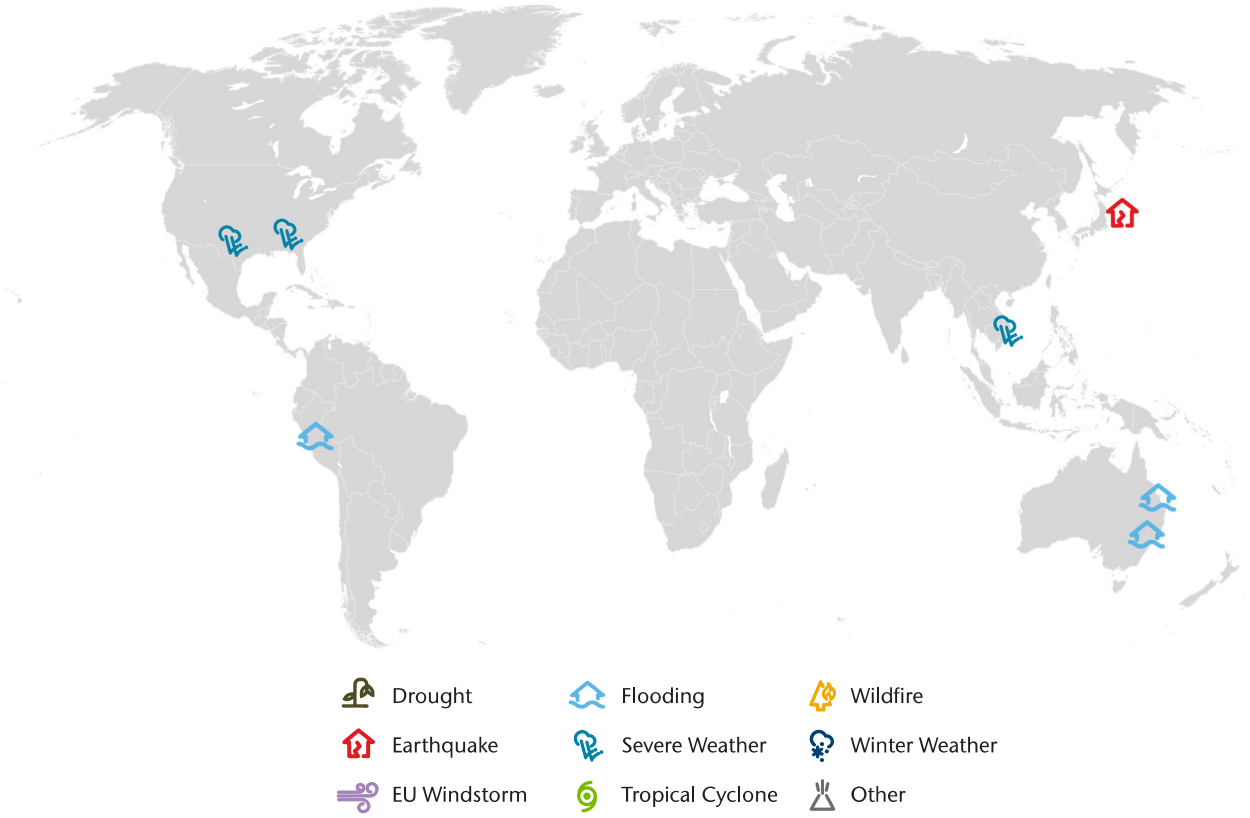
Weekly Cat Report

March 26, 2021

This Week's Natural Disaster Events



Event	Impacted Areas	Fatalities	Damaged Structures and/or Filed Claims	Preliminary Economic Loss (USD)*	Page
Severe Weather	United States	6+	Thousands	100s of Millions	3
Flooding	Australia	0	Thousands	1+ billion	8
Severe Weather	United States	0	Thousands	200+ million	12
Flooding	Peru	1	3,500+	Millions	13
Earthquake	Japan	0	Dozens	Unknown	13
Severe Weather	Thailand, Vietnam	2+	500+	Unknown	13

**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

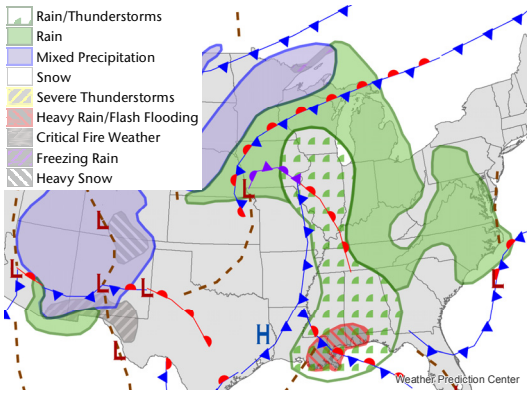
Active severe weather pattern continues to affect the U.S.

A series of strong disturbances traversing a mid- to upper- level trough extended a period of active weather across the Southern Plains, Lower Mississippi Valley, Deep South, and Mid-South between March 22-25. Severe storms swept through parts of Texas on March 22-23 and March 24-25, generating multiple instances of large and damaging hail, strong straight-line winds, and tornadoes. On March 25, a significant severe weather event unfolded in the Southeast and Tennessee Valley, which included a High Risk (level 5 out 5) for severe storms and damaging tornadoes - particularly in portions of Alabama, Mississippi, and Tennessee. As of this writing, at least five fatalities had been confirmed on March 25. Total economic and insured losses were each anticipated to reach into the hundreds of millions (USD).

Meteorological Recap

A period of unsettled weather across the central and southern U.S. between March 22-25 was generated by multiple short-wave impulses traversing the base of a mid- to upper-level longwave trough. This included severe storms which produced straight-lines winds, large hail, and tornadoes in the Southern Plains, Southeast, and Tennessee Valley coupled with heavy rainfall and flooding, particularly in the Southeast and northern Gulf Coast. Favorable environmental conditions on March 25 prompted the Storm Prediction Center (SPC) to issue a rare High Risk (level 5 of 5); the second such issuance this month.

March 22-24



U.S. surface weather map for March 23
Data: Weather Prediction Center

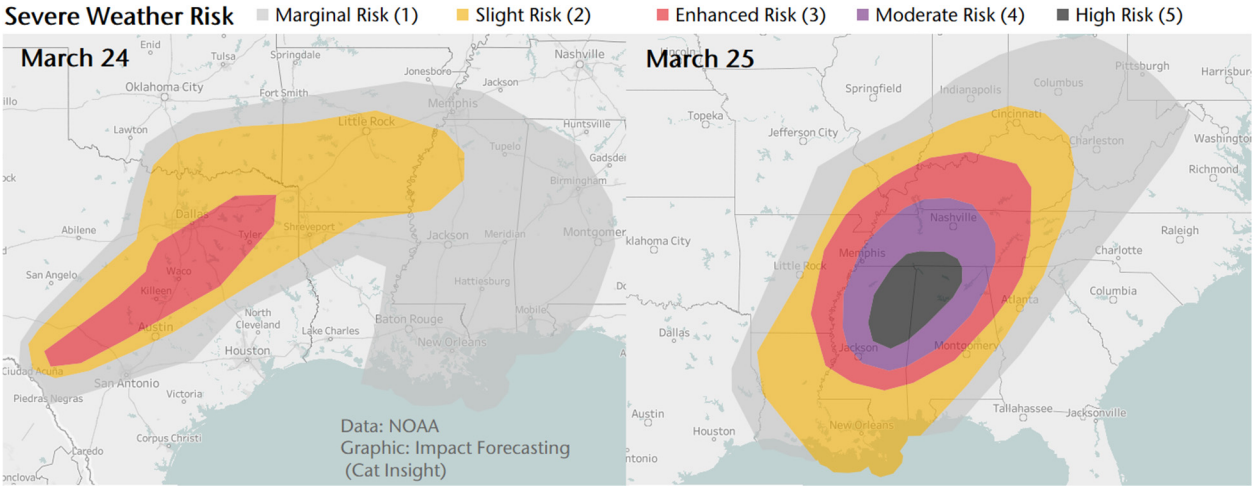
Severe thunderstorms and heavy rains developed in the warm sector of a strengthening surface low pressure system which emerged across the Southern Plains on March 22. This system prompted the SPC to issue a Slight Risk (level 2 out of 5) for severe storms centered across the Red River Valley in southern Oklahoma and northcentral Texas. The predominant threats associated with this event were large hail and strong straight-line winds. The environment across the region was conducive for robust thunderstorm development and characterized by ample low-level wind shear, modest moisture, and steepening lapse rates (changes in temperature with height). Severe storm development initiated in the vicinity of a dry line (a boundary which separates dry air from moist air) and ahead of the approaching cold front. Supercells and severe linear storm segments swept across large portions of central and eastern Texas during the evening and overnight hours on March 22. Hail reaching 3.0 inches (7.6 centimeters), and straight-line wind gusts approaching and exceeding 60 to 70 mph (96 to 112 kph) were observed.

As the cyclone continued to track northeastward and mature across the Midwest between March 23-24, an associated stalled frontal boundary in the south-central U.S. enhanced heavy rainfall along the northern Gulf Coast. Flood Watches and Warnings spanning coastal portions of eastern Louisiana, Mississippi, Alabama, and the western Florida Panhandle were triggered by a prolonged period of training convection and heavy rainfall. This boundary crept back northward on March 24, reinvigorating heavy rainfall along with localized flooding. Rainfall totals in localities of southern Louisiana approached 6 to 8 inches (150 to 200 millimeters) over a 48-hour period.

March 24-25

Beginning March 24, warm, moist air from the Gulf of Mexico was advected inland across regions of the Southern Plains and Lower Mississippi Valley south of a northward lifting frontal boundary. Concurrently, a second upper level system associated with a persistent longwave trough over the central U.S., pivoted from the Southwest toward the Southern Plains. This system was initially responsible for producing winter weather impacts across the drought stricken Southern Rockies. As the impulse approached the Southern Plains, a surface low pressure system strengthened over western Texas - in association with the southern end of the frontal boundary.

The SPC upgraded an elongated region extending from central to northeast Texas to an Enhanced Risk (level 3 out of 5) for severe storms on March 24. During the afternoon, clearing skies coupled the northward advance of the warm front aided in destabilizing the atmosphere. By the evening and overnight hours, severe storm development was ongoing in the vicinity of the surface warm front and east of a cold front in northern and central Texas, aided by large scale lift enhanced by the approaching shortwave trough. Scattered discrete convection and supercells initially evolved near and east of the Dallas-Fort Worth Metroplex. These storms were followed by severe storms clusters and linear segments to the southwest, across the Edwards Plateau and Hill Country, which continued into the morning hours of March 25. Very large hail was the predominant peril, as multiple instances of hailstones exceeding 2.0 inches (5.1 centimeters) were reported.



