WEST YOST

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2025 Safe Yield Reevaluation

Chino Valley Model Calibration Workshop #2

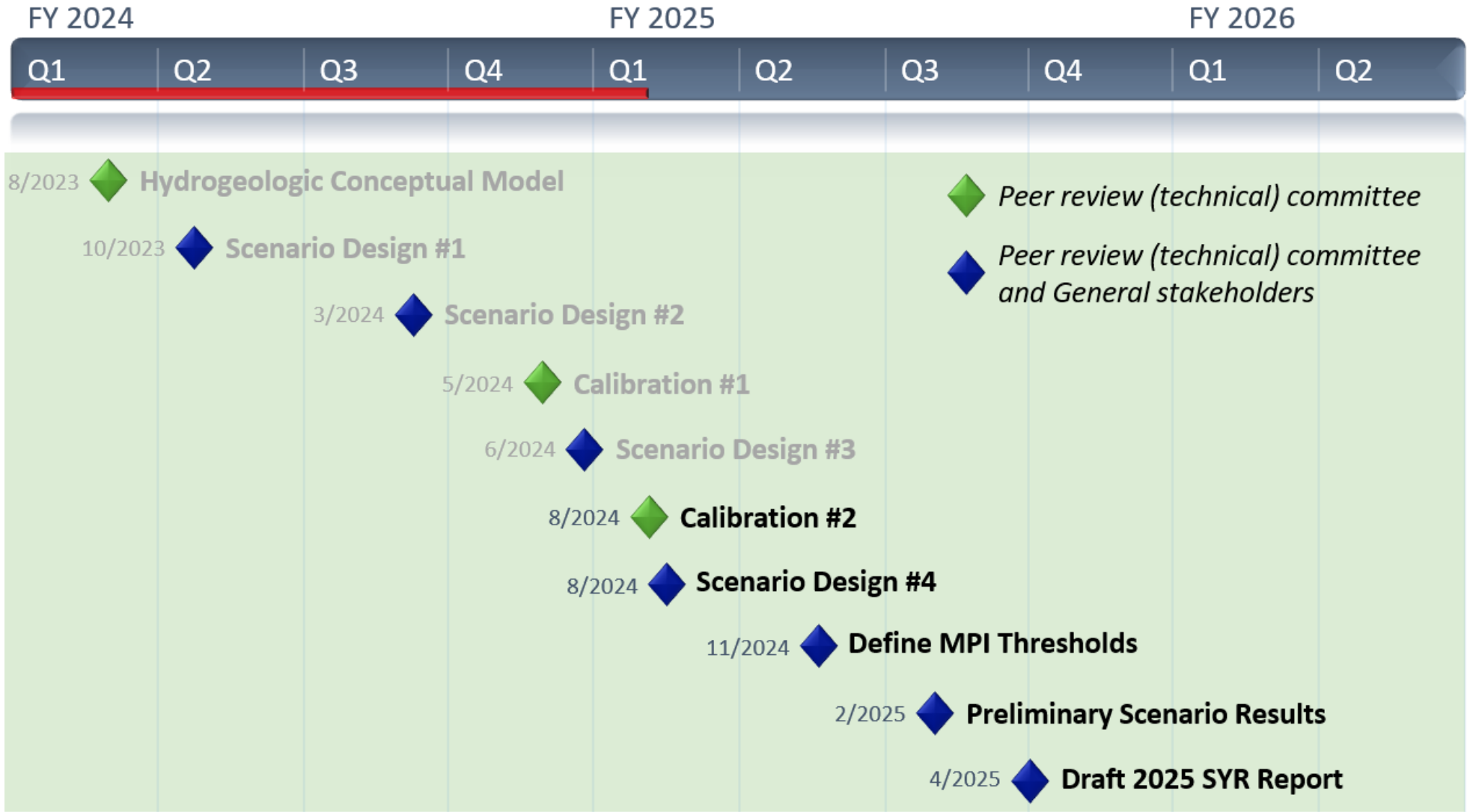
August 6, 2024

Meeting Objectives

Develop an understanding of the final recalibration and uncertainty analysis and the calibrated realizations to be used in the 2025 Safe Yield Reevaluation (2025 SYR)

Gather feedback on recalibration/uncertainty analysis and chosen realizations

2025 SYR Timeline



Agenda

- Welcome
- Recap of May 29th Workshop
- Appropriative Pool Comments and Responses
- Results and Recommendations
- Next Steps and Schedule

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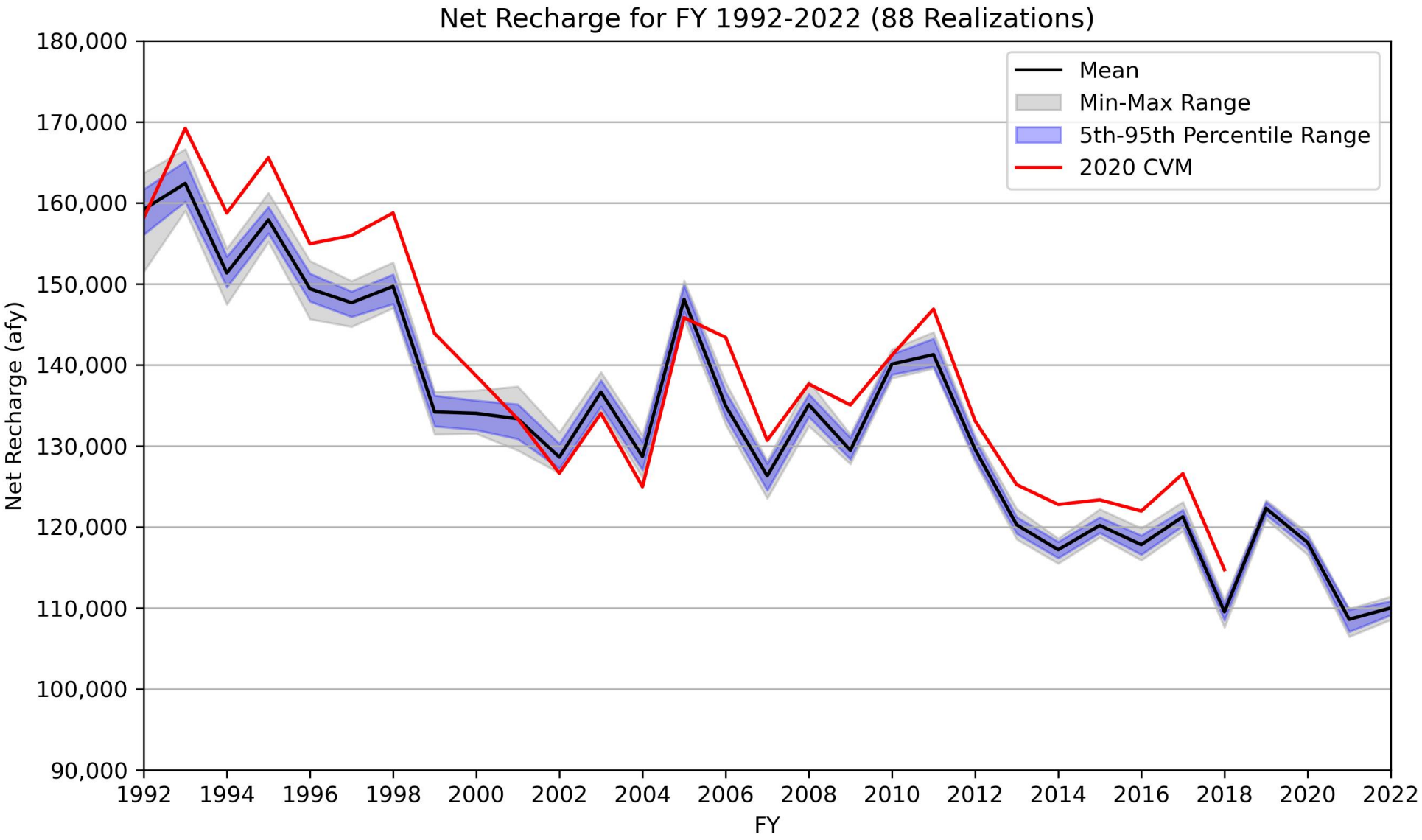
Recap of 5/29 Workshop

- Updates to the Chino Valley Model (CVM)
- Manual calibration results
- PESTPP-IES and uncertainty analysis
- Next steps – continue exploring uncertainty

Initial Results – 5/29 Workshop



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Some Definitions

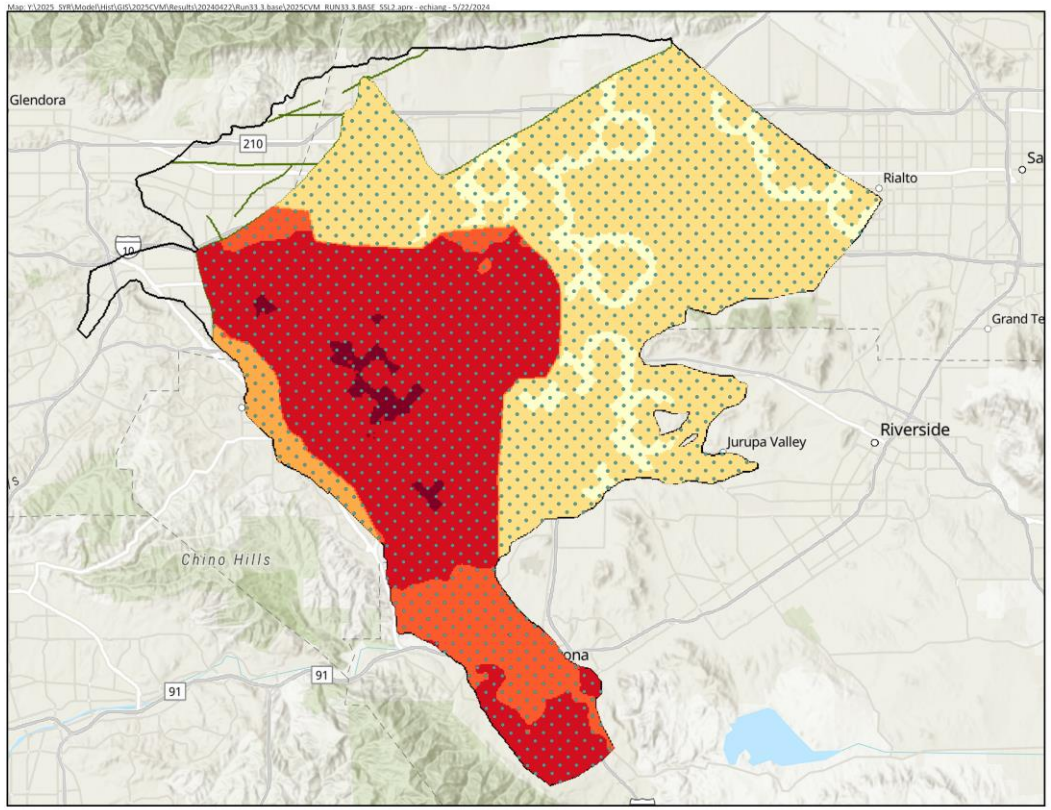
PESTPP-IES parameters can vary many model parameters

- E.g., a pilot point for specific yield (Sy) used as a PESTPP-IES parameter can vary the Sy values at that that cell and many adjacent cells
- In the context of PESTPP-IES, we are referring to parameters as PESTPP-IES parameters

