WEST YOST

Water. Engineered.

2025 Safe Yield Reevaluation

Scenario Design Workshop #4

August 27, 2024

Meeting Objectives

Develop an understanding of the proposed quantitative Water Plan Scenarios, Climate Scenarios, and assignment of likelihoods

Gather feedback on quantitative Projection Ensemble and assignment of likelihoods

Agenda

- Welcome
- Process and Timeline
- Response to Party Comments
- Final Projection Ensemble
- Water Plan Scenarios
- Climate Data
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- Next Steps and Schedule

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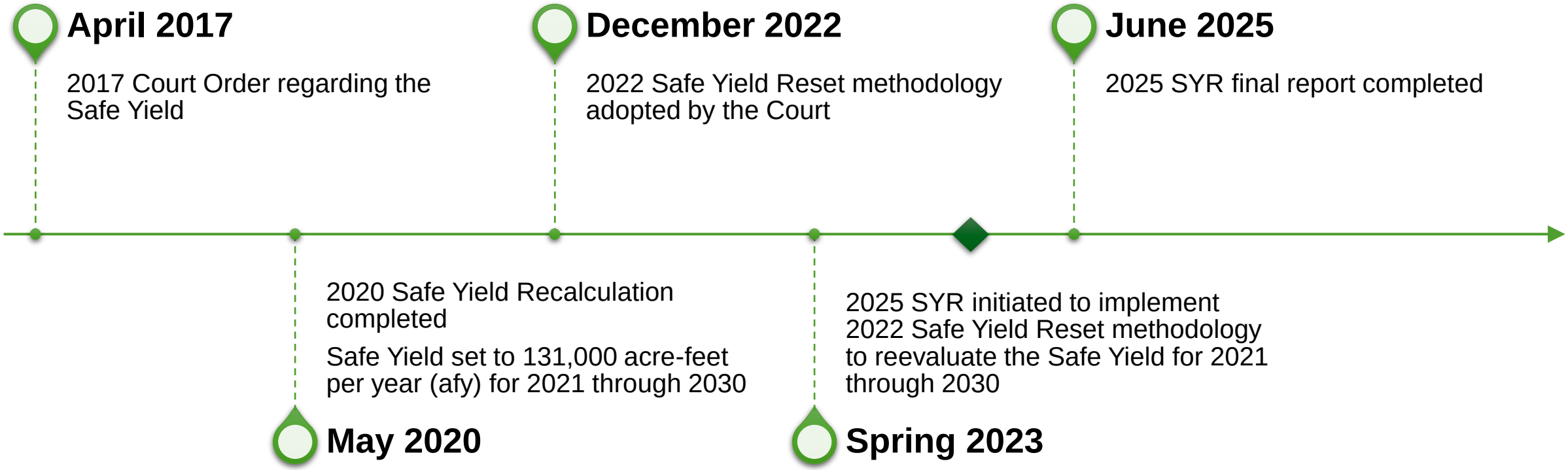
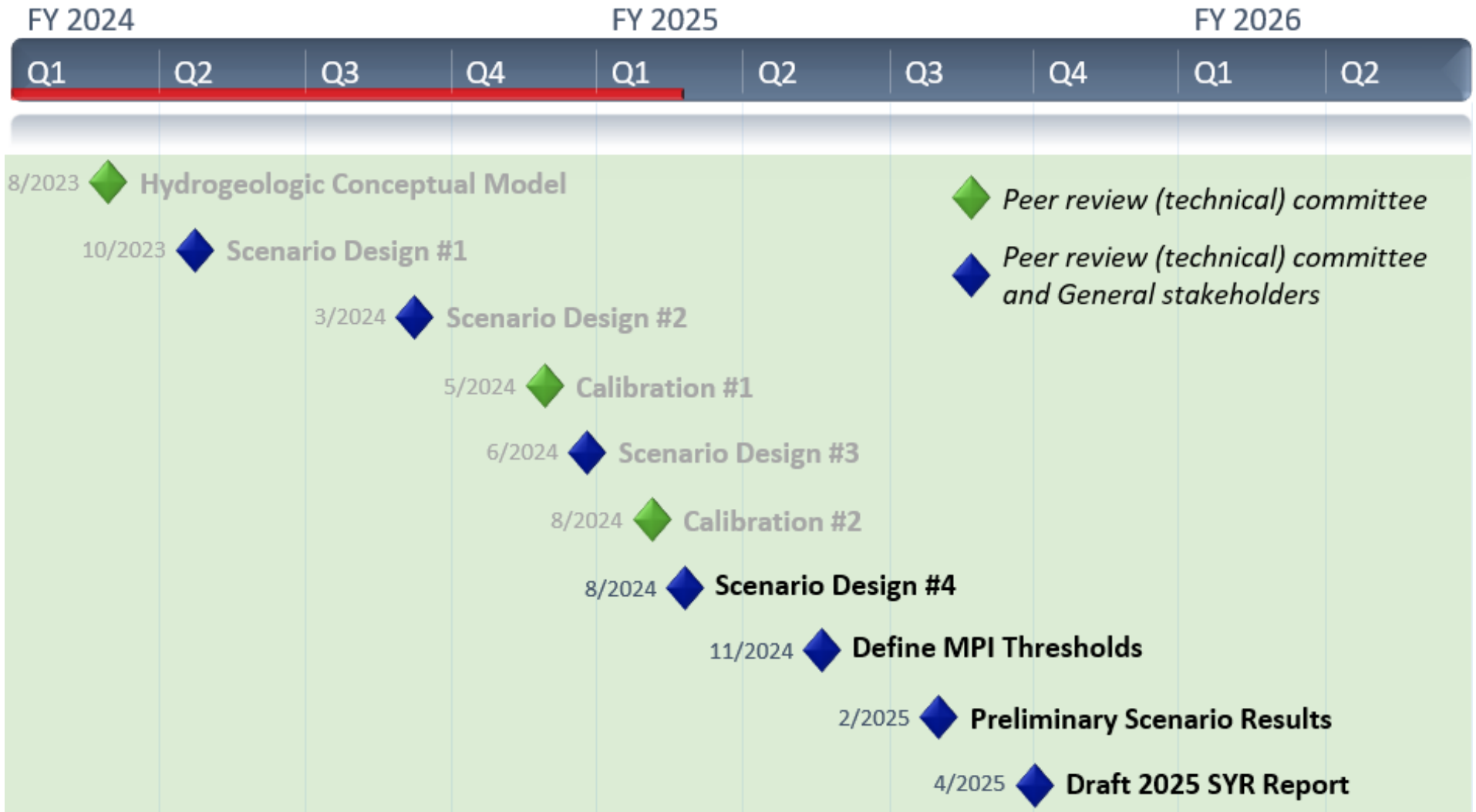

April 2017
2017 Court Order regarding the Safe Yield
May 2020
2020 Safe Yield Recalculation completed
Safe Yield set to 131,000 acre-feet per year (afy) for 2021 through 2030
December 2022
2022 Safe Yield Reset methodology adopted by the Court
Spring 2023
2025 SYR initiated to implement 2022 Safe Yield Reset methodology to reevaluate the Safe Yield for 2021 through 2030
June 2025
2025 SYR final report completed

