

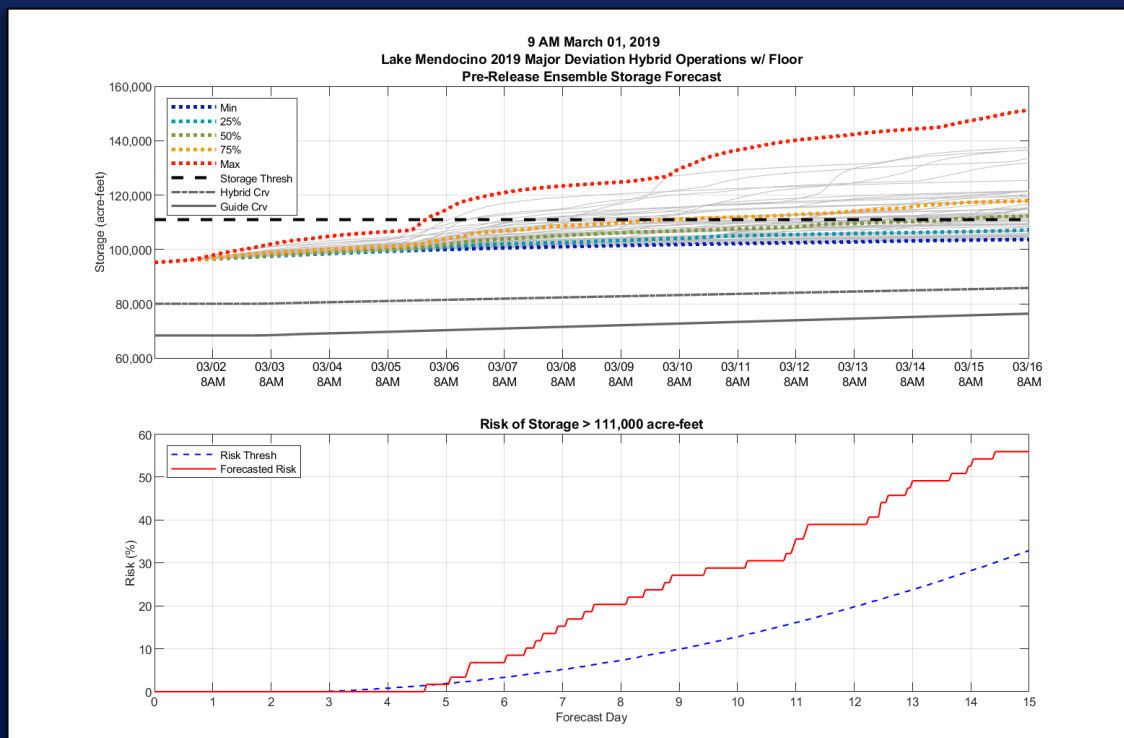


Sonoma
Water

Forecast Informed Reservoir Operations 2019 Decision Support System

Chris Delaney
Mike Konieczki
Jay Jasperse
Cary Talbot
Marty Ralph
Rob Hartman
August 6, 2019

2019 Annual
FIRO Workshop



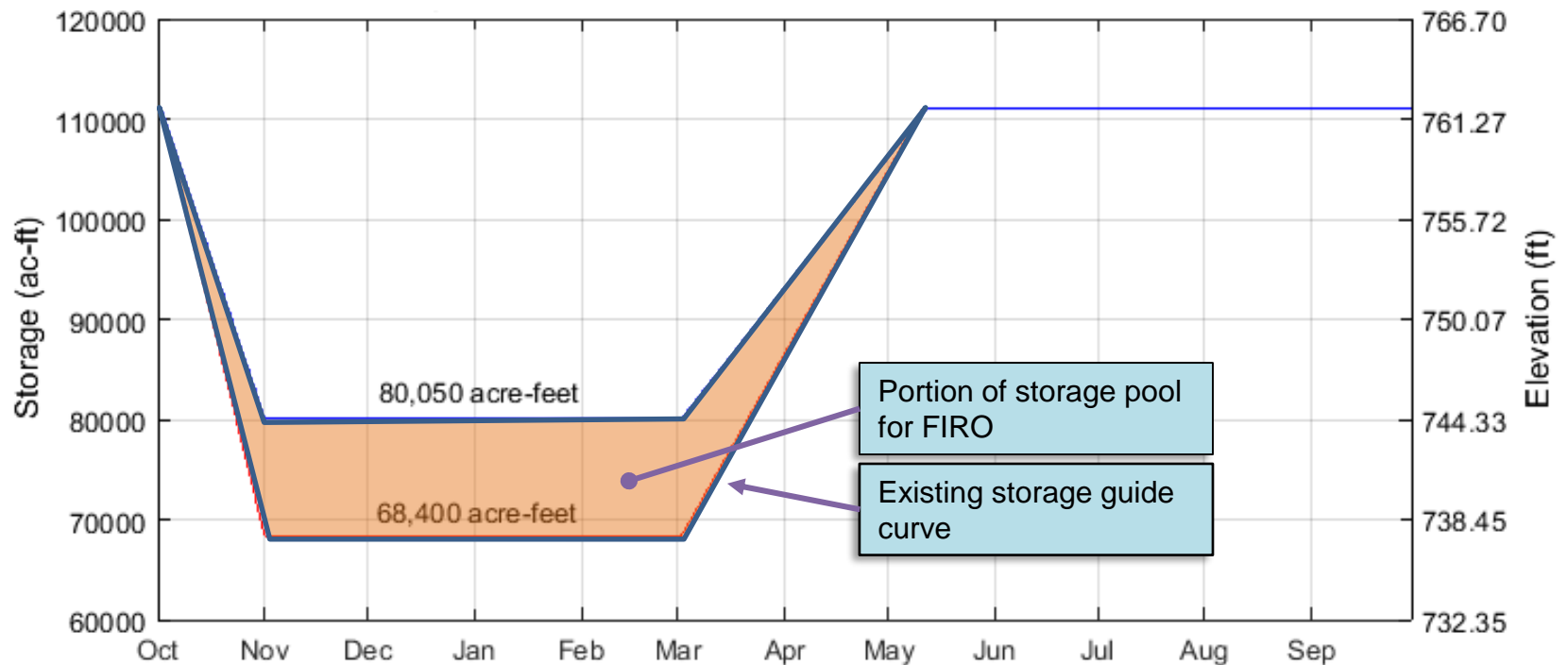
Presentation Overview

- **Lake Mendocino Decision Support System**
- Ensemble Forecast Operations Model
- 2020 Next Steps

