



Office of the Washington State Climatologist

May 2023 Report and Outlook

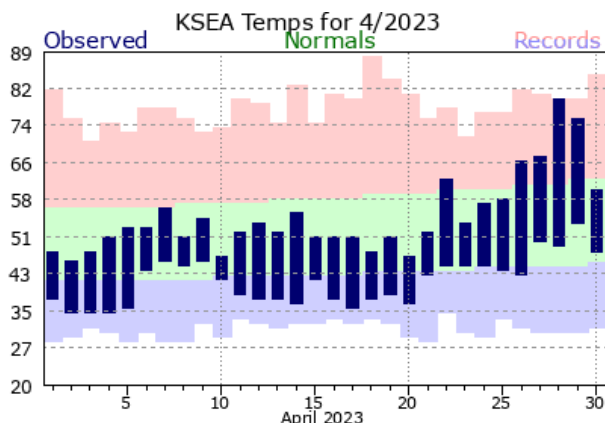
May 10, 2023

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

April Event Summary

Mean April temperatures were colder than normal across the entire state, tying 1927 and 1984 as the 30th coldest April since records began in 1895 (-2.2°F below the 1991-2020 normal). Recall that 2022 also featured a colder than usual April; the 2023 April temperature anomalies were not nearly as large as those in 2022, which ranked as the 3rd coldest April statewide. Total April precipitation was a bit more variable, but generally above normal after a few months of below normal precipitation. Averaged statewide, April ranked as the 15th wettest with total precipitation $0.90''$ above normal.

Fitting with the overall theme, the month started on a cold note with both Wenatchee (27°F - tie)



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and Ephrata (23°F) setting daily low minimum temperature records on the 2nd. On the 3rd, SeaTac Airport recorded a trace of snow - a snowfall record for the day (Figure 1). At Rosalia, WA - the opposite corner of the state in southeastern WA - the recorded $4''$ of snow on the same day was the most April snow on record

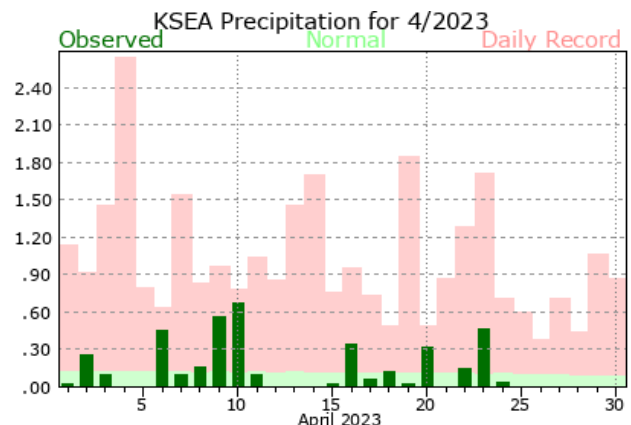


Figure 1: April 2023 daily temperatures for SeaTac International Airport compared to the 1991-2020 normal (green envelope) and previous records (blue and red envelopes; NWS).

there. More widespread low minimum temperature records were set on the 5th, including Ellensburg (19°F), Ephrata (21°F), Yakima (21°F), Olympia (25°F), and Bellingham (29°F - tie). This period was also accompanied by frequent precipitation; Quillayute set a daily maximum rainfall record on the 9th (1.94"), joined by Olympia (0.70") and Ephrata (0.93") on the 10th, and Yakima (0.61") on the 11th.

As shown in Figure 1, a rapid warm up occurred at the end of the month. Record high daily temperatures were set at Bellingham (72°F), SeaTac Airport (80°F), Olympia (83°F), Quillayute (84°F), Hoquiam (86°F), and Vancouver (88°F) on the 28th. For Quillayute and Hoquiam, the temperatures on the 28th ranked as the all-time highest April temperatures on record at those particular stations. Given the colder than normal temperatures this spring - between 1 and 4°F below normal (Figure 2), the warm-up was rather dramatic. The 80°F day at SeaTac Airport on the 28th also counted as the first day of 2023 with temperatures equal to or above 70°F. In other words, Seattle skipped right over a 70 degree day and went right to 80. Eastern WA had their warmest temperatures on the 29th; Ellensburg set a record daily high temperature of 85°F on that day.