By March 25, the potent shortwave trough and a strong mid-level jet continued to pivot northeastward across the Southern Plains and Mid-Mississippi Valley. At the surface, a deepening area of low pressure traversed Arkansas and southern Missouri. Increasing southerly low-level flow, associated with a low-level jet, resulted in strong moisture advection across the Lower Mississippi Valley and Southeast. In the morning hours, a broad area of precipitation adjacent to and north of the warm front pushed northward throughout the region. This rainfall increased the potential for flash flooding as heavy rains fell on already saturated soils. These conditions impelled the SPC to issue a High Risk (level 5 out of 5) for severe thunderstorms and tornadoes across portions of northern Mississippi, northern Alabama, and southern Tennessee. A Slight Risk (level 2 out 5) or higher spanned from the northern Gulf Coast into the Ohio Valley and encompassed no less than 30 million people.

In the wake of morning showers and storms, ample daytime heating combined with increasing low-level moisture across the Mid-South created a volatile environment for severe storm development. In the expanding warm sector, impressive wind shear and large values of Convective Available Potential Energy

of CAPE (which is directly related to the updraft strength in a thunderstorm) were observed. The NWS advised all modes of severe weather were possible, including strong tornadoes and flash flooding. By the afternoon, storms began to initiate across in the expanding warm sector, and ahead of the approaching cold front. Heavy rains prompted multiple Flash Flood Warnings across Mississippi and Alabama.

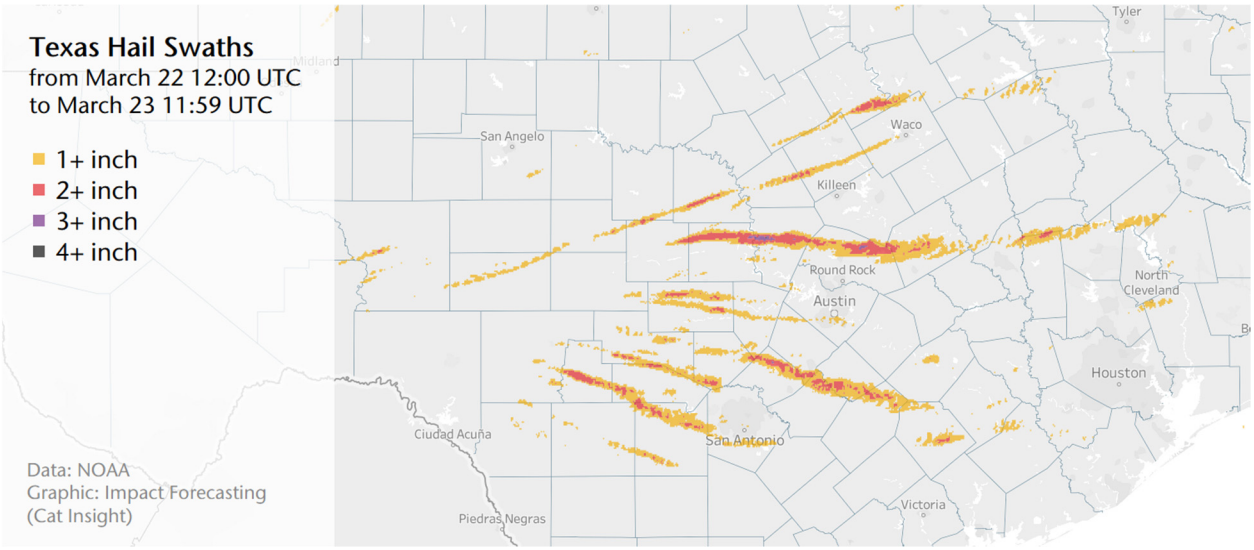
At 11:25 AM CDT (16:25 UTC) on March 25 the SPC issued a Particularly Dangerous Situation (PDS) Tornado Watch for western and northern Alabama, northwest Georgia, central and eastern Mississippi, and southern Tennessee. The watch warned of the potential for numerous tornadoes - including several intense tornadoes, likely widespread damaging winds with isolated gusts reaching 80 mph (130 kph), and likely isolated large hail events with hailstones reaching 2.5 inches (6.4 centimeters) in diameter. Shortly after the watch was broadcast, a PDS Tornado Warning was issued by the NWS as a dangerous supercell with a confirmed tornadic debris ball on radar imagery was evolving across Hale, Tuscaloosa and Bibb Counties (Alabama). As the storm progressed northeastward, a Tornado Emergency was declared for portions of Shelby and Jefferson Counties – centered near Highway 280 and Lee Branch, as the NWS notified of a confirmed large and destructive tornado approaching the area.

An additional PDS Tornado Warning several hours later in central Hale and Bibb Counties (Alabama), originally resulted from a radar confirmed tornado. A verified large tornado associated with this supercell prompted a Tornado Emergency for portions of Perry and Bibb Counties – particularly the towns of Brent and Centreville. The Tornado Emergency was subsequently extended into Chilton and Shelby Counties – including the towns of Montevallo, Wilton, and Calera.

Event Details

March 22

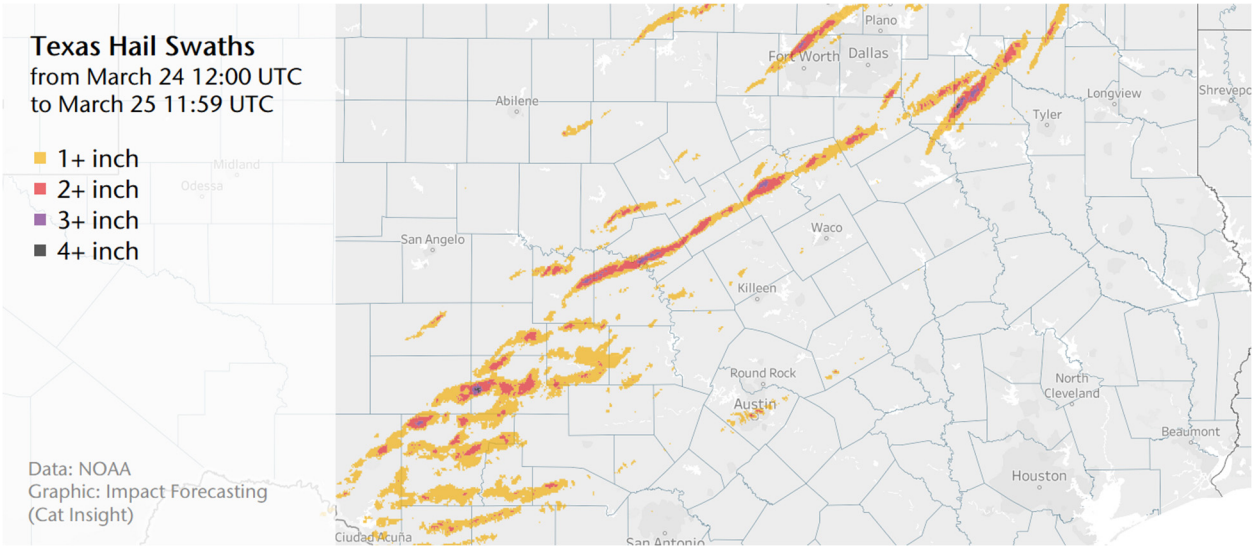
In **Texas**, significant hailstones greater than or equal to 2.0 inches (5.1 centimeters) were recorded on March 22 in Burnet, Real, and Comal Counties. Hail approaching 3.0 inches (7.6 centimeters) were observed near Burnet (Burnet County), as well as near Leakey (Real County). In Bertram (Burnet County), strong straight-line winds knocked down power lines and significantly impacted at least two buildings. Several other structures, including the library, sustained minor damage. An EF1 tornado was confirmed in Comal County, northeast of San Antonia (near Canyon Lake Dam). The tornado damaged



one home and multiple trees, while snapping several utility poles on the south-central side of the lake. Further northwest, a straight-line wind gust of 76 mph (122 kph) was measured in Garza County.

March 24-25

As of this writing there were 34 instances of severe hail reported on March 24, a majority of which occurred in Texas - including seven reports of large hail greater than or equal to 2.0 inches (5.1 centimeters). In **Texas**, hailstones approaching 2.0 inches (5.1 centimeters) were observed in Real County, marking the 2nd time significant hailstones fell in the county during the past week. Hail reaching 3.0 inches (7.6 centimeters) in diameter, baseball sized, were reported in Kimble County. A long track supercell generated a notable swath of severe hail which peaked across San Saba, Mills, and Hamilton Counties. Damaging and large hailstones also fell in highly populated regions near Fort Worth in Tarrant and Denton Counties, as well as north of Austin in Travis County. Thousands of customers in the Austin Metro Area lost power as the storms passed. In **Mississippi,** strong winds in Wilkinson County toppled a tree onto a mobile home, which resulted in one fatality.



In **Alabama**, preliminary reports on March 25 indicated that at least five fatalities and several injuries occurred in Calhoun County, associated with a long track tornadic supercell. Nearby, substantial damage to property and homes were confirmed, particularly near the City of Ohatchee. In Bibb County, a confirmed large tornado generated extensive damage near the towns of Brent and Centreville.

In **Tennessee**, damaging hail approaching ping-pong ball sized was reported in the Nashville Metro Region (Davidson County). Multiple instances of downed trees along with impacts to property and windows were reported throughout the City.

At the time of this writing, the severe weather outbreak was ongoing in the Southeast and Tennessee Valley, and preliminary damage assessments were underway. Updated event details will be provided in next week's Weekly Cat Report.

