Office of the Washington State Climatologist

March 2022 Report and Outlook

March 8, 2022

http://www.climate.washington.edu/

February Event Summary

Average February temperatures were below normal for most of Washington State, particularly in the northeastern region. Total February precipitation was much below normal throughout the state as well, with a few exceptions where the heavy precipitation at the end of the month resulted in normal monthly precipitation totals.

Overall, the month was mostly uneventful weather-wise. For the first couple weeks of the month, temperatures were mostly in their normal range and the dry spell that started in early January continued. Figure 1 shows the February temperature and precipitation time series from SeaTac Airport; note the limited precipitation through February 25 as a result of a ridge of high

In this Issue

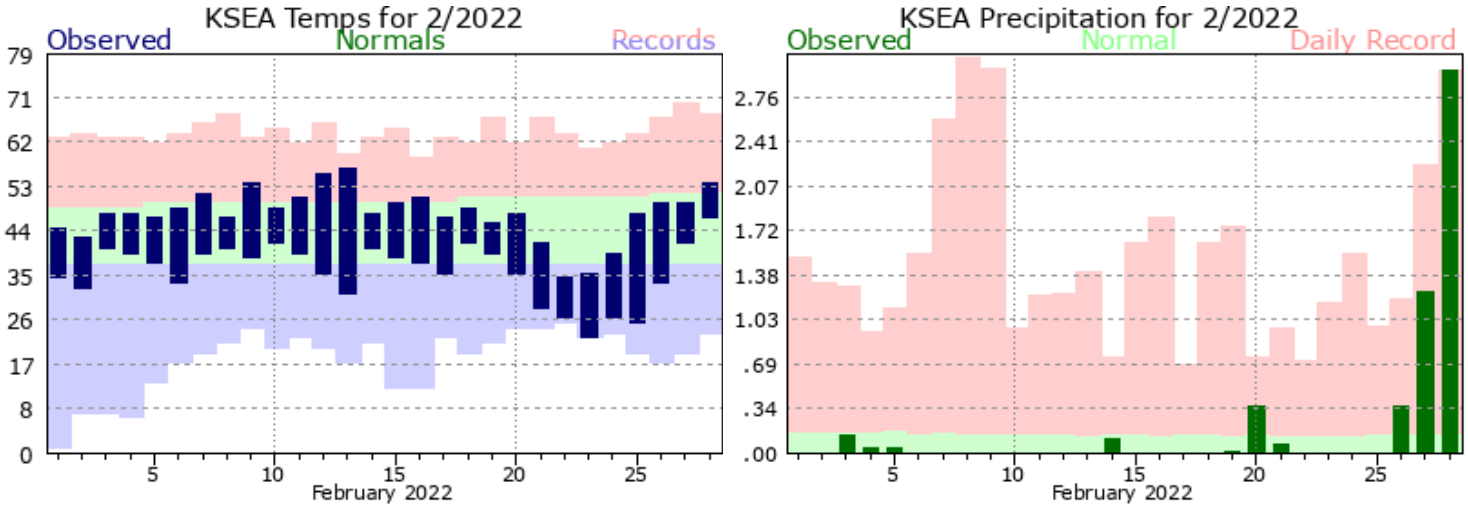


Figure 1: February 2022 daily temperature and precipitation for SeaTac Airport compared to the 1991-2020 normal (green envelope)and previous records (blue and red envelopes; NWS).

