

# The Month In Review

**December 2021**

National Weather Service  
Pendleton, Oregon

Photo: Heavy snow in the northern Blue Mountains of Oregon



# December 2021, Climate Summary

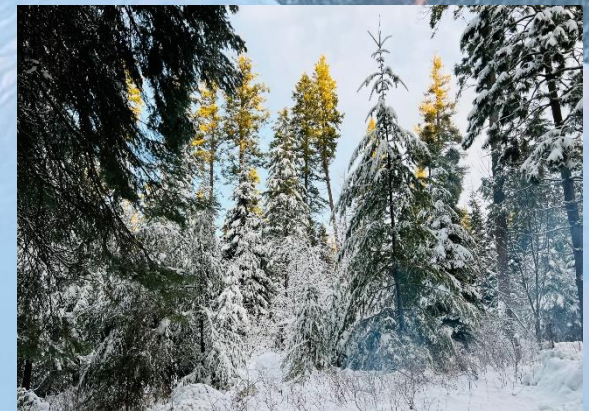
December 2021 was a more active month for weather than November, with a greater amount of more significant weather events, colder temperatures and heavy mountain snow, especially in the Washington Cascades, and in the east-northeast mountains. However, there were also wind events which caused extensive wind impacts such as downed trees/tree limbs on power lines, power outages and smaller lighter objects being blown around. There were also some quiet periods, but they were short in duration, since there were no long wave, long term upper high-pressure systems to allow for any long term calm stagnant periods with fog and stratus, which is common for this time of year with high pressure systems aloft. Rather, the weather pattern was more progressive with faster, stronger, and more frequent weather systems moving across the area. Record weather events were mainly high temperature records, but there was also one low temperature record and two excessive rainfall records broken. Below are some images of typical conditions during the month of December 2021.



One of the first lower elevation snowfalls, with greater than 1 inch of snow, which occurred on December 9<sup>th</sup>, 2021.



A quiet evening sunset over Pendleton, Oregon.

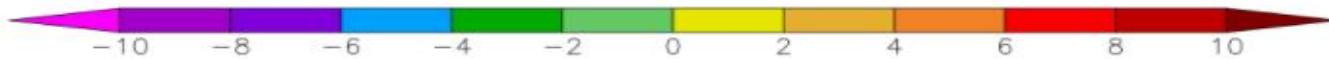
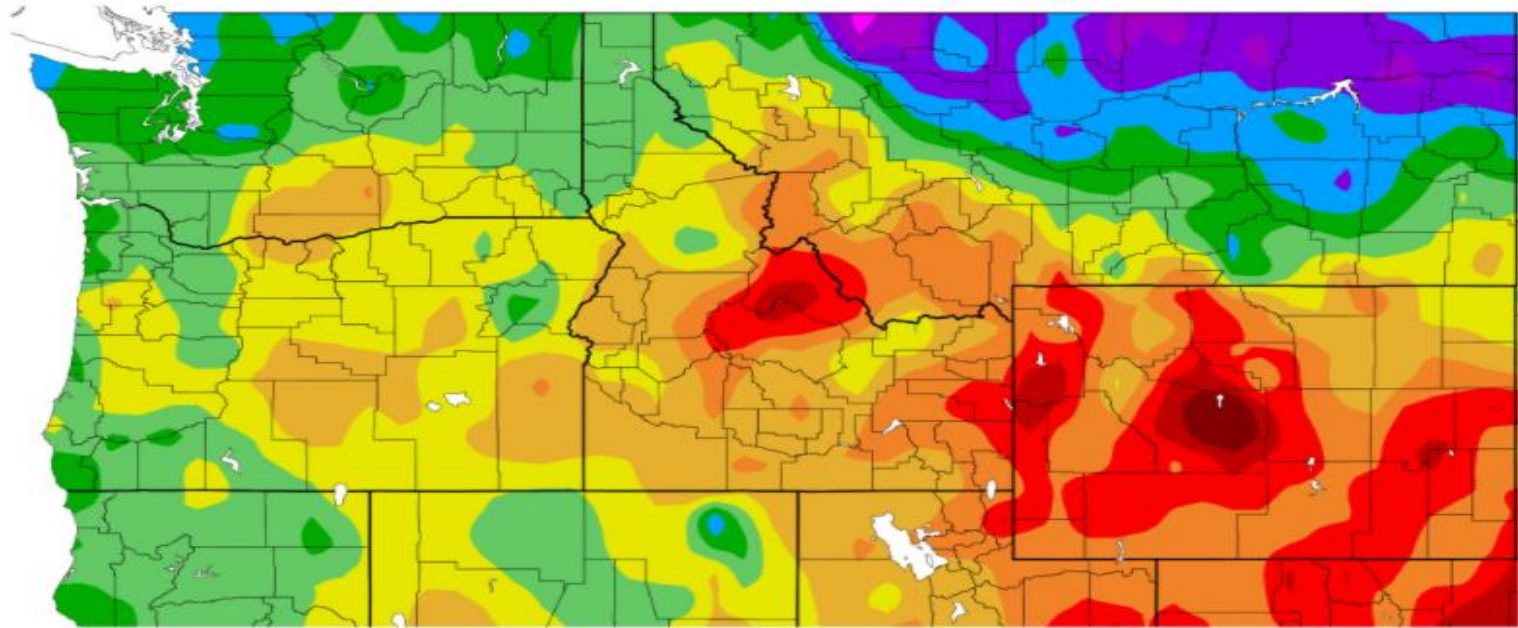


Christmas Day in the Blue Mountains with the sunrise hitting the tops of the trees.



