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 call (888) 788-0099 or (877) 853-5247 US Toll-free
Enter Meeting ID: 940 4802 4973#
Passcode: 864551#

Special Meeting
February 17, 2021 @ 2:00 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_Feb17-2021-2.pdf
   CWRP_Board_Feb17-2021_final-1.pdf

5. CLOSED SESSION

5.a. CONFERENCE WITH LEGAL COUNSEL – ANTICIPATED LITIGATION
(Government Code §54956.9(b)
Number of potential cases: 1

6. ADJOURNMENT

CASITAS MUNICIPAL WATER DISTRICT
MEMORANDUM

TO: BOARD OF DIRECTORS

FROM: MICHAEL FLOOD, GENERAL MANAGER

SUBJECT: DISCUSSION OF COMPREHENSIVE WATER RESOURCES PLAN

DATE: 02/17/21

RECOMMENDATION:

The Board of Directors review modeling 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.

The Draft CWRP recommends a Lake Casitas operational yield of 10,660 AFY on average based on the following modeling and policy assumptions:

- Safe Demand approach that models demand reductions in accordance with the District's Water Efficiency and Allocation Program
- Minimum Allowable Storage of 20,000 AF to provide a planning contingency for unforeseen conditions and emergencies
- Re-sequenced hydrology for 100 alternate 74-year periods[1] (probabilistic approach)
- 95% Reliability Goal
- Climate change adjustment
- Robles Diversion Efficiency of 70%
- Initial Lake Volume of 237,761 AF (full reservoir)

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; and January 15, 2021.

[1] Data set provided to Stantec by Casitas

On January 15, 2021, the Board directed staff to revise the modeling and policy assumptions as follows, which results in a Lake Casitas operational yield of 18,420 AFY on average. With this approach, an additional safety factor is recommended to account for hydrologic uncertainty.

- 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
- 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
- Historical hydrologic period from 1945-2018
- Robles Diversion Efficiency of 70%
- Initial Lake Volume of 237,761 AF (full reservoir)

Subsequently, staff realized that a more complete understanding of the probabilistic approach to the hydrology was needed in order for the Board to make further policy decisions prior to a Supply and Demand analysis.

DISCUSSION:

Staff recommends the Board continue policy discussions related to the Lake Casitas yield modeling, and revisit the probabilistic approach for modeling future hydrologic uncertainty. Based on previous Board discussions, sensitivity analyses have been performed that evaluate the probabilistic approach based on different hydrologic periods. Results will be compared that use the hydrologic periods of 1945-2018, 1945-2006, and 1956-2018 to evaluate hydrologic statistics and resequencing. While the sensitivity analyses use a different hydrologic modeling approach than the direction provided by the Board on January 15th, 2021, the analyses are consistent with remaining policy direction as follows:

- Safe Yield approach
- Minimum allowable storage of 950 AF
- Robles Diversion Efficiency of 70%
- Initial Lake Volume of 237,761 AF (full reservoir)

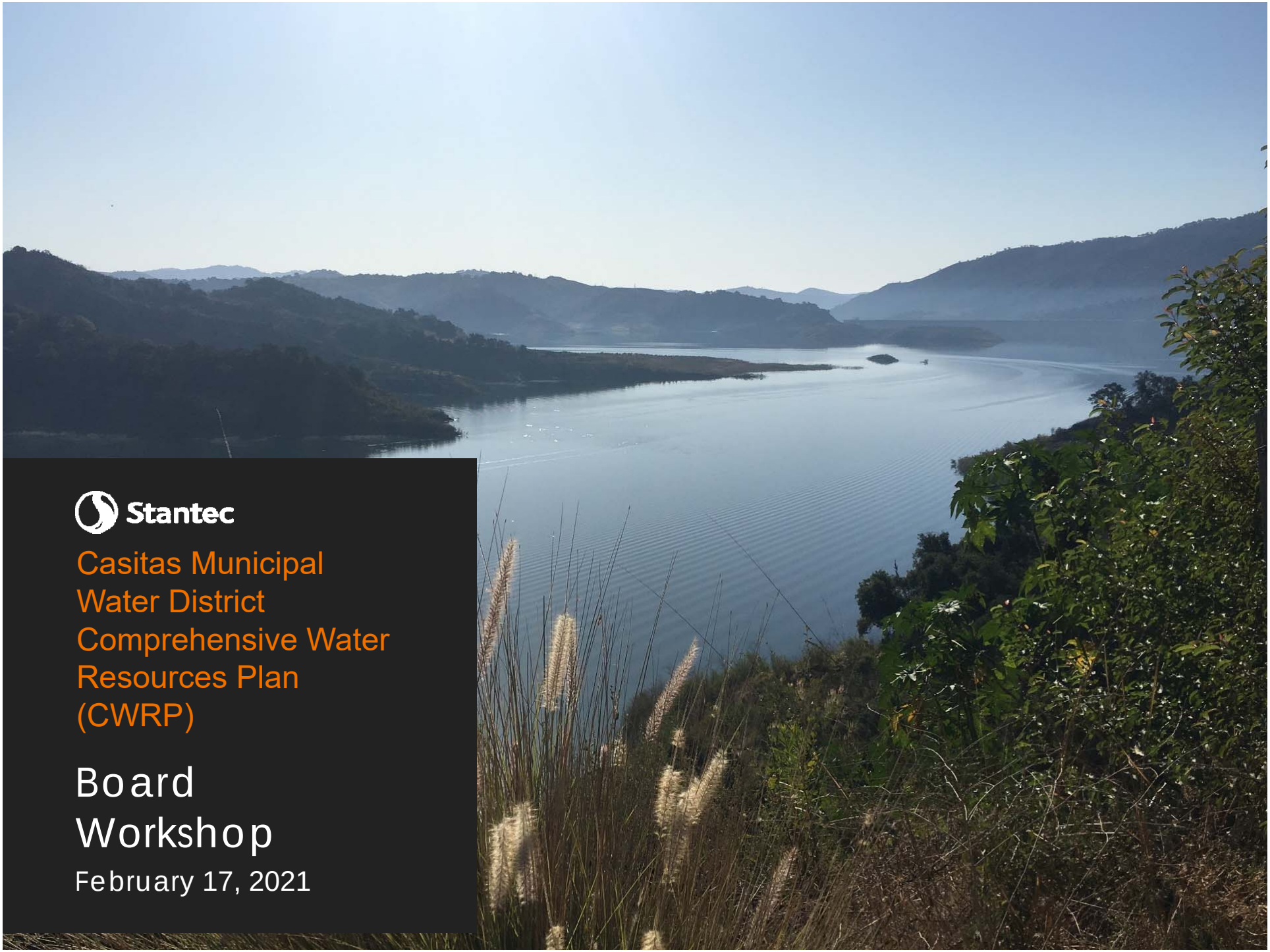
A presentation will be provided to review the current model and additional sensitivity analyses. A summary of the results is presented in Table 1 on the next page. With this approach, staff recommends a 90-95% reliability level.

