The Month In Review

May 2023

National Weather Service,
Pendleton, Oregon

Thunderstorm microburst in Glenwood, Klickitat County, WA. Photo by: Jeff King

May 2023 Climate Conditions Summary

May 2023 started out warmer than normal through the 4th and then Pacific weather systems with cooler air moved into the region between the 5th and the 10th. There were thunderstorms that occurred beginning on the 3rd during this transition, and persisted through the 10th with hail, strong gusty winds, and heavy rain. Some of the hail diameters were reported to be up to three quarters of an inch, and isolated locations saw heavy rain amounts of over 2 inches. These occurred mainly in central OR. After this period of cooler and wetter conditions, a strong high pressure system aloft rebuilt over the region and caused a warming trend to begin on the 11th, which persisted through the 21st. During this period, there were record high temperatures, with the hottest days being on the 19th and 20th. Temperature were 15 to 20 degrees above normal on those days, especially in the lower elevations, where most of the record high temperatures occurred.

On the 21st and 22nd, cooler air moved back into the region with temperatures returning to near normal, and at times slightly below normal. However, there were no record low temperatures recorded. During this transition from hot to cooler weather, there were more thunderstorms, some of which were severe, which occurred mostly on the 19th through the 21st. These storms produced mainly large hail and strong gusty winds. Reported hail sizes reached up to 0.75 - 1.5 inches in diameter, and wind gusts over 60 mph. While these severe reports came mostly from central and north central OR, there were a few reports of large hail and/or strong winds in northeast OR. Slightly cooler than normal conditions briefly returned on the 22nd through the 24th, and then they became slightly warmer than normal again through the 31st.

Below and on the next slide are images of weather and climate conditions during the month.

Severe hail from thunderstorms

Brilliant sunrise due to smoke over NE Oregon

Cloud to ground lightning over Pendleton, OR

More Images Representing May 2023 Weather/Climate Conditions

Double rainbow over northeast OR. Photo by: Scott Butner

Thunderstorms with frequent cloud to ground lightning

Mammatus clouds under a thunderstorm anvil cloud

May bloom of a 100+ year old lilac tree in Pendleton, OR

Significant Weather Events - Local Storm Reports for May 2023

Significant Weather Events					
Date	**Location**	**State**	**Event Type**	**Magnitude**	**Source**
May 3, 2023	6 NE SISTERS	OR	HAIL	0.7	TRAINED SPOTTER
May 3, 2023	REDMOND	OR	HAIL	0.5	PUBLIC
May 4, 2023	10 S UKIAH	OR	HAIL	0.7	TRAINED SPOTTER
May 9, 2023	8 E PRINEVILLE	OR	HEAVY RAIN	2.23	COCORAHS
May 9, 2023	8 E PRINEVILLE	OR	HEAVY SMALL HAIL	0.10	COCORAHS
May 9, 2023	4 NNW GOLDENDALE	WA	HEAVY RAIN	1.1	COCORAHS
May 9, 2023	6 SSE PRINEVILLE	OR	HEAVY RAIN	1.49	COCORAHS
May 10, 2023	1 SE FLORA	OR	HEAVY RAIN	0.46	COCORAHS
May 15, 2023	9 SE REDMOND	OR	FLOOD		COCORAHS
May 19, 2023	15 SE REDMOND	OR	HAIL	0.88	TRAINED SPOTTER
May 19, 2023	TERREBONNE	OR	HAIL	0.88	PUBLIC
May 19, 2023	2 NE REDMOND	OR	HAIL	1.25	PUBLIC
May 19, 2023	2 NE CULVER	OR	HAIL	0.5	TRAINED SPOTTER
May 19, 2023	13 ENE WARM SPRINGS	OR	TSTM WND GST	59	MESONET
May 19, 2023	11 E SHANIKO	OR	TSTM WND GST	59	MESONET
May 20, 2023	2 NNE DESCHUTES RIVER	OR	HAIL	0.5	TRAINED SPOTTER
May 20, 2023	6 SW DESCHUTES RIVER	OR	HAIL	1	BROADCAST MEDIA
May 20, 2023	23 ESE PRINEVILLE	OR	HAIL	0.5	TRAINED SPOTTER
May 20, 2023	2 N MONUMENT	OR	HAIL	0.25	TRAINED SPOTTER
May 20, 2023	7 E PRINEVILLE	OR	HAIL	0.25	TRAINED SPOTTER
May 20, 2023	6 SE SISTERS	OR	HAIL	1.5	PUBLIC
May 20, 2023	5 ESE SISTERS	OR	HAIL	1	PUBLIC

Please note: Magnitude units are either inches, mph, degrees F, or miles.

continued on next slide →

Significant Weather Events - Local Storm Reports for May 2023

Significant Weather Events					
Date	**Location**	**State**	**Event Type**	**Magnitude**	**Source**
May 20, 2023	2 W MADRAS	OR	HAIL	0.88	TRAINED SPOTTER
May 20, 2023	2 WSW MISSION	OR	TSTM WND GST	62	MESONET
May 21, 2023	NORTH POWDER	OR	HAIL	0.75	PUBLIC
May 21, 2023	22 E UNION	OR	HAIL	1.5	PUBLIC
May 21, 2023	22 SSW JOSEPH	OR	HAIL	1	PUBLIC

There were a total of 27 Local Storm Reports (LSRs) during May 2023. Every LSR was for either hail, strong thunderstorm wind gusts, or heavy rain. Most of these reports came from central to north central OR, but some also came from northeast OR, especially from the northeast mountains. The largest hail report was 1.5 inches in diameter, which was reported on the 20th and again on the 21st, near the city of Sisters, in central OR, and also near Union, in northeast OR, respectively. The strongest thunderstorm wind gust was 62 mph near Mission, OR, in the Foothills of the Northern Blue Mountains. The second strongest thunderstorm wind gusts (2 of them) were 59 mph, which both occurred in north central OR. The greatest amount of rain reported from a thunderstorm was 2.23 inches, near the city of Prineville, in central OR.

The severe weather was more frequent during the latter half of the month, due to a stronger cold front, which pushed into an upper ridge that contained hotter and more unstable air than earlier in the month (i.e., there was a stronger interaction between these two air masses at the end of the month, rather than at the beginning of the month).

Record Weather Events for May 2023

Record Weather Reports					
Event	**Date**	**Where**	**Previous Record**	**New Record**	**Records Began**
High Temperature	May 3, 2023	Ellensburg, WA	85 / 1946	86	1934
High Temperature	May 19, 2023	Ellensburg, WA	87 / 2006	93	1934
High Temperature	May 19, 2023	Pendleton, OR	90 / 1928	92	1934
High Temperature	May 19, 2023	Hermiston, OR	96 / 1954	96 (tie)	1906
High Temperature	May 19, 2023	Pasco, WA	94 / 2006	98	1942
High Temperature	May 19, 2023	Redmond, OR	89 / 2008	90	1941
High Temperature	May 19, 2023	Walla Walla, WA	89 / 2006	91	1949
High Temperature	May 19, 2023	Yakima, WA	88 / 1956	93	1909
High Temperature	May 19, 2023	Dallesport, WA	91 / 1993	96	1948
High Temperature	May 20, 2023	Ellensburg, WA	87 / 1958	92	1934
High Temperature	May 20, 2023	Pendleton, OR	90 / 1929	93	1934
High Temperature	May 20, 2023	Hermiston, OR	94 / 1928	97	1906
High Temperature	May 20, 2023	Pasco, WA	93 / 1928	98	1942
High Temperature	May 20, 2023	Redmond, OR	87 / 1967	87 (tie)	1941
High Temperature	May 20, 2023	Walla Walla, WA	90 / 1958	92	1949
High Temperature	May 20, 2023	Yakima, WA	89 / 1947	94	1909

