Climatology Report

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Talk Outline

- A Look Back at the 2022 Forecast
- The State of the Climate
  - 2022 Global to Regional Perspective
- Current Conditions
- Summary and Vintage 2023 Forecast

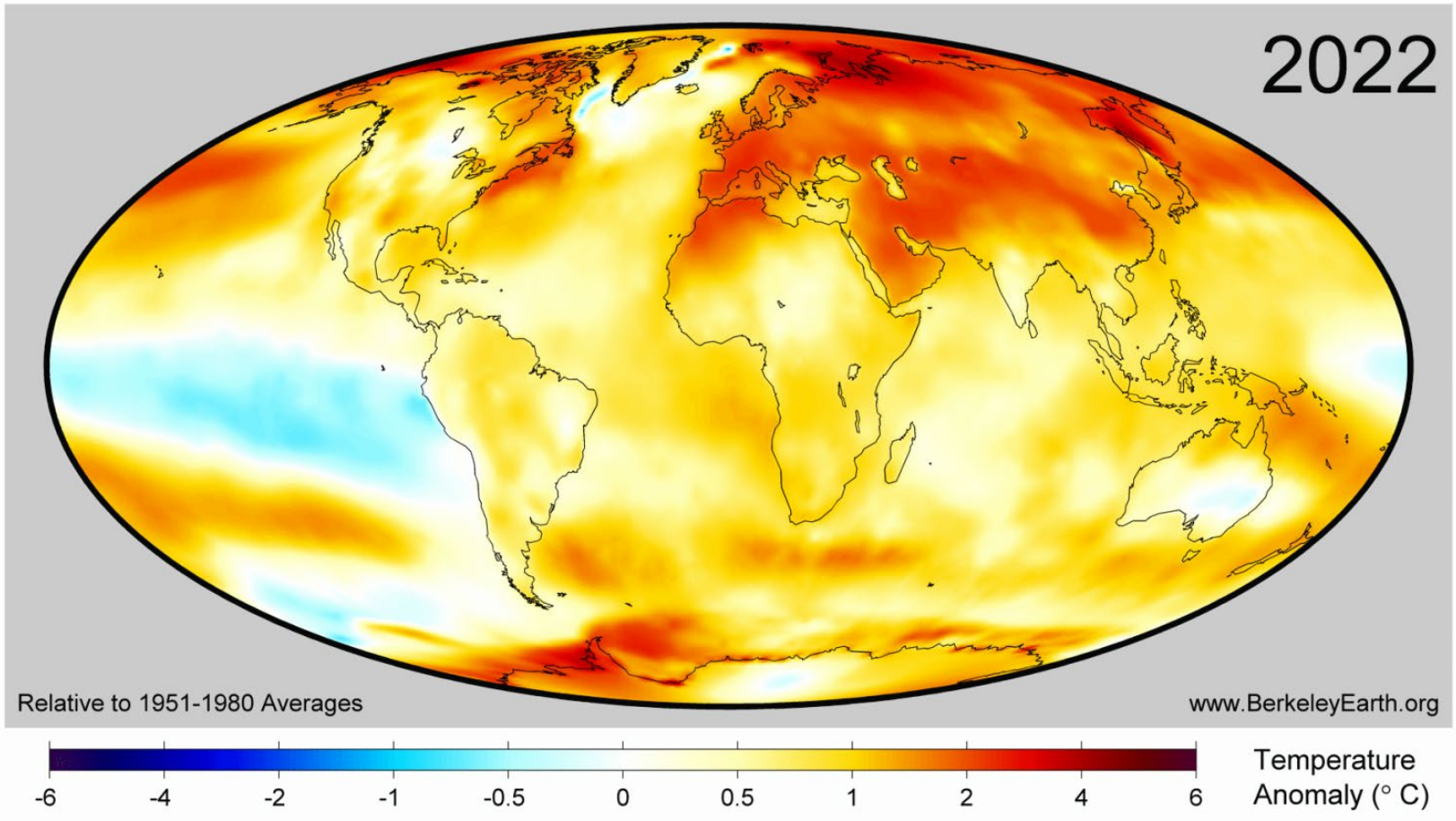
Climate Forecast 2022 – Hit or Miss?

- Globally a top 5 warmest year … very close
- Continued strong climate variability … a hit
- West - spring frost risk high … a hit, unfortunately
- Drought concerns: PNW ⇣, CA↑ … a hit (except late)
- West - warmer growing season … a partial hit
- PNW – Record warm/dry late season …

State of the Climate
2022 Global to Regional Perspective

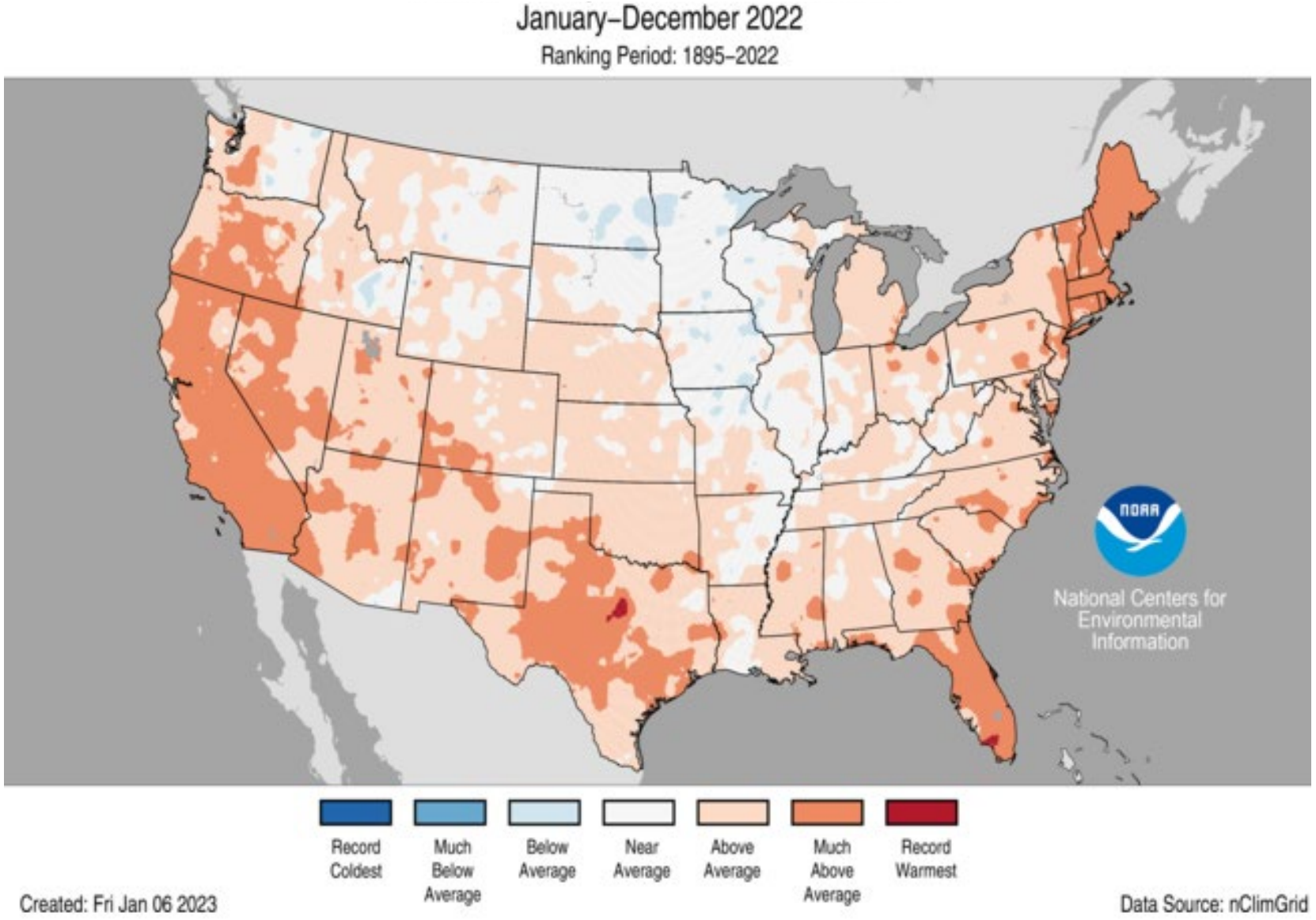
Global Temperature Departures 2022

- 2022 was the 5-7th warmest year on record (+1.55°F) and the last 8 years the warmest ever
- 46th consecutive year with temperatures above average
- 2022 ocean heat content at a record high
- 2022 also was the Arctic's warmest year ever, has warmed 4 times the rate of the rest of the globe