Staff is requesting direction on the policy assumptions related to Lake Casitas yield modeling, which affect the gap analysis and planned projects in the CWRP.

Table 1. Safe Yield Reliability for Varying Periods of Record (AFY) – With Climate Change Adjustment

Reliability	Full Period of Record; 20,000 AF min storage	Full Period of Record; Dead pool min storage	1945-2006 Period of Record; Dead pool min storage	1956-2018 Period of Record; Dead pool min storage
50% Reliability	14,800	15,800	17,000	17,600
75% Reliability	11,900	12,800	13,800	14,100
90% Reliability	9,900	10,800	11,800	12,100
95% Reliability	9,200	10,000	11,000	11,400

* Period of record used to generate 100 stochastic hydrologic sequences as noted, minimum allowable storage as noted, 70% Robles Diversion Structure reliability, full initial storage, no WEAP adjustments to demand
** Results rounded to three significant figures
*** Climate change adjustment is -4.3% for all reliability levels



Stantec

Casitas Municipal Water District Comprehensive Water Resources Plan (CWRP)

Board Workshop

February 17, 2021

Agenda

1. Goals
2. Next Steps
3. Overview of Lake Casitas Yield Model
4. Supplemental Analyses of Safe Yield with Partial Periods of Record
5. Policy Considerations

Goals

Goals

- Describe updates to Lake Casitas yield model
- Understand how the probabilistic method was applied
- Compare safe yield probabilistic outcomes using various hydrologic datasets
- Provide policy direction on development of planned Lake Casitas yield

