

**Ojai Basin Groundwater Management Agency
2011 & 2012 Annual Report**



Ojai Basin Groundwater Management Agency
March 27, 2014

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1.0 Introduction

The Ojai Basin Groundwater Management Agency (OBGMA) issues this Annual Report representing the calendar years 2011 and 2012. Similar to many previous years, the annual report comprises two years of reporting as compilation of data on extractions and activities has been completed. As the OBGMA has streamlined its efforts, and importantly, enacted measures to ensure more accurate extraction reporting, future years' Annual Reports are anticipated to be issued mid-calendar year for the preceding year.

Mission Statement

It is the mission of the Ojai Basin Groundwater Management Agency 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.

The mission of the OBGMA is derived from its enabling legislation, the Ojai Basin Groundwater Management Agency Act, which became law in 1991. The act was approved as a response to the needs and concerns of local water agencies, water users, and well owners of the Ojai Basin. The Agency was established in the fifth year of a drought, amidst concerns for potential Basin overdraft.

The mission is in keeping with the history of the Basin and the circumstances existing when the Agency was formed. Since that time, although there have been some good water years and the Ojai Basin has continued to provide sufficient water for its well owners, competition for scarce water resources in Southern California and Ventura County is ever expanding, water resource planning is intensifying, and the importance of the OBGMA mission is even greater today.

Background

Based upon the studies conducted by and for the Agency, and due to a relatively wet period over the past 15 years, the water supplies and demands in the basin are largely in balance and capable of meeting the annual demands of overlying landowners and in-basin water users under present conditions. However, after a series of dry years, water levels in some wells in the basin decline to the point where an alternative water source must be used. In part, that is why water users presently import some 3,682 (1985 to 2012 average) acre feet of Casitas Municipal Water District (Casitas) water into the basin annually, mostly for irrigation.

If Casitas water was not available or not used in a series of dry years, considering the present understanding of the hydrology of the basin and the existing water uses, some shallower and peripheral wells would probably not produce water, pumping lift costs to pump groundwater would be excessive, some wells would produce excessive amounts of sand, water quality of pumped groundwater would likely be compromised, and other detrimental effects of a reduced amount of storage in the Basin.

Through the agency's efforts, many stakeholders better understand these conditions, and the importance of conjunctive use in action: using groundwater when available and relying on Casitas water when basin storage is minimized. This practice has a somewhat self-regulating effect on the basin, as the charges for purveyor water encourage conservation and good stewardship of the groundwater resource.

Therefore, the focus of the Agency's efforts is on protecting and preserving the basin groundwater resource for in-basin use; and guarding against export of water from the basin.

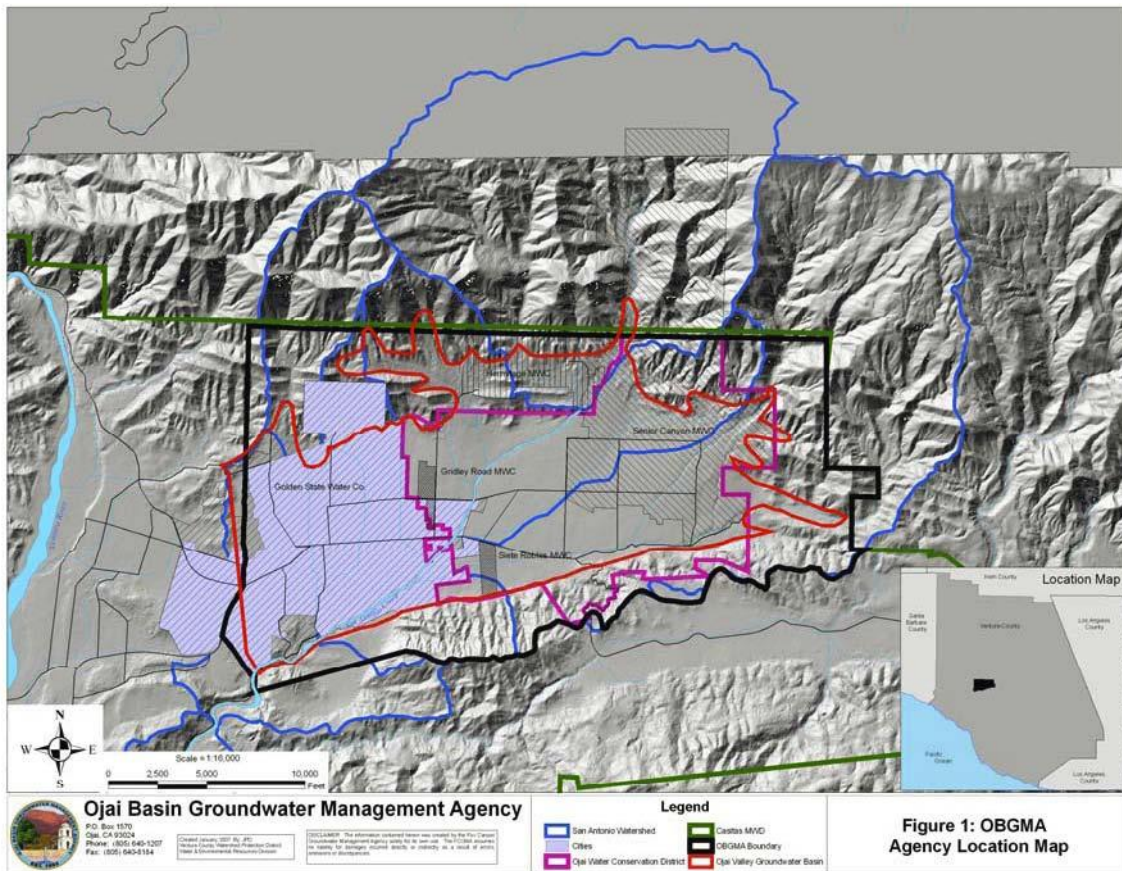


Figure 1 - OBGMA Agency Location Map

Two critical facts underline the importance of the Ojai Basin Groundwater Management Agency (OBGMA) and this Annual Report, which represents a summary of the basin conditions, the OBGMA activities and efforts to manage the basin in keeping with its Management Plan and enabling legislature .

Chronic drought is a climatic reality. Over the last 100 years there were several serious droughts, and climate change may likely bring an increase in the number and intensity of years with below average rainfall. Local precipitation,

the only source of water in the Ventura River watershed, is predicted by several models to decrease in annual averages. Extended periods of drought are likely.

The Ventura River watershed is used by numerous interests. Most water available to the various water purveyors in the watershed is accounted for; it has been predicted that, in a long- term drought, the Lake Casitas could go dry. Existing wells already in the Ojai Basin are producing groundwater at a rate that is considered to be at or slightly below the safe yield of the basin, and it is predicted (with historical precedence) that in a long term drought a significant number of the existing wells will go dry. Stakeholders in the Ojai Basin can not expect an economically reasonable new source of water.

The OBGMA has been given the responsibility for managing the Ojai groundwater basin and, working with its constituents, the well operators in the basin, for conserving that groundwater. The intent of this plan is to avoid, where possible, and strive to minimize, the adverse economic and social impacts facing our valuable but limited water supply.

Board of Directors

The OBGMA Board consists of five members and their alternates. The five seats comprise representatives of each of the following entities:

- Ojai Water Conservation District
- City of Ojai
- Golden State Water Company
- Casitas Municipal Water District
- Mutual water companies

Regular attendance at each of the Board meetings is required to form a quorum and attend to board activities. During 2011 and 2012, the Board was comprised of the following personnel, with alternates occasionally representing and attending:

- Jerry Conrow, President (OWCD)
- Roger Essick (Mutual water companies)
- Russ Baggerly (CMWD)
- Ken Petersen (GSWC)
- Betsy Clapp (City of Ojai)

Summary of years' accomplishments

Over Calendar Years 2011 and 2012, OBGMA accomplished many activities in keeping with its enabling legislation and management planning, including:

- Held monthly board meetings with public participation to carry out the objectives of its enabling legislature and groundwater monitoring plan
- Supported recordation of water extractions for individual well owners
- Documented groundwater extraction from reported pumping
- Monitored water levels in the basin both automatically via a network of data loggers and manually

- Coordinated with County and private entities to monitor basin conditions
- Permitted the construction of four water wells in 2011 and four in 2012
- Successfully completed a groundwater model of the basin
- Supported the ongoing design and permitting of the San Antonio Spreading Grounds rehabilitation project (SACSGRP)
- Participated in outreach programs including presentations to the Groundwater Resources Association of California (GRAC)
- Drafted detailed plans for basin inflow and outflow monitoring and applied to the State for Local Groundwater Assistance Funding to implement the planned monitoring
- Compiled geologic and hydrogeologic data to further the understanding of the basin
- Participated in watershed, county, and state-wide meetings, conferences, and discussions to further the Agency's participation and exposure to affect policy
- Assisted individual stakeholders to understand their roles, rights, and responsibilities as overlying landowners of the groundwater basin.
- Developed, maintained and updated the website (www.obgma.com) to inform the public regarding the OBGMA activities and basin conditions.