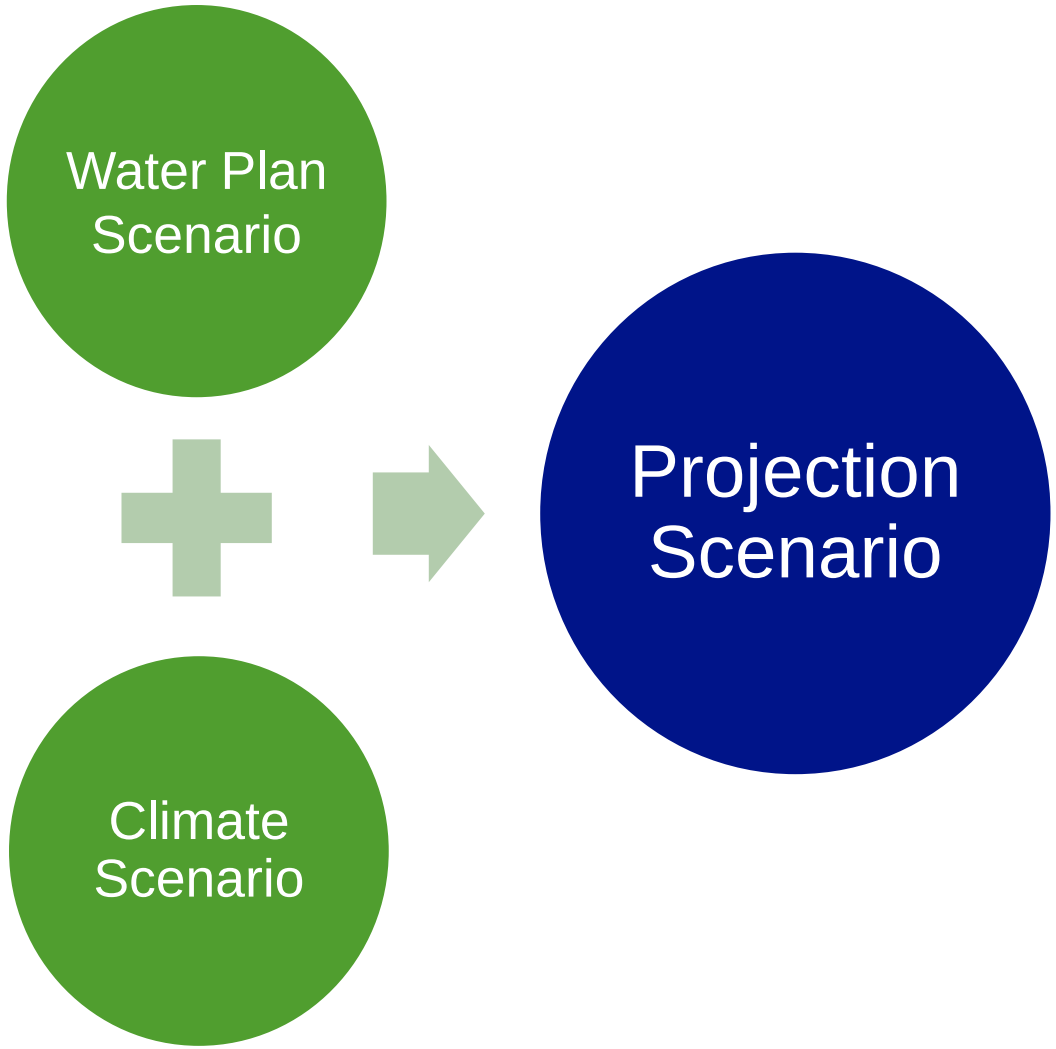
2025 SYR Process

- Update hydrogeologic conceptual model
- Generate calibrated realizations (2025 CVM)
- Develop projection realizations
- Simulate projection realizations
- Evaluate simulation results and calculate Safe Yield
- Develop 2025 SYR report
- Reset Safe Yield (if necessary)

2025 SYR Timeline



What is a projection scenario?



Why do we need multiple projection scenarios?

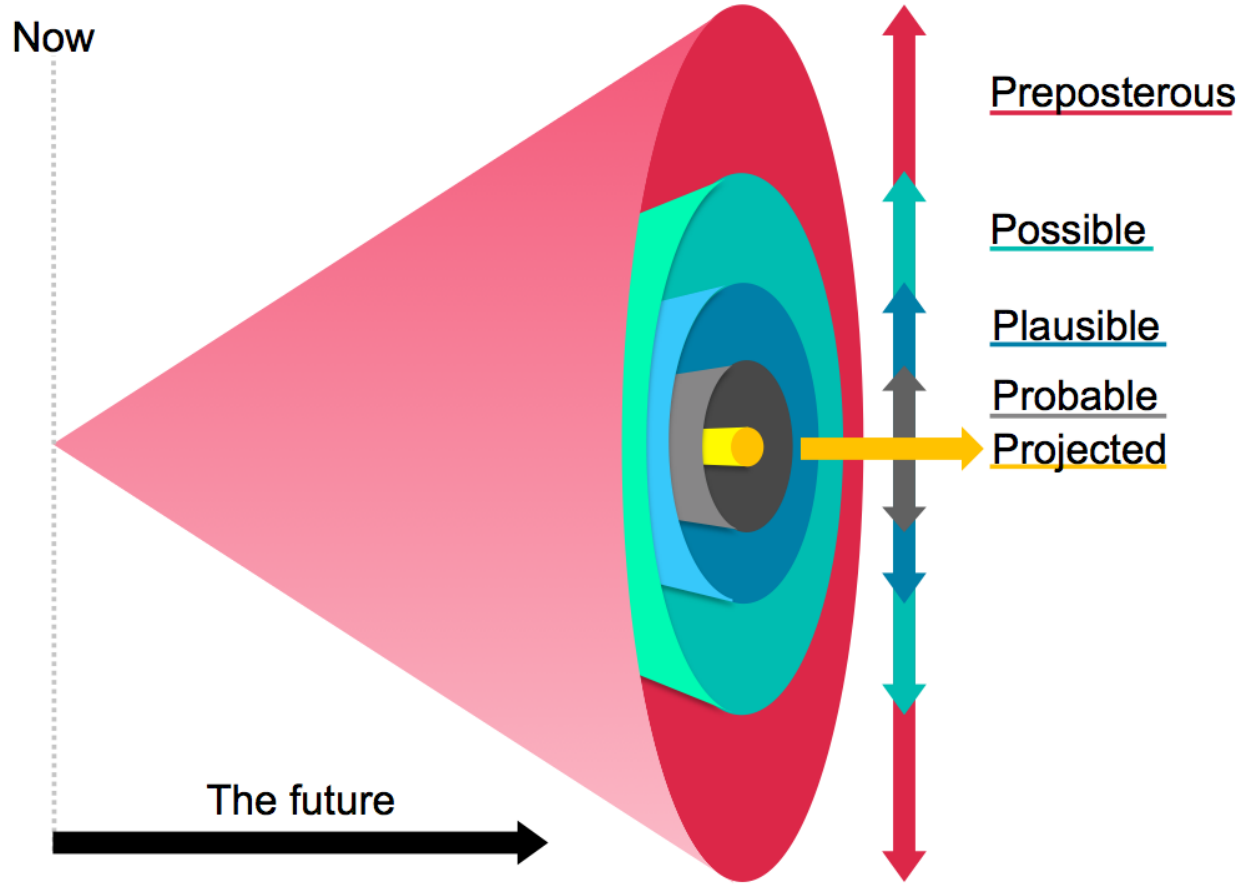
By simulating multiple possible futures, we can better understand the effect of ***predictive uncertainty*** on the Safe Yield and basin behaviors

Helps quantify risk of Material Physical Injury and adverse impacts and identify cost-effective mitigation actions

Goal for developing projection scenarios

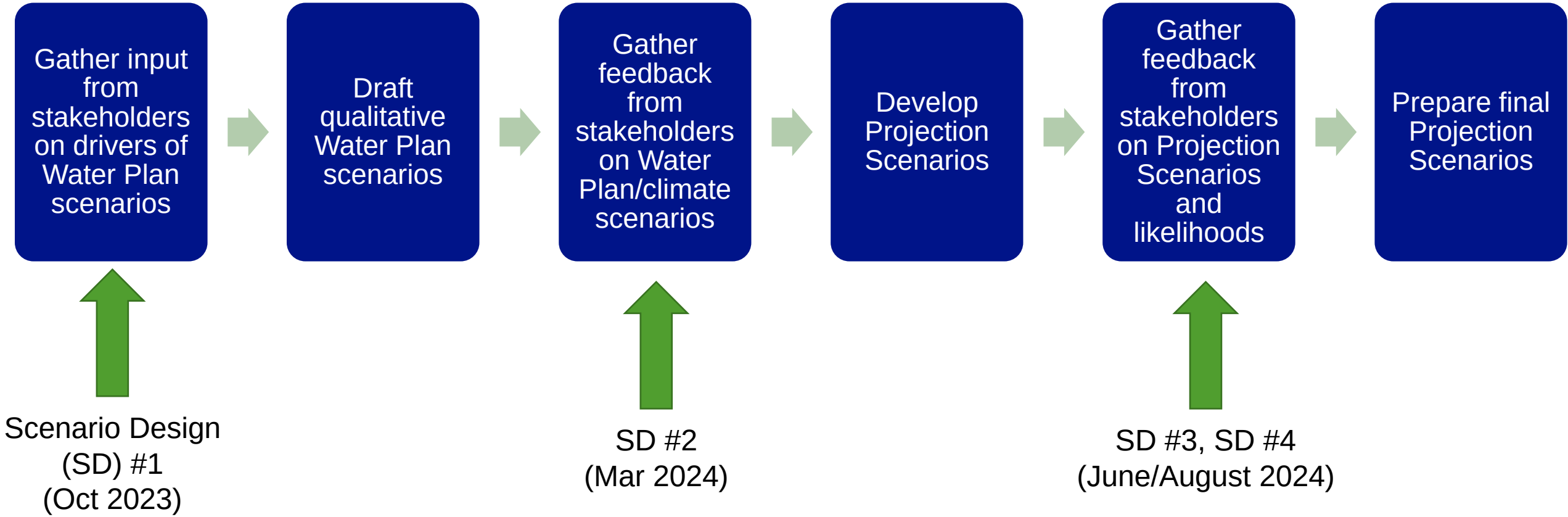
Identify the possible range of Water Plans and climate conditions

(Steps 3 and 4 of the 2022 Safe Yield Reset Methodology)



Envisioning the future for strategic planning - Goal Atlas

Process to develop projection scenarios



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Summary of Feedback from Draft Scenario Design TM/Workshop #3

Questions related to changes between 2020 CVM and 2025 CVM and relationship between net recharge and groundwater levels

Peer reviewers suggesting methods for developing projection scenarios

Requesting clarification on climate scenarios and addressing historical trends of overestimated demands

Summary of Feedback from Draft Scenario Design TM/Workshop #3

We are required to consider the Conservation Regulation in the 2025 SYR projection scenarios

