



## Board of Directors

Brian Brennan, Director  
Angelo Spandrio, Director  
Pete Kaiser, Director

Neil Cole, Director  
Richard Hajas, Director

### CASITAS MUNICIPAL WATER DISTRICT Meeting to be held at the

The meeting will be held via teleconference.  
To attend the meeting please call (877) 853-5247 or (888) 788-0099 US Toll-free  
Enter Meeting ID: 926 8142 0646#  
Passcode: 749790#

Special Meeting  
February 26, 2021 @ 3:00 PM

Right to be heard: Members of the public have a right to address the Board directly on any item of interest to the public which is within the subject matter jurisdiction of the Board. The request to be heard should be made immediately before the Board's consideration of the item. No action shall be taken on any item not appearing on the agenda unless the action is otherwise authorized by subdivision (b) of §54954.2 of the Government Code and except that members of a legislative body or its staff may briefly respond to statements made or questions posed by persons exercising their public testimony rights under section 54954.3 of the Government Code.

1. CALL TO ORDER
2. ROLL CALL
3. PUBLIC COMMENTS - Presentation on District related items that are not on the agenda - three minute limit.
4. ACTION ITEM
  - 4.a. Discussion and Possible Action on the Draft Casitas MWD Comprehensive Water Resources Plan.  
[Memo\\_Board\\_CWRP\\_Feb26-2021-Final.pdf](#)  
[ATT1\\_Board\\_CWRP\\_Feb26-2021.pdf](#)  
[CWRP\\_Board\\_Feb26-2021.pdf](#)

5. ADJOURNMENT

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**CASITAS MUNICIPAL WATER DISTRICT  
MEMORANDUM**

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**TO:** BOARD OF DIRECTORS  
**FROM:** MICHAEL FLOOD, GENERAL MANAGER  
**SUBJECT:** DISCUSSION OF COMPREHENSIVE WATER RESOURCES PLAN  
**DATE:** 02/26/21

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**RECOMMENDATION:**

The Board of Directors review demand and supply analyses related to the Comprehensive Water Resources Plan, and direct staff as appropriate.

**BACKGROUND:**

The Board of Directors authorized a consulting services agreement with Stantec in January 2019 to prepare the Comprehensive Water Resources Plan (CWRP). An overview of the draft CWRP was presented at a Board Workshop held on February 8, 2020, and the draft CWRP report was released for public review from June 26, 2020 through August 24, 2020. Several public comments were received on the draft CWRP report, which were provided to the Board of Directors on September 23, 2020 and December 9, 2020. The full draft CWRP report is found on the District's website: <https://www.casitaswater.org/your-water/casitas-water-security>.

On December 9, 2020, the Board of Directors discussed the need for additional Board meetings to discuss the goals of the Comprehensive Water Resources Plan. The Board has continued to meet and discuss the CWRP at subsequent meetings held on December 16, 2020; December 23, 2020; January 15, 2021, and February 17, 2021.

At the January 15, 2021 meeting, the Board directed staff to revise the hydrologic modeling assumptions used to estimate the future Lake Casitas operational yield as follows, and prepare a demand and supply analysis for further discussion.

Revised hydrologic modeling assumptions for future Lake Casitas Yield:

- 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)
- Use demand assumption of 16,000 AFY for the Casitas System
- Provide safety factors to account for future uncertainty

On February 17, 2021, the District held a Special Board Meeting to review the various aspects of the probabilistic analysis in the draft plan.

**DISCUSSION:**

**Future Long-term Demand Analysis:**

The following is a summary of historical demands, planned future demands, and additional considerations related to uncertainty in future demands.

*Historical Demands*

Historical water demands by customer class are shown in Attachment 1, Figures 1 and 2. Casitas implements managed demand reductions as lake levels decline according with the Water Efficiency Allocation Plan (WEAP), and the effect of this type of demand management during droughts is apparent during the 1989 and post-2016 periods.

Prior to recent WEAP demand reductions, water produced from Lake Casitas for customer demands and system losses ranged between 14,841 AFY (2011) to 20,402 AFY (2013), and averaged 17,509 AFY for the 5-year period from 2011-2015<sup>1</sup>. From 2006-2010, the water produced from Lake Casitas ranged between 14,637 AFY (2010) to 21,326 AFY (2007), and average 17,760 AFY<sup>1</sup>.

Demands from Agricultural and Resale customers together make up the majority of Casitas' customer demands, representing 84% of total demands from 2006-2015. Annual demands from these customers can vary significantly from year to year. Unrestricted demands for water typically increase during dry periods and decrease during wet periods. However, both of these customer classes have demonstrated lower water use from Casitas in response to the recent drought (refer to Attachment 1, Figures 1 and 2) and the District's associated demand management measures through the WEAP, including a \$5.00/Unit Conservation Penalty in 2016 which currently remains in place.

*Planned Demands*

The Draft CWRP is based on a future average non-drought demand of 16,000 AFY for the Casitas System (which includes approximately 525 AFY added to the Ojai system), and a future average non-drought demand of 2,350 AFY for the Ojai system, for a total combined demand of 17,825 AFY (16,000 – 525 + 2350 = 17,825). These demands represent the amount of water produced to meet both customer uses and losses in the water delivery systems. Additional information can be found in Sections 3 and Appendix C of the Draft CWRP report.

The Draft CWRP planned demands are approximately 10% less than previously planned<sup>2</sup> long-term demands of 17,500 AFY for the Casitas system and 2,570 AFY for the Ojai system to reflect that the recent drought will likely result in some permanent changes in customer water use in the

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<sup>1</sup> Data reported by calendar year.

<sup>2</sup> Urban Water Management Plans (UWMPs) for Casitas and Ojai systems

long-term. Water demands typically rebound after drought periods, but do not fully return to pre-drought levels due material changes such as replacement of landscaping, irrigation systems, and appliances with more water-efficient devices. A comparison of Draft CWRP planned demands and previous UWMP planning demands is presented in Attachment 1, Table 1. For purposes of this analysis, the distribution of demand by customer class is assumed to be consistent with previous planning reports.

#### *Additional Considerations related to Agricultural and Resale Demands*

Agricultural and Resale customers rely on groundwater as a primary supply, and use Lake Casitas water as a backup. There are several processes currently underway related to groundwater pumping, including the Sustainable Groundwater Management Act, the City of Ventura's groundwater adjudication lawsuit, and the State of California's Ventura River Instream Flow Study. The outcome of these processes is currently unknown, and all have the potential to limit the availability of groundwater during certain periods; which could increase demands on Lake Casitas. Until more information is known regarding future groundwater availability, there is some uncertainty in long-term future demands on Lake Casitas.

