



National Significant Wildland Fire Potential Outlook

Predictive Services
National Interagency Fire Center

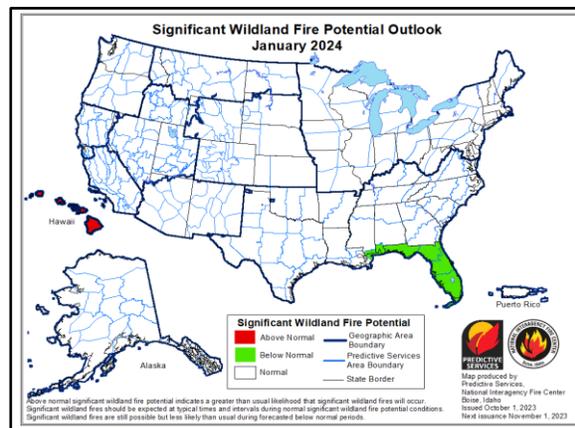
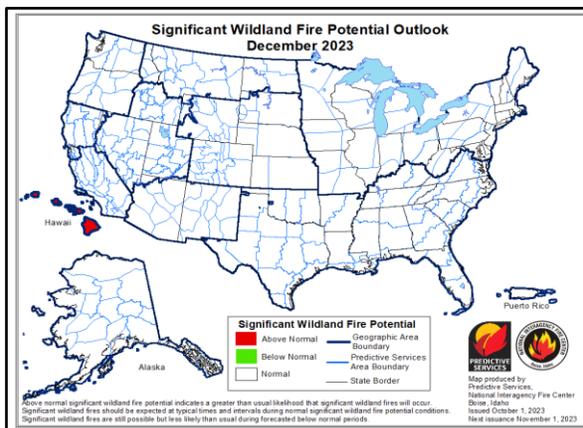
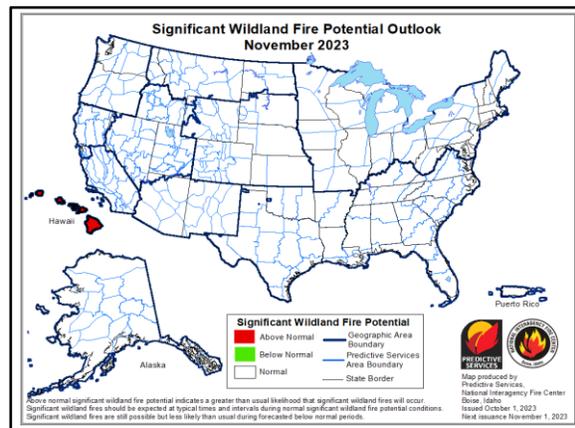
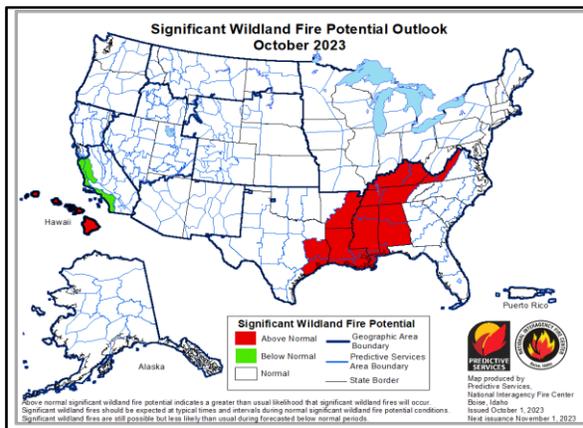


Issued: October 2, 2023
Next Issuance: November 1, 2023

Outlook Period – October 2023 through January 2024

Executive Summary

The significant wildland fire potential forecasts included in this outlook represent the cumulative forecasts of the ten Geographic Area Predictive Services units and the National Predictive Services unit.



Significant fire activity generally decreased during September as the national preparedness level dropped from four to three September 7 and from three to two September 25. Rainfall at the end of August and beginning of September across northern California and the northern Intermountain West caused a step down in fire activity, and a season ending rain event along and west of the Cascades from northwest California through western Washington occurred the last week in September. However, active large fires continued in western Washington and northwest California between the two rainfall events, with continued elevated initial attack and large fire activity in Southern Area. Year-to-date acres burned for the US remains well below the 10-year average at just under 40%, with a slightly below average number of fires as well, about 97% of average. Significant fire activity continued at times in northwestern Canada with over 46 million acres burned, with resumed commitment of US resources.

Early and late September precipitation events in the northwestern US helped slow significant fire activity but moderate to extreme drought continues along and west of the Cascades stretching into northern Montana. Extreme and exceptional drought expanded and intensified across central and east Texas through the Lower Mississippi Valley, with continued warmer and drier than normal conditions. Much of the Southwest and Four Corners had warmer and drier than normal conditions, with above normal temperatures from the Rockies to the Mississippi Valley. Drought also intensified and expanded in portions of the Ohio Valley and Midwest, but late month rainfall did bring some relief. Heavy rain fell on portions of the East Coast due to tropical cyclones or remnants of tropical cyclones, with a developing coastal low producing record setting rainfall in and around New York City September 29.

Climate Prediction Center and Predictive Services monthly and seasonal outlooks depict likely below normal precipitation and above normal temperatures for the northwestern US into winter. Above normal precipitation is likely from the southern Plains through the Southeast and possibly extending through the Southwest, Four Corners, and Mid-Atlantic during fall and into winter. Above normal temperatures are likely on the East and West Coasts through October. However, there is greater forecast uncertainty than typical for El Niño due to other climate, teleconnection, and ocean temperature patterns that do not often coincide with El Niño leading to a lack of previous events to predict from.

Above normal significant fire potential is forecast from southeast Texas through the Lower Mississippi, Ohio, and Tennessee Valleys into Alabama and western Virginia during October. Above normal potential could extend into November across these and adjacent areas, but there remains significant forecast uncertainty. Above normal potential will continue across the Hawaiian Islands, especially lee sides through January as drought is likely to expand and intensify with stronger than normal trade winds. Below normal significant fire potential is forecast for coastal southern and central California in October before returning to normal in November. Offshore wind events are likely to be near to below normal in frequency for the West Coast, including California. Below normal potential is also likely from the central Gulf Coast through Florida in January as confidence is higher for above normal precipitation by winter.

