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Panel on Water in the Ojai Valley

Sunday, April 15th, 2018 • 3:00–5:00PM

We wish to thank our panelists for giving their time and expertise to this critical matter.
We hope this afternoon will provide insight and community support as we explore solutions to our water situation, as well as the implications of the options now under consideration.

Ojai CHAUTAUQUA

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The Ojai Chautauqua

The Ojai Chautauqua is part of a 150-year tradition that has thrived across the United States since the 19th century. The concept of the *Chautauqua* is to build community by bringing together ideas, entertainment, discussion, and expertise to local family and community gatherings. Former U.S. President Theodore Roosevelt is quoted as saying that the Chautauqua is "The most American thing in America."

Ojai has modernized the Chautauqua tradition by focusing on today's need to improve civil discourse on controversial subjects, where passions tend to run high. Civil discourse is noticeably absent from many aspects of contemporary life. The result of this failing is not only sad… It is dangerous. Through the Ojai Chautauqua, we hope to develop this essential ability so that together we can affect a positive change that extends far and wide. Visit **www.ojaichat.org** to view our past panels, to learn about future events, and to contribute to this endeavor.

Ojai Valley Chamber of Commerce

OAK GROVE SCHOOL

This free event is made possible with support from private donors, the Ojai Valley Chamber of Commerce, and Oak Grove School.

Ojai Chautauqua Moderator

Tom Krause

Tom Krause is the President of the *Ojai Chautauqua* Committee. Over the last 35 years, Tom has been an entrepreneur, consultant and frequent author and speaker on topics such as culture change, cognitive bias, leadership development, executive decision-making, behavioral safety, and patient safety. He is currently president of *The Agora Foundation*, a member of the Board of Visitors and Governors for St. John's College, and the Board of Directors of Thomas Aquinas College. In 1979 Tom co-founded Behavioral Science Technology (BST) now a global consulting firm acquired in 2012 by DEKRA Insight. Tom has a Ph.D. in Clinical Psychology from the University of California-Irvine, master's degrees from California State University-Long Beach and St. John's College of Santa Fe, New Mexico, and a bachelor's degree from California State University-Long Beach. He is a long-time Ojai resident and non-profit contributor.

Summary

When we perceive a generous supply of drinkable water around us we feel safe, and when we don't we feel nervous. And for good reason. Any hiker who has had the experience of running low on water with no water source in sight knows the situation well. That is how many describe feeling when they see the dry brush in the mountains (pre-Thomas Fire), dry creeks (pre-March and April rains) and the continuing very low lake level. We all agree that whatever the status quo is in terms of use and supply, something will have to change or we will eventually run out of water. What we disagree on is how to reduce the use and increase the supply. Those different ideas about solutions are what we are here today to discuss, in the spirit of civil discourse and to our mutual benefit.

First, some facts:

> Lake Casitas has a maximum water storage capacity of 238,000 Acre Feet (AF). The available annual supply from Lake Casitas is determined by the lake's *safe yield*. *Safe yield* is the amount of water that may be withdrawn from the lake on an average annual basis without depleting the supply. The Casitas *safe yield* was reevaluated in 2004 and determined to be 20,840 AF (Casitas, 2004).
>
> As of 8:56AM, April 2nd, 2018, the lake level was 491.24 feet, storing 84,889 AF, a lake capacity of 35.7%. So, if normal use is 20,840 AF per year, we have a little more than four years before the lake is dry. This revised lake level and capacity accounts for mud and silt residing at the bottom of the lake. Of course, if the current circumstances continue, drought stages are implemented to reduce use and extend the supply. More than expected rain will also extend the lake supply.

There are three proposals under consideration for today's conversation, and these options are not mutually exclusive:

1) **The Three Sisters Proposal** (Summary on pages 20-23). Casitas, Calleguas, and the City of Ventura would work together to pipe in water from the State Water Project, attaching Ojai to the state water grid. The lake can then recharge and become a storage container for reduced use and in emergency if needed.

2) **The Hobos Proposal** (Summary on pages 24-27). Casitas would drill three horizontal bores north of the lake in order to access potential underground water sources in the nearby mountains. This new source could decrease lake use and allow it to recharge.

3) **Redesigned Catchment and Storage, Valley Wide** (Summary on pages 28-31). The increase in supply would come not from a new source, but rather through rain catchments and systems that would allow the water to directly recharge the aquifers instead of running off to the ocean.

We look forward to a great conversation and to hearing your questions. **— The Ojai Chautauqua**

Ojai Chautauqua Panelists

Tom Ash

Tom Ash has over 30 years of experience in the fields of water use efficiency, public education and horticulture. As a water conservation specialist from the University of California, Tom was the University liaison to water agencies in southern California starting in 1987 (the beginning of the 1987-1992 drought). At the Irvine Ranch Water District (IRWD) Tom designed the first turf rebate program, use of recycled water for agricultural and commercial users, and implemented the first water budget tiered rate structure at a water agency. The combination of efficiency based water rates and conservation programs earned IRWD recognition as "the model" for rates and conservation by the US EPA (1996). Tom has been an advisor to the US Drought Policy Task Force (2002-2005), advised Sunset Magazine on water efficient landscapes, was the recipient of the first "Excellence in Water Conservation" Award presented by the California Urban Water Conservation Council (2000), and helped train water providers and the landscape industry in Australia during a game-changing 12-year drought. Tom is currently a Senior Planner at the Inland Empire Utilities Agency and a frequent visitor to the Ojai valley.

Mary Bergen

Mary first came to Ojai in 1957 when her parents bought a ranch on Creek Road. She learned to love the land by exploring the hills and canyons on horse and on foot. After graduating from high school, she became a marine biologist (B.A. Stanford, M.A. UCSB, Ph.D. USC). She worked on water quality and environmental issues as a consultant, researcher and staff biologist for Federal and State Agencies. In 2000, Mary moved back to the ranch in Ojai and permanently set down roots. She managed her family avocado orchard from 2000 to 2017. She has been on the Board of Directors of the Casitas Municipal Water District since 2010. She represents Casitas on the Board of the Upper Ventura River Groundwater Agency and is an alternate member of the Board of the Ojai Basin Groundwater Agency. She is on the Casitas ad hoc committee for State water issues.

Dan Breen

Dan Breen is a Managing Partner at CFX Direct LLC, a financial service firm based in Chicago, and has been a licensed securities broker for over 30 years. Dan is an expert in assisting investors locate and realize liquidity for non-listed Alternative Assets. Currently he is part of a team charged with creating new exchange platforms for crypto securities and other blockchain based securitized assets. Dan is a fourth generation Californian and has lived in Ojai for over 25 years with his wife Vicki Derby-Breen and son Zac. He is a current Director and former President of Siete Robles Mutual Water Company (SRMWC). Involvement in the neighborhood owned water company has given Dan the opportunity to thoroughly understand the water issues in Ojai and the people involved with those issues. He supervised the permitting, financing, testing and installation of the new well and filtration facilities for SRMWC. Currently he represents the Mutual Water Companies in the basin as President of the Ojai Basin Groundwater Management Agency (OBGMA).

Richard Hajas

Richard Hajas has been involved in the management of water and wastewater for over 40 years. He has managed the operations and maintenance of two major water districts in Ventura County (Casitas Municipal Water District and Camrosa Water District) and has provided management consulting services to other local agencies. His water resource planning experience includes chairing the steering committee for development of the Calleguas Creek Watershed Plan encompassing four major cities, thousands of acres of prime agricultural land and valuable wetlands in Ventura County. During his career he has authored several studies analyzing the costs and benefits of multi-million-dollar projects, such as: the development of the Conejo Creek Project, the largest reclaimed water project in Ventura County; construction of a wastewater treatment plant; and the acquisition of a sewer service district by the City of Ventura. Beginning in 2007 he used his experience to assist the Ojai community effort to replace the CPUC regulated water company, Golden State Water. He authored a feasibility analysis of the acquisition, which became the basis for the eventual sale of the water company to Casitas Municipal Water District in June 2017. Richard, now retired, continues to serve on the Board of Directors of OJAI Flow. He most recently authored the "Cooperative Regional Approach to Improving Ventura County's Water Supply Reliability" as a member of the Ojai Valley Water Advisor Group. He and his wife Sandy have lived in the Valley for 40 years, raised two sons, and now have two grandchildren who also live in the Ojai Valley. He has a B.A. Degree and a master's Degree in public administration from CSU, Northridge.

Connor Jones

Connor Jones is a certified permaculture designer and teacher with a lifelong fascination for ecology, anthropology, and traditional food systems. As a child he marveled at the wonders of nature in immersion with it and in small assembled ecosystems created at home. Later in life farming, and his love for ecology began to merge with the introduction to permaculture design. His discoveries led him to the Permaculture Research Institute of Australia at the age of 18 where he became certified to design and teach. Since then he has founded East End Eden a 10 acre family operated permaculture demonstration site in Ojai, California where he teaches regular workshops and offers mentorship opportunities through farm work trade positions. *East End Eden* is also a nursery for varied perennial crops well suited to the bioregion. Connor also has a permaculture design and consulting company that offers clients sound advice for improving their yields and land value through applied ecological design.

Bruce Kuebler

Bruce Kuebler has a Bachelor of Science Degree in Engineering from UCLA; did post graduate studies in hydrology and public administration at USC, and became a Registered Civil Engineer in California. He spent his career as a water engineer with the Los Angeles Department of Water & Power, retiring after 35 years. During his tenure, he moved from technical studies of groundwater and surface water sources, water quality, and design of pumps and tanks to managerial positions dealing with all aspects of the Water System's operation. A significant part of Bruce's career was spent on environmental studies and legal issues surrounding the Los Angeles Aqueduct supply from Inyo and Mono Counties. His last job was Director of the Water Quality and Distribution Division. Bruce was appointed to the Board of Ventura River Water District on May 8, 2013 and elected in November 2013 and November 2016. He represents the District on the newly created Upper Ventura River Groundwater Agency. He lead formation of the Agency and is the Board's Chair. Bruce and Patrish, an OSA artist, enjoy Oak View, home for 19 of their 51 years of marriage. They have 2 children, 3 grandchildren, and a faithful Akita.

Alex Kim

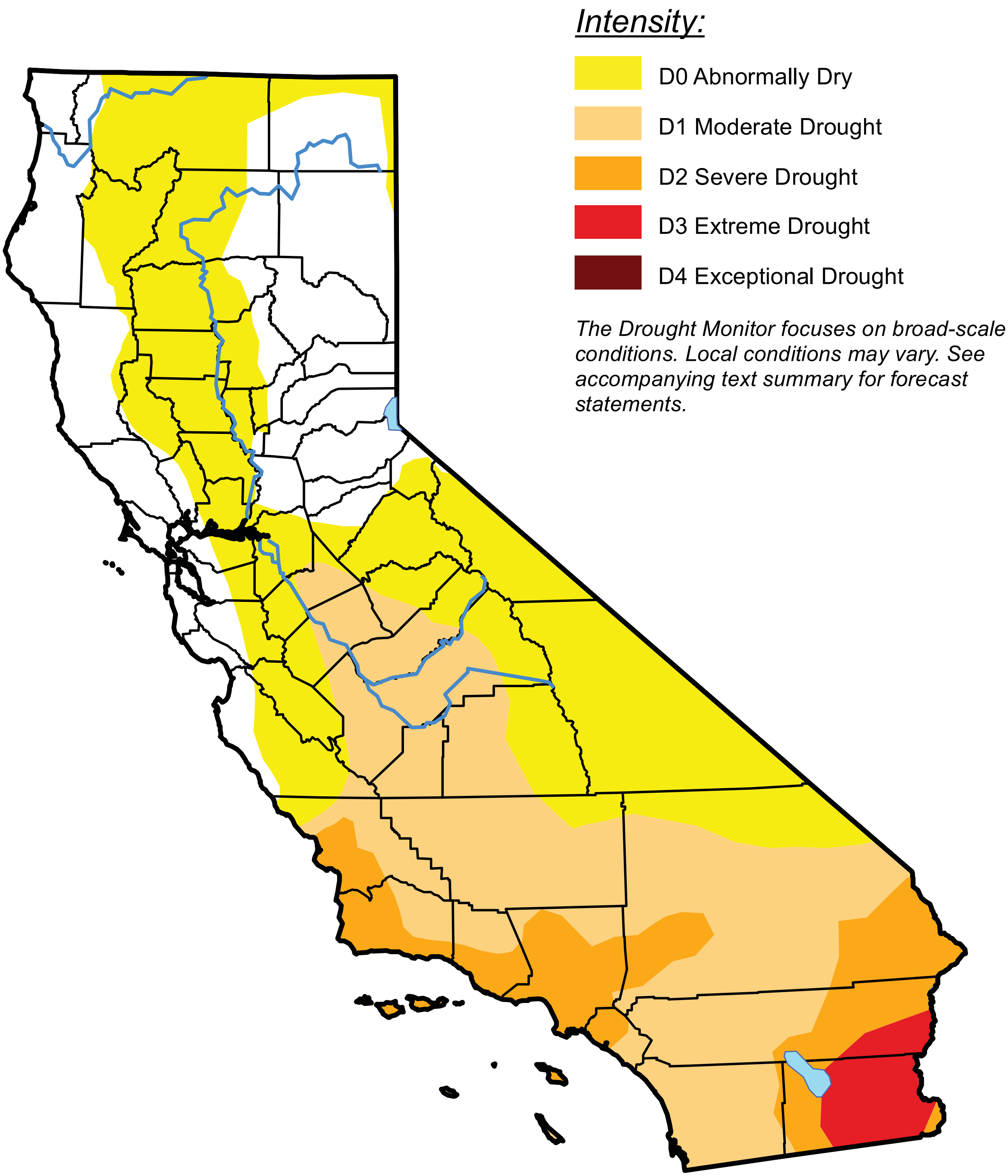
Alex Kim became the Managing Director of The Ojai Valley Inn in January 2015. Alex joined the Inn after a distinguished career in the hospitality industry that spans three decades and includes management positions at *The Hyatt Regency, Hotel InterContinental*, *La Quinta Resort and Club*, and *The One&Only Ocean Club,* Bahamas, where he was General Manager from 2009 to 2012. Prior to joining the Ojai Valley Inn, he was the General Manager of Meadowood Napa Valley. At the Inn, Alex oversees all aspects of management, including enhancements to the property since 2015 including the redesign of the lobby, the adult and family swimming pools, the historic Neff Lounge, the fine-dining restaurant, and the Farmhouse. Alex grew up in Seoul, S. Korea, and came to the U.S. to study hospitality at Florida International University. After graduating in 1989, he began his career as a Corporate Management Trainee at Hyatt Regency in Indianapolis, Indiana. In 1993, Alex became Director of Catering and Convention Services at *St. Regis Bal Harbour*, Florida. He relocated to California in 2000 to become Director of Food and Beverage at *The La Quinta Resort and Club*. Alex has been married for 23 years to musician and educator, Jai Kim. They have three children, Catherine, Isabelle, and AJ. In his spare time, he enjoys traveling with his family, collecting fine wines and dabbling in carpentry.

