Weather and Climate Summary and Forecast May 2023 Report

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Summary:

- The return of high-pressure in the last week of April brought a nice warm-up, but it was short-lived as the circulation has fallen back to troughing with low-pressure areas dipping south along the west coast. The combined cool SSTs offshore and meridional circulation over the west kept temperatures below average¹ in April for the entire western US, especially in the Great Basin and Rockies.
- April turned dry across the southern portion of the west while much of the PNW made up some of the short-term deficit experienced since the start of the year.
- Continued north-south flow over the west coast is allowing moderately cold core low-pressure areas to spin to our west. The result is the short-term forecast calling for unsettled conditions with temperatures running near seasonal to below average over the west with precipitation spinning onshore bringing spring thunderstorms to light rain over most regions. This should give way to more seasonal conditions in the second half of May.
- A warm-up at the end of April started snow melt, but cooler conditions have slowed the onslaught. Snow Water Equivalents range from 90-110% of normal across the northern states in the west to 200 to 800% above average in California, the Basin, and the rest of the Rockies. Note that I have not mentioned the D word here!
- The 30-day forecast has the odds tilted to California seeing average to below average temperatures and above average precipitation in May while the PNW will likely be warmer than average and see close to average precipitation. The 90-day forecast continues to show a slightly warmer scenario for the PNW, while most everywhere else is likely closer to average. El Niño is forecast to come into play over the next couple of months while the PDO remains in a strong negative phase with cold near-shore SSTs along the western coast of North America. My take is that El Niño will produce a warm summer, but the cold PDO will make it slow to come.

Past Month and Year to Date:

Although not as cold as March, April maintained the overall cool trend over the western US. Continued circulation favoring flow out of the Gulf of Alaska dipping south along the west coast has kept temperatures below average. While April was closer to average for much of California, it was 1-4°F below average for much of the west and up to 7-9°F below average in the Rockies (Figure 1). After the active patterns producing atmospheric river events over the last few months, April saw less precipitation overall, especially in California and the southwest where most of the region saw 50% or less of average for the month. For the PNW, 110-300% of normal precipitation was seen for many areas in April,





¹ Note that all references to normal or averages in this report are to the 1981-2010 climate normal for each weather/climate parameter unless stated otherwise. Also, note that the 1991-2020 climate normals are starting to become available across reporting agencies and will be used in this report when possible.

although eastern Oregon and Idaho remained relatively dry (Figure 1). For the rest of the country, the driest area was in the central to southern Plains and Texas, where drought conditions remain severe (see Drought section below). A wetter than average month was seen across the Rockies and into the northern Plains, Great Lakes, and New England. In terms of temperatures across the country during April, the cold in the west extended over the northern to southern Plains, while the rest of the eastern US saw near average to way above average temperatures (New England was 3 to 7°F above average; not shown).

Year-to-date the western US has seen one of the coldest such periods in quite a while. Temperatures are running from near average in a few isolated areas (southwest, northern Cascades) to up to 7 degrees below average in the Great Basin and Rockies (Figure 2). January through April precipitation amounts for the west show the pattern of strong atmospheric rivers and cut-off lows during the first four months of 2023. Except for dry conditions in southeastern California, the state has seen 110 to over 200% of normal precipitation since the start of the year (Figure 2). The wet year-to-date conditions extend into the Great Basin, Rockies, and Four Corners region lowering drought impacts. However, most of Oregon, Washington, northern Idaho, and western Montana have remained dry receiving 50-90% of normal. As often mentioned in this report, "when the west is cold, the east is warm" holds very true for the start of 2023 with the eastern US largely 2 to 7°F above average with New England seeing one of the mildest second half of winters on record (not shown). Precipitation amounts for the water year are mixed across the eastern half of the country with substantially drier than normal amounts experienced in the Plains, much of Texas, and Florida, while the mid-south, southeast, and portions of the eastern seaboard have been closer to average or slightly wetter than average (not shown).



