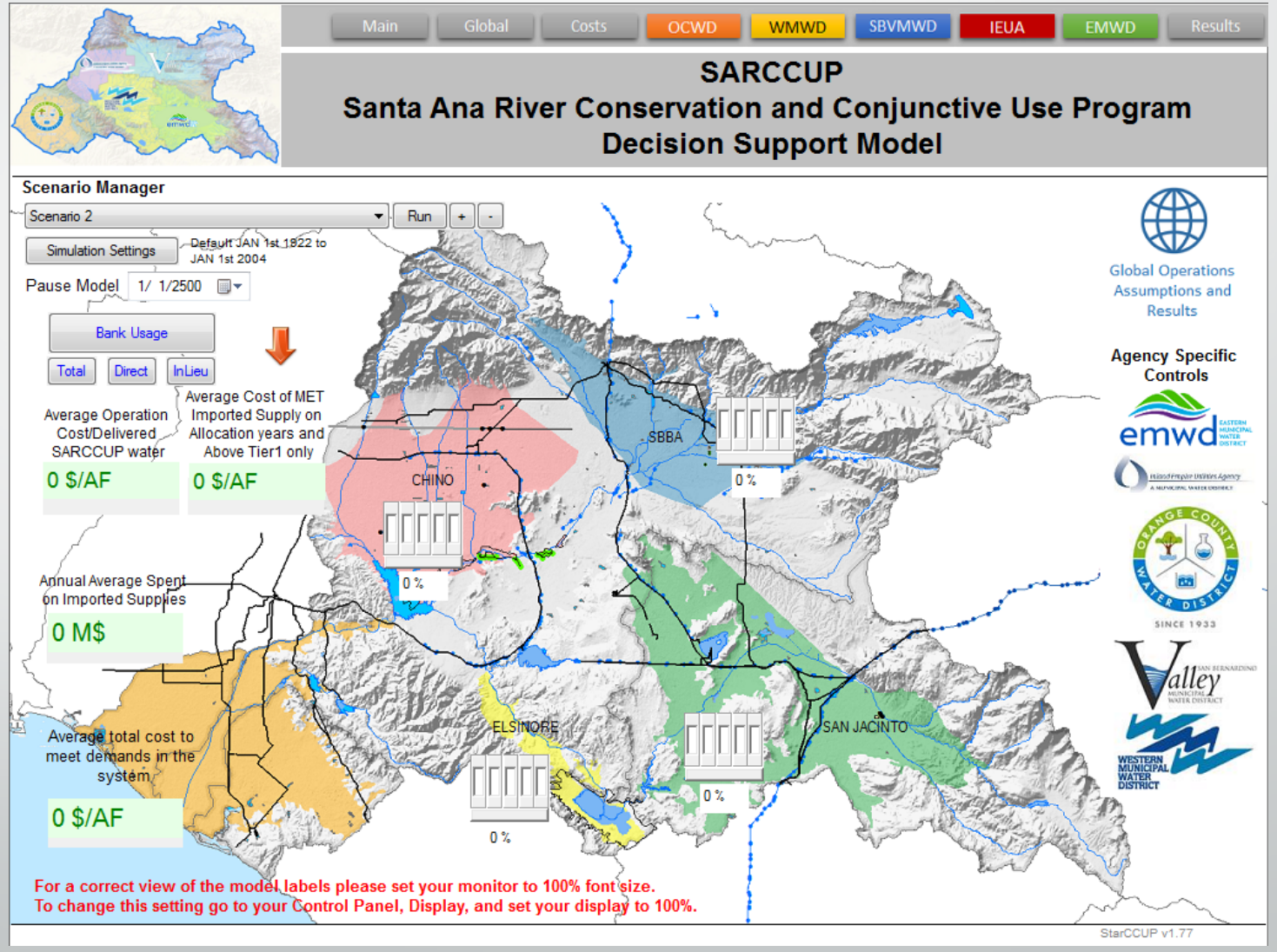
SARCCUP **Optimization** Model Results

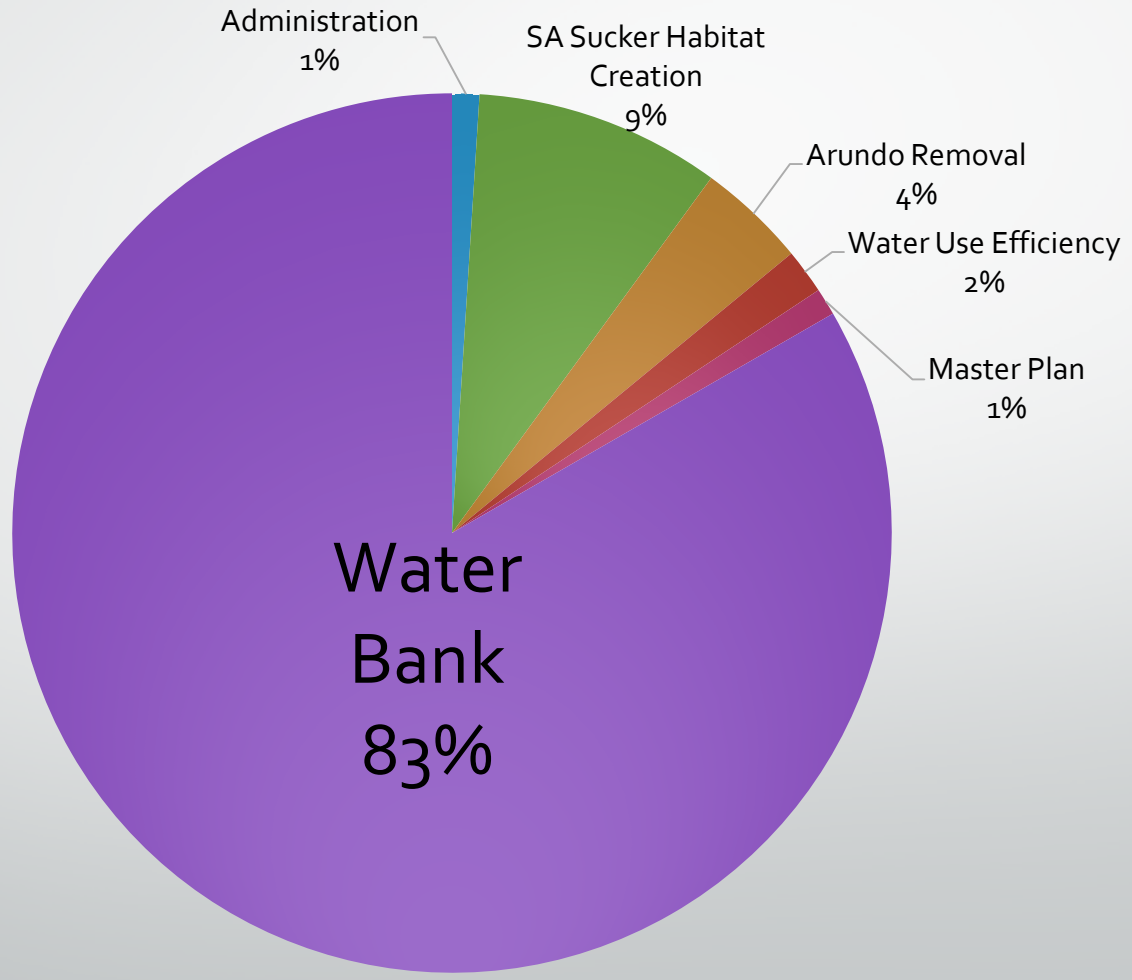


DSM Summary

PA-23 Committee Briefing

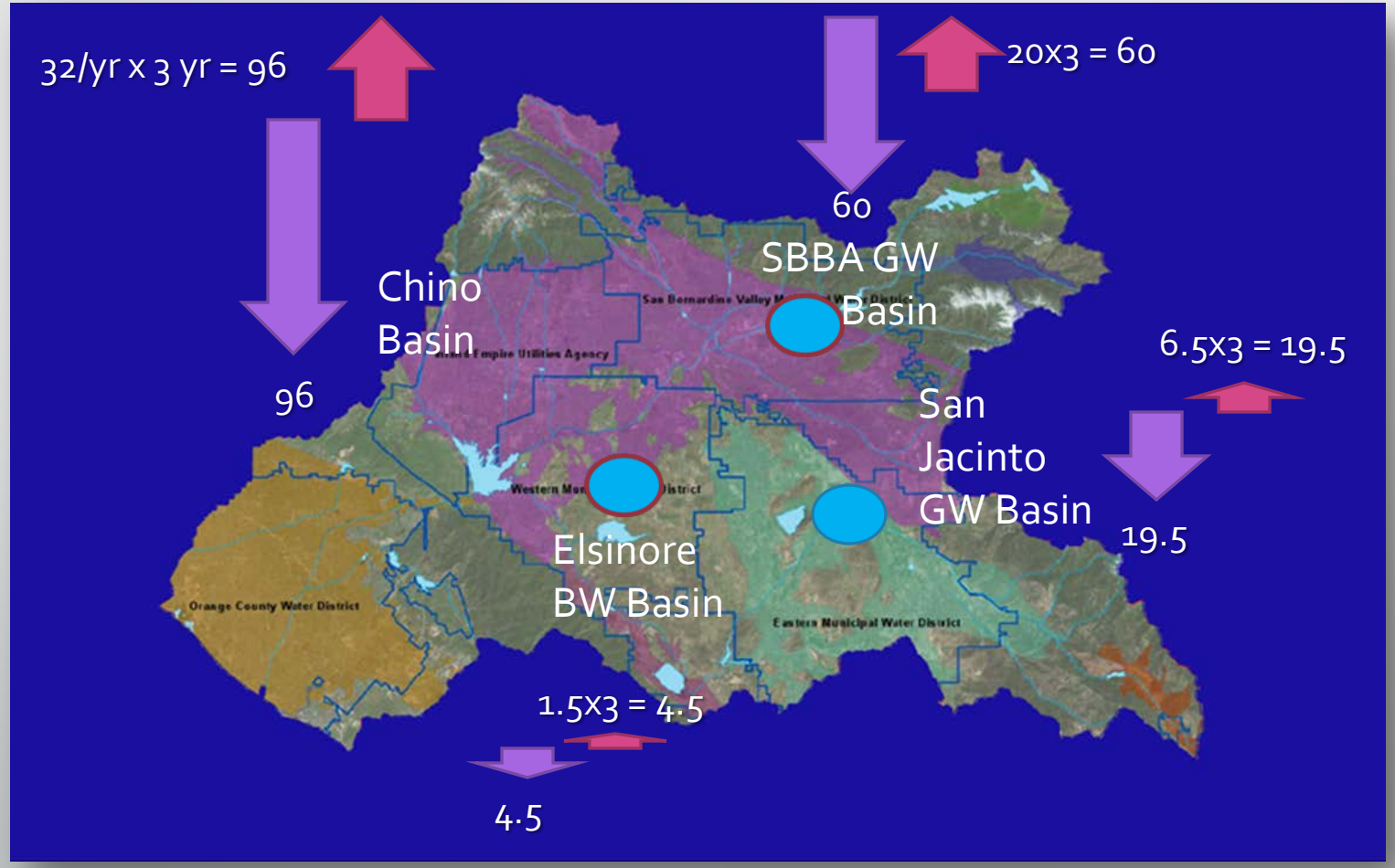
April 4, 2017

SARCCUP Elements



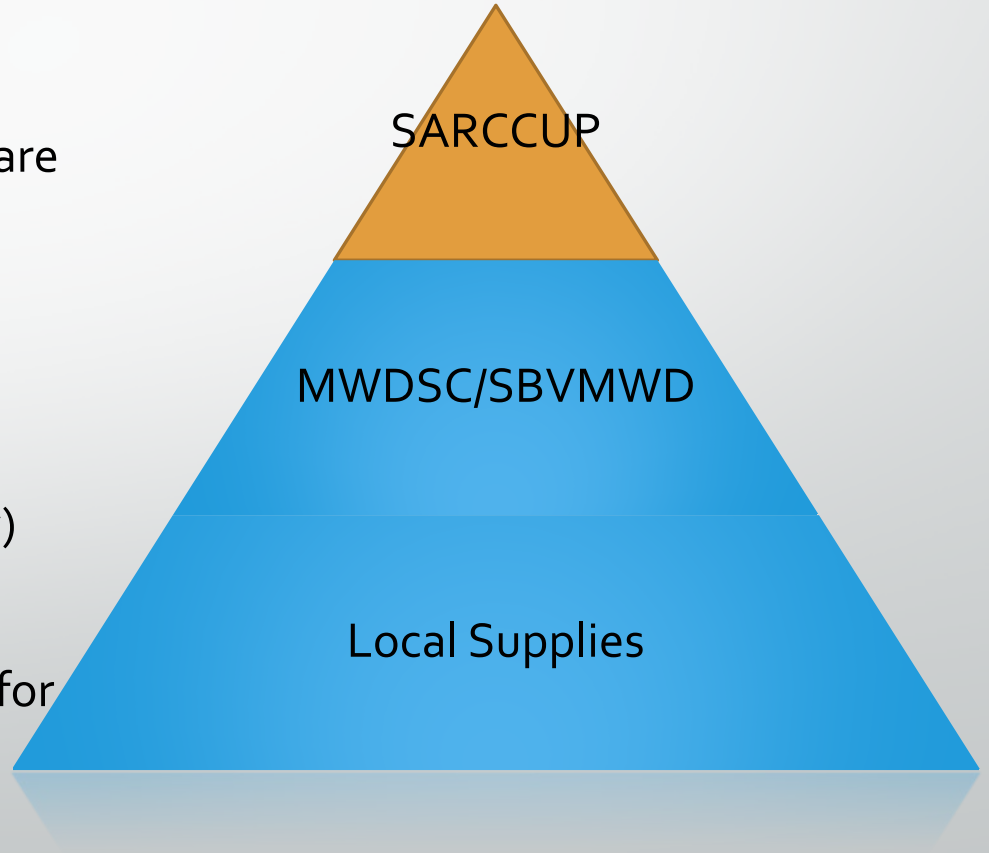
SARCCUP Groundwater Bank

(1,000's AF)

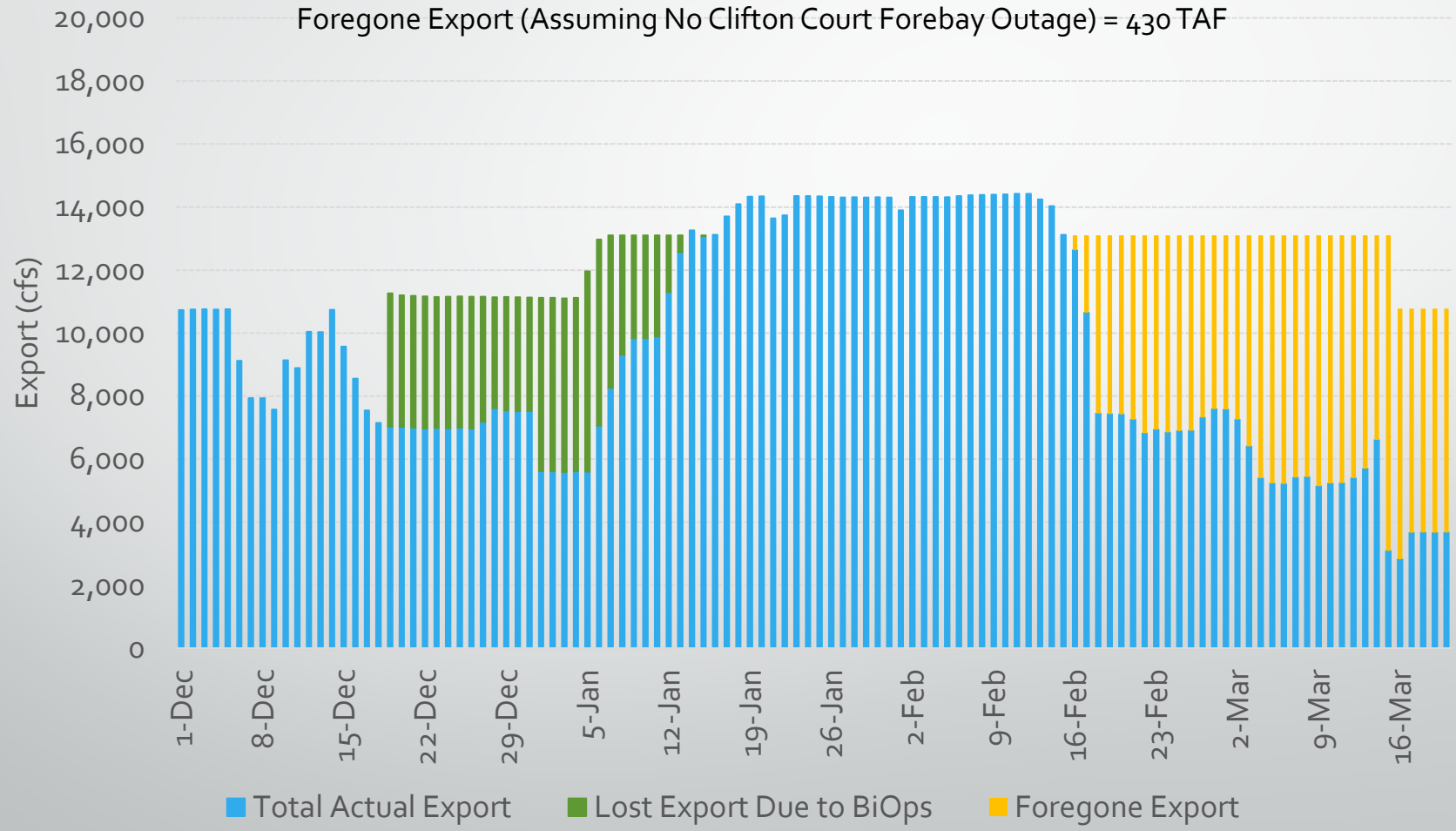


Groundwater Bank Goals

- Lower overall water cost
  - Maximize import of water in wet years when prices are lower
  - Provide dry year yield that is cheaper than the "spot market"
- Provide dry year yield during drought periods
  - Extraordinary Supply (in addition to MWDSC supply)
  - Proactive approach
  - Reduce the impact of drought (better quality of life for customers)