Snowpack and Drought Summary

The cooler and wetter than normal April conditions contributed to late-season snowpack growth in Washington. By May 1, almost every basin had average snowpack that was near-median to above median, with the Lower Snake-Walla Walla basin at the highest relative to median with 146% (Figure 3). The North Puget Sound basin was the exception, with the average only at 88% of median on May 1. Snowmelt began in late April

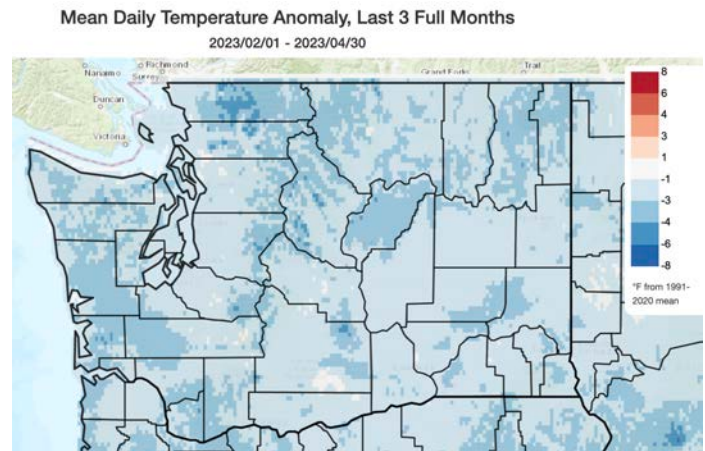


Figure 2: Mean February-April temperature anomalies for Washington relative to the 1991-2020 normal period (Climate Toolbox).

in earnest with the onset of slightly above normal temperatures. For some locations, snowmelt is occurring quicker than usual. The Bumping Ridge (4,610') Snotel site is shown as an example: after peaking on April 23, a rapid melt has brought the snowpack trace into the "yellow" category (representing the 30-50th percentile), and it looks likely that the snowpack could melt a few weeks early (Figure 4). This is not the case everywhere,

but appears more common for Snotel stations east of the Cascade Mountain crest.

There have been some improvements to the U.S. Drought Monitor map (Figure 5) since the last edition of the OWSC newsletter. Specifically, some of the “abnormally dry” conditions were removed along the southern coast, southwest WA, and central WA where April precipitation totals were highest relative to normal. The April precipitation also helped the Yakima Basin reservoir system. The U.S. Bureau of Reclamation’s revised May forecast increased the junior water rights water supply to 86% of their entitlements, up from the 82% projections in early April.

In final drought-related news, the NOAA National Integrated Drought Information System (NIDIS) recently revised their state drought pages, and engaged local experts at OWSC and WA state agencies to review the content. The [WA page](#) is now live, and has various condition and drought index maps, near-term precipitation outlooks, some background on WA drought, and links to other drought resources on the state and local level. Check it out!

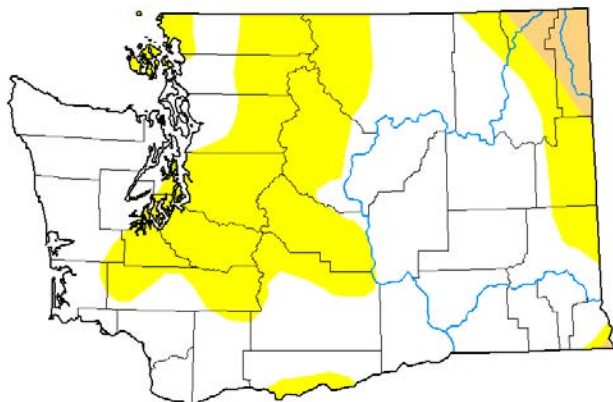


Figure 5: The May 4, 2023 edition of the U.S. Drought Monitor.

