

OR & WA Water Year 2022 Climate Recap

Karin Bumbaco¹, Larry O'Neill², and Nick Bond¹

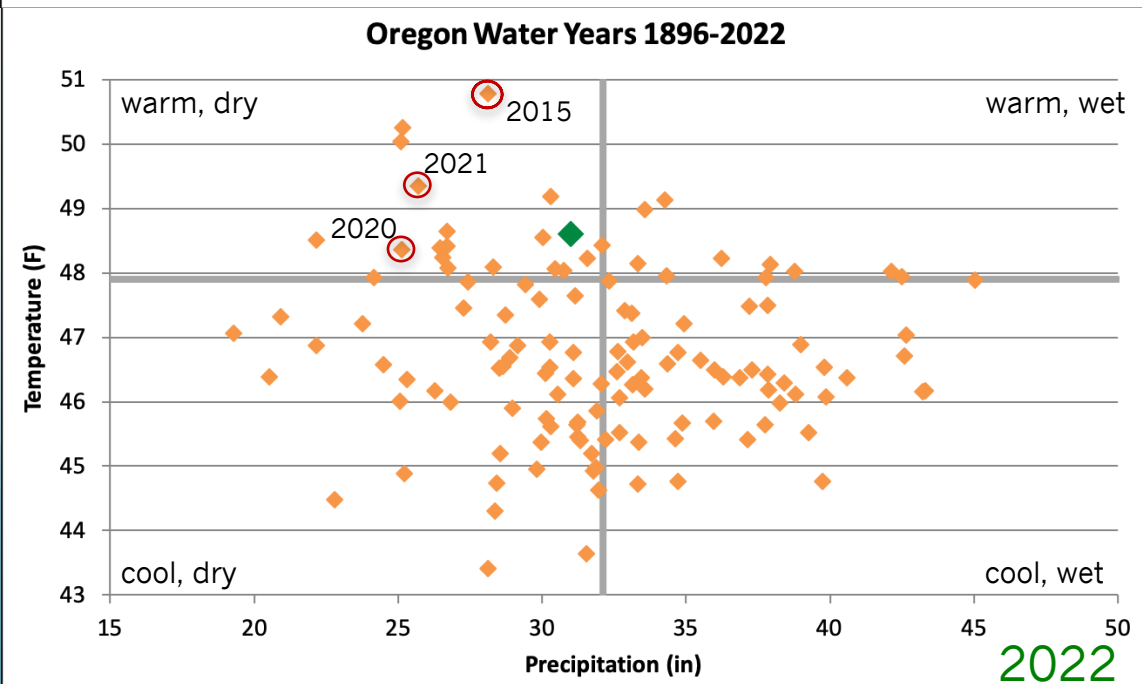
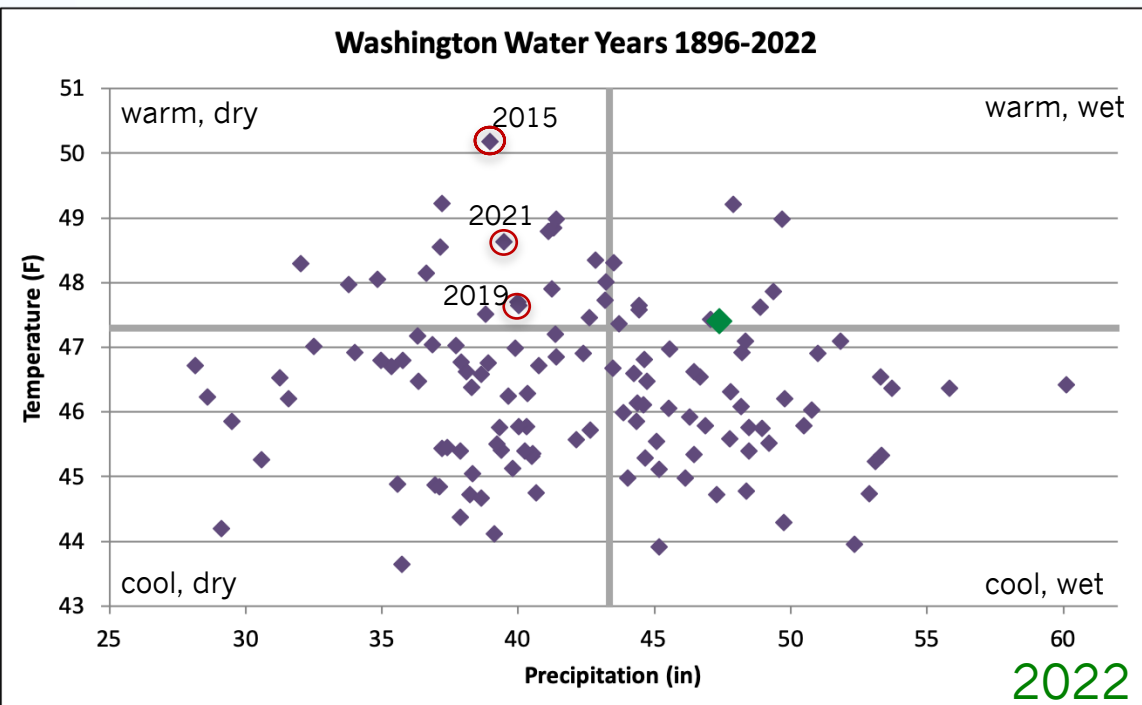
1: Office of the Washington State Climatologist; Cooperative Institute for Climate, Ecosystem, and Ocean Studies; University of Washington

2: Oregon Climate Service; CEOAS Oregon State University

October 25, 2022

Water Year Summary

- WA:
 - +0.1°F anomaly
 - +4.06" anomaly



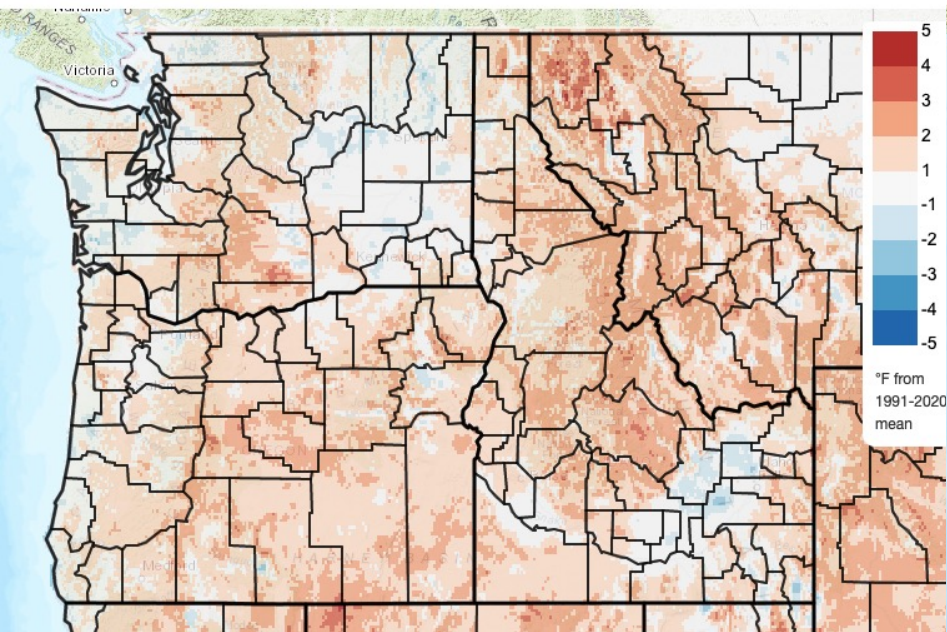
- OR
 - +0.7°F anomaly; tied 2014 for 8th warmest
 - -1.11" anomaly

(1991-2020 normal)

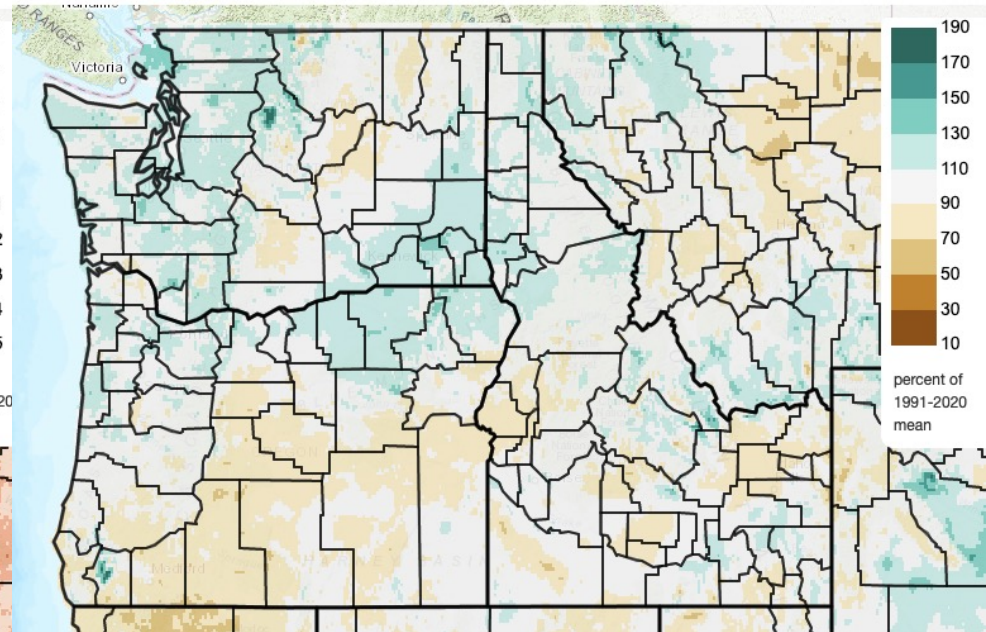
2022 Water Year

October 2021-September 2022

Mean Daily Temperature Anomaly, Last Oct to Last Full Month
2021/10/01 - 2022/09/30



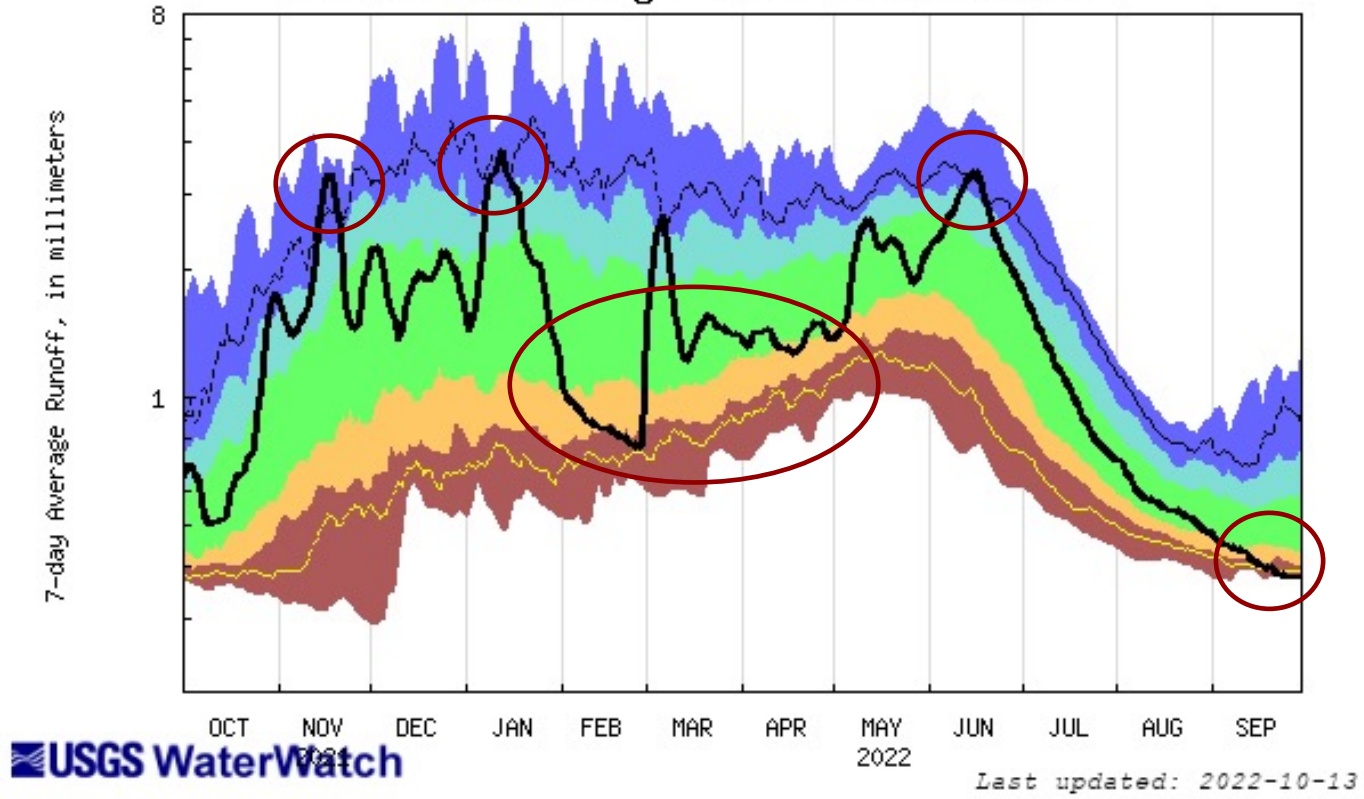
Total Precipitation Anomaly, Last Oct to Last Full Month
2021/10/01 - 2022/09/30



