Generally, groundwater flow is from a northern to southern direction, following the surface drainage and the slight but relatively consistent gradient of the basin (SWRCB, 1956; VRWC, 2015) (Figure ES-08). Groundwater levels in the UVRGB fluctuate seasonally with the highest water levels occurring in the winter to early spring and the lowest levels occurring in fall or winter (Figure ES-09). Groundwater levels do not display significant long-term temporal trends. Water level declines are seen during the droughts of the late 1980s and the 2010s (when historical lows were observed); however, the water levels rebound rapidly in the wet years that follow with complete basin refilling. The changes in groundwater storage from rapid cyclical draining and filling of most of the total basin storage is in stark contrast with most Basins in the State, in which the range of storage change is small compared to the total basin storage and storage changes are more gradual over time.

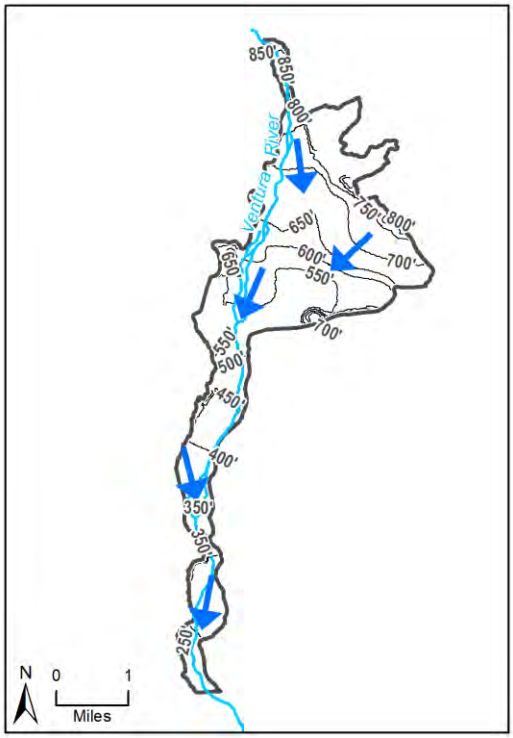

Figure ES-08: Groundwater Elevation Contours and Flow Directions

In general, due to the unconfined conditions of the groundwater, the quality of the groundwater in the UVRGB is heavily influenced by (a) the quality and quantity of surface water runoff that recharges the groundwater basin, (b) leaching of nutrients from fertilizers and manure, and (c) percolation of return flows from applied waters and septic system leachate. Nitrate is the primary groundwater quality concern in the UVRGB with some municipal wells exceeding the nitrate Maximum Contaminant Level in the Mira Monte area. Nitrate concentrations in groundwater within the gaining portions of the Ventura River (Casitas Springs Area and southern portion of the Santa Ana Area) are generally lower than the RWQCB Basin Plan water quality objective of 5 mg/L for surface water.

Possibly from Monterey formation as well?

Vent. Co. Environmental Health was testing nitrates to determine the source. Do they have results?

ES-5 Water Budget

The groundwater flow model was used to quantify water budgets for the historical, current, and projected conditions, including the evaluation of uncertainty due to climate change (Appendix H). As required by SGMA, potential effects of land use change and population growth were evaluated for the projected water budget. It was concluded that these factors are not anticipated to have a material impact on future water demand and the water budgets for the Basin because of land use policies and ordinances that greatly limit the potential for material growth in the Basin.