Past Weather and Drought

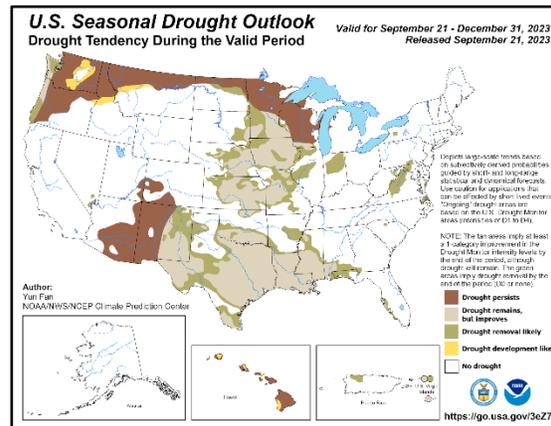
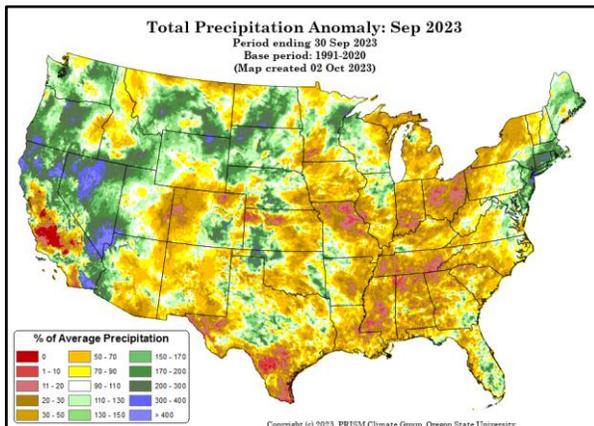
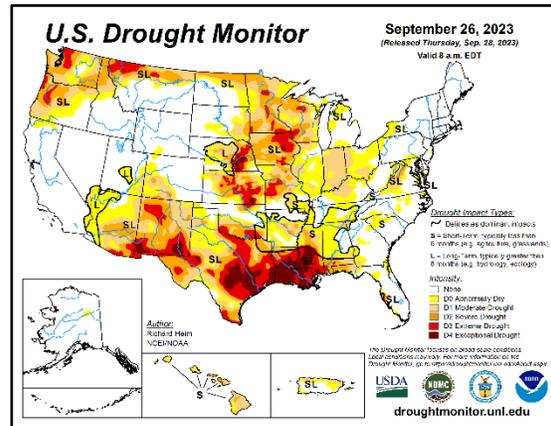
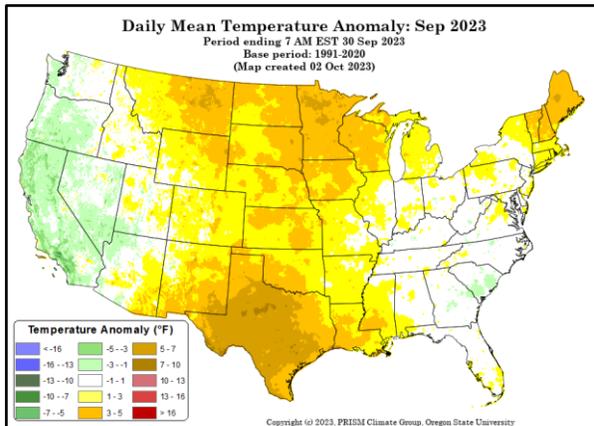
Near to well above normal temperatures and below normal rainfall continued from the Lower Mississippi Valley through the much of the southern Plains and into the Upper Mississippi Valley. Well below normal rainfall was also observed in the much of the Southeast through the Ohio Valley, and Great Lakes. However, a late September slow moving storm did provide widespread wetting rain across much of the Upper/Mid-Mississippi Valley, southern Great Lakes, and Ohio Valley. Additionally, wetting rain across portions of Ozarks, ArkLaTex, central/east Texas, and Lower Mississippi Valley led to a temporary decrease in fire activity and potential late in the month. Heavy rain fell along portions of the East Coast due to tropical cyclones or remnants of them leading to a mosaic of above and below normal rainfall. Post Tropical Cyclone Lee also provided tropical storm conditions to much of Maine and eastern Massachusetts mid-month, while record setting rainfall was observed in New York City September 29.

South and west Texas through the Four Corners mostly received below normal rainfall, while mostly above normal rainfall was observed in the Pacific Northwest, Great Basin, Desert Southwest, and northern Rockies onto the Plains. However, portions of the Intermountain West and much of central California had below normal precipitation. Much of the West had near to below normal temperatures, while the Rockies and Plains into the Upper Midwest had above normal temperatures.

Drought continued with some exacerbation in the Pacific Northwest before the late month atmospheric river event. While this will help drought conditions, moderate to extreme drought still spans large swaths of Oregon, Washington, north Idaho, and northern Montana. Drought also

degraded by multiple classes in the Lower Mississippi Valley, with an introduction of drought in the Ohio Valley. Extreme to exceptional drought now spans much of east and central Texas through the Lower Mississippi Valley onto the central Gulf Coast. Drought also continued and intensified across much of the Southwest, especially southern Arizona and New Mexico.

A deep upper low provided rainfall for portions of the Pacific Northwest and northern California into the northern Intermountain West early in September. This helped decrease fire activity, but a warming and drying trend with periods of stronger winds, including at times offshore winds, helped increase fire activity until the last week of September. Then an atmospheric river during the last week of September provided widespread season ending wetting rain along and west of the Cascades where most active large fires remained in the West.

