

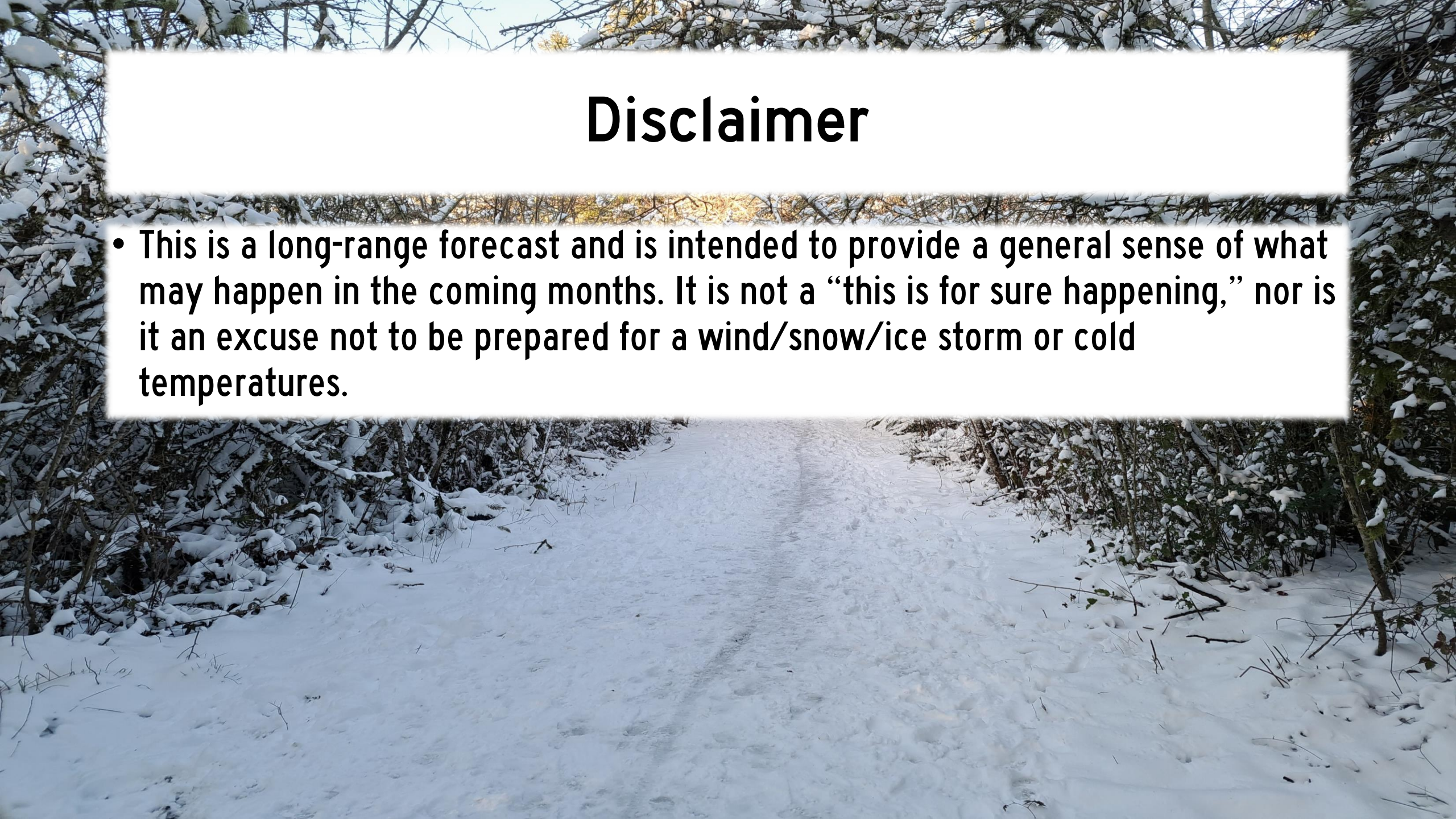
2024-25 Willamette Valley Winter Weather Predictions

















By: Tanis Leach

Disclaimer

- This is a long-range forecast and is intended to provide a general sense of what may happen in the coming months. It is not a “this is for sure happening,” nor is it an excuse not to be prepared for a wind/snow/ice storm or cold temperatures.



2023-24 Scorecard

Predictions	Actual/Projected	Oct	Dec
Water Year Rain: 31-39" (Dec: 33-41") Winter less than 14.97"	39.9"		
Average Temperature Departure: Within 1.5°F of Average Dec: 0-3°F above average	1.7°F Above Average		
Lowest Winter Temperature: >20°F	15°F		
Peak Wind Gust: 45-55 mph December Update: <49 mph	47 MPH		
Most Active Time: December Dec Update: Dec 25 to Jan 25, Mar 1-10	Jan 9-20 th , March 1 st -10 th		
April 1 st Snow Depth: 75-110% of normal December Update: 60-100% of normal	~85% Basin, 84% at the Snowtel. 70-100% at lower elevations		
Valley Snowfall: 0-3" (1-5" in Central/South Valley) December Update: 0-3" entire valley.	Portland: 1.6 in. Eugene: 1.4 in. All Valley Average (Population Weighted): 2.69 inches		

Methodology

- **Adjusted analog year approach using:**
 - ENSO via the Oceanic Nino Index (ONI) and confirmed using the Southern Oscillation Index (SOI).
 - ~~Pacific and Atlantic Multidecadal Oscillation (PDO and AMO).~~
 - Quasi-Biannual Index (QBO) (Note: This is experimental for at least this year)
 - Sunspot Count.
 - **Analogs are not weighted equally. Analogs closer to this year's conditions have a higher weighting.**
- **Adjustments to analog years made using statistical analysis (since 1940):**
 - If there is a statistically likely/unlikely chance (90%) of something occurring, analogs will be adjusted unless there is a clear trend in the analog years showing the opposite.
 - General trends based on the previous season when appropriate.
- **Snow before the 1970s has been adjusted to a 4.3-inch average per winter on analogs.**
- **Temperature departures adjusted to averages at the time they occurred.**
- **All forecasts will cover what has happened in 1 out of 3 winters at the Portland Airport.**
- **Analogs now go back to 1872.**

A photograph of a snowy forest path. The path is covered in a thick layer of snow, with some footprints visible. The surrounding trees and bushes are heavily laden with snow, creating a dense, white canopy. The background shows a bright, hazy light, possibly from the sun, filtering through the trees. A white rectangular box with a black border is centered over the path, containing the text "Data and Oscillations" in a bold, black, sans-serif font.