Figure 2 – Western US 2023 year to date (January 1, 2023 to April 30, 2023) temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Heat Accumulation:

For the first look at growing degree-days (GDDs) over the western US for 2023, Figure 3 shows that even the cool start has produced some heat. The absolute April GDD numbers were relatively low across the west, but the deviation from the climate normals show that the month was slightly above average for much of the west, although the central valley of California, portions of the western valleys of Oregon and Washington, and much of eastern Washington and Idaho are currently running slightly below average. Converting the mapped data in Figure 3 to days ahead or days behind normal finds the west mostly 6-18 days behind normal accumulation amounts at the end of April (not shown).

Heat accumulation (GDD) amounts for four locations that I have tracked for many years in wine regions in Oregon are mostly above both the 1981-2010 and 1991-2020 climate normals for the month of April. The exception is that eastern Oregon is slightly below the 1991-2020 climate normals. Also, each of these locations had between 150% to over 500% of what they accumulated in April 2022, albeit last April was one of the cooler April's on record.



Figure 3 – Western US April 2023 growing degree-days (image from Climate Impacts Research Consortium, University of Idaho).



Figure 4 – Cumulative growing degree-days (base 50°F, no upper cut-off) for McMinnville, Roseburg, Milton-Freewater, and Medford, Oregon. Comparisons between the current year (2023) and a recent cool year (2010), a recent warm year (2015), and both the 1981-2010 and 1991-2020 climate normals are shown (NCDC preliminary daily data).

Drought Watch – The drought footprint in the continental US has dropped below 50% for the first time in many years, according to the U.S. Drought Monitor. The Northern Plains south to Texas continues to be the driest region in the country, while the eastern US is now largely free from drought, except south Florida. The recovery from the historic

drought footprint over the west of the last few years is amazing. While April was not as wet as the last few months in California, precipitation amounts in the PNW (Figure 1) helped lower the drought severity there (Figure 5). While drought declarations are still in place in some areas of the west, the overall magnitude and spatial impacts have lessened tremendously. Thanks to record-breaking rain and snow across California, the Great Basin states, and the Rockies dramatic changes in drought have occurred. Today, drought conditions can be found in close to 50% of the western US compared to over 95% in some level of drought at the start of the water year. The most extreme categories of drought (extreme and exceptional) across the west dropped to close to 1% over the last 60 days and remain at the lowest level in the last decade. By state, Washington has dropped to nearly 37% of the state in the lowest levels of drought. Oregon continues to have the largest area of extreme drought coverage in Oregon has dropped from close to 100% at the start of the water year to close to 75% now. Idaho has also seen drought coverage drop from nearly 98% of the state to less than 70% today. For California, the state started the water year in October at 100% in some level of drought and 40% in either extreme or exceptional drought. Today the state has dropped to just less than 32% in some level of drought with the more extreme drought categories remaining off the map for three straight months. What a turnaround!

Heading into summer the seasonal drought outlook points to improvement across most of the western US (Figure 5, right panel). Portions of southern California, southern Nevada, and central Utah, along with much of eastern Oregon and Washington and northern Idaho are expected to remain in drought or develop further as we move into summer. However, the improvement or removal of drought status is forecast for most of California, areas of the southwest, and portions of the northern Rockies and Plains. The area of the country expected to experience worsening drought conditions continues to focus on the central Plains south into Texas and shifting west into New Mexico (Figure 5).



Figure 5 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – Weakening sea surface temperatures (SSTs) in the central-eastern equatorial Pacific continued in April with the region now firmly in an ENSO-neutral state (Figure 6). Neutral conditions are also now seen in many ocean and atmosphere variables across the tropics. The update from the Climate Prediction Center (CPC) in April issued an El Niño watch, which typically signals the start of the warm phase of ENSO. Most models and forecasters are pointing to El Niño having a 73% chance of starting during the May-July period. As we move into the summer and anticipate the fall season, El Niño becomes the dominant state of the Tropical Pacific with forecast probabilities in the 78-87% range.

