

Floods - How to keep you and your family safe.

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. As much as 90 percent of the damage related to all natural disasters (excluding droughts) is caused by floods and associated debris flows. Most communities in the United States can experience some kind of flooding. Over the 10-year period from 1988 to 1997, **floods cost the Nation, on average, \$3.7 billion annually.** The long-term (1940 to 1999) annual average of lives lost is 110 per year, mostly as a result of flash floods.

What Causes Floods?

Flooding occurs in known floodplains when prolonged rainfall over several days, intense rainfall over a short period of time, or an ice or debris jam causes a river or stream to overflow and flood the surrounding area. Melting snow can combine with rain in the winter and early spring; severe thunderstorms can bring heavy rain in the spring and summer; or tropical cyclones can bring intense rainfall to the coastal and inland states in the summer and fall.

Flash floods occur within six hours of a rain event, or after a dam or levee failure, or following a sudden release of water held by an ice or debris jam, and flash floods can catch people unprepared. You will not always have a warning that these deadly, sudden floods are coming. So if you live in areas prone to flash floods, plan now to protect your family and property.

As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. **Urbanization increases runoff two to six times over what would occur on natural terrain.** During periods of urban flooding, streets can become swift moving rivers, while basements and viaducts can become death traps as they fill with water.

Several factors contribute to flooding. **Two key elements are rainfall intensity and duration.** Intensity is the rate of rainfall, and duration is how long the rain lasts. Topography, soil conditions, and ground cover also play important roles. **Most flash flooding is caused by slow-moving thunderstorms, thunderstorms repeatedly moving over the same area, or heavy rains from hurricanes and tropical storms.** Floods, on the other hand, can be slow- or fast-rising, but generally develop over a period of hours or days.

Learn about flooding and flash flooding in your area by contacting the local emergency management office, [National Weather Service \(NWS\)](#) office, your [American Red Cross chapter](#), or your planning and zoning department. If you are at risk, take steps to reduce damage and the risk of injury or loss to your family.

Awareness Information

Know the difference between WATCHES and WARNINGS.

- A National Weather Service (NWS) 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.

Many more WATCHES are issued than WARNINGS. A WATCH is the first sign a flood may occur, and when one is issued, you should be aware of potential flood hazards.

Be aware of flood hazards. Floods can roll boulders, tear out trees, destroy buildings and bridges, and scour out new channels. Flood waters can reach heights of 10 to 20 feet and often carry a deadly cargo of debris. Flood-producing rains can also trigger catastrophic debris slides.

Regardless of how a flood or flash flood occurs, the rule for being safe is simple: **head for higher ground and stay away from flood waters.** Even a shallow depth of fast-moving flood water produces more force than most people imagine. The most dangerous thing you can do is to try walking, swimming, or driving through flood waters. Two feet of water will carry away most automobiles.

Plan for a Flood

- **Develop a Family Disaster Plan.** Please see the "[Family Disaster Plan](#)" section for general family planning information. Develop flood- specific planning. **Learn about your area's flood risk and elevation above flood stage.**
- Contact your local Red Cross chapter, emergency management office, local National Weather Service office, or planning and zoning department about your area's flood risk.
- 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 floods:

- **Talk to your insurance agent.** Homeowners' policies do not cover flooding. Ask about the [National Flood Insurance Program \(NFIP\)](#).
- **Use a NOAA Weather Radio with a tone-alert feature, or a portable, battery-powered radio (or television) for updated emergency information.**

- **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.
- **Discuss floods with your family.** Everyone should know what to do in case all family members are not together. Discussing floods ahead of time helps reduce fear and anxiety and lets everyone know how to respond.

What to Tell Children

- **If you come upon flood waters, stop, turn around, and go another way. Climb to higher ground.** If it is moving swiftly, even water six inches deep can knock you off your feet. Many people are swept away wading through flood waters, resulting in injury or death.
- **Stay away from flooded areas.** Even if it seems safe, flood waters may still be rising.
- **Never try to walk, swim, drive, or play in flood water.** You may not be able to see on the surface how fast flood water is moving or see holes and submerged debris.
- **If you are in a vehicle and become surrounded by water, if you can get out safely, do so immediately and move to higher ground.** Vehicles can be swept away in two feet of water.
- **Watch out for snakes in areas that were flooded.** Flood waters flush snakes from their homes.
- **Stay away from creek and stream banks in flooded and recently flooded areas.** The soaked banks often become unstable due to heavy rainfall and can suddenly give way, tossing you into rapidly moving water.
- **Never play around high water, storm drains, ditches, ravines, or culverts.** It is very easy to be swept away by fast moving water.
- **Throw away all food that has come into contact with flood waters.** Contaminated flood water contains bacteria and germs. Eating foods exposed to flood waters can make you very sick.

