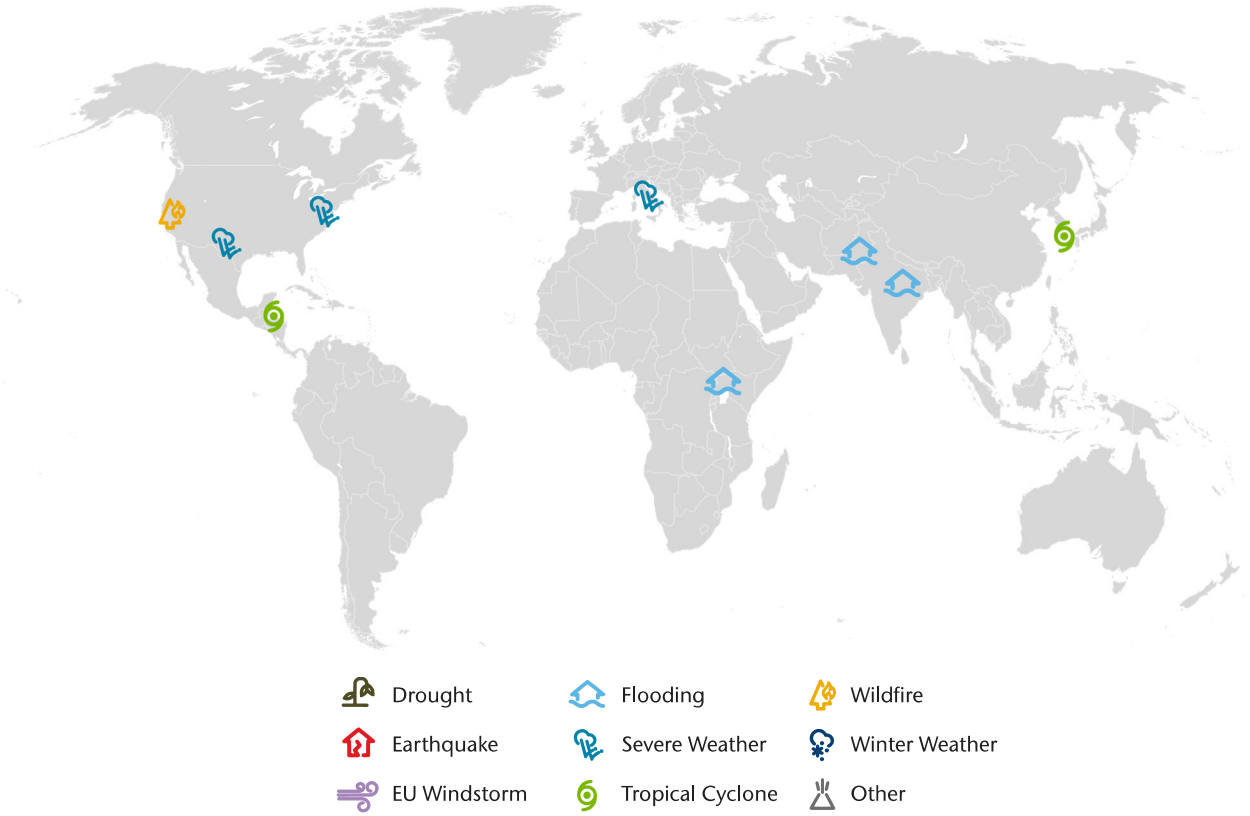
Weekly Cat Report

September 4, 2020

This Week's Natural Disaster Events



Event	Impacted Areas	Fatalities	Damaged Structures and/or Filed Claims	Preliminary Economic Loss (USD)*	Page
Typhoon Maysak	Korean Peninsula, China	1+	Thousands	Millions	3
Hurricane Laura	United States	25+	Tens of Thousands+	Billions	6
Wildfire	United States	8+	Thousands	100s of Millions+	8
Severe Weather	United States	0	Thousands	100+ million	10
Flooding	Nepal	22+	Dozens	Negligible	15
Severe Weather	Italy, Central Europe	4+	Thousands	10s of millions	15
Flooding	Pakistan	46+	Hundreds	Unknown	15
Flooding	India	100+	25,000+	Millions	16
Flooding	Uganda	8+	Hundreds	Unknown	16
Hurricane Nana	Belize, Honduras, Guatemala	N/A	Unknown	Unknown	16

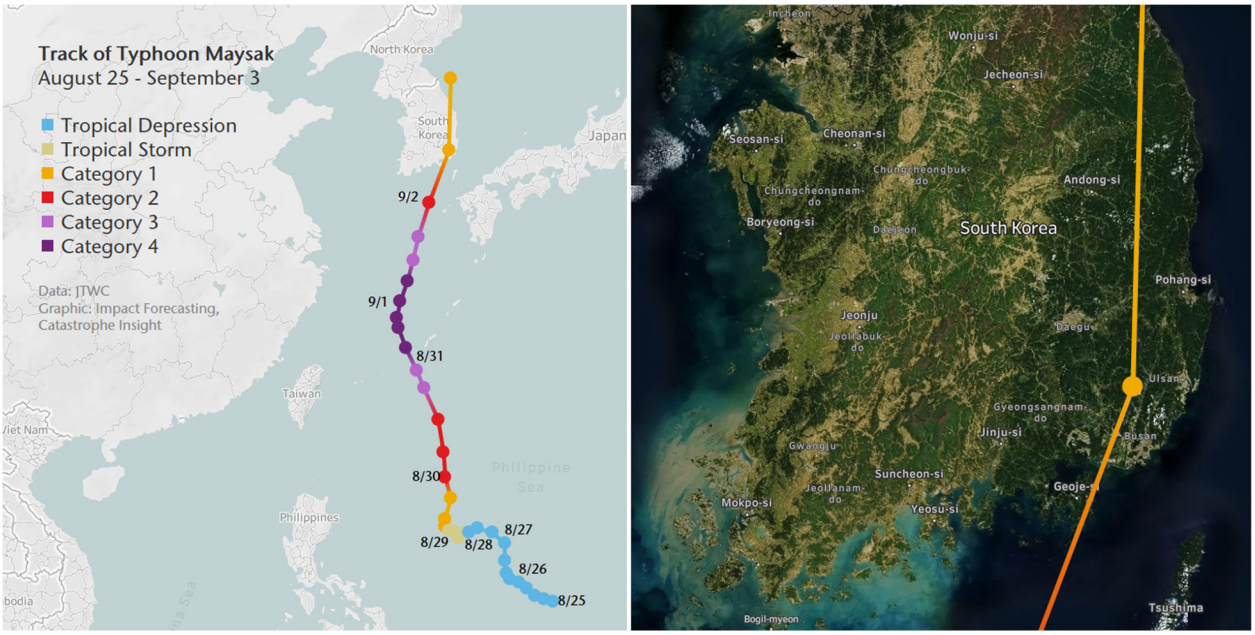
**Please note that these estimates are preliminary and subject to change. In some instances, initial estimates may be significantly adjusted as losses develop over time. This data is provided as an initial view of the potential financial impact from a recently completed or ongoing event based on early available assessments.*

Along with this report, we continue to welcome users to access current and historical natural catastrophe data and event analysis on Impact Forecasting's Catastrophe Insight website: http://catastropheinsight.aon.com

Typhoon Maysak makes landfall in South Korea

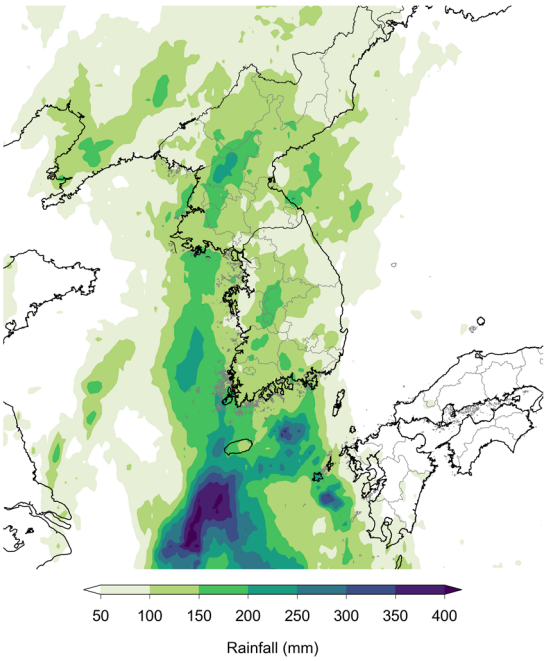
Typhoon Maysak became the ninth named storm the 2020 Northwest Pacific Typhoon Season. Maysak had undergone rapid intensification and became the strongest typhoon recorded in the Western Pacific Ocean this year. At its peak, the JTWC highlighted that the storm had 230 kph (145 mph) winds (1-minute sustained average) – equivalent to a Category 4 storm on the Saffir-Simpson Hurricane Wind Scale. Maysak eventually made landfall in South Korea near Busan City at approximately 02:30 AM local time on September 3 with an estimated 1-minute average sustained winds of 155 kph (100 mph). The South Korean government cited notable damage due to high winds and coastal and inland flooding. Total economic losses were anticipated to reach well into the millions (USD).

Meteorological Recap

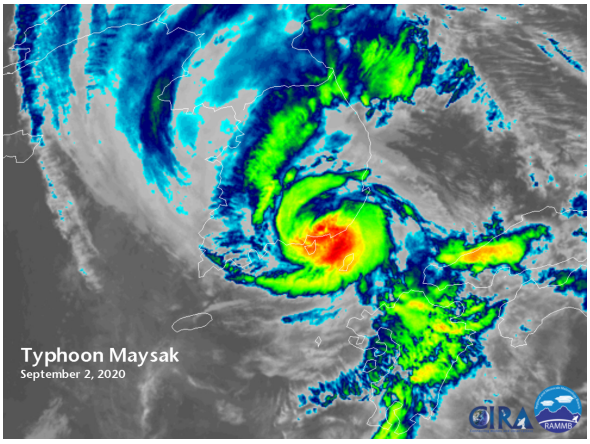


A broad low-pressure area with disorganized convection persisted several hundred miles east-southeast of Samar Island in central Philippines archipelago on August 25. Favorable conditions of low-to-moderate wind shear and warm along track sea surface temperature aided in consolidating circulation of the broader area of low pressure. The system generally tracked west-northwestward and its center became more consolidated with a well-defined area of central convection on August 26. The Joint Typhoon Warning Center (JTWC), which had already started monitoring the system (designated as 10W), issued its first tropical cyclone formation alert on August 27. Later, on the same day, the Japan Meteorological Agency upgraded the system into a tropical storm and assigned it an international name “Maysak” – the ninth named storm of the 2020 Northwest Pacific Typhoon Season. In tandem the PAGASA and JMA, the JTWC also upgraded the system to a tropical storm on August 28 at 12:00 UTC.

