The Inland Northwest Informer

Information For Storm Spotters, Cooperative Observers And Everyone

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Fall/Winter 2021 - Volume 29

Historic Heat Wave - Early Summer 2021

By Ed Townsend, Science and Operations Officer and Cole Evans, Meteorologist

Over the last full week of June 2021, an anomalous high pressure ridge amplified over the Pacific Northwest, leading to an unprecedented heat wave over the region. Despite being only a week into astronomical summer, the magnitude of this ridge led to sites all across the region setting all-time record high temperatures.

June 2021 High Temperature Summary

Location	Hottest Temperature Recorded	Highlights
Pendleton, OR	117°F on June 29	Four Daily Highs and the June Monthly Record Broken
Dallesport, WA	118°F on June 28	**All-time High Temperature Broken**
Yakima, WA	113°F on June 29	**All-time High Temperature Broken**
Pasco, WA	115°F on June 27	**All-time High Temperature Tied**
Walla Walla, WA	116°F on June 29	**All-time High Temperature Broken**
Hermiston, OR	118°F on June 29	**All-time High Temperature Broken**
Redmond, OR	112°F on June 29	**All-time High Temperature Broken**
Meacham, OR	103°F on June 29	Three Daily Highs and the June Monthly Record Broken

Figure 1. Records for June 2021

The severe magnitude of this heat wave led to at least 116 deaths in Oregon as reported by the Associated Press in July and 140 in Washington per the Washington State Department of Health. The majority of deaths occurred in Portland and Seattle, which saw all-time record high temperatures of 116°F and 108°F, respectively. Lack of sufficient cooling infrastructure contributed to the death toll too, as many homes in the area lack air conditioning. Fewer deaths were seen in northeast Oregon and south central Washington, which could be attributed in part to being more acclimated to summer heat waves. However, the timing, duration, and severity of this event make the record-breaking high temperatures stand out as especially exceptional, considering the area typically does not see its highest summertime temperatures until late July and early August.

The origins of the amplified upper-level ridge of high pressure associated with the heat wave actually stemmed from an upper-level low over the northern Pacific. From June 20 to June 23, the upper low advected colder air from the Bering Sea, strengthened the upper-level jet and led to the development of a low pressure system. This caused the weather pattern to amplify, deepening the low as well as strengthening the upper-level ridge downstream. By June 21, the influence of the ridge was evident over the Pacific Northwest, with high temperatures rising to the upper 90s across the Columbia Basin, prompting NWS Pendleton to issue heat advisories for the lower Basin. By June 25 the axis of the ridge positioned itself over the Pacific Northwest, with only little movement seen through June 30. Daily record highs were set across most sites in the forecast area beginning June 25, with all-time record highs being set on June 27, 28, and 29. The hottest

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Banner Image by A. Adams

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temperatures recorded during the event occurred on the 28th and 29th. The upper-level ridge would then break down starting June 30 into July 1 and was attributed to a developing trough over the Gulf of Alaska.

As one of the leading weather-related killers, it's important to assess yourself, family, friends, and co-workers as everyone is impacted by the heat differently. Those that are especially sensitive, the heat vulnerable, which includes children, disabled, or elderly adults, are impacted at lower thresholds. Furthermore, outdoor workers can be at a higher risk as well! As such, be sure you know what the symptoms are of heatstroke and heat exhaustion, what you can do to prevent heat-related illnesses, and how to get the forecast any given day.

You can always get the latest forecast at weather.gov/Pendleton and learn how to stay stay safe during a heat wave at www.weather.gov/heat. ❖

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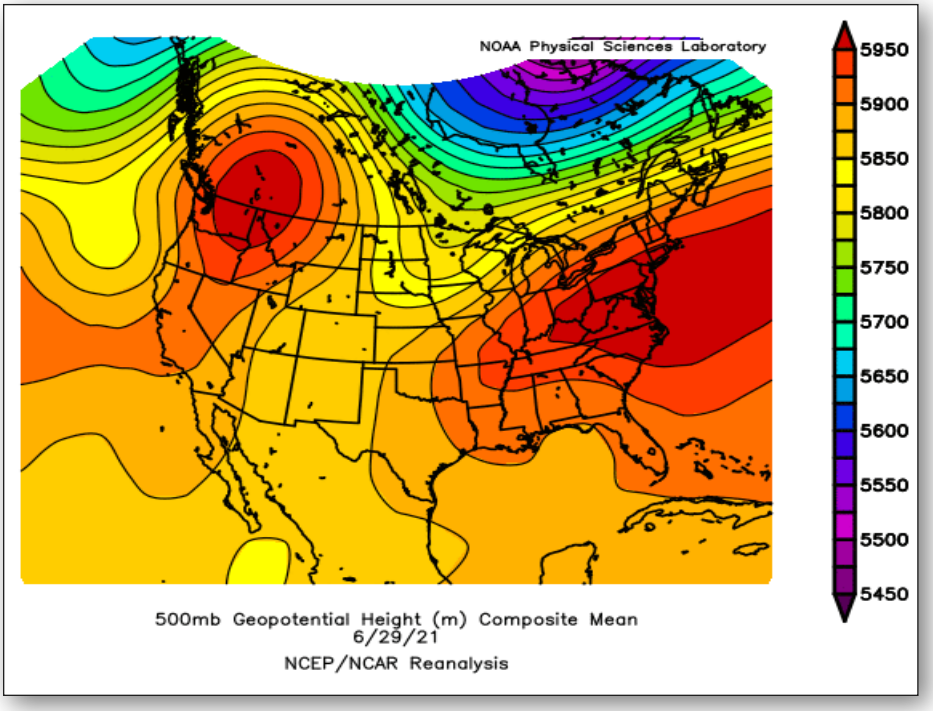