- Required by 2020 Court Order and 2022 Safe Yield Reset Methodology
- Water Plan Scenarios should reflect demands that are less than the party-provided Water Plans
- Conservation Regulation provides a defensible framework for adjusting party-provided Water Plans

Incorporating Feedback from Stakeholder/Peer Review

- Limiting size of Projection Ensemble
- Addressing high uncertainty in Conservation Regulation timeline and implementation
- Acknowledging diversity in drivers of and opinions on scenarios
- Clearly communicating costs and scope
- Identifying and implementing stakeholder-identified efficiencies in modeling approach

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Projection Ensemble

Projection Scenario	Rationale	Water Plan Scenario			Climate Scenario
		Demand	Groundwater Utilization	Imported Water Utilization	
1	Expected/baseline	Expected	Expected	Expected	Average
2	Hot/dry climate	Expected	Expected	Expected	Hot/dry
3	Cool/wet climate	Expected	Expected	Expected	Cool/wet
4	Impact of high demands	High	High	Low	Average
5	Low groundwater levels	High	High	Low	Hot/dry
6	High net recharge	High	High	Low	Cool/wet
7	Impact of low demands	Low	Low	High	Average
8	Low net recharge	Low	Low	High	Hot/dry
9	High groundwater levels	Low	Low	High	Cool/wet

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Translating Water Plan Scenarios into 2025 CVM Inputs

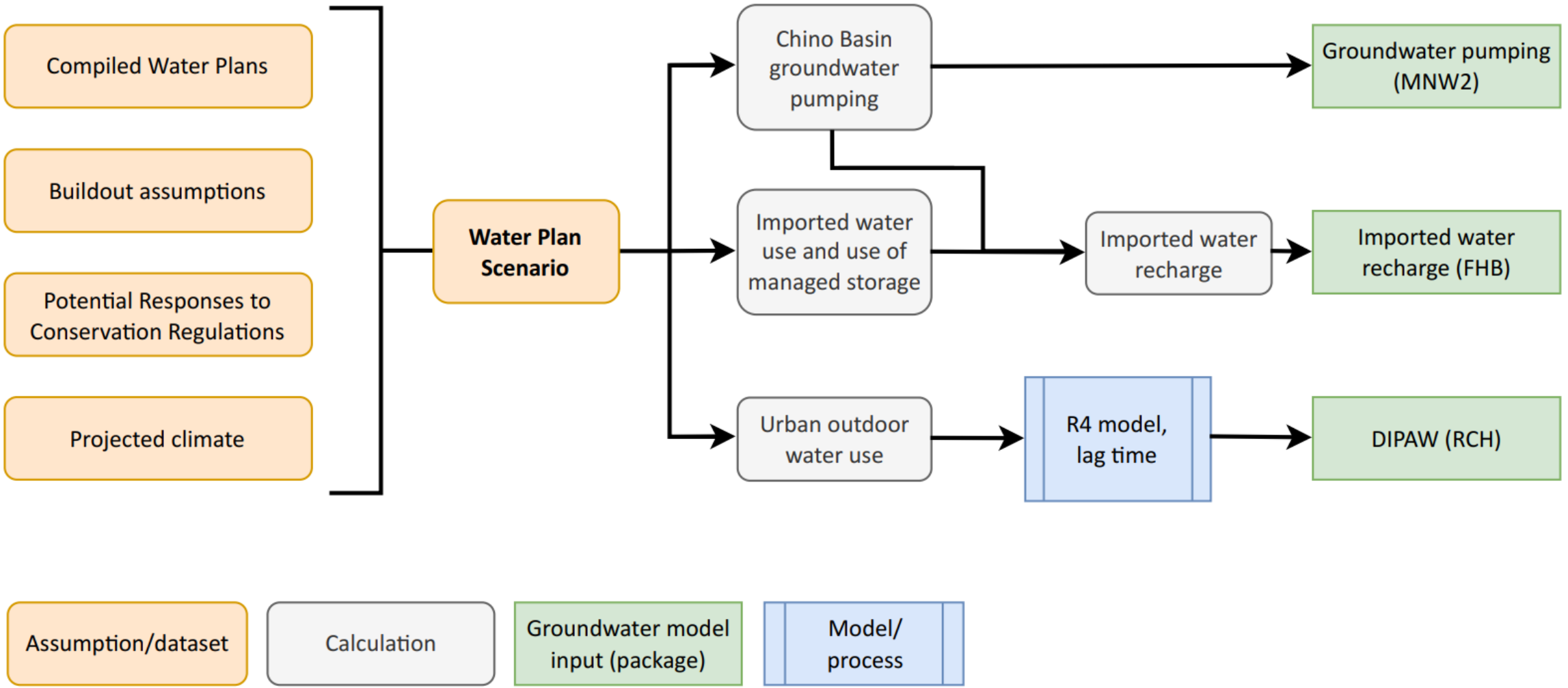
Which model inputs will vary for each Water Plan scenario?

What are the current plans, projections, and assumptions for future cultural conditions in the Chino Basin?

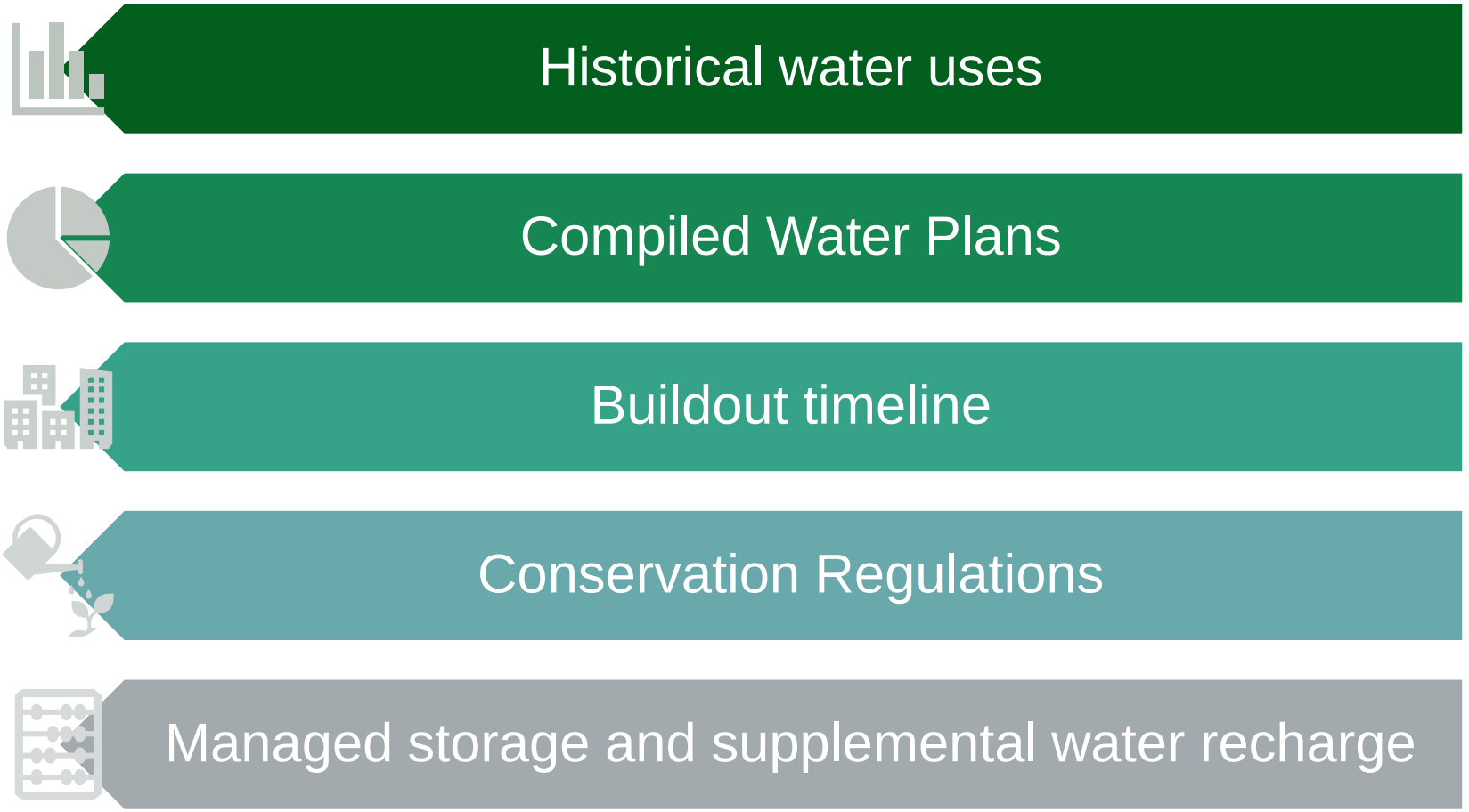
How should the current plans and projections translate into Water Plan scenarios that represent the uncertainty in future cultural conditions?

How should the Water Plan scenarios reflect climatic variability?