Financial Loss

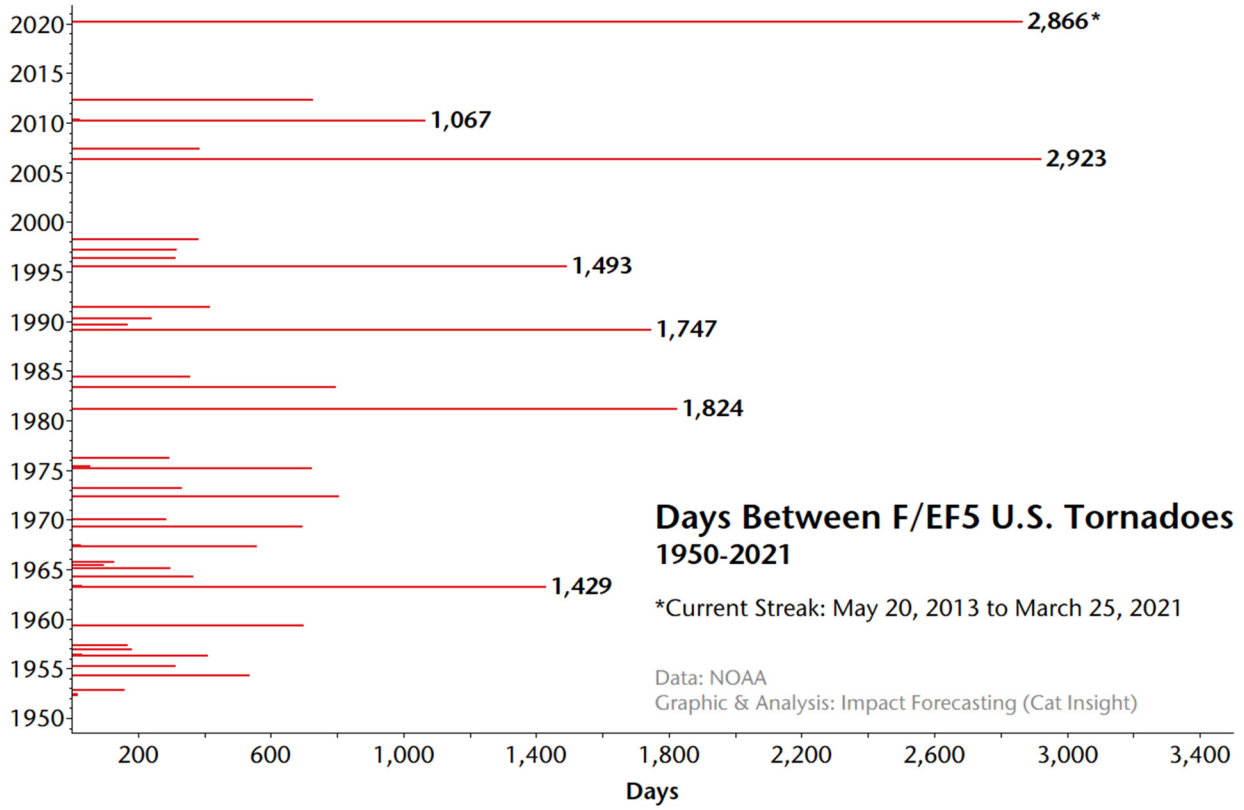
With the severe weather outbreak still ongoing as of this writing, it remained too preliminary to provide a specific economic or insured loss estimate for the last week of storms. Given the footprint of hail and wind-related damage in Texas alone in highly exposed areas from the earlier portion of the week, it was expected that the insured cost will well exceed USD100 million in that state alone.

Early visual assessments of tornado damage in Alabama on March 25 appeared to be significant in some spots. Further hail and wind damage in Tennessee, notably around Nashville, was also expected to be notable. The full March 22-25 period was likely to result in an insured loss tallying well into the hundreds of millions (USD). The overall economic loss will be even higher.

As a reminder, 2020 was the costliest year on record for U.S. insurers with the severe convective storm peril. The latest 2020 U.S. SCS insured loss tally is now USD36 billion; eclipsing the previous record of USD32 billion in 2011. This continues to become an increasingly expensive peril for the industry, with a “new normal” of at least USD10 billion in insured losses occurring in every year since 2008.

Miscellaneous

Note that as of March 25, 2021, this marked the 2,866th consecutive day since the last F/EF5 tornado was confirmed in the United States. The last occurrence was May 20, 2013 in Moore, Oklahoma. National Weather Service meteorologists will be conducting damage surveys in the coming days to officially assign ratings to each of the confirmed tornadoes across the United States.

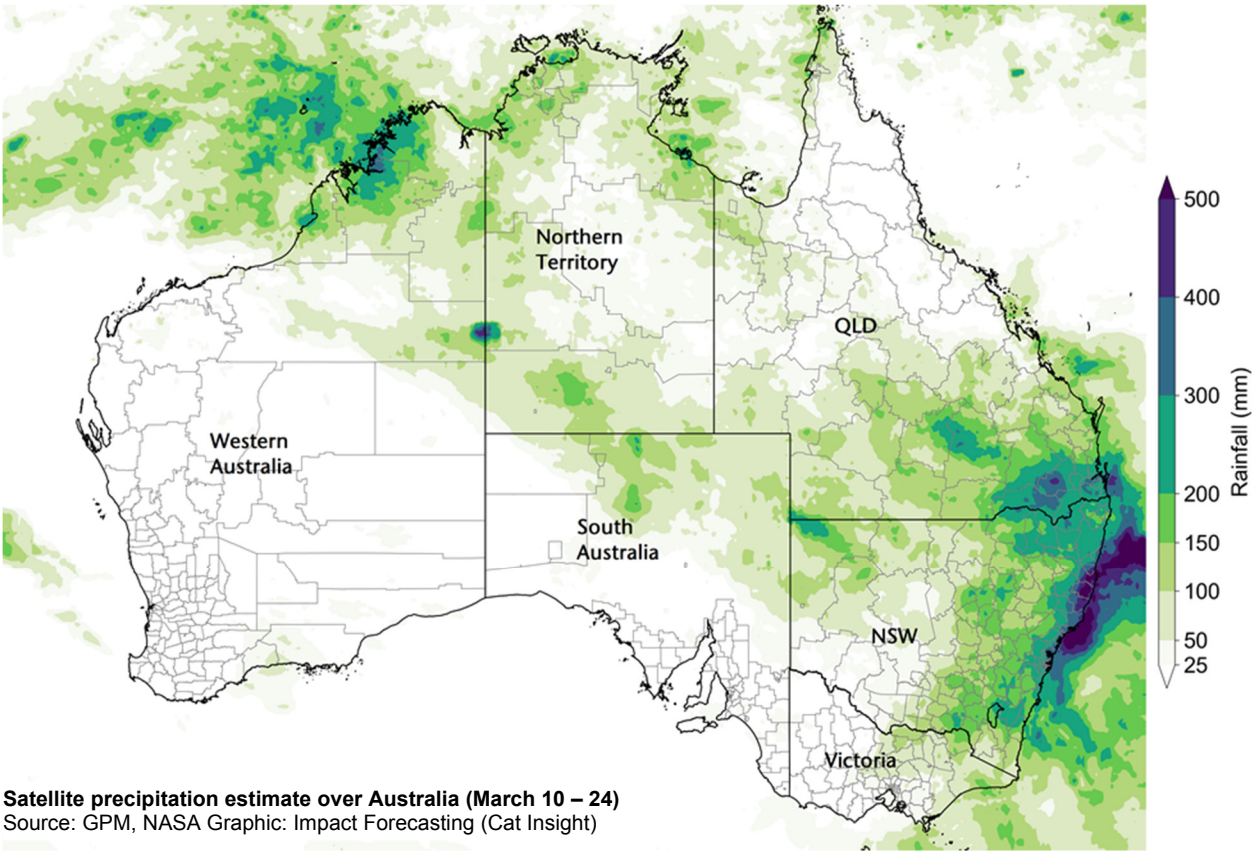


Excessive rainfall prompts major flooding in Australia

Multiple, potent low-pressure systems and East Coast Low events impacted Australia's East Coast from March 10 to 24. The inclement weather resulted in widespread inundation damage to thousands of residential houses, vehicles, businesses, and local infrastructure. Tens of thousands of livestock were swept away, and a vast area of cropland was left inundated. The event caused extensive power outages and evacuations across the states of New South Wales and Queensland. At least two fatalities were reported. The Insurance Council of Australia declared an insurance catastrophe for New South Wales and Queensland. At least 22,100 claims had already been filed, with an estimated insured loss of AUD331 million (USD251 million). These totals were anticipated to substantially rise. The overall economic loss is expected to show a notable protection gap.

Meteorological Recap

Wide swaths of Australia's East Coast endured a period of **prolonged flooding** during the past week, with much of the coastal areas registering exceptionally high precipitation. According to the Australian Bureau of Meteorology (BOM), multiple intense low-pressure systems and surface troughs originated and traversed along the northern and eastern parts of Australia, resulting in several days of unsettled weather across the Australian East Coast. Heavy rainfall triggered severe flash floods in the most populated regions across eastern Australia from March 13 through March 24.

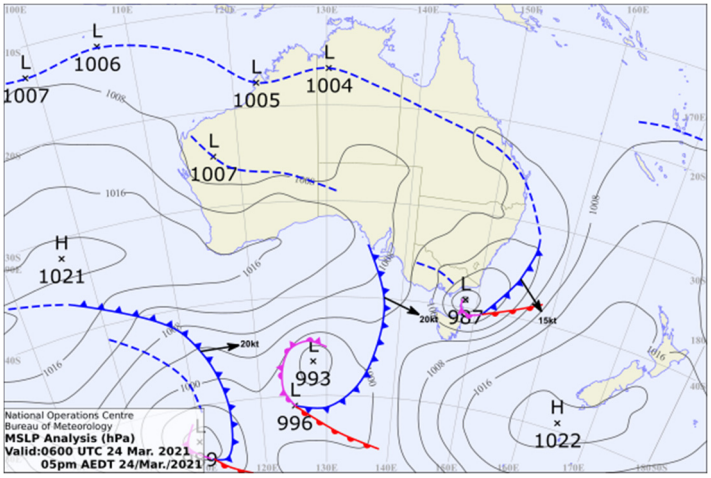


Satellite precipitation estimate over Australia (March 10 – 24)
Source: GPM, NASA Graphic: Impact Forecasting (Cat Insight)

The event started on March 13 when a **surface trough** originated across the eastern and northern parts of inland Australia and resulted in moderate- to heavy-precipitation in west Kimberley and the Carpentaria district in the Northern Territory, the Gulf Country, Cape York Peninsula, central and southern Queensland, and the inland northern parts of New South Wales. This event led to flash flooding in the severely affected regions of the New South Wales, northern parts of Western Australia, and parts of Northern Territory. In the states of Northern Territory and Western Australia, several flash flooding events were reported in northern parts.