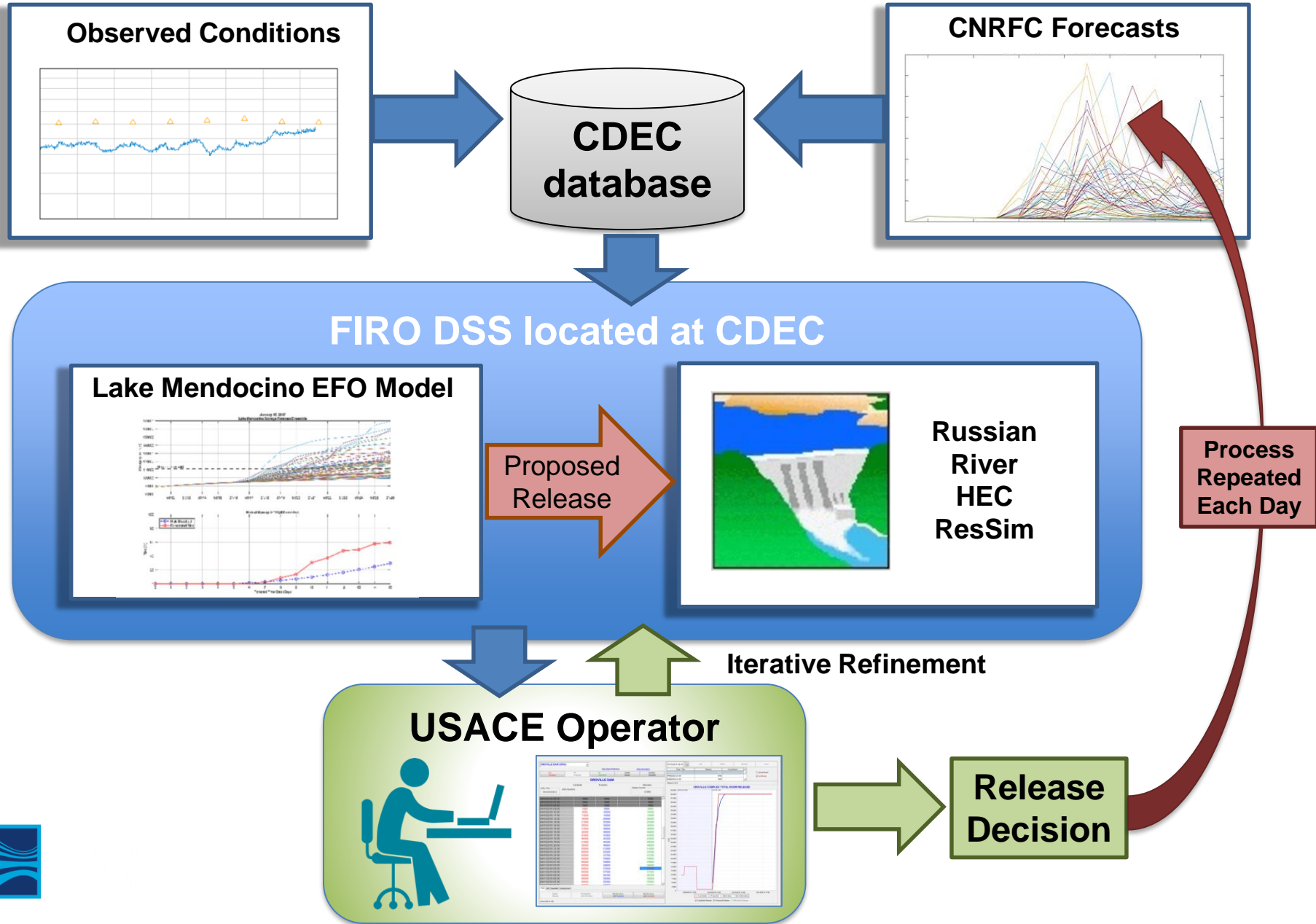


2019 Major Deviation

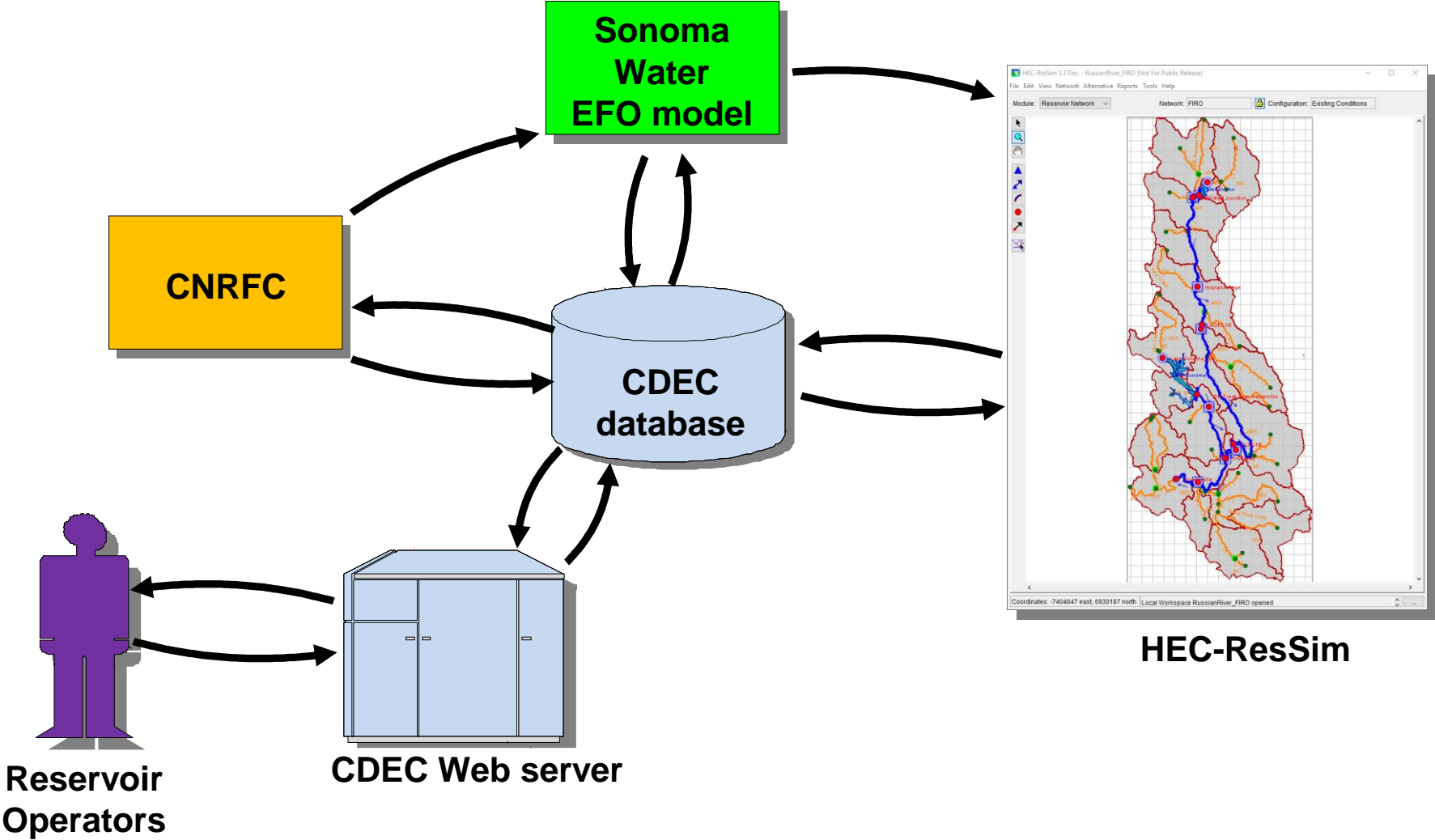
- Major Deviation to Water Control Manual
 - Approved by USACE in November 2018 for 2018/2019 winter and spring season



FIRO Decision Support System (DSS)

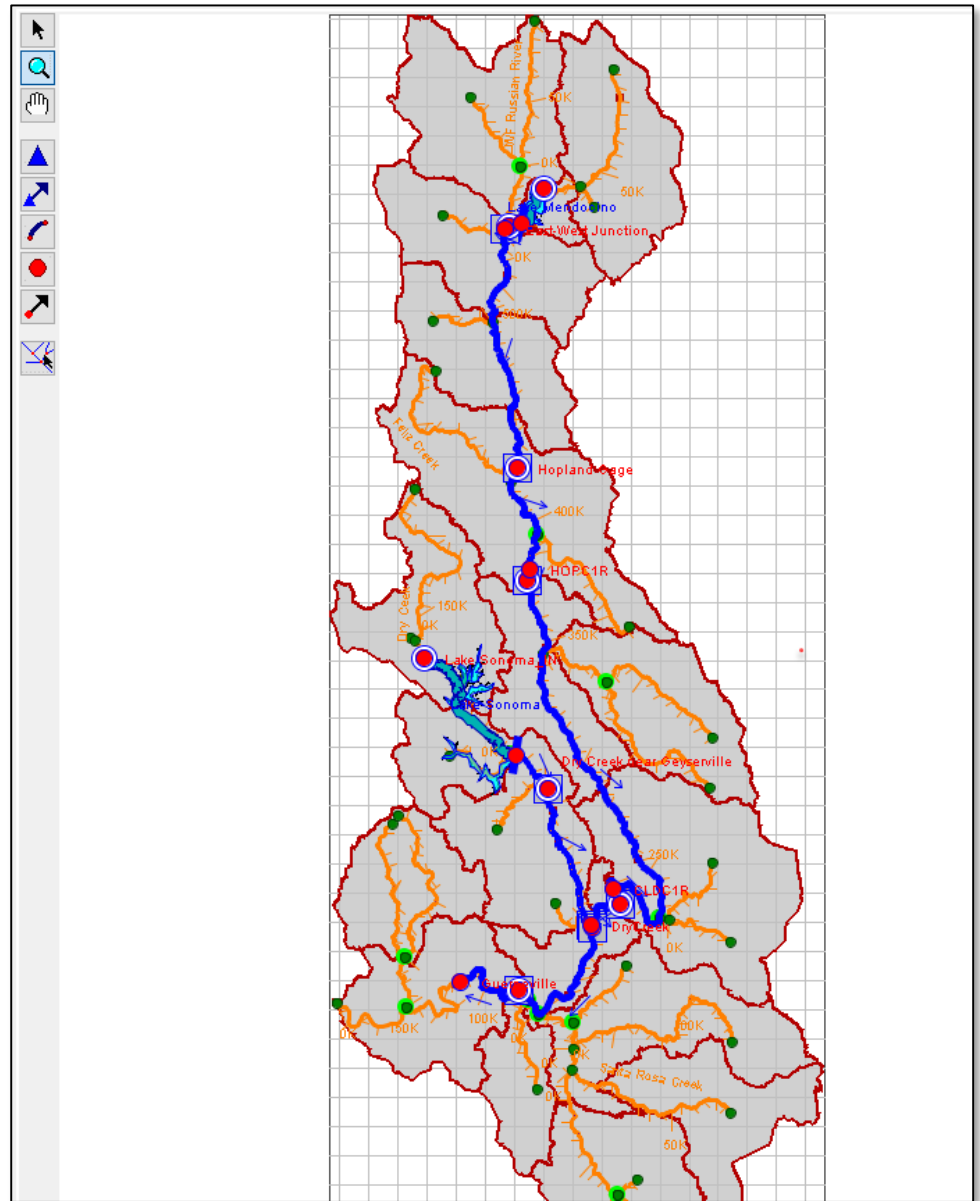


FIRO DSS Components

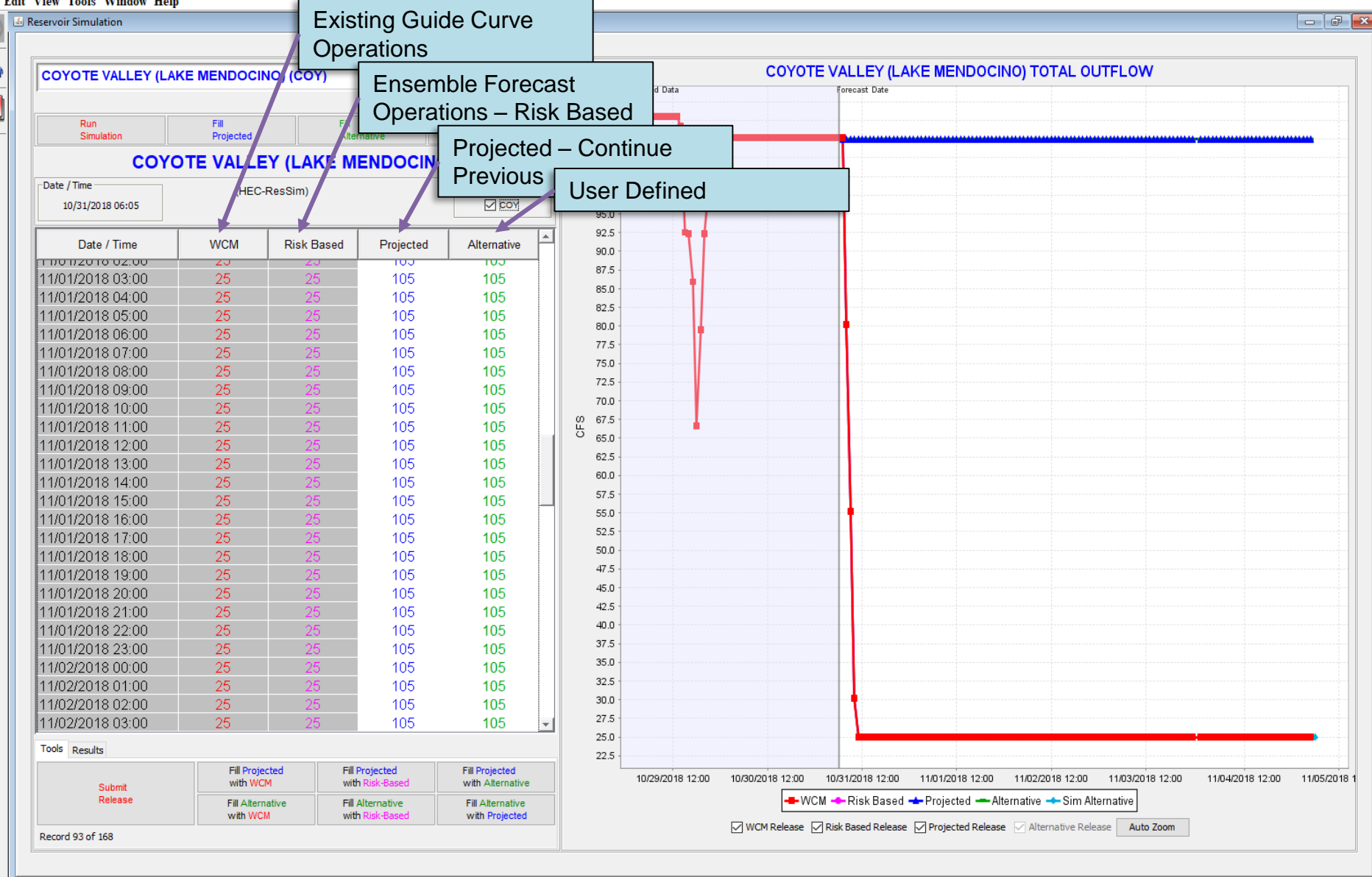


FIRO HEC-ResSim model

- ❖ Based on PVA model developed by HEC
- ❖ 2 Reservoirs
 - Lake Mendocino
 - Lake Sonoma
- ❖ Variable Lag & K routing
- ❖ Releases from EFO model included as rule



