Watershed Resilience Pilot Project

November 13, 2025

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Why a we doing this?

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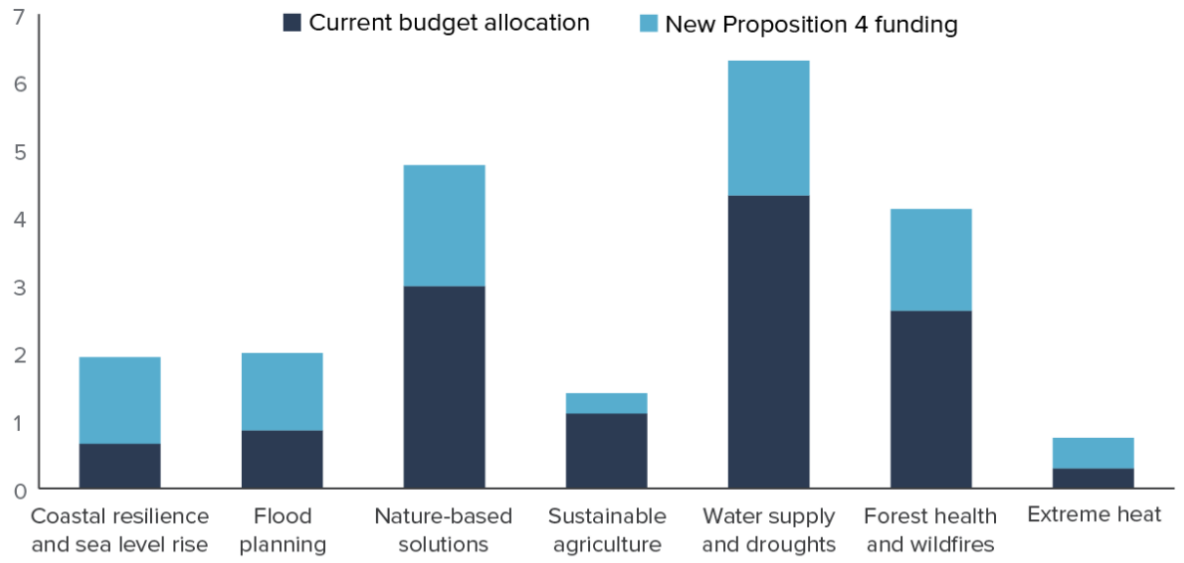
- To position our region for Proposition 4 funding
- To make the transition from IRWM to Watershed Resilience based allocations of state funding

Proposition 4 will substantially increase the state budget for various water and climate initiatives

Funding ($ billion)



SOURCE: State Legislature (Proposition 4), California State Budget Summary 2024-25 and Legislative Analyst's Office.
NOTES: All figures are in billions. An additional $1.57 billion in Proposition 4, which will support parks access ($720 million) and clean energy infrastructure ($850 million), is not included in the figure.
FROM: PPIC Blog, February 2025.

Accomplishments

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- Develop Watershed Boundary
- Develop Watershed Network (always in progress)
- Vision Statement
- Gap Analysis
- Climate Assessments (qualitative and quantitative)
- Assess Risks
- Public Outreach

Folsom Reservoir, January 26, 2014
John Chacon/California Department of Water Resources

Work to do

- Outreach
- Complete Climate Assessments (Almost done)
- Receive Adaption Strategies to evaluate
- Develop Adaptation Strategies
- Develop Implementation Strategies
- Prepare Plan

Folsom Dam and Lake on November 17, 1977
Vince Arrant/California Department of Water Resources

Pilot Roadmap

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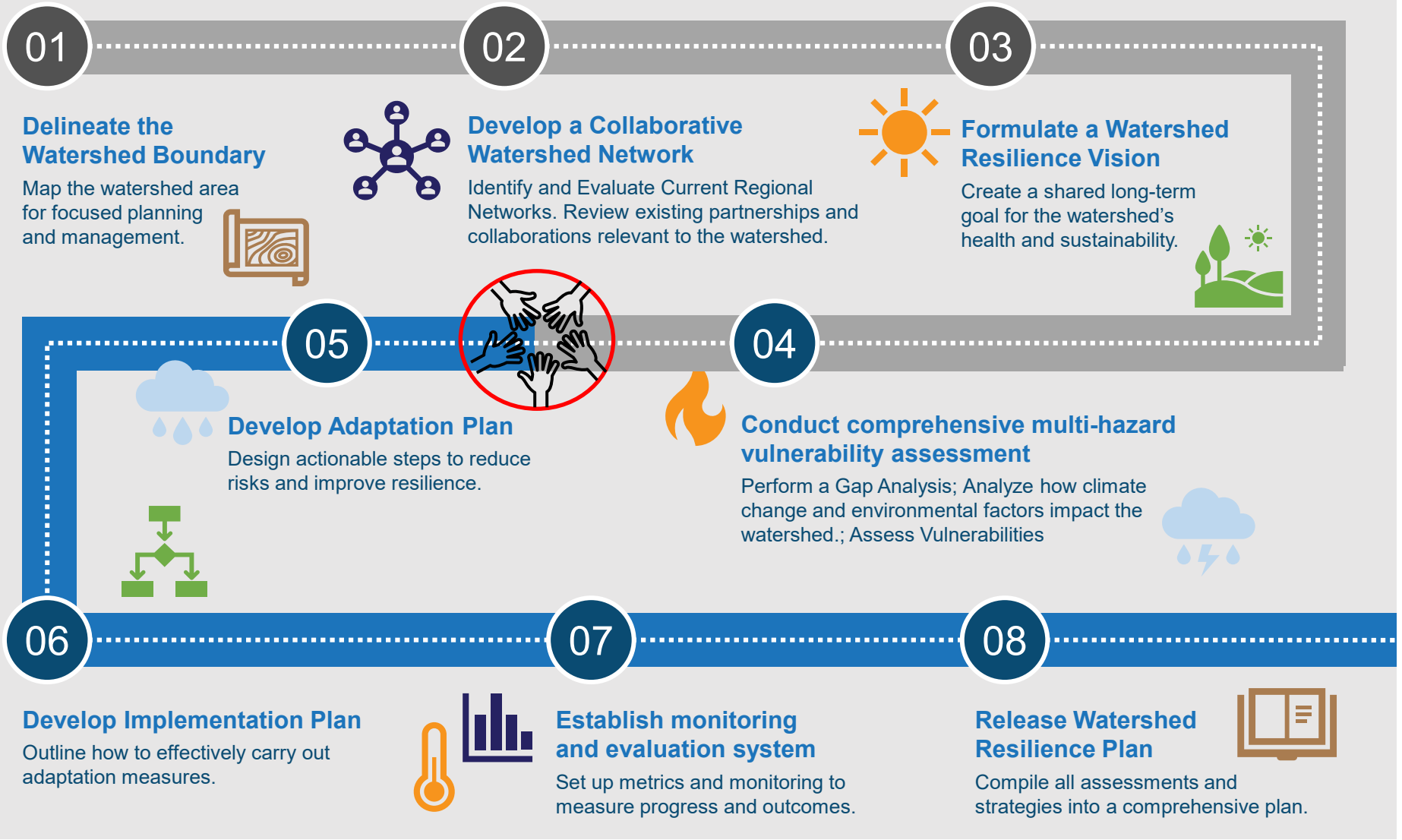

Project Schedule

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	2024						2025												2026					
American River WRP Task	Q3			Q4			Q1			Q2			Q3			Q4			Q1			Q2		
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
Task 1: Project Management			9						27					11	9		4	TBD	TBD	TBD	TBD			
Task 2: Reporting																								
Task 3: Identify and Assess Existing Regional Networks																								
Task 4: Develop Watershed Network					13			10			19				18				TBD			TBD		
Task 5: Delineate Watershed Boundary																								
Task 6: Watershed Resilience Vision																								
Task 7: Perform Gap Analysis																								
Task 8: Assess Climate Vulnerability and State of Watershed																								
Task 9: Assess Vulnerability and Risks													16											
Task 10: Develop Adaptation Strategies and Evaluations																								
Task 11: Develop Implementation Strategies																								
Task 12: Performance Tracking																								
Task 13: Watershed Resilience Plan																				Draft		Final		

Advisory Committee Meetings Watershed Network Meetings Vulnerability Metrics Workshop

Climate Scenarios for Quantitative Assessment

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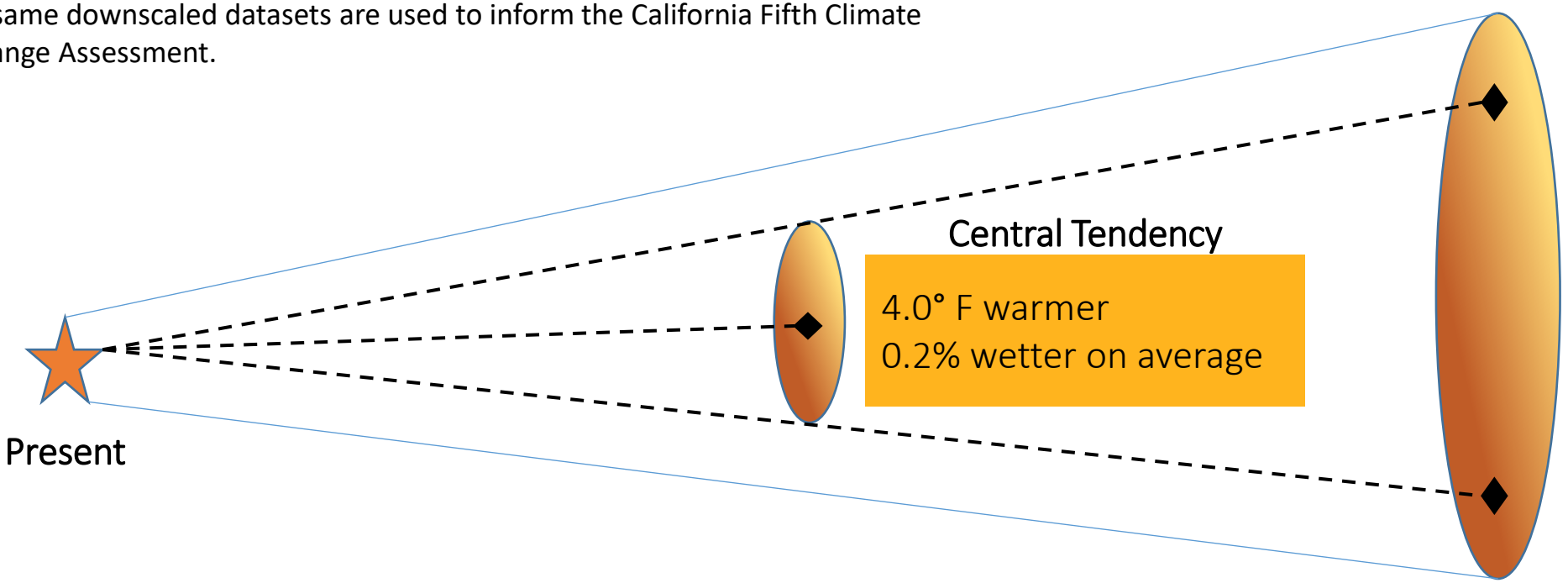
Scenarios based on downscaled climate model projections from CMIP6 (Coupled Model Intercomparison Project Phase 6)

These same downscaled datasets are used to inform the California Fifth Climate Change Assessment.



