

Oregon-Washington Water Year 2023 Climatological Recap

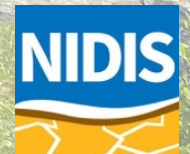
Larry O'Neill

*CEOAS Oregon State University
Director, Oregon Climate Service
State Climatologist of Oregon*

Wallowa Mtns
July 2023

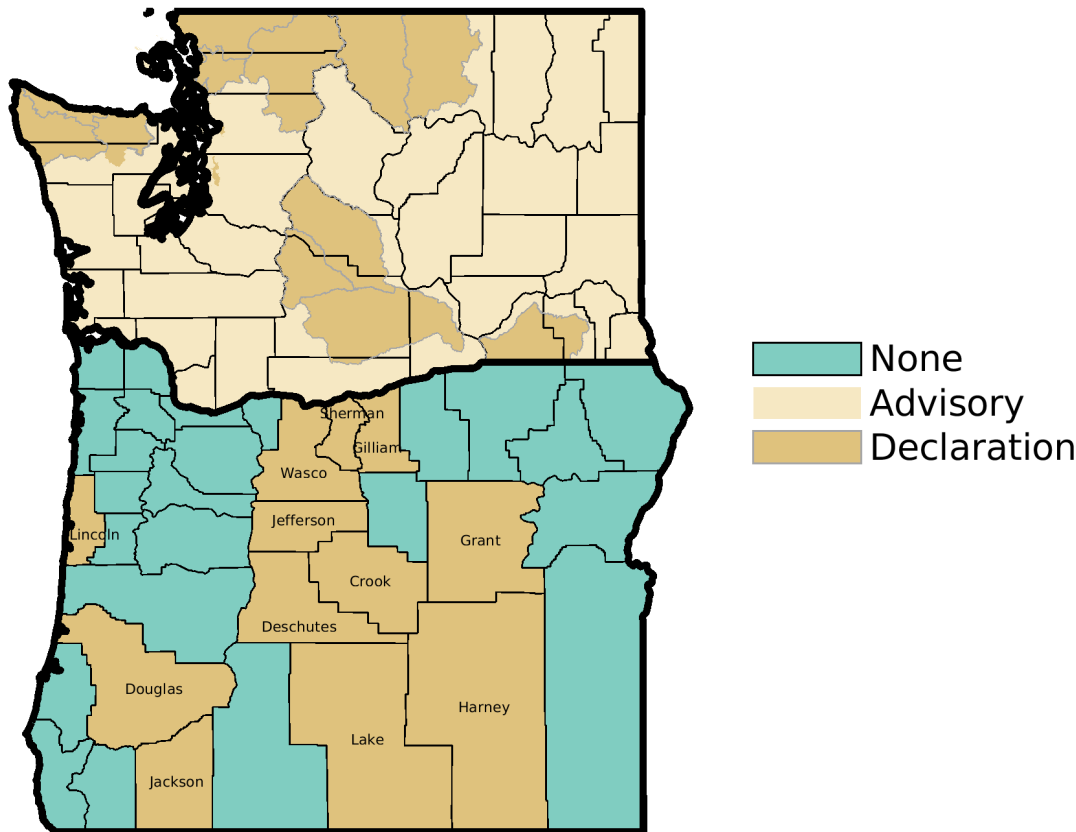


Oregon State University
College of Earth, Ocean,
and Atmospheric Sciences



State-issued drought declarations issued during WY2023

Drought Declarations or Advisories During WY2023



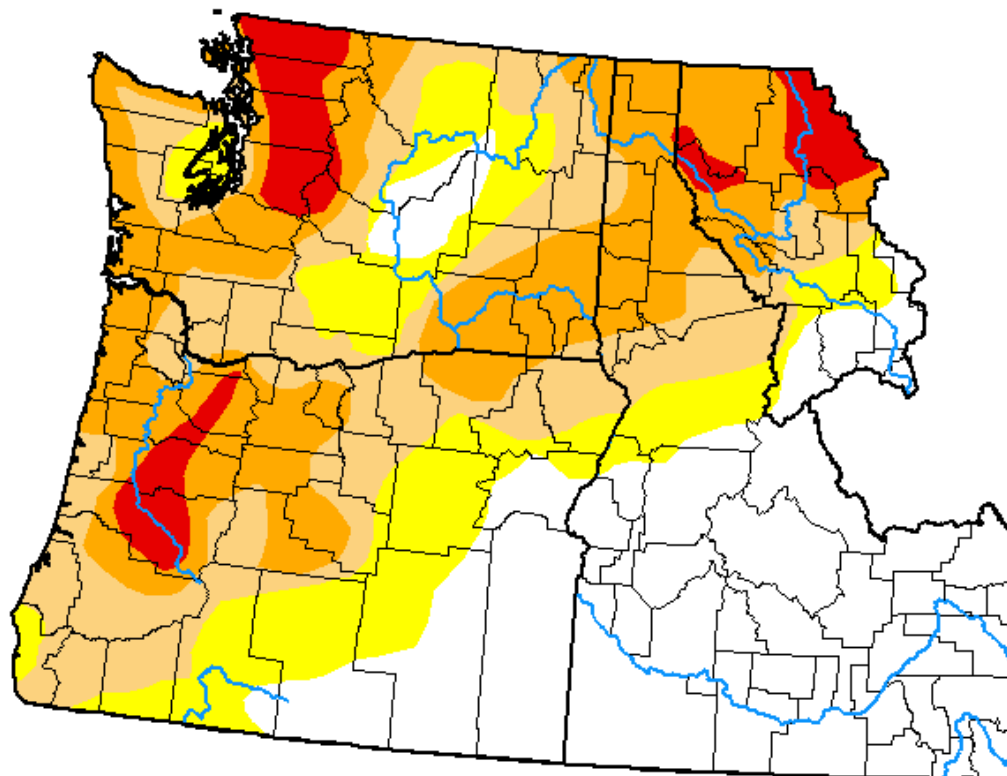
Washington: Statewide drought advisory with 8 watersheds with drought declarations

Oregon: 12 out of Oregon's 36 counties had a governor-issued drought declaration

U.S. Drought Monitor

Pacific Northwest DEWS

October 3, 2023
 (Released Thursday, Oct. 5, 2023)
 Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	34.73	65.27	49.48	27.83	5.59	0.00
Last Week <i>09-26-2023</i>	34.73	65.27	50.11	28.69	7.48	0.00
3 Months Ago <i>07-04-2023</i>	35.55	64.45	37.90	4.95	0.00	0.00
Start of Calendar Year <i>01-03-2023</i>	14.80	85.20	48.85	24.03	9.29	0.50
Start of Water Year <i>09-26-2023</i>	34.73	65.27	50.11	28.69	7.48	0.00
One Year Ago <i>10-04-2022</i>	0.16	99.84	65.23	25.39	11.86	0.50

Intensity:



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

At the end of WY2023, 49.5% of the Pacific Northwest was in some stage of drought, a decrease of 15.7% from the start of the water year!



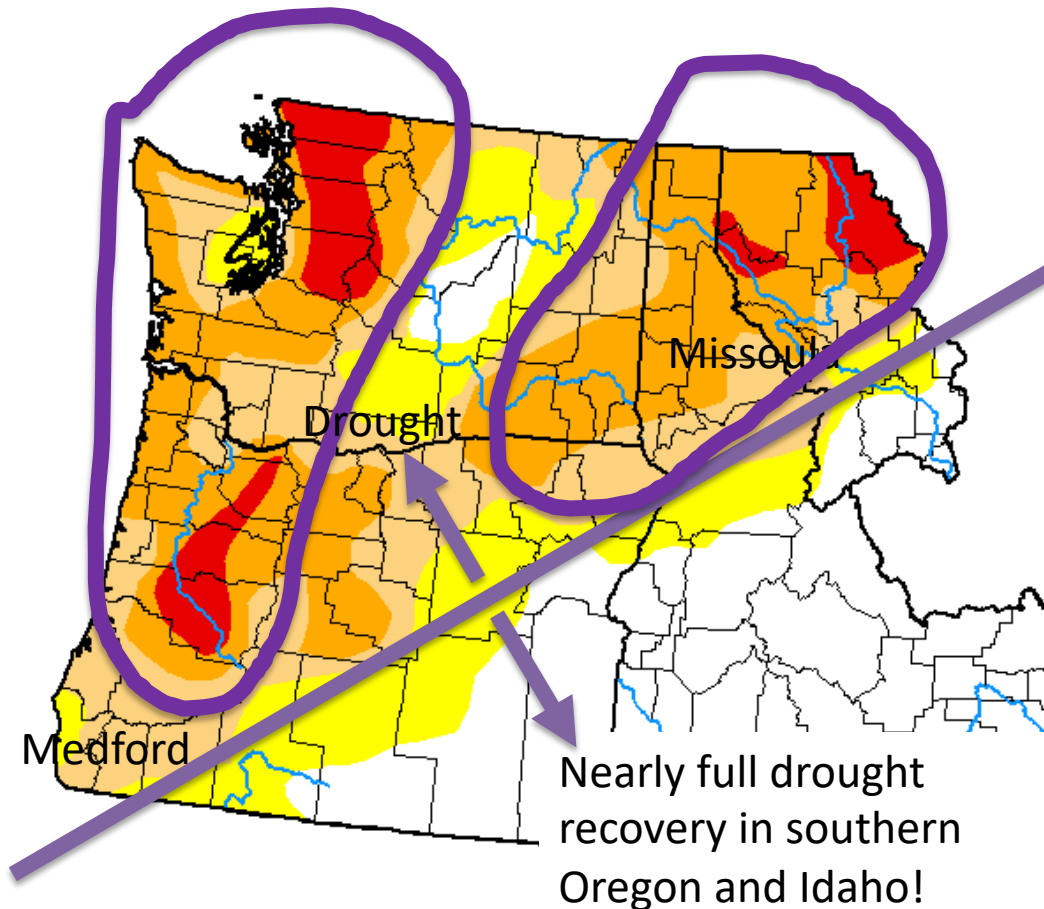
U.S. Drought Monitor

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Western WA and OR

NE Pacific Northwest



Drought Conditions (Percent Area)

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Intensity:

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

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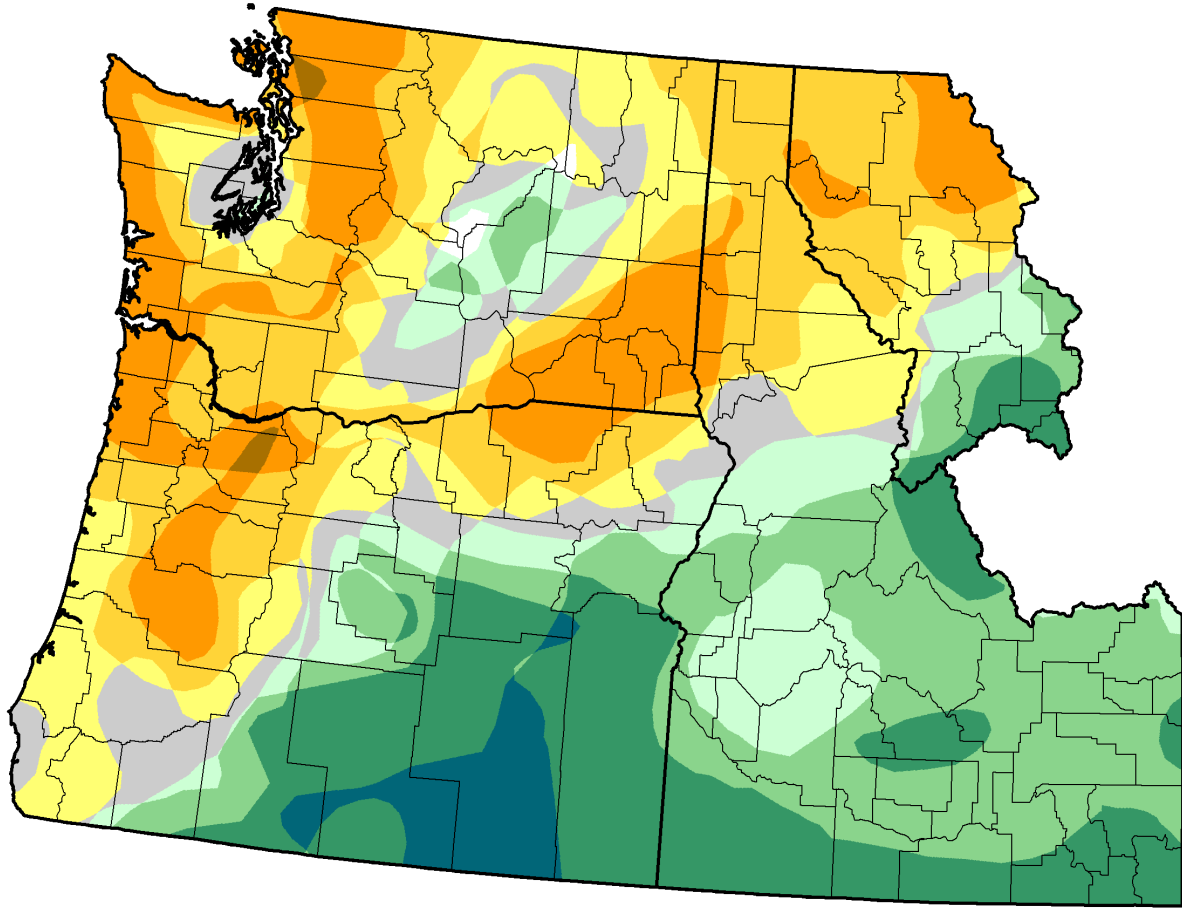
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




Brad Pugh
 CPC/NOAA



U.S. Drought Monitor Class Change - Pacific Northwest DEWS

Start of Calendar Year



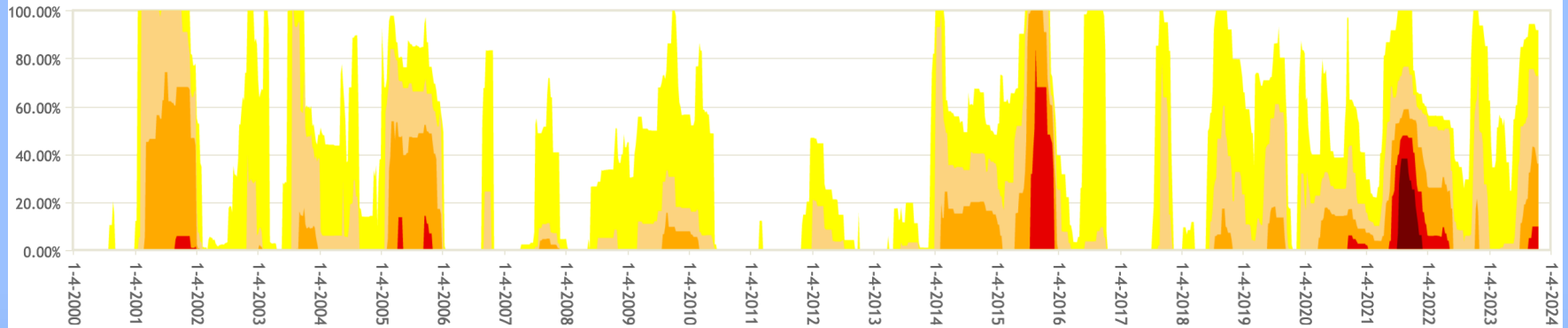
-  5 Class Degradation
-  4 Class Degradation
-  3 Class Degradation
-  2 Class Degradation
-  1 Class Degradation
-  No Change
-  1 Class Improvement
-  2 Class Improvement
-  3 Class Improvement
-  4 Class Improvement
-  5 Class Improvement

October 3, 2023
compared to
January 3, 2023

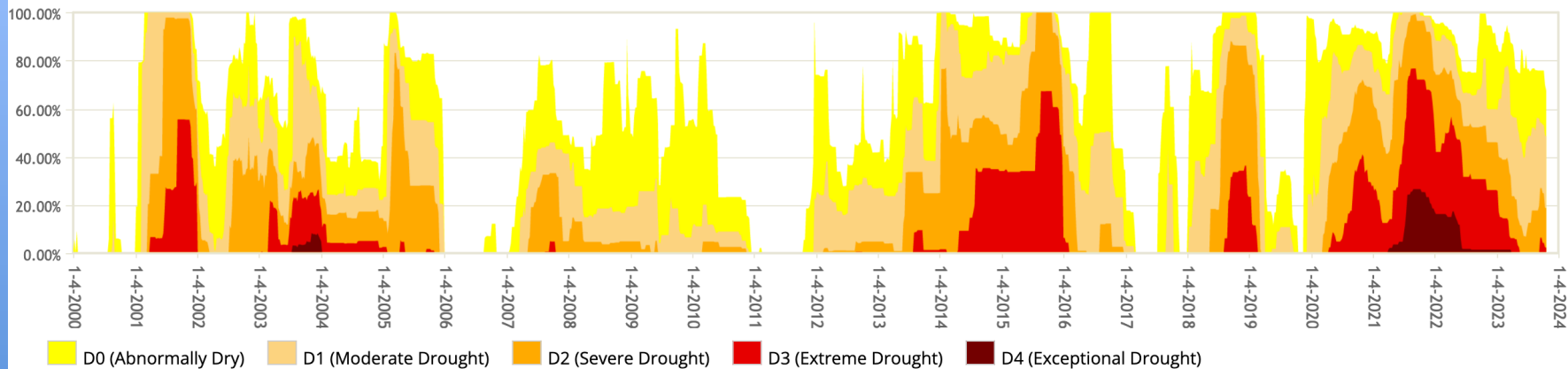
droughtmonitor.unl.edu

Drought Advisories and Declarations

Washington Percent Area in U.S. Drought Monitor Categories



Oregon Percent Area in U.S. Drought Monitor Categories

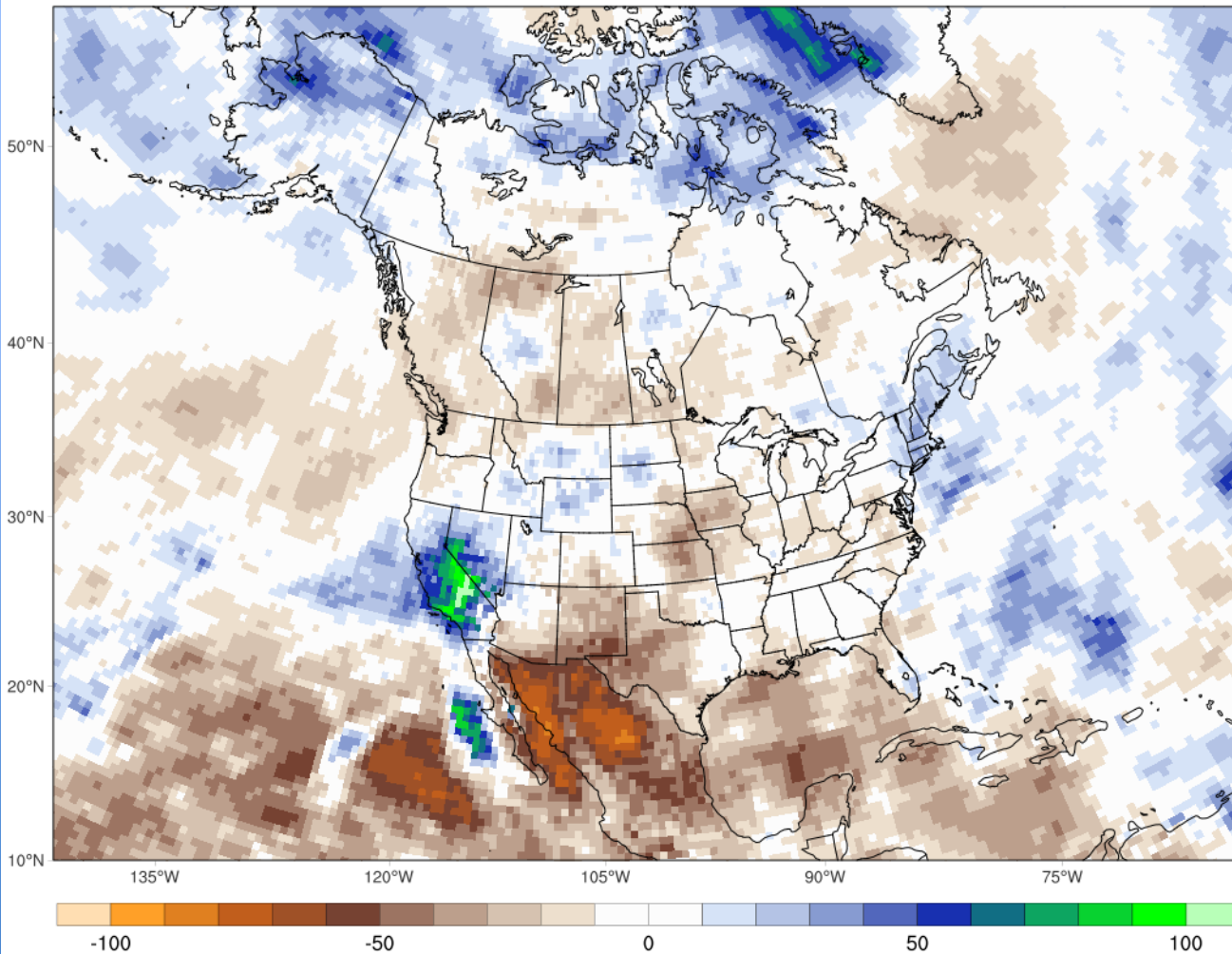


- Large parts of Oregon are still in a multi-year drought which began in 2020
- Washington mostly recovered from multi-year drought this year, although drought re-emerged during late spring