#### *Planning for Demand Uncertainty*

The Draft CWRP assumes a future planned demand of 16,000 AFY for the Casitas System, and a planned demand of 17,825 AFY for the entire District service area including the Ojai System. The following is a summary of considerations related to future demand uncertainty:

- Planned demand on the Casitas System is less than the historical average demands (2006-2015).
- Planned demand is lower than previous UWMP planning demands, since it assumes demands will rebound but not fully return to pre-drought levels.
- Future groundwater supplies may be less than were available historically, and there is a potential for increased reliance on Casitas (particularly from Resale and Agricultural customers).

As such, it is recommended that the Board adopt a future planned demand of 16,000 AFY for the Casitas System (17,825 AFY for the entire service area), and incorporate future demand uncertainty into an adaptive management strategy. Water produced for the Casitas System in calendar year 2020 was 10,817 AFY from Lake Casitas and 179 AFY from a local groundwater well, and it could take several years before production demands reach 16,000 AFY. Demands will be tracked over time, and once more information is known regarding future groundwater availability, then additional adaptive management measures could be taken (such as increased demand management or alternative supply development).

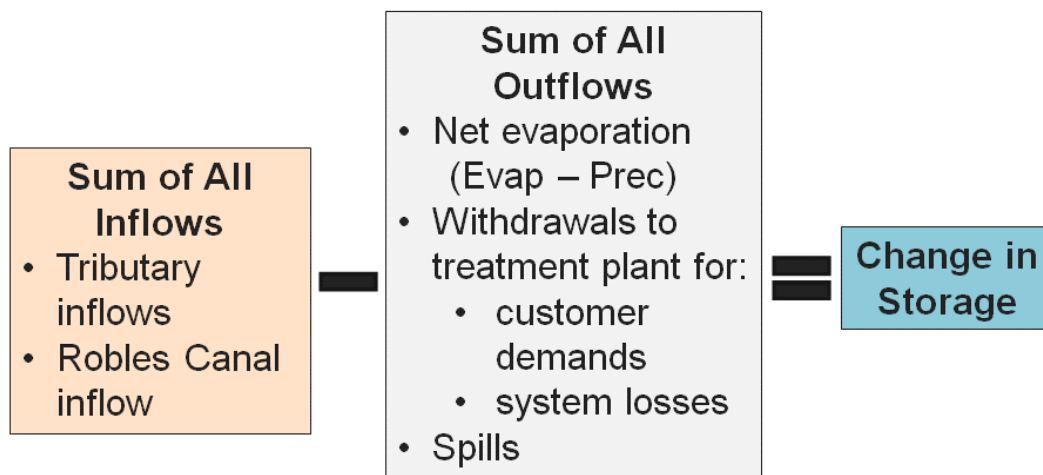
#### **Future Long-Term Supply Analysis:**

The water supply availability from Lake Casitas was previously studied by the United States Bureau of Reclamation in the 1954 evaluation of the Ventura River Project, and later by the District in the 1989 and 2004. In the most recent study (2004), the Lake Casitas safe yield was estimated

to be 20,540 AFY (assuming potential impacts of the 2003 Robles Biological Opinion operating criteria and the removal of Matilija Dam).

The Lake Casitas yield model is 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 (refer to Figure 1). The previous Lake Casitas yield analyses used historical hydrology in the simulations. That includes historical data for direct inflows to Lake Casitas from tributaries, flows in the Ventura River on which diversions at the Robles Diversion Structure were based, and net evaporation from the Lake.

**Figure 1. Mass Balance Model in Excel for Estimating Lake Casitas Yield**



As part of the CWRP, the yield model was updated to include the following improvements.

#### Current Yield Model Updates and Improvements

- Extended hydrologic period of record from 1945-1999 to 1945-2018
- 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 of 70 percent, consistent with operational data since the Fish Passage Facility was constructed
- Improved method of calculating monthly net evaporation loss

The Draft CWRP analyses incorporated future hydrologic variability by generating 100 synthetic hydrologic datasets (or 100 traces) derived from the historical dataset from 1945-2018 and having the same basic statistics, providing a probabilistic analysis of supply reliability. However,

the same model can be used to evaluate Lake Casitas Yield based on the historic hydrologic dataset (or a single trace).

The planned Lake Casitas yield is dependent on various policy assumptions and criteria, such as assumed hydrologic assumptions (probabilistic versus historic), minimum allowable storage, and future withdrawals to meet demands, and others. In regard to withdrawals for demands, the model is programmed to evaluate both a “safe yield” approach with constant withdrawals every year, as well as a “safe demand” approach that incorporates demand reductions as lake levels decline according with the District’s Water Efficiency and Allocation Program.

#### Policy Assumptions and Criteria related to Yield Modeling

On January 15, 2021, the Board directed staff to use the modeling and policy assumptions as follows, which results in a Lake Casitas safe yield of 18,420 AFY. These policies are revised from the Draft CWRP, and resulted in a higher Lake Casitas yield than reported in the Draft CWRP.

- 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.

#### *Supply Safety Factor*

The revised modeling and policy assumptions are based on historical hydrology. However, historical hydrology cannot be expected to repeat itself, and hydrologic variability from year to year is significant (refer to Attachment 1, Figure 3). Future droughts could be more severe than the droughts in the 1945-2018 historical record. 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. A safety factor is intended to account for uncertainty of future supply availability.

#### **Future Long-Term Demand and Supply Comparison (Gap Analysis):**

Table 1 herein presents a gap analysis reflecting the revised modeling and policy assumptions, with varying levels of supply safety factors (ranging between 0-20 percent). All scenarios assume a 4% reduction in supply reflecting a climate change adjustment consistent with the Draft CWRP assumptions.

Without a safety factor, supply exceeds anticipated demand on the Casitas System, with an average surplus of 1,800 AFY. With these assumptions (which are not recommended), no additional projects would be needed for future planning. With a safety factor of 20% applied to

supplies, the projected gap on the Casitas System would be approximately 1,900 AFY, which is about 3,300 AFY less than the projected gap of 5,200 AFY in the Draft CWRP.

### *Ojai System*

Of the 16,000 AFY demands on the Casitas System, approximately 525 AFY are planned demands to serve the Ojai System. In scenarios where the Casitas System is showing a projected shortage, the shortage has been applied to the Ojai System proportional to demands. This is reflected in the reduction from 525 AFY to 462 AFY of Casitas System supply to the Ojai System (depending on the level of safety factor). This reduction has a minimal impact on the Ojai System supply and demand balance, since the majority of Ojai System demands are met by Ojai Basin groundwater supply. Without a safety factor, the average shortage on the Ojai System is 25 AFY, which is consistent with the Draft CWRP. With a safety factor of 20%, the projected gap on the Ojai System would be approximately 90 AFY.

Casitas acquired the Golden State Water Company (GSWC) in June 2017. The GSWC served the Ojai customers for over 85 years, with a long history of groundwater pumping. The 2017 acquisition included several groundwater wells, with some wells over 45 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 acre-feet per year (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. With these improvements, there would be no projected shortage on the Ojai System under the various safety factor scenarios.