How to Protect Your Property

- **Keep insurance policies, documents, and other valuables in a safe-deposit box.** You may need quick, easy access to these documents. Keep them in a safe place less likely to be damaged during a flood.
- **Avoid building in a floodplain unless you elevate and reinforce your home.** Some communities do not permit building in known floodplains. If there are no restrictions, and you are building in a floodplain, take precautions, making it less likely your home will be damaged during a flood.
- **Raise your furnace, water heater, and electric panel to higher floors or the attic if they are in areas of your home that may be flooded.** Raising this equipment will prevent damage. An undamaged water heater may be your best source of fresh water after a flood.
- **Install check valves in building sewer traps to prevent flood water from backing up into the drains of your home.** As a last resort, when floods threaten, use large corks or stoppers to plug showers, tubs, or basins.

- **Construct barriers such as levees, berms, and flood walls to stop flood water from entering the building.** Permission to construct such barriers may be required by local building codes. Check local building codes and ordinances for safety requirements.
- **Seal walls in basements with waterproofing compounds to avoid seepage through cracks.**
- **Consult with a construction professional for further information if these and other damage reduction measures can be taken.** Check local building codes and ordinances for safety requirements.
- **Contact your local emergency management office for more information on mitigation options to further reduce potential flood damage.** Your local emergency management office may be able to provide additional resources and information on ways to reduce potential damage.

Assemble a Disaster Supplies Kit

Please see the section "["Disaster Supplies Kit"](#) for general supplies kit information. Flood-specific supplies should include the following:

- **Disaster Supplies Kit basics.**
- **Evacuation Supply Kit.**
- **If you live in a frequently flooded area, stockpile emergency building materials.** These include plywood, plastic sheeting, lumber, nails, hammer and saw, pry bar, sand, shovels, and sandbags.

Media and Community Education Ideas

- Have your community join the National Flood Insurance Program. Any community may join the NFIP. Check with your local emergency management office for more information.
- Publish a special section in your local newspaper with emergency information on floods and flash floods. Localize the information by printing the phone numbers of local emergency services offices, the American Red Cross chapter, and the nearest hospitals.
- Interview local officials about land use management and building codes in floodplains.
- Work with local emergency services and American Red Cross officials to prepare special reports for people with mobility impairments about what to do if an evacuation is ordered.
- Periodically inform your community of local public warning systems. Explain the difference between flood watches and warnings. Let them know where to turn for emergency broadcast information should they hear a warning on their radio or television.
- Assist hospitals and other operations that are critically affected by power failure by arranging for auxiliary power supplies.
- Contact your local National Weather Service office or emergency management agency for information on local flood warning systems. River and rainfall readings are valuable to local emergency management agencies and the NWS in assessing flood conditions and taking appropriate actions. Advanced warning provided by early detection is critical to

saving lives. Automatic flood detection systems are available commercially for flood-prone communities.

- Publish emergency evacuation routes for areas prone to flooding.

What to Do Before Flooding Occurs

- **If it has been raining hard for several hours, or steadily raining for several days, be alert to the possibility of a flood.** Floods happen as the ground becomes saturated.
- **Use a NOAA Weather Radio or a portable, battery-powered radio (or television) for updated emergency information.** Local stations provide the best advice for your particular situation.
- **Listen for distant thunder.** In some types of terrain, runoff from a faraway thunderstorm could be headed your way.
- **If you are stopping your vehicle, camp or park away from streams and washes, particularly during threatening conditions.** Flood waters can rise quickly and carry you or your belongings away.
- **When in or along stream channels, be aware of distant events, such as dam breaks or thunderstorms that may cause flash floods in the area.**

What to Do During a Flood WATCH

When a flood or flash flood WATCH is issued:

- **Listen continuously to a NOAA Weather Radio, or a portable, battery-powered radio (or television) for updated emergency information.** Local stations provide you with the best advice for your particular situation.
- **Everyone in a WATCH area should be ready to respond and act quickly.** Floods and flash floods can happen quickly and without warning. Be ready to act immediately.
- **Be alert to signs of flooding, and if you live in a flood-prone area, be ready to evacuate at a moment's notice.** Floods can happen quickly and you may need to leave with little or no notice.
- **Follow the instructions and advice of local authorities.** Local authorities are the most informed about affected areas. They will best be able to tell you areas to avoid.

If your residence is in a flood-prone area:

- **Fill bathtubs, sinks, and plastic bottles with clean water.** Water may become contaminated or service may be interrupted.
- **Bring outdoor belongings, such as patio furniture, indoors.** Unsecured items may be swept away and damaged by flood waters.
- **Move your furniture and valuables to higher floors of your home.** If flood waters affect your home, higher floors are less likely to receive damage.
- **If you are instructed by local authorities, turn off all utilities at the main power switch and close the main gas valve.** In some areas, local authorities may advise you to turn off utilities to prevent further damage to homes and the community.

