



# Imbalance Reserves (IR) Mosaic Parameter Results and Summary: Stakeholder Session 1

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Short Term Forecasting

November 4th, 2024

# Housekeeping reminders

- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO's permission.
- Meeting is structured to stimulate dialogue and engage different perspectives.
- Please keep comments professional and respectful.
- Please try and be brief and refrain from repeating what has already been said so that we can manage the time efficiently.

## Instructions for raising your hand to ask a question

- If you are connected to audio through your computer, open the participant and chat panels on the bottom right. 🖐️
- If you dialed in to the meeting, press \*3 to raise your hand.
- Please remember to state your name and affiliation before making your comment.
- You may also send your question via chat to Christina Guimera or to all panelists.

# Agenda

- Background
- Mosaic parameter testing approach
- Mosaic parameter results
  - Sample scheme (Ensemble 1)
  - Sample size (Ensemble 2)
- Scaling methodology for Imbalance Reserves Summary
- Imbalance Reserves Summary
- Initial STF Recommendation

November Meeting

# BACKGROUND

# Background

- An integral part of DAME and EDAM will be the introduction of Imbalance Reserves (IR). Benefits from IR design may be affected by the underlying performance of mosaic quantile regression

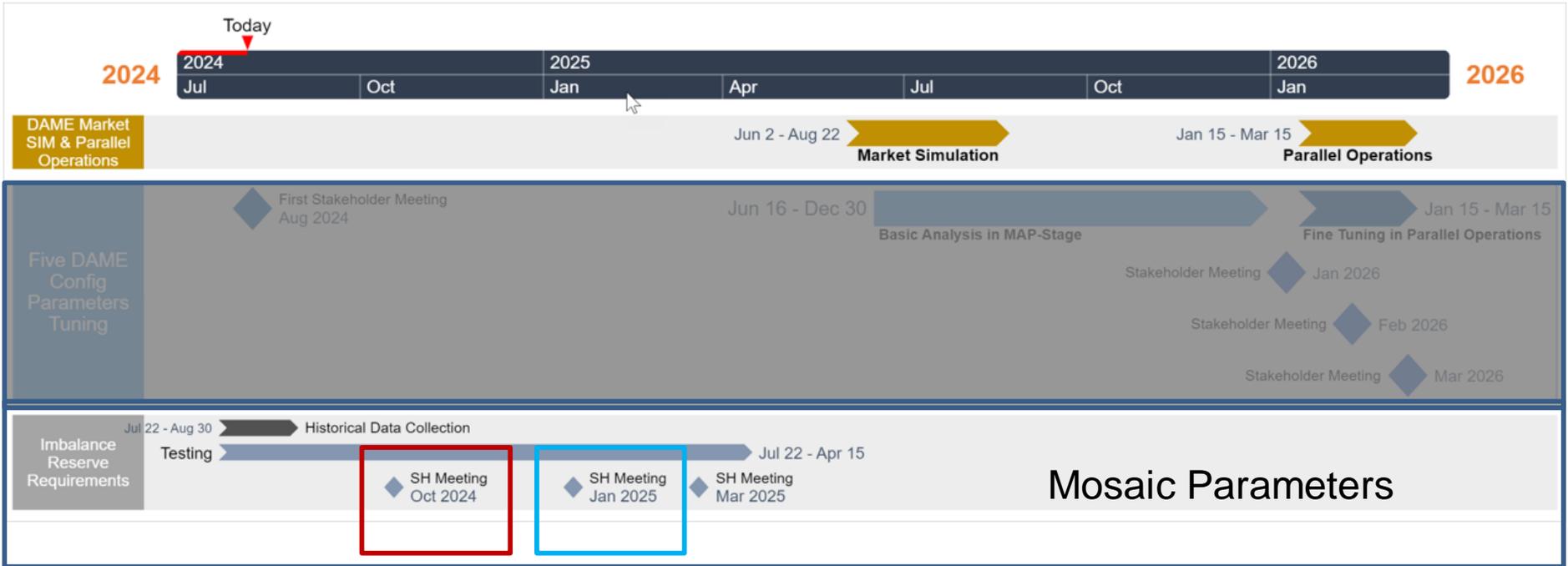
# Background

- [Purpose] Ongoing evaluation of IR mosaic quantile regression parameters. Expectations of mosaic established from FRP may diverge regarding IR
- [Plan] STF team will trial mosaic parameter configurations published in external BRS, as well as alternative configurations, for overall performance. STF will then present on findings and offer recommendation.
- [Goal] Market participants will get a chance to evaluate and provide comments and optimized values will be deployed in DAME Market Simulation.

# Expected Outcomes

- Optimal set of mosaic parameters for DAME Market Simulation. Duly reflect changes to BPM/BPS if there are changes to initially specified mosaic parameters.
- Provide 2 year of simulated requirements for participating entities w/ optimized mosaic parameters
- Show Adjusted Requirements (w/ diversity benefit) for participants

# DAME Configurable Parameters Tuning Timeline



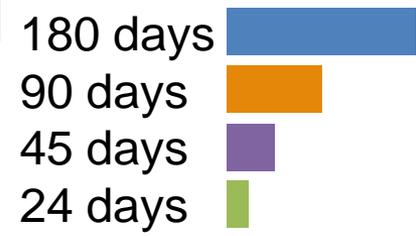
November SH Call – Discuss initial findings regarding mosaic parameters and diversity benefit results for entities that have signed implementation agreement as well as for expanded EDAM

January SH Call – Discuss any follow-up or overflow from November meeting and discuss data quality, dynamic and quarterly thresholds steps. Assert final recommendation with respect to November and January presentations, and external feedback .