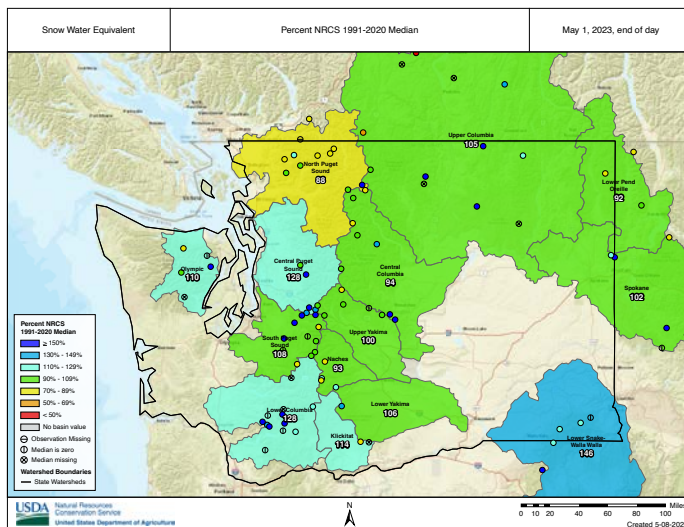


Figure 3: Snowpack (in terms of snow water equivalent) percent of normal for Washington as of May 1, 2023 (NRCS).

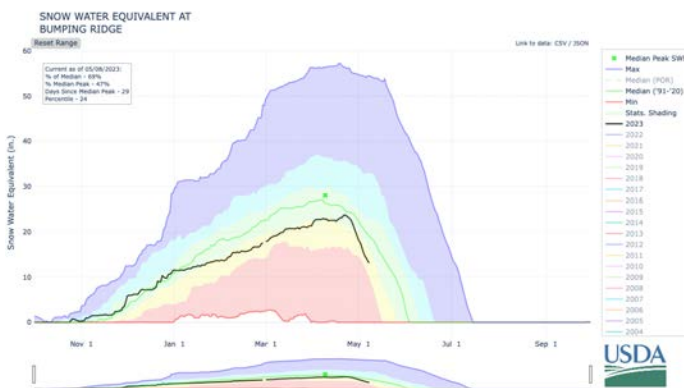


Figure 4: 2023 water year snow water equivalent (black trace) compared to median (green trace) and prior years, including the maximum (blue trace) and minimum (red trace), at the Bumping Ridge Snotel site in the Naches Basin (NRCS).

Intensity:



A Review of Winter 2022-23

A Message from the State Climatologist

In early fall 2022, much attention was being paid to La Niña conditions continuing for a third consecutive winter, and the Climate Prediction Center (CPC) seasonal forecasts were calling for 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.

La Niña conditions first developed in late 2020, and this last winter was the third consecutive featuring La Niña. The intensity of this extended event generally decreased in time with the winter of 2020-21 in the moderate category and the latter two winters in the weak-moderate range. Figure 6 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 2023. The “La Niña Advisory” issued by the CPC in October 2021 finally expired in March 2023. Neutral conditions are currently present in the tropical Pacific, and forecast models are indicating a likelihood of El Niño

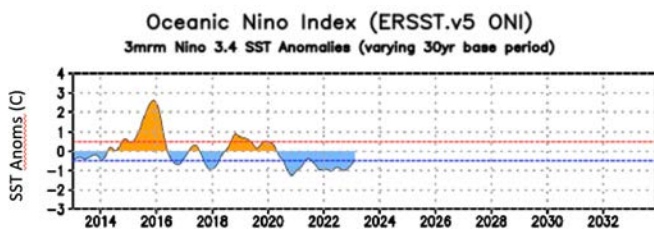


Figure 6: The 3-month Oceanic Niño Index based on the sea-surface temperatures in the Niño3.4 region of the equatorial Pacific Ocean from 2013 through 2023 (from [Climate Prediction Center](#)).

conditions developing late this summer through the end of the year.

Figure 7 shows the departure from average temperature and percent of normal precipitation across the state from October 2022 through March 2023. Temperatures were generally below normal, particularly east of the Cascade Mountains. Averaged statewide, mean temperatures were 1.1°F below the 1991-2020 normal and tied as the 53rd coldest since records began in 1895. Winter precipitation was below normal across most of western WA, and normal to slightly above normal in parts of eastern WA. The drier conditions in the climatologically wetter areas of the state tilted the statewide statistics towards the dry side; averaged statewide, the winter ranked as the 27th driest with 83% of normal precipitation (-5.55”).