Hot-Dry

7.9° F warmer
1.4% drier on average

Central Tendency

4.0° F warmer
0.2% wetter on average

Warm-Wet

5.4° F warmer
7.4% wetter on average

Current Conditions

Mid Future
2041-2070 (2055)

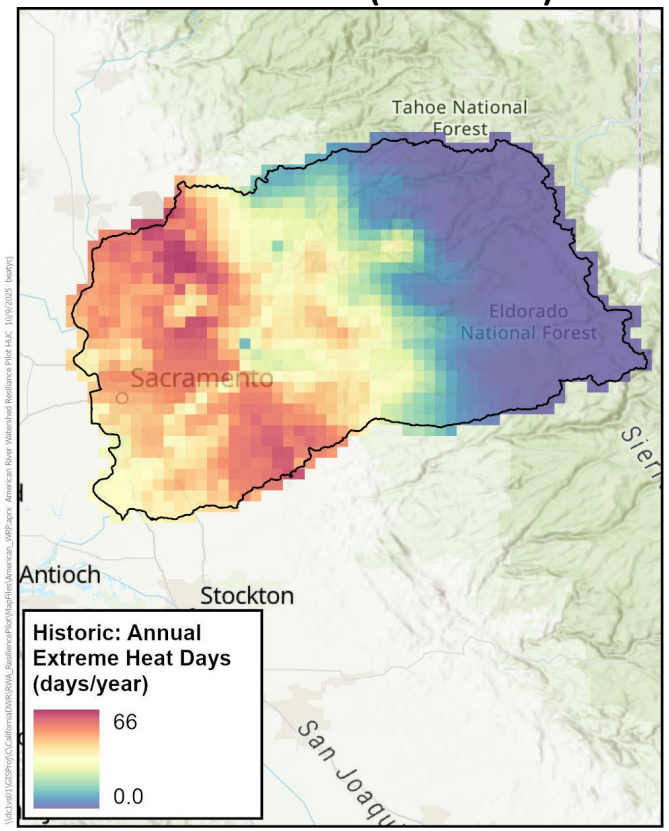
Late Future
2071-2100 (2085)

Extreme Heat

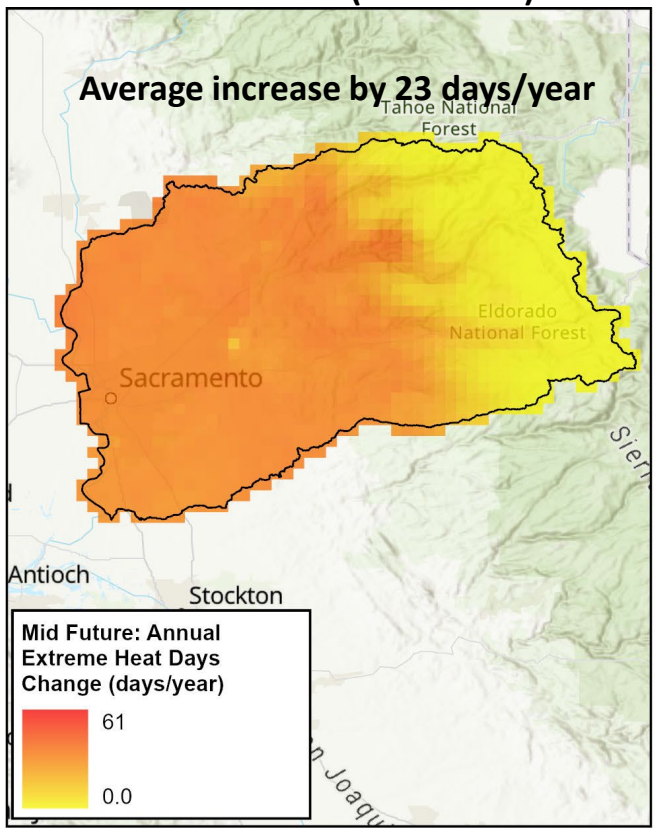
Change in Extreme Heat Days (days > 95F) for the American River Region

- Warmer regions of Valley Floor are more prone to extreme heat days
- Number of extreme heat days will increase by 20 to 40 days across region
- Extreme heat will increase irrigation demands, increase water temperature, and impact recreation activities.

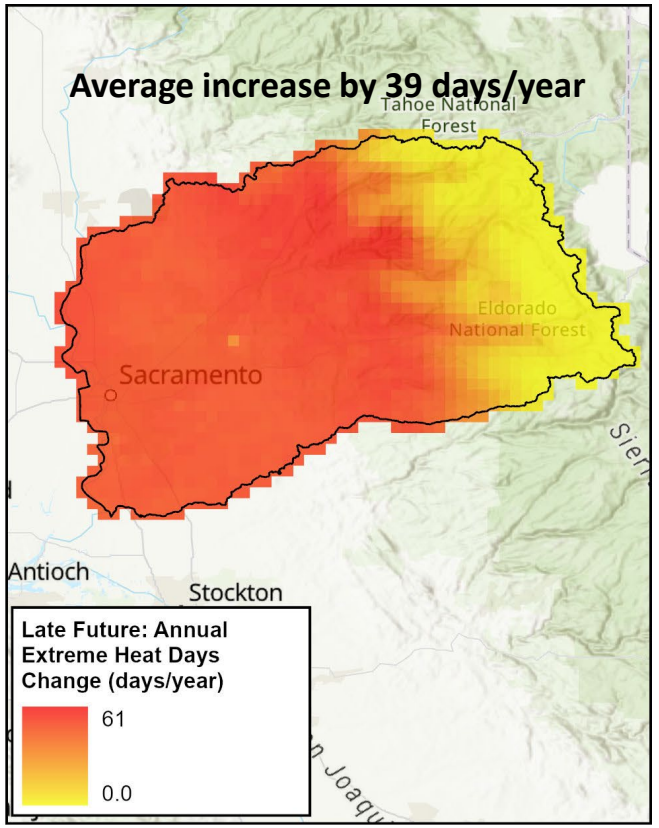
Historical (1981-2010)



Mid Future (2041-2070)



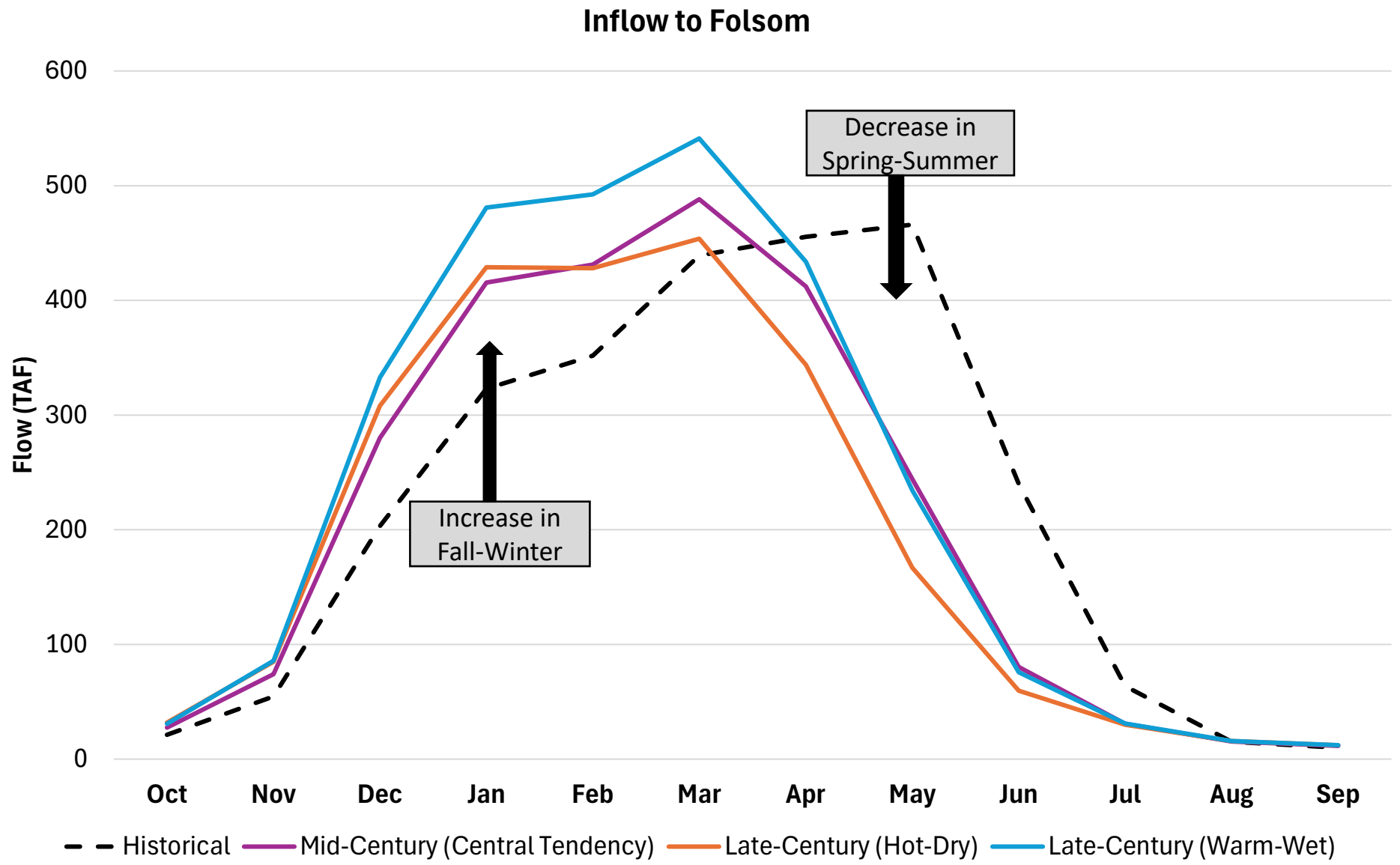
Late Future (2071-2100)



