



Office of the Washington State Climatologist

April 2022 Report and Outlook

May 11, 2022

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

April Event Summary

Average April temperatures were much below normal across Washington. Averaged statewide, April was the 3rd coldest on record; only April 1955 and April 2011 were colder. According to temperature rankings for individual stations, Walla Walla, Ritzville, Wenatchee, and Ephrata recorded their coldest April since records began at each location (Table 1). For many stations, April 2022 was the coldest since 2011. Precipitation, on the other hand, was variable, with most of the state receiving above normal precipitation. Averaged statewide, April was the 10th wettest on record. Table 1 also shows April precipitation that ranked among the top ten wettest for selected locations. Pasco and Vancouver, for example, recorded their wettest April in their relatively short station histories. The central and northern Puget Sound, San Juan Island, and parts of north central and northeastern WA were the exceptions, receiving below normal precipitation.

April began with a low pressure system that brought gusty winds and rain on the 3rd. Wind gusts between 30 and 60 mph were recorded around western WA. Quillayute measured 3.15" of precipitation, which set a daily record for the

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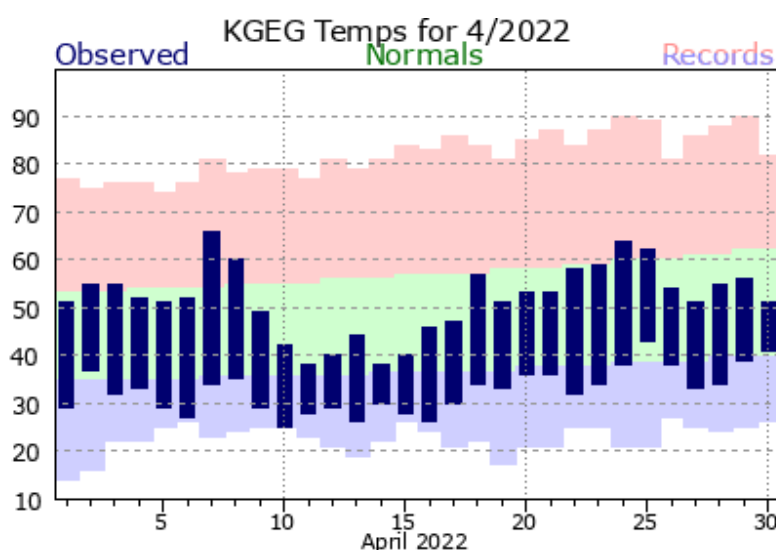


Figure 1: April 2022 daily temperature for Spokane International Airport compared to the 1991-2020 normal (green envelope) and previous records (blue and red envelopes; [NWS](#)).

Station	April Average Temperature	Rank	April Precipitation	Rank	Records Began
Walla Walla	45.9	1	2.75"	10	1949
Ritzville	41.0	1	-	-	1916
Wenatchee Pangborn AP	44.8	1	1.36"	6	1960
Ephrata	44.4	1	-	-	1949
Pasco Tri Cities	48.9	2	1.93"	1	1998
Vancouver Pearson AP	48.3	3	5.41	1	1998
Omak	45.4	3	-	-	1998
Friday Harbor	46.0	3	1.84	3	1998
Spokane AP	42.1	7	-	-	1881
Quillayute	43.9	9	10.52	12	1967

Table 1: April average temperatures and total precipitation and rankings (coldest to warmest and wettest to driest) for selected WA locations.

April 3 and also ranks as the wettest April day since records began in 1966. As shown in Figure 1, much below normal temperatures were measured around the state from about the 9th through the 21st. Lowland snowfall was recorded in parts of WA throughout this period as well. For example, the Vancouver area received about 2-3" on April 12. Wenatchee (Waterplant) recorded 5.4" of snow over the 13th and 14th, ranking as the most April snow since records began in 1931 and the latest spring snow on record. Figure 2 shows snowfall totals from CoCoRaHS in the Leavenworth and Wenatchee area as measured on the morning of the 14th. 1.5" of snow fell at Spokane AP on the 14th, also setting a maximum daily snowfall record.

There were also many instances of record-breaking cold maximum and minimum

temperatures during this period as well. On the 11th, record low maximum temperatures were set at Pullman (35°F), Spokane (38°F), Wenatchee (39°F), Ephrata (42°F), and Omak (51°F). Record low minimum temperatures were set at Quillayute (26°F), Wenatchee Pangborn (28°F), and SeaTac AP (32°F - tie) on the 13th. On the 15th, record cold minimum temperatures were set at Ephrata (19°F), Yakima (21°F), Wenatchee Pangborn (23°F), and Walla Walla (30°F - tie). The low temperatures at Wenatchee and Ephrata also set records for the coldest April temperatures on record. These are just a handful of examples; cold temperature records were consistently set from the 11th through the 17th at least somewhere in the state. Temperatures warmed to more seasonal temperatures briefly, before the month ended with significant rainfall and below normal temperatures.