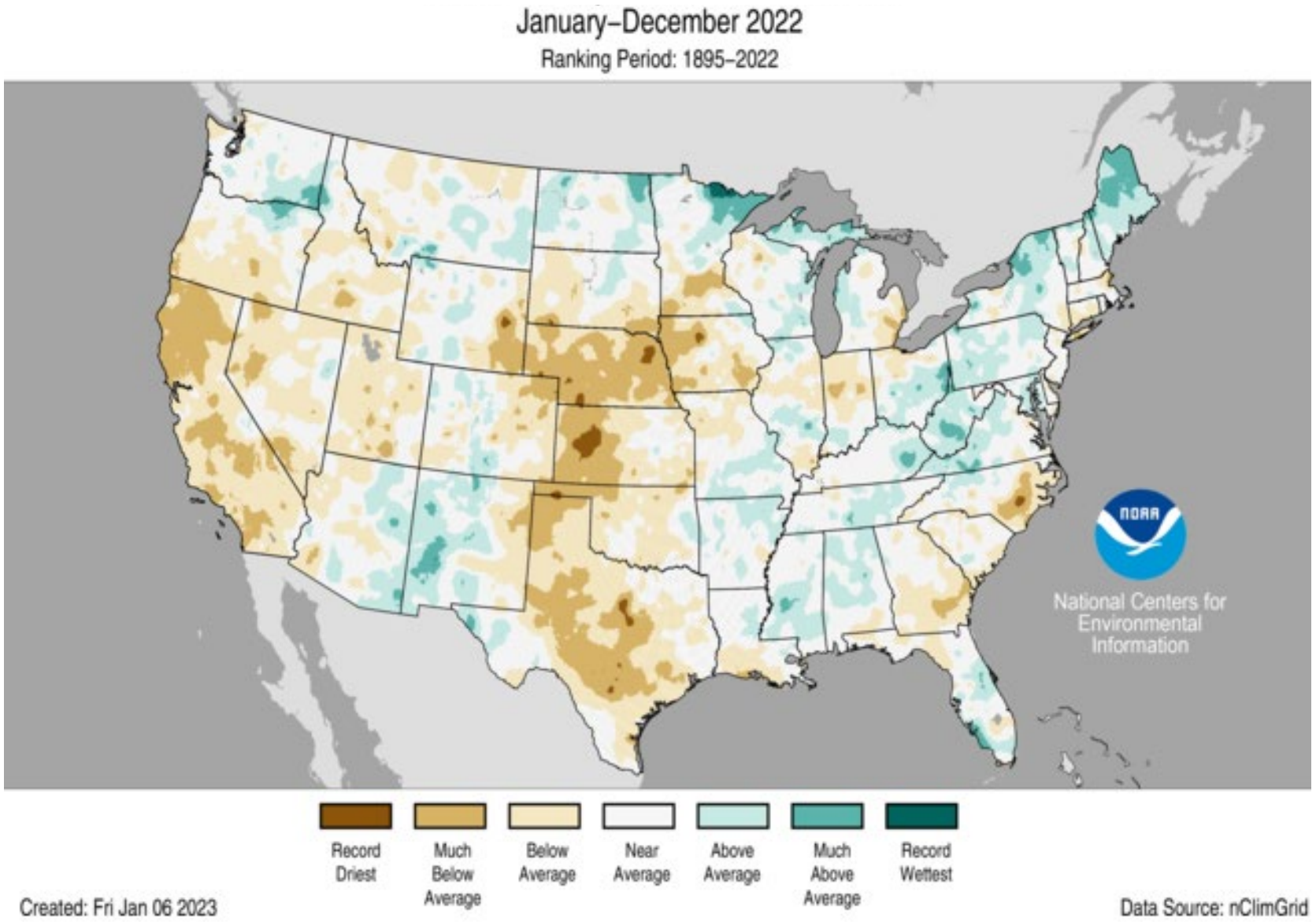
US Temperature Departures 2022

- CONUS near average to 3.4°F above average in 2022
- Top 20 warmest year on record, +1.4°F
- 26th consecutive year CONUS above average
- Tmax up moderately more than Tmin in 2022



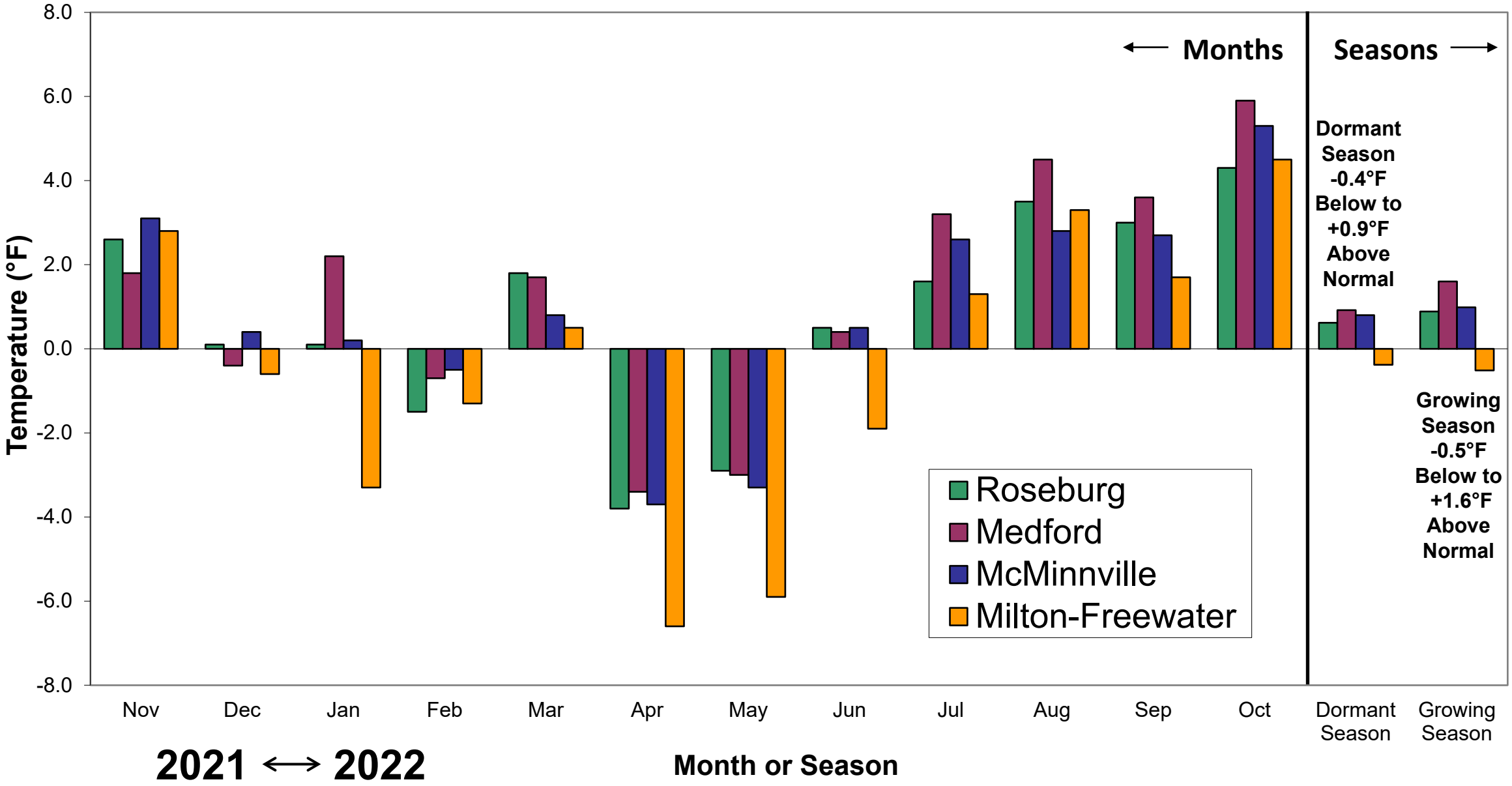
US Precipitation Departures 2022

- CONUS drier than average, but large differences across the county
- Mid-South, New England, Four Corners, and inland PNW above
- Rest of the West, central and southern Plains, and southeast below



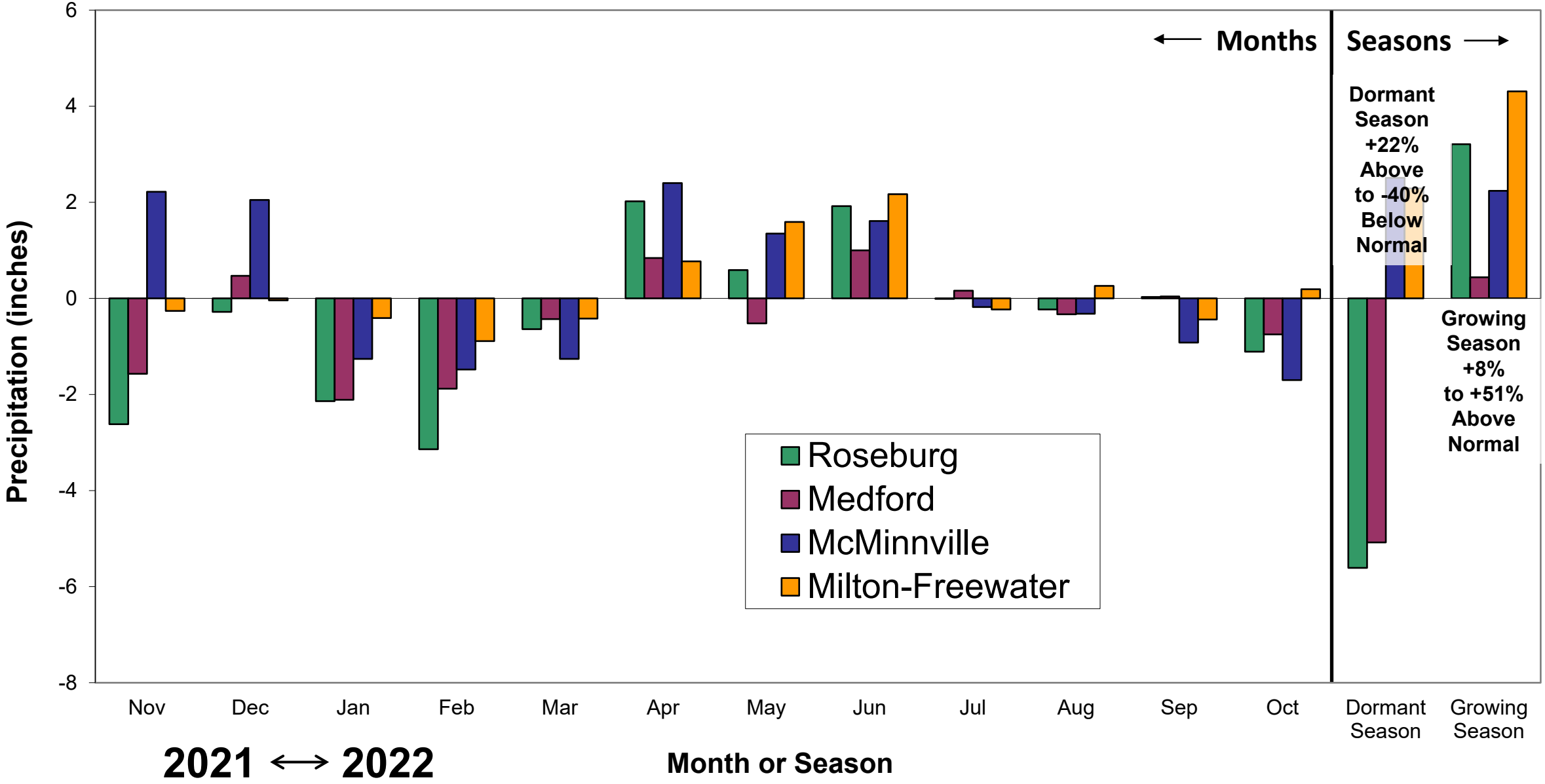
Oregon 2021-22
Weather/Climate Summary

2021-22 Regional Temperature Departures from Normal



Summation of daily temperature departures by month, the dormant period (Nov-Mar) and the growing season (Apr-Oct) compared to the 1991-2010 climate normals from the NWS stations (www.noaa.gov)