Bill Weirick

Currently concluding his first term as a member of the Ojai City Council, William Weirick comes to this position after a twenty year academic career as a university administrator and economics professor. He also has served for the past twenty years as part of the management team for a third generation family business managing a diversified portfolio of real estate assets in the Southern California region. Born in Long Beach as a third generation Southern Californian, his father's career in the petrochemical business led to relocations from California to New York, Louisiana, New Jersey, and Texas. Most of this time was spent in various locations within Louisiana. This laid the basis for taking an academic position in Louisiana after completing his doctorate in economics at the University of Wyoming. Dr. Weirick began re-locating to Ojai after retiring from his academic position in 2004. While serving as a professor and university administrator in Louisiana, Dr. Weirick was involved in capital projects programs, business research activities, numerous university/community partnerships, and both local and regional economic development activities. His published work focused on land economics and microeconomic public policy analysis. He also was involved in arts organizations, beautification activities, and downtown renewal efforts. Before assuming the City Council seat, Dr. Weirick served a Chair of the Ojai Building Appeals Board and was involved in supporting Ojai FLOW which led to an historic public buy-out of the local private water utility.

The California Drought

Source: www.drought.gov



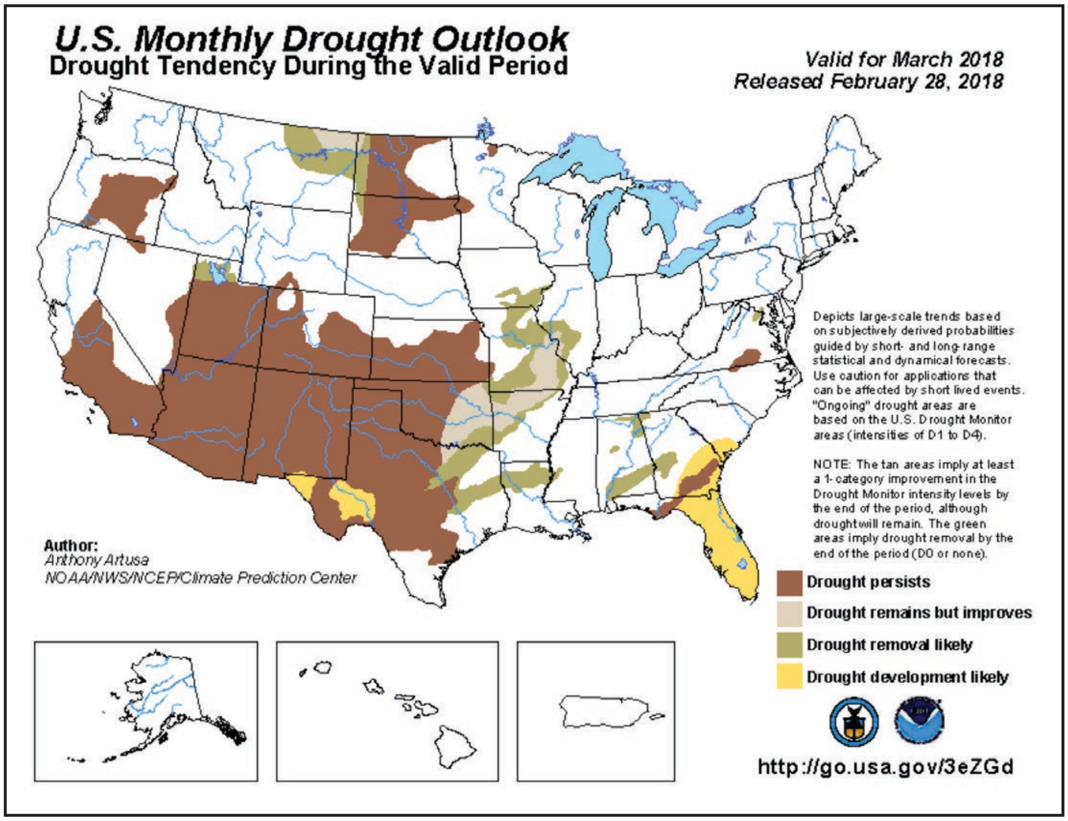
Drought Stages

Source: Casitas Municipal Water District

Water Shortage Condition	Key Casitas Communications and Actions	Customer Demand Reduction Measures	Penalties And Rates
Stage 1 Supply Range 100% - 50% Demand Reduction **0%** **(80% of 1989 use)**	• Initiate public information and advertising campaign. • Publicize ways to reduce water consumption. • Coordinate conservation actions with other water purveyors and cities. • Perform water audits and promote water efficient use/conversions. • Conduct water workshops. • Temporary staffing for public inquiries, as needed.	• Water conservation practices requested of all customer classifications. • Adhere to Water Waste Prohibition Ordinance. • Adhere to assigned water allocation or less.	• Consider and implement Conservation Penalty for water use in excess of allocation. • Consider rates for revenue stabilization and cost of service.
Stage 2 Supply Range 50% - 40% Demand Reduction From Stage 1 Allocation **20%**	• Declare Stage 2 • Implement demand reductions for each customer classification. • Intensify public information campaign. • Optimize existing water resources. • Intensify leak detection. • Develop appeals staffing. • Consult with major customers to develop conservation plans and water use audits.	• Continue all Stage 1 measures. • Landscape watering restricted to two (2) watering days per week. • Require water audits for large water users; implement recommendations of the water audits. • Businesses display “save water” signage. • Increase public information.	• Consider and implement Conservation Penalty for water use in excess of allocation – response to reduced allocation. • Consider rates for revenue stabilization and cost of service.
Stage 3 Supply Range 40% - 30% Demand Reduction From Stage 1 Allocation **30%**	• Declare Stage 3 • Implement demand reductions for each customer classification. • Expand and intensify public information campaign. • Provide regular briefings, publish monthly consumption report. • Hire additional temporary staff in customer service, conservation, and water distribution. Water waste enforcement. • Moratorium on new service connections.	• Continue with Stage 1 and 2 measures. • Reduced water allocations. • Landscape watering restricted to one (1) watering day per week. • No landscape changes unless xeriscape.	• Consider and implement Conservation Penalty for water use in excess of allocation – response to reduced allocation. • Consider rates for revenue stabilization and cost of service.
Stage 4 Supply Range 30% - 25% Demand Reduction From Stage 1 Allocation **40%**	• Declare Stage 4 • Implement demand reductions for each customer classification. • Continue to provide regular media briefings. • Scale up appeals • Open drought information center.	• Continue with Stage 1 through 3 measures. • Reduced water allocations. • Landscape watering restricted to one (1) watering day per week. • Implement restrictive Irrigation delivery schedule. • Minimal water for large landscapes. • Consider prohibition of filling swimming pools and fountains. • Implement restrictive Irrigation delivery schedule and quantities greater than 60%.	• Consider and implement Conservation Penalty for water use in excess of allocation – response to reduced allocation. • Consider rates for revenue stabilization and cost of service.
Stage 5 Supply Range 25% - 0% Demand Reduction From Stage 1 Allocation **50%**	• Declare Stage 5 • Implement demand reductions for each customer classification. • Minimize outdoor water use and non-essential uses. • Implement aggressive public outreach and education program. • Implement crisis communications plan. • Coordinate with State and local agencies to address enforcement challenges. • Water Shortage Emergency declaration to be considered.	• Continue with Stage 1 through 4 measures. • Reduced water allocations. • Rescind Temporary meters issued. • No turf irrigation. • Implement restrictive Irrigation delivery schedule and quantities greater than 50%.	• Consider and implement Conservation Penalty for water use in excess of allocation – response to reduced allocation. • Consider rates for revenue stabilization and cost of service.

Country-Wide Current Monthly Prediction

Source: NOAA Climate Prediction Center

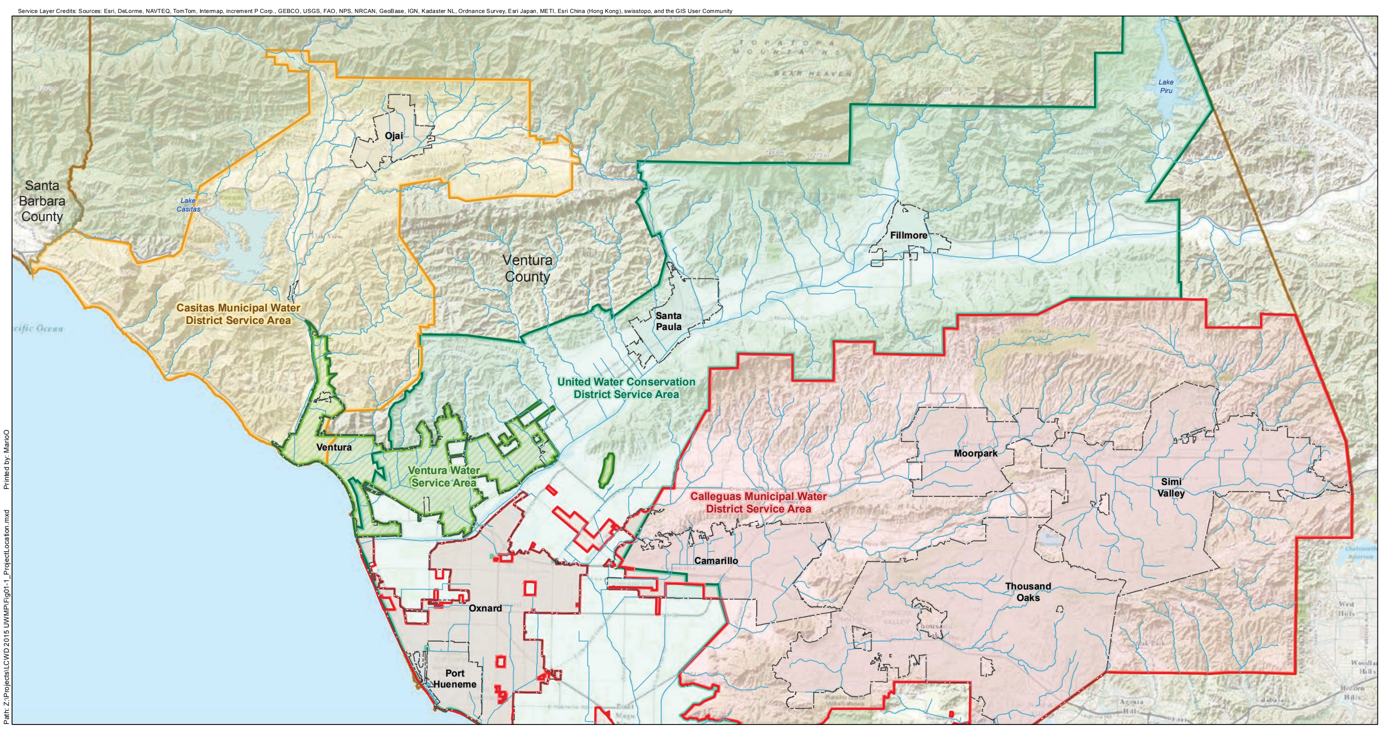


Latest Seasonal Assessment - Drought intensity remained steady or worsened across California, the Southwest, and the central to southern high Plains from mid-February through early March 2018, while heavy to excessive rainfall resulted in drought elimination across the lower Mississippi Valley, eastern Oklahoma, and northeast Texas. Short-term moderate drought expanded across southeast Georgia and coastal South Carolina during the past month. A small area of short-term moderate drought was recently introduced to south Florida.