Figure 2 (right). Daily average 500 mb pattern on 6/29/21 provided by the NOAA/ESRL Physical Sciences Laboratory, Boulder Colorado from their Web site at http://psl.noaa.gov/

Figure 3 (left). Heat is typically the leading cause of weather-related fatalities each year. Heat waves not only cover a large area but also expose a high number of people. Learn how to stay safe during a heat wave at weather.gov/heat.

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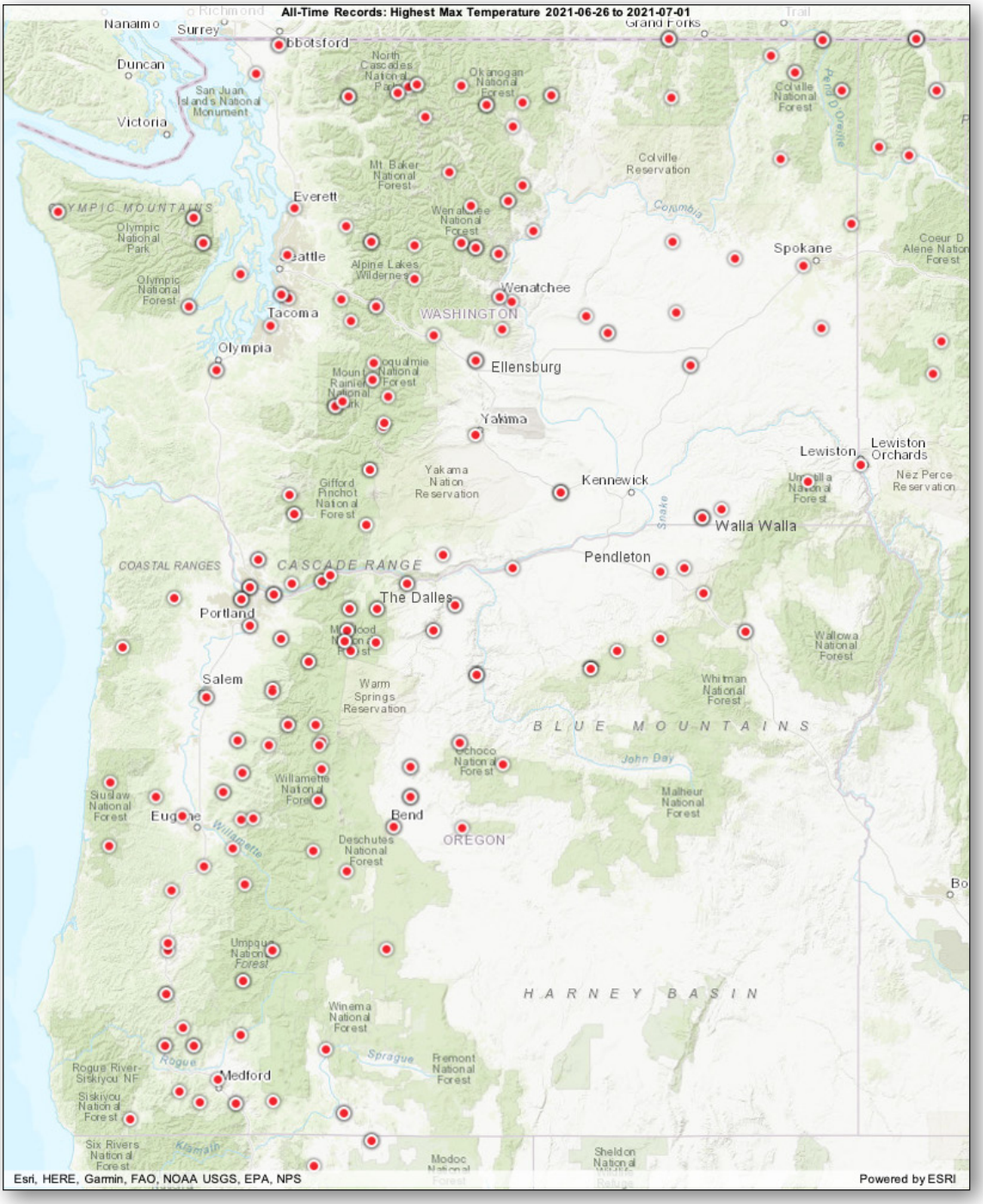
Figure 4 (below). Locations that broke all-time high temperature records during the June 2021 heat wave from June 26 to July 1, 2021.



