



# Strategic Water Supply Assessment

**BOARD MEETING**

**July 19, 2022**



# Overview: Strategic Water Supply Assessment

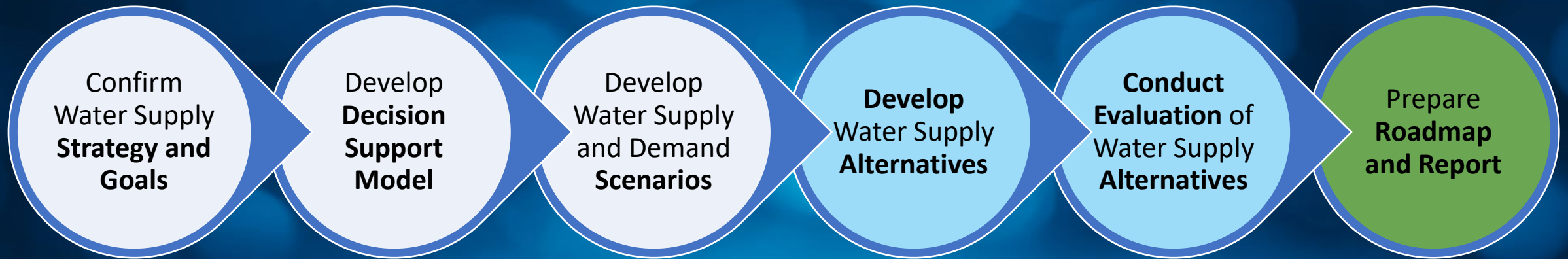
- Project Update
- Water Management Alternatives – Interties & Local Storage Options
- Summary and Next Steps
- Q&A

# Key Project Scope Elements

Understanding Current Risks & Establishing Goals

Identifying & Evaluating Alternatives

Recommendations  
& Path Forward

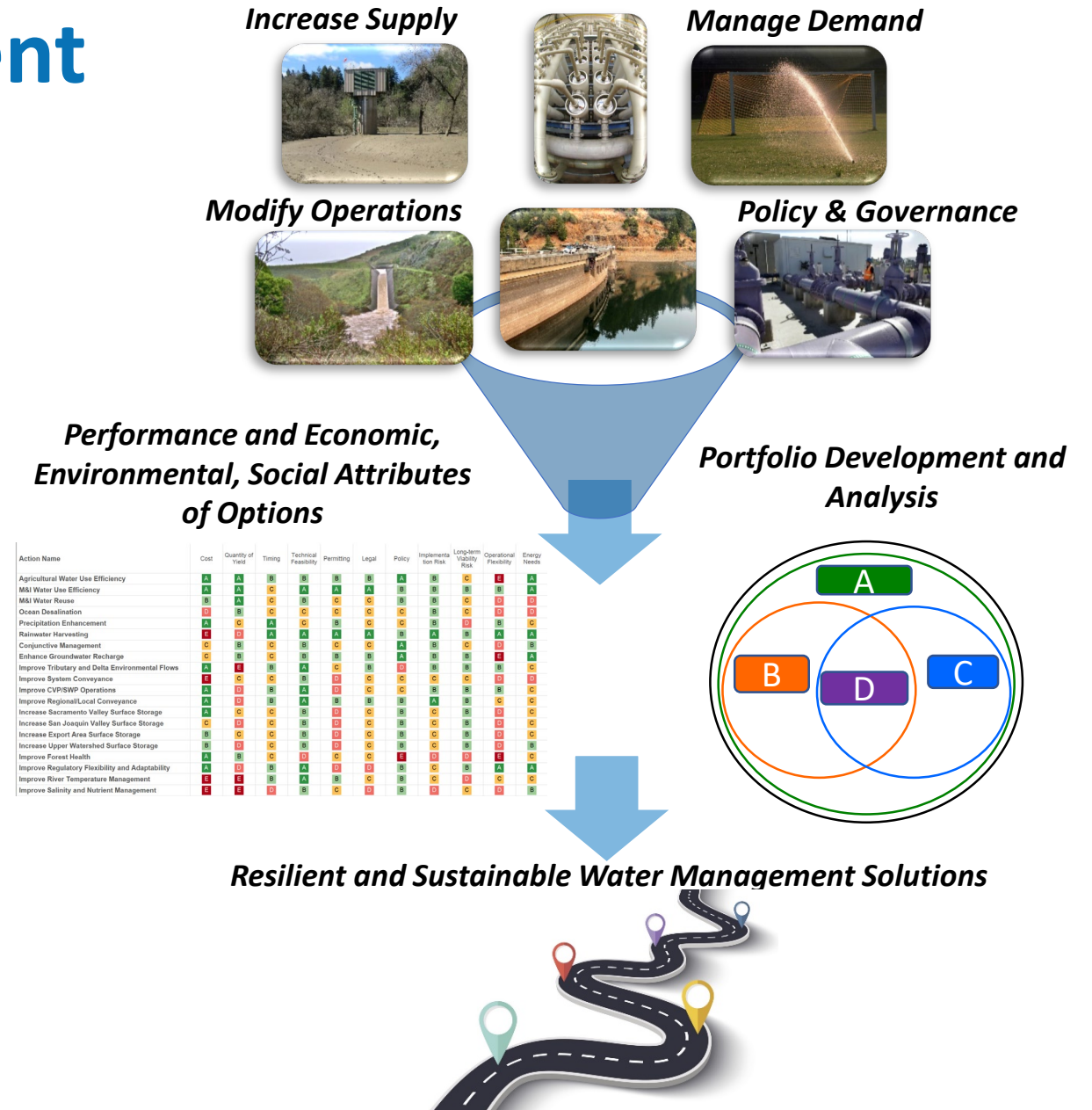


We are here



# Water Supply Assessment Process

- Consider a broad range of water management alternatives
- Identify most promising alternatives
- Evaluate alternatives for performance and other economic, environmental, and social criteria
- Explore strategic combinations of alternatives
- Develop roadmap with specific project, pathways, and triggers to achieve resilient and sustainable solutions



