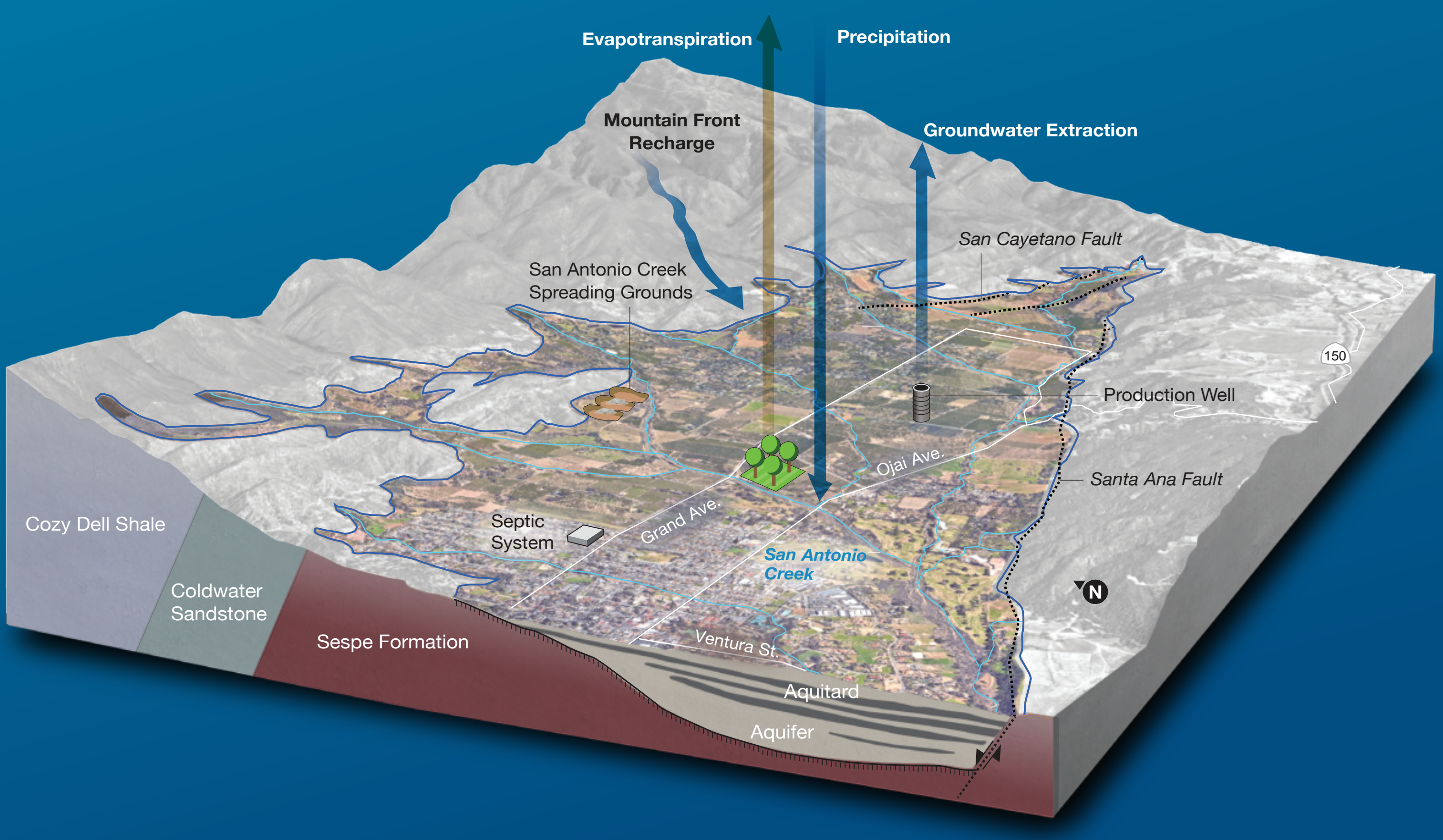
OJAI BASIN
Groundwater Management Agency

DRAFT FINAL

Groundwater Sustainability Plan for the OJAI VALLEY GROUNDWATER BASIN



Ojai Basin Groundwater Management Agency
417 Bryant Circle, Suite 112, Ojai, CA 93023
Plan Manager: John Mundy
January 2022

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APPENDICES

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
AB	Assembly Bill
AF	acre-feet
AFY	acre-feet per year
AGR	agriculture supply
amsl	above mean sea level
bgs	below ground surface
BMP	best management practice
Ca	calcium
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFD	Community Facilities District
cfs	cubic feet per second
CGPS	continuous global positioning system
CIMIS	California Irrigation Management Information System
Cl	chloride
CMWD	Casitas Municipal Water District
COCs	contaminants of concern
CWC	California Water Code
DAC	disadvantaged community
DDMW	depth-discrete monitoring well
DDW	Division of Drinking Water
DPWM	Distributed Parameter Watershed Model
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
ET	evapotranspiration
ETo	reference evapotranspiration
EVT1	MODFLOW Evapotranspiration Package
F	Fahrenheit
ft^2/min	square feet per minute
FUDS	Formerly Used Defense Sites Database
GAMA	Groundwater Ambient Monitoring and Assessment Program
GDE	groundwater dependent ecosystem
GIS	geographic information system
GPS	global positioning system
GSA	Groundwater Sustainability Agency
GSP, Plan	Groundwater Sustainability Plan
GWMP	groundwater management plan
HCM	hydrogeologic conceptual model
HCO_3	bicarbonate
ILRP	Irrigated Lands Regulatory Program
IND	industrial service supply

Acronym/Abbreviation	Definition
INSAR	interferometric synthetic aperture radar
IRWM	Integrated Regional Water Management
K	potassium
Los Angeles Basin Plan	*Water Quality Control Plan for the Los Angeles Region*
LTCP	Low-Threat Closure Policy
LUST	leaking underground storage tank
MCL	maximum contaminant limit
Mg	magnesium
mg/L	milligrams per liter
mm	millimeter
MTBE	methyl tert-butyl ether
MUN	municipal and domestic supply
MWC	Mutual Water Company
Na	sodium
NCCAG	Natural Communities Commonly Associated with Groundwater
NDMI	Normalized Difference Moisture Index
NDVI	Normalized Difference Vegetation Index
NHD	National Hydrography Dataset
NO_3	nitrate
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWIS	National Water Information System
OBGM	Ojai Basin Groundwater Model
OBGMA	Ojai Basin Groundwater Management Agency
OVGB, Ojai Valley Basin	Ojai Valley Groundwater Basin
OVSD	Ojai Valley Sanitary District
OWCD	Ojai Water Conservation District
OWS	Ojai Water System
OWTS	on-site wastewater treatment system
PMA	Projects and Management Action
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
PRISM	Parameter-Elevation Regressions on Independent Slopes Model
PROC	industrial process supply
RMP	representative monitoring point
RWQCB	Regional Water Quality Control Board
SACSG	San Antonio Creek Spreading Grounds
SB	Senate Bill
SCAG	Southern California Association of Governments
SGMA	Sustainable Groundwater Management Act
SMCL	secondary maximum contaminant level
SO_4	sulfate
SWN	state well number
SWP	State Water Project

Acronym/Abbreviation	Definition
SACSGRP	San Antonio Creek Spreading Grounds Rehabilitation Project
SWRCB	State Water Resources Control Board
TBA	thiobarbituric acid
TDS	total dissolved solids
TNC	The Nature Conservancy
TPH	total petroleum hydrocarbons
USGS	U.S. Geological Survey
UST	underground storage tank
UVRGB	Upper Ventura River Groundwater Basin
UWMP	urban water management plan
VCEHD	Ventura County Environmental Health Division
VCRMA	Ventura County Resource Management Agency
VCWPD	Ventura County Watershed Protection District
WCVC	Watersheds Coalition of Ventura County
WDR	Waste Discharge Requirement
WSIP	Water Storage Investment Program
WY	Water Year

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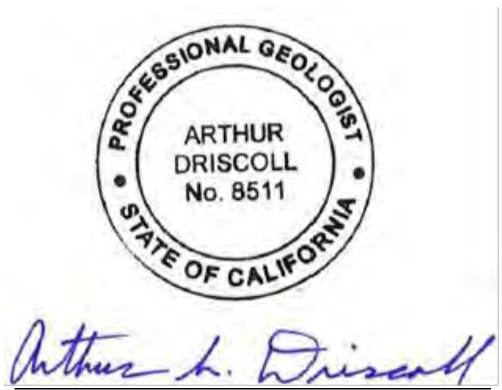
SIGNATURE PAGE

This Draft Final Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin has been prepared under the direction of a professional geologist licensed in the State of California as required per California Code of Regulations, Title 23 Section 354.12 consistent with professional standards of practice.



Arthur Storer Driscoll, III (Trey)
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EXECUTIVE SUMMARY

The Ojai Basin Groundwater Management Agency (OBGMA), acting as the Groundwater Sustainability Agency (GSA) for the Ojai Valley Groundwater Basin (OVGB; California Department of Water Resources [DWR] Basin No. 4-002), developed this Groundwater Sustainability Plan (GSP) to enable stakeholders to sustainably manage groundwater and surface water resources and to comply with the requirements of the Sustainable Groundwater Management Act (SGMA).

ES 1.0 INTRODUCTION

The OBGMA has groundwater management responsibilities within its jurisdictional boundary, as defined in the original enabling legislation, Senate Bill 534, approved on October 8, 1991. The OBGMA boundary covers the majority of the OVGB and, as further described in Chapters 1 and 2, the areas outside the OBGMA boundary but within the OVGB are effectively managed.

The overarching objective of SGMA is to establish and achieve the sustainability goal for the OVGB through the development and implementation of a GSP. In enacting SGMA, the Legislature also set forward more specific purposes underlying the legislation, which include providing for sustainable management of groundwater, avoiding six designated undesirable results to groundwater resources that could occur without proper management, enhancing the ability of local agencies to take action to protect groundwater resources, and preserving the security of water rights to the greatest extent possible consistent with sustainable management of groundwater.

The intent of this GSP is to meet the requirements of SGMA. To this end, this GSP includes the scientific and other background information about the OVGB required by SGMA and its implementing regulations. The GSP is also intended to provide a roadmap for how sustainability is to be maintained in the OVGB, including through projects and management actions (PMAs) to be taken, as well as the financial implications of implementing the GSP. At the same time, the GSP recognizes that while some management actions can be taken early on in the GSP implementation process, other actions, including those requiring grant funding and collaboration between stakeholders, are to be implemented over time.

SGMA mandates that steps be taken to ensure the broadest possible public participation in the GSP development process. From its inception, the OBGMA has been focused on soliciting and receiving input from a wide variety of stakeholders regarding OVGB issues. As part of the OBGMA's effort to consider the interests of all beneficial uses and users of groundwater, the OBGMA Board of Directors is made up of key stakeholders from the Ojai community including representatives of each of the following entities: Ojai Water Conservation District, City of Ojai, Casitas Municipal Water District, Communities Facility District No. 2013-1, and mutual water companies.

ES 2.0 SUMMARY OF BASIN SETTING AND CONDITIONS

DWR has designated the 9.2-square-mile OVGB as high priority[1]. Recharge to the OVGB occurs through percolation of surface waters through alluvial channels, infiltration of precipitation that falls directly on the valley floor, subsurface flow, and septic and irrigation return flow. Land uses consist primarily of private land under County jurisdiction, the City of Ojai, and public land owned and managed by the U.S. Forest Service. The developed land uses in the OVGB include in general residential, agricultural, recreational, and commercial.

As represented in the "Hydrogeologic Conceptual Model" developed for this GSP, the unconsolidated alluvial sediments that fill the OVGB are composed of 50 to 100 feet thick units of sand, gravel, and clay that pinch out toward the northern and eastern lateral edges of the OVGB. The maximum total thickness of the alluvial deposits is approximately 715 feet. The primary storage units for groundwater are approximately four discrete sand and gravel units on the order of up to 100 feet thick each, which are sourced near the alluvial fan heads in the northeast side of the Ojai Valley. The coarse-grained sand and gravel aquifer units are thickest in the northern, central, and eastern areas of the OVGB and thinnest in the south and west where fine grained lacustrine and floodplain deposits predominate. The fine grained deposits act as confining and perching layers, separating the water bearing zones into multiple aquifer units. The total groundwater storage capacity of the OVGB is estimated to be upwards of 85,000 acre-feet (AF).

Groundwater level trends in the OVGB are correlated with mountain front recharge, precipitation, return flows, and groundwater extraction. The direction of regional groundwater flow in the OVGB is away from the Topatopa Mountains towards the southwest, except near major centers of groundwater extraction where the hydraulic gradient is locally toward the pumping wells. Over the past 70 years, groundwater levels have declined and recovered in response to changes in climatic conditions and groundwater extraction. Groundwater level declines of approximately 200 feet occurred between 1958 and 1962, and 2011 and 2016, coincident with periods of drought. However, groundwater levels recovered in subsequent average and wet water years, and significant and unreasonable impacts to beneficial uses and users were not observed. Local Ventura River watershed surface flows are sourced from Ventura River tributaries and from the Ventura River itself through a diversion canal and stored in Lake Casitas, all of which are located outside of the OVGB. The Casitas Municipal Water District distributes Lake Casitas stored water to wholesale accounts, retail municipal and industrial accounts, and retail agricultural accounts. A portion of Lake Casitas storage is distributed to wholesale and retail accounts inside the boundaries of the

[1] Basin prioritization classifies the California's 515 basins and subbasins into priorities based on components identified in the California Water Code. The priority process consists of applying datasets and information in a consistent, statewide manner in accordance with the provisions in California Water Code, Section 10933(b). Further information on DWR's basin prioritization process can be found on the following website: https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization.

OBGMA. The conjunctive use of surface water and groundwater in the OVGB has occurred since at least 1949 and is key to meeting the total water demand of users located within the OVGB.

The water budget for the OVGB provides an accounting and assessment of the average annual volume of groundwater and surface water entering (i.e., inflow) and leaving (i.e., outflow) the OVGB. Annual change in groundwater in storage is summed to determine the cumulative change in groundwater in storage over time. Results from the Ojai Basin Groundwater Model (OBGM) indicate that groundwater in storage decreased at an average annual rate of approximately 15 acre-feet per year (AFY) between water years 1971 and 2019. Over this 49-year period, groundwater in storage declined by a total of approximately 750 AF, which is within the predictive uncertainty of the numerical model and indicates that the OVGB has not experienced overdraft conditions. Different periods of records would present different average annual decreases, increases, or stability. The sustainable yield of the OVGB has been estimated to range from approximately 4,100 AFY to 5,000 AFY.

Groundwater quality in the OVGB is currently good and generally meets California drinking water maximum contaminant levels (MCLs) without treatment. The primary constituents of concern (COCs) in the OVGB include total dissolved solids, sulfate, chloride, boron, nitrate, iron, and manganese. At times concentrations of COCs in groundwater from certain wells in the OVGB have exceeded California drinking water MCLs; however, concentrations have exhibited a stable or improving trend over time.

ES 3.0 OVERVIEW OF SUSTAINABILITY INDICATORS, MINIMUM THRESHOLDS, AND MEASURABLE OBJECTIVES

To maintain a viable water supply for current and future beneficial uses and users of groundwater in the OVGB, the OBGMA's sustainability goal is to preserve the quantity and quality of groundwater in the Ojai Basin in order to protect and maintain the long-term water supply for the common benefit of the water users in the Basin. This GSP is intended to ensure that the OVGB continues to operate within its sustainable yield and does not experience undesirable results within the planning and implementation horizon of this GSP (50 years). The OBGMA has established minimum thresholds for the following sustainability indicators determined to be a potential future undesirable result.

Groundwater Levels

The minimum thresholds for groundwater levels are based on the record low static groundwater level that occurred in well 04N22W05L008S at approximately 312 feet below ground surface in September 1951. The minimum thresholds represent groundwater elevations in the OVGB that, if exceeded at multiple wells for a duration of greater than one year, may cause undesirable results. The one-year criterion is based on the rapid recovery of groundwater levels and groundwater in storage observed in average and wet water years. The one-year period provides the OBGMA sufficient time to implement management actions to reduce groundwater extraction and conserve groundwater supplies. The primary measurable objective for groundwater levels is for groundwater levels at representative monitoring points (RMPs) to remain above established minimum thresholds, and for groundwater levels to stabilize and recover after each drought period in average and wet water years. Numeric measurable objectives for groundwater levels will be developed as part of the proposed conjunctive management plan PMA No 2 – Protect and Manage the Basin.

Groundwater in Storage

As groundwater in storage cannot be measured directly, the minimum threshold for groundwater in storage is based on the record low static groundwater levels that occurred in the OVGB in 1951 as previously described, and rapidly recovered in subsequent wet years. The estimated remaining groundwater in storage in 1951 was approximately 37,179 AF, which is about 10% lower than the recent historical low of 41,310 AF that occurred in 2016. The minimum threshold represents a volume of groundwater in storage in the OVGB that, if exceeded for a duration of greater than one year, may cause undesirable results. Numeric measurable objectives for groundwater in storage will be developed as part of the proposed conjunctive management plan PMA No 2 – Protect and Manage the Basin.

Groundwater Quality

To protect and maintain water quality in the OVGB, the primary measurable objective is for the identified COCs to exhibit stable or improving trend. The OBGMA recognizes that varying degree of water quality is required for potable, non-potable, and environmental beneficial uses. To that end, the drinking water standards specified in Title 22 of the California Code of Regulations (CCR) are established as the minimum thresholds for groundwater quality for potable supply wells, provided there is a nexus with groundwater extraction and the groundwater quality impairment. In addition, the Los Angeles Basin Plan water quality objectives are established as the measurable objectives for groundwater quality, provided there is a nexus with groundwater extraction and the groundwater quality impairment. Groundwater quality monitoring will occur throughout GSP implementation.

ES 4.0 OVERVIEW OF PROJECTS AND MANAGEMENT ACTIONS

Since the OBGMA's initial groundwater management plan, five PMAs have been developed to address sustainability goals, minimum thresholds, and data gaps identified for the OVGB. The proposed PMAs, mirroring the previous OBGMA GMPs, are organized under five primary goals to manage the OVGB, each with a number of action elements described as follows:

Management Action No. 1 – Understand the Basin

The OBGMA recognizes that a comprehensive understanding of the hydrogeology of the OVGB is necessary for the long-term sustainability of the groundwater resource. The proposed PMAs developed to support this management action include: 1) conduct groundwater level, groundwater quality, and streamflow monitoring; 2) conduct groundwater extraction monitoring; 3) prepare a sampling and analysis plan and a quality assurance project plan; 4) prepare a groundwater dependent ecosystems assessment; 5) develop a data management system; and 6) simulate extreme climate scenarios.

Management Action No. 2 – Protect and Manage the Basin

To ensure that the OVGB continues to operate within its sustainable yield and does not experience undesirable results within the planning and implementation horizon of this GSP, the OBGMA may take direct management actions to reduce groundwater extraction and conserve groundwater supplies. The proposed PMAs developed to support this management action include: 1) develop a comprehensive conjunctive management plan; 2) develop a groundwater allocation; 3) develop a water conservation program; and 4) encourage voluntary pumping reductions.

Management Action No. 3 – Encourage Supporting Activities

The OBGMA has a long history of working cooperatively with other agencies, stakeholders, and water users to protect and maintain groundwater and local surface water supply for the common benefit of the water users of the OVGB. The OBGMA will continue to support and work collectively on projects with other entities to ensure the sustainability goals of this GSP are achieved. The proposed PMAs developed to support this management action include: 1) develop a salt and nutrient management plan; 2) evaluate the feasibility of recycled water production for non-potable reuse; 3) explore opportunities to implement focused recharge; and 4) explore access to water sources outside the Ventura River watershed through branch pipeline connections to the California Aqueduct.

Management Action No. 4 – Communicate Effectively

Effective communication between the OBGMA, stakeholders, and water users is a required component of SGMA and key to successful groundwater sustainability planning and implementation of projects and management actions. The proposed PMAs developed to support this management action include: 1) evaluate the settlement management plan provisions; 2) implement the public outreach and engagement plan; and 3) complete the groundwater sustainability plan annual reports and 5-year updates.

Management Action No. 5 – Administrate Efficiently

The resources available to the OBGMA to sustainably manage the OVGB include extraction fees charged to groundwater users and grant funding. Therefore, it is essential that the OBGMA administrates efficiently and pursue alternative funding opportunities to implement the PMAs described in this GSP and keep extraction fees low. The OBGMA will continue to explore grant funding opportunities that are within its purview to pay management and administration costs, operations and monitoring costs, and to fund continuation of the existing, and implementation of the proposed, PMAs identified in this GSP.

ES 5.0 PLAN IMPLEMENTATION

The deadline for the OBGMA to adopt this GSP is January 31, 2022. The OBGMA is responsible for implementing the GSP over SGMA's planning and implementation horizon (50 years). The OBGMA will submit annual reports by April 1 of each year. The annual reports will document new data being collected to track groundwater conditions within the OVGB, monitor progress on implementation of PMAs, and present an evaluation of measured data in comparison to interim milestones for each sustainability indicator. In addition to the annual reports, the OBGMA will submit more detailed 5-year evaluations to DWR by April 1 of 2027, 2032, 2037, and 2042. The 5-year evaluations provide the GSA an opportunity to assess the success and/or challenges in GSP implementation, including reporting on the effectiveness of PMAs. If knowledge of OVGB conditions has changed based on updated data, if management criteria (e.g., sustainable yield, minimum thresholds, or interim milestones) need to be modified, or if PMAs need to be modified or added, revisions to the GSP may be proposed and the necessary steps will be taken by the GSA. California Environmental Quality Act (CEQA) review would be completed prior to implementation of the PMAs that require CEQA.

The OBGMA has performed substantial work toward estimating the cost of GSP implementation. Chapter 5, Plan Implementation, contains a breakdown of tasks and associated cost estimates for management/administration, office expenses, training and memberships, GSP costs; operations and monitoring, annual and periodic (i.e., 5-year) reporting; PMAs. The estimated GSP implementation cost for the anticipated 20-year implementation period is approximately $8,114,000. This estimate does not include the implementation of all PMAs, or final costs incurred by OBGMA. Additional budget may be required to implement PMAs once they have been developed. In general, the OBGMA plans to fund GSP implementation using a combination of groundwater extraction fees and/or grants.

CHAPTER 1
INTRODUCTION

1.1 PURPOSE OF THE GROUNDWATER SUSTAINABILITY PLAN

The Ojai Basin Groundwater Management Agency (OBGMA), acting as the Groundwater Sustainability Agency (GSA) for the Ojai Valley Groundwater Basin (OVGB; DWR Basin No. 4-002),[1] developed this Groundwater Sustainability Plan (GSP, Plan) in compliance with the 2014 Sustainable Groundwater Management Act (SGMA) (California Water Code Section 10720–10737.8, et al.) and the Department of Water Resources (DWR) GSP Regulations (California Code of Regulations, Title 23, Section 350 et seq.). Among the legislative purposes of SGMA are for California's groundwater basins to be managed sustainably, "to manage groundwater basins through the actions of local government agencies to the maximum extent feasible," and to provide local public agencies acting as GSAs with the authority and technical and financial assistance necessary to achieve basin sustainability (California Water Code Section 10720.1). Appendix A includes the Preparation Checklist for GSP Submittal, which identifies where in this GSP each of the statutory requirements under SGMA are addressed.

The GSA jurisdictional boundary includes the majority of the OVGB as defined in the original enabling legislation, Senate Bill (SB) 534, approved on October 8, 1991. The boundaries of the management agency are defined in Article 2, Section 201. Figure 1-1 shows the OBGMA boundary and the boundary of the OVGB. A few small areas of the OVGB are not located within the OBGMA boundary. These areas outside the OBGMA boundary total 143.7 acres and include narrow, shallow alluvial filled stream channels along the southern flank of the Topatopa Mountains (northern boundary of OVGB), and an approximately 134.5-acre strip of land along the western margin of the OVGB. As further described in Chapter 2, the areas outside the OBGMA boundary but within the OVGB are effectively managed. The Ojai Valley Basin is designated by DWR as high priority[2]. The presence and potential interconnectedness of groundwater basins adjacent to the Ojai Valley Basin, including the Upper Ventura River Groundwater Subbasin (DWR Basin No. 4-003.01) and Upper Ojai Valley Groundwater Basin (DWR Basin No. 4-001), are described and considered in this GSP, though the focus of the GSP is on defining the criteria under which the OVGB will continue to be managed sustainably.

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1 The Ojai Valley Groundwater Basin is abbreviated as the "Ojai Valley Basin" or OVGB in this document.

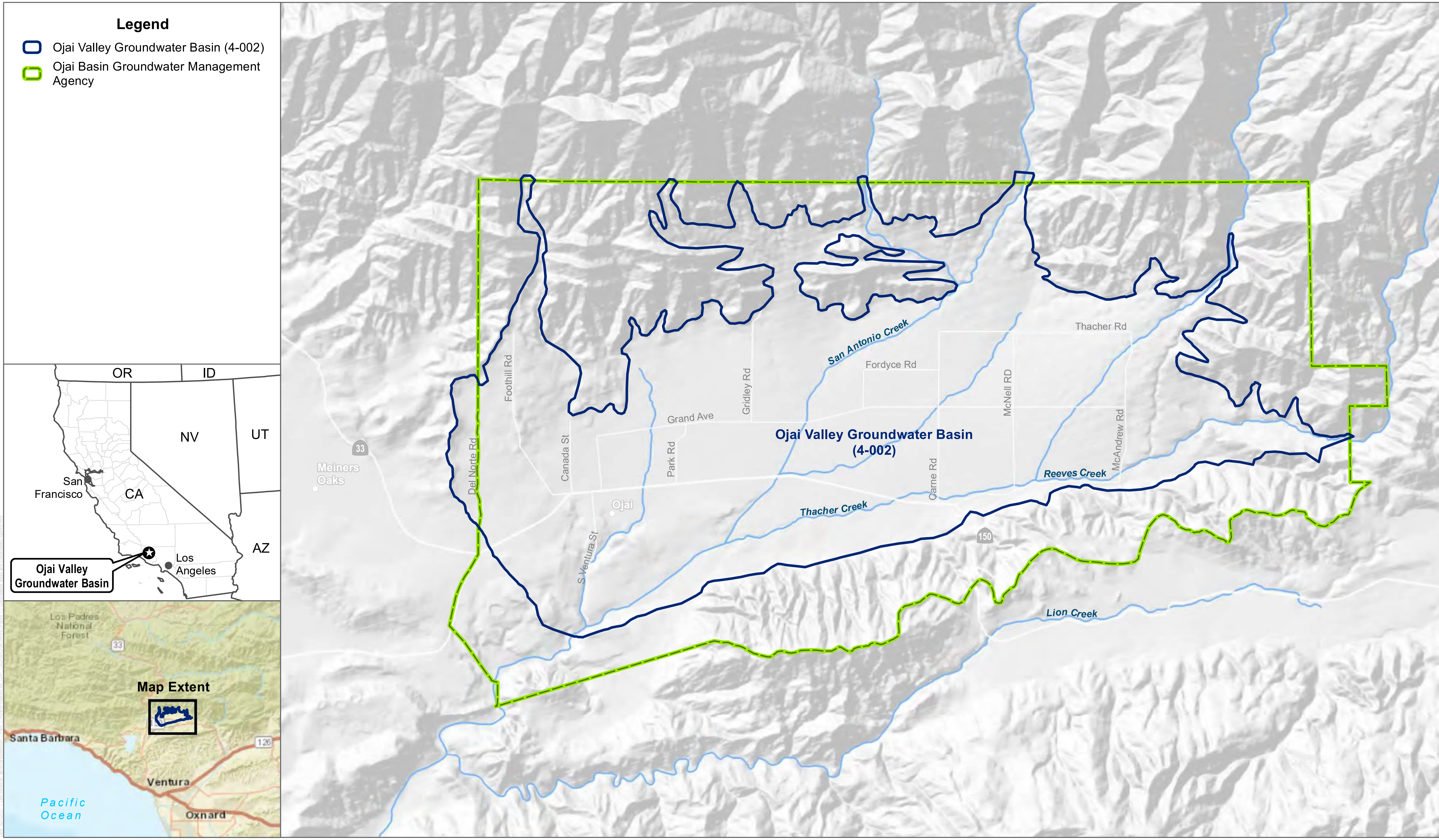
2 Basin prioritization classifies the California's 515 basins and subbasins into priorities based on components identified in the California Water Code. The priority process consists of applying datasets and information in a consistent, statewide manner in accordance with the provisions in California Water Code, Section 10933(b). Further information on DWR's basin prioritization process can be found on the following website: https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization.

SGMA defines sustainable groundwater management as the "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results" (California Water Code Section 10721). "Undesirable results" are defined in SGMA and are summarized here as any of the following effects caused by groundwater conditions occurring throughout the basin.[3]

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable degraded water quality
- Significant and unreasonable seawater intrusion
- Significant and unreasonable land subsidence
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

As described in Chapter 2, Plan Area and Basin Setting, undesirable results within the Ojai Valley Basin have not occurred historically. Groundwater levels and groundwater in storage in the OVGB fluctuate primarily in response to climatic variability where groundwater levels decline during dry periods and recover during wet periods. The water budget indicates that over the 48-year period from 1971 to 2019 the OVGB has operated within its sustainable yield based on available data. Water quality of the principal aquifers is suitable for beneficial uses. Localized areas of degraded water quality are primarily attributable to septic effluent or water from deeper aquifers with higher total dissolved solids concentrations. Water quality degradation is currently not an undesirable result in the OVGB. Seawater intrusion is not applicable to this inland basin. Both elastic land subsidence and rebound are documented to occur in the OVGB. Land subsidence is currently not an undesirable result in the OVGB. Available data do not indicate a direct nexus of groundwater extractions with depletions of interconnected surface water. However, this finding is based on limited data and a preliminary hydrogeological conceptual model that suggests surface waters in San Antonio Creek are sustained by a perched upper aquifer that is disconnected from the deep producing aquifers. The OBGMA conducts ongoing studies to further build the datasets regarding groundwater – surface water interactions.

[3] "Basin" as defined in SGMA, means a groundwater basin or subbasin identified and defined in Bulletin 118 or as modified pursuant to California Water Code Section 10722, et seq. (Basin Boundaries).



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DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS

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FIGURE 1-1

Ojai Valley Groundwater Basin and Groundwater Sustainability Agency

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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The publication of this GSP represents a key milestone in defining the criteria under which the OVGB will continue to be managed sustainably. This GSP characterizes groundwater conditions, trends, and the cumulative impacts of groundwater pumping for each of the SGMA-defined sustainability indicators (Chapter 2); establishes minimum thresholds, measurable objectives, and interim milestones by which sustainability can be measured and tracked (Chapter 3, Sustainable Management Criteria); identifies projects and management actions to be implemented by the GSA and/or stakeholders (Chapter 4, Projects and Management Actions); and outlines a plan for annual reporting and periodic (i.e., 5-year) evaluations (Chapter 5, Plan Implementation). The GSP documents necessary steps, determined by the GSA in collaboration with stakeholders, and informed by the best available information, to continue sustainable management of the OVGB.

1.2 SUSTAINABILITY GOAL

The mission of the OBGMA, which is derived from the Legislative findings of the Agency Act, is to preserve the quantity and quality of groundwater in the Ojai Basin in order to protect and maintain the long-term water supply for the common benefit of the water users in the Basin (SB 534, October 1991). This GSP is intended to also meet the overarching sustainability goal of SGMA to operate the OVGB within its sustainable yield without causing an undesirable result.

1.3 AGENCY INFORMATION

The OBGMA is the single GSA responsible for managing the supply and demand of the Ojai Valley Basin for the protection and common benefit of agricultural, municipal, and industrial water users of the Basin.

The contact name and mailing address of the GSP Manager for the OBGMA is as follows:

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Ojai, California 93024
Mailing: P.O. Box 1779, Ojai California 93024
805.640.1207

1.3.1 Organization and Management Structure of the Groundwater Sustainability Agency

The OBGMA Board of Directors comprises five members and their alternates representing: (1) Ojai Water Conservation District, (2) City of Ojai, (3) Casitas Municipal Water District, (4) small water companies, and (5) Casitas – Ojai Community Facilities District (formerly Golden State Water Company). Board Members are appointed by their respective governing bodies for an undefined term. The OBGMA Board convenes approximately monthly, in conformance with the Brown Act. Additional special meetings were held as-needed and a special hearing was held to review and approve this GSP.

Appendix B contains documentation, in reverse chronological order, of the formation of the GSA and initiation of the GSP in compliance with SGMA. Appendix B also includes the GSA's notices to DWR regarding its intent to develop a GSP. Appendix C provides the Public Outreach and Engagement Plan and list of Public Meetings held by the OBGMA where information on the GSP was presented and public comment accepted.

1.3.2 Legal Authority of the Groundwater Sustainability Agency

OBGMA was created in 1991 by a special act of the California legislature, SB 534. OBGMA is one of only 15 special act districts with legislative authority to manage groundwater in California. As outlined in SB 1168, Chapter 4, Section 10723. (c), SGMA identifies the OBGMA as the "exclusive local agency" within its statutory boundaries for the purposes of implementing the SGMA. On December 2014, the Board of Directors of the OBGMA passed Resolution 2014-4 wherein the OBGMA elected to become a GSA as defined by SB 1168.

On September 16, 2014, Governor Brown signed into law Senate Bills 1168 and 1319 and Assembly Bill 1739 as part of the SGMA legislation, which provides among other powers, local groundwater agencies the authority and the technical and financial assistance necessary to sustainably manage groundwater. The GSA has statutory authorities that are essential to groundwater management as well as SGMA compliance.

Section 10720.7 of SGMA requires that all basins designated in Bulletin 118 as high or medium priority be managed under a GSP. Pursuant to Section 10727 of SGMA, the GSA is required to develop, adopt, and implement this GSP to manage the basin and intend on using the authorities granted to them to memorialize the roles and responsibilities for developing and implementing the GSP.

1.3.3 Notice and Communication

In 2020, the GSA prepared a Draft Public Outreach and Engagement Plan to provide individual stakeholders, stakeholder organizations, and other interested parties an opportunity to be involved in the development and evaluation of this GSP. To this end, the Public Outreach and Engagement Plan, included as Appendix C of this GSP, describes the steps the GSA has taken, and will continue to take, to achieve broad, enduring and productive public involvement during the development and implementation phases of this GSP. The Public Outreach and Engagement Plan includes a list of identified stakeholders as of 2020 and describes the methods and avenues in which the GSA has continued to identify additional stakeholders, continued to solicit public involvement and feedback, and considered and/or incorporated stakeholder comments and concerns into the development and future implementation of this GSP. In addition to the Public Outreach and Engagement Plan, Appendix C also includes a list of public meetings that have been held to date as a means to document the level of public outreach that has occurred thus far. Table 1-1 provides a summary of the stakeholder categories in the Ojai Valley Basin.

Table 1-1
Stakeholder Categories in the OVGB

Category of Interest	Examples of Stakeholder Groups	Engagement Purpose
General Public	General Public	Inform to improve public awareness of sustainable groundwater management
Land Use	County of Ventura (Resource Management Agency and Planning Division) City of Ojai	Consult and involve to ensure land use policies are supporting GSP and vice-versa
Private Users	Domestic users	Inform and involve to avoid negative impact to these users
Urban/Agriculture/Recreational Users	Casitas Municipal Water District Small Water Systems Golf Courses and Recreational Facilities	Collaborate to ensure sustainable management of groundwater
Environmental and Ecosystem	California Department of Fish and Wildlife National Marine Fisheries Service The Nature Conservancy	Inform and involve to sustain a vital ecosystem
Economic Development	City of Ojai Mayor Betsy Stix State Assembly Member Steve Bennett State Senator Monique Limón County District 1 Supervisor Matt LaVere	Inform and involve to support a stable economy
Human Right to Water	Domestic water users Disadvantaged Communities Chumash Barbareño/Ventureño Band of Mission Indians	Inform and involve to provide a safe and secure groundwater supplies to DACs
Integrated Water Management	Regional water management groups (IRWM regions)	Inform, involve, and collaborate to improve regional sustainability

Notes: DAC = disadvantaged community; IRWM = Integrated Regional Water Management.

1.3.3 Estimated Cost of Implementing the Groundwater Sustainability Plan and the Groundwater Sustainability Agency's Approach to Meet Costs

Annual implementation costs may vary from year to year as a result of the status of project and management actions (PMAs), significance of new data, and increased milestone reporting requirements every fifth year of implementation. However, the estimated GSP implementation cost for the next 21 years is approximately $8,114,000. Estimated total GSP implementation costs assume the following general components:

- Management and Administration

- Office Expenses
- Training & Memberships
- Regular Professional Support Services
- Operations & Monitoring Costs
- 5-year review assessments and reporting
- Projects and Management Actions

1.4 GROUNDWATER SUSTAINABILITY PLAN ORGANIZATION

This GSP is organized as follows:

- The **Executive Summary** is a plain language summary that provides an overview of the GSP and a description of groundwater conditions in the basin.
- **Chapter 1, Introduction**, includes the purpose of the GSP, sustainability goals, and agency information and outlines document organization.
- **Chapter 2, Plan Area and Basin Setting,** consists of two main parts. This first part provides a general overview of the OVGB, including agency jurisdiction, relevant water resources monitoring and management plans, a description of land uses and land use policies, and an overview of GSP notice and communication activities. The second part describes the hydrogeologic setting of the OVGB, including a description of current and historical conditions related to each undesirable result defined under SGMA. The second part also provides a summary of the groundwater modeling and water budgets established for the OVGB.
- **Chapter 3, Sustainable Management Criteria**, describes criteria by which the GSA has defined conditions that constitute sustainable groundwater management for the OVGB, including the process by which the GSA has characterized undesirable results, and established minimum thresholds and measurable objectives for each applicable sustainability indicator.
- **Chapter 4, Projects and Management Actions**, consists of a description of the projects and management actions the GSA has determined will achieve the sustainability goal for the OVGB, including projects and management actions to respond to changing conditions in the OVGB.
- **Chapter 5, Plan Implementation**, provides an estimate of GSP implementation costs, a schedule for implementation, and a plan for annual reporting and periodic (5-year) evaluations.

1.5 REFERENCES CITED

DWR (California Department of Water Resources). 2019. *Sustainable Groundwater Management Act 2018 Basin Prioritization Process and Results*. January 2019.

OBGMA (Ojai Basin Groundwater Management Agency). 2014. Resolution 2014-4. A Resolution of the Ojai Basin Groundwater Management Agency requesting authorization form the Department of Water Resources to Become the Groundwater Sustainable Agency of the Ojai Basin as stated in California Water Code Section 10723(c)(3). December 4, 2014.

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CHAPTER 2
PLAN AREA AND BASIN SETTING

This Chapter of the Ojai Valley Groundwater Basin (OVGB)[1] Groundwater Sustainability Plan (GSP) is organized into four major parts. Section 2.1, Description of the plan area, covers administrative, statutory, and policy issues, as well as aspects of the built environment related to water supply and demand. Specifically, Section 2.1 describes administrative boundaries, land use and population characteristics, and identifies existing water resources monitoring and management plans and programs. Section 2.2, Basin Setting, covers the general geographic and climatic setting of the OVGB. Section 2.3, Hydrogeologic Conceptual Model, describes the geologic and hydrogeologic setting, as well as the historical and current groundwater conditions in the OVGB. Finally, Section 2.4, Water Budget, covers the groundwater budget including groundwater flux, alternative water supplies, and quantification of historical, current, and future water budget conditions. A list of references cited, as well as all figures, are provided at the end of the chapter.

2.1 DESCRIPTION OF THE PLAN AREA

As described in Chapter 1, Introduction, the Groundwater Sustainability Agency (GSA) boundary includes all but 143.7 acres of the OVGB as defined by the California Department of Water Resources (DWR). The OBGMA was granted a basin boundary modification to more closely align basin delineation with geology and hydrogeologic conditions in 2016, resulting in the current Bulletin 118 delineation. The OBGMA jurisdiction, as defined in the original enabling legislation, Senate Bill (SB) 534, known as the Ojai Basin Groundwater Management Agency (OBGMA) Act, differs slightly from the DWR defined extent of the OVGB. Areas outside the OBGMA boundary include narrow, shallow alluvial filled stream channels along the southern flank of the Topatopa Mountains (northern boundary of the OVGB) and a strip of land along the western margin of the OVGB (Figure 1-1). There is no known groundwater extraction in these areas of the OVGB. Therefore, the areas outside the OBGMA boundary but within the OVGB are effectively managed under this GSP. The boundary of the OVGB as defined by the DWR is used as the boundary of the plan area in this GSP. The GSA consists solely of the OBGMA. This GSP therefore consists of a "single plan covering the entire basin developed and implemented by one groundwater sustainability agency," per California Water Code Section 10727(b)(1) and applies to the 5,913.4 acres within the OVGB.

The Ojai Valley Basin is designated by the DWR as one of California's 46 high priority[2] alluvial basins (DWR 2020a). The Ojai Valley Basin (DWR Basin No. 4-002) has a surface area of approximately 5,913.4 acres, or 9.2 square miles, and underlies the City of Ojai in the central part of

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1 The Ojai Valley Groundwater Basin is abbreviated as the "Ojai Valley Basin" or OVGB in this document.

2 Basin prioritization classifies the California's 515 basins and subbasins into priorities based on components identified in the California Water Code. The priority process consists of applying datasets and information in a consistent, statewide manner in accordance with the provisions in California Water Code, Section 10933(b). Further information on DWR's basin prioritization process can be found on the following website: https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization.

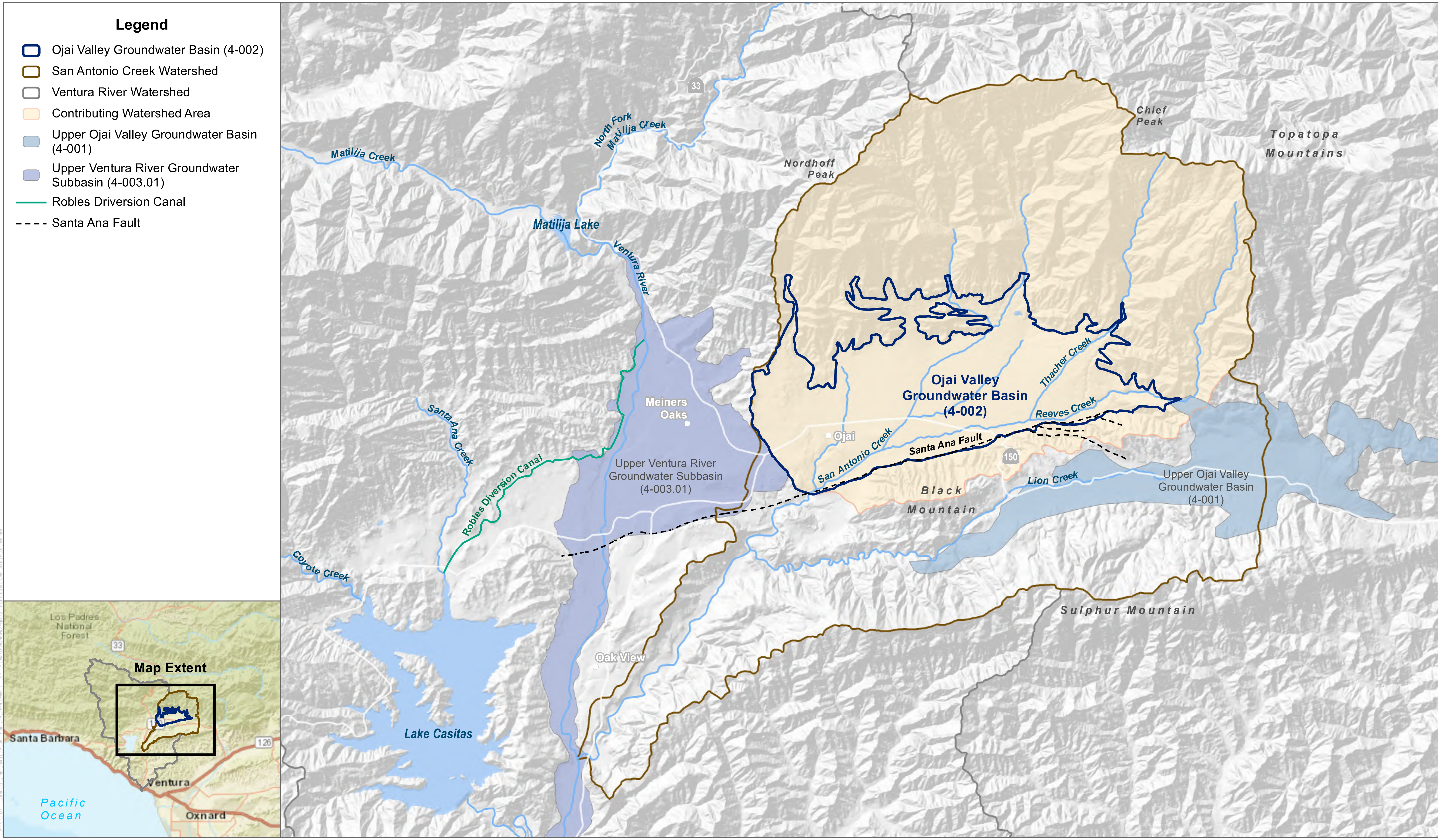
Ventura County (County). The OVGB's boundaries are formed by Tertiary age[3] consolidated rocks associated with the Topatopa Mountains of California's Transverse Ranges to the north and east, the Upper Ojai Valley Groundwater Basin (DWR Basin No. 4-001) to the east, the Santa Ana Fault and Black Mountain to the south, and the Upper Ventura River Groundwater Subbasin (DWR Basin No. 4-003.01) to the west (Figure 2-1, Plan Area and Contributing Watershed; DWR 2004). The eastern and western boundaries of the OVGB correspond to recognized bedrock highs that limit groundwater exchange flow between the OVGB and adjacent basins. The potential flow of groundwater between the OVGB and Upper Ventura River Subbasin is considered likely to be very small due to the low hydraulic conductivity of the geologic materials (bedrock) that form the boundary between the two groundwater basins (DWR 2004; Kear 2005).

Although the plan area is defined as the OVGB, information applicable to the Upper Ojai Valley Basin and Upper Ventura River Subbasin, as well as the hydrologic characteristics of the sub-watersheds contributing to the Ojai Valley Basin, is also provided in this chapter. DWR has designated the Upper Ojai Valley Basin as having a very low priority, because there is less than 2,000 acre-feet[4] per year (AFY) of extraction from the basin (DWR 2020a). DWR has designated the Upper Ventura River Subbasin as having a medium priority, because total groundwater extraction is greater than 2,000 AFY and adverse impacts to streamflow and habitat have been identified (DWR 2020a; Hopkins 2013; NMFS 2005; LARWQCB 1998). Evaluation of the validity and relevance of instream flow recommendations for the Ventura River (CDFW 2021) to the GSP is ongoing.

Recharge to the OVGB occurs through percolation of surface waters through alluvial channels, infiltration of precipitation that falls directly on the valley floor, subsurface flow, and septic and irrigation return flow (DWR 2004). The San Antonio Creek watershed upstream of the OVGB is the major contributing watershed to the OVGB, which is a subwatershed of the Ventura River watershed. The San Antonio Creek watershed is approximately 32,743.1 acres, or 51.2 square miles and completely encompasses the OVGB (Figure 2-1). The portion of the San Antonio Creek watershed that contributes recharge to the OVGB is approximately 20,340.8 acres, or 31.8 square miles (Figure 2-1). A summary of the groundwater basins, contributing watershed, and DWR designations is provided in Table 2-1.

[3] Geologic period from 66 million to 2.6 million years ago. The geologic timescale classifies this time period as the Cenozoic Era that includes the Paleogene and Neogene Periods.

[4] The volume of water required to cover 1 acre of land (43,560 square feet) to a depth of 1 foot; equal to 325,851 gallons or 1,233 cubic meters.



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DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS

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FIGURE 2-1

Plan Area and Contributing Watershed

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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Table 2-1
Summary of the OVGB, Adjacent Basins, and Contributing Watershed Area

Basin/Watershed Name	Area			DWR Designations		Previous Groundwater Management Plan	GSP Required per SGMA
	Acres	*Square Miles*	*Basin Number*	*Critically Overdrafted*	*Basin Priority*		
Ojai Valley Groundwater Basin	5,913.4	9.2	4-002	No	High	Yes	Yes
Adjacent Basins							
Upper Ojai Valley Groundwater Basin	3,806.3	5.9	4-001	No	Very low	No	No
Upper Ventura River Groundwater Subbasin	5,278.1	8.2	4-003.01	No	Medium	No	Yes
Watershed Contributing to the Ojai Valley Groundwater Basin							
San Antonio Creek Watershed	32,743.1	51.2	Not applicable, but relevant for recharge to the OVGB and the water budget.				
Area Contributing to OVGB	20,340.8	31.8					

Source: DWR 2020a.
Notes: DWR = Department of Water Resources; GSP = Groundwater Sustainability Plan; SGMA = Sustainable Groundwater Management Act.

2.1.1 Summary of Jurisdictional Areas and Other Features

2.1.1.1 Land Use Jurisdictions within the OVGB

The OVGB consists primarily of private land under County jurisdiction, the City of Ojai, and public land owned and managed by the U.S. Forest Service. The developed land uses in the OVGB include in general residential, agricultural, recreational, and commercial. Approximately 67% of the OVGB consists of private land under County jurisdiction, 31% of the OVGB consists of the City of Ojai, and 2% of the OVGB consists of a portion of the Los Padres National Forest. The Los Padres National Forest intersects the OVGB on the northern border and occupies the mountain regions above the Ojai Valley. The land uses in the contributing watershed include primarily open space and recreation, and some agriculture (Figure 2-2, Jurisdictional Boundaries). Table 2-2 summarizes the land ownership and jurisdiction in the OVGB.

Table 2-2
Summary of Land Ownership in the OVGB

Ownership Type	Agency	Description	Acres / % of Total
Private	Private	Mixed land use including primarily residential, agriculture, and undevelopable or protected land under Ventura County jurisdiction	3,963.5 / 67%
City	City of Ojai	Mixed land use including primarily residential, commercial/industrial, and open space and recreation within Ojai City limits	1,847.2[a] / 31%

Table 2-2
Summary of Land Ownership in the OVGB

Ownership Type	Agency	Description	Acres / % of Total
Federal	U.S. Forest Service	Los Padres National Forest public land	102.7 / 2%
		Grand Total	**5,913.4**

Source: Geographic information system analysis of jurisdictional boundaries.
Note:
[a] Acreage includes Soule Park which is owned by the County of Ventura.

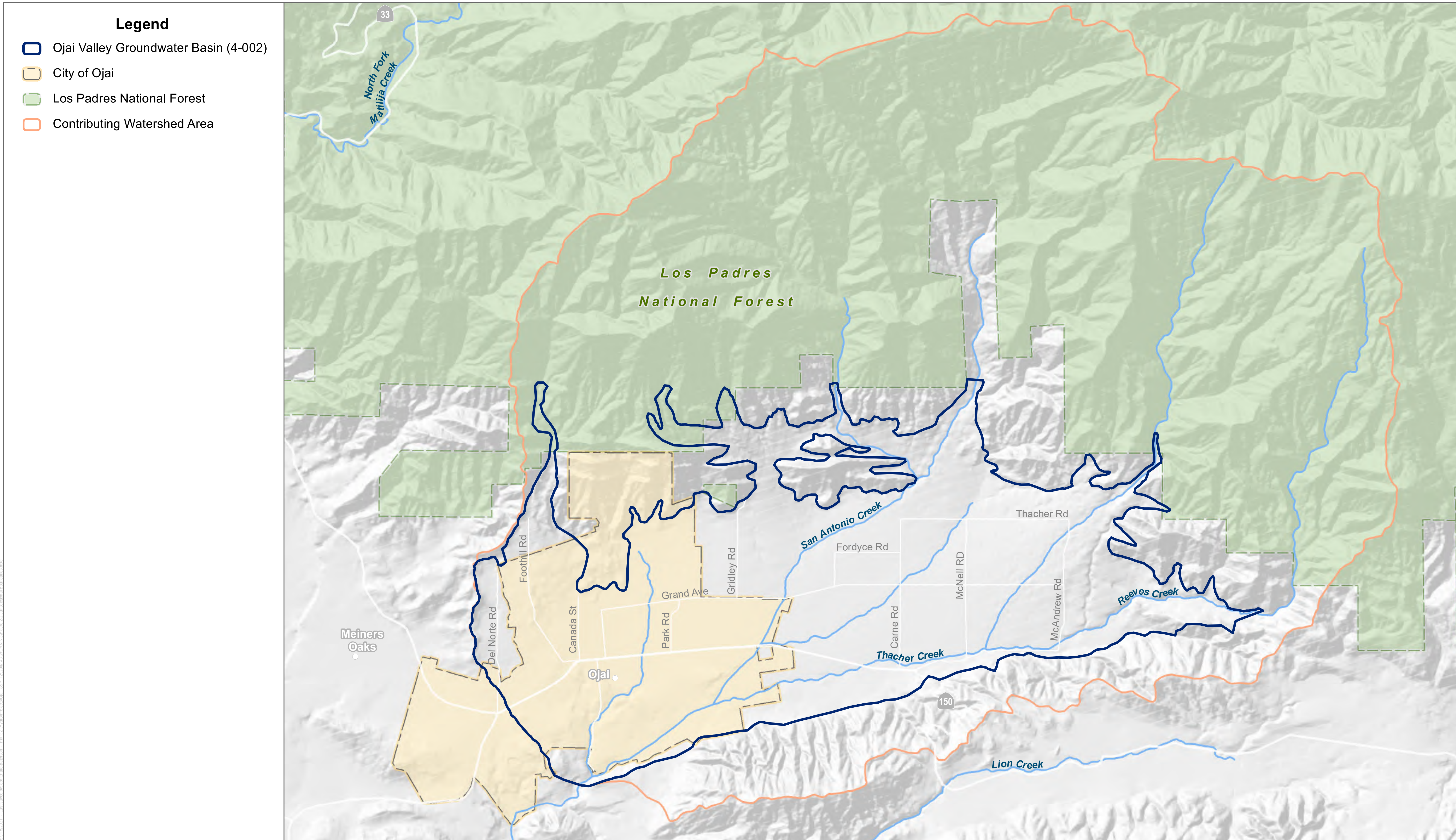
2.1.1.2 Water Agencies Relevant to the Plan Area

The primary water agency serving the OVGB is the Casitas Municipal Water District (CMWD). In addition to CMWD, there are multiple small private water companies that provide water service within the OVGB, including the Siete Robles Mutual Water Company, Senior Canyon Mutual Water Company, Hermitage Mutual Water Company, Gridley Road Water Group, and Ventura County Property Administrator. Additional water agencies relevant to the OVGB include the Ojai Valley Sanitary District (OVSD), which provides sewer service, and the Ojai Water Conservation District (OWCD), which is a water reclamation district. Each water agency relevant to the OVGB is described below and shown on Figure 2-3, Water Purveyors.

Casitas Municipal Water District

The public water district serving the OVGB is the CMWD, which provides water service to 6,130 agricultural, commercial, and residential customers (population of approximately 64,000) in western Ventura County including the developed portions of the Ojai Valley within its service area (CMWD 2021). CMWD's service area is approximately 87,022 acres in size and covers the entire OVGB, with the exception of approximately 9 acres in the northern part of the OVGB (CMWD 2021).

CMWD was formed in 1952 to help communities in western Ventura County overcome water shortage issues by increasing local water supply reliability. In 1959 the Ventura River Project was completed, which included construction of Lake Casitas, an approximately 254,000-acre-foot (AF) reservoir (more recently calculated to have a storage capacity of approximately 238,000 AF) on Coyote Creek and Santa Ana Creek, and the Robles Diversion Canal, a pipeline used to convey 500 cubic feet per second (cfs) of water from the Ventura River to Lake Casitas (Figure 2-1). CMWD operates and maintains Lake Casitas, which is the District's main source of water supply, one municipal supply well (Mira Monte Well) located outside of the OVGB with a capacity of approximately 300 AFY, the Robles Diversion Canal, and approximately 97-miles of water distribution pipelines (CMWD 2021; Milner 2016). The planned operational yield from Lake Casitas is 14,865 AFY, and from Mira Monte Well is 145 AFY, for a combined yield of 15,010 AFY (CMWD 2021). In addition, CMWD owns and operates the Ojai potable water system, which serves approximately 2,953 residences and businesses within Community Facilities District (CFD) No. 2013-1 (Ojai). CFD No. 2013-1 encompasses approximately 2,150 acres of land in the City of Ojai and unincorporated Ventura County (Figure 2-3; CMWD 2021).