By the morning hours of August 29, the system had strengthened to a strong tropical storm, according to the JMA and JTWC. On August 29 at 18:00 UTC, Maysak first strengthened into a typhoon, with maximum sustained winds of 75 mph (120 kph); equivalent to a Category 1 storm on the Saffir-Simpson Hurricane Wind Scale (SSHWS). Maysak was the fourth typhoon of the 2020 Northwest Pacific Typhoon Season. The system further intensified between August 29-30, and by 18:00 UTC on August 30, the system intensified into a Category 2 storm, according to the JTWC. On August 30 at 18:00 UTC, Maysak was located approximately 180 kilometers (110 miles) south-southwest of Okinawa, Japan with 1-minute sustained winds of 200 kph (125 mph). The system continued to further strengthen and during a 24-hour stretch ending on August 31 at 18:00 UTC, the intensified by 45 kph (30 mph) to attain a peak intensity of 215 kph (130 mph); equivalent to a Category 4 on the Saffir-Simpson Hurricane Scale.



During the next 12-hour stretch, the system tracked through highly favorable conditions of low wind-shear and warm along track sea surface temperature. At its peak, Maysak had 1-minute sustained average winds of approximately 230 kph (145 mph) at 06:00 UTC on September 1. Maysak tracked generally northward due to the steering effects of twin ridges of high pressure located in the east-southeast and north-northeast directions, respectively. Satellite imagery depicted that the system was starting to fluctuate in intensity. The combination of increasing wind shear, less favorable sea waters of the Yellow Sea should, and land interaction along its northern and eastern quadrants manifested in the gradual weakening of Maysak and it was noted to have declined to an estimated intensity of 165 kph (105 mph) – Category 2 equivalent storm on the SSWHS during the afternoon hours on September 2. At around 15:00 UTC on the same day, Maysak was located approximately 90 kilometers (55 miles) west of Tsushima, Nagasaki in Japan with 1-minutes sustained average winds of 165 kph (105 mph) while gusts near the center were exceeding 220 kph (140 mph).



According to the NASA's visible infrared Imagery, the eye feature associated with Maysak had become obscured, and strong thunderstorms circled the central convection region of storm on September 2. Typhoon Maysak continued north-northeastward at 28 kph (17 mph) with a minimum central pressure of 950 millibars. Maysak officially made landfall at approximately 02:20 AM local time on September 3 (17:20 UTC on September 2) with an estimated 1-minute average sustained winds of 155 kph (100 mph) west of Busan City – the second largest city in South Korea. This was an equivalent to a Category 2 hurricane.

Typhoon Maysak rapidly degraded due to the frictional effects offered by rugged mountain ranges on the southern Korean Peninsula. Later, Maysak tracked through the Sea of Japan (known as East Sea in Korea) and made a second landfall near Kimchaek in North Korea's North Hamgyong province at around 02:00 UTC on September 3.

Another tropical storm “Haishen” was expected to evolve as an even stronger typhoon than Maysak. Haishen is anticipated to make landfall in either South Korea or southern Japan by the end of this week.

Miscellaneous – Typhoon Maysak (2020) was included among the strongest storms to directly strike the Korean Peninsula. As per the reliable historical records, there were only three instances in which a Category 2-equivalent or higher intensity storm had directly hit the southern tip of Korean Peninsula. Typhoon Sarah (1959) had made landfall in South Korea with an intensity equivalent to Category 3 storm had catastrophic impacts on the nation. Typhoon Faye (1995) and Maemi (2003) both had weakened to Category 2 storm shortly before the commencement of landfall. Also, the central pressure of Typhoon Maysak (952 millibars) was only slightly higher than the Typhoon Sarah (950 millibars), which is believed to be the lowest minimum central pressure for any typhoon directly hitting Korean peninsula.

Event Details

Typhoon Maysak wreaked havoc in **South Korea** which has experienced one of longest and wettest monsoon season this year. The storm brought damaging winds and heavy rains across the Korean Peninsula, particularly in Jeju island and southeastern provinces of mainland South Korea. Hurricane-force winds associated with the storm knocked down trees and utility poles, destroyed signboards, toppled vehicles, shattered windows, and damaged buildings. Power was knocked down in large areas; particularly in Jeju island and southern mainland South Korea. Roughly 300,000 households were left without electricity, and 2,500 residents were evacuated from low-lying and coastal regions. Flights were cancelled and ferry services between Jeju island and mainland South Korea were stopped. The port city of Incheon suspended dozens of sea routes.

Source: Yonhap

Maysak brought widespread impacts to the city of Busan, including damage to thousands of homes, businesses, roads, and bridges as winds gusted beyond 165 kph (105 mph). During September 1-2, over some isolated locations on the Jeju island, 24-hour rainfall accumulations topped 1,000 millimeters (40 inches), causing inundation of several hundred houses. Roads and highways were blocked at hundreds of locations across the cities located in southern parts of South Korea. Government officials cited that one person had died in storm-related incident. Damage assessment and economic loss estimation remained ongoing at the time of this writing.

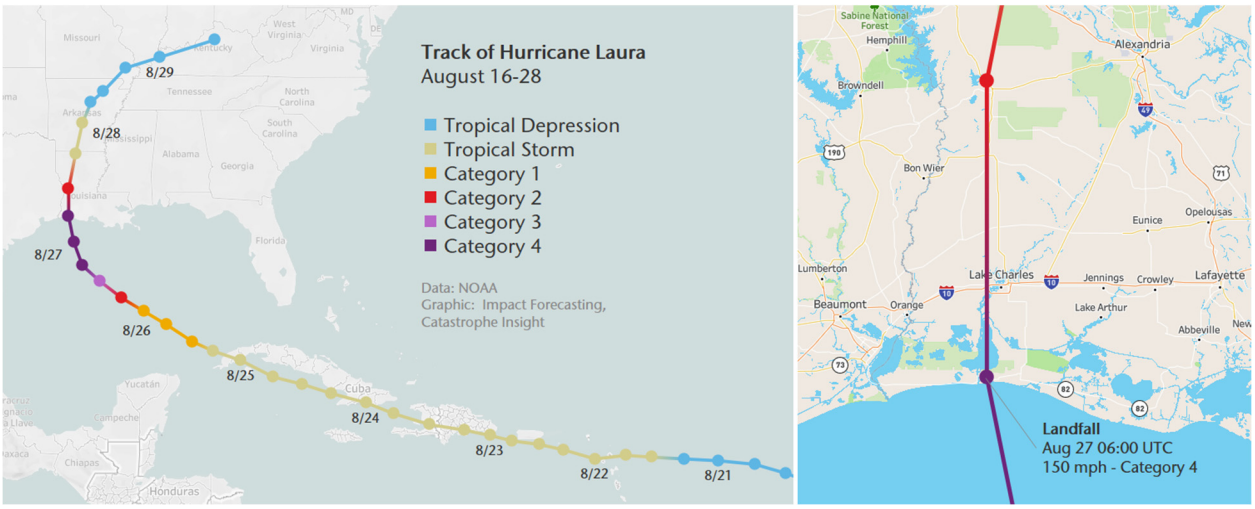
Typhoon Maysak also affected prefectures in western **Japanese Archipelago**. As of this writing, according to the Fire and Disaster Management Agency, Japan, dozens of houses were damaged or destroyed and around 28 people were injured; however, no casualties were reported. Maximum damage and injuries were reported from the Fukuoka Prefecture. A cargo ship with 43 crew members onboard went missing in the stormy East China Sea. The search operation by the Japan coastguard officials remained ongoing as of this writing.

The storm would later bring heavy precipitation to eastern and central parts of **North Korea**. According to the State Hydro-Meteorological Administration, North Korea, the port town of Wonsan located along the east coast recorded more than 385 millimeters (15 inches) of rainfall in a 15-hour stretch ending on 03:00 UTC on September 2. Hundreds of homes and roads along with a large area of agricultural land was damaged or destroyed in storm-related incidents.

Update: Hurricane Laura

After making landfall as a Category 4 storm near Cameron, Louisiana on August 27 with a maximum wind speed of 150 mph (240 kph), Hurricane Laura caused catastrophic impacts across swaths of the state, particularly in Cameron and Calcasieu Parishes including the City of Lake Charles. At least 25 fatalities were confirmed in the United States, and 60 overall including the Caribbean. Laura tied the record for the fastest intensification rate in the Gulf of Mexico during a 24-hour period, in addition to the record for the strongest hurricane to make landfall in Louisiana since 1856. At the peak roughly 1 million customers in the U.S. lost power. Further inland, Laura continued to produce severe weather, isolated tornadoes, and flash flooding, as heavy rains and gusty winds persisted while the storm progressed northeastward throughout portions of the Central Mississippi Valley, Ohio Valley and Mid-Atlantic between August 27-29. Total economic and insured losses were each individually anticipated to reach well into the billions (USD).

Meteorological Recap



The National Hurricane Center further downgraded Laura to a tropical depression on August 27 at 10:00 PM (3:00 UTC August 28) as maximum winds fell to 35 mph (55 kph) with the center of the storm located 20 miles (50 kilometers) northeast of Little Rock (Arkansas). Laura remained a minor inland flood threat as the cyclone became embedded in the mid-level westerly flow. On August 28, Laura continued to lose tropical characteristics while rapidly progressing northeastward through the Central Mississippi Valley and Ohio Valley. Four tornadoes were confirmed in Alabama on August 28 as tropical moisture interacted with an unstable airmass fueled by ample diurnal heating and low-level wind shear. The system continued to quickly weaken and was classified as a remnant low while moving across Kentucky on August 29. The remnants of Laura were ultimately absorbed into a cold frontal boundary trekking across the Mid-Atlantic States and off the coastline, while continuing to produce locally heavy rainfall and isolated severe weather. The frontal boundary merged with a low-pressure system progressing across Atlantic Canada, ushering a surge of tropical moisture northward toward the Canadian Maritimes through August 30.

A full recap of Laura's meteorological background can be found in last week's Weekly Cat Report.

Event Details

Louisiana

After Laura affected power services to at least 600,000 customers across **Louisiana**, while at least 500 electricity transmission towers were affected in the Lake Charles (Calcasieu Parish) area alone, A spokesperson for the Governor's office indicated that following the storm 98 water systems statewide were inoperable, affecting no less than 177,000 residents. A press releases from the Federal Emergency Management Agency (FEMA) revealed that a major disaster declaration for Louisiana was approved on August 28. According to the Louisiana State Health Department, prolonged power and water outages aided in the decision to evacuate patients from at least 10 hospitals and behavioral centers, as well as 11 nursing homes, including Lake Charles Hospital. At least 17 deaths in Louisiana have been contributed to the cyclone. Rainfall totals near landfall and across western Louisiana were estimated by the Weather Prediction Center (WPC) to be between 5 and 10 inches (125 and 250 millimeters) with isolated totals approaching 12 inches (300 millimeters).

Texas

Impacts from Laura resulted in eight fatalities across **Texas**, of which five were due to carbon monoxide poisoning relating to generator use. The Governor of Texas indicated that at least 160,000 power outages occurred throughout the state, with no less than 8,500 residents sheltered.

Arkansas

Remaining a Tropical Storm with maximum estimated wind speeds of 50 mph (85 kph), the core of Laura proceeded into **Arkansas** late in the afternoon on August 27. The Arkansas Governor declared a State of Emergency in anticipation of Laura's impacts. Noted impacts to structures, power lines, and trees throughout the southern and central portions of the state were widespread. Peak wind gusts in the most affected regions generally ranged from 45 to 55 mph (72 to 88 kph), with a 57 mph (92 kph) gust measured near El Dorado (Union County). The heaviest rainfall amounts were reported in central Arkansas where 3 to 5 inches (75 to 125 millimeters) of rainfall, with locally higher amounts were measured. Power was interrupted to no less than 50,000 customers throughout the state. The storm spawned multiple reported tornadoes, one of which prompted a Potentially Dangerous Situation (PDS) tornado warning for portions of Craighead and Greene Counties. An EF2 tornado with maximum wind speeds of 115 mph (185 kph) was confirmed in Randolph County causing significant impacts to one home along with several outbuildings and numerous trees.

