

February 2025: Conditional Positional Analysis (CPA) Implementation – LOSOM Recovery Operations

Water Resources & Systems Modeling Bureau, Systems Modeling Unit
SFWMD

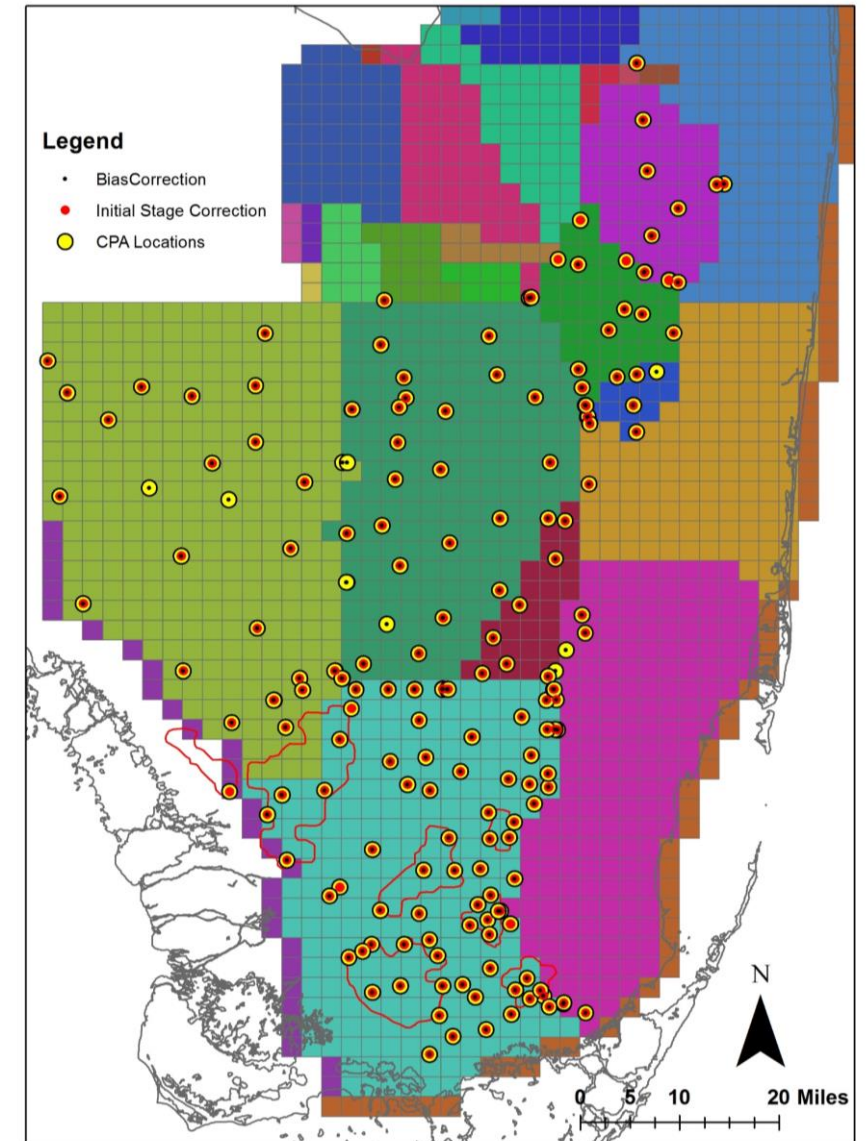


CPA Overview



- CPA is a stochastic framework ([CPA Overview](#)) that transforms stages obtained from Dynamic Position Analysis (DPA) based on forecasted rainfall conditions over the next twelve months (Ali, 2016).
- CPA depends on DPA - DPA stage outputs are used as inputs to CPA ([DPA](#)).
- 3 rainfall outlook scenarios (climatological, CPC, and Preferred Scenario) are used to compare potential stage outlooks.
- February 2025 CPA was conducted for the Lake Okeechobee System Operating Manual (LOSOM) plan – Recovery Operations (RO).
- CPA is implemented for 200 locations in the Everglades including Lake Okeechobee. Additionally, CPA was implemented for WCA1Avg (avg of Site 7, Site 8T, and Site 9) and WCA3AAvg (avg of Site 63, Site 64, and Site 65) stages (Khare et al., 2024, [UF WI Symposium 2024 Presentation](#)).

Conditional Position Analysis (CPA) Gage Locations



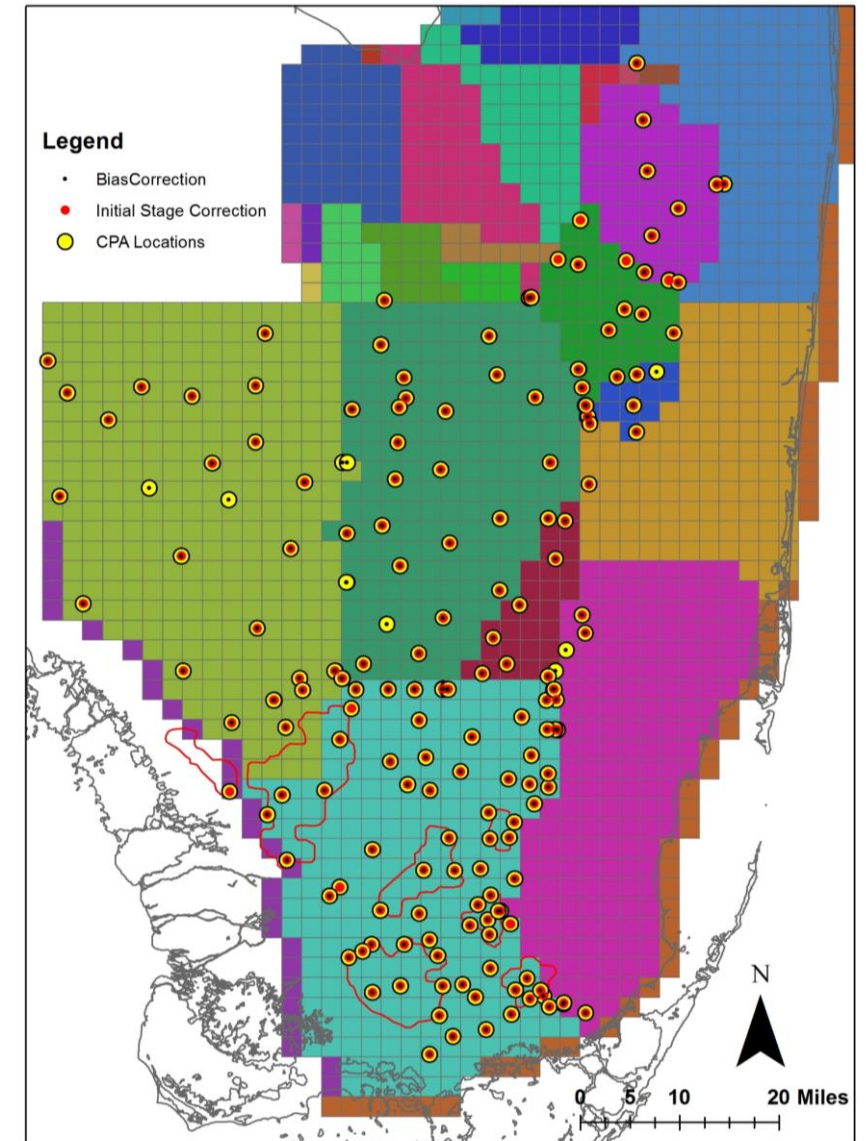
CPA Overview



➤ CPA Outputs

- CPA forecasted stage percentiles from 'Climatological' scenario are first collapsed on DPA stage percentiles. Corresponding adjustments are then applied to stage percentile lines for all other rainfall scenarios.
- Even though CPA methodology considers current operational protocols as it transforms rainfall probability outlook into stage change probability outlook via a Transition Probability Matrix, CPA generated extreme stages (i.e., extreme percentile) may not always be captured by the available model data sets.
- Currently, efforts are underway to develop mechanism to constrain CPA generated stages such that even extreme stages would conform to practically possible stages under current operational protocols.

