Severe Weather Information Sheets

- Floods and Flash Floods
- Heat Wave
- Hurricane and Tropical Storms
- Thunderstorms
- Winter Storms

Floods and Flash Floods

Learn about your flood risk. Contact your local American Red Cross chapter, emergency management office, local National Weather Service office, or planning and zoning department to find out about your area's flood risk.

AWARENESS MESSAGES

Why talk about floods?

Floods are among the most frequent and costly natural disasters according to FEMA. As much as 90 percent of the damage related to all natural disasters (excluding drought) is caused by floods and associated debris flows. . Floods, on average, kill more than 100 people and are responsible for $4.6 billion in damage in the United States each year.

Most communities in the United States can experience some kind of flooding. 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 coastal and inland states in the summer and fall.

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 more than what would occur on natural terrain. During periods of urban flooding, streets can become swiftly moving rivers, while basements and viaducts can become death traps as they fill with water.

What causes floods and flash floods?

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.

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. Floods can be slow- or fast-rising, but generally develop over a period of hours or days.

Most flash flooding is caused by slow-moving thunderstorms, thunderstorms repeatedly moving over the same area, or heavy rains from hurricanes and tropical storms. Flash floods take from several minutes to several hours to develop. Flash floods generally 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. Flash floods can occur without warning.

Floods can roll boulders, tear out trees, destroy buildings and bridges, and scour new channels. Floodwater can reach heights of 10 to 20 feet (3 to 6 meters) and often carries a deadly cargo of debris. Flood-producing rains can also trigger catastrophic debris slides.

How can I protect myself in a flood?
Regardless of how a flood occurs, the rule for being safe is simple: head for higher ground and stay away from floodwater. Even a shallow depth of fast-moving floodwater produces more force than most people imagine. It is exceedingly dangerous to try to walk, swim, or drive in floodwater. Two feet (0.6 meters) of water will carry away most vehicles, including sport utility vehicles (SUVs) and pickup trucks. You can protect yourself best by being prepared and having time to act. You can protect your home best by taking measures to reduce potential flood damage (called mitigation) and buying flood insurance in advance.

What is the best source of information in a flood situation?
Local radio or television stations or a NOAA Weather Radio are the best sources of information in a flood situation for official weather and weather-related bulletins.

NOAA Weather Radio is the prime alerting and critical information delivery system of the National Weather Service (NWS). NOAA Weather Radio broadcasts warnings, watches, forecasts, and other hazard information 24 hours a day over more than 650 stations in the 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific territories.

The NWS encourages people to buy a weather radio equipped with the Specific Area Message Encoder (SAME) feature. This feature automatically alerts you when important information about floods and other hazards is issued for your area. Information on NOAA Weather Radio is available from your local NWS office or at www.nws.noaa.gov/nwr.

Is your community StormReady? To help people prepare for the ravages of hazardous weather, the National Weather Service has designed StormReady, a program aimed at arming America's communities with the communication and safety skills necessary to save lives and property. More information is available at www.stormready.noaa.gov/.

ACTION MESSAGES
Be Prepared for a Flood
Protect Yourself

CORE ACTION MESSAGES
- Determine your risk.
- Prepare members of your household.
- Consider flood insurance.

For general preparedness, every household should create and practice a Family Disaster Plan and assemble and maintain a Disaster Supplies Kit. In addition, every household should take flood-specific precautions and plan for and practice what to do if a flood occurs.

If you are at risk from floods, you should:

- **Find out the elevation above flood stage of your home, outbuildings, and pastures or corrals.** 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.
- **Find out if local streams or rivers flood easily.**
- **Talk with members of your household about the possibility of floods and flash floods and what to do to stay safe if one occurs.** Knowing how to respond will reduce fear and save precious time in an emergency.
- **Find out about the flood evacuation routes in your area and develop a flood evacuation plan for your household.** (See chapter on "Evacuation and Sheltering, and Post-disaster Safety.") All members of the household should know where to meet each other, where to evacuate to, and what route(s) to take if they have to leave. Making plans well in advance will help you avoid last-minute confusion.
- **Find out if you are located in a floodplain,** which is considered a Special Flood Hazard Area. If you are, you are still eligible for flood insurance. Check with your city or county government (start with the Building or Planning Department) to review the Flood Insurance Rate Maps, published by the Federal Emergency Management Agency (FEMA). If your home is especially vulnerable, consider relocation.
- **Talk to your insurance agent.** Homeowners' policies do not cover flooding. Ask about the National Flood Insurance Program (NFIP) (www.fema.gov/nfip).
- **Use a NOAA Weather Radio or listen to local stations on a portable, battery-powered radio or television for updated emergency information.**
- **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.