DSS Web Interface



Downstream Conditions



Downstream Target Flow

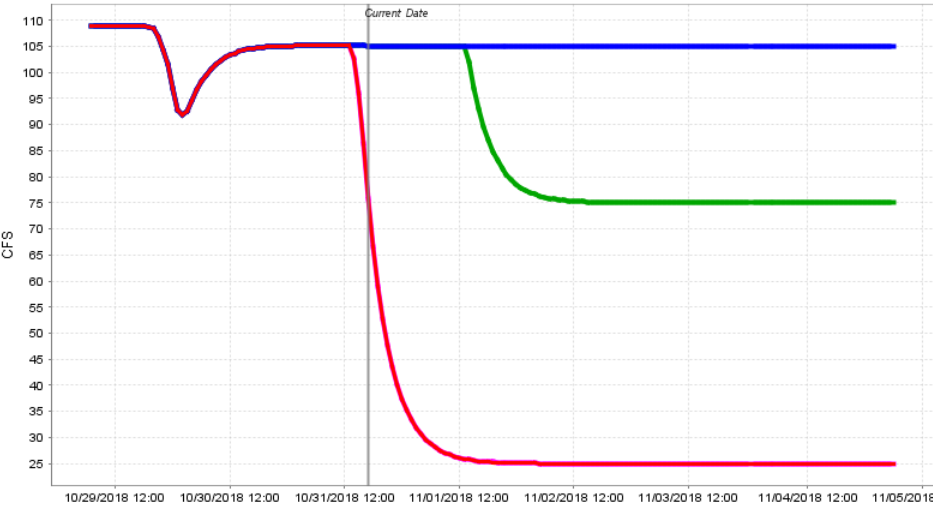


Downstream Target Locations Results - Flow

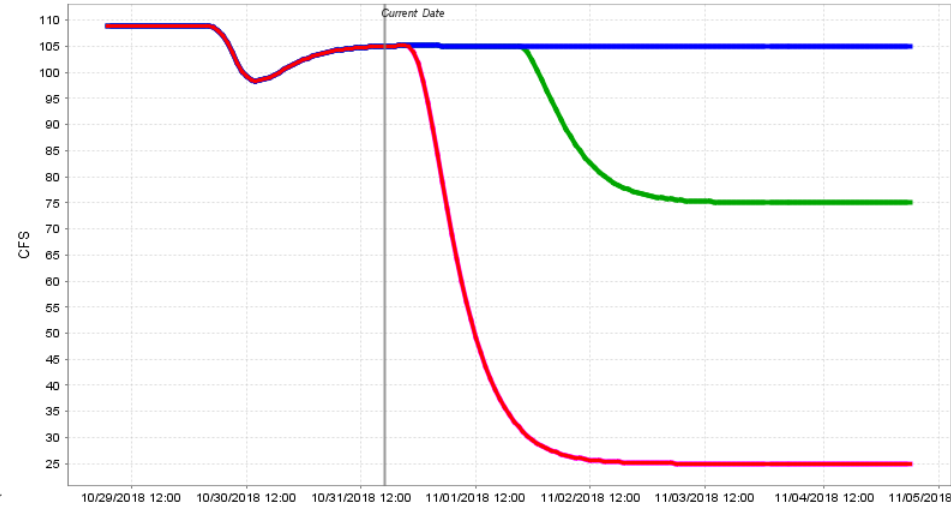
Simulation was executed on: 10/31/2018 16:48

Run Configuration: Release Override for COY

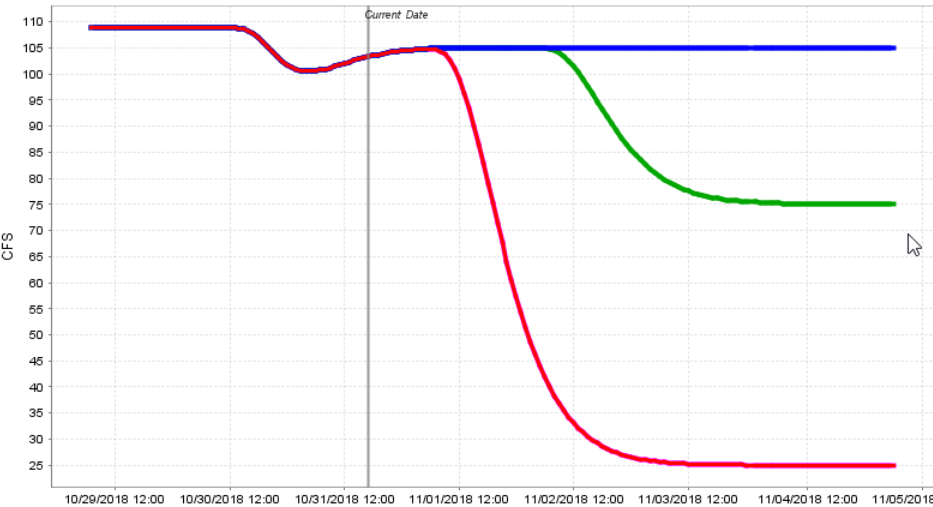
RUSSIAN RIVER NEAR HOPLAND (HOP)



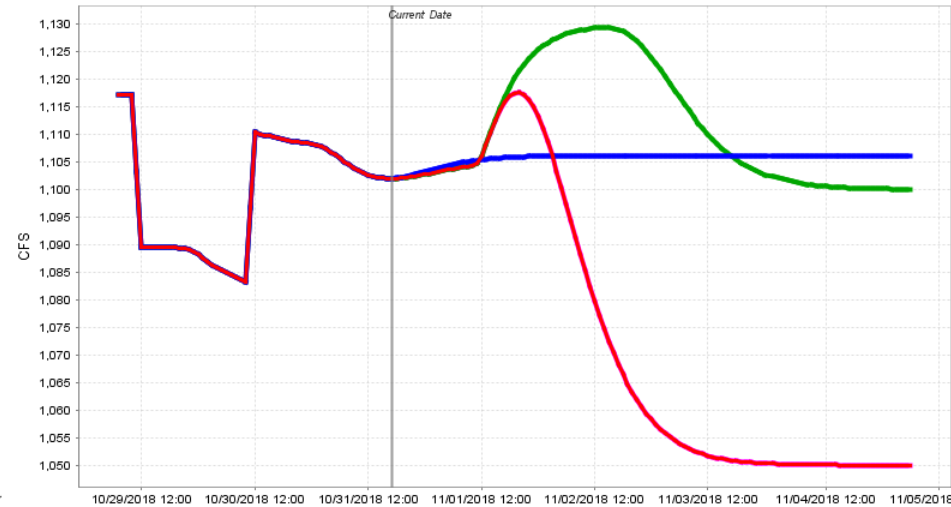
RUSSIAN RIVER AT CLOVERDALE (CLV)



RUSSIAN RIVER NEAR HEALDSBURG (HEA)



RUSSIAN RIVER NEAR HACIENDA BRIDGE (HAC)

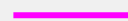
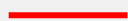


WCM

Risk Based

Projected

Alternative



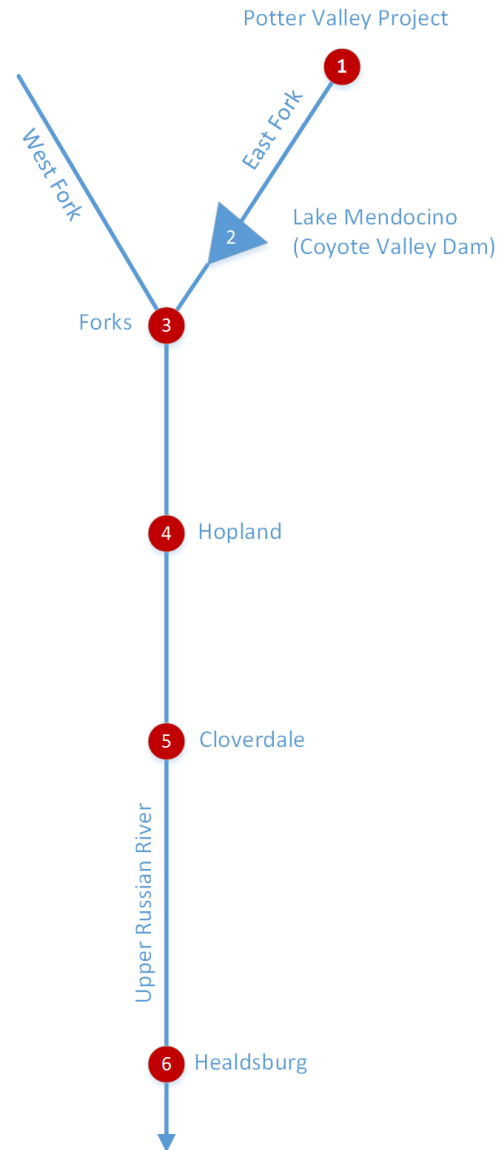
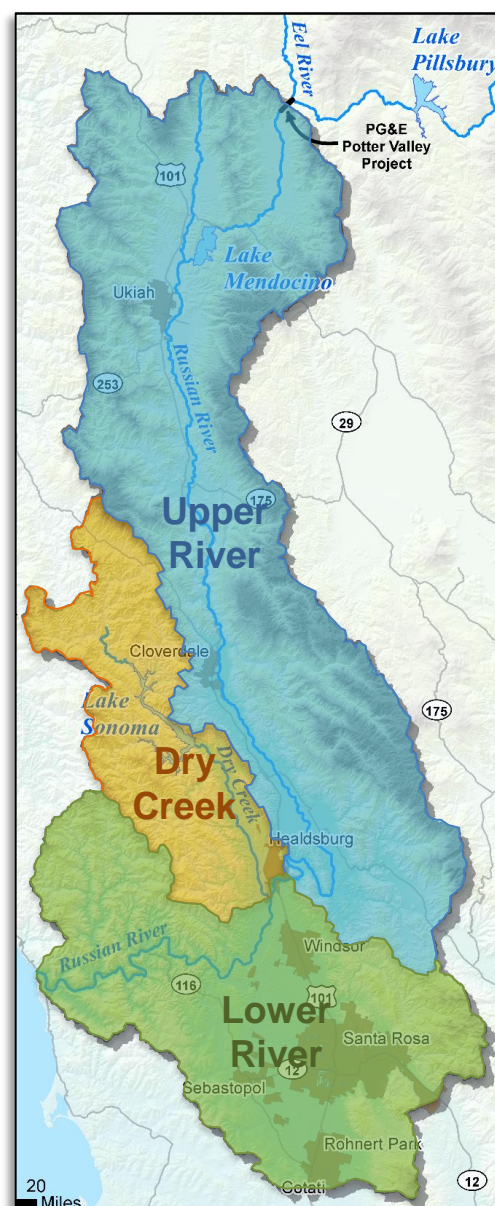
Presentation Overview

- Lake Mendocino Decision Support System
- **Ensemble Forecast Operations Model**
- 2020 Next Steps



Lake Mendocino

Ensemble Forecast Operations Model



❖ Reservoir Management Model

- Developed in MatLab
- Hourly Time Step

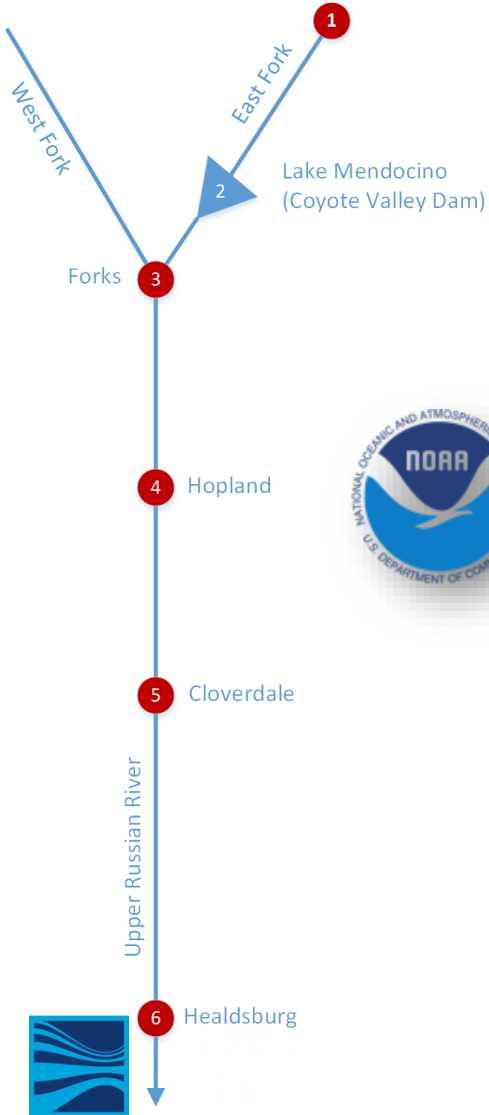
❖ Upper Russian River

- Headwaters to the City of Healdsburg
- 70 mile reach
- 6 Model Junctions
 - USGS Discharge Gages
 - NOAA Flow Forecast Points