# December 2021, Departure from Normal of Average Temperatures

Departure from Normal Temperature (F)  
12/1/2021 – 12/31/2021



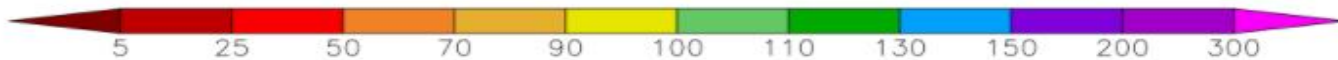
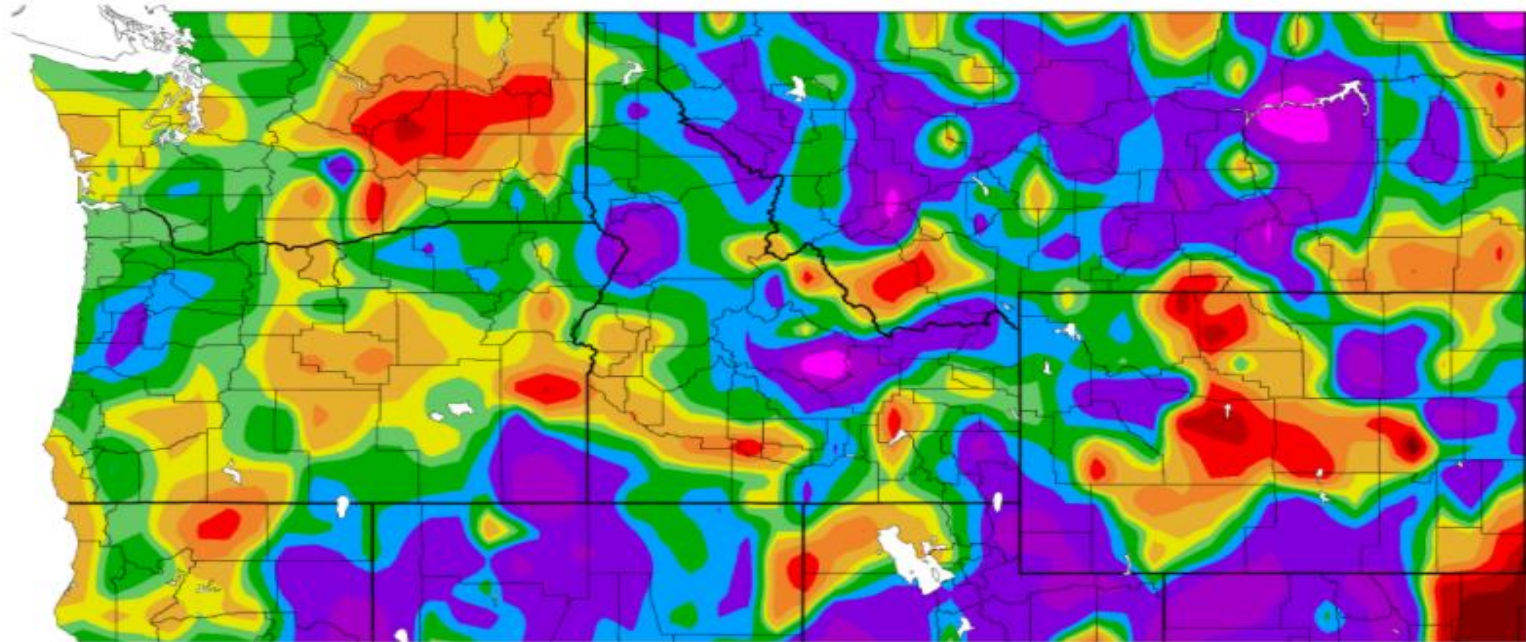
Generated 1/6/2022 at HPRCC using provisional data.

NOAA Regional Climate Centers

The departure from normal of the average temperatures were mostly above normal across northeast OR and southeast WA. The range of values that were most common was zero to 4 degrees above normal on average. The warmest areas were over central OR and over the southern WA Cascades, and the coolest over the NE mountains and the central WA Cascades.

# December 2021, Percent of Normal of Precipitation

Percent of Normal Precipitation (%)  
12/1/2021 – 12/31/2021



Generated 1/6/2022 at HPRCC using provisional data.

NOAA Regional Climate Centers

There was a rather wide range of values of the Percent of Normal Precipitation across northeast OR and southeast WA. They ranged from 25-50 percent of normal over the western Lower Columbia Basin of WA, 50-70 percent of normal over central OR and most of the Cascades, and as much as 150 percent over a small area of the Lower Columbia Basin of OR, and the central WA Cascades.