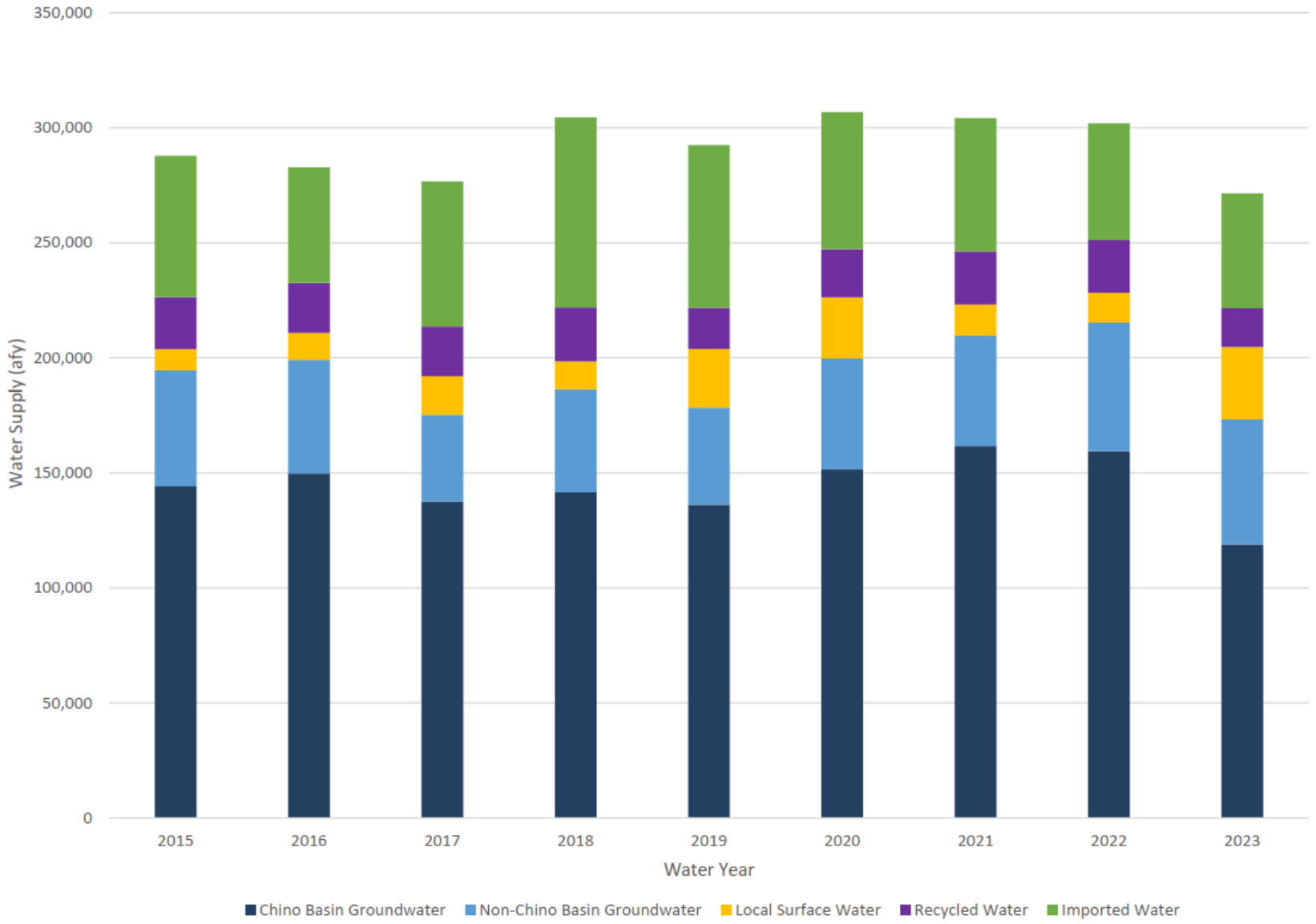
Updating Model Inputs



Current Plans, Projections, and Assumptions for Future Cultural Conditions



Historical Water Supplies of the Chino Basin Parties



Compiled Water Plans

Appropriative Pool

- Water Plans compiled from data collection and evaluation
- Historical patterns

Overlying Non-Ag Pool

- Data collection and evaluation
- Historical patterns

Ag Pool

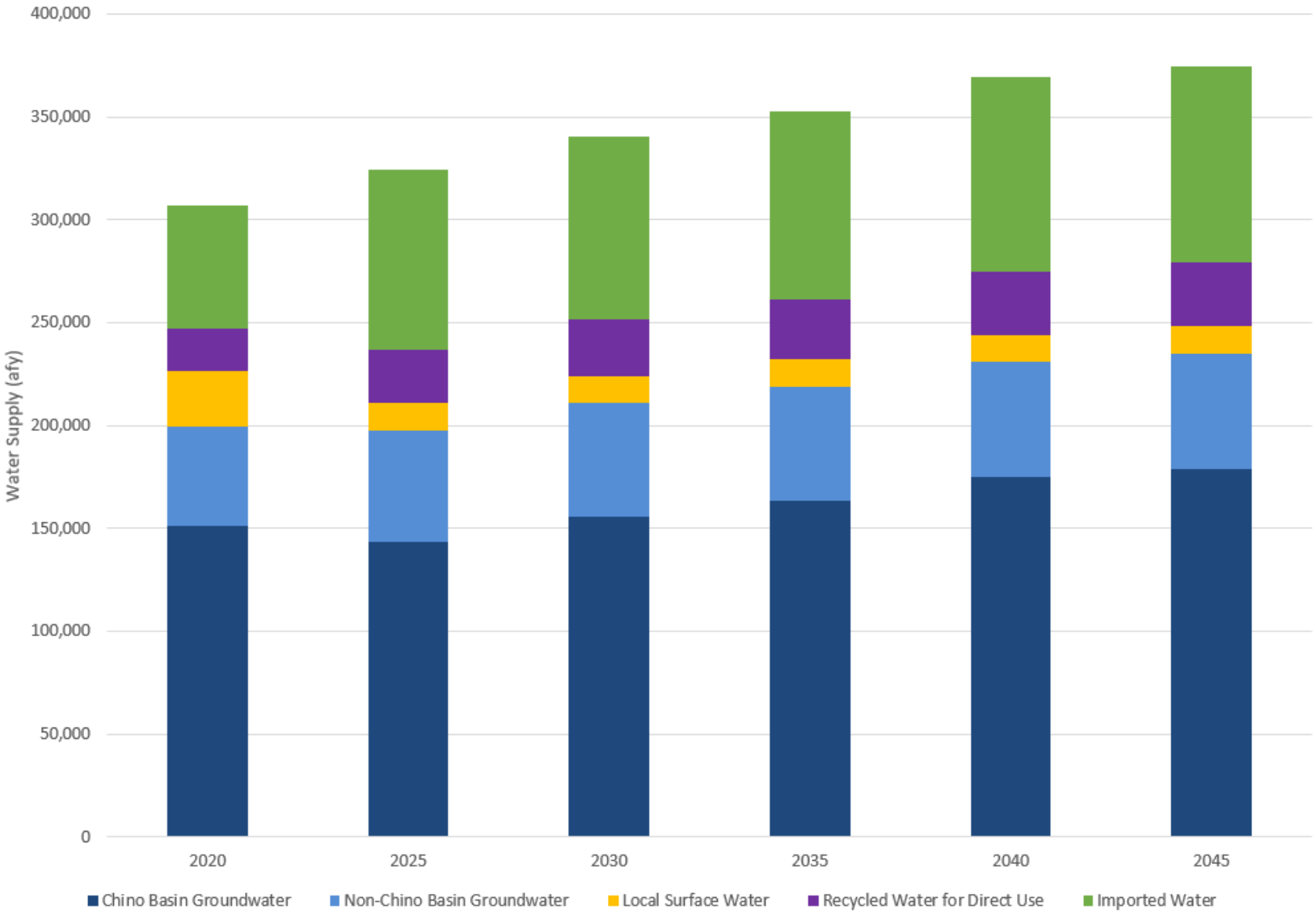
- Projected buildout
- Historical patterns

Compiled Water Plans

Category	2020[(a)]	2025	2030	2035	2040	2045
Volume (afy)						
Chino Basin Groundwater	151,365	143,179	155,712	163,446	175,211	179,016
Non-Chino Basin Groundwater	48,308	54,682	55,077	55,371	55,762	55,954
Local Surface Water	26,620	13,205	13,205	13,205	13,205	13,205
Imported Water	59,637	87,113	88,368	91,624	94,310	94,808
Recycled Water for Direct Use	20,857	25,891	27,888	29,185	30,782	31,282
Total	306,787	324,070	340,250	352,831	369,270	374,265
Percentage of Total Supply						
Chino Basin Groundwater	49%	44%	46%	46%	47%	48%
Non-Chino Basin Groundwater	16%	17%	16%	16%	15%	15%
Local Surface Water	9%	4%	4%	4%	4%	4%
Imported Water	19%	27%	26%	26%	26%	25%
Recycled Water for Direct Use	7%	8%	8%	8%	8%	8%
Total	100%	100%	100%	100%	100%	100%

[(a)] Historical data compiled for Water Year 2020 for the Chino Basin SGMA Annual Report.