Later, on March 18, while this low-pressure trough was extending from the northern Gulf of Carpentaria to the Indian Ocean, another **tropical low-pressure system** developed in its proximity. The combination of these systems produced atmospheric instability, resulting in moderate precipitation and thunderstorms with moderate falls in the parts Western Australia, Northern Territory, and the far north of Queensland. Later, the system traversed further inland and to the south, as heavy rainfall was registered in the affected regions. Later on, a low-pressure trough area originated in the northern coast of New South Wales and pushed inland, producing moderate rainfall along the northeastern and eastern coast of Australia. Heavy daily precipitation accumulations of up to 100 millimeters (4 inches) were registered in the northern / eastern New South Wales and southern Queensland, with locally much higher amounts.

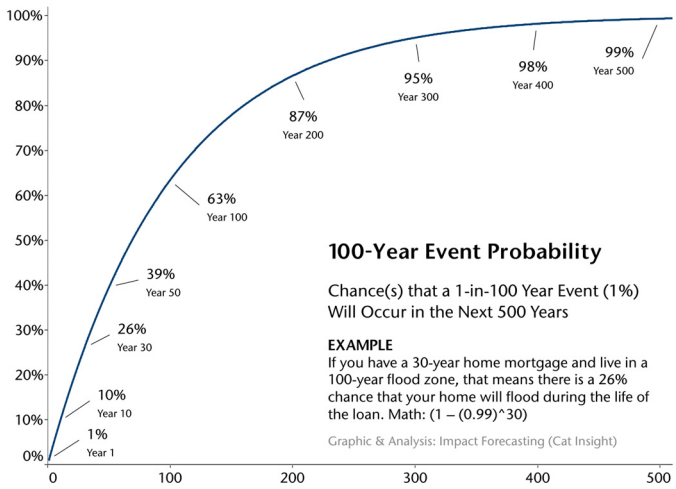
Weather Station Location	Precipitation (mm)
Nambucca Heads	990
Mt Seaview	890
Kempsey Ap AWS	740
Taree AP AWS	565
Pt Macquarie AWS	500
Katoomba	495
Old Bar	490
Tweed Heads	480
Coffs Harbour Airport	465
Evans Head AWS	450



Stations with highest accumulated weekly precipitation ending on March 24 (left) and surface weather chart (right)
Data: Bureau of Meteorology, Australia

From March 20 to 24, a **low-pressure system** again formed inland of northern New South Wales and traversed further inland towards the East Coast of Australia, while the already existing coastal trough positioned near the northern parts of New South Wales remained almost stationary throughout this period, resulting in several bouts of extremely heavy precipitation. The BOM issued multiple severe weather advisories and flood warning for rivers in the proximity of Sydney. One-week rainfall total ending on March 24 exceeded 400 millimeters (16 inches) across the northern coastal areas and Central Tablelands in New South Wales, also in the southern parts of Queensland. This prolonged episode of heavy precipitation resulted in **'one-in-100-year'** flooding in eastern and central parts of New South Wales and southern Queensland.

Elsewhere in Australia, rainfall totals ranging between 200 to 400 millimeters (8 to 16 inches) were registered across the Australia's east coast, central and inland southern Queensland, and in the north and along eastern New South Wales. Some isolated locations in the states of Western Australia and Northern Territory also recorded similar rainfall accumulations.



*A **'one-in-100-year"** flood is defined as an event of a magnitude and spatial extent of rainfall pattern over a region which will be exceeded on an average only once in every 100-year period – meaning that there is a 1 percent chance that such 'one-in-100-year' event will occur in any randomly chosen year, also known as 'Annual Exceedance Probability'. Numerous academic studies argue that extreme rainfall events, such as the ongoing floods in Australia, are becoming more frequent under the influence of global warming. Research suggests that such events will have a smaller return period in future years as more warming occurs.*

*An **East Coast Low (ECL)** is characterized as an intense low-pressure system which forms off the Australia's East Coast. While these systems generally originate as an extratropical cyclones or the low-pressure trough areas and traverse along the Australian East Coast, their intensification is usually aided by the mesoscale warm eddies of the East Australian Current and sea surface temperature gradients across the Australian coastline. In a rare situation, an ECL might also result from a frontal boundary of a cold or an occluded front stretching from the state of Victoria into the Tasman Sea. These ECLs bring extremely heavy inland precipitation, gale- or storm-force winds, prolonged dangerous swells, and rough sea conditions across the Australian East Coast.*

Event Details

Several bouts of exceptionally heavy rainfall from March 10 through 24 led to one of the worst flooding events in Australia since 1961, with the greatest impacts occurring across the states of New South Wales and Queensland. The State Emergency Service enacted mandatory evacuations for more than 18,000 residents in vulnerable low-lying regions; 15,000 evacuations from the Mid-North Coast and roughly 3,000 in Sydney. In addition, approximately 40,000 residents were displaced from their homes in the incidents directly related to the flooding; most of them were in New South Wales. Hundreds of schools and government offices remained closed for multiple days. The transportation sector was crippled by prolonged rains and flooding, resulting in traffic incidents, blocked roadways, and flight cancellations. Tens of thousands of customers across the states of Queensland and New South Wales were affected by power outages. Internet and mobile communication in large areas were knocked out, mainly due to damaged utility poles and communication lines.

Prolonged rains rendered the soils saturated, resulting in numerous downed power lines, utility poles, and trees. Major Rivers in the states of New South Wales and Queensland broke their banks at more than a dozen locations, causing inundation damage to adjacent structures. Heavy riverine flooding and mudslides blocked multiple highways, including the New England Highway connecting New South Wales to Queensland, which left several communities inaccessible and prompting the disaster officials to evacuate several families via helicopter. The SES of New South Wales responded to more than 7,500 requests for assistance, of which roughly 750 were related to the evacuation from the heavily flooded areas. The rescue and relief operations were severely hampered by the stormy weather conditions and flooded roads. No less than ten million people across Australia were kept under a severe weather warning by the BOM, Australia.

Due to the prolonged flooding, most of the major rivers including the Hawkesbury River swelled to above the severe flood-stage, causing widespread inundation damage and road blockades. The Wollombi Brook River at Bulga peaked at 6.63 meters (21.7 feet) around 02:00 PM local time on March 23, resulting in massive inundation. Several major dams in New South Wales and Queensland, particularly near the Sydney Metropolitan region neared their spilling points, prompting officials to open their floodgates. Large amounts of water discharge due to the opening or spilling of the dam triggered severe flash-flooding and mudslides in affected areas, particularly in the suburbs of Sydney.

Flooding in NSW, Australia
Source: State Emergency Service, NSW

As of this writing, at least two casualties were confirmed in New South Wales. Thousands of residential buildings, vehicles, businesses, roads, and bridges were damaged to various degrees. Tens of thousands of livestock were swept away by the floodwaters and a vast area of agricultural land was inundated, per local media reports. Beside the direct property damage, an expectation of some business interruption due to shutdowns from the flooding. Until waters fully recede, it will be difficult to conclude the complete overview of the physical damage and non-physical damage event impact.

Financial Loss

The Insurance Council of Australia (ICA) had initially declared an insurance catastrophe for the large areas of New South Wales on March 22 and later extended it for the southeast Queensland. As of the morning of March 25, the ICAUS cited that at least 22,100 claims of an estimated worth AUD331 million (USD251 million) had already been filed. Given the large flood footprint, and as waters continue to slowly recede in some of the hardest-hit areas, it is expected that there will be a prolonged period of claims filings and assessment to property. The number of claims and resultant losses will further increase; perhaps significantly and approaching AUD1 billion (USD760 million) in New South Wales alone.

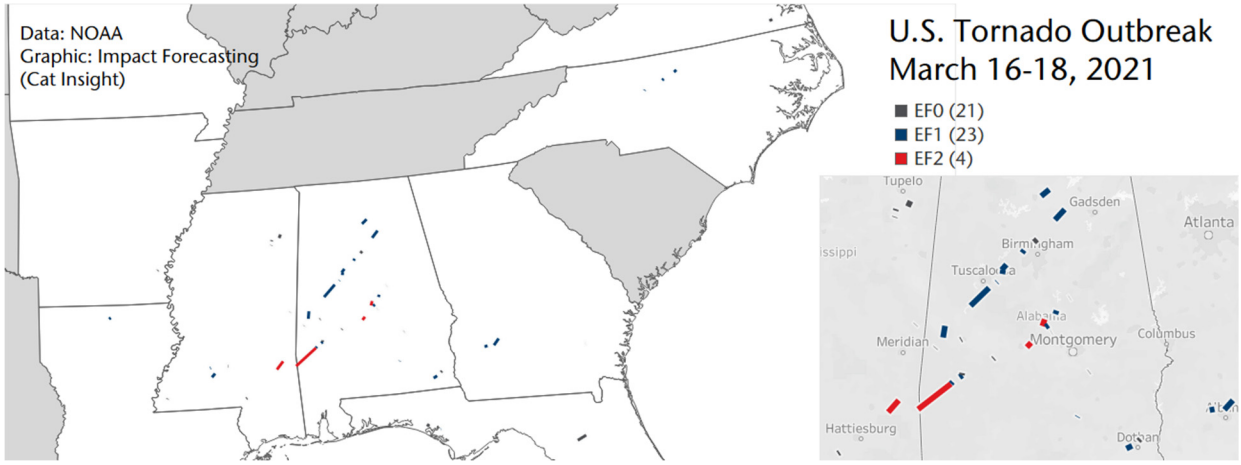
The overall economic loss, including damage to infrastructure and agribusiness, will be much higher than the eventual insurance industry impact. It is expected that the economic loss will well exceed USD1 billion. Flood events typically result in a higher protection gap given challenges around underinsurance and lack of proper take-up.

Update: U.S. March 16-18 Tornado Outbreak

The March 16-18 U.S. tornado outbreak resulted at least 48 confirmed tornadoes, of which 25 occurred in the State of Alabama. As of this writing, four surveyed tornadoes were assigned an EF2 rating on the Enhanced Fujita Scale. Overall, the tornadoes, combined with large hail, and strong straight-line winds generated notable damage to structures, outbuildings, and vegetation across portions of the Southern Plains, Deep South, and Southeast. Localities in Alabama and Mississippi were most impacted. Total economic and insured losses over the three-day period were anticipated to surpass USD200 million.