WY2023 Precipitation Anomaly (percentage)

Acc. Precipitation Anomaly (%)
Water Year (Oct-Sep) 2023 - 1979-2000

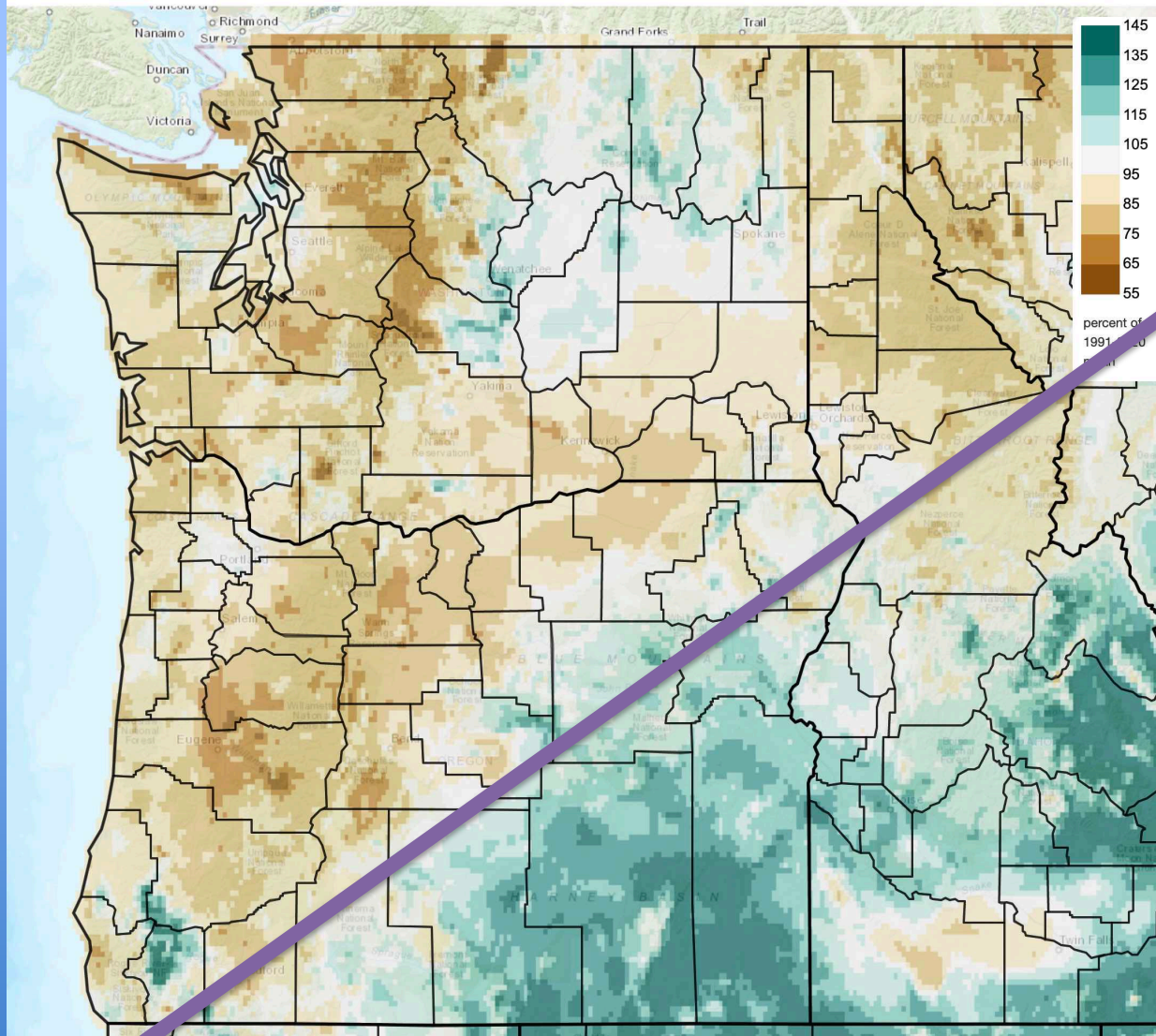
ECMWF ERA5 (0.5x0.5 deg)



Somewhat atypical weak La Nina year, with historically wet California and Nevada and historical dryness in northern Mexico

WY2023 Precipitation Anomaly (percentage)

2023/10/01 - 2023/09/30



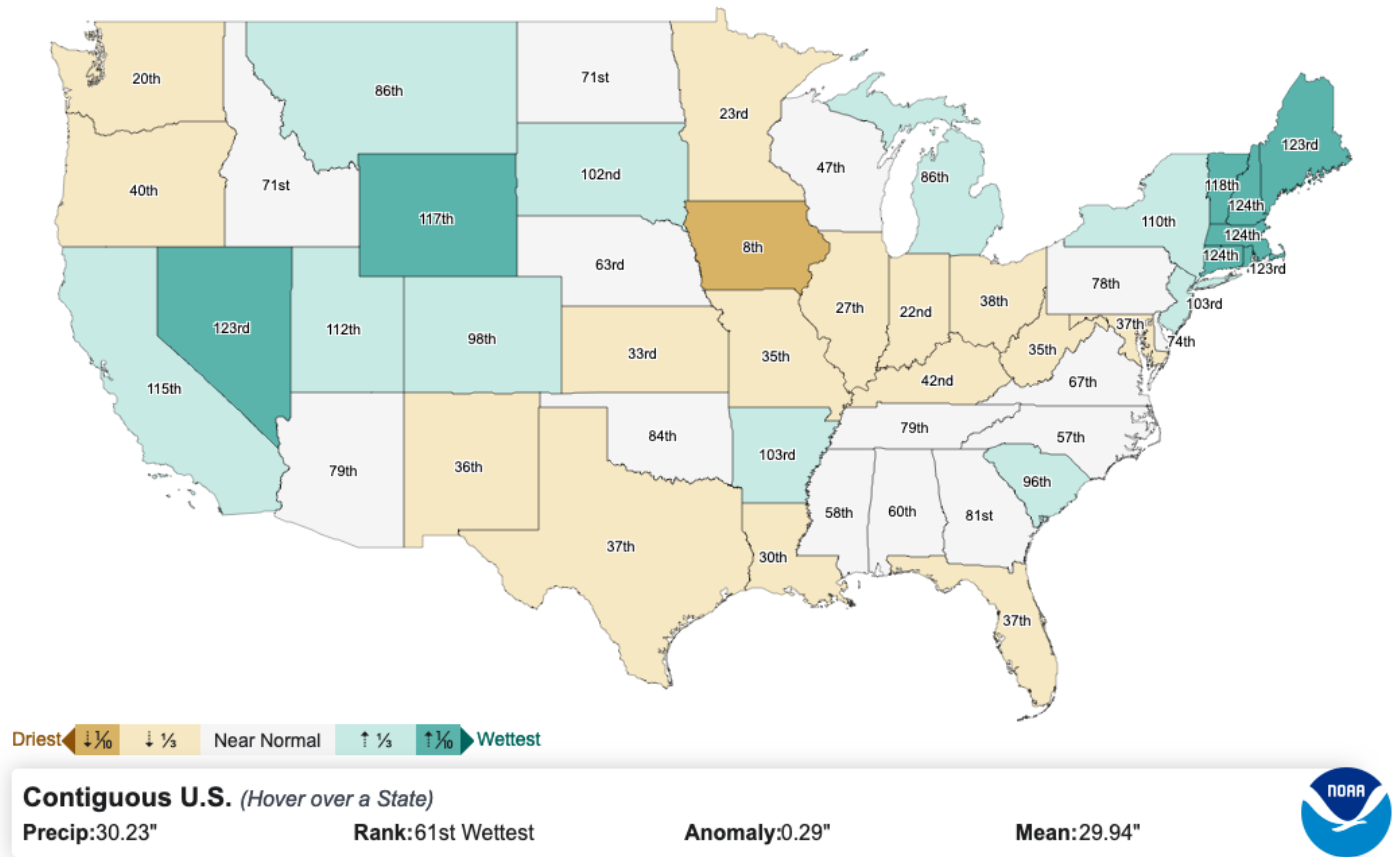
This La Niña event was drier in much of the PacNW than is typically observed during other La Niña events

Western Washington and the north Oregon Cascades received near normal precipitation and above average snowpack

Water Year 2023 Precipitation Ranking

Statewide Precipitation Rank (128 years)

October 2022 - September 2023



Other than Oregon and Washington, most of the US west had a relatively wet water year
Oregon: 40th driest out of 128 years (-2.61" anomaly, 92% of normal)
Washington: 20th driest out of 128 years (-5.50" anomaly, 87%)

WY 2023 Seasonal Precipitation Rankings

Numbers shown are the dryness rankings since 1895
1=driest, 129=wettest, 65=median or typical

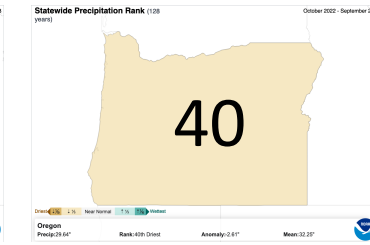
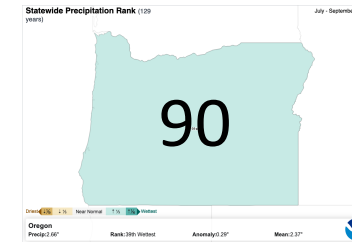
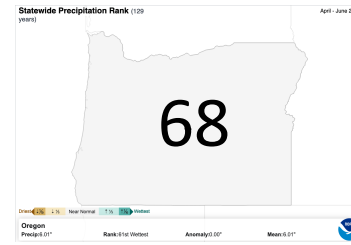
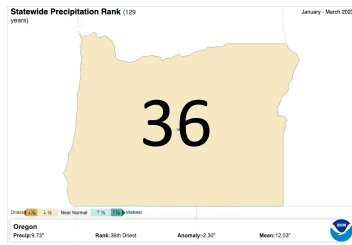
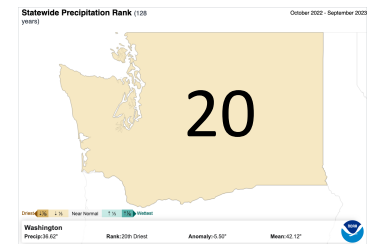
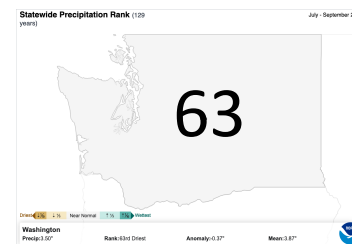
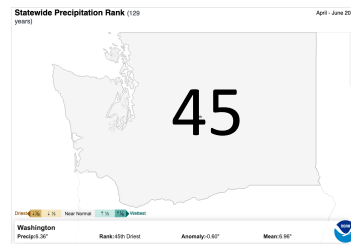
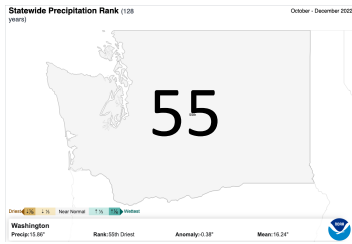
Oct-Nov-Dec 2022