Some Definitions

Overfitting

- We used “overfitting” to mean that PESTPP-IES generated unrealistic patterns of heterogeneity (e.g., horizontal hydraulic conductivity) given our prior knowledge of the hydrostratigraphy
- “Overfitting is normally deemed to have occurred when the cost of achieving this fit is the introduction of too much heterogeneity to the calibrated parameter field.” – John Doherty, PEST Manual



Incorporating Comments re: Uncertainty

Since the 5/29 workshop, we have:

- Increased number of parameters
- Revised upper/lower bounds of parameters
- Increased number of desired realizations
- Updated layer weights during iterations

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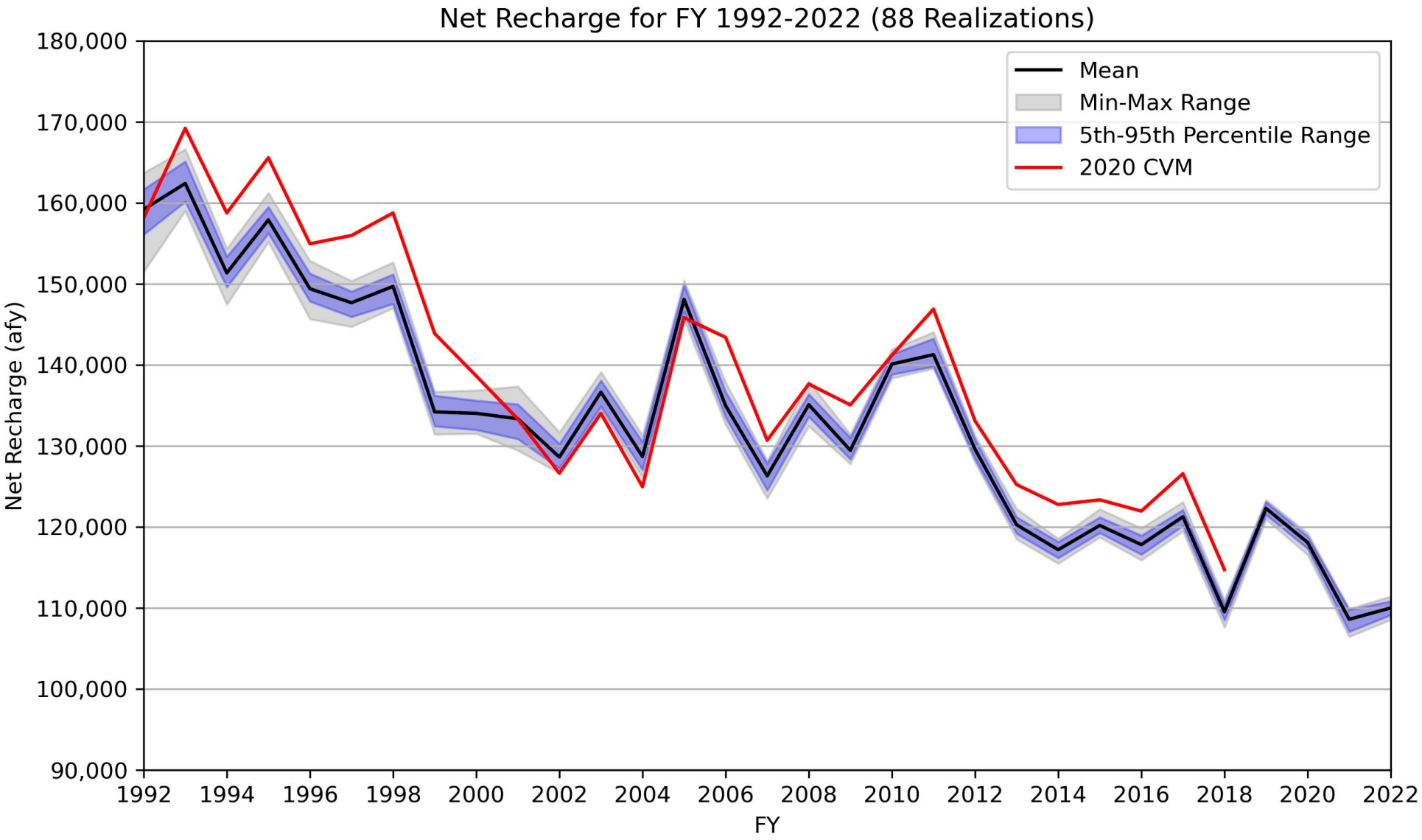
Exploring Uncertainty

Range of parameters

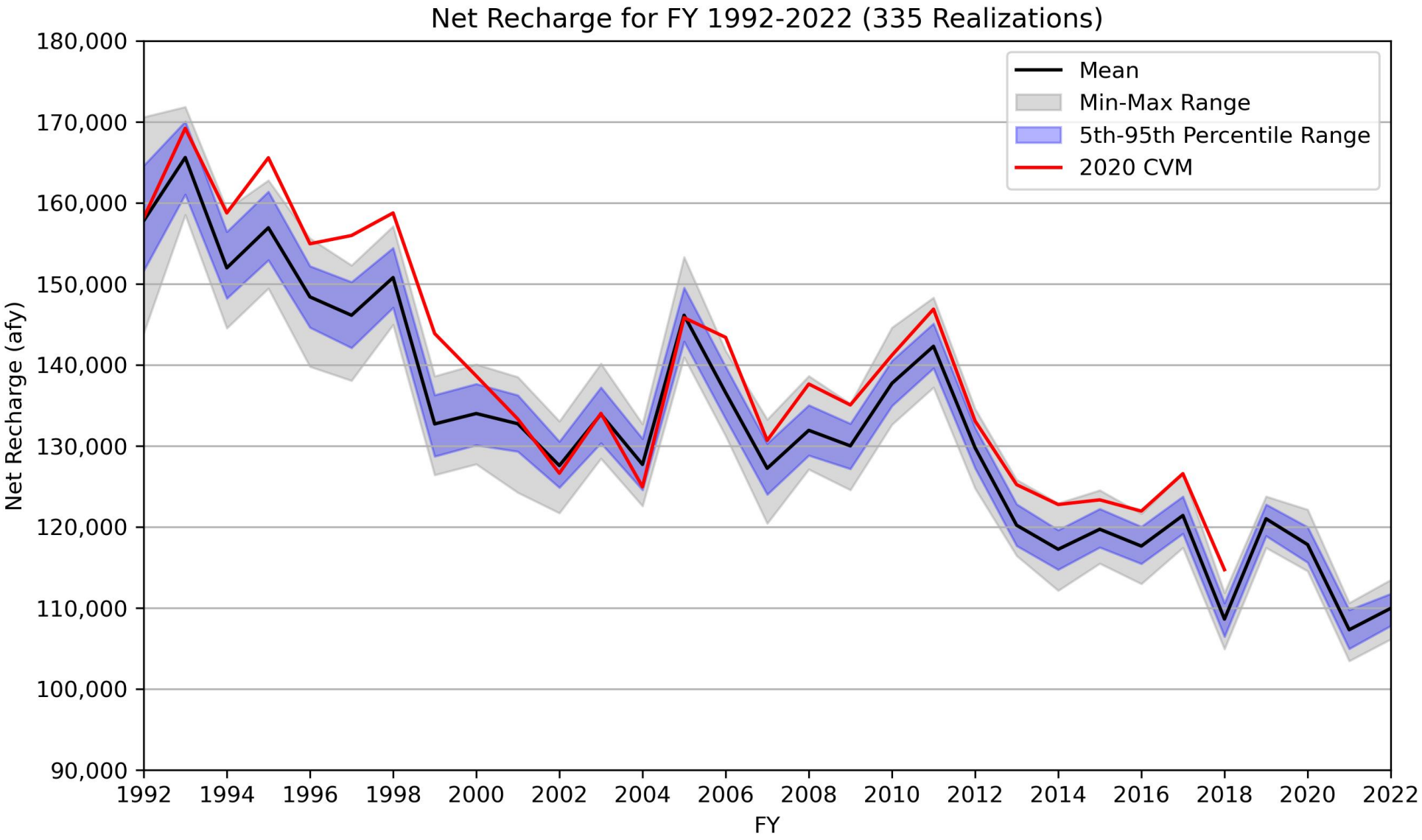
Number of realizations

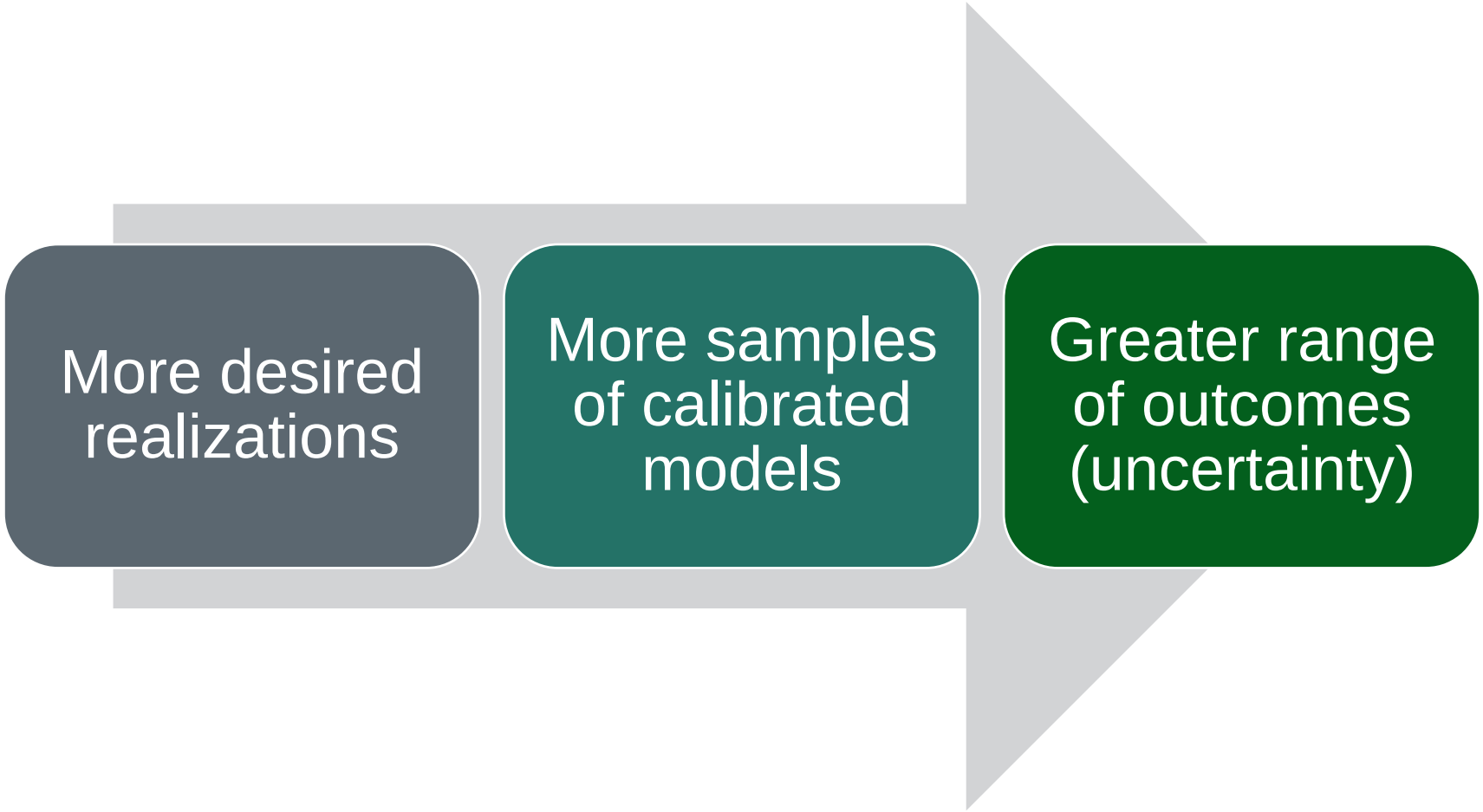
Number of pilot points/parameters

Initial Results – 88 Realizations



335 Realizations




More desired realizations
More samples of calibrated models
Greater range of outcomes (uncertainty)