Conditional Position Analysis (CPA) Gage Locations





CPA: Rainfall Scenarios



➤ Climatological

- Climatological scenario assumes equal chances of below-normal/dry, normal, and above-normal/wet rainfall conditions over next twelve 3 monthly seasons (slide 5).
- This scenario is the connecting link between DPA and all other scenarios simulated under CPA.

➤ CPC

- This is based on official rainfall forecasts published by NOAA's Climate Prediction Center (CPC) every month ([Climate Prediction Center - Forecasts & Outlook Maps, Graphs and tables \(noaa.gov\)](https://climatepredictioncenter.noaa.gov/forecasts/)).
- It is also used by JEM's EverForecast tool for stage prediction.

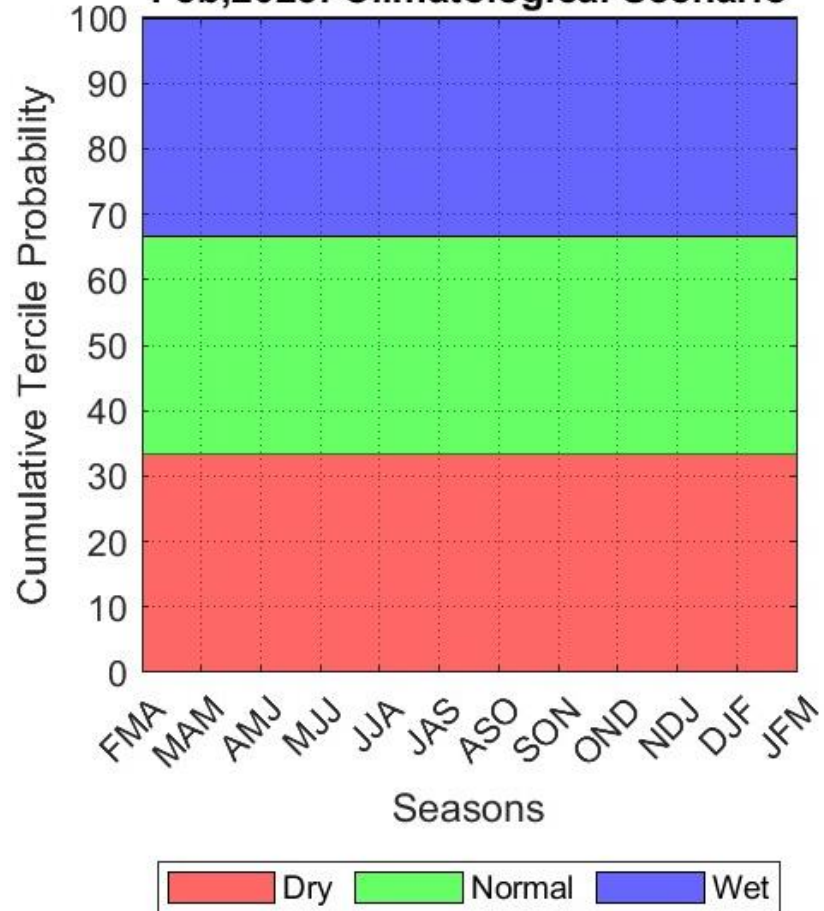
➤ Preferred Scenario (PrefSce)

- Seasonal rainfall probabilities are calculated based on historical data and projected Niño-3.4 Index ([Climate Prediction Center - El Nino Southern Oscillation \(noaa.gov\)](https://climatepredictioncenter.noaa.gov/el-nino-southern-oscillation/)) published by CPC.
- This scenario developed by System Modeling Unit ([PrefSce Overview](#)) represents a best professional judgement rainfall outlook and is typically more aggressive in terms of shifts from Climatological probabilities compared to CPC.