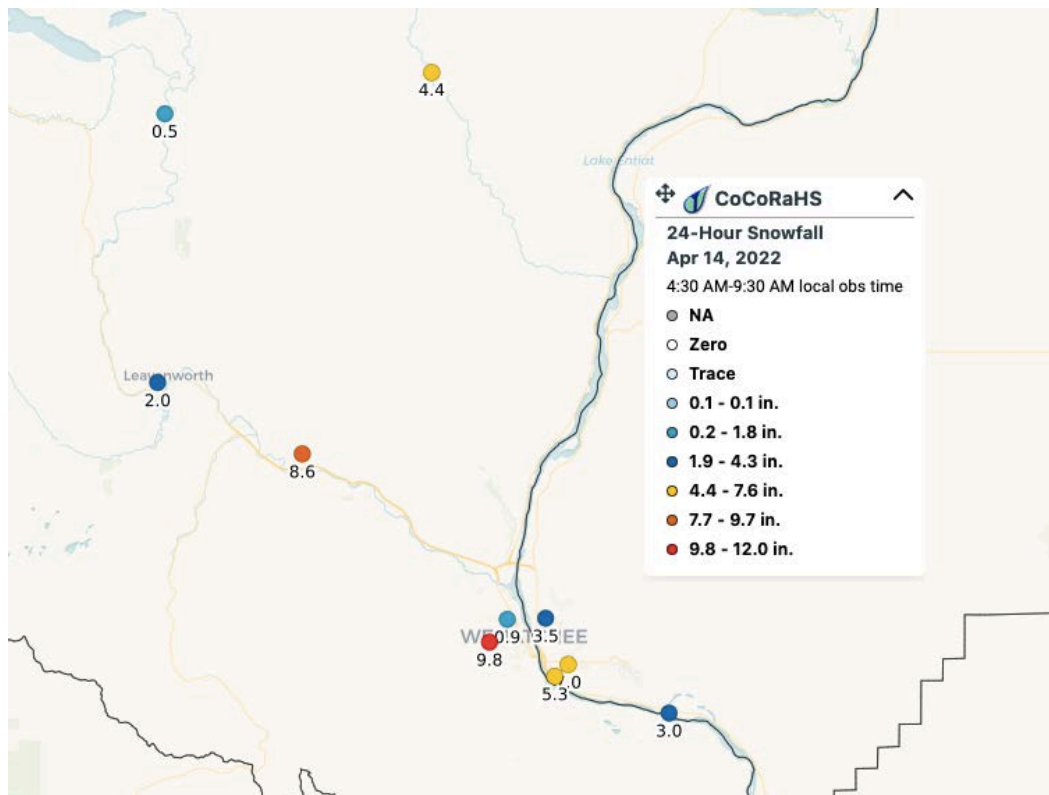


Figure 2: 24-hour snowfall measurements on the morning of April 14, 2022 from [CoCoRaHS](#) observers.

Updates to the WA State Hazard Mitigation Plan

The WA Emergency Management Division is in the process of updating the [2018 State Enhanced Hazard Mitigation Plan](#) and is seeking stakeholders to participate in regional hazard vulnerability assessments. Volunteers must be official representatives of local, tribal, or state governments, nonprofit organizations, or academia and have local knowledge about natural hazards where they live or work. Volunteers are expected to participate in up to three meetings in the summer and fall (remote attendance possible) and can sign up [here](#).

Snowpack and Drought Summary

Precipitation was above normal in the higher elevation areas of WA during April, building snowpack throughout the month. Figure 3 shows the basin average snow water equivalent (SWE) as of May 2, a drastic improvement compared to the SWE in early April. The cool and wet April did not just slow snowmelt, there were actual gains in SWE throughout the state. May 2 basin averages are normal to above normal statewide, ranging between 96% of normal in the Lower Yakima to 134% of normal in the Central Puget Sound. An updated April-September water supply forecast released on May 4 from the Yakima Bureau of Reclamation is now estimating that junior irrigators will receive their total allotment of water based on adequate water storage in their reservoirs and improved snowpack.

Improvements were made to the U.S. Drought Monitor (Figure 4) since the last edition of the newsletter. Specifically, the area of “extreme drought - D3” and parts of the “severe drought - D2” area in the Lower Columbia Basin were reduced because this region received much above normal April precipitation. Despite the wet April, below normal soil moisture at the root zone, the lack of precipitation from January through March 2022, as well as longer-term precipitation deficits on the order of the last 1 to 2 years are reflected by the continuing designation of drought conditions in eastern WA.