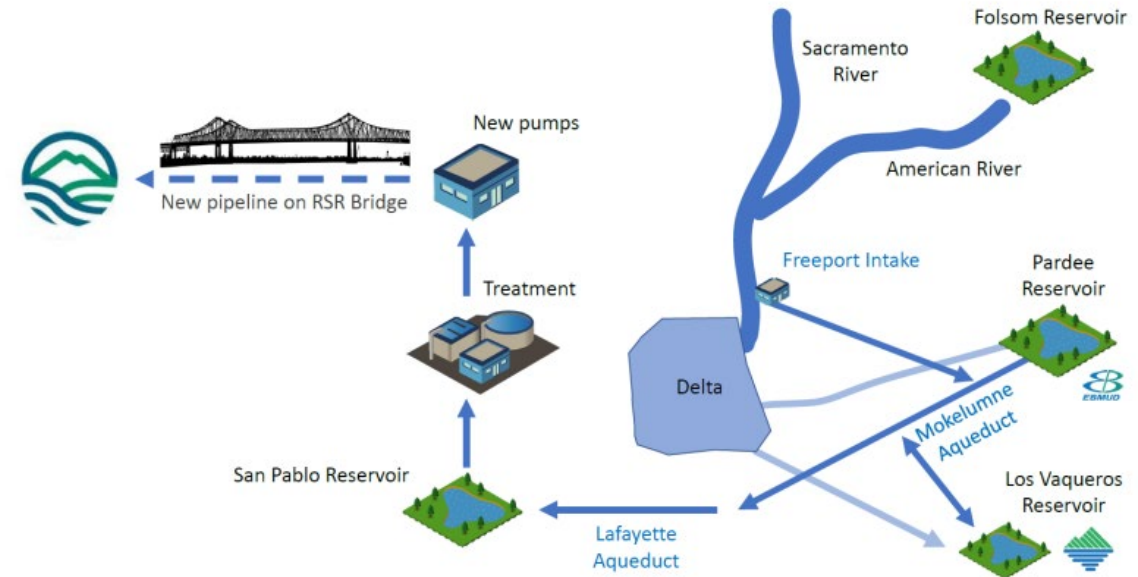
# Water Management Alternatives Considered

- Baseline – Existing water supply system with planned improvements
- Desalination
- Recycled Water
- **Local Surface Storage**
- **Water Purchases with Conveyance through Bay Interties**
- Sonoma-Marin Partnerships
- Conservation

# Water Purchases with Conveyance through Bay Interties

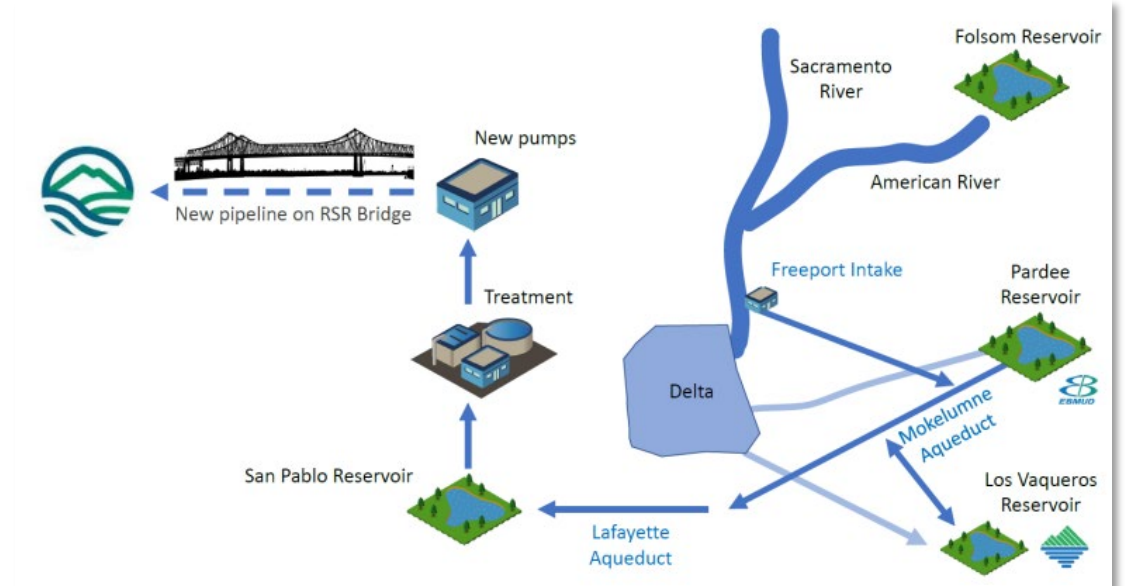
# Water Purchases with Conveyance through Bay Interties

- EBMUD Intertie (Sac Valley purchases)
- CCWD Intertie (Sac Valley purchases)
- North Bay Aqueduct Intertie (Sac Valley purchases)
- SFPUC Intertie (Golden Gate Bridge)



# EBMUD or CCWD Intertie

- Sac Valley water purchases conveyed through EBMUD or CCWD systems
- Pipeline to connect to EBMUD or CCWD systems and across San Rafael Bridge (27")
- MMWD tie in near CMSA
- Richmond distribution improvements for EBMUD customers
- Alternative to connect to CCWD, rather than EBMUD
- Significant permitting requirements
- EBMUD wheeling principles to be considered
- Water availability in extreme drought may affect project yield





# North Bay Aqueduct - Intertie

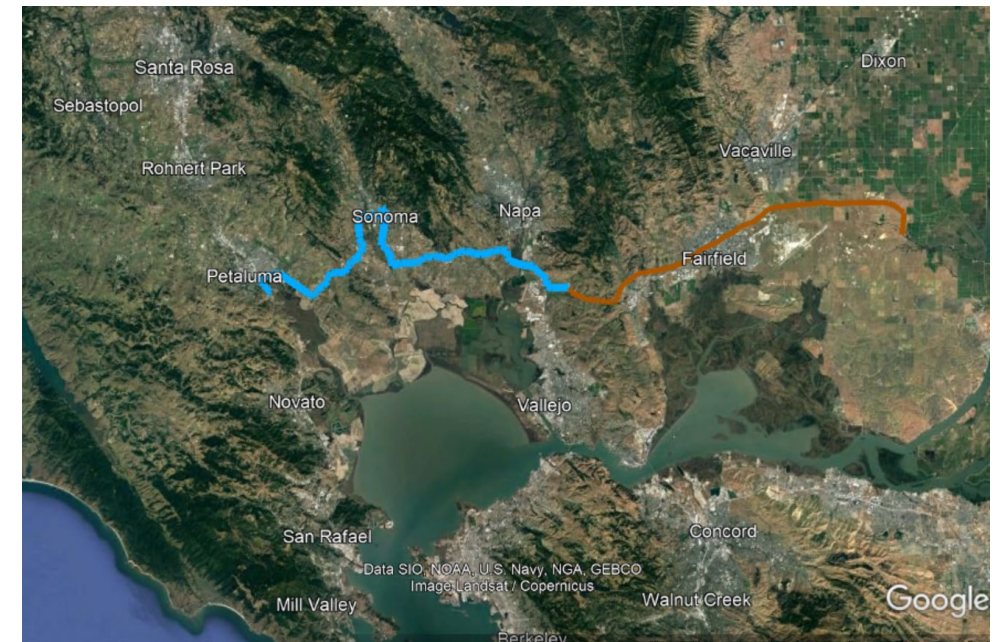
## Option 1

- Sac Valley water purchases conveyed through North Bay Aqueduct
- Pipeline and pump station to connect to MMWD system – Option 1



## Option 2

- Potential connection to Sonoma Water system for regional supply – Option 2
- Potential partnership with Sonoma Water



