The Month In Review

July 2022

Photo: Morning Alto-Cumulus Castellanas, implying elevated instability. Photo by: Roger Cloutier

July 2022, Climate Conditions Summary

July 2022 was significantly warmer, and drier than normal compared to the previous few months. In fact, it was one of the warmest July's on record, with many days having high temperatures of 90 to 100 degrees or higher. Pendleton, OR for example, recorded a total of 21 days with high temperatures of 90 degrees or warmer, and of those, there were 9 days that were 100 degrees or hotter. There were 7 days in a row with temperatures greater than 100 degrees from July 25th to the 31st during a significant heat wave, with the hottest day having a high temperature of 111 degrees on the 29th. During about the first third of the month, there were still some weather systems that moved across the region, which brought most of the significant weather for the month. Most of these were severe hail reports on the 2nd of the month across central to northeast OR. Then there were heavy rain events from thunderstorms on the 6th, 7th, 12th, and 28th of the month. This heavy rain fell over a very short period of time, causing localized flooding. There was a severe thunderstorm on the 28th, and again on the 30th, which brought large hail and heavy rain to Bickleton, WA on the 28th, and strong thunderstorm outflow winds to Madras, OR on the 30th. The thunderstorm over Bickleton, WA produced large golf ball sized hail and heavy rain, while the storm near Madras, OR produced strong damaging outflow winds, with low visibility in blowing dust. Below are some images of weather conditions during July 2022.

Golf ball sized hail fell in Bickleton, WA on July 28th.

Thunderstorm rain shaft under the cell, in north central OR, in early July.

Still quite green in Wallowa County, OR in early July.

More Images Representing July 2022 Weather/Climate Conditions

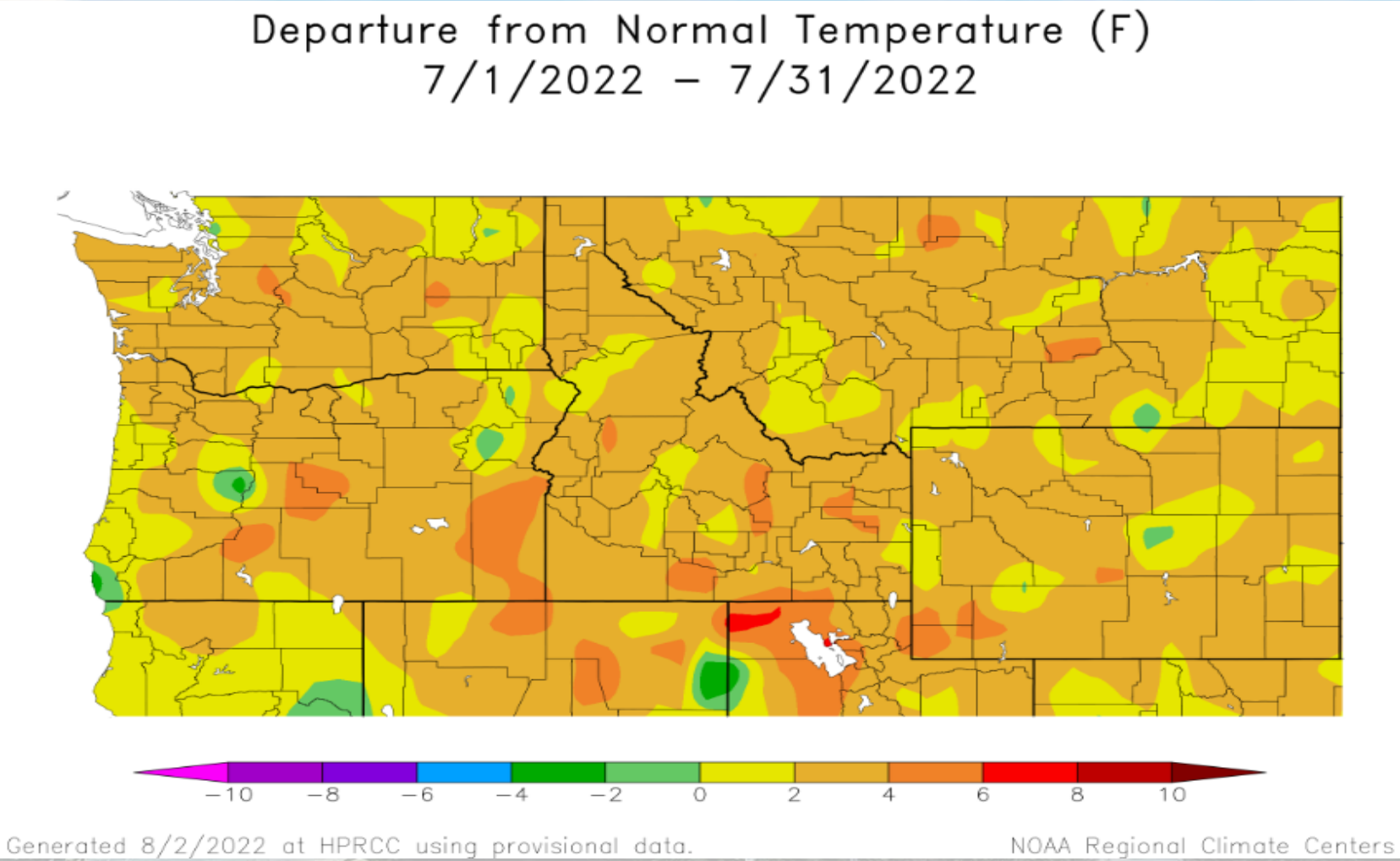
Egg cooking in the hot sun during a heat wave.

Arora Borealis in northern sky, Pendleton, OR.