North Pacific Watch – While the tropics are transitioning from a cold to warm state (El Niño), sea surface temperatures along the North American coast remain cold and have expanded over a wider area and continue to extend further west and southwest (Figure 6). Out in the central North Pacific, the pool of warmer SSTs continues at the same magnitude but has contracted spatially over time. The overall pattern continues to show the strongly negative Pacific Decadal Oscillation. The continued strong north-south circulation of the atmosphere over the west coast has supported the wind field along the coast, enhancing the cooler than normal surface water temperatures via upwelling. The feedback between the atmosphere and ocean along the west coast continues to have a strong influence on our cooler than

average temperatures over the last few months and will likely continue to influence the short-term forecast (see below). With the onset of warming in the Tropical Pacific (El Niño), we are likely to see some warmer atmospheric temperatures as we move into summer, but the magnitude of the colder offshore SSTs might reduce or slow the overall El Niño effect.



Figure 6 – Global sea surface temperatures (°C) for the period ending May 1, 2023 (image from Tropicaltibits.com).

Forecast Periods:

Next 5 Days: Unsettled conditions will continue over the next few days. The high-pressure influence of the last week in April gave way to a trough of cooler air out of the Gulf of Alaska which spun up a large low-pressure area off the west coast. This low is spinning air from the southwest into California bringing thunderstorm activity to many. This situation will keep temperatures below seasonal averages up and down the west coast and bring rain off and on over the next five days or so.

6-10 Day (valid May 8-12): The cool pattern looks to extend into this forecast period. A trough over the western US will keep things unsettled leaving temperatures fluctuating between cooler than average to mild to slightly warmer than average. Precipitation will be in play in an on again, off again framework with low-pressure areas continuing to spin moisture onshore. Precipitation amounts over the west will likely be low, but frequent enough to keep the ground wet in many places. As is nearly always the case, while the west is cool the east is warm. From the front range of the Rockies eastward, temperatures are forecast to be much warmer than average. Precipitation amounts are forecast to be below average over the Four Corners region and northern New England, while the Gulf Coast and mid-south are expected to be wetter than average.

8-14 Day (valid May 11-17): By mid-month temperatures are expected to rebound over the western US with the PNW likely to see the warmest conditions. Precipitation is forecast to be near normal to below normal over the western US as the trough gives way to some minor ridging in the circulation over the west. Across the rest of the country, temperatures are expected to be below average in the southwest into Texas but continued warm across the mid-section of the country, Gulf Coast, and eastern seaboard. Precipitation amounts in the US are forecast for above average from New Mexico and Texas across the Gulf to Florida, near normal in the mid-west to New England, and below average in the western Great Lakes.

30 Day (valid May 1-31): The month of May is forecast to end up with an interesting north-south pattern in the west with the PNW likely seeing above average temperatures while California and the southwest are forecast to see below average temperatures for the month (Figure 7). The cooler conditions likely southward come from the anticipated cloud cover and rain coming in the first 15-20 days of the month from the trough and low-pressure areas spinning far south off the coast of California. The precipitation forecast shows the pattern associated with this flow likely leaving California largely above average for the month. The rest of the country is forecast to be close to seasonal temperatures, except in

the mid-south where below average temperatures are anticipated, and for Florida and northern New England which are expected to be warmer than average. Precipitation amounts for May are forecast to be above average across the Gulf Coast states, and dry in the upper Midwest and Great Lakes (Figure 7).

90 Day (valid May-June-July): The seasonal forecast heading into summer is hinting at the western US likely seeing above average temperatures in the PNW to closer to average temperatures in California (Figure 7). Near average temperatures are also likely in the northern Rockies, across the Plains, and into the western Great Lakes, while the southwest, across the Gulf and southeast, and into the northeast are forecast for above average temperatures. The seasonal precipitation forecast is calling for most of the western US to have equal chances to see slightly above to slightly below amounts, while the northern PNW and desert southwest are forecast to see a dry period. Higher than average precipitation amounts are expected in the southeast while near average precipitation is forecast elsewhere (Figure 7).



Figure 7 – Temperature (left panel) and precipitation (right panel) outlooks for the month of May (top panel) and May, June, and July (bottom panel) (Climate Prediction Center, climate.gov).

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