



**WHITE PAPER ON  
SHORT LIST OF SUPPLY OPTIONS  
FOR DROUGHT AND EMERGENCY PREPAREDNESS**

Prepared by:

- Michael Flood, PE, General Manager
- Kelley Dyer, PE, Assistant General Manager
- Julia Aranda, PE, Engineering Manager

DRAFT

September 28, 2022

This page intentionally blank.

## Table of Contents

1. Introduction .....	3
2. Demands .....	3
2.1. Planned Long-Term Demands.....	4
2.2. Water Efficiency and Allocation Program .....	4
2.3. Current Demand Status .....	5
3. Existing Supplies.....	6
3.1. Local Supplies.....	6
3.1.1 Casitas System Supply.....	6
3.1.2 Ojai System Supply.....	8
3.1.3 Uncertainty in Planned Existing Local Supplies .....	8
3.2. Imported Water .....	9
3.2.1 Overview of State Water Project Facilities .....	9
3.2.2 State Water Project Reliability.....	12
4. Drought and Emergency Supply Options.....	14
4.1. Additional Demand Management.....	14
4.1.1 Critical Demands .....	14
4.1.2 Water Shortage.....	17
4.2. Temporary Emergency Projects .....	17
4.3. VRBO .....	18
4.4. Imported Water Options.....	18
4.4.1. Effect of Imported Water Supply on Lake Casitas .....	18
4.4.2. Ventura-Santa Barbara Counties Interconnection.....	18
4.4.3. Calleguas-Ventura Interconnection .....	21
4.4.4. Summary Table of Imported Water Costs .....	24
Appendix A: Cost Analysis of Imported Water Options .....	25
Appendix B: Analysis Lake Casitas Storage with Imported Water Deliveries (2018 to 2022).....	26

This page intentionally blank.

## 1. Introduction

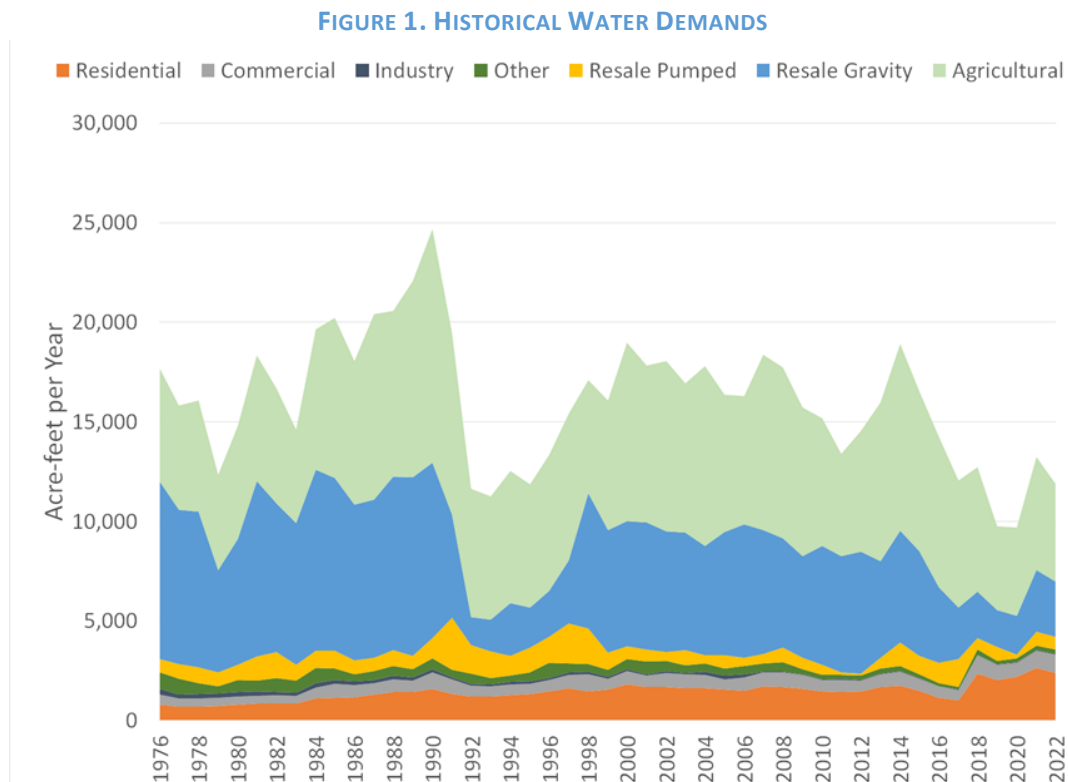
The Ventura River Watershed has been experiencing extreme dry conditions that have persisted since 2012. While Lake Casitas is designed to supply water during multi-year drought conditions, lake levels as of September 2022 are approximately 31 percent of capacity (73,600 Acre-feet remaining). Should dry conditions persist, the Casitas Board of Directors will face major decisions in the near term related to drought response and planning. The purpose of this white paper is to summarize information currently available on management options.

The District operates two water systems known as the Casitas System and the Ojai System, with the Casitas System being the larger of the two systems. The Casitas System is primarily supplied by Lake Casitas along with one groundwater well located in the Upper Ventura River Groundwater Basin. The Ojai System is primarily supplied by groundwater wells in the Ojai Groundwater Basin, with supplemental supply from the Casitas System.

Given the current status of Lake Casitas, the focus of this paper is related to the Casitas System.

## 2. Demands

Customer demands on the Casitas System over the last several decades have ranged from a high of approximately 24,000 Acre-feet (AF) in 1989 to a low of approximately 8,500 AF in 2019<sup>1</sup>. Figure 1 shows a snapshot of water demands over the last two decades (1999-2020). In general, agricultural customers make up the majority of demand at 50 percent. Wholesale customers comprise approximately 30 percent and retail urban customers 20 percent.



<sup>1</sup> Based on fiscal year consumption data. Does not include system water loss.

Casitas manages customer demands through the Water Efficiency Allocation Program (WEAP), which includes conservation targets based on lake level. Since 2016, Casitas has been in Stage 3 of the WEAP with mandated 30 percent conservation. The average demands on the Casitas System over the last 10 years from 2011- 2020 were approximately 14,525 AFY (including losses), which includes periods before and after the WEAP was implemented.

### 2.1. Planned Long-Term Demands

In accordance with California Water Code, the District prepares an Urban Water Management Plan (UWMP) every five years. The UWMP outlines the reliability of water sources over a 20-year timeframe, demand management measures and water shortage contingency plans, and progress toward meeting State target reduction goals for water consumption.

The Board adopted the 2020 UWMP on June 23, 2021. The long-term planned demands in the 2020 UWMP reflect the average demands over the last 10 years, which are 14,525 AFY on the Casitas System and 1,850 AFY on the Ojai System. The Casitas System has supplied the Ojai System an average of 461 AFY over the last 10 years. Therefore, the combined total planned demand is 15,914 AFY (14,525 + 1850 – 461 = 15,914).

### 2.2. Water Efficiency and Allocation Program

During drought conditions, the WEAP is a cornerstone policy for Casitas’ demand management. The WEAP describes the water demand reduction strategies and measures to address water shortage conditions, promote water conservation and the efficient use of water, and the application of a penalty to customers who waste water. The WEAP was originally developed in response to the 1987-1991 drought period, and is updated and modified as needed. The collective work in 1992 set the starting point for a system of water allocation assignments and demand response criteria based on the level of water storage in Lake Casitas.

Under the WEAP, each customer is assigned an individual allocation based on reasonable use for their water use classification and property characteristics. As Lake Casitas levels decline, allocations are reduced according to mandatory water use reductions associated with each declared water shortage stage. Table 1 shows the recommended stages based on Lake Casitas storage levels based on the most recently adopted WEAP.

