

American River Basin Study

Workshop #1: Assessing Climate Change Challenges











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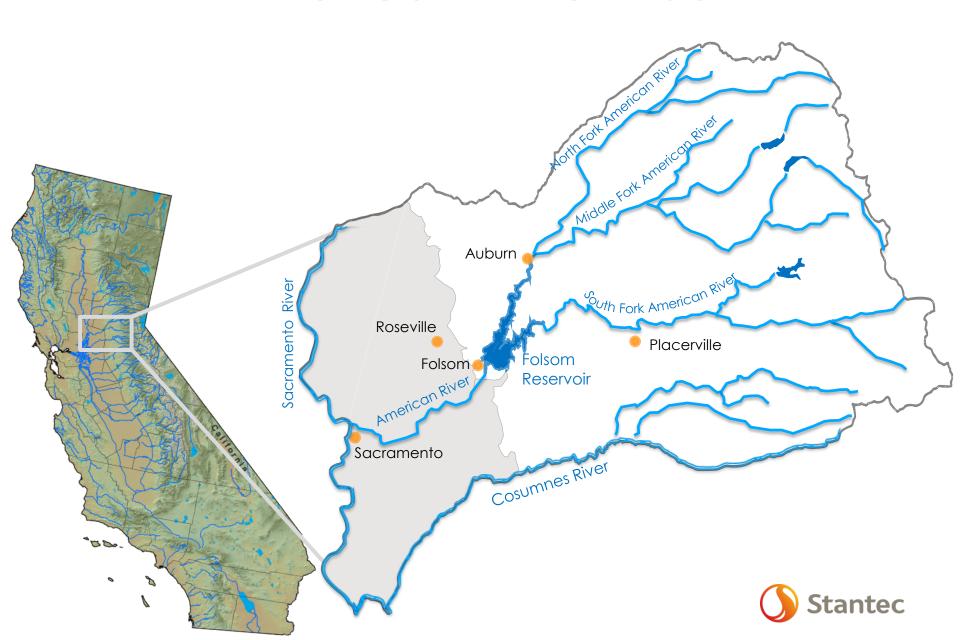
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Workshop Outline

- American River Basin Study Overview
- Projected Future Climate Conditions
- Effect of Climate Change on Regional Water Management
- Regional Water Management Vulnerabilities
- Next Steps



American River Basin



History of Regional Collaboration and Self-Reliance

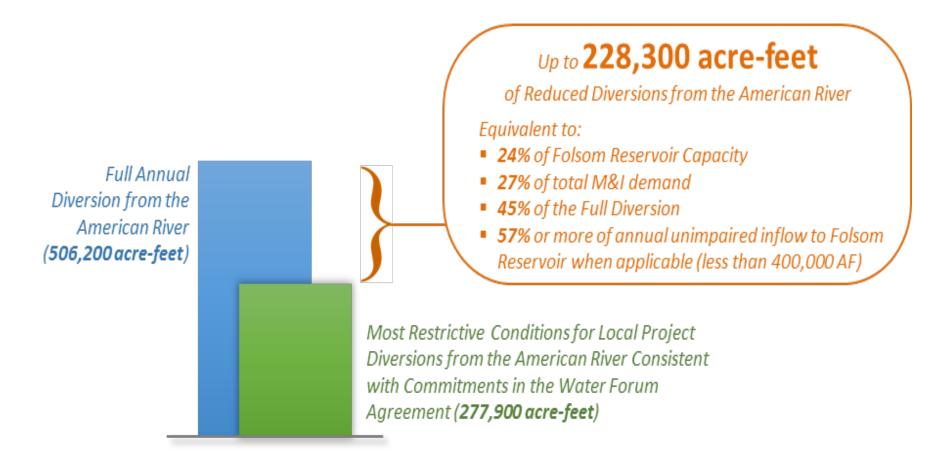








Regional Commitment for Sustainability





Yet, Vulnerabilities Remain ...

Folsom Reservoir, the primary storage in the basin, is operated by Reclamation as part of the Central Valley Project



Folsom Reservoir reached a record low of 135,000 acre-feet on December 5, 2015.



Building on Regional Planning

2017 North American Basin Regional Drought Contingency Plan (RDCP)
Focus on drought mitigation actions



2019 Regional Water Reliability Plan (RWRP)

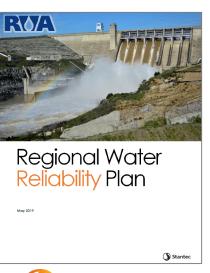
Focus on enhancing conjunctive use to address water reliability challenges



American River Basin Study

Focus on effects of climate change and potential adaptations







WaterSMART Basin Studies

Focus

- Evaluate impacts of climate change and help ensure sustainable water supplies by identifying strategies to address imbalances between water supply and demand.
- Basins and subbasins in the 17 western states.

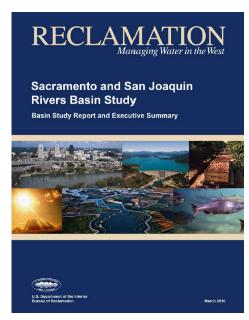
Benefits

Resulting recommendations DO NOT constitute
Federal decisions or authorization; however,
further feasibility studies for such purposes are
possible under the authorizing legislation.

American River Basin Study (ARBS)

- Builds on Sacramento-San Joaquin Basin Study (2016) to provide refinement and details to the American River Basin
- Provides potential benefits to Reclamation:
 - Reduce direct demands on Folsom Reservoir operation
 - Increase Folsom Reservoir's regulating capacity for flow and storage
 - Address CVP contract reliability for American River Division





ARBS Cost-Share Partners

Federal – Reclamation



- Non-Federal
 - Placer County Water Agency



- El Dorado County Water Agency
- City of Folsom
- City of Roseville
- City of Sacramento
- Regional Water Authority





ARBS Objectives

- 1. Further refine water supply and demand assessment for the American River Basin
- 2. Address regional supply-demand imbalance and infrastructure deficiencies under existing and future climate change conditions.
- 3. Improve coordination of local and Federal water management.
- 4. Align water management tools, strategies, and planning efforts of Reclamation and water agencies in the basin.
- 5. Identify water management strategies and actions that are functional under multiple future potential climate and socioeconomic conditions to 2100 AD.

