



Hurricane

Produced by the National Disaster Education Coalition: American Red Cross, FEMA, IAEM, IBHS, NFPA, NWS, USDA/CSREES, and USGS

Why talk about hurricanes?

There are no other storms like hurricanes on Earth. Views of hurricanes from satellites located thousands of miles above the Earth show how these powerful, tightly coiled weather systems are unique. Each year, on average, 10 tropical storms (of which six become hurricanes) develop over the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico. Many of these storms

remain over the ocean. However, an average of five hurricanes strike the United States coastline every three years. Of these five, two will be major hurricanes, which are storms of category 3 or higher on the Saffir-Simpson scale, which corresponds to hurricanes

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with winds at or above 111 miles per hour.

Timely warnings have greatly diminished hurricane fatalities in the United States. In spite of this, property damage continues to mount. There is little we can do about the hurricanes themselves. However, the **National Oceanic and Atmospheric Administration's (NOAA's)** Tropical Prediction Center and **National Weather Service (NWS)** field offices team up with other federal, state, and local agencies; rescue and relief organizations; the private sector; and the news media in a huge warning and preparedness effort.

What are hurricanes, and what causes them?

Hurricanes and tropical storms are cyclones with tropical origins (tropical cyclones). When the winds of a tropical storm (winds 39 to 73 miles per hour) reach a constant speed of 74 miles per hour or more, it is called a hurricane. Hurricane winds blow in a large spiral around a relatively calm center known as the "eye." The "eye" is generally 20 to 30 miles wide, and the storm may have a diameter of 400 miles across. As a hurricane approaches, the skies will begin to darken and winds will grow in strength.

A hurricane can bring torrential rains, high winds, and storm surge as it nears land. A single hurricane can last more than two weeks over open waters and can run a path across the entire length of the eastern seaboard.

More dangerous than the high winds of a hurricane is the storm surge — a dome of ocean water that can be 20 feet high at its peak and 50 to 100 miles wide. The surge can devastate coastal communities as it sweeps ashore. In recent years, the fatalities associated with storm surge have been greatly reduced as a result of better warning and preparedness within coastal communities.

Most deaths due to tropical cyclones are flood-related. Inland flooding is a common occurrence with hurricanes and tropical storms. Torrential rains from decaying hurricanes and tropical storms can produce extensive urban and river flooding. Winds from these storms located offshore can drive ocean water up the mouth of rivers, compounding the severity of inland flooding. Inland streams and rivers can flood and trigger landslides. Mudslides can occur in mountainous regions. In addition, hurricanes can spawn tornadoes, which add to the destructiveness of the storm.

Learn about hurricane risk in your community by contacting your local emergency management office, National Weather Service office, or [American Red Cross chapter](#).

Awareness Information

- A National Weather Service WATCH is a message indicating that conditions favor the occurrence of a certain type of hazardous weather. For example, a severe thunderstorm watch means that a severe thunderstorm is expected in the next six hours or so within an area approximately 120 to 150 miles wide and 300 to 400 miles long (36,000 to 60,000 square miles). The NWS Storm Prediction Center issues such watches. Local NWS forecast offices issue other watches (flash flood, winter weather, etc.) 12 to 36 hours in advance of a possible hazardous-weather or flooding event. Each local forecast office usually covers a state or a portion of a state.
- An NWS WARNING indicates that a hazardous event is occurring or is imminent in about 30 minutes to an hour. Local NWS forecast offices issue warnings on a county-by-county basis.
- A hurricane WATCH is issued when there is a threat of hurricane conditions within 24 to 36 hours.
- A hurricane WARNING is issued when hurricane conditions are expected in 24 hours or less.

Many people do not realize the threat of hurricanes as each one is different. Over the past several years, U.S. hurricane warning systems have provided adequate time for people on barrier islands and the immediate coastline to move inland when hurricanes threaten. However, due to

rapid population growth, it is becoming more difficult to evacuate people from the barrier islands and other coastal areas because roads have not kept pace with the expansion. The problem is further compounded by the fact that 80 to 90 percent of the population now living in hurricane-prone areas have never experienced the core of a “major” hurricane. Many of these people have been through weaker storms. The result is a false impression of a hurricane’s damage potential. This often leads to complacency and delayed actions, which could result in the loss of many lives.

Plan for a Hurricane

Develop a Family Disaster Plan. Please see the [“Family Disaster Plan”](#) section for general family planning information. Hurricane-specific planning should include the following:

- Learn about your community’s risk from hurricanes. Contact your local emergency management office, local National Weather Service office, or local chapter of the American Red Cross for more information on hurricanes and how to prepare for them.
- If your community is at risk from hurricanes, contact the local emergency management office or planning and zoning office to find out if you live in an area that could flood during a hurricane or heavy rains. If you live in a risk area, learn what types of supplies should be stored to protect your home from flood waters. Knowing the elevation of your property in relation to nearby streams and dams will let you know if forecasted flood levels will affect your home.