Next Steps

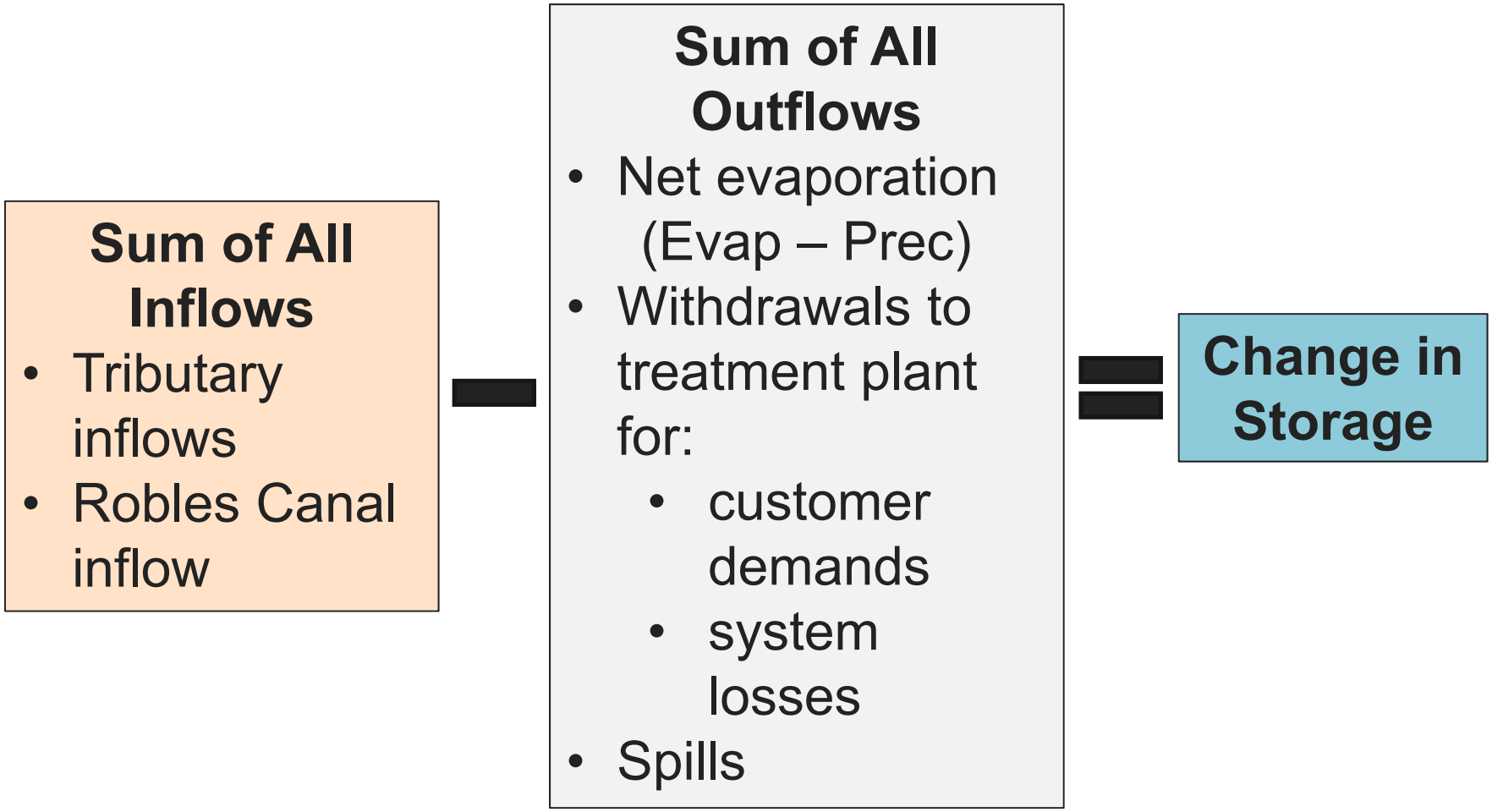
Next Steps

- Apply planned Lake Casitas yield to supply/demand gap analysis
- Prepare revised planning report

Casitas Comprehensive Water Resources Plan

Overview of Lake Casitas Yield Model

Monthly Mass Balance Model in Excel



Lake Casitas
Yield Model
Overview

Input Data and Computations

- **Tributary Inflows** – historical measurements and estimates provided by Casitas
- **Robles Diversions** – Ventura River flow at Robles diversion provided by Casitas; diverted flows based on Biological Opinion rules and diversion structure efficiency
- **Net Evaporation** – historical evaporation rates and precipitation amounts provided by Casitas
- **Withdrawals** – assumed demands from Casitas system, or trial demands in an iterative safe yield analysis
- **Spills** – water lost over the spillway; computed based on spillway rating curve

Lake Casitas Yield Model Overview

Lake Casitas Yield Model Improvements

- Extended **period of record** from WY1945-1999 to WY1945-2018
- Incorporated results of recent bathymetric survey – reduced **maximum capacity** from 254,000 AF to 237,761 AF
- Added function to compute **reservoir spills**
- Incorporated Robles Diversion operations based on current **BO guidelines**
- Reduced modeled Robles diversions based on historical **diversion structure efficiency**
- Improved method of calculating monthly **net evaporation** loss
- Added function for user to select **minimum allowable storage** level
- Added function for user to select **initial reservoir storage**
- Added function to simulate **WEAP impacts** on customer demand

Lake Casitas Yield Model Overview

Lake Casitas Yield Model Improvements

- Extended **period of record** from WY1945-1[illegible] 1945-2018
- Incorporated results of recent bathym[illegible]ed **maximum capacity** from 254,000
- Added function to compute [illegible]
- Incorporated Robles D[illegible] current **BO guidelines**
- Reduced m[illegible] on historical **diversion structur**
- Im[illegible] onthly **net evaporation** loss
- Add[illegible] elect **minimum allowable storage** level
- Added [illegible]er to select **initial reservoir storage**
- Added fu[illegible] o simulate **WEAP impacts** on customer demand

Results = Safe Yield was reduced

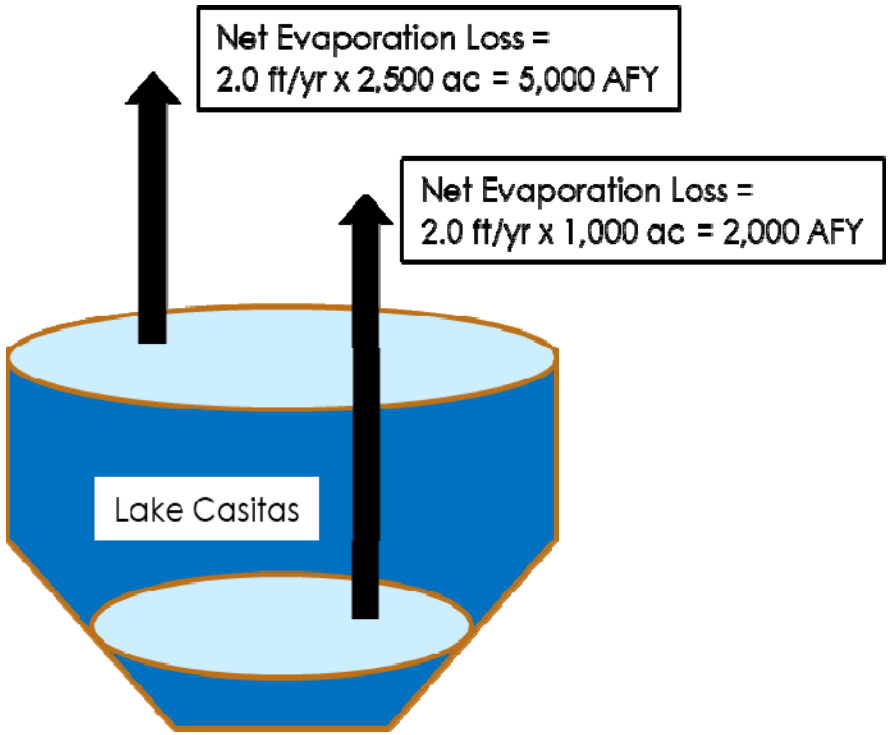
Robles Diversion Calculations

Flow in Ventura River at Diversion Structure **&** Biological Opinion Operating Rules **&** Diversion Structure Efficiency (70%)

