



Weekly Cat Report

December 18, 2020

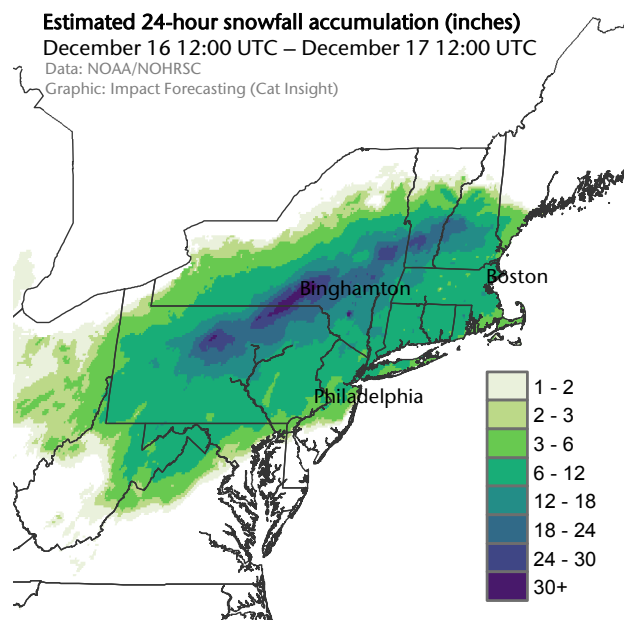
Major early season nor'easter impacts U.S. East Coast

A powerful nor'easter impacted the eastern U.S. between December 16-17 producing notable snow accumulations in portions of the Mid-Atlantic, Northeast, and New England. As of this writing, regions in Pennsylvania, New York, Connecticut, Rhode Island, and Massachusetts reported snowfall totals approaching and exceeding 12 inches (30 centimeters), with several localities reporting preliminary totals exceeding 30 inches (76 centimeters). Strong north-easterly winds battered portions of the coast, while mixed precipitation and ice accretion impacted localities spanning from the central Appalachians into the Mid-Atlantic. Thousands of power outages were reported, while the transportation sector was severely impacted. Total economic and insured losses were anticipated to reach into the millions (USD).

Meteorological Recap

A potent upper level trough which dug southward across the southern Rockies and subsequently swept eastward aided in producing a significant winter storm for localities spanning from the Central and Southern Plains, into the Appalachians, and across the Mid-Atlantic and Northeast. At the surface, an eastward propagating low-pressure system produced unsettled weather and accumulating snowfall across the Plains on December 15. Meanwhile, flow around an Arctic dome of high pressure building toward southern Canada aided in ushering cold air across portions of New England and the Northeast. This pattern also supported a trapped layer of surface cold air east of the central Appalachians, a phenomenon known as Cold Air Damming (CAD).

By December 16, Winter Storm Warnings were in effect spanning from south central Virginia into southern Maine. In total, the NWS indicated at least 60 million people were under winter weather advisories, watches, and warnings as the storm unfolded. Initially, accumulating snow, sleet, and freezing rain occurred along the central Appalachians, while an expanding area of snow overspread the Ohio Valley. The system further organized into a powerful nor'easter as a secondary area of low pressure, strengthening off the Southeast coast, quickly consolidated and ejected toward the Mid-Atlantic and Northeast by the evening of December 16. As the deep low-pressure system continued to pull ample moisture from the Gulf and Atlantic, heavy snowfall encroached on regions of the Northeast and southern New England through December 17. At the peak, snowfall accumulations in the Southern Tier region of New York, including Binghamton, approached 4 to 5 inches/hour (10 to 13 centimeters/hour). By the morning of December 17, a station in Newark Valley, New York (Tioga County) preliminarily reported 44 inches (112 centimeters) of accumulation. The NWS measured 24.7 inches (62.7 centimeters) of snowfall in Williamsport, Pennsylvania (Lycoming County) - setting a record for most snow from a single event. Coastal flooding accompanied the nor'easter, driven by strong north-easterly winds with maximum gusts approaching and exceeding 40 to 50 mph (64 to 80 kph).



24-hour snowfall greater than or equal to 1 inch.

Event Details

The coastal low severely disrupted transportation across the northeastern U.S. as no less than 1,300 flights were cancelled between December 16-17 due to anticipated impacts from severe winter weather. States of Emergency were declared by the governors of Pennsylvania and New Jersey. The governor of New York declared a state of emergency for 18 counties.

In **Virginia**, State Police responded to no less than 325 emergency calls in northern Virginia related to the treacherous weather, of which 200 were involving vehicular crashes - resulting in one confirmed fatality. At the peak, at least 50,000 customers across the state were without power. In **Maryland**, State Police confirmed 1,159 emergency calls between December 16-17, of which 356 were related to crashes, 226 for disabled or unattended vehicles, and 17 regarding roadside hazards including downed trees and power lines. On December 17 an airplane slid off the runway at Baltimore-Washington International Airport (BWI). In **Pennsylvania**, at least one casualties and several injuries were reported in Clinton County resulting from a weather-related traffic incident involving dozens of cars along Interstate 80.



Police use snowmobiles along I-787 in New York
Source: New York State Police

In **New York**, at least six people were injured from a multivehicle accident along the Henry Hudson Parkway in New York City. Significant traffic backups were reported along Interstate 81 in the Southern Tier region. In several locations, New York State Police assisted motorists by snowmobile and had to dig out vehicles trapped in large snowbanks. As of this writing, two deaths have been confirmed across the state. In **Massachusetts**, a 'Snow Emergency' was declared for the City of Boston in anticipation of the nor'easter. **New Hampshire** state police responded to over 120 calls regarding crashes and or disabled vehicles by the afternoon of December 17.