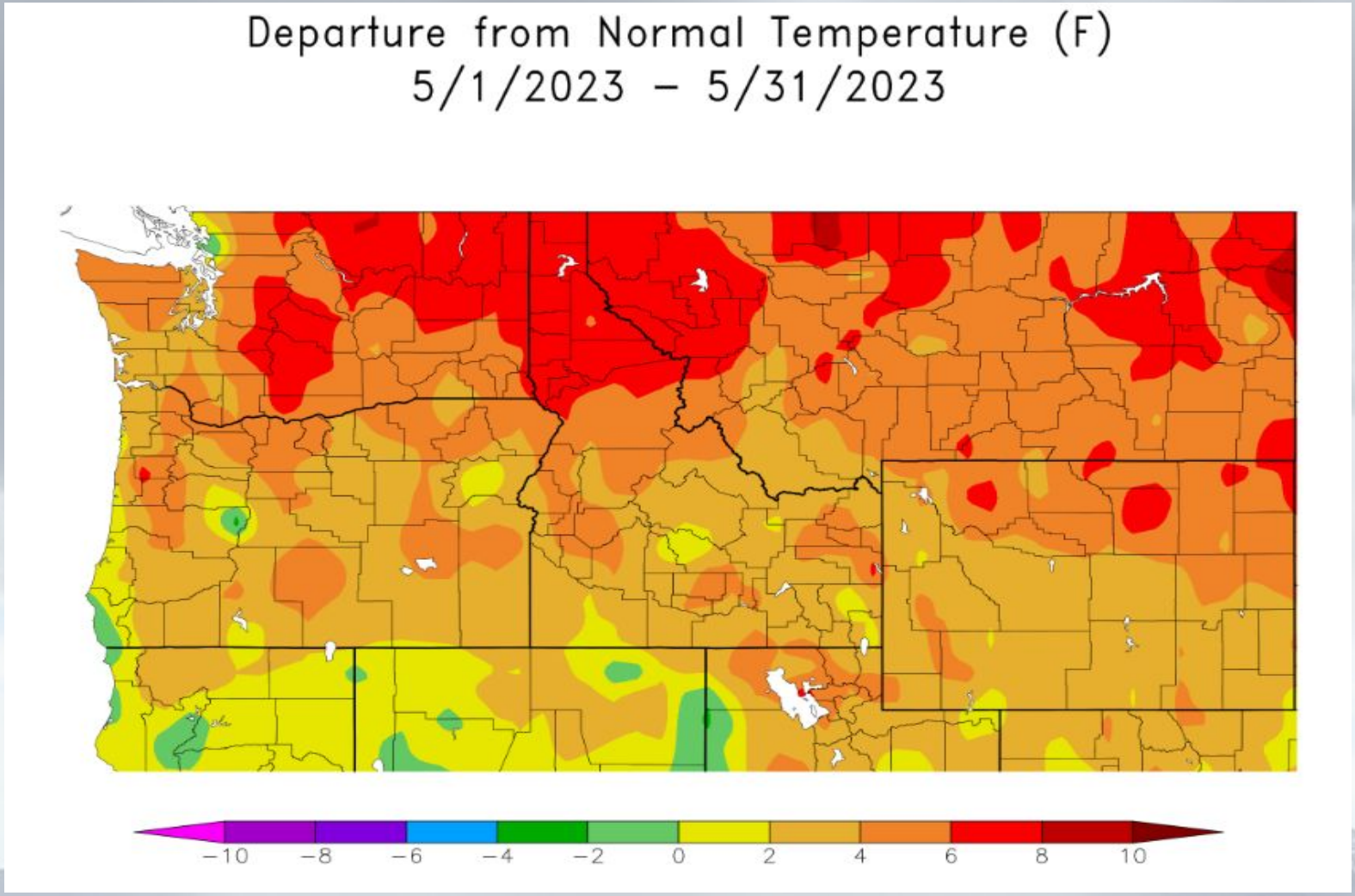
These are record weather reports during May 2023, and every one of them was a record high temperature. One of them was on the 3rd of the month, but the rest of them occurred on either the 19th or the 20th during an early season heat wave. The greatest record high temperature in the list above was 98 degrees at Pasco, WA, which occurred on the 20th, and it broke the old record of 93 degrees in 1928. This was followed by a record high of 97 degrees at Hermiston, OR, also on the 20th, which broke the old record of 94 degrees, also in 1928. There were likely hotter temperatures than these in the forecast area during this heat wave, but they did not break any record high temperatures.

May 2023: Observed Monthly Maximum & Minimum Temperatures

Location	Highest Maximum	Lowest Minimum
Pendleton, OR	93	39
Redmond, OR	90	30
Pasco, WA	98	40
Yakima, WA	95	37
Walla Walla, WA	92	40
Bend, OR Co-Op	84	31
Ellensburg, WA	93	38
Hermiston, OR	97	39
John Day, OR	92	37
La Grande, OR	89	32
The Dalles, OR	96	43
Meacham, OR	84	29
MT Adams RS, WA	88	30

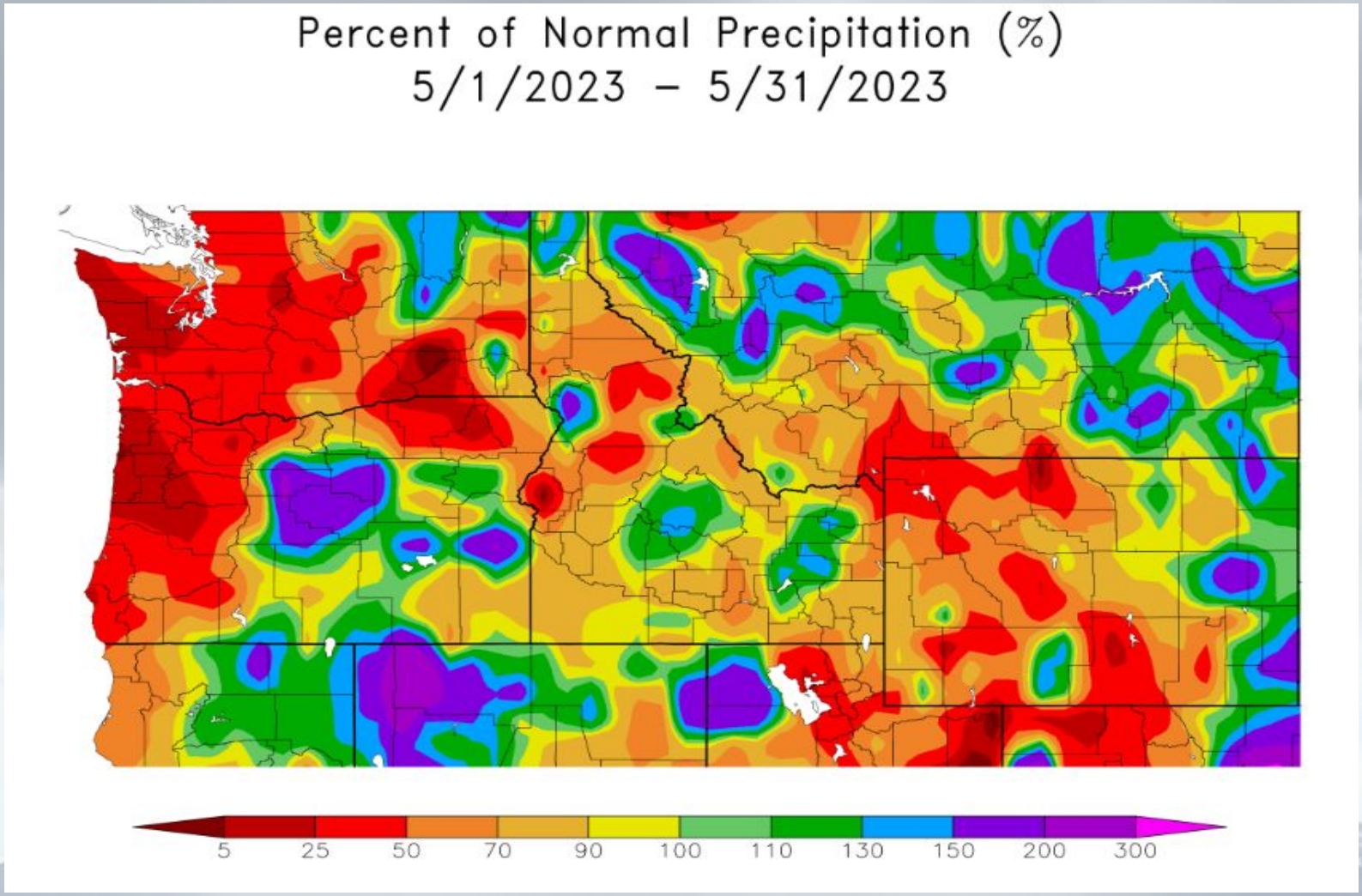
The highest maximum temperature in the list above was 2 degrees shy of 100 F at Pasco, WA with a high of 98 degrees, and the lowest maximum was a tie between the Bend, OR Co-Op and Meacham, OR, both with maximum highs of 84 degrees. The lowest minimum temperature occurred at Meacham, OR with a low of 29 degrees, and the warmest lowest minimum was 43 at The Dalles, OR (Dallesport, WA). Most of the highest maximums were between 85 and 95 degrees, and the lowest minimums ranged mostly from 30 to 40 degrees.