Adding Pilot Points/Parameters

PESTPP-IES algorithm is independent of number of pilot points/parameters,

…but adding more pilot points/parameters increases the required computational resources, which can slow the process

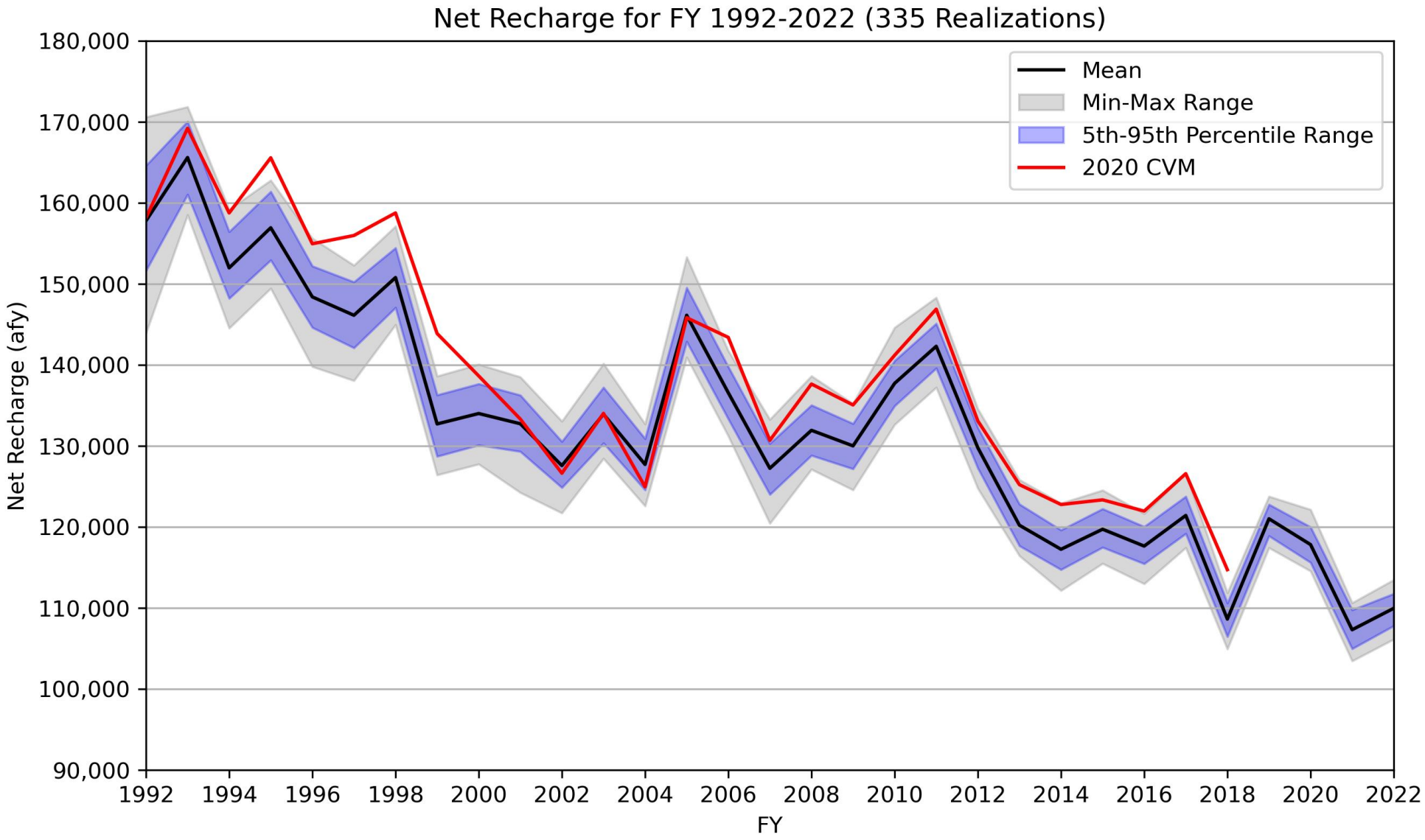
More pilot points/parameters may affect uncertainty

Adding Pilot Points/Parameters

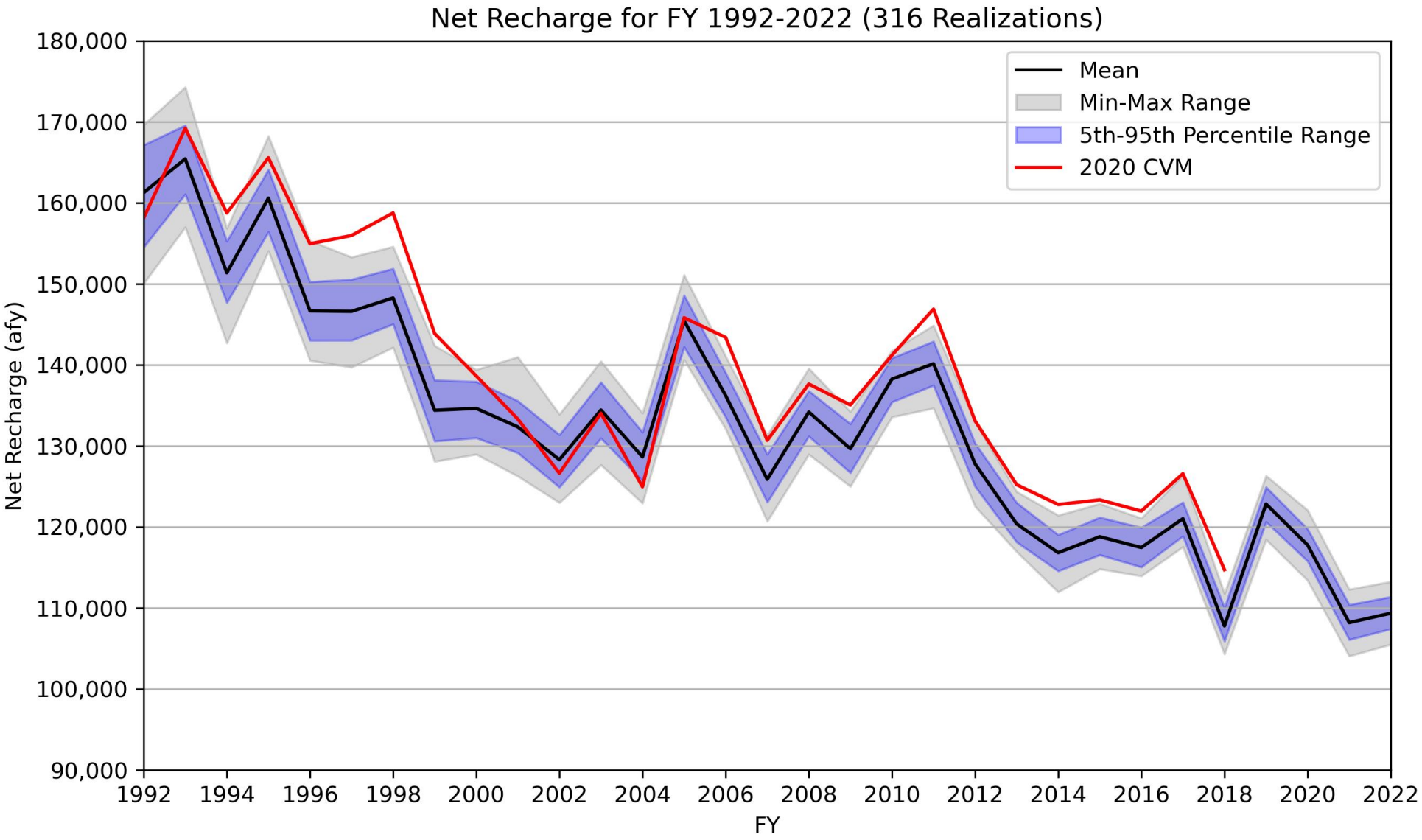
25,326 adjusted parameters, including:

- Areal groundwater recharge multiplier
- Boundary inflow multiplier
- Max ET rate multiplier
- Streambed conductivity
- Hydraulic conductivity of faults
- HK values at pilot points in model layers 1 to 5
- VK values at pilot points in model layers 1 to 5. Most VK values are linked to HK values with varying ratios of their initial values.
- SY values at pilot points in model layer 1
- SS values at pilot points in model layers 2 to 5