(1991-2020 normal)

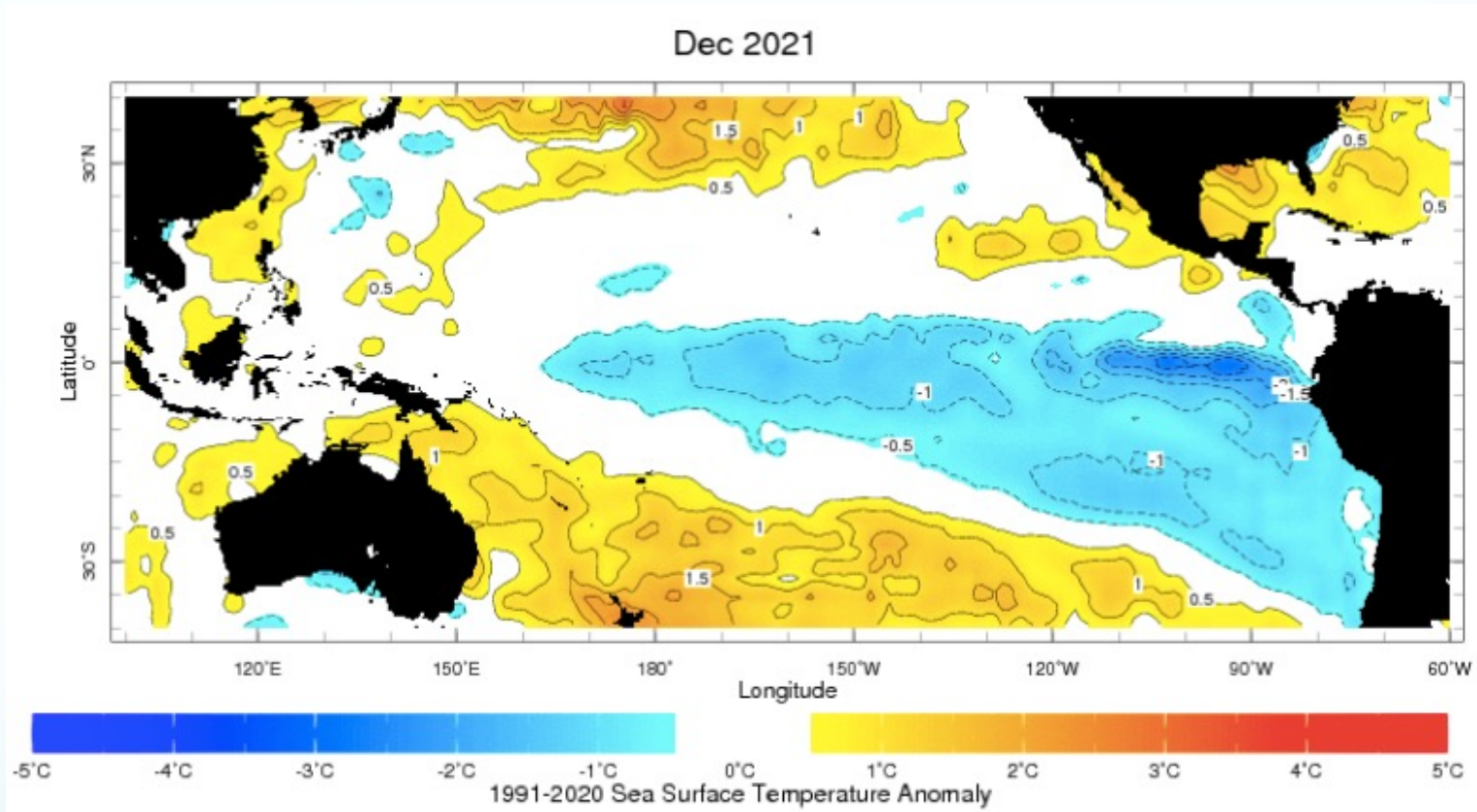
Pacific Northwest Runoff

Duration hydrograph of 7-day average runoff for Water Resource Region Pacific Northwest



Explanation - Percentile classes						
lowest-10th percentile	5	10-24	25-75	76-90	95	90th percentile -highest
Much below Normal	Below normal	Normal	Above normal	Much above normal	Flow	

Second La Niña



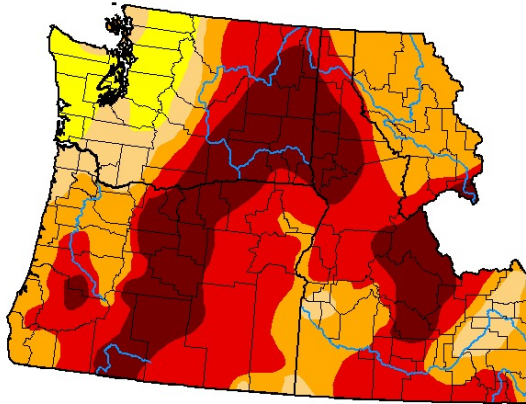
Oceanic Niño Index

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2020	0.5	0.5	0.4	0.2	-0.1	-0.3	-0.4	-0.6	-0.9	-1.2	-1.3	-1.2
2021	-1.0	-0.9	-0.8	-0.7	-0.5	-0.4	-0.4	-0.5	-0.7	-0.8	-1.0	-1.0
2022	-1.0	-0.9	-1.0	-1.1	-1.0	-0.9	-0.8	-0.9				

Drought Progression

Beginning of the Water Year

U.S. Drought Monitor Pacific Northwest DEWS



September 28, 2021
(Released Thursday, Sep. 30, 2021)
Valid 8 a.m. EDT

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	93.35	84.83	57.49	24.06
Last Week 09-21-2021	0.00	100.00	93.35	84.83	57.49	23.62
3 Months Ago 06-29-2021	4.62	95.38	84.48	60.98	29.30	1.95
Start of Calendar Year 12-29-2020	38.14	61.86	40.77	27.90	10.74	0.00
Start of Water Year 09-29-2020	21.70	78.30	51.11	28.83	13.73	0.00
One Year Ago 09-29-2020	21.70	78.30	51.11	28.83	13.73	0.00

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>

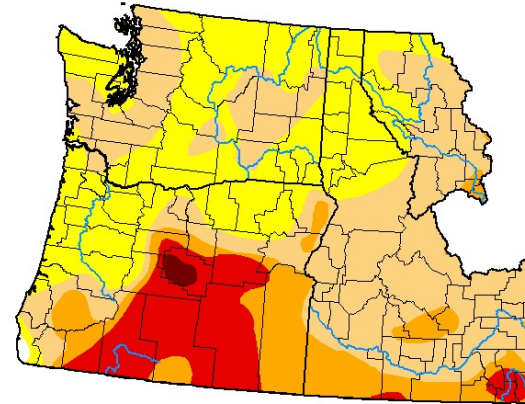
Author:
Brian Fuchs
National Drought Mitigation Center



droughtmonitor.unl.edu

End of the Water Year

U.S. Drought Monitor Pacific Northwest DEWS



October 4, 2022
(Released Thursday, Oct. 6, 2022)
Valid 8 a.m. EDT

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.16	99.84	65.23	25.39	11.86	0.50
Last Week 09-27-2022	2.06	97.94	62.50	24.12	11.86	0.50
3 Months Ago 07-05-2022	41.20	58.80	39.92	23.93	12.30	0.63
Start of Calendar Year 01-04-2022	15.92	84.08	75.97	48.26	22.13	6.50
Start of Water Year 09-30-2021	2.06	97.94	62.50	24.12	11.86	0.50
One Year Ago 10-05-2021	0.00	100.00	93.33	84.83	58.20	22.85

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:
Brad Pugh
CPC/NOAA

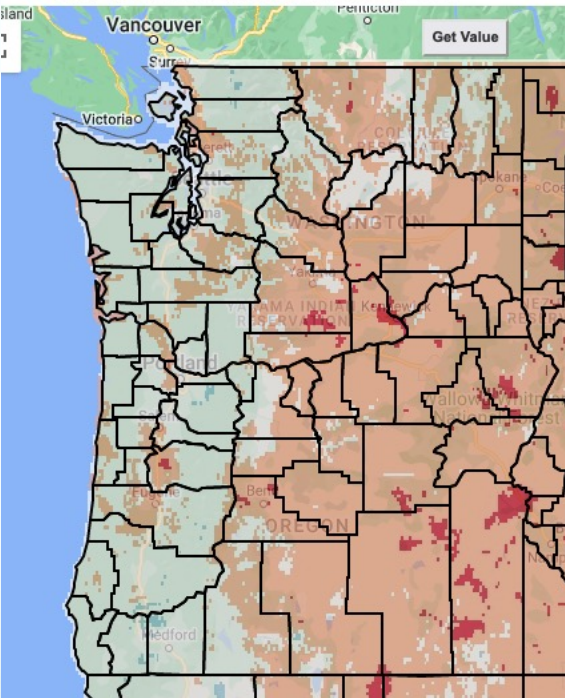


droughtmonitor.unl.edu

October-November 2021

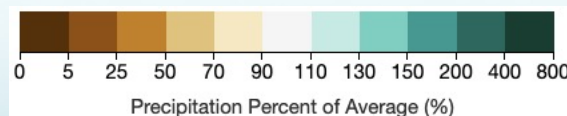
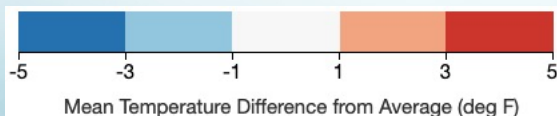
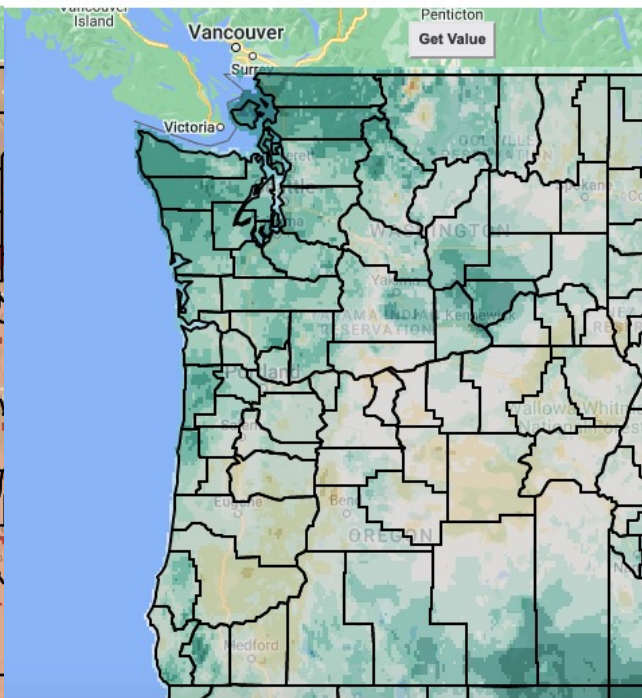
Mean Temperature Difference from Average (gridMET)

2021-10-01 to 2021-11-30, Mean, vs. 1991 - 2020



Precipitation Percent Of Average (gridMET)

2021-10-01 to 2021-11-30, Total, vs. 1991 - 2020

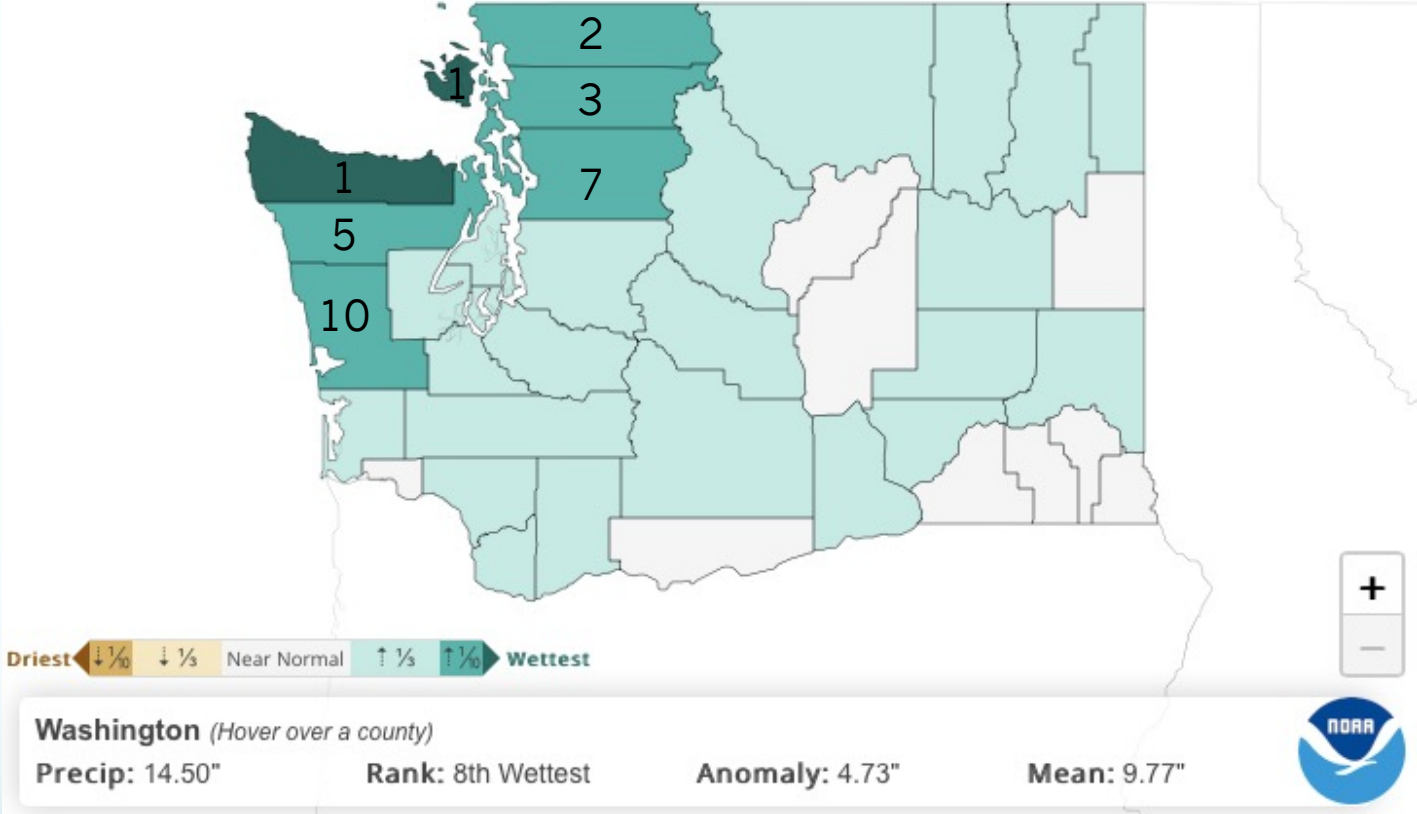


- October was cooler and wetter than normal for both states
- November was warmer than normal for both state but wet in WA and dry in OR
- WA: 8th wettest Oct-Nov