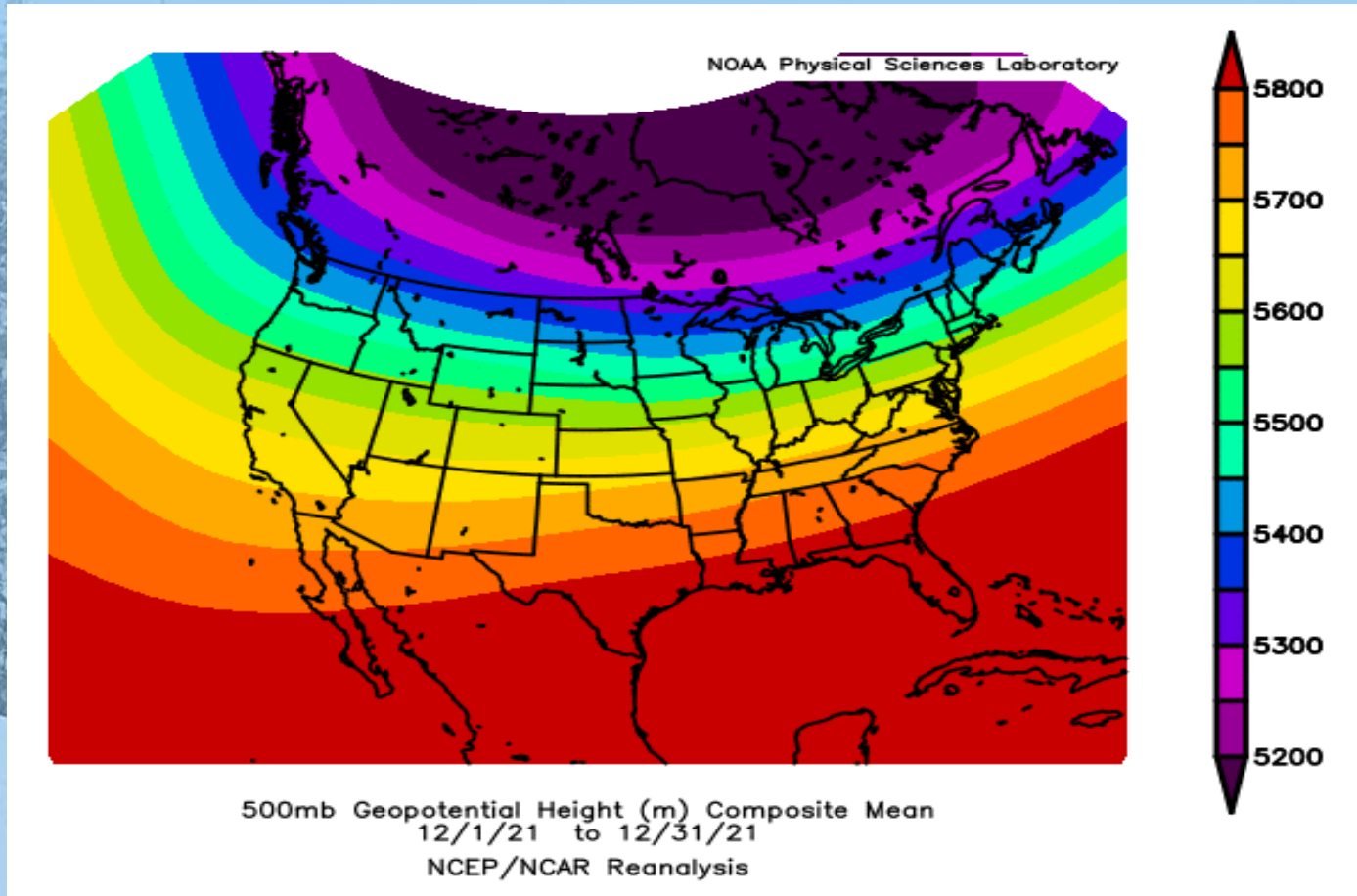


# December 2021, Departures from Normal Means/Sums for Select Cities

	Max T	Max T D	Min T	Min T D	Ave T	Ave T D	PCPN	PCPN D
<b>Yakima</b>	39.6	3.8	25.4	4.1	32.5	4.0	0.33	-1.20
<b>Kennewick</b>	44.8	4.9	32.1	3.3	38.4	4.1	1.25	0.12
<b>Walla Walla</b>	41.4	2.9	28.6	0.2	35.0	1.6	2.19	-0.28
<b>The Dalles</b>	44.2	3.9	32.5	2.3	38.4	3.2	1.60	-1.13
<b>Redmond</b>	45.0	4.5	24.9	4.2	35.0	4.4	0.69	-0.47
<b>Pendleton Airport</b>	42.2	2.7	27.3	0.3	34.7	1.5	2.01	0.54
<b>La Grande Airport</b>	38.7	1.1	24.3	0.6	31.5	0.8	1.15	-0.51
<b>John Day</b>	44.8	3.1	27.8	5.4	36.3	4.3	0.74	-0.50

The table above shows that every temperature mean (Max, Min and Avg) were above normal, with a range of 0.2 to 5.4 degrees above the normal means. Precipitation amounts were mostly below normal, except for at Kennewick, WA and the Pendleton, OR Airport which received greater than normal amounts of precipitation. The values ranged from -1.13 inches below normal at The Dalles, OR to +0.54 inches above normal at the Pendleton, OR Airport, which was also, one of the highest amounts of precipitation in the list.

# December 2021, Average 500 MB Pattern



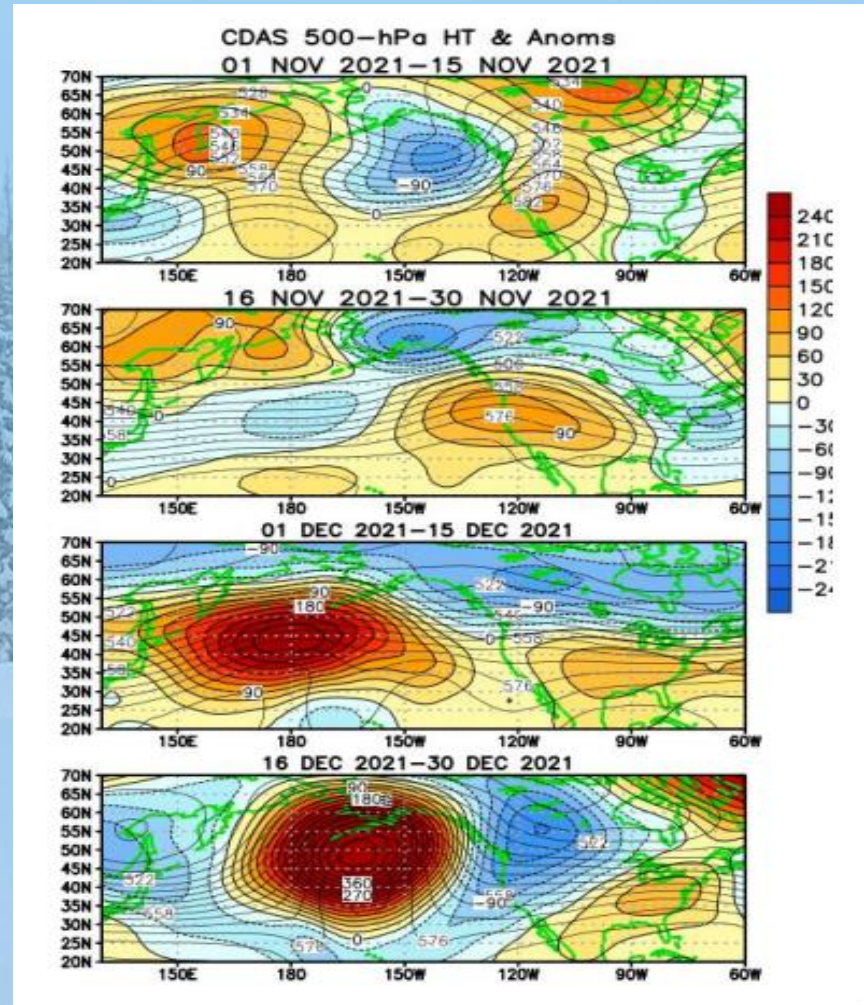
The average 500 MB pattern for December was more of a progressive zonal westerly flow aloft, within a very broad large scale cyclonic flow over north America. This allowed for more frequent, sometimes strong, and sometimes wetter weather systems to move across the region and the forecast area. This overall pattern for the whole month does not depict the smaller scale, shorter term weather systems that impacted the forecast area. Rather it merely shows that December was more active and had a more progressive flow pattern aloft, overall.



# Two Month, Bi-weekly 500 MB Plots for November & December 2021

These are more detailed semi-monthly average 500 mb pattern plots, which was from the following period: 1<sup>st</sup> Nov 2021 through 30<sup>th</sup> Dec 2021)

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.



It is obvious that both the start and finish to December had a much greater anomalous 500 mb flow pattern than either of the two bi-weekly periods in November. This is very well depicted by the strong and persistent upper high-pressure system over the northeast Pacific, which resulted in either a mean trough or a mean progressive zonal flow downstream over the Pacific Northwest resulting in colder and/or wetter conditions in some areas of the forecast area.