An increasingly dry time of year broadly favors persistence of ongoing drought across Oregon, California, and the Southwest. Despite below-average snow water content across the Sierra Nevada Mountains, development is expected to be limited due to the 2016-17 wet season, most reservoir levels currently near average, and precipitation during the latter half of March.

Map of Local Water Districts

Source: Calleguas Municipal Water District



Legend

- Calleguas Municipal Water District Service Area
- Casitas Municipal Water District Service Area
- United Water Conservation District Service Area
- Ventura Water Service Area

A History of the Casitas Municipal Water District

Source: www.casitaswater.org/history

Foundation years

Throughout the late 1940s and early 1950s, residents and farmers alike continued their struggle to attain and retain precious water. In the growing community of Oak View, wells went dry and citizens began trucking in water. Truckers also hauled water to the Rincon area along the coast, where fresh running water was nonexistent.

In October of 1952, a handful of individuals formed the Ventura River Municipal Water District (VRMWD) with Leland G. Bennett as engineer-manager. In July of 1953, they opened a District office at 480 North Ventura Avenue in Ventura. As their first order of business, they asked the United State Bureau of Reclamation (Bureau) to make a water requirement and supply study of the Ventura River area.

With the results of their new investigation and previous studies in hand, the Bureau proposed a 250,000 acre-foot reservoir on Coyote Creek, a 500 cubic-feet-per-second diversion canal from the Ventura River to Lake Casitas and a backbone main conveyance system to distribute water throughout the District through 33-miles of pipeline. Casitas would furnish water for irrigation and for municipal and industrial use within its boundaries.

Congressman Charles Teague toured this area to take a look at the water picture for himself. In 1955, he introduced the Ventura River Project authorization bill to the United States House of Representatives.

The various bureaus within the Department of the Interior – U.S. Department of Agriculture, U.S. Fish and Wildlife Services, Army Corps of Engineers, U.S. Public Health Services and the State of California – were asked to review the proposal. All of these agencies favored the project except the State. They wanted to implement a smaller plan that would provide a 25-year supply of water at a smaller unit cost. They maintained this was all of the water we would need because Northern California water would eventually be available to us. It made more sense to local project organizers to take responsibility for their own water supply as much as possible.

Who Needs a New Dam?

Not everyone locally agreed with the plan for a new dam. Some people wanted the dam built elsewhere to preserve the Santa Ana Valley farmland.

A group called "The Taxpayers' Committee" raised questions about tackling a project of this magnitude. They suggested it might be cheaper to desalt ocean water and they hired Stanford Research Institute to study the issue. However, the Stanford report confirmed the future needs for water and methods of developing a water supply project as determined by the Bureau.

The Committee then expressed concern about the project payment program. When the Bureau arranged an ascending schedule of annual payments, the Taxpayers' Committee embraced the project. The Casitas Dam issue was then placed on the ballot. Voters were so enthusiastic about the dam that they approved the project and repayment plan by a 31 to 1 margin. Congress was so supportive that they approved the project in record time without opposition.

On March 1, 1956, the Ventura River project was authorized. Soon after, Congress appropriated $6,400,000 to start construction. VRMWD had negotiated a unique contract with the Bureau – one that gave them control of the District and even the water rights.

Casitas Dam Groundbreaking

The groundbreaking ceremony for Casitas Dam took place on August 27, 1956. Over the next two years, heavy equipment moved 9,500,000 cubic yards of dirt, sand and gravel – much of it removed from the Santa Ana Valley. Workers dramatically altered the face of the little valley in the process of building the dam.

At the Crest, the earth filled Casitas Dam originally measured 40 feet from lakeside to the face of the dam. The foot of the dam was 1750 feet thick. A seismic retrofit in 2000 increased the thickness of the dam by an additional 110 feet. The dam stretches 2060 feet from bank to bank and it stands 285 feet above the lakebed. There are 9 intake gates at different levels in the dam where water is taken, treated and released to the water distribution system to the public. A 750-foot-long access tunnel runs through the dam and leads to the hydraulic system for the gates. The lakebed encompasses 2,760 acres and has a 254,000 acre-foot capacity.

Casitas Reservoir was ready to start accumulating stream flows from Coyote Creek, Santa Ana Creek, and the Robles Diversion Canal by November 1958. A 33-mile network of concrete and steel pipe ranging form 12 to 54 inches in diameter ran from the lake through five different pumping plants and chlorination stations to six balancing reservoirs built to hold a total of 26 million gallons of treated water. Pipelines then continued to reach customers throughout the district and have since added over 95 miles of pipeline. District boundaries encompass Ojai, Upper Ojai, the Ventura River Valley, city of Ventura to Mills Road and the Rincon along the Pacific Ocean to the Santa Barbara County line.

Dam Completed

Once the Casitas Dam was completed Lake Casitas remained practically empty for four years. Water levels were only a foot and a half above the bottom of the lowest intake gate by 1961. Water was too low to get to customers. Plans were made to bring in barges with large pumps that could get the water into the intake structure.

It was February of 1962 when over 20 inches of rain fell within a five day period that Lake Casitas filled to 53,000 acre-feet of water. Then in 1969 there was too much water. Two "one-hundred-year storms" slammed the county. Rainfall reached 70 inches and caused $1.5 million in damages to the Robles Diversion Canal, several pipelines and the Casitas recreation area. The damage prevented Lake Casitas from filling up. It would not be until March 31, 1978 that water would flow over the Casitas Dam spillway.

Olympics

The 1984 Olympic rowing and canoeing events took place at Lake Casitas. Throughout July and August of that year, thousands of straw hat-clad people came with their families to view the historic sporting event.

Lake Casitas Levels and Rain Fall

Source: Casitas Municipal Water District

The historical data has been updated for the reporting period and is presented for the period from 1959 through 2017. The historical data includes summaries for the Casitas Reservoir operation, Robles Diversion, rainfall, and ambient air temperature.

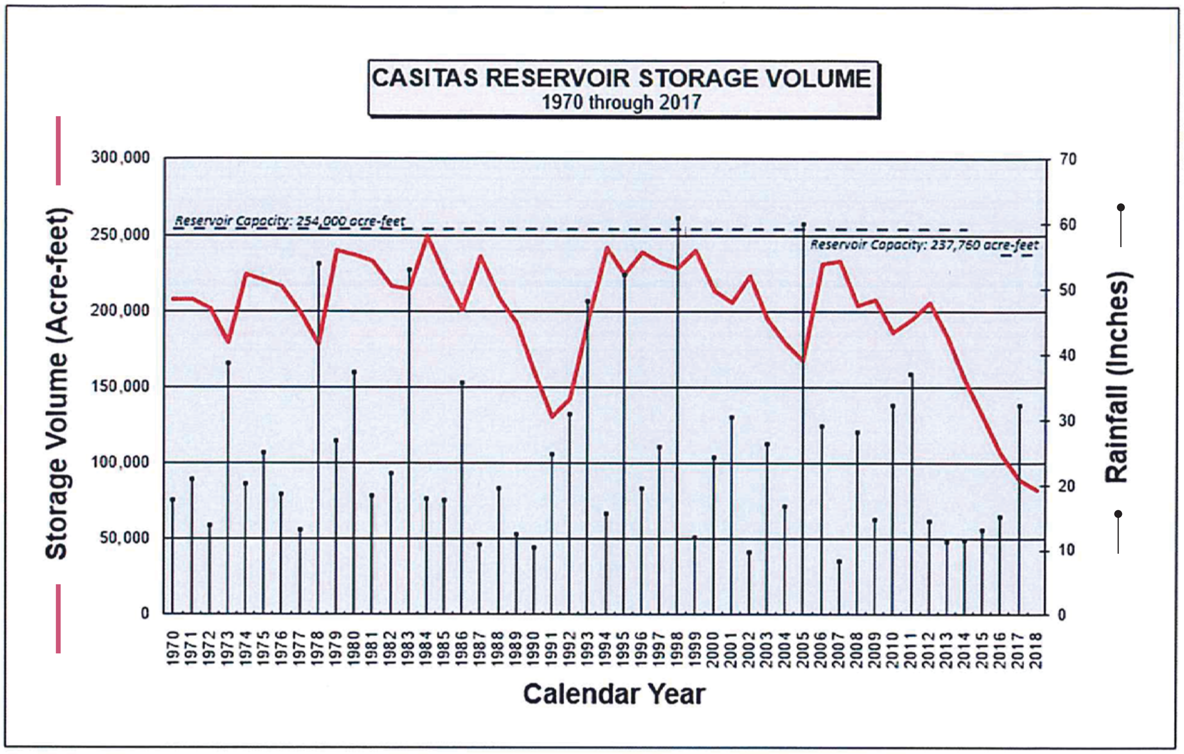
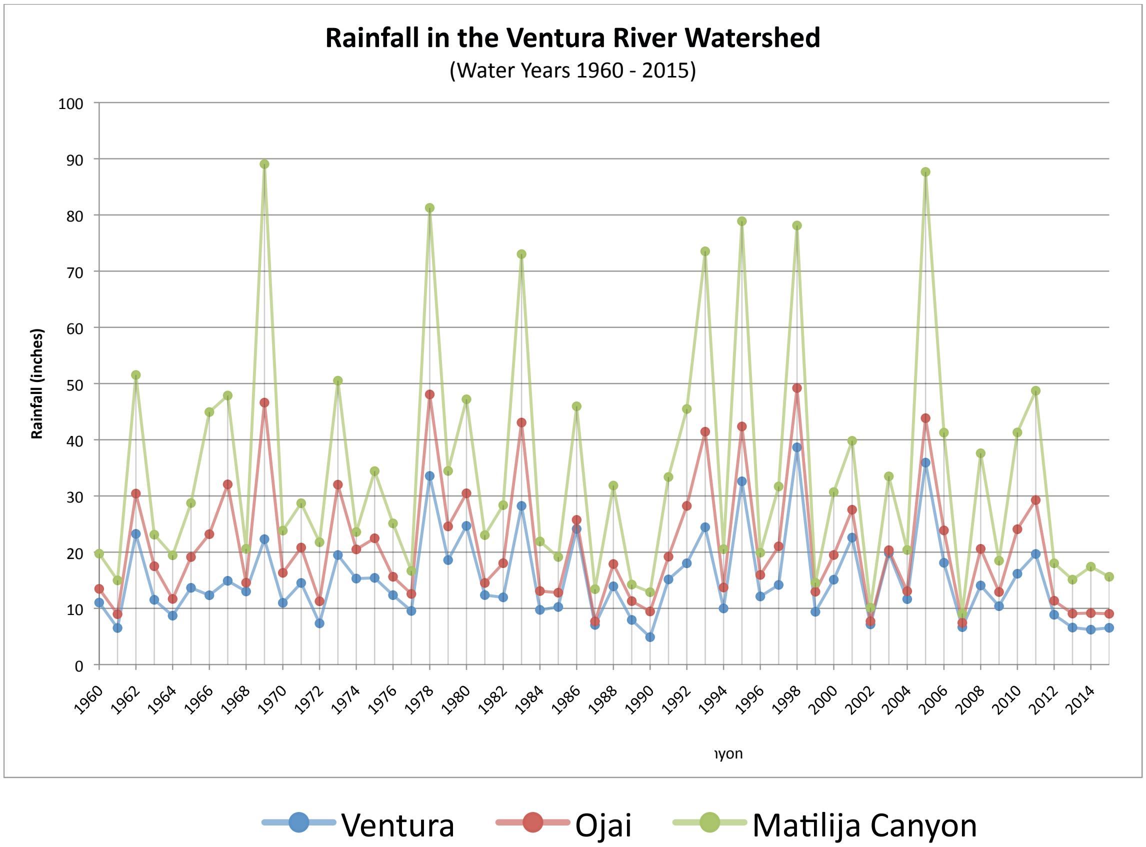


Figure 1. Storage volume, represented by a solid line, is reservoir storage at the start of each calendar year (elevation measured on last day of previous calendar year). Rainfall, represented by data points with drop lines, is the three-station water year average for Casitas Dam, Casitas Recreation and Matilija Dam rain gages. Reservoir volume prior to 1970 (not shown) represents initial filling period after Casitas Dam completion in 1959.