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DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS

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FIGURE 2-2

Jurisdictional Boundaries

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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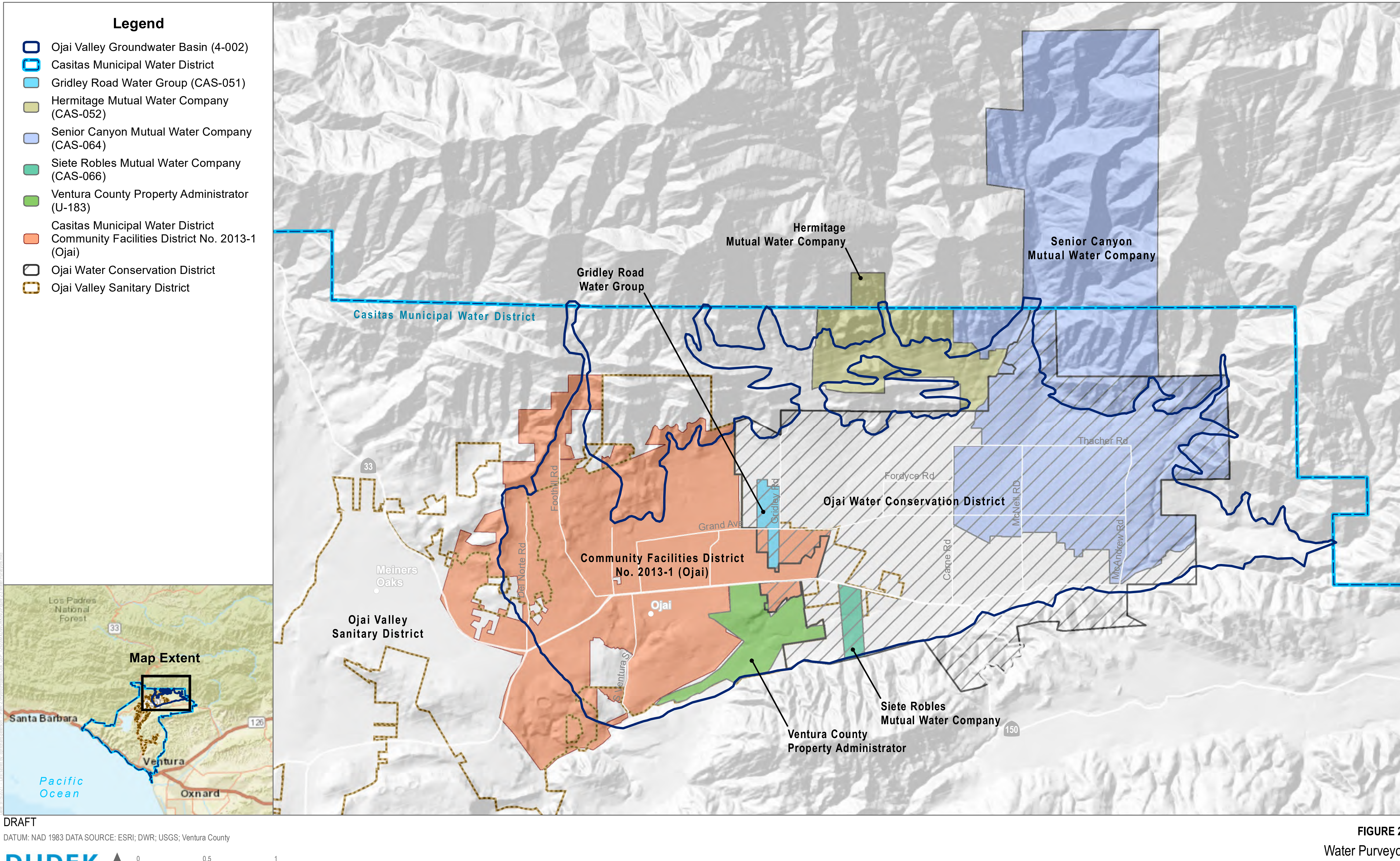

FIGURE 2-3

Water Purveyors

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Community Facilities District No. 2013-1 was formed by CMWD at the request of members of the community in March 2013 pursuant to the Mello-Roos Community Facilities Act of 1982, as amended (Sections 53311 et seq. of the Government Code of the State of California), to finance the acquisition of the Ojai Water System facilities from Golden State Water Company (David Taussig & Associates 2013). In June 2017, CMWD acquired the Ojai Water System. The Ojai Water System consists of a network of 45 miles of pipeline, six storage reservoirs with a capacity of 1.99 million gallons, five booster pump stations, and six groundwater wells. The six groundwater wells include San Antonio Well 3, San Antonio Well 4, Gorham Well, Mutual Well 4, Mutual Well 5, and Mutual Well 6 (CMWD 2021; WSC 2018). Groundwater production from the Ojai Water System wellfield from 1994 to 2016 averaged approximately 1,800 AFY (CMWD 2021).

Ojai Valley Sanitary District

The Ojai Valley Sanitary District was formed in 1985 and provides sewer service to about 20,000 residents in the City of Ojai, the north Ventura Avenue area, and the unincorporated Ojai Valley. The OVSD's service area is approximately 8,629 acres in size and covers approximately 33% of the OVGB. The OVSD's wastewater treatment plant is located along the Ventura River in the north Ventura Avenue area downstream of the OVGB. The treatment plant has a rated capacity of 3.0 million gallons per day average dry weather flow and is operated to comply with the requirements of the OVSD's National Pollution Discharge Elimination System (NPDES) Permit, which was renewed in 2013 (OVSD 2017). Highly treated effluent is primarily discharged in accordance with the NPDES Permit requirements to the Ventura River (at approximately river mile 5) with a limited quantity of treated effluent reclaimed for irrigation use at the treatment plant. No additional reclaimed water is currently available in the Ojai Valley.

Ojai Water Conservation District

The OWCD is a water reclamation district formed in 1949. Originally named San Antonio Water Conservation District, the primary purpose of the OWCD is to divert water from San Antonio Creek into settling ponds for groundwater recharge. The OWCD's service area is approximately 3,727 acres in size and generally covers the unincorporated portion of the OVGB to the east of the City of Ojai.

Ventura County Watershed Protection District

Ventura County Watershed Protection District (VCWPD) was originally established on September 12, 1944 as the Ventura County Flood Control District. VCWPD's mission is to protect life, property, watercourses, watersheds, and public infrastructure from the dangers and damages associated with flood and stormwaters. VCWPD emphasizes integrated watershed management to solve flood control problems with environmentally sound approaches. VCWPD owns and operates the San Antonio Creek Spreading Grounds Rehabilitation Project in collaboration with OBGMA and CMWD. Between 1963 and 1985, the spreading basins were used to divert excess flows from San Antonio Creek to recharge groundwater in the OVGB. The Wheeler Fire of 1985 prompted the VCWPD to purchase the spreading grounds property to construct a debris basin to protect the properties adjacent to San Antonio Creek. The construction of the debris basin resulted in the spreading basins being filled with excavated material and abandoned. Eventually, VCWPD secured funding to reconstruct the basins, and a new spreading facility was completed in 2014. The spreading grounds are anticipated to recharge an average of 126 AFY, and up to a maximum of 914 AFY, of water to the OVGB depending on hydrology, permitting issues, and water rights of downstream users (Walter 2015).

Private Water Purveyors

In addition to CMWD, multiple small private water companies provide water service within the OVGB. Siete Robles Mutual Water Company (MWC) was formed in 1940 and serves CMWD water, in addition to groundwater from a single production well, to approximately 300 people within its service area of approximately 50.4 acres. Senior Canyon MWC was formed in 1929 and serves CMWD water, in addition to groundwater from 6 production wells, to approximately 800 people within its service area of approximately 3,229.6 acres. Hermitage MWC was formed in 1979 and serves CMWD water to approximately 23 people within its service area of approximately 476.5 acres. Gridley Road Water Group was formed in 1930 and serves groundwater from a single production well to approximately 44 people within its service area of approximately 48.6 acres. Lastly, Ventura County Property Administrator, which is a County water purveyor managed by the General Services Agency Parks Department, serves groundwater from at least one production well to Soule Park Golf Course, an approximately 890.4 acre service area (VCWPD 2006).

2.1.2 Water Resources Monitoring and Management Programs

2.1.2.1 Groundwater Monitoring

Groundwater Elevations

In response to SB X7-6, passed by the State Legislature in 2009, DWR developed the California Statewide Groundwater Elevation Monitoring (CASGEM) Program to encourage collaboration between local monitoring parties and DWR, and to collect statewide groundwater elevations for the purpose of tracking seasonal and long-term groundwater elevation trends in groundwater basins statewide. DWR works cooperatively with local agencies, referred to as CASGEM monitoring entities, to collect and maintain groundwater elevation data in a manner that is readily and widely available to the public through the CASGEM online reporting system.

The VCWPD acts as the CAGSEM umbrella monitoring entity for Ventura County. VCWPD collects water level data quarterly or semi-annually, compiles the data it collects along with groundwater level measurements taken by other agencies, and uploads it to the CASGEM website a minimum of two times per year. A total of 39 wells in the OVGB have been monitored for groundwater levels as part of the CASGEM monitoring program with data available from as early as 1927. Currently, VCWPD monitors groundwater levels in 18 wells located throughout the OVGB on a quarterly basis (the number of wells monitored by VCWPD is based on accessibility). In addition, OBGMA measures groundwater levels using automated data loggers in seven wells. These include five privately owned production wells and the San Antonio Creek Spreading Grounds Rehabilitation Project (SACSGRP) depth-discrete monitoring well (DDMW) that consists of a nested series of four 2-inch diameter PVC casings and one 4-inch-diameter PVC casing. These also include the South-Central DDMW that consists of four nested 2-inch-diameter casings located in the southern portion of the Ojai Basin in an easement granted to the OBGMA by the City of Ojai. Both the VCWPD and OBGMA monitor well 04N22W04Q001S.

The pressure transducer data collected from the OBGMA monitored wells have been used to assess trends in groundwater levels in response to precipitation. Wells that are routinely monitored for groundwater levels are shown in Figure 2-4, Current Groundwater Elevation Monitoring Network and Table 2-3.

Table 2-3
Current Groundwater Elevation Monitoring Network

Well Name	SWN	CASGEM ID	Well Use	Data Logger Installed	Data Record	
					Start	*End*
—	04N22W05L008S	2816	Agricultural	No	10/4/1949	Present
—	04N22W06D001S	2818	Agricultural	No	10/28/1949	Present
Topa Topa Ranch Well No. 5[a]	04N22W04Q001S	2813	Agricultural	Yes	2/25/1966	Present
—	04N23W01K002S	2837	Domestic	No	12/6/1972	Present
—	04N22W07G001S	2826	Agricultural	No	10/5/1972	Present
—	04N22W08B002S	26333	Industrial	No	10/5/1972	Present
—	04N22W05H004S	39777	Agricultural	No	10/13/1972	Present
—	04N22W05M001S	2817	Agricultural	No	12/6/1972	Present
—	04N22W07B002S	2824	Agricultural	No	10/5/1972	Present
—	04N22W05D003S	2814	Agricultural	No	12/6/1972	Present
—	04N22W06M001S	2822	Agricultural	No	12/6/1972	Present
—	04N23W02K001S	46068	Agricultural	No	12/6/1972	Present
Mutual Well 4	04N22W06K003S	—	Municipal	No	12/6/1972	Present
—	05N22W32J002S	38094	Agricultural	No	11/18/1949	Present
—	04N23W12L002S	26381	Agricultural	No	12/4/1981	Present
—	04N22W06K012S	26330	Agricultural	No	12/19/1994	Present

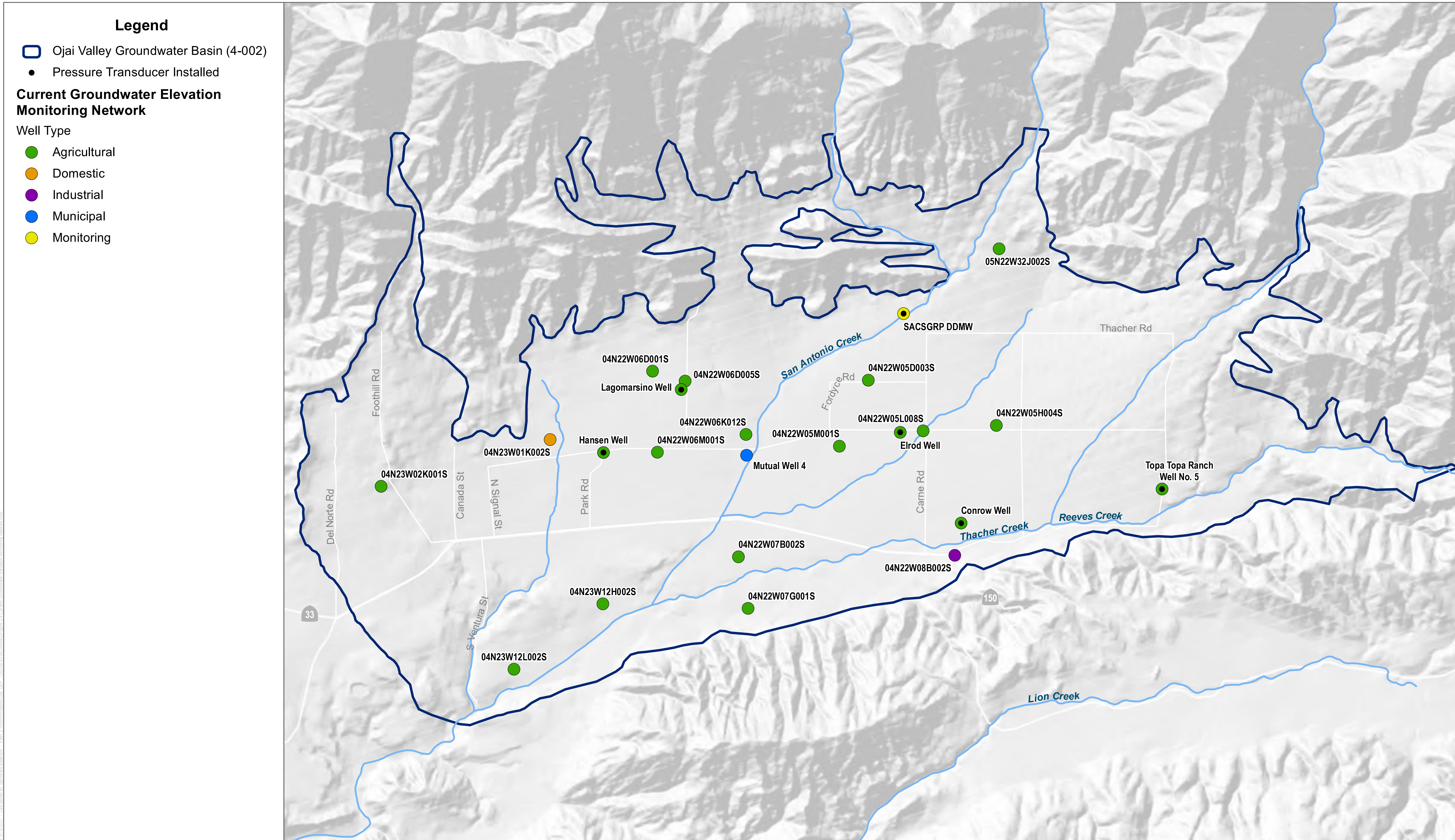
Table 2-3
Current Groundwater Elevation Monitoring Network

Well Name	SWN	CASGEM ID	Well Use	Data Logger Installed	Data Record	
					Start	*End*
—	04N23W12H002S	26380	Agricultural	No	12/19/1994	Present
—	04N22W06D005S	46108	Agricultural	No	1/31/1995	Present
SACSGRP DDMW	05N22W32P002S –P006S	—	Monitoring	Yes	2/21/2017	Present
South-Central DDMW	TBD	TBD	Monitoring	Yes	6/1/2021	Present
Lagomarsino Well	04N22W06E006S	—	Agricultural	Yes	10/25/2013	1/11/2019
Hansen Well	04N23W01J003S	—	Agricultural	Yes	8/15/2014	Present
Elrod Well	04N22W05L003S	—	Agricultural	Yes	2/14/2017	Present
Conrow Well	04N22W05Q001S	—	Agricultural	Yes	8/22/2014	4/19/2017

Source: OBGMA 2018; Dorrington pers. comm. 2021.
Notes: — = not available or not applicable; SWN = state well number; CASGEM = California Statewide Groundwater Elevation Monitoring Program. TBD = to be determined.
[a] The pressure transducer in Topa Ranch Well No. 5 had the surface cable cut and is currently suspended. The instrument is in the process of being recovered. The Conrow Well has changed ownership and is in need of update. The Lagomarsino Well logger may have had the cable cut by a contractor and has not been recovered, but is in the process of being replaced.

Groundwater Quality

SWRCB's Groundwater Ambient Monitoring and Assessment (GAMA) Program conducts comprehensive monitoring of California's groundwater quality, compiles and standardizes groundwater quality data across several different sources and regulatory programs and makes that data readily accessible to the public. In addition, GAMA conducts groundwater studies related to groundwater vulnerability, groundwater quality in domestic wells, and groundwater impacts associated with non-point sources of contamination. GAMA also contains a collection of scientific assessment reports that contain results of regionally specific groundwater quality investigations (GAMA 2020). Groundwater quality data from the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) is included in GAMA, including information on cleanup sites with the potential to impair water quality. The Regional Water Quality Control Boards (RWQCBs) also oversee several regulatory programs that collect and report water quality data, such as the Irrigated Lands Regulatory Program. Some of these data are accessible in GAMA. In addition, the VCWPD collects annual groundwater quality data from several wells in the OVGB and produced annual reports of groundwater quality between 2010 and 2015. Groundwater quality data for the OVGB from both the SWRCB's GAMA online database and VCWPD's annual reports, as well as groundwater quality data provided by VCWPD in electronic format (Dorrington pers. comm. 2021), was used in the preparation of the GSP (see Section 2.3.4.4, Groundwater Quality).



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DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; VCWPD; OBGMA

DUDEK

0 0.5 1 Miles

FIGURE 2-4

Current Groundwater Elevation Monitoring Network

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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Groundwater Extraction

The OBGMA is mandated by its enabling act to monitor groundwater extractions from all active wells within the OVGB. The OBGMA requires well operators to accurately measure and report extractions as precisely as possible, regardless of volume extracted, using flow meters and a standardized Groundwater Extraction Form in January, April, July, and October of each year. Additionally, because groundwater extractions are self-reported, OBGMA requests photographs or field verifies well meters when reported production rates appear anomalous. The number of active wells varies from year to year due to construction and destruction of wells, well owners not pumping due to changes in agricultural use, or well owners obtaining water from other sources. Currently, there are approximately 184 active wells in the OVGB (Figure 2-5, Groundwater Well Locations and Density per Square Mile). The reported total annual groundwater extraction from the OVGB between 1985 and 2020 ranged from 3,239 AF in 2016 to 7,697 AF in 1992, for an average of approximately 4,893 AFY[5] (OBGMA 2018, 2021a; Figure 2-6, Historical Groundwater Extraction and Estimated Water Use by Sector). Over the 33-year period of record, private well production accounted for, on average, approximately 64% of total groundwater extracted from the OVGB while municipal well production accounted for approximately 36%. In 2018, the total groundwater extracted from the OVGB was approximately 4,515 AF, of which approximately 2,565.6 AF (57%) was for agriculture, 418.6 AF (9%) was for domestic, and 1,530.8 AF (34%) was for municipal use, including CMWD and other municipal pumping (OBGMA 2019; Figure 2-6).

2.1.2.2 Precipitation and Streamflow Monitoring

The primary sources of historical and current climate and streamflow data for the OVGB include VCWPD, DWR, the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Geological Survey (USGS). Precipitation and streamflow data are compiled by the VCWPD and made accessible through the County's Hydrologic Data Webpage. Additional climate data are available from NOAA's Climate Data Online service, and streamflow data from the USGS National Water Information System (NWIS) Mapper. In addition, the OBGMA conducts monthly manual stream discharge monitoring and continuous stream stage monitoring on lower San Antonio Creek. The data from these monitoring entities are used to inform development of the groundwater basin setting, hydrogeological conceptual model, and groundwater budget.

Table 2-4 lists all the precipitation stations and stream gauges within and in the vicinity of the OVGB, along with their status (active/inactive) and their period of record. Figure 2-7, Weather Stations and Average Annual Precipitation in the OVGB shows all listed stations, except for the closest California Irrigation Management Information System (CIMIS) station (Santa Paula), which is located approximately 10 miles south-southeast of the southern OVGB boundary. Figure

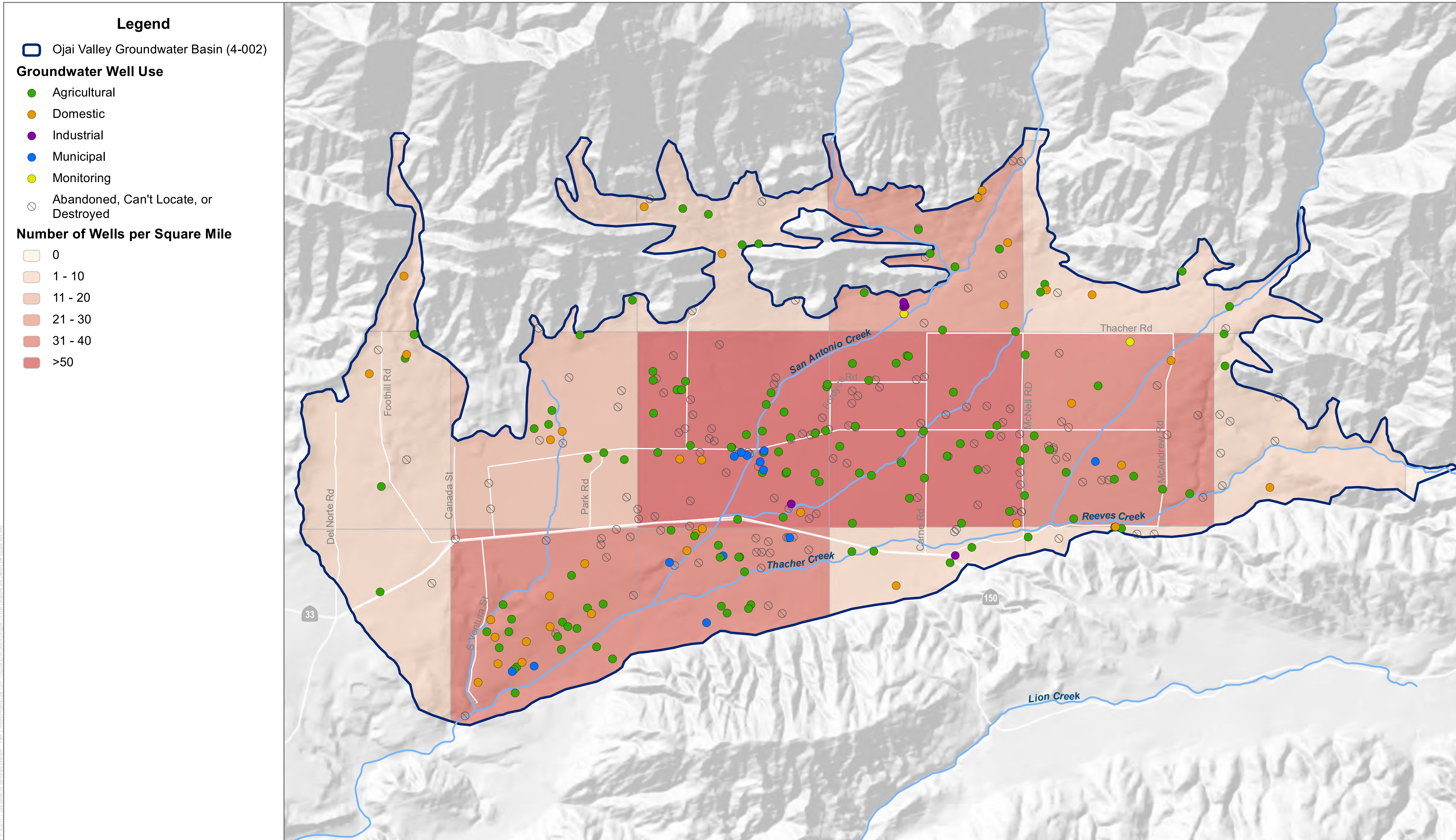
[5] The Ojai Basin Groundwater Model estimates total annual groundwater extraction over the period between 1985 to 2018 of approximately 4,100 AFY (DBS&A 2020b). Prior to 1993, groundwater extraction in the OVGB was not completely metered and modeled estimates differ from OBGMA reporting.

2-7 also shows the location of the OBGMA manual stream monitoring site on lower San Antonio Creek at Skunk Ranch Road.

Table 2-4
Weather Stations and Stream Gauges in the Vicinity of the OVGB

Station Name (Agency No./ID)	Latitude	Longitude	Elevation (Feet amsl)	Status	Period of Record
Weather Stations					
National Oceanic and Atmospheric Administration					
Ojai, CA, US (USC00046399)	34.4477	-119.2275	745	Active	5/1/1905 – Present
County of Ventura					
Ojai-County Fire Station (030D)	34.44806	-119.2313	760	Active	10/1/1980 – Present
Ojai-Thacher School (059)	34.46664	-119.1804	1,440	Active	10/1/1915 – Present
Upper Ojai-Happy Valley (064B)	34.43722	-119.1899	1,320	Active	10/1/1970 – Present
Ojai-Bower Tree Farm (153A)	34.44139	-119.2219	780	Active	10/1/1977 – Present
Ojai-Stewart Canyon (165)	34.46053	-119.2486	970	Active	10/1/1956 – Present
Meiners Oaks-County Fire Station (218)	34.44461	-119.2852	730	Active	10/1/1964 – Present
Senior Gridley Canyon - Type B (300)	34.48192	-119.2088	2,514	Active	10/1/1992 – Present
Nordhoff Ridge - Type C (303)	34.50989	-119.2308	4,112	Active	10/1/1997 – Present
California Irrigation Management Information System					
Santa Paula (198)	34.324639	-119.10488	218	Active	3/30/2005 – Present
Santa Paula (58)	34.301667	-119.11889	175	Inactive	7/30/1987 – 2/15/1991
Stream Gauges					
County of Ventura					
San Antonio Creek at Camp Comfort (616)	34.42703	-119.2585	577	Active	10/1/2018 – Present
Fox Canyon Drain below Ojai Ave (631)	34.44742	-119.2411	734	Inactive[a]	10/1/1967 – 10/1/2008
San Antonio Cr above Spreading Grounds (648)	34.46636	-119.2053	—	Active[b]	10/1/2013 – 9/30/2014
San Antonio Creek at Grand Ave (649)	34.45436	-119.2218	—	Active[b]	10/1/2013 – 9/30/2016
San Antonio Creek at Hwy 150 (650)	34.44914	-119.2248	—	Inactive	10/1/2013 – 9/30/2014
Thacher Creek at Boardman Road (669)	34.44481	-119.2227	—	Active[ab]	10/1/2002 – 10/1/2008
San Antonio Creek at Hwy 33 (605)	34.38039	-119.3046	307	Inactive	10/1/1949 – 10/1/2014
San Antonio Creek at Old Creek Road (605A)	34.38256	-119.3027	—	Active[b]	10/1/2013 – 9/30/2019
U.S. Geological Survey					
San Antonio Creek at Casitas Springs (11117500)[c]	34.38039	-119.3046	307	Inactive	10/1/1949 – 9/29/1983
San Antonio Creek Near Ojai CA (11117000)	34.42694	-119.2575	—	Inactive	10/1/1927 – 9/29/1932

Source: NOAA 2020; CIMIS 2020; VCWPD 2020; USGS 2020a.
Notes: amsl = above mean sea level; — = data are not available.
[a] Peak event only site.
[b] Site listed as active on the VCWPD Hydrologic Data Server but period of record does not extend to present.
[c] Site is same as station 605 monitored by VCWPD.



DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; VCWPD; OBGMA

DUDEK

0 0.5 1 Miles

FIGURE 2-5

Groundwater Well Locations and Density per Square Mile

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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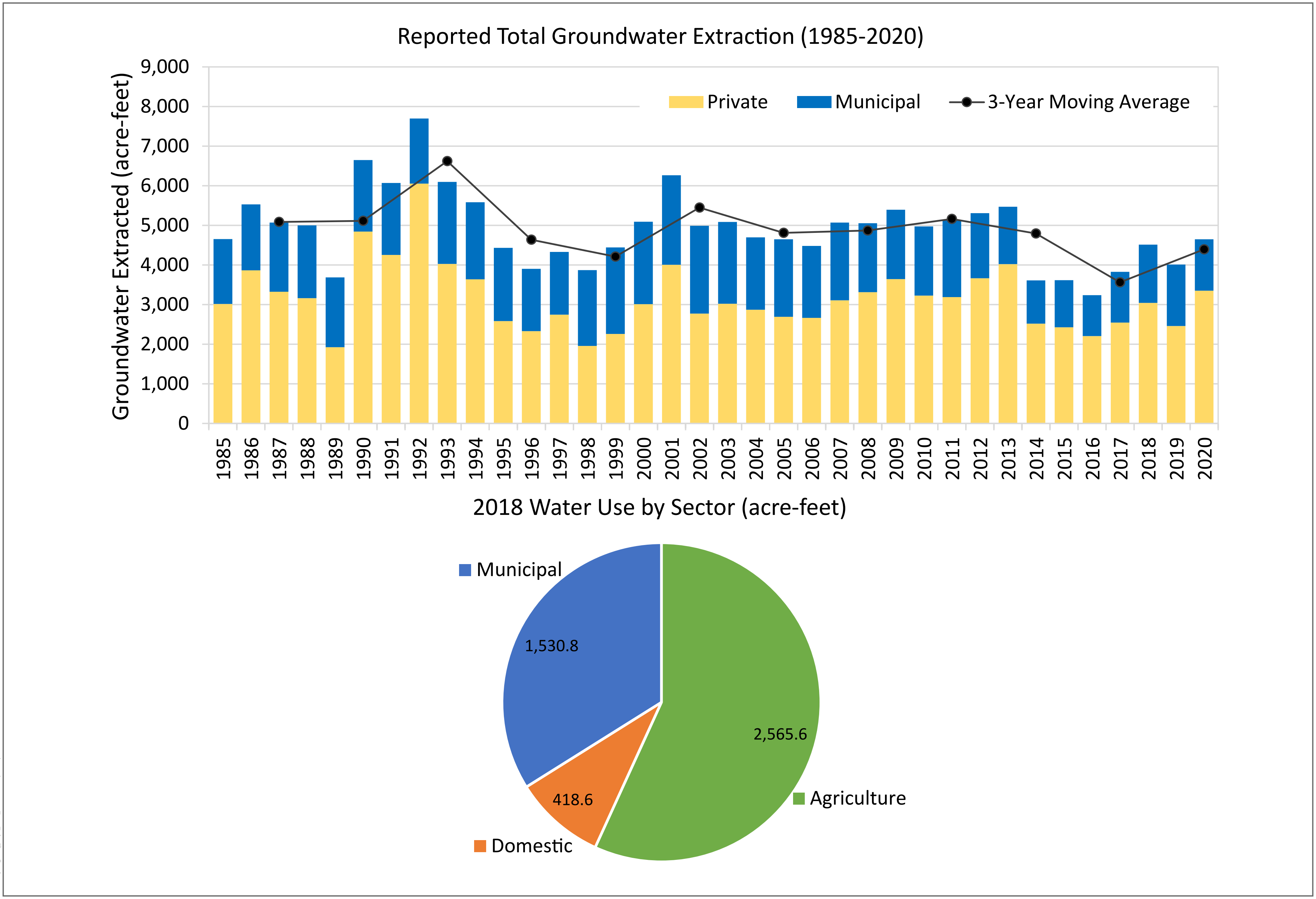

SOURCE: OBGMA

FIGURE 2-6

Historical Groundwater Extraction and Estimated Water Use by Sector

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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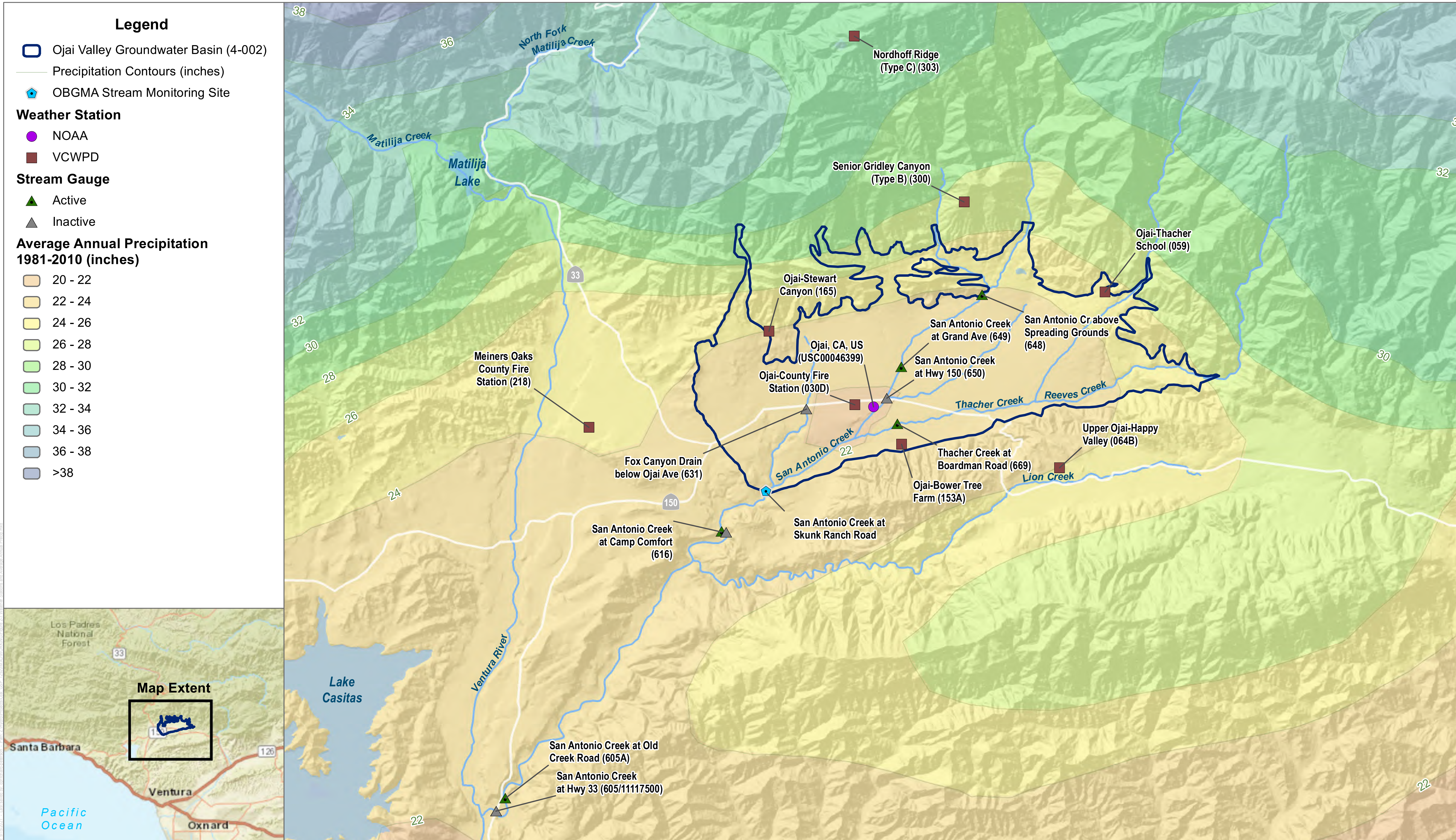

DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; NOAA; VCWPD; PRISM

DUDEK

0 1 2 Miles

FIGURE 2-7

Weather Stations and Average Annual Precipitation in the Plan Area

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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2.1.2.3 Management Plans

Groundwater Management Plan for the Ojai Basin

In 1992, the State Legislature provided an opportunity for local groundwater management with the passage of Assembly Bill (AB) 3030, the Groundwater Management Act (California Water Code, Part 2.75). Many basins developed a groundwater management plan (GWMP) to provide planned and coordinated monitoring, operation, and administration of groundwater basins with the goal of long-term groundwater resource sustainability. The Groundwater Management Act was first introduced in 1992 as AB 3030 and has since been modified by SB 1938 in 2002 and AB 359 in 2011. This legislation has largely been superseded by SGMA.

The Ojai Basin Groundwater Management Agency was created in 1991 with the mission "to preserve the quantity and quality of groundwater in the Ojai Valley Basin in order to protect and maintain the long-term water supply for the common benefit of the water users in the basin" (OBGMA 1994). The creation of the OBGMA required a special act of the California legislature, the Ojai Basin Groundwater Management Agency Act, or SB 534 (OBGMA 1994). The OBGMA adopted a GWMP under AB 3030 in 1994 (OBGMA 1994). The initial GWMP drew from existing data and sources and provided a review of groundwater conditions in the OVGB. It also provided a detailed action plan for the effective management of the OVGB consisting of five broad goals including: (1) understanding the basin, (2) controlling exports: protecting and managing the basin, (3) encouraging supporting activities, (4) effective communication, and (5) efficient administration (OBGMA 1994). Since the development of the initial GWMP in 1994, OBGMA prepared updates to the GWMP in 2007 and 2018 (OBGMA 2018).

Ventura County Integrated Regional Water Management Plan

The Ventura County Integrated Regional Water Management Program (IRWM) began in 2005 following the passage of Proposition 50, the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002. Chapter 8 of Proposition 50 authorized the legislature to appropriate $500 million for IRWM planning, the intent of which was to encourage agencies to develop plans using regional water management strategies for water resources and to develop projects using these IRWM strategies to protect communities from drought, protect and improve water quality, and improve local water security by reducing dependence on imported water. The Watersheds Coalition of Ventura County (WCVC), the IRWM planning group for Ventura County, developed and then adopted its first IRWM plan in 2006, and under Proposition 50 received $25 million for 11 countywide projects. The WCVC Integrated Regional Watershed Management Plan (IRWM Plan) was updated under the Proposition 84 Guidelines in 2013 and received approximately $56.2 million for 22 countywide projects. Several WCVC IRWM Proposition 50 and 84 grant funded projects were completed in the OVGB, including the San Antonio Creek Spreading Grounds

Rehabilitation Project Phases 1 and 2, and the Senior Canyon Water Company Automation Upgrades Project.

In 2019, another update to the IRWM Plan was prepared to ensure that the County remains eligible for funding under the Proposition 1 guidelines (WCVC 2019). The Proposition 1 IRWM Grant Program provides funding for projects that help meet the long-term water needs of the state, including the need to decrease reliance on imported water sources, increase infrastructure resilience to the impacts of climate change, and locally manage and prioritize watershed resources and water infrastructure projects. The 2019 update focused on improving the previous IRWM Plan and incorporating the outcome of the SGMA and the formation of groundwater sustainability agencies (WCVC 2019). The IRWM Plan region encompasses all of Ventura County.

Urban Water Management Plan

Casitas Municipal Water District water supply management is outlined in the 2020 Urban Water Management Plan (CMWD 2021). All urban water suppliers (as defined in California Water Code Section 10617), including CMWD, are required to prepare water management plans on a 5-year cycle.[6] These plans describe existing and planned water supply sources, identify human and/or environmental threats to water reliability, outline how they will meet state-mandated water conservation targets,[7] establish water shortage contingency plans, and assess whether their existing and future water supplies will be sufficient over a 20-year planning horizon. Projections of growth and land use in the service area along with drought scenarios are incorporated in the long-term water supply assessment. Although CMWD does not meet the requirements of an agricultural water supplier,[8] CMWD voluntarily completed a combined urban water management plan (UWMP) and Agricultural Water Management Plan in 2015 (Milner 2016), and included elements of agricultural management planning in its 2020 UWMP (CWMD 2021). In 2015, CMWD supplied 8,048 AF of water to approximately 5,732 acres of irrigated crops including avocados, hay, lemons, oranges, strawberries, tangerines, and walnuts (Milner 2016). In 2020, CMWD supplied 5,116 AF of water for agricultural irrigation (CMWD 2021).

CMWD's annual water demand has varied historically from a low of approximately 8,545 AF in 2019 to a high of approximately 24,416 AF in 1989. Agricultural sales account for approximately 50% of CMWD's total water demand, followed by sales to other water agencies (35%) and retail sales (15%). CMWD's water supply comes from local surface water stored in Lake Casitas and

6 Per California Water Code Section 10617, an urban water supplier means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly, to more than 3,000 customers or supplying more than 3,000 AFY of water.

7 The Water Conservation Act of 2009 (i.e., SB X7-7) requires that the state reduce urban water consumption by 20% by the year 2020, as measured in gallons per capita per day.

8 Per California Water Code Section 10608.12(a), an agricultural water supplier means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water.

local groundwater extracted from Mira Monte Well. CMWD's water demand from Lake Casitas reached a high of 26,180 AF in calendar year 1989, but has since remained consistently lower with a decline to 7,668 AF in calendar year 2019 in response to water resource changes by large customers, heightened customer awareness of water resource conditions, and CMWD's Water Efficiency and Allocation Program (CMWD 2021).

As part of the 2020 UWMP update, CMWD's future water supplies and demands were assessed. For the period from 2020 to 2040, CMWD's projected water supply is 19,310 AFY. This estimate assumes that 14,865 AFY of surface water will be sourced from Lake Casitas, 145 AFY of groundwater will be pumped from Mira Monte Well, 2,000 AFY of State Water Project (SWP) water will be delivered via the Ventura-Santa Barbara Counites Intertie (discussed below), and up to 2,300 AFY will be pumped from the Ojai wellfield. Based on CMWD's water supply reliability assessment, no water shortages are predicted based on average and single-dry years planning evaluations (CMWD 2021). Given that Lake Casitas and groundwater basin storage can sustain extended drought periods, a few dry years have little effect on Casitas' supply availability. However, supplies can become limited during extended drought periods and Casitas implements its Water Efficiency and Allocation Program as a demand management tool as Lake Casitas storage declines. This demand management helps to stretch supplies longer than the 5-year drought period evaluated in the 2020 UWMP (CMWD 2021).

In addition to the UWMP, CMWD has a Water Shortage Contingency Plan, a Staged Demand Reduction Program, and a Water Efficiency and Allocation Program. CMWD plans to continue to develop and implement aggressive water conservation programs to overcome potential future water shortage issues. CMWD does not plan to obtain additional water through surface water transfers and exchanges, from desalinated water, or from recycled water. CMWD does, however, have an entitlement to 5,000 AFY of SWP water that it is currently not able to receive because CMWD does not have a physical connection to the SWP. CMWD has been involved in several studies to bring SWP water to the service area. Ultimately, either construction of a pipeline or interagency coordination and water transfers and exchanges would be required for CMWD to access its SWP entitlement (Milner 2016). Funding is currently being pursued for construction of a 1.5-mile pipeline between CMWD and Carpinteria Valley Water District, referred to as the Ventura-Santa Barbara Counties Intertie, which would increase the size of a current Intertie connection as well as build pump stations to enable the ability to move 2,000 AFY on average of Casitas' SWP supplies to the Casitas system (CMWD 2021).

UWMPs provide valuable data on regional water demand and supply, provide a means of measuring how effective water conservation and water use efficiency efforts have been, and set the framework for evaluating and prioritizing future capital improvements. With groundwater being an important source of water supply for the OVGB, the sustainable management criteria as well as the projects and management actions developed in this GSP draw from information in prior UWMPs and are likewise expected to heavily inform the next UWMP cycle.

2.1.2.4 Regulatory Programs

Porter-Cologne Water Quality Control Act and Clean Water Act Permitting

The Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act; codified in California Water Code, Section 13000 et seq.) is the primary state water quality control law for California. Whereas the federal Clean Water Act applies to all waters of the United States, the Porter-Cologne Act applies to waters of the state, which includes isolated wetlands and groundwater in addition to federal waters.[9] The Porter-Cologne Act is implemented by SWRCB and the nine RWQCBs. In addition to other regulatory responsibilities, the RWQCBs have the authority to conduct, order, and oversee investigation and cleanup where discharges or threatened discharges of waste to waters of the state could cause pollution or nuisance, including impacts to public health and the environment. The OVGB is located in the northern area of the RWQCB, Los Angeles Region (RWQCB Region 4) and within the Ventura River Hydrologic Unit, per the RWQCB Water Quality Control Plan for the Los Angeles Region (Los Angeles Basin Plan; RWQCB 2014). These statutes are relevant to the GSP in that they regulate the quality of point-source discharges (e.g., wastewater treatment plant effluent, industrial discharges, and on-site wastewater treatment systems (OWTSs) and non-point source discharges (e.g., stormwater runoff) to the underlying aquifer.

The Los Angeles Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Los Angeles Basin Plan (California Water Code Sections 13240–13247). The Porter-Cologne Act provides the RWQCBs with authority to include in their Basin Plans water discharge prohibitions applicable to particular conditions, areas, or types of waste. The Los Angeles Basin Plan is continually being updated to include amendments related to implementation of total maximum daily loads, revisions of programs and policies within the RWQCB Los Angeles Region, and changes to beneficial use designations and associated water quality objectives. The beneficial uses for groundwater are identified in the Los Angeles Basin Plan as being suitable for municipal and domestic supply, agricultural supply, industrial process supply, and industrial service supply (RWQCB 2014). Unlike beneficial uses of surface water (which vary based on individual surface water body), the RWQCB designates the same beneficial uses for all DWR-designated groundwater basins in the Los Angeles Region.

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9 "Waters of the state" are defined in the Porter-Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state" (California Water Code Section 13050[e]).

The Los Angeles Basin Plan defines water quality objectives for groundwater generally (for taste, odors, and radioactivity), as well specific to beneficial uses (i.e., municipal/domestic supply and agricultural supply). The water quality objectives for municipal/domestic supply are the same as primary drinking water standards (i.e., maximum contaminant levels [MCLs]) found in Title 22 of the California Code of Regulations (CCR). For agricultural uses of groundwater, the Los Angeles Basin Plan provides water quality objectives consisting of maximum concentrations for various inorganic chemicals (including certain metals and nitrate) and guidelines for various physical and general mineral properties (RWQCB 2014, Tables 3-8 and 3-9). The Los Angeles Basin Plan defines additional objectives for select constituents specific to certain groundwater basins, including the OVGB. For the OVGB, the Los Angeles Basin Plan has defined additional objectives for total dissolved solids (TDS), sulfate, chloride, and boron (RWQCB 2014, Table 3-13).

The Porter-Cologne Act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair a beneficial use of surface or groundwater of the state. California Water Code Section 13260(a) requires that any person discharging waste or proposing to discharge waste—other than to a community sewer system—that could affect the quality of the waters of the state file a Report of Waste Discharge with the applicable RWQCB. For discharges directly to surface water (waters of the United States), a National Pollutant Discharge Elimination System (NPDES) permit is required, which is issued under both state and federal law; for other types of discharges, such as waste discharges to land (e.g., spoils disposal and storage), erosion from soil disturbance, or discharges to waters of the state (such as groundwater and isolated wetlands), Waste Discharge Requirements (WDRs) are required and are issued exclusively under state law. WDRs typically require many of the same best management practices (BMPs) and pollution control technologies as required by NPDES-derived permits. The NPDES and WDR programs regulate construction, municipal, and industrial stormwater and non-stormwater discharges under the requirements of the Clean Water Act of 1972 and the Porter-Cologne Act, respectively. The construction and industrial stormwater programs are administered by SWRCB, whereas individual WDRs, low-threat waivers, and other OVGB-specific programs are administered by the Los Angeles RWQCB. Programs and policies that have particular relevance to the OVGB include the following:

1. **Stormwater General Permits (Construction and Industrial General Permits).** SWRCB and the Los Angeles RWQCB administer a number of general permits that are intended to regulate activities that collectively represent similar threats to water quality across the state and thus can appropriately be held to similar water quality standards and pollution prevention BMPs. Construction projects more than 1 acre in size are regulated under the statewide Construction General Permit and are required to develop and implement a stormwater pollution prevention plan. Six separate annual reports were submitted for the 2019-2020 reporting period within the OVGB (SWRCB 2020a), indicating that six projects are required to implement a stormwater pollution prevention plan. Similarly, industrial sites are also

required to develop a stormwater pollution prevention plan that identifies and implements BMPs necessary to address all actual and potential pollutants of concern. Currently there is one entity within the OVGB subject to an industrial stormwater pollution prevention plan. The City of Ojai, located at 408 South Signal Street, Ojai, CA, 93023 submitted an Annual Report for the 2019-2020 reporting period and indicated that no pollutants were present at The City of Ojai facility (SWRCB 2020a).

2. **Irrigated Lands Regulatory Program.** Water discharges from agricultural operations include irrigation runoff, flows from tile drains, irrigation return flows, and stormwater runoff. These discharges can affect water quality by transporting pollutants, including pesticides, sediment, nutrients, salts (including selenium and boron), pathogens, and heavy metals, from cultivated fields into surface waters and/or groundwater. To prevent agricultural discharges from impairing the waters that receive these discharges, the Irrigated Lands Regulatory Program (ILRP) regulates discharges from irrigated agricultural lands. This is done by issuing WDRs or conditional waivers of WDRs to growers. These orders contain conditions requiring water quality monitoring of receiving waters and corrective actions when impairments are found. Through a series of events related to the passage of SB 390 (Alpert), the ILRP originated in 2003. Initially, the ILRP was developed for the Central Valley RWQCB. As the Central Valley RWQCB ILRP progressed, a groundwater quality element was added to the filing requirement for agricultural lands that had previously been subjected to only surface water discharge concerns. To date, the different RWQCBs are in different stages of implementing the ILRP. The Los Angeles RWQCB has a conditional waiver program for irrigated agricultural lands throughout the region, focusing on priority water quality issues such as pesticides and toxicity, nutrients, and sediments—especially nitrate impacts to drinking water sources. According to the SWRCB GeoTracker database, there are no enrollees to the Irrigated Lands Regulatory Program in the OVGB (SWRCB 2020b).

3. **OWTS Requirements.** Requirements for the siting, design, operation, maintenance, and management of OWTSs are specified in SWRCB's OWTS Policy (SWRCB 2018). The OWTS policy sets forth a tiered implementation program with requirements based upon levels (tiers) of potential threat to water quality. The OWTS policy includes a conditional waiver for on-site systems that comply with the policy. On-site sewage disposal systems in Ventura County are regulated by the Environmental Health Division Liquid Waste Program. Ventura County regulations for on-site sewage disposal systems set forth specific requirements related to (1) permitting and inspection of on-site systems; (2) septic tank design and construction; (3) drywell and disposal field requirements; and (4) servicing, inspection, reporting, and upgrade requirements. Standards pertaining to system sizing and construction are contained in the California (Uniform) Plumbing Code. Additional

requirements for on-site sewage disposal systems in Ventura County are adopted as part of community plans or as project-specific mitigation measures.

4. **Individual WDRs.** Individual WDRs are required for point source discharges to land not otherwise covered under a general permit program or conditional waiver. The purpose of individual WDRs are to define discharge prohibitions, effluent limitations, and other water quality criteria necessary to ensure discharges do not result in exceedances of Los Angeles Basin Plan objectives for receiving waters, including groundwater. There is a total of 11 individual WDRs in the OVGB—five draft, three historical, and three active WDRs. The three active WDRs include the Krishnamurti Education Center (WDR100039613), Monica Ros School, Inc. (WDR100000508), and The Thacher School Wastewater Treatment Plant (WDR100000725). Both the Krishnamurti Center and Monica Ros School submit quarterly monitoring reports for the discharge of wastewater to several on-site OWTSs. The Thacher School Wastewater Treatment Plant submits quarterly monitoring reports for the discharge of wastewater to a 40,000 gallon per day design peak capacity on-site wastewater treatment plant where, once treated, the effluent is discharged to a 24,000 square foot buried leach field. The Thacher School Wastewater Treatment Plant has a groundwater monitoring network consisting of two wells, one up-gradient (state well number (SWN) 05N22W33J01S) and one down-gradient (MW-1R) of the treatment plant, in addition to a third well (SWN 05N22W33R01S) that is used to calculate groundwater flow direction, that are monitored quarterly for a variety of constituents including nitrate, TDS, chloride, sulfate, and boron (SWRCB 2020b).

Implementation of the GSP would not affect the applicability or implementation of the regulatory programs discussed above, and continued implementation of Porter-Cologne Act and the Clean Water Act permitting would advance the GSP's sustainability goals related to water quality. The County requires new development and redevelopment projects proposed within the OVGB to comply with NPDES permits, WDRs, and OWTS requirements as part of its permitting and approval process. These programs will continue to provide benefits to water quality by requiring both point and non-point discharges to comply with Los Angeles Basin Plan water quality objectives and to be protective of Los Angeles Basin Plan beneficial uses throughout SGMA's planning and implementation horizon. In addition, the application of stormwater permits means specific performance standards for capture and infiltration of stormwater runoff would be implemented where applicable, providing opportunities for enhanced recharge of the OVGB.

Groundwater Well Permitting

Statewide standards for the construction, repair, reconstruction, or destruction of wells are found in DWR Bulletin 74-81 and 74-90 (i.e., California Well Standards) (DWR 1981, 1991). The California Well Standards include requirements to avoid sources of contamination or cross-contamination, proper sealing of the upper annular space (i.e., first 50 feet), disinfection of the well following construction work, use of appropriate casing material, and other requirements. In October 2017, Governor Brown signed SB 252, which became effective on January 1, 2018. SB 252 requires well permit applicants in critically overdrafted basins to include information about the proposed well, such as location, depth, and pumping capacity. The bill also requires the permitting agency to make the information easily accessible to the public and the GSAs. The OVGB is not designated as critically overdrafted.

The Ventura County Public Works Agency issues groundwater well permits in the OVGB. In December 2014, the Ventura County Ordinance No. 4468 was adopted which regulates the construction, maintenance, operation, modification, and destruction of groundwater wells. Ventura County requires well permits for any construction, modification, replacement, repair, or destruction of wells. Permit requirements include "information as the Agency may deem necessary in order to determine whether underground waters will be protected" (Chapter 8, 4813, C8). Ventura County well construction or destruction activity standards are required to comply with the DWR Well Standards Bulletin Nos. 74-81, 74-90, and 74-9. New water wells must be equipped with a flow meter and calibrated every 3 years; however, de minimis extractors (those producing less than 2 AFY) are exempt from this requirement. Completion logs are required for all wells and geophysical logs are required where necessary to prevent cross contamination of pumping zones. Section 4826 pertains to the Aquifer Protection Program, the purpose of which is to require destruction or repair of wells that are causing groundwater pollution. The provision requires annual reporting of water extractions, time of operation, static groundwater levels, and pump test data if available. Based on these data, all wells are classified in regard to location and operational condition. Due to pervasive drought conditions, as of October 28, 2014, Section 4826.1 prohibited the construction of new wells or modification or repair of existing wells within the unincorporated area of Ventura County except under specific circumstances. With the initiation of SGMA, the ordinance was modified to include only basins designated as high or medium priority by DWR, which includes the OVGB. In addition, OBGMA requires all wells in the OVGB to be registered and extractions reported in accordance with Ordinance No. 1.

Title 22 Drinking Water Program

The SWRCB DDW regulates public water systems in the state to ensure the delivery of safe drinking water to the public. A public water system is defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. Private domestic wells, wells associated with drinking water systems with less than 15 residential service connections, industrial wells, and irrigation wells are not regulated by DDW.

DDW enforces the monitoring requirements established in Title 22 of the California Code of Regulations for public water system wells, and all the data collected must be reported to DDW.

Title 22 also designates the MCLs for various waterborne contaminants, including volatile organic compounds, non-volatile synthetic organic compounds, inorganic chemicals, radionuclides, disinfection byproducts, general physical constituents, and other parameters.

Water Supply Planning and Water Use Efficiency

Over the years, California has passed a series of Senate Bills, including SB X7-7, SB 610, SB 221, SB 1262, and most recently SB 606, that together outline the regulatory framework for water conservation and water supply planning, and for considering issues of water availability in the environmental and permitting process for land use plans, projects, and subdivisions. These bills have been codified in the California Water Code Sections 10608–10609.42, which establish water use and demand reduction targets; Sections 10610–10657, which address UWMPs; and Sections 10910–10914, which address water supply assessments, as well as California Government Code Section 66473.7 (part of the Subdivision Map Act of 1893), which contains requirements related to written verifications (i.e., "will-serve" letters). Collectively, these laws, along with the California Environmental Quality Act of 1970 (CEQA), prompt cities, counties, special districts, and water suppliers to evaluate growth in a broader geographic and temporal context, by coordinating land use planning with water availability and sustainability. CMWD's UWMP is described in greater detail in Section 2.1.2.3, Management Plans. SB 1262, which became effective in 2017, made changes to existing law to integrate to some extent existing law governing written verifications and water supply assessments with the passage of SGMA. The sections of the California Water Code addressing water supply now contain several provisions relating specifically to groundwater, which if used wholly or in part to supply a project or subdivision, triggers additional analytical steps that could expand the necessary scope of a CEQA document, water supply assessment, and/or written verification, as applicable. SB 1262 added language in the subdivision map act clarifying additional considerations for when part or all of the water supply comes from groundwater, especially in adjudicated basins, basins in critical overdraft, and/or basins designated as high or medium priority pursuant to SGMA. In addition to incorporating information from UWMPs, water supply assessments may incorporate relevant information from GSPs prepared pursuant to SGMA.