Jan-Feb-Mar 2023

Apr-May-Jun 2023

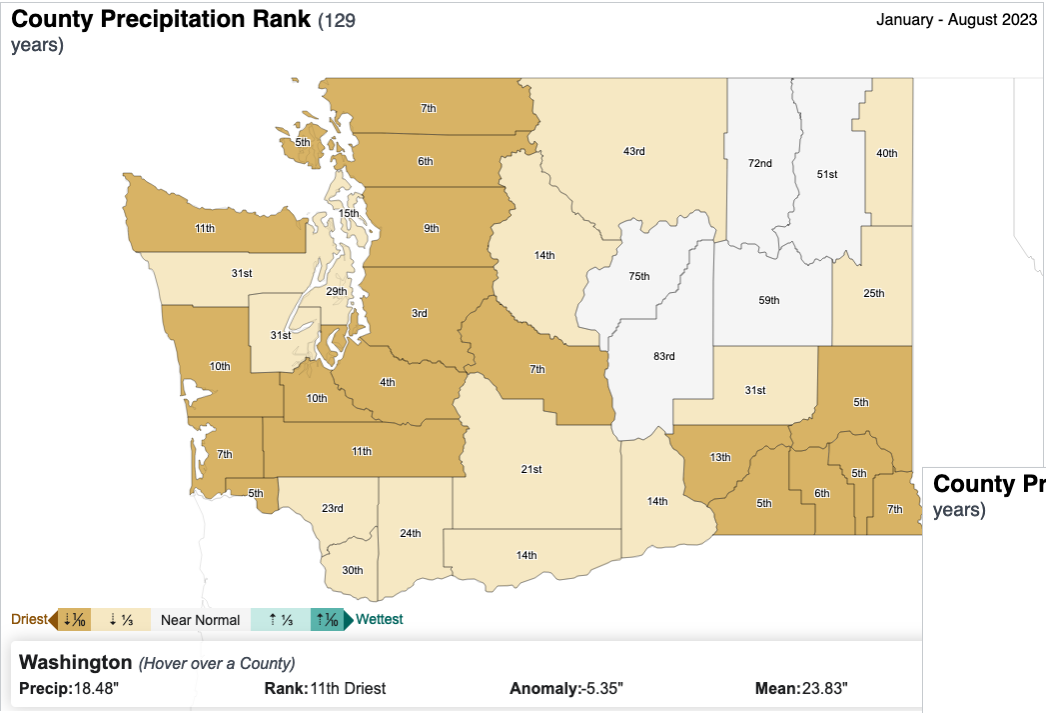
Jul-Aug-Sep 2023

Oct 2022-Sep 2023



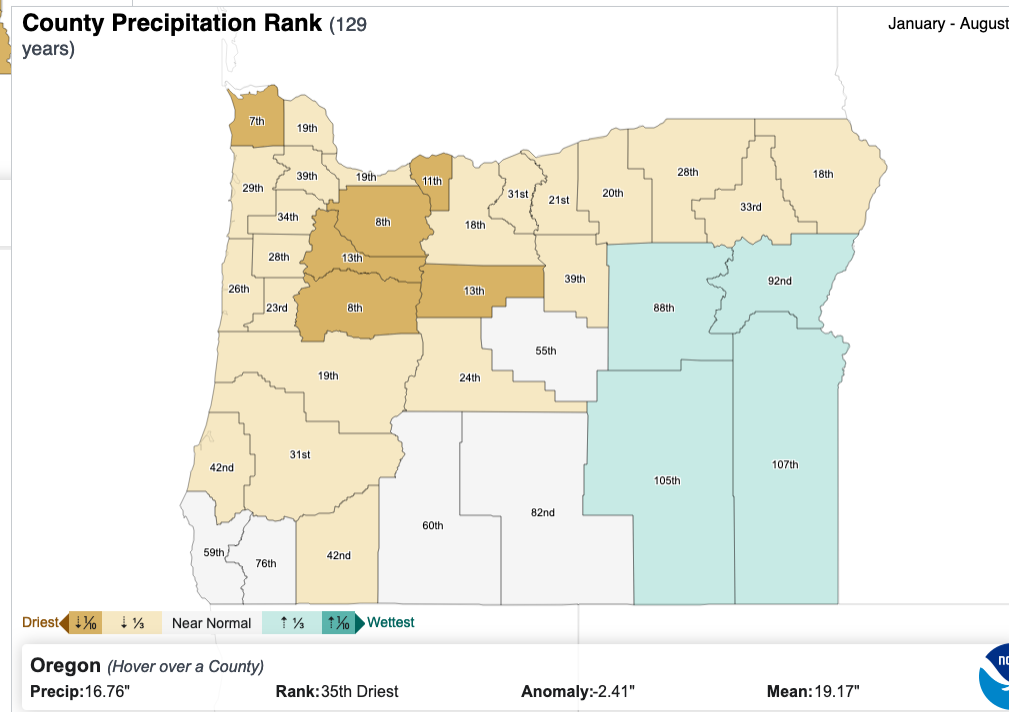
- Washington had a drier than normal winter and water year
- Oregon started with a moderately dry fall and winter
- Much wetter than normal summer in eastern Oregon

January-August 2023 Precipitation Rankings



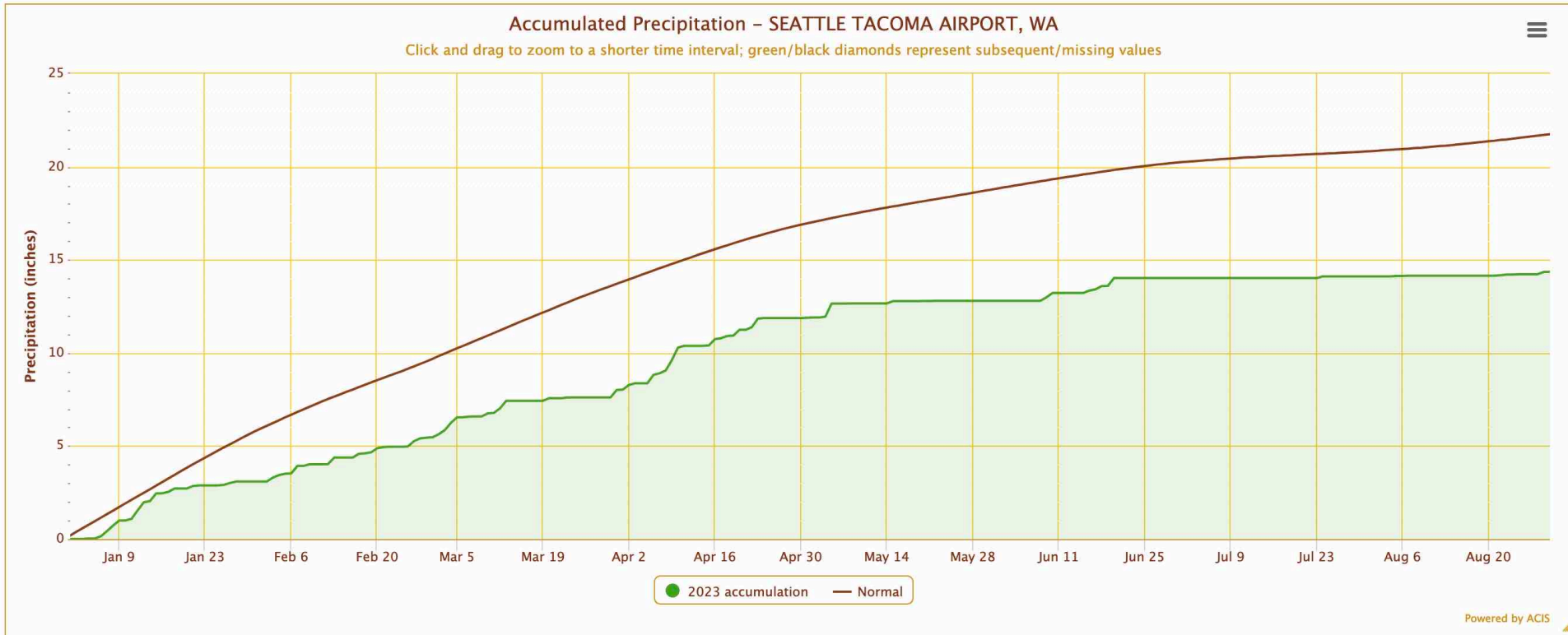
Washington:
 7 counties in top 5 driest Jan-Aug
 17 counties in top 10 driest Jan-Aug

