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Welcome to the latest installment of The North Coast Observer! In this issue, there are articles on the significant dry lightning event of August 16th-17th, the subsequent fires and smoke, and the record-setting August heat wave. As always, a detailed summary of the previous season is included, along with an outlook for the coming fall, and a list of upcoming night sky events.

As Northwest California transitions into fall, the weather focus begins to shift to increasing rains and, eventually, mountain snows. However, until more widespread rains occur, the fire weather threat will remain. Stay tuned for the latest forecasts, watches, and warnings. If you haven't already, make sure you follow us on social media ([links below](#)). And, make sure you have a safe fall!

Follow Us on Social Media!

Website weather.gov/eureka
Facebook facebook.com/NWSEureka
Twitter twitter.com/NWSEureka

Upcoming Events

Date	Event
Sep 1	Meteorological fall begins
Sep 22	Autumn equinox at 6:30 AM
Oct 15	Great California ShakeOut
Oct 31	Growing season ends in zones 102,105-108
Nov 1	Growing season ends in zones 110-115
Nov 15	Daylight Saving Time ends at 2:00 AM
Nov 15	Growing season ends in coastal zones
Dec 1	Meteorological winter begins
Dec 21	Winter solstice at 2:02 AM

Great California ShakeOut is October 15th!

from the California ShakeOut website

International ShakeOut Day is always on the third Thursday of October. This year, that falls on October 15th. As always, you can hold your ShakeOut drill when and where you want. You can choose another date or several dates, and include people in multiple locations (home, work, or school), perhaps through video conferencing. Click [here](#) for more information!

**Join Us
in the
World's Largest
Earthquake Drill.**

October 15, 2020

www.ShakeOut.org

**Shake
Out**



Rainy Season Preparation Checklist

- ✓ Clean and repair gutters around your house. *Watch out for insects and other small animals!*
- ✓ Sweep up debris from around storm drains near your house.
- ✓ Locate and repair any roof damage. Water damage inside your house can be indicative of roof damage outside. Moss on the edges of shingles can allow rain and wind to get beneath the shingles during inclement weather. *Be careful up there!*
- ✓ Trim any branches that may make contact with your house.
- ✓ Look for water accumulation around the foundation of your home, and direct it away by re-grading or using trenches.

August 16th-17th Dry Lightning Event

by Matthew Kidwell

An upper-level low developed off the coast of southern California on August 15th. This feature pushed the persistent ridge of high pressure over the area off to the east, and southerly winds developed across northern California. Southerly winds helped to increase elevated moisture and instability.

Early in the morning of the 16th, a shortwave trough moved around the low which had moved north and was located off the central California coast. This shortwave provided just enough vertical lift to develop numerous thunderstorms across the San Francisco Bay area. Through the morning, these storms moved up into Sonoma, Napa, and Lake counties, and they continued farther north in the afternoon. These storms produced gusty winds up to 40 mph in Lake county. The next day, another round of thunderstorms moved across the same areas. Through much of the event, the lower atmosphere remained relatively dry. As a result, many of the thunderstorms produced little rainfall.

A map of the cloud-to-ground lightning strikes detected from these storms is shown below. These strikes started numerous wildfires, including the August Complex in eastern Trinity and Mendocino counties and the LNU Complex which spread into southern Lake county. The most notable aspect of this lightning outbreak was how widespread the lightning was and how dry the grass and trees were leading up to the event. This was the beginning of one of the worst wildfire seasons in California history. See Record-breaking September Fires & Smoke for more information.