Alabama

Four tornadoes were confirmed in **Alabama** including two EF1 tornadoes in Winston County which damaged multiple outbuildings and manufactured homes along with notable impacts to trees and vegetation. An EF1 and an EF0 tornado were confirmed in Cullman County, destroying at least three outbuildings and one mobile home, along with minor damage to vehicles and boats.

Financial Loss

Total economic losses and insured losses were expected to reach well into the billions of dollars (USD). However, given that most surge damage occurred in generally rural areas, the resultant NFIP payout is not anticipated to be substantial. Additionally, initial reports indicate that damage to offshore energy interests was not as impactful as feared.

Update: Wildfires continue across California

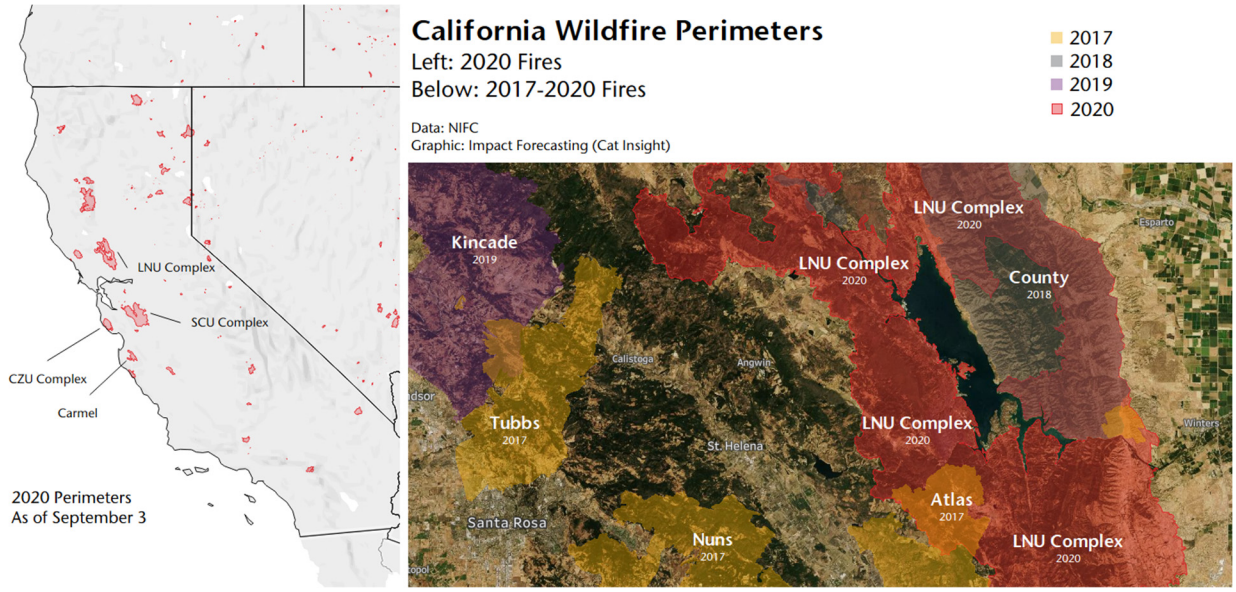
After a brief period of seasonable weather which aided in allowing personnel to make significant progress in controlling many large wildfires currenting ravaging portions of northern California – especially at lower elevations, a return to abnormally hot and dry conditions began the first week of September. At least eight wildfire-related fatalities were now confirmed. As of this writing, three lightning sparked fire complexes across the state rank among the Top 20 largest wildfires in California History since accurate records began being kept in 1932. These include the SCU Lightning Complex (#2), the LNU Lightning Complex (#3), and August Complex Fires (#4), burning in the Mendocino National Forest.

Meteorological Recap

A dominant and anomalous high-pressure ridge began to re-establish itself across the Southwestern United States between September 1-4, bringing a return to near record breaking heat throughout widespread regions in the Desert Southwest and California. National Weather Service (NWS) forecast offices have issued Excessive Heat Watches and Warnings across a majority of eastern and coastal California as well as the Great Basin and Desert Southwest in anticipation of dangerously hot daytime temperatures reaching and exceeding 100°F with nighttime temperature remaining well above average throughout the period of September 4-7. These conditions will enhance the threat of critical fire weather across the Western United States.

In addition to the heat, air quality alerts remained in place for many localities in central and northern California as smoke from ongoing wildfires continues to blanket the region during the first days of September. Abnormally dry conditions have also persisted across portions of the Southwest, where measurable rainfall has not been recorded in Bishop, California since April 18 and Las Vegas, Nevada since April 20.

The graphic below highlights the latest 2020 fire perimeter map for California (left), and then overlays the 2020 fires in Northern California with previous recent year events in 2017, 2018, and 2019.



Event Details

Since the lightning siege began in mid-August, Cal Fire has recorded at least 14,000 lightning strikes. During this period 900 new wildfires have been documented, which have now burned no less than 1.5 million acres (607,000 hectares), destroying at least 3,100 structures. During the first week of September, a firefighter assigned to the August Complex in the Mendocino National Forest was killed, bringing the total number of fatalities from the lightning siege fires to eight.

As of this writing, the SCU Lightning Complex, currently the second-largest fire in California history, has burned at least 391,578 acres (158,465 hectares) and is 76 percent contained. To date the fire has destroyed 82 structures, damaged 18 others, and resulted in five injuries. The LNU Lightning Complex, currently the third largest wildfire in California history has burned 375,209 acres (151,841 hectares) and is 78 percent contained. The fire has destroyed 1,490 structures and damaged 232 others, while resulting in five civilian casualties, making it the ninth-most destructive wildfire in state history. The August Complex in the Mendocino National Forest has affected 287,106 acres (116,188 hectares) and is 23 percent contained, becoming the fourth-largest wildfire in California history. The CZU Lightning Complex has expanded to 85,467 acres (34,587 hectares) and is 46 percent contained. The complex has also destroyed 1,490 structures and damaged 140 others, while resulting in one fatality, tying with the LNU Lightning Complex as the ninth-most destructive wildfire in state history.

Financial Loss

As most fires are not yet contained, and assessments remain ongoing, it is still too early to provide any specific economic or insured loss estimate at this time. Given the number of structures already identified as damaged or destroyed, however, ensures that the economic cost will reach into the hundreds of millions (USD) each for the LNU Lightning Complex and CZU Lightning Complex fires.

Ranking	Acres Burned		Destroyed Structures		Fatalities	
1	Mendocino Complex (2018)	459,123	Camp (2018)	18,804	Camp (2018)	85
2	SCU Lightning Complex (2020)	391,578	Tubbs (2017)	5,636	Griffith Park (1933)	29
3	LNU Lightning Complex (2020)	375,209	Tunnel (1991)	2,900	Tunnel (1991)	25
4	August Complex (2020)	287,106	Cedar (2003)	2,820	Tubbs (2017)	22
5	Thomas (2017)	281,893	Valley (2015)	1,955	Rattlesnake (1953)	15
6	Cedar (2003)	273,246	Witch (2007)	1,650	Cedar (2003)	15
7	Rush (2012)	271,911	Woolsey (2018)	1,643	Loop (1966)	12
8	Rim (2013)	257,314	Carr (2018)	1,614	Inaja (1956)	11
9	Zaca (2007)	240,207	LNU Lightning Complex (2020)	1,490	Hauser Creek (1943)	11
10	Carr (2018)	229,651	CZU Lightning Complex (2020)	1,490	Iron Alps Complex (2008)	10
11	Matilija (1932)	220,000	Nuns (2017)	1,355	Redwood Valley (2017)	9
12	Witch (2007)	197,990	Thomas (2017)	1,063	Harris (2007)	8
13	Klamath Theater Complex (2008)	192,038	Old (2003)	1,003	Carr (2018)	8
14	Marble Cone (1977)	177,866	Jones (1999)	954	Canyon (1968)	8
15	Laguna (1970)	175,425	Butte (2015)	921	Old (2003)	6
16	Basin Complex (2008)	162,818	Atlas (2017)	783	Hacienda (1955)	6
17	Day (2006)	162,702	Paint (1990)	641	Decker (1959)	6
18	Station (2009)	160,557	Fountain (1992)	636	Atlas (2017)	6
19	Camp (2018)	153,336	Sayre (2008)	604	LNU Lightning Complex (2020)	5
20	Rough (2015)	151,623	Berkeley (1923)	584	Esperanza (2006)	5

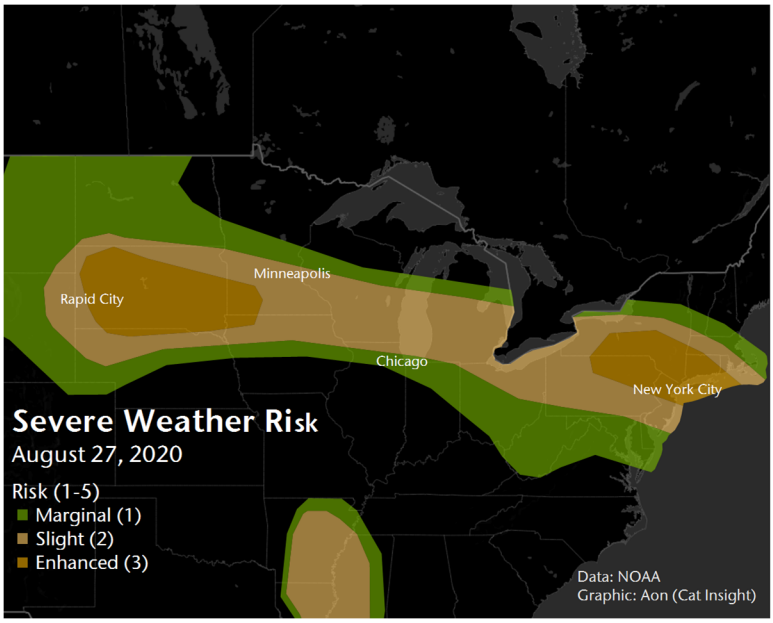
Data: NIFC / CalFire Graphic: Impact Forecasting (Cat Insight)

Strong winds and large hail impact Northeast, Plains

Strong upper level jet stream support across the northern tier of the county, coupled with a digging trough approaching the northwestern United States, aided in triggering multiple rounds of severe storms between August 26-28. At the surface, a meandering series of frontal boundaries focused the storms around and north of the periphery of a weakening ridge toward the Southwest. The most significant impacts occurred across regions of the Northeast, Mid-Atlantic, and Northern Plains, with the greatest hazards being strong straight-line winds, large hail, and isolated tornadoes. Clusters of severe storms and supercells traversing the Texas panhandle and Red River Valley between August 29-30 brought strong winds and large hail, particularly to northern portions of the Amarillo metro region in Texas.

