



Office of the Washington State Climatologist

August 2024 Report and Outlook

August 8, 2024

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

July Event Summary

Mean July temperatures were above normal across the state, with some locations in northeastern Washington exceeding 8°F above normal.

Averaged statewide, July average temperatures ranked as the 2nd warmest in the 130-year record. For Spokane, the July 2024 average temperature ranked as the warmest on record, with anomalies 7.2°F above the 1991-2020 normal. Table 1 shows the average July 2024 temperature rankings for multiple locations in Washington. July precipitation was minimal and a large majority of the state received less than 30% of normal. Averaged statewide, July ranked as the 25th driest.

Station	July Average Temperature Rank	Record Began
Spokane	1	1881
Olympia	3	1941
SeaTac	3	1945
Vancouver	3	1997
Pullman	5	1998

Table 1: July average temperature rankings (warmest to coldest) for selected WA locations.

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Figure 1 shows the daily maximum and minimum temperatures and precipitation for SeaTac Airport for July. In the early part of July, daily maximum temperatures were above normal and continued for the majority of the month for not only SeaTac but many other locations in Washington State. For example, Bellingham had mostly above normal temperatures for the majority of July as well. Bellingham temperature departures from normal are plotted in Figure 2, revealing similar patterns to Figure 1 for SeaTac. Not only was the month warm overall, but there were record-breaking daily temperatures for multiple days and locations. SeaTac experienced two record-breaking days of high temperatures on July 7th (93 °F) and 10th (98 °F). Spokane similarly saw three days of record daily high temperatures on the 8th (100 °F), 9th (102 °F), and 10th (104 °F). Multiple other locations had reports of record daily highs,

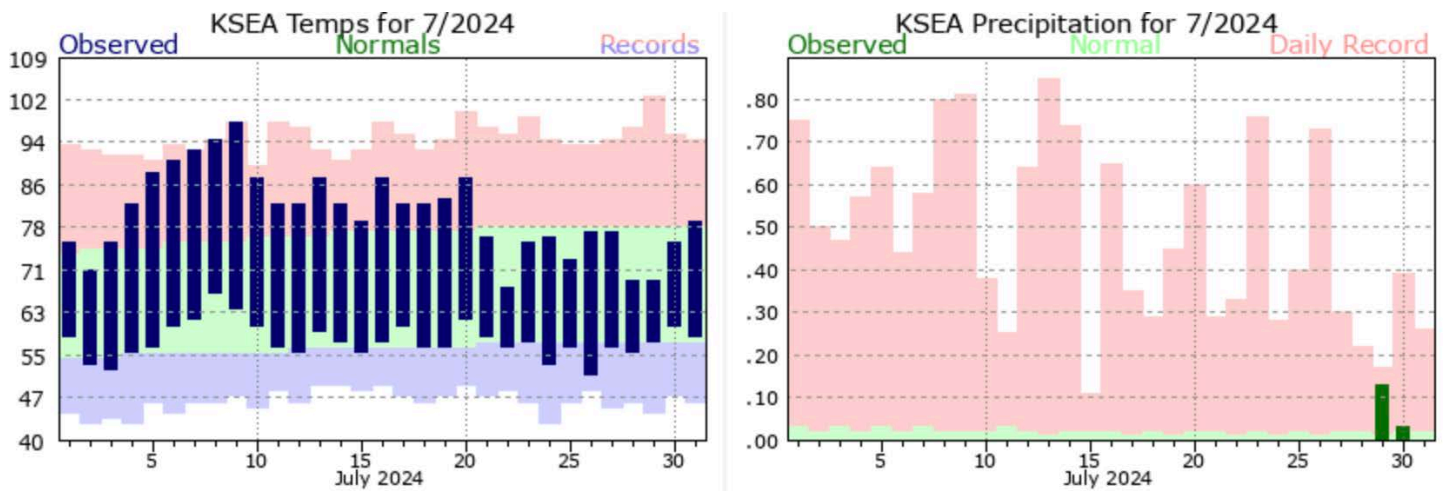


Figure 1: July 2024 daily temperatures (left) and precipitation (right) for SeaTac International Airport compared to the 1991-2020 normal (green envelope) and previous records (blue and red envelopes; NWS).

including Quillayute, Bellingham, Wenatchee, Pullman, and Vancouver. SeaTac Airport recorded the longest stretch of consecutive days 80°F or above with 17 days from July 4 through July 20. This beat out a 15-day run in June and July of 2015. Similarly, Spokane Airport recorded their longest stretch of days 90°F or above with 20 days from July 5 through July 24. This beat a 15-day run in July and August of 2017.