### **Request for Board Direction to Staff:**

Staff is requesting policy direction on the safety factors to be used in the demand and supply comparison, which affect the gap analysis and planned projects.



**Table 1. Demand and Supply Comparison (Gap Analysis),  
 With Various Safety Factor Scenarios**

All units in AFY unless noted otherwise.

**Casitas System**

<b>FUTURE DEMAND</b>					
Planned Average Demand:	16,000	16,000	16,000	16,000	16,000
<b>PROJECTED EXISTING SUPPLY</b>					
Planned Lake Casitas Yield:	18,420	18,420	18,420	18,420	18,420
Planned Mira Monte Well Yield:	180	180	180	180	180
Supply Safety Factor:	0%	-5%	-10%	-15%	-20%
Climate Change Adjustment:	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%
Projected Supply:	17,800	16,870	15,940	15,010	14,080
<b>DEMAND/SUPPLY BALANCE</b>					
Surplus (+) / Shortage (-)	<b>1,800</b>	<b>870</b>	<b>(60)</b>	<b>(990)</b>	<b>(1,920)</b>

**Ojai System**

<b>FUTURE DEMAND</b>					
Planned Average Demand:	2,350	2,350	2,350	2,350	2,350
<b>PROJECTED EXISTING SUPPLY</b>					
Planned Casitas System Yield <sup>1</sup> :	525	525	523	493	462
Planned Ojai Well Yield:	1,800	1,800	1,800	1,800	1,800
Projected Supply:	2,325	2,325	2,323	2,293	2,262
<b>DEMAND/SUPPLY BALANCE</b>					
Surplus (+) / Shortage (-)	<b>(25)</b>	<b>(25)</b>	<b>(27)</b>	<b>(57)</b>	<b>(88)</b>

**Notes**

<sup>1</sup> Assumes shortages in the Casitas System are distributed proportional to demands on that system (Ojai demands represent 525 AFY out of the 16,000 AFY demands on the Casitas System).

**ATTACHMENTS:**

**Attachment 1:**

- Figure 1. Historic Water Use by Customer Class (Line Chart)
- Figure 2. Historic Water Use by Customer Class (Area Chart)
- Table 1. Comparison of Planning Demands
- Figure 3. Historical Lake Levels, Inflow, and Drought Periods

Figure 1. Historic Water Use by Customer Class  
(Line Chart)

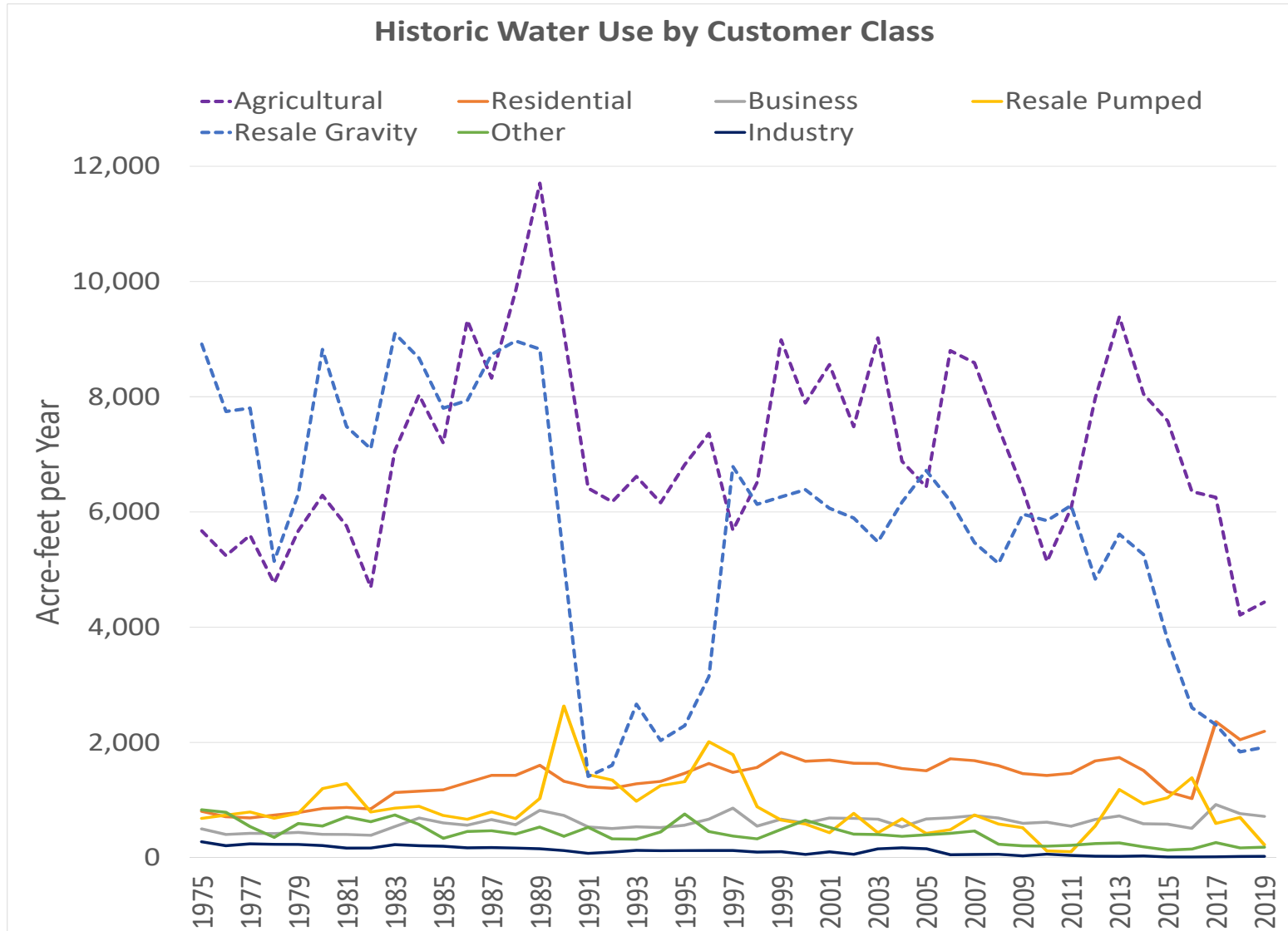
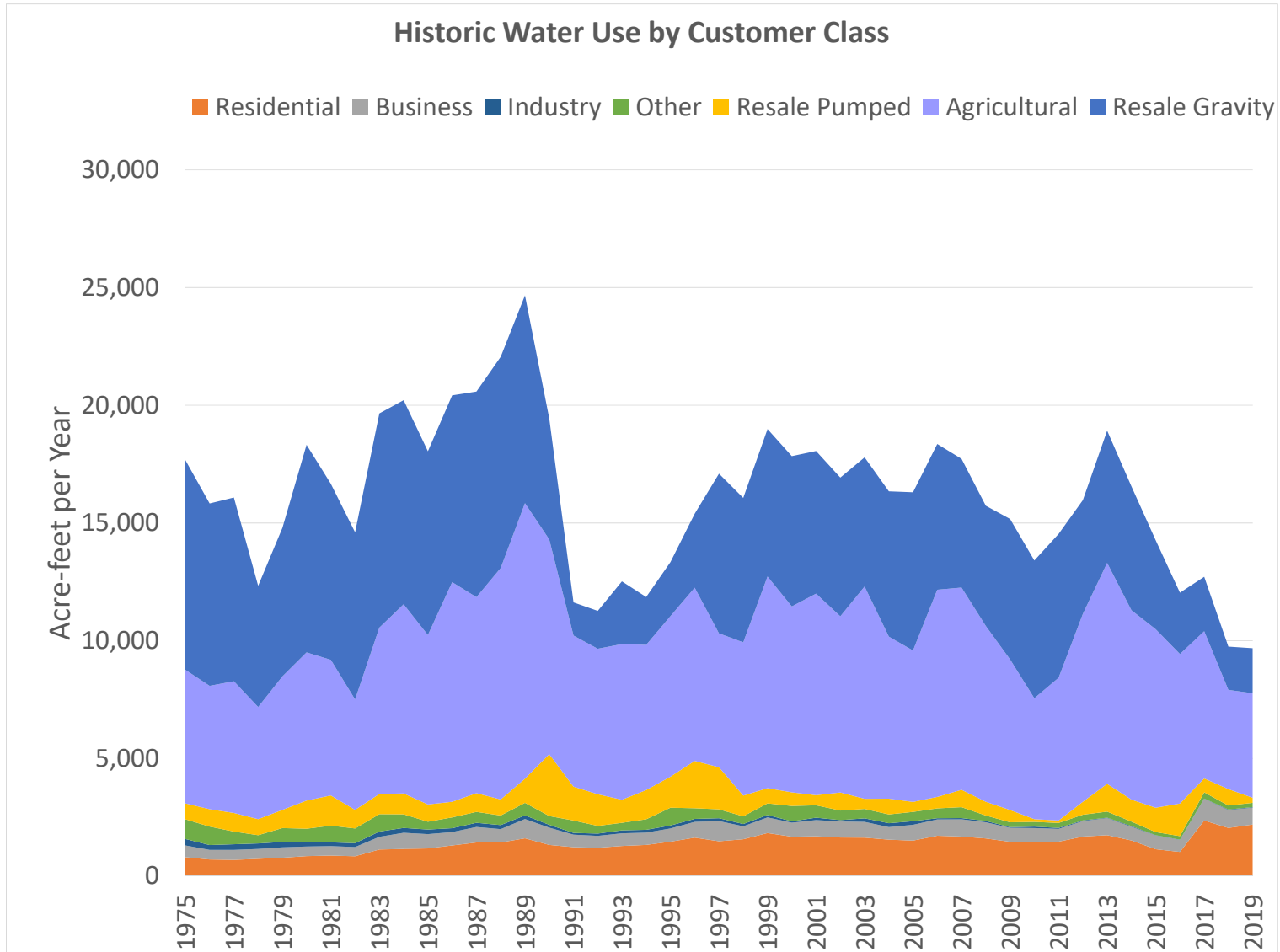