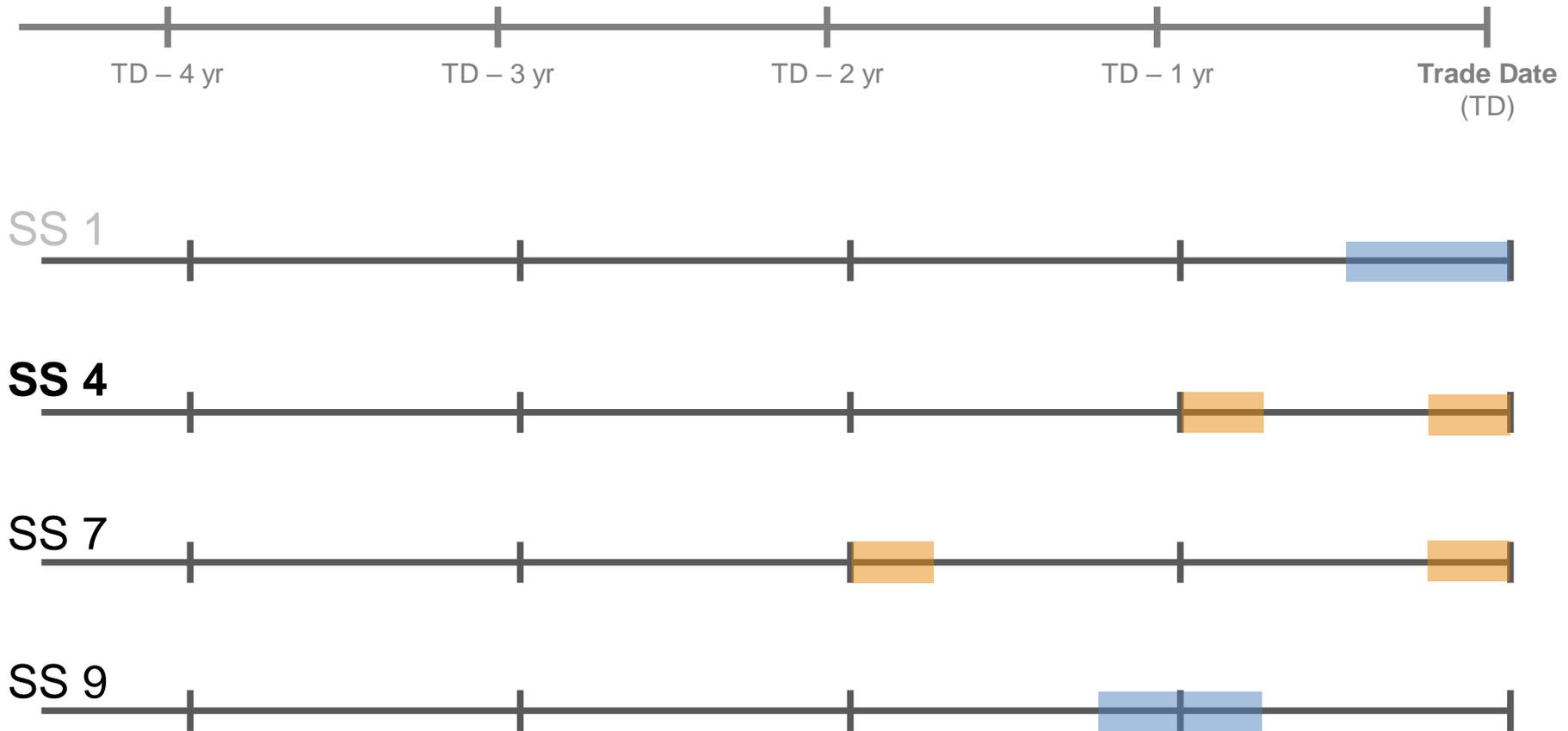
# What are the Mosaic Parameters?

Mosaic Parameter	Order of Evaluation	Current Value	Items Evaluated
<b>Historical Days / Split Window (Sample Scheme)</b> <b>November Call</b>	1	Sample scheme 4	Performance of IR with sampling schemes: 4, 7, 9 <i>(graphical explanation on next slide)</i>
<b>Historical Period Sample Days</b> <b>November Call</b>	2	180 sample days total	Performance of IR with 150, 180, 210 sample days in historical period
<b>Dynamic Thresholds</b> <b>January Call</b>	3	99 % (1%)	Performance of IR with 99%, 98.5%, 98% (1%, 1.5%, 2%)
<b>Static Thresholds</b> <b>January Call</b>	4	90 days, Sample scheme 1	Finalized List in January
<b>Discard Range</b> <b>January Call</b>	5	No discard range	Performance of IR with and without discard range

# Sample Scheme (SS) Key \*



Current configuration is SS4. SS1 was the methodology used in FRP at launch. SS7 and SS9 simulation results are presented here in comparison to SS4.



\* Illustrative examples. Periods and timelines not to scale.

November Meeting

# MOSAIC PARAMETER TESTING APPROACH

# Testing Approach

- Simulate 2 years worth of Imbalance Reserve Requirements
  - (May 2022 to May 2024)
  - Run first ensemble of simulations trialing different sample schemes [4, 7, 9]
  - Run second ensemble of simulations trialing different sample days for the calculation period [150, 180, 210]
  - \*Run third ensemble of simulations with different dynamic threshold offsets (e.g., 98,98.5,99) – **January Meeting**
- Assess **performance** within ensemble 1 and 2. Initially, evaluate period level summary with respect to baseline mosaic parameters to show changes with respect to bias metrics.
- If change is suggested at summary level, further interrogate alternative configuration with rolling/seasonal summaries and weighted summaries

# Three approaches to assessing performance

- **(1) \*Period summary**
  - BAA level
  - EDAM AREA
- **(2) Rolling or Seasonal summaries**
  - BAA level
  - EDAM AREA
- **(3) Hscore**
  - All BAAs are equally weighted

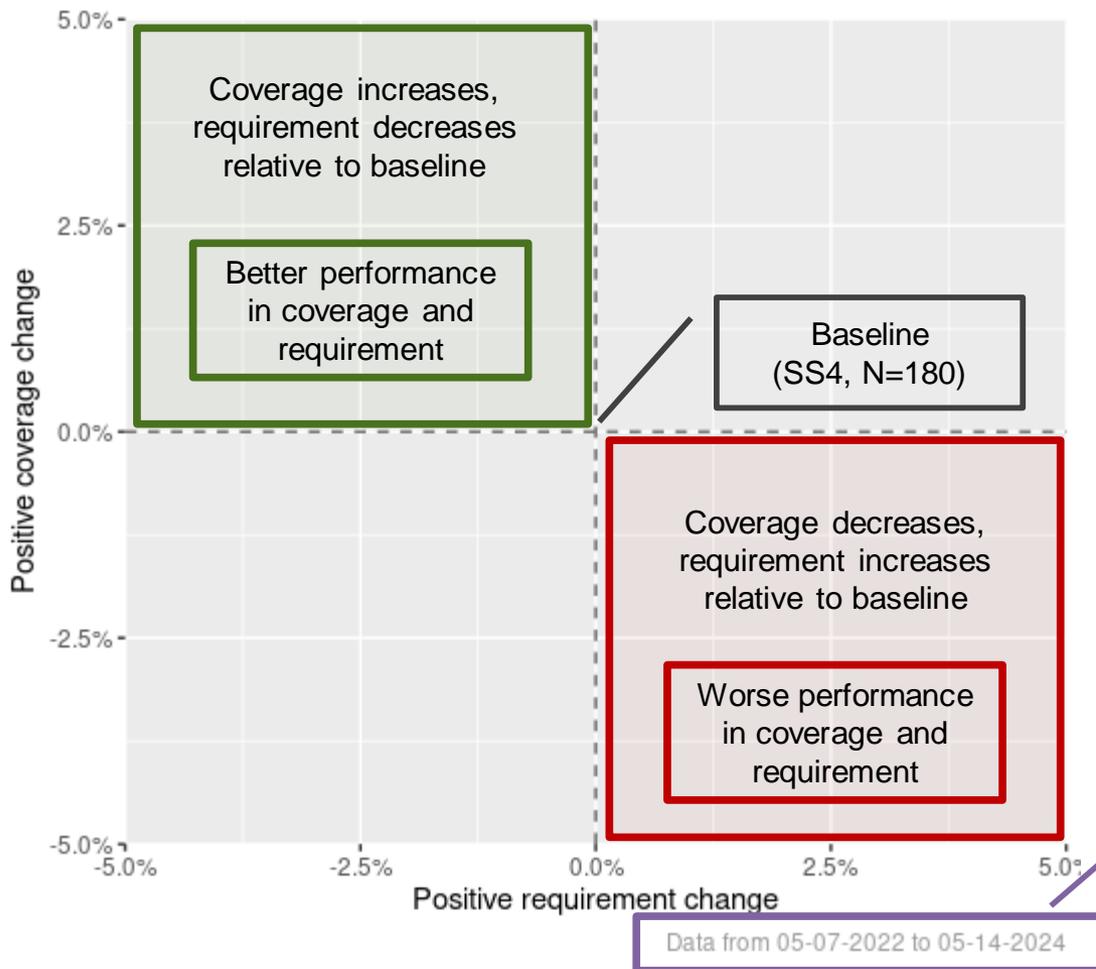
\*2 year average

## Hscore

- (H)ierarchical score
- Holistic performance metric
- Combination of coverage and requirement, plus consideration of time of day, requirement direction, and sample period length