Gunsight Mountain seen from Anthony Lake, OR

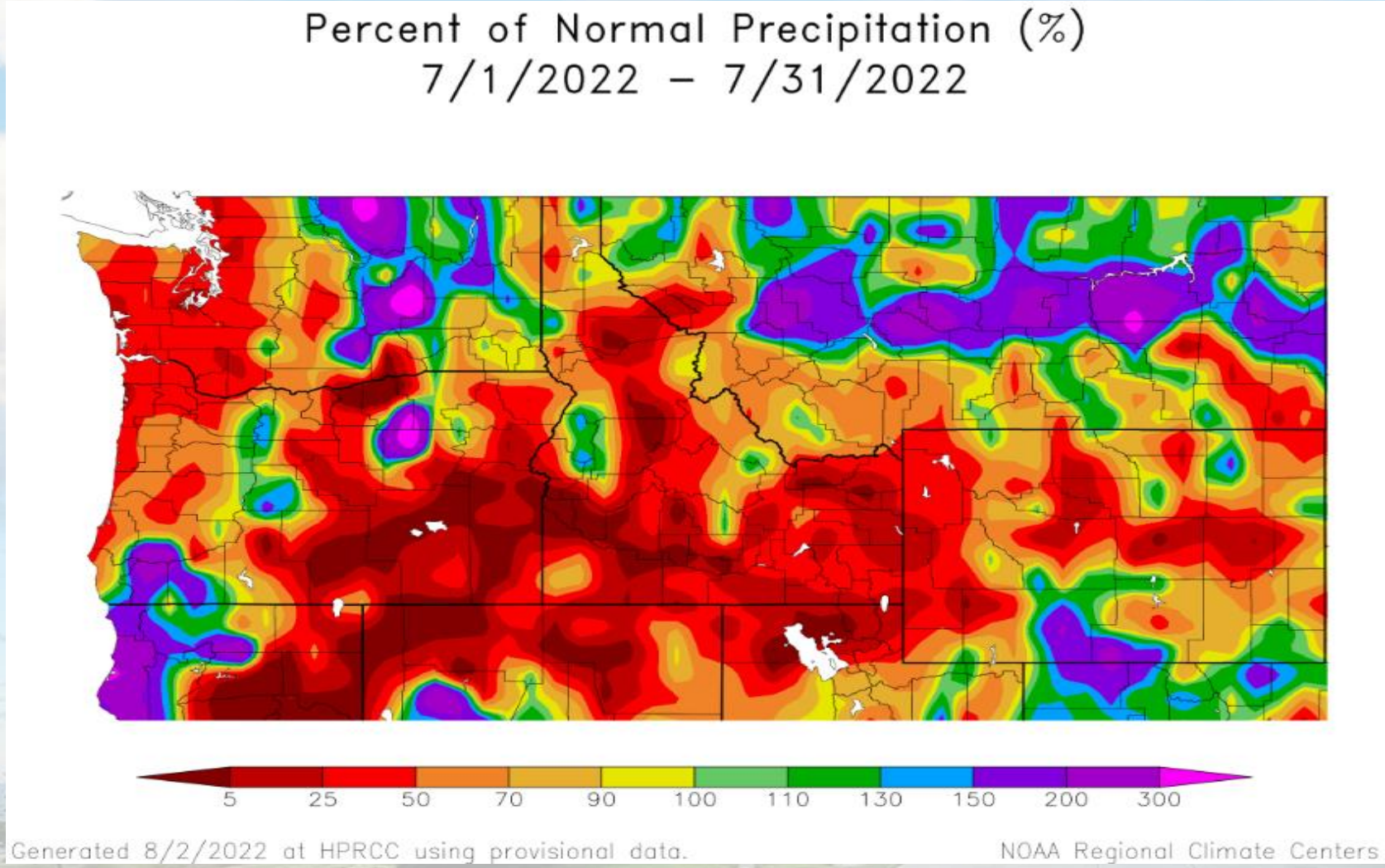
Eastern Columbia Gorge turns brown in hot dry air.

July 2022, Departure from Normal of Average Temperatures



The departure from normal of the average temperatures were mostly 2 to 6 degrees above normal across northeast OR and southeast WA. The coolest areas were over the northeast mountains in Union and Wallowa counties. The hottest areas were in central OR, in Deschutes and Crook counties. These departures from normal are greater than that of June 2022. This was mostly caused by a significant heat wave that occurred during the period of July 24th to the 31st.

July 2022, Percent of Normal of Precipitation



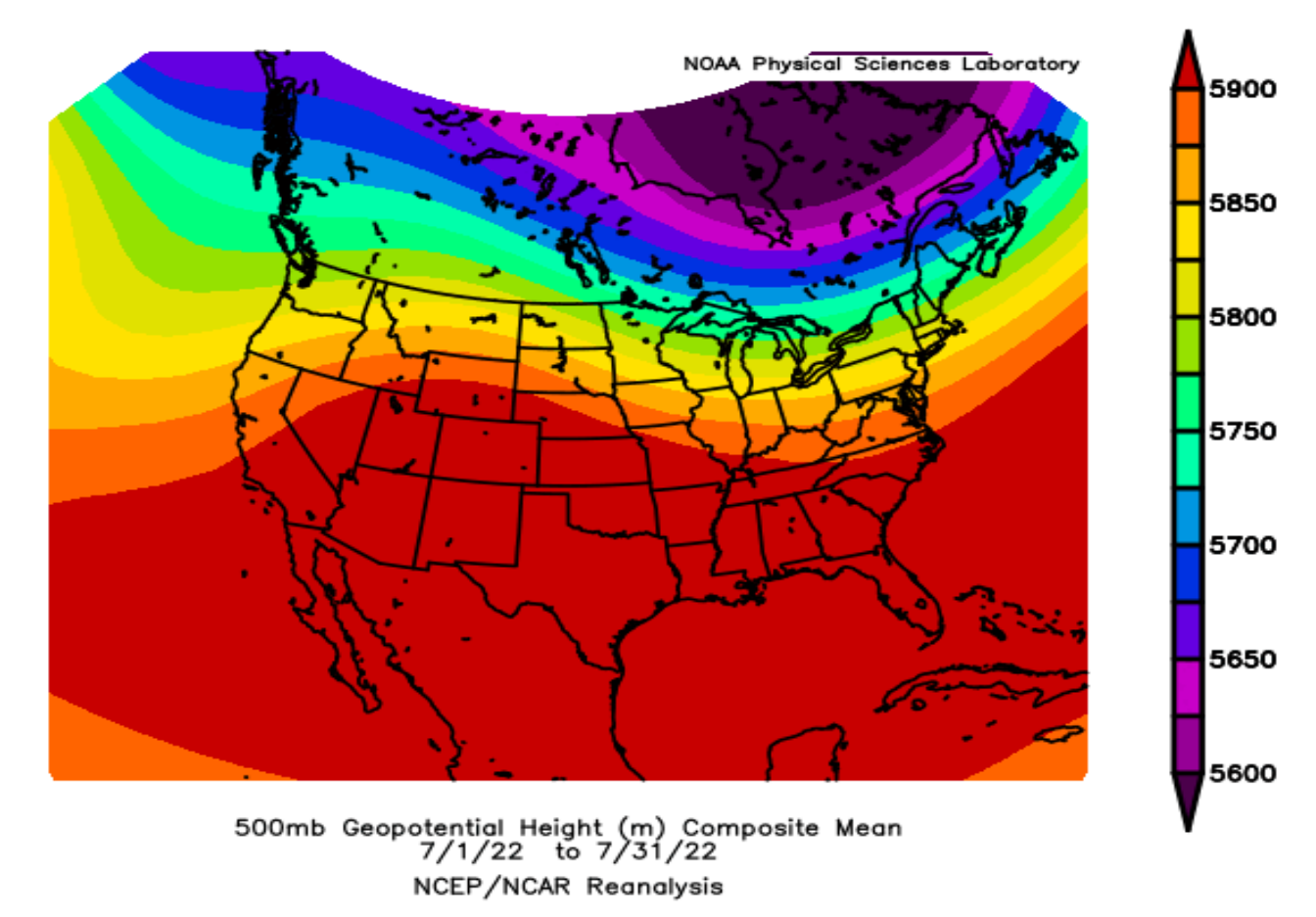
There was much variability of the distribution of precipitation across northeast OR and southeast WA during July 2022. Mostly of these areas were drier than normal, with a percent of normal precipitation that ranged from near zero percent to 50 percent in areas east of the OR Cascades and in the eastern Columbia River Gorge. The wettest areas were north central OR, Deschutes Co. OR, and eastern Yakima Co. WA.