Data and Oscillations

ENSO Outlook: The US's Look

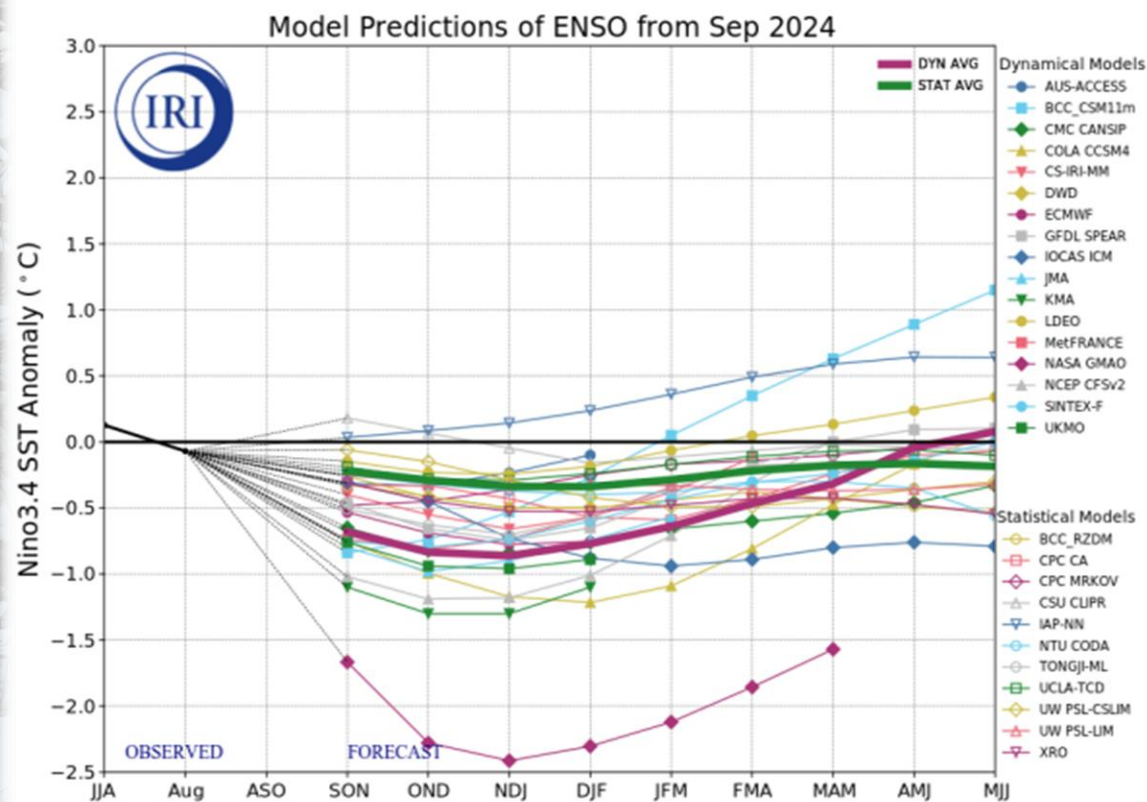
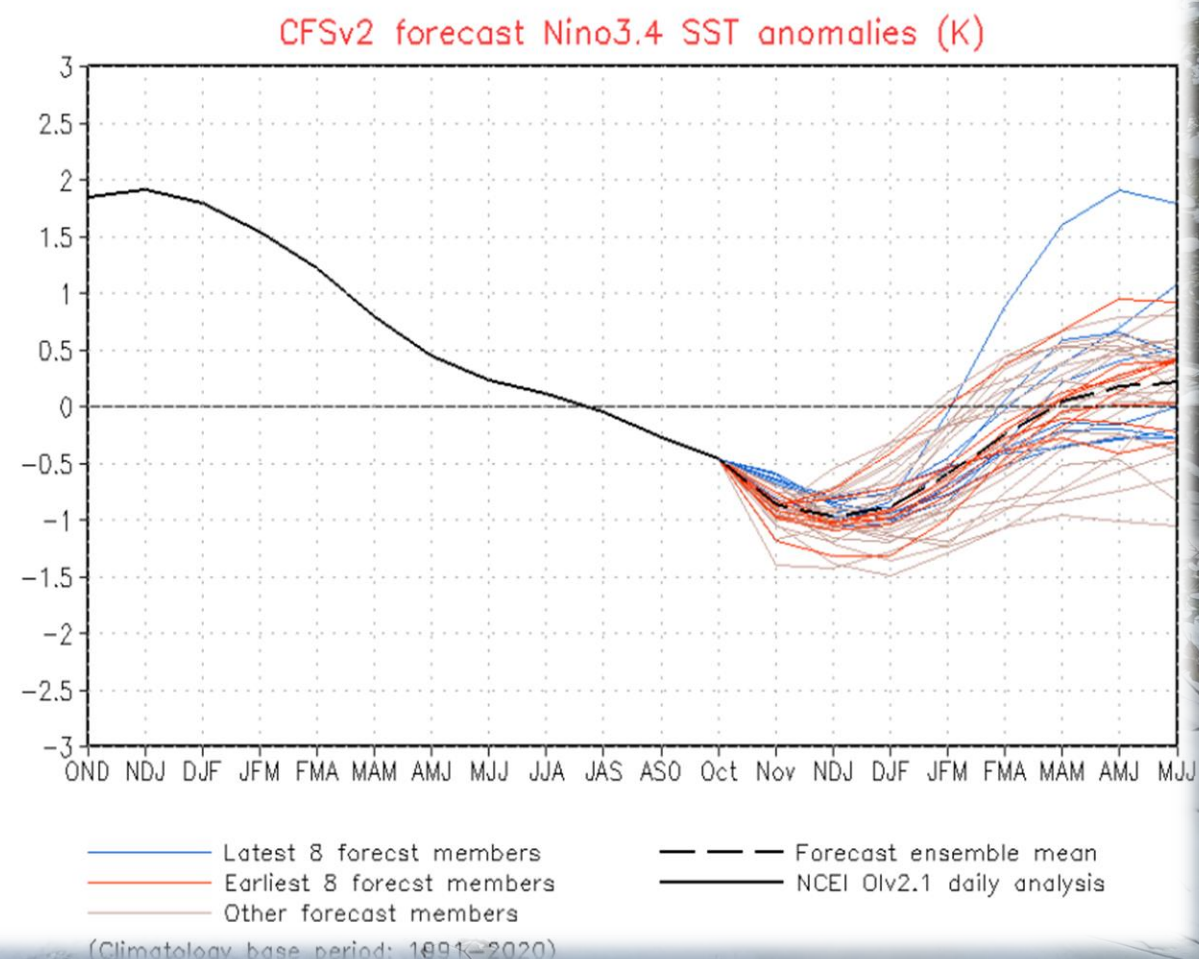


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 19 September 2024).