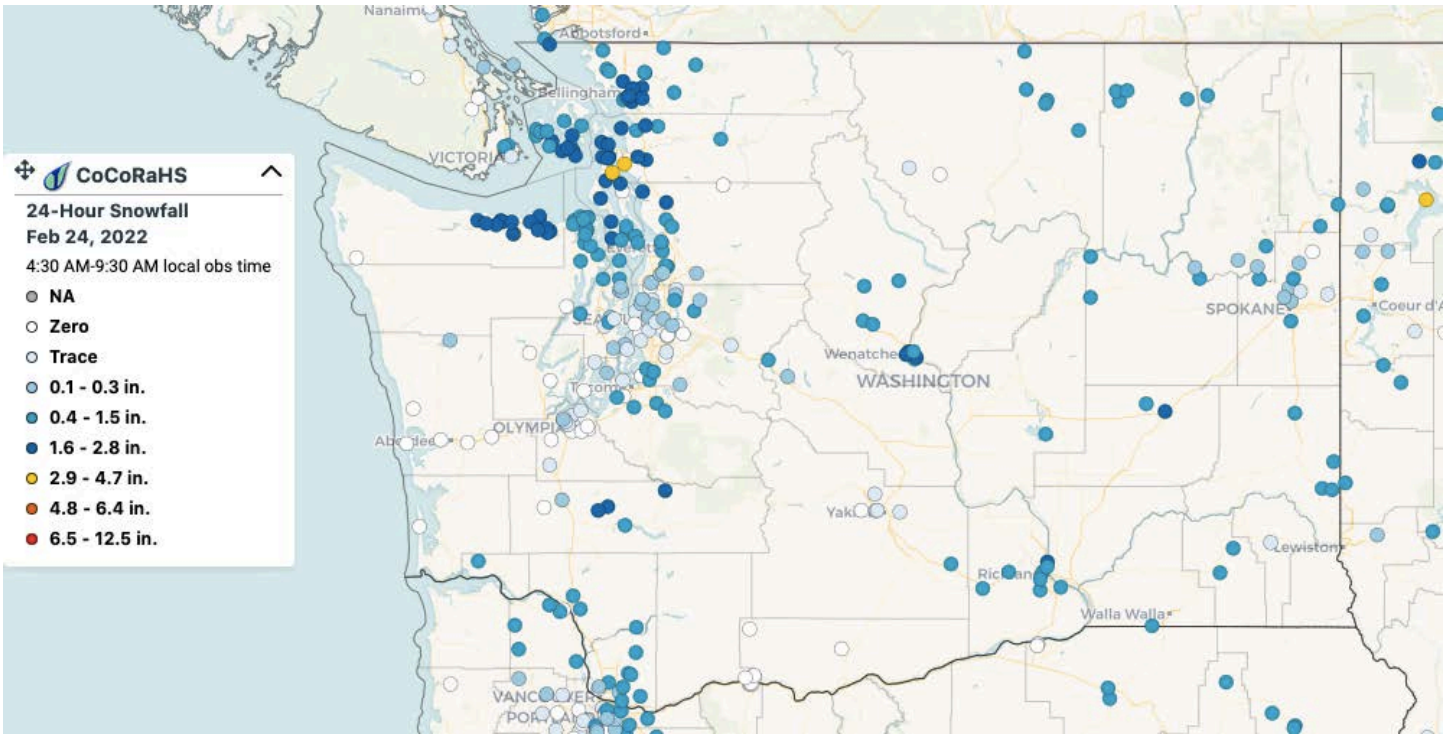


Figure 2: 24-hour snowfall measurements on the morning of February 24, 2022 from the CoCoRaHS network.

pressure off our coast that was the dominating weather pattern. That ridge brought several afternoons of sunny skies, and record high temperatures were observed around the state on the 9th through the 12th. For example, Dallesport (70˚F), Yakima (70˚F), Pasco (69˚F), Walla Walla (67˚F), and Ellensburg (63˚F) set record high temperatures on the 10th as did Vancouver on the 11th (68˚F) and 12th (65˚F - tie).

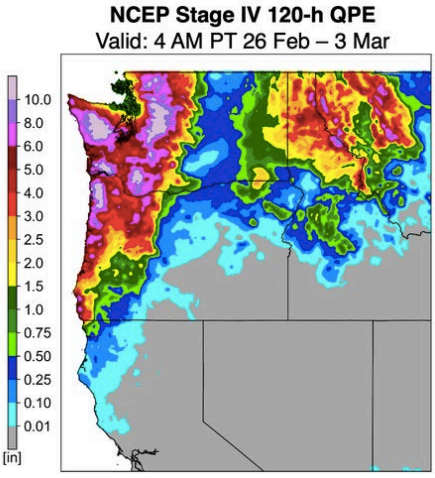


Figure 3: NCEP quantitative precipitation estimate from Feb 26-Mar 3, 2022 (from CW3E).

A notable cold snap occurred from the 21st through the 25th, and snow fell around the state on the 23rd (Figure 2).