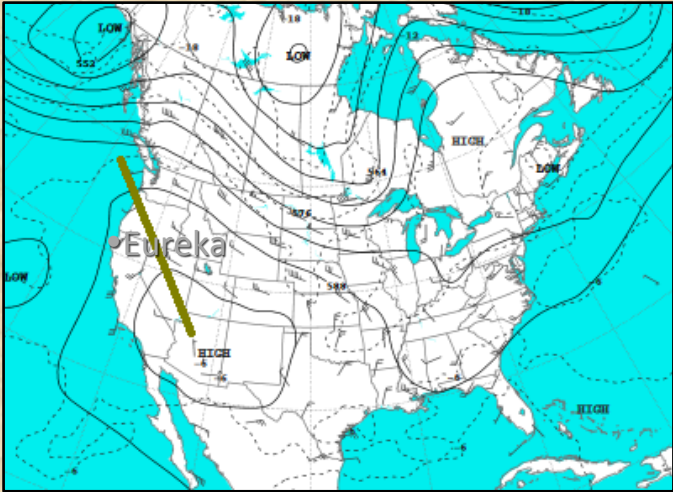


August 16th-17th cloud-to-ground lightning strikes.

Record-Setting August Heat Wave

by Matthew Kidwell

A high pressure ridge building over the area from the desert southwest (see map below, brown line is the ridge) brought record high temperatures to much of Northwest California in the middle of August. Temperatures peaked on August 15th with numerous inland locations seeing temperatures climb over 100°F.



500mb chart from 4AM August 15th.

At the coast, winds became light and from the east. This offshore flow helped to keep the marine air off the coast and allowed temperatures even at the immediate coast to warm to near 80°F. This brought the warmest temperatures to the coastal areas since October 24th, 2019.

Location	August 15 th Max Temperature
Eureka (Woodley Island)	78*
Fort Bragg 5N	79*
Arcata/Eureka Airport	81
Crescent City Airport	82
Scotia	93**
Potter Valley Powerhouse	106*
Willow Creek 1NW	106
Ukiah Airport	107*

*daily record **monthly record

Area Rainfall Observers Needed!

by Scott Carroll



As the rainy season returns, this is a good time to remind you that NWS Eureka is always looking for volunteers to take rain and snow observations and participate in the CoCoRaHS program. CoCoRaHS is short for Community Collaborative Rain, Hail, & Snow Network. Observations are entered via a website or phone app once per day (along with special event reports as needed). This data is used by your local National Weather Service office to assess forecast accuracy and to assist in warning and advisory decision-making. Click [here](#) for more information or to join CoCoRaHS. Click [here](#) to see the latest area CoCoRaHS data roundup.

Record-Breaking September Fires & Smoke

by Alex Dodd

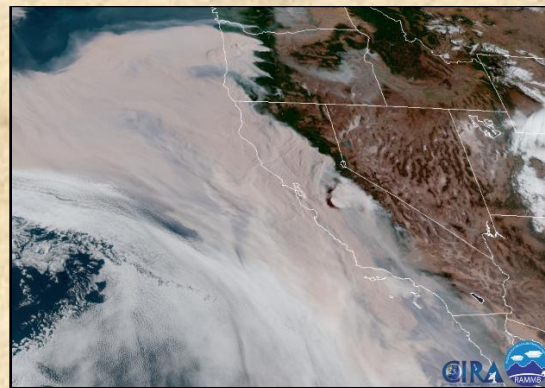
One of the most prolific Northwest California fire weather events on record occurred September 7th to 9th, 2020. This event pushed the August Complex Fire to become the largest fire on record in California. The stage was set well in advance for extreme fire weather, as the previous winter of 2019-2020 featured below to well below normal rainfall across Northern California. Severe to locally extreme drought conditions were in place heading into early September. Fuel for wildfires (dead vegetation) typically reach peak dryness this time of year, and 2020 was no exception.

Leading up to the fire weather event, a record heat wave resulted in 100°F to 110°F temperatures across most of our inland valleys. For instance, Ukiah reached 108°F on September 5th, 113°F on the 6th, and 111°F on the 7th. An abnormally strong ridge of high pressure over the southwestern United States was to blame for this heat. As this ridge pushed northwestward off the Pacific Northwest coast on Monday the 7th, a potent upper level trough dropped southward out of western Canada and across the Rockies by Tuesday, September 8th. The same system brought early season snow to the Front Range of the Rockies. A strong dry cold front rushed southward into Northern California, with very dry air rushing in on strong northeast to east winds from Monday night through early Wednesday morning September 9th. The preceding heat and subsequent drying winds pushed fuel moisture readings well past critical thresholds, and in some cases beyond record dry levels.