Rain Fall in Ventura River Watershed

Source: Ventura River Watershed Council



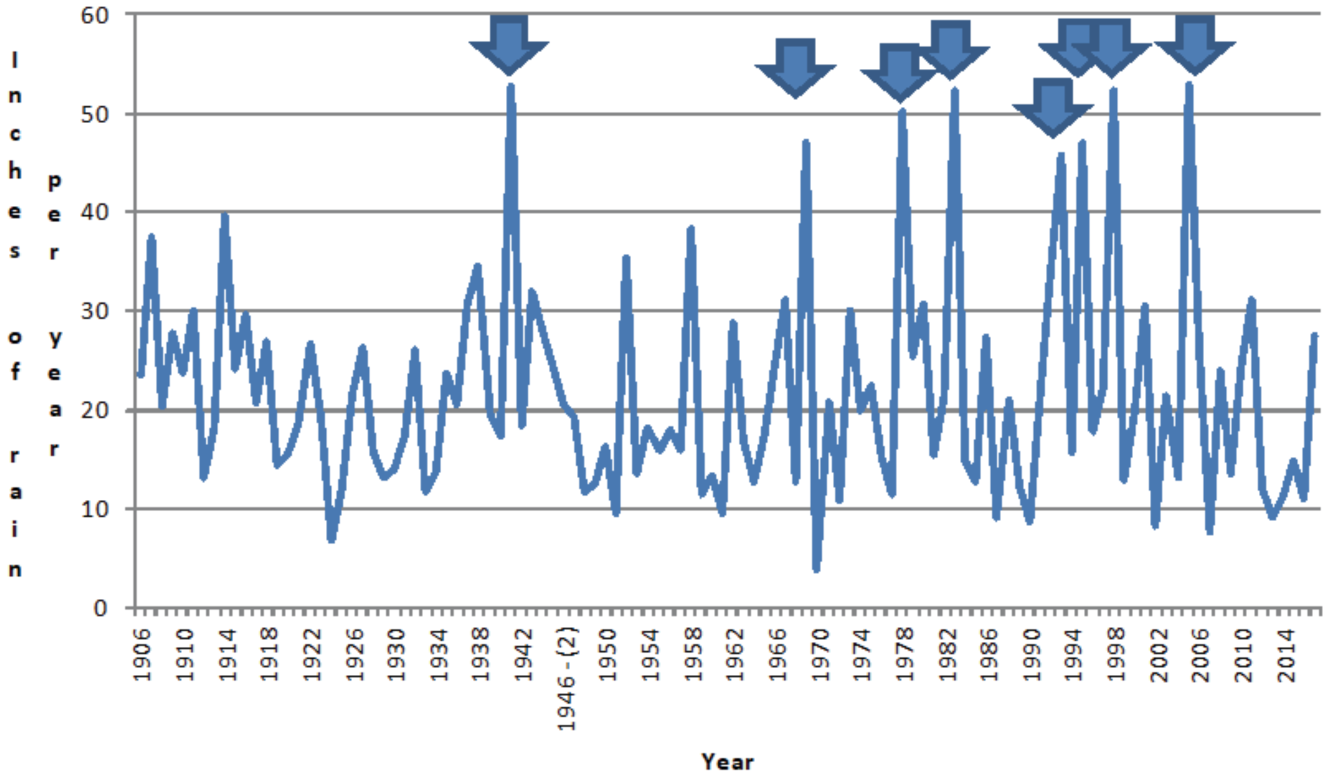
Rainfall is highly variable in the watershed—seasonally, and from year to year. Rainfall typically occurs in just a few significant storms each year, which can come any time between October 15 and April 1, with 90% of the rainfall occurring between November and April. Snowfall is generally minimal and short-lived.

The Ventura River watershed's rainfall patterns vary geographically. The rainfall totals from the watershed's three climate zones shown in the chart above illustrate that, on average, the watershed's upper areas receive over twice as much rainfall, almost 20 inches more, as its lower areas.

Historic Regional Rainfall

Source: Ventura County Watershed Protection District

Historical Annual Rainfall Recorded at Ojai Station
Thacher School 1906 – 2017

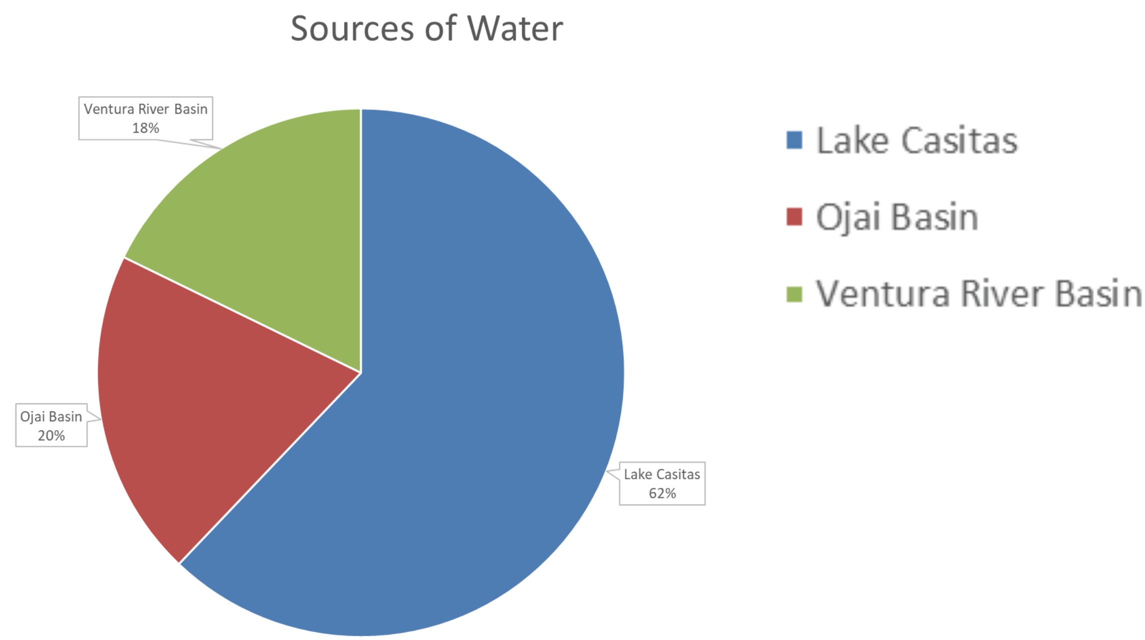


Source: Ojai Valley Water Advisory Group

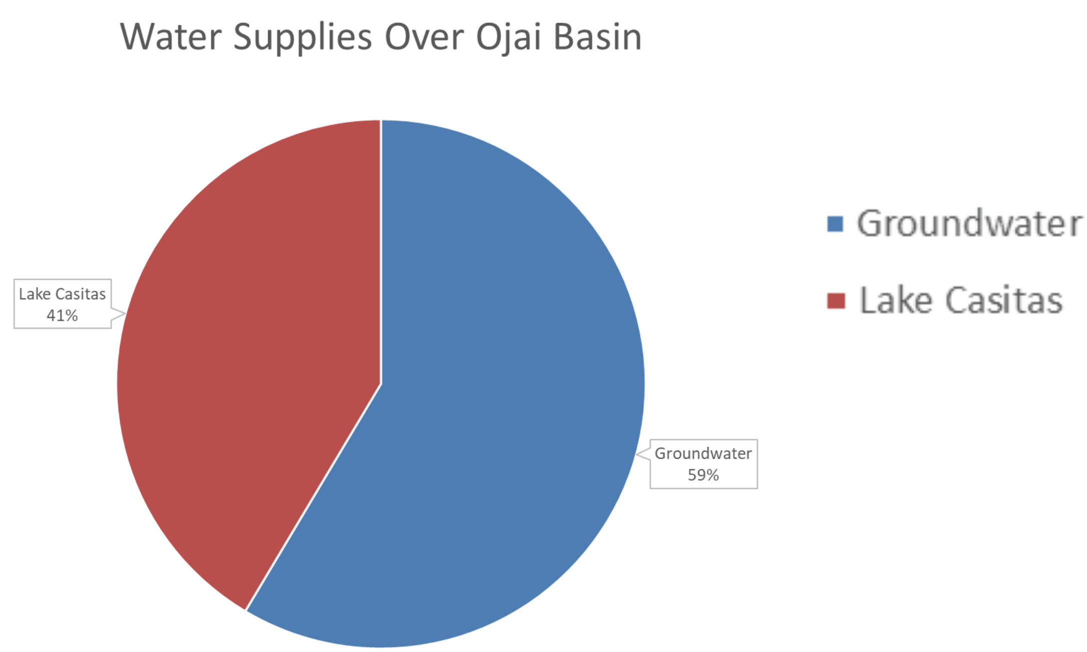
The potential flaw in Casitas' projections is the assumption that the future recovery period will occur as rapidly as the 1966-1980 period. Historical records demonstrate that 1969-1980 may be part of the wettest period of record. The chart above shows how often major rain events occurred in the recovery period compared to the historical record. From 1906-2017 a total of 8 years experienced rainfall in excess of 40 inches at the Ojai weather station (Ventura County Watershed Protection District Rainfall Data Base). In the 62 years between 1906 and 1968 a rainfall year over 40 inches occurred only once. In the 37 years, 1969-2006, rainfall years of over 40 inches occurred 7 times. During the rather short 15 year recovery period there were 2 years with greater than 40 inches of rain. Using this period (1965-1980) to project recovery may be far too optimistic. Using an extreme wet period that has not been repeated historically, combined with the growing evidence of climate change does not present the most probable outcome.

Water Supplies

Source: Ventura County Watershed Protection District



Source: Ojai Basin Draft Groundwater Management Plan 2018

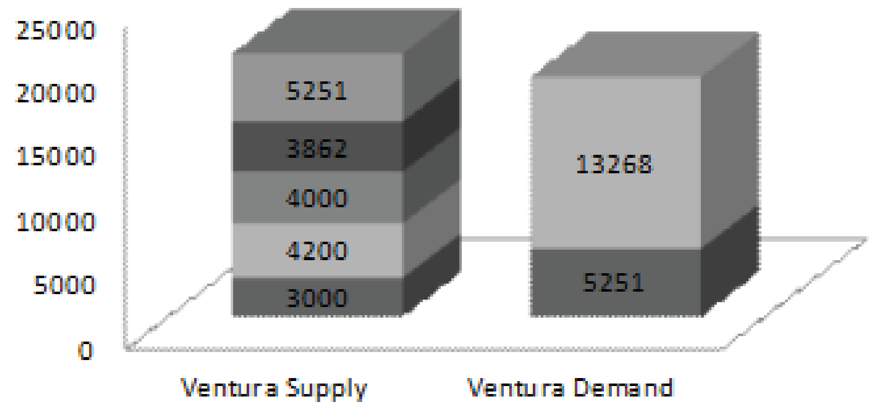


Lake Casitas and Ventura

Source: Ojai Valley Water Advisory Group

City of Ventura
Water Supply and Demand 2017 - Normal Year

City of Ventura	
Demand	**AF/Yr**
East End Ventura	13,268
West End Ventura	5,251
Total	**18,519**
Supplies	
Lake Casitas	5,251
Oxnard Plan	3,862
Mound Basin	4,000
Ventura River	4,200
Santa Paula Basin	3,000
Total	**20,313**
Deficit / Surplus	**1,794**

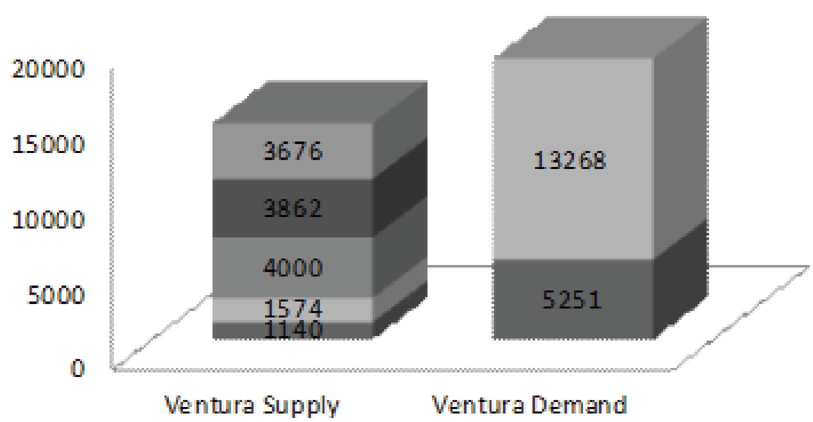


Data from *City of Ventura 2017 Comprehensive Water Resource Report*

In a dry year, Ventura's supplies are reduced. The table below illustrates how supplies fall short of average water use in a dry year. The availability of Ventura River water is reduced significantly. Santa Paula Basin allocation is reduced to prevent overdraft and Casitas may impose staged allocation reductions from the lake, based on lake levels. In 2017 the City's allocation from Lake Casitas was reduced by 30% and may be reduced further to 40% in 2018. In a dry year the City has a deficit of water use over supply of (4,267) AF. Implementation of water conservation and rationing programs are the City's only means of managing these deficits.