Figure 2. Historic Water Use by Customer Class  
(Area Chart)

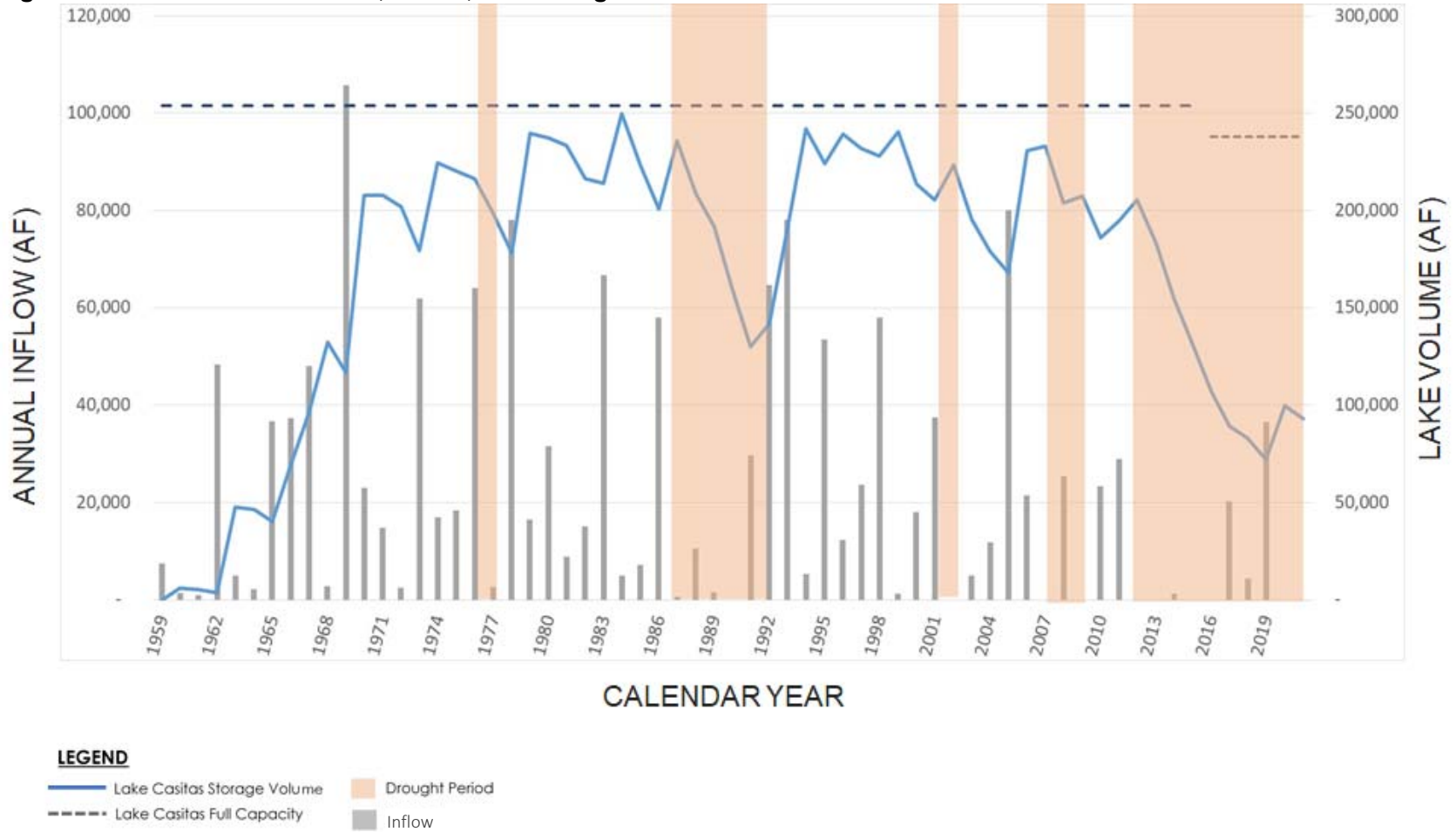


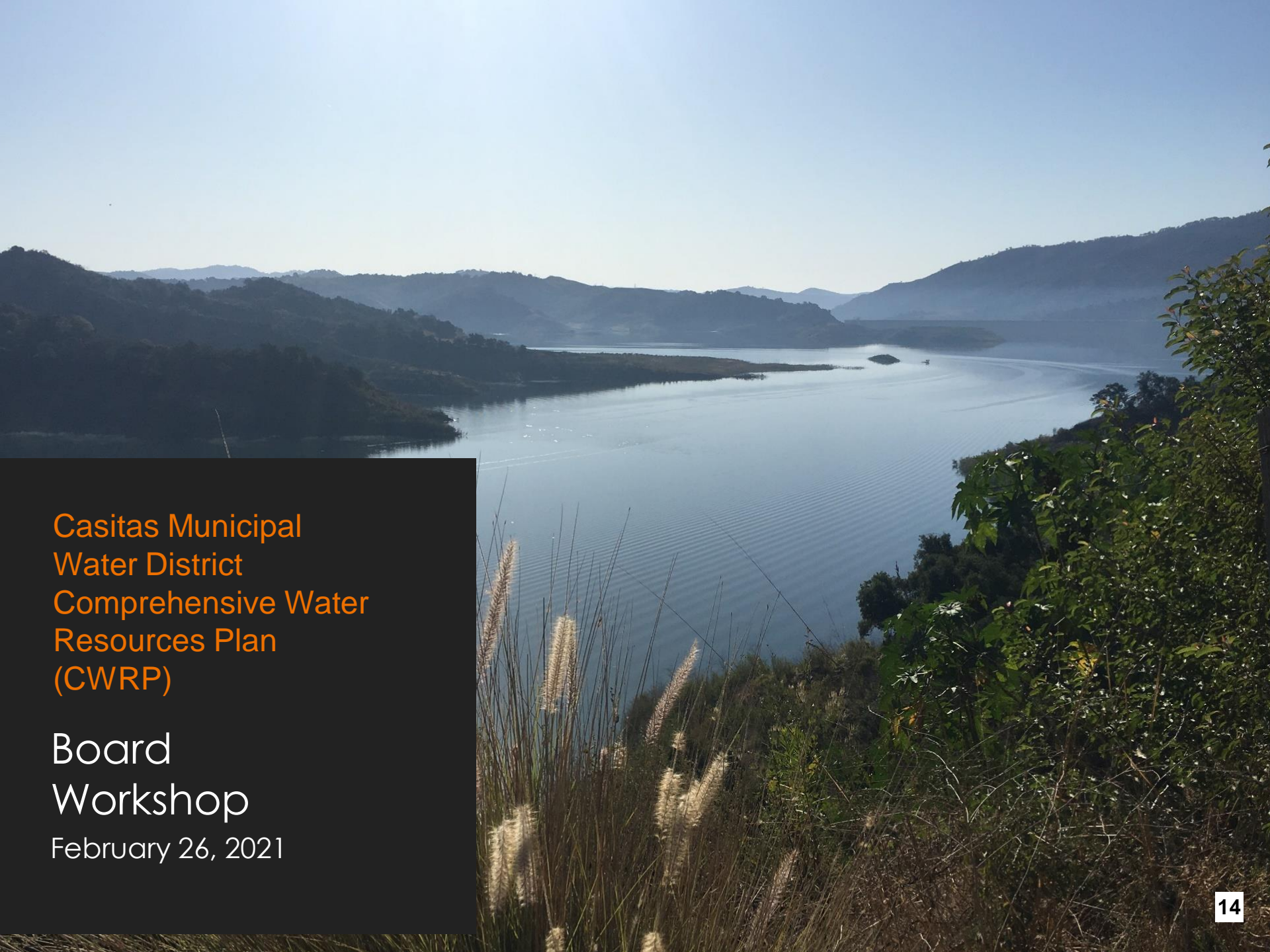
**Table 1. Comparison of Planning Demands**

Casitas System Demand Category	Planned Future Demand		
	2015 UWMP <sup>1</sup> (2040 Projections)	Draft CWRP <sup>2,3</sup> (2040 Projections)	Percent Reduction in Planned Demand
Retail	2,889	2,628	9%
Retail – Agricultural	7,705	7,009	9%
Resale	6,260	5,695	9%
Subtotal	16,855	15,332	9%
Water Loss	645	668 <sup>4</sup>	-4%
Total Water Demand	17,500	16,000	9%
<p><b>Notes</b>                      All data is reported in AFY except where noted otherwise.  <sup>1</sup> The 2015 UWMP demand/supply comparisons are based on 17,500 AFY, and did not include estimated water loss. Demands by water use category have been adjusted accordingly.  <sup>2</sup> Draft CWRP demand projections include 525 AFY for the Ojai system.  <sup>3</sup> Estimated future water use by customer class is assumed to be the same distribution as 2015 UWMP projections.  <sup>4</sup> Based on average water loss in 2018 and 2019. Assumes water loss is proportional to pipe length between Casitas and Ojai systems.</p>			