**TABLE 1. WEAP STAGES, LAKE CASITAS VOLUMES, AND DEMAND REDUCTIONS**

	<b>Stage 1</b>	<b>Stage 2</b>	<b>Stage 3</b>	<b>Stage 4</b>	<b>Stage 5</b>
<b>Lake Casitas Storage (Percent of Capacity)</b>	100%	50%	40%	30%	25%
<b>Lake Casitas Storage (Volume in Acre-feet)</b>	237,761	118,880	95,116	71,328	59,440
<b>Demand Reduction (Percentage)</b>	20% Voluntary	20% Mandatory	30% Mandatory	40% Mandatory	50% Mandatory
<b>Target Demand from Lake Casitas<sup>1</sup> (Acre-feet per Year)</b>	19,127	19,127	16,736	14,345	11,955

<sup>1</sup> Target demand represents percent reductions of Lake Casitas deliveries compared with 1989, and is measured based on Marion Walker WTP production.

### 2.3. Current Demand Status

Since fiscal year (FY) 2013-14, the demand on the Lake Casitas supply continued to decline through the 2020 Fiscal Year (Table 2) in response to the WEAP, water resource changes by large customers, and the heightened customer awareness of water resource conditions.

The Lake Casitas demand reached 12,460 Acre-Feet in FY 2021 and 11,304 in FY 2022. (The amounts in Table 2 are registered at the Marion Walker Treatment Plant and differ from amounts reported on the District’s Monthly Consumption Reports, which do not include system losses)

**TABLE 2. WATER DELIVERIES FROM THE LAKE CASITAS SUPPLY**

<b>Fiscal Year</b>	<b>2013-14</b>	<b>2014-15</b>	<b>2015-16</b>	<b>2016-17</b>	<b>2017-18</b>	<b>2018-19</b>	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>
<b>Lake Casitas Deliveries (AF)</b>	20,417	17,339	15,662	13,200	12,322	9,340	8,802	12,460	11,304
<b>Declared WEAP Stage</b>	1	1	2	3	3	3	3	3	3

### 3. Existing Supplies

The District operates two water systems known as the Casitas System and the Ojai System, with the Casitas System being the larger of the two systems. The Casitas System is primarily supplied by Lake Casitas along with one groundwater well located in the Upper Ventura River Groundwater Basin. The Ojai System is primarily supplied by groundwater wells in the Ojai Groundwater Basin, with supplemental supply from the Casitas System.

The following is a description of planned existing supplies and uncertainty related to planning assumptions.

#### 3.1. Local Supplies

All supplies currently delivered are from local groundwater and surface water resources. The following is a description of water supplies for the Casitas System and Ojai System, as well as uncertainty in planned existing supplies.

##### 3.1.1 Casitas System Supply

Lake Casitas was formed by the construction of Casitas Dam by the US Bureau of Reclamation in 1958. The total lake capacity is 237,761 AF as of 2017. The Robles Diversion and Fish Passage Facility is located on the north end of the Ventura River and allows Casitas to divert river flow to the Robles Canal to supply Lake Casitas. Operation of the Robles Facility is in accordance with the 2003 non-jeopardy Biological Opinion (BO) prepared by National Marine Fisheries Service (NMFS) due to the listing of steelhead trout as an endangered species.

The water supply availability from Lake Casitas was previously studied by the USBR in the 1954 evaluation of the Ventura River Project, and later by the District in the 1989, 2004 and 2021. In the “Water Supply and Use Status Report” (Casitas, 2004), the Safe Yield of Lake Casitas was determined to be 20,480 AFY based on a mass-balance model that tracks Lake Casitas inflows, outflows (including evaporation) and change in storage to simulate operations over a time series of assumed hydrology conditions. From 2019 through April 2021, the Lake Casitas model was updated to include:

- Extended hydrologic period of record (from previous of 1945-1999)
- Incorporated results of recent Lake Casitas bathymetric survey – reduced maximum storage capacity from 254,000 AF to 237,761 AF
- Added function to compute reservoir spills
- Incorporated Robles Diversion operations based on 2003 Biological Opinion requirements and 2018 Critical Drought Protection Measures
- Reduced modeled Robles diversions based on a diversion efficiency consistent with operational data since the Fish Passage Facility was constructed
- Improved method of calculating monthly net evaporation loss

On January 15, 2021, the Board directed staff to use the modeling and policy assumptions as follows:

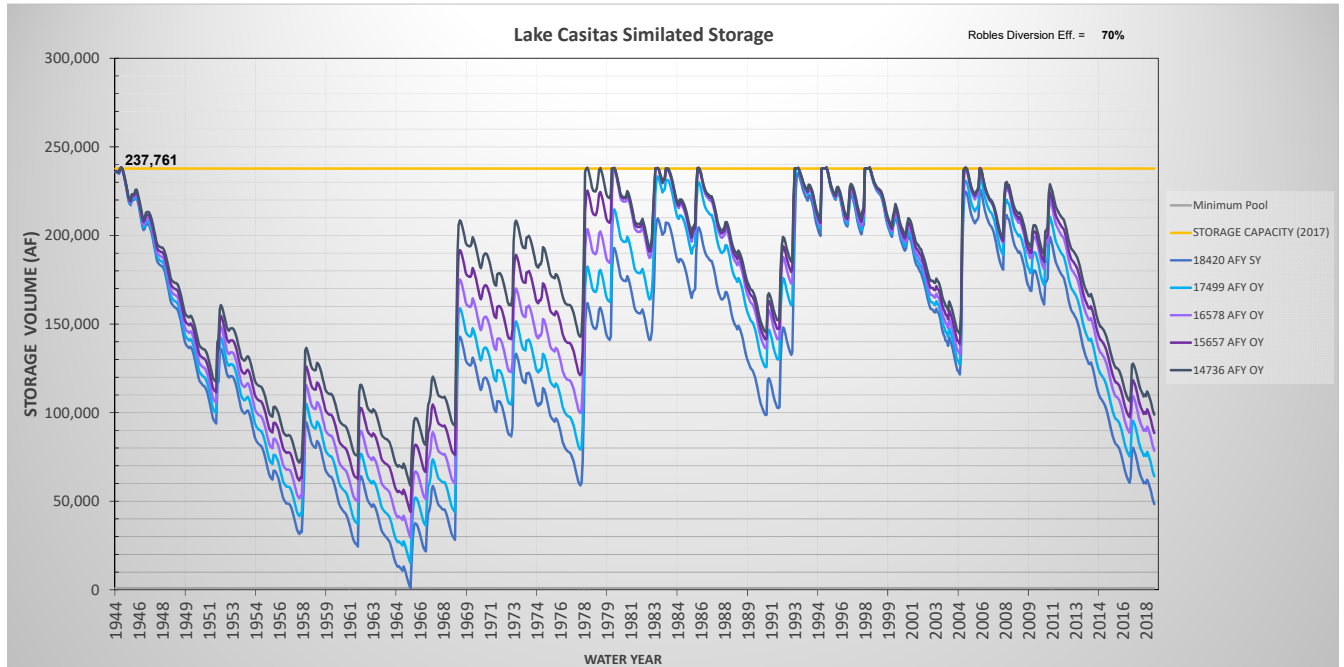
- Safe Yield approach that models the largest yield that can be withdrawn from the lake in every year without dropping below the minimum allowable storage level
- Historical hydrologic period from 1945-2018



- Minimum Allowable Storage of 950 AF, which is the dead pool elevation at which water can no longer flow by gravity to the water treatment plant
- Robles Diversion Efficiency of 70%
- Initial Lake Volume of 237,761 AF (full reservoir)

In addition, the Board directed staff to provide considerations for a safety factor for future hydrologic uncertainty. Figure 2 and Table 3 present the modeled Lake Casitas storage levels and yields based on varying levels of supply safety factors.

**FIGURE 2. MODELED LAKE CASITAS STORAGE LEVELS WITH VARIOUS SAFETY FACTOR SCENARIOS**



**TABLE 3. MODELED LAKE CASITAS MINIMUM STORAGE LEVELS WITH VARIOUS SAFETY FACTOR SCENARIOS**

Safety Factor	Lake Casitas Yield, AFY	Minimum Storage Level, AF
-----	18,420	970
-5%	17,499	15,049
-10%	16,578	29,439
-15%	15,657	44,068
-20%	14,736	58,783

Based on safe yield modeling and a report titled *Projected Changes in Ventura County Climate* prepared by the Desert Research Institute in 2019, increased evaporation of six inches/year was found to reduce the Lake Casitas safe yield for historical inflow hydrology by 4.3 percent. This factor was applied to results of yield simulations to account for potential future climate change.