ARBS Anticipated Outcomes

- Consistent modeling data and tools for Federal and regional planning in the American River Basin (climate change hydrology, upper watershed operations, and water temperature).
- Projected supply-demand imbalance at build-out under climate change conditions
- Evaluation of adaptation measures and their ability to reduce imbalances



ARBS Schedule

Task	2017	2018	2019	2020
MOA Signed	*			
Climate Change Data & Model Development	_			
Water Supply & Demand Assessment				
Adaptation Strategy Development		•		
Findings & Final Report				
Public Stakeholder Meetings			**** ********************************	is is



Future Climate Scenarios

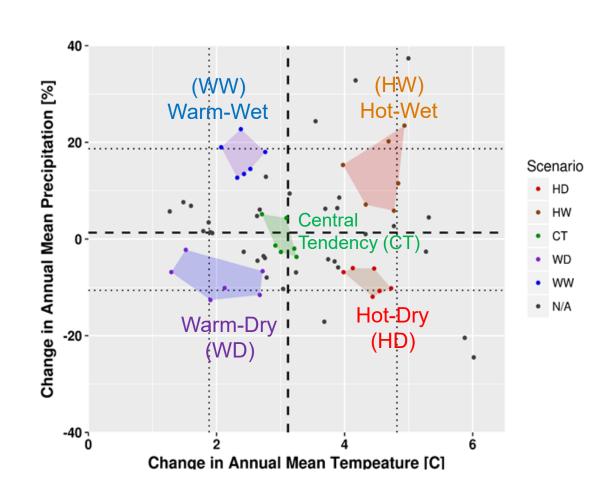
California future climate projections predict:

- Increase in temperature
- Uncertainty in amount of precipitation

Future climates reflect:

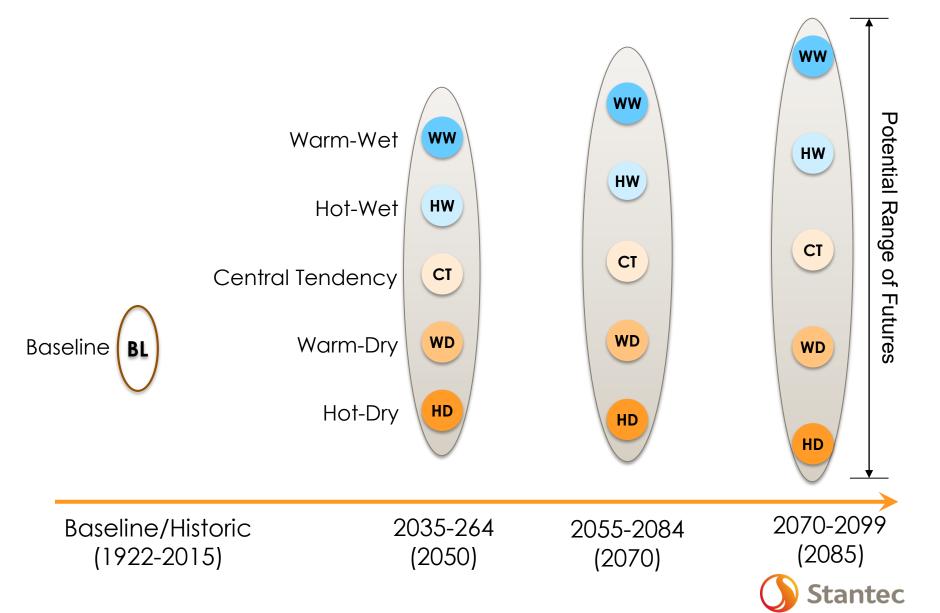
- 2 scenarios for global growth of greenhouse gases
- 32 global climate models
- Multiple initial climate conditions

To describe the full range of potential climate futures,
ARBS developed 5 scenarios.