Record low minimum temperatures were also set during this period. For example, on the 23rd, record low minimum temperatures were observed at Olympia (14˚F), SeaTac AP (23˚F), and Quillayute (24˚F - tie). Pullman recorded a minimum of 24˚F on the 25th, tying the previous minimum temperature record on that day.

Finally, the month ended with two atmospheric rivers that brought heavy rain to Washington. Precipitation began as snow in the mountains on the 27th, and forced closures of the mountain passes. Once the precipitation turned to rain the following day, river flooding, and road closures due to landslides and avalanches became the primary concern (Washington Post). Daily record rainfalls were set throughout this wet period: Quillayute recorded 2.88" on the 27th and SeaTac AP (2.97"), Olympia (3.12"), Hoquiam (2.14"), Spokane (0.72"), and Pullman (0.57") set records on the 28th. All told, two to 10" of precipitation occurred in western WA over a 5-day period (Figure 3).

Snowpack and Drought Summary

February 2022 was mostly a bust in terms of mountain snowpack in WA. The drier than normal conditions meant that there was little growth in our snowpack for most of the month. The wet ending to February proved to be a mixed bag in terms of snow in the mountains: some places were able to gain snow water equivalent (SWE), notably colder locations such as the northern Cascades, while many lower elevation sites had only minor gains or even lost SWE once the precipitation turned to rain. Still, the basin average SWE percent of median from NRCS as of March 3 (Figure 4) shows near-median SWE for several basins, thanks to the head start received in late December and early January. The North Puget Sound, Central Puget Sound, South Puget Sound, Upper Columbia, Lower Pend Oreille, and Spokane basins all have near-median basin SWE, with totals between 90 and 98% of normal. Other basins are below normal with the Olympic, Lower Columbia, Naches, Upper Yakima, and Central Columbia, and Lower Snake-Walla Walla basins ranging between 81 and 89% of median. The Klickitat and Lower Yakima basins are faring the worst with 73 and 61% of median, respectively. Nevertheless, the U.S. Bureau of Reclamation Yakima project announced on March 3 that proratable water users are expected to receive 96% of their normal water supply this April through September, however, citing good storage in their reservoirs.

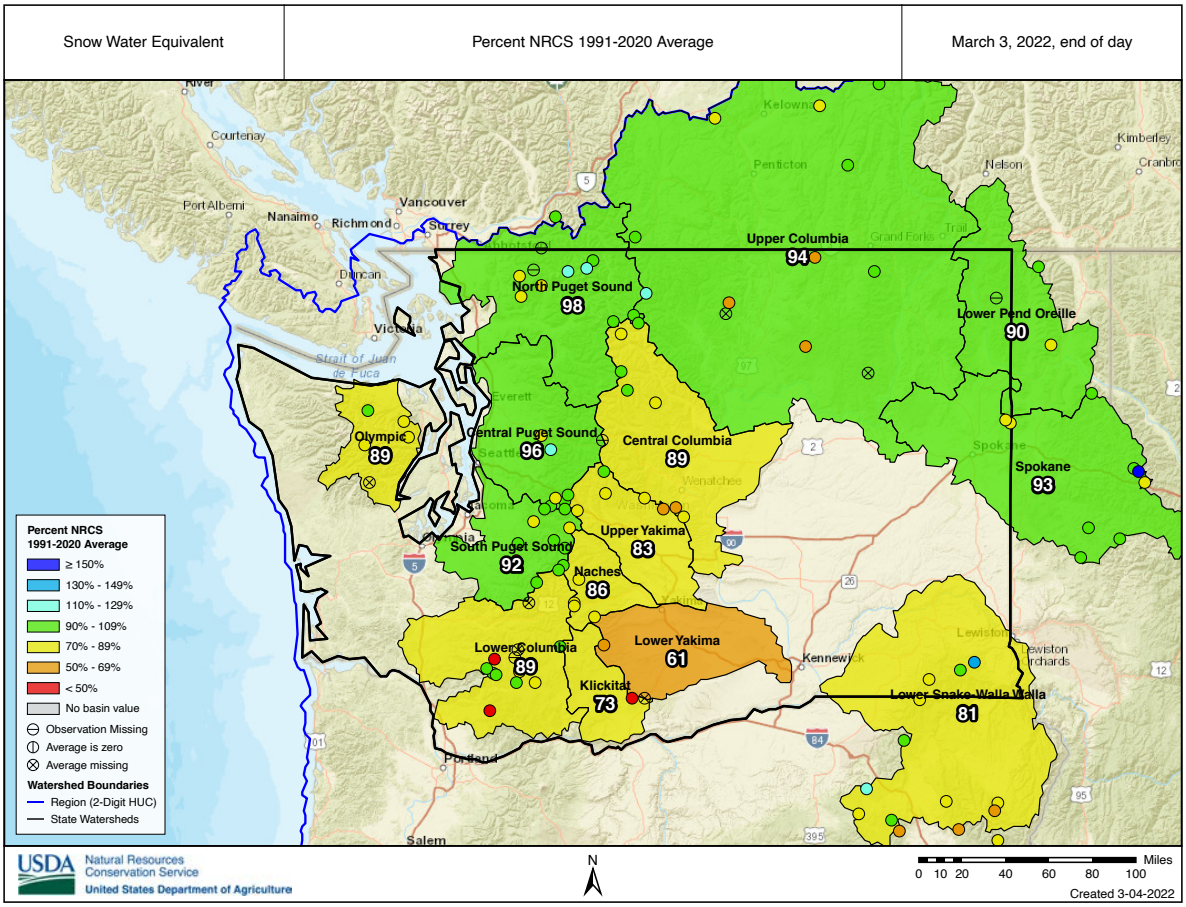
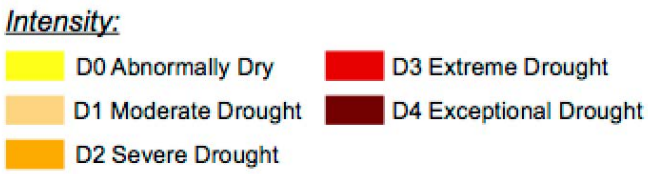