October-November 2021

County Precipitation Rank (of 127 years)

October - November 2021



Washington (Hover over a county)

Precip: 14.50"

Rank: 8th Wettest

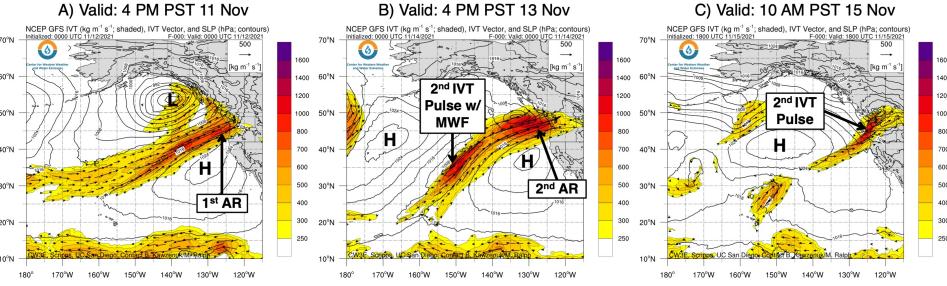
Anomaly: 4.73"

Mean: 9.77"

November Flooding

CW3E Event Summary: 10–16 November 2021

GFS IVT Analyses of the two ARs

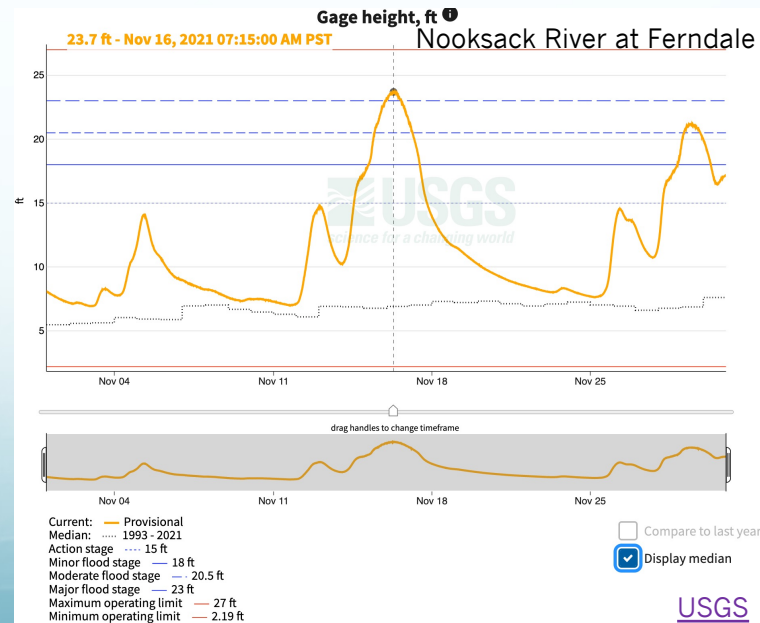
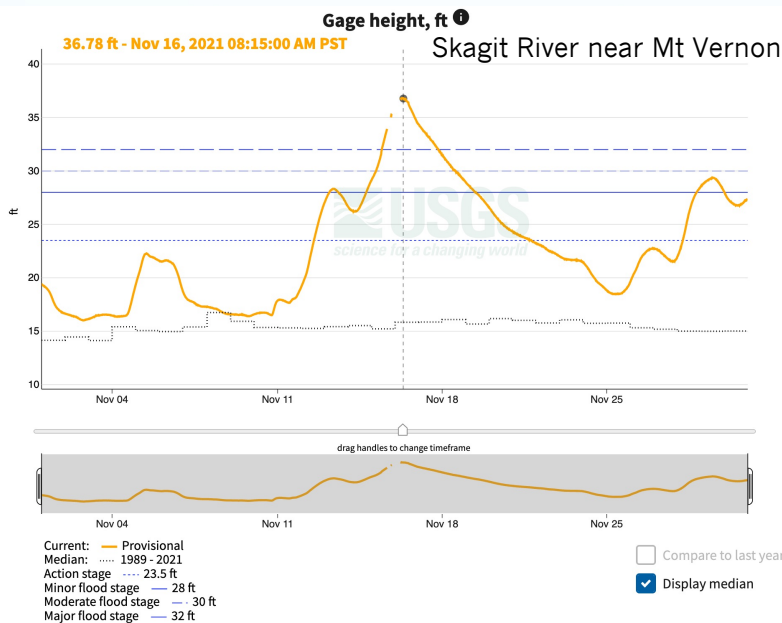


- Two ARs developed over the Northeast Pacific Ocean and impacted the US West Coast from 10 Nov through 15 Nov
- The first AR made landfall in the Pacific Northwest on the morning of 11 Nov (Figure A) in association with a surface cyclone
- The second AR made landfall early on 13 Nov (Figure B) in nearly the same location as the first AR
- A mesoscale frontal wave (MFW) formed into a secondary cyclone at $\sim 150^\circ\text{W}$ on 13 Nov, which created a 2nd pulse of enhanced IVT magnitudes ($> 800 \text{ kg m}^{-1} \text{ s}^{-1}$) and prolonged the overall duration of AR conditions over the coastal Pacific Northwest (Figures B and C)

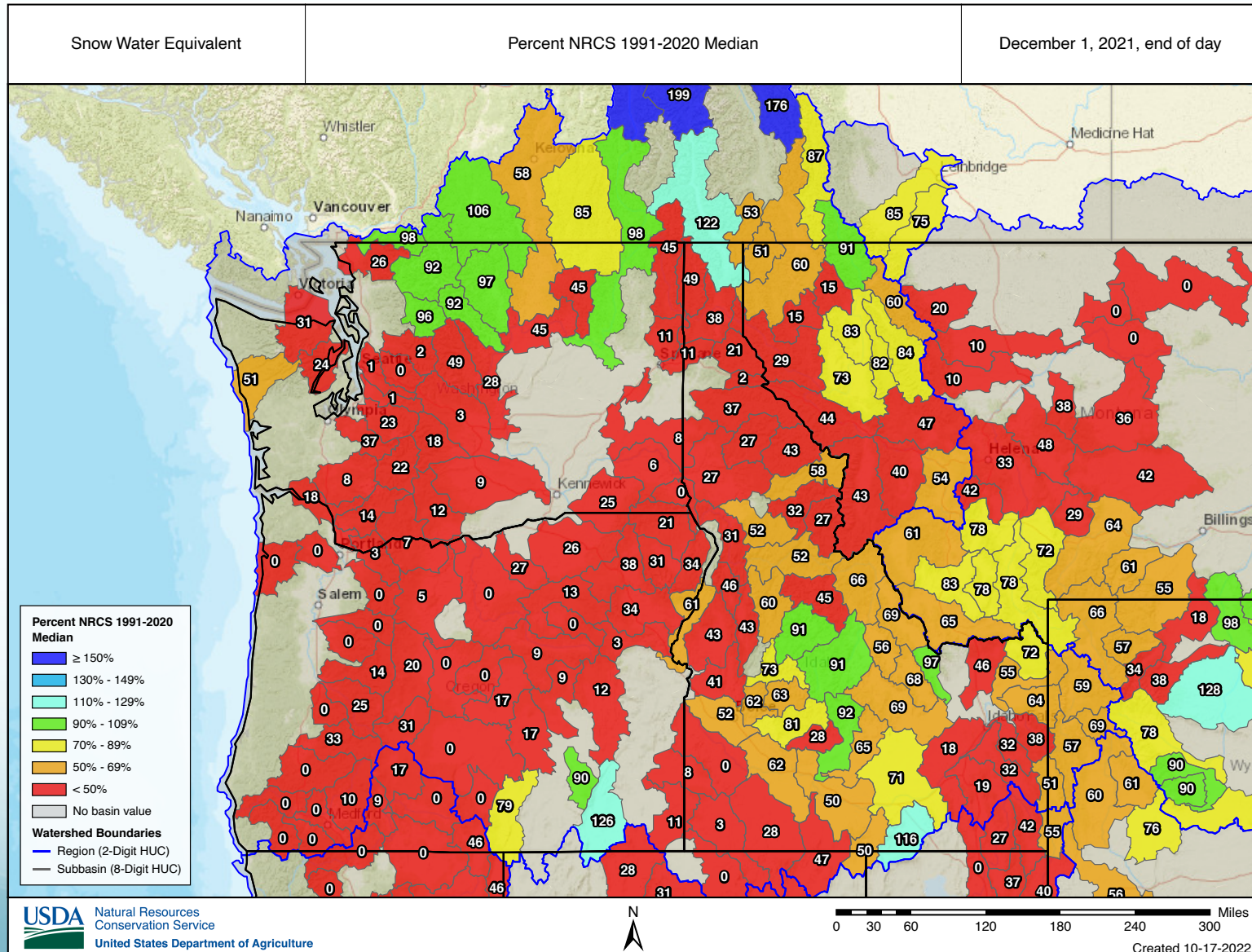


Center for Western Weather and Water Extremes

City of Bellingham

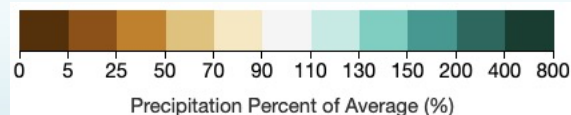
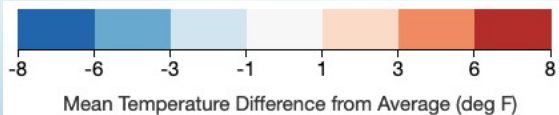
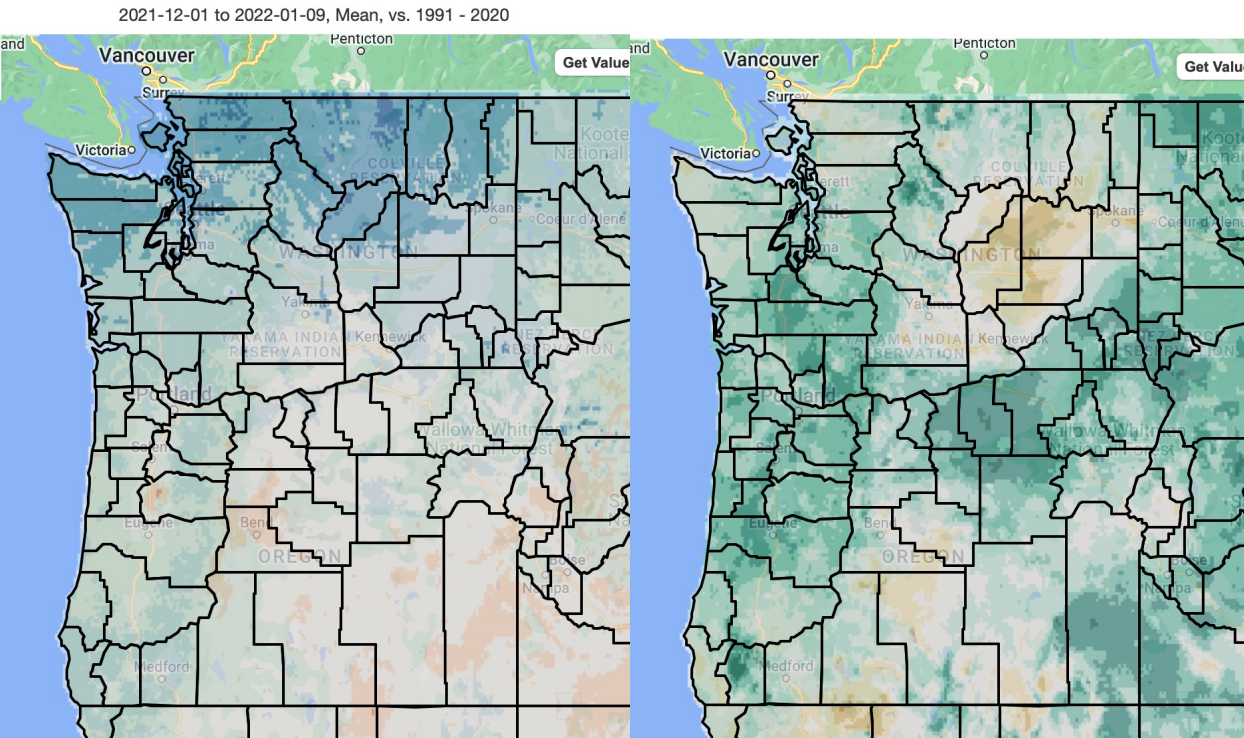