AB 1668 and SB 606, passed in May 2018, would require the SWRCB, in coordination with DWR, to adopt long-term standards for the efficient use of water, as provided, and performance measures for commercial, industrial, and institutional water use on or before June 30, 2022. The bill, among other things, establishes a standard for indoor water use of 55 gallons per capita daily to be reached by 2025, 52.5 gallons per capita daily beginning in 2025, decreasing to 50 gallons per capita daily beginning in 2030, or as determined jointly by DWR and SWRCB in accordance with necessary studies and investigations. DWR will also adopt long-term standards for outdoor residential water use and outdoor irrigation in connection with commercial, industrial, and institutional water use. With the 20% by 2020 conservation goal pursued in the Water Conservation Act of 2009, these bills extend UWMP requirements, but will measure compliance with uniform standards based on the aggregate amount of water that would have been delivered the previous year by an urban retail water supplier if all that water had been used efficiently (rather than relative to a water district's baseline). The legislation has a variance process available to allow for exceptions in special circumstances approved by DWR. AB 1668 continues the requirements for urban water suppliers to submit UWMPs every 5 years (though in years ending in 6 and 1 instead of 0 and 5), and makes water suppliers ineligible for any water grant or loan if it does not submit a UWMP. The bills also add requirements for agricultural water management.

Operational Flexibility and Conjunctive Management Considerations

Operational flexibility is a key consideration in integrated water resource management because it helps water purveyors adapt to known legal, operational, and environmental constraints and plan for an uncertain future, especially as it relates to drought resiliency and the effects of climate change. Operational flexibility can be measured over a given time horizon and/or geographic scale (e.g., water district service area) as the difference between available water supply and service area demand. Operational flexibility is maximized when a water purveyor has a large variety of sources in a water supply portfolio, when it has local control over such sources, and when such sources are connected to each other (e.g., conjunctively managed). On a general statewide scale, water purveyors are increasingly looking to minimize reliance on imported water supplies by promoting stormwater recharge, maximizing wastewater recycling, and sustainably developing local sources of water.

CMWD draws from two sources—Lake Casitas (maintained by runoff from the Ventura River and the subwatersheds surrounding the reservoir) and groundwater—which differ in terms of the volume available, timing of peak availability, and reliability. Climate and regulatory constraints (e.g., water quality standards, water rights, and minimum environmental flows) have historically had a greater impact on the availability of surface water supplies. With the passage of SGMA and the sustainable management criteria established in this GSP (Chapter 3), once adopted, minimum thresholds may be established for each sustainability indicator. OBGMA has exercised its authority to manage the OVGB in a manner that avoids critical overdraft and manages the OVGB conjunctively with its surface water supplies in accordance with its adopted GWMP (OBGMA 2018). OBGMA's planning documents identify CMWD as a "backup" water supply in the event groundwater supplies become depleted. OBGMA does not currently have a groundwater banking plan within the OVGB.

The GSP complements and enhances existing projects and programs currently in place to maximize beneficial use of water resources and increase operational flexibility within the OVGB.

2.1.3 Land Use Considerations

The following section presents a review of population and land use characteristics of the OVGB, and the various land use plans and their applicability to groundwater resource management. State law requires that all cities and counties adopt a comprehensive, long-term general plan that outlines physical development of the county or city. The general plan must cover a local jurisdiction's entire planning area so that it can adequately address the broad range of issues associated with the city or county's development. Ultimately, the general plan expresses the community's development goals and embodies public policy relative to the distribution of future public and private land uses. The general plan may be adopted as a single document or as a group of documents relating to subjects or geographic segments of the planning area.

Most of the planning documents relevant to the OVGB fall under the umbrella of the Ventura County General Plan, which is a "living document" made up of many parts that are periodically updated by the County's Planning Division. The core structure of the document is to have broad countywide land use policies that then get refined in various community plans—the local setting, policy issues, and community concerns are taken into account through a public participation process. All elements of a general plan, whether mandatory or optional—including community plan principles, goals, objectives, policies, and plan proposals—must be internally consistent with each other and all elements have equal legal status (i.e., no element is legally subordinate to another).

The development and implementation of the GSP is relevant to several general plan and community plan elements, and vice versa, because both contain policies and implementation actions that are intended to be protective of water resources. All applicable land use plans acknowledge the major constraints on growth that the lack of water availability presents, and the County's general plans broadly encourage water conservation, and prohibit development, such as tentative map and subdivision approvals, unless the availability of water can be proven. Several plan elements intersect, including the Conservation Element, the Environmental Resource Management Element, and the Groundwater Resources Element, and contain policies specifically aimed at water resources and groundwater sustainability.

In a few cases, identified below, the passage of SGMA and the adoption of this GSP render some of the land use plan policies or underlying assumptions within them out of date. Where this occurs, it is expected that future general plan and community plan updates, and/or updates to general plan theoretical buildout estimate, must consider the sustainability goals, sustainable management criteria, as well as the projects and management actions of this GSP, and revise the relevant land use plans accordingly.

2.1.3.1 Land Use and Population

To evaluate current land uses within the OVGB, the OVGB boundary was intersected with the 2012 and 2016 land use layers from the Southern California Association of Governments (SCAG).

The percentage of various land use categories for the OVGB are presented in Table 2-5. The land uses in the OVGB are shown on Figure 2-8, Current Land Use. Within the OVGB, the majority of the land is agriculture, single family residential, facilities (including a golf course and school), and transportation, communications, and utilities. Agriculture is the most water-intensive land use in the OVGB. According to SCAG's 2016 land use dataset, updated as of November 2018, approximately 2,672 acres within the OVGB are used for agriculture (Table 2-5).

Table 2-5
Summary of Land Use in the OVGB

Land Use Category	2012		2016[a]	
	Acres	*Percent*	*Acres*	*Percent*
Agriculture	2,681.6	45.3%	2,672.3	45.2%
Commercial and Services	43.6	0.7%	43.6	0.7%
Education	39.8	0.7%	39.8	0.7%
Facilities	546.3	9.2%	545.0	9.2%
General Office	16.9	0.3%	16.9	0.3%
Industrial	31.4	0.5%	31.4	0.5%
Mixed Residential	16.0	0.3%	14.8	0.2%
Mixed Residential and Commercial	3.7	0.1%	3.7	0.1%
Mobile Homes and Trailer Parks	1.6	0.0%	1.6	0.0%
Multi-Family Residential	63.3	1.1%	63.3	1.1%
Open Space and Recreation	40.3	0.7%	40.3	0.7%
Rural Residential	150.2	2.5%	144.0	2.4%
Single Family Residential	1,562.7	26.4%	1,576.7	26.7%
Transportation, Communications, and Utilities[b]	363.6	6.1%	375.1	6.3%
Undeveloped or Protected Land	133.9	2.3%	132.8	2.2%
Vacant	168.9	2.9%	172.9	2.9%
Water	10.6	0.2%	0.2	0.0%
Unknown	38.9	0.7%	38.9	0.7%
Total	**5,913**	**100%**	**5,913**	**100%**

Source: SCAG 2020.
Notes:
[a] Draft version of SCAG's 2016 land use dataset, updated November 2018. Final 2016 land use dataset not available as of August 2020.
[b] This land use includes road rights-of-way that were not included in the land use data layer.

There are several sources of population data for the OVGB, most of which are derived from decennial census counts, which last occurred in 2020. Sources of population information are as follows:

- **U.S. Census Bureau:** The U.S. Census Bureau conducts a census count every 10 years. Census data are gathered by tracts, blocks, and census-designated places. Census blocks were intersected with the OVGB boundary to determine the population overlying the OVGB for 2010. Census blocks that intersected the boundaries of the OVGB were area-weighted to determine the population that falls within the OVGB.
- **City and County General Plans**: The City of Ojai and the County of Ventura gather data on development, growth, and land use patterns, and make population estimates in

conjunction with census data. The City's and County's general plans and websites were reviewed for historical and current population data.

- **Southern California Association of Governments**: SCAG is the nation's largest metropolitan planning organization, representing 6 counties, 191 cities, and more than 18 million residents. SCAG produces demographics data and growth forecasts for the entire Southern California region which were reviewed and used to forecast population growth within the OVGB.

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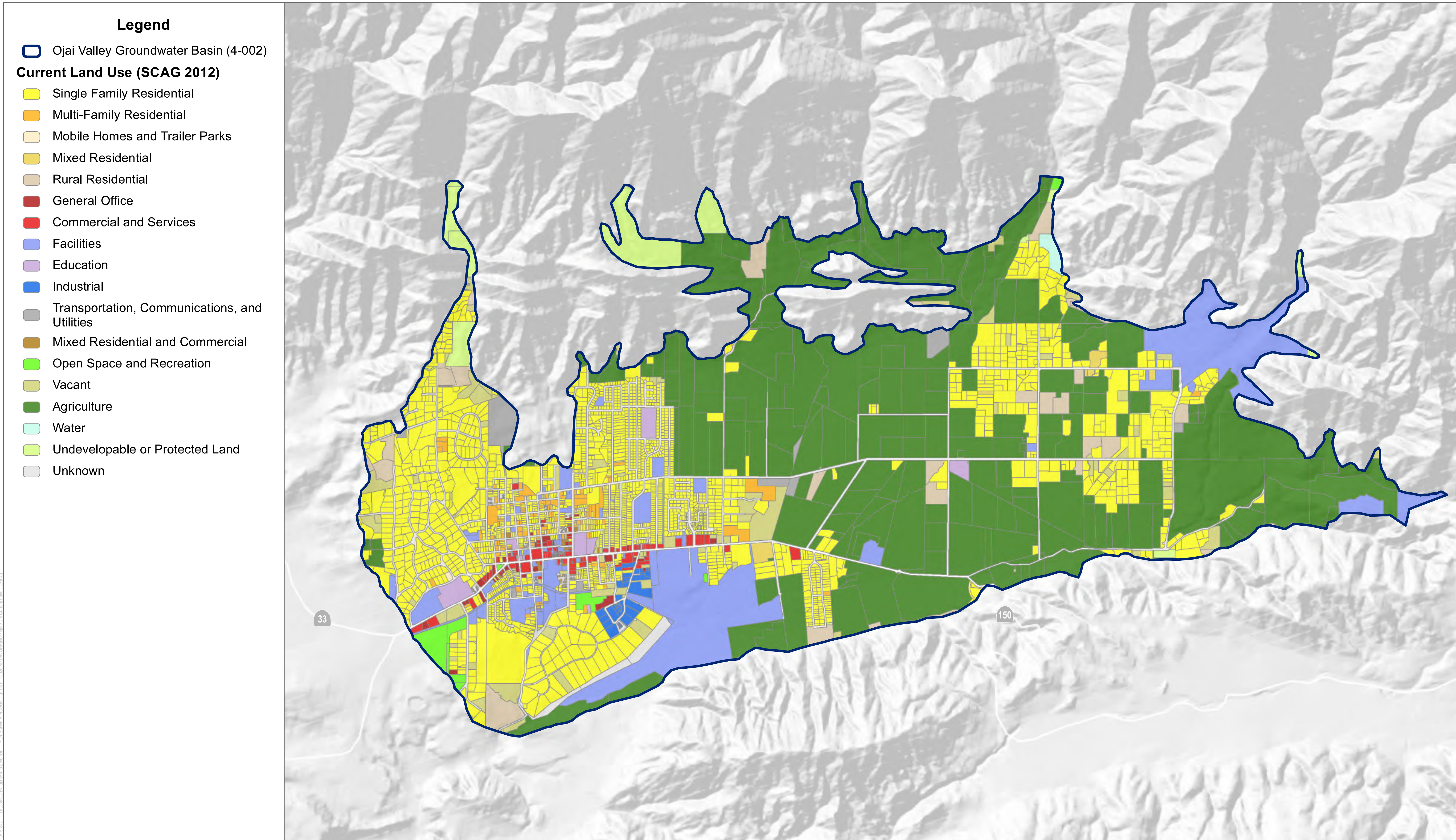

DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; SCAG

DUDEK

FIGURE 2-8

Current Land Use

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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At a countywide level, population growth is skewed toward incorporated cities. The population distribution within Ventura County is the result of a 1969 County–City agreement, called the Guidelines for Orderly Development, which directs urban-level development to incorporated cities in Ventura County (VCPD 2019). That agreement limits urban-level development and services within unincorporated areas. The total increase in population within unincorporated areas in Ventura County was 1.9% from 2000 to 2010, whereas population in the cities increased by 10.3% over the same period (VCPD 2019).

Table 2-6 shows the past, current, and projected population for Ventura County, the City of Ojai, and the OVGB. The population of the OVGB is estimated to have been 7,749 in 2010, based on census data. The population of the City of Ojai was estimated to have been 7,679 in 2018, approximately 0.9 percent of the total population of Ventura County, with an average household size of 2.4. Between 2000 and 2018, the City of Ojai's population growth rate was -2.3%, which was substantially lower than the Ventura County rate of 14.1% over the same period (SCAG 2019). The population of the City of Ojai is, however, forecasted to increase by approximately 6.5% between 2020 and 2035, and 2.5% between 2035 and 2040 (SCAG 2016). Using the 2010 OVGB population of 7,749 as a baseline and the average of forecasted growth rates for Ventura County and City of Ojai, the population of the OVGB is predicted to be 8,905 by the year 2040 (Table 2-6).

Table 2-6
Past, Current, and Projected Population for Ventura County, the City of Ojai, and the OVGB

Area	Population					
	2000	*2010*	*2012*	*2020*	*2035*	*2040*
Ventura County	753,197	823,318	835,400	886,400	945,100	965,400
City of Ojai[a]	7,862	7,461	7,535	7,700	8,200	8,400
OVGB[b]	—	7,749	7,844	8,170	8,705	8,905

Source: VCPD 2019 (for Ventura County, City of Ojai, and OVGB population in 2000 and 2010) and SCAG 2016 (for Ventura County and City of Ojai population 2012-2040).
Notes: — = not available or not applicable.
[a] Approximately 66% of the City of Ojai is in the OVGB.
[b] 2012-2040 OVGB population estimated based on average of forecasted growth rates for Ventura County and City of Ojai over same periods.

As defined in California Health and Safety Code, Section 116275, disadvantaged communities (DACs) are Census geographies having less than 80% of the statewide annual median household income. Based on 2016 DAC mapping at the Census Block Group level, approximately 1,220 acres of the OVGB are identified as severely disadvantaged with a median household income of $26,250 per year, and 640 acres are disadvantaged with a median household income of $50,200 per year (DWR 2020b). More recent 2018 DAC mapping at the Census Block Group Level indicates the areas of the OVGB previously identified as disadvantaged are no longer designated as disadvantaged (DWR 2020b).

2.1.3.2 General Plans

General plans are considered applicable to the GSP to the extent that they may change water demands within the OVGB or affect the ability of the GSA to achieve sustainable groundwater management over the planning and implementation horizon. General Plans applicable to the OVGB are (1) the Ventura County 2040 General Plan, (2) the Ojai Valley Area Plan, and (3) the City of Ojai General Plan. Each of the relevant general plans is summarized in Table 2-7 and described below.

Ventura County 2040 General Plan

The Ventura County General Plan (VCPD 2020a) applies to the County as a whole and includes area-specific plans for distinct unincorporated areas. For example, the Ojai Valley Area Plan (VCPD 2020b) includes specific water supply and water conservation and reuse policies that address local issues. The Ventura County 2040 General Plan outlines land use and growth policies at the County-wide level, and has several elements particularly relevant to groundwater sustainability, including the following:

- **Land Use and Community Character Element.** The Land Use and Community Character Element includes policies establishing land use designations with the intent to preserve open space, agricultural, and rural lands while permitting growth in unincorporated communities and cities. Section 2.2–Land Use Designations and Standards describes the preservation and management of open space areas for public health and safety, as well as for managed production of resources, such as groundwater basins.
- **Public Facilities, Services, and Infrastructure Element.** The Public Facilities, Services, and Infrastructure Element provides the framework for decisions concerning siting and maintenance of infrastructure, utilities, and services. The sections of this element with particular relevance to groundwater include: Section 5.4–Wastewater Treatment and Disposal, Section 5.5–Solid and Hazardous Waste, and Section 5.6–Flood Control and Drainage Facilities.
- **Conservation and Open Space Element.** The Conservation and Open Space Element provides guidance for the conservation, preservation, management, and development of natural, cultural, and scenic resources. In addition, the element provides guidance related to energy resources and planning for climate change impacts. Section 6.8–Open Space presents policies to preserve open space lands.
- **Hazards and Safety Element.** The Hazards and Safety Element includes policies to reduce hazards and ensure public safety, and focuses on the County's strategy to adapt to natural

hazards exacerbated by climate change. The sections with relevance to groundwater sustainability include Section 7.4–Geologic and Seismic Hazards and Section 7.5–Hazardous Materials.

- **Agriculture Element.** The Agriculture Element presents policies intended to maintain and promote Ventura County's thriving agriculture industry. Section 8.5–Sustainable Farming and Ranching establishes farming practices that will enhance the sustainability of agriculture in the County, including techniques designed to reduce water consumption.
- **Water Resources Element.** The purpose of the Water Resources Element is to provide a policy framework to preserve and enhance water supply and quality to ensure the long-term availability of the resource. The goals and policies of the element are organized under the following sections: 9.1–Water Supply, 9.2–Water Quality, 9.3–Water Conservation and Reuse, 9.4–Groundwater, 9.5–Watershed Management, 9.6–Water for Agriculture, and 9.7–Water for the Environment.
- **Area Plans.** The General Plan is supplemented by individual Area Plans that take into account the local setting, policy issues, and community concerns. The Area Plan applicable to the GSP is the Ojai Valley Area Plan (VCPD 2020b). The Water Resources Element of the Ojai Valley Area Plan includes specific policies that address local issues including: (1) effects on water from oil and gas exploration and production, (2) sedimentation, oil residue, and other urban pollutants impact mitigation, (3) water conservation techniques in new development, and (4) retrofits to limit water demand (VCPD 2020b).

City of Ojai General Plan

The City of Ojai General Plan outlines the City's land use and growth policies, reflecting the community's long-term development goals. Many of the goals and policies included in the City's general plan supplement those contained in the Ventura County 2040 General Plan. The elements of the City of Ojai General Plan with goals and policies that explicitly address water resources include the Land Use (City of Ojai 1997), Safety (City of Ojai 1991), and Conservation (City of Ojai 1987) elements. As discussed in the City of Ojai General Plan 2014-2021 Housing Element (City of Ojai 2013), data relevant to air quality, water resources, and traffic in the current adopted City of Ojai General Plan are outdated. When funding is available, the City plans to complete a comprehensive general plan update that will address development constraints resulting from regional air quality, water quality, water supply, and transportation issues (City of Ojai 2013).

Table 2-7
Summary of General Plan Policies Relevant to Groundwater Sustainability in the OVGB

Element	Policy/Action No.	Description	GSP Consistency
Ventura County 2040 General Plan			
Land Use and Community Character Element – Section 2.2 Land Use Designations and Standards	Goal LU-9: To maintain an Open Space designation that: preserves for the benefit of all county residents the continued wise use of the county's renewable and nonrenewable resources by limiting the encroachment into such areas of uses which would unduly and prematurely hamper or preclude the use or appreciation of such resources; acknowledges the presence of certain hazardous features which urban development should avoid for public health and safety reasons, as well as for the possible loss of public improvements in these areas and the attendant financial costs to the public; retains open space lands in a non-urbanized state so as to preserve the maximum number of future land use options; retains open space lands for outdoor recreational activities, parks, trails and for scenic lands; Defines urban areas by providing contrasting but complementary areas which should be left non-urbanized; Recognizes the intrinsic value of open space lands and not regard such lands as "areas waiting for urbanization"; encourages Land Conservation Act contracts on farming and grazing and open space lands; and supports the productive agricultural activities of Open Space designated lands that are commonly used for agriculture, grazing, and ranching and that are important to the overall economy of Ventura County.		
	Policy LU-9.2	The County shall designate areas of land or water which are set aside for public health and safety as Open Space, thereby safeguarding humans and property from certain natural hazards, including, but not limited to, areas which require special management or regulation because of hazardous or special conditions such as earthquake fault zones, unstable soil areas, flood plains, watersheds, areas presenting high fire risks, areas required for the protection of water quality and water reservoirs, and areas required for the protection and enhancement of air quality.	Consistent
	Policy LU-9.7	The County shall designate areas set aside for managed production of resources as Open Space, including, but not limited to, forest lands, rangeland, agricultural lands not otherwise designated Agricultural; areas required for the recharge of groundwater basins; bays, estuaries, marshes, rivers, and streams which are important for the management of commercial fisheries; and areas containing major mineral deposits, including those in short supply.	Consistent
Public Facilities, Services, and Infrastructure Element – Section 5.4 Wastewater Treatment and Disposal, Section 5.5 Solid and Hazardous Waste, and Section 5.6	Goal PFS-4: To ensure the adequate provision of individual and public wastewater collection, treatment, reclamation, and disposal operations and facilities to meet the county's current and future needs in a manner that will protect the natural environment as well as public health, safety, and welfare.		
	Policy PFS-4.4	The County shall encourage wastewater treatment facilities to provide the maximum feasible protection and enhancement of groundwater resources.	Consistent
	Policy PFS-4.5	The County shall encourage on-site water reuse for landscape irrigation and groundwater recharge consistent with health standards, to reduce demand for potable water, and increase drought and disaster resiliency.	Consistent
	Policy PFS-4.6	The County shall encourage public wastewater system operators to upgrade existing wastewater treatment systems to reclaim water suitable for reuse for landscaping, irrigation, and groundwater recharge.	Consistent

Table 2-7
Summary of General Plan Policies Relevant to Groundwater Sustainability in the OVGB

Element	Policy/Action No.	Description	GSP Consistency
Flood Control and Drainage Facilities	Goal PFS-5: To maximize recycling, reuse, and composting of solid waste and ensure the safe handling and disposal of the remaining solid and hazardous waste		
	Policy PFS-5.1	The County shall require new landfills and other solid waste processing and disposal facilities (including facilities for composting, green waste, food waste) to be sited in areas that do not pose health and safety risks to residents and groundwater resources. The County shall require such facilities to be located based on objective criteria that do not disproportionally impact Designated Disadvantaged Communities.	Consistent
	Goal PFS-6: To provide adequate surface drainage and flood control facilities to protect public health and safety.		
	Policy PFS-6.2	The County shall encourage the integration of design features into flood control projects, when feasible: to address resource conservation and restoration and preservation of natural riparian habitats, to provide groundwater recharge, to enhance water quality, to protect scenic vistas, and to incorporate recreational areas or opportunities.	Consistent
	Policy PFS-6.4	The County shall coordinate with local, regional, state, and federal agencies to identify existing and potential infrastructure improvements to increase water retention to respond to drought conditions.	Consistent
	Policy PFS-6.5	The County shall require that stormwater drainage facilities are properly designed, sited, constructed, and maintained to efficiently capture and convey runoff for flood protection and groundwater recharge.	Consistent
Conservation and Open Space Element – Section 6.2 Coastal Resources and Section 6.8 Open Space	Goal COS-2: To protect and conserve coastal beaches and sand dunes, proactively enhance coastal and marine resources, and respond to projected sea level rise.		
	Policy COS-2.10	The County shall work with Federal, State, and local jurisdictions, agencies, and organizations to monitor saltwater intrusion and take proactive steps to reduce intrusion, including: working to maintain and restore coastal wetlands buffers; enhancing groundwater management to prevent excessive pumping in order to restore groundwater levels needed to reduce saltwater intrusion; and implementing mitigation measures to prevent saltwater intrusion into estuaries and groundwater basins including, but not limited to, implementation of reactive barriers and use of pumps to divert saltwater.	Not applicable to the OVGB
	Goal COS-9: To develop and maintain a comprehensive system of parks, recreation, and natural open space lands that meet the active and passive recreation and open space needs of Ventura County residents and visitors.		

Table 2-7
Summary of General Plan Policies Relevant to Groundwater Sustainability in the OVGB

Element	Policy/Action No.	Description	GSP Consistency
	Policy COS-9.2	The County shall place a high priority on preserving open space lands for recreation, habitat protection, wildlife movement, flood hazard management, public safety, water resource protection, and overall community benefit.	Consistent
Hazards and Safety Element – Section 7.4 Geologic and Seismic Hazards and Section 7.5 Hazardous Materials	Goal HAZ-4: To minimize the risk of loss of life, injury, collapse of habitable structures, and economic and social dislocations resulting from geologic and seismic hazards.		
	Policy HAZ-4.15	The County shall require that potential ground surface subsidence be evaluated prior to approval of new oil, gas, water or other extraction well drilling permits and appropriate and sufficient safeguards are incorporated into the project design and facility operation.	Consistent
	Goal HAZ-5: To minimize the risk of loss of life, injury, serious illness, damage to property, and economic and social dislocations resulting from the use, transport, treatment and disposal of hazardous materials and wastes.		
	HAZ-5.3	The County shall strive to locate and control sources of hazardous materials to prevent contamination of air, water, soil, and other natural resources.	Consistent
Agricultural Land Preservation Element – Section 8.5 Sustainable Farming and Ranching	Goal AG-5: To encourage sustainable and regenerative farming and ranching practices that promote resource conservation and reduce greenhouse gases.		
	Policy AG-5.4	The County shall encourage farmers to continue and enhance the water-saving irrigation techniques designed to reduce water consumption.	Consistent
Water Resources Element – All Sections	Goal WR-1: To effectively manage water supply by adequately planning for the development, conservation, and protection of water resources for present and future generations		
	Policy WR-1.1	The County should encourage water suppliers, groundwater management agencies, and groundwater sustainability agencies to inventory and monitor the quantity and quality of the county's water resources, and to identify and implement measures to ensure a sustainable water supply to serve all existing and future residents, businesses, agriculture, government, and the environment.	Consistent
	Policy WR-1.2	The County shall consider the location of a discretionary project within a watershed to determine whether or not it could negatively impact a water source. As part of discretionary project review, the County shall also consider local watershed management plans when considering land use development.	Consistent

Table 2-7
Summary of General Plan Policies Relevant to Groundwater Sustainability in the OVGB

Element	Policy/Action No.	Description	GSP Consistency
	Policy WR-1.3	The County shall support the use of, conveyance of, and seek to secure water from varied sources that contribute to a diverse water supply portfolio. The water supply portfolio may include, but is not limited to, imported water, surface water, groundwater, treated brackish groundwater, desalinated seawater, recycled water, and stormwater where economically feasible and protective of the environmental and public health.	Consistent
	Policy WR-1.4	The County shall continue to support the conveyance of, and seek to secure water from, state sources.	Consistent
	Policy WR-1.5	The County shall participate in regional committees to coordinate planning efforts for water and land use that is consistent with the Urban Water Management Planning Act, Sustainable Groundwater Management Act, the local Integrated Regional Water Management Plan, and the Countywide National Pollutant Discharge Elimination System Permit (stormwater and runoff management and reuse).	Consistent
	Policy WR-1.6	The County shall encourage the continued cooperation among water suppliers in the county, through entities such as the Association of Water Agencies of Ventura County and the Watersheds Coalition of Ventura County, to ensure immediate and long-term water needs are met efficiently.	Consistent
	Policy WR-1.7	The County shall encourage the continued cooperation among water suppliers in the county, through entities such as Association of Water Agencies of Ventura County and the Watersheds Coalition of Ventura County, to establish and maintain emergency inter-tie projects among water suppliers.	Consistent
	Policy WR-1.8	The County shall encourage the consolidation of water suppliers where necessary to ensure all residents are receiving water of adequate quality and quantity, to promote management efficiencies, and to encourage sharing of local resources and enhancement of managerial and technical expertise and capacity.	Consistent
	Policy WR-1.9	Where technically feasible, the County shall support the use of groundwater basins for water storage	Consistent
	Policy WR-1.10	The County shall continue to support and participate with the Watersheds Coalition of Ventura County in implementing and regularly updating the Integrated Regional Water Management Plan.	Consistent
	Policy WR-1.11	The County shall require all discretionary development to demonstrate an adequate long-term supply of water.	Consistent

Table 2-7
Summary of General Plan Policies Relevant to Groundwater Sustainability in the OVGB

Element	Policy/Action No.	Description	GSP Consistency
	Policy WR-1.12	The County shall evaluate the potential for discretionary development to cause deposition and discharge of sediment, debris, waste and other pollutants into surface runoff, drainage systems, surface water bodies, and groundwater. The County shall require discretionary development to minimize potential deposition and discharge through point source controls, storm water treatment, runoff reduction measures, best management practices, and low impact development.	Consistent
	Policy WR-1.13	The County shall require that all County-owned water pumps use 100 percent renewable-sourced electricity for water pumping, when feasible, and shall encourage private entities to use 100 percent renewable-sourced electricity when feasible.	Consistent
	Policy WR-1.14	The County shall require that discretionary development for new golf courses shall be subject to conditions of approval that prohibit landscape irrigation with water from groundwater basins or inland surface waters identified as Municipal and Domestic Supply or Agricultural Supply in the California Regional Water Quality Control Board's Water Quality Control Plan unless: 1. The existing and planned water supplies for a Hydrologic Area, including interrelated Hydrologic Areas and Subareas, are shown to be adequate to meet the projected demands for existing uses as well as reasonably foreseeable probable future uses within the area; and 2. It is demonstrated that the total groundwater extraction/recharge for the golf course will be equal to or less than the historic groundwater extraction/recharge for the site as defined in the County Initial Study Assessment Guidelines. Further, where feasible, reclaimed water shall be utilized for new golf courses.	Consistent
	Goal WR-2: To implement practices and designs that improve and protect water resources.		
	Policy WR-2.1	The County shall cooperate with Federal, State and local agencies in identifying and eliminating or minimizing all sources of existing and potential point and non-point sources of pollution to ground and surface waters, including leaking fuel tanks, discharges from storm drains, dump sites, sanitary waste systems, parking lots, roadways, and mining operations.	Consistent
	Policy WR-2.2	The County shall evaluate the potential for discretionary development to cause deposition and discharge of sediment, debris, waste, and other contaminants into surface runoff, drainage systems, surface water bodies, and groundwater. In addition, the County shall evaluate the potential for discretionary development to limit or otherwise impair later reuse or reclamation of wastewater or stormwater. The County shall require discretionary development to minimize potential deposition and discharge through point source controls, storm water treatment, runoff reduction measures, best management practices, and low impact development	Consistent

Table 2-7
Summary of General Plan Policies Relevant to Groundwater Sustainability in the OVGB

Element	Policy/Action No.	Description	GSP Consistency
	Policy WR-2.3	The County shall require that discretionary development not significantly impact the quality or quantity of water resources within watersheds, groundwater recharge areas or groundwater basins.	Consistent
	Policy WR-2.4	The County shall require discretionary development for out-of-river mining below the historic or predicted high groundwater level in the Del Norte/El Rio (Oxnard Forebay Basin) to demonstrate that exaction activities will not interfere with or affect water quality and quantity pursuant to the County's Initial Study Assessment Guidelines.	Not applicable to the OVGB
	Goal WR-3: To promote efficient use of water resources through water conservation, protection, and restoration.		
	Policy WR-3.1	The County shall encourage the use of non-potable water, such as tertiary treated wastewater and household graywater, for industrial, agricultural, environmental, and landscaping needs consistent with appropriate regulations.	Consistent
	Policy WR-3.2	The County shall require the use of water conservation techniques for discretionary development, as appropriate. Such techniques include low-flow plumbing fixtures in new construction that meet or exceed the state Plumbing Code, use of graywater or reclaimed water for landscaping, retention of stormwater runoff for direct use and/or groundwater recharge, and landscape water efficiency standards that meet or exceed the standards in the California Model Water Efficiency Landscape Ordinance.	Consistent
	Policy WR-3.3	The County shall require discretionary development to incorporate low impact development design features and best management practices, including integration of stormwater capture facilities, consistent with County's Stormwater Permit.	Consistent
	Policy WR-3.4	The County shall strive for efficient use of potable water in County buildings and facilities through conservation measures, and technological advancements.	Consistent
	Goal WR-4: To maintain and restore the chemical, physical, and biological integrity and quantity of groundwater resources.		
	Policy WR-4.1	The County shall work with water suppliers, water users, groundwater management agencies, and groundwater sustainability agencies to implement the Sustainable Groundwater Management Act and manage groundwater resources within the sustainable yield of each basin to ensure that county residents, businesses, agriculture, government, and the environment have reliable, high-quality groundwater to serve existing and planned land uses during prolonged drought years.	Consistent

Table 2-7
Summary of General Plan Policies Relevant to Groundwater Sustainability in the OVGB

Element	Policy/Action No.	Description	GSP Consistency
	Policy WR-4.2	In areas identified as important recharge areas by the County or the applicable Groundwater Sustainability Agency, the County shall condition discretionary development to limit impervious surfaces where feasible and shall require mitigation in cases where there is the potential for discharge of harmful pollutants within important groundwater recharge areas.	Consistent
	Policy WR-4.3	The County shall support groundwater recharge and multi-benefit projects consistent with the Sustainable Groundwater Management Act and the Integrated Regional Water Management Plan to ensure the long-term sustainability of groundwater.	Consistent
	Policy WR-4.4	The County shall encourage the use of in-stream water flow and recycled water for groundwater recharge while balancing the needs of urban and agricultural uses, and healthy ecosystems, including in-stream waterflows needed for endangered species protection.	Consistent
	Policy WR-4.5	The County shall require that discretionary development shall not significantly impact the quantity or quality of water resources within watersheds, groundwater recharge areas or groundwater basins.	Consistent
	Policy WR-4.6	The County shall require discretionary development for out-of-river mining below the historic or predicted high groundwater level in the Del Norte/El Rio (Oxnard Forebay Basin) to demonstrate that extraction activities will not interfere with or affect groundwater quality and quantity pursuant to the County's Initial Study Assessment Guidelines.	Not applicable to the OVGB
	Policy WR-4.7	The County shall require that discretionary development be subject to conditions of approval requiring proper drilling and construction of new oil, gas, and water wells and removal and plugging of all abandoned wells on-site.	Consistent
	Policy WR-4.8	The County shall require all new water wells located within Groundwater Sustainability Agency boundaries to be compliant with GSAs and adopted Groundwater Sustainability Plans.	Consistent
	Policy WR-4.9	The County shall prohibit new water wells in the Oxnard Plain Pressure Basin if they would increase seawater intrusion in the Oxnard or Mugu aquifers.	Not applicable to the OVGB
	Goal WR-5: To protect and, where feasible, enhance watersheds and aquifer recharge areas through integration of multiple facets of watershed-based approaches.		
	Policy WR-5.1	The County shall work with water suppliers, Groundwater Sustainability Agencies, wastewater utilities, and stormwater management entities to manage and enhance the shift toward integrated management of surface and groundwater, stormwater treatment and use, recycled water and conservation, and desalination.	Consistent

Table 2-7
Summary of General Plan Policies Relevant to Groundwater Sustainability in the OVGB

Element	Policy/Action No.	Description	GSP Consistency
	Policy WR-5.2	The County shall continue to seek funding and support coordination of watershed planning and watershed-level project implementation to protect and enhance local watersheds.	Consistent
	Goal WR-6: To sustain the agricultural sector by ensuring an adequate water supply through water efficiency and conservation.		
	Policy WR-6.1	The County should support the appropriate agencies in their efforts to effectively manage and enhance water quantity and quality to ensure long-term, adequate availability of high quality and economically viable water for agricultural uses, consistent with water use efficiency programs	Consistent
	Policy WR-6.2	The County should support programs designed to increase agricultural water use efficiency and secure long-term water supplies for agriculture.	Consistent
	Policy WR-6.3	The County should encourage the use of reclaimed irrigation water and treated urban wastewater for agricultural irrigation in accordance with federal and state requirements in order to conserve untreated groundwater and potable water supplies	Consistent
	Goal WR-7: To consider the water needs of the natural environment with other water uses in the county		
	Policy WR-7.1	The County shall encourage the appropriate agencies to effectively manage water quantity and quality to address long-term adequate availability of water for environmental purposes, including maintenance of existing groundwater-dependent habitats and in-stream flows needed for riparian habitats and species protection.	Consistent
Ojai Valley Area Plan			
Water Resources Element – Water Supply and Water Conservation and Reuse Section	Goal OV-62: To ensure that water which currently meets State standards shall not be degraded and ensure that water quality which does not meet State standards is improved.		
	Policy OV-62.1	The County shall require that new oil and gas exploration and production activity shall does not significantly affect the quality or quantity of the water supply.	Consistent
	Goal OV-63: To ensure that new development does not exceed water resources available to the Ojai Valley.		
	Policy OV-63.1	The County shall appropriately condition discretionary development which has the potential to deposit a significant amount of sedimentation, oil residue, or other urban pollutants into the surface water drainage system, to require retention basins and oily water separators so that at least the first inch of rainfall from any one storm is retained within the project, in order that contaminants from urban runoff do not significantly impact downstream surface water quality and biological resources. The County shall require the control devices used in the oily separators to be properly maintained for the life of the authorized use.	Consistent
	Goal OV-64: To ensure the employment of water conservation measures in new construction and encourage water conservation practices in agricultural, municipal, industrial, and recreational uses and in existing development.		

Table 2-7
Summary of General Plan Policies Relevant to Groundwater Sustainability in the OVGB

Element	Policy/Action No.	Description	GSP Consistency
	Policy OV-64.1	The County shall condition discretionary development to utilize all feasible water conservation techniques.	Consistent
	Policy OV-64.2	The County shall require new discretionary development to retrofit existing plumbing fixtures or provide other means so as not to add any net increased demand on the existing water supply. The County shall apply this policy until such time as a groundwater basin study is completed and it is found that the available groundwater, or other sources of water, could adequately provide for cumulative demand without creating an overdraft situation.	Consistent
	Goal OV-65: To encourage the safe use of reclaimed water for irrigation, agriculture, wetland enhancement and stream flow maintenance and such other uses as are applicable.		
City of Ojai General Plan			
Land Use Element – Preserving Ojai's Small-Town Character and Managing the Pace of Growth and Development Sections	Goal: Preserve Ojai's small-town character.		
	Policy LU-11	Permit new developments only where and when adequate water and sewer infrastructure can be ensured by providing systemwide infrastructure improvements in advance of needs. Where construction of master planned facilities is not practical in advance, permit the construction and use of on-site facilities only to the extent that future construction of the master planned facilities will not be jeopardized (within low and very low density residential areas, septic tanks may be used for sewage disposal in lieu of community sewer system, subject to applicable health requirements).	Consistent
	Goal: Manage the pace of growth and development.		
	Policy LU-18	Limit the rate of residential, commercial, and office development as necessary to protect vital resources such as air and water quality.	Consistent
Safety Element – Disasters Section	Goals: 1) A City that is prepared for hazards and disasters so as to protect the public health, safety, and welfare, and to minimize damage to property; 2) A City whose development is planned in consideration of major hazards and other physical constrains so as to minimize loss of life, injury, and damage to property resulting from hazards and disasters; 3) A City whose citizens are informed as to the appropriate actions to take in the event of hazards and disasters; and, 4) A City that continues to improve upon inter-agency communication and cooperation regarding safety issues and emergency response preparedness.		
	Policy 3	The City shall ensure that adequate water supplies are available to Ojai residents following a major disaster.	Consistent
Conservation Element –	Goal: The city of Ojai shall strive to preserve the quantity and enhance the quality of water resources that may affect the Ojai Valley.		
	Policy 1	The City shall ensure that adequate supplies of water be available to all City residents and uses requiring water.	Consistent

Table 2-7
Summary of General Plan Policies Relevant to Groundwater Sustainability in the OVGB

Element	Policy/Action No.	Description	GSP Consistency
Water/Watersheds Section	Policy 2	The City shall identify the sources and availability of water, flood potential, and sources of potential damage to the City's water supply and quality in order to maintain the optimum quality of water in the City and its watershed.	Consistent
	Policy 3	The City shall strive to protect natural watersheds, drainage beds and water recharge areas and rebuild those damaged to achieve recovery of local water and the preservation of water systems.	Consistent

Source: City of Ojai 1987, 1991, 1997; VCPD 2020a, 2020b.

2.1.3.3 Other Planning/Land Use Considerations

All discretionary projects proposed within the OVGB are required to comply with CEQA. In 2019, the Governor's Office of Planning and Research released an update to the CEQA Guidelines that included a new requirement to analyze projects for their compliance with adopted GSPs. Specifically, the new applicable significance criteria include the following:

- Would the program or project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
- Would the program or project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Therefore, to the extent to which general plans allow growth that could have an impact on groundwater supply, such projects would be evaluated for their consistency with adopted GSPs and for whether they adversely impact the sustainable management of the OVGB. Under CEQA, potentially significant impacts identified must be avoided or substantially minimized unless significant impacts are unavoidable, in which case the lead agency must adopt a statement of overriding considerations.

The County has long implemented its own CEQA significance thresholds based on heightened public concern and awareness for the scarcity of the County's groundwater resources. The Ventura County Initial Study Assessment Guidelines (Guidelines; VCPD 2011) contain threshold of significance criteria and methodology to ensure consistent and complete assessment of direct and indirect impacts of projects on groundwater quality and quantity. For example, the County's General Plan states that each legal parcel requiring a domestic water source is required to have a permanent supply of water (VCPD 2019). According to the County Guidelines, all projects supplied by a source of water that do not meet the criteria of a permanent supply of water shall be considered potentially significant (e.g., a spring does not meet the criteria for a permanent source of water supply) (VCPD 2011).

2.1.4 Beneficial Uses and Users

As discussed in Section 2.1.2, designated beneficial uses for groundwater in the OVGB include municipal and domestic supply (MUN), agricultural supply (AGR), industrial process supply (PROC), and industrial service supply (IND) based on the Los Angeles Basin Plan (RWQCB 2014). Two primary sectors extract the majority of groundwater in the OVGB: (1) agriculture use; and (2) municipal use (i.e., CMWD) (OBGMA 2018). Other groundwater users include four private water companies, including Siete Robles MWC, Senior Canyon MWC, Hermitage MWC, and Gridley Road Water Group, and one County managed non-potable irrigator, Ventura County

Property Administrator. Private groundwater users who extract less than 2 AFY are considered de minimis users under SGMA.

2.1.5 Additional GSP Components

Ventura River Watershed Adjudication

A related component of this GSP is the ongoing water rights litigation in the Ventura River Watershed. Settlement negotiations are currently ongoing among the parties and a Management Plan, as described below, has yet to be made available to the OBGMA. A summary of the history and status of the Ventura River Watershed Adjudication is as follows: In September 2014, the nonprofit Santa Barbara Channelkeeper filed a lawsuit (Santa Barbara Channelkeeper v. City of Buenaventura, Case No 19STCP01176) alleging the City of Ventura's diversions from the Ventura River were unreasonable and hurt habitat for endangered steelhead trout and other wildlife[10]. In response to the lawsuit, the City of Ventura filed a Cross-Complaint, and later a First Amended Cross-Complaint seeking to bring in other users of surface water and groundwater in the Ventura watershed, including the OVGB, which was one of the four "significant" basins[11] identified by the City of Ventura in the lawsuit.

Channelkeeper moved to strike the City of Ventura's First Amended Cross-Complaint, and the San Francisco County Superior Court granted the motion. The City of Ventura appealed the decision to strike its First Amended Cross-Complaint and on January 30, 2018, the Court of Appeal, First Appellate District, Division Two, reversed the San Francisco County Superior Court's decision. Following the Court of Appeal's decision, Channelkeeper filed a First Amended Complaint and Petition and the City of Ventura filed a Second Amended Cross-Complaint. On January 2, 2020, the City of Ventura filed a Third Amended Cross-Complaint. In the Amended Cross-Complaint, the City of Ventura named approximately 2,300 Cross-Defendants who beneficially use or who have potential rights to waters in the Ventura River Watershed, including surface water from the Ventura River and its tributaries and groundwater from the basins. The Amended Cross-Complaint asserts claims for pueblo and/or treaty water rights, prescriptive water rights, appropriative water rights, municipal priority, the human right to water, and reasonable and beneficial use, and asserts the City of Ventura's relative priority rights to water, including, without limitation, a request for a comprehensive adjudication of the Ventura River Watershed and the imposition of a physical solution.

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10 The Los Angeles RWQCB listed reaches 3 and 4 of the Ventura River on the 1998 California 303(d) List of Impaired Surface Waters for pumping and water diversion (LARWQCB 1998). National Marine Fisheries Service concluded that groundwater extractions from the City of Ventura's Foster Park well field are detrimental to the survival and recovery of Southern California steelhead (NMFS 2007).

11 The Groundwater Basins of the Ventura watershed include the Lower Ventura River Basin, the Upper Ventura River Basin, the Ojai Valley Groundwater Basin and the Upper Ojai Valley Basin.

The Amended Complaint and the Amended Cross-Complaint are the operative pleadings. The judicial venue was transferred from the San Francisco County Superior Court to the Los Angeles County Superior Court because of its closer proximity to the action. On November 21, 2019, the Court granted the City of Ventura's motion to approve a notice of adjudication and the City of Ventura has served or provided notice to 1) all property owners overlying the basins; 2) all property owners whose property is contiguous to the Ventura River or its tributaries, other than the federal government; and 3) all known holders of appropriative water rights, other than the federal government. The City of Ventura has served a summons on approximately 2,300 Cross-Defendants owning approximately 1,750 riparian parcels and provided 12,766 notices to the owners of approximately 10,000 parcels overlying the four groundwater basins.

On September 30, 2019, Channelkeeper and the City of Ventura entered into a settlement agreement that resulted in the partial dismissal of Channelkeeper's cause of action against the City of Ventura, pending entry of a Physical Solution. On August 20, 2020, Channelkeeper and the City of Ventura agreed to amend the settlement, resulting in a full dismissal of all issues set forth in the Amended Complaint.

On September 15, 2020, the City of Ventura, Ventura River Water District, Meiners Oaks Water District, Wood-Claeyssens Foundation, and the Rancho Matilija Mutual Water Company released a Proposed Physical Solution. The Proposed Physical Solution resolves that it is not necessary at this time for the court to determine the relative priority rights to water or to establish a comprehensive adjudication of water rights in the Ventura watershed. The Proposed Physical Solution recognizes and requires integration with GSPs under development for the OVGB and Upper Ventura River Basin. The parties and the management committee, an arm of the court, would coordinate with the GSAs in finalizing and preparing the Management Plan[12], which is a plan to move the conditions of the Southern California steelhead (*Oncorhynchus mykiss*) fish population (Fishery) in the watershed from baseline condition to good condition. The Proposed Physical Solution is expressly designed to address one of the six "undesirable results" that the GSP must avoid—the significant and undesirable depletions of interconnected surface water. The Proposed Physical Solution proposes to use the health of the Fishery as a proxy for the overall health of the instream uses in the Ventura River Watershed. The court finds that the Proposed Physical Solution addresses this undesirable result, and if they so choose, the GSAs may adopt the Proposed Physical Solution to meet the requirements of that portion of the GSP. In addition, the Proposed Physical Solution and the finally adopted Management Plan will include a water management component that could inform other requirements of the GSPs.

[12] As of June 2021, no formal coordination by the parties and the management committee has occurred with the OBGMA, the GSA for the OVGB. As this GSP is due to the DWR on January 31, 2022, it is unlikely that there is sufficient time to review and incorporate appropriate findings and recommendations of the Management Plan into the GSP.

The Proposed Physical Solution consists of three phases: 1) Adoption Phase, 2) Implementation Phase, and 3) Adaptive Management Phase. The Adoption Phase allows the parties time to establish the governance structure and adopt the Management Plan. The Implementation Phase is a 10-year period after adoption of the Management Plan in which the parties will implement the Management Plan, and the Adaptive Management Phase is a continuing series of 10-year periods in which the parties will adaptively manage the implementation of the Management Plan and plan updates. The purpose of this phasing is to allow for transition of existing baseline conditions in the Ventura River watershed to good conditions as measured by the health of the Fishery.

Management Plan actions to achieve good conditions for Fishery health include potential activities such as removing barriers that block the steelhead's access to critical habitat, creation of rearing habitat (pools) and river features such as boulder and large woody material to improve habitat conditions, reducing invasive species, and monitoring water quality and the steelhead population.

To date, no settlement agreement has been reached and the current terms of the Proposed Physical Solution have not been resolved. The Ventura River Watershed Adjudication is ongoing and has not been incorporated into this GSP. A discussion of the relationship of interconnected surface water with groundwater in the OVGB is described in Section 2.3.4.6.

2.2 BASIN SETTING

2.2.1 Geography

The OVGB is situated in a small east-west oriented valley in the Topatopa Mountains of the Transverse Ranges geomorphic province of Southern California. The OVGB is located approximately 11 miles inland from the Pacific Ocean. The land surface elevation of the OVGB ranges from approximately 630 feet above mean sea level (amsl) along the south-western boundary where San Antonio Creek exits the OVGB to approximately 2,080 feet amsl at the southern flank of the Topatopa Mountains (northern boundary of the OVGB). Nordhoff Peak (4,473 feet amsl) and Chief Peak (5,570 feet amsl) occupy the highest points of the Topatopa Mountains to the north of the OVGB and mark the northern boundary of the San Antonio Creek watershed (Figure 2-1). Black Mountain and Sulphur Mountain lie to the south of the OVGB and denote the southern boundary of the San Antonio Creek watershed. A description of the OVGB's lateral and vertical hydrogeological boundaries is provided in Sections 2.3.1 and 2.3.2.

2.2.2 Surface Water and Drainage Features

The OVGB is within the San Antonio Creek watershed which is one of the largest sub-watersheds of the Ventura River watershed (Figure 2-1). The San Antonio Creek watershed is characterized by tectonically active mountains dominated by chaparral and exposed bedrock with narrow ephemeral and intermittent streams. There are no major surface water reservoirs within the San

Antonio Creek watershed. San Antonio Creek is the largest stream in the San Antonio Creek watershed and is fed by four primary tributary streams including McNell Creek, Thacher Creek, Reeves Creek, and Lion Creek, the last-mentioned being located outside of the OVGB. A number of small named and unnamed ephemeral drainages also contribute flow to San Antonio Creek.

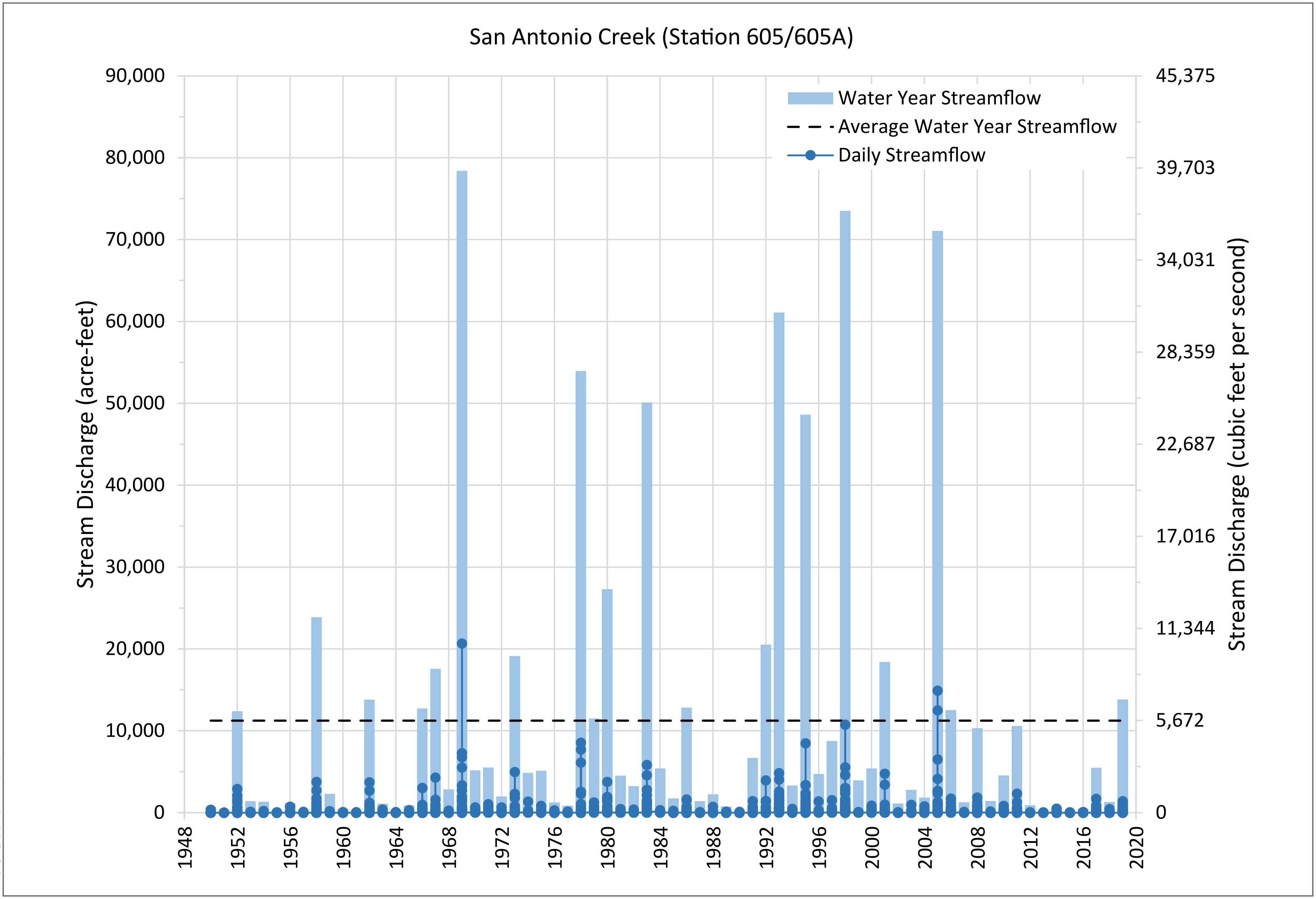
Streamflow records are available for four active and four inactive stream gauging stations on San Antonio Creek, in addition to one active gauging station on Thacher Creek and one inactive gauging station on Fox Canyon Drain, a small drainage that bisects the City of Ojai (Table 2-4, Weather Stations and Stream Gauges in the Vicinity of the OVGB). The two stream gauges on San Antonio Creek at the confluence with the Ventura River, Stations 605 and 605A, together provide daily stream discharge at the outlet of the San Antonio Creek watershed for the period from October 1949 to October 2019 (Figure 2-7). Peak flow typically occurs between December and April of any given water year and baseflow generally falls to 0 cubic feet per second (cfs) between June and October. There are some exceptions, particularly in 1969, 1978, 1983, 1993, 1995, 1998, and 2005 when flow continued through the summer months. The highest gauged flow was 10,405 cfs in January 1969. The water year with the lowest recorded stream discharge was 1951, where apparently no flow occurred, and the water year with the highest recorded stream discharge was 1969 at 78,403 AF. The average water year stream discharge is 11,230 AF (Figure 2-9, San Antonio Creek Stream Discharge).

2.2.3 Historical, Current, and Projected Climate

The climate within the OVGB is monitored continuously by several agencies, including NOAA, VCWPD, and others, as discussed in Section 2.1.2.2. The most complete historical record of precipitation, temperature, wind, and other climate variables is from the NOAA Ojai weather station (Station No. USC00046399).

2.2.3.1 Precipitation

The climate of the OVGB is Mediterranean, with warm, dry summers and cool, wet, winters. Precipitation is highly variable in the OVGB—seasonally, and from year to year. Precipitation typically occurs in just a few significant storms each year, which can come any time between October and April, with over 90% of the precipitation occurring between November and April (WCVC 2019; Figure 2-10, Monthly Average Total Precipitation). The Parameter-Elevation Regressions on Independent Slopes Model (PRISM) 30-year (1981–2010) digital elevation model precipitation data shows that the average annual precipitation in the OVGB ranges from about 22 inches per year in the southwestern part of the OVGB to nearly 26 inches per year in the northernmost parts of the OVGB along the southern flank of the Topatopa Mountains (Figure 2-7).