Event Details

Tornadoes were confirmed in nine states between March 16-18, which included Alabama, Arkansas, Florida, Georgia, Louisiana, Missouri, Mississippi, North Carolina, and Virginia. As of this writing, 48 tornadoes have been confirmed during the three-day period; EF0 (21), EF1 (23), EF2 (4). All four EF2 tornadoes touched down on March 17 and occurred in either Alabama or Mississippi. The 25 tornadoes which were confirmed in Alabama preliminarily rank as the 6th largest tornado count from a single event in recorded state history.



In **Alabama**, a strong EF2 tornado in Chilton County, near Pools Crossroads, had estimated wind speeds topping 130 mph (210 kph). The tornado collapsed brick walls of a residence, while damaging multiple outbuildings and displacing several vehicles. In Dallas County, an EF2 tornado with a maximum width exceeding 0.5 miles (0.8 kilometers) damaged several homes in and around the Burnsville Community. An EF-2 tornado, which began in Mississippi and crossed into Alabama, had a path length exceeding 30 miles (48 kilometers) and spanned four counties - Wayne County (Mississippi) and Choctaw, Clarke, and Marengo Counties (Alabama). The tornado had a maximum estimated wind speed of 130 mph (210 kph). The twister produced an extensive swath of tree damage in northwestern Clarke County, where several homes and structures were also impacted. Significant damage to an older home, along Campbell's Landing Road, resulted in two injuries. A long track EF1 tornado which passed through Hale and Tuscaloosa Counties caused minor to moderate structural damage to multiple homes near Moundville, including the Waterbury Drive sub-division. In addition, damage was noted to an apartment building, the post office, and a church.

In **Mississippi**, an EF2 tornado touched down in Wayne County, tracking from Strengthford to north of Waynesboro. The tornado destroyed a large area of pine trees, while damaging several outbuildings and at least one mobile home.

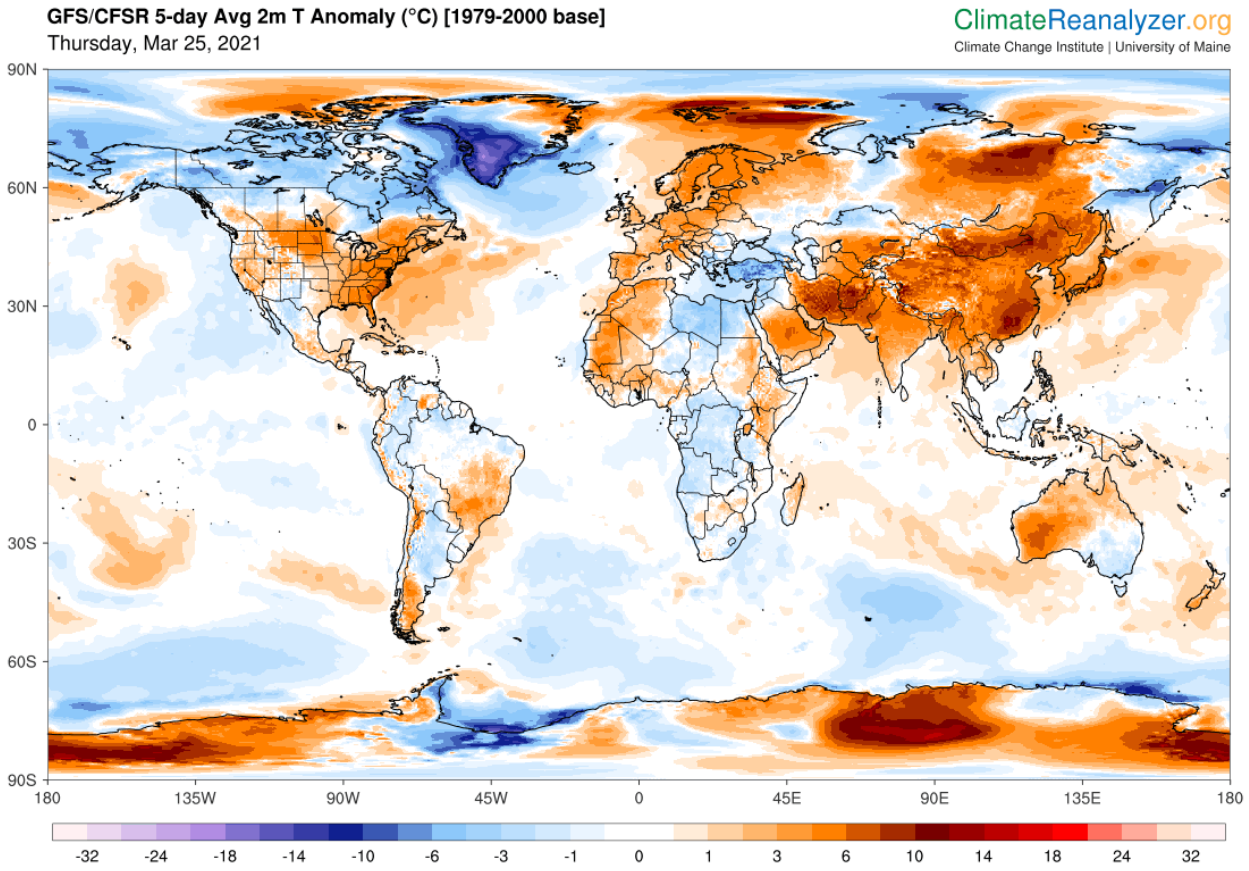
Natural Catastrophes: In Brief

Flooding (Peru)
Northern regions of Peru experienced heavy seasonal rainfall in recent days, which resulted in notable flooding in portions of Loreto, Piura, Amazonas, San Martin and elsewhere. A particularly difficult situation was registered in Yurimaguas district of the Loreto region since March 20; as local media reported more than 3,000 homes inundated, along with negative impacts on infrastructure and the agricultural sector. Further impacts were felt in other regions of Peru, but authorities have not yet provided a comprehensive summary of damage attributed to the whole rainy season.

Earthquake (Japan)
An earthquake of magnitude-7.0 (USGS) struck off the north coast of Honshu Island on 20 March at 18:09 local time (09:09 UTC), resulting in injuries and damage. The epicenter of the tremor was located approximately 27 kilometers (23 miles) east-northeast of Ishinomaki City of the Miyagi Prefecture at an approximate depth of 54 kilometers (36 miles). A Tsunami Warning was immediately issued and was downgraded to a Tsunami Forecast later. At least eleven people sustained injuries, while dozens of structures were damaged to varying degrees, per Japan's Fire and Disaster Management Agency (FDMA).

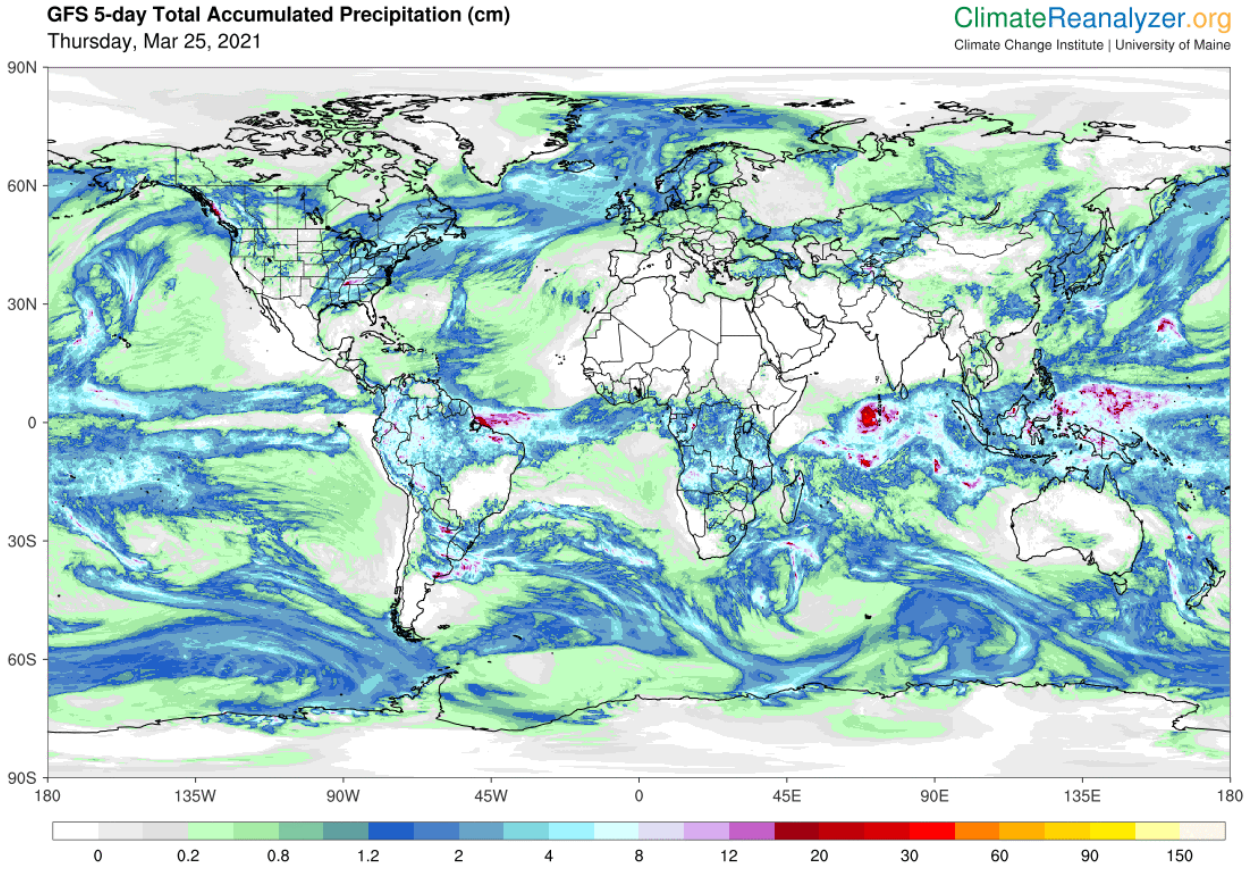
Severe Weather (Vietnam, Thailand)
A band of intense thunderstorms brought heavy precipitation and damaging winds to regions of Vietnam and Thailand between March 21-23, resulting in notable damage and casualties. According to the federal governments, no less than 500 residential houses were destroyed in Vietnam (200) and Thailand (300). At least two residents were killed – one each in Thailand and Vietnam and several others were injured. Nearly 4,000 hectares (12,000 acres) of rice and other seasonal crops were affected in Vietnam alone. Severe losses were inflicted on the public infrastructure.

