616	12,931	1,879	2006	2	2016	2
02N22W36E04S	195	---	285	---	Oxnard Plain	21	129	2,704	800	2006	2	2016	2
02N22W36E05S	130	---	170	---	Oxnard Plain	21	77.9	1,635	651	2006	2	2016	2
02N22W36F02S	170	---	366	---	Oxnard Plain	75	136	10,219	351	1979	2	2016	2
02N22W36L01S	128	---	426	---	Oxnard Plain	75	72.6	5,446	250	1979	2	2016	2
02N22W36M03S	112	---	292	---	Oxnard Plain	22	44.3	975	94.1	1979	2	1997	2
02N23W13E01S	523	---	1,123	---	Mound	67	231	15,498	733	1983	2	2016	2
02N23W13F02S	521	---	982	---	Mound	76	209	15,917	811	1979	1	2016	2
02N23W13G01S	360	---	860	---	Mound	13	292	3,794	473	2010	2	2016	2
02N23W13K01S	623	---	1,230	---	Mound	11	33.5	368	102	1979	2	1997	2
02N23W13K03S	800	---	1,200	---	Mound	75	307	23,017	757	1979	2	2016	2
02N23W13K04S	800	---	1,200	---	Mound	67	129	8,661	294	1983	2	2016	2
02N23W14B01S	223	---	733	---	Mound	11	59.4	654	123	1979	2	1997	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
02N23W14K01S	501	---	920	---	Mound	9	134	1,209	253	1979	2	1997	2
02N23W24F01S	---	---	---	---	Mound	75	124	9,275	521	1979	2	2016	2
02N23W24G01S	742	---	927	---	Mound	75	2.7	200	69.9	1979	2	2016	2
02N23W25H01S	130	---	238	---	Oxnard Plain	75	225	16,882	478	1979	2	2016	2
02N23W25M01S	130	---	230	---	Oxnard Plain	75	264	19,830	695	1979	2	2016	2
02N23W25Q01S	190	---	220	---	Oxnard Plain	74	2.0	150	12.3	1979	2	2016	2
02N23W25R02S	162	---	182	---	Oxnard Plain	14	142	1,989	286	1979	2	1997	2
02N23W36A01S	232	---	366	---	Oxnard Plain	75	116	8,690	390	1979	2	2016	2
02N23W36A02S	240	---	368	---	Oxnard Plain	45	190	8,530	862	1979	2	2001	2
02N23W36A04S	200	---	400	---	Oxnard Plain	36	147	5,305	387	1999	1	2016	2
02N23W36C04S	210	---	260	---	Oxnard Plain	75	2.0	153	12.9	1979	2	2016	2
02N23W36C05S	200	---	445	---	Oxnard Plain	24	6.9	166	13.5	2005	1	2016	2
02N23W36H02S	181	---	381	---	Oxnard Plain	58	312	18,110	578	1988	1	2016	2
02N23W36L01S	110	---	250	---	Oxnard Plain	75	3.9	291	20.9	1979	2	2016	2
03N19W32L01S	605	---	860	---	West Las Posas	1	40.2	40.2	40.2	2015	2	2015	2
03N20W28J05S	240	---	360	---	East Las Posas	6	0.4	2.6	0.6	2013	1	2015	2
03N20W28P01S	---	---	---	---	East Las Posas	22	1.0	21.7	4.6	2005	1	2015	2
03N20W28P02S	140	---	400	---	East Las Posas	34	0.7	22.5	3.5	1999	1	2015	2
03N20W28P03S	---	---	---	---	East Las Posas	11	0.2	1.9	0.7	2010	1	2015	1
03N20W28Q01S	550	---	1,110	---	East Las Posas	64	4.8	310	10.2	1983	2	2015	1
03N20W32F02S	1,010	---	1,510	---	West Las Posas	49	74.3	3,643	466	1984	1	2010	1
03N20W32G01S	---	---	---	---	West Las Posas	1	0	0	0	2013	2	2013	2
03N20W32G02S	1,295	---	1,540	---	West Las Posas	40	27.9	1,116	114	1988	2	2010	1
03N20W32H02S	762	---	1,090	---	West Las Posas	12	27.6	331	109	2000	1	2013	2
03N20W32H03S	900	---	1,100	---	West Las Posas	11	15.5	170	52.4	2010	2	2015	2

Table 3-8. Well Information

Well ID	Reported Depth to Top of Screen (ft bgs)	Estimated Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Estimated Depth to Bottom of Screen (ft bgs)	Basin ID	Number of Semi-Annual Pumping Records	Average Semi-Annual Reported Pumping (acre-ft)	Total Pumping Volume (acre-ft)	Maximum Semi-Annual Reported Pumping (acre-ft)	First Year of Well Records	First Semi-Annual Period of Well Records	Last Year of Well Records	Last Semi-Annual Period of Well Records
03N20W32K01S	870	---	1,160	---	West Las Posas	26	51.6	1,342	111	2003	1	2015	2
03N20W33B01S	844	---	1,141	---	East Las Posas	60	28.7	1,721	61.9	1983	2	2015	2
03N20W33B04S	1,058	---	1,300	---	East Las Posas	45	14.0	628	32.0	1992	1	2015	2
03N20W33C01S	---	---	---	---	East Las Posas	62	0.9	57.2	2.0	1985	1	2015	2
03N20W33M01S	470	---	600	---	East Las Posas	9	0	0	0	2008	2	2013	2
03N21W35L02S	1,300	---	1,770	---		21	9.0	190	172	2006	2	2016	2
03N21W35L03S	1,100	---	1,530	---		13	47.1	613	80.2	2010	2	2016	2
03N21W35P01S	807	---	1,879	---		19	105	1,988	150	1979	2	1997	2
03N21W35P02S	790	---	1,760	---	West Las Posas	58	101	5,842	276	1988	1	2016	2
03N21W35R01S	800	---	1,720	---	West Las Posas	65	67.8	4,410	617	1983	2	2015	2
03N21W36Q01S	860	---	1,700	---	West Las Posas	65	108	7,019	224	1983	2	2015	2
03N21W36Q02S	804	---	1,684	---	West Las Posas	64	130	8,306	285	1983	2	2015	2
03N21W36R02S	1,215	---	1,990	---	West Las Posas	18	17.3	311	72.6	2005	1	2013	2
03N21W36R03S	966	---	1,476	---	West Las Posas	12	90.4	1,085	157	2010	1	2015	2
03N22W34E01S	528	---	618	---	Santa Paula	18	0.4	8.0	3.5	2008	1	2016	2
03N22W34Q02S	---	---	---	---	Santa Paula	74	85.1	6,294	290	1979	2	2016	2
03N22W34Q03S	280	---	470	---	Santa Paula	8	85.2	681	123	2013	1	2016	2
03N22W34R01S	300	---	343	---	Santa Paula	74	27.1	2,006	92.8	1979	2	2016	1

Data from United and FCGMA records as described in Section 3.

Notes: ft bgs = feet below ground surface
acre-ft = acre-feet

Table 4-1. Summary of Simulated Annual-Average Flows in Forebay

Aquifer system	Storage	Areal Recharge	Underflow from Oxnard Plain Basin	Underflow from Mound Basin	Underflow from Santa Paula Basin	UWCD Spreading	Pumping from Wells	ET	Santa Clara River Percolation
Shallow	1	343	4	-	-	-	-	-	-
UAS	2,398	2,102	-34,245	-2,122	502	48,297	-22,547	-326	7,534
LAS	91	-	-857	236	251	-	-1,670	-	-
Sum	2,490	2,445	-35,098	-1,886	753	48,297	-24,217	-326	7,534

Units are in acre-feet per year. Positive values indicate inflows, negative values indicate outflows.

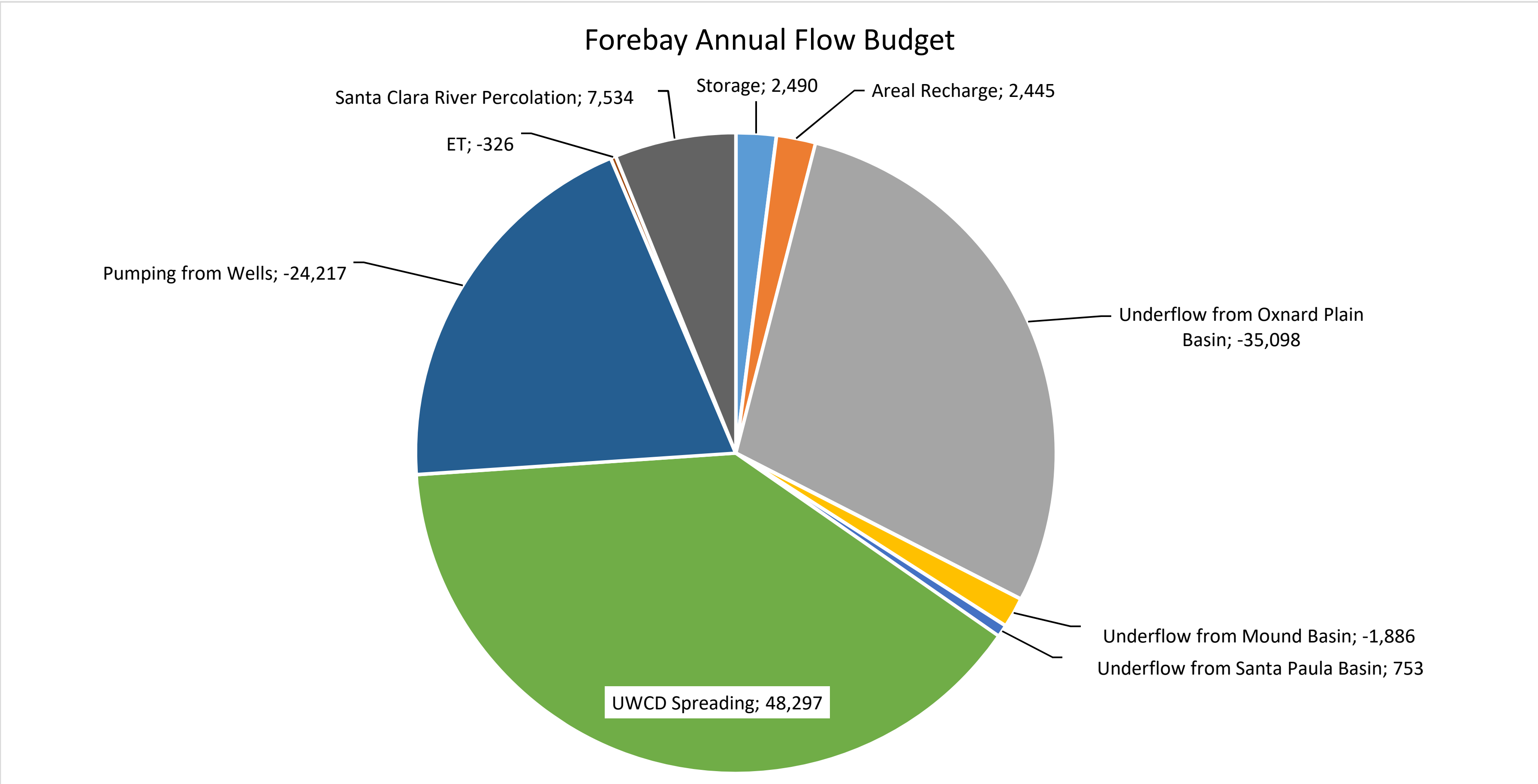

Table 4-2. Summary of Simulated Annual-Average Flows in Oxnard Plain Basin

Aquifer system	Storage	Tile Drains	Recharge	Pumping from Wells	ET	Underflow from Forebay	Underflow from Mound Basin	Underflow from Pleasant Valley Basin	Underflow from Las Posas Basin	Coastal Flux North of Channel Islands Harbor	Coastal Flux from Channel Islands Harbor to Arnold Road	Coastal Flux from Arnold Road to Point Mugu	Santa Clara River percolation	Calleguas Creek percolation
Shallow	659	-6,414	20,377	-21	-7,667	-4	-558	1,316	-128	-1,242	-540	663	506	2,177
UAS	1,705	-221	599	-28,056	-	34,245	-94	-170	-2,330	712	1,408	1,785	384	-
LAS	348	-	37	-26,722	-	857	2,151	-2,419	1,156	1,936	2,654	908	-	-
Sum	2,712	-6,636	21,013	-54,800	-7,667	35,098	1,499	-1,273	-1,302	1,406	3,523	3,357	889	2,177

Units are in acre-feet per year. Positive values indicate inflows, negative values indicate outflows.

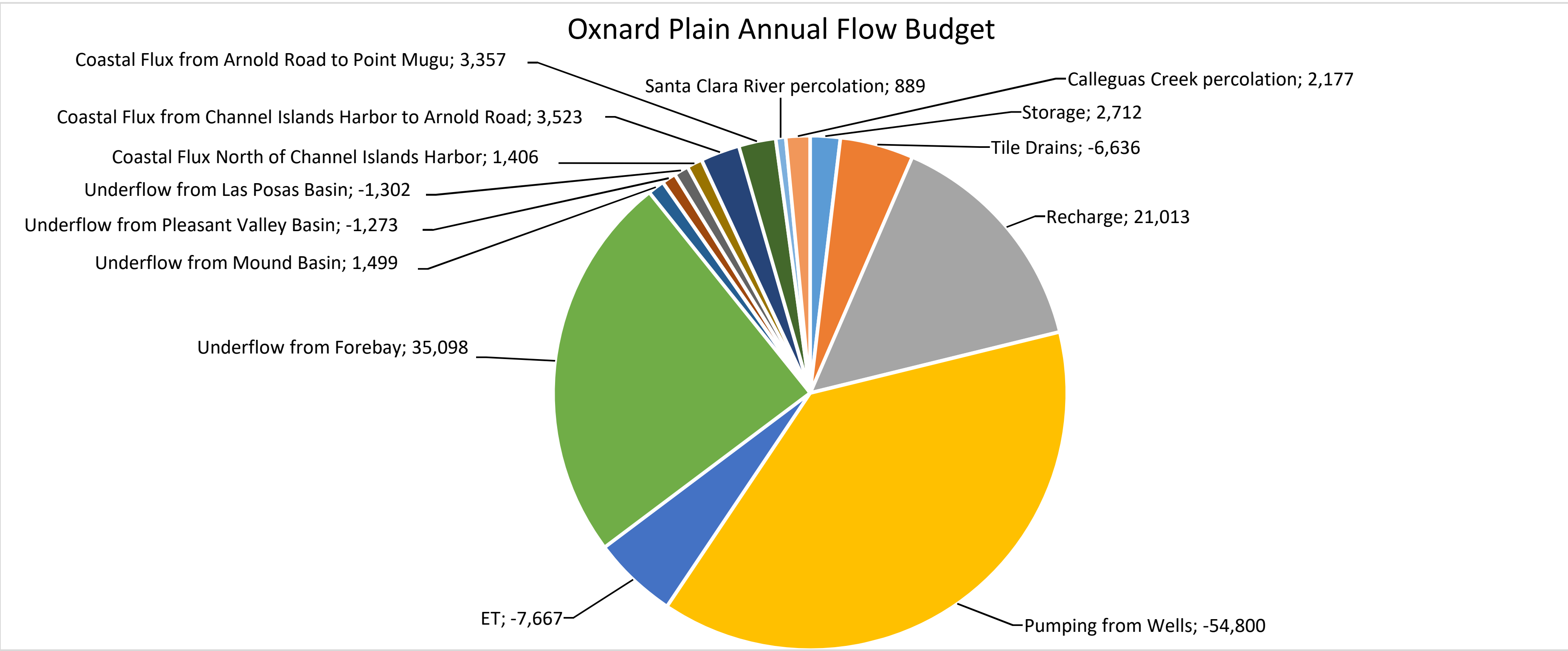

Table 4-3. Summary of Simulated Annual-Average Flows in Pleasant Valley Basin

Aquifer system	Storage	Tile Drains	Areal Recharge	Pumping from Wells	ET	Underflow from Oxnard Plain Basin	Underflow from Las Posas Basin	Arroyo Las Posas Percolation	Conejo Creek Percolation	Calleguas Creek Percolation	Mountain Front Recharge	GW Flux from East Las Posas
Shallow	-519	-5,196	8,204	-223	-903	-1,316	-	563	3,616	7,537	-	-
UAS	-1,154	-	692	-8,706	-981	170	-563	3,697	1,831	-	1,610	1,646
LAS	-262	-	384	-12,157	-	2,419	-418	-	-	-	-	-
Sum	-1,935	-5,196	9,280	-21,086	-1,884	1,273	-981	4,260	5,447	7,537	1,610	1,646

Units are in acre-feet per year. Positive values indicate inflows, negative values indicate outflows.

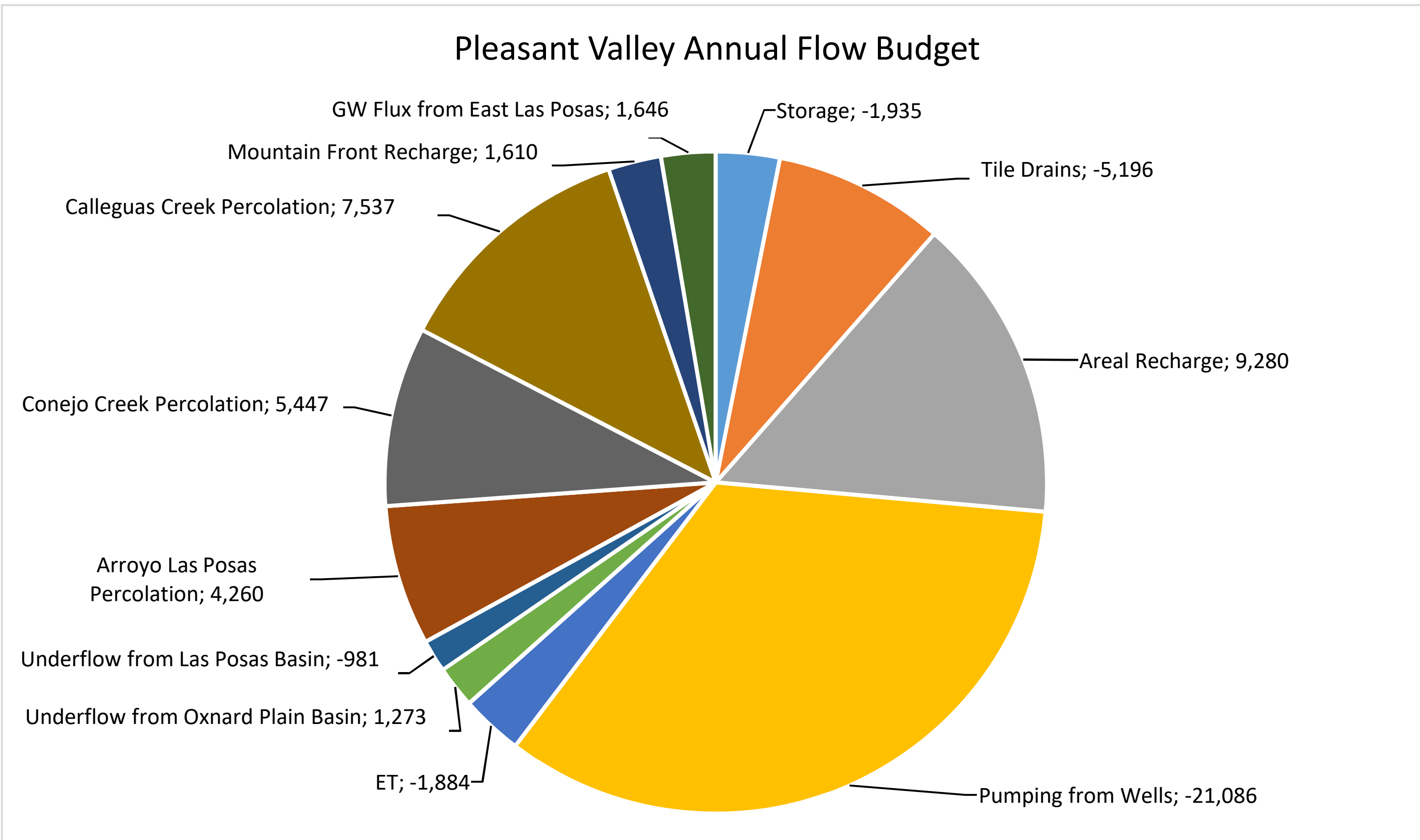

Table 4-4. Summary of Simulated Annual-Average Flows in Mound Basin

Aquifer system	Storage	Mountain-Front Recharge	Areal Recharge	Pumping from Wells	ET	Underflow from Santa Paula Basin	Underflow from Oxnard Plain Basin	Underflow from Forebay	Coastal Flux	Santa Clara River Percolation
Shallow	-2	-	2,238	-	-365	-3	558	-	-208	-1,168
UAS	303	-	26	-2,208	-	843	94	2,122	15	-
LAS	122	2,855	141	-5,162	-	2,253	-2,151	-236	-73	-
Sum	423	2,855	2,406	-7,369	-365	3,093	-1,499	1,886	-267	-1,168

Units are in acre-feet per year. Positive values indicate inflows, negative values indicate outflows.

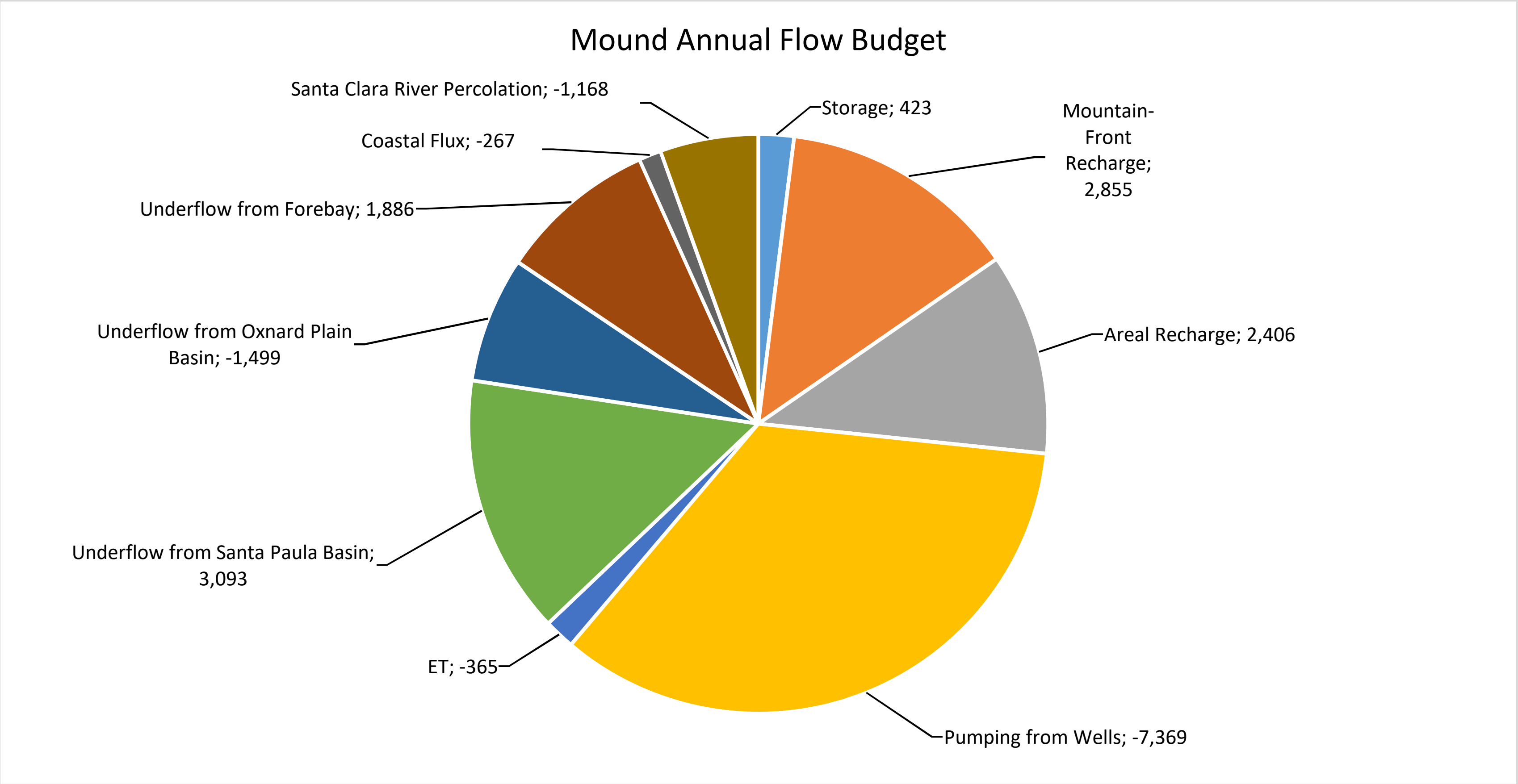

Table 4-5. Summary of Simulated Annual-Average Flows in Las Posas Basin

Aquifer system	Storage	Mountain-Front Recharge	Areal Recharge	Pumping from Wells	Underflow from Oxnard Plain Basin	Underflow from Pleasant Valley Basin
Shallow	255	-	5,155	-	2,458	563
UAS	2,256	1,734	1,135	-12,820	-1,156	418
LAS	2,511	1,734	6,291	-12,820	1,302	981
Sum	5,022	3,469	12,582	-25,639	2,605	1,962

Units are in acre-feet per year. Positive values indicate inflows, negative values indicate outflows.

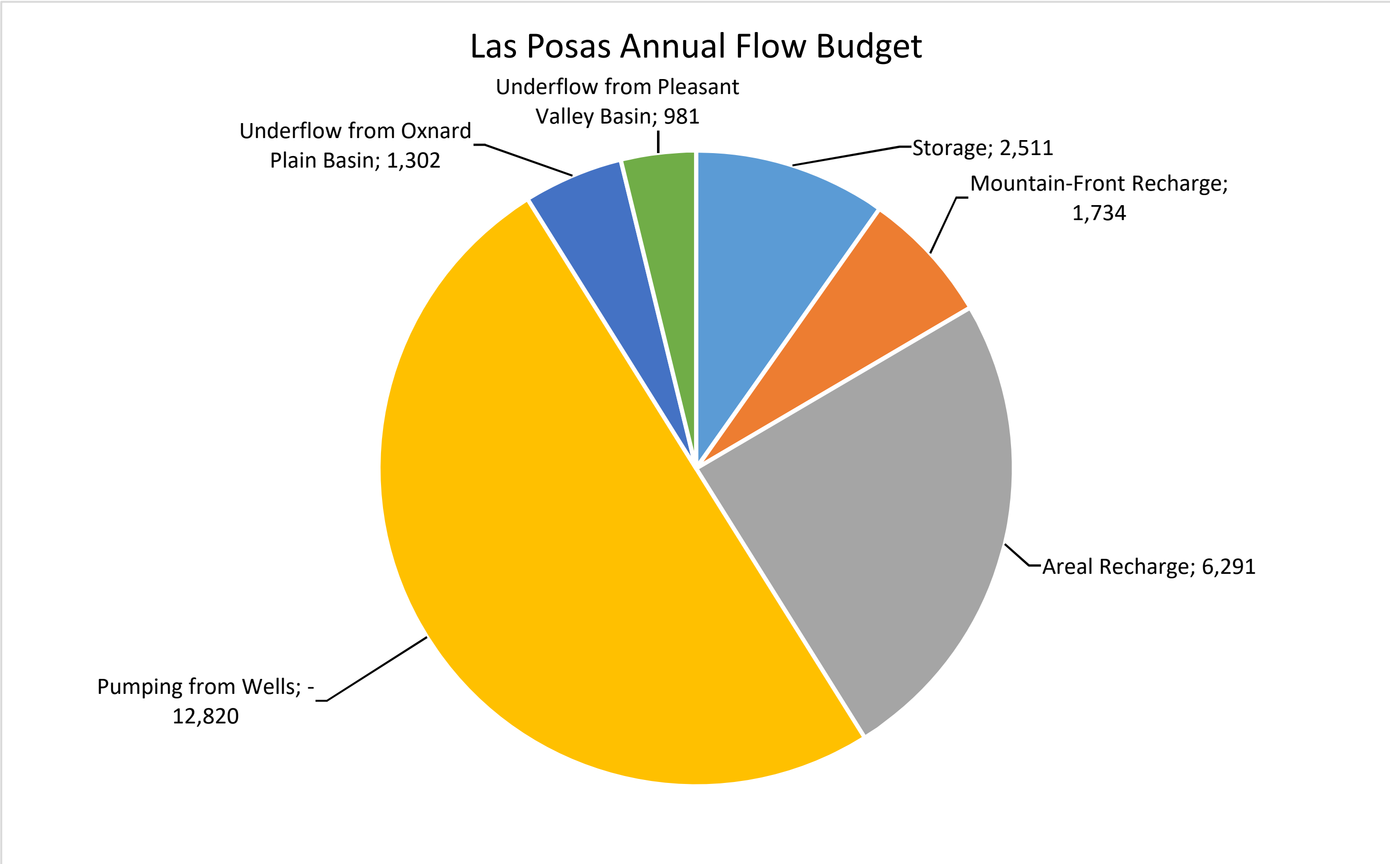

Table 4-6. Values Input for Parameters (by Zone) During Sensitivity Analysis

Horizontal Hydraulic Conductivity in Each Zone (ft/day)																														
Layer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
1	1.0E-12	200	200	200	200	300	200	200	300	200	200	200	200	50	50	200	0.1	300	200	200	1.0E-12	200	100	100	100	100	1	200	200	200
2	1.0E-12	0.01	0.01	0.01	1.00E-02	0.01	0.01	1.0E-03	0.01	0.01	0.01	100	100	50	50	200	0.01	300	200	0.01	1.0E-12	1.0E-04	100	100	100	0.01	0.01	200	100	100
3	1.0E-12	100	100	100	1.00E-02	300	100	100	250	100	100	100	50	10	10	200	0.05	250	200	100	1.0E-12	100	50	80	1	100	1	200	100	100
4	1.0E-12	0.01	0.01	0.1	1.00E-02	1	1	1	200	1	20	100	20	1	1	200	1.00E-03	250	200	1	1.0E-12	1	20	50	1	1	0.01	200	100	100
5	1.0E-12	100	50	50	100	200	50	50	200	100	20	100	20	1	1	200	20	200	100	100	1.0E-12	50	20	50	1	100	1	200	100	100
6	1.0E-12	1.0E-03	1.0E-03	1.0E-03	1	3.0E-03	0.01	1.0E-03	1.0E-03	5.0E-04	1.0E-02	50	0.01	0.01	0.01	1.00E-03	0.01	1.0E-04	0.1	1.0E-03	0.01	1.0E-03	0.1	1	5.0E-03	1.0E-03	1.0E-03	50	0.1	0.1
7	1.0E-12	20	20	20	20	20	20	20	0.5	20	20	10	10	10	1	20	5	1.0E-04	20	20	1.0E-12	20	10	20	1	100	0.1	20	20	10
8	1.0E-12	0.1	0.1	0.1	1	0.1	0.1	0.1	0.05	0.1	0.1	1.0E-04	0.1	0.1	0.1	0.1	1	1.0E-04	0.1	0.1	1.0E-12	0.1	0.1	0.1	0.1	0.1	0.01	15	0.01	0.01
9	1.0E-12	10	10	10	10	10	10	10	0.5	10	20	5	1	1	1	10	5	1.0E-04	10	10	1.0E-12	10	5	10	1	100	0.1	10	10	5
10	1.0E-12	0.1	0.1	0.1	1	0.1	0.1	0.1	0.05	0.1	0.1	0.01	0.1	0.1	0.1	0.1	1	1.0E-04	0.1	0.1	1.0E-12	0.1	0.1	0.1	0.1	0.1	0.01	0.01	0.01	0.01
11	1.0E-12	5	5	5	1	5	5	5	0.5	5	5	5	1	1	1	10	1	1.0E-04	5	5	1.0E-12	10	1	5	1	50	0.1	5	5	2
12	1.0E-12	0.1	0.1	0.1	1	0.1	0.1	0.1	0.05	0.1	0.1	0.01	0.1	0.1	0.01	0.1	1	1.0E-04	0.1	0.1	1.0E-12	10	0.1	0.01	0.01	0.1	0.01	0.1	0.1	0.5
13	1.0E-12	1	1	1	1.0E-03	1	1	1	0.1	1	1	5	1	0.5	0.01	1	0.01	1.0E-04	1	1	1.0E-12	1	1	1	0.01	5	0.1	5	5	2

Vertical Anisotropy Ratio in Each Zone (unitless)																														
Layer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
1	10	10	10	10	10	10	10	10	10	10	10	100	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
2	10	10	10	10	10	10	10	10	10	10	10	100	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
3	10	10	10	10	10	10	10	10	10	10	10	100	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
4	10	10	10	10	10	10	10	10	10	10	10	100	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
5	10	10	10	10	10	10	10	10	10	10	10	100	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
6	10	10	10	10	10	10	10	10	10	10	10	100	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
7	10	10	10	10	10	10	10	10	10	10	10	100	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
8	10	10	10	10	10	10	10	10	10	10	10	100	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
11	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
12	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
13	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

Storage Coefficient in Each Zone (unitless)																														
Layer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
2	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
3	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
4	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
5	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
6	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.002	0.001	0.0005	0.0005	0.0005	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.002
7	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.002	0.001	0.0005	0.0005	0.0005	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.002
8	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.002	0.001	0.0005	0.0005	0.0005	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.002
9	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.002	0.001	0.0005	0.0005	0.0005	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.002
10	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.002	0.001	0.0005	0.0005	0.0005	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.002
11	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.002	0.001	0.0005	0.0005	0.0005	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.002
12	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.002	0.001	0.0005	0.0005	0.0005	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.002
13	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.0005	0.0005	0.002	0.001	0.0005	0.0005	0.0005	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.002

Table 4-6. Values Input for Parameters (by Zone) During Sensitivity Analysis

	Specific Yield in Each Zone (unitless)																													
Layer	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.1	0.1	0.15	0.15	0.15	0.15	0.15
2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.15
3	0.15	0.15	0.15	0.15	0.05	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.1	0.1	0.15	0.15	0.15	0.15	0.15
4	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.15	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.15
5	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.1	0.1	0.1	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.1	0.1	0.15	0.15	0.15	0.15	0.15
6	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.15	0.1	0.1	0.1
8	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
9	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.15	0.1	0.1	0.1
10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.15	0.1	0.1	0.1
12	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
13	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.15	0.1	0.1	0.1

Table 4-7. Model Layers and Parameter Zones with Sensitivity Types II, III, or IV for Horizontal Hydraulic Conductivity

Layer	Zone	Groundwater Elevation Sensitivity	Flow Budget Sensitivity	Sensitivity Type
1	4	Low	High	II
1	5	Low	High	II
1	11	High	High	VI
1	13	Low	High	II
1	20	Low	High	II
2	11	Low	High	II
2	13	Low	High	II
3	6	Low	High	II
3	9	High	High	VI
3	10	High	Low	III
3	11	Low	High	II
3	24	High	Low	III
5	5	Low	High	II
5	6	Low	High	II
5	9	High	High	VI
5	10	High	High	VI
6	4	High	High	VI
6	6	Low	High	II
6	7	High	High	VI
6	11	High	High	VI
6	13	High	High	VI
6	19	High	High	VI
7	2	Low	High	II
7	4	High	High	VI
7	5	High	High	VI
7	6	High	Low	III
7	7	High	Low	III
7	9	High	Low	III
7	10	High	High	VI
7	11	High	Low	III
7	12	High	High	VI
7	19	Low	High	II
9	4	High	High	VI
9	5	High	High	VI
9	6	Low	High	II
9	10	High	Low	III
9	11	High	Low	III
9	12	High	Low	III
9	20	Low	High	II
9	28	High	Low	III
10	28	High	Low	III
11	12	High	Low	III
13	12	High	Low	III

Table 4-8. Model Layers and Parameter Zones with Sensitivity Types II, III, or IV for Vertical Hydraulic Conductivity

Layer	Zone	Groundwater Elevation Sensitivity	Flow Budget Sensitivity	Sensitivity Type
2	5	High	Low	III
2	11	Low	High	II
4	5	High	Low	III
6	4	High	High	VI
6	6	Low	High	II
6	7	High	High	VI
6	11	High	High	VI
6	13	High	High	VI
6	19	High	High	VI
7	6	Low	High	II
7	12	High	High	VI
12	12	High	Low	III

Table 4-9. Model Layers and Parameter Zones with Sensitivity Types II, III, or IV for Storage Coefficient

Layer	Zone	Groundwater Elevation Sensitivity	Flow Budget Sensitivity	Sensitivity Type
4	9	Low	High	II
5	9	Low	High	II
8	12	High	Low	III
9	12	High	Low	III
10	12	High	Low	III
11	12	High	Low	III
13	12	High	Low	III

Table 4-10. Model Layers and Parameter Zones with Sensitivity Types II, III, or IV for Specific Yield

Layer	Zone	Groundwater Elevation Sensitivity	Flow Budget Sensitivity	Sensitivity Type
2	5	High	Low	III
3	9	High	High	VI
7	12	High	Low	III

Table 4-11. Model Layers and Parameter Zones with Sensitivity Types II, III, or IV for Recharge

Basin	Water Source	Land Use	Groundwater Elevation Sensitivity	Flow Budget Sensitivity	Sensitivity Type
Forebay	Precipitation	Ag.	Low	High	II
Forebay	Pumped Water	Ag.	High	High	VI
Mound	Precipitation	M&I	High	Low	III
Mound	Applied Water	M&I	High	Low	III
Mound	Pumped Water	Ag.	Low	High	II
Oxnard Plain	Precipitation	Ag.	High	High	VI
Oxnard Plain	Pumped Water	Ag.	High	High	VI
Pleasant Valley	Precipitation	Ag.	High	High	VI
Pleasant Valley	Pumped Water	Ag.	High	High	VI
West Las Posas	Precipitation	Ag.	High	High	VI
West Las Posas	Applied Water	Ag.	High	Low	III
West Las Posas	Pumped Water	Ag.	High	High	VI

Table 4-12. Input Parameters for Horizontal Flow Barriers (Faults)

ID	Fault Name	Uppermost Layer Affected	Lowest Layer Affected	Conductance
1	Round Mountain + Long Canyon	3	13	0.04
2	Sycamore Canyon	5	5	0.06
3a	Bailey in UAS	3	5	0.005, 1.0E-4
3b	Bailey in LAS	6	13	1.0E04, 1.0E-6
4	Springville	6	13	1.0E-4, 5.0E-4
5	Santa Rosa	3	13	1.0E-06
6	Hueneme Canyon	6	13	0.03
7	Montalvo	7	13	1
8	Oak Ridge in Mound and OP	7	13	1
9	Country Club	3	13	1.0E-05
10	Oak Ridge in Forebay	3	13	1.0E-04
11	North Mugu Lagoon	7	13	1.0E-04
51	Camarillo	3	13	1.0E-06
52	Santa Rosa Valley	3	13	1.0E-06
53	Las Posas + Santa Rosa	3	13	1.0E-06
75	La Loma + Fox Canyon	7	13	0.001
76	Unknown North WLP	7	13	0.001

Table 4-13. Model Layers and Parameter Zones with Sensitivity Types II, III, or IV for Horizontal Flow Barrier (Fault) Conductance

Layer	Zone	Groundwater Elevation Sensitivity	Flow Budget Sensitivity	Sensitivity Type
4	Springville	High	Low	III
9	Country Club	Low	High	II
10	Oak Ridge (in Forebay)	High	High	VI
75	La Loma and Fox Canyon	High	Low	III
76	Unnamed in northern West Las Posas basin	High	Low	III