Ojai System Demand Category	GSWC 2010 UWMP (2035 Projections)	Draft CWRP <sup>1</sup> (2040 Projections)	Percent Reduction in Planned Demand
Retail	NA	2,093	NA
Water Loss	NA	257 <sup>2</sup>	NA
Total Water Demand	2,570	2,350	8%
<p><b>Notes:</b>  <sup>1</sup> The Draft CWRP assumes 525 AFY of Ojai System demands would be met by the Casitas system.  <sup>2</sup> Based on average water loss in 2018 and 2019. Assumes water loss is proportional to pipe length between Casitas and Ojai systems.</p>			

Figure 3. Historical Lake Levels, Inflow, and Drought Periods





Casitas Municipal  
Water District  
Comprehensive Water  
Resources Plan  
(CWRP)

Board  
Workshop  
February 26, 2021





# Agenda

1. Background
2. Goal of Meeting
3. Demand Considerations
4. Supply Considerations
5. Revised Gap Analysis
6. Policy Input from Board
7. Next Steps

# Background

- Draft CWRP Report prepared in Summer 2020
- Recent efforts have been focused on revisiting hydrologic assumptions related to future Lake Casitas yield
- January/February 2021– Board directed staff to modify future Lake Casitas yield projections and return with a revised demand and supply analysis (a.k.a. “gap analysis”)