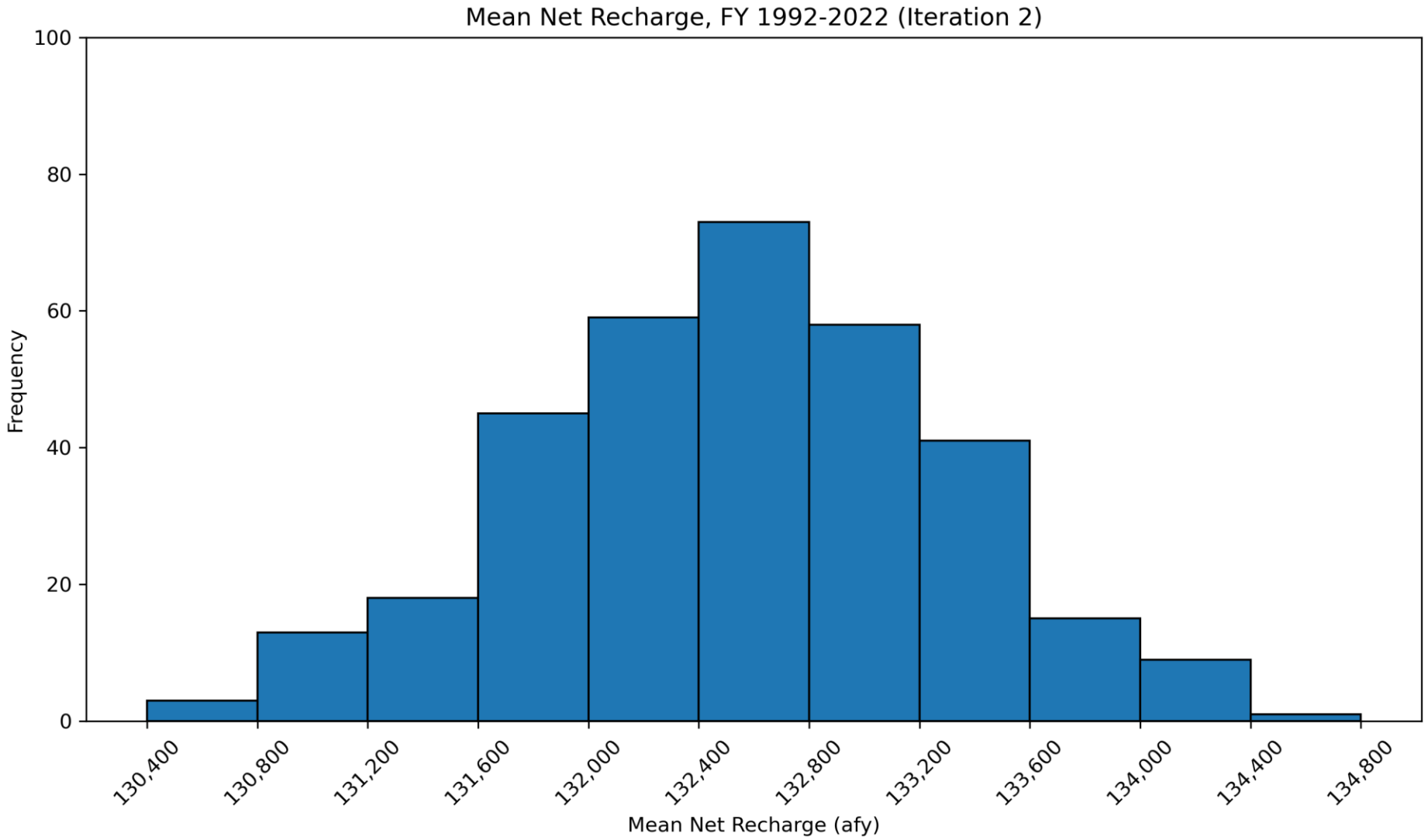
2.7k Parameters



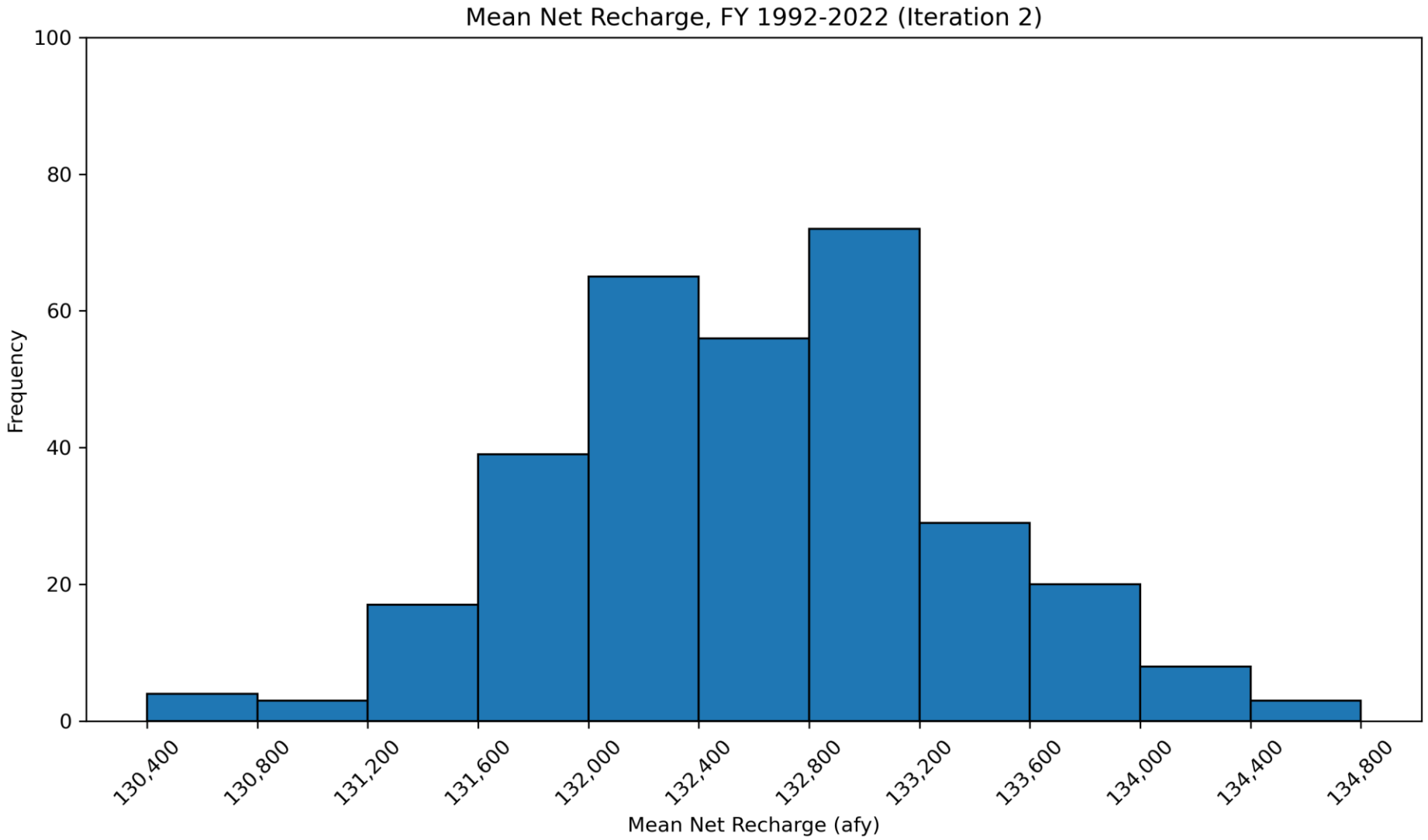
25k Parameters



2.7k Parameters



25k Parameters



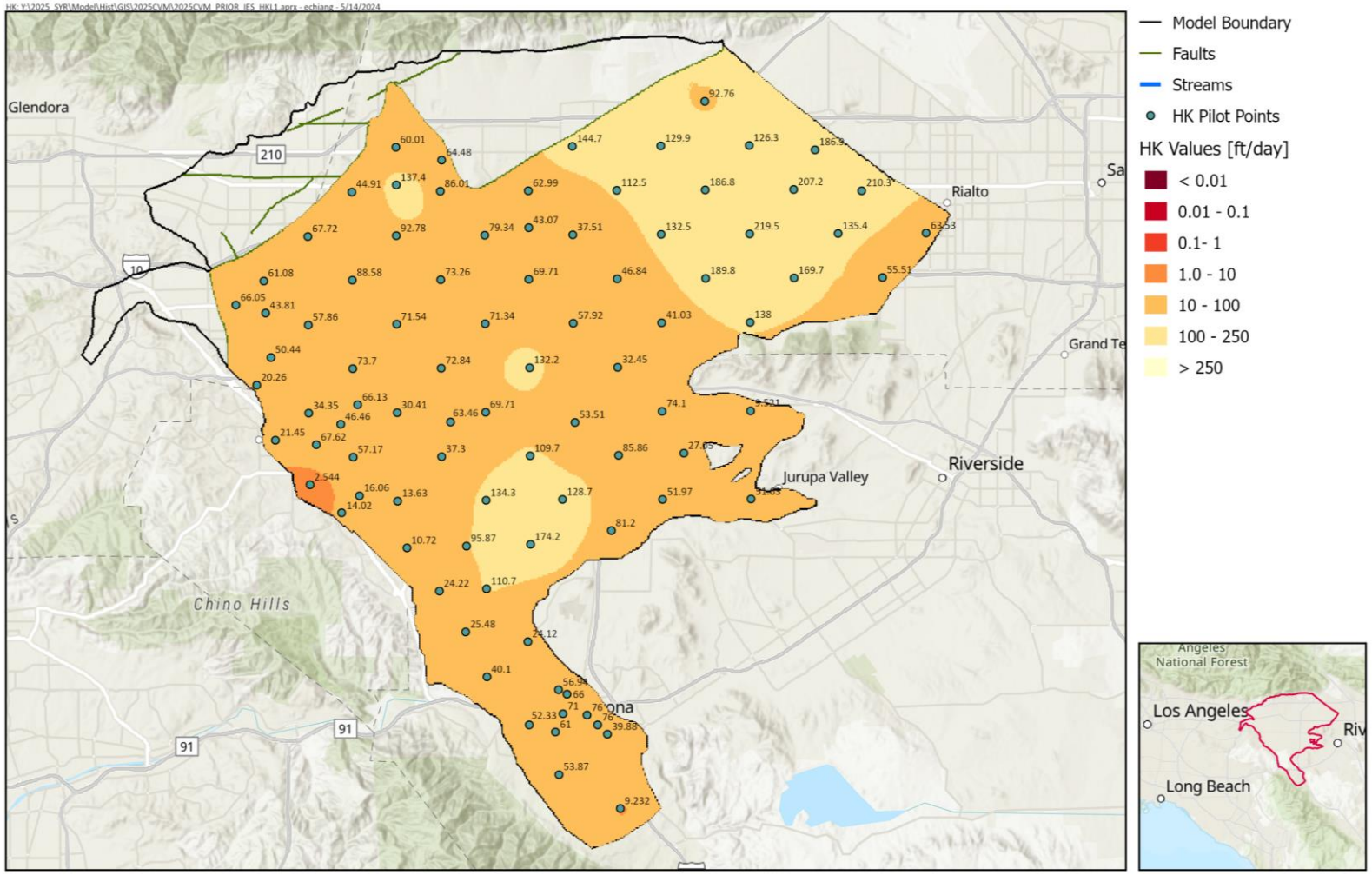
Findings

Increasing pilot points/parameters by ~9.2x resulted in negligible change in uncertainty of net recharge and other water budget components

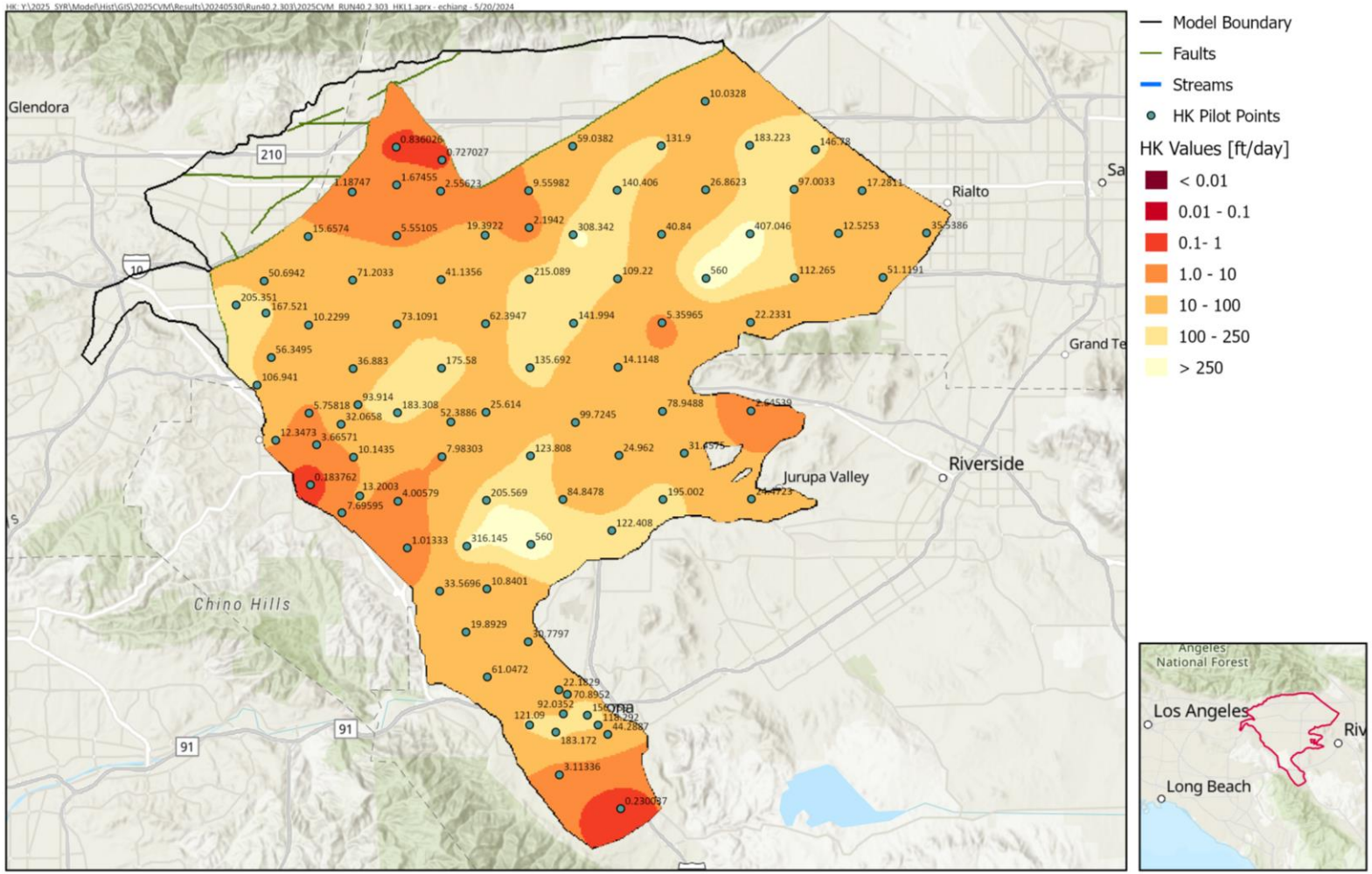
Recommendation:

Use configuration with 25k parameters and 316 realizations

Prior – HK


HK: Y:\2025_SYR\Model\Hist\GIS\2025CVM\2025CVM_PRIOR_IES_HKL1.aprx - echiang - 5/14/2024
Glendora
Rialto
Riverside
Jurupa Valley
Chino Hills
Grand Te
210
10
91
Model Boundary
Faults
Streams
HK Pilot Points
HK Values [ft/day]
< 0.01
0.01 - 0.1
0.1- 1
1.0 - 10
10 - 100
100 - 250
> 250
Angeles National Forest
Los Angeles
Long Beach
Prepared by:
WEST YOST
0 2 4 Miles
0 3 6 Km
Prepared for:
Chino Basin Watermaster
2025 Safe Yield Reevaluation
2025 CVM
HK in Layer 1
Realization: Prior PESTPP-IES
Figure XXX

2.7k Parameters – HK



Prepared by:

WEST YOST

0 2 4 Miles
N
0 3 6 Km

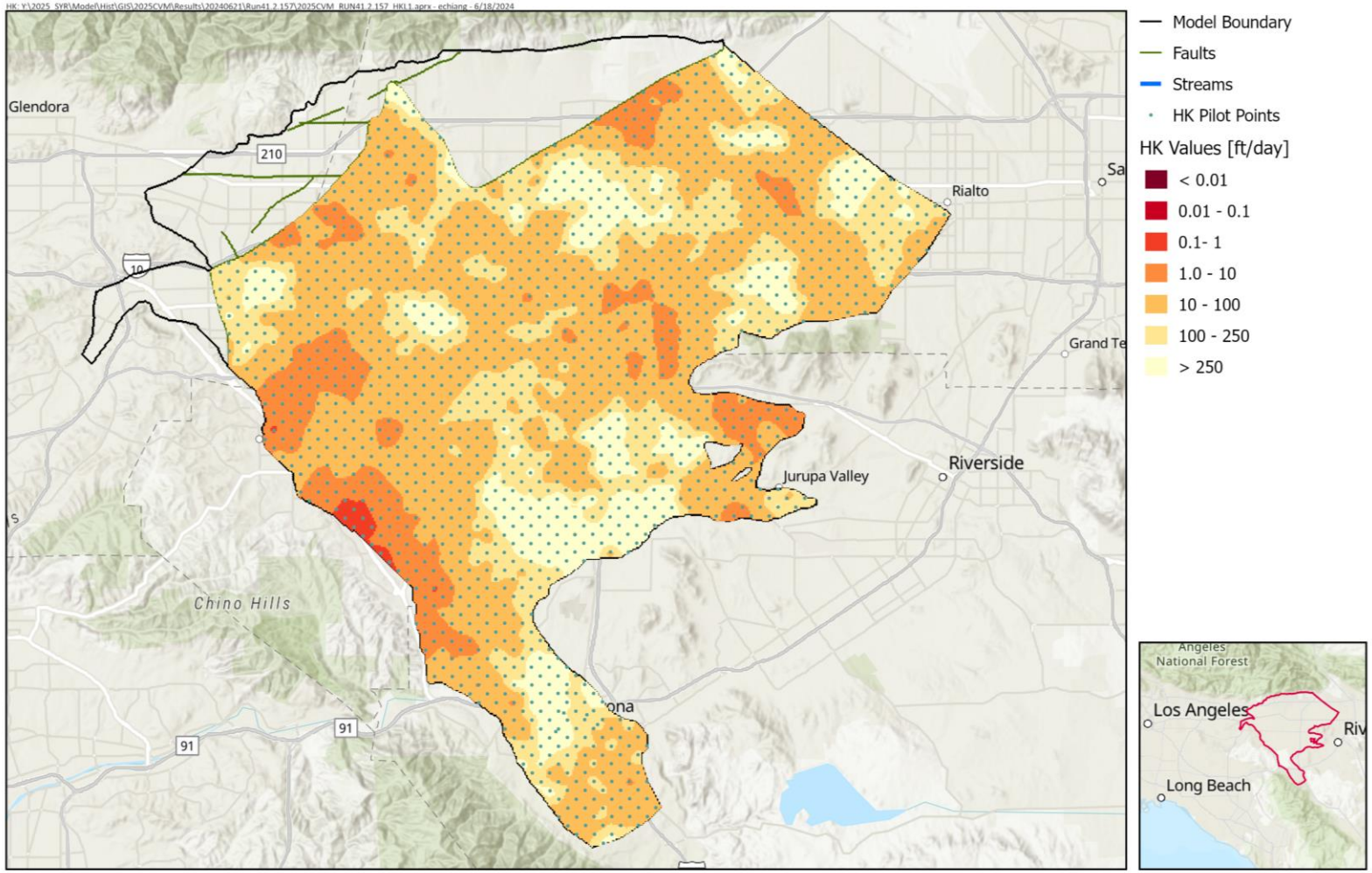
Prepared for:

Chino Basin Watermaster
2025 Safe Yield Reevaluation

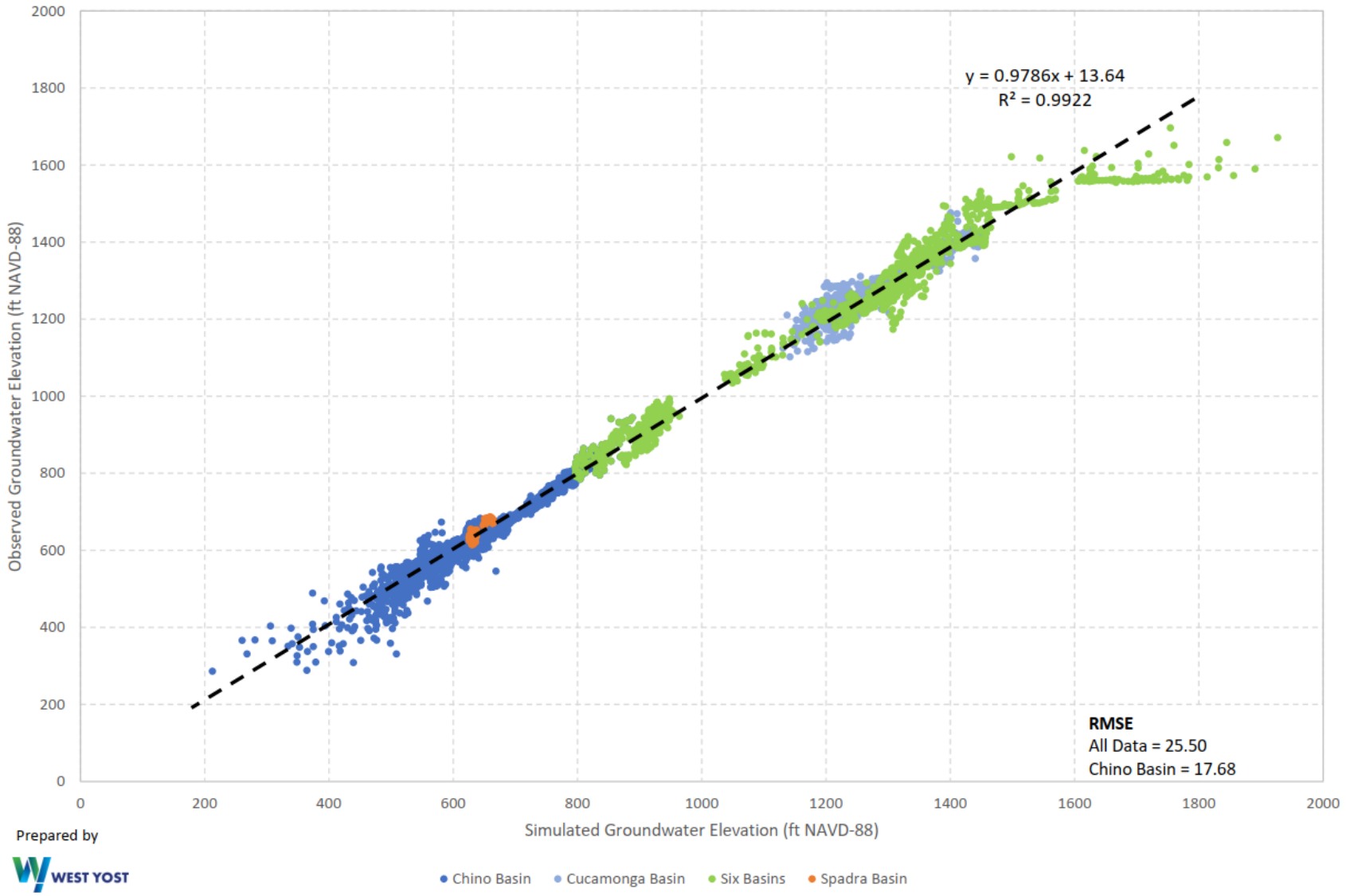
2025 CVM
HK in Layer 1
Realization: 40.2.303

