

# The Month In Review

September 2022

National Weather Service  
Pendleton, Oregon

Photo: Smoke streaming across the sky from area wildfires

# September 2022, Climate Conditions Summary

September was a mostly dry and benign month, except for smoke issues due to ongoing very dry conditions and regional wildfires. The month started out with very hot temperatures on the first couple days, especially on the 2<sup>nd</sup>. Record high temperatures were broken at many locations on the 2<sup>nd</sup>, with three stations reporting record highs for the whole month, as well as the day. Every station listed in the tables in this document reported warmer and drier than normal conditions for the month. The two hottest stations on the 2<sup>nd</sup> were at John Day, OR and Redmond, OR. Precipitation amounts were also very light, with every station reporting less than a half inch, except for Meacham, OR, which reported a total of 0.72 inches. The only significant weather events that occurred were a strong non-thunderstorm wind gust which caused a large tree limb to break and fall on a power line on the 3<sup>rd</sup>, and non-severe sized hail from a thunderstorm northeast of Pilot Rock, OR on the 17<sup>th</sup>. The same weather disturbance responsible for producing that thunderstorm also brought Pendleton, OR most of its rainfall for the month, with only 0.05 of an inch being reported from the 17<sup>th</sup> to the 18<sup>th</sup>. This was also during the coolest time of the month, in which maximum temperatures have cooled off to mostly the 70s to lower 80s. The coolest day in Pendleton OR was a high of only 68 degrees on the 18<sup>th</sup>. However, most of the month was in the 80s and 90s in the lower elevations. Below and on the next slide are images of some of the climate and weather conditions observed during the month.



**Hazy landscape due to smoke from area wildfires.**



**Morning thunderstorms over NE Oregon.**



**Red – Orange sunset due to smoke from area wildfires**

# More Images Representing September 2022 Weather/Climate Conditions



**Cirrocumulus clouds over the Columbia Gorge**



**High thin cirrus creating a beautiful sunrise**



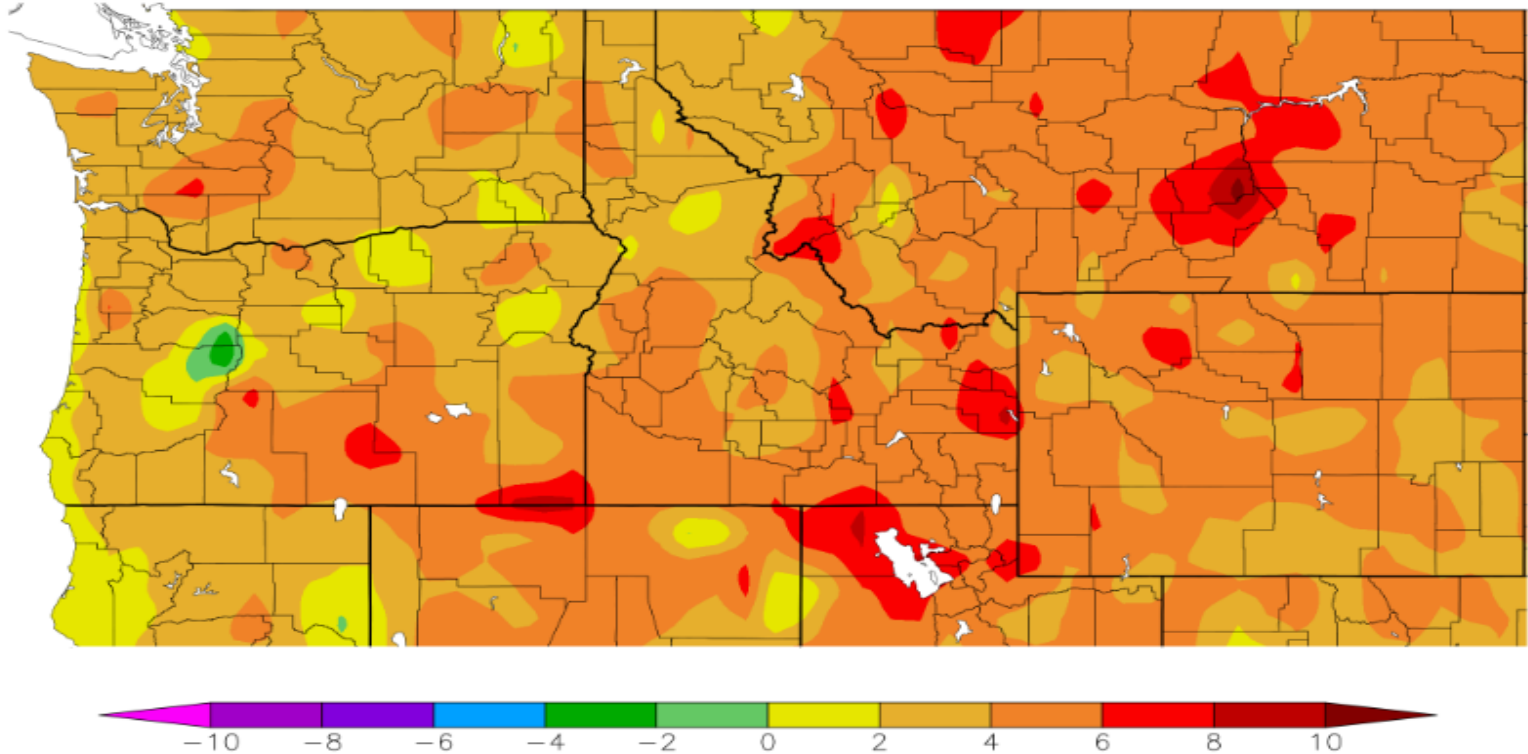
**Smoke from nearby wildfires over central Oregon**