# Significant Weather Events for December 2021

Significant Weather Events				
Event	Date	Report	Where	Source
Non-TSTM Wind Gust	December 8, 2021	M 65 mph	Ellensburg, WA	ASOS
Heavy Snow	December 9, 2021	E 8.0 inches	Tollgate, OR	NWS Employee
Non-TSTM Wind Gust	December 11, 2021	M 69 mph	25 NW Richland, WA	Mesonet
Heavy Snow	December 11, 2021	M 12.0 inches	6 NNW Easton, WA	COCORAHS
Non-TSTM Wind Gust	December 11, 2021	M 78 mph	22 NNW Richland, WA	Mesonet
Non-TSTM Wind Gust	December 11, 2021	M 51 mph	25 NNW Richland, WA	Mesonet
Non-TSTM Wind Gust	December 11, 2021	M 70 mph	13 NW Richland, WA	Mesonet
Non-TSTM Wind Dmg	December 11, 2021	Overtured trucks	7 NNW West Richland, WA	Public
Non-TSTM Wind Gust	December 11, 2021	M 50 mph	2 SE Kennewick, WA	Trained Spotter
Non-TSTM Wind Gust	December 11, 2021	U 51 mph	Dayton, WA	Public
Non-TSTM Wind Gust	December 11, 2021	M 62 mph	3 NE Walla Walla, WA	ASOS
Non-TSTM Wind Dmg	December 11, 2021	13 " diameter tree down	2 SE Kennewick, WA	Trained Spotter
Non-TSTM Wind Gust	December 11, 2021	M 59 mph	1 NW Richland, WA	ASOS
Heavy Snow	December 12, 2021	M 7.0 inches	6 NNW Easton, WA	COCORAHS
Heavy Snow	December 12, 2021	E 13.0 inches	WNW Tollgate, OR	Trained Spotter
Heavy Snow	December 12, 2021	M 10.0 inches	Ski Bluewood, WA	Public
Snow	December 13, 2021	M 6.0 inches	1 SW Minam, OR	Dept of Highways
Heavy Snow	December 14, 2021	M 8.0 inches	Enterprise, OR	Dept of Highways
Heavy Snow	December 14, 2021	E 15.0 inches	3 S Joseph, OR	US Forest Service
Snow	December 15, 2021	M 5.0 inches	4 NNW La Pine, OR	Trained Spotter
Snow	December 15, 2021	E 5.0 inches	Goldendale, WA	Public
Snow	December 15, 2021	M 6.0 inches	2 SSW Camp Sherman, OR	Trained Spotter
Snow	December 16, 2021	E 6.0 inches	Trout Lake, WA	Public
Heavy Snow	December 16, 2021	M 8.1 inches	Snowden, WA	Co-Op Observer
Heavy Snow	December 19, 2021	E 4.5 inches	Dufur, OR	Public
Snow	December 20, 2021	E 3.0 inches	Adams, OR	Public
Snow	December 20, 2021	M 2.8 inches	Pendleton, OR	Official NWS Obs
Snow	December 20, 2021	M 3.5 inches	3 S Heppner, OR	Public
Heavy Snow	December 20, 2021	E 6.0 inches	5 WNW La Grande, OR	Public
Heavy Snow	December 20, 2021	M 12.0 inches	Ski Bluewood, WA	Public

There was a high wind event on the 8<sup>th</sup>, 9<sup>th</sup> and 11<sup>th</sup>, and snow events during the rest of the time until the 20<sup>th</sup>.



# Significant Weather Events for December 2021 (continued)

Significant Weather Events (continued)				
Event	Date	Report	Where	Source
Snow	December 20, 2021	E 2.5 inches	Milton-Freewater, OR	Public
Heavy Snow	December 20, 2021	M 5.0 inches	2 ENE Hermiston, OR	NWS Employee
Heavy Snow	December 20, 2021	E 8.0 inches	Meacham, OR	Media
Heavy Snow	December 20, 2021	M 6.0 inches	Moro, OR	Public
Snow	December 20, 2021	E 3.0 inches	Dallesport, WA	Public
Heavy Snow	December 20, 2021	E 8.0 inches	6 NNW Goldendale	Public
Heavy Snow	December 20, 2021	M 7.8 inches	5 SSW Chenoweth, OR	Trained Spotter
Heavy Snow	December 20, 2021	E 4.0 inches	4 SSW Hermiston, OR	Public
Heavy Snow	December 20, 2021	M 16.0 inches	5 ENE White Salmon, WA	COCORAHS
Heavy Snow	December 20, 2021	M 8.2 inches	7 NE White Salmon, WA	COCORAHS
Heavy Snow	December 20, 2021	M 8.5 inches	1 SE Flora, OR	COCORAHS
Heavy Snow	December 20, 2021	E 6.0 inches	5 SE Goldenddale, WA	Trained Spotter
Heavy Snow	December 20, 2021	M 14.0 inches	9 NNE The Dalles, OR	Trained Spotter
Heavy Snow	December 20, 2021	E 4.0 inches	Arlington, OR	Public
Heavy Snow	December 20, 2021	M 4.0 inches	WNW White Salmon, WA	Trained Spotter
Heavy Snow	December 20, 2021	E 6.0 inches	1 NW Lyle, WA	Public
Heavy Snow	December 23, 2021	M 8.0 inches	2 SSE Snoqualmie Pass, WA	COCORAHS
Heavy Snow	December 23, 2021	M 12.0 inches	SSE Easton, WA	Trained Spotter
Heavy Snow	December 23, 2021	E 36.0 inches	SW Easton, WA	Trained Spotter
Heavy Snow	December 24, 2021	M 7.0 inches	SSW Trout Lake, WA	COCORAHS
Heavy Snow	December 24, 2021	M 8.0 inches	4 ENE White Salmon, WA	COCORAHS
Heavy Snow	December 24, 2021	M 10.5 inches	2 SSE Snoqualmie Pass, WA	COCORAHS
Heavy Snow	December 24, 2021	M 10.0 inches	6 NNW Easton, WA	COCORAHS
Heavy Snow	December 24, 2021	M 7.2 inches	7 NE White Salmon, WA	COCORAHS
Heavy Snow	December 24, 2021	M 5.8 inches	1 NNW Glenwood, WA	Trained Spotter
Heavy Snow	December 24, 2021	M 14.0 inches	WNW Tollgate, OR	Trained Spotter
Heavy Snow	December 24, 2021	M 8.0 inches	9 SW Thorp, WA	Trained Spotter
Heavy Snow	December 25, 2021	M 10.1 inches	2 SSE Snoqualmie Pass, WA	COCORAHS
Snow	December 26, 2021	M 4.0 inches	5 NNW La Pine, OR	Trained Spotter
Snow	December 26, 2021	M 4.5 inches	2 SSE Snoqualmie Pass, WA	COCORAHS

Snow/Heavy snow events continued through the 26<sup>th</sup> across the forecast area.