❖ Variable Lag & K Routing

Lake Mendocino Ensemble Forecast Operations Model

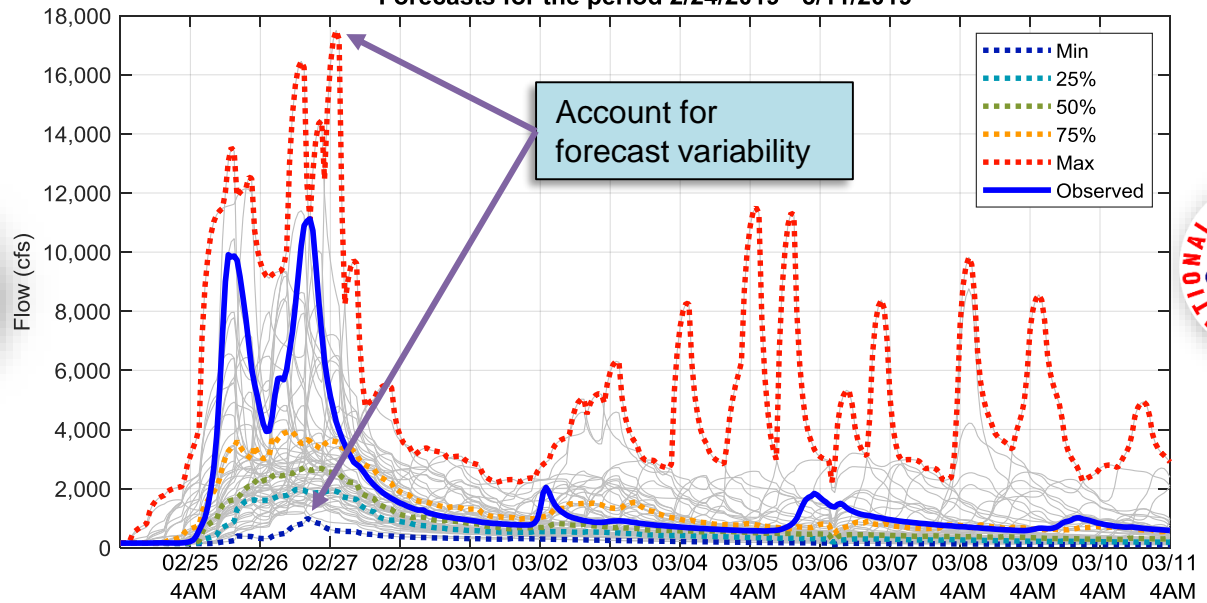
Potter Valley Project



CNRFC

California Nevada River Forecast Center

MEFP-based Traces for Russian R - Ukiah
Forecasts for the period 2/24/2019 - 3/11/2019



HEFS

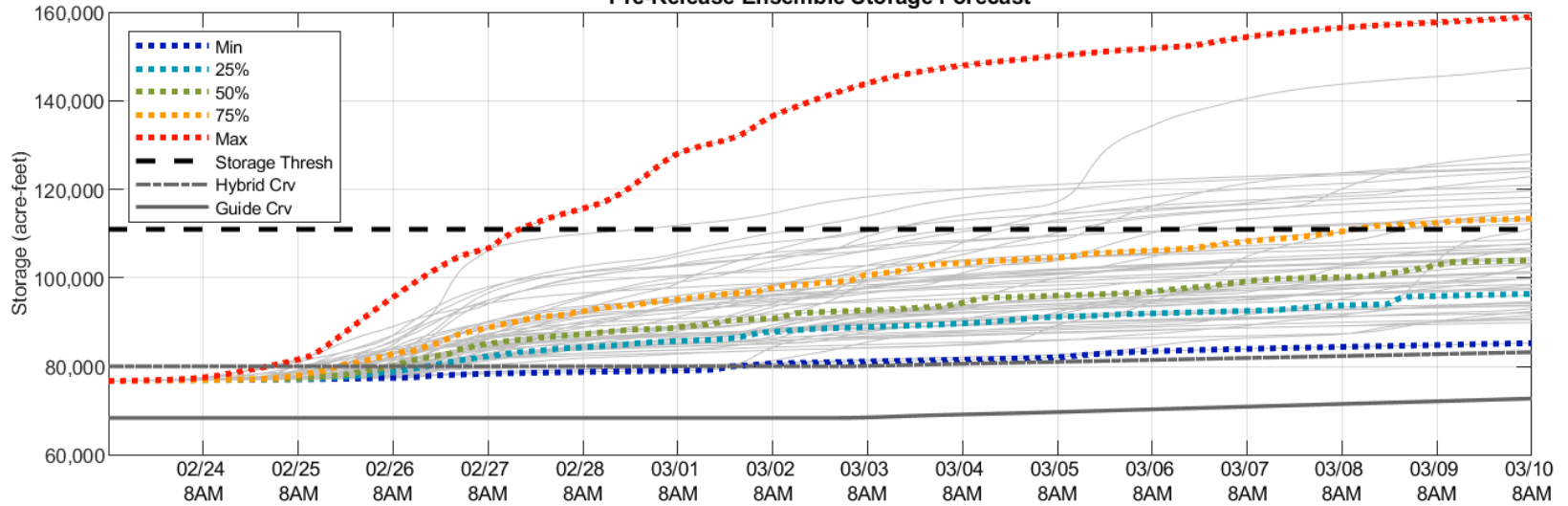
Hydrologic Ensemble Forecast System



February 23 EFO Forecast

9 AM February 23, 2019

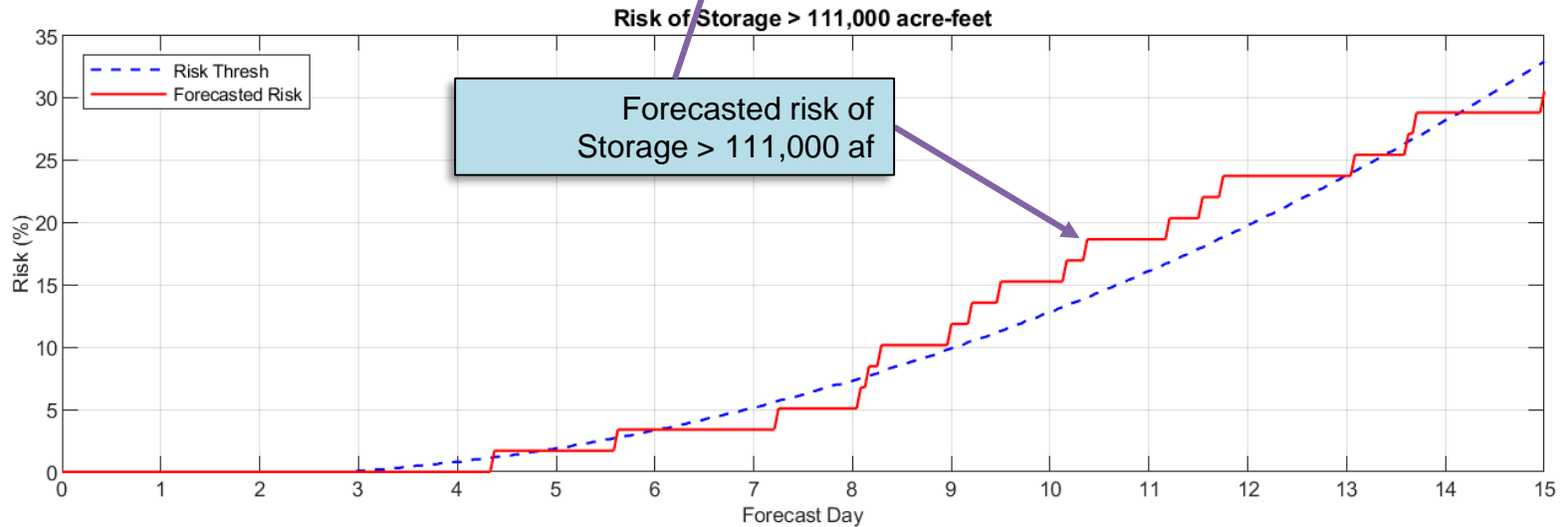
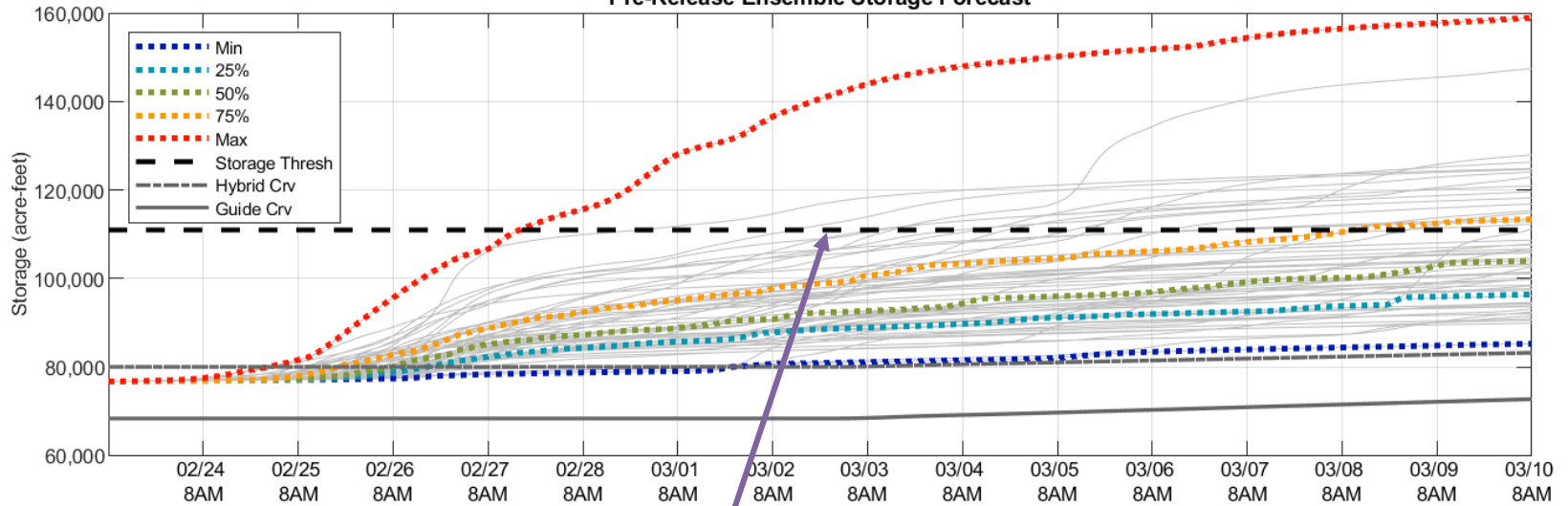
Lake Mendocino 2019 Major Deviation Hybrid Operations w/ Floor
Pre-Release Ensemble Storage Forecast