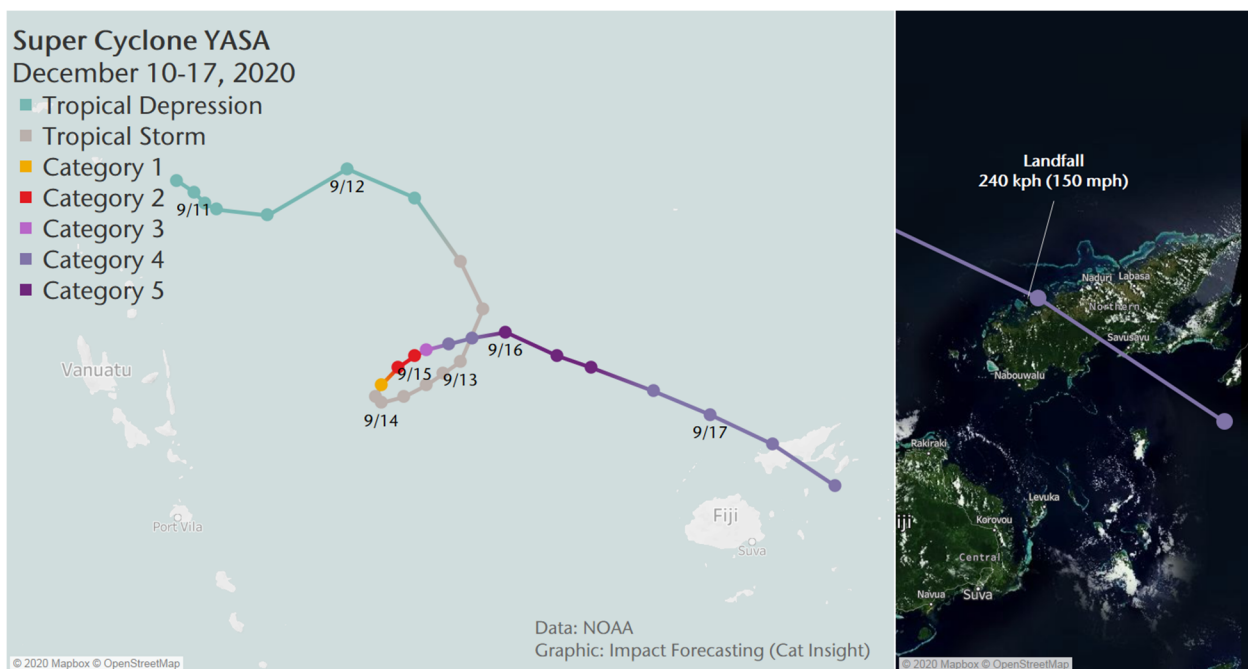
Financial Loss

The storm was continuing to unfold as of this writing, and damage assessments were ongoing. Total economic and insured losses were anticipated to reach into the millions (USD).

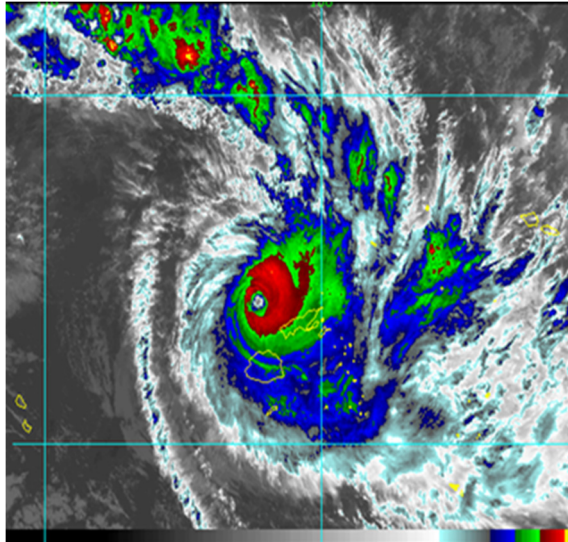
Powerful Cyclone Yasa makes catastrophic landfall in Fiji

Cyclone Yasa made landfall in Fiji on December 17 as a Category 4-equivalent storm, resulting in substantial damage in the archipelago. As of this writing, there were no official reports of human casualties. Yasa became the first named storm of the 2020-2021 South Pacific cyclone season, and also became the earliest Category 5-equivalent storm to form in the South Pacific basin since reliable records began multiple decades ago. (The 2020-2021 season runs from July 1, 2020 to June 30, 2021.) The cyclone made landfall on Fiji's Vanua Levu Island with 1-minute average winds of 240 kph (150 mph). Multiple initial reports cited widespread wind, flood, and coastal inundation damage in Vanua Levu and Viti Levu islands of Fiji. The total combined financial toll was likely to be well into the millions (USD).

Meteorological Recap



On December 10, a low-pressure area located approximately 655 kilometers (405 miles) north of Vanuatu's Port Vila was first identified by the Joint Typhoon Warning Center (JTWC). At the time of formation, the system was surrounded by the marginally favorable atmospheric and oceanic environment with very less or perhaps no convection near the center of it. During the evening hours of December 10, the JTWC issued its first tropical cyclone formation alert on the system with a fair possibility of tropical cyclogenesis in next 24-hour period. Later, on December 11, the system followed a northeastward track, came in the vicinity of more favorable environment, and became better organized. The Fiji Meteorological Services (FMS) also started monitoring the system by classifying it as a Tropical Disturbance, later that day. The following day, the system exhibited continued strengthening and the JTWC started issuing severe weather advisories on the system and assigned it a numerical identifier '05P'. During the period of next 24-hour, the system further consolidated with an increased thunderstorm activity and organized convection near its center. On December 13, the FMS upgraded it into a Category 1 tropical cyclone (Australian tropical cyclone intensity scale) and assigned it an international name 'Yasa' – first named tropical cyclone of the 2020-2021 South Pacific cyclone season.



Cyclone Yasa nearing Fiji
Source: CIRA/ RAMMB

Later, Cyclone Yasa exhibited continued intensification and it first attained hurricane-equivalent intensity on December 14 at 12:00 UTC – 120 kph (75 mph) – Category 1-equivalent storm on the Saffir-Simpson Hurricane Wind Scale. During a 24-hour stretch ending on December 15 at 18:00 UTC, the system further strengthened by 75 kph (45 mph) to an initial peak intensity of 250 kph (155 mph), per the records of JTWC. Cyclone Yasa had developed a well-defined eye feature by this time. At its peak, the JTWC highlighted that the storm had 260 kph (160 mph) winds (1-minute sustained average) – Category 5-equivalent storm on the Saffir-Simpson Scale. Later, as revealed by the satellite imagery, the system fluctuated in its intensity and exhibited rapid weakening as it neared the Fiji Island. Yasa officially made landfall over Fiji's Vanua Levu Island with 1-minute average winds of 240 kph (150 mph) on December 17 at 06:00 PM local time.

After making landfall, Yasa tracked into the open waters of the South Pacific where increasingly unfavorable atmospheric conditions led to steady weakening.

Event Details

Yasa made landfall in the Bua Province of Vanua Levu island of Fiji as a Category 4-equivalent storm, causing widespread damage and casualties. In anticipation of the storm, the government of Fiji declared 14-hour curfew in the whole country on December 17 and advised the citizens to take refuge at safe places. Thousands of residents from the low-lying coastal areas were preemptively evacuated in more than 1,035 government evacuation centers. Rescue officials along with Police personnel were deployed for rescue and relief works. Shipping services remained suspended and the closure of all schools was ordered in anticipation of the storm. Additionally, the Fiji's National Disaster Management Office activated an emergency operation center. On December 16, the FMS issued forecast of hurricane-force winds and heavy rainfall for the Yasawa, Mamanuca, Viti Levu and Vanua Levu island groups for next few days.

