# COYOTE VALLEY DAM (LAKE MENDOCINO) OPERATIONS FOR WATER YEAR 2019

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Lake Mendocino Annual FIRO Workshop

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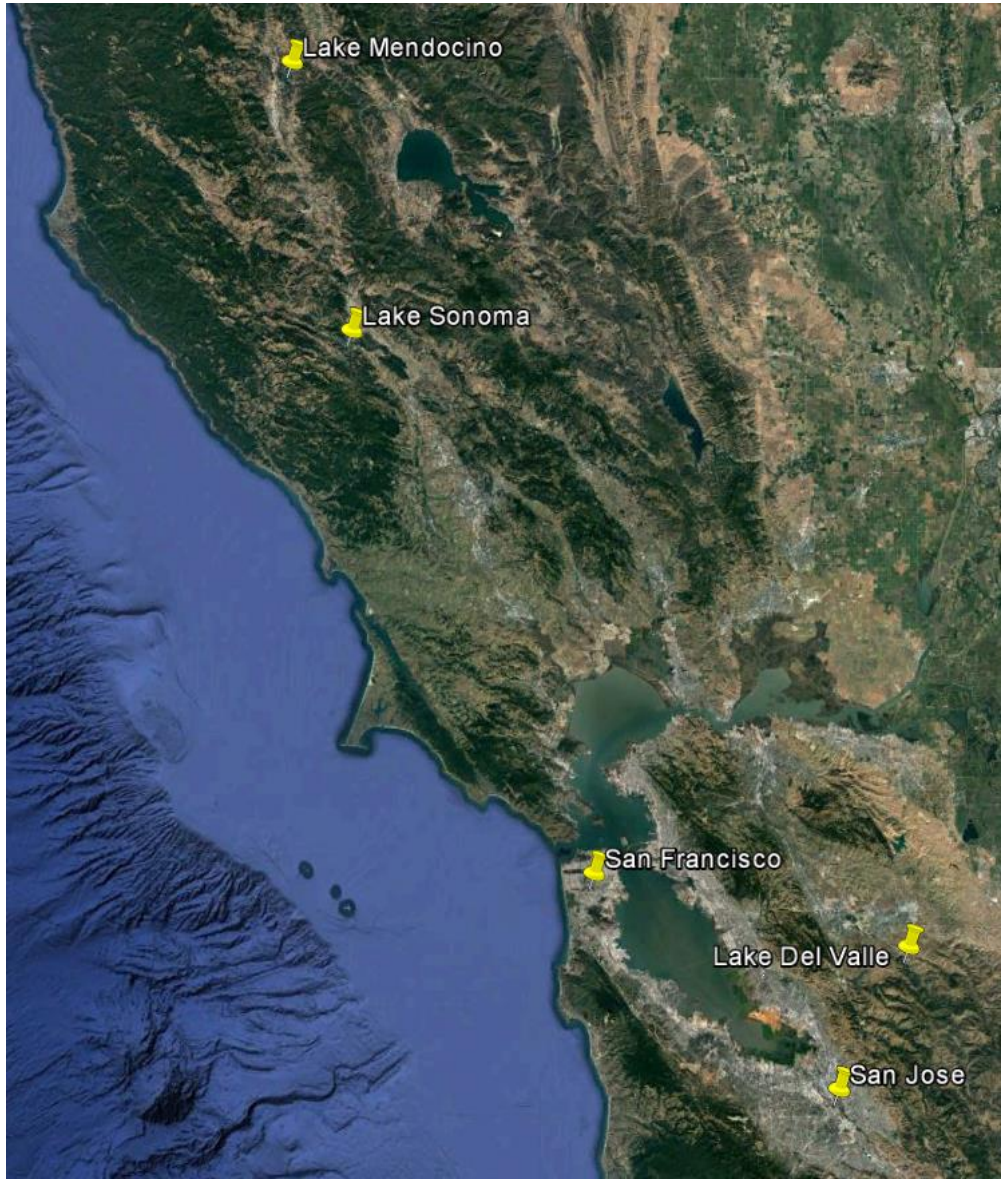
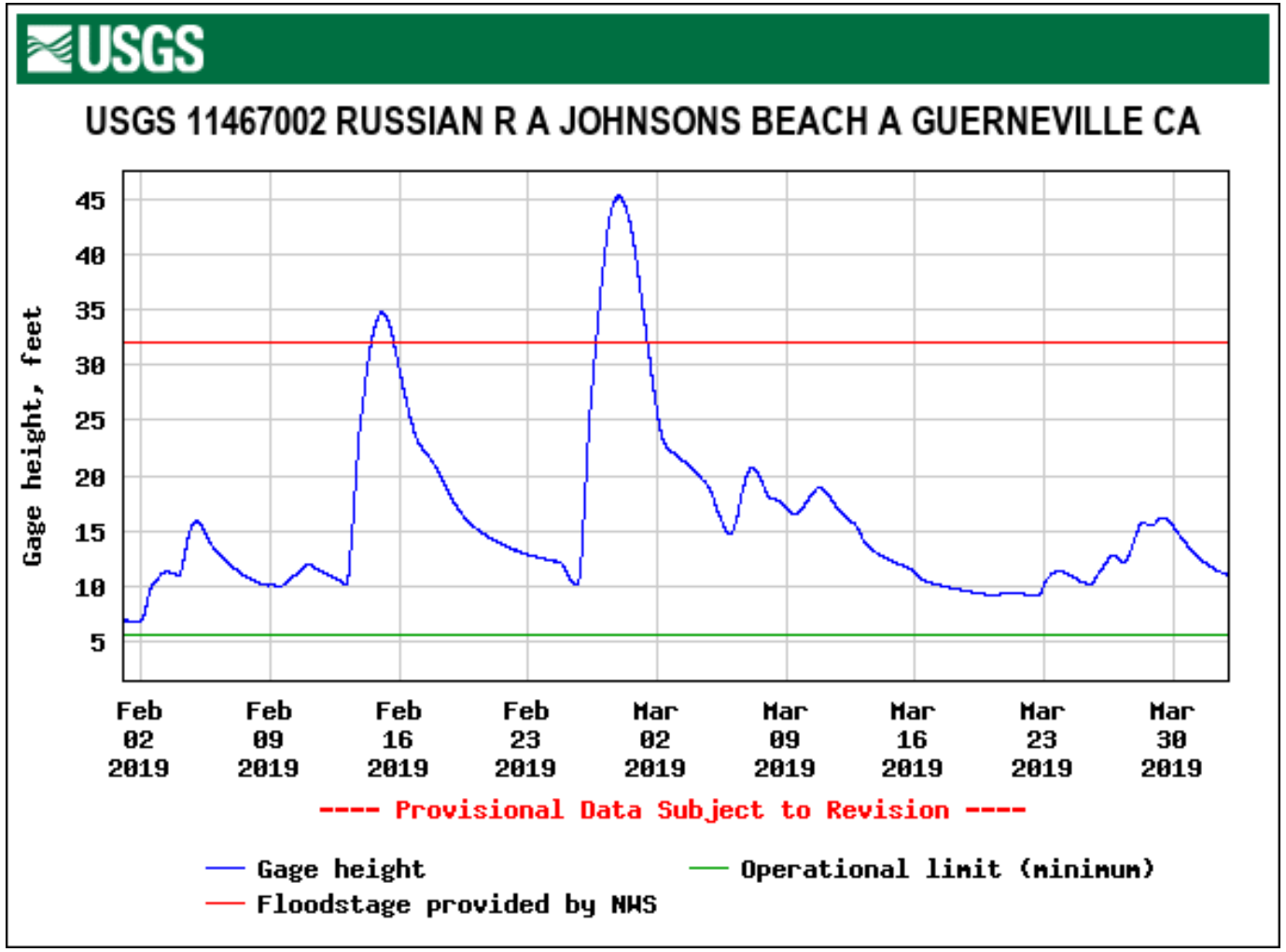
# SAN FRANCISCO DISTRICT (SPN) AREA OF RESPONSIBILITY FOR WATER MANAGEMENT

- Russian River Watershed
  - Coyote Valley Dam (Lake Mendocino)
  - Warm Springs Dam (Lake Sonoma)
- Alameda Creek Watershed
  - Del Valle Dam (Lake Del Valle) – SECTION 7, Owned and Operated by California Department of Water Resources (DWR)

Water Management Staff consists of one section chief (hydraulic engineer) and two water managers (hydraulic engineer and hydrologist).



# RUSSIAN RIVER AT GUERNEVILLE – FEBRUARY 2019




Peak stage in 2019 ~ 45 ft.