Dec 1 Snow Water Equivalent



December 2021-early January

Mean Temperature Difference from Average Precipitation Percent Of Average (gridMET)
(gridMET)
2021-12-01 to 2022-01-09, Total, vs. 1991 - 2020



- Second half of Dec was cooler and wetter
- Northerly flow aloft brought cold and lowland snow
- All 4 WA mountain passes were closed in early January



Snow measuring up to a foot deep covers a neighborhood near the Port Angeles Public Library on Sunday morning. (Keith Thorpe/Peninsula Daily News)

December 27, 2021

 **Washington State DOT** 
@wsdot · [Follow](#)



Replying to @wsdot

Avalanche control was done Wednesday AM which resolved immediate avalanche risk but also created more snow & large debris that must be cleared off the road. There are also areas with 4-inch-thick ice on the road that need to be removed. (4/7)

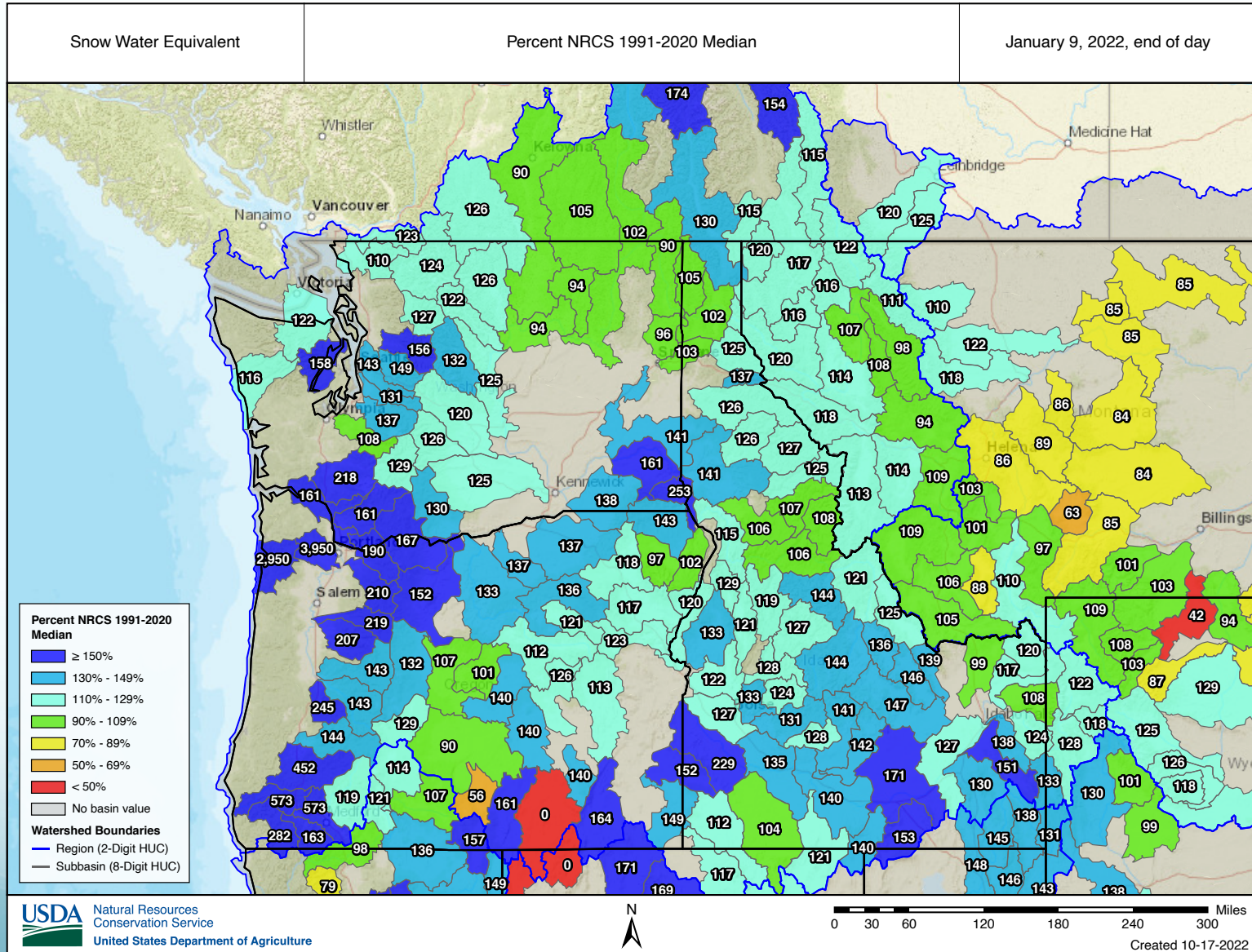


4:17 PM · Jan 12, 2022



 23  Reply  Share

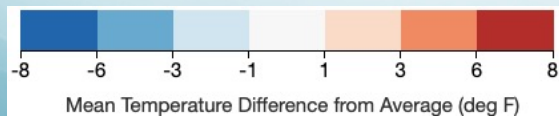
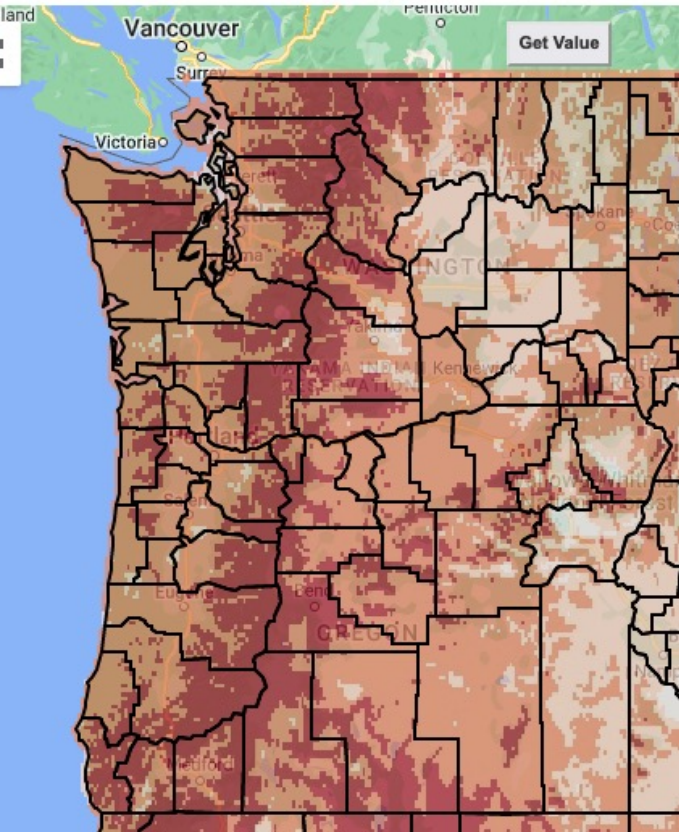
Jan 9 Snow Water Equivalent



January 10-March 2022

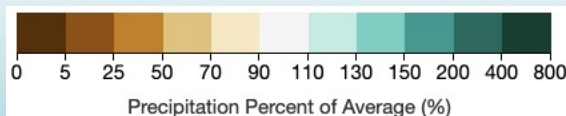
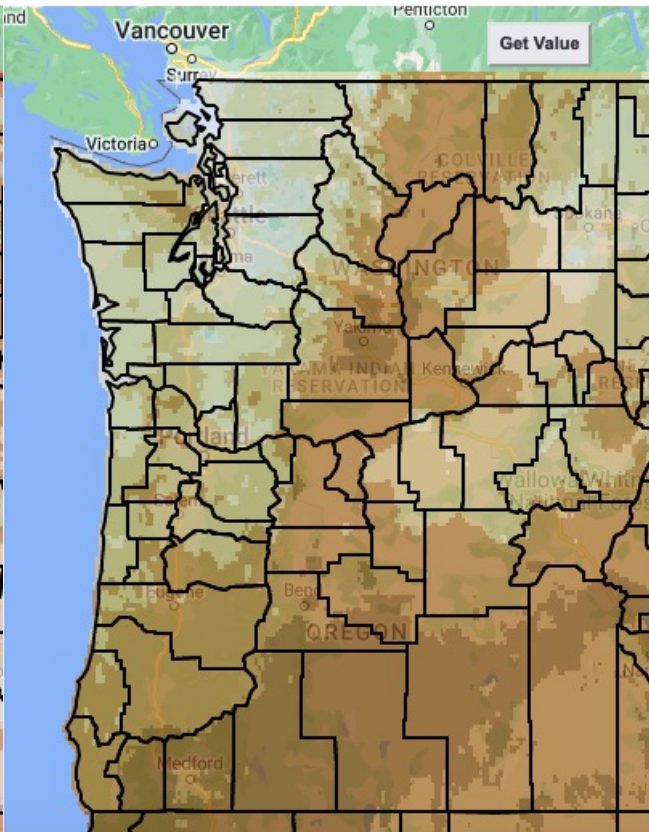
Mean Temperature Difference from Average (gridMET)

2022-01-10 to 2022-03-31, Mean, vs. 1991 - 2020



Precipitation Percent Of Average (gridMET)

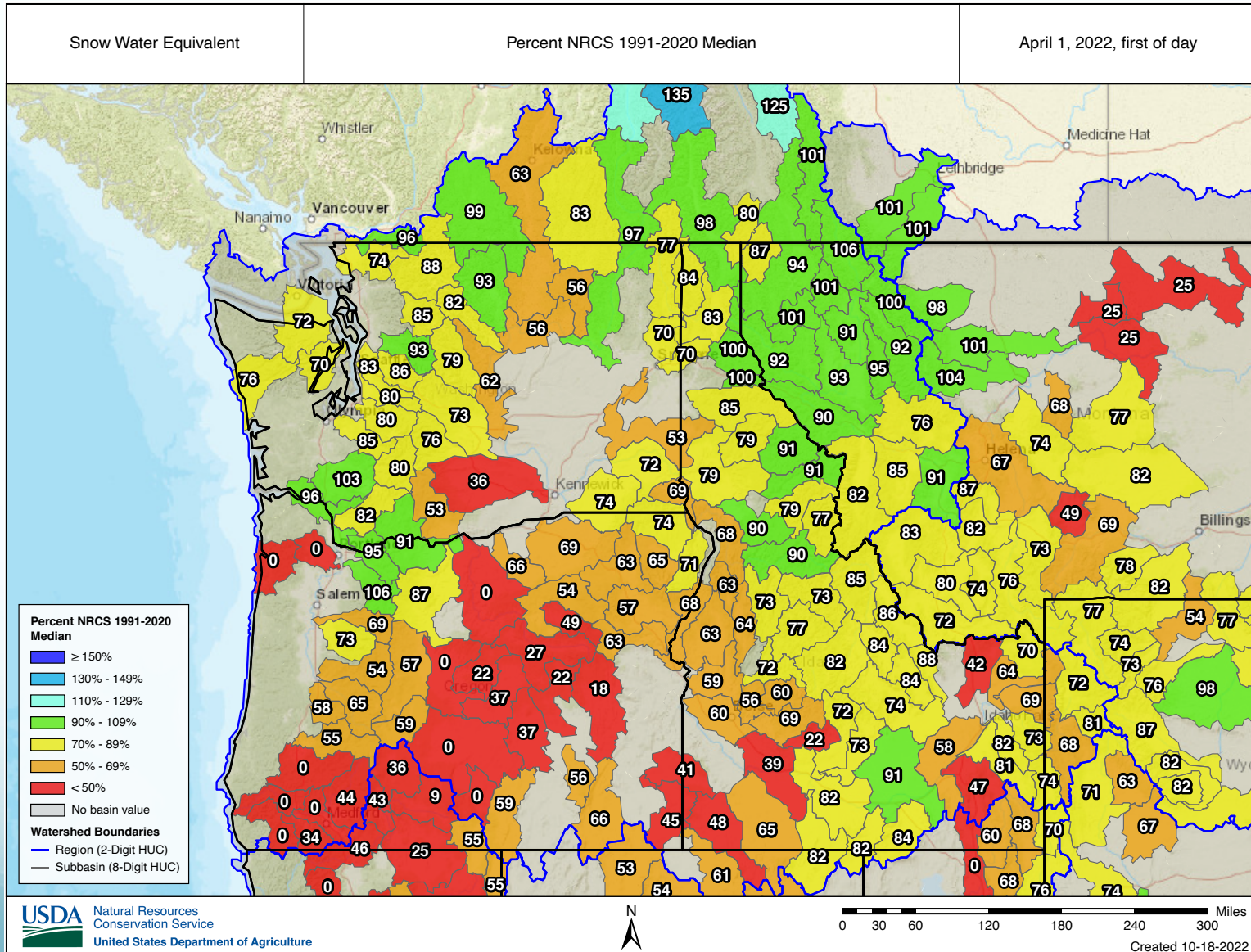
2022-01-10 to 2022-03-31, Total, vs. 1991 - 2020