## Goal of Meeting

- Review gap analysis, and provide policy direction on supply safety factors related to uncertainty of future Lake Casitas yield

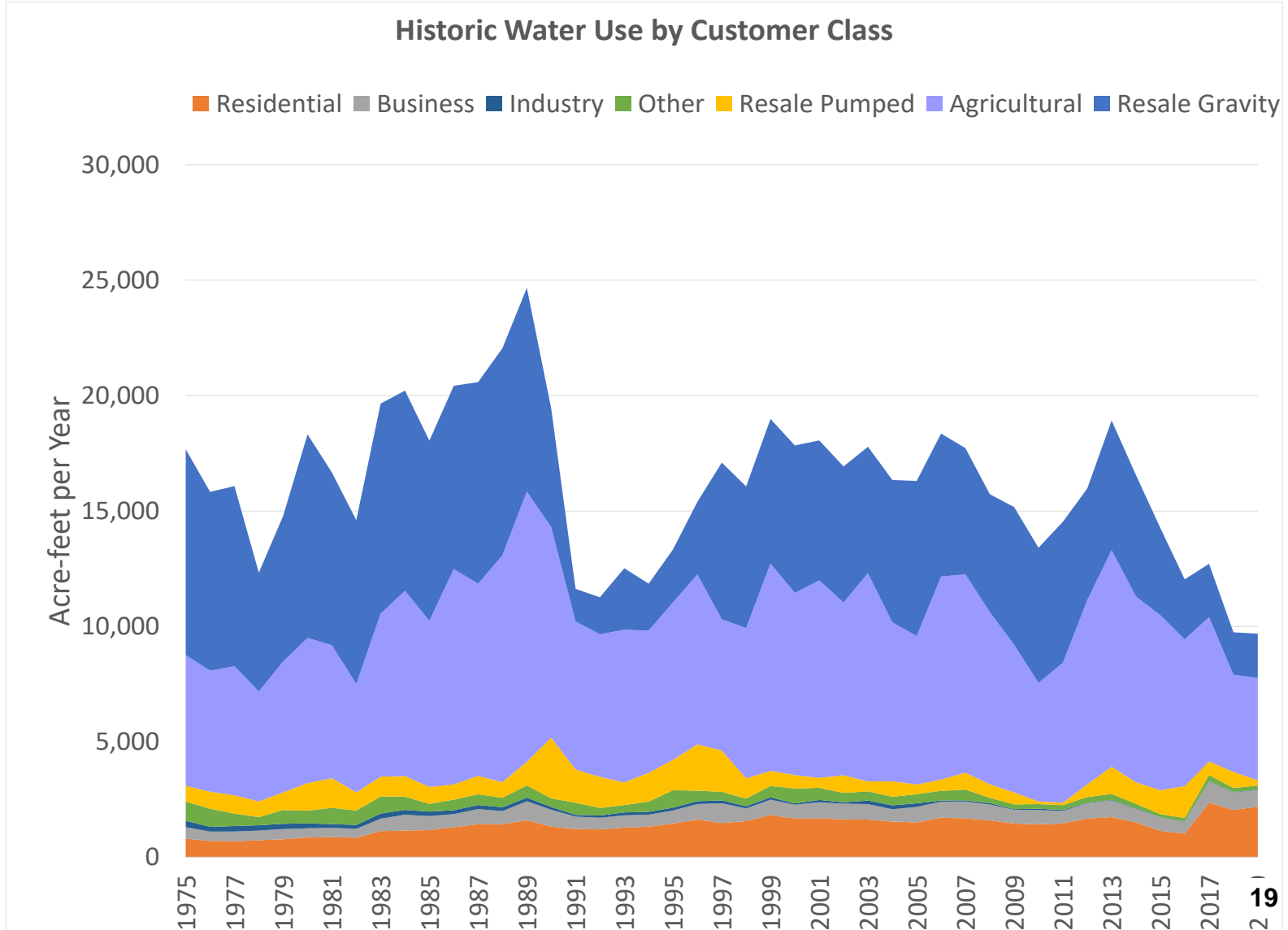


Casitas Comprehensive Water Resources Plan

# Historic and Planned Demands

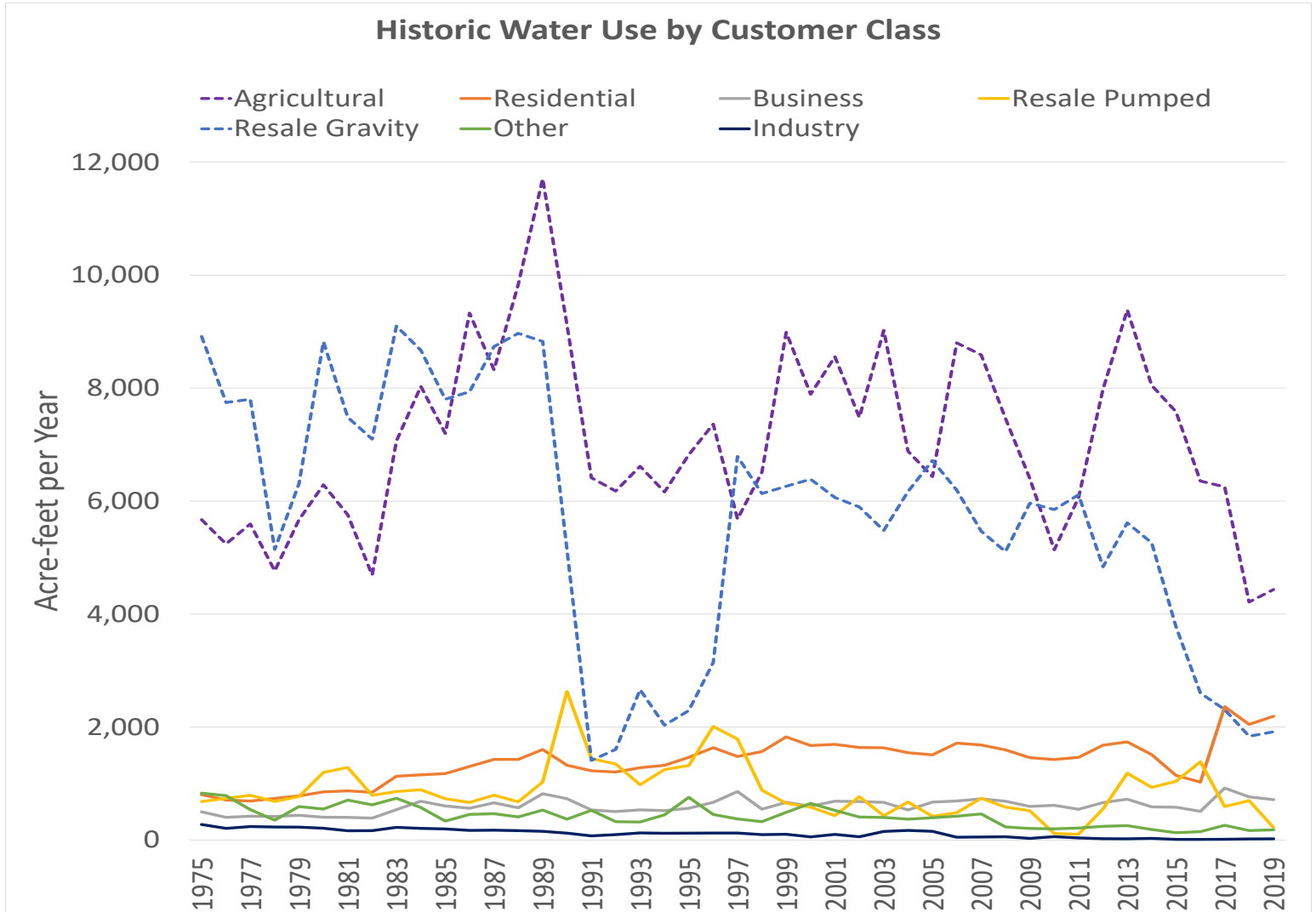
# Historic Demand by Customer Class (Casitas System)