February 23 EFO Forecast

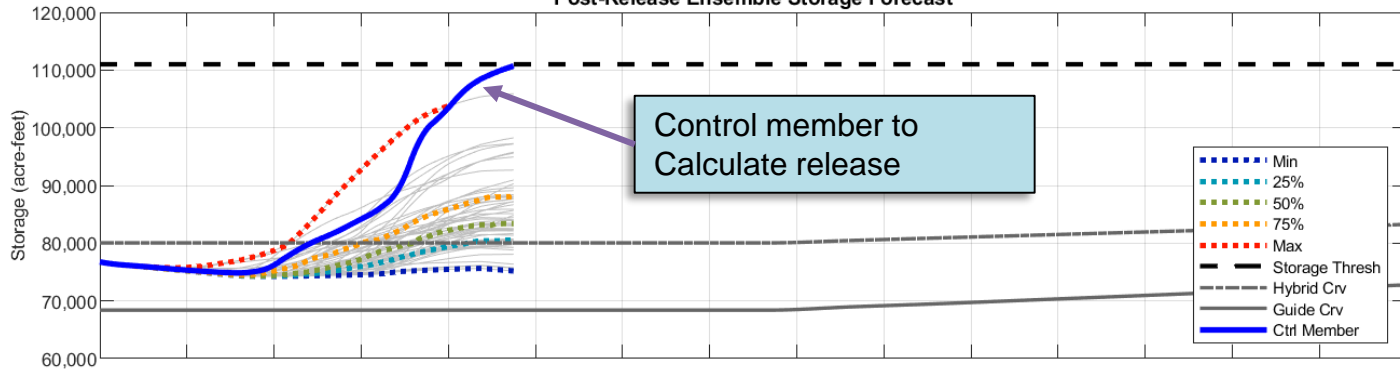
9 AM February 23, 2019

Lake Mendocino 2019 Major Deviation Hybrid Operations w/ Floor
Pre-Release Ensemble Storage Forecast



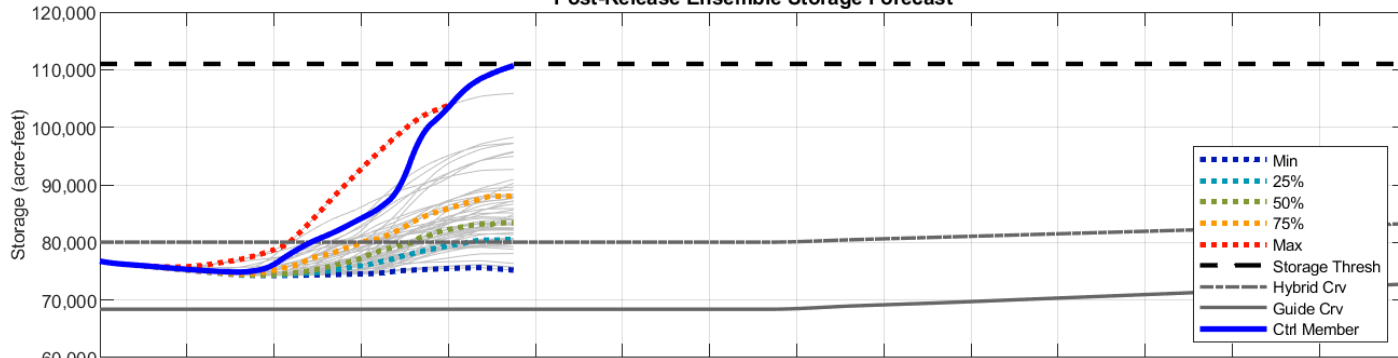
February 23 Release Forecast

9 AM February 23, 2019
Lake Mendocino 2019 Major Deviation Hybrid Operations w/ Floor
Post-Release Ensemble Storage Forecast

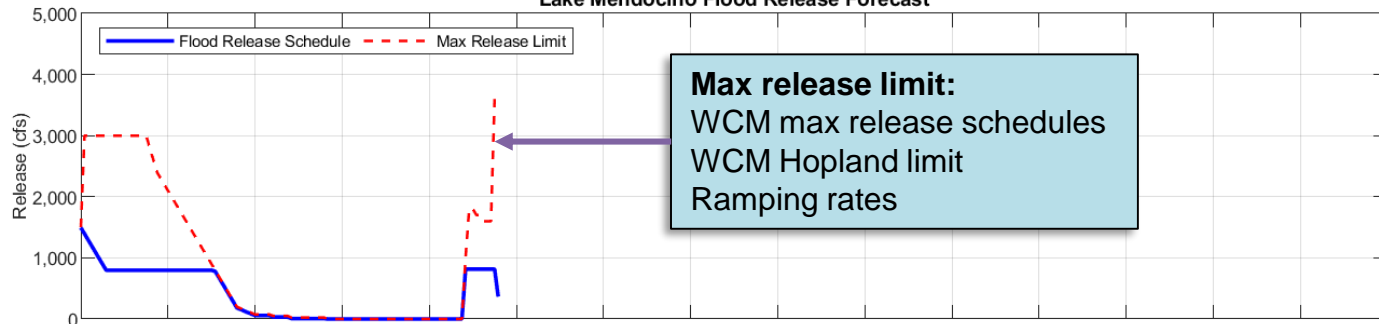


February 23 Release Forecast

9 AM February 23, 2019
Lake Mendocino 2019 Major Deviation Hybrid Operations w/ Floor
Post-Release Ensemble Storage Forecast



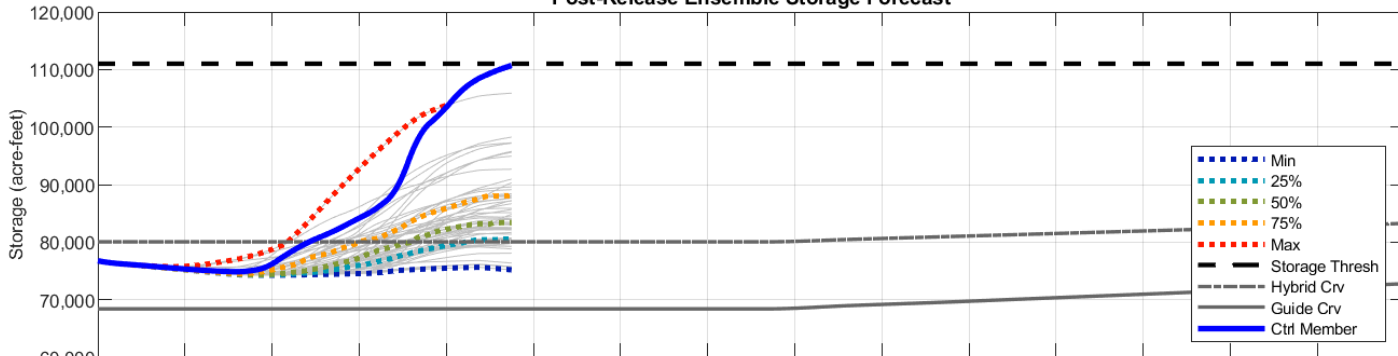
Lake Mendocino Flood Release Forecast



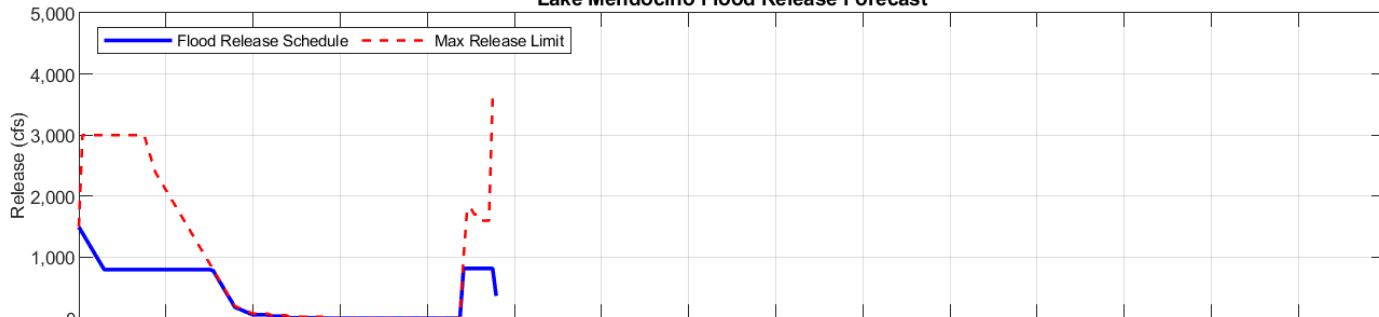
February 23 Release Forecast

9 AM February 23, 2019

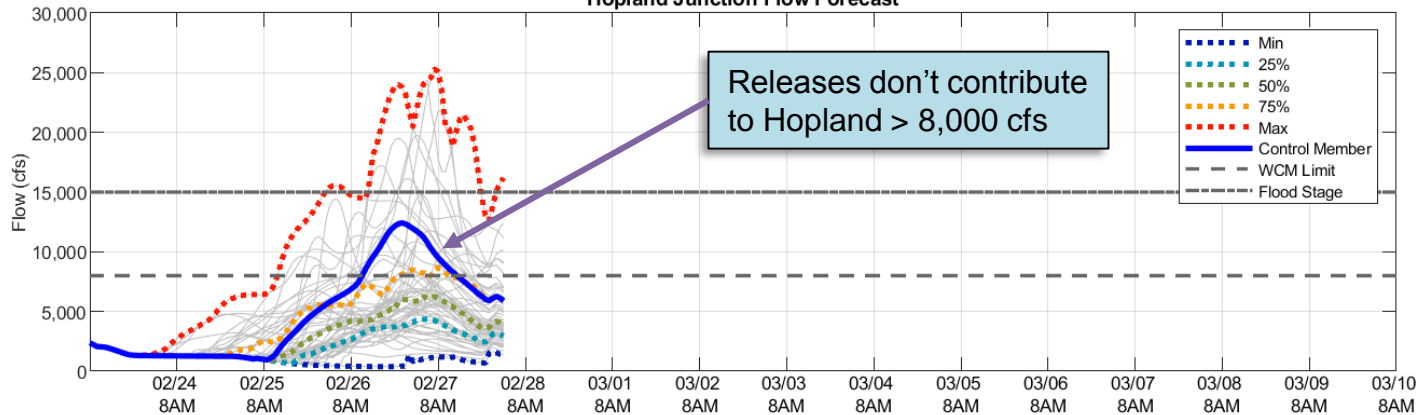
Lake Mendocino 2019 Major Deviation Hybrid Operations w/ Floor
Post-Release Ensemble Storage Forecast