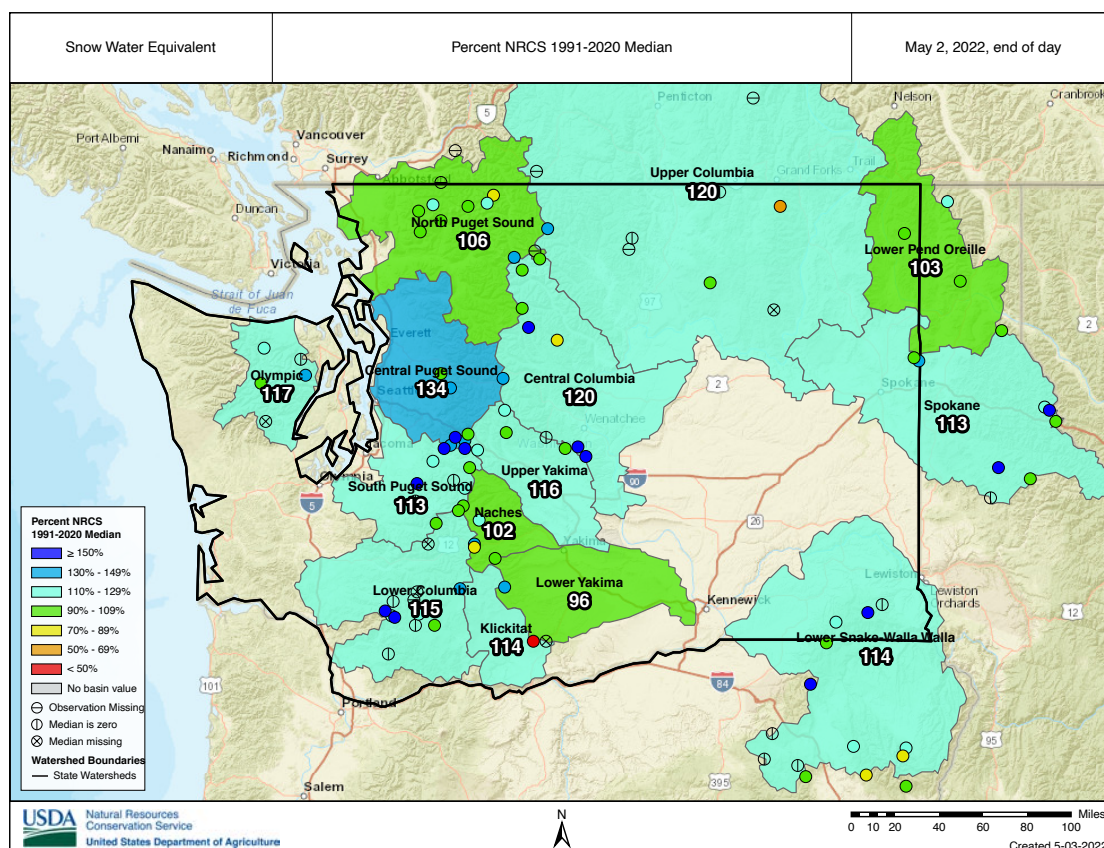


Figure 3: Snowpack (in terms of snow water equivalent) percent of median for WA as of May 2, 2022. The median is based on the 1991-2020 period (NRCS).

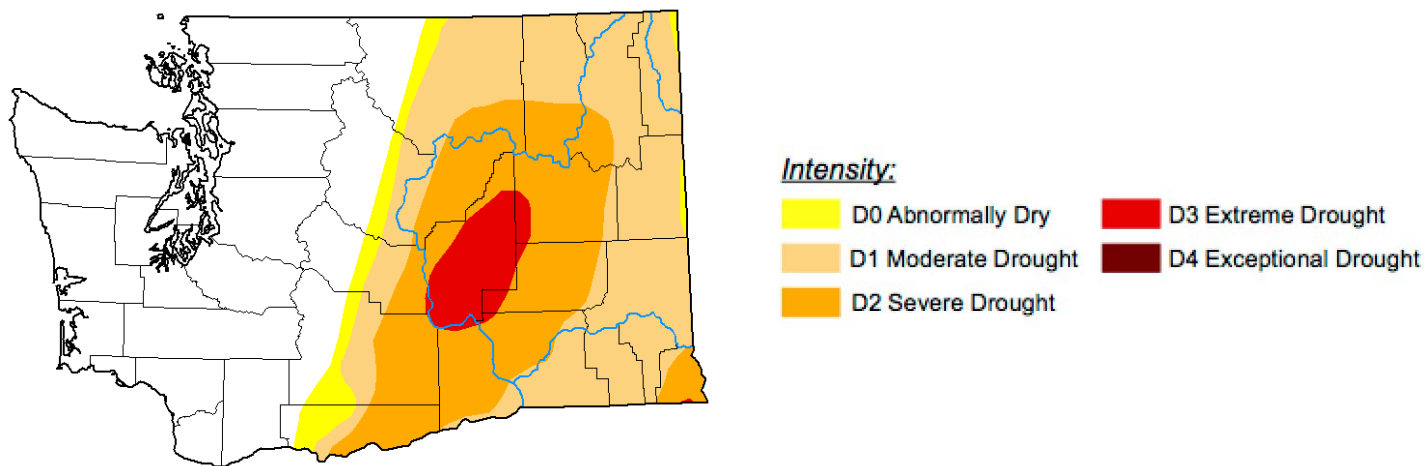


Figure 4: The May 5, 2022 edition of the [U.S. Drought Monitor](#).

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

For this month's CoCoRaHS corner, we would like to highlight an example of a role CoCoRaHS can have in the advancement of science that you may not have previously considered. Back in 2017, Mattingly et al. wrote a [paper](#) discussing “design values” of precipitation. Design values estimate the maximum amount of precipitation that can be expected in a given city over a given time frame. They are used by engineers to design hydrologic infrastructure. Typically, design values are calculated using a long-term record of observations taken from maybe a handful of stations near a city. The authors of the paper calculated updated design values for short time frames using CoCoRaHS data collected across the greater Fort Collins and Boulder, CO metropolitan area. They found that these new design values were larger than the existing design values; that is to say, plans based on only a few stations were underestimating the amount of precipitation the city may need to be equipped to handle. In the future, urban planners could rely on CoCoRaHS data for a potentially better idea of the hydrologic infrastructure a city requires!

Members of the Washington CoCoRaHS network recorded 10,608 observations over the month of April (96% of March's number of observations). 64% of observations recorded some amount of precipitation; not a far cry from March's 62%. An observer in Hoodspport, WA recorded the highest one-day gauge catch total of 3.78" on 4/4.

Some observers commented on “awfully cold” conditions throughout the month, and many reported quite wet conditions. Said one observer in Lewis County: “Early peas I planted--eternal optimist that I am--when we had about two days of sun last month, have scarcely sprouted. I imagine they have largely rotted in the ground. Just another example of how it really doesn't pay to rush the season.” Indeed, April showers weren't just rain showers – a few observers reported varying amounts of snow as noted above. Perhaps May will be kinder to gardeners!

A Review of Winter 2021-22

A Message from the State Climatologist

La Niña developed early in fall of 2021, and the Climate Prediction Center (CPC) seasonal forecasts were calling for cooler and wetter than normal conditions for WA for the winter months. So how did the winter actually play out? Here we summarize the winter ENSO conditions, average temperature and precipitation anomalies for WA, and corresponding snowpack with the current implications for summer water supplies.