Table 4-14. Model Layers and Parameter Zones with Sensitivity Types II, III, or IV for Streambed Conductance

Stream	Groundwater Elevation Sensitivity	Flow Budget Sensitivity	Sensitivity Type
Arroyo Las Posas	High	High	VI
Conejo Creek	High	High	VI
Calleguas Creek	High	High	VI
Santa Clara River	High	High	VI

Table 4-15. Model Layers and Parameter Zones with Sensitivity Types II, III, or IV for General Head Boundary (GHB) Conductance

GHB Location	Groundwater Elevation Sensitivity	Flow Budget Sensitivity	Sensitivity Type
Santa Paula	Low	Low	I
Pacific Ocean, Layer 1	Low	High	II
Pacific Ocean, Layers 3, 5, 7, 9, & 11	High	High	VI

FIGURES

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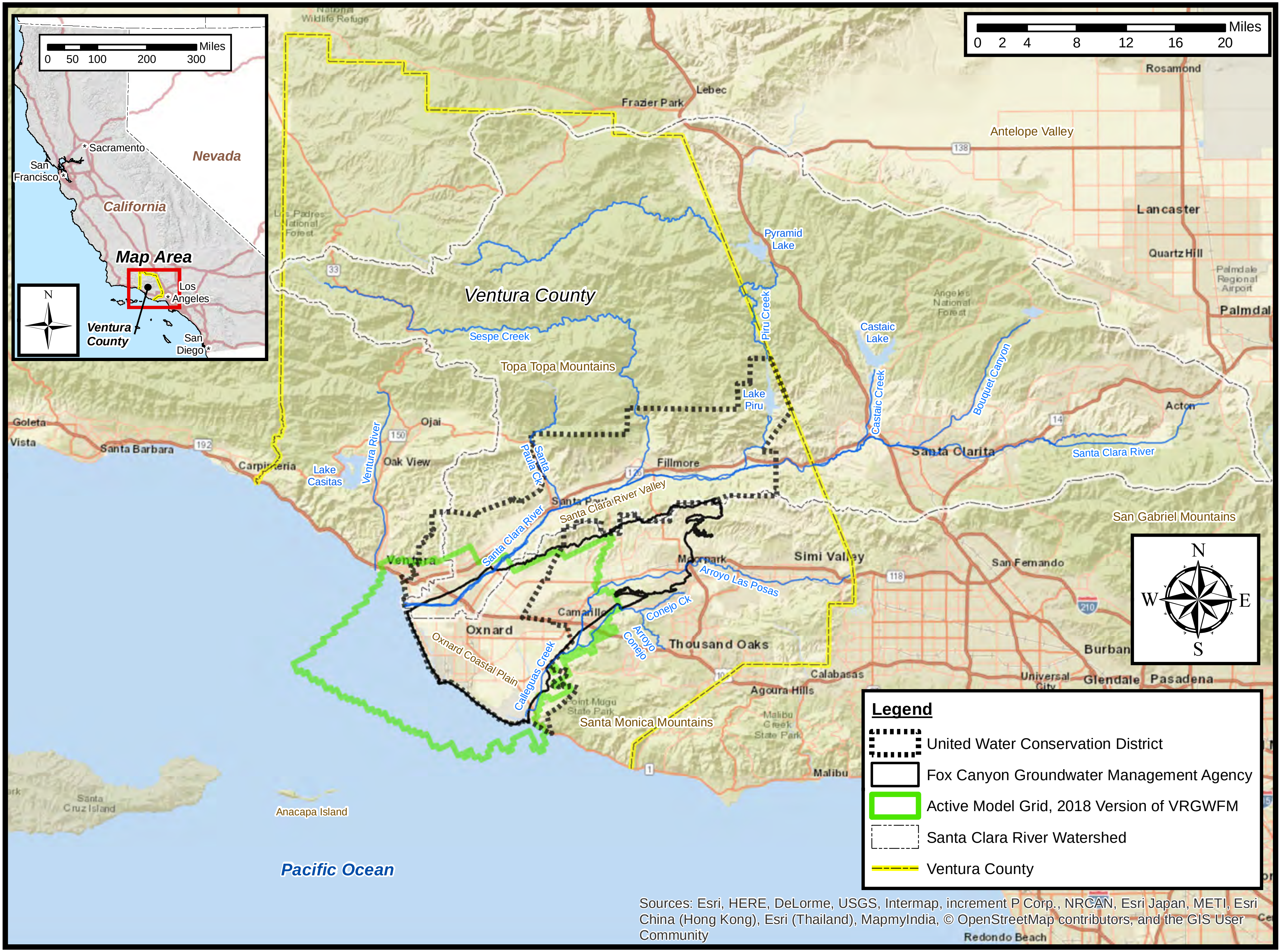


Figure 1-1. Location Map

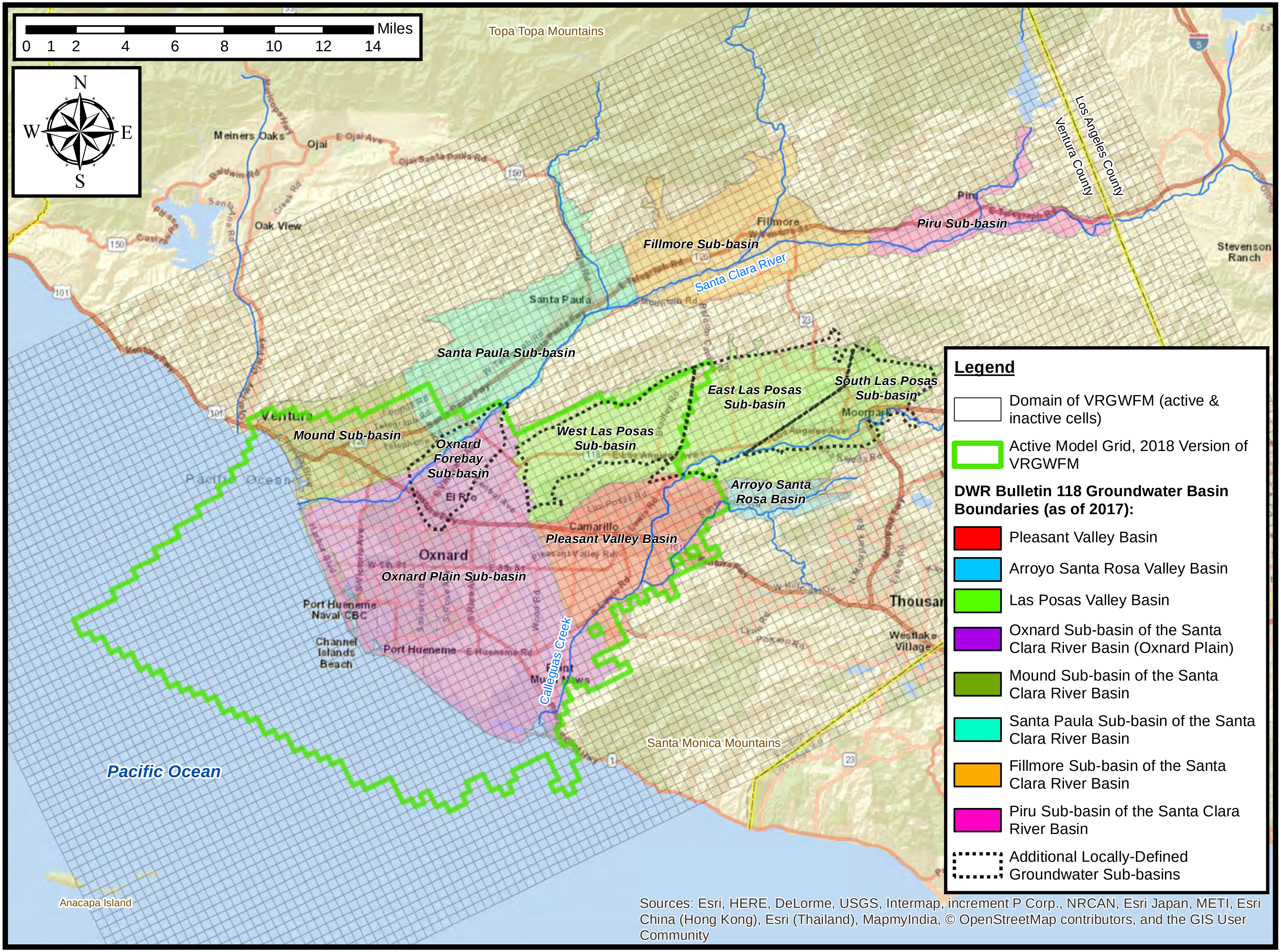


Figure 1-2. Ventura Regional Groundwater Flow Model (VRGWFM) Domain

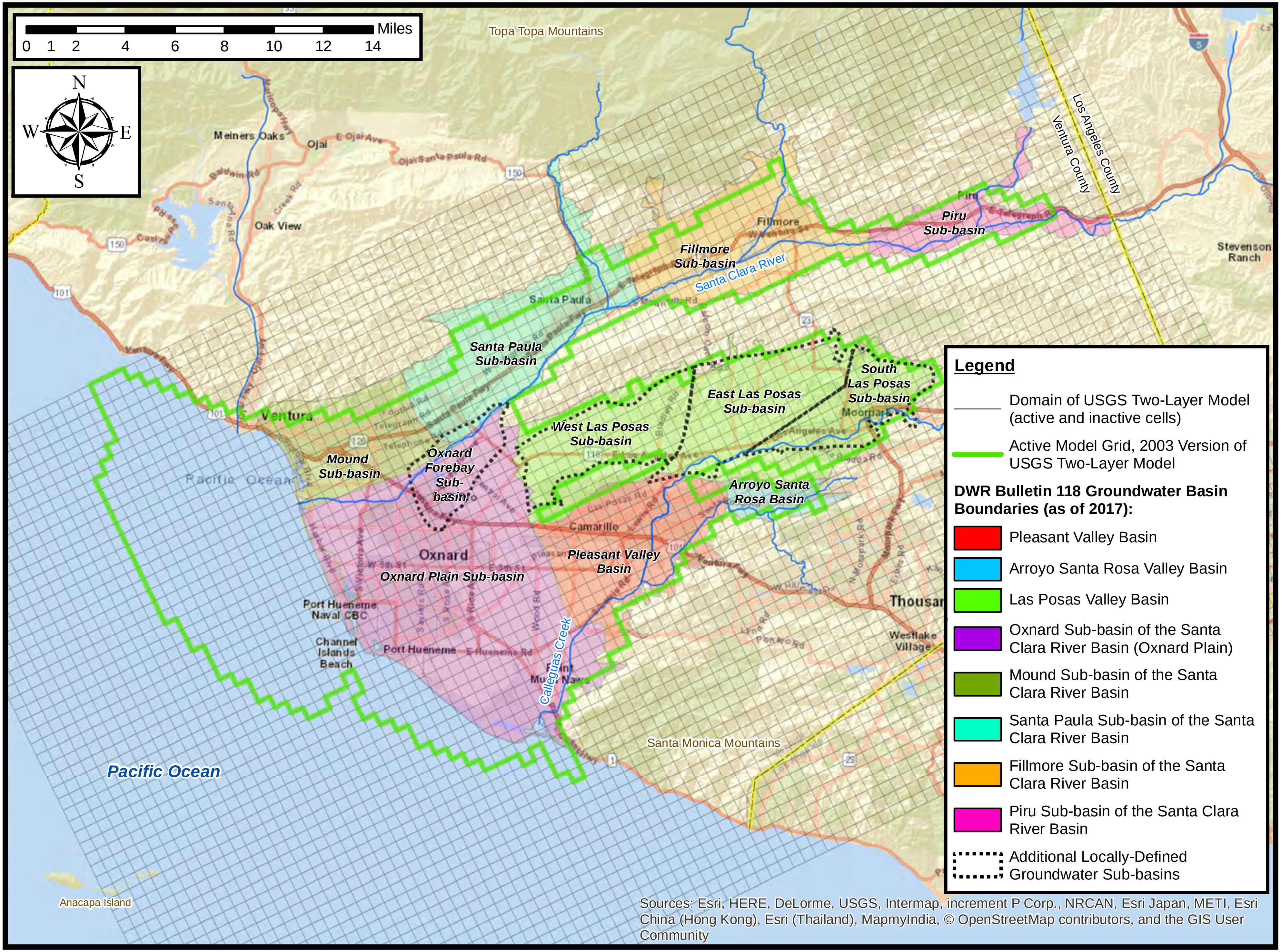


Figure 1-3. USGS Model Domain

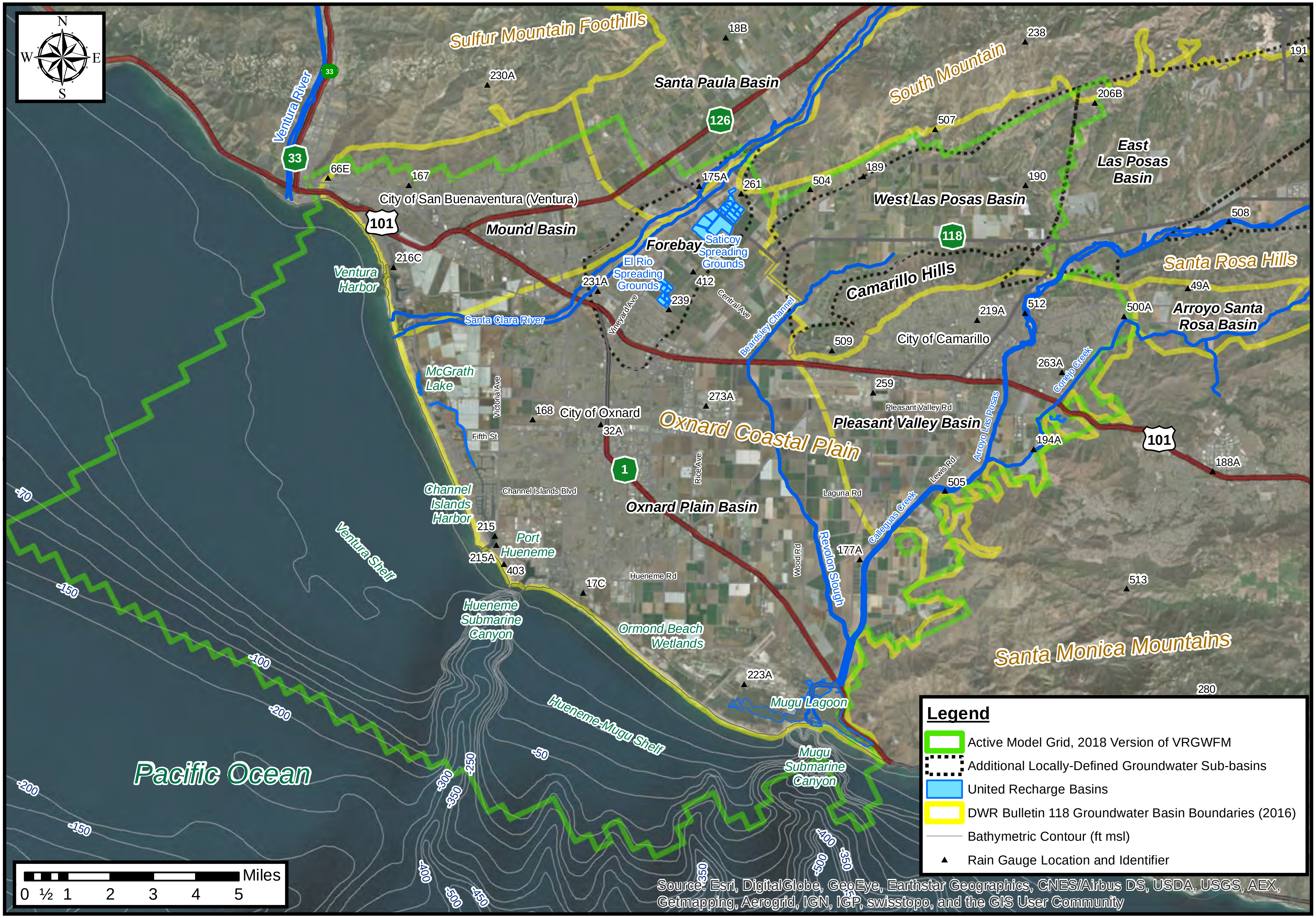


Figure 2-1. Study Area

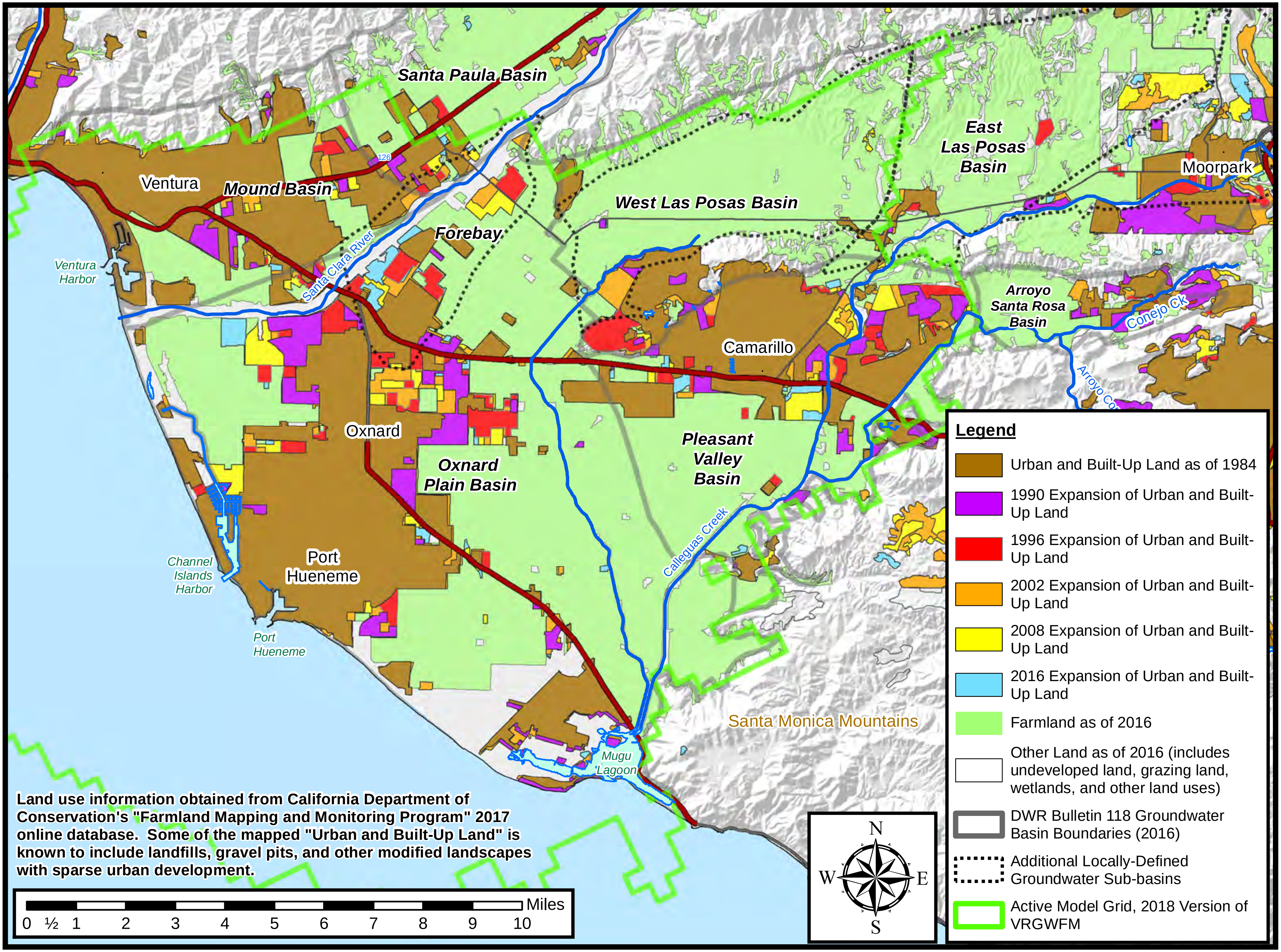


Figure 2-2. Land Use in Study Area

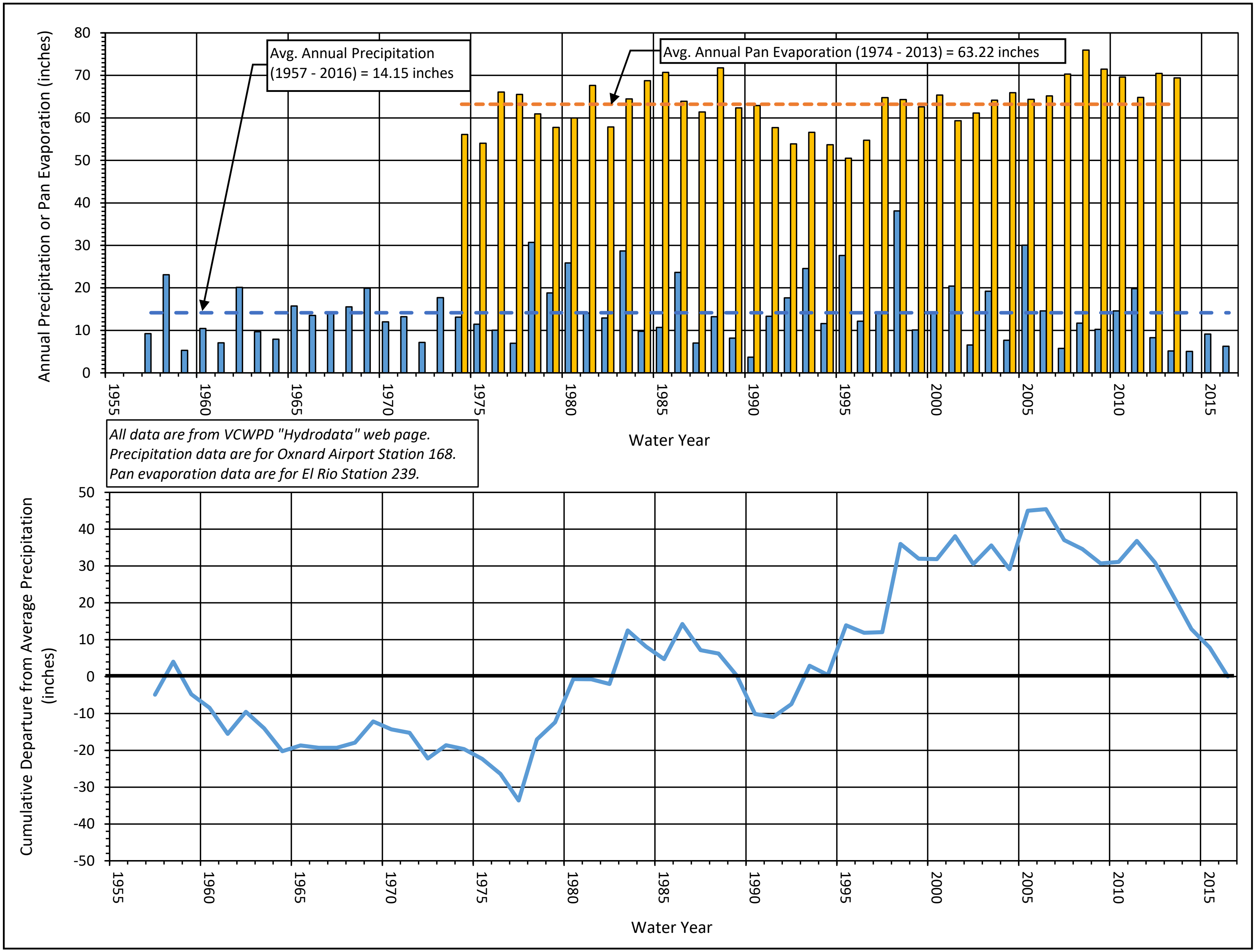


Figure 2-3. Annual Precipitation and Evaporation at Selected Locations in Study Area

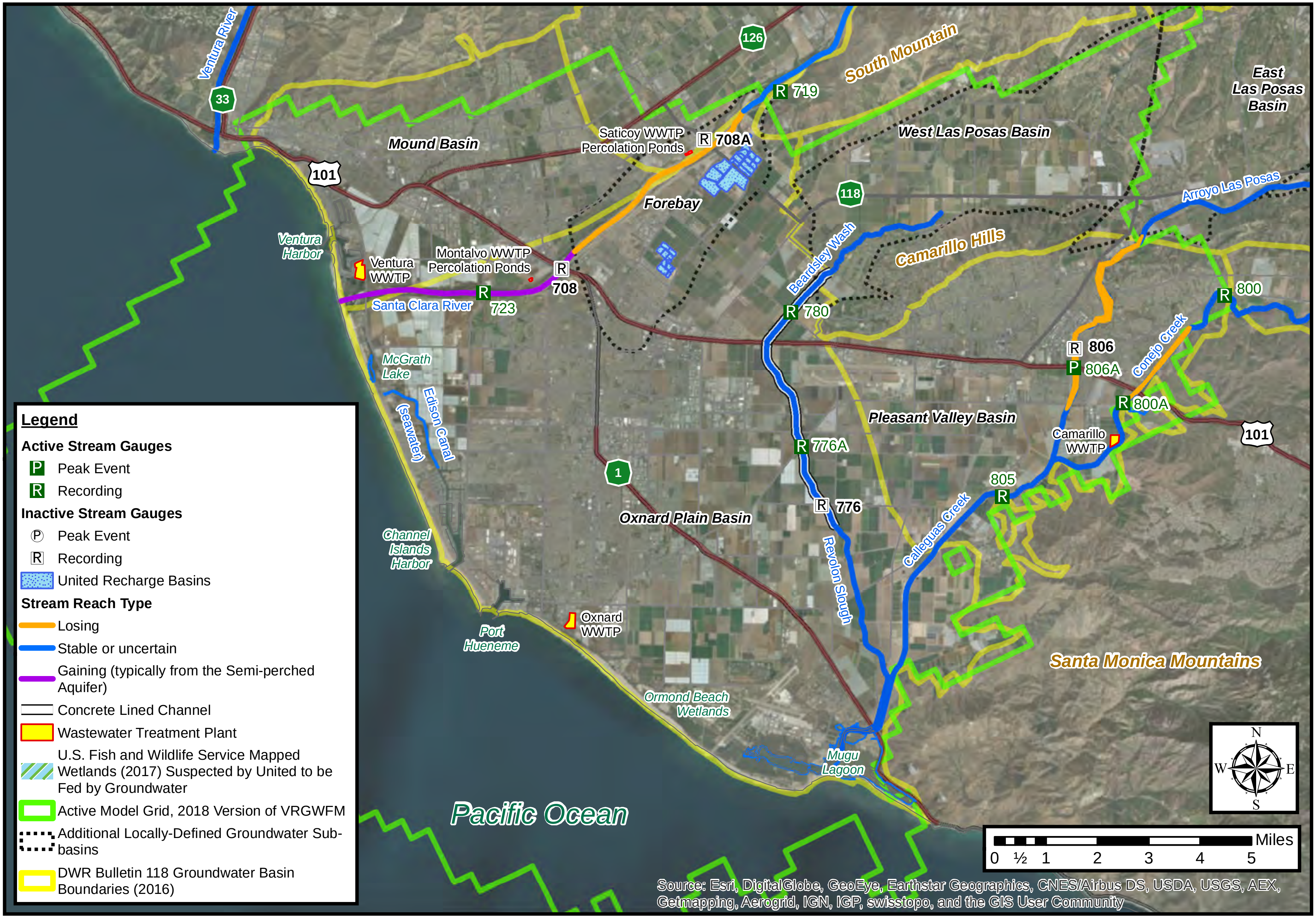


Figure 2-4. Surface Water Bodies in Study Area

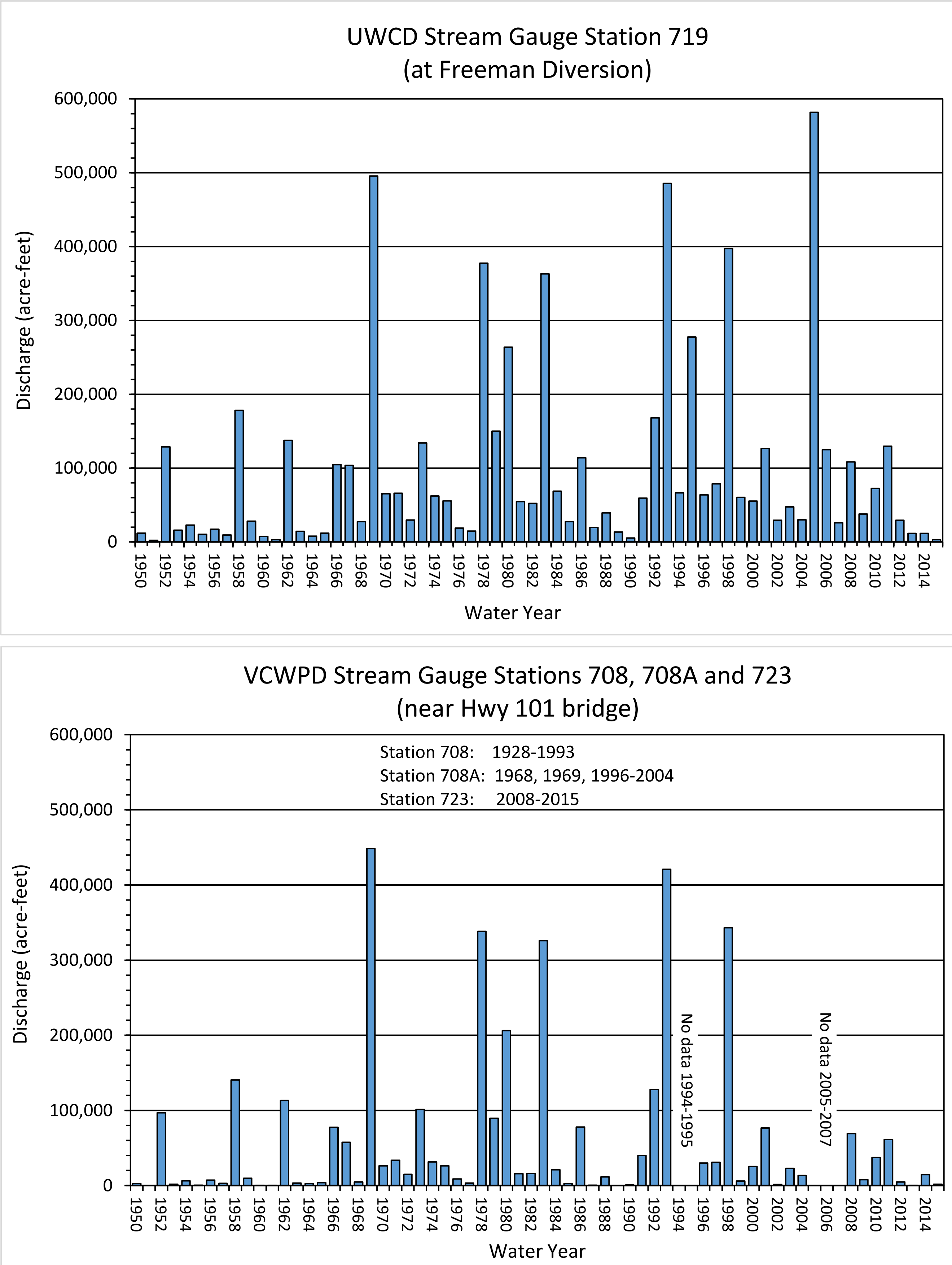
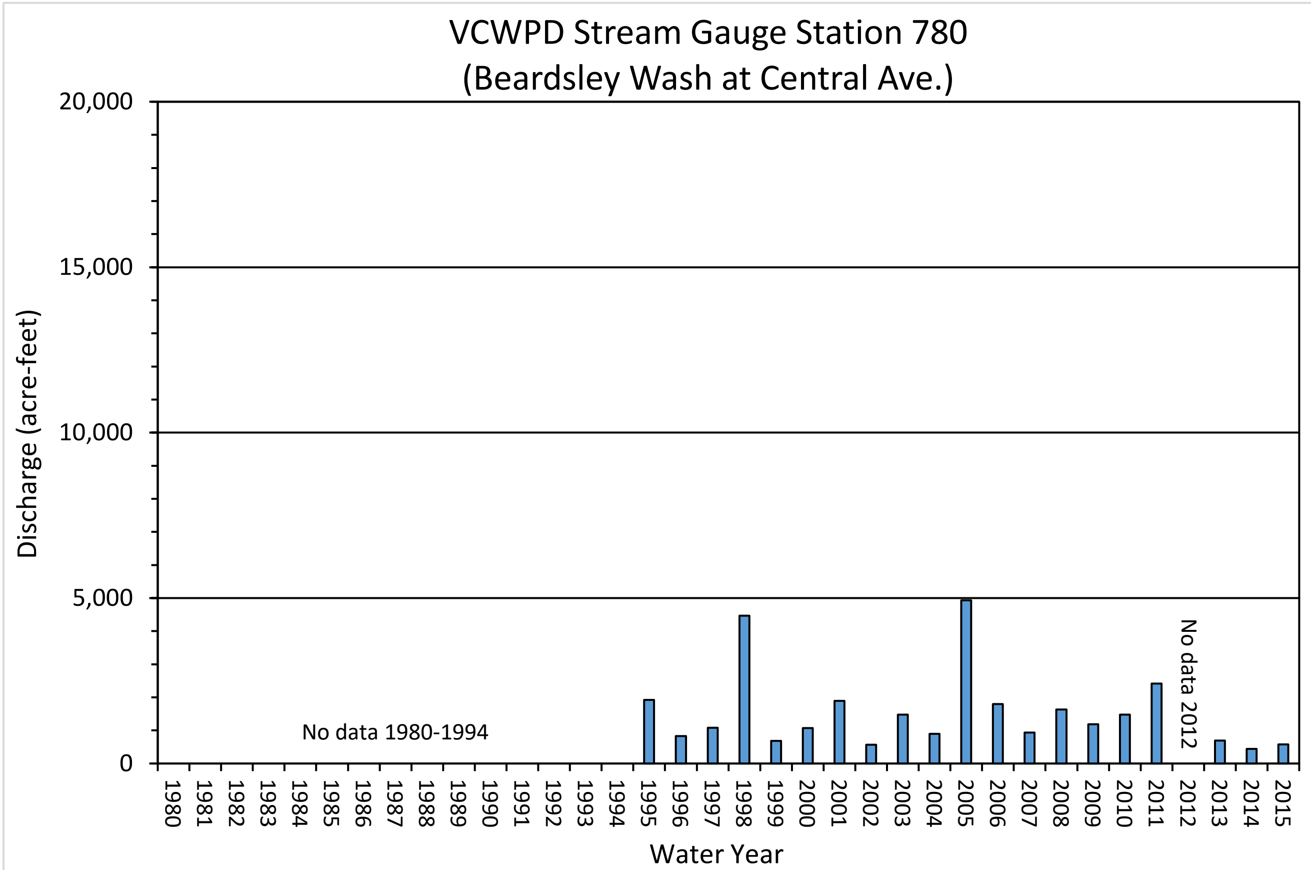