Figure 4: Snowpack (in terms of snow water equivalent) percent of median for WA as of March 3, 2022. The median is based on the 1991-2020 period (NRCS).

Due to the dry February conditions, there was no change to the U.S. Drought Monitor (Figure 5) since the last edition of our newsletter. The moderate to extreme drought in eastern WA reflects long term precipitation deficits that have yet to fully recover.



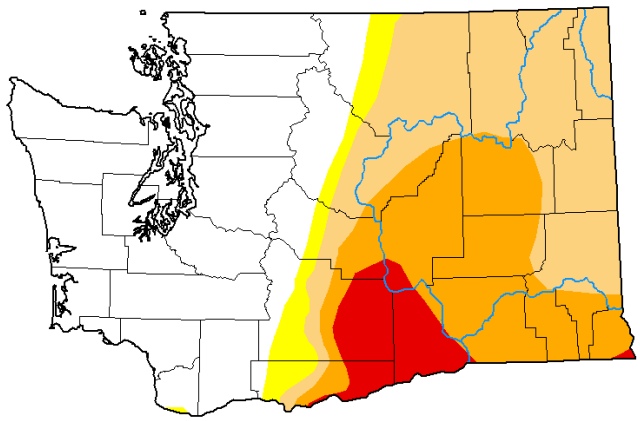


Figure 5: The March 3, 2022 edition of the U.S. Drought Monitor.

Community, Collaborative Rain, Hail, and Snow (CoCoRaHS) Corner

Valentine's Day has come and gone, but we extend a belated, heartfelt appreciation for our CoCoRaHS observers for the holiday. No matter the month, it's always a good idea to share the things you love with the people you love – have you considered reaching out to those in your life you think might be interested in CoCoRaHS? Or do you happen to read this newsletter each month and find the CoCoRaHS Corner interesting, but haven't yet taken the leap to joining the network? In any case, now is the best time of the year to team up with CoCoRaHS to create a lasting, accurate, and widespread precipitation record. It's CoCoRaHS March Madness 2022!