Climatologically, July is the driest month of the year for a majority of Washington locations. Precipitation in July 2024 was even less than expected for most of the state. The largest exception came at the end of the month with a

short-lived wet system. Figure 3 shows the precipitation totals measured by volunteer observers from July 29th through July 31st. The heaviest precipitation fell in the northern Puget Sound region. For example, Bellingham measured 0.96" of rain on July 29th. For the rest of the month, the temperatures dip below normal, as they did for most of Washington. This and the precipitation at the very end of the month provided

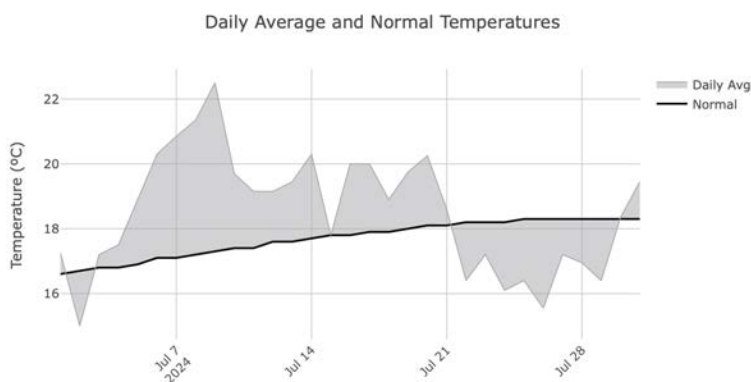


Figure 2: July 2024 daily average temperatures difference (°C) from the 1991-2020 normal for Bellingham (CPC).

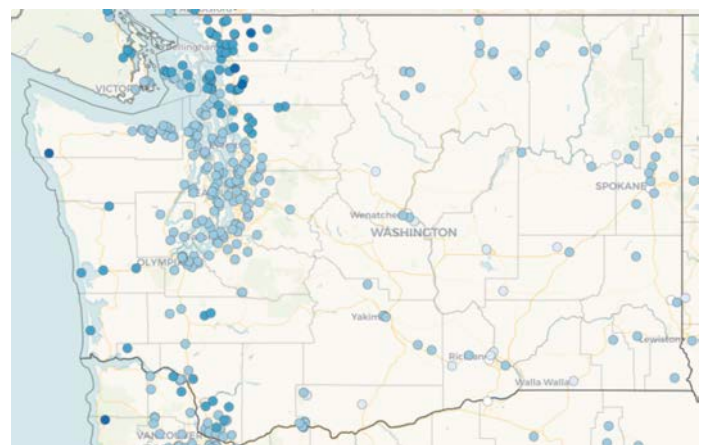


Figure 3: Accumulated precipitation in inches from July 29- July 31, 2024 from CoCoRaHS volunteer observers.

temporary relief from the dry conditions.

With the above normal maximum temperatures and dry conditions in July active fires have begun to make an appearance. There are 8 active wildfires in Washington at the time of this writing (Figure 4). More information on the specifics of their containment situation, cause, and start date can be found on the [Northwest Interagency Coordination Center](#) (NWCC).