May 2023: Departure from Normal of Average Temperatures



The image above shows that the entire forecast area (northeast OR and southeast WA) had above normal temperatures. The greatest departures were over northern areas in WA, and the least were in central OR. The warmest areas were in the WA Cascades and east slopes, including the Yakima and Kittitas Valleys. The location with the greatest negative departure from normal temperature was a very small area in central OR over the Cascades in extreme western Deschutes County.

May 2023: Percent of Normal of Precipitation



Most of the northern areas from the WA Cascade east slopes southeast across the Lower Columbia Basin to the northeast mountains had a significantly lower percentage of normal precipitation (some spots as low as 5 percent denoted in the darker red). Much of central OR had significantly higher percentages of normal precipitation (>= 150 percent of normal in purple areas). The southern Blue Mountains received mostly 100-130 percent of normal (green areas).

May 2023: 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
Yakima	79.8	7.4	50.0	8.1	64.9	7.8	0.11	-0.47
Kennewick	81.4	6.9	54.8	5.3	68.1	6.1	0.08	-0.56
Walla Walla	75.5	5.1	52.1	3.8	63.8	4.4	0.29	-1.84
The Dalles	79.3	6.4	52.1	3.5	65.7	4.9	0.14	-0.55
Redmond	73.2	5.7	42.1	6.7	57.7	6.3	2.04	1.01
Pendleton Airport	76.9	6.9	49.3	3.7	63.1	5.3	0.45	-0.90
La Grande Airport	73.1	5.3	43.4	0.9	58.2	3	0.79	-1.45
John Day	74.2	7.8	46.4	9.3	60.3	8.5	2.34	0.51

Every average temperature departure from normal was above normal. John Day, OR, had the greatest departures for all three of these categories. All stations in the list, except for two (Redmond, OR and John Day, OR), had well below normal precipitation, with departures of normals ranging from -0.47 to -1.84 inches below normal. The two stations that had above normal precipitation were located within the same areas as in the previous slide in central to east central OR. These two stations that had above normal precipitation (both in central or east central OR) were caused by thunderstorms with heavy rainfall.

The greatest departures are outlined in black boxes.

May 2023: Observed Total Precipitation and Total Snowfall/Hail

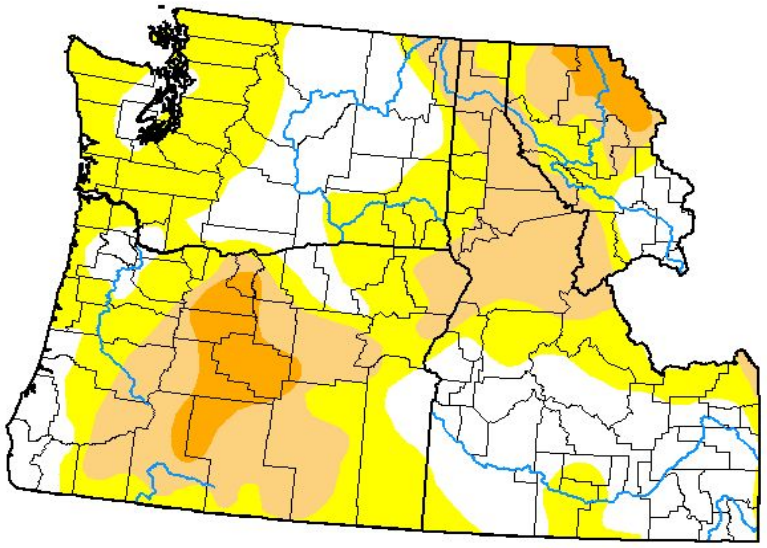
Location	Total Precipitation (inches)	Total Snow/Hail (inches)
Pendleton, OR	0.45	0.0
Redmond, OR	2.04	M
Pasco, WA	0.03	M
Yakima, WA	0.11	M
Walla Walla, WA	0.29	M
Bend, OR Co-Op	1.81	0.0
Ellensburg, WA	0.45	M
Hermiston, OR	0.35	M
John Day, OR	2.34	M
La Grande, OR	0.79	M
The Dalles, OR	0.14	M
Meacham, OR	1.21	M
Mt. Adams RS, WA	0.68	0.0

The greatest precipitation amount in the list above was at John Day, OR, with 2.34 inches, while the lowest was at Pasco, WA with only 0.03 of an inch. As for snow (or hail in the warm season), there were no reports of snow or hail at any of the three available stations. However, hail was reported by weather spotters in other locations, which were not regular reporting stations listed above.

May 2023 - Drought Monitor – Pacific Northwest

U.S. Drought Monitor

Pacific Northwest DEWS



May 30, 2023

(Released Thursday, Jun. 1, 2023)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	34.00	66.00	28.53	5.47	0.00	0.00
Last Week 05-23-2023	40.81	59.19	30.82	5.94	0.00	0.00
3 Months Ago 02-28-2023	15.60	84.40	59.11	18.83	5.14	0.50
Start of Calendar Year 01-03-2023	14.80	85.20	48.85	24.03	9.29	0.50
Start of Water Year 09-27-2022	2.06	97.94	62.50	24.12	11.86	0.50
One Year Ago 05-31-2022	26.62	73.38	57.79	38.36	18.38	4.19

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

Author:

Richard Heim

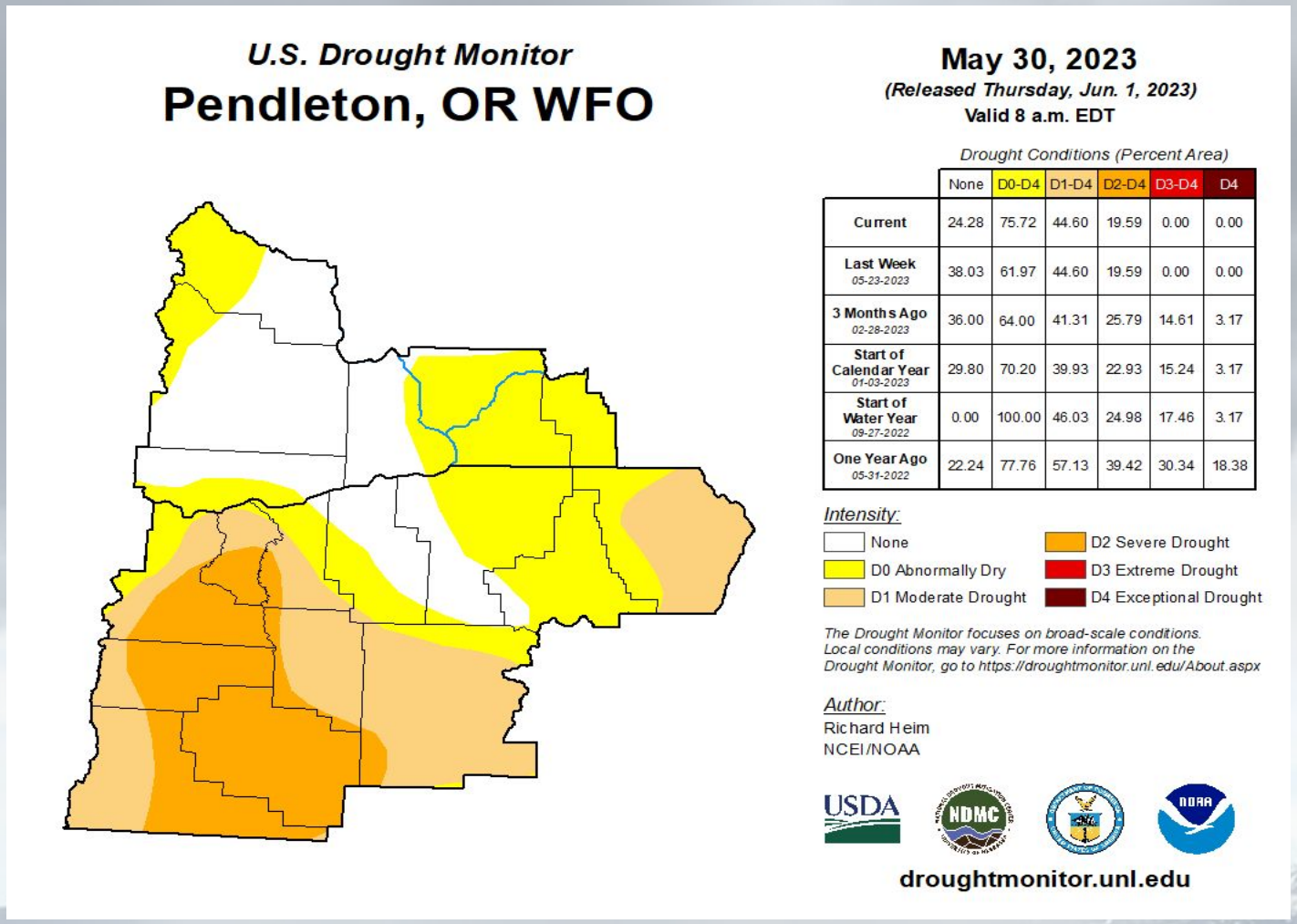
NCEI/NOAA

USDA NDMC NOAA

droughtmonitor.unl.edu

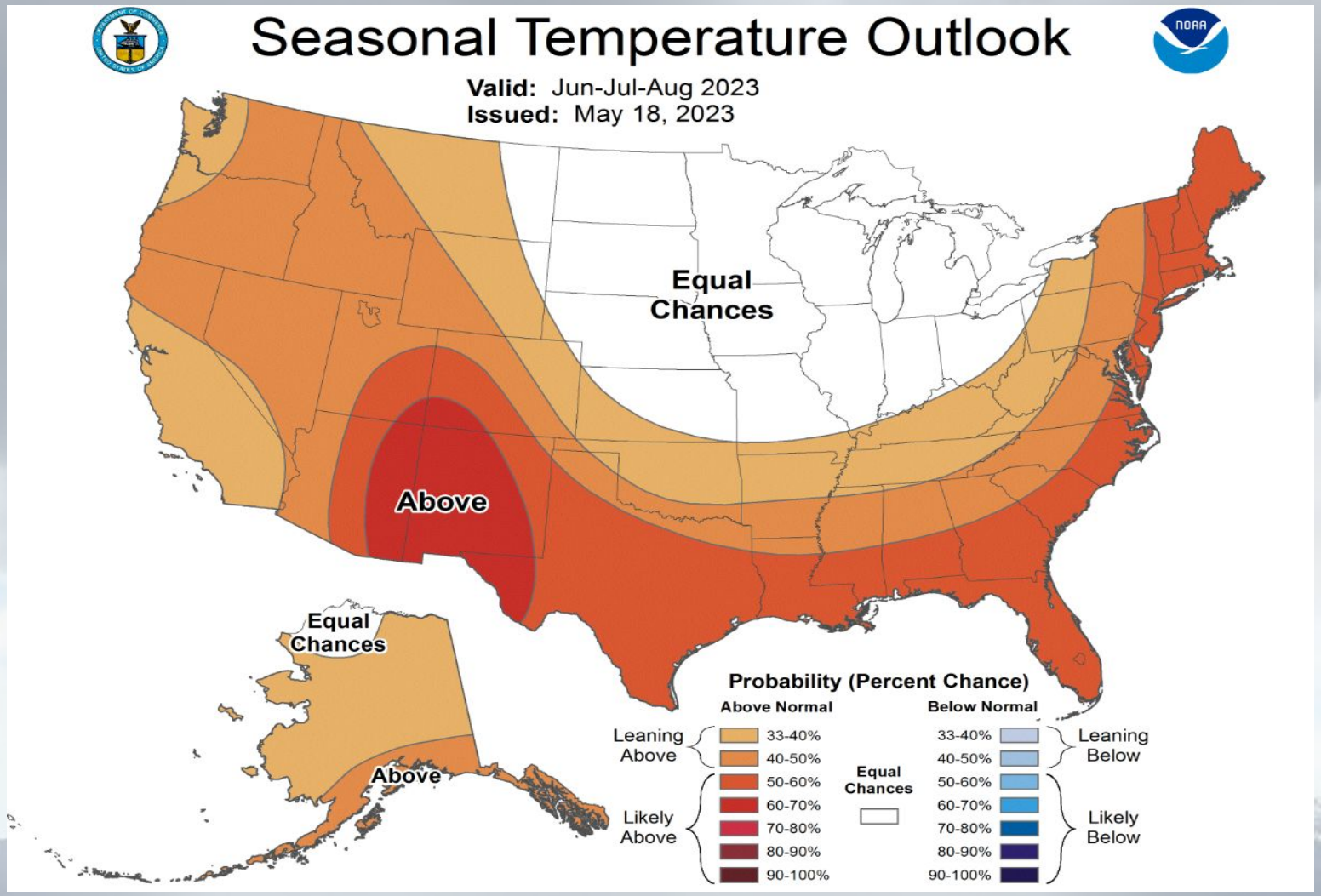
Drought conditions decreased further over central OR, east of the Cascades, but increased over north central OR, now with drought conditions in the D1 to D2 category (Abnormally Dry to Moderate Drought). In recent months, the drought category in central OR was as high as D4 (“Exceptional Drought”). Elsewhere, the least drought conditions were from east of the WA Cascades down through the lower Columbia Basin with a drought index of none to D0 (“Abnormally dry”). A drought index as high as D1 (“moderate”) occurred in the John Day Highlands, and eastern Wallowa County.