**A dull sunset in the eastern Columbia Gorge**

# September 2022, Departure from Normal of Average Temperatures

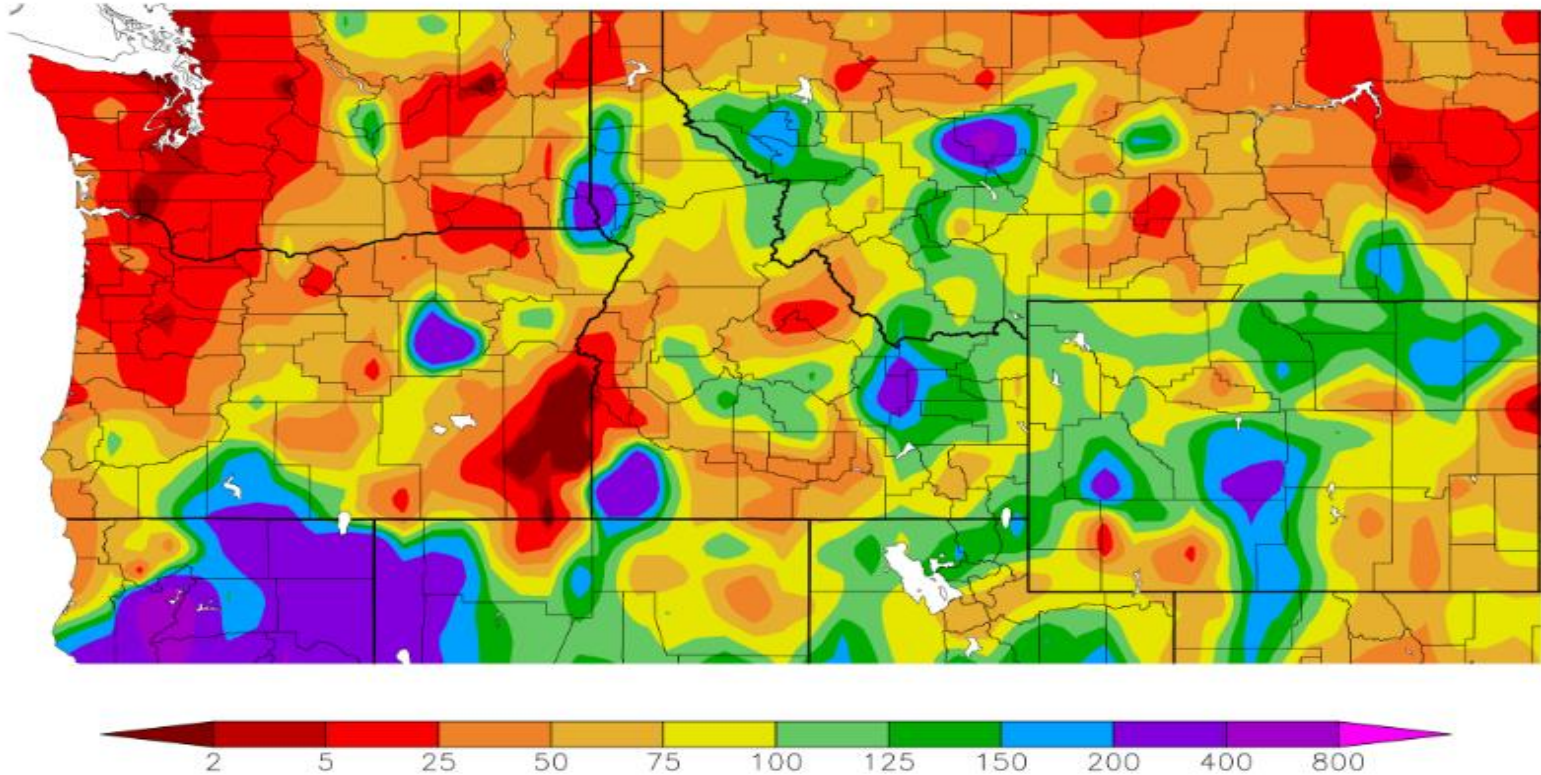
Departure from Normal Temperature (F)  
9/1/2022 – 9/30/2022



The departure from normal of the average temperatures were greater than zero (above normal) at all locations of the forecast area. They ranged from 4-6 degrees over east central OR and over the OR northern Blue Mountains. Most of the rest of the area had departures ranging from 2-4 degrees, except for small areas over the central OR Cascades northeast across the Lower Columbia Basin of OR into southeast WA, where the coolest areas were, with departures of 0-2 degrees greater than zero.

# September 2022, Percent of Normal of Precipitation

Percent of Normal Precipitation (%)  
9/1/2022 – 9/30/2022



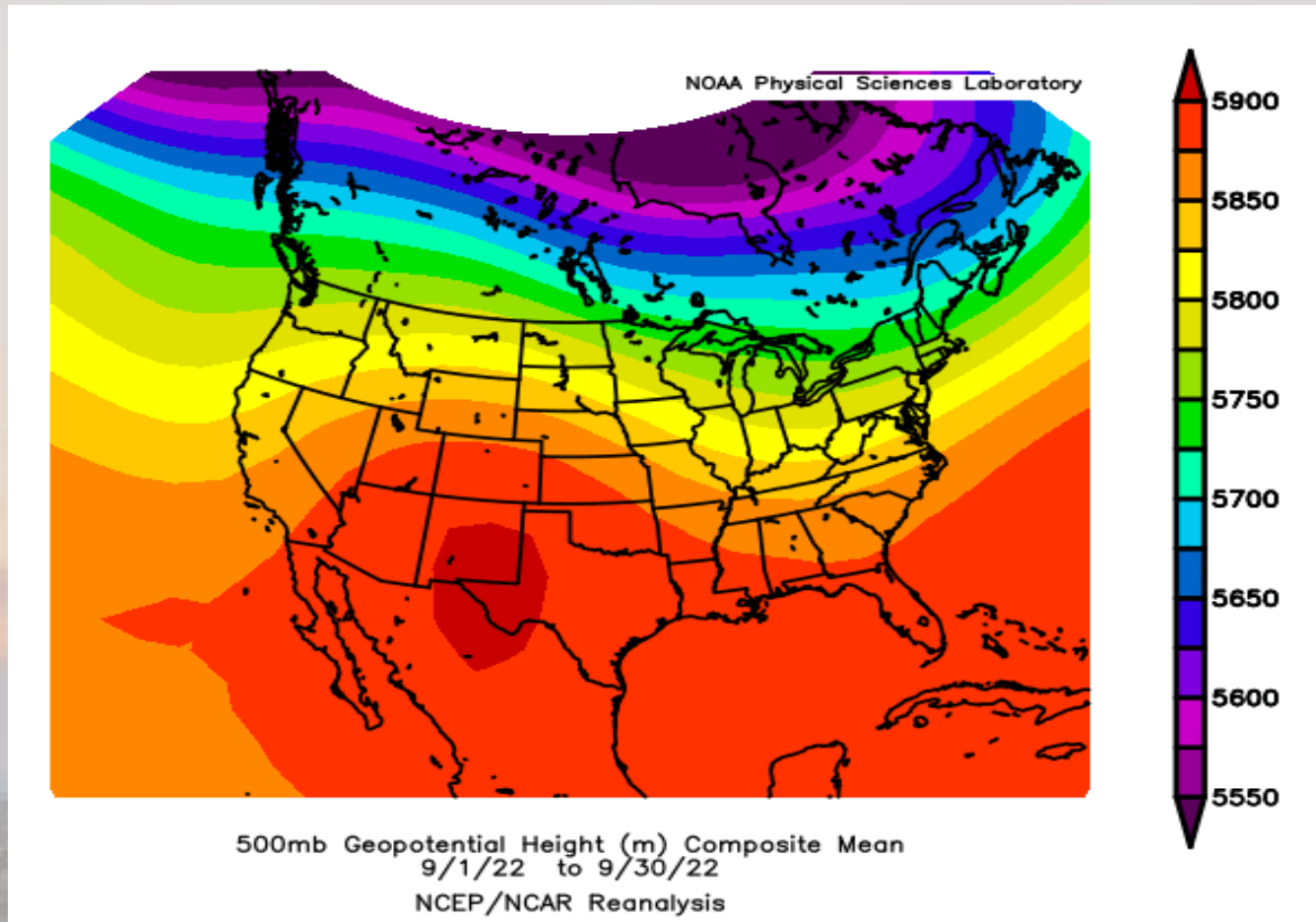
Most of northeast OR and southeast WA had a percent of normal precipitation less than 75 percent. The exception was over Grant County in east central OR, where departures ranged from 150-400 percent of normal. This area of wetter than normal conditions were likely due to thunderstorms. The driest areas were in the Lower Columbia Basin and north central OR with departures less than 25 percent of normal.