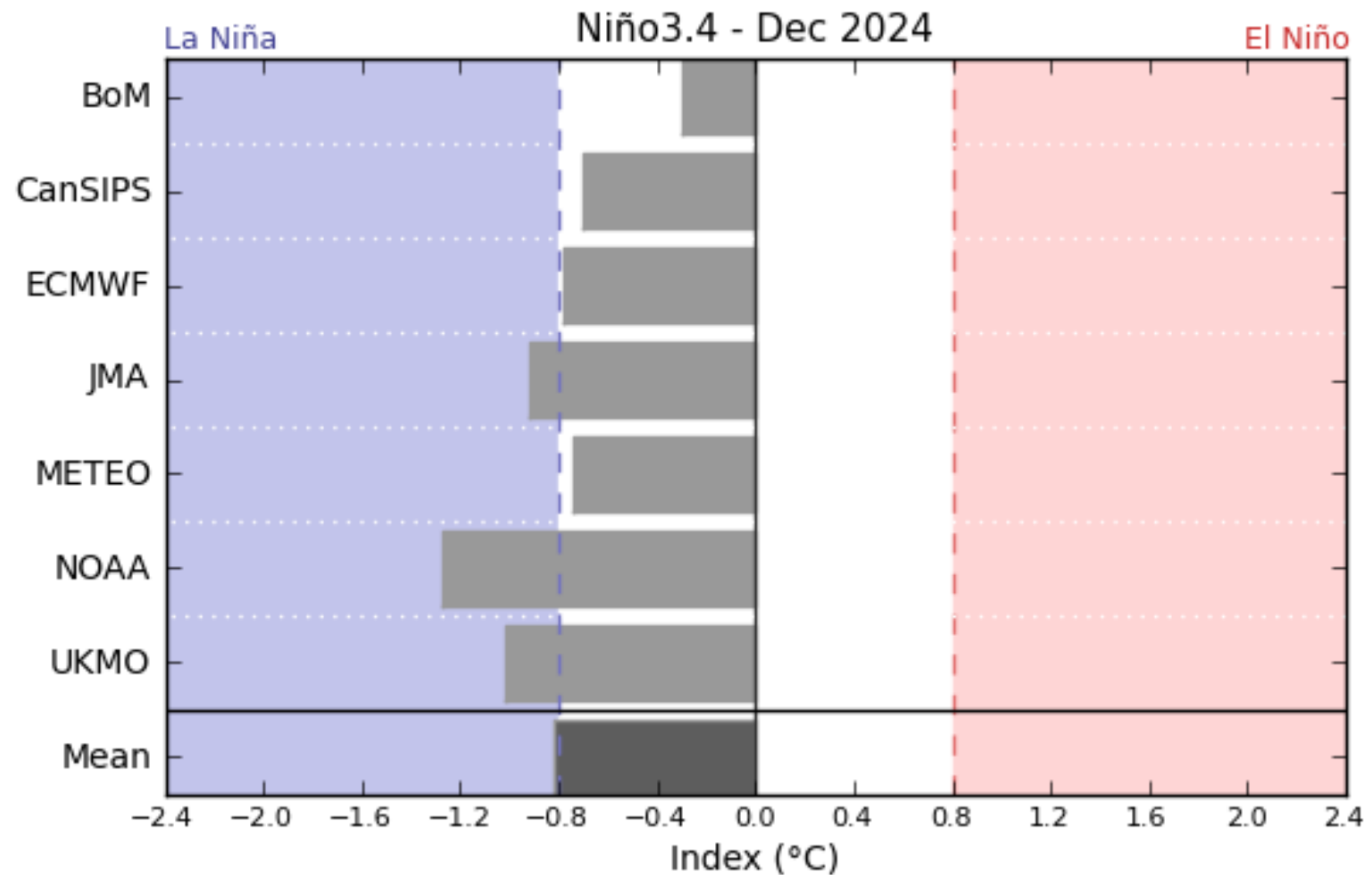


NWS/NCEP/CPC

Last update: Mon Oct 14 2024
Initial conditions: 40Oct2024-13Oct2024

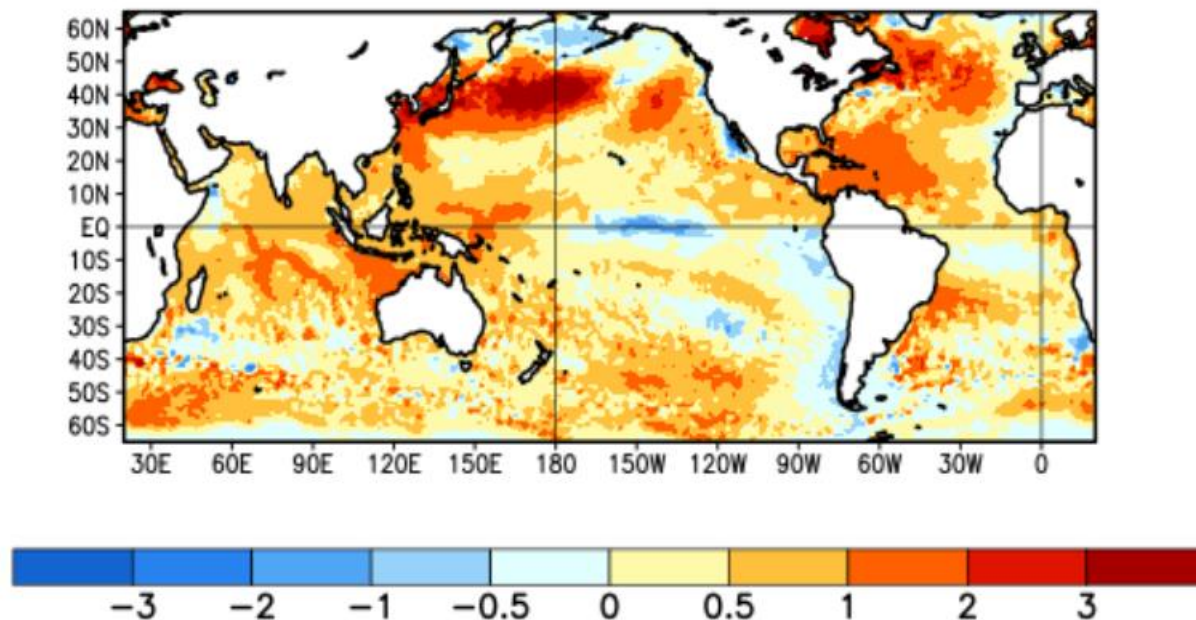


ENSO Outlook: The World's Look



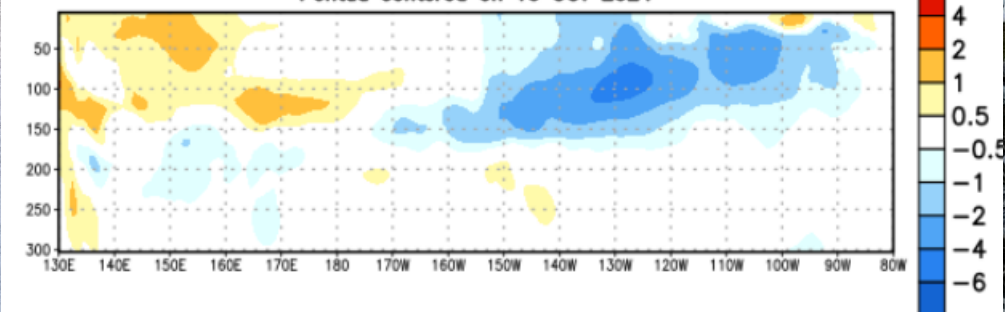
Ocean Temperatures: At the Surface

Average SST Anomalies
15 SEP 2024 – 12 OCT 2024



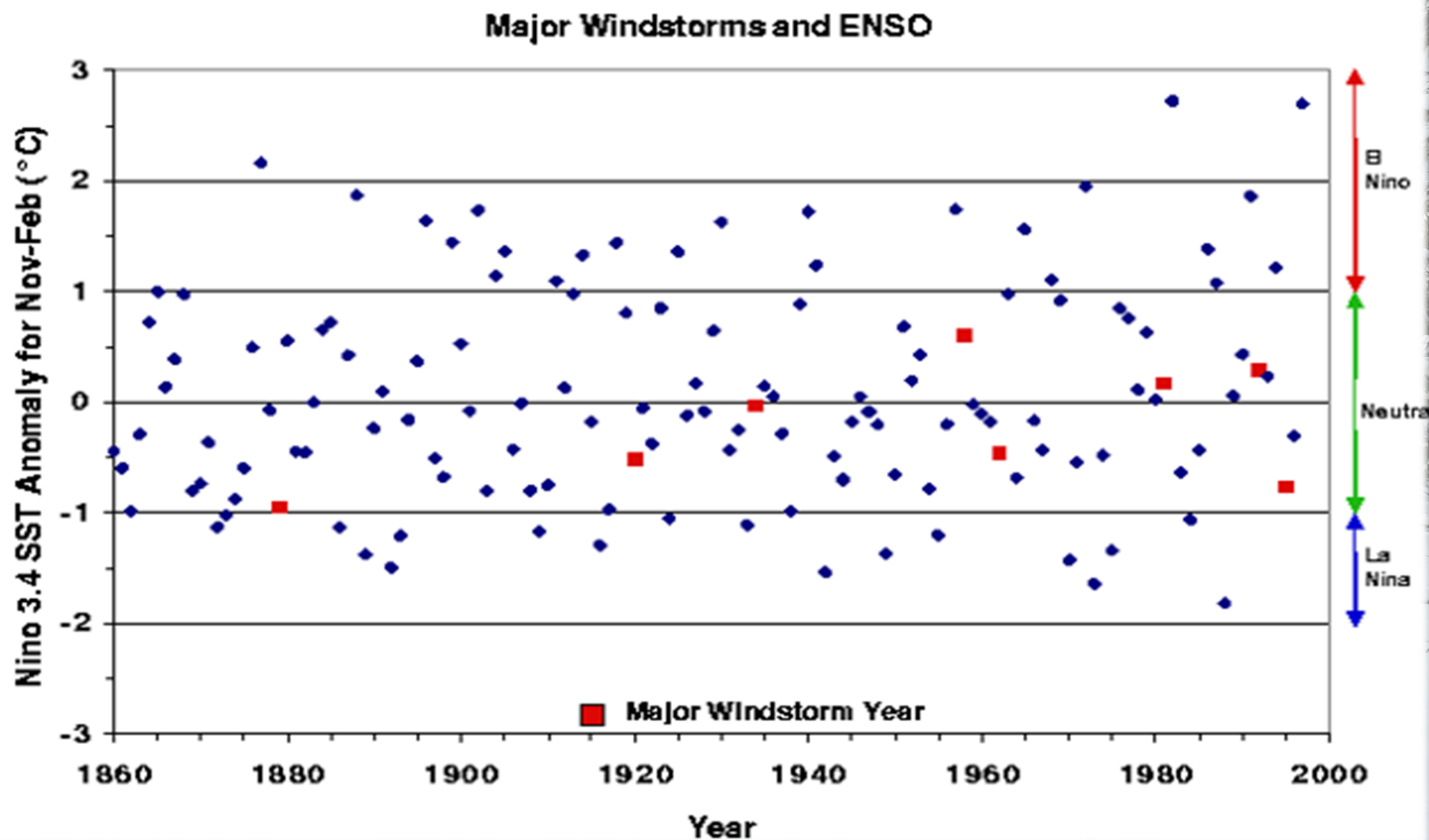
EQ. Subsurface Temperature Anomalies (deg C)