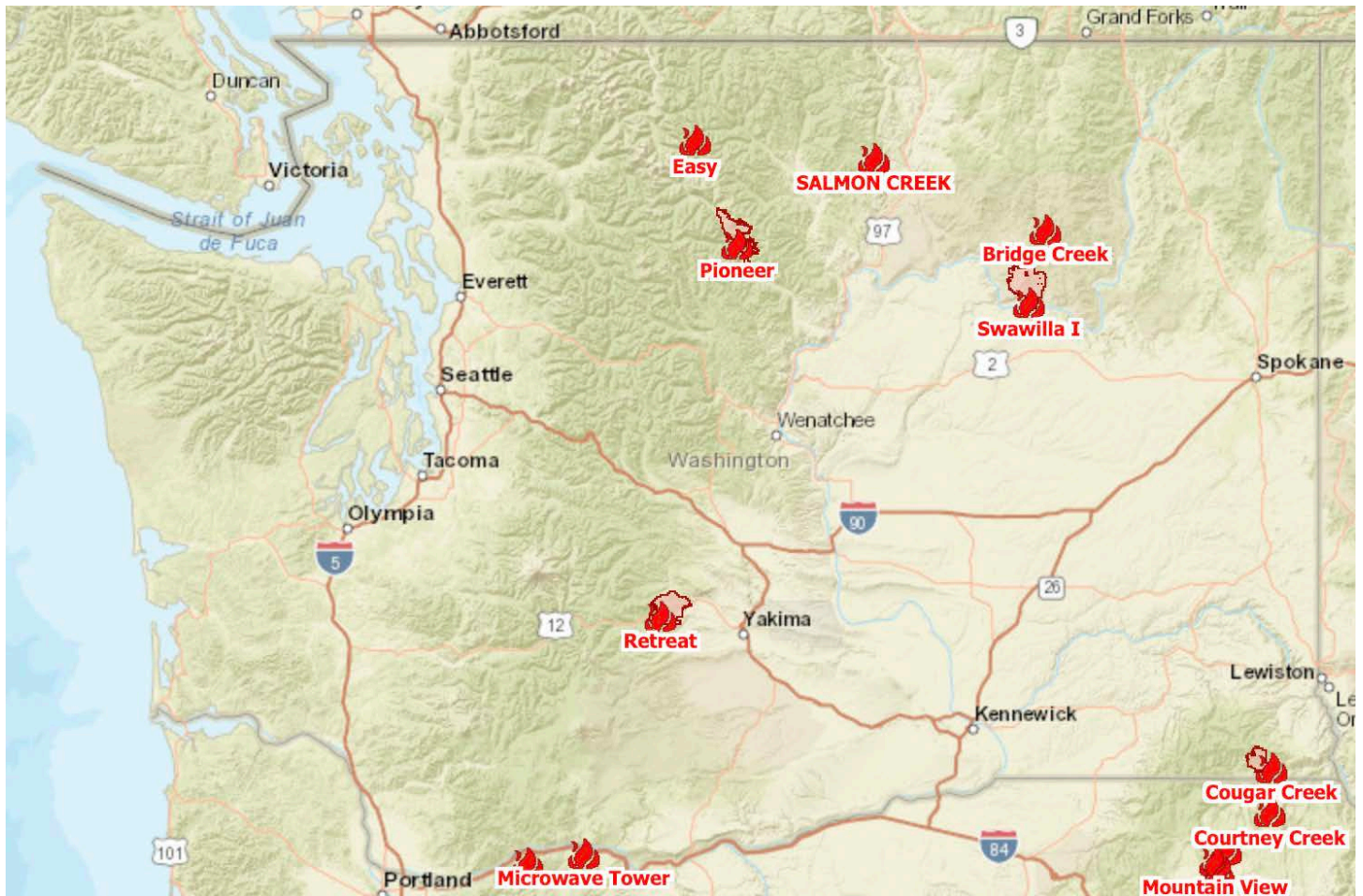


Figure 4: Active Fires as of August 6 (NWCC).

Stream Flow and Drought Summary

Average streamflow relative to normal decreased due to the lack of precipitation this July. Stream gauges in parts of the southern and central Puget Sound, Olympic, Northwest, and Northeast regions averaged below normal to much below normal for July (Figure 5). Locations near the coast and in southwestern Washington had normal streamflow.

The latest U.S. Drought Monitor map (Figure 6) remained the same in western Washington as it was in the previous newsletter. Drought conditions have worsened in parts of eastern Washington, specifically the eastern border of the Cascade Mountains where there is now more Severe Drought (D2) and Moderate Drought (D1). In addition, there are now Abnormally Dry (D0) conditions in southeastern Washington that were not present in June.

The Washington state drought emergency was extended in mid-April for most of the state and is still in effect.

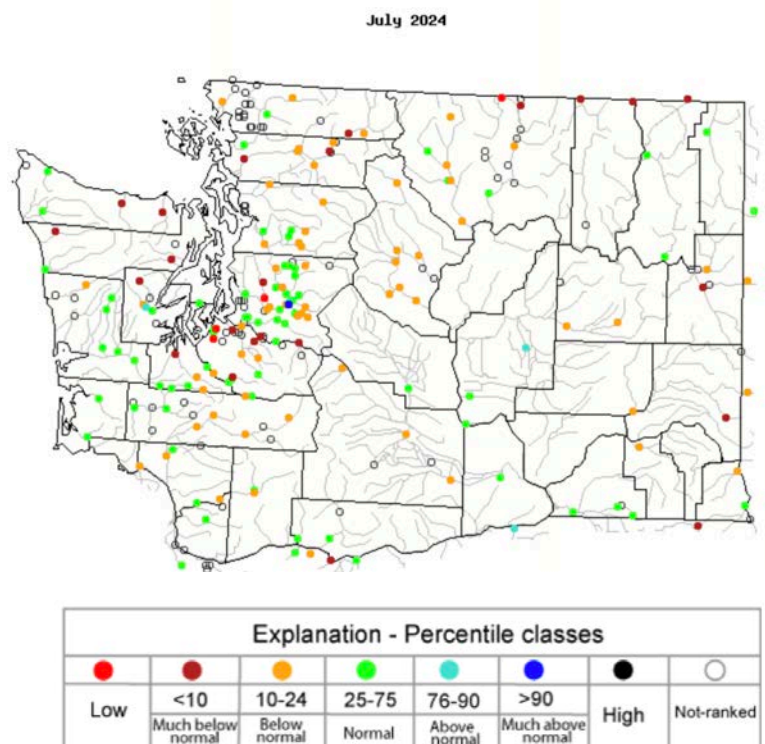


Figure 5: The average July streamflow percentiles (USGS).