These dry winds then forced ongoing large fires (Red Salmon and Hopkins/Elkhorn/August Complex) in Northern California to spread rapidly toward the west and southwest, fueled by the near record dry vegetation. Additionally, new fires (Slater and Oak) were sparked, and these also grew quickly on September 7th through the 9th. All these fires resulted in mandatory evacuations of several communities, including significant portions of southern Trinity and southeastern Humboldt counties, as well as parts of Willits and Gasquet.



Hopkins Fire burns near the Mad River Ranger District.
Credit: Six Rivers National Forest/Mad River Ranger District



Smoke covering the US West Coast on 9/9/20.

While the larger population centers in our area were not directly impacted by the fires, all of Northwest California experienced a prolific bout of smoke and poor air quality. The smoke expanded quickly across California on September 8th and covered the entire west coast of the United States by Thursday the 10th. Coastal air quality remained unhealthy through the weekend of the 12th-13th.



Smoke over Eureka causes a very red sky on 9/9/20.

Credit: Humboldt County Sheriff's Office

An approaching low pressure system offshore finally brought cooler air and increasing onshore winds heading through the following week, which quickly cleared smoke away from the coast and more gradually improved air quality for portions of the interior as well. However, with little in the way of rain expected for most of our area, large fires may still be burning into October.

For current air quality conditions near you, visit fire.airnow.gov. For air quality statements, advisories, and alerts, visit your local air quality management district:

Humboldt, Trinity, & Del Norte counties: ncuaqmd.org

Mendocino County: co.mendocino.ca.us/aqmd/

Lake County: lcaqmd.net

Experimental HRRR Model Smoke Forecast Graphics
(updated by 8AM each morning)

<https://www.weather.gov/eka/AreaSmokeForecast>



JUNE

High pressure brought warm and dry conditions to inland areas, while coastal areas saw the typical fog, low clouds, and cool temperatures. Several weather systems moved through the area early in the month and brought some light rain, though most locations still saw below normal rainfall for the month. The most noticeable impact of these systems was the big temperature swings away from the coast. High temperatures dropped into the 60s in Ukiah and Weaverville just a few days after being in the upper 90s. The coast did not see the big temperature swings, but coastal clouds increased ahead of these weather systems and decreased behind them. Overall, temperatures were notably above normal, especially in the inland areas. Rainfall was below normal. However, the deficits were small as normal rainfall in the summertime are light.

JULY

High pressure was in place for much of the month bringing warm and dry conditions across the area. Most of the area received no rainfall, although the coast saw a few days of moderate drizzle bringing a few hundredths of an inch. Climatologically, July is the driest month. So, despite most areas seeing no rainfall, this is not unusual. Some of the inland areas saw thunderstorms on July 22nd and again on the 26th and 27th. These storms brought significant local rainfall to the mountains. However, the rains did not happen to hit any of the climate sites. Storms also started some wildfires, the largest of which were combined into the Red Salmon Complex in northeast Humboldt and northwest Trinity counties. High temperatures were above normal across the interior. However, most sites did not see any particularly hot or cool days. Ukiah, for example, had only two days in the 80s and only four days over 100°F. Along the coast, temperatures were close to normal.

AUGUST

High pressure continued to dominate, with warm and dry conditions persisting. The most significant weather occurred in the middle of the month when strong high pressure and weak offshore flow brought record high temperatures on the 15th and the 16th at the coast and across the interior. Eight stations tied or set records on these dates. Immediately following the heat, an upper level low approaching from the southwest brought monsoonal moisture to the area. This produced numerous thunderstorms across Northern California on the 16th and the 17th. These storms started numerous large fires around the area, although they only impacted eastern Mendocino County and southern Lake County in Northwest California. These thunderstorms brought sporadic, mostly insignificant rainfall to a few sites. High temperatures across the interior continued to be 5 to 7°F above normal, continuing the trend from July. The coast experienced temperatures 2 to 3°F above normal, whereas coastal temperatures were close to normal in July.