City of Ventura
Water Supply and Demand 2017 - Dry Year

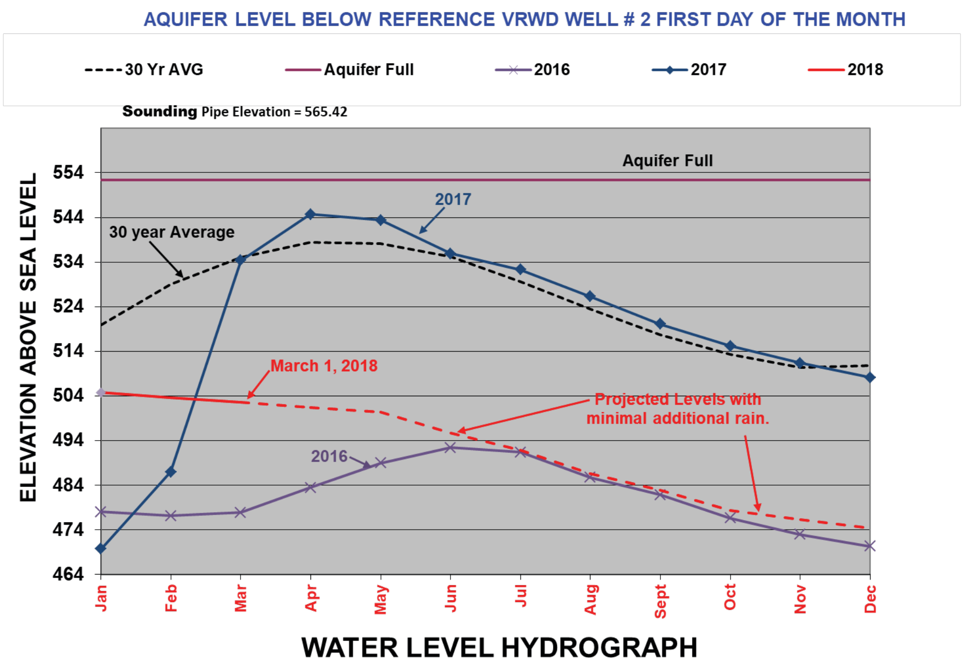
City of Ventura	
Demand	**AF/Yr**
East End Ventura	13,268
West End Ventura	5,251
Total	**18,519**
Supplies	
Lake Casitas	3,676
Oxnard Plan	3,862
Mound Basin	4,000
Ventura River	1,574
Santa Paula Basin	1,140
Total	**14,252**
Deficit / Surplus	**(4,267)**

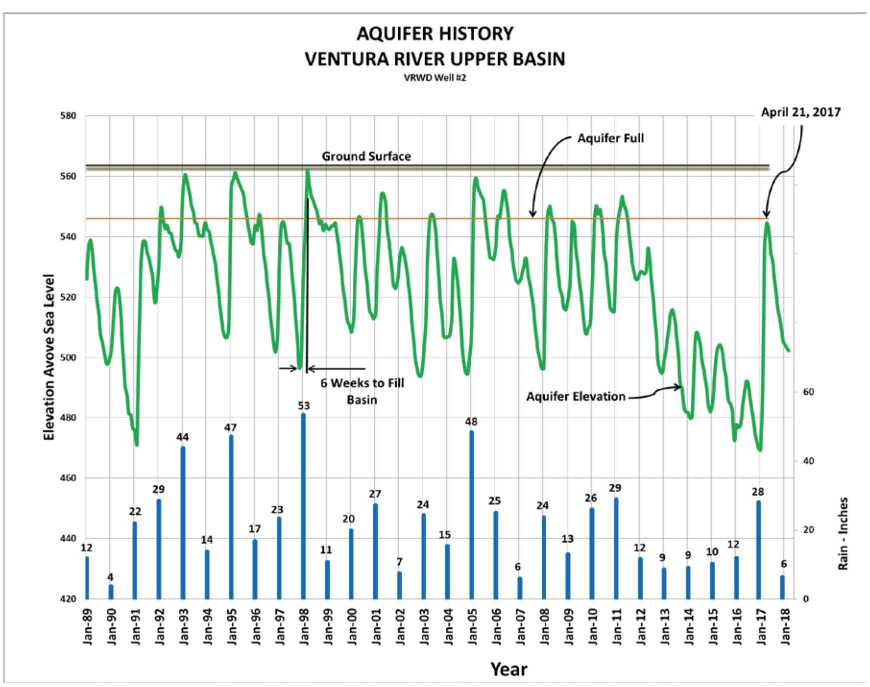


Data from *City of Ventura 2017 Comprehensive Water Resource Report.*
Casitas Stage 3 (30% reduction in allocation).

Ventura River Basin

Source: Ventura River Water District

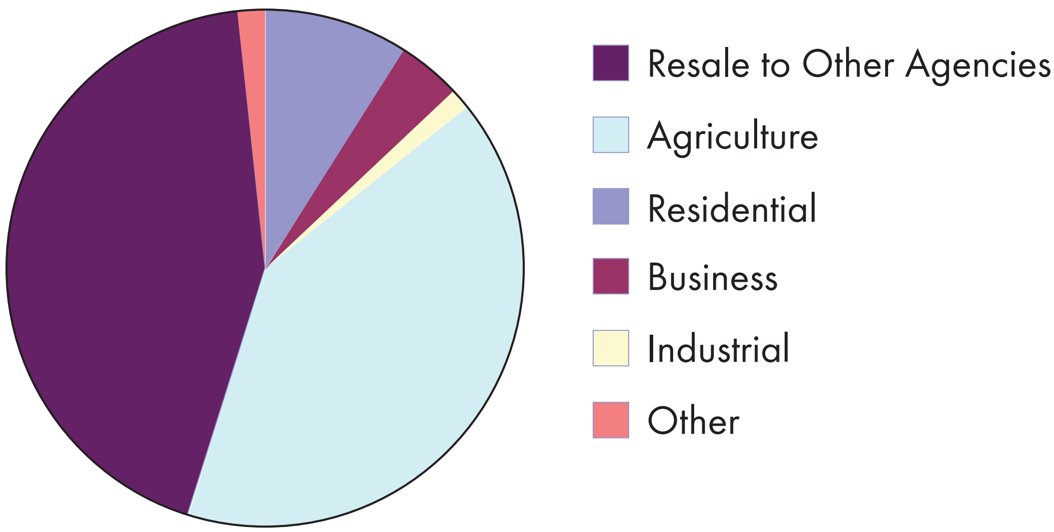




The Ventura River Groundwater Basin Water supplies 20,000 people served by City of Ventura, Meiners Oaks and Ventura River Water Districts and some agriculture by a small number of wells. The basin extends from Foster Park to the mouth of Matilija Canyon along Ventura River flood plain and abuts Ojai Groundwater Basin near Topa Mountain Winery. San Antonio Creek connects the two basins. The basin is relatively shallow (60-100 feet) with deepest part (200 feet) just north of 150 bridge. The basin fills rapidly (several months) by the Ventura River in normal years and empties during a year or two. Water levels have been stable over long term (70 years) with ups and downs depending on drought and wet periods. When the wells go dry (as happened during current drought), water suppliers rely on Lake Casitas water. Pre-drought pumping averaged 9,500 acre-feet per year.

Water Use by Customer Type

Source: Casitas Municipal Water District

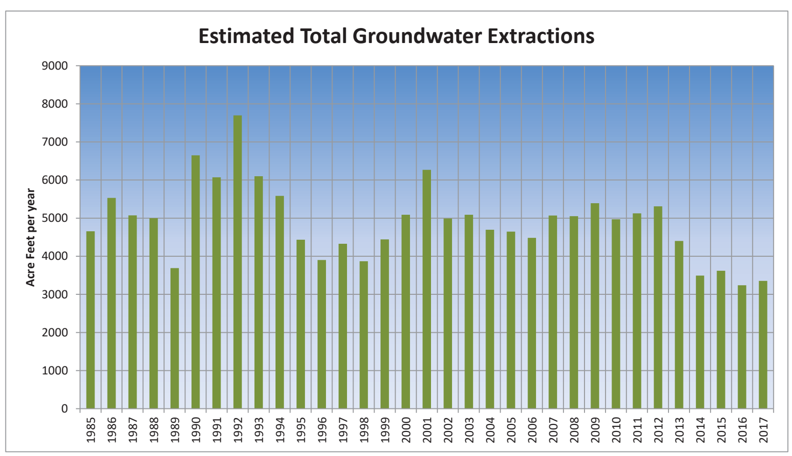


Water Use and Demand

Source: The Ojai Basin Groundwater Management Agency (OBGMA)

OBGMA Customer Type
10/15 to 9/16

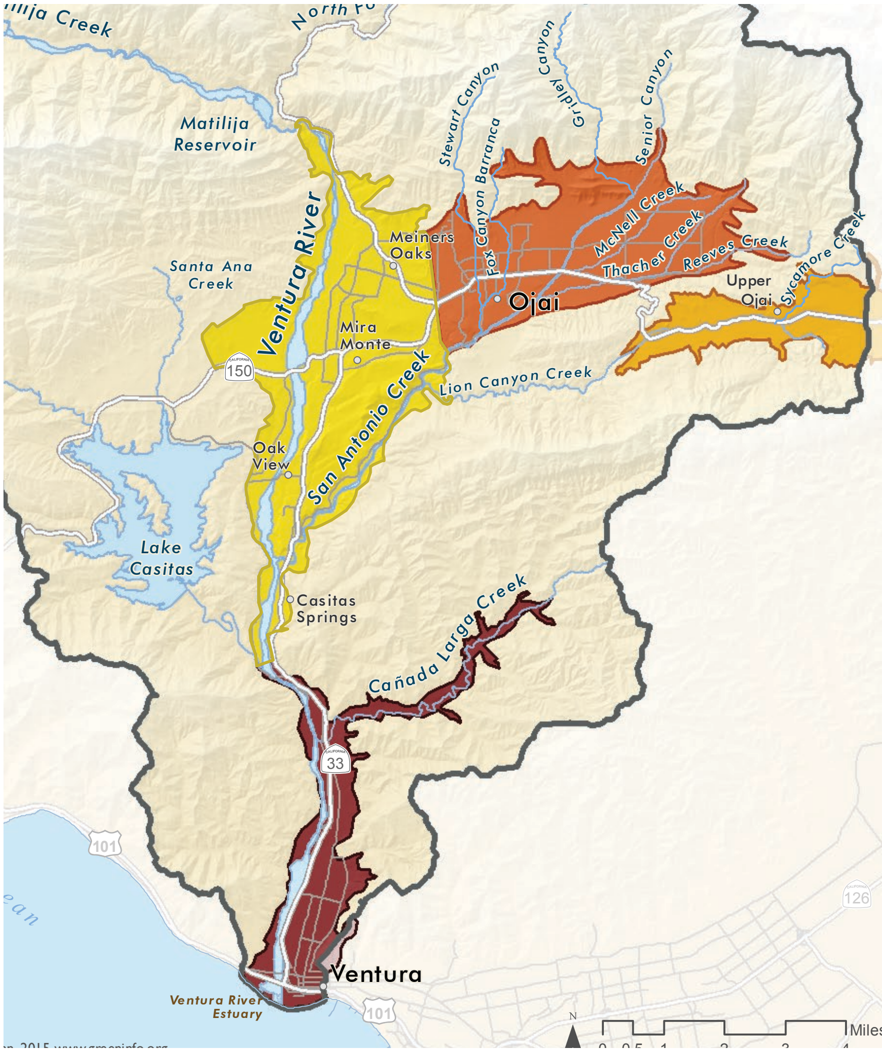
Agriculture: 56%
Golden State: 32%
Domestic: 9%
Municipal/Industry: 3%



Groundwater use in the Ojai Basin between 1985 and 2012 averaged approximately 5,100 acrefeet annually, of which some 1,850 acre-feet (or 36%) was pumped by the GSWC for municipal and domestic supply. In addition to GSWC, the mutual water companies and active private wells supply both agricultural and domestic water in the basin. During the 1985 to 2013 period, the highest production was 7,697 acrefeet (1992, with 1,645 AF from GSWC and 6,052 AF from private wells) and the lowest was 3,690 acrefeet (1989, with 1.766 AF from GSWC and 1,924 AF from private wells). The figure above presents the estimated total annual basin water demand. Total basin demand is the calculated as the sum of groundwater extraction (by both GSWC and private wells) and surface water importation from Lake Casitas.