2.0 Duties And Responsibilities

The OBGMA is required by law to have a Groundwater Management Plan (Plan) to guide its operations. The initial Plan was prepared and published in 1995. The 2007 Update provided additional information to the original Plan and has been developed based on studies done for the Agency by its hydrogeologists, engineering contractors, input from well owners and water users, recommendations made by the Agency's advisory committee and by the State of California Department of Water Resources. Figure 1 presents a map of the OBGMA area of purview and service areas of other local agencies.

In the ensuing years between the original Plan publication and the 2007 update, numerous studies and projects have been undertaken in the Basin within the purview of the OBGMA and have led to a better understanding of Basin hydrogeology, demands, and hydrologic fluctuations which affect the stakeholders. Continually improved understanding provides an additional level of detail to the goals and objectives of the Plan; as the understanding of the Basin improves over the years, updates to the Plan will be incorporated. It is anticipated that the Plan will be updated every five years.

The Plan consists of five broad goals. Each goal includes a number of action elements, and as described herein there are tables under each goal which demonstrate when various action elements were completed or are planned for completion. While the five broad goals will provide the structure to the Agency's management efforts for several years, the Agency anticipates that the detailed action elements will evolve as the Agency's efforts continue to progress. Approved plan elements will be implemented in the form of rules,

regulations or ordinances. Prior to implementation, additional criteria to guide these actions will be developed in a public process by the Board and added to this management plan. Some elements as noted herein require more study and public review before specific implementation actions are approved. Additions will be made to this Plan as actions to implement these elements are reviewed by the water users and well owners in the basin and approved by the Agency Board of Directors (Board). Revisions or updates to the approved Plan will be made only after full review, consideration of any advisory recommendation and formal approval by the Board.

The five goals are described in detail in the 2007 Groundwater Management Plan Update available at www.OBGMA.com, and are:

- 1) Understanding the Basin
- 2) Controlling Exports; protecting and managing the Basin
- 3) Encouraging Supporting Activities
- 4) Effective Communication
- 5) Efficient Administration

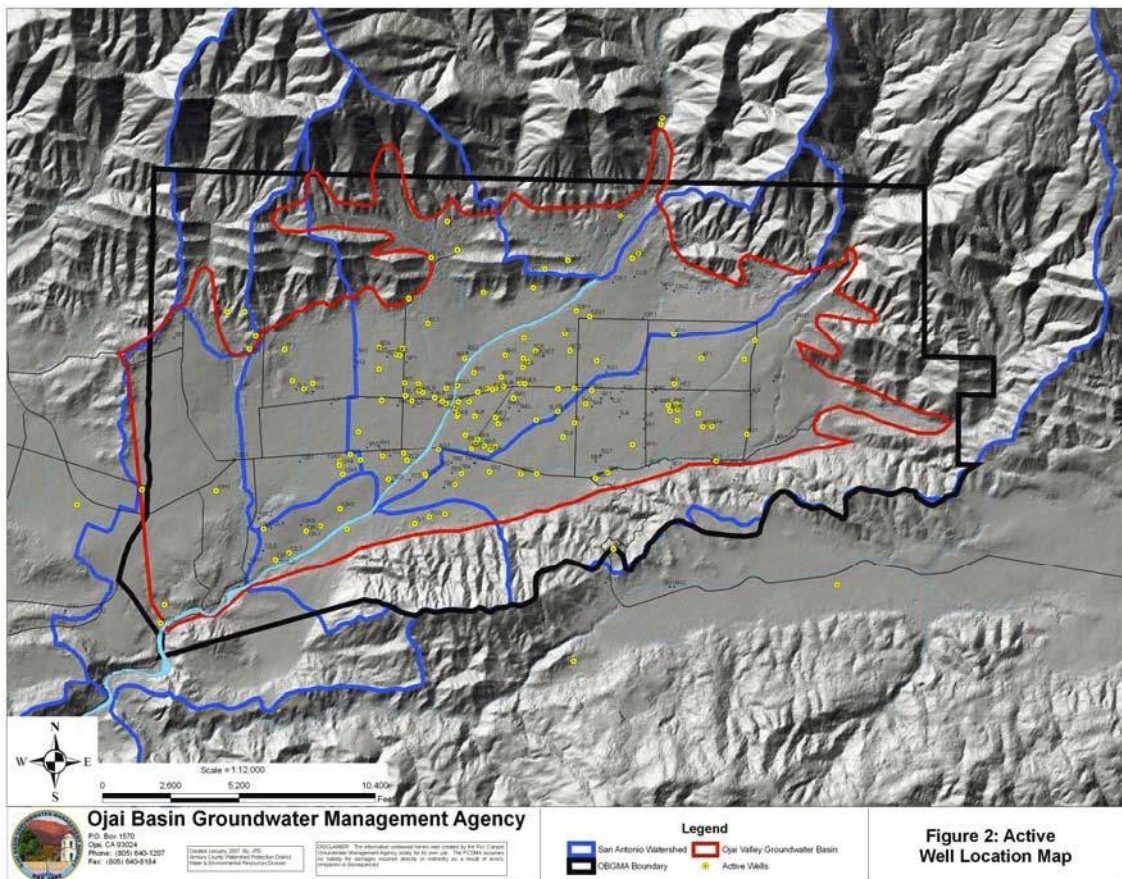


Figure 2- Active Well Location Map

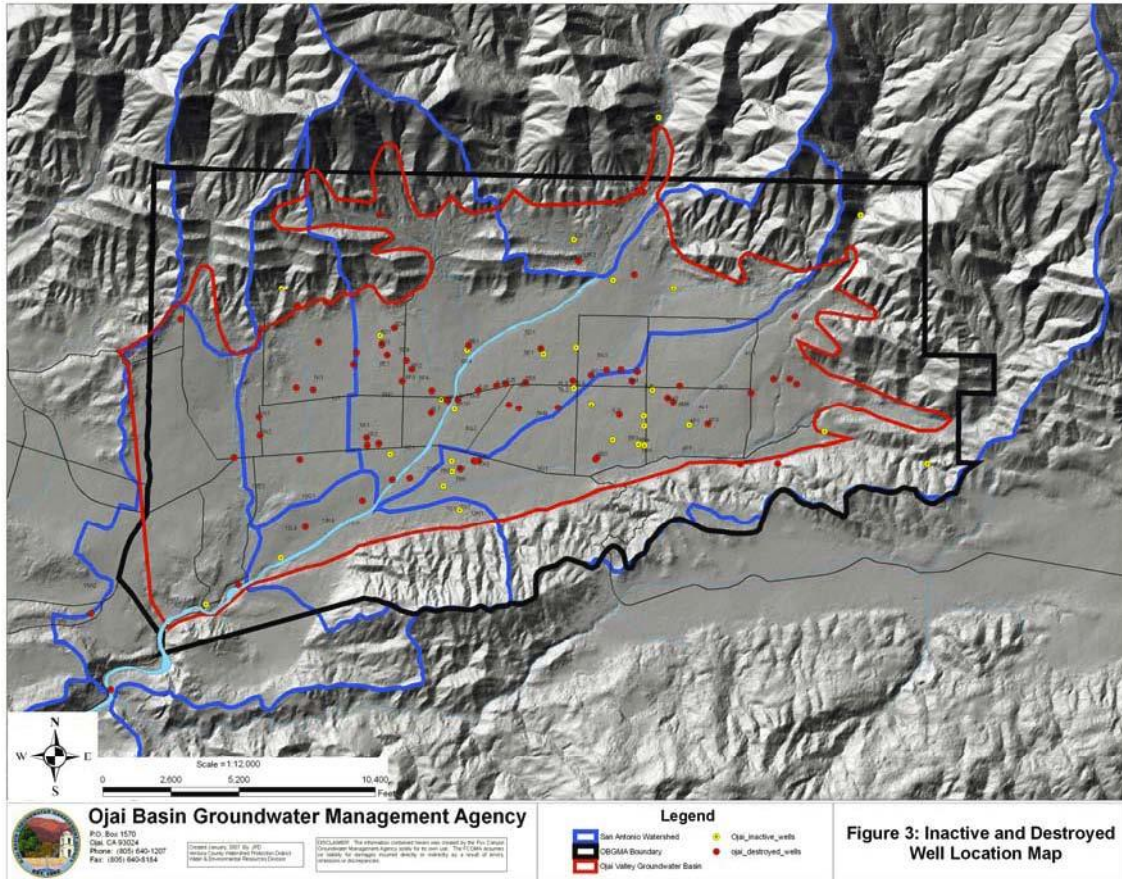


Figure 3- Inactive and destroyed Well Location Map

Ordinances

Many of these goals are met by enacting ordinances and resolutions. During the 2011 and 2012 Calendar Years, no new ordinances were adopted

Resolutions

During the 2011 and 2012 Calendar Years, the following Resolution was adopted and implemented:

Resolution 2011-1 (draft) and 2, adopted, signed, and approved June 30, 2011 approved an extraction charge of \$15.00 per Acre Foot.

Projects

Two Major Projects were implemented with the OBGMA serving as major stakeholder.