Impacted Sectors

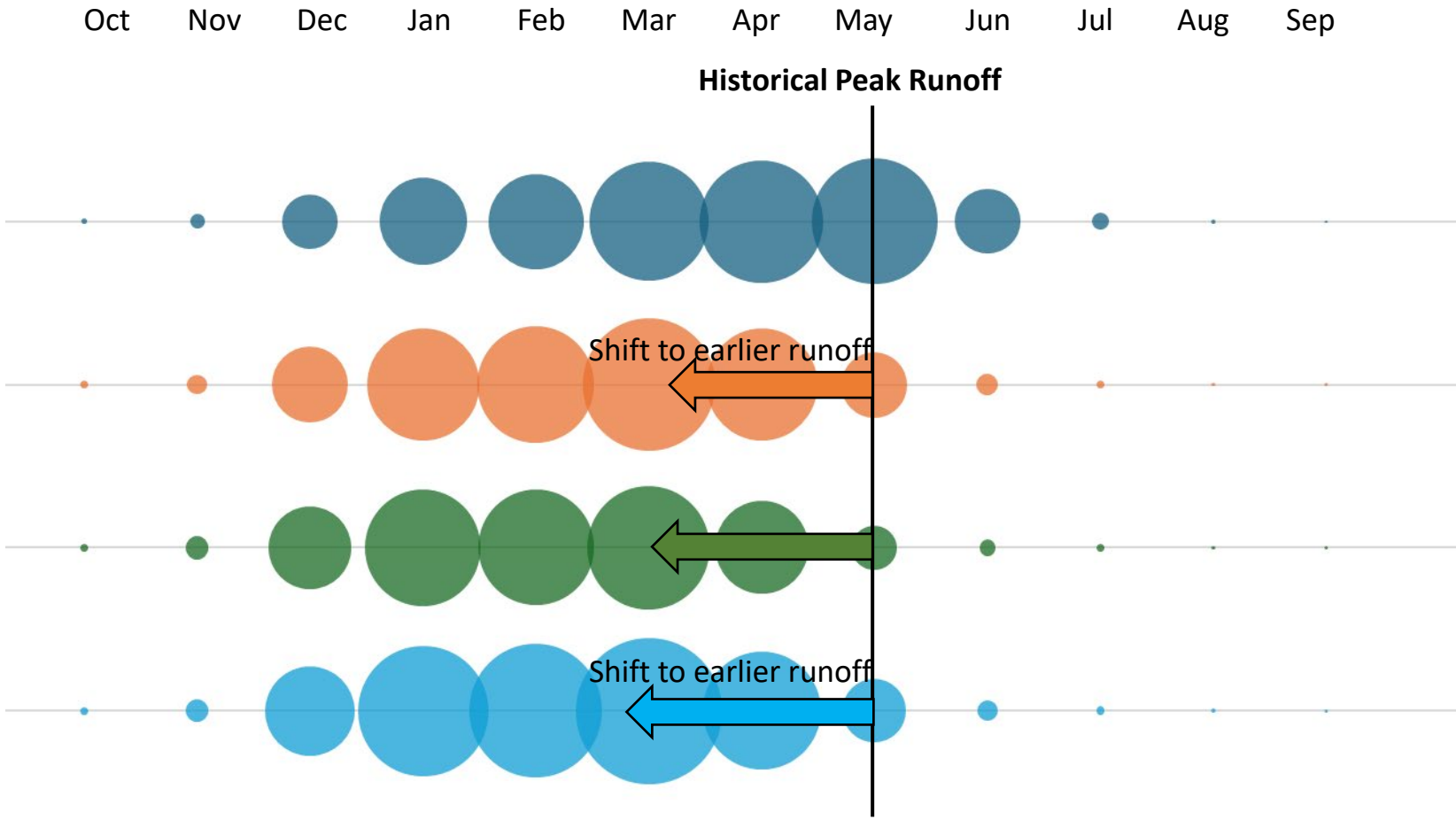
- Agriculture
- Ecosystem
- Recreation
- Surface Water Supply
- Hydropower

American River Streamflow Hydrograph



American River Streamflow Timing

Changes in Timing of Peak Inflow to Folsom



	Total Runoff Volume
Historical Data	2.64 MAF
Mid-Century (Central Tendency)	2.51 MAF
Late-Century (Hot-Dry)	2.36 MAF
Late-Century (Warm-Wet)	2.77 MAF

MAF = million acre-feet

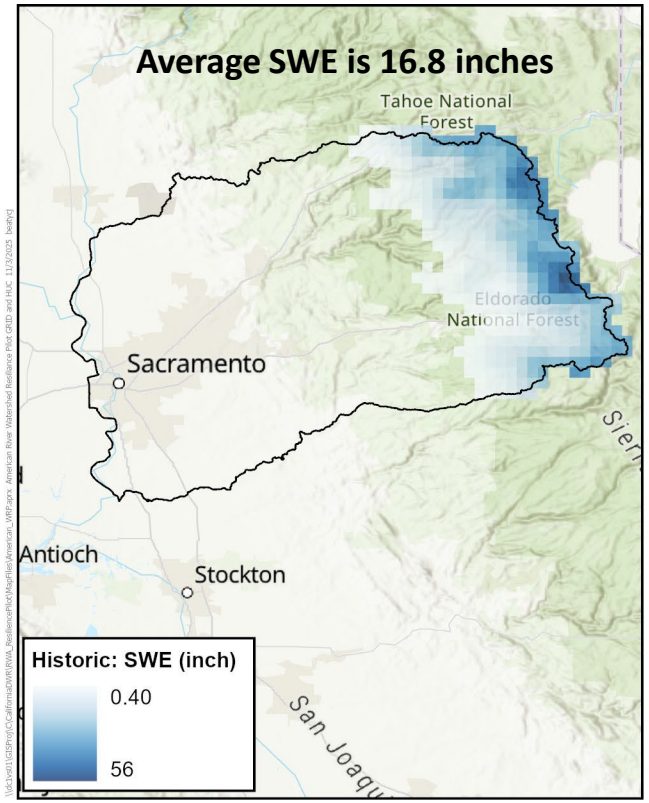
Peak inflow to Folsom could occur up to **2 months earlier**

Snow

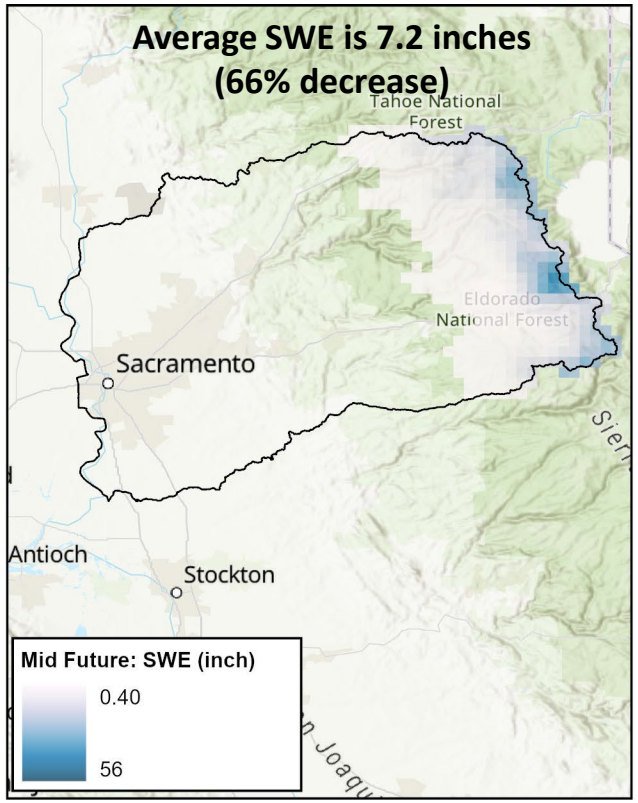
Change in April 1 Snow (measured as snow water equivalent, or SWE)

- Significant reduction in snow under both future periods as early snow melt and more precipitation will fall as rain instead of snow.
- Accelerated snowmelt cause early runoff, lower spring runoff, increases flood risks, impacts reservoir operations.