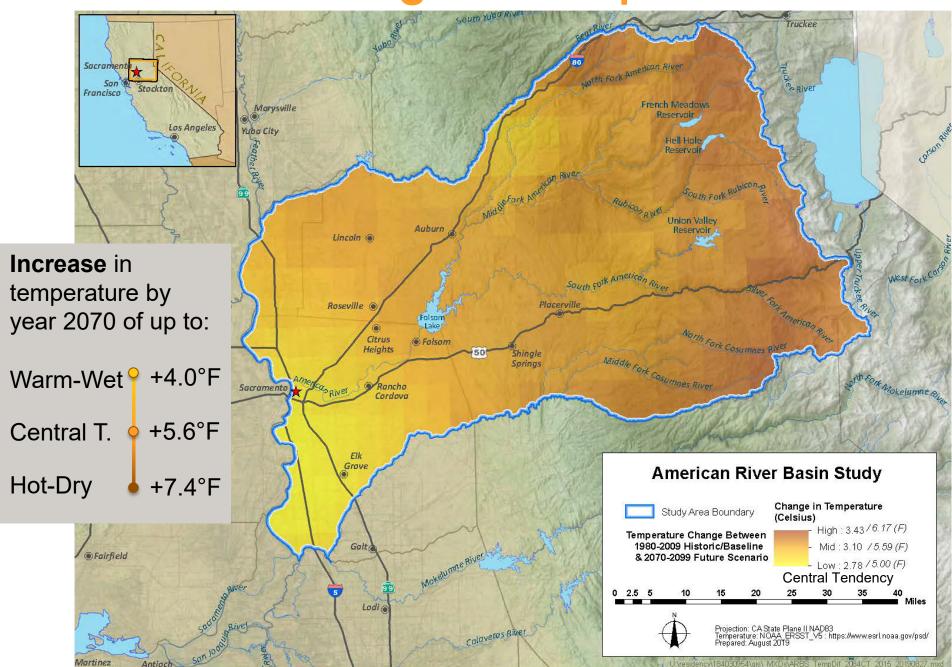




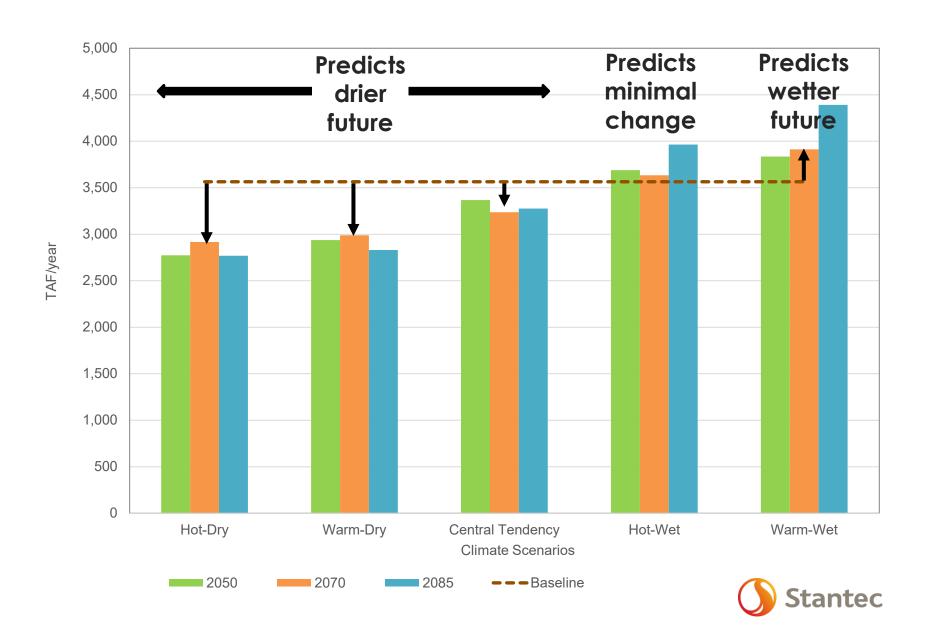
Future Climate Scenarios



Future Changes in Temperature



Future Changes in Runoff



Changes in Timing of Runoff

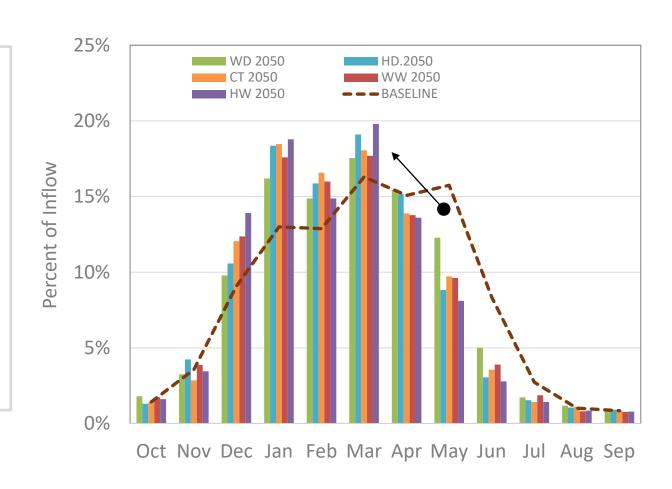
Early snowmelt and less precipitation as snowfall



Runoff will occur earlier in the year



Lower spring runoff

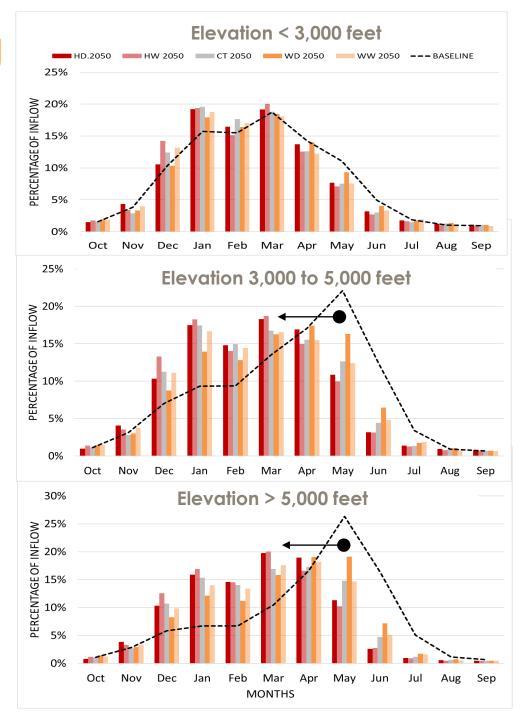




Changes in Timing of Snowmelt

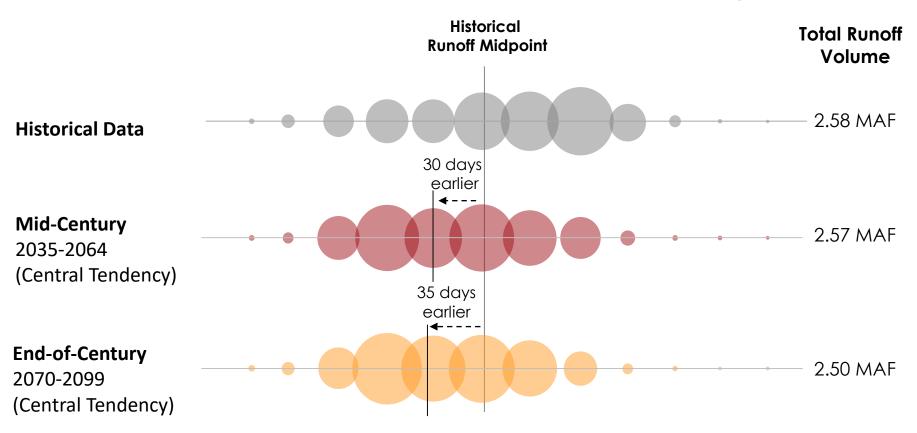
Historically, runoff occurs in Iate spring at elevations above 3,000 feet, peaking around May.

Under future conditions, runoff is expected earlier, with <u>peak</u> <u>snowmelt 30-60 days earlier</u>.