Peak stage in 2017 ~ 38 ft

Peak stage in 1986 ~ 49 ft

# RUSSIAN RIVER AT GUERNEVILLE – FEBRUARY 2019

Image is from the San Jose Mercury News

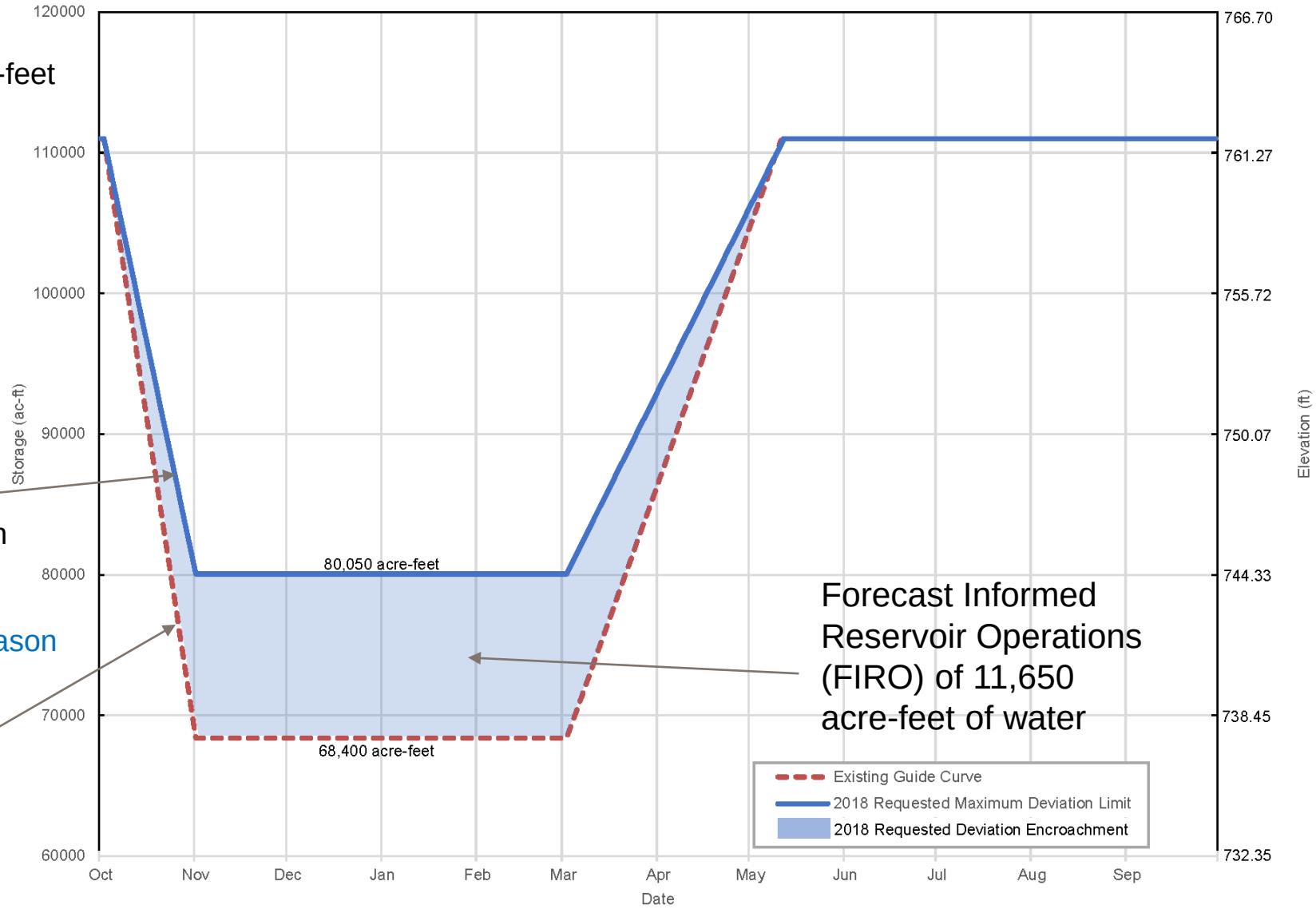
# WATER YEAR 2019

# COYOTE VALLEY DAM EXISTING RULE CURVE AND APPROVED MAJOR DEVIATION

Gross pool storage is 116,500 acre-feet (pool elevation 764.8 ft NGVD 29).

Water management staff were allowed to operate the dam to a rule curve that was part of an approved Major Deviation request for FIRO (blue line) – allowable top of conservation pool of 80,050 acre-feet in the winter season

Water management staff normally operate the dam to the rule curve in the approved water control plan (red dotted line) - top of conservation pool of 68,400 acre-feet in the winter season