In April 2021, the Board adopted a Lake Casitas safe yield of 18,420 acre-feet per year (AFY) with a supply safety factor of -15 percent and a climate change adjustment of -4.3 percent was applied for planning purposes. When these two factors are included, the combined planned operational yield from Lake Casitas and the one groundwater well is determined to be **15,010 AFY** for the Casitas System.

### 3.1.2 Ojai System Supply

Casitas acquired the Ojai System from Golden State Water Company in June 2017. The Ojai System receives water from Ojai Basin groundwater and two interconnects supplying water from the Casitas System. Approximately 461 AFY of the planned demands on the Casitas System are for deliveries to the Ojai System. The 2017 acquisition included several groundwater wells, with some wells over 60 years old and in need of rehabilitation and replacement. The wells acquired by GSWC were unable to produce their original design capacity of 4,404 AFY and average Ojai wellfield production from 1994-2016 was about 1,800 AFY. Casitas has made progress in improving the condition of the wells, although work is still underway and not yet completed. The well improvements are anticipated to provide an average production of 2,300 AFY.

### 3.1.3 Uncertainty in Planned Existing Local Supplies

As with any future planning efforts, there is uncertainty. The following is a summary of considerations related to future uncertainty of supplies from Lake Casitas:

- Hydrology may not be the same as modeling assumptions. Future droughts could be more severe than historical hydrology. Because the Casitas System is dependent on surface water for its water supply, its exposure to risk from future changes in regional climate and hydrology is significant.
- Matilija Dam Removal could result in sediment loading impacts that reduce the ability to divert or extract water supply along the Ventura River.
- State Water Resources Control Board (SWRCB) and California Department of Fish and Wildlife (CDFW) Instream Flow Studies could reduce local region water supplies and increase reliance on Casitas. Based on preliminary analysis of the CDFW Instream Flow Recommendations, the potential supply impacts would exceed the supply safety factors considered herein. Therefore, this analysis will need to be revisited once more information is known regarding the SWRCB modeling study.
- Ventura River Watershed Adjudication initiated by the City of Ventura has the potential to reduce supply availability depending on the outcome of the flow regime and water rights issues.

## 3.2. Imported Water

In 1963, the Ventura County Flood Control District (VCFCD, now the Ventura County Watershed Protection District), contracted with the State of California for 20,000 AFY of water from the State Water Project (SWP). In 1971, the VCFCD and Casitas executed a contract assigning the rights (including payment of all costs) of the Water Supply Contract to Casitas. Casitas subsequently subcontracted a 10,000 AFY share to the City of Ventura and a 5,000 AFY share to UWCD, leaving Casitas with 5,000 AFY for its own use. UWCD can access SWP through Lake Piru (via Pyramid Lake and Piru Creek), although local infrastructure is not in place to deliver the contractual share to Casitas and the City of Ventura.

While Casitas and the City of Ventura have not historically taken delivery of imported water, the agencies have continued to make payments for their contractual share of fixed costs of the State Water Project. Options to construct local infrastructure and allow delivery of State Water supplies are currently under design as discussed herein.

### 3.2.1 Overview of State Water Project Facilities

Planned, constructed, and operated by the California Department of Water Resources (DWR), the SWP is one of the world's largest water, power, and conveyance systems supplying water to more than 27 million people and 750,000 acres of farmland. The SWP relies on a delivery system of reservoirs, aqueducts, power plants, and pumping plants that allow the movement of water from northern to southern California and the ability to exchange and transfer water with SWP contractors throughout the state. The SWP primary delivery facilities are shown in Figure 3. More information on the SWP and its facilities can be found at: <https://water.ca.gov/Programs/State-Water-Project>.

FIGURE 3. SWP DELIVERY FACILITIES



(Source: DWR Bulletin 132, 2015)

To the north of Ventura County, the SWP serves Santa Barbara County through the Coastal Branch Aqueduct and a 42-mile long Central Coast Water Authority pipeline shown in Figure 4. This pipeline allows for the SWP to deliver water to Lake Cachuma for conveyance to South Santa Barbara County agencies via Tecolote Tunnel and the South Coast Conduit, which extend as far south as Carpinteria Reservoir, serving the Carpinteria Valley Water District (CVWD). (The Tecolote Tunnel and South Coast Conduit are not shown in Figure 4 but are shown in Figure 7.)

**FIGURE 4. STATE WATER PROJECT COASTAL BRANCH AQUEDUCT**



To the south of Ventura County, the Metropolitan Water District of Southern California (MWD) is a regional wholesaler that provides water to 26 member public agencies (*The Metropolitan Water District of Southern California, 2020*). MWD imports water from both the SWP and the Colorado River Aqueduct. Calleguas Municipal Water District (Calleguas) is a member agency of MWD and receives their SWP water through a complex delivery system. Water delivered to Calleguas is treated by MWD at the Joseph Jensen Filtration Plant in Granada Hills. Once SWP water reaches Calleguas via the East Portal Facility in Chatsworth, it is distributed through the potable water distribution system (Figure 5), stored in Lake Bard, or injected into the Fox Canyon aquifer.

**FIGURE 5. CALLEGUAS MUNICIPAL WATER DISTRICT POTABLE WATER DISTRIBUTION SYSTEM**



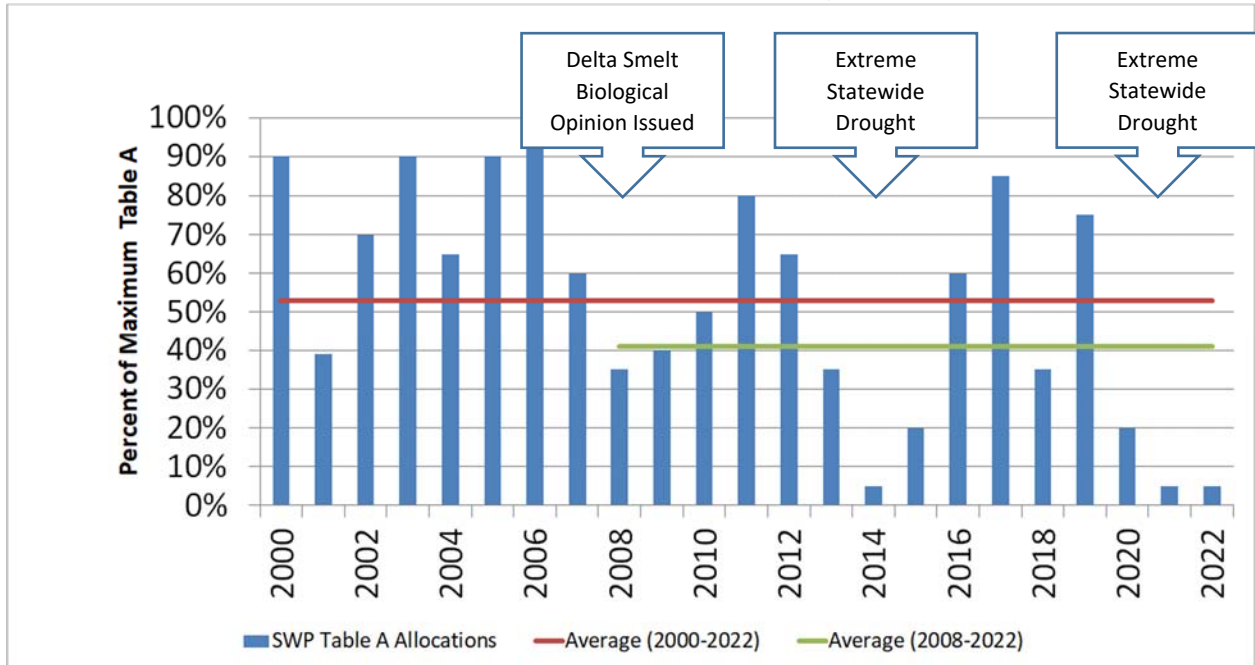
### 3.2.2 State Water Project Reliability

While Casitas’ SWP Table A entitlement is 5,000 AFY, this level of reliability is not expected from the State Water Project on an annual basis. DWR prepares a biennial report to assist SWP contractors and local planners in assessing the availability of supplies from the SWP. In December 2021, DWR issued its most recent update, the *2021 Draft DWR State Water Project Delivery Capability Report (DCR)*. The 2021 Draft DCR includes DWR’s estimates of SWP water supply availability under existing conditions. According to the Draft DCR, the long-term average delivery under existing conditions is 55 percent of Table A. For Casitas, this would result in a long-term average yield of 2,750 AFY under existing conditions.