Report Your Drought Impacts

Are you experiencing a drought impact? Your on-the-ground observations are critical in helping us understand the broad picture of drought in the state. The National Drought Mitigation Center and partners have developed Condition Monitoring Observer Reports on Drought (CMOR-drought), a short survey that allows the public to enter their observations regarding crops, water supply, fire, etc. We would greatly appreciate your input, and these reports help experts assess drought impacts for the U.S. Drought Monitor maps.

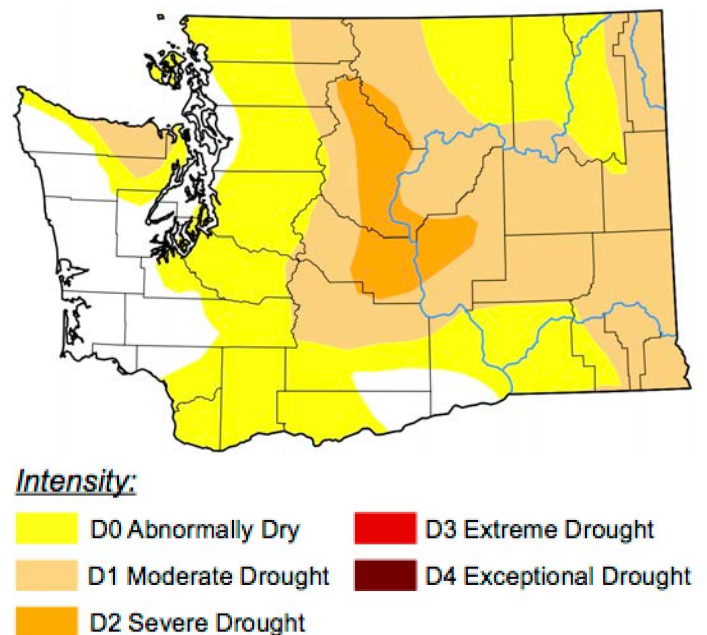


Figure 6: The August 8, 2024 edition of the U.S. Drought Monitor.

Heat Waves: Heat-related illness (HRI) Prevention and Adaptation

Climate Matters Series

Author: Sara Salimi

With the hotter conditions in early July across the Pacific Northwest we've received a lot of questions about trends in heat waves. Past research from OWSC has shown that daytime heat waves — which we defined as 3 consecutive days above the 99th percentile — do not yet show a statistically significant trend across western Washington and western Oregon. In contrast, there has been a significant increase in overnight heat events (Bumbaco et al. 2013). As warming accelerates due to climate change, we expect these trends to become more clear, with more frequent and intense heat waves in the future. We're currently updating our 2013 study and will share our results here when they are finalized. In the meantime, the focus of this piece is to review heat-related illness prevention strategies and showcase King County's new Extreme Heat Mitigation Strategy.

Heat-Related Illness (HRI) and Prevention

Rising temperatures and the possibility of more frequent heat waves are a growing concern for the livelihood of Washingtonians, as recent extreme heat in the Pacific Northwest has brought up major concerns regarding human health and safety, and nature preservation. Ecosystems are also harmed by excessive heat, but in this month's newsletter we are focusing on the human impacts. Exposure to extreme heat can stress multiple organ systems and put individuals at risk of heat-related illness (HRI) and mortality (Hess et al. 2023, Vogel et al. 2023). This means it is important to quickly identify what is causing the HRI symptoms so that appropriate action can be taken to regulate health (Figure 7). Some of the notable heat-related illnesses include acute heat illnesses (e.g., heat exhaustion, heat stroke), chronic disease exacerbations (e.g., flares of cardiovascular, kidney, respiratory, and psychiatric disorders), injuries (e.g., occupational injuries, drowning), and adverse

pregnancy outcomes (e.g., premature delivery, low-birth weight; Hess et al. 2023, Vogel et al. 2023). People who are at greater risk of HRI are the elderly, children, pregnant people, people who have chronic medical conditions, and the unhoused population (Vogel et al. 2023). People in urban areas can be more vulnerable to adverse health outcomes due to the urban heat island effect, where urban areas can get hotter because there is more concrete, asphalt, and fewer trees in neighborhoods.