The Groundwater Model

Importantly, the OBGMA completed the "Groundwater Model Development, Ojai Basin, Ventura County, California," in final form on November 15, 2011. This significant modeling effort was funded through the DWR Local Groundwater Assistance (LGA) Program and represented a leap in the technical understanding of the Basin and the capabilities of the OBGMA to model various scenarios related to natural and artificial recharge, groundwater extraction, and new well construction. Ongoing model updates, conducted at the discretion of the Board, allow the OBGMA to consider the effects of various scenarios including drought, recharge, additional well construction and groundwater extraction.

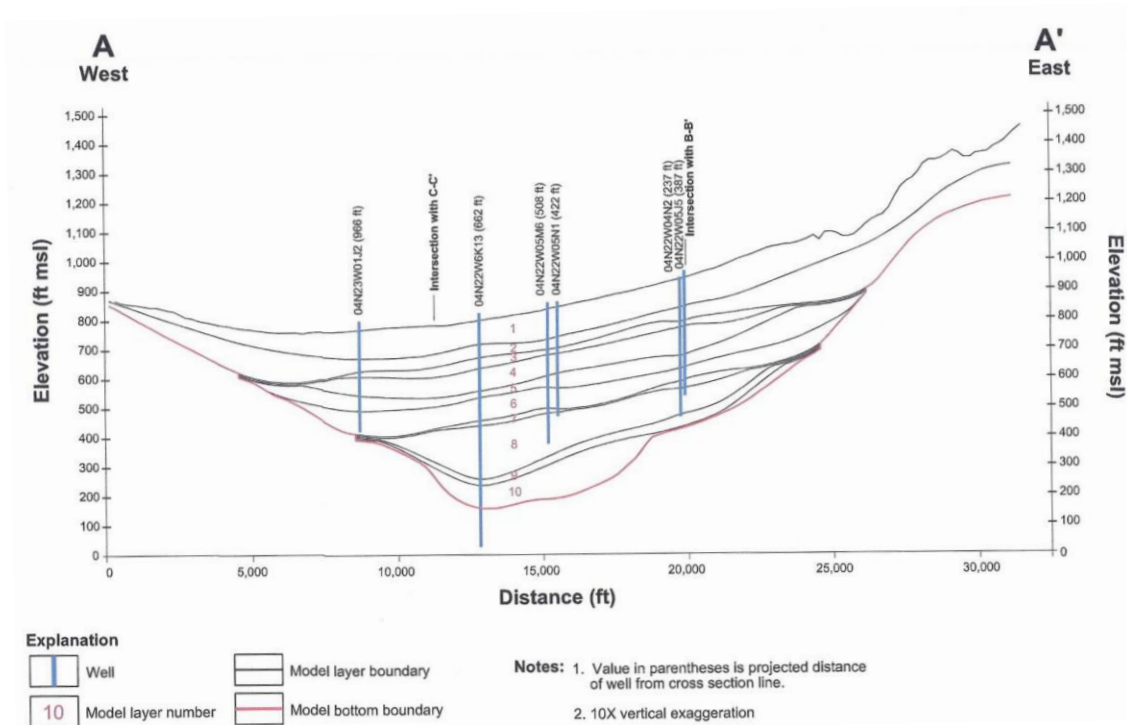


Figure 4 - West to east cross section showing 11 model layers

The SACSGRP

The San Antonio Creek Spreading Grounds Rehabilitation Project (SACSGRP) is intended to increase groundwater storage and recharge in the Ojai Valley Groundwater Basin by rebuilding an abandoned diversion works, rehabilitating existing relic infiltration basins, and constructing passive percolation recharge wells adjacent to San Antonio Creek. The project site is located on an 11.4 acre parcel of land owned by the Ventura County Watershed Protection District adjacent to San Antonio Creek, within the

unincorporated portion of Ventura County, approximately 0.9 miles northeast of the City of Ojai, California. The proposed project received \$1,315,000 in grant funding from the State Water Resources Control Board through the Proposition 50 Integrated Regional Water Management Grant, which was awarded to the Watershed Coalition of Ventura County. A stakeholder group composed of the Ojai Basin Groundwater Management Agency, the Ojai Water Conservation District, the Golden State Water Company, the Casitas Municipal Water District and the Ventura County Watershed Protection District was formed in January 2008 to collaborate on the implementation and maintenance of the proposed project. The primary purpose of the project is to capture 25 cubic feet per second (cfs) of surface flow (when available) from San Antonio Creek to recharge the Ojai Valley Groundwater Basin and help augment the Ojai Valley's water supply.

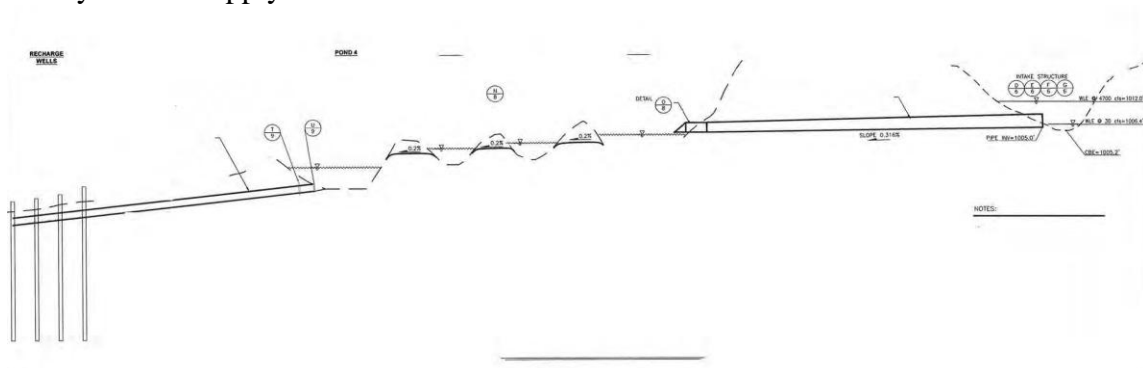


Figure 5 -Hydraulic profile for SACSGRP from diversions through intake to recharge wells

The Ojai Groundwater Basin Inflow/Outflow Study

OBGMA Completed an application to the 2012 DWR LGA grant solicitation to implement the proposed project entitled "Ojai Groundwater Basin Inflow/Outflow Study," which has been abbreviated to the acronym of "IOS." As the name implies, the IOS strives to quantify the inflowing surface water that recharges the basin, the outflowing surface water that discharges from the basin, and quantify the surface water flowing through the central portion of the basin at the point of compliance for the SACSGRP.

Although the project was not initially funded through the highly competitive LGA process, the workplan presented in the application can serve for the OBGMA's implementation in a self-funded means or future grant applications.

The application components are found at:

<http://www.water.ca.gov/lgagrnt/docs/applications/Ojai%20Basin%20Groundwater%20Management%20Agency%20%28201209870016%29/>

Inventory and Status of Wells

During 2011, 125 wells were actively reporting groundwater extraction from the Ojai Basin. During 2012, this number decreased by one, as a net decrease in well inventory was realized; four new wells were constructed each year, two wells were destroyed in 2012 and one was destroyed in 2011.

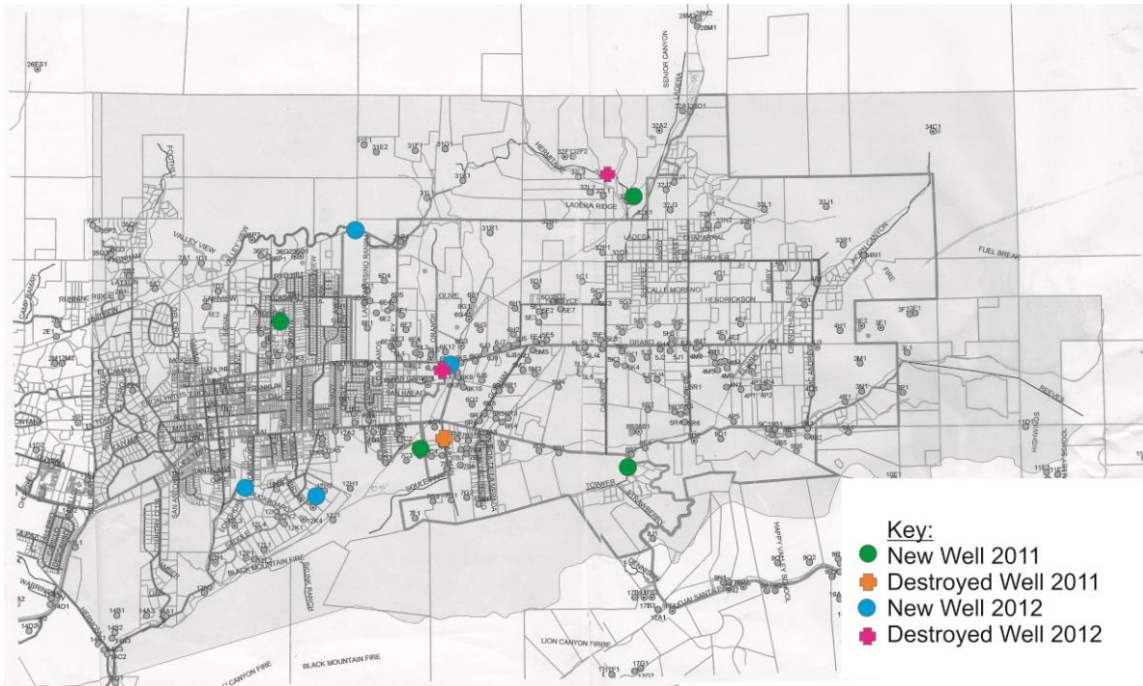


Figure 6- New and Destroyed Well Location Map

3.0 Precipitation

In the Ventura River Watershed, no significant water is imported for human uses including agricultural, irrigation, or municipal supplies. Virtually all water tributary to the Ojai Groundwater Basin derives from the hydrologic cycle as precipitation within the mountainous area surrounding the Ojai Basin and, to a lesser degree, precipitation on the valley floor itself.