Meteorological Recap

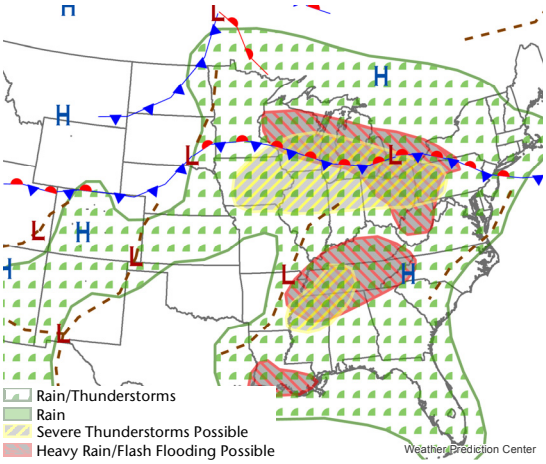
August 27



On August 27, severe weather was initiated across the Northeastern United States in relation to a frontal boundary extending southeastward from a low-pressure system over southern Canada. The Storm Predication Center (SPC) indicated an Enhance Risk (level 3 out of 5) for severe weather across regions of the Northeast, including northeastern Pennsylvania, northern New Jersey, southern New York and Connecticut. The environment south of this boundary was characterized by abundant moisture, steep low-level lapse rates (changes in temperature with height), ample wind shear, and strong diurnal heating with surface temperatures reaching into the upper 80s and 90s (°F). These conditions led to southeastward propagating thunderstorm bands, which had the greatest Impacts across portions of Connecticut, New York, and Pennsylvania. Severe straight-line winds with measured gusts approaching and exceeding 70 mph (112 kph) and isolated tornadoes were the primary hazards.

Further west, a short-wave trough deepening over the Northern Plains and associated developing surface low pressure system produced additional severe weather. The SPC highlighted a large region of southern South Dakota for an Enhanced Risk (level 3 out of 5) for severe weather, with a Slight Risk (level 2 out of 5) extending along a west to east corridor toward the Northeast coast. Ahead of the approaching surface cold front, initially discrete cells and thunderstorms developing west of the Dakotas quickly grew into a Mesoscale Convective System (MCS) which trekked across North and South Dakota into the overnight hours. The primary hazards associated with this event were large hail, and strong straight-line winds approaching and exceeding 80 mph (128 kph).

August 28



Severe storm activity across the northern half of the country was associated with an eastward tracking area of low pressure centered around northern Wisconsin and accompanying frontal boundaries, including a quasi-stationary front extending from the Northeast through western New York, southern Michigan, and across the southern Great Lakes. Ongoing outflow driven clusters of storms adjacent to this boundary in the eastern United States were enhanced as they moved southeastward toward an increasingly unstable environment in portion of Ohio and western and central Pennsylvania. Further east a mature severe squall line continued through southeastern Pennsylvania, Maryland and New Jersey. The greatest hazards with this event were heavy rainfall, and severe straight-line winds - with gusts reaching 60 mph (96 kph).

August 29

Severe weather was enhanced adjacent to the trailing end of a stalled cold frontal boundary spanning the Tennessee Valley and continuing westward toward Oklahoma. An ongoing cluster of storms re-intensified during the morning hours bringing severe weather to portions of southeastern Kansas and southern Missouri, where straight-line winds were the primary hazard. Substernal surface heating (with temperature reaching into the 90s °F) and ample low-level moisture across the Texas panhandle and Red River Valley, ahead of an approaching surface low pressure system, fueled additional clusters of severe storms and supercells throughout the evening and overnight hours. The main hazards associated with these storms were large hail, approaching 2.0 inches (5.1 centimeters), and strong straight-line winds.

Event Details

August 27

Across the Northeast measured wind gusts between 60 and 70 mph (96 and 112 kph) were common, with a maximum recorded wind gust of 81 mph (130 kph) occurring atop a fire tower near Reading, Pennsylvania (Berks County).

In eastern **Ohio**, severe wind gusts reaching 70 mph (112 kph) resulted in numerous reports of downed trees impacting structures and power lines, particularly in Trumbull, Mahoning, and Stark Counties. In **Pennsylvania**, at least 55,000 customers were without power following the storms. Numerous instances of downed trees and impacted structures occurred throughout Butler and Alleghany Counties.

In **New York**, an EF1 tornado was confirmed in Orange County, with an estimated maximum wind speed approaching 90 mph (145 kph), resulting in uprooted and snapped trees, while nearby a straight-line wind gust caused structural damage to two buildings at the Orange County Airport. Hailstones approaching 2.0 inches (5.1 centimeters) were reported in Livingston County. At least 40,000 customers throughout the state lost power resulting from this event.

Severe storms were particularity damaging in **Connecticut** where at least 48,000 customers were affected by electricity outages. In New Haven County and EF1 tornado with maximum estimated wind speeds of 110 mph (177 kph) caused a path of damage spanning from Bethany through Hamden, and toward North Haven. Extensive damage was observed near the center of Hampden, including a flat roof torn from a two-story building, and numerous uprooted and snapped trees. In North Haven significant structural and hardwood tree damages was reported before the tornado lifted, in one instance a tree fell through the roof of a home.

Storm impacts in Branford, CT. Source: Eversource CT

South of where the tornado dissipated, large swaths of microburst wind damage, with wind speeds estimated between 90 to 100 mph (145 to 160 kph) and a path width approaching 0.5 mile (0.8 kilometers) were surveyed by the National Weather Service (NWS). At least 18 homes were damaged in North Branford, with additional structural damage in Branford and East Haven. Multiple homes were struck by fallen trees. Notable impacts occurred at the East Haven High School football field, where grandstand bleachers were flipped over while the AstroTurf was peeled from the ground.

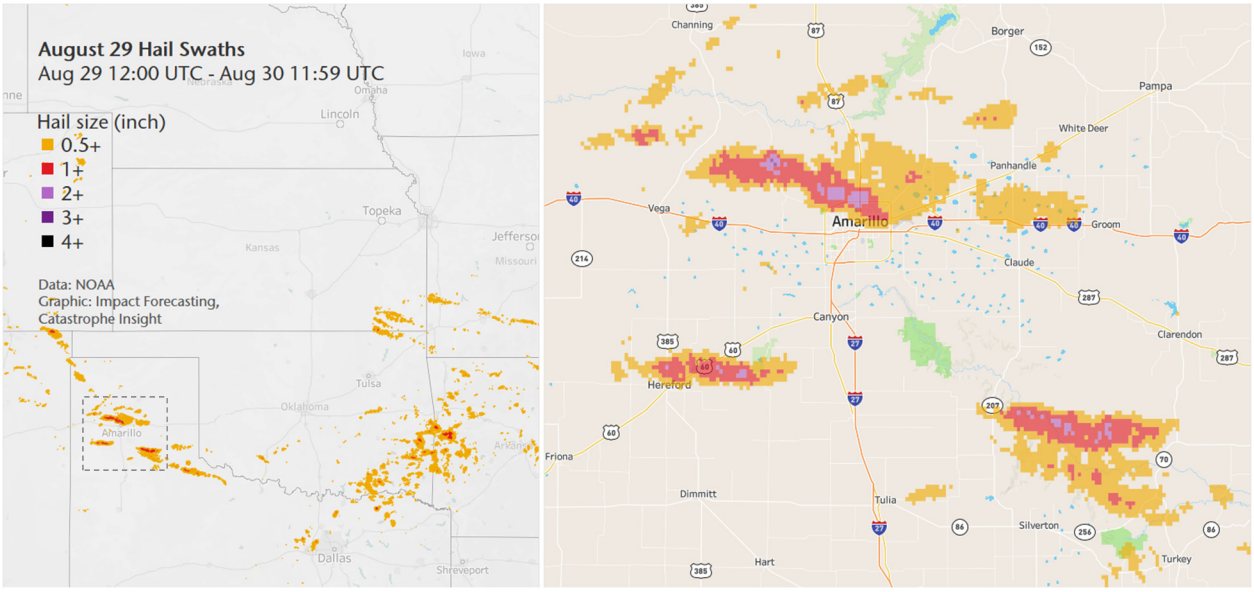
In **North Dakota**, hail approaching 2.0 inches (5.1 centimeters) was observed in Grant County. In **South Dakota**, maximum wind gusts of 91 (146) and 104 (167) mph (kph) were recorded in Stanley County. Damage to cropland and outbuilding were observed in Hand County. In Hamlin County, notable roofing impacts occurred - including damage to a daycare and bus barn.

August 28

Severe storms producing heavy rainfall on already saturated soils led to numerous flood warnings across central **Maryland** and the District of Columbia. In Cecil County severe storms producing wind gusts In excess 60 mph (96 kph) resulted in widespread reports of downed trees and utility lines. In **Pennsylvania,** tree and structural damage was noted in Huntingdon County. Further east, a quarter-mile long swath of significant tree and power pole damage was reported in Bucks County, while multiple streets were inundated and impassable across Delaware County.

August 29

In **Texas**, hailstones approaching 2.0 inches (5.1 centimeters) in diameter were reported over northern Amarillo (Potter County), where wind driven hail resulted in notable damage to vehicles and windshields, in additional to exterior impacts to structures. The NWS surveyed two swaths of straight-line wind damage across eastern and northeastern Amarillo, where estimated maximum wind speeds were 80 to 90 mph (128 to 145 kph). Several outbuildings and barns were destroyed. A metal building at the airport had part of its roof torn off, while roofing damage also occurred at the NWS Amarillo office. Across the region, extensive damage was noted to roofs, outbuildings, trailers, power lines, and trees. In Cason County, strong winds toppled several train cars, with debris closing a portion of Highway 60 for a brief period. A maximum measured wind gust of 70 mph (112 kph) was reported in Clay County.



Financial Loss

Total combined economic losses from the periods between August 26-28 and August 29-30 were expected to each top USD100 million. Most of the wind and hail-related damage will be covered by insurance.

Natural Catastrophes: In Brief

Flooding (Nepal)
Ten people were killed and two others remained missing after multiple landslides occurred in Kalikot District in Karnali Province in Nepal on August 30-31. Five buildings were destroyed by the debris flow. On September 3, heavy rainfall triggered a massive landslide in Dhorpatan Municipality-9 of Baglung district, Nepal. Government officials cited that at least 12 people were killed, and dozens of others were still missing as search operation continued. As many as 50 houses were washed away.

Severe Weather (Italy, Central Europe)
An active pattern caused by the progression of a large upper trough, with a strong ridge of high pressure on its eastern side, resulted in a notable severe weather outbreak in parts of Southern and Central Europe on August 29-30. With strong moisture advection from the Western Mediterranean thanks to an active jet stream, violent storms developed, particularly in northern Italy, Austria and elsewhere. Hundreds of weather-related claims and several millions worth of damage was reported from Tessin canton and eastern Switzerland. Agricultural impacts included more than 3,000 hectares (7,400 acres) of damaged crops in southern Burgenland and Steiermark, Austria. Strong storms also affected the Mazowieckie region in Poland, where emergency services conducted 1,100 interventions. There were 16,000 power outages. However, the worst effects were felt in parts of Italy, where four people were killed. A tornado caused structural damage along its track outside of Viterbo in Lazio region on August 30; local authorities initially estimated damage at upwards of EUR30 million. Powerful storms generated large hail and strong winds across the Po Valley, causing notable agricultural and property losses.