# September 2022 Departures from Normal Means/Sums for Select Cities

	Max T	Max T D	Min T	Min T D	Ave T	Ave T D	PCPN	PCPN D
<b>Yakima</b>	82.3	4.3	48.3	4.8	65.3	4.5	0.13	-0.23
<b>Kennewick</b>	83.7	3.8	56.3	4.0	70.0	3.9	0.12	-0.18
<b>Walla Walla</b>	80.4	2.5	55.4	2.8	67.9	2.7	0.18	-0.57
<b>The Dalles</b>	85.9	5.8	55.9	4.3	70.9	5.1	0.30	-0.17
<b>Redmond</b>	81.1	4.9	42.5	4.3	61.8	4.6	0.20	-0.21
<b>Pendleton Airport</b>	82.6	5.2	51.6	2.2	67.1	3.7	0.09	-0.48
<b>La Grande Airport</b>	81.4	5.2	44.9	1.2	63.2	3.2	0.41	-0.26
<b>John Day</b>	85.0	6.2	51.1	10.4	68.1	8.3	0.26	-0.37

Every single station listed in the table above had warmer than normal and drier than normal conditions with departures of the mean maximum, mean minimum and mean average temperatures all greater than zero. John Day, OR was the warmest for all three of these variables, while the coolest was at Walla Walla, WA. However, Walla Walla, WA was also the driest location, with a departure from normal precipitation amount of -0.57 of an inch, which was the greatest. These warmer and drier than normal conditions were a continuation of the unusually hotter than normal summer for most of the forecast area. Some areas even had departures from normal greater than that of June through August, especially John Day, OR.

# September 2022, Average 500 MB Pattern

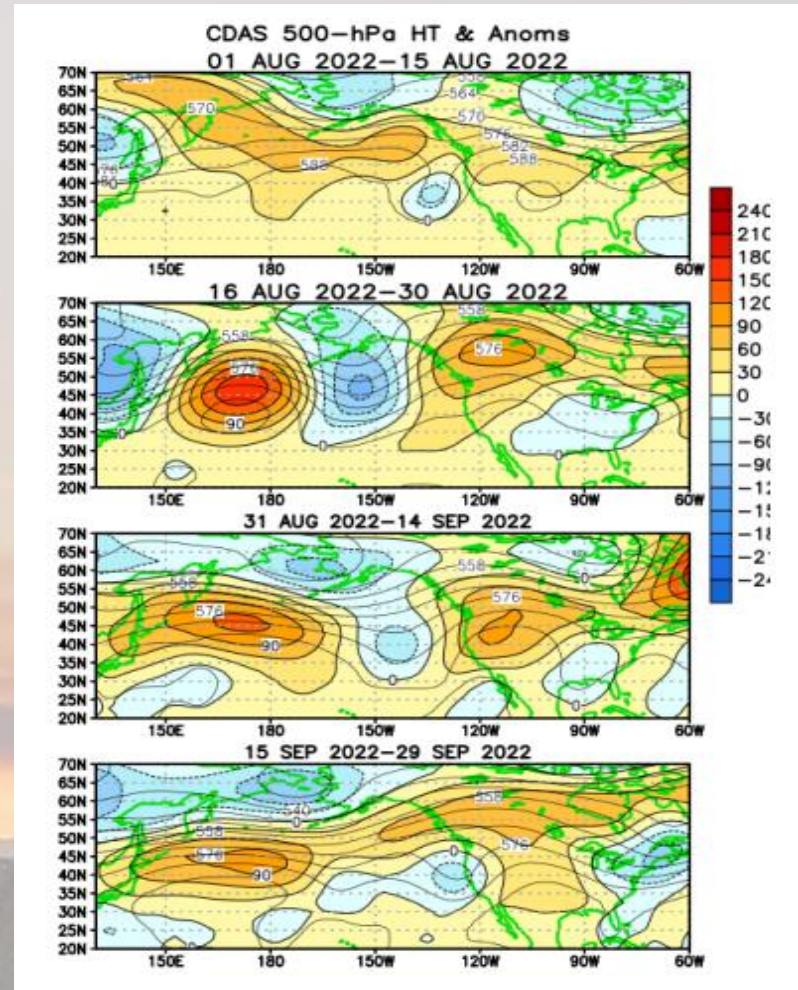


The average 500 MB flow pattern for September 2022 over the Pacific Northwest was a southwest flow pattern with an upper ridge axis centered just east of the Rocky Mountains. This resulted in a warmer and drier than normal month overall. However, the southwest flow did not result in wetter conditions like that of August, since the southwest monsoon season typically weakens during September, and results in less moisture and instability being pulled northward in a southwest flow at the upper levels of the atmosphere.