Oregon:
 3 counties in top 10 driest
 2 counties in top 25 wettest



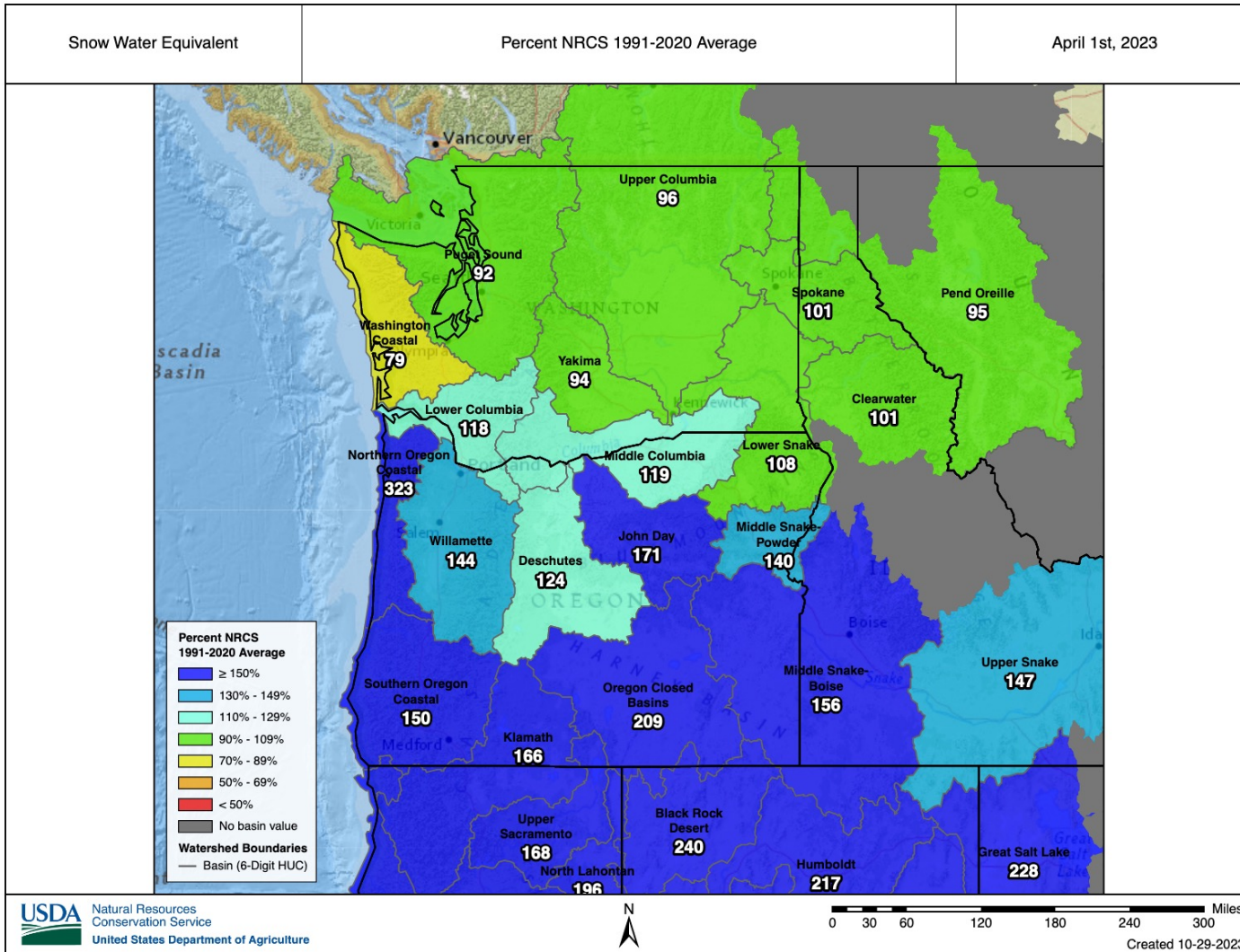
Seattle precipitation during calendar year 2023

Seattle experienced its 4th driest Jan-Aug on record (since 1945)



Click to Plot/Remove Years of Interest									(number of missing days in parentheses)									Resort table by year																																																														
1985: 11.37	1952: 16.04	1966: 18.38	2018: 19.41	1956: 20.51	1957: 21.56	1951: 23.04	1983: 24.59	1961: 28.25	1979: 13.02	1947: 16.82	2001: 18.45	2009: 19.44	1993: 20.55	1982: 21.59	2016: 23.72	1954: 24.81	2017: 28.42	1973: 13.60	1988: 17.08	2000: 18.76	1978: 19.45	1986: 20.59	1958: 21.95	1959: 23.86	1999: 25.02	1953: 28.56	2023: 14.36	2008: 17.16	1969: 19.08	1992: 19.52	1967: 20.70	1945: 22.09	1975: 24.00	1991: 25.10	1968: 29.49	1962: 14.76	2019: 17.22	1998: 19.26 (2)	2015: 19.61	2002: 20.78	1960: 22.09	2020: 24.01	2022: 25.13	2014: 29.84	1949: 15.10	1963: 17.59	2005: 19.30	2007: 19.68	1976: 20.79	1962: 22.34	1971: 24.07	2012: 26.39	1950: 30.51	1994: 15.68	2004: 17.97	1970: 19.35	1955: 20.03	1984: 20.80	2006: 22.51	1974: 24.16	1948: 27.42	1972: 31.18	1981: 15.83	1965: 18.23	1987: 19.39	2021: 20.21	1995: 20.99	2010: 22.82	2011: 24.25	1997: 27.46		1977: 15.95	1980: 18.26	2013: 19.40	1989: 20.25	2003: 21.28	1964: 22.89	1990: 24.49	1996: 27.81	

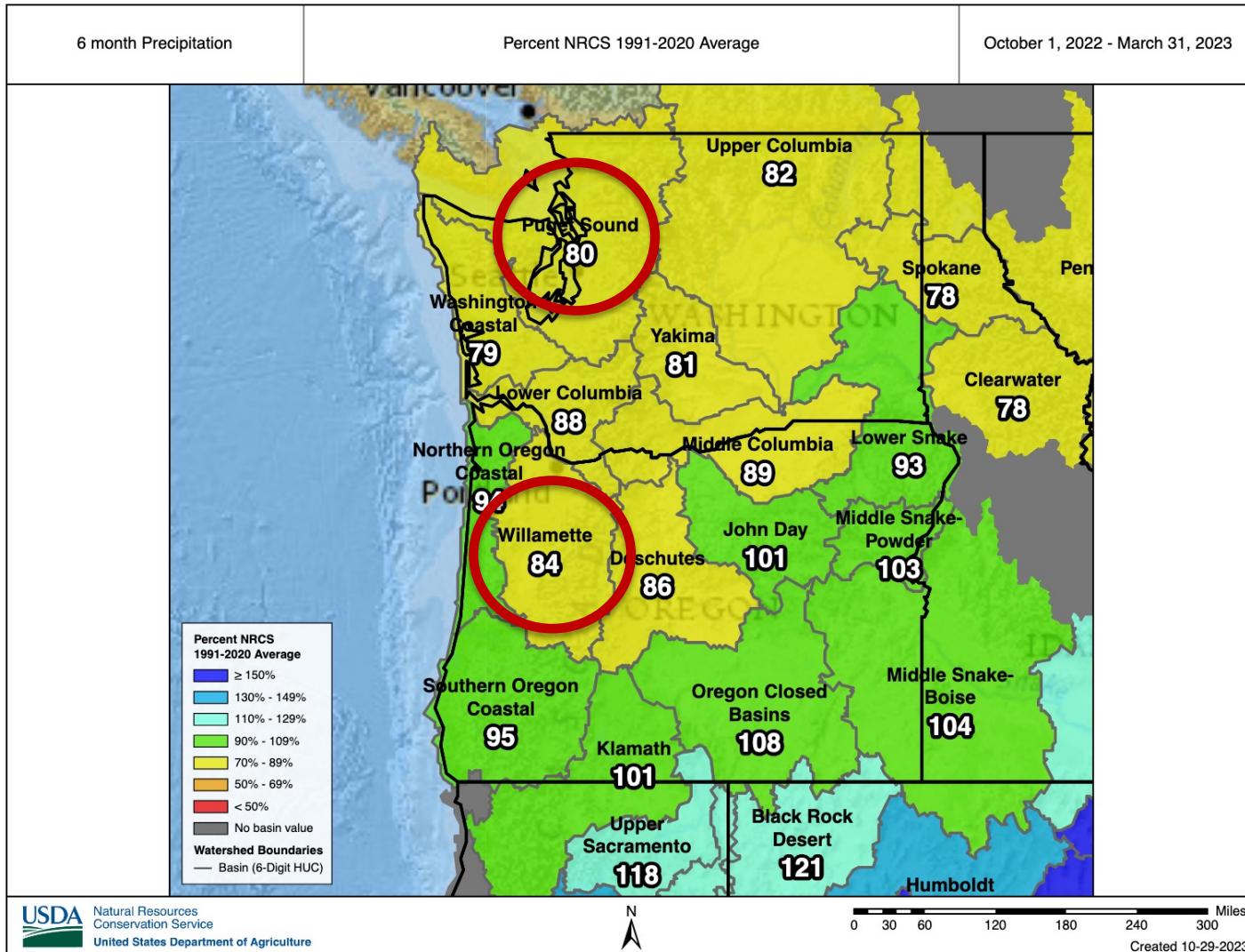
April 1st 2023 snow water equivalent



Washington's Apr 1 snowpack was about exactly normal at 101%

Oregon had an amazing snowpack year at 154% of normal, fourth best Apr 1 snowpack since 1990!

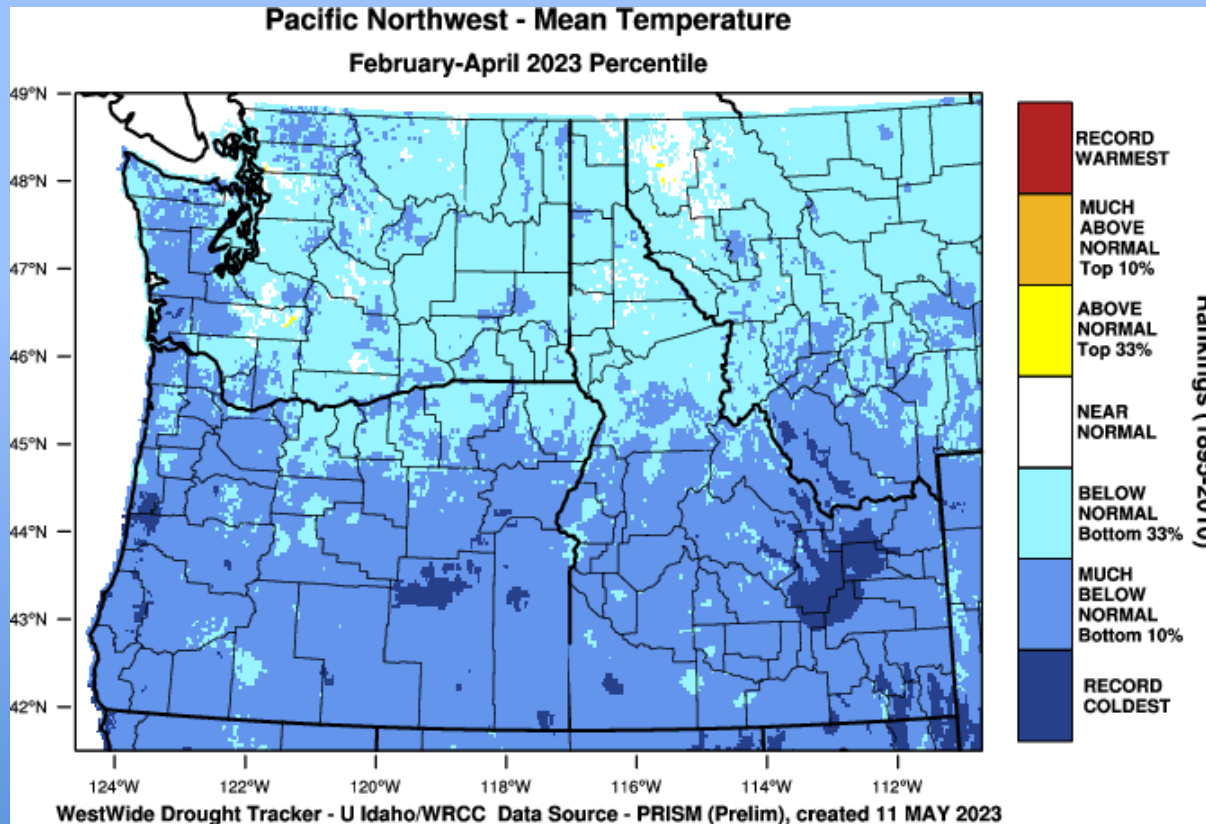
Total precipitation from high-elevation SNOTEL stations for Oct 1-Mar 31 2023