Compiled Water Plans



Buildout Timeline

Timelines and population growth are incorporated in Urban Water Management Plans and reflected in Water Plans

Municipal Appropriative Pool parties have indicated a buildout of 2040 or 2045

Conservation Regulation

Background and timeline

- The “Making Conservation a California Way of Life” (Conservation Regulation) aims to increase statewide conservation
- Adopted July 2024, effective January 2025

Conservation Regulation

Water budget

- Requires calculating a budget for four components: residential water use, water losses, outdoor irrigation (CII w/ DIMs), and bonus incentives

Relevance to 2025 SYR

- Outdoor irrigation (residential and CII w/ DIMs) has the greatest impact on the Basin

Conversations with AP Parties

- Met with four parties to discuss Conservation Regulations (Ontario, CVWD, JCSD, Upland)
- Highlighted challenges with meeting nominal reductions greater than 10-15 percent
- Many parties hired outside consultant to assist with developing more accurate water budgets compared to the State Board's database
- Water Plans do not necessarily reflect the Conservation Regulation water budgets

Estimated Implementation of Conservation Regulation

Calculated nominal water use objectives for residential use based on State Board database

- Adjusted for population growth

Calculated nominal water use objectives for CII w/ DIMs based on:

- Conservation Regulation
- Patterns derived from party-provided data

Water Plan Scenarios
Buildout and Conservation Regulation

Low Demand

- Buildout: ~2045
- Major AP retailers meet >80% of retail reductions, >90% of reductions in CII w/ DIMs
- 2045 demands: 329,000 acre-feet (af)

Expected Demand

- Buildout: ~2040
- Major AP retailers meet >60% of retail reductions, >80% of reductions in CII w/ DIMs
- 2045 demands: 346,000 af

High Demand

- Buildout: ~2037
- Major AP retailers meet >35% of retail reductions, >50% of reductions in CII w/ DIMs
- 2045 demands: 361,000 af

Water Plan Scenarios
Groundwater and Imported Water Utilization

Low Groundwater Utilization/High Imported Water Utilization

- Imported water/groundwater increases/decreases by 8% relative to expected groundwater pumping
- Parties will meet 70 percent of replenishment obligations through managed storage

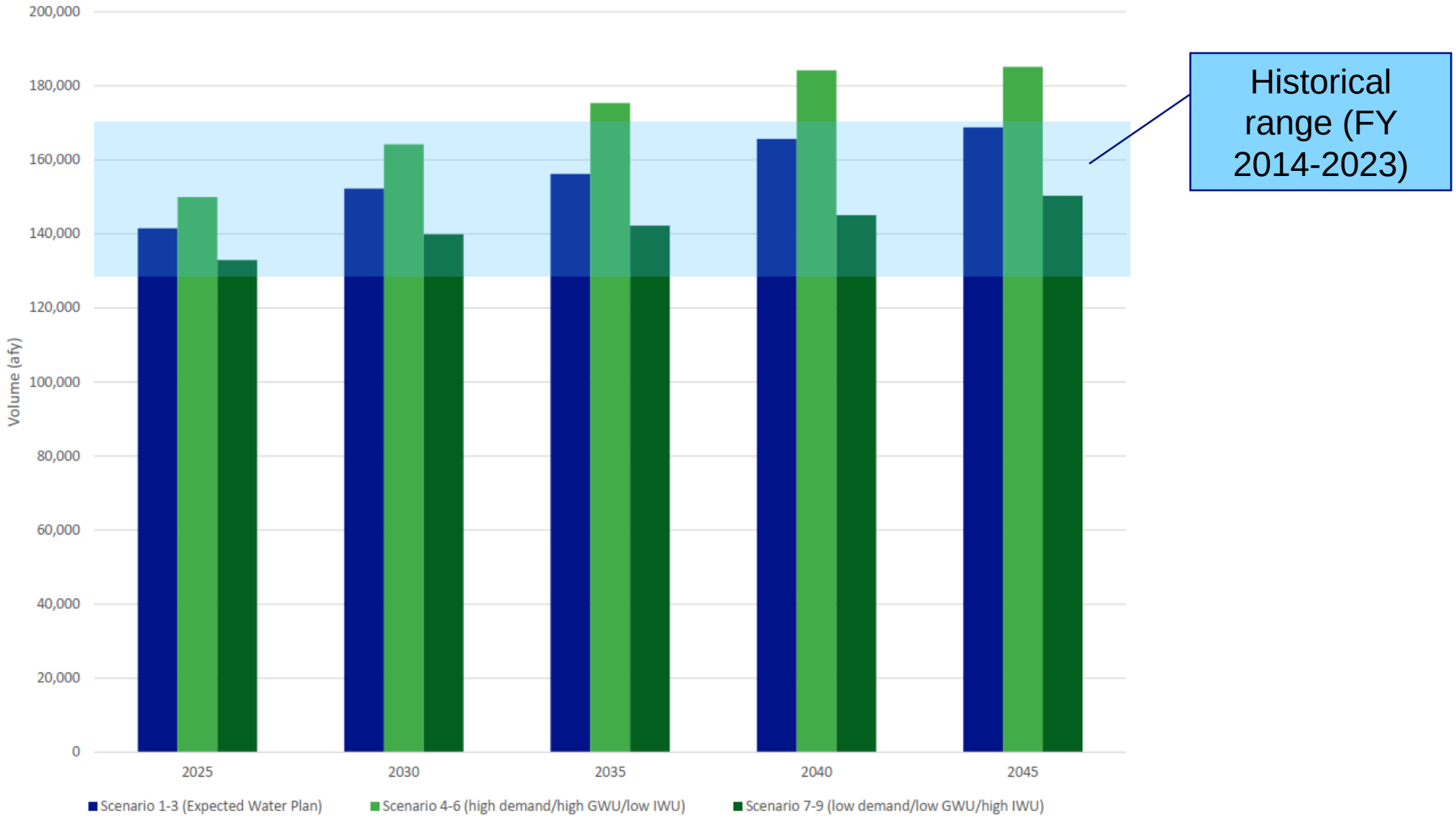
Expected Utilization

- Distribution is identical to Water Plans
- Parties will meet 90 percent of replenishment obligations through managed storage

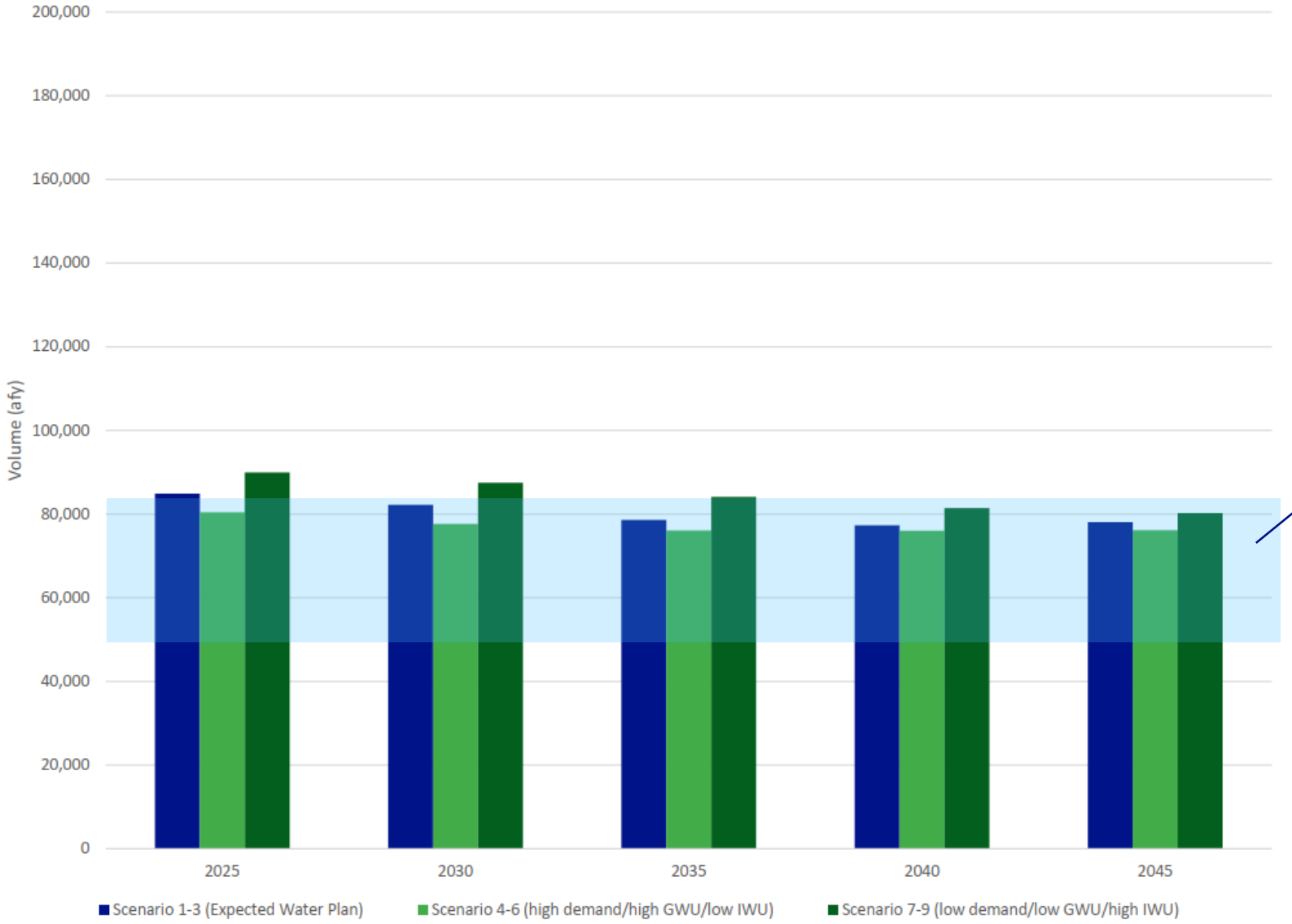
High Groundwater Utilization/Low Imported Water Utilization