SOURCE: VCWPD

DUDEK

FIGURE 2-9

San Antonio Creek Stream Discharge

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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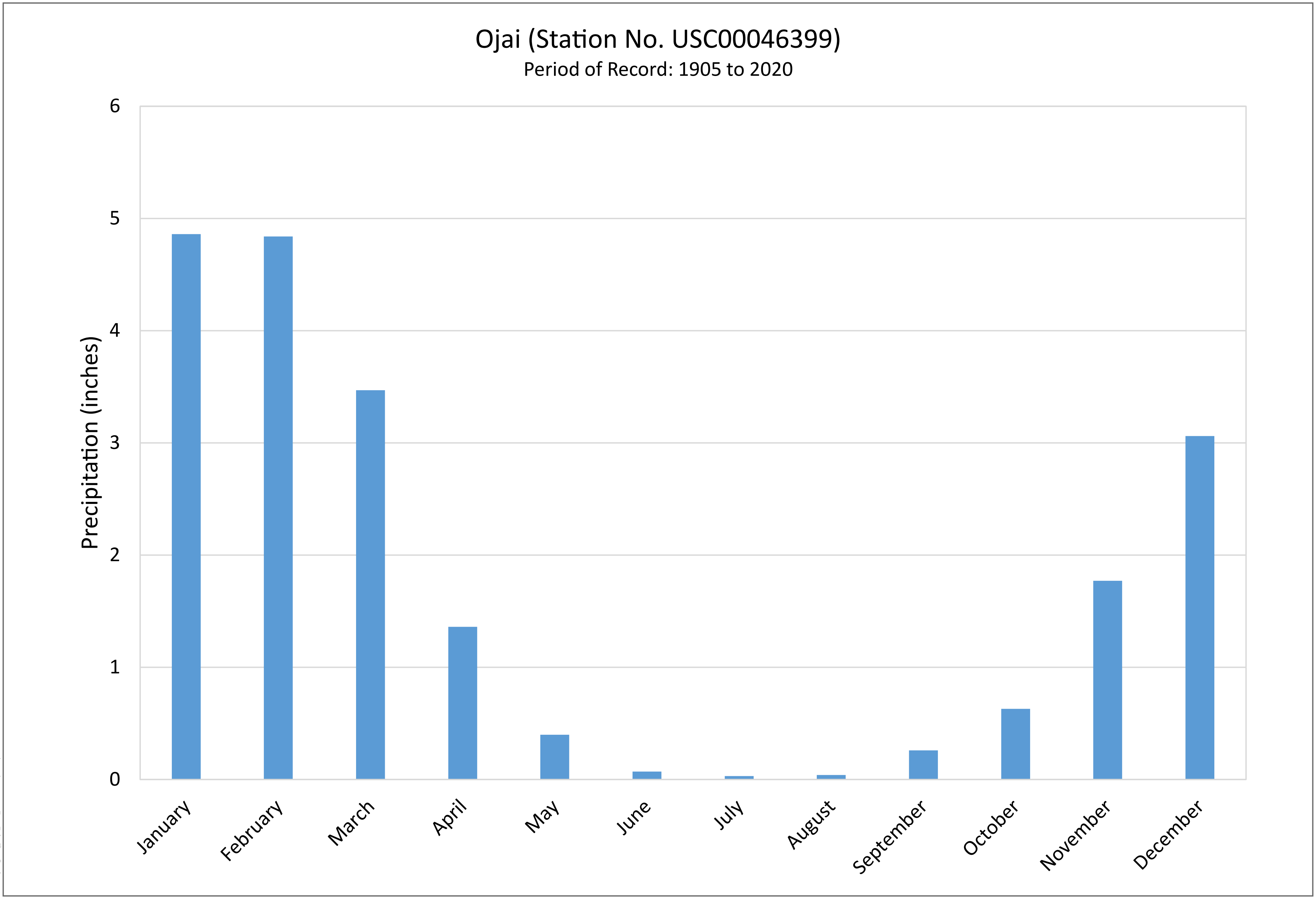

SOURCE: WRCC

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FIGURE 2-10

Monthly Average Total Precipitation

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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Based on length of record, proximity to the OVGB, and station type meeting the standards set by the National Weather Service, the four most representative stations for climate analysis are the Ojai, Ojai-Thacher School, Ojai-Stewart Canyon, and Meiners Oaks-County Fire Station precipitation stations. Average water year precipitation data for the four weather stations for the period from 2000 to 2019 (20-year period) are provided in Table 2-9. Based on this 20-year record, the average water year precipitation in the vicinity of the OVGB ranges from 17.46 inches (Ojai station) to 20.06 (Ojai-Thacher School station), for a combined average annual precipitation of 18.88 inches (Table 2-8). Recent measured average water year precipitation for the four rain gauges located in the OVGB are all lower than the PRISM calculated averages.

Table 2-8
Average Water Year Precipitation from 2000 to 2019 for Select Rain Gauges in the Vicinity of the OVGB

Water Year	Rain Gauge			
	Ojai (USC00046399)[a]	*Ojai-Thacher School (059)*	*Ojai-Stewart Canyon (165)*	*Meiners Oaks-County Fire Station (218)*[b]
	Precipitation (inches)			
2000	18.84	19.73	18.00	20.30
2001	18.67	30.55	27.38	30.00
2002	7.27	8.27	7.19	8.07
2003	—	21.35	21.70	24.81
2004	13.65	13.04	12.64	15.15
2005	47.31	52.90	45.77	51.35
2006	25.37	26.00	23.44	25.91
2007	7.42	7.65	6.42	7.00
2008	—	23.89	21.25	23.86
2009	11.39	13.62	13.76	—
2010	21.46	24.35	24.05	25.36
2011	24.79	31.18	28.33	27.60
2012	10.06	12.09	10.85	10.64
2013	8.66	9.11	8.62	8.59
2014	9.49	11.30	9.67	9.12
2015	12.22	14.91	12.64	10.47
2016	10.69	11.07	12.00	10.75
2017	28.07	28.50	26.26	26.55
2018	11.81	13.60	11.87	10.88
2019	27.16	28.10	26.53	25.66
Average	**17.46**	**20.06**	**18.42**	**19.58**

Source: NOAA 2020, VCWPD 2020.
Notes: — = not available or not applicable.
[a] Water year precipitation data are not available (incomplete data record) for the Ojai weather station for the years 2003 and 2008.
[b] Water year precipitation for the Meiners Oaks-County Fire Station weather station for 2009 is reported as 0 so value excluded from table.

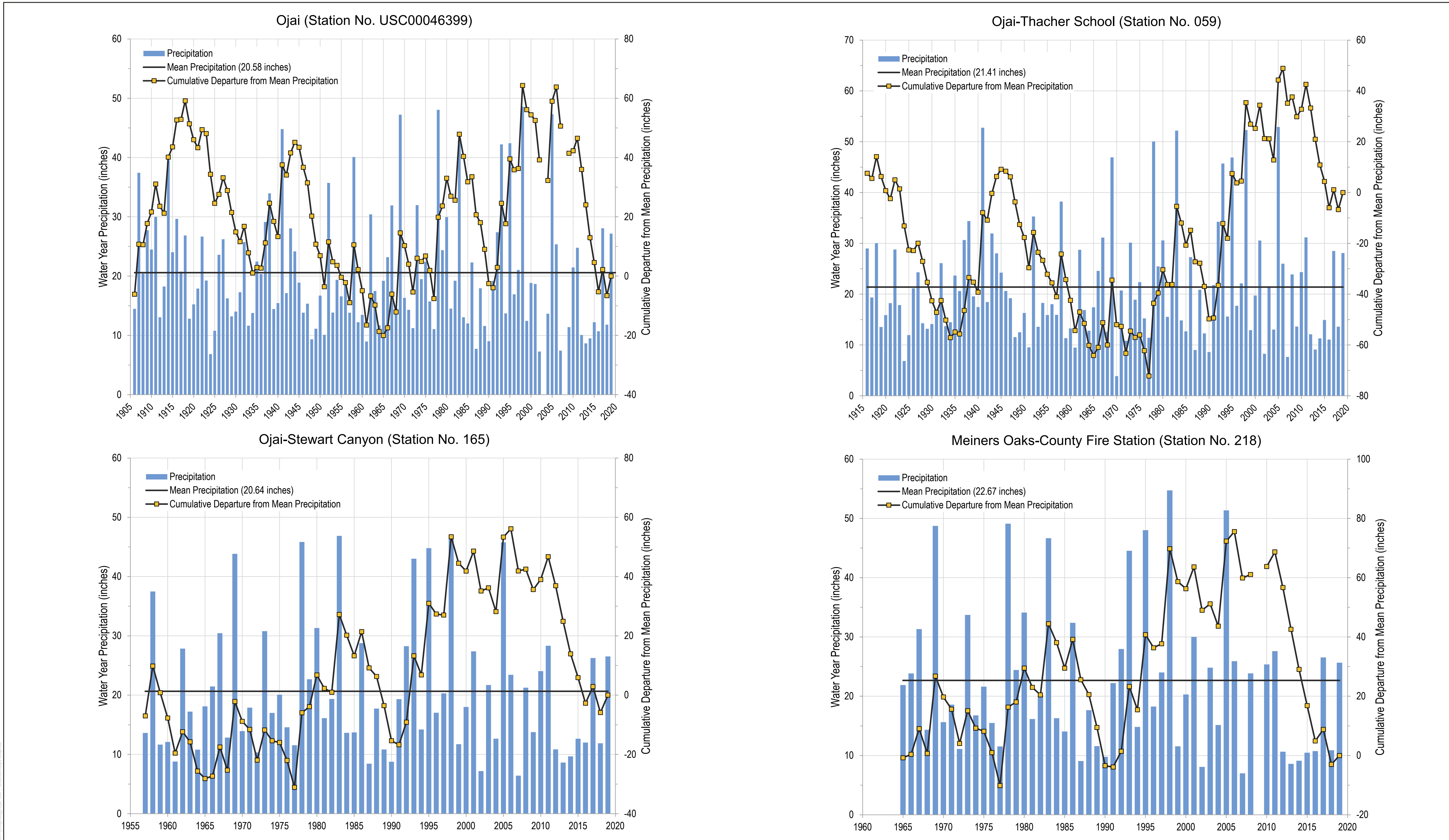
The most complete historical record of precipitation is from the NOAA Ojai station (Station No. USC00046399). Precipitation data collected since 1906 show that annual precipitation in Ojai has ranged from a low of 6.84 inches in 1924 to a high of 48.58 inches in 1998, while the average precipitation over the period from 1906 to 2019 was 20.58 inches (Figure 2-11, Water Year Precipitation; WCVC 2019; NOAA 2020). Very few years actually have average precipitation; most years are drier than average, and a relatively few very wet years heavily influence the average. Since 1906, 62% of the years have had less than average precipitation. Using the VCWPD's definition of a "significantly high rainfall year" as one having precipitation at least 150% above the average, or greater than 30.88 inches, there have been 15 years of significantly high precipitation in Ojai since 1906 (in 1907, 1914, 1938, 1941, 1952, 1958, 1967, 1969, 1973, 1978, 1983, 1993, 1995, 1998 and 2005). This is an average of once every eight years. Precipitation data from the four weather stations indicate that the period from 1970 through 2019 includes two major wet and dry climate cycles (Figure 2-11).

2.2.3.2 Temperature

Temperatures within the OVGB fluctuate on a seasonal basis from warm summers to cool winters. August and September are typically the hottest months in the OVGB. Based on the Ojai station, the average annual temperature in the OVGB is 61.4°F, ranging from an average low of 40.1°F in January to an average high of 80.9°F in July. The historical all-time minimum and maximum temperature recorded at the Ojai station are 13°F and 119°F, respectively (WRCC 2020).

2.2.3.3 Evapotranspiration

Reference evapotranspiration (ETo) in the OVGB has been calculated from the data collected at CIMIS Station 198 (located approximately 10 miles south-southeast of the southern basin boundary in Santa Paula, California) on a daily basis since 2005 (Table 2-9). The average ETo measured at CIMIS Station 198 between 2005 and 2020 is 52.75 inches per year or 4.40 feet per year (Table 2-9). In contrast, the average annual precipitation in the OVGB, based on the Ojai station (Figure 2-11) is 20.58 inches per year. The ETo values calculated from the CIMIS data reflect the amount of water that could be transpired by grass or alfalfa if supplied by irrigation, but do not represent the actual transpiration from any specific crop or native vegetation. To calculate the ET rate for a specific crop or native vegetation, the ETo is multiplied by a crop coefficient that adjusts the water consumption for each crop relative to the water consumption for alfalfa.



SOURCE: NOAA; VCWPD

FIGURE 2-11

Water Year Precipitation

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Table 2-9
Monthly and Yearly Reference Evapotranspiration (ETo) Totals for California Irrigation Management Information System Station No. 198 from 2005 to 2020 (Inches)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
2005	—	—	—	3.03	8.56	8.63	7.32	5.66	4.74	3.53	3.07	2.32	—
2006	3.15	3.43	3.13	3.53	4.59	5.49	5.58	5.67	4.56	3.74	3.01	3.01	48.89
2007	2.74	2.74	4.21	4.13	5.06	5.80	6.00	5.50	4.51	4.40	2.55	2.60	50.24
2008	2.52	2.69	4.94	5.69	5.47	6.56	6.20	5.76	4.87	4.73	3.17	2.13	54.73
2009	3.81	2.60	4.27	4.8	5.57	5.18	6.71	5.62	4.97	4.04	3.21	2.17	52.95
2010	2.45	2.34	4.71	4.86	6.39	5.85	5.80	6.20	4.88	2.98	3.01	1.78	51.25
2011	3.40	3.12	3.95	4.93	6.14	5.16	6.06	5.55	4.11	3.70	2.96	2.65	51.73
2012	3.33	3.53	3.99	4.76	6.19	5.88	6.03	6.31	4.92	3.79	2.38	1.72	52.83
2013	3.20	3.16	4.03	4.92	6.26	5.88	5.87	5.99	5.03	4.26	2.93	3.10	54.63
2014	3.39	2.74	4.48	5.57	6.72	6.12	6.24	5.73	4.88	4.11	3.04	1.52	54.54
2015	2.09	2.48	4.08	4.92	5.08	5.29	5.90	6.38	5.35	4.11	3.47	2.71	51.86
2016	2.16	4.19	4.19	5.59	5.29	6.00	6.90	6.08	5.11	3.57	2.72	2.40	54.2
2017	1.88	1.69	4.71	5.80	5.87	6.07	6.65	5.86	4.68	4.83	2.59	3.52	54.15
2018	2.87	3.12	3.52	5.31	4.92	6.11	6.87	6.58	4.70	4.12	3.39	2.48	53.99
2019	2.25	2.12	4.18	5.16	5.36	4.53	6.52	6.44	5.17	5.25	2.94	2.52	52.44
2020	2.50	3.61	3.26	4.52	6.61	5.77	6.80	—	—	—	—	—	—
13-Year Average	**2.78**	**2.90**	**4.11**	**4.85**	**5.88**	**5.90**	**6.34**	**5.96**	**4.83**	**4.08**	**2.96**	**2.44**	**52.75**

Source: CIMIS 2020.
Notes: 2005 and 2020 are excluded from the average as the record for those years are not complete.

According to the State of California Reference Evapotranspiration Map developed by CIMIS, the OVGB is located at the southern edge of Evapotranspiration Zone 10, with an annual average ETo of 49.1 inches or 4.09 feet (CIMIS 1999). This regional average annual ETo estimate is comparable to the ETo measured at CIMIS Station 198 (Table 2-9).

2.2.3.4 Projected Climate

Over the historical precipitation period of record there have been several serious droughts, and climate change may bring an increase in the frequency and intensity of years with below average historical rainfall. Projected future climate conditions related to precipitation frequency and intensity over the long term for California indicate, in general, a decrease in average precipitation, but an increase in the intensity of large storm events (Pierce et al. 2018). Additionally, it is projected that by the end of the century temperatures will increase by anywhere from 3.6°F to 12.6°F, with a strong increase in the number of extremely hot days relative to historical norms (Pierce et al. 2018). To evaluate climate change impacts on mean water year precipitation in the OVGB, DWR-projected 2030 and 2070 precipitation change factors, which are based on the California Water Commission's Water Storage Investment Program (WSIP) climate change analysis results, were applied to the historical precipitation record of the Ojai station (Station No. USC00046399).

Projected climate change factor data are provided by DWR in both tabular and geographic information system (GIS) spatial formats for the period from January 1915 to December 2011. For water years after 2011, change factor values for the pre-2011 water year with the most similar mean annual precipitation were used. Based on the GIS spatial data, the Ojai station falls within model grid cell 9263.

Based on the Ojai station (Station No. USC00046399) historical precipitation record for water years 1916 to 2019 and the DWR precipitation change factors, average water year precipitation is projected to increase by 0.14 inches and 0.67 inches by 2030 and 2070, respectively. Although average water year precipitation is anticipated to increase slightly based on the analysis, the number of extreme dry and wet water years is also predicted to increase by approximately 2% by 2070.

2.3 HYDROGEOLOGIC CONCEPTUAL MODEL

The hydrogeologic conceptual model (HCM) provides the framework for the development of water budgets, analytical and numerical models, and monitoring networks. Additionally, the HCM serves as a tool for stakeholder outreach and communication, and assists with the identification of data gaps. The HCM does not compute specific quantities of water flowing through or moving into or out of a basin, but rather provides a general understanding of the physical setting, characteristics, and processes that govern groundwater occurrence and movement within a basin. The parameters of the HCM developed for the OVGB are depicted on Figure 2-12, Hydrogeologic Conceptual Model. These parameters include basin boundaries, stratigraphy, land use, and the general processes that contribute to recharge and discharge from the OVGB. The following subsections detail the geologic and hydrogeologic characteristics of the OVGB, as well as historical and current groundwater conditions.

2.3.1 Geology

The OVGB underlies the western Transverse Ranges geomorphic province. The Transverse Ranges is characterized by east–west-trending mountain ranges from Points Arguello and Conception at the coast, inland to the San Bernardino Mountains. The province includes the offshore Channel Islands, which are similar in orientation and geologic composition to the mainland (CGS 2002). The southernmost mountains of the Transverse Ranges are the Santa Monica Mountains. The Transverse Ranges are actively uplifting in response to compression along an east–west-trending section of the San Andreas Fault (CGS 2002). The Transverse Ranges northern boundary is the east–west-trending Santa Ynez Fault, along which uplift of the Santa Ynez Mountains is occurring. The southern Transverse Ranges boundary is the Santa Monica Fault Zone, at the southern base of the Santa Monica Mountains.

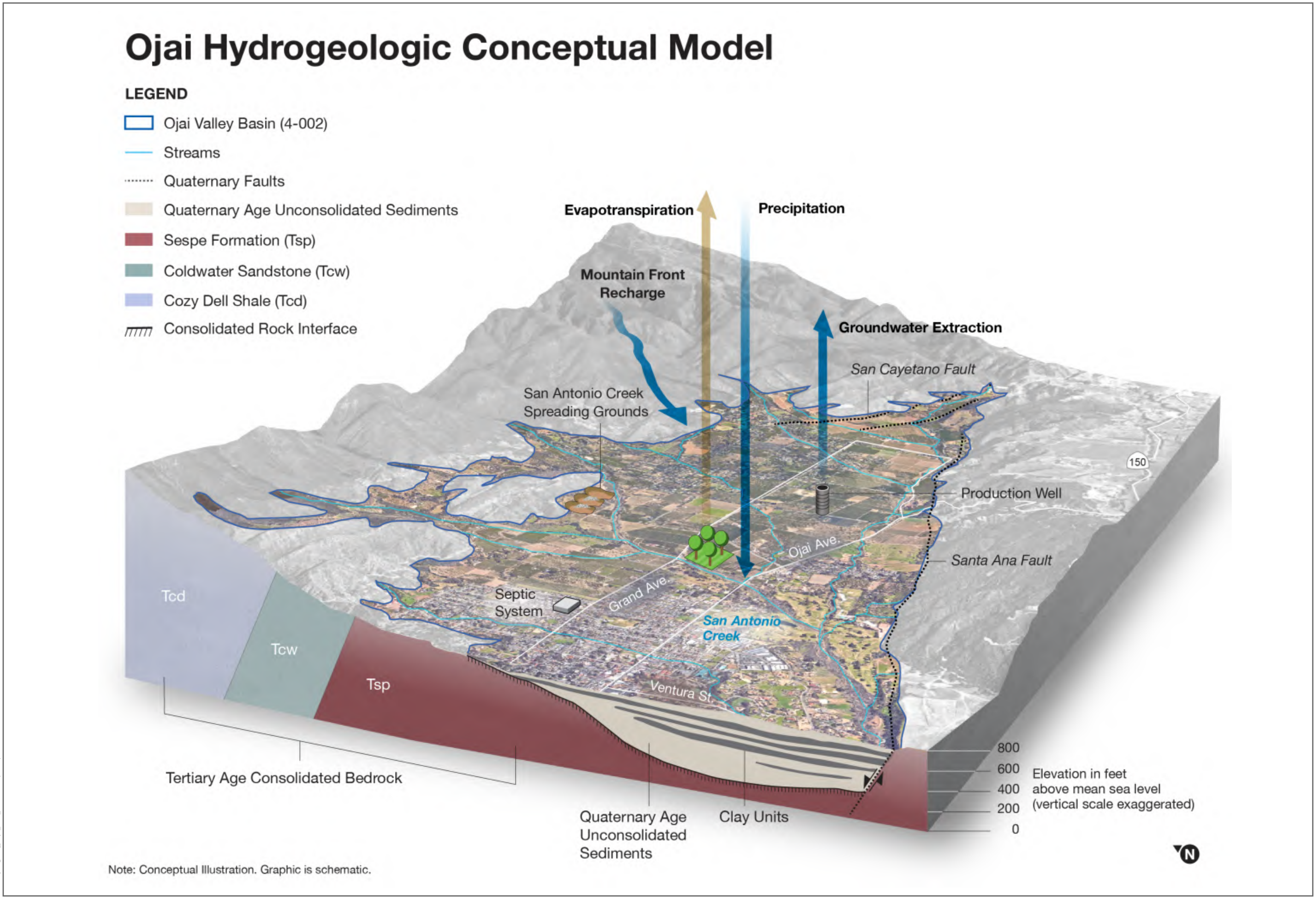

FIGURE 2-12

Hydrogeologic Conceptual Model for the Ojai Valley Groundwater Basin

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The OVGB is bounded on the north and east by Tertiary age[13] consolidated rocks associated with the Topatopa Mountains, and on the south by the Santa Ana Fault. The underlying geologic structure of the OVGB consists of downward-folded (synclinal) Eocene to early Miocene[14] folded and faulted sedimentary rocks of predominately the Rincon Shale, Vaqueros Sandstone, and Sespe formations. Additional sedimentary rock formations that outcrop within and/or underlie the OVGB include the Monterey Shale (Modelo), Coldwater Sandstone, and Cozy Dell Shale formations (Figure 2-13A, Dibblee Geologic Map and Figure 2-13B, Dibble Geologic Map Legend). The OVGB lies above the Tertiary age consolidated rocks and is composed of unconsolidated Pleistocene to Holocene age[15] alluvial water-bearing sediments (DWR 2004).

2.3.1.1 Units

The geologic units of the OVGB are of two general types: (1) consolidated rocks, which compose the east–west-trending Topatopa Mountains and underlie the OVGB, and (2) the unconsolidated sediments that overlie the basement rock and compose the OVGB aquifer and surficial geology. The boundary between the consolidated and unconsolidated rocks represents an unconformity across which lithological units representing millions of years are missing (Figure 2-13B). The geologic units underlying the OVGB are described below from oldest to youngest.

Tertiary Age Consolidated Rocks

Tertiary age consolidated rocks of marine and nonmarine origin that underlie the OVGB include the Sespe Formation, Vaqueros Sandstone, and Rincon Shale. These rocks effectively form the base of the freshwater aquifer in the OVGB and typically yield minor amounts of poor quality water. The Sespe Formation is an Oligocene age[16] terrestrial red to locally green silty shale and claystone interbedded with pink sandstone and conglomerate that subcrops below much of the OVGB and outcrops at much of the northern basin boundary of the OVGB. Overlying the Sespe Formation are the Miocene age Vaqueros Sandstone and Rincon Shale, both of which are of marine origin. The Vaqueros Sandstone consists primarily of light gray to tan, thickly bedded, fine-grained sandstone, while the Rincon Shale consists of poorly bedded gray clay shale and siltstone (Figures 2-13A and 2-13B).

13 The Tertiary age is a geologic period from 66 million to 2.6 million years ago. The geologic timescale classifies this time period as the Cenozoic Era that includes the Paleogene and Neogene Periods.

14 The Eocene and Miocene Epochs are geological periods from 56 to 33.9 million years ago and 23 to 5.3 million years ago, respectively.

15 The Pleistocene is the geologic epoch lasting from approximately 2.6 million to 11,700 years ago and spans a period of successive glacial and interglacial climate cycles. The Holocene epoch is an interglacial period representing the last 11,700 years. The Quaternary Period is the last period of the Cenozoic Era and includes the Pleistocene and Holocene.

16 The Oligocene Epoch is a geological period from about 33.9 to 23 million years ago.

Quaternary Age Deposits

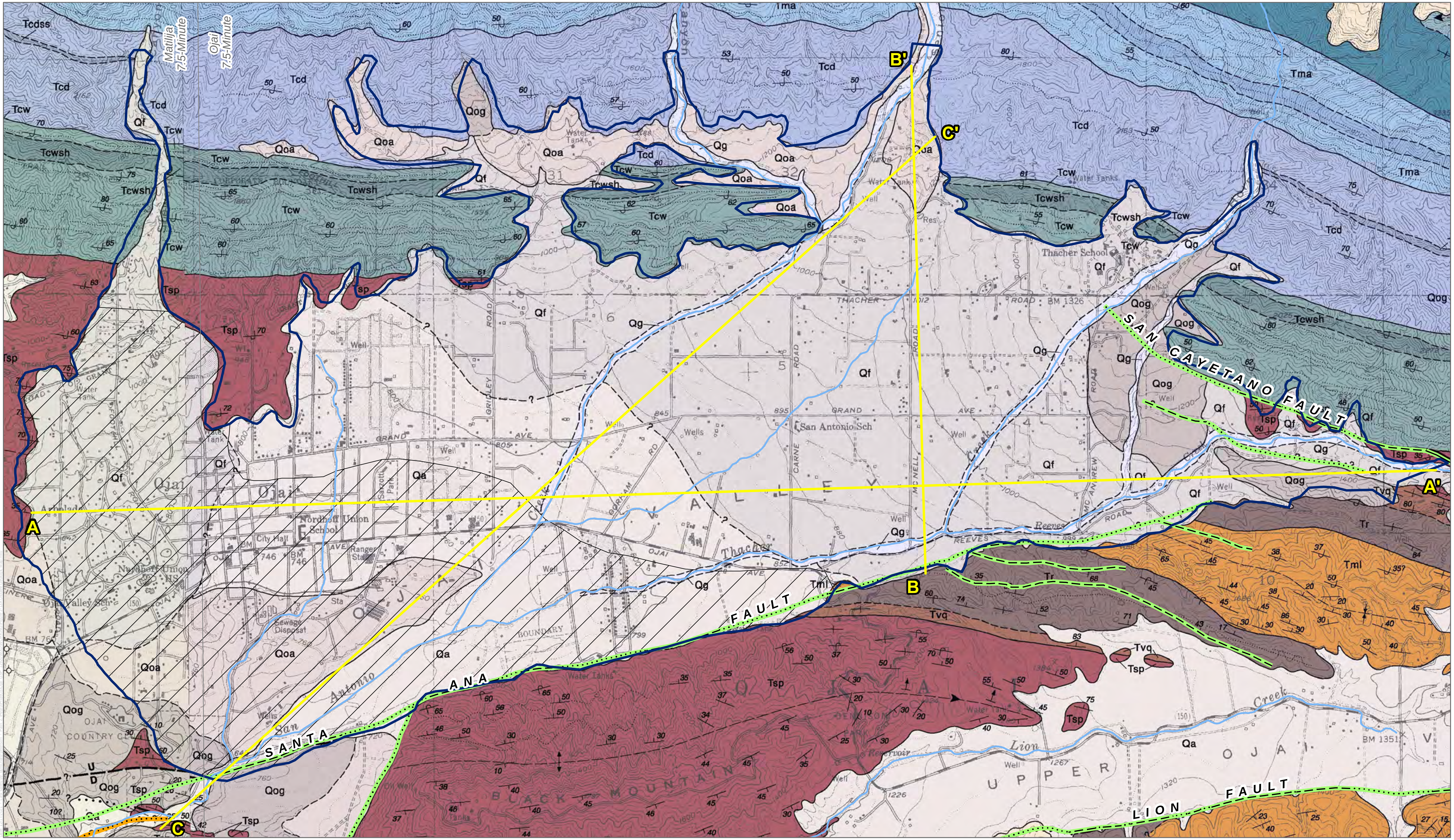
Unconsolidated deposits of Pleistocene to Holocene age eroded from the uplifted areas surrounding the OVGB unconformably overlie the consolidated Tertiary bedrock. The groundwater resources of the OVGB exist primarily within these deposits (see Section 2.3.2, Principal Aquifers and Aquitards). The surficial sediments consist of alluvial fan, stream channel, and floodplain deposits containing a wide range of material, from gravel- to clay-size particles. Approximately one half of the Quaternary sedimentary deposits of the OVGB are unconsolidated floodplain deposits of silt, sand, and gravel. Stream channel deposits consisting mostly of gravel and sand delineate the drainages of the major creeks that transect the OVGB. Older dissected surficial sediments, including remnants of weakly consolidated alluvial deposits of gravel, sand, and silt, and cobble-boulder fan gravel and fanglomerate deposits composed largely of sandstone detritus, flank the hillslopes surrounding the OVGB and underlie the southern portion of the City of Ojai. The remainder of the City of Ojai and OVGB is occupied by alluvial fan boulder gravel deposits (Figures 2-13A and2-13B).

2.3.1.2 Structures

The OVGB lies at the northern edge of the central Ventura basin, the deepest structural depression of the Transverse Ranges. Rocks of this region have been faulted and folded into a series of predominately west-trending anticlines and synclines caused by regional north-south compression. Much of this compression is absorbed locally by the San Cayetano Fault immediately to the east of the OVGB, and by the Red Mountain Fault approximately 9 miles to the southwest of the OVGB.

2.3.1.3 Faults

The Santa Ana Fault, which is part of the Mission Ridge fault system, runs in an east-west direction along the southern boundary of the OVGB at the base of Black Mountain. The Santa Ana Fault is a moderately constrained to inferred, late Quaternary fault with a slip rate of between 0.2 and 1 millimeter per year (USGS 2020b). The San Cayetano Fault extends into and is mapped terminating in the eastern portion of the OVGB. The San Cayetano Fault is a well constrained to inferred, latest Quaternary thrust fault with a slip rate of greater than 5 millimeters/year. No other major mapped faults are present in the OVGB (USGS 2020b). Faults primarily align along boundaries of the OVGB and do not influence groundwater flow within the OVGB.



DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; Dibblee

DUDEK

0 0.5 1 Miles

FIGURE 2-13A

Dibblee Geologic Map

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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Legend

Ojai Valley Groundwater Basin (4-002)

Cross Section

Approximate Extent of Perched Aquifer

Quaternary Faults

Latest Quaternary (<15,000 years), inferred location

Late Quaternary (< 130,000 years), well constrained location

Late Quaternary (< 130,000 years), moderately contrained location

Late Quaternary (< 130,000 years), inferred location

Qg / Qf / Qa

SURFICIAL SEDIMENTS

Qg *Stream channel deposits, mostly gravel and sand*
Qa *Alluvial fan boulder gravel*
Qf *Alluvium: uncolsolidated floodplain deposits of silt, sand and gravel*

Qls

LANDSLIDE DEBRIS

Qoa / Qog

OLDER DISSECTED SURFICIAL SEDIMENTS

Qoa *Remnants of weakly consolidated older alluvial deposits of gravel, sand and silt*
Qog *Cobble-boulder fan gravel and fanglomerate deposits composed largely of sandstone detritus*

— *UNCONFORMITY* —

Tp

PICO SANDSTONE
Marine; Pliocene age

Tp *Massive to bedded gray siltstone, mudstone and minor tan sandstone; sandstone locally pebbly*

Tsq

SISQUOC SHALE
Marine, late Miocene age

Tsq *Light gray silty shale or claystone, locally slightly siliceous and diatomaceous; Delmontian-Mohnian Stages*

Tm / Tml

MONTEREY SHALE (MODELO FORMATION)
Marine; early to late Miocene age

Tm *Upper shale unit: white-weathering, thin-bedded, hard, platy to brittle siliceous shale, locally cherty; Mohnian Stage*
Tml *Lower shale unit: white-weathering, soft, fissle to punky clay shale with interbeds of hard siliceous shale and thin limestone strata; Luisian-Relizian Stages*

Tr

RINCON SHALE
Marine; early Miocene age

Tr *Poorly bedded gray clay shale and siltstone; contains occasional gray dolomitic concretions; Saucesian and upper Zemorrian Stages*

Tvq

VAQUEROS SANDSTONE
Shallow marine; early Miocene age

Tvq *Massive to thick bedded, light gray to tan, fine-grained sandstone locally calcareous; Zemorrian Stage*

Tsp

SESPE FORMATION
Nonmarine; Eocene to Miocene, predominantly Oligocene age

Tsp *Maroon, red and locally green silty shale or claystone and interbedded red to pinkish-gray sandstone; some sandstone beds in lower part coarse-grained and include pebble-cobble conglomerate; lowest part consists of pink sandstone and red claystone*

Tcw / Tcwsh

COLDWATER SANDSTONE
Marine; late Eocene age

Tcw *Hard, tan, bedded arkosic sandstone with minor interbeds of greenish-gray siltstone and shale; local oyster shell beds common in upper part; Narizian Stage*
Tcwsh *Greenish-gray siltstone and shale with occasional interbeds of tan sandstone*

Tcd / Tcdss

COZY DELL SHALE
Marine; late Eocene age

Tcd *Dark gray, argillaceous to silty micaceous shale with minor light gray to tan arkosic sandstone; Narizian Stage*
Tcdss *Light gray to tan arkosic sandstone with minor interbeds of gray micaceous shale*

Tma / Tmash

MATILIJA SANDSTONE
Marine; middle to late Eocene age

Tma *Hard, thick bedded, tan to mottled light greenish-gray arkosic sandstone with thin partings to thick interbeds of gray micaceous shale; lower Narizian (?) and upper Ulatisian (?) Stages*
Tmash *Gray micaceous shale with minor tan sandstone interbeds*

Tjsh / Tjss

JUNCAL FORMATION
Marine; early(?) to middle Eocene age

Tjsh *Dark gray micaceous shale with minor thin interbeds of hard, gray-white to tan arkosic sandstone; lower Ulatisian(?) to upper Penutian(?) Stages*
Tjss *Hard, gray-white to tan arkosic sandstone with minor interbeds of dark gray micaceous shale*

Kush / Kucg

UNAMED MARINE STRATA (JALAMA ? FORMATION)
Marine; upper Cretaceous age

Kush *Dark gray to black micaceous clay shale with minor interbeds of hard, tan, arkosic sandstone*
Kucg *Gray to brown cobble conglomerate of granitic, porphyritic-andesitic, and quartzitic detritus in arkosic sandstone matrix*

SOURCE: Dibblee

FIGURE 2-13B

Dibblee Geologic Map Legend

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2.3.1.4 Folds

The major folds in the vicinity of the OVGB include the Matilija overturn, Ojai syncline, Reeves syncline, and Lion Mountain anticline. Competent Eocene clastic marine rocks form the Matilija overturn, which is the overturned southern section of an anticline in the Santa Ynez and Topatopa mountains. The Ojai Syncline underlies the OVGB and consists of terrestrial Sespe Formation and older marine rocks. Ductile middle to upper Miocene marine rocks form the Reeves syncline, which underlies the mountains northeast of the OVGB. The Lion Mountain anticline forms Black Mountain and is composed of non-marine rocks of the Sespe Formation (Kear 2005).

2.3.2 Principal Aquifers and Aquitards

Water-bearing units of the OVGB include alluvial deposits and fractures and interstices of underlying Tertiary rocks. The alluvium is composed of units of sand, gravel, and clay up to 50 to 100 feet thick that pinch out toward the lateral edges of the OVGB (Kear 2005; DBS&A 2011, 2020a). The alluvial deposits are the most productive units in the OVGB, with well yields that range from 100 to 600 GPM (DWR 2004). The weathered Tertiary rocks are typically consolidated and yield minor amounts of poor-quality water, with well yields typically around 2 to 5 GPM, but reaching a maximum of about 50 GPM (DWR 2004). The contact of the alluvial unconsolidated deposits of Pleistocene to Holocene age with the Tertiary rocks define the base of the OVGB. The primary storage units for groundwater are approximately four discrete sand and gravel units on the order of up to 100 feet thick each, which are sourced near the alluvial fan heads in the northeast side of the Ojai Valley (Kear 2005; OBGMA 2018). The individual coarse grained sand and gravel aquifer units that together comprise the primary production aquifer are thickest in the northern and eastern areas of the OVGB and thinnest in the southern and western areas of the OVGB where fine grained lacustrine and floodplain deposits of up to approximately 100 feet thick predominate as confining layers creating a multi-layered aquifer system (DBS&A 2011; Kear 2005; OBGMA 2018). The uppermost confining clay unit, which generally extends from approximately 30 to 130 feet below ground surface (bgs), is the thickest and most extensive aquitard and separates the primary production aquifer from a shallow perched aquifer (Kear 2005, 2021; OBGMA 2018). The approximate extent of the shallow perched, based on well geophysical and lithologic logs, is shown in Figure 2-13A (Kear 2005, 2021). The shallow perched aquifer generally extends from approximately 15 to 30 feet bgs (Kear 2005, 2021). Groundwater within the primary production aquifer is predominantly under unconfined conditions near the alluvial fan heads and semi-confined to mostly confined in the central, southern, and western portions of the OVGB (Kear 2005; 2021). The alluvial deposits are deepest in the central and southern areas of the OVGB (Kear 2005; DBS&A 2011, 2020a). The maximum total thickness of the alluvial deposits is approximately 900 feet (DBS&A 2011, 2020a).

The hydraulic properties of the primary production aquifer vary spatially. Results of field pumping tests indicate aquifer transmissivity ranges from 1×10^{-5} to 6.20 square feet per minute for an average of approximately 2.0 square feet per minute (Kear 2005). Aquifer storativity ranges from 1×10^{-8} to 0.024 for an average of approximately 0.003 (Kear 2005) and will vary with groundwater level fluctuation. Hydraulic conductivity and specific yield and storage values used in the Ojai Basin Groundwater Model (OBGM) developed by DBS&A also provide an estimate of the hydraulic properties of the primary production aquifer and aquitards. Values for aquifer hydraulic conductivity used in the OBGM range from 7 to 150 feet per day. Values for aquifer specific yield used in the OBGM range from 0.03 to 0.1. The specific storage of all aquifer layers in the OBGM is 1×10^{-6} per foot and of all aquitard layers is 1×10^{-7} per foot. The specific yield of all aquitard layers in the OBGM is 0.03. The hydraulic conductivity of all aquitard layers in the OBGM is presented as 0.1 feet per day (DBS&A 2011, 2020a). Note that while units of the model are simplified as being laterally contiguous, their conductivity properties do change with facies changes, generally becoming finer-grained and less conductive toward the southwest portion of the OVGB. Cross-sectional interpretations of the multi-layered OVGB aquifer system are shown in cross-sections A-A' (west-east), B-B' (south-north), and C-C' (southwest-northeast) (Figures 2-14 to 2-16, Cross Sections AA', BB', and CC', respectively) at the locations shown on Figure 2-13A.

2.3.3 Recharge and Water Deliveries

Water deliveries to the OVGB include potable water supplied by CMWD, which have historically ranged from an estimated 2,404 AFY to 5,272 AFY (Figure 2-17, Casitas Municipal Water District Water Deliveries); however, these surface water imports are used exclusively for domestic and agricultural supply, and not for managed recharge. The San Antonio Creek spreading grounds have historically been used to divert excess flows from San Antonio Creek to recharge groundwater in the OVGB (Figure 2-18, Recharge Areas and Soils). The spreading grounds are estimated to have provided an average of 126 AFY of recharge to the OVGB (Walter 2015). With the exception of the San Antonio Creek spreading grounds, recharge to the OVGB is limited to natural infiltration of precipitation, and to a lesser degree, return flows from septic systems and applied irrigation water.

The San Antonio Creek watershed, which drains the mountains surrounding the OVGB, provides recharge to the OVGB through infiltration of streamflow into the shallow alluvial sediments. Mountain front recharge that occurs at the interface between surrounding bedrock and unconsolidated sediments is a source of recharge along the creeks that enter the OVGB (Figure 2- 18). Focused areas of recharge also include areas of the OVGB occupied by soils with high saturated hydraulic conductivity (Figure 2-18). DBS&A (2020b) estimated average annual recharge from precipitation for the revised OBGM calibration period (1970 to 2019) to be approximately 6,970 AFY. The amount of groundwater recharge to the OVGB is considered to vary significantly from year to year. Daniel B. Stephens & Associates (DBS&A 2011) estimated annual recharge from precipitation for the original OBGM calibration period (1970 to 2009) to range from approximately 1,700 AFY to 20,000 AFY.

The other, though less voluminous, source of recharge is return flows from agricultural irrigation. DBS&A (2020b) estimated recharge from irrigation return flows for the period 1970 to 2019 to be approximately 1,483 AFY.

Septic tank treatment and disposal systems also contribute a source of recharge to the OVGB, but this source is considered negligible when compared to natural recharge. DBS&A (2020b) identified 16 individual septic systems and one wastewater treatment plant (Thacher School) within the OVGB, although there are likely additional OWTSs as OVSD's service area only covers approximately 33% of the OVGB. DBS&A (2011) estimated the recharge rate for individual septic systems to be 0.16 AFY, and for the Thacher School wastewater treatment plant to be 19 AFY, for a combined recharge rate from wastewater of approximately 22 AFY. Additional information on recharge sources as they pertain to the basin water budget is provided in Section 2.4.1, Inflow to Groundwater System.

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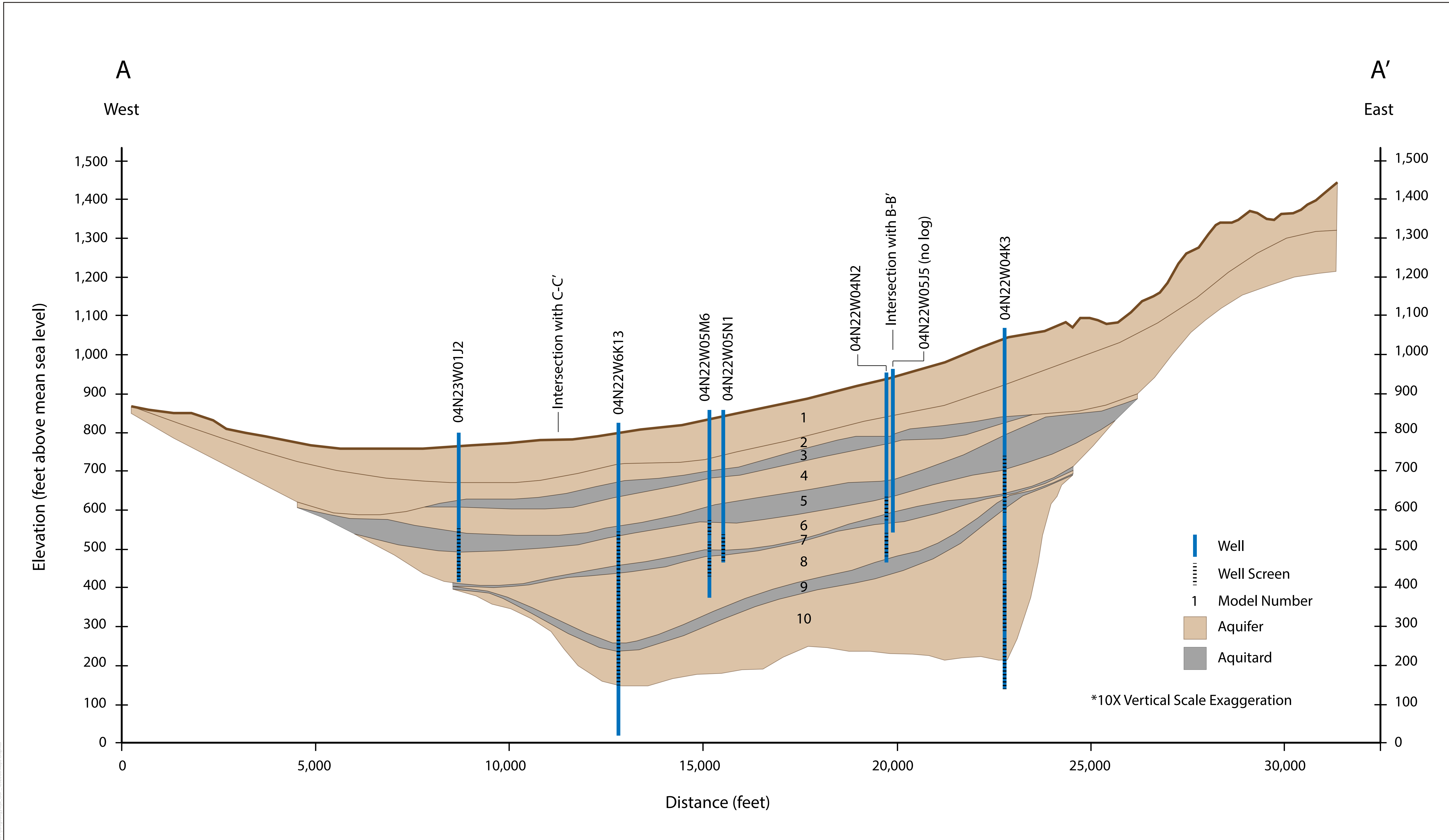

SOURCE: Adopted from DBS&A

DUDEK

FIGURE 2-14

A - A' Geologic Cross-Section

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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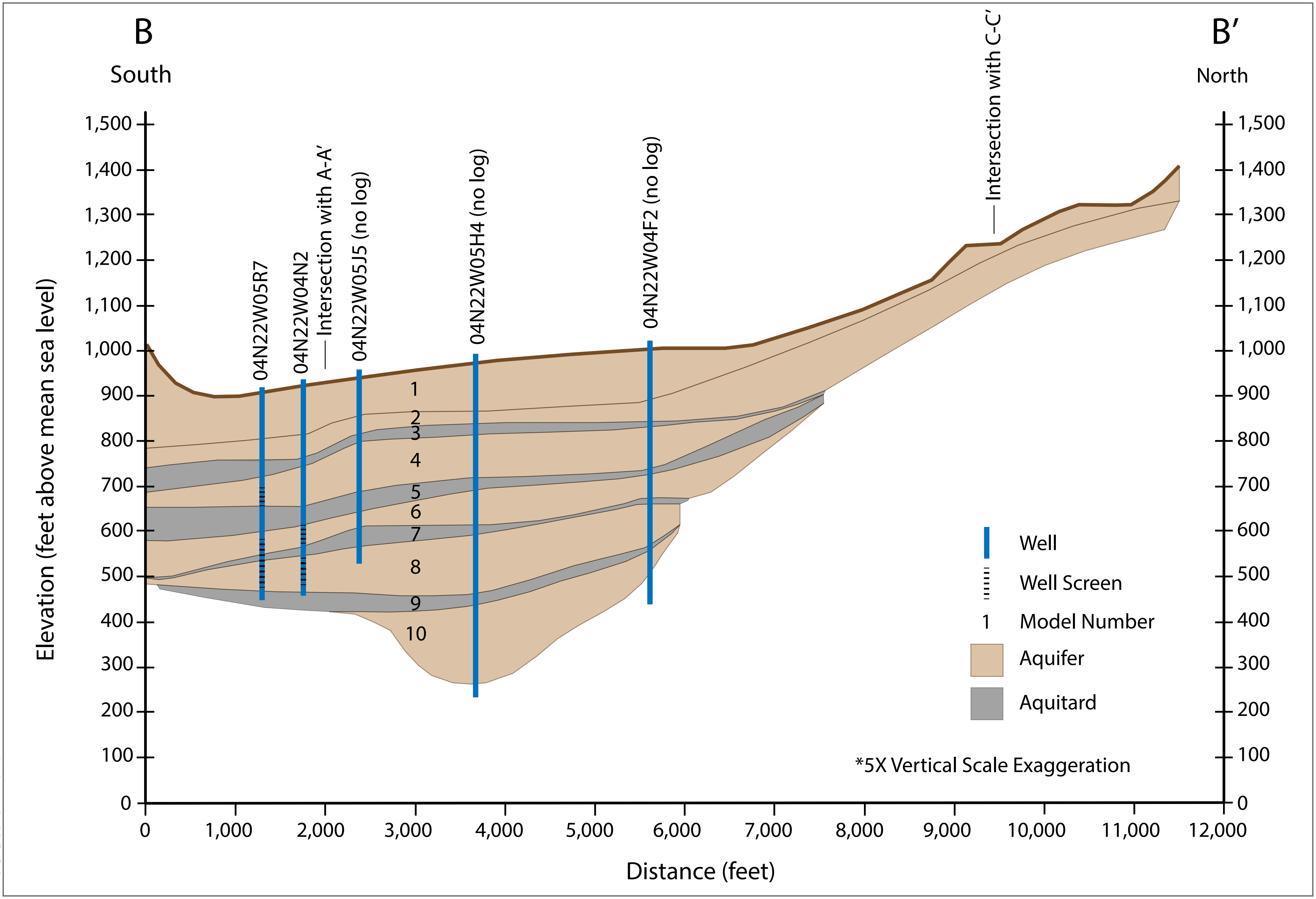

SOURCE: Adopted from DBS&A

DUDEK

FIGURE 2-15

B - B' Geologic Cross-Section

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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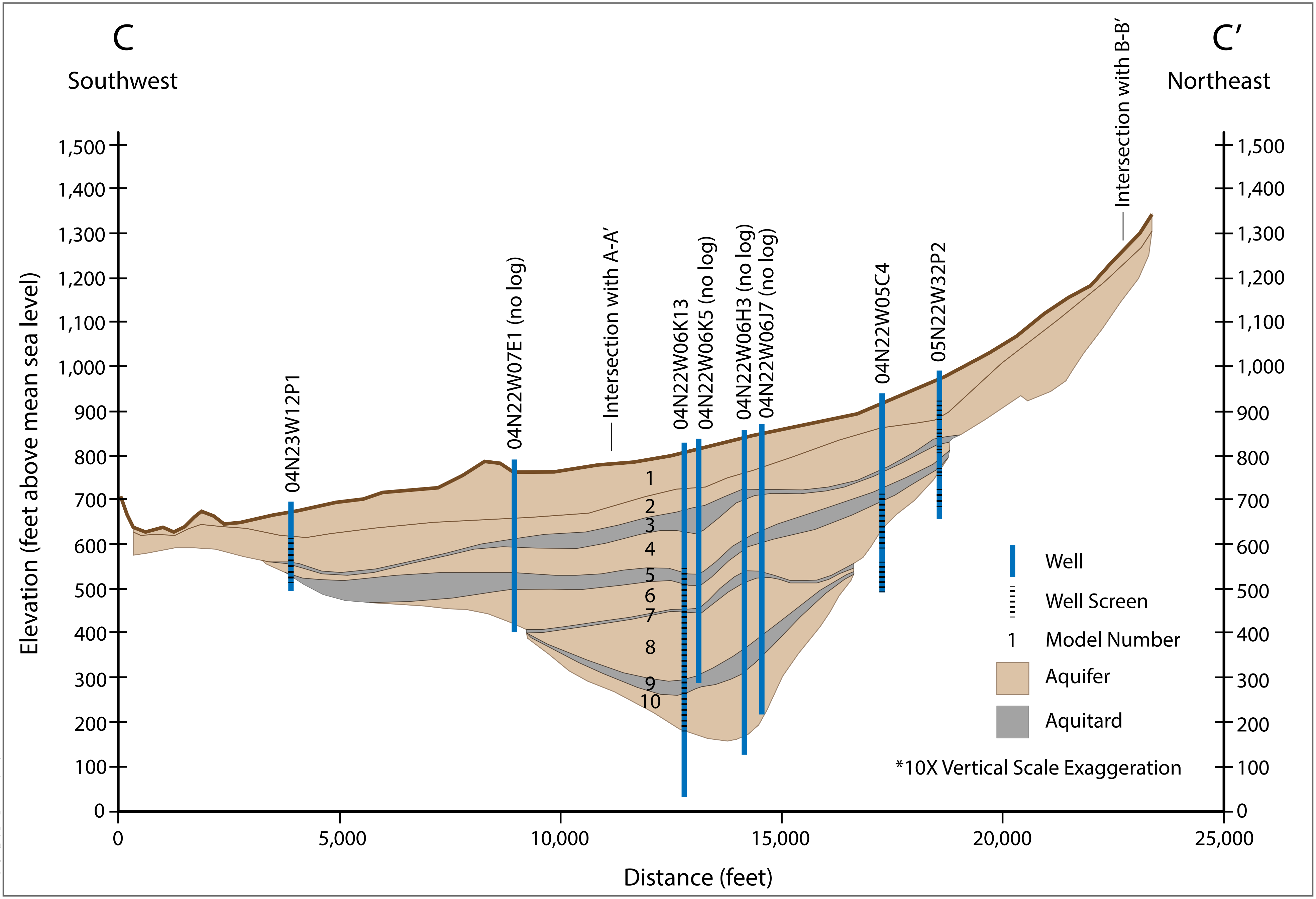

SOURCE: Adopted from DBS&A

DUDEK

FIGURE 2-16

C - C' Geologic Cross-Section

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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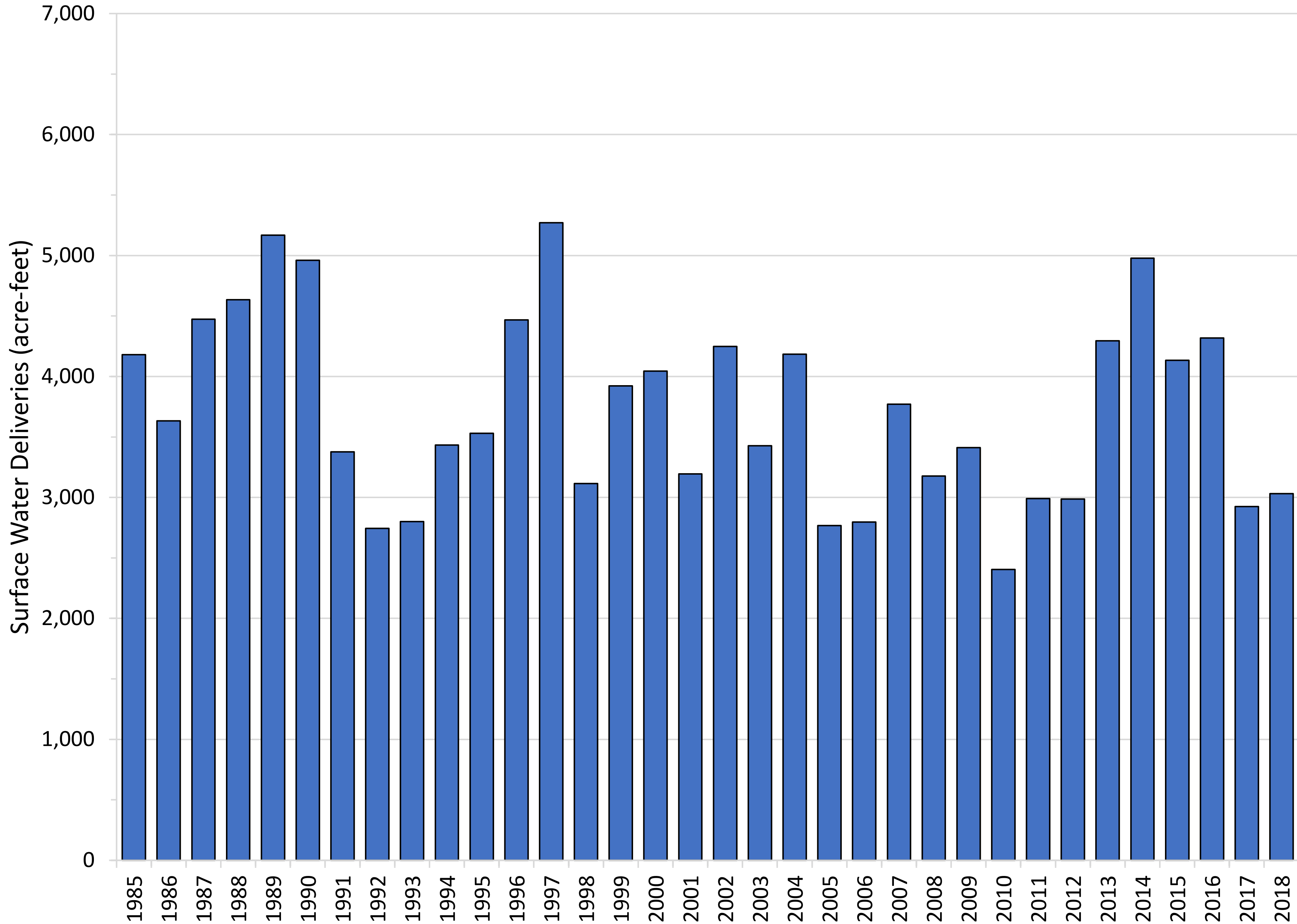

SOURCE: OBGMA

DUDEK

FIGURE 2-17

Casitas Municipal Water District Estimated Water Deliveries

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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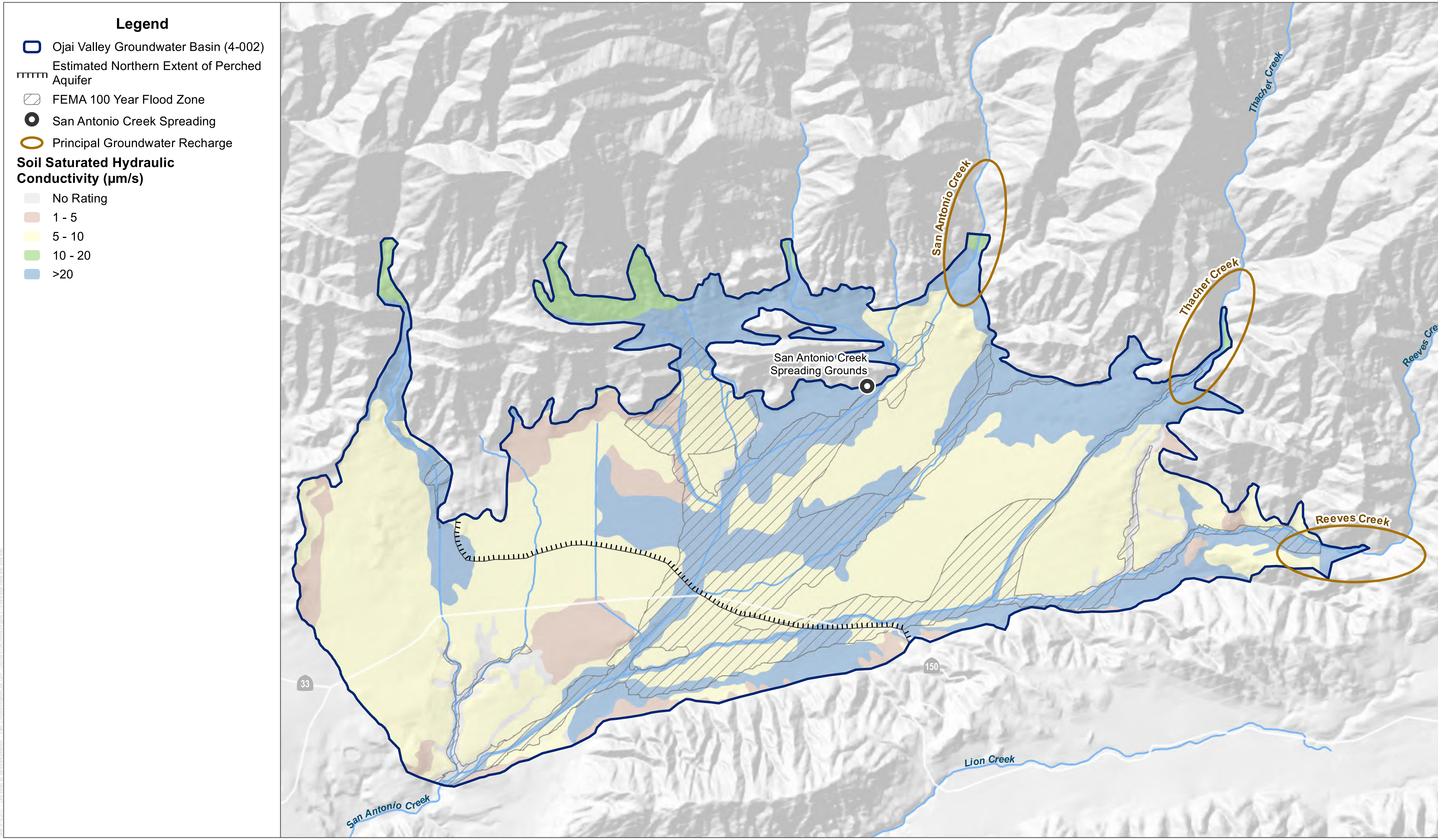

DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; USDA; FEMA

DUDEK

0 0.5 1 Miles

FIGURE 2-18

Recharge Areas and Soils

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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2.3.4 Historical and Current Groundwater Conditions

2.3.4.1 Groundwater Elevation Data

Groundwater elevations in the OVGB were first measured in 1927, and multiple entities, including the USGS, VCWPD, and OBGMA, have recorded groundwater levels since that time. Prior to 1949, available groundwater elevation data are limited to a single well (SWN 04N22W05L001S) located in the central part of the OVGB. Since 1949, an increasing number of wells have been monitored for groundwater levels, including dedicated monitoring wells and agricultural, domestic, municipal, and industrial production wells. Currently, the VCWPD and OBGMA are the two primary entities that monitor groundwater levels in the OVGB, which together periodically take depth to water measurements in approximately 23 wells located across the OVGB. Hydrographs for all OVGB wells in which water level measurements have been recorded and made available are included in Appendix D.

