A satellite image of a mountainous region, likely the Sierra Nevada range. The terrain is rugged with significant snow cover on the peaks and upper slopes. A river is visible winding through the valley, and a large lake is situated in the lower right. The sky is filled with white clouds.

CNRFC Update & 2019 Post-Analysis

November 6, 2019

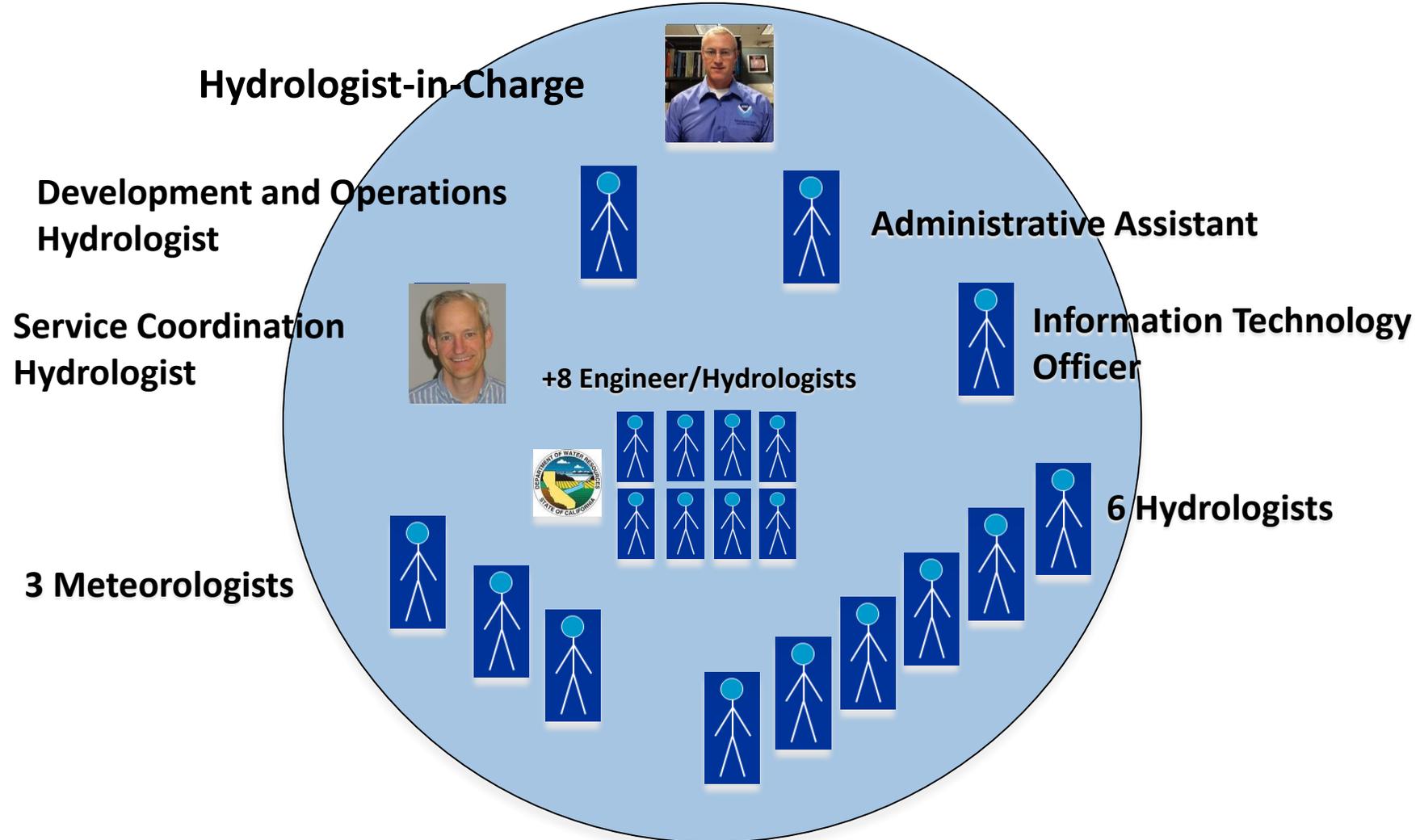
Pete Fickenscher

Service Coordination Hydrologist

NWS - CNRFC

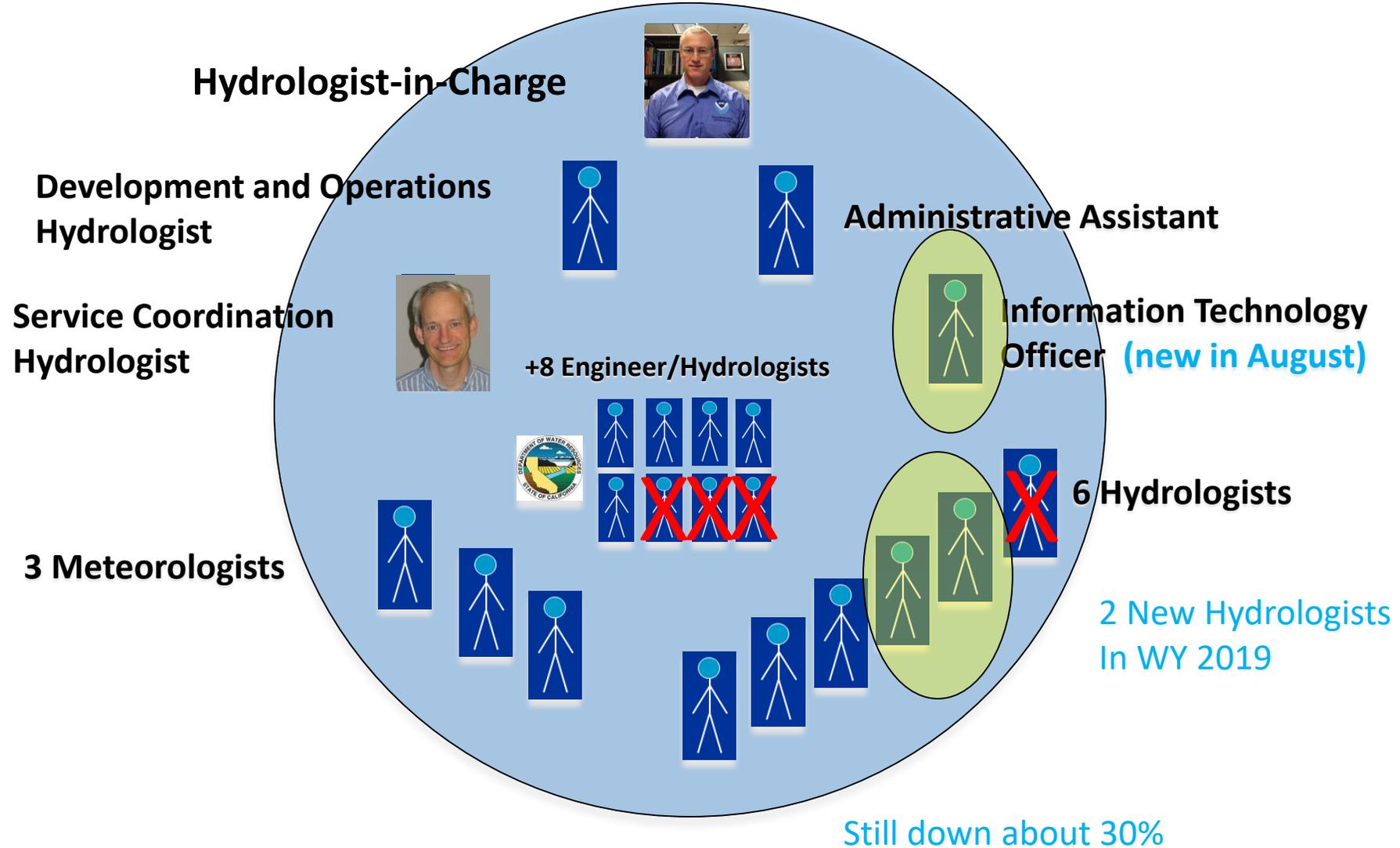


CNRFC Full Staffing (14)