WA: 34th warmest and 41st driest

OR: 16th warmest (tie) and 8th driest

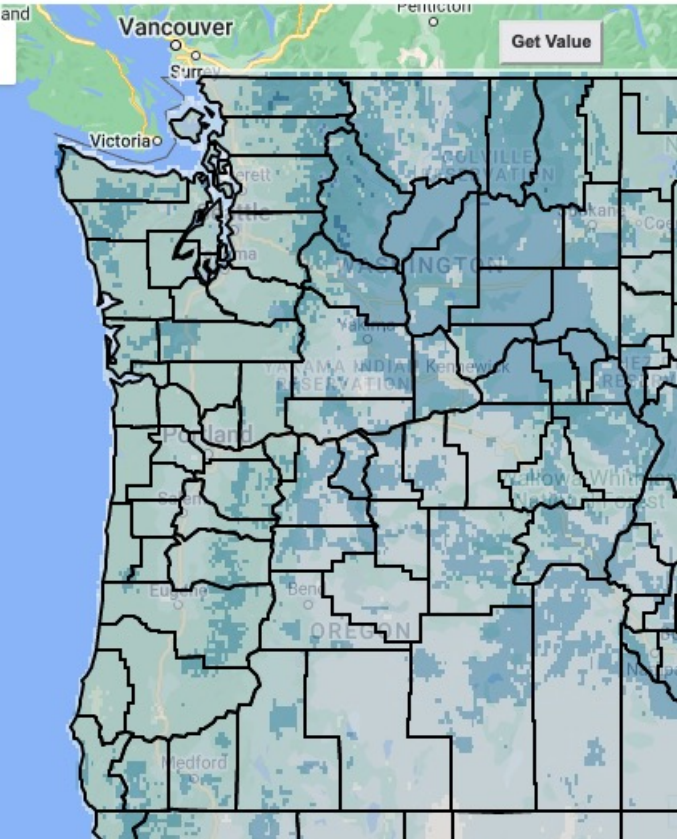
April 1 Snow Water Equivalent



April-June 2022

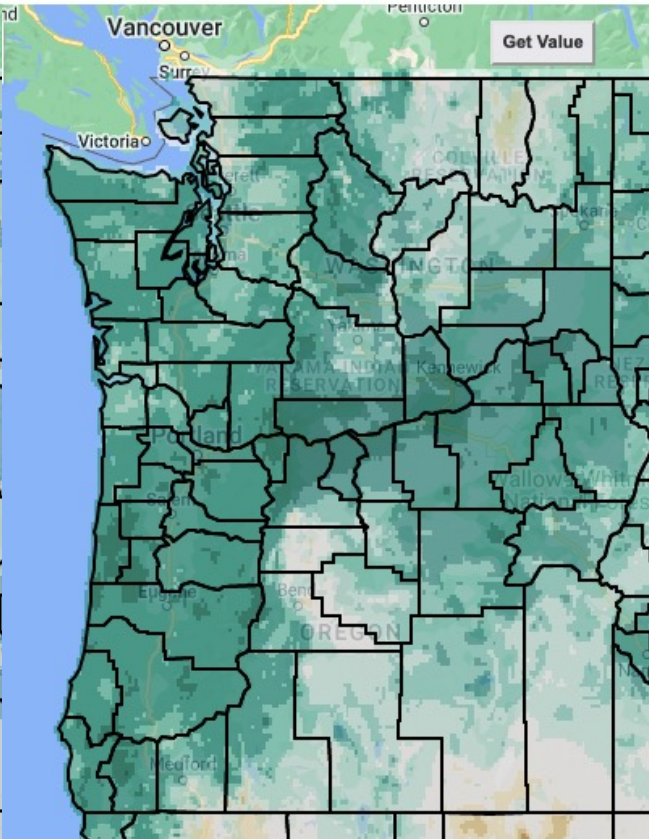
Mean Temperature Difference from Average (gridMET)

2022-04-01 to 2022-06-30, Mean, vs. 1991 - 2020



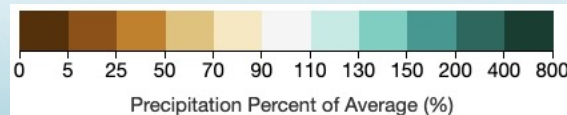
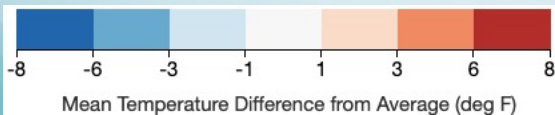
Precipitation Percent Of Average (gridMET)

2022-04-01 to 2022-06-30, Total, vs. 1991 - 2020



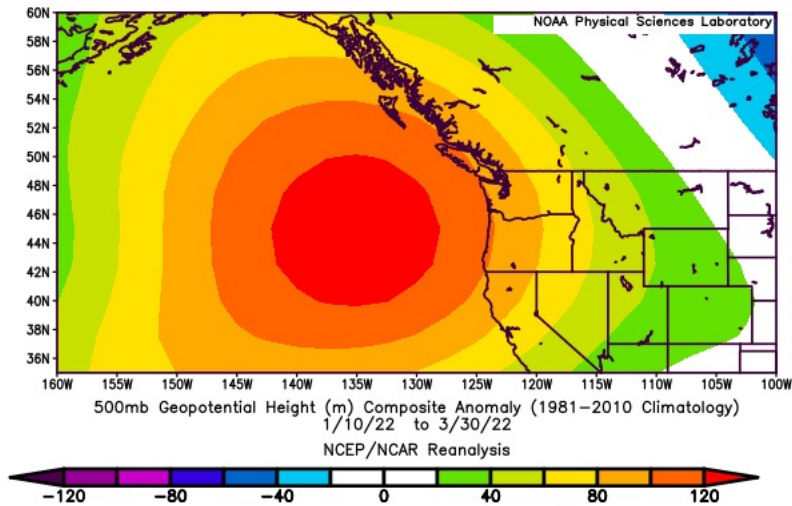
WA: 6th coldest and 3rd wettest

OR: 17th coldest and 2nd wettest

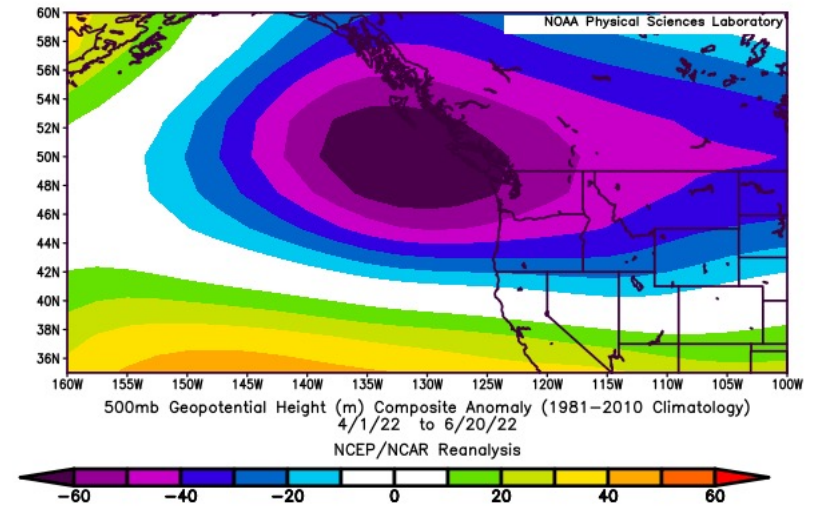


Atmospheric Pattern Shift

Jan 10-Mar 30, 2022



Apr 1-Jun 20, 2022



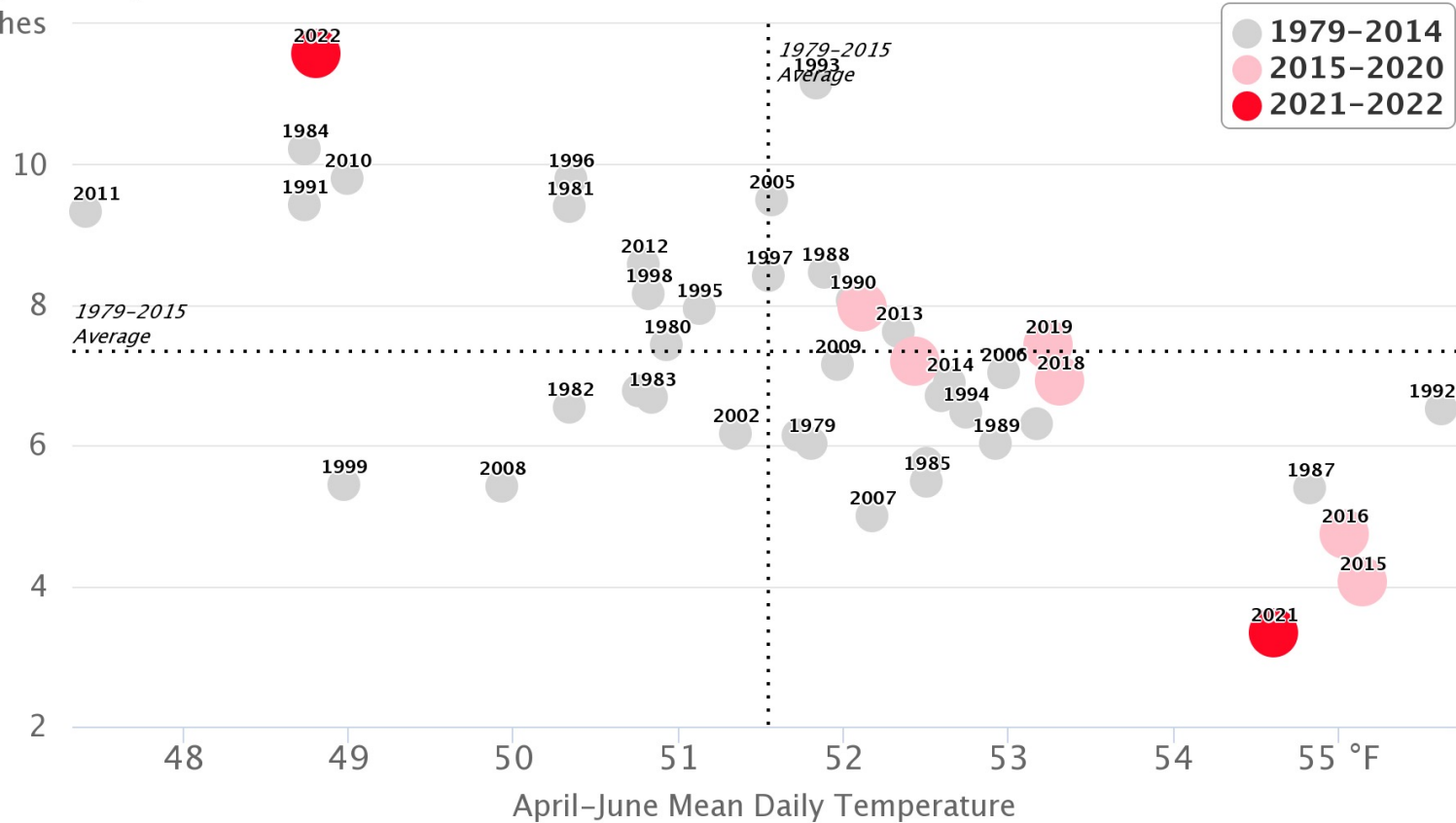
Spring Comparison

Washington and Oregon

41.9899N to 49.0952N, 124.7900W to 116.6816W

April–June Precipitation

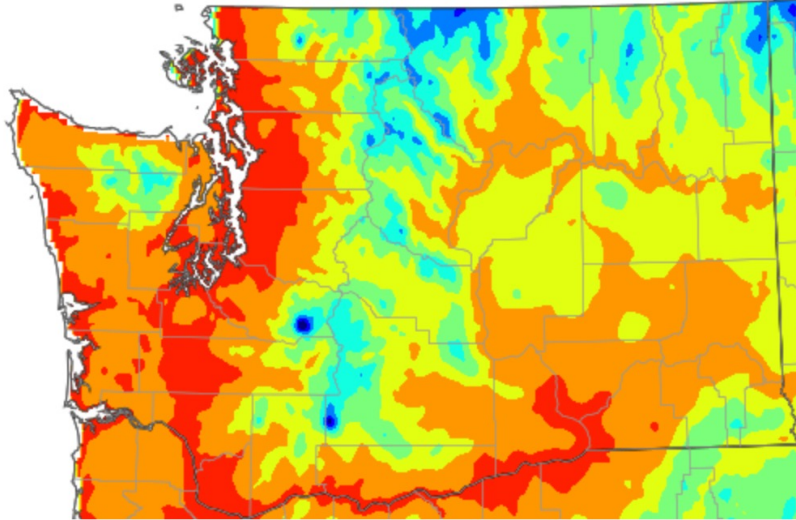
12 inches



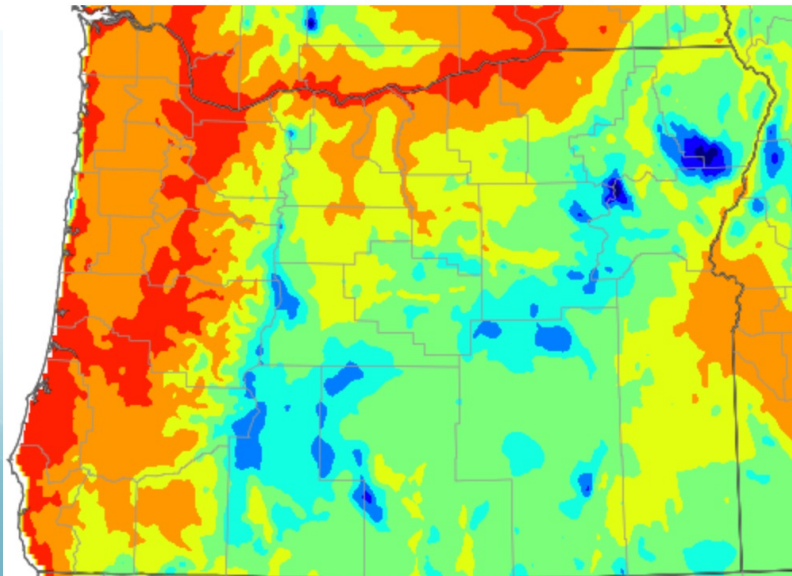
Climate Toolbox, Data Source: gridMET (UC Merced)