Figure 2-5. Annual Discharge in Santa Clara River



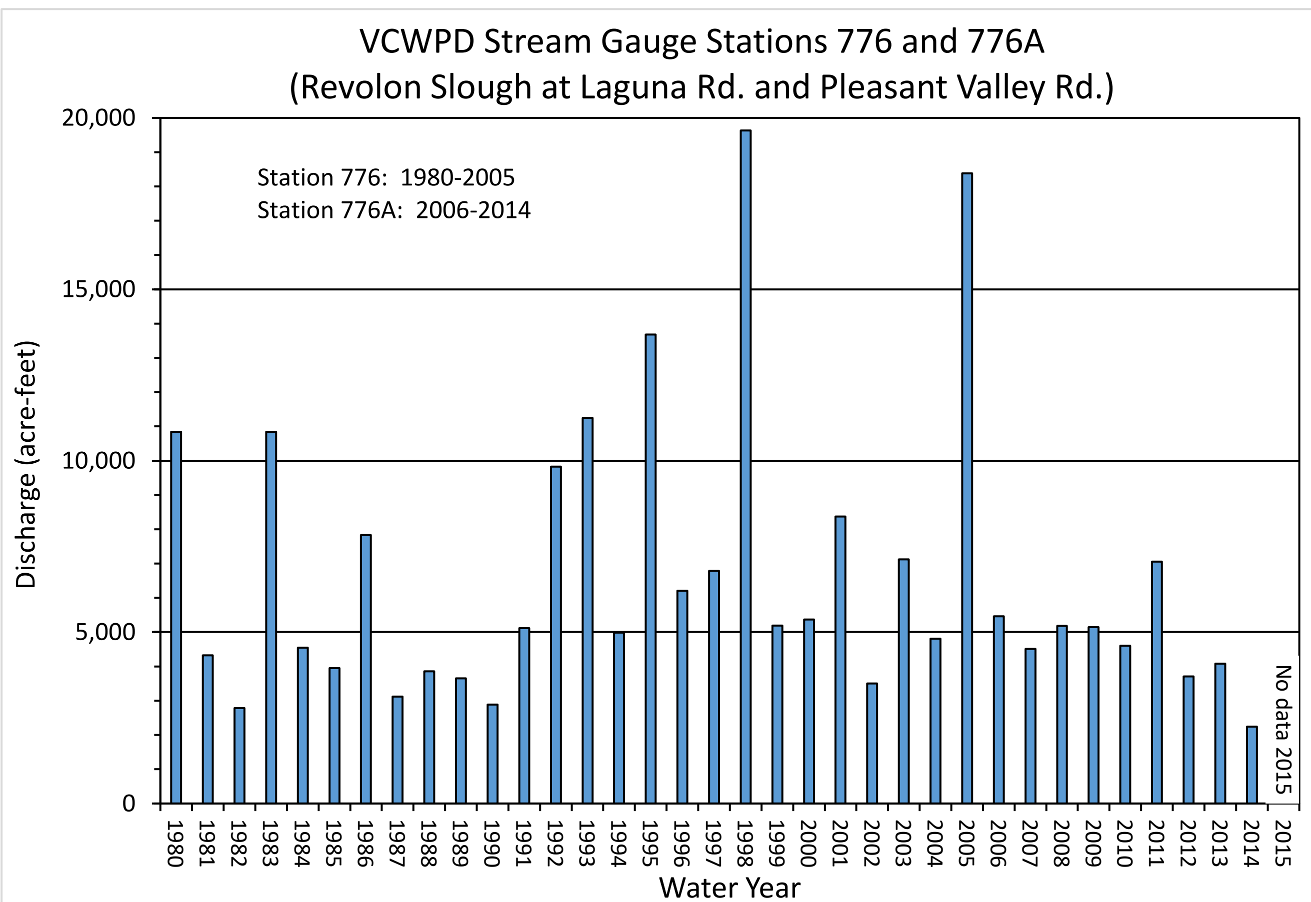


Figure 2-6. Annual Discharge in Revolon Slough/Beardsley Wash

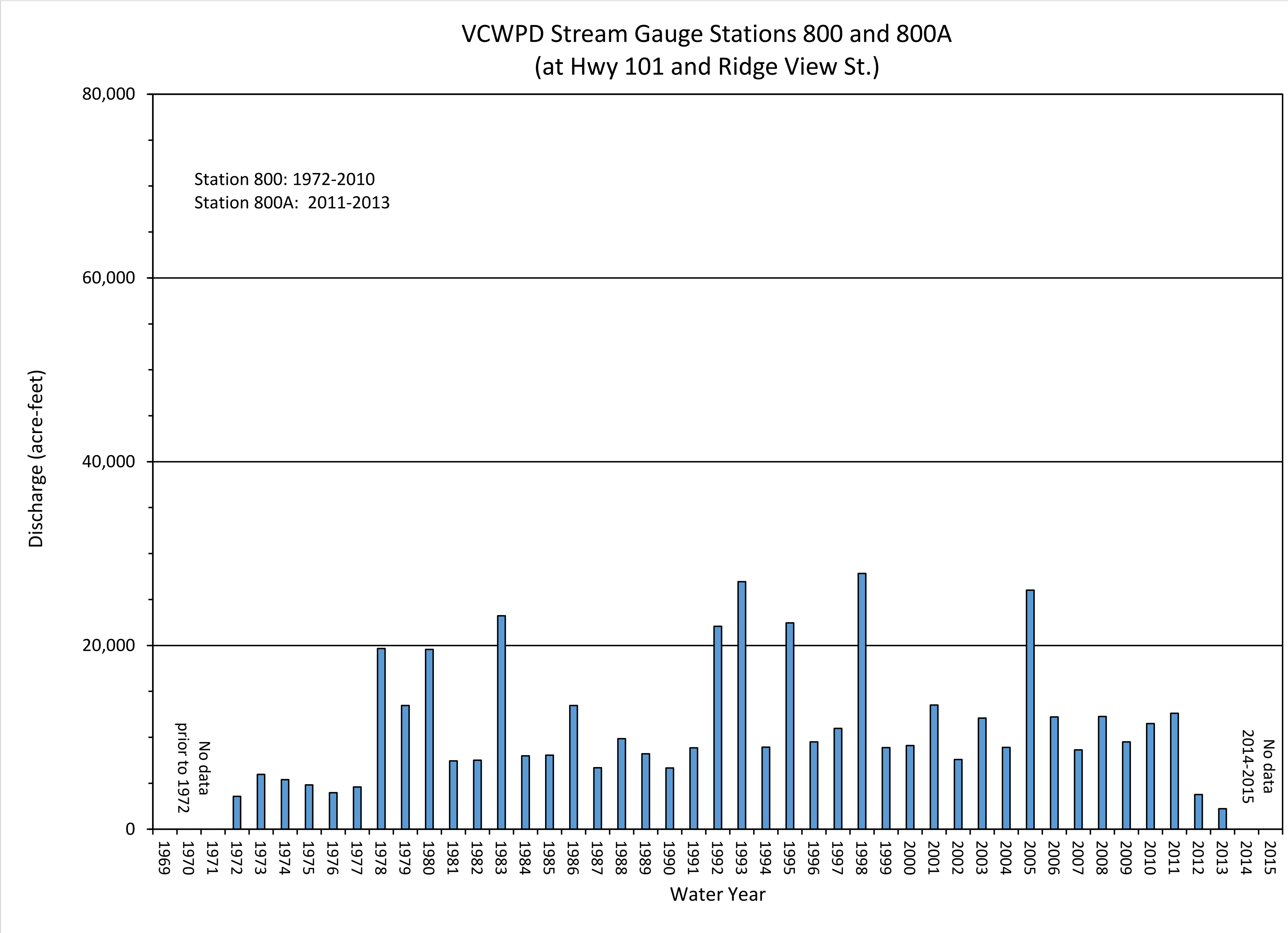


Figure 2-7. Annual Discharge in Conejo Creek

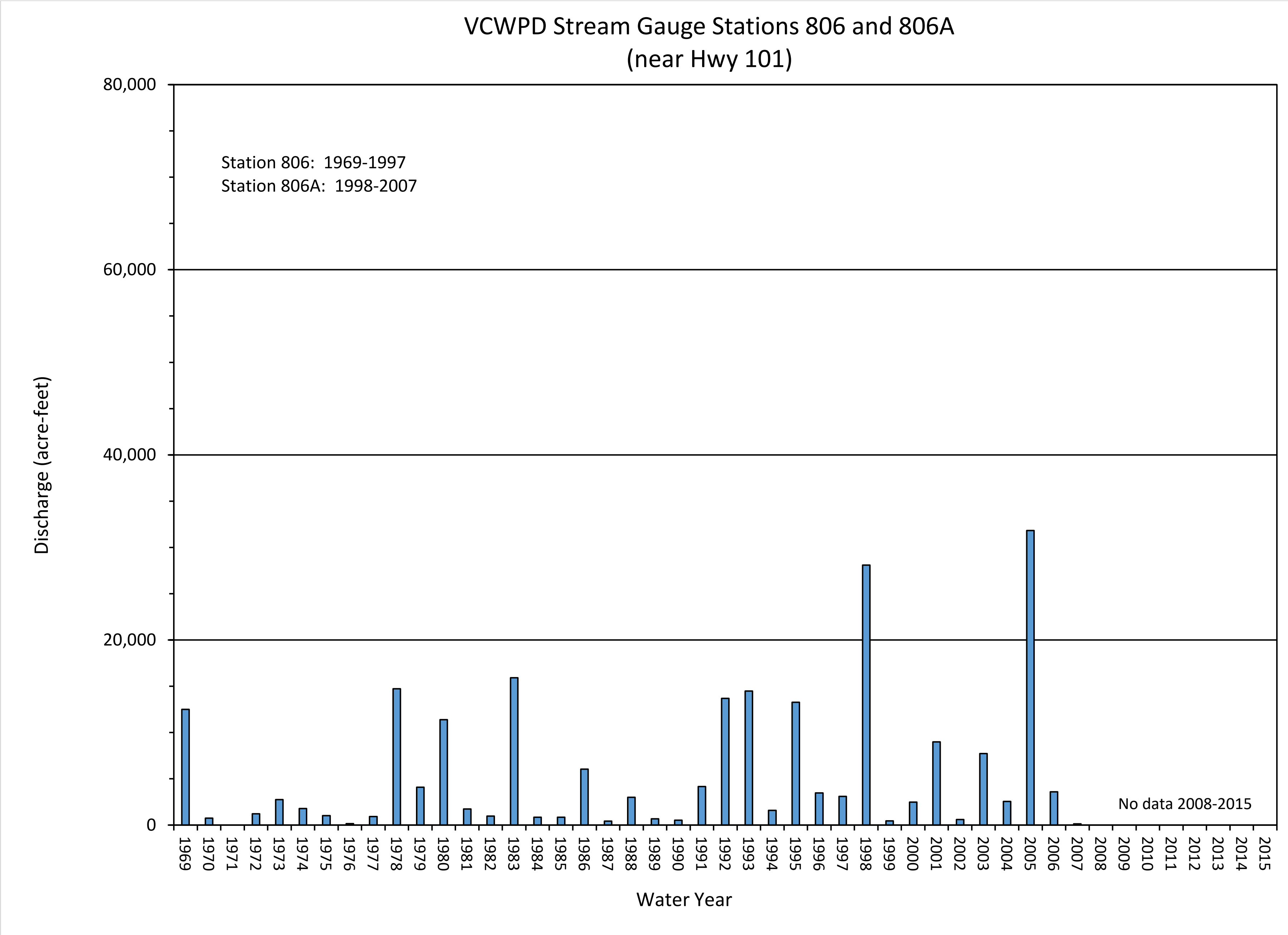


Figure 2-8. Annual Discharge in Arroyo Las Posas

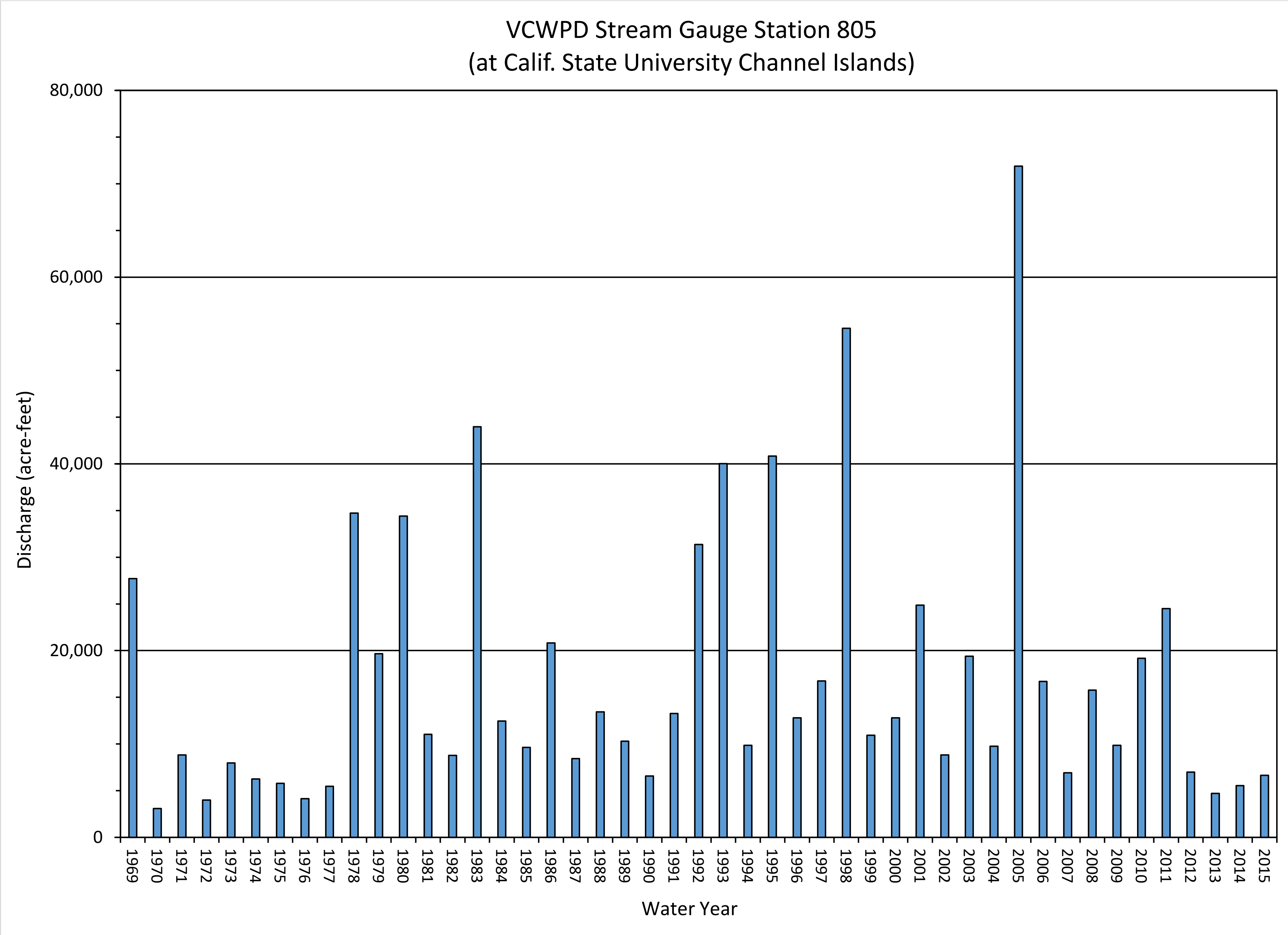


Figure 2-9. Annual Discharge in Calleguas Creek

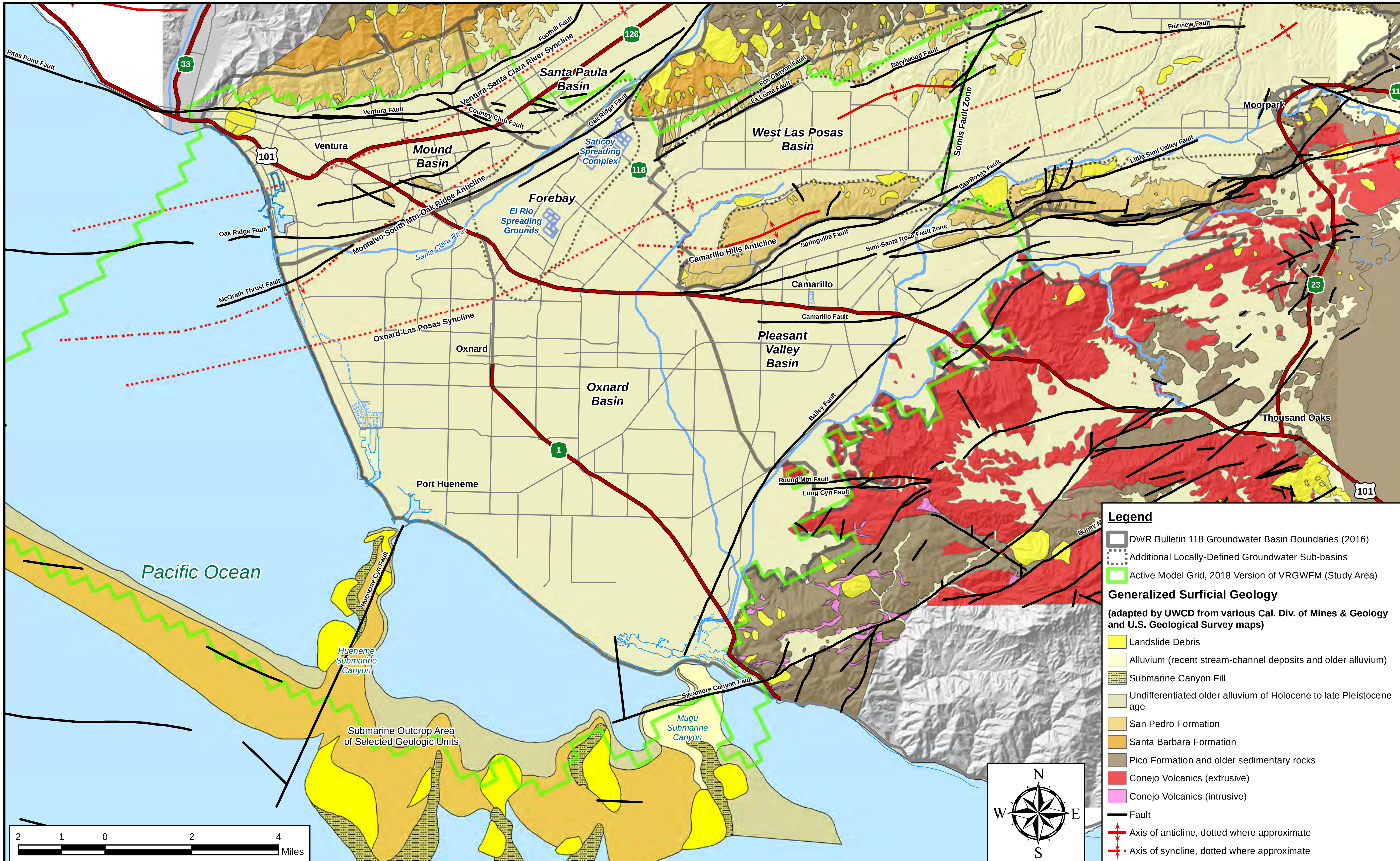
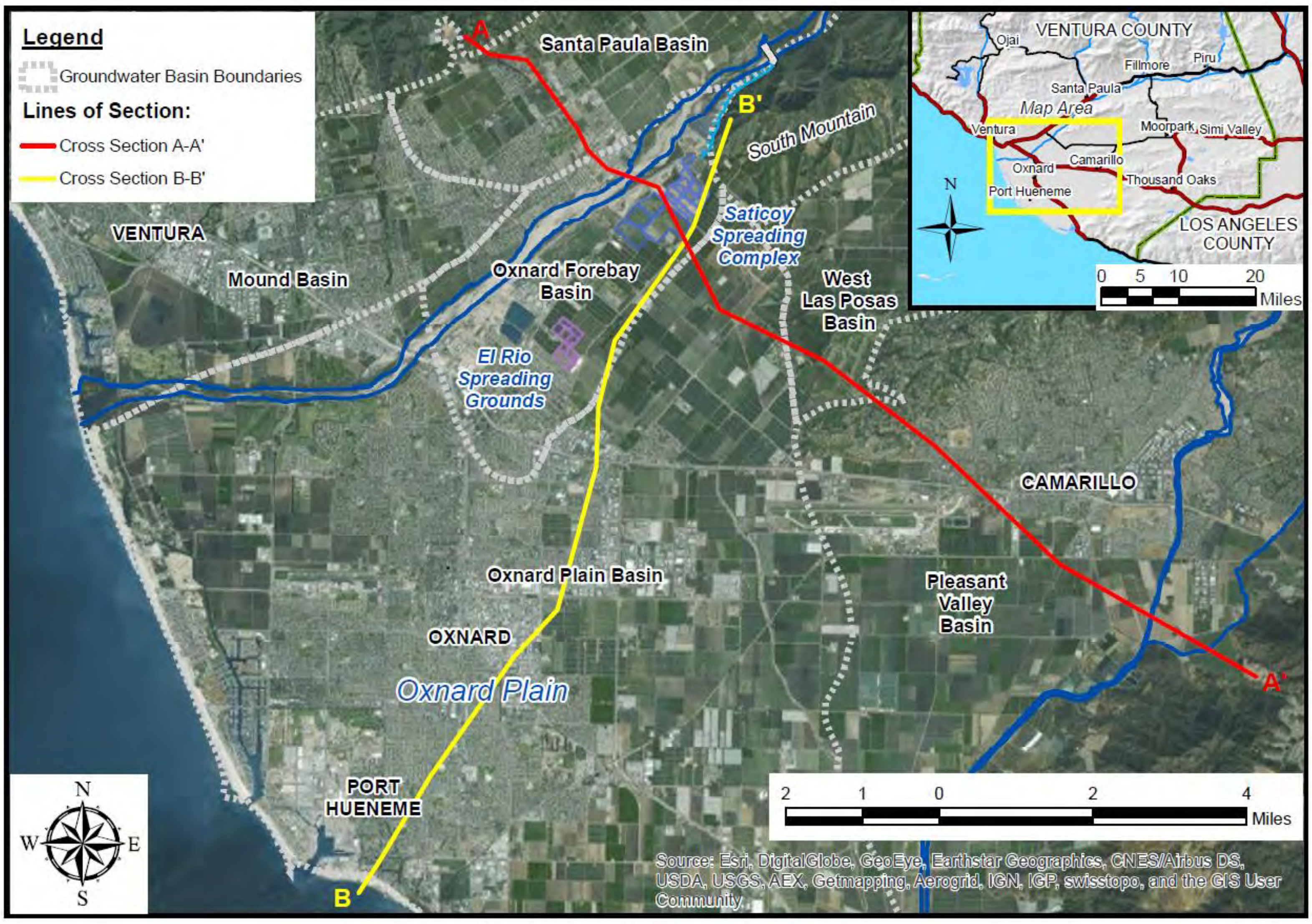
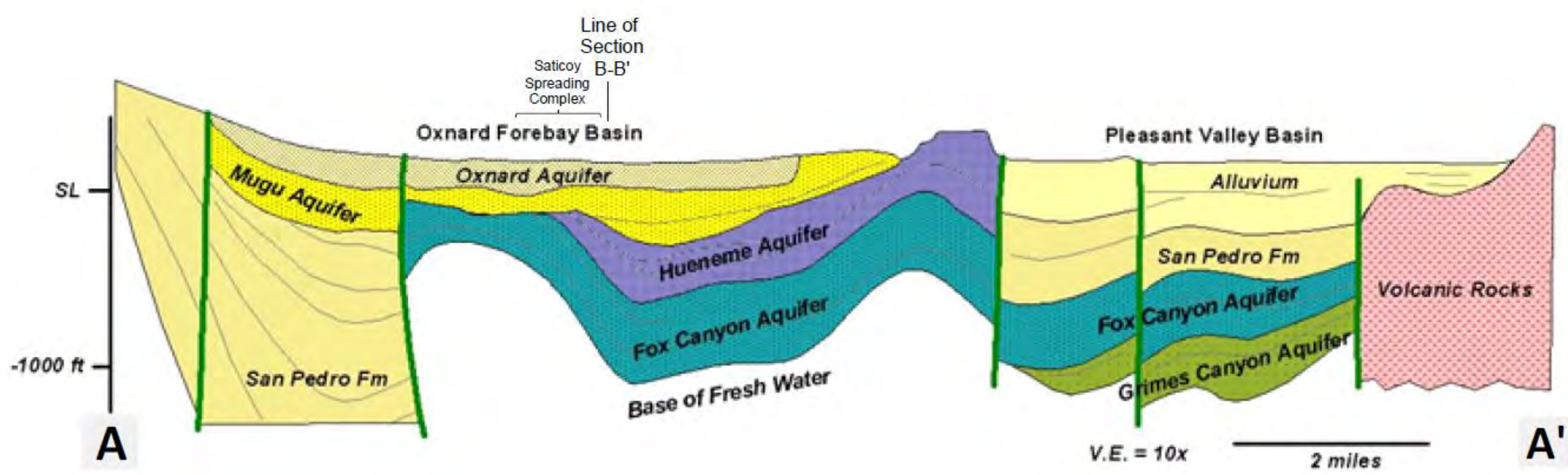


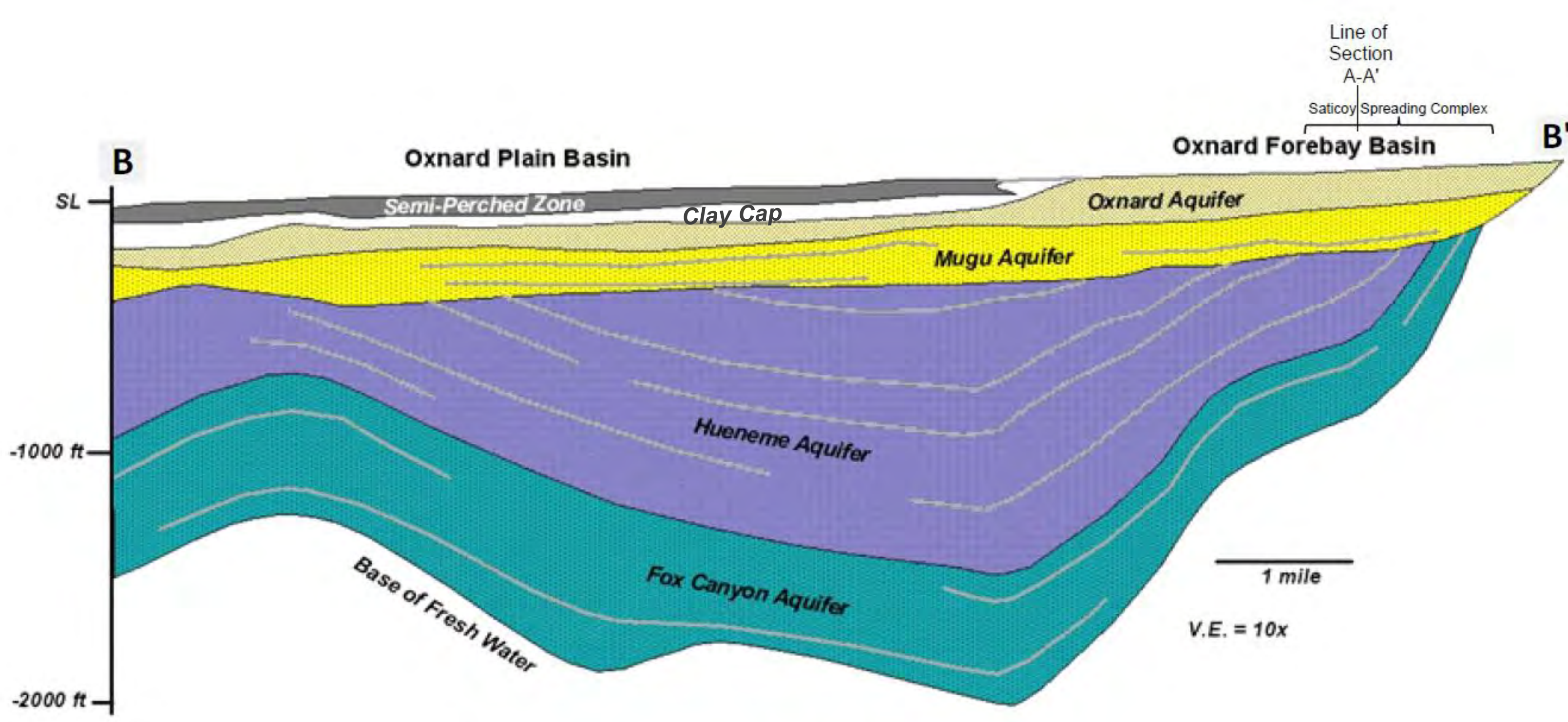
Figure 2-10. Regional Surface Geology



Cross-Section Locations



Cross-Section A-A'



Cross-Section B-B'

(Adapted from Mukae and Turner, 1975, cross-sections B-B' and C-C')

Figure 2-11. Conceptual Cross Sections A-A' and B-B'

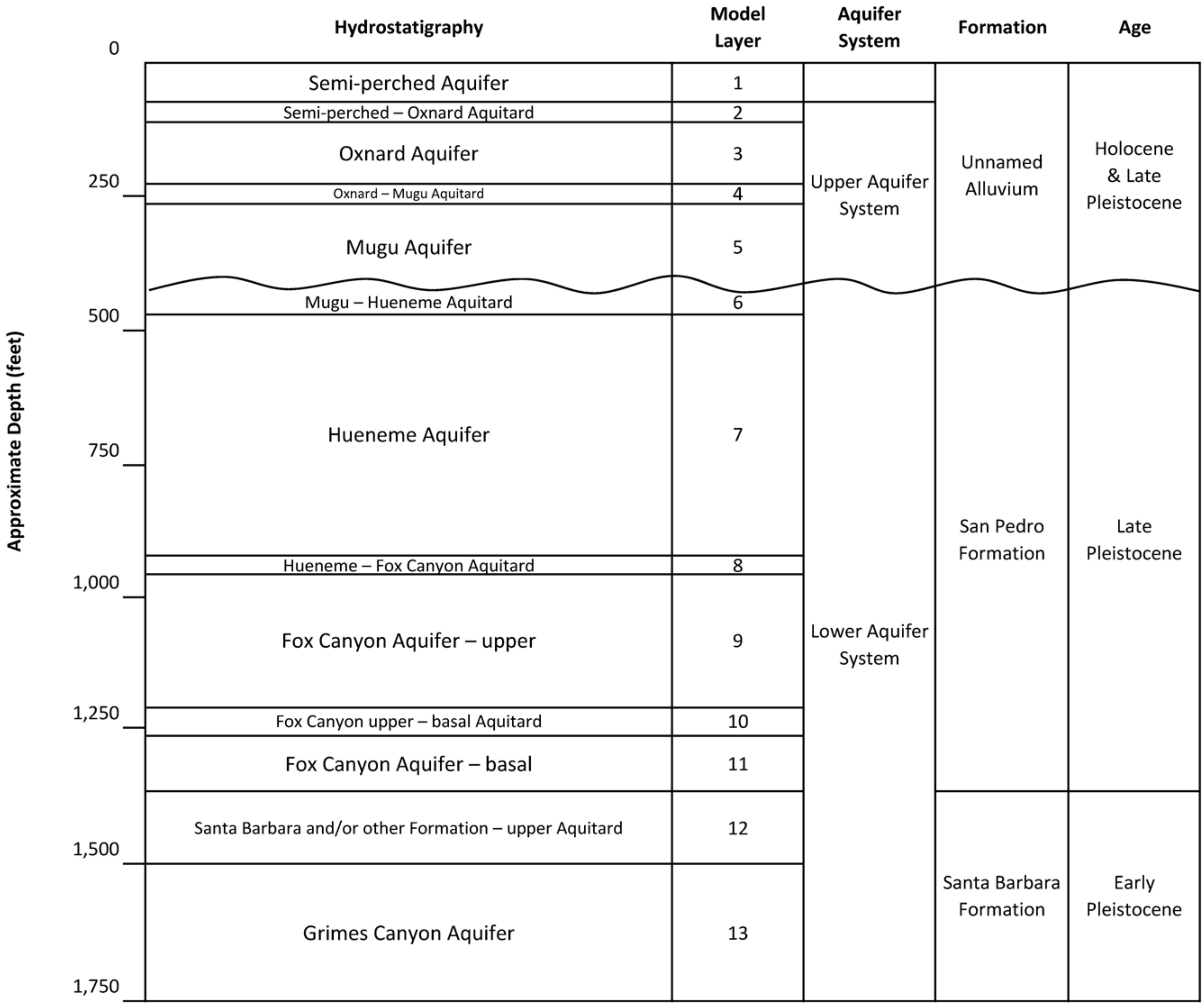


Figure 2-12. Major Hydrostratigraphic Units in Study Area

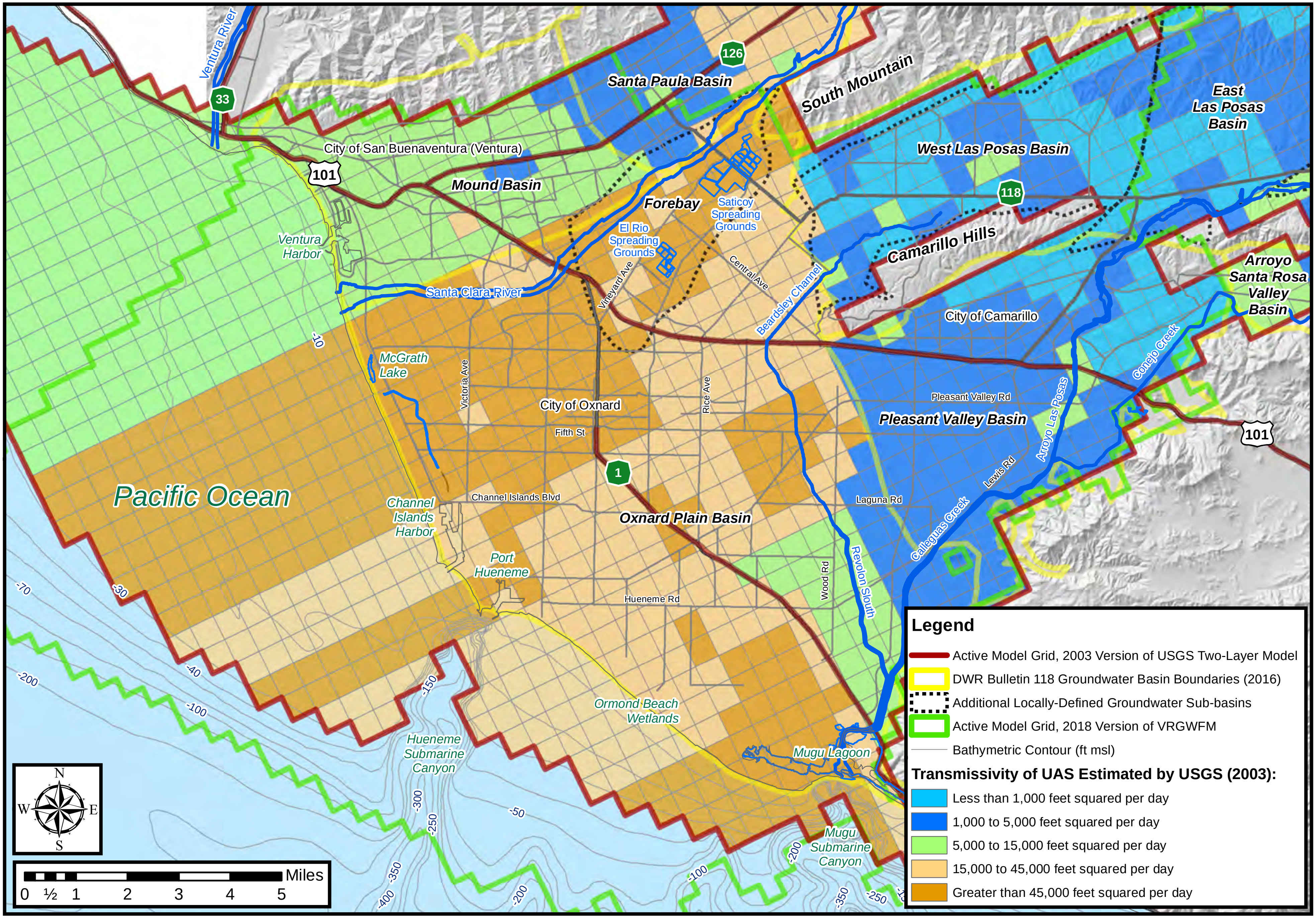


Figure 2-13. Transmissivity Estimated by the USGS for the Upper Aquifer System

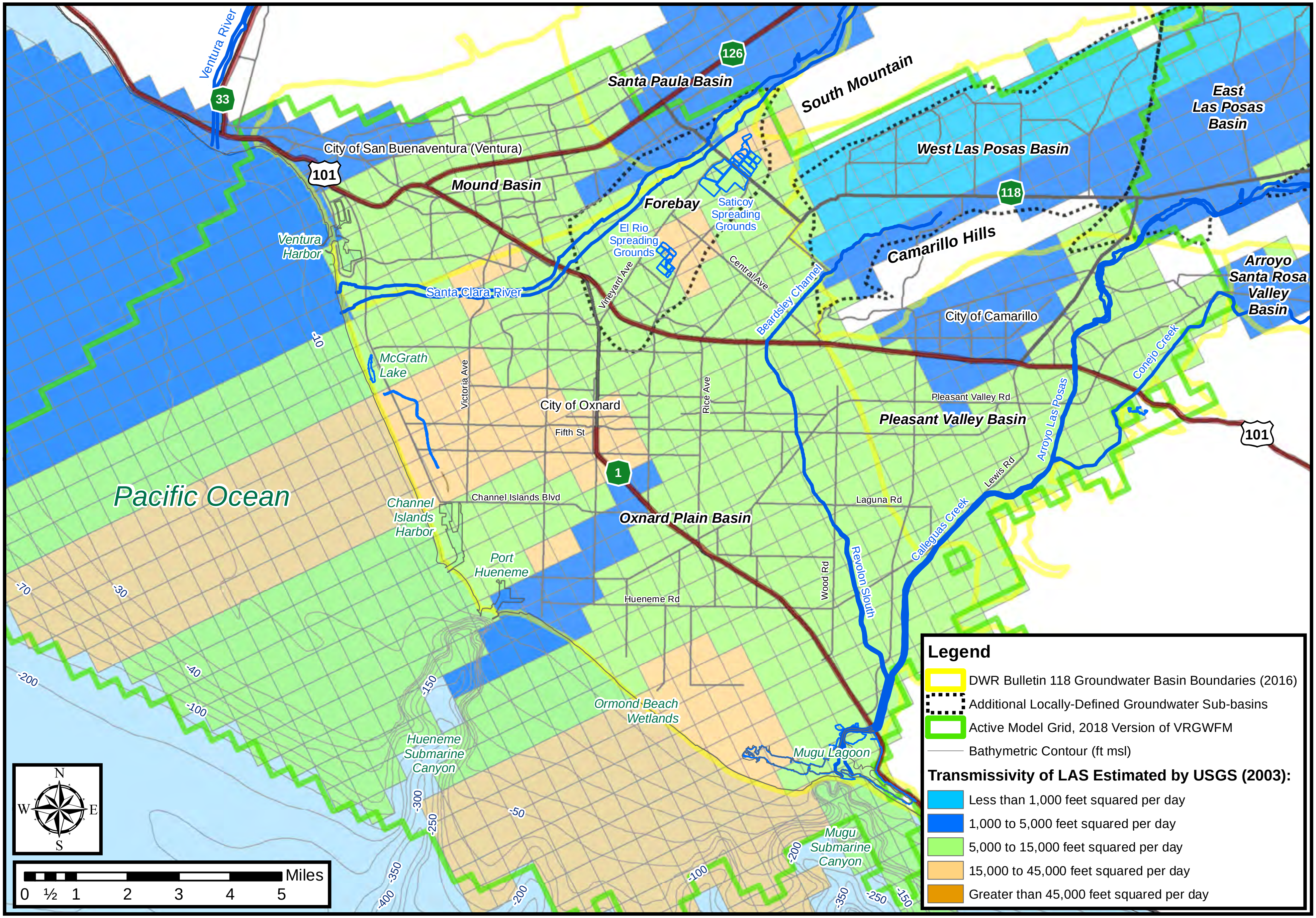


Figure 2-14. Transmissivity Estimated by the USGS for the Lower Aquifer System

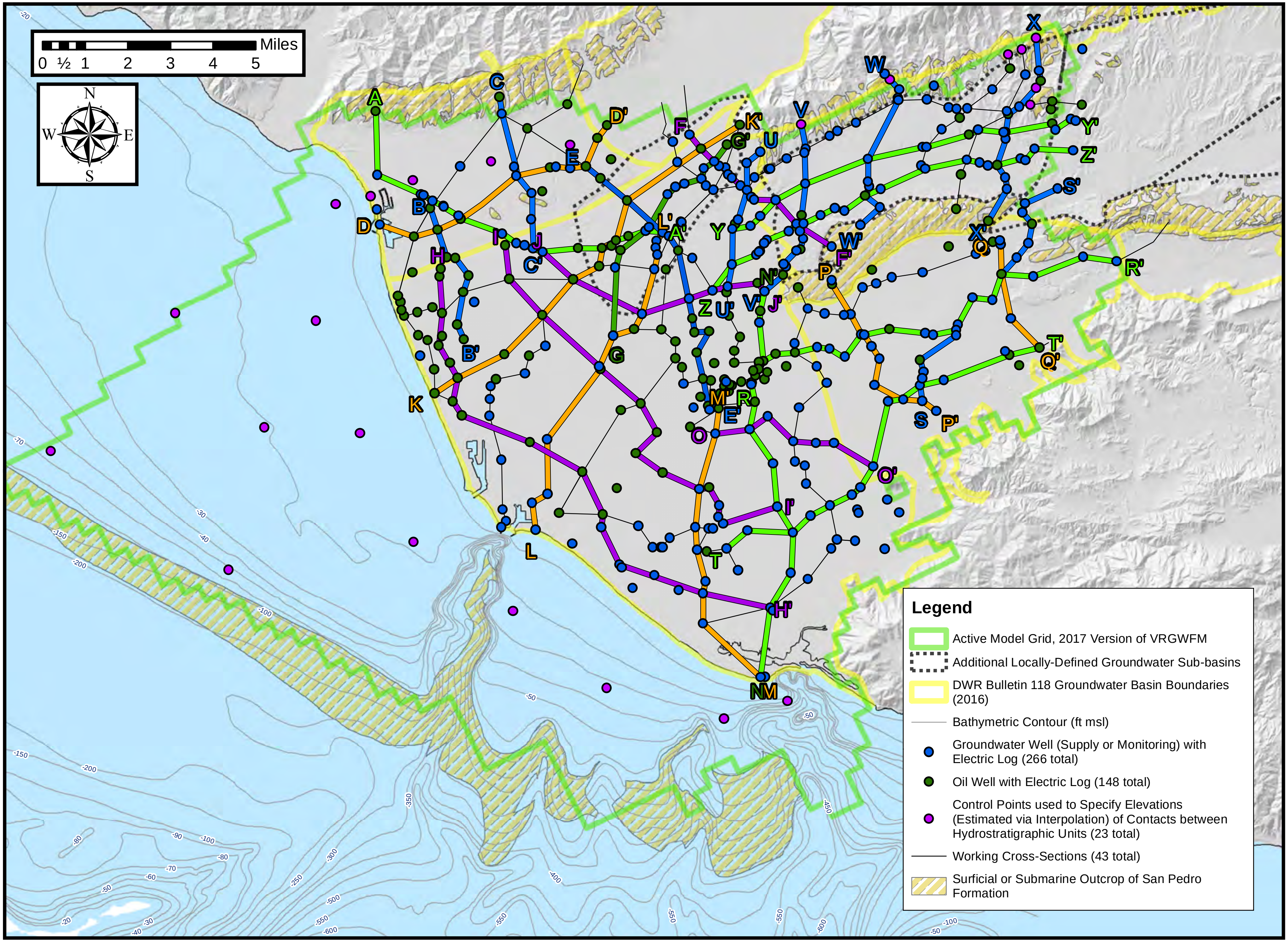


Figure 2-15. Locations of Boring Logs and Cross Sections Used to Update Hydrostratigraphic Conceptual Model