May 2023 - Drought Monitor – Pendleton Forecast Area



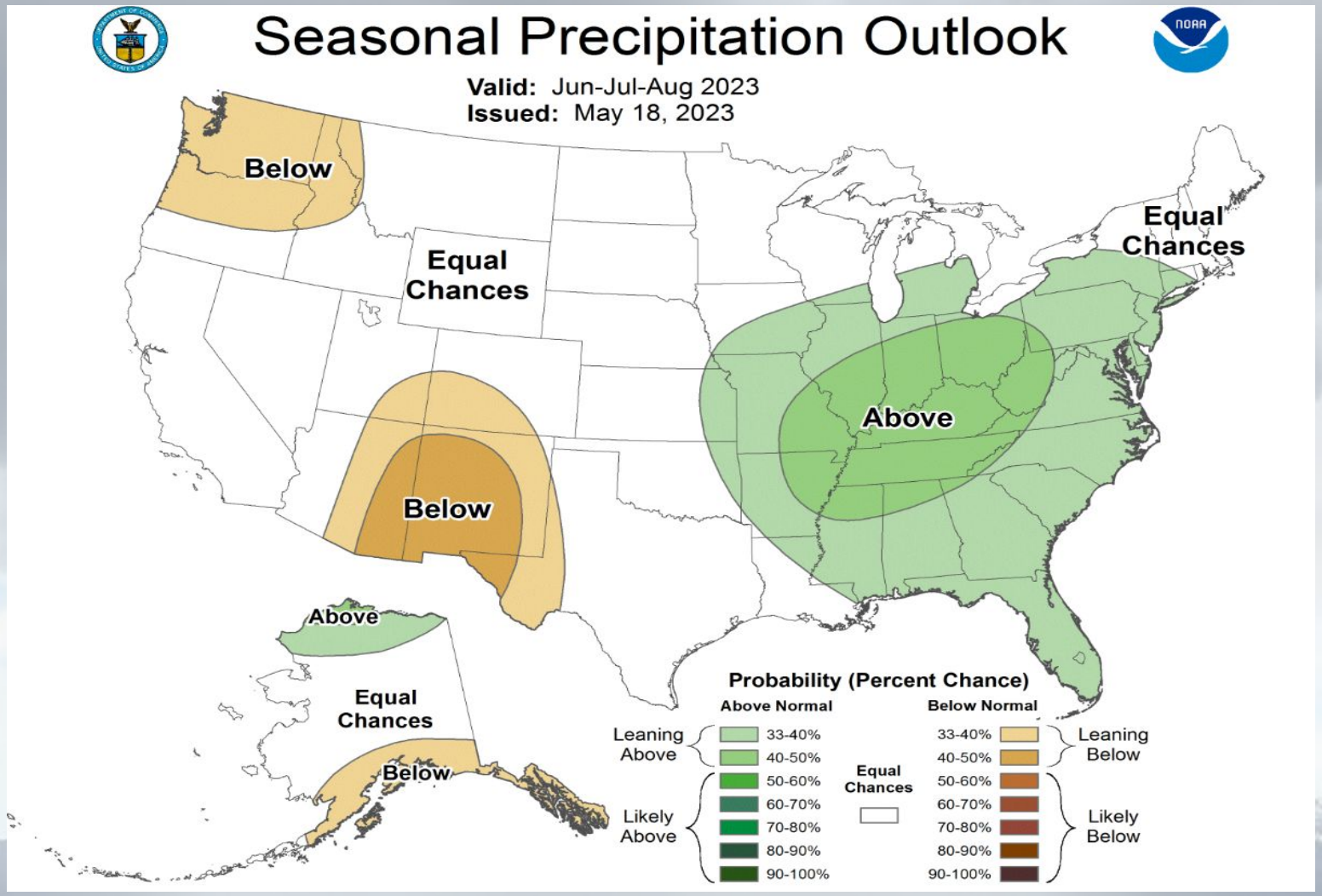
A close up of the forecast area shows that central & north central OR had the greatest drought conditions with drought conditions now at D1 (Moderate Drought). Elsewhere, the least drought conditions were east of the WA Cascades through the lower Columbia Basin and the southern Blue Mountains, with None to D0 (“Abnormally dry”). The John Day Highlands and eastern Wallowa County, had a drought index as great as D1 (“Moderate”) drought.

USA Three Month Temperature Outlook



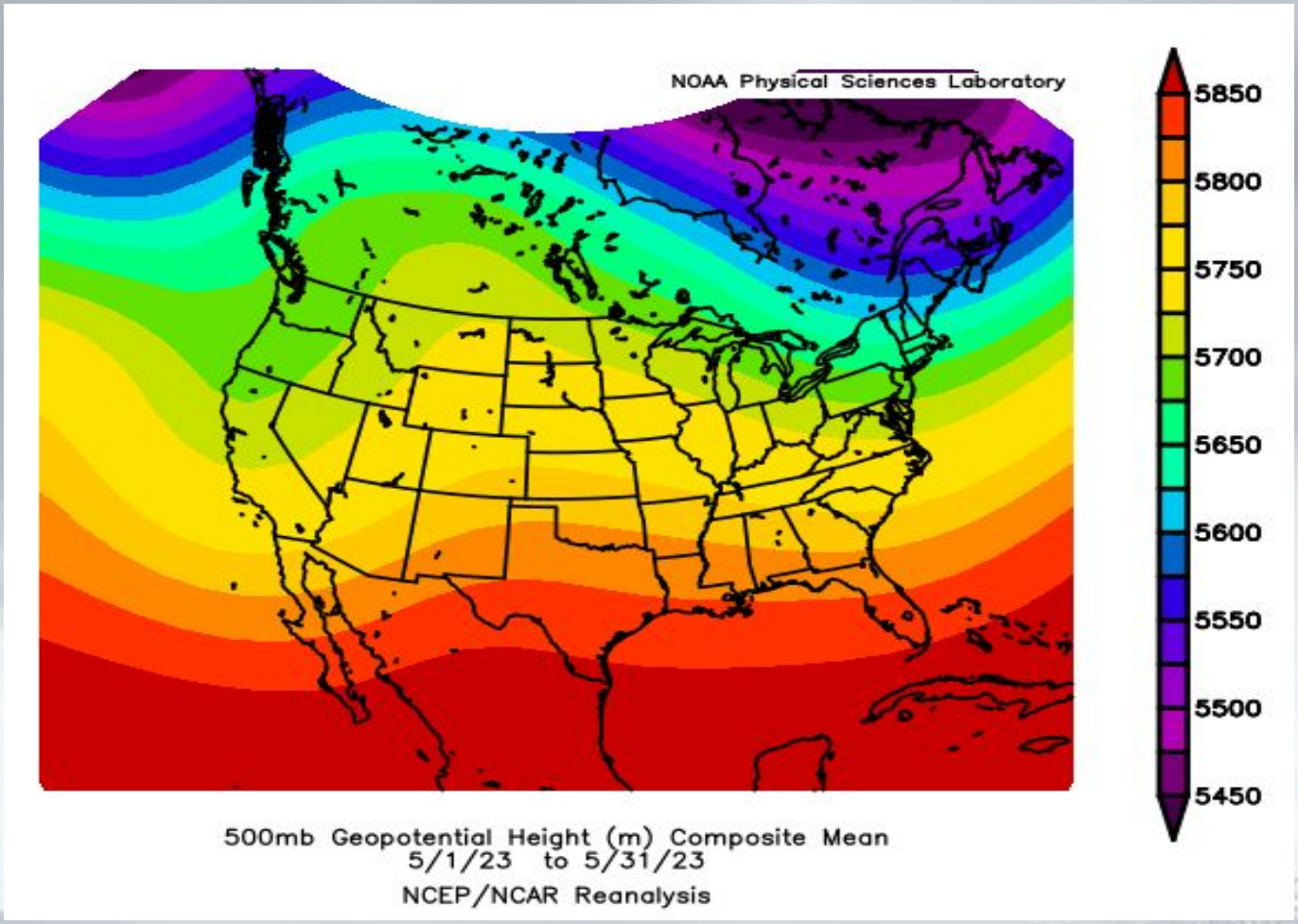
The three month outlook for the period June through August over the Pacific Northwest shows that temperature probabilities are leaning towards above normal. This is not much of a change since April, except that the probabilities are slightly higher, and with a greater coverage area.