Mid-April Cold Snap

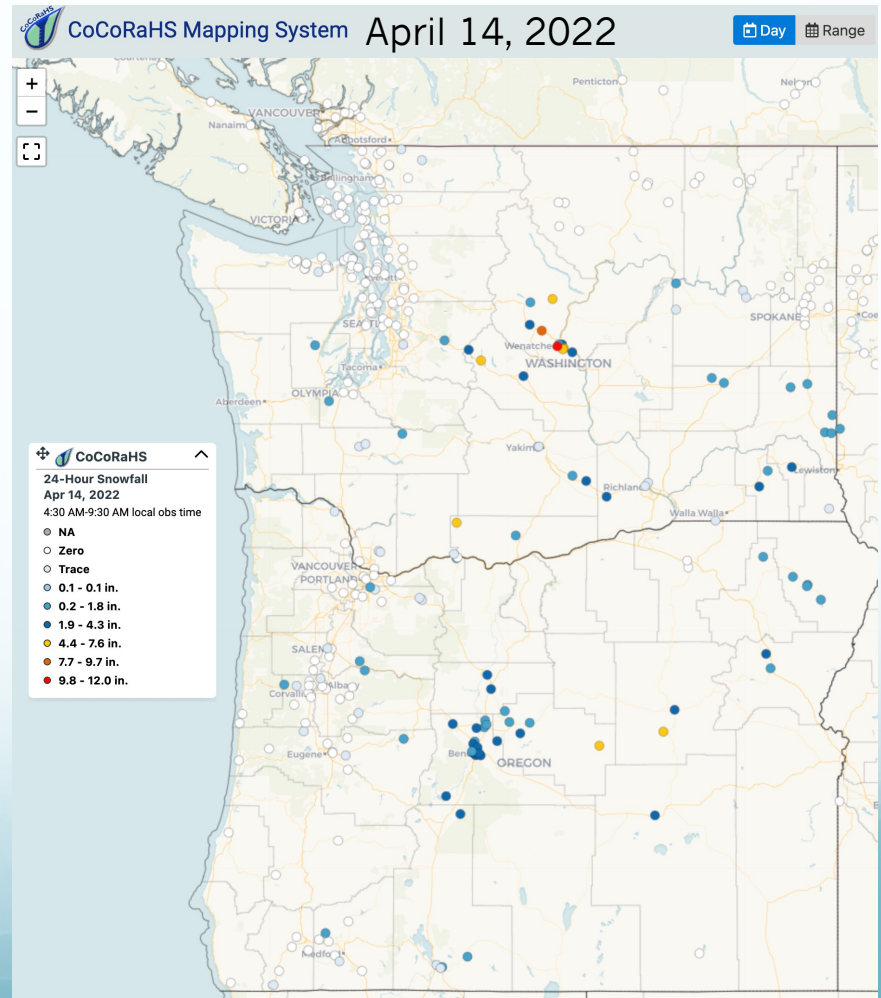
Lowest Min Temperature - April 9, 2022 through April 22, 2022



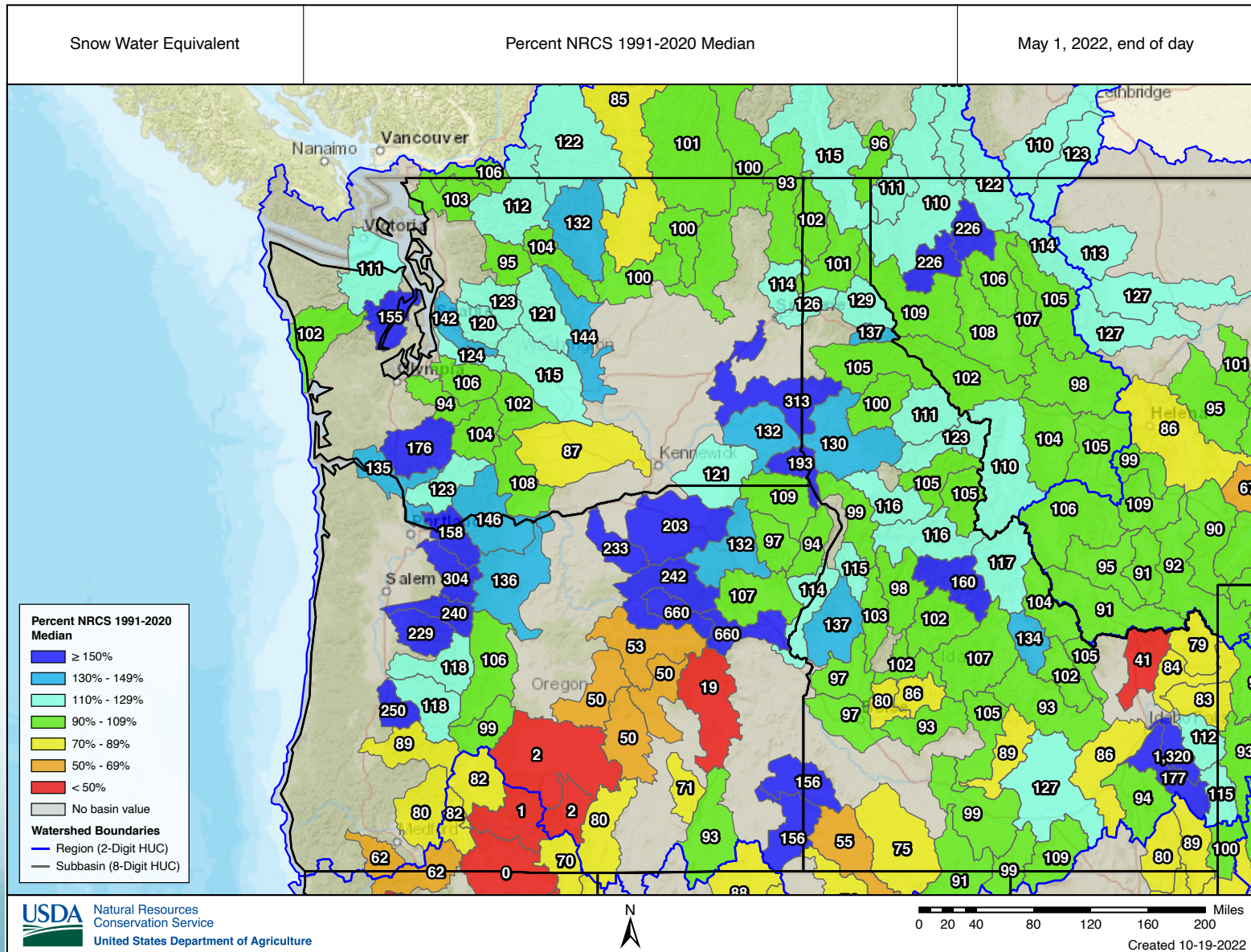
Lowest Min Temperature - April 9, 2022 through April 22, 2022



- Frequent snow throughout this period, including lower elevations in OR

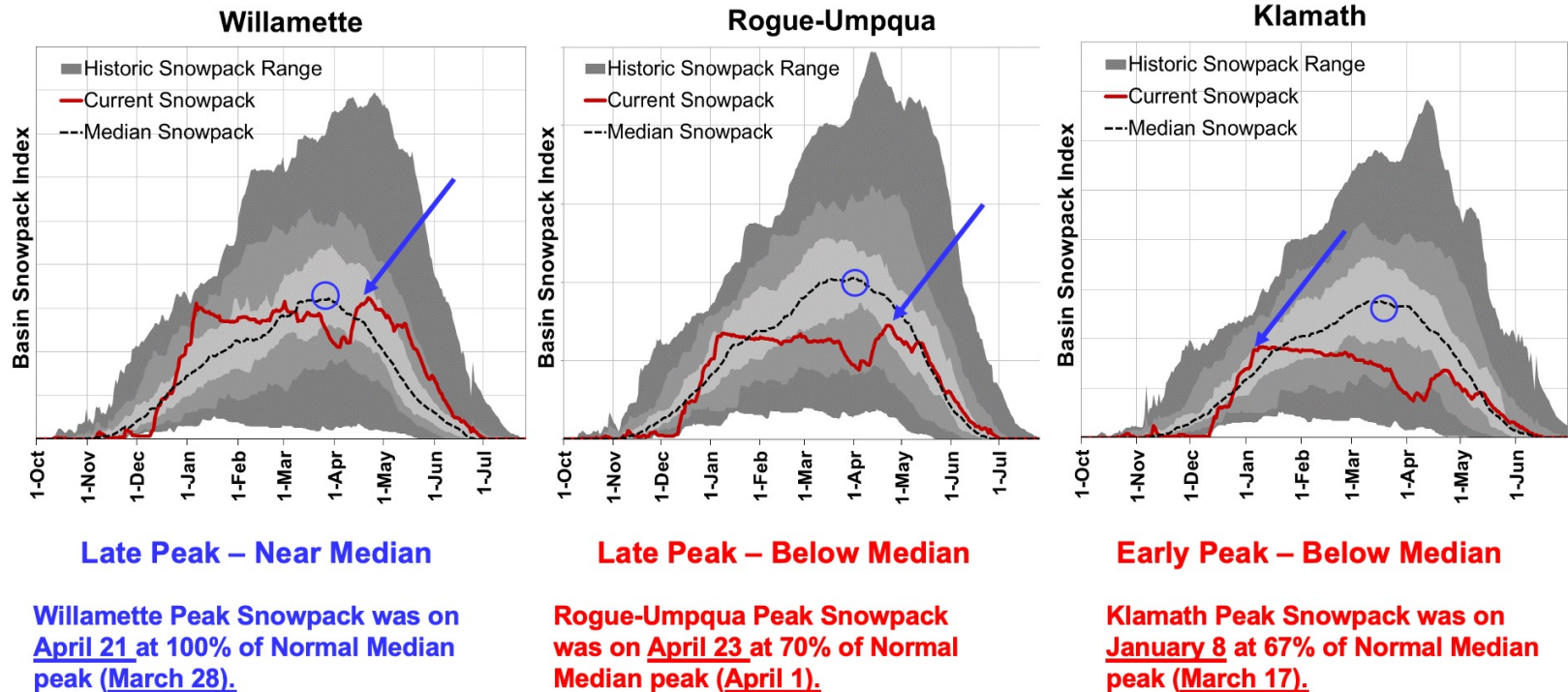


May 1 Snow Water Equivalent



Variability in Peak SWE

OREGON SNOWPACK GRAPHS WY2022

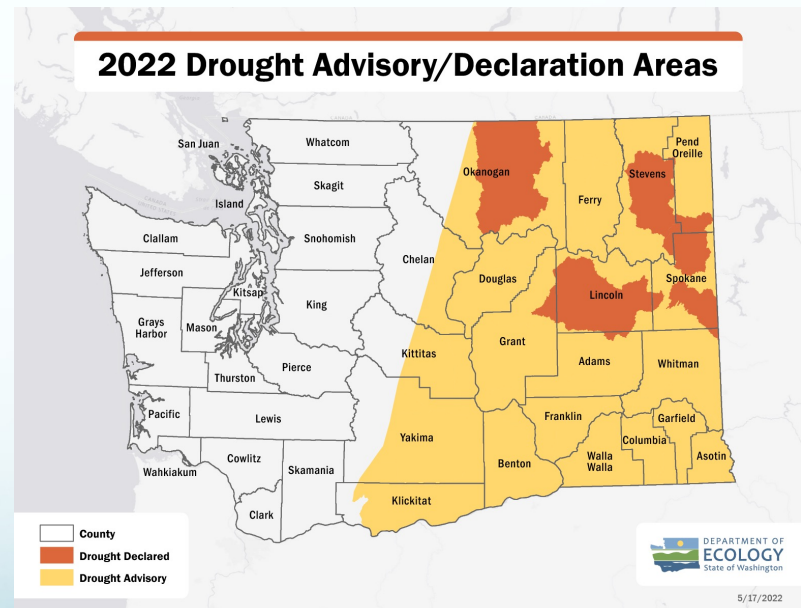
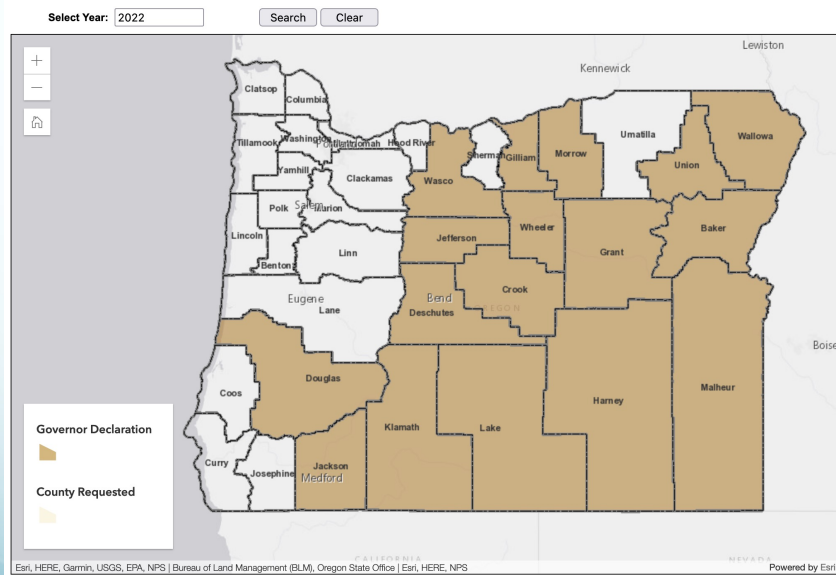