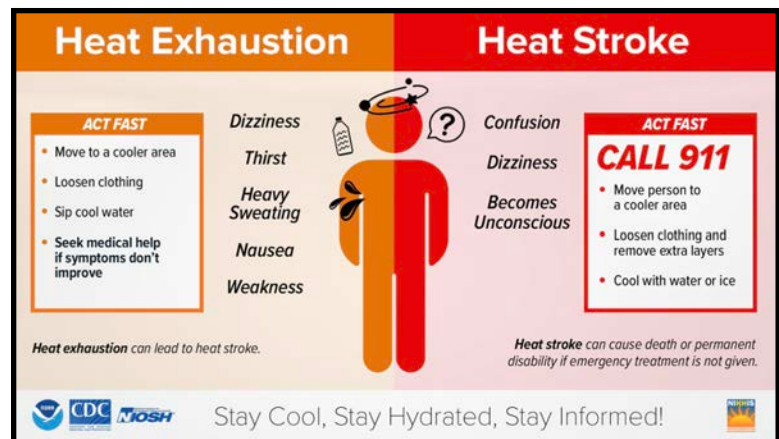


Figure 7 : Take appropriate action in the case of heat exhaustion (left side) and heat stroke (right side). Some others ways you can create a cool environment is by placing a cool damp towel on the neck of the individual. If person is able a cool shower can be just as effective. (Vogel et al. 2023)

Outside workers such as those in agriculture, construction, firefighting, and manufacturing are at high risk of heat-related illness and even death. It is crucial to track HRI in the workplace (both for indoor and outdoor workers) and to introduce prevention and mitigation strategies that make sense for maintaining a healthy and safe environment. After the extreme heat wave experienced in the Pacific Northwest in June 2021, the Washington State Department of Labor & Industries (L&I) revised the 2008 outdoor heat

exposure rule, which went into effect on July 17th, 2023 (Ahmad et al. 2023).

In the new version the outdoor heat exposure rules are applied year-round and outdoor temperature levels depend on the type of clothing (breathable or not) used at work. Also, the outdoor temperature action level has been reduced from 89 °F to 80 °F (Ahmad et al. 2023; Table 2). Some additional information was included in the definitions for the outdoor heat exposure rules including acclimatization, establishing a buddy system, risk factors from HRI, and shade (Ahmad et al. 2023). The new rules put greater responsibility on both the employer and the employee to ensure safe working conditions during extreme heat situations. The employer must include a written outdoor heat exposure safety program that incorporates the following: shade or other means to reduce body temperature, procedures for providing cool

drinking water, acclimatization methods (e.g. close observations of employees not acclimatized yet, and buddy systems), emergency response procedures for employees demonstrating HRI signs and symptoms (information and training), a high heat procedure (e.g. cool-down rest periods), and methods of observing signs and symptoms for HRI by the employer (Table 3; Ahmad et al. 2023).

The Washington State Department of Labor & Industries has recognized the extreme heat impacts by taking action to set new rules that potentially change the functionality of the workplace to benefit workers. There are many options that supervisors can consider to keep their employees comfortable and cool while also reducing their heat exposure such as providing air conditioning and scheduling work during the cooler hours of the day.

Outdoor Heat Exposure Rules	When do the rules hold?	Outdoor Temperature Action Levels	Definitions	Mandatory
Old (2008)	May-September Only	89 F - for all clothing		
New (2023)	Year-round	52 F - for employees wearing non-breathable clothes (vapor barrier clothing or PPE) 80 F - for all other clothing	• Acclimatization • Buddy system • Risk factors for HRI • Shade	• Cool-down rest periods (paid) • Close observation • Areas of shade • Cool drinking water • Outdoor heat exposure safety program • Information and training

Table 2 : Heat Exposure Rules Comparison Old (2008) vs New (2023) (Ahmad et al. 2023).

Preventative Cool-Down Rest Periods	Access to Shade	High Heat Procedures (Mandatory)	Acclimatization (Mandatory)
If employees ever feel overheated employers must provide paid cool-down rest period. If during meal break it isn't paid.	There needs to be enough shade provided by employer near work area that is large enough to cover for all employees.	10-minutes cool-down every 2 hours when temperatures > 90 F. 15-minute cool-down every hour when temperatures ≥ 100 F.	Employers must closely observe employees for the 14 days that aren't accustomed to the heat. Regular communication if employee alone or set buddy system.

Table 3 : Employer Rules For Extreme Heat Exposure (Ahmad et al. 2023).

Adaptation: New Extreme Heat Plan (King County)

A King County study exposed inequalities that some communities are being disproportionately affected by heat, with different parts of the county experiencing as much as a 20°F difference in temperature at the same time (Iyaz et al. 2023). This poses a concern as people living in heat islands are disproportionately low-income, people of color, seniors living alone, and people with limited English proficiency (Iyaz et al. 2023). The heat mapping project that King County and the City of Seattle part took in has allowed us to see these disproportionate impacts of heat in King County. Volunteers helped gather the temperature measurement data for this heat mapping project during a one-day extreme heat event that occurred on July 27, 2020 (Iyaz et al. 2023). The measurements were collected over multiple times of the day (6-7 am, 3-4 pm, and 7-8 pm) (Iyaz et al. 2023). Figure 8 shows the surface-level temperatures that were recorded during the evening in the region, which clearly shows higher temperatures for urban areas with less tree canopy when compared to areas that aren't as urbanized. This information is helpful for informing near-term and long-term actions.