Meetings and events > Market Surveillance Committee > [Uncertainty Performance – Presentation – Apr 11, 2024](#)

# Explainer for pareto-type period summary plot



Axes represent a scaled change relative to a specified “baseline” performance

x-axis – Positive requirement change  
Average upward requirement (x)  
 $(x_2 - x_1) / x_1$

y-axis – Positive coverage change  
Average upward coverage (y)  
 $(y_2 - y_1) / y_1$

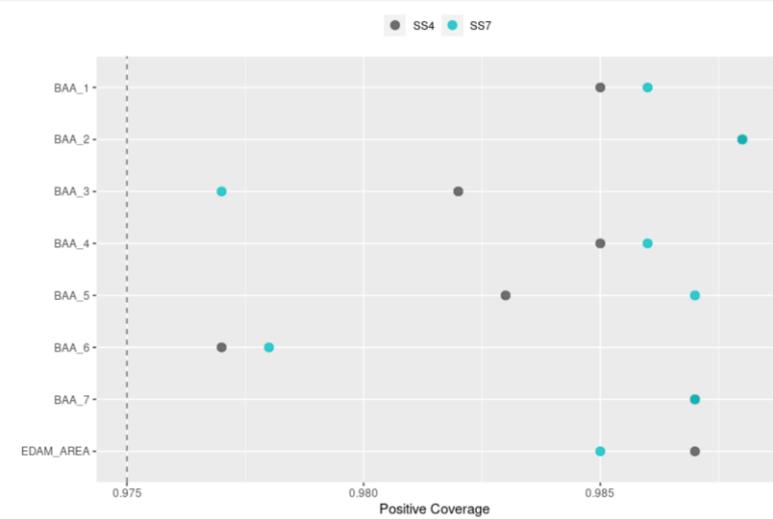
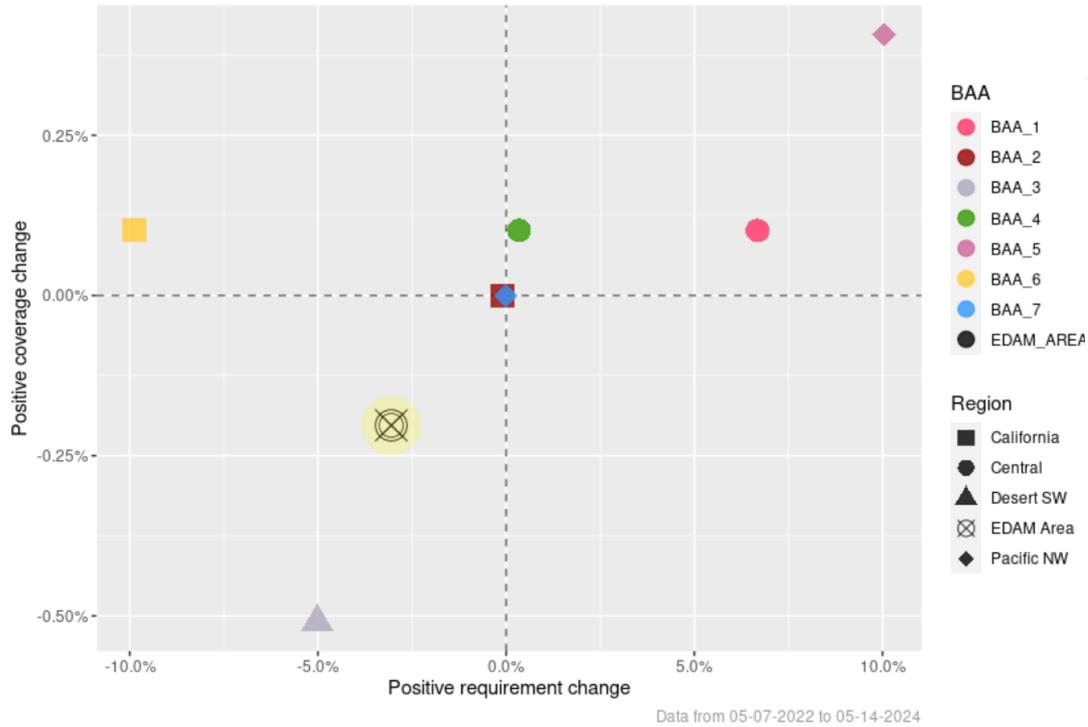
Upper left and lower right quadrants represent clear performance improvement or degradation. Upper right and lower left quadrants present mixed results. Typically, increased requirements coincide with increased coverage.