USA Three Month Precipitation Outlook



The three month outlook for the period June - August over the Pacific Northwest shows that most of the forecast area is leaning toward having below normal precipitation. As with the 3 month temperature outlook, this is not much of a change from April's 3 month outlook, and the areal coverage is close to what it was last month as well.

May 2023 Average 500 MB Pattern

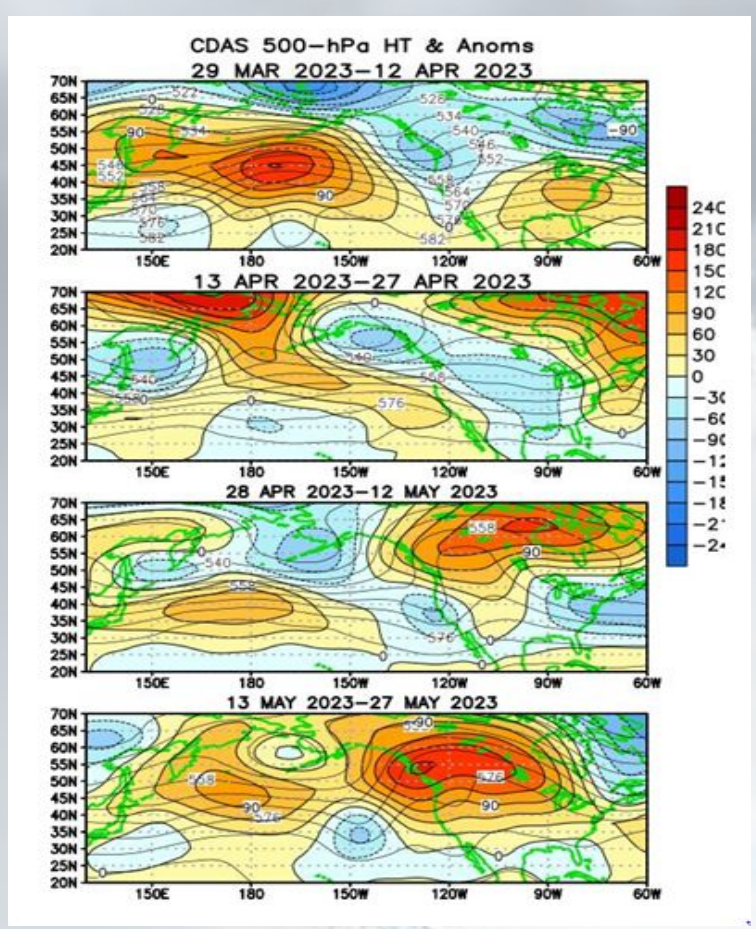


After a near zonal flow in April, May's average 500 mb pattern over the Pacific Northwest featured a pronounced upper trough. Since the upper trough axis was west of the forecast area along the coast, a warmer south to southwest flow aloft was present on the east side of the trough. This resulted in warmer than normal conditions. This pattern also contributed to greater instability and lifting mechanisms (such as cold fronts), producing an enhancement in thunderstorm activity.

Two Month, average Bi-weekly 500 MB Plots for April - May 2023

These are more detailed bi-weekly average 500 mb pattern plots that were sampled from the very end of March through the end of May

The area of focus is the Pacific Northwest (OR & WA). The land boundaries are shown by the green lines. Yellow and orange colored areas represent areas of high pressure or ridges at 500 mb. The blue colors show areas of low pressure systems or troughs at 500 mb.

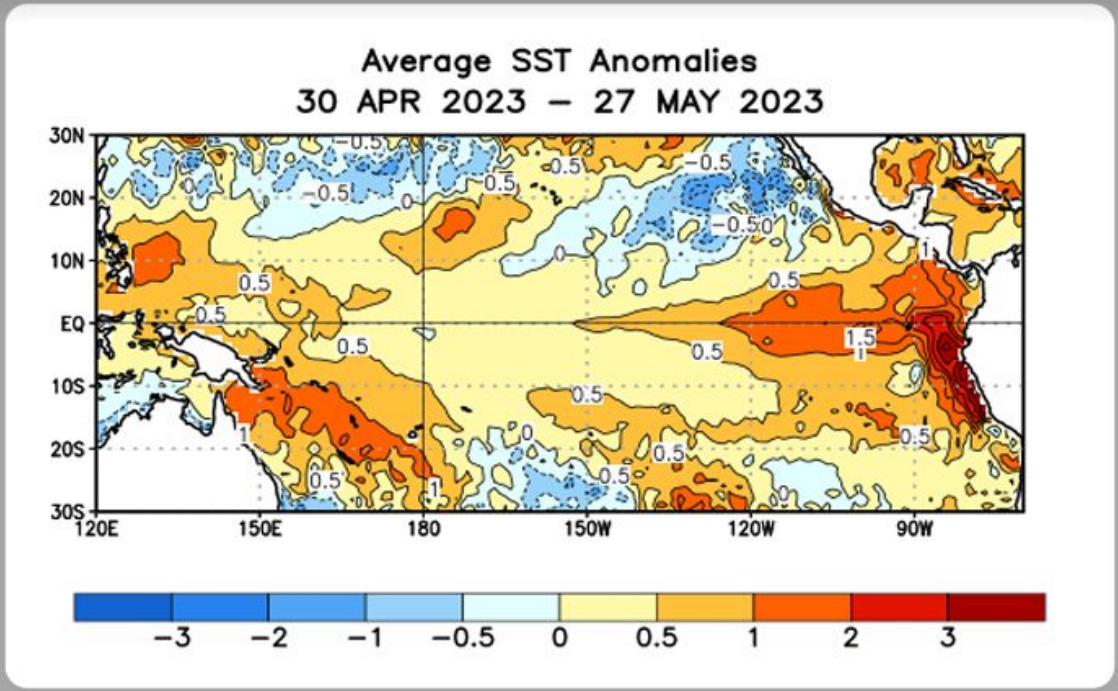


From March 29th - April 12th, there was an average weak upper trough over the west coast. Then from April 13th - April 27th, the flow became mostly zonal, westerly, over the Pacific Northwest. From April 28th - May 12th, the upper flow pattern then became more of a Rex Block pattern, with an upper high to the north and an upper low off the CA coast. Then, the upper high to the north became much stronger from May 13th - May 27th. This strengthening is likely what led to the record breaking heat wave during the latter part of May. Then, as cooler Pacific air moved into the region and interacted with the hot and unstable air over the inland Pacific Northwest, producing more thunderstorms, some of which were severe, with large hail, strong gusty winds and heavy rain.

Sea Surface Temperature (SST) Anomalies for May 2023

SST Departures (°C) in the Tropical Pacific During the Last Four Weeks

In the last four weeks, equatorial SSTs were above average in the eastern and western Pacific Ocean and were near average in the central Pacific Ocean.



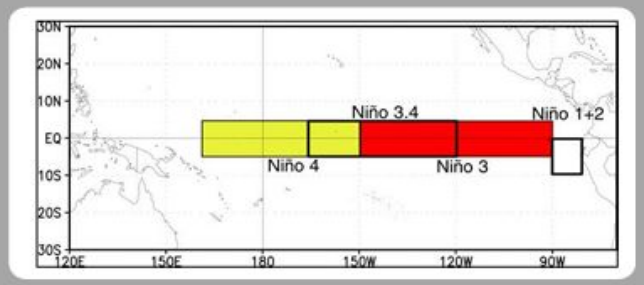
During the last 4 weeks equatorial Sea Surface Temperatures (SSTs) became further warmer than average over the eastern and western Pacific, and they were near normal over the central Pacific. This continued warming trend of the equatorial Pacific continues to show the transition from ENSO-neutral this spring, to the likelihood of an El-Niño event developing this summer and continuing into fall and the winter of 2023 - 2024.

