SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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

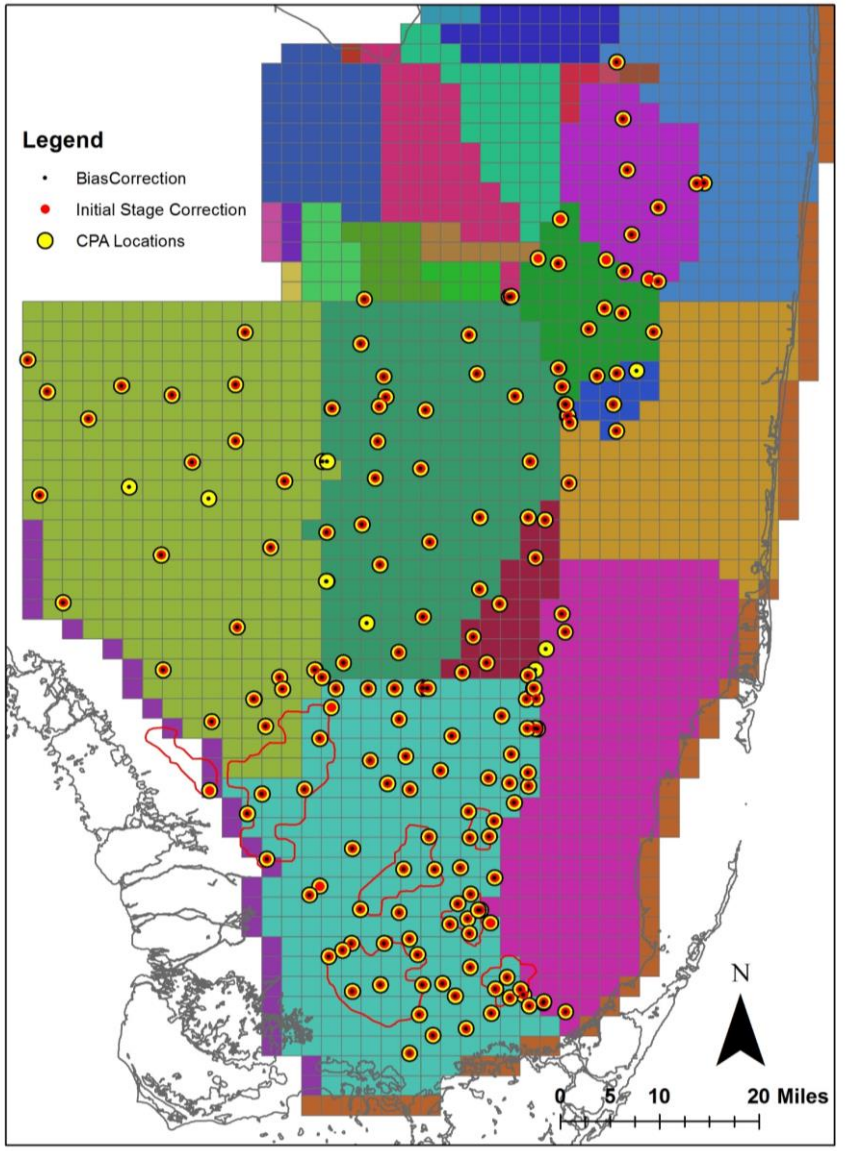
Water Resources & Systems Modeling Bureau, Systems Modeling Unit
SFWMD

sfwmd.gov

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.
- May 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

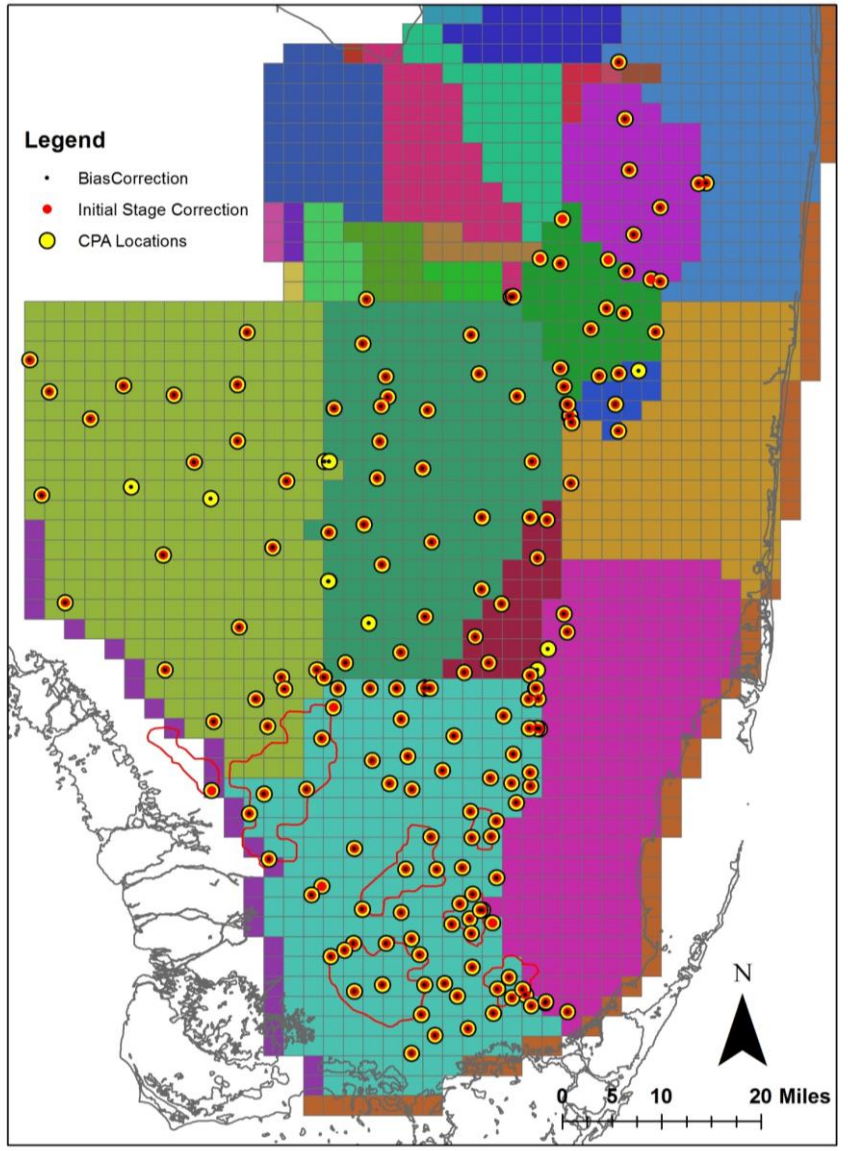


CPA Overview

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.

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.