# Two Month, Average Bi-weekly 500 MB Plots for August & September 2022

These are more detailed bi-weekly average 500 mb pattern plots, which was sampled from the following period: 1<sup>st</sup> of August through the 29<sup>th</sup> of September.

The land boundaries are shown in green. Yellow and orange colors represent areas of high pressure or ridges at 500 mb and the cooler shades of blue color show areas of low pressure or troughs at 500 mb.





# Significant Weather & Record Weather Events for September 2022

Significant Weather Events				
Event	Date	Report	Where	Source
Non-TSTM WND DMG	September 3, 2022	30 ft tree limb down on power line	Athena, OR	Fire Dept & Rescue
Hail	September 17, 2022	E 0.25 inch	4 NE Pilot Rock, OR	Trained Spotter

The only two significant weather events during September were a non-thunderstorm wind gust, which broke a large tree limb off a tree and onto power lines, and a report of non-severe hail with a thunderstorm during the middle of the month.

Record Weather Reports					
Event	Date	Where	Previous Record	New Record	Records Began
High Temperature	September 1, 2022	Dallesport, WA	102 / 1998	102 (Tie)	1929
High Temperature	September 1, 2022	Pasco, WA	101 / 1998	102	1934
High Temperature	September 1, 2022	Ellensburg, WA	96 / 2013	97	1934
High Temperature	September 1, 2022	Hermiston, OR	101 / 1967	102	1906
High Temperature	September 1, 2022	Yakima, WA	97 / 1949	98	1909
High Temperature	September 2, 2022	Pendleton, OR	101 / 1950 & (104 in 1930 Monthly Tie)	104	1934
High Temperature	September 2, 2022	Redmond, OR	105 / 1998 & (105 in 1998 Monthly Broken)	106	1941
High Temperature	September 2, 2022	Pasco, WA	101 / 1998 & (101 in 1998 Monthly Broken)	102	1934
Maximum Rainfall	September 12, 2022	Yakima, WA	0.03 / 1962	0.05	1909
High Temperature	September 26, 2022	Ellensburg, WA	86 / 2016	86 (Tie)	1934
High Temperature	September 26, 2022	Dallesport, WA	93 / 2003	93 (Tie)	1929
High Temperature	September 27, 2022	Pendleton, OR	91 / 1967	92	1934
High Temperature	September 27, 2022	Ellensburg, WA	88 / 2003	88 (Tie)	1934

Every record weather event, except for one, was of a record high temperature. Three of these were not only the record highs for the day, but also for the month, with one being a tie, at Pendleton, OR. Then there was a record rainfall amount of 0.05 inch at Yakima, WA.

# September 2022, Observed Monthly Max & Min Temperatures

Location	Highest Maximum	Lowest Minimum
Pendleton, OR	104	44
Redmond, OR	106	31
Pasco, WA	102	42
Yakima, WA	97	38
Walla Walla, WA	103	46
Bend, OR	100	39
Ellensburg, WA	97	37
Hermiston, OR	100	41
John Day, OR	108	40
La Grande, OR	102	32
The Dalles, OR	102	49
Meacham, OR	99	27
MT Adams RS, WA	93	35

Most of the highest maximum temperature in the list were at or above 100 degrees. The exceptions were at 4 stations, which were all in the 90s. This included a record high of 99 at Meacham OR, which is very rare for Meacham's high elevation, in the crest of the northern Blue Mountains, especially this late in the warm season. The lowest minimums were all typical for September.

# September 2022 Observed Total Precipitation and Total Snowfall/Hail

Location	Total Precipitation (inches)	Total Snow/Hail (inches)
Pendleton, OR	0.09	0.0
Redmond, OR	0.20	M
Pasco, WA	0.12	M
Yakima, WA	0.13	M
Walla Walla, WA	0.18	M
Bend, OR	0.08	0.0
Ellensburg, WA	0.15	M
Hermiston, OR	0.09	M
John Day, OR	0.26	M
La Grande, OR	0.41	M
The Dalles, OR	0.30	M
Meacham, OR	0.72	M
MT Adams RS, WA	0.22	0.0

Every single precipitation amount in the list was less than a half inch, except for Meacham OR, which received 0.72 inch. These values were well below typical September precipitation totals, in which there is usually a fire season ending rain event during the month. There were no reports of hail (or snow) during the month at any of these stations. However, there was hail reported near Pilot Rock OR, which was shown on a previous slide.