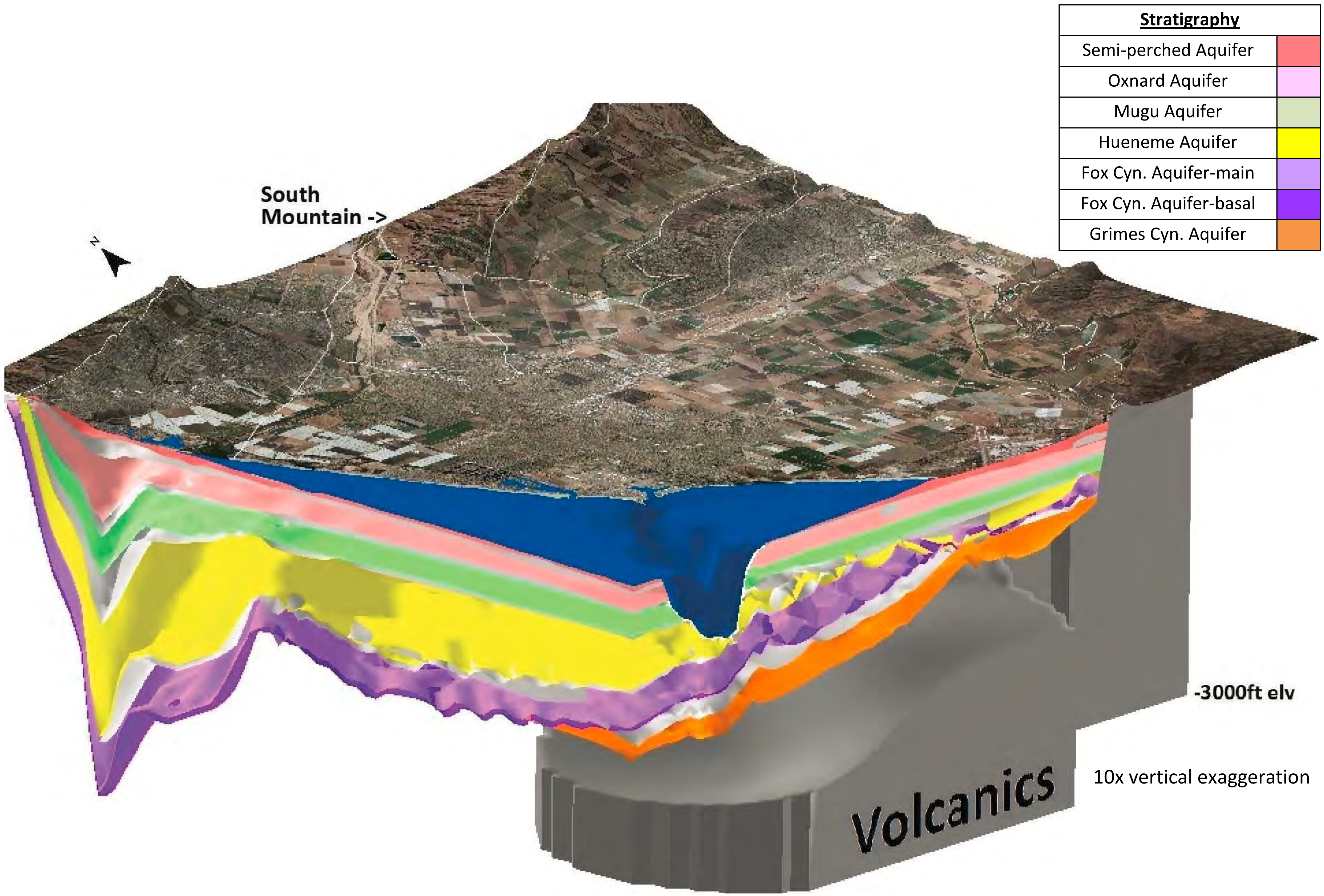


Figure 2-16. Three-Dimensional Representation of Updated Hydrostratigraphic Conceptual Model

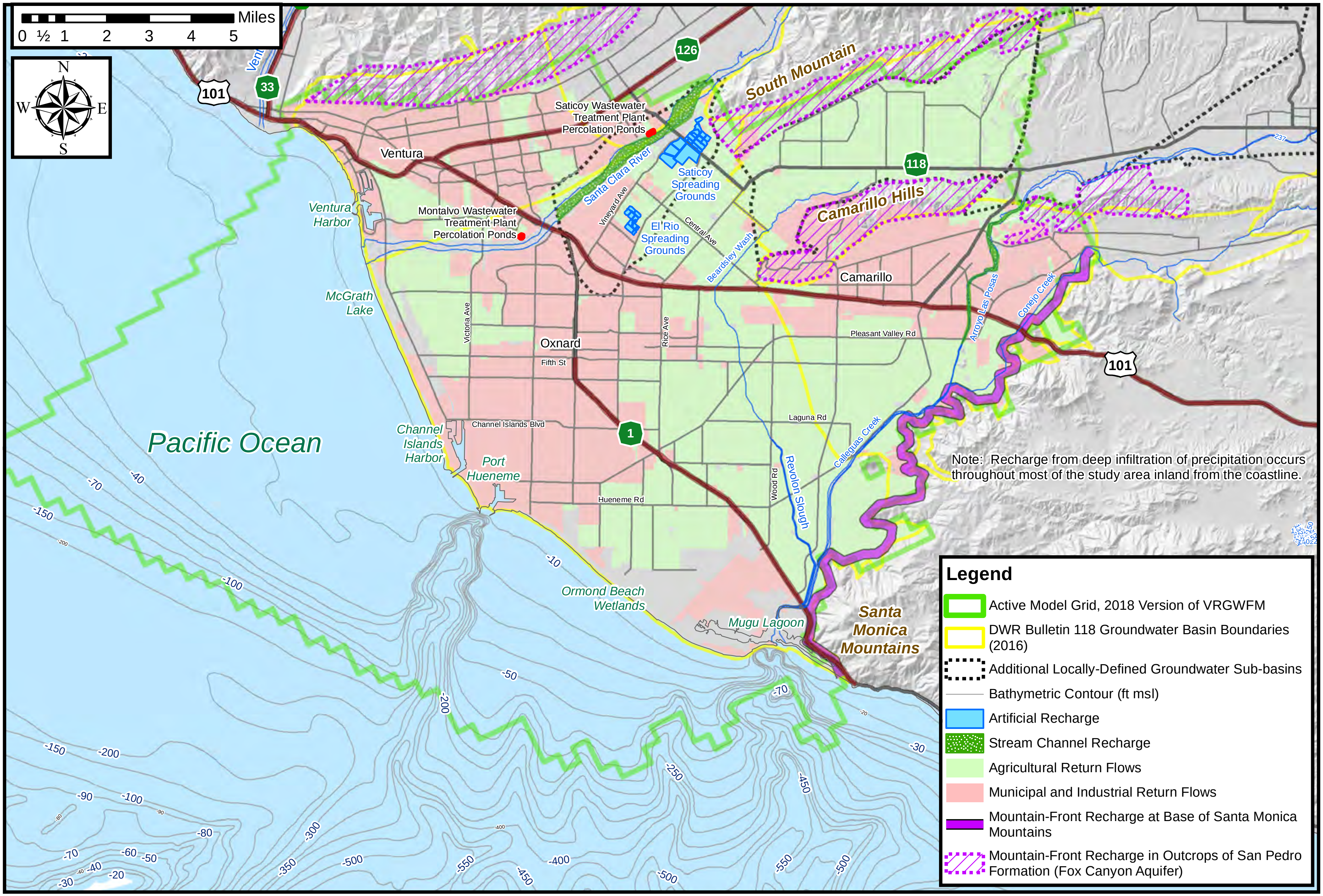


Figure 2-17. Areas of Groundwater Recharge in Study Area

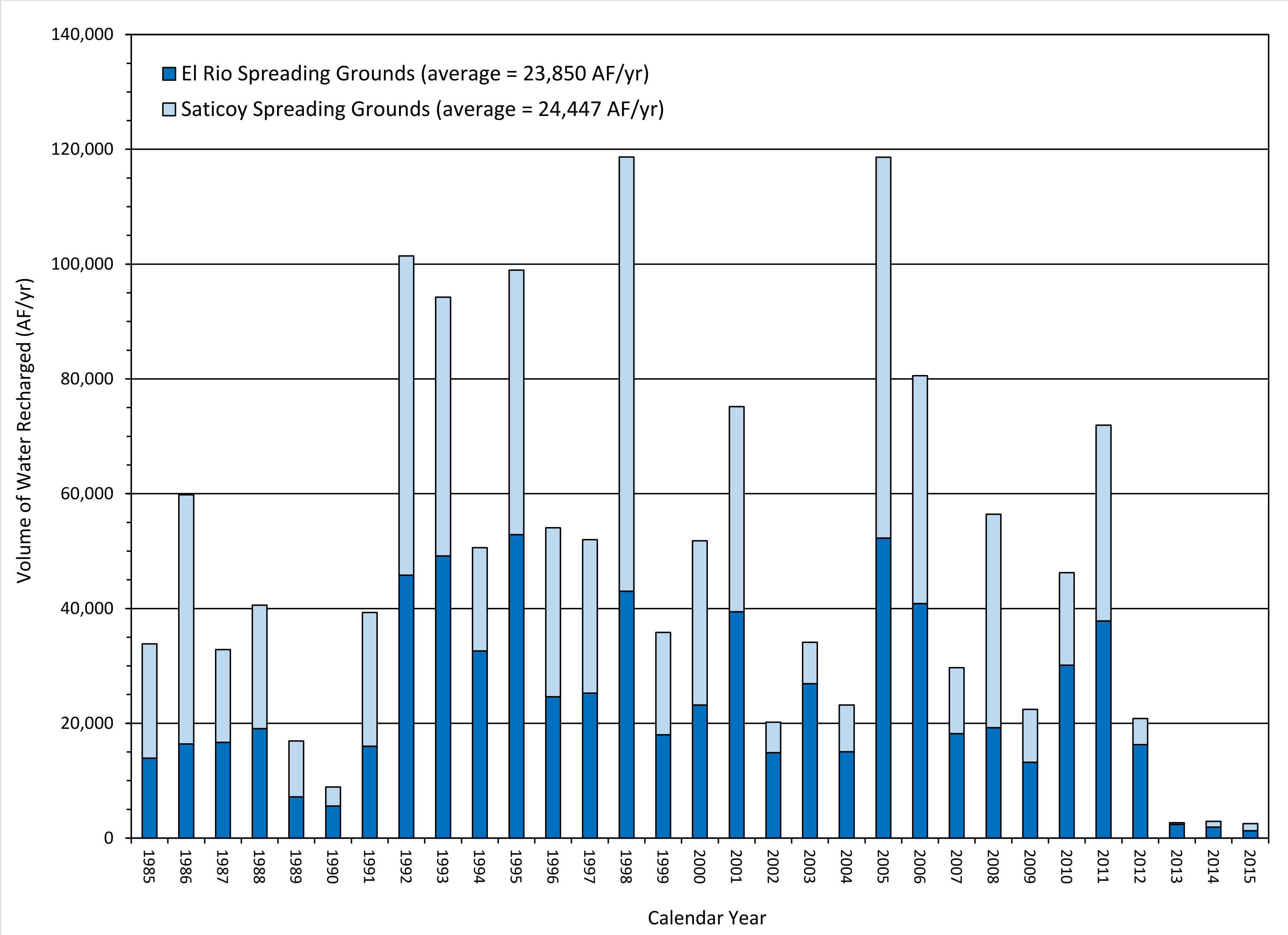
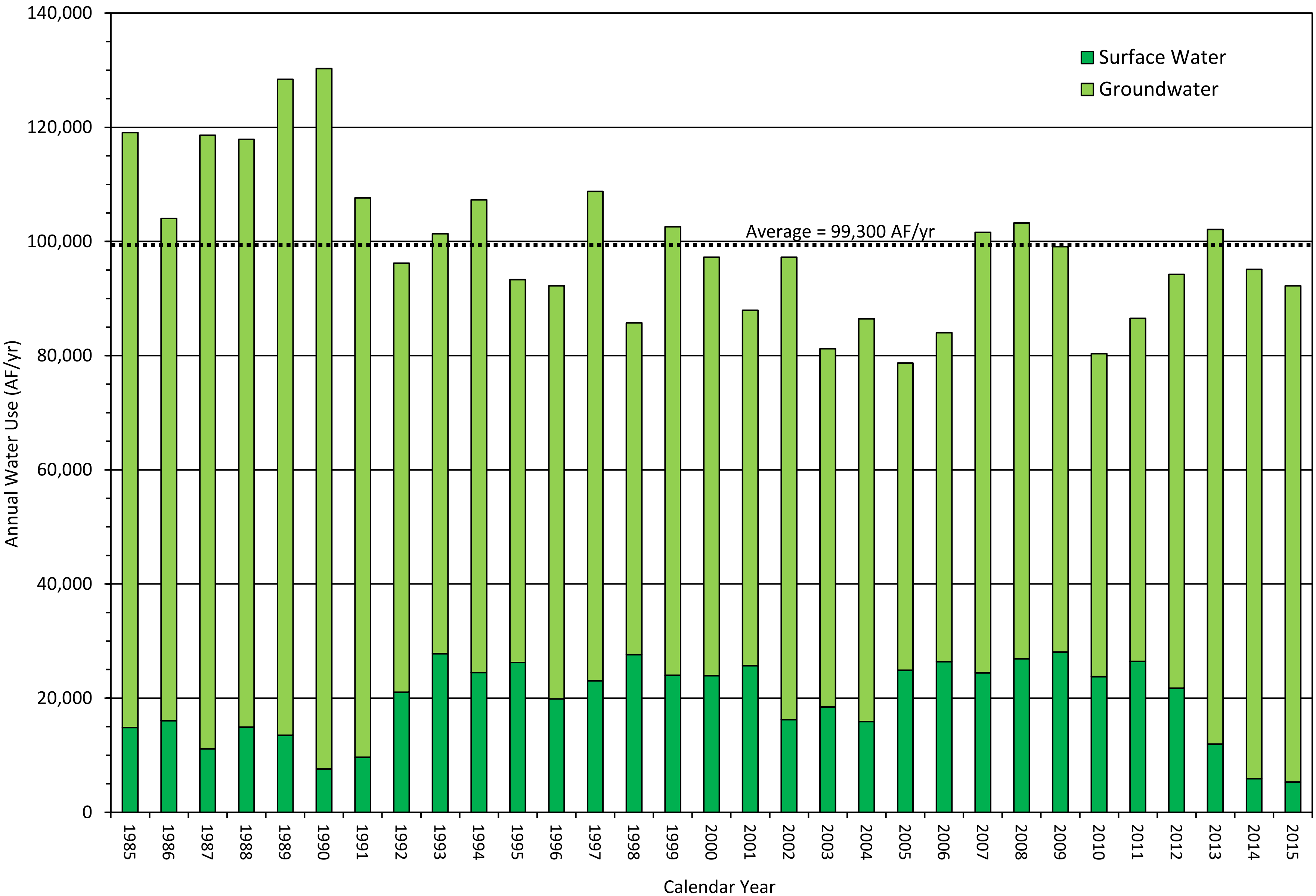


Figure 2-18. Annual Volumes of Water Recharged at United's Spreading Grounds



Note: The volumes of water shown on this graph are those reportedly used in the Mound, Oxnard Plain, Forebay, Pleasant Valley, and West Las Posas basins only. A small, additional volume is also used in portions of the active domain of the VRGWFM that are outside of these basins, and are not shown on this graph.

Figure 2-19. Annual Agricultural Water Use in Study Area

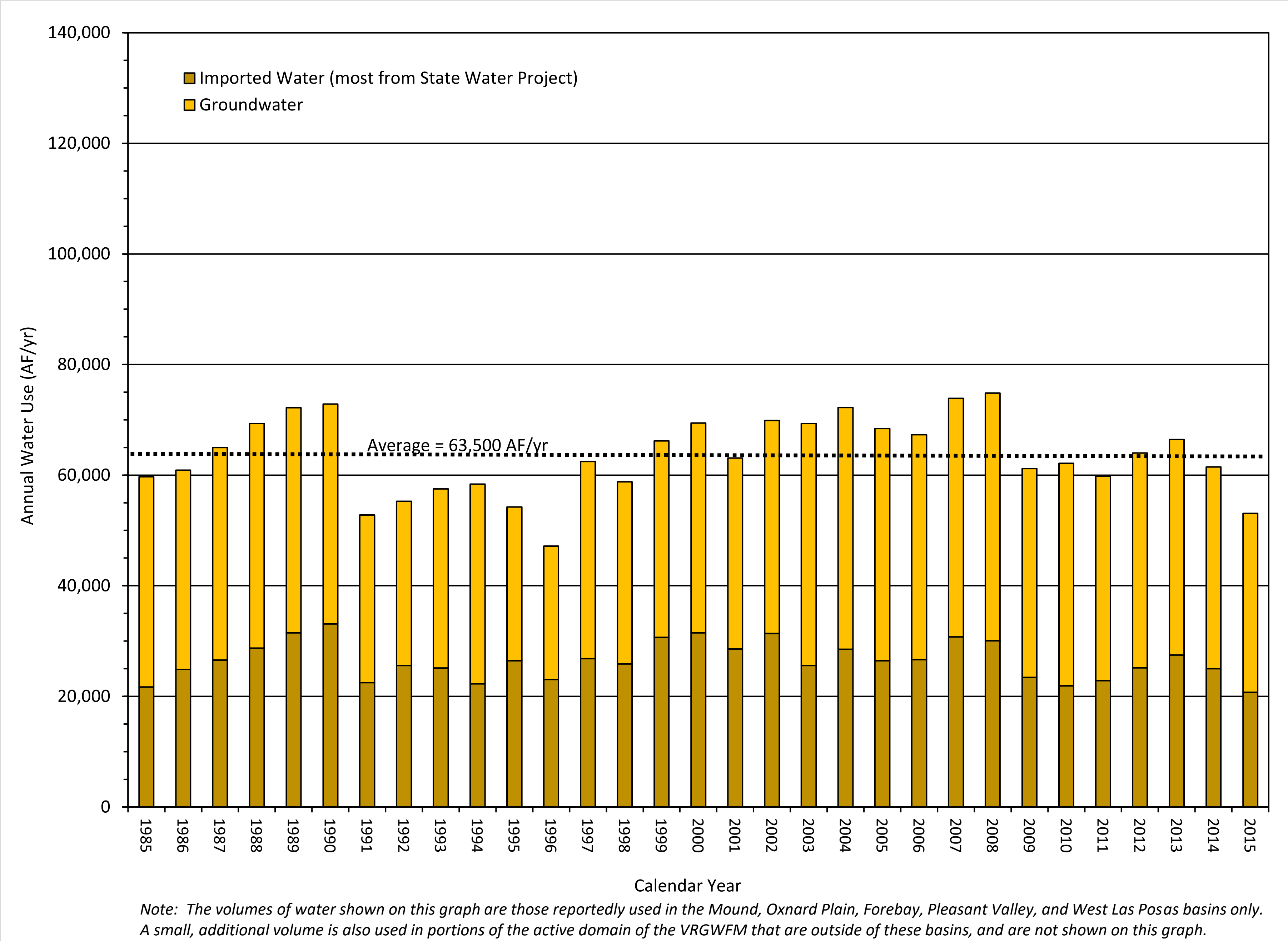


Figure 2-20. Annual Municipal and Industrial Water Use in Study Area

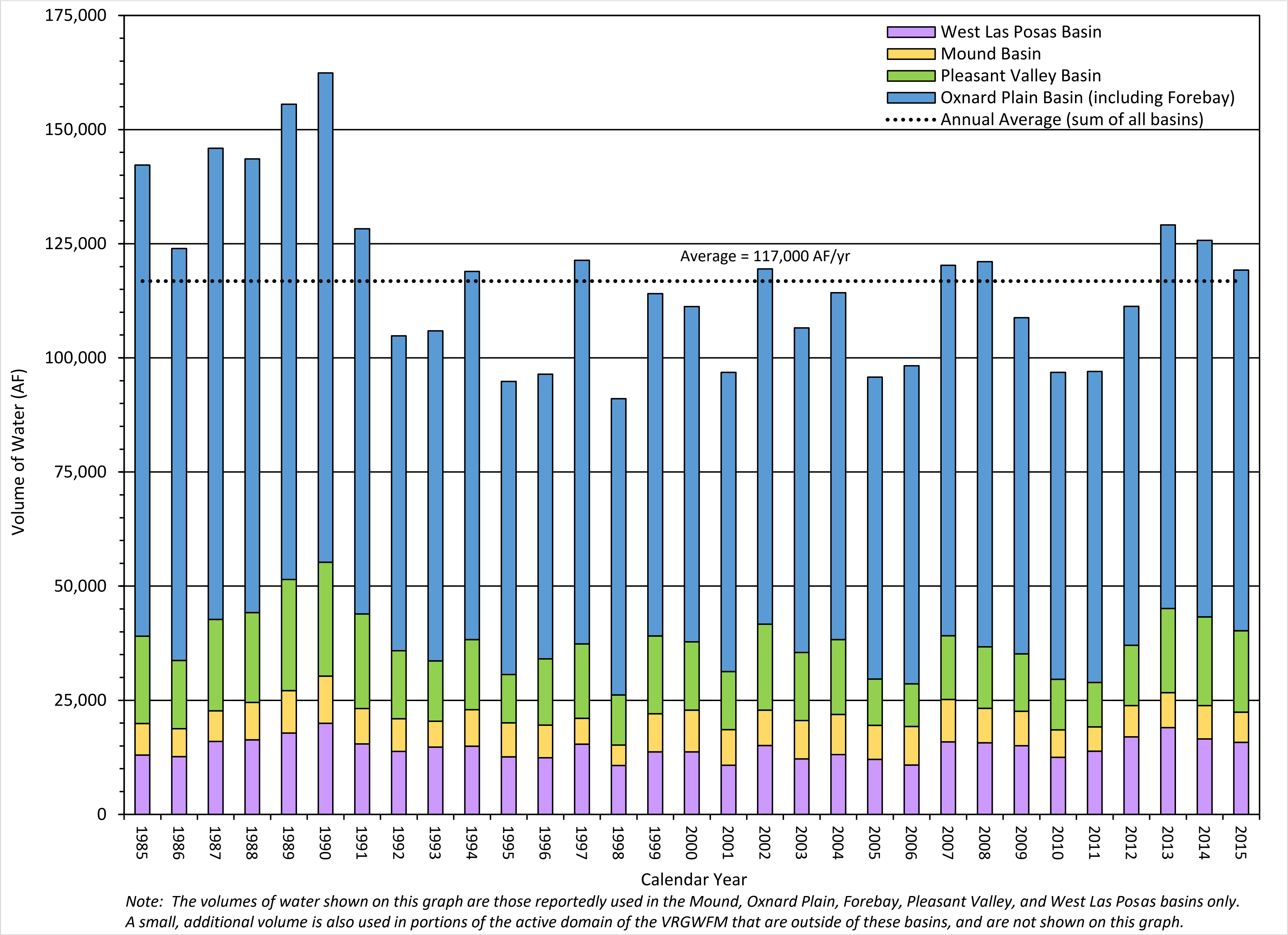


Figure 2-21. Annual Groundwater Extractions in Study Area

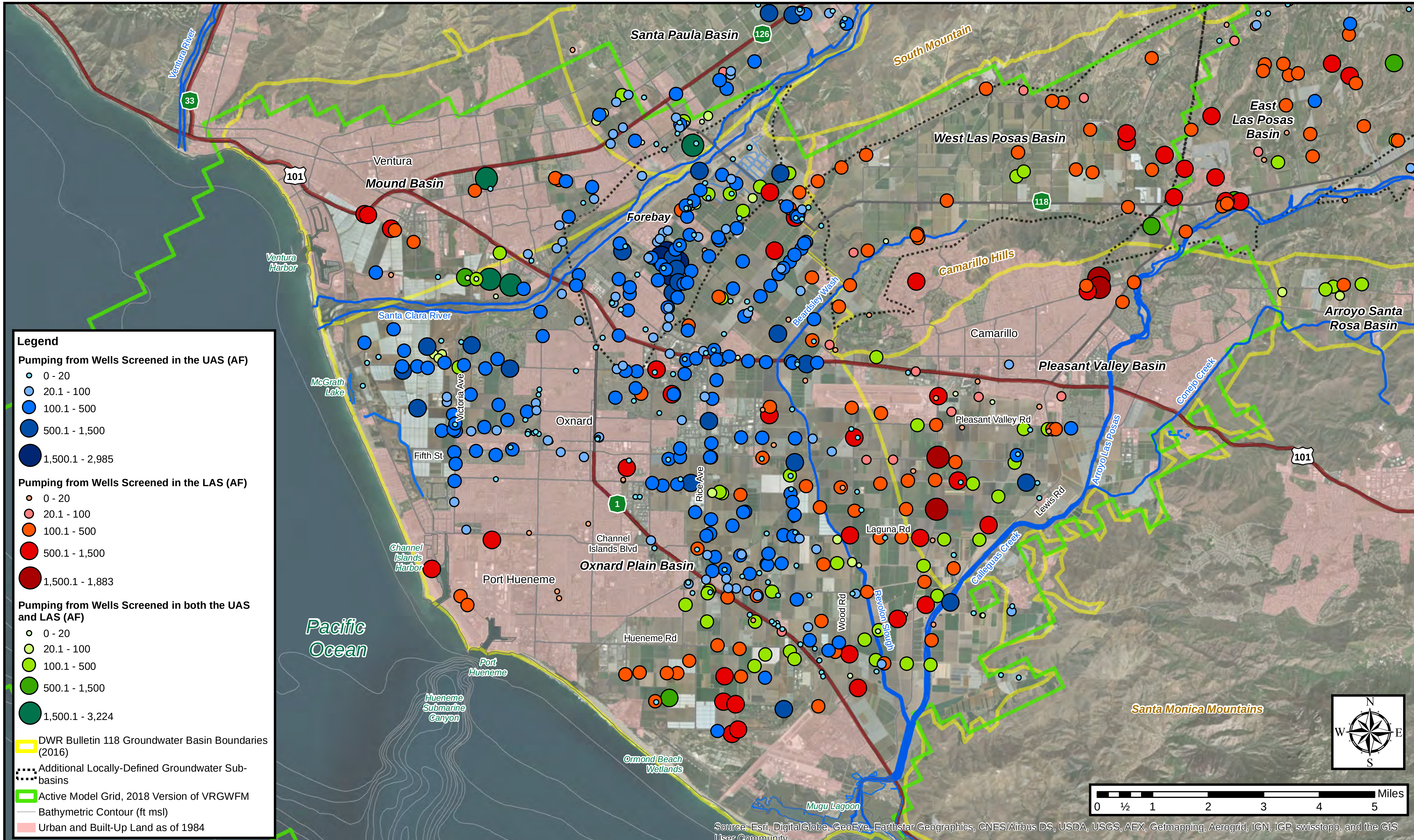


Figure 2-22. Locations of Groundwater Extractions, CY 1985

Pumping rates reported semi-annually to United and FCGMA by well owners. Aquifer system from which groundwater is extracted at each well was determined by United based on reported screened intervals and depths to aquifers indicated by updated hydrostratigraphic conceptual model.

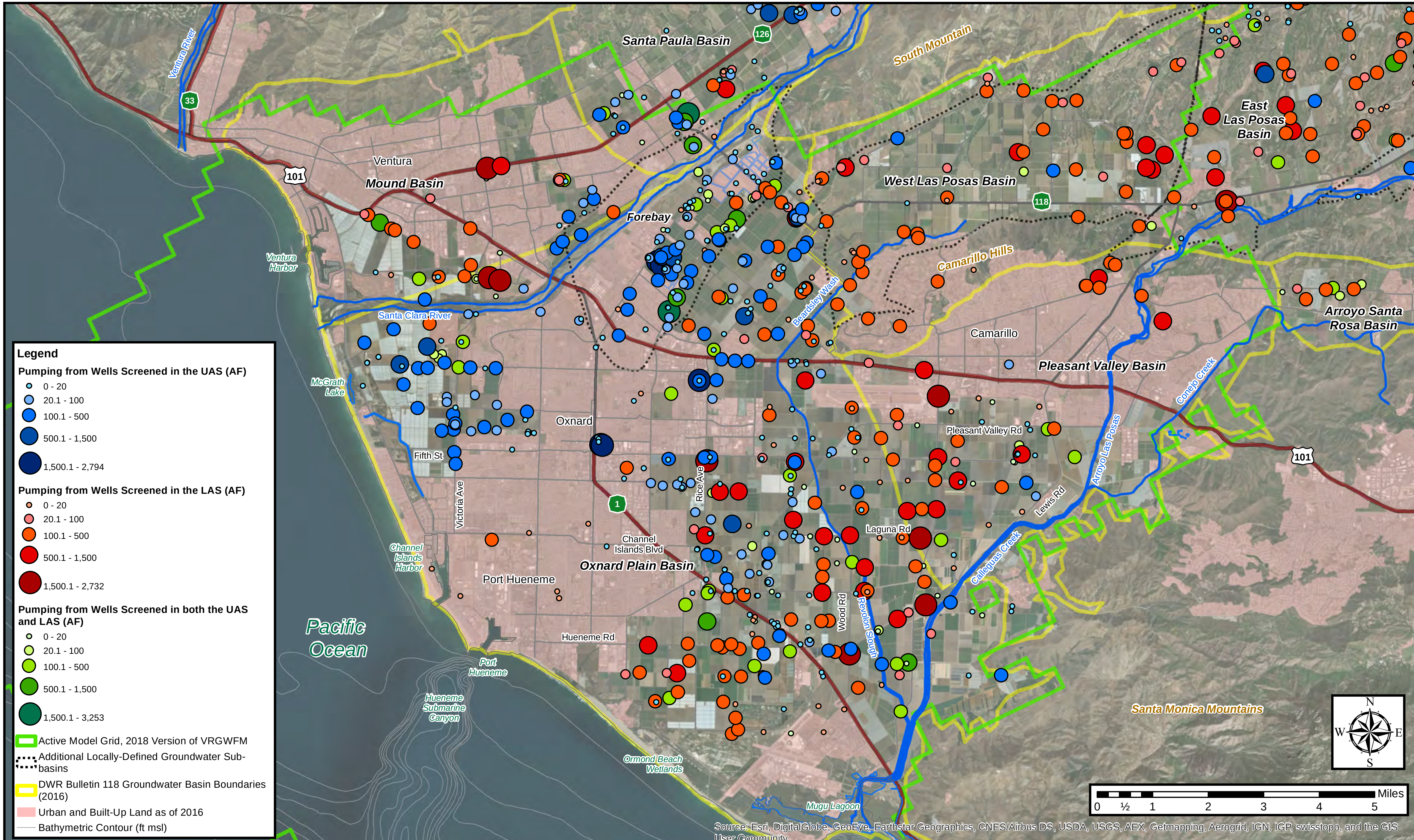


Figure 2-23. Locations of Groundwater Extractions, CY 2015

Pumping rates reported semi-annually to United and FCGMA by well owners. Aquifer system from which groundwater is extracted at each well was determined by United based on reported screened intervals and depths to aquifers indicated by updated hydrostratigraphic conceptual model.

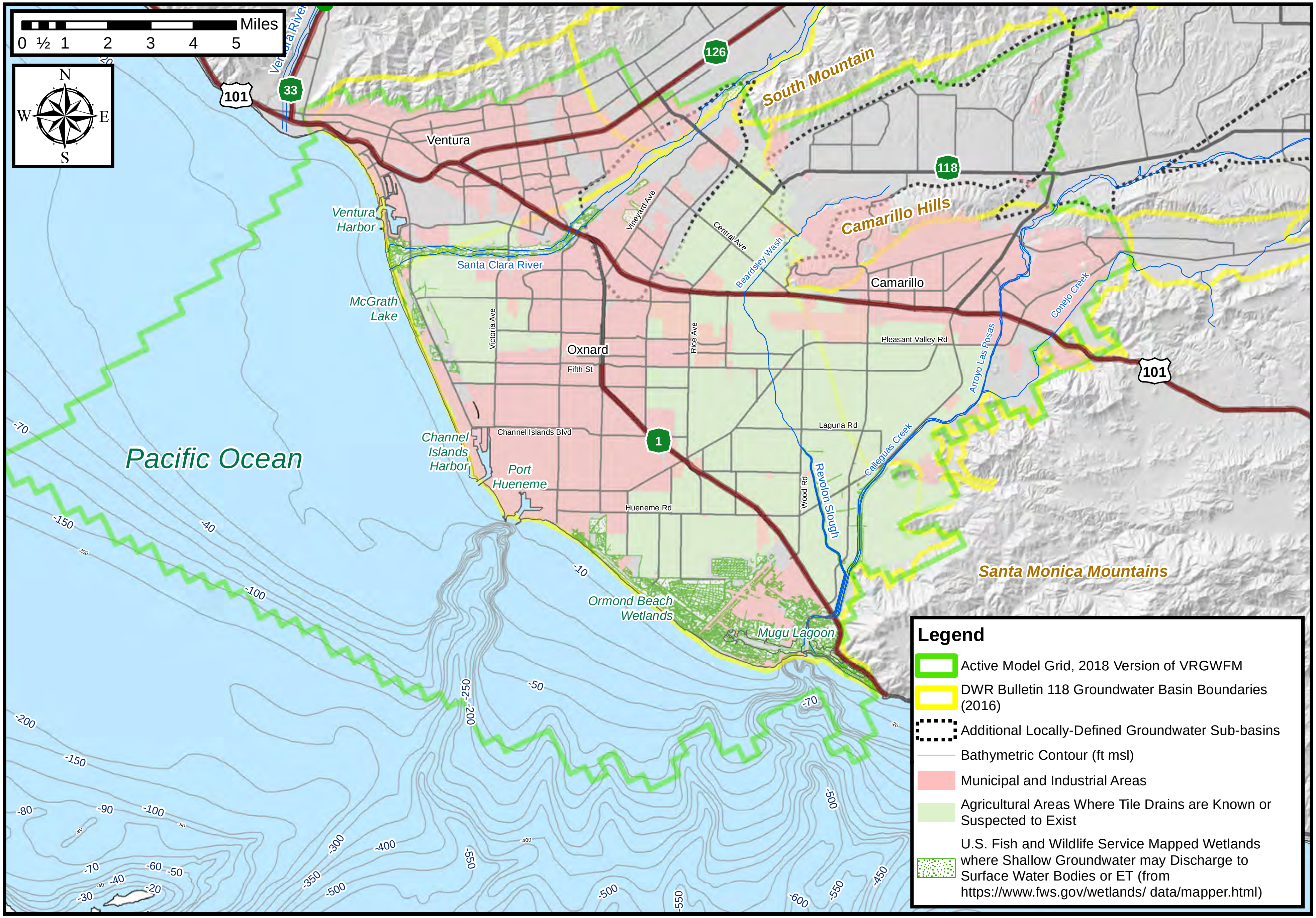


Figure 2-24. Areas of Groundwater Discharge in Study Area

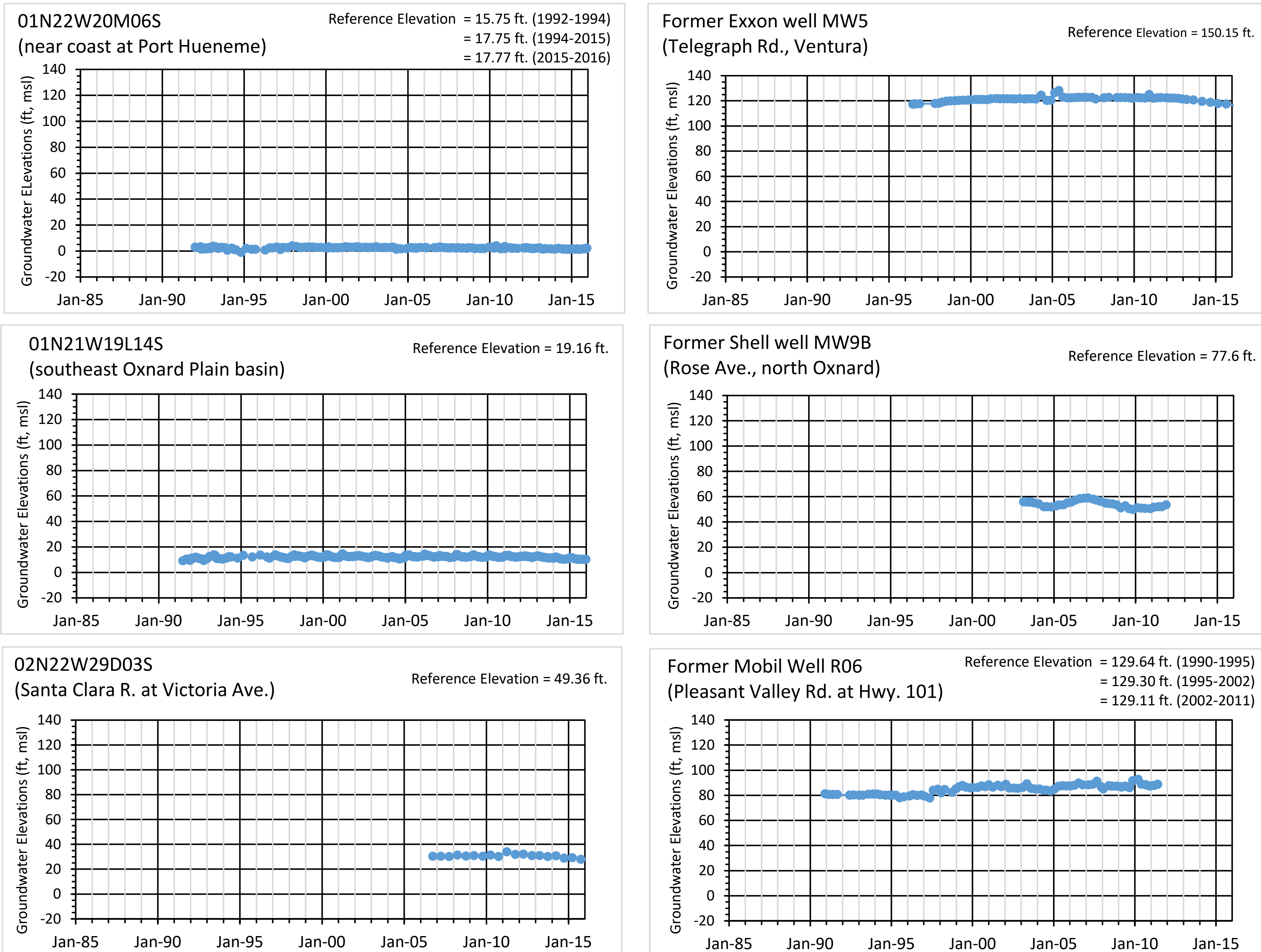


Figure 2-25. Groundwater Elevations Measured at Selected Wells Screened in the Semi-Perched Aquifer