Historical Groundwater Elevation Trends

Groundwater elevations in the OVGB are correlated with mountain front recharge, precipitation, return flows, and groundwater extraction. Groundwater elevations are highest in the northern and eastern portions of the OVGB, adjacent to the Topatopa Mountains, and lowest in the southwestern part of the OVGB in the vicinity of San Antonio Creek. The direction of regional groundwater flow in the OVGB is away from the Topatopa Mountains towards the southwest, except near major centers of groundwater extraction where the hydraulic gradient is locally toward the pumping wells.

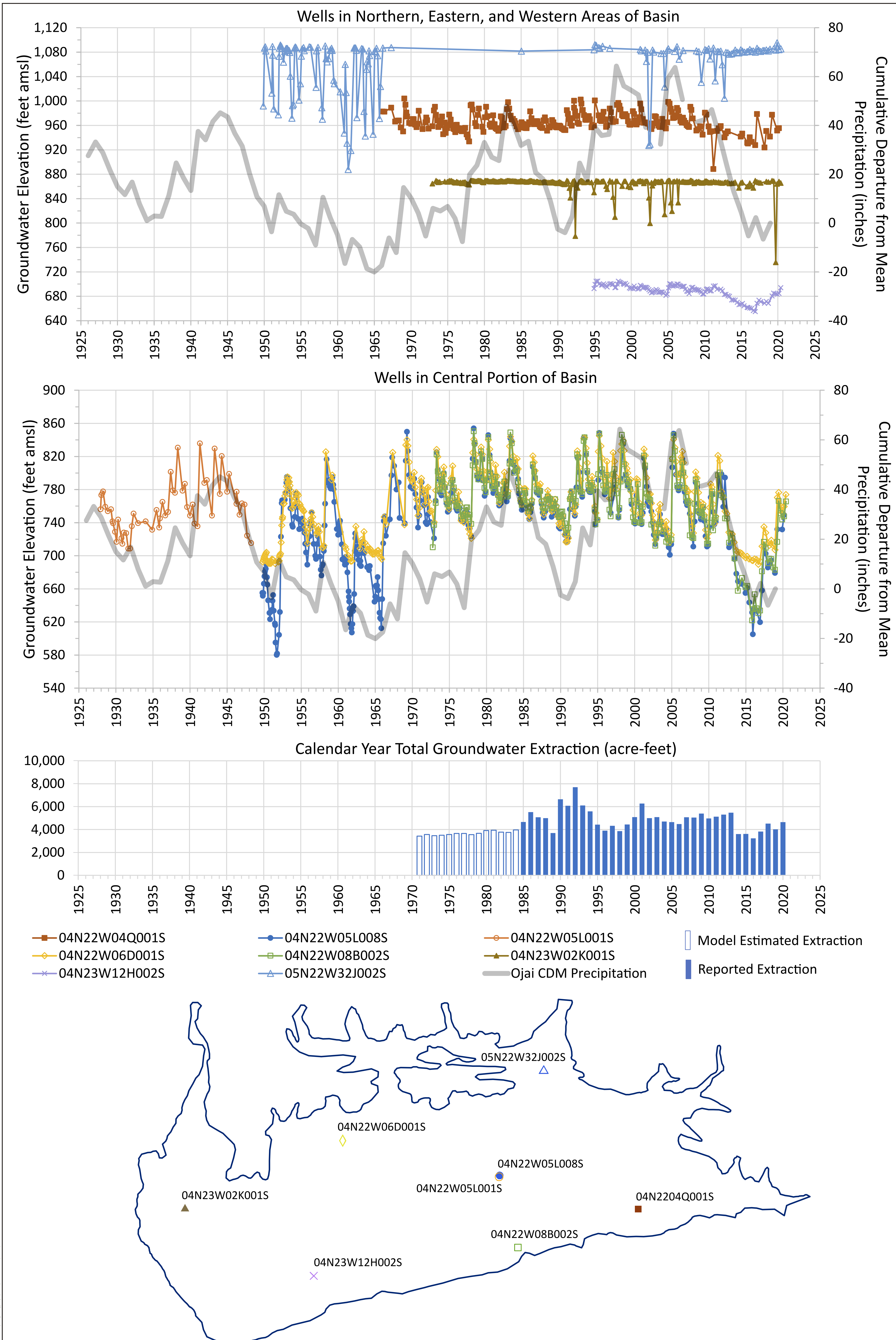
In December 1927, groundwater elevations in well 04N22W05L001S in the central part of the OVGB were approximately 756 feet amsl (Figure 2-19, Hydrographs for Select Wells). Between 1927 and 1948 (the end of the measurement record), groundwater levels in well 04N22W05L001S fluctuated in response to recharge from precipitation, declining during dry periods and rising during wet periods (Figure 2-19). The cyclic pattern of groundwater level decline and recovery over dry and wet climatic cycles observed in well 04N22W05L001S is apparent in hydrographs for wells located throughout the OVGB, with wells in the central part of the OVGB showing the largest response to precipitation and wells in the peripheral northern, eastern, and western areas exhibiting little to no response (Figure 2-19). Wells in the peripheral areas of the OVGB are not adjacent to the majority of the production wells, and groundwater levels in the peripheral wells likely reflect the combined influences of local precipitation and bedrock-derived recharge that helps maintain higher groundwater levels on the margins of the OVGB (OBGMA 2018).

Well 04N22W05L008S located in the central part of the OVGB has the longest and most continuous groundwater elevation record spanning from October 1949 to present. Over the approximately 71-year period of record, groundwater elevations have ranged from a low of approximately 580 feet amsl in September 1951 to a high of approximately 854 feet amsl in April 1978 (Figure 2-19). Declines in groundwater elevation of approximately 200 feet occurred between 1958 and 1962, and 2011 and 2016, coincident with periods of drought shown in the declining cumulative departure from the mean precipitation curve (Figure 2-19). Groundwater elevations recovered after each drought period. The magnitude of recovery depended on the length of time between droughts and the amount of precipitation received in each of the water years between the droughts, as well as the amount of groundwater extracted. These patterns of groundwater level decline and recovery were observed primarily in wells located in the central portion of the OVGB, although absolute changes in groundwater level varied geographically. In March 2020, the most recent measurement, the groundwater elevation in well 04N22W05L008S was approximately 749 feet amsl (Figure 2-19).

To evaluate how the historical groundwater gradient and direction of flow differed between a period of above average precipitation and a period of below average precipitation, groundwater elevation contours were generated using available data from wells greater than 100 feet in total depth for spring 1998 and fall 2015, respectively. The wells included in the analysis are screened across multiple aquifer units that comprise the primary production aquifer (see Section 2.3.2, Principal Aquifers and Aquitards). As of fall 2020, the only depth discrete groundwater well in the OVGB is well SACSGRP DDMW (05N22W32P002S–P006S) located at the San Antonio Creek Spreading Grounds.

In spring 1998, groundwater elevations ranged from a high of approximately 1,115 feet amsl in the eastern part of the OVGB to a low of 678 feet amsl in the southwestern part of the OVGB. The direction of groundwater flow was toward the southwest and the hydraulic gradient was approximately 0.019 feet/feet, as measured between wells 04N22W06D005S, 04N22W08B002S, and 04N23W12L002S (Figure 2-20, Groundwater Elevation Contours Spring 1998).

In fall 2015, groundwater elevations ranged from a high of approximately 1,081 feet amsl in the northeastern part of the OVGB to a low of approximately 579 feet amsl in the central part of the OVGB. The direction of groundwater flow was toward the southwest and the hydraulic gradient was approximately 0.056 feet/feet, as measured between wells 05N22W32J002S, 04N22W06D005S, and 04N22W08B002S. A pumping depression in the central part of the OVGB, as evidenced by the bullseye shaped contours and depressed water levels in several wells, indicates that groundwater flow was locally toward the center of the OVGB and pumping wells (Figure 2- 21, Groundwater Elevation Contours Fall 2015).



SOURCE: VCWPD; OBGMA

FIGURE 2-19

Hydrographs for Select Wells

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Current Groundwater Elevation Trends

Groundwater elevations in wells throughout the OVGB had generally been recovering in recent years from the last major drought period that ended around 2016 but are again declining due to below average precipitation recorded in the 2020 to 2021 Water Year. Between fall 2016 and spring 2020, groundwater elevations in peripheral areas of the OVGB increased by greater than 40 feet and levels in the central part of the OVGB increased by as much as 130 feet (Figure 2-19). In spring 2020 groundwater elevations in wells were generally near or at historical average levels.

In fall 2019, groundwater elevations ranged from a high of approximately 1,084 feet amsl in the northeastern part of the OVGB to a low of approximately 676 feet amsl in the central part of the OVGB. The direction of groundwater flow was toward the southwest and the hydraulic gradient was approximately 0.028 feet/feet, as measured between wells 05N22W32J002S, 04N23W01K002S, and 04N22W07G001S. Depressed groundwater levels in several wells in the central part of the OVGB suggest that a pumping depression persisted through the fall until the wet season recharge period (Figure 2-22).

In spring 2020, groundwater elevations ranged from a high of approximately 1,085 feet amsl in the northeastern part of the OVGB to a low of approximately 694 feet amsl in the southwestern part of the OVGB. The direction of groundwater flow was toward the southwest and the hydraulic gradient was 0.028 feet/feet, as measured between wells 05N22W32J002S, 04N23W01K002S, and 04N22W07G001S (Figure 2-23).

2.3.4.2 Estimate of Groundwater in Storage

The total groundwater storage capacity of the OVGB has been estimated to be between 70,000 AF and 85,000 AF (DWR 2004; OBGMA 2016). Since 1975, the total annual groundwater in storage in the OVGB at the springtime high point has been estimated using measured groundwater level data from key monitoring wells. From 1975 to 2018, the estimated total groundwater in storage has ranged from a minimum of 41,310 AF in 2016 to a maximum of 83,785 AF in 1983 (OBGMA 2016 and 2018). In 2018, the estimated groundwater in storage was 48,642 AF (OBGMA 2018).

The annual change in storage is also estimated using the Ojai Basin Groundwater Model developed by DBS&A (2011). The OBGM-calculated change in storage is lower than the volume in storage calculated using the method described in OBGMA (2016) (Section 2.4.3).

2.3.4.3 Seawater Intrusion

As an inland basin, the OVGB has no hydraulic connection to the Pacific Ocean. The OVGB is approximately 11 miles from the Pacific Ocean at an elevation of more than 630 feet amsl. Therefore, seawater intrusion has not occurred and will not occur in the OVGB.

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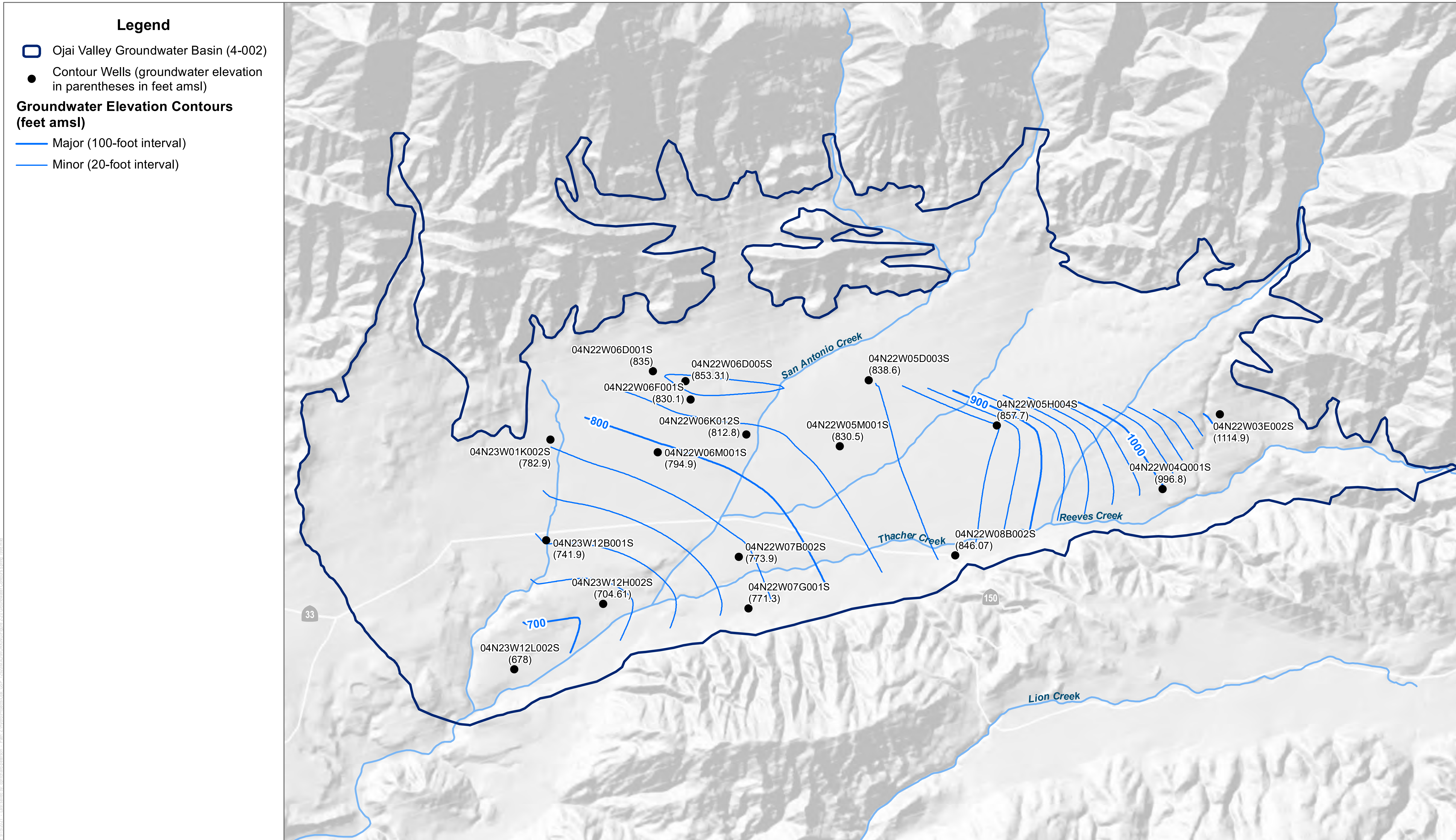

DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; VCWPD

DUDEK

0 0.5 1 Miles

FIGURE 2-20

Groundwater Elevation Contours Spring 1998

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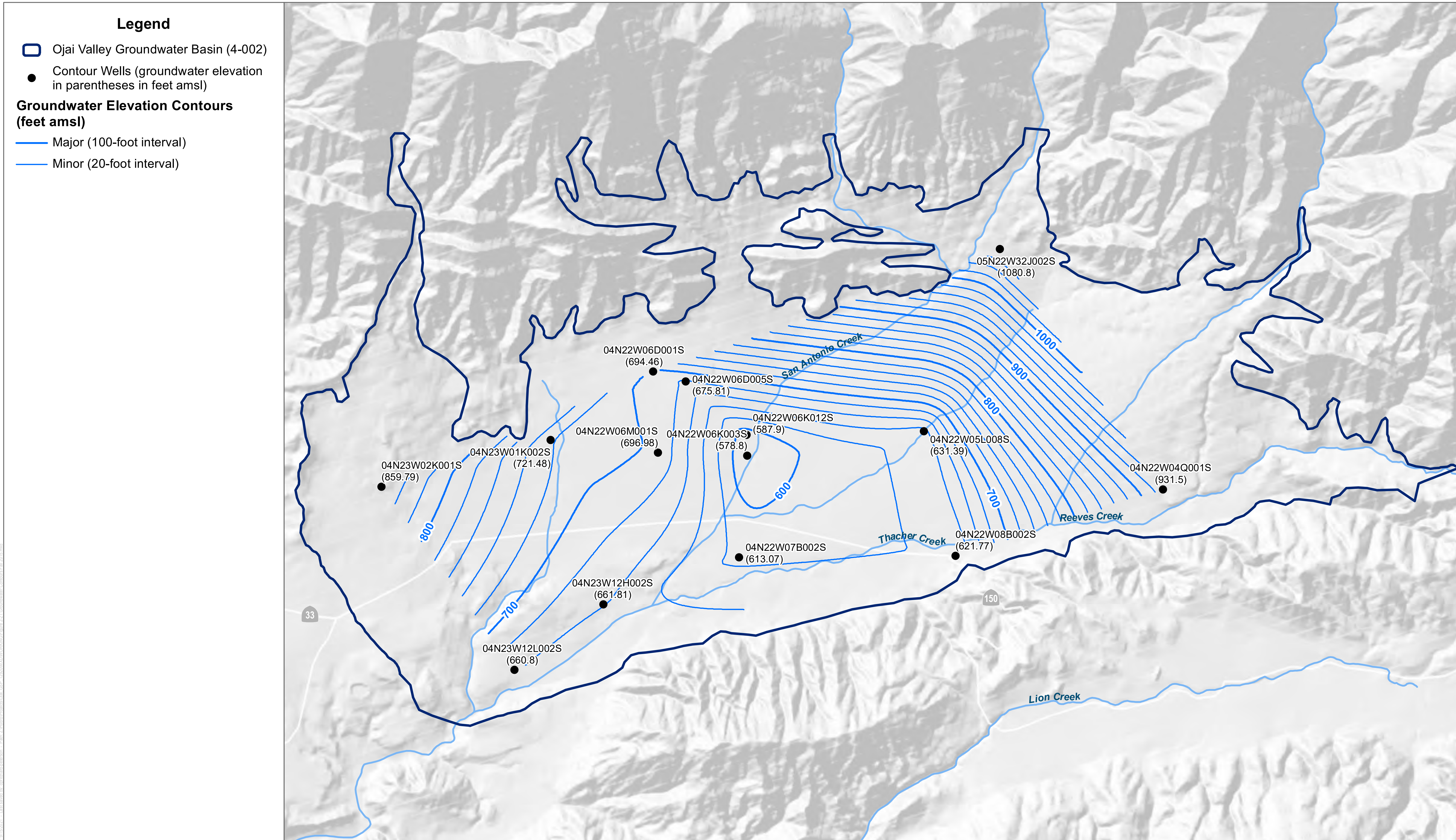

DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; VCWPD

DUDEK

0 0.5 1 Miles

FIGURE 2-21

Groundwater Elevation Contours Fall 2015

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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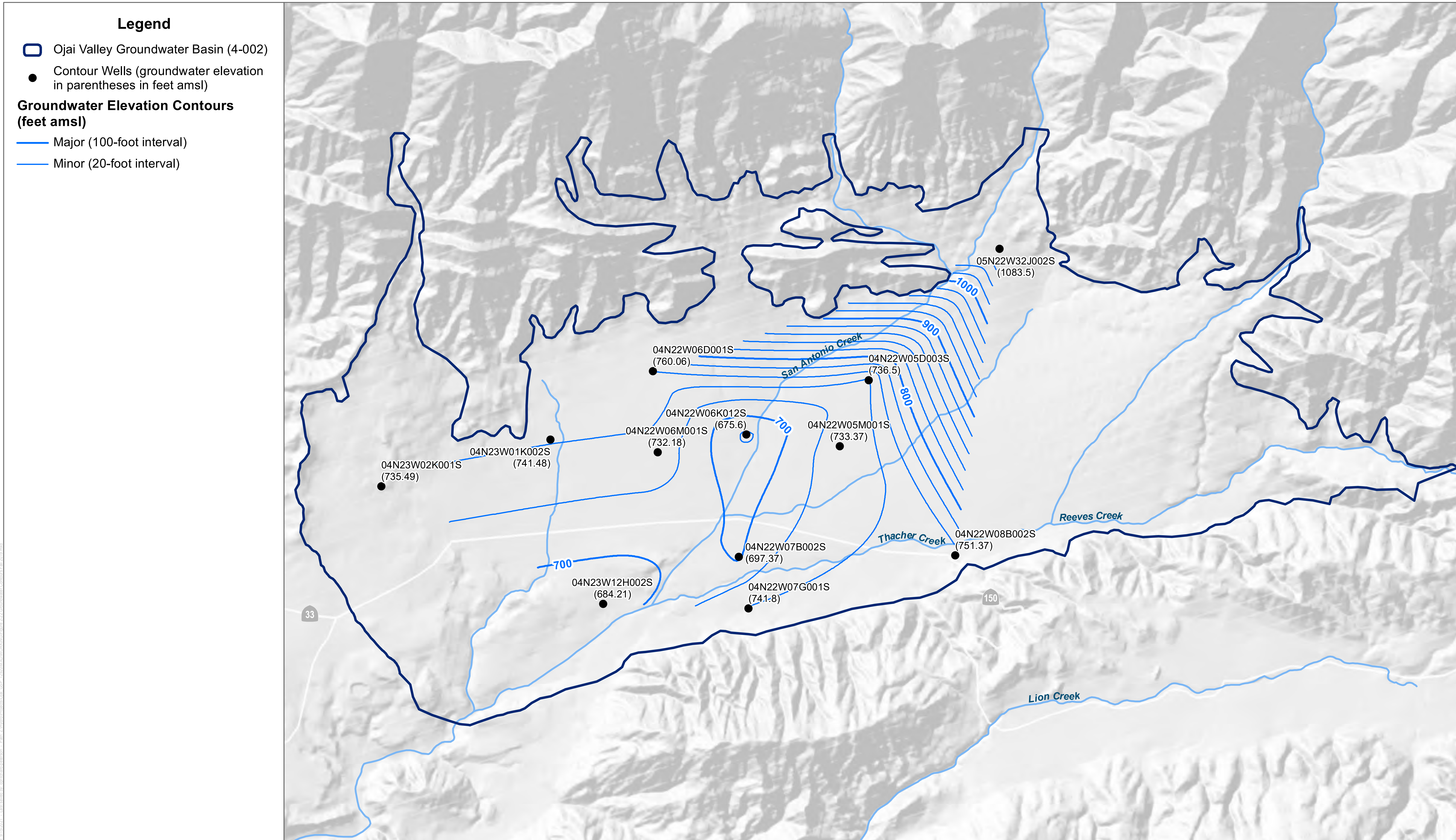

DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; VCWPD

DUDEK

0 0.5 1 Miles

FIGURE 2-22

Groundwater Elevation Contours Fall 2019

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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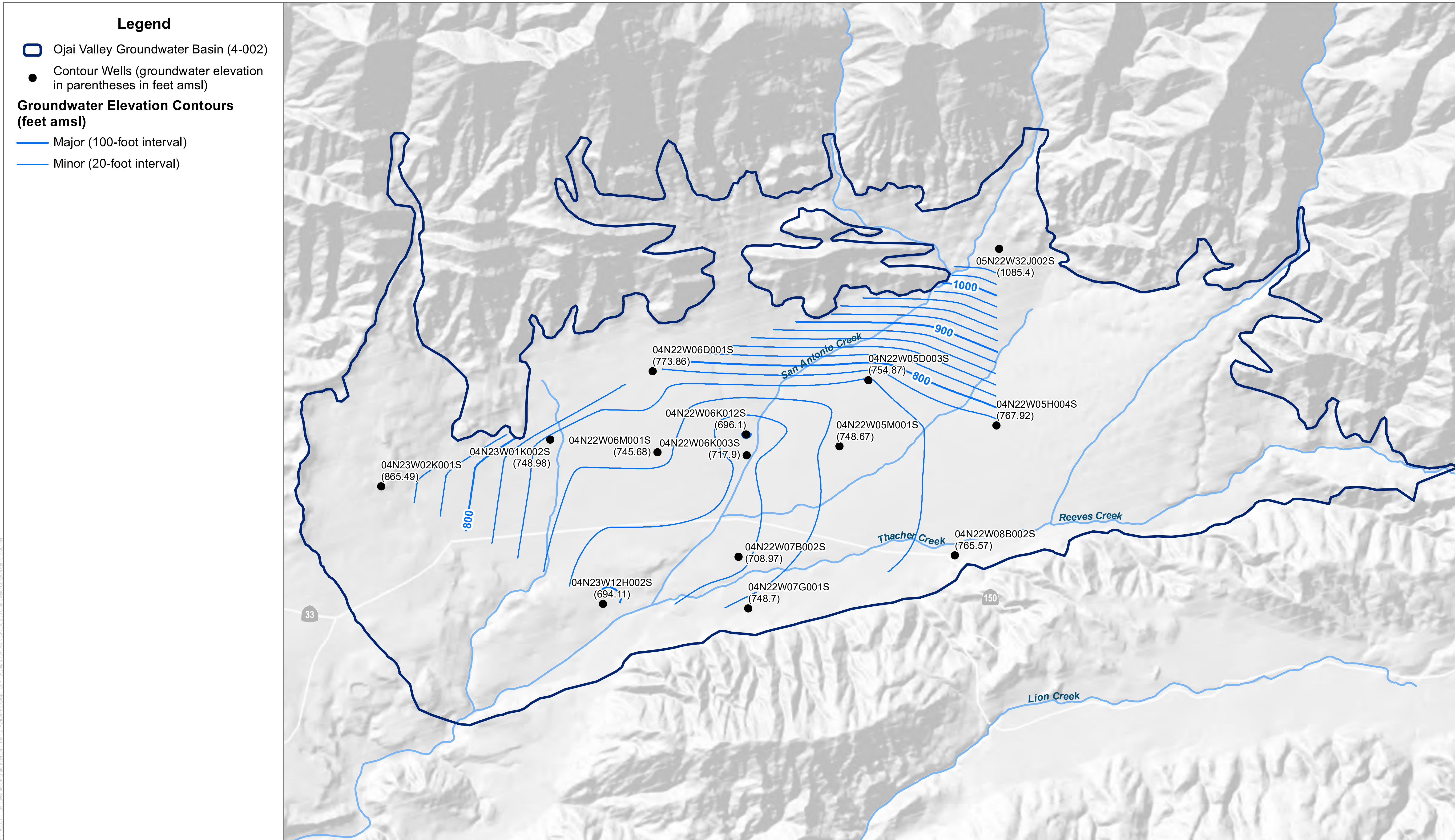

DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; VCWPD

DUDEK

FIGURE 2-23

Groundwater Elevation Contours Spring 2020

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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2.3.4.4 Groundwater Quality

The primary sources of groundwater quality data for the OVGB come from reporting by operators of municipal potable supply wells to the SWRCB DDW for the purpose of ensuring that water supplied to the public meets drinking water quality standards, and from groundwater quality monitoring conducted by the VCWPD. The groundwater quality results for municipal potable supply wells are reported to the SWRCB (nine wells total) and included in the SWRCB GeoTracker GAMA database (SWRCB 2020b). The VCWPD collects annual groundwater quality data from a network of wells in the OVGB and produced annual reports on groundwater conditions in the OVGB between 2010 and 2015 (OBGMA 2018; VCWPD 2010, 2011, 2012, 2013, 2015, and 2016). The VCWPD has continued to monitor groundwater quality in wells in the OVGB but has not published the data in annual reports (Dorrington pers. comm. 2021). Between 2010 and 2020, VCWPD sampled wells in the OVGB for inorganic water quality constituents, including TDS, major anions (sulfate [SO_4], chloride [Cl], bicarbonate [HCO_3], and nitrate [NO_3]), cations (calcium [Ca], sodium [Na], potassium [K], and magnesium [Mg]), and Title 22 metals. VCWPD noted in the annual reports that groundwater quality in the OVGB was considered good, although there was a high variation in groundwater quality in the individual wells sampled, as demonstrated by the Stiff diagrams shown in Figure 2-24, Stiff Diagrams for Wells Sampled by VCWPD 2010–2020 (Dorrington pers. comm. 2021; VCWPD 2010, 2011, 2012, 2013, 2015, and 2016). OBGMA has noted that overall, groundwater is of sufficient quality for drinking and irrigation, although some wells need to blend water from other sources to meet drinking water quality standards (OBGMA 2018). TDS, nitrate, chloride, sulfate, boron, odor, and metals (particularly iron and manganese) have been cited as potential groundwater quality concerns in the OVGB (DWR 2004; OBGMA 2018; RWQCB 2014; VCWPD 2010, 2011, 2012, 2013, 2015, and 2016).

Total Dissolved Solids

TDS is a measure of all dissolved solids in water including organic and suspended particles. Sources of TDS include groundwater interaction with aquifer materials, as well as mixing with other water sources, such as septic effluent or water from deeper aquifers with higher TDS concentrations. Reported concentrations of TDS in wells sampled between 2010 and 2020 ranged from 370 milligrams per liter (mg/L) to 1,520 mg/L, for an average TDS concentration of approximately 760 mg/L (Dorrington pers. comm. 2021; SWRCB 2020b; VCWPD 2010, 2011, 2012, 2013, 2015, and 2016). Five of the 29 wells sampled had TDS concentrations above the secondary maximum contaminant level (SMCL) of 1,000 mg/L (Figure 2-25, Maximum TDS Concentrations 2010–2020). SMCLs are established for constituents that are not health hazards, but which may cause drinking water to have negative aesthetic effects (i.e., a negative impact on taste or odor) if they are above secondary standards. While TDS concentrations may be near SMCLs, TDS concentrations in groundwater have not significantly affected the ability of groundwater to be put to beneficial use within the OVGB. Several municipal wells have TDS measurements that have been collected regularly since the 1980s. All measurements collected at the municipal wells have been below the SMCL for TDS (Appendix D). A Mann-Kendall[17] analysis of trends in TDS concentrations in the municipal wells showed that they have been stable since measurements began, with the exception of Gorham Well, which has shown an increasing trend in TDS (Appendix D). TDS time series plots for municipal wells and wells sampled by VCWPD are included in Appendix D.

Nitrate

Nitrate has been identified as the primary groundwater quality constituent of concern for most of the Ventura River watershed (OBGMA 2018). Typical sources of nitrate include fertilizer, wastewater, and septic effluent. Nitrate can also be naturally occurring. Nitrate concentrations (as nitrogen) in wells sampled between 2010 and 2020 ranged from below the method detection limit (<0.09 mg/L)[18] to 14.7 mg/L, for an average nitrate as nitrogen concentration of approximately 4.5 mg/L (Dorrington pers. comm. 2021; SWRCB 2020b; VCWPD 2010, 2011, 2012, 2013, 2015, and 2016). The California drinking water MCL for nitrate as nitrogen is 10 mg/L. Two of the 29 wells sampled had nitrate concentrations above the MCL (Figure 2-26, Maximum Nitrate as Nitrogen Concentrations 2010–2020). Nitrate concentrations in the municipal wells sampled since the 1980s have not exceeded the MCL, with the exception of Grant Well (Appendix D). A Mann-Kendall trend analysis of nitrate concentrations in the municipal wells showed that they have been stable over time, with the exception of Gorham Well, Mutual Well 5, and Well 4. Gorham Well and Well 4 have shown an increasing trend in nitrate over time while Mutual Well 5 has shown a decreasing trend in nitrate (Appendix D). Nitrate time series plots for municipal wells and wells sampled by VCWPD are included in Appendix D.

Chloride

In general, chloride concentrations in wells sampled between 2010 and 2020 were well below the upper SMCL of 500 mg/L, with an average chloride concentration of approximately 65 mg/L (Dorrington pers. comm. 2021; SWRCB 2020b; VCWPD 2010, 2011, 2012, 2013, 2015, and 2016). Reported chloride concentrations in wells sampled ranged from 12 mg/L to 580 mg/L. One well (SWN 04N22W07D004S), located in the southwestern portion of the OVGB, has historically had chloride concentrations in excess of the SMCL, with a concentration measured at 580 mg/L in both 2011 and 2015 (Figure 2-27, Maximum Chloride Concentrations 2010–2020). Depth discrete studies have indicated that deeper aquifers, particularly in the central and southwestern

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17 The Mann-Kendall test does not require regularly spaced sample intervals, is unaffected by missing time periods, and does not assume a pre-determined data distribution (non-parametric statistics). The Mann-Kendall test assesses whether or not a dataset exhibits a monotonic (up or down) trend within a selected significance level. A significance level of 0.05 or confidence level of 95% was selected for this analysis.

18 The detection limit was not reported by the VCWPD or SWRCB, but is less than 0.09 mg/L (the lowest reported detected concentration) (SWRCB 2020b).

portions of the OVGB, have poorer quality water with higher chloride concentrations (OBGMA 2018). It is possible that this well, which is screened from 200 to 500 feet depth, is pulling water from deeper aquifers with higher chloride concentrations. Chloride concentrations in the municipal wells sampled have remained well below the SMCL since measurements began (Appendix D; SWRCB 2020b). Thus, chloride is currently not a significant issue for beneficial use of groundwater in the OVGB. A Mann-Kendall trend analysis of chloride concentrations in the municipal wells showed that they have been stable over time, with the exception of Grant Well and San Antonio Well 3, which have shown an increasing trend and a decreasing trend in chloride, respectively. Chloride time series plots for municipal wells and wells sampled by VCWPD are included in Appendix D.

Sulfate

Sulfate concentrations in wells sampled between 2010 and 2020 were below the upper SMCL of 500 mg/L, with an average sulfate concentration of approximately 210 mg/L (Dorrington pers. comm. 2021; SWRCB 2020b; VCWPD 2010, 2011, 2012, 2013, 2015, and 2016). Reported sulfate concentrations in wells sampled ranged from 65 mg/L to 490 mg/L. Two of the 29 wells sampled had sulfate concentrations above the recommended SMCL of 250 mg/L, but all wells sampled had sulfate concentrations below the upper SMCL of 500 mg/L (Figure 2-28, Maximum Sulfate Concentrations 2010–2020). Thus, sulfate is currently not a significant issue for beneficial use of groundwater in the OVGB. A Mann-Kendall trend analysis of sulfate concentrations in the municipal wells showed that they have been stable over time, with the exception of San Antonio Well 3, which has shown a decreasing trend in sulfate (Appendix D). Sulfate time series plots for municipal wells and wells sampled by VCWPD are included in Appendix D.

Boron

Boron concentrations in wells sampled between 2010 and 2020 were below the California State Notification Level[19] of 1 mg/L, with an average boron concentration of approximately 0.15 mg/L (Figure 2-29, Maximum Boron Concentrations 2010–2020; Dorrington pers. comm. 2021; SWRCB 2020b; VCWPD 2010, 2011, 2012, 2013, 2015, and 2016). Reported boron concentrations in wells sampled ranged from below the method detection limit (<0.0001 mg/L)[20] to 0.5 mg/L. Thus, boron is currently not a significant issue for beneficial use of groundwater in the OVGB. A Mann-Kendall trend analysis of boron concentrations in the municipal wells showed that they have been stable over time (Appendix D). Boron time series plots for municipal wells and wells sampled by VCWPD are included in Appendix D.

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19 The State of California has established health-based advisory levels referred to as “notification levels” to provide information to public water systems about certain non-regulated chemicals in drinking water that lack MCLs, including boron.

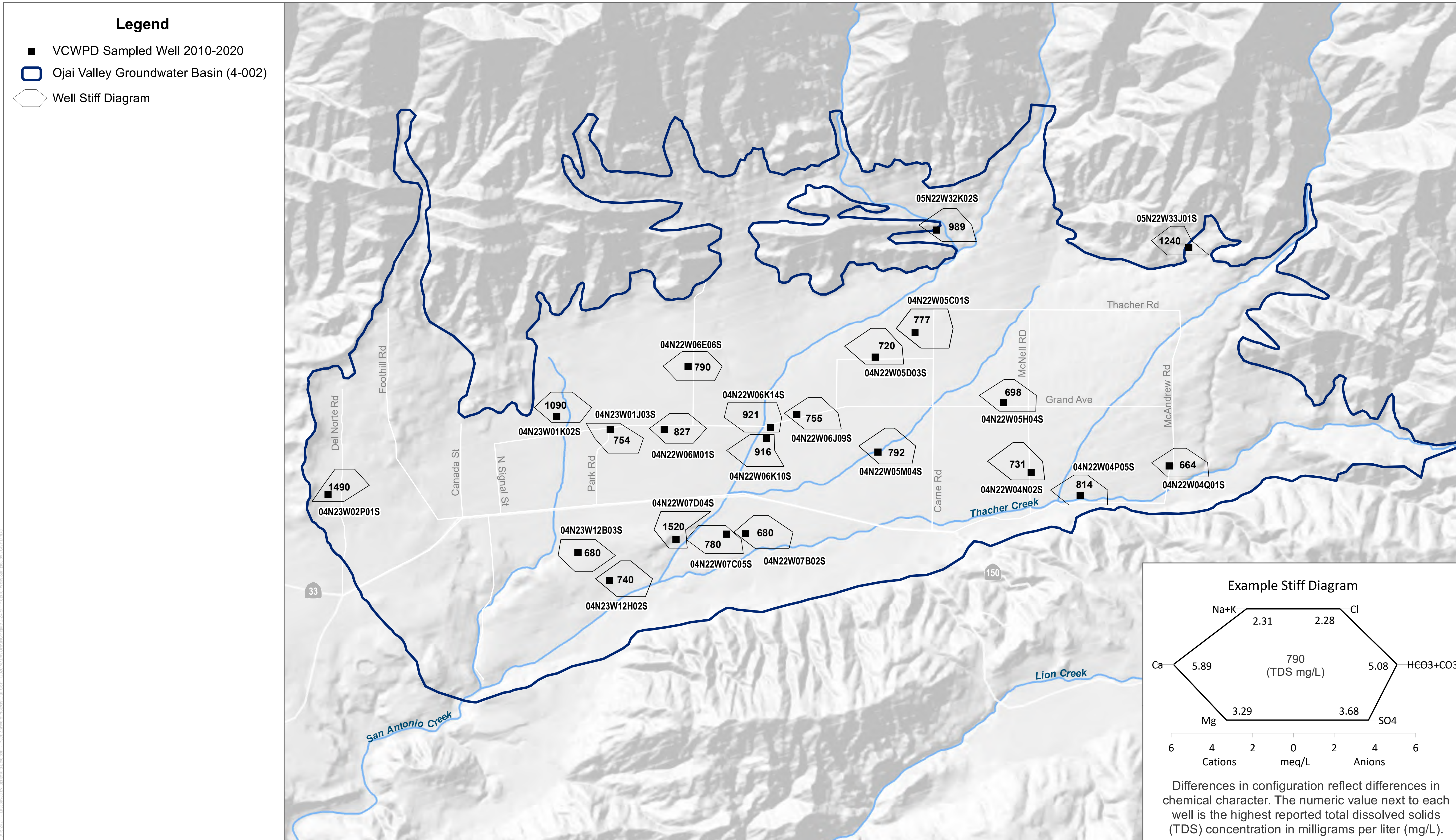
20 The detection limit was not reported by the VCWPD or SWRCB, but is less than 0.0001 mg/L (the lowest reported detected concentration) (SWRCB 2020b).

Metals

In addition to monitoring for major inorganic constituents, VCWPD and operators of municipal wells have sampled for Title 22 metals. Between 2010 and 2020, seven of the 29 wells sampled had iron concentrations above the SMCL of 0.3 mg/L, and 14 of the 29 wells had manganese concentrations above the SMCL of 0.05 mg/L (SWRCB 2020b; VCWPD 2010, 2011, 2012, 2013, 2015, and 2016). Reported concentrations of iron in wells sampled between 2010 and 2020 ranged from below the method detection limit (<0.03 mg/L)[21] to 2.64 mg/L, for an average iron concentration of approximately 0.25 mg/L. Reported concentrations of manganese in wells sampled between 2010 and 2020 ranged from below the method detection limit (<0.0026 mg/L)[22] to 1.80 mg/L, for an average manganese concentration of approximately 0.25 mg/L. Wells with iron and manganese above the SMCL were generally located in the central portion of the OVGB (Figure 2-30, Maximum Iron Concentrations 2010–2020; Figure 2-31, Maximum Manganese Concentrations 2010–2020). An analysis of iron concentrations over time in municipal wells shows that iron concentrations have generally been well below the SMCL since measurements began (Appendix D; SWRCB 2020b). Manganese concentrations in municipal wells have been much more variable, with manganese concentrations exceeding the SMCL several times over the historical measurement period (Appendix D; SWRCB 2020b). The most recent samples for the municipal wells show that manganese concentrations were below the SMCL, with the exception of San Antonio Well 4 and Well 4 (Appendix D; SWRCB 2020b). It should be noted that CMWD operates a groundwater treatment plant to remove iron and manganese prior to distribution to customers. A Mann-Kendall trend analysis of iron and manganese concentrations in municipal wells showed that they have been stable over time, with the exception of Mutual Well 4, Mutual Well 5, and San Antonio Well 4, which have shown a decreasing trend in manganese. Iron and Manganese time series plots for municipal wells and wells sampled by VCWPD are included in Appendix D.

[21] The detection limit was not reported by the VCWPD or SWRCB, but is less than 0.03 mg/L (the lowest reported detected concentration) (SWRCB 2020b).

[22] The detection limit was not reported by the VCWPD or SWRCB, but is less than 0.0026 mg/L (the lowest reported detected concentration) (SWRCB 2020b).



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DATUM: NAD 1983 DATA SOURCE: VCWPD

DUDEK

0 0.5 1 Miles

FIGURE 2-24

Stiff Plots for Wells Sampled by VCWPD 2010-2020

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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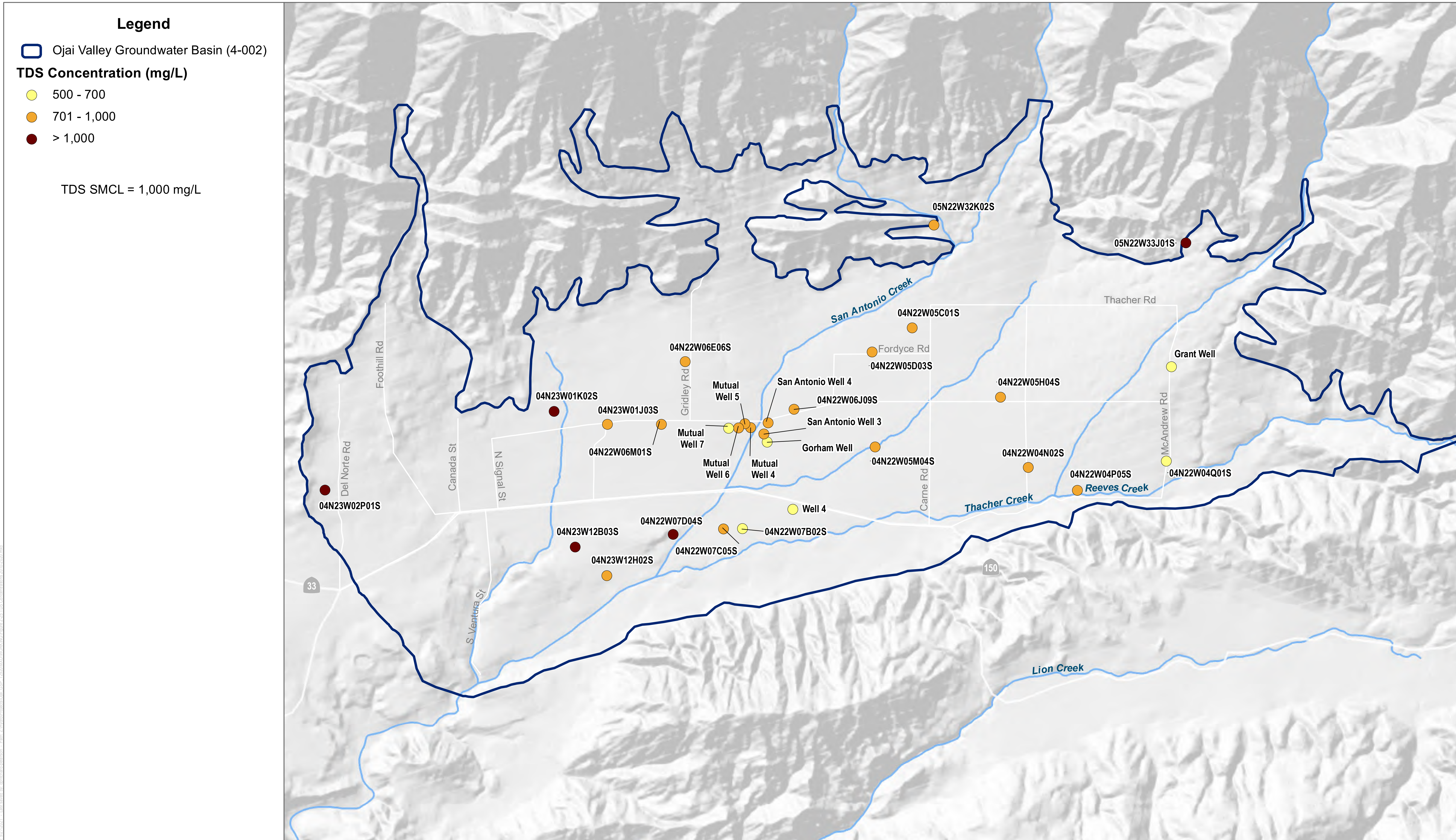

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DATUM: NAD 1983 DATA SOURCE: VCWPD; SWRCB

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FIGURE 2-25

Maximum Total Dissolved Solids Concentrations 2010-2020

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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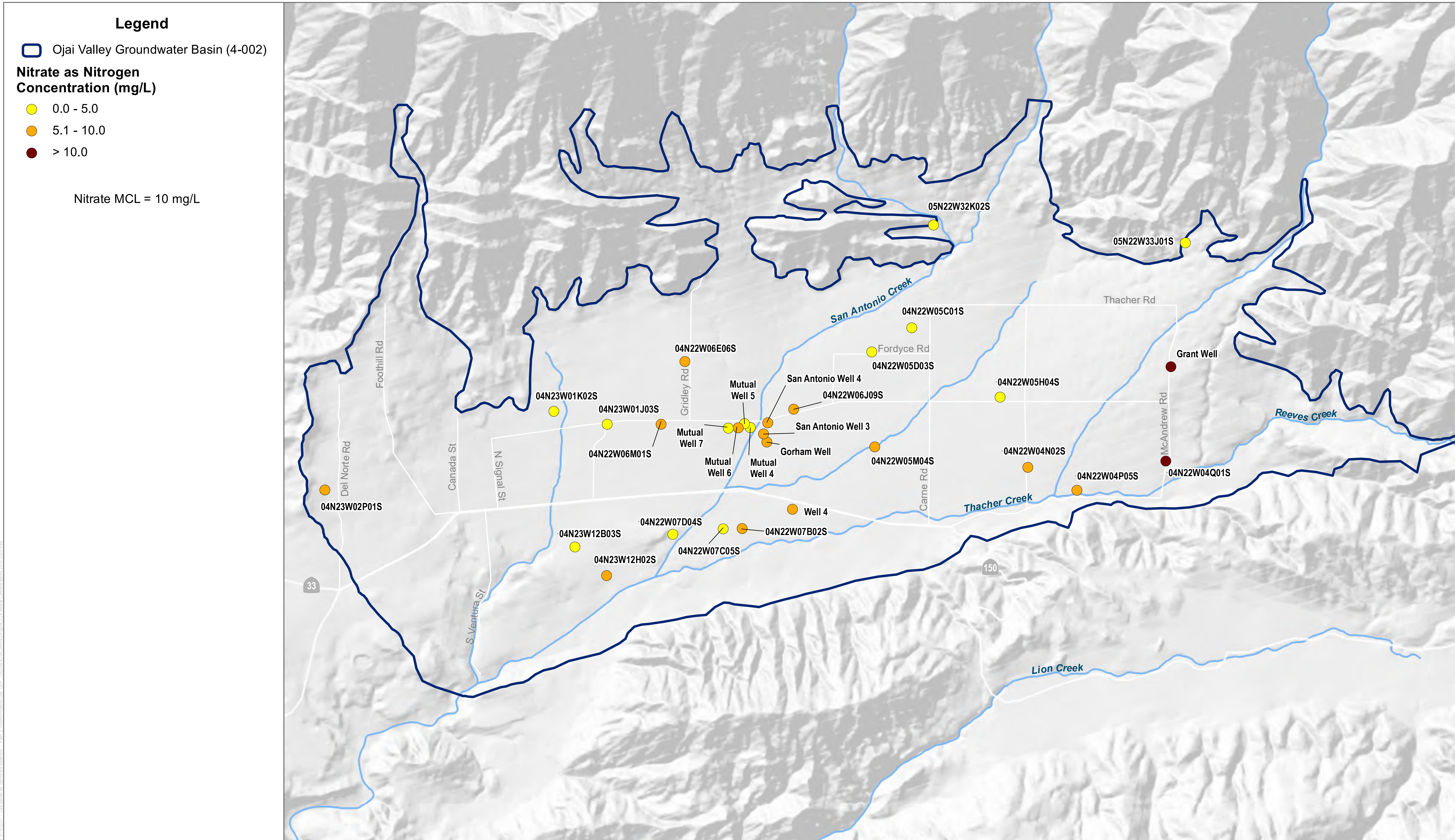

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DATUM: NAD 1983 DATA SOURCE: VCWPD; SWRCB

DUDEK

0 0.5 1 Miles

FIGURE 2-26

Maximum Nitrate as Nitrogen Concentrations 2010-2020

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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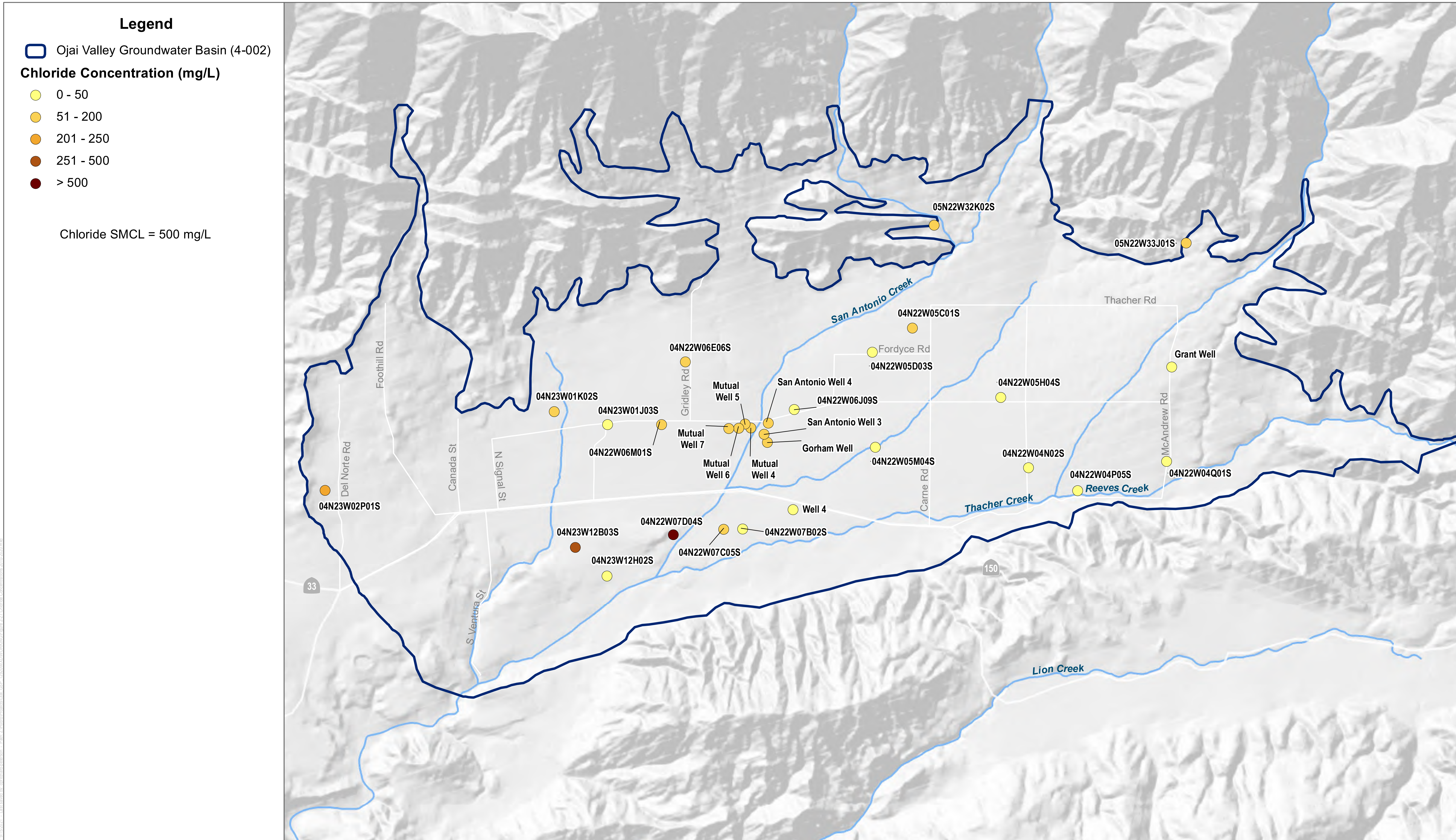

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DATUM: NAD 1983 DATA SOURCE: VCWPD; SWRCB

