

Hurricanes and Tropical Storms

To climatologists, the technical term used to describe the weather phenomenon is “tropical cyclone”. A tropical cyclone is a rotating, organized system of clouds and thunderstorms that originates over tropical or subtropical waters and has a closed low-level circulation. They are classified as follows:

- **Tropical Depression:** A tropical cyclone with maximum sustained winds of 38 mph (33 knots) or less.
- **Tropical Storm:** A tropical cyclone with maximum sustained winds of 39 mph to 73 mph (34 to 63 knots).
- **Hurricane:** A tropical cyclone with maximum sustained winds of 74 mph (64 knots) or higher. In the western North Pacific, hurricanes are called typhoons; similar storms in the Indian Ocean and South Pacific Ocean are called cyclones.
- **Major Hurricane:** A tropical cyclone with maximum sustained winds of 111 mph (96 knots) or higher, corresponding to a Category 3, 4 or 5 on the Saffir-Simpson Hurricane Wind Scale.



On average, there are 12 tropical storms each year, six of which become hurricanes that form over the Atlantic Ocean, Caribbean or Gulf of Mexico. The hurricane season for this region runs from Jun. 1 to Nov. 30 each year.

In the central Pacific Ocean, there's an average of three tropical storms each year, two of which become hurricanes. The hurricane season for this region runs from May 15 to Nov. 30 each year.

Over a typical 2-year period, the U.S. coastline is struck by an average of three hurricanes, one of which is classified as a major hurricane.

Hurricane Hazards

Hurricanes can be powerful and destructive. While hurricanes pose the greatest threat to life and property, tropical storms and depression can also be devastating.

The primary hazards associated with tropical cyclones (which include tropical depressions, tropical storms and hurricanes) are storm surge flooding, inland flooding from heavy rains, destructive winds, tornadoes and high surf and rip currents.

- **Storm surge** is the abnormal rise of water generated by a storm's winds. This hazard is historically the leading cause of hurricane related deaths in the United States. Storm surge and large battering waves can result in large loss of life and cause massive destruction along the coast. Storm surge can travel several miles inland, especially along bays, rivers and estuaries.
- **Flooding** from heavy rain is the second leading cause of fatalities from landfalling tropical cyclones. Widespread torrential rains associated with these storms often cause flooding hundreds of miles inland. This flooding can persist for several days after a storm has dissipated.
- **Winds** from a hurricane can destroy buildings and manufactured homes. Signs, roofing material and other items left outside can become flying missiles during hurricanes.
- **Tornadoes** can accompany landfalling tropical cyclones. These tornadoes typically occur in rain bands well away from the center of the storm.
- **Dangerous waves** produced by a tropical cyclone's strong winds can pose a significant hazard to coastal residents. These waves can cause deadly rip currents, significant beach erosion and damage to structures along the coastline, even when the storm is more than a 1,000 miles offshore.

Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 119-153 km/h	Minimal: Damage to building structures possible, primarily to unanchored older model mobile homes. Damage to poorly constructed signs, shrubbery and trees. Loose outdoor items become projectiles. Numerous power outages.
2	96-110 mph 154-177 km/h	Widespread from very strong winds: Some roofing material, door and window damage to buildings. Considerable damage to trees, vegetation, mobile homes and piers. A number of high rise building glass windows dislodged to become projectiles. Widespread power outages up to several days.
3 (major)	111-129 mph 178-208 km/h	Extensive from dangerous winds: Some structural damage to small residences and utility buildings with minor amount of wall failures. Mobile homes destroyed. Many trees uprooted or snapped. Power outages lasting several days or weeks.

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
4 (major)	130-156 mph 209-251 km/h	Devastating from extremely dangerous winds: Some wall failures with complete house roof structure failures. Extensive damage to doors, windows and trees. Electricity unavailable for weeks.
5 (major)	157 mph or higher 252 km/h or higher	Catastrophic: Complete roof failure on many residences and industrial buildings. Some complete building failures with small buildings blown over or away. Power outages for weeks or months.

Stay Informed, Listen for Weather Alerts

The National Weather Service (NWS) continuously broadcasts warnings, watches, forecasts and non-weather related hazard information on NOAA Weather Radio All Hazards (NWR). You can find the radio broadcast frequency to listen for NOAA Weather alerts in your area by using the index located at http://www.nws.noaa.gov/nwr/coverage/station_listing.html.