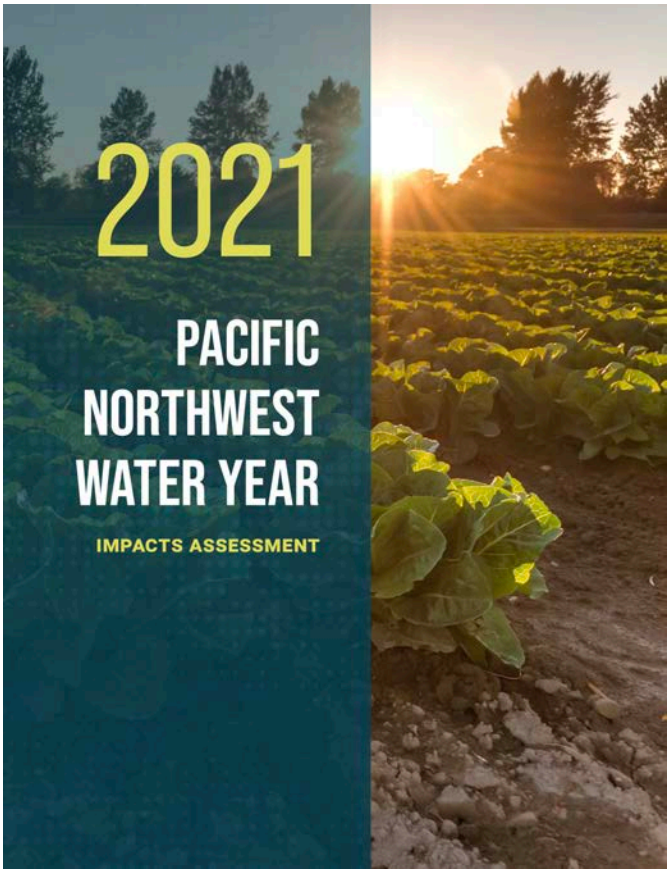
Every year, each state competes to see which can garner the most new CoCoRaHS members in the month of March. Taking a look at the past winners . . . it appears that since the competition's inception in 2008, Washington has **never once placed!** A statewide embarrassment! Only you – yes, you – can help us avoid this fate. Only a few moments recording what you find in your rain gauge each morning can mean the world of a difference to meteorologists and climatologists across the nation. For more information, visit the CoCoRaHS website.

Members of the Washington CoCoRaHS network recorded 9,866 observations over the month of February (90% of January's number of observations). Only 47% of observations recorded some amount of precipitation, a 4% decrease from January. Six new members joined the Washington network in the month of February. An observer in Quinault, WA recorded the state's highest one-day total for the month, with 3.8" recorded on 2/28/2022.

Fewer condition monitoring reports and significant weather reports came through in the month of February, likely due to the drier-than-normal conditions across the state. Many folks in eastern Washington reported a decrease in snowpack due to a lack of precipitation and strong winds. At the very least, observers noted that stream levels remained around normal at different times during the month.

Pacific Northwest 2021 Water Year Impacts Assessment Released

A Message from the State Climatologist



The second annual Pacific Northwest (PNW) 2021 Water Year Impacts Assessment was released a few weeks ago. This was a regional collaboration involving researchers and state and federal practitioners, sponsored by the NOAA National Integrated Drought Information System (NIDIS), and led by OWSC. The report focuses on the regional drought, recapping the weather and climate of water year 2021 (October 1, 2020-September 30, 2021), as well as sector-specific impacts and response actions. We encourage our readers to check it out at the following link: https://www.drought.gov/documents/2021-pacific-northwest-water-year-impacts-assessment. In the present piece, we highlight three of the seven of the "Lessons Learned" featured in the report, which can be found on pages 6 and 7.

"**Rapid changes in the spring of 2021 demonstrated the importance of considering a broader set of potential conditions when planning for drought.**" As many of our readers are aware, spring of 2021 was remarkably dry throughout the PNW – ranking as the 2nd driest March-May since records began in 1895. The exceptionally dry spring, followed by a record warm summer, accelerated drought development and its impacts. Particularly for Washington, where most locations saw near-normal to above normal snowpack by April 1, 2021, the extent to which the dry spring ushered in drought conditions was mostly unforeseen. Overall, the extent to which ***dry*** (and not just warm) springs can lead to drought conditions and impacts may have previously been underappreciated.