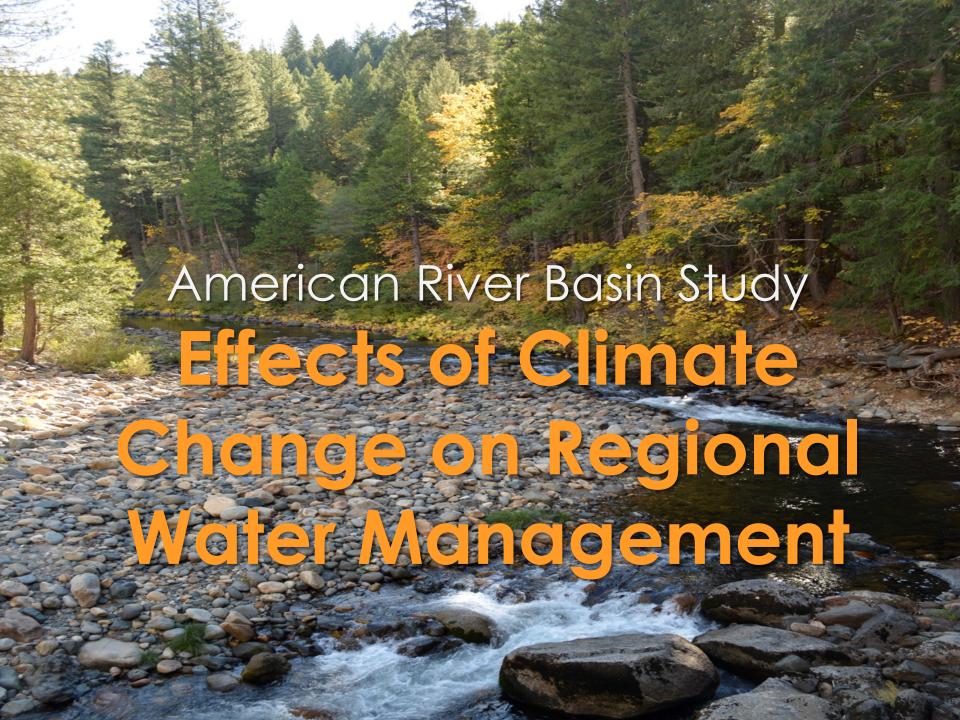
Changes in Timing of Inflow to Folsom

Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep

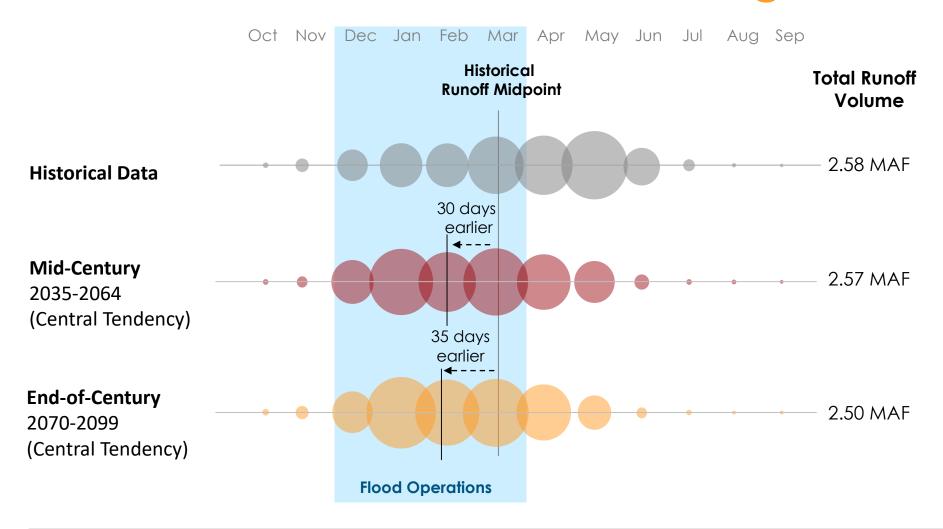


MAF = million acre-feet

Inflow to Folsom could occur 30 to 40 days earlier on average.



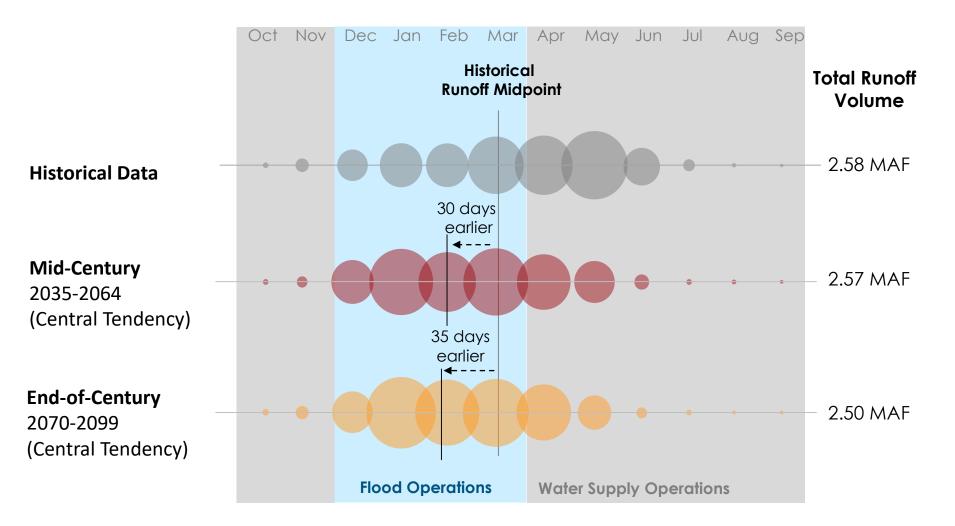
Potential Effects on Flood Management



Earlier runoff would:

increase the chance of spills from Folsom reservoir during flood season.

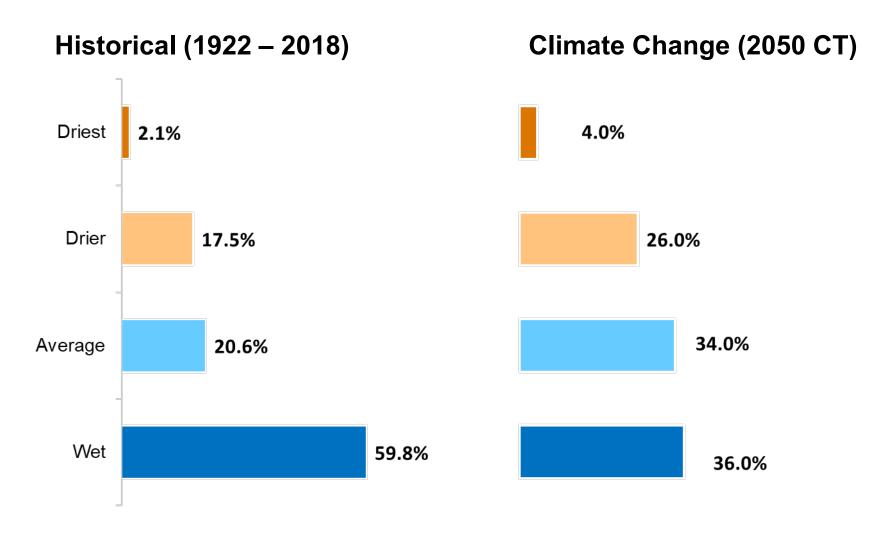
Potential Effects on Water Supply Availability



Earlier runoff would:

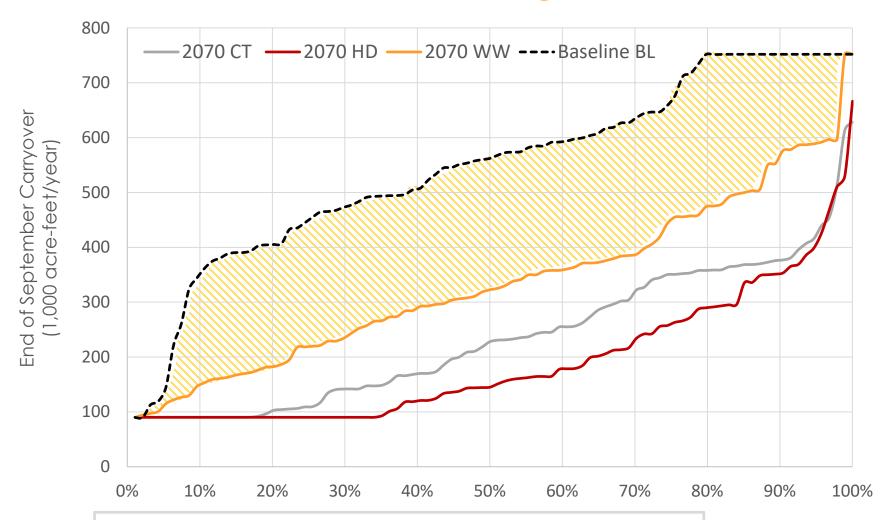
- increase the chance of spills from Folsom reservoir during flood season.
- <u>reduce water supply</u> available during summer and fall for M&I, ecosystem, hydropower, irrigation, recreation, etc.

Potential Effects on Water Forum Agreement



Earlier runoff means less unimpaired runoff March through November. Thus affecting available supplies during summer and fall for M&I, ecosystem, hydropower, irrigation, recreation, etc.

Changes in Runoff Timing Reduces Folsom Lake Storage



Lower storage affects ability to meet:

- Regional water demands
- Lower American River ecosystem needs



Water Demand Analysis

Integrated local and statewide data sources used to develop water demands for the ARBS region for existing and future planning horizons (2050, 2070, 2085).

General Plans and Urban Water Management Plans

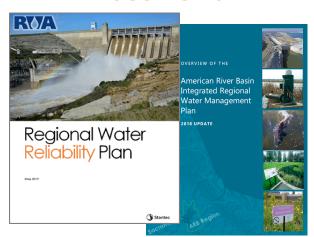


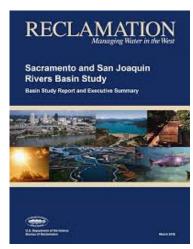
California Water Plan Update



Sacramento-San Joaquin Basin Study

Regional Planning Documents







Water Demand Analysis

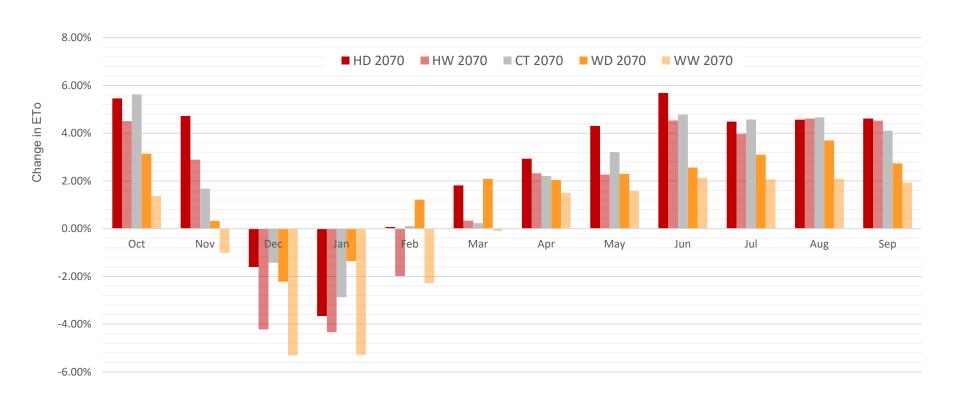
Demand Unit	Demand Unit Description	Existing	2050	2070	2085		
ARBS Valley Floor Region							
22_NU	Northgate 880	2.7	6.4	6.4	6.4		
23_NU	Self-Supplied	1.4	1.4	1.4	1.4		
24_NU2.1	PCWA: Lower Zone 6, Foothill-Sunset WTP	22.7	51	51	51		
24_NU2.2	PCWA: City of Lincoln (FO-SU)	10.1	37	37	37		
24_NU4	Self-supplied	0.4	1.0	1.0	1.0		
26N_NU1.1	SSWD – NSA (Arcade NH)	4.2	4.7	4.7	4.7		
26N_NU1.2	SSWD – NSA (Northridge)	15.7	17.4	17.4	17.4		
26N_NU1.3	McClellan	-	0.0	0.0	0.0		
26N_NU1.4	Cal-Am WC – Antelope	5.6	5.4	5.4	5.4		
26N_NU1.5	Lincoln Oaks	7.9	6.4	6.4	6.4		
26N_NU1.6	Cal-Am-WC - West Placer	0.8	6.8	6.8	6.8		
26N_NU1.7	Rio Linda Elverta CWD	5.8	10.5	10.5	10.5		
26N_NU2	Carmichael WD	9.9	10.3	10.3	10.3		
26N_NU3	City of Sac (N)	39.7	68.9	73.5	73.5		
26N_NU4	SSWD - SSA	17.5	19.3	19.3	19.3		
26N_NU5.1	Golden State WC – Arden	1.1	1.1	1.1	1.1		
26N_NU5.2	Del Paso Manor WD	1.5	1.5	1.5	1.5		
26N_NU5.3	SCWA Zone 41 – Arden Park Vista	3.8	3.8	3.8	3.8		
26N_NU5.4	Cal-Am WC – Arden	1.7	1.7	1.7	1.7		
26N_PU1	City of Roseville	31.8	53.7	55.0	55.0		
26N_PU2	San Juan WD	13.8	20.4	20.4	20.4		
26N_PU3.1	Orange Vale WC	4.6	5.6	5.6	5.6		
26N_PU3.2	Citrus Heights WD	14.1	20.5	20.5	20.5		
26N_PU3.3	Fair Oaks WD	11.7	14.3	14.3	14.3		



Future Change in Evapotranspiration

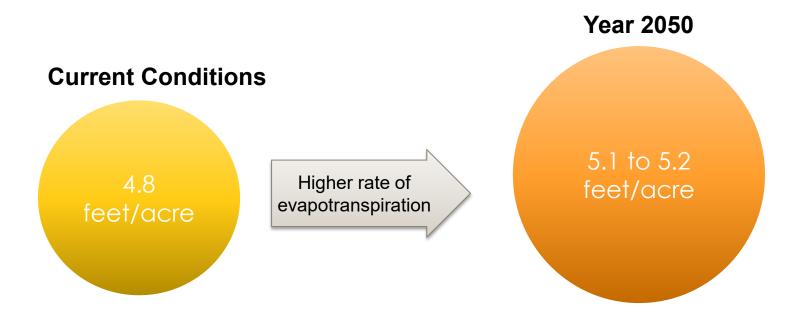
Future increase in temperature can result in higher evapotranspiration of 2% to 4% in the growing season (April to October).