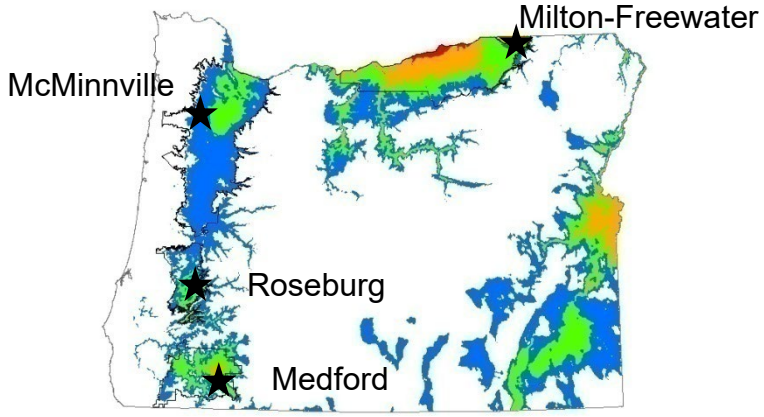
2021-22 Regional Precipitation Departures from Normal



Summation of daily precipitation departures by month, the dormant period (Nov-Mar) and the growing season (Apr-Oct) compared to the 1991-2010 climate normals from the NWS stations (www.noaa.gov)

2022 Growing Season Cumulative Degree-Days

- 4% to 9% lower than 2021
- 3% below to 7% above the 2004-2022 average
- 6% to 30% above the 1981-2010 average
- 4% below to 18% above the 1991-2020 average



3659
3202
3155
2484

Cummulative GrDD (Base 50°F)

4000
3500
3000
2500
2000
1500
1000
500
0

1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct

Date

Averages from 2004-2022

- McMinnville
- McMinnville Average
- Milton-Freewater
- Milton-Freewater Average
- Roseburg
- Roseburg Average
- Medford
- Medford Average

This chart represents the 2022 cumulative growing degree-days compared to the average for 2004-2022 for the growing season (Apr-Oct) from the NWS stations (www.noaa.gov)

Vintage 2022: Cool/Wet Spring Frost Event

Dynamically Speaking …

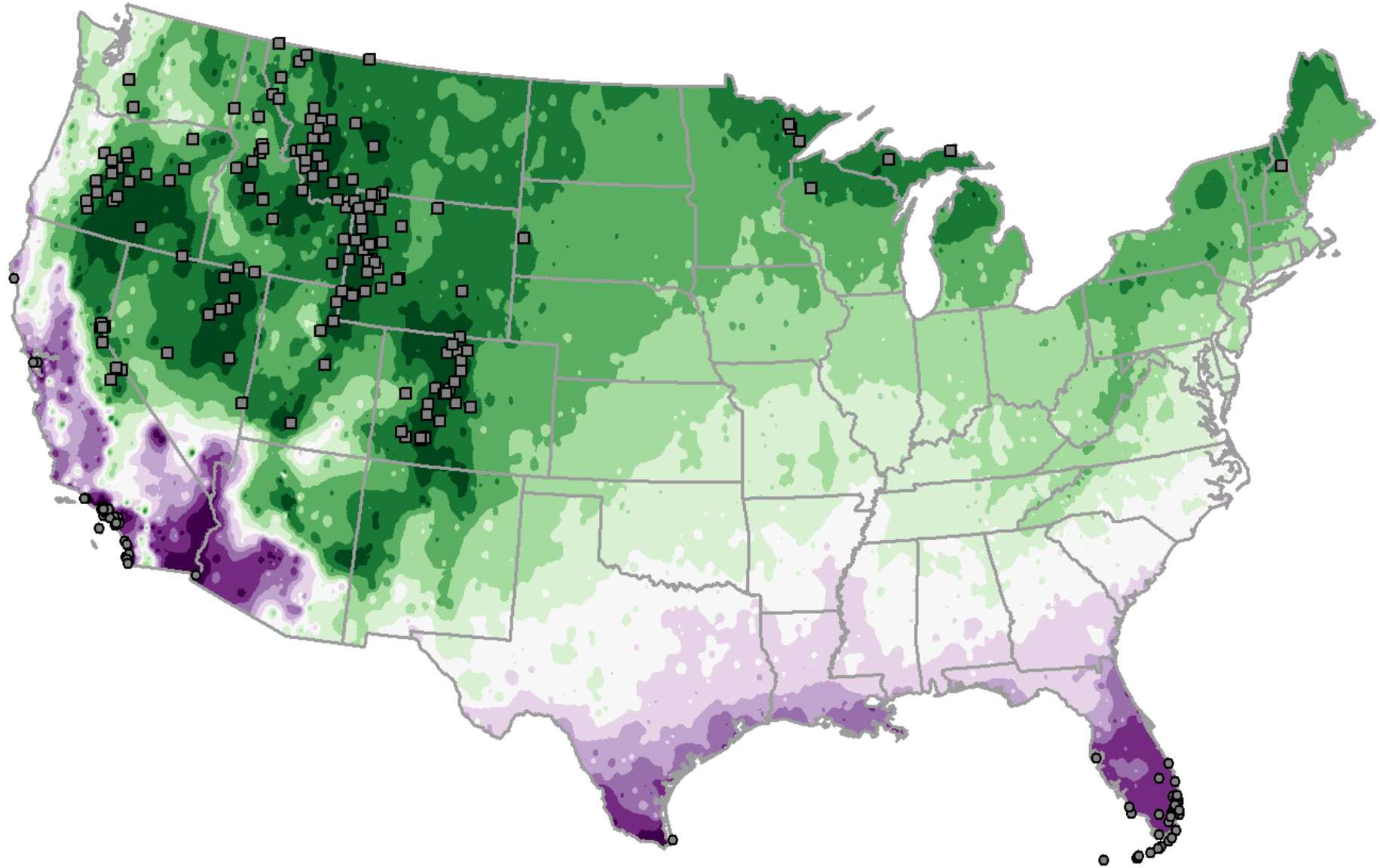
- Cold air mass event
- Advective frost
- Vertically distributed cold air
- Not much could be done about it
- On the forecast horizon starting in mid-December
- Spring adjustment from a mild and dry winter
- Atmospheric circulation pattern created February in April
- Strong PDO-ENSO signal

Statistically Speaking …

- All four of these are relatively common statistically …
  - Warm and dry March, early April
  - Early bud break
  - Cold and wet mid to late April
  - April frost
- … individually
- But in combination, very low probability
- Statistically a one in 30 to 50-year event
- Dynamically possible in any year