"**Multiple-year impacts of drought are possible and warrant planning.**" For large areas of eastern Oregon and southern Idaho, persistent dry conditions and below normal snowpack during water years 2020 and 2021 have led to multi-year drought conditions. Even in WA, where precipitation in the fall and winter is typically sufficient for drought recovery, there are some locations in eastern WA where there have been substantial precipitation deficits spanning multiple water years. Figure 6 shows the 24-month Standardized Precipitation Evapotranspiration Index, a measure of drought that takes temperature and precipitation into account,

ending in September 2021. From this perspective, the severity of the drought in the Lower Columbia basin of Washington state was on par with that seen in Oregon and Idaho. Long-term plans should account for these kinds of episodes.

"**Compounded impacts of climate change and variability are becoming more diverse and affecting natural resources, agriculture, and water supply.**" Across the PNW, the 2020 water year saw extensive impacts associated with drought and wildfire. In 2021, extensive impacts were associated with the heat wave in combination with drought. Their interplay certainly had consequences for natural resource managers, agricultural producers, and water providers. The specific contributions of various weather and climate factors are often difficult to tease apart, but better documentation and understanding of attributions should aid planning and ultimately mitigating the hardships associated with future adverse events.

We hope that this is enough of a teaser to entice your perusal of the report. One goal of the assessment is to provide ongoing documentation of the specific conditions that cause impacts, towards improving management of drought and other climate-related impacts in the future. We are open to your feedback on this effort!

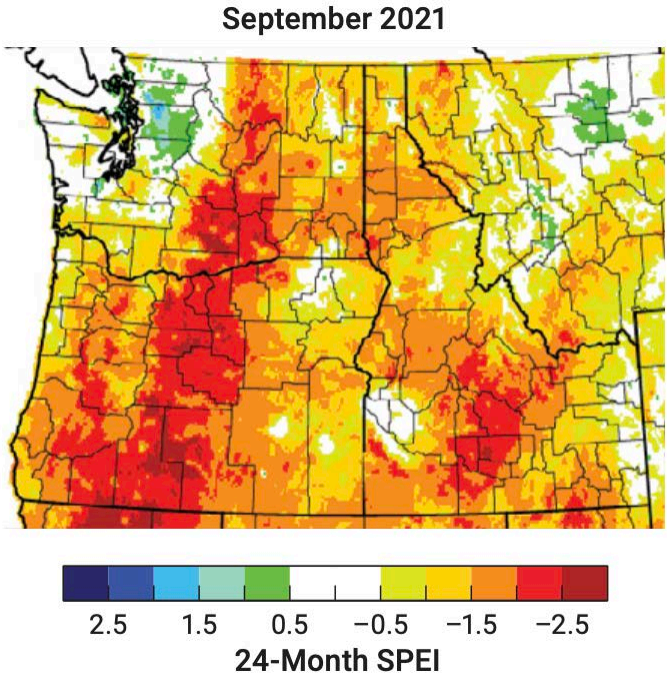


Figure 6: 24-month Standardized Precipitation Evapotranspiration Index ending Sept 30, 2021. Indices less than -1 typically signify drought and the severity increases as the index becomes more negative (from PNW 2021 Water Year Impacts Assessment; adapted from WestWide Drought Tracker).