Figure XXX

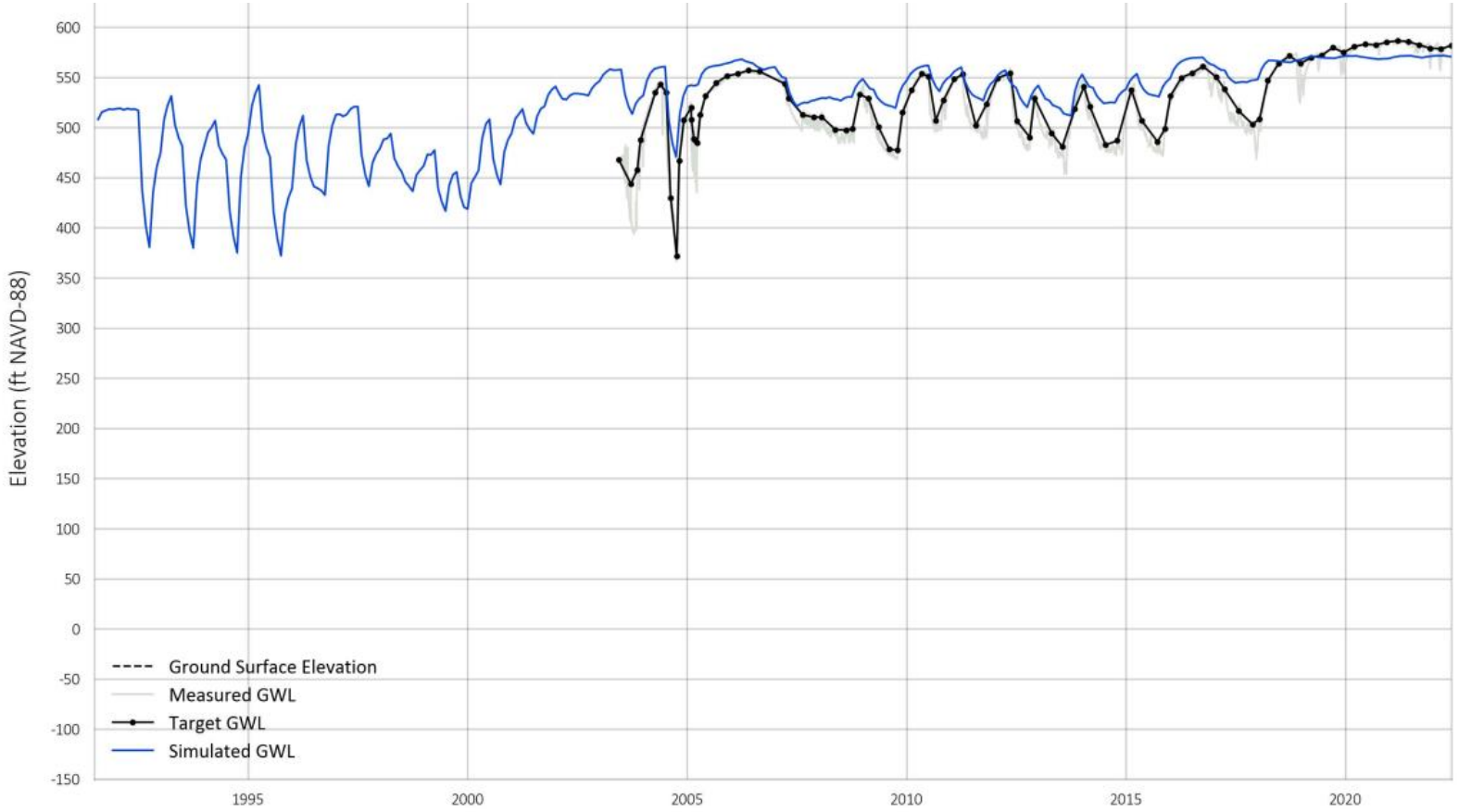
25k Parameters – HK (Realization 157)



Results – Realization 157 (R157)



Results – R157



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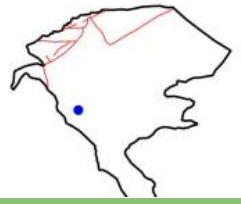
Well Location



Statistics

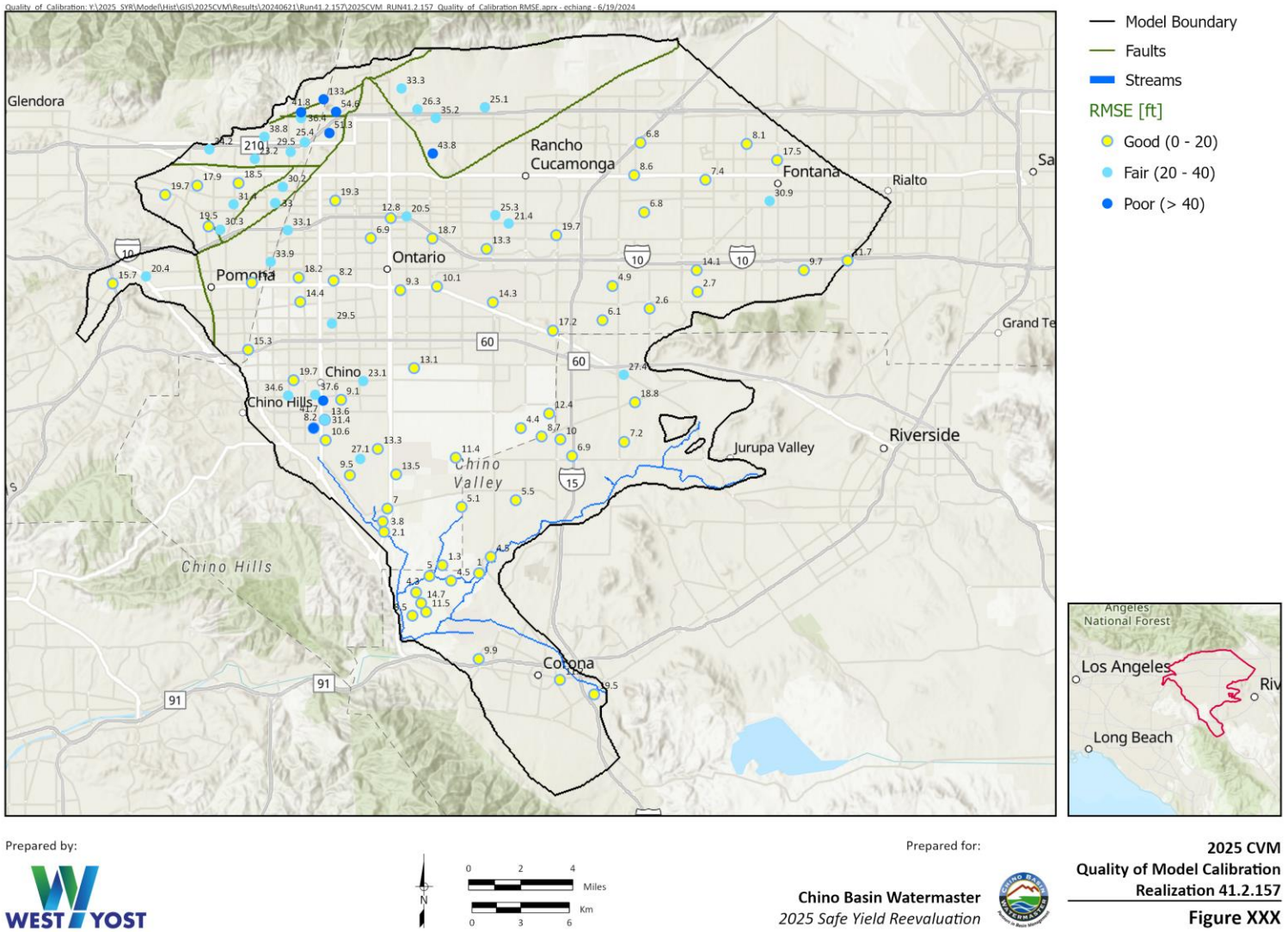
Target GWL (ft)
Mean = 526.27
Standard Deviation = 39.66

Simulated GWL (ft)
Mean = 547.06
Standard Deviation = 19.01

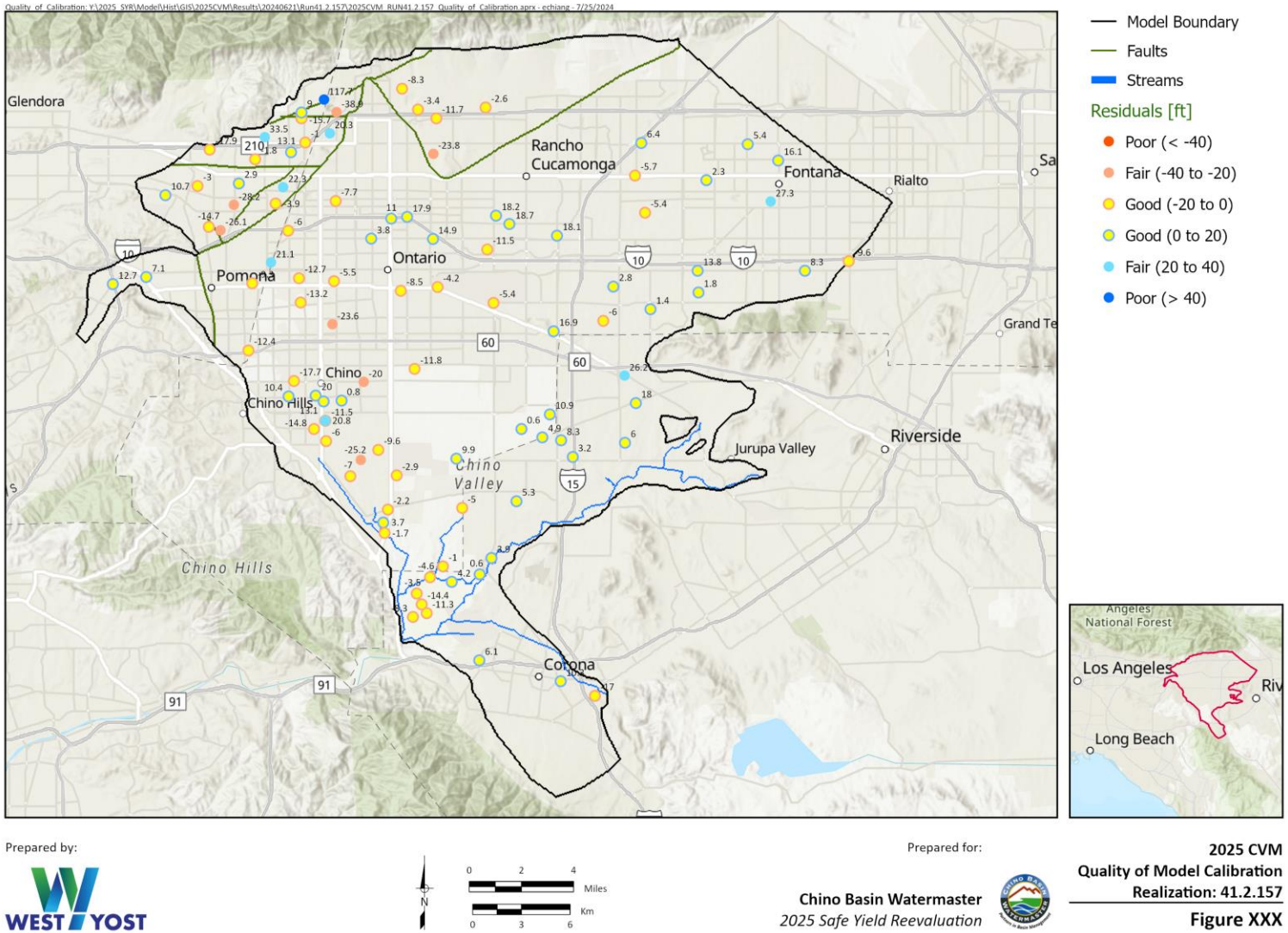
Mean Residual (ft) = 20.79

2025 CVM Realization: Run_41.2.157
Groundwater Level (GWL)
HydroDaVE Well ID: 1206952
Well Name: AP-PA/7
Owner: Chino Basin Watermaster