Day of the Last Spring Freeze

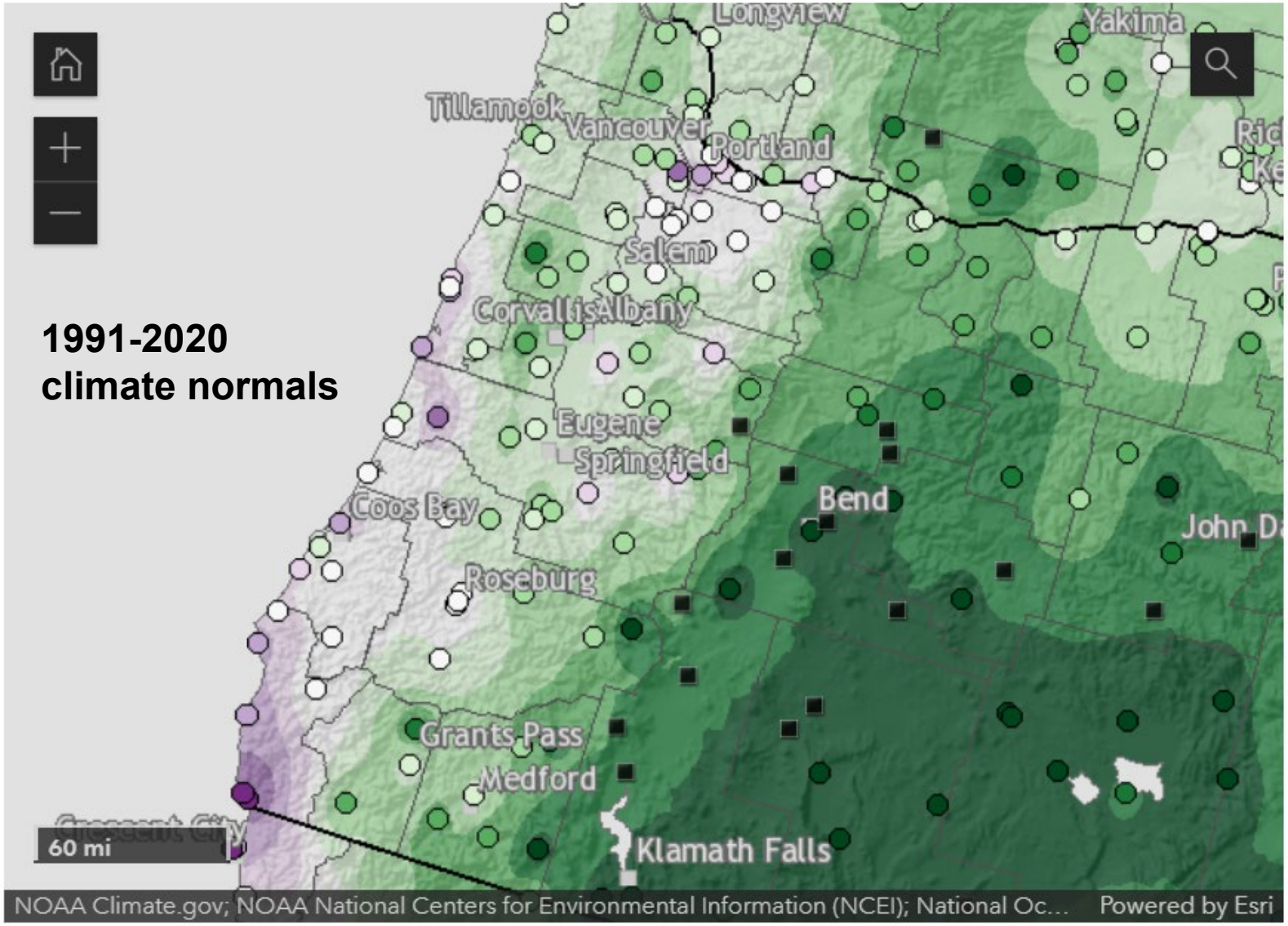
from the 1991-2020 U.S. Climate Normals

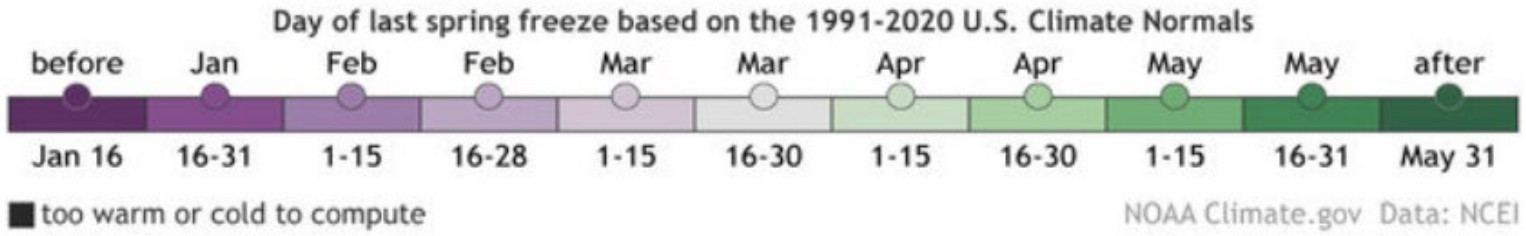


Too Warm to Compute

Too Cold to Compute

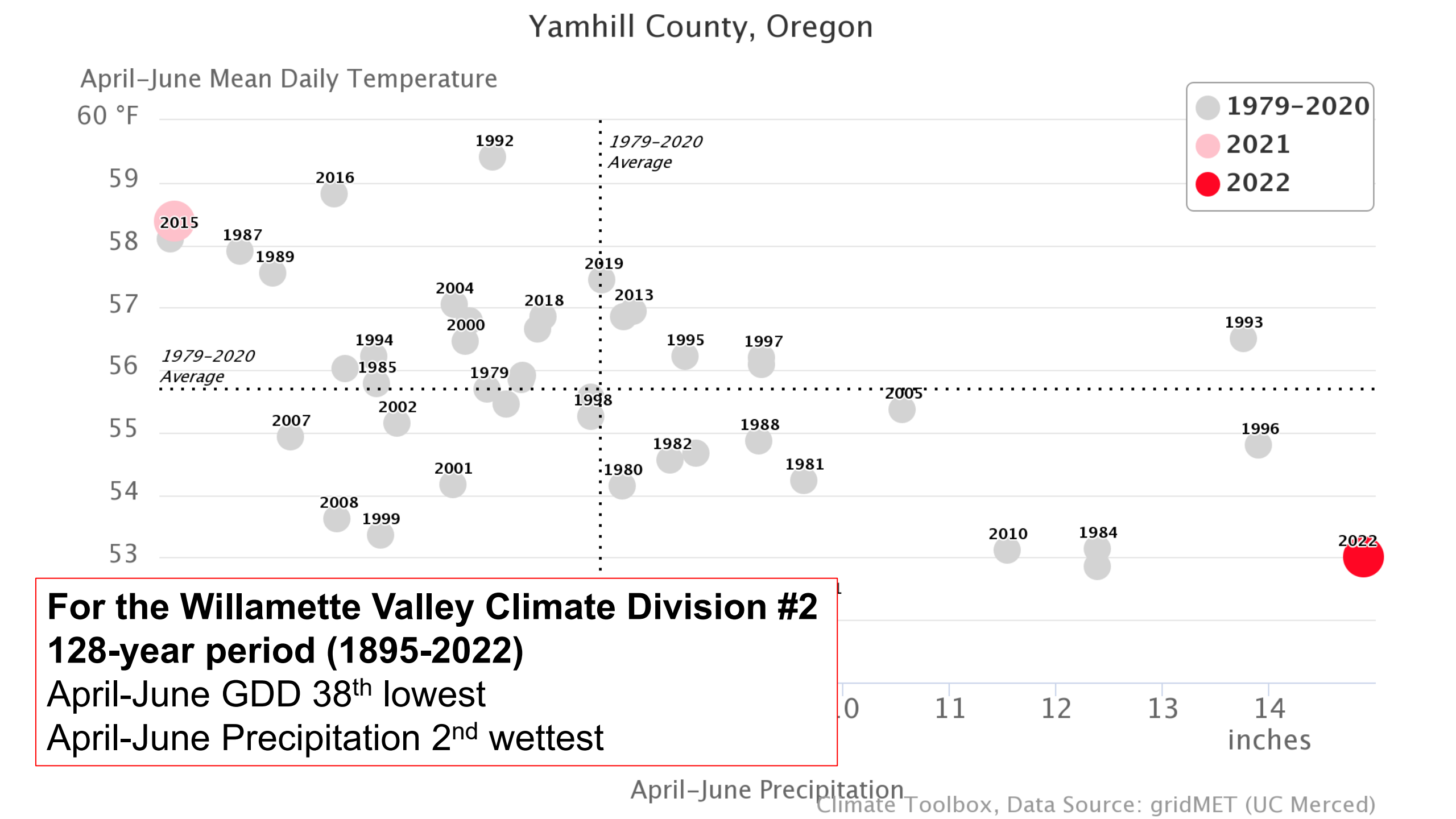
Before Jan 16	Jan 16-31	Feb 1-15	Feb 16-28	Mar 1-15	Mar 16-30	Apr 1-15	Apr 16-30	May 1-15	May 16-31	After May 31



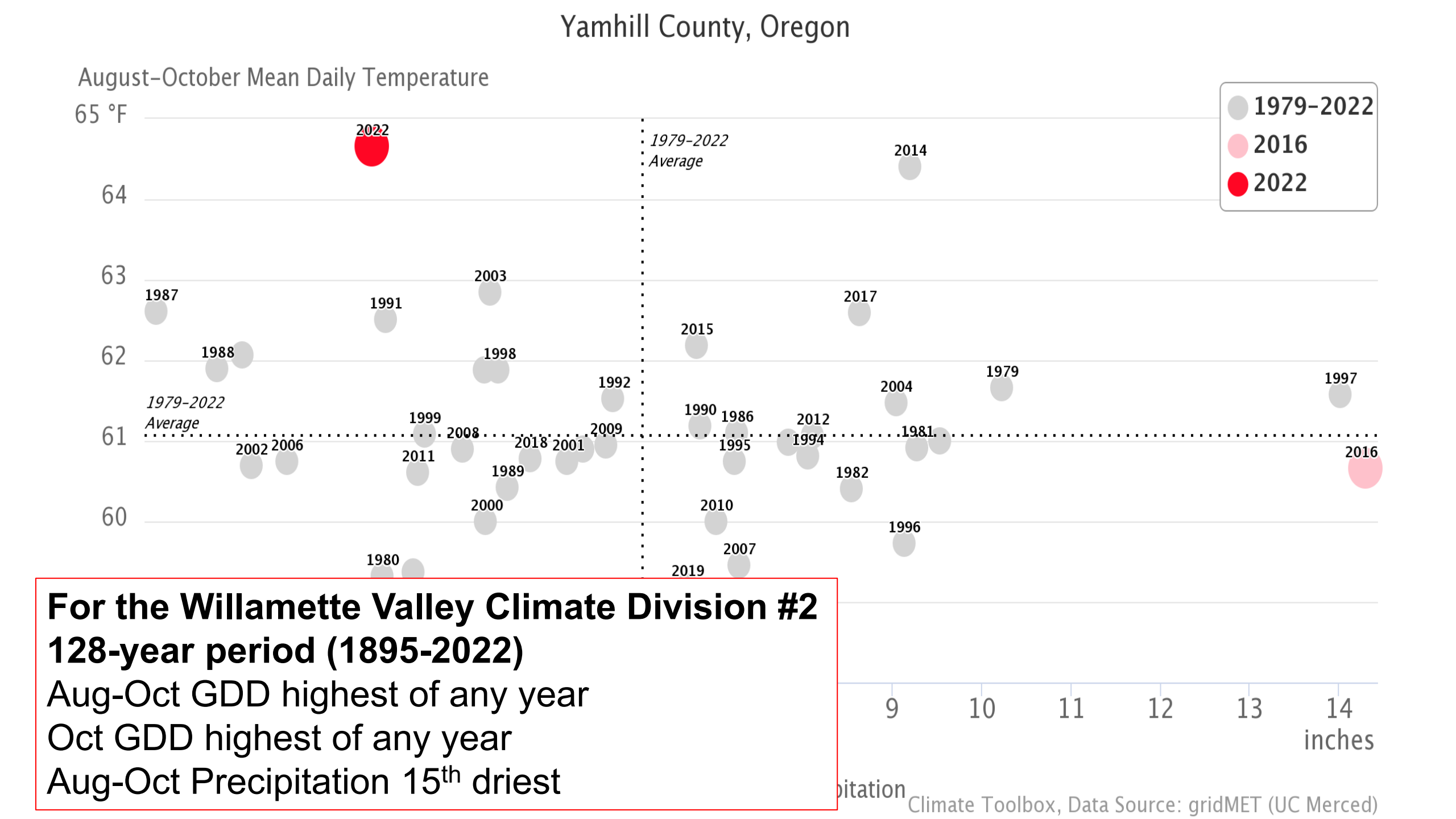


Western valley spring freeze dates (50% probability) show that many locations have early April to early May freeze probabilities:

- Salem – April 3
- Eugene – April 11
- McMinnville – April 15
- Forest Grove – April 16
- Dallas – April 16
- Elkton – April 16
- Cave Junction – May 1
- Applegate – May 4



For the Willamette Valley Climate Division #2
128-year period (1895-2022)
April-June GDD 38th lowest
April-June Precipitation 2nd wettest

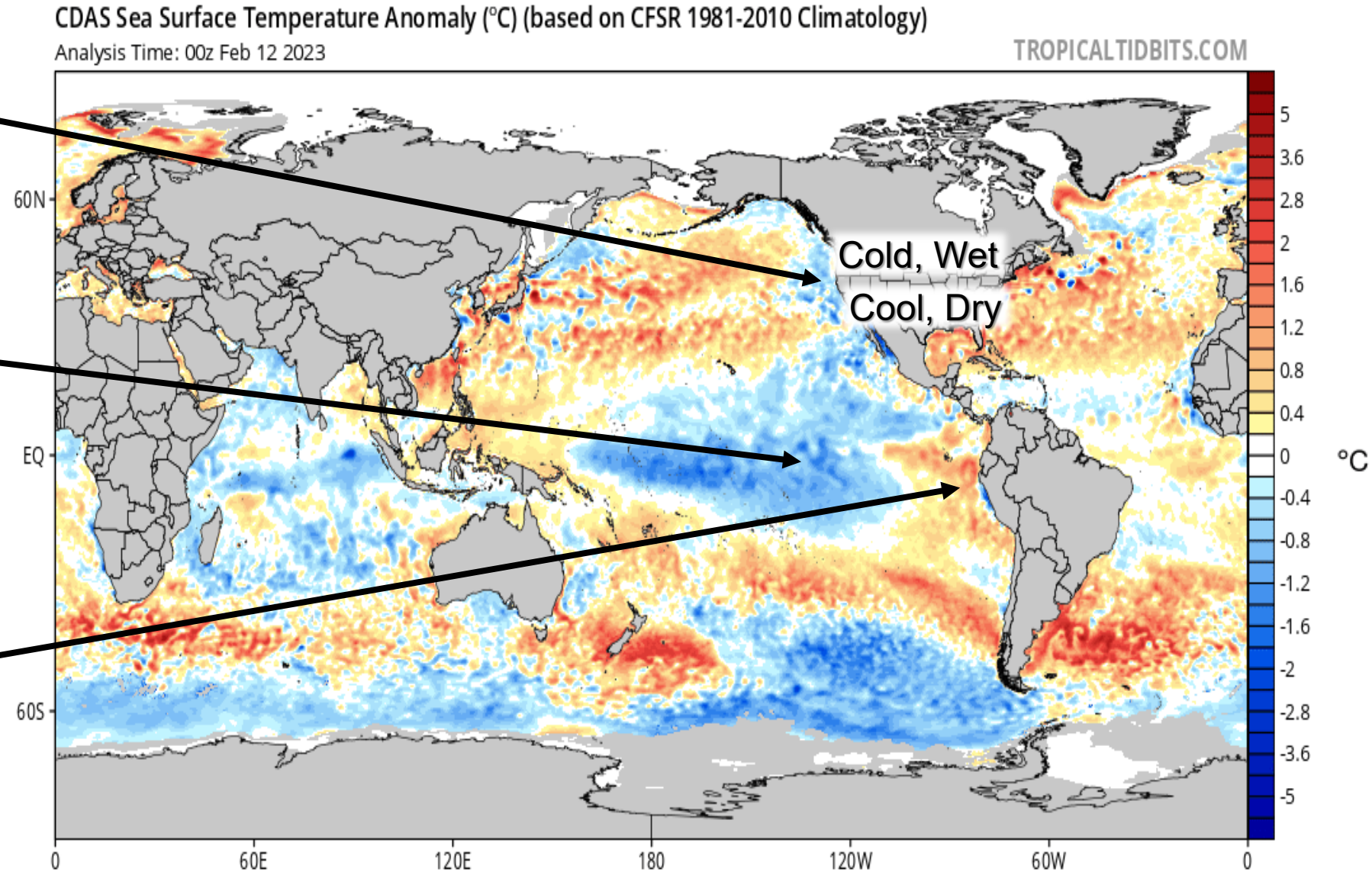


For the Willamette Valley Climate Division #2
128-year period (1895-2022)
Aug-Oct GDD highest of any year
Oct GDD highest of any year
Aug-Oct Precipitation 15th driest

Current Conditions

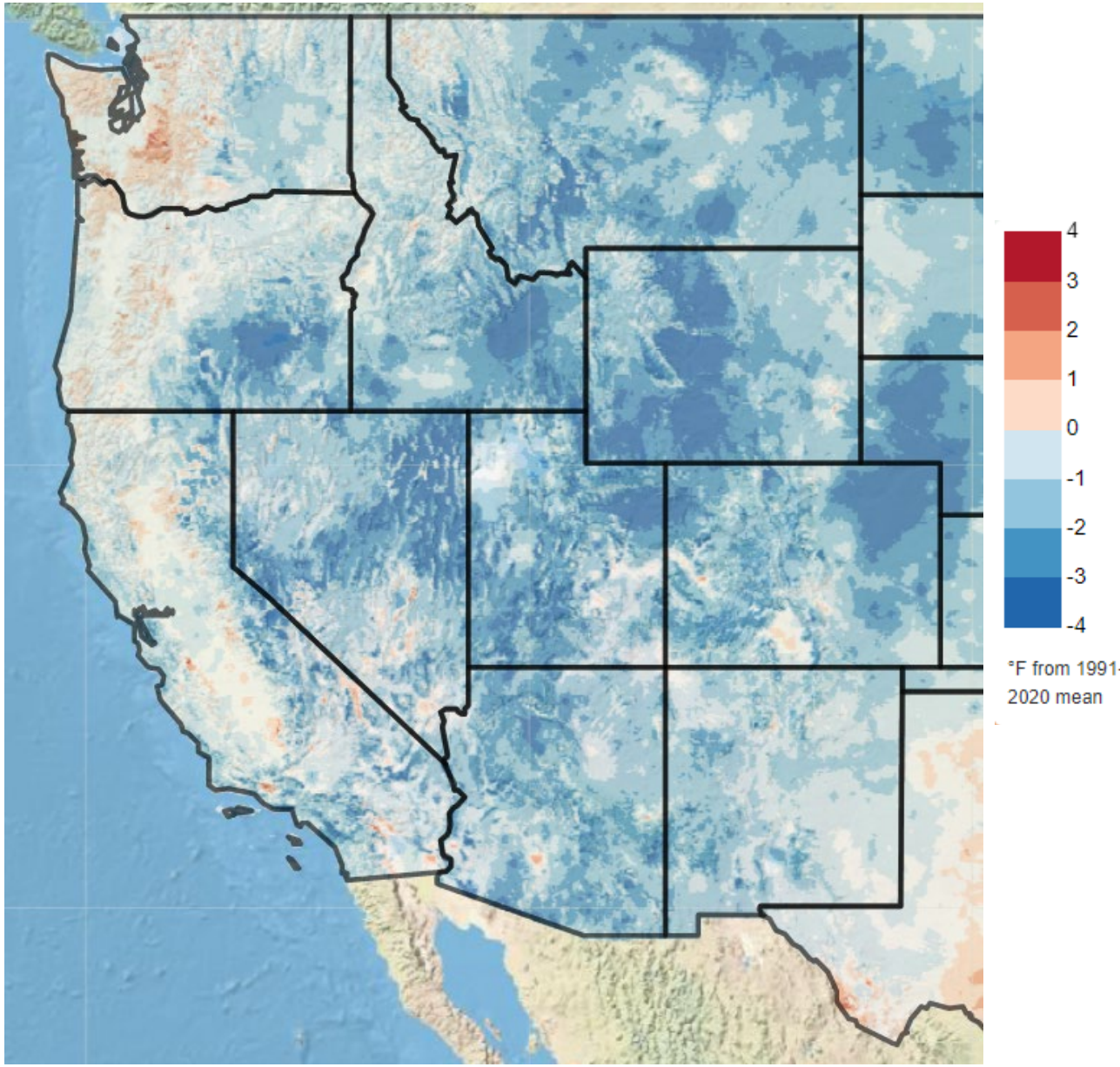
Current Sea Surface Temperatures

- Continued strong negative Pacific Decadal Oscillation (PDO) conditions
- Tropics in La Niña this winter, third winter in a row … rare
- PDO-La Niña in phase
- SSTs forecast to warm slowly into spring, shifting to ENSO neutral then ~60% chance of El Niño by late summer, fall