Drought Update 2021

By Marilyn Lohmann, Service Hydrologist

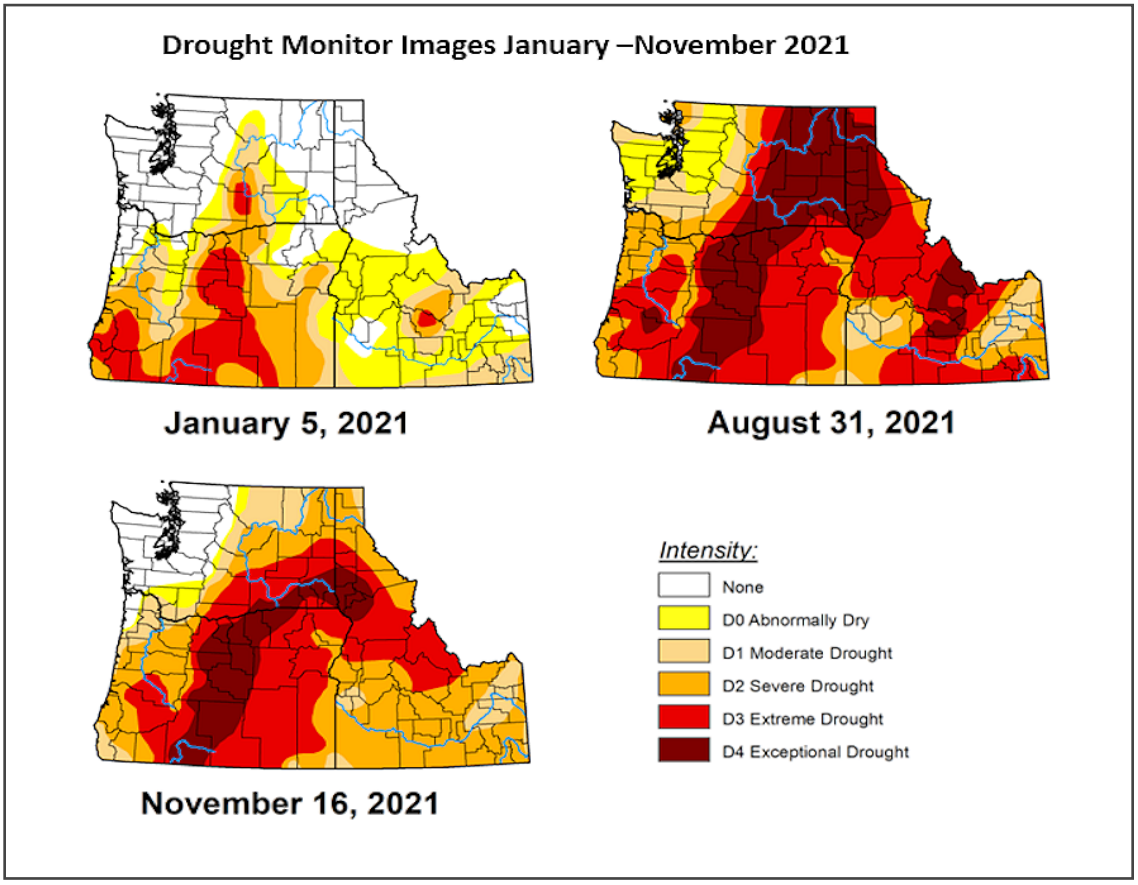
Severe to extreme drought conditions were already in place in portions of central and north central Oregon and east central Washington when 2021 began. This was due to below normal precipitation over a multi-year period. Mountain snowpack was progressing, but lower elevation precipitation remained well below normal.

January was dry with mild temperatures, but February was wet and cold with well above normal precipitation and snow for even the lower elevations. The mountains continued to receive above normal snowpack through March. April and May were historically dry across the Pacific Northwest during the normally wet spring period causing the start of many dryland crop failures. The mountain snowpack melted out about a month earlier than normal, with below normal streamflow seen in parts of the region by the end of May. June saw an historic heatwave June 25th through July 7th with a number of all-time record high temperatures on June 28 and 29th. The heat combined with the historically dry conditions from April and May, fueled the expansion of D4 or Exceptional Drought across much of central and northern Oregon and eastern Washington by the end of July. The drought conditions saw little change through August and September as mainly dry conditions and warm temperatures continued. In October, the weather pattern became more active with much of the Pacific Northwest seeing near to above normal precipitation, followed by a much wetter November.