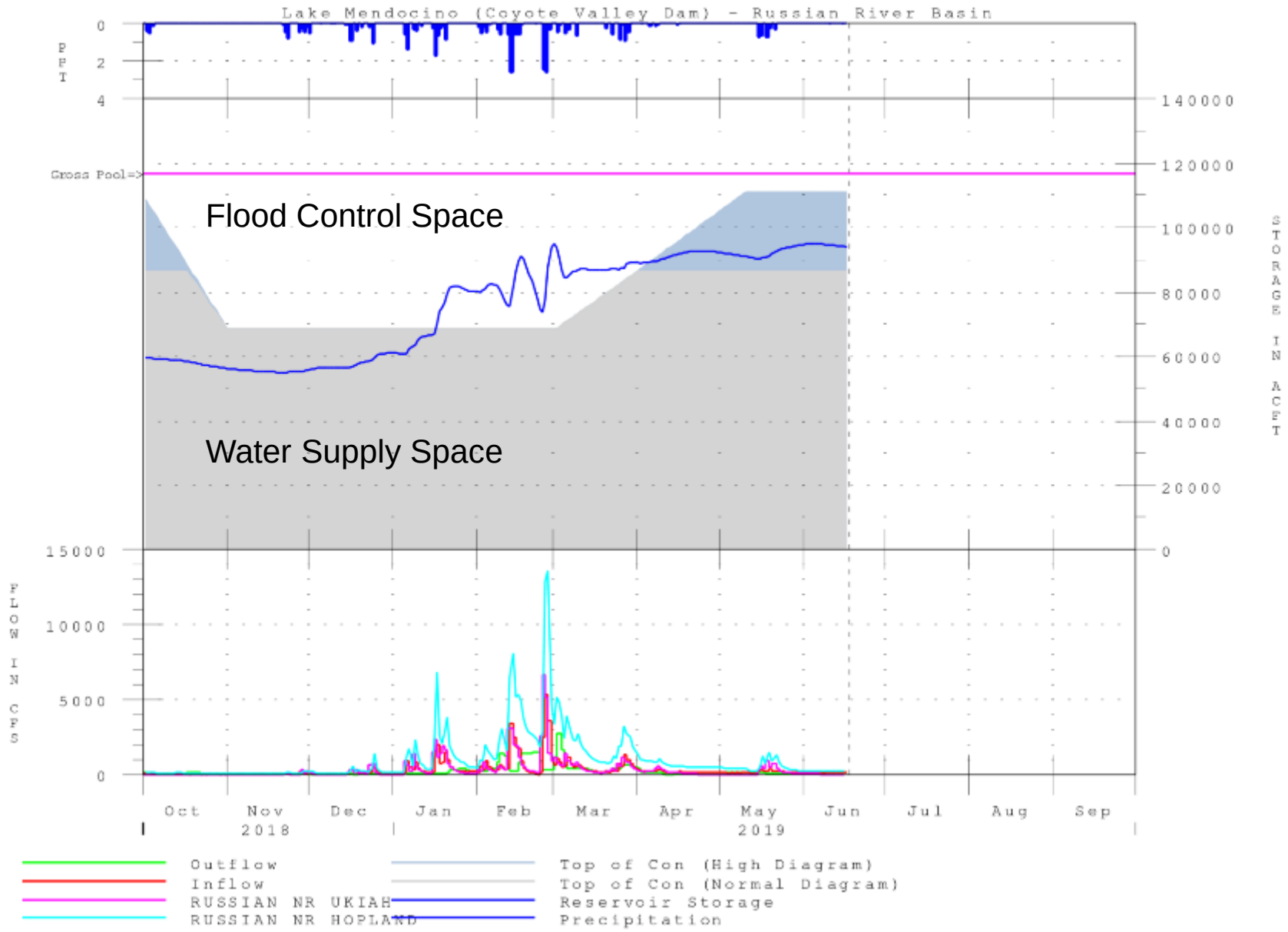

Forecast Informed Reservoir Operations (FIRO) of 11,650 acre-feet of water

# COYOTE VALLEY DAM OBSERVED OPERATIONS

Precipitation →

Storage →

Flow →

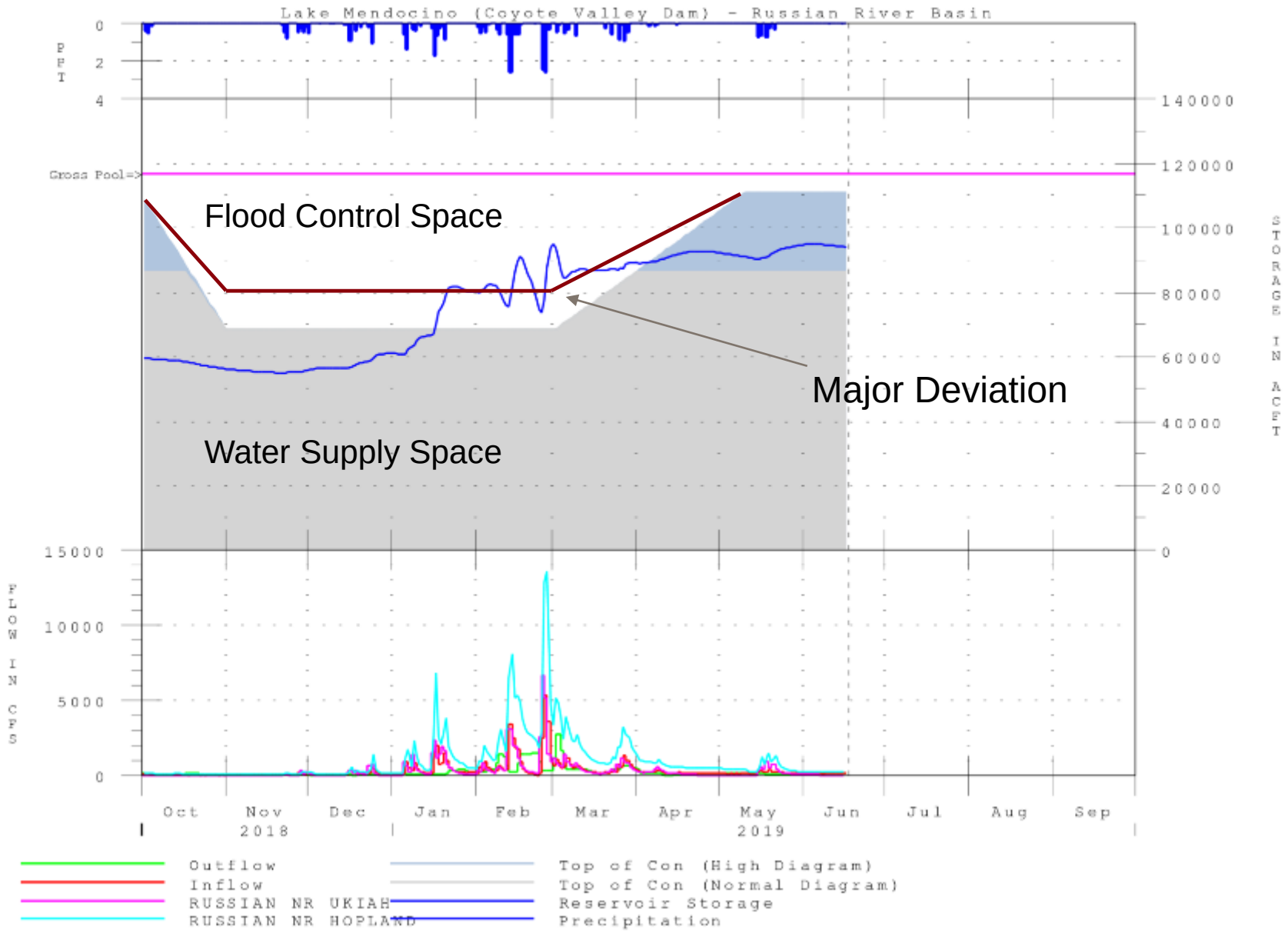


# COYOTE VALLEY DAM OBSERVED OPERATIONS

Precipitation →

Storage →

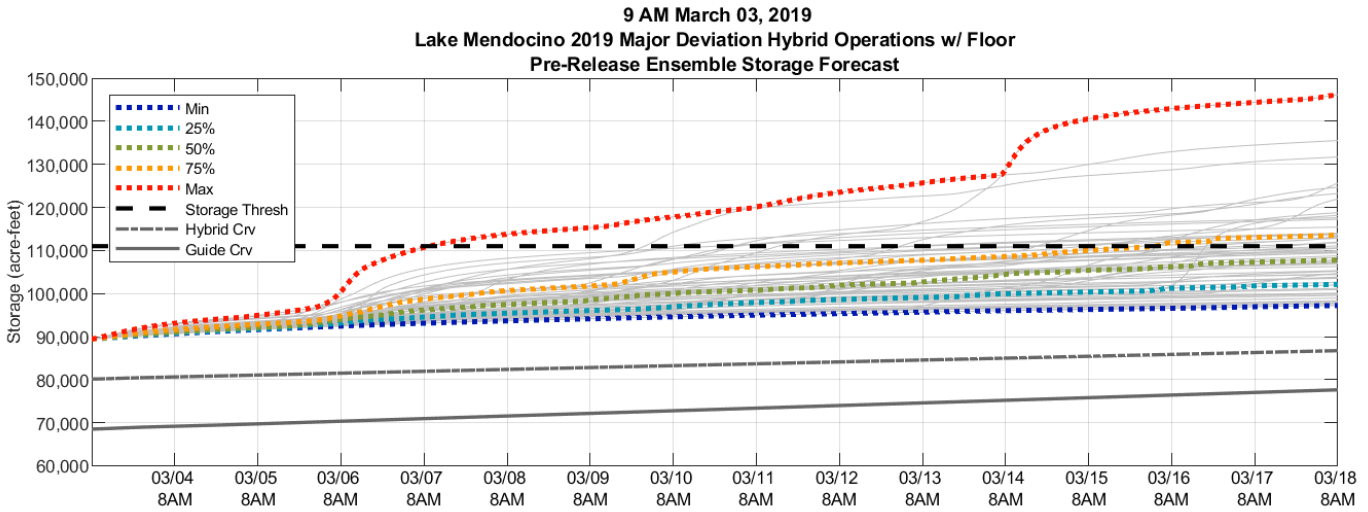
Flow →

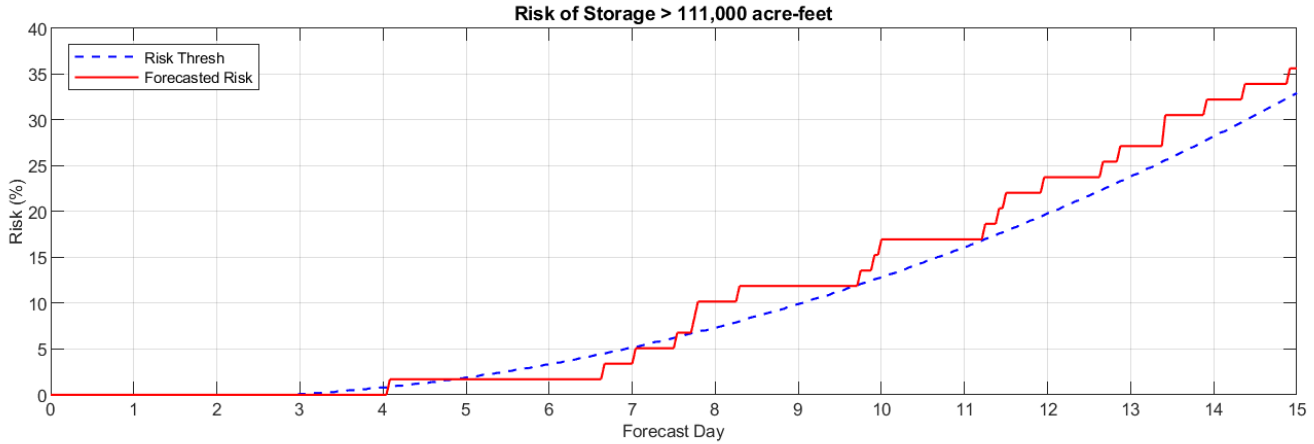


# TOOLS AND WEATHER PRODUCTS

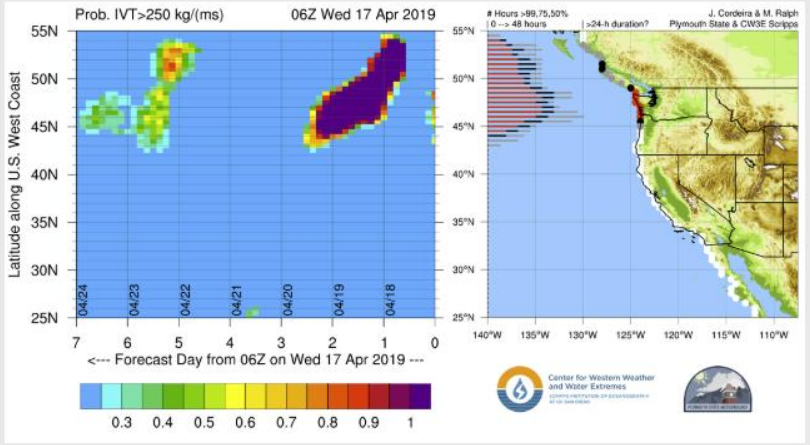
- Lake Mendocino Decision Support System (DSS)
  - Ensemble Forecast Operations (EFO) to 111,000 acre-feet; use of HEC-ResSim for routing of flows
- CNRFC Deterministic and Ensemble Weather Products
  - Precipitation
  - Reservoir Inflow
  - River Stage
- CW3E FIRO Webpage
  - AR Landfall Tool
  - IVT Plume Diagrams
- Russian River Corps Water Management System (CWMS) model
  - Implementation phase

# SAMPLE EFO MODEL OUTPUT



# CW3E FIRO WEBPAGE

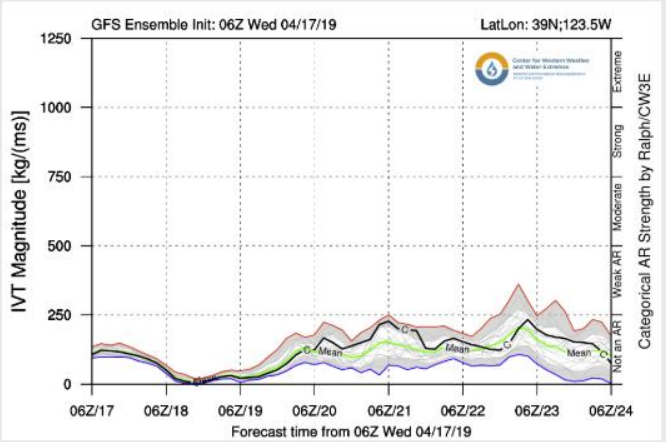



**U.S. West Coast IVT Plume Diagrams** Courtesy Jason Cordeira, Plymouth State University

The plume diagrams below represent the integrated water vapor transport (IVT) forecast for each of the 20 perturbed GFS ensemble models (thin gray lines), the unperturbed GFS control forecast (black line), the 20-member ensemble mean (green line), and the maximum ensemble value at that forecast hour (red line) and minimum ensemble value at that forecast hour (blue line). The white shading represents the +/- 1 standard deviation forecast from the ensemble mean. The yellow dot on the map indicates the location of the current plot.