Time range used to produce results

November Meeting

# MOSAIC PARAMETER RESULTS

# Ensemble 1 - Tranche 2: Period Summary (SS4 → SS7)



# Ensemble 1 / Sample Scheme

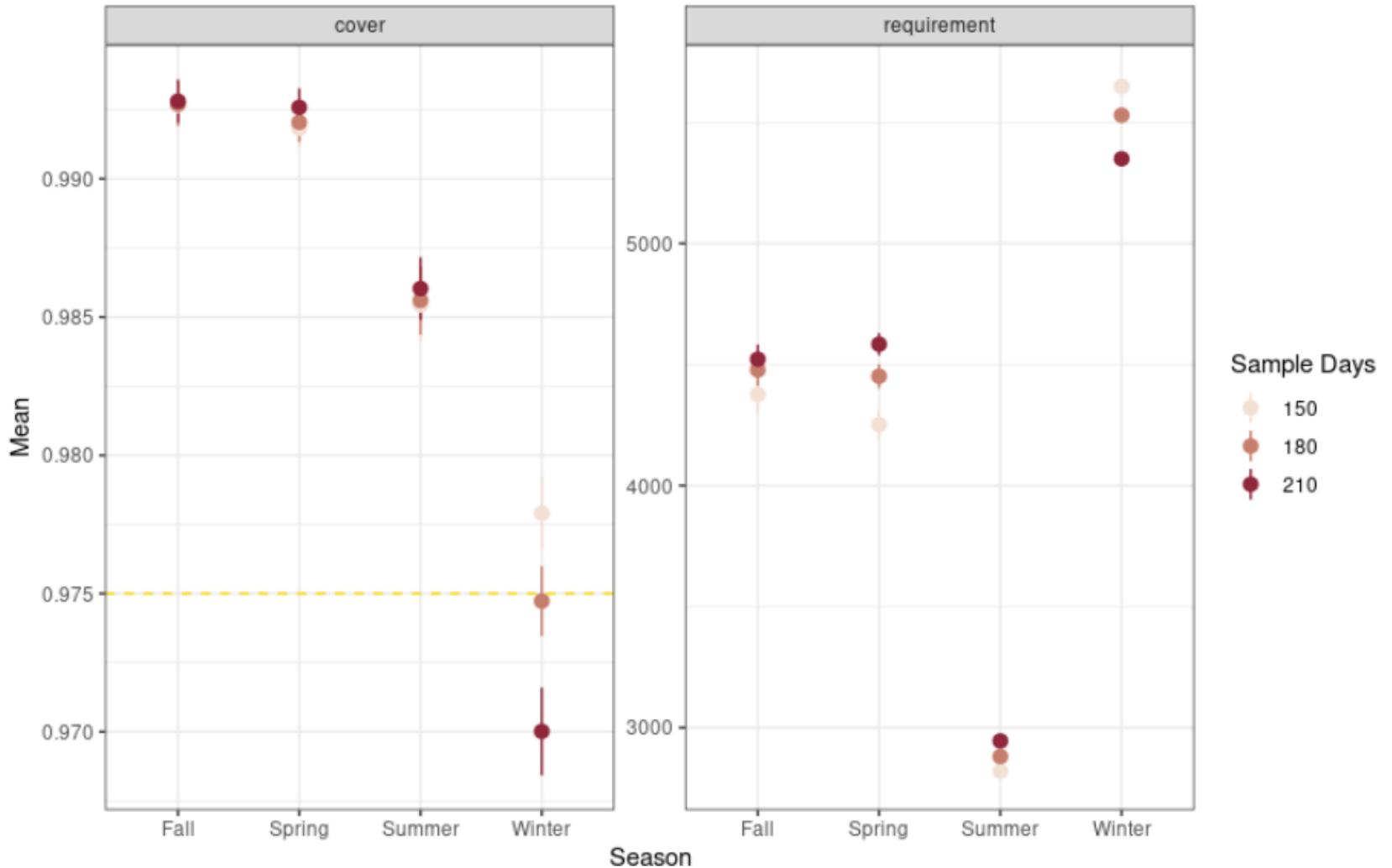
## Mosaic Parameter Recommendation

- Recommending no change (Sample Scheme 4)
  - Across BAAs switching to sample scheme 7 we saw mixed results, typically little change to coverage or requirement. When there was a relative increase in coverage, it was above the target level.



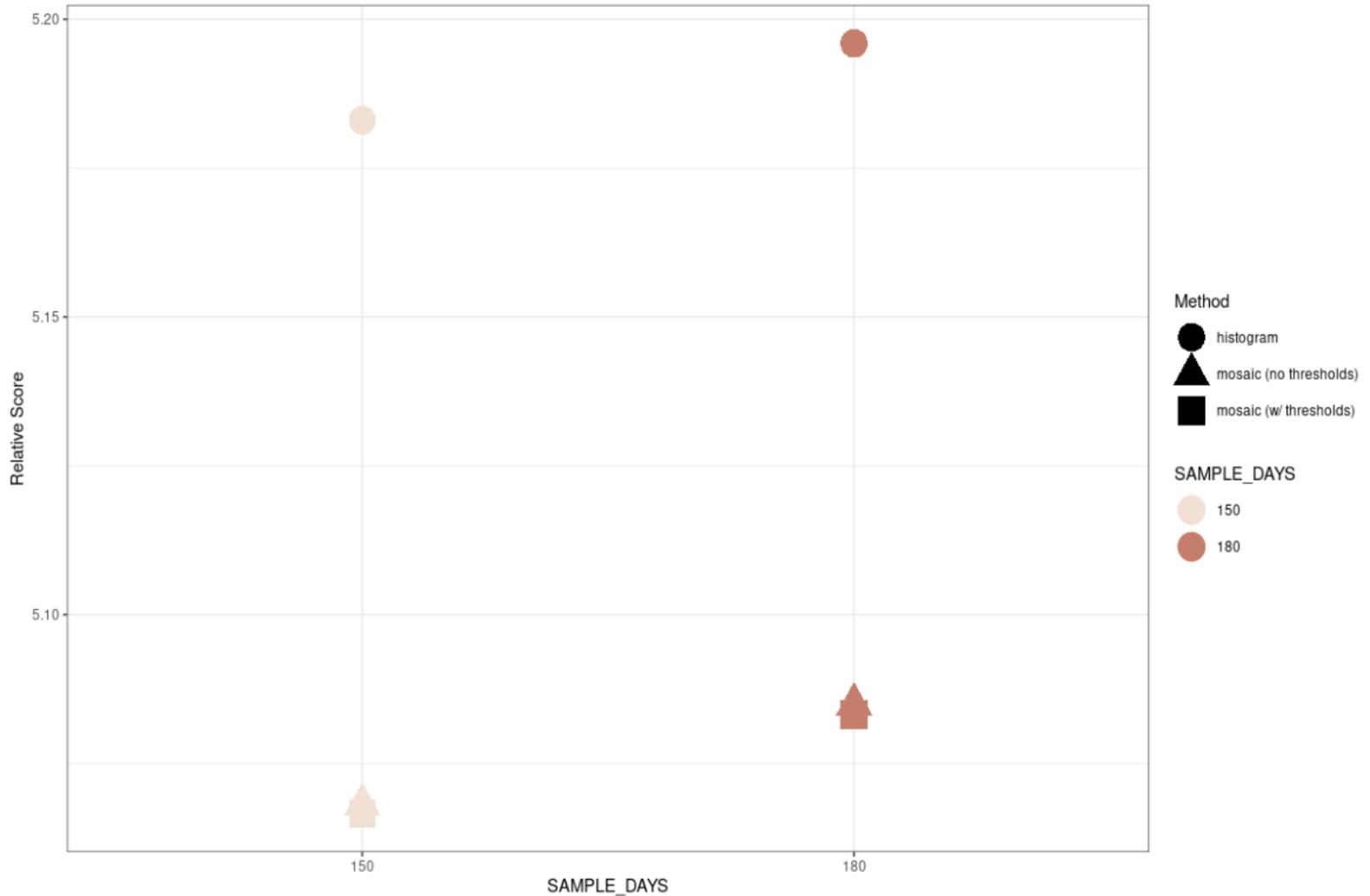
# Further Breaking Ensemble 2 Results Down by Season