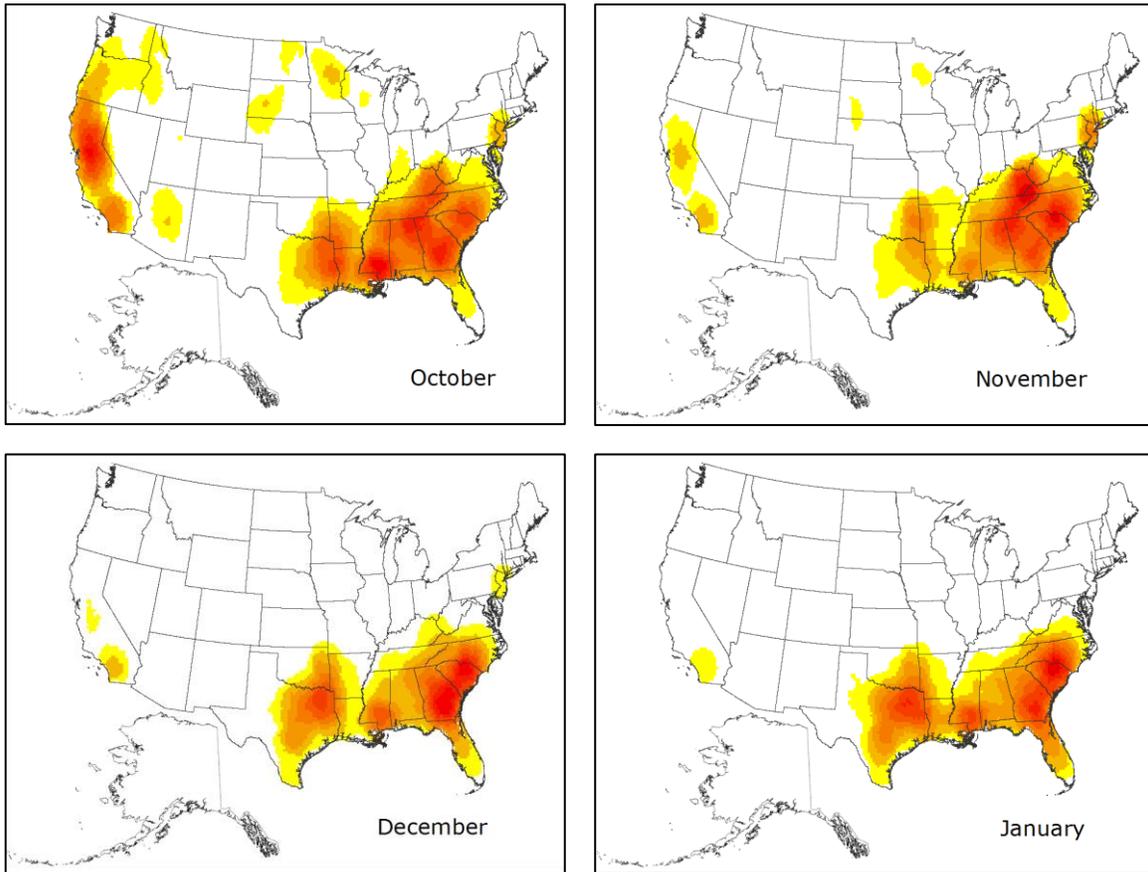


Left: Departure from Normal Temperature (top) and Percent of Normal Precipitation (bottom) (from PRISM Climate Group, Oregon State University). Right: U.S. Drought Monitor (top) and Drought Outlook (bottom) (from National Drought Mitigation Center and the Climate Prediction Center).

Weather and Climate Outlooks

El Niño continues in the equatorial Pacific Ocean, with the warmest sea surface temperature (SST) anomalies in the eastern equatorial Pacific Ocean. SSTs are consistent with a moderate El Niño, and atmosphere responses to El Niño are being observed. The Climate Prediction Center forecasts El Niño conditions continuing through winter into spring, with a chance of a strong El Niño still possible this fall and winter. Other teleconnection patterns, such as the Madden Julian Oscillation (MJO), Pacific Decadal Oscillation, and Pacific-North American Pattern may influence weather and climate during the outlook period, but El Niño will be the main driver through the outlook period.

Geographic Area Forecasts



Normal fire season progression across the contiguous U.S. and Alaska shown by monthly fire density (number of fires per unit area). Fire size and fire severity cannot be inferred from this analysis. (Based on 1999-2010 FPA Data)

Alaska

Normal wildfire potential is expected for Alaska October through January as Alaska is moving out of fire season with establishment of the permanent winter snowpack.

The US Drought Monitor shows a small area of abnormally dry conditions in the Yukon Flats downriver from Fort Yukon. The Canadian Forest Fire Danger Rating System (CFFDRS) Drought Code (DC) indicates that deeper fuels are very dry there, as well as some parts of the Tanana Valley. Otherwise, DC values are generally close to normal conditions for the end of season.

The El Niño now in place suggests a tendency for warmer and wetter than normal weather in Alaska, and this is reflected in the Climate Prediction Center's (CPC) forecast for the upcoming months. CPC maps indicate warmer than normal conditions are likely statewide, with the greatest departures from normal likely along the North Slope. CPC's precipitation forecasts are for wetter than normal conditions in the north and along the west coast, though El Niño years often bring excessive snow to the southern part of the state. Temperatures are dropping below freezing overnight across much of the landscape, with snow covering many higher elevation areas. Snow is expected to blanket most of the state by the last half of this month.

Fire activity has slowed to near zero. For the month of September, less than ten new ignitions have been identified, and all have been small human ignitions. Fire spread has been minimal, and overall acreage has decreased due to more accurate mapping.

Fuels in western and southern Alaska are extremely wet, while in the eastern Interior, there are still some dry areas. The Yukon Flats downriver from Fort Yukon and some parts of the Tanana Valley have dry deep duff fuels, but surface fuels and upper duff layers have picked up significant rain, reducing spread potential. At this time, below-freezing temperatures and developing

snowpack are leading to shutdown of fire weather indices for the winter months as fuels simply are not aggressively burnable when frozen and buried in snow. However, it is suspected that the larger fires in the Tanana Valley may overwinter in those deep, dry duff layers, and give rise to holdovers next spring.

With minimal fire activity, fire season is essentially over for Alaska. Though there is the potential for a few human starts, especially in the drier fuels of the eastern Interior, it is expected that they will remain small and easily managed. Daylight hours continue to shrink, and the sun angle is already quite low even at mid-day, with below-freezing temperatures at night and highs in the 40s during the day. The permanent winter snowpack is likely to be established in late October for most areas, dealing the final blow to any remaining fire potential. It is expected that October through January will exhibit normal fire activity in Alaska.