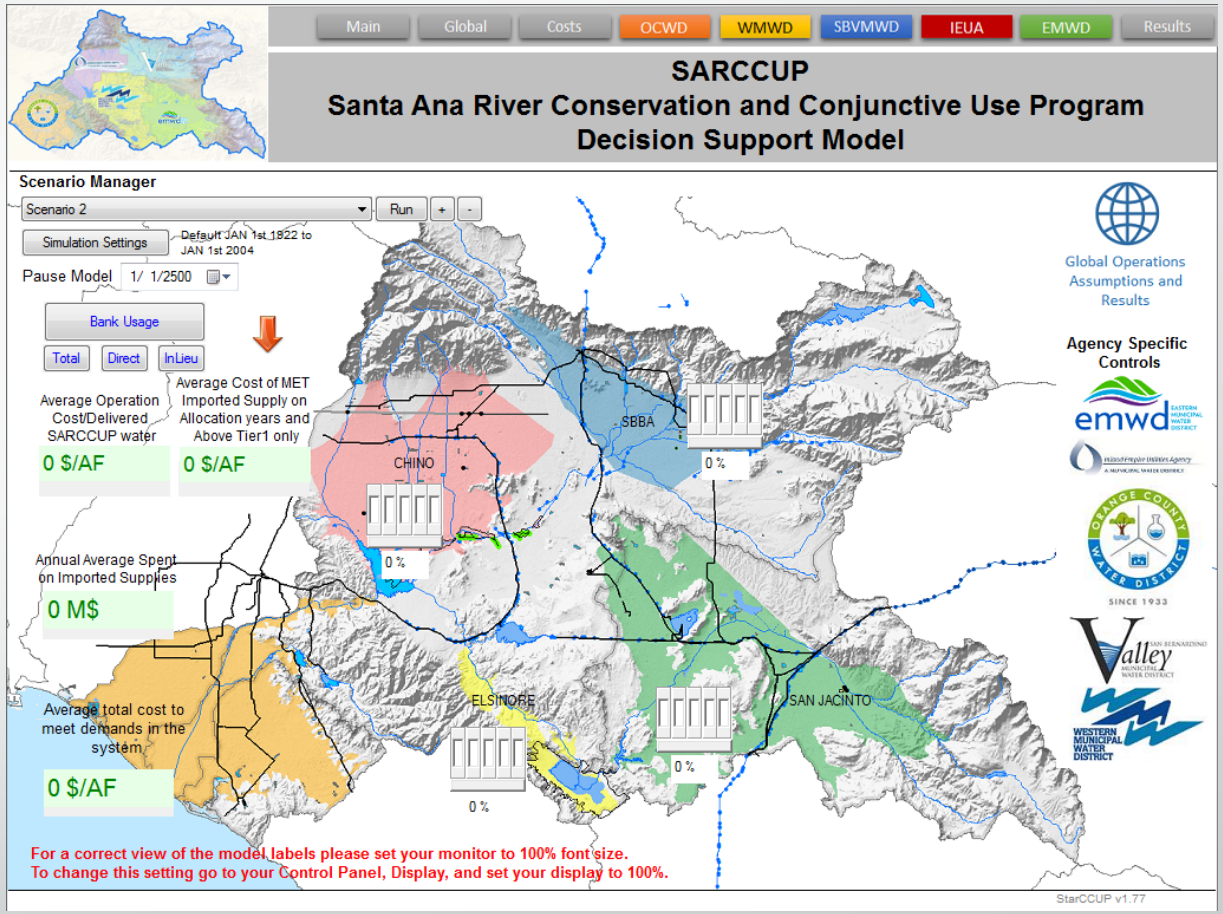


Lost Export Due to BiOps and Foregone Export: Water Year 2016-17



Modeling Goals and Objectives

- Maximize the storage of wet year SWP water to produce "dry year yield"
- Simulate operations
- Identify any constraints
- Optimize operations and quantify the benefits and costs
- Determine ultimate size of the bank



Questions to Answer about SARCCUP

- What is the cost of SARCCUP water and how does it compare to the cost of water without SARCCUP?

- How does the California Water Fix impact SARCCUP?

- Where are the “bottlenecks” in SARCCUP, if any? What recharge/extraction facilities would be required to alleviate specific bottlenecks?

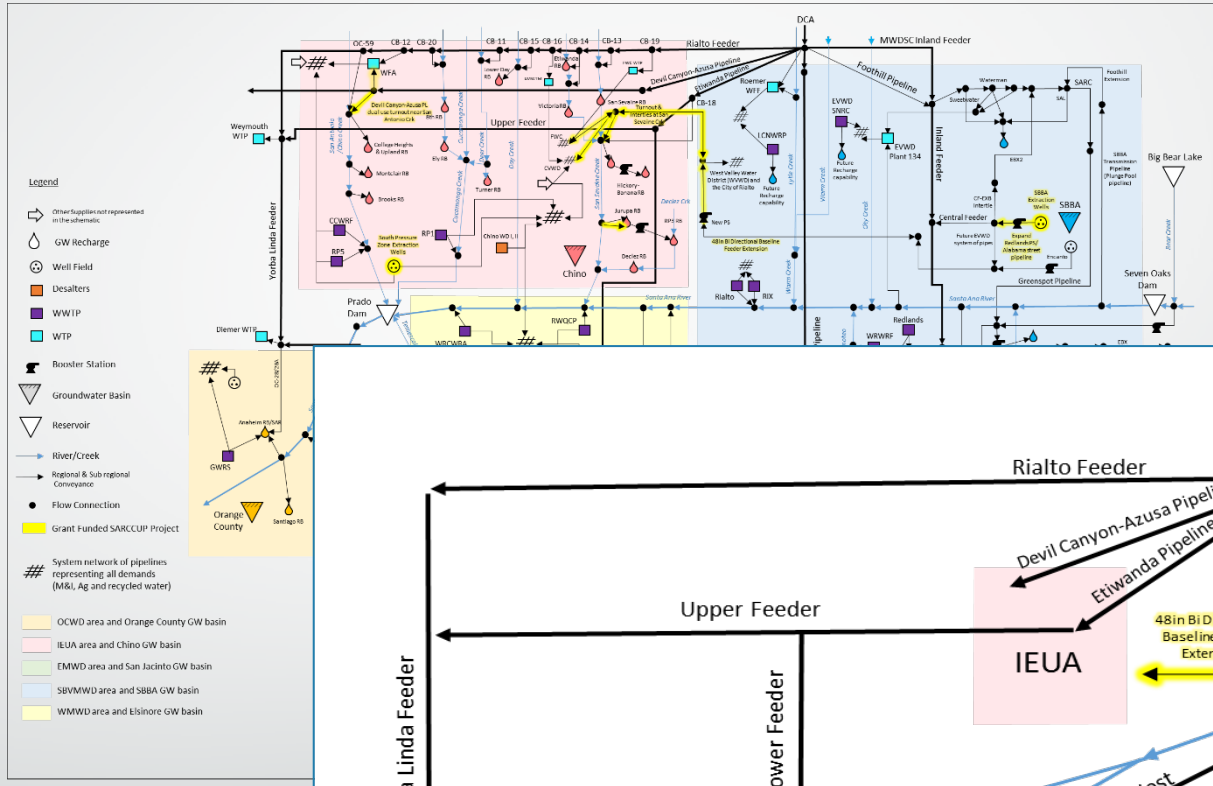
- Where in the watershed does extra recharge or extraction capacity exist without new facilities?

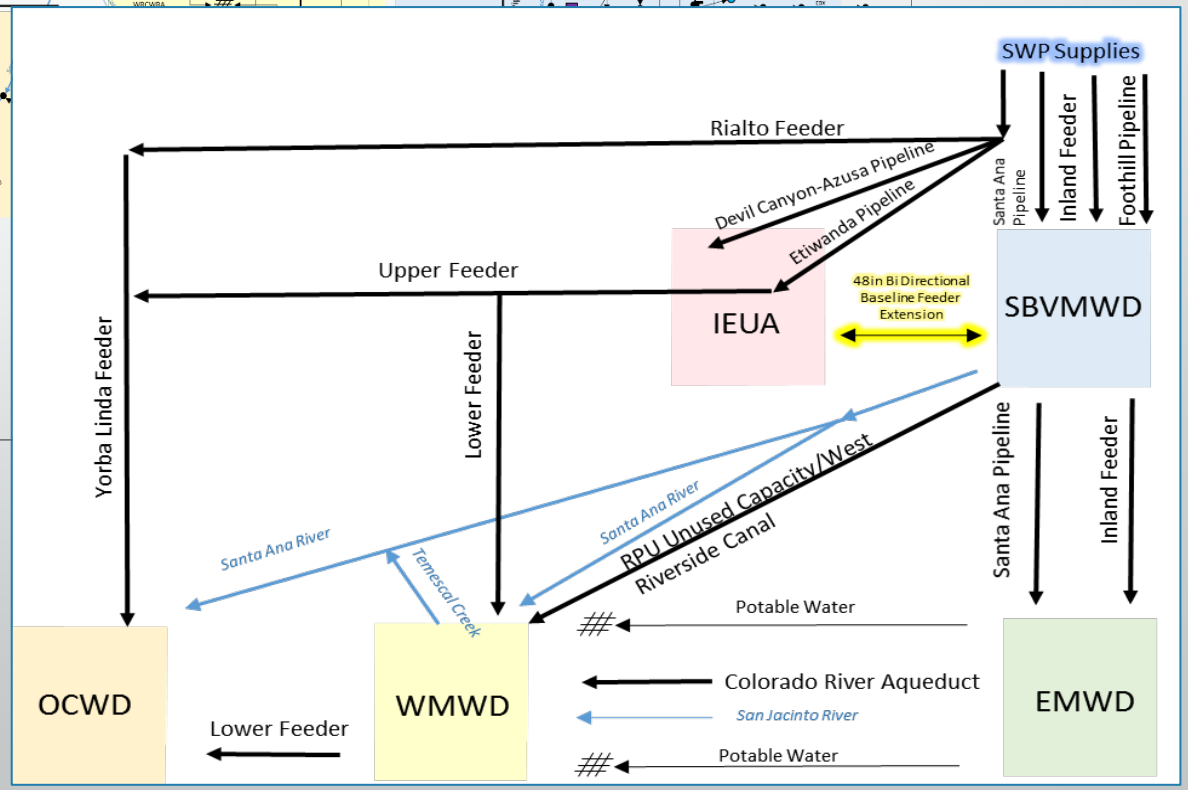
- What facilities would be needed to increase the storage capacity to 500,000 AF and the dry year yield to 166,000 AFY?

- What if OCWD were to only receive treated wastewater via the SAR? Would that stretch water supplies and reduce costs in the watershed?