Current Storm Information Resources

- National Weather Service: www.weather.gov
- National Hurricane Center: www.nhc.noaa.gov
- Central Pacific Hurricane Center: www.prh.noaa.gov/cphc

Mobile NHC and NWS Information Resources

- Mobile NHC website in basic HTML: www.nhc.noaa.gov/mobile
- Mobile NWS website for smartphone: <http://mobile.weather.gov>
- FEMA Mobile App: www.fema.gov/mobile-app

Facebook

- NHC Facebook Page: www.facebook.com/US.NOAA

Weather Watches and Warnings – What to Listen For

- **Tropical Storm or Hurricane Advisory:** The NWS issues an Advisory when it expects conditions to cause significant inconveniences that may be hazardous. If caution is used, these situations shouldn't be life-threatening.
- **Hurricane Watch:** An announcement that hurricane conditions (sustained winds of 74 mph or higher) are possible within the specified area in association with a tropical, subtropical or post-tropical cyclone. The hurricane watch is issued 48 hours in advance of the anticipated onset of tropical-storm-force winds. Prepare your home and review your plan for evacuation in case warnings are issued. Listen closely to instructions from local officials.
- **Tropical Storm Watch:** An announcement that tropical storm conditions (sustained winds of 39 to 73 mph) are possible within the specified area within 48 hours. Prepare your home and review your plan for evacuations in case warnings are issued. Listen closely to instructions from local officials.

Weather Watches and Warnings — What to Listen For *continued*

- **Hurricane Warning:** An announcement that hurricane conditions (sustained winds of 74 mph or higher) are expected somewhere within the specified area. The hurricane warning is issued 36 hours in advance of the anticipated onset of tropical-storm-force winds.
- **Tropical Storm Warning:** An announcement that tropical storm conditions (sustained winds of 39 to 73 mph) are expected somewhere within the specified area within 36 hours.
- **Extreme Wind Warning:** Extreme sustained winds of a major hurricane (115 mph or greater) are expected to begin within an hour. Take immediate shelter in the interior portion of a well-built structure.

Additional Watches and Warnings are issued to provide detailed information on specific threats such as floods and tornadoes. Local National Weather Service offices issue Flash Flood/Flood Watches and Warnings as well as Tornado Warnings.

Be Prepared

Know what actions to take before the hurricane season begins, when a hurricane approaches and when the storm is in your area, as well as what to do after a hurricane leaves your area. This will increase your chance of survival and can help to reduce property damage and potential business interruption.

Continuity Planning:

Assess company functions to determine which staff, materials, procedures and equipment are absolutely necessary to keep the business operating. Start by reviewing your business process flow chart, if one exists, to identify operations critical to survival and recovery. Include emergency payroll and accounting systems to track and document costs in the event of a disaster. Establish procedures for succession of management including at least one person who is not at the company headquarters, if possible.

Next, decide who should participate in putting together your emergency plan. Include co-workers from all levels in planning and as active members of the emergency management team. Consider a broad cross-section of people from throughout your organization, but focus on those with expertise vital to daily business functions. These will likely include people with technical skills as well as managers and executives.

Then, make a list of your most important customers and proactively plan ways to serve them during and after a disaster. Also, identify key suppliers, shippers, resources and other businesses you must interact with on a daily basis. Develop professional relationships with more than one company in case your primary contractor can't service your needs. A disaster that shuts down a key supplier can be devastating to your business.

Finally, plan what you will do if your building, plant or store is not accessible. Define crisis management procedures and individual responsibilities in advance. Talk with your staff or co-workers and frequently review and practice what you intend to do during and after an emergency.

Emergency Planning for Employees:

Your employees and co-workers are your business' most valuable asset. Two-way communication is central before, during and after a disaster. Include emergency information in newsletters, on your company intranet, in periodic employee emails and/or other communication tools. Designate an out-of-town phone number where employees can leave an "I'm okay" message in a catastrophic disaster. If you have employees with disabilities or special needs, ask them what assistance, if any, they require.

Emergency Supplies:

When preparing for emergency situations, it's best to think first about the basics of survival: fresh water, food, clean air and warmth. Encourage everyone to have a portable emergency supply kit customized to meet their personal needs, such as the inclusion of essential medications. Determine what emergency supplies the company can feasibly provide, if any, and which ones individuals should provide.

Recommended emergency supplies include: water, food, both a battery-powered radio and a NOAA weather radio with an alert function, extra batteries, a flashlight, first aid kit, whistle, wrench or pliers to turn off utilities, moist towelettes, garbage bags and plastic ties for personal sanitation.