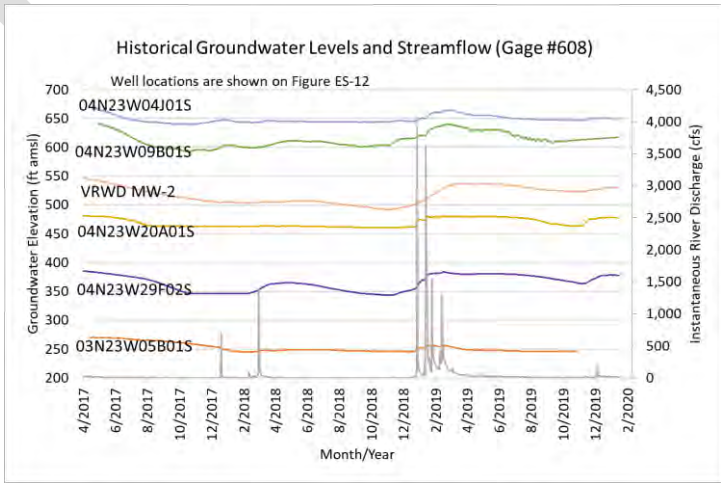

Figure ES-09: Groundwater Level Seasonal Fluctuations

SCM for ISW depletions were developed for the Foster Park Aquatic Habitat Area based on a 2012 field study that is considered to be the best available science for the Foster Park Aquatic Habitat Area (Hopkins 2013). This study established the potential for significant and unreasonable effects on steelhead when surface water flows decline below 2 cubic feet per second, as measured at Casitas Vistas Road Bridge (i.e., the southern basin boundary and location of USGS Stream Site 11118500). The minimum threshold is designed to prevent depletions of ISW that cause a degradation in habitat conditions that may be reasonably expected to lead to substantially stress steelhead and/or potential steelhead mortality (i.e., significant and unreasonable effects). The minimum threshold is ISW depletion that causes stream flow to decline to 2 or less cfs at Casitas Vistas Road bridge (USGS Stream Site 11118500, as shown in Table ES-04 below. The measurable objective is the same as the minimum threshold to minimize impacts on water supply for other beneficial users in the Basin.

Table ES-04: Minimum Thresholds and Measurable Objectives for ISW Depletion, Foster Park Habitat Area

Undepleted Flow (without groundwater pumping – derived from groundwater model)	Depletion Minimum Threshold and Measurable Objective	Goal
> 2 cfs	Undepleted flow minus 2 cfs	The minimum threshold and measurable objective seek to prevent depletions of surface water flow caused by groundwater pumping that would cause surface water flow to be less than 2 cfs when surface water flow would not be less than 2 cfs without pumping
< = 2 cfs	0 cfs	The minimum threshold and measurable objective seek to prevent depletions of surface water flow caused by groundwater pumping when surface water would already be 2 cfs or less without groundwater pumping

Significant and unreasonable effects on recreational beneficial uses are considered to be prevented if significant and unreasonable effects on GDEs are prevented because the presence of GDEs is a major reason for the recreational use of trails, preserves, etc. in the Basin.

ES-7 Monitoring Networks

The GSP Emergency Regulations require monitoring networks be developed to collect data of sufficient quality, frequency, and spatial distribution to characterize groundwater and related surface water conditions in the Basin, evaluate changing conditions that occur during implementation of the GSP, and for implementation of the SMC for the Basin. Monitoring networks should accomplish the following (§354.34(b)):

- **Demonstrate progress toward achieving measurable objectives described in the GSP**
- **Monitor impacts to the beneficial uses and users of groundwater**
- **Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds**
- **Quantify annual changes in water budget components**

Biological monitoring in the Foster Park Aquatic Habitat Area will be performed to assess performance of the ISW depletions sustainable management criteria. A work plan will be developed during fiscal year 2022 to layout the proposed monitoring activities. It is anticipated that the work plan will include a greater degree of monitoring activities leading up to the first five-year GSP evaluation to establish baseline information, followed by a more limited and streamlined monitoring program for the remainder of the GSP implementation period. The initial four-year "baseline" program may include field monitoring activities (e.g., field observations of instream habitat and aquatic species) and continuous in-situ water quality monitoring. It is anticipated that collected data will be correlated with flow measurements made by USGS and the City of Ventura. The study plan will detail a specific schedule, monitoring parameters, field methods, and data interpretation/evaluation methodology. UVRGA will develop the monitoring plan in coordination with the Ventura Watershed Adjudication parties to seek consistent potential monitoring activities that may be envisioned post-judgment. This monitoring may eventually be performed by others as part of implementation of a judgment to the adjudication. A report will be prepared at the conclusion of the baseline monitoring phase to inform the first five-year GSP evaluation.

Pursuant to section §352.6, monitoring data will be stored in UVRGA's Data Management System (DMS). Data will be transmitted to DWR with the GSP, annual reports, and GSP updates electronically on the forms provided by DWR.

ES-8 Projects and Management Actions

Seawater intrusion and land subsidence are not applicable sustainability indicators for the Basin. Therefore, projects or management actions are not needed to address these sustainability indicators.