DUDEK

0 0.5 1 Miles

FIGURE 2-27

Maximum Chloride Concentrations 2010-2020

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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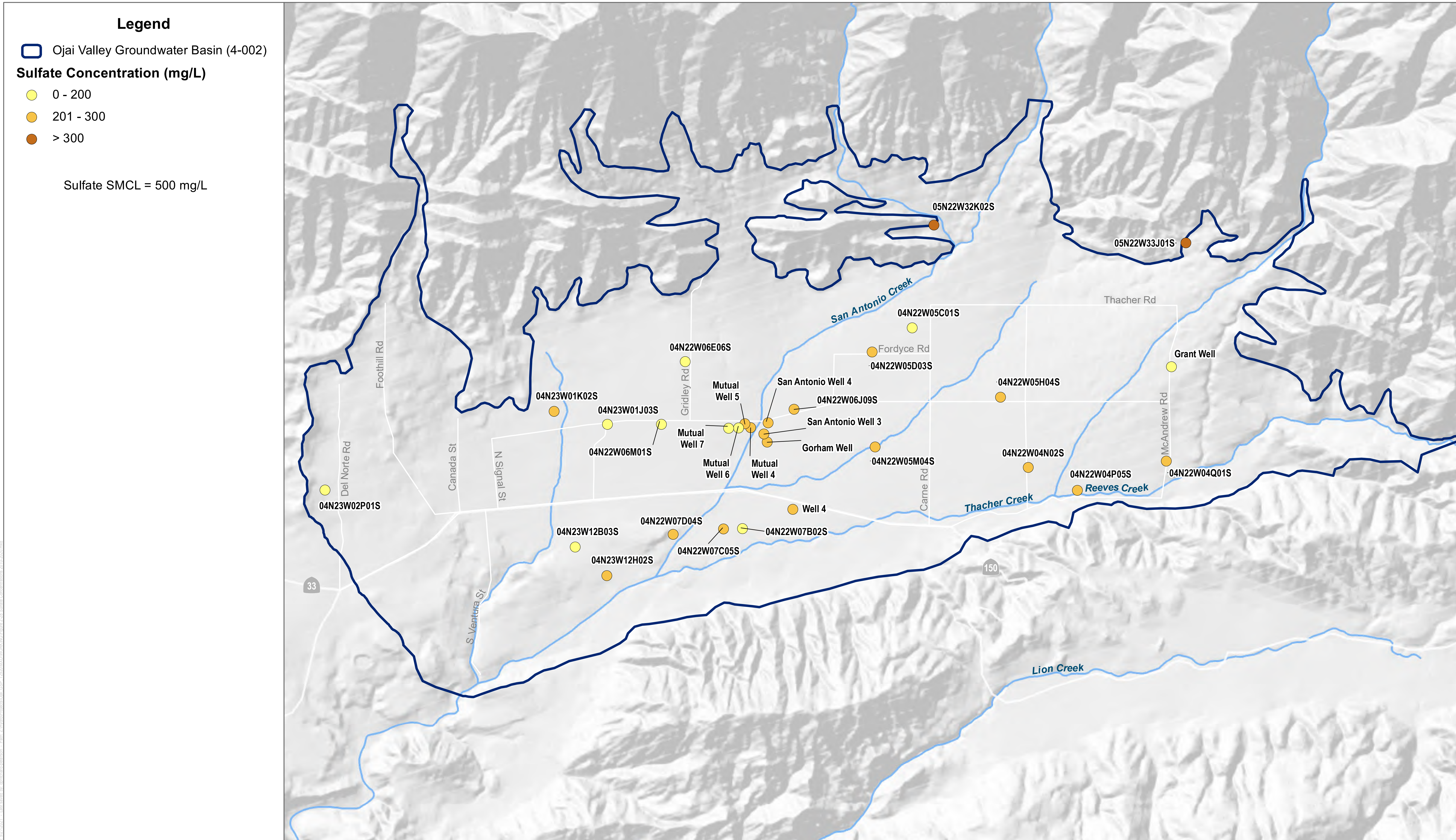

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DATUM: NAD 1983 DATA SOURCE: VCWPD; SWRCB

DUDEK 0 0.5 1 Miles

FIGURE 2-28

Maximum Sulfate Concentrations 2010-2020

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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Legend

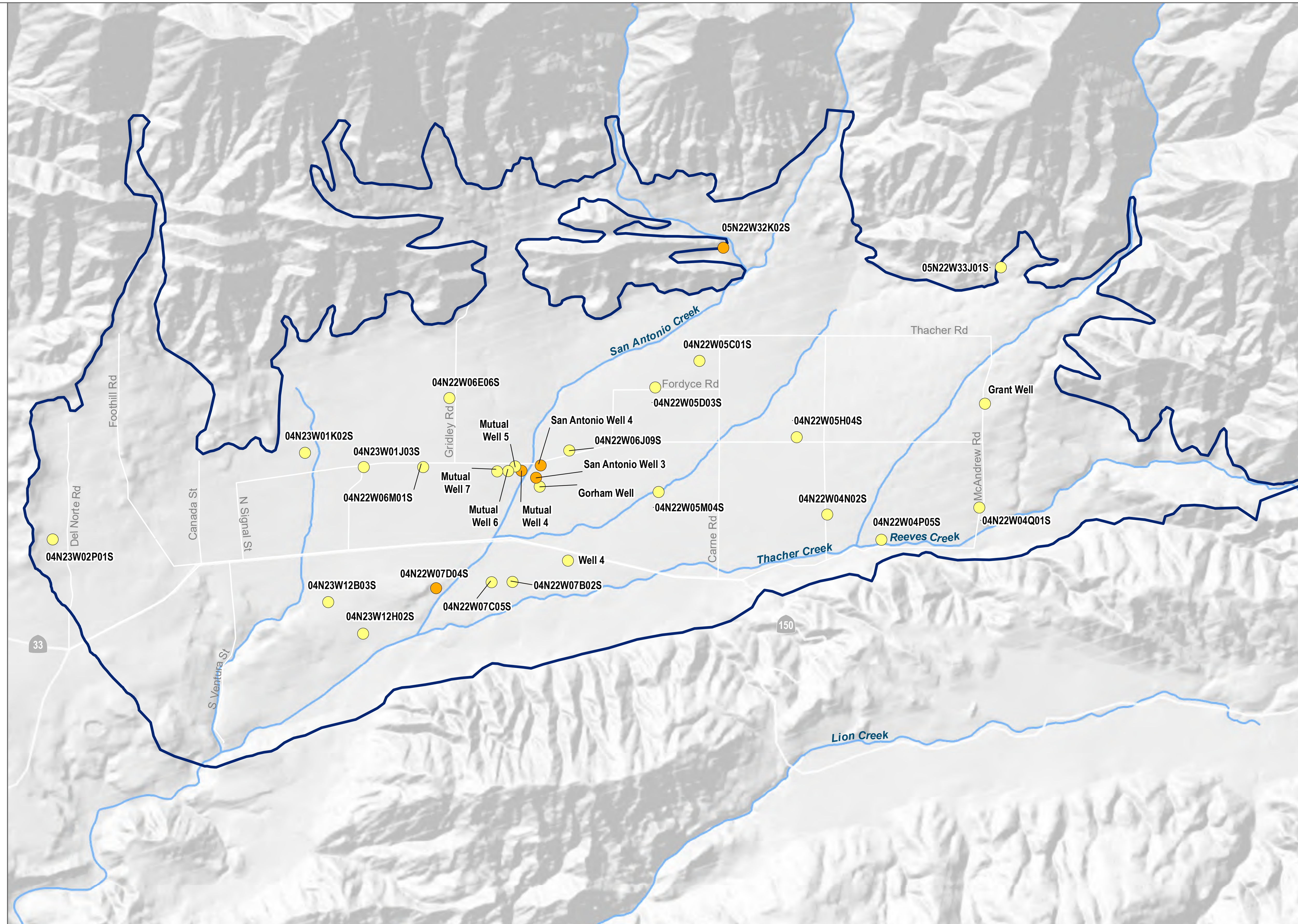
Ojai Valley Groundwater Basin (4-002)

Boron Concentration (mg/L)

0.000 - 0.250

0.251 - 0.500

Boron NL = 1 mg/L



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DATUM: NAD 1983 DATA SOURCE: VCWPD; SWRCB

DUDEK

0 0.5 1 Miles

FIGURE 2-29

Maximum Boron Concentrations 2010-2020

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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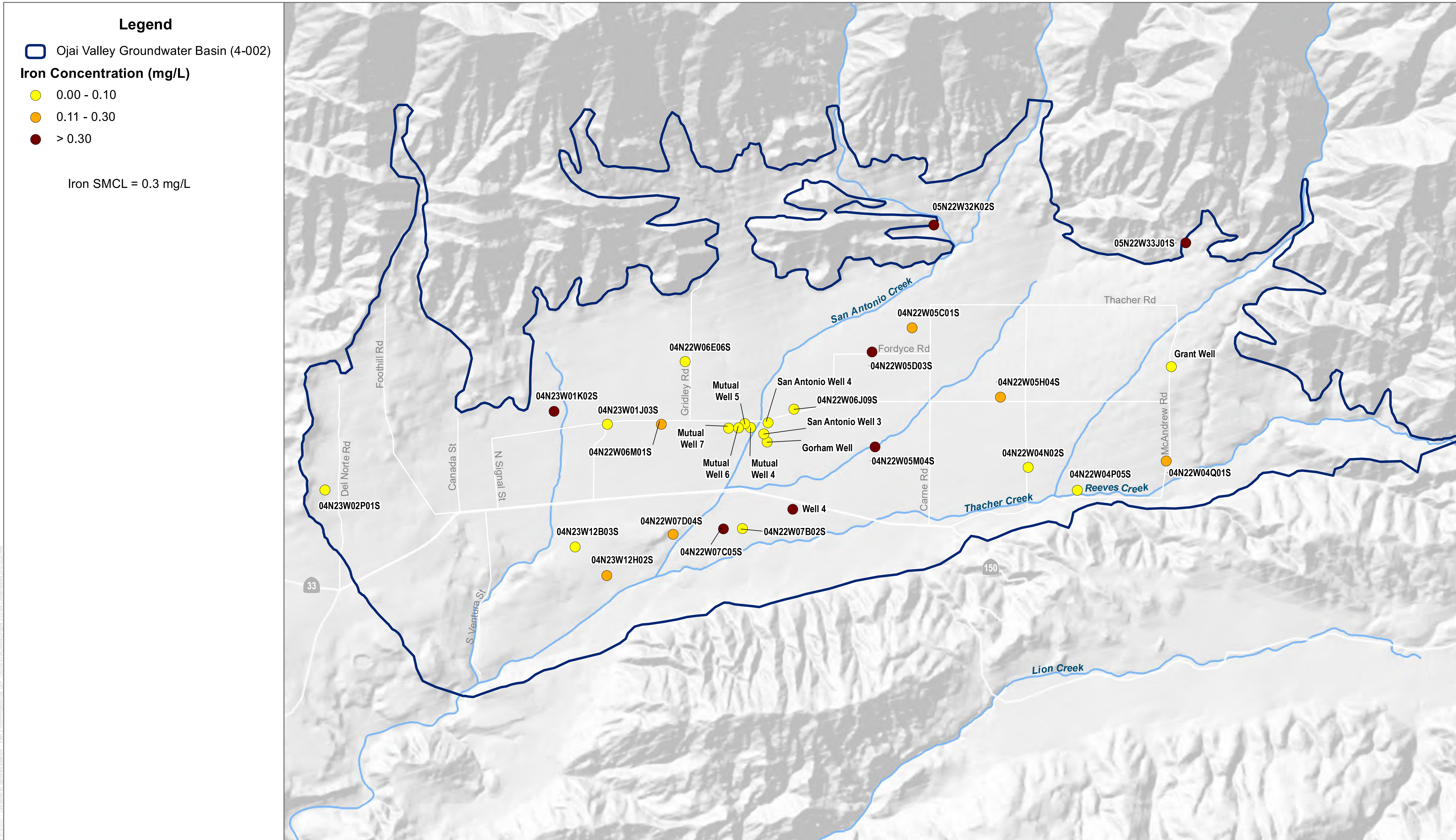

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DATUM: NAD 1983 DATA SOURCE: VCWPD; SWRCB

DUDEK 0 0.5 1 Miles

FIGURE 2-30

Maximum Iron Concentrations 2010-2020

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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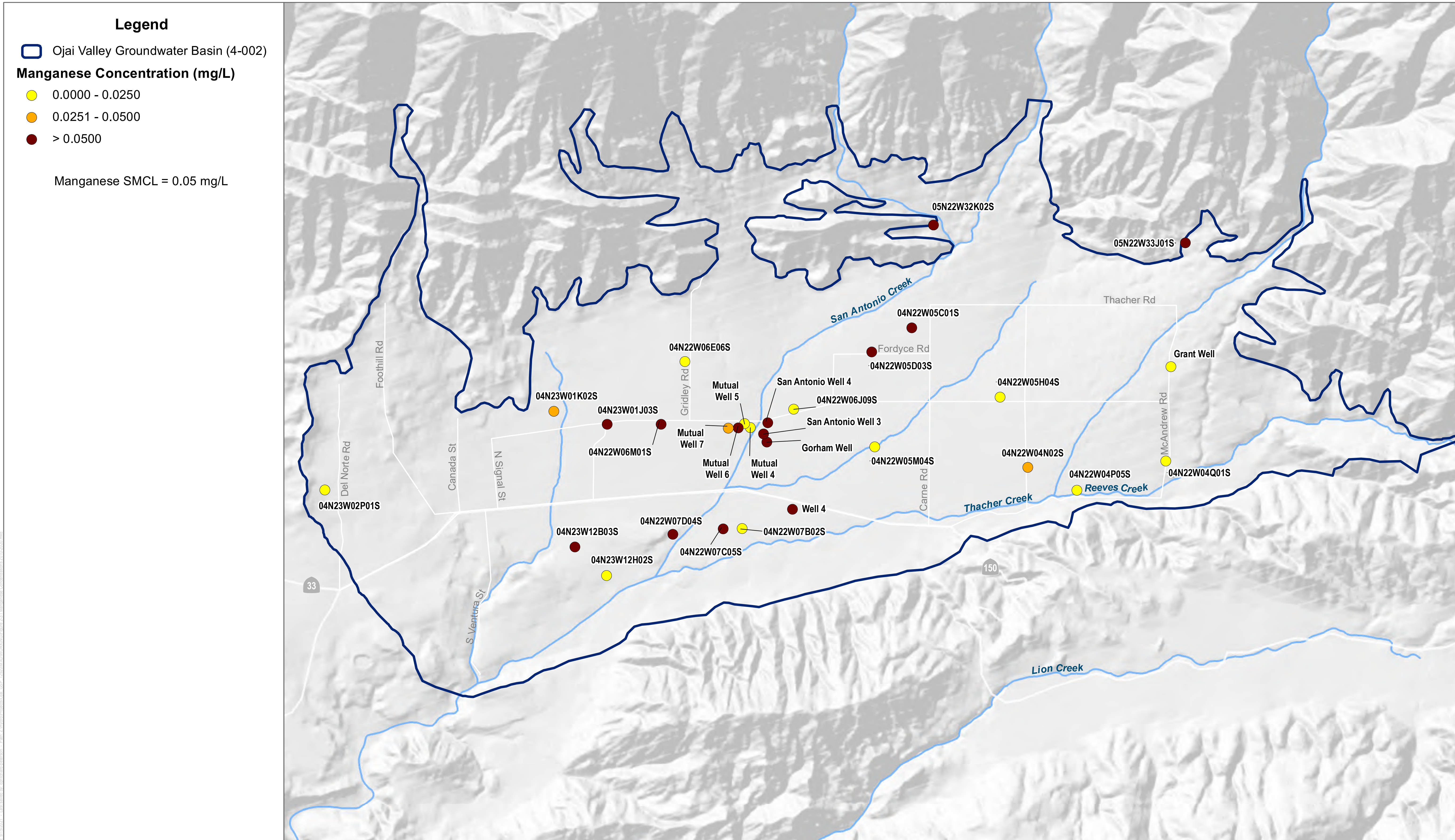

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DATUM: NAD 1983 DATA SOURCE: VCWPD; SWRCB

DUDEK

0 0.5 1 Miles

FIGURE 2-31

Maximum Manganese Concentrations 2010-2020

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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Review of Regulatory Cleanup Sites, Historic Oilfields, and Septic Systems

Both the Department of Toxic Substances Control's EnviroStor database and SWRCB's GeoTracker database were reviewed for information on the nature and status of regulatory cleanup sites located within the OVGB. These sites consist of a mix of commercial, industrial, and public land uses, predominantly consisting of automobile service stations along the California State Highway 150 corridor and within the Ojai Village (Downtown) area. Figure 2-32, Regulatory Cleanup Program Sites and Impaired Surface Waters shows the locations and status of cleanup site cases within the OVGB, along with the primary potential media of concern (e.g., soil or groundwater) for each. All cleanup site cases where groundwater was identified as a potential medium of concern are labeled on Figure 2-32. All GeoTracker sites in the OVGB have received closure from Ventura County Environmental Health Division (VCEHD) in accordance with its low-threat closure policy, indicating that contaminant releases have been remediated and adequately contained (as shown by contaminant plumes that have been either stable or decreasing in extent and concentration). Table 2-10 provides a comprehensive summary of each regulatory cleanup site case where groundwater was identified as a potential medium of concern in the OVGB. The sites that have had the greatest groundwater quality impact consist of leaking underground storage tank sites in the southwest corner of the OVGB in and around the vicinity of California State Highway 150. There are two closed cases that are near water supply wells in the Ojai Village area where groundwater was the medium of concern. Southeast of the Private Residence leaking underground storage tank (LUST) site, where a spill of a diesel underground storage tank (UST) was reported in 1995, is an active agricultural well (SWN 04N23W02K001S). South and east of the Mann Property LUST site, where a leak of a gasoline UST was reported in 1988, are an active agricultural well (SWN 04N23W12B03S) and domestic well (SWN 04N23W12B02S), respectively. No further information could be obtained on either case.

Table 2-10
Regulatory Cleanup Site Database Review

Project/Site Name	Site Type /Cleanup Program	Potential Contaminants of Concern	Potential Media of Concern	Case Status (Date)	Comment
DTSC / Envirostor Database					
Ojai Valley Club	Military Evaluation (FUDS)	None Specified	None Specified	Inactive - Needs Evaluation (7/1/2005)	Not on the National Priorities List. Current land use is residential.
SWRCB / Geotracker Database					
Beacon #3754	LUST Cleanup Site	Gasoline	Other groundwater (uses other than drinking water)	Completed - Case Closed (1/24/2007)	In 1998 soil samples were collected and elevated hydrocarbon concentrations (TPH and MTBE) were detected. Site assessment activities and monitoring well installation was conducted.

Table 2-10
Regulatory Cleanup Site Database Review

Project/Site Name	Site Type /Cleanup Program	Potential Contaminants of Concern	Potential Media of Concern	Case Status (Date)	Comment
					Groundwater monitoring continued until 2006 when the site was granted closure. Seven wells were abandoned in 2007 at the request of VCEHD as one of the requirements for closure of the LUST case.
Chevron #9-0478	LUST Cleanup Site	Gasoline	Other groundwater (uses other than drinking water)	Completed - Case Closed (12/6/2006)	The site was formerly occupied by a Chevron service station. In 2004, a 1,000-gallon UST was removed and soil confirmation samples were taken. Approximately 19 cubic yards of soil were excavated and stockpiled on site during excavation and soil sampling activities and it was determined that residual concentration of hydrocarbons do not pose a risk to public health. In 2006, VCEHD granted closure of the site.
Coburn Property	LUST Cleanup Site	Gasoline	Other groundwater (uses other than drinking water)	Completed - Case Closed (9/19/2012)	This property is a private residence. Contamination was discovered in 1992 when a 550 gallon gasoline UST was removed. Two grab samples were collected and lead was detected, triggering VCEHD to require additional assessment. TPH was later detected. Monitoring wells and vapor probes were installed and the site was monitored from 1994 to 2011. Remediation efforts included excavation and off-site disposal of contaminated soil, groundwater extraction and treatment, a soil vapor extraction pilot test, bioremediation, and in-situ chemical oxidation. VCEHD concluded that residual contamination remaining at the site does not pose a risk to human health, groundwater, or the environment.
Elmer Friend Property	LUST Cleanup Site	Gasoline	Aquifer used for drinking water supply	Completed - Case Closed (5/8/1995)	Leak reported in 1988 at 469 E Ojai Ave. No further information available.
Fast Gas	LUST Cleanup Site	Gasoline	Other groundwater (uses other	Completed - Case Closed (7/18/1996)	A gasoline leak at 616 E. Ojai Ave., a former gas station, was reported in 1985. Subsequently, monitoring wells

Table 2-10
Regulatory Cleanup Site Database Review

Project/Site Name	Site Type /Cleanup Program	Potential Contaminants of Concern	Potential Media of Concern	Case Status (Date)	Comment
			than drinking water)		were installed. A 1996 monitoring report indicated that no well exhibited signs of hydrocarbons. Monitoring wells and a groundwater extraction well were abandoned after the site received UST site remediation closure in 1996.
Hailwood, Inc.	LUST Cleanup Site	Gasoline	Other groundwater (uses other than drinking water)	Completed - Case Closed (4/2/1997)	Leak reported in 1988 at 201 Signal Street. No further information available.
Kwik Serve	LUST Cleanup Site	Gasoline	Other groundwater (uses other than drinking water)	Completed - Case Closed (9/10/2015)	The release was discovered in 1988 when three gasoline USTs were removed. More than 730 tons of impacted soil were transported off-site for disposal in 1995, prior to the installation of new gasoline USTs at the site. A groundwater treatment system and vapor extraction system operated at the site from 1997 through 2002, removing dissolved phase hydrocarbons and vapor phase hydrocarbons. Three gasoline USTs were removed in 2004 and one UST was removed in 2005. More than 370 tons of impacted soil were excavated and transported off-site for disposal. Residual petroleum constituents pose a low risk to human health, safety, and the environment. The site is currently a retail bike shop.
Landis Inc.	LUST Cleanup Site	Gasoline	Other groundwater (uses other than drinking water)	Completed - Case Closed (11/25/1998)	A petition to close the case was filed in 1998, which was found by VCEHD to have merit. Soil and water investigations were performed and demonstrated that residual petroleum is limited to mudflow deposits of the original release and extends less than 200 feet north of the former tank pit.
Mann Property	LUST Cleanup Site	Gasoline	Other groundwater (uses other	Completed - Case Closed (10/28/2009)	A 1,0000-gallon UST was removed in 1988 in the western parcel and a 550-gallon UST and fuel pump was

Table 2-10
Regulatory Cleanup Site Database Review

Project/Site Name	Site Type /Cleanup Program	Potential Contaminants of Concern	Potential Media of Concern	Case Status (Date)	Comment
			than drinking water)		removed in 1996 in the eastern parcel. Multiple soil and groundwater assessments were conducted at the site between 1989 and 2000. Monitoring wells were installed, hydrocarbon-impacted soils were over excavated from the tank cavity, and 16 soil borings were drilled and sampled in and around the former tank cavity. Contamination attenuated to closeable concentrations by March 2000, when VCEHD approved destruction of the wells on the western parcel. After site assessment via eight monitoring wells and over excavation of hydrocarbon-impacted soils in 1997 and additional remedial excavation in 2008, the groundwater plume was deemed stable and attenuating with time.
Ojai Valley Imports	LUST Cleanup Site	Waste oil / motor / hydraulic / lubricating	Other groundwater (uses other than drinking water)	Completed - Case Closed (8/9/2018)	The site is located at 996 E. Ojai Ave., is a former gasoline service station, and is currently an auto service and repair shop. In 1984, one 6,000-gallon and two 8,000-gallon USTs were removed. In 1986, one 500-gallon waste-oil UST was removed. TPH, benzene, ethylbenzene, MTBE, and TBA concentrations have been detected in groundwater and soil. Site remediation consisted of ozone/oxygen sparging. The case was closed after meeting all of the criteria for the LTCP policy in 2018.
Pacific Bell	LUST Cleanup Site	Diesel	Other groundwater (uses other than drinking water)	Completed - Case Closed (2/23/2004)	One 2,000-gallon UST was removed at 202 Ojai Avenue. Two soil samples and a water sample were analyzed after the UST removal. Subsequent samples collected indicated that the amount and concentrations of petroleum hydrocarbon contamination in soils and groundwater beneath the site are minor and closure was granted.

Table 2-10
Regulatory Cleanup Site Database Review

Project/Site Name	Site Type /Cleanup Program	Potential Contaminants of Concern	Potential Media of Concern	Case Status (Date)	Comment
Private Residence	LUST Cleanup Site	Diesel	Other groundwater (uses other than drinking water)	Completed - Case Closed (6/25/1996)	A leak was reported in 1995 followed by site assessment and remediation. No further information is provided.
Ultramar #754	LUST Cleanup Site	Gasoline	Aquifer used for drinking water supply	Completed - Case Closed (7/18/1996)	A gasoline leak at 616 E. Ojai Ave., a forming gas station, was reported in 1985. Subsequently, monitoring wells were installed. A 1996 monitoring report indicated that no well exhibited signs of hydrocarbons. Monitoring wells and a groundwater extraction well were abandoned after the site received UST site remediation closure in 1996.

Source: SWRCB 2020b (Geotracker Database), DTSC 2020 (Envirostor Database)
Notes: DTSC = California Department of Toxic Substances Control; COC = Contaminant(s) of Concern; FUDS = Formerly Used Defense Sites Database; LTCP = SWRCB Low-Threat Closure Policy; MCL = Maximum Contaminant Limit; MTBE = methyl tert-butyl ether; TBA = tertiary butyl alcohol; TPH = Total Petroleum Hydrocarbons; UST = Underground Storage Tank; VCEHD = Ventura County Environmental Health Division

As shown on Figure 2-32, the majority of the OVGB lies within the northern boundary of the Ojai Oil Field. There is a cluster of active, idle, inactive, plugged and/or abandoned oil and gas wells adjacent to the southern edge of the OVGB, as shown in the California Department of Conservation's Geologic Energy Management Division (formerly the Division of Oil, Gas, and Geothermal Resources) database of oil and gas wells. One well within the cluster falls within the OVGB and it is an idle oil and gas well (Figure 2-32; CalGEM 2020). Lion Mountain Ranch immediately south of the OVGB has historically supported oil and gas development since the 1860's when shallow oil wells were drilled in the vicinity of historical oil seeps (County of Ventura 2016). Subsequent oil wells were drilled in the 1940s, 1950s, 1960s, and 1980s that supplied oil and gas. There are three active wells at Lion Mountain Ranch, all located outside of the OVGB, that continue to produce oil and gas. Oil is transported off-site to Santa Paula by truck and gas is currently flared on-site.

In addition to regulatory cleanup sites and historical oilfields, septic tanks—if in disrepair or otherwise not operating as intended—represent another potential point source of contamination (e.g., nitrogen, bacteria, and pathogens) to the groundwater aquifer. Most developed properties within the OVGB have sewer connections to the Ojai Valley Sanitary District, which collects and processes wastewater from about 20,000 residents of the City of Ojai, the unincorporated Ojai

Valley, and north Ventura. However, some unincorporated areas within the OVGB are not serviced by this sewer system and rely on OWTSs for treatment of domestic wastewater.

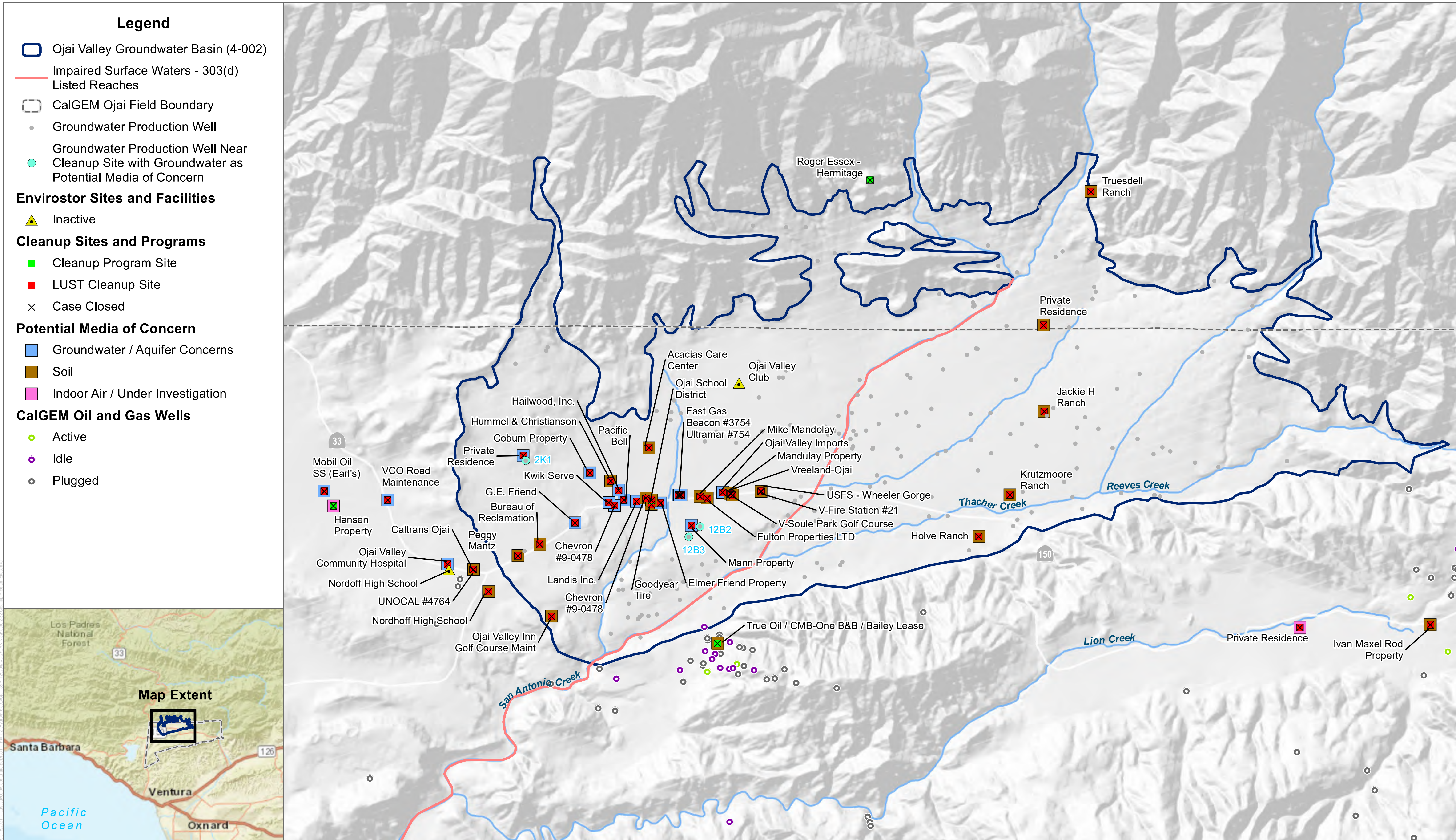
A 2018 Total Maximum Daily Load Study in the Ventura River watershed investigated the influence of OWTS on surface water quality in the watershed. This Total Maximum Daily Load Study identified OWTS as a contributing source of nutrients to the Ventura River watershed (VCEHD 2019). The study found that analysis from the sampling from two groundwater wells along San Antonio Creek in an area east of the City of Ojai and within the OVGB suggests that it is likely that groundwater in this area is influenced by nearby OWTS (VCEHD 2019). A surface water sample in the vicinity of these two wells had an average nitrate concentration of 1.4 mg/L, no detected pharmaceuticals and personal care products, and nitrate isotope results suggesting nitrate sources from animal waste and/or sewage (VCEHD 2019).

The Siete Robles tract, a community east of the City of Ojai and south of Ojai Avenue in the OVGB, is an area known for OWTS-related concerns. According to an Advisory Notice sent out by VCEHD in November 2005, elevated groundwater conditions reduced the ability of soil within the tract to treat sewage discharges from many of the septic systems. The inability of the soil to adequately receive and treat sewage can result in insanitary conditions leading to foul odors and potential human health risk. Some systems in the tract do not meet current Ventura County Building Code and Los Angeles Regional Water Quality Control Board minimum requirements for separation of septic systems from underlying groundwater (VCEHD 2005).

A list of parcels with probable septic tanks was obtained from Ojai Valley Sanitary District and used to create a map of parcels containing OWTS within the OVGB (Palmer pers. comm. 2020). Using this data, it is estimated that up to 780 OWTSs are in the OVGB. A map showing all parcels with OWTSs within the OVGB is shown in Figure 2-33, Parcels with Septic System. As shown in Figure 2-33, a large number parcels with septic tanks are located in the eastern portion of the OVGB which could be the source of the elevated nitrate concentrations in groundwater in that area (Figure 2-26).

Impaired Surface Water Sites

The portion of San Antonio Creek that overlies the Basin is listed in the SWRCB impaired surface waters list (i.e., 303(d) listed reaches; Figure 2-32; SWRCB 2016). Impairments listed for San Antonio Creek are TDS, nitrogen, and indicator bacteria. The 303(d) report by the SWRCB indicates that 74 of 222 samples taken from the creek for TDS analysis exceeded the water quality objective of 800 mg/L, four of 23 samples collected exceeded the water quality objective for nitrogen of 5 mg/L, and 46 of 263 samples exceeded the water quality objectives for indicator bacteria. High concentrations of chlorides and TDS are commonly observed in the OVGB during dry conditions when groundwater, high in dissolved salts, is the main source of baseflow (OBGMA 2018). High concentrations of indicator bacteria and nitrogen may be related to issues with contamination from OWTS as discussed above.



DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; SWRCB (Geotracker); DTSC (Envirostor)

DUDEK

0 0.5 1 Miles

FIGURE 2-32

Regulatory Cleanup Program Sites and Impaired Surface Waters

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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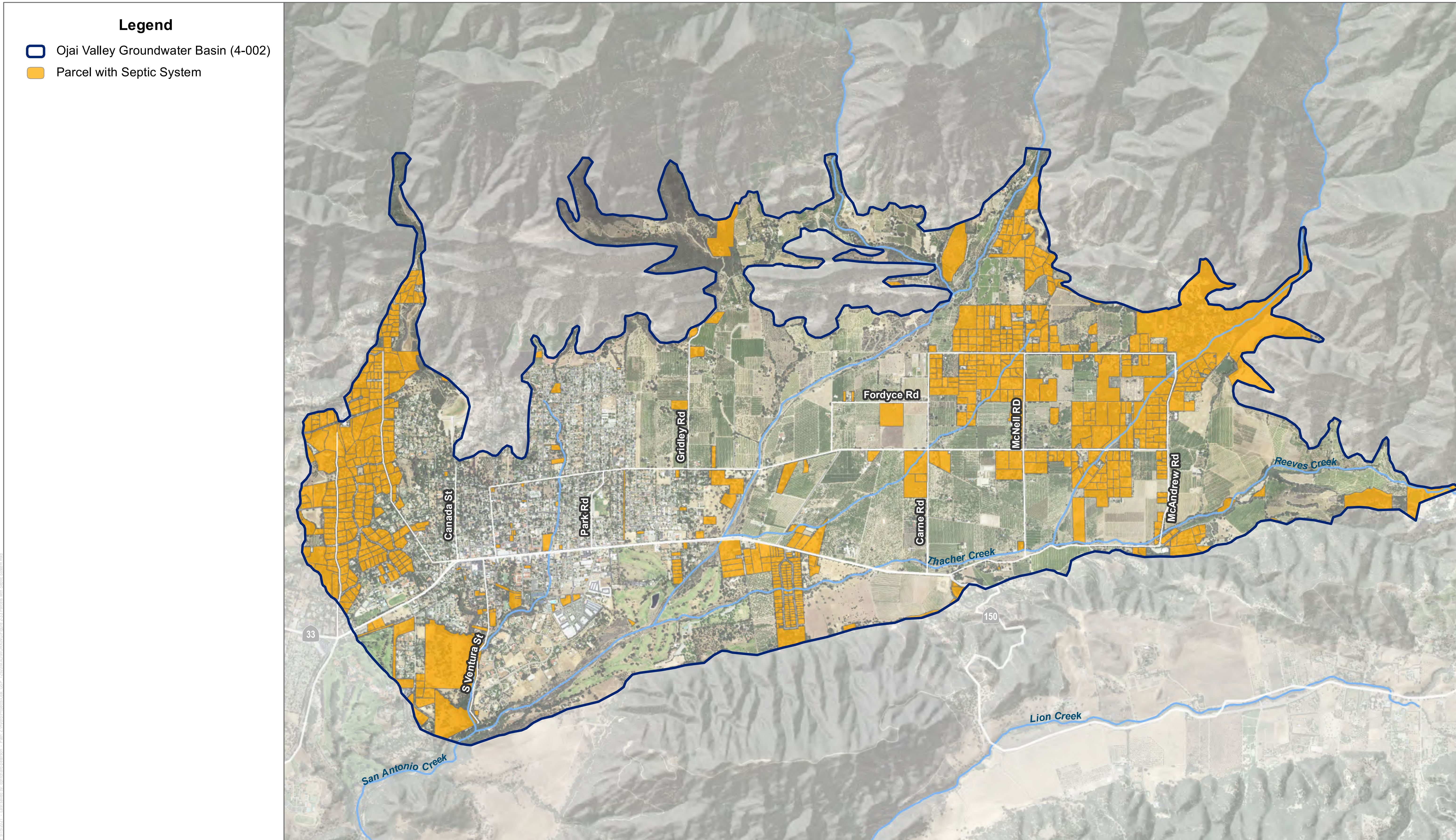

DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; VCWPD

DUDEK

0 0.5 1 Miles

FIGURE 2-33

Parcels with Septic System

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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2.3.4.5 Land Subsidence

The primary cause of land subsidence in California, aside from the effects of tectonic forces, is aquifer system compaction as a result of fluid withdrawal. Aquifer system compaction occurs when there is a reduction of fluid (e.g., oil or groundwater) pressure in the void spaces (i.e., pores) of unconsolidated sediments. Land subsidence resulting from aquifer deformation may be of two kinds: elastic or inelastic. Elastic deformation is the reversible and temporary fluctuation of the land surface in response to seasonal groundwater recharge or extraction. Inelastic deformation is the irreversible and permanent compression of the land surface caused by the compaction of the pore spaces within the fine-grained sediments of an aquifer system. Inelastic deformation occurs when groundwater elevations drop below the historical range and fine-grained sediments become depressurized. The compaction or collapse of the pore spaces within the fine-grained sediments of an aquifer system results in the permanent loss of aquifer storage (Borchers and Carpenter 2014).

The University NAVSTAR Consortium, a non-profit university-governed consortium that facilitates geoscience research and education using geodesy, operates a network of continuous GPS (CGPS) instruments across the Americas, including in California. The closest CGPS station to the OVGB is station HVYS, located approximately 0.5 miles south of the OVGB. Another CGPS station within the vicinity of the OVGB is station NHRG, located approximately 3 miles northeast of the OVGB. (Figure 2-34, Land Subsidence). Land surface elevation at both stations has decreased by approximately 20 millimeters (0.79 inches) at each station since 2000 (UNAVCO 2020).

DWR provides vertical displacement data for the OVGB derived from interferometric synthetic aperture radar (InSAR) through DWR's SGMA Data Viewer. The TRE Altamira InSAR dataset is collected by the European Space Agency from the Sentinel-1A satellite for California from January 2015 through September of 2019 and processed by TRE Altamira. Sampling of the 100-meter by 100-meter calculation grid cells within the OVGB indicates that between 2015 and 2019, 41% of the OVGB experienced total negative vertical displacement (subsidence) between 0 and 0.21 inches while the 59% of the OVGB experienced total positive vertical displacement (uplift) between 0 and 0.75 inches. The average displacement within the OVGB was an uplift of 0.16 inches during the time period. (Figure 2-34).

As presented in the Report Supporting Alternative Demonstration of Groundwater Sustainability (OBGMA 2016), data from a 2005-2010 study (Marshall et al. 2013) used GPS and InSAR to document land motion throughout the western Transverse Ranges. This data indicates that subsidence of approximately 0.16 inches extends similarly into the mountains north and south of the OVGB consistent with a tectonic motion rather than land motion that would be consistent with groundwater extraction-caused subsidence (OBGMA 2016).

Between 2005 and 2010, springtime-high water levels in key observation well 04N22W05L008S averaged 820.97 feet amsl, which is 71.35 feet higher than the average between 2000 and 2019.

Between 2015 and 2019, the springtime-high water level in key observation well 04N22W05L008S averaged 697.34 feet amsl, 123.63 feet lower than the 2005 to 2010 time period and 52.57 feet lower than the 2000 to 2019 time period. Table 2-11 compares the water levels and vertical displacement over the entire OVGB during the two time periods. These data indicate that higher groundwater levels in well 04N22W05L008S are not correlated with land surface uplift.

Table 2-11
Comparison Between Water Levels and Land Subsidence for 2005-2010 and 2015-2019

Time Period	Average Groundwater Level (feet amsl)[a]	Deviation from 2000-2019 Average Groundwater Level (feet)[a]	Total Vertical Displacement (inches)
2005-2010	820.97	71.35	-0.64[b]
2015-2019	697.34	-52.27	0.64[c]

Source: OBGMA 2016.
Notes: amsl = above mean sea level.
a Springtime-high water level at key well 04N22W05L008S.
b TRE Altamira InSAR data presented in OBGMA 2016.
c TRE Altamira InSAR data from SGMA Data Viewer.

Vertical displacement data was collected at a higher frequency during the 2015 to 2019 time period, which can be used to investigate seasonal correlations between vertical displacement and groundwater levels at the location of the key observation well 04N22W05L008S, shown on Figure 2-34. Figure 2-35, Groundwater Levels and Land Subsidence, shows the relationship between vertical displacement obtained from the SGMA Data Viewer within the 100-meter x 100-meter cell (AX0DAZN) at the location of key observation well 04N22W05L008S compared to groundwater levels at the key well over the same time period. Based on the data at this location it is not clear that groundwater level change is the cause of uplift or subsidence. Correlations can be noticed at times, including a spike in water level and vertical displacement in September 2016 followed by a sharp decrease in both. A similar increase in groundwater level can be correlated with an increase in uplift in September 2018 and September 2019. It is also evident, however, that spikes in vertical displacement occurred in September 2015 and September 2017 while groundwater levels remained relatively stable (Figure 2-35).

Although subsidence has been largely unmonitored until recently, the OVGB is estimated to currently be at a high risk for land subsidence based on groundwater level trends, but at a medium to low overall risk for future subsidence (DWR 2014). In addition, there is no documentation of physical evidence of subsidence such as well casing failure, infrastructure disruption, or earth fissures within the OVGB. As noted, variations in land surface elevation may result from temporary elastic or tectonic deformation and fluctuating groundwater levels. Available data indicates insignificant subsidence, likely from causes other than inelastic deformation. This is in agreement with the OVGB GWMP, which concludes that to date, no surface or subsurface evidence of land subsidence has been observed in the Ojai Valley Basin (OBGMA 2018).

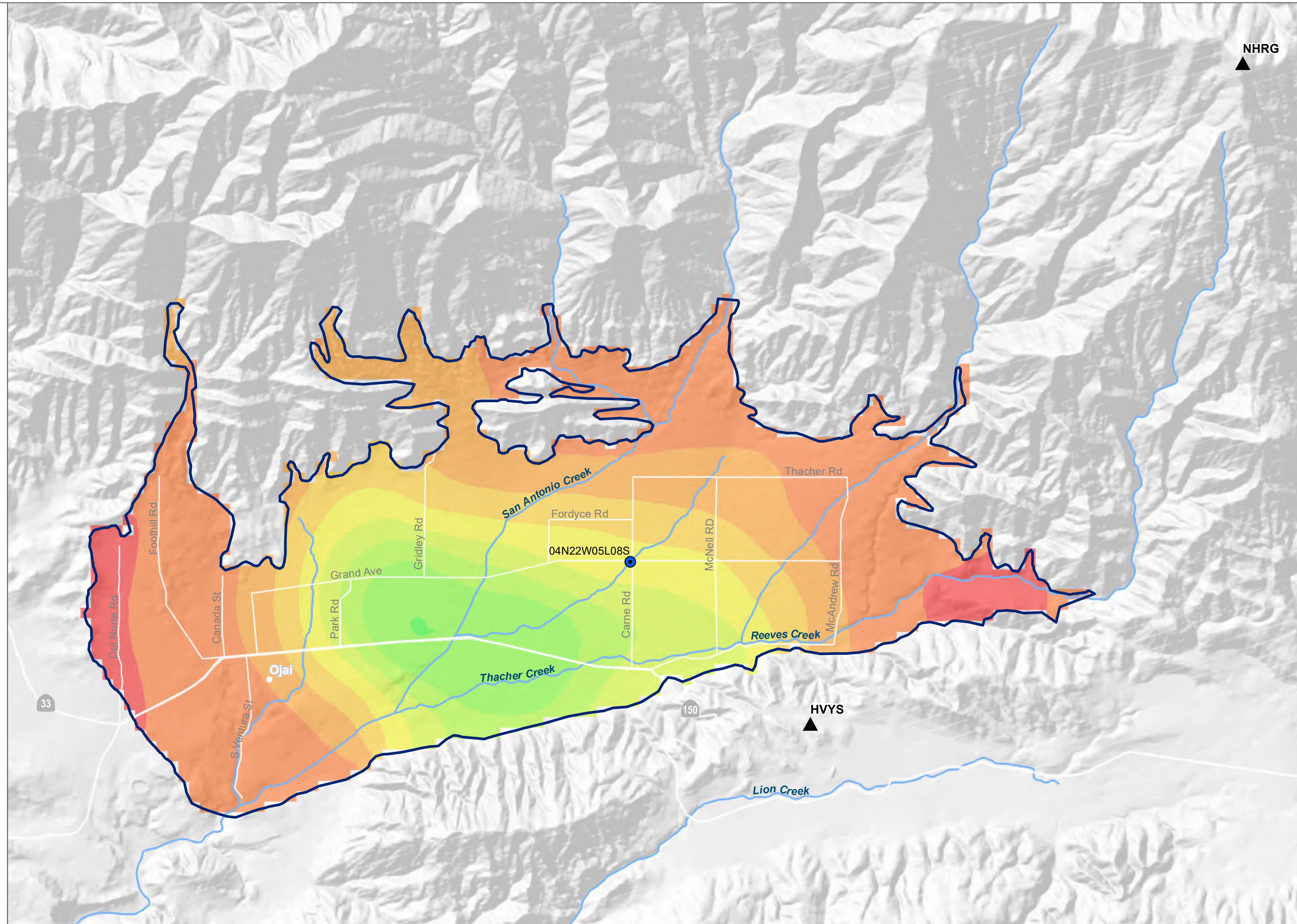
Legend

- Ojai Valley Groundwater Basin (4-002)
- CASGEM Key Well
- CGPS Station

TRE Altamira InSAR Vertical Displacement (inches)

(June 13, 2015 to September 19, 2019)

- -0.250 to -0.125
- -0.125 to 0
- 0 to 0.125
- 0.125 to 0.250
- 0.250 to 0.375
- 0.375 to 0.500
- 0.500 to 0.625
- 0.625 to 0.750
- 0.750 to 0.875



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DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; SGMA; UNAVCO

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FIGURE 2-34

Land Subsidence

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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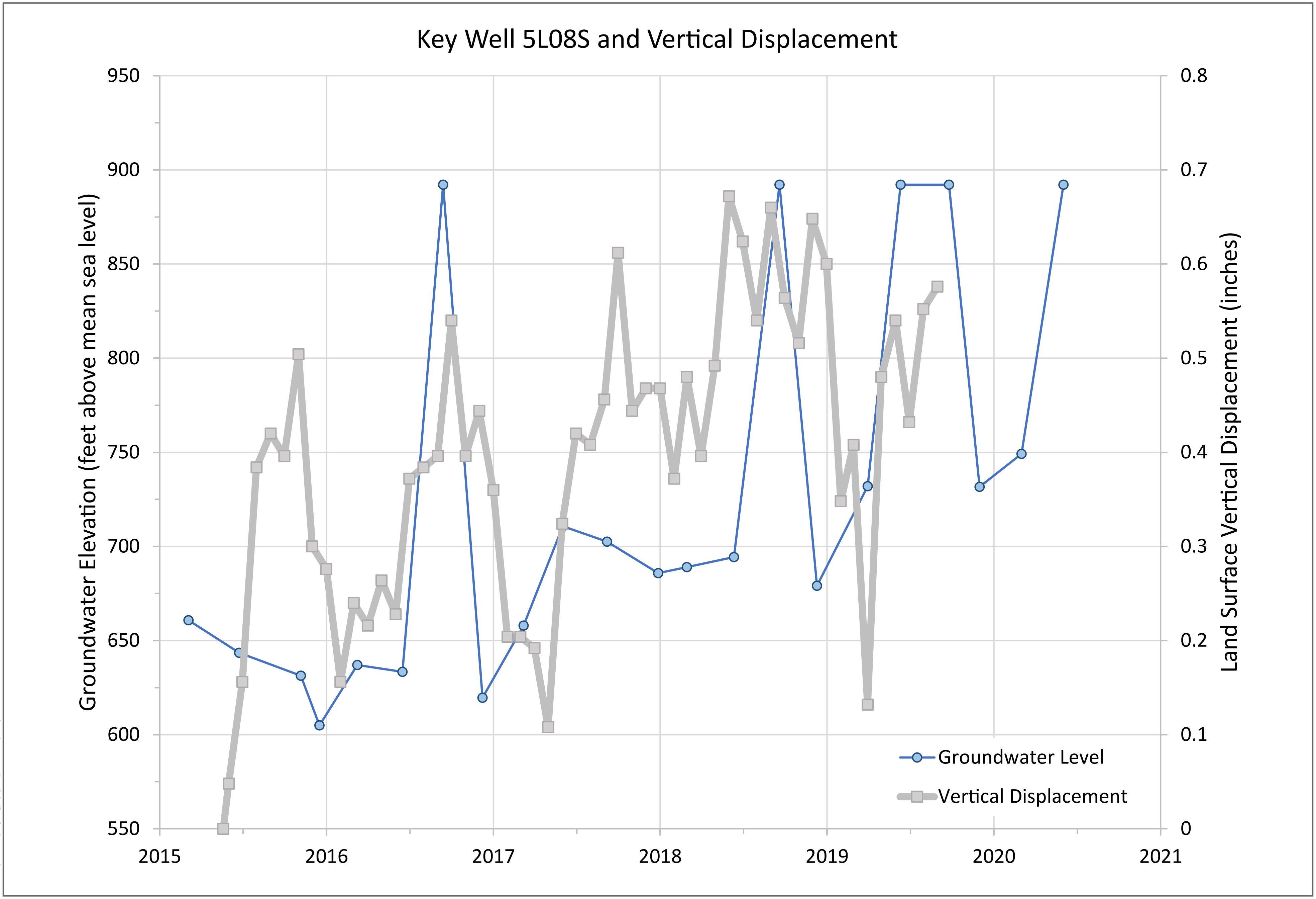

SOURCE: VCWPD; TRE Altamira InSAR

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FIGURE 2-35

Groundwater Levels and Land Subsidence

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2.3.4.6 Groundwater–Surface Water Connections

The primary surface water features in the OVGB are streams. In general, streams may be classified as gaining, losing and connected to groundwater, or losing and disconnected from groundwater. Stream–aquifer exchanges are controlled by several factors, including stream discharge and stage, the magnitude and distribution of hydraulic conductivities of the streambed and aquifer sediments, streambed thickness and its variation, the hydraulic gradient between the stream and the aquifer, and the geometric/morphological characteristics of the stream channel (Barlow and Leake 2012). DWR (2016) identifies monitoring of streamflow as a necessary component of the water budget analysis as well as necessary for evaluating of stream depletions associated with groundwater extractions.

As discussed in Section 2.2.2, San Antonio Creek is the primary stream that flows through the OVGB. San Antonio Creek is fed by several named and unnamed drainages, the largest being McNell, Thacher, and Reeves creeks. According to the USGS National Hydrography Dataset (NHD), nearly the entire length of every creek that transects the OVGB is classified as intermittent[23] within the OVGB, with the exception of the lowermost reaches of San Antonio Creek, Thacher Creek, and the Fox Canyon Drain/Stewart Canyon drainage which are classified as perennial[24] (Figure 2-36, NCCAG Listed Communities). Based on available lithologic, streamflow, and groundwater level and quality data, there is a shallow perched aquifer in the southern and western portion of the OVGB that is in hydraulic connection with surface water of San Antonio Creek and its tributaries. The shallow perched aquifer is separated from the deeper confined production aquifers by an extensive clay aquitard (Kear 2005, 2021; OBGMA 2018). Groundwater levels in the shallow perched aquifer exhibit a stable trend with little seasonal fluctuation or response to groundwater extraction while groundwater levels in the primary production aquifer show the effects of groundwater extraction (Figure 2-37, Shallow Perched Aquifer and Deep Production Aquifer Groundwater Level Trends; Kear 2021). Surface water in San Antonio Creek and groundwater in the perched aquifer have a similar calcium-bicarbonate/sulfate water character, whereas groundwater in the primary production aquifer has a sodium-bicarbonate/chloride water character (Kear 2021). Figure 2-38, Lower San Antonio Creek Hydrogeologic Conceptual Model, illustrates the hydrogeology of the OVGB along lower San Antonio Creek as described above.

Streamflow records are available for four active and three inactive stream gauging stations on San Antonio Creek, in addition to one active gauging station on Thacher Creek and one inactive gauging station on Fox Canyon Drain. In addition, the OBGMA conducts monthly manual stream discharge monitoring and continuous stream stage monitoring on lower San Antonio Creek (Appendix E, Figure 6, Groundwater-Surface Water Monitoring San Antonio Creek). However, available shallow monitoring well and stream gauge data are limited in temporal resolution (i.e., short length of record and/or coarse measurement interval) and additional data and analysis are needed to quantify the degree of stream-aquifer connectivity. In order to continue to characterize

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23 Stream in which surface flows cease for some duration each year.
24 Stream in which surface flows persist year-round.

the interaction between groundwater and surface water within the OVGB, additional analysis and continued monitoring of groundwater levels in the shallow perched aquifer, and streamflow and stage in San Antonio Creek is ongoing.

The known unique hydrogeologic characteristics of the perched aquifer system may justify separation of the perched system into a separate management area.

Chapter 3, Section 3.5, Monitoring Network, explains the proposed actions to evaluate groundwater–surface water interactions.

2.3.4.7 Groundwater Dependent Ecosystems

Groundwater dependent ecosystems (GDEs) are plant and animal communities that require groundwater to meet some or all water needs (Rohde et al. 2018). GDEs can include wetlands, streams, springs and seeps, and terrestrial vegetation. These communities are especially reliant on groundwater during dry seasons and droughts. GDEs have social, economic, and environmental benefits that include their ability to improve water quality, support biodiversity, and provide places for recreation. Depletion of groundwater levels in the vicinity of GDEs can threaten their existence (Rohde et al. 2018). GDEs are defined under the SGMA as "ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" (Title 23 CCR Section 351(m)).

Overview of the Natural Communities Commonly Associated with Groundwater Dataset within the OVGB

Within the OVGB, 38 individual vegetation communities and 8 wetland communities that may depend on groundwater were identified in the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset provided by DWR (Rhode et al. 2018). The NCCAG dataset comprises 48 publicly available state and federal agency mapping datasets including but not limited to the following: VegCAMP—The Vegetation Classification and Mapping Program, California Department of Fish and Wildlife; CALVEG—Classification and Assessment with Landsat Of Visible Ecological Groupings, U.S. Department of Agriculture Forest Service; NWI V 2.0—National Wetlands Inventory (Version 2.0), U.S. Fish and Wildlife Service; FVEG—California Department of Forestry and Fire Protection, Fire and Resources Assessment Program; and USGS National Hydrography Dataset. Vegetation types less commonly associated with groundwater were removed from these datasets and the NCCAG only retained vegetation types commonly associated with groundwater (Rohde et al. 2018). Figure 2-36 shows the aerial extent of the communities and Table 2-12 provides a summary of the communities by vegetation and wetland type. An inventory of the aquatic and terrestrial freshwater species that may inhabit the mapped vegetation and wetland communities is provided in Appendix E.

Table 2-12
Summary of NCCAG Dataset within the OVGB

Natural Community Commonly Associated with Groundwater	Number of Polygons	Acres
Vegetation Dataset		
Coast Live Oak (*Quercus agrifolia*)	25	158.3
Riparian Mixed Hardwood	5	61.6
Riversidean Alluvial Scrub	4	13.8
Valley Oak (*Quercus loboata*)	2	5.8
Willow (*Salix spp.*)	2	9.6
Subtotal	*38*	*249.0*
Wetland Dataset		
Palustrine, Emergent, Persistent, Seasonally Flooded	1	0.1
Palustrine, Forested, Seasonally Flooded	1	1.6
Palustrine, Scrub-Shrub, Seasonally Flooded	1	1.8
Riverine, Unknown Perennial, Unconsolidated Bottom, Semi-permanently Flooded	5	0.9
Subtotal	*8*	*4.3*
Grand Total	**46**	**253.3**

Source: DWR 2020c.

The predominant phreatophyte species identified within the OVGB is coast live oak (*Quercus agrifolia*) and the predominant wetland type is palustrine, scrub-shrub, seasonally flooded (Table 2-12 and Figure 2-36). Together, these two vegetation and wetland types account for approximately 63% of the communities that may rely on groundwater within the OVGB. There are no managed wetlands in the OVGB.