Lower evapotranspiration is expected during rainy season (December to February).





Potential Effects on Agricultural Water Demand



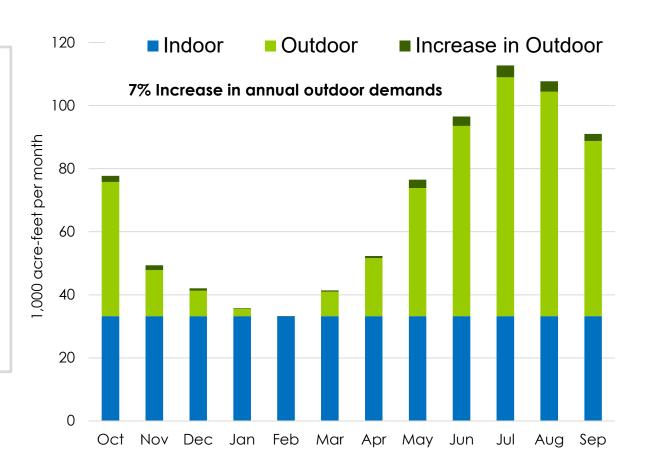
- Agricultural water demand includes conveyance losses and on-farm irrigation efficiencies.
- Higher evapotranspiration rate results in higher agricultural water demands.
- Under similar cropping patterns, Year 2050 irrigation water demands would increase by 7.7% on average.



Potential Effects on Urban Outdoor Demand

Higher evapotranspiration rate results in higher outdoor irrigation demand.

Under similar urban landscaping, irrigation water demands could increase up to 7%, about 3% in total demands (2050 Central-Tendency scenario)

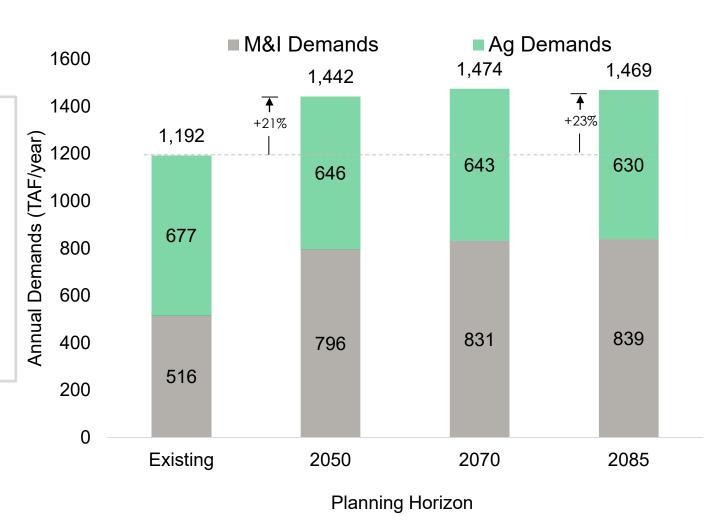




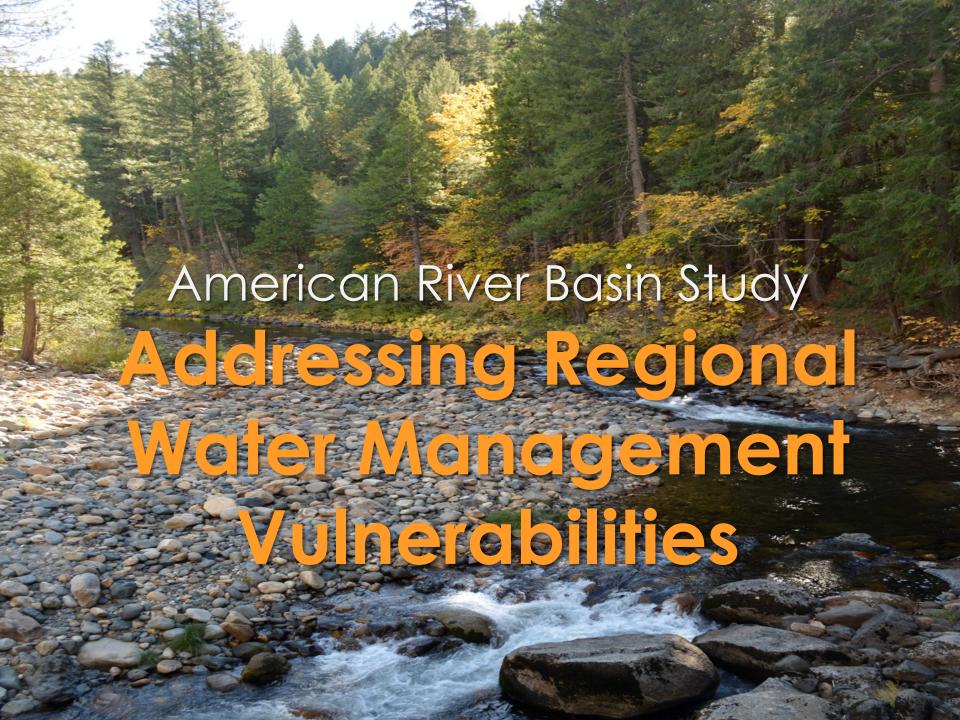
Overall Change in Water Demand

Key assumptions:

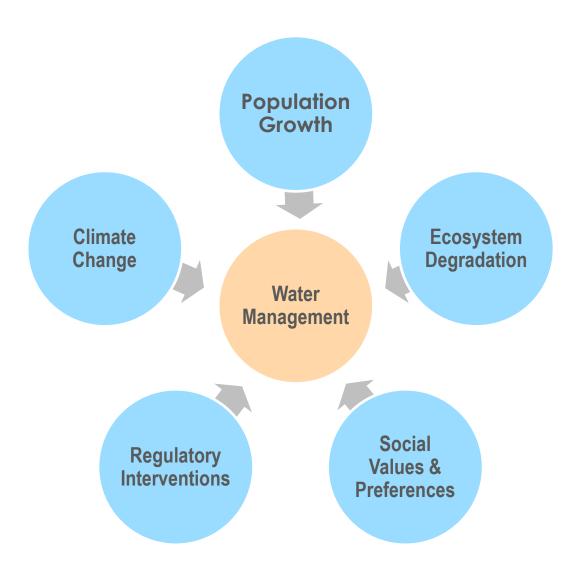
- No change in current crop types
- No change in urban outdoor practices
- Most urban buildout reached by 2050
- Maintain current levels of water use efficiency