Historical data and the modeling projections indicate that the measurable objectives for the chronic lowering of groundwater levels, reduction of groundwater storage, and degraded water quality sustainability indicators will be met without the need of projects or management actions. However, there is uncertainty concerning effects on domestic wells in the Basin. Therefore, a management action is included to collect more information about domestic wells. UVRGA will perform additional outreach to and survey domestic well owners in the Basin. The survey will be designed to collect information from the well owners about well status (active, backup, abandoned, destroyed), water uses (drinking water, fire protection, landscape, agricultural, etc.), historical well performance, groundwater levels, groundwater quality, well maintenance issues, and whether alternative sources of water are available. This information will be used to further evaluate potential effects on domestic wells relative to the groundwater level minimum thresholds. The first 5-year GSP evaluation will consider this information and the groundwater level minimum thresholds will be updated, if appropriate.

Projects and/or management actions are needed to meet the measurable objective for depletions of interconnected surface water. Two separate actions are needed to address direct and indirect depletions that could potentially cause undesirable results.

Direct ISW depletion by City of Ventura water extraction facilities in the Foster Park Aquatic Habitat Area will be addressed via the "Foster Park Protocols." The Foster Park Protocols consist of operational protocols for the City of Ventura extraction facilities in the Foster Park Aquatic Habitat Area that will address direct depletion of ISW. The Foster Park Protocols involve monitoring river gages and shutting down the City's extraction facilities when certain surface water flow thresholds are reached. The Foster Park Protocols are implemented pursuant to a settlement agreement between the City of Ventura and Santa Barbara Channelkeeper regarding the action titled Santa Barbara Channelkeeper v. State Water

Definitions of Key SGMA Terms

California Water Code

Sec. 10721

Unless the context otherwise requires, the following definitions govern the construction of this part:

BOLD OR UNDERLINE ALL WORDS

(a) Adjudication action means an action filed in the superior or federal district court to determine the rights to extract groundwater from a basin or store water within a basin, including, but not limited to, actions to quiet title respecting rights to extract or store groundwater or an action brought to impose a physical solution on a basin.

(b) Basin means a groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to Chapter 3 (commencing with Section 10722).

(c) Bulletin 118 means the department's report entitled California's Groundwater: Bulletin 118 updated in 2003, as it may be subsequently updated or revised in accordance with Section 12924.

(d) Coordination agreement means a legal agreement adopted between two or more groundwater sustainability agencies that provides the basis for coordinating multiple agencies or groundwater sustainability plans within a basin pursuant to this part.

(e) De minimis extractor means a person who extracts, for domestic purposes, two acrefeet or less per year.

(f) Governing body means the legislative body of a groundwater sustainability agency.

(g) Groundwater means water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water that flows in known and definite channels.

(h) Groundwater extraction facility means a device or method for extracting groundwater from within a basin.

(i) Groundwater recharge or recharge means the augmentation of groundwater, by natural or artificial means.

(j) Groundwater sustainability agency means one or more local agencies that implement the provisions of this part. For purposes of imposing fees pursuant to Chapter 8 (commencing with Section 10730) or taking action to enforce a groundwater sustainability plan, groundwater sustainability agency also means each local agency comprising the groundwater sustainability agency if the plan authorizes separate agency action.

(k) Groundwater sustainability plan or plan means a plan of a groundwater sustainability agency proposed or adopted pursuant to this part.

(l) Groundwater sustainability program means a coordinated and ongoing activity undertaken to benefit a basin, pursuant to a groundwater sustainability plan.

(m) In-lieu use means the use of surface water by persons that could otherwise extract groundwater in order to leave groundwater in the basin.

(n) Local agency means a local public agency that has water supply, water management, or land use responsibilities within a groundwater basin.

5,700

Ventura River Water District (VRWD)

VRWD is a small water district that supplies water to the area stretching from the southwestern edge of the City of Ojai down to the northern half of Oak View, and in the eastern half of Casitas Springs. VRWD serves a population of approximately 6,000 via approximately 2,150 service connections. Groundwater is VRWD's primary water supply source. VRWD also purchases surface water from CMWD, both as a backup source and as a regular source for customers in certain portions of the VRWD service area. VRWD was established in 1957 as a special district under State law, which gives authorization to exercise water supply and water management authority within its jurisdiction.

2.2 Description of Plan Area [§354.8]

This section provides a description of the plan area, including a summary of jurisdictional areas and existing water-resources monitoring and management programs in the Basin.

2.2.1 Summary of Jurisdictional Areas and Other Features [§354.8(a)(1),(a)(2),(a)(3),(a)(4),(a)(5), and (b)]

§354.8 Description of Plan Area. *Each Plan shall include a description of the geographic areas covered, including the following information:*

(a) One or more maps of the basin that depict the following, as applicable:

(1) The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins.

(2) Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.

(3) Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans.

(4) Existing land use designations and the identification of water use sector and water source type.