Lake Casitas Yield Model Overview

Net Evaporation Calculations

- Net evaporation loss (in ac-ft) = net evaporation rate x simulated lake surface area



Lake Casitas Yield Model Overview

Generation of Synthetic Hydrologic Records to Capture Natural Variability

Historical Hydrologic Data

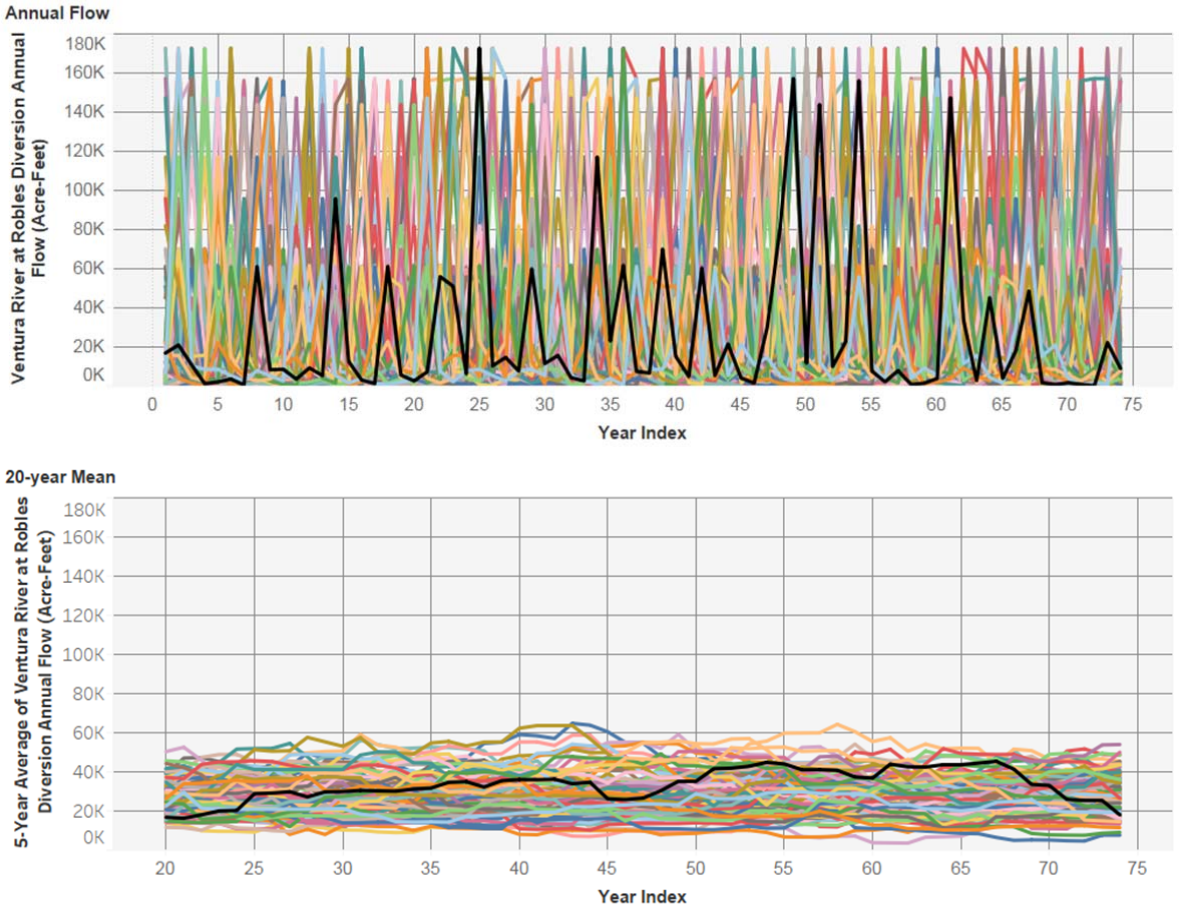
Full 74-year historical period (1945-2018)

K-Nearest Neighbor Method (KNN)

- Resequence years 100 times to generate 74-year records
- Maintain basic statistics
- Use historical months from resequenced years