Northwest

Recent heavy rain from the Cascades westward has returned those Predictive Services Areas (PSAs) to normal significant fire potential during October. The remaining Northwest Geographic Area will remain normal in October. Fire potential is then expected to remain near normal across the entire geographic area through the winter months.

Most September temperatures across the geographic area remained within a couple degrees of normal. Washington trended a little above normal and Oregon near to a little below normal. Rainfall favored several areas east of the Cascades as thunderstorms brought periodic wetting rains. Only late in the month did a Pacific storm bring substantial rainfall to the Cascades westward and eventually lighter wetting rains eastward. Most of the Coast Range and Olympics received two to four inches of rain in a 72-hour period. Coastal southwest Oregon and area fires received 2.50 to nearly 5.50 inches of rain that same period.

Most of the geographic area remains in some form of drought. Portions of northwest Oregon and northwest Washington advanced into extreme drought during the month. Only southeast Oregon and a small portion of northeast Washington remain free of any designation. The recent rainfall will have some impact on overall drought conditions, but several similar events are likely needed to fully erase the drought conditions.

The number of new fires in September continued to remain below average. At the end of September, all the existing large fires west of the Cascades had received substantial rainfall, which has significantly reduced fire behavior and future spread potential. Large fire growth persisted west of the Cascades peaking with the passage of a thermal trough during the middle of the month when the Anvil Fire in southwest Oregon grew over 7,500 acres in four days. During the same thermal trough event, the Delabarre fire in Olympic National Park grew from 30 acres to over 3,000 acres in two burn periods. Extreme fire behavior with 2-mile spotting was observed. Delabarre is now the largest fire in Olympic National Park history at just over 4,000 acres.

ERC values in western PSAs NW01, NW02, and NW03 trended above average for most of the month. After recent precipitation, ERCs for all western PSAs have dropped to below average values. 1000-hour fuels are trending upward faster than normal seasonality in response to the increase in precipitation. East of the Cascades cured low elevation rangeland fuels will become flammable and exhibit increased potential rates of spread when aligned with strong winds.

NOAA outlooks slightly favor above normal temperatures for the Pacific Northwest in October. Precipitation is slightly favored to be below normal for most of the area. The far eastern areas do not show notable signals toward either above or below normal precipitation. For November through January, continued development toward a strong El Niño will bring a 50-60 percent chance of above normal temperatures. Precipitation for that period slightly favors below normal precipitation. Both are in line with historical Pacific Northwest El Niño conditions.

Rains during the last week of September have effectively ended large fire season across the Northwest Geographic Area. As such, a normal significant fire risk is expected through the winter months. A typical moderate to strong El Niño winter season will produce week-long drying episodes. These episodes then have the potential to dry 100-hour and lighter fuels to a point of carrying fire for multiple burn periods under supportive wind and low humidity conditions. Given the low predictability for these events on a seasonal scale, normal fire conditions are forecast.

Northern California and Hawai'i

Significant fire potential is projected to be near average from October through January. During October, all Predictive Service Areas (PSAs) average one or less fire and less than one fire per month from November through January. Hawaii's significant fire potential is above normal for October through January.

The weather pattern during September included many more cool and moist low-pressure troughs versus warm and dry high-pressure ridging days. The last week of the month was especially unsettled with three distinct and strong low-pressure systems, including an atmospheric river event. Temperatures were generally below normal, although a few near to above normal pockets occurred favoring the North Coast PSA and portions of northeast California. Precipitation anomalies were mixed, but generally near to above normal values were observed with pockets of below normal across the North Coast PSA, Greater Bay Area, and portions of the Sacramento Valley. The two most notable wetting precipitation events occurred on September 1 and 25. More than 500 lightning strikes occurred each day September 1, 16, and 18. Nearly 3600 lightning strikes were recorded across the region during September which is around 1000 more strikes than the 2012-2022 average. Dry northerly and easterly wind events increased in frequency during the latter half of the month, with the strongest occurring during September 20- 21. An unusually strong and dry south-southwest wind event occurred on September 25 and pushed the Burning Index, an output of the National Fire Danger Rating System (NFDRS), to reach or exceed daily record high values for the Northeast California and Far Eastside PSAs.

Two distinct fire season slowing events occurred during September. The most impactful event, in terms of raising live and dead fuel moistures over a large spatial area, occurred on September 1. The atmospheric river event on September 25 provided heavy rainfall across the North Coast and western portions of the Northwest Mountains PSAs which included the ongoing large fires. Dead fuel moistures were generally near to above normal across most PSAs and time frames. Herbaceous curing had overspread North Ops with partially to mostly cured grasses found across the low and mid elevations, although heavier precipitation on September 1 invoked a rare September green-up across the low elevations of western Shasta County. Woody shrubs experienced some moistening in early September, but most of the month was spent in a curing process with the first notable freeze of the season occurring across portions of the north and east on the September 21. Most of the live fuel moisture sampling revealed near to a little above normal readings, although some species like chamise and sage were below the flammable 100% threshold. A moderate drought classification remained across the far northwest corner of California.

Fire business lowered during September compared to August. A little over 30 lightning ignitions were reported during the month with most of them occurring during the heavier lightning periods of September 16-18. High-risk for significant fire potential was issued for September 16 and 17 due to the lightning threat. High-risk and Red Flag Warnings were issued for the gusty-dry wind threats on September 20-21 and 25. Initial attack fire numbers averaged around 10 per day. The largest fire, outside of the fire complexes in the northern Coastal Range, grew to 75 acres in the Sacramento Valley on September 25. Notable fire activity occurred on the Smith River and SRF lightning complexes during September 15-17 as well as September 20-22. Broadcast prescribed burns were conducted during the entire month but were most prevalent during the days leading up to the rain event of September 25.

There will be several strong oceanic-atmospheric teleconnections during the next four months, which makes it harder forecast temperature, precipitation, and wind anomalies. Therefore, expect some major fluctuations in the atmospheric patterns. The weather outlook for October is for near to above normal temperatures and near to below normal precipitation. Lightning is not expected to be a big issue during October, and the frequency of the offshore wind events should be near normal, although October is typically the peak period, so some notable events should occur. There is a better shot for widespread wetting rain events from November through January creating near to above normal precipitation across most of the area. During this period, a drier than normal signal is likely across the far north, but the lower sun angle, lessening daylight hours, and periodic moisture events will keep significant fire potential muted.