Protect Your Property

CORE ACTION MESSAGES
- Build with flooding in mind.
- Protect important papers and equipment.

If you are at risk from floods, you should:

- **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 to make it less likely your home will be damaged during a flood.

- **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.
- **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 plumbing to prevent floodwater 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 floodwater 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 about these and other damage-reduction measures.** 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.
- **Ensure that any outbuildings, pastures, or corrals are protected in the same way as your home.** When installing or changing fence lines, consider placing them in such a way that your animals are able to move to higher ground in the event of flooding.

Sand Bags

If flooding is expected, consider using sand bags to keep water away from your home. It takes two people about one hour to fill and place 100 sandbags, giving you a wall one foot (0.3 meter) high and 20 feet (6 meters) long. Make sure you have enough sand, burlap or plastic bags, shovels, strong helpers, and time to place them properly.

Avert the Dangers of Flood and Flash Flood

CORE ACTION MESSAGES

- **Listen for and respond to watches and warnings.**
- **If advised to evacuate or if you think you are in danger, leave immediately.**
- **Prepare your home if you have time.**

Even when there are no signs of a flood, be alert to conditions that can cause floods:

- Heavy rain for several hours, or steady rain for several days, can saturate the ground and cause a flood.
- Distant thunder indicates a distant thunderstorm that could send runoff your way. Runoff can produce a deadly flash flood that appears with no warning, particularly in certain types of terrain, for example, in an arroyo or streambed.
- Other distant events, such as a dam break or the sudden unclogging of an ice jam, can cause flash floods.

Park a vehicle or set up camp away from streams and washes, particularly during threatening conditions. Floodwater can rise quickly and carry you, your vehicle, or your belongings away.

Listen for watches and warnings on NOAA Weather Radio or a local radio or television station.

Watch, Warning

A **Flood WATCH** means a flood is possible in your area.
A **Flood WARNING** means flooding is already occurring or will occur soon in your area.
A **Flash Flood WATCH** means flash flooding is possible in your area.
A **Flash Flood WARNING** means a flash flood is occurring or will occur very soon.

Watches and warnings are issued by the National Weather Service (NWS) and broadcast on NOAA Weather Radio and on local radio and television stations.

A watch is the first official alert that a flash flood or flood may occur in a specific area. People in a watch area should review their flood plans (Family Disaster Plan, Disaster Supplies Kit, evacuation routes), keep informed, and be ready to act if a warning is issued or if flooding occurs.

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What to Do Before a Flood

CORE ACTION MESSAGES
- Use NOAA Weather Radio or listen continuously to a local radio or television station.
- Be ready to evacuate immediately.
- Follow authorities' instructions.
- Save lives, not belongings.

If a flood or flash flood watch is issued for your area, you should:

- **Use a NOAA Weather Radio or listen continuously to a local station on a portable, battery-powered radio or television.**
- **Be ready to 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 and the most knowledgeable about areas you should avoid.
- **If your home is in a flood-prone area:**

  -**Fill plastic bottles with clean water for drinking.** (See Appendix: Storing Water.) Water may become contaminated or water service may be interrupted.

  -**Fill bathtubs and sinks with water for flushing the toilet or washing the floor or clothing.** Adults can use this water for bathing, but young children should not bathe in water that has been stored in glazed tubs and sinks because over time lead can leach into the water from the glaze.

  -**Bring outdoor belongings, such as patio furniture, indoors.** Unsecured items may be swept away and damaged by floodwater.

  -**Move your furniture and valuables to higher floors of your home**. If floodwater affects your home, higher floors are less likely to be damaged.

  -**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, if you shut if off, 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.

  -**Unplug small appliances.** Small appliances may be affected by electrical power surges that may occur. Unplugging them reduces potential damage.

  -**Keep your previously assembled Disaster Supplies Kit near.** 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 conclude that your home is at risk from floodwater.

- **Consider a precautionary evacuation of your animals,** especially any large or numerous animals. Waiting until the last minute could be fatal for them and dangerous for you. Where possible, move livestock to higher ground. If you are using a horse or other trailer to evacuate your animals, move early rather than wait until it may be too late to maneuver a trailer through slow traffic.