Weak-moderate La Niña conditions persisted from fall 2021 through the following winter. This was the second consecutive La Niña, with a moderate event also occurring during the winter of 2020-21. Figure 5 shows the 3-month running mean of the sea-surface temperature (SST) anomalies for the Niño3.4 region of the equatorial Pacific Ocean (known as the Oceanic Niño Index) from 2013 through early 2022. The CPC issued a “La Niña Advisory” in October 2021, which is still in effect at the time of this writing. Currently, there is a higher probability that La Niña will persist through the summer (chances between 51 and 59% for various summer periods), and we may even see a third La Niña winter for 2022-23. Early indications show a 54% chance of La Niña in

October-December 2022 and a lesser likelihood of neutral conditions (37%) or El Niño (9%); we will continue to monitor the state of the tropical Pacific because of its importance to the seasonal weather of the Pacific Northwest.

Figure 6 shows the departure from average temperature and percent of normal precipitation across the state from October 2021 through March 2022. Averaged statewide, both temperatures and precipitation were near-normal, with temperatures +0.1°F above the 1991-2020 normal and precipitation at 106% of normal. But those statewide averages fail to capture some of the more interesting spatial variations. In particular, winter temperatures were between 1 and 3°F above normal throughout the Cascade Mountains, which were balanced by some pockets of cooler than normal temperatures elsewhere in the state. In terms of precipitation, western WA was mostly on the wet side, with totals typically ranging from 110-130% of normal. Some areas, such as western Whatcom and Skagit counties had even more precipitation than usual (130-170%), in large part from heavy November precipitation that caused flooding. Winter precipitation in

eastern WA was near-normal to below normal (70-90% of averages). This relatively dry period follows longer-term precipitation deficits going back to October 2019 for much of the Lower Columbia Basin.

There was also some substantial monthly

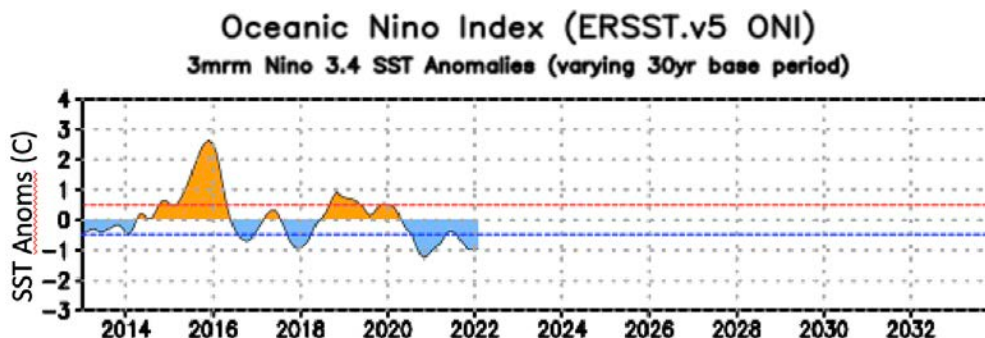


Figure 5: The 3-month Oceanic Niño Index based on the sea-surface temperatures in the Niño3.4 region of the equatorial Pacific Ocean from 2013 through 2022 (from [Climate Prediction Center](#)).

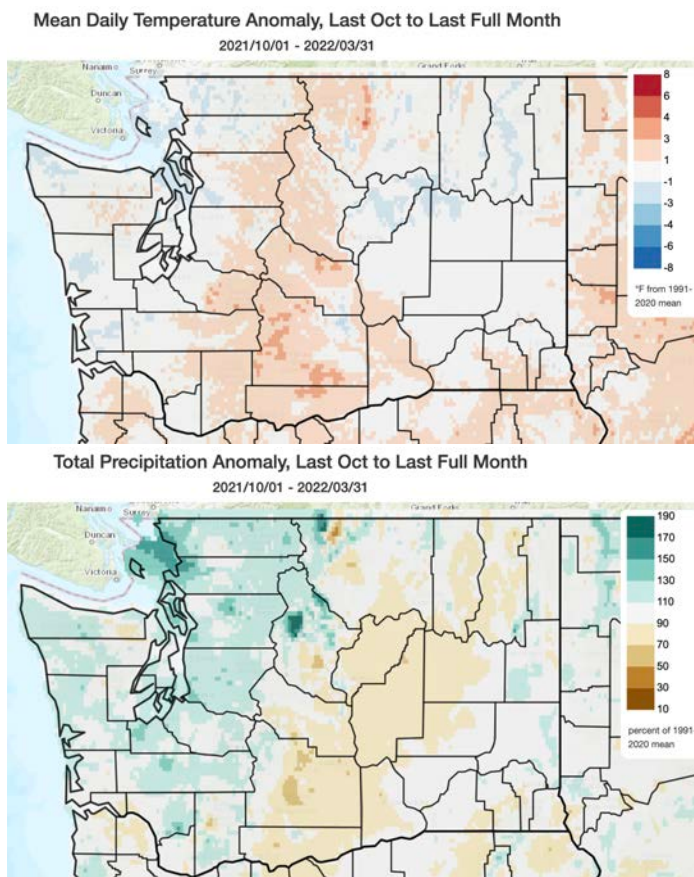


Figure 6: October 2021 through March 2022 (a) average temperature departure from the 1991-2020 normal and (b) precipitation percent of normal for WA state (from [Climate Toolbox](#)).

variability within the winter. The starkest contrast was between precipitation in early and late winter. October and November were wet for a majority of the state (not shown), and the 2-month period ranks as the 8th wettest Oct-Nov averaged statewide since records began in 1895. On the other hand, February and March were much drier than usual statewide, ranking as the 27th driest on record. Figure 7 shows the January-March precipitation anomalies, and precipitation was between 50 and 70% of normal for a large area of eastern WA. The central Puget Sound is the exception on this map, and that above normal precipitation can be mostly attributed to an atmospheric river that brought heavy rain at the end of February. Overall, there was very little

precipitation from about the second week of January through the end of March.