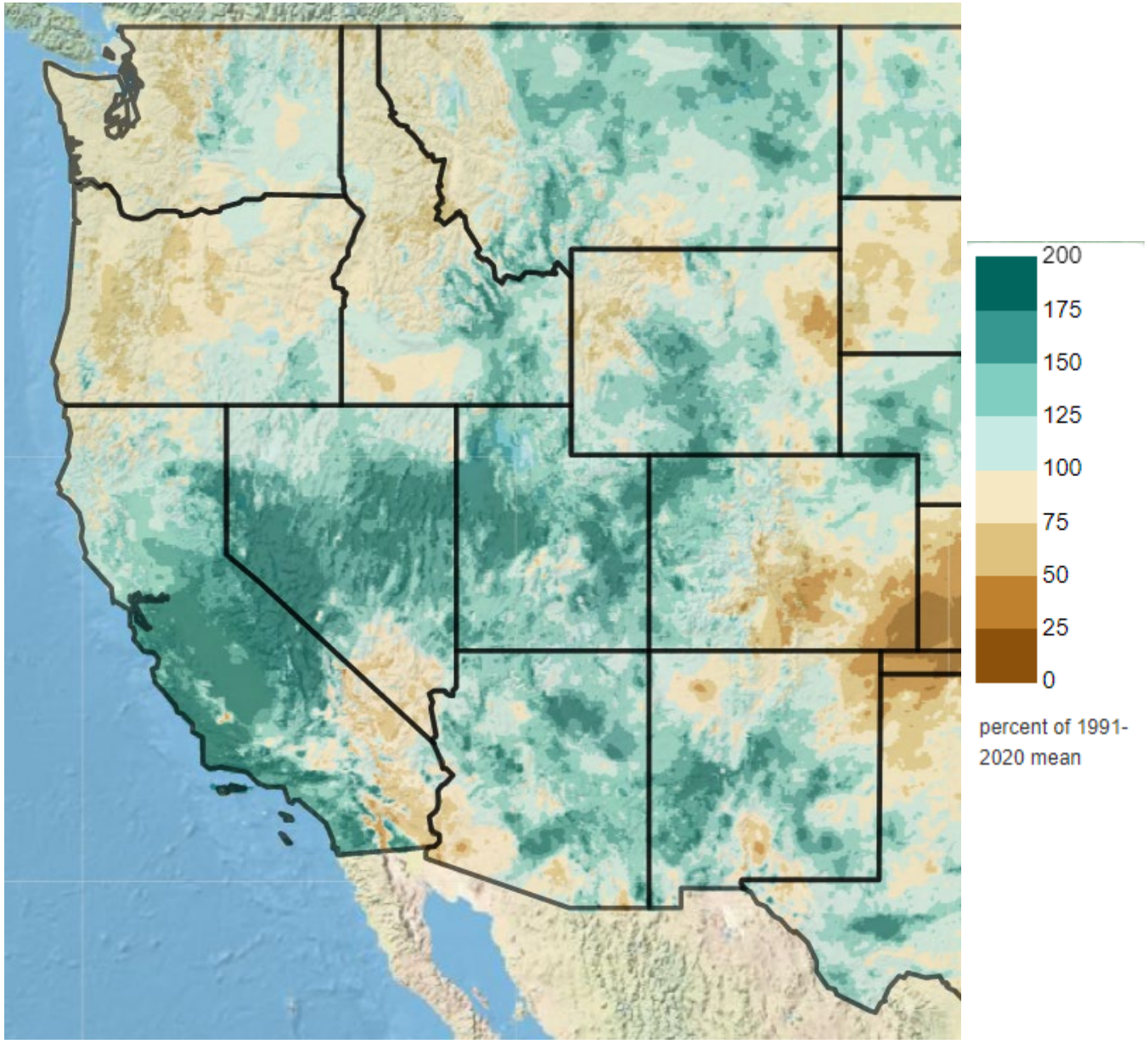
- Temperatures unlike those expected from a typical La Niña winter, large influence from the Arctic driving the differences

Water Year Mean Temperature Departure from Normal
Oct 1, 2022, to Feb 12, 2023



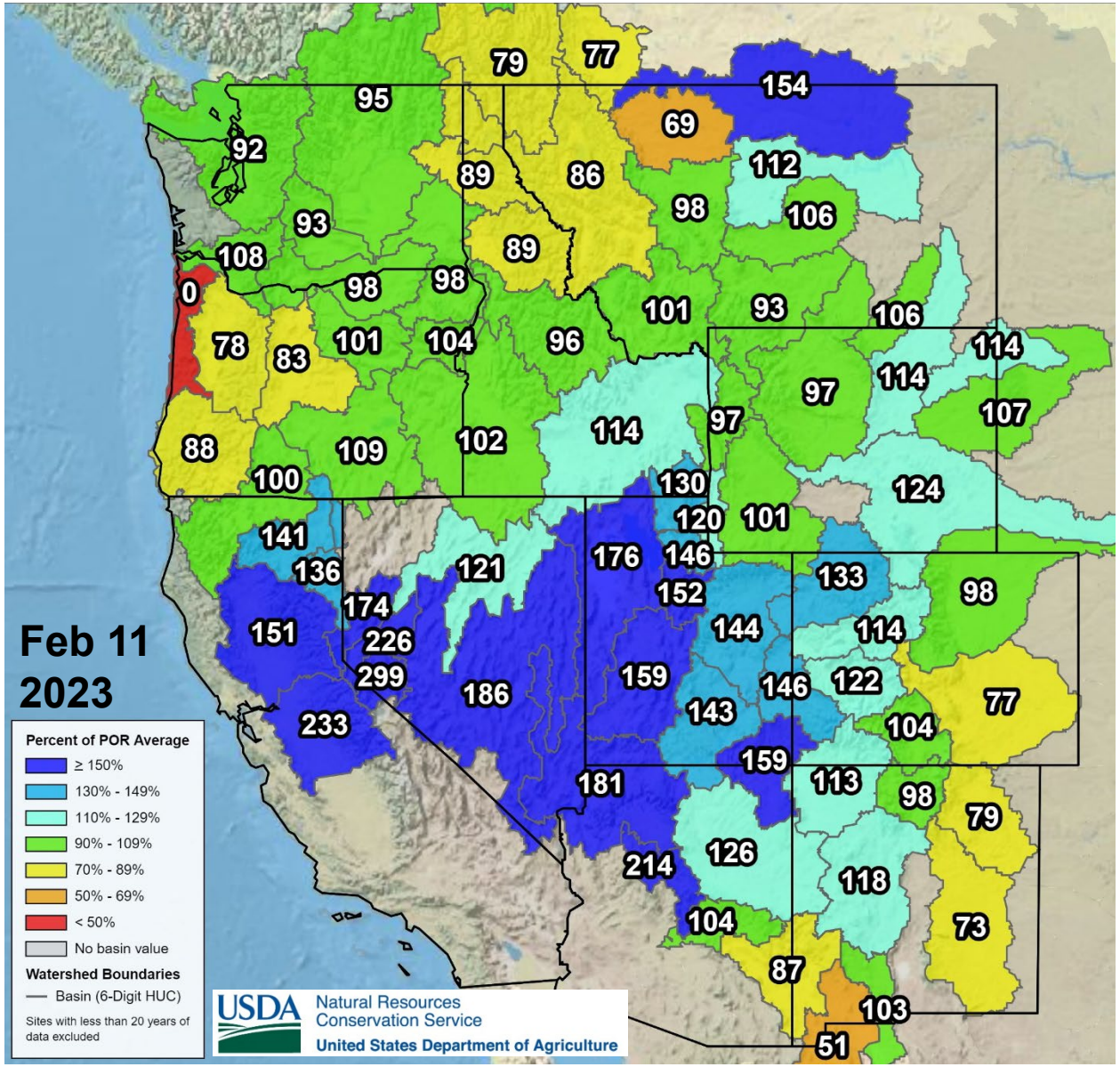
- Temperatures unlike those expected from a typical La Niña winter, large influence from the Arctic driving the differences
- Dry start for the PNW, 16 day run of atmospheric rivers flipped California, Basin, Rockies to wet

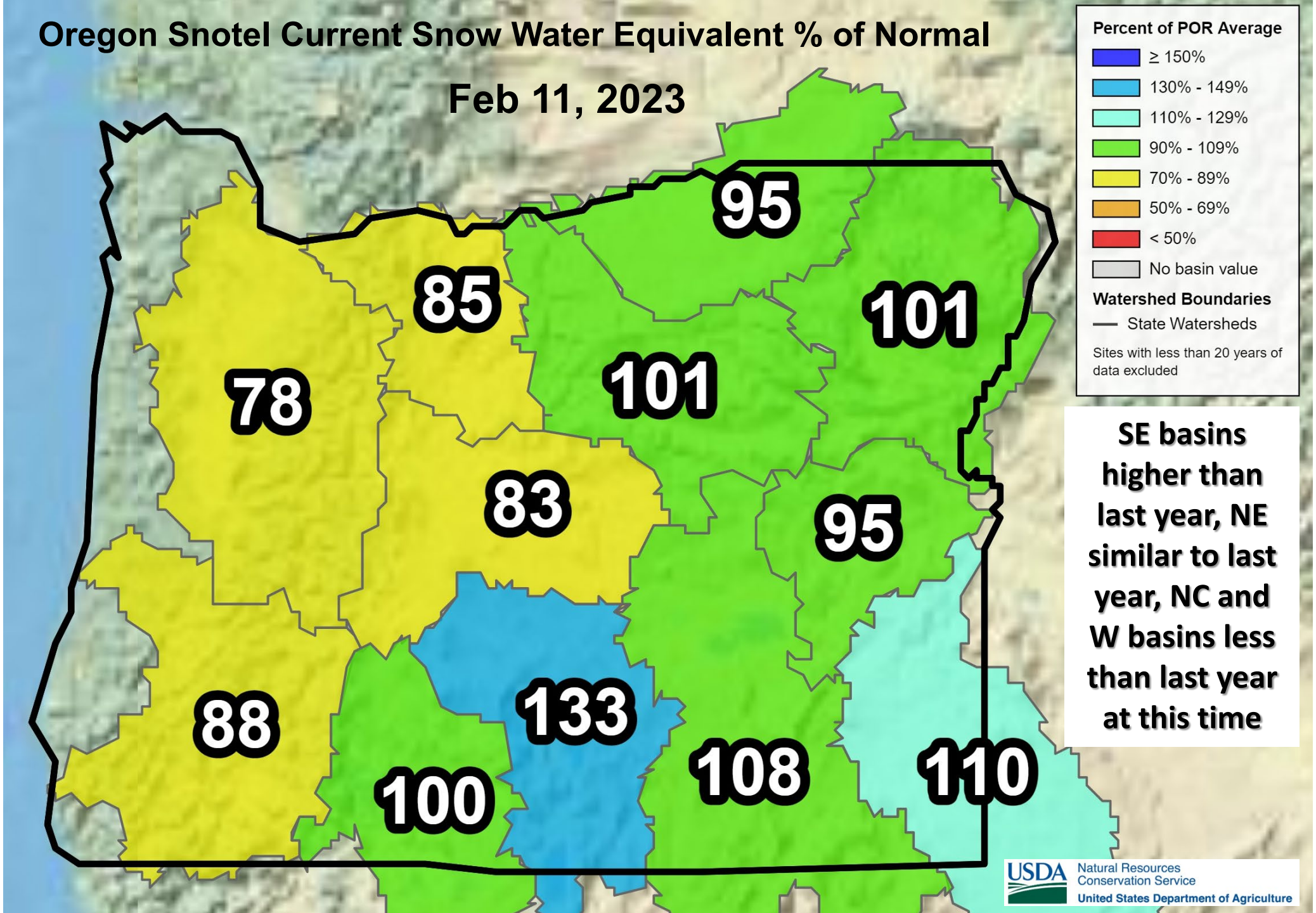
Water Year Precipitation % of Normal
Oct 1, 2022, to Feb 12, 2023