Pentad centered on 10 OCT 2024



Most recent pentad analysis

Major Windstorms and ENSO



What Happens During These ENSO States

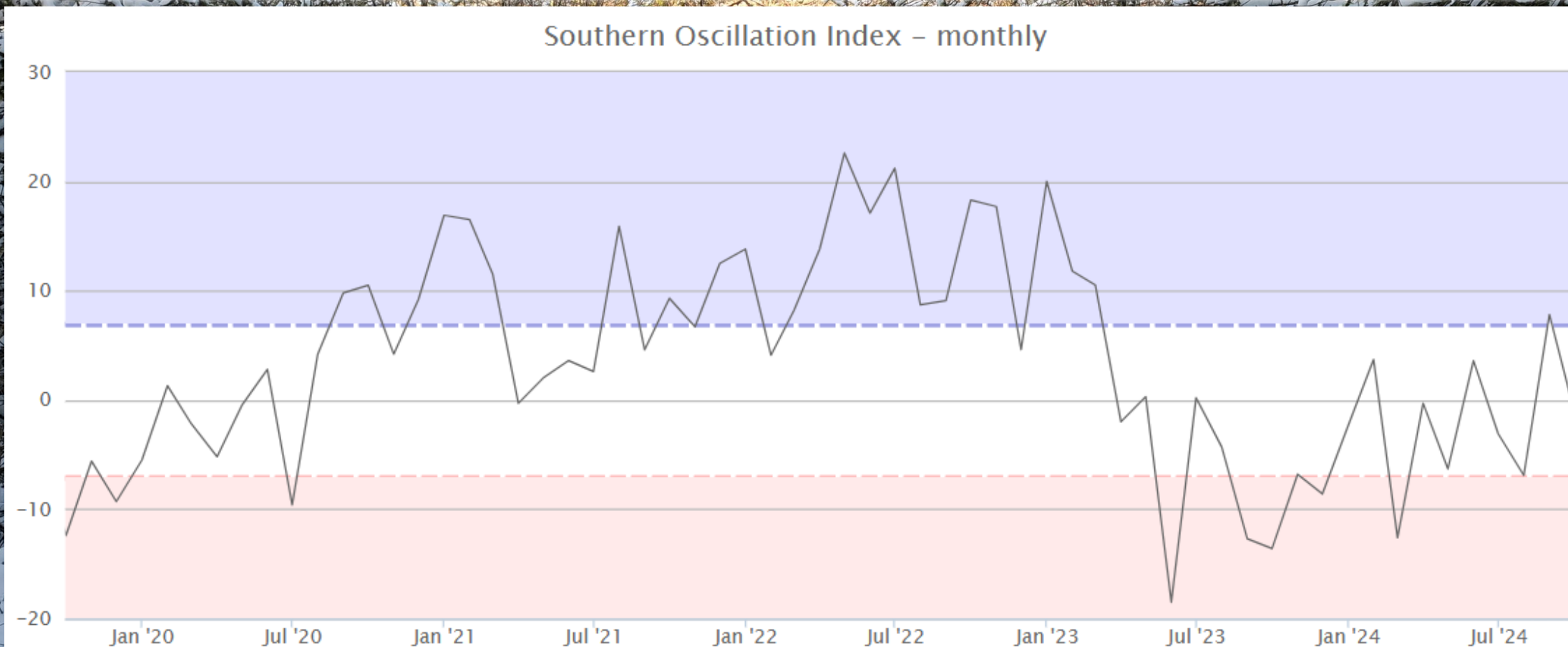
Neutral

- Median snowfall 2.6 inches
- Average temperature (decade adjusted): -0.06°F .
- Median lowest temperature: 19°F
- Water year rainfall median: 32.5" at PDX
- Typical Mountain snowfall.

Weak La Ninas

- Snowiest ENSO state, with a median of 7.3" (adjusted)
- Average temperature (decade adjusted): -0.64°F .
- Median Lowest temperature: 17°F
- Water year rainfall median: 38.44" at PDX
 - The driest water year was a weak La Nina.
- 115% of Mountain Snowfall.

Southern Oscillation Index: Last 5 Years



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Last 12 months

Last 5 years

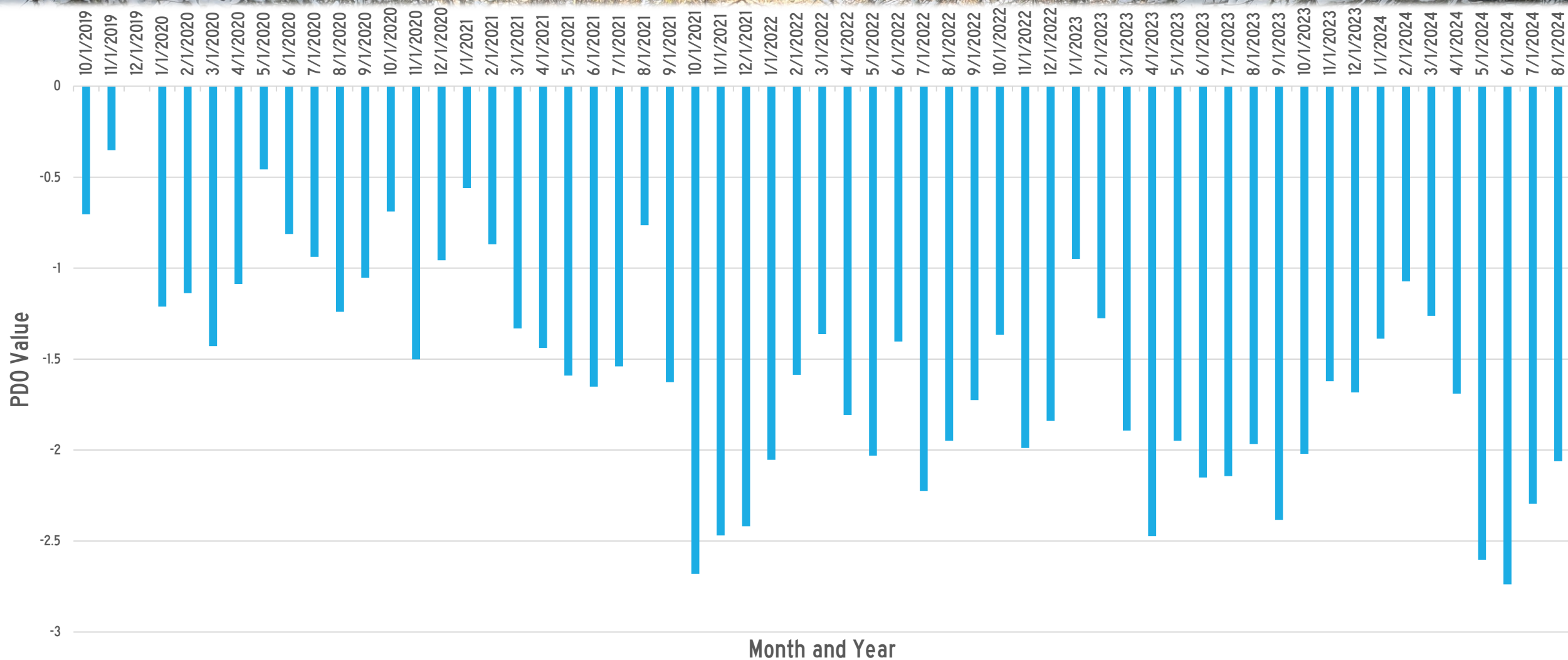
Last 10 years

Last 20 years

Last 50 years

All years

PD0: Last 5 Years



AMO.....



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Climate Timeseries

AMO (Atlantic Multidecadal Oscillation) Index

The AMO is currently not updated due to the source dataset (Kaplan SST) not being updated. We apologize for the inconvenience. NOAA/NCEI has a [time-series of the AMO](#) based on the NOAA ERSSTV5. NCAR has [AMO code](#). Note their definition removes the global mean.

Description:

The timeseries are calculated from the [Kaplan SST dataset](#) which is updated monthly. It is basically an index of the N Atlantic temperatures. Time series are created; a smoothed version and an unsmoothed version. In addition, two files starting at 1948 are produced to be used in the [Correlation](#) webpages.

Time Interval: Monthly

Time Coverage: 1856 to Jan 2023

Update Status: updated monthly

Get Data:

[AMO unsmooth, long: Standard PSL Format](#) ([What is standard format?](#))

[AMO smoothed, long.](#)

[AMO unsmoothed, short \(1948 to Jan 2023\).](#)

[AMO smoothed, short \(1948 to Jan 2023\).](#)

Source:

Timeseries is calculated at NOAA NCEI



Search



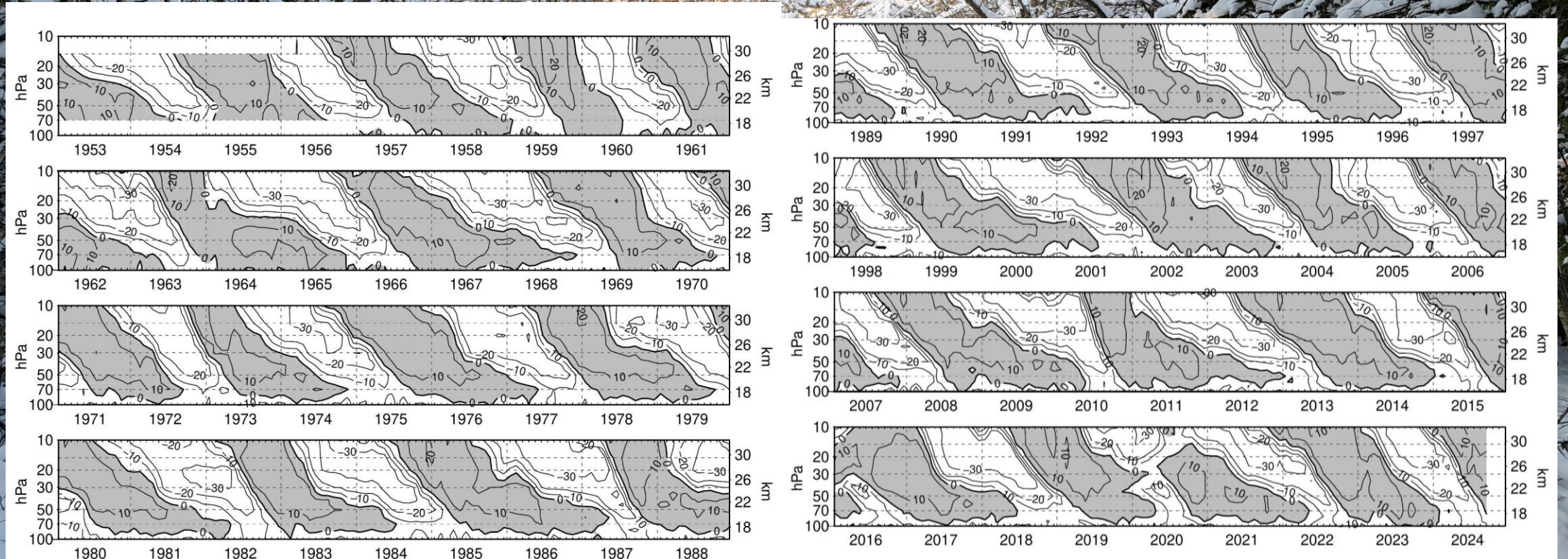
12:54 AM
10/14/2024



QBO: A Primer

- The QBO is on average a 27-month cycle measuring winds between 10mb and 100mb in the upper atmosphere divided into 2 phases:
 - The Westerly Phase produces heightened odds of below-normal temperatures, arctic blasts, and slightly higher-than-normal precipitation.
 - The Easterly Phase produces above-normal temperatures and slightly below-normal precipitation. Increased chance of sudden stratospheric warming events.
- Slightly more often in the westerly phase, but the easterly phase tends to be stronger.

QBO Values



Sunspot Count

ISES Solar Cycle Sunspot Number Progression



A photograph of a winter forest scene. A path covered in snow leads from the bottom center towards the background. The path is flanked by dense, snow-laden branches and trees. The branches are dark and intricate, creating a complex web of lines against the lighter background. The snow is a bright, clean white, covering the ground and the branches. In the background, some evergreen trees are visible, their needles also covered in snow. The overall atmosphere is quiet and serene. A white rectangular box is superimposed over the middle of the image, containing the text "Analog Years and Statistics" in a bold, black, sans-serif font.

Analog Years and Statistics

Analog Years

- 1878-79
- **1886-87**
- 1889-90
- 1897-98
- 1903-04
- 1906-07
- 1912-13
- **1915-16**

- 1924-25
- 1931-32
- 1942-43
- 1947-48
- 1964-65
- **1966-67**
- 1973-74
- 1983-84

- 1988-89
- **1992-93**
- 1995-96
- 1998-99
- 2003-04
- 2010-11
- **2016-17**

Top analog Year

Top Analog Year Comparisons Pre-1950

	1886-87	1915-16	2024-25
La Nina Strength	Moderate	Super Cold Neutral	Weak
PDO	Negative	Flip to Negative	Negative
Sunspot progression	65%	70%	45%

Top Analog Year Comparisons Since 1950

	1966-67	1992-93	2016-17	2024-25
La Nina Strength	Cold Neutral	Neutral	Weak	Weak
PDO	Neutral (Negative Tilt)	Positive	Neutral	Negative
QBO	Transitioning to Westerly	Transitioning to Westerly	Transitioning to Westerly	Transitioning to Westerly
Sunspot progression	27%	78%	70%	45%

Top Analog Year Extreme Events Pre-1950

1886-87

- 2nd warmest December day downtown at 65°F on the 13th.
 - Not due to an atmospheric river.
- Early February major arctic blast.
 - February 3rd high of 16°F, low of 9°F the next morning.
 - 6 days in a row failing to go above freezing (would be 5 in today's climate).
 - 11.4 inches of snow in the blast alone (plus another 7.5 inches in more marginal setups later in the month).

1915-16

- Two Major Arctic Blasts. Portland's January average temperature was 29.7°F
- Early January Blast:
 - 7 days in a row at or below 30°F highs in PDX.
 - Eugene didn't stay consistently below 32°F
 - 11.2" of snow at PDX, 6.7" of snow at EUG.
- Late January to Early February Blast:
 - Another 7 days failing to get above freezing at PDX.
 - 26.8" of snow at PDX (plus unknown ice and flooding).
 - Eugene dodged most of the cold/snow/ice, except one day with 7.3".
- March 4th, 1916 in Eugene: 10.7" inches of snow.
 - Marginal setup, likely wouldn't happen today.
- Hyperactive Water Year: 56.42" Downtown Portland, 55.96" in Eugene.

Top Analog Year Extreme Events Since-1950

1966-67

- Dud.

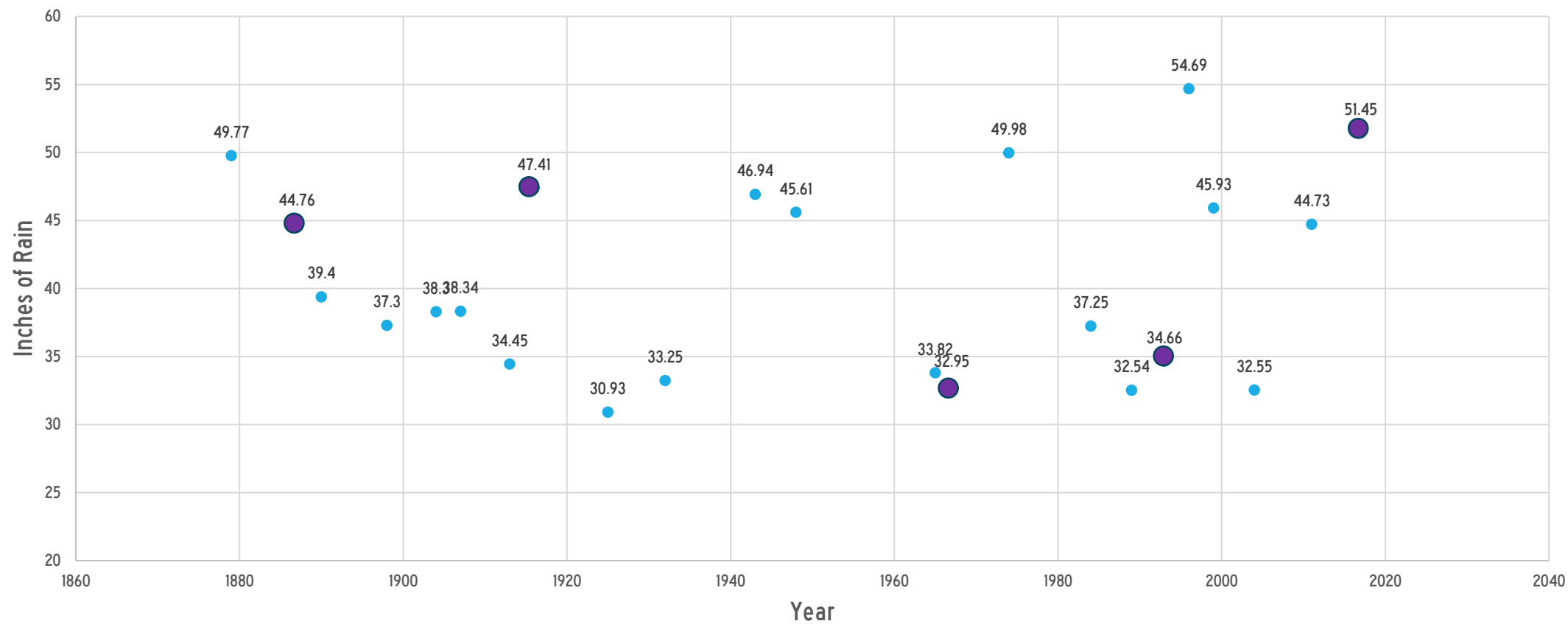
1992-93

- 14.1" Snowfall in PDX, 18.2" in EUG.
 - PDX had snow Dec-Feb, with February being the most favorable. Contained February's 1-day snowfall record until Feb 22, 2023.
- January minor arctic blast Southern Valley.
 - EUG Bottomed out at 8°F
- Puget Sound Inauguration Day Windstorm.
- Eugene hyperactive water year: 63.21"

2016-17

- Most Active Winter since 1995-96.
- 4 separate Snow and Ice events in PDX (3 in EUG).
- Windstorm in April with a peak gust of 56 mph.
- Hyperactive Water Year: 51.45" at PDX.