Global Temperature Anomaly Forecast



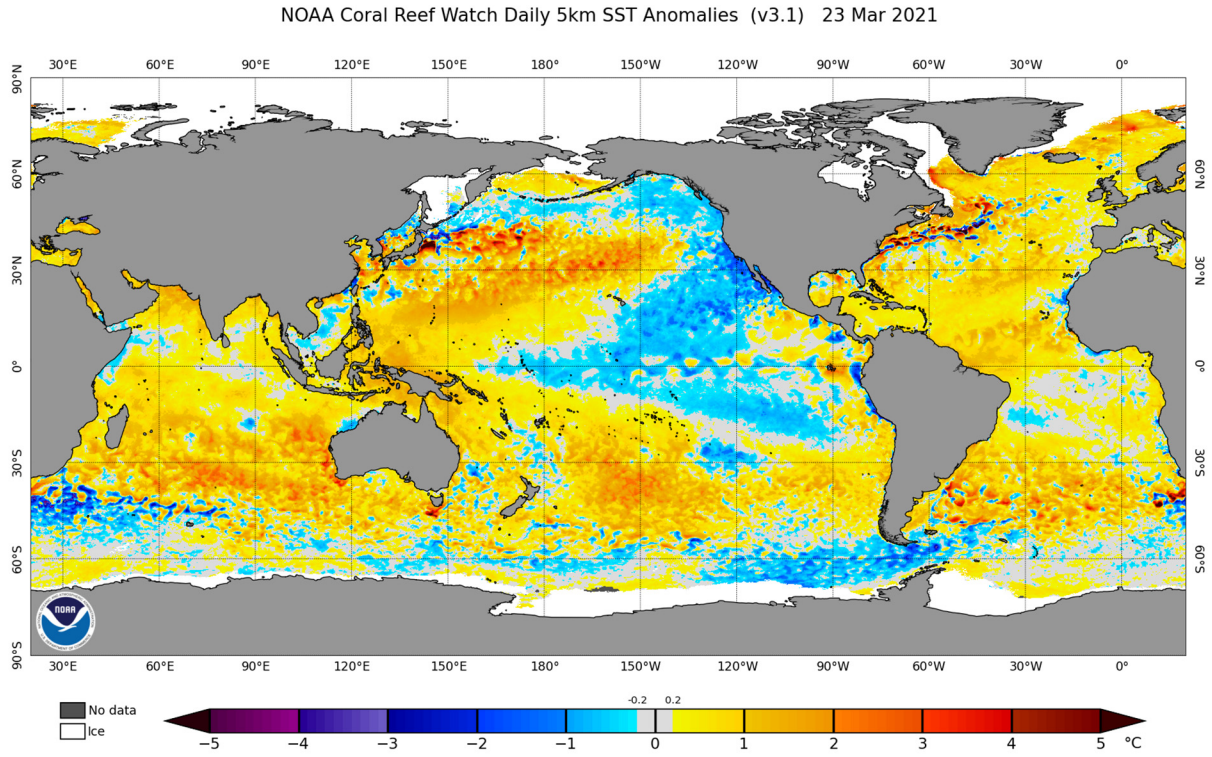
Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

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.

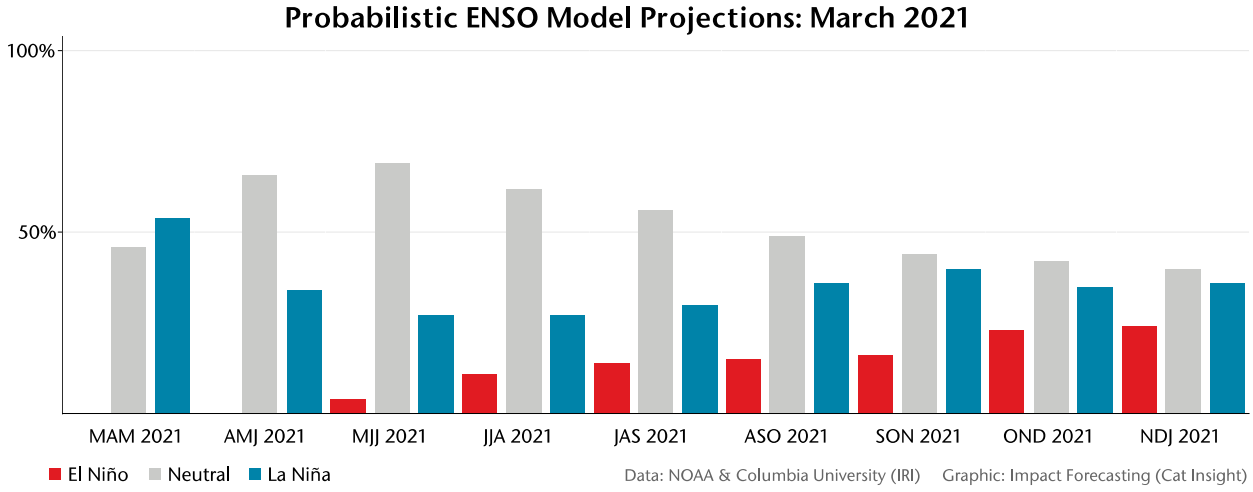
Select Current Global SSTs and Anomalies

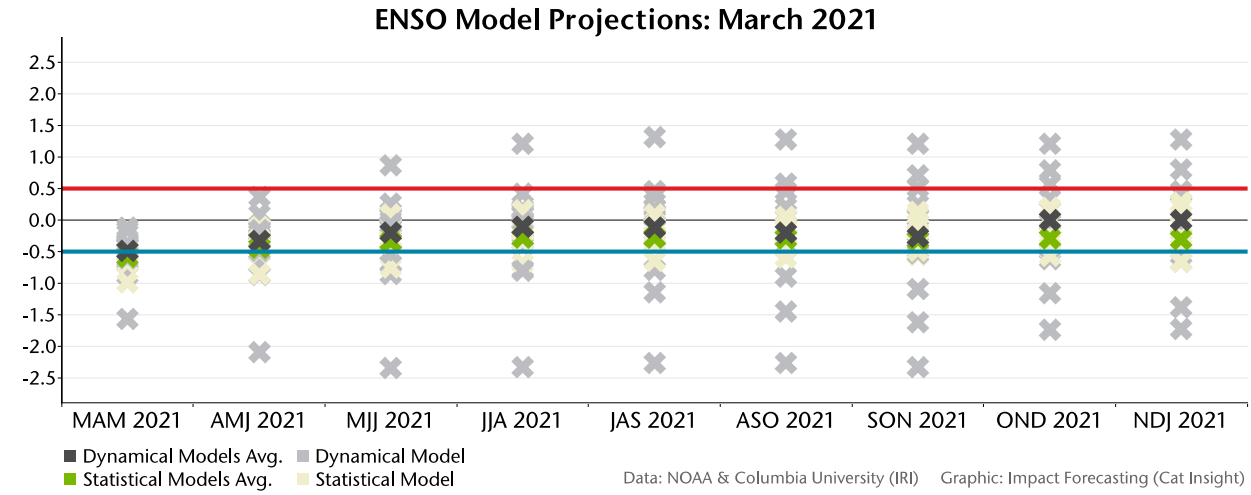
Location of Buoy	Temp (°C)	Departure from Last Year (°C)
Eastern Pacific Ocean (1,020 miles SW of San Salvador, El Salvador)	25.7	+0.7
Niño3.4 region (2°N latitude, 155°W longitude)	26.2	-1.1
Western Pacific Ocean (700 miles NNW of Honiara, Solomon Islands)	30.2	+0.1

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

El Niño-Southern Oscillation (ENSO)

La Niña conditions are currently present, though NOAA has officially issued a **La Niña Advisory**. NOAA notes a 60 percent chance of a transition to ENSO-neutral conditions by the spring months.





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.*

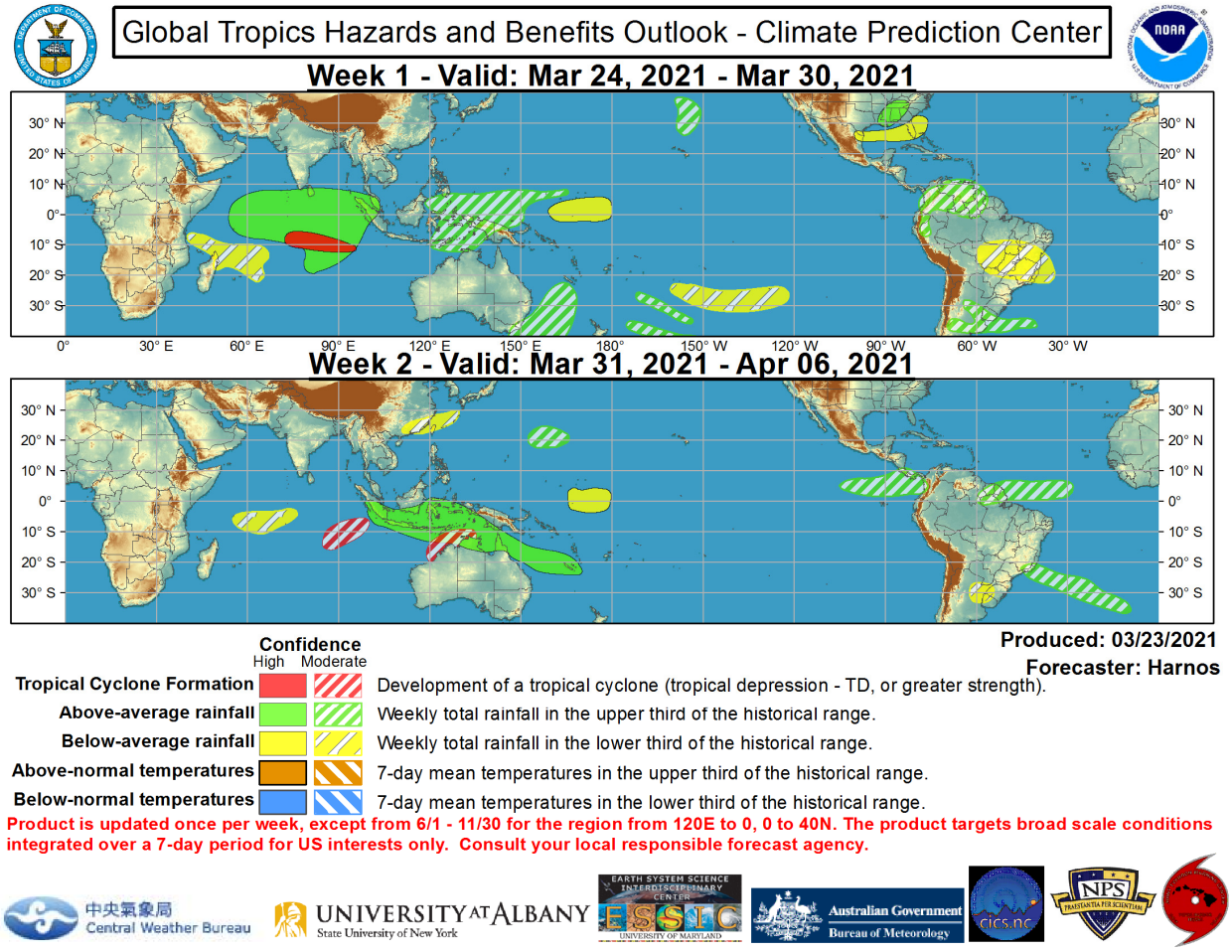
La Niña *refers to the periodic cooling of sea-surface temperatures (-0.5°C) across the east-central equatorial Pacific. It represents the cold phase of the ENSO cycle.*