July 2022 Departures from Normal Means/Sums for Select Cities

	Max T	Depart	Min T	Depart	Ave T	Depart	PCPN	Depart
Yakima	93.6	5.7	57.4	4.1	75.5	4.9	0.19	-0.03
Kennewick	94.8	4.5	64.6	2.9	79.7	3.7	0.22	0.00
Walla Walla	91.6	2.4	63.5	2.6	77.6	2.6	0.24	-0.35
The Dalles	94.4	6.9	64.8	4.4	79.6	5.6	0.15	-0.01
Redmond	92.9	7.3	51.6	5.4	72.3	6.4	0.20	-0.33
Pendleton Airport	94.2	6.2	60.5	3.3	77.4	4.8	0.31	-0.01
La Grande Airport	89.8	4.4	53.4	-0.4	71.6	2.0	0.26	-0.42
John Day	94.6	6.4	58.7	9.1	76.6	7.7	0.78	0.18

The table above shows that all stations had departures of normal of the mean maximum temperatures that were warmer than normal, with the greatest departure being +7.3 degrees at Redmond, OR. All stations, except the La Grande, OR Airport, also had warmer than normal departures from normal of the mean minimum temperatures. The greatest was +9.1 degrees above normal at John Day, OR. All of the mean average temperatures had departures from normal that were warmer than normal, with the greatest being +7.7 degrees also at John Day, OR. Most of the departures from normal of precipitation were below normal, with the greatest departure from normal at the La Grande Airport, OR.

July 2022, Average 500 MB Pattern

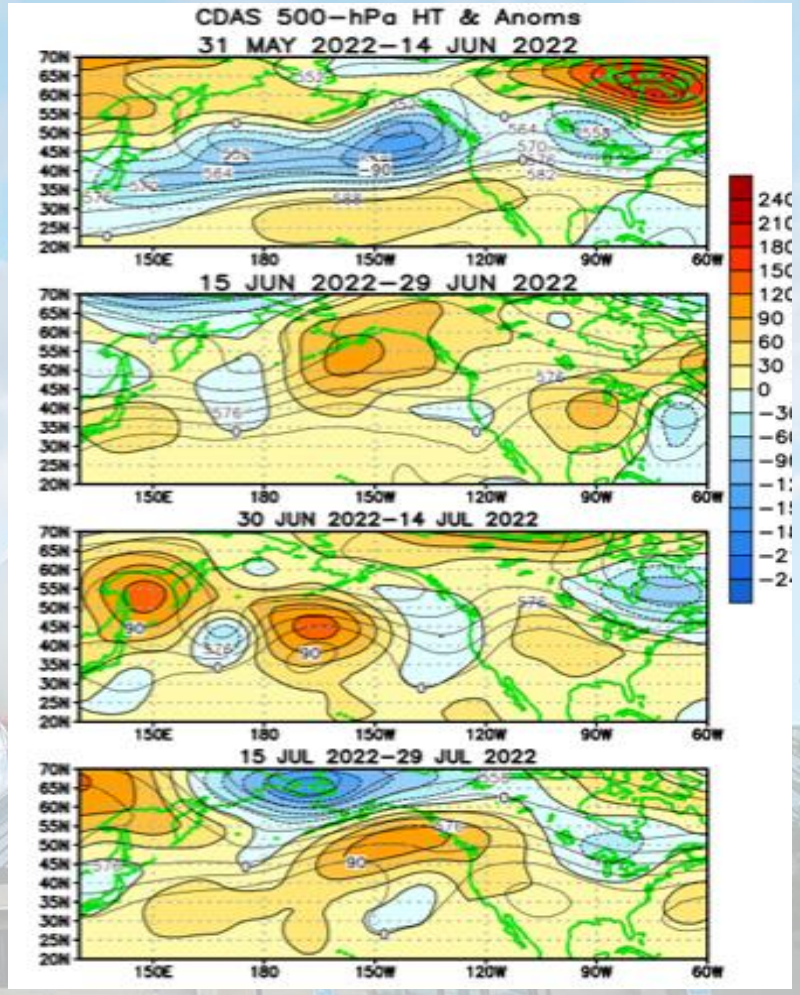


The average 500 MB flow pattern for July 2022 over the Pacific Northwest was a southwest flow on the west side of an upper ridge over the interior northwest. This resulted in several thunderstorm outbreaks, some of which were severe. It also resulted in warmer and drier than normal conditions. Most of the significant weather systems moved across the region in a southwest flow at the beginning of the month, and then a strong upper ridge, with a significant heat wave occurred at the end of the month over the Pacific Northwest.

Two Month, Average Bi-weekly 500 MB Plots for June & July 2022

These are more detailed bi-weekly average 500 mb pattern plots, which was sampled from the following period: 31st of May through the 29th of July.

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.



During the period from the end of May until the middle of June, a southwest flow pattern prevailed over the Pacific Northwest. Then from mid June through mid July, (the second and third image) an upper trough persisted off the coast, with an upper southwest flow over the Pacific Northwest. This resulted in a frequent thunderstorm pattern, some of which were severe. Then during the period from mid July to the end of July, a strong upper ridge developed, and caused a significant heat wave to occur. During this time, many high temperature records were broken for at least several days in a row.