There was also some substantial monthly variability within the winter. The starkest contrast was between October and November temperatures. Recall that the summer of 2022 was warmer and drier than usual, and those conditions lasted well into October. Statewide October temperature anomalies were 6.6°F above normal before a later than usual return of cooler and wetter weather at the very end of the month. This heralded a marked shift to statewide November temperatures that were 6.0°F below normal. December temperatures were also generally below normal, followed by above normal January temperatures, and then below normal temperatures in both February and March. Monthly precipitation was more variable across the state and not as easily generalized. That being

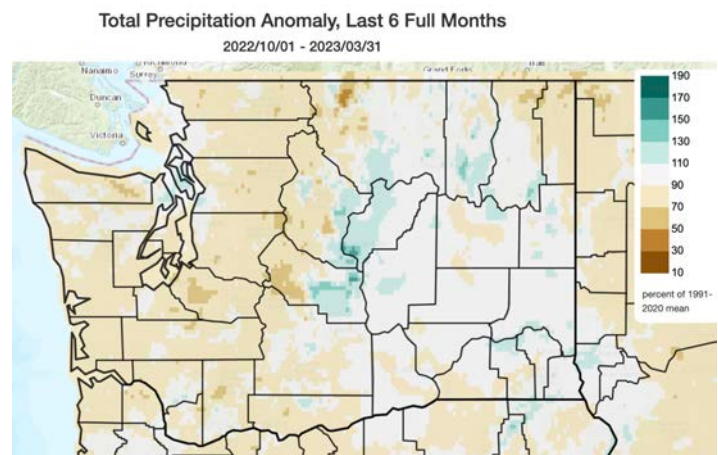
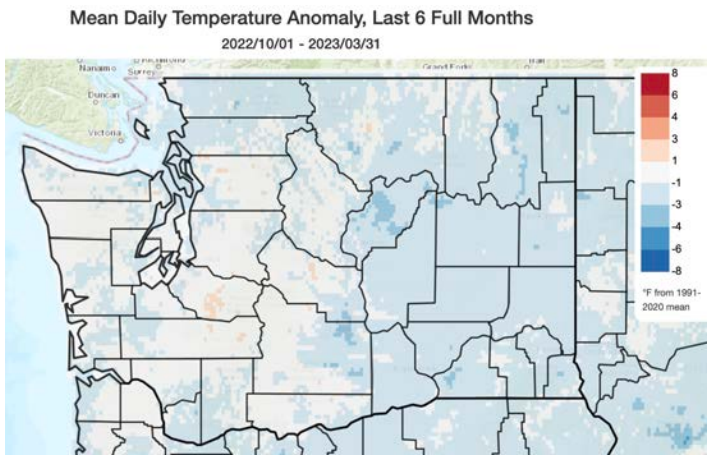


Figure 7: October 2022 through March 2023 (a) average temperature departure from the 1991-2020 normal and (b) precipitation percent of normal for WA state (from [Climate Toolbox](#)).

said, October, January, February, and March tended to be drier than normal, while November and December had more regions of the state with wetter than normal conditions.

Despite more winter months being on the drier side than the wetter side, the statewide average snowpack on April 1 was 101% of median, largely due to the below normal winter temperatures. Figure 8 shows the basin average snow water equivalent around the state on April 1, and most basins had near-normal snowpack. The North Puget Sound basin was an exception, ending the season with 85% of median snowpack. In contrast, the Lower Columbia and Lower Snake-Walla Walla basins were above median with 119 and 126% of median, respectively. The above normal snowpack and periods of above normal precipitation improved the U.S. Drought Monitor over the course of the winter in Washington, especially east of the Cascade Mountains. By early April, 52% of the state was in “abnormally dry” conditions and only about 2% of the state was in “moderate drought”, representing less coverage than in early October 2022.

The April-September natural streamflow forecasts from the National Weather Service Northwest

River Forecast Center indicate mostly normal to above normal streamflow throughout Washington (Figure 9). Several rivers in the northern Puget Sound and north central Washington are projected to have only between 77 and 89% of their normal April-September streamflow, but concerns about drought are minimal at the time of this writing.