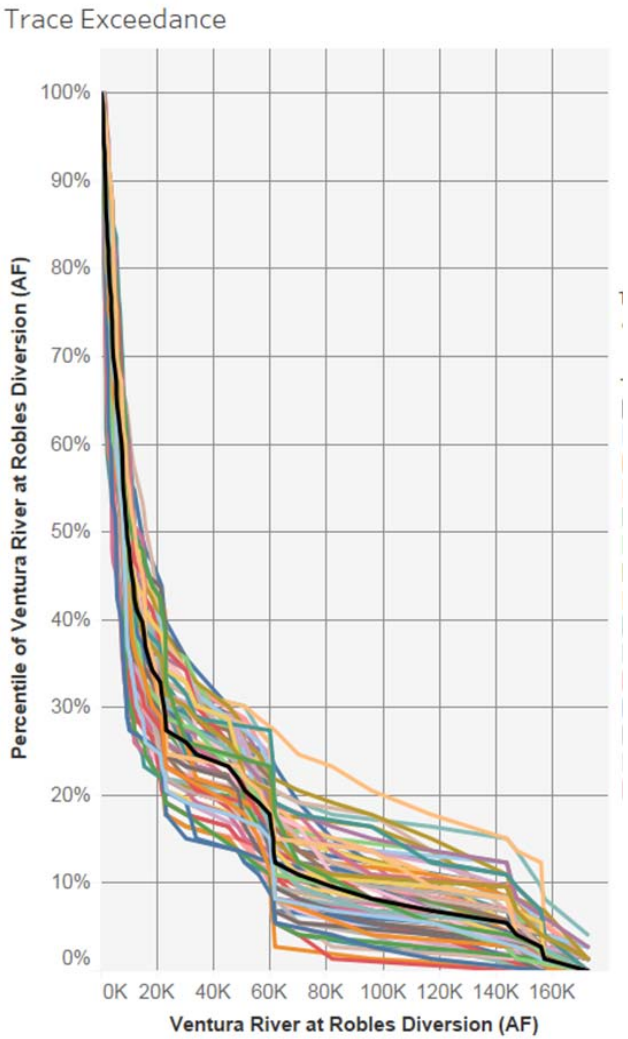
100 74-year Traces of Synthetic Monthly Flows