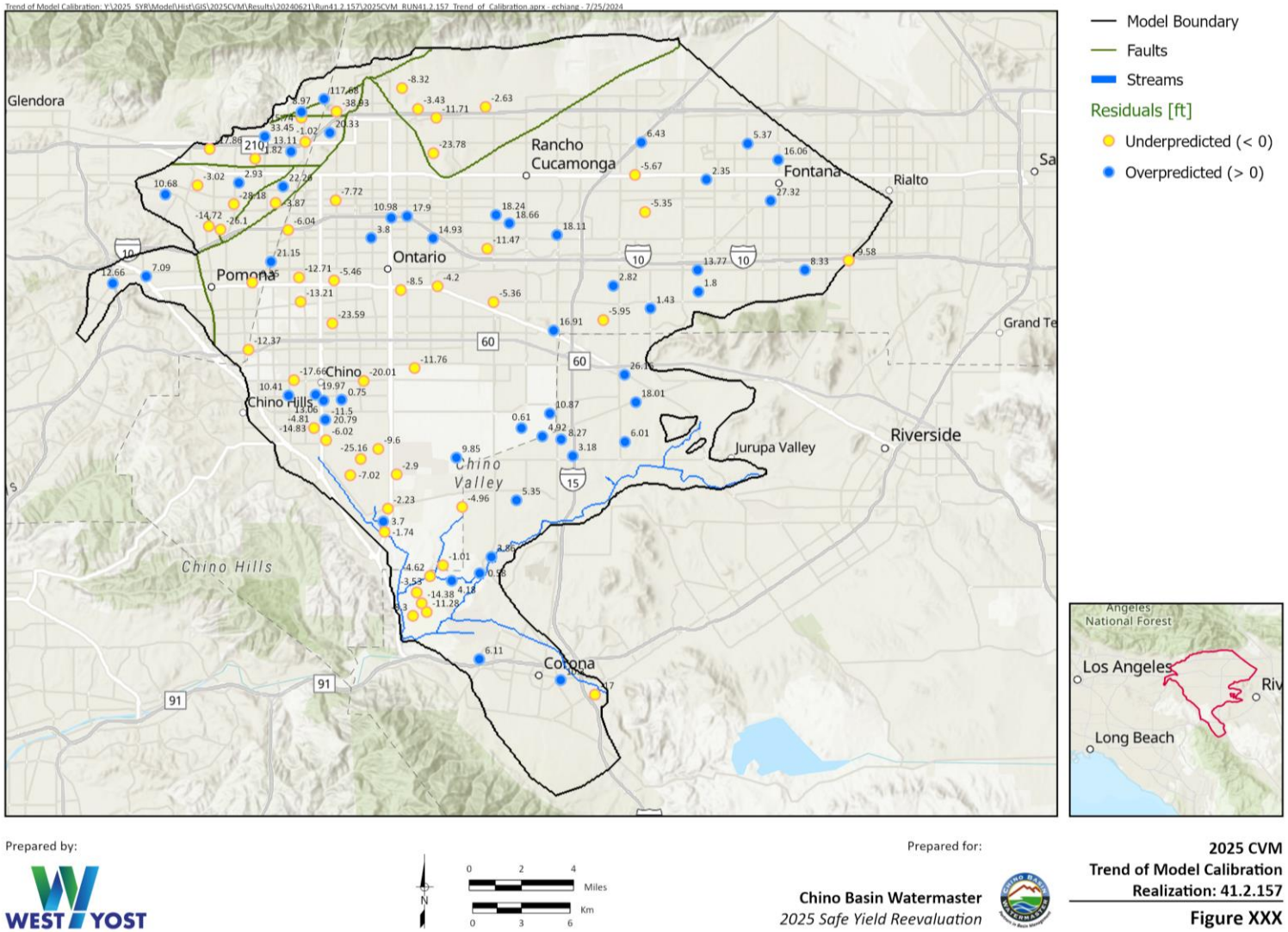
Results – R157



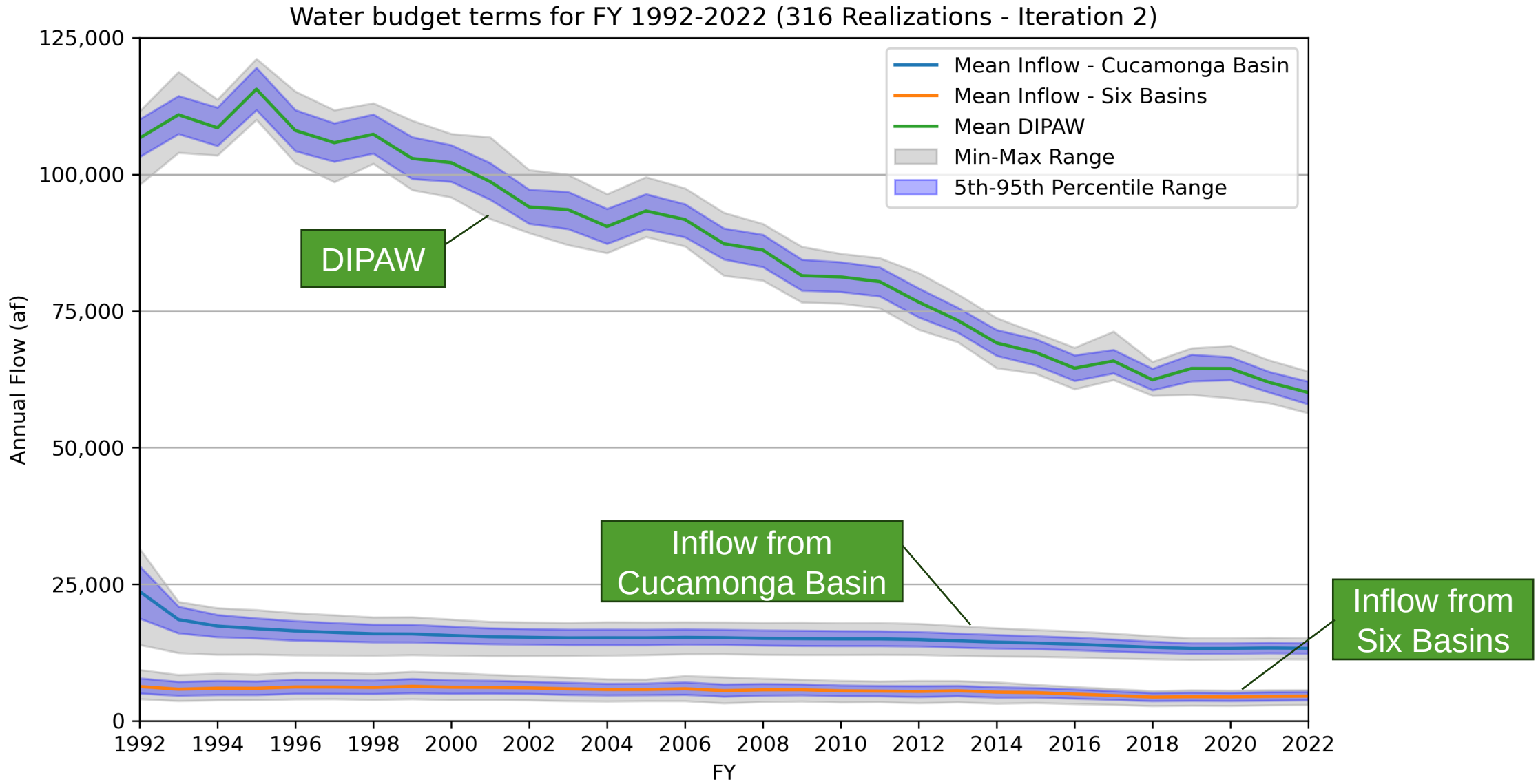
Results – R157



Results – R157



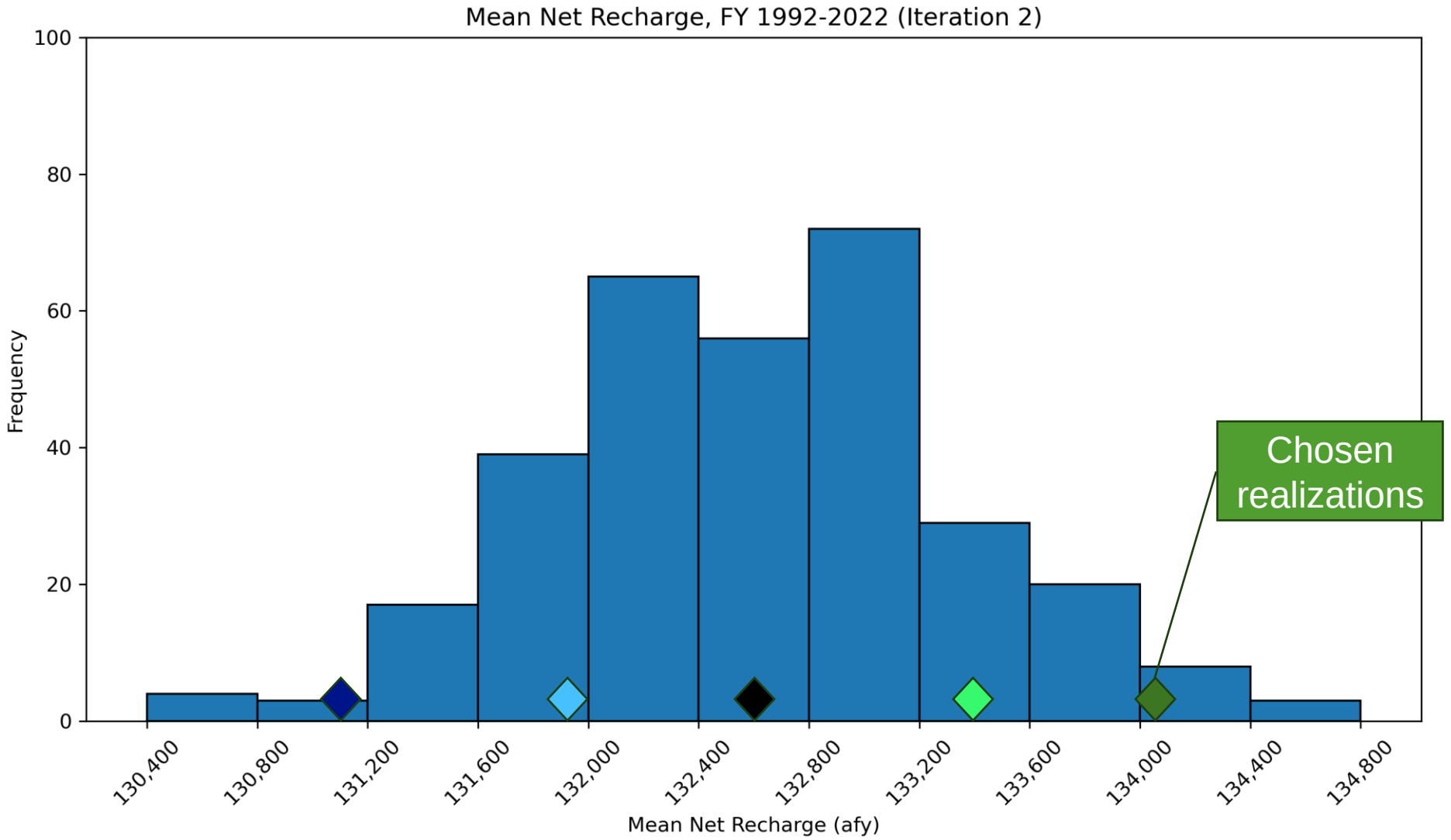
Water Budget Components – All Realizations