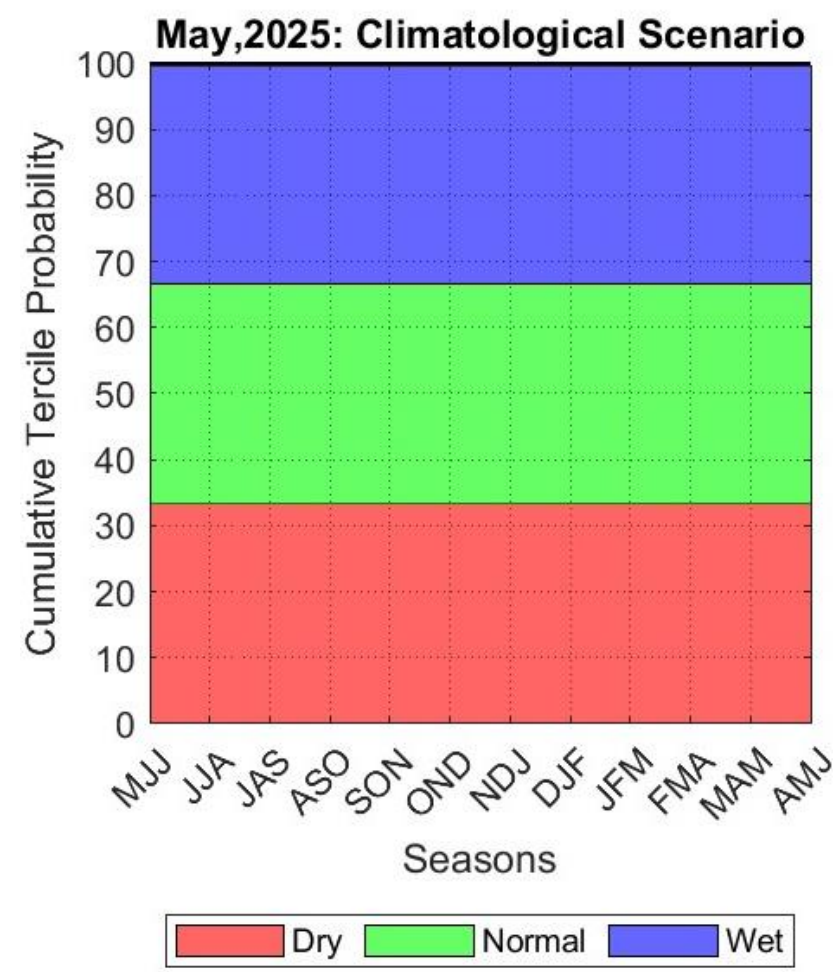
CPC

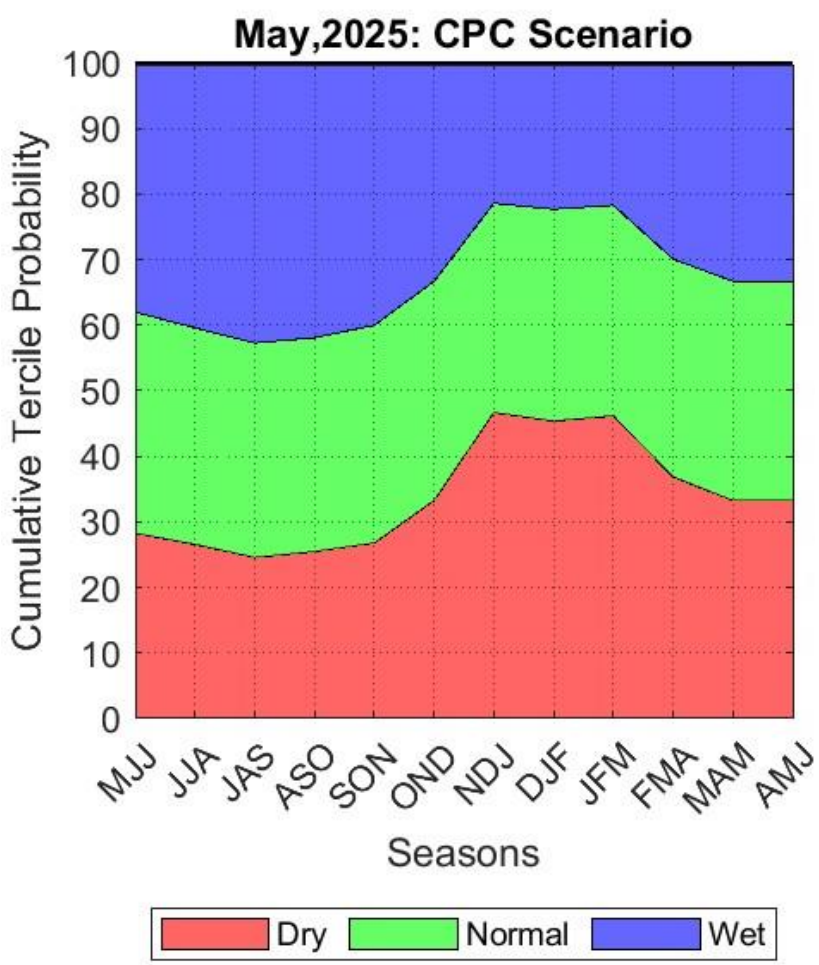
- This is based on official rainfall forecasts published by NOAA's Climate Prediction Center (CPC) every month (Climate Prediction Center - Forecasts & Outlook Maps, Graphs and tables (noaa.gov)).
- It is also used by JEM's EverForecast tool for stage prediction.

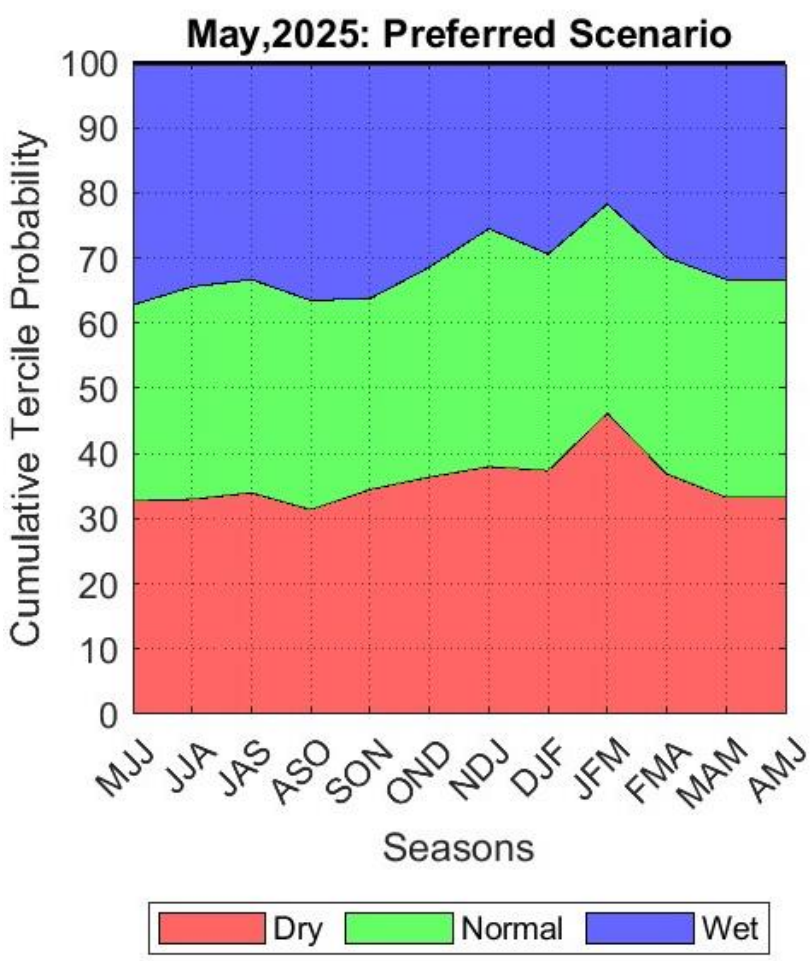
Preferred Scenario (PrefSce)

- Seasonal rainfall probabilities are calculated based on historical data and projected Niño-3.4 Index (Climate Prediction Center - El Nino Southern Oscillation (noaa.gov) published by CPC.
- This scenario developed by System Modeling Unit (**PrefSce Overview**) represents a best professional judgement rainfall outlook.