Seasonal Average of Coverage and Requirements  
EDAM Area



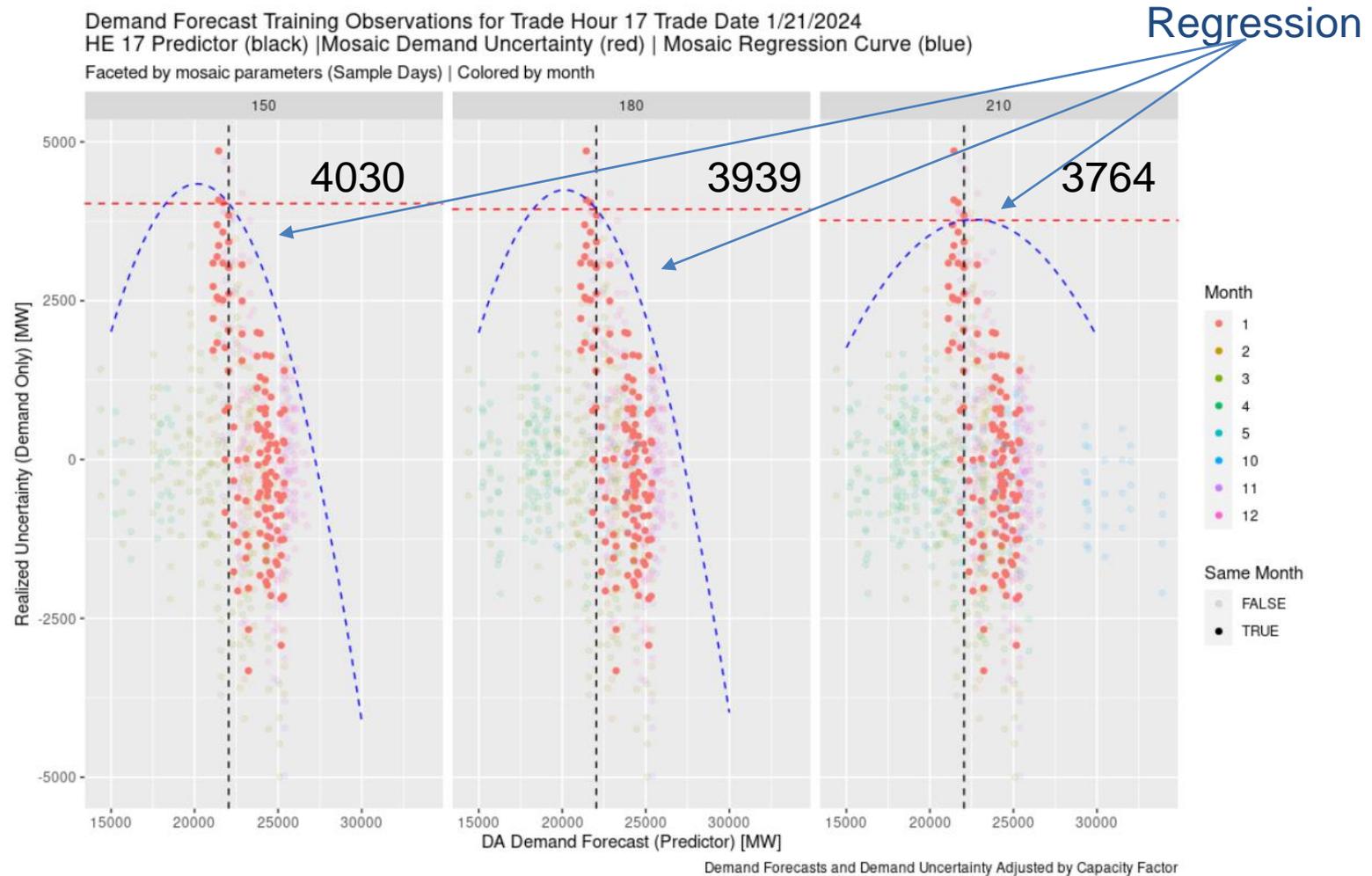
# Equal-Weighted Relative Score, all Percentiles and BAAs

Ensemble 2 | Tranche 2



20220507 to 20240514 | lower score is better

# Mosaic adversely affected by increased sample days, especially Winter and Summer



## Ensemble 2 / Sample Days

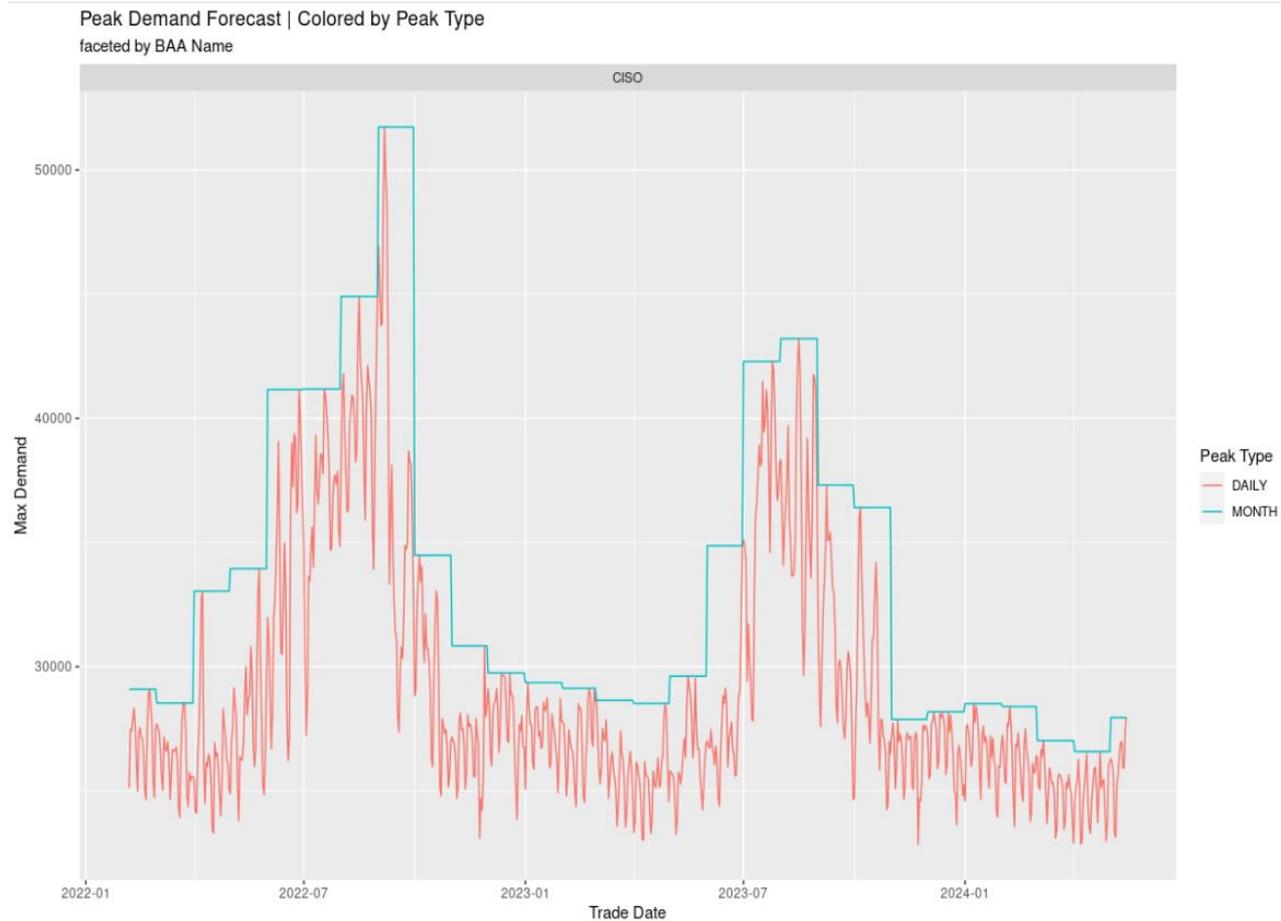
### Mosaic Parameter Recommendation

- **Recommending Sample change to 150 days**
  - Across BAAs switching to 150 sample days provides coverage above target while maintaining lower requirement
- Percentage of intervals that hit dynamic threshold ceiling increases from 6.6% to 8.3%