The Ojai Basin

Source: The Ojai Basin Groundwater Management Agency (OBGMA)



The Ojai Basin has the largest capacity of the Ventura River watershed's four groundwater basins. It has a maximum capacity of approximately 85,000 acre-feet, with a safe annual year of approximately 5,026 acre-feet. *(Note: A groundwater basin's maximum capacity does reflect the amount of available water. Much of that water is not usable or economically recoverable.)*

This basin is quickly recharged during wet periods, and can be rapidly depleted during periods of drought. For example, in just seven months, between March 2012 and October 2012, water levels in the Ojai Basin dropped 84 feet. On the other extreme, in 1952, the heavy winter rainfall was sufficient to return the groundwater in the Ojai Basin to near maximum levels, even though the basin was at historic low levels following five years of deficient rainfall. In terms of the long-term average, however, amount of groundwater in storage has been fairly stable.

Groundwater Basin	Acres	Sq. Mi.	Shallow Depth to Water (ft.)	Max. Capacity	Avg. Well Yield	Active Wells	Approx. Safe Yield
Upper Ojai	2,840	4.4	0-40	5,681 AF	50 gpm	95	Unavail.
Ojai Valley	6,471	10.1	0-80	85,000 AF	383 gpm	149	5,026 AF
Upper Ventura River	9,360	14.6	0-5	35,118 AF	600 gpm	160	9,482 AF
Lower Ventura River	6,090	9.5	3-13	8,743 AF [a]	20 gpm	16	2,130 AF [b]

Summary of the Three Sisters Plan

Source: The Ojai Valley Water Advisory Group

A Cooperative Regional Approach to Improving Ventura County's Water Supply Reliability

Published by the Ojai Valley Water Advisory Group

Prepared by

Richard H. Hajas

February 2, 2018

Summary

Five consecutive years of only one-half of average rainfall has reduced local groundwater levels and Lake Casitas storage levels to record lows. Water users in western Ventura County are subject to costly water conservation, allocation, and rationing programs for the second time in the past 25 years. Eastern Ventura County has one source of water, through a single pipeline from the California State Water Project (SWP). An interruption in the imported water supplies by a catastrophic earthquake or other event could leave a large portion of Ventura County without water for as long as 6 months.

The Problem

Calleguas Municipal Water District and the eastern Ventura County have access to the vast water resources of Metropolitan Water District (MET) and the SWP, but have a vulnerable delivery system. The City of Ventura has a variety of groundwater supplies that are capable of producing a small surplus of water during normal years, but no water supply reserves for dry periods. The Casitas Municipal Water District (Casitas) service area has groundwater supplies that satisfy only about 40% of the water needs. In a normal year 60% of the area's water supply is Lake Casitas. During dry years both groundwater supplies and Casitas lake levels are low. Ventura County has little or no reserve water supplies to satisfy the county's needs during drought or emergency conditions.

Responsible Agencies

Three major water authorities manage water supplies in Ventura County: Casitas Municipal Water District (Casitas) and City of Ventura in the western county, and Calleguas Municipal Water District (Calleguas) in the east county. Each of these water authorities is pursuing very costly projects to improve water reliability in their respective service areas. Calleguas needs a local *emergency supply of 30,000 acre feet (AF)[1] to achieve its goal of a 6 month supply stored locally. Ventura and Casitas need additional water supplies and a reserve supply for dry years. None of the three agencies have the financial resources or the water system infrastructure to solve this problem on their own.*

State Water Project

More water can be accessed from the SWP. Ventura and Casitas combined could receive an average annual supply of nearly 5635 AF from the SWP, but they have no access to the SWP system. Even with access SWP water is as unreliable as local rainfall. In 2014, during the current local drought, SWP allocations were cut to 5% of annual deliveries.

If Casitas and Ventura each found a means to access SWP their individual situations would only slightly improve. Both would enjoy surplus supplies during normal years, but both would continue to experience deficits during dry periods. Ventura has no means of storing surplus water and Casitas even, with SWP water, would continue to rely on over 50% of Lake Casitas' reserve for routine normal year uses.

Lake Casitas

Lake Casitas is a valuable asset that is being underutilized. Lake Casitas was built to serve as a water storage facility to capture the areas infrequent storm waters. These storm waters were to provide back up for dry periods when groundwater supplies are low. Over time the area began to rely on lake water as a primary source rather than a back up. Today Lake Casitas has become a routine source of water rather than a reserve. When groundwater levels are low, lake levels are also low.

The Solution

If Ventura, Casitas, and Calleguas worked collectively and pooled each of their unique resources, the County could enjoy the benefits of a reliable and abundant water supply well into the future. Ventura and Casitas may have the opportunity to access SWP through Calleguas. With access to SWP water, combined with all of Ventura's and Casitas' current supplies, Ventura and Casitas would enjoy an average annual surplus of 13,500 AF, equal to 32% of their combined annual water needs. This surplus water could be reserved in Lake Casitas and shared by Ventura and Casitas during dry periods.

When a cooperative operational scenario is applied to the Lake Casitas 20 year drought model developed by Casitas the results are lake storage levels never falling below 50% of capacity or 125,000 AF, throughout the worst drought period of record. With minimum lake levels in this range Casitas could easily provide Calleguas with 30,000 AF of needed emergency water. In return western

Summary of the Three Sisters Plan Continued

Source: The Ojai Valley Water Advisory Group

Ventura County would be connected to the state's huge water network and Calleguas could provide an equal amount of emergency water to western Ventura County if ever needed.

Feasibility

A series of pipelines, pumping facilities and water storage tanks would be required to move water from Calleguas across Ventura and into the Casitas service area. The same pipelines could be used to deliver water back to Calleguas from the lake in an emergency. All three agencies have the engineering resources to construct the needed infrastructure.

The environmental impacts are neutral or positive. No foreign water will be placed in Lake Casitas with this proposal. The pressure to over pump local groundwater will be greatly reduced. There will be less competition between the development of sustainable groundwater and surface water plans and community's water demands.

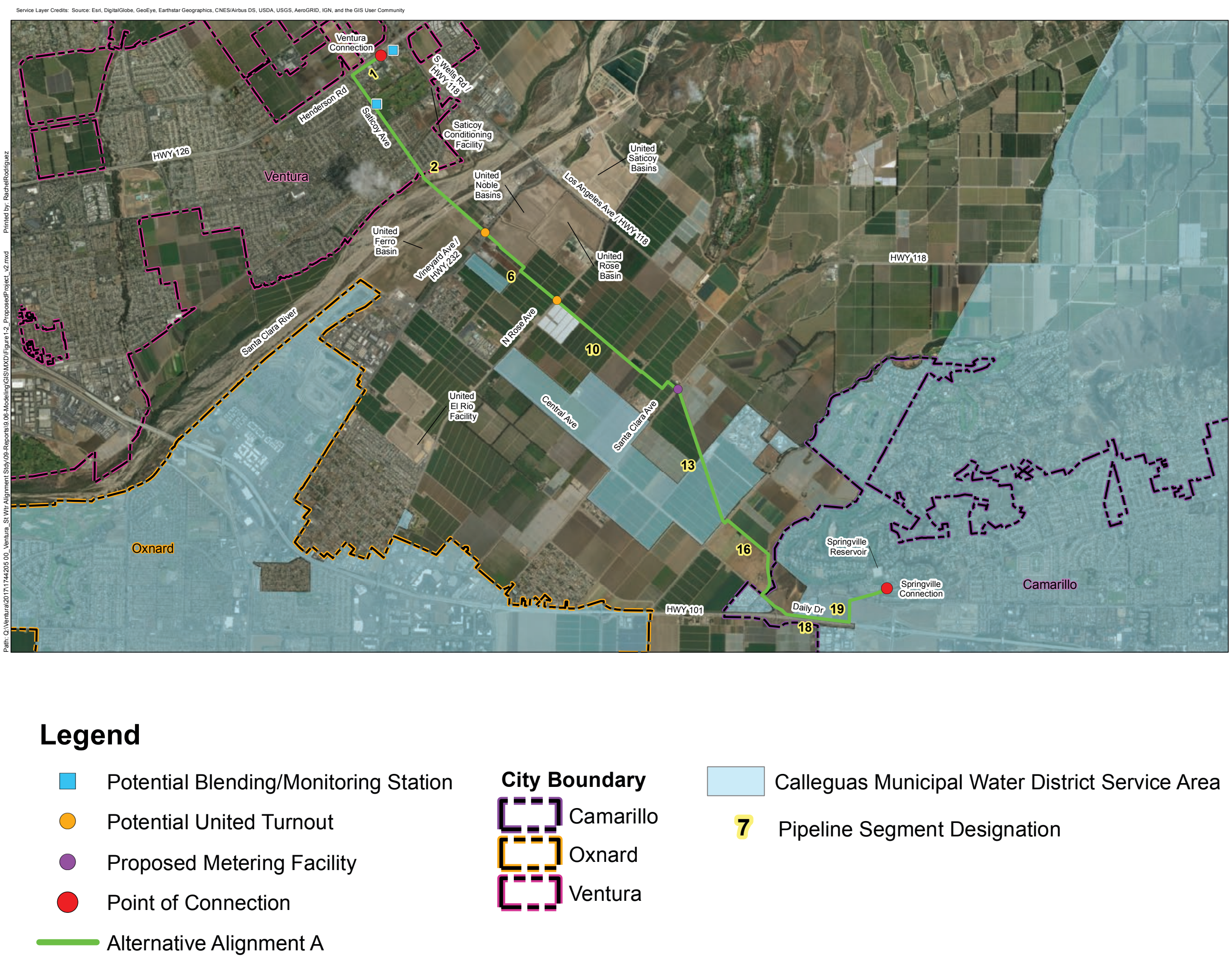
The combined financial resources of all three agencies can be utilized to spread the costs of the project over a very large customer base. These water customers are paying more and more for less and less water every year under the current conditions. And these customers will ultimately pay for whatever projects currently being considered by the individual agencies, projects that may not produce needed long term benefits.

The main obstacles to the success of a cooperative solution to the area's water supply problem will likely be institutional issues. Each community and agency has a culture of "going it alone" and values independence over cooperation. This culture will be hard to overcome, especially in the Ojai Valley. But the Ojai Valley may have the most to gain from a cooperative approach and unfortunately has the most to lose by doing nothing. Without significant rain in 2018 the Ojai Valley and the Casitas service area face the grim reality of an economic disaster, a disaster that will impact agriculture, the tourist industry, real estate values, and the quality of life for everyone.

Conclusion

The following analysis demonstrates that ample water resources are available to Ventura County to avoid chronic water shortages and provide reserve supplies for emergencies. If the local water agencies work collectively and pool each of their unique resources, the County could enjoy the benefits of a reliable and abundant water supply well into the future. A collective and cooperative solution to Ventura County's water supply deficiencies may be the most effective, least costly, and most timely of all of the individual alternatives currently under review.

Source: City of San Buenaventura - State Water Interconnection Project



The interconnection project consists of a connection to the Calleguas system, a pipeline of approximately 7 miles in length, a flow and pressure control and metering station along that pipeline, flow and pressure control and metering stations at United turnout(s) for water delivery, a connection to the City's water distribution system, and a blending/monitoring station within the City's system. The City, in partnership with Casitas, United, and Calleguas, is finalizing the SWP Interconnection Alignment Study. The purpose of that study is to identify connection points to both the City and Calleguas systems and alignments between the various connection points, and to evaluate the advantages and disadvantages of the various alignments. That study has evaluated 20 different pipeline segments, including three alignments from the City of Ventura to cross the Santa Clara River, three different connection points with Calleguas, and routes through roadways and privately held agricultural land between the two connection points. The preferred alignment from that study is the proposed project described in this Notice Of Preparation (February 2018).

Summary of the HoBos Plan

Source: Casitas Municipal Water District

Project Description

Item 1, the Matilija Formation Horizontal Bores (Matilija HoBos) Target project is comprised of drilling bores and well completions in the Matilija sandstone which would begin vertically then change direction to eventually become horizontal, directed to the north, and target the stratigraphic base of the Matilija Formation along the easternmost portion of the Santa Ynez Mountains. The Project would allow for drought-period release of groundwater impounded within the target formation. With low-elevation well head points, water would conceptually drain to the well heads under pressure and be controlled via a valve or series of valves for redundancy and safety. When opened, the valves would allow for water to flow a dedicated pipeline (temporary or permanent) discharging directly to the canal or the Lake[1].