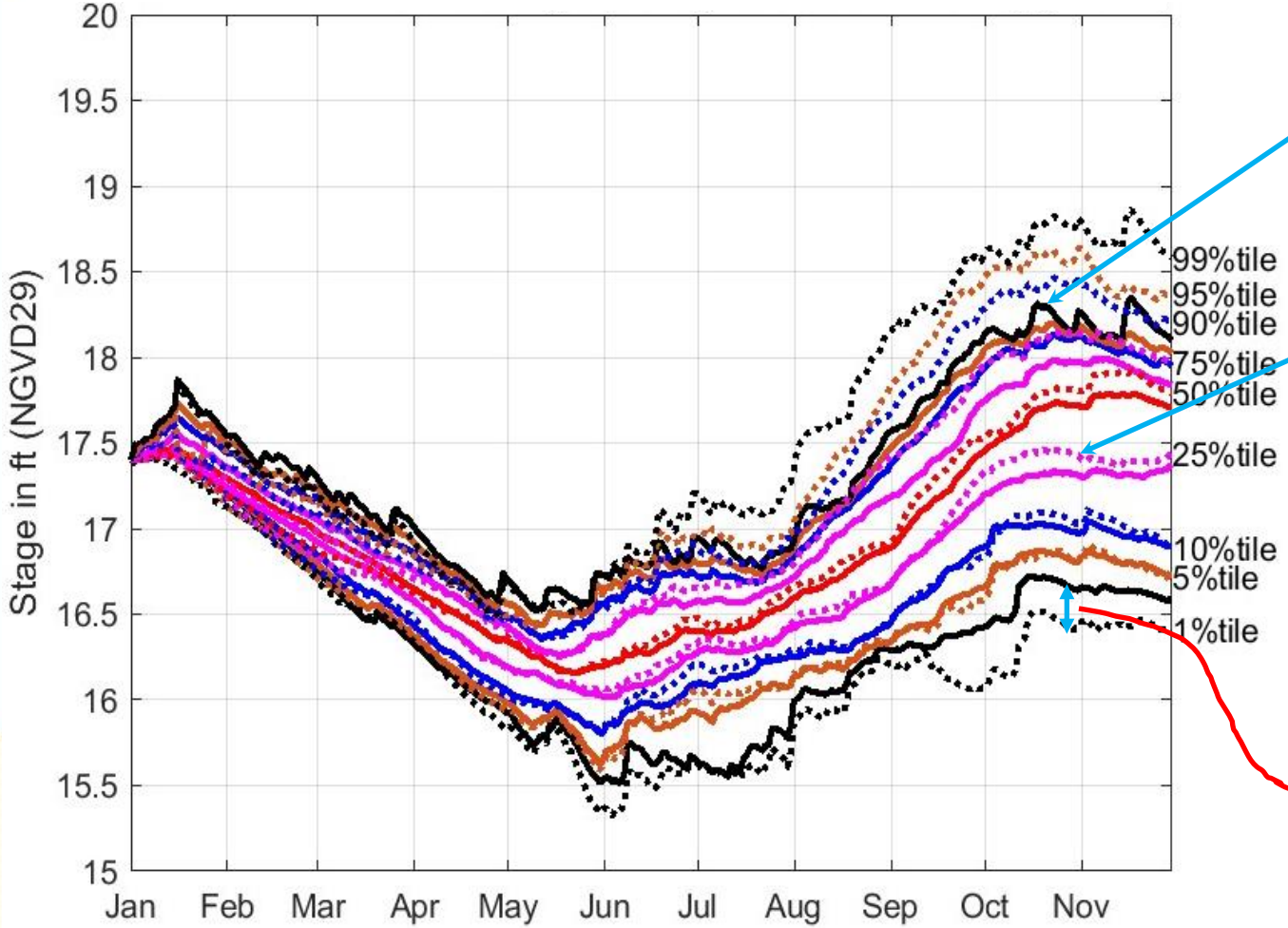
May 2025 CPA: Rainfall Scenarios







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

May 2025 CPA: LOSOM Recovery Operations

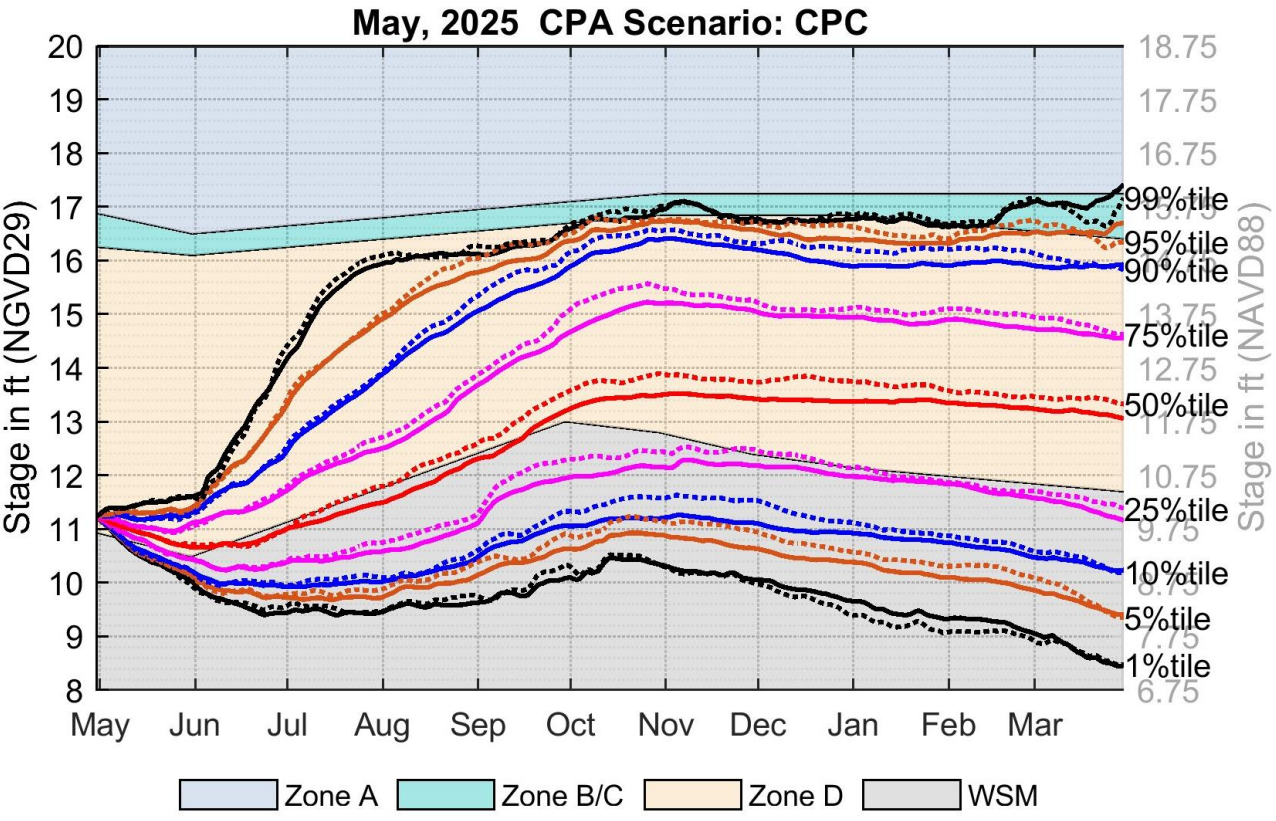
Starting December 7, 2024 the US Army Corps of Engineers (USACE) - Jacksonville District began releases under Lake Okeechobee Recovery Operations. The goal of recovery is to lower lake levels before the onset of the wet season to allow for recovery of lake ecology.