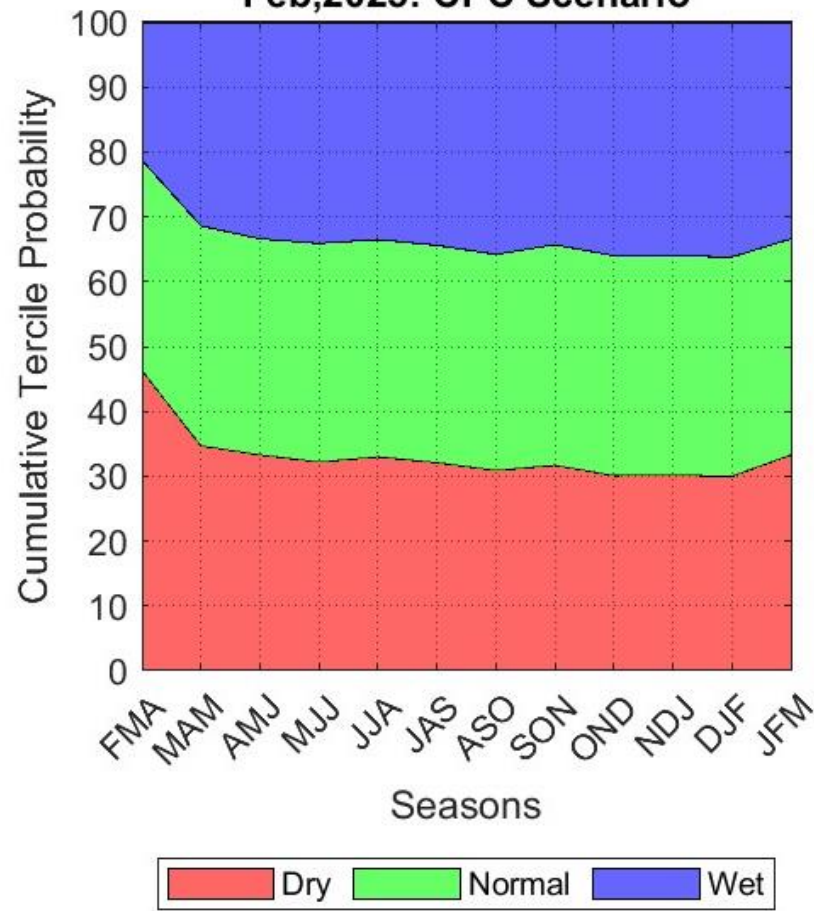
February 2025 CPA: Rainfall Scenarios



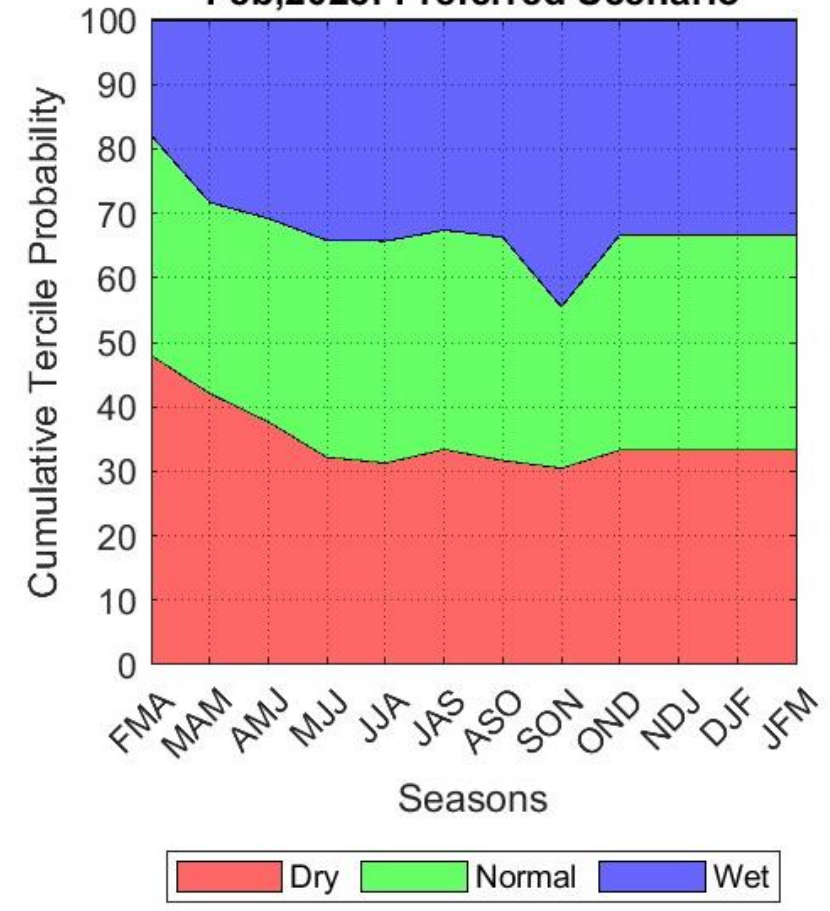
Feb,2025: Climatological Scenario



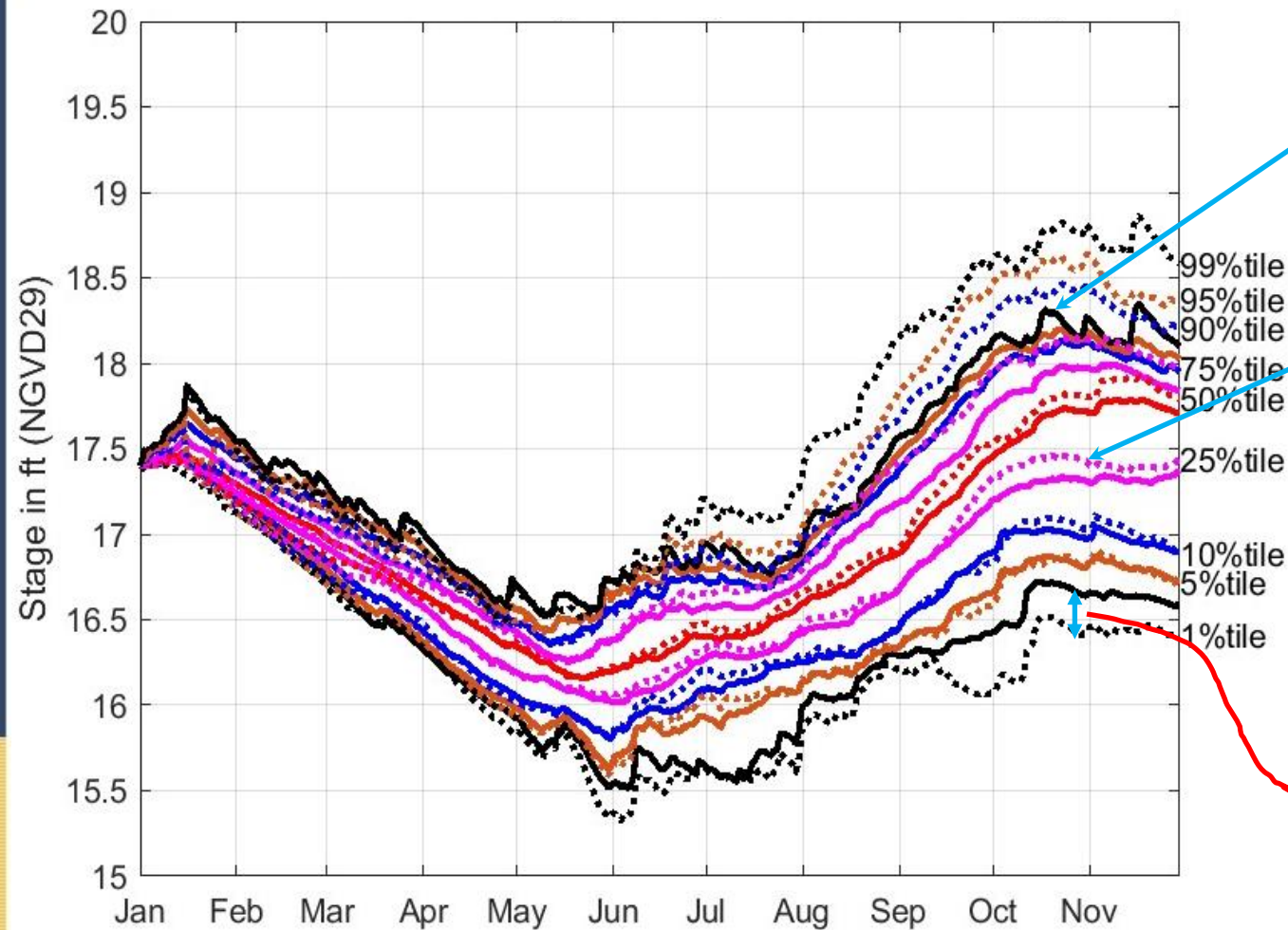
Feb,2025: CPC Scenario



Feb,2025: Preferred Scenario



CPA: Key to Reading Results



Solid lines → Climatological Scenario/DPA

Dotted lines → Alternative Rainfall Scenario

Black lines → 1% and 99%
Brown lines → 5% and 95%
Blue lines → 10% and 90%
Pink lines → 25% and 75%
Red lines → 50%

**Need to focus on how
DPA percentile lines
shift under Alternate
Rainfall Scenario**



LOSOM RO

February 2025 CPA: LOSOM Recovery Operations



- Starting December 7, 2024 the U.S. Army Corps of Engineers (USACE) - Jacksonville District began releases under Lake Okeechobee Recovery Operations (RO). The goal of recovery is to lower lake levels before the onset of the wet season to allow for recovery of lake ecology.
- SFWMM model assumptions for the February 1, 2025 LOSOM RO DPA
- Lake Okeechobee releases
 - 2100 cfs at S-79 to the Caloosahatchee River Estuary (CRE)
 - 1000 cfs at S-80 to the St. Lucie Estuary (SLE)
 - Maximum practicable releases south

NOTE:

- *As per LOSOM Water Control Plan (WCP) flow target for St. Lucie Estuary is 1400 cfs. However, that includes flows from Lake Okeechobee at S-80, Gordy Road Structure, S-97, and S-49. To account for this, regulatory flow target at S-80 was set at 1000 cfs.*