Generation of Synthetic Hydrologic Records to Capture Natural Variability



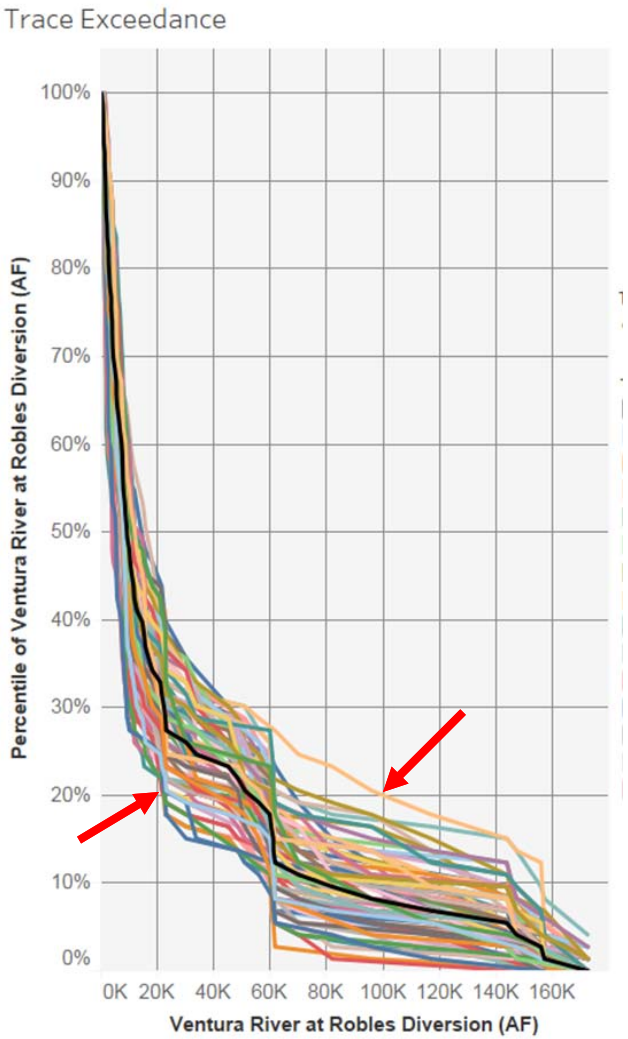
Lake Casitas Yield Model Overview

Generation of Synthetic Hydrologic Records to Capture Natural Variability



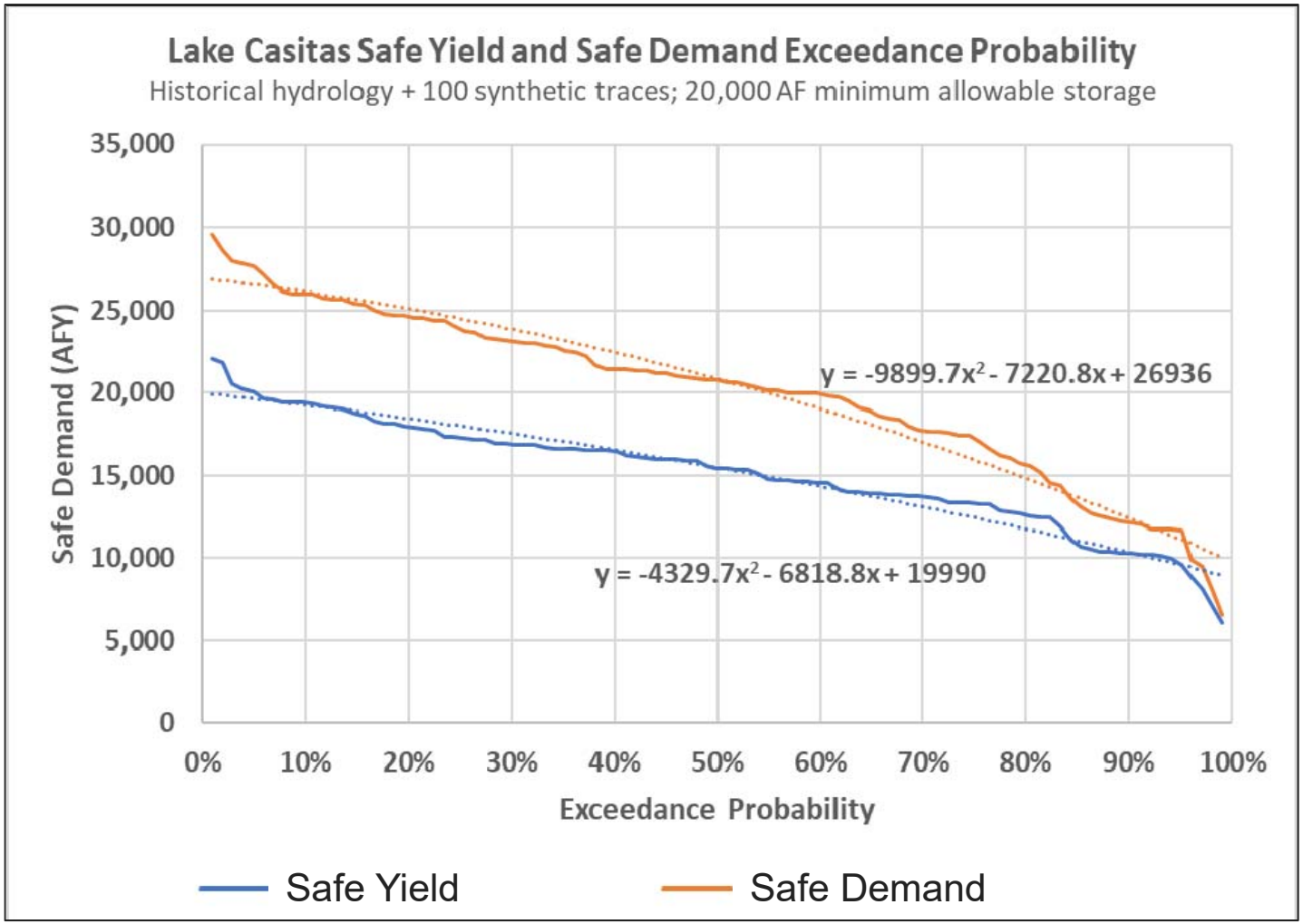
Lake Casitas Yield Model Overview

Generation of Synthetic Hydrologic Records to Capture Natural Variability



Lake Casitas Yield Model Overview

Safe Yield Computed for Each Trace and Ranked for Reliability Analysis

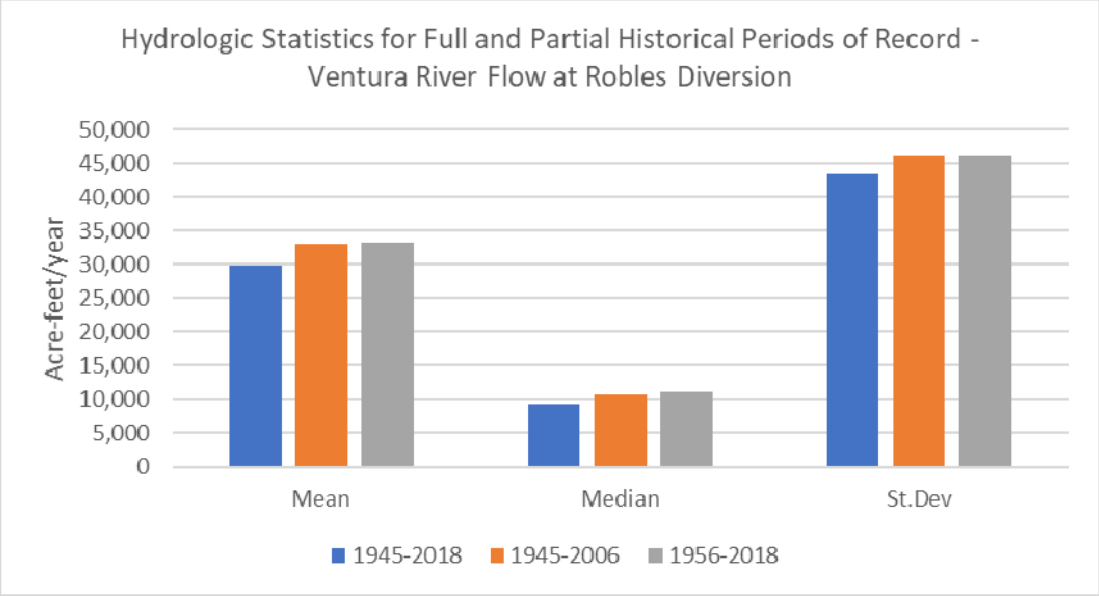


Casitas Comprehensive Water Resources Plan

Supplemental Analyses of Safe Yield with Partial Periods of Record

Comparison of Full Historical Period of Record to Partial Periods of Record

Summary Statistics: Ventura River Flow at Robles Diversion (AFY)			
Statistic	**1945-2018**	**1945-2006**	**1956-2018**
Mean	29,977	33,176	33,313
Median	9,355	10,796	11,156
St.Dev	43,437	46,176	46,156



Generation of Synthetic Hydrologies

Historical Hydrologic Data

Full historical period (1945-2018)

Partial period #1 (1945-2006)

Partial Period #2 (1956-2018)