- SFWMM model assumptions for the May 1, 2025 DPA
- Recovery operations start at the beginning of the DPA simulation and end May 31st.
  - Lake Okeechobee releases
    - 650 cfs at S-79 to the Caloosahatchee River Estuary (CRE)
    - 0 cfs at S-80 to the St. Lucie Estuary (SLE)
  - Maximum practicable releases south

May 2025 CPA: LOK

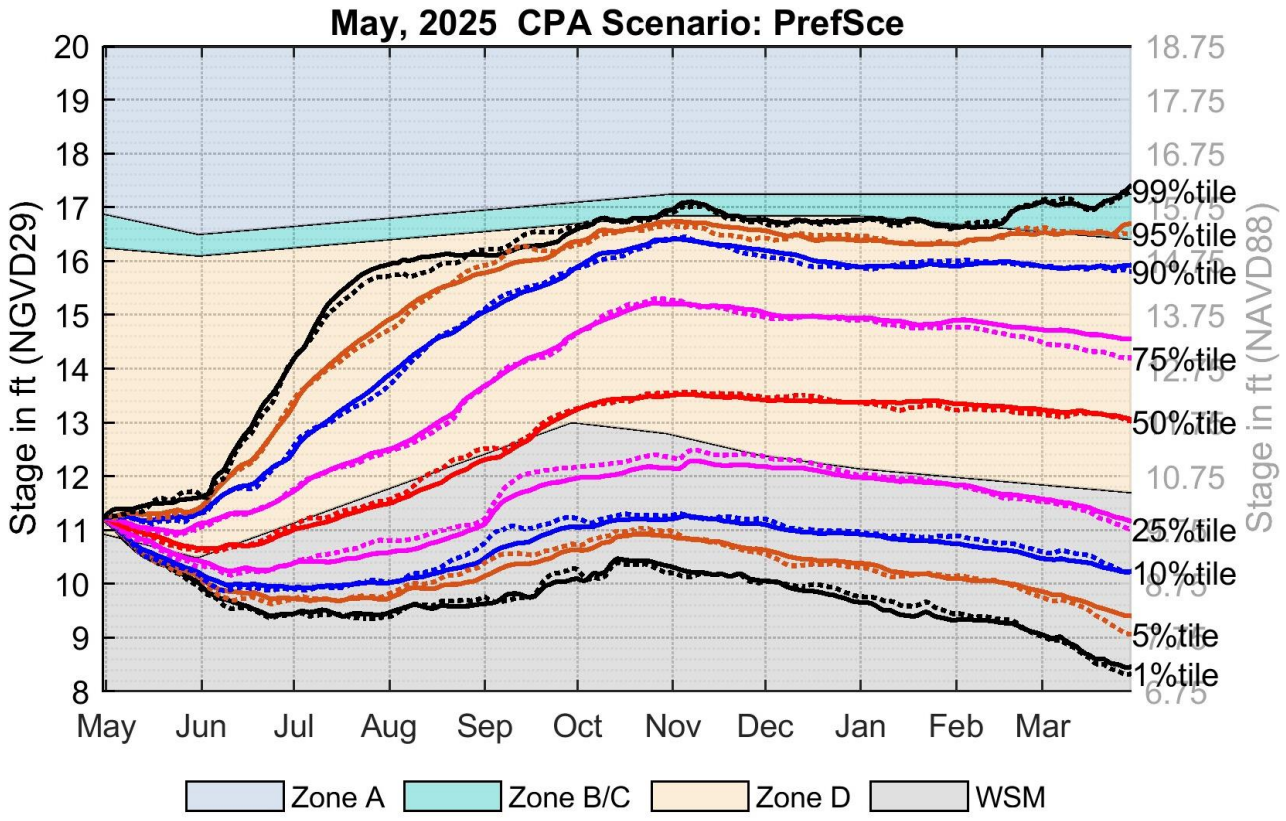