(5) The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.

(b) A section description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.

The geographic area covered by this GSP and managed by UVRGA includes the entire UVRGB (Department of Water Resources Basin 4-3.01) as defined by DWR Bulletin No. 118, "California's Groundwater," Update 2020 (DWR, 2020). The extent of UVRGB is shown on Figure 2.1-01. The Basin is located in the central portion of the Ventura River Watershed along the Ventura River near the communities of Casitas Springs, Mira Monte, and Meiners Oaks. The UVRGB is bordered by the Ojai and Lower Ventura River Groundwater Basins to the east and south, respectively (DWR Basin Nos. 4-002 and 4-003.02). No groundwater basins exist immediately west and north of UVRGB. The Ojai Basin is managed by the Ojai Basin Groundwater Management Agency (OBGMA). OBGMA is developing a GSP for the Ojai Basin. The Lower Ventura River Basin is a very low priority basin and is therefore not subject SGMA requirements.

Jurisdictional boundaries of various agencies located within UVRGA are depicted on Figure 2.1-02 and include:

Ventura River Watershed Adjudication (titled Santa Barbara Channelkeeper v. State Water Resources Control Board and the City of San Buenaventura (Los Angeles County Superior Court, Case No. 19STCP01176)

In 2014, Santa Barbara Channelkeeper filed a lawsuit against the City of Ventura and the State of California related to the balance between human and non-human use of the Watershed (Appendix D). Specifically, Channelkeeper asserted that the City's use of water from the Foster Park area (located within the UVRGB) violated the Reasonable Use Doctrine because the City's municipal use was harming the Southern California Steelhead. Ultimately, the Court of Appeal held that the reasonableness of the City's use had to be measured against all other users of the Watershed, and therefore allowed the City to bring into the lawsuit everyone currently extracting or who could extract water from the system in the future (cross-complaint).

In 2019, the City of Ventura entered into a settlement agreement with Santa Barbara Channelkeeper that includes certain flow and non-flow measures. The settlement agreement was executed in September 2019 and amended in August 2020. The flow measures are known as the "Foster Park Protocols" and involve monitoring river gages and shutting down the City's extraction facilities when certain surface water flow thresholds are reached. The Foster Park Protocols are relevant to this GSP because they contribute to addressing one of the six SGMA sustainability indicators: depletions of interconnected surface water. The Foster Park Protocols address direct depletion of the Ventura River by the City of Ventura's Foster Park water extraction facilities.

In 2020, certain adjudication parties developed a proposed physical solution to settle the cross-complaint. The proposed physical solution seeks to address the habitat conditions for the Steelhead population in order to return the habitat to good condition, and then maintain it. The Foster Park Protocols are a component of the proposed physical solution. The proposed physical solution has not yet been considered by the Court.

A future judgment will likely include aspects relevant to implementation of the GSP. There is no definitive timeline for a judgment. UVRGA will monitor, and to the extent possible, coordinate with the adjudication process during GSP implementation. Note that UVRGA is not a party to the lawsuit.

2.2.2.3 Conjunctive Use Programs [§354.8(e)]

§354.8 Description of Plan Area. *Each Plan shall include a description of the geographic areas covered, including the following information:*
(e) A description of conjunctive use programs in the basin.

Conjunctive use is a term used to describe the coordinated use of both surface water and groundwater resources. There are no formal conjunctive use programs in the Basin, although it is noted that MOWD and VRWD ~~and~~ operate their wells conjunctively with Lake Casitas surface water supplies. MOWD and VRWD rely principally on groundwater from UVRGB and increasingly utilize surface water from CMWD during dry periods when well yields decline. Variable groundwater pumping rates for MOWD and VRWD were incorporated into the water budgets for this GSP.

Groundwater is MOWD's primary water supply source. Water from CMWD is used as backup, such as during extended drought periods. MOWD was formed in 1948 as a special district under State law, which authorizes it to exercise water supply and water management authority within its jurisdiction. MOWD is a signatory member to the JPA Agreement forming the Agency and is represented on the Agency's Board of Directors.

- Ventura River Water District (VRWD) is a small water district that supplies water to the area stretching from the southwestern edge of the City of Ojai down to the northern half of Oak View, and in the eastern half of Casitas Springs. VRWD serves a population of approximately 6,000 via approximately 2,150 service connections. Groundwater is VRWD's primary water supply source. CMWD water is also used, both as a backup source and as a regular source for customers in some locations. VRWD is a signatory member to the JPA Agreement forming the Agency and is represented on the Agency's Board of Directors.