SARCCUP DSM System Representation

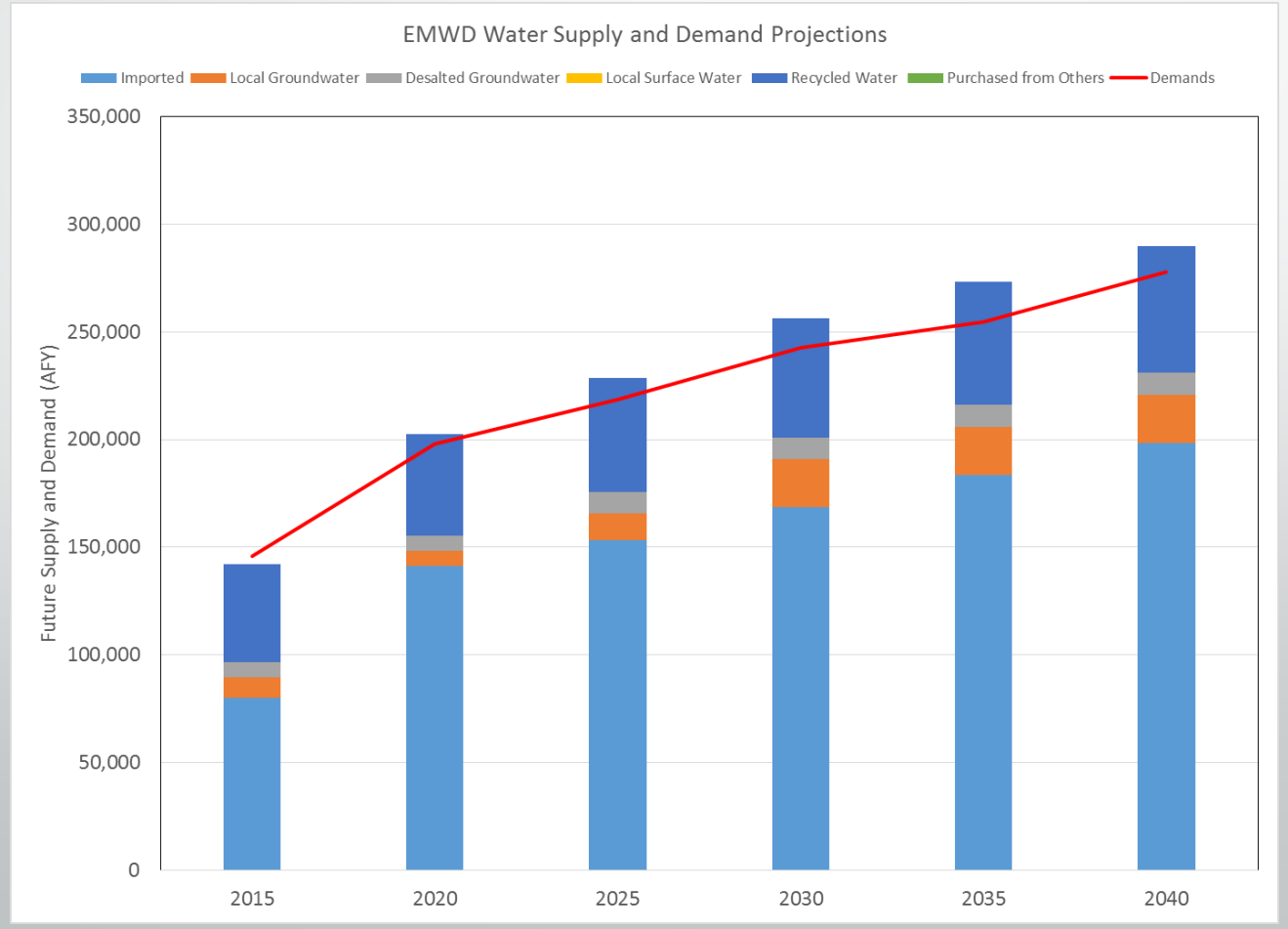
- Simplified network of system includes:
  - Service areas for SBVMWD, IEUA, EMWD, WMWD, and OCWD
  - Imported and local supplies
  - Demands
  - Regional conveyance
  - Proposed SARCCUP facilities