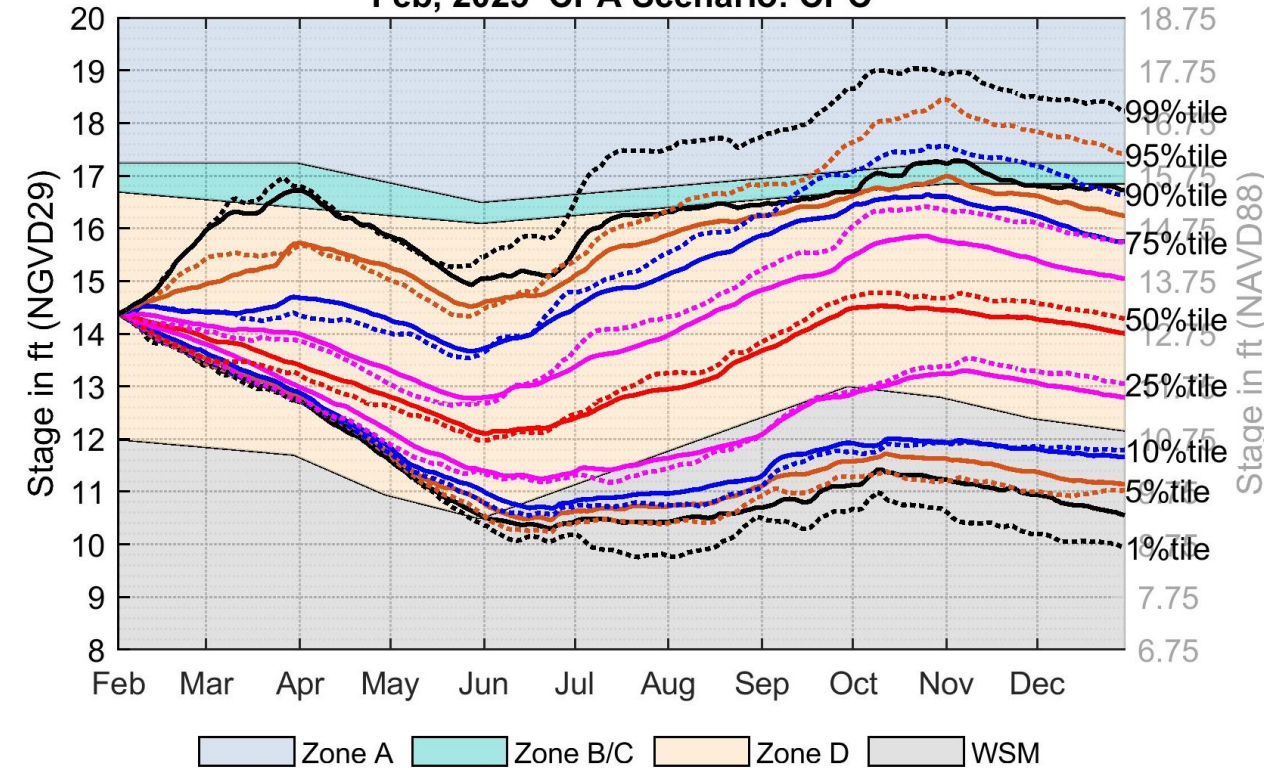
February 2025 CPA: LOK



CPC

LOK

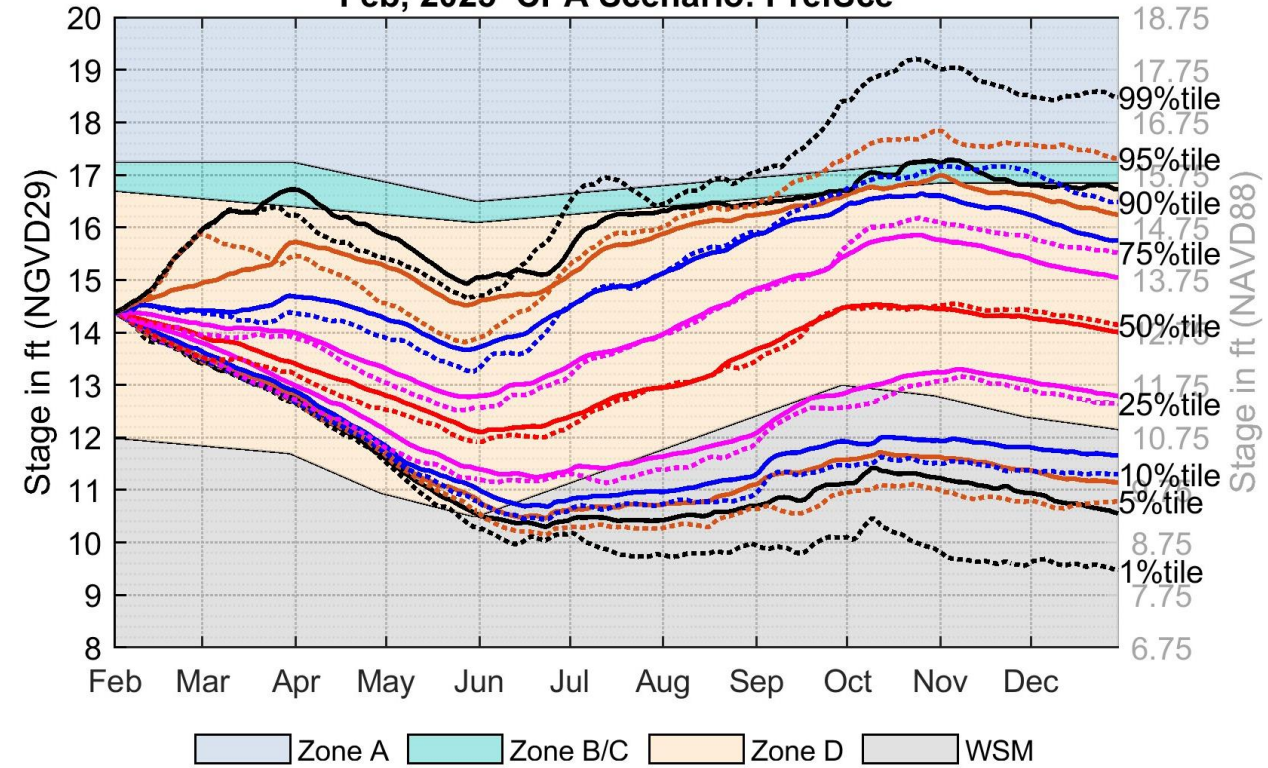
Feb, 2025 CPA Scenario: CPC



PrefSce

LOK

Feb, 2025 CPA Scenario: PrefSce



Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.25 ft for Lake Okeechobee).