Significant Weather Events for July 2022

Significant Weather Events				
Event	**Date**	**Report**	**Where**	**Source**
Hail	July 2, 2022	E 1.00 inch	9 WSW Kamela, OR	Public
Hail	July 2, 2022	E 0.88 inch	NNW Spray, OR	Trained Spotter
Hail	July 2, 2022	E 1.00 inch	3 N Spray, OR	Amateur Radio
TSTM Wind Damage	July 2, 2022	Power Outage & Flooding	Bend, OR	Broadcast Media
Hail	July 2, 2022	E 1.75 inches	Bend, OR	Public
Hail	July 2, 2022	E 0.88 inch	Bend, OR	Public
Hail	July 2, 2022	E 1.00 inch	Bend, OR	Public
Hail	July 2, 2022	E 1.50 inches	5 SE Ukiah, OR	Public
Hail	July 2, 2022	E 1.00 inch	1 E Dale, OR	Trained Spotter
TSTM Wind Damage	July 2, 2022	Power Outages	Pilot Rock, OR	Trained Spotter
Hail	July 2, 2022	E 1.75 inches	Summerville, OR	Trained Spotter
Hail - Damage	July 2, 2022	E 1.50 inches, Garden, Car	Summerville, OR	Public
Heavy Rain	July 6, 2022	M 0.64 inch	NE Sunnyside, WA	COCORAHS
Heavy Rain	July 7, 2022	M 0.60 inch	Granger, WA	COCORAHS
Heavy Rain	July 12, 2022	M 1.50 inch	3 SSW Wallowa, OR	Trained Spotter
Hail & Heavy Rain	July 28, 2022	E 1.75 inches & E 1.00 Inch rain	18 SSW Satus, WA	Public
TSTM Wind Damage	July 30, 2022	Fences Blown Down	1 SW Madras, OR	NWS Employee
TSTM Wind Gust	July 30, 1933	M 67 mph	Madras, OR	AWOS

Most of the significant event reports were of large hail with thunderstorms, which occurred mostly on the 2nd of July. Then heavy rains in a short period of time during thunderstorms fell on the 6th, 7th, 12th, and the 28th. Thunderstorm wind damage occurred on the 30th near Madras, OR. The largest hail reported was estimated to be 1.75 inches on the 2nd in Bend, OR, and also in Summerville, OR, then on the 28th in Bickleton, WA along with heavy rain in Bickleton, WA. Thunderstorm damage near Madras, OR on the 30th were fences blown down by thunderstorm outflow winds, along with near zero visibility in blowing dust.

Record Weather Events for July 2022

Record Weather Reports					
Event	**Date**	**Where**	**Previous Record**	**New Record**	**Records Began**
High Temp	July 25, 2022	Dallesport, WA	108 / 1996	108 (Tie)	1929
High Temp	July 25, 2022	Ellensburg, WA	99 / 2018	101	1934
High Temp	July 26, 2022	Ellensburg, WA	99 / 2018	103	1934
High Temp	July 26, 2022	Dallesport, WA	111 / 1998	111 (Tie)	1929
High Temp	July 26, 2022	Redmond, OR	101 / 1998	103	1941
High Temp	July 27, 2022	Redmond, OR	103 / 1968	104	1941
High Temp	July 27, 2022	Ellensburg, WA	100 / 2020	105	1934
High Temp	July 27, 2022	Yakima, WA	106 / 1998	106 (Tie)	1909
High Temp	July 28, 2022	Redmond, OR	104 / 1968	107	1941
High Temp	July 28, 2022	Pendleton, OR	108 / 1928	108 (Tie)	1934
High Temp	July 28, 2022	Hermiston, OR	108 / 1939	108 (Tie)	1906
High Temp	July 28, 2022	Pasco, WA	109 / 1934	109 (Tie)	1934
High Temp	July 28, 2022	Yakima, WA	105 / 1971	107	1909
High Temp	July 28, 2022	Ellensburg, WA	105 / 2014	109	1934
High Temp	July 29, 2022	Pendleton, OR	104 / 2003	111	1934
High Temp	July 29, 2022	Hermiston, OR	107 / 1958	112	1906
High Temp	July 29, 2022	Redmond, OR	103 / 2003	109	1941
High Temp	July 29, 2022	Pasco, WA	107 / 2014	112	1934
High Temp	July 29, 2022	Walla Walla, WA	106 / 1960	108	1949
High Temp	July 29, 2022	Dallesport, WA	107 / 2018	112	1929
High Temp	July 29, 2022	Yakima, WA	105 / 2014	107	1909
High Temp	July 29, 2022	Ellensburg, WA	102 / 2018	107	1934
High Temp	July 30, 2022	Pendleton, OR	109 / 2020	110	1934
High Temp	July 30, 2022	Redmond, OR	104 / 2020	108	1941
High Temp	July 30, 2022	Ellensburg, WA	104 / 2020	105	1934
High Temp	July 30, 2022	Yakima, WA	105 / 2020	106	1909
High Temp	July 30, 2022	Dallesport, WA	108 / 2020	112	1929
High Temp	July 31, 2022	Ellensburg, WA	105 / 2018	106	1934
High Temp	July 31, 2022	Redmond, OR	100 / 1971	105	1941

Every single record weather event was for record high temperatures, which all occurred during a significant record breaking heat wave from the 25th of July to the 31st. Every one of these record high temperatures were at or above 100 degrees, except for Ellensburg, WA on the 25th and the 26th, which were both 99 degrees. Most of these records were broken, but 6 out of 29 of these records were a tie with the previous record.