The lack of late winter precipitation impacted our snowpack. After huge gains from heavy mountain snowfall in late December, growth in our snowpack stalled for the second half of winter. April 1 SWE (Figure 8a) was below normal statewide, particularly in the Lower Yakima, Klickitat, and Lower Snake-Walla Walla basins. April conditions, however, were cooler than normal with higher-elevation areas of the state receiving above normal precipitation that resulted in late season snowpack growth. Figure 8b shows the snowpack percent of median as of April 28 with nearly every basin at values of normal to above normal. Even locations where snowmelt had begun, such as Lost Horse and Indian Rock Snotel locations, reversed course to build snowpack. Figure 9, from the Bumping Ridge Snotel site (4,610'), illustrates the seasonal patterns well, showing the snowpack growing from December through early January, staying steady from mid-January through March, and then growing to near-normal in April.

The streamflow forecasts from the National Weather Service Northwest River Forecast Center

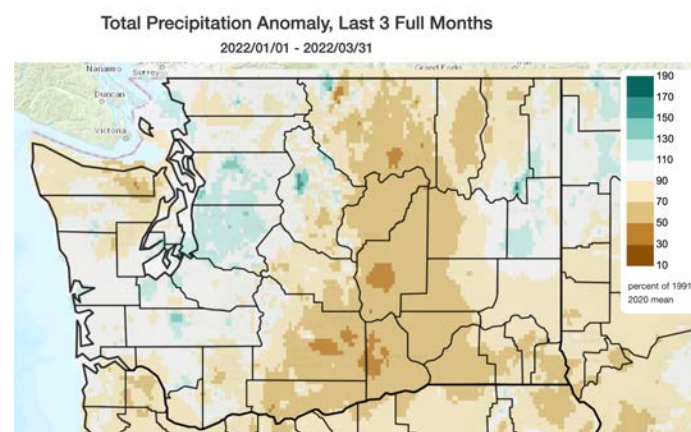


Figure 7: Precipitation percent of the 1991-2020 normal for January-March 2022 in

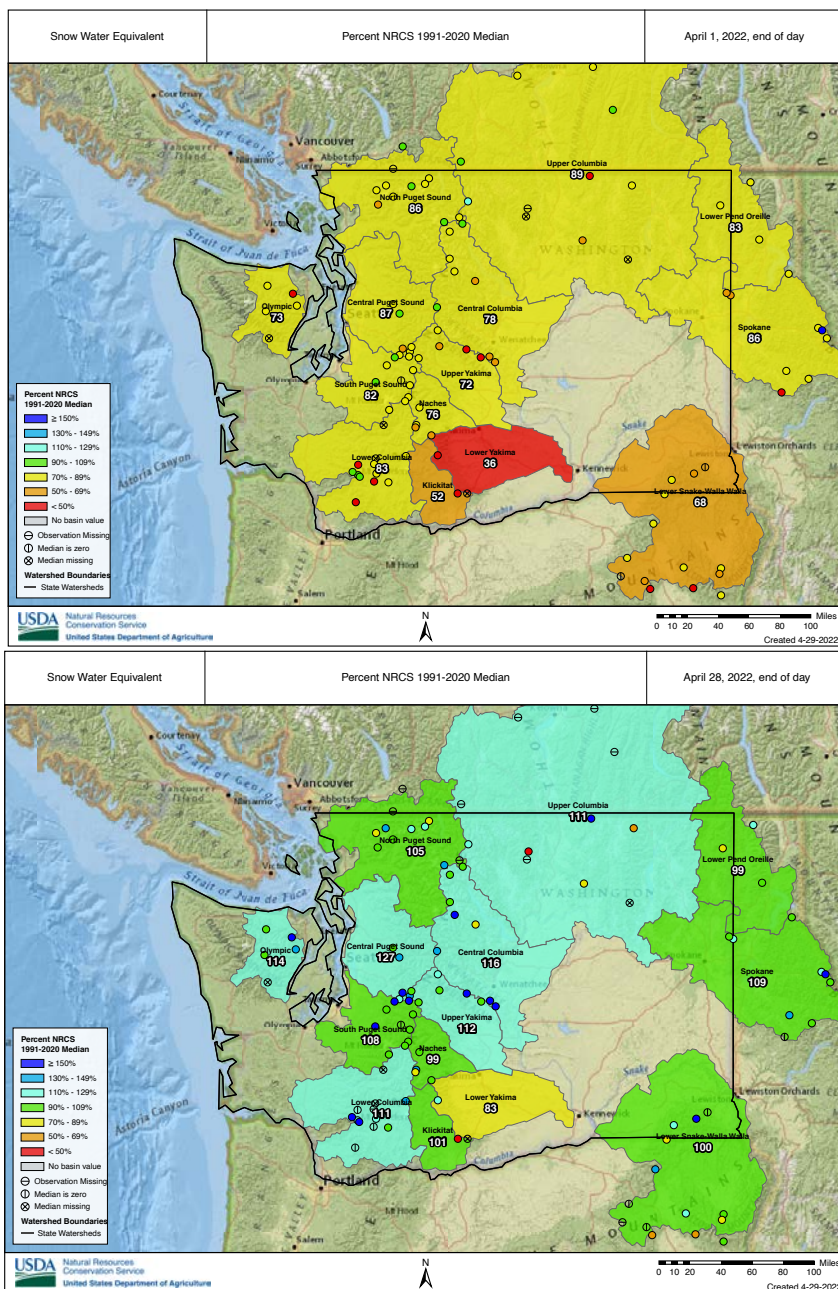


Figure 8: Basin-average snow water equivalent (SWE) percent of median on a) April 1, 2022 and b) April 28, 2022 for WA (from [NRCS](#)).