King County recently released its Extreme Heat Mitigation Strategy which aims to take a comprehensive approach to preparing the community in King County for the impacts of climate change (Iyaz et al. 2023). The King County Extreme Heat Mitigation Strategy is a 5-year plan (2024-2029), and there are 20 actions that either help with near-term heat coping activities (e.g. cold towels on windows, cold showers, seeking air-conditioned spaces, or fans) or longer-term heat preparedness intervention (e.g. multilingual communication of heat preparedness and mitigation content, heat resilience training, and increasing tree canopy areas) (Iyaz et al. 2023). The 20 actions are organized into 6 overarching categories that summarize the strategy. For more information visit [The King County Extreme Heat Mitigation Strategy](#) (Table 4).

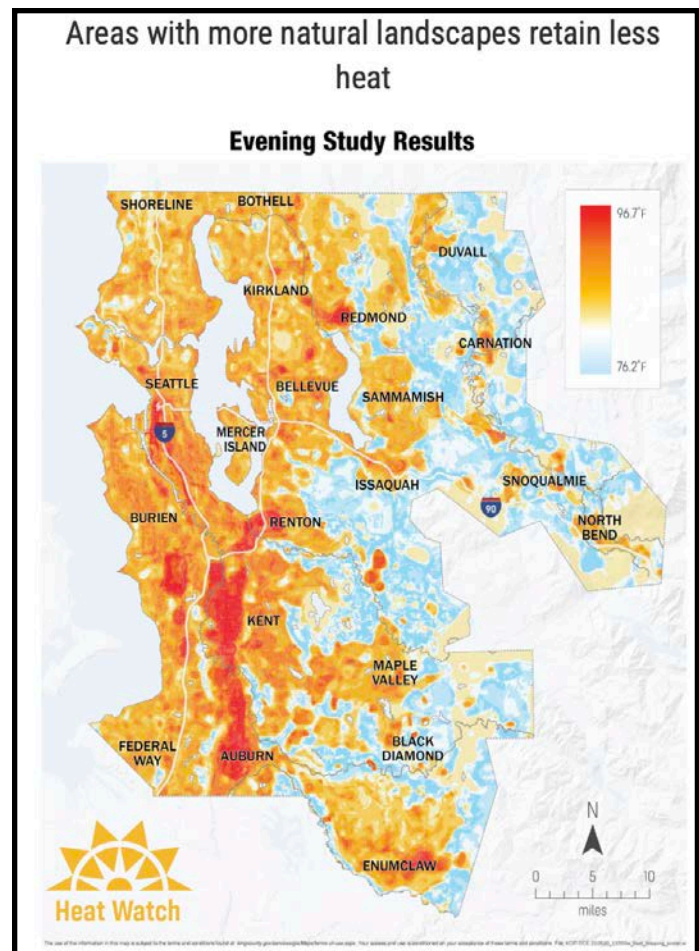


Figure 8: Surface-level temperatures in the Evening of July 27, 2020 (Iyaz et al. 2023).

Help people stay cool and safe indoors	• Provide home cooling systems • Increase access to cooling locations • Improve energy efficiency • Assistance on utility bills
Help people stay cool and safe outdoors	• Support drowning prevention • Support those that are unhoused • Heat safety at work
Cool our neighborhoods	• Increasing urban tree canopy • Expand access to green space and parks • Preserve forested areas
Design for heat	• Develop codes and policies • Plans for schools • Integrating heat resilience into building
Increase heat safety and awareness	• Addressing the need for multilingual awareness regarding heat • Communication and trainings • Active alerts
Support heat action	• Pursuing sustainable partnerships and funding opportunities • Support community-led heat resilience efforts

Table 4 : The 6 categories of the King County Extreme Heat Mitigation Strategy (left column) and the actions for each (right column) (Iyaz et al. 2023).

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Ahmad, H. R., and Joyce, P. D. 2023. Employers Feeling the Heat: Washington Adopts Permanent Changes to Outdoor Heat Exposure Rules Effective July 12, 2023. *Seyfarth*. <https://www.seyfarth.com/news-insights/employers-feeling-the-heat-washington-adopts-permanent-changes-to-outdoor-heat-exposure-rules-effective-july-17-2023.html>