**Select forecast length of plot and coastal location to generate plot. Click image to open in new tab.**

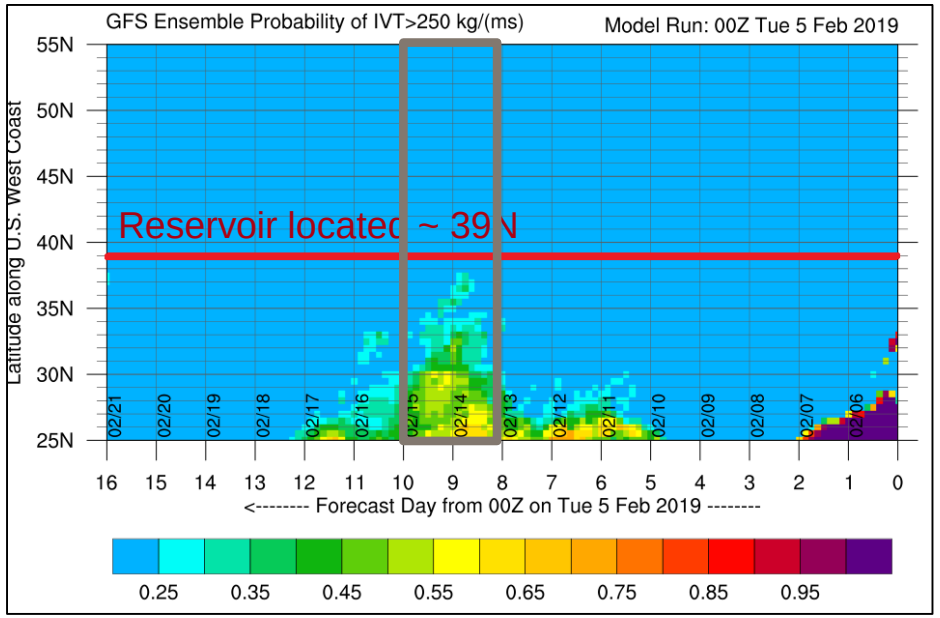
Forecast Length: 7 Days ▼ Location: 39°N, 123.5°W ▼



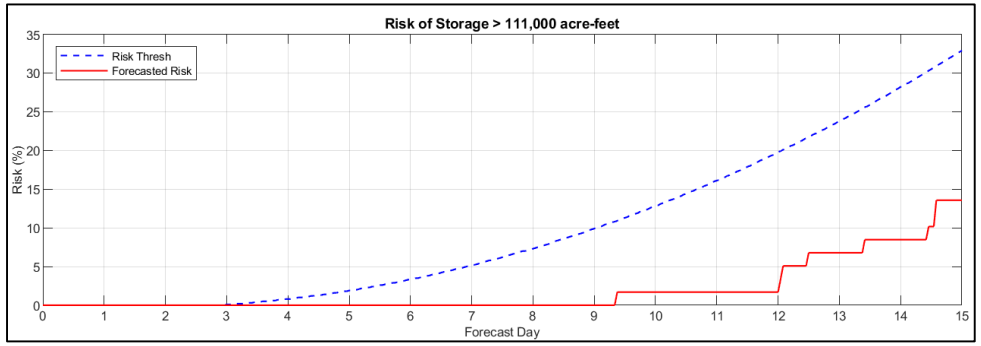
# FEBRUARY 13-14, 2019 STORM
# COYOTE VALLEY DAM

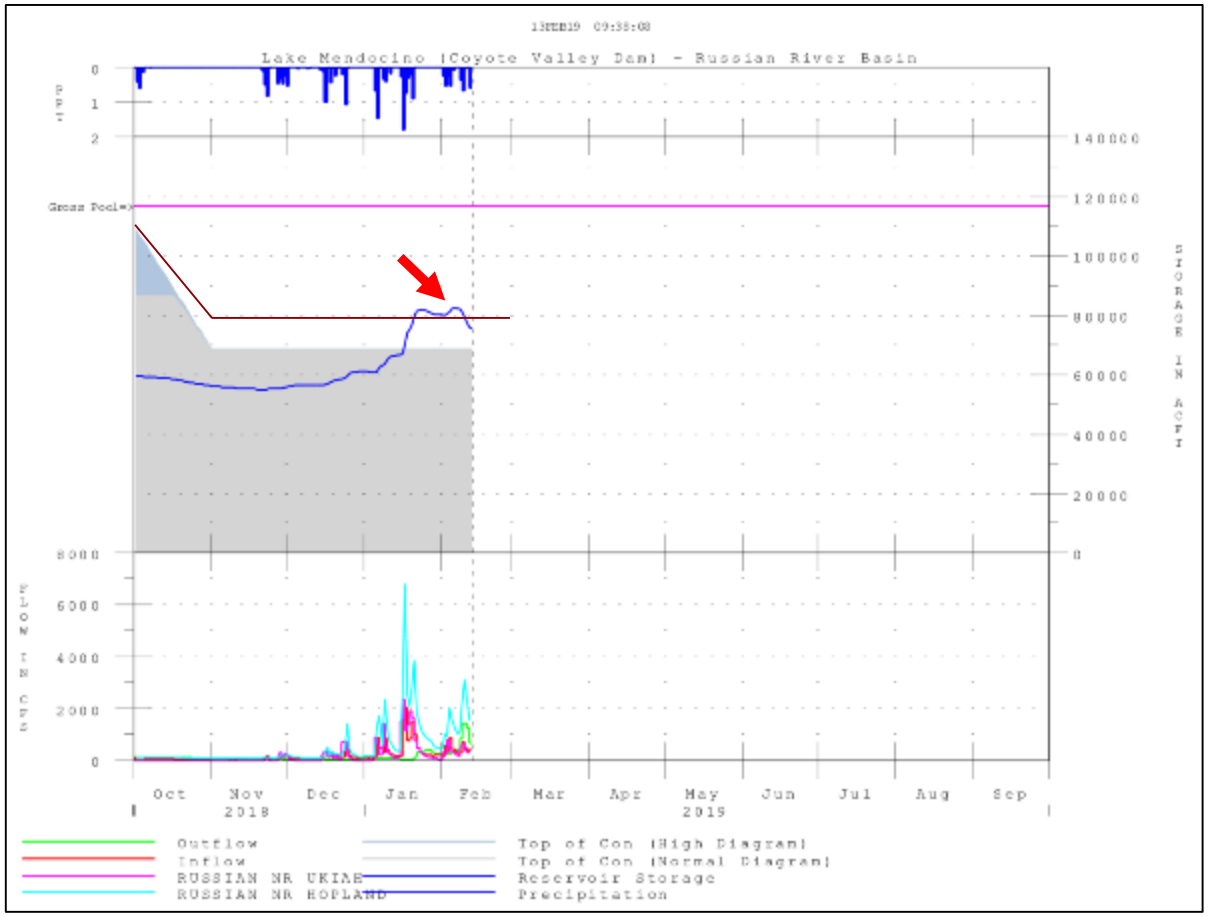
# EARLY FEBRUARY 2019

Midnight reservoir storage on February 5 ~ 82,283 acre-feet




There was still uncertainty in the long term ensemble forecasts if a weak to moderate atmospheric river over the Russian River basin would occur from February 13-14. Release of 425 cfs and storage was held steady near the Major Deviation storage limit of 80,050 acre-feet.