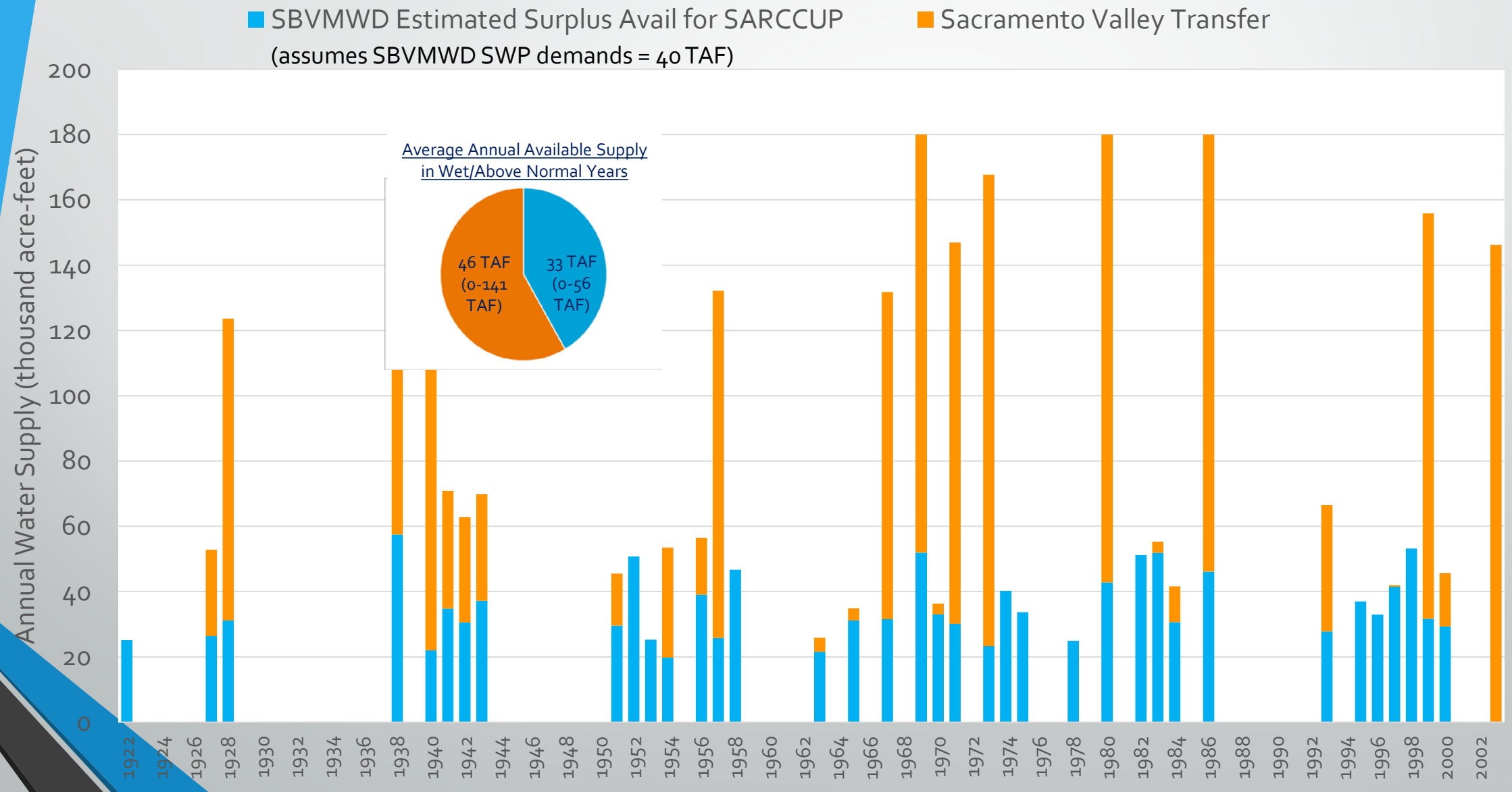


Projection of Future Baseline Water Supply and Demands

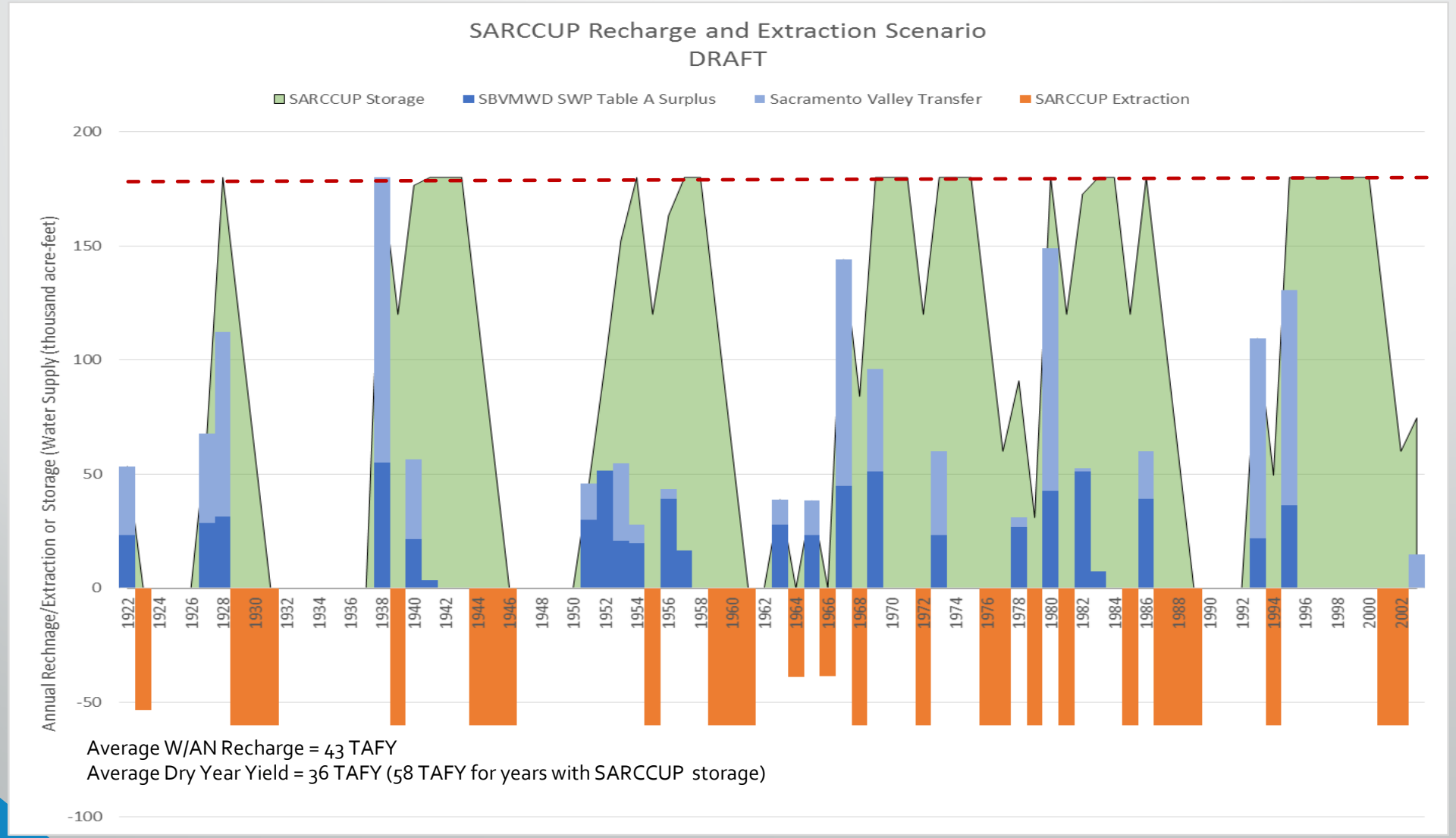
(Data collected from 2015 UWMPs)



Forecasted Water Supply Available for SARCCUP



Example SARCCUP Recharge and Extraction Operation



Average W/AN Recharge = 43 TAFY
Average Dry Year Yield = 36 TAFY (58 TAFY for years with SARCCUP storage)

Simulating MWD Allocation Years

Scenario 1 - 26 years of curtail (32% of the years)
Scenario 2 - 27 years of curtail (33% of the years)
Scenario 3 - 14 years of curtail (17% of the years)

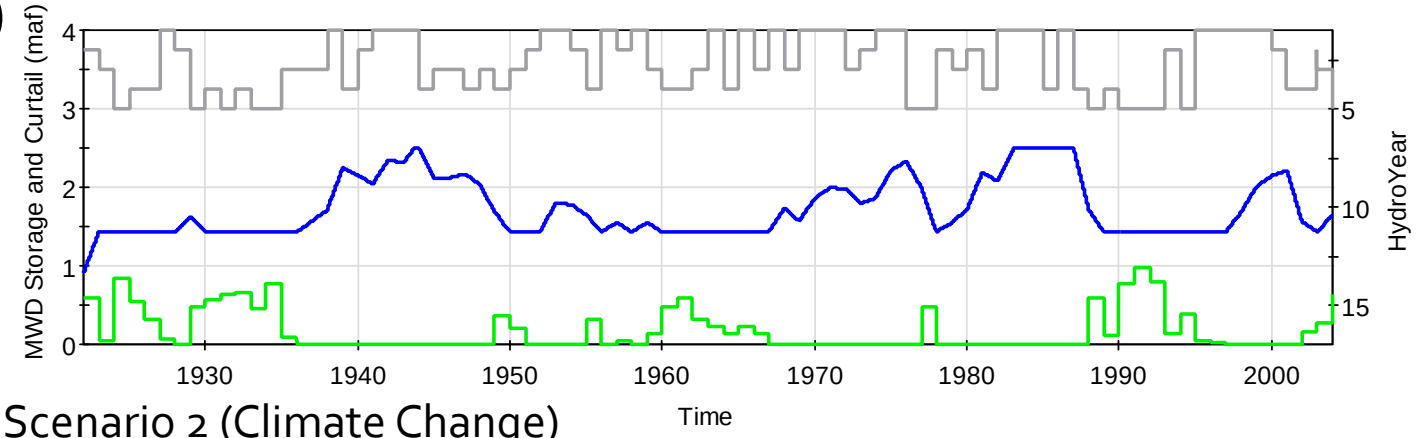
Legend:

Estimated MWD Storage Volume

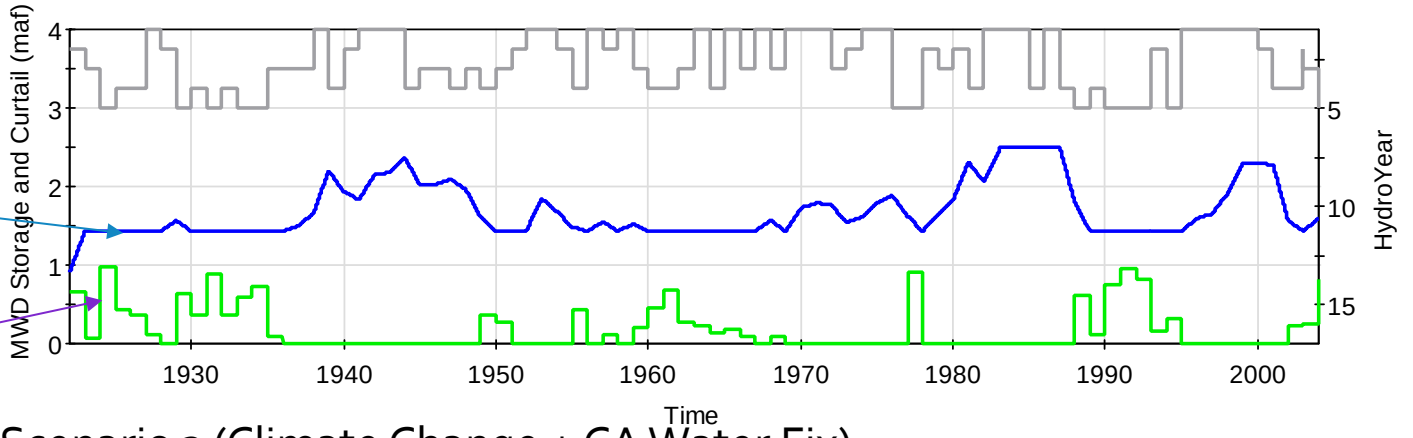
Curtail Years with magnitude (Volume)

Hydro Year
Right vertical scale
1(Wet) to 5(Critical)

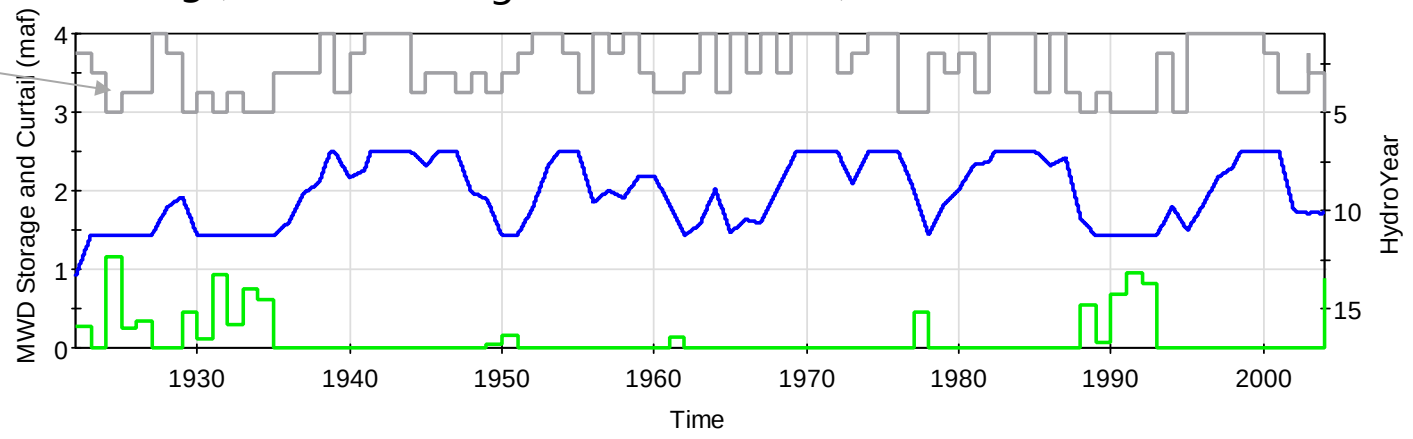
Scenario 1 (Existing)