Methods for Identifying Groundwater Dependent Ecosystems

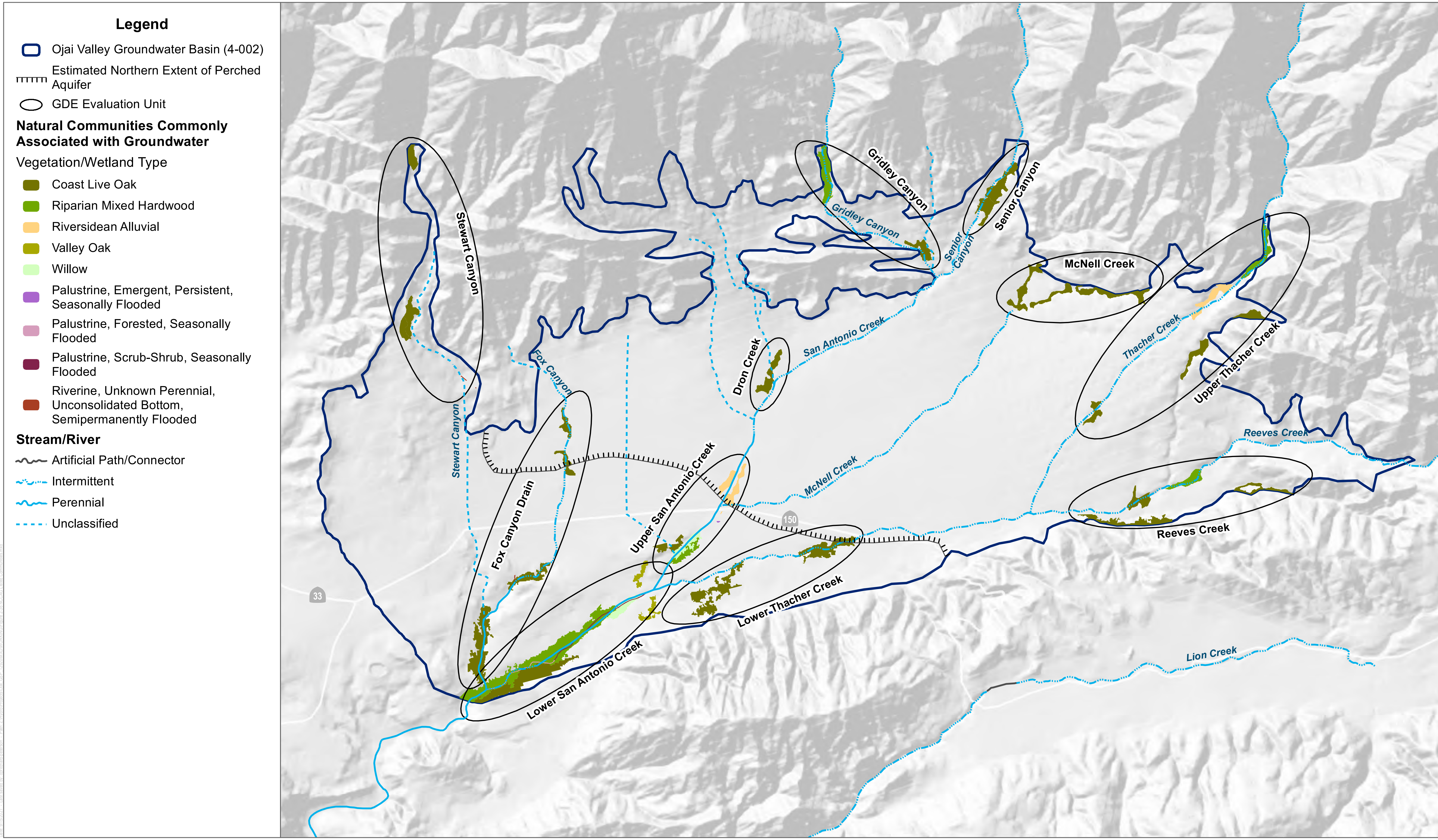
Due to the abundance and extent of individual vegetation and wetland communities identified in the NCCAG dataset, communities in the OVGB were aggregated into larger GDE evaluation units by stream and/or stream reach, comprising 11 evaluation units in total. GDE evaluation units in the OVGB were characterized using information provided in the NCCAG dataset as well as measured groundwater levels, historical aerial photographs, lithologic data, and precipitation and Landsat[25] data aggregated by The Nature Conservancy (TNC). TNC used Landsat data to calculate historical variations in the Normalized Difference Vegetation Index (NDVI) and Normalized Difference Moisture Index (NDMI) for the period from 1985 to 2018 (Klausmeyer et al. 2019).

[25] The Landsat mission is the longest running satellite monitoring program used to capture space-based images of the Earth's surface every 16 days. Landsat is managed by NASA and records visible, near-infrared, middle-infrared, and thermal wavelengths reflected from the Earth's surface. TNC aggregated this data to generate NDVI and NDMI.

These indices provide a quantitative measure of a habitat's greenness and moisture content during prolonged dry periods. Long-term variations in NDVI and NDMI act as a proxy for habitat health.

Groundwater elevation measurements, aerial photographs, lithologic data, and NDVI and NDMI indicators were reviewed following the general guidelines outlined by TNC (Rohde et al. 2018). Vegetation and wetland communities were characterized as: (1) priority potential groundwater dependent ecosystems, (2) potential groundwater dependent ecosystems or (3) potential GDEs not likely impacted by groundwater extraction. Communities were characterized as priority potential groundwater dependent ecosystems if NDVI and/or NDMI were positively correlated (correlation coefficient[26] greater than or equal to 0.6) with groundwater levels in the primary production aquifer (average annual dry period groundwater elevation [June through October] at key well 04N22W05L008S) and groundwater levels measured at nearby wells (approximately <1 one-half mile from GDE unit) were shallower than 30 feet bgs. This criterion for groundwater depth is identified by TNC as representative groundwater conditions that may sustain common phreatophytes and wetland ecosystems, with the exception of Valley oak, which has a maximum rooting depth of 80 feet and may be able to access deeper groundwater (Rohde et al. 2018). Vegetation and wetland communities were characterized as potential groundwater dependent ecosystems if groundwater levels underlying the communities have not been measured or the source of water sustaining a habitat was not easily identifiable. Conversely, vegetation and wetland communities were characterized as potential GDEs not likely impacted by groundwater extraction if groundwater levels were not correlated with NDVI and/or NDMI and there was geologic evidence that the communities were disconnected from the primary production aquifer, or the communities persisted during periods when underlying groundwater levels were much deeper than 30 feet bgs. Vegetation and wetland communities at a distance of greater than one-half mile from the nearest groundwater extraction well were characterized as not likely to be impacted by current groundwater extraction within the OVGB.

[26] The correlation coefficient is a measure of the strength of the linear relationship between two variables. The correlation coefficient assumes values ranging between +1 and -1, with 0 indicating no relationship, +1 indicating a perfect positive linear relationship, -1 indicating a perfect negative linear relationship. Generally, correlation coefficient values between 0 and ±0.3 indicate a weak linear relationship, values between ±0.3 and ±0.7 indicate a moderate linear relationship, and values between ±0.7 and ±1.0 indicate a strong linear relationship.



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DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; NCCAG; OBGMA

DUDEK

0 0.5 1 Miles

FIGURE 2-36

NCCAG Listed Communities

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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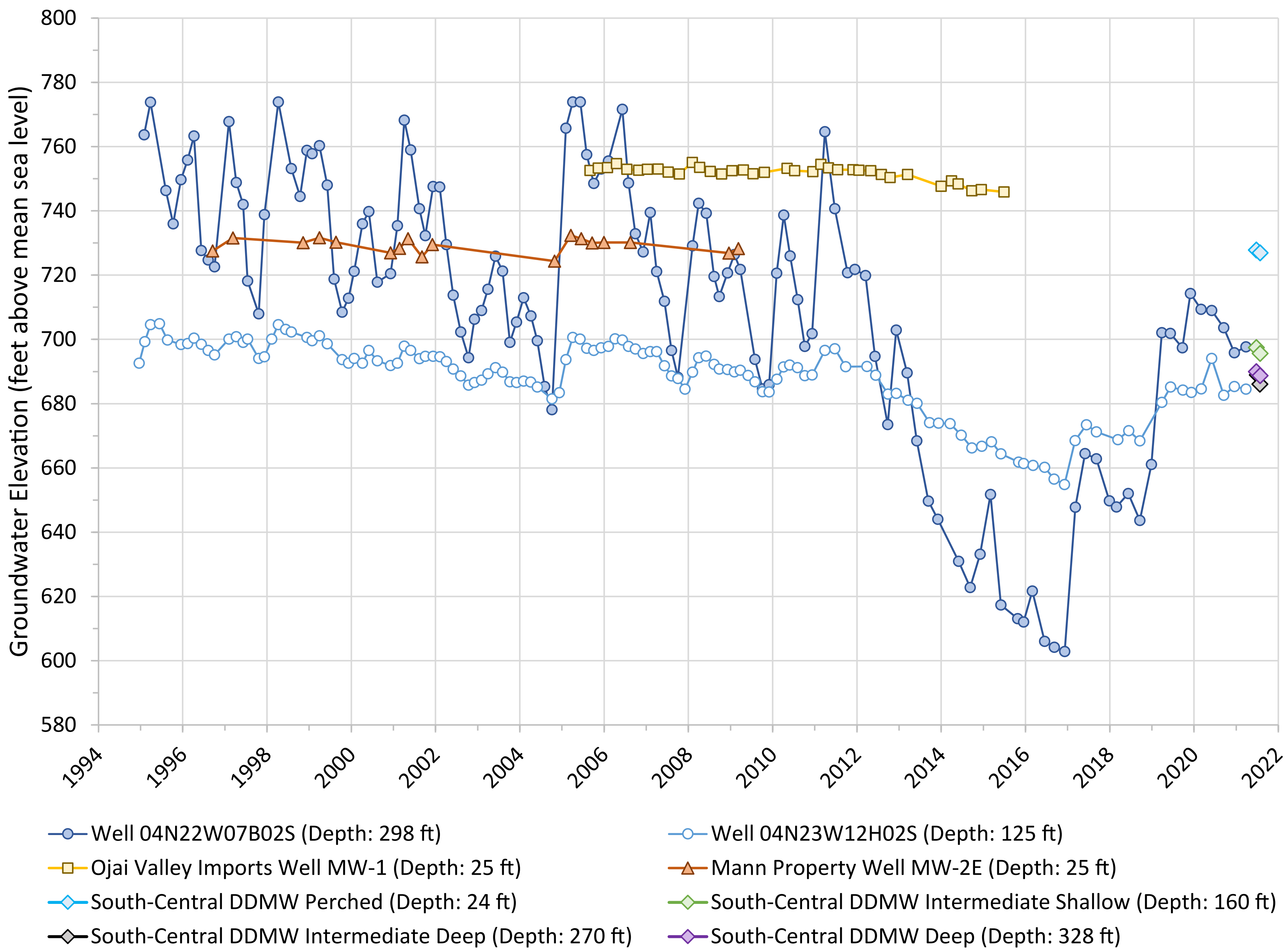

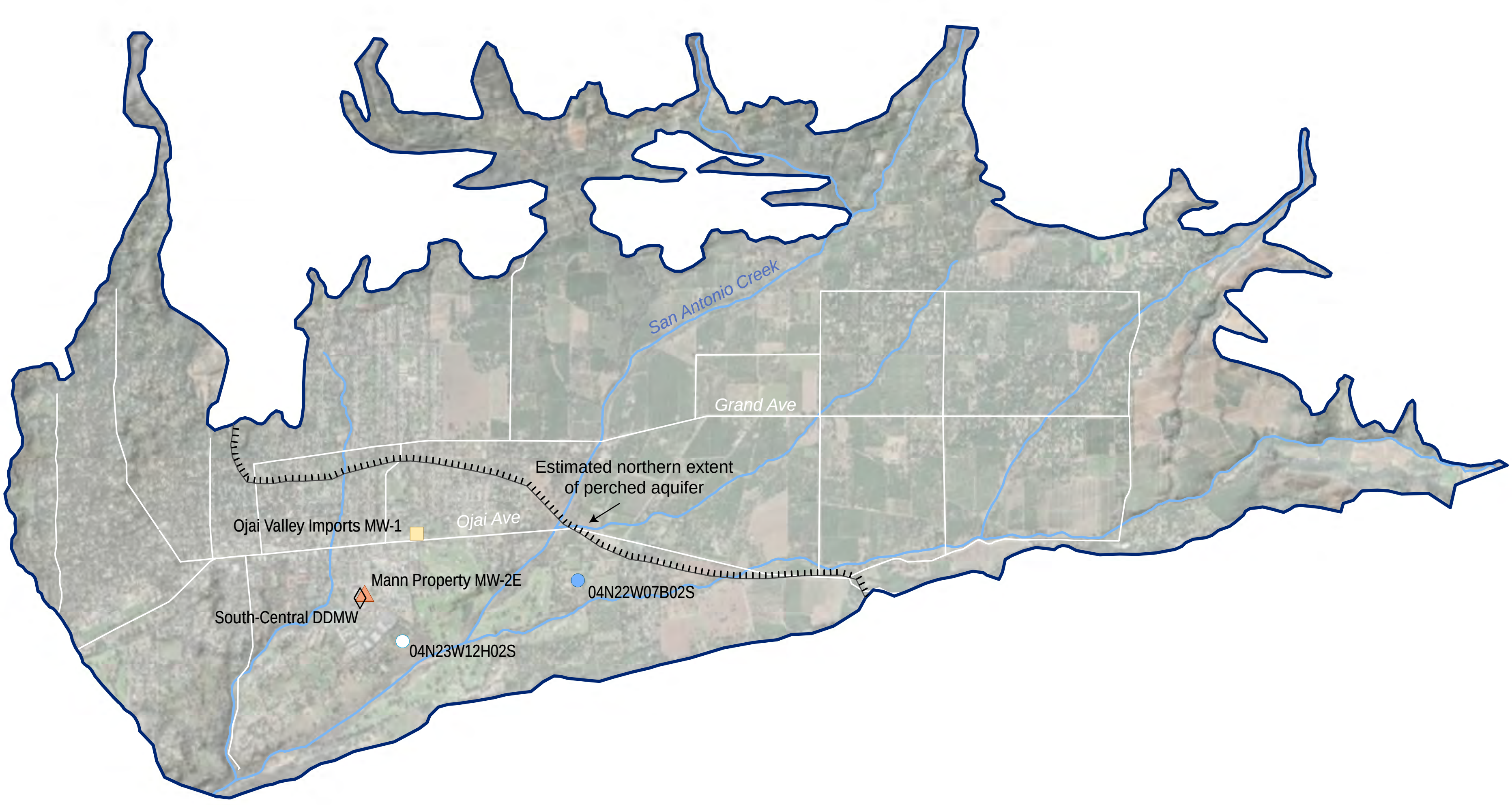

SOURCE: VCWPD; SWRCB

FIGURE 2-37

Shallow Perched Aquifer and Deep Production Aquifer Groundwater Level Trends

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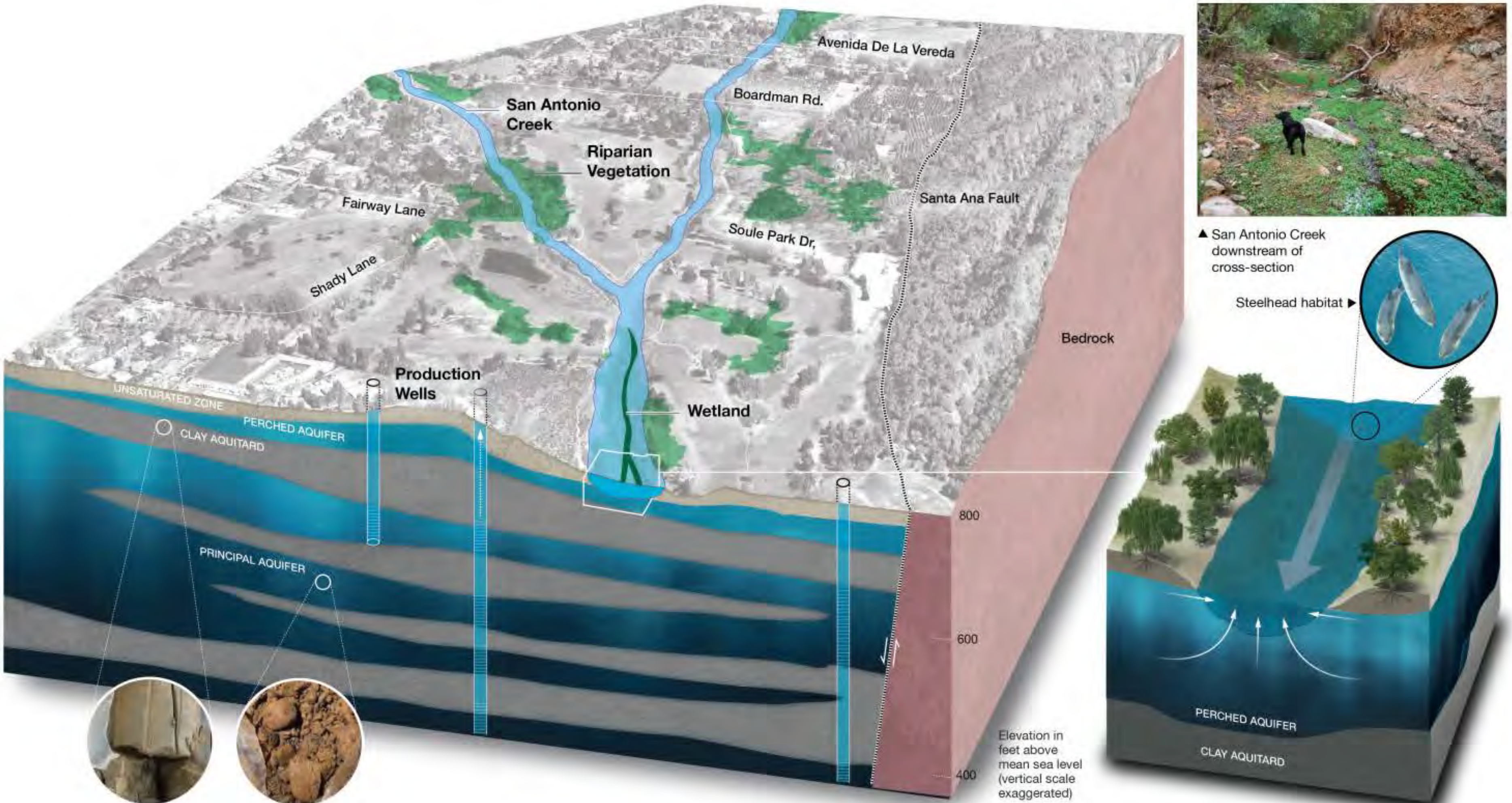

FIGURE 2-38

Lower San Antonio Creek Hydrogeologic Conceptual Model

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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Summary of GDE Characterization

This section describes the results of the GDE characterization in the OVGB. Data supporting the characterization of each ecosystem is described in detail in Appendix E.

SGMA requires that all beneficial uses and users of groundwater, including environmental users of groundwater (e.g., GDEs), be considered in the development of GSPs. Vegetation and wetland communities within the OVGB that may depend on groundwater as identified in the NCCAG dataset were characterized using the methods described above and the guidelines outlined by TNC (Rohde et al. 2018). Of the 46 individual vegetation and wetland communities (253.3 acres) identified in the NCCAG dataset, 12 communities (94.3 acres) are characterized as priority potential groundwater dependent ecosystems, 21 communities (99.5 acres) are characterized as potential groundwater dependent ecosystems, and 13 communities (59.5 acres) are characterized as potential GDEs not likely impacted by groundwater extraction.

In nine of the twelve vegetation and wetland communities identified as priority potential groundwater dependent ecosystems (with a combined area of approximately 92.3 acres), vegetation health trends for the ecosystems are positively correlated with groundwater levels and groundwater levels underlying the ecosystems are shallower than 30 feet bgs. In three of the twelve vegetation and wetland communities identified as priority potential groundwater dependent ecosystems (with a combined area of approximately 2.0 acres), vegetation health data are not available but the ecosystems are located along perennial creek reaches in the central part of the OVGB where historical groundwater level declines in the primary production aquifer have been most significant. The priority potential GDEs consist of coast live oak; riparian mixed hardwood; willow (*Salix spp.*); valley oak (*Quercus lobata*); Riversidean alluvial scrub; palustrine, scrub-shrub, seasonally flooded; and riverine, unknown perennial, unconsolidated bottom, semi-permanently flooded vegetation and wetland communities located along or near the perennial reach of San Antonio Creek (Figure 2-39, Potential Groundwater Dependent Ecosystems). Although there is geologic evidence that these communities may be disconnected from the primary production aquifer as described in Section 2.3.4.6 and shown in Figure 2-38, the location of the ecosystems (near or along the perennial reach of San Antonio Creek) and vegetation health data suggest that groundwater may support these ecosystems, and there is potential for the ecosystems to be impacted by groundwater extraction.

In the majority of the potential groundwater dependent ecosystems (21 individual ecosystems with a combined area of approximately 99.5 acres) NDVI and NDMI data are not available, or vegetation health trends and aerial photographs indicate the presence of persistent vegetation during drought conditions, but data to characterize groundwater conditions underlying the ecosystems are limited. The potential GDEs for which data are limited consist of riparian mixed hardwood; riverine, unknown perennial, unconsolidated bottom, semi-permanently flooded; and riversidean alluvial scrub vegetation and wetland communities. The potential GDEs are largely located on alluvial fans along the OVGB margins at the southern flank of the Topatopa mountains (Figure 2-39). Data indicate groundwater levels in these areas of the OVGB have remained relatively stable at 40 to 50 feet bgs, as described in Section 2.3.4.1, and current groundwater extraction in these areas is not significant. Further characterization of these ecosystems and their potential dependence on groundwater is warranted if future additional groundwater extractions are planned for these areas of the OVGB.

A total of 13 vegetation and wetland communities (59.5 acres) are characterized as potential GDEs not likely impacted by groundwater extraction (Figure 2-39). These ecosystems consist of coast live oak; riversidean alluvial scrub; palustrine, emergent, persistent, seasonally flooded; riverine, unknown perennial, unconsolidated bottom, semi-permanently flooded; and palustrine, forested, seasonally flooded vegetation and wetland communities. Vegetation health trends for these 13 mapped communities are not correlated with groundwater levels, the communities persisted during periods when groundwater levels were greater than 70 feet bgs, and there is geologic evidence that these communities may be disconnected from the primary production aquifer as described in Section 2.3.4.6 and shown in Figure 2-38. Therefore, these ecosystems are not likely to be impacted by groundwater extraction.

It should be noted that additional data acquisition and monitoring including field surveys are needed to refine the potential GDE inventory, verify each ecosystem's dependence on groundwater, identify which ecosystems are of greatest ecological value, assess the susceptibility of each ecosystem to changing groundwater conditions, and evaluate whether potential effects of groundwater extraction are adverse to the health of the potential GDEs. Chapter 3, Section 3.5, Monitoring Network, identifies the metrics and proposed actions necessary to fill data gaps in order to establish sustainability indicators that are protective of GDEs.

2.4 WATER BUDGET

The water budget characterizes groundwater availability by assessing and analyzing inflows and outflows of water to the OVGB over time. This section presents historical and current water budget conditions and quantifies the volume of groundwater held in storage in the OVGB. In this GSP, the historical water budget was compiled for the period from water year 1971 through the end of water year 2014, and the current condition water budget was compiled for the period from water year 2015 through the end of water year 2019.

In order to develop the water budget for the OVGB, the OBGMA commissioned the development of the Ojai Basin Groundwater Model in 2011 (DBS&A 2011). The OBGM was recently updated to include data through the end of water year 2019 (DBS&A 2020b). The OBGM consists of two parts: a surface water model, that was built using the Distributed Parameter Watershed Model (DPWM) code, and a groundwater model that was developed using the MODFLOW-SURFACT code. The surface water model is used to estimate recharge from rainfall and irrigation, which is then used as an input to the groundwater model. Input and output files for both the DPWM and MODFLOW-SURFACT models were provided for preparation of historical, current, and projected water budgets for the OVGB.

The groundwater model domain roughly aligns to the boundary of the alluvial aquifer and is defined by a finite-difference grid of uniform cells (also called nodes) that are 200-feet by 200-feet square, or roughly 0.92 acres in area. The model is divided vertically into 10 layers, with layers 1, 2, 4, 6, 8, and 10 representing aquifer units and layers 3, 5, 7, and 9 representing semi-confining units. Note that this model simplifies OVGB stratigraphy. The aquifer properties such as hydraulic conductivity and storativity change across each stratigraphic unit. For the purposes of a general water budget this is deemed useful, but management based on measured parameters is optimal.

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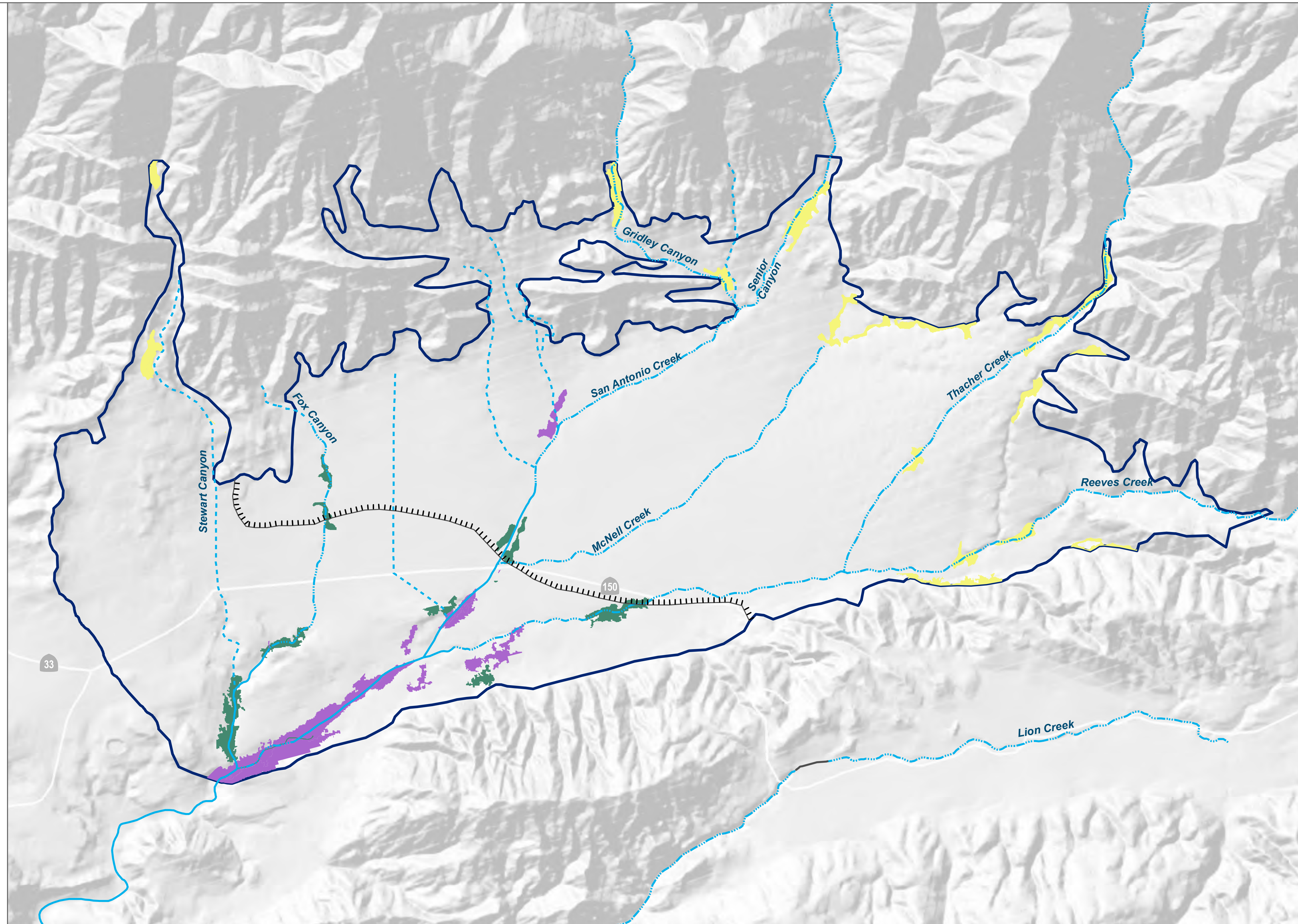

Legend

- Ojai Valley Groundwater Basin (4-002)
- Estimated Northern Extent of Perched Aquifer

Ecosystem Classification

- Potential GDE Not Likely Impacted by Groundwater Extraction
- Potential GDE
- Priority Potential GDE

Stream/River

- Artificial Path/Connector
- Intermittent
- Perennial
- Unclassified

DRAFT

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; NCCAG; OBGMA

DUDEK

0 0.5 1 Miles

FIGURE 2-39

Potential Groundwater Dependent Ecosystems

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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2.4.1 Inflow to Groundwater System

The OVGB is recharged by combination of native and non-native water supplies. Native water supplies to the OVGB include deep percolation of precipitation that falls on the basin floor and subsurface underflows of precipitation that falls in the watershed that drains to the basin (DBS&A 2020b). In addition to these sources, surface water flows along the San Antonio Creek were historically diverted for recharge to the basin via the San Antonio Creek Spreading Grounds (Figure 2-12). San Antonio Creek diversions were managed by Ojai Water Conservation District between 1963 and 1985 as described previously in Section 2.1.1.2, Water Agencies Relevant to the Plan Area.

Non-native water supplies to the basin include septic system discharges, disposal of treated wastewater via leaching fields operated by the Thacher School, and irrigation return flows. Irrigation return flows consist of both domestic water supplies used to irrigate landscape as well as water used for agriculture to irrigate crops such as citrus and various grains.

Average annual components of native and non-native groundwater recharge sources are summarized in Sections 2.4.1.1 through 2.4.1.4. These average annual quantities were extracted from the MODFLOW-SURFACT output files of the OBGM and represent average conditions in the basin between water years 1971 and 2014.

2.4.1.1 Precipitation recharge and irrigation return flows

Recharge from precipitation and irrigation is calculated using the DPWM surface water model. The DPWM is a soil-water-balance model that uses inputs such as precipitation, evapotranspiration, geology, soils, and vegetation cover to estimate runoff and water percolation through the soil column on a watershed-wide scale. The DPWM grid is designed to exactly overlay the grid for the groundwater model so that recharge outputs from the DPWM can be input directly to the groundwater model. The DPWM outputs for precipitation recharge and irrigation return flows are aggregated and input to the MODFLOW-SURFACT code using the recharge-seepage face package. This implementation of the recharge package removes excess recharge that would result in groundwater elevations that exceed land surface elevation, thereby limiting the specified recharge rate by the simulated groundwater elevation. Recharge calculations from the DPWM are considered uncalibrated since there are no streamflow gauges within the model domain to use for calibration (DBS&A 2011).

Results from the output files of the OBGM indicate that an average of approximately 6,500 AF of precipitation and irrigation return flows recharged the basin annually between water years 1971 and 2014 (Table 2-13). Documentation of the OBGM indicates that approximately 77% of the 6,500 AFY is attributed to precipitation recharge and the remaining 23% is attributed to irrigation return flows (DBS&A 2020b).

Table 2-13
Historical Water Budget for the OVGB

Water Year	Water Year Type	Groundwater Inflows (Acre-Feet)				Groundwater Outflows (Acre-Feet)					Change in Storage (Acre-Feet)	
		Recharge[a]	*Mtn. Front Recharge*	*Septic, Wastewater, and SACSG*	*Subtotal*	*Pumping*	*ET*	*Stream Discharge*	*Underflows to UVRGB*	*Subtotal*	*Annual*	*Cumulative*
1971	Dry	6,562	2,293	520	9,375	3,443	288	3,577	91	7,399	**1,976**	**1,976**
1972	Dry	4,178	1,512	523	6,213	3,563	282	2,607	91	6,543	**-330**	**1,645**
1973	Wet	11,515	4,066	520	16,100	3,488	311	8,476	94	12,369	**3,732**	**5,377**
1974	Average	6,088	1,911	520	8,519	3,500	308	5,385	95	9,287	**-768**	**4,609**
1975	Average	6,454	2,120	520	9,094	3,568	307	5,188	95	9,157	**-64**	**4,545**
1976	Average	2,212	567	523	3,301	3,642	279	2,175	91	6,187	**-2,886**	**1,658**
1977	Dry	2,492	686	520	3,697	3,657	254	1,466	88	5,465	**-1,767**	**-109**
1978	Wet	18,355	7,088	520	25,963	3,581	327	14,817	95	18,821	**7,142**	**7,033**
1979	Average	7,133	2,416	520	10,069	3,663	318	7,702	97	11,780	**-1,712**	**5,322**
1980	Average	12,181	4,538	523	17,241	3,886	330	11,893	98	16,206	**1,035**	**6,356**
1981	Dry	3,534	1,150	520	5,204	3,942	294	3,725	94	8,056	**-2,852**	**3,505**
1982	Average	2,705	646	520	3,871	3,799	275	2,001	90	6,165	**-2,295**	**1,210**
1983	Wet	14,207	5,079	520	19,806	3,765	323	10,781	95	14,965	**4,841**	**6,051**
1984	Dry	2,458	566	523	3,546	3,932	289	3,342	93	7,656	**-4,110**	**1,941**
1985	Dry	2,750	725	520	3,995	3,959	264	1,663	89	5,976	**-1,981**	**-41**
1986	Average	7,962	2,662	21	10,645	3,420	279	3,930	90	7,718	**2,927**	**2,886**
1987	Dry	1,051	36	21	1,108	3,460	254	1,347	88	5,149	**-4,041**	**-1,154**
1988	Average	3,016	706	21	3,744	3,577	212	1,252	84	5,125	**-1,382**	**-2,536**
1989	Dry	2,464	702	21	3,187	3,524	165	1,013	81	4,782	**-1,595**	**-4,131**
1990	Dry	1,892	498	21	2,412	3,773	124	849	77	4,823	**-2,411**	**-6,542**
1991	Average	7,315	2,674	21	10,011	3,810	145	2,591	78	6,624	**3,387**	**-3,155**
1992	Average	10,141	3,552	21	13,714	4,467	227	4,419	86	9,200	**4,515**	**1,359**
1993	Wet	16,349	6,263	21	22,633	4,687	319	12,630	95	17,731	**4,902**	**6,261**
1994	Dry	2,042	465	21	2,528	4,578	282	2,680	92	7,631	**-5,103**	**1,158**
1995	Wet	15,871	5,702	21	21,595	4,626	317	11,713	94	16,750	**4,845**	**6,002**

Table 2-13
Historical Water Budget for the OVGB

Water Year	Water Year Type	Groundwater Inflows (Acre-Feet)				Groundwater Outflows (Acre-Feet)					Change in Storage (Acre-Feet)	
		Recharge[a]	*Mtn. Front Recharge*	*Septic, Wastewater, and SACSG*	*Subtotal*	*Pumping*	*ET*	*Stream Discharge*	*Underflows to UVRGB*	*Subtotal*	*Annual*	*Cumulative*
1996	Average	3,617	1,141	21	4,779	4,708	290	3,055	93	8,147	**-3,368**	**2,635**
1997	Average	8,439	2,965	21	11,424	4,957	303	4,841	93	10,195	**1,229**	**3,864**
1998	Wet	16,909	6,327	21	23,257	3,956	344	15,465	98	19,864	**3,393**	**7,257**
1999	Dry	1,014	42	21	1,077	4,600	281	2,758	92	7,731	**-6,654**	**604**
2000	Average	5,582	2,066	21	7,670	4,501	252	2,439	88	7,280	**390**	**993**
2001	Average	10,479	3,649	21	14,150	4,384	289	6,066	91	10,831	**3,318**	**4,311**
2002	Dry	1,362	127	21	1,510	4,531	263	1,714	89	6,598	**-5,087**	**-776**
2003	Average	4,479	1,236	21	5,737	4,189	239	1,544	86	6,058	**-321**	**-1,097**
2004	Dry	3,162	828	21	4,012	4,326	197	1,138	83	5,744	**-1,732**	**-2,829**
2005	Wet	18,168	6,607	21	24,796	3,914	312	11,448	94	15,767	**9,029**	**6,200**
2006	Average	7,029	2,305	21	9,356	3,939	312	5,486	95	9,832	**-476**	**5,723**
2007	Dry	897	37	21	955	5,150	264	1,959	90	7,463	**-6,508**	**-784**
2008	Average	8,420	2,859	21	11,300	4,868	256	3,730	88	8,942	**2,358**	**1,574**
2009	Dry	2,672	756	21	3,449	4,753	231	1,340	86	6,410	**-2,961**	**-1,387**
2010	Average	7,613	2,361	21	9,995	4,277	255	2,814	87	7,433	**2,562**	**1,175**
2011	Average	10,080	3,392	21	13,493	4,709	308	5,567	93	10,678	**2,815**	**3,990**
2012	Dry	1,408	95	21	1,525	5,318	253	1,477	88	7,136	**-5,611**	**-1,621**
2013	Dry	1,355	110	21	1,486	5,002	159	909	79	6,150	**-4,663**	**-6,285**
2014	Dry	2,566	994	21	3,581	5,377	98	700	72	6,247	**-2,666**	**-8,951**
1971-2014 Average		***6,504***	***2,194***	***191***	***8,889***	***4,154***	***266***	***4,584***	***90***	***9,093***	***-203***	—
Dry WY Type Average		*2,437*	*646*	*188*	*3,270*	*4,272*	*236*	*1,904*	*87*	*6,498*	*-3,228*	
Average WY Type Avg.		*6,892*	*2,303*	*179*	*9,374*	*4,098*	*273*	*4,320*	*90*	*8,781*	*593*	
Wet WY Type Average		*15,910*	*5,876*	*235*	*22,021*	*4,002*	*322*	*12,190*	*95*	*16,609*	*5,412*	

Notes: Avg. = Average; Mtn. = Mountain; SACSG = San Antonio Creek Spreading Grounds; ET = evapotranspiration; UVRGB = Upper Ventura River Groundwater Basin.

[a] Recharge refers to deep percolation of precipitation and irrigation return flows.

2.4.1.2 Mountain Front Recharge

Precipitation that falls outside the OVGB but within the San Antonio Creek watershed may act as a source of groundwater recharge to the basin (e.g. mountain front recharge). The primary mechanism that results in the recharge of upgradient precipitation is infiltration, and subsequent underflow, through alluvial channels that extend beyond the basin boundary (DBS&A 2011). Estimates of precipitation infiltration into the alluvial channels that extend beyond the basin boundary were computed for the 1971-2014 period by the DPWM and used as inputs to the MODFLOW-SURFACT model.

Results from the OBGM indicate that an average of approximately 2,200 AFY of precipitation recharged the basin via underflows through upgradient alluvial channels (Table 2-13). This source of recharge historically accounted for an average of 25% of the total annual recharge to the OVGB.

2.4.1.3 San Antonio Creek Spreading Grounds

Surface water flows through the San Antonio Creek were historically diverted to the San Antonio Creek Spreading Grounds between 1963 and 1985 (OBGMA 2021b). No written records were kept of annual diversion volumes, but it is estimated that during operations, 15-25 AF of surface water was diverted daily to the San Antonio Creek Spreading Grounds for approximately 30 days per year (DBS&A 2011). Based on these estimates, the OBGM simulated an annual diversion and recharge volume of approximately 500 AFY (Table 2-13). When operational, recharge via the San Antonio Creek Spreading Grounds provided an average of approximately 5% of the annual recharge to the basin.

2.4.1.4 Septic Systems and Wastewater Recharge

Septic system recharge to groundwater was estimated using the Ventura County Individual Sewage Disposal System Applications/Permits database. Using this database, DBS&A identified 16 individual septic systems within the model boundary and a septic system at the Thacher School (DBS&A 2011). Recharge from septic systems was applied at the appropriate areas within the model. The average annual volume of recharge from septic systems and wastewater disposal at the Thacher School was 21 AFY. Between 1971 and 2014, this accounted for less than 1% of the average annual recharge to the basin.

Data collected by the Ventura County Watershed Protection District indicate that approximately 780 parcels in the OVGB rely on septic systems for on-site wastewater treatment systems. The 780 parcels with on-site wastewater treatment systems are not included in the OBGM. As a result, septic system return flows may be underestimated by the OBGM.

2.4.2 Outflows from Groundwater System

Groundwater discharges from the OVGB occur via discharges to the San Antonio Creek, evapotranspiration of shallow groundwater by native phreatophytes, groundwater production, and, to a lesser extent, underflows to the Upper Ventura River Subbasin and include subsurface flow in San Antonio Creek alluvium beyond the OVGB boundary (Figure 2-1). The rates and extent of discharge from these sources are simulated by MODFLOW-SURFACT in the OBGM.

Average annual components of model-simulated groundwater outflows are summarized in Sections 2.4.2.1 through 2.4.1.3. These average annual quantities were extracted from the OBGM and represent average conditions in the basin between water years 1971 and 2014.

2.4.2.1 Groundwater Discharge to Streams

Results from the OBGM indicate that the largest source of groundwater outflow from the OVGB is groundwater discharge to the San Antonio Creek (Table 2-13).

Surface water and groundwater interactions in the OBGM are simulated using both the DPWM and MODFLOW-SURFACT codes. Recharge to groundwater from streams is estimated using the DPWM and applied to the MODFLOW-SURFACT code using the recharge seepage face package (DBS&A 2011). As noted previously, this implementation of the recharge package in MODFLOW-SURFACT implicitly sets the recharge value in a cell equal to zero when groundwater elevations reach land surface.

Groundwater discharges to streams were simulated in the OBGM using the MODFLOW drain package (DBS&A 2011). In the OBGM, each stream reach is represented as a drain with a predefined geometry and streambed conductivity. The drain package then calculates groundwater discharges through the drain, or stream bottom, based on the difference in groundwater and drain elevations, and the pre-defined hydraulic properties of the drain. All drain cells within the model have a uniform width of 10 feet, a uniform length of 283 feet, a uniform bed thickness of 1 foot, and a uniform conductivity of 26.1 feet per day (DBS&A 2011). The elevation of each drain was set as 5 feet below the average land surface of the cell where the drain is located (DBS&A 2011). Between water years 1971 and 2014, the average annual groundwater discharge to streams calculated by the OBGM was approximately 4,600 AFY (Table 2-13).

2.4.2.2 Groundwater Pumping

Groundwater pumping is the second largest groundwater outflow simulated by the OBGM. Groundwater pumping data from wells within the model boundary were determined from the OBGMA database. OBGMA pumping records were available for 172 wells within the model boundary. The groundwater model assumed pumping from these wells to be the only pumping within the OVGB. As a result, pumping may be underestimated in the OBGM. Pumping volumes were reported to the OBGMA every six months from 1996 to 2015 and quarterly thereafter. Groundwater extraction records were only available starting in the year 1996. For years prior to 1996, the average quarterly extraction at each well was applied to corresponding quarters, with average values being reduced by 25% in the years 1986 through 1991 based on reports of reduced groundwater extractions during this period (DBS&A 2011). Between water years 1971 and 2014, the average annual groundwater extraction rate in the OBGM was approximately 4,200 AFY (Table 2-13). Groundwater extractions in the OBGM ranged from 3,420 AF in water year 1986 to 5,377 AF in water year 2014.

Estimated pumping data are also available from the OBGMA pumping database for calendar years 1985 through 2018. The average calendar year pumping for this period was 4,926 AF (OBGMA 2018). Model pumping for this same period averaged 4,286 AFY, suggesting that the model may underestimate the total pumping that occurs during this period. The model documentation suggests that pumping in the model is likely underestimated due to the assumption that only the 172 pumping wells included in the model extract water from the basin (DBS&A 2011). Interpretation of model results should take into consideration underestimation of pumping as part of the uncertainty in model results.

2.4.2.3 Evapotranspiration

Irrigated crop evapotranspiration in the OVGB was estimated using the DPWM to determine the rate and location of irrigation return flows to the OVGB over time. The DPWM calculates irrigated crop evapotranspiration using the Penman-Monteith equation, which computes evapotranspiration demands using local crop type and density information, land surface characteristics, and climatological data (DBS&A 2013). Precipitation and applied water volumes that locally exceed crop evapotranspiration demands contribute to irrigation return flows to the basin (DBS&A 2011). Because irrigated crops are located in areas of the OVGB that overlie the primary production aquifer and their shallow roots do not intercept the water table, evapotranspiration by irrigated crops does not directly contribute to outflows from groundwater.

Riparian habitats in the OVGB rely on shallow groundwater as a source of water supply (DBS&A 2011). Riparian habitats were mapped across the model domain using vegetation maps produced by the U.S. Fish and Wildlife Service and Wildscape Restoration (DBS&A 2011). Evapotranspiration from these habitats were estimated using the MODFLOW evapotranspiration (EVT1) package (DBS&A 2011). Inputs to the EVT1 package include maximum evapotranspiration rate and extinction depth[27]. The EVT1 package assumes a linear relationship between evapotranspiration and the height of the water table above the extinction depth. The

[27] Extinction depth is the depth to which the roots of plants extend below land surface and is the depth at which evaporation from the water table ceases.

maximum riparian evapotranspiration rate in the model was estimated using the DPWM and set equal to 57.2 inches per year, and the extinction depth was set at 13.12 feet (DBS&A 2011). Between water years 1971 and 2014, the average annual evapotranspiration by riparian habitats, as calculated by the OBGM, was 266 AFY (Table 2-13).

2.4.4.4 Subsurface Outflow

Subsurface groundwater outflow from the OVGB includes groundwater outflow in the alluvium at the southwestern part of the basin and outflow from the alluvium to bedrock beneath the alluvial aquifer. Both outflow in the alluvium and outflow to bedrock are estimated in the model using the MODFLOW general head boundary package (DBS&A 2011). The general head boundary package computes flow based on the difference in head between groundwater in the cell and head at the boundary, the boundary width, and the hydraulic conductivity of the boundary. Between water years 1971 and 2014, the average annual subsurface outflows estimated by the model were 90 AFY (Table 2-13).

2.4.3 Change in Annual Volume of Groundwater in Storage

Estimates of annual and cumulative changes in storage for the OVGB were extracted from the OBGM model output files. Annual change in storage from the model is presented in Figure 2-40, Annual Change in Groundwater in Storage, and cumulative change in storage is presented in Figure 2-41, Cumulative Change in Groundwater in Storage.

Results from the OBGM indicate that groundwater in storage decreased at an average annual rate of approximately 15 AFY between water years 1971 and 2019 (Table 2-16). Over this 49-year period, groundwater in storage declined by a total of approximately 750 AF.

2.4.4 Quantification of Current, Historical, and Projected Water Budget

Each GSP is required to include an accounting of the total annual volume of surface water and groundwater entering and leaving the basin during historical, current, and projected conditions (23 CCR Section 354.18). As previously noted, historical conditions for the OVBG refer to the 44 year period from the start of water year 1971 through the end of water year 2014 and current conditions refer to the period from the start of water year 2015 through the end of water year 2019. Results summarizing the current and historical water budgets are based on simulation results extracted from the OBGM.

In order to better understand the influence of climate on groundwater in storage in the OVGB, water years were divided into water year types based on the amount of precipitation that fell in the year versus the average precipitation over the period of record. Data used for water year type was taken from the Ojai station (Station No. USC00046399). Water years were divided into three types:

dry, average, and wet. Water years were classified as dry if precipitation was less than 75% of the average annual precipitation for the Ojai station, average if precipitation was between 75% and 150% of average annual precipitation, and wet if precipitation was greater than 150% of the average annual precipitation (Figures 2-40 and 2-41).

Between water years 1971 and 2014 (Historical Conditions), 18 years were characterized as dry water years, 19 years were characterized as average water years, and 7 years were characterized as wet water years. Between water years 2015 and 2019 (Current Conditions), water years 2015, 2016, and 2018 were characterized as dry water year types, and water years 2017 and 2019 were characterized as average water types.

Water budgets for these two time periods are described in sections 2.4.4.1 and 2.4.4.2 and are shown graphically in Figure 2-42, Historical and Current Conditions Water Budget.

2.4.4.1 Quantification of Historical Water Budget

Historical Availability and Reliability of Surface Water Supply for Deliveries (23 CCR 354.18(c) 2(a))

Surface water imported by CMWD has historically provided an estimated 47% of the annual domestic and agricultural water supplies to the OVGB. Between water year 1971 and 2014, CMWD imported an estimated 3,750 AF of surface water to the basin annually (Table 2-14). CMWD imported water supplies ranged from an estimated minimum of 2,404 AF in 2010 and to an estimated maximum of 5,272 AF in 1997. Water years 2010 and 1997 were both average water year types.

During dry, average, and wet water years, CMWD imported an estimated average of approximately 4,200 AFY, 3,600 AFY, and 3,100 AFY, respectively.

Table 2-14
Historical Imported Water Supplies to the OVGB

Calendar Year	Water Year Type	Estimated Casitas Imports (AF)
1985	Dry	4,181
1986	Average	3,633
1987	Dry	4,473
1988	Average	4,635
1989	Dry	5,169
1990	Dry	4,961
1991	Average	3,377
1992	Average	2,744
1993	Wet	2,800

Table 2-14
Historical Imported Water Supplies to the OVGB

Calendar Year	Water Year Type	Estimated Casitas Imports (AF)
1994	Dry	3,433
1995	Wet	3,530
1996	Average	4,468
1997	Average	5,272
1998	Wet	3,115
1999	Dry	3,922
2000	Average	4,044
2001	Average	3,195
2002	Dry	4,249
2003	Average	3,428
2004	Dry	4,185
2005	Wet	2,768
2006	Average	2,796
2007	Dry	3,770
2008	Average	3,176
2009	Dry	3,411
2010	Average	2,404
2011	Average	2,990
2012	Dry	2,986
2013	Dry	4,295
2014	Dry	4,978
	1985–2014 Average	*3,746*
	Dry WY Type Average	*4,155*
	Average WY Type Average	*3,551*
	Wet WY Type Average	*3,053*

Notes: AF = acre-feet; WY = water year.

Assessment of Historical Groundwater Inflows, Outflows, and Storage Changes as a function of Water Year Type (23 CCR Section 354.18(c) 2(b))

Results from the OBGM indicate that the OVGB was recharged at an average annual rate of approximately 9,400 AFY during average water years (Table 2-13). Of this, approximately 73% was derived from precipitation and irrigation return flows, 25% was derived from upgradient alluvial channel recharge, and 2% was derived from septic systems, wastewater disposal, and surface water spreading. In average water years, groundwater extractions and discharges to streams averaged approximately 4,100 AFY and 4,300 AFY, respectively (Table 2-13).

The OBGM estimates that groundwater in storage increased at an average rate of approximately 600 AFY during average water years. Change in groundwater in storage calculated by the OBGM during average water years ranged from a loss of approximately 3,400 AF in water year 1996 to an increase of approximately 4,500 AF in water year 1992. Annual precipitation in water years 1992 and 1996 was approximately 133% and 82% of the long-term average. The large variation in annual storage change between these two years demonstrates the climatic dependence of groundwater conditions in the OVGB.

During dry water years, the OBGM estimates that the OVGB was historically recharged at an average rate of approximately 3,300 AFY, which is approximately 65% less than recharge during average water years. Groundwater extractions in the OBGM are an average of approximately 200 AFY higher during dry water years than average water years. Groundwater discharges to streams during dry water years are approximately 55% lower than average water year type conditions.

Results from the OBGM indicate that groundwater in storage historically declined at an average rate of approximately 3,200 AFY during dry water years. This reduction in storage was driven by relatively consistent agricultural, municipal, and domestic groundwater demands during periods where precipitation recharge was 65% lower than average water year type conditions.

Groundwater in storage historically rebounded, on average, 5,400 AFY during wet water years (Figure 2-41). The increase in storage was driven by increased precipitation recharge (Table 2-13).

2.4.4.2 Quantification of Current Conditions Water Budget

Availability and Reliability of Surface Water Supply for Deliveries

Between water years 2015 and 2019, CMWD imported an average of approximately 3,600 AF of surface water to the OVGB annually. Peak imports to the OVGB during this period occurred in water year 2016, where CMWD imported approximately 4,300 AF of water to the OVGB. Surface water supplies imported to the OVGB during current conditions were similar in volume to historical imports (Table 2-14 and Table 2-15)

Table 2-15
Historical Imported Water Supplies to the OVGB

Calendar Year	Water Year Type	Casitas Imports (AF)
2015	Dry	4,133
2016	Dry	4,319
2017	Average	2,924
2018	Dry	3,031
	2015–2018 Average	*3,601*

Notes: AF = acre-feet.

Assessment of Groundwater Inflows, Outflows, and Storage Changes during Current Conditions

Results from the OBGM indicate that the OVGB was recharged at an average annual rate of approximately 7,100 AFY during water years 2015 through 2019 (Table 2-16). This average annual recharge rate is approximately 20% lower than historical conditions, reflecting the drier-than-average climate experienced within the OVGB between 2015 and 2019.

Over this same period, groundwater production from the OVGB averaged approximately 3,500 AFY, which is 700 AFY less than groundwater extraction rates reported for water years 1971-2014. Reduced groundwater extractions between 2015 and 2019 resulted in an average annual increase in groundwater in storage of approximately 1,600 AFY.

Climatic conditions and groundwater management between 2015 and 2019 has restored groundwater storage in the basin to pre-drought conditions (Figure 2-41). Current management in the OVGB has resulted in a cumulative increase in storage of approximately 8,100 AF between water years 2015 and 2019.

2.4.4.3 Quantification of Projected Water Budgets

Each GSP is required to include projected water budgets in order to estimate, “future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify uncertainties of these projected water budget conditions” (23 CCR §354.18(c) 3). To assess future conditions, the projected water budgets are required to utilize a 50-year projection horizon that incorporates the most recent land use and population data, projected water demands, and surface water availability. Projected water budgets shall also be used to evaluate the potential impacts of climate change on operations within the Plan Area.

Table 2-16
Current Condition Water Budget for the OVGB

Water Year	Water Year Type	Groundwater Inflows (Acre-Feet)				Groundwater Outflows (Acre-Feet)					Change in Storage (Acre-Feet)	
		Recharge[a]	*Mtn Front Recharge*	*Septic, Wastewater, and SACSG*	*Subtotal*	*Pumping*	*ET*	*Stream Discharge*	*Model-based Underflows to UVRGB*	*Subtotal*	*Annual*	*Cumulative relative to water year 1971*
2015	Dry	1,430	264	21	1,715	3,682	70	483	68	4,303	-2,588	-11,538
2016	Dry	1,115	255	21	1,391	3,034	51	374	64	3,523	-2,132	-13,670
2017	Average	10,092	3,559	21	13,672	2,874	97	3,047	69	6,087	7,584	-6,086
2018	Dry	2,297	899	21	3,218	4,311	90	646	72	5,120	-1,902	-7,987
2019	Average	11,473	4,191	21	15,685	3,644	158	4,573	78	8,453	7,232	-755
2015-2019 Average		*5,281*	*1,834*	*21*	*7,136*	*3,509*	*93*	*1,825*	*70*	*5,497*	*1,639*	—

Notes: Avg. = Average; Mtn. = Mountain; SACSG = San Antonio Creek Spreading Grounds; ET = evapotranspiration; UVRGB = Upper Ventura River Groundwater Basin.
[a] Recharge refers to deep percolation of precipitation and irrigation return flows.

2.4.4.3.1 Projected Water Budget Assumptions

Simulated Climate Conditions

Projected water budgets for the OVGB were generated using simulation results from the DPWM and MODFLOW-SURFACT codes of the OBGM. Three future scenarios were simulated as part of the GSP development: (1) a Future Baseline scenario, (2) a Climate Change I scenario, and (3) a Climate Change II scenario. Each scenario utilized the hydrologic conditions recorded at the NOAA climate measurement station located in Ojai (NOAA Station ID: Ojai USC00046399) during the period from water year 1944 to 1993 to represent projected conditions from water year 2020 through water year 2069. During this period, the NOAA rain gauge measured approximately 20.2 inches of rain annually, which is similar to the long-term historical average annual precipitation rate (Section 2.2.3.1). This period in the climate record is characterized by a prolonged dry period between water years 1944 and 1965, followed by wet and dry climate cycles between water years 1965 and 1993 (Figure 2-11). Between 1944 and 1993, 21 years were characterized as dry water years, 21 years were characterized as average water years, and 8 years were characterized as wet water years.

Temperature measurements collected at the NOAA for the period from 1944 to 1993 approximated average conditions, with the daily maximum temperatures in August averaging approximately 90^{o} F and daily minimum temperatures in January averaging approximately 36^{o} F. Daily maximum temperature, minimum temperature, and precipitation measured at the NOAA gauge during this period were used as inputs to the DPWM for the Future Baseline scenario.

DWR provides monthly change factors that can be used to adjust historical data to represent projected future conditions (DWR, 2018). To simulate the effects of climate change on groundwater resources in the OVGB, the DWR 2030 and 2070 central tendency precipitation and evapotranspiration change factors were applied to the measured precipitation and temperature data, respectively. DWR's 2030 and 2070 central tendency change factors represent that mean monthly adjustment for historical data predicted from an ensemble of 20 different global climate projections (DWR, 2018). Results from the Climate Change I scenario reflect basin conditions using the 2030 central tendency change factors, and results from the Climate Change II scenario reflect basin conditions using the 2070 central tendency change factors.

The application of DWR's 2030 and 2070 climate change factors resulted in a slight increase in average annual precipitation compared to Future Baseline conditions. In the Climate Change I scenario, annual precipitation averaged approximately 20.4 inches per year and in the Climate Change II scenario, annual precipitation averaged approximately 21.0 inches per years. These precipitation rates are approximately 0.2 and 0.8 inches per year higher than conditions simulated in the Future Baseline scenario.