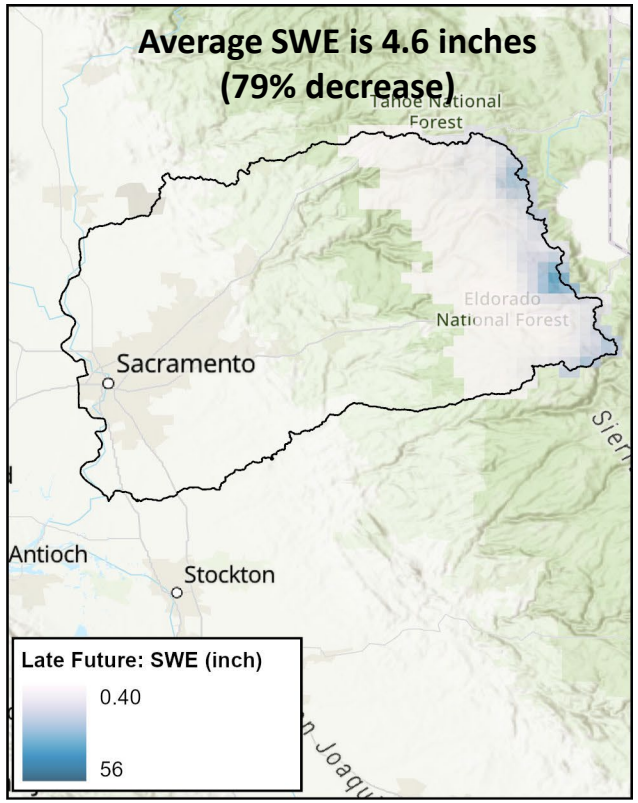
Historical (1981-2010)



Mid Future (2041-2070)



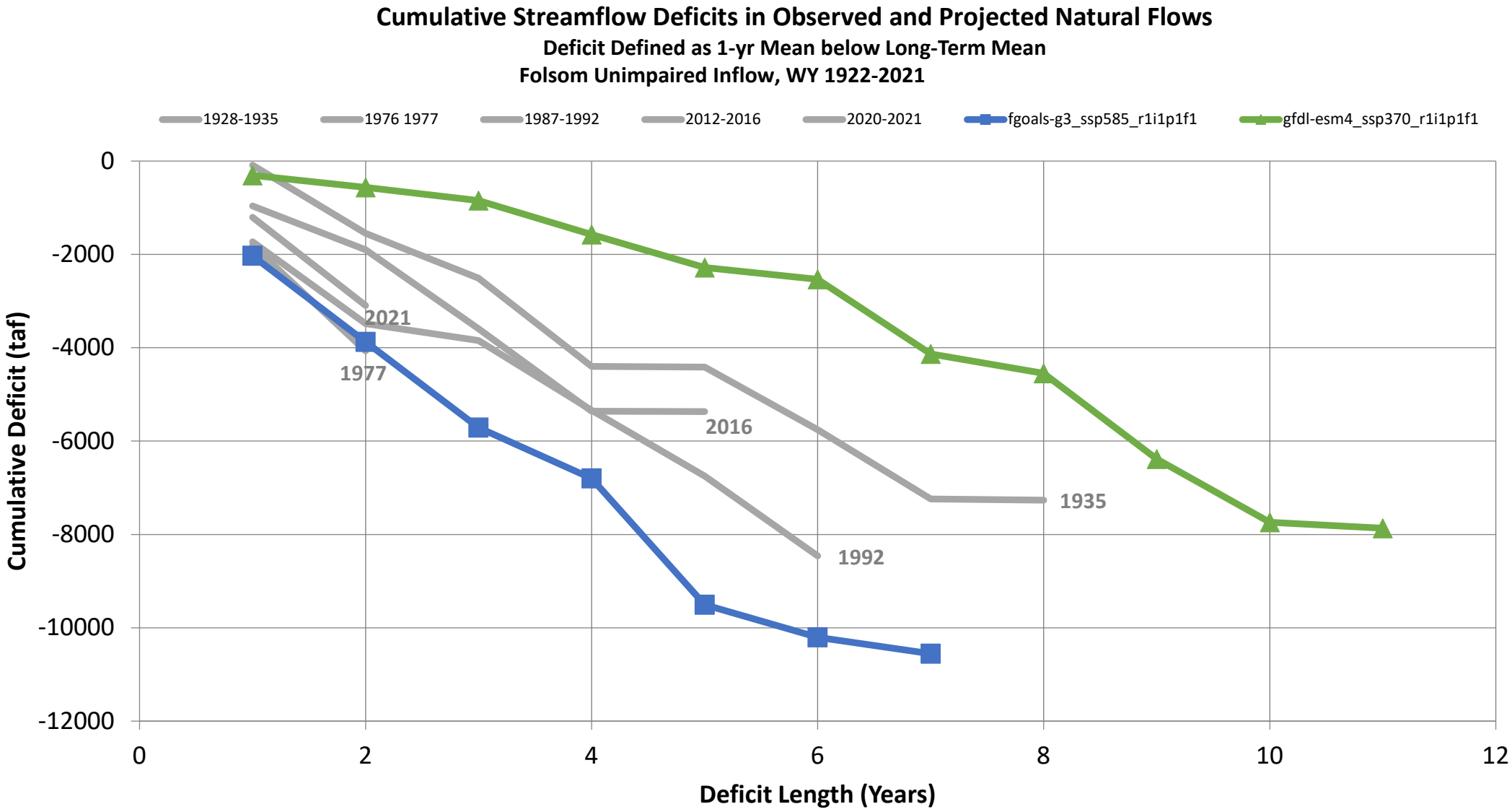
Late Future (2071-2100)



Impacted Sectors

- Surface Water Supply
- Flood Management
- Hydropower
- Recreation
- Ecosystem

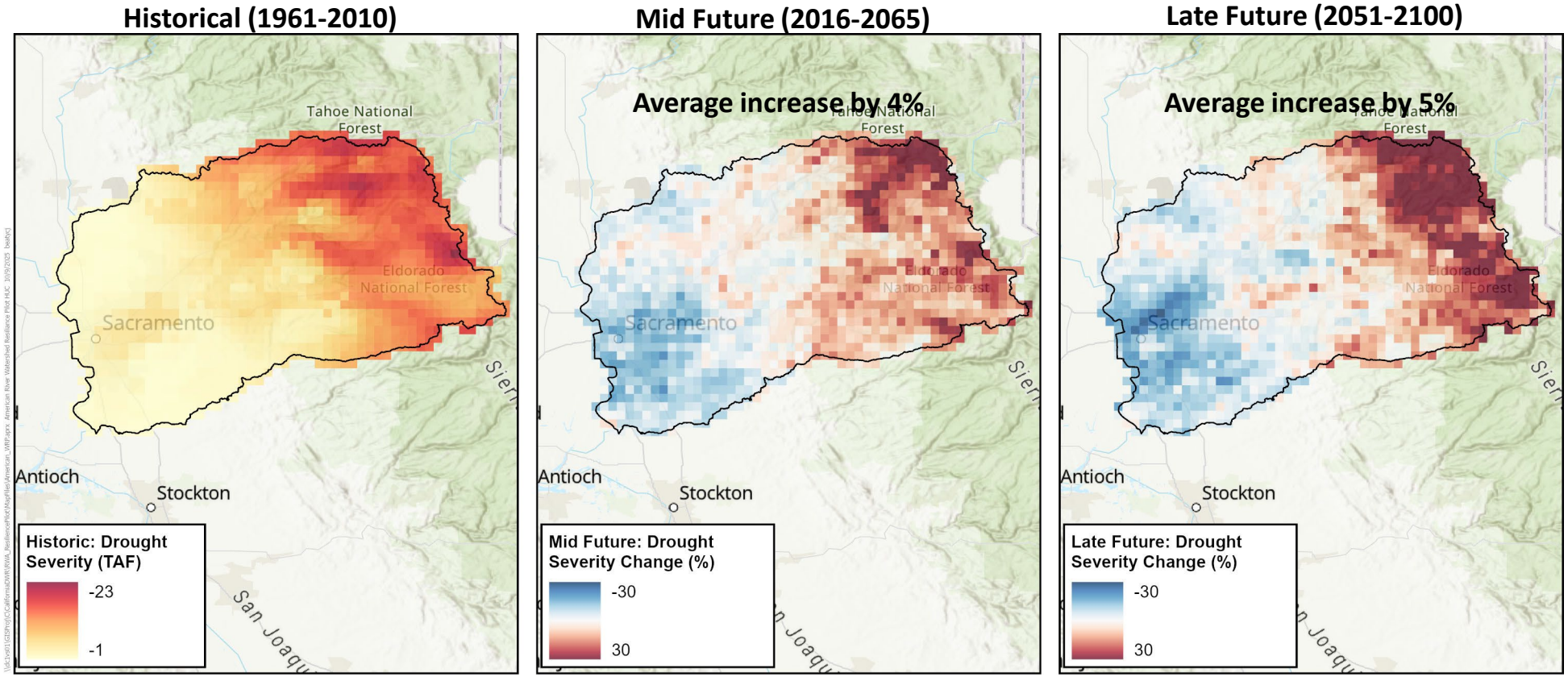
Drought Severity and Duration - Projections



Drought Severity

Change in Drought Severity for the American River Region

- Sierra is projected to face severe drought due to rising temperatures and runoff reductions in future periods.
- However, increase in precipitation for Valley floor will help to alleviate future droughts.
- Severe drought increases the dryness and causes crop failure, forest health implications and elevates wildfire risks.



Impacted Sectors

- Surface Water Supply
- Agriculture
- Ecosystem

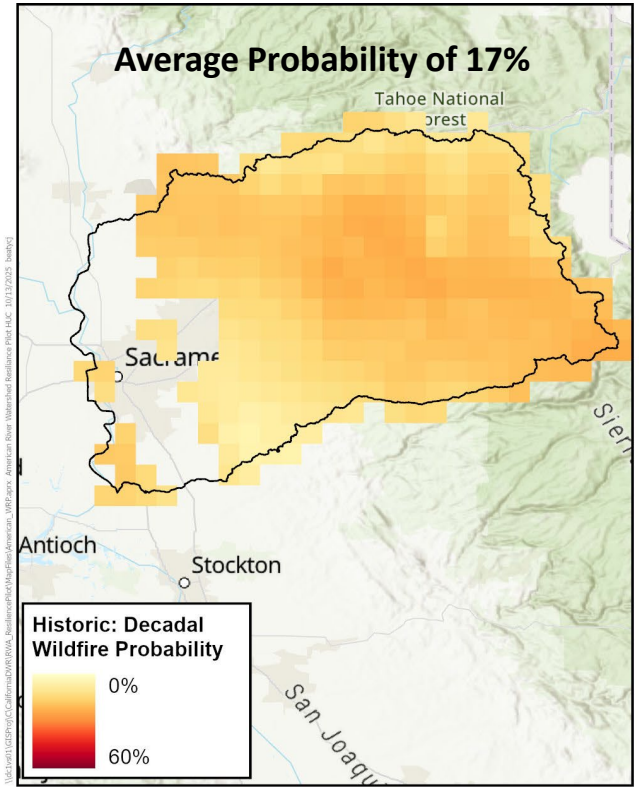
Drought Severity is defined as maximum cumulative annual deficit.