The well above normal precipitation has allowed improvement in the drought conditions. Continued improvement is expected through the winter month, but some degree of drought conditions are still expected to be seen in Spring of 2022.

For more details on the drought and the impacts from drought and forecasts, go to www.drought.gov ❖

Figure 5. Pacific Northwest drought progression.



Winter 2021-2022 Seasonal Outlook

By Roger Cloutier, Meteorologist

A La Nina Advisory is currently in effect through the winter (December – February) with about a 90 percent chance of a La Nina occurrence. Then in the spring, from March – May, the probably decreases to about a 50 percent chance of La Nina conditions to persist through these spring months. Figure 6 is an ENSO probabilistic forecast of La Nina, El Nino or ENSO neutral conditions. The blue bars indicate the chances of La Nina conditions each 3 month period beginning in October, November and December of 2021. The red bars indicate the probability of El Nino conditions for each 3 month period beginning in October, November and December of 2021. Lastly, the grey bars indicate the chances of ENSO neutral conditions.

The Blue bars indicate a high likely hood of a La Nina event to occur through the winter of 2021-2022. The red bars are non-existent until the March, April, May period, which is the same time that the probability of La Nina conditions decreases to 50 percent, and then further decreases during the late spring into the summer of 2022. The probabilistic chance of El Nino conditions (the red bars) indicate an increasing chance of an El Nino event beginning in the March, April and May period. However, the probability of El Nino conditions does not even reach a 20 percent chance by the June, July and August period (the bars farthest to the right of the graphic). The probabilistic chance of either La Nina or El Nino conditions becomes close to each other at around 20 percent in the June, July and August period (the bars farthest to the right of the graphic). At that same time, the grey bars show a greater than a 50 percent probability that ENSO neutral conditions will exist. In fact, ENSO neutral conditions have a 50 percent or greater probability for each of the last three 3 month periods in the graphic.

A strong La Nina event in the winter usually results in wetter and colder than normal conditions for the Pacific Northwest. A moderate La Nina is still likely to cause wetter than normal conditions, but not always colder than normal. We have seen a fairly wet and cool autumn, which is consistent with a La Nina event. Last winter, we also had a La Nina event during the winter, which was a moderate La Nina event, and it was wetter, but not colder than normal overall during the event. However, there was a 5 day period last February when conditions were much colder than normal, with significant snowfall, but most of last winter was warmer than normal. Recently we have seen warmer than normal and wetter than normal conditions more often with La Nina conditions existing. Thus, a moderate La Nina event does not necessarily result in colder than normal conditions. Moderate La Nina events are likely to have more of an impact on precipitation, and less of an impact on temperatures. This coming winter, a moderate La Nina event is expected. As a result, it does not necessarily indicate a colder than normal winter with more snow this year. Last winter (2020-2021), in which there was also a moderate La Nina event, temperatures were mostly warmer than normal, with periods of significant rain and mountain snow events. However, there was that aforementioned 5 day period, in the middle of February, where heavy snow fell over a few days over the lower elevations with much colder than normal temperatures. At the end of that period, cumulative snow totals on the ground reached nearly 17 inches in Pendleton, Oregon.

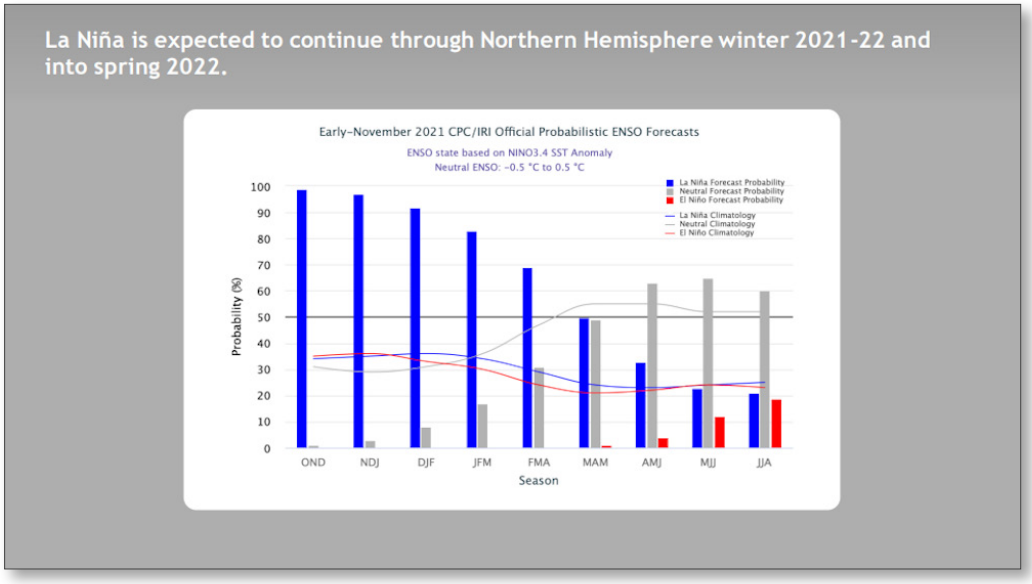


Figure 6. ENSO Probablistic Forecast of La Nina (blue), El Nino (red), and ENSO Neutral Conditions (gray).