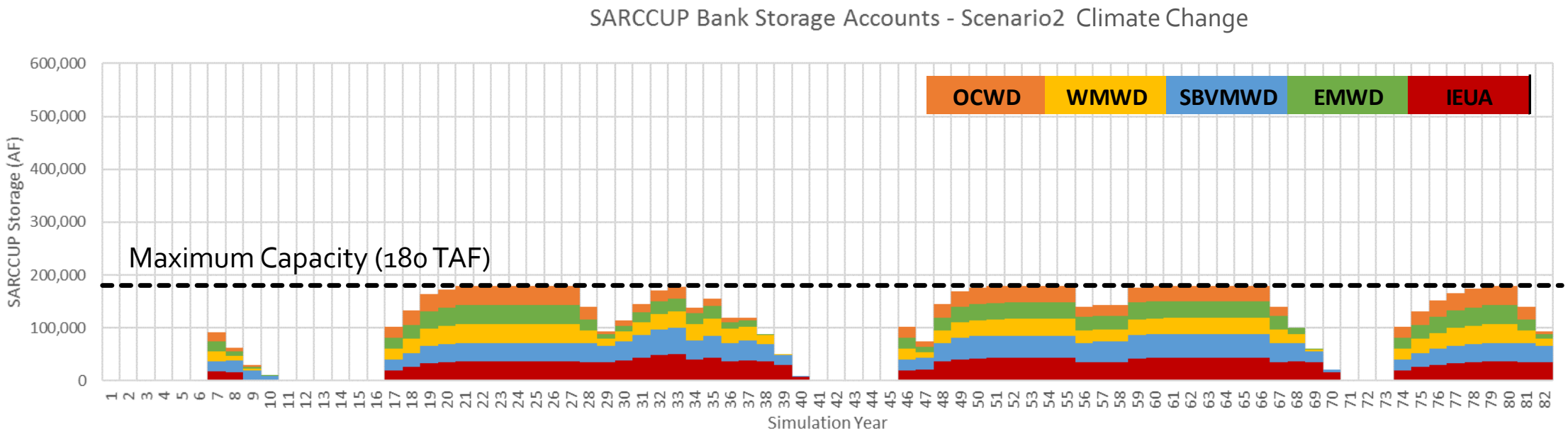
Scenario 2 (Climate Change)

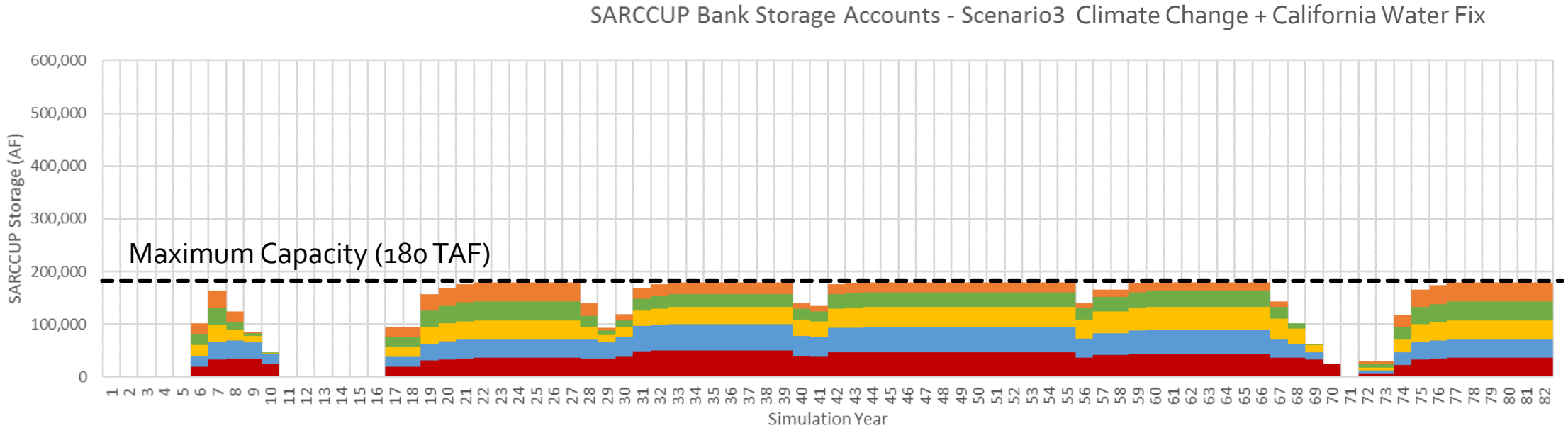


Scenario 3 (Climate Change + CA Water Fix)

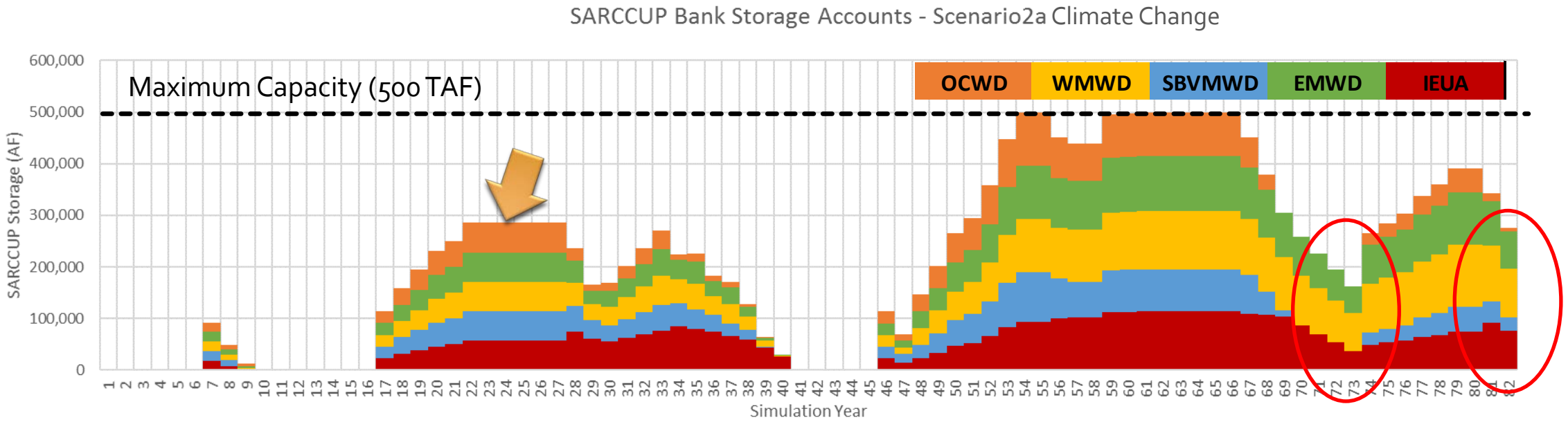


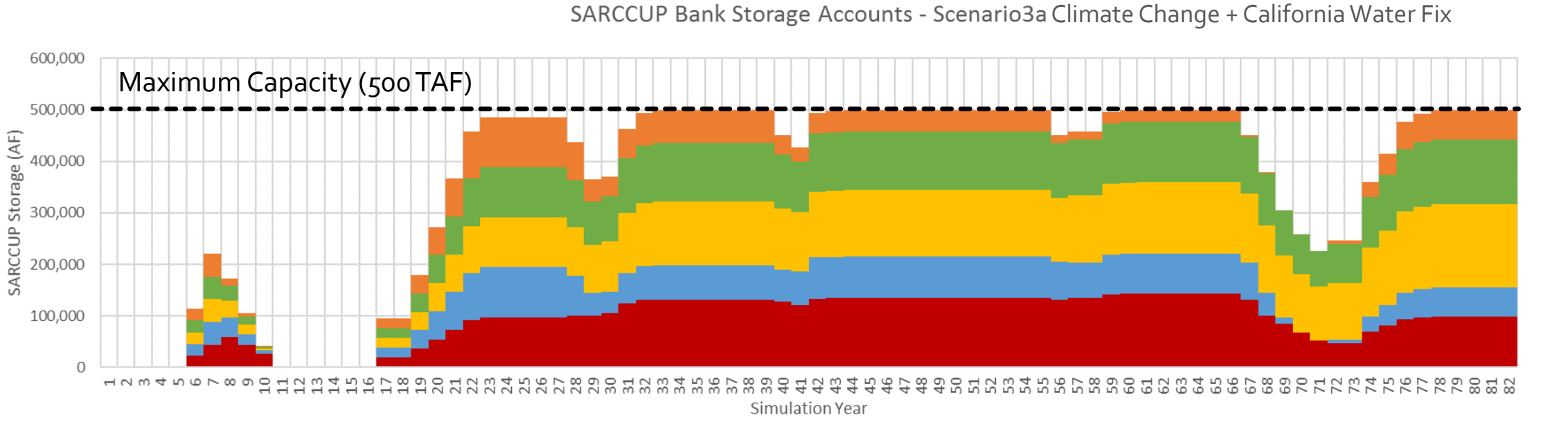
SARCCUP Storage – Model Results for **180** TAF Bank