Wildfire Probability

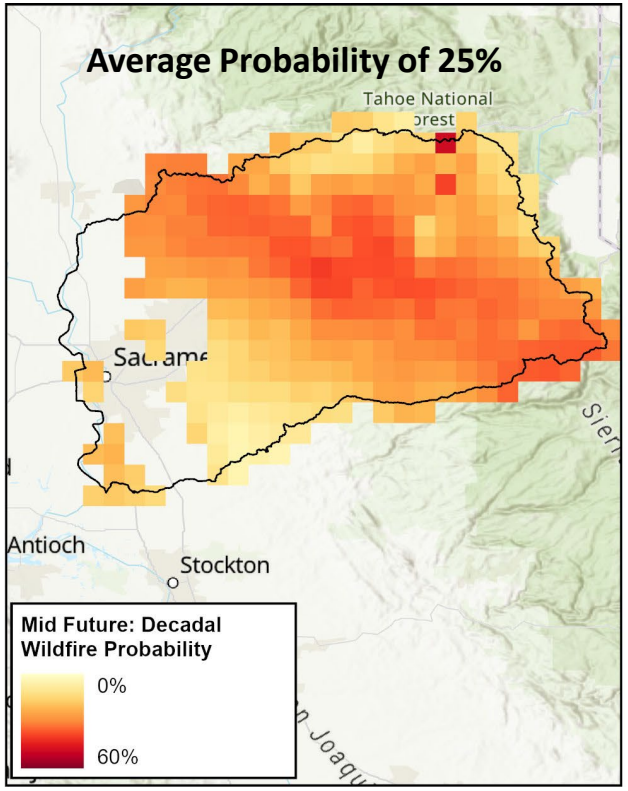
Wildfire Probability (%) for the American River Region

- Upper watersheds are more susceptible to wildfires.
- Increase in drought will make the region more vulnerable to wildfires in future.
- Wildfire causes water quality issues, loss of vegetation and biodiversity.

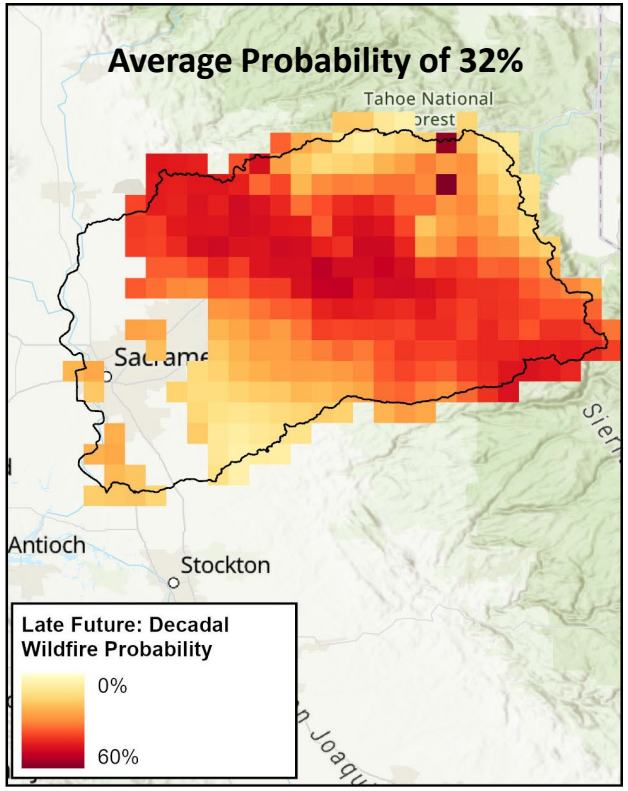
Historical (1981-2010)



Mid Future (2041-2070)



Late Future (2071-2100)



Impacted Sectors

- Surface Water Supply
- Water Quality
- Agriculture
- Ecosystem
- Flood Management

Prioritize Areas of Highest Vulnerability

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- Focus on most vulnerable areas
- Understand causes of climate vulnerability
  - Climate sensitivity or lack of adaptive capacity

Planning Area	System	System	System Component (Asset)	Composite Score
merican River	Community & Equity	CE	Walnut Grove and Isleton Communities	3.3
merican River	Agriculture	AG	Placer County (West Placer)	3.3
merican River	Community & Equity	CE	Urban Core and Floodplain communities	3.3
merican River	Community & Equity	CE	Sacramento Metro East	3.3
merican River	Ecosystem	ES	Riparian and Groundwater Dependent Ecosystems	3.0
merican River	Ecosystem	ES	Forest Health and Ecosystem Services	3.0
merican River	Ecosystem	ES	Aquatic Ecosystems	5.0
merican River	Flood Management	FM	Lower American & Sacramento Levee System	4.7
merican River	Flood Management	FM	Folsom Reservoir	5.0
merican River	Flood Management	FM	Floodplain and Local Drainage	3.0
merican River	Groundwater Supply	GW	Natural System - South American Subbasin	4.0
merican River	Groundwater Supply	GW	Natural System - North American Subbasin	4.0
merican River	Groundwater Supply	GW	Built System - land owner groundwater wells	3.0
merican River	Hydropower	HP	Folsom Reservoir	4.3
merican River	Surface Water Supply	SW	Natural Conveyance - River System	4.0
merican River	Surface Water Supply	SW	Folsom Reservoir	5.0
merican River	Water Quality	WQ	Regulatory Standards	3.7
merican River	Water Quality	WQ	Ecological	3.7
merican River	Water Quality	WQ	Drinking Water Source Quality	3.0

Vulnerability Key:
1 = Low
2 = Low/Moderate
3 = Moderate
4 = Moderate/High
5 = High

System Key:
CE = Community & Equity
ES = Ecosystem
FM = Flood management
GW = Groundwater supply
HP = Hydropower
SW = Surface water supply
WQ = Water quality
RC = Recreation

Example Adaptation Strategies

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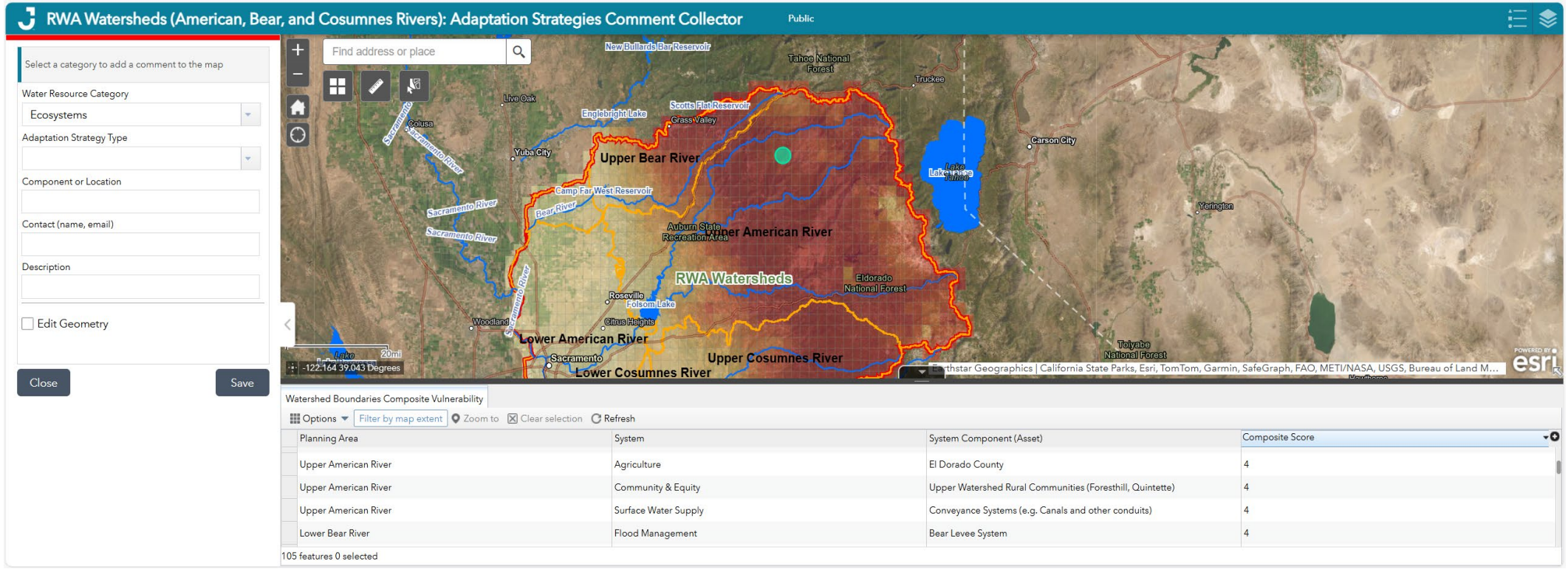
- Forecast-Informed Reservoir Operations (FIRO) for Folsom Reservoir to provide additional drought and coldwater pool protection
    - Vulnerability: *Lower American River water supply, flood management, and ecosystem vulnerabilities*
- Headwaters fuels reduction program to reduce risk of catastrophic wildfire (I-80 corridor and adjacent towns such as Colfax)
    - Vulnerability: *Upper American River and Bear River wildfire vulnerability*

Soliciting Input on Adaptation Strategies

- **We want your good ideas!**
- **Use Online tool**
- **Or reach out to Project Team**

- **Be specific**
  - ✓ What water resource categories does it address?
  - ✓ What climate impacts?
  - ✓ Where?