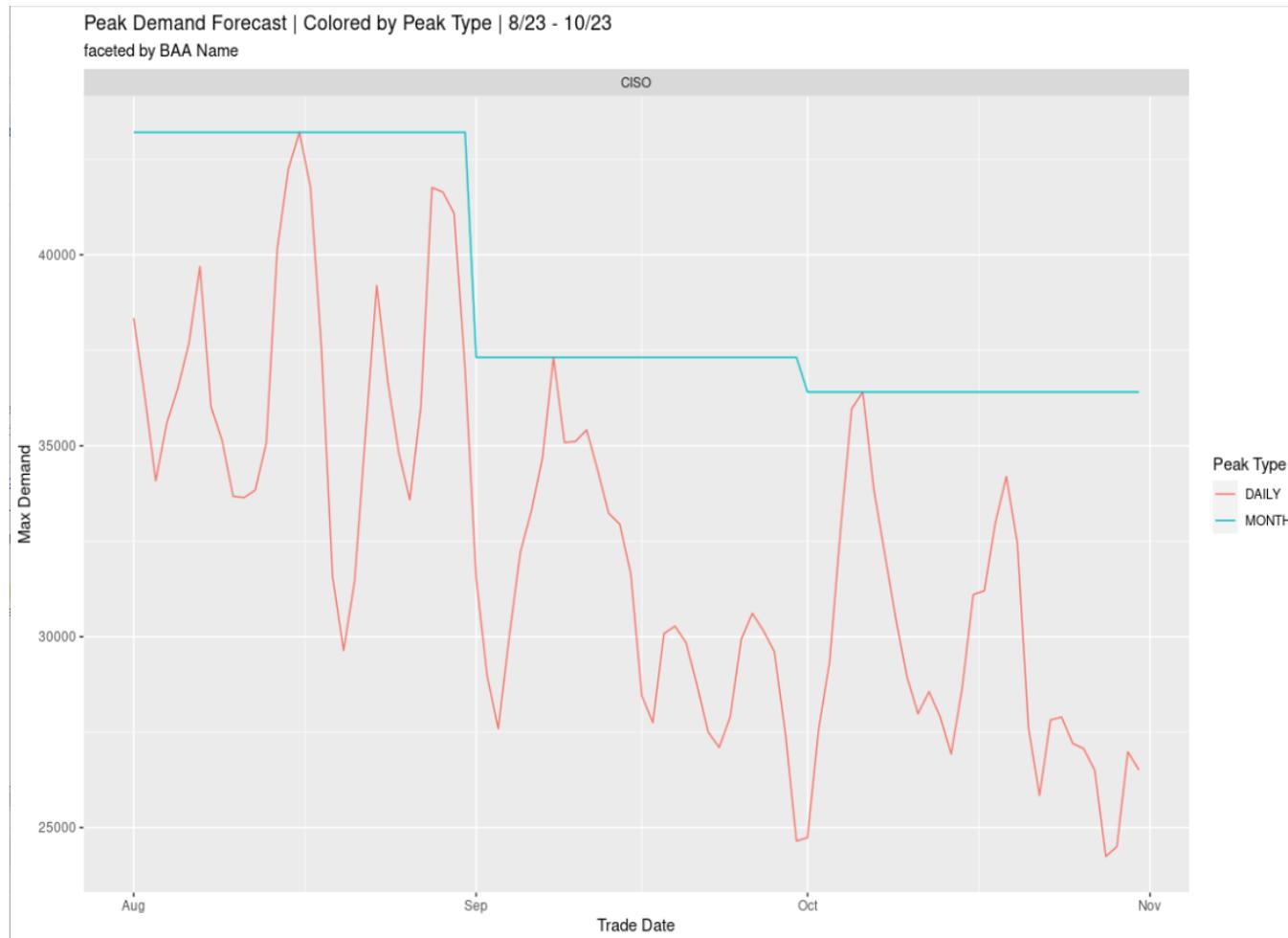
With respect to monthly peak demand forecast

# **SCALING METHODOLOGY FOR IMBALANCE RESERVES SUMMARY**

# Scaling Requirements Based on Monthly Peak Demand



# Example Zooming in on Aug – Oct 2023 ....



With respect to monthly peak demand forecast

# **IMBALANCE RESERVES SUMMARY**

# Imbalance Reserves Summary

	IR	FRP (RSE)
Granularity	60 min → 15 min	15 min → 5 min
Uncertainty Horizon	14 – 38 hr	55 – 115 min
Area Peak Demand <sup>*,**</sup>	70-89,000 MW	~160,000 MW
Diversity Benefit <sup>**,***</sup>	25-37%	60%
Area <b>Requirement</b> Peak	Winter	Summer

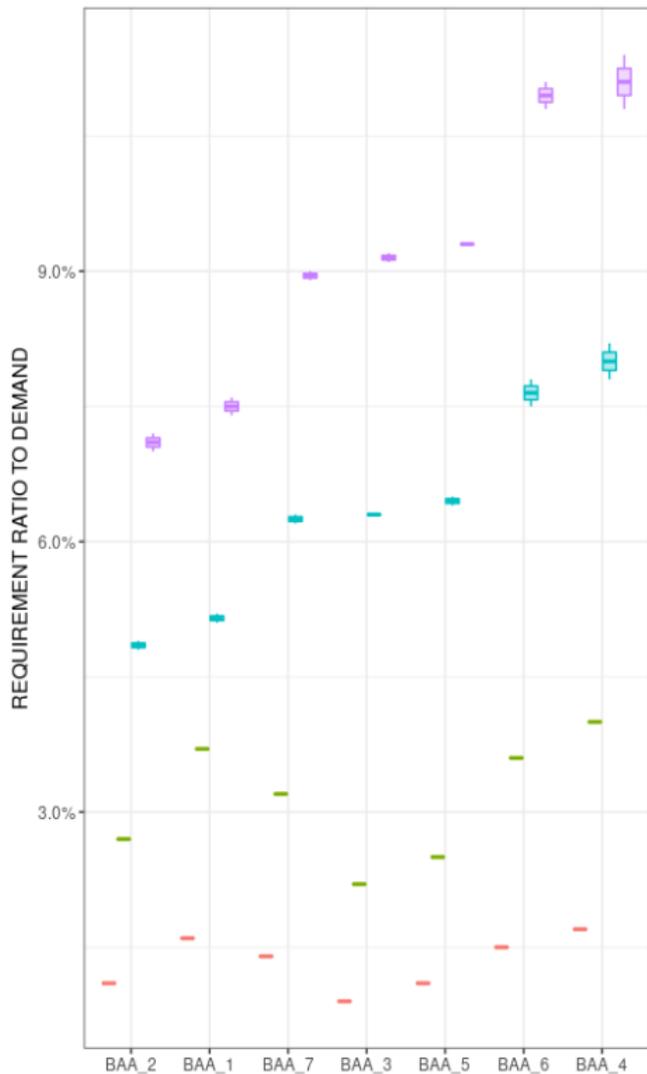
\*Aggregate of Monthly Peak demand, e.g., can occur at different times

\*\*Range of values from implementation entities and additional tranche 2 participants