Demand Considerations



# Historic Demand by Customer Class (Casitas System)

Demand Considerations



## Planning Demands

- Previous UWMP's future demand of 17,500 AFY for the Casitas System
- Draft CWRP future demand of 16,000 AFY for the Casitas System
- Draft CWRP assumed demands will rebound but not fully return to pre-drought levels

## Planning for Demand Uncertainties

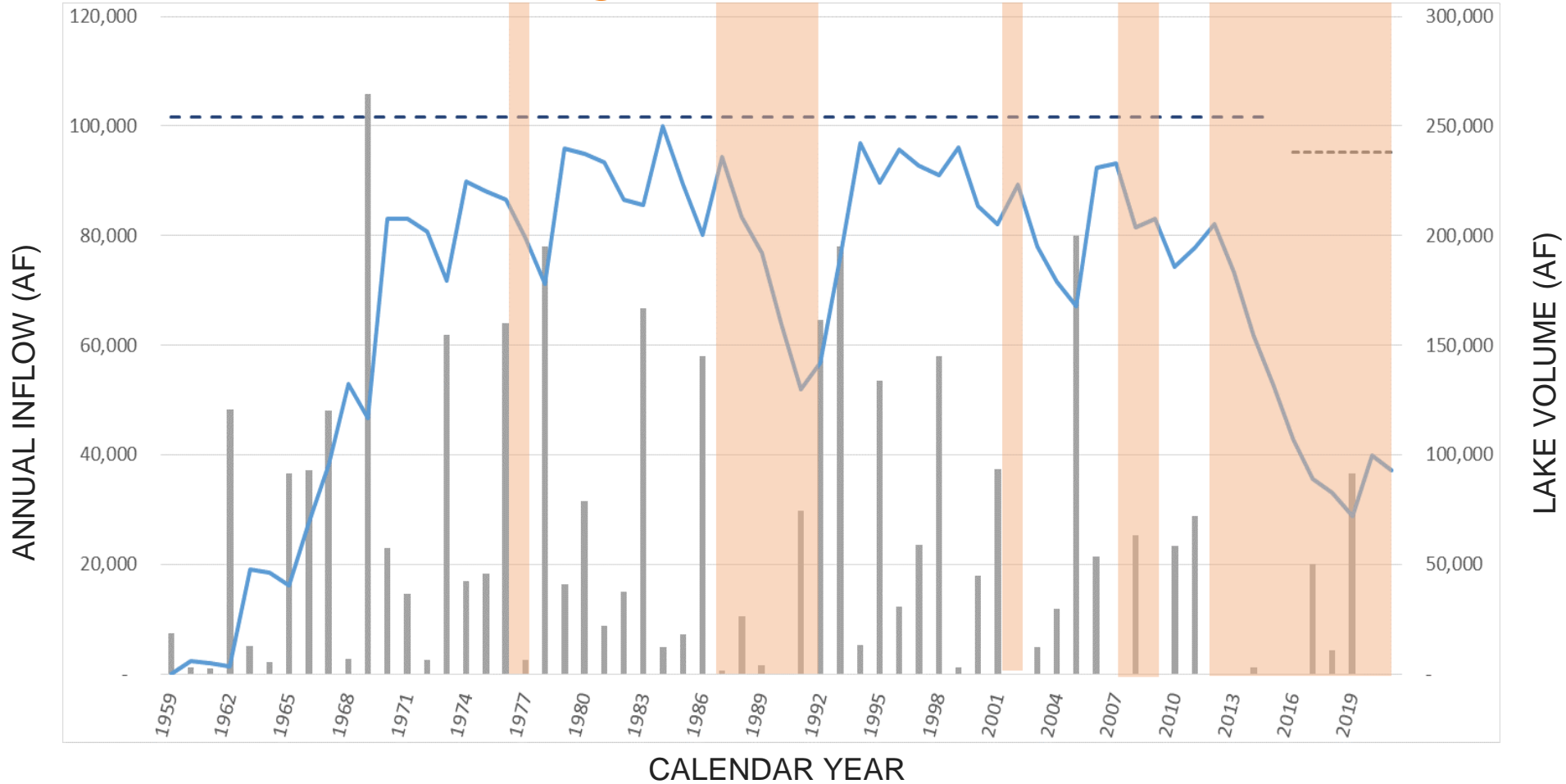
- Planned demand is less than historical non-drought demands, and less than previous UWMP planning demands
- Future groundwater supplies may be less than historical, and there is a potential for increased reliance on Casitas
- Current demands are less than planned demands
- An **adaptive management strategy** should be developed to phase in additional supply or demand management once more information is known about future groundwater availability