# Water Purchases through Bay Intertie Options Cost Estimate Summary

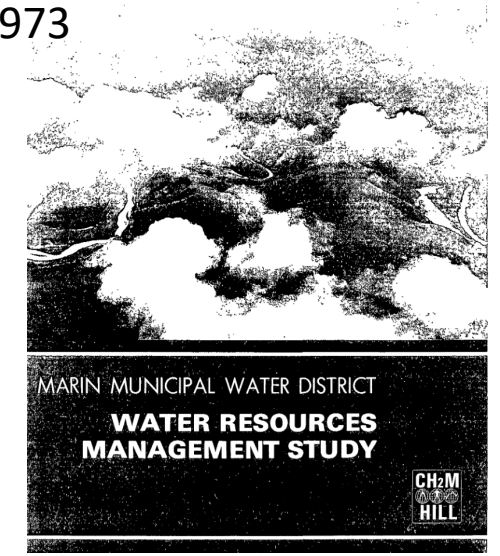
Alternative	EBMUD Intertie	CCWD Intertie	North Bay Aqueduct Intertie Option 1*	North Bay Aqueduct Intertie Option 2*	SFPUC Intertie (In progress)
Capital Cost	\$111,350,000	\$280,434,266	\$225,443,094	\$289,416,219	
Annual O&M Cost	\$14,202,000	\$11,457,000	\$6,365,000	\$6,365,000	
Total Annualized Cost	\$19,883,000	\$25,765,000	\$17,867,000	\$21,131,000	
Yield, AFY	9000	9000	5000	5000	
Cost per AFY	<b>\$2,200</b>	<b>\$2,900</b>	<b>\$3,600</b>	<b>\$4,200</b>	

\*Treatment needed

\*\* Cost estimates should be considered DRAFT. Updates are likely as evaluation continues to progress. Typical expected accuracy range for this class estimate (Class 5) is –20 to –50 percent on the low side and +30 to +100 percent on the high side.

# Local Storage Augmentation

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# Previous Studied Reservoir Sites

**TABLE 5-1  
LOCAL WATER SUPPLY PROJECTS**

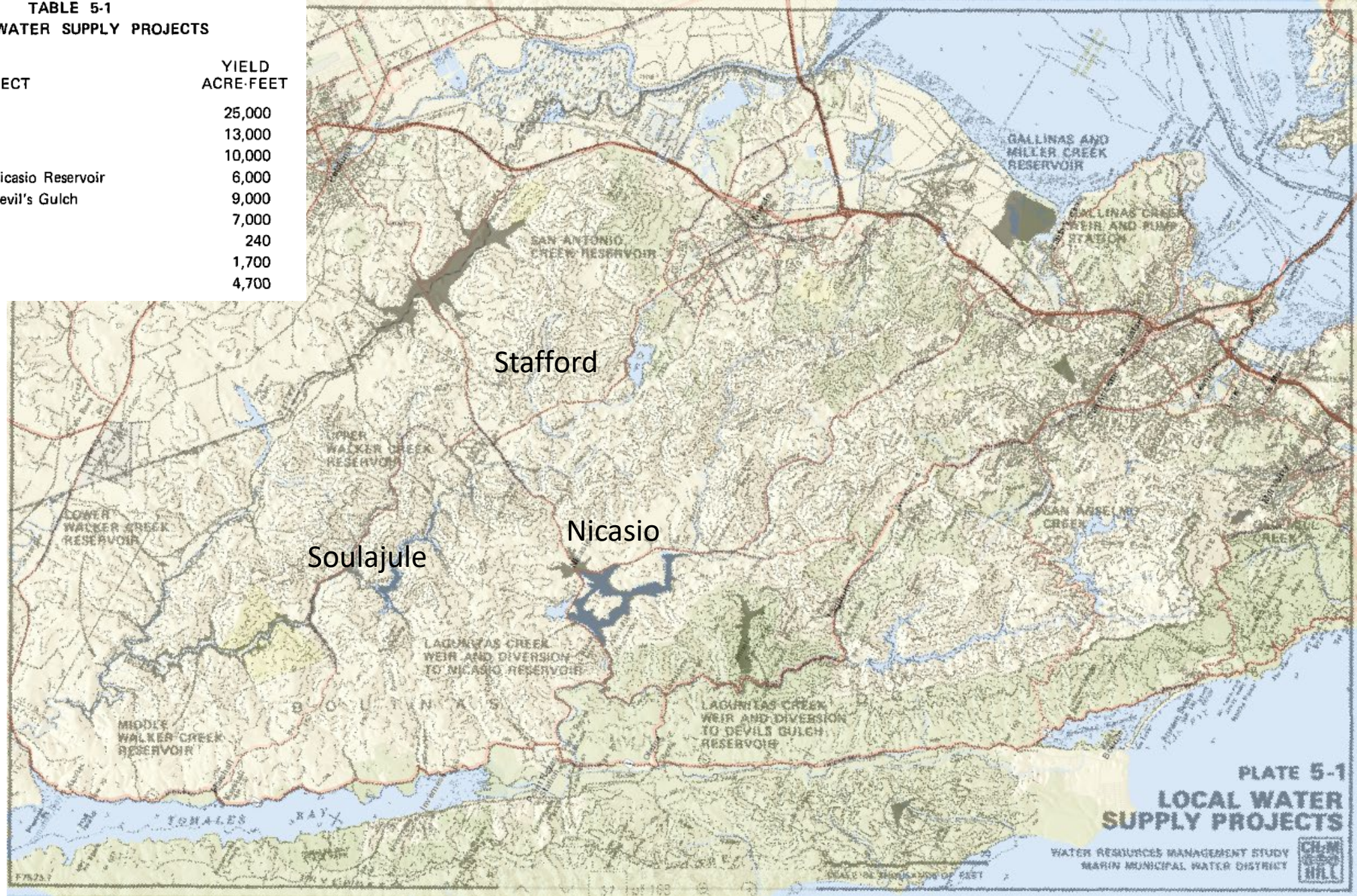
WATER SUPPLY PROJECT	YIELD ACRE-FEET	
Lower Walker Creek	25,000	Severe Environmental Impact
Middle Walker Creek	13,000	Requires new dam, Soulajule was built after this assessment
Upper Walker Creek	10,000	Severe Environmental Impact
Lagunitas Diversion to Nicasio Reservoir	6,000	Diversion downstream from Kent, Kent expanded in 1982
Lagunitas Diversion to Devil's Gulch	9,000	Environmental Impact
San Antonio Creek	7,000	Severe Local Impact
Old Mill Creek	240	Low yield
San Anselmo Creek	1,700	Low yield
Galinas & Miller Creeks	4,700	Low yield, conflict with park project