Summer 2020 Monthly Climate Comparison

	Crescent City			Eureka			Ukiah		
	Ave Hi	Ave Lo	Total Precip	Ave Hi	Ave Lo	Total Precip	Ave Hi	Ave Lo	Total Precip
Jun	63.3	51.5	0.65	63.1	51.3	0.20	88.7	54.8	Trace
Jul	61.6	50.2	None	63.1	51.3	0.03	95.8	55.6	None
Aug	65.5	53.6	0.02	66.2	52.8	0.08	96.8	59.5	0.08

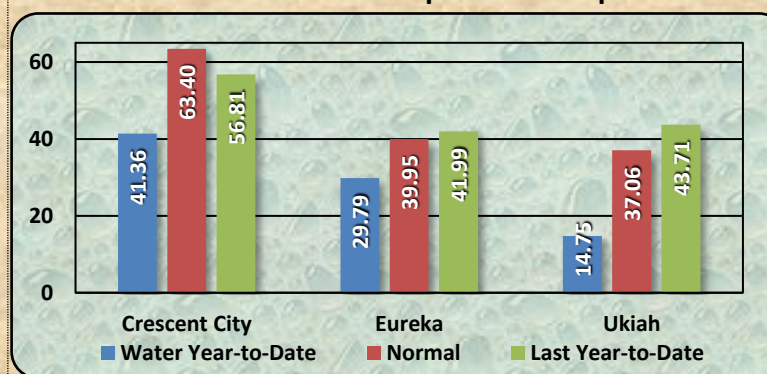
temperatures in °F, rainfall in inches

Summer Record Events

Date	Location	Record	Value	Previous Record
Aug 15	Eureka	Max Temp	78°F	73°F in 2013
Aug 15	Ukiah	Max Temp	107°F	107°F in 1951+
Aug 30	Eureka	Min Temp	47°F	47°F in 1908+

+record tied

Water Year-to-Date Precipitation Comparison



rainfall in inches, data through Sep 15th

Fall Outlook (September-November)

[click images for links](#)

The Climate Prediction Center's fall outlook for northwest California is calling for better than even chances of above normal temperatures (*figure 1 below*) and even chances of above and below normal precipitation (*figure 2 below*).

The entire country has a better than even chances of above normal temperatures, with warm temperatures most likely across the Four Corners region and New England. Better than even chances for wet weather are expected across Washington state and in the southeast.

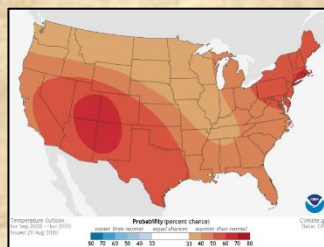


Figure 1 – Temperature Outlook

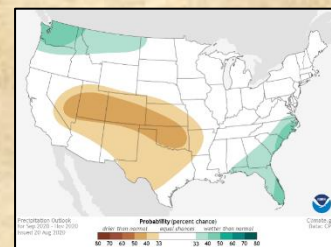


Figure 2 – Precipitation Outlook

More detailed outlook information can be found on the Climate Prediction Center's [website](#). For more detailed local climate information, visit NWS Eureka's [homepage](#), then click on the Climate and Past Weather menu.



As the nights gradually become longer during the fall months, night sky observers are rewarded with several meteor showers. The Orionids, Taurids, Leonids, Geminids, and Ursids are all coming up over the next few months. Meteor showers are named for the constellations that they appear to radiate from. However, meteors visible from Earth are comprised of

material in orbit of our sun. The best times to view meteor showers are when the moon has either not risen or is close to new, ensuring a darker sky. The number of meteors typically increases a few days before the maximum date and then decreases for several days after the maximum. Typically, the Geminid meteor shower is one of the most prolific. This year, the Geminids coincide with a near new moon in mid-December.