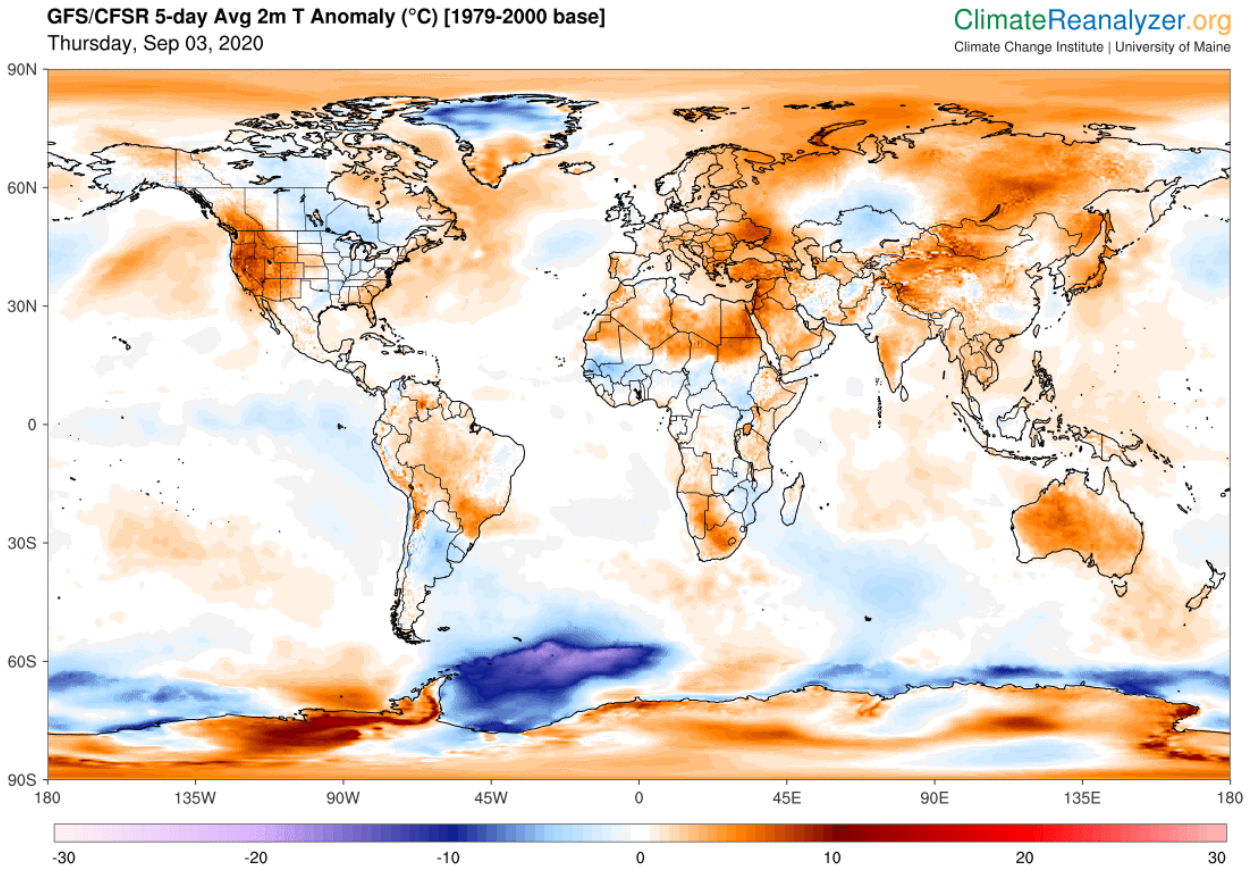
Flooding (Pakistan)
Between August 28 – September 3, incessant rains prompted severe flash floods and landslides in more than twenty districts of Khyber Pakhtunkhwa Province located in northern Pakistan. At several rain gauge locations in northern Pakistan, 24-hour rainfall accumulations surpassed 125 millimeters (5 inches), causing notable inundation damage to hundreds of houses, roads, and a large area of agricultural land. Pakistan Disaster Management Agency cited that 30 people were killed, and 40 others were injured in rain-related incidents between August 31 – September 3. Nearly 150 houses were either damaged or destroyed. Another 16 people died due to heavy flooding on August 26-28, according to the PDMA and local media reports.

Flooding (India)
Persistent torrential rains associated with a low-pressure monsoon trough affected India from August 28 – September 3. Among the hardest-hit states included Madhya Pradesh, Chhattisgarh, Gujrat, and Karnataka. According to the Disaster Management Division, Ministry of Home Affairs, India, another 100 additional casualties were noted and around 25,000 houses were reported to have sustained damage to various degrees during this period. Further losses were inflicted on public infrastructure and agricultural land.

Flooding (Uganda)
Record-breaking water levels of Lake Kyoga and Lake Albert resulted in notable inundation in Uganda and the displacement of at least 8,700 people. Locally strong storms also resulted in at least eight fatalities in Arua District. Estimates of economic losses were not available.

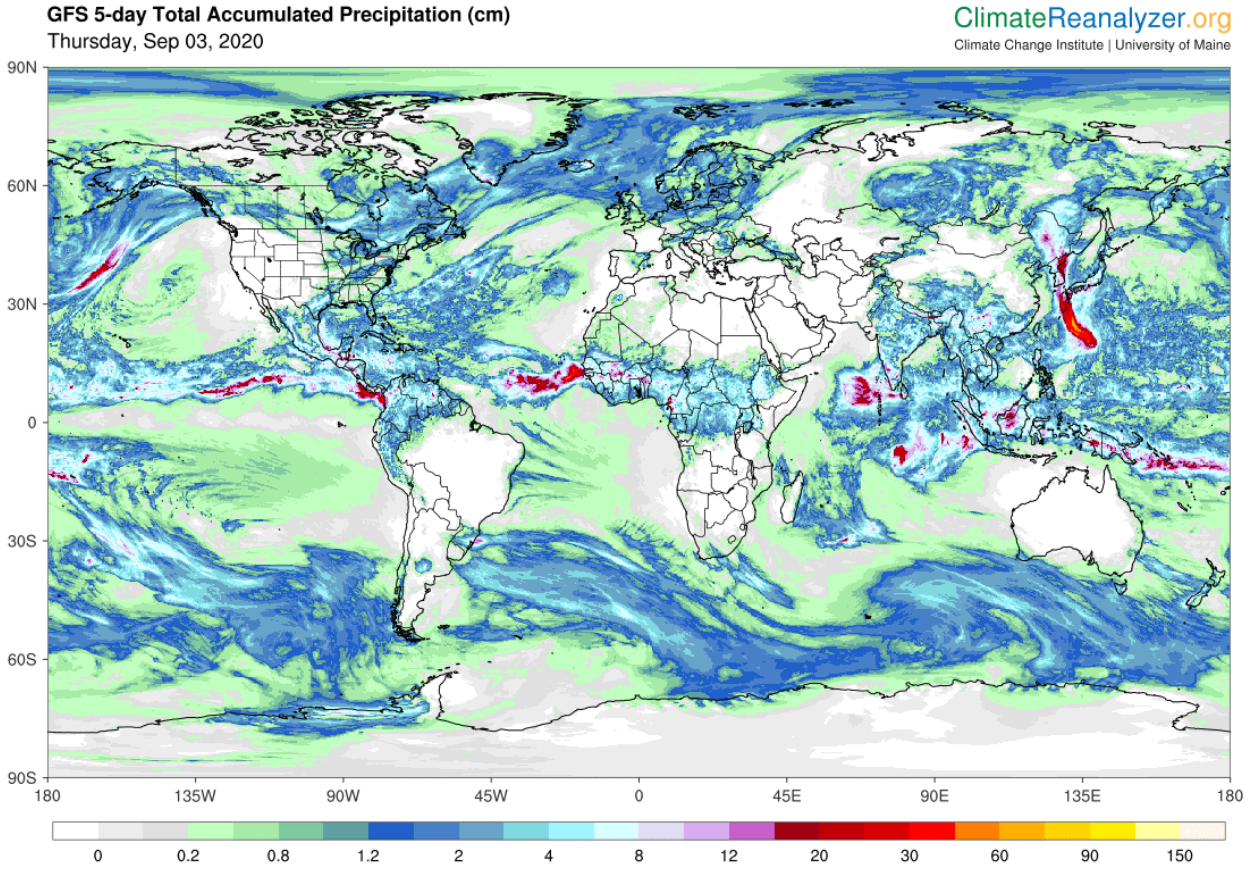
Hurricane Nana (Belize, Honduran, Guatemala, Mexico)
Hurricane Nana, the 5th hurricane of the 2020 Atlantic Hurricane Season, made landfall along the coast of Belize between Dangriga and Placecia at 1:00 AM CDT (6:00 UTC) on September 3 with maximum wind speeds of 75 mph (120 kph) – equivalent to a low-end Category 1 storm on the Saffir-Simpson Hurricane Wind Scale. Nana began as a wave in the central Tropical Atlantic on August 27 and proceeded on a western trajectory into the warm waters of the Caribbean where the storm gradually intensified despite persistent northerly wind shear. As Nana approached landfall, Hurricane Warnings were issued for the coast of Belize south of Belize City. Once inland, Nana began to rapidly weaken while interacting with rugged terrain. The greatest inland threats with the cyclone continued to be flash-flooding and landslides across portions of Belize, Honduras, Guatemala, and southern Mexico. At least 4,000 people in Belize moved to government shelters. The Permanent Contingency Commission of Honduras (COPECO) reported flooding and inundated roadways across the Island of Roatan. Preliminary information from the National Coordination for Disaster Reduction, Guatemala (CONRED) indicated damage to structures and downed trees in the Izabal Department. This is an ongoing situation and will continued to be monitored in the coming days.