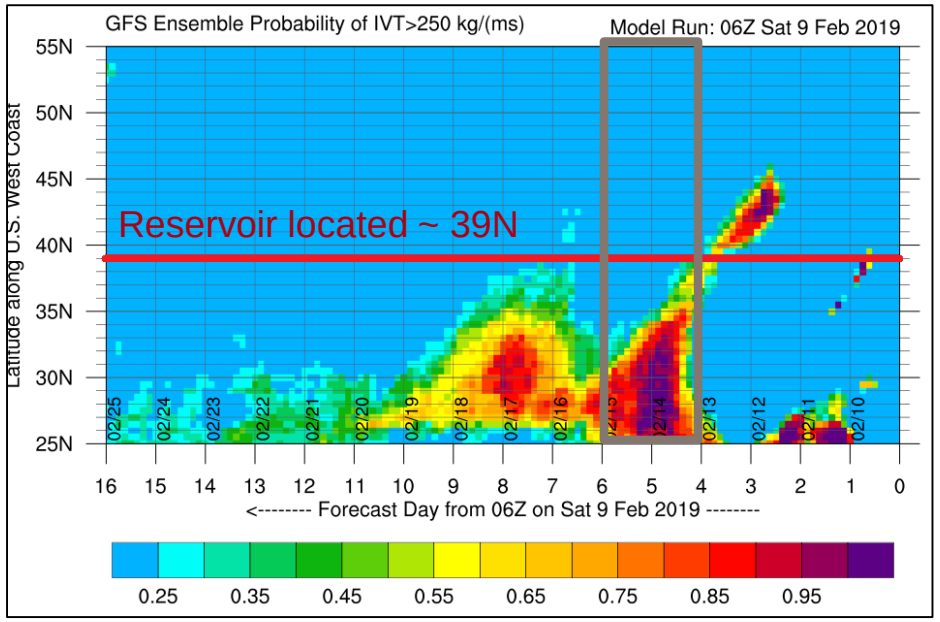


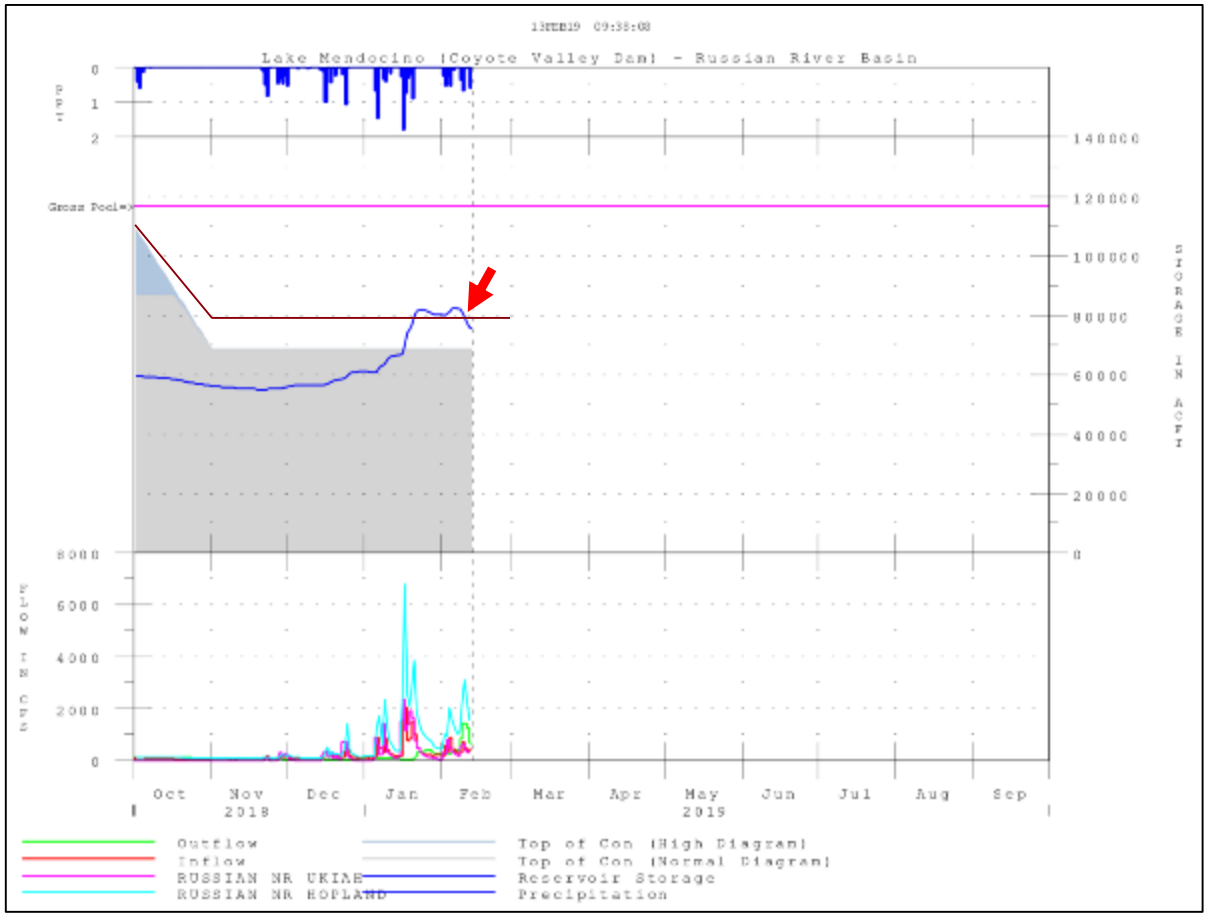




Risk of completely filling up the reservoir was forecasted to be low for the entire 15-day forecast period.

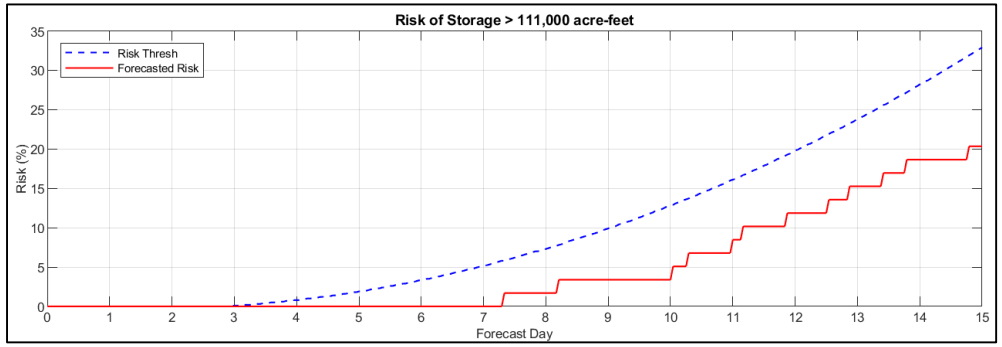
# FEBRUARY 9, 2019

Midnight reservoir storage on February 9 ~ 79,330 acre-feet
QPF for February 13-14 was ~2 inches



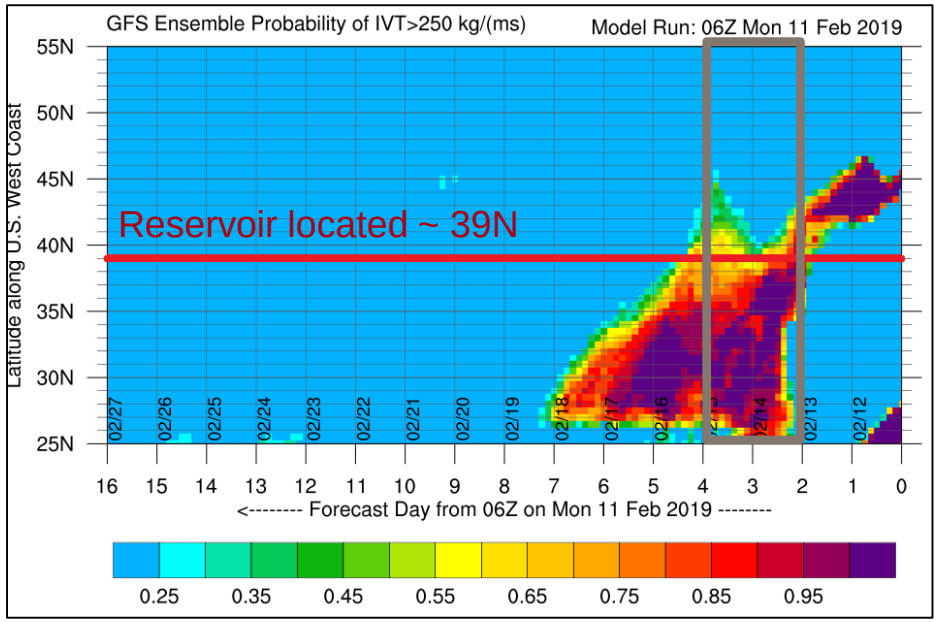

The likelihood of a weak to moderate atmospheric river to occur over the basin was becoming more clear for February 13-14 in both the short term deterministic forecast and long term ensemble forecast. Releases were increased to 1500 cfs to make space for water.