In Oregon, the excellent snowpack disguised well below normal fall and winter precipitation at high elevations

Great snowpack but not enough water was a communication challenge during spring/summer

Cold February-April 2023

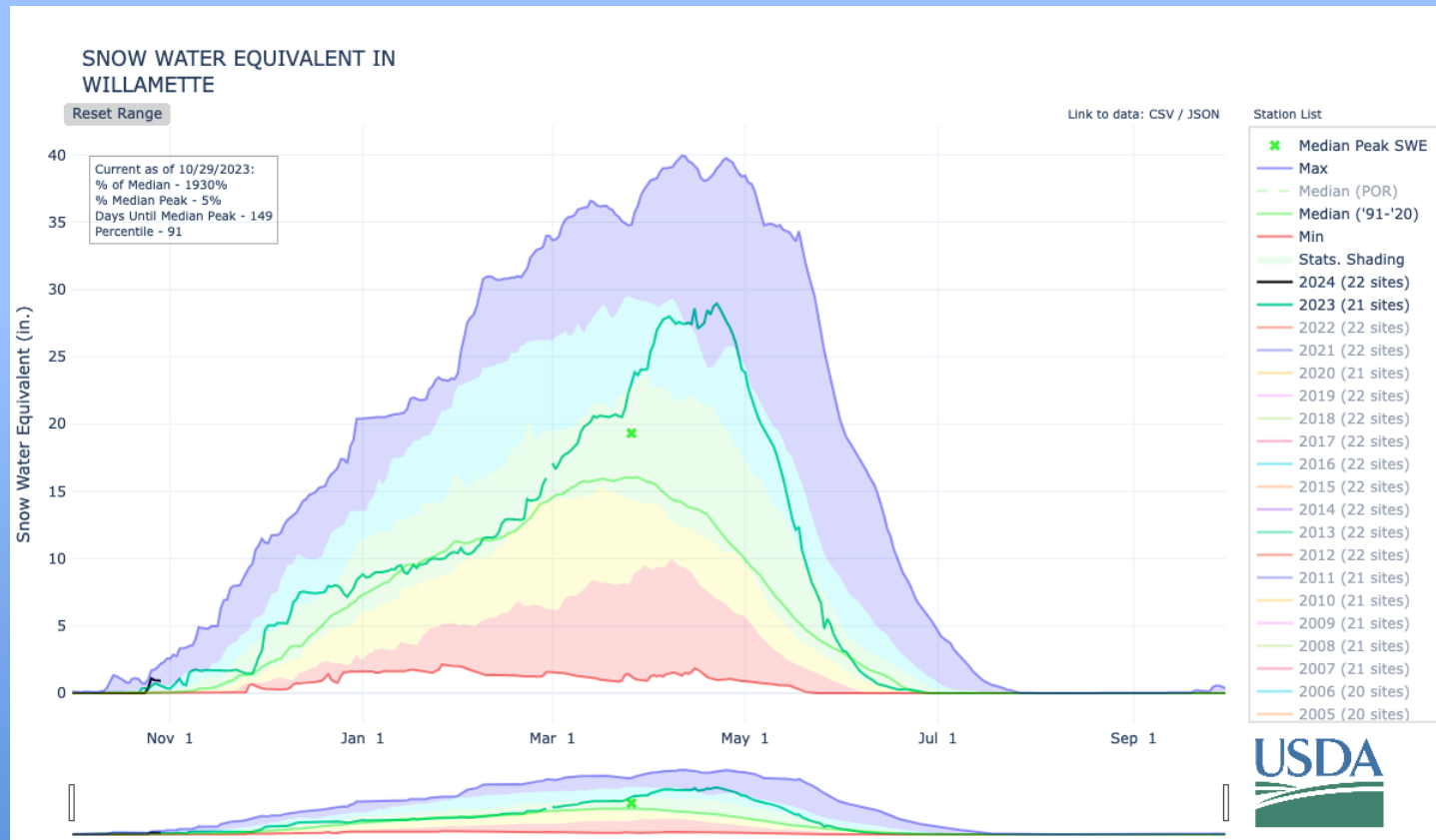


Much colder Feb-April 2023 helped preserve our snowpack

Washington: 31st coldest Feb-Apr on record (since 1895)

Oregon: 13th coldest Feb-Apr on record (since 1895)

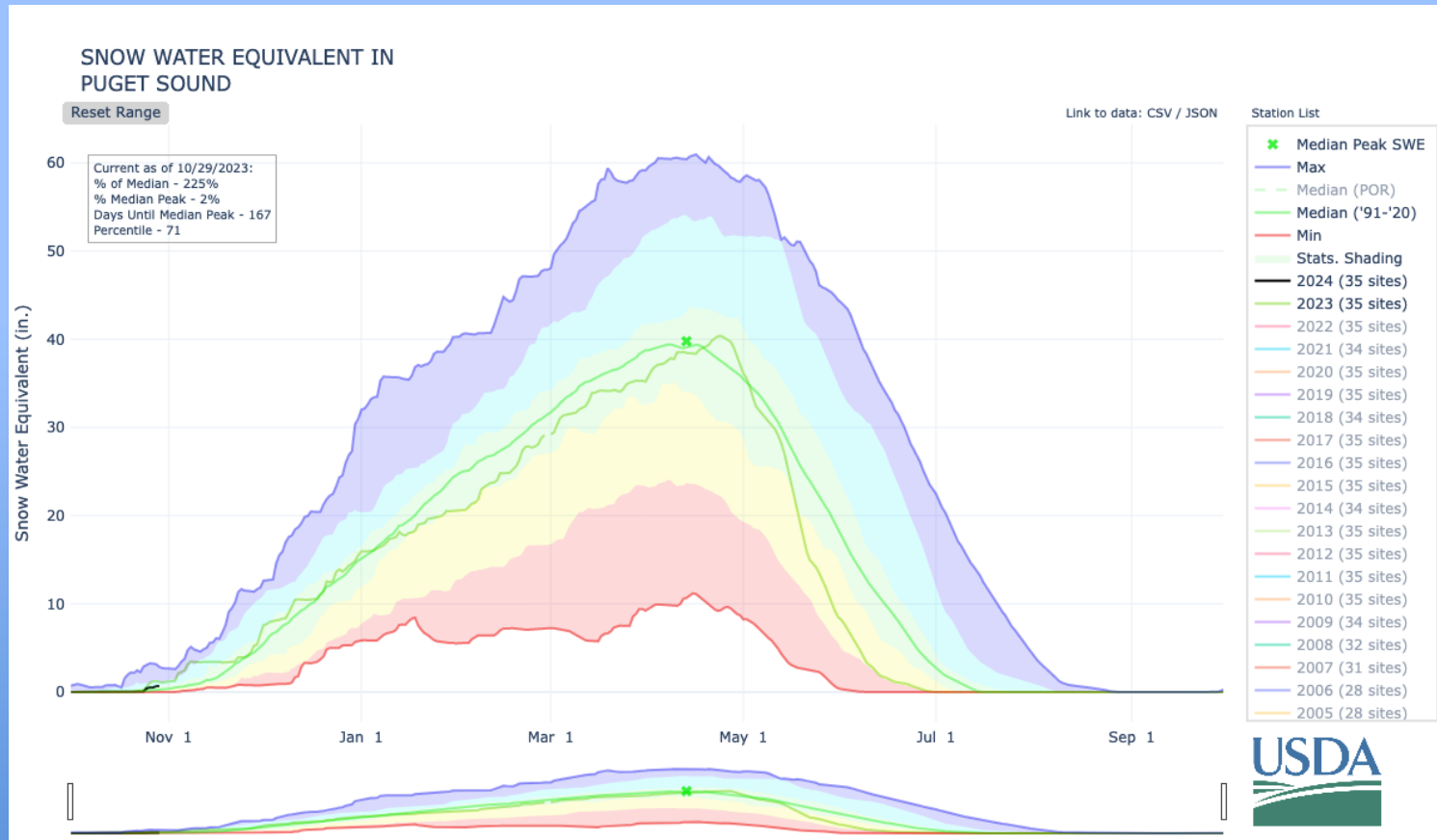
Evolution of the Willamette basin SWE



We expected the extra snowpack to stick around for longer into the summer

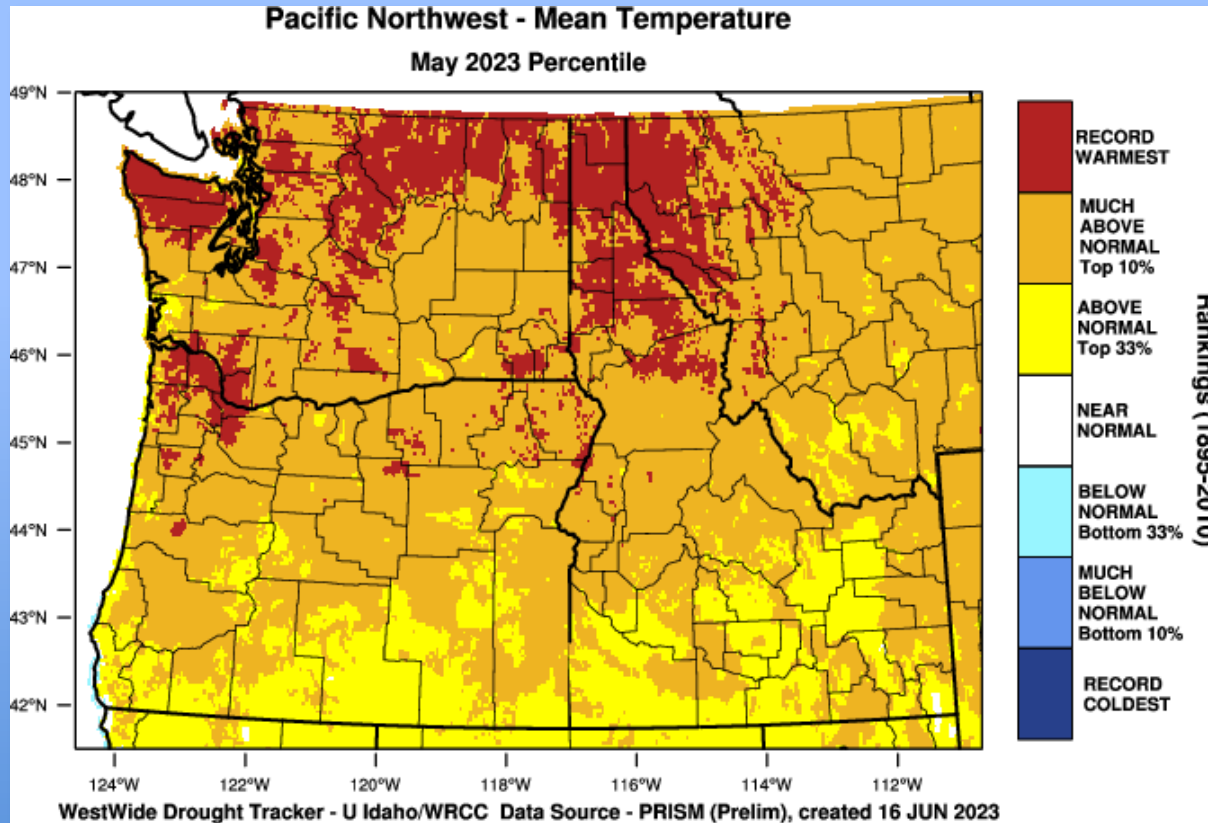
However, in western Oregon, it melted out about a week earlier than typical