In summary, our wet season had below normal temperatures and precipitation, averaged statewide. There were substantial swings in the direction of the temperature anomalies by month,

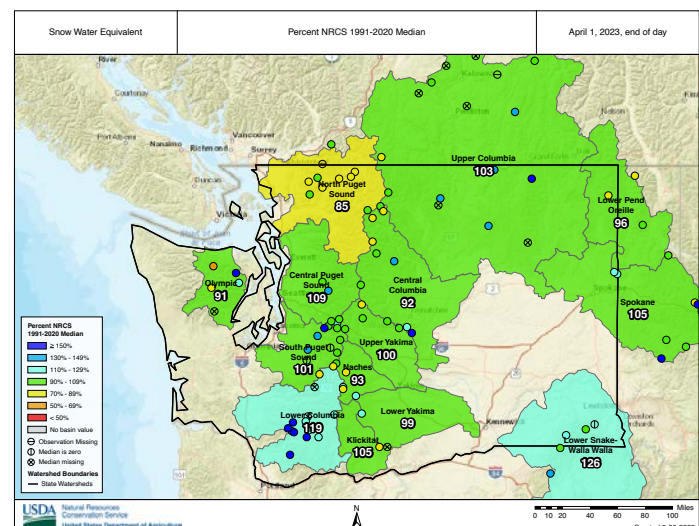


Figure 8: Basin-average snow water equivalent (SWE) percent of median on April 1, 2023 for WA (from [NRCS](#)).

while precipitation was more consistently below normal, particularly in western Washington. The 3-month seasonal outlook issued by the CPC in November called for cooler and wetter than normal conditions for December through February, but only the temperature portion of that outlook materialized. Both the October-March period, and shorter winter window of December through February were drier than normal. Nevertheless, the April 1 snowpack was normal to above median across much of the state, leading to largely favorable natural streamflow forecasts for April through September.