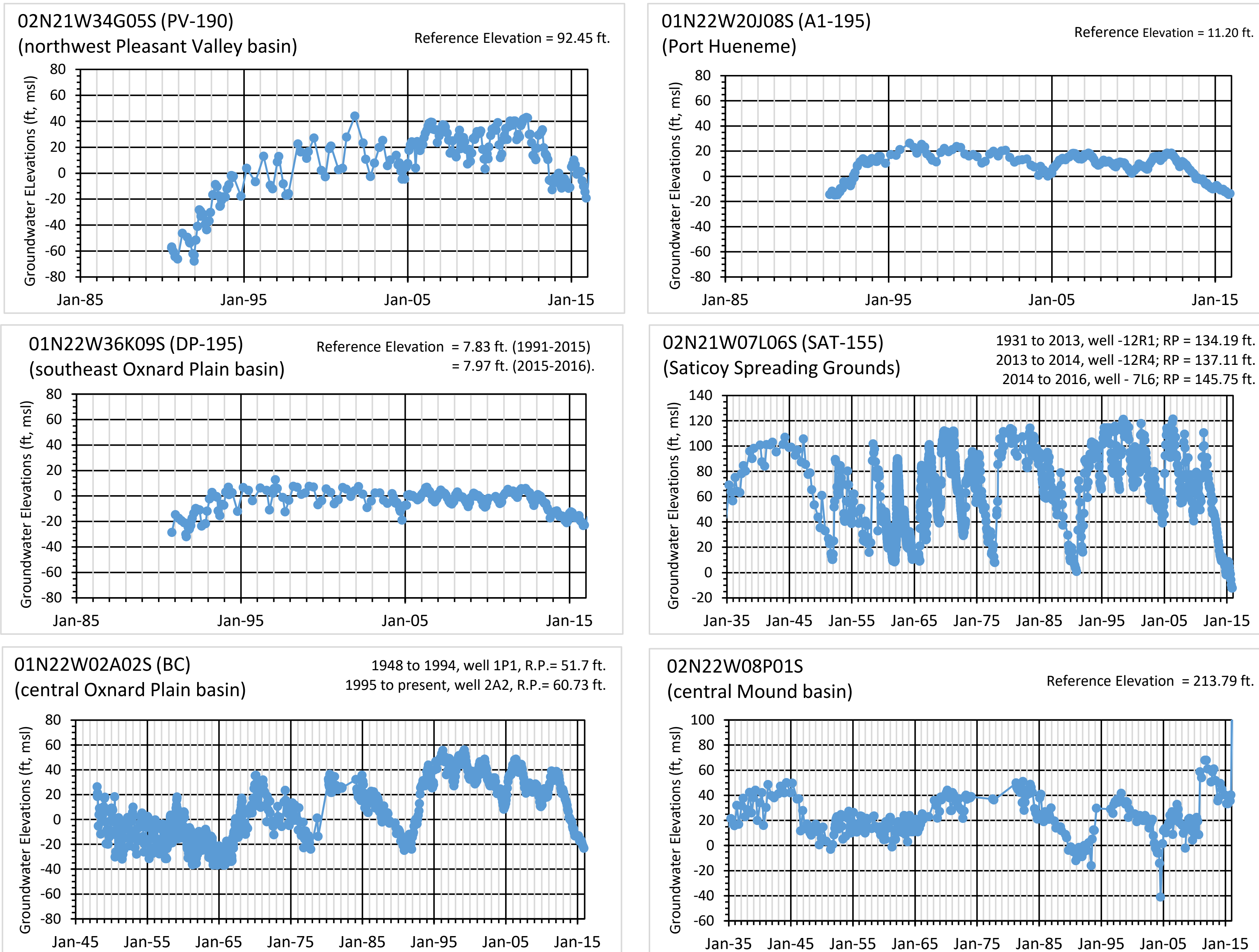


Figure 2-26. Groundwater Elevations Measured at Selected Wells Screened in the UAS

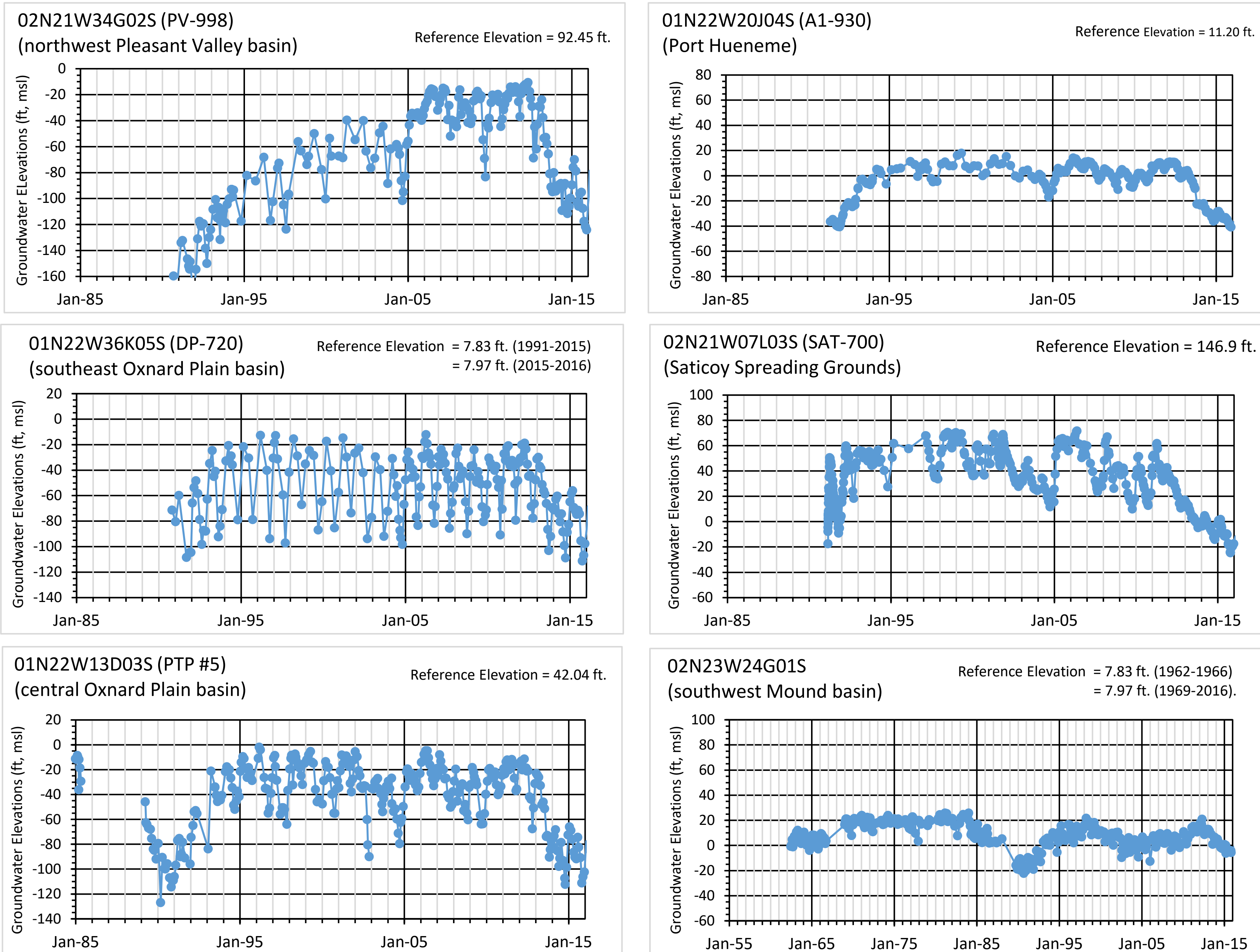


Figure 2-27. Groundwater Elevations Measured at Selected Wells Screened in the LAS

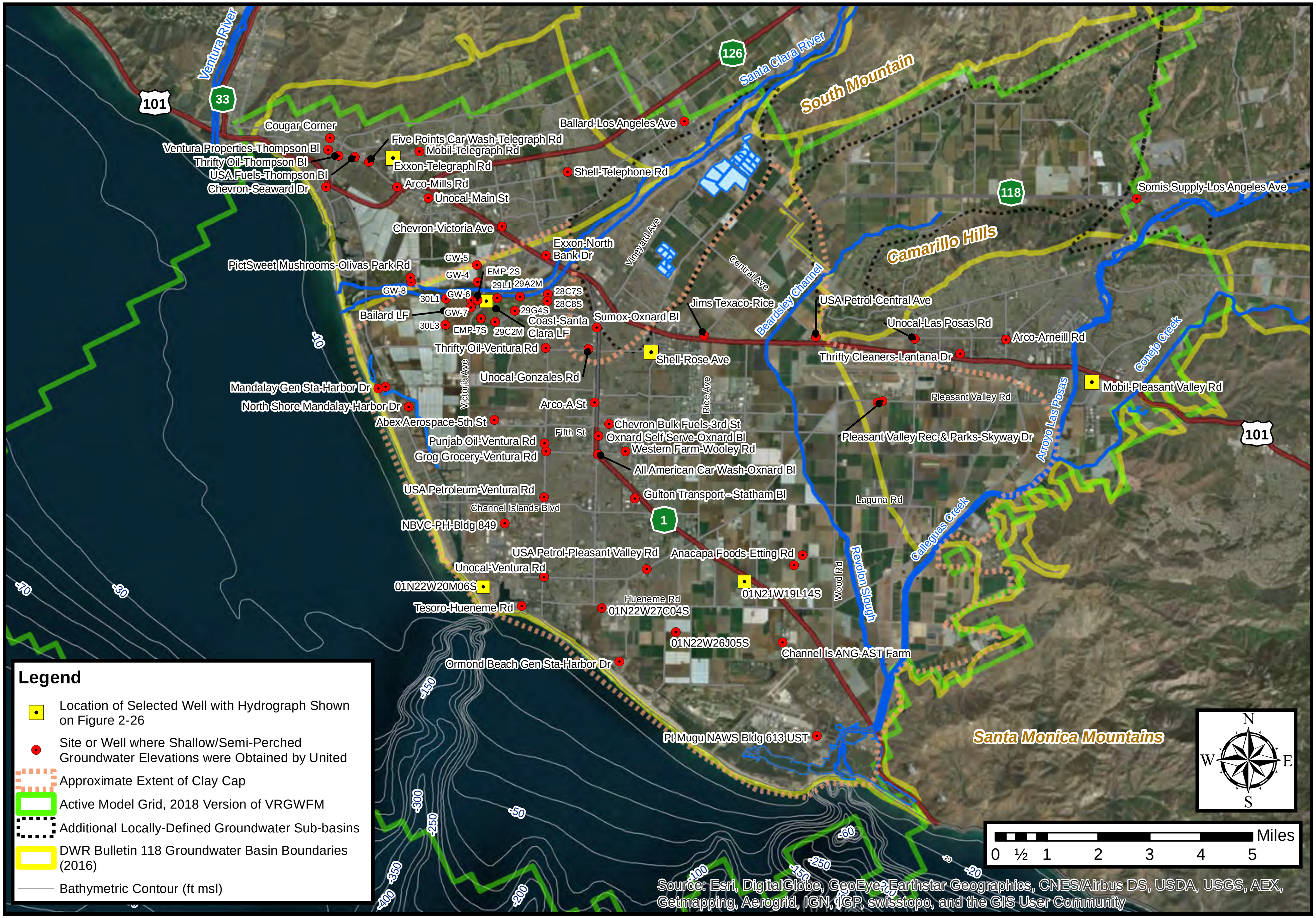


Figure 2-28. Locations of Selected Wells Screened in the Semi-perched Aquifer

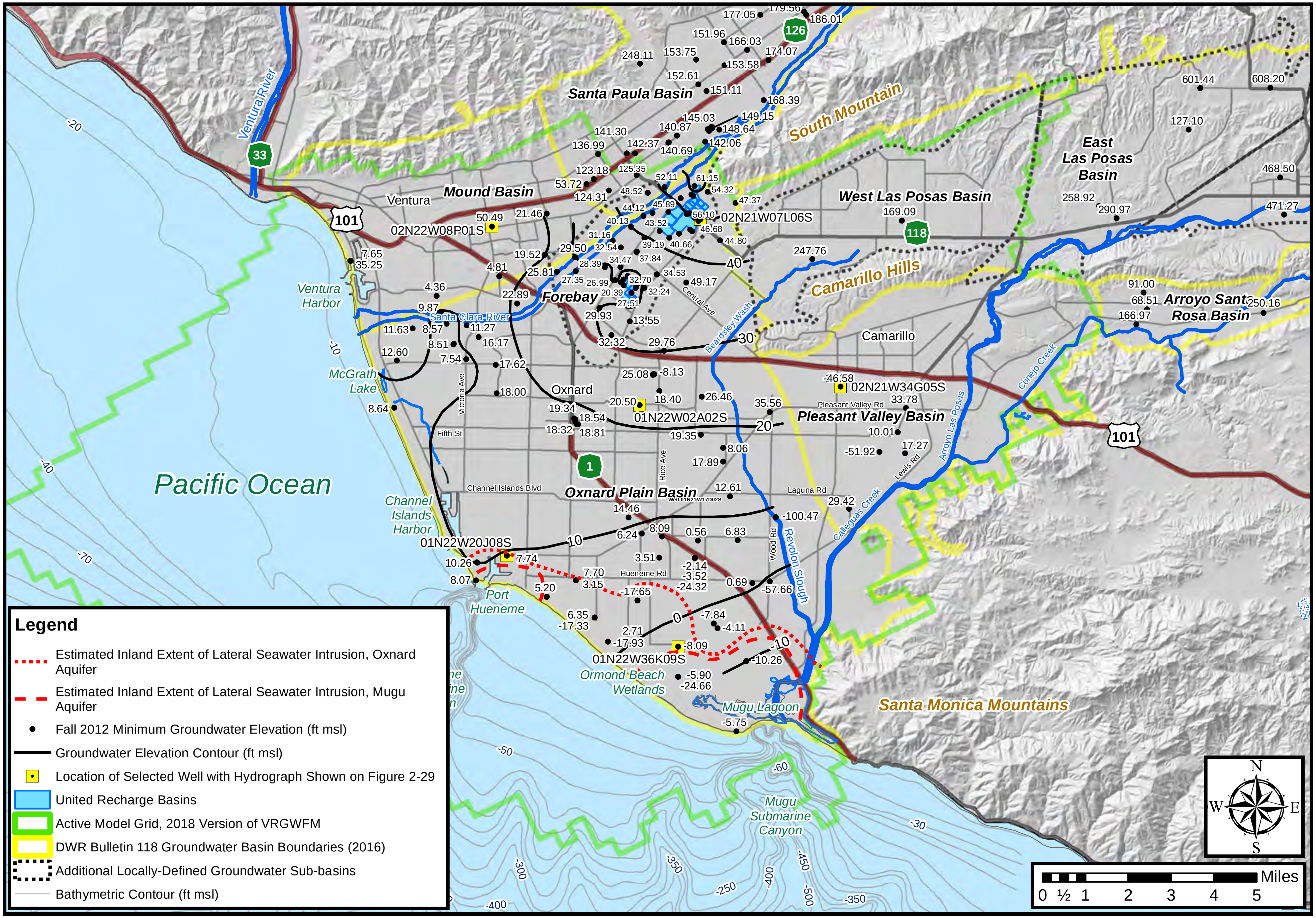


Figure 2-29. Groundwater Elevation Contours for UAS, Fall 2012

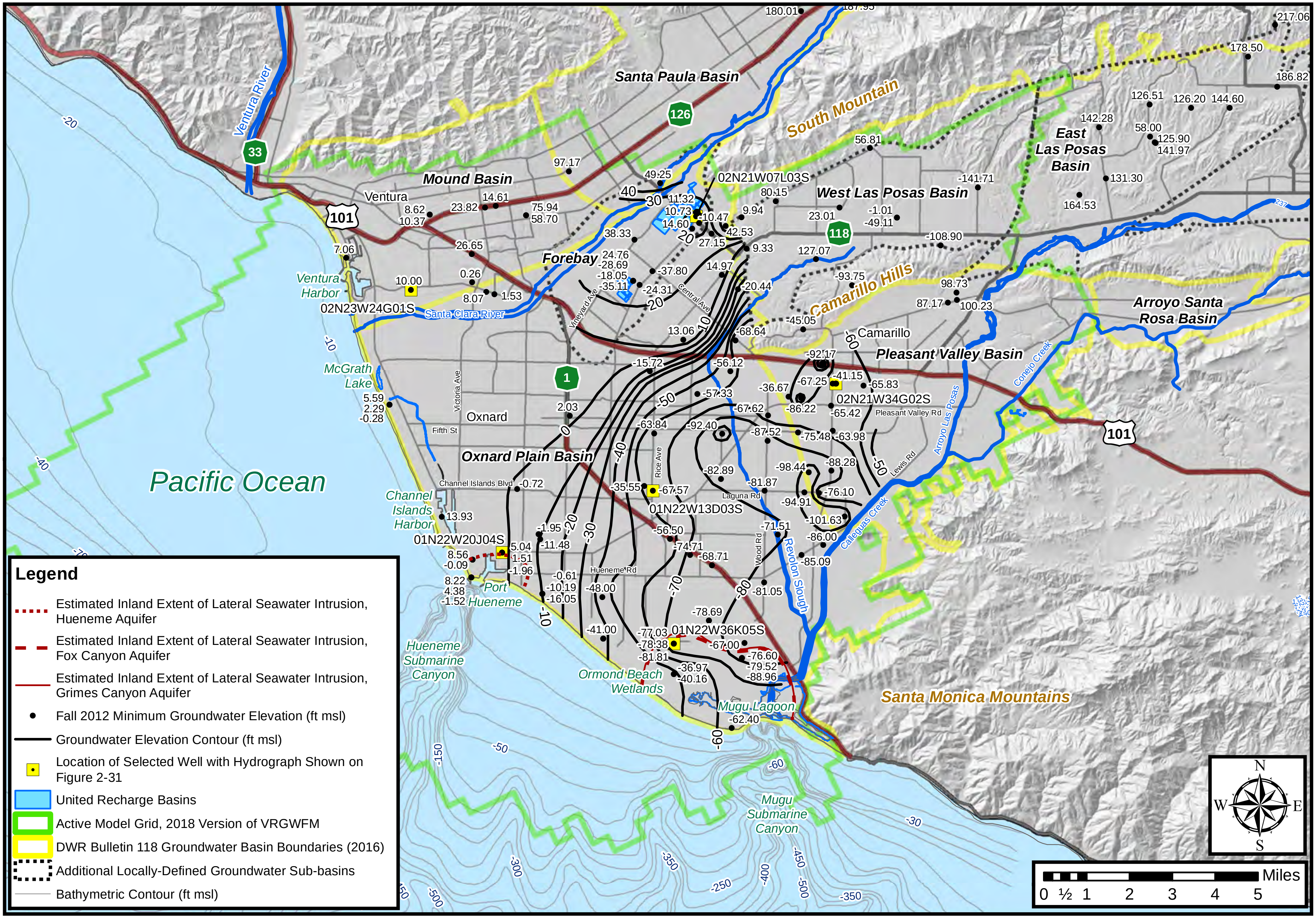


Figure 2-30. Groundwater Elevation Contours for LAS, Fall 2012

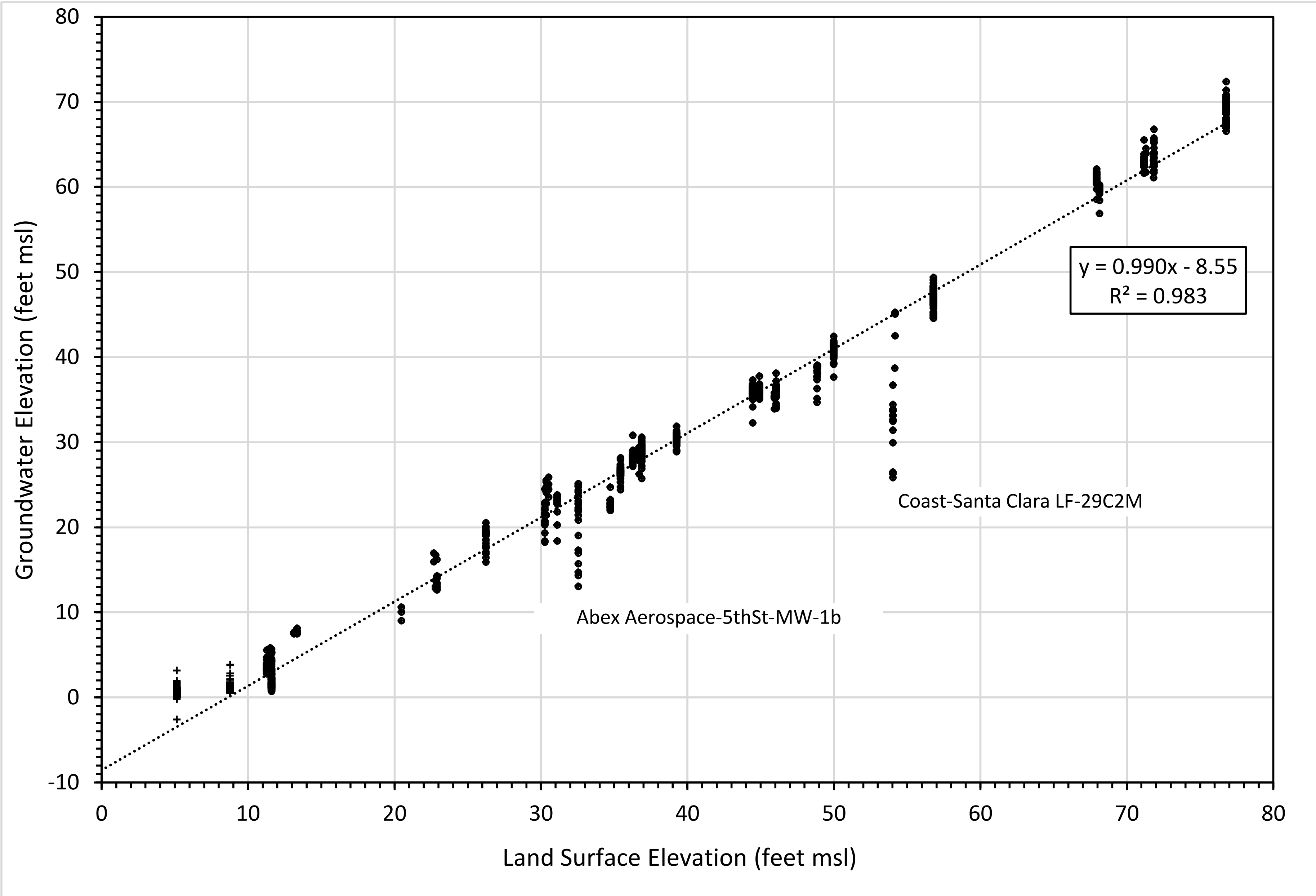


Figure 2-31. Groundwater Elevations in Semi-Perched Aquifer versus Land Surface Elevation