Evolution of the Puget Sound basin SWE



The snowpack in the windward WA Cascades peaked near the end of April and then melted out 2-3 weeks earlier than normal

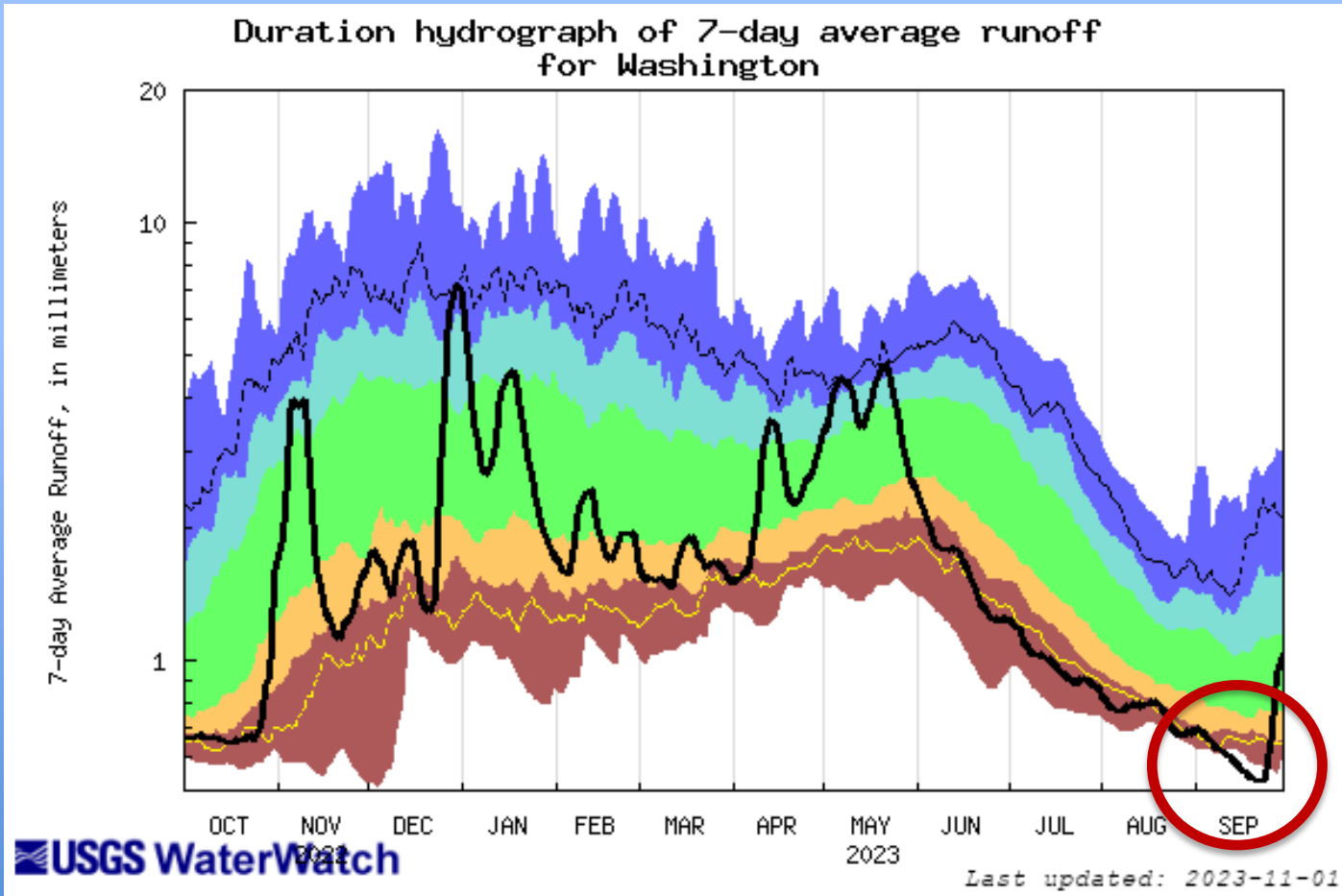
Record warm May 2023



Washington: Warmest May on record (since 1895)

Oregon: 5th warmest May on record (since 1895)

Average 7-day runoff for Washington



Peak spring streamflows about a few weeks early

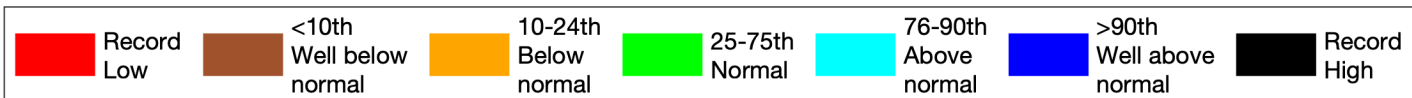
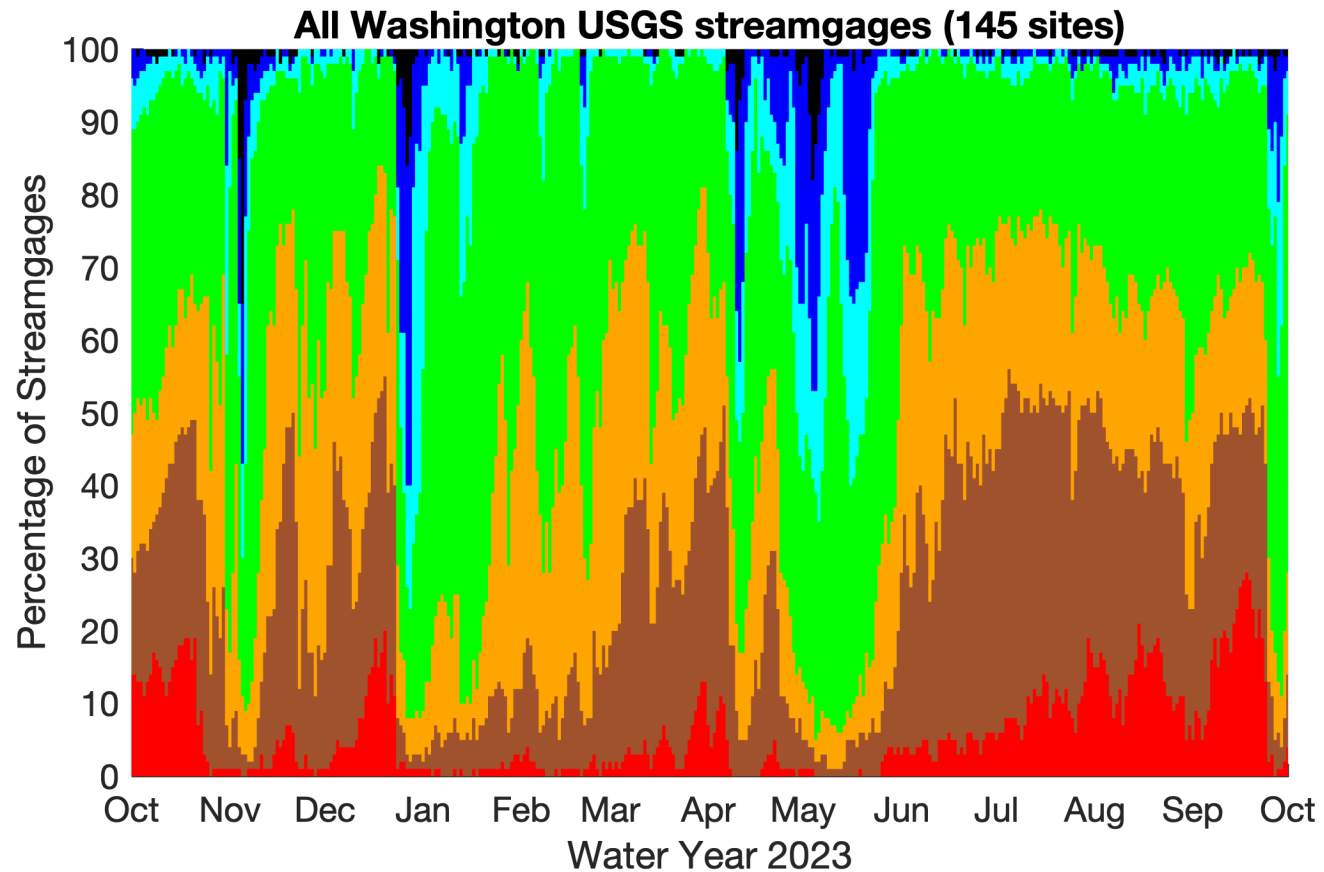
Feb-Mar low