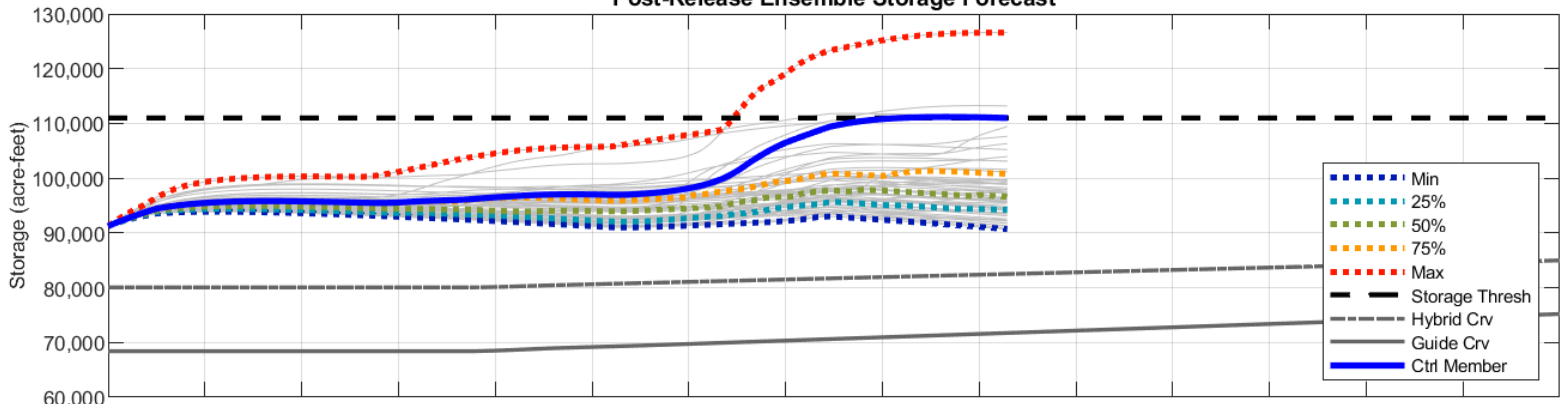
Lake Mendocino Flood Release Forecast



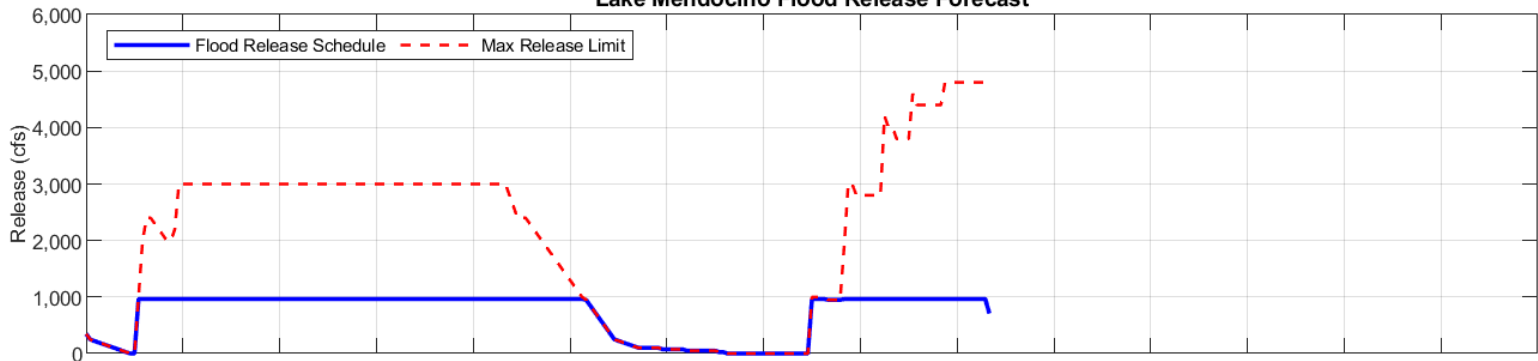
Hopland Junction Flow Forecast



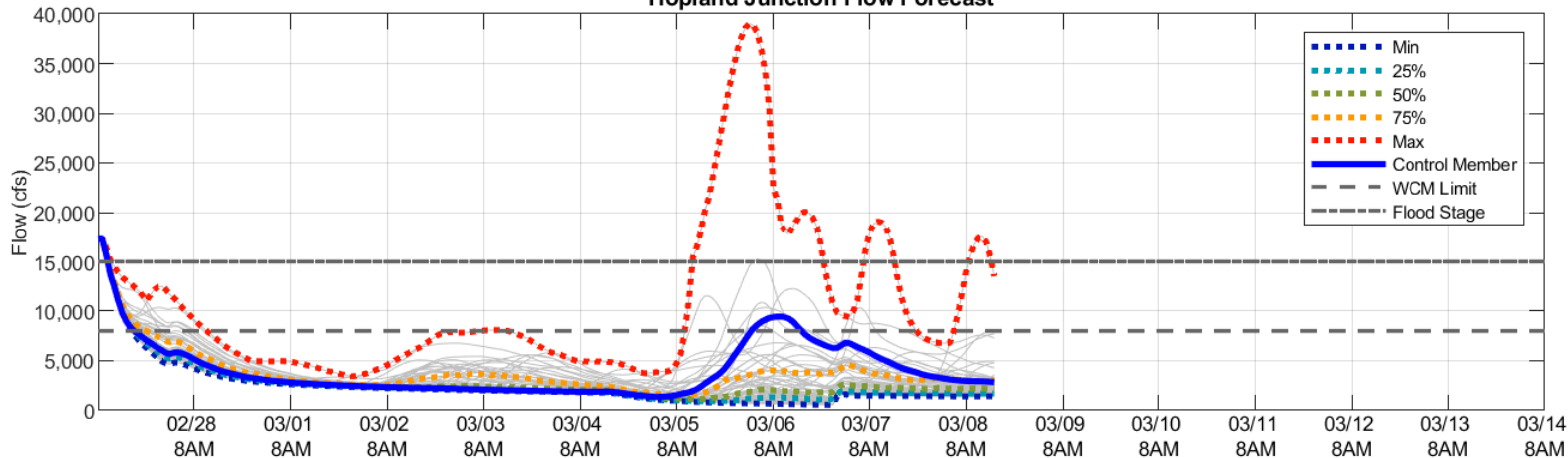
9 AM February 27, 2019
 Lake Mendocino 2019 Major Deviation Hybrid Operations w/ Floor
 Post-Release Ensemble Storage Forecast



Lake Mendocino Flood Release Forecast



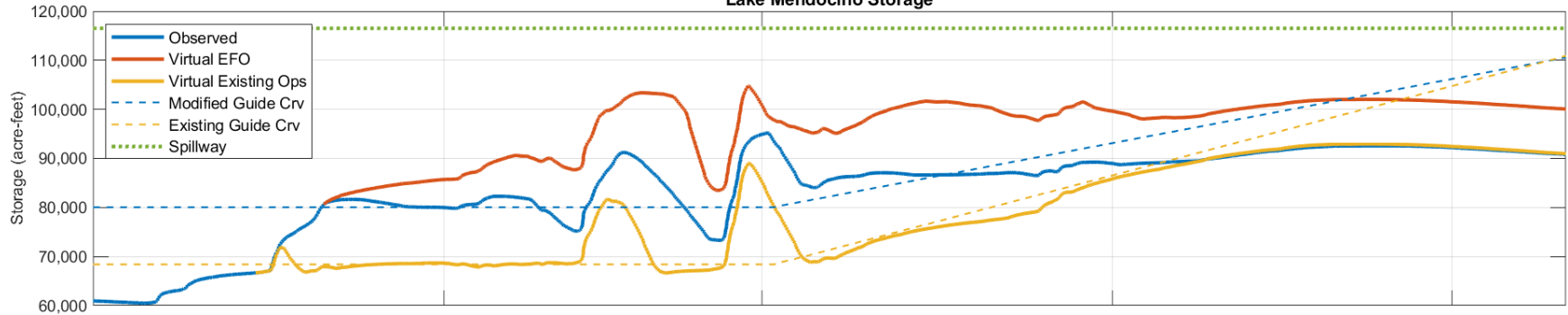
Hopland Junction Flow Forecast





CW3E Virtual Operations

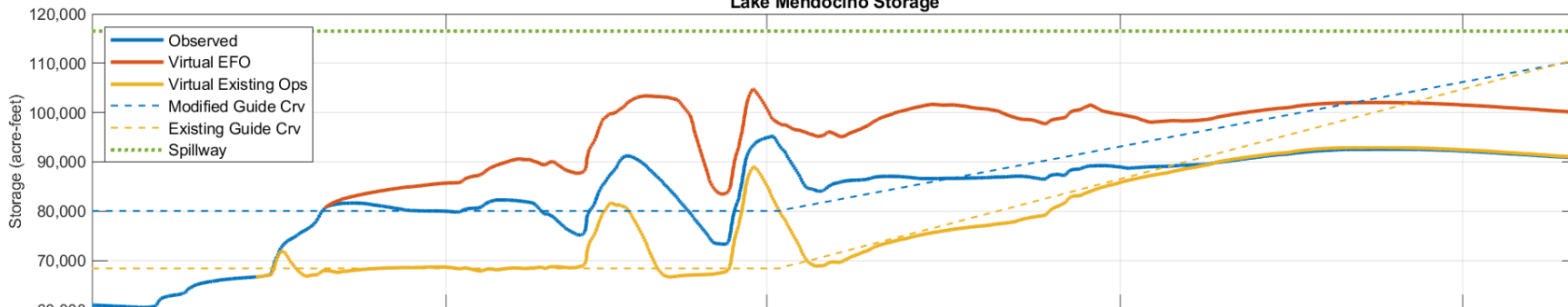
2019 Major Deviation
Ensemble Forecast Operations Summary Plots
Lake Mendocino Storage