- Imported water/groundwater decreases/increases by 8% relative to expected groundwater pumping
- Parties will meet 100 percent of replenishment obligations through managed storage

Total Chino Basin Groundwater Demands for Water Plan Scenarios – Average Hydrologic Year



Total Chino Basin Imported Water Demands for Water Plan Scenarios – Average Hydrologic Year



Historical range (FY 2014-2023)

Variability of Water Plans due to Climate Scenarios

Climatic Variability

- Interannual or multi-year variability in precipitation and temperature

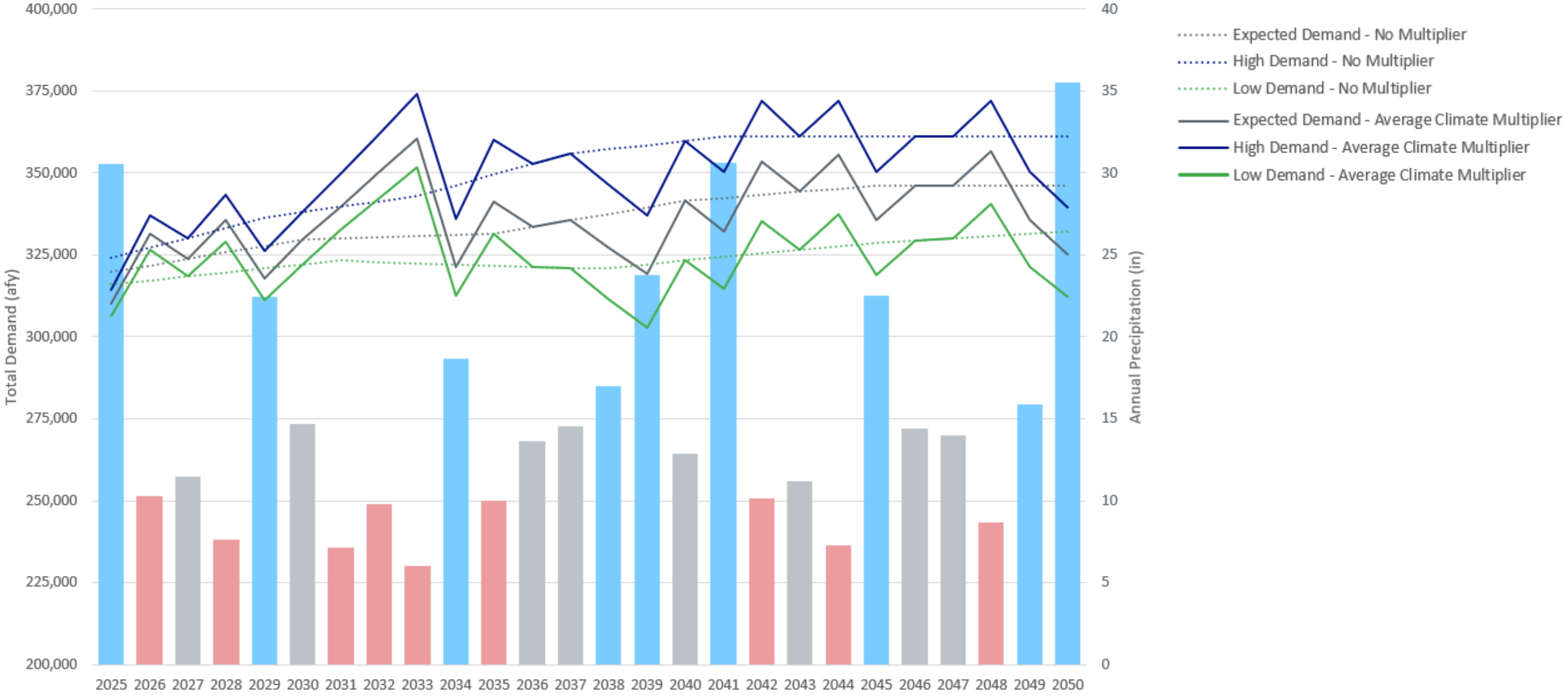
Variability of Demands due to Precipitation

- Fluctuate within ±9% of average demands, scaled by annual precipitation and compounding for multiple dry/wet years

Variability of Demands due to Temperature

- Demands will be adjusted 1.2% per degree Fahrenheit deviation from expected climate (calculated on average annual temperature)

Total Chino Basin Demands for Water Plan Scenarios – Average Climate Scenario



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Developing Data for Climate Scenarios

Datasets for projected climate conditions

- Remaining challenges with CMIP6 data
- Transitioning to using DWR change factors (CFs) based on CMIP5 climate models

Generating projected precipitation/ evapotranspiration (ET)

- FY 2024-2030 based on historical data (sampled from FY 1950-2022) with 2030 CFs
- FY 2031-2080 based on scenario from chosen dataset, blending 2030 and 2070 CFs

Overview of Change Factors (CFs)

Multipliers of monthly historical data to reflect future scenarios and years

- Varies across basin and over time
- CFs available for 1915-2011 historical data

CFs are available for three scenarios

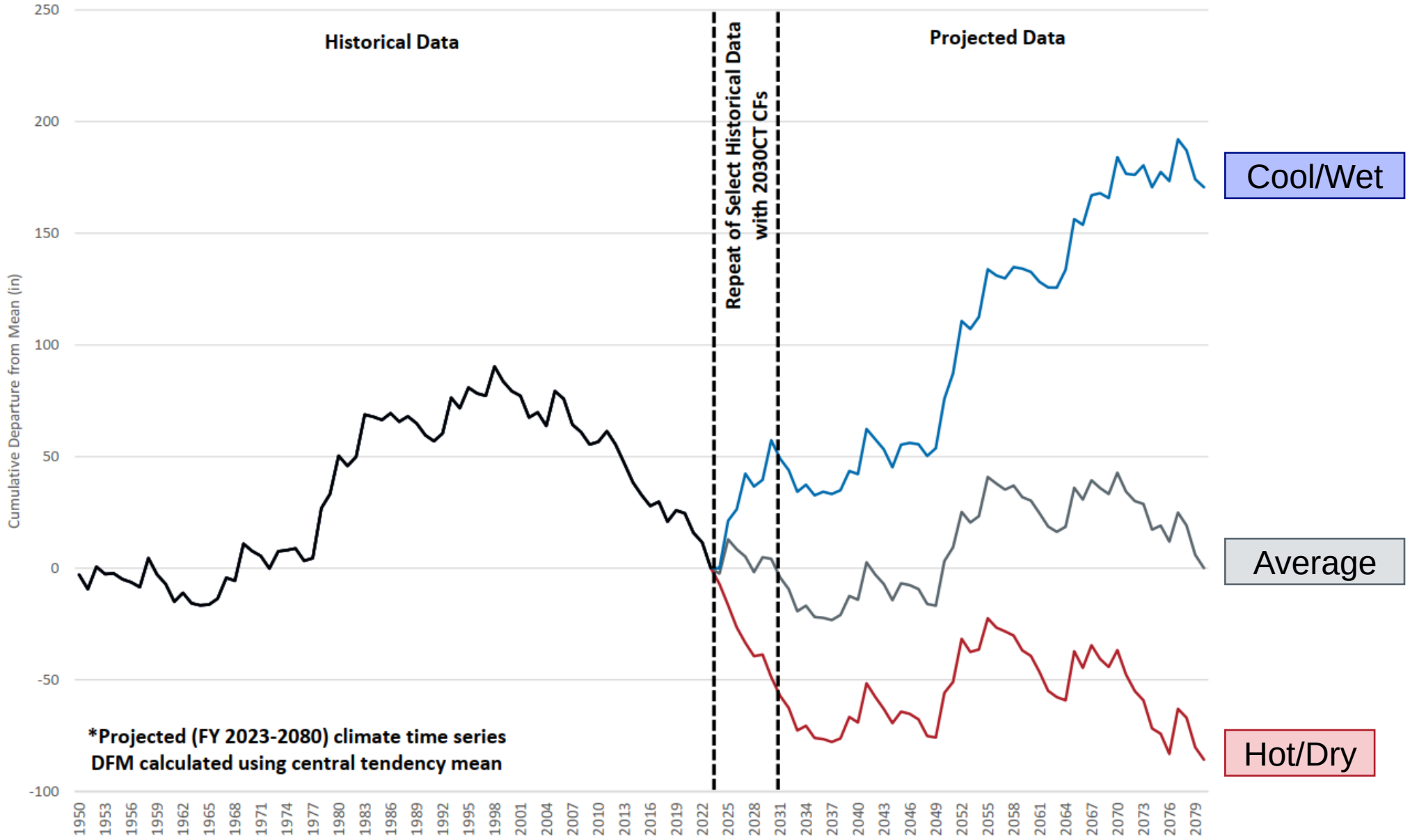
- 2030: Central Tendency (CT)
- 2070: CT, Dry/Extreme Warming (DEW), Wet/Moderate Warming (WMW)