[RWA Watersheds (American, Bear, and Cosumnes Rivers): Adaptation Strategies Comment Collector]



Evaluate Adaptation Strategies

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- Potential Evaluation Criteria:
  - Resilience benefits
  - Cost to implement
  - Timing to implement
  - Environmental impacts
  - Feasibility
  - Energy impacts
  - Permitting and legal complexity
  - Social impacts
  - Jurisdictional complexity

Evaluation Summary of Alternatives

Evaluation Criteria

Code	Name	Yield Rati..	Cost Rating	Timing Ra..	Reliability..	Flexibility ..	Feasibilit..	Environm..	Energy Ra..	Permittin..	Social Rati..	Jurisdicti..	Public Acc..	Yield Value
Adaptation Strategies		2	5	4	1	4	2	4	5	5	2	2	3	5,045
		2	5	4	1	4	2	4	5	5	2	2	3	5,045
		1	5	4	1	4	2	4	5	5	2	2	3	10,090
		1	5	4	2	4	2	4	5	5	2	2	3	15,130
		2	5	3	1	4	3	4	5	5	2	2	3	5,145
		2	5	5	1	4	2	4	4	5	2	3	3	5,045
		2	3	3	3	3	2	3	3	3	2	3	2	5,325
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		2	3	4	2	4	3	4	1	4	4	4	4	5,000
		2	3	4	2	4	3	4	1	4	3	4	3	5,000
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		4	1	1	3	1	1	2	2	1	2	2	1	2,000
		3	3	2	3	1	1	2	2	1	2	2	1	2,500
		3	4	3	2	3	1	3	2	2	2	2	1	2,700
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		2	5	4	3	4	1	3	3	4	3	4	2	5,000
		2	5	4	3	4	1	3	3	4	3	4	2	5,000
		2	5	4	3	4	1	3	3	4	3	4	2	5,000
		4	5	4	3	4	1	4	2	4	3	4	3	1,000
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		2	5	5	2	4	5	4	4	5	4	2	5	4,030
		1	5	5	2	5	5	4	5	5	4	2	5	7,060

Nimbus Hatchery Salmon Run Event

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Hosted By:

RWA
Regional Water Authority
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Supported by:

Jacobs

valley vision
Community Inspired Solutions

Khadam
CONSULTING

Thank you!

https://rwawatershedsresilience.com/

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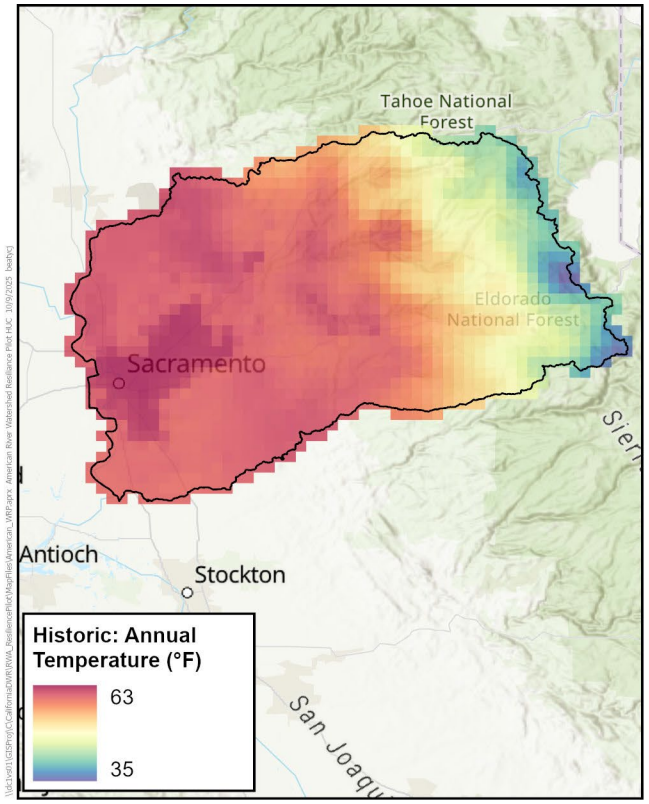
Temperature

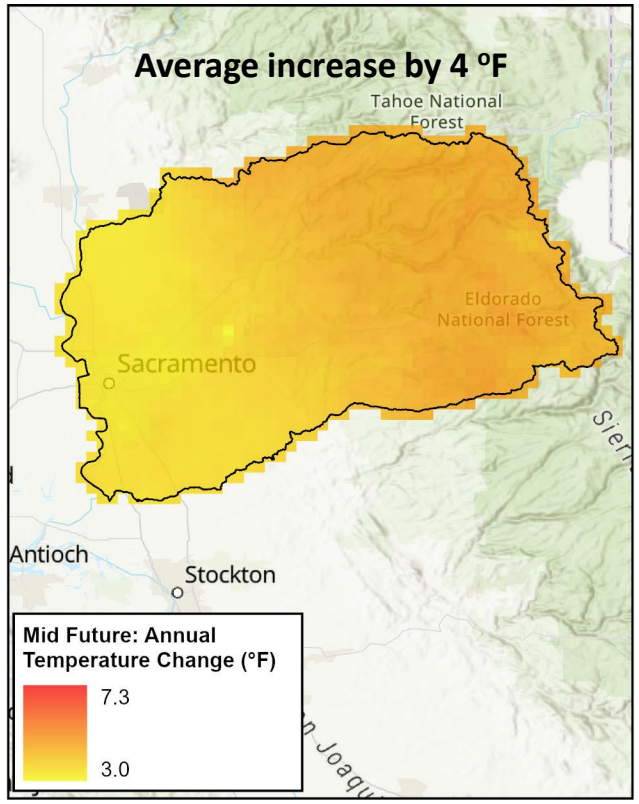
Change in Annual Temperature (°F) for the American River Region

- Valley Floor area is warmer than Sierra region
- Sierra region is projected to see a larger increase in temperatures
- Temperature increase will cause early snowmelt, cause runoff timing shifts, and increase evapotranspiration

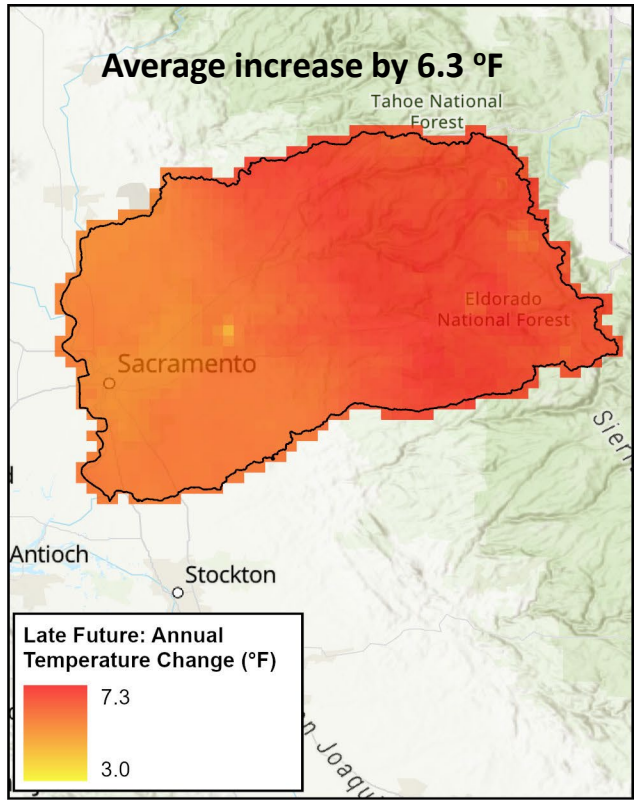
Historical (1981-2010)



Mid Future (2041-2070)



Late Future (2071-2100)



Impacted Sectors

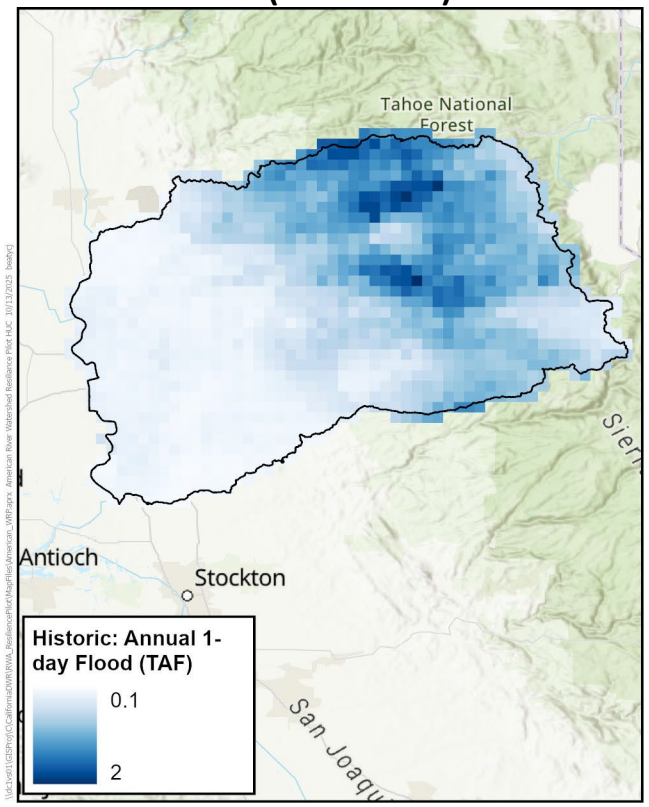
- Surface Water Supply
- Groundwater Supply
- Ecosystem
- Agriculture

1-Day Flood

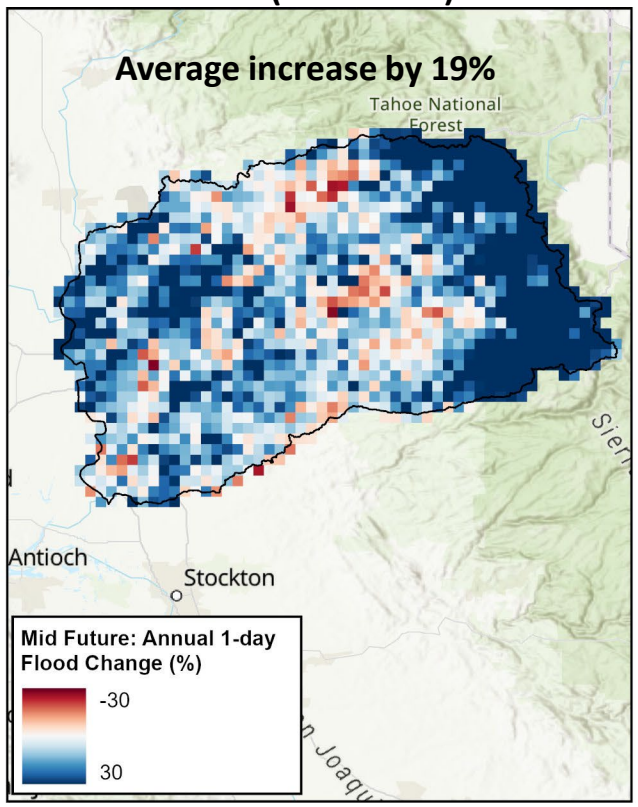
Change in Annual 1-Day Flood for the American River Region

- Sierra region is highly susceptible to floods due to extreme precipitation events.
- Decreased snowpack and early snowmelt
- Similar to extreme precipitation, flood increases moderately for mid future and more substantially for late future.