TABLE 5-1

## LOCAL WATER SUPPLY PROJECTS

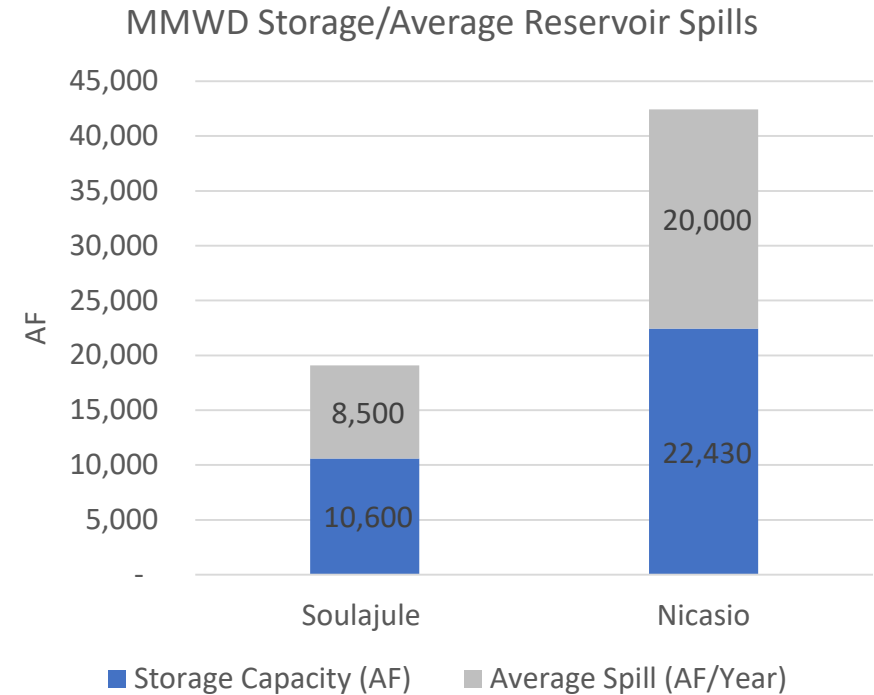
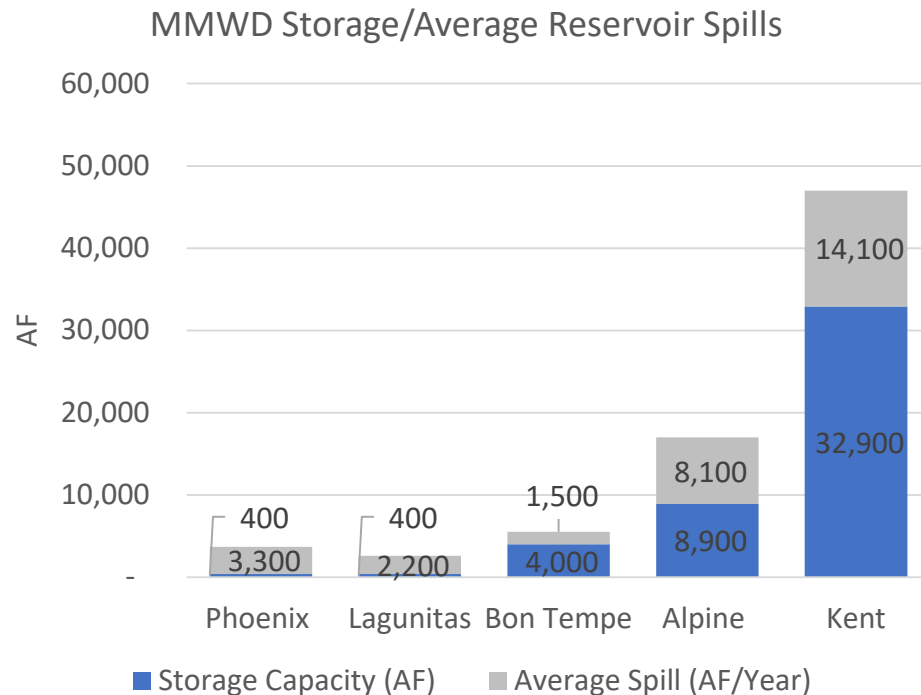
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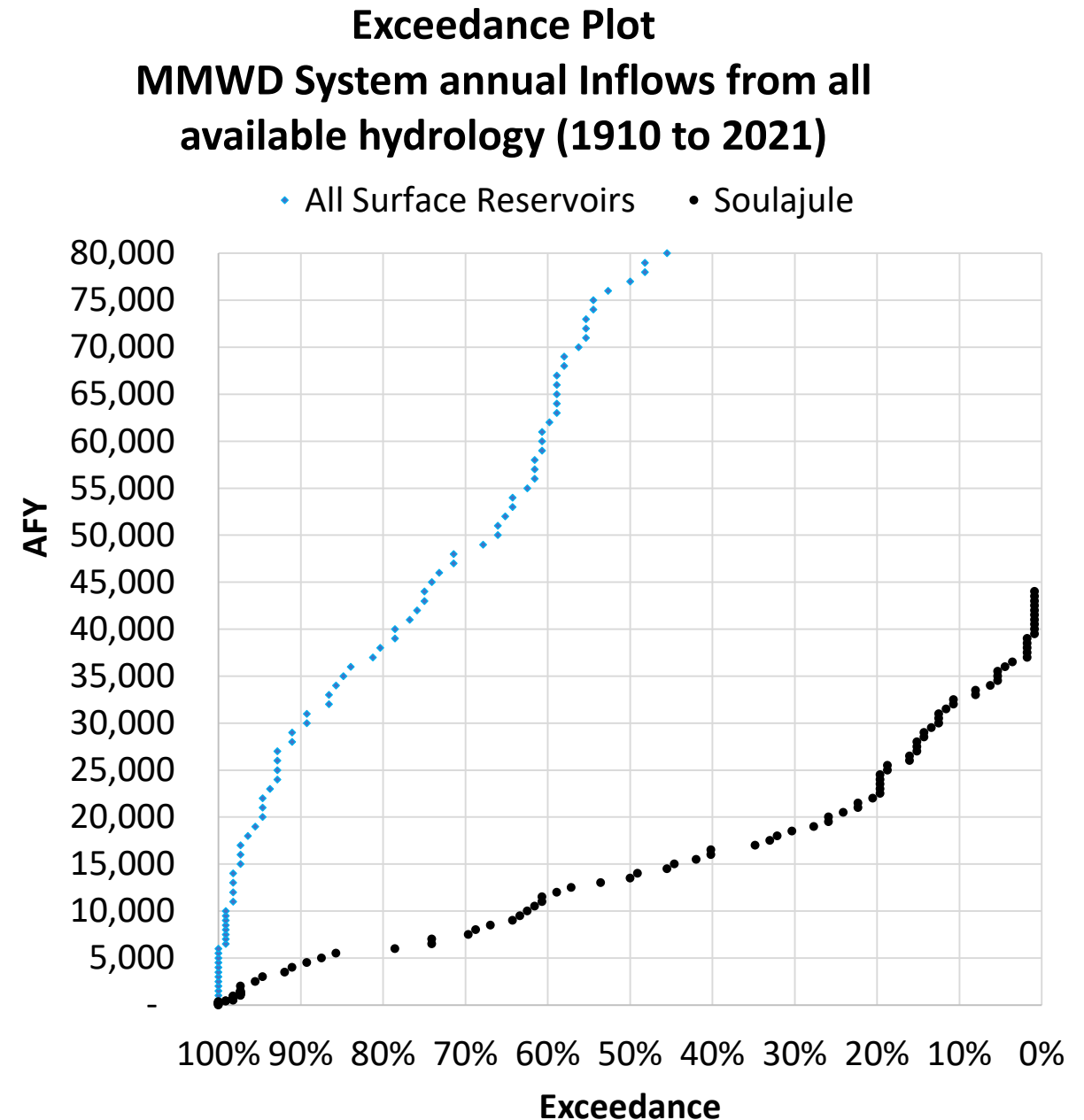
# Storage Expansion Options Opportunities