Proposed Climate Scenarios

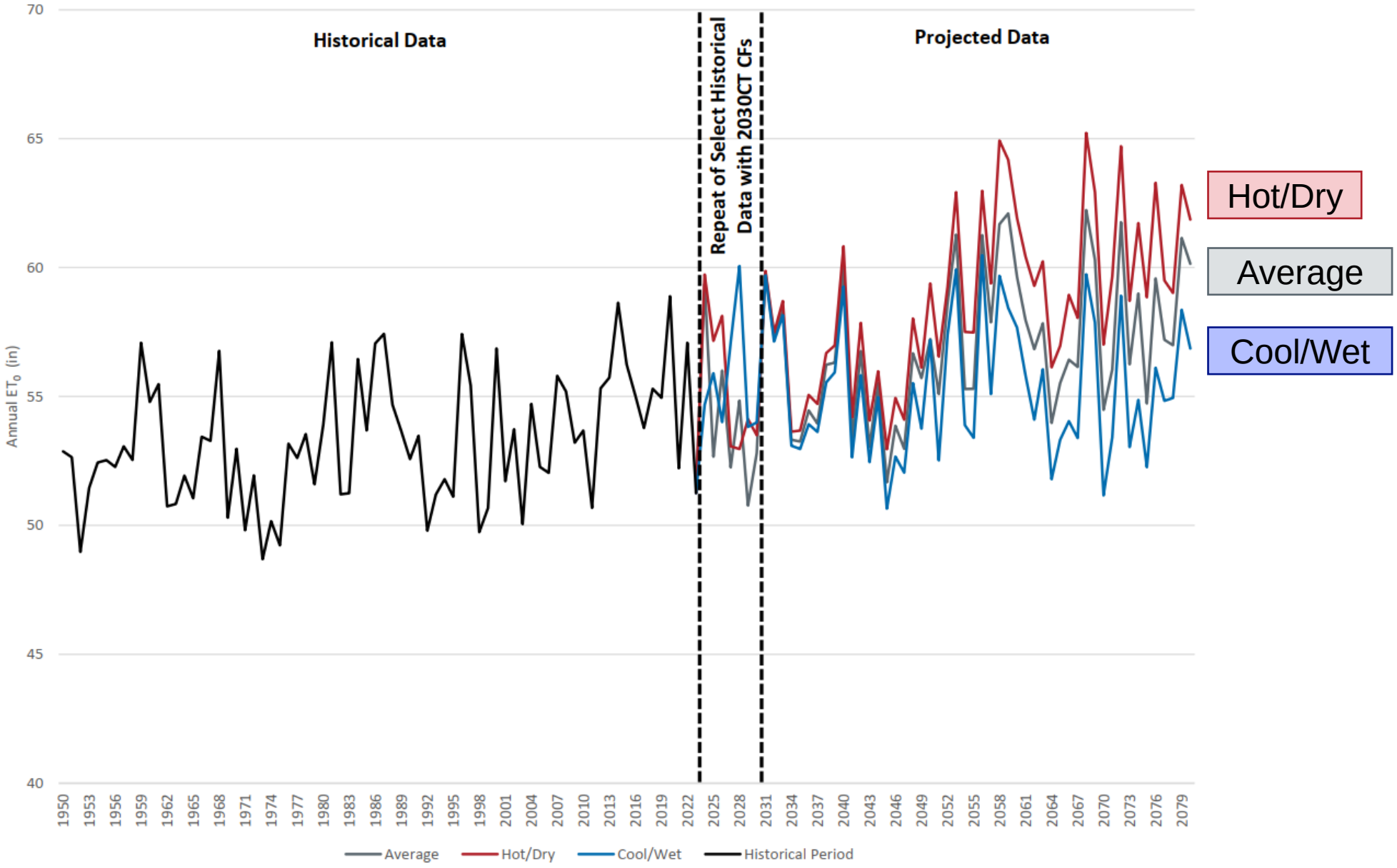
Climate Scenario	Precipitation and ET	
	FY 2024 through 2030	FY 2031 through 2080
Average	Historical period with average precipitation[a] (FY 1968-1974) modified with 2030CT CFs	Historical period (FY 1959-2008) modified using CFs 2030CT and 2070CT
Hot/Dry	Historical period with lowest precipitation (FY 2012-2018)	Historical period (FY 1959-2008) modified using CFs 2030CT and 2070DEW
Cool/Wet	Historical period with highest precipitation (FY 1977-1983) modified with 2030CT CFs	Historical period (FY 1959-2008) modified using CFs 2030CT and 2070WMW

[a] Calculated based on continuous seven-year periods taken from the historical (PRISM) data of FY 1950 through 2022.

Precipitation Time Series for Climate Scenarios



Reference ET (ET_0) for Climate Scenarios



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Assigning Likelihoods

Numerical weights applied to Water Plan Scenarios and Climate Scenarios

Expected Water Plan Scenario and Average Climate Scenario –

higher likelihood

Proposed Likelihoods

Projection Scenario	Water Plan Scenario			Climate Scenario	Proposed Likelihood Weights		
	Demand	Groundwater Utilization	Imported Water Utilization		Water Plan Scenario	Climate Scenario	Total
1	Expected	Expected	Expected	Average	2	2	4
2	Expected	Expected	Expected	Hot/dry	2	1	2
3	Expected	Expected	Expected	Cool/wet	2	1	2
4	High	High	Low	Average	1	2	2
5	High	High	Low	Hot/dry	1	1	1
6	High	High	Low	Cool/wet	1	1	1
7	Low	Low	High	Average	1	2	2
8	Low	Low	High	Hot/dry	1	1	1
9	Low	Low	High	Cool/wet	1	1	1

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Next Steps

Compile feedback from peer reviewers/stakeholders on draft Scenario TM #3

Please provide feedback to Garrett Rapp (grapp@westyost.com) by **September 20, 2024**

Respond to written feedback and finalize Scenario TM #3

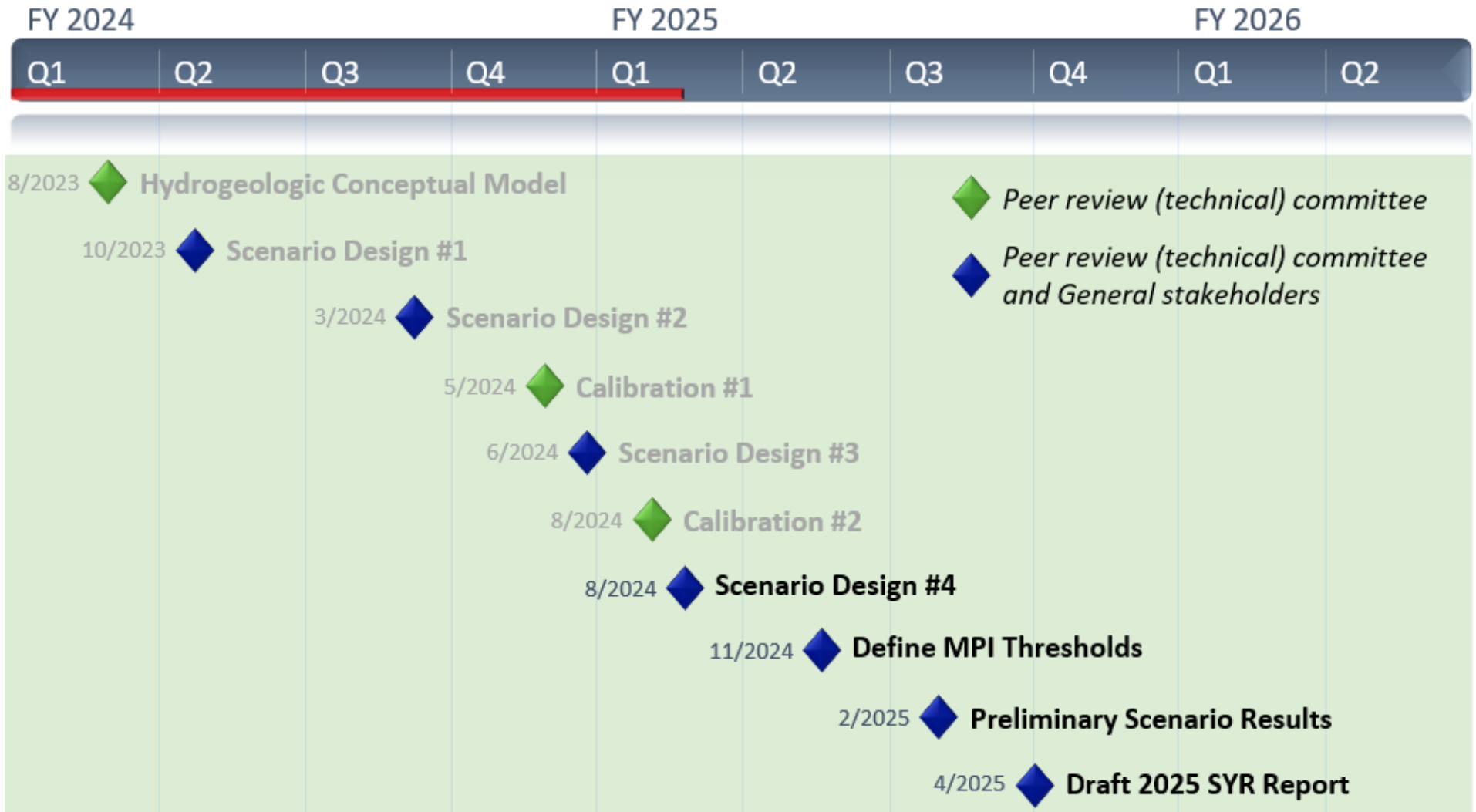
Prepare input files for Projection Ensemble