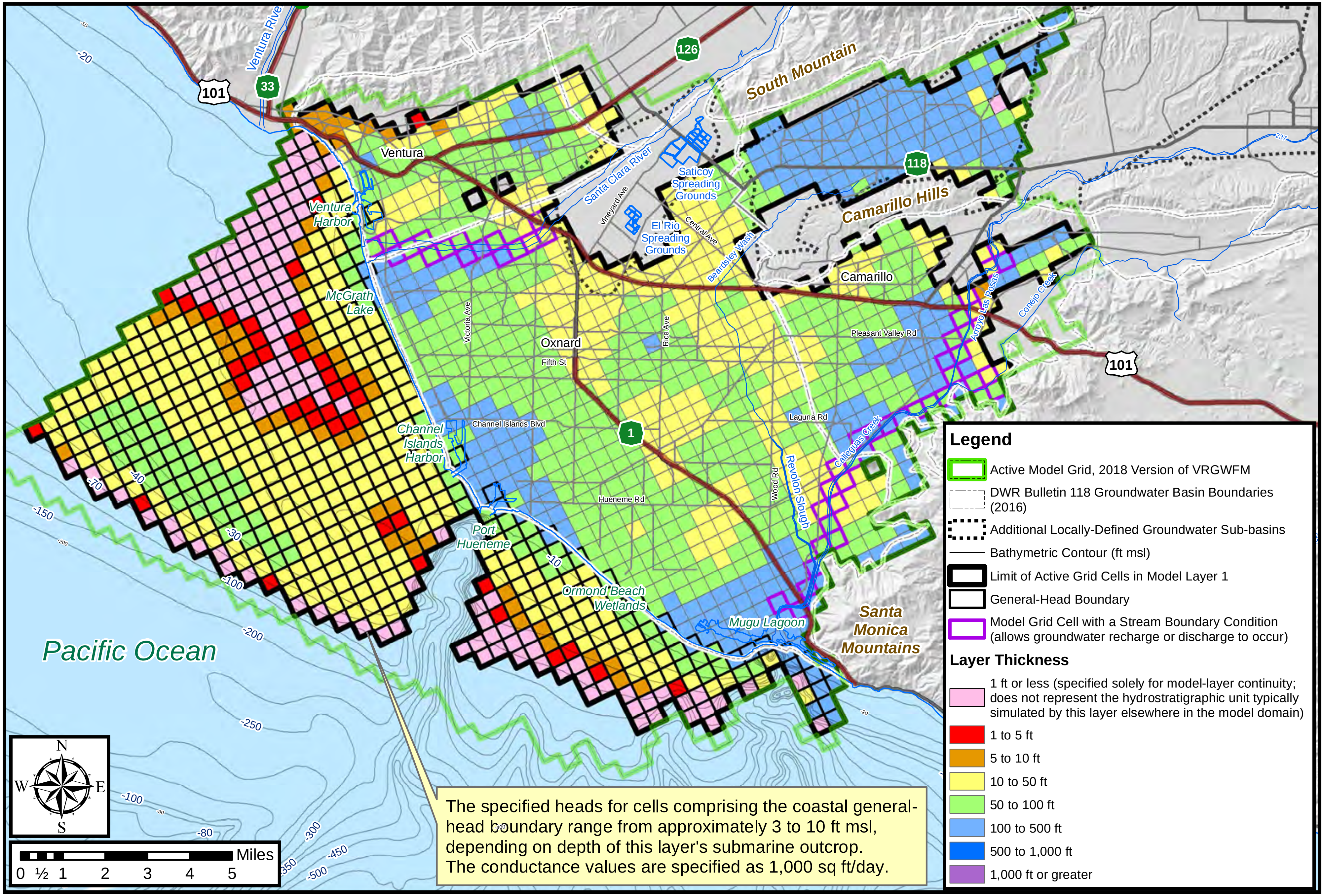


Figure 3-1. Boundary Conditions, Thickness, and Extent of Model Layer 1

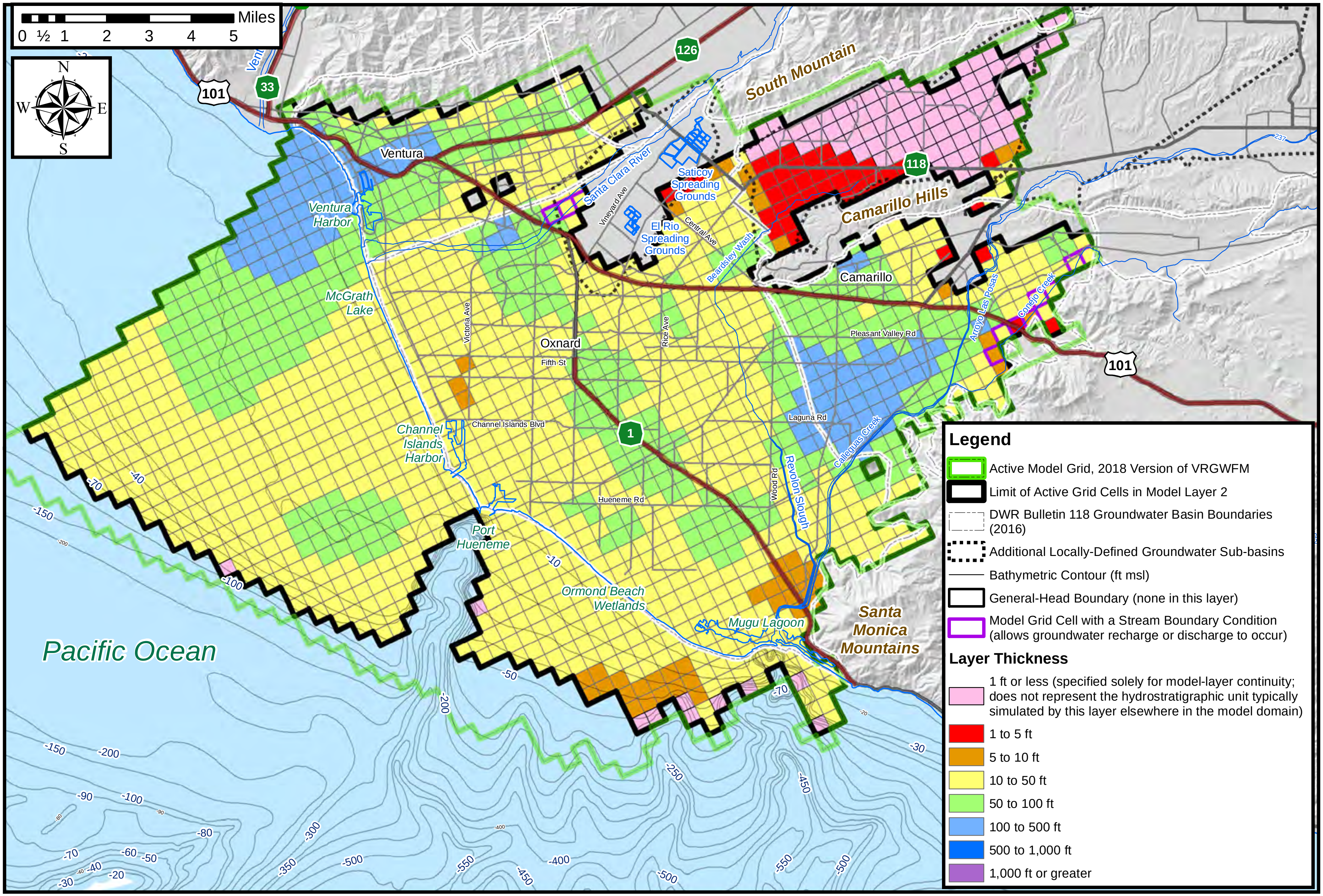


Figure 3-2. Boundary Conditions, Thickness, and Extent of Model Layer 2

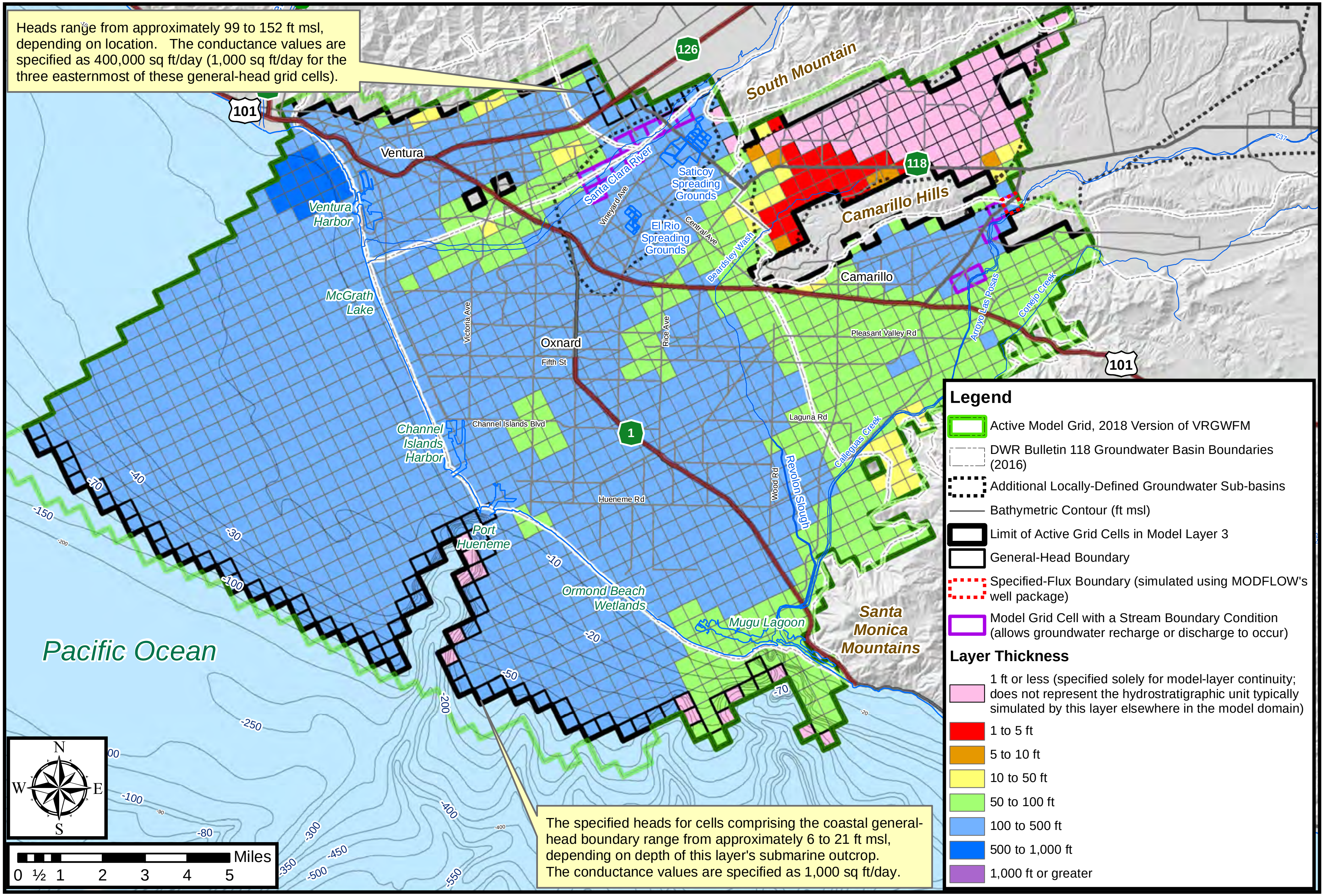


Figure 3-3. Boundary Conditions, Thickness, and Extent of Model Layer 3

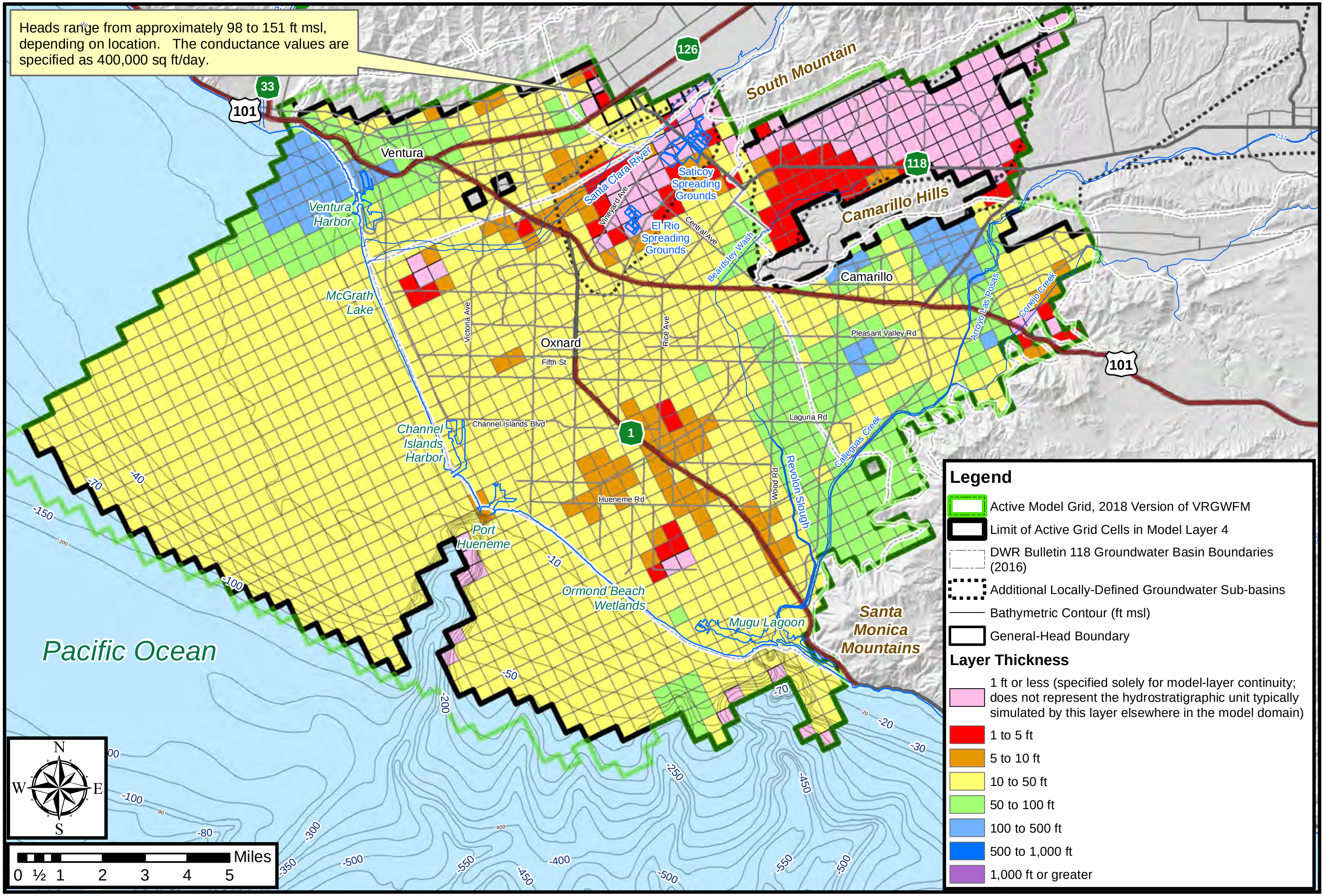


Figure 3-4. Boundary Conditions, Thickness, and Extent of Model Layer 4

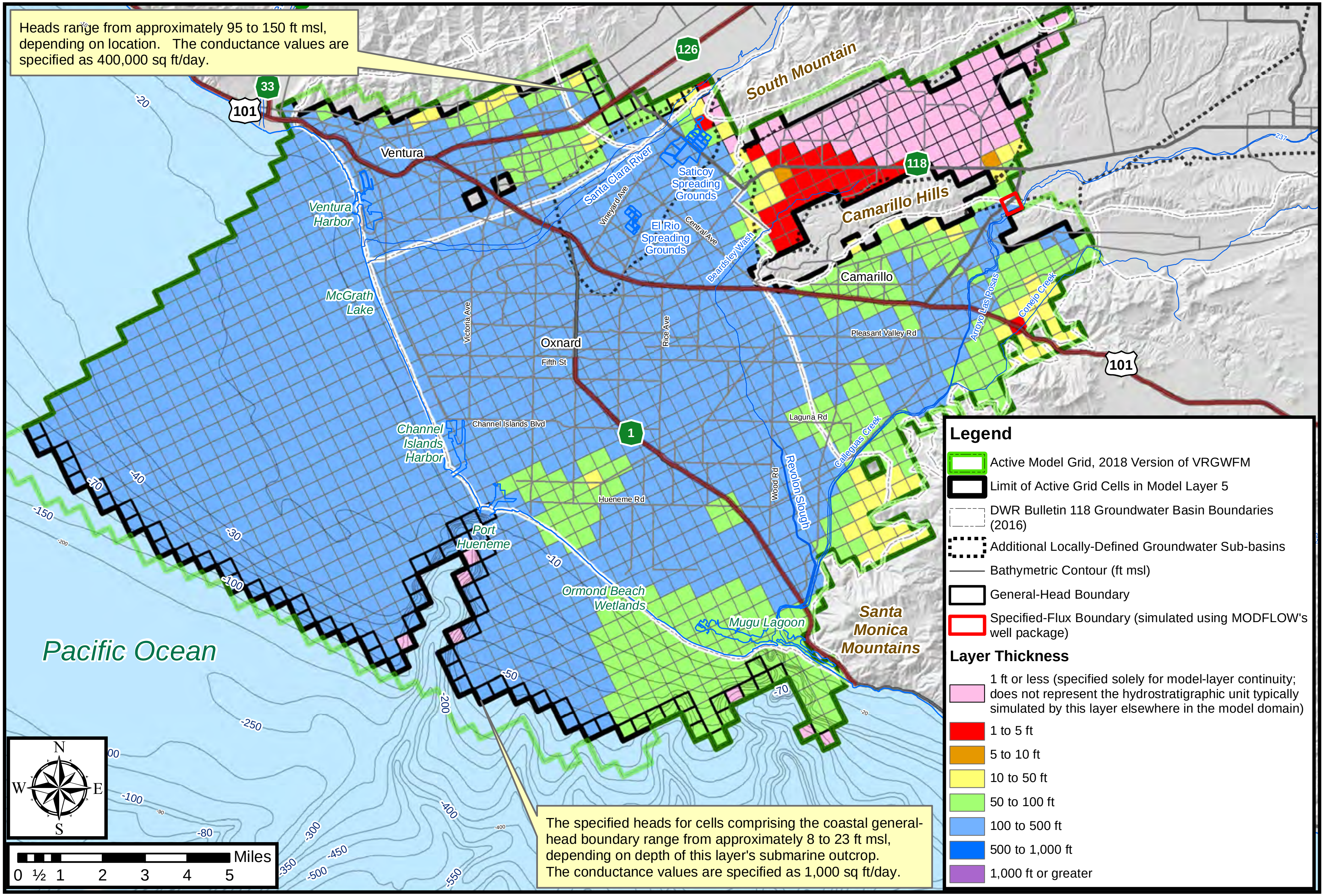


Figure 3-5. Boundary Conditions, Thickness, and Extent of Model Layer 5

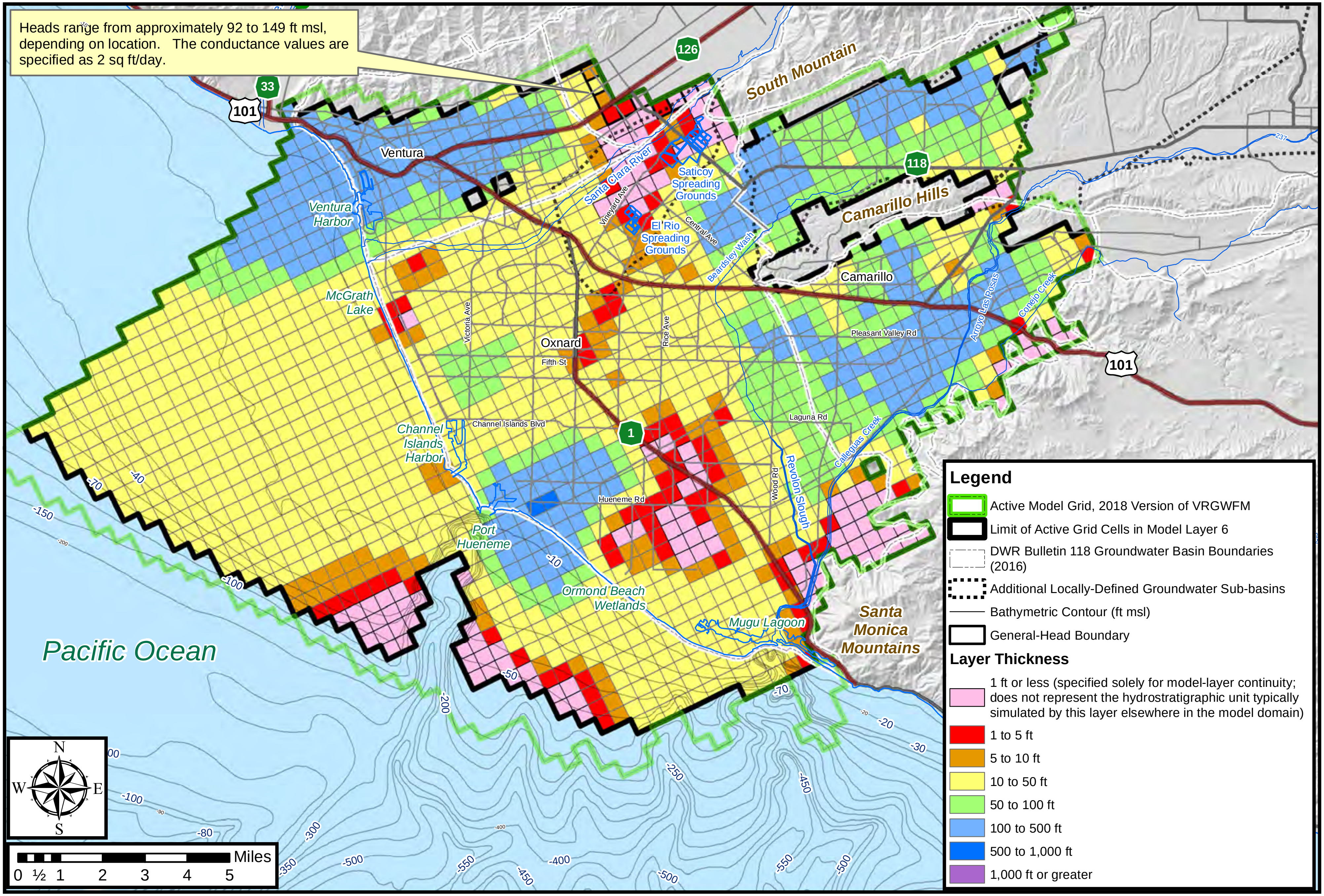


Figure 3-6. Boundary Conditions, Thickness, and Extent of Model Layer 6

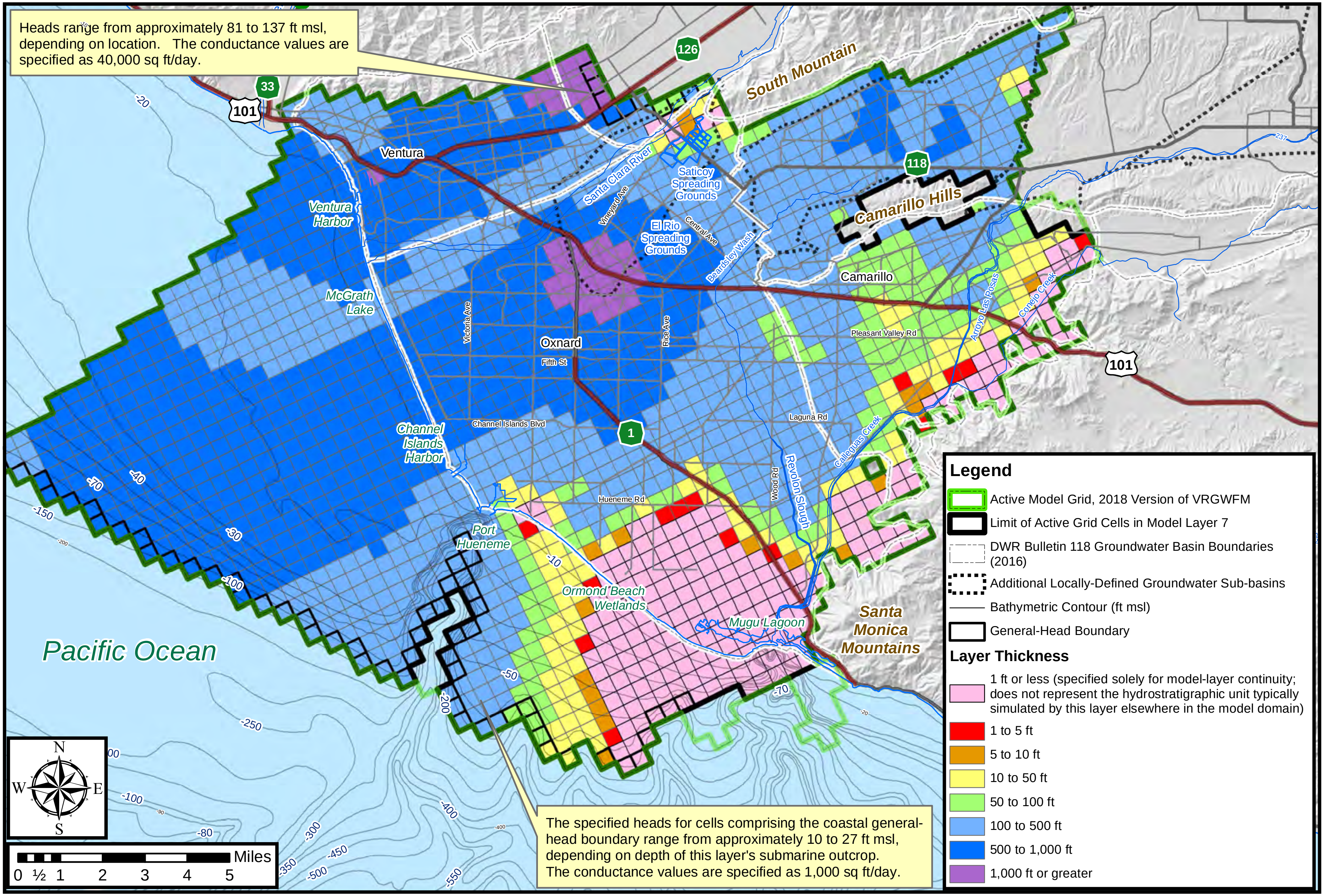


Figure 3-7. Boundary Conditions, Thickness, and Extent of Model Layer 7

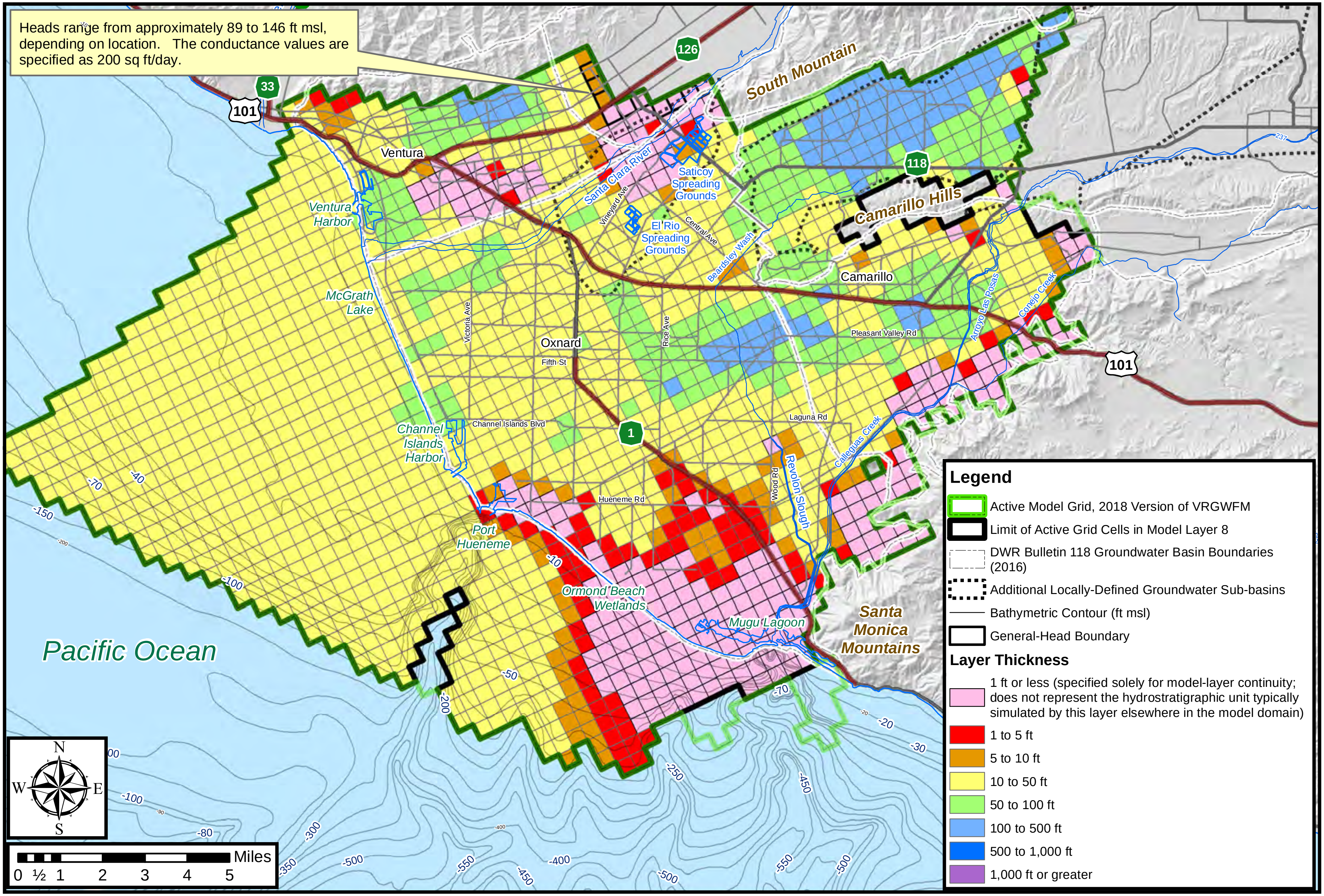


Figure 3-8. Boundary Conditions, Thickness, and Extent of Model Layer 8

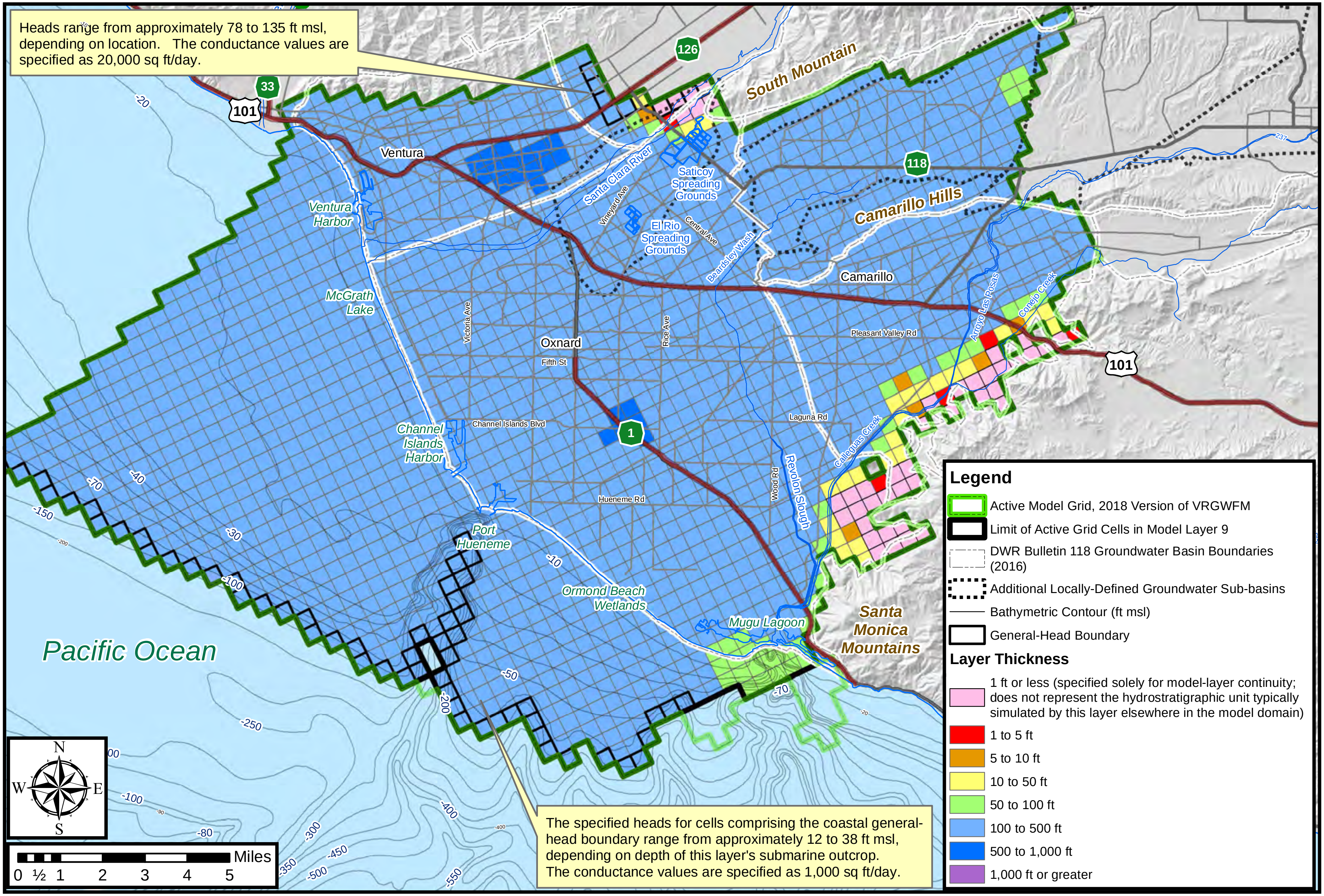


Figure 3-9. Boundary Conditions, Thickness, and Extent of Model Layer 9

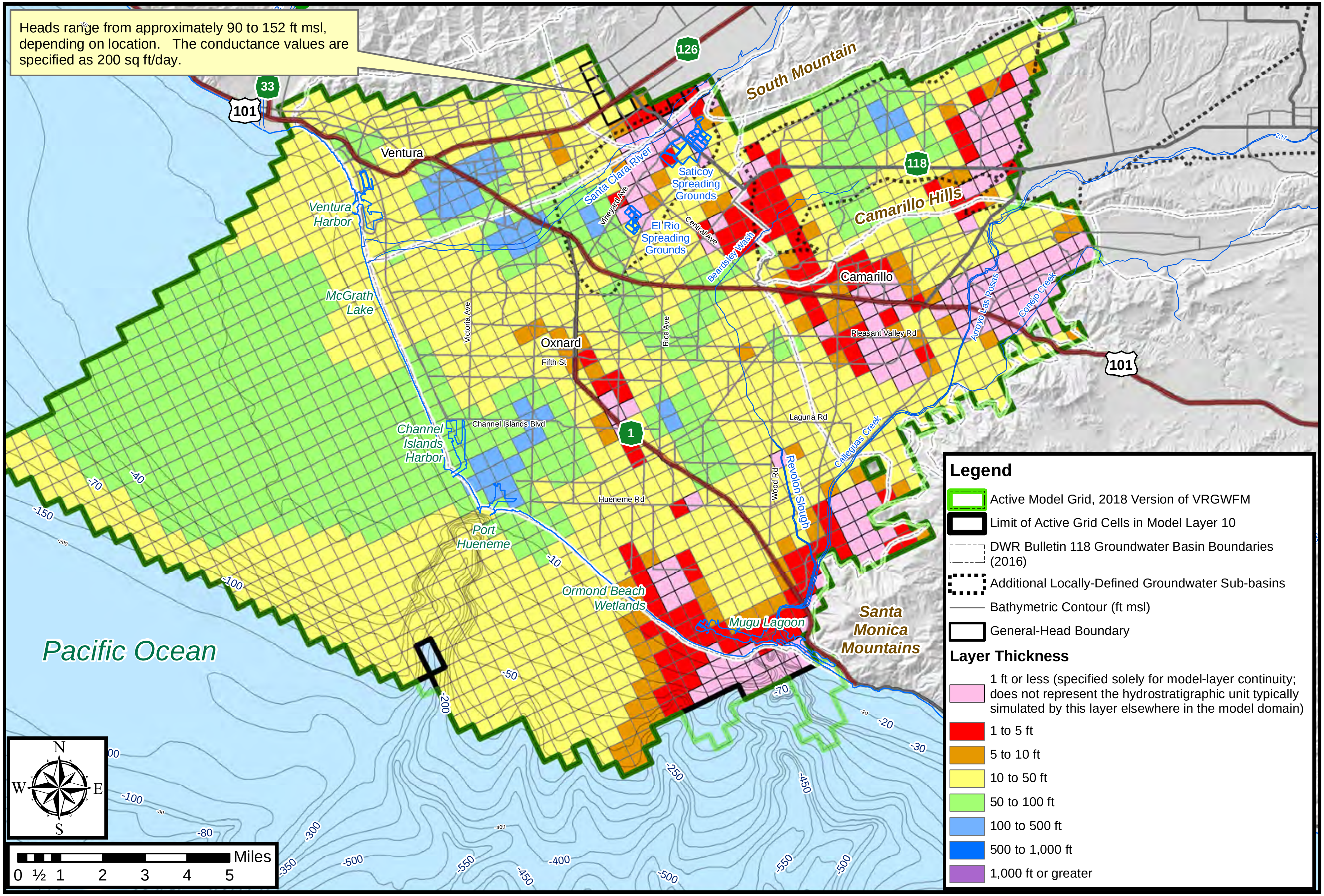


Figure 3-10. Boundary Conditions, Thickness, and Extent of Model Layer 10

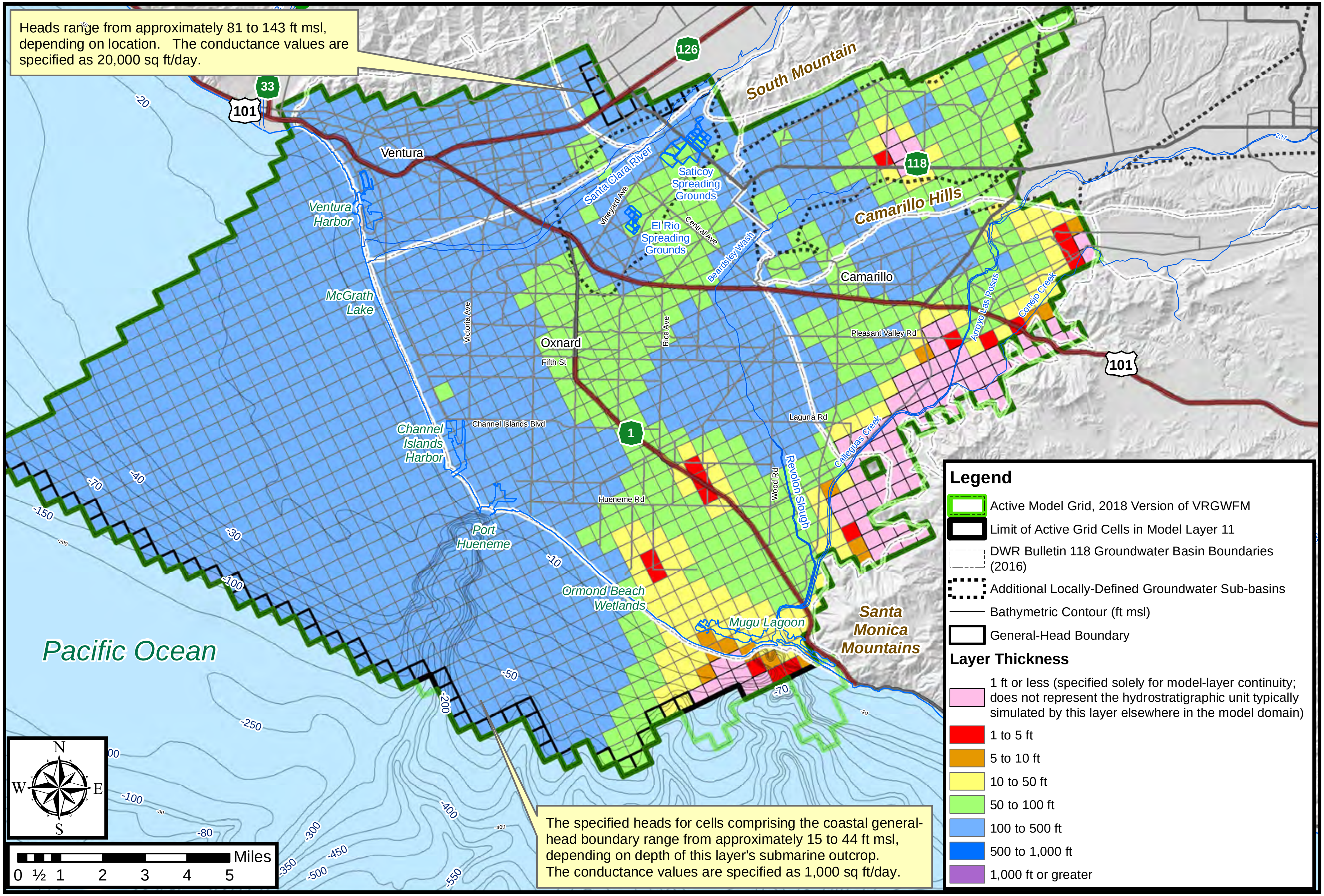


Figure 3-11. Boundary Conditions, Thickness, and Extent of Model Layer 11

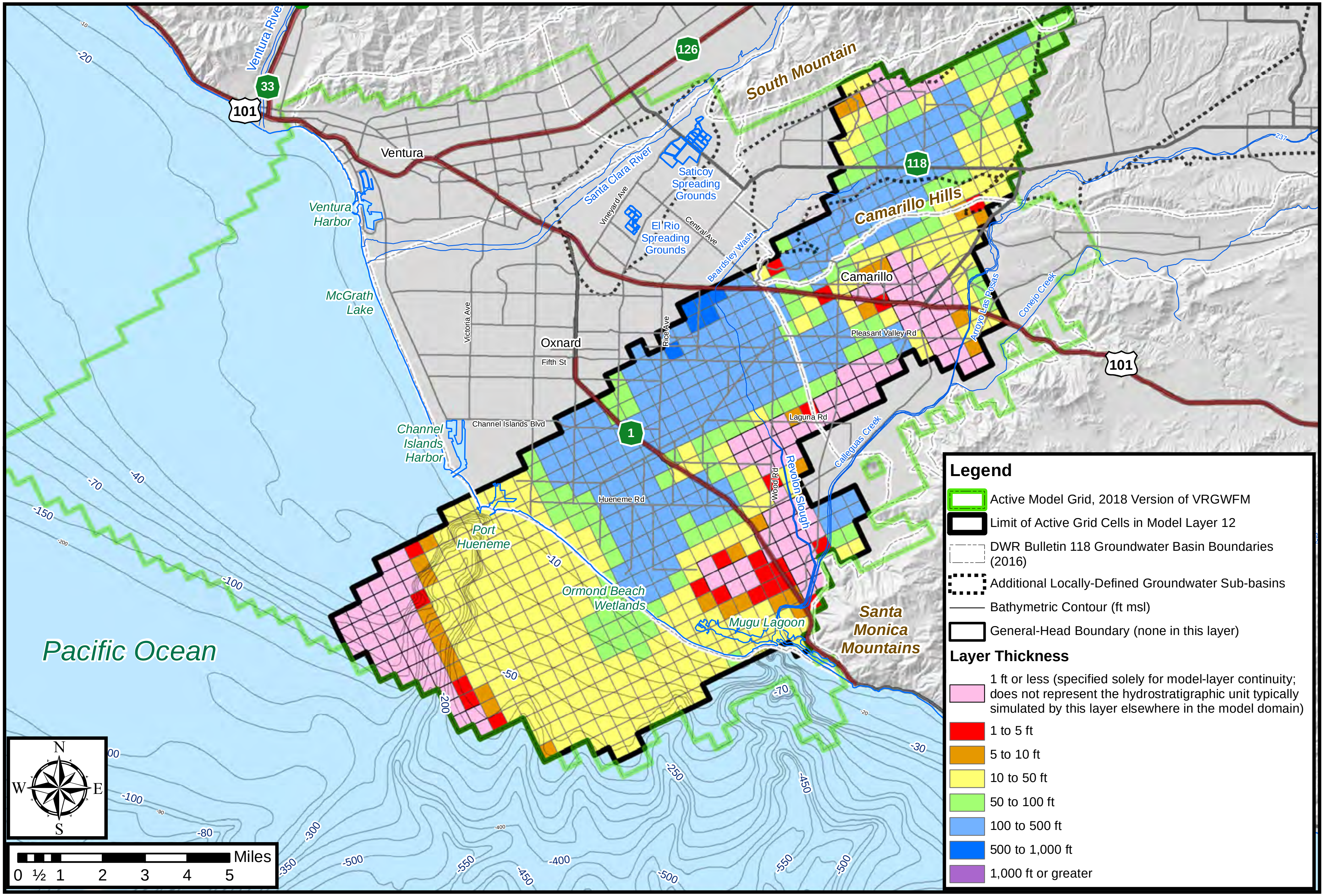


Figure 3-12. Boundary Conditions, Thickness, and Extent of Model Layer 12

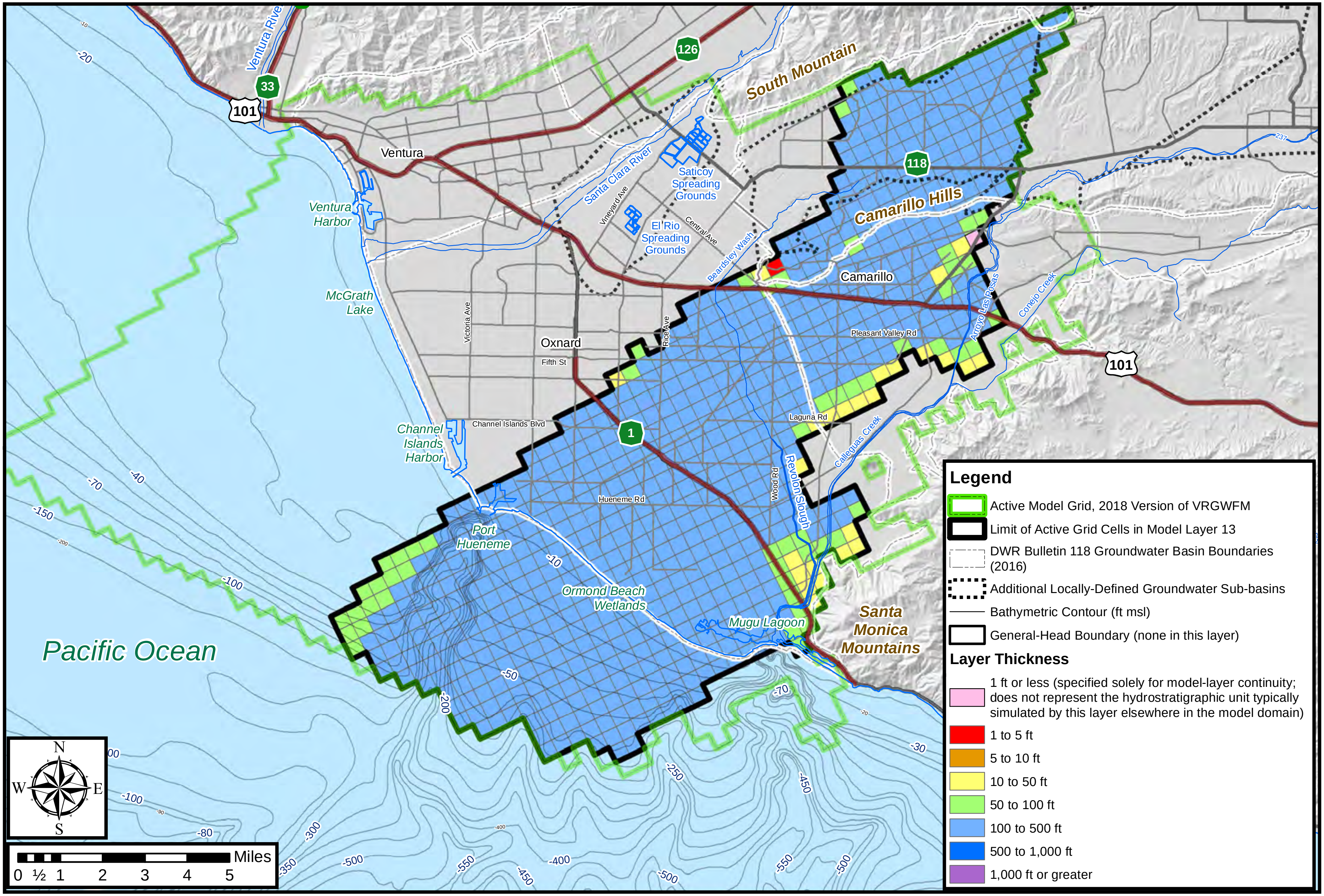


Figure 3-13. Boundary Conditions, Thickness, and Extent of Model Layer 13

Model Layer	Mound Basin	Forebay area	Oxnard Plain Basin	Pleasant Valley Basin	West Las Posas Sub-basin
1	Shallow alluvial aquifer	*layer inactive*	Semi-perched Aquifer	Semi-perched Aquifer	Shallow alluvial aquifer
2	Fine-grained Pleistocene deposits (Layers 2 through 4)	*layer inactive*	Clay Cap	Clay Cap	Layers 2 through 5 are each 1 foot thick in this basin, and assigned similar properties as the shallow alluvial aquifer
3		Oxnard Aquifer	Oxnard Aquifer	Oxnard Aquifer	
4		Oxnard-Mugu Aquitard	Oxnard-Mugu Aquitard	Oxnard-Mugu Aquitard	
5	Mugu Aquifer	Mugu Aquifer	Mugu Aquifer	Mugu Aquifer	
6	Mugu-Hueneme Aquitard	Mugu-Hueneme Aquitard	Mugu-Hueneme Aquitard	Mugu-Hueneme Aquitard	unnamed aquitard
7	Hueneme Aquifer	Hueneme Aquifer	Hueneme Aquifer	Hueneme Aquifer	Upper San Pedro Formation (Layers 7 and 8)
8	Hueneme-Fox Cyn Aquitard	Hueneme-Fox Cyn Aquitard	Hueneme-Fox Cyn Aquitard	Hueneme-Fox Cyn Aquitard	
9	Fox Cyn-main Aquifer	Fox Cyn-main Aquifer	Fox Cyn-main Aquifer	Fox Cyn-main Aquifer	Fox Cyn-main Aquifer
10	Mid-Fox Cyn Aquitard	Mid-Fox Cyn Aquitard	Mid-Fox Cyn Aquitard	Mid-Fox Cyn Aquitard	Mid-Fox Cyn Aquitard
11	Fox Cyn-basal Aquifer	Fox Cyn-basal Aquifer	Fox Cyn-basal Aquifer	Fox Cyn-basal Aquifer	Fox Cyn-basal Aquifer
12	*layer inactive*	*layer inactive*	Fox-Grimes Aquitard	Fox-Grimes Aquitard	Fox-Grimes Aquitard
13	*layer inactive*	*layer inactive*	Grimes Canyon Aquifer	Grimes Canyon Aquifer	Grimes Canyon Aquifer

Note: This diagram is conceptual, and does not reflect all of the details incorporated in the VRGWFM regarding changes in thickness or character of hydrostratigraphic units occurring in each basin or area.