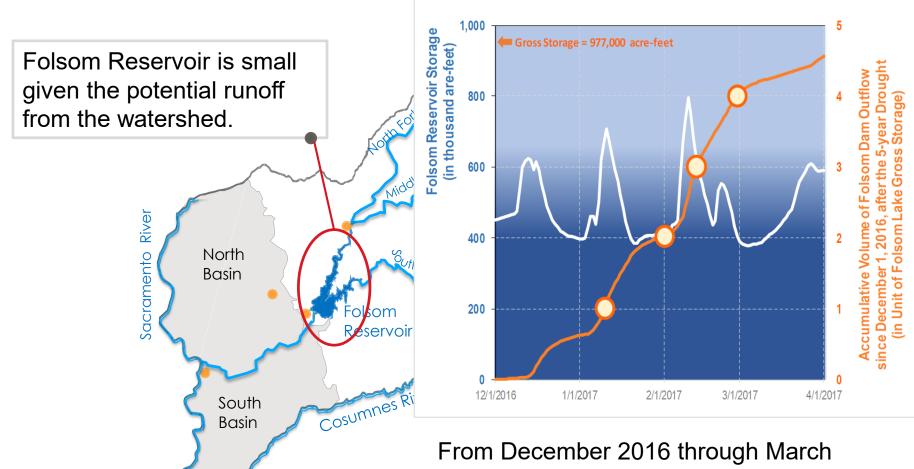






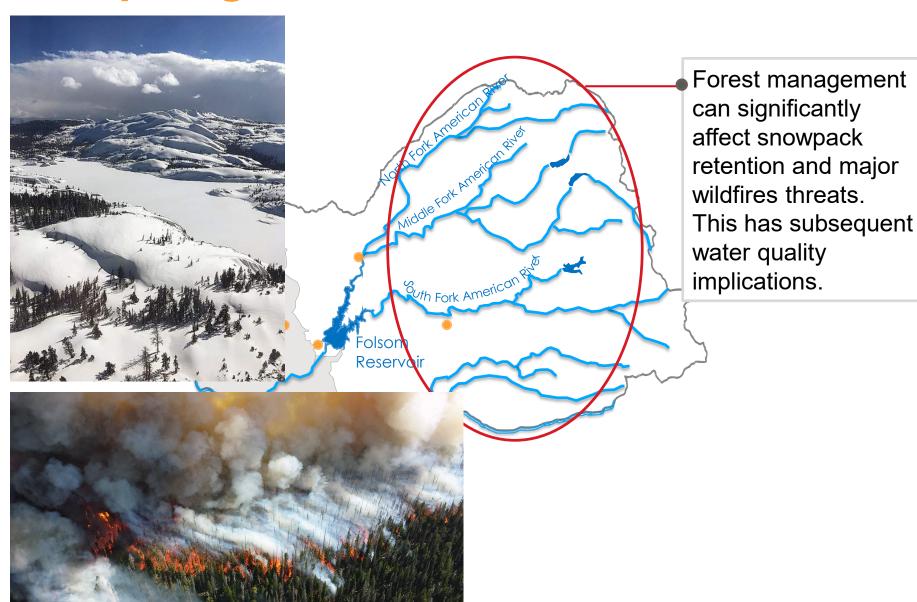
Regional Water Management Stressors

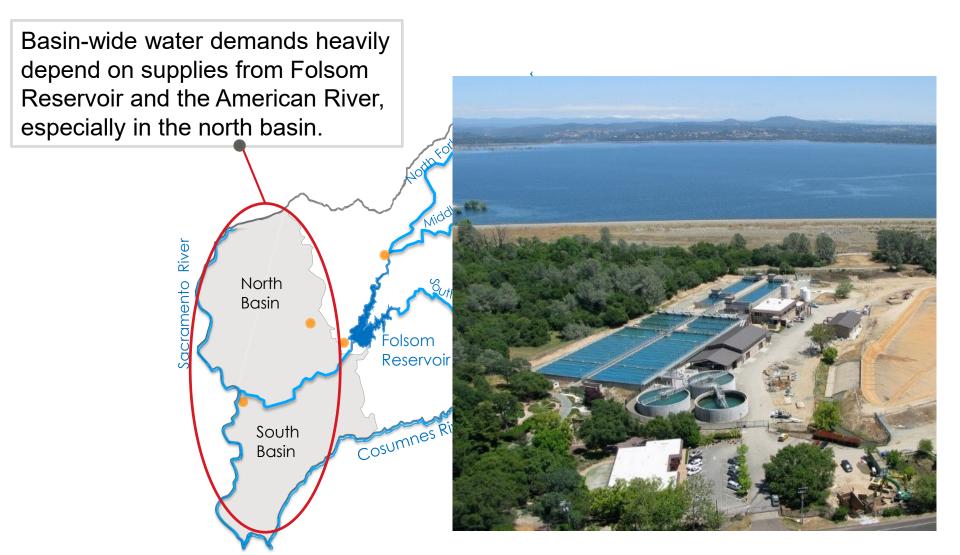




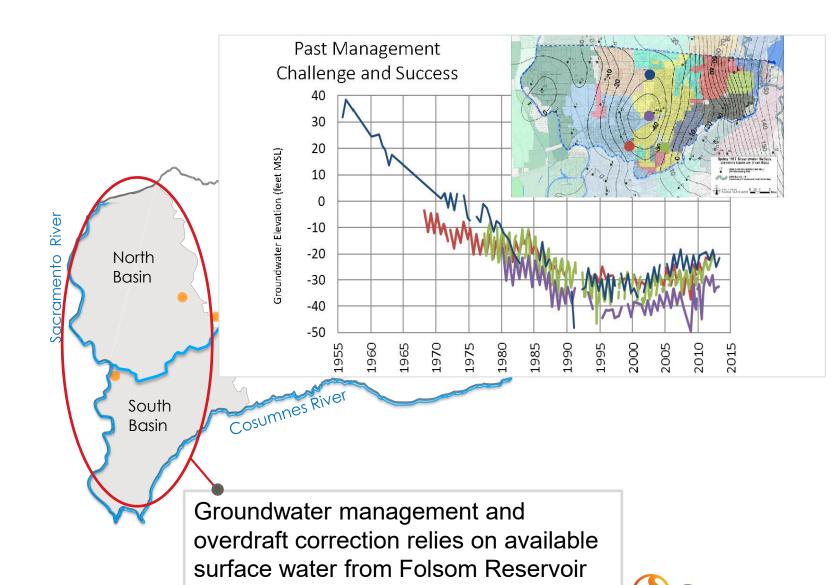
From December 2016 through March 2017, the cumulative volume released from Folsom Dam for flood control purposes could have filled the reservoir over four times.