DWR’s estimates of SWP deliveries are based on a computer model that simulates monthly operations of the SWP and Central Valley Project systems. In the existing conditions model scenario, DWR applied the existing facilities; hydrologic inflows to the model based on 94 years of historical inflows (1922–2015); current regulatory and operational constraints, including 2018 Coordinated Operation Amendment, 2019 biological opinions, and 2020 Incidental Take Permit; and contractor demand at maximum Table A amounts.

This estimate of existing reliability is about the same as the historical Table A deliveries for 2000-2022 shown in Figure 6. The average allocation in the last ten years has been reduced due to extreme drought and environmental restrictions. If completed, the proposed Delta Conveyance Project is intended to improve the long-term reliability of its State Water Project deliveries.

**FIGURE 6. HISTORICAL SWP TABLE A DELIVERIES, 2000-2022**



## 4. Drought and Emergency Supply Options

Casitas has a long history of considering improvements to its water supply portfolio. Most recently, Casitas evaluated several options in a draft Comprehensive Water Resources Plan (CWRP), including conveyance of State Water, groundwater, recycled water, local operational agreements, existing facility improvements, desalination, and conservation (Stantec, 2020).

Based on the draft CWRP analyses, select options are described herein for further consideration. Casitas continues to plan additional supplies in the event that lake levels continue to decline. The Casitas Board could implement demand management, supply options, or a combination of both.

### 4.1. Additional Demand Management

In the event of continued decline of Lake Casitas storage, the Board could restrict demands beyond the current Stage 5 targets in the WEAP. This could be a possible Stage 6 declaration and would require determining which types of uses would be curtailed.

Table 4 shows the recent water use and allocations by customer class and by system.

**TABLE 4. ALLOCATIONS AND WATER USE BY CLASS**

<b>Casitas System</b>			
<b>Classification</b>	<b>Stage 3 Allocation, AFY</b>	<b>5-Year Average, CY 2016-2020, AFY</b>	<b>FY 2022 Water Use, AFY</b>
Agricultural	8,609	5,412	4,862
Residential	2,248	1,141	1,210
CII/Other	941	662	768
Resale	5,724	2,886	3,403
Total	17,522	10,101	10,243
<b>Ojai System</b>			
<b>Classification</b>	<b>Stage 3 Allocation, AFY</b>	<b>5-Year Average, CY 2016-2020, AFY</b>	<b>FY 2022 Water Use, AFY</b>
Agricultural	65	61	64
Residential	1577	1,081	1,194
CII/Other	586	420	397
Resale	0	0	0
Total	2,228	1,562	1,655

#### 4.1.1 Critical Demands

Due to persistent dry conditions, the DWR has supplied water based on minimum unmet water demands to meet domestic water supply, fire protection, and sanitation needs (referred to as “health and safety” needs). The DWR determined these health and safety needs to be not more than 55 gallons per capita per day (gpcd), consistent with recent State Water Resources Control Board emergency curtailment regulations<sup>2</sup>.

<sup>2</sup> Cal. Code Regs., tit. 23, §§ 877.1(g), 878.; see also [https://www.waterboards.ca.gov/drought/delta/docs/deltareg\\_oal\\_approval.pdf](https://www.waterboards.ca.gov/drought/delta/docs/deltareg_oal_approval.pdf)



Using the State’s approach, Table 5 shows the estimated health and safety demand for Casitas’ service area.

**TABLE 5. ESTIMATED HEALTH AND SAFETY DEMAND USING STATE’S APPROACH (55 GPCD)**

<b>System/Classification</b>	<b>Population<sup>1</sup></b>	<b>Health and Safety Demand, AFY</b>
Ojai Retail	6,712	414
Casitas Retail	11,042	680
Casitas Resale	45,964	2,832
<b>Total</b>	<b>63,718</b>	<b>3,926</b>

<sup>1</sup>Source: 2020 UWMP

A policy consideration for the Board is whether to include agricultural uses in planned critical demands. The intended uses for the Ventura River Project included both municipal and industrial (M&I) as well as agricultural irrigation. Construction costs were distributed such that 42.67% of costs were paid by M&I customers and 57.33% of costs were paid by agricultural customers, according to the 1957 Amendatory Contract with the United States<sup>3</sup>.

For consideration, the following options are presented with various levels of agricultural demands included in critical demands (Table 6).

**TABLE 6. POLICY OPTIONS RELATED TO CRITICAL DEMANDS FOR AGRICULTURE**

<b>Policy Options</b>	<b>M&amp;I Health and Safety Demand</b>	<b>Agricultural Share of Critical Demand</b>	<b>Total Critical Demand, AFY</b>
1. No Ag Demand	3,926	0	3,926
2. Ag and M&I have equal share	3,926	3,926	7,852
3. Ag has 57.33% share	3,926	5,275	9,200

Over the 5 year period from fiscal years ending 2016-2021, total M&I demands ranged from 5,396 to 7,684 AFY, and averaged 6,213 AFY. Therefore, the M&I health and safety demands of 3,926 AFY would be a 37% reduction from recent usage. Table 7 shows how the critical demand options for agriculture compare with recent usage.

**TABLE 7. AGRICULTURAL CRITICAL DEMAND OPTIONS COMPARED WITH RECENT USAGE**

<b>Policy Option</b>	<b>Agricultural Critical Demand, AFY</b>	<b>5-year Average Agricultural Demand, AFY (FY16-21)</b>	<b>Critical Demand Reduction from Recent Usage</b>
No Ag Demand	0	5,355	100%
Ag and M&I have equal share	3,926	5,355	27%
Ag has 57.33% share	5,275	5,355	1%

Staff recommends Option 2, which would result in a total critical demand of 7,852 AFY. With an assumed 10% water loss contingency, this would be a planned critical demand of 8,725 AFY. It is expected that some of this demand could be supplied by groundwater, although the majority would come from Lake Casitas.

<sup>3</sup> Amendatory Contract between the United States and the Ventura River Municipal Water District Providing for the Construction of a Storage and Conveyance System dated November 5, 1957.

In Table 3, the lowest modeled Lake Casitas storage level (with the Board-adopted safety factor of -15%) is 44,068 AF which is 18.5% of capacity. Assuming Stage 6 is declared when the lake level reaches 20% of capacity or 47,552 AF, there would be 4 years of supply remaining with a Stage 6 critical demand of 8,725 AFY. This estimate assumes average evaporation of 3,000 AFY based on maximum observed evaporation rates and projected surface area at lower storage volume.

Customers may reduce their water use voluntarily as the lake levels drop. However, if the Board were to take action to align allocations to match the critical demand, the following adjustments would need to be made:

- Eliminate non-essential allocations for Residential customers
- Reduce allocations for all other classes by 70%
- Consider further limitations on new allocations for temporary or permanent use

Table 8 shows the allocations by class and water system under a Stage 6, and Table 9 shows a summary of the proposed lake level and overall demand reduction with Stage 6.