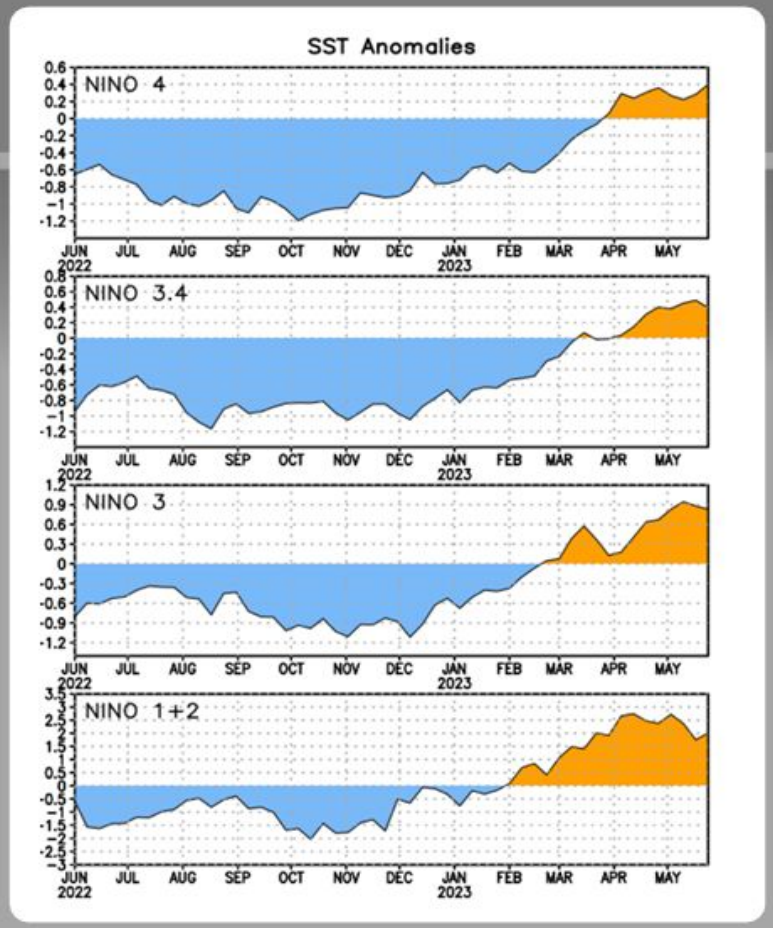
ENSO Niño Regions SST Anomalies for Each Niño Region in May 2023

Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

Niño 4	0.4°C
Niño 3.4	0.4°C
Niño 3	0.8°C
Niño 1+2	2.0°C





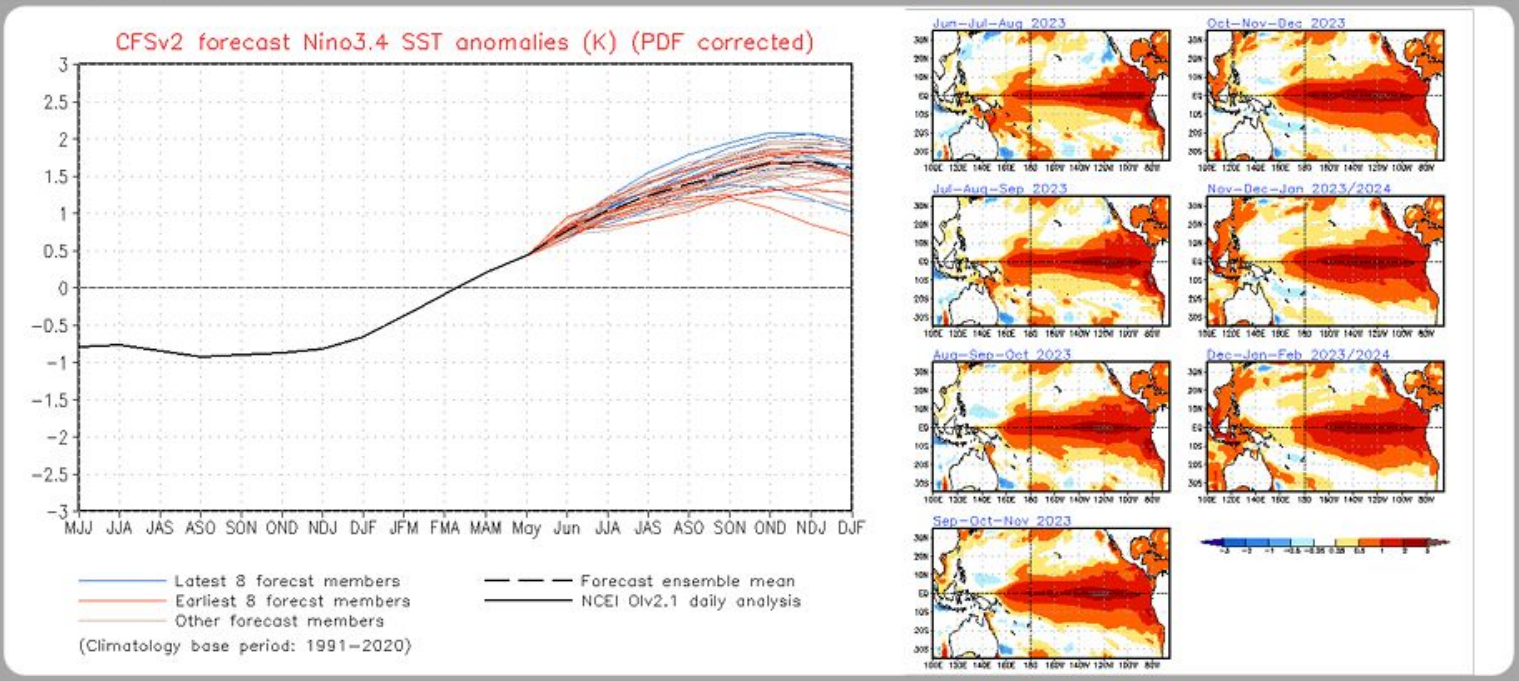
All Niño Regions continued to show above normal SST anomalies during May (as depicted by the orange shading). This trend is forecast to continue as ENSO-neutral conditions continue to indicate that a transition from ENSO-neutral to an El-Niño event will become more likely this summer and fall. The warmest Niño Region was in Niño Region 1 + 2 and 3, with the least in Niño Regions 3.4 and 4 (as shown by the amount of orange shading duration).