Keep copies of important records such as sitemaps, building plans, insurance policies, employee contact and identification information, bank account records, supplier and shipping contact lists, computer backups, emergency or law enforcement contact information and other priority documents in a waterproof, fireproof portable container. Store a second set of records at an off-site location.

Planning to Stay or Go:

Depending on your circumstances and the nature of the disaster, the first important decision is whether to shelter-in-place or evacuate. You should understand and plan for both possibilities in advance by developing clear, well-thought-out plans. Monitor weather and news reports for information or official instructions as they become available. It is usually advisable to evacuate if instructed to do so by local authorities.

Make an Evacuation Plan:

Some disasters will require employees to leave the workplace quickly. Learn your community's evacuation plan and identify posted routes. The ability to evacuate workers, customers and visitors effectively can save lives. If your business operates out of more than one location, establish evacuation procedures for each individual building. If your company is in a high-rise building, an industrial park or even a small strip mall, it's important to coordinate and practice with other tenants or businesses to avoid confusion and potential gridlock.

In situations where there's advanced warning and a severe hurricane is anticipated, it may be best to seek a community emergency shelter. Storm surge flooding is very dangerous and you should seek high ground if possible. To find a shelter near you, download the Federal Emergency Management Agency (FEMA) app at fema.gov/mobile-app. You should plan for all possibilities. Go to www.ready.gov for more specific information on these topics.

Make a Shelter-in-Place Plan:

If the hurricane's arrival is imminent, it's best to stay indoors to avoid any uncertainty outside. Secure and brace exterior doors and wall openings. Take refuge in an interior room. Stay away from windows and glass doors. Recognize if you're in an area which may be subject to storm surge flooding. Make sure the authorities, family or friends know your whereabouts. Maintain a method of communication.

Talk to Your People

Providing for your co-workers' well-being is recognized as one of the best ways to assure your company's recovery. That means communicating regularly with employees before, during and after an incident. Use newsletters, intranets, staff meetings and other internal communications tools to communicate emergency plans and procedures.

Practice the Plan with Co-workers:

Frequently practice what you intend to do during a disaster. Conduct regularly scheduled education and training seminars to provide co-workers with information, identify needs and develop preparedness skills. Include disaster training in new employee orientation programs.

Promote Family and Individual Preparedness:

If individuals and families are prepared, your company and your coworkers are better positioned in an emergency situation. Encourage your employees and their families to: get an emergency supply kit, make a family emergency plan and be informed about different threats and their appropriate responses.

Write a Crisis Communication Plan:

Detail how your organization plans to communicate with employees, local authorities, customers and others during and after a disaster. Include relevant information for employees, top company executives, the general public and your customers as well as local, state and federal authorities.

Protect Your Investment

In addition to emergency planning and communicating with employees, there are steps you can take to safeguard your company and secure your physical assets.

Review Insurance Coverage:

Inadequate insurance coverage can lead to major financial loss if your business is damaged, destroyed or simply interrupted for a period of time. Insurance policies vary, so check with your agent or provider about things such as physical losses, flood coverage and business interruption. Understand what your policy covers and what it does not. Flood losses are not covered under a business or home-owners insurance policy. FEMA manages the National Flood Insurance Program and its policies are available in most communities through insurance agents.

Prepare for Utility Disruptions:

Businesses are often dependent on electricity, gas, telecommunications, sewer and other utilities. You should plan ahead for extended disruptions during and after a disaster. Speak with service providers about potential alternatives. Consider options such as renting or purchasing portable generators to power the vital aspects of your business in an emergency.

Secure Facilities, Buildings and Plants:

While there's no way to predict what will happen or what your business' circumstances will be, there are things you can do in advance to help protect your physical assets. Where possible, take steps before the storm strikes to mitigate the impact of high winds and floodwaters or surge. Strengthen the building envelope from wind by reinforcing or boarding up wall openings, doors and windows. Use of hurricane resistant glass and hurricane shutters is preferred.

Take steps to protect your property from flood waters. Elevate contents stockpiles, computers, communications and electrical equipment where possible. Install check-valves in sewer lines to prevent sewer backups. If there's a sump pump, install battery backup. Use protective materials such as plywood, plastic sheeting and sandbags to protect the perimeter.

An investment in planning today won't only help protect your business investment and your livelihood, but will also support your employees, customers and stakeholders, the community, the local economy and even the country. Get ready now.

Other Severe Weather Emergency and Disaster Preparedness Resources:

Preparedness for Businesses: www.ready.gov/business

Federal Emergency Management Agency (FEMA): www.fema.gov

National Hurricane Center: www.nhc.noaa.gov

American Red Cross: www.redcross.org

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