WY2020 Staffing (13)

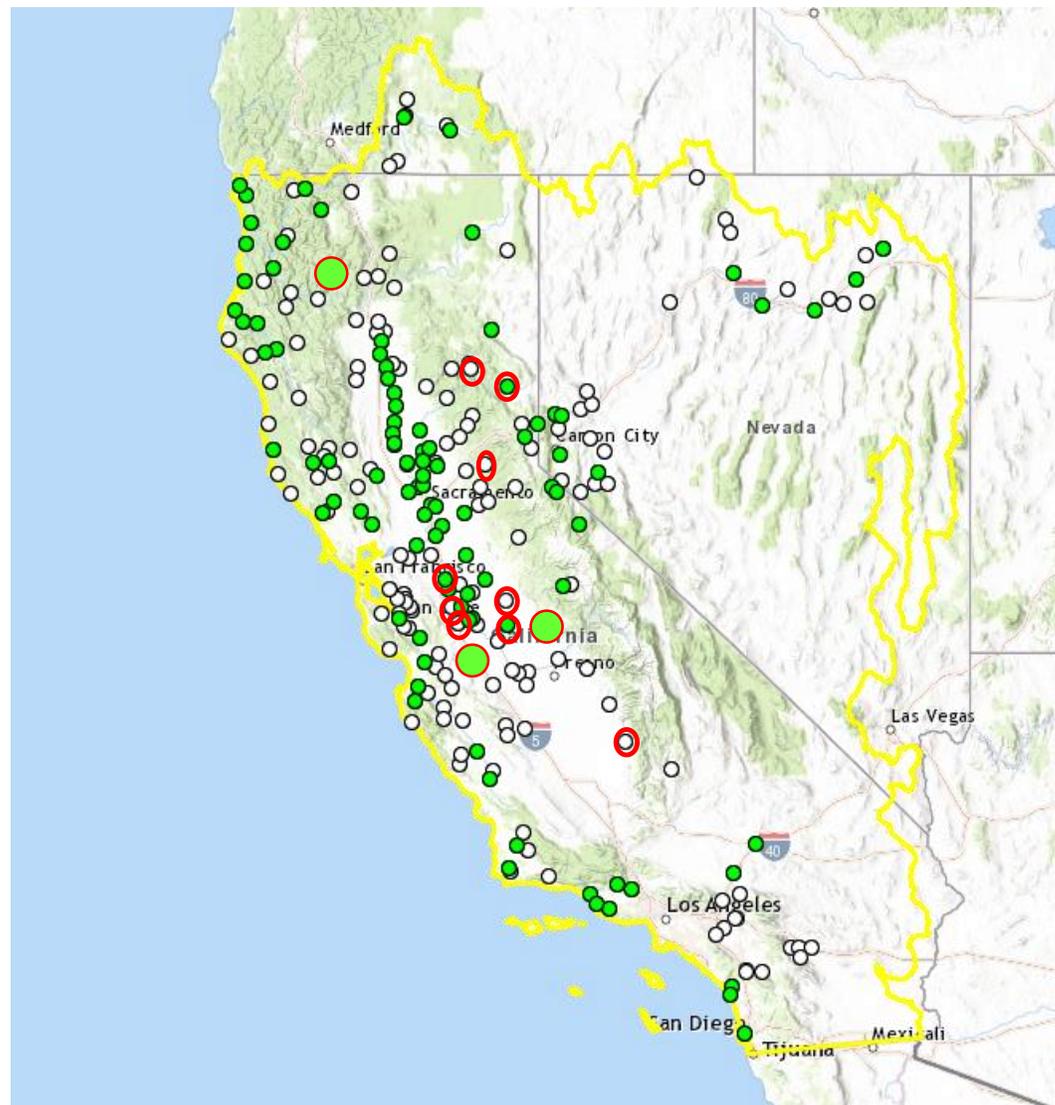




WY2020 New Developments



- Reservoirs
 - Trinity Lake
 - Los Banos Reservoir
 - Merced Group
- San Joaquin
 - MS at STVC1 to 68 ft
 - Recalibrations
 - Vernalis Ensembles
- DWR Reservoirs
 - Feather Basin





WY2020 New Developments

- Move to Baseline
 - Lost Hardware
 - Security requirements
- National Water Center Backup Development

WHEN YOU HEAR THIS:



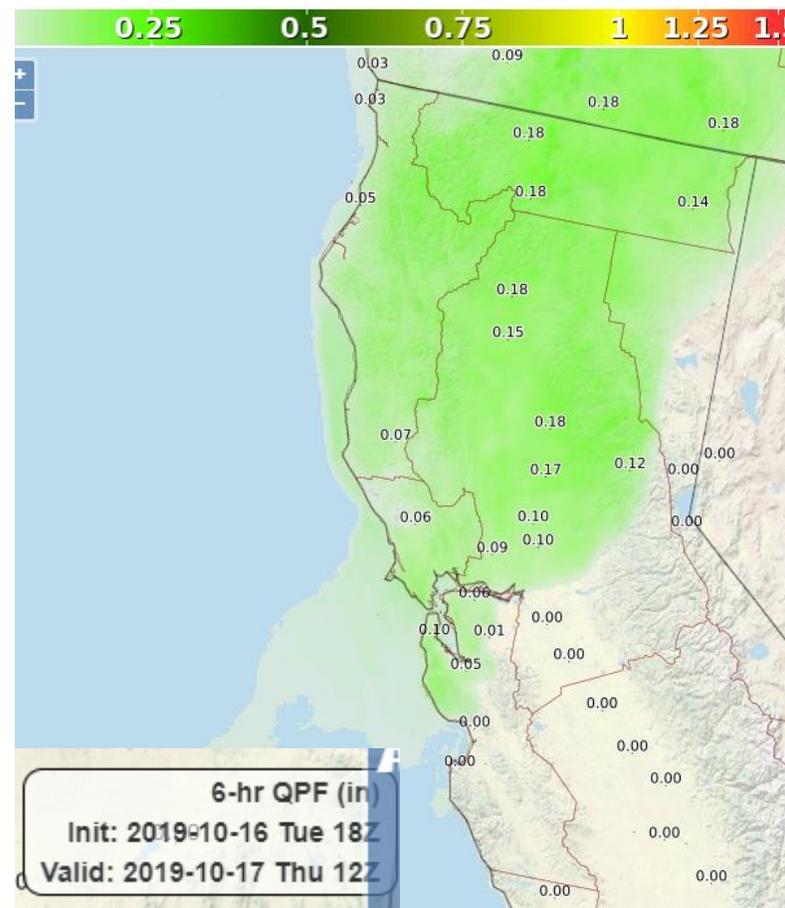
YOU KNOW YOU'RE IN A SOFTWARE PROJECT



WY2020 New Developments

- **Baseline Forcings**
 - National Blend of Models (NBM)
 - Working on Verification

“The U.S. National Blend of Models provides statistically postprocessed, high-resolution multimodel ensemble guidance, providing National Weather Service forecasters with a calibrated, downscaled starting point for producing digital forecasts.” T. Hamill



Example of NBM QPF as a starting point for CNRFC QPF.