An excellent proxy for recharge is precipitation as measured at the Ojai Fire Station. Long-term (1931-2012) average annual rainfall at that location is 21.21 inches; higher in the watershed, the average annual precipitation is nearly 36 inches.

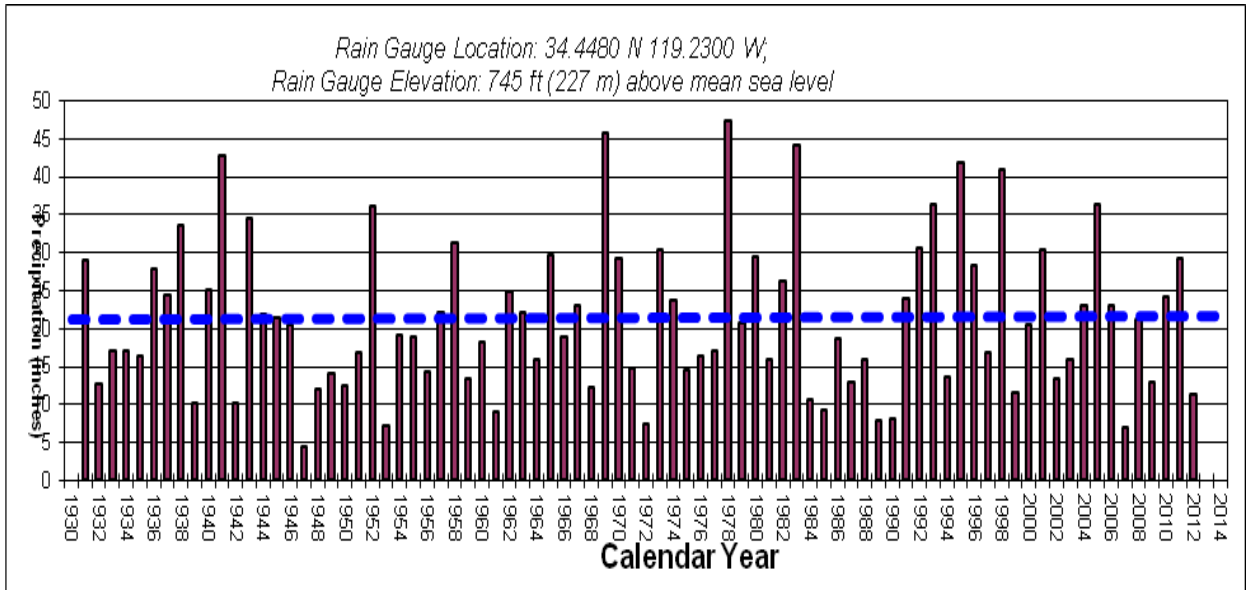


Figure 7- Precipitation at Ojai Valley Floor

In addition to the bar chart presented above, the accumulative departure from average annual precipitation is an indicator of drought periods versus periods of "normal" or "wet" periods. As the curve declines to the right, a period of drought is realized. Locally, it appears that a drought period began after the end of the 2010-2011 water year.

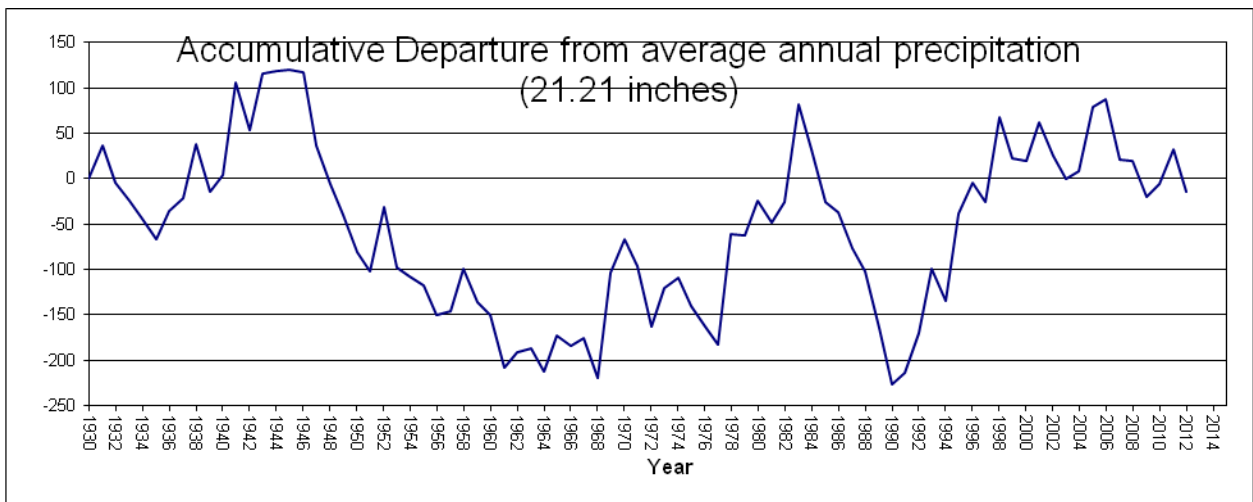


Figure 8- Accumulative departure curve

Based on the amount of precipitation measured within the watershed, and modeled recharge estimates, the OBGMA estimates that during water year ending 2011, 29.27 inches of rain fell on the valley floor and upwards of 10,000 acre-feet of water recharged to the basin. Similarly, during water year ending September 30, 2012, 11.35 inches of rain fell on the valley floor and about 2,000 acre feet of recharge was added to the basin storage.

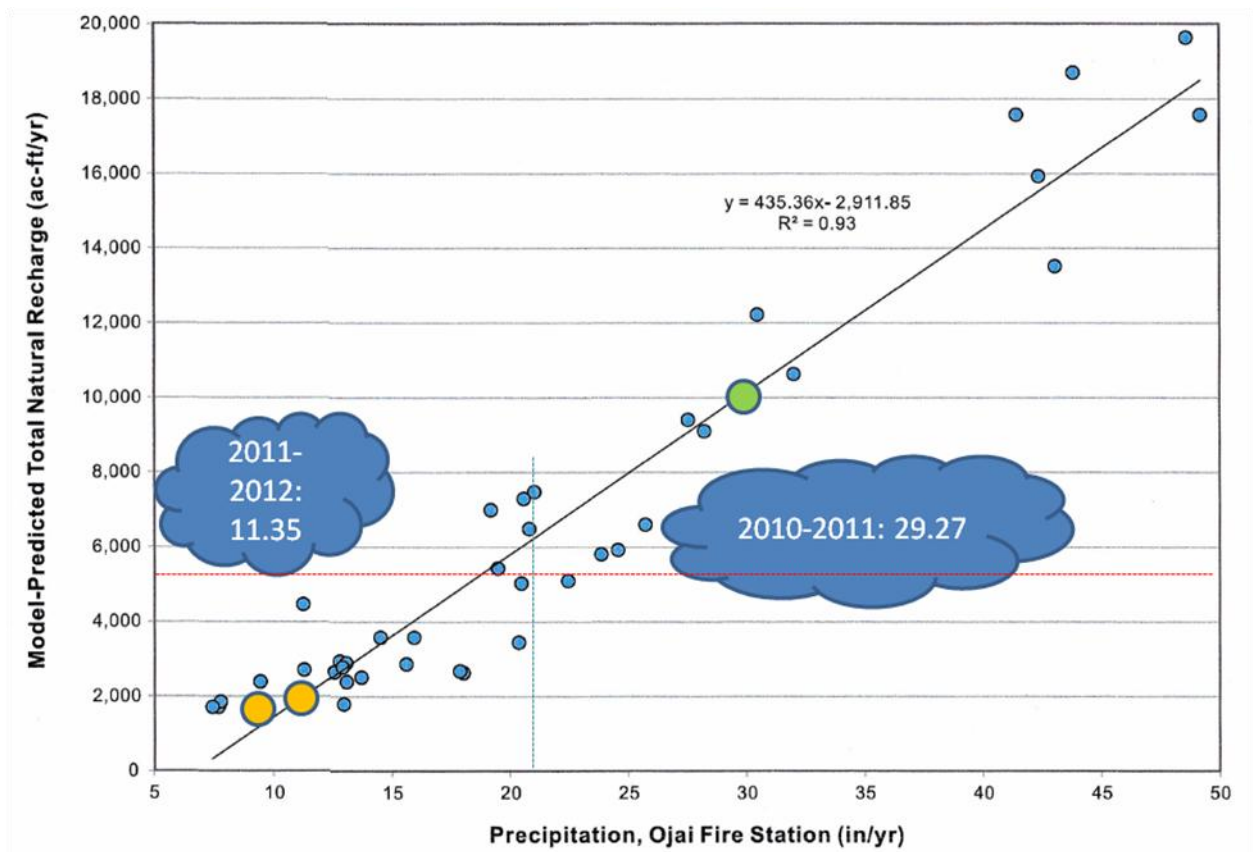


Figure 9- Relationship between precipitation and recharge

4.0 Groundwater Levels

Modeled and observed phenomena indicate that any precipitation less than 11 inches on the valley floor is taken up by evapotranspiration and soil storage, among other factors, and that significant recharge is limited to primarily subsurface flow during these drier years. The OBGMA's monitoring of the basal alluvial aquifer near the SACGRP Project indicate a favorable component of "recharge without rainfall" as discharges from adjacent bedrock aquifers contribute spring flow and subterranean contributions to the alluvial aquifers.