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.*

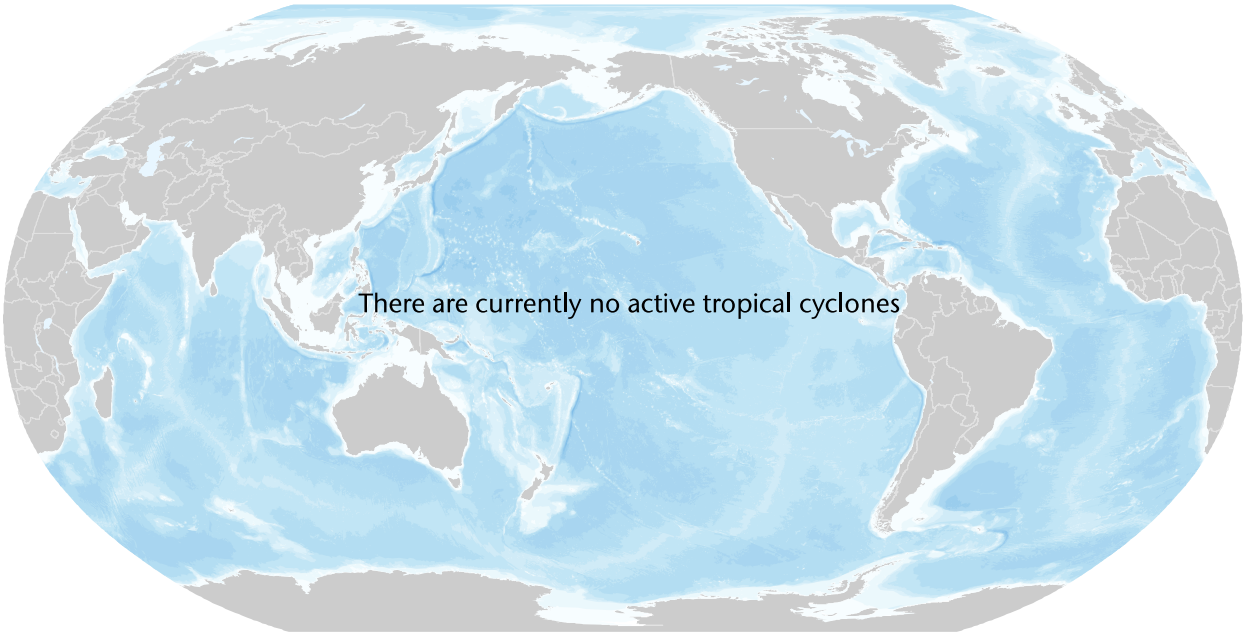
El Niño (La Niña) is a phenomenon in the equatorial Pacific Ocean characterized by a five consecutive 3-month running mean of sea surface temperature (SST) anomalies in the Niño 3.4 region that is above the threshold of +0.5°C (-0.5°C). This is known as the Oceanic Niño Index (ONI).

Global Tropics Outlook



Source: Climate Prediction Center

Current Tropical Systems



Tropical Depression Tropical Storm Category 1 Category 2 Category 3 Category 4 Category 5

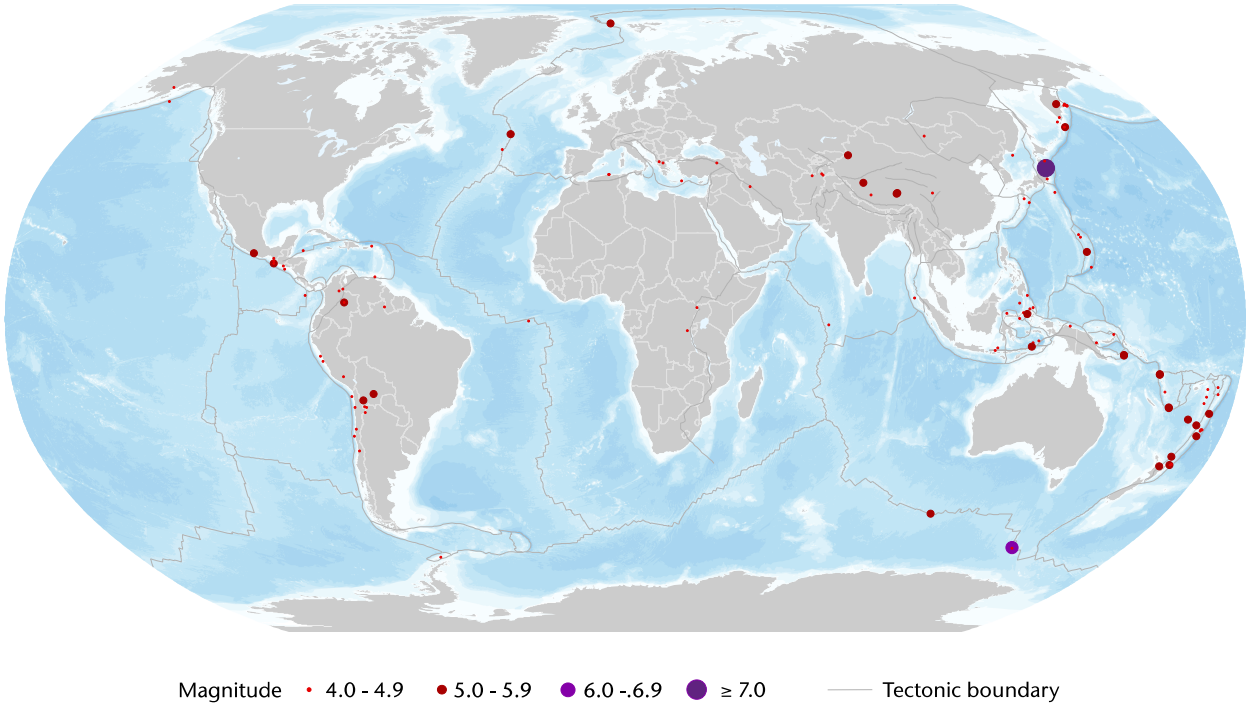
Location and Intensity Information

Name*	Location	Winds	Storm Reference from Land	Motion**

* 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): March 19 – 25

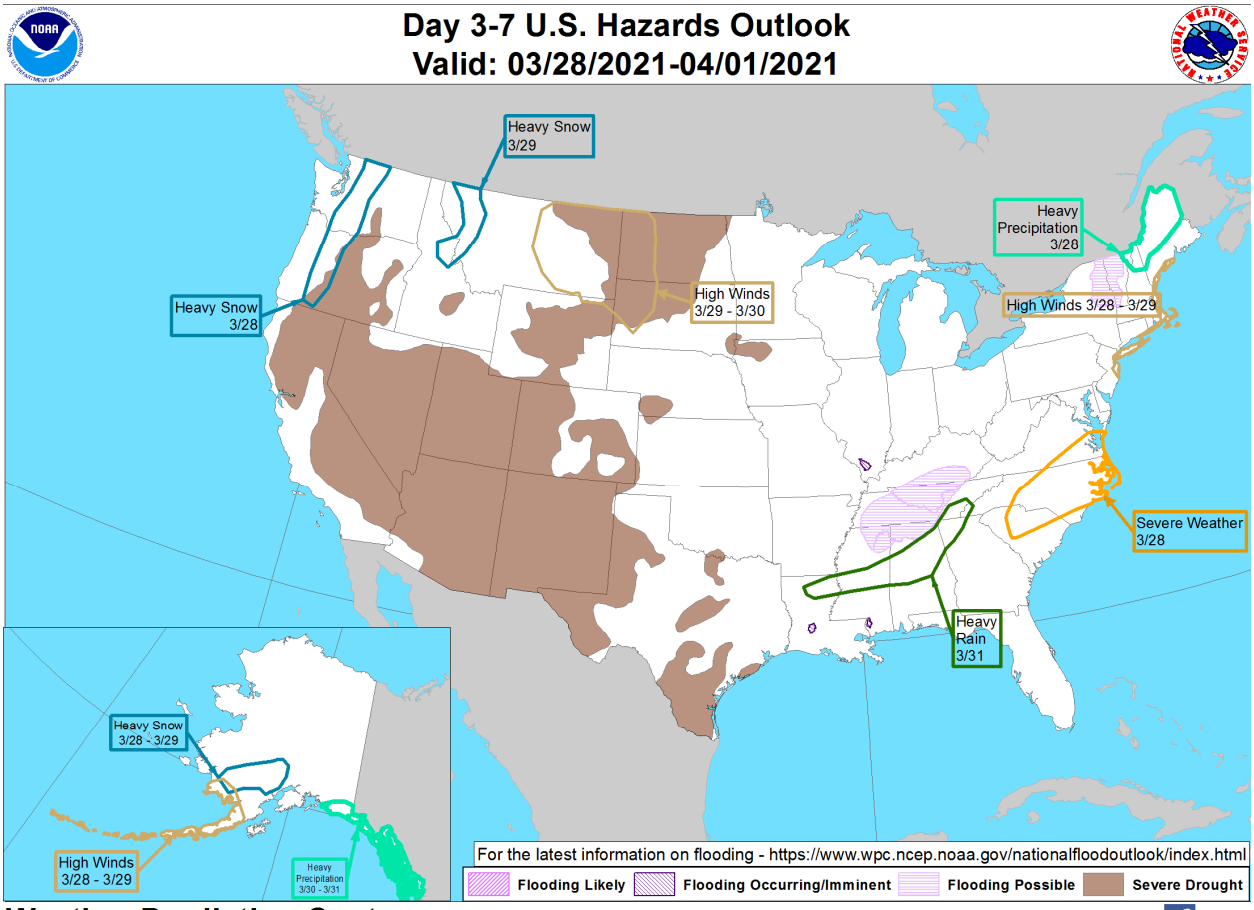


Significant EQ Location and Magnitude (≥M6.0) Information

Date (UTC)	Location	Magnitude	Depth	Epicenter
03/20/2021	59.62°S, 150.31°E	6.1	10 km	west of Macquarie Island
03/20/2021	38.48°N, 141.61°E	7.0	54 km	27 kilometers (17 miles) ENE of Ishinomaki, Japan