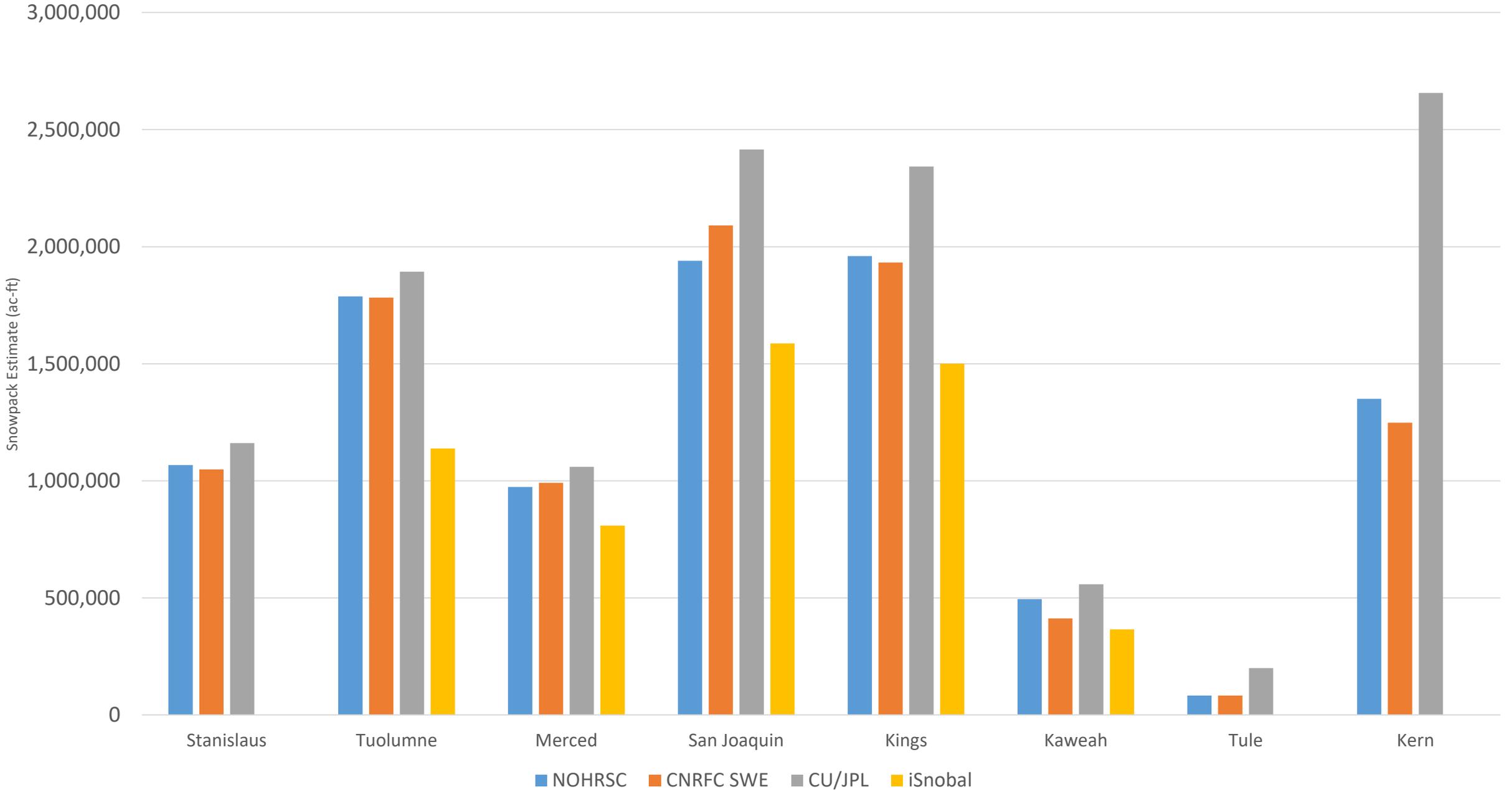
1. WY 2019 – Factors in AJ Forecast

- Dry Fall (until Thanksgiving)
- Very cold & wet February → Lots of low snow
- Wet May → Wettest AJ in 8 Years (WY2011)