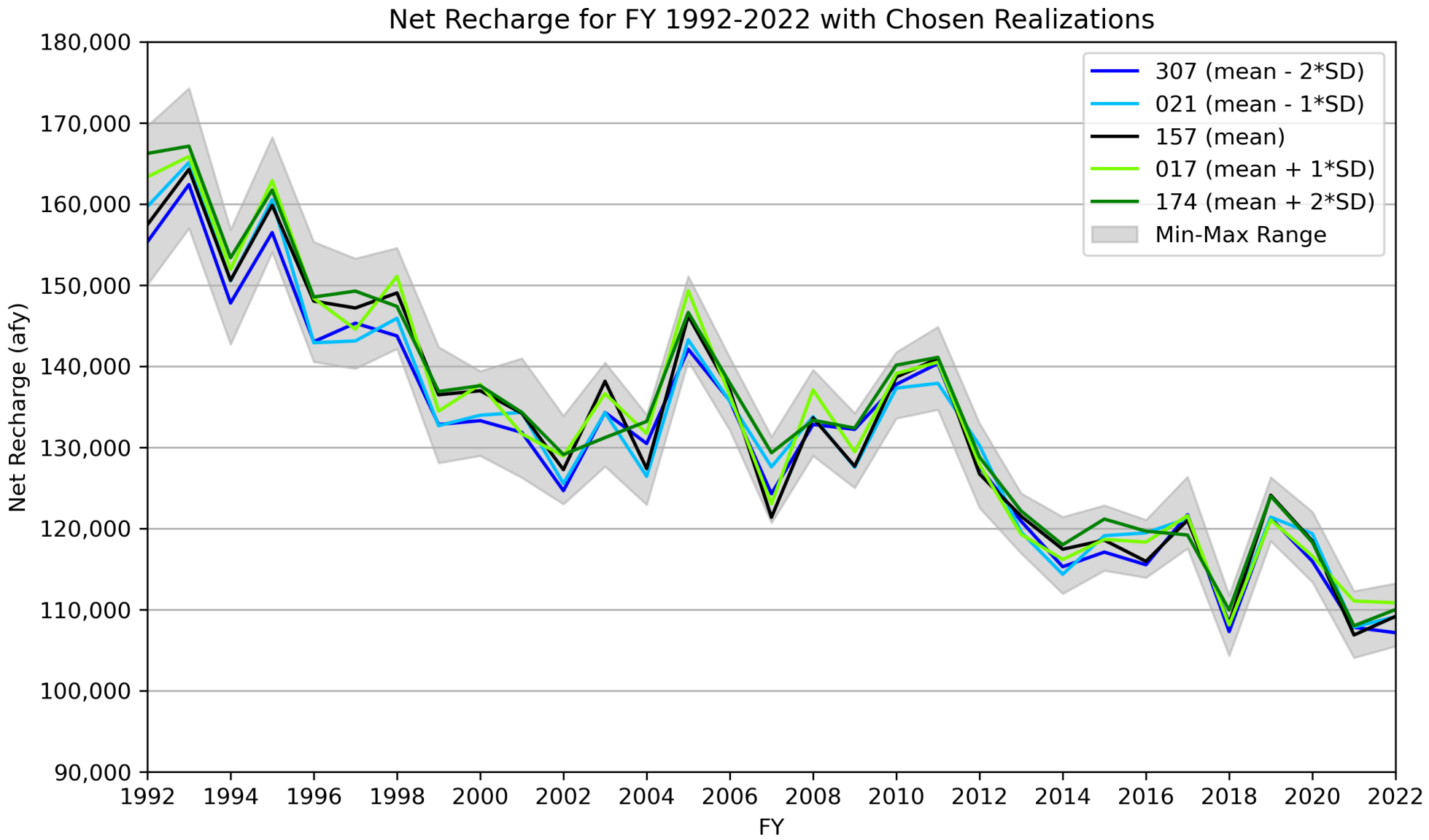
Selection of Realizations for 2025 SYR

Choose realizations that represent mean net recharge and +/- 1, 2 SD from mean net recharge

Chosen Realizations



Chosen Realizations



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Next Steps

Compile feedback from peer reviewers on recalibration/uncertainty analysis and proposed realizations (please email Garrett Rapp at grapp@westyost.com by Friday, August 23rd)

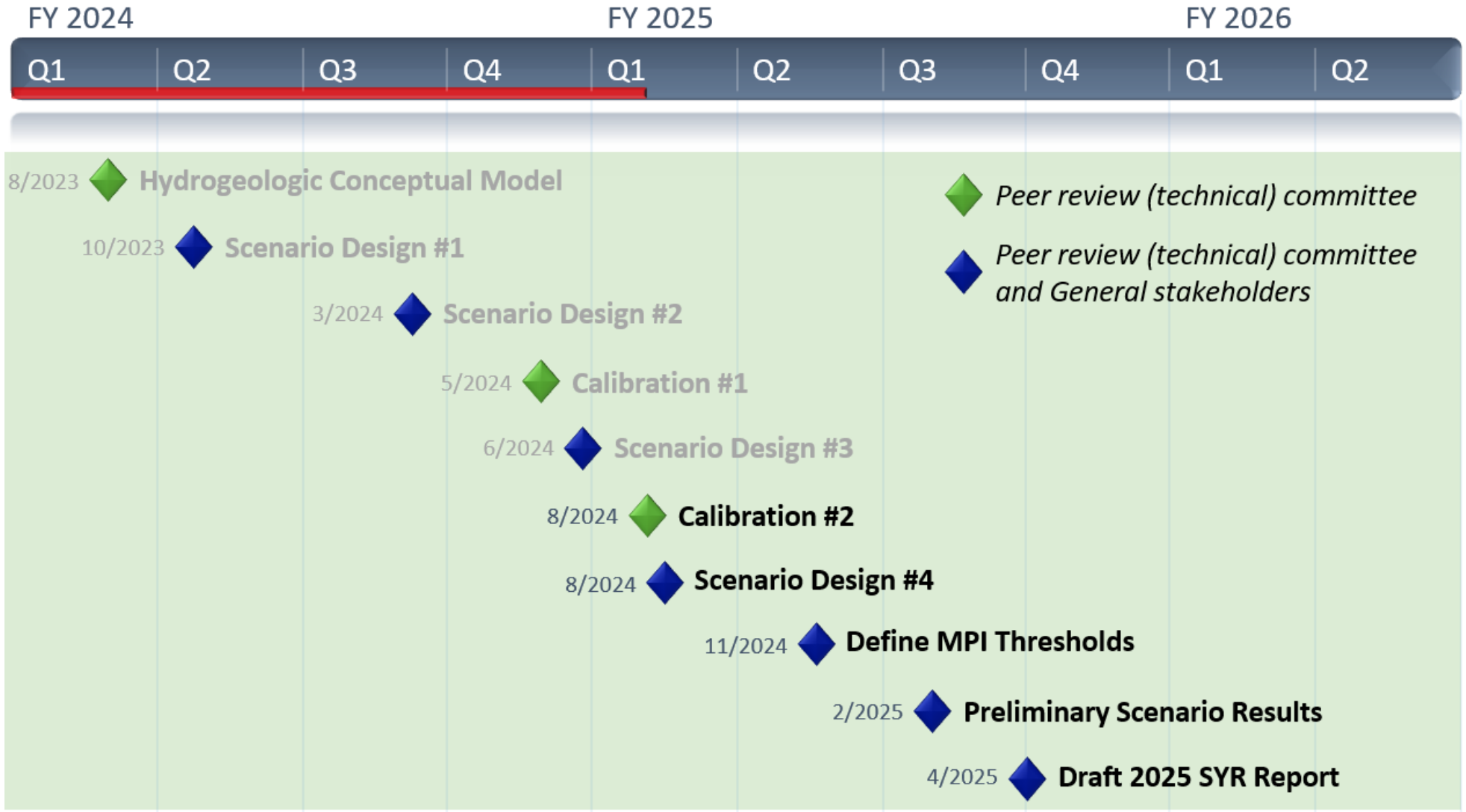
Finalize calibrated realizations, develop projection realizations

Upcoming workshops:

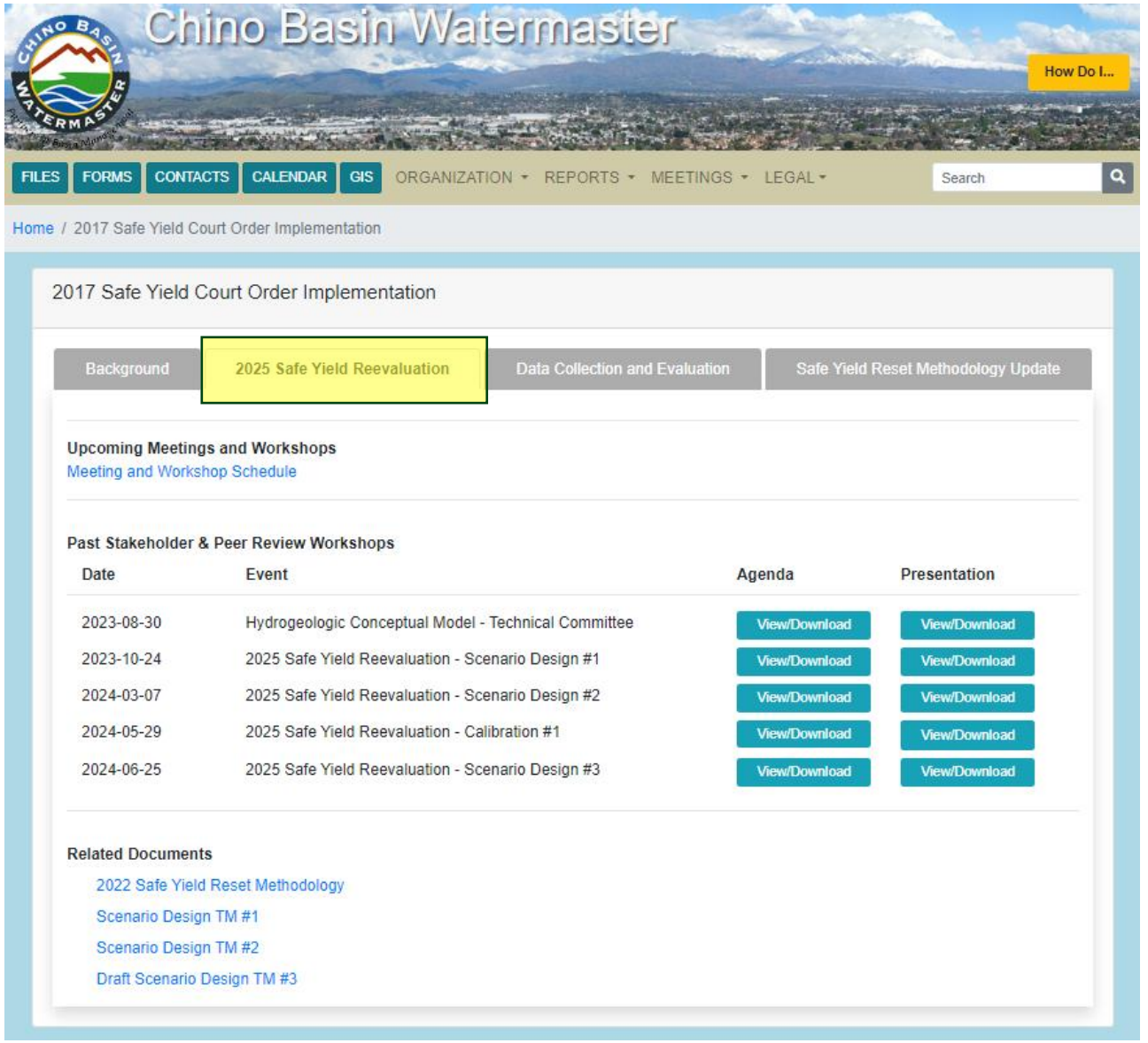
August 27, 2024: Scenario design workshop #4 (peer reviewers/stakeholders)

Fall 2024: MPI workshop (peer reviewers/stakeholders)

2025 SYR Timeline



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



THANK YOU