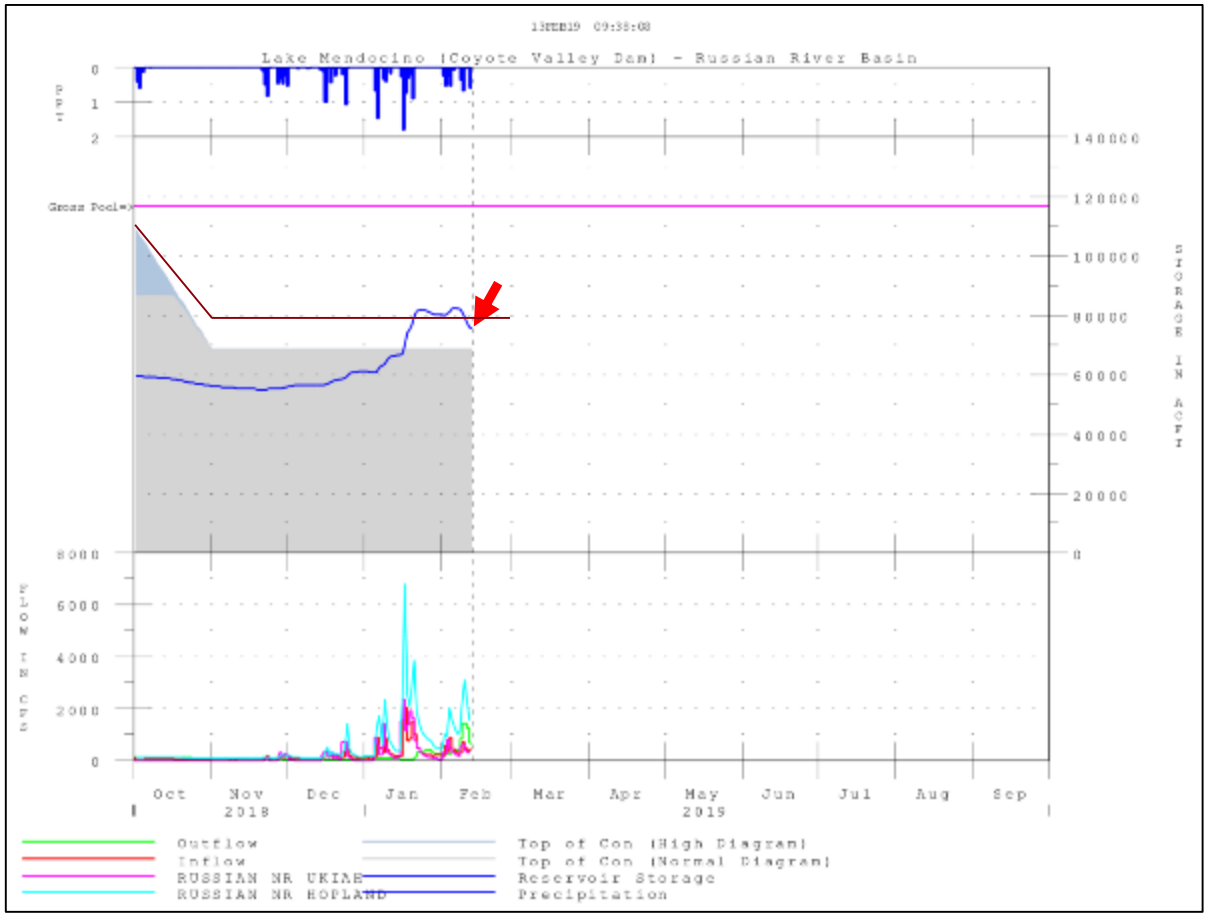



Risk of completely filling up the reservoir was forecasted to be higher than in previous days.

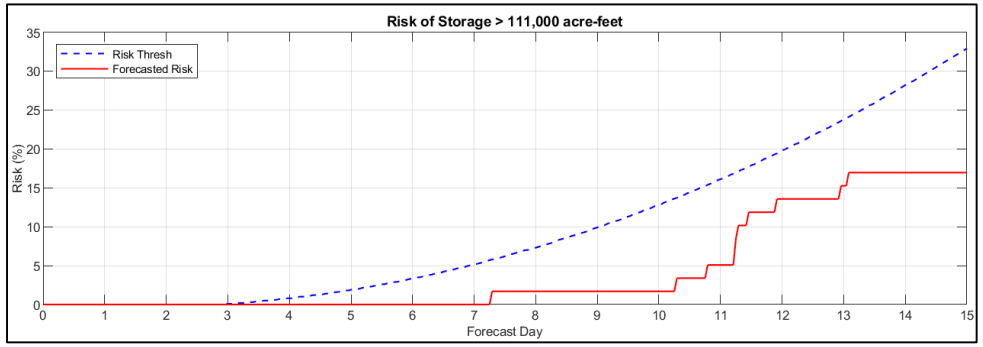
# FEBRUARY 11, 2019

Midnight reservoir storage on February 11 ~ 75,816 acre-feet
QPF for February 13-14 was ~3-5 inches




Now it was almost certain that a weak to moderate atmospheric river would occur over the basin based on both the short term deterministic forecast and long term ensemble forecast.. Releases continued at 1500 cfs to draw storage below the Major Deviation limit of 80,050 acre-feet to make space for water.




Risk of completely filling up the reservoir was reduced over the 10 day period compared to February 9 forecast because of continued releases.

Storage was lowered to ~75,000 acre-feet by the evening of February 12.

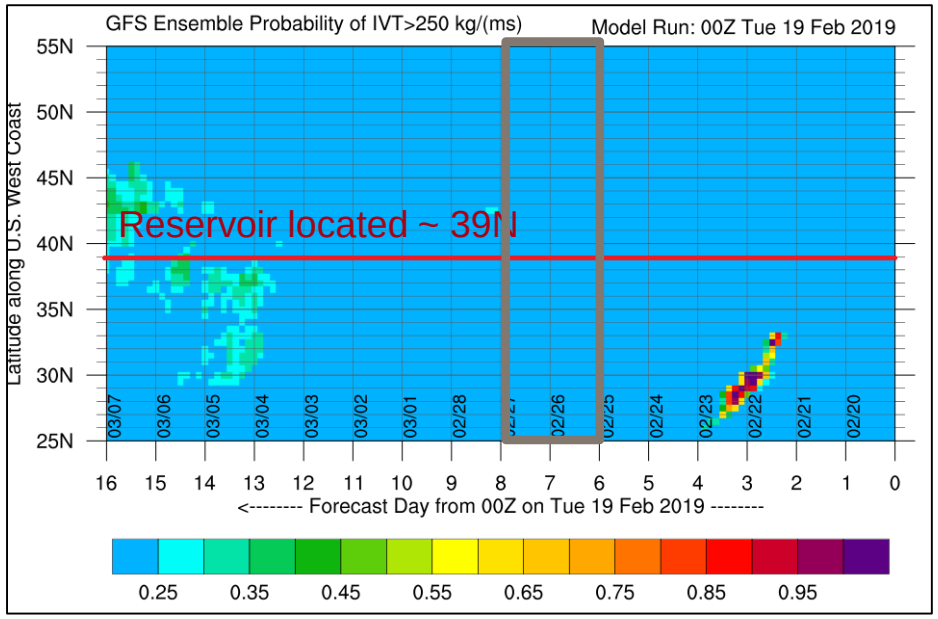
Storage rose to ~91,000 acre-feet as a result of that February 13-14 storm.  Observed precipitation over the entire basin was ~3-5 inches.

(Gross pool is 116,500 acre-feet; top of conservation pool is 68,400 acre-feet)

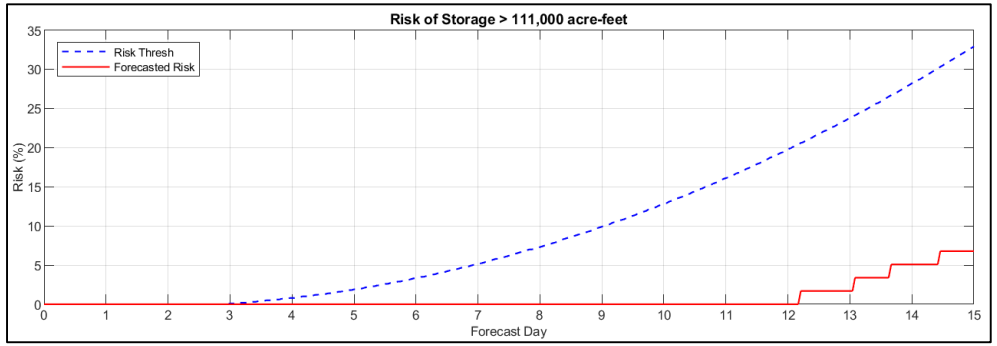
# FEBRUARY 25-26, 2019 STORM
# COYOTE VALLEY DAM