SACSGRP DDMW 190-210 feet: Basal Alluvial Aquifer

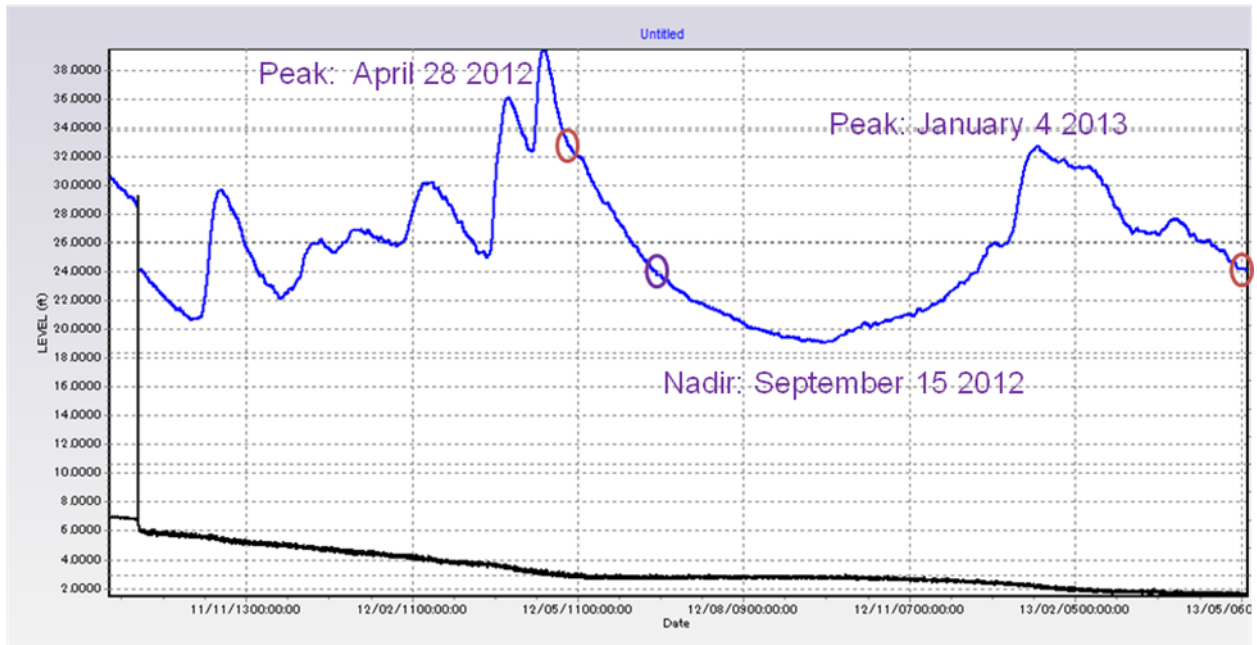


Figure 10- SACSGRP DDMW water levels October 2011 to May 2013

Monitoring of water levels by the County and OBGMA in several key wells provide a direct insight into basin storage and the effects of drought on portions of the basin. Generally, peripheral northern and eastern areas appear to be less affected by the droughts as they store the bedrock-derived recharge first as compared to central and southern portions of the basin. Additional storage capacity and extraction from the central portions of the basin compared to the peripheral areas also contribute to this phenomenon of discrepancy in water levels.