# September 2022 - Drought Monitor - West

## U.S. Drought Monitor West

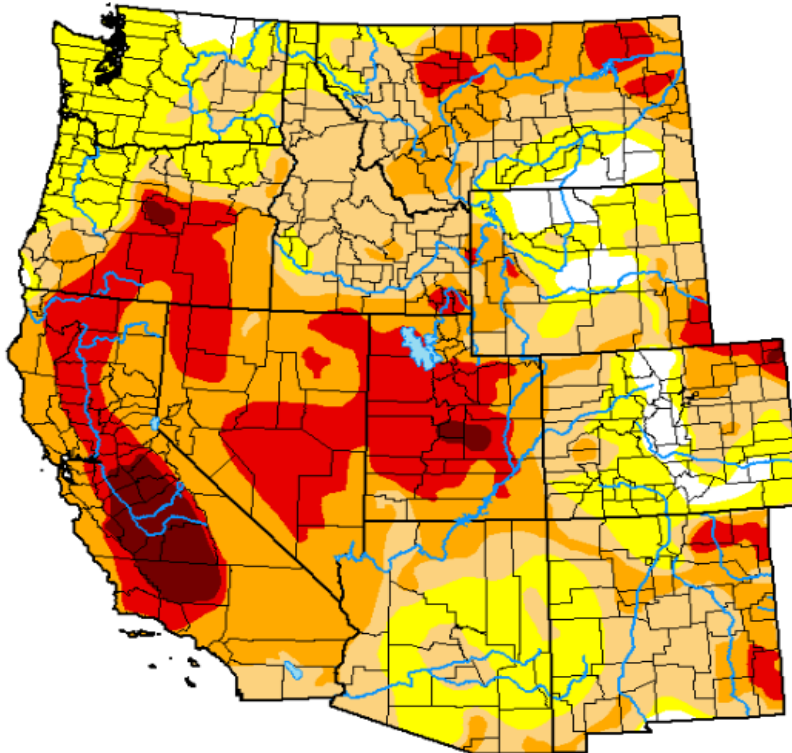
**September 27, 2022**

(Released Thursday, Sep. 29, 2022)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	3.89	96.11	73.90	47.71	19.37	2.63
<b>Last Week</b> 09-20-2022	5.81	94.19	73.69	48.66	18.32	2.63
<b>3 Months Ago</b> 06-28-2022	14.57	85.43	75.87	60.22	32.43	6.12
<b>Start of Calendar Year</b> 01-04-2022	3.68	96.32	89.29	64.90	23.85	3.94
<b>Start of Water Year</b> 09-26-2021	2.21	97.79	89.60	75.38	52.46	18.40
<b>One Year Ago</b> 09-26-2021	2.21	97.79	89.60	75.38	52.46	18.40



### Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate Drought	D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

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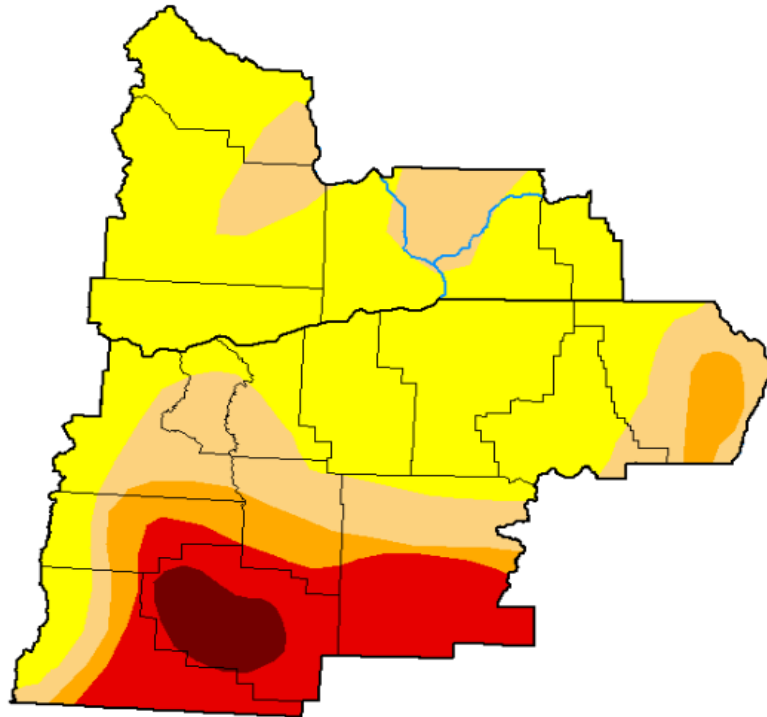
[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

Drought conditions increased for many areas of the Pacific Northwest. In the previous few months, the drought category had dropped to “None” for much of the Lower Columbia Basin and the Blue Mountain Foothills. However, with the hot and dry summer continuing into September, these areas increased back to the D0 (“Abnormally Dry”) category. Elsewhere, the worse drought conditions continued to be over central and east central OR, with a drought category of D3-D4 (“Extreme” to “Exceptional Drought”).

# September 2022 - Drought Monitor – Pendleton Forecast Area

## U.S. Drought Monitor Pendleton, OR WFO

**September 27, 2022**  
(Released Thursday, Sep. 29, 2022)  
Valid 8 a.m. EDT



*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	0.00	100.00	46.03	24.98	17.46	3.17
<b>Last Week</b> 09-20-2022	9.59	90.41	42.87	24.74	17.46	3.17
<b>3 Months Ago</b> 06-28-2022	36.22	63.78	39.76	27.78	22.24	4.01
<b>Start of Calendar Year</b> 01-04-2022	3.10	96.90	95.52	87.37	61.34	21.83
<b>Start of Water Year</b> 09-28-2021	0.00	100.00	98.24	93.83	85.03	49.93
<b>One Year Ago</b> 09-28-2021	0.00	100.00	98.24	93.83	85.03	49.93

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>*

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Drought conditions over the northern, northwest and along the crest of the Cascades/east slopes were mostly in the D0 to D1 category (“Abnormally Dry” to “Moderate Drought”). The south central and southeast portions of the forecast area had the worse drought conditions, ranging from a thin sliver of D2 (“Severe Drought”) conditions bordering a larger area of D3 to D4 (“Extreme” to “Exceptional Drought”) conditions. This is especially true for Crook County in the south-central Forecast Area.