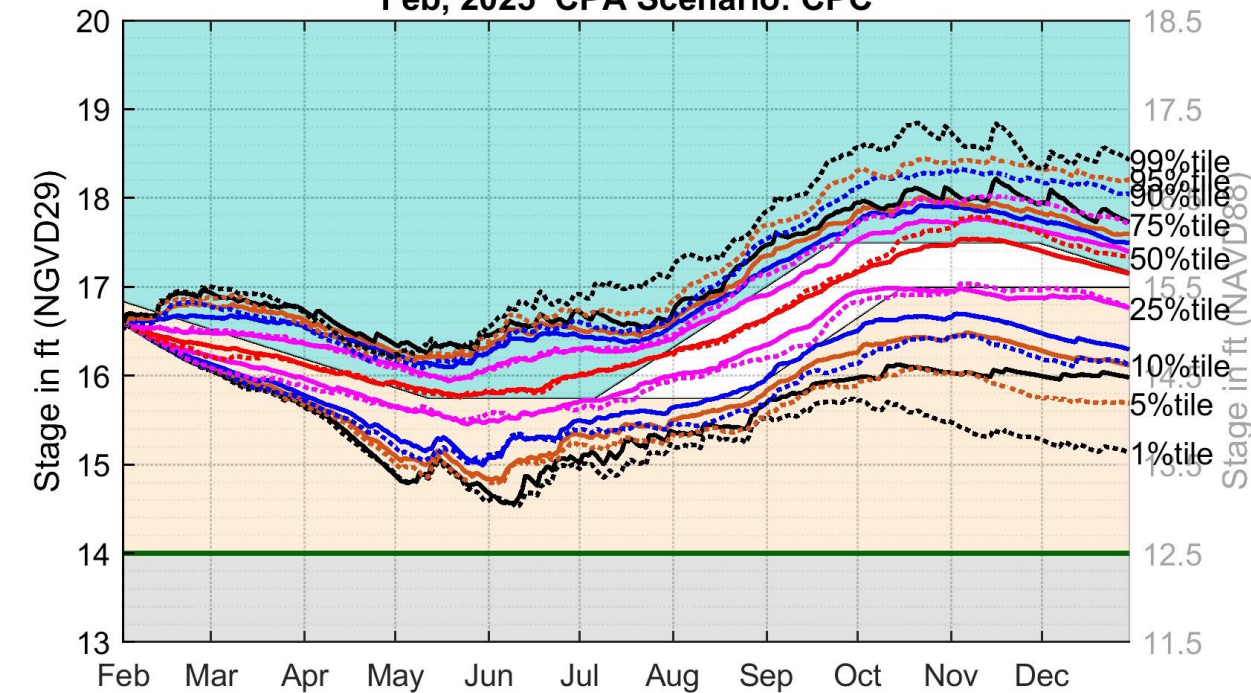
February 2025 CPA: WCA1 3 Gage Avg.



CPC

WCA1Avg

Feb, 2025 CPA Scenario: CPC

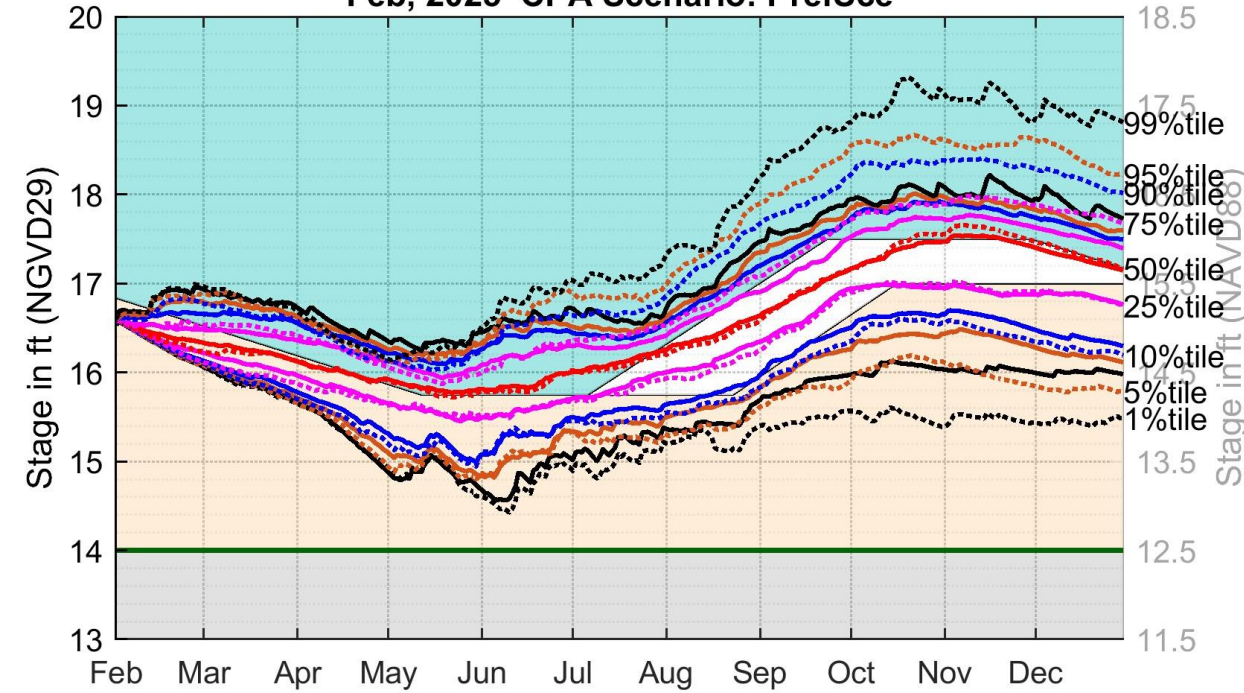


Zone A-1 Zone A-2 Zone B Zone C WS Floor

PrefSce

WCA1Avg

Feb, 2025 CPA Scenario: PrefSce



Zone A-1 Zone A-2 Zone B Zone C WS Floor

Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.5 ft for WCA1).