Global Temperature Anomaly Forecast



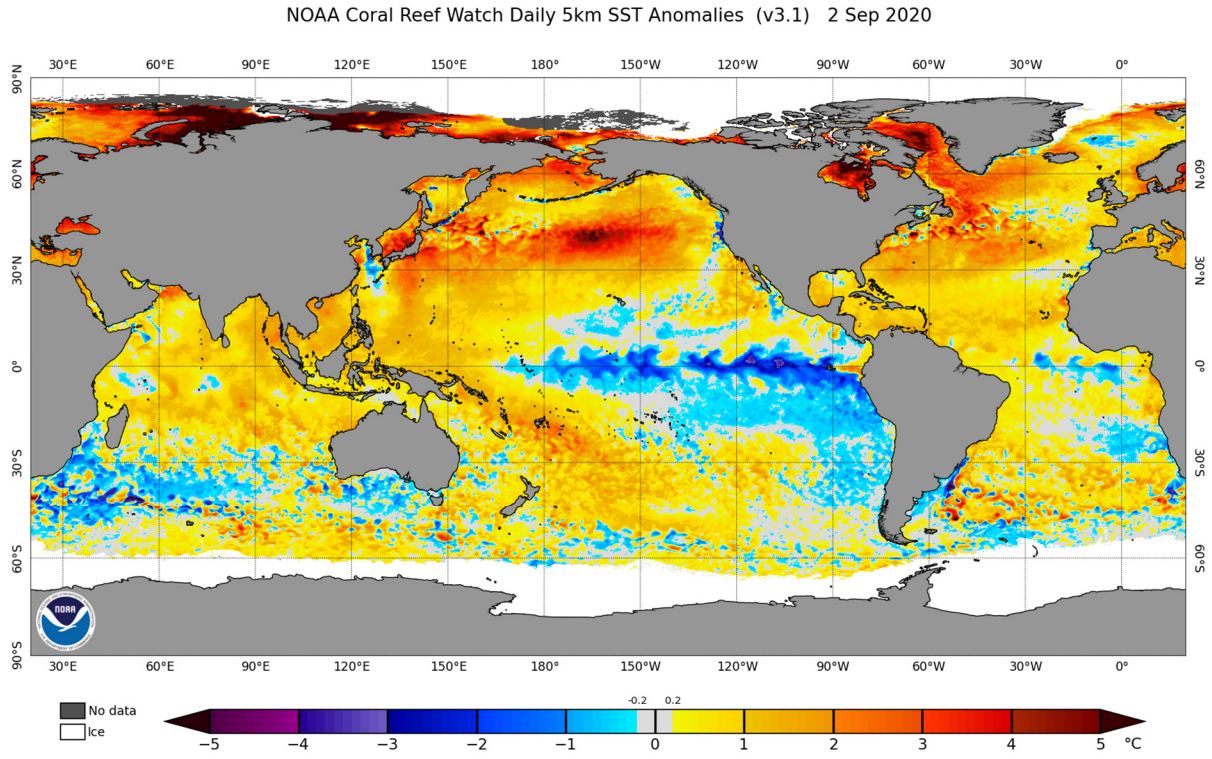
Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

Global Precipitation Forecast



Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

Weekly Sea Surface Temperature (SST) Anomalies (°C)



The SST anomalies are produced by subtracting the long-term mean SST (for that location in that time of year) from the current value. This product with a spatial resolution of 0.5 degree (50 kilometers) is based on NOAA/NESDIS operational daily global 5 kilometer Geo-polar Blended Night-only SST Analysis. The analysis uses satellite data produced by AVHRR radiometer.

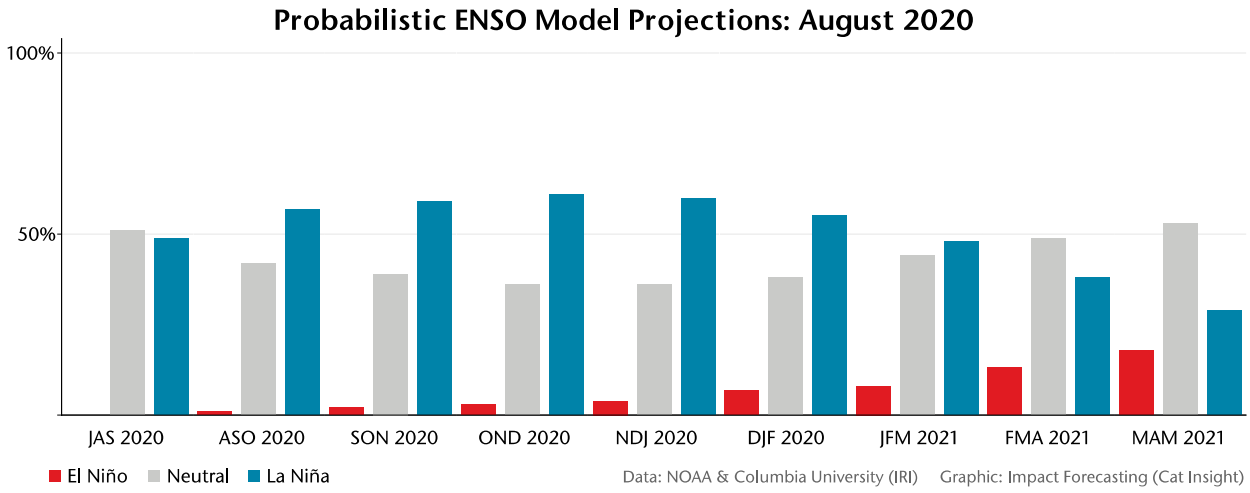
Select Current Global SSTs and Anomalies

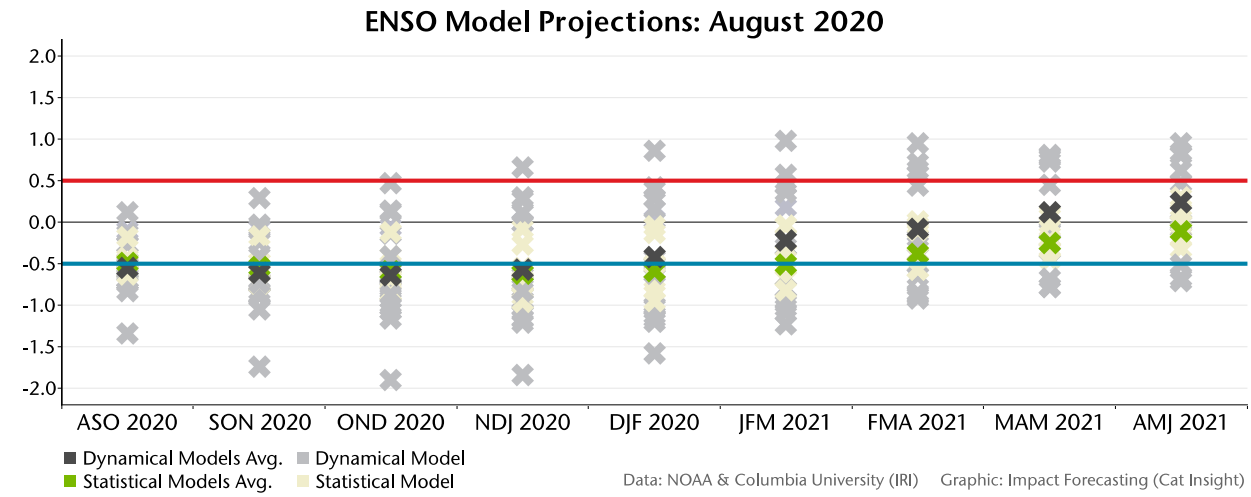
Location of Buoy	Temp (°C)	Departure from Last Year (°C)
Eastern Pacific Ocean (1,020 miles SW of San Salvador, El Salvador)	19.0	-3.1
Niño3.4 region (2°N latitude, 155°W longitude)	25.3	-1.1
Western Pacific Ocean (700 miles NNW of Honiara, Solomon Islands)	30.0	+0.1

Sources: ESRL, NOAA, NEIS, National Data Buoy Center

El Niño-Southern Oscillation (ENSO)

ENSO-neutral conditions are currently present. NOAA notes that these neutral conditions will likely linger through the Northern Hemisphere (boreal) summer months. The agency further states that there is a 60 percent chance that a weak La Niña will emerge in the boreal autumn and last through the winter of 2020 / 2021 (~55 percent chance).





El Niño *refers to the above-average sea-surface temperatures (+0.5°C) that periodically develop across the east-central equatorial Pacific. It represents the warm phase of the ENSO cycle.*

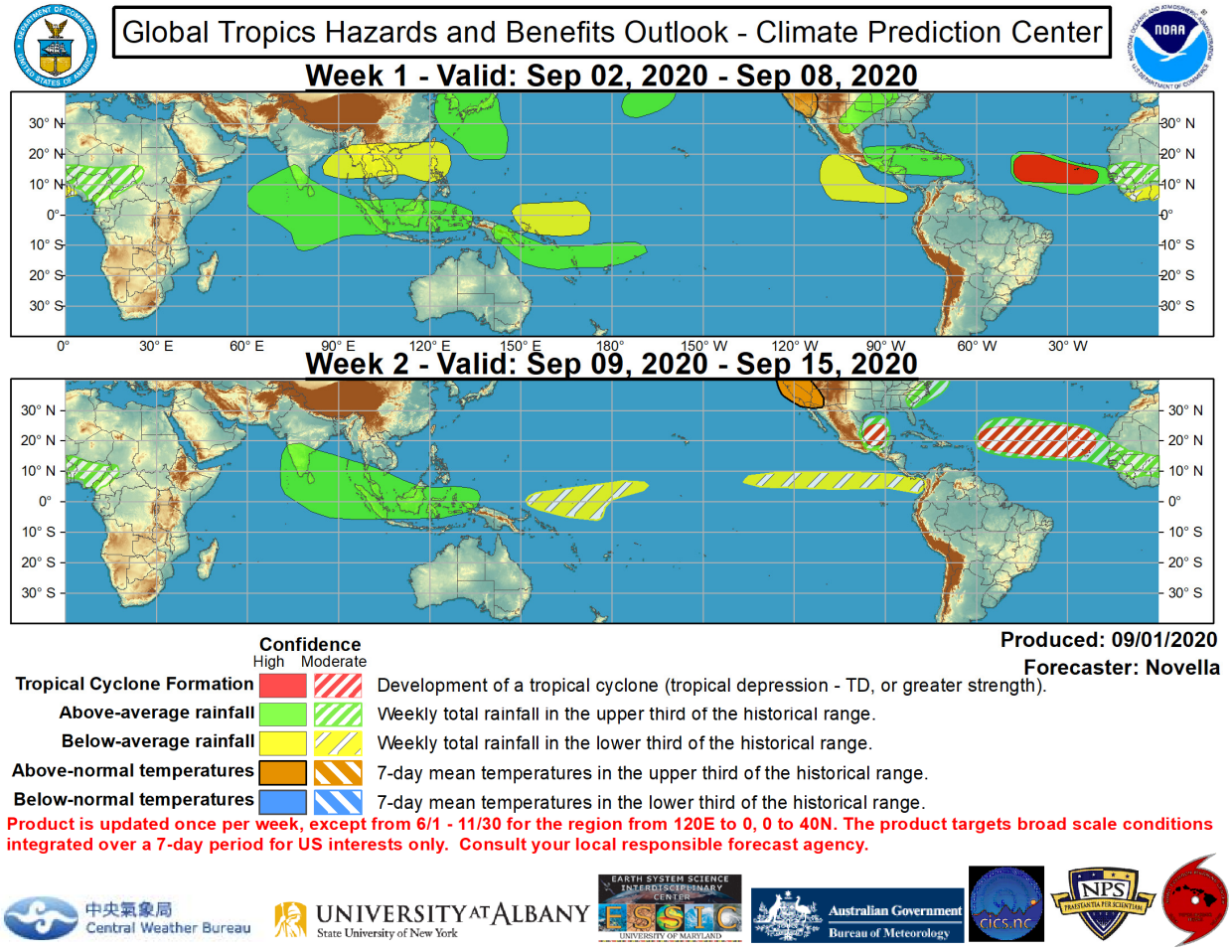
La Niña *refers to the periodic cooling of sea-surface temperatures (-0.5°C) across the east-central equatorial Pacific. It represents the cold phase of the ENSO cycle.*

El Niño and La Niña episodes typically last nine to 12 months, but some prolonged events may last for years. While their frequency can be quite irregular, El Niño and La Niña events occur on average every two to seven years. Typically, El Niño occurs more frequently than La Niña.