have improved throughout April. The April-September streamflow natural forecast as of April 29 indicates normal streamflow throughout most of the state (Figure 10), except for some rivers in southeast WA, north central WA, and in the Spokane area, where projections indicate only about 57-70% of normal Apr-Sept streamflow. For example, the forecast for the Okanogan River and

Oroville is for 66% of normal Apr-Sept streamflow.

In summary, our wet season had near-normal temperatures and precipitation, averaged statewide. As usual there was considerable variability; notably the mountainous areas had above normal temperatures and the Lower Columbia Basin was dry relative to normal. January through March was much drier than usual, particularly for eastern WA. Despite lackluster snowpack at the end of winter, a cool and wet April helped bring snowpack back to normal for most of the state. The CPC seasonal forecasts for a cool and wet January-March did not come into fruition, as that period was generally warmer and drier than normal. The dry late winter may have implications for dryland agriculture where there has also been long-term precipitation deficits, though April's wet weather eased those concerns to an extent. In addition, the Northwest River Forecast Center's streamflow forecasts indicate that some water supply issues may arise later this summer in parts of WA state.

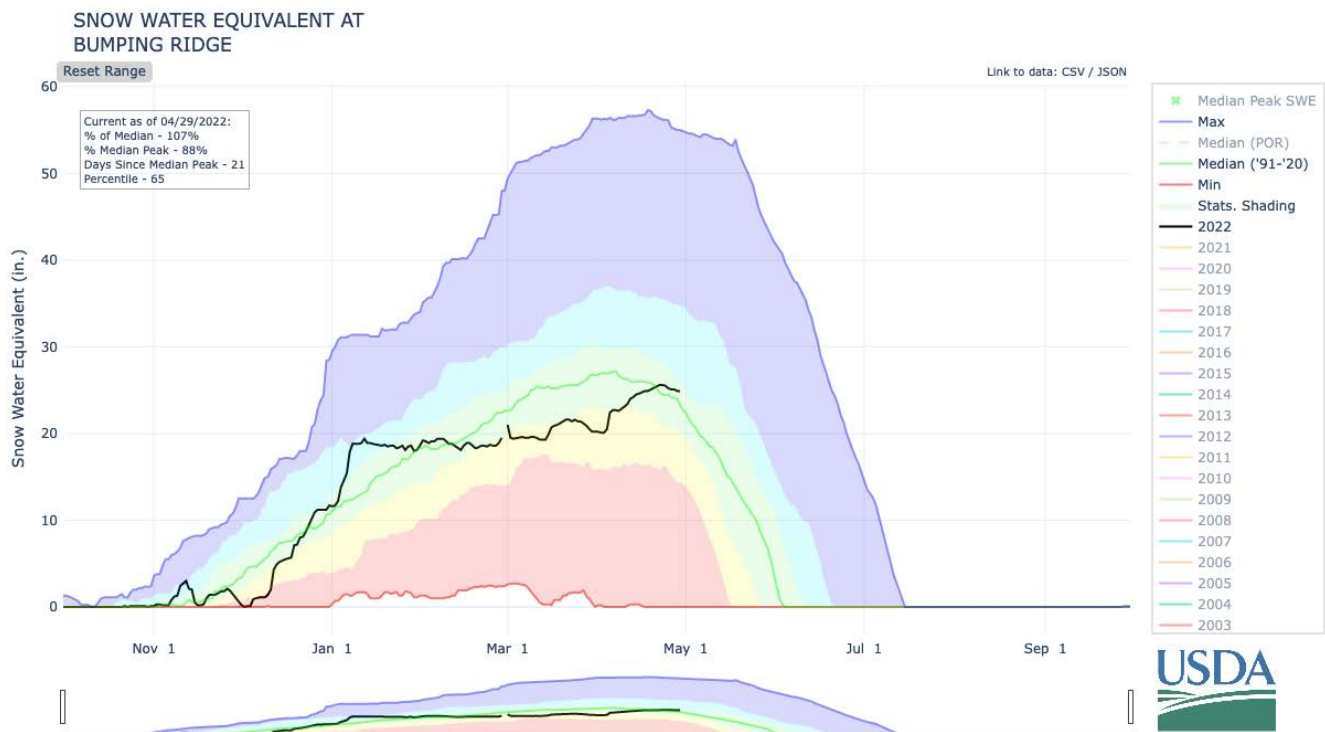


Figure 9: The 2021-22 snowpack trace (black line) from Oct 1 through April 29 at Bumping Ridge compared to median (green line) and the highest (blue line) and lowest (red line) in the historical record (from [NRCS](#)).