Based on the alignment of the expected teleconnections over the next four months, North Ops should experience an extended period of warm and dry weather coinciding with periods of gusty northerly winds. However, the timing or month for the development of this pattern is unknown. Initial low elevation green-up should occur across the northwest corner during October due to the late September rainfall. More widespread low-elevation green-up, generally below 1,500 feet, will occur from November through January. Drought is not expected to be a major player the next few months. The potential for short duration flammable fuels coupled with critical fire weather conditions exists during October to early November, but not enough to warrant an above normal designation of significant fire potential. Therefore, normal significant fire potential has been designated for northern California from October through January.

Sea surface temperature (SSTs) anomalies surrounding the Hawai'ian Islands were generally near to a little above normal. Near average SST anomalies are expected to remain the next four months with a warmer signal across the north. Average temperatures were near to above normal during September, with the warmer anomalies found across the Big Island and Oahu. Precipitation was below to well below normal and aided in the expansion of more widespread drought across the island chain. No Red Flag Warnings were issued by the National Weather Service.

El Niño will likely peak during the outlook period and become moderate to strong. Precipitation is likely to be below normal during the next four months across the entire island chain. Average temperatures should be near to slightly above normal. Several fire potential enhancing ingredients will impact the island chain during the outlook period. These are abundant cured herbaceous fuels with less new herbaceous growth during the start of the wet season, widespread and increasing drought intensity, and a heavy dead and down component induced by the August 7-9 windstorm. There should also be periods of stronger westerly-downslope winds across the expected drier than normal windward sides. Above normal significant fire potential is forecast for the island chain from October through January and a specialized fuels and fire behavior advisory may be needed in the coming months due to the unusually flammable conditions.

Southern California

A significantly cooler September was observed across most of southern California as a strong and pronounced marine layer persisted over the area. This trend was largely driven by persistent upper level troughing off the California coast. Locations south of the San Gabriel and San Bernardino Mountains generally had a wetter than normal September, except for San Diego County and coastal Orange County. North of the San Bernardino Mountains, September was a very dry month with widespread areas receiving less than 5% of the monthly average precipitation. The driest areas were most notable along the interior central coast, San Joaquin Valley, and high desert areas. The wettest areas were Riverside and Imperial Counties as well as in the Sierra Nevada. The monsoon has been inactive in September, and September 1 was the only day where monsoonal moisture entered the region and brought widespread showers to the area. Otherwise, onshore flow persisted this month, which allowed for ample marine influence, especially west of the coastal slopes.

Strong El Niño conditions persist in the eastern and central equatorial Pacific. Sea surface temperature (SST) anomalies have remained above +1.0°C for the past month and above +0.5°C since late June in Niño 3.4 Region (i.e., central Pacific). The core of the warmest water continues to remain in the eastern equatorial Pacific, making this a traditional El Niño.

Fuels continue to remain moist from the combination of this being a very wet year and a pronounced marine layer keeping relative humidity high. Energy Release Component (ERC) values continue to remain below average, and 1000-hour dead fuel moisture continues to remain above average in all Predictive Service Areas (PSAs), except for the Lower Deserts and Eastern Deserts PSAs. The Lower Deserts and Eastern Deserts have 1000-hour dead fuel moisture near normal. However, there is a very light fuel load with respect to 1000-hour dead fuel moisture in those two PSAs as finer fuel is much more dominant in that location. The odds tilt in favor towards dead fuel moisture remaining above normal and ERCs below normal overall. Intermittent periods of drier conditions are likely, especially during the fall months due to offshore wind events.

Forecast guidance favors El Niño conditions continuing through January, and ensemble guidance suggests that SST anomalies in Niño 3.4 Region are likely to peak during the November – January timeframe. Overall, there is moderate to high confidence in forecast guidance that favors a cooler and wetter period. A unique weather pattern on the subseasonal-to-seasonal (S2S) scale is highly likely to remain in place. This pattern features the combination of a strong traditional east Pacific El Niño combined with the Pacific Decadal Oscillation (PDO) remaining strongly negative. Weather over the east Pacific and California features a stronger jet stream, and this pattern allows for cooler temperatures and above normal precipitation. However, there is still at least a moderate degree of uncertainty due to the lack of analog years since strong El Niño events almost always correspond to a strongly positive phase of the PDO. This pattern is also less favorable for offshore wind events, with the greatest chance for offshore wind events likely in November. Given the overall weather pattern, it is likely that a large wetting rain would occur prior to then.

Northern Rockies

Significant wildland fire potential in the Northern Rockies Geographic Area (NRGA) for October through January is expected to be normal. As we move past the autumnal equinox and into the cooler and darker part of the year, multiple rounds of widespread rainfall have moved through the NRGA, with few areas of negative precipitation anomalies over the last 30 days. Most of those areas of below normal precipitation are along the Montana Hi-Line through northwest North Dakota and reflected in the areas of drought shown on the current drought monitor. Short-term outlooks place much of the NRGA in normal to above normal moisture potential and at normal or below normal temperature potential. Longer term outlooks do favor warmer and drier conditions over the winter, but any effects on fire season will be felt next year rather than this year.

The pattern of brief periods of hot and dry weather followed by wet and cool weather continued through the month of September, moderating periods of fire activity almost immediately. Overnight relative humidity recovers throughout the month generally stayed moderate to good, limiting fuel stress in the region. Temperatures generally followed a pattern of above normal temperature anomalies at lower elevations and below normal temperature anomalies at higher elevations, highlighting the atmospheric instability that led to a lot of thunderstorm activity over the area in September. Despite the above normal temperature anomalies, winds remained light for much of the month, reflected in below normal evapotranspiration anomalies despite above normal temperatures.

Drought did not change more than category in the last month, and most drought shown over the area remained static since last month. Moderate (D1) to severe (D2) drought is widespread across the northern portions of Idaho, Montana, and North Dakota, with a few pockets of extreme (D3) drought in northern Montana and North Dakota.