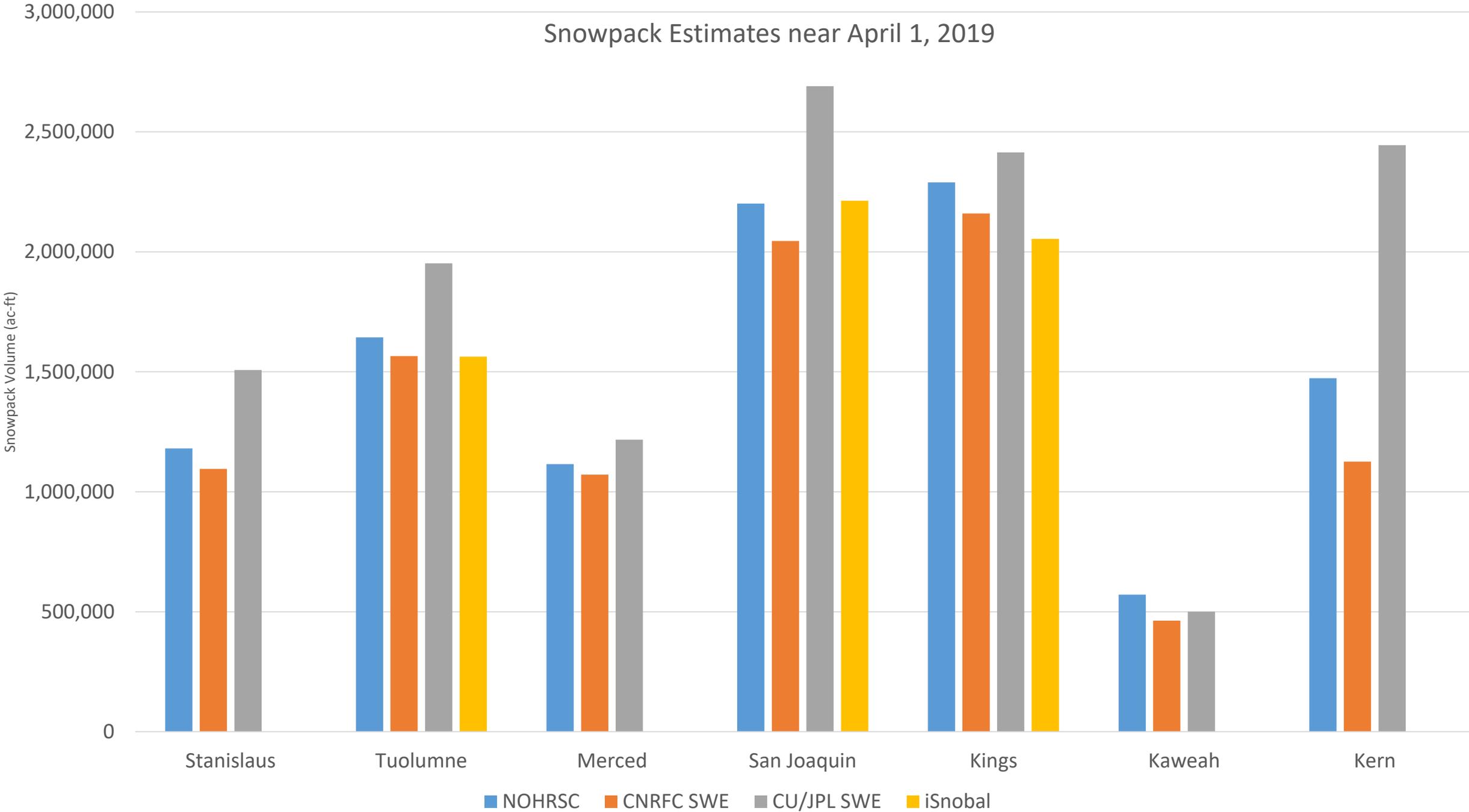
2. Snow Volume Estimations

3. AJ Runoff Forecast Verification

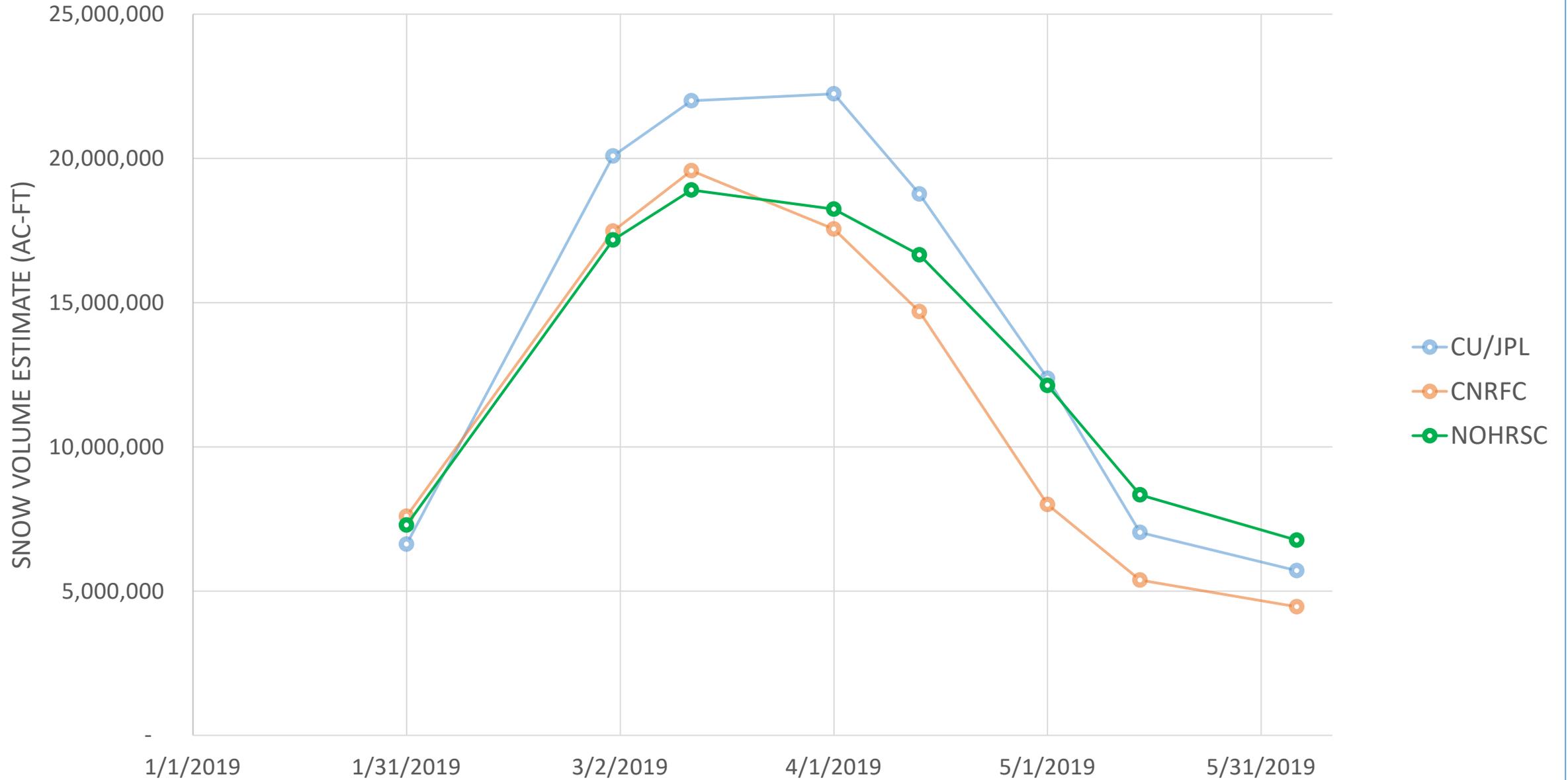
Snowpack Estimates near March 1, 2019



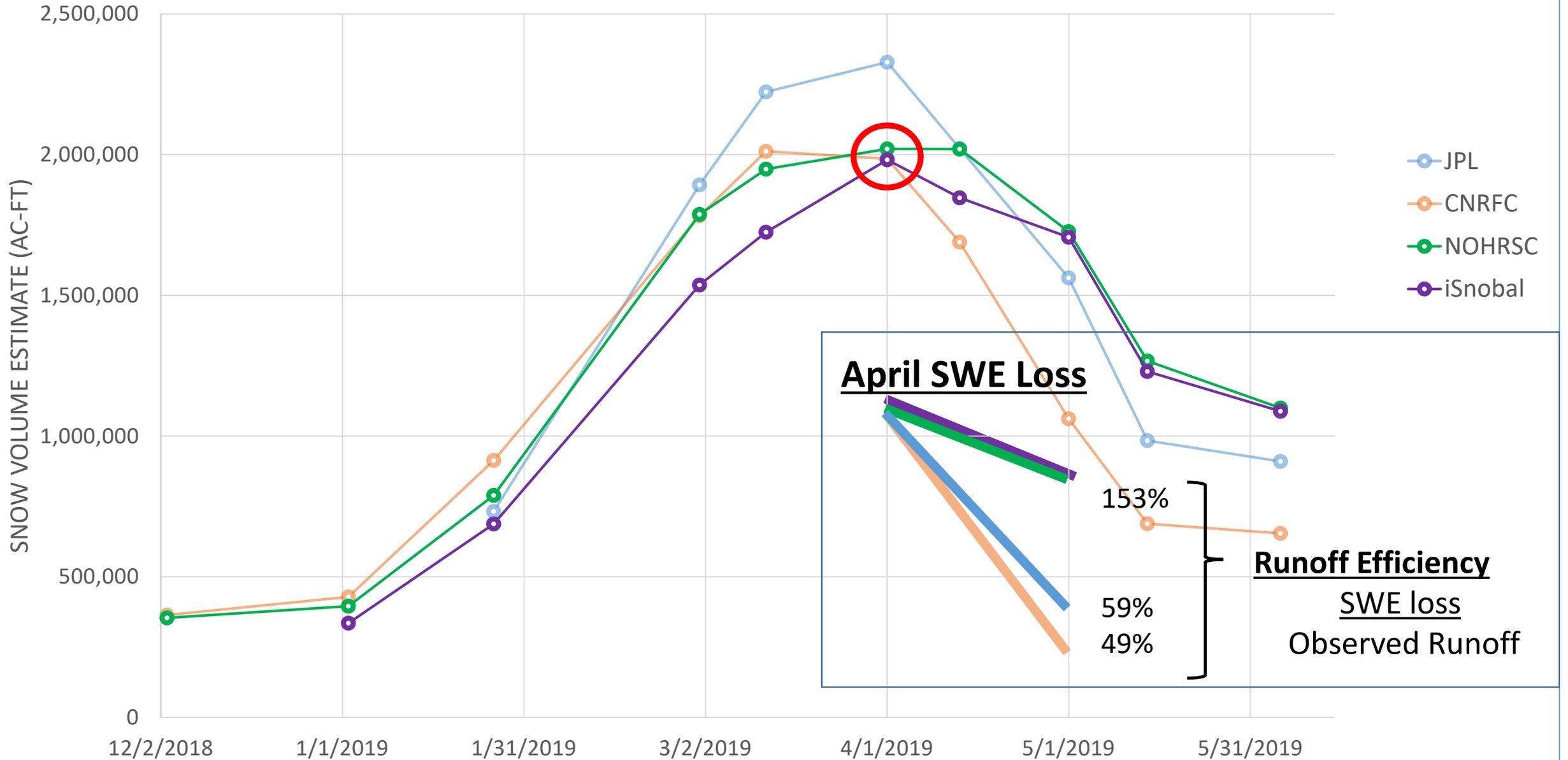
Snowpack Estimates near April 1, 2019



West Sierra Basins - 2019 SWE Volume Estimates



Tuolumne Basin - 2019 SWE Volume Estimates



Wet May → Boost to
AJ Runoff