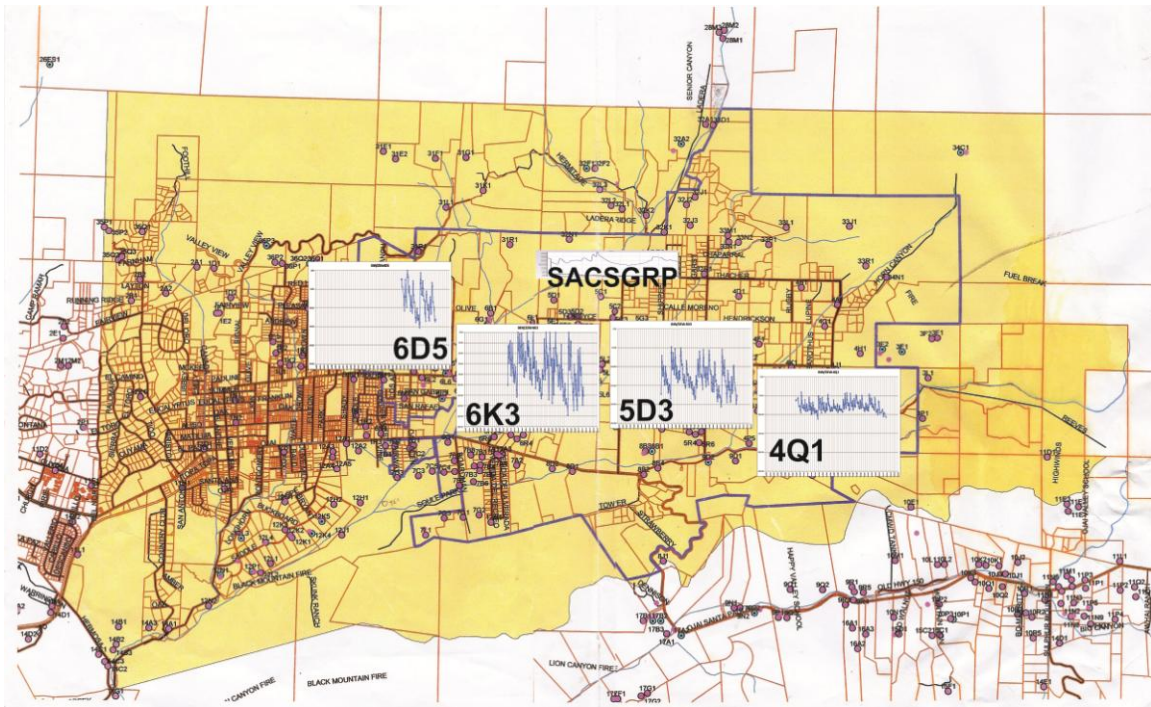
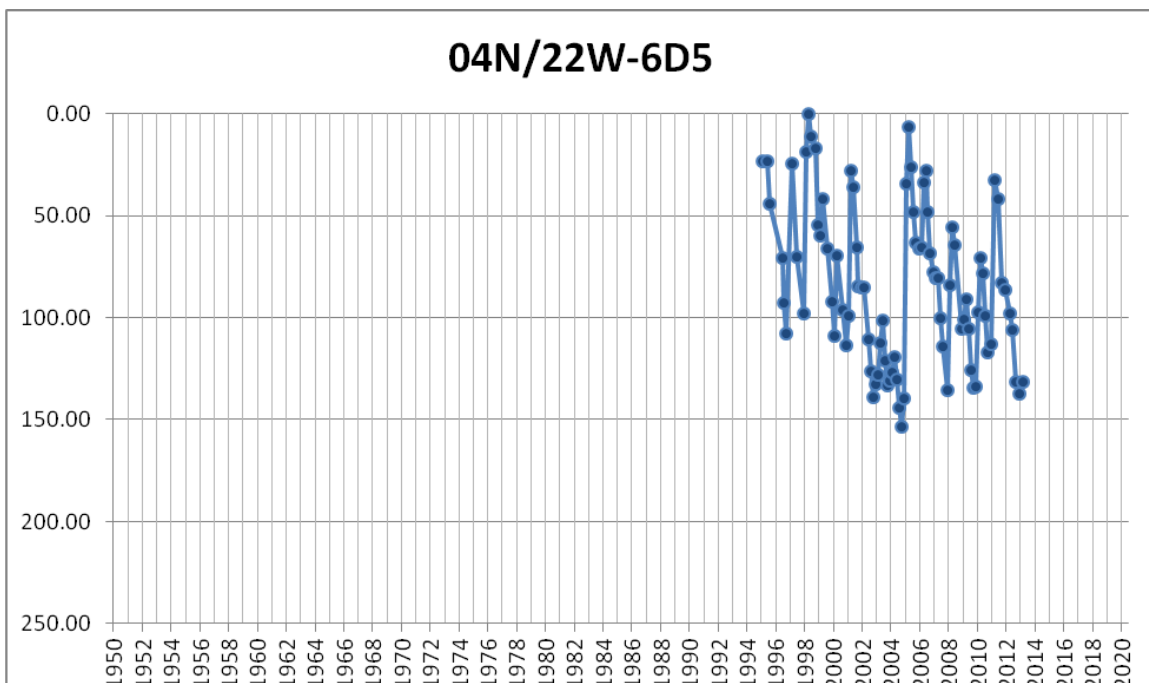
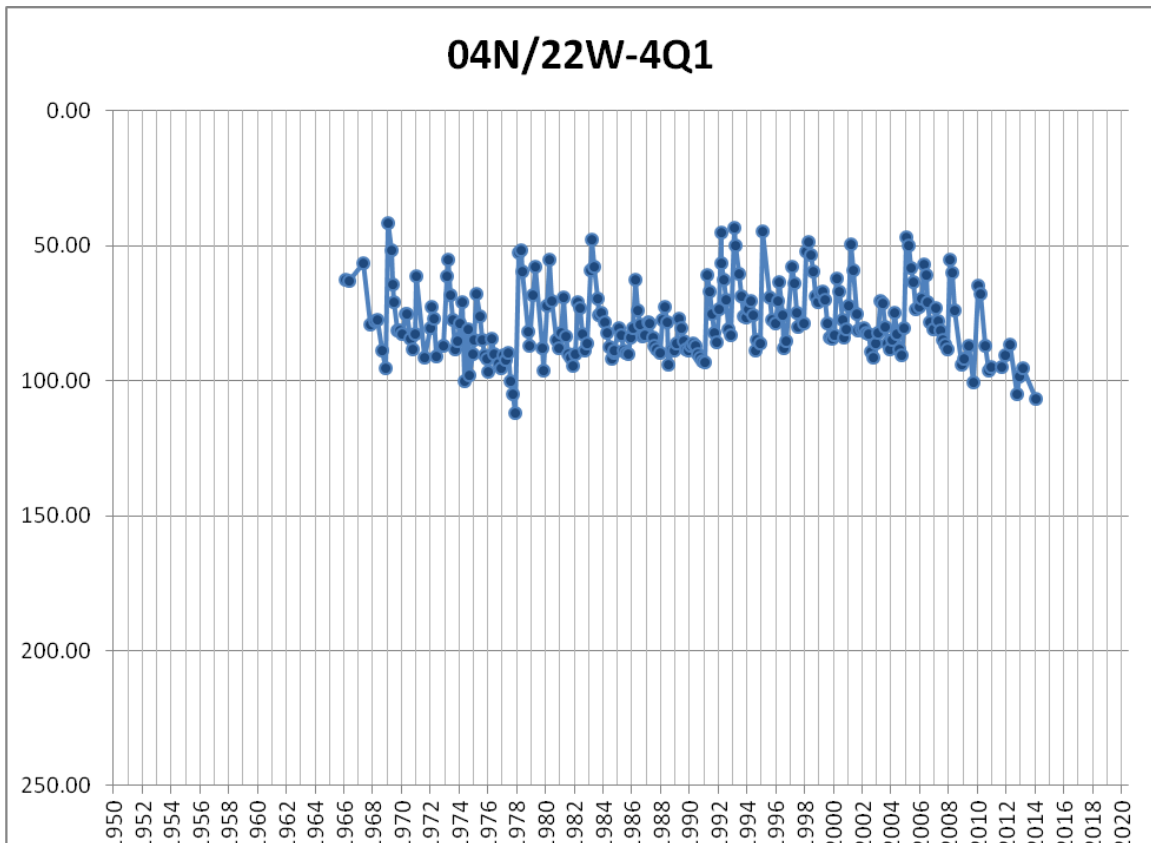
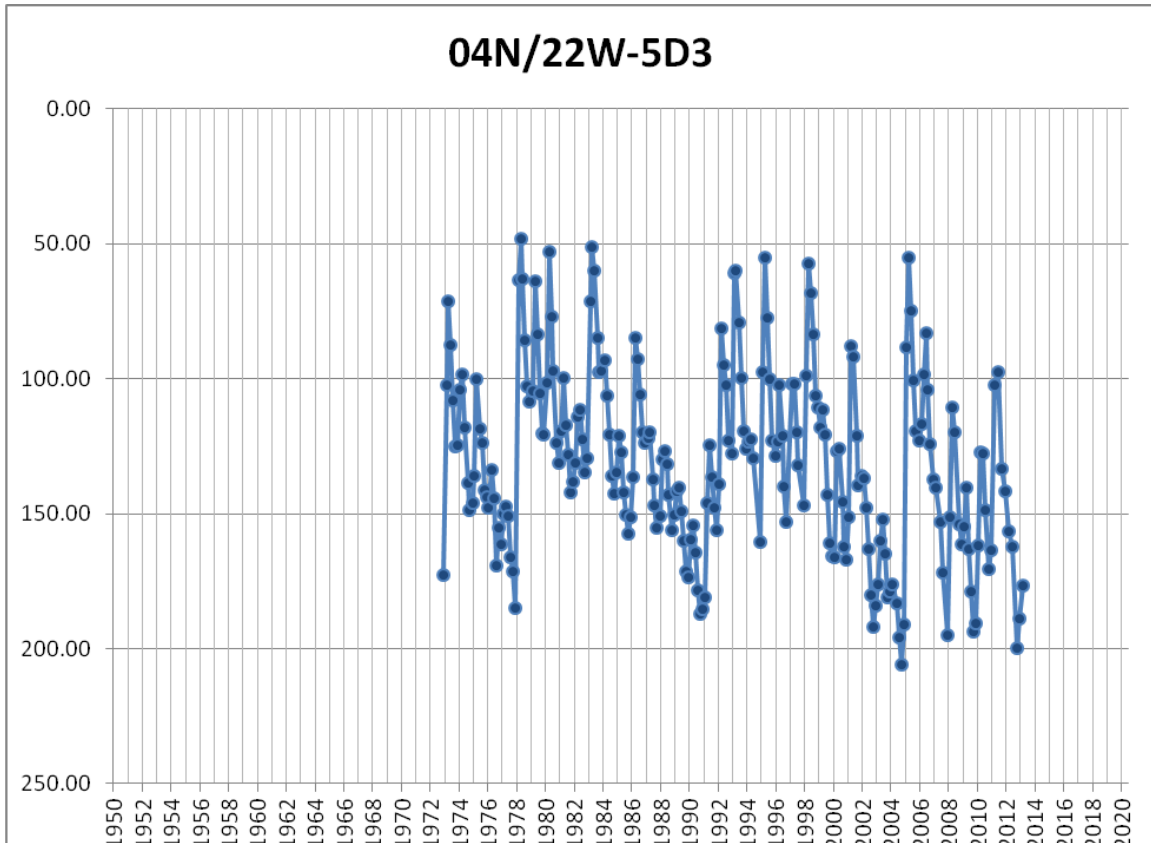
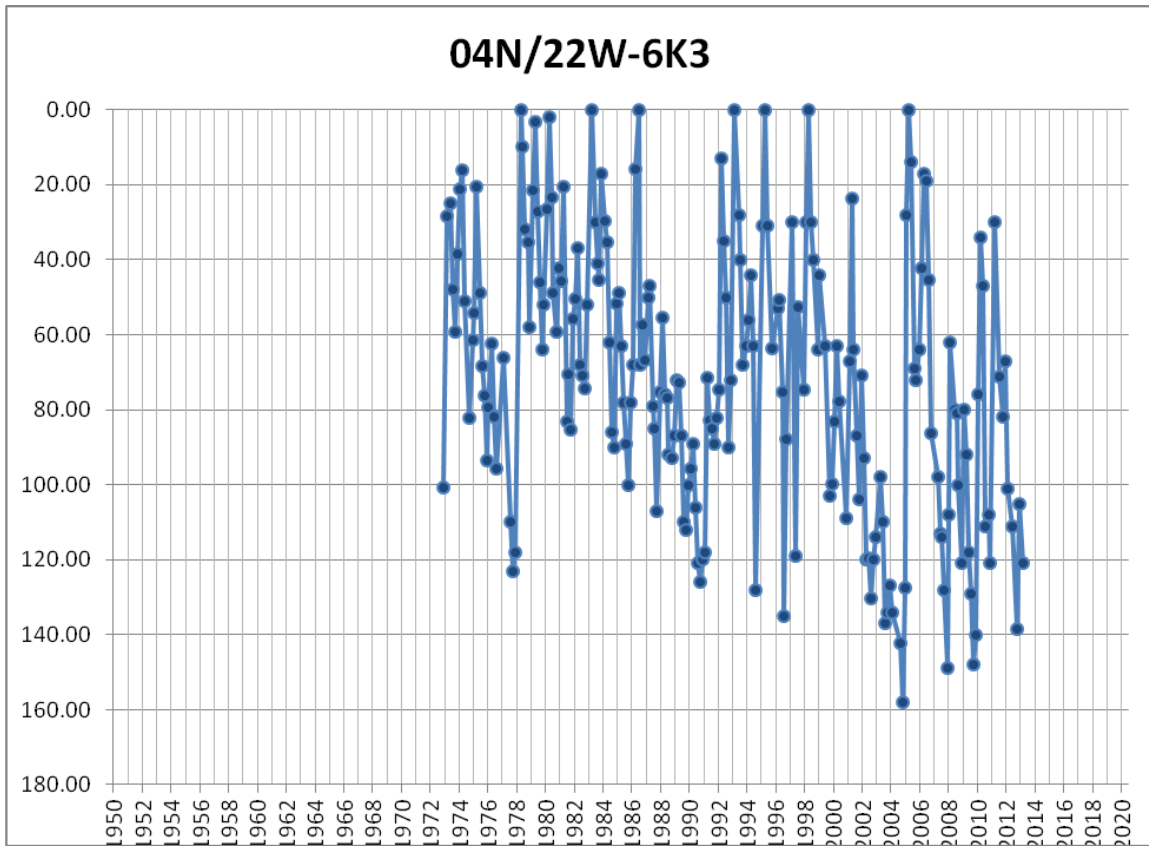