Courtesy of Scott Oviatt (NRCS)

Drought Declarations

- In May, WA extended the 2021 drought declaration for 5 eastern WA watersheds
 - Declaration lifted in July
- OR declarations made in March through early June

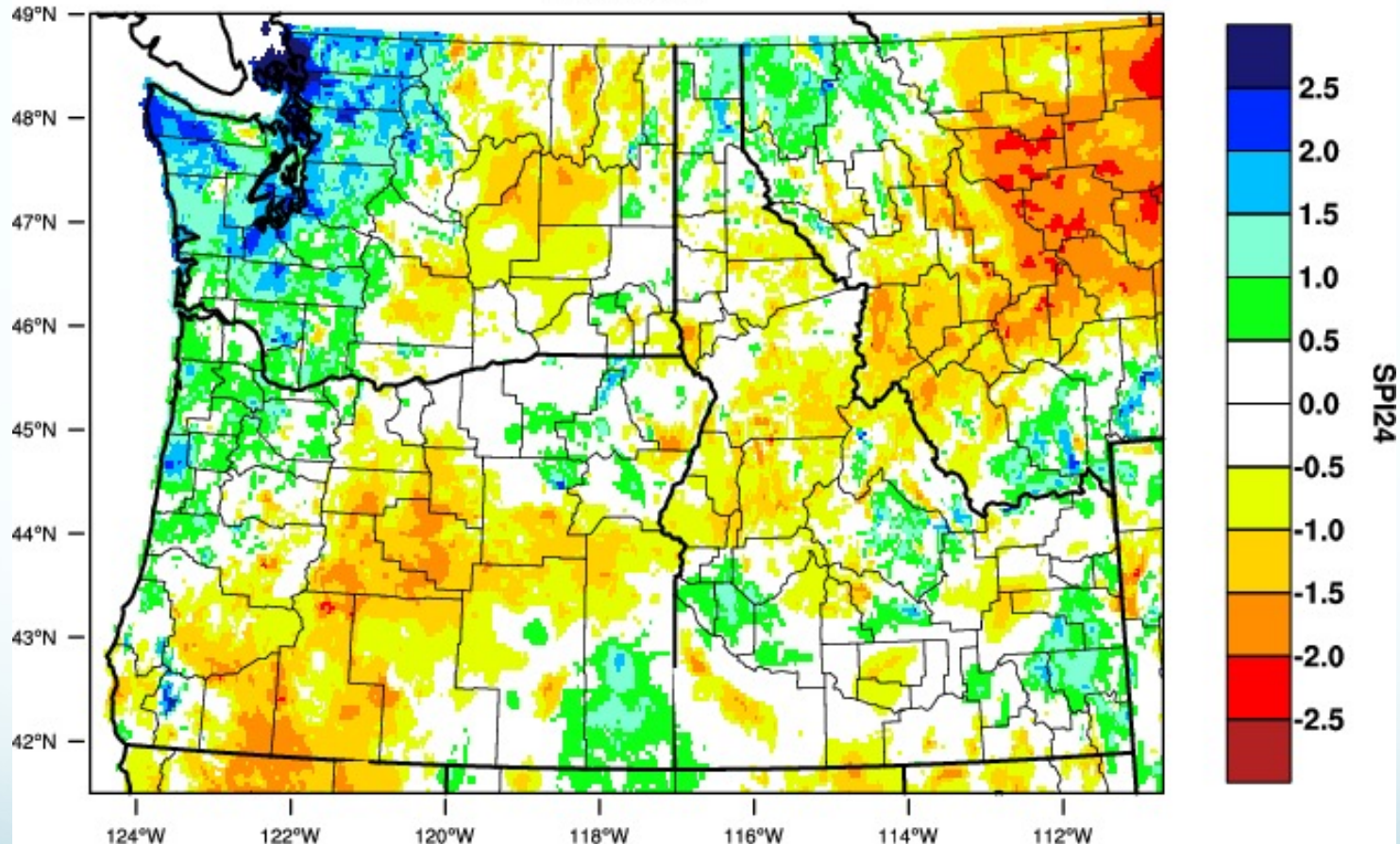
Drought Declaration Status Map



Long-term drought

Pacific Northwest - 24 month SPI

June 2022

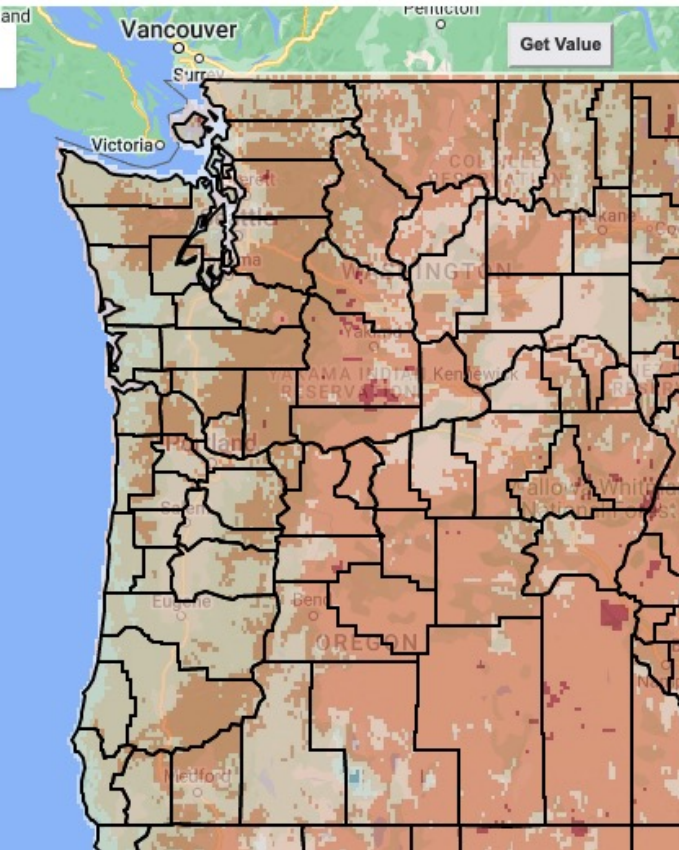


WestWide Drought Tracker - U Idaho/WRCC Data Source - PRISM (Prelim), created 16 JUL 2022

July-September 2022

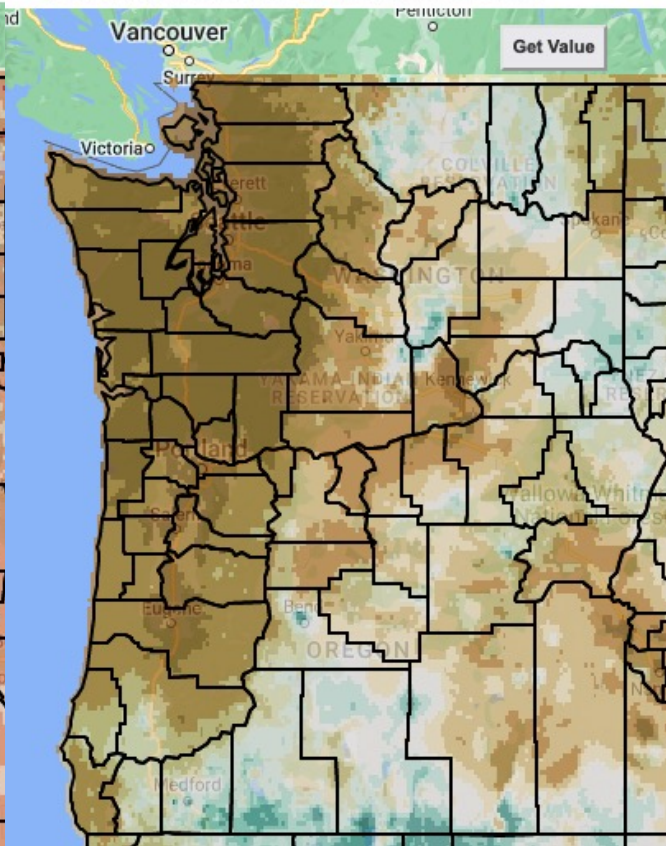
Mean Temperature Difference from Average (gridMET)

2022-07-01 to 2022-09-30, Mean, vs. 1991 - 2020



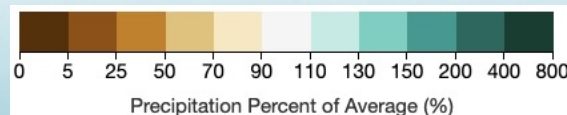
Precipitation Percent Of Average (gridMET)

2022-07-01 to 2022-09-30, Total, vs. 1991 - 2020

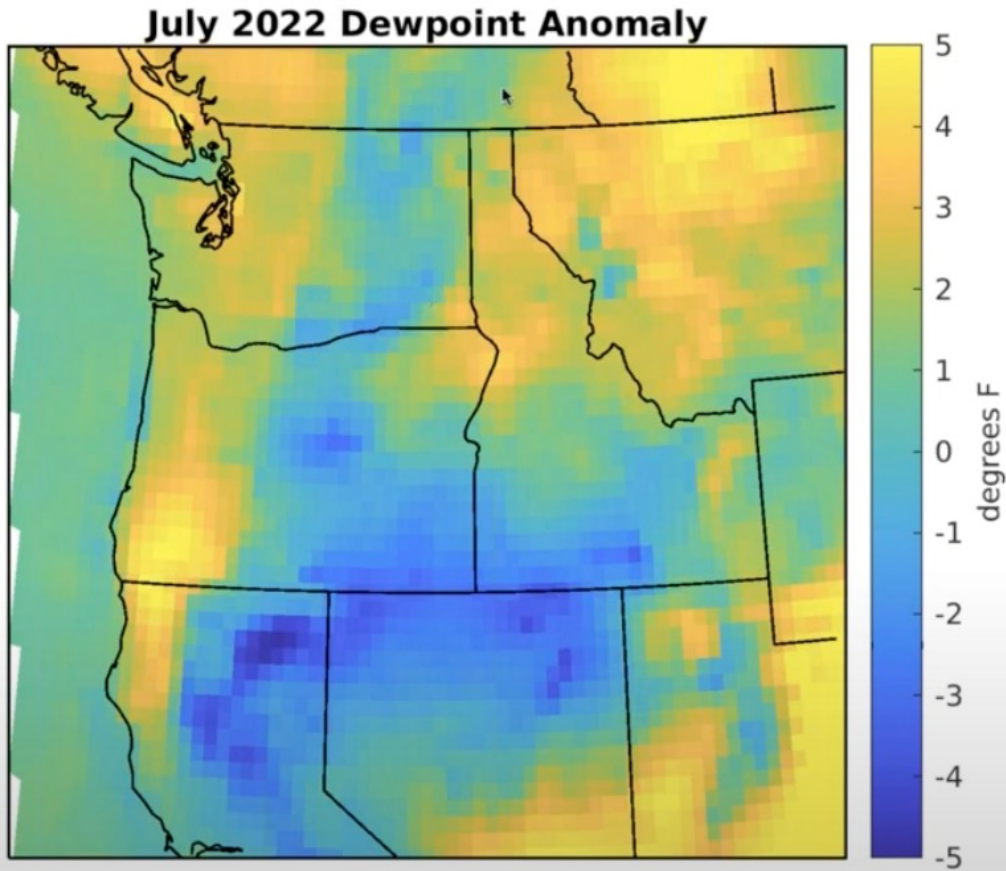


WA: Warmest and 2nd driest

OR: Warmest and 7th driest (tie)