Yasa brought catastrophic impacts in Vanua Levu and Viti Levu islands of Fiji. Multiple initial reports of damage came citing significant damage to the residential houses, public infrastructure, and to the farm sector, mainly due to strong winds and flooding caused by heavy rains. The assessment of damage and associated economic losses remained ongoing as of this writing.

Natural Catastrophes: In Brief

Flooding (Indonesia)

Unabated rains from December 12-17, which is being enhanced by La Nina-influenced conditions in the Pacific Ocean, aggravated the flooding situation in Aceh, West Java, and West Nusa Tenggara provinces of Indonesia. These heavy rains prompted the Cermei River to break its banks at several locations, causing notable inundation damage. According to the media reports and ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre), no fewer than 2,100 housing units were either damaged or destroyed in the rain-related incidents, while tens of thousands of residents of these provinces were critically affected.

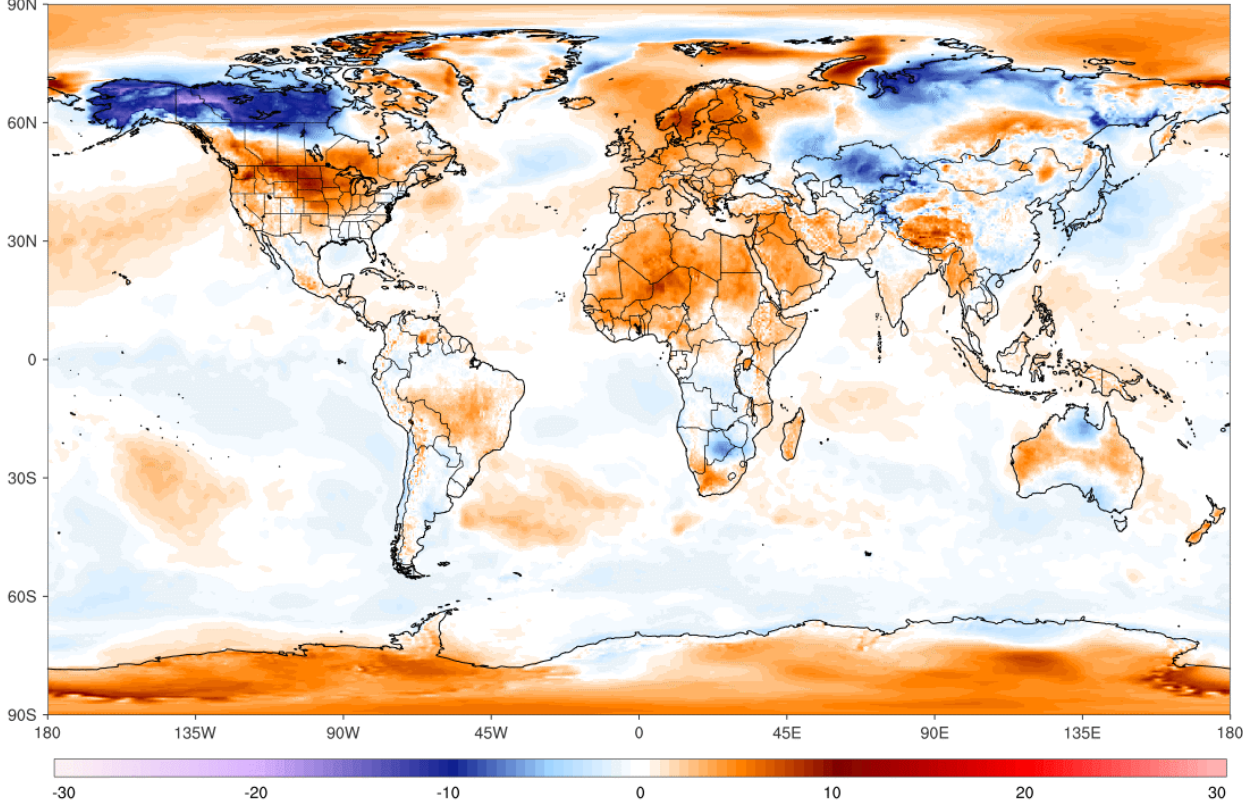
Severe Weather (United States)

An area of showers with embedded severe thunderstorms, ahead of a cold frontal boundary, resulted in at least two confirmed tornados across densely populated regions of West Central Florida (Pinellas, Hillsborough, and Polk Counties) on December 16. The conditions prompted the National Weather Service (NWS) to issue a Particularity Dangerous Situation (PDS) tornado warning which included west Hillsborough County and the City of Tampa. The storms resulted in extensive structural and vehicular damage, while knocking out power to at least 14,000 residents. In Pinellas County, an EF2 tornado with maximum estimated wind speeds of 125 mph (200 kph) was confirmed. The Pinellas Park police department reported at least 25 damaged structures, mainly along Endeavour Way south of Bryan Dairy Road. Nearby, flying debris was observed at the St. Pete-Clearwater International Airport. A second tornado, rated an EF1, touched down near Plant City in Hillsborough County before the cell moved into Polk County. Emergency management officials in Polk County informed no less than three structures were damaged near Gibsonia. Total economic and insured losses were anticipated to reach into the millions (USD).