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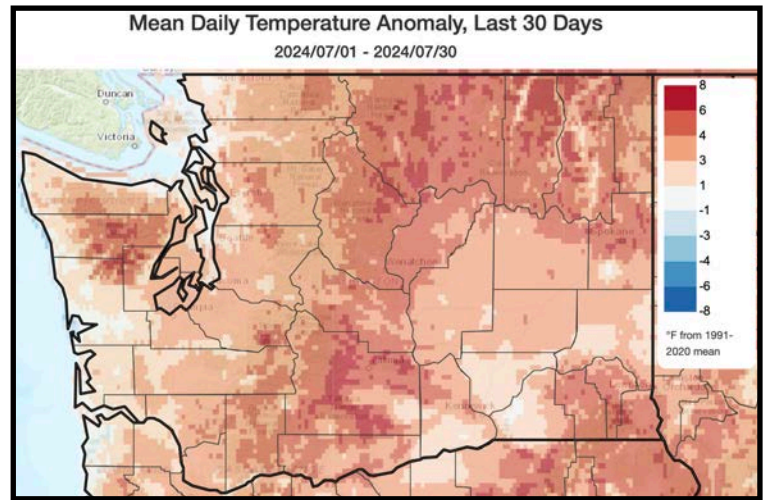
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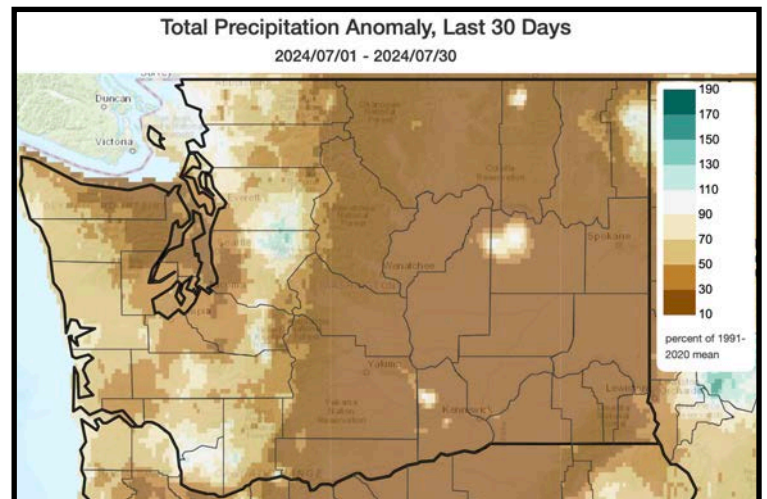
Climate Summary

July average temperature anomalies were above normal for a majority of Washington State. The map to the right shows that most of the warm temperature anomalies between 3 and 8 °F above normal were located in the Northeastern region, the eastern slopes of the Cascade Mountains, and the Olympic Mountains. Spokane was 7.2 °F above normal as shown in Table 5. Some locations weren't as anomalously warm in comparison to the other areas this month: Hoquiam and Bellingham, for example, were 1.8 °F and 1.1 °F above normal (Table 5).

Total July precipitation was mostly below normal across Washington, but there were exceptions as some areas did receive above-normal precipitation. Bellingham and Hanford measure 116 and 150% of their normal July precipitation, respectively. Bellingham was able to go above the climatological normal for precipitation because the late July storm was most intense in that area. A majority of eastern Washington locations (Spokane, Wenatchee, Omak, Pullman, Ephrata, and Pasco) received less than 50% of their normal July precipitation. Some areas in western Washington like SeaTac Airport and Olympia received 27% and 40% of normal precipitation, respectively. Coastal areas like Quillayute and Hoquiam had somewhat below-normal precipitation, but not as extreme according to Table 5. The below-normal precipitation across the state was in large part due to the high-pressure system that persisted over the region as well as the strong heat wave in the early part of July.



July temperature (°F) departure from normal relative to the 1991-2020 normal (Climate Toolbox).



July total precipitation percent of the 1991-2020 normal (Climate Toolbox).

Station	Mean Temperature (°F)			Precipitation (inches)		
	Average	Normal	Departure from Normal	Total	Normal	Percent of Normal
Western Washington						
Olympia	67.7	64.2	3.5	0.21	0.53	40
Seattle WFO	70.0	66.5	3.5	0.25	0.78	32
SeaTac AP	69.8	67.1	2.7	0.16	0.60	27
Quillayute	62.3	59.3	3.0	1.51	1.58	96
Hoquiam	62.1	60.3	1.8	0.69	0.85	81
Bellingham AP	65.0	63.9	1.1	1.02	0.88	116
Vancouver AP	72.5	69.0	3.5	0.07	0.42	17
Eastern Washington						
Spokane AP	78.2	71.0	7.2	0.01	0.42	2
Wenatchee	80.2	74.7	5.5	0.00	0.24	0
Omak	79.6	73.7	5.9	0.00	0.52	0
Pullman AP	70.2	67.0	3.2	0.02	0.39	5
Ephrata	78.5	75.3	3.2	0.00	0.30	0
Pasco AP	78.1	74.7	3.4	0.00	0.15	0
Hanford	81.6	78.2	3.4	0.30	0.20	150

Table 5: July 2024 climate summaries for locations around Washington with a climate normal baseline of 1991-2020.