- **Get your preassembled disaster supplies ready.** You may need to act quickly. Having your supplies ready will save time.
- **Fill your car's gas tank, in case an evacuation notice is issued.** If electric power is cut off, gas stations may not be able to operate pumps for several days.
- **Be prepared to evacuate.** Local officials may ask you to leave if they truly feel your home is at risk from flood waters.

What to Do During a Flood WARNING

When a flood or flash flood WARNING is issued:

- **Listen continuously to a [NOAA Weather Radio](#), or a portable, battery-powered radio (or television) for updated emergency information.** Local stations provide you with the best advice for your particular situation.
- **Be alert to signs of flooding.** A **WARNING** means a flood is imminent or is happening in the area.
- **If you live in a flood-prone area or think you are at risk, evacuate immediately.** **Move quickly to higher ground. Save yourself, not your belongings.** The most important thing is your safety.
- **Follow the instructions and advice of local authorities.** Local authorities are the most informed about affected areas. They will best be able to tell you areas to avoid.
- **If advised to evacuate, do so immediately.** Move to a safe area before access is cut off by flood water. Evacuation is much simpler and safer before flood waters become too deep for vehicles to drive through.
- **Follow recommended evacuation routes.** Shortcuts or alternate, nonrecommended routes may be blocked or damaged by flood waters.
- **Leave early enough to avoid being marooned by flooded roads.** Delaying too long may allow all escape routes to become blocked.

Flood Safety

- **Stay out of areas subject to flooding.** Dips, low spots, canyons, washes, etc., can become filled with water.
- **If outdoors, climb to high ground and stay there.** Move away from dangerous flood waters.
- **If you come upon a flowing stream where water is above your ankles, stop, turn around, and go another way.** 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.

What to Do if Your Are Driving During a Flood

- **Avoid already flooded areas, and areas subject to sudden flooding.** Do not attempt to cross flowing streams. Most flood fatalities are caused by people attempting to drive through water, or people playing in high 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. Look out for flooding at highway dips, bridges, and low areas. Two feet of water will carry away most automobiles.
- **If you are driving and come upon rapidly rising waters, turn around and find another route. Move to higher ground away from rivers, streams, creeks, and storm drains. If your route is blocked by flood waters or barricades, find another route.** Barricades are put up by local officials to protect people from unsafe roads. Driving around them can be a serious risk.
- **If your vehicle becomes surrounded by water or the engine stalls, and if you can safely get out, abandon your vehicle immediately and climb to higher ground.** Many deaths have resulted from attempts to move stalled vehicles. When a vehicle stalls in the water, the water's momentum is transferred to the car. The lateral force of a foot of water moving at 10 miles per hour is about 500 pounds on the average automobile. The greatest effect is buoyancy - for every foot that water rises up the side of a car, it displaces 1,500 pounds of the car's weight. So, two feet of water moving at 10 miles per hour will float virtually any car. Many persons have been swept away by flood waters upon leaving their vehicles, which are later found without much damage. **Use caution when abandoning your vehicle, and look for an opportunity to move away quickly and safely to higher ground.**

What to Do After a Flood or Flash Flood

- **Seek necessary medical care at the nearest hospital or clinic.** Contaminated flood waters lead to a greater possibility of infection. Severe injuries will require medical attention.
- **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.
- **Continue to listen to a NOAA Weather Radio or local radio or television stations and return home only when authorities indicate it is safe to do so.** Flood dangers do not end when the water begins to recede; there may be flood-related hazards within your community, which you could hear about from local broadcasts.
- **Stay out of any building if flood waters remain around the building.** Flood waters often undermine foundations, causing sinking, floors can crack or break and buildings can collapse.

- **Avoid entering ANY building (home, business, or other) before local officials have said it is safe to do so.** Buildings may have hidden damage that makes them unsafe. Gas leaks or electric or waterline damage can create additional problems.
- **Report broken utility lines to the appropriate authorities.** Reporting potential hazards will get the utilities turned off as quickly as possible, preventing further hazard and injury. Check with your utility company now about where broken lines should be reported.
- **Avoid smoking inside buildings.** Smoking in confined areas can cause fires.

When entering buildings, use extreme caution. Building damage may have occurred where you least expect it. Watch carefully 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 travel 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 at 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 waterline 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 snakes and many animals 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.**

After returning home:

- **Throw away food that has come in contact with flood waters.** Some canned foods may be salvageable. If the cans are dented or damaged, throw them away. Food contaminated by flood waters can cause severe infections.
- **If water is of questionable purity, boil or add bleach, and distill drinking water before using.** (See information on water treatment under the ["Disaster Supplies Kit"](#) section.) Wells inundated by flood waters should be pumped out and the water tested for purity before drinking. If in doubt, call your local public health authority. Ill health effects often occur when people drink water contaminated with bacteria and germs.
- **Pump out flooded basements gradually (about one-third of the water per day) to avoid structural damage.** If the water is pumped completely in a short period of time, pressure from water- saturated soil 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.