CPC

LOK



PrefSce

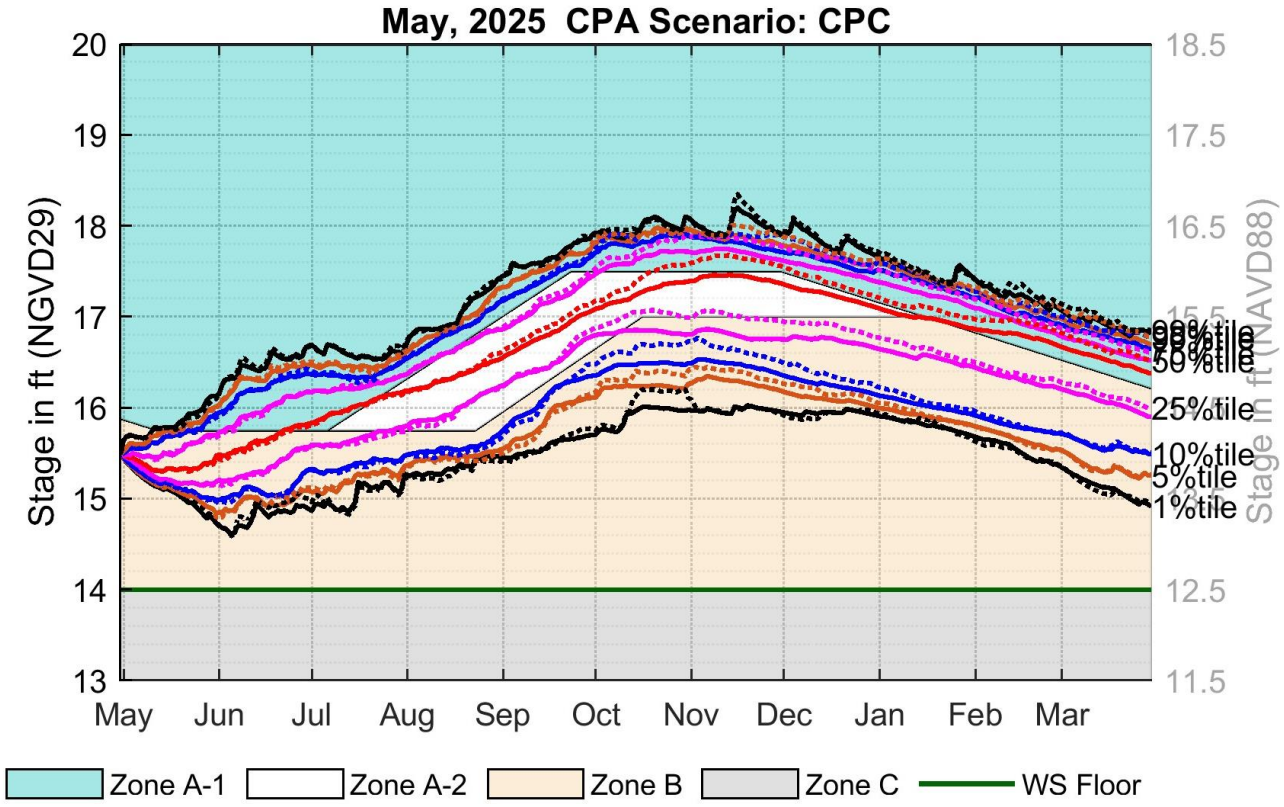
LOK



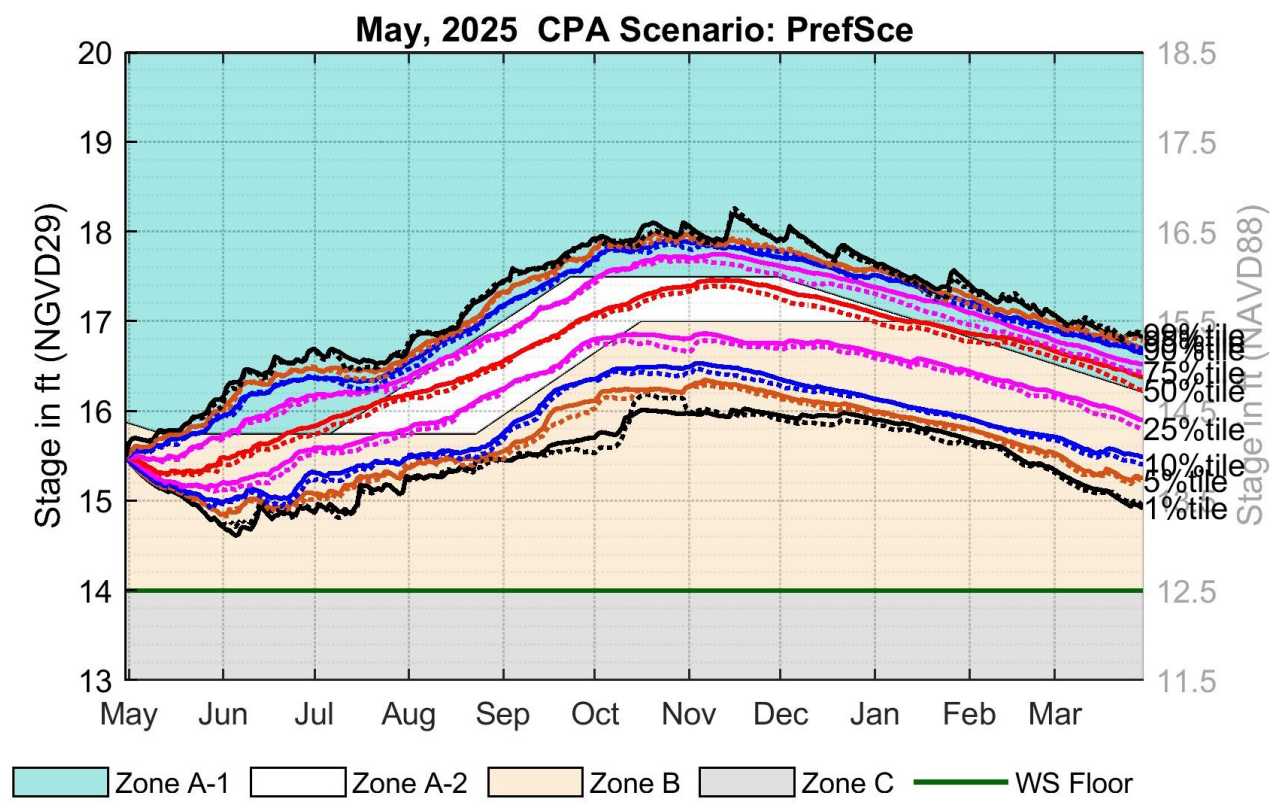
Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.25 ft for Lake Okeechobee).

May 2025 CPA: WCA1 3 Gage Avg.

CPC



PrefSce

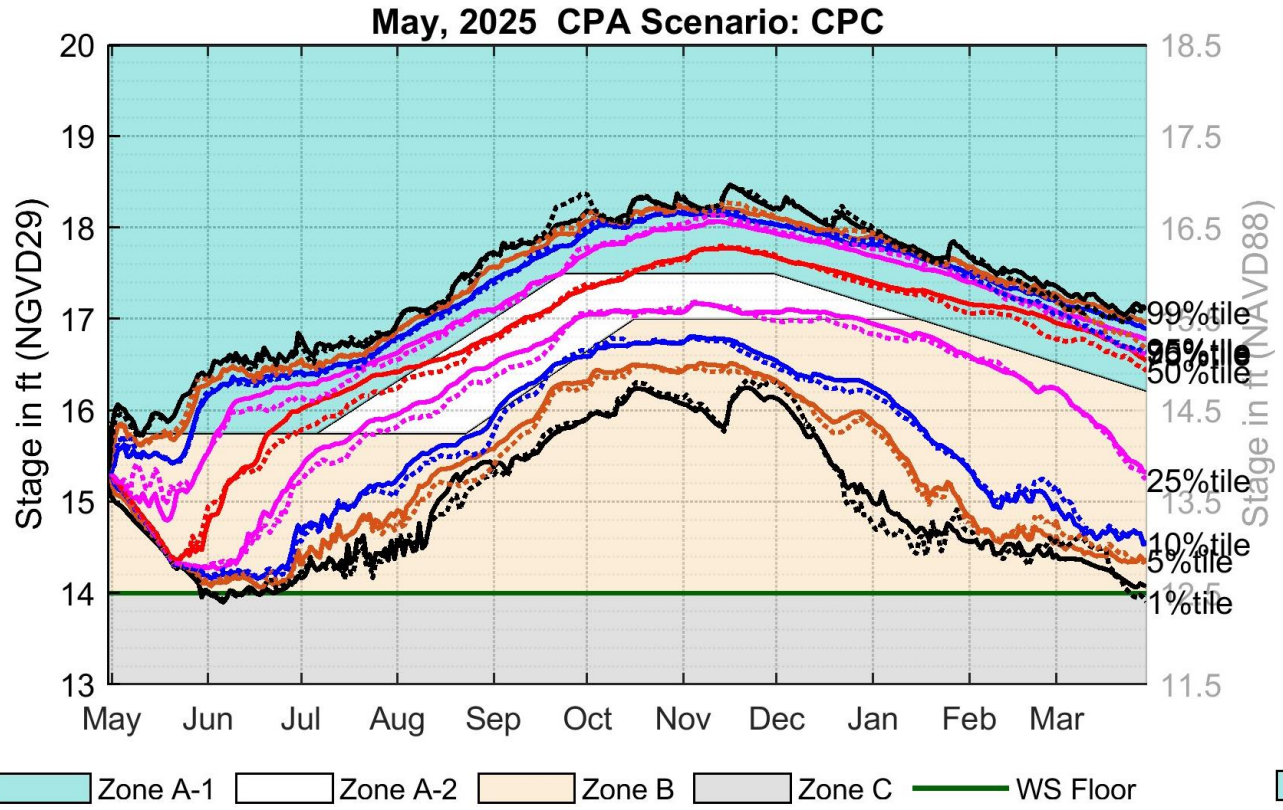


Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.5 ft for WCA1).