Global Temperature Anomaly Forecast

GFS/CFSR 5-day Avg 2m T Anomaly (°C) [1979-2000 base]
Thursday, Dec 17, 2020

ClimateReanalyzer.org
Climate Change Institute | University of Maine

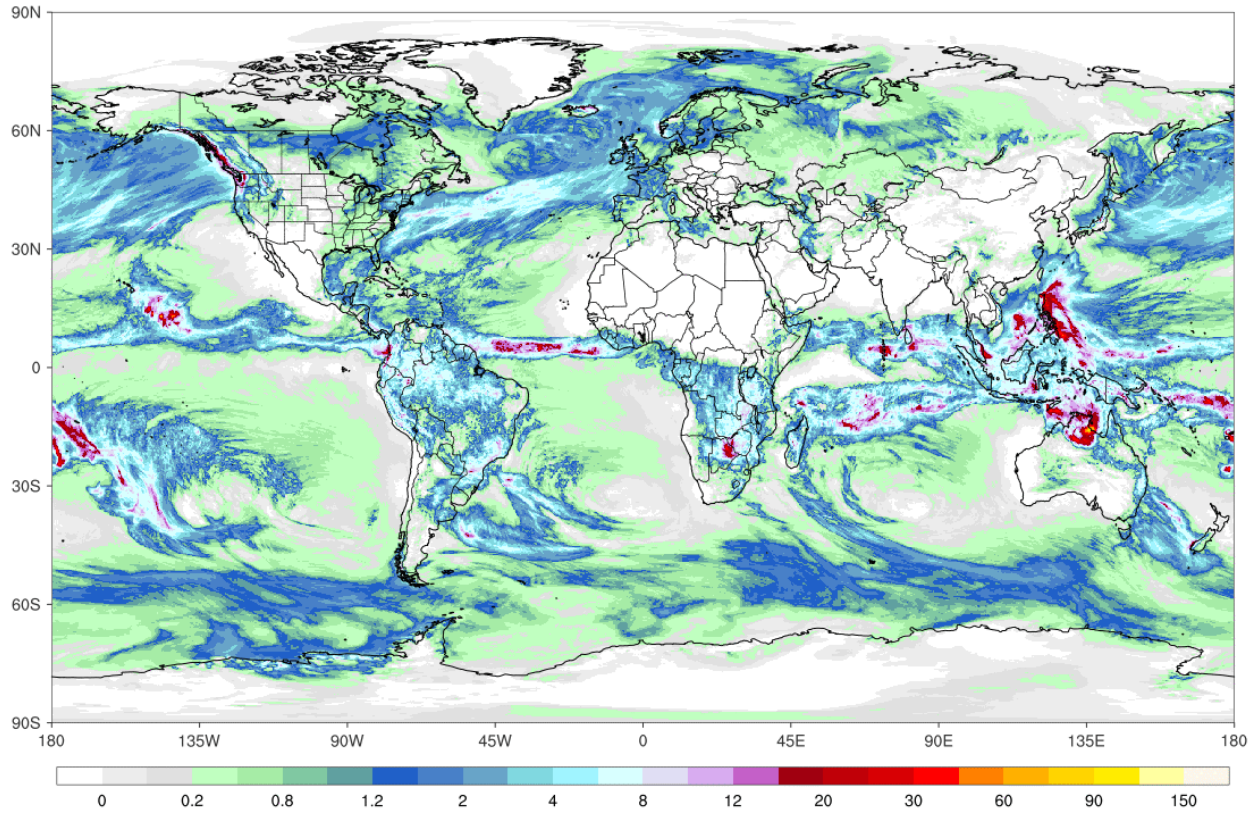


Source: Climate Reanalyzer, Climate Change Institute, University of Maine, USA

Global Precipitation Forecast

GFS 5-day Total Accumulated Precipitation (cm)
Thursday, Dec 17, 2020

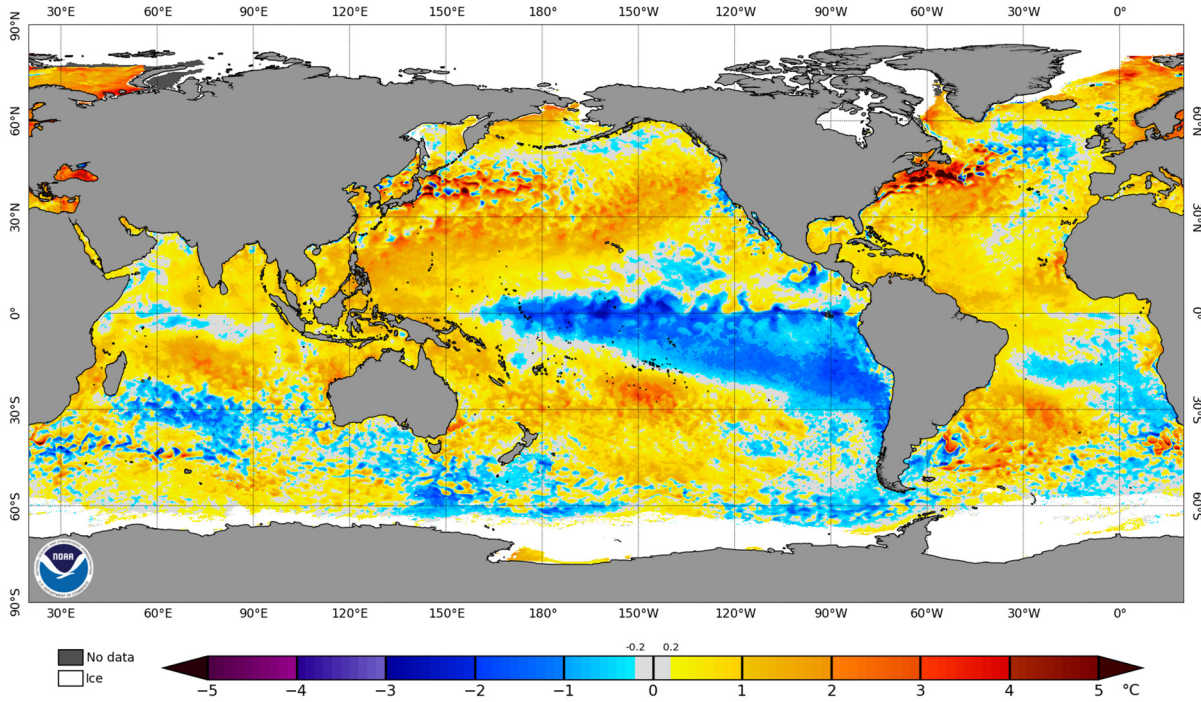
ClimateReanalyzer.org
Climate Change Institute | University of Maine



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

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

NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 16 Dec 2020



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.