Casitas Comprehensive Water Resources Plan

# Supply Considerations

# Historical Lake Levels, Rainfall, and Drought Periods

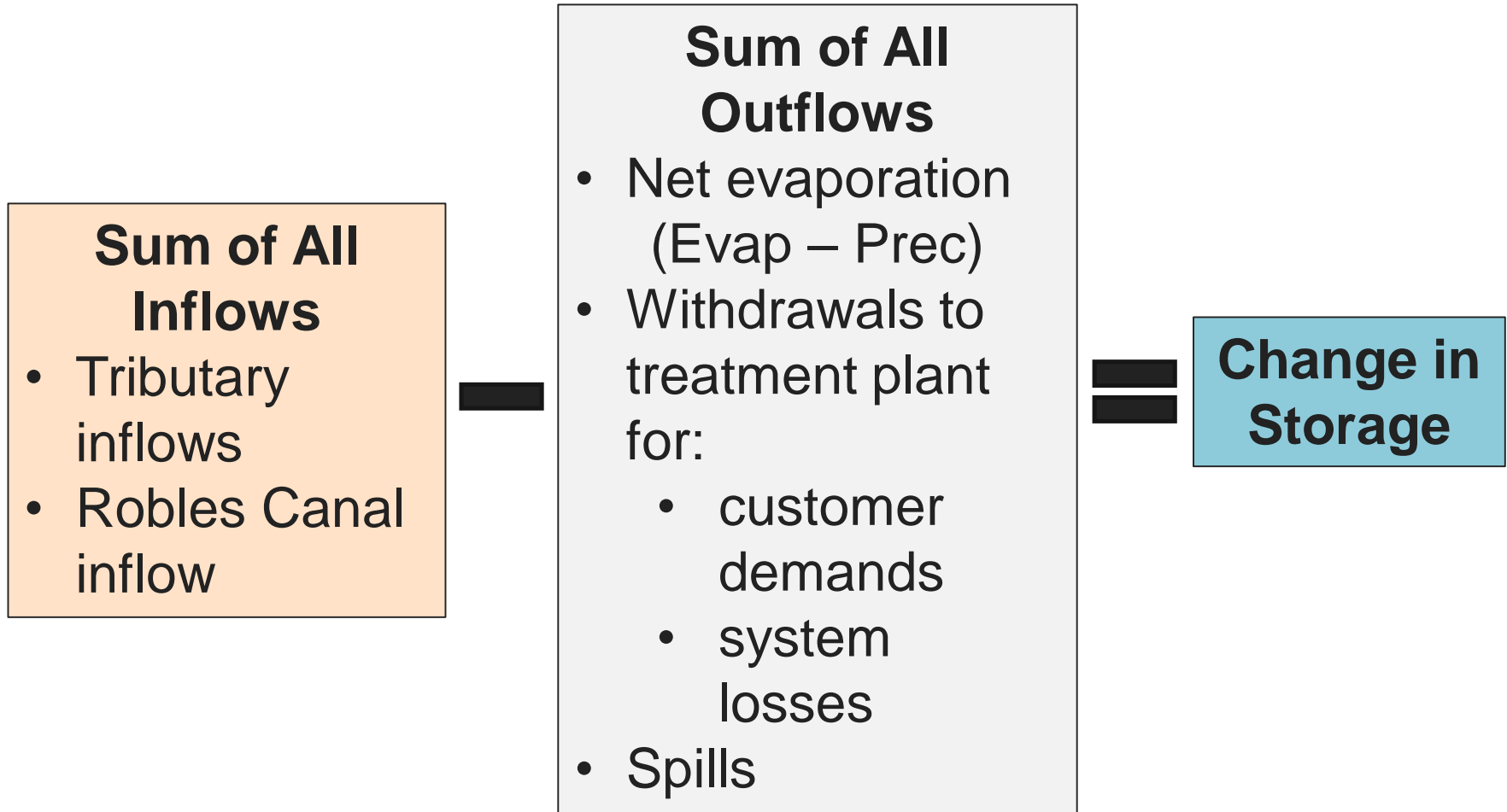


**LEGEND**

- Lake Casitas Storage Volume
- Lake Casitas Full Capacity
- █ Inflow
- █ Drought Period



# Modeling Future Lake Casitas Yield (Mass Balance Model)



# Board Direction on Jan 15, 2021

Background

<b>Planning Assumptions &amp; Criteria</b>	<b>Draft CWRP</b>	<b>Board Direction (Jan 15, 2021)</b>
Operational Yield Approach	Safe Demand (w/ WEAP)	Safe Yield (w/o WEAP)
Minimum Lake Storage	20,000 AF	950 AF (Dead Pool)
Future Hydrology	Re-sequenced Historical w/ Climate Change	Historical hydrology plus safety factor

# Board Direction on Jan 15, 2021

Background

<b>Planning Assumptions &amp; Criteria</b>	<b>Draft CWRP</b>	<b>Board Direction (Jan 15, 2021)</b>
Operational Yield Approach	Safe Demand (w/ WEAP)	Safe Yield (w/o WEAP)
Minimum Lake Storage	20,000 AF	950 AF (Dead Pool)
Future Hydrology	Re-sequenced Historical w/ Climate Change	Historical hydrology plus safety factor
Estimated Future Long-term Yield:	<b>10,660 AFY</b>	<b>18,420 AFY</b>

# Planning for Hydrologic Uncertainty

- Historical hydrology is not expected to repeat itself
- Future droughts could be more severe than the droughts in the 1945-2018 historical record
- A **supply safety factor** is a policy consideration to account for uncertainty of future supply availability and other unknown factors



Casitas Comprehensive Water Resources Plan

# Demand and Supply Comparison

# Gap Analysis

<b>Casitas System</b>					
<b>Planned Demand:</b>	<b>16,000</b>	<b>16,000</b>	<b>16,000</b>	<b>16,000</b>	<b>16,000</b>
Planned Supply:	18,600	18,600	18,600	18,600	18,600
Supply Safety Factor:	<b>0%</b>	<b>-5%</b>	<b>-10%</b>	<b>-15%</b>	<b>-20%</b>
Climate Change Adjustment:	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%
<b>Projected Supply:</b>	<b>17,800</b>	<b>16,870</b>	<b>15,940</b>	<b>15,010</b>	<b>14,080</b>
<b>Surplus (+) / Shortage (-)</b>	<b>1,800</b>	<b>870</b>	<b>(60)</b>	<b>(990)</b>	<b>(1,920)</b>

All units in AFY except where noted otherwise.



Casitas Comprehensive Water Resources Plan

# Policy Direction from Board



# Policy Direction

- Staff is requesting policy direction regarding supply safety factors



# Policy Direction

<b>Casitas System</b>					
<b>Planned Demand:</b>	<b>16,000</b>	<b>16,000</b>	<b>16,000</b>	<b>16,000</b>	<b>16,000</b>
Planned Supply*:	18,600	18,600	18,600	18,600	18,600
Supply Safety Factor:	<b>0%</b>	<b>-5%</b>	<b>-10%</b>	<b>-15%</b>	<b>-20%</b>
Climate Change Adjustment:	-4.3%	-4.3%	-4.3%	-4.3%	-4.3%
<b>Projected Supply:</b>	<b>17,800</b>	<b>16,870</b>	<b>15,940</b>	<b>15,010</b>	<b>14,080</b>
<b>Surplus (+) / Shortage (-)</b>	<b>1,800</b>	<b>870</b>	<b>(60)</b>	<b>(990)</b>	<b>(1,920)</b>

\* Includes 180 AFY of local well supply  
All units in AFY except where noted otherwise.

## Next Steps

- Re-evaluate planned supply portfolio and consider phased implementation strategy
- Consider revisions to the plan



Casitas Comprehensive Water Resources Plan

End of Presentation