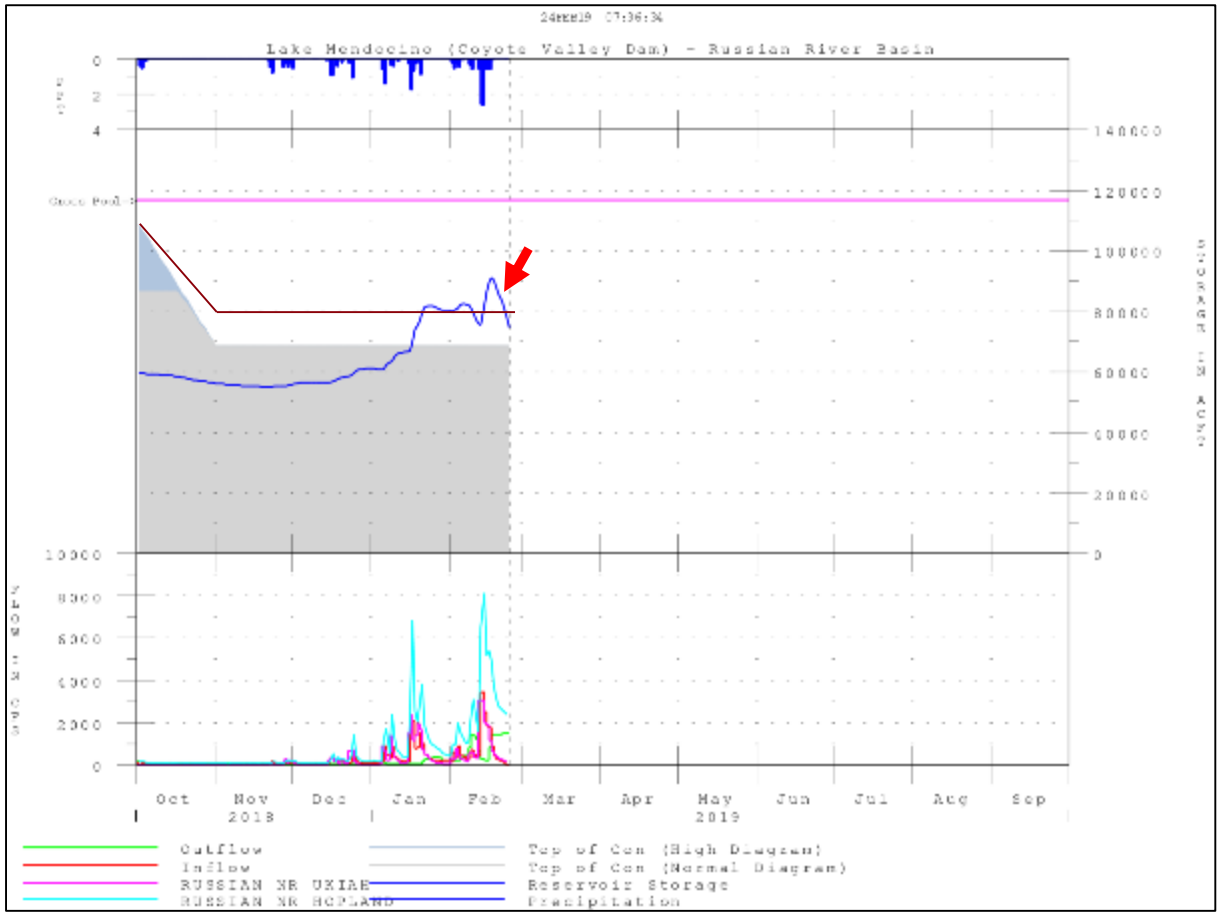
# FEBRUARY 19, 2019

Midnight reservoir storage on February 19 ~ 85,707 acre-feet




The long term ensemble forecasts did not indicate the possibility of a weak to moderate atmospheric river occurring over the Russian River basin from February 25-26. However, because of the previous storm that had occurred, releases were still being made towards the Major Deviation storage limit of 80,050 acre-feet.

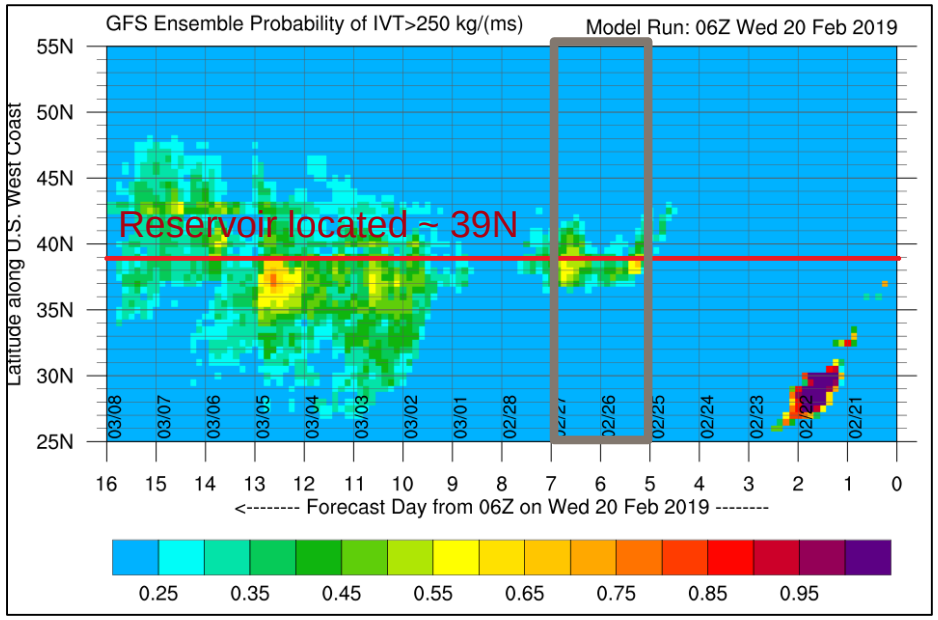


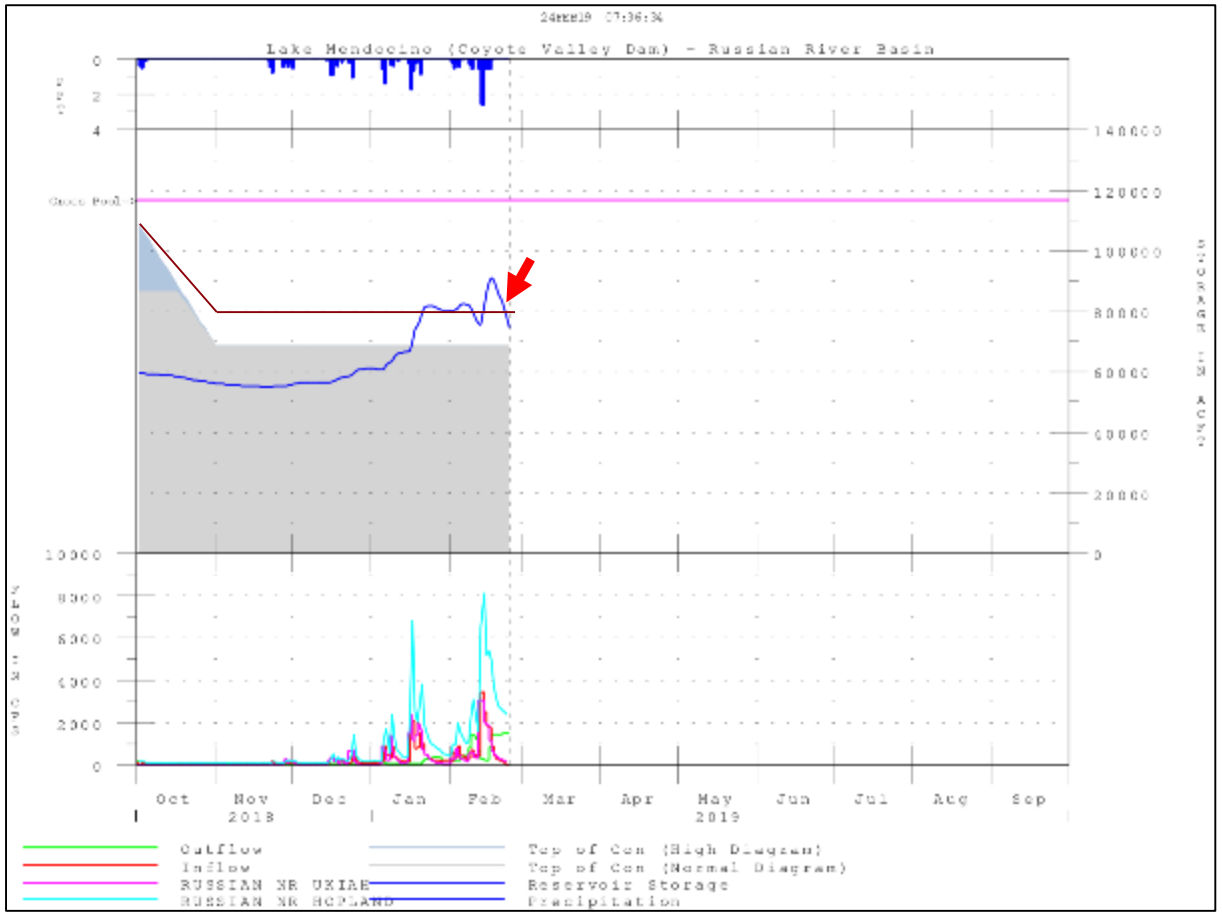




Risk of completely filling up the reservoir was forecasted to be low for the entire 15-day forecast period.