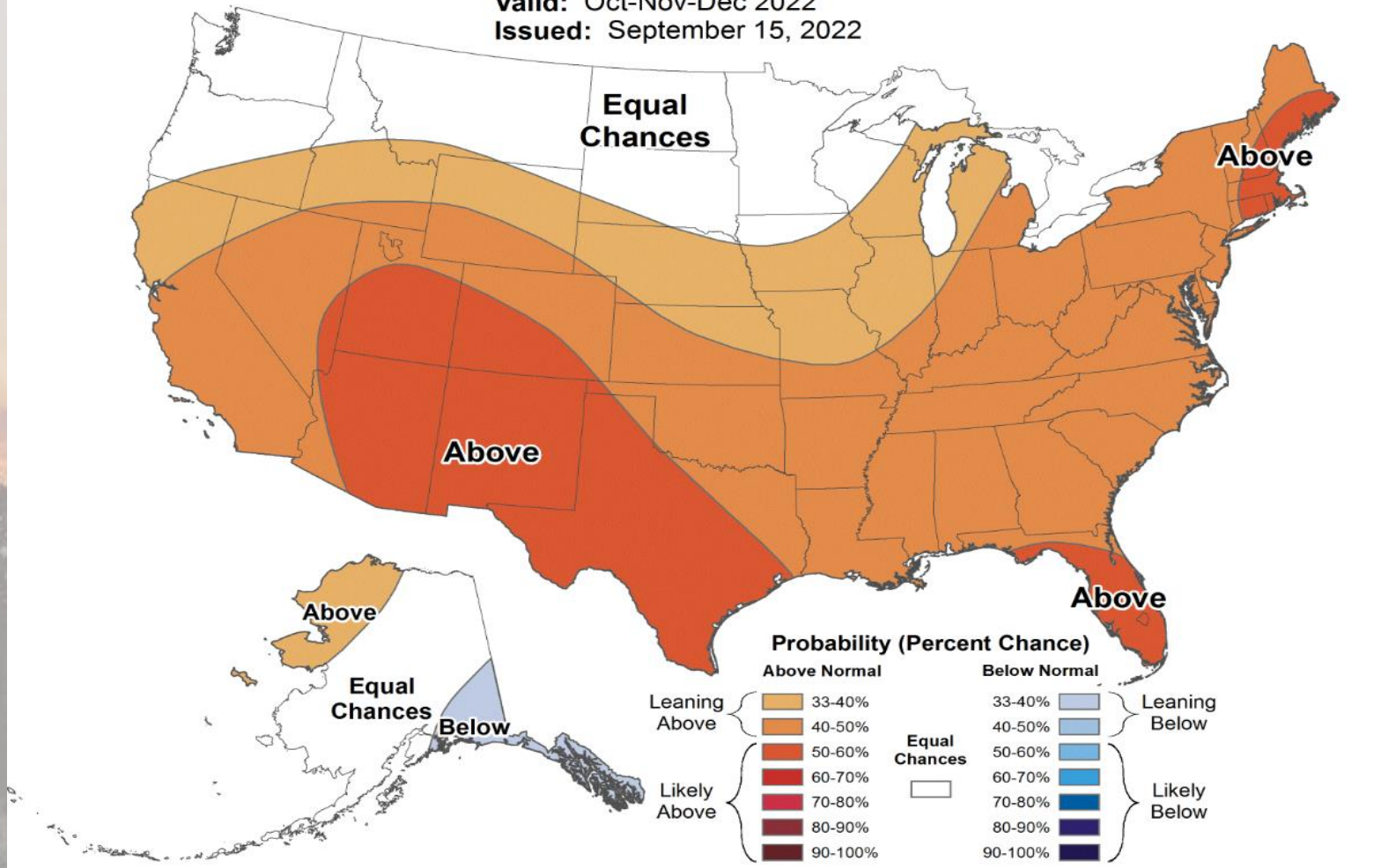
# USA Three Month Temperature Outlook



## Seasonal Temperature Outlook



Valid: Oct-Nov-Dec 2022  
Issued: September 15, 2022



The temperature outlook for the 3-month period of October – December is for a greater chance of equal chances of above or below normal temperatures. While this may depart from typical La-Nina conditions over the Pacific Northwest, this forecast is still not unusual for late summer & early fall in eastern OR/WA.