- MMWD reservoirs spills average ~53,000 AFY (Last 12 years)



# Storage Expansion Options Opportunities

- Entire system receives 80,000 AFY or less approximately 50% of the years
- Soulajule receives 15,000 AFY or less approximately 50% of the years. Currently has one demand, approximately 2,600 AFY for environmental releases



# Local Storage Augmentation

1. Raising Soulaajule Dam
2. Dredging Nicasio Lake
3. Adjustable Spillways



Source: Salix "Expert desilting or dredging of ponds, lakes, and  
(<http://www.salixrw.com/techniques/lake-desilting/>)



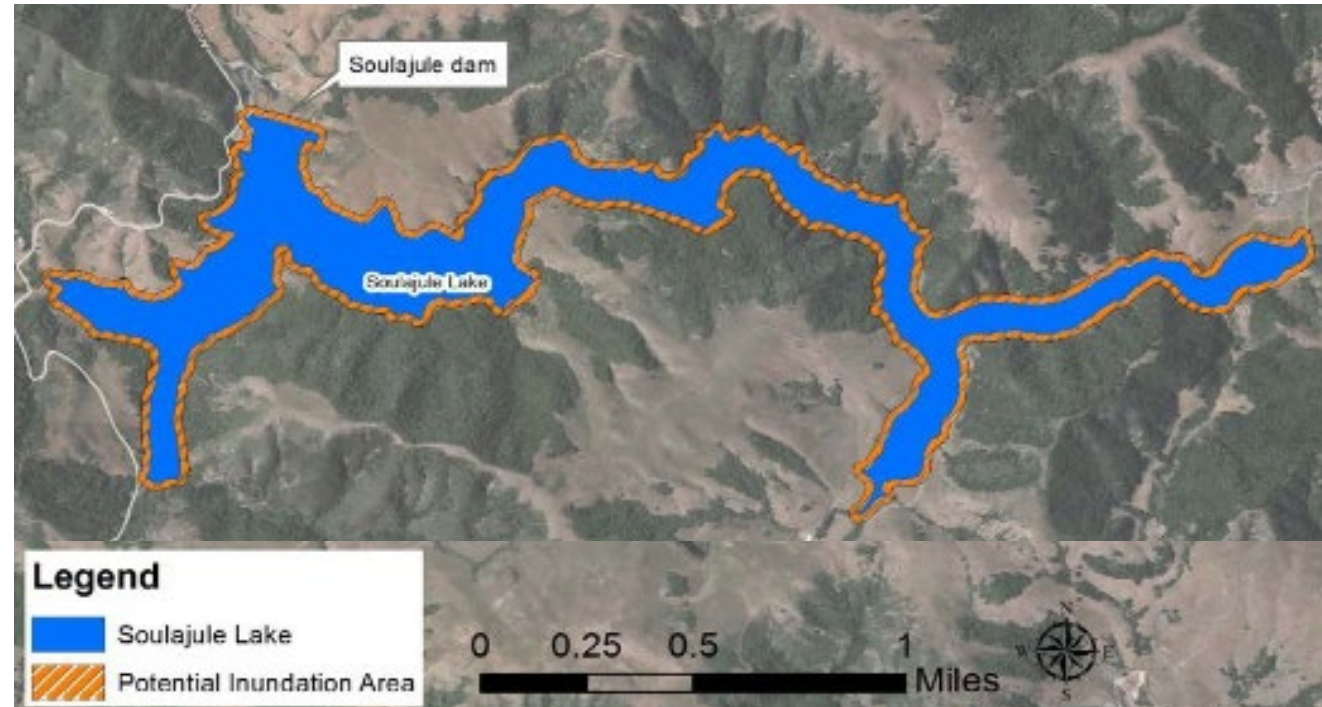
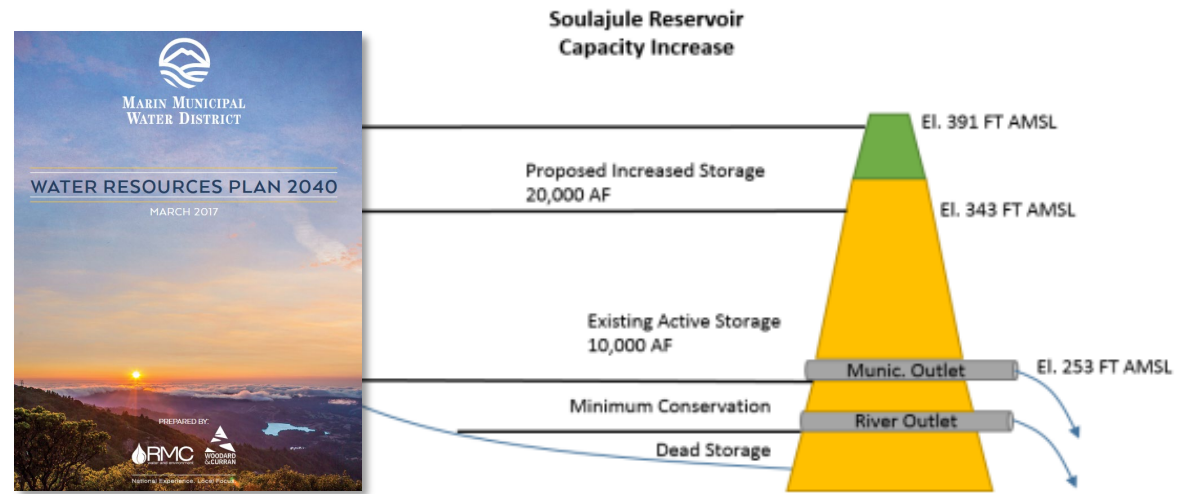
# Option 1: Raising Soulaajule Dam

## ■ Description

- Increase Soulaajule Dam height by 48 feet
- Additional 20,000 AF of storage in Soulaajule (Total storage from 10,000 AF to 30,000 AF).
- Potential Yield ~4,000 AFY
- Electrification of Soulaajule