Climate Outlook

According to the Climate Prediction Center (CPC), conditions in the equatorial Pacific Ocean remain ENSO-neutral, and a “La Niña Watch” is currently in effect. It is expected that La Niña will develop sometime in the late summer/early fall. There is a continuation of below-average subsurface ocean temperatures in the eastern Pacific and low-level easterly wind (trade wind) anomalies in July. La Niña development is favored in the coming months. According to ENSO models, by the August-October period, there’s a 70% chance of La Niña conditions, 29% chance of neutral conditions, and only 1% chance of El Niño.

The CPC August outlook (Figure 9) has higher odds of above-normal temperatures for most WA except for the coast which has equal chances. The odds of warmer-than-normal temperatures are higher in the eastern part of the state, ranging between 40% and 60% on the three-tiered scale. For precipitation, there are higher odds of below-normal precipitation for WA (excluding the coast) with the majority of the state falling between the 33% and 50% range.

The late summer into fall (August-September-October; ASO) temperature outlook (Figure 10) decreased the area of Washington expected to have above-normal temperatures. Most of the state now has equal chances of below, equal to, or above-normal temperatures as an outcome. Only a small portion of southeastern Washington has higher odds of above-normal ASO temperatures (33-40% chance). The ASO precipitation outlook shows a higher chance of above-normal precipitation in western Washington, but for the rest of the state it remains uncertain.

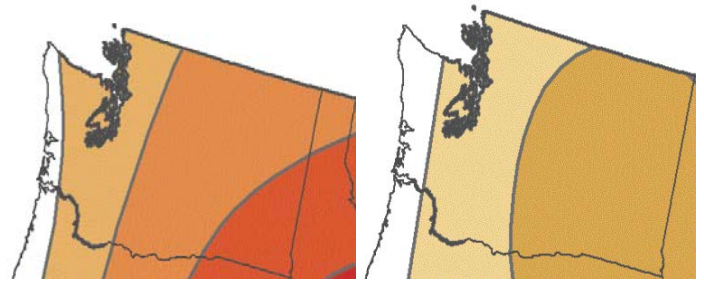


Figure 9: August outlook for temperature (left) and precipitation (right).

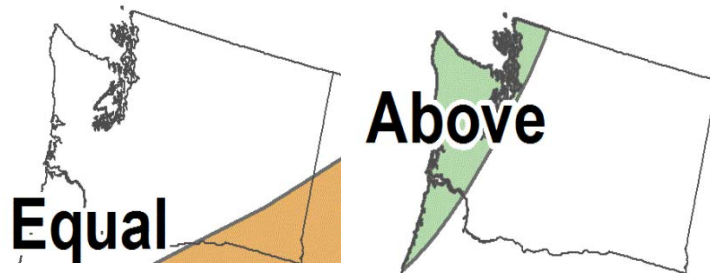
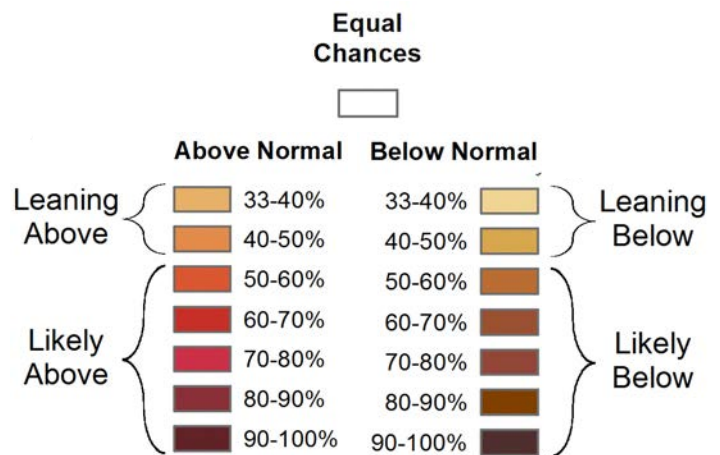


Figure 10: August-September-October outlook for temperature (left) and precipitation (right). (Climate Prediction Center)

About the August Climate Matters Author



Sara Salimi (she/her) is a new research climatologist with the Office of the Washington State Climatologist. She recently graduated from the University of Miami with a Masters in Weather Forecasting where she had the opportunity to produce reliable graphics aimed at increasing public interpretation and decision making for different weather-related hazards (particularly hurricanes and winter storms). Previously, she received her Bachelors in Climate and Meteorology with a minor in Mathematics from the University of Washington.

Sara is eager to collaborate with the UW Climate Impacts Group in communicating the current climate conditions as well as future climate issues in Washington State (ex: water management, drought, and floods) through newsletters and synthesis reports. She is also helping organize the Climate Matters Series page for the new OWSC website. In her free time she enjoys hiking, reading, and writing poems.