ENSO-neutral *refers to those periods when neither El Niño nor La Niña conditions are present. These periods often coincide with the transition between El Niño and La Niña events. During ENSO-neutral periods the ocean temperatures, tropical rainfall patterns, and atmospheric winds over the equatorial Pacific Ocean are near the long-term average.*

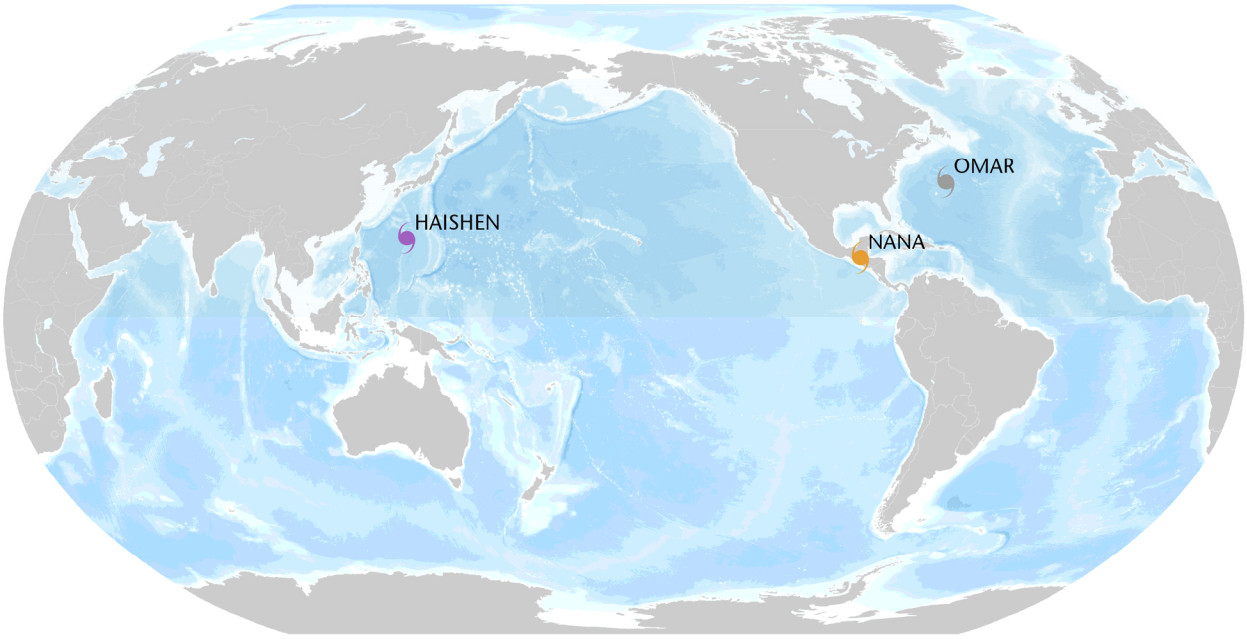
El Niño (La Niña) is a phenomenon in the equatorial Pacific Ocean characterized by a five consecutive 3-month running mean of sea surface temperature (SST) anomalies in the Niño 3.4 region that is above the threshold of +0.5°C (-0.5°C). This is known as the Oceanic Niño Index (ONI).

Global Tropics Outlook



Source: Climate Prediction Center

Current Tropical Systems



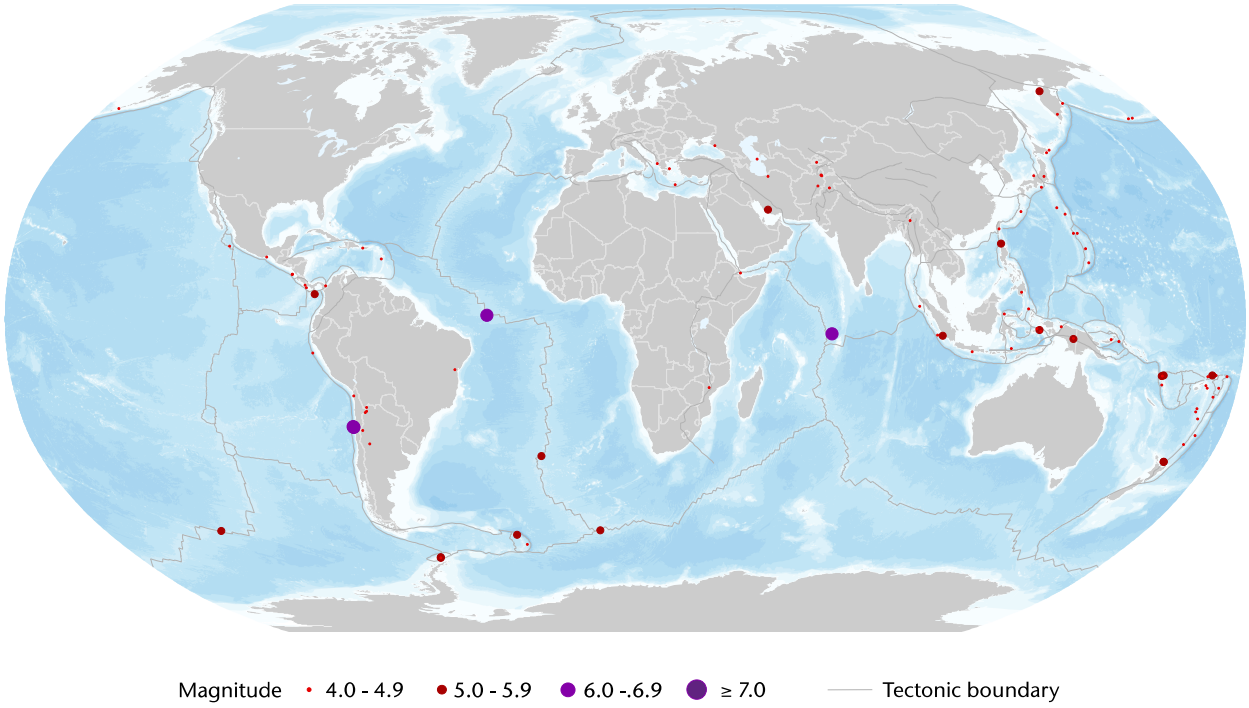
Location and Intensity Information

Name*	Location	Winds	Storm Reference from Land	Motion**
TY Haishen	21.4°N, 135.4°E	145 mph	1,000 kilometers (625 miles) SE of Okinawa, Japan	WNW at 9 mph
TD Nana	16.0°N, 91.1°W	35 mph	220 miles (350 kilometers) WSW of Belize City, Belize	WSW at 14 mph
TD Omar	35.9°N, 61.1°W	35 mph	335 miles (540 kilometers) NE of Bermuda	E at 13 mph

* TD = Tropical Depression, TS = Tropical Storm, HU = Hurricane, TY = Typhoon, STY = Super Typhoon, CY = Cyclone
** N = North, S = South, E = East, W = West, NW = Northwest, NE = Northeast, SE = Southeast, SW = Southwest

Sources: National Hurricane Center, Joint Typhoon Warning Center, Central Pacific Hurricane Center

Global Earthquake Activity (≥M4.0): Aug 28 – Sep 3

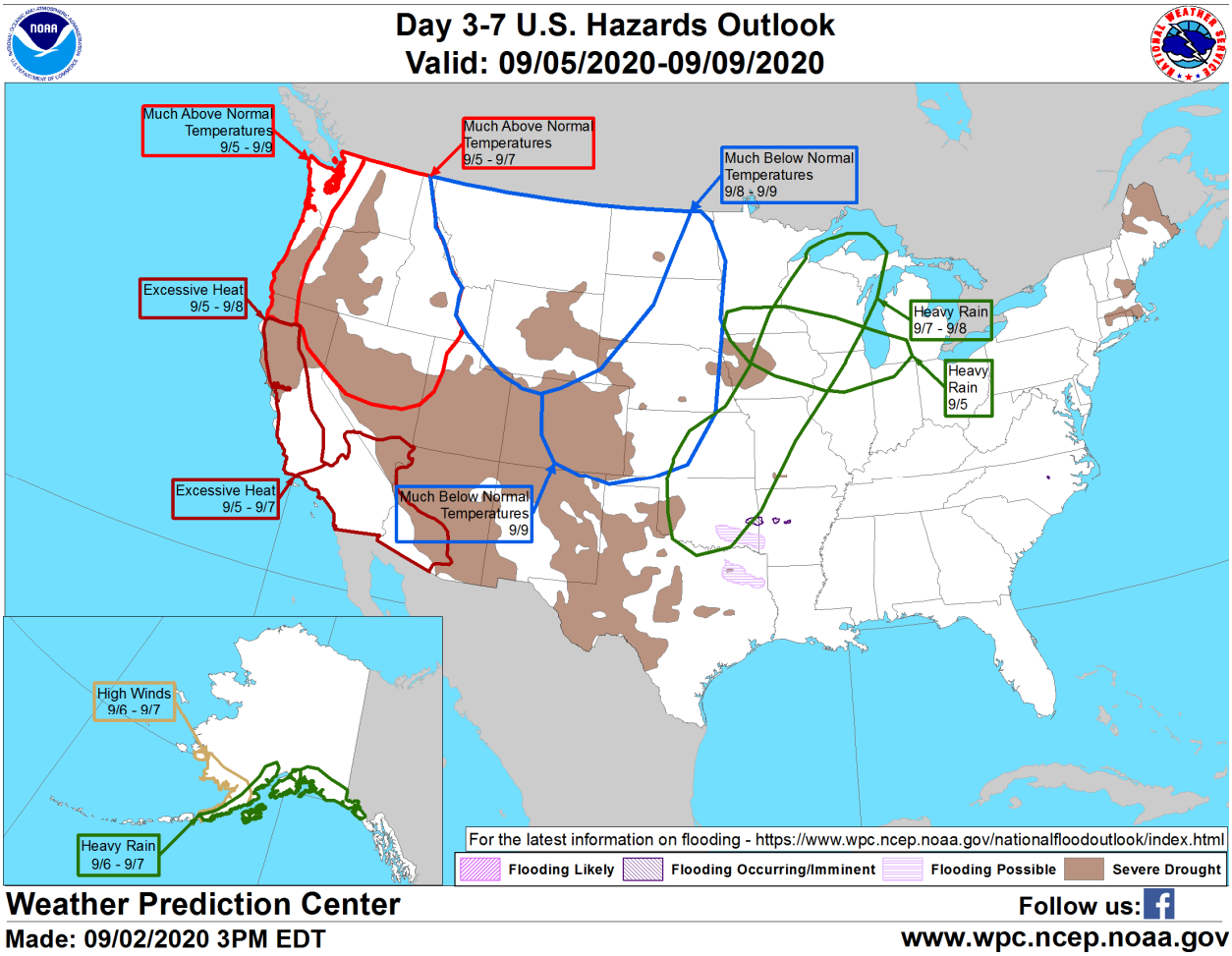


Significant EQ Location and Magnitude (≥M6.0) Information

Date (UTC)	Location	Magnitude	Depth	Epicenter
08/30/2020	0.77°N, 29.83°W	6.5	10 km	central Mid-Atlantic Ridge
08/31/2020	3.99°S, 70.24°E	6.1	10 km	Chagos Archipelago region
09/1/2020	27.97°S, 71.30°W	6.8	23 km	85 kilometers (53 miles) NW of Vallenar, Chile
09/1/2020	28.03°S, 71.31°W	6.3	19 km	81 kilometers (50 miles) NW of Vallenar, Chile
09/1/2020	27.93°S, 71.39°W	6.5	14 km	95 kilometers (59 miles) NW of Vallenar, Chile