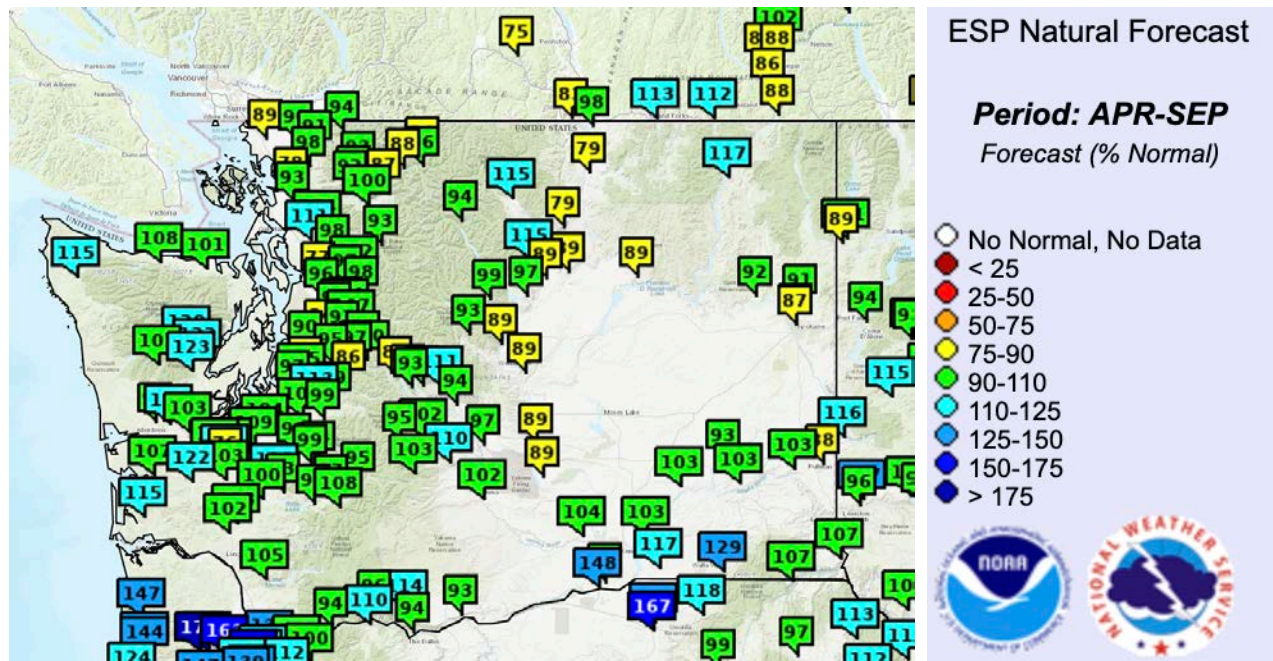


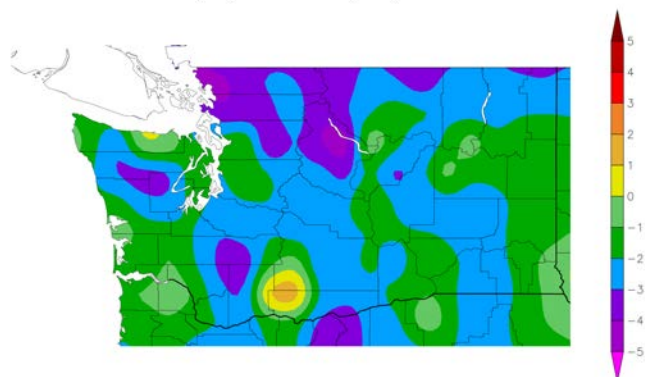
Figure 9: April through September 2023 natural water supply forecast in percentage of normal for WA as of May 6, 2023 from the NWS Northwest River Forecast Center. Forecasts are updated daily.

Climate Summary

Similar to February and March, average April temperatures were below normal statewide. According to the map from the High Plains Regional Climate Center, average April temperatures were between 1 and 3°F below normal across the state. The northern tier of Washington was the coldest relative to normal; for example Bellingham was 2.2°F below normal (Table 1). Ephrata, SeaTac, and Wenatchee were also cool spots with temperature anomalies 3.1, 2.8, and 2.7°F below normal, respectively.

In contrast to the last couple of months, total April precipitation was greater than normal for most of the state. In western WA, April precipitation was between 110 and 200% of normal for most locations. The exceptions were the northern Puget Sound area and the very northern portion of the Olympic Peninsula where precipitation was between 70 and 90% of normal. The Bellingham Airport site only received 59% of normal (Table 1). In eastern WA, the central portion received much above normal precipitation (150-300% of normal); Ephrata received 245% of normal, for example. Spokane and southeastern WA didn't fare as well, with the former ending the month with 80% of normal.