1000-hour dead fuel moistures are uniformly more than 15% across the NRGA, and all PSAs are at or above normal dead fuel moistures for this time of year after the precipitation received through

the last month. Energy release component (ERC) values across the geographic area are below normal for this time of year.

Live fuels are going through seasonal curing, with hard frost temperatures at higher elevations. Overnight relative humidity recoveries are continually moderate to good most nights, which decreases the window of fine fuel availability for a burn period. However, the northern Idaho Panhandle and northwest-northern Montana have less fuel loads and greenness than recent years correlating to where drought is present and will continue to pose risk for fire spread during dry and windy days. In contrast, southern Montana and North Dakota, which had higher than average precipitation throughout the summer, have fine fuel loads higher than average that are continuing to cure and could contribute to fire spread concerns during periods of prolonged dryness in October once that curing is complete.

Over the month of September, minimal initial attack was recorded for most days, with prescribed burning starting mid-September and continuing into next month. Large fire growth was modest at the beginning of the month, but no growth has occurred recently.

All PSAs are expected to have normal significant wildland fire potential for October through January. While long-term drought is present across the landscape in the northern portions of our geographic area, short term rainfall amounts have been well-distributed across the area, increasing dead fuel moistures to above normal and decreasing ERCs to below normal. However, due to above normal temperatures and below normal precipitation in longer term weather outlooks, we will not be putting any PSAs in below normal risk for this outlook.

Great Basin

Fire activity slowed considerably through September, due to several cold frontal passages bringing much cooler temperatures, higher humidity, and precipitation, especially across the northern half of Nevada, southern and eastern Idaho, Wyoming, the western half of Utah, and far southern Nevada. Drier areas continued to be central and southwest Idaho, parts of western Nevada and central and eastern Utah. However, shorter daytime periods and occasional showers have kept these fuels not critical, aside from windy days. Fire activity is expected to remain low and normal for the time of year through January. There may be a few upticks in fire potential on windy days in areas that have prolonged dryness and above normal grass crops in the lower elevations, depending on weather conditions. However, these instances would be localized and for short periods.

Temperatures over the last 30 days have been cooler than normal over the western half of the Great Basin and warmer than normal in the north and eastern areas. However, a few cold fronts have moved through the region in September and brought significantly cooler temperatures for short periods to all areas. Precipitation has been well above normal across much of Nevada, southern and eastern Idaho, western Wyoming, and northern and far southwest Utah. Precipitation remained below normal over eastern Utah and much of southwest and west-central Idaho. Drought conditions have continued to improve with no drought in most areas of the Great Basin. The only exception is far southern Nevada, the Arizona Strip, and far southeast Utah that have abnormally dry conditions with very small areas of moderate drought remaining.

Fuel moisture will continue to decrease heading into October as a strong cold front and low-pressure system swings through the Great Basin bringing colder weather, higher humidity, and widespread precipitation, along with snowfall to the higher terrain. We will need to monitor the areas of eastern Utah, southern Idaho, and northern Nevada that have above normal fine fuel loading for windy conditions after prolonged dry periods through December that may drive fire potential up for a burning period or two, as grasses will be dormant. Fire activity remains low across the Great Basin, with only light initial attack each day and all fires remaining very small.

Normal significant fire potential is expected through October and the normal dormant periods of November through January. Despite areas of significant carry-over fuels in parts of northern Nevada and southern Idaho, the continued pattern of cold fronts moving through the Great Basin is expected to continue into early October, before any prolonged drying can even begin to slowly reverse the fuel situation. In far southern areas, the above normal monsoon activity of August and continued periods of precipitation in September, combined with the statistically reduced chances of large fires due to the rapidly shortening daylight hours, are setting up classic season ending conditions. The only areas to watch will be parts of eastern Utah, northern Nevada, and southern Idaho if prolonged dry periods occur and then are followed by strong winds. This may increase fire potential at times for a burning period or two.

Southwest

Normal significant fire potential is expected through January for the Southwest Geographic Area. Some localized areas of above normal significant fire potential could arise across parts of Arizona during October but are still expected to be closer to normal overall.

The overall trend through most of the first six months of 2023 was for below normal temperatures nearly areawide, with wetter than normal conditions focused along and west of the Continental Divide and across the northern tier of New Mexico. During the months of May through July, precipitation was below normal for much of the geographic area, except for northeastern New Mexico. This trend continued from late July through late September, with above normal precipitation relegated to generally far northwestern Arizona and northeastern New Mexico, but the remainder of the geographic area received below to well below normal rainfall. This was mostly due to a weaker than normal monsoon this summer, which led to mostly above normal temperatures as well.

The ongoing El Niño is expected to further intensify through fall and will continue to have a big influence on the weather and climate for the forecast period. Unfortunately, this means that some lingering dry areas could result during early to mid-fall. Although presently expected to be near normal, some localized areas of above normal fire potential could result over the next month or so west of the Divide coincident with periods of drier than normal conditions and stronger winds. In addition, some areas across the eastern plains of New Mexico continue to have unusual amounts of dead and down brown grasses.

The large-scale weather pattern will continue to be variable, and a western US upper-level trough pattern is expected overall for the early-mid fall months. This dictates a move towards breezy periods and near to below normal temperatures for the western one-third to half of the geographic area, with above normal temperatures most likely focused across the eastern half to one-third of the geographic area. Precipitation is expected to be close to normal overall, with some above normal areas for portions of New Mexico during October. As autumn moves on, more areas of above normal precipitation will be likely west of the Divide. As late fall and early winter arrive, an overall cooler and wetter pattern is anticipated due to the approach of the mature phase of the ongoing El Niño-Southern Oscillation.

Rocky Mountain

The Rocky Mountain Area (RMA) is expecting normal fire potential through the outlook period. The pattern has shifted over the last month, with more low-pressure systems moving through the area, bringing more chances for rain, and keeping a persistent ridge of high pressure from developing. However, temperatures through September have continued to run above normal, which has allowed drought conditions to persist with no improvement or some degradation, but largely no expansion either.

