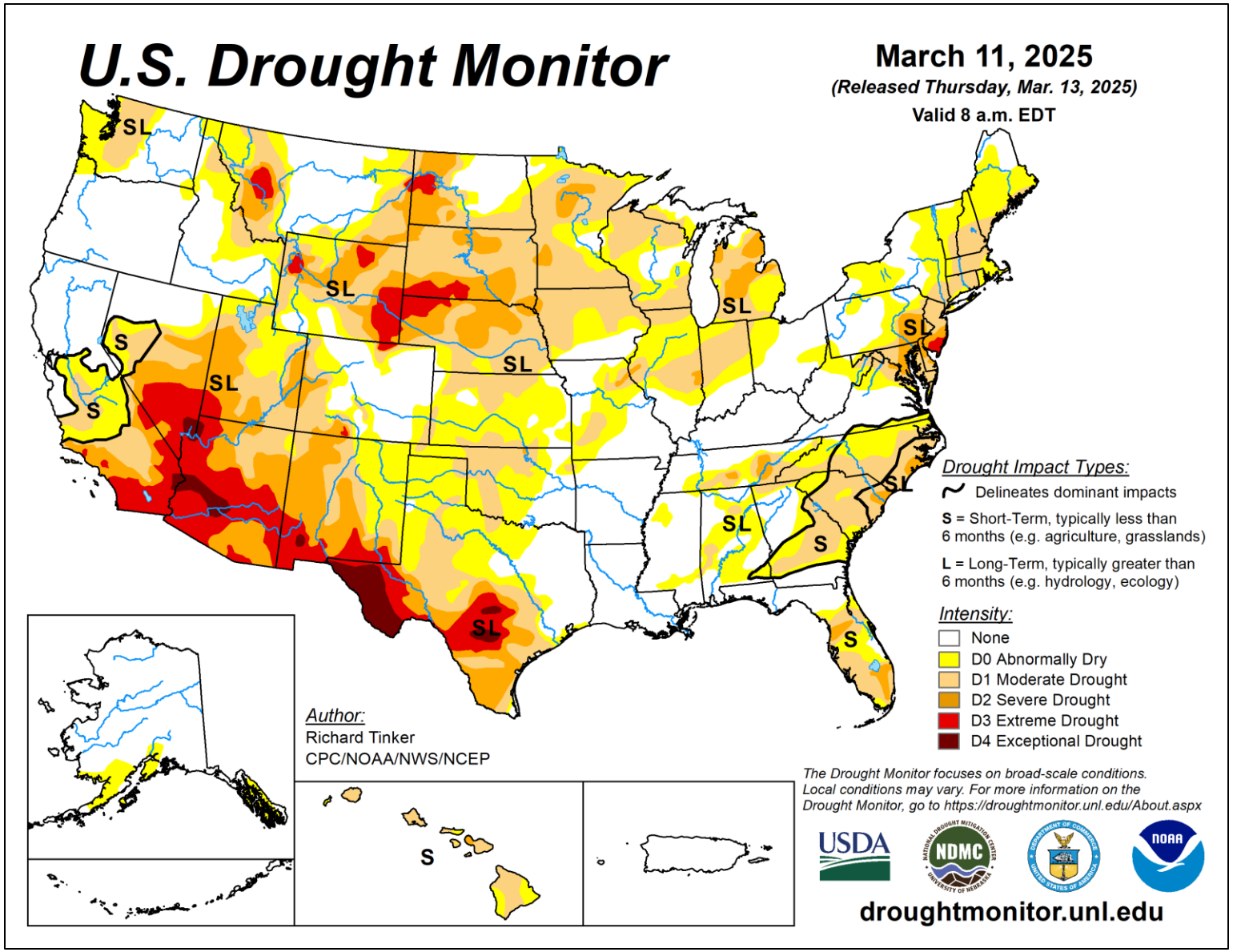
Drought Outlook Support Briefing

Climate Prediction Center/NCEP/NWS/NOAA

March 18, 2025

http://www.cpc.ncep.noaa.gov/products/Drought

Current Drought Conditions

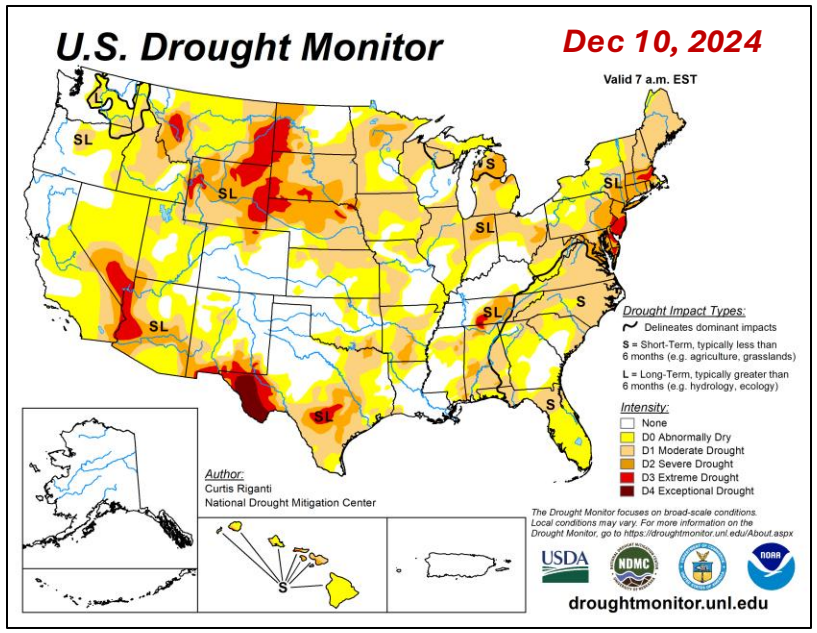


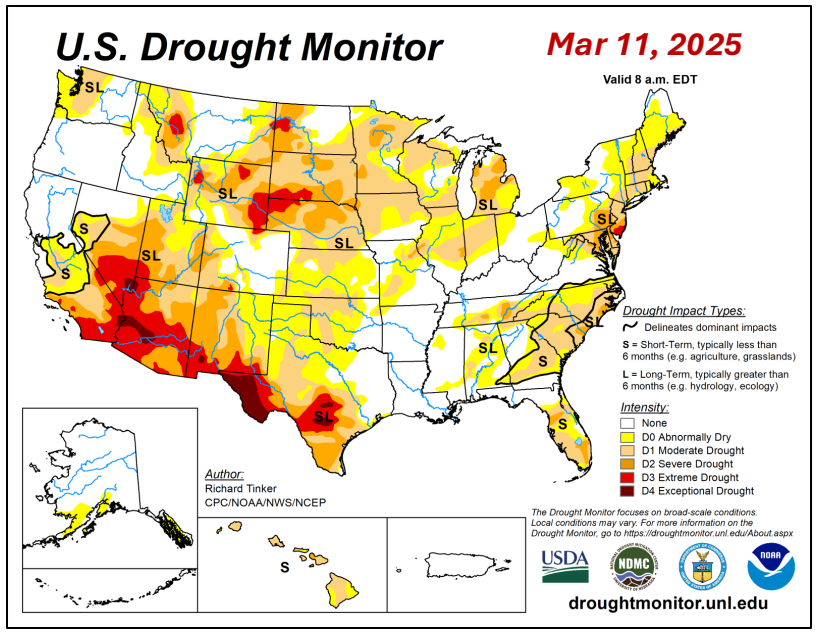
https://droughtmonitor.unl.edu/CurrentMap.aspx

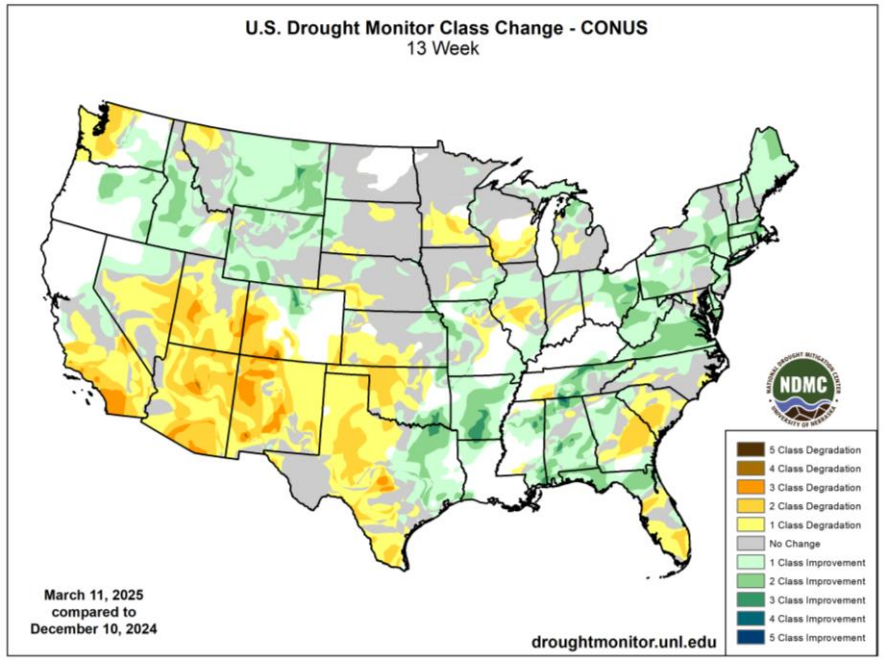
U.S. Drought Monitor
March 11, 2025

- **CONUS**
  - 44% of area in drought (D1-D4), 67% of area in D0-D4.
  - Drought over much of the Southwest, Northern & Southern Plains, Midwest, and eastern tier of CONUS
- Abnormally dry (D0) conditions along the southern tier of **Alaska**
- D0-D1 conditions in **Hawaii**

Recent Drought Evolution







Over the past three months:

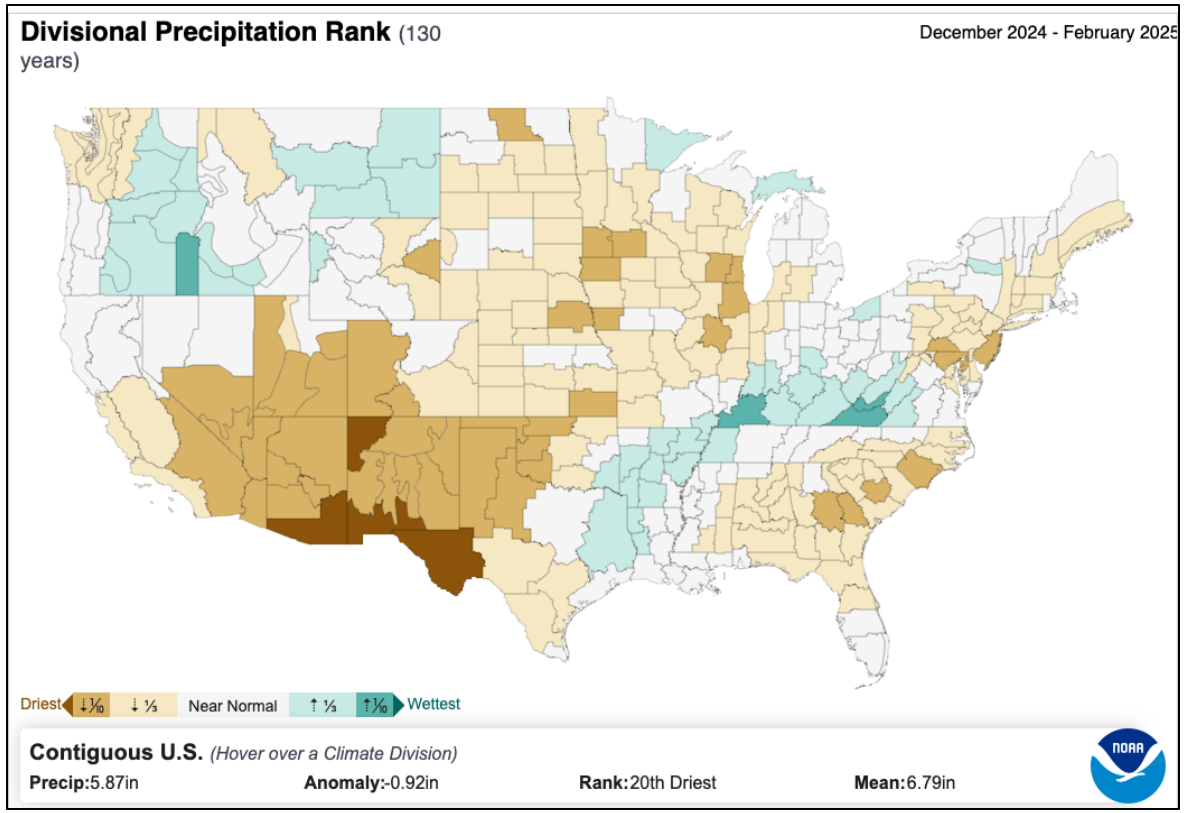
- **CONUS**
  - Drought category degradation in much of the Southwest, southern Plains, and portions of Southeast
  - Drought category improvement in much of the Northwest, Northeast and south-central CONUS
- Development of D0 conditions in **Alaska**
- Drought development in **Hawaii**

https://droughtmonitor.unl.edu/Maps/ChangeMaps.aspx

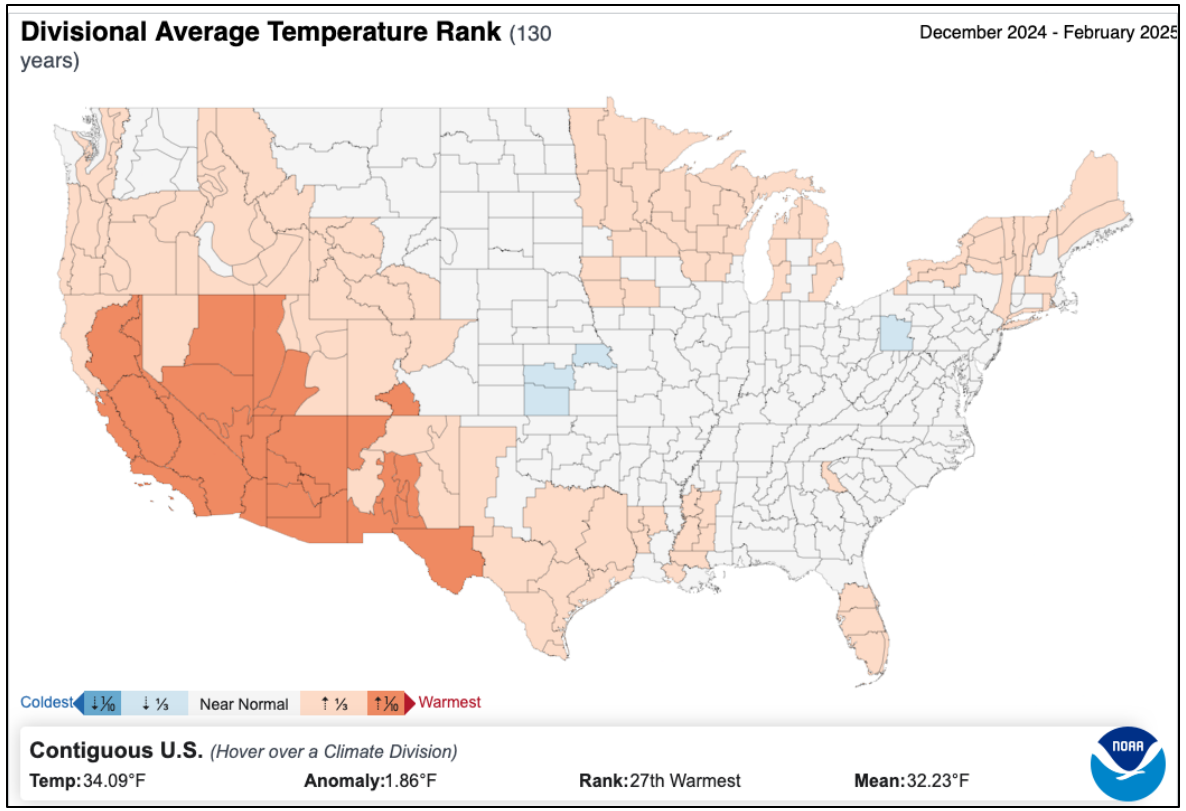
Precipitation and Temperature Ranks (NOAA/NCEI)

DJF2024/25 relative to 1895-present

Precipitation



Temperature

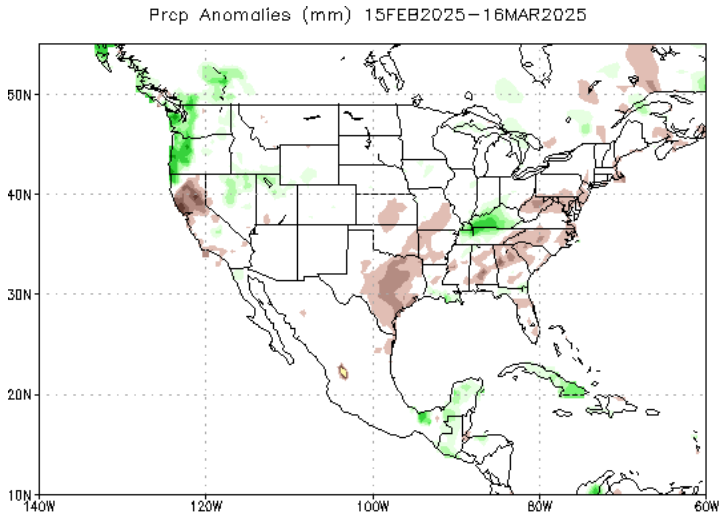


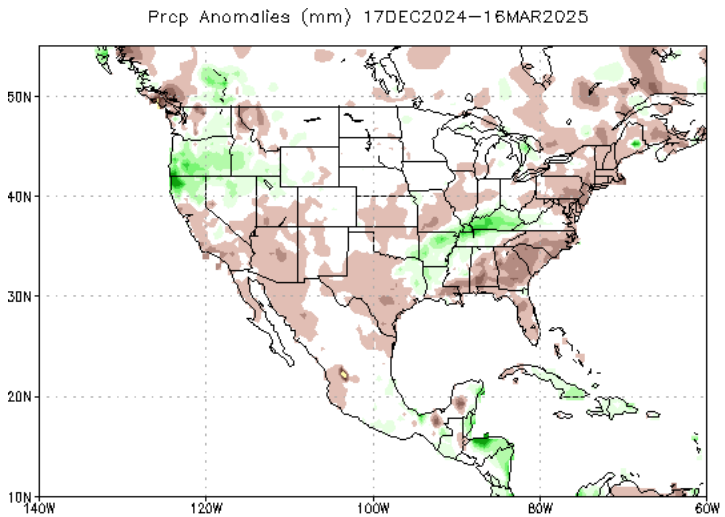
- Abnormally dry (bottom 10%) and warm (top 10%) conditions in much of the Southwest
  - Record driest conditions (relative to 1895-present) in southern AZ, NM and western TX

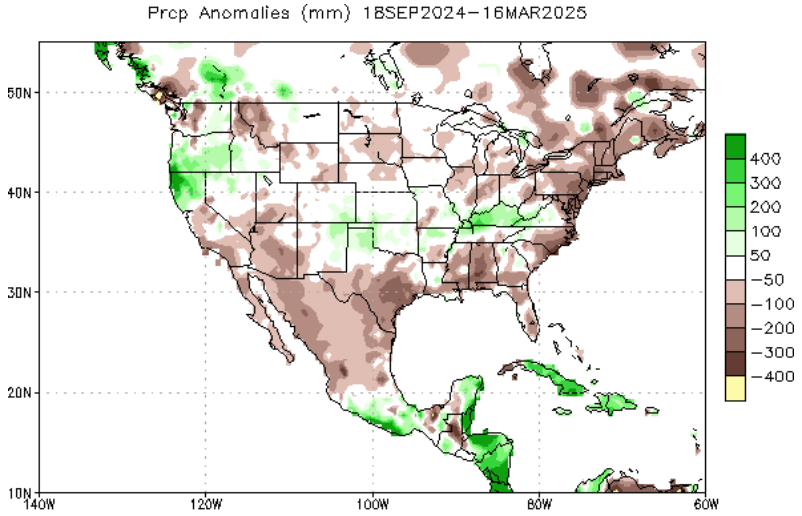
https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/divisional/mapping

Precipitation

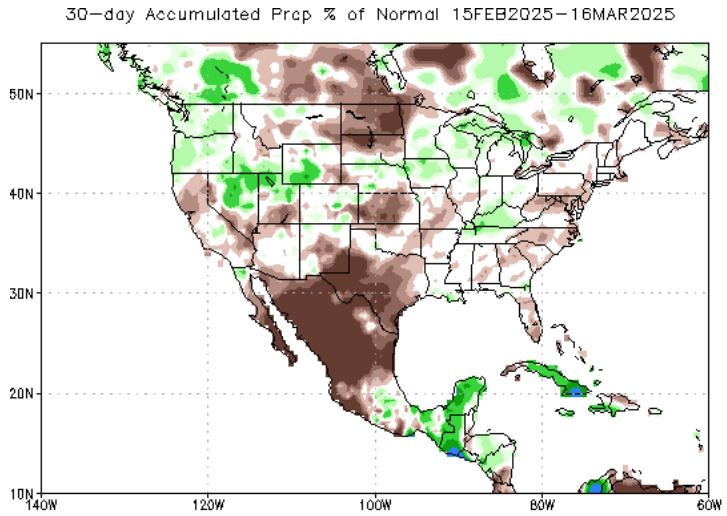
Anomalies

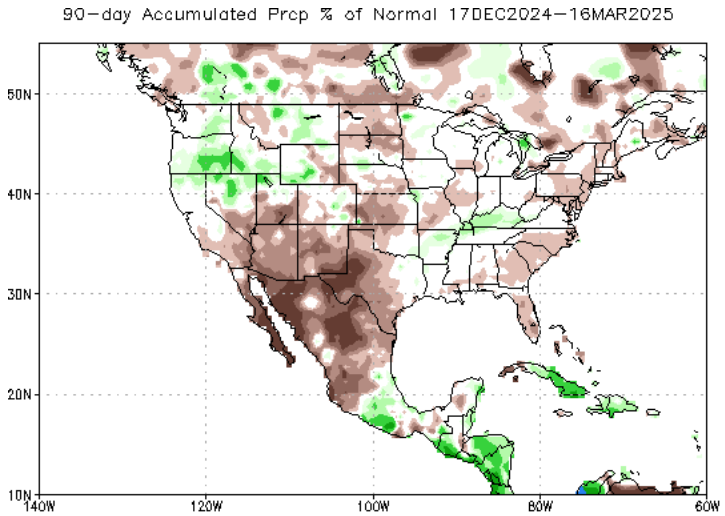


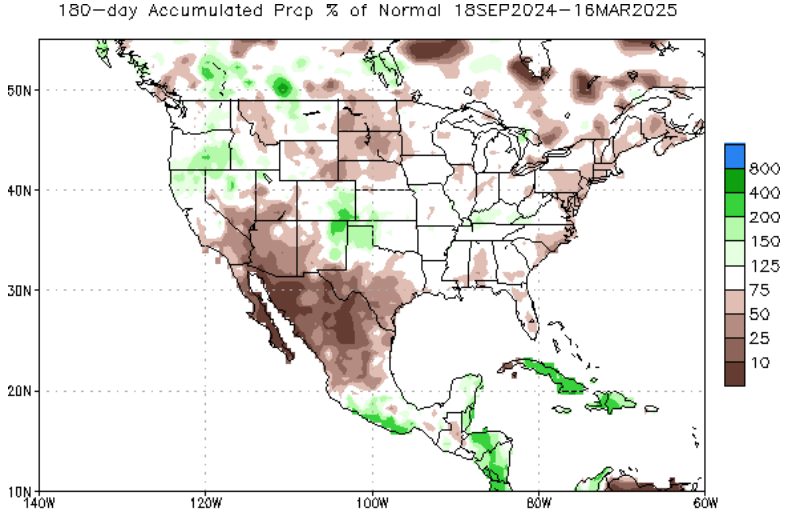




% of Normal



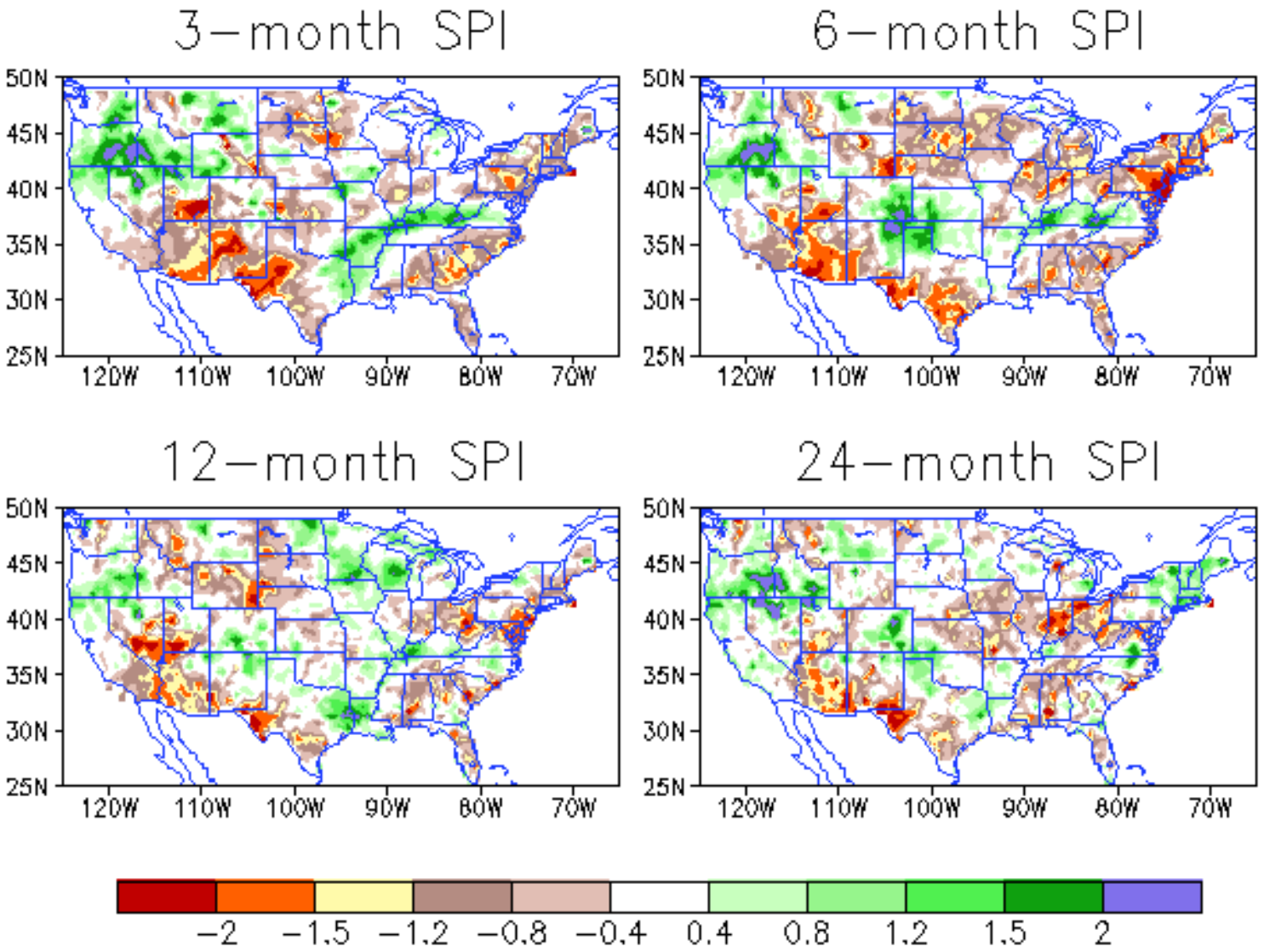




1-month **3-month** **6-month**

https://www.cpc.ncep.noaa.gov/products/Global_Monsoons/American_Monsoons/NAMS_precip_monitoring.shtml

Standardized Precipitation Index (SPI)

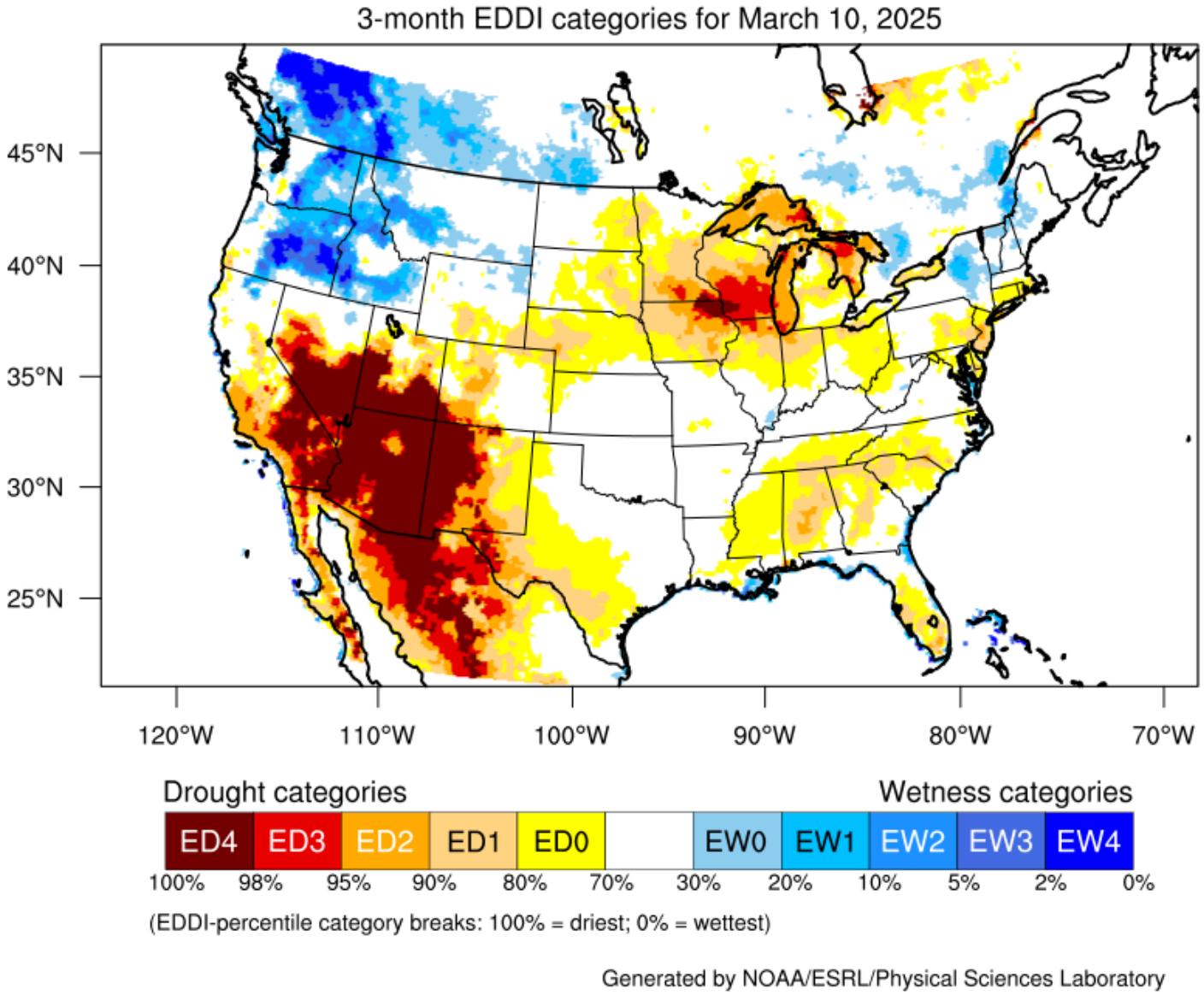


https://www.cpc.ncep.noaa.gov/products/Drought/Figures/index/spi_plot.gif

SPI (through March 14, 2025)

Precipitation deficits are present along the southwestern tier of CONUS and the Southeast over timescales ranging from 3 to 24 months, as well as eastern Northeast over 6-12 months.

Evaporative Demand Drought Index (EDDI)

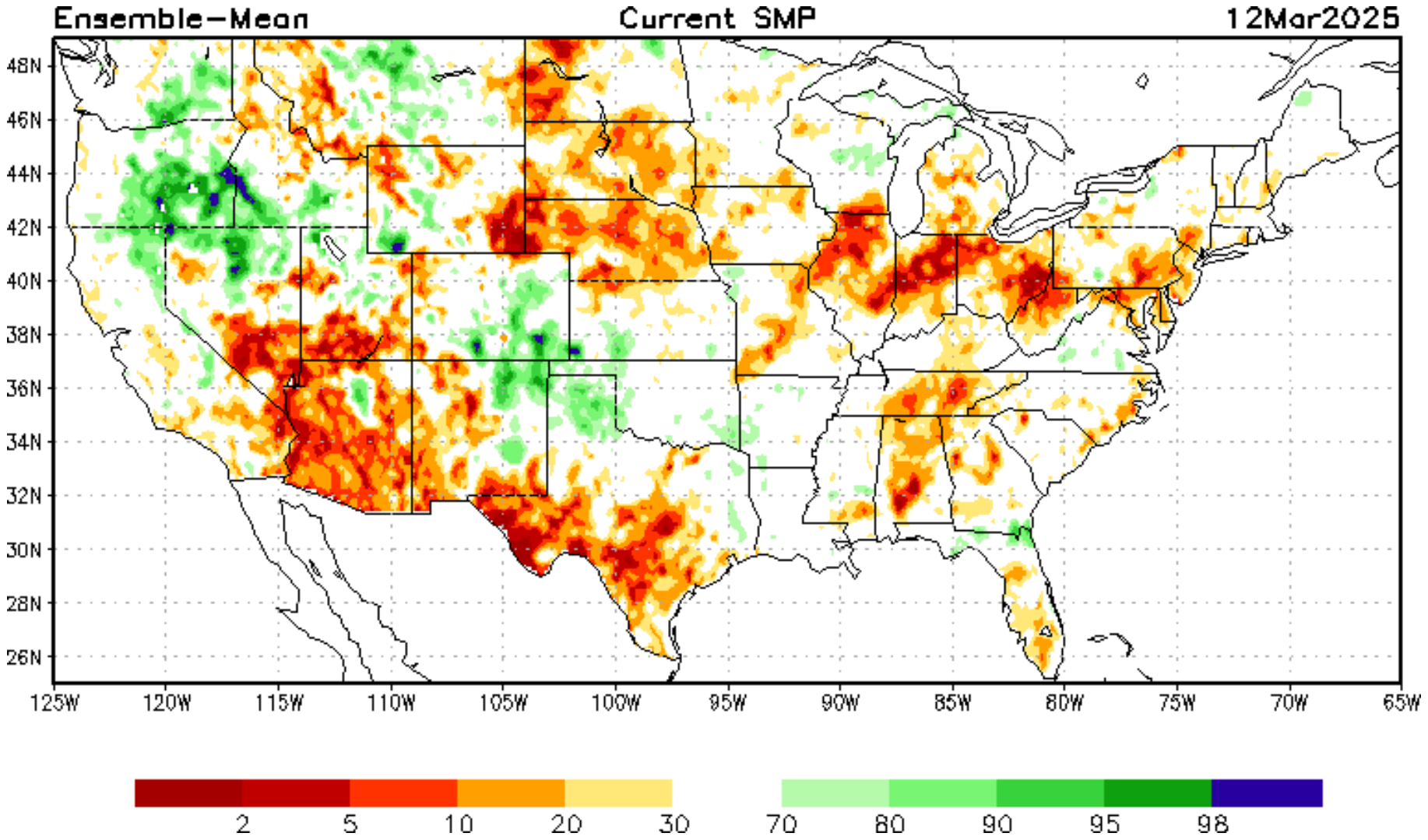


3-month EDDI (March 10, 2025)

- Unusually high evaporative demand (ED4) in the Southwest.
- ED1+ conditions in the Prairie and portions of the Southeast.
- Unusually low evaporative demand in the Pacific Northwest.

https://psl.noaa.gov/eddi/#current_conditions

Soil Moisture Percentile



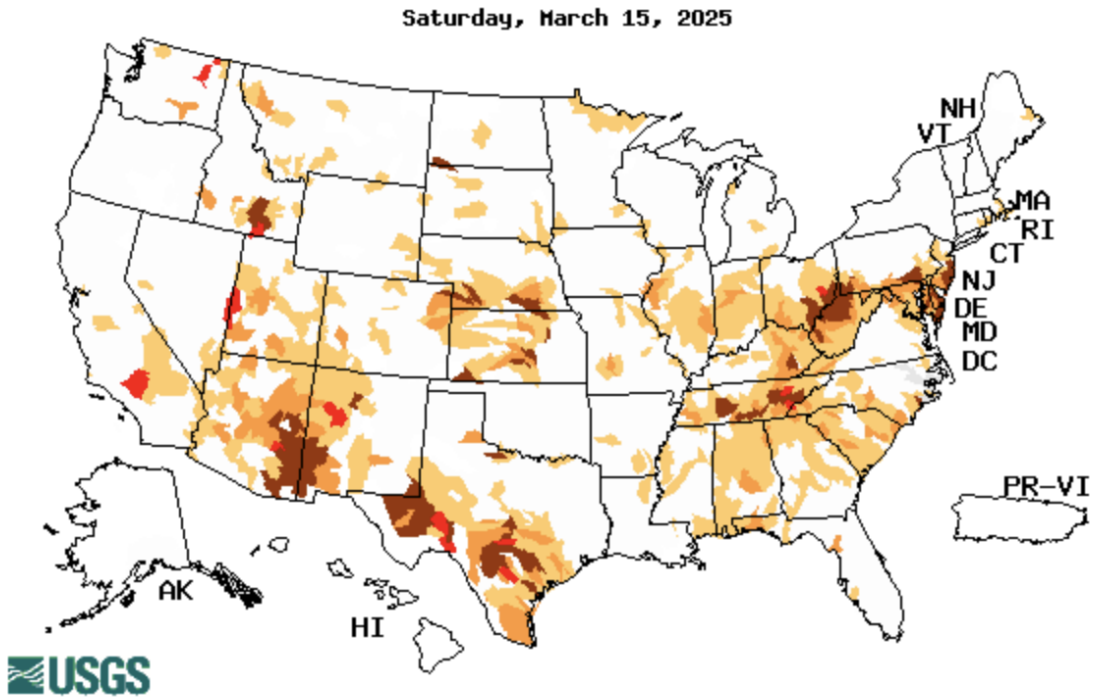
Dry soil moisture in much of the Southwest, portions of Northern Plains and eastern CONUS

https://www.cpc.ncep.noaa.gov/products/Drought/Monitoring/smp.shtml

USGS Streamflow

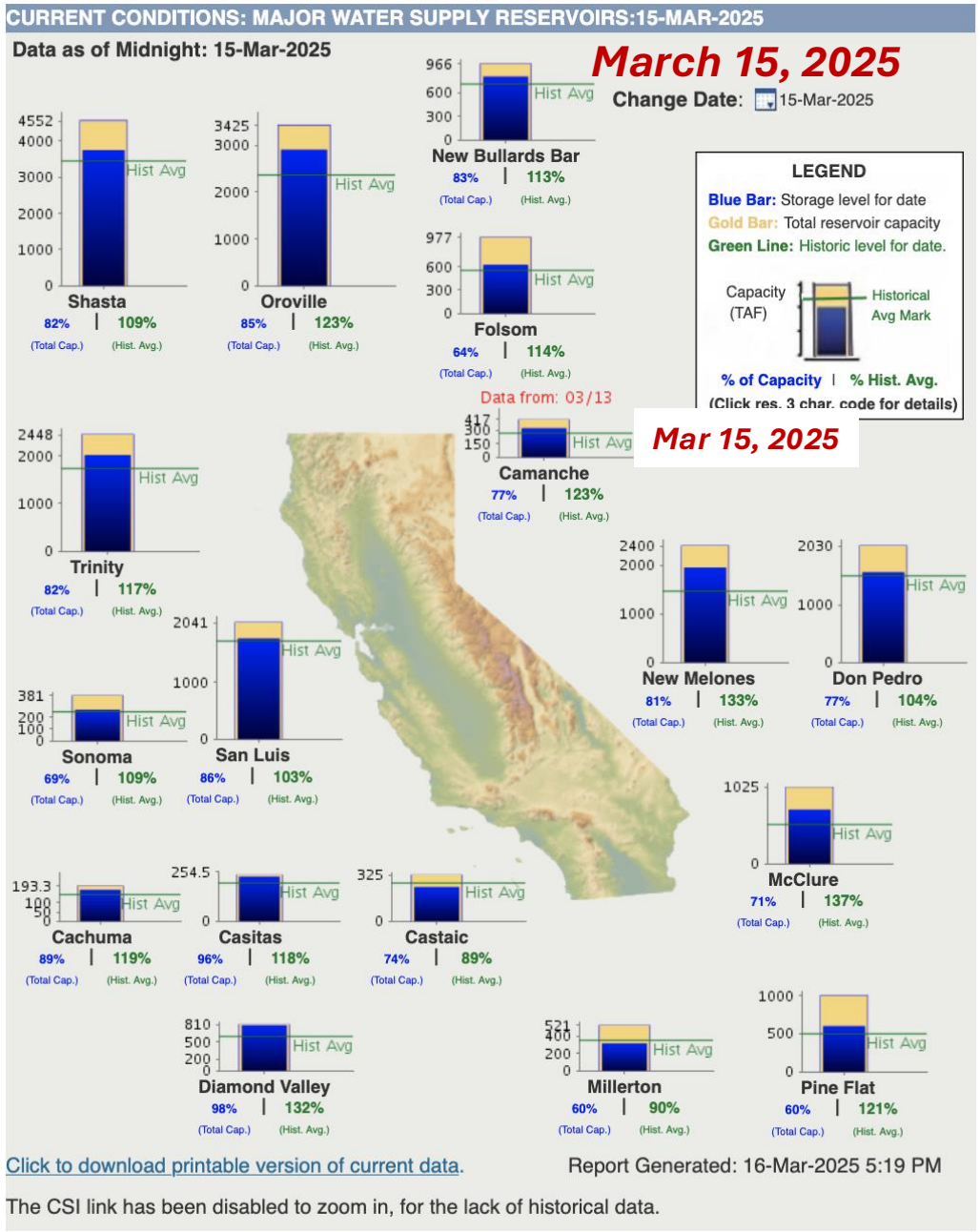
Map of below normal 14-day average streamflow compared to historical streamflow for the day of year (United States)

State or Water-Resources Regions



Explanation - Percentile classes			
Low	<=5	6-9	10-24
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal

Reservoir Capacity: California

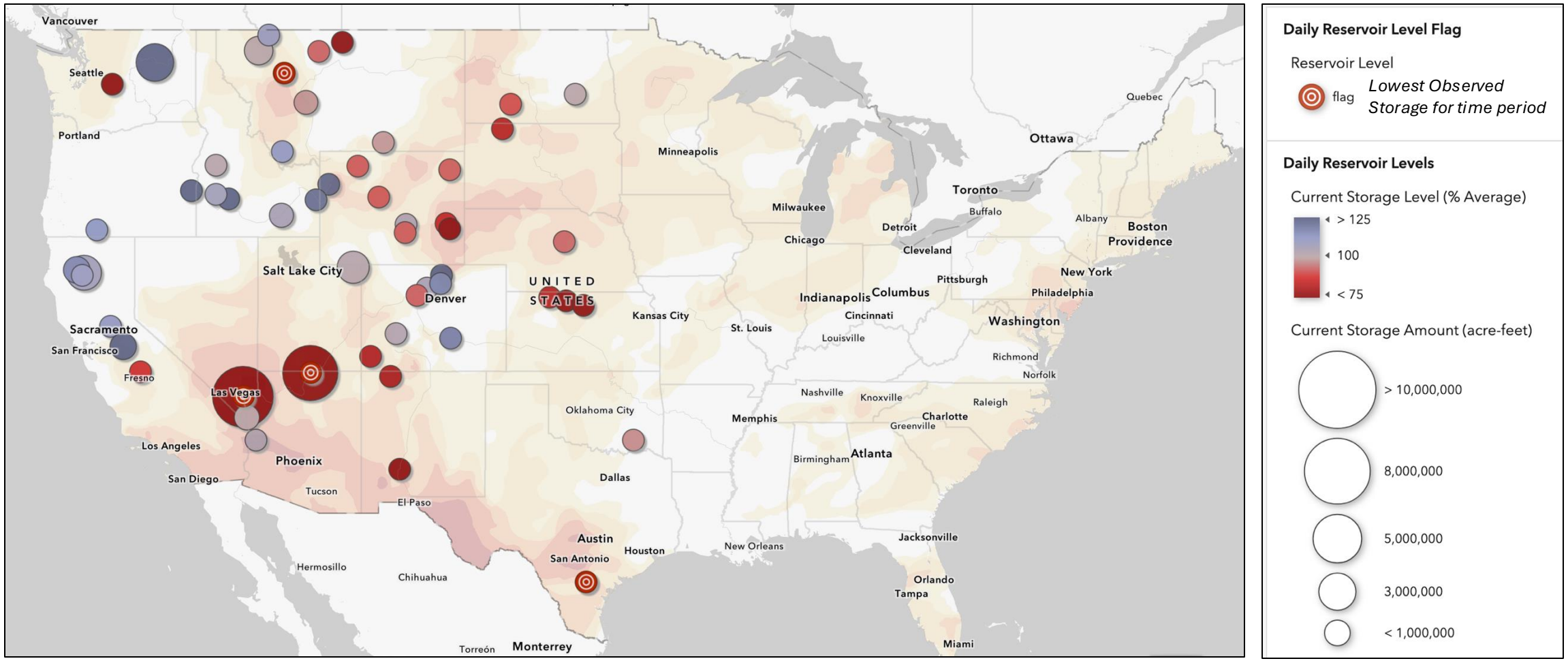


- Most of the major water supply reservoirs are above historical average levels.
- Below average ones
  - Castaic: 89%
  - Millerton: 90%

https://cdec.water.ca.gov/resapp/RescondMain

Reservoir Storage: Western CONUS

Reclamation Reservoir Storage (March 13, 2025)

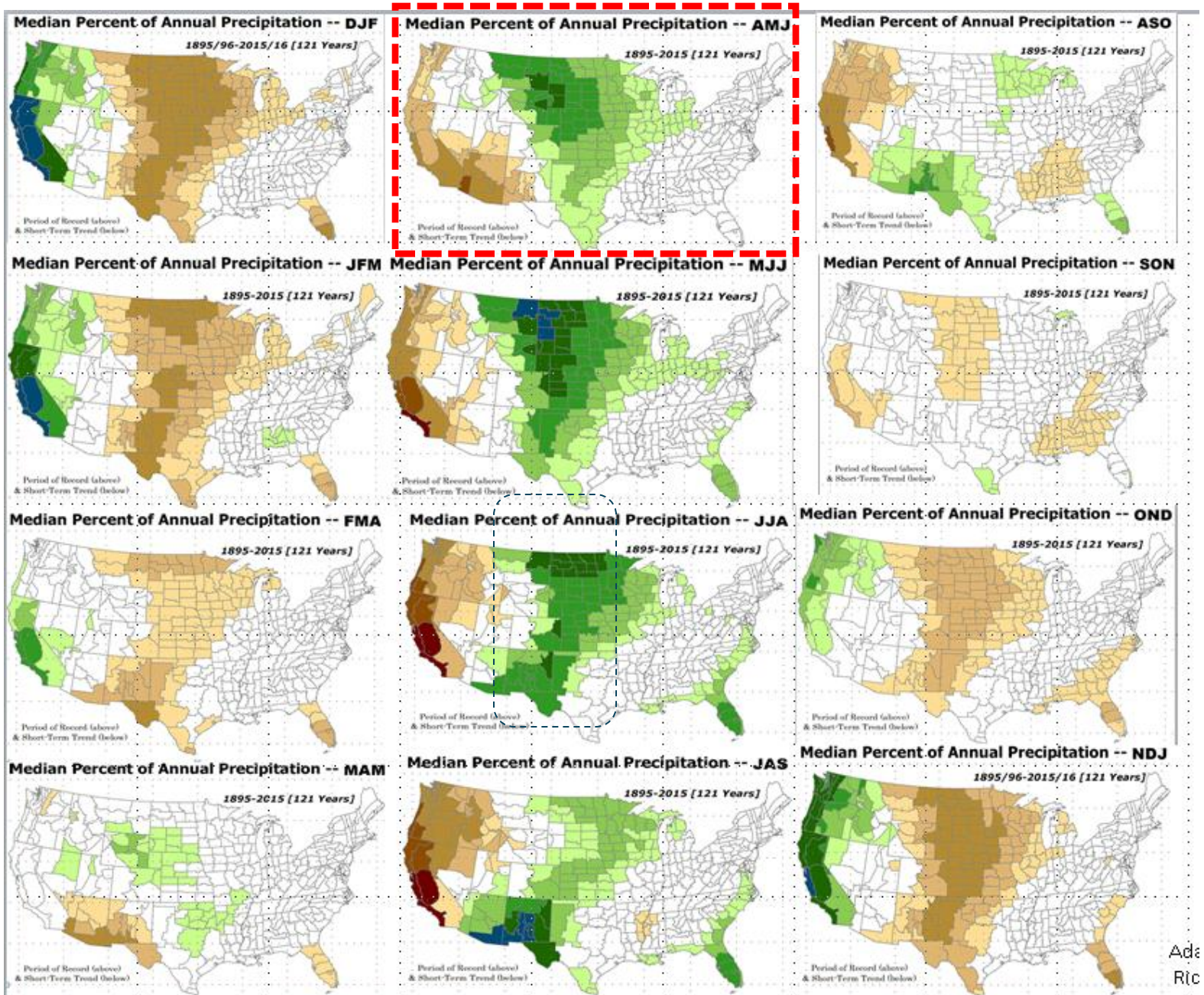


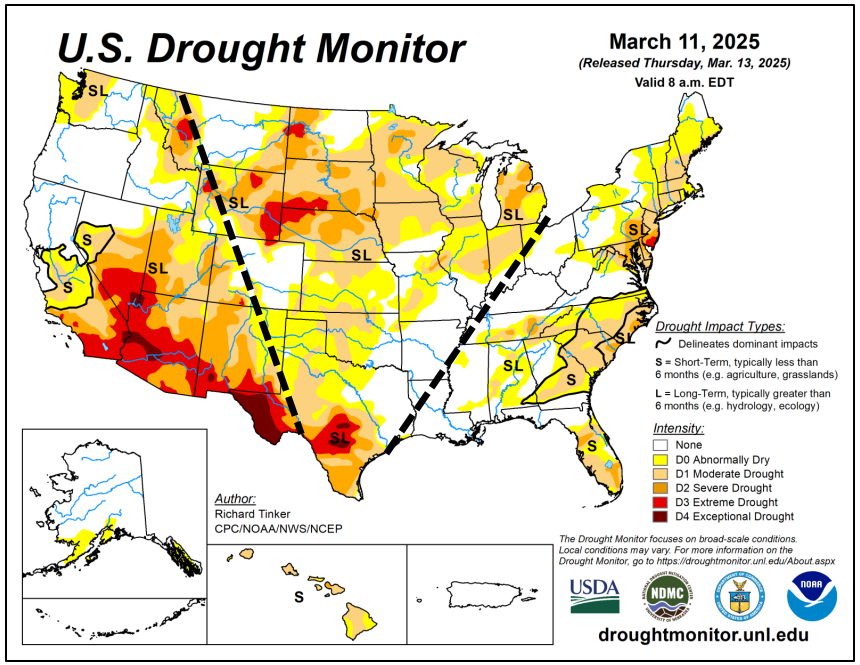
Flagged reservoirs (lowest storage observed on March 13 in the last 30 years)**:**
Lake Powell (56%), Lake Mead (55%), Gibson Dam And Reservoir (16%), Choke Canyon Dam And Reservoir (24%)

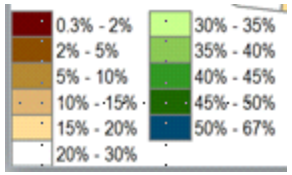
https://usbr.maps.arcgis.com/apps/dashboards/81aaec3e74024ce6b9a5e50caa20984e

Seasonal Drought Prediction

Seasonal Precipitation Climatology

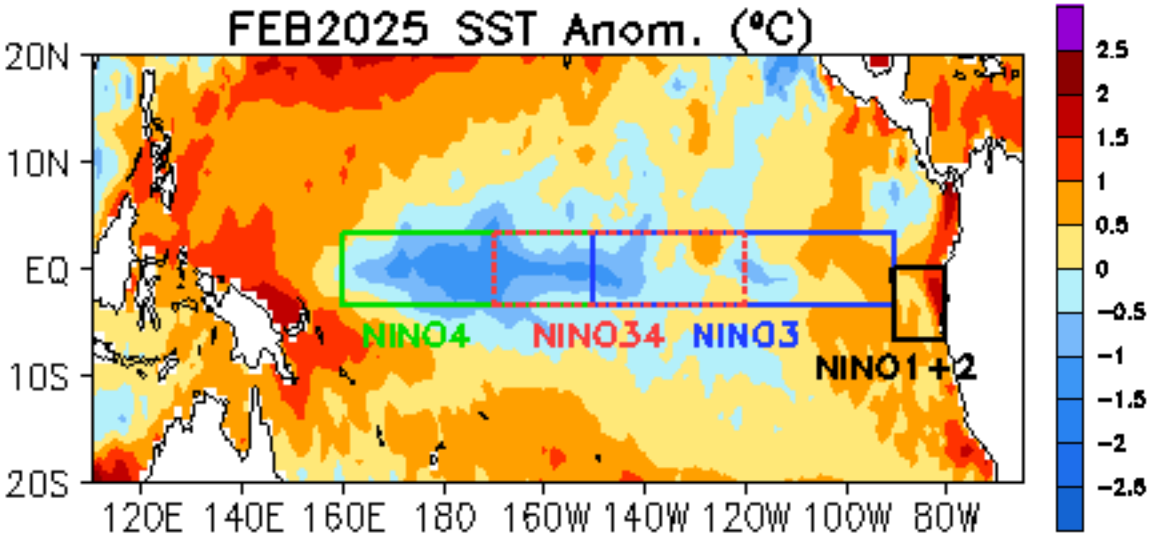


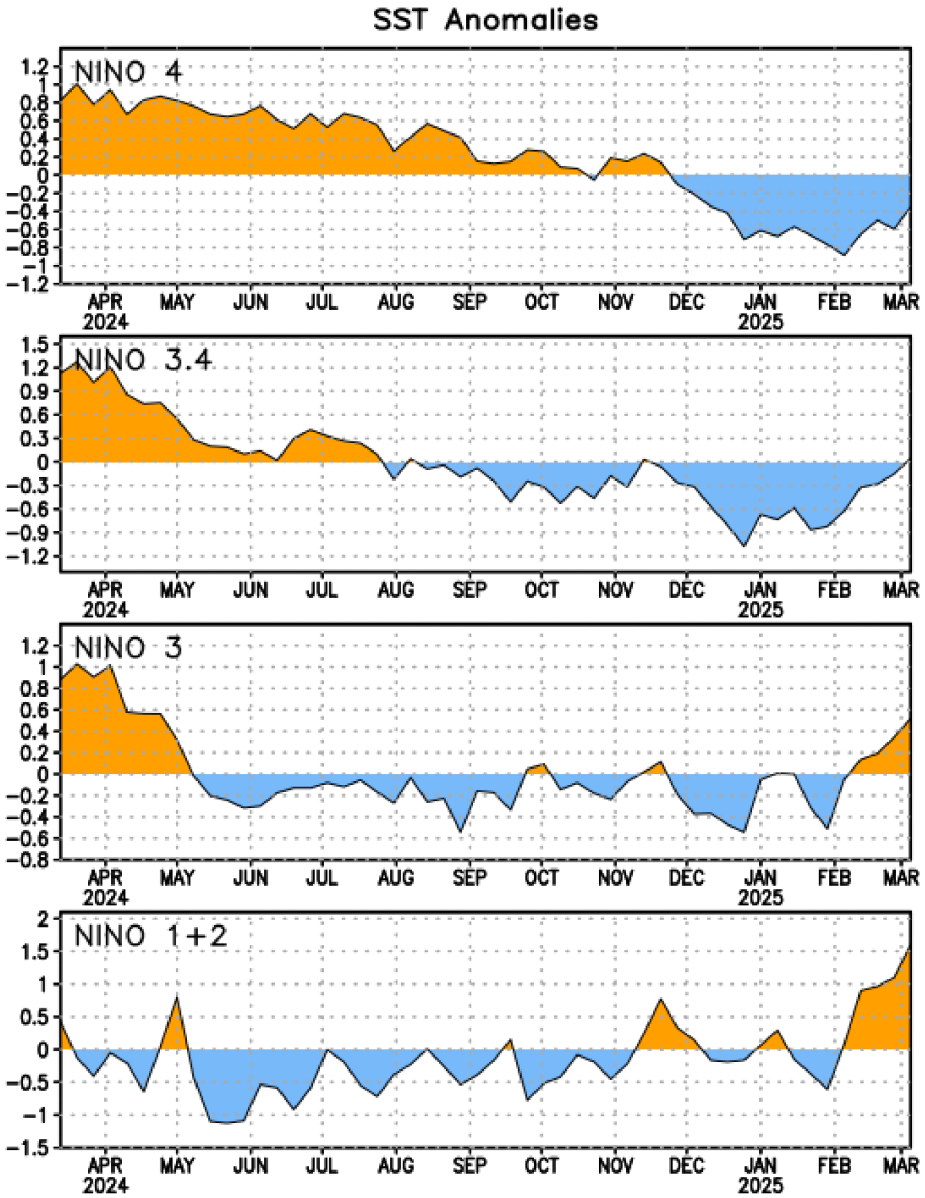




Courtesy: Rich Tinker (CPC)

ENSO: Recent Conditions

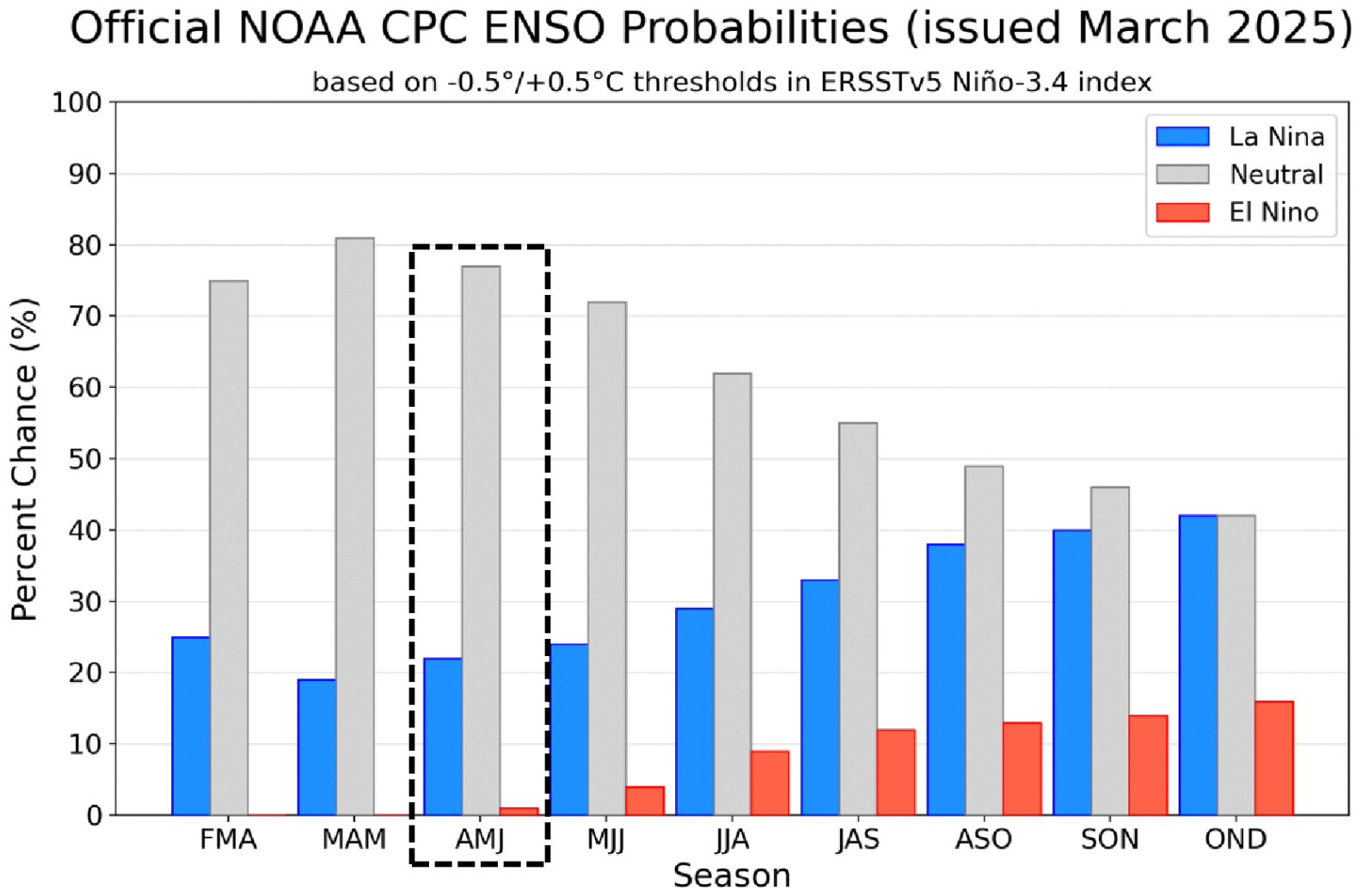




- February 2025: weak La Nina conditions
- During DJFM 2024/25, below-average SSTs weakened in the central and east-central equatorial Pacific Ocean.
- All weekly Niño indices reflected this decline, with near-to-below average values emerging in the Niño-3.4 and Niño-4 regions.

https://www.cpc.ncep.noaa.gov/products/GODAS/ocean_briefing.shtml

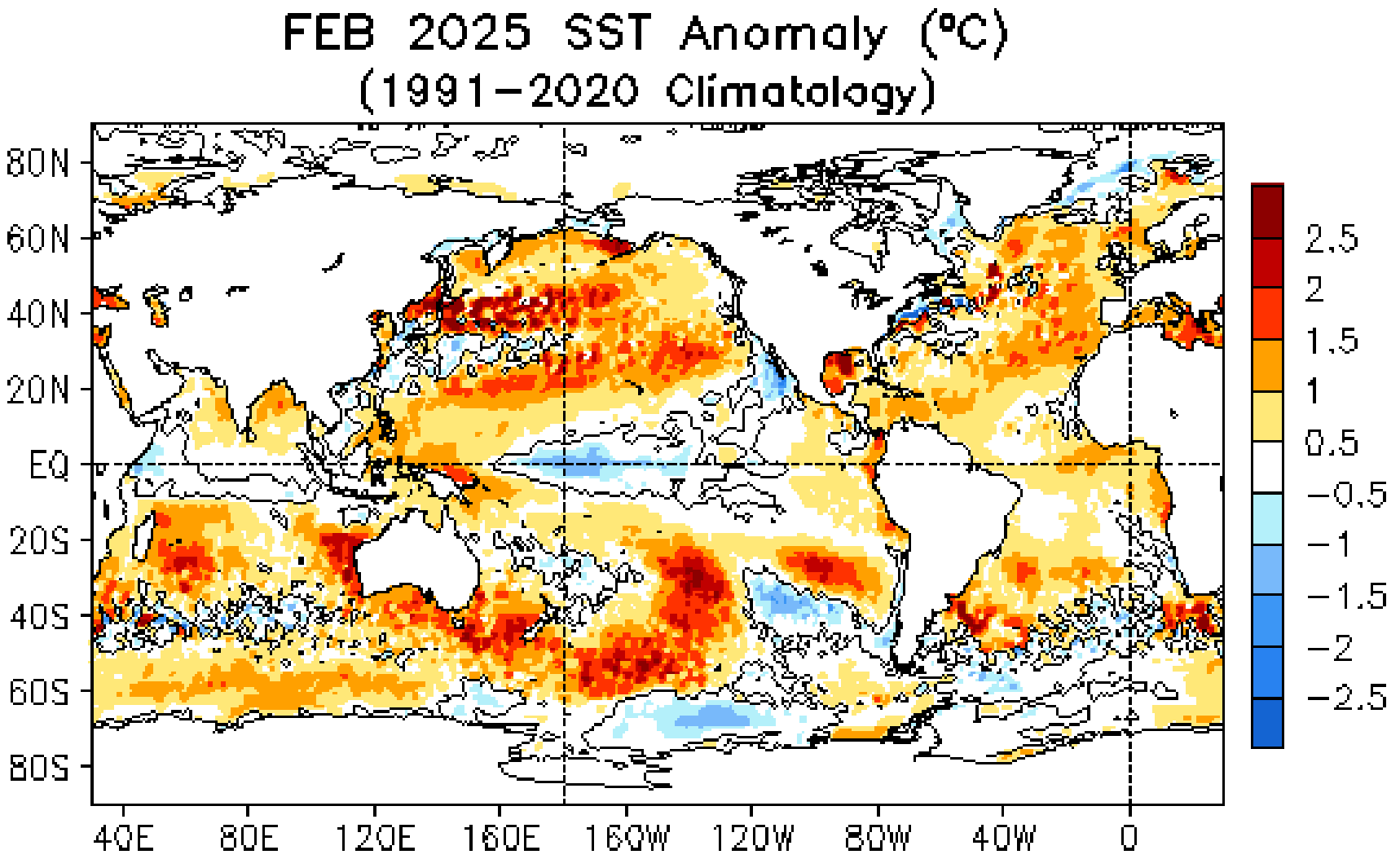
ENSO: Official NOAA CPC Forecast



ENSO-neutral is favored to develop in the next month and persist through the boreal summer, with 77% chance for April-May-June (AMJ) 2025.

https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/figure07.gif

Global SST Anomaly

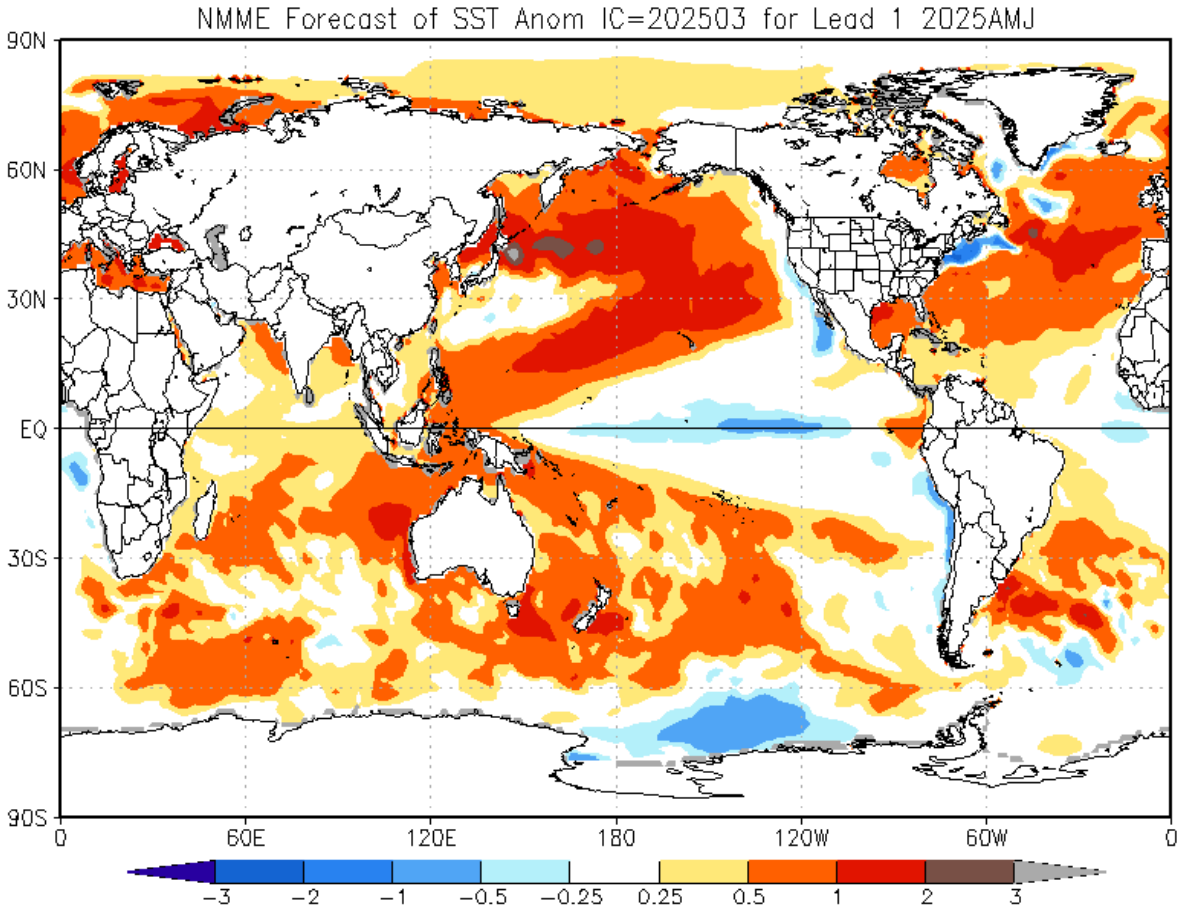


https://www.cpc.ncep.noaa.gov/products/GODAS/ocean_briefing_new/mnth_sst_sstdiff_glb_xy.gif

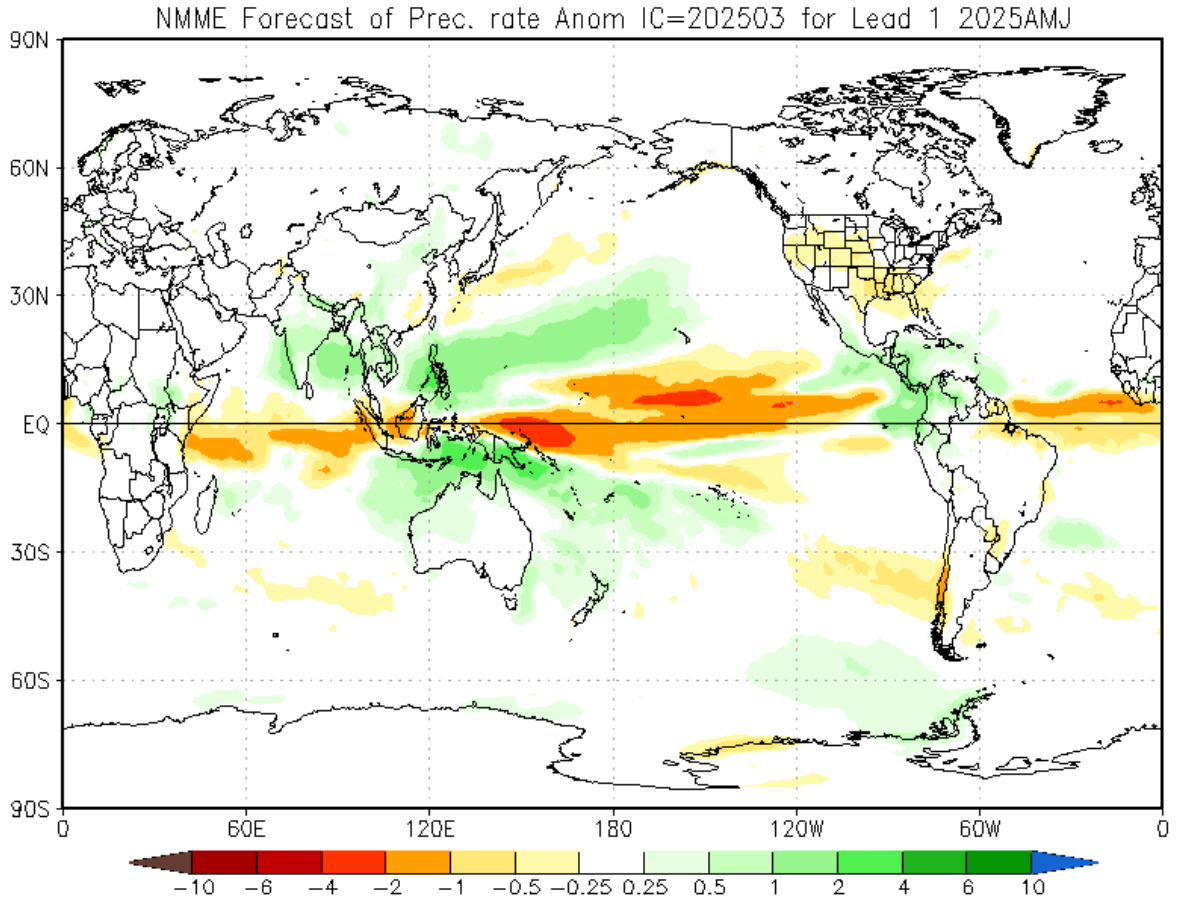
NMME Seasonal Forecasts: SST

IC=202503 Ensemble Mean Forecasts: Lead=1month for AMJ2025

SST



Precipitation

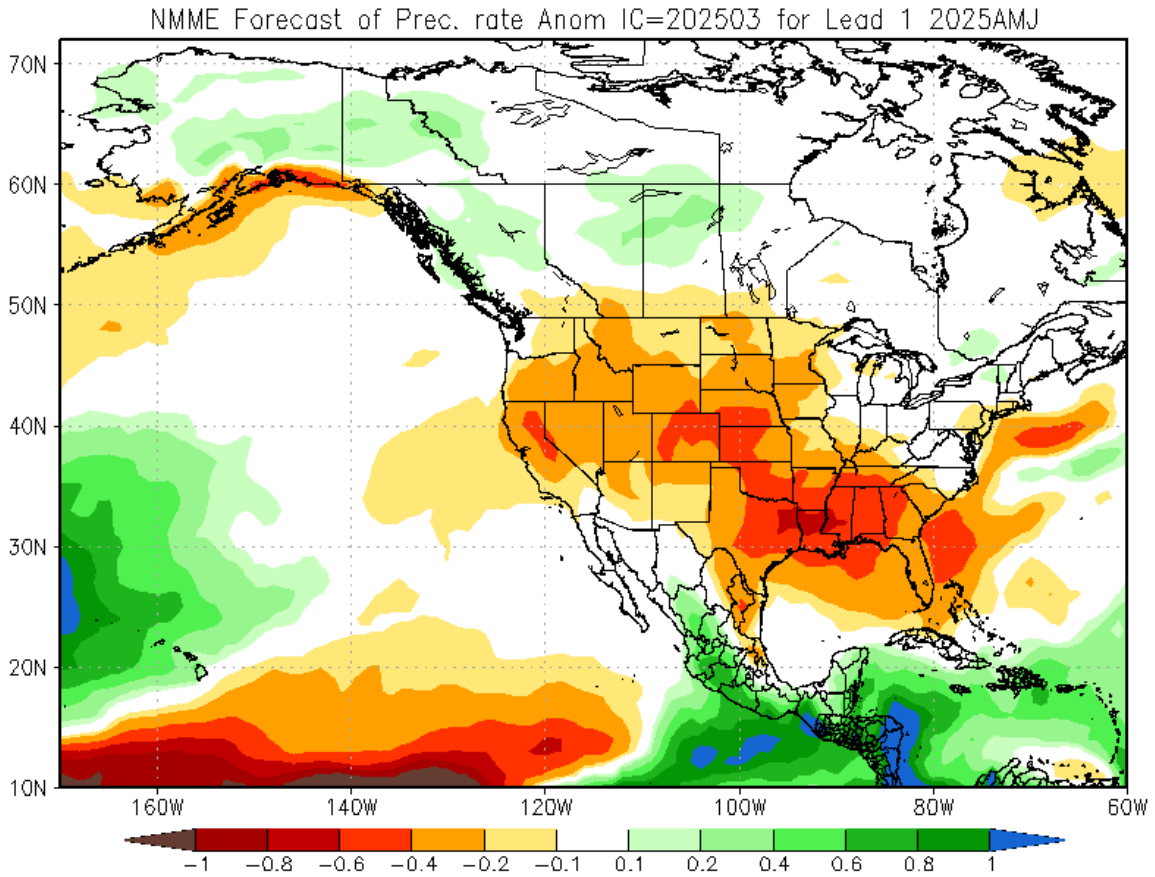


https://www.cpc.ncep.noaa.gov/products/NMME/

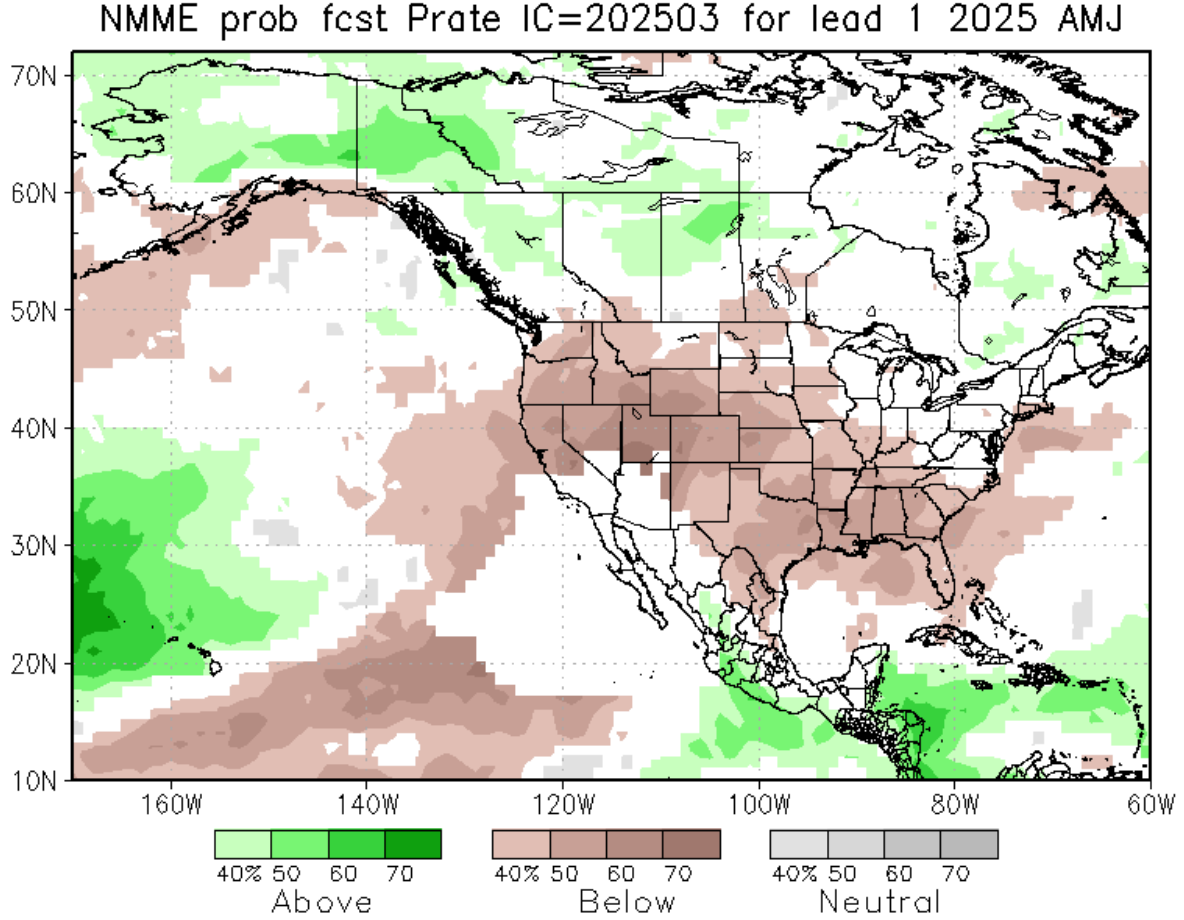
NMME Forecasts: Precipitation

IC=202503 Lead=1month for AMJ2025

Multi-Model Ensemble Mean



Probability

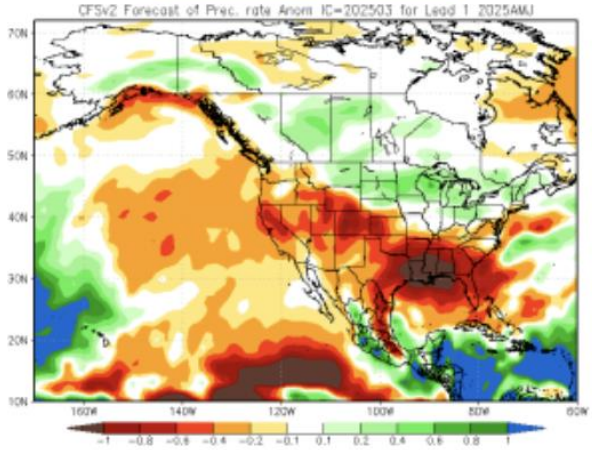


NMME forecasts precipitation deficits over much of the western and southern CONUS with >40% probability.

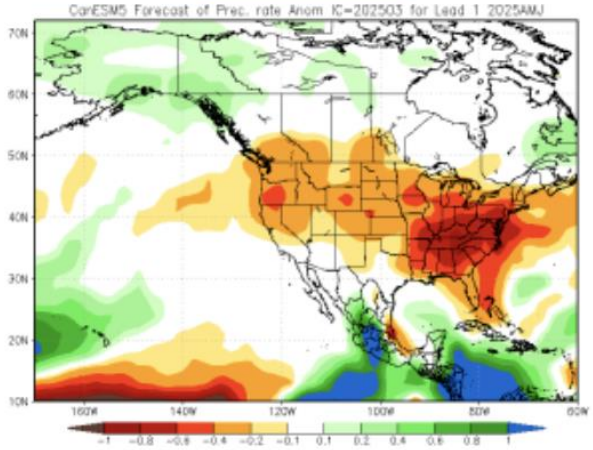
https://www.cpc.ncep.noaa.gov/products/NMME/

NMME Forecasts: Precipitation

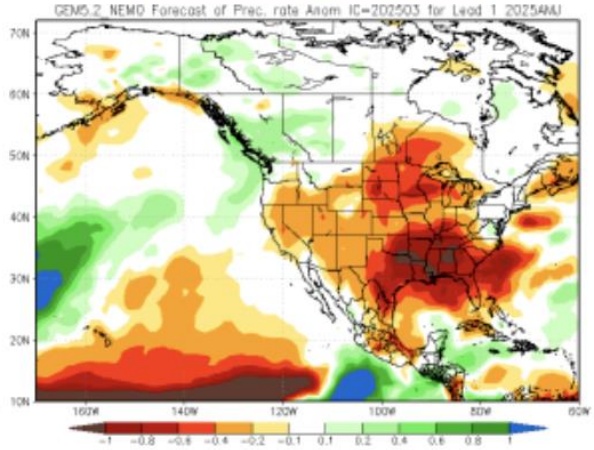
NCEP_CFSv2



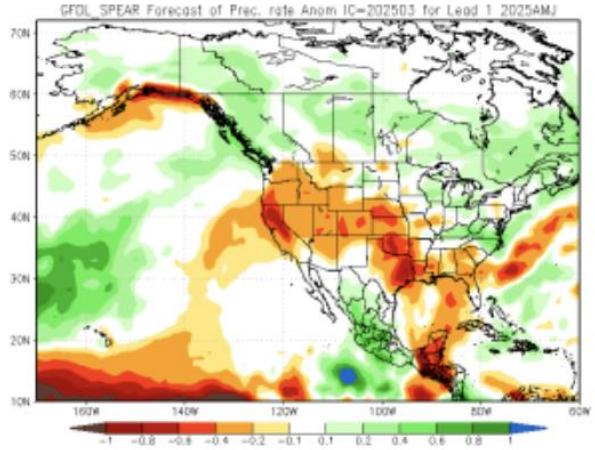
CanESM5



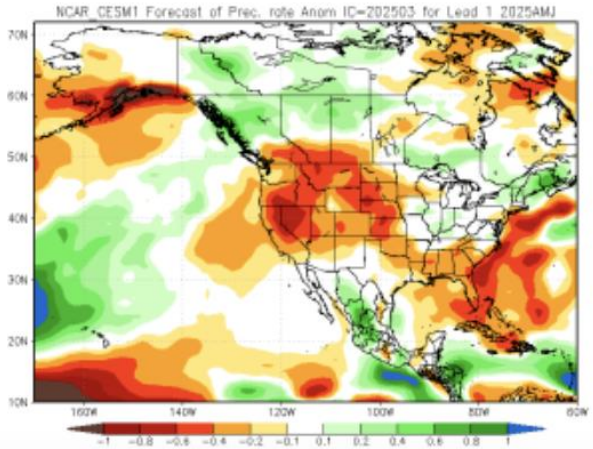
GEM5.2_NEMO



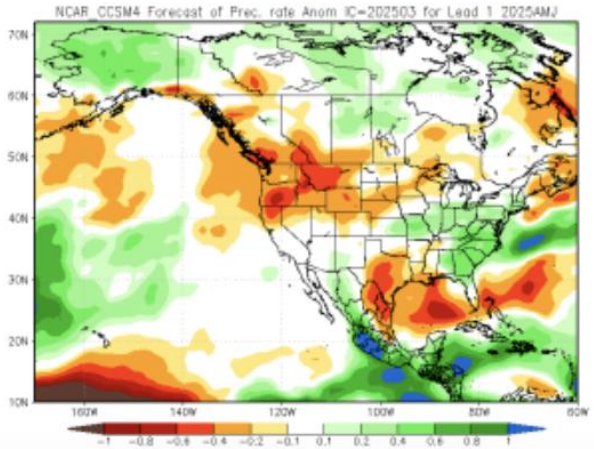
GFDL_SPEAR



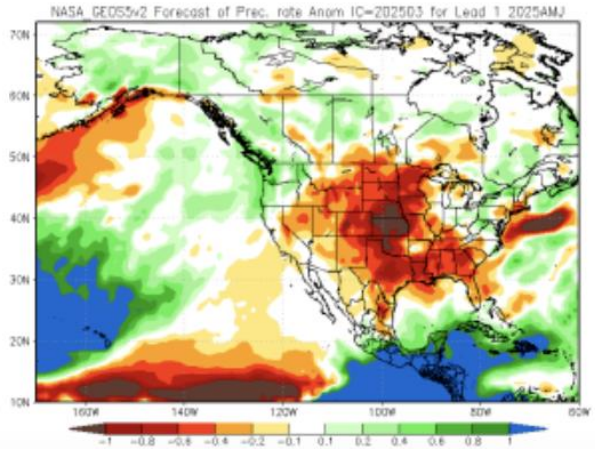
NCAR_CESM1



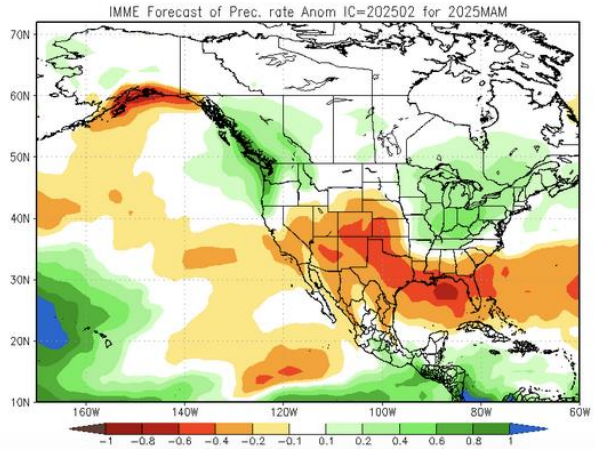
NCAR_CCSM4



NASA_GEOS5v2



IMME



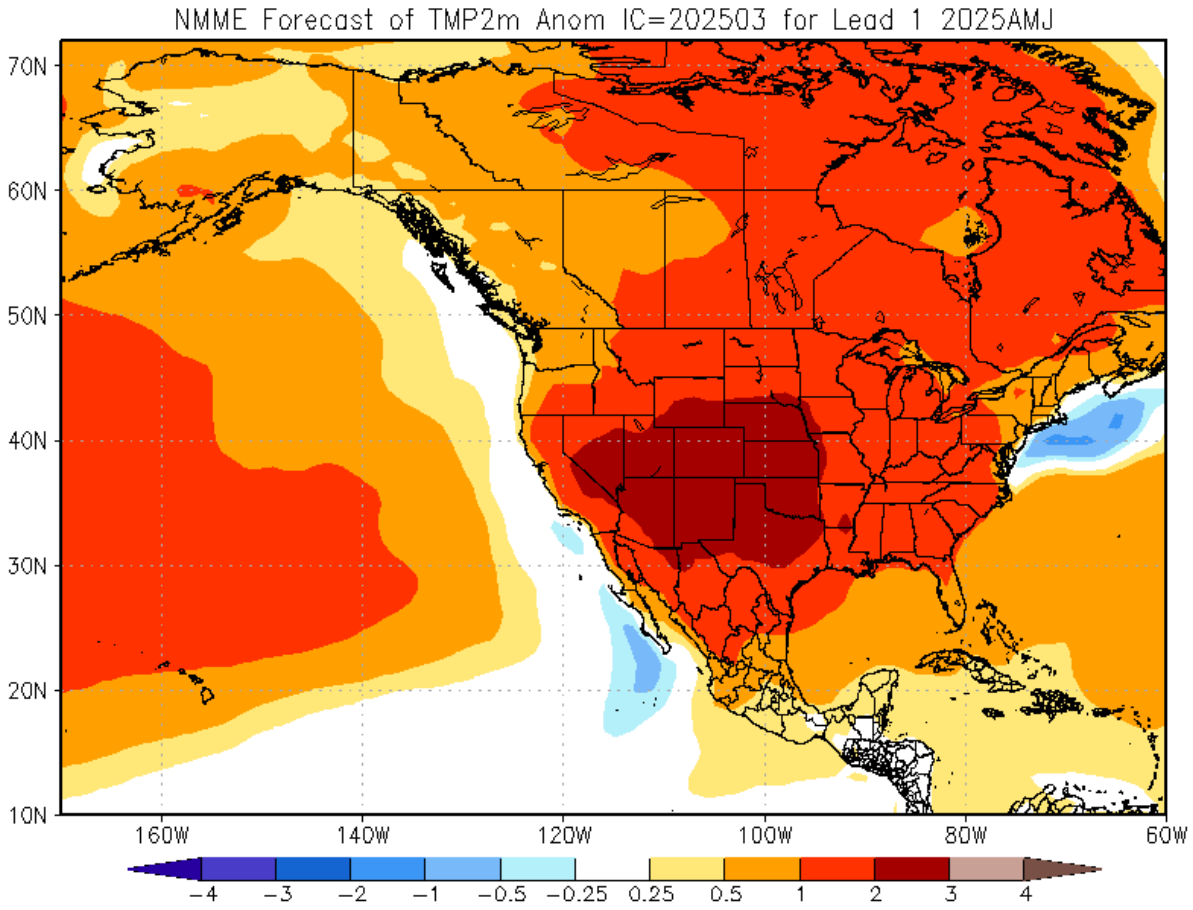
General agreements across the NMME models and IMME in forecasting precipitation across much of the CONUS

https://www.cpc.ncep.noaa.gov/products/NMME/

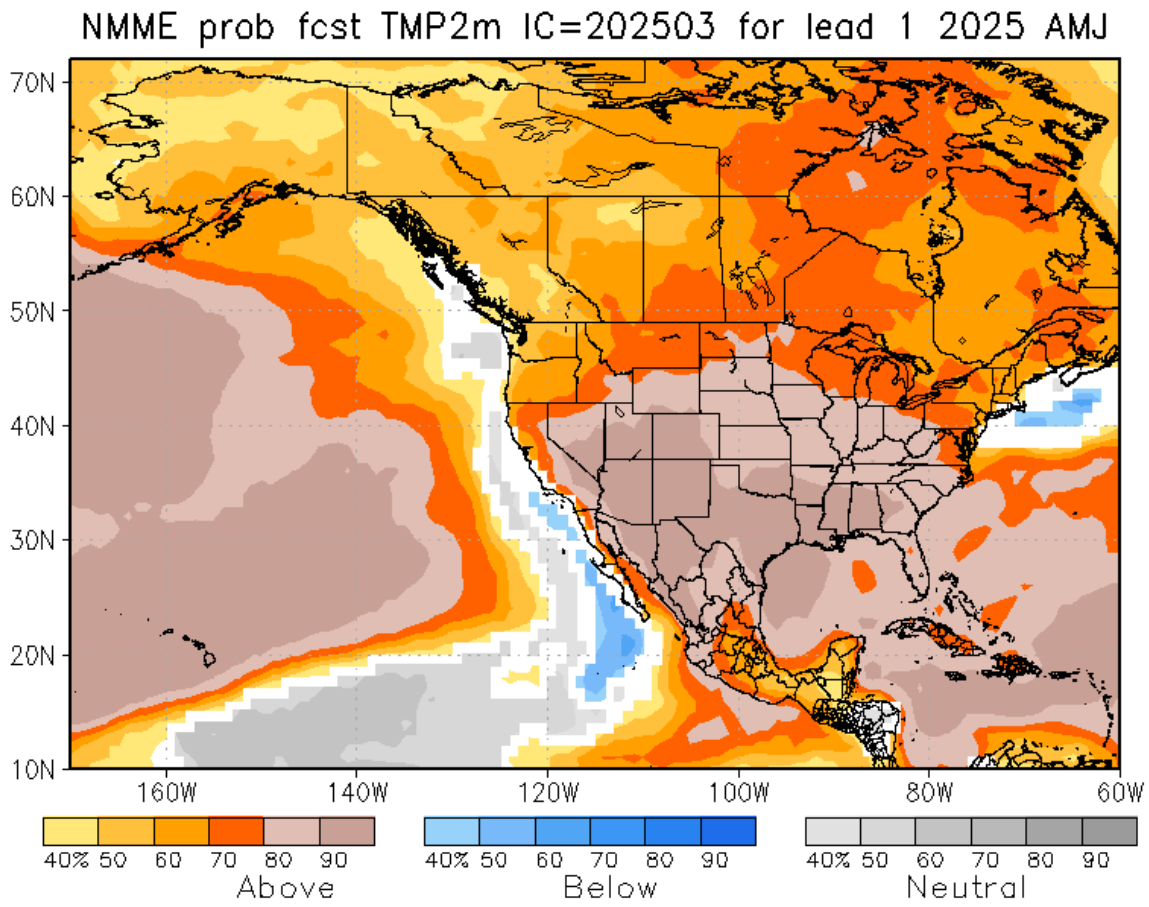
NMME Forecasts: Temperature

IC=202503 Lead=1month for AMJ2025

Multi-Model Ensemble Mean



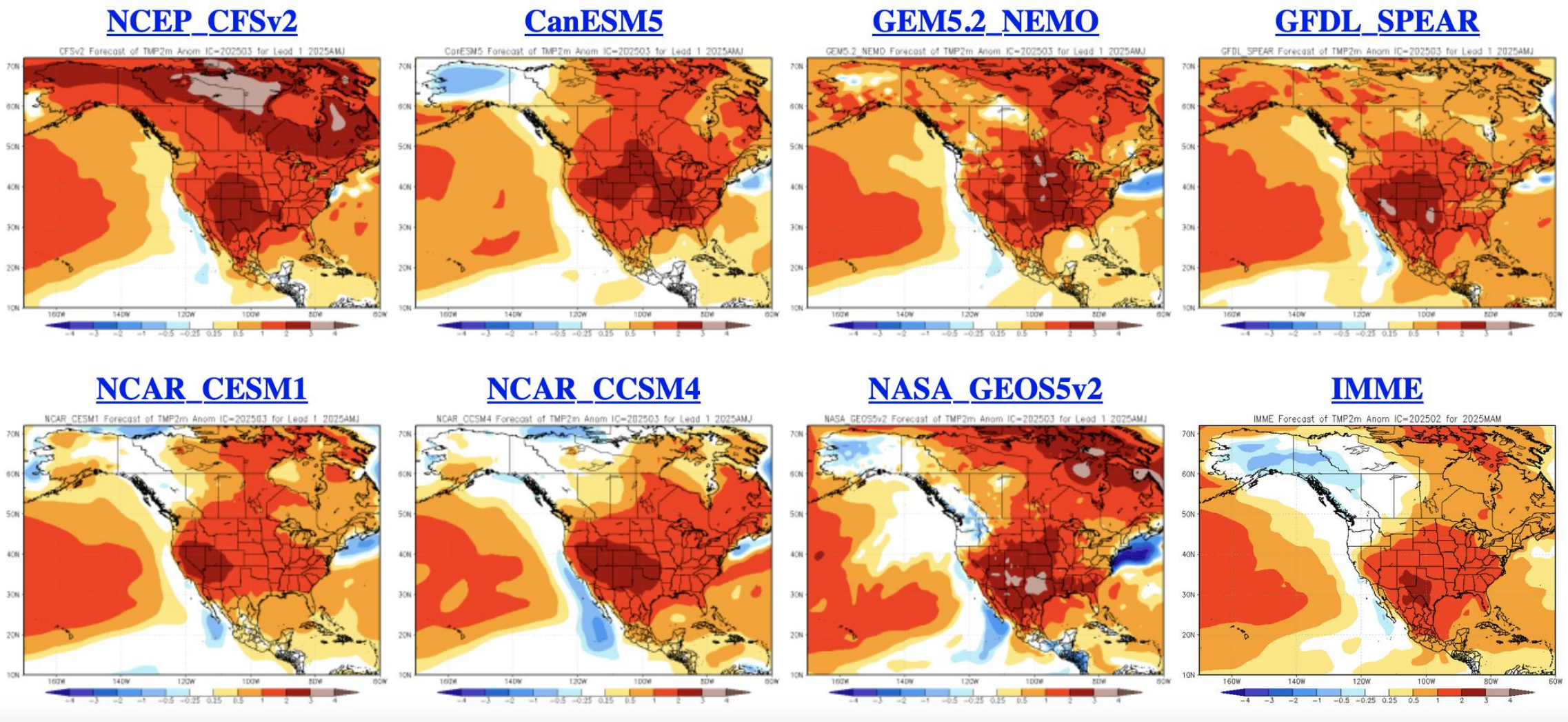
Probability



NMME forecasts warm T2m anomalies across much of the CONUS with >70% probability.

https://www.cpc.ncep.noaa.gov/products/NMME/

NMME Forecasts: Temperature

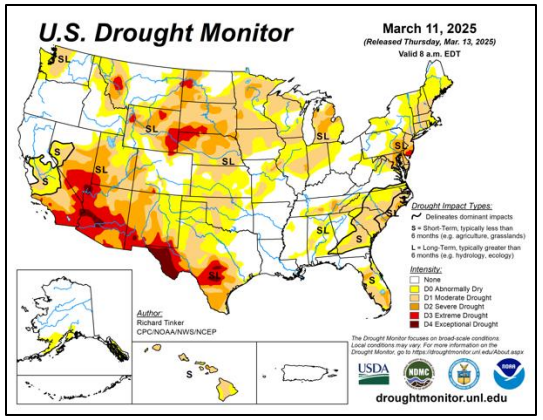


General agreements among the NMME models and IMME in forecasting warm T2m anomalies over CONUS

https://www.cpc.ncep.noaa.gov/products/NMME/

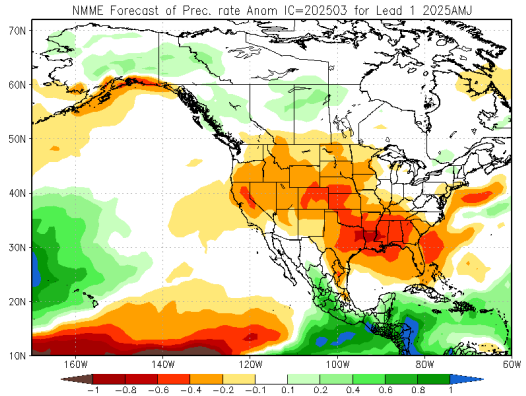
Seasonal Drought Prediction

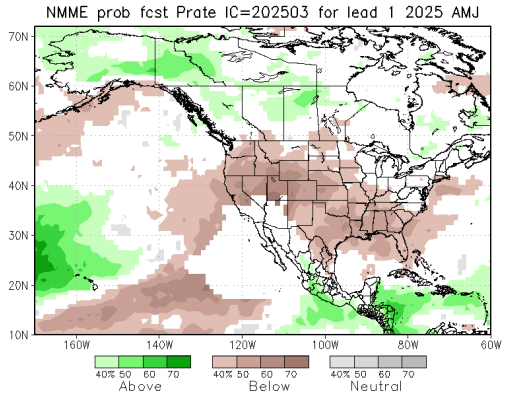
Initial Drought Conditions



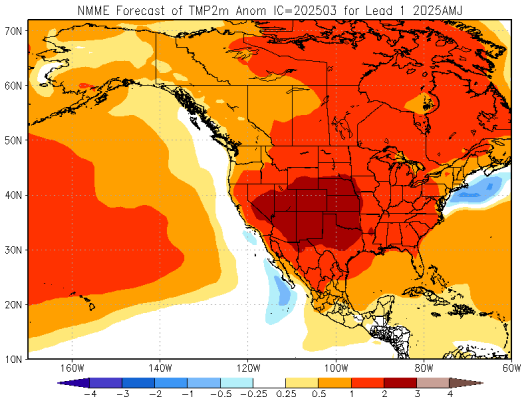
+

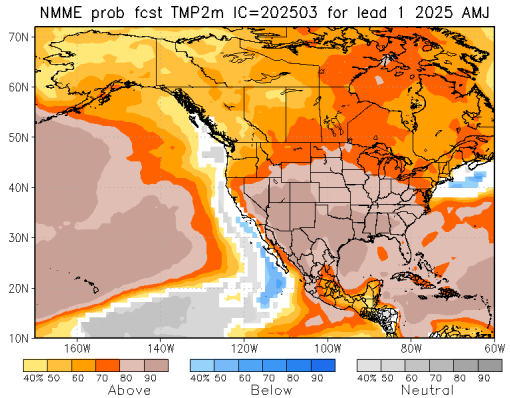
S2S Precipitation Forecasts





S2S Temperature Forecasts





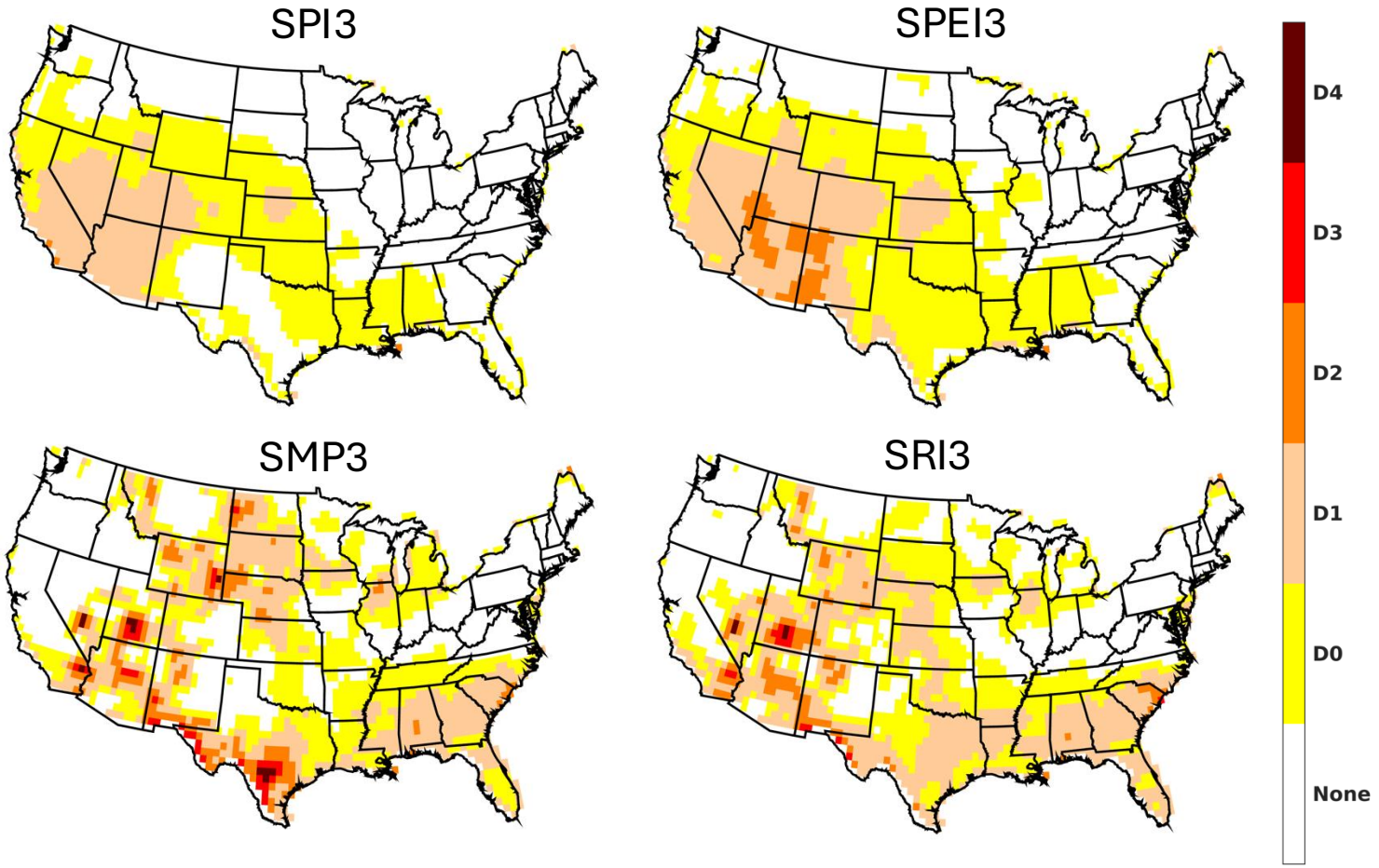
=

Seasonal Drought Forecasts

CPC Objective Drought Forecasts

IC_202503 Lead=3month for 202506

NMME-based Ensemble Median Forecast



Drought is forecast as a multi-variate and multi-scalar phenomenon.

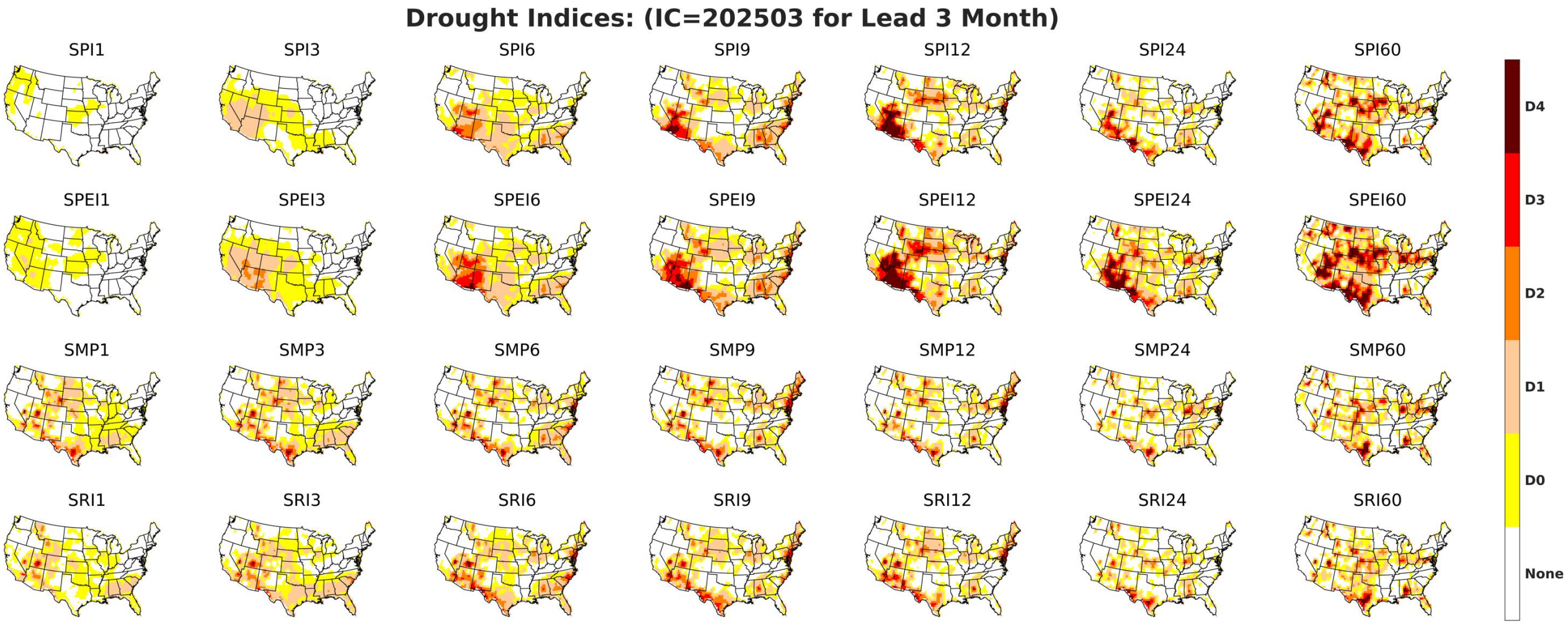
SPI3, SPEI3 (short-term meteorological drought): D1+ conditions favored over much of the Southwest, D0 over south central CONUS

SMP3, SRI3 (agricultural & hydrological drought): Persistence of initial drought conditions with dry conditions developing over the central CONUS.

SPI: Standardized Precipitation Index
SPEI: Standardized Precipitation-Evapotranspiration Index
SMP: Soil Moisture Percentile
SRI: Standardized Runoff Index

NOAA NWS Climate Prediction Center NIDIS

CPC Objective Seasonal Drought Forecasts



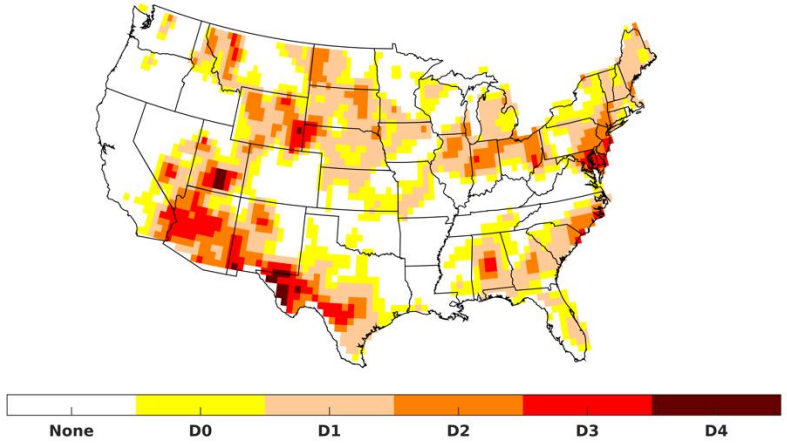
The forecasts for these drought indices are integrated using CPC objective drought blends developed for forecasts to produce forecasts for integrated drought conditions.

NOAA NWS Climate Prediction Center

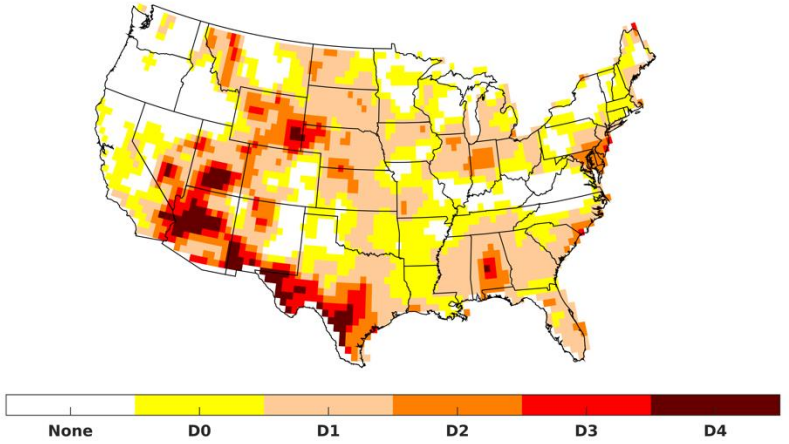
CPC Objective Seasonal Drought Forecast

Realtime oSDO (IC=202503 for Lead 3 Month 202506)

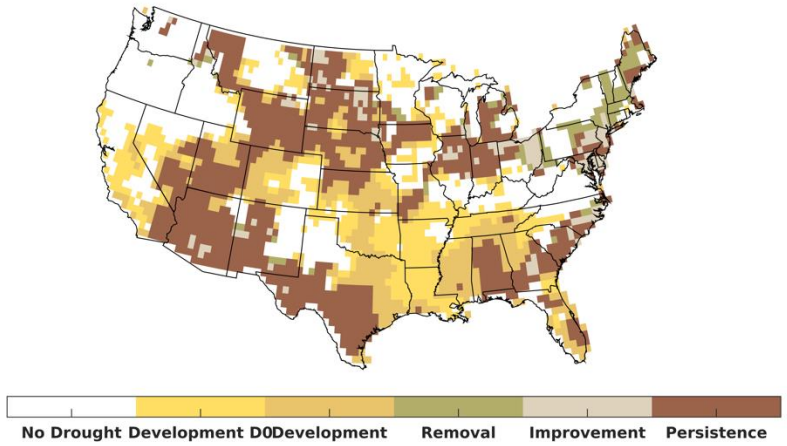
oSDM 202502



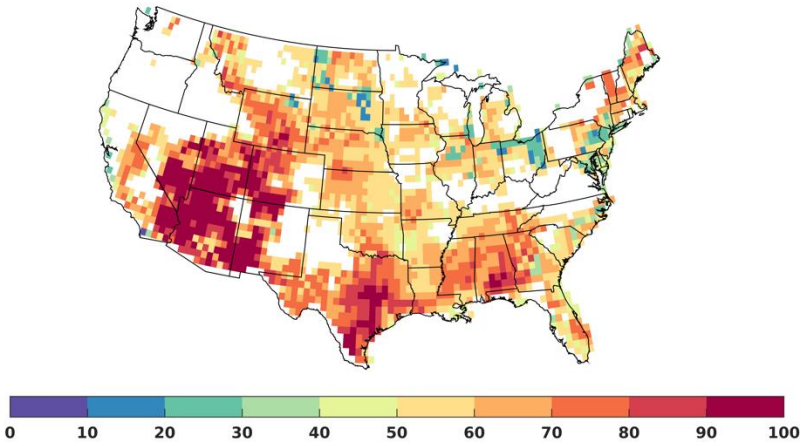
oSDO (Lead 3 Month 202506)

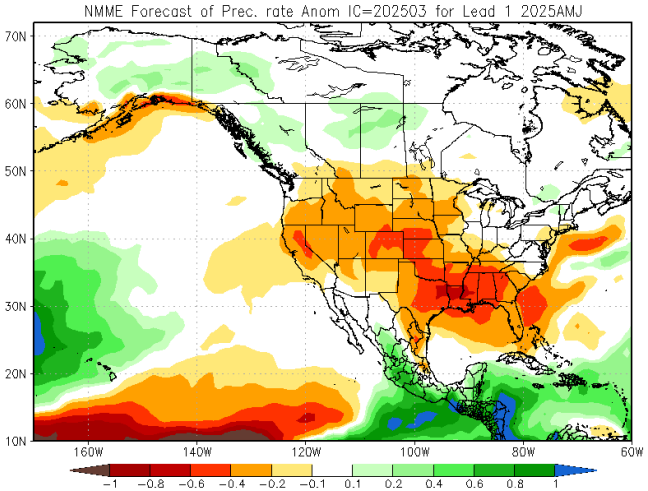


oSDO Tendency (202502 – 202506)



Probability of oSDO Tendency



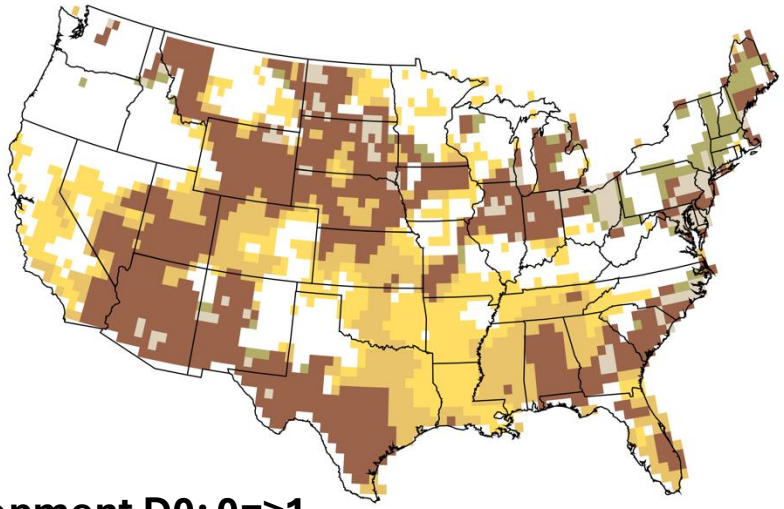


Development D0: 0=>1

NOAA NWS Climate Prediction Center

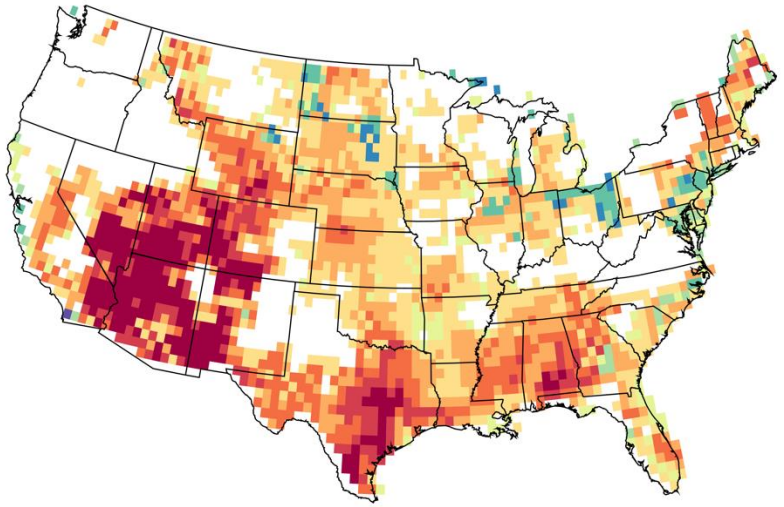
CPC Objective Seasonal Drought Forecast

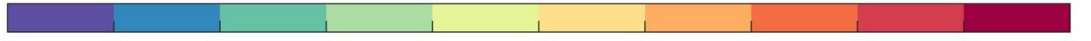
oSDO Tendency (202502 – 202506)



Development D0: 0=>1

Probability of oSDO Tendency



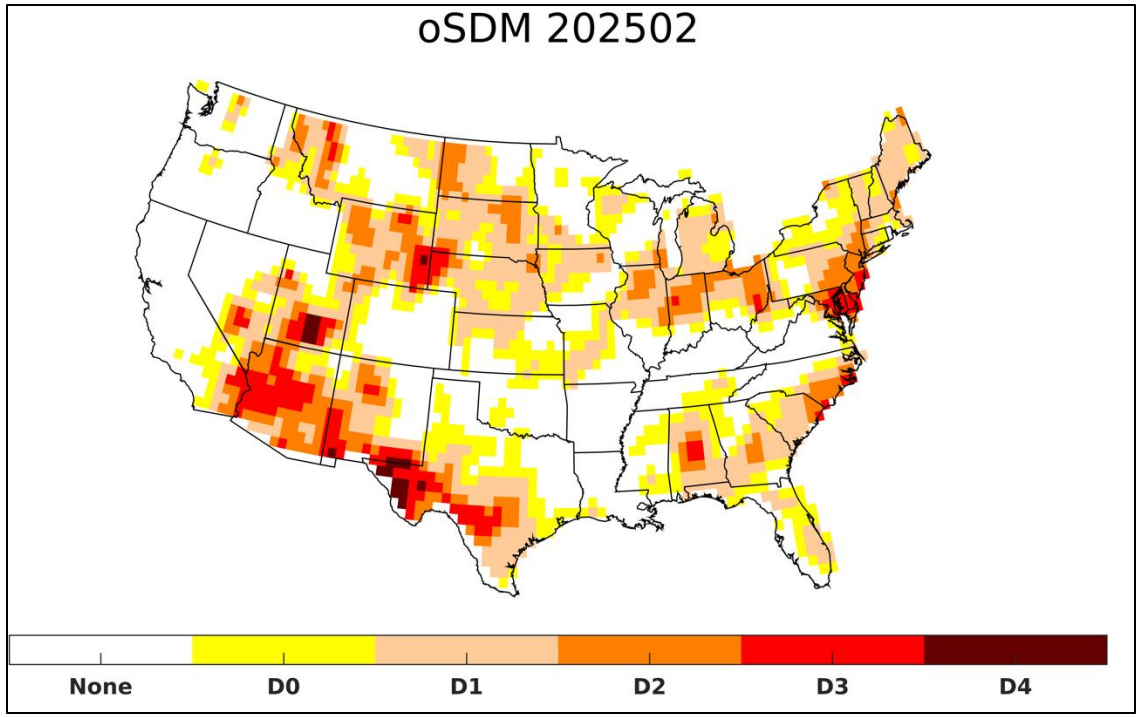


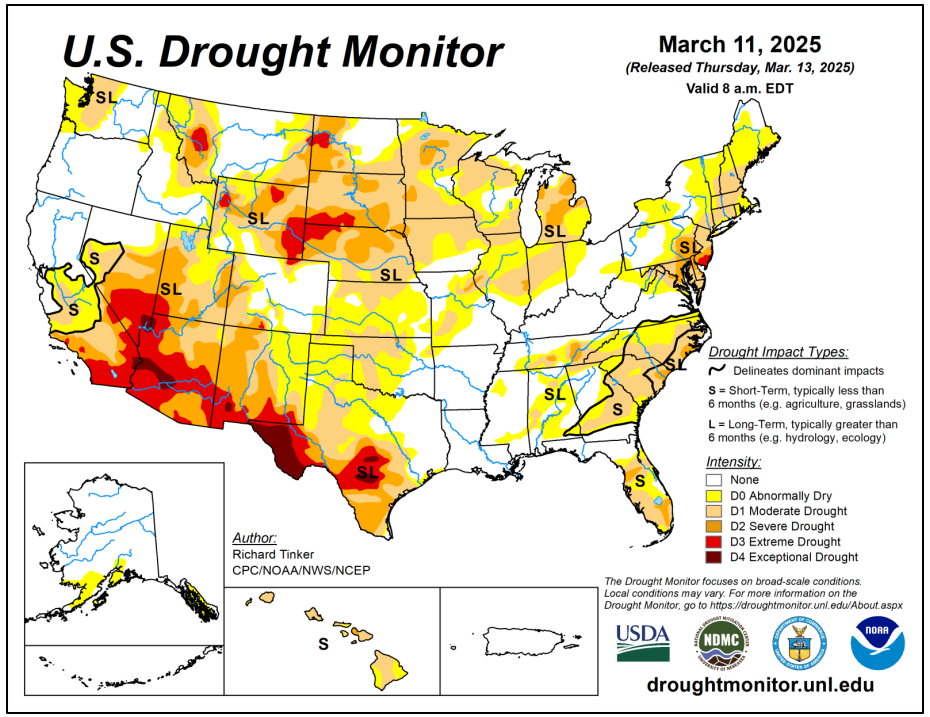
Objective Seasonal Drought Forecast

- **Drought persistence**
  - Favored in the Southwest, portion of the Southeast, with >60% probability
  - Likely in the Northern Plains, portions of the Midwest, with varying probability (30-70%)
- **Drought development** favored across much of the central CONUS not covered by drought persistence, southern and central California, with >60% probability.
- **Drought removal**: Favored in eastern New England, with >60% probability
- **Drought persistence/improvement**: likely in the mid-Atlantic, with 30-40% probability

NOAA NWS Climate Prediction Center

Adjusted Objective Seasonal Drought Forecasts

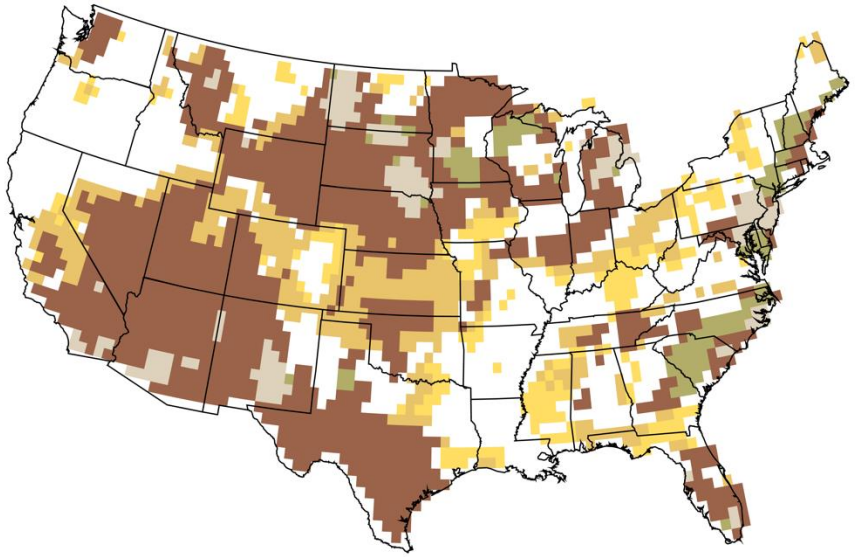




- The objective Drought Monitor aligned with the objective drought forecasts differs from the USDM, due to differences in their climatological base periods, methodologies in integrating drought indices, and temporal resolutions.
- To better support the CPC operational SDO, which is initialized using the latest weekly USDM, an adjusted Seasonal Drought forecast is being ***tested*** by adding the 3-month objective forecast tendency onto the latest USDM (next slide).

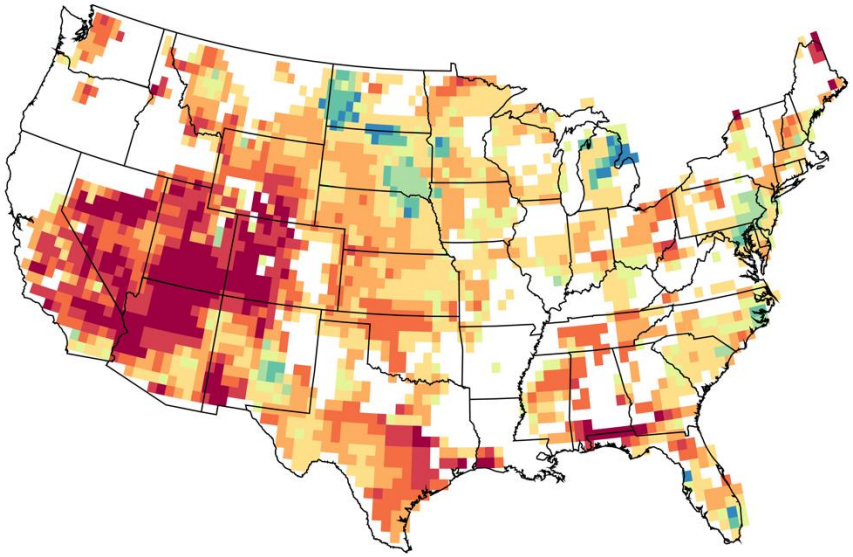
Adjusted Objective Seasonal Drought Forecasts

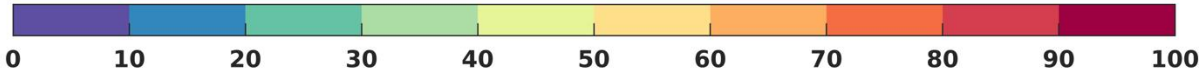
Adjusted oSDO Tendency (20250311 - 202506)



Development D0: 0=>1

Probability of oSDO Tendency



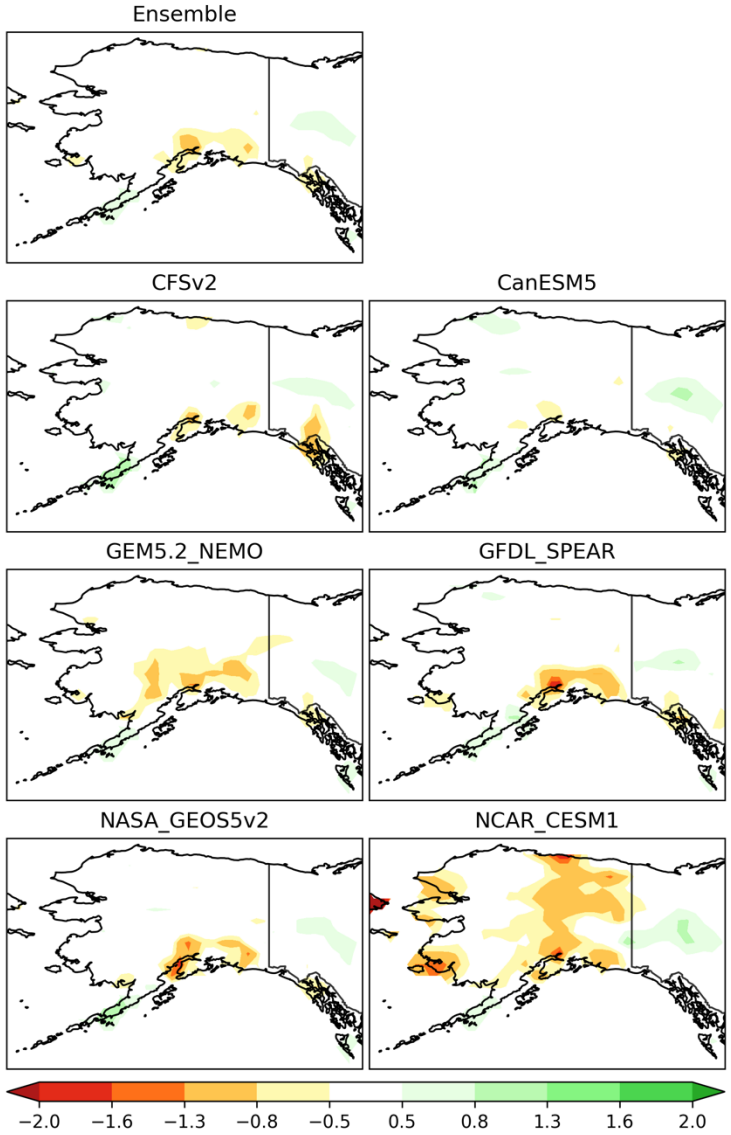


NOAA NWS Climate Prediction Center

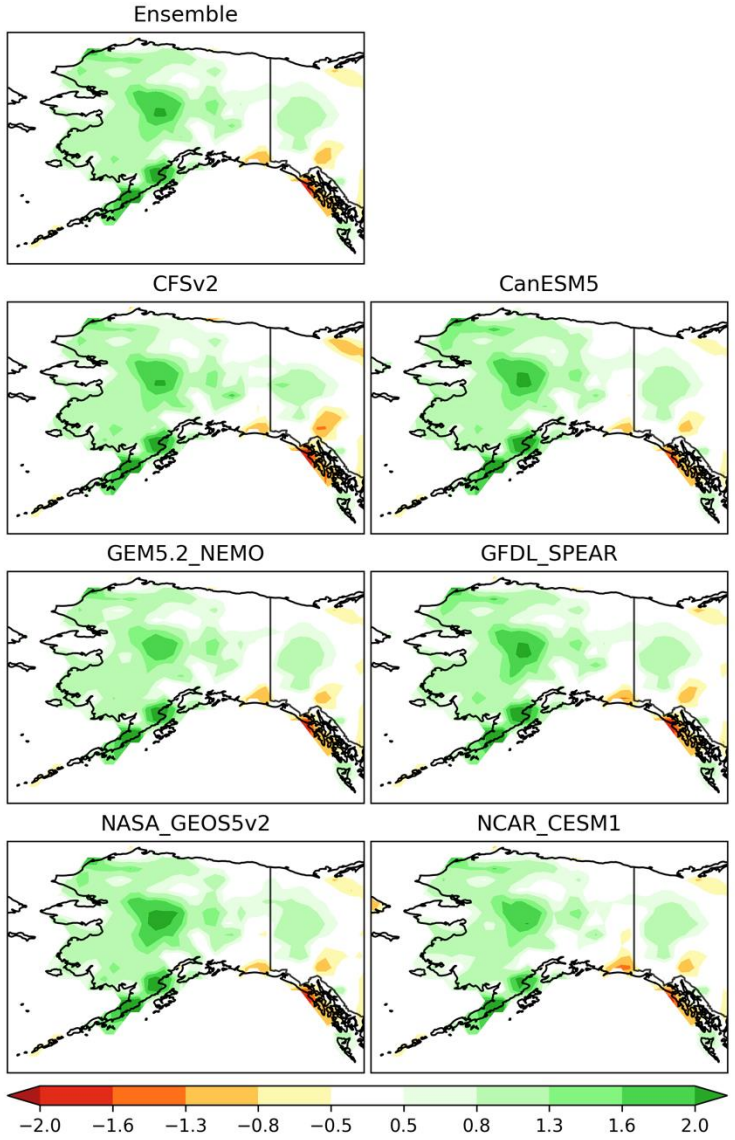
NIDIS

Alaska: SPI Forecasts

SPI3 lead=1month for 202504



SPI12 lead=3month for 202506



SPI forecasts based on NMME IC_202503

- **SPI3 (202504)**: Dry anomalies along the southern tier of Alaska.
- **SPI12 (202506)**: Wet anomalies over much of the western and central Alaska. Dry anomalies over the Alaska Panhandle.

https://www.cpc.ncep.noaa.gov/products/Drought/AK/nmme.shtml

Summary

- **Current drought conditions**
  - Drought is present over much of the Southwest, Northern & Southern Plains, Midwest, and eastern tier of CONUS.

- **SST forecasts for AMJ2025**
  - ENSO-neutral conditions are favored, with 77% probability.
  - The forecast SST anomalies in the Pacific, Atlantic and Indian Oceans tend to increase the likelihood of precipitation deficits across much of the CONUS.

- **Drought forecasts for AMJ2025**
  - NMME forecasts precipitation deficits and warm T2m anomalies across much of the CONUS except the Northeast
  - Objective seasonal drought forecasts
    - **CONUS**
      - **Drought persistence** favored in the Southwest, and portion of the Southeast, with >60% probability; likely in the Northern Plains, portions of the Midwest, with varying probability (30-70%)
      - **Drought development** favored across much of the central CONUS not covered by drought persistence, and southern and central California, with >50% probability
      - **Drought removal** favored in eastern New England with >60% probability
      - **Drought persistence/improvement**: likely in the mid-Atlantic, with relative low probability (30-40%)
    - **Alaska**
      - Short-term meteorological drought (SPI3) along the southern edge of Alaska
      - Long-term meteorological drought (SPI12) over the Alaska Panhandle