Source: United States Geological Survey

U.S. Weather Threat Outlook

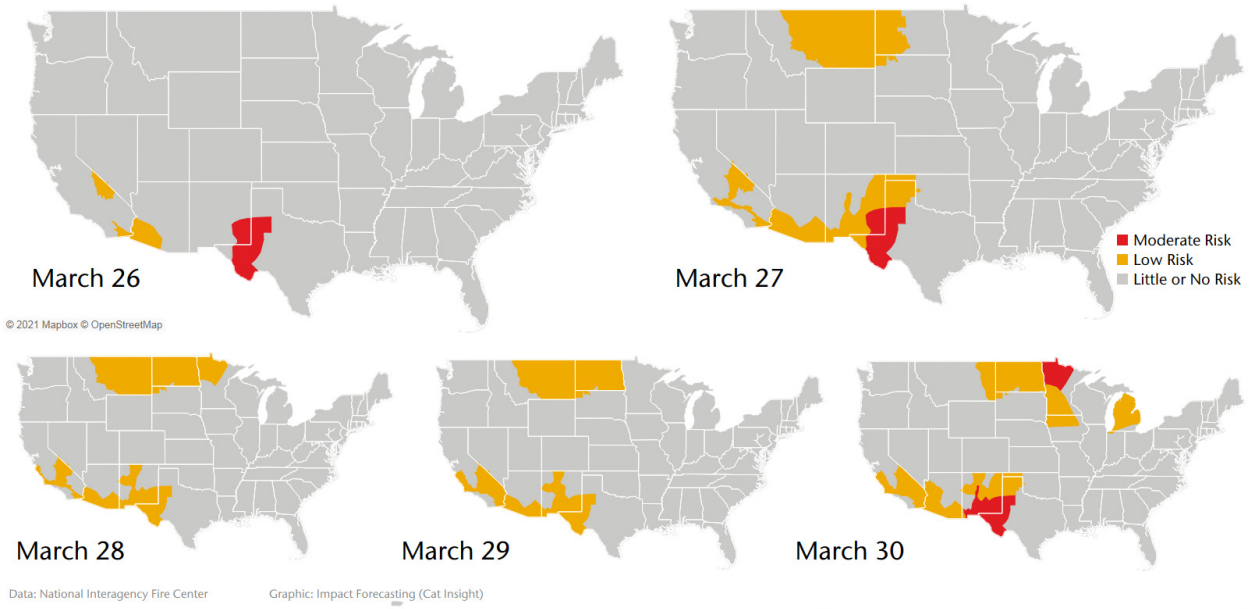


Potential Threats

- A low-pressure system traversing southeastern Canada will produce Heavy Precipitation across northern New England on March 28. An associated strong pressure gradient will generate High Winds spanning the northern Mid-Atlantic and New England Coasts between March 28-29.
- A trailing frontal boundary will sweep across the Southeast on March 28, generating Severe Weather in regions of the Carolinas and Virginia.
- A low-pressure system is anticipated to produce Heavy Snow across the Cascades and Bitterroot Mountains between March 28-29. As the low deepens, a region of High Winds is expected in the Northern Plains and High Plains on March 29-30.
- Moisture pooling along a frontal boundary will result in Heavy Rain in the Lower Mississippi Valley and Southeast by March 31.

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

The National Interagency Fire Center has highlighted a limited volume of potential fire risk across much of the country during the next week. The combination of high winds and lower humidity will result in continued enhanced fire risks across the Southwest. Much of the western U.S. remains mired in a significant drought.



Annual YTD Wildfire Comparison: March 19*

Year	Number of Fires	Acres Burned	Acres Burned Per Fire
2017	11,116	2,073,920	186.57
2018	9,248	323,596	34.99
2019	3,307	65,421	19.78
2020	5,205	107,135	20.58
2021	7,628	188,605	24.73
10-Year Average (2011-2020)	**7,676**	**368,182**	**47.97**

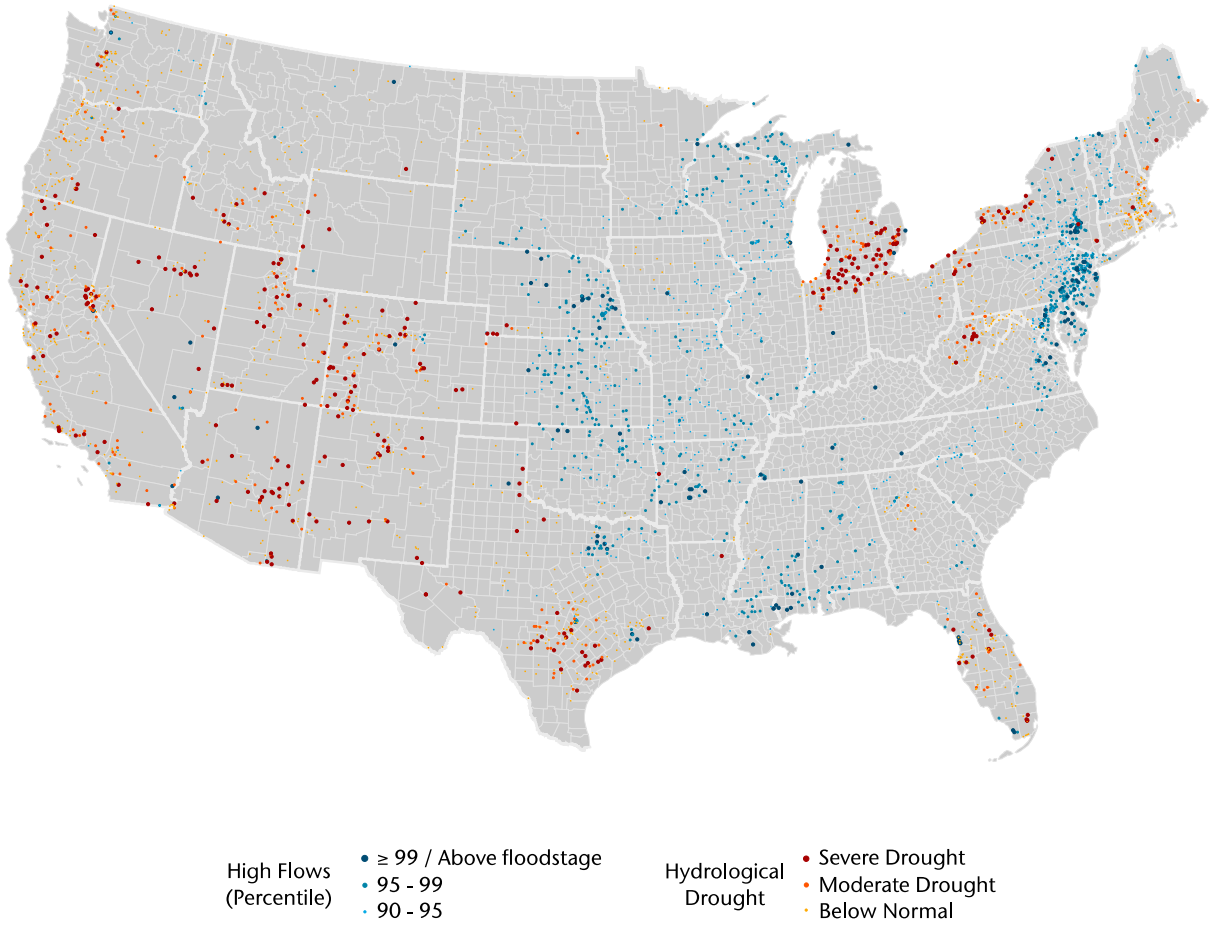
*Most recent available data via NIFC
Source: National Interagency Fire Center

Top 5 Most Acres Burned by State: March 25

State	Number of Fires	Acres Burned	Acres Burned Per Fire
Texas	1,156	51,576	44.62
Oklahoma	436	25,724	59.00
Florida	593	20,560	34.67
Mississippi	658	17,657	26.83
South Dakota	21	13,927	663.21

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
Neosho River near Iola, Kansas	16.94	99.07
Wind River at Riverton, Wyoming	5.94	99.06
North Platte River near Northgate, Colorado	3.62	99.05
Walnut River at Winfield, Kansas	15.38	98.99
Neosho River near Parsons, Kansas	23.29	98.99

Source: United States Geological Survey

Source Information

Active severe weather pattern continues to affect the U.S.

U.S. National Weather Service
U.S. Storm Prediction Center
Strong Winds Damage Buildings in Small Town of Bertram, Texas, The Weather Channel
Possible tornado outbreak looms for Deep South, Tennessee Valley on Thursday, The Washington Post
Heavy hail falls across Central Texas Thursday in overnight storms, KXAN Austin

Excessive rainfall prompts major flooding in Australia

Bureau of Meteorology, Australia
State Emergency Service
Insurance Council of Australia
'Catastrophic' Australia floods prompt helicopter rescues, Channel News Asia
Two men killed in floods; state MP stands by statement on federal senator – as it happened, The Guardian
Australia floods: Thousands evacuated as downpours worsen, BBC News
As it happened: ADF joins NSW flood teams; BOM warns wet weather 'far from over'; 8000 call for help in Sydney, 9 News

Update: U.S. March 16-18 Tornado Outbreak

U.S National Weather Service
U.S. Storm Prediction Center
U.S. Weather Prediction Center

Natural Catastrophes: In Brief

Loreto: this is how Yurimaguas was left after heavy rains that flooded thousands of homes, El Compercio
United States Geological Survey
Fire and Disaster Management Agency (FDMA)
Vietnam Disaster Management Authority
Department of Disaster Prevention and Mitigation, Thailand

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