7,500

- Ventura Water (City of San Buenaventura) does not operate a public water system within the Basin boundary but operates wells in the southern portion of the Basin that supply its public water system in the City, which is located approximately 4 miles south of the Basin. The City of San Buenaventura is a signatory member to the JPA Agreement forming the Agency and is represented on the Agency's Board of Directors.

WHAT POPULATION SERVED

- **Local Land Use Planning Agencies:**
  - The County of Ventura has land use planning authority on unincorporated land overlying the Basin (Figure 2.2-01). The County is a signatory member to the UVRGA JPA Agreement and is represented on the Agency's Board of Directors.
  - The City of Ojai has land use planning authority over a small area (0.75 square miles) in the eastern corner the Basin (Figure 2.2-01). Implementation of the City of Ojai General Plan is expected to have a negligible effect on GSP implementation in the UVRGB because of the limited area within the Basin and because the overlap area and is not considered a primary groundwater recharge area due to the presence of shallow bedrock of the Sespe Formation or Ojai Conglomerate (Figure 3.1-25).
  - The City of San Buenaventura has land use planning authority in a small area (0.13 square miles) of land owned by the City in the southern part of the Basin (Figure 2.2-01). The City is a signatory member to the UVRGA JPA Agreement and is represented on the Agency's Board of Directors.
- **Environmental Users of Groundwater:** Riparian and aquatic habitats in the Basin also rely on groundwater and are referred to as groundwater dependent ecosystems (GDEs) in SGMA.

Two riparian GDE units were identified in the Basin: (1) South Santa Ana GDE Unit and (2) Foster Park GDE Unit. The riparian GDE units consist primarily of mixed hardwood and wetland habitats that are federally designated critical habitat for multiple species and support a number of other special status species.

Five Aquatic GDE areas were identified in areas of the Basin, although only two were determined to be susceptible to potential significant and unreasonable effect related to depletion of interconnected surface water by groundwater extractions. These two areas are the (1) Confluence Aquatic Habitat Area and (2) Foster Park Aquatic Habitat Area. The Confluence Habitat Area occurs in the southern portion of the Basin near the confluence of the Ventura River with San Antonio Creek. This habitat area is characterized by upwelling groundwater and

surface water are intimately interconnected in the Basin. The groundwater budget and flow conditions in the alluvial aquifer are dominated by interaction with the Ventura River, which provides most of the recharge (inflows) to the Basin as stream flow percolation in the northern portion of the Basin and receives most of the discharge (outflows) from the Basin as down valley groundwater flow that feeds springs (i.e., groundwater discharge) in the Ventura River in the southern portion of the Basin (hence, the name of the community of Casitas *Springs*). Groundwater extractions are secondary to groundwater discharge to the Ventura River except during dry periods when the spring flows decrease substantially due to low Ventura River stream flow entering the northern end of the Basin.

The thinness of the aquifer, high permeability, large north-south topographic gradient, and intimate interconnection between groundwater and surface water causes UVRGB to behave materially different than most groundwater basins in the State. The Basin groundwater levels and storage trends closely mimic surface water flows, with groundwater levels and storage exhibiting large and rapid fluctuations relative to the total saturated thickness and total groundwater storage, more so than perhaps any other groundwater basin in the State. During non-drought periods, the Basin fills up on the order of two out of every three years and significant surface water base flow is sustained by rising groundwater in the southern part of the Basin. During droughts, much of the Basin groundwater storage drains out naturally to the Ventura River within the first few years causing a significant decrease in Ventura River base flow in the lower part of the Basin.

To facilitate discussion within the GSP, the Basin has been subdivided into six hydrogeologic areas based on the hydrogeology, stratigraphy, and primary recharge and discharge processes (Figure 3.1-01 and discussed in detail in Sections 3.1.1 and 3.1.3). For ease of discussion, the text will refer to these areas in the following sections. Four of the hydrogeologic areas– the Kennedy, Robles, Santa Ana and Casitas Springs Areas – run north to south along the Ventura River corridor and were delineated primarily based on groundwater-surface water interaction characteristics. The Mira Monte/Meiners Oaks Area located east of the Ventura River underlain by older alluvium that generally above the water table; many wells in this area are believed to extract groundwater from bedrock formations such as the Ojai Conglomerate that do not have significant hydraulic connectivity with the Ventura River. The groundwater-bearing formations in the Mira Monte/Meiners Oaks Area have much lower permeability compared to the younger deposits along the Ventura River. The Terraces Area west of the Ventura River consists of alluvial deposits that are elevated above and separated from the Ventura River floodplain by bedrock; therefore, groundwater in the Terraces Area has very limited hydraulic connection with the rest of the Basin.