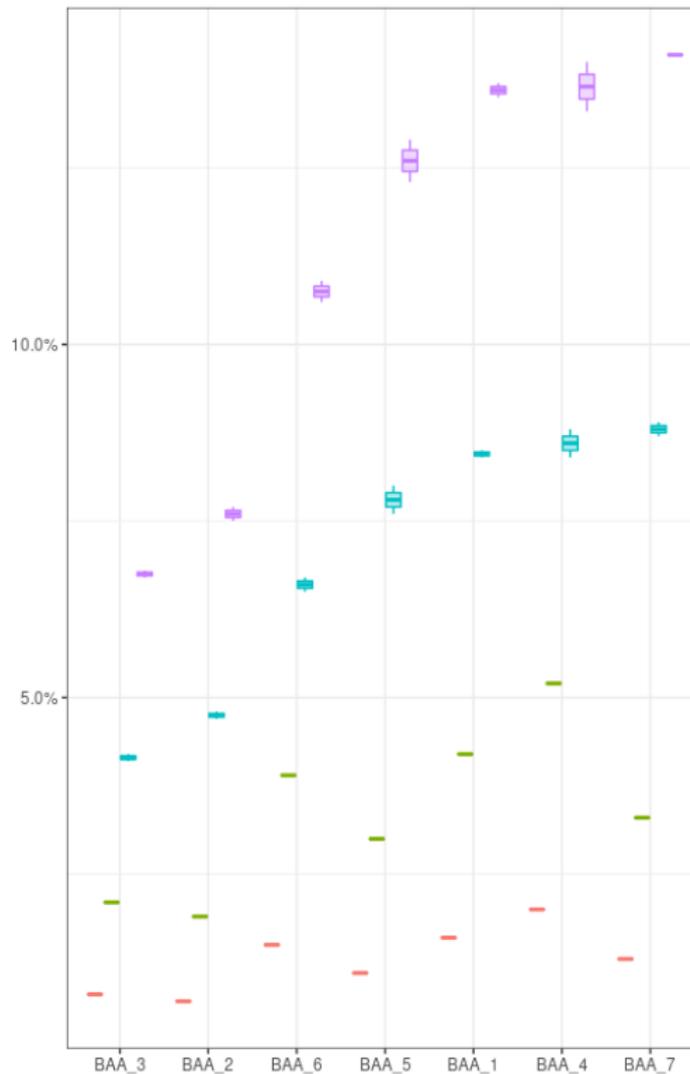
\*\*\*Caution on comparing IR and FRP directly due to footprint and granularity differences.

# Scaled Requirements by BAA

## Up Requirement



## Down Requirement



20220507 to 20240514 | \*ADJ denotes (-) diversity benefit | Tranche 3

- Scaled Requirements
- FRP\_ADJ
  - FRP
  - IBR\_REQUIREMENT\_ADJ
  - IBR\_REQUIREMENT

# STF Initial Recommendation

## STF Recommendation

- Sample Scheme: 4 → 4
- Sample Days: 180 → 150

## General Observations

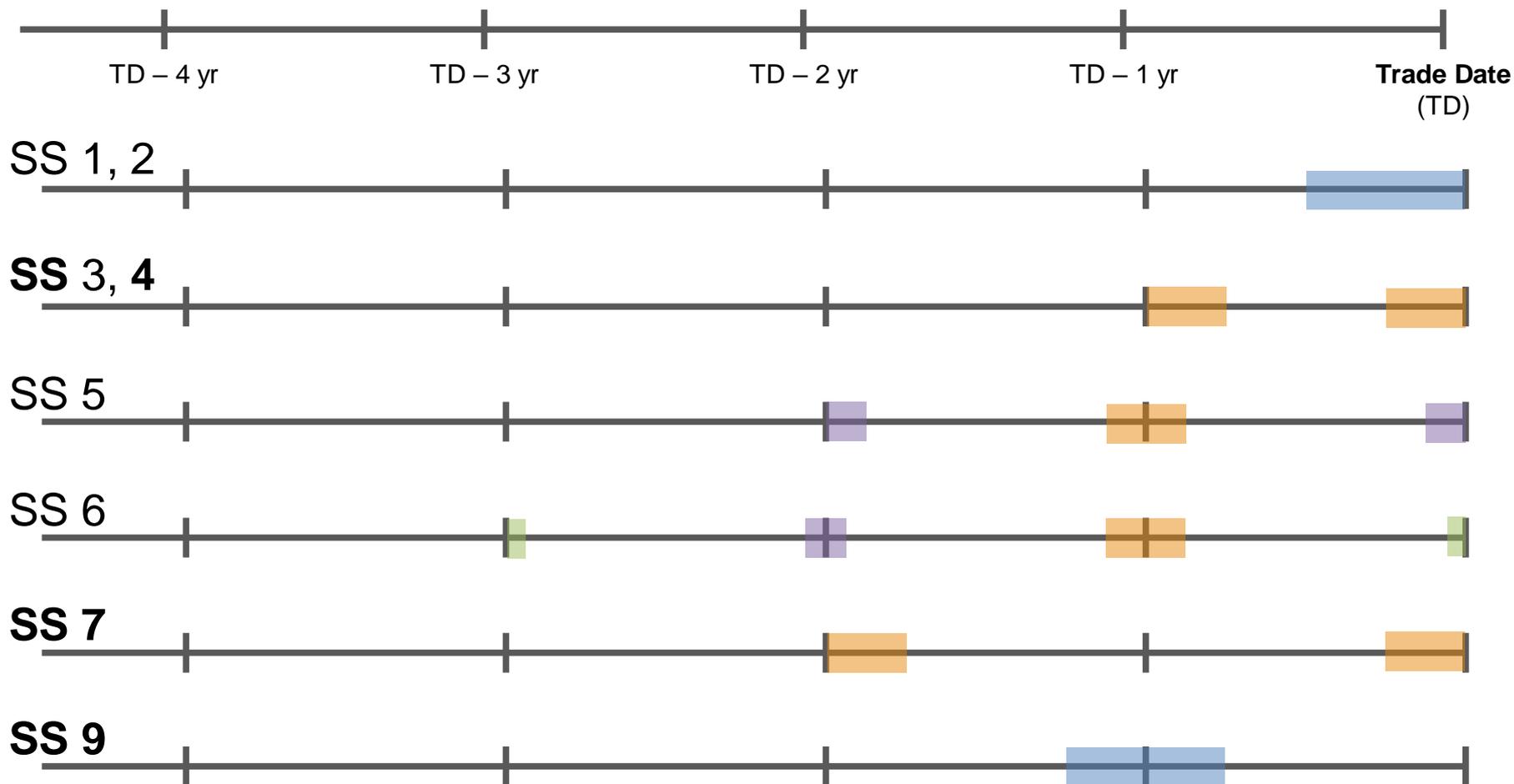
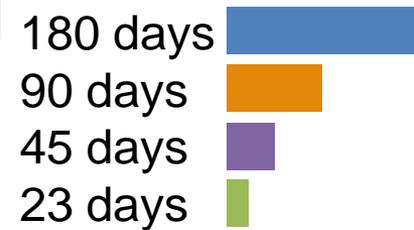
- For methods outlined, IR generally over-covered (FRP is generally under-covered)
- Seems to be a correlation between wind penetration and increased requirement magnitude
- EDAM Area upward requirement peaks in Winter