May 2025 CPA: WCA1 Site 8-C

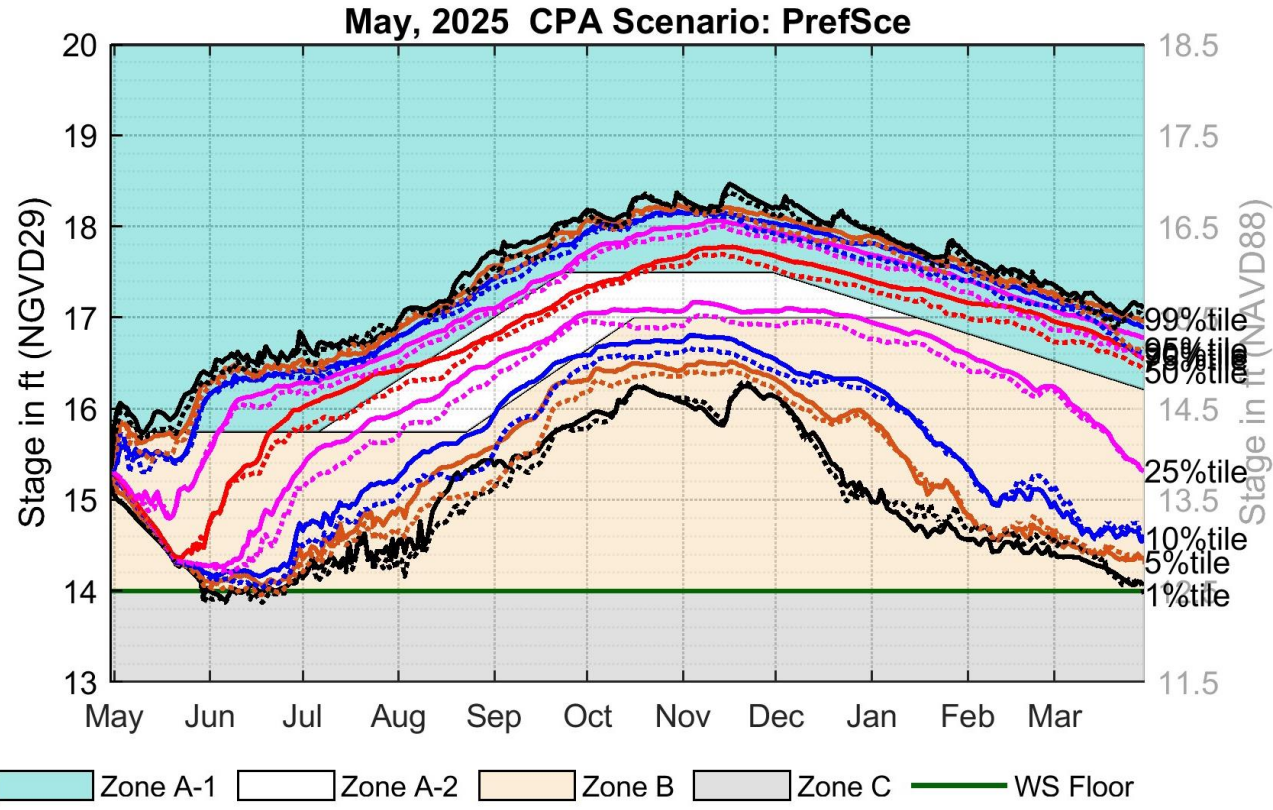
CPC

SITE_8C



PrefSce

SITE_8C

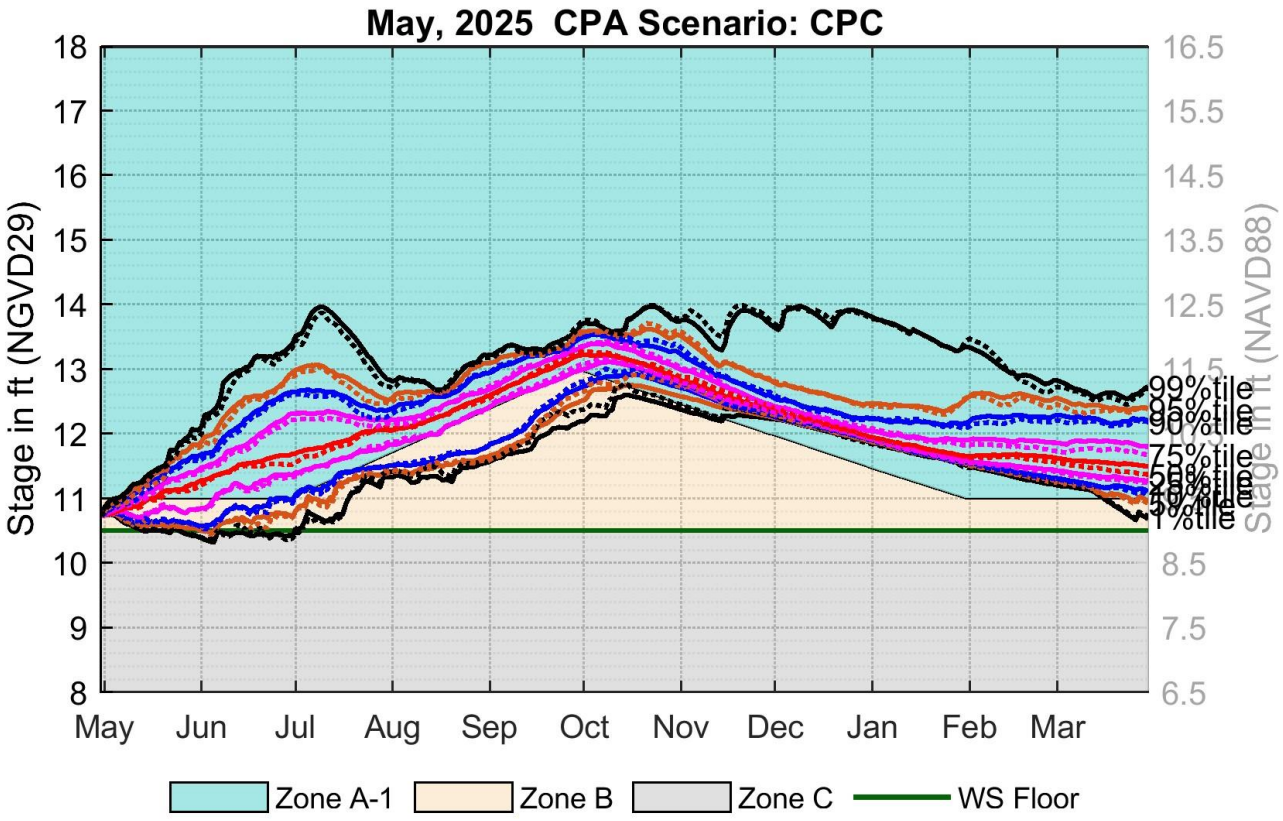


Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.5 ft for WCA1).