3.1.1 Regional Hydrology

3.1.1.1 Precipitation, Topography and Watershed Boundary [§354.14(d)(1)]

§354.14 Hydrogeological Conceptual Model.
(d) Physical characteristics of the basin shall be represented on one or more maps that depict the following:
(1) Topographic information derived from the U.S. Geological Survey or another reliable source.

The UVRGB is located within the Ventura River Watershed and lies under and adjacent to the northern part of the Ventura River. The Ventura River Watershed encompasses about 227 miles in northwest Ventura County with a small portion of the watershed in the southeastern edge of Santa Barbara County (Figure 3.1-02). The Ventura River runs through the center of the watershed, draining numerous

water storage capacity to less than 500 AF (USBR, 2000; Entrix, 2001). The removal of the dam was authorized in 1998, but removal is still pending.

Casitas Reservoir is the largest reservoir within the watershed. The Casitas Dam was constructed in 1959 by the United States Bureau of Reclamation (USBR), providing a maximum storage capacity of ~~254,000~~ AF (Entrix, 2001) with a long-term average demand of 17,500 AF (VRWC, 2015). Water is diverted from the Ventura River via the Robles Diversion and delivered to the reservoir through the Robles Diversion Canal, a concrete-lined 5.4-mile canal (EDAW, 1978). The diversion works consist of a cutoff wall, forebay basin, spillway, fish passage structures, and diversion canal to Casitas Reservoir (CMWD, 2005). Typically, a little less than half of the reservoir supply comes from the Ventura River. Runoff from Coyote and Santa Ana sub-watersheds provides the remainder of its supply (Entrix, 2001). Diversions from Ventura River to Casitas Reservoir are typically from January to March when the river flows are sufficient to meet certain operational regulatory requirements designed to address upstream steelhead migration impediments between the diversion works and just north of the Santa Ana Boulevard bridge. The diversion system has a nominal capacity of 500 cfs (CMWD, 2021). Environmental considerations and physical operating conditions govern operation of the diversion structure under different hydrologic situations. The Biological Opinion (BO) from the National Marine Fisheries Service (adopted in 2004) modified previous requirements for passage of flows for fish habitat. This was further modified during the recent drought to allow increased diversions to the Lake when storage levels in the Lake are low (CMWD, 2021). Within the Migration Period (Jan. 1st to June 30th) outlined in the BO, available flows above 30 cfs up to 500 cfs can be diverted down the Robles Canal, with flows at or below 30 cfs, bypassing the diversion structure and flowing downstream. Additional diversion rules are applied to maintain flows during and after stormflow events within the fish migration season. Outside of the migration period (July 1 to December 31), available flows over 20 cfs up to 500 cfs can be diverted down the Robles Canal.

In addition to the Robles Diversion, there is a privately owned surface water diversion located north of the Robles Diversion (Figure 3.1-08) used for agricultural purposes.

Water from the Lake Casitas Reservoir is the primary water supply for many users in the Basin. Lake Casitas' water is also blended with poorer quality groundwater to improve water quality and extend supplies (VRWC, 2015). The reservoir is carefully managed to maintain supplies during a dry period equivalent to the historical 21-year dry period from 1945 to 1965, the longest dry period on record. While the lake has not yet been put to a "21-year dry period test," it has been a reliable source of water in many multi-year dry periods when numerous wells were dry and there was little flow in the Ventura River (VRWC, 2015).

The Foster Park Subsurface Dam, completed in 1908 by the Ventura County Light and Power Company, is a partial dam extending 973 ft across the Ventura River at a depth ranging between 5 ft to 65 ft with a 300-ft gap on the east side (URS, 2003; USACE, 2004). This partial dam is located just upstream of the boundary between the Upper and Lower Ventura River Groundwater basins. The City of Ventura formerly captured surface flows via a surface diversion. However, this facility has been closed since 2000, due to natural channeling of the Ventura River that has bypassed the structure (Entrix, 2001; VRWC, 2015). The City of Ventura currently extracts water via a subsurface collector consisting of two perforated pipes installed in the subsurface on the upstream side of the dam and several nearby wells (i.e., the "Nye Wells").