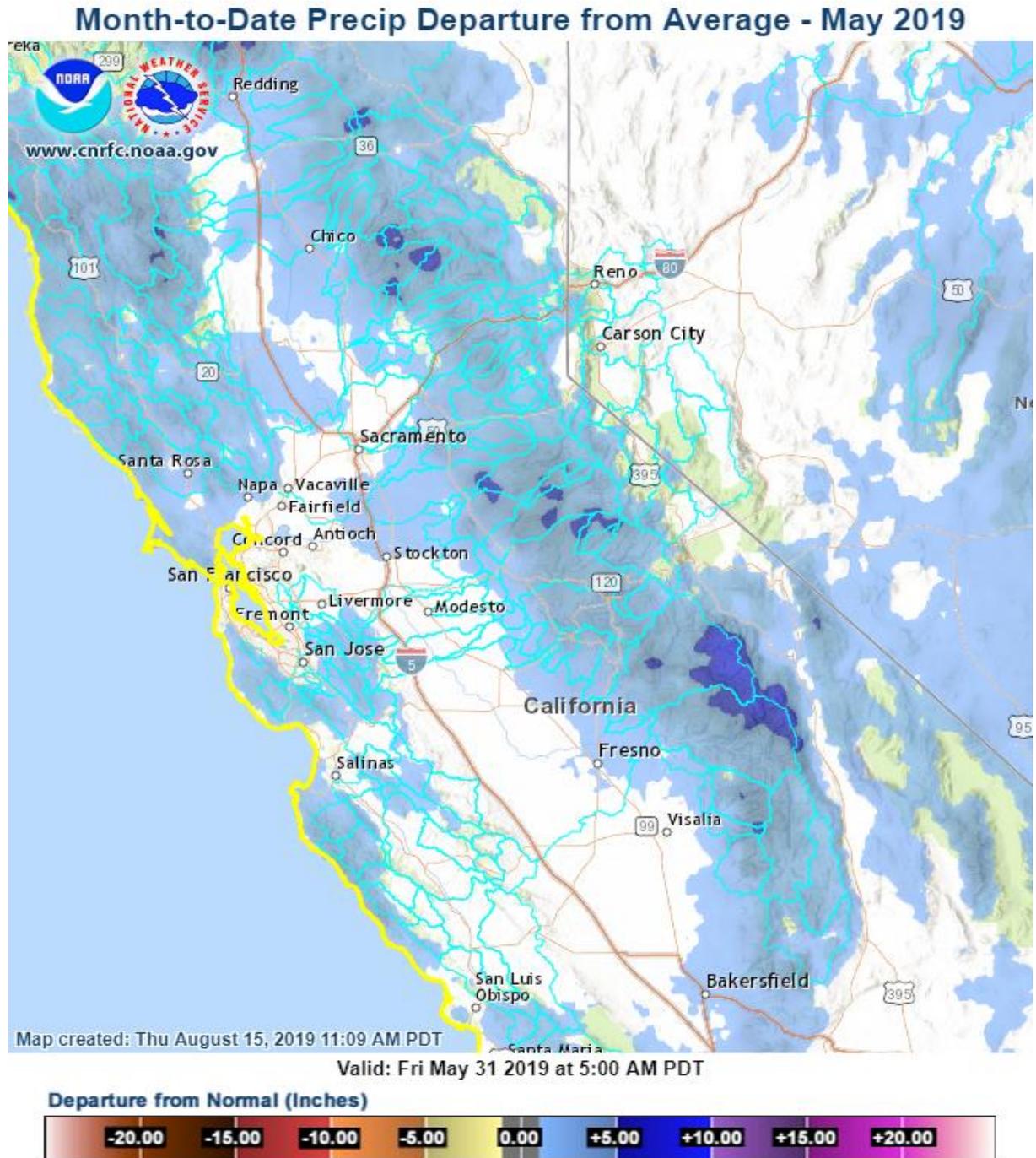
AJ Precipitation Totals

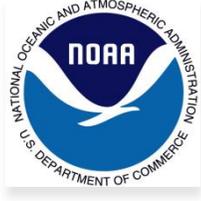
8 Station Index = 10.96 in. (83rd percentile)

5 Station Index = 7.4 in. (76th percentile)

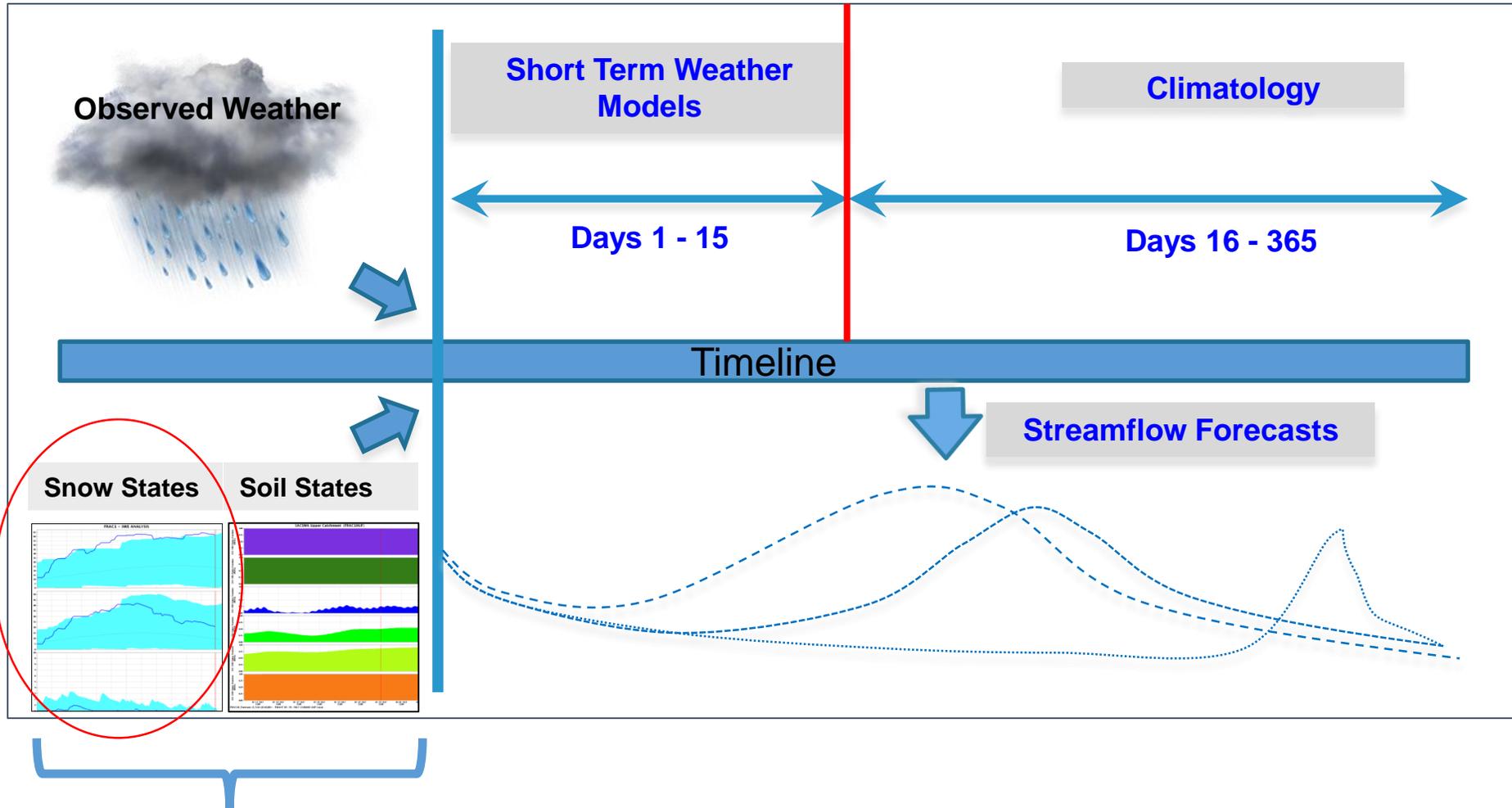
6 Station Index = 5.64 in. (73rd percentile)

Assumption: For verification of April 1st runoff forecast, a “perfect” forecast should be near the non-exceedance 25th percentile.