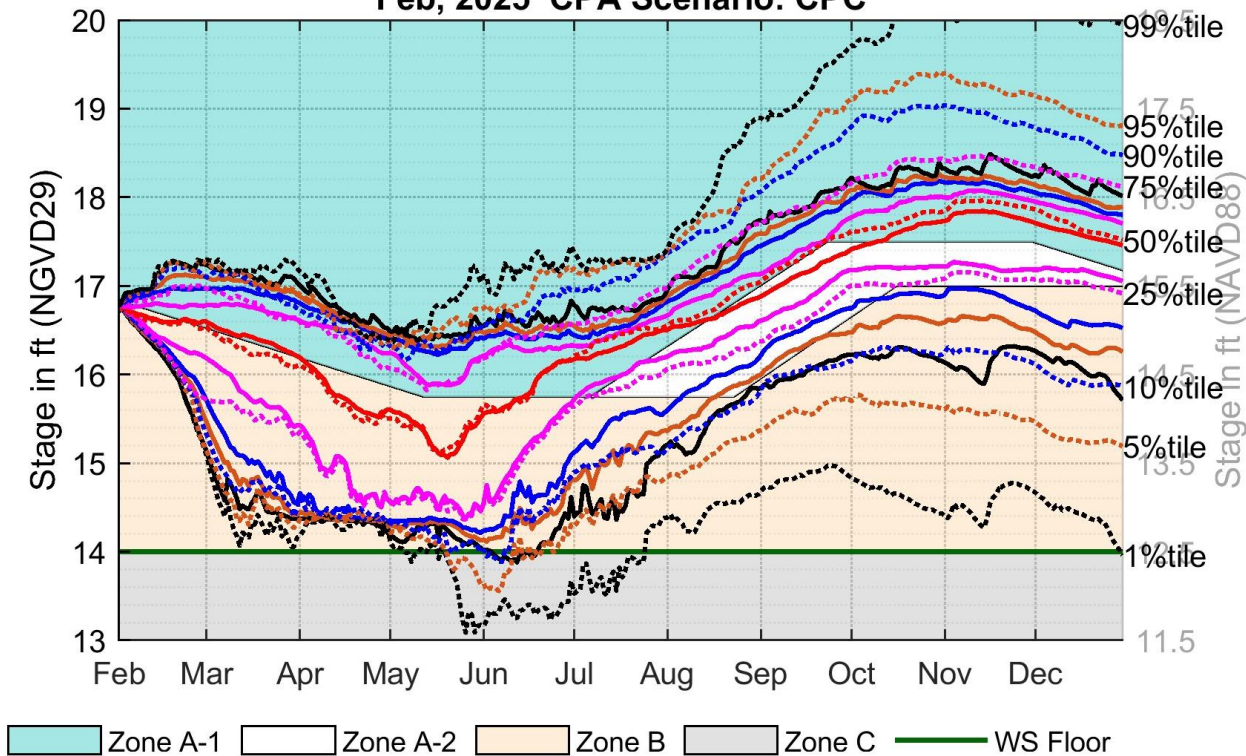
February 2025 CPA: WCA1 Site 8-C



CPC

SITE_8C

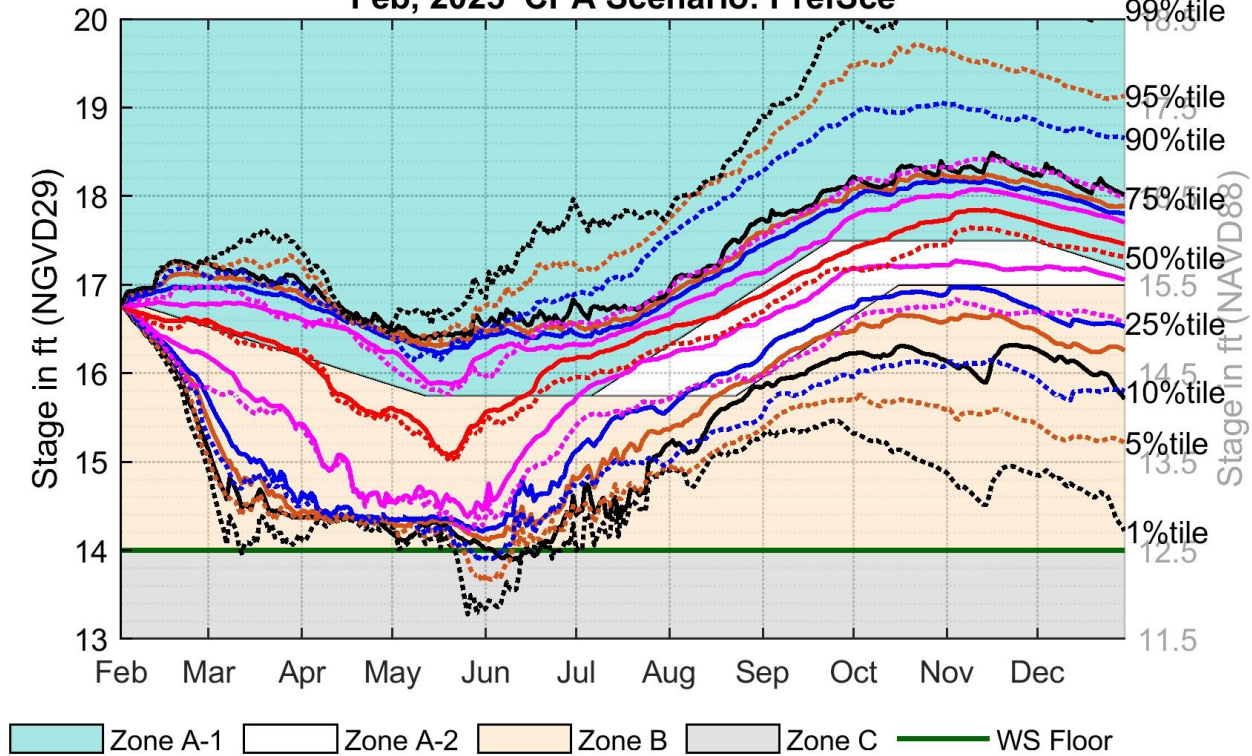
Feb, 2025 CPA Scenario: CPC



PrefSce

SITE_8C

Feb, 2025 CPA Scenario: PrefSce



Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.5 ft for WCA1).