If you are at risk from hurricanes:

- Talk to your insurance agent. Homeowners’ policies do not cover flooding from hurricanes. Ask about the National Flood Insurance Program (NFIP).
- Ask about your community’s hurricane preparedness plan. The local emergency management office or local chapter of the American Red Cross should be able to provide you with details of this plan, including information on the safest evacuation routes, nearby shelters, advice on when schools would be closed and what conditions are necessary for recommended evacuation of certain areas.
- Develop an evacuation plan. (See [“Evacuation”](#) in the “Family Disaster Plan” section.) Everyone in your family should know where to go if they have to leave. Trying to make plans at the last minute can be upsetting and create confusion.
- Determine where to move your boat in an emergency. Marinas and other storage facilities may fill up quickly. Some locations may have less risk of damage than others. You may be required to secure your boat well in advance of approaching hurricanes.

- Discuss hurricanes with your family. Everyone should know what to do in case all family members are not together. Discussing hurricanes ahead of time will help reduce fear and anxiety, and lets everyone know how to respond. Review flood safety and preparedness measures with your family.

Assemble a Disaster Supplies Kit

Please see the “Disaster Supplies Kit” section for general supplies kit information. Hurricane-specific supplies should include the following:

- A week’s supply of food and water (to be kept at home in addition to the recommended three-day supply for your evacuation kit).
- Disaster Supply Kit basics.
- Evacuation Supplies Kit.

How to Protect Your Property

- **Make a list of items to bring inside in the event of a storm.** A list will help you remember anything that can be broken or picked up by strong winds. Hurricane winds, often in excess of 100 miles per hour, can turn unanchored items into deadly missiles, causing damage or injury when they hit.
- **Keep trees and shrubbery trimmed.** Make trees more wind resistant by removing diseased or damaged limbs, then strategically remove branches so that wind can blow through. Hurricane winds frequently break weak limbs and hurl them at great speed, causing great damage when they hit property. Debris collection services may not be operating just before a storm, so it is best to do this well in advance of approaching storms.
- **Remove any debris or loose items in your yard.** Hurricane winds can pick up anything unsecured, creating damage to property when the debris hits.
- **Clear loose and clogged rain gutters and downspouts.** Hurricanes often bring long periods of heavy rain. Providing clear drainage will help prevent misdirected flooding.
- **Install permanent hurricane shutters.** Hurricane shutters provide the best protection for your windows and doors. Taping windows could take critical time from more effective preparedness measures. All tape does is help prevent glass from broken windows from scattering all over inside. Tape does not prevent windows from breaking. Cover the outside of windows with shutters or plywood.
- **If you do not have permanent hurricane shutters, install anchors for plywood (marine plywood is best) and predrill holes in pre-cut half-inch outdoor plywood boards so that you can cover the windows of your home quickly.** Mark which board fits which window. Note: Tape does not prevent windows from breaking, so taping windows is not recommended. Most homes destroyed during recent hurricanes had no window protection. When wind enters a home through broken windows, the pressure builds against the walls and can lift roofs, followed by collapsing walls.

- Install protection to the outside areas of sliding glass doors. Glass doors are as vulnerable as windows to breakage by wind-driven objects.
- Well ahead of time, buy any other items needed to board up windows and protect your home. When a hurricane threatens, supplies are quickly sold out at many stores. Stock may not be replenished until after the storm.
- Strengthen garage doors. Many houses are destroyed by hurricane winds that enter through damaged garage doors, lifting roofs, and destroying the remainder of the house.
- Have an engineer check your home and advise about ways to make it more resistant to hurricane winds. There are a variety of ways to protect your home. Professionals can advise you of engineering requirements, building permits or requirements of local planning and zoning departments to provide the most effective protection.
- Elevate coastal homes. Raising houses to a certain height will make them more resistant to hurricane-driven waters. There may be many local codes affecting how and where homes can be elevated. Meet with your emergency manager or planning and zoning official for a description of the process to have your home elevated. There may also be community funds available for such measures.
- If you live in a flood plain or are prone to flooding, also follow flood preparedness precautions. Hurricanes can bring great amounts of rain and frequently cause floods. Some hurricanes have dropped more than 10 inches of rain in just a few hours.