May 2025 CPA: WCA2A Site 17

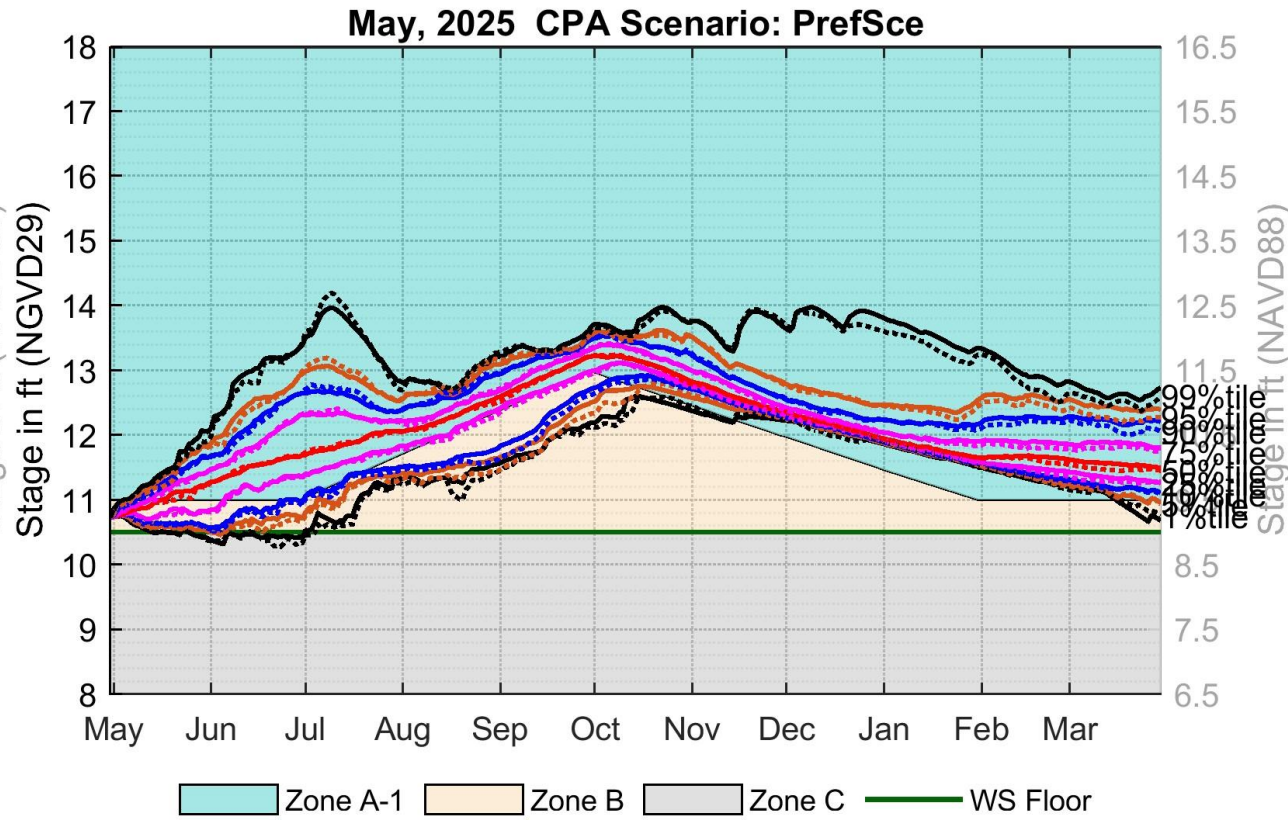
CPC

SITE_17



PrefSce

SITE_17

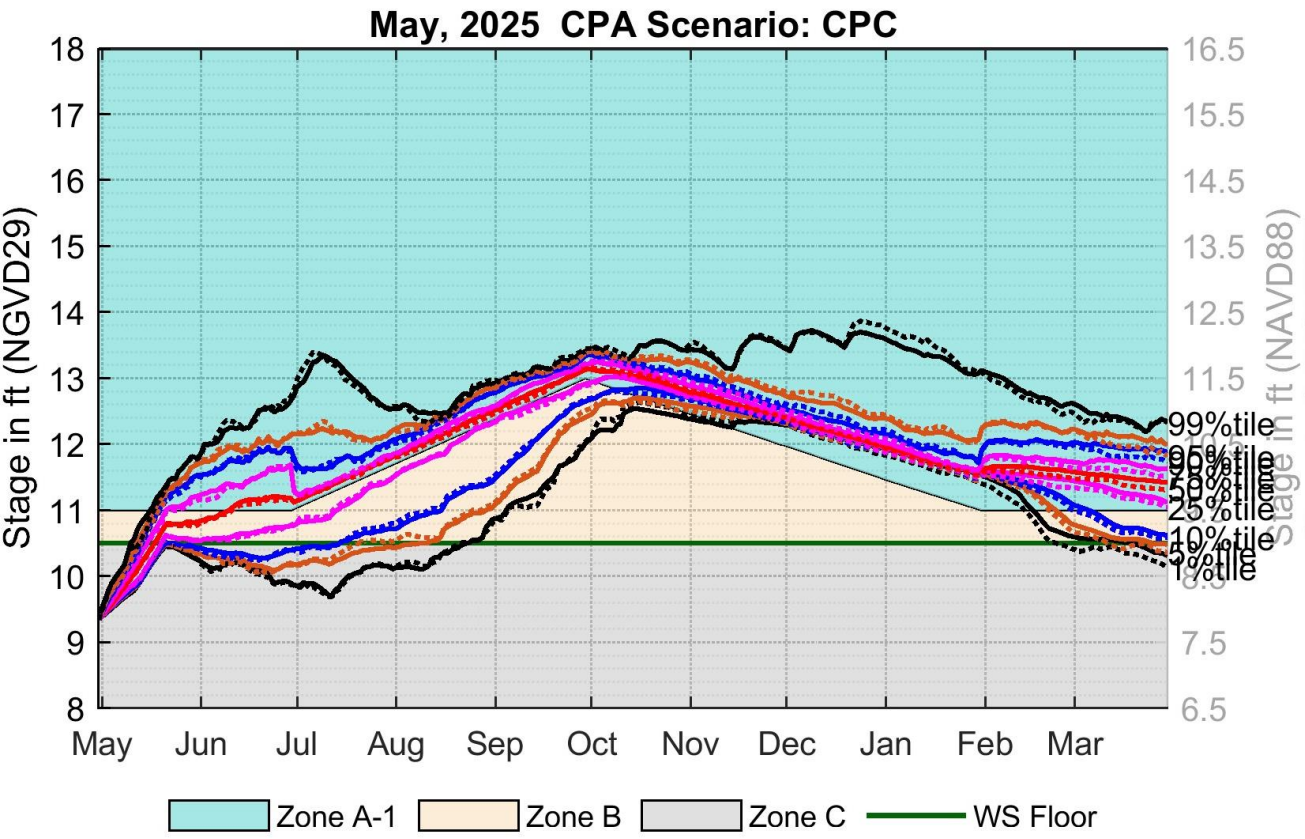


Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.5 ft for WCA2A).