**TABLE 8. ALLOCATIONS AND WATER USE BY CLASS**

<b>Casitas System</b>			
<b>Classification</b>	<b>Stage 6 Allocation, AFY</b>	<b>5-Year Average, CY 2016-2020, AFY</b>	<b>FY 2022 Water Use, AFY</b>
Agricultural	3,587	5,412	4,862
Residential	991	1,141	1,210
CII/Other	392	662	768
Resale	2,577	2,886	3,403
<b>Total</b>	<b>7,547</b>	<b>10,101</b>	<b>10,243</b>
<b>Ojai System</b>			
<b>Classification</b>	<b>Stage 6 Allocation, AFY</b>	<b>5-Year Average, CY 2016-2020, AFY</b>	<b>FY 2022 Water Use, AFY</b>
Agricultural	27	61	64
Residential	812	1,081	1,194
CII/Other	244	420	397
Resale	0	0	0
<b>Total</b>	<b>1,083</b>	<b>1,562</b>	<b>1,655</b>

**TABLE 9. PROPOSED STAGE 6 LAKE CASITAS VOLUME AND DEMAND REDUCTION**

	<b>Stage 1</b>	<b>Stage 2</b>	<b>Stage 3</b>	<b>Stage 4</b>	<b>Stage 5</b>	<b>Stage 6</b>
<b>Lake Casitas Storage (Percent of Capacity)</b>	100%	50%	40%	30%	25%	20%
<b>Lake Casitas Storage (Volume in Acre-feet)</b>	237,975	118,988	95,190	71,393	59,494	47,552
<b>Demand Reduction (Percentage)</b>	20% Voluntary	20% Mandatory	30% Mandatory	40% Mandatory	50% Mandatory	Essential Only for Residential; 70% Mandatory for all other classes
<b>Target Demand from Lake Casitas<sup>1</sup> (Acre-feet per Year)</b>	19,127	19,127	16,736	14,345	11,955	8,725

<sup>1</sup> Target demand represents % reductions of Lake Casitas deliveries compared with 1989, and is measured based on Marion Walker WTP production.

#### 4.1.2 Water Shortage

In the event existing Lake Casitas water supply is unavailable, staff recommends that backup water supplies be developed to meet health and safety demands of 3,926 AFY. Of this amount, 3,512 AFY is related to the Casitas System (680 AFY retail and 2,832 AFY resale – See Table 5 above). While some resale customers may be able to provide backup water supplies of their own, the full health and safety demand of 3,512 AFY should be used for planning purposes on the Casitas System.

#### 4.2. Temporary Emergency Projects

In the event emergency supplies are needed to meet public health and safety needs, and facilities to access Casitas’ emergency water supply are not available, the District could construct facilities to increase groundwater production and convey water from neighboring water agencies or private well owners. The options for temporary supply during emergencies include, but are not limited to:

- **Resale Agency Interconnect:** Use excess capacity when available from resale agency groundwater wells (i.e. Meiners Oaks Water District, Ventura River Water District, City of Ventura, etc.) to supply water directly to Casitas’ potable water system or to Lake Casitas via the Robles Canal
- **Private Owner Interconnect:** Use excess capacity when available from a private groundwater well owner to supply water directly to Casitas’ potable water system or to Lake Casitas via the Robles Canal
- **Upper Rincon Creek Intertie:** An existing 6" Upper Rincon Creek lateral normally feeds water from Casitas’ potable water system to Carpinteria Valley Water District (CVWD). In this option, the flow in the pipeline would be reversed to allow water from CVWD to be pumped into Casitas’ system. Facilities would include a temporary booster pump skid and piping, as well as increased capacity of an existing turnout on the Rincon Main.
- **Increased Mira Monte Well Supply:** The existing Mira Monte Well produces water for Casitas’ potable water system but is limited in production due to elevated nitrate levels. To keep nitrate levels within drinking water quality requirements, water from Lake Casitas is blended with Mira

Monte Well. This option involves downsizing a pump at the Avenue 2 Pump Plant to provide longer blending periods and allow for increased production from the Mira Monte Well.

The feasibility of the options listed above is currently being evaluated for additional emergency supply.

### 4.3. VRBO

The Matilija Formation Deep Wells project consists of the construction of one or more deep water wells in the Matilija sandstone. This formation contains groundwater that recharged over very long time periods. Based on preliminary analysis, the Matilija Formation could yield approximately 5,000 gallons per minute of groundwater (potentially 8,000 acre-feet per year) in the Eastern Santa Ynez Mountains via vertical boring possibly extending as far as 15,000 feet. Preliminary estimates indicate 29,000 to 280,000 AF of water in storage in this formation. However, information regarding geologic characteristics is incomplete and requires further study.

The project includes the exploration of vertical wells located on property owned by Casitas, west of the Robles Diversion Facility. This water supply may be used as an emergency supply in drought conditions. Water can be treated at the site and fed into Casitas' transmission system and/or discharged to the Robles Canal and sent to Lake Casitas. Additional study is required regarding project feasibility including pilot tests to confirm well yields. In addition, the District will need to understand the water rights associated with this water source and the impacts to the landowners.

Based on initial evaluation, the anticipated capital cost of the project is \$5.6 million per well for drilling and construction. Drilling of a pilot well to test water quality and quantity is estimated to be approximately \$2 million (2018 dollars). The number of wells is undetermined currently. The project implementation period is estimated to be 5 years including design.

### 4.4. Imported Water Options

While Casitas does not currently have infrastructure in place to deliver its imported water supplies, two regional projects are currently under design and described herein.

#### 4.4.1. [Effect of Imported Water Supply on Lake Casitas](#)

Imported water supplies would be used as available to offset customer demands on Lake Casitas. An analysis of Lake Casitas storage levels if Casitas' State Water Project Table A water supplies had been delivered over the last five years to the District's customers is provided in Appendix B. The overall impact would be approximately 7,000 Acre-Feet of additional supply during that timeframe.

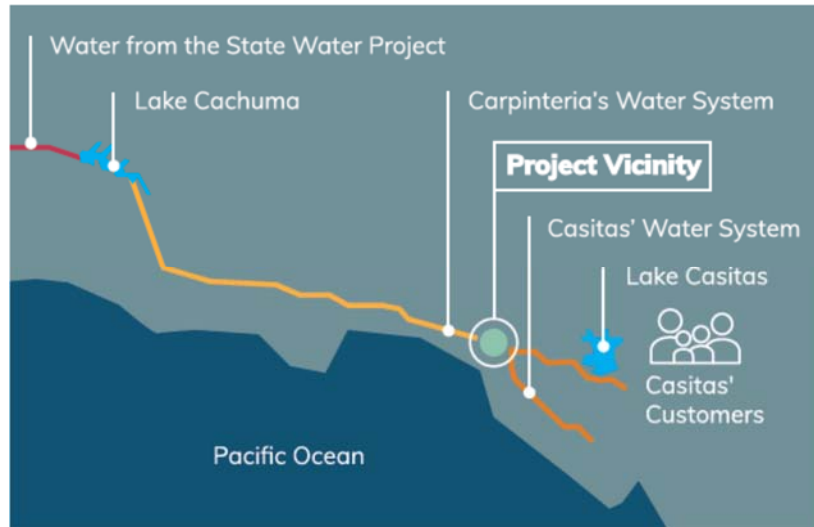
#### 4.4.2. [Ventura-Santa Barbara Counties Interconnection](#)

Casitas is currently designing the Ventura-Santa Barbara Counties Intertie to provide physical delivery of water to Casitas' system to mitigate droughts and emergencies (Figure 7). The project is a bi-directional 16-inch, 1.3 mile potable water pipeline to connect the transmission mains between the Carpinteria Valley Water District (CVWD) system and the Casitas water distribution system. The project also includes two proposed booster pump stations and minor treatment facilities to allow delivery of water 1) directly to Casitas customers and/or 2) to storage in Lake Casitas.