If a flood or flash flood warning is issued for your area, you should:

- **Use a NOAA Weather Radio or listen continuously to a local station on a portable, battery-powered radio or television.**
- **Be alert to signs of flooding.** A warning means a flood is imminent or is happening in the area.
- **Bring your companion animals indoors and maintain direct control of them.** Be sure that your pet disaster kit and your family Disaster Supplies Kit are ready to go in case you need to evacuate.
- **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.
- **If advised by authorities to evacuate, do so immediately.** Move to a safe area before access is cut off by floodwater. Evacuation is much simpler and safer before floodwater becomes too deep for vehicles to drive through.
- **Follow the instructions and advice of local authorities.** Local authorities are the most informed about affected areas and the most knowledgeable about areas you should avoid.
- **Follow recommended evacuation routes.** Shortcuts or alternative, non-recommended routes may be blocked or damaged by floodwater.
- **Leave early enough to avoid being marooned by flooded roads.** Delaying too long may allow all escape routes to become blocked.
- **If you evacuate, take your animals with you.** If it is not safe for you, it is not safe for your animals.

What to Do During a Flood or Flash Flood

CORE ACTION MESSAGES
- Climb to high ground.
- Get away from standing, flowing, or rising water.

If you are outdoors, you should:

- **Stay out of areas subject to flooding.** Dips, low spots, canyons, washes, etc. can become filled with water.
- **Climb to high ground and stay there.** Move away from dangerous floodwater.
- **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 swift water. Many 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 (15 centimeters) deep can sweep you off your feet.

If you are driving, you should:

- **Avoid already flooded areas, and areas subject to sudden flooding.** Do not attempt to cross flowing streams or water covered roads. As little as six inches of water may cause you to lose control of your vehicle. The National Weather Service reports that nearly half of all flood fatalities are vehicle related. The depth of water is not always obvious. The roadbed may be washed out under the water, and you could be stranded or trapped. Also, standing water may be electrically charged from underground or downed power lines. 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 (0.6 meters) of water will carry away most vehicles, including SUVs and pickup trucks.
- **Stay away from underpasses.** Underpasses can fill rapidly with water, while the adjacent roadway remains clear. Driving into an underpass can quickly put you in five to six feet (1.5 to 1.8 meters) of water.
- **Turn around and find another route if you come upon rapidly rising water.** Move to higher ground away from rivers, streams, creeks, and storm drains. If your route is blocked by floodwater 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.

What to Do After a Flood or Flash Flood

CORE ACTION MESSAGES
- Help yourself, then help others.
- Stay away from damaged areas.

- **Get medical care at the nearest hospital or clinic, if necessary.** Contaminated floodwater can cause infection. Severe injuries will require medical attention.
- **Help people who require special assistance**—infants, elderly people, those without transportation, large families who may need additional help in an emergency situation, people with disabilities, and the people who care for them.
- **Stay away from damaged 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 water, crumbled roads, landslides, mudflows, and other hazards.
- **Continue to listen to NOAA Weather Radio or a local radio or television station 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 floodwater remains around the building.** Floodwater often undermines 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 damage to electric lines or water lines 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.
- **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 long pants, a long-sleeved shirt, and sturdy shoes.** The most common injury following a disaster is cut feet.
- **Use battery-powered lanterns or flashlights when examining buildings**. DO NOT USE CANDLES.
- **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 have traveled 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 get everyone outside quickly. 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 damage to sewage and water lines.** 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 that were made before the pipes were damaged. Turn off the main water valve before draining water from these sources.
- **Watch out for wild animals, especially poisonous snakes, that may have come into buildings with the floodwater.** Use a stick to poke through debris. Floodwater flushes 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.
- **Watch your animals closely.** Keep all your animals under your direct control. Hazardous materials abound in flooded areas. Your pets may be able to escape from your home or through a broken fence. Pets may become disoriented, particularly because flooding usually affects scent markers that normally allow them to find their homes. The behavior of pets may change dramatically after any disruption, becoming aggressive or defensive, so be aware of their well-being and take measures to protect them from hazards, including displaced wild animals, and to ensure the safety of other people and animals.

After returning home, you should:

- **Throw away food and drinking water that has come in contact with floodwater, including canned goods.** It is impossible to know if containers were damaged and the seals compromised. Food contaminated by floodwater can cause severe infections.
- Discard wooden spoons, plastic utensils, and baby bottle nipples and pacifiers if they have been covered by floodwater. There is no way to safely clean them.
- Disinfect metal pans and utensils by boiling them in clean or properly treated water.
- **If water is of questionable purity, boil the water or add bleach to it, and then distill the water if you will be drinking it.** (See Appendix: Drinking Water Safety.) Wells inundated by floodwater 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.
- **Avoid drinking or preparing food with tap water until you are certain it is not contaminated