# Significant Weather Events for December 2021 (continued)

Significant Weather Events (continued)				
Event	Date	Report	Where	Source
Snow	December 26, 2021	M 3.5 inches	2 WNW Sisters, OR	COCORAHs
Snow	December 26, 2021	M 4.0 inches	6 NNW Easton, WA	COCORAHs
Heavy Snow	December 26, 2021	M 8.8 inches	SSW Trout Lake, WA	COCORAHs
Heavy Snow	December 26, 2021	M 8.0 inches	W Trout Lake, WA	Trained Spotter
Heavy Snow	December 26, 2021	M 9.0 inches	2 SSW Camp Sherman, OR	Trained Spotter
Heavy Snow	December 27, 2021	E 13.0 inches	4 NW Butte Ranch, OR	Dept of Highways
Snow	December 27, 2021	M 3.0 inches	10 ENE Goldendale, WA	Trained Spotter
Heavy Snow	December 27, 2021	M 12.5 inches	2 WNW Sisters, OR	COCORAHs
Snow	December 28, 2021	M 3.5 inches	6 SSE Prineville, OR	COCORAHs
Heavy Snow	December 29, 2021	M 4.0 inches	Pendleton, OR	NWS Employee
Heavy Snow	December 30, 2021	M 4.0 inches	Pendleton, OR	NWS Employee
Heavy Snow	December 30, 2021	M 7.0 inches	4 NW Meacham, OR	Co-Op Observer
Heavy Snow	December 30, 2021	M 4.5 inches	John Day, OR	Co-Op Observer
Heavy Snow	December 30, 2021	M 10.0 inches	Walla Walla, WA	Emergency Mngr
Heavy Snow	December 30, 2021	M 6.0 inches	Athena, WA	Public
Heavy Snow	December 30, 2021	M 5.1 inches	3 NW Pendleton, OR	Official NWS Obs
Heavy Snow	December 30, 2021	M 12.0 inches	9 SW Ski Bluewood, OR	Mesonet
Heavy Snow	December 30, 2021	U 13.0 inches	Walla Walla, WA	Public
Heavy Snow	December 30, 2021	E 5.0 inches	SW Condon, OR	Trained Spotter
Heavy Snow	December 30, 2021	M 10.0 inches	3 NNW Meacham, OR	Mesonet
Heavy Snow	December 30, 2021	E 8.0 inches	Prairie City, OR	Public
Heavy Snow	December 30, 2021	E 4.0 inches	Dayton, WA	Public
Heavy Snow	December 30, 2021	M 10.0 inches	3 NNW Ski Bluewood, WA	Mesonet
Heavy Snow	December 30, 2021	E 9.0 inches	Walla Walla, WA	Public
Heavy Snow	December 30, 2021	M 12.0 inches	SE Walla Walla, WA	Public
Heavy Snow	December 30, 2021	E 12.0 inches	WNW Tollgate, OR	Trained Spotter
Heavy Snow	December 31, 2021	M 14.0 inches	10 NNE Ukiah	Mesonet
Heavy Snow	December 31, 2021	M 13.0 inches	6 ENE Lehman Hot Springs, OR	Federal Official
Heavy Snow	December 31, 2021	M 16.0 inches	Ski Bluewood, WA	Public
Heavy Snow	December 31, 2021	E 4.0 inches	SSW Condon, OR	Trained Spotter

Snow/Heavy snow events continued through the end of the month (shown here and the top of the next slide).



# Significant Weather Events for December 2021 (continued)

Significant Weather Events (continued)				
Event	Date	Report	Where	Source
Heavy Snow	December 31, 2021	M 13.0 inches	La Grande, OR	Public
Heavy Snow	December 31, 2021	M 7.0 inches	4 ENE White Salmon, WA	COCORAHS
Heavy Snow	December 31, 2021	M 5.7 inches	7 NE White Salmon, WA	COCORAHS
Heavy Snow	December 31, 2021	M 8.5 inches	9 N Elgin, OR	COCORAHS
Heavy Snow	December 31, 2021	E 6.0 inches	Boardman, OR	Public
Heavy Snow	December 31, 2021	M 9.4 inches	Cove, OR	Public
Heavy Snow	December 31, 2021	M 6.0 inches	Heppner, OR	Co-Op Observer
Heavy Snow	December 31, 2021	M 14.0 inches	5 SSE Joseph, OR	Public
Heavy Snow	December 31, 2021	M 14.0 inches	Joseph, OR	Public
Heavy Snow	December 31, 2021	M 11.0 inches	Thorn Hollow, OR	Public
Heavy Snow	December 31, 2021	E 6.0 inches	6 SE Mayville, OR	Trained Spotter
Heavy Snow	December 31, 2021	M 5.0 inches	6 W Condon, OR	Trained Spotter
Heavy Snow	December 31, 2021	M 5.5 inches	4 ESE Pilot, Rock, OR	Trained Spotter
Heavy Snow	December 31, 2021	M 11.0 inches	5 SE Fossil, OR	Public
Heavy Snow	December 31, 2021	M 7.0 inches	11 ESE Starkey, OR	Mesonet
Heavy Snow	December 31, 2021	M 11.0 inches	7 SE Joseph, OR	Public

## Record Weather Event Reports for December 2021

Record Weather Reports					
Event	Date	Where	Previous Record	New Record	Records Began
High Temp	December 1, 2021	Pendleton, OR	66 / 1926	68	1934
High Temp	December 1, 2021	Ellensburg, WA	56 / 2012	66	1934
High Temp	December 1, 2021	Hermiston, OR	64 / 1951	71	1906
High Temp	December 1, 2021	Pasco, WA	66 / 1941	71	1942
High Temp	December 1, 2021	Redmond, OR	67 / 2008	72	1941
High Temp	December 1, 2021	Walla Walla, WA	61 / 1958	67	1930
High Temp	December 1, 2021	Yakima, WA	67 / 1972	72	1909
High Temp	December 1, 2021	Dallesport, WA	65 / 1975	70	1929
Max Rainfall	December 19, 2021	Hermiston, OR	0.55 / 1917	0.86	1906
Max Rainfall	December 19, 2021	Pasco, WA	0.58 / 1940	0.68	1942
Low Temp	December 27, 2021	Walla Walla, WA	12 / 1983	11	1930

Record weather events were mostly high temperature records, but there was also a record low temperature record broken, and two Max Rainfall records broken.

# December 2021, Observed Monthly Max & Min Temperatures

Location	Highest Maximum	Lowest Minimum
Pendleton, OR	68	-7
Redmond, OR	72	1
Pasco, WA	71	-5
Yakima, WA	72	13
Walla Walla, WA	67	0
Bend, OR	68	8
Ellensburg, WA	66	3
Hermiston, OR	71	-9
John Day, OR	64	-2
La Grande, OR	57	-10
The Dalles, OR	70	10
Meacham, OR	64	-16
MT Adams RS, WA	61	11

The highest maximum temperatures ranged from 57 degrees at La Grande, OR to 72 degrees at Yakima, WA. The lowest minimum temperatures ranged from -16 degrees at Meacham, OR to +13 degrees at Yakima, WA.