Very close to all-time record low runoff during mid-September

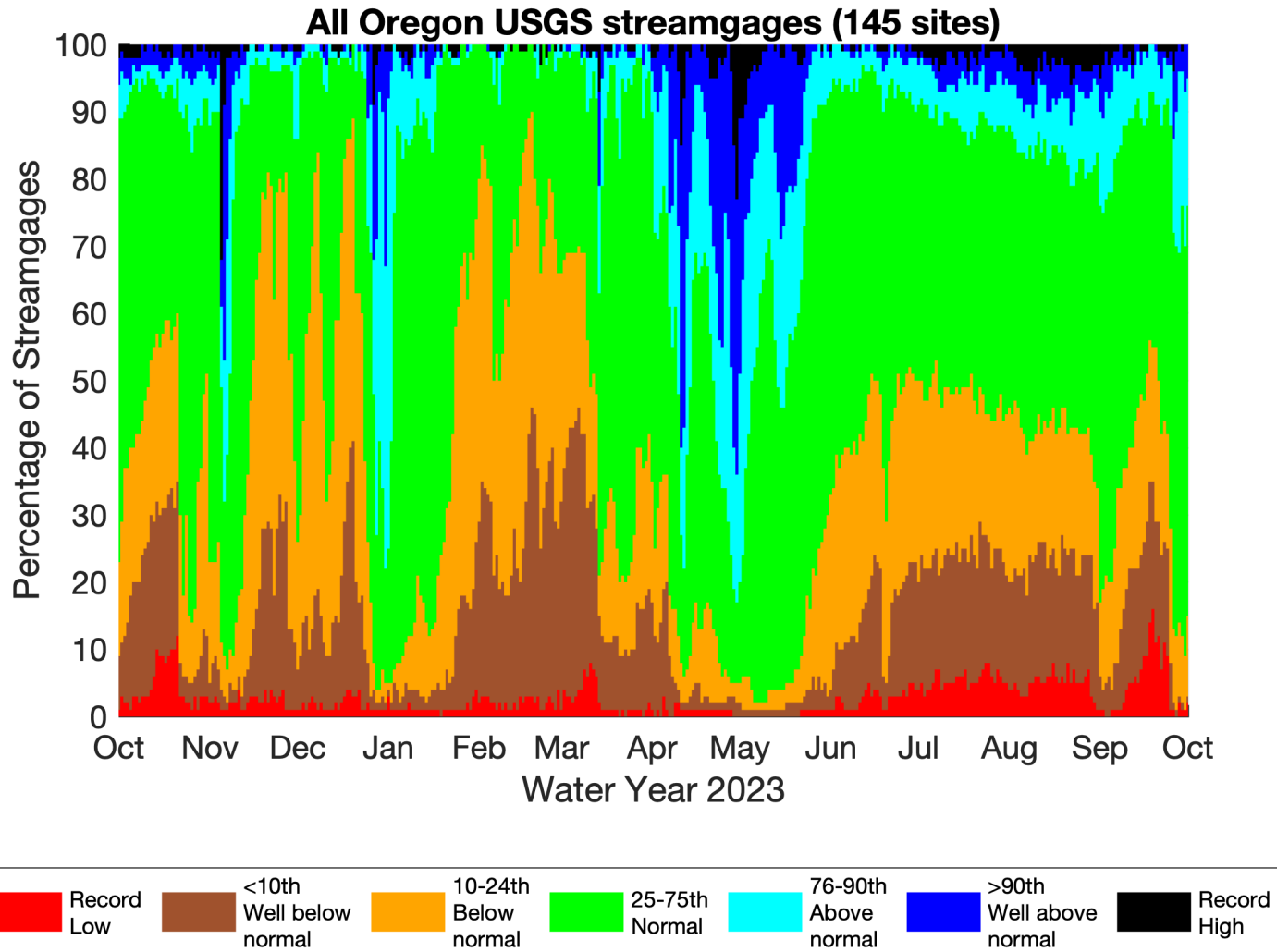
Lower runoff than Sept 1994 and lowest since Dec 1936 (!)

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

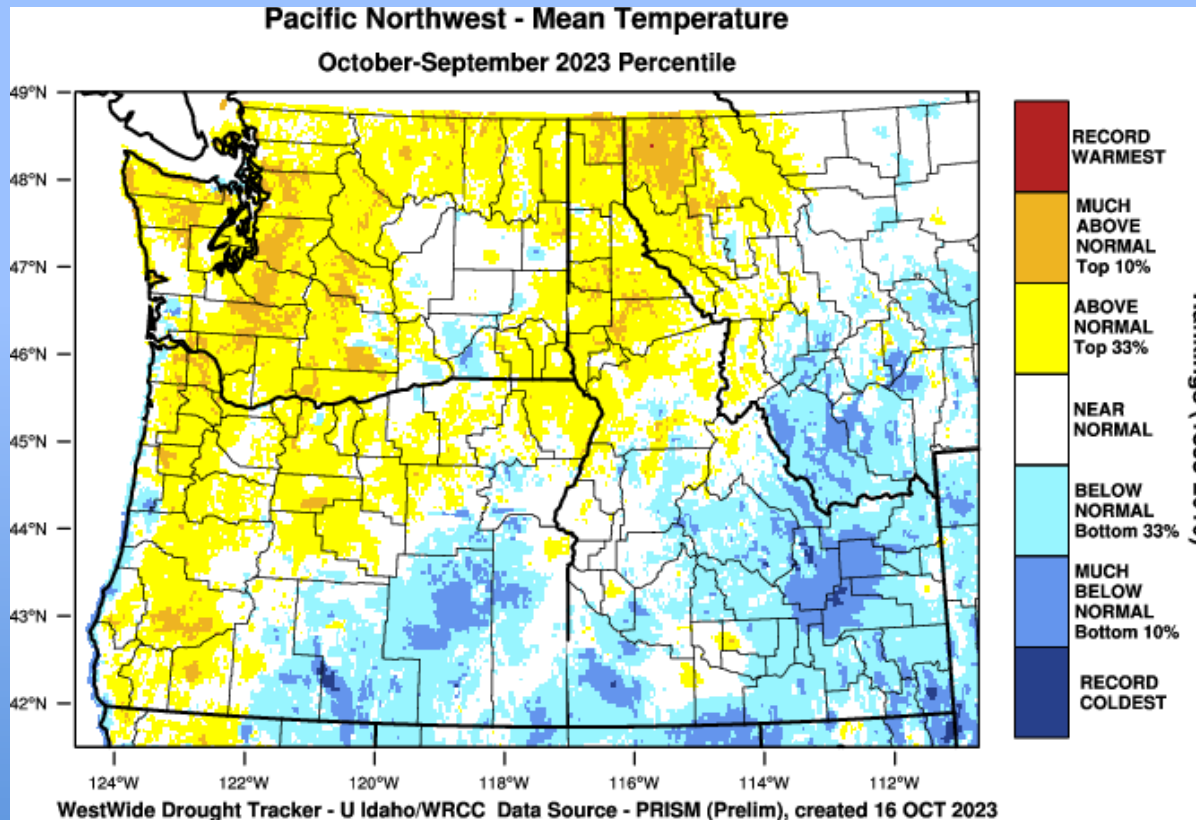
Washington streamflow categories during WY2023



Oregon streamflow categories during WY2023



Water Year 2023 slightly warmer than average



OR:, +0.8F (1901-2000)

WA:, +1.4F

Washington: 20th warmest (since 1895)

Oregon: 42nd warmest (since 1895)

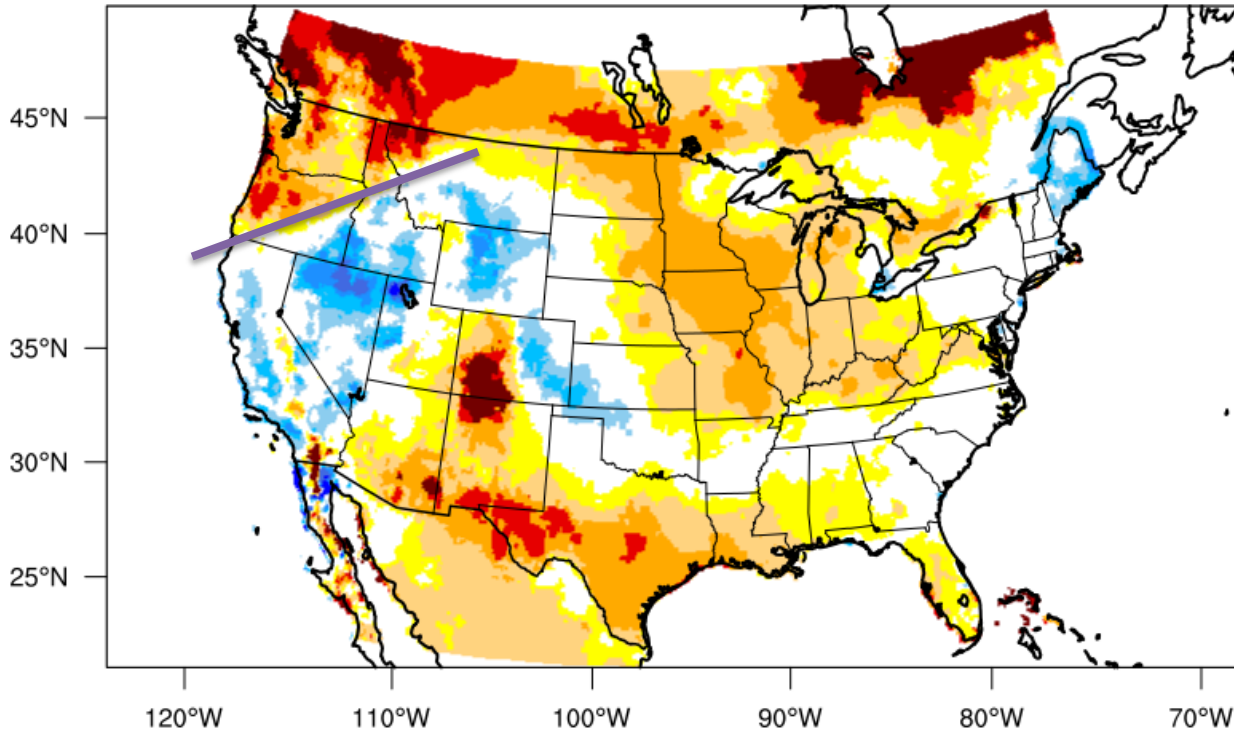
of days with daily maximum temperature above 80°F during 2023

	2023	Ranking in historical record	Record or previous record
Eugene, OR	104	1	98 (1968)
Portland, OR	95	1	90 (2021)
Salem, OR	99	1	98 (2021)
Redmond, OR	111	1	105 (1967)
Pendleton, OR	113	4	128 (1931)
Medford, OR	127	Tied-12	142 (2015)
Seattle, WA	45	Tied-5	51 (2015)
Spokane, WA	94	1	92 (1938)
Olympia, WA	61	Tied-2	65 (1967)
Pullman, WA	92	1	85 (2003)
Boise, ID	125	1	123 (2003)
Lewiston, ID	120	1	112 (2015)

Persistently warm days throughout the 2023 summer in the PacNW

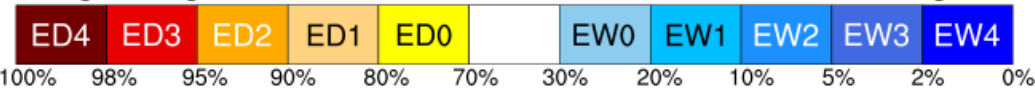
Evaporative Demand

6-month EDDI categories for October 17, 2023



Drought categories

Wetness categories



(EDDI-percentile category breaks: 100% = driest; 0% = wettest)

Generated by NOAA/ESRL/Physical Sciences Laboratory

Over the last 6 months, evaporative demand has been greatest in the areas receiving the least precipitation, a true double whammy for surface water availability during the crucial summer season

Summary



Despite a relatively dry water year in western Washington and Oregon, a cold Feb-Apr preserved a good-great snowpack into Spring



An historically warm May reduced the benefit of the snowpack during the summer water season



A warm summer and an extended dry spell, combined with early snow meltout and abnormally high evaporative demand, led to abnormally low streamflows throughout the summer



Nearly full drought recovery was realized in much of eastern and southern Oregon



Precipitation did not do as far as it usually does due to record high temperatures and evaporation during summer in western Washington and Oregon