July 2022, Observed Monthly Max & Min Temperatures

Location	Highest Maximum	Lowest Minimum
Pendleton, OR	111	52
Redmond, OR	109	41
Pasco, WA	112	53
Yakima, WA	109	48
Walla Walla, WA	108	55
Bend, OR	99	43
Ellensburg, WA	109	47
Hermiston, OR	112	52
John Day, OR	109	49
La Grande, OR	105	42
The Dalles, OR	112	55
Meacham, OR	98	37
MT Adams RS, WA	100	43

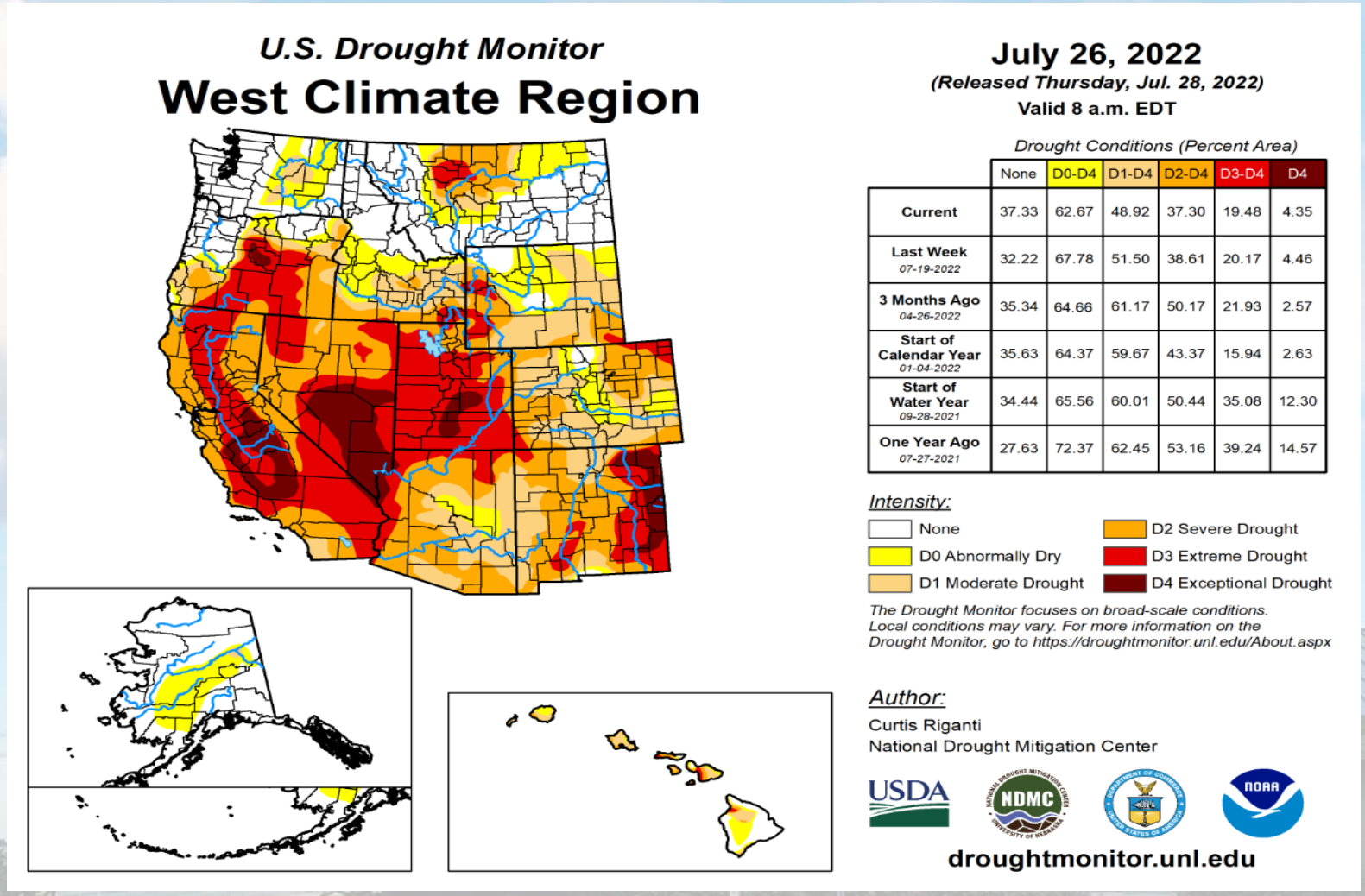
The highest maximum temperatures ranged from 98 degrees at Meacham, OR to 112 degrees at Pasco, WA, Hermiston, OR, and at The Dalles, OR. The lowest minimum temperatures ranged from 37 degrees at Meacham, OR to 55 degrees at Walla Walla, WA and at The Dalles, OR. The highest maximums are box colored red, and the lowest minimums are box colored blue.

July 2022 Observed Total Precipitation and Total Snowfall/Hail

Location	Total Precipitation (inches)	Total Snow/Hail (inches)
Pendleton, OR	0.31	0.0
Redmond, OR	0.20	M
Pasco, WA	0.15	M
Yakima, WA	0.19	M
Walla Walla, WA	0.24	M
Bend, OR	0.57	M
Ellensburg, WA	Trace	M
Hermiston, OR	0.03	M
John Day, OR	0.78	M
La Grande, OR	0.26	M
The Dalles, OR	0.15	M
Meacham, OR	0.29	M
MT Adams RS, WA	0.21	0.0