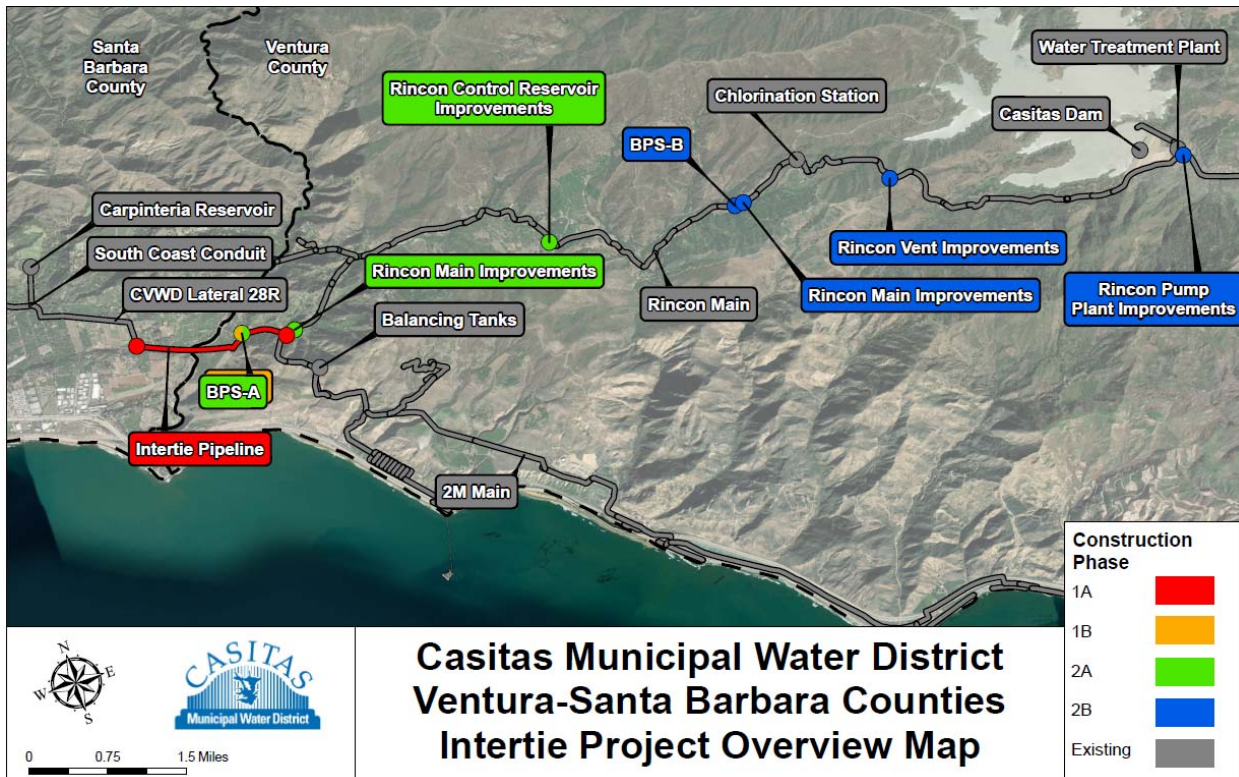
The project could be phased (Figure 8) where the first phase involves delivery of water only to the coastal areas, thereby reducing demands on Lake Casitas; and later phases could provide pumped water to the rest of the system, further reducing demands on existing local resources. It also may be possible

to deliver a portion of the water directly into the lake. The capital costs herein assume construction of all phases, including two new booster pump stations to deliver water throughout the system.

**FIGURE 7. VENTURA-SANTA BARBARA COUNTIES INTERTIE VICINITY MAP**



**FIGURE 8. VENTURA-SANTA BARBARA COUNTIES INTERTIE PROJECT PROPOSED ALIGNMENT**



Casitas' State Water would be delivered through facilities owned by various entities, including California DWR, Central Coast Water Authority, Bureau of Reclamation (Lake Cachuma and South Coast Conduit), City of Santa Barbara (treatment plant), and Carpinteria Valley Water District pipelines. Therefore, several delivery agreements would be necessary.

The 16-inch pipeline would have a capacity of 10 CFS (approximately 7,000 AFY). For planning purposes, it is assumed that available capacity would only be available over 4 months of the year, resulting in about 2,000 AFY of deliveries on average. Since the Santa Barbara water agencies use State Water as a backup water supply during drought conditions, there may be limited capacity during coincident water shortage events. However, there have been recent years when excess capacity was available and Casitas could have taken delivery if the infrastructure was in place.

This connection could also provide opportunities for supplemental water during times when South Coast Santa Barbara agencies have surplus water available.

#### *Project Status*

Design and permitting of the project are underway. It is estimated the Ventura-Santa Barbara Counties Intertie could be constructed in 3-4 years.

#### *Project Costs*

Under the current Memorandum of Understanding (MOU) with Carpinteria Valley Water District (CVWD), Casitas and CVWD would evenly divide construction costs of the portion of the pipeline within CVWD's service area and Casitas would be responsible for the balance of the costs.

While these costs will not be known until project bids are received, the overall estimated costs of the project are as follows:

Total annual costs to Casitas would be the debt payment, fixed maintenance cost, plus charges related to the unit cost of delivery.

Capital Cost: \$15,500,000 based on preliminary design estimate (2019 dollars); of this amount, the CVWD would pay approximately \$600,000 and Casitas would pay the balance.

#### Grants and Loans:

- \$2 million federal grant from United States Bureau of Reclamation
- \$17 million available State Revolving Fund ASADRA Loan
  - \$3 million forgiveness
  - \$7 million financed over 30 years at 0% interest
  - Remainder of loan financed over 30 years at 50% of the California general obligation bond rate for previous calendar year (assumed 0.85% interest)

Annual Debt Payment: **\$365,999**

Annual fixed maintenance cost: assume 1% of capital cost (**\$155,000**)

#### Variable Operational Unit Cost of Delivery (paid based on amount of water delivered):

- \$2100-2900/AF (includes fixed and variable costs of existing facilities in Santa Barbara)
- Casitas share of fixed cost is negotiable, since Casitas would use excess capacity and have lower priority use of the system
- Assume payment with water could reduce monetary cost by 10% to **\$1,890-2,610/AF**

#### 4.4.3. Calleguas-Ventura Interconnection

Calleguas Municipal Water District (Calleguas) and the City of Ventura (City) are designing 7.4 miles of pipeline between Calleguas and the City of Ventura (Figures 9 and 10). The City is responsible for 4 miles and Calleguas for 3.4 miles. The project would have a dual purpose of delivering imported water to western Ventura County and provide an emergency water connection from the City to Calleguas MWD. The City of Ventura would also upgrade their existing infrastructure (known as the Eastside to Westside Waterline Project) to allow for the delivery of SWP water to reach the westside of their distribution system that is within the Casitas service area. The City could take delivery of Casitas' SWP allocation, instead of Lake Casitas water, thereby reducing demands on the lake through the water exchange.

Assuming the long-term average reliability of the State Water project, it is anticipated that average yield of this project would be 2,750 AFY to Casitas (based on 55% of 5,000 AFY). Under the proposed exchange agreement, the City would continue to be subject to a Casitas WEAP annual allocation. When SWP water is available and Casitas requests delivery, the City's allocation would be satisfied by the combined total of SWP water and Lake Casitas water. For example, if the City's allocation is 5,000 AFY, Casitas could supply 2,000 AF from the SWP and 3,000 AF from Lake Casitas water, reducing demand on the lake by 2,000 AF.

While this project would not provide direct delivery of water to Casitas' system during emergencies, it would provide delivery to demands within Casitas' service area located in the City of Ventura, thereby reduce demands on Casitas' system. Temporary or permanent facilities could be constructed for direct delivery to Casitas' distribution system but would be additional cost.

#### *Project Status*

The City of Ventura and Calleguas are leading the design and construction for their respective portions of the project. The following is a summary of the status design and permitting for each segment:

##### City of Ventura East-West Waterline Project

- 90% Design Complete; permits expected in 2022
- The City has indicated that construction of the East-West Waterline project will be out to bid for construction as soon as permits are received and design is finalized, likely within the next year.

##### City of Ventura 4-mile pipeline

- Design and permitting underway
- Hydraulic analysis and pipe sizing underway
- EIR challenged in court; appeal decision expected in 2022 (pending court date)

The City has indicated that design and permitting for the 4-mile pipeline could be complete within one year, with construction expected to begin in early 2024. Based on the City's 2020 Urban Water Management Plan, the City plans to use approximately 1,300 AFY of State Water to improve system water quality starting by 2025, although the City does not anticipate a water shortage during a multi-year drought condition until 2035.