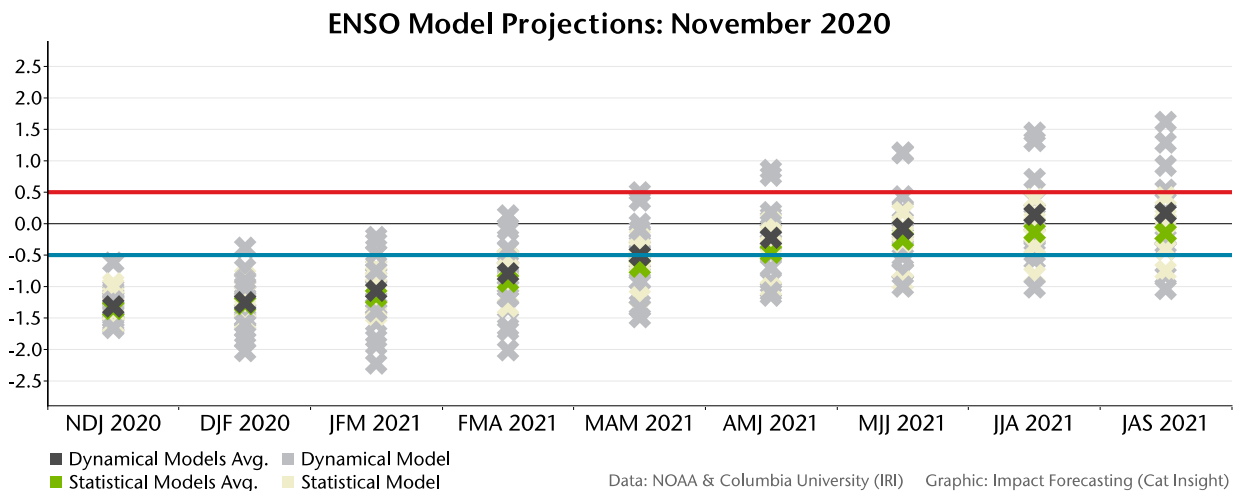
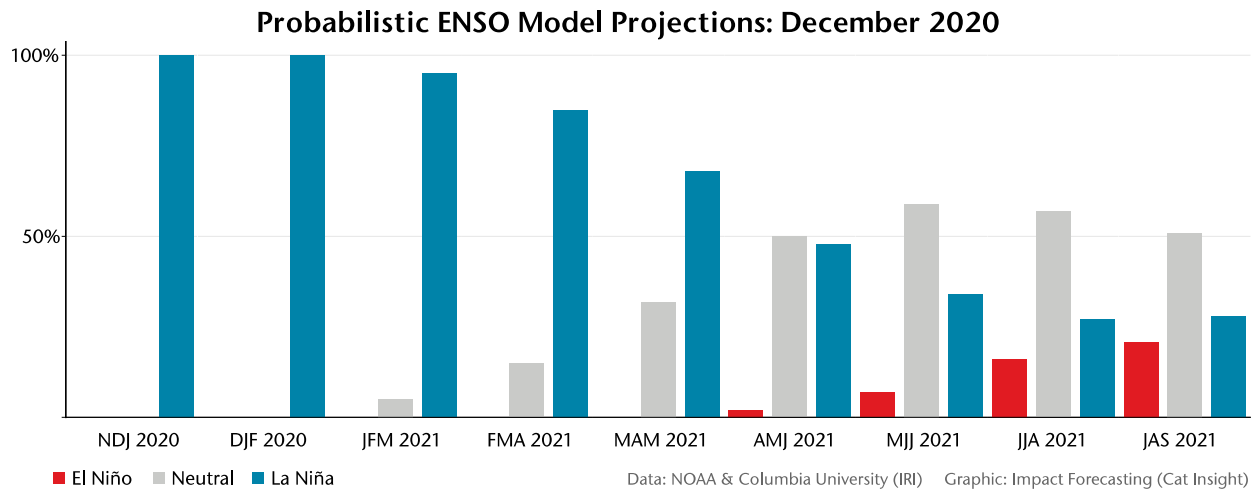
Select Current Global SSTs and Anomalies

Location of Buoy	Temp (°C)	Departure from Last Year (°C)
Eastern Pacific Ocean (1,020 miles SW of San Salvador, El Salvador)	25.6	-0.5
Niño3.4 region (2°N latitude, 155°W longitude)	23.9	-3.1
Western Pacific Ocean (700 miles NNW of Honiara, Solomon Islands)	29.8	-0.2

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 95 percent chance that La Niña conditions will persist through boreal (Northern Hemisphere) winter of 2020 / 2021, and a 50 percent chance that these conditions will linger into 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).

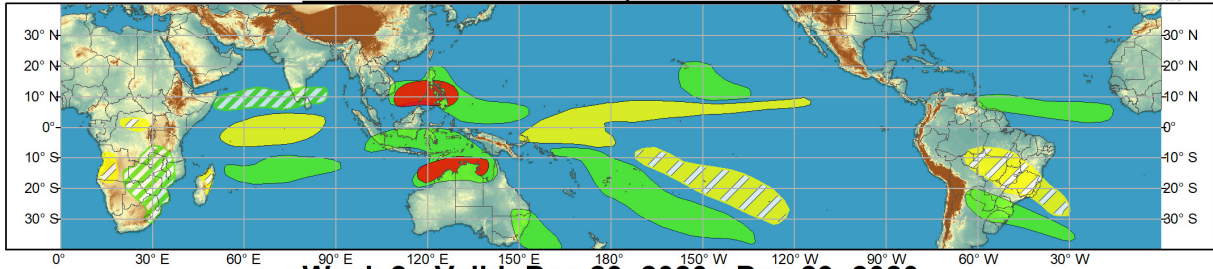
Global Tropics Outlook



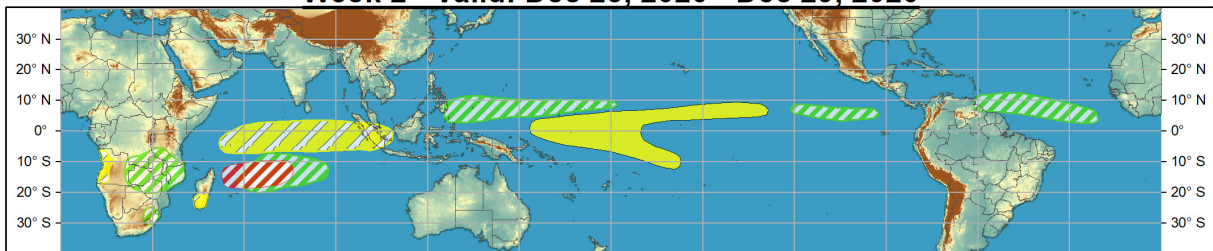
Global Tropics Hazards and Benefits Outlook - Climate Prediction Center



Week 1 - Valid: Dec 16, 2020 - Dec 22, 2020



Week 2 - Valid: Dec 23, 2020 - Dec 29, 2020



Confidence
High Moderate

- Tropical Cyclone Formation** Development of a tropical cyclone (tropical depression - TD, or greater strength).
- Above-average rainfall** Weekly total rainfall in the upper third of the historical range.
- Below-average rainfall** Weekly total rainfall in the lower third of the historical range.
- Above-normal temperatures** 7-day mean temperatures in the upper third of the historical range.
- Below-normal temperatures** 7-day mean temperatures in the lower third of the historical range.

Product is updated once per week, except from 6/1 - 11/30 for the region from 120E to 0, 0 to 40N. The product targets broad scale conditions integrated over a 7-day period for US interests only. Consult your local responsible forecast agency.