The last month saw less of a persistent ridge, with a few low-pressure systems that moved through the area bringing better chances for rain. As El Niño conditions continued, much of the area

experienced above normal temperatures. Much of the RMA had temperatures that were 2 to 3 degrees above normal, and the above normal conditions were over much more of the RMA than in August. With the low-pressure systems that moved through, there was more rain, with much of the RMA receiving 1 to 2 inches of rain, over 150% of normal. However, there were some areas across Kansas, the West Slope, and south-central Wyoming that remained only 30 to 70 percent of normal. Some locations on the West Slope received a few tenths through the month. The rainfall was not enough to offset the heat, with the areas of drought not seeing improvement, and some areas continued to see worsening drought across Nebraska, Kansas, and southwest Colorado.

Fuel moisture was largely driven by the rain events and were fluctuating above and below average. During the dry periods, values trended down towards the minimums for September. The fine fuels on the central Plains, where there is above normal fuel loading from the wet spring, are curing out. This is resulting in more areas that could carry fire. However, there are areas where the fuels are not as cured that has limited fire spread.

There continued to be light initial attack through the month, mostly associated with the lightning activity that accompanied some of the low-pressure systems. As winds increased ahead of a couple of the weather systems, fires that have been on the landscape did see increased interior burning.

Seasonal precipitation outlooks depict near normal precipitation for the RMA, but there will continue to be periods that may be drier for a week or two at a time. Temperatures will continue to be above normal through November for Wyoming and Colorado, while the central Plains will generally be around normal, before becoming more normal across the entire RMA into winter. These trends are consistent with an El Niño forecast to continue through winter. While above normal temperatures continue, expect more evapotranspiration, which will reduce effects of normal precipitation in the fuels, with drought conditions likely to remain as is or further develop. The outlook for the Rocky Mountain area anticipates normal significant fire potential across the geographic area through December.

Eastern Area

Near normal significant fire potential is forecast across the majority of the Eastern Area October 2023 into January 2024. Periods of above normal potential are still possible across parts of the Great Lakes that have not received heavy precipitation through the end of September.

Negative 14- and 30-day precipitation anomalies were indicated towards the end of September across the eastern Great Lakes, parts of the Mid-Mississippi and Ohio River Valleys, and the northwestern tiers of New England and the Mid-Atlantic States. Longer term drought remained across the western Mississippi Valley and the central Great Lakes. This is a result of warmer than normal temperatures, below normal precipitation, and widespread low relative humidity that affected these areas earlier in the summer.

The El Niño Southern Oscillation (ENSO) transitioned from a 3-year episode of La Niña conditions (cooler than normal Pacific Ocean sea surface temperatures off the western coast of South America) to increasingly warmer than normal sea surface temperatures of El Niño regime through the spring and into the summer. This transition has led to some uncertainty in the longer-term model forecasts for fall and winter. Historical or analog climate trend comparisons are also limited due to very few past similar ENSO transitions on record, making longer term weather trend forecasts challenging. Other sea surface temperature regimes also contribute to global weather patterns adding to the uncertainty in long term weather forecasts.

The Predictive Services precipitation outlooks forecast below normal precipitation across the northeastern Great Lakes and parts of New England in October and the northwestern Great Lakes progressing into November. According to the NOAA Climate Prediction Center long term outlooks, below normal precipitation is forecast across the eastern Great Lakes and parts of New England

this fall into winter, with above normal precipitation likely across the southern tier of the Eastern Area.

According to the Predictive Service temperature outlooks, near to above normal temperatures are forecast across much of the Eastern Area in October and across the Upper Mississippi Valley and New England in November. The Climate Prediction Center forecasts above normal temperatures across the northern and eastern tiers of the Eastern Area from October into January 2024.

Normal significant fire potential is forecast for the majority of the Eastern Area with slightly above normal potential in areas of the Great Lakes that did not receive recent heavy precipitation. Drought Codes from the Canadian Forest Fire Danger Rating System (CFFDRS) that represent drying deep into the soil are still showing areas of high indices leading to potential for extended mop up and deep-burning fires where fires have residence time. Leaf drop is occurring and outlook predictions for precipitation are normal to below normal for October and November, which could lead to some above normal fire potential in parts of the Great Lakes with a hot, dry, windy day. Fire potential is expected to significantly decrease by mid-November. With harvesting and hunting season ongoing, potential for ignition is increased as well as potential for spread with wind alignment.

Despite fairly widespread areas of rainfall through the end of September, longer term drought and negative soil moisture anomalies were still in place across the western Mississippi Valley and the central Great Lakes towards the end of September. Due to uncertainty in the longer-term weather outlooks through the rest of the fall, periods of above normal fire potential remain possible across these areas. Portions of the Mid-Atlantic States and the northwestern half of New England may also experience periods of above normal fire potential into October due to more recent drying trends. Overall, near normal fire potential is expected across the Eastern Area through the remainder of fall and early winter.

Southern Area

Underlying, significant drought persists in large parts of the western and central geographic area despite episodes of well-timed heavy rainfall the past several weeks. This is abundantly clear in Keetch-Byram Drought Indices (KBDIs) remaining well above normal on an unusually large scale and by 60-day rainfall deficits, which remain below 25% of normal across portions of Texas, Oklahoma, Louisiana, Mississippi, and Alabama. Flash drought has continued to expand to the north and east into increasing portions of Louisiana, Arkansas, Mississippi, and Alabama. Meanwhile, short-term dryness is pronounced through much of the rest of the Mississippi, Tennessee, and Ohio Valleys, as is clear in the 14- and 30-day percent of normal rainfall. Exceptional drought across the US Virgin Islands may be of increasing concern, particularly if it lingers into the Caribbean's dry season.

Leaf drop is beginning earlier than normal in areas impacted by this summer's drought, including over parts of the Lower Mississippi Valley into the Plains states, in addition to more localized portions of the Appalachians. Hardwood-dominant areas typically see an uptick in wildfire risk once this process nears completion, as fresh leaf litter contributes to fuel loading and an open canopy allows for solar radiation to reach the fuel bed. It is not clear to what extent leaf drop will be impacted by the record early green-up this spring, but confidence is increasing that drought will continue to stress trees and other vegetation, ultimately increasing the potential for an early start to the fall fire season in the driest parts of the Southern Area. Urban trees stressed by pollution and non-native invasives are also experiencing early leaf drop, which could impart localized impacts to the wildland-urban interface this autumn.