Target Formation

The Matilija Sandstone is known to be among the more porous and permeable local bedrock formations. Recharge to the Matilija Sandstone aquifers which would feed the HoBos conceptually appears to occur primarily via precipitation on the ridges of the Santa Ynez Mountains to the west and up to 3,000 FT higher in elevation than Lake Casitas.

The Matilija Sandstone forms prominent strike ridges in the Santa Ynez Mountains for more than 48 mi (80 km), from east of Highway 154 to northeast of Ojai. It is exposed on both sides of the Santa Ynez fault, thinning both westward and eastward from its maximum exposed thickness of 2,624 FT (800 m) at the type section, Matilija Springs.

Production

Item 1 production is estimated to be approximately 8,000 Acre Feet per Year (AFY), with production during dry years only. During wet years when other sources of water are more readily available, we would expect depleted reserves to be restored at an estimated rate of greater than 2,000 AFY within the aquifers intersected by the HoBos. Adaptive management would be an absolute necessity for this project.

The target portion of the formation outcrops between the Ventura River and the Juncal Pass. This is a 6-mile ridge, where 2,000 FT of stratigraphic thickness of this formation is exposed. Assuming 2,000 vertical feet of saturation, a block of 1,26 $X10^{11}$ cubic feet of material may be available for groundwater storage. Assuming a 1% specific yield, on average for this formation block, we calculate over 29,000 AF of water in storage. This is thought to be a conservative estimate of available water.

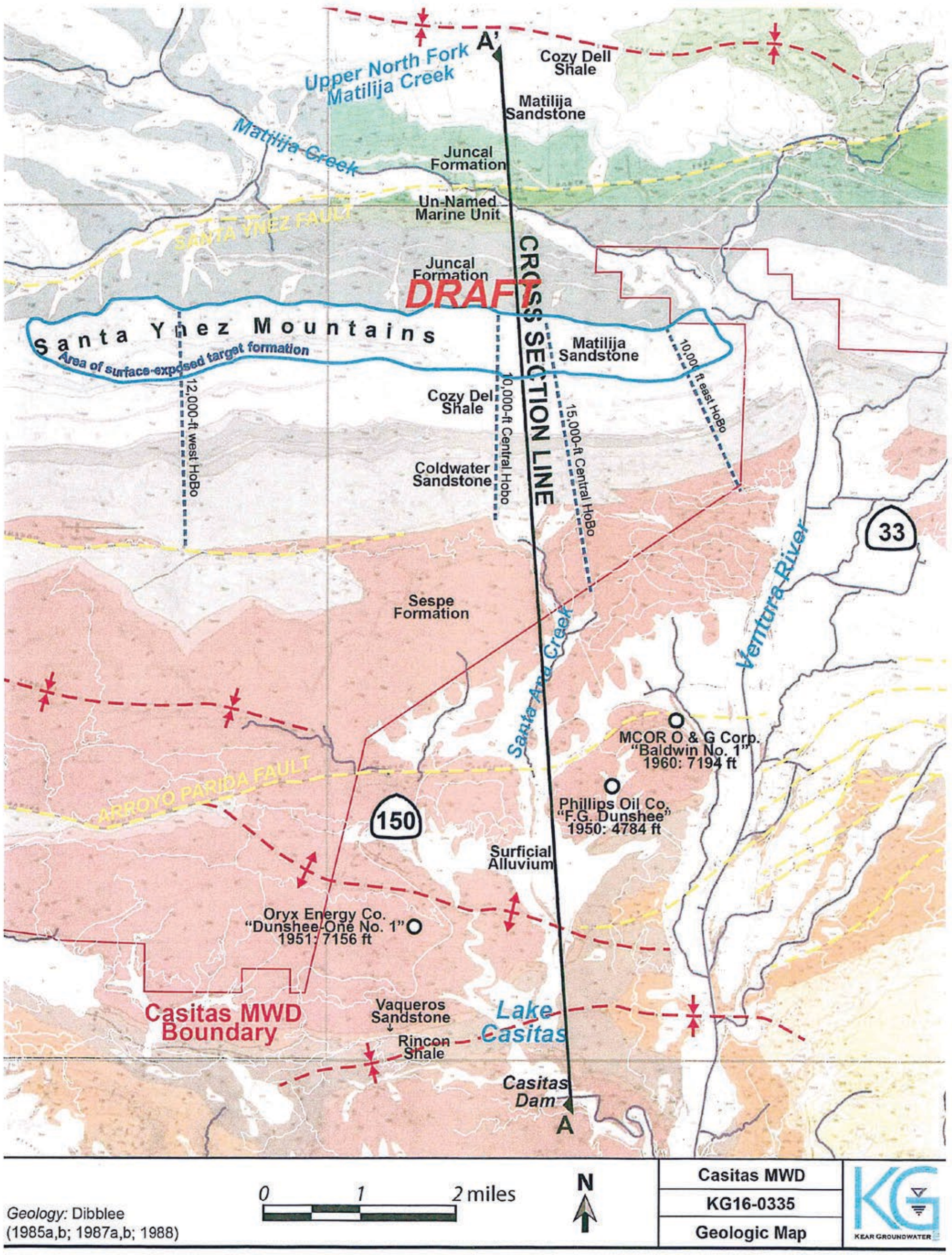
On a more liberal end of the estimation spectrum, a specific yield of 5 percent may be assumed, and a 3,000-foot saturated thickness may be assumed. This could bring a potential amount of water in available storage upwards of 200,000 acre feet.

Opinion of Probable Cost

Anticipated capital cost of the project is $5.6 million per well for drilling and construction, and the pipeline to the canal. Operation costs on the order of $10,000 per year.

Project Timeline

From initiation of design through the environmental review process to completion of construction, if the project is allowed to progress without delay, the total time is estimated at 5 years. It is anticipated that the project would be conducted in phases, with the initial HoBo constructed during the earliest phase as a pilot test/proof of concept project that could be utilized accordingly. Subsequent HoBos could be completed as needed and as the adaptive management of the initial HoBo proves worthwhile.



Summary of the HoBos Plan continued

Source: Casitas Municipal Water District

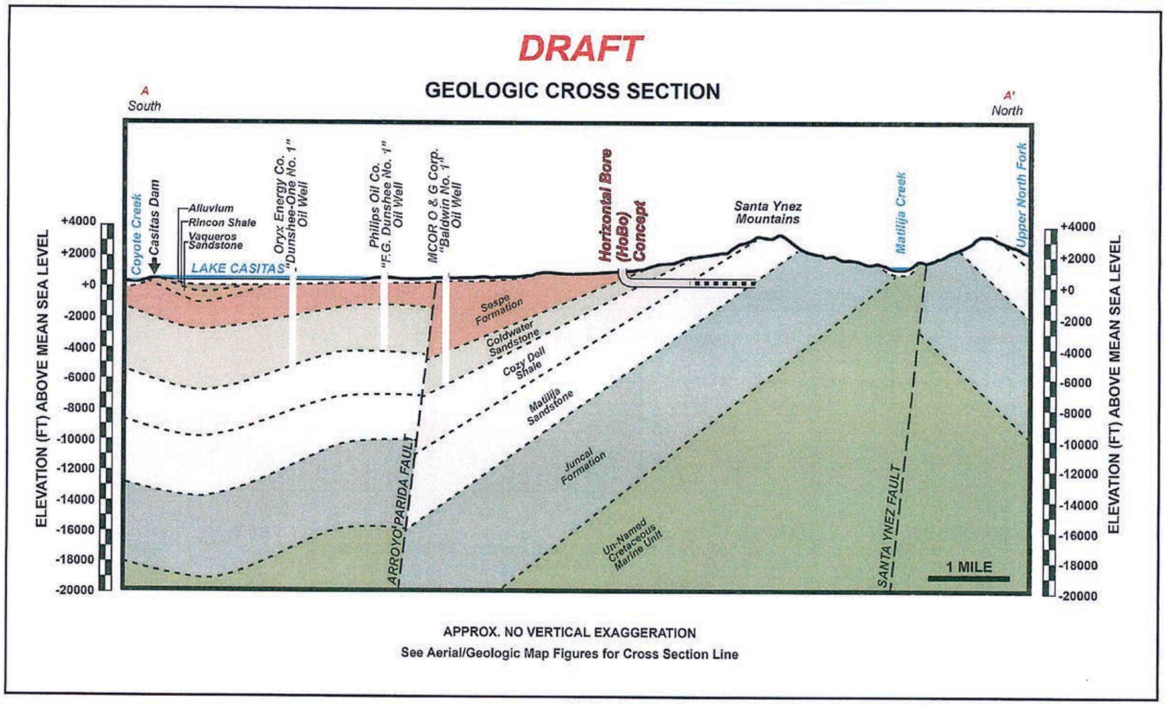
Note that the target formation exists at great vertical depth beneath the District area. The Chismahoo oil exploration well encountered the Matilija Formation at 5,800 FT and remained within the formation until the exploration well's total depth of over 8,000 FT. No significant oil or gas shows were encountered in this bore.

12,000-FT West HoBo: Postulated to be spudded at an elevation of about 1900 FT, just north of Superior Ridge and directed toward White Ledge Peak. Over the bore target formation exposure elevations are typically above 3,000 FT AMSL. Flow would enter Coyote Creek when opened, tributary to Lake Casitas. This location is outside of the District Boundary but within the Lake Casitas Watershed Wilderness. Los Padres National Forest permitting will be essential for construction and operations and maintenance.

15,000-FT Central HoBo: Postulated to be spudded at an elevation of about 860 FT, just south of the intersection of Cooper Canyon Road and the District Boundary. Direction of the bore would be to the north, just east of North Fork Santa Ana Creek. Over the bore target formation exposure elevations are typically above 3,000 FT AMSL. Flow would enter Cooper Canyon when opened, tributary to Santa Ana Creek and Lake Casitas. This location is inside of the District Boundary and within the Lake Casitas Watershed Wilderness. Los Padres National Forest permitting will be essential for construction and operations and maintenance as the intended as the majority of the bore will underlie LPNF lands. Some private property owner negotiations are anticipated to be required.

10,000-FT Central HoBo: Postulated to be spudded at an elevation of about 1200 FT, near lightly cultivated land associated with the Taft lease / property. Direction of the HoBo would be generally under the North Fork Santa Ana Creek. Over the bore target formation exposure elevations are typically above 3,000 FT AMSL. Flow would enter Santa Ana Creek when opened, tributary to Lake Casitas. This location is outside of the District Boundary but within the Lake Casitas Watershed Wilderness. Private property owner/lessee negotiations and Los Padres National Forest permitting will be essential for construction and operations and maintenance.

10,000-FT East HoBo: Postulated to be spudded at an elevation of about 850 FT, just inside the District boundary at Rice Canyon. Direction of the East HoBo would be generally north-northwest. Over the bore target formation exposure elevations are typically above 2,000 FT AMSL. Flow would enter the creek in Rice Canyon when opened and be directed to the Robles Canal, tributary to Lake Casitas. Private property owner negotiations and Los Padres National Forest permitting will be essential for construction and operations and maintenance. This HoBo would be likely lowest pressure/production of the described bores.



Water Quality

Groundwater Quality from Matilija Formation wells and springs locally is expected to be consistent with the water generated by the Matilija HoBo. Total Dissolved Solids (TDS) in the range of 400 to 800 MGL and calcium-bicarbonate water character are expected. Iron, manganese, sulfates may be elevated but not expected to be detrimental to project implementation. Pilot project efforts would be implemented to detail actual water quality.

Reliability

Using an adaptive management strategy, the reliability of the HoBo is high, in that water could be extracted on an as-needed basis (during droughts) and allowed to recharge during periods of higher precipitation. Conceptually, when a target/threshold low lake level is reached, the HoBos would be opened, but remain shut-in and monitored during other times.

Water Rights

The district must explore the extraction of this percolating groundwater and its appropriative right to extract. Other than some minor spring use (Ojala), this resource appears to be untapped as effectively all water in storage has bypassed the root zone of flora in the headwaters along the ridge. We expect that a physical solution (such as serving affected spring owners with a water source during drought periods and HoBo use) would be offered as offsets of potential water rights issues.

Public Agency Involvement

For this project it is anticipated that the involved agencies will include the U.S. Bureau of Land Management and the USDA Forest Service, from whom a permit must be acquired. The project involves discharging raw water into watercourses that for the most part are jurisdictional. Additional agencies likely to be involved are the Regional Water Quality Control Board, the CA Department of Fish and Wildlife, the US Army Corps of Engineers, the Ventura County Watershed Protection District the National Marine Fisheries Service/NOAA, and possibly others. Well site preparation may involve a grading permit from the Ventura County Development Services Department.

Private landowners, whose property could be used for access, pipeline alignment and drilling if CMWD property is not available for drilling, will also be involved.