Source: United States Geological Survey

U.S. Weather Threat Outlook



Potential Threats

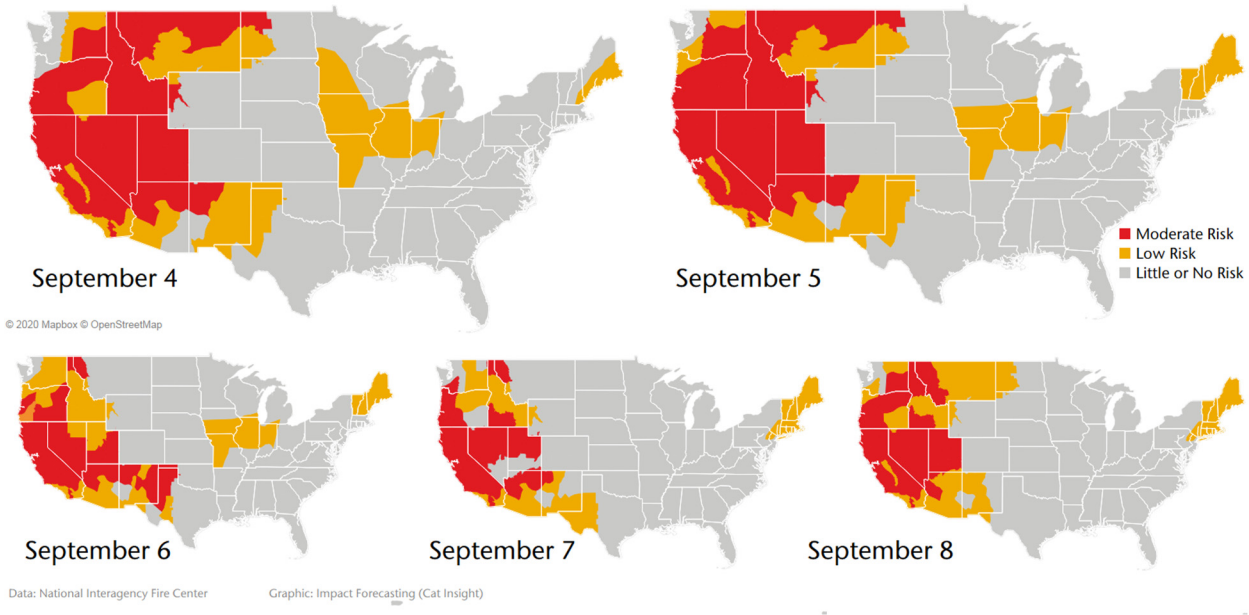
- The greatest threat in the medium range forecast is much above normal temperature and excessive heat returning to the Western United States between September 5-8. An anomalous dome of high pressure building over the region will allow consecutive days of triple digit heat across portions of California and the Desert Southwest, offering minimum nighttime relief. The heat wave will enhance fire weather conditions across localities which have recently been affected by historic wildfire activity.

- In contrast, an amplifying trough anchored across the Central United States will usher in much below normal temperatures to the Northern and Central Plains and Rockies between September 7-10.

- The highly amplified pattern will allow for an upper level trough to bring heavy rainfall spanning from the Southern Plains toward the Midwest between September 7-9.

U.S. Wildfire: Significant Fire Risk Outlook & Activity

The National Interagency Fire Center has highlighted an extended risk of elevated wildfire conditions across parts of the West, Desert Southwest, and Southern Plains during the first week of September. A potentially historic heatwave will engulf much of California and the Desert Southwest through the early portion of next week. This will severely enhance the fire potential in these areas, especially spots were fires continue to burn.



Annual YTD Wildfire Comparison: September 3*

Year	Number of Fires	Acres Burned	Acres Burned Per Fire
2016	40,784	4,654,939	114.14
2017	46,793	7,529,721	160.92
2018	45,784	6,950,908	151.82
2019	33,906	4,085,520	120.50
2020	40,308	4,224,078	104.80
10-Year Average (2010-2019)	**42,609**	**5,530,457**	**129.80**

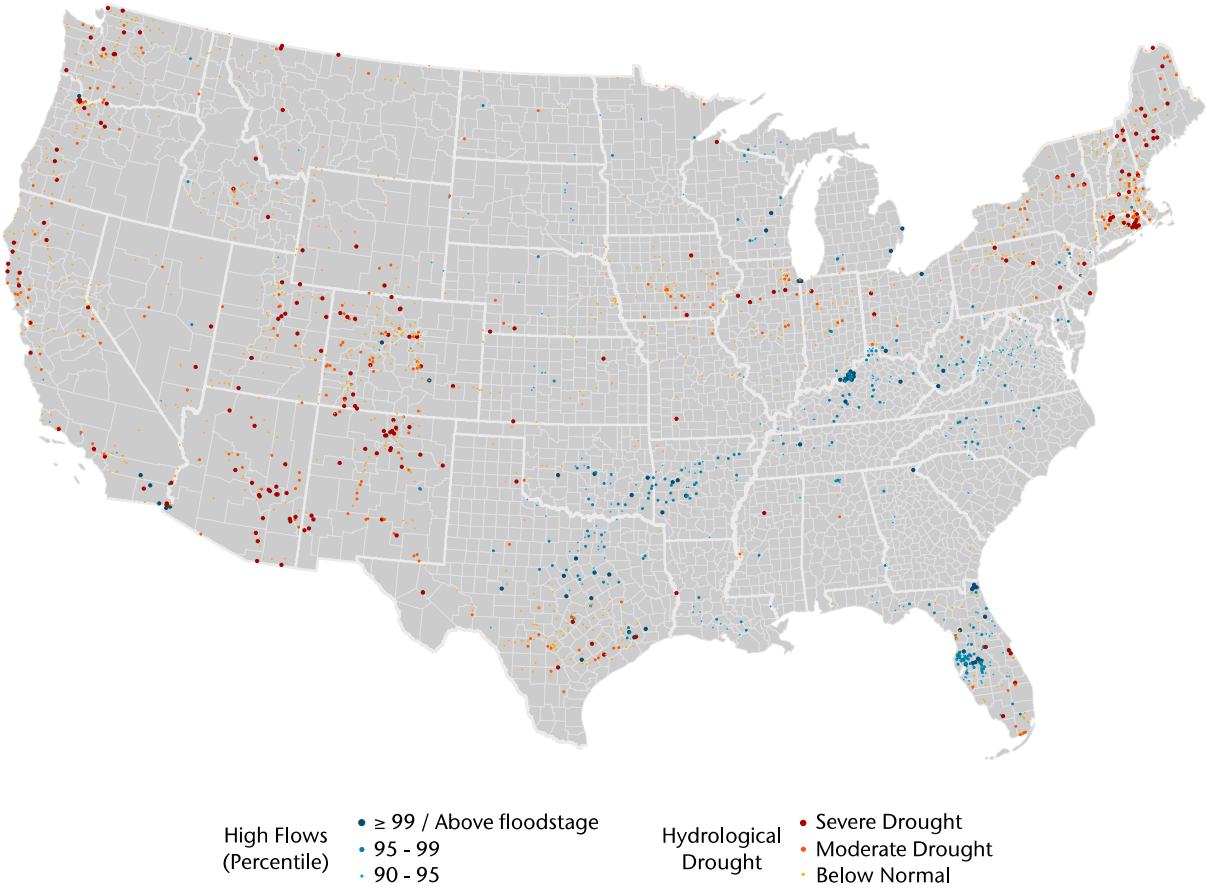
**Last available update from NIFC*
Source: National Interagency Fire Center

Top 5 Most Acres Burned by State: September 3

State	Number of Fires	Acres Burned	Acres Burned Per Fire
California	7,675	1,425,282	185.70
Arizona	1,946	839,788	431.55
Colorado	919	262,008	285.10
Nevada	635	224,982	354.30
Texas	4,251	219,354	51.60

Source: National Interagency Fire Center

Current U.S. Streamflow Status



A ≥99th percentile indicates that estimated streamflow is greater than the 99th percentile for all days of the year. This methodology also applies for the other two categories. A steam in a state of severe drought has 7-day average streamflow of less than or equal to the 5th percentile for this day of the year. Moderate drought indicates that estimated 7-day streamflow is between the 6th and 9th percentile for this day of the year and 'below normal' state is between 10th and 24th percentile.

Top 5 Rivers Currently Nearing or Exceeding Flood Stage

Location	Current Stage (ft)	Flood Percentile
Greenbrier River at Alderson, West Virginia	5.18	99.21
Kennebec River at The Forks, Maine	4.85	99.15
Big Coal River at Ashford, West Virginia	6.41	99.00
Flat Brook near Flatbrookville, New Jersey	3.67	98.96
Potomac River near Petersburg, West Virginia	5.04	98.92

Source: United States Geological Survey

Source Information

Typhoon Maysak makes landfall in South Korea

Typhoon Maysak Lashes South Korea, VOA
Typhoon Maysak leaves major damage in S. Korea, especially in Jeju and Busan, Arirang
Typhoon hits waterlogged Koreas, Bega District News
Typhoon Maysak causes heavy flood damage in eastern regions of N. Korea, Yonhap News Agency
Maysak – Northwestern Pacific Ocean, Hurricane and Typhoon Updates, NASA
Typhoon Maysak could become one of South Korea's strongest typhoons on record, Yale Climate Connections
Joint Typhoon Warning Center
Japan Meteorological Agency
Philippine Atmospheric, Geophysical and Astronomical Services Administration
Central Disaster and Safety Countermeasure Headquarters, Ministry of the Interior and Safety, South Korea
National Aeronautics and Space Administration
Korea Meteorological Administration
Fire and Disaster Management Agency, Japan

Update: Hurricane Laura

U.S National Weather Service
U.S. National Hurricane Center
U.S Weather Prediction Center
Federal Emergency Management Agency (FEMA)
*Hurricane Laura Leaves Six Dead, Homes Flattened, Coastal Towns Flooded in Louisiana, The Weather Channe*l
Hurricane Laura by the numbers: Winds to 137 mph, a 15-foot surge and yet another Category 4+ on U.S. soil, Washington Post
Facing weeks without water service, Lake Charles hospital evacuates after Hurricane Laura, The Advocate

Update: Wildfires continue across California

U.S National Weather Service
The California Department of Forestry and Fire Protection (Cal Fire)

Strong winds and large hail affect Northeast, Plains

U.S National Weather Service
U.S Storm Prediction Center
Trees Down, Power Out: Severe Storms, Including Tornado, Leave Pockets of Damage Across State, NBC Connecticut
Severe storms bring damaging winds, flooding rains across the Philadelphia region, ABC 6 Philadelphia
Pittsburgh Weather: Severe Storms Rip Through Area, Causing Massive Power Outages, CBS 2 Pittsburgh

Natural Catastrophes: In Brief

Ten people killed while two others gone missing in Kalikot landslide, The Kathmandu Post
Landslide, flash floods kill 12 in Nepal, dozens missing, Reuters
Pakistan Disaster Management Agency
Disaster Management Division, Ministry of Home Affairs, India
India Meteorological Department
U.S National Hurricane Center
Permanent Contingency Commission of Honduras (COPECO)
National Coordination for Disaster Reduction, Guatemala (CONRED)

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