Media and Community Education Ideas

- Publish a special section in your local newspaper with emergency information on hurricanes. Localize the information by printing the phone number of local emergency services offices, the **American Red Cross** chapter, and the nearest hospitals.
- Provide hurricane tracking charts to local schools.
- Work with local emergency services and American Red Cross officials to prepare special reports to people with mobility impairments on what to do if an evacuation is ordered.
- At the beginning of each hurricane season, encourage the emergency response organizations to review community hurricane disaster plans.
- Publicize and promote a hurricane awareness week.
- Stage a simulated evacuation to show your community what can happen.
- Periodically inform your community of local public warning systems.

- Publish emergency evacuation routes.

What to Do During a Hurricane WATCH

- Continue listening regularly to a NOAA Weather Radio or local radio or television stations for updated information. Hurricanes can change direction, intensity, and speed very suddenly. What was a minor threat several hours ago can quickly escalate to a major threat.
- Listen to the advice of local officials, and evacuate if they tell you to do so. Avoid flooded roads and watch for washed-out bridges. Leaving an area that may be affected will help keep your family safe. Local officials may call for evacuation in specific areas at greatest risk in your community. Following the advice of local authorities is your safest protection. Local officials may close down certain roads, especially near the coast, when the outer effects of increasing wind and rain from a hurricane reach the coast.
- Prepare your property for high winds. Hurricane winds can blow large, heavy objects and send them crashing into homes. Anything not secured may become a deadly or damaging projectile.
 - Bring lawn furniture inside, as well as outdoor decorations or ornaments, trash cans, hanging plants, or anything else that can be picked up by the wind.
 - Make trees more wind resistant by removing diseased and damaged limbs, then strategically remove branches so that wind can blow through.
 - Secure building by closing and boarding up each window of your home. Remove outside antennas.
 - Moor boat securely or move it to a designated safe place. Use rope or chain to secure boat to trailer. Use tie-downs to anchor trailer to the ground or house.
- Fill your car's gas tank. If advised to evacuate, you may have to travel long distances or be caught in traffic, idling for long periods of time. Gas stations along the route may be closed.
- Stock up on prescription medications. Stores and pharmacies may be closed after the storm.
- Recheck manufactured home tie-downs. Manufactured homes may not be as affected by strong winds if they are tied down according to the manufacturer's instructions. Properly tied down homes are more likely to stay fixed to their foundations.
- Check your Disaster Supplies Kit. Some supplies may need to be replaced or restocked.

- Turn refrigerator and freezer to coldest setting. Open only when absolutely necessary and close quickly. Keeping the coldest air in will help perishables last much longer in the event of a power failure.
- Store valuables and personal papers in a safety deposit box in a waterproof container on the highest level of your home. Hurricanes leave much water damage inside homes. Historically, it is shown that protecting valuables in this manner will provide the best security.
- Turn off utilities if told to do so by authorities. Authorities may ask you to turn off water or electric utilities to prevent damage to your home or within the community. Most of the time they will tell you to leave the gas on because a professional is required to turn your gas back on, and it may be several weeks before you receive service.
- Turn off propane tanks. Propane tanks may be damaged or dislodged by strong winds or water. Turning them off reduces the fire potential if they are damaged by the storm.
- Unplug small appliances. Small appliances may be affected by electrical power surges that may occur as the storm approaches. Unplugging them reduces potential damage.
- Review evacuation plan. Make sure your planned route is the same as the currently recommended route. Sometimes roads may be closed or blocked, requiring a different route.
- Stay away from flood waters. If you come upon a flooded road, turn around and go another way. When you are caught on a flooded road and waters are rising rapidly around you, if you can do so safely, get out of your vehicle and climb to higher ground. Most hurricane-related deaths are caused by floods, and most flood fatalities are caused by people attempting to drive through water. The depth of water is not always obvious. The roadbed may be washed out under the water, and you could be stranded or trapped. Rapidly rising water may stall the engine, engulf the vehicle and its occupants, and sweep them away. Two feet of water will carry away most automobiles.

What to Do During a Hurricane WARNING

- Listen to a NOAA Weather Radio, or portable, battery-powered radio or television for updated information and official instructions. Hurricanes can change direction, intensity, and speed very suddenly. Continue listening for local information.
- If officials announce a hurricane warning, they may ask you to leave your home as soon as possible to be safe. Take your Disaster Supplies Kit and go to a shelter or your family contact's home. Call your check-in contact so someone will know where

you are going. Local officials advise leaving only if they truly believe your location is in danger. It is important to follow their instructions as soon as possible. Roads may become blocked and the storm can worsen, preventing safe escape. Having your disaster supplies will make you more comfortable while you are away from home.