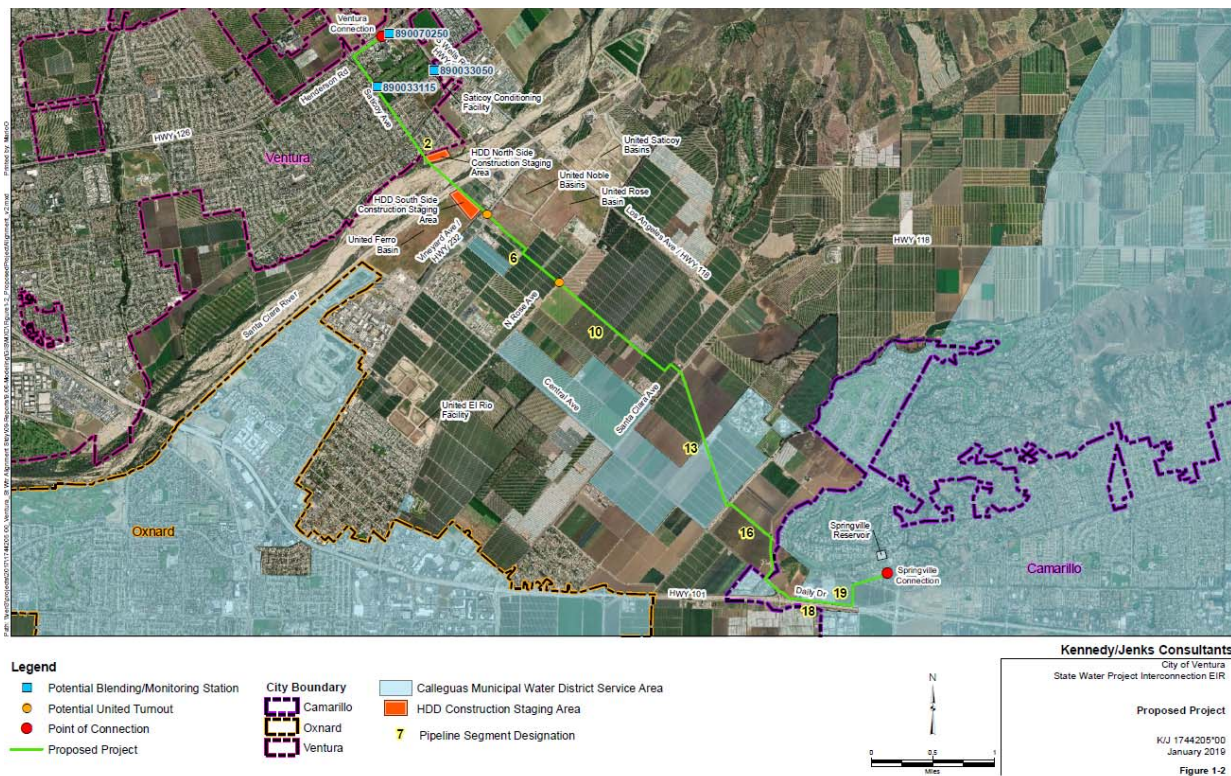
##### Calleguas Pipeline

- Preliminary design underway
- Calleguas has indicated that construction is expected to begin in early 2025

FIGURE 9. CALLEGUAS-VENTURA INTERCONNECTION PROJECT VICINITY



FIGURE 10. CALLEGUAS-VENTURA INTERCONNECTION PROJECT PROPOSED ALIGNMENT  
 Source: (Kennedy/Jenks Consultants, State Water Project Interconnection EIR, 2018)





### *Project Costs*

Casitas has previously shared in the cost of the City of Ventura's State Water Interconnection Alignment Study and Environmental Impact Report. Casitas could also consider participating in the design costs in the near term.

Two methods of longer-term participation provided for consideration. Option A is to participate through a commitment to fund construction and operational costs. Option B is to participate through wheeling as needed.

### *Calleguas-Ventura Interconnection Option A: Participate in Construction and Operational Cost*

Under Option A, Casitas would invest in 1/3 of the capacity of the City of Ventura's 4-mile pipeline. Casitas would be a minority partner, and would be responsible for the following estimated costs:

Capital Cost to Casitas: \$10,000,000 based on preliminary design estimate (2019 dollars).

#### Grants and Loans:

- The City and Calleguas are in the process of applying a grant through the State's Integrated Water Resources Management Program.
- Note that since Casitas is not a lead agency for the project, Casitas is not eligible to apply for State or Federal grants or loans.
- For Casitas' share of the capital costs, assume a private loan at 5% for 30 years.

Annual Debt Payment: **\$650,514**

Annual fixed maintenance cost: assume 1% of capital cost (**\$100,000**)

Variable Operational Unit Cost of Delivery (paid based on amount of water delivered):

- **\$1,200-1,500/AF**
- Includes DWR variable costs, MWD treated water wheeling costs, Calleguas MWD wheeling costs, and operating costs of City-owned facilities

The operating costs of City-owned facilities are estimated to be \$50/AF and are included in this analysis.

The City is proposing to continue to pay the resale gravity rate to Casitas for any imported water delivered to its system within the Casitas service area.

### *Calleguas-Ventura Interconnection Option B: Participate in Wheeling as Needed*

It may be possible to utilize the Calleguas-Ventura interconnection on an as needed basis when surplus pipeline capacity is available. While the City is still working to complete the hydraulic analysis on their portion of the pipeline, information from the preliminary design indicates that the pipe sizing is not dependent on whether Casitas participates in the project or not. The governing factor in the pipe sizing is the ability for the City to deliver water to Calleguas. Once sizing is determined for Calleguas' needs, it is expected the pipe capacity for water flowing the other direction (toward the City) will be sufficient for both the City and Casitas deliveries.

Under Option B, Casitas would not have dedicated capacity in the City of Ventura's 4-mile pipeline nor be responsible for annual debt service. Instead, Casitas would use excess capacity as needed and as

available. This option would be similar to the current level of participation by the United Water Conservation District.

The estimated costs for the wheeling option are as follows:

Capital Cost: None

Annual Debt Payment: None

Annual fixed maintenance cost: None

Variable Operational Unit Cost of Delivery (paid based on amount of water delivered):

- In Option A, the total unit cost including annual debt service, annual fixed maintenance costs, and variable operational unit cost of delivery is \$1,700-\$2,000/AF. *For example: \$1,700/AF = (\$650,000 + \$100,000 + \$1,200 x 1,500) / 1,500 AF.*
- For planning purposes, it is assumed the City would add \$100-200/AF additional cost for wheeling.
- Therefore, total unit cost of delivery is assumed to be **\$1,800-2,200/AF.**

#### 4.4.4 Summary Table of Imported Water Costs

A detailed cost analysis of the imported water options is provided in Appendix A.

The variable costs will be subject to inflation. However, it is assumed that Casitas water rates would be increased to keep up with inflation and the analysis is presented in today’s dollars for simplicity.

The unit cost is calculated based on average imported water deliveries of 1,500 AFY, although it is expected that more or less than this amount could be delivered in any given year.

While a full cost of service analyses would need to be conducted through a water rate study, the average monthly cost for customers is estimated based on: 1) distribute total annual costs to resale versus retail customers proportional to planned water use, and 2) divide respective costs by number of resale or retail connections. This represents a very high-level, ballpark estimate of customer bill impacts.

Table 10 summarizes the unit cost and average monthly cost per connection for each option evaluated in Appendix A.