Departure from Normal Temperature (F)
4/1/2023 - 4/30/2023

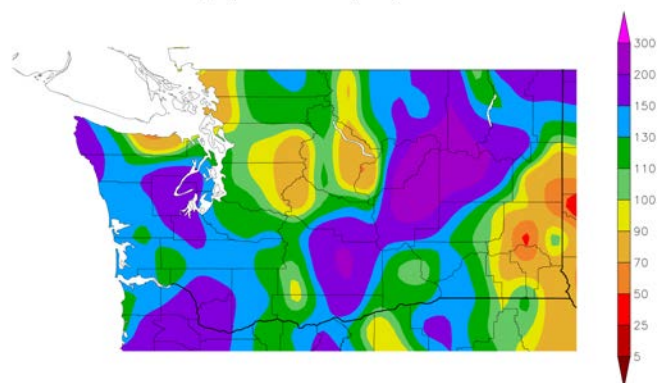


Generated 5/6/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

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

Percent of Normal Precipitation (%)
4/1/2023 - 4/30/2023



Generated 5/6/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

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

Station	Mean Temperature (°F)			Precipitation (inches)			Snowfall (inches)		
	Avg	Norm	Departure from Normal	Total	Norm	Percent of Normal	Total	Norm	Percent of Normal
Western Washington									
Olympia	46.3	48.2	-1.9	6.21	3.67	169	M	M	-
Seattle WFO	49.3	50.8	-1.5	3.15	2.98	106	M	M	-
SeaTac AP	48.5	51.3	-2.8	3.86	3.18	121	T	0	0
Quillayute	46.3	46.9	-0.6	12.00	8.11	148	M	M	-
Hoquiam	48.5	48.7	-0.2	M	5.35	M	M	M	-
Bellingham AP	47.4	49.6	-2.2	1.64	2.77	59	M	M	-
Vancouver AP	50.4	51.7	-1.3	5.18	2.93	177	M	M	-
Eastern Washington									
Spokane AP	46.4	47.0	-0.6	1.00	1.25	80	3.1	0.7	443
Wenatchee	48.4	51.1	-2.7	0.44	0.57	77	M	M	-
Omak	48.1	49.8	-1.7	1.29	0.83	155	M	M	-
Pullman AP	44.6	46.8	-2.2	1.50	1.79	84	M	M	-
Ephrata	47.7	50.8	-3.1	1.42	0.58	245	M	M	-
Pasco AP	51.8	52.7	-0.9	0.82	0.66	124	M	M	-
Hanford	51.4	53.6	-2.2	0.80	0.57	140	0.4	T	400

Table 1: April 2023 climate summaries for locations around Washington with a climate normal baseline of 1991-2020.

Climate Outlook

According to the Climate Prediction Center (CPC), neutral El Niño-Southern Oscillation (ENSO) conditions are present in the equatorial Pacific Ocean. The long-lasting La Niña that began in the latter portion of 2020 finally ended in March, and the CPC has now issued a “El Niño Watch”. Neutral conditions are expected to persist in the near-term, but [ENSO models](#) indicate a 75% probability of El Niño developing for the June-July-August period.

In contrast to our recent cool weather, the CPC temperature outlook for May (Figure 10) is calling for higher than usual odds of above normal temperatures statewide. The odds of a warmer than normal May are highest (between 50 and 60%) for northeastern WA. May precipitation is uncertain: there are equal changes (33.3%) of below, equal to, or above normal precipitation for the entire state.

The three-month May-June-July (MJJ) temperature outlook is similar to the May outlook in the sense that warmer than normal conditions have a higher likelihood of occurring. The odds are just slightly elevated, however, with between a 33 and 40% chance statewide (Figure 11). The MJJ precipitation outlook is calling for below normal precipitation for the whole state. The odds of below normal precipitation are highest for northeastern WA and are between 40 and 50% on the three-tiered scale. The remainder of the state has a 33-40% chance of below normal MJJ precipitation.



Figure 10: May outlook for temperature (left) and precipitation (right).

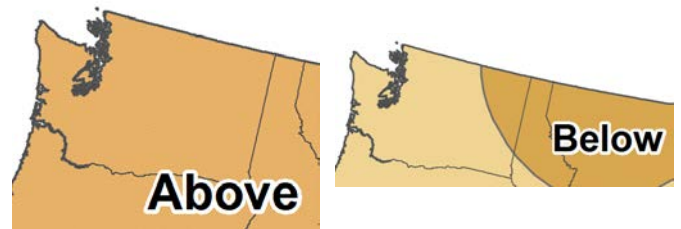
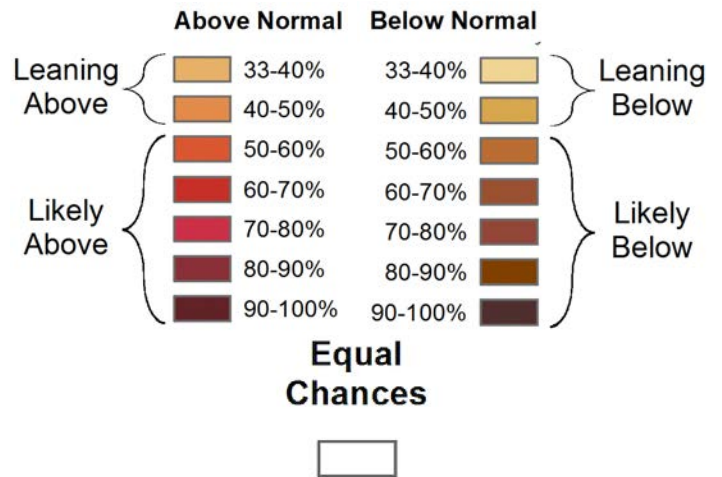


Figure 11: May-June-July outlook for temperature (left) and precipitation (right) (Climate Prediction Center).