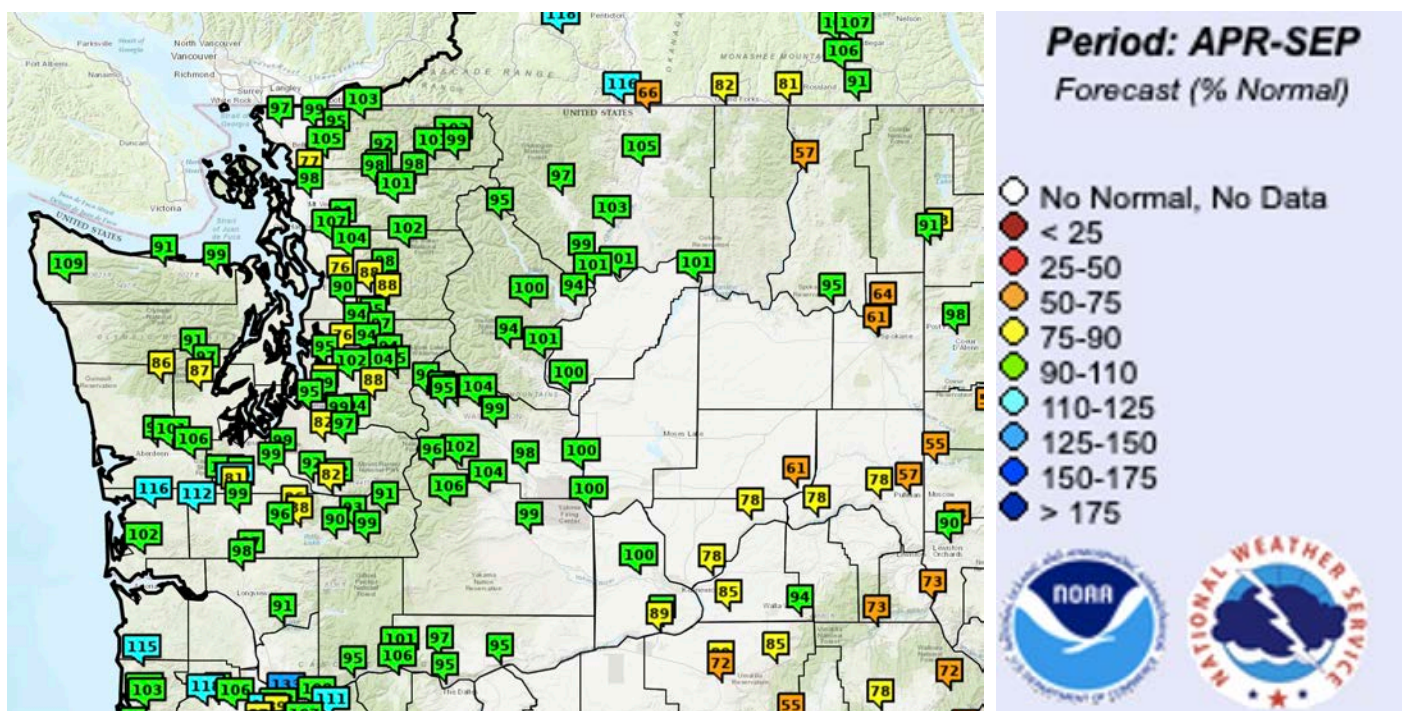


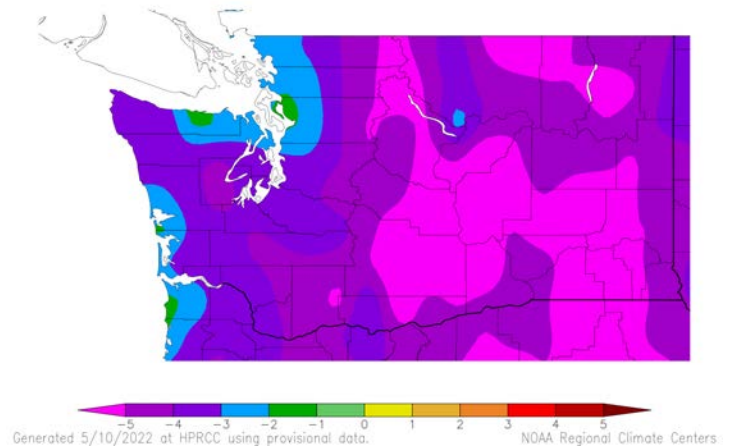
Figure 10: April through September 2022 natural water supply forecast in percentage of normal for WA as of April 29, 2022 from the NWS Northwest River Forecast Center. [Forecasts](#) are updated daily.

Climate Summary

April was chilly, as reflected by this map provided by the High Plains Regional Climate Center. Average temperatures were substantially cooler than normal across the entire state. Many areas in eastern WA saw average temperatures more than 5°F below the norm. Ephrata is the most extreme example from our sampling of stations in Table 2, with an average temperature of 6.4°F below normal. The water moderated coastal regions of Washington a bit, but even then, stations such as SeaTac Airport still dipped to 4.2°F below normal. The regions bordering the Puget Sound and the southwestern coast were the warmest relative to normal in the state for the month.

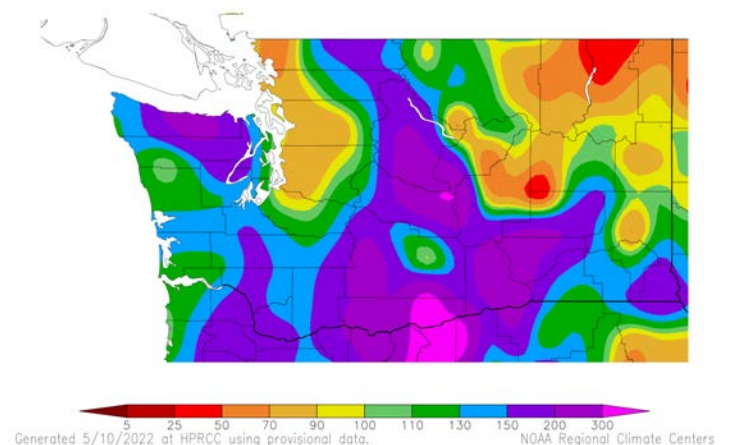
Precipitation deviations from the norm were not so consistent across the state. The majority of the state experienced more precipitation than normal, with areas east of the Cascades and in south-central WA receiving double the normal totals for April. The eastern coast of the Puget Sound and other northern areas of the state were both a bit drier than normal, with some areas (such as Bellingham) receiving less than 50% of normal precipitation. Still other areas hovered around normal, such as the Seattle WFO. Despite the variety, most of the state ended up on the wet side.