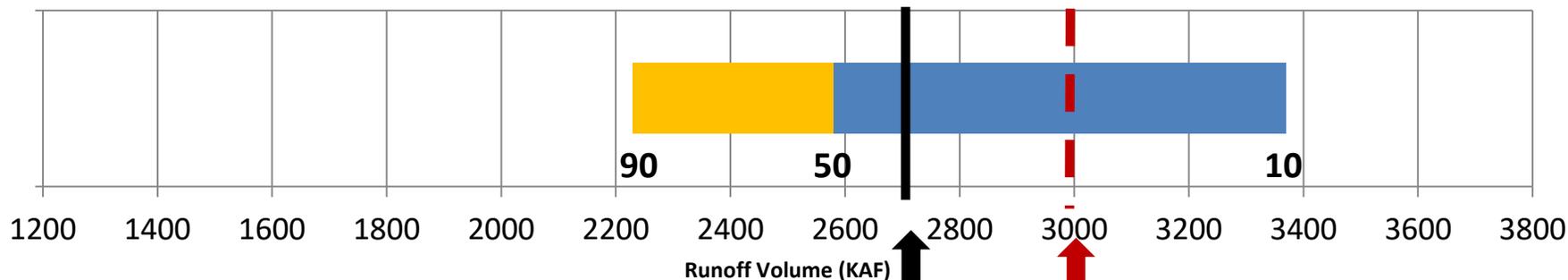
HEFS = Hydrologic Ensemble Forecast Service



Snow and Soil uncertainty not quantified → Forecast uncertainty is too narrow

Apr 1st AJ Volume Forecasts (HEFS)

Shasta Apr 1



% Error

10%

Observed AJ
Volume

Error

Forecast AJ Volume
(25% non-exceedance)

Verification Assumption:

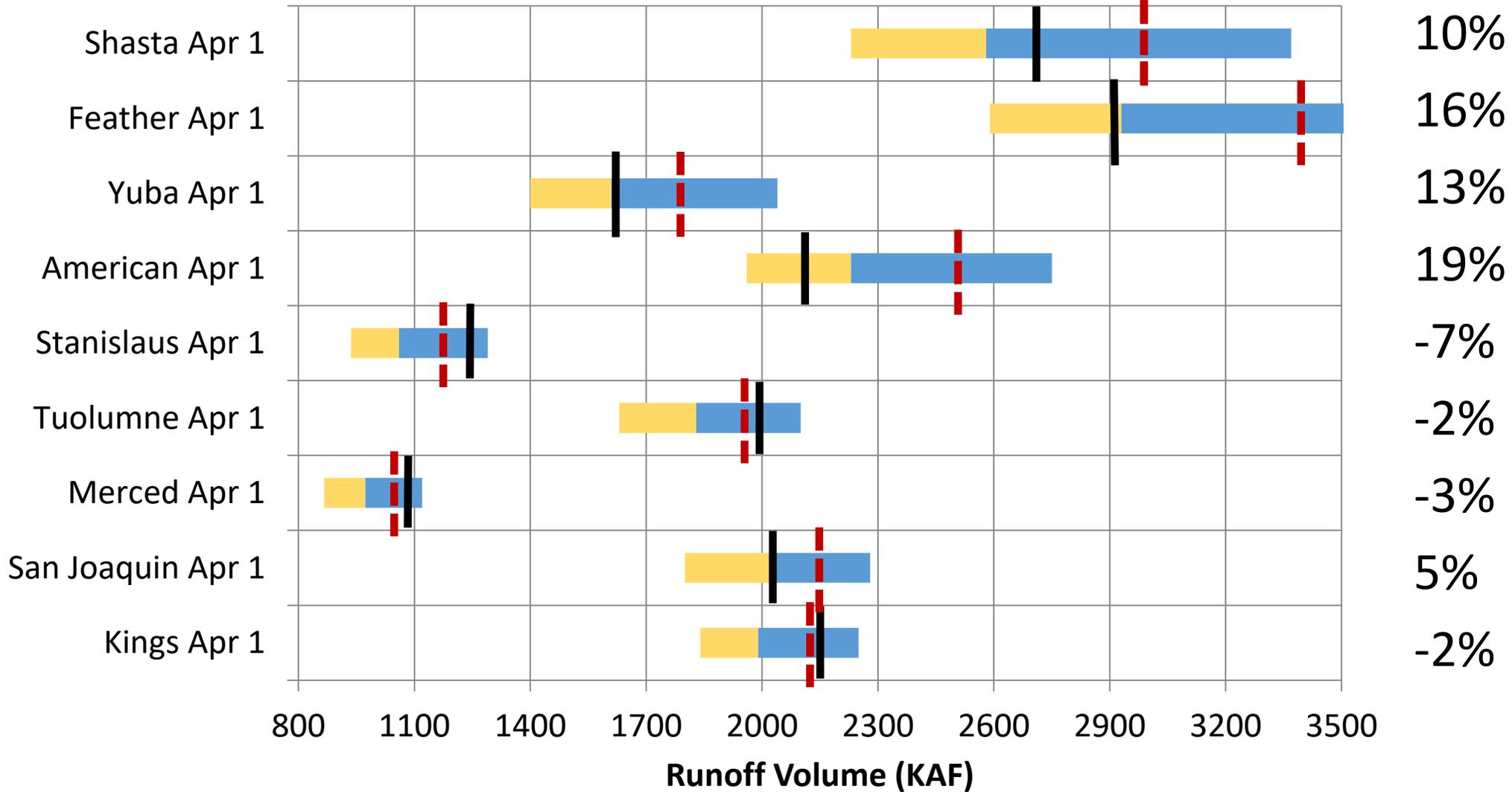
- A “perfect” April 1 forecast of AJ Volume ~ 25th percentile

Caveats:

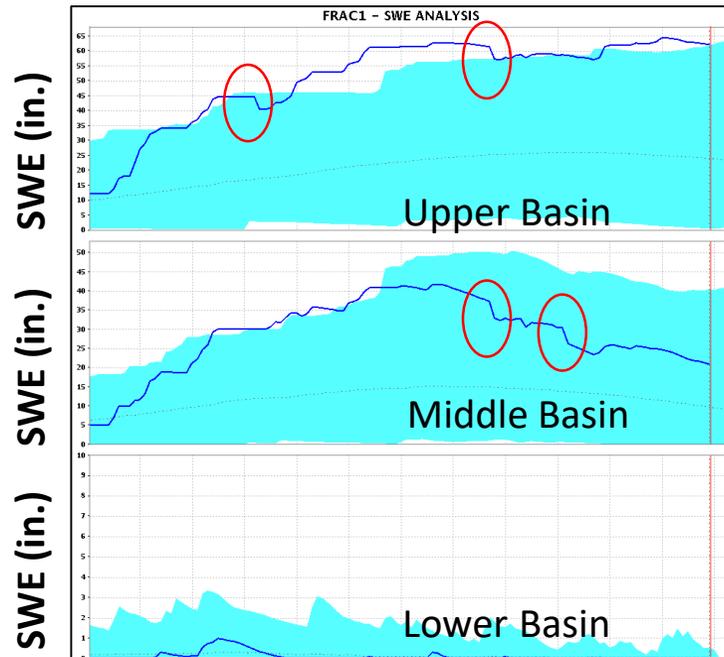
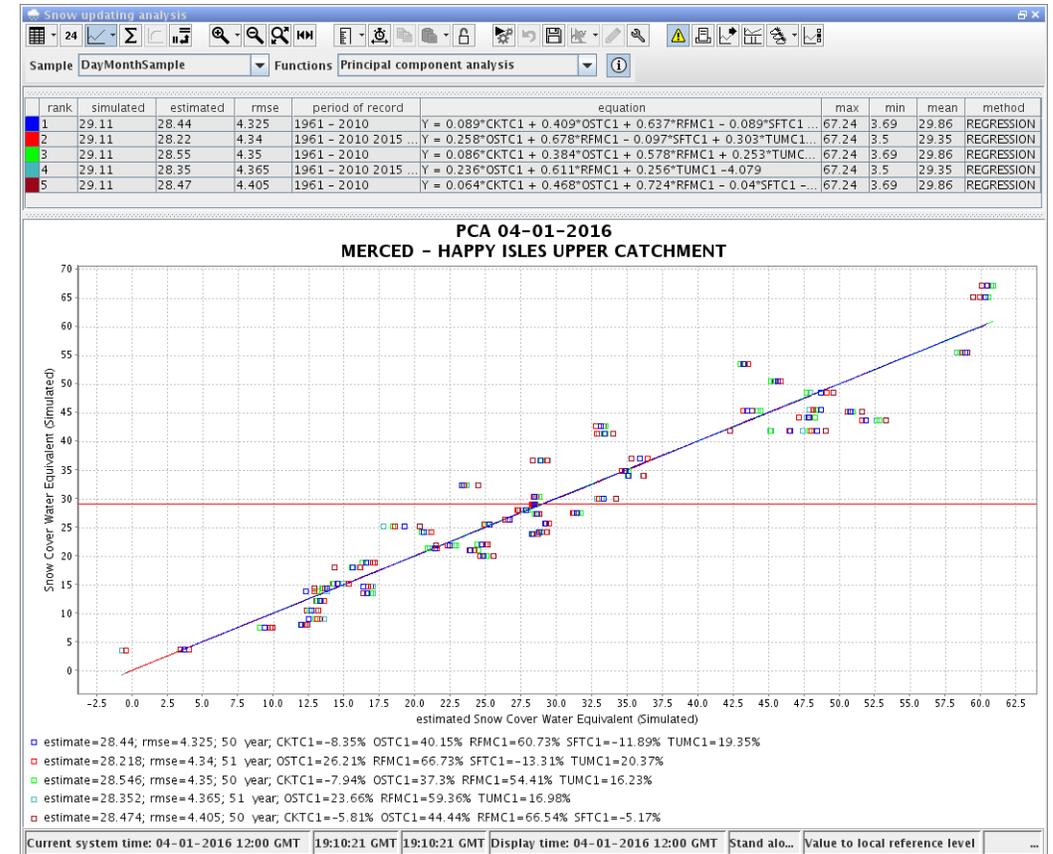
- Snow bias is mixed in with soil biases and model biases (SCA curve).
- Forecast rainfall not accounted for (first week of April 0.5 - 2.0 inches)
- Only one forecast examined - Daily fluctuations in HEFS not accounted for
- Basin to basin rainfall differences not accounted for

Apr 1st AJ Runoff Volume Forecasts (HEFS)