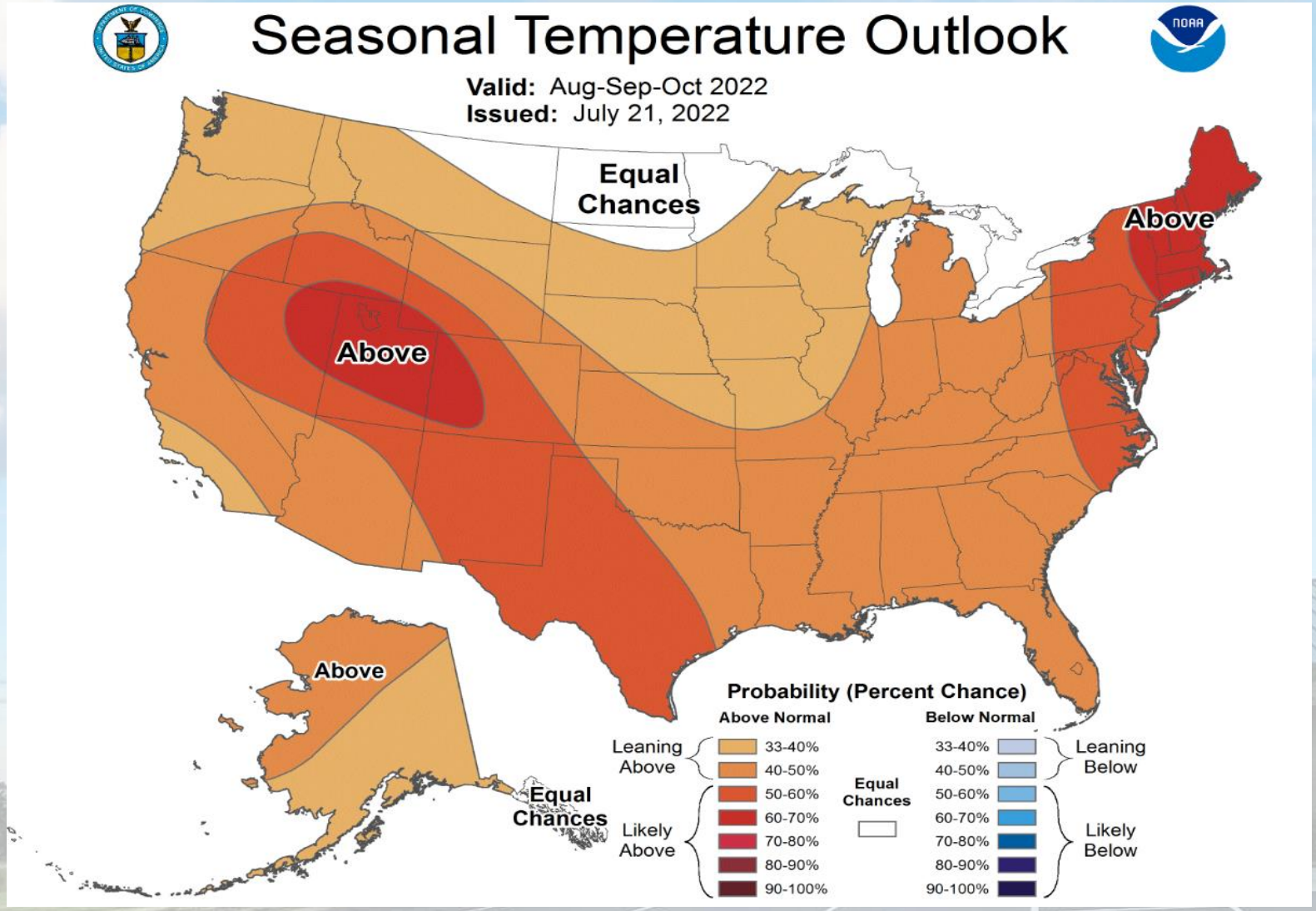
Precipitation amounts ranged from a minimum of a trace at Ellensburg, WA (brown) to 0.78 inch at John Day, OR (green). All precipitation amounts were below an inch, and were mostly from a tenth to 3 tenths of an inch. These values are much lower than precipitation amounts in June, which was mostly due to the Pacific Northwest being dominated mostly by high pressure ridges. There was no snow or hail at any of these listed stations.

July 2022 - Drought Monitor - West



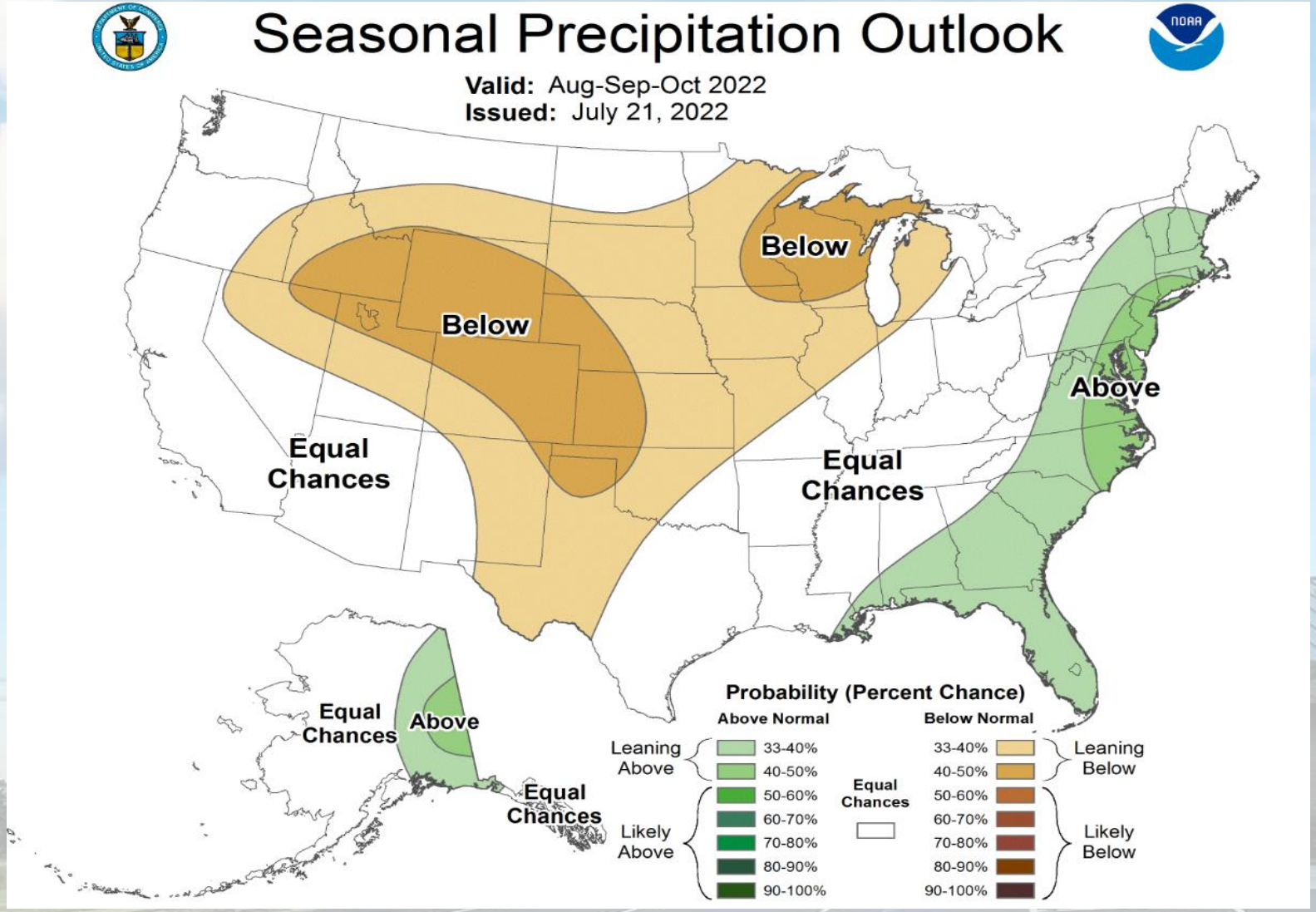
There was a small area in central OR with “Exceptional” (D4) drought, and a larger area in central to east central OR with an “Extreme” (D3) drought. Elsewhere, drought conditions ranged mostly from an “Abnormally Dry” (D0) drought to a “Severe” (D2) drought. The exception is for most of the Lower Columbia Basin of OR and WA, which had mostly no drought conditions (“None”). The heavy rain from the spring continued to reduce the drought areas, even though much of July was warm to hot and dry.