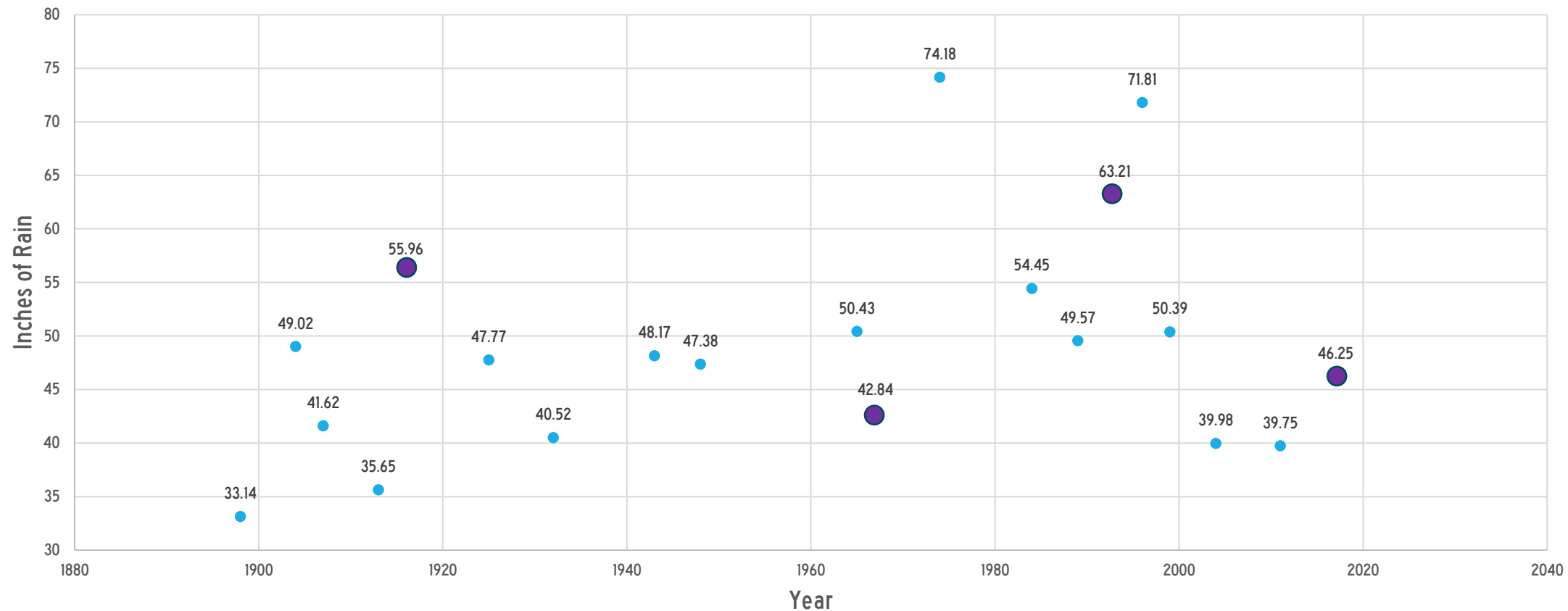
Water Year Rainfall PDX



● Top Analog Year

Median: 38.34"
Top Analog Median: 44.76"
Weighted Analog Median: 41.32"

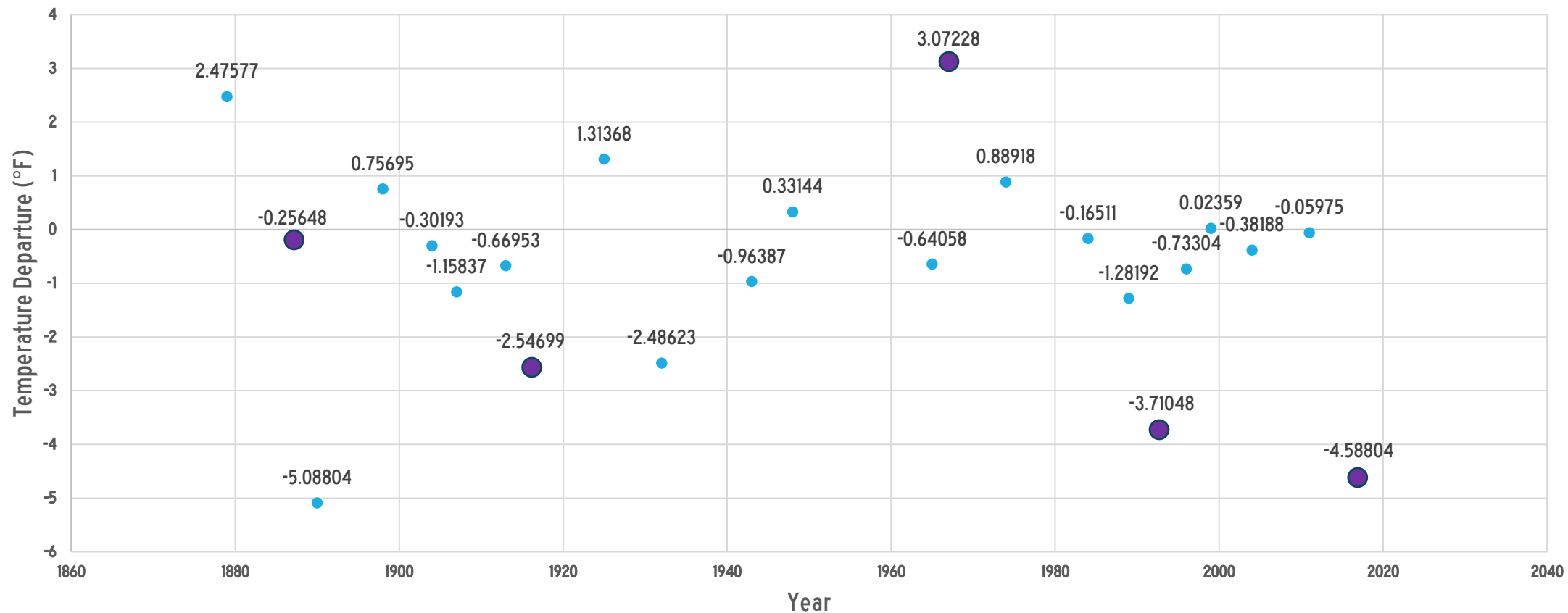
Water Year Rainfall EUG



● Top Analog Year

Median: 47.97"
Top Analog Median: 51.11"
Weighted Analog Median: 50.66"

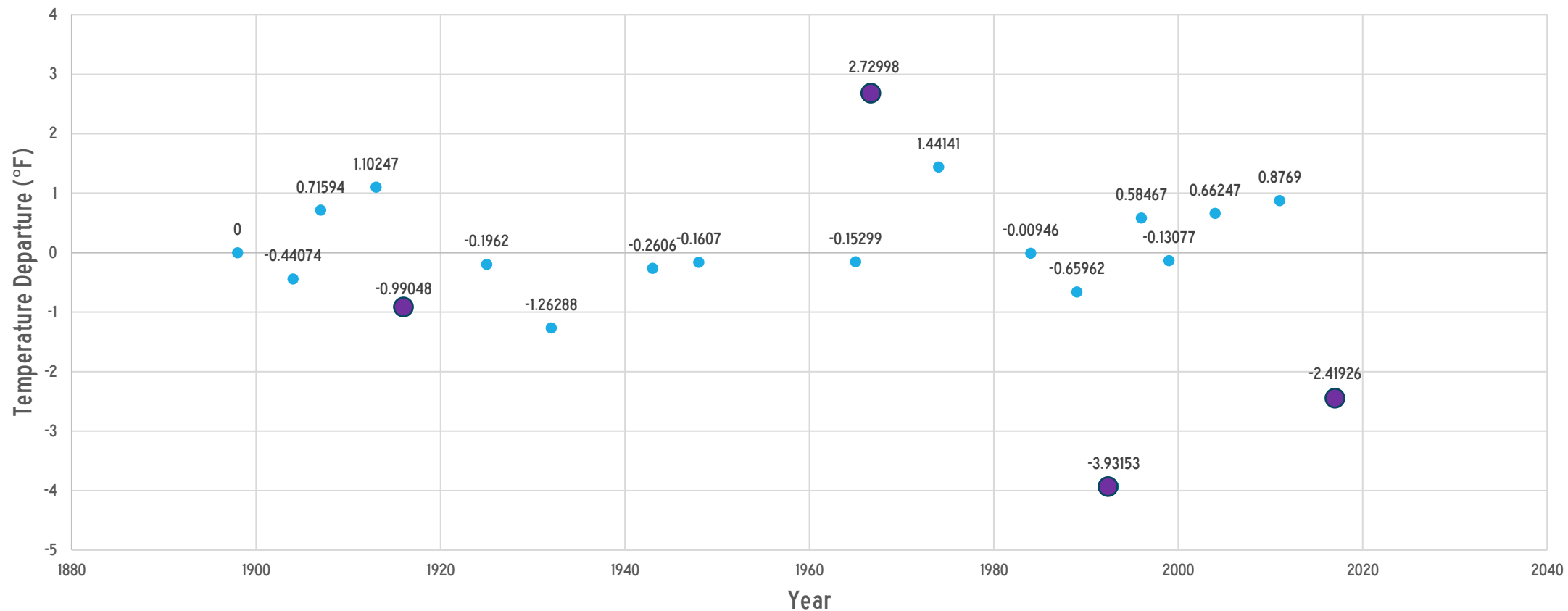
Temperature Departure From Average (Trend Adjusted) PDX