The application of DWR's 2030 and 2070 evapotranspiration change factors to the daily minimum and maximum temperatures result in warmer conditions across the OVGB compared to the Future Baseline scenario. In the Climate Change I scenario, daily maximum and minimum temperatures increased by an average of approximately 3° F and 2° F, respectively, compared to the Future Baseline scenario. In the Climate Change II scenario, daily maximum and minimum temperatures increased by an average of approximately 7° F and 4° F, respectively, compared to the Future Baseline scenario

Simulated Water Demands

Groundwater was extracted from the OVGB a constant extraction rate of approximately 4,000 AFY for all three future scenario conditions. This is slightly lower than the estimated historical sustainable yield of 4,100 AFY. The constant 4,000 AFY basin-wide extraction rate was distributed across each production well using the average groundwater extraction distribution from the current condition simulation.

On April 21, 2021, the Casitas Municipal Water District Board adopted a projected system demand of 14,525 AFY, which is below the Casitas System operational yield of 15,010 AFY (CMWD, 2021). These projected demands suggest that local surface water supplies are anticipated to remain available to the OVGB throughout the 50-year projection horizon. Local surface water has historically supplied approximately 40% of the total water supplies to the OVGB.

Land-use and irrigation practices were held constant from the current conditions throughout the 50-year projection horizon.

2.4.4.3.2 Future Baseline Scenario Water Budget

Results from the OBGM indicate that the OVGB would receive approximately 7,750 AF of recharge annually under Future Baseline conditions. Approximately 70% of this recharge will occur in the form of precipitation recharge and irrigation return flows, and 28% would occur in the form of mountain front recharge (Table 2-17). The projected average annual recharge to the OVGB under the Future Baseline conditions is approximately 1,100 AFY lower than historical conditions. This is due to a reduction in precipitation recharge and irrigation return flows (Table 2-17).

Table 2-17
Comparison of Historical, Current, and Projected Water Budgets for the OVGB

Water Budget Component	Historical (1971-2014)	Current (2015-2019)	Future (2020-2069)		
			Future Baseline	*Climate Change I*	*Climate Change II*
Precipitation Recharge and Irrigation Return Flows	6,502	5,281	5,593	5,473	5,591
Mountain Front Recharge	2,194	1,834	2,138	2,151	2,344
Septic, Wastewater, and Former SACSG	191	21	21	21	21
Total Groundwater Inflows	*8,887*	*7,136*	*7,752*	*7,645*	*7,956*
Pumping	4,154	3,509	4,006	4,006	4,005
ET	266	93	217	215	216
Groundwater Discharges to Streams	4,586	1,826	3,303	3,200	3,504
Model-based Subsurface Outflows to Upper Ventura River Subbasin	90	70	85	85	85
Total Groundwater Outflows	**9,095**	**5,499**	**7,611**	**7,506**	**7,810**
Annual Change in Storage	**-208**	**1,637**	**141**	**139**	**146**

Notes: All values in acre-feet per year; SACSG = San Antonio Creek Spreading Grounds; ET = evapotranspiration.

Under Future Baseline conditions, the OBGM indicates that approximately 7,600 AFY of groundwater will discharge the Basin via groundwater extractions, evapotranspiration, groundwater discharges to streams, and underflows to the Upper Ventura River Subbasin (Table 2-17). Of this, the OBGM indicates that approximately 3,300 AFY will discharge to the San Antonio Creek, 85 AFY will discharge from the OVGB via underflows to the Upper Ventura River Subbasin, and 215 AFY will be lost to evapotranspiration of shallow groundwater. As previously noted, groundwater extractions were simulated at constant rate of 4,000 AFY (Table 2-17).

The projected groundwater outflows from the OVGB are approximately 1,500 AFY lower than historical conditions (Table 2-17). This is predominantly due to a reduction in groundwater discharges to the San Antonio Creek of approximately 1,200 AFY compared to results from the 1971-2014 period (Table 2-17). Groundwater extractions under Future Baseline conditions were approximately 150 AFY lower than the average simulated historical extraction rate.

Results from the OBGM indicate that groundwater in storage will increase by approximately 140 AFY under Future Baseline conditions (Table 2-17). Over the 50-year projection horizon, this would result in a surplus of groundwater in storage of approximately 6,000 AF compared to the volume of groundwater in storage at the beginning of water year 1971 (Figure 2-43, Historical, Current, and Future Baseline Water Budget). Like the historical condition simulations, the OBGM indicates that groundwater in storage is depleted during dry climate periods, and the total volume of groundwater in storage is replenished during wet water years (Figure 2-43).

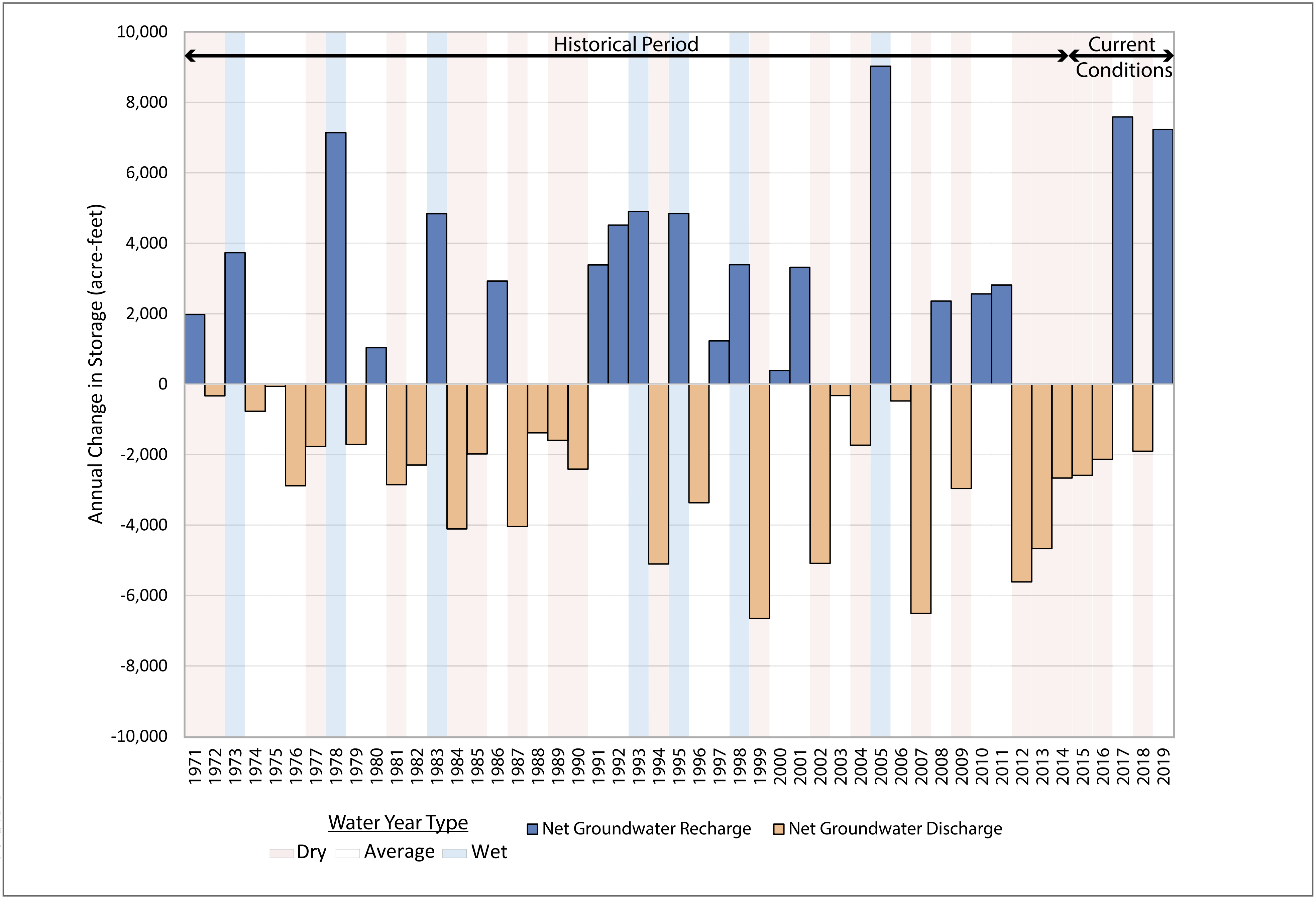
2.4.4.3.3 Climate Change I Scenario Water Budget

Results from the OBGM indicate that the OVGB would receive approximately 7,650 AF of recharge annually under Climate Change I conditions. Like the Future Baseline scenario, approximately 70% of this recharge will occur in the form of precipitation recharge and irrigation return flows, and 28% would occur in the form of mountain front recharge (Table 2-17). The projected average annual recharge to the OVGB under the Climate Change I scenario is approximately 1,200 AFY lower than historical conditions. This is due to a reduction in precipitation recharge and irrigation return flows (Table 2-17).

Under the Climate Change I scenario, the OBGM indicates that approximately 7,500 AFY of groundwater will discharge the Basin via groundwater extractions, evapotranspiration, groundwater discharges to streams, and underflows to the Upper Ventura River Subbasin (Table 2-17). Of this, the OBGM indicates that approximately 3,200 AFY will discharge to the San Antonio Creek, 85 AFY will discharge from the OVGB via underflows to the Upper Ventura River Subbasin, and 215 AFY will be lost to evapotranspiration of shallow groundwater. As previously noted, groundwater extractions were simulated at constant rate of 4,000 AFY (Table 2-17).

The projected groundwater outflows from the OVGB are approximately 1,600 AFY lower than historical conditions (Table 2-17). Like the Future Baseline simulation, this is predominantly due to a reduction in groundwater discharges to the San Antonio Creek of approximately 1,400 AFY compared to results from the 1971-2014 period (Table 2-17). Groundwater extractions under Future Baseline conditions were approximately 140 AFY lower than the average simulated historical extraction rate.

Results from the OBGM indicate that groundwater in storage will increase by approximately 140 AFY under Future Baseline conditions. Over the 50-year projection horizon, this would result in a surplus of groundwater in storage of approximately 6,000 AF compared to the volume of groundwater in storage at the beginning of water year 1971 (Figure 2-44, Historical, Current, and Projected Change in Storage). These simulated change in storage results are similar to conditions projected under the Future Baseline scenario despite the OVGB receiving less recharge in the Climate Change I scenario (Figure 2-44). The similarity in annual and cumulative change in storage between simulation results is caused by a decrease in groundwater discharges to streams that scales with the reduction in precipitation recharge and irrigation return flows (Table 2-17).



Source: Daniel B. Stephens & Associates (DBS&A)

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FIGURE 2-40

Annual Change in Groundwater in Storage

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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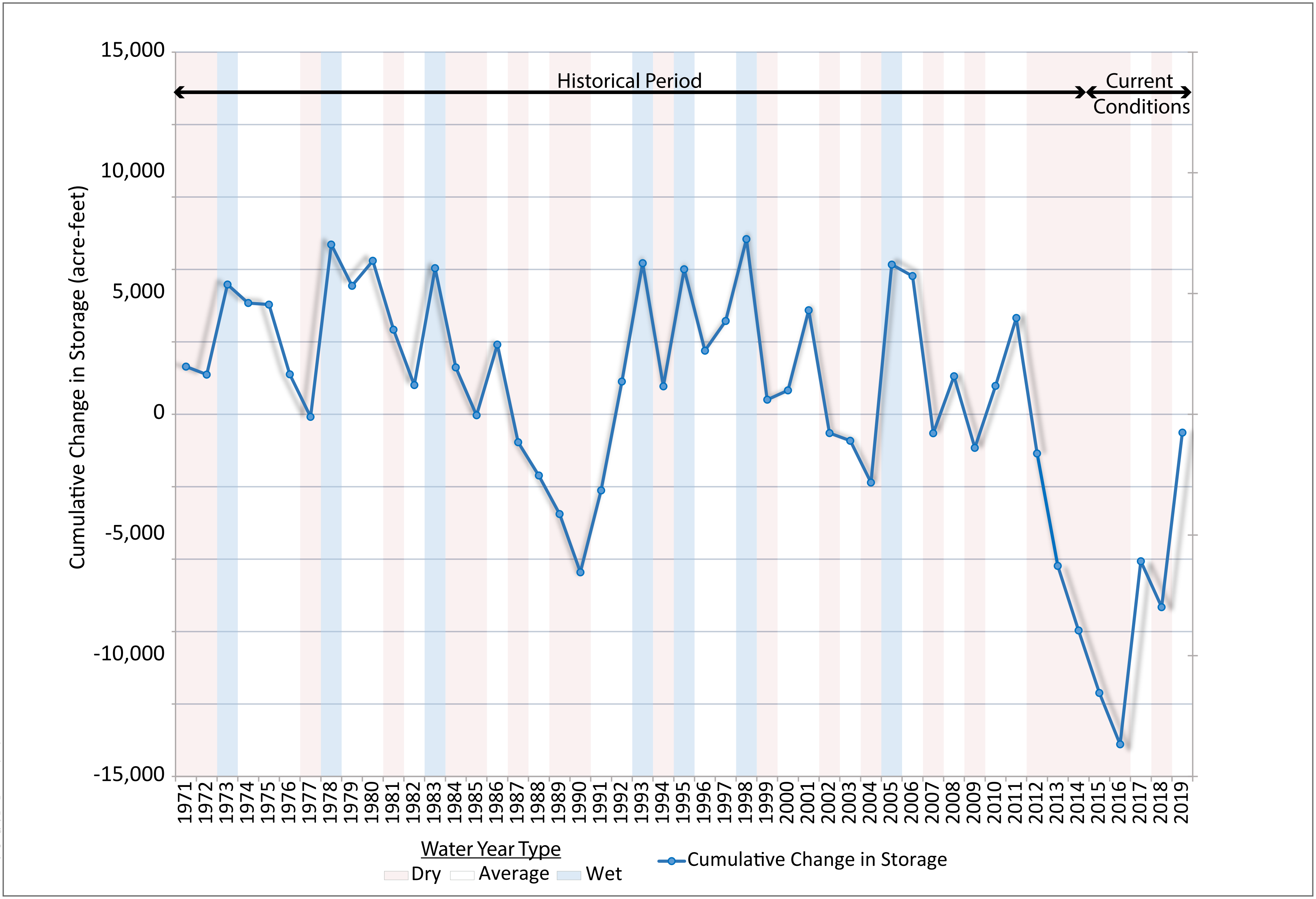

Source: Daniel B. Stephens & Associates (DBS&A)

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FIGURE 2-41

Cumulative Change in Groundwater in Storage

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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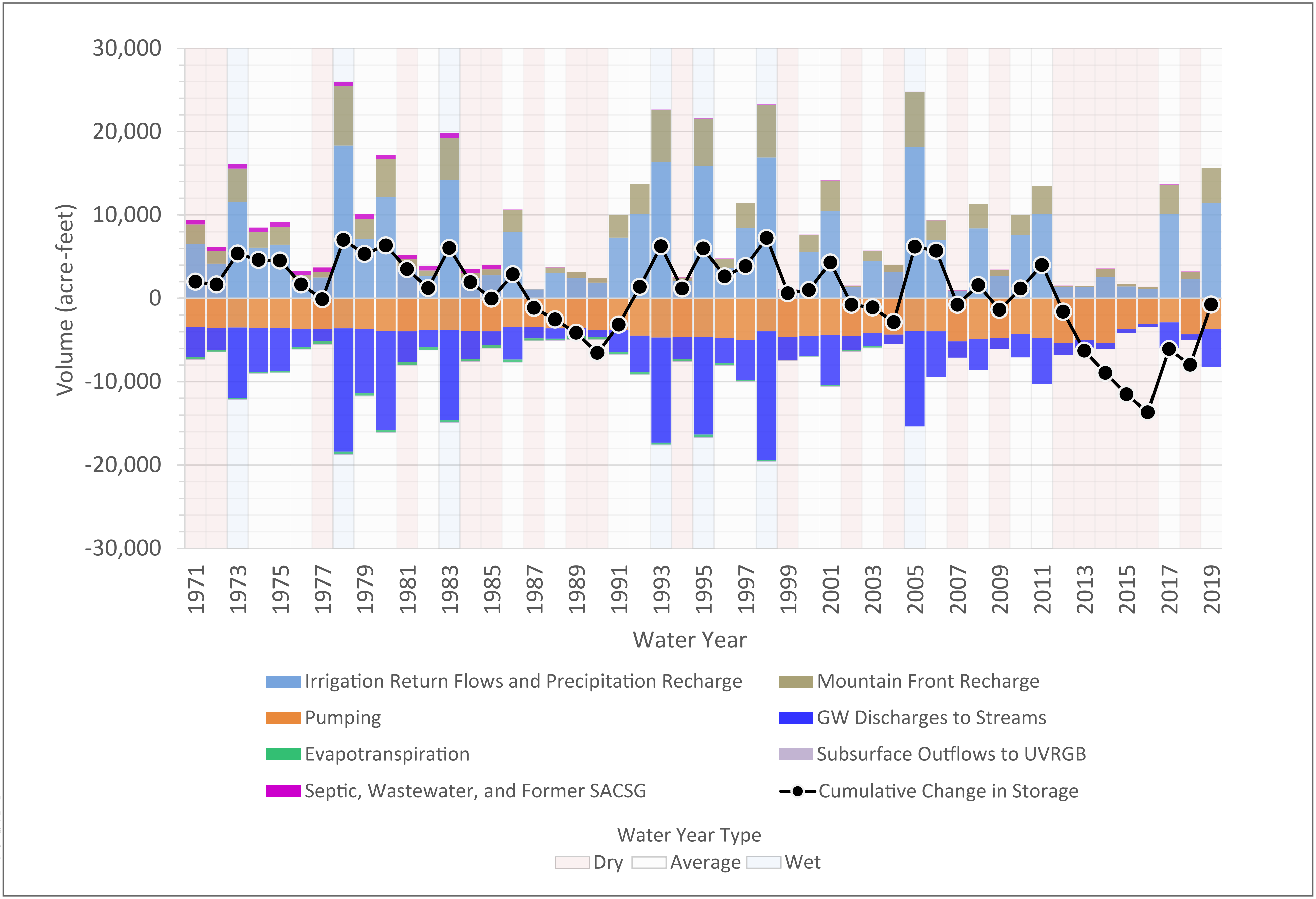

Source: Daniel B. Stephens & Associates (DBS&A)

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FIGURE 2-42

Historical and Current Conditions Water Budget

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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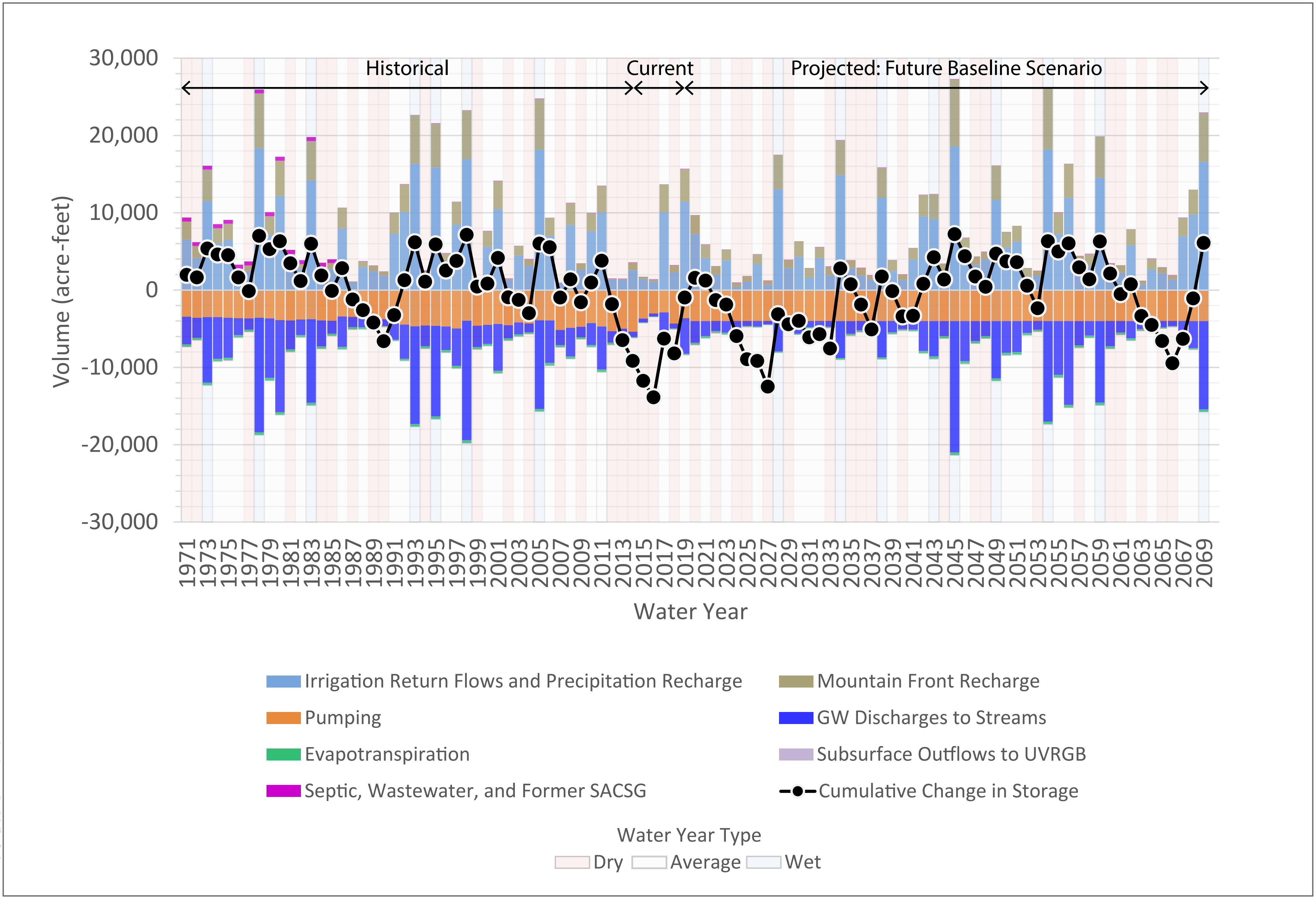

Source: Daniel B. Stephens & Associates (DBS&A)

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FIGURE 2-43

Historical, Current, and Future Baseline Water Budget

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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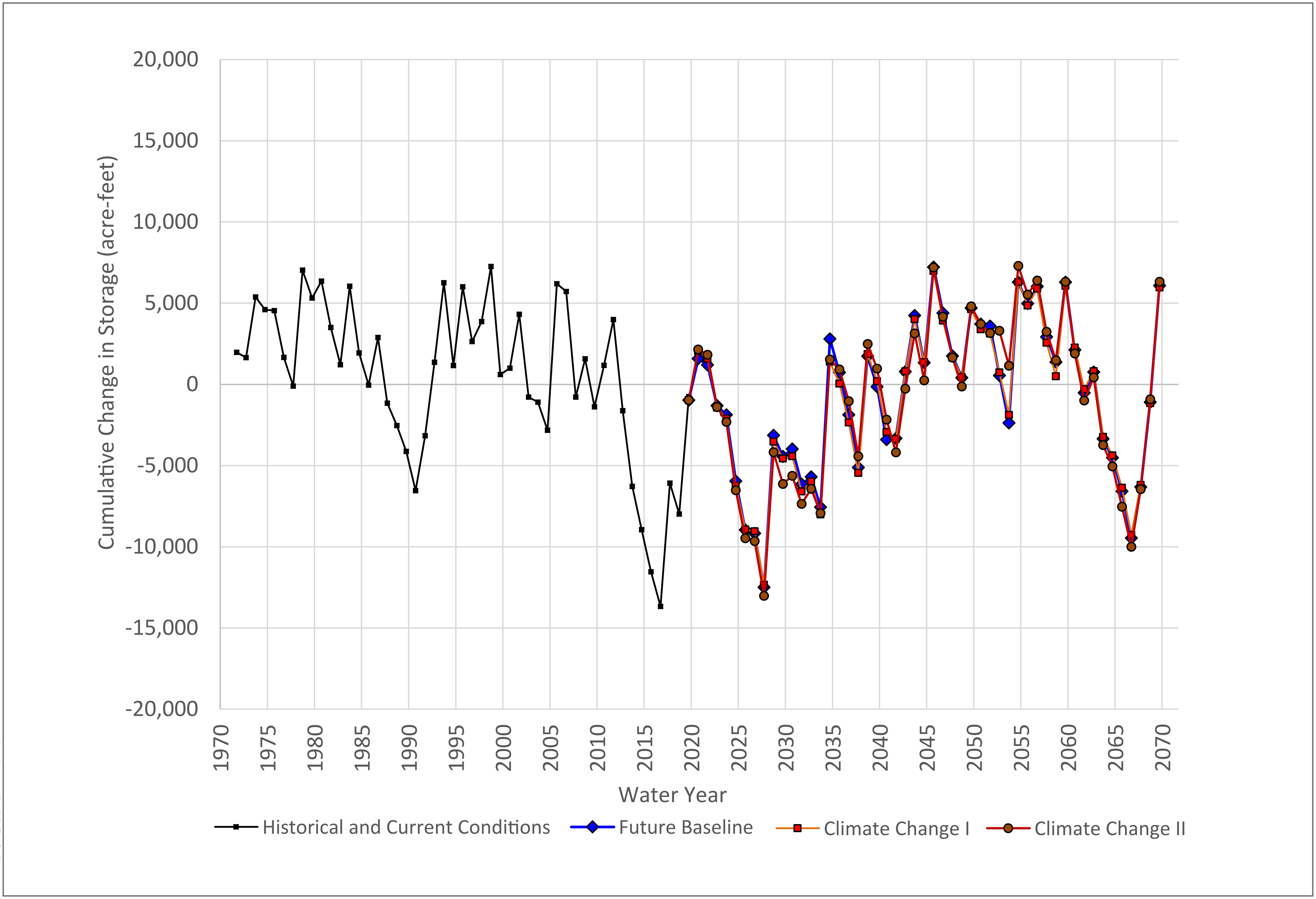

Source: Daniel B. Stephens & Associates (DBS&A)

FIGURE 2-44

Historical, Current, and Projected Change in Storage

Groundwater Sustainability Plan for the Ojai Valley Groundwater Basin

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2.4.4.3.4 Climate Change II Scenario Water Budget

Results from the OBGM indicate that the OVGB would receive approximately 7,950 AF of recharge annually under Climate Change II conditions. Like the Future Baseline and Climate Change I scenarios, approximately 70% of this recharge will occur in the form of precipitation recharge and irrigation return flows, and 29% would occur in the form of mountain front recharge (Table 2-17). The projected average annual recharge to the OVGB under the Climate Change I scenario is approximately 900 AFY lower than historical conditions. This is due to a reduction in precipitation recharge and irrigation return flows (Table 2-17).

The projected average annual recharge to the OVGB under the Climate Change II scenario is the highest projected recharge rate across all three future simulations. This is due to the fact that the application of DWR's 2070 central tendency climate change factors to locally measured climate data resulted in an average annual increase in precipitation of 0.8 inches over the Future Baseline hydrology. In addition, DWR's 2070 central tendency factors result in a slightly higher frequency of wet water years compared to Future Baseline conditions. The increased average annual precipitation rate resulted in higher rates of precipitation recharge and mountain front recharge compared to the Future Baseline and Climate Change I scenario.

Under the Climate Change II scenario, the OBGM indicates that approximately 7,800 AFY of groundwater will discharge the Basin via groundwater extractions, evapotranspiration, groundwater discharges to streams, and underflows to the Upper Ventura River Subbasin (Table 2-17). Of this, the OBGM indicates that approximately 3,500 AFY will discharge to the San Antonio Creek, 85 AFY will discharge from the OVGB via underflows to the Upper Ventura River Subbasin, and 215 AFY will be lost to evapotranspiration of shallow groundwater. As previously noted, groundwater extractions were simulated at constant rate of 4,000 AFY (Table 2-17).

The projected groundwater outflows from the OVGB are approximately 1,300 AFY lower than historical conditions (Table 2-17). Like the Future Baseline simulation, this is predominantly due to a reduction in groundwater discharges to the San Antonio Creek of approximately 1,000 AFY compared to results from the 1971-2014 period (Table 2-17). Under the Climate Change II scenario, groundwater discharges to the San Antonio Creek are approximately 200 AFY and 300 AFY higher that the Future Baseline and Climate Change I scenarios, respectively. This increase in groundwater discharges to streams reflects the increased precipitation recharge and mountain front recharge simulated by the Climate Change II scenario.

Results from the OBGM indicate that groundwater in storage will increase by approximately 150 AFY under Future Baseline conditions. Over the 50-year projection horizon, this would result in a surplus of groundwater in storage of approximately 6,300 AF compared to the volume of groundwater in storage at the beginning of water year 1971 (Figure 2-44). The simulated change in storage results are similar to conditions projected under the Future Baseline and Climate Change I scenarios. The similarity in projected storage change under all three conditions demonstrates that the simulated precipitation and mountain front recharge rates directly affect the rates at which groundwater discharges to the San Antonio Creek.

2.4.5 Discussion of Model Calibration, Uncertainties, and Recommendations for Improvement

The numerical model of the OVGB was calibrated using groundwater observations from 18 wells (DBS&A 2011). Calibration wells were selected based on their construction information and record of measurements (DBS&A 2011). Only values of hydraulic conductivity, specific yield, and specific storage were adjusted during model calibration. Other values, including groundwater extraction, recharge, and evapotranspiration were held constant at the values that were estimated prior to model calibration. All of the calibration wells are production wells (DBS&A 2011).

Model calibration was evaluated using the mean error, the mean absolute error, and the root mean square error (DBS&A 2011). The mean error for the model was -11.26 feet, indicating that, on average, simulated groundwater elevations are around 11 feet higher than observed groundwater elevations (DBS&A 2020b). The mean absolute error was 20.88 feet, and the root mean square error was 26.8 feet (DBS&A 2020b). The scaled root mean square error, which is often used as an indicator of how good the model calibration is, was 4.6 percent for the most recent calibration (DBS&A 2020b). A value of less than 10 percent for the scaled root mean square error is generally considered acceptable for model calibration (Rumbaugh and Rumbaugh 2005).

As part of the initial model calibration process, components of model uncertainty were identified, and a sensitivity analysis was conducted (DBS&A 2011). The initial model report noted that the model did a poor job of capturing shorter term fluctuations (on the order of weeks to months) in observed groundwater elevation data. This was attributed to the fact that the model has quarterly stress periods (i.e., it is only calculating groundwater elevations on a quarterly basis), as well as the fact that all of the calibration wells are production wells, and groundwater elevations collected in those wells could be impacted by pumping (DBS&A 2011). It was also noted that estimates of recharge from precipitation and streamflow are uncalibrated due to a lack of streamflow data within the model domain, and that extraction data were estimated between 1970 and 1996 (DBS&A 2011). The sensitivity analysis concluded that the model-predicted groundwater elevations were most sensitive to changes in recharge from precipitation and irrigation, hydraulic conductivity of aquifer units, and specific yield of all layers (DBS&A 2011).

As with most numerical groundwater models, significant assumptions needed to be made in order to generate inputs to the groundwater model. Specifically, assumptions were needed to generate inputs for natural recharge and groundwater extraction, which are the main inflows and outflows of water to the OVGB. Recharge was generated using the DPWM model. A lack of streamflow data within the OVGB is a significant data gap, since it means that recharge values calculated by the DPWM cannot be calibrated (DBS&A 2011). Model reporting also acknowledges that extractions are potentially underestimated based on the data used to generate the inputs (DBS&A 2011). While all available extraction data was used, it was assumed that no extraction occurred outside of the information reported to the OBGMA (DBS&A 2011). In addition, in order to extend the model back to 1970, extraction data had to be extrapolated to cover a period from 1970 to 1996 when no extraction data was available (DBS&A). Continued collection of extraction data as part of GSP implementation will allow for future refinement of the model to reduce model uncertainty and allow for more accurate predictions of future basin conditions.

2.4.6 Quantification of Overdraft

The GSP Emergency regulations require that the water budget include, "a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions" if the Basin is found to be experiencing overdraft (23 CCR 354.18, Water Budget). Groundwater overdraft is defined in DWR Bulletin 118 as:

> *"…the condition of a groundwater basin or subbasin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions. Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years"* (DWR 2004).

Groundwater elevation measurements collected in the OVGB indicate that the volume of groundwater in storage fluctuates in response to wet and dry climate cycles. For example, between water years 1983 and 1990, average annual precipitation measured in the OVGB was 80% of the long-term average and groundwater elevations declined by approximately 130 feet (measured at well 04N22W06D001S). This period was followed by a wet climate cycle, where precipitation between 1991 and 1998 averaged approximately 140% of the long-term average. Between 1991 and 1998, groundwater elevations increased at well 04N22W06D001S by approximately 120 feet, effectively restoring the OVGB to pre-drought conditions. Groundwater elevations in spring 2019 are similar to those measured in spring 1971, which indicates that the OVGB has not experienced overdraft conditions.

These observations of groundwater elevation declines during dry climate cycles and increases during wet climate cycles are represented effectively by the OBGM. Between 1971 and 2019, the OBGM indicates that groundwater in storage within the OVGB declined by 750 AF, or approximately 15 AFY. This rate of groundwater storage decline is within the model predictive uncertainty, which supports the conclusion that the OVGB is not currently experiencing, and has not historically experienced, overdraft conditions.

2.4.7 Sustainable Yield Estimate

Title 23 Section 354.18 requires that each Plan develop an estimate of the sustainable yield using information and data presented in the water budget for the basin. The SGMA legislation defines the sustainable yield of the basin as, "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from groundwater supply without causing undesirable results" (California Water Code Section 107271). Undesirable results are defined under SGMA as significant and unreasonable impacts to six different sustainability indicators:

- Chronic lowering of groundwater levels
- Reduction of groundwater in storage
- Degradation of water quality
- Land Subsidence
- Depletion of Interconnected Surface Water
- Seawater Intrusion

As noted in section 2.3.4, seawater intrusion is not a sustainability indicator applicable to the OVGB, and, as is described in Chapter 3 of this report, undesirable results associated with chronic lowering of groundwater levels, reduction of groundwater in storage, degradation of water quality, and land subsidence have not historically occurred in the basin. The impact of groundwater extraction rates on depletion of interconnected surface water is not well constrained and is a data gap in the OVGB (Section 2.3.4.7). This data gap is currently being addressed by OBGMA through the construction of a nested monitoring well located along the San Antonio Creek that has been designed to measure long-term trends in surface water-groundwater connection along the primary drainage channel in the OVGB. Because the historical relationship between surface water flows, groundwater elevations, and groundwater production is not well constrained by measured data, the historical and current water budgets extracted from the OBGM were used to develop an estimate of safe yield[28] for the OVGB.

[28] The safe yield is defined as the, "maximum quantity of water which can be withdrawn annually from groundwater supply without causing a gradual lowering of groundwater levels resulting in the eventual depletion of supply" (Babbit et al 2018).

Between 1971 and 2019, groundwater extractions simulated by the OBGM averaged approximately 4,100 AFY. The simulated change in groundwater in storage during this period is approximately -15 AFY, which is within the model uncertainty. The discrepancy in modeled versus reported/estimated pumping (Section 2.4.2.1) increases model uncertainty and suggests that the safe yield for the OVGB is likely higher than 4,100 AFY. This estimate is similar to the previously estimated safe yield value for the OVGB of approximately 5,000 AFY (DBS&A, 2011).

Future conditions in the OVGB may deviate from historical conditions due to the increased water usage efficiency practices, the availability of surface water supplies, and climate change. The final estimate of sustainable yield for the OVGB will not only consider the historical and current conditions safe yield estimate but will also be defined to prevent the onset of future undesirable results. Projected water budget assumptions that forecast conditions in the OVGB are described in Section 2.4.4.2. Sustainable management criteria are described in Chapter 3. Based on the projected water budgets and work completed to date to develop sustainable management criteria, the provisional estimate of the sustainable yield of the OVGB is approximately equivalent to the safe yield of 4,100 AFY.

2.4.8 Surface Water Available for Groundwater Recharge or In-Lieu Use

Water from Lake Casitas is used to meet agricultural and domestic demands (OBGMA 2018). Water from Lake Casitas is also blended with poorer quality groundwater by some water purveyors to improve water quality (OBGMA 2018). Lake Casitas has a total capacity of roughly 238,000 acre-feet. The average annual demand for water from Lake Casitas by users in the OVGB is approximately 3,680 AFY (OBGMA 2018).

In addition to surface water imported from Lake Casitas, artificial recharge occurred within the OVGB at the San Antonio Creek Spreading Grounds between 1963 and 1985 (DBS&A 2011; Section 2.4.1.3). The Wheeler Fire of 1985 prompted the VCWPD to purchase the spreading grounds property to construct a debris basin to protect the properties adjacent to San Antonio Creek. The construction of the debris basin resulted in the spreading basins being filled with excavated material and abandoned. VCWPD reconstructed a new spreading facility in 2014; this new spreading facility has not been operational since construction but will be operated collaboratively between the VCWPD, OBGMA, and CMWD (OBGMA 2018). When operational, the spreading grounds are anticipated to recharge an average of 126 AFY of water to the OVGB depending on hydrology, permitting issues, and water rights of downstream users.

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CHAPTER 3
SUSTAINABLE MANAGEMENT CRITERIA

This chapter of the Groundwater Sustainability Plan (GSP) provides a discussion of the sustainability goal (Section 3.1), undesirable results (Section 3.2), minimum thresholds (Section 3.3), measurable objectives to avoid undesirable results (Section 3.4), and monitoring network (Section 3.5) to measure each sustainability indicator applicable to the Ojai Valley Groundwater Basin (OVGB).[1] Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators[2] defined by the Sustainable Groundwater Management Act (SGMA) are caused by groundwater conditions, as a result of groundwater extraction and/or groundwater management, occurring in the OVGB. This chapter describes the criteria by which the Groundwater Sustainability Agency (GSA), or Ojai Basin Groundwater Management Agency (OBGMA), defines undesirable results within the OVGB, and identifies what constitutes sustainable groundwater management for the OVGB, including the process by which the GSA establishes minimum thresholds[3] and measurable objectives[4] for each applicable sustainability indicator (Title 23 California Code of Regulations [CCR] Section 354.22). Accordingly, the following Sections are subdivided to address each groundwater sustainability indicator. Undesirable results can vary for the beneficial uses and users supported by the OVGB's aquifers.

The OBGMA will periodically evaluate this GSP, assess changing conditions in the OVGB that may warrant modification of the GSP or management objectives, and may adjust components accordingly. The OBGMA will focus its evaluation on determining whether the actions under the GSP are meeting the GSP's sustainability goal for the OVGB.

3.1 SUSTAINABILITY GOAL

3.1.1 Standards for Establishing the Sustainability Goal

A sustainability goal[5] is a succinct, qualitative statement of the GSA's objectives and desired conditions of the groundwater basin. The California Department of Water Resources (DWR)

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1 A basin is a groundwater basin identified and defined in Bulletin 118 or as modified pursuant to a basin boundary modification approved by the Department of Water Resources (CWC Section 10721). In the context of this GSP, the word "basin" means the Ojai Valley Groundwater Basin, unless otherwise specified.

2 A sustainability indicator refers to "any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results" (Title 23 CCR Section 351(ah)).

3 A minimum threshold means "a numeric value for each sustainability indicator used to define undesirable results" (Title 23 CCR Section 351(t)).

4 A measurable objective means "specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin" (Title 23 CCR Section 351(s)).

5 "Sustainability goal" means the existence and implementation of one or more GSP's "that achieve sustainable groundwater management by identifying and causing the implementation of measures targeted to ensure the . . . basin is operated within its sustainable yield" (California Water Code [CWC] Section 10721(u))." "Sustainable

SGMA GSP regulations (Title 23 CCR Section 350, et seq.) provide supplemental information about the sustainability goal. For example, the regulations state: "Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including:

- information from the basin setting used to establish the sustainability goal,
- a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield[6], and
- an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon" (Title 23 CCR Section 354.24).

3.1.2 Background

The City of Ojai and unincorporated Ojai Valley rely on local groundwater resources as the primary source of municipal drinking water, domestic supply, and agricultural irrigation. Groundwater also supports other beneficial uses, as described in Chapter 2, Plan Area and Basin Setting, of this GSP, including those set forth in the *Water Quality Control Plan for the Los Angeles Region* (Los Angeles Basin Plan) (RWQCB 2014).

The total annual groundwater extraction from the OVGB for beneficial use has historically ranged from 3,239 acre-feet per year (AFY) to 7,697 AFY (OBGMA 2018), while the sustainable yield of the OVGB has been estimated to range from approximately 4,100 AFY (Chapter 2, Section 2.4.7) to 5,000 AFY (DBS&A 2011). Prolonged periods of groundwater extraction in excess of the sustainable yield may impact beneficial uses and users of groundwater in the OVGB. Impacts to beneficial uses and users may include decreased well production rates, increased pumping costs, and/or degraded groundwater quality. Without continued management and action, groundwater could become more challenging and expensive to access and potentially insufficient in quantity or quality to support beneficial uses.

groundwater management" means the "management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results" (CWC Section 10721(v)). Undesirable results include chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply, significant and unreasonable reduction of groundwater storage, significant and unreasonable degraded water quality, and depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water (CWC Section 10721(x)).

6 "Sustainable yield" means the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result [CWC Section 10721(w)].

3.1.3 Sustainability Goal

The OBGMA's sustainability goal is to preserve the quantity and quality of groundwater in the Ojai Basin in order to protect and maintain the long-term water supply for the common benefit of the water users in the Basin. This GSP is intended to also meet the overarching sustainability goal of SGMA to ensure that the OVGB continues to operate within its sustainable yield and does not exhibit undesirable results within the planning and implementation horizon of this GSP (50 years).

Meeting this goal requires maintaining a balance of water demand with available water supply and protecting groundwater quality through the SGMA planning and implementation horizon. A good analogy is a prudent financial routine of "balancing the books" whereby the totals of debit (groundwater withdrawal) and credits (recharge) are brought into agreement to determine the profit or loss (change in groundwater storage) made during a period of time (annually or over a longer period of time such as a hydrologic cycle). Central to maintaining this goal is a strong understanding of the local setting of the OVGB described in Chapter 2. The OVGB currently relies entirely on local water resources. Conditions within the OVGB have been sustainable over the modeled period from 1971-2019 (49 year period) and will continue to be considered sustainable so long as the following sustainability goal components continue to be met:

- Long-term, aggregate groundwater use is less than or equal to the OVGB's estimated sustainable yield, as defined by SGMA;
- Groundwater levels are maintained at elevations necessary to avoid undesirable results. Lowering of groundwater levels potentially leading to significant and unreasonable depletions of available water supply for beneficial use could occur if groundwater levels fall below minimum thresholds set at representative monitoring points[7] (RMPs);
- Groundwater quality, as measured in municipal and domestic water wells, generally exhibits a stable and/or improving trend for identified contaminants of concern (COCs): total dissolved solids (TDS), sulfate, chloride, boron, nitrate, iron, and manganese; and
- Groundwater quality is suitable for existing beneficial uses.

3.1.4 Sustainability Strategy

To ensure the OVGB continues to operate within its sustainable yield over the planning and implementation horizon, the OBGMA has evaluated continuing several existing project and management actions (PMAs), and implementing several proposed PMAs, as detailed in Chapter 4, Projects and Management Actions. The existing PMAs are: (1) Conduct Groundwater Level, Groundwater Quality, and Stream Flow Monitoring; (2) Conduct Groundwater Extraction

[7] Per CCR Section 351, "representative monitoring" refers to a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin.

Monitoring; (3) Develop Data Management System; (4) Develop Comprehensive Conjunctive Management Plan; (5) Develop Groundwater Allocation; (6) Develop Water Conservation Program; (7) Encourage Voluntary Pumping Reductions; (8) Evaluate Feasibility of Recycled Water Production for Non-Potable Reuse; (9) Explore Opportunity to Implement Focused Recharge; and (10) Explore Grant Funding Opportunities. The proposed PMAs expected to be implemented are: (1) Prepare Sampling and Analysis Plan and Quality Assurance Project Plan; (2) Prepare Groundwater Dependent Ecosystems Assessment; (3) Simulate Extreme Climate Scenarios; (4) Develop Salt and Nutrient Management Plan; (5) Explore State Water Project Water Delivery Options; (6) Evaluate Settlement Management Plan from Physical Solution; (7) Implement Public Outreach and Engagement Plan; and (8) Complete Groundwater Sustainability Plan Annual Reports and 5-Year Updates. The overarching sustainability goal as well as the continued absence of undesirable results are expected to be maintained through implementation of the PMAs. The sustainability goal will also be maintained through proactive monitoring and management by the OBGMA as described in this and the following chapters.

Table 3-1 summarizes whether each of the six undesirable results has occurred, is occurring, or is expected to occur in the future in the OVGB without GSP implementation, and shows the PMAs that have been developed to address each of the undesirable results expected to occur. The City of Ojai and residents of the unincorporated Ojai Valley have been acutely aware of water problems for the past few decades, and the major drought period from 2012 through 2016 led to further heightened public awareness locally and across the state. Because supply augmentation through imported surface water is not a feasible option for the OVGB at this time, the only tool available to the OBGMA to maintain groundwater sustainability is through demand reduction. The Casitas Municipal Water District (CMWD) already implements a water conservation (shortage) policy and agricultural users have implemented increasingly efficient irrigation systems over the years. It is important to continue to implement and strengthen water conservation practices, as proposed in the water conservation PMA, because opportunity remains for further water savings, particularly for residences. California's current statewide target for indoor water use is 55 gallons per capita per day. In 2020, Ojai system water users' consumed an average of 209 gallons per capita per day for indoor and outdoor water use (CMWD 2021).

Considering the water conservation already achieved, and the diminishing returns in the volume of water that can be saved through conservation alone, key PMAs to ensure the OVGB continues to operate within its sustainable yield over the planning and implementation horizon are: Develop Comprehensive Conjunctive Management Plan, Develop Groundwater Allocation, Encourage Voluntary Pumping Reductions, Evaluate Feasibility of Recycled Water Production for Non-Potable Reuse, and Explore Opportunity to Implement Focused Recharge. These PMAs may be implemented if minimum thresholds are exceeded and undesirable results are determined to be occurring or likely to occur.

Table 3-1
Summary of Undesirable Results Applicable to the OVGB

Sustainability Indicator	Historical (Pre-2015)	Existing Conditions	Future Conditions Without GSP Implementation	Select PMAs to be Implemented to Meet the GSP's Sustainability Goal
Chronic Lowering of Groundwater Levels	Not Significant	Not Significant	Potentially Significant and Unreasonable	Conduct Groundwater Level and Extraction Monitoring, Develop Comprehensive Conjunctive Management Plan, Develop Groundwater Allocation, Encourage Voluntary Pumping Reductions
Reduction of Groundwater Storage	Not Significant	Not Significant	Potentially Significant and Unreasonable	
Seawater Intrusion	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Degraded Water Quality	Not Significant	Not Significant	Potentially Significant and Unreasonable	Conduct Groundwater Quality Monitoring
Land Subsidence	Not Significant	Not Significant	Not Significant	Not Applicable
Depletion of Interconnected Surface Water	Data Gap: however preliminary data indicates not significant	Data Gap: however preliminary data indicates not significant	Data Gap	Prepare Groundwater Dependent Ecosystems Assessment, Conduct Groundwater Level and Streamflow Monitoring

Notes: GSP = groundwater sustainability plan; PMA = projects and management action.

3.2 UNDESIRABLE RESULTS

Standards for the Description of Undesirable Results

According to GSP Regulations, the GSP's description of undesirable results is to include the following:

1. The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.
2. The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.
3. Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results (Title 23 CCR Section 354.26(b)).

Under SGMA, undesirable results occur when the effects caused by groundwater conditions occurring throughout the basin cause significant and unreasonable impacts to any of the six sustainability indicators. That is, the "significant and unreasonable occurrence of any of the six sustainability indicators constitutes an undesirable result" (DWR, Draft Sustainable Management Criteria, Best Management Practice, Section 4, p. 5). These sustainability indicators are:

- Chronic lowering of groundwater levels
- Reduction of groundwater storage
- Seawater intrusion
- Degraded water quality
- Land subsidence
- Depletions of interconnected surface water

Application of Standards in the Ojai Valley Basin

Each of the sustainability indicators for the OVGB is discussed as follows, in the context of undesirable results.

3.2.1 Chronic Lowering of Groundwater Levels – Undesirable Results

Chronic lowering of groundwater levels occurs when groundwater production exceeds the long-term sustainable yield of a basin resulting in a significant and unreasonable depletion of supply. Temporary lowering of groundwater levels has historically occurred in the OVGB during periods of drought due to groundwater production for beneficial use and the absence of a viable alternative source of water supply other than local surface water from Lake Casitas. The existing beneficial uses and users of OVGB water are described in Chapter 2, Section 2.1.4, Beneficial Uses and Users. Per the Los Angeles Basin Plan (RWQCB 2014), the beneficial uses for groundwater in the OVGB include municipal and domestic supply (MUN), agricultural supply (AGR), industrial process supply (PROC), and industrial service supply (IND). Other OVGB pumpers include small water systems and *de-minimis* users. SGMA requires that all beneficial uses and users of groundwater, including groundwater dependent ecosystems (GDEs), be considered in GSPs (CWC Section 10723.2). Several vegetation and wetland communities located along San Antonio Creek within the OVGB have been identified to have a potential dependence on groundwater to meet some or all water needs, as described in Chapter 2, Section 2.3.4.7, Groundwater Dependent Ecosystems, and Appendix E, GDEs. Undesirable results associated with chronic (i.e., persistent and long-term) lowering of groundwater levels are most directly indicated by loss of access to adequate water resources for support of current and/or potential future beneficial uses and users. As discussed in Chapter 2, Section 2.3.4.1, Groundwater Elevation Data, the rate of groundwater level decline is variable across the OVGB, generally greatest in the central part of the OVGB and decreasing in magnitude towards the peripheral areas of the OVGB. Declines in groundwater elevation were observed in the central part of the OVGB between 1958 and 1962, and 2011 and 2016, coincident with periods of drought. However, groundwater levels recovered in subsequent average and wet water years, and significant and unreasonable impacts to beneficial uses and users were not observed.

Lowering of groundwater levels is significant and unreasonable if sufficient in magnitude to lower the rate of production of existing groundwater wells below that necessary to meet the minimum required to support the overlying beneficial uses, where alternative means of obtaining sufficient groundwater resources or local surface water resources from Lake Casitas are not technically or financially feasible for the well owner to absorb, either independently or with assistance from the OBGMA, or other available assistance/grant program(s). The undesirable results of chronic lowering of groundwater levels could occur in the OVGB in the future in the absence of management actions to counteract lowering of groundwater levels below minimum thresholds. For the undesirable result of chronic lowering of groundwater levels to be considered significant and unreasonable, groundwater level declines would have to persist during the intervening average and wet water years because that would indicate a chronic/persistent overdraft condition. As discussed in Section 3.3, Minimum Thresholds, this GSP establishes thresholds for the OVGB that would generally indicate the occurrence (or absence) of an undesirable result. These thresholds relate to known elevations that current and future groundwater levels can be compared against, such as the prevailing elevations of the perforated intervals of groundwater wells in use or the lowest historical groundwater elevation recorded at each RMP, where known. The proposed PMAs to mitigate potential effects to beneficial use and users are discussed in Chapter 4, Projects and Management Actions.

3.2.2 Reduction of Groundwater in Storage – Undesirable Results

Reduction of groundwater storage has the potential to impact the beneficial uses and users of groundwater in the OVGB by limiting the volume of groundwater available for agricultural, municipal, domestic, and industrial use. In essence, the undesirable results of reductions in groundwater in storage are the same as those previously described for chronic lowering of groundwater levels because these impacts go hand-in-hand. Reduction of groundwater in storage could also impact other sustainability indicators, namely groundwater quality.

Significant and unreasonable impacts with respect to groundwater in storage could occur if groundwater extractions exceed the sustainable yield of the OVGB over a prolonged period containing both wet and dry water years, resulting in a long-term deficit in the groundwater budget. Simulation results from the Ojai Basin Groundwater Model (OBGM) indicate that the volume of groundwater in storage at the end of water year 2019 is approximately equal to the volume of groundwater in storage in water year 1971, which indicates that the OVGB has not experienced overdraft conditions (Chapter 2, Section 2.4.4.2).

An important concept relevant to groundwater in storage in the OVGB is the high variability and the decadal periodicity of wet versus dry periods in the climatic record, as described in Chapter 2, Section 2.2.3, Historical, Current, and Projected Climate, and shown in the cumulative departure from the mean precipitation curve in the Ojai Valley (Figure 2-11). Precipitation records indicate that very few years actually have average precipitation; most years are drier than average, and a relatively few very wet years heavily influence the average. The long-term groundwater supply depends on wet years with high recharge rates; however, these occur relatively infrequently, and the 20-year GSP implementation period could occur during a multi-decadal dry period. According to the OBGM, the average annual recharge from precipitation and irrigation return flows between water years 1971 to 2014 was approximately 6,500 AFY (DBS&A 2020).

Reduction in groundwater storage is significant and unreasonable if it is sufficient in magnitude to lower the rate of production of groundwater wells below that needed to meet the minimum required to support the overlying beneficial uses, and where means of obtaining sufficient groundwater or local surface water resources from Lake Casitas are not technically or financially feasible for the well owner to absorb, either independently or with assistance from the OBGMA, or other available assistance/grant program(s).

3.2.3 Seawater Intrusion – Undesirable Results

Undesirable results from seawater intrusion are not considered to be applicable to the OVGB due to geographic isolation from the ocean. The OVGB is more than 11 miles from the Pacific Ocean at an elevation of more than 630 feet above mean sea level (amsl). As a result, this GSP does not establish criteria for seawater intrusion (Title 23 CCR Section 354.26(d)).

3.2.4 Degraded Water Quality – Undesirable Results

In general, the groundwater quality in the OVGB meets California drinking water maximum contaminant levels (MCLs) without the need for treatment. As documented in Chapter 2, Section 2.3.4.4, Groundwater Quality, the primary constituents of concern in the OVGB include TDS, sulfate, chloride, boron, nitrate, iron, and manganese. Nitrate has been identified as the primary groundwater quality contaminant for most of the Ventura River watershed (OBGMA 2018). The source of nitrates is likely associated with either historical fertilizer applications or septic return flows, although nitrate can also be naturally occurring. At times concentrations of COCs in groundwater from certain wells in the OVGB have exceeded California drinking water MCLs; however, in most cases the COCs are naturally occurring and concentrations have exhibited a stable or improving trend over time (Chapter 2, Section 2.3.4.4, Groundwater Quality).

Degraded groundwater quality is significant and unreasonable if the magnitude of degradation precludes the use of groundwater for existing beneficial uses, including through migration of contaminant plumes that impair water supplies, where alternative means of treating or otherwise obtaining sufficient alternative water resources are not technically or financially feasible. At a minimum, for municipal and domestic wells, groundwater quality must meet potable drinking water standards specified in Title 22 of the CCR. For non-potable production wells, groundwater quality should generally be suitable for agricultural and industrial use. The majority of groundwater pumped in the OVGB is used for agricultural irrigation and thus does not have to meet potable drinking water standards to be put to beneficial use. The Los Angeles Basin Plan (RWQCB 2014) has established numerical objectives for groundwater quality in the OVGB, which are described in greater detail in Section 3.4.4, Degraded Water Quality – Measurable Objectives.

In summary, degradation of groundwater quality is an undesirable result that is not occurring and will not occur within the framework of existing regulations and adherence to state and local OVGB plans. Groundwater quality has continued to be suitable for beneficial use throughout the OVGB. Reduction of groundwater in storage and chronic lowering of groundwater levels are closely linked to undesirable effects on groundwater quality because these conditions increasingly limit the effectiveness of existing mitigation strategies (e.g., blending of groundwater with other water sources). Significant and unreasonable impacts on groundwater quality are a potential outcome in the future if groundwater overdraft is to occur because previous studies have indicated poorer water quality with higher chloride concentrations in portions of the deeper aquifers of the OVGB. Therefore, adherence to existing regulations and to state and local OVGB plans (which are used as the minimum thresholds and measurable objectives for this sustainability indicator), as well as implementation of sustainability criteria for chronic lowering of groundwater levels and reduction of groundwater in storage, in combination, is sufficient to ensure adverse effects related to groundwater quality would continue to be neither significant nor unreasonable.

3.2.5 Land Subsidence – Undesirable Results

The undesirable result of land subsidence includes an irreversible reduction in groundwater storage, and differential settlement of the land surface that substantially interferes with surface land uses. As discussed in Chapter 2, Section 2.3.4.5, Land Subsidence, the degree of land subsidence occurring in the OVGB is minimal, has not substantially interfered with surface land uses in the past, and is not anticipated to substantially interfere with surface land uses in the foreseeable future, including within the GSP's planning and implementation horizon. Therefore, this GSP does not propose minimum thresholds or measurable objectives specific to this sustainability indicator. If during the GSP implementation timeline, it becomes evident that minimum thresholds and measurable objectives for lowering of groundwater levels and groundwater in storage are not being met, the degree to which land subsidence may become an undesirable result will be re-evaluated.