- If you are not advised to evacuate, stay indoors, on the first floor away from windows, skylights and glass doors, even if they are covered. Stay on the floor least likely to be affected by strong winds and flood waters. A small interior room without windows on the first floor is usually the safest place. Have as many walls between you and the outside winds as possible. Sometimes strong winds and projectiles may tear hurricane shutters off, so stay away from windows even if they are covered. Lie on the floor under a table or other sturdy object. Being under a sturdy object will offer greater protection from falling objects.
- Close all interior doors. Secure and brace external doors. Closed doors will help prevent damaging hurricane winds from entering additional rooms.
- Have a supply of flashlights and extra batteries handy. Avoid using open flames (candles and kerosene lamps) as a source of light. Flashlights provide the safest emergency lighting source. Between 1984 and 1998, candle-related deaths from home fires following hurricanes were three times greater than the number of deaths related to the direct impact of the hurricane. Kerosene lamps require a great deal of ventilation and are not designed for indoor use.
- Store drinking water in clean bathtubs, sinks, plastic bottles, and cooking utensils. Public water supplies and wells may become contaminated, or electric pumps may be inoperative if power is lost. Survivors of community-wide disasters have said the individual's greatest need following the disaster is water.
- If power is lost, turn off major appliances to reduce the power "surge" when electricity is restored. When electricity is restored, the surge from many major appliances starting at the same time may cause damage or destroy the appliances. Turning off or unplugging major appliances will allow you to decide when it is best to turn them back on.
- If in a mobile home, check tie-downs and evacuate immediately. Historically, manufactured homes suffer the greatest amount of damage during hurricanes. Prior to 1994, most manufactured homes were not designed to withstand even moderate winds.
- Be aware that the calm "eye" is deceptive; the storm is not over. The worst part of the storm will happen once the eye passes over and the winds blow from the opposite direction. Trees, shrubs,

buildings, and other objects damaged by the first winds can be broken or destroyed by the second winds. The opposing winds begin suddenly, and have surprised and injured many people who ventured out during the eye.

- Watch out for flooding. Hurricanes and tropical storms often drop large amounts of rainfall and cause severe flooding, even when they are weakening or are no longer a named storm. “Weak” tropical storms are just as capable of producing heavy rainfall and flooding as major hurricanes.
- Be alert for tornadoes. Tornadoes can happen during and after a hurricane passes over. Remain indoors on a lower level, in the center of your home, in a closet or bathroom without windows. Going below ground, such as to a basement or storm cellar, increases your risk from flood.

What to Do if Evacuation Is Necessary

- Leave as soon as possible (if possible, in daylight). Avoid flooded roads and watch for washed-out bridges. Roads and bridges frequently become crowded and traffic moves slow. Evacuation will probably take longer than expected. Give yourself plenty of time.
- Secure your home by unplugging appliances and turning off electricity and the main water valve. This will reduce potential damage to your appliances (from power surges) and to your home.
- Tell someone outside of the storm area where you are going. Relatives and friends will be concerned about your safety. Letting someone know your travel plans will help relieve their fear and anxiety.
- If time permits, and you live in an identified surge zone or area prone to flooding, move furniture to a higher floor. Moving valuable furnishings helps reduce potential damage.
- Bring preassembled emergency supplies and warm protective clothing. People frequently arrive at shelters or hotels with nothing. Having these items will make you more comfortable in other locations.
- While shelters provide a safe place to stay and food, specialty items for infants and individuals on restricted diets may not be available. It may take several days until permission is given by local authorities to re-enter an evacuated area. Bring these items with you to a shelter:
 - First aid kit, manual, and prescription medications.
 - Baby food and diapers.
 - Cards, games, books.
 - Toiletries.

- Battery-powered radio and extra batteries.
 - Flashlight (one per person) and extra batteries.
 - Blankets or sleeping bags.
 - Identification.
 - Valuable papers (copies of insurance papers, passports, and other essential documents).
- Lock up your home and leave. There may be individuals evacuating after you, or returning before you. Police may be busy with hurricane-related emergencies and not able to patrol neighborhoods as usual. Lock your property as you normally would when leaving home.