Figure 11 - Locations of Wells with hydrographs are shown above, including the SACSGRP DDMW basal alluvial aquifer, while details of the data are presented on the following graphs.



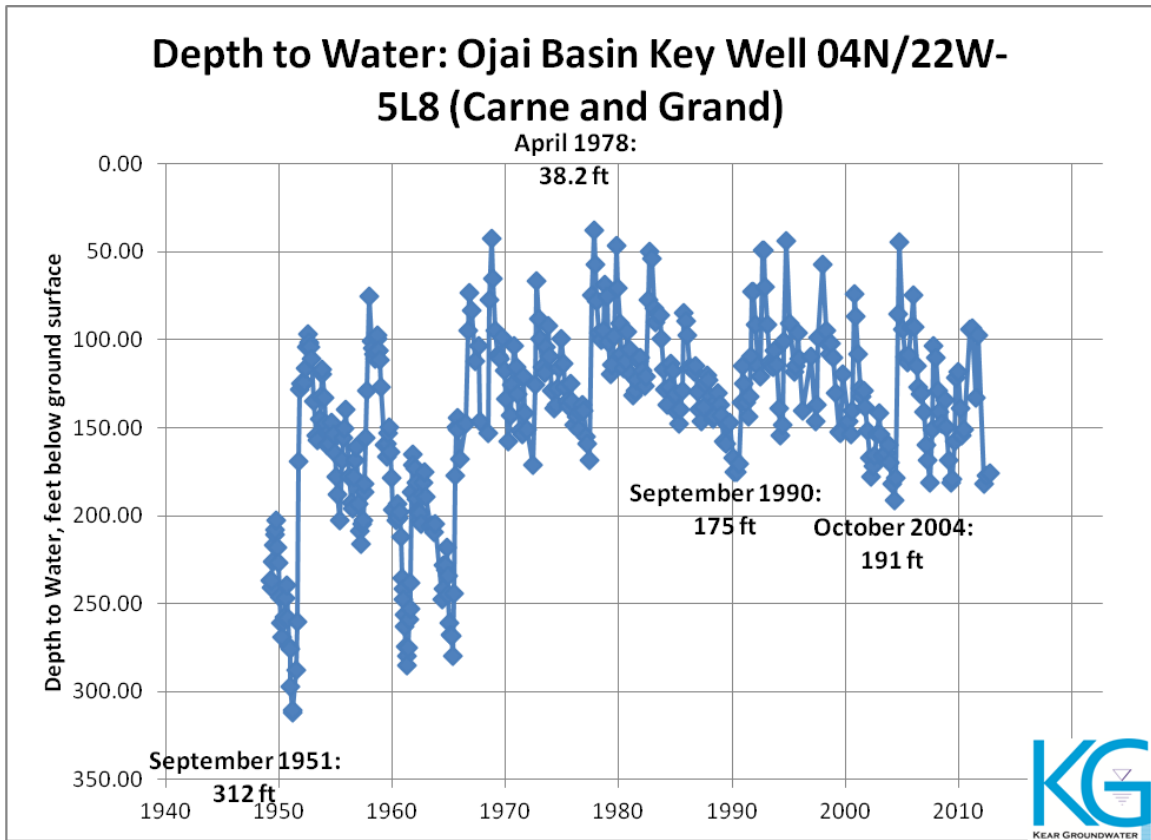




Based on the hydrographic data, the OBGMA estimates that the amount of groundwater in storage in the Basin at the spring high point is as follows:

The historic nadir in basin storage was in 1951 during a significant drought and before the current practice of conjunctive use including Casitas water imports was commonplace. At that time, in 1951, 43,741 acre feet are estimated to have been in storage in the Basin. This nadir is a significant threshold because the confined aquifer skeleton would have been maximally compacted at that time. Static water levels below that depth would increase compaction and potentially cause subsidence and cause irrecoverable storage capacity in the Ojai Basin.

<u>YEAR</u>	<u>Springtime Basin storage (Acre Feet)</u>
2002	62,567 AF
2003	57,087 AF
2004	55,094 AF
2005	80,000 AF <i>Artesian Flow Observed</i>
2006	62,810 AF <i>Artesian Flow Observed</i>
2007	49,750 AF
2008	59,000 AF
2009	50,000 AF
2010	54,627 AF
2011	63,944 AF <i>Artesian Flow Observed</i>
2012	62,402 AF



5.0 Groundwater Quality

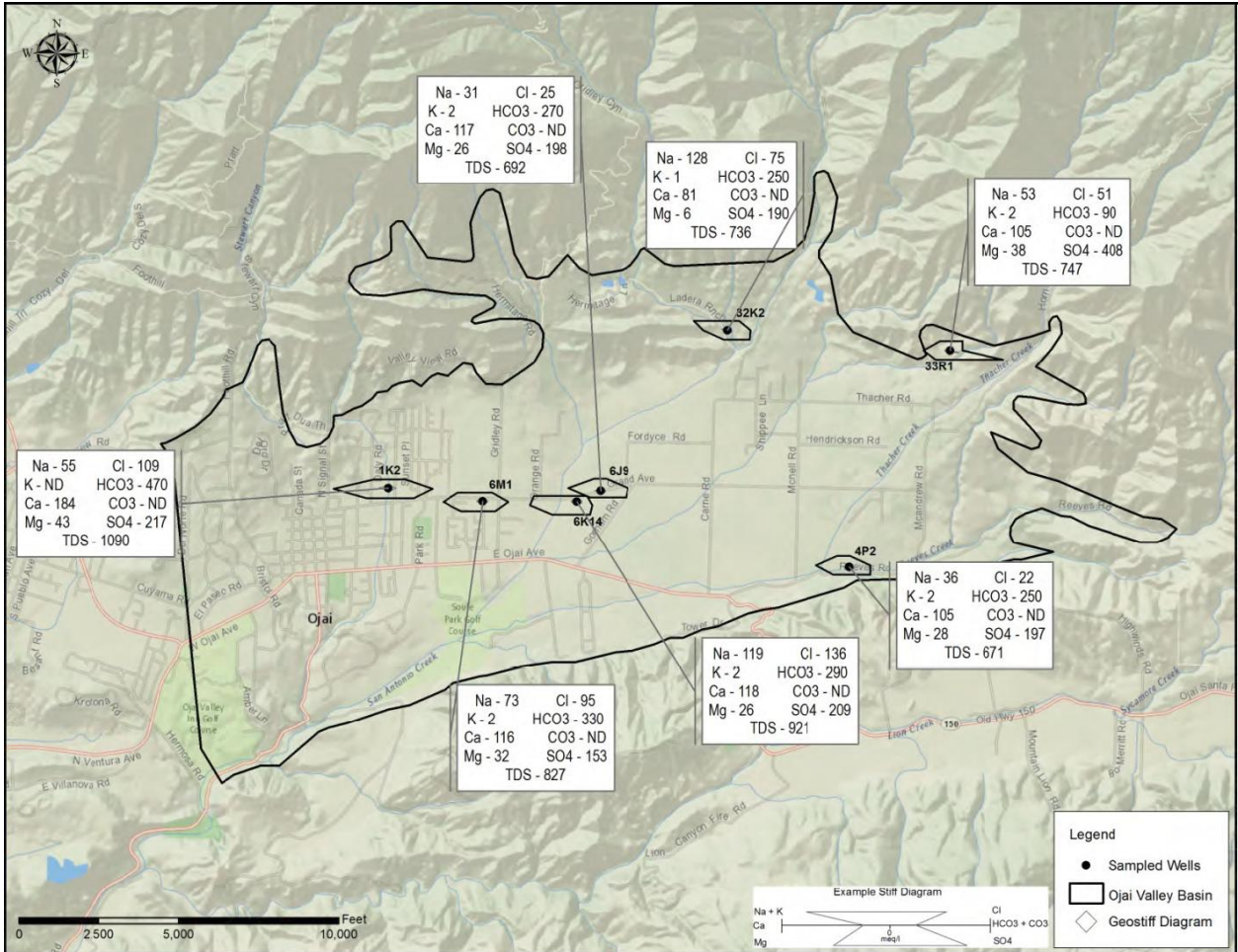


Figure 12- General water quality data 2012

The Ojai Valley Basin water quality is considered good for domestic and agricultural purposes. Average TDS is 812 mg/l and ranges from 671 to 1090 mg/l in county-sampled and reported wells. Depth-discrete information indicate a higher chloride concentration in deep aquifers in the central and southwestern portion of the basin. Two wells have iron (Fe) concentrations above the secondary MCL for drinking water. Water samples from three wells were analyzed for inorganic chemicals (Title 22 metals). No inorganic chemical was above the primary MCL for drinking water. Stiff water quality diagrams in the figure above show that Ojai Valley groundwater chemistry is quite variable. The above figure also shows approximate well locations and concentrations of total dissolved solids (TDS), sodium (Na⁺), potassium (K⁺), calcium (Ca²⁺), magnesium (Mg²⁺), chloride (Cl⁻), bicarbonate (HCO₃⁻), carbonate (CO₃²⁻) and sulfate (SO₄²⁻) for the wells sampled by the County of Ventura in the Ojai Valley basin in 2012.