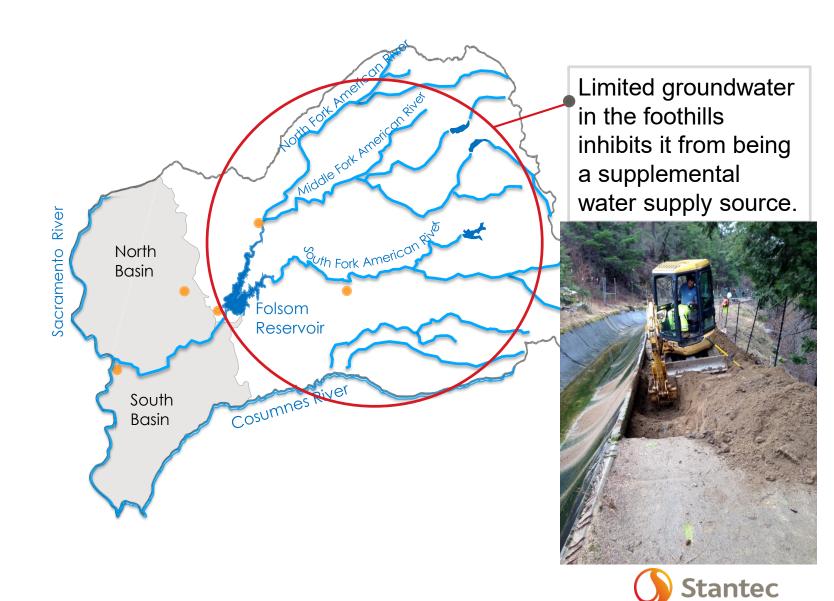


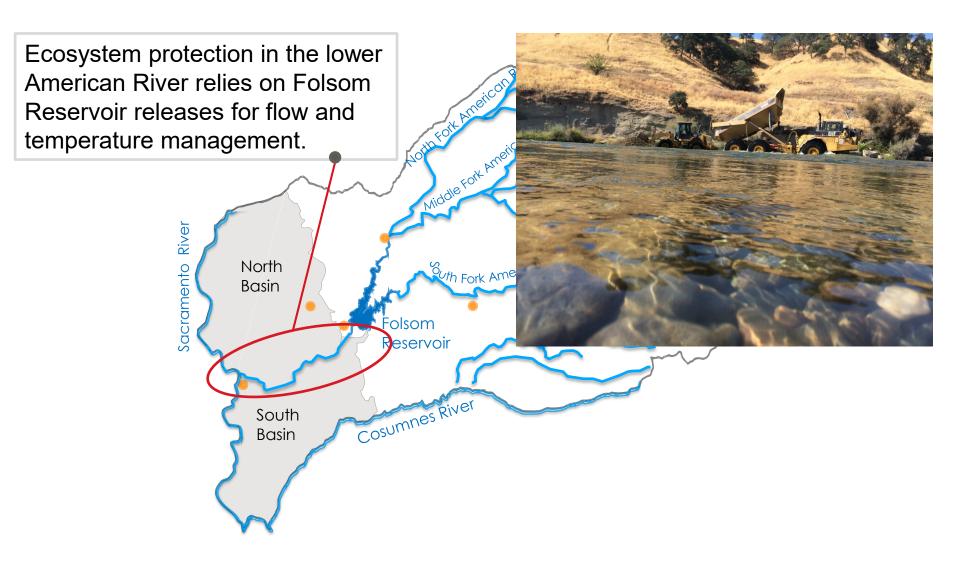




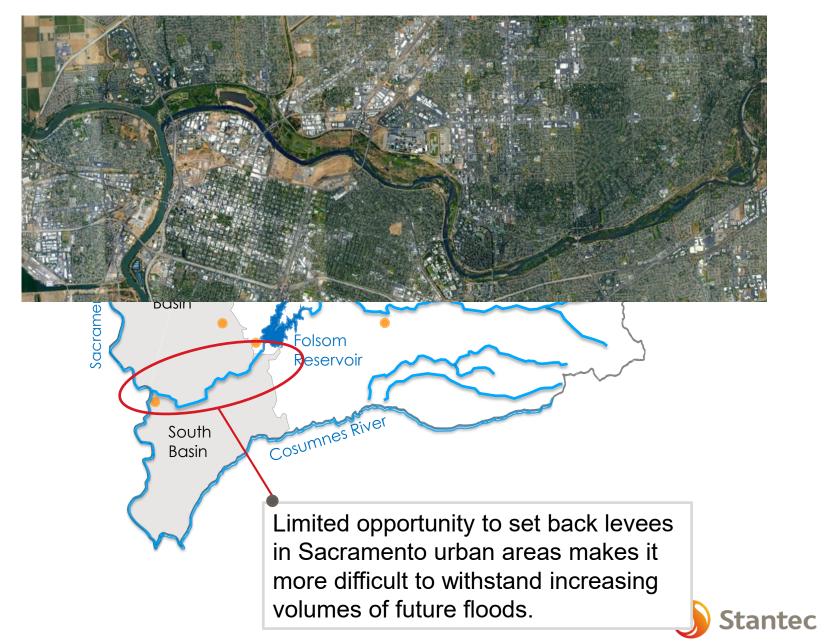


and the American River.











How to Address Future Challenges?

- Build on current water management initiatives
- Advance regional-Federal collaboration to meet common challenges
- Develop long-term regional strategy informed by the following adaptation portfolios:



Next Steps

• Oct 15, 2019:

- Workshop #2 Addressing Potential Climate Change Effects on Water Management
- Interactive workshop to discuss how to address regional water management vulnerabilities

Fall 2019 – Spring 2020:

- Compile management actions to address regional vulnerabilities
- Formulate and evaluate adaptation portfolios

Jun 2020:

 Develop study findings and recommendations for longterm regional strategy

ARBS Anticipated Outcomes

- Consistent modeling data and tools for Federal and regional planning in the American River Basin (climate change hydrology, upper watershed operations, and water temperature).
- Projected supply-demand imbalance at build-out under climate change conditions
- Evaluation of adaptation measures and their ability to reduce imbalances



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