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Since a La Nina event is now currently in effect, there have been more occurrences of Atmospheric River (AR) events over the Pacific Northwest bringing wetter than normal conditions. However, temperatures have been warmer than normal during these AR events so far, which resulted in mainly rain in both the mountains and valleys. However, as we go deeper into the winter, heavy snow in the mountains will become more likely and more frequent, even if the lower elevations are still too warm for snow. However, as was the case last winter, which was also during a moderate La Nina event, a heavy snow event is still quite possible in the lower elevations.

Figure 7 is an ensemble mean (thick black dashed line), which predicts ENSO conditions for Nino region 3.4 using Sea Surface Temperature anomalies. Nino region 3.4 is the central equatorial Pacific Ocean. The zero line on the vertical axis of the graph indicates ENSO neutral conditions. Below that zero line are La Nina conditions, and above the zero line are El Nino conditions. At the zero line is ENSO neutral conditions.

In the image above, the CFS.v2 ensemble mean (thick black dashed line) shows ENSO La Nina conditions (Sea Surface Temperatures or SST) anomalies below the zero line for Nino Region 3.4 to persist through the winter of 2021-2022, reaching a greatest chance in December 2021, and then slowly rising back up closer to the neutral zero line during the rest of the winter into the spring of 2022. However, it does not reach the neutral line even by the June, July, August period (the far right side of the graphic). The spread of the ensemble members after December is rather small, and there is only a short period of time where some of these members rise above the zero line (or above the ENSO neutral conditions line).

Figures 8 and 9 (next page) are the 3-month seasonal forecasts of temperature and precipitation anomalies for the USA during the period December, January and February.

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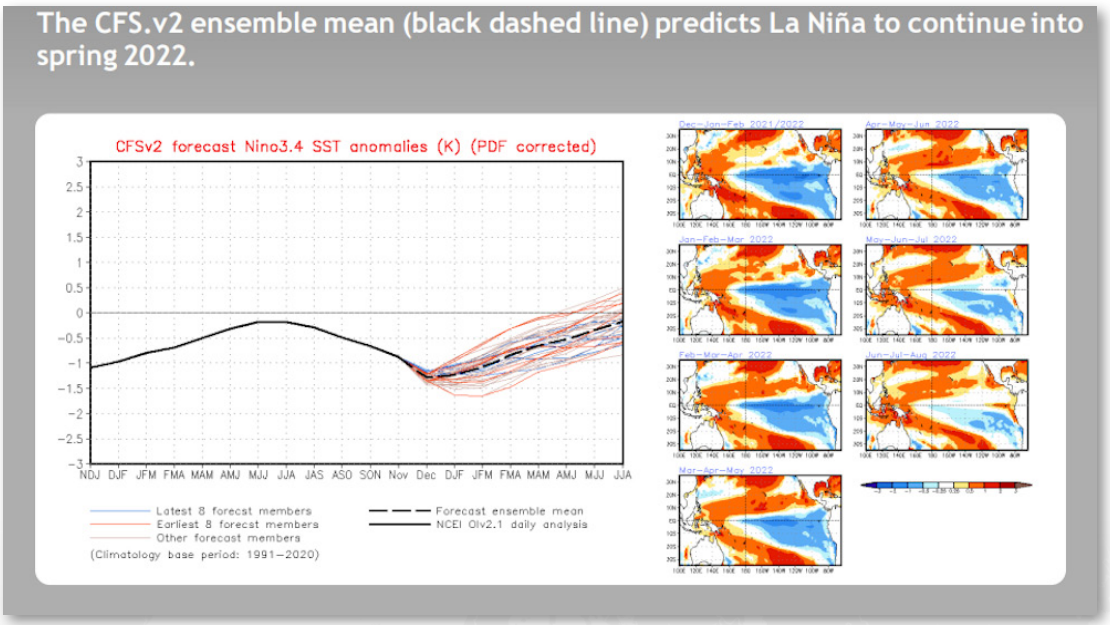

Figure 7. Ensemble mean predictions.