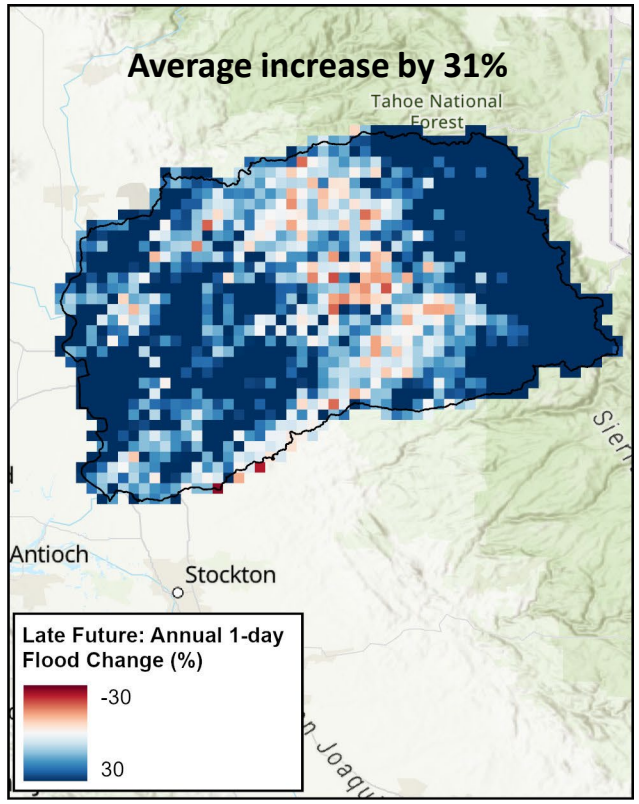
Historical (1961-2010)



Mid Future (2016-2065)



Late Future (2051-2100)



Impacted Sectors

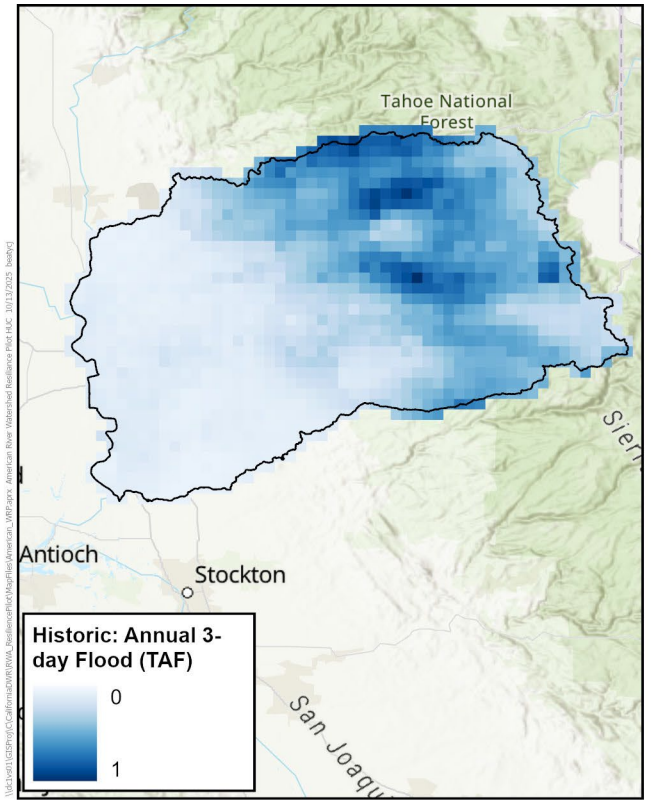
- Flood Management
- Surface Water Supply
- Ecosystem
- Recreation

3-Day Flood

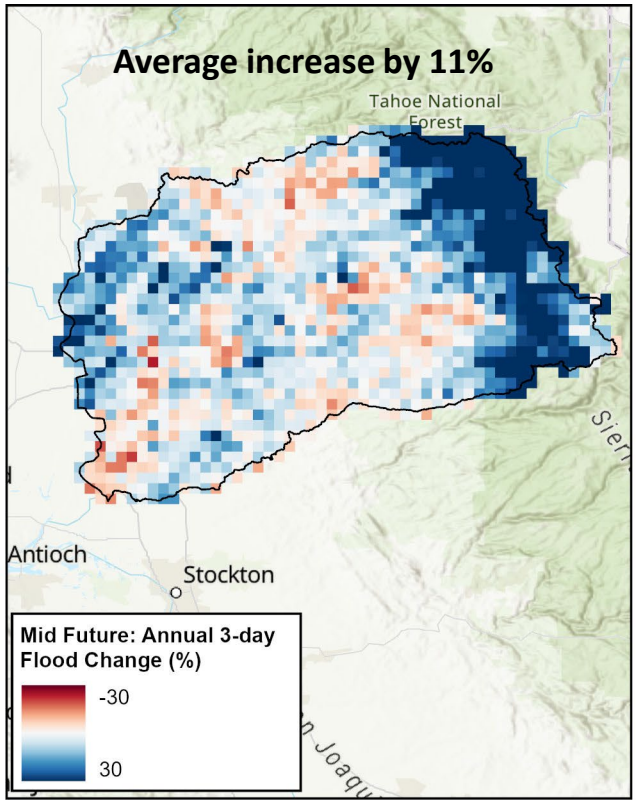
Change in Annual 3-Day Flood for the American River Region

- Sierra region is highly susceptible to floods due to extreme precipitation events.
- Decreased snowpack and early snowmelt
- Similar to extreme precipitation, flood increases moderately for mid future and more substantially for late future.

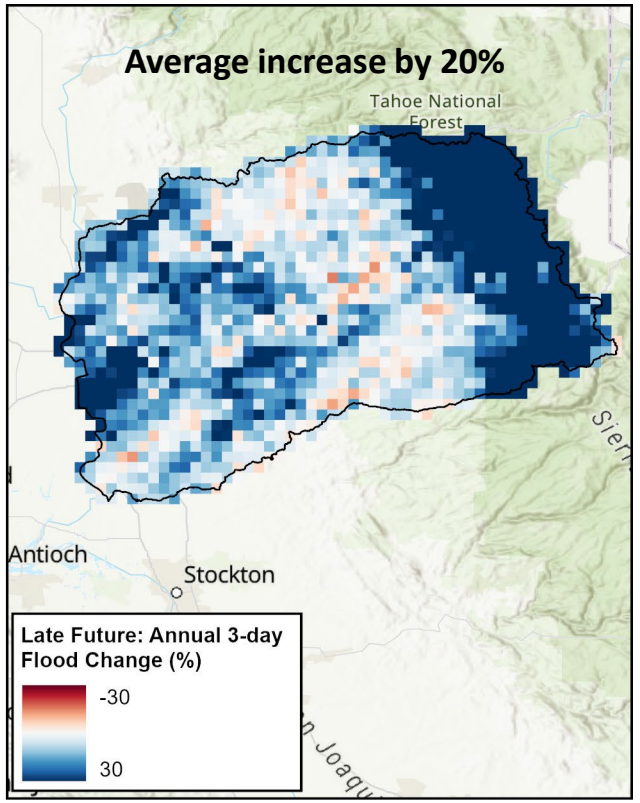
Historical (1961-2010)



Mid Future (2016-2065)



Late Future (2051-2100)



Impacted Sectors

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- Surface Water Supply
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Total Runoff

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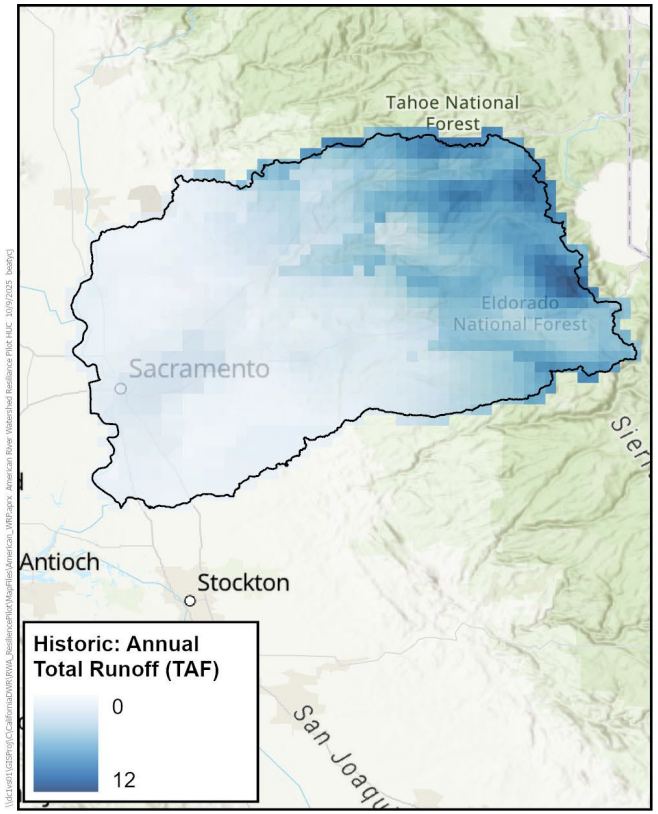
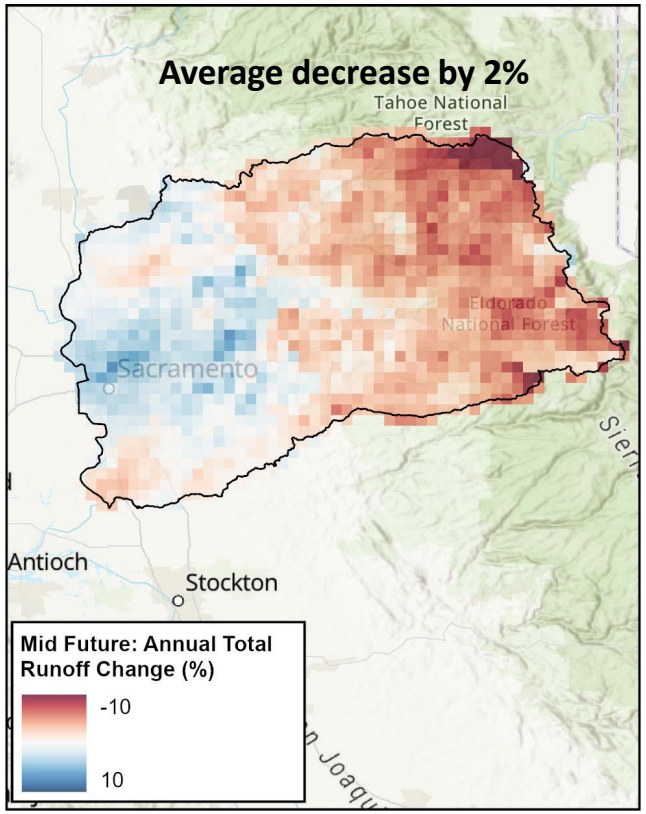
Change in Annual Total Runoff (TAF) for the American River Region

- Sierra region generates more runoff due to higher precipitation.
- Precipitation is projected to increase generally over the study domain, higher rise in temperatures for Sierra region will increase the evapotranspiration and hence reduce the runoff in future periods.
- Increase in runoff will be beneficial for water supply, but the reduction will make the region prone to droughts.