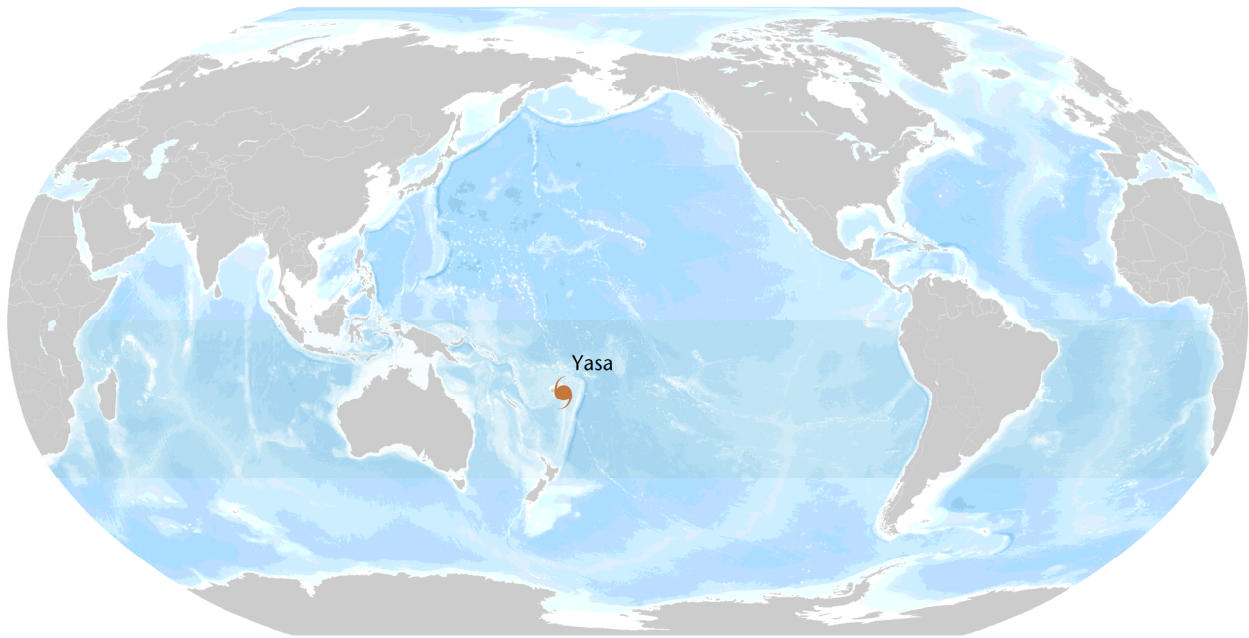
Produced: 12/15/2020

Forecaster: Novella



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

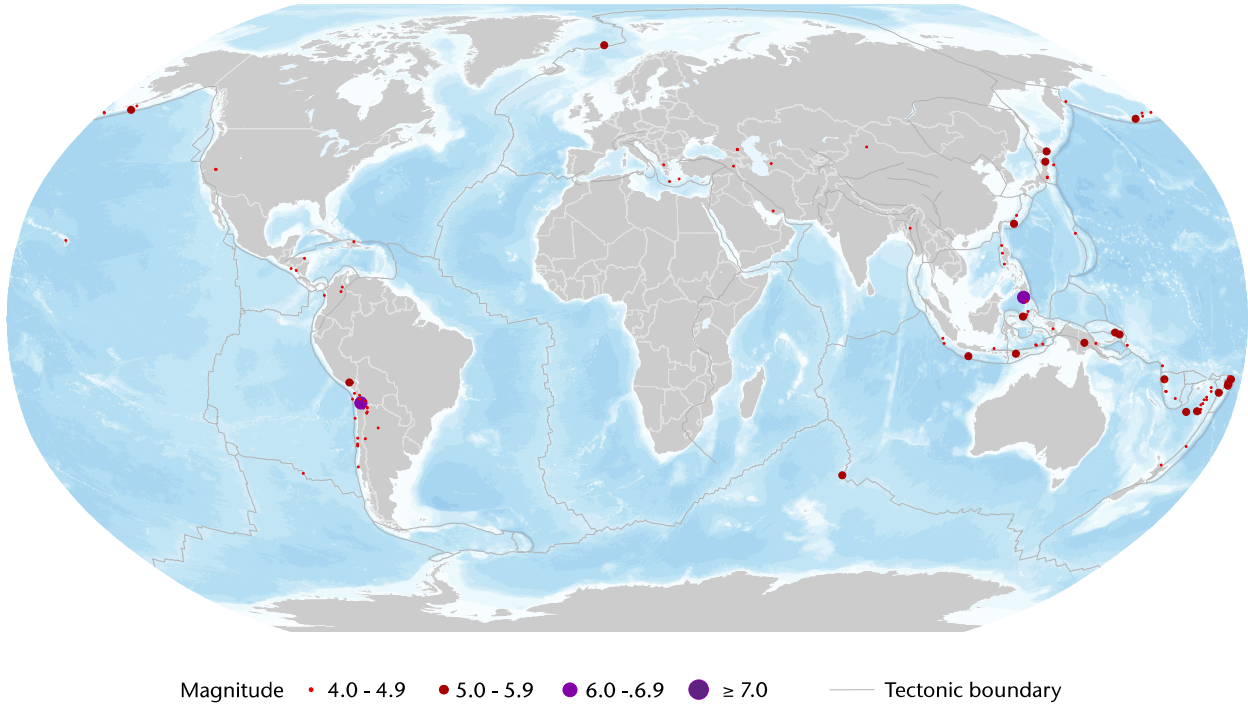
Name*	Location	Winds	Storm Reference from Land	Motion**
CY Yasa	18.3°S, 179.0°W	95 mph	145 miles (235 kilometers) E of Suva, Fiji	SE at 14 mph

* 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 ($\geq M4.0$): December 11 – 17