## ■ Considerations

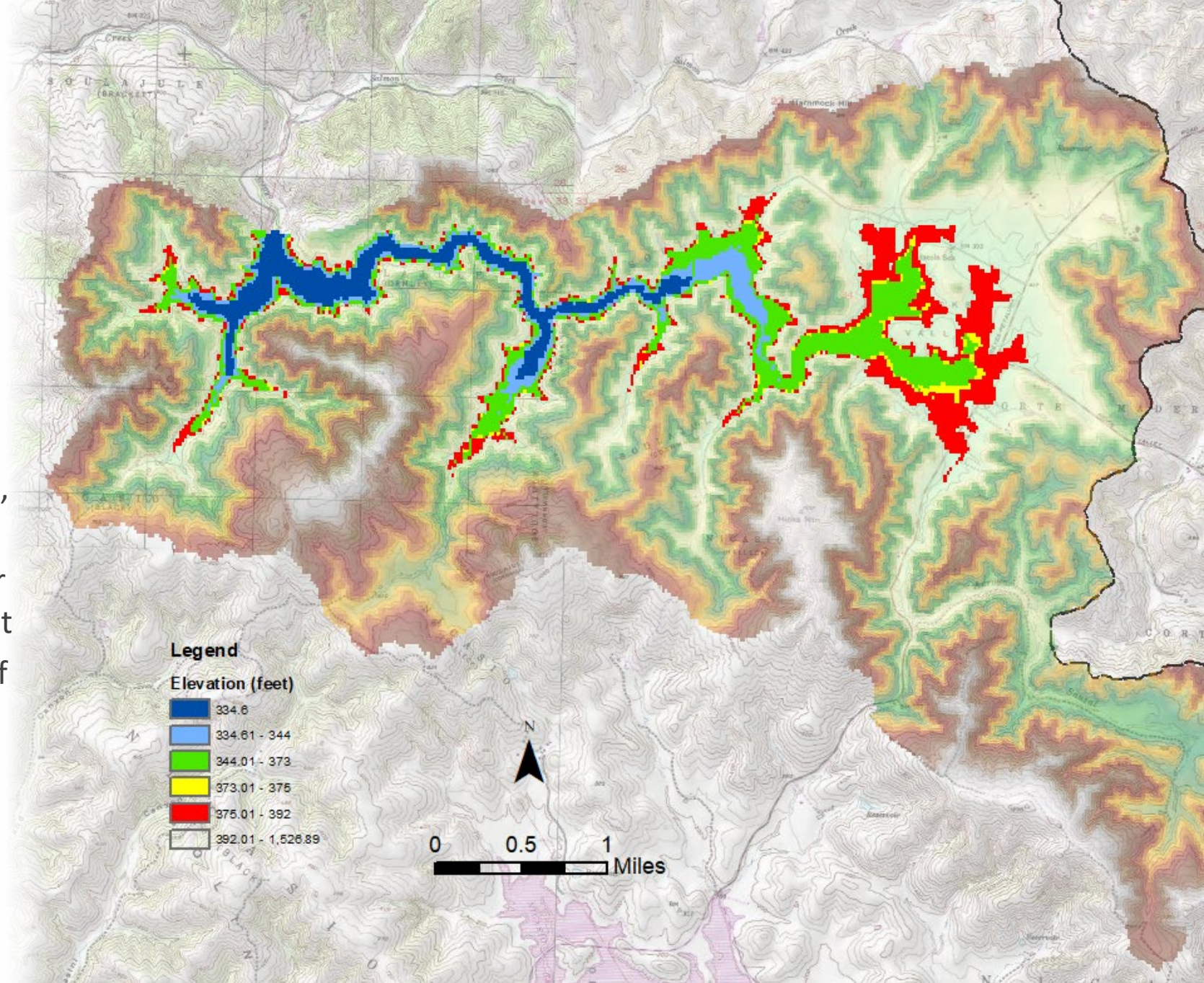
- Dam adequacy and structural integrity
- New inundated areas
- Water rights





# Option 1: Raising Soulaajule Dam

- More recent estimates suggests:
  - A lower dam might be sufficient to achieve extra 20,000 AF of storage (extra **36 feet** on top of current dam, which is 344 ft tall)
  - Expected water surface elevation for a 30,000 acre-feet storage is 373 feet
  - 373 feet might still inundate areas of Hicks Valley and have shallow water levels