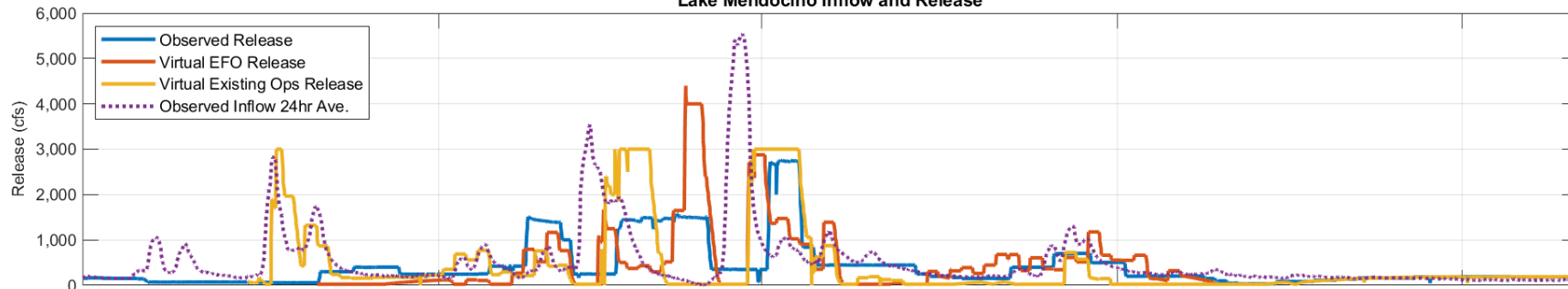


CW3E Virtual Operations

2019 Major Deviation
Ensemble Forecast Operations Summary Plots
Lake Mendocino Storage



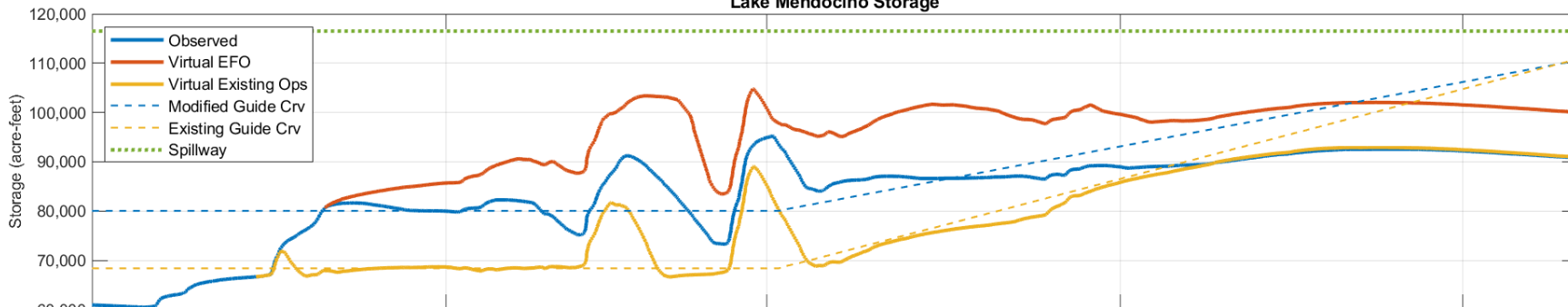
Lake Mendocino Inflow and Release



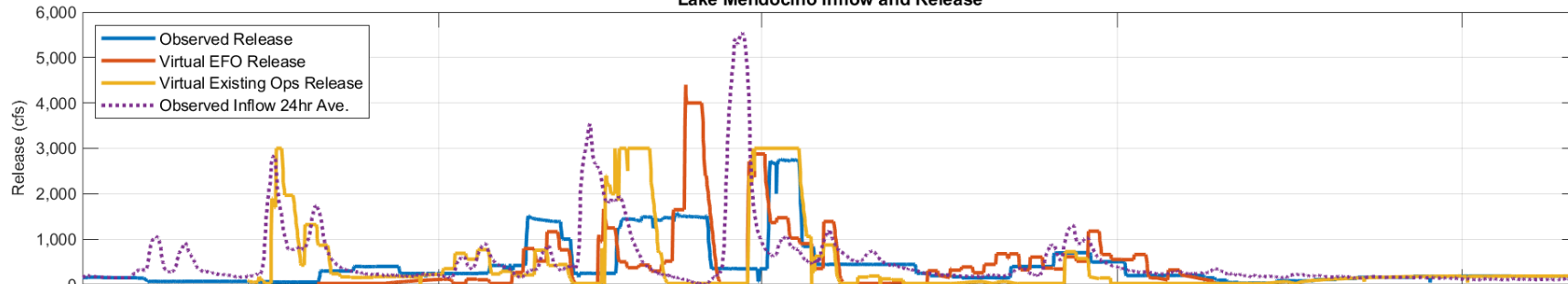


CW3E Virtual Operations

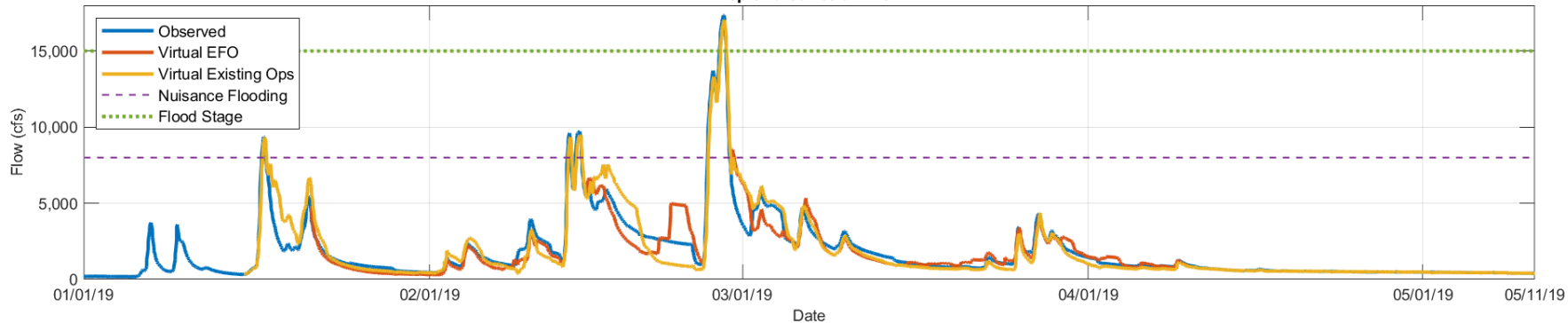
2019 Major Deviation
Ensemble Forecast Operations Summary Plots
Lake Mendocino Storage



Lake Mendocino Inflow and Release



Hopland Junction Flow



Presentation Overview

- Lake Mendocino Decision Support System
- Ensemble Forecast Operations Model
- **2020 Next Steps**