May 2025 CPA: WCA2A S11B_H

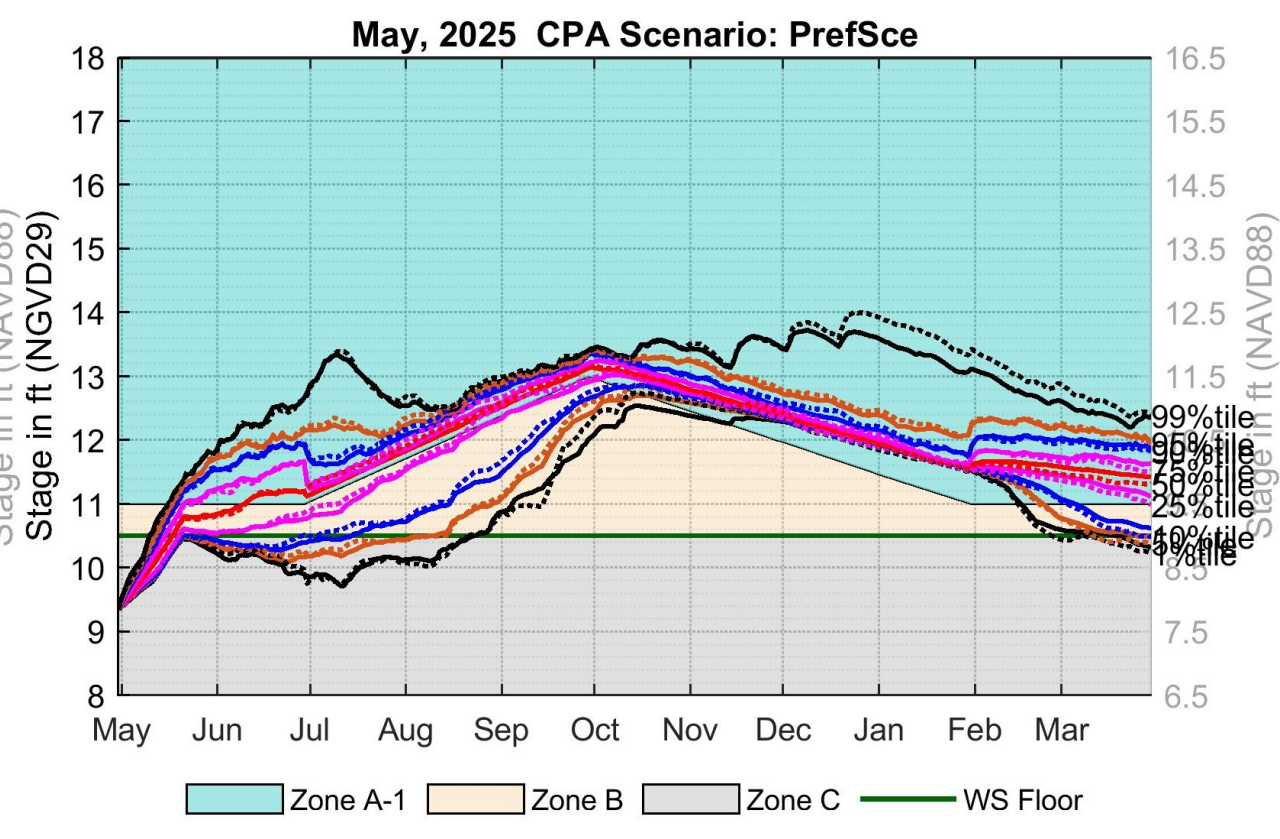
CPC

WCA2Avg



PrefSce

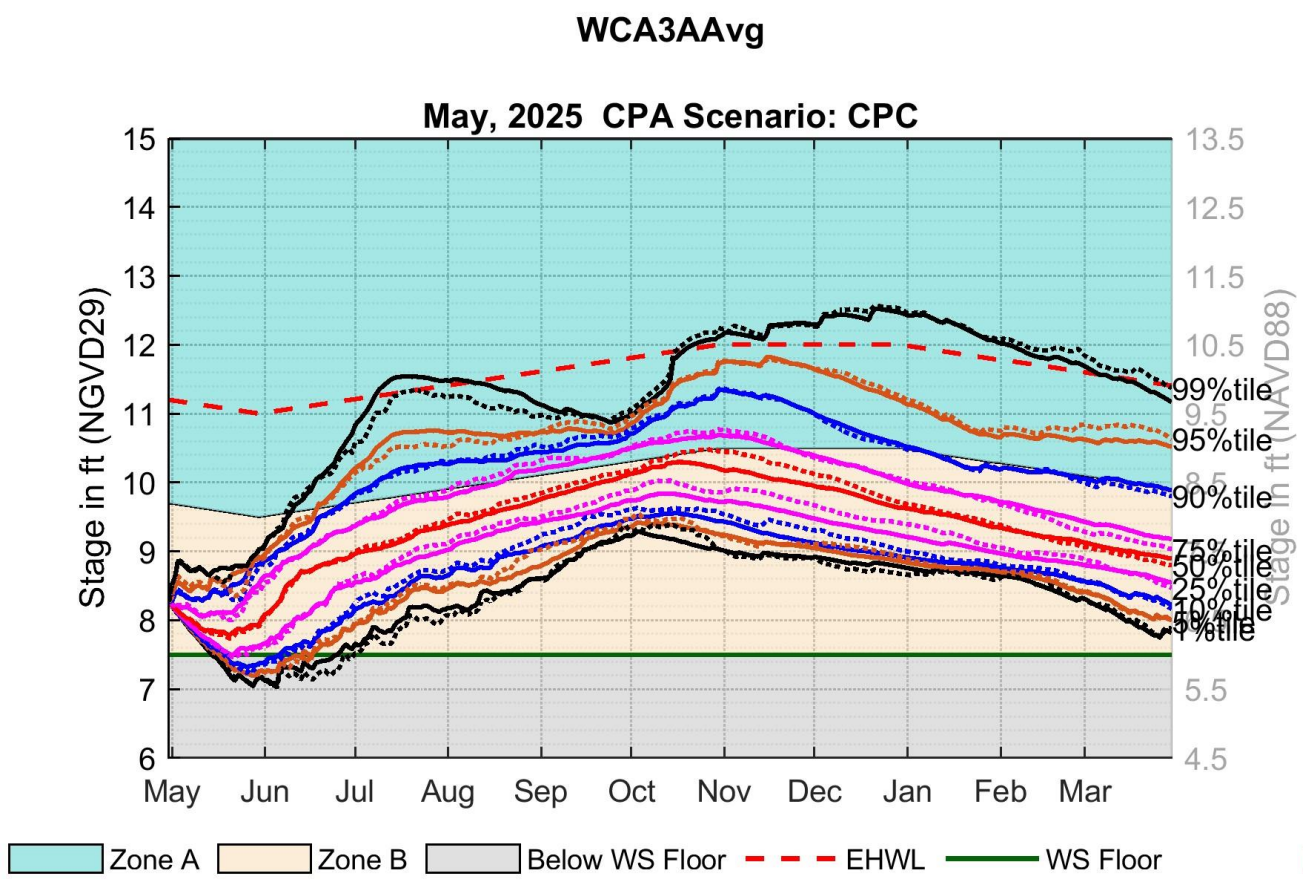
WCA2Avg



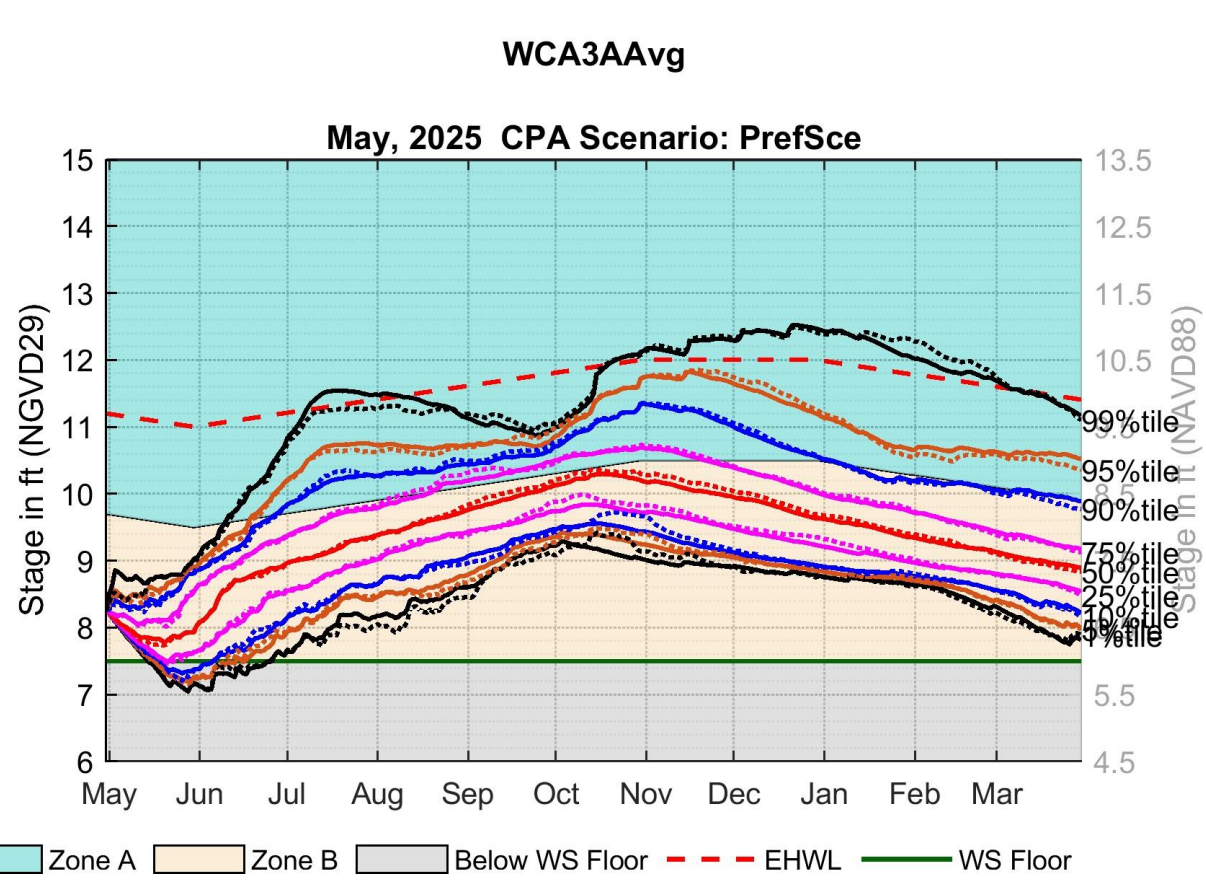
Secondary vertical axis shows stages in NAVD88. These stages are based on Agreed Upon Regulation Schedule Conversion Offsets between NGVD29 and NAVD88 (1.5 ft for WCA2A).

May 2025 CPA: WCA3A 3 Gage Avg.

CPC



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 WCA3A).