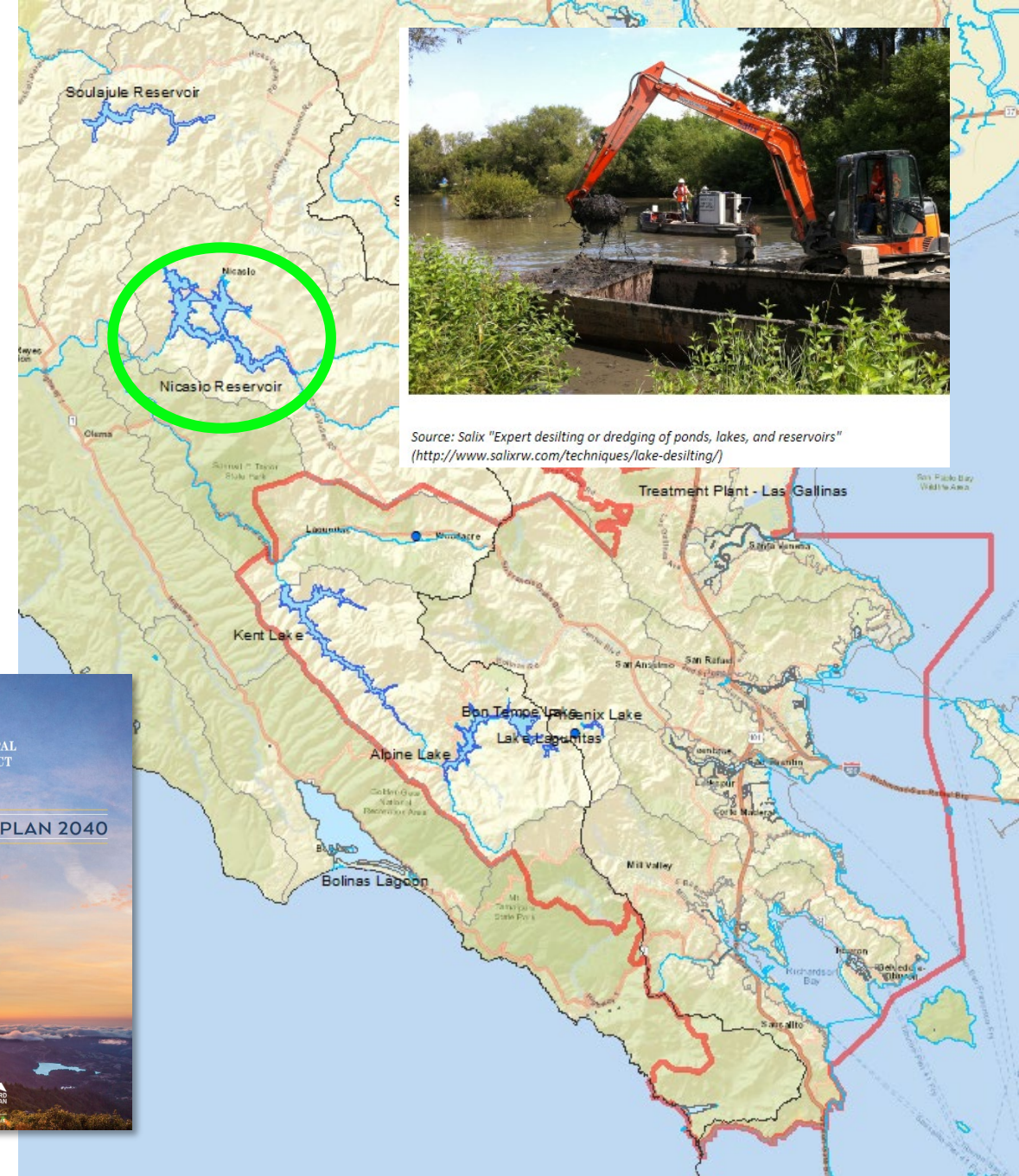


# Option 1: Raising Soulaajule Dam Estimated Benefit

- 2,800 AFY Improvement on shortages, storage deficit from Scenario3
- From 2034 to 2037 approximate 30,000 AF of storage was used:
  - 12,500 AF for environmental releases
  - 16,200 AF pumped to Nicasio
  - 2,000 AF evaporation
- 36 feet taller than current dam (from 344 feet to 380 feet)
- Potential increased benefits with change in operation rules, moving water to Nicasio more frequently

# Option 2: Dredging Nicasio Lake

- Potential yield estimated in the Water Resources Plan 2040 based on 1,000 AFY of storage capacity
- Challenges:
  - Environmental and fishing interests may oppose the dredging due to potential negative impacts associated with dredging large amounts of sediment, including mobilizing contaminants that have settled in the sediment.
  - Small yield, benefits could be diluted if not coordinated with imported water rules



## Option 2: Dredging Nicasio Lake Estimated Benefit

- 100 AFY Improvement on shortages, storage deficit from Scenario3
- Small overall improvement on imported water
- Drought benefit is diluted if not coordinated with imported water operation

# Option 3: Adjustable Spillways

- Description
  - Increase reservoir storage through installation of movable spillway gates
  - Gates to be installed and operated to retain additional storage during wet periods
  - Likely limited to 3 feet of increase (5,270 acre-feet)
- Considerations
  - Adequacy of spillway and dam
  - Increased inundated lake area
  - Water Rights



WEST YOST  
Figure 10-2  
Stafford Lake Main Spillway  
Movable Notch Gate  
North Marin Water District  
Local Water Supply

Relative Increase in Storage Capacity with Increase in Spillway Height

Elevation Increase (ft)	Kent Lake (acre-feet)	Nicasio (acre-feet)	Soulajule (acre-feet) (earthen)	Alpine Lake (acre-feet)
1	440	750	300	230
2	880	1520	620	460
<b>3</b>	<b>1330</b>	<b>2310</b>	<b>930</b>	<b>700</b>
4	1780	3110	1250	930
5	2240	3920	1580	1180
Current Freeboard	15	15	12	8

# Option 3: Movable Spillway Gates Estimated Benefit

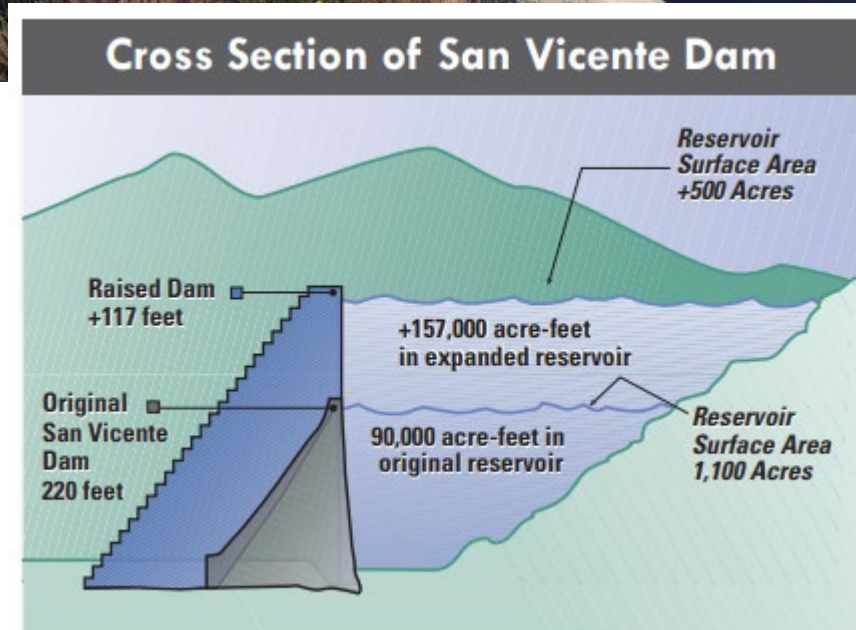
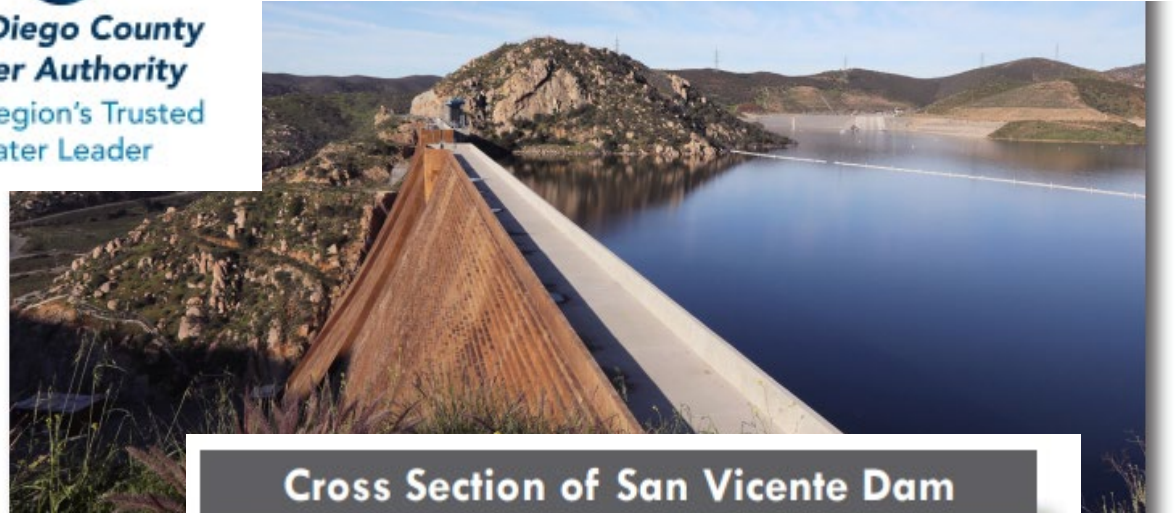
- 700 AFY Improvement on shortages and storage deficit from Scenario3
- Assumes 3 feet of movable gates implemented at Soulajule, Nicasio, Kent and Alpine
- Improvements in storage deficit and shortage
  - 4 feet increase will result in 900 AFY improvements on shortages and storage deficit
  - 5 feet increase will result in 1,200 AFY improvements on shortages and storage deficit