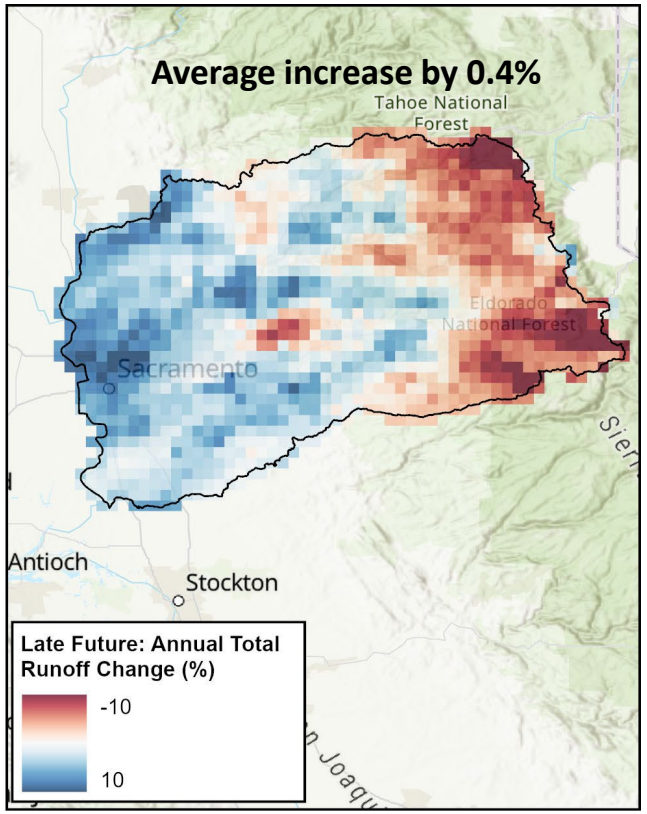
Historical (1981-2010)



Mid Future (2041-2070)



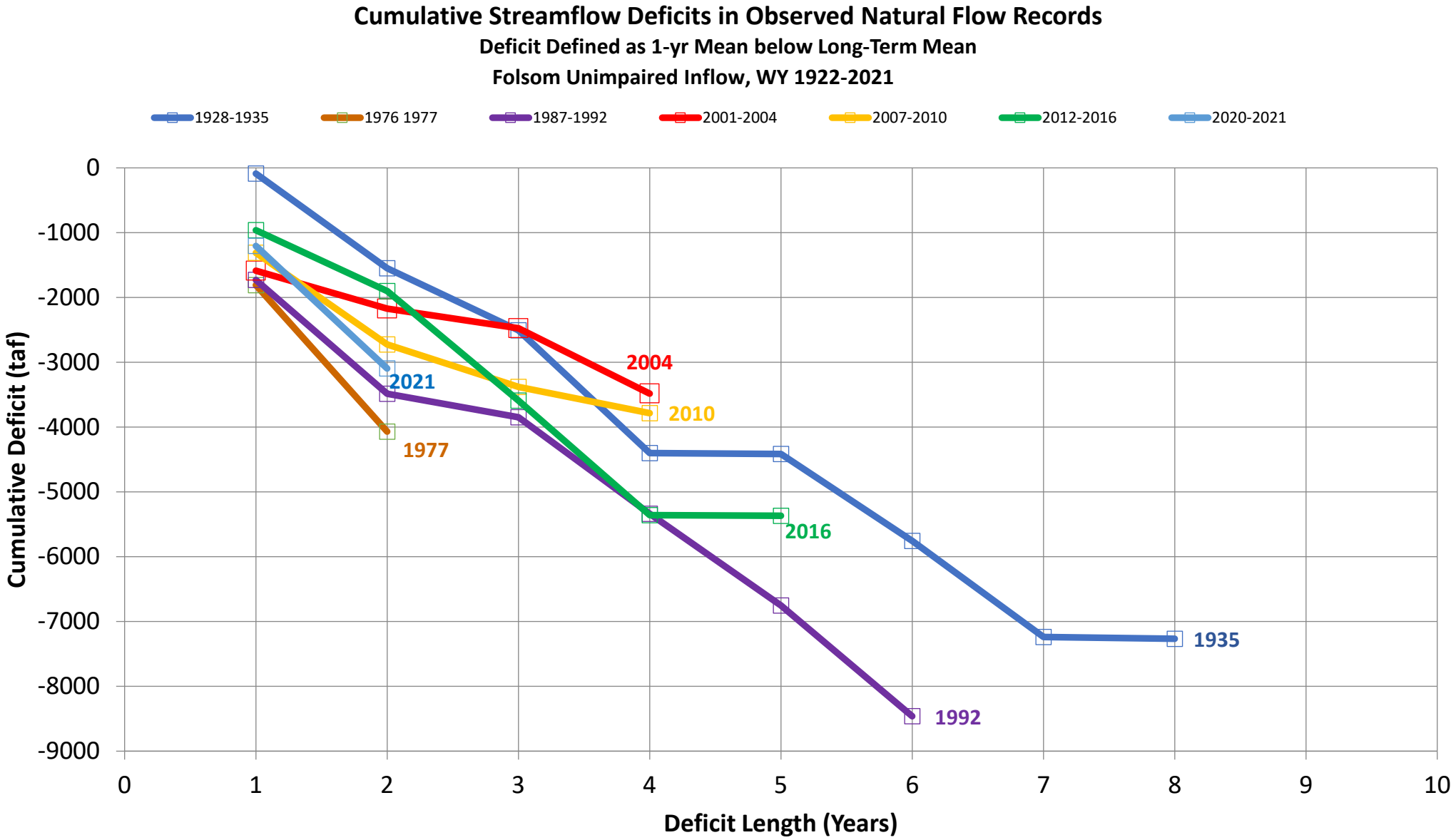
Late Future (2071-2100)



Impacted Sectors

- Surface Water Supply
- Groundwater Supply
- Agriculture
- Hydropower
- Recreation

Drought Severity and Duration – Historical



Vulnerability Assessment – Exposure Analysis

Regional Water Authority
BUILDING ALLIANCES IN NORTHERN CALIFORNIA

1. Set the Stage → 2. Explore Hazards → **3. Assess Vulnerability** → 4. Develop Adaptation Strategies → 5. Implement & Monitor

1. Systematically identify & evaluate the vulnerabilities of watershed resources to climate hazards.

Surface Water Supply	Groundwater Supply
Flood Management	Ecosystem
Water Quality	Recreation
Hydropower	Community & Equity

2. Highlight critical vulnerabilities for additional focus.

3. Inform development of targeted adaptation strategies for long-term resilience.

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1. Systematically identify & evaluate the vulnerabilities of watershed resources to climate hazards.
2. Highlight critical vulnerabilities for additional focus.
3. Inform development of targeted adaptation strategies for long-term resilience.

1. Prioritize areas of highest vulnerability
2. Frame breadth of potential strategies
3. Solicit input on potential strategies
4. Synthesize input and develop conceptual strategies
5. Evaluation strategies

Analytical Tools & Key Quantitative Metrics

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	Sectors	Hydrology (VIC)	System Operations (CalSim 3)	Water Temperature (HEC-5Q)	Key Metrics Example
1	Surface Water Supply	◆	◆		- Reservoir storage levels
2	Groundwater Supply		◆		- Groundwater basin storage - Groundwater Sustainability Plans results
3	Flood Management	◆	◆		- Reservoir flood releases - CVFPP 2022 Update results
4	Ecosystem		◆	◆	- River temperature - River flows and habitat
5	Water Quality			◆	- River temperature
6	Recreation	◆	◆		- Reservoir storage levels - Snowpack conditions
7	Hydropower		◆		- Energy generation from reservoir operations
8	Agriculture		◆		- Surface water & groundwater supply metrics

Breadth of Strategies - We are Seeking a Broad Range of Strategies

Category	Description
Water Management Infrastructure	Physical, engineered solutions and approaches aimed at improving water management
Reservoir and River System Operations	Operational adjustments and modifications for reservoirs and other water infrastructure
Operations, Maintenance, Repair, Rehabilitation	Approaches focused on improving and enhancing both routine and non-routine upkeep of water management facilities
Watershed and Floodplain Management	Efforts related to improving the assessment and mitigation of flood risk under climate change at both the watershed and floodplain scale
Ecosystem Management	Nature-based solutions and approaches aimed at improving ecological processes, restoring and reconnecting habitats, and reducing stressors
Science and Technology	Actions focused on the monitoring, prediction, and measurement of climate-related information under climate change.
Emergency Management	Measures related to improving emergency preparedness and response under potential future risks associated with climate change.
Programmatic, or Project-Specific Permitting	Mitigation and permitting-related approaches or modifications aimed at promoting multi-benefit or climate-resilient actions.
Policy and Regulations	Regulatory or policy changes focused on addressing or incorporating climate change into new or existing guidance.
Funding and Finance	Actions focused on improving climate preparedness and resiliency through funding or financing options
Land Management	Solutions and approaches aimed at improving natural, urban, public, and agricultural land management under climate change.
Groundwater Management	Approaches related to improving groundwater recharge, use, and quality.
Water Quality Management	Actions related to improving water quality and water supply under climate change.