Catchment and Storage – Beyond Conservation

Source: Tom Ash

Using local rain fall more effectively is a new source of water for the Ojai Valley. This is a photo of burn area in the East End above Senior Canyon. The blue lines depict placement of natural-types of barriers to slow the run-off from storms, allowing water to soak into the ground and spread throughout the adjacent soil profile. The benefit of storm water capture in the burn areas around the entire valley are (1) higher infiltration of water into the soils and ground water basin even in low rain years, (2) retention of soil moisture to speed re-vegetation of burn areas, (3) beginning a process to protect properties from potentially damaging storm runoff and flooding, and (4) maximizing the multiple beneficial uses of rain that falls in the valley watershed. Implementing storm water capture would be a coordinated effort between the Forest Service, Natural Resources Conservation Service, land owners, and local public agencies. Funding is available through grants from State agencies. Note: Thatcher School and the San Antonio watershed have received such funding.

Swales and an infiltration pool holding water that previously deposited silt on highway 33 and wasted copious amount of water. Designed and installed by Connor Jones.

Bioswales are channeled depressions or trenches that receives rainwater runoff (as from a parking lot) and has vegetation (such as grasses, flowering herbs, and shrubs) and organic matter (such as mulch) to slow water infiltration and filter out pollutants.

Students digging bioswales in the gardens of Oak Grove School.

"Not even a single raindrop should be allowed to flow into the sea without it first having been used for the benefit of the people…" — is the best summing up of the new water paradigm, a statement which, in the coming decades, should become a slogan for mankind calling for the preservation of civilization.
— Dr. Michal Kravcik, Hydrologist, International Environmental Award Winner

The part of climatic change which is the result of human activities (draining of a region), can be reversed through systematic human activity (the watering of a region). The watering of land can be achieved through saturation of the small water cycle over land by ensuring comprehensive conservation of rainwater and enabling its infiltration and evaporation. This can help achieve the renewal of the small water cycle over a region and fundamentally change the trend of changing climatic conditions: it can—to reverse the trend of regional warming—temper extreme weather events and ensure a growth in water reserves in the territory. **— Dr. Michal Kravcik, Hydrologist, International Environmental Award Winner**

Catchment and Storage – Beyond Conservation

Source: Ojai Permaculture

Harvest the Rain

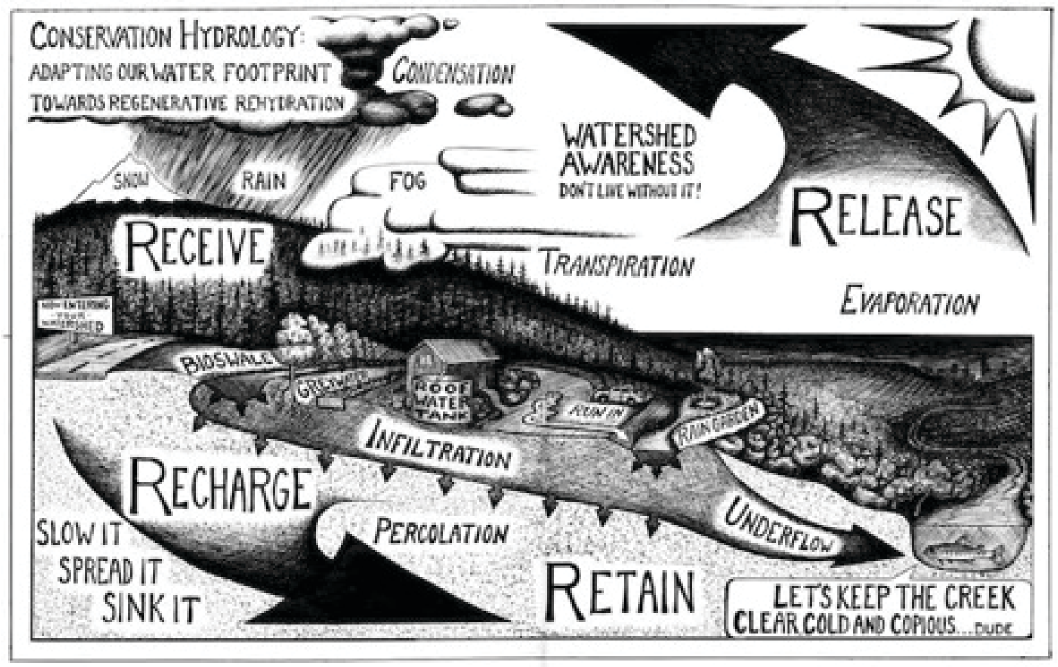
Ojai faces a crisis of water management, we lack not water but the systems for storing it. As we get progressively closer to the 'tap out" point of our current water storage and delivery systems, rainfall patterns become progressively unpredictable.

The solution can be simple, relative to the alternative, which represents long-term water fragility and huge infrastructural costs to import water from long distances from watersheds facing similar hydraulic decline and ecological degradation. As the saying goes "water flows uphill to money", let us not spend our money expediently but spend it wisely. The truest solution offers itself within our watershed, using our landscape, our topography, our open spaces, our farms, and our residences.

Every year this valley sheds literally billions of gallons of "freshwater" to the ocean as runoff. Well, the truth is, that water is not so fresh. Because of our current land management, water acts as an agent of erosion and progressive desertification in our watershed, carrying tons of sediment in its turbid floodwaters every year. This is not natural, normal, or healthy. The typical attitude towards water is to get it off the landscape as fast as possible while the rain is falling and then demand for it to come back during the dry season at high expense. It's nonsensical.

Hydrology, roughly speaking, understands the water cycle this way; atmospheric moisture is created through evaporation, and transpiration from soil, bodies of water and leaf surfaces. That water is condensed into clouds where it is then pressurized, achieves a freezing point and then, weighted, ice crystals fall and melt as raindrops. That water then reaches terminal velocity as it falls from the sky. This is essentially natural "Desal" (water desalination) with a nuclear furnace at a safe distance of 90 million miles away (the sun) and free delivery of water to your land or rooftop every year (precipitation). In a healthy ecosystem rainfall is intercepted by vegetation or soil surface organic matter giving it little chance to create erosion and soil loss, in fact the water cycle works in its benefit to accrue soil. After reaching the soil surface or leaf surface a large percentage is directed down into the soil where it travels until it reaches the pre existing layer of saturation also known as the "water table". This level can fluctuate based upon many factors, rainfall, infiltration rate of soil, tree transpiration, temperature, and most notably groundwater pumping. Our soils have an immense capacity to store water, this is why in arid, highly evaporative climates, groundwater is the most sensible source of water. Therein lies the fundamental problem and the potential solution

If we perennially direct water off our landscapes during the rainy season the groundwater replenishing process is inhibited greatly, yet we continue to pump from that underground reservoir. It's much like drawing money from a bank account daily while giving little or no consideration to depositing into it. We all know how well that works out.



Source: The Water Institute at Occidental Arts and Ecology

Facts:

1 acre of lightly vegetated clay soil sheds about 135 gallons per minute in a .5” rain event.

Ojai receives an average of 322,008 AF of rainfall=104,926,628,808 gal. Of that water 33% goes to the stream, 5% goes to groundwater, 62% evapotranspiration

The strategy includes a representation of the consumer categories for water consumption in the valley. A hierarchy of importance will be placed upon those areas with the largest surface area and/or potential for groundwater infiltration. They are as follows:

Agricultural Land

Agricultural land makes up approximately 7,291 acres, or about 5% of the watershed catchment surface area. This land, by the nature of its use is largely unpaved and open. It is optimal for implementing stormwater infiltration from its own surfaces, adjacent lands at a higher gradient, existing engineered drainages, roadways and ephemeral streams. A conservative estimate of what could be captured and infiltrated on just the surface area of Ag land alone is about 13-16,000AF, nearly the annual demand from lake casitas. This figure doesn’t even include ‘run-on” or water entering the infiltration area from other sources as mentioned above.

Another element of how Agriculture can affect water is by improving the soil carbon content. Increasing carbon in the soil by only 1% can store up to 25,000 more gallons per acre, reducing irrigation demand and increasing infiltration of rain and reducing runoff and erosion. That’s 182 million gallons or about 560 AF on the 7,291 acres of Ag.

Residential

Residents in the city of Ojai, for example, could make subtle changes to their landscape to keep water where it lands and direct roof water and hardscape runoff into their soils instead of into storm drains. Changing the surface contours of your landscape from convex to concave immediately makes water more capable of staying put and infiltrating. Mulching helps condition the soil to percolate water more effectively and acts as a sponge while also reducing soil surface evaporation. This pattern, replicated over 3,000 -/+ households with an average hardscape surface of about 2,000 sq ft could equal up to 60 million gallons of groundwater infiltration, nearly 1/3 of residential use in Ojai per year. All of the sidewalks and roads combined could come close to supplying all of the needs of the City’s residents if proper management and storage was applied.

Pros and Cons of Desalination

Source: www.sciencing.com

Advantages & Disadvantages of Desalination Plants

By Anne Ackerman; Updated February 01, 2018

Desalination converts salty water into drinkable water by removing salt and other solids from seawater or brackish water. Although the desalination process has been around for centuries, desalination plants allowing large-scale treatment of water didn't come into being until the 1950s. In 2002, 12,500 desalination plants in 120 countries provided 14 million cubic meters per day of fresh drinking water. World-wide desalination plant capacity will nearly double by 2015. Read on to find out more about the advantages and disadvantages of using water desalination plants.

Advantage: Provides Accessible Drinking Water

Water desalination plants can provide drinking water in areas where no natural supply of potable water exists. Some Caribbean islands get almost all of their drinking water through desalination plants, and Saudi Arabia gets 70 percent of its fresh water via the process. Even in countries where fresh water is plentiful, desalination plants can provide water to drier areas or in times of drought. The United States, for example, uses 6.5 percent of the world's supply of desalinated water.

Disadvantage: High Costs to Build and Operate

It is very costly to build and operate desalination plants. Depending on their location, building a plant can cost from $300 million to $2.9 billion. Once operational, plants require huge amounts of energy. Energy costs account for one-third to one-half of the total cost of producing desalinated water. Because energy is such a large portion of the total cost, the cost is also greatly affected by changes in the price of energy. It is estimated that a one cent increase in the cost of a kilowatt-hour of energy raises the cost of of one acre-foot of desalinated water by $50.

Advantage: Quality and Habitat Protection

Desalinized water generally meets or exceeds standards for water quality. Water desalination plants can also reduce pressure on freshwater supplies that come from areas that need protecting. By treating ocean water rather than removing it from sources that may also be habitats for endangered species, these important freshwater bodies can be preserved. In addition, removing salt water from the oceans can raise people's awareness about protecting these bodies of water.

Disadvantage: Environmental Impact

The environmental impact is another disadvantage to water desalination plants. Disposal of the salt removed from the water is a major issue. This discharge, known as brine, can change the salinity and lower the amount of oxygen in the water at the disposal site, stressing or killing animals not used to the higher levels of salt. In addition, the desalination process uses or produces numerous chemicals including chlorine, carbon dioxide, hydrochloric acid and anti-scalents that can be harmful in high concentrations.

Contacting Your Local Agencies

Casitas Municipal Water District

www.casitaswater.org

1055 Ventura Avenue
Oak View, CA 93022

(805) 649-2251

Visit their website to contact individual board members.

Ojai Basin Groundwater Management Agency

www.uvrgroundwater.org

428 Bryant Circle, Suite 100
Ojai, CA 93023

(805) 640 - 1247

contactus@uvrgroundwater.org

Ojai Basin Groundwater Management Agency

www.obgma.com

428 Bryant Circle, Suite 100
Ojai, CA 93023

(805) 640 - 1207

obgma@aol.com

Ventura Water

www.cityofventura.ca.gov/885/Ventura-Water

Ventura City Hall
501 Poli Street
Ventura CA 93001

(805) 652 - 4587

watercommission@cityofventura.ca.gov
council@cityofventura.net

United Water Conservation District

www.unitedwater.org

106 North 8th Street
Santa Paula, CA 93060

(805) 525 - 4431

Visit their website to contact individual board members.

City of Ojai

www.ojaicity.org

401 S. Ventura Street
Ojai, CA 93023

(805) 646 - 5581

Visit their website to contact individual board members.

Calleguas Municipal Water District

www.calleguas.com

2100 Olsen Road
Thousand Oaks, CA 91360

(805) 526 - 9323

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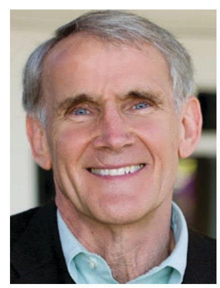

District 1 - Supervisor Steve Bennett

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Chautauqua tickets prices are kept low or zero to encourage maximum participation. Through essential community support, students and teachers attend free of charge for most events, and it is very deeply appreciated. Please give what you can once per year. All supporters will benefit from the difference they make together through the Ojai Chautauqua.

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They hope you will join them.

Ojai CHAUTAUQUA

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