% Error



CNRFC HEFS Forecasts – SWE Adjustments



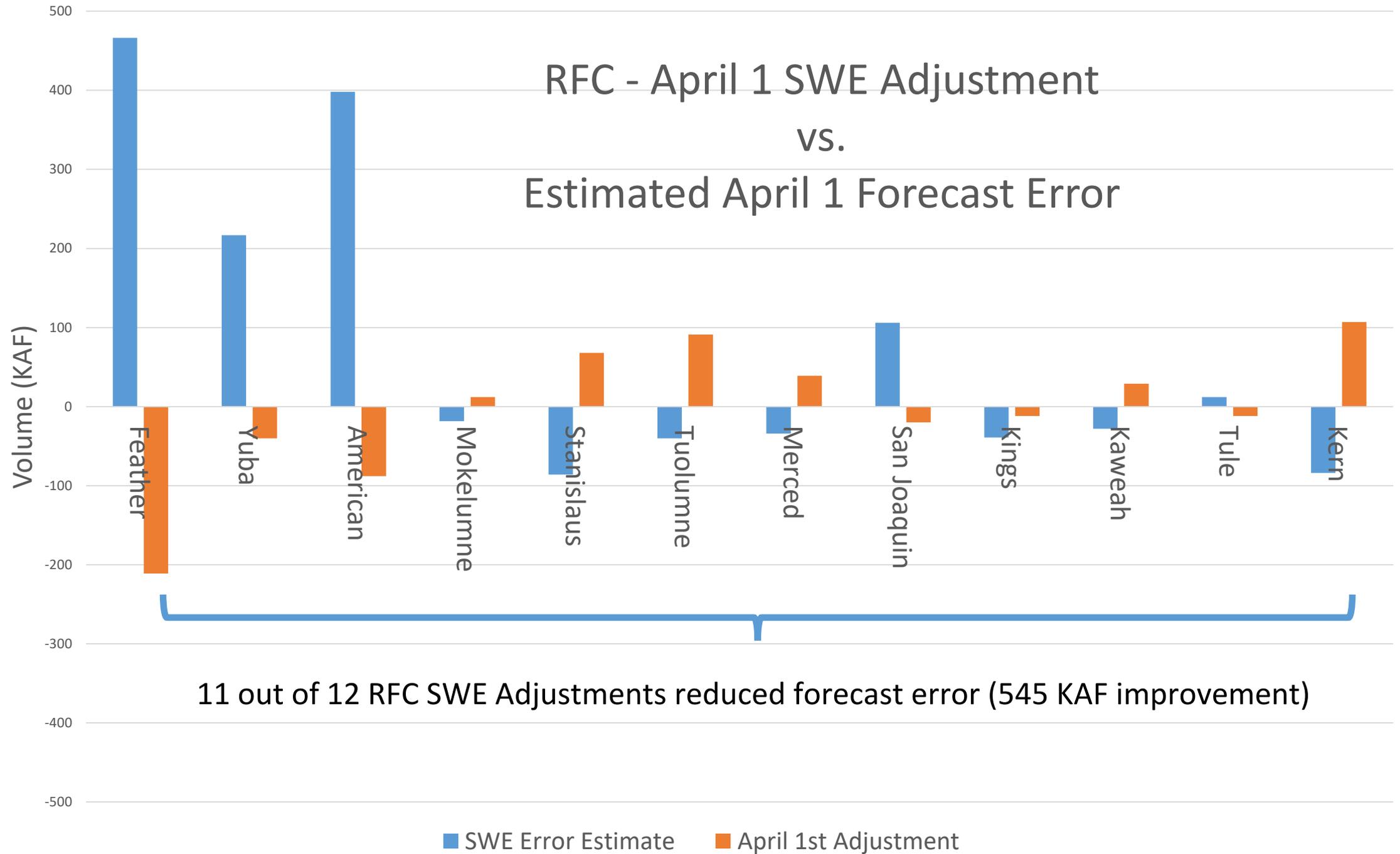
Jan. 1

Mar. 1

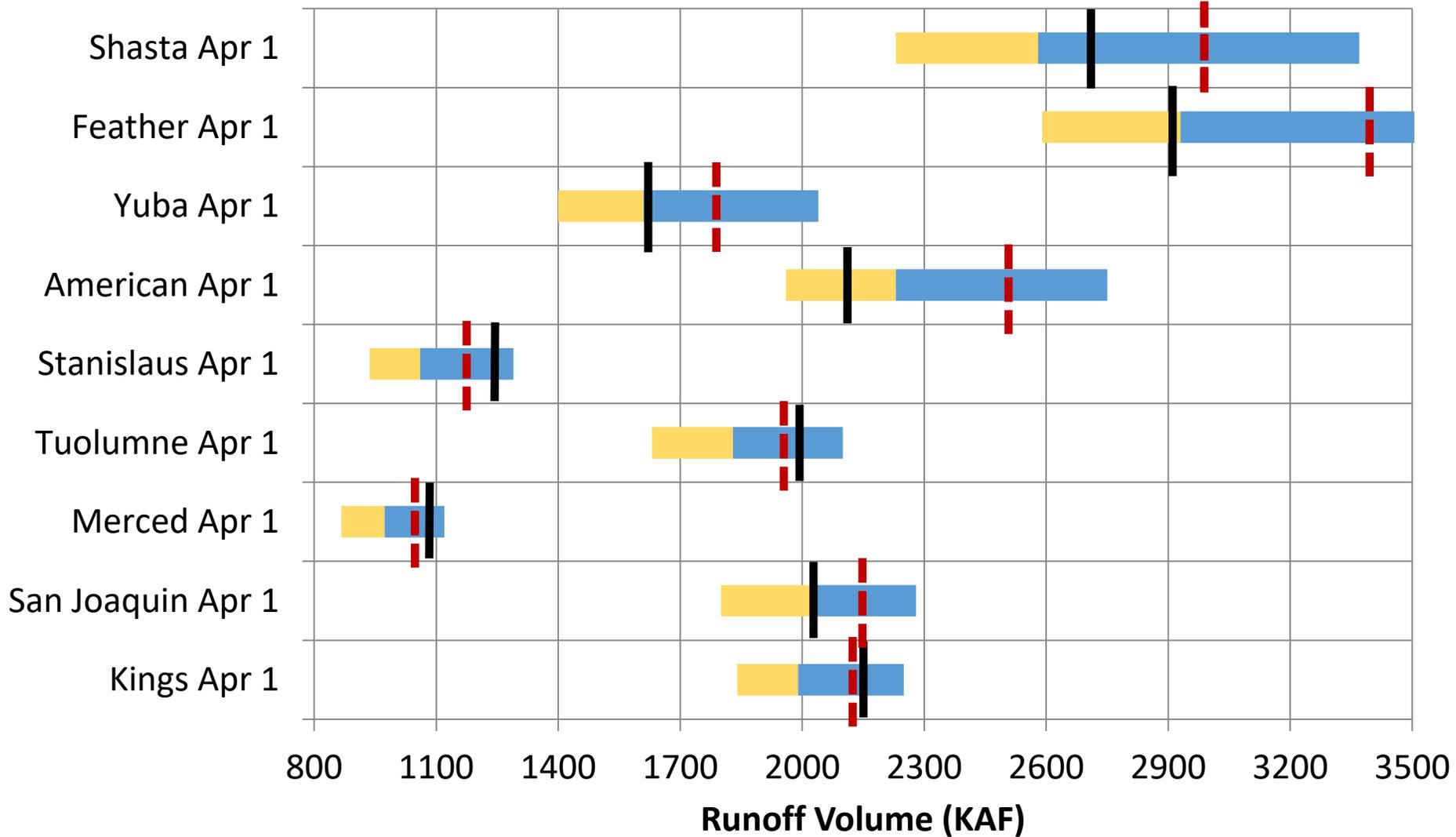
May 1



RFC - April 1 SWE Adjustment vs. Estimated April 1 Forecast Error



Apr 1st AJ Runoff Volume Forecasts (HEFS)



% Error
(Raw)

% Error
(adjusted)

10%

9%

16%

8%

13%

10%

19%

13%

-7%

-1%

-2%

-1%

-3%

2%

5%

4%

-2%

-2%

2019 AJ Forecast : Post-Analysis

Summary:

- Low Elevation snow made for difficulties in volume estimations
- Snowpack estimates had wide uncertainty (20-50% on May 1).
- CNRFC forecasts could have been improved by:
 - Removing model biases (due to low snow accumulation);
 - Using a more recent MAT climatology for AJ forecasts;
 - Including snow and soil uncertainty into forecast spread.

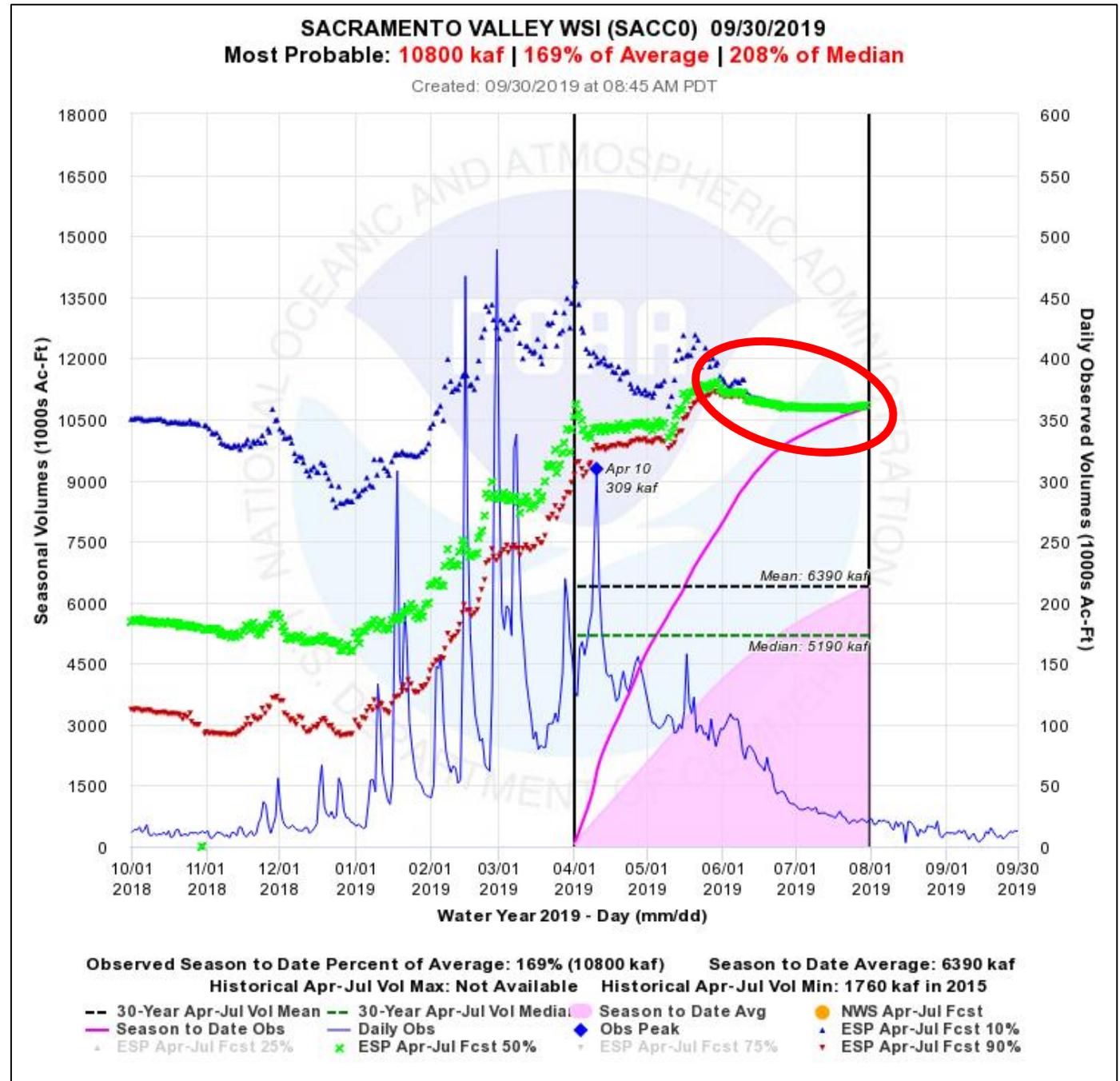
QUESTIONS ?



Extra Slides

CNRFC

Sacramento River AJ Forecasts



CNRFC

San Joaquin AJ Forecasts