# San Vicente Dam



- San Diego County Water Authority
- 117 ft above original
- 6 years to complete (completed in 2014)
- Extra 157,000 AF
- Total project cost \$396 million



# Los Vaqueros Reservoir

- Contra Costa Water District
- 1997 - The District completed construction of a 100,000-acre-foot Los Vaqueros Reservoir.
- 2012 - The District completed construction to raise the dam height and expand reservoir storage to 160,000 acre-feet.
- Reclamation and the District are continuing to study alternatives to further expand the reservoir to 275,000 acre-feet
- 53 ft above last expansion (160,000 acre-feet)
- Estimated 6 years to complete (complete by 2027)
- Extra 115,000 AF (from 160,000 to 275,000 AF)
- Estimated Capital Cost \$942.49 million (February 2020)



**Table ES-1. Summary of Facilities in the Alternatives**

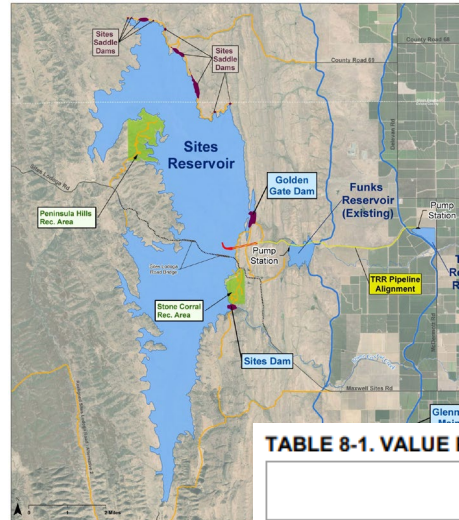
	No Action	1A, 1B, 2A <sup>1</sup>	4A
<b>Existing Facilities (no change)</b>			
Old River Intake	250 cfs	250 cfs	250 cfs
Middle River Intake	250 cfs	250 cfs	250 cfs
Old River Pipeline	320 cfs	320 cfs	320 cfs
Los Vaqueros Pipeline	400 cfs	400 cfs	400 cfs
Transfer Pipeline (Fill/Release)	200/400 cfs	200/400 cfs	200/400 cfs
EBMUD-CCWD Intertie	155 cfs	155 cfs	155 cfs
Transfer Reservoir	4 million gallons	4 million gallons	4 million gallons
<b>Proposed Modifications to Existing Facilities</b>			
Los Vaqueros Reservoir Capacity	160 TAF	275 TAF	160 TAF
Los Vaqueros Reservoir Maximum Water Surface Elevation	507 feet	560 feet	507 feet
Transfer Facility Pump Station Capacity	150 cfs	200 cfs	200 cfs
<b>Proposed New Facilities</b>			
Transfer-Bethany Pipeline Capacity	None	300 cfs	300 cfs
Delta-Transfer Pipeline Capacity	None	180 cfs	None
Expanded Transfer Facility Pump Station Capacity	None	300 cfs	300 cfs
Expanded Transfer Facility Storage Reservoir Capacity	None	5 million gallons	5 million gallons
Neroly High Lift Pump Station Capacity	None	350 cfs	350 cfs
Pumping Plant #1 Capacity	200 cfs	350 cfs <sup>2</sup>	350 cfs <sup>2</sup>
<b>Los Vaqueros Watershed Facilities</b>			
Los Vaqueros Marina Complex	No change	Relocated upslope	No change
Los Vaqueros Watershed Trails	None	Expanded	None
Los Vaqueros Interpretive Center	No change	Improved	Improved
Los Vaqueros Watershed Office Barn	No change	Seismically upgraded and improved	Seismically upgraded and improved

<https://www.usbr.gov/mp/vaqueros/docs/lve-fr-exec-summary.pdf>

# Sites Reservoir



- Sites Project Authority
- Off-stream facility captures storm water flows from Sacramento River
- Estimated full operational in 2030
- 1.5 Million acre-feet of storage
- Estimated cost (2019) \$3.037 Billion



Participants Include:

**9** Sacramento Valley governing agencies

**23** Reservoir Committee members

**All participants continued their support for Sites Reservoir in 2021.**

These participants represent more than 24.5 million people, more than 500,000 acres of farmland, and the environmental resource agencies that have stewardship over rivers, fish, and habitat within the watershed.

TABLE 8-1. VALUE PLANNING GROUP RECOMMENDED PROJECTS

	VP5	VP6	VP7
	Option 1	Option 2	Recommended
Reservoir Size	1.3 MAF	1.3 MAF	1.5 MAF
Dunnigan Release Capacity (cfs)	1,000 cfs to CBD	1,000 cfs to River	1,000 cfs to CBD
Estimated Cost (2019 dollars)	\$2,855,000,000	\$2,988,000,000	\$3,037,000,000
Estimated Cost per Acre-Foot with WIFIA <sup>a</sup> (2020)	\$592	\$621	\$611
Estimated Deliveries (Long-Term Average in TAF)	234	234	243

<sup>a</sup> Water Infrastructure Finance and Innovation Act

# Local Storage Options Cost Estimate Summary

	Option 1:	Option 2:	Option 3:
Alternative	Raising SoulaJule	Dredging Nicasio	Movable Spillway Gates
Capital Cost	\$148,400,000	\$132,000,000	\$80,000,000
Annual O&M Cost	\$3,320,000	\$0	\$1,000,000
Total Annualized Cost	\$16,559,000	\$19,468,000	\$6,393,000
Yield, AFY	2800	100	700
Cost per AFY	\$5,900	\$194,700	\$9,100

\*\* Cost estimates should be considered DRAFT. Updates are likely as evaluation continues to progress. Typical expected accuracy range for this class estimate (Class 5) is –20 to –50 percent on the low side and +30 to +100 percent on the high side.

# Status and Next Steps



# Work in Progress

- Water management alternatives, costs, and other evaluation criteria being further progressed
- Integration of water management alternatives into decision support model is necessary to evaluate yield of supplies when integrated into system
- Structure for forecast-based decision-making on integrating and optimizing supplies
- Detailed evaluation criteria

# Strategic Water Supply Assessment: Schedule

- July 19 (7:30pm – 9:30pm) – Review Interties, Local Supply Enhancement and Sonoma options
- **July 28 – Public Workshop #3**
- August 2 – Conservation
- August - Public Workshop TBD