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The resultant expectations indicated by the above graphics shows that this coming winter will be mostly cooler and wetter than normal. There is a possibility of some very cold and snowy periods, but there will be mostly periods of heavy mountain snow, and lower elevation rain. This will be mostly be beneficial precipitation, such that it will ease the recent drought conditions and result in greater fuel moisture during the spring and summer of 2022. That will in turn result in lower fire danger, and a better supply of water for irrigation. However, it should be noted that the possibility of too much rain and melting mountain snow exists with the occurrence of warm AR events, which may lead to flooding events (possibly significant flooding events) this winter or during the spring snow melt months. ❖

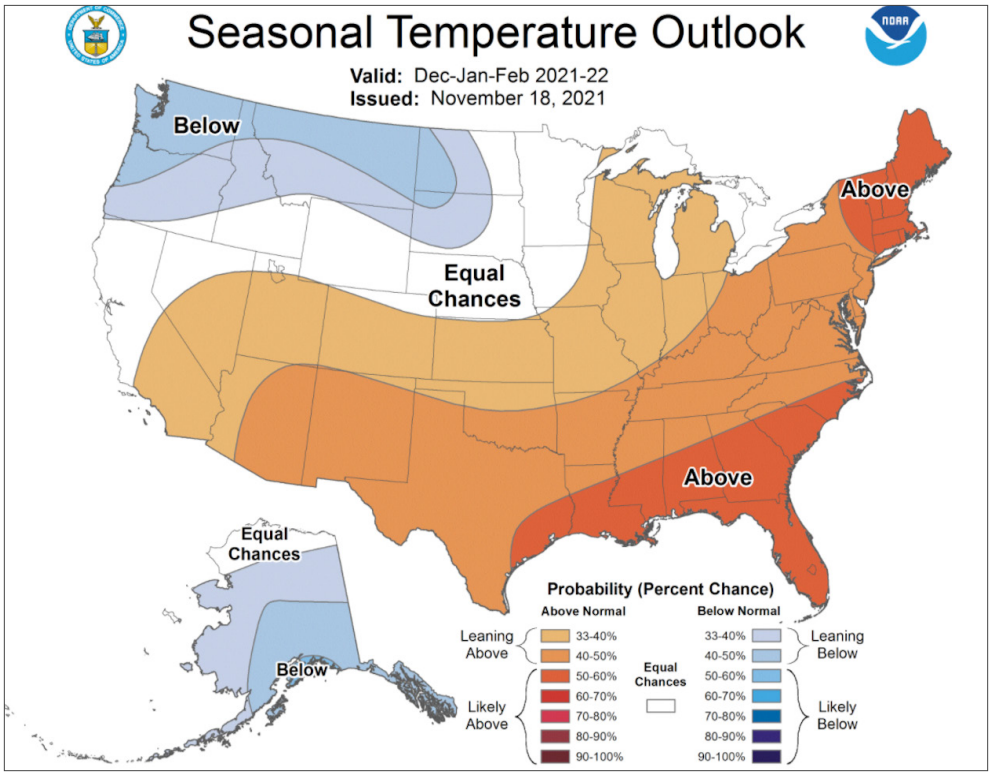

Figure 8. The 3 month temperature outlook for December, January and February indicates a greater chance of below normal temperatures over the Pacific Northwest. This would be consistent with a strong La Nina event.

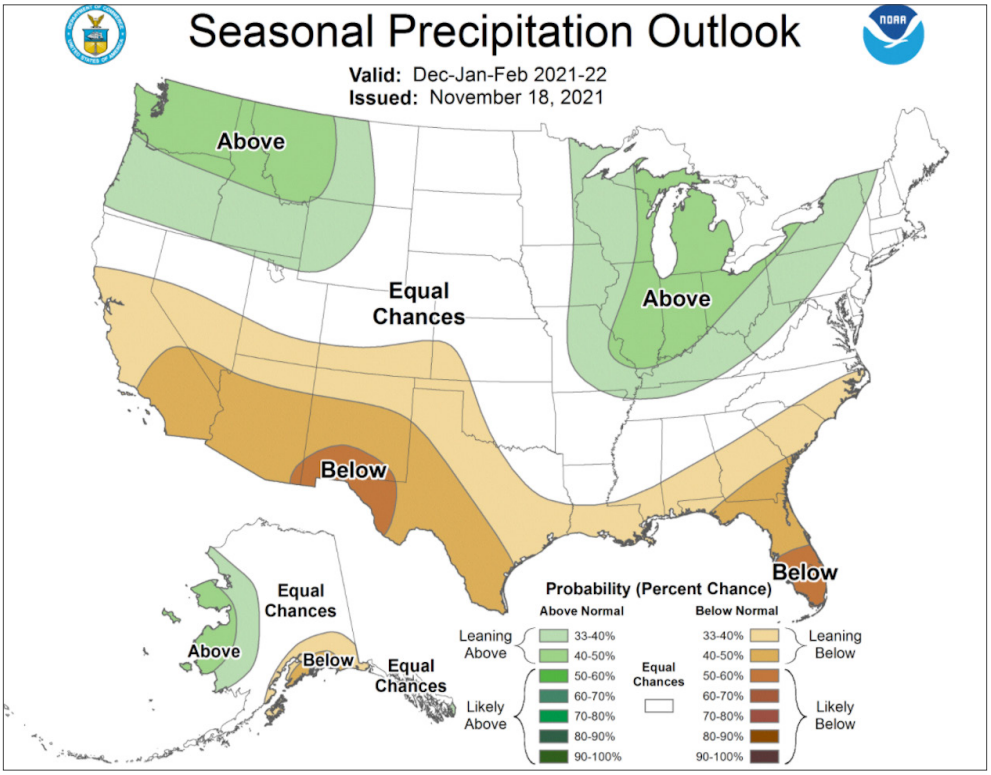

Figure 9. In this image, it is predicted that the Pacific Northwest will have a greater chance of above normal precipitation, with the forecast area being in the green colors between 33 – 50 percent chances. This is consistent with either a moderate or a strong La Nina event.