● Top Analog Year

Median: -0.84°F
Top Analog Median: -2.55°F
Weighted Analog Median: -1.07°F

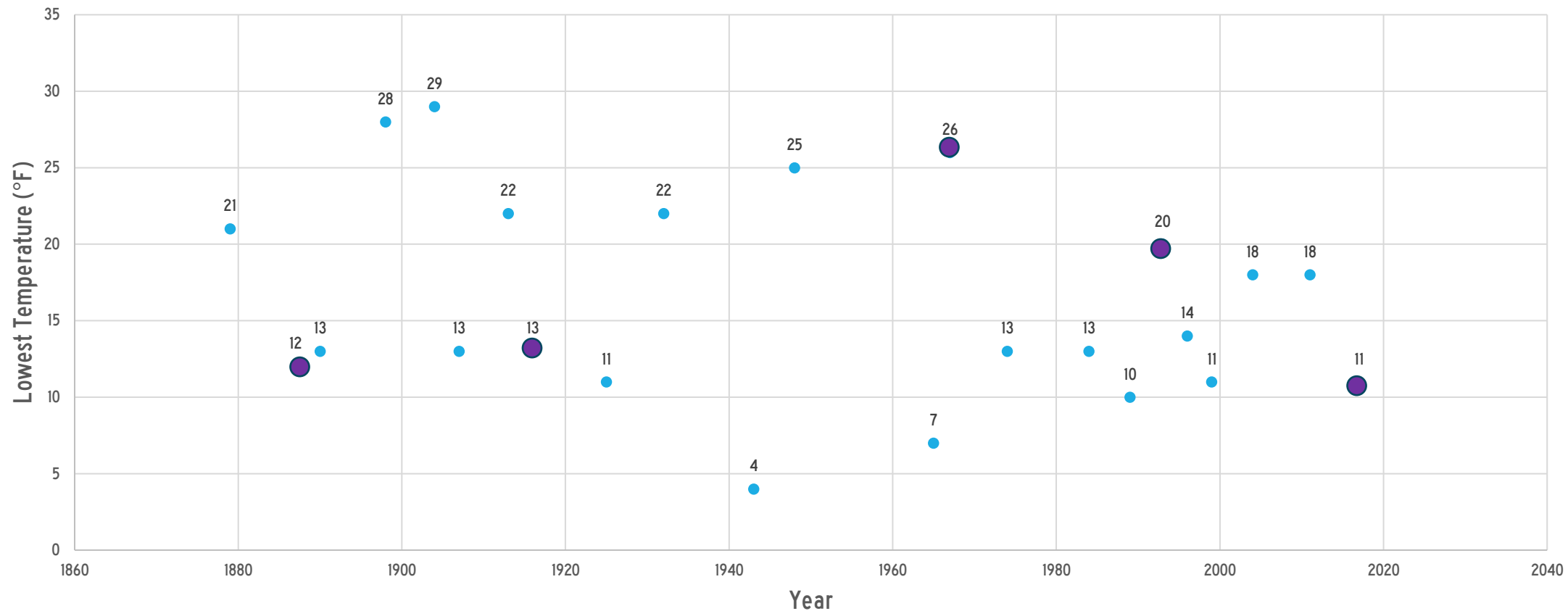
Temperature Departure From Average (Trend Adjusted) EUG



● Top Analog Year

Median: -0.14°F
Top Analog Median: -1.71°F
Weighted Analog Median: -1.04°F

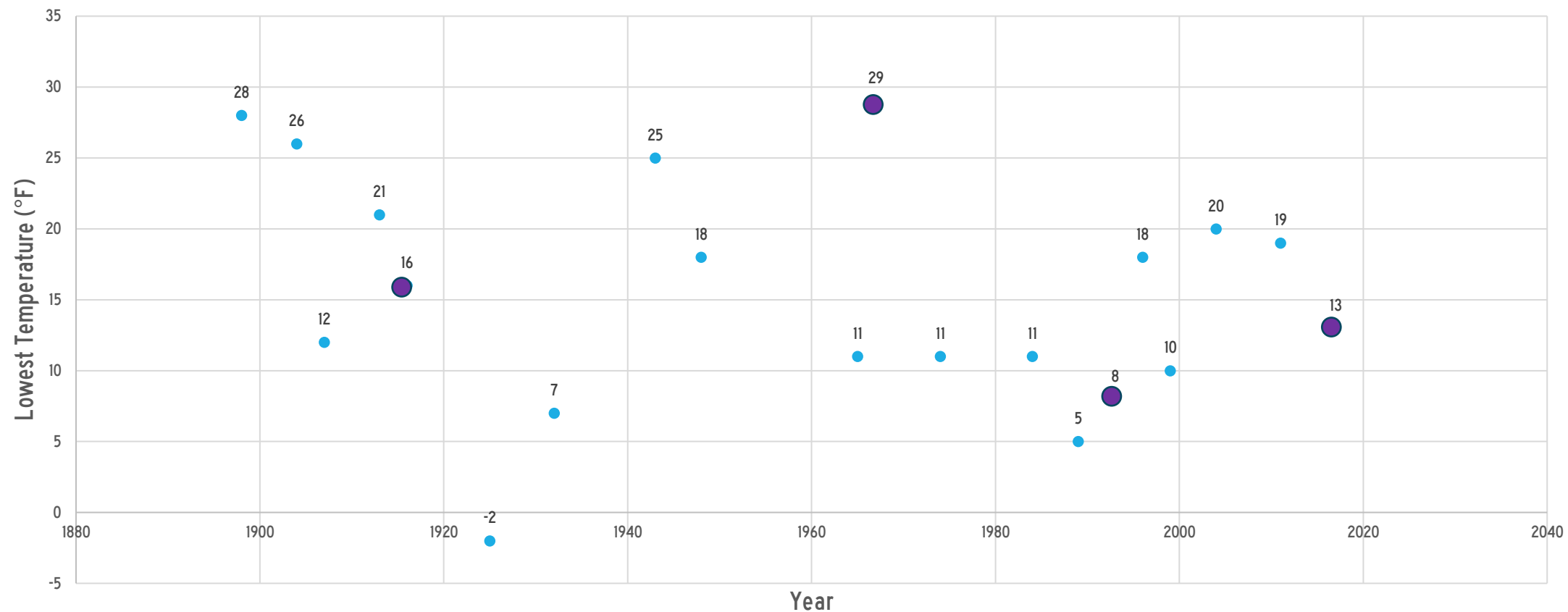
Lowest Winter Temperature (Trend Adjusted) PDX