# QUESTIONS / SUGGESTIONS

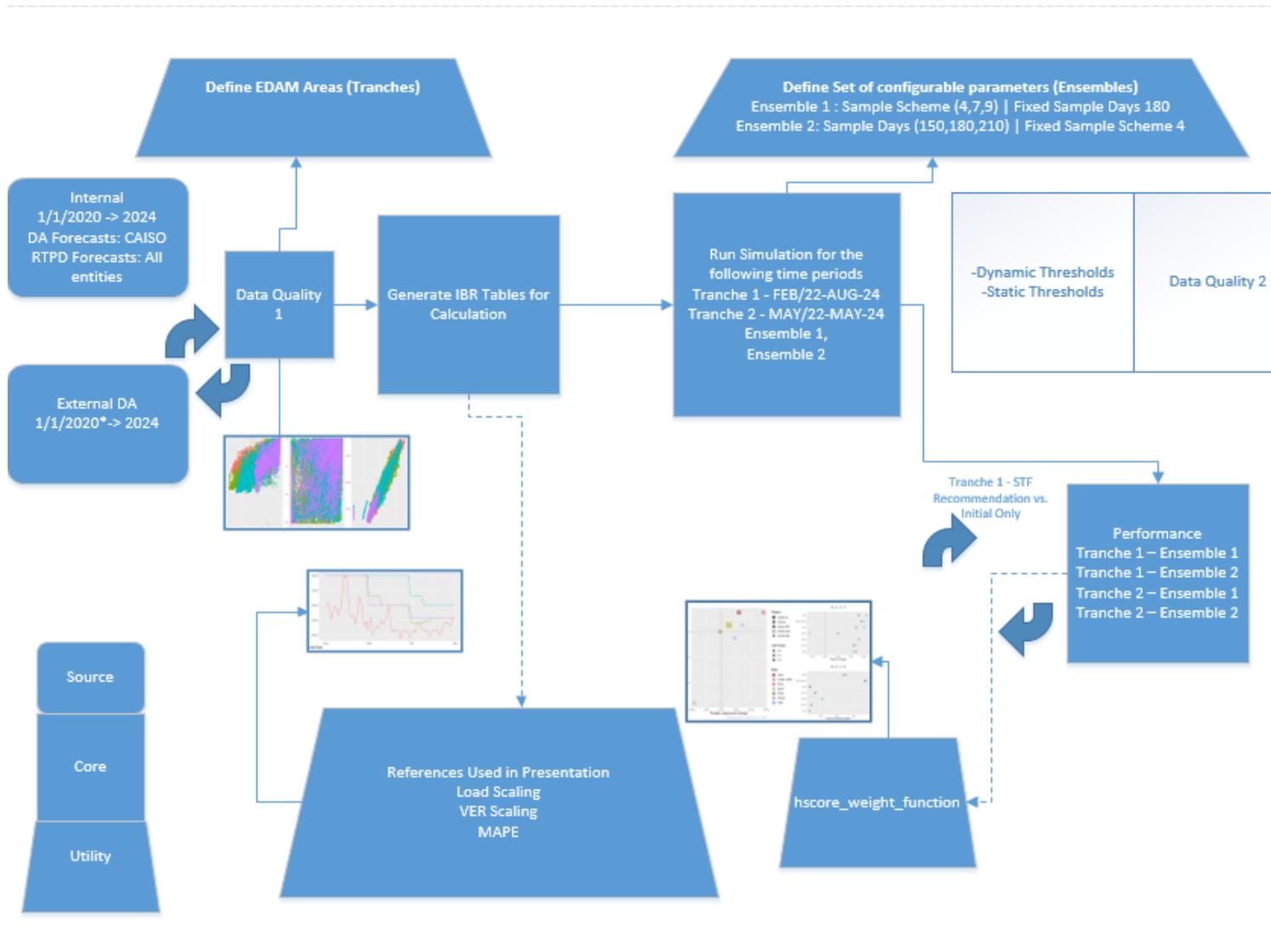


# SUPPLEMENTARY

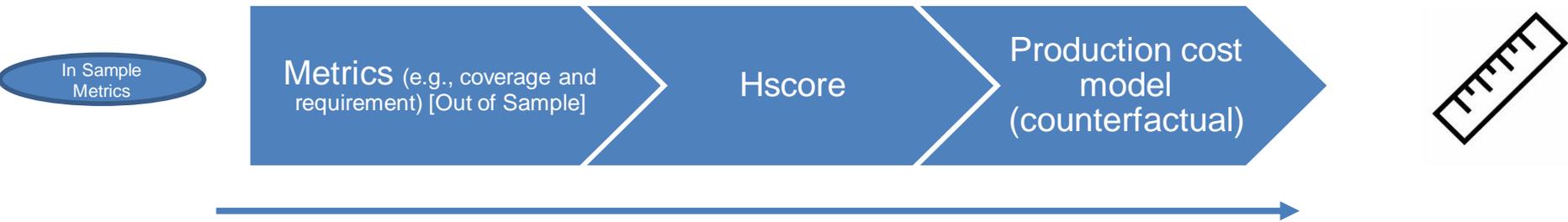
# Sample Scheme (SS) Key \*



\* Illustrative examples. Periods and timelines not to scale.



# Hscore summary slide



Less difficult to construct  
 Less compute  
 Less information  
 Less efficient to communicate

More difficult to construct  
 More compute  
 More information  
 More efficient to communicate

# Example Communication

Hello,

CAISO is preparing for a workshop regarding configurable parameters within the DAME/EDAM initiative. Part of that initiative will be to trial different sampling (longer sample periods) and performance to prepare for the IR deployment for all participating/interested entities. To assist in this we are requesting to receive data from your entity starting from 1/1/2020 - present day ( to facilitate the study of longer sample periods).

Through this we will also be able to provide estimates of IRU and IRD for your entity.

You can find some details on similar analysis we have done regarding configurable parameters in FRP in the following stakeholder links as well.

Nov. 29, 2023 Market Surveillance Committee (MSC) [presentation](#)

Feb. 7 2024 Board of Governors [presentation](#)

The only requirement we have is to receive your hourly DA forecasts for demand, solar and wind in the attached format (solar and wind aggregations done prior to sending to CAISO and stacked “longways” – attached format should help calibrate). We will provide the FMM values for demand, solar and wind.

Thank you,

A	B	C	D	E	F	G	
Timestamp	TRADE_DT	TRADE_HF	FORECAST	FORECAST	LEAD_IND	BAA_NAME	
2021-01-01	1/1/2021	1	0	SOLAR	DA	BAA	
2021-01-01	1/1/2021	2	0	SOLAR	DA	BAA	
2021-01-01	1/1/2021	3	0	SOLAR	DA	BAA	
2021-01-01	1/1/2021	4	0	SOLAR	DA	BAA	
2021-01-01	1/1/2021	5	0	SOLAR	DA	BAA	
2021-01-01	1/1/2021	6	0	SOLAR	DA	BAA	
2021-01-01	1/1/2021	7	0	SOLAR	DA	BAA	
2021-01-01	1/1/2021	8	92.98754	SOLAR	DA	BAA	
2021-01-01	1/1/2021	9	404.9092	SOLAR	DA	BAA	
2021-01-01	1/1/2021	10	452.752	SOLAR	DA	BAA	
2021-01-01	1/1/2021	11	413.9338	SOLAR	DA	BAA	
2021-01-01	1/1/2021	12	448.4426	SOLAR	DA	BAA	

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