Upcoming workshops:

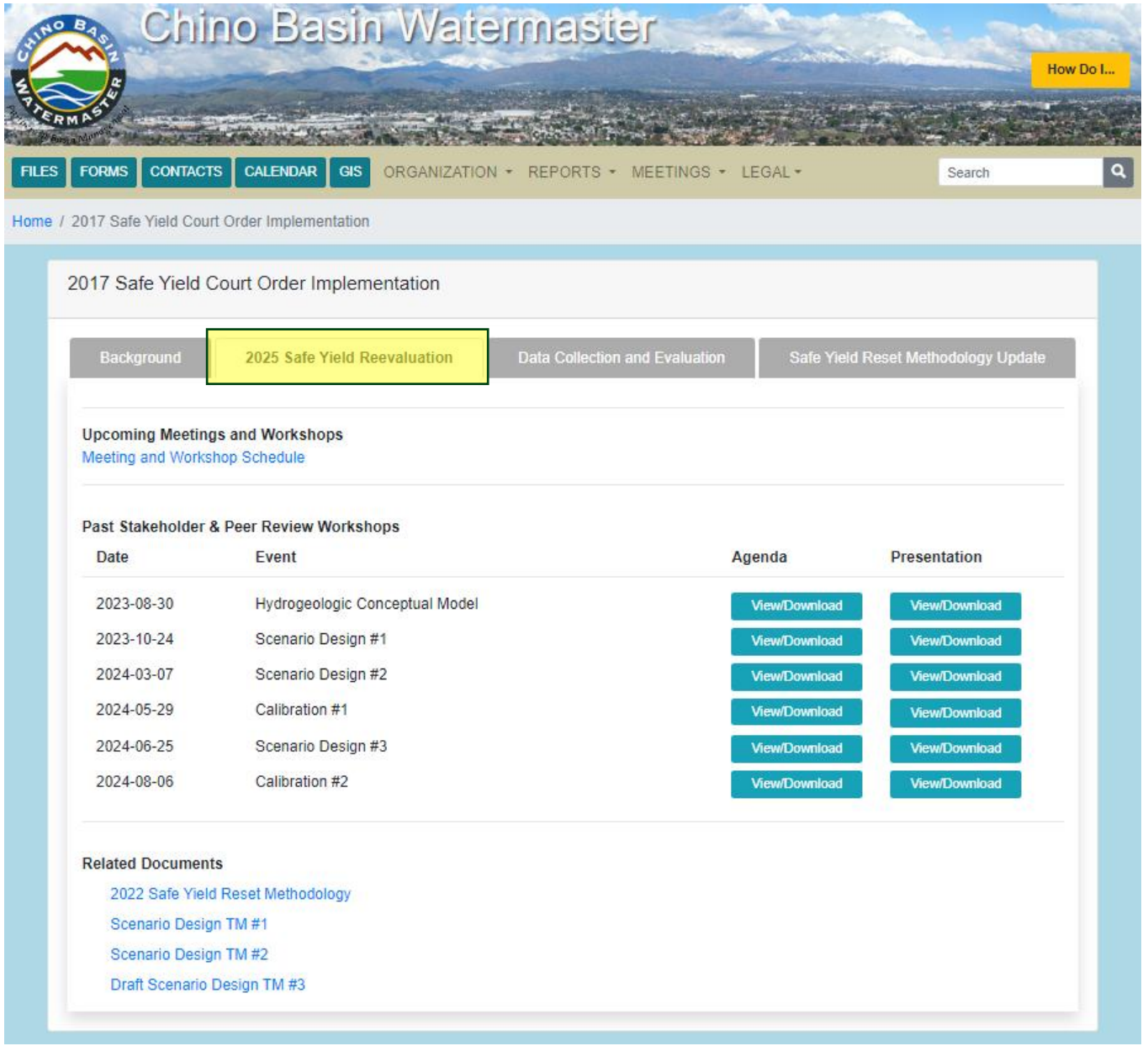
November 2024: MPI Workshop (peer reviewers/stakeholders)

February/March 2025: Preliminary result review (peer reviewers/stakeholders)

2025 SYR Timeline

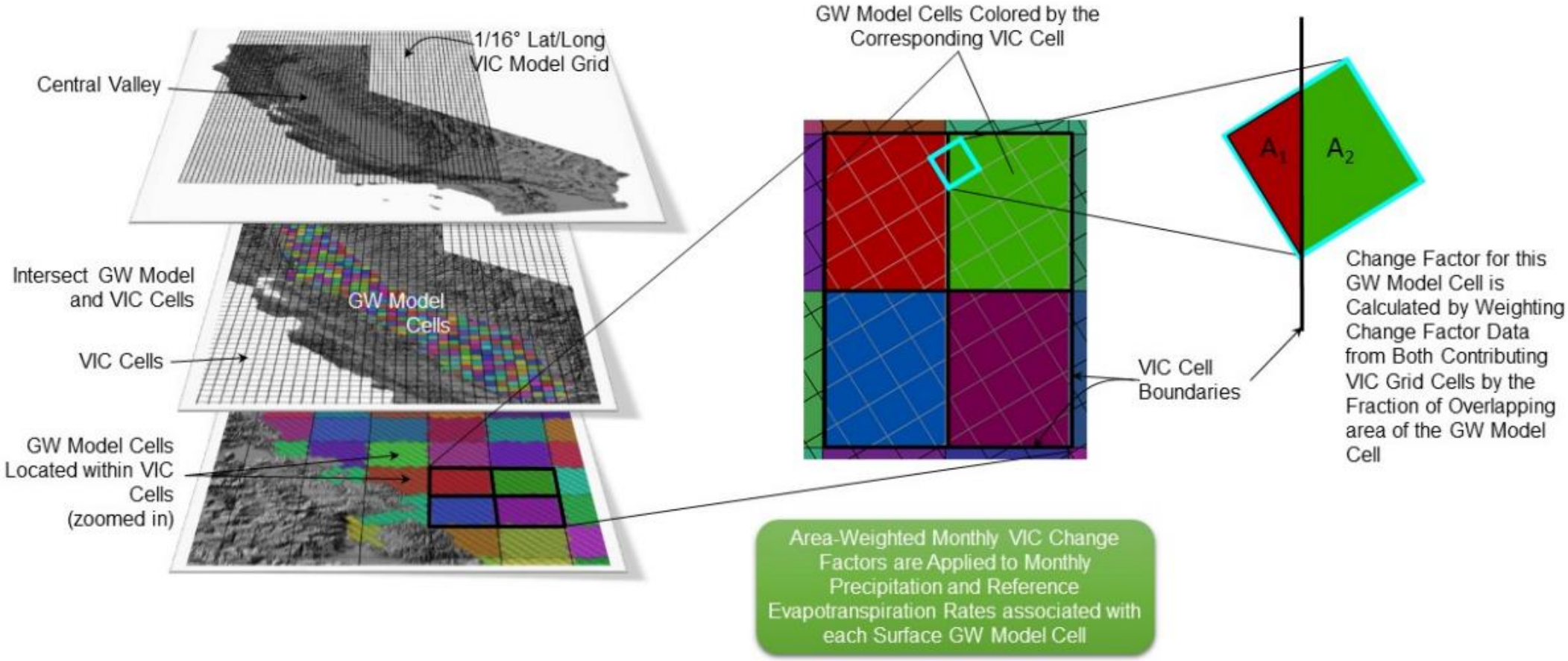


https://www.cbwm.org/pages/syrm/



THANK YOU

Overview of Change Factors (CFs)



From CA DWR – Guidance for Climate Change Data Use During Groundwater Sustainability Plan Development (2018)