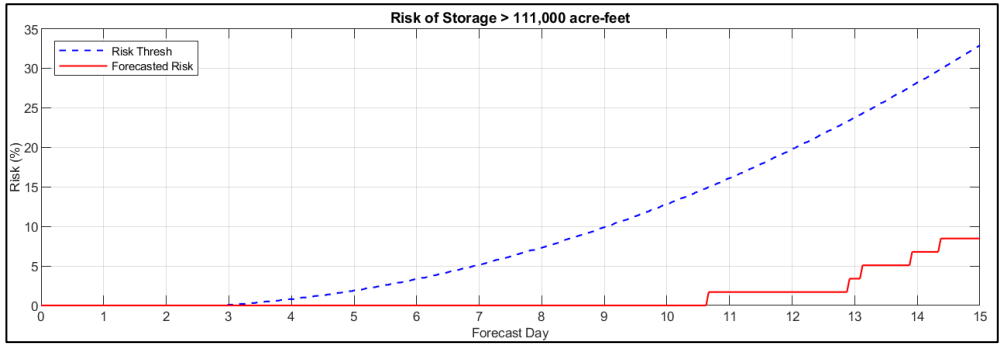
# FEBRUARY 20, 2019

Midnight reservoir storage on February 20 ~ 83,236 acre-feet
QPF for February 25-26 was ~ 2-3 inches



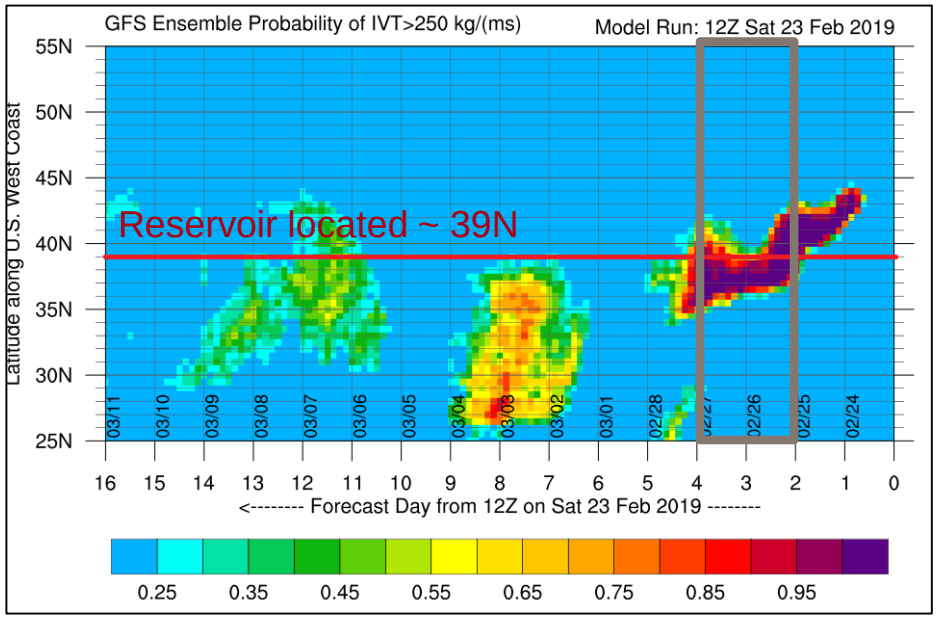

The long term ensemble forecasts and short term deterministic forecast were starting to indicate the possibility of an atmospheric river occurring over the Russian River basin from February 25-26. Because of the previous storm that had occurred, releases were still being made towards the Major Deviation storage limit of 80,050 acre-feet.

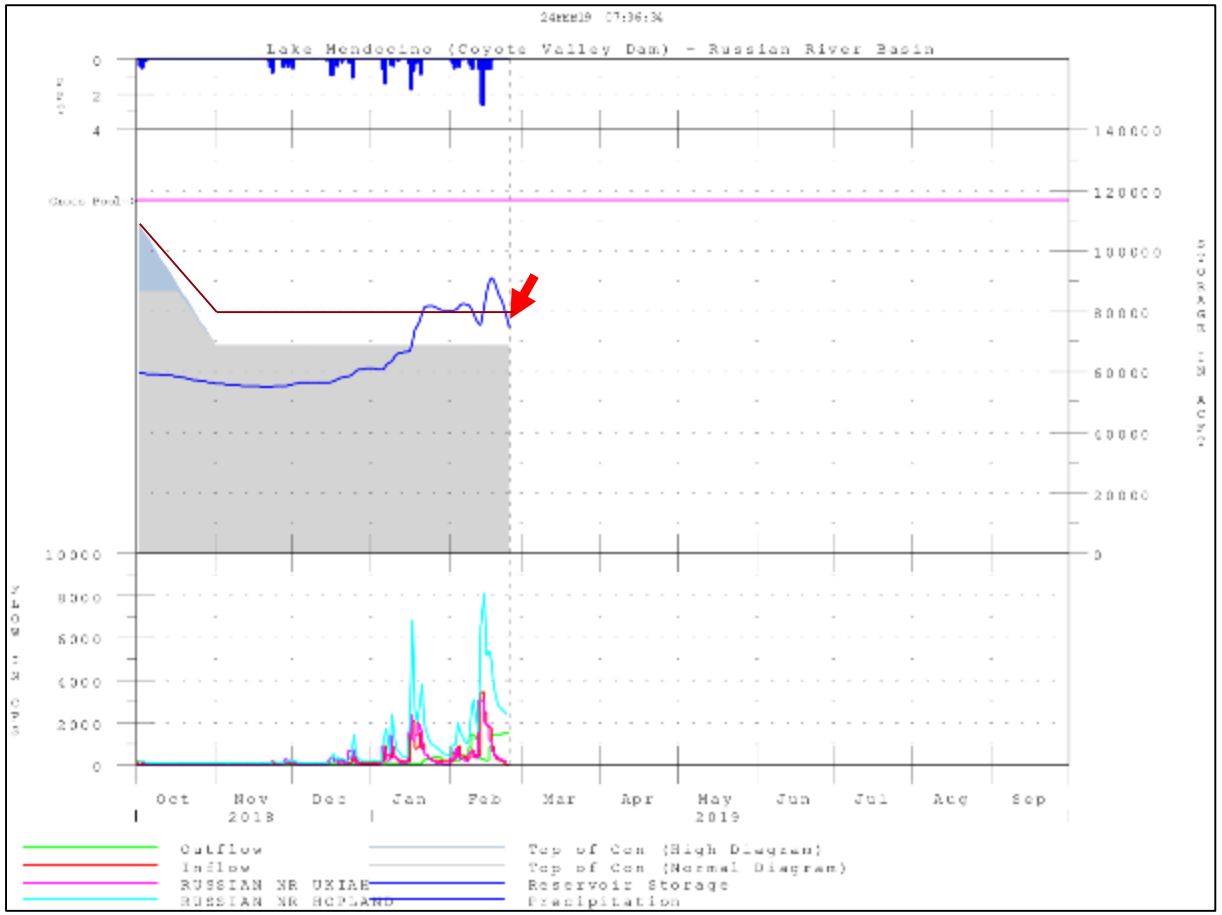



Risk of completely filling up the reservoir was forecasted to be low for the entire 15-day forecast period.

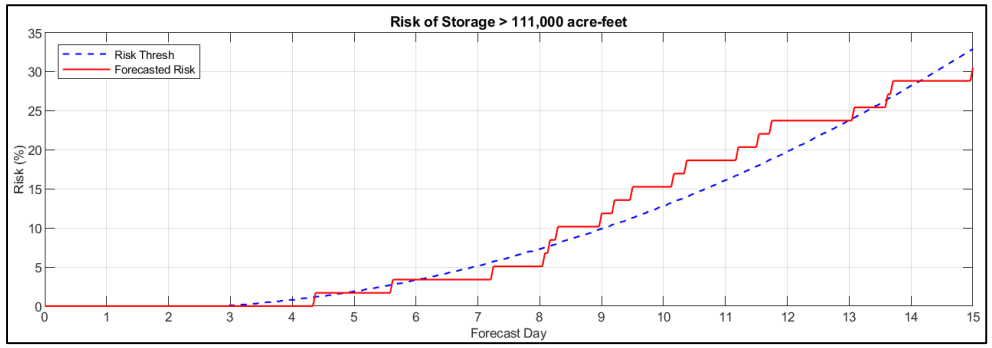
# FEBRUARY 23, 2019

Midnight reservoir storage on February 23 ~ 74,794 acre-feet
QPF for February 25-26 was ~5-6 inches




Now it was almost certain that an atmospheric river would occur over the basin based on both the short term deterministic forecast and long term ensemble forecast. Releases continued at 1500 cfs to draw storage below the Major Deviation limit of 80,050 acre-feet to make space for water.




Risk of completely filling up the reservoir was forecasted to be high because the atmospheric river was projected to be of great magnitude.

Storage was lowered to ~73,000 acre-feet by the morning of February 25.

Storage rose to ~95,000 acre-feet as a result of that February 25-26 storm. Observed precipitation over the entire basin was ~6-10 inches.

(Gross pool is 116,500 acre-feet; top of conservation pool is 68,400 acre-feet)

# MAJOR DEVIATION REQUEST FOR COYOTE VALLEY DAM

Accomplishments:

- Tested for significant inflow events (up to ~22,000 acre-feet)  [Note: the overall flood control space of the reservoir is 48,100 acre-feet]
- Maintained normal operations (outflow from power plant during normal business hours)
- Generally followed NMFS recommended ramping rates
- Developed good relationship with Sonoma Water staff regarding review and discussion of weather products

To be determined:

- Reaction to back-to-back storm events
- Reaction to storm events in December or January
- Reaction to operational or recreational challenges

# SOME FINAL FOOD FOR THOUGHT

1. While there have been some years of drought in California, there have been plenty of years that have also been very wet and have utilized a significant amount of flood control space at the two reservoirs within the watershed.
2. Given the current weather forecast skill and the current operational constraints at Coyote Valley Dam (Lake Mendocino), it would be very difficult to deviate by more than 11,650 acre-feet from its current approved water control plan for winter storage.
3. Coyote Valley Dam (Lake Mendocino) is not the only reservoir within the Russian River watershed. It is important that operations of Warm Springs Dam (Lake Sonoma) are not hindered by any proposed FIRO of Coyote Valley Dam (Lake Mendocino), especially given the fact that USACE owns and operates both dams.

# QUESTIONS?