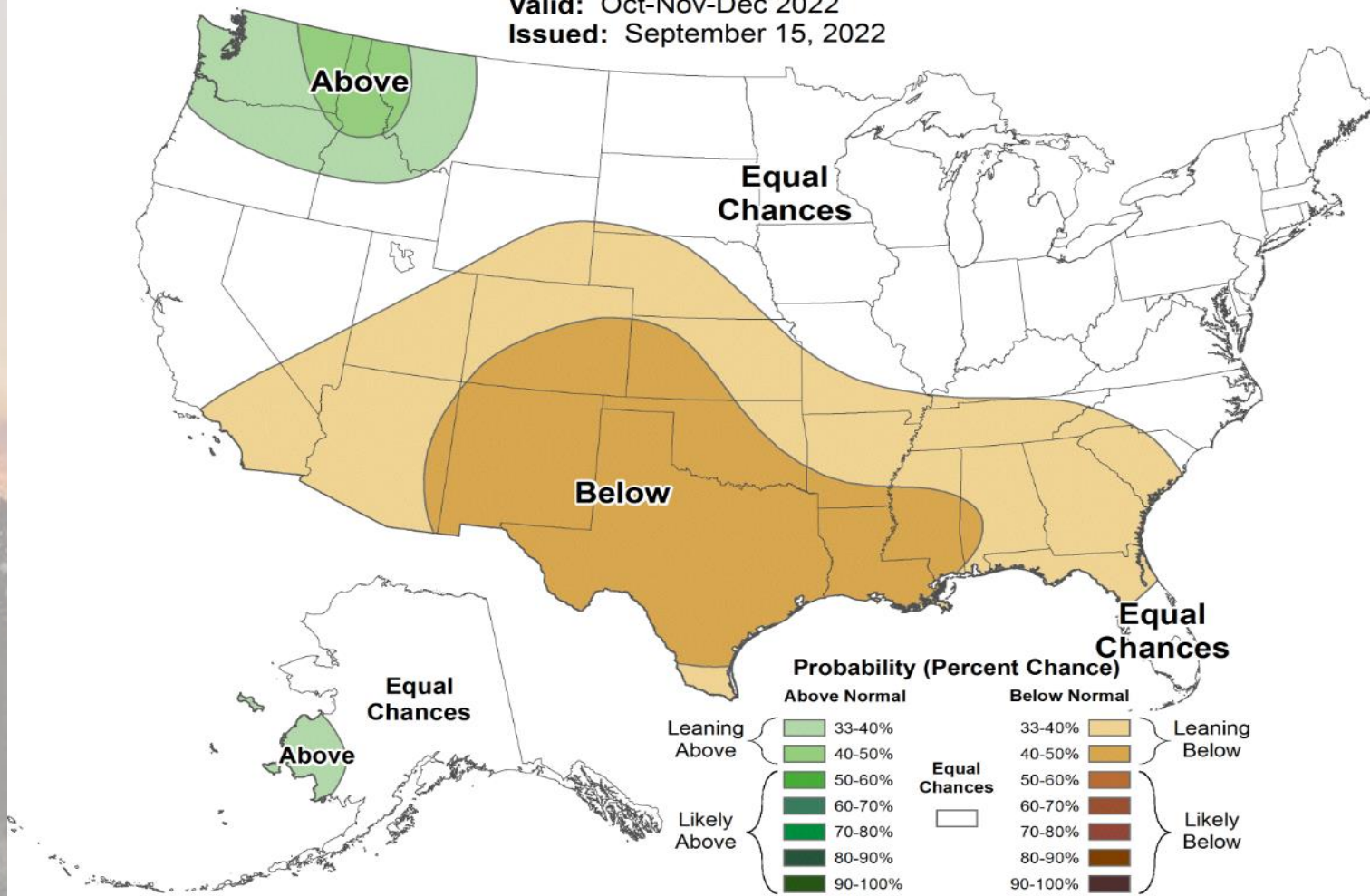
# USA Three Month Precipitation Outlook



## Seasonal Precipitation Outlook



Valid: Oct-Nov-Dec 2022  
Issued: September 15, 2022

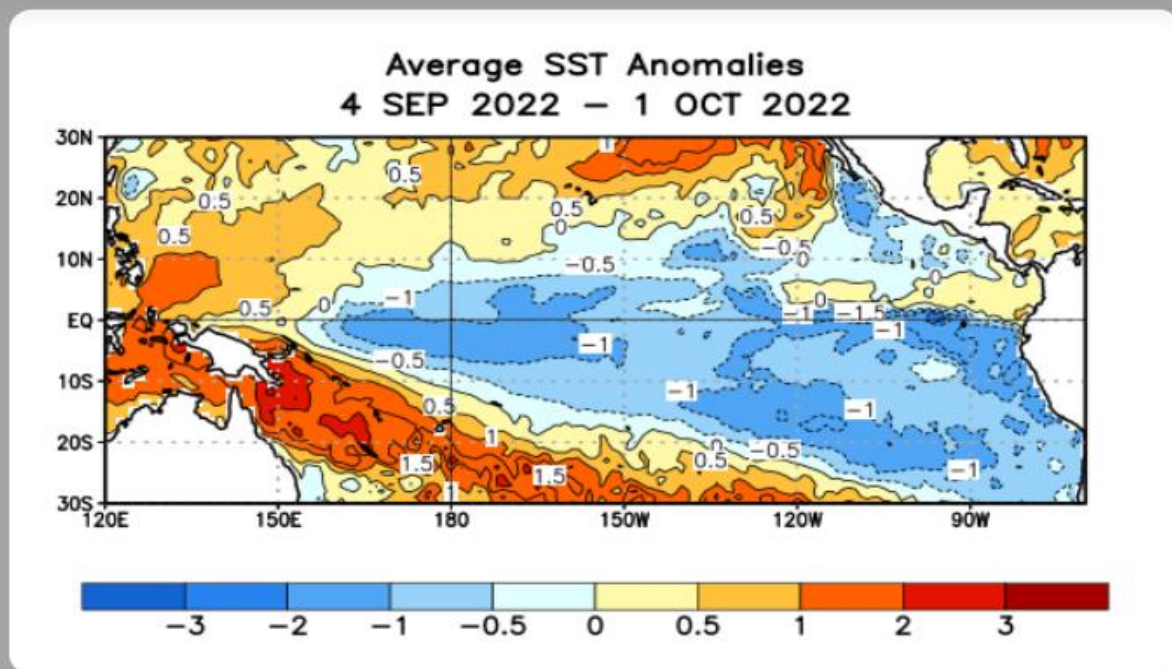


The precipitation outlook for the 3-month period October – December is for a greater chance of above normal precipitation over the Pacific Northwest. This is more consistent with La-Nina conditions in the Pacific Northwest that what the 3-month temperature forecast is.

# Sea Surface Temperature (SST) Anomalies for September 2022

## SST Departures ( $^{\circ}\text{C}$ ) in the Tropical Pacific During the Last Four Weeks

In the last four weeks, equatorial SSTs were below average across most of the Pacific Ocean.



Sea Surface Temperatures (SSTs) were still below average across most of the equatorial Pacific Ocean. However, there was an area of above normal Sea Surface Temperatures north of the equator, off mainly the Mexican coast, and a lesser area of above normal SSTs off the Central and South American west coasts. However, the above image is still representative of La Nina conditions.

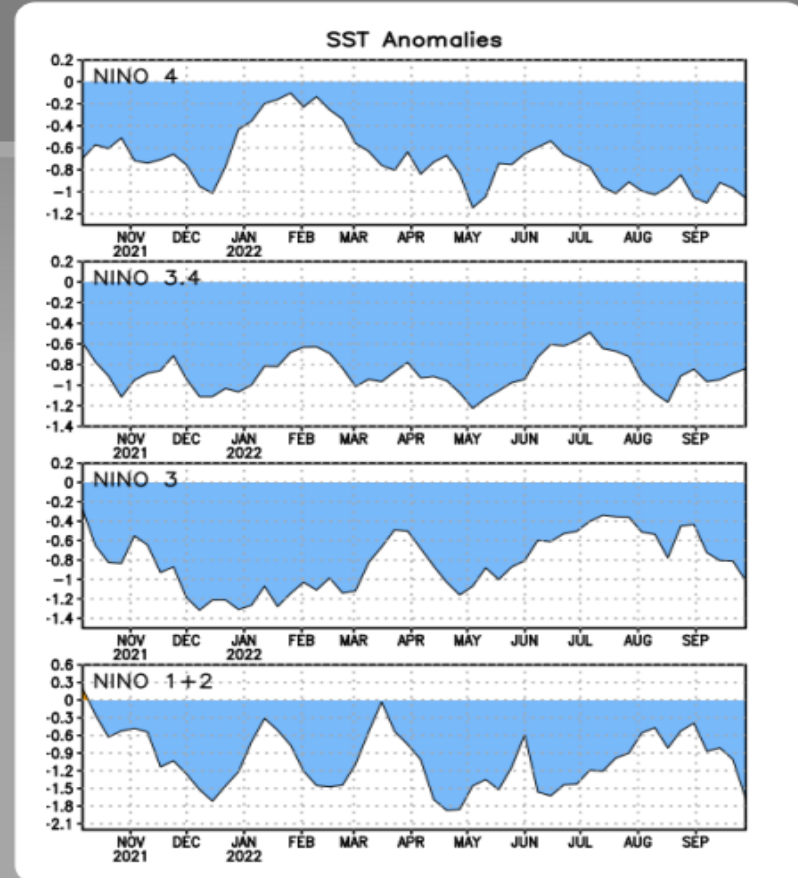
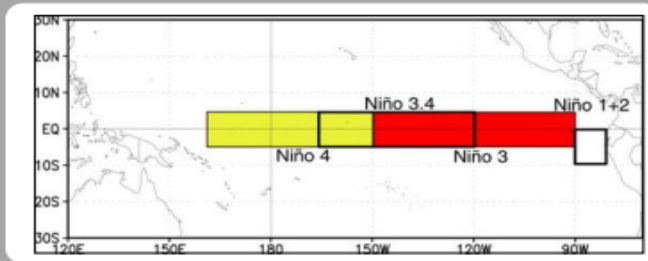