# December 2021, Observed Total Precipitation and Total Snowfall/Hail

Location	Total Precipitation (inches)	Total Snow/Hail (inches)
Pendleton, OR	2.01	17.8
Redmond, OR	0.69	M
Pasco, WA	1.00	M
Yakima, WA	0.33	M
Walla Walla, WA	2.19	M
Bend, OR	0.81	2.0
Ellensburg, WA	0.57	M
Hermiston, OR	1.78	M
John Day, OR	0.74	M
La Grande, OR	1.15	M
The Dalles, OR	1.60	M
Meacham, OR	6.05	M
MT Adams RS, WA	2.29	14.0

Precipitation amounts in the list ranged from 0.57 of an inch at Ellensburg, WA to a whopping 6.05 inches at Meacham, OR. Of the three stations that usually have snowfall reports, Pendleton, OR had the most, (17.8 inches) for the month, and Bend, OR with the least amount of only 2.0 inches.

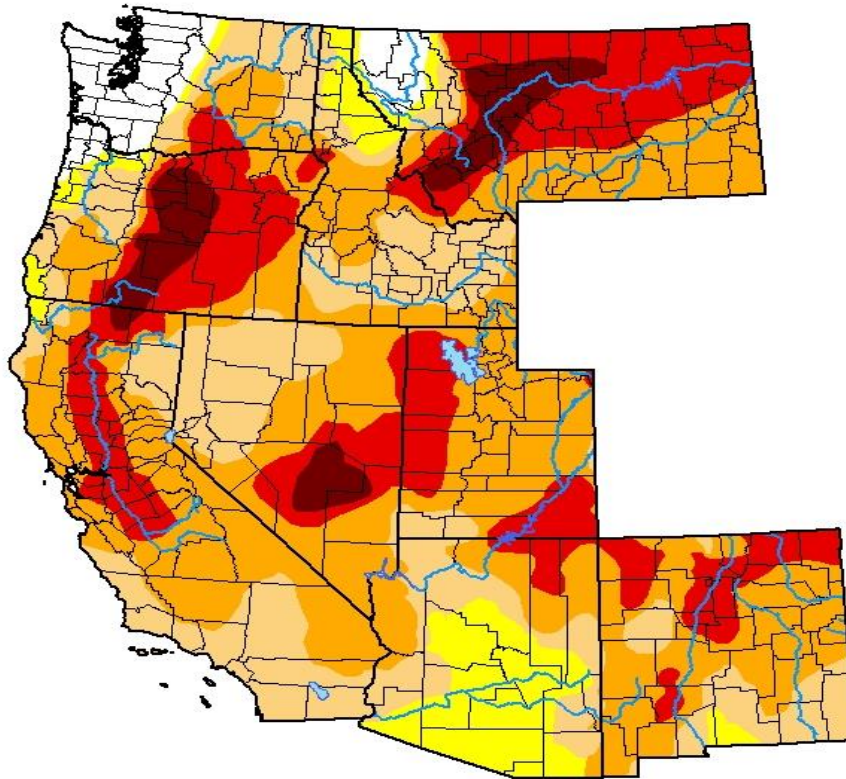
# December 2021 - Drought Monitor - West

## U.S. Drought Monitor West

January 4, 2022

(Released Thursday, Jan. 6, 2022)

Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	4.43	95.57	87.78	64.63	25.30	4.75
<b>Last Week</b> <i>12-28-2021</i>	4.14	95.86	89.41	72.36	33.66	5.81
<b>3 Months Ago</b> <i>10-05-2021</i>	1.26	98.74	92.86	81.03	58.81	21.37
<b>Start of Calendar Year</b> <i>01-04-2022</i>	4.43	95.57	87.78	64.63	25.30	4.75
<b>Start of Water Year</b> <i>09-28-2021</i>	1.32	98.68	93.35	81.07	58.72	21.77
<b>One Year Ago</b> <i>01-05-2021</i>	13.91	86.09	74.75	62.54	45.42	23.76

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>

Author:

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CPC/NOAA/NWS/NCEP

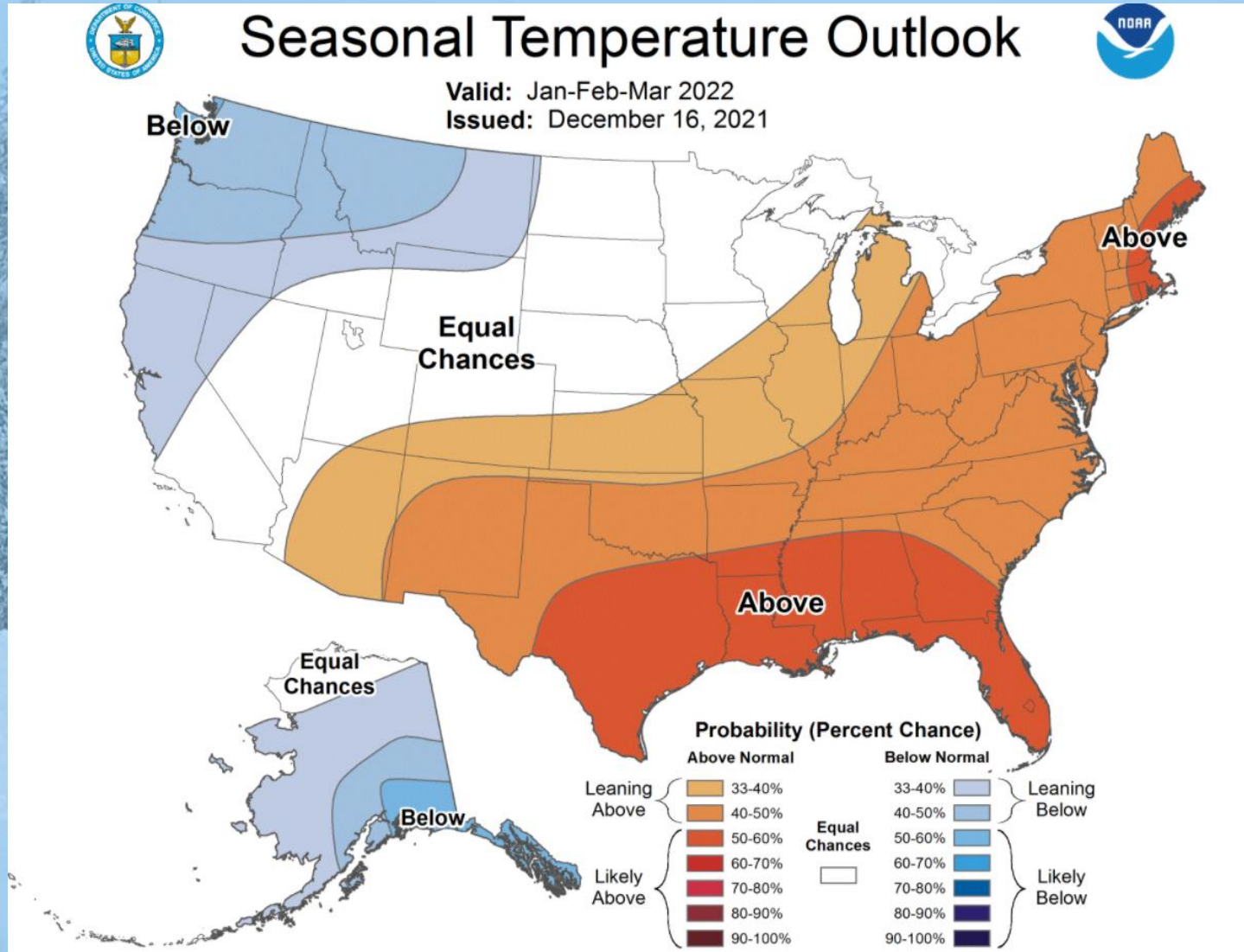


[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

Despite the greater amount of weather systems during December 2021, by January 4<sup>th</sup>, there was still an Exceptional Drought (“D4”) over the east slopes and adjacent valleys/plateaus of the OR Cascades. The rest of northeast OR and southeast WA are in a Severe to Extreme Drought category (“D2” to “D3”).

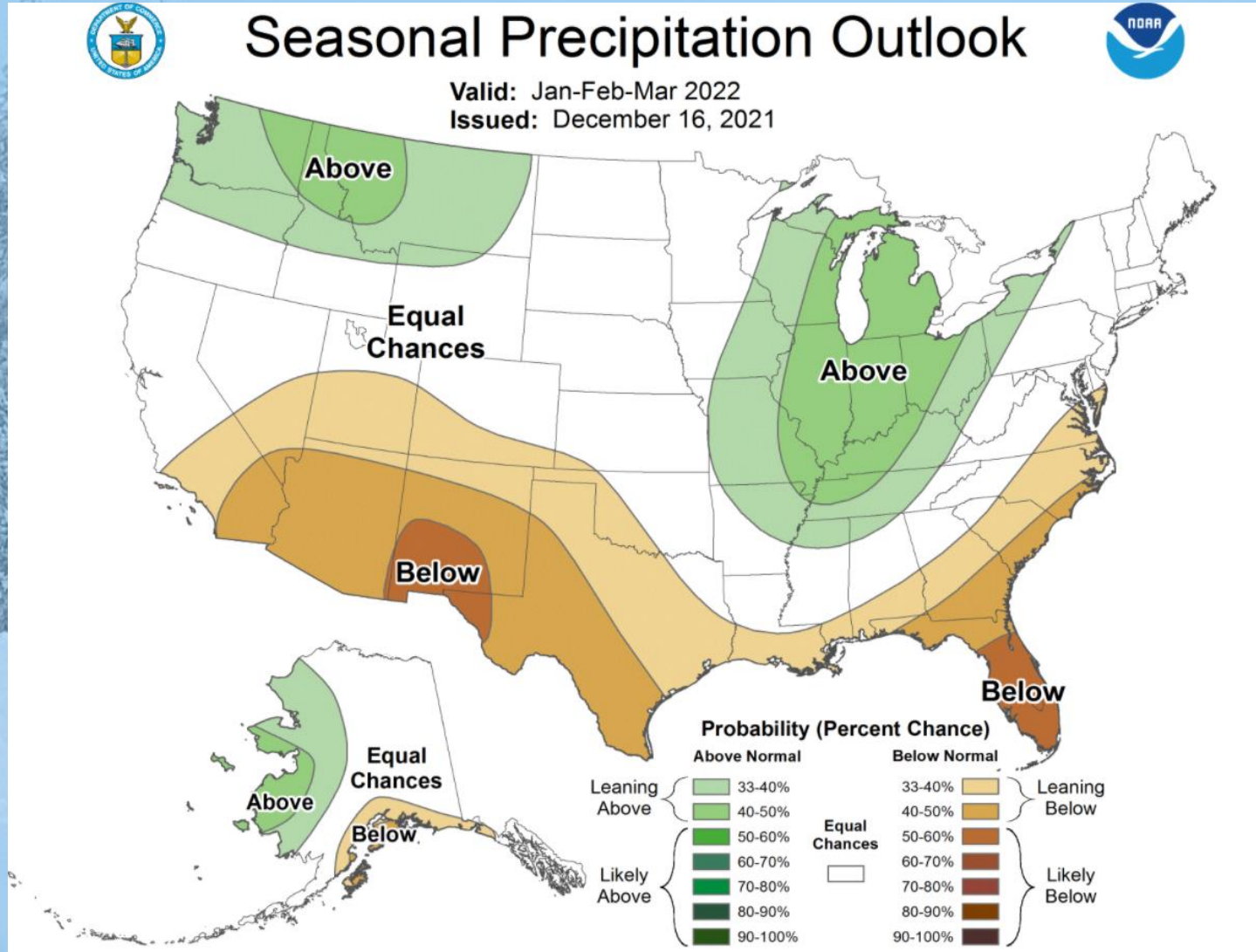


# USA Three Month Temperature Outlook



The temperature outlook for the next 3 months (January - March) is for a greater chance of near to below normal temperatures over the Pacific Northwest. This is consistent with the on-going stronger La Nina event this winter.