2021 Wildfire Season Recap

By Mary Wister, Meteorologist / Incident Meteorologist

What good can come from an extended drought? Unless you are a lizard or a kangaroo rat, nobody wants a long term drought, especially if you live in the Pacific Northwest. Simply stated, droughts lead to wildfires. During extreme or exceptional drought, the odds of large and costly wildfires increase. Most of eastern Washington and eastern Oregon reached D3 (extreme) and D4 (exceptional) drought this past summer, and many large wildfires in NWS Pendleton's forecast area lasted for weeks. Here is a recap of some of the 2021 wildfires in NWS Pendleton's county warning area (CWA).

The Schneider Springs Fire was the largest wildfire in Washington at 107,322 acres. Located 20 miles northwest of Naches, the Schneider Springs Fire began from a lightning strike on August 4 and was not contained until the end of October. This fire burned through heavy timber and steep terrain, not to mention during a time of prolonged dry weather and occasional windy conditions, therefore full suppression was a significant challenge for this fire in the Okanogan-Wenatchee Forest.

Multiple fires were ignited by lightning strikes on the same evening of July 7 in far southeast Washington in the Pomeroy Ranger District and the Umatilla National Forest—Asotin Complex, Dry Gulch, Lick Creek, and Green Ridge. The Asotin Complex was contained on the same day, but the other fires burned for weeks and required Incident Management Teams. While Dry Gulch burned over 38,000 acres, Lick Creek and Green Ridge merged with a total of 76,167 acres.

Although it was contained in 48 hours, a wildfire that developed eight miles northeast of Yakima consumed 13, 000 acres on July 12. The source of the grass fire, known as the Burbank Fire, was reported "undetermined".

Oregon observed a lot of large wildfires in 2021. The largest fires—that is, fires over 50,000 acres—were reported in south central and southwest Oregon, including the Bootleg Fire at over 400,000 acres near Beatty, Oregon. However, multiple fires in central and northeast Oregon required the attention of various Incident Management Teams.

The Joseph Canyon and Dry Creek fire kicked off the fire season early when these began on June 4 from lightning strikes. Dry Creek was contained at the end of June and Joseph Canyon was fully contained on July 15, and both totaled 9174 acres. Shortly afterwards, three large fires from undetermined sources developed in north central Oregon—S-503 near Pine Grove (6680 acres), Wrentham Market located six miles east of Dufur (7222 acres), and the Rattlesnake Fire near Warm Springs (5479 acres).

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Lick Creek Fire on the Umatilla National Forest in southeast Washington. Photo by Brendan O'Reilly/U.S. Forest Service - Pacific Northwest Region

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Thunderstorms on June 30 were the source of the Lewis Rock Fire (368 acres) located four miles southeast of Mitchell and the Ryegrass Fire (approximately 1000 acres) located six miles southeast of Paulina. Due to the complex terrain and extreme hot and dry weather, a Type 1 Incident Management Team from the Oregon Department of Forestry (ODF) was ordered for the Lewis Rock Fire, and the fire could have been much larger if not for the dedicated services of the ODF team and wildland firefighters.

Three other large wildfires in NWS Pendleton's CWA were also responsible for essential firefighting resources this past summer. The Grandview Fire located ten miles northeast of Sisters burned over 6000 acres from July 11-July 25. The Elbow Creek Fire burned a total of 22,960 acres on both sides of the Grande Ronde River and affected multiple agencies such as the Umatilla and Wallowa Whitman National Forests, the Oregon Department of Forestry, and the Vale Bureau of Land Management. The Elbow Creek Fire began on July 15 and was declared fully contained on September 24. The Black Butte Fire ignited on August 3 and was fully contained on September 27. It burned 22,445 acres near Unity, Oregon. The Black Butte was caused by lightning, but the Grandview and Elbow Creek Fires have been undetermined and are under investigation.