Significant EQ Location and Magnitude ($\geq M6.0$) Information

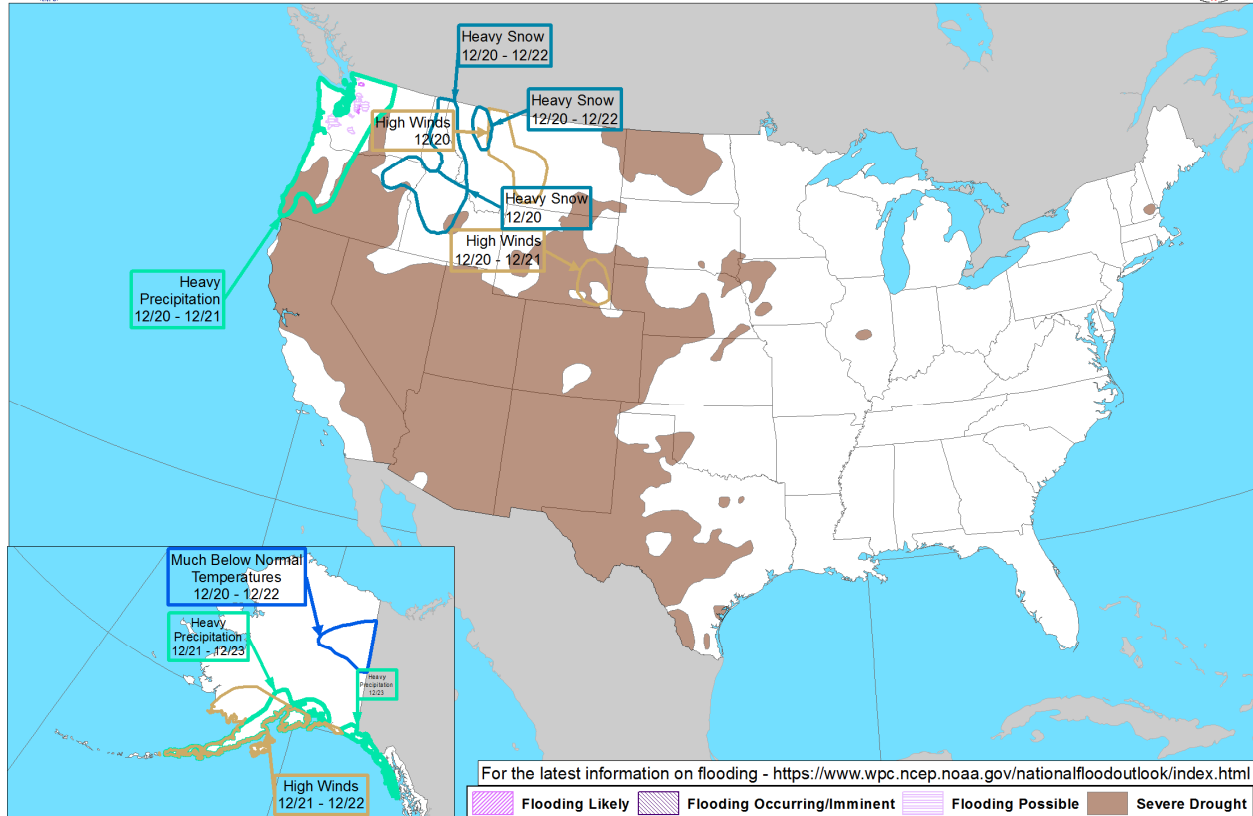
Date (UTC)	Location	Magnitude	Depth	Epicenter
12/14/2020	21.81°S, 68.72°W	6.0	114 km	74 kilometers (46 miles) NNE of Calama, Chile
12/15/2020	5.21°N, 125.44°E	6.1	27 km	Mindanao, Philippines

Source: United States Geological Survey

U.S. Weather Threat Outlook



Day 3-7 U.S. Hazards Outlook Valid: 12/20/2020-12/24/2020



Weather Prediction Center

Made: 12/17/2020 3PM EST

Follow us:

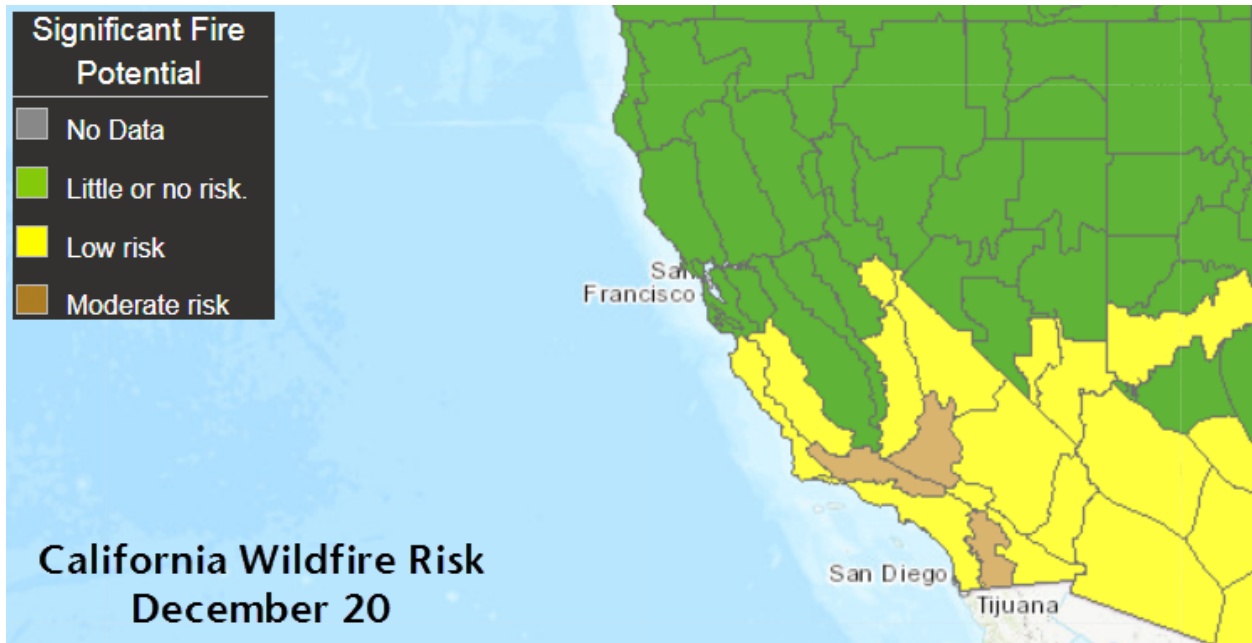
www.wpc.ncep.noaa.gov

Potential Threats

- An active weather pattern featuring a series of frontal system will produce heavy precipitation across the Pacific Northwest between December 20-22, with heavy snow anticipated amid higher elevations of the Coastal Ranges and Cascades.
- Further inland, these disturbances will produce heavy snowfall among regions of the Northern Rockies between December 20-22.
- Strong Chinook winds are expected across areas of the Northern Rockies between December 20-21, particularly along the eastern slopes.

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

The National Interagency Fire Center has highlighted a reduction of the most serious fire risks across much of the country during the next week. Parts of California may have elevated fire conditions at various points, but the risk has started to diminish as the winter season conditions begin to take hold.



Annual YTD Wildfire Comparison: December 4*

Year	Number of Fires	Acres Burned	Acres Burned Per Fire
2016	60,382	5,292,210	87.65
2017	57,707	9,247,998	160.26
2018	52,693	8,492,822	161.18
2019	47,673	4,682,666	98.22
2020	52,934	9,539,554	180.22
10-Year Average (2010-2019)	55,941	6,613,017	118.21