Late in September, Jupiter and Saturn will appear in the southwestern evening sky close to first quarter moon. On October 2nd, Mars will appear all night in proximity to a nearly full moon. On October 13th, a thin waning crescent moon can be found near Venus in the late night eastern sky before sunrise. Around October 22nd, a waxing crescent moon will be very close in the southwestern evening sky to both Jupiter and Saturn. Mars will once again traverse the night sky with a nearly full moon around October 29th, with the moon becoming full on Halloween.

On November 12th, an extremely thin crescent moon will join Venus in the early morning eastern sky just before sunrise. Around November 19th, a first quarter moon will appear near Jupiter and Saturn once again in the southwestern early evening sky. A penumbral lunar eclipse will occur on November 30th, with the eclipse maximum occurring after midnight. Typically, the moon appears dimmer and reddish during this type of eclipse.

Night Sky Calendar	
Date	Event
Sep 24	Moon-Jupiter conjunction
Sep 25	Moon-Saturn conjunction
Oct 2	Moon-Mars conjunction
Oct 13	Mars opposition
	Moon-Venus conjunction
Oct 20	Orionid meteor shower maximum
Oct 22	Moon-Jupiter-Saturn conjunction
Oct 25	Mercury inferior conjunction
Oct 29	Moon-Mars conjunction
Oct 31	Uranus opposition
Nov 4	S Taurid meteor shower maximum
Nov 11	N Taurid meteor shower maximum
Nov 12	Moon-Venus conjunction
Nov 17	Leonid meteor shower maximum
Nov 19	Moon-Jupiter-Saturn conjunction
Nov 30	Penumbral lunar eclipse (max 1:44 AM)
Dec 12	Moon-Venus conjunction
Dec 13	Geminid meteor shower maximum
Dec 16	Moon-Jupiter-Saturn conjunction
Dec 22	Ursid meteor shower maximum
	Jupiter-Saturn conjunction

Moon phases and event information courtesy of NASA

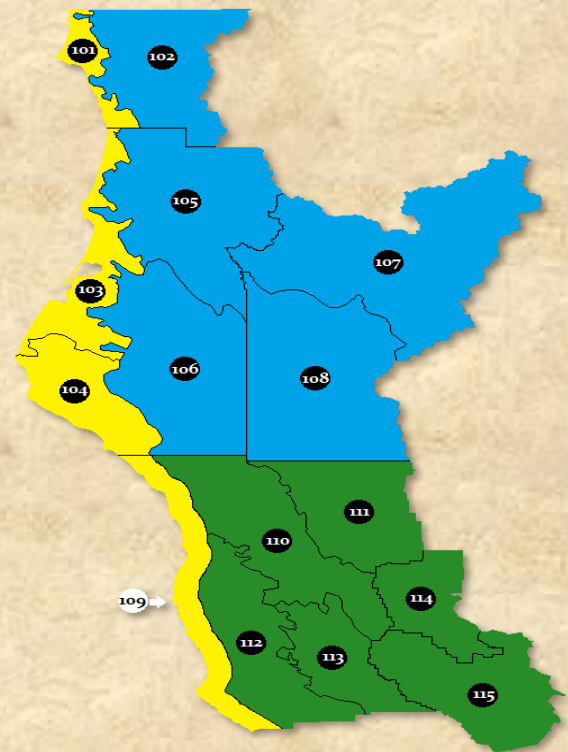


Moon Phases							
September	October	November	December				
☉ 1 st	☉ 1 st	☾ 8 th	☾ 7 th				
☾ 10 th	☾ 9 th	☉ 14 th	☉ 14 th				
☉ 17 th	☉ 16 th	☾ 21 st	☾ 21 st				
☾ 23 rd	☾ 23 rd	☉ 30 th	☉ 29 th				
	☉ 31 st						

Growing Season Coming to an End

by Scott Carroll

The return of fall brings with it the return of cold overnight temperatures and the potential for frost to develop. The National Weather Service in Eureka issues Frost Advisories, Freeze Warnings, and Hard Freeze Warnings during locally defined growing. The normal growing season ends on October 15th in the blue shaded zones below, on October 31st in the green shaded zones, and on November 15th in the yellow coastal zones.



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