Figure 3-14. Conceptual Diagram Illustrating Relationships between Model Layers and Hydrostratigraphic Units

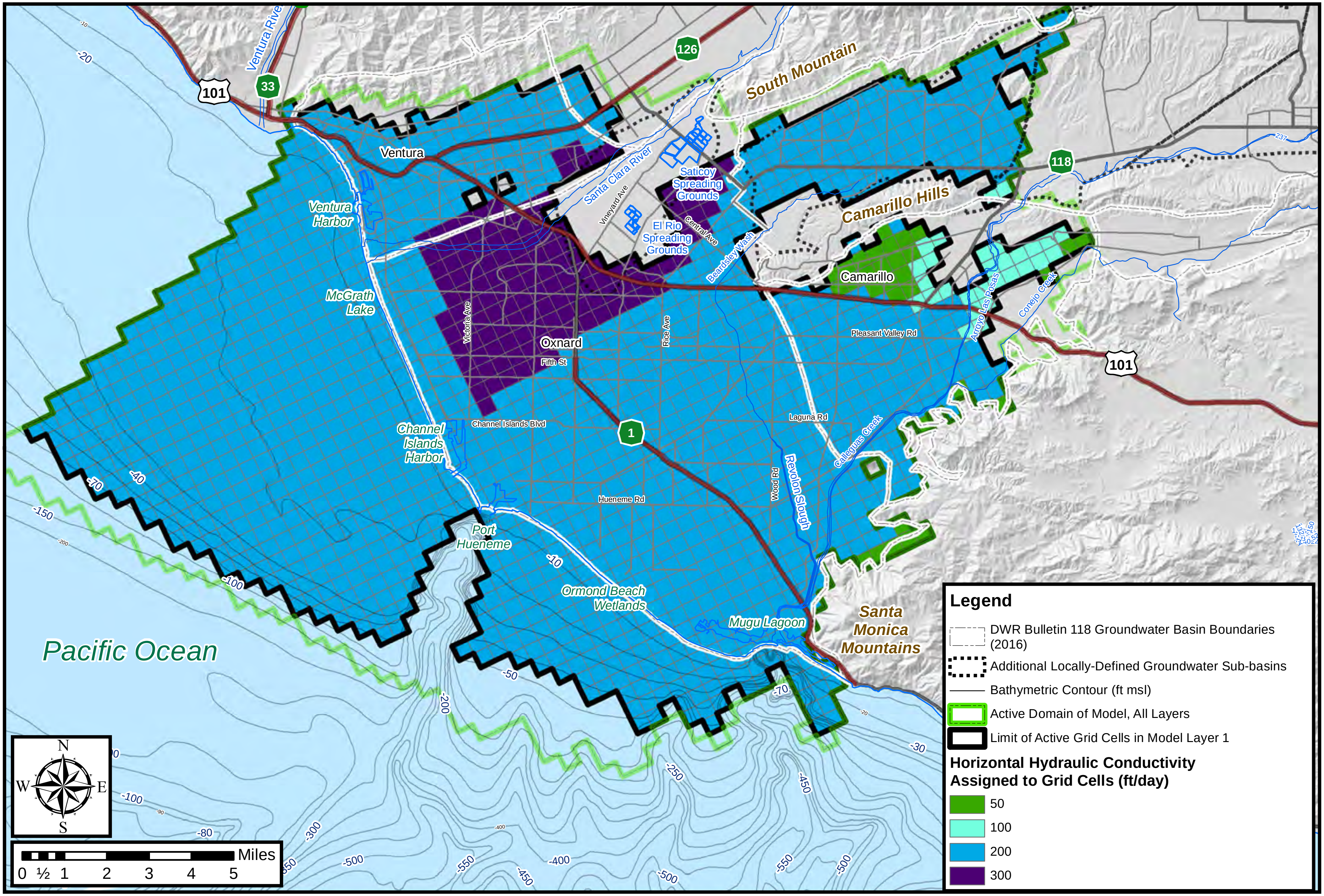


Figure 3-15. Horizontal Hydraulic Conductivity of Grid Cells in Model Layer 1

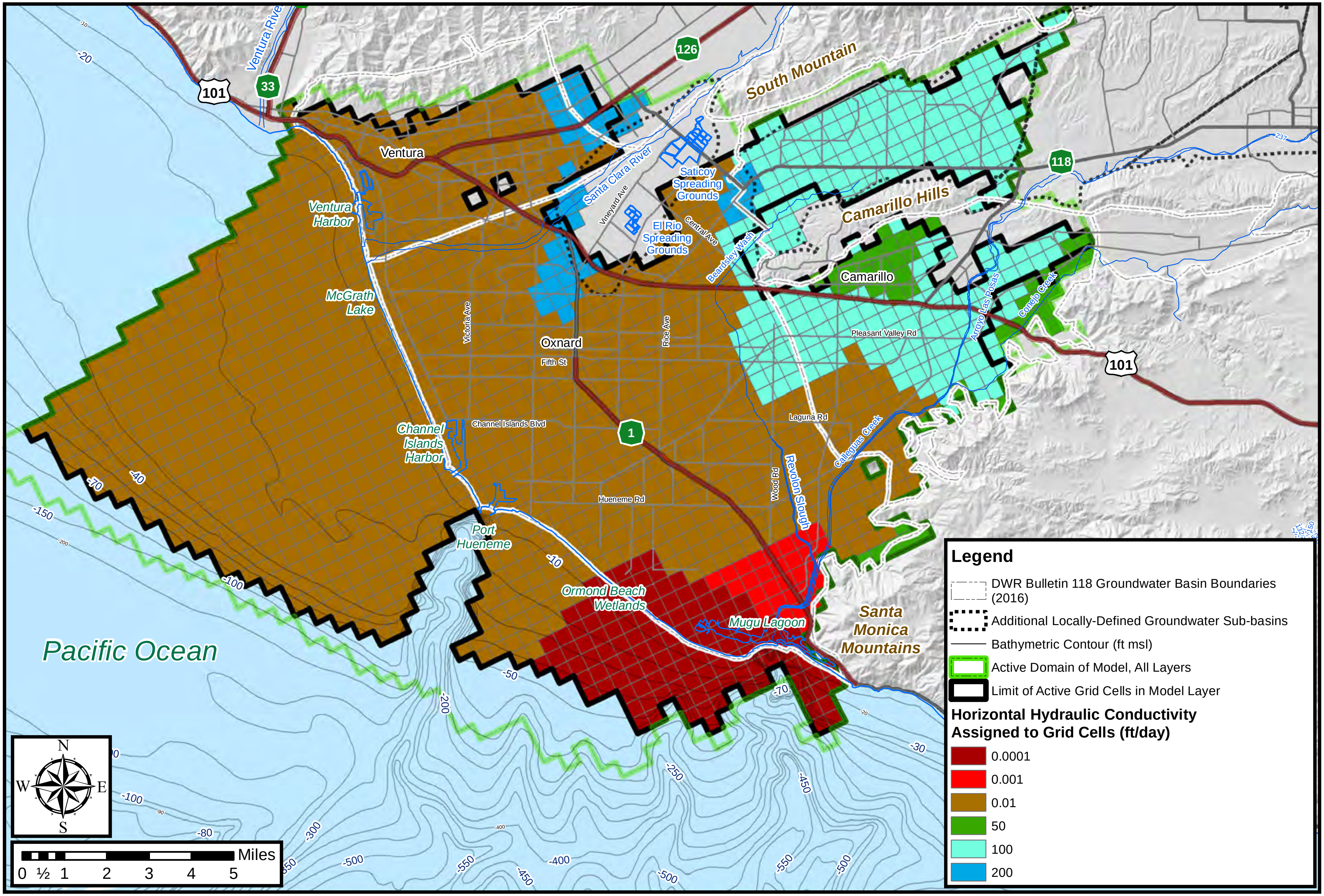


Figure 3-16. Horizontal Hydraulic Conductivity of Grid Cells in Model Layer 2

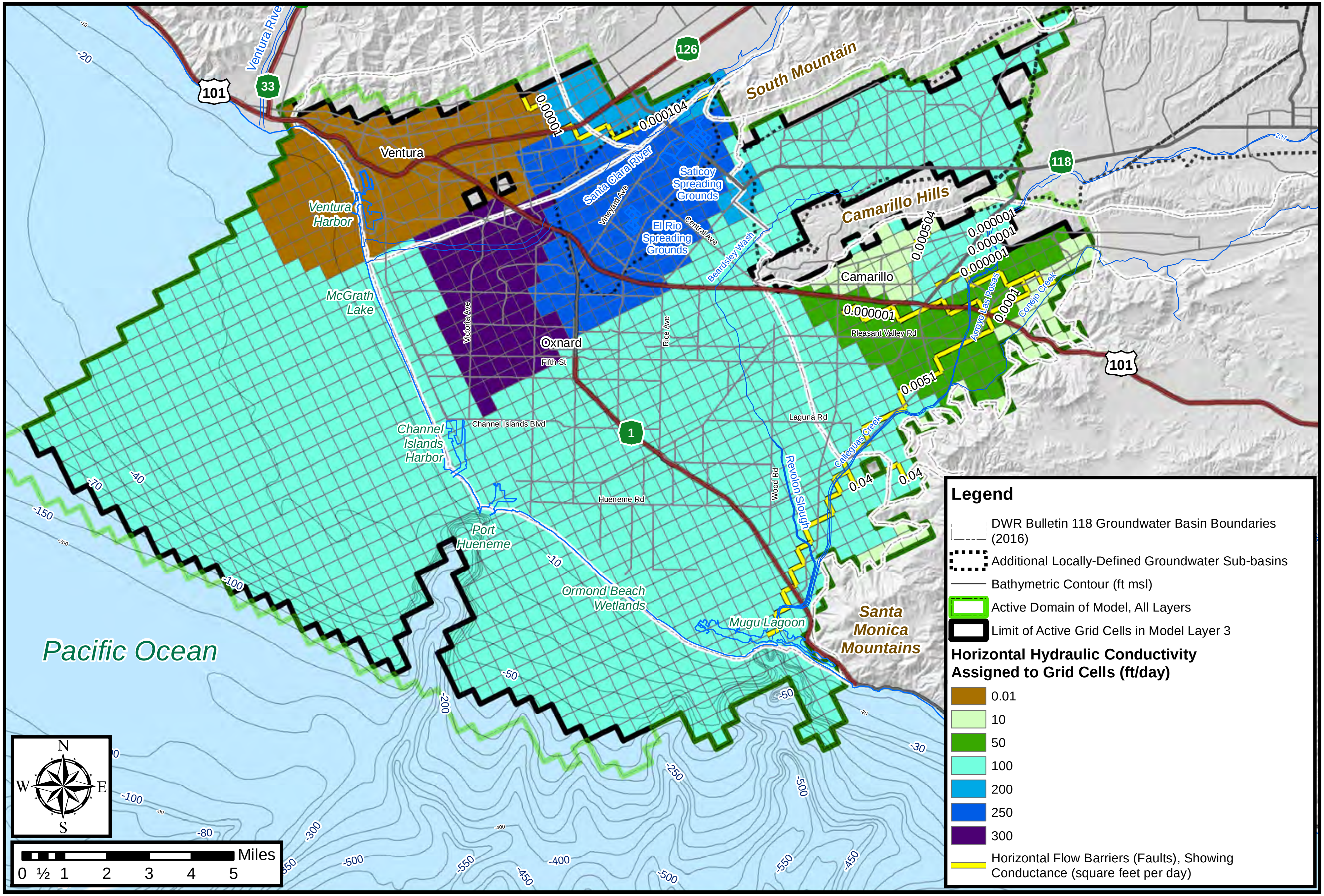


Figure 3-17. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 3

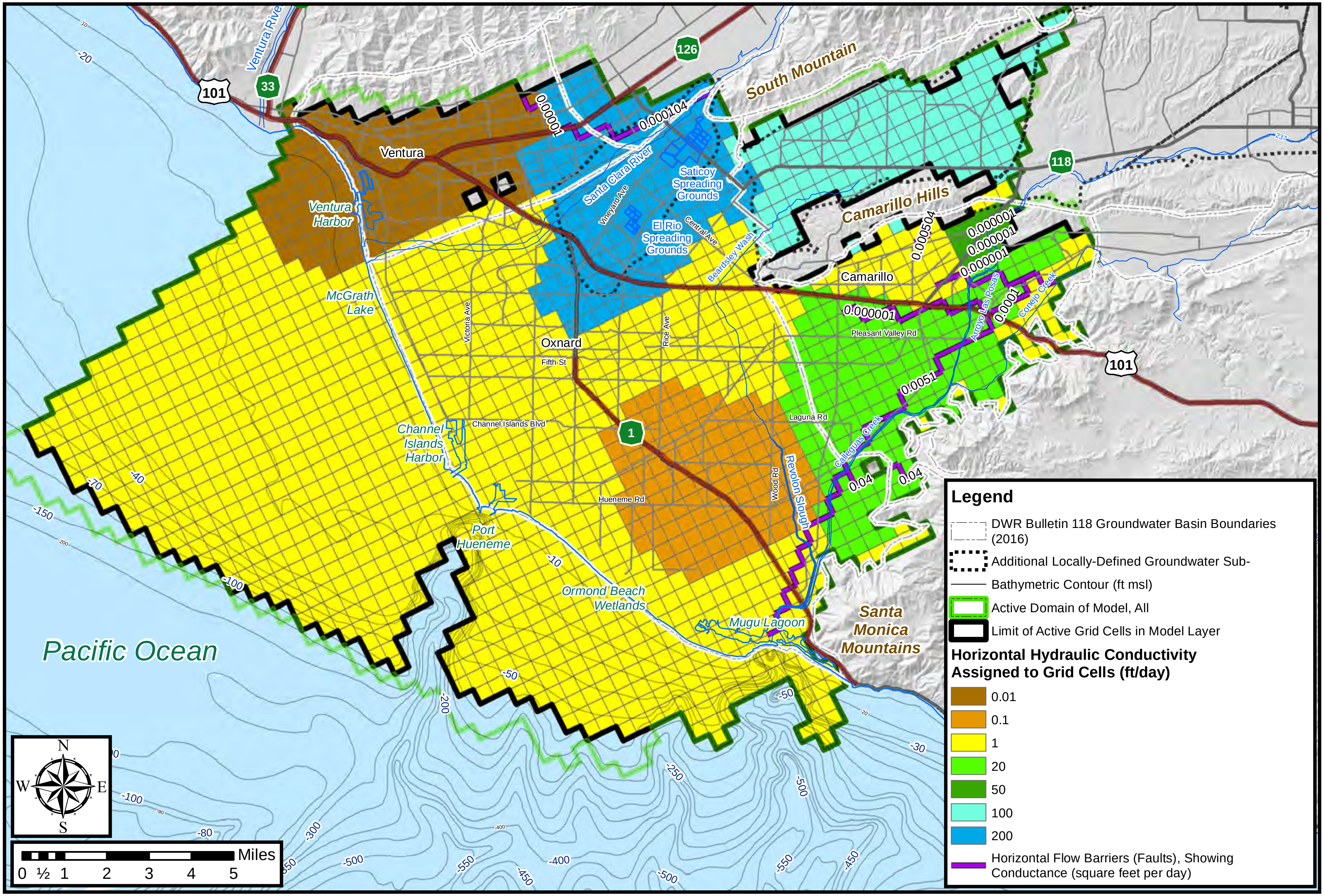


Figure 3-18. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 4

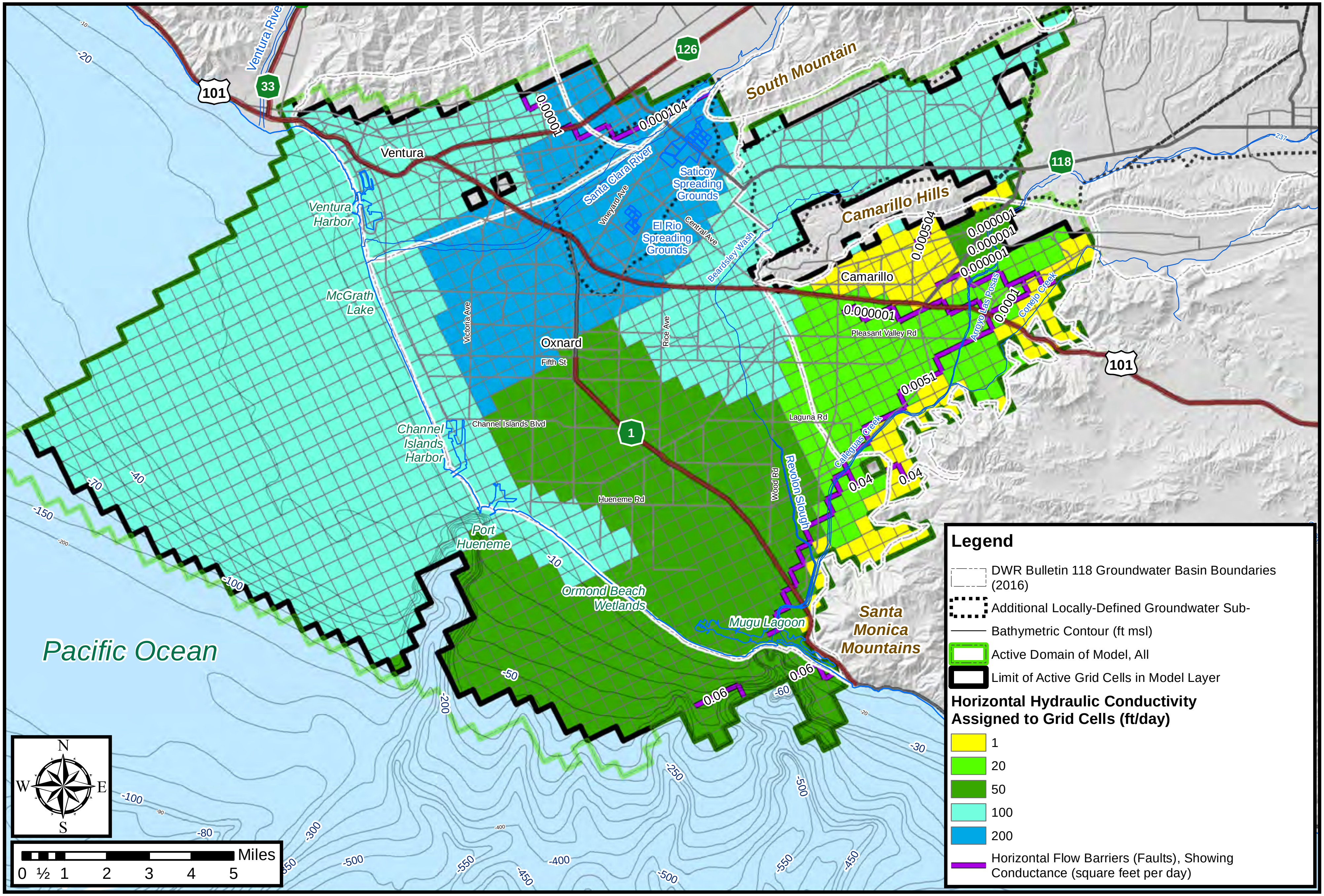


Figure 3-19. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 5

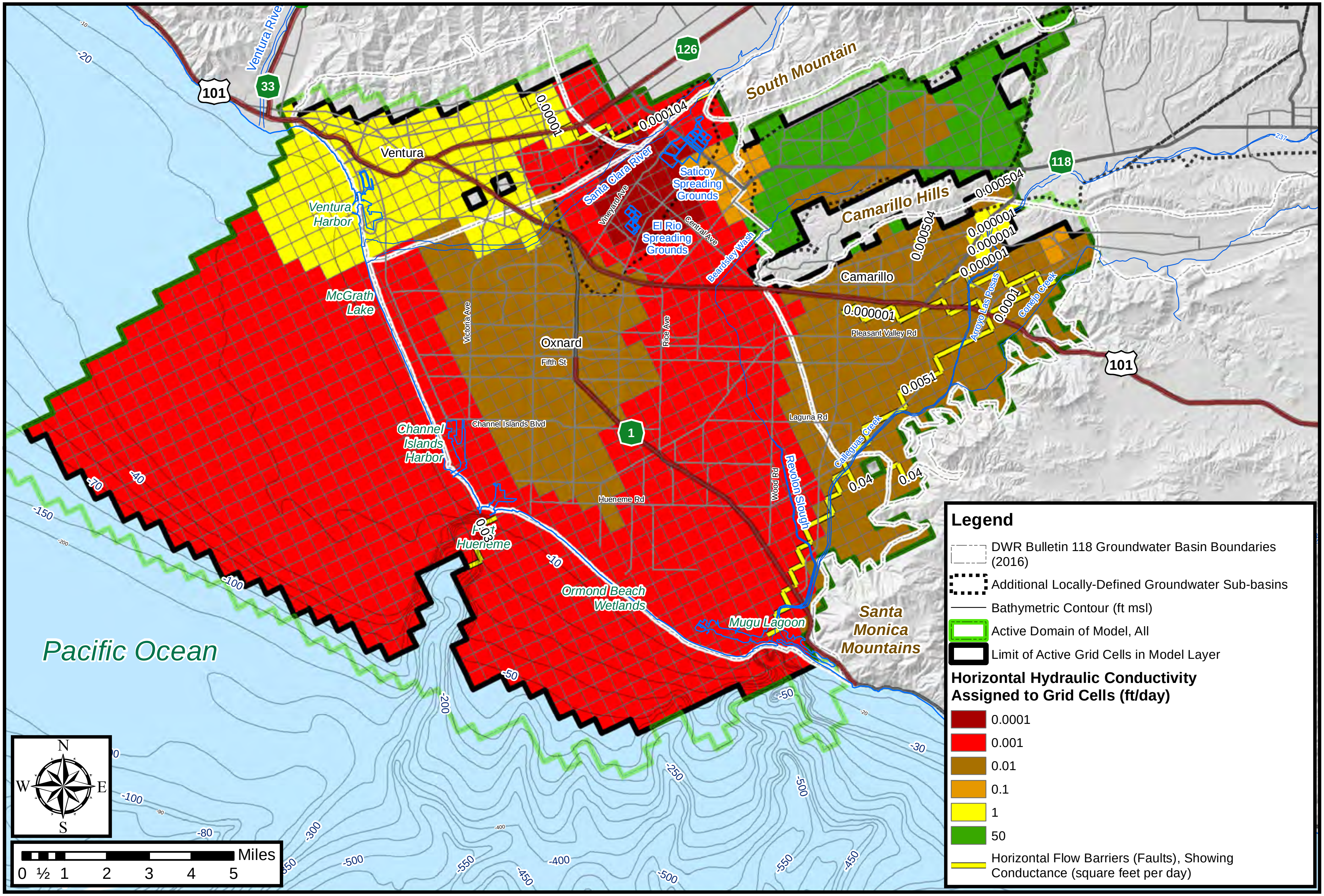


Figure 3-20. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 6

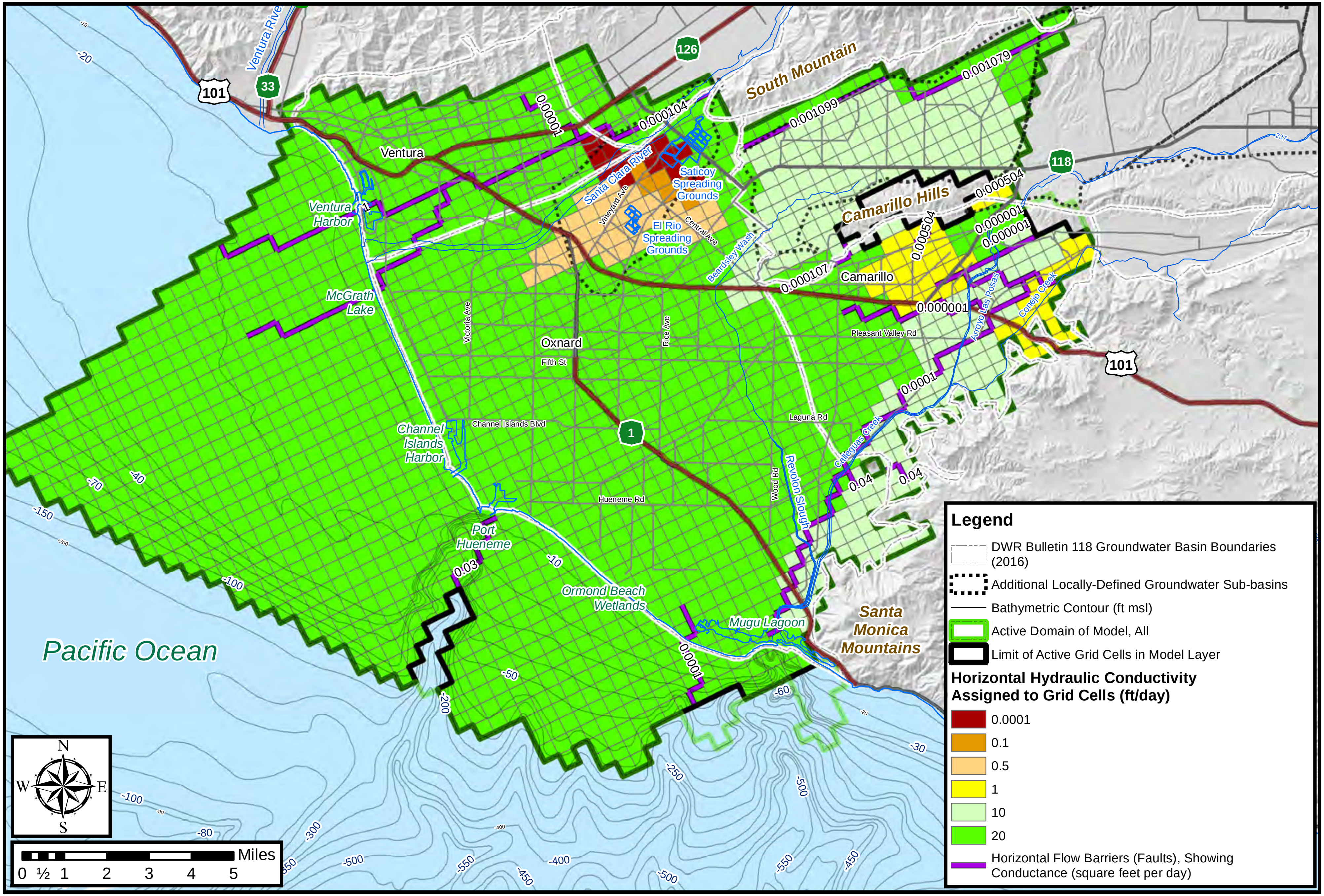


Figure 3-21. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 7

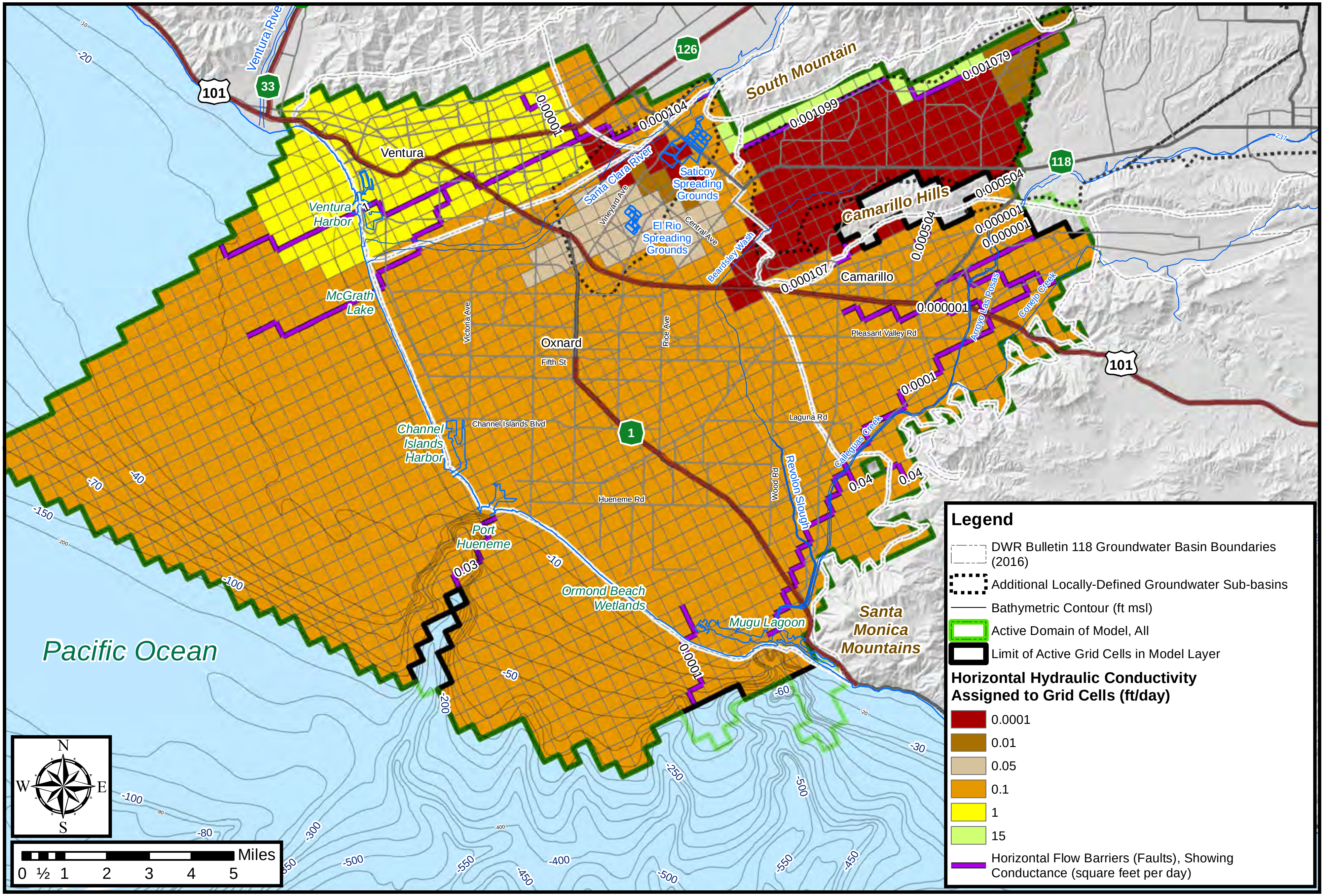


Figure 3-22. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 8

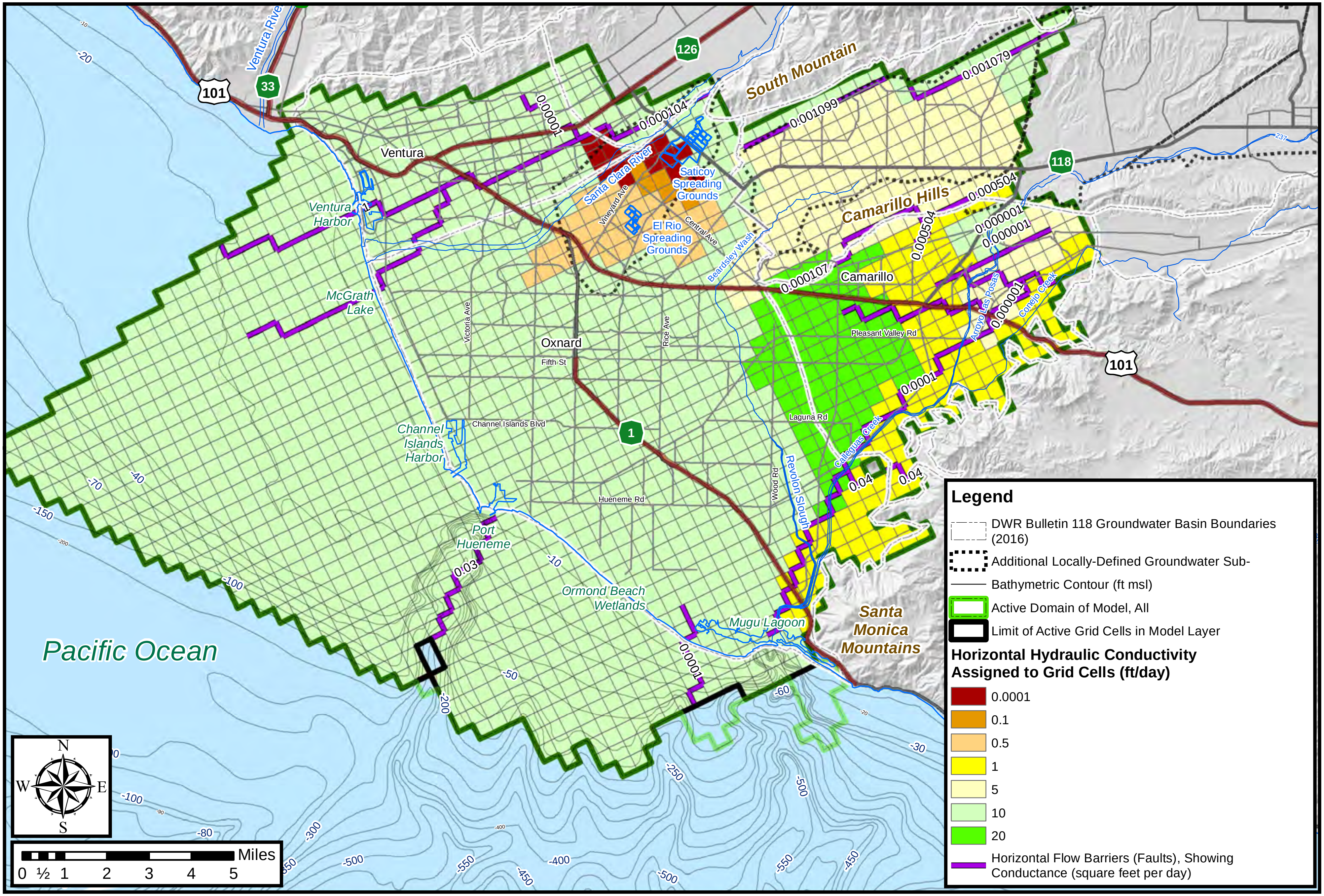


Figure 3-23. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 9

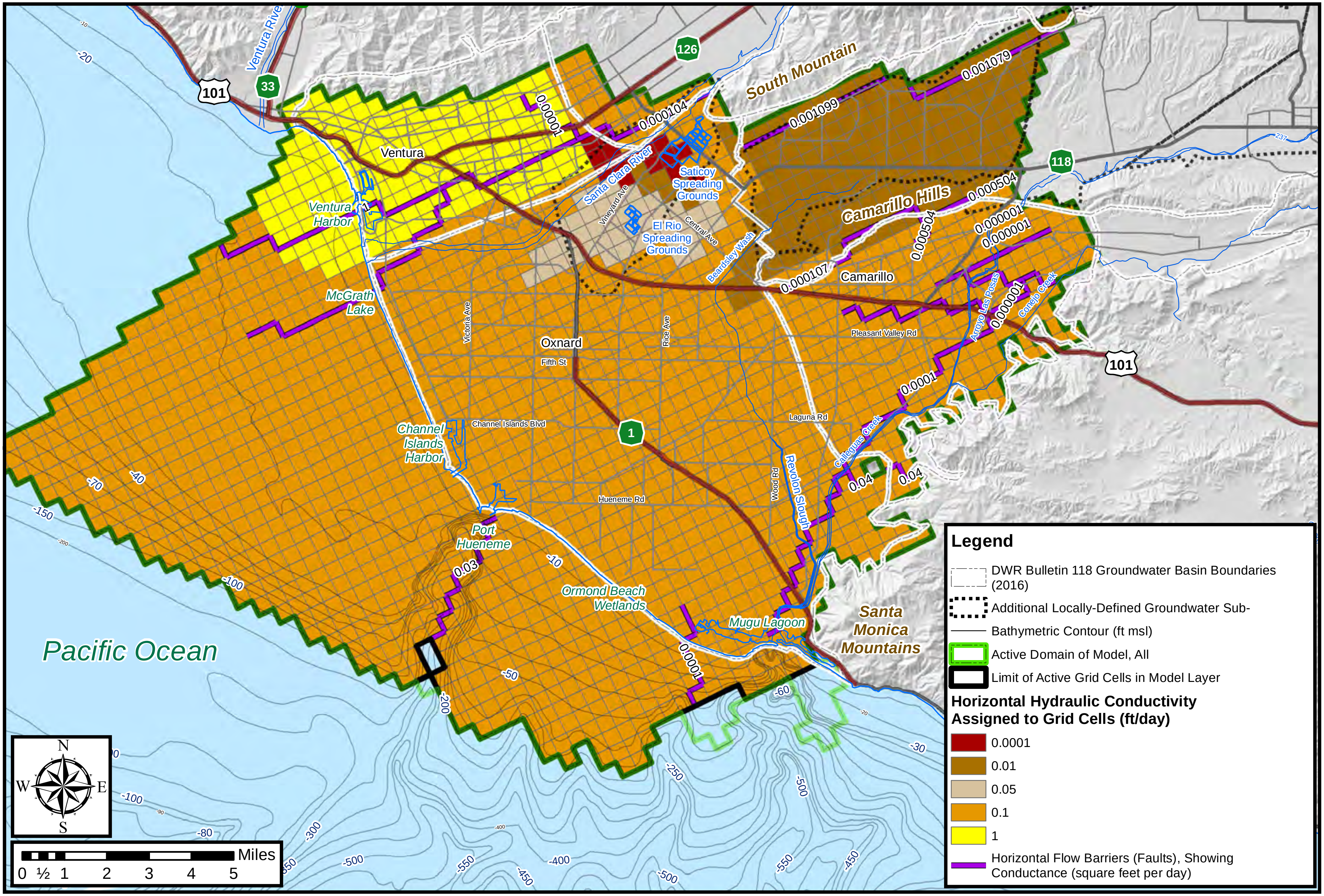


Figure 3-24. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 10

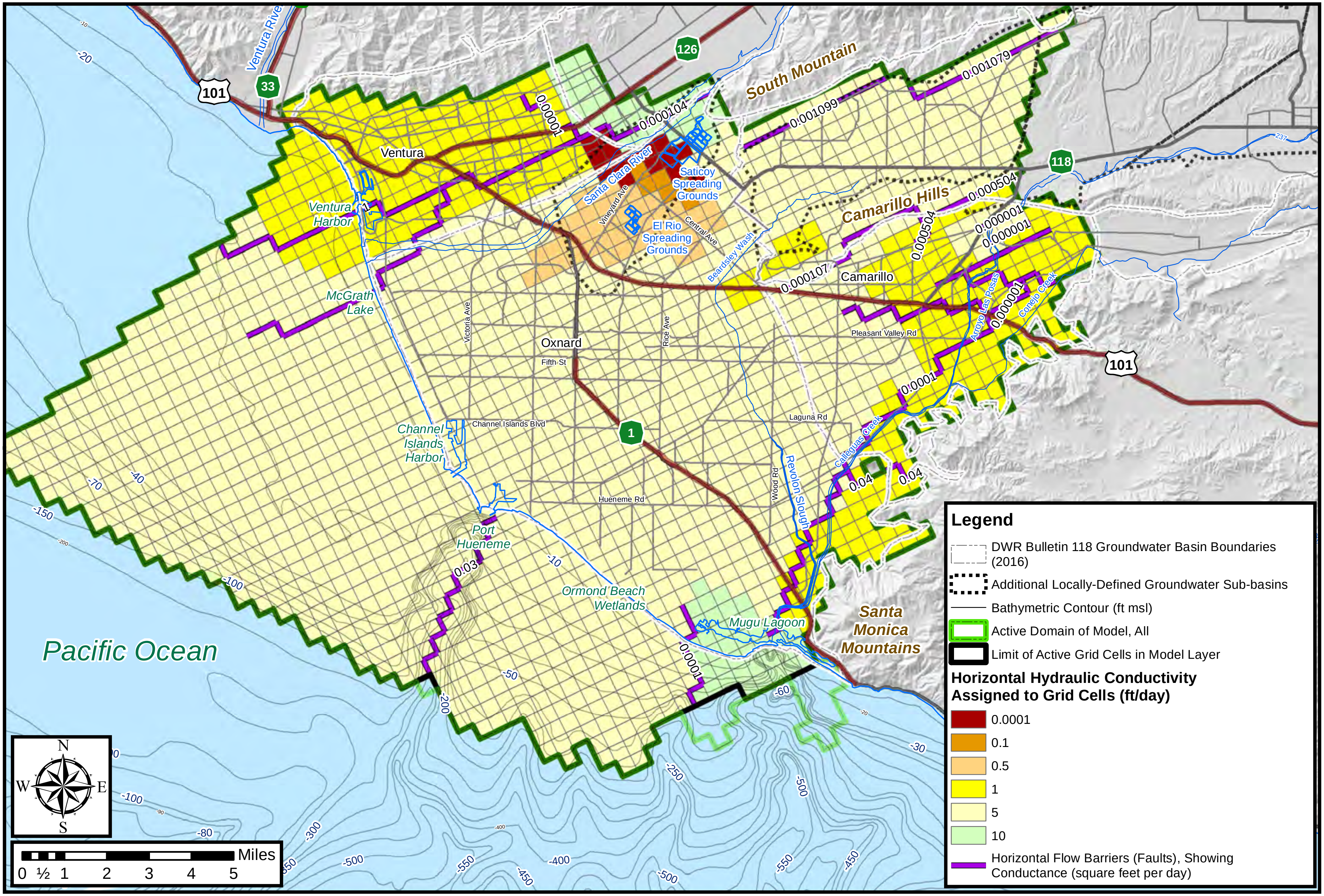


Figure 3-25. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 11

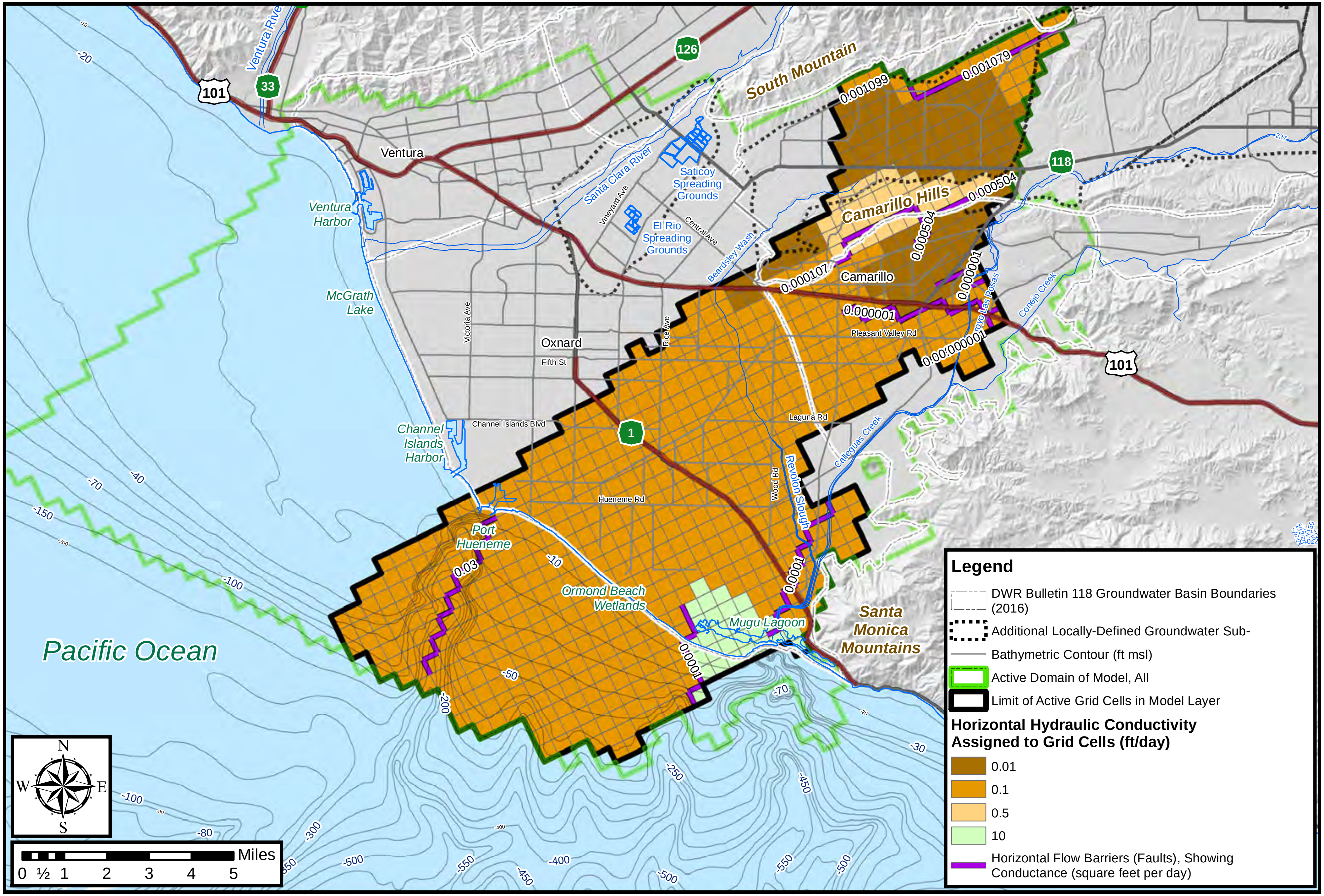


Figure 3-26. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 12

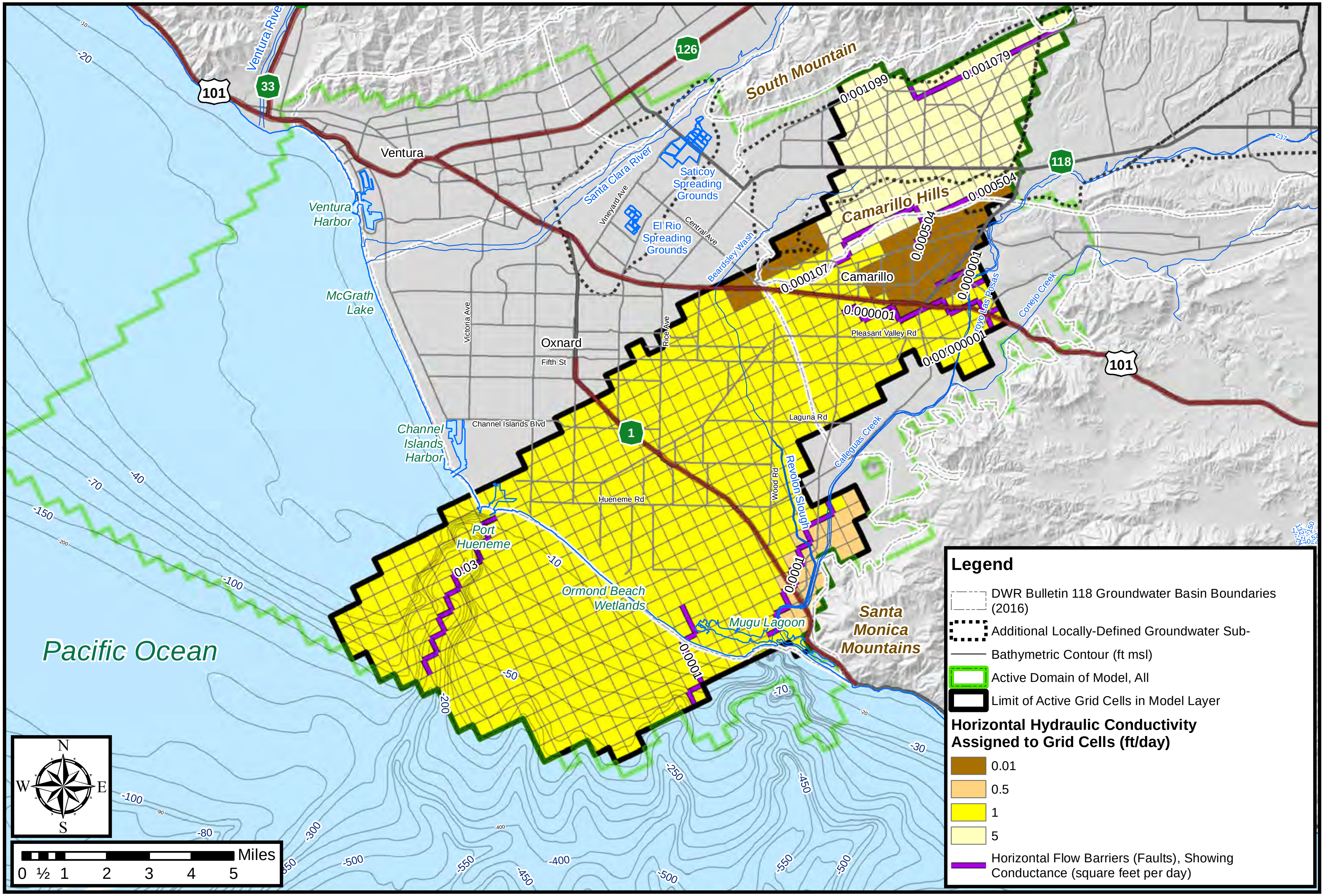


Figure 3-27. Horizontal Hydraulic Conductivity of Grid Cells and Conductance of Horizontal Flow Barriers in Model Layer 13