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

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

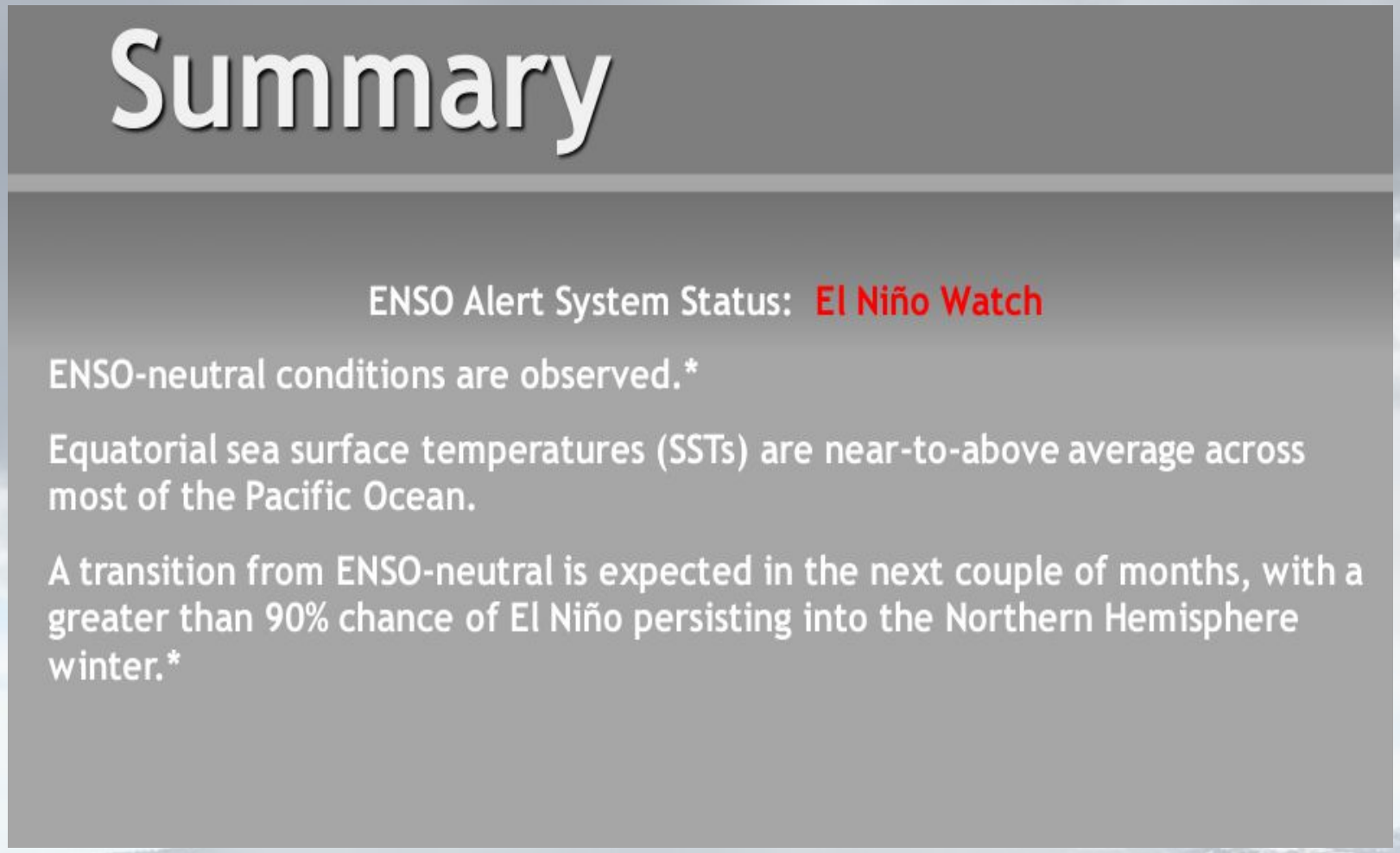
Issued: 30 May 2023

The CFS.v2 ensemble mean (black dashed line) favors a transition from ENSO-neutral to El Niño in June, followed by a strong El Niño (> 1.5°C) during the winter 2023-24.

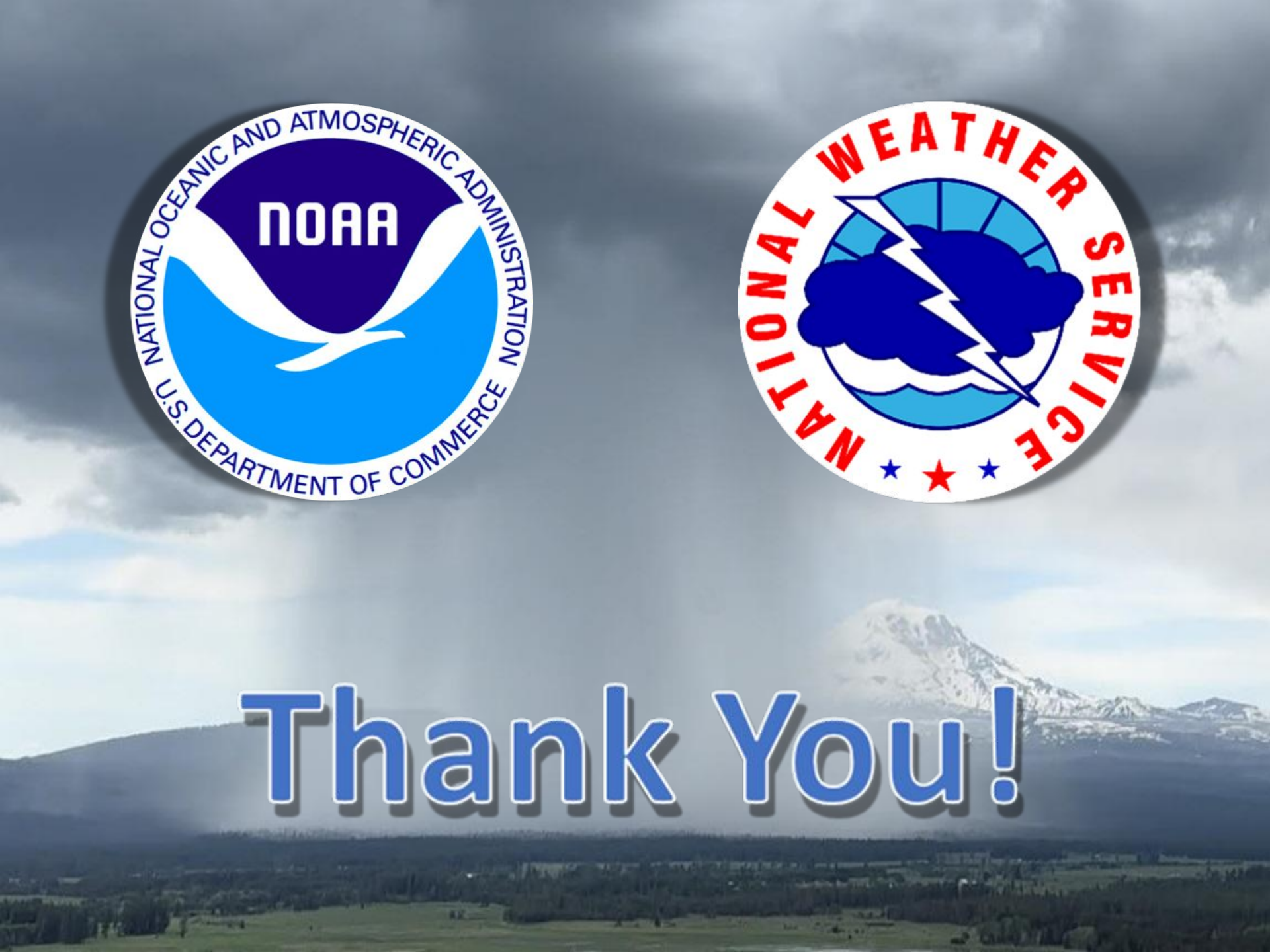


The SST CFS.v2 forecast ensemble mean continues to favor a transition from ENSO-neutral to El-Niño by this summer. All of the SST ensemble members are well above normal (above the black dashed horizontal zero line). The thumbnail images to the right also show increasing SST's through the spring and summer, and then remain much warmer than normal through the fall.

Current ENSO (El Niño Southern Oscillation) Alert System Status



The current ENSO Alert System Status continues to be **"El Niño Watch"**. ENSO-neutral conditions are currently observed, with equatorial SSTs near-to-above average across most of the Pacific Ocean. A transition from the current ENSO-neutral conditions to El-Niño is now is favored by a greater than 90 percent chance (an increase from 62 percent last month), with an El-Niño event persisting into the Northern Hemisphere fall and winter.


NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
NATIONAL WEATHER SERVICE
Thank You!