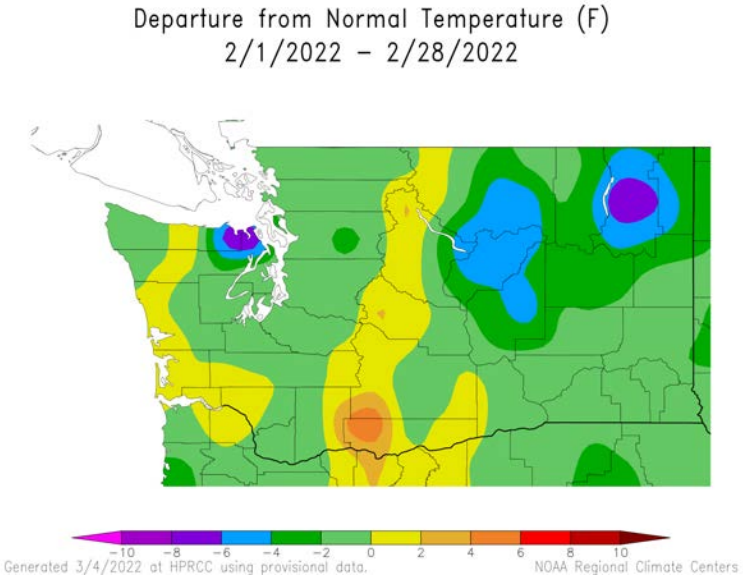
Reference

Bumbaco, K.A., M.H. Rogers, L.W. O'Neill, D.J. Hoekema, C.L. Raymond. 2022. *2021 Pacific Northwest Water Year Impacts Assessment.* A collaboration between the Office of the Washington State Climatologist, Climate Impacts Group, Oregon State Climatologist, Idaho Department of Water Resources, and NOAA National Integrated Drought Information System.

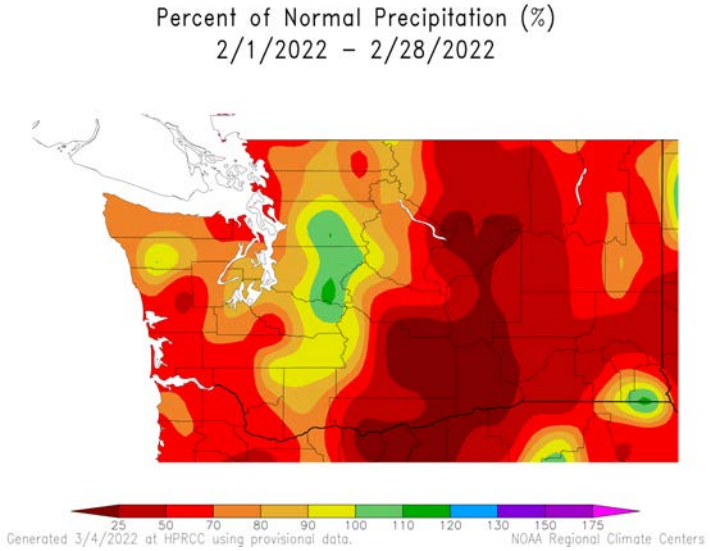
Climate Summary

According to the High Plains Regional Climate Center, average February temperatures were below normal for most of the state. Note the large spread for the color bar on the plot on the right, with recorded average temperatures within 2°F of normal for a majority of the state. Only parts of the Olympic Peninsula and the eastern slopes of the Cascades recorded temperatures above normal. Even then, those stations mostly remained close to normal. Both the northeastern corner of the Olympic Peninsula and the northeastern corner of the state at large were much colder than normal, with average temperatures stretching past -6°F below normal in some cases. Omak is the best example of this from the stations listed in Table 1, with an anomaly of -5.1°F.

February was abnormally dry across almost the entire state. This might not be clear just from looking at Table 1; SeaTac receiving over 140% of normal February precipitation, with Olympia and Seattle WFO recording just about normal precipitation, appears inconsistent with the RCC map. The reason for the discrepancy is that many stations surrounding Olympia and Seattle recorded below normal precipitation, and as such, influences of stations recording above-normal precipitation totals were smoothed out of this map. One may visit the High Plains Regional Climate Center website to see a map of individual station measurements of precipitation as well as many other useful variables. All in all, the west flank of the Cascade Mountains received the most precipitation relative to normal, with much of that occurring near the end of the month. Eastern Washington did not benefit as much from that atmospheric river, with many stations recording less than 25% of normal precipitation. Ephrata, for instance, received a paltry 23% of normal precipitation.



February temperature (°F) departure from normal relative to the 1991-2020 normal (HPRCC).



February total precipitation percent of 1991-2020 normal (HPRCC).