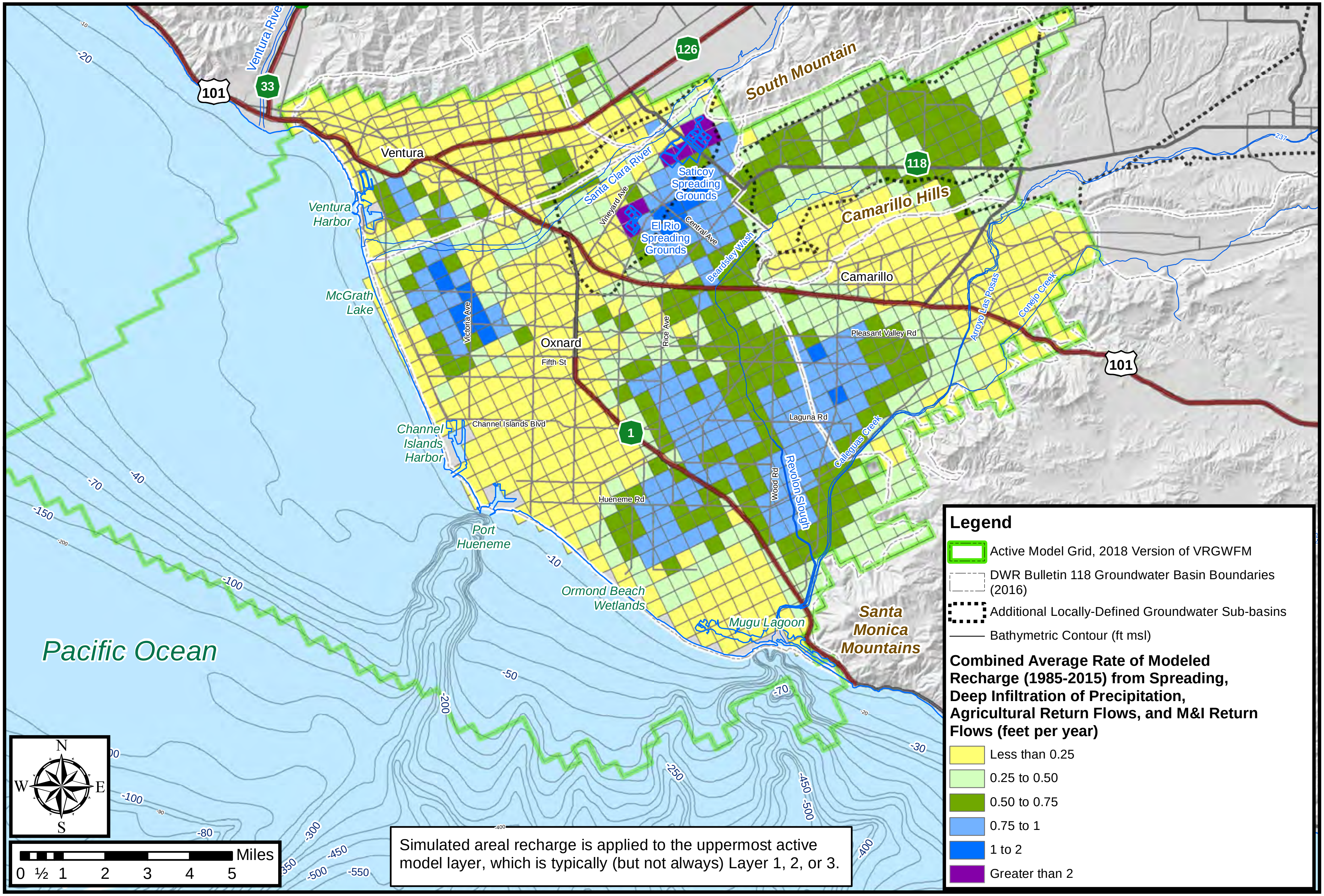


Figure 3-28. Simulated Average Areal Recharge Rates in Active Model Domain

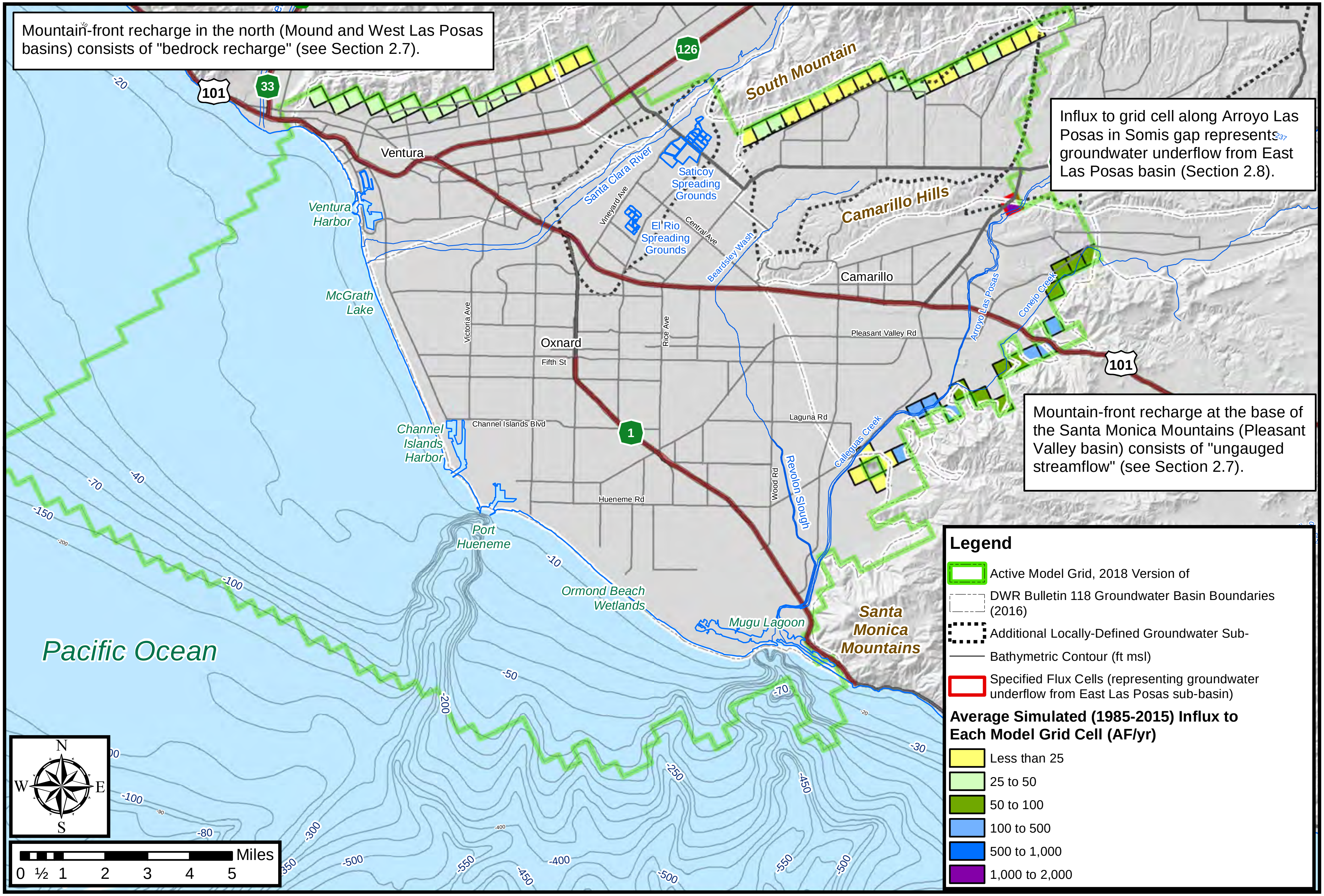


Figure 3-29. Simulated Average Mountain-Front Recharge Rate and Groundwater Underflow from Specified Flux Cells in Active Model Domain

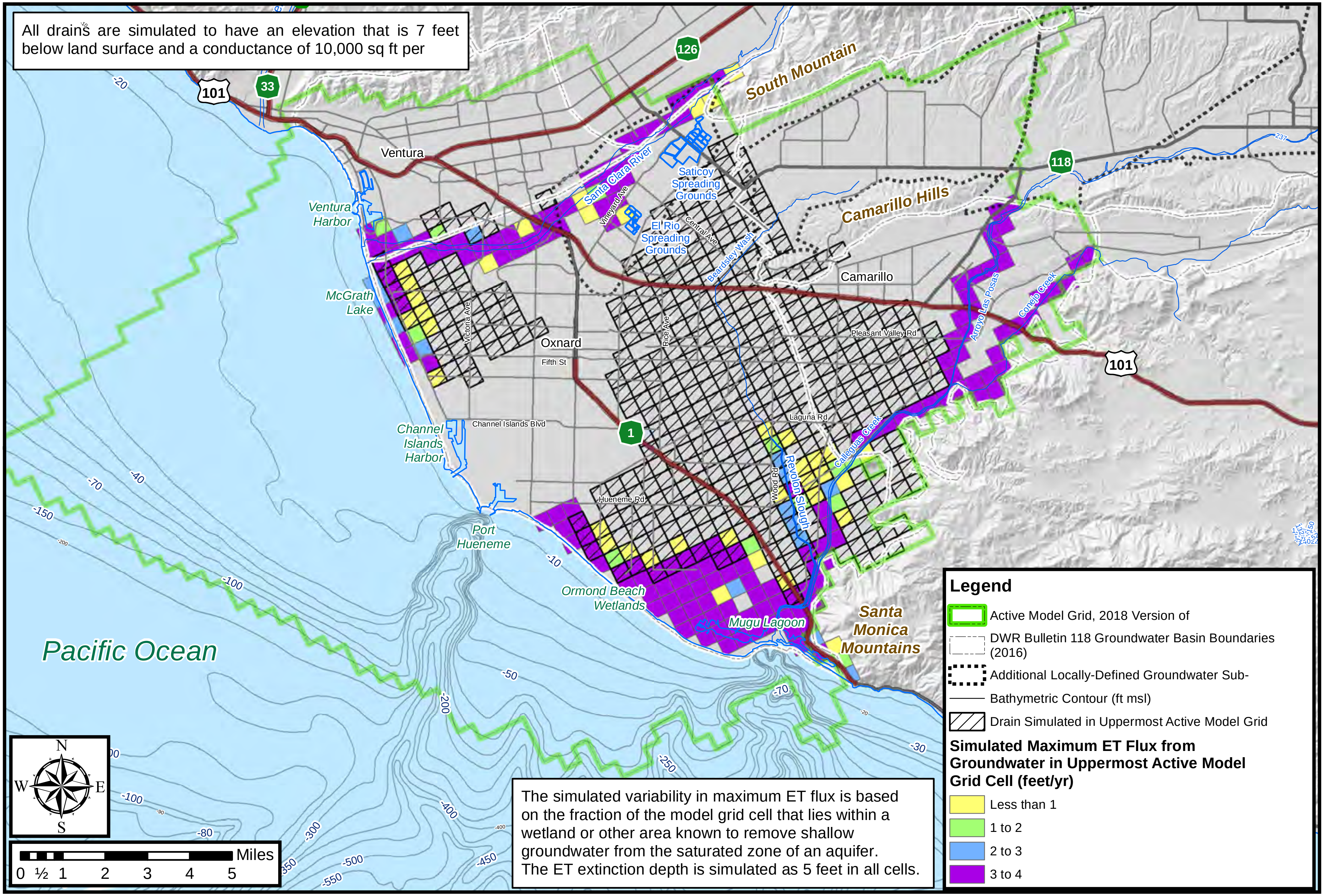


Figure 3-30. Model Grid Cells with Tile Drains or Evapotranspiration

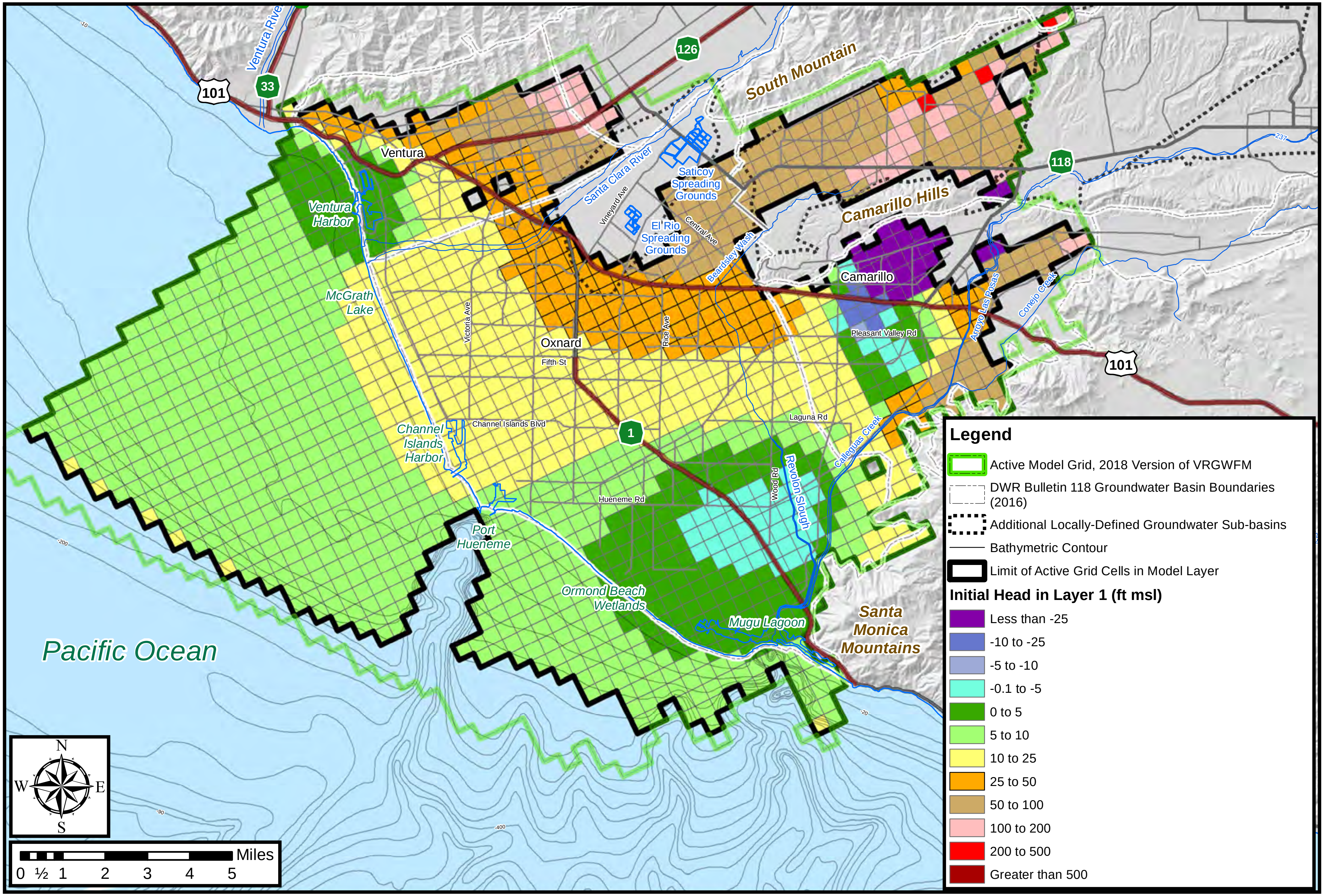


Figure 3-31. Initial Head in Model Layer 1, Representing the Shallow Groundwater System

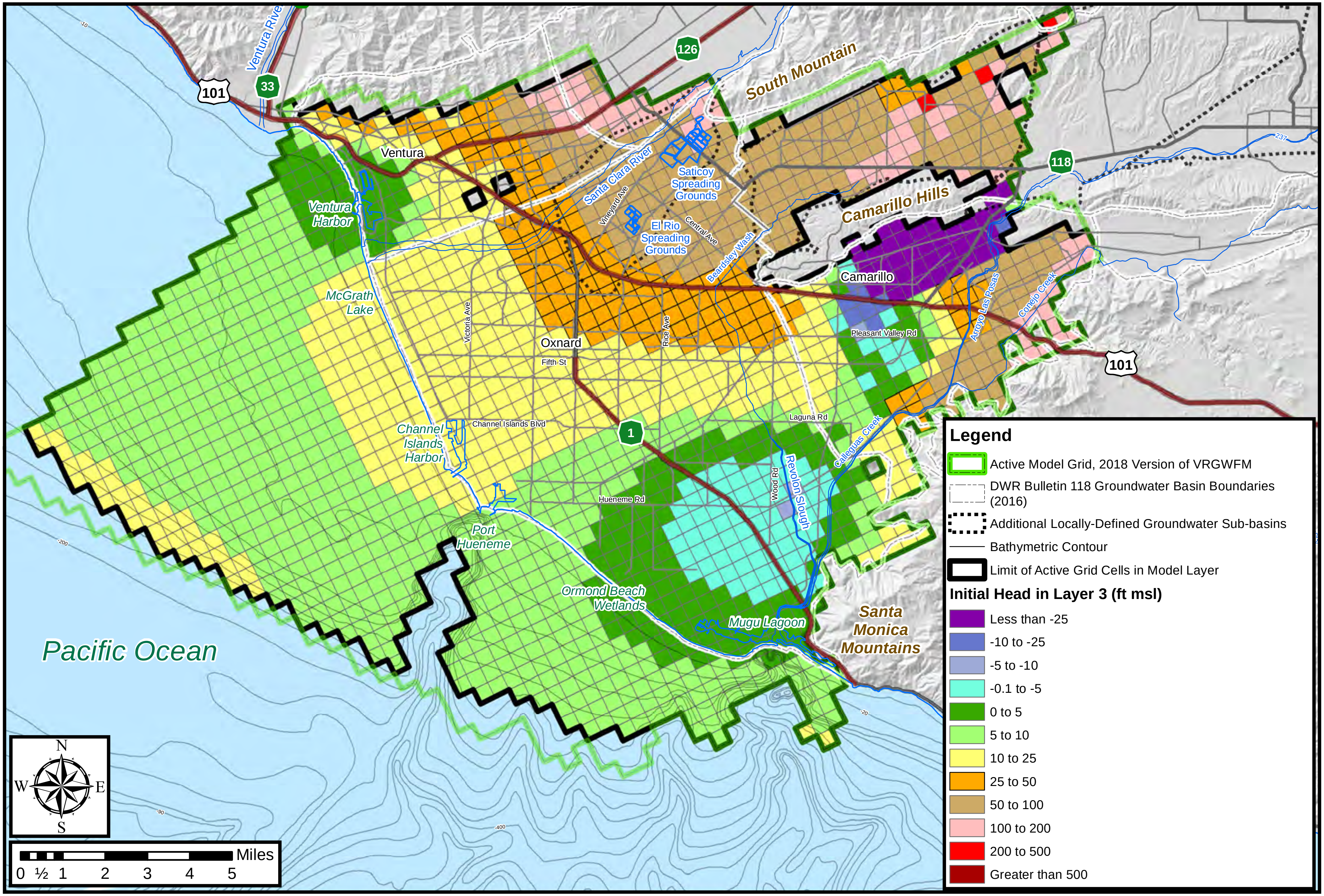


Figure 3-32. Initial Head in Model Layer 3, Representing the UAS

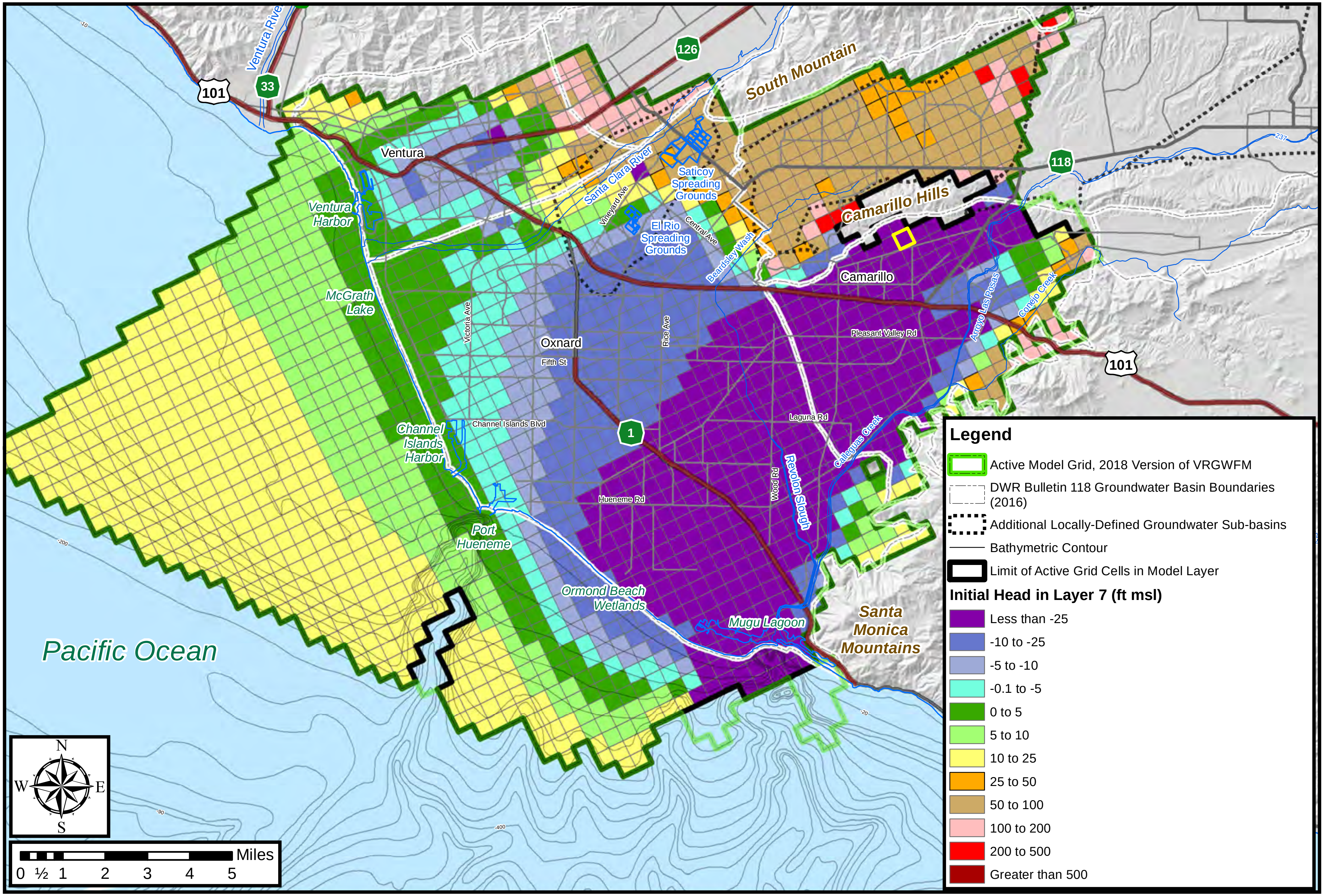


Figure 3-33. Initial Head in Model Layer 7, Representing the LAS

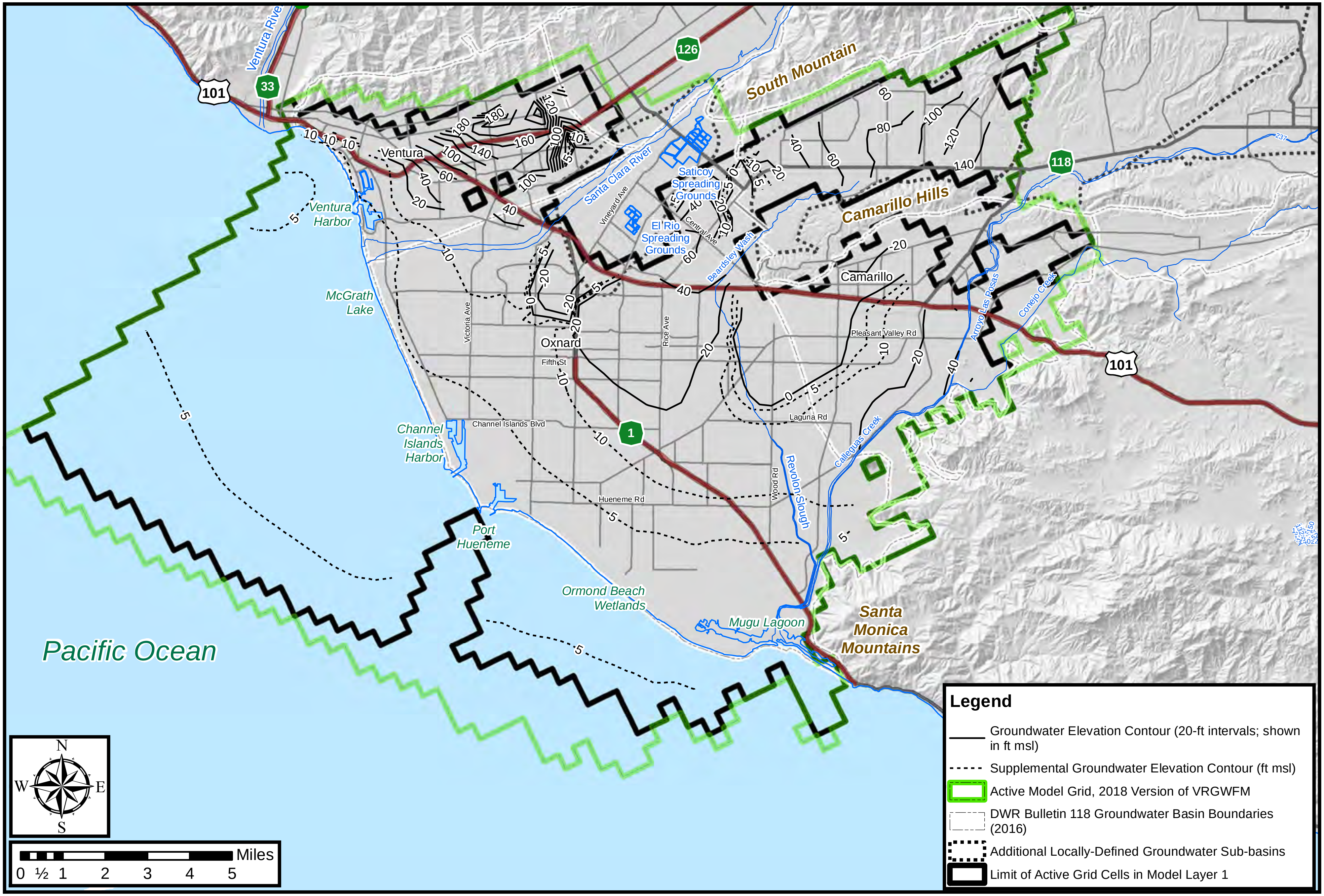


Figure 4-1. Simulated Groundwater Elevations in Layer 1, October 1991

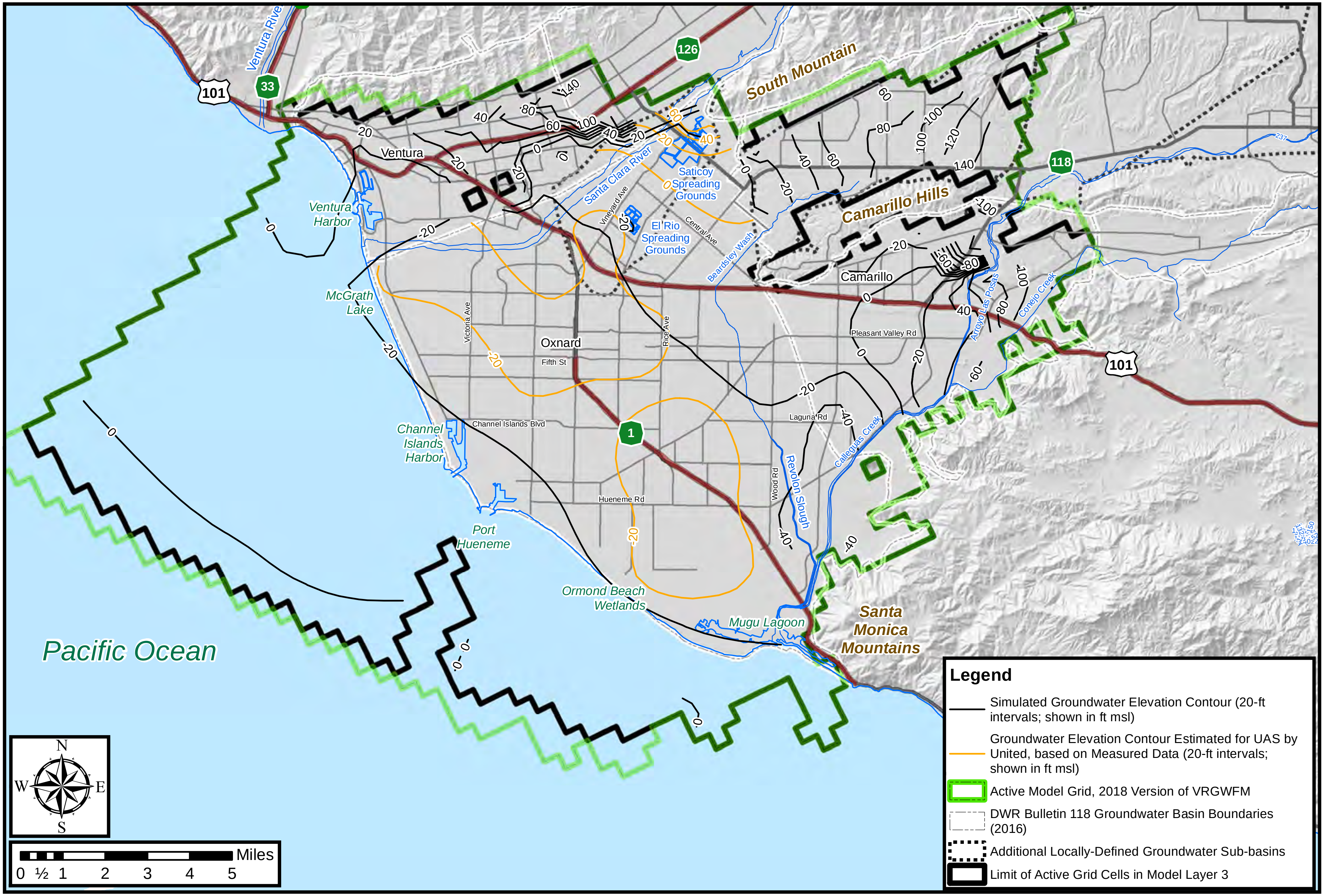


Figure 4-2. Simulated Groundwater Elevations in Layer 3, October 1991

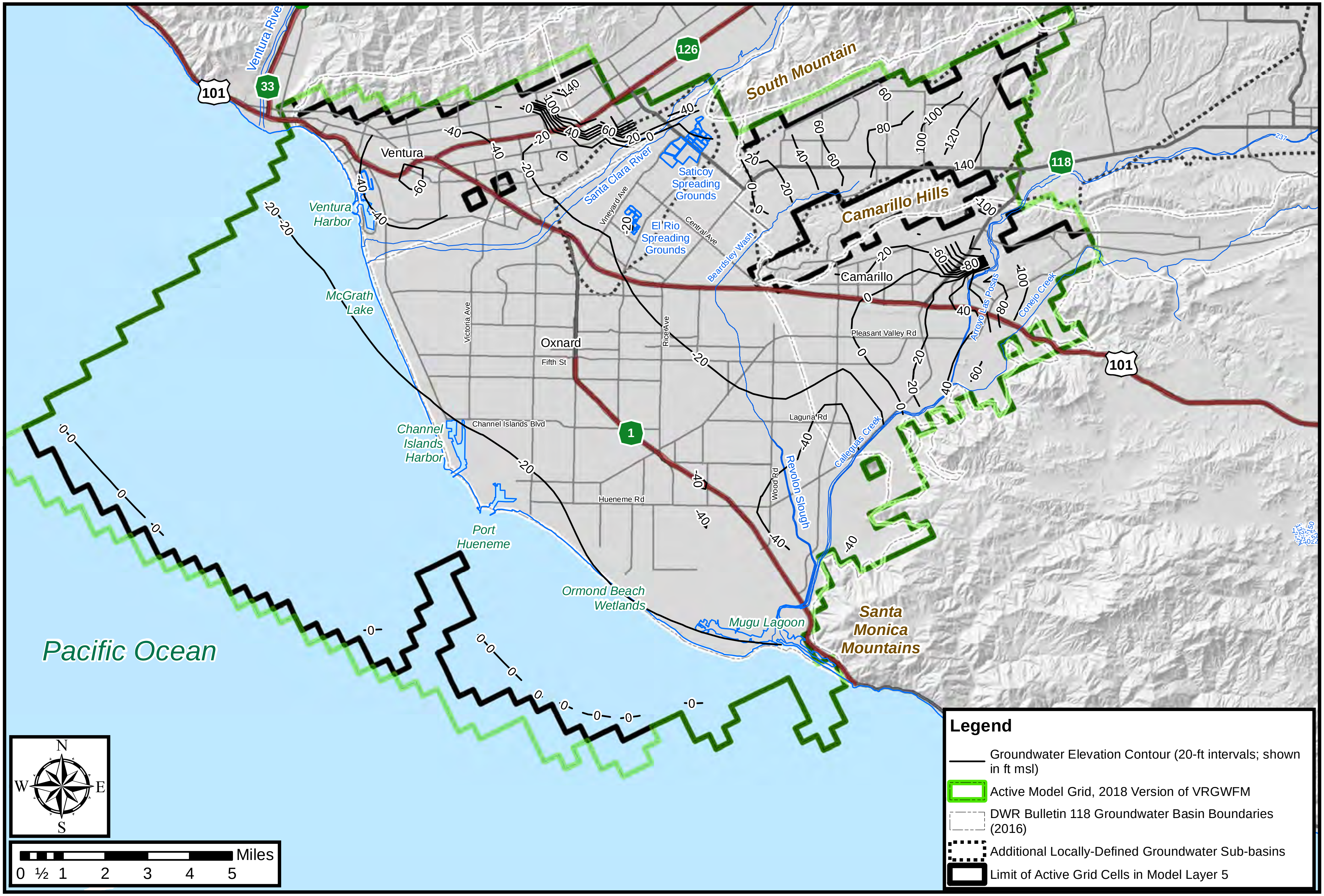


Figure 4-3. Simulated Groundwater Elevations in Layer 5, October 1991