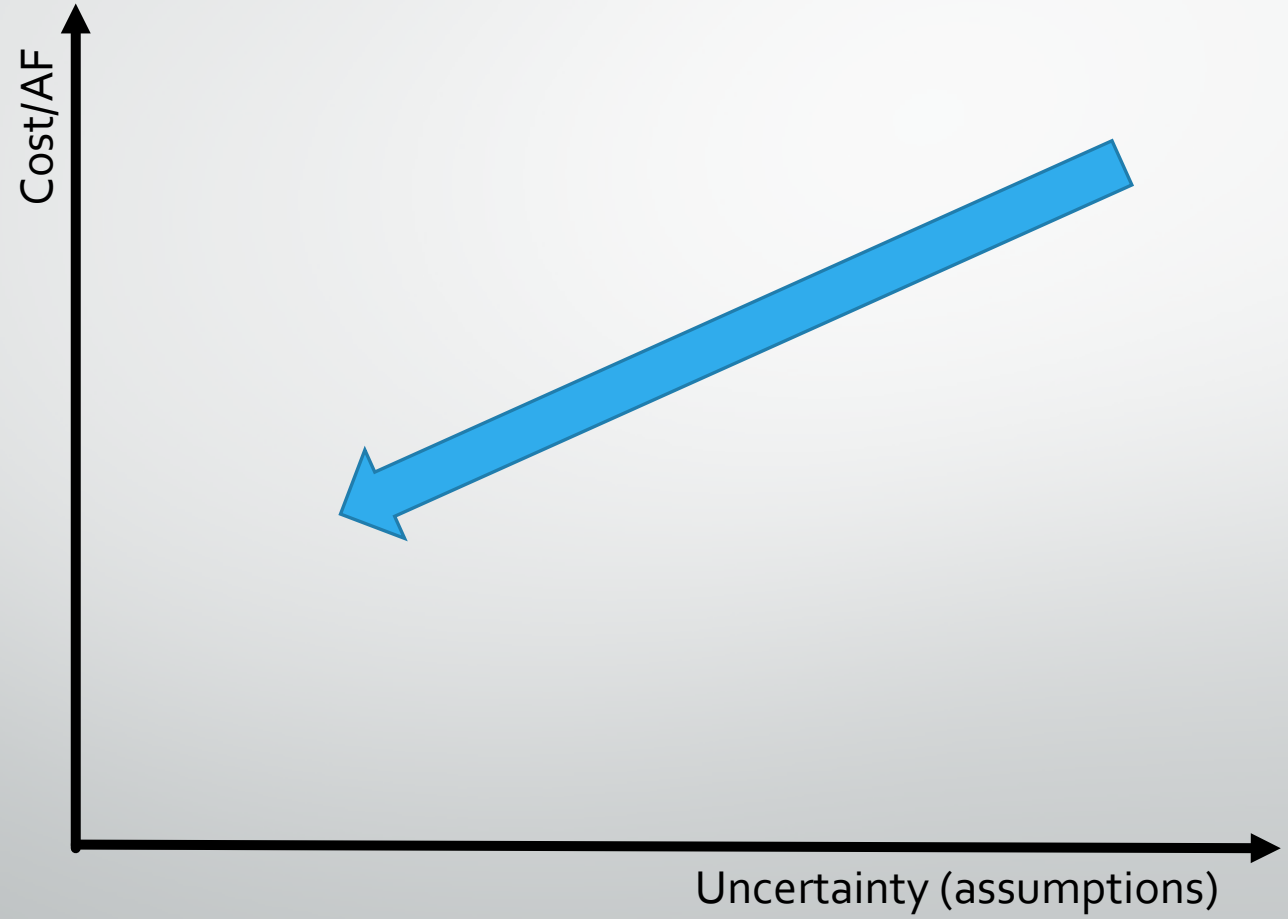


SARCCUP Storage – Model Results for **500** TAF Bank





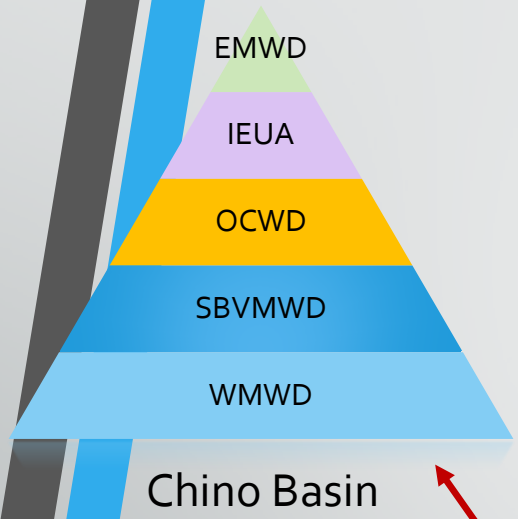
Modeling Process



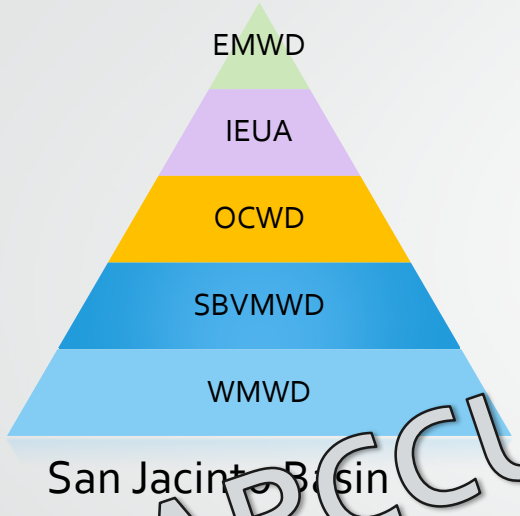
Latest Model Changes

- Refinements to reduce uncertainty
  - Cost data
    - SWP for Valley District customer
    - Extraction and conveyance data
- Optimization
    - Is there a way to operate SARCCUP to minimize costs?