# USA Three Month Precipitation Outlook



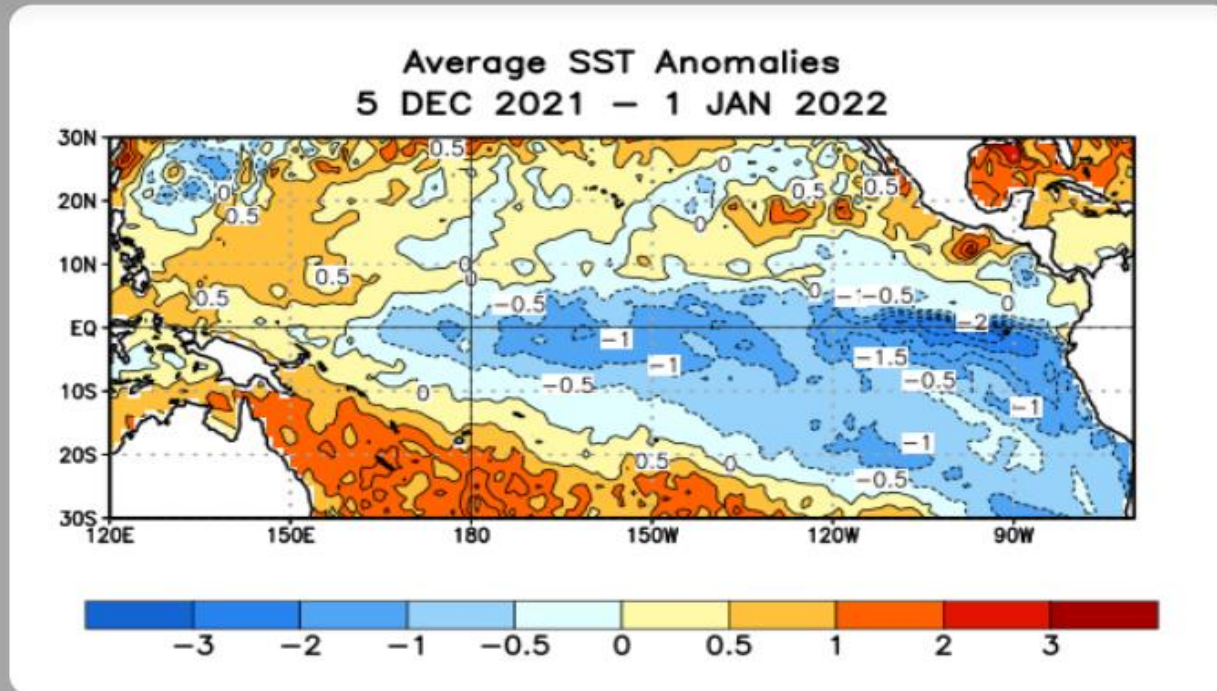
The precipitation outlook for the next 3 months (January - March) is for a greater chance of near to above normal precipitation over the Pacific Northwest. This is also consistent with the on-going stronger La Nina event this winter.



# Sea Surface Temperature (SST) Anomalies for December 2021

## SST Departures (°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.



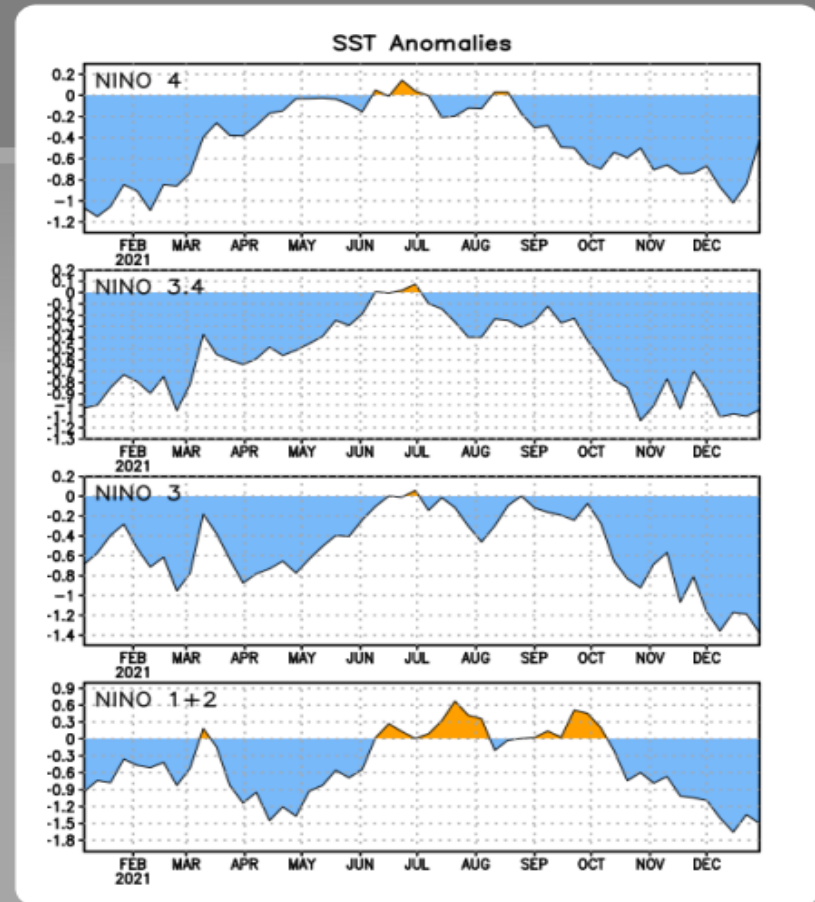
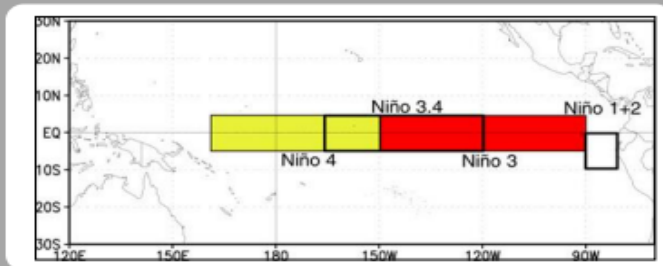
Equatorial SSTs were mostly below average from the 5<sup>th</sup> of December to the 1<sup>st</sup> of January. The coolest waters were over the eastern equatorial Pacific, south of Mexico and central America. The departure values are colder than they were a year ago, in which there was a weaker La Nina event that took place.

# ENSO NINO Regions SST Anomalies for Each Nino Region

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

The latest weekly SST departures are:

Niño 4	-0.4°C
Niño 3.4	-1.0°C
Niño 3	-1.4°C
Niño 1+2	-1.5°C



Niño Regions 1+2, and 3 had the greatest differences of sea surface temperatures from the summer max to the current minimum. Niño region 3.4 (which is the region that affects western North America the most) also had a large difference from the warm season max SST to the current cold season SST, as of the end of December 2021.



# 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 the central and east-central Pacific Ocean.

The tropical Pacific atmosphere is consistent with La Niña.

La Niña is favored to continue through the Northern Hemisphere winter 2021-22 (~95% chance) and transition to ENSO-neutral during the spring 2022 (~60% chance during April-June).\*

The current ENSO Alert System Status is still “**La Nina Advisory**”. La Nina conditions are favored to continue, with a 95% chance, from now until March, and then a transition to ENSO-neutral conditions during the spring of 2022, from April – June, (a 60 percent chance of transition to ENSO-neutral conditions).



**Thank You!**