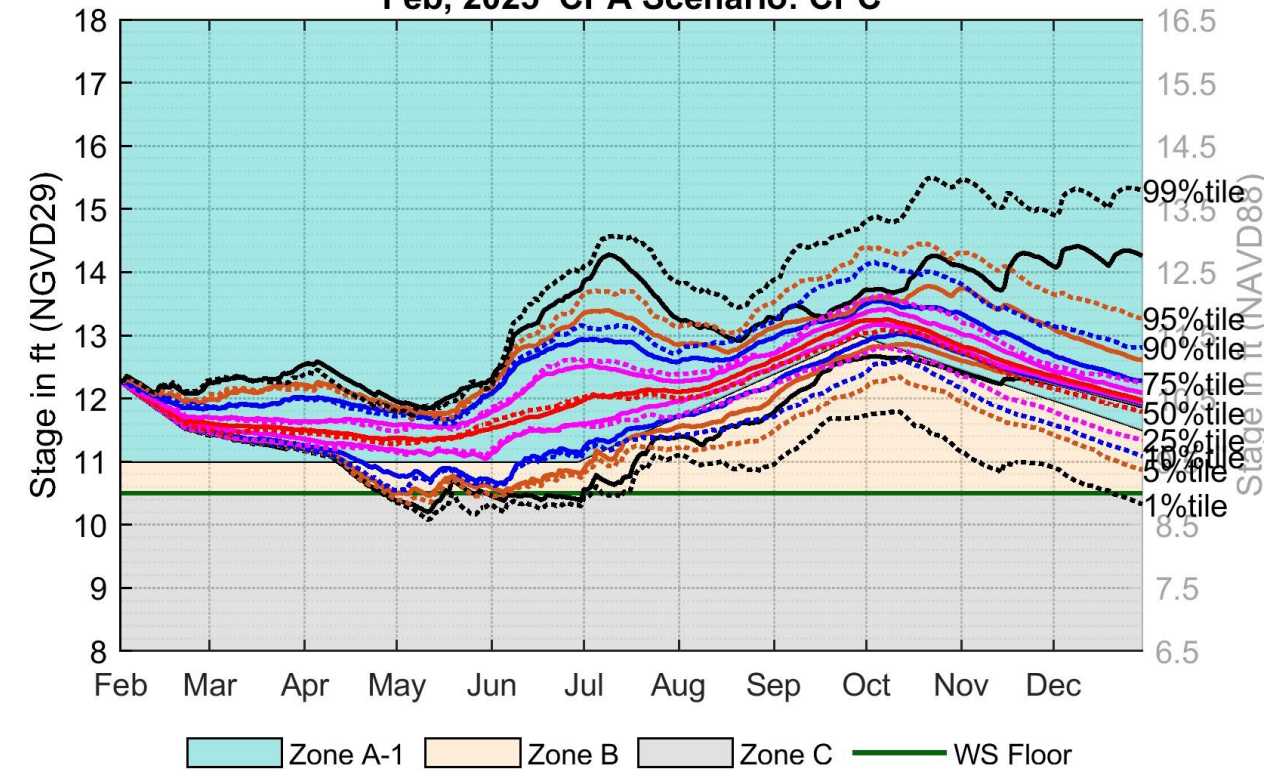
February 2025 CPA: WCA2A Site 17



CPC

SITE_17

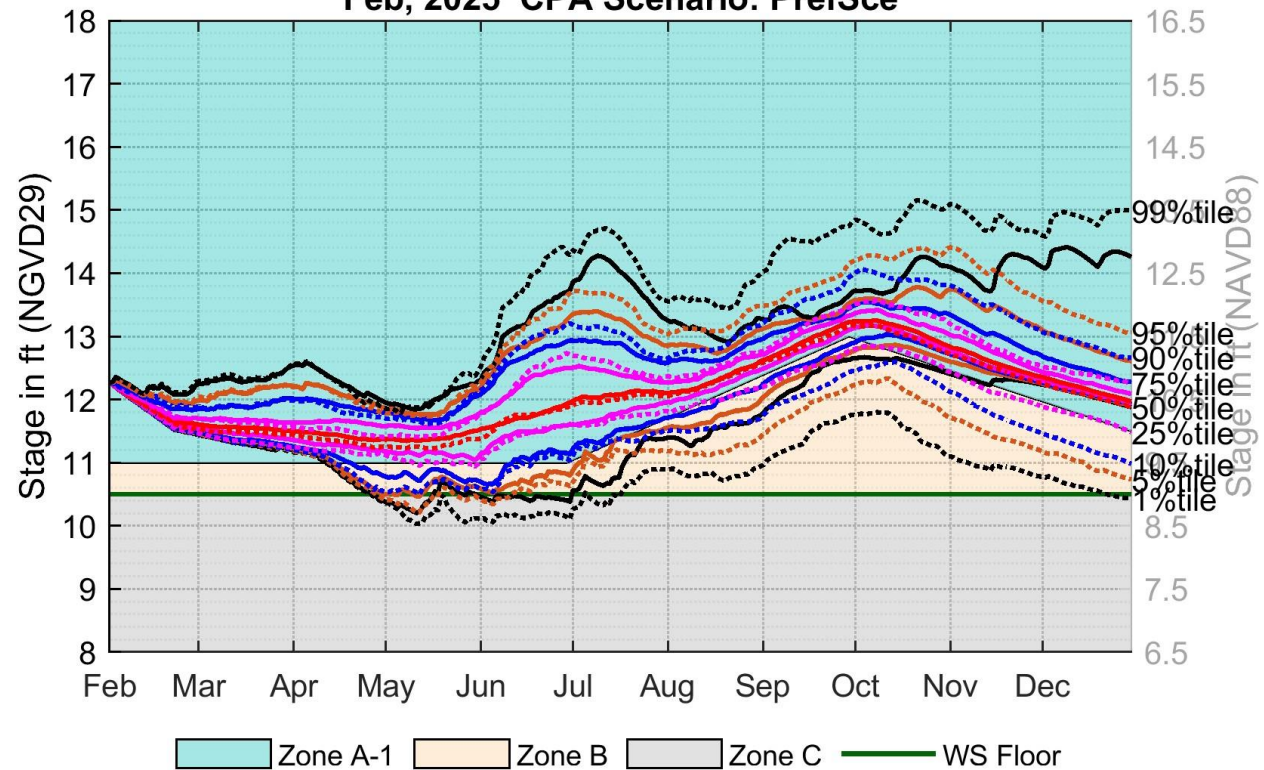
Feb, 2025 CPA Scenario: CPC



PrefSce

WCA2Avg

Feb, 2025 CPA Scenario: PrefSce



Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.5 ft for WCA2A).

February 2025 CPA: WCA2A S11B_H



CPC

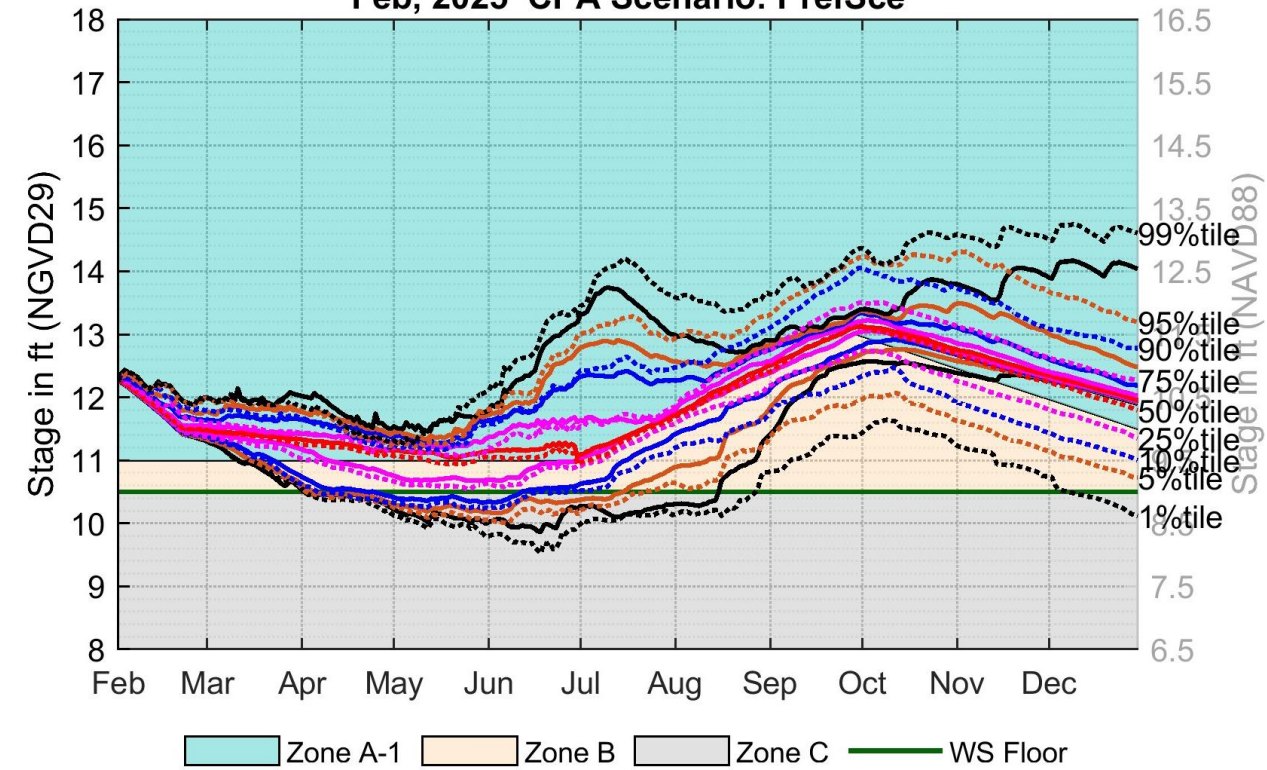
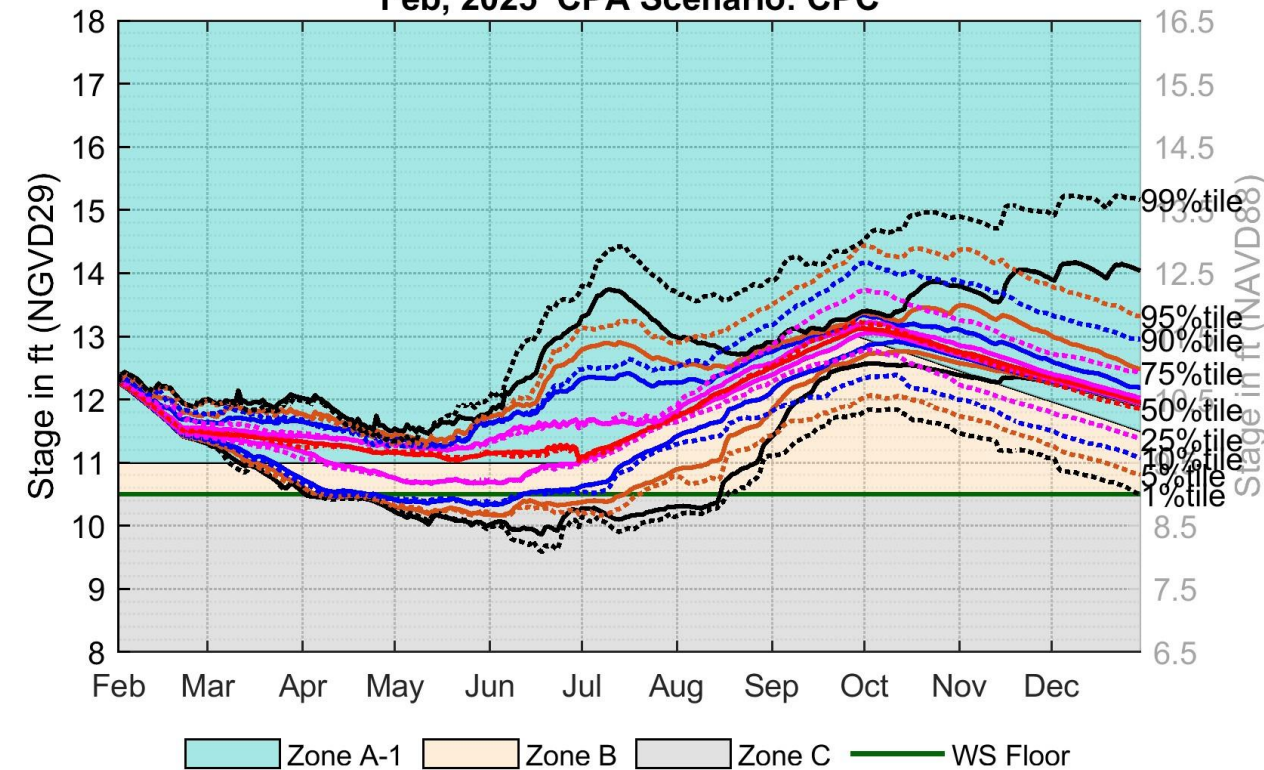
PrefSce