Station	Mean Temperature (°F)			Precipitation (inches)		
	Average	Normal	Departure from Normal	Total	Normal	Percent of Normal
Western Washington						
Olympia	39.2	40.7	-1.5	5.37	5.09	106
Seattle WFO	42.8	43.4	-0.6	3.59	3.54	101
SeaTac AP	42.1	44.0	-1.9	5.32	3.76	142
Quillayute	41.5	42.1	-0.6	7.42	9.73	76
Hoquiam	45.0	43.6	1.4	5.16	6.65	78
Bellingham AP	40.4	41.7	-1.3	1.48	2.85	52
Vancouver AP	42.2	43.1	-0.9	3.06	3.77	81
Eastern Washington						
Spokane AP	31.5	32.9	-1.4	1.18	1.44	82
Wenatchee	31.9	34.5	-2.6	0.41	0.76	54
Omak	27.4	32.5	-5.1	0.26	0.91	29
Pullman AP	32.4	35.4	-3.0	1.00	1.59	63
Ephrata	31.2	34.9	-3.7	0.15	0.64	23
Pasco AP	38.1	38.4	-0.3	0.16	0.63	25
Hanford	36.7	38.2	-1.5	0.20	0.66	30

Table 1: February 2022 climate summaries for locations around Washington with a climate normal baseline of 1991-2020.

Climate Outlook

According to the Climate Prediction Center (CPC), La Niña conditions are present in the Pacific Ocean, and a "La Niña Advisory" remains in effect. Over the last 4 weeks, sea surface temperatures (SSTs) in most of the eastern and central equatorial Pacific Ocean have been below average. These below-average anomalies have strengthened, becoming both more widespread and colder in some parts of the eastern and central Pacific. Above average SSTs continue to be recorded in the western equatorial Pacific Ocean. La Niña conditions are likely to persist through the end of spring (77% chance for the March-May season; up from 67% last month). Neutral ENSO conditions are more likely to emerge in the beginning of summer than anything else (56% chance for the May-July season; up from 51% last month).

The CPC outlook for March (Figure 7) shows 40-50% chances of below normal temperatures for all of Washington state. Similarly, the entire state has a 40-50% chance of experiencing above normal precipitation on the three-tier scale.

The three-month outlook for March-April-May (MAM) shown in Figure 8 predicts below normal temperatures statewide, with chances of below normal temperatures between 33 and 40% for the southeastern half of the state and chances between 40 and 50% for the northwestern half of the state. Most of the state has 33 to 40% chances of above normal precipitation, but the northernmost parts of Washington are slightly more likely to endure (or enjoy!) this fate, with 40 to 50% odds instead.

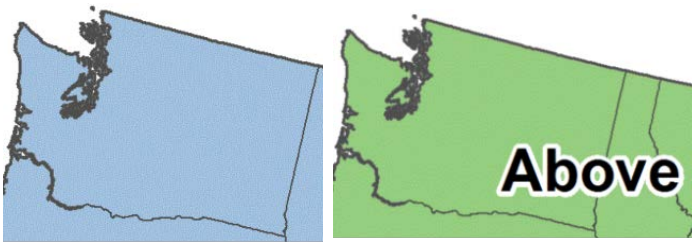
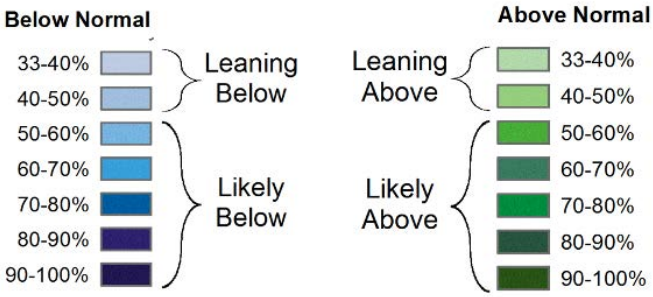


Figure 7: March outlook for temperature (left) and precipitation (right).



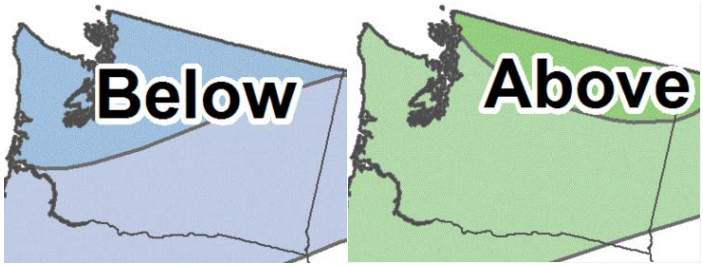


Figure 8: March-April-May outlook for temperature (left) and precipitation (right) (Climate Prediction Center).