3.1.1.3 Imported Water [§354.14(d)(6)]

of the basin (e.g., published geologic maps such as Dibblee, 1987, 1988; and the USGS Earthquake Hazards Program (USGS, 2020). Faulting can offset bedrock and older (deeper) alluvium deposits, potentially form subsurface barriers to water flow, and force groundwater to daylight to ground surface and discharge into surface water channels.

Within this regional setting, the UVRGB extends from just downstream of the confluence of the Matilija Creek and the North Fork Matilija Creek (Ventura River Mile 16.2) to Foster Park (Ventura River Mile 5.9). In the north and west, the UVRGB is bounded by tertiary bedrock outcrops (Figure 3.1-10a). The boundary between the UVRGB and adjacent Ojai Basin is approximately situated between Camp Comfort to the south and Arbolada to the north. South of the Ojai Basin boundary, the UVRGB is bounded by the Arroyo Parida-Santa Ana Fault and bedrock outcrops. The UVRGB is bounded by the Lower Ventura River Groundwater Basin to the south.

Figures 3.1-10a and 3.1-10b show the surface geology and major fault systems within and surrounding the UVRGB (USGS, 2006, 2015). The UVRGB is filled with Quaternary-aged alluvium of largely fluvial origin, with sediment derived from the weathering and erosion of the surrounding mountains. These deposits consist of older late Pleistocene-aged, dissected sediments and younger Holocene-aged sediments. Active sedimentation occurs as stream-channel deposits of sand and gravel, such as along Ventura River and its tributary creeks; alluvial fan deposits of gravel; and floodplain alluvium of clay, silt, sand, and gravel (e.g., Dibblee, 1987, 1988).

The UVRGB extends as a north-south trending narrow and shallow erosional trough, filled with young alluvium deposited by the Ventura River between Camino Cielo Road in the north and the United States Geological Survey (USGS) gauging station at Casitas Vista Bridge in the south. The young alluvial deposits are highly permeable (hydraulic conductivity as high as approximately 3,500 feet per day) and have relatively high storage coefficients (specific yield as high as approximately 14%). North of approximately Highway 150, the young alluvial deposits are typically underlain by older alluvium that has significantly lower permeability and water storage capabilities. South of approximately Highway 150 the Ventura River ~~may~~ has eroded completely through the older alluvium deposits and the young alluvial deposits are in direct contact with the bedrock (as evidenced from the bedrock outcrops along the edges of the river floodplain).

The eastern portion of the UVRGB extends east from the Ventura River encompassing the communities of Meiners Oaks and Mira Monte and is underlain by older alluvium deposits that are generally above the water table and various bedrock formations which have limited hydraulic connectivity with the Ventura River. Many wells in the Mira Monte – Meiners Oaks Area may be screened in the Ojai Conglomerate, a bedrock formation that has low permeability and water storage capability (for example, the hydraulic conductivity at the new VRWD Well No. 6 was estimated to be ~3 ft/day compared to hydraulic conductivity along the Ventura River of >1,000 ft/day). The "Terrace" areas west of the Ventura River is also underlain by older alluvium that is uplifted above the regional water table and, hence, is largely hydraulically disconnected from the principal aquifer of the Basin. Wells in the Terrace Area appear to generally draw water from the underlying Sespe Formation.

The relatively young (Holocene- to late Pleistocene-aged) surficial sediments unconformably overlie older Pleistocene- and Tertiary-aged consolidated sedimentary rocks (discussed in more detail in Section 3.1.3.1 and shown on cross-sections in Figures 3.1-16 through 3.1-18). The older bedrock units consist of sedimentary rocks of dominantly marine deposition, which are exposed to ground surface in the mountainous regions that surround the basins (e.g., Dibblee, 1987; USGS, 2006, 2015).

indicating that these samples may have been collected from wells that produce groundwater from a bedrock formation. Groundwater from the well in the Terraces Area has a sodium-chloride type (and total dissolved solids [TDS] >5,000 milligrams per liter [mg/L]), which is representative of older groundwater. Given the relatively unique water type of this well in the Terraces Area, the geochemistry suggests this area has a low degree of hydraulically connectivity with the remainder of the UVRGB.

Groundwater Quality

The UVRGB has historically maintained generally good water quality. The Regional Water Quality Control Board's Basin Plan also establishes groundwater quality "objectives" as "the allowable limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area" (RWQCB-LA, 2019). The groundwater quality objectives are shown in the Table 3.1-02.