KNN Resequencing Method

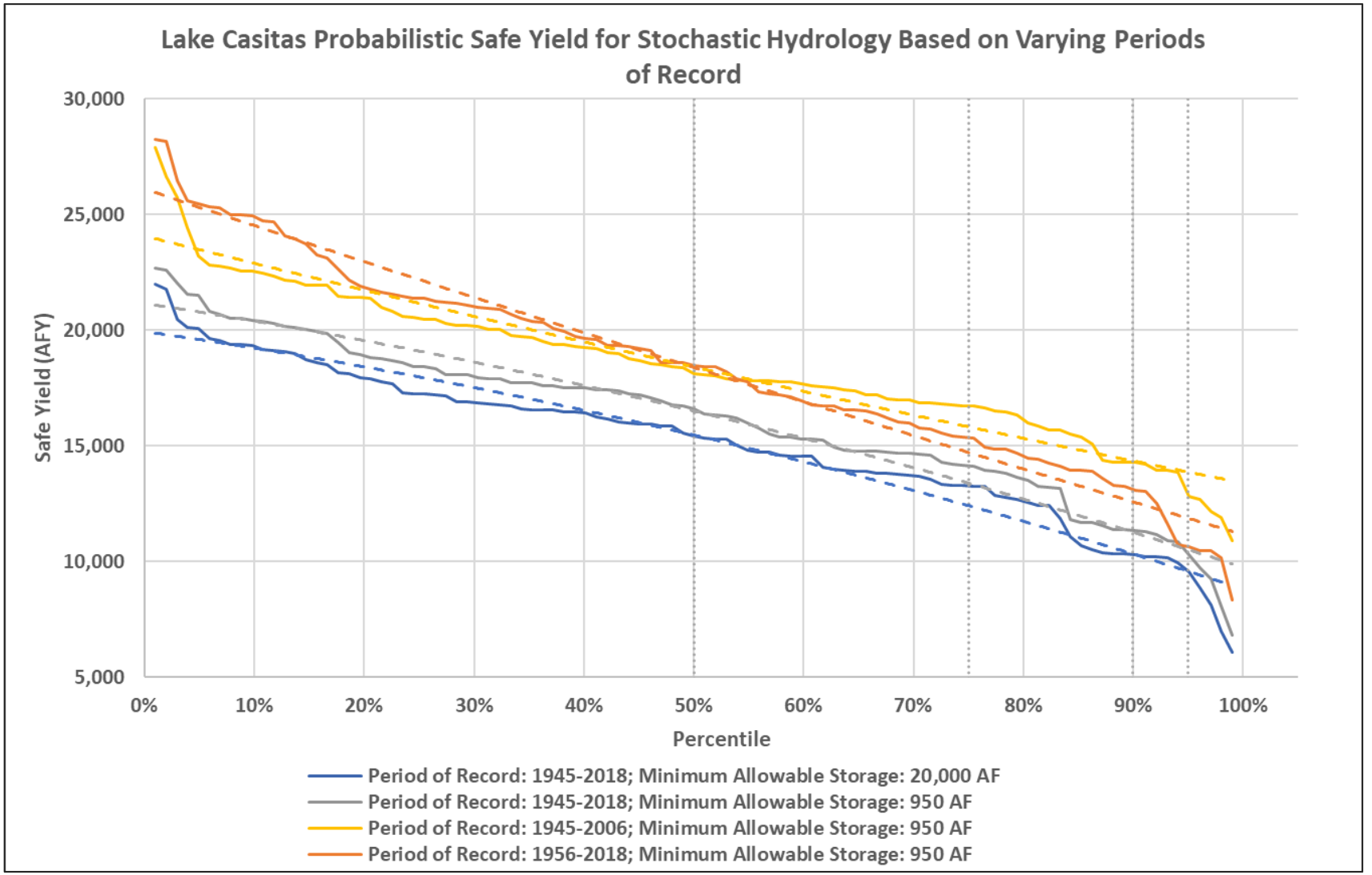
- Resequence years 100 times to generate 74-year records
- Maintain basic statistics
- Use historical months from resequenced years