WCA2Avg

WCA2Avg

Feb, 2025 CPA Scenario: CPC

Feb, 2025 CPA Scenario: PrefSce



Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.5 ft for WCA2A).

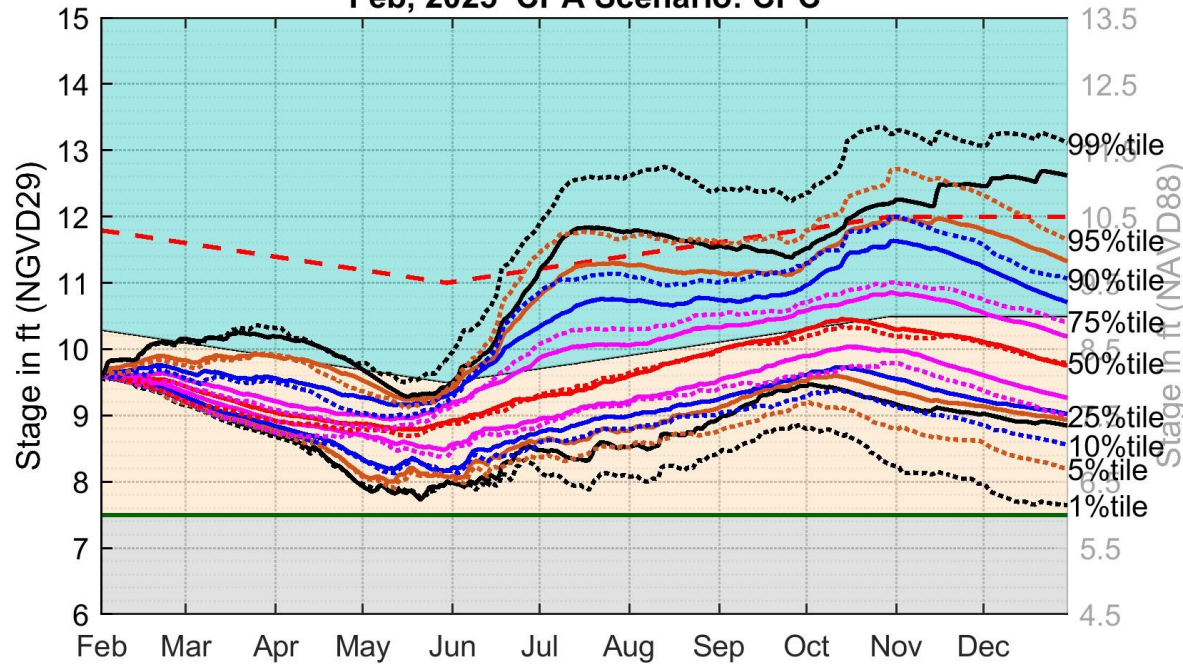
February 2025 CPA: WCA3A 3 Gage Avg.



CPC

WCA3AAvg

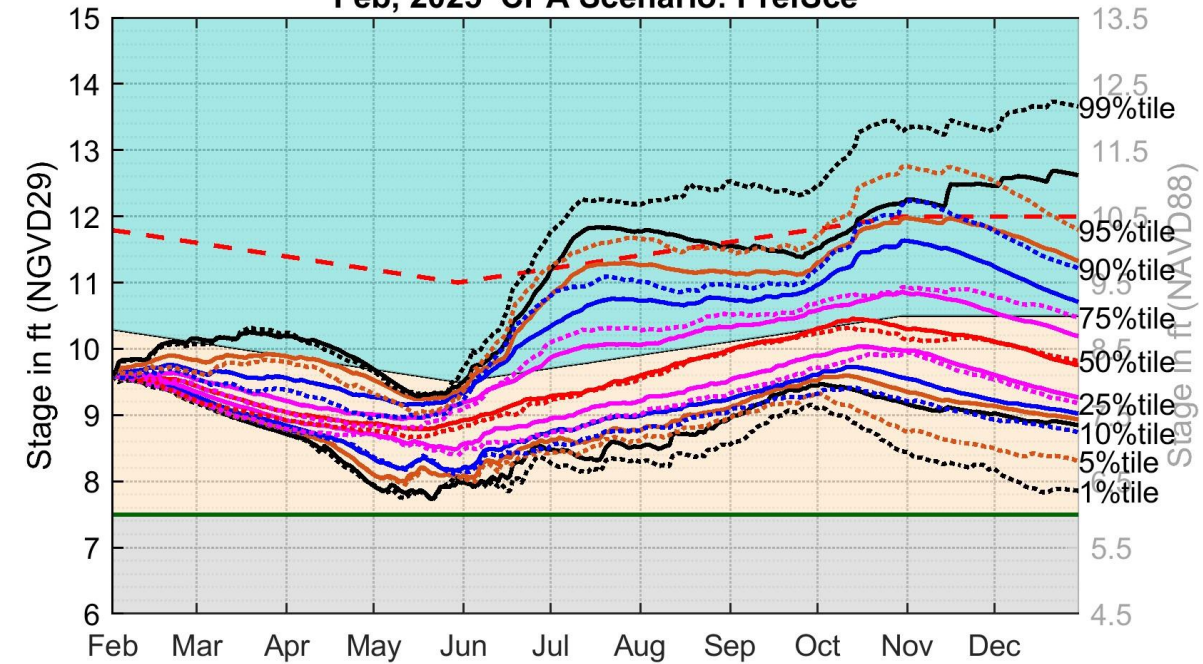
Feb, 2025 CPA Scenario: CPC



PrefSce

WCA3AAvg

Feb, 2025 CPA Scenario: PrefSce



Zone A Zone B Below WS Floor EHWL WS Floor

Zone A Zone B Below WS Floor EHWL WS Floor

Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.5 ft for WCA3A).