Figures 3.1-27 and 3.1-28 show median concentrations for nitrate (as N) calculated over data available from 1975 to 2019 (long-term) and data available from 2008 to 2019 (recent), respectively. Chemographs for select wells with good temporal data coverage are shown for each hydrogeologic area. Wells with median nitrate higher than the water quality objective (10 mg/L as N) are shown in red and labeled. Nitrate concentrations in the Mira Monte/Meiners Oaks Area tend to be the highest, with several wells showing historical and recent nitrates above the water quality objective. Some wells in the Robles Area also show elevated nitrate levels, though these have typically been below the water quality objective. Some of these wells (e.g., 04N23W16C08S) show higher nitrate concentrations during the recent drought (2012-2016), when there was less recharge from fresher quality surface water. Elevated nitrate concentrations in groundwater have been found in areas of Tico Road and Mira Monte, as well as the northern portion of the Robles Area, where several sources including equestrian facilities, fertilizing operations, and septic systems may contribute to the nutrient loading in these areas (DBSA, 2010b). Nitrate concentrations in the Kennedy, Santa Ana, and Casitas Springs areas tend to be low and well below the water quality objective. Note that there is sparse data available in recent years in the Santa Ana Area.

Previous investigations have reported that TDS concentrations from public supply wells within the Basin range from about from 500 to 1240 mg/L, with an average of about 700 mg/L (DWR, 2003). Figures 3.1-29 and 3.1-30 show median concentrations for TDS calculated for the long-term (s-2019) and recent (2008-2019) period of record, respectively. A few wells have median TDS concentrations above the water quality objective, with several wells showing concentrations just below to the water quality objective with a few exceedances in the past. TDS concentrations appear to increase during extended dry periods when there is less recharge of fresher quality surface water.

Figures 3.1-31 and 3.1-32 show median concentrations for sulfate calculated for the long-term (1969-2019) and recent (2008-2019) period of record, respectively. Most wells were below the water quality objective, though several wells had concentrations just below the water quality objective. In general, the lowest observed concentrations are in the Mira Monte/Meiners Oaks Area. Since bedrock contributions are the primary source of sulfates in the water, the relatively lower concentrations in the Mira Monte/Meiners Oaks Area are indicative of older water that has not flowed over or through (fractured) bedrock.

Figures 3.1-33 and 3.1-34 show median concentrations for chloride calculated for the long-term (1975-2019) and recent (2008–2019) period of record, respectively. With one exception, chloride concentrations

Ventura River would improve the understanding and refine the modeling of streamflows and surface-water/groundwater interactions within the UVRGB.

Imported Water [§354.14(d)(6)]

No data gaps or significant uncertainties were identified.

Regional Geology and Structural Setting [§354.14(b)(1), (d)(2)]

No data gaps or significant uncertainties were identified.

Soil Characteristics [§354.14(d)(3)]

No data gaps or significant uncertainties were identified.

Vertical and Lateral Extent [§354.14(b)(2),(b)(3), (c)]

No significant data gaps or uncertainties were identified with respect to the lateral or vertical extent of the Basin.

Groundwater Flow Barriers [§354.14(b)(4)(C) and (c)]

No significant data gaps or uncertainties were identified with respect to lateral groundwater flow barriers in the Basin.

Formation Names and Hydraulic Properties [§354.14(b)(4)(A), (b)(4)(B)]

As noted in Section 3.1.3.1, a few aquifer tests have been reported in the literature. The best available information for aquifer and aquitard hydraulic properties in the UVRGB is from the calibrated numerical flow model (Appendix H). Use of model-derived hydraulic properties values is considered appropriate and, therefore, the lack of aquifer tests results is not considered a significant data gap or uncertainty at this time. Going forward, UVRGA will work with well owners in the Basin to conduct aquifer tests when such opportunities arise, such as when new or replacement wells are constructed. Additional wells and aquifer tests closer to the Ventura River will help refine the estimates of hydraulic properties within the Ventura River floodplain.

Groundwater Recharge and Discharge Areas [§354.14(d)(4)]

The primary locations of groundwater recharge and discharge are adequately identified in the GSP and are not a data gap. It is acknowledged that there is considerable variability in the extents of the recharge and discharge areas over time.

Water Quality [§354.14(b)(4)(D)]

The northern ⅔ of the Mira Monte/Meiners Oaks Area has sparse groundwater quality data. However, there is very little groundwater production in this Area (and much of the area has shallow our outcropping bedrock), so this is not considered to be a significant data gap or uncertainty in the HCM.