# ENSO NINO Regions SST Anomalies for Each Nino Region in September 2022

## Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

Niño 4	-1.1°C
Niño 3.4	-0.8°C
Niño 3	-1.0°C
Niño 1+2	-1.7°C



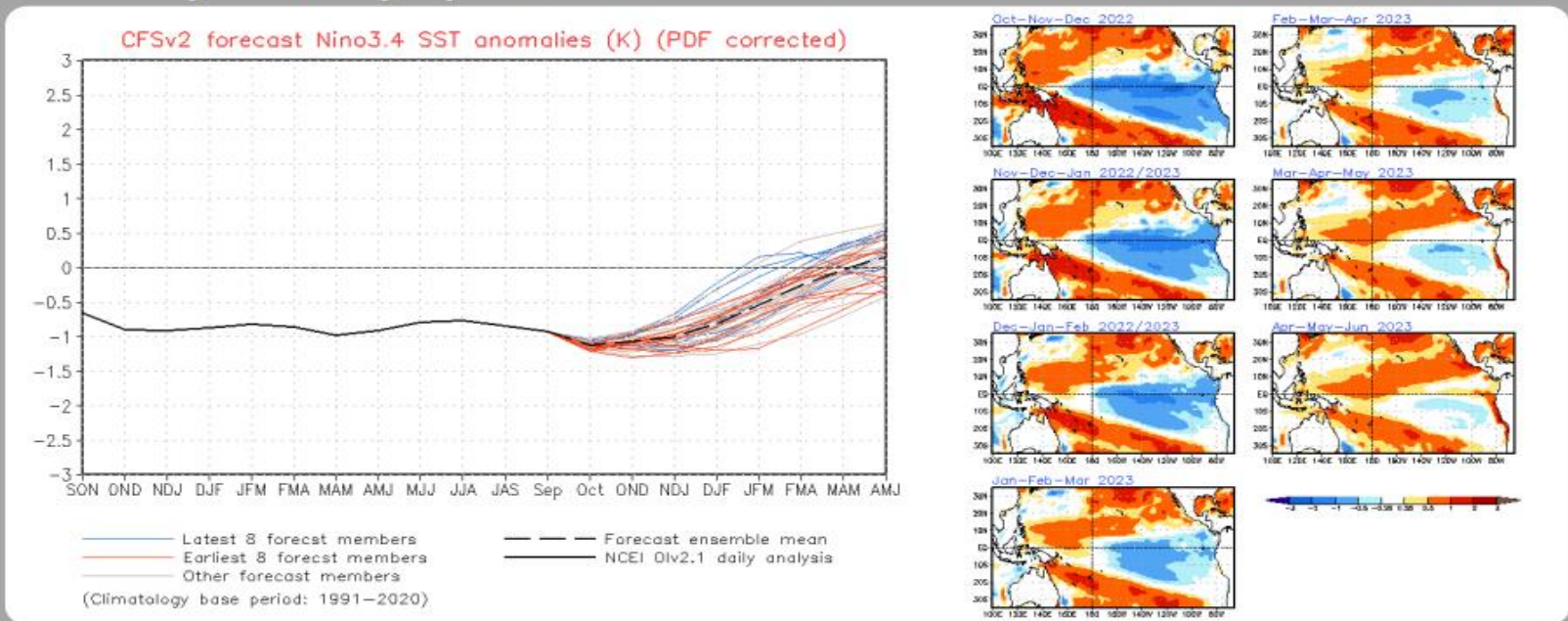
Niño Regions 1 + 2, 3, and 4 showed cooling during September, while Niño Region 3.4 (the Niño Region that has the greatest influence of weather conditions over the USA) showed some slight warming during September. However, all Niño Regions still have well below normal Sea Surface Temperatures (SSTs), which is consistent with the ongoing La Nina event for the third year in a row.

# Sea Surface Temperature (SST) NCEP CFS.v2 Ensemble Mean Outlook

## SST Outlook: NCEP CFS.v2 Forecast (PDF corrected)

Issued: 3 October 2022

The CFS.v2 ensemble mean (black dashed line) indicates La Niña persisting into the Northern Hemisphere winter 2022-23, and then transitioning to ENSO-neutral by February-April 2023.



The SST CFS.v2 forecast ensemble mean shows La Nina conditions are expected to persist into the Northern Hemisphere winter 2022-2023, and then transition to ENSO-neutral conditions by February through April 2023. However, both the black dashed line (the ensemble mean) and the small SST images to the right all show a gradual warming trend of SSTs by late winter into spring of 2023. This indicates that La Nina conditions are expected to weaken gradually after the November – January 3 month period. In fact, the ensemble mean rises to above the zero line by the March - May three month period.

# Current ENSO (El Nino Southern Oscillation) Alert System Status

## Summary

ENSO Alert System Status: **La Niña Advisory**

La Niña is present.\*

Equatorial sea surface temperatures (SSTs) are below average across most of the Pacific Ocean.

The tropical Pacific atmosphere is consistent with La Niña.

La Niña is favored to continue through Northern Hemisphere winter 2022-23, with a 91% chance in September-November, decreasing to a 54% chance in January-March 2023.\*

The current ENSO Alert System Status is still “**La-Nina Advisory**”. Equatorial sea surface temperatures are still below average across most of the Pacific Ocean, which is consistent with La Nina conditions, as is the tropical Pacific atmosphere. La Nina is favored to continue through the Northern Hemisphere winter of 2022 – 2023 (still a 91 percent chance) through November. Chances are then expected to decrease to a 54 percent chance during the period from January – March 2023, as equatorial Sea Surface Temperatures increase, with ENSO conditions beginning a transition to ENSO neutral.



Thank You!