*Latest update from NIFC

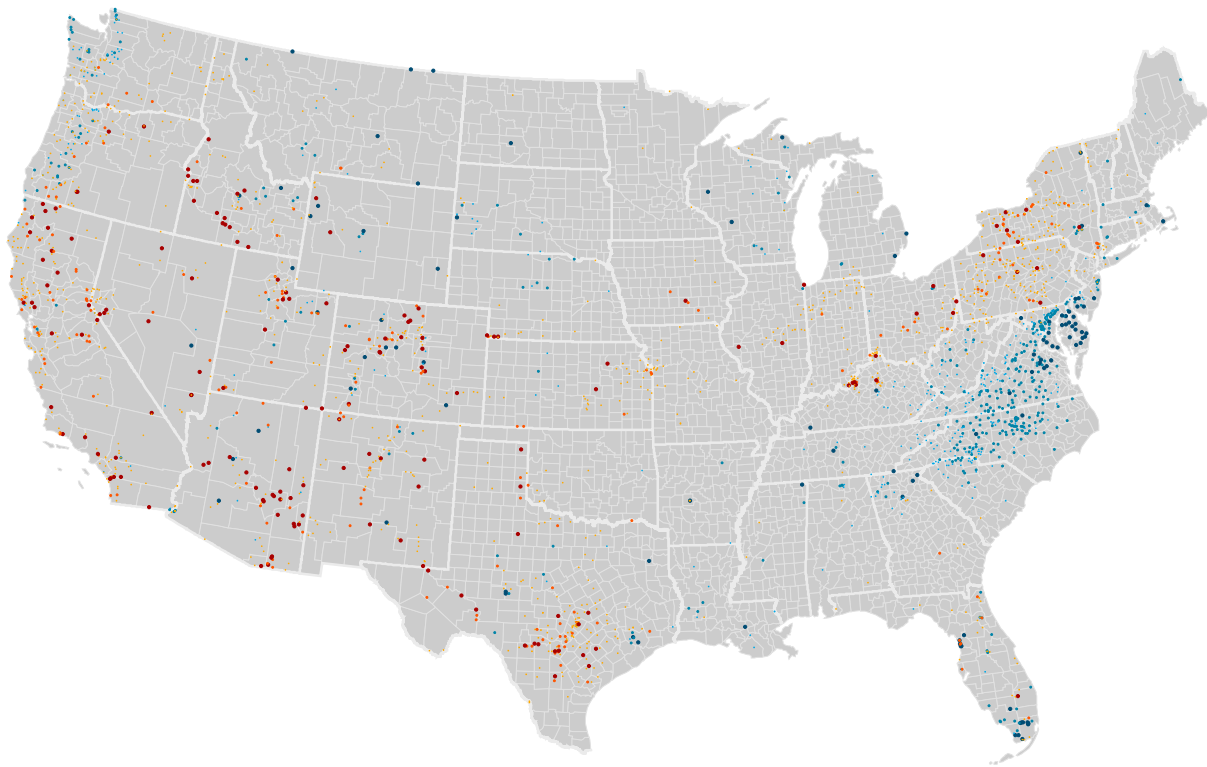
Source: National Interagency Fire Center

Top 5 Most Acres Burned by State: December 17

State	Number of Fires	Acres Burned	Acres Burned Per Fire
California	10,271	3,855,942	375.42
Washington	1,654	1,007,308	609.01
Arizona	2,511	978,505	389.69
Oregon	2,129	772,341	362.77
Colorado	1,078	625,356	580.11

Source: National Interagency Fire Center

Current U.S. Streamflow Status



- | | | | |
|----------------------------|--------------------------------|-------------------------|--------------------|
| High Flows
(Percentile) | • ≥ 99 / Above floodstage | Hydrological
Drought | • Severe Drought |
| | • 95 - 99 | | • Moderate Drought |
| | • 90 - 95 | | • Below Normal |

A $\geq 99^{\text{th}}$ 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 stream 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
Weber River near Oakley, Utah	5.73	99.15
Taylor River at Almont, Colorado	2.77	99.09
Wind River at Riverton, Wyoming	7.75	99.05
Oconto River near Gillett, Wisconsin	4.36	99.03
Deep River at Ramseur, North Carolina	5.18	98.98

Source: United States Geological Survey

Source Information

Major early season nor'easter impacts U.S. East Coast

U.S. National Weather Service

Virginia State Police

Maryland State Police

Snowy Blast Causes Havoc on the Roads, The New York Times

Winter Storm Gail: Two Killed in Pennsylvania Pileup; Hundreds of Crashes in Virginia, Maryland, The Weather Channel

Snowstorm rages in New England after burying parts of New York with more than 40 inches, The Washington Post

Powerful Cyclone Yasa makes catastrophic landfall in Fiji

Joint Typhoon Warning Center (JTWC)

Fiji Meteorological Services (FMS)

Yasawa currently feeling the impact of TC Yasa, Fiji Village

Roads Flooded as Tropical Cyclone Yasa Hits Fiji, Yahoo News

Fiji declares state of natural disaster as powerful cyclone hits, Global Times

Natural Catastrophes: In Brief

ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre)

Indonesian National Board for Disaster Management

U.S. Storm Prediction Center

Tornado damages Pinellas; warnings lifted for Hillsborough, Polk, Tampa Bay Times

'Large, extremely dangerous' tornado confirmed in Tampa Wednesday afternoon, NWS says, ABC Action News Tampa Bay

Contact Information

Steve Bowen

Director & Meteorologist
Head of Catastrophe Insight
Impact Forecasting
Aon
steven.bowen@aon.com

Brian Kerschner

Senior Catastrophe Analyst
Impact Forecasting
Aon
brian.kerschner@aon.com

Michal Lörinc

Senior Catastrophe Analyst
Impact Forecasting
Aon
michal.lorinc@aon.com

Gaurav Srivastava

Catastrophe Analyst
Impact Forecasting
Aon
gaurav.srivastava6@aon.com

About Aon

Aon plc (NYSE:AON) is a leading global professional services firm providing a broad range of risk, retirement and health solutions. Our 50,000 colleagues in 120 countries empower results for clients by using proprietary data and analytics to deliver insights that reduce volatility and improve performance.

© Aon plc 2020. All rights reserved.

The information contained herein and the statements expressed are of a general nature and are not intended to address the circumstances of any particular individual or entity. Although we endeavor to provide accurate and timely information and use sources we consider reliable, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.

Copyright © by Impact Forecasting®

No claim to original government works. The text and graphics of this publication are provided for informational purposes only. While Impact Forecasting® has tried to provide accurate and timely information, inadvertent technical inaccuracies and typographical errors may exist, and Impact Forecasting® does not warrant that the information is accurate, complete or current. The data presented at this site is intended to convey only general information on current natural perils and must not be used to make life-or-death decisions or decisions relating to the protection of property, as the data may not be accurate. Please listen to official information sources for current storm information. This data has no official status and should not be used for emergency response decision-making under any circumstances.

Cat Alerts use publicly available data from the internet and other sources. Impact Forecasting® summarizes this publicly available information for the convenience of those individuals who have contacted Impact Forecasting® and expressed an interest in natural catastrophes of various types. To find out more about Impact Forecasting or to sign up for the Cat Reports, visit Impact Forecasting's webpage at impactforecasting.com.

Copyright © by Aon plc. All rights reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise. Impact Forecasting® is a wholly owned subsidiary of Aon plc.