Pine trees along the Gulf Coastal Plain that were stressed by drought over the summer continue to show well below normal live fuel moisture values despite abundant recent rainfall. A loblolly pine sample taken in Angelina County, Texas, on September 15 indicated a live fuel moisture value that tied the historical minimum from 2001-2023. Recovery significant enough to halt wildfire

risks in pine-dominant areas is thought to be unlikely until next spring. Fortunately, herbaceous fuels in southeast Texas that, when cured, act as a carrier of fire either horizontally or vertically into the pine canopy have shown signs of recovery due to recent rainfall, with a strong green-up response reported by the National Forests and Grasslands of Texas.

A host of other potential impacts are within the realm of possibility. Southern pine beetle infestations have recently been reported in numerous states across the Southern Area, while the Hemlock wooly adelgid continues to plague the Appalachians. Hurricane debris from the past half decade or so may also contribute to fuel loading, as it has in Louisiana recently, especially where 1000-hour fuel moisture is abnormally low in areas of severe to exceptional drought. Last December's record cold snap and this spring's post-green-up freezes could also contribute to fuel loading in some areas of the Appalachian states as we head into the dormant season. A more in-depth analysis on grass loading in Texas and Oklahoma will be available later this fall, but early indications are that the wet spring and early summer contributed to abundant grasses as compared to last year.

El Niño is expected to dominate weather across the Southern Area for the October 2023 to January 2024 period, but there are certainly different flavors of El Niño that lead to uncertainties. A typical El Niño, if there is such a thing, generally features a suppressed storm track across the central and eastern US during the late fall and winter months. High pressure ridges aloft over Canada and the northern US can result in drier and warmer than normal conditions over the northern tier of the geographic area, but the suppressed and often active storm track brings an abundance of precipitation to the southern tier. Persistent cloudiness associated with this pattern results in below average temperatures, as well. Moderate or strong El Niños like this year's have usually seen this pattern develop during October, which is on average one of the drier months of the year for much of Southern Area.

All of that said, it is perhaps wise to prepare for the unexpected given that 2023's weather and fire activity has been anything but normal. Historically warm sea surface temperatures (SSTs) globally may not allow for the response that would normally be expected from El Niño, and cool SSTs near Hawaii are anti-correlated to warmth in the central and eastern tropical Pacific that is the hallmark of El Niño. What this may do to the large-scale pattern is unclear, as there are no perfect analogs for the current situation. Medium-range outlooks from NOAA and extended ensemble guidance are not yet supportive of this turn to cool and wet weather, although parts of the Great Plains should see an active weather pattern return during the first week of October. It is hard to bet against an eventual and perhaps dramatic turn to unsettled weather for the Gulf States and Southeast, but unfortunately, the timing of this pattern change is of low confidence.

Exceptionally warm SSTs in the Gulf of Mexico and Caribbean are positively correlated to tropical cyclone formation, which is climatologically favored in these areas during October and November as high pressure dominates eastern North America and frontal boundaries provide a focus for low pressure development. El Niño has not yet produced the increase in wind shear that normally suppresses tropical cyclone activity, so active weather in the tropics is certainly a risk for the first half of the forecast period. Whether this results in drought-busting rain or enhances fire weather is up for debate and will be dependent on smaller-scale weather features that are difficult to predict more than a week or two out. This will also have implications on risks for Puerto Rico and the US Virgin Islands, where El Niño has allowed drought to linger or worsen. The rainy season for the Caribbean climatologically ends in November, closely mirroring the Atlantic hurricane season.

Persistent and expanding drought, along with drier and much warmer than normal conditions through at least the first half of October are the primary drivers for including southeast Texas, Louisiana, Mississippi, Alabama, eastern Arkansas, western and central Tennessee, Kentucky, and the mountains of Virginia in above normal significant fire potential for October. The highest confidence in above normal activity in October is centered on eastern Louisiana, Mississippi, and Alabama. Any improvement in the fire environment in mid to late September appears likely to be reversed, though risks are not expected to be as high as they were in southeast Texas and

western Louisiana in August given beneficial but scattered rainfall in these areas, along with the decreasing potential for triple-digit heat. Inaccessible marsh fires in coastal Louisiana have been burning for an extended period and may be more susceptible to significant growth during periods of critical fire weather that become more likely in fall. Central and eastern Virginia picked up beneficial rainfall from Tropical Storm Ophelia, but drought and dryness have been otherwise pervasive for an extended period from portions of the Blue Ridge Mountains up through the Appalachian Plateau.

Throughout the outlined predictive service areas for October, hardwood-dominant forests may see an earlier than normal start to the fall fire season assuming leaf drop associated with drought stress accelerates. However, if El Niño swings into full gear, an abrupt end to the season will occur. Based on El Niño climatology, this quick improvement is most likely for Texas, Louisiana, Mississippi, and Alabama no later than early November. Areas farther north, especially in Kentucky and Virginia, could see the above normal potential expanded into November and possibly December on subsequent updates. For now, confidence is too low in conditions during November and December to go with anything other than normal significant fire potential, but both below normal and above normal potential are possible within Southern Area.

Below normal significant fire potential is depicted for January 2024 across Florida, coastal Alabama, and coastal Mississippi due to forecasts of a wet, cool, and humid start to winter. This below normal potential may be expanded farther north and west in January and later into the winter or early spring on updates to this product the next few months. Note that it may be more difficult to achieve prescribed fire acreage this winter in these areas assuming both above normal precipitation and frequent episodes of wetting rainfall come to fruition.

Outlook Objectives

The National Significant Wildland Fire Potential Outlook is intended as a decision support tool for wildland fire managers, providing an assessment of current weather and fuels conditions and how these will evolve in the next four months. The objective is to assist fire managers in making proactive decisions that will improve protection of life, property, and natural resources, increase fire fighter safety and effectiveness, and reduce firefighting costs.

For questions about this outlook, please contact the National Interagency Fire Center at (208) 387-5050 or contact your local Geographic Area Predictive Services unit.

Note: Additional Geographic Area assessments may be available at the specific GACC websites. The GACC websites can also be accessed through the NICC webpage at:

<http://www.nifc.gov/nicc/predictive/outlooks/outlooks.htm>