Departure from Normal Temperature (°F)
4/1/2022 – 4/30/2022



April temperature (°F) departure from normal relative to the 1991-2020 normal ([HPRCC](#)).

Percent of Normal Precipitation (%)
4/1/2022 – 4/30/2022



April 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	44.3	48.2	-3.9	5.35	3.67	146
Seattle WFO	48.6	50.8	-2.2	2.94	2.98	99
SeaTac AP	47.1	51.3	-4.2	2.71	3.18	85
Quillayute	43.9	46.9	-3.0	10.52	8.11	130
Hoquiam	47.1	48.7	-1.6	7.18	5.35	134
Bellingham AP	46.9	49.6	-2.7	1.34	2.77	48
Vancouver AP	48.3	51.7	-3.4	5.41	2.93	185
Eastern Washington						
Spokane AP	42.1	47.0	-4.9	1.09	1.25	87
Wenatchee	44.8	51.1	-6.3	1.36	0.57	239
Omak	45.4	49.8	-4.4	0.92	0.83	111
Pullman AP	41.1	46.8	-5.7	2.36	1.79	132
Ephrata	44.4	50.8	-6.4	0.36	0.58	62
Pasco AP	48.9	52.7	-3.8	1.93	0.66	292
Hanford	47.8	53.6	-5.8	1.54	0.57	270

Table 2: April 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, below average sea surface temperatures (SSTs) have persisted in most of the Pacific Ocean as well as the far eastern Atlantic Ocean. SSTs have been above average near the central Atlantic Ocean, Indonesia, and the eastern Indian Ocean, consistent with India’s ongoing record-setting heat wave. There is a 59% chance that La Niña conditions persist over the June-August season. La Niña conditions may continue into the autumn as well, with 50-55% chances of such an outcome.

The CPC outlook for May (Figure 11) shows 40-50% chances of below normal temperatures for the entire state. The Olympic Peninsula and southern WA show 33-40% chances of above average precipitation for the month, while the rest of the state exhibits 40-50% chances of above average precipitation.

The three-month outlook for May-June-July (MJJ) shown in Figure 12 predicts above normal temperatures for the eastern half of the state, with chances between 33 and 40%. Dry conditions are likely for the entire state, with most of the state slotted at 40-50% chances for drier-than-normal conditions. The northwestern-most corner of the state is slightly less likely to experience dry conditions, with 33-40% odds.

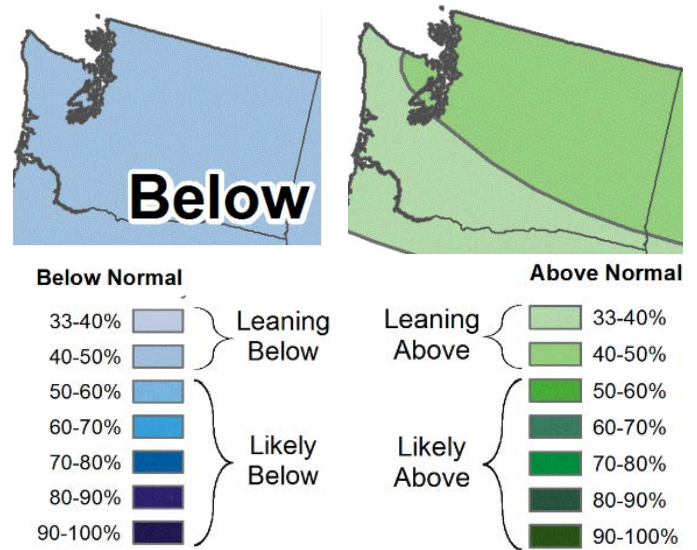


Figure 11: May outlook for temperature (left) and precipitation (right).

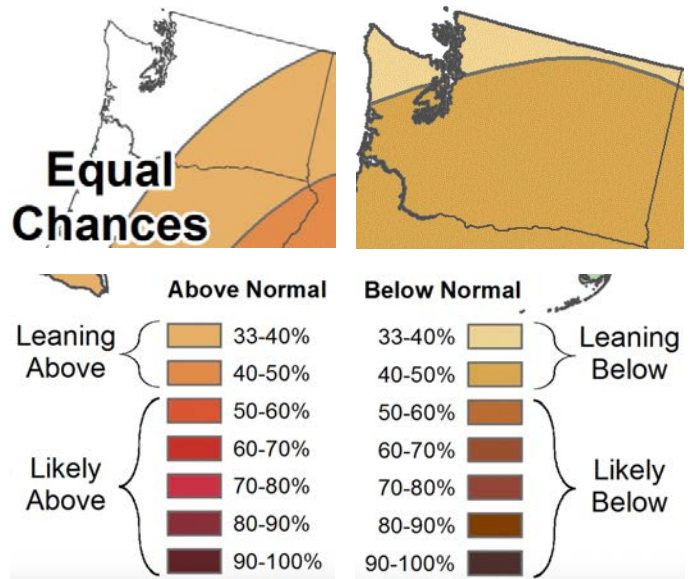


Figure 12: May-June-July outlook for temperature (left) and precipitation (right) (Climate Prediction Center).