6.0 Groundwater Extractions

Reported Extractions

Reported extractions from 125 wells in 2011 and 124 wells in 2012 indicate an extraction quantity of 5,125 acre-feet and 5,310 acre-feet, respectively.

These extraction totals are in-line with historical use and trends since the OBGMA has been monitoring extractions from the Basin. Graphical depiction of these extractions, compared to estimated irrigation demand, imported water, and municipal groundwater extraction, are presented and tabulated below. Notably absent from this calculation is the imported water from Lake Casitas that Golden State Water Company (GSWC) provided to its customers.

Since the passage of OBGMA Ordinance No. 7 requiring metering of extraction facilities, an increased accuracy is afforded to these calculations and reporting. Additionally, a general declining trend may be observed owing to the fact that crop factors, formerly used to estimate extraction, often overestimated the actual amount of groundwater extraction.

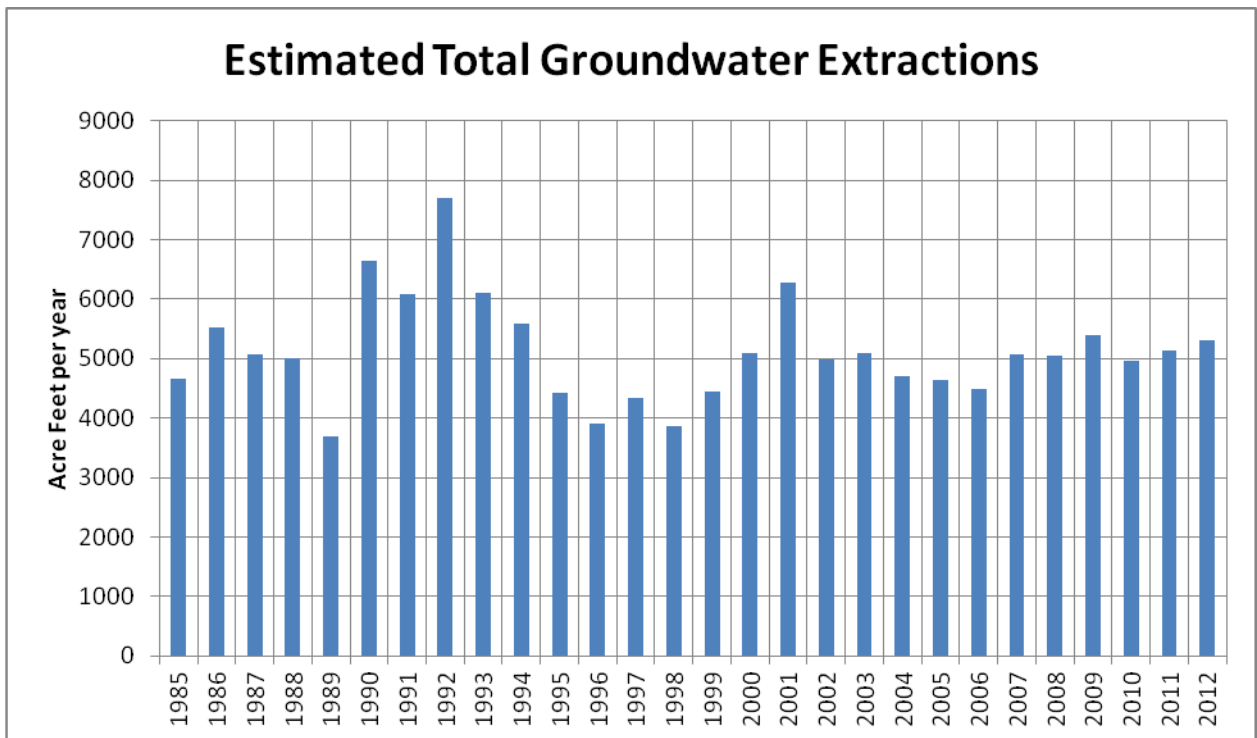


Figure 13 - Acre feet of groundwater extraction over time

Groundwater Extractions, Demands and Imports

Calendar Year	Estimated Irrigation Demand	Casitas Importation	Estimated Groundwater Extraction (Private Wells)	Groundwater Extraction (GSWC)	Estimated Total Groundwater Extractions
1985	7200	4181	3019	1638	4657
1986	7500	3633	3867	1663	5530
1987	7800	4473	3327	1744	5071
1988	7796	4635	3161	1839	5000
1989	7093	5169	1924	1766	3690
1990	9804	4961	4843	1804	6647
1991	7631	3377	4254	1819	6073
1992	8769	2744	6052	1645	7697
1993	6829	2800	4029	2070	6099
1994	7072	3433	3639	1946	5585
1995	6117	3530	2587	1846	4433
1996	6801	4468	2333	1569	3902
1997	8017	5272	2745	1583	4328
1998	5071	3115	1956	1913	3869
1999	6185	3922	2263	2181	4444
2000	7054	4044	3010	2080	5090
2001	7204	3195	4009	2258	6267
2002	7021	4249	2772	2220	4992
2003	6450	3428	3022	2066	5088
2004	7058	4185	2873	1824	4697
2005	5462	2768	2694	1955	4649
2006	5462	2796	2666	1818	4484
2007	6877	3770	3107	1963	5070
2008	6492	3176	3316	1736	5052
2009	7054	3411	3643	1751	5394
2010	5633	2404	3229	1742	4971
2011	5867	2990	3191	1934	5125
2012	6292	2986	3664	1646	5310

Natural Discharge

Natural discharge from the Basin occurs primarily via San Antonio Creek. Modeled discharge to surface streams is reported to average 2,282 Acre feet per year. Smaller components of discharge are to evapotranspiration (258 af/yr) and outflow to downgradient bedrock and alluvium (129 AF/yr).

In Water Year Ending 2011, a total of 10,597 acre feet are calculated to have discharged at San Antonio Creek beneath the Casitas Springs bridge at Highway 33. This compares to 906 Acre feet at the same point for water year ending 2012. The Ojai Basin comprises

approximately 70.3 percent of the surface water tributary area to this gage and is one of the only groundwater basins that provides perennial discharge to the creek system. Although no active gage is present to date near the discharge point from the Ojai Basin, monitoring of the San Antonio Creek at Creek Road is within the OBGMA Purview and a planned activity.

7.0 Conclusions

Outlook for coming year (2013 and 2014)

Local precipitation in 2011 and 2012 represented a drying trend with declining precipitation totals for each water year. Continued persistent drought is anticipated, with low precipitation anticipated for 2013 and 2014. Demand on the Basin is anticipated to be high and natural discharges low.

Agency Planned Activities

For 2013 the OBGMA is planning several key objectives:

- Continued involvement in the SACSGRP, slated for construction late 2013
- Installing and monitoring additional continuous water level monitoring devices in key stakeholders' wells
- Adding hydrographs to the website
- Permitting wells
- Running model updates to evaluate dynamic conditions and scenarios
- Holding monthly board meetings with public participation to carry out the objectives of its enabling legislature and groundwater monitoring plan
- Supporting recordation of water extractions for individual well owners
- Documenting groundwater extraction from reported pumping
- Coordinating with County and private entities to monitor basin conditions
- Participated in outreach programs
- Compiling geologic and hydrogeologic data to further the understanding of the basin
- Participating in watershed, county, and state-wide meetings, conferences, and discussions to further the agency's participation and exposure to affect policy
- Assisting individual stakeholders to understand their roles, rights, and responsibilities as overlying landowners of the groundwater basin.
- Maintaining and updating the website to inform the public regarding the OBGMA activities and basin conditions.
- Considering a Groundwater Management Plan Update
- Considering the ramifications of ownership transfer of GSWC on basin management, possibly revising the OBGMA Act
- Continue to explore and apply for grant funding opportunities to carry out the OBGMA responsibilities, goals and objectives.