100 (74-year) Traces of Synthetic Monthly Flows

1. Based on full historical period
2. Based on partial period #1
3. Based on partial Period #2

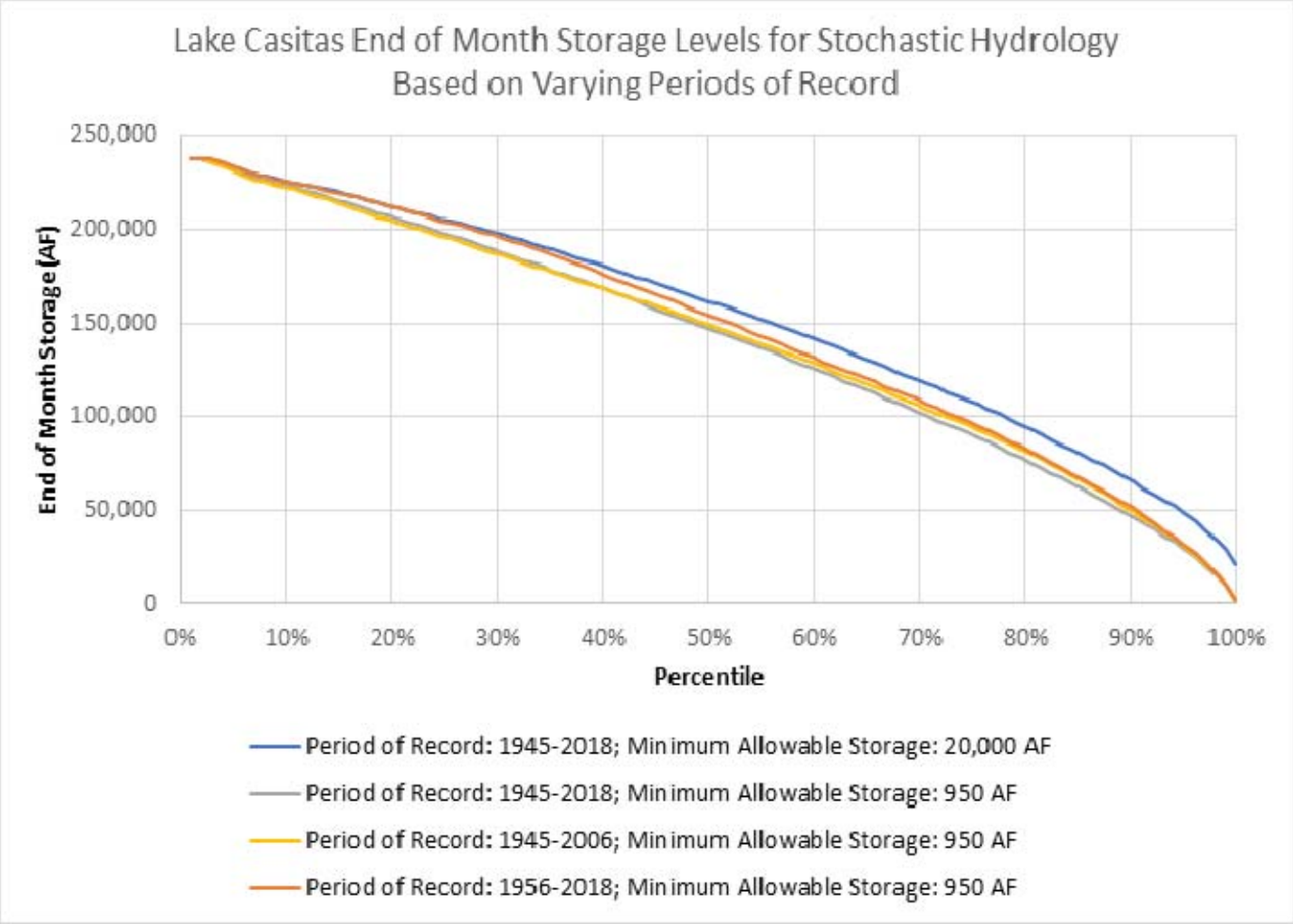
Supplemental Safe Yield Analysis

Probabilistic Safe Yield for Full vs Partial Periods of Record



Supplemental Safe Yield Analysis

Simulated Distribution of Lake Casitas Storage Levels for Each Period of Record



Supplemental Safe Yield Analysis

Probabilistic Safe Yield for Full vs Partial Periods of Record with Climate Change Adjustment

Safe Yield Reliability for Varying Periods of Record (AFY) – With Climate Change Adjustment				
Reliability	**Full Period of Record; 20,000 AF min storage**	**Full Period of Record; dead pool min storage**	**1945-2006 Period of Record; dead pool min storage**	**1956-2018 Period of Record; dead pool min storage**
50% Reliability	14,800	15,800	17,000	17,600
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* Period of historical record used to generate 100 stochastic hydrologic sequences as noted, minimum allowable storage as noted, 70% Robles Diversion Structure reliability, full initial storage, no WEAP adjustments to demand

** Results rounded to three significant figures

*** Climate change adjustment is -4.3% for all reliability levels

Supplemental Safe Yield Analysis

Probabilistic Safe Yield for Full vs Partial Periods of Record with Climate Change Adjustment

Safe Yield Reliability for Varying Periods of Record (AFY) – With Climate Change Adjustment				
Reliability	**Full Period of Record; 20,000 AF min storage**	**Full Period of Record; dead pool min storage**	**1945-2006 Period of Record; dead pool min storage**	**1956-2018 Period of Record; dead pool min storage**
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** Results rounded to three significant figures

*** Climate change adjustment is -4.3% for all reliability levels

Casitas Comprehensive Water Resources Plan

Policy Considerations

Policy Considerations

Method for Yield Planning

1. Historical Hydrology with Safety Factor
2. Probabilistic Approach
   - Full Period of Record
   - Partial Period of Record
   - Reliability Level

Recommendation

Recommendation:

- That Board approve:
  - Use of probabilistic method for Lake Casitas Yield planning
  - A hydrologic period that includes recent hydrology
  - Reliability level of 90-95 percent

Policy Direction

Policy Direction

Safe Yield Reliability for Varying Periods of Record (AFY)				
Reliability	**Historic Hydrology**	**Probabilistic Hydrology**		
		Full Period of Record	**1945-2006 Period of Record**	**1956-2018 Period of Record**
Not Applicable	18,400			
50% Reliability		15,800	17,000	17,600
75% Reliability		12,800	13,800	14,100
90% Reliability		10,800	11,800	12,100
95% Reliability		10,000	11,000	11,400

Notes

* Climate change adjustment is -4.3% for all reliability levels in probabilistic results, no climate change adjustment applied to historical hydrology results
* 70% Robles Diversion Structure reliability, full initial storage, dead pool minimum storage, no WEAP adjustments to demand
* Results rounded to three significant figures

Casitas Comprehensive Water Resources Plan

End of Presentation