**TABLE 10. SUMMARY OF COSTS FOR IMPORTED WATER OPTIONS**  
(FROM APPENDIX A)

<b>Parameter</b>	<b>Ventura –Santa Barbara Counties Intertie</b>	<b>Ventura Pipeline: Option A (Invest)</b>	<b>Ventura Pipeline: Option B (Wheeling)</b>
Unit Cost (\$/AF):	\$2,237-\$2,957	\$1,700-2,000	\$1,800-2,200
Retail Connection Average Monthly Cost:	\$33-44	\$25-30	\$27-33
Resale Connection Average Monthly Cost:	\$3,190-4,216	\$2,424-2,852	\$2,567-3,137

Appendix A:  
Cost Analysis of Imported Water Options

Cost Parameters	Ventura - Santa Barbara Counties Intertie	Invest in portion of Ventura Pipeline	Wheeling in Ventura Pipeline
Average Yield, AFY	1,500	1,500	1,500
Capital Cost	\$15,500,000	\$10,000,000	N/A
Grant Funding Secured	\$2M USBR + \$3M ASADRA Loan	None	None
Loan Assumptions			
Loan Source	ASADRA	Unknown	N/A
Loan Amount (after grant funding)	\$10,500,000	\$10,000,000	N/A
Interest Rate	\$7M @ 0%; assume remainder @ 0.85%	assume 5%	N/A
Term	30 years	30 years	N/A
Annual Debt Service Payment	\$365,999	\$650,514	N/A
Annual Fixed Operational Cost, \$/year (assume 1% of capital cost)	\$155,000	\$100,000	N/A
Variable Operational Unit Cost, \$/AF Low Estimate	\$1,890	\$1,200	\$1,800
Variable Operational Unit Cost, \$/AF High Estimate	\$2,610	\$1,500	\$2,200

### Ventura - Santa Barbara Counties Intertie

	Low Estimate	High Estimate
Yield	1,500	1,500
Fixed Cost	\$520,999	\$520,999
Variable Cost	\$2,835,000	\$3,915,000
Total Cost	\$3,355,999	\$4,435,999
Unit Cost, \$/AF	\$2,237	\$2,957
Average Monthly Cost per Retail Connection	\$33	\$44
Average Monthly Cost per Resale Connection	\$3,190	\$4,216

### Other Information

Planned Resale Water Use, AFY	4356
Planned Retail Water Use, AFY	11558
Planned Total Water Use, AFY	15914
Number of Resale Customers	24
Number of Retail Customers	6124
Number of Total Customers	6148

### Calleguas-Ventura Interconnection: Invest in Portion of Ventura Pipeline

	Low Estimate	High Estimate
Yield	1,500	1,500
Fixed Cost	\$750,514	\$750,514
Variable Cost	\$1,800,000	\$2,250,000
Total Cost	\$2,550,514	\$3,000,514
Unit Cost, \$/AF	\$1,700	\$2,000
Average Monthly Cost per Retail Connection	\$25	\$30
Average Monthly Cost per Resale Connection	\$2,424	\$2,852

### Calleguas-Ventura Interconnection: Wheeling in Ventura Pipeline

	Low Estimate	High Estimate
Yield	1,500	1,500
Fixed Cost	\$0	\$0
Variable Cost	\$2,700,514	\$3,300,514
Total Cost	\$2,700,514	\$3,300,514
Unit Cost, \$/AF	\$1,800	\$2,200
Average Monthly Cost per Retail Connection	\$27	\$33
Average Monthly Cost per Resale Connection	\$2,567	\$3,137

Appendix B:  
Analysis Lake Casitas Storage  
with Imported Water Deliveries (2018 to 2022)

**Analysis:** Analyze the impact on the supply in Lake Casitas of the delivery of State Water Project water supplies with a target of 1,500 Acre-Feet per year of importation.

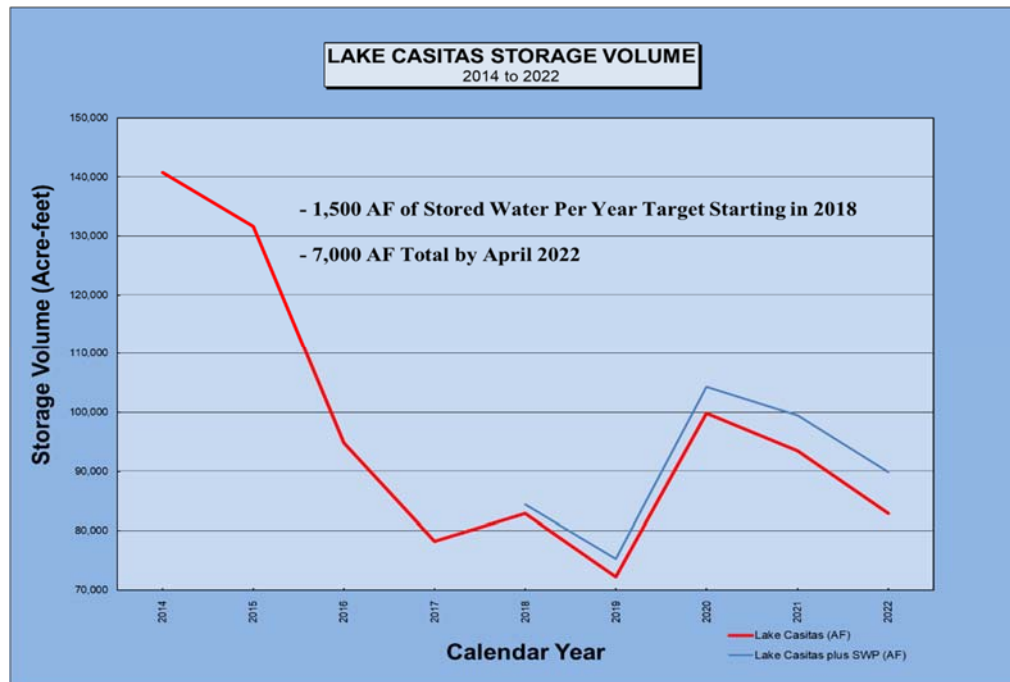
The table below shows the approximate cumulative impact on the supply in Lake Casitas from importation of 1,500 Acre-Feet of Casitas' State Water Project Table A water supply starting in the 2018 calendar year and proceeding for the following five years.

The first column shows Casitas' allocation from the State Water Project in that particular year, the second column shows the 'carryover' water that is available for the subsequent year or years after the annual importation of 1,500 Acre-Feet, and the third column shows the cumulative total deliveries.

SWP Supply Analysis (Target = 1,500 AF/Year)			
	Casitas' SWP Allocation	Carryover	Cumulative Total (AF)
2018	1750	250	1500
2019	3750	2500	3000
2020	1000	2000	4500
2021	250	750	6000
2022	250	0	7000*

\*Note that only 1,000 Acre-Feet would have been available for import in 2022.

The graph below shows the approximate difference in the level in Lake Casitas from these deliveries. Note the historic level in Lake Casitas reflects that of January 1<sup>st</sup> of each year.



**Result:** Supplies in Lake Casitas would have been increased by approximately **7,000 Acre-Feet** during this period.

The supply analysis relating to Lake Casitas storage levels is based on actual historical demands that occurred from 2014-2022. On April 21, 2021, the Casitas Board of Directors adopted a planned demand of 14,525 AFY for the Casitas System which is based on average demands from 2011-2020. If this demand level had occurred going back to 2004, there would have been a total of 27,559 AF of conservation savings, plus an additional 7,000 AF with SWP deliveries for a total of 35,559 AF increased storage in the lake. This demonstrates that conservation will continue to be important going forward, in combination with a more diverse supply portfolio to mitigate droughts and emergencies.

<b>Fiscal Year</b>	<b>Historical Demand, AFY</b>	<b>Lake Casitas Planned Demand, AFY</b>	<b>Planned Conservation Savings, AFY</b>	<b>Cumulative Conservation Savings, AF</b>
2004	17,784	14,525	3,259	3,259
2005	16,344	14,525	1,819	5,078
2006	16,302	14,525	1,777	6,854
2007	18,354	14,525	3,829	10,684
2008	17,725	14,525	3,200	13,883
2009	15,899	14,525	1,374	15,257
2010	15,295	14,525	770	16,027
2011	13,541	14,525	-	16,027
2012	14,646	14,525	121	16,148
2013	16,093	14,525	1,568	17,716
2014	20,417	14,525	5,892	23,608
2015	17,339	14,525	2,814	26,422
2016	15,662	14,525	1,137	27,559
2017	13,200	14,525	-	27,559
2018	12,322	14,525	-	27,559
2019	9,340	14,525	-	27,559
2020	8,802	14,525	-	27,559
2021	12,460	14,525	-	27,559
2022	11,304	14,525	-	27,559