What to Do After a Hurricane

- Continue listening to local radio or television stations or a NOAA Weather Radio for information and instructions. Access may be limited to some parts of the community, or roads may be blocked.
- If you evacuated, return home when local officials tell you it is safe. Local officials on the scene are your best source of information on accessible areas and passable roads.
- Stay alert for extended rainfall and subsequent flooding, even after the hurricane or tropical storm has weakened. Hurricanes may stall or change direction when they make landfall, or they may bring a lot of rain upriver, causing additional flood hazards for hours or days after the storm.
- Stay away from flood waters. Drive only if absolutely necessary and avoid flooded roads and washed-out bridges. Continue to follow all flood safety messages. Flood waters may last for days following a hurricane. If you come upon a flooded road, turn around and go another way. When you are caught on a flooded road and waters are rising rapidly around you, if you can safely get out of the car, do so immediately and climb to higher ground. Never try to walk, swim, or drive through such swift water. Most flood fatalities are caused by people attempting to drive through water or people playing in high water. If it is moving swiftly, even water six inches deep can sweep you off your feet, and two feet can carry away most automobiles.
- If you come upon a barricade, follow detour signs or turn around and go another way. Barricades are put up by local officials to protect people from unsafe roads. Driving around them can be a serious risk.
- Stay on firm ground. Moving water only six inches deep can sweep you off your feet. Standing water may be electrically charged from

underground or downed power lines.

- Help injured or trapped persons. Give first aid where appropriate. Do not move seriously injured persons unless they are in immediate danger of further injury. Call for help.
- Help a neighbor who may require special assistance — infants, elderly people and people with disabilities. Elderly people and people with disabilities may require additional assistance. People who care for them or who have large families may need additional assistance in emergency situations.
- Avoid disaster areas. Your presence might hamper rescue and other emergency operations, and put you at further risk from the residual effects of floods, such as contaminated waters, crumbled roads, landslides, mudflows, and other hazards.
- Avoid loose or dangling power lines; immediately report them to the power company, police, or fire department. Reporting potential hazards will get the utilities turned off as quickly as possible, preventing further hazard and injury.
- Electrical equipment should be checked and dried before being returned to service. Call an electrician for advice before using electricity, which may have received water damage.
- Stay out of the building if water remains around the building. Flood waters often undermine foundations, causing buildings to sink, floors to crack, or walls to collapse.
- When entering buildings, use extreme caution. Hurricane-driven flood waters may have damaged buildings where you least expect it. Carefully watch every step you take.
 - Wear sturdy shoes. The most common injury following a disaster is cut feet.
 - Use battery-powered lanterns or flashlights when examining buildings. Battery-powered lighting is the safest and easiest, preventing fire hazard for the user, occupants, and building.
 - Examine walls, floors, doors, staircases, and windows to make sure that the building is not in danger of collapsing.
 - Inspect foundations for cracks or other damage. Cracks and damage to a foundation can render a building uninhabitable.
 - Look for fire hazards. There may be broken or leaking gas lines, flooded electrical circuits, or submerged furnaces or electrical appliances. Flammable or explosive materials may come from upstream. Fire is the most frequent hazard following floods.
 - Check for gas leaks. If you smell gas or hear a blowing or hissing

noise, open a window and quickly leave the building. Turn off the gas, using the outside main valve if you can, and call the gas company from a neighbor's home. If you turn off the gas for any reason, it must be turned back on by a professional.

- Look for electrical system damage. If you see sparks or broken or frayed wires, or if you smell burning insulation, turn off the electricity at the main fuse box or circuit breaker. If you have to step in water to get to the fuse box or circuit breaker, call an electrician first for advice. Electrical equipment should be checked and dried before being returned to service.
 - Check for sewage and water line damage. If you suspect sewage lines are damaged, avoid using the toilets and call a plumber. If water pipes are damaged, contact the water company, and avoid using water from the tap. You can obtain safe water from undamaged water heaters or by melting ice cubes.
 - Watch out for animals, especially poisonous snakes, that may have come into buildings with the flood waters. Use a stick to poke through debris. Flood waters flush many animals and snakes out of their homes.
 - Watch for loose plaster, drywall, and ceilings that could fall.
 - Take pictures of the damage, both of the building and its contents, for insurance claims.
- Open windows and doors to ventilate and dry your home.
 - Check refrigerated food for spoilage. If power was lost, some foods may be spoiled.
 - Avoid drinking or preparing food with tap water until you are certain it is not contaminated. Hurricane-driven flood waters may have contaminated public water supplies or wells. Local officials should advise you on the safety of the drinking water. Undamaged water heaters or melted ice cubes can provide good sources of fresh drinking water.
 - Pump out flooded basements gradually (about one-third of the water per day) to avoid structural damage. If the water is pumped out completely in a short period of time, pressure from water on the outside could cause basement walls to collapse.
 - Service damaged septic tanks, cesspools, pits, and leaching systems as soon as possible. Damaged sewage systems are health hazards.
 - Use the telephone only for emergency calls. Telephone lines are frequently overwhelmed in disaster situations. They need to be clear for emergency calls to get through.