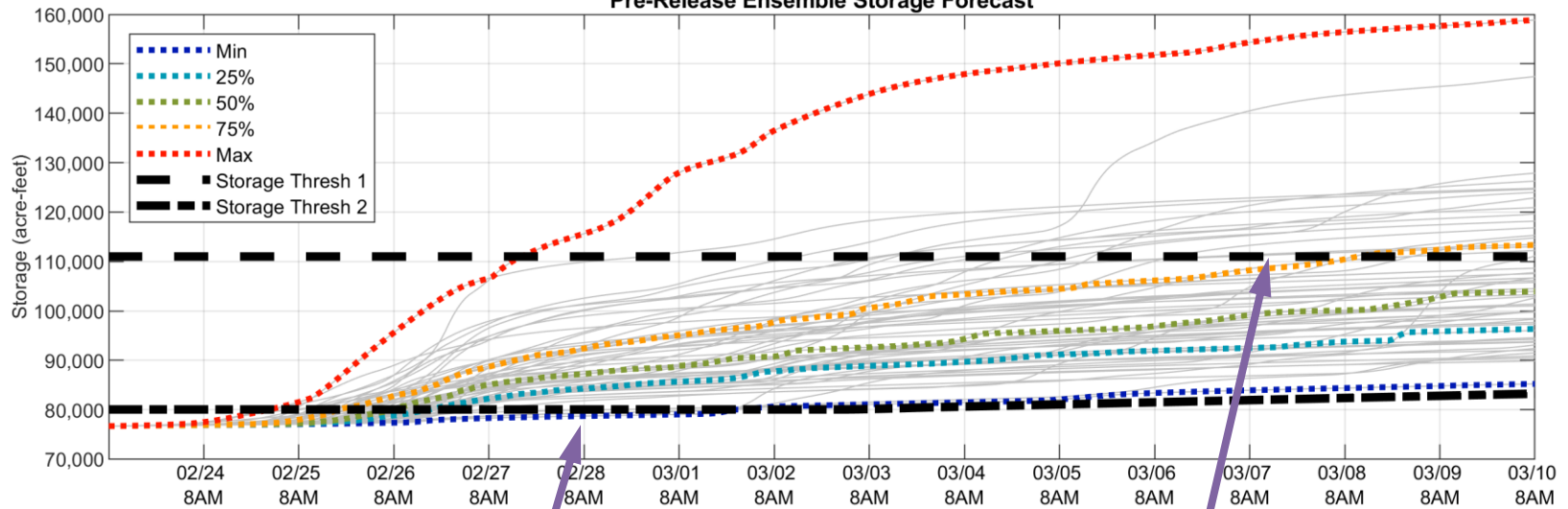


2020 Major Deviation Hybrid

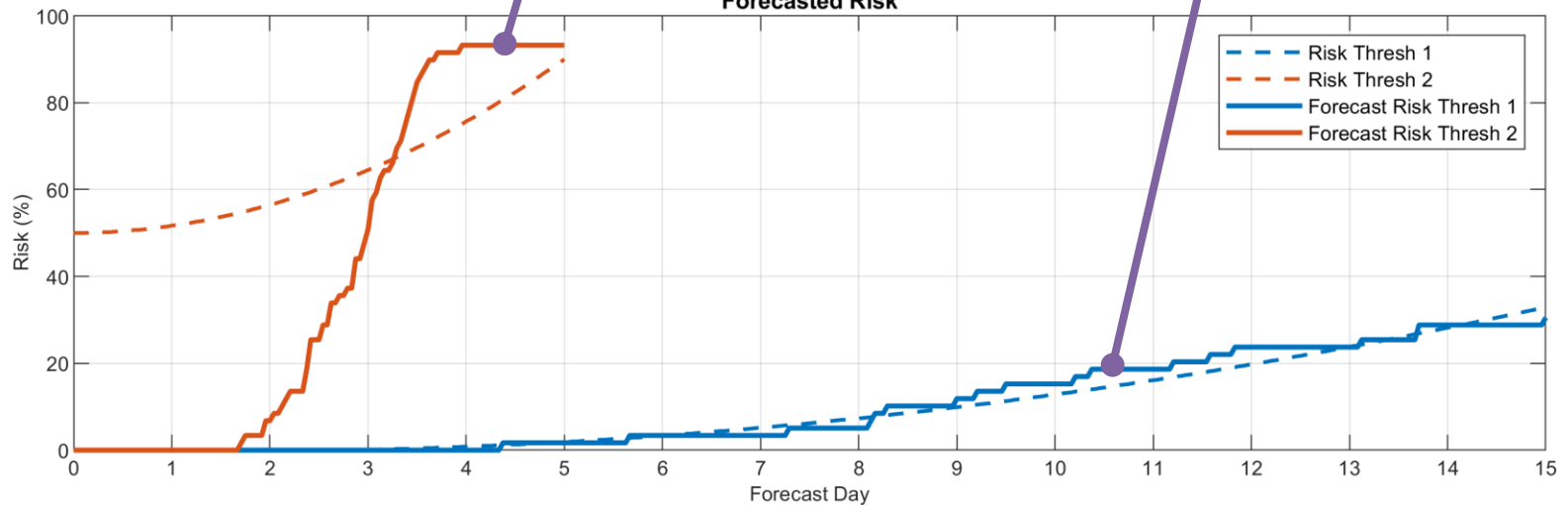
9 AM February 23, 2019

Lake Mendocino Hybrid2

Pre-Release Ensemble Storage Forecast

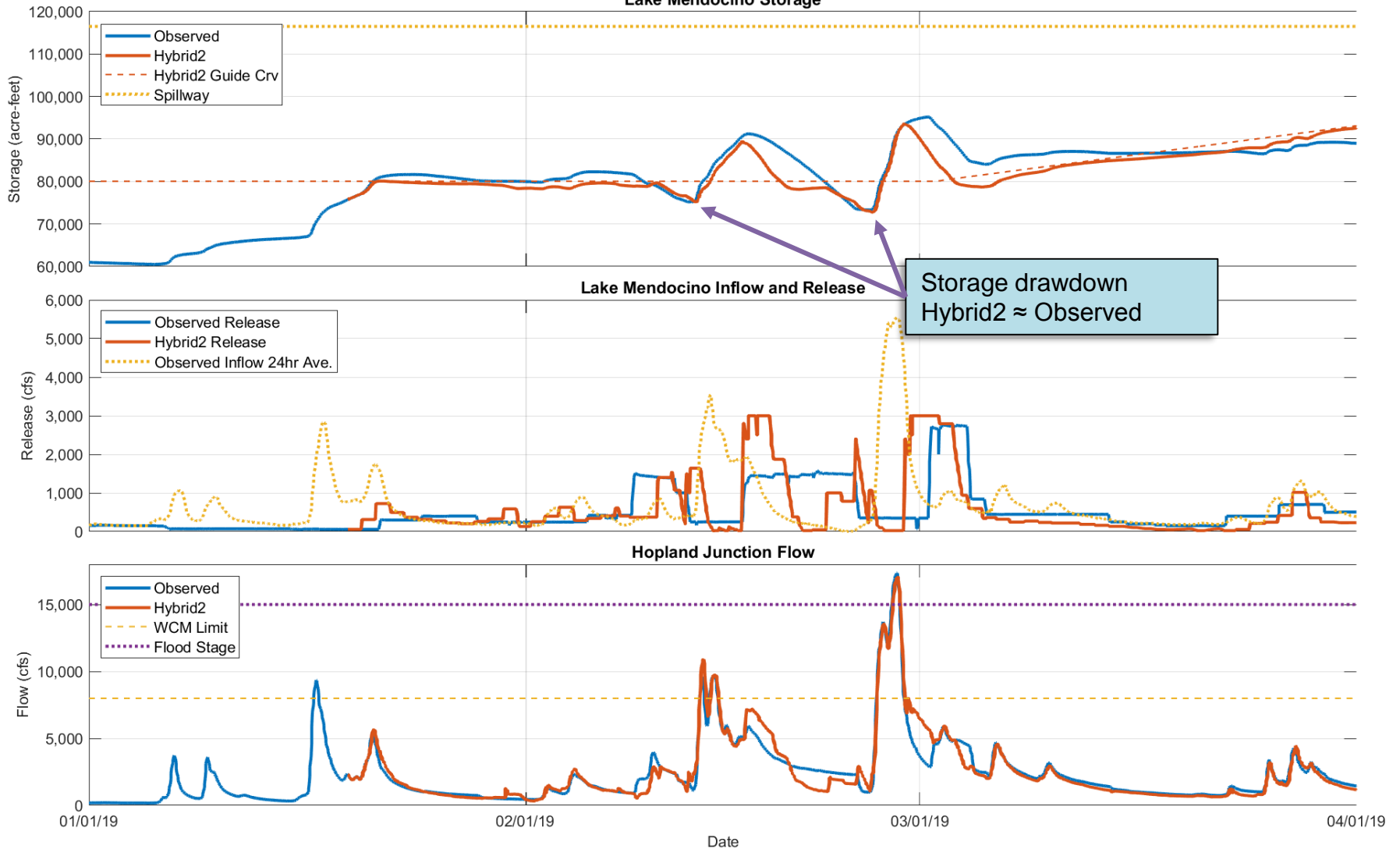


Forecasted Risk



2020 Major Deviation Hybrid

Jan2019 - Apr2019
Ensemble Forecast Operations Summary Plots
Lake Mendocino Storage



2020 DSS Improvements

- Russian River HEC-ResSim Model
 - Refine flow routing
- EFO Model
 - Hybrid 2 – multiple storage thresholds
 - Extend model to Lower Russian River
 - Add rule for managing to Guerneville flows
- Web Interface
 - Incorporate EFO figures in the web interface
 - Links to other forecast products:
 - CNRFC
 - CW3E

Thank You



**Sonoma
Water**

Chris Delaney
Engineer
Chris.delaney@scwa.ca.gov



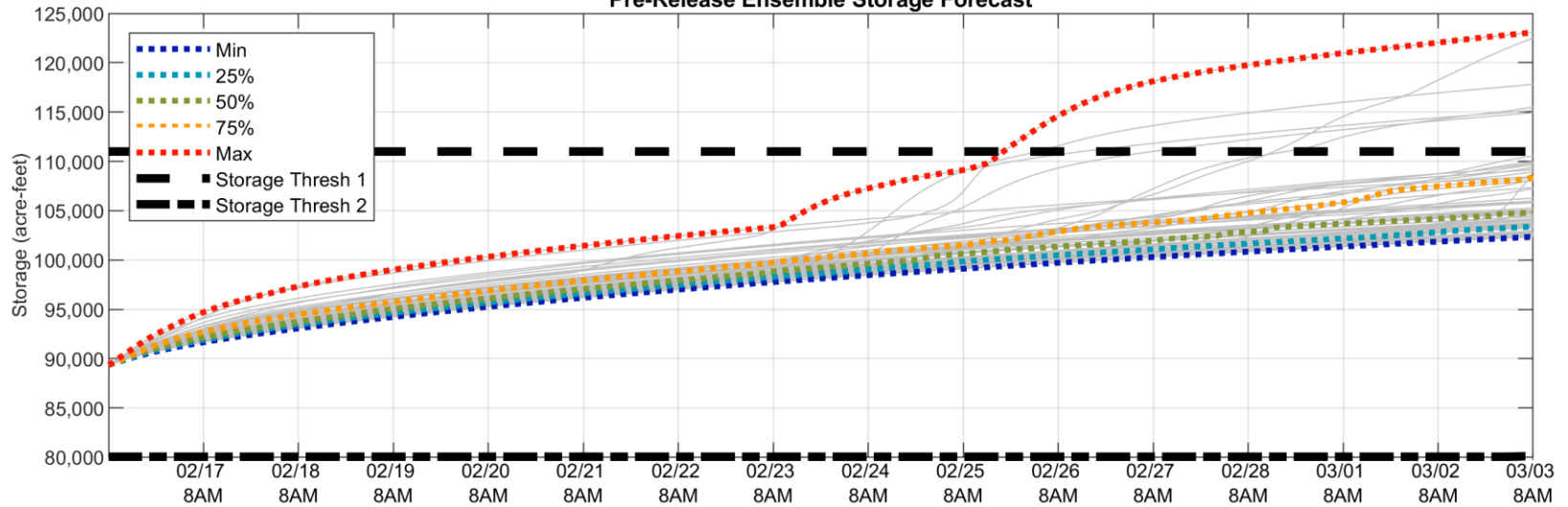
sonomawater.ca.gov

Hybrid 2 February 16

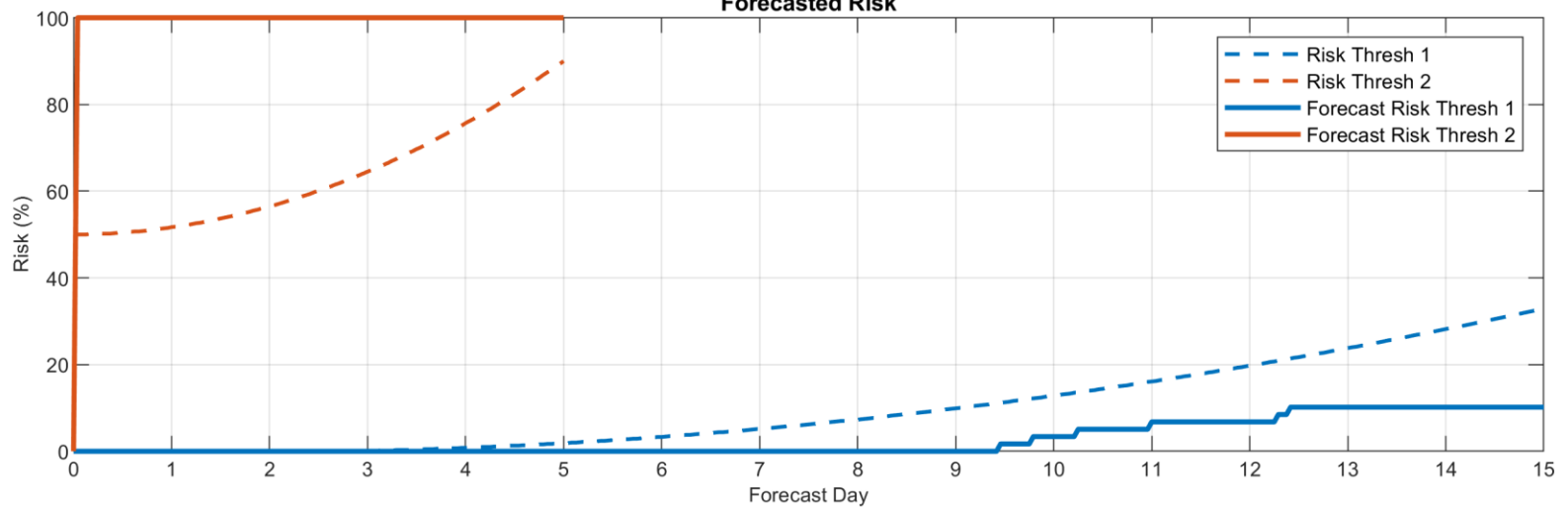
9 AM February 16, 2019

Lake Mendocino Hybrid2

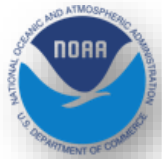
Pre-Release Ensemble Storage Forecast



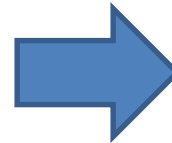
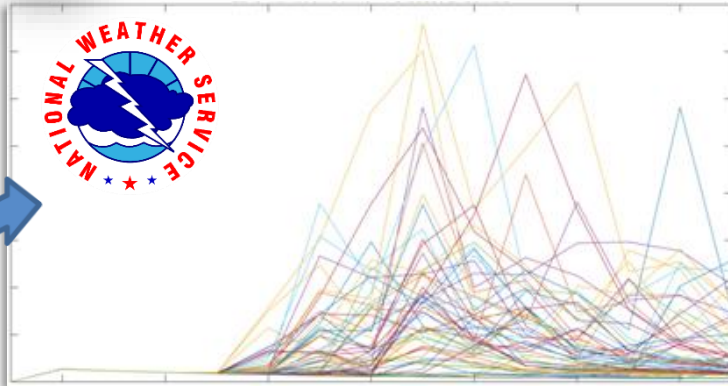
Forecasted Risk



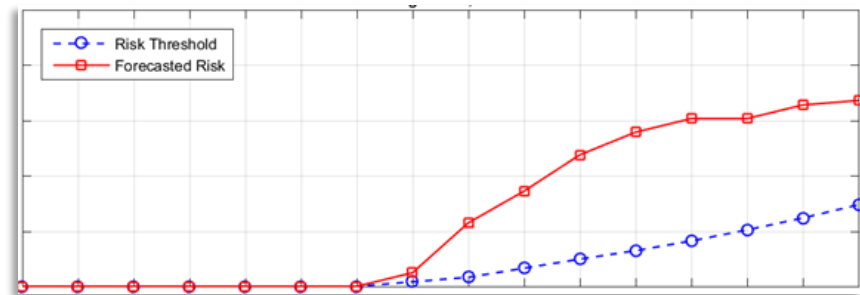
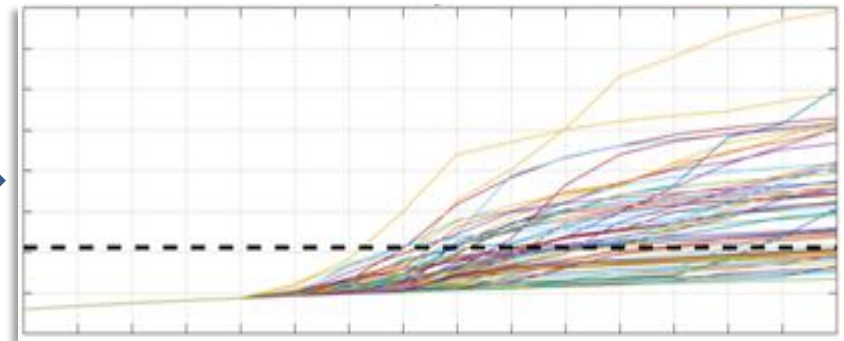
Ensemble Forecast Operations (EFO)



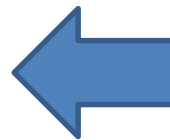
CA-NV River Forecast Center
Ensemble Flow Forecast



Storage Forecast



Flood Risk Analysis



Flood Release

Process repeated each time step