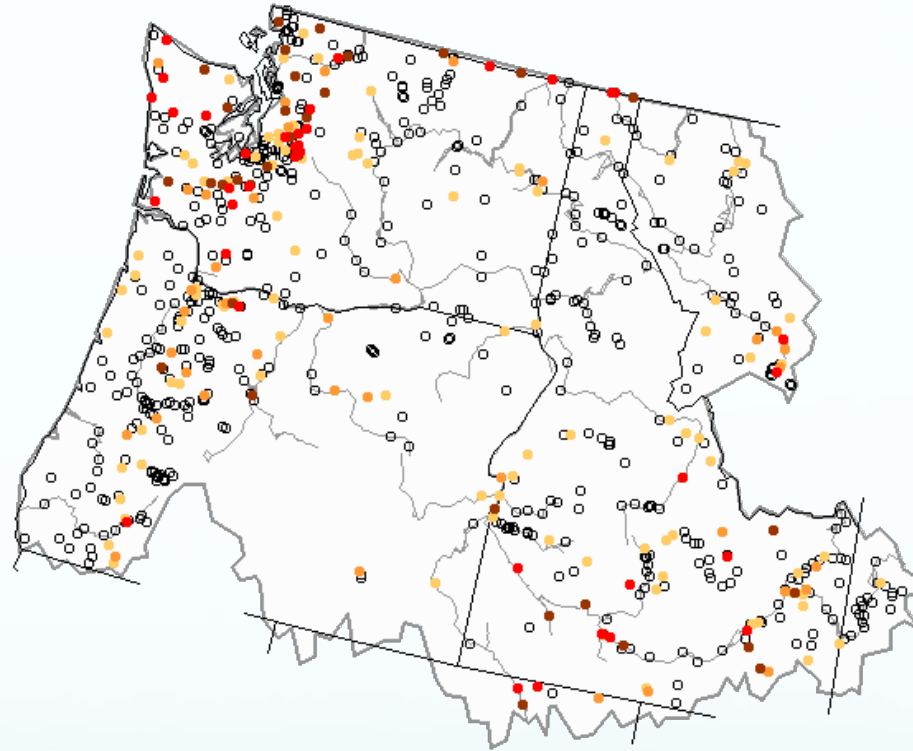
High humidity








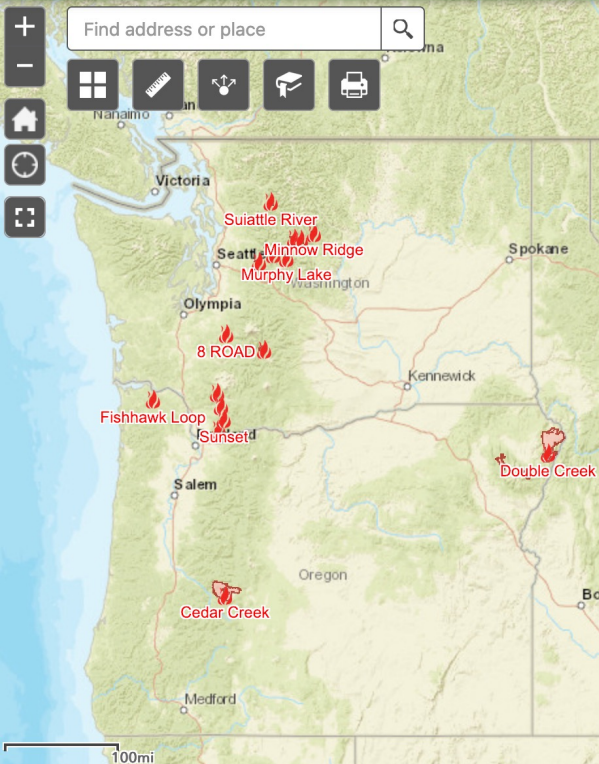
- Above normal dewpoint temperatures west of the Cascades in OR and WA
- Reduced evaporative demand

September Streamflow

September 2022

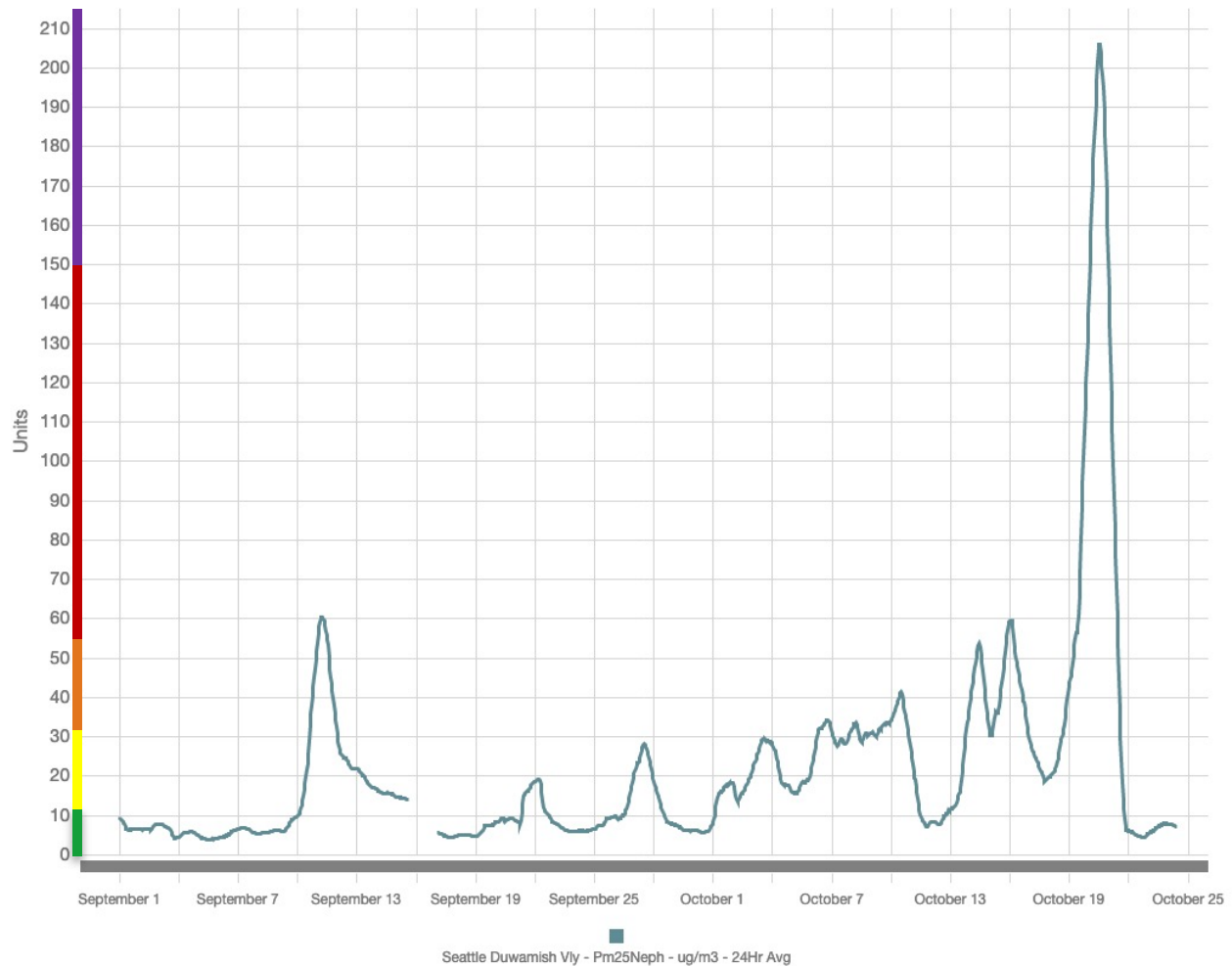


Explanation - Percentile classes				
				
New low	≤ 5	6-9	10-24	Not ranked
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal	



October 18, 2022

Wildfires

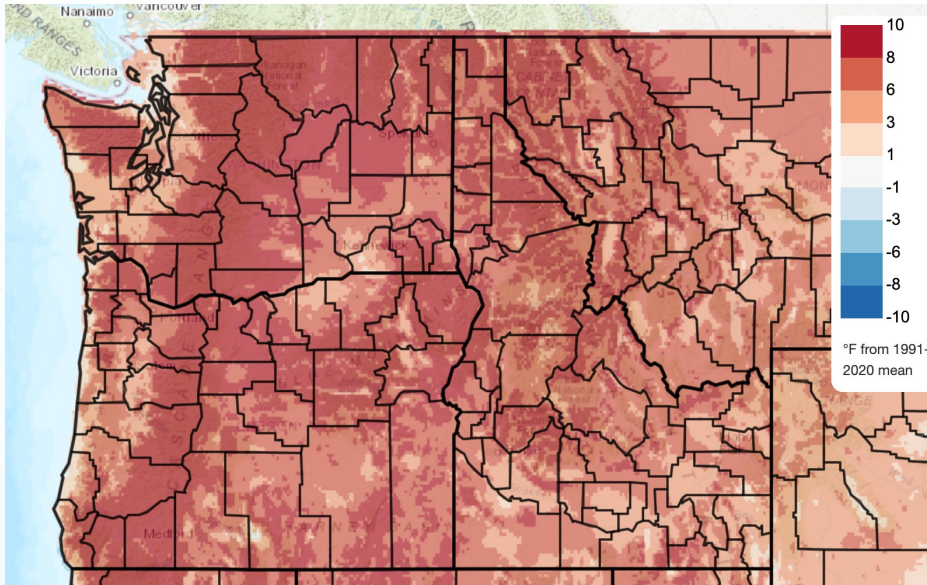


Seattle Duwamish Vly - Pm25Neph - ug/m3 - 24Hr Avg

October 2022

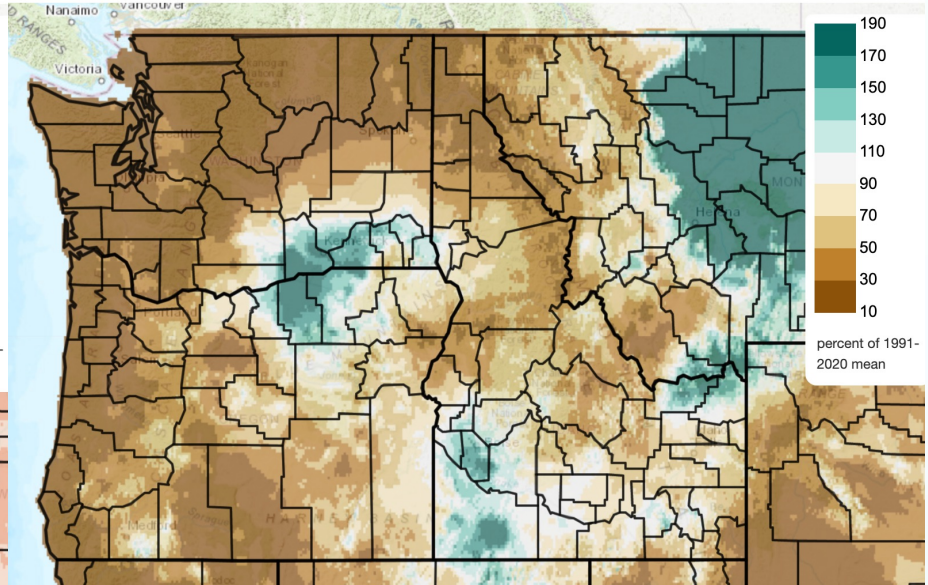
Mean Daily Temperature Anomaly, Since Oct 1st

2022/10/01 - 2022/10/22



Total Precipitation Anomaly, Since Oct 1st

2022/10/01 - 2022/10/22

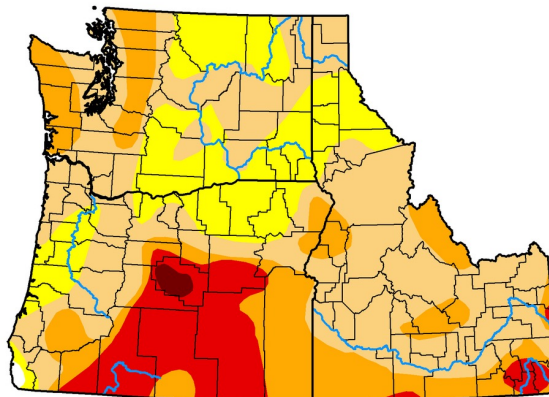


U.S. Drought Monitor
USDA Northwest Climate Hub

October 18, 2022

(Released Thursday, Oct. 20, 2022)

Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	70.19	29.81	23.56	10.31	3.90	0.16
Last Week 10-11-2022	70.19	29.81	21.09	8.24	3.90	0.16
3 Months Ago 07-19-2022	56.09	43.91	17.83	7.85	4.04	0.21
Start of Calendar Year 01-04-2022	74.10	25.90	23.79	15.09	6.81	2.01
Start of Water Year 09-27-2021	70.29	29.71	18.36	7.80	3.90	0.16
One Year Ago 10-19-2021	72.19	27.81	26.83	24.79	18.03	7.29

Intensity:

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

Summary

- Average water year conditions even out the intense variability within the water year
 - Washington: near-normal T, above normal P
 - Oregon: above normal T and below normal P
- Significant variations: wet fall with flooding, heavy snow in late Dec/early Jan, extended mid-winter period of warm/dry, cold and wet spring, and then record warm and dry late summer into early fall
- In general, drought conditions improved over the course of the water year, especially in WA
- Snowpack generally peaked late with some important variability and drought persisting, especially in southern Oregon