USA Three Month Temperature Outlook



The temperature outlook for the next 3 months (August - October) is for a greater chance of above normal temperatures. While this may depart from typical La-Nina conditions over the Pacific Northwest, this forecast is not unusual for a typical eastern OR/WA late summer into autumn.

USA Three Month Precipitation Outlook

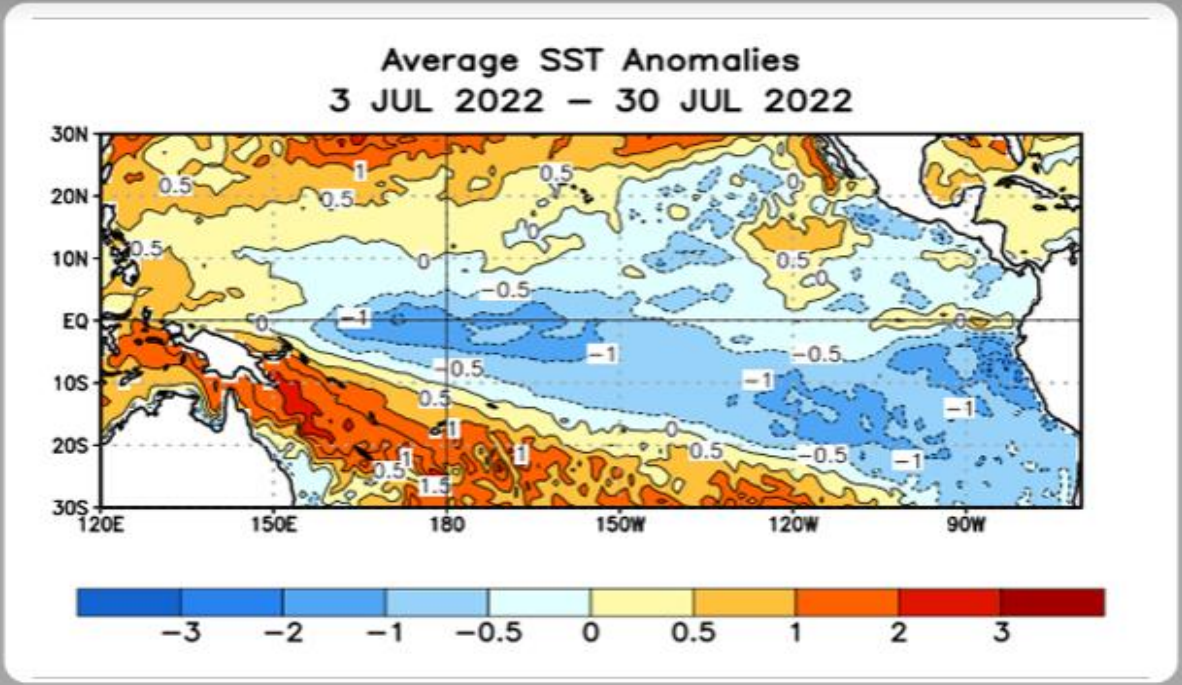


The precipitation outlook for the next 3 months (August – October) is for equal chances to slightly below normal precipitation over the Pacific Northwest. While this may not be consistent with La-Nina conditions, it is not unusual to have dry conditions during a typical eastern OR/WA late summer into autumn.

Sea Surface Temperature (SST) Anomalies for July 2022

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

In the last four weeks, equatorial SSTs were below average in the central Pacific Ocean, but were near-average in the eastern Pacific.



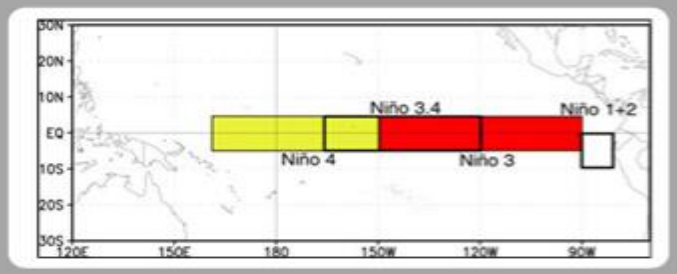
Sea Surface Temperatures (SSTs) remained below average over the central equatorial Pacific, but warmed to near average in the eastern equatorial Pacific. Departures ranged from 0 to -2 degrees C, with the greatest in the central Pacific and the least in the eastern Pacific. This is still consistent with the ongoing La-Nina event, however the slight warming in the eastern Pacific indicates that La Nina is weakening slightly. The small areas of above normal SSTs off the coasts of Mexico, Central and northern South America have increased slightly since June.

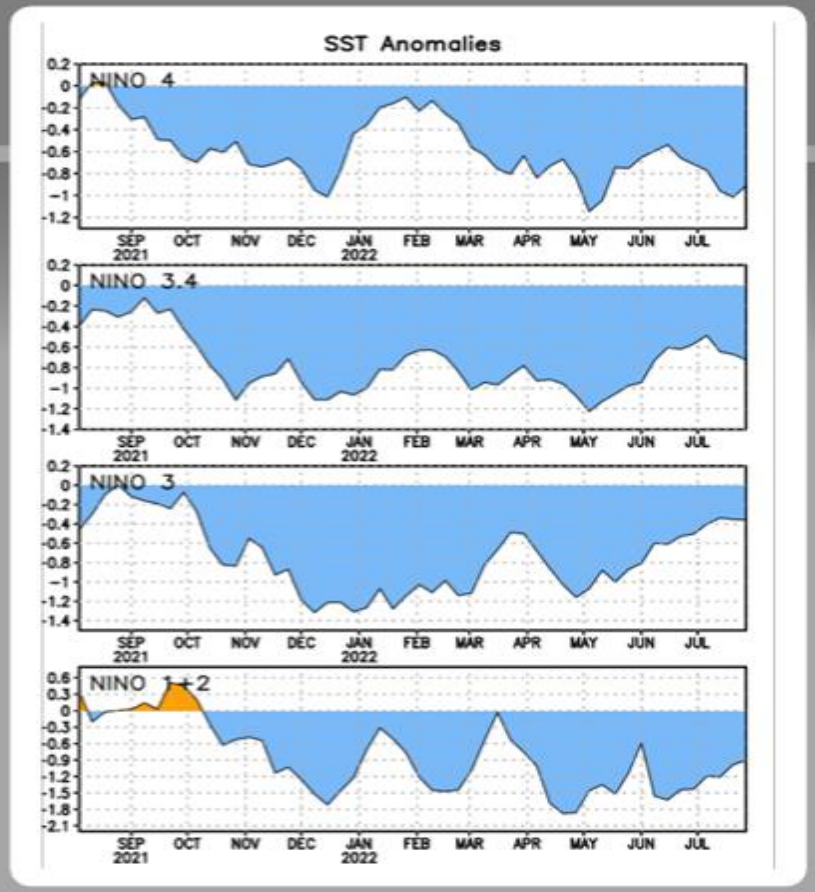
ENSO NINO Regions SST Anomalies for Each Nino Region in July 2022

Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

Niño 4	-0.9°C
Niño 3.4	-0.7°C
Niño 3	-0.4°C
Niño 1+2	-0.9°C





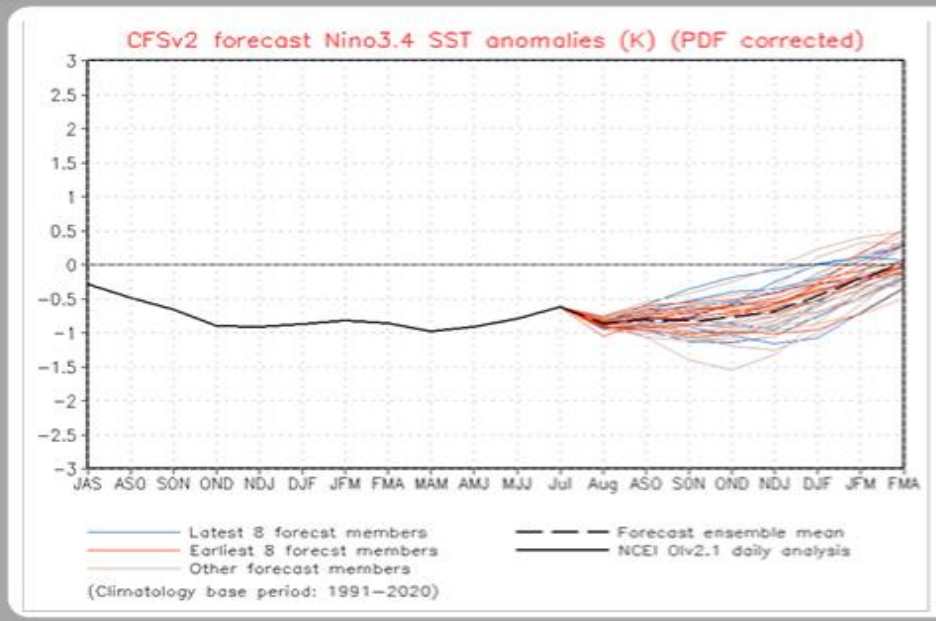
All Nino Regions continued to have SST anomalies less than zero degrees C. However, there was some cooling that took place in Nino Regions 1+2 and 4 during June. Nino Region 3 remained nearly steady, while Nino Region 3.4 warmed slightly during June. The fact that all Nino Regions continued to still have SST anomalies less than zero is consistent with the ongoing La Nina event, especially in Nino Regions 1+2 and Nino Region 4 where cooling took place. The greatest cooling was in Nino Region 1+2, and the greatest warming was in Nino Region 3.4.

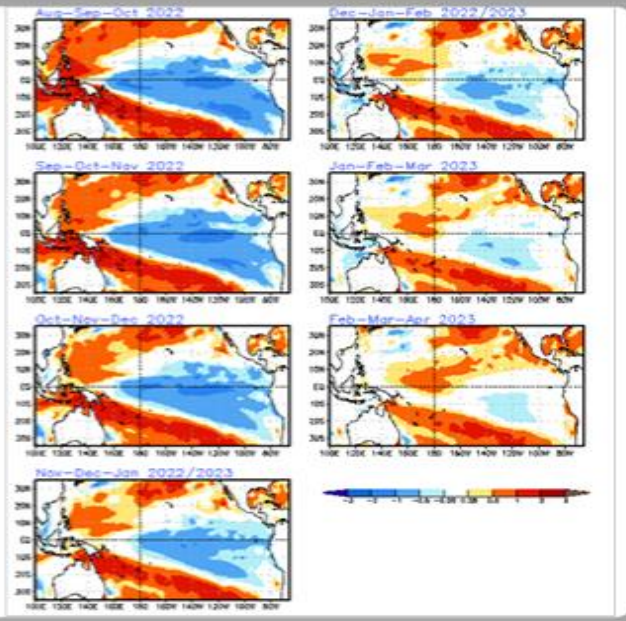
Sea Surface Temperature (SST) NCEP CFS.v2 Ensemble Mean Outlook

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

Issued: 1 August 2022

The CFS.v2 ensemble mean (black dashed line) indicates La Niña persisting into the Northern Hemisphere winter 2022-23.





The SST CFS.v2 ensemble mean outlook shows that SSTs are forecast to remain below the zero (neutral) line through the winter of 2022-2023. However, all of the ensemble members as well as the mean ensemble forecast (black dashed line) shows the anomalies to be steady through the fall, and then warm to near ENSO–neutral by late winter into spring of 2023. The overall trend of warming SSTs are also shown in the images to the right, which shows equatorial Pacific SSTs gradually become warmer for each of the 3 month periods from late this summer through late winter into the spring of 2023.

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 2022 with the odds for La Niña decreasing into the Northern Hemisphere late summer (60% chance in July-September 2022) before increasing through the Northern Hemisphere fall and early winter 2022 (62-66% chance).*

The current ENSO Alert System Status is still **"La-Nina Advisory"**. Equatorial SSTs are below average across most of the Pacific Ocean, and the tropical Pacific atmosphere is still consistent with La-Nina. La-Nina is favored to continue through the end of the year, with the odds for La Nina decreasing into the Northern Hemisphere late summer being a 60 percent chance from now through September 2022. Then La Nina is expected to increase, with a 62-66 percent chance, through the Northern Hemisphere fall and early winter, before decreasing to near ENSO-neutral by the late winter and early spring of 2023.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Thank You!