● Top Analog Year

Median: 13°F
Top Analog Median: 13°F
Weighted Analog Median: 13°F

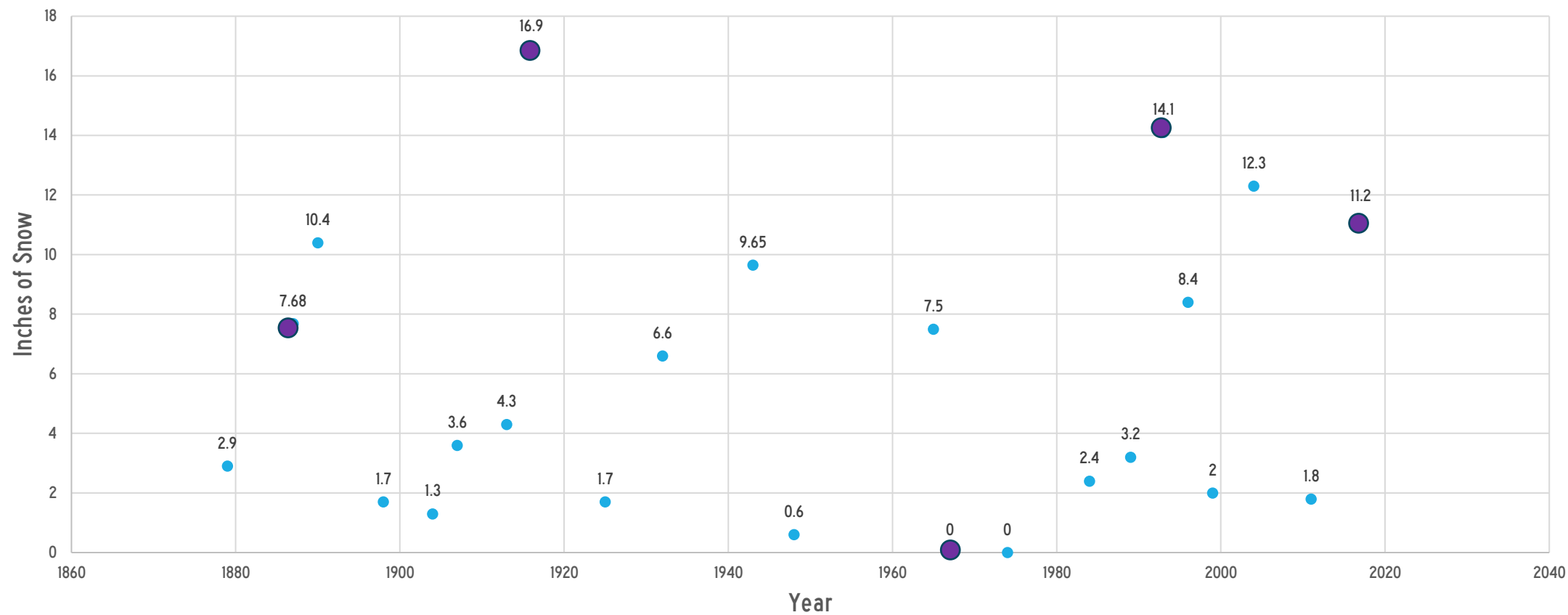
Lowest Winter Temperature (Trend Adjusted) EUG



● Top Analog Year

Median: 14.5°F
Top Analog Median: 14.5°F
Weighted Analog Median: 14.5°F

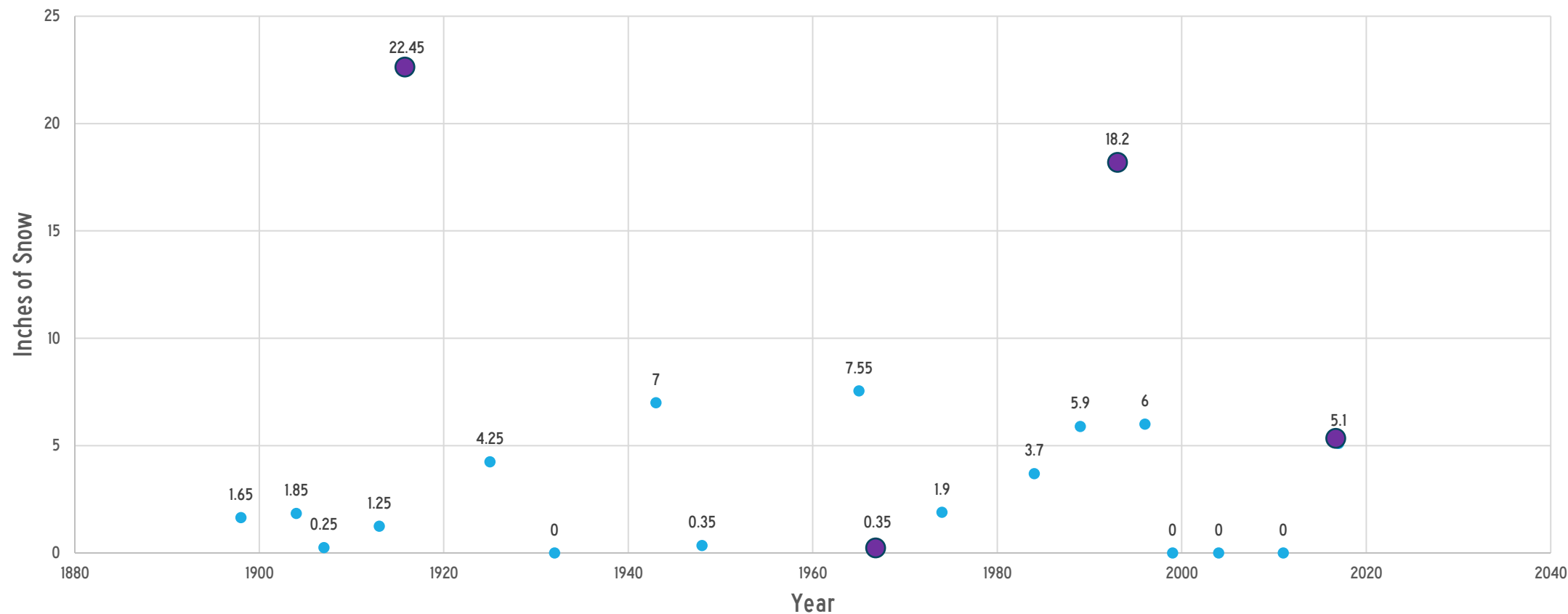
Adjusted Snowfall PDX



● Top Analog Year

Median: 3.6"
Top Analog Median: 11.2"
Weighted Analog Median: 9.6"

Adjusted Snowfall EUG



● Top Analog Year

Median: 3.7"
Top Analog Median: 11.7"
Weighted Analog Median: 11.5"

Historically Significant Trends:

- 9 consecutive winters have had measurable snowfall. (record high)
 - Chance of a 10th occurring (unadjusted): 3% chance
 - Possibly overridden by La Ninas almost always having snowfall.
- Only 3 winters (1941-42, 1973-74, 1976-77) have produced a temperature under 20°F with less than 1.5 inches of snow (all with 0).
- All but 1 of the 15 Moderate or Strong El Nino to La Ninas produced an arctic blast (93.3% occurrence rate).
- All but 1 of the 15 Moderate or Strong El Nino to La Ninas had the La Nina water year wetter than the El Nino water year (93.3% occurrence rate).
 - 39.9" was our water year.

A photograph of a narrow path covered in snow, flanked by dense, snow-laden branches and trees. The scene is brightly lit, with a warm, golden light source visible through the trees in the background, creating a high-contrast, almost ethereal atmosphere. The snow is thick and uneven, with some footprints visible on the path. The branches are dark and intricate, creating a complex web of lines against the bright background.

The Predictions

The Basics

- **Rain: Above average. Hyperactive year possible:**
 - PDX: **39.9"** or more, with a best estimate of **46"**
 - S. Valley: **44.2"** or more, with a best estimate of **51"**
- **Temperature Departure: Below Normal favored: 0.6°F+ below average**
 - PDX Best estimate: **2°F below average**
 - S. Valley Best estimate: **1.5°F below average**
- **Windstorm(s): A decent windstorm: 53 mph+**
 - Or somewhere in the PNW gets a big windstorm and the Willamette Valley dodges it (ex: Inauguration Day windstorm)
- **Lowest Temperature: Below 20°F**
 - Best Estimate: **13°F**
- **Most likely to be Active: Latter Half of Winter (Jan 1-Feb 15)**

Snowfall

- **Mountain Snow Depth on April 1st greater than 125% of normal**
 - 115% or better above 5000 feet.
- **Valley Snowfall: Possibly Hyperactive: 6" or more**
 - PDX Best Estimate: 9"
 - S. Valley Best Estimate: 11"
 - Chance of No Snow Winter: 20%

Things Winter Will Never Do

- Never going to give you up,
- Never going to let you down,
- Never going to run around, and desert you.
- Never going to make you cry,
- Never going to say goodbye,
- Never going to tell a lie, and hurt you.



A photograph of a narrow, snow-covered path in a winter forest. The path is covered in a thick layer of white snow, with some faint tracks visible. On either side of the path, there are dense, snow-laden branches of trees and shrubs. The branches are dark and intricate, creating a complex web of white and brown. In the background, the path leads towards a brighter area where more trees are visible, some with yellowish leaves. A white rectangular box with a soft shadow is centered over the path, containing the text "Thank You." in a bold, black, sans-serif font.

Thank You.

Links

- Full report:

https://docs.google.com/document/d/1izkmlx3aEFwQqbqaZf1ol4wZsK6rdQYs/edit?usp=drive_link&oid=102355074394437759895&rtpof=true&sd=true

- YouTube Channel:

<https://www.youtube.com/@weatherandtravelwithtanis4589/videos>