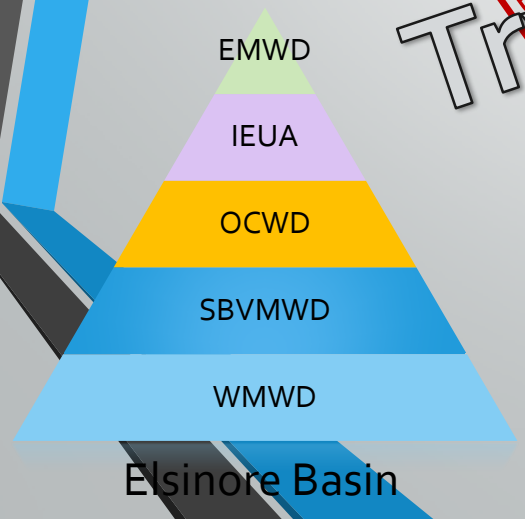
Initial Operation



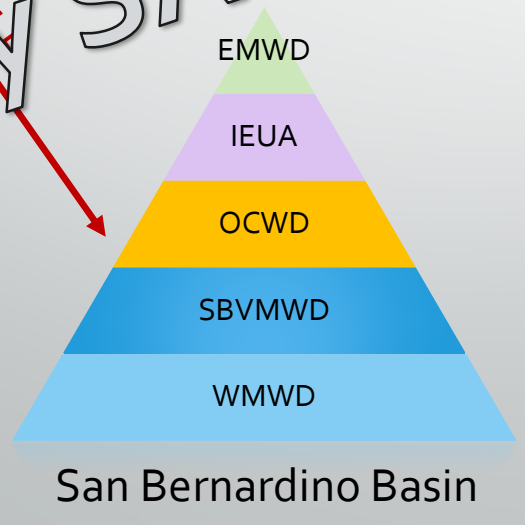
Chino Basin



San Jacinto Basin

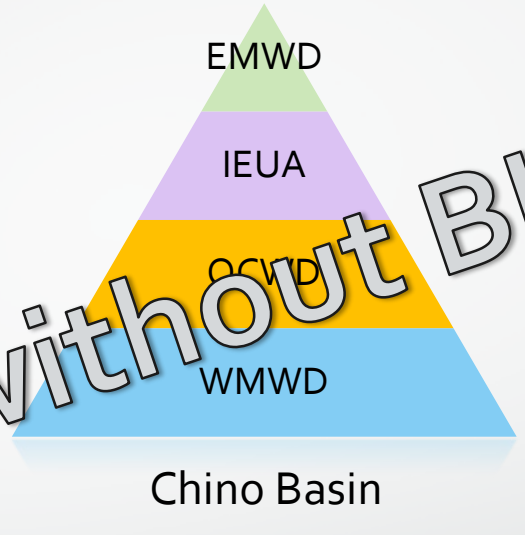


Elsinore Basin

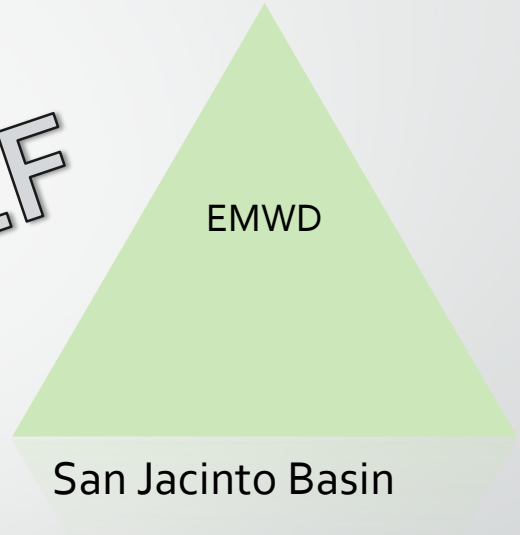


San Bernardino Basin

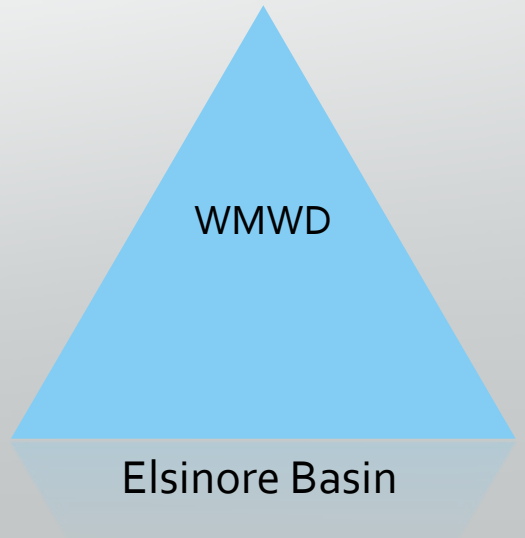
Optimized Operation



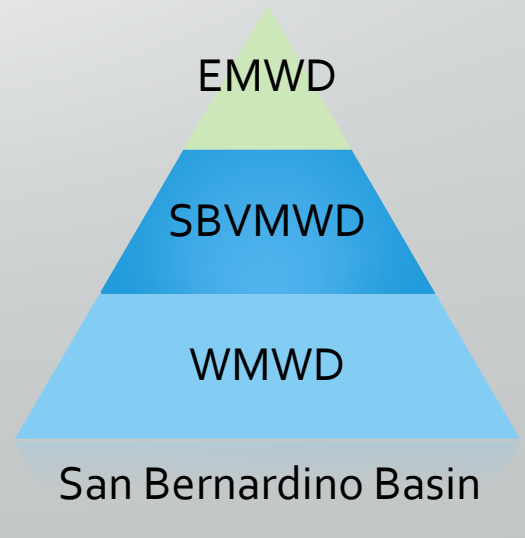
Chino Basin



San Jacinto Basin



Elsinore Basin



San Bernardino Basin

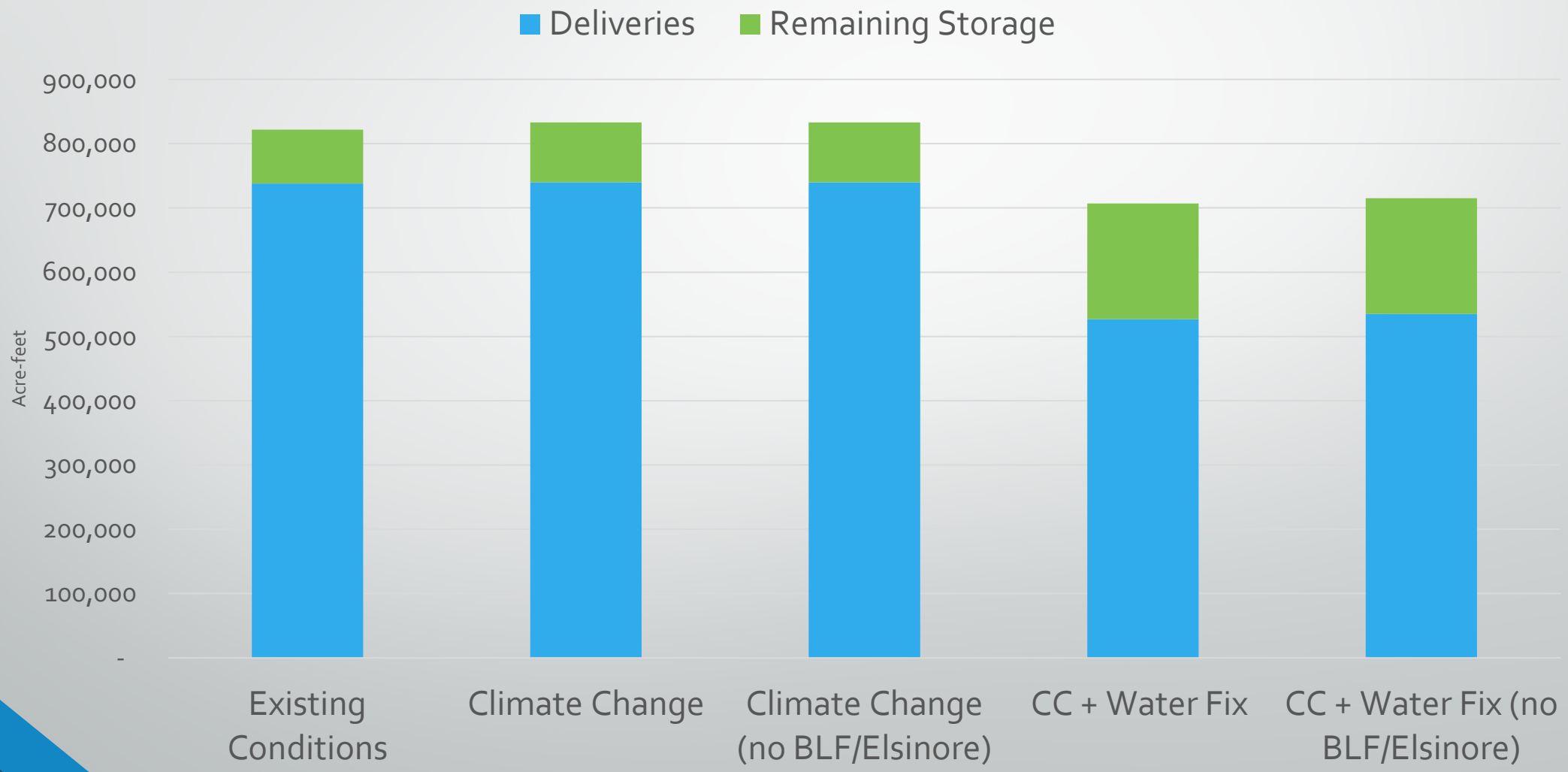
Try SARCCUP without BLF

Groundwater Bank Operational Costs

Basin	Storage (AF)	Yield (AF for 3 yrs)	Recharge/Extraction ($)
Chino	96,000	3[illegible],700	$265
Elsinore	4,500	1,500	$370
San Bernardino	[illegible]0,000	20,000	$100
San Jacinto	19,500	6,500	$230

Try SARCCUP without Elsinore Bank

Optimization Model Results



Removal of Baseline Feeder and Elsinore Bank

Deliveries

- No reduction in deliveries

Capital

- About $31 million available for other features?

Operations

- Reduces ongoing operations costs

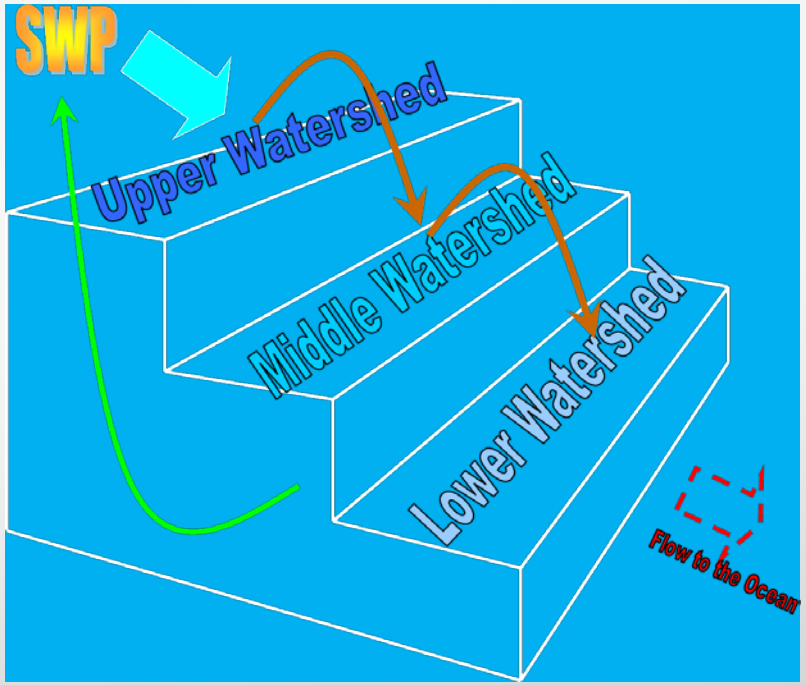
SARCCUP Cost

Model Run	Estimated SARCCUP Operational Cost*	MWDSC Treated Water Rate	DSM Refinements or Improved Estimates
January 2017	$1,100 - $1,200/AF	$979	• Improved costs • Improved in-lieu exchange operation
April 2017	$800-950/AF		• Refined agency costs • Optimized to minimize costs

Does not include capital recovery cost for facilities estimated at $130 - $190/AF (cash) and $260 - $360/AF (financed, 30 years, 5%)

What if OCWD were to only receive Recycled Water via the Santa Ana River?

- Original Scenario
  - IEUA delivers recycled water to OCWD in exchange for OCWD's SARCCUP groundwater supply in Chino
  - Limited to approximately 10-50 TAFY due to available IEUA delivery capability and OCWD imported water demand
  - Limited benefit likely due to 1-for-1 exchange assumptions
- Proposed Scenario
  - OCWD only receives recycled water
  - Reduces fill amount for SARCCUP
  - What facilities are required?



	SARCCUP Operation	SARCCUP Scenario 4	
			?
Storage in upper watershed	50,000	40,000	
Delivery in upper watershed	40,000	40,000	
Delivery in lower watershed	10,000	10,000	(used first by upper watershed)

What are the bottlenecks?

- Extraction
  - Extraction capacity would need to increase for a larger bank size
- Conveyance
  - There is one entry point for the SWP into the watershed, Devil Canyon Power Plant (PP). The available capacity at this PP could constrain the ultimate size of the bank. **More study recommended.**

Key Findings from Modeling Runs

- Climate change has little impact on SARCCUP deliveries
- CA Water Fix reduces the demand on SARCCUP because there is more supply available from SWP
- Removal of the Baseline Feeder and the Elsinore Bank reduces design and construction costs by $31 million without any impact on SARCCUP deliveries

- Ultimate SARCCUP Bank
  - Bank capacity appears to be around 300,000 AF
  - Additional extraction facilities would be required in SBBA and Chino
  - Devil Canyon conveyance could constrain the ultimate size of the bank

Recommendations

- Authorize the funds to perform additional modeling to answer the following questions:
  - Is there a benefit to operating SARCCUP in non-MWDSC allocation years as a local supply?
  - Is there a way to phase SARCCUP until we see the outcome of CA Water Fix?
  - What other facilities could be built with the $31 million savings to improve SARCCUP?
  - Can we reduce recharge needs by only delivering recycled water to OCWD (using the same water twice)?
  - How do we equitably divide the costs given two State Water Contractors
    - Metropolitan Water District of Southern California – collects revenue through water sales, includes additional costs for storage program, etc.
    - San Bernardino Valley Municipal Water District – collects revenue through property taxes
  - What is the ultimate size of the SARCCUP bank?
    - Is the size constrained by Devil Canyon conveyance?
    - Is there storage capacity in the groundwater basins to accommodate a larger bank size?
    - How much additional extraction would be required? Where?
- Postpone the Master Plan until this modeling is complete