One aspect from the 2021 wildfires across the West that stood out compared to previous years was the need for resources that were stretched thin. Strategic planning was necessary to prioritize resources or share resources from one fire to another. The National Interagency Fire Center (NIFC) raised the national Preparedness Level to a category of 5 on July 15—the highest level of wildland fire activity. A PL5 means that at least 80% of the country's Incident Management Teams and wildland firefighting crews have been deployed to incidents. This was the earliest date a national PL5 was declared in over ten years, and the PL5 had a record-breaking stretch of 69 consecutive days. This has been a long arduous wildfire season in the West, and a heartfelt appreciation goes to those who spent weeks or months away from home to protect lives and property this past season. ❖

Remember—*You can help minimize damage from wildfires by maintaining your landscaping. Here are a few tips for cleaning your property and preventing fire spread:*

1. *Remove dead vegetation at least 10 feet away from your home.*
2. *Store flammable material such as propane tanks and firewood stacks at least 30 feet away from your home and outbuildings.*
3. *If you have trees on your property, prune so the lowest branches are 6-10 feet from the ground.*
4. *Keep your lawn hydrated and maintained.*
5. *Clear leaves and other debris from roofs, gutters, eaves, porches and decks. This prevents embers from igniting your home.*

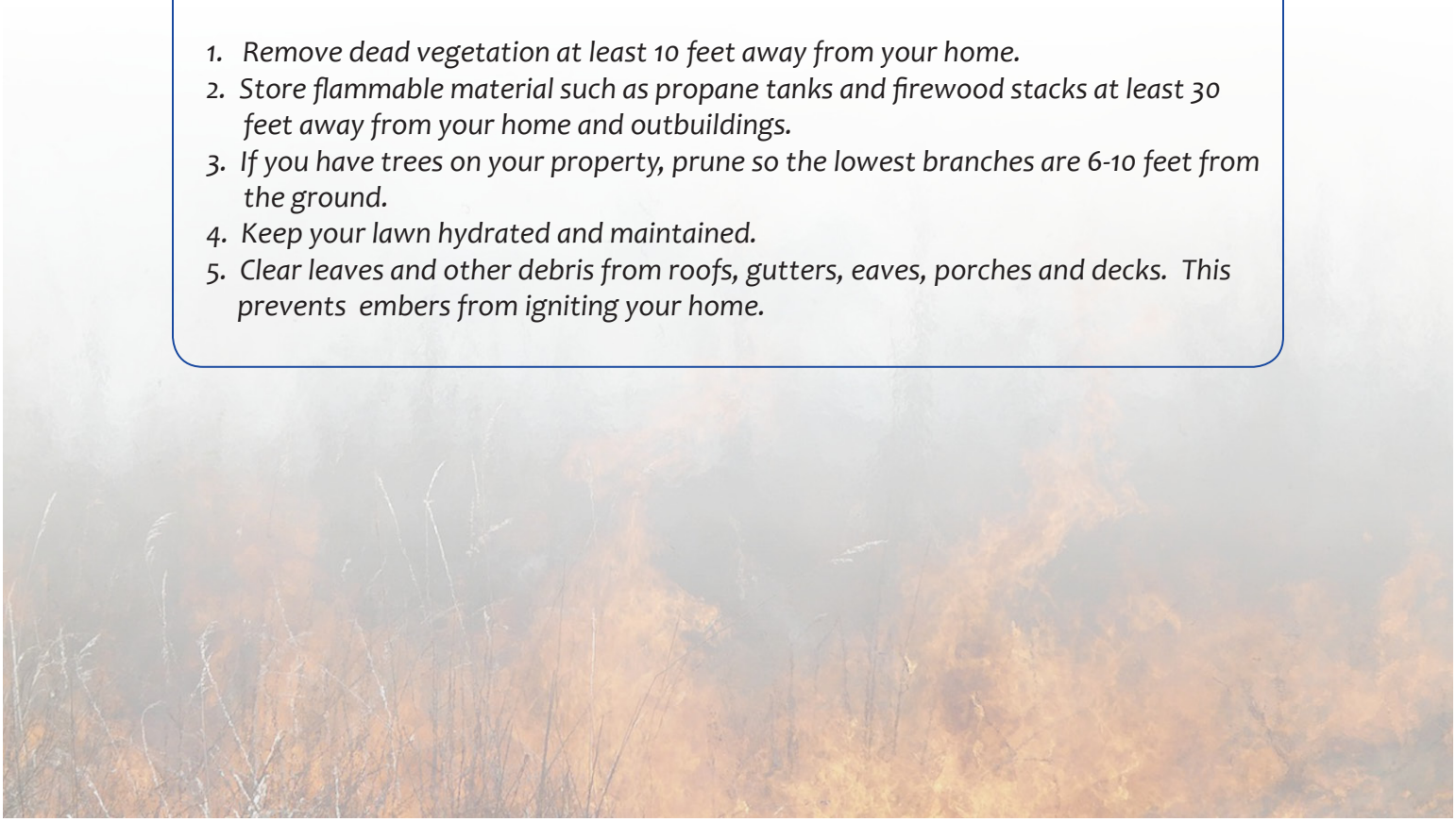

Photo Album

Winter in Trout Lake, Washington.
Photo by Darlisa Black

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