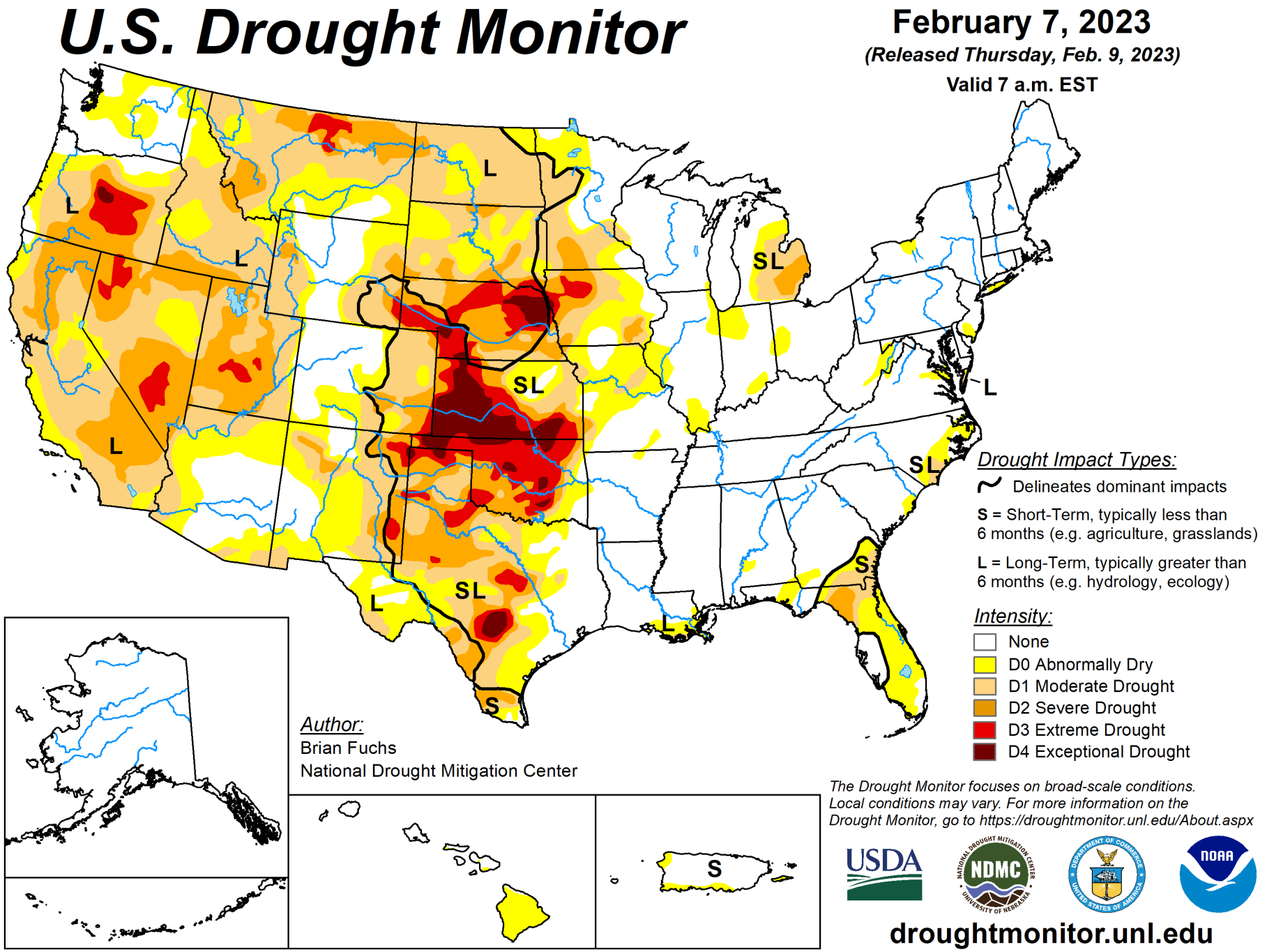
- Temperatures unlike those expected from a typical La Niña winter, large influence from the Arctic driving the differences
- Dry start for the PNW, 16 day run of atmospheric rivers flipped California, Basin, Rockies to wet
- Major recovery in SWE for California, the Basin, and the Rockies

Westwide Snotel Current Snow Water Equivalent % of Normal




Oregon Snotel Current Snow Water Equivalent % of Normal
Feb 11, 2023
Percent of POR Average
≥ 150%
130% - 149%
110% - 129%
90% - 109%
70% - 89%
50% - 69%
< 50%
No basin value
Watershed Boundaries
State Watersheds
Sites with less than 20 years of data excluded
95
85
101
78
101
83
95
88
133
108
110
100
SE basins higher than last year, NE similar to last year, NC and W basins less than last year at this time
USDA
Natural Resources Conservation Service
United States Department of Agriculture

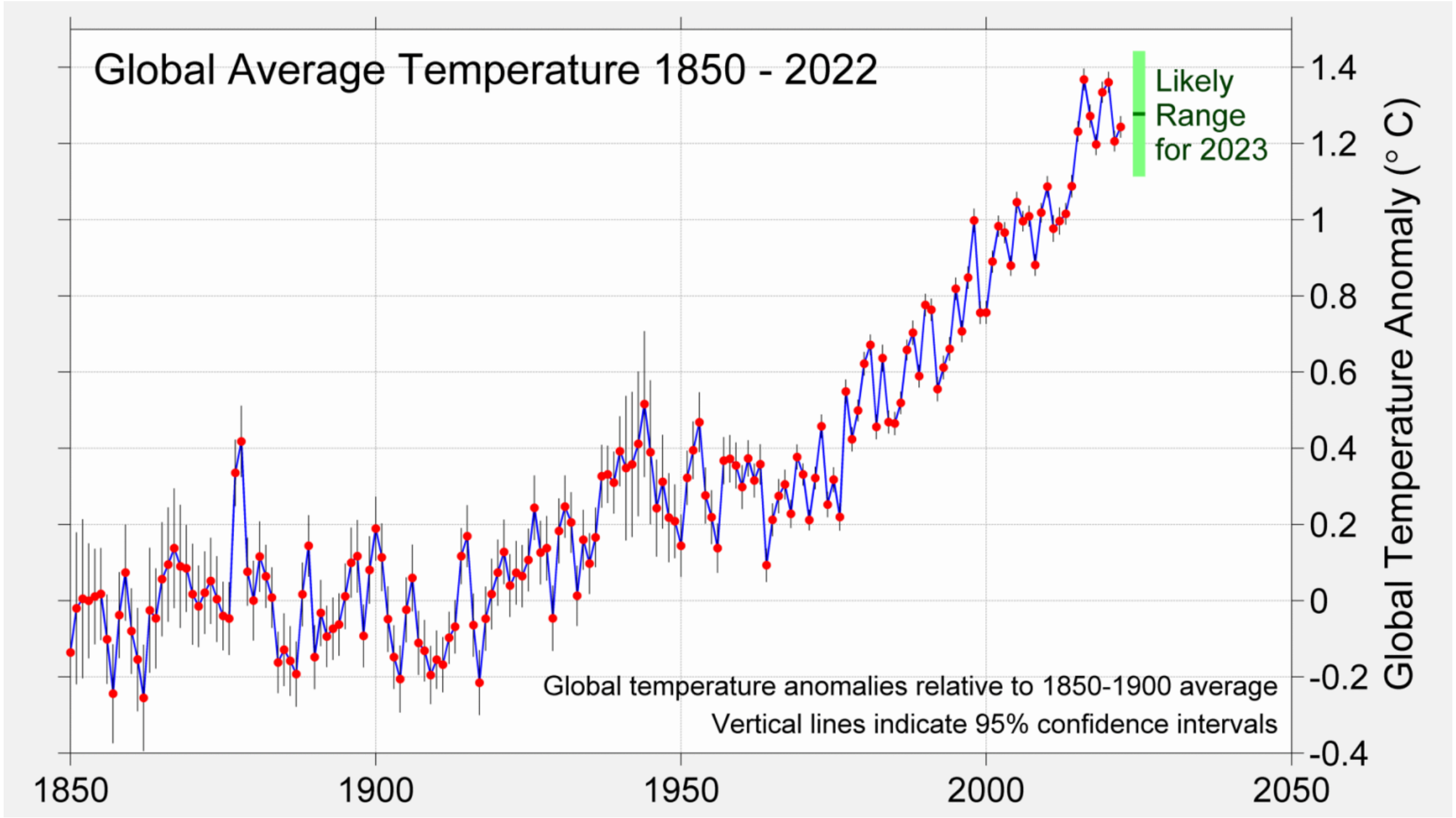
- Drought footprint in the west continues, but at lower severity
- 85% in some level of drought
- ~5% in extreme to exceptional drought
- Severity increased in Texas/Plains
- PNW likely to recover some more into spring



Summary and Forecast

Summary and Forecast

- 2023 likely as warm as the average year over last decade, even higher if a flip to El Niño occurs



Data from Berkeley Earth (www.BerkeleyEarth.org)

Summary and Forecast

- 2023 likely as warm as the average year over last decade, even higher if a flip to El Niño occurs
- Climate system likely to continue with substantial variability in weather/climate factors

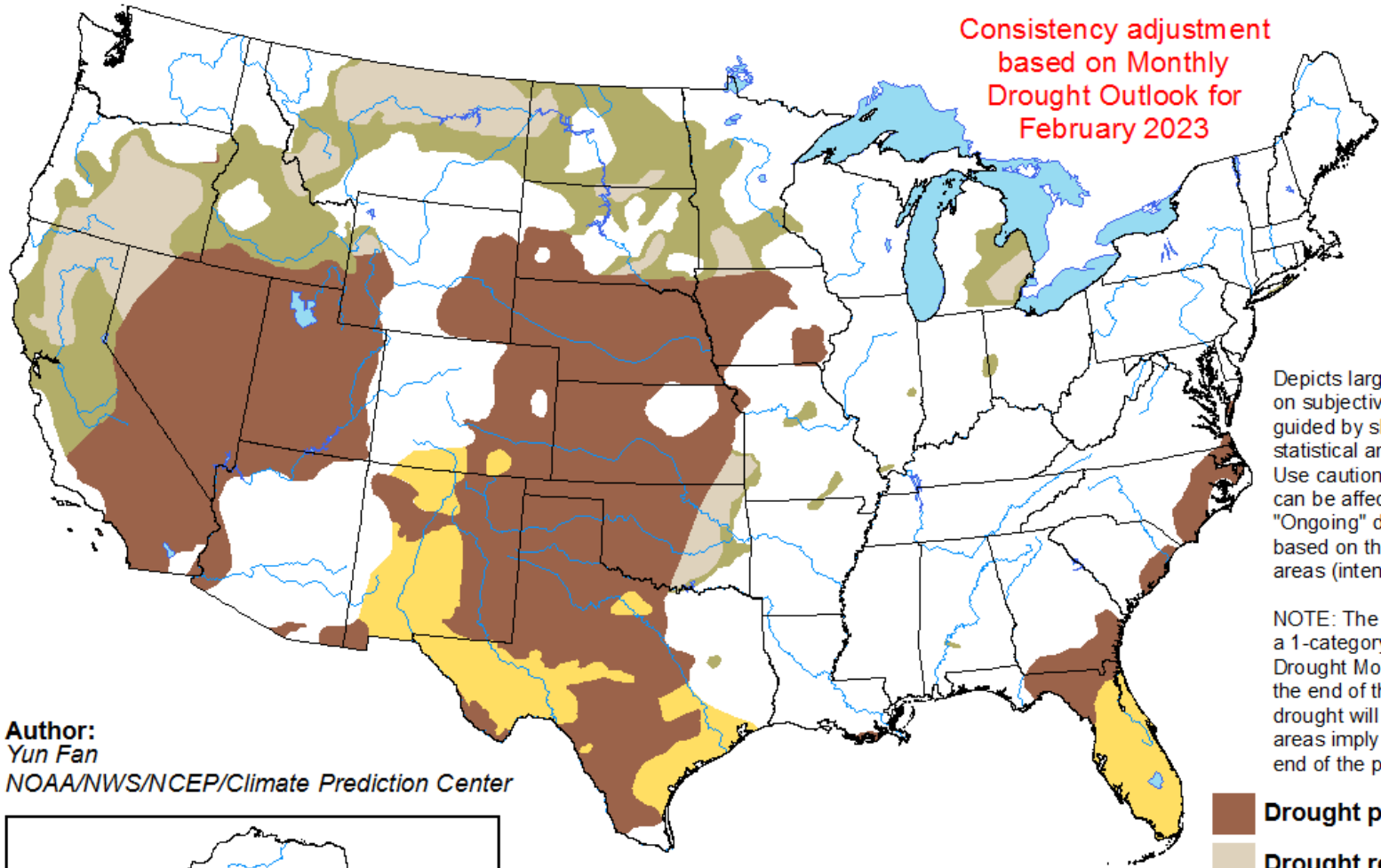
Summary and Forecast

- Spatial extent of drought in the west has declined and severity is lower
- Continued improvement from central California into the PNW, drought likely continuing south and eastward into the Plains/Texas

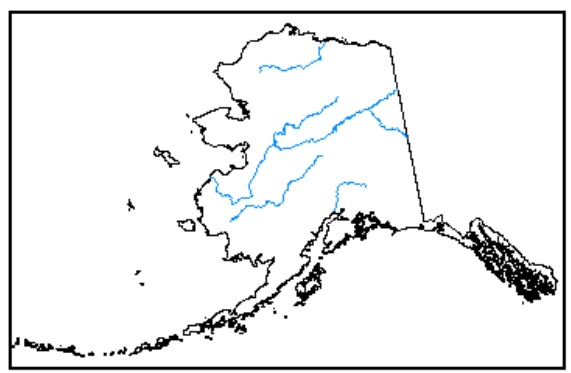
U.S. Seasonal Drought Outlook

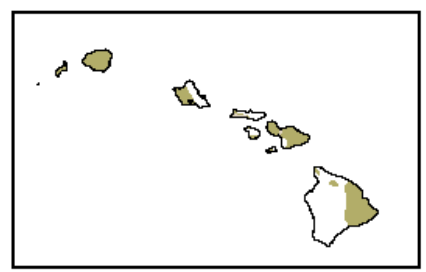
Drought Tendency During the Valid Period

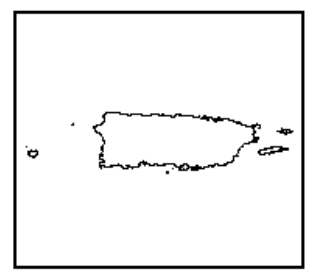
Valid for February 1 - April 30, 2023
Released January 31, 2023



Author:
Yun Fan
NOAA/NWS/NCEP/Climate Prediction Center







Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

- **Drought persists**
- **Drought remains but improves**
- **Drought removal likely**
- **Drought development likely**

http://go.usa.gov/3eZ73

Summary and Forecast

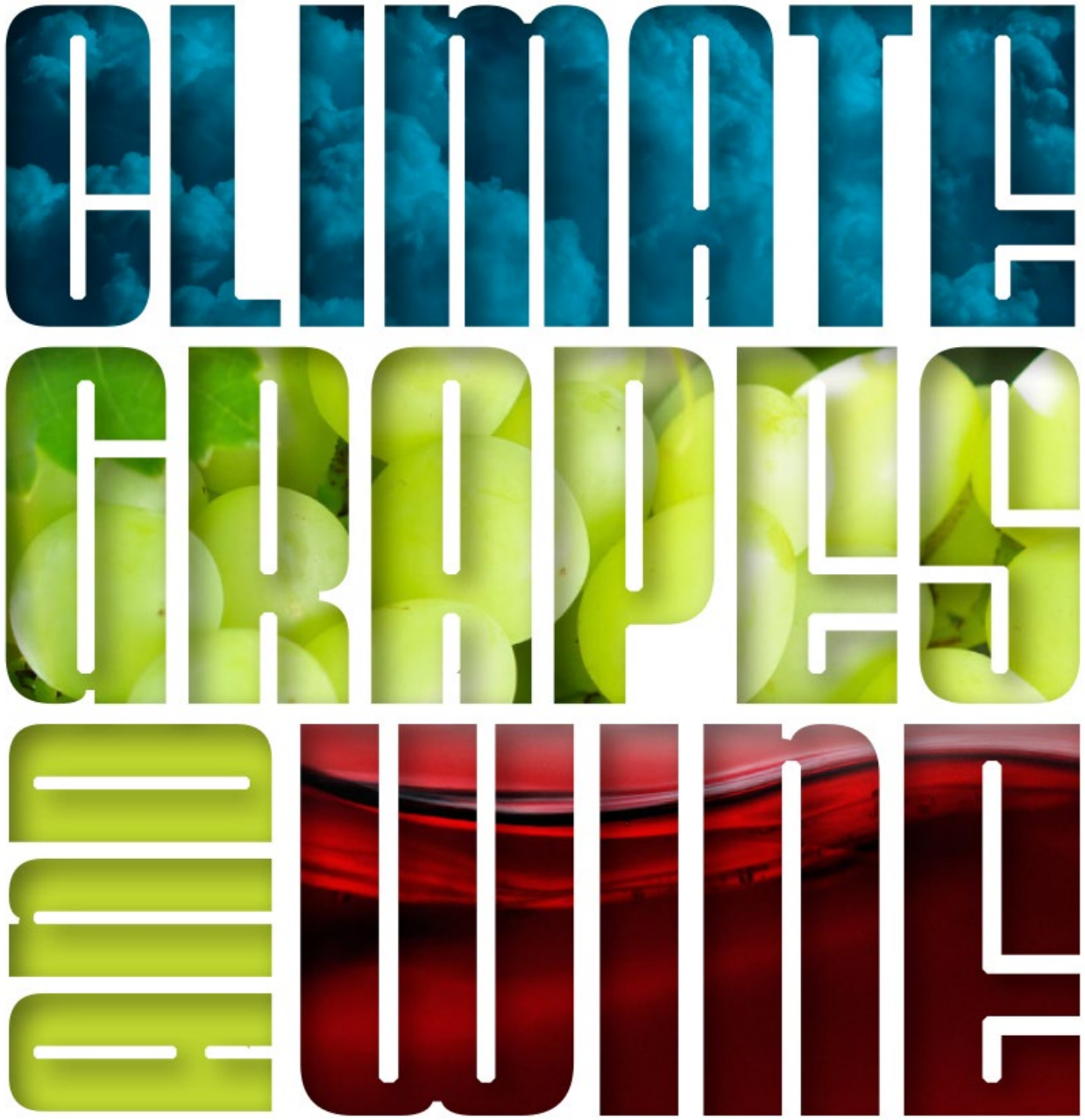
- Spatial extent of drought in the west has declined and severity is lower
- Continued improvement from central California into the PNW, drought likely continuing south and eastward into the Plains/Texas
- Extreme Arctic warming likely to continue influencing greater mid-latitude climate variability

Spring/Summer 2023 Forecast

- Three year La Niña likely to shift to neutral then El Niño
- North Pacific SST likely to stay cooler than average along the coast of North America
- Current conditions and forecast models tilt the odds in favor of;
  - PNW cooler than average temperatures late winter through spring, average precipitation through spring
  - California average to warm through spring, with near average to below average precipitation spring

Spring/Summer 2023 Forecast

- Same as last year …. spring frost frequency and severity higher in the PNW and near average California during years with these current and forecasted conditions
- Early models are showing that temperatures in the summer will be like those of the last few years in the west
- Drought concerns should ease some more across most of the PNW and northern California; rest of California, Basin, Rockies, and southwest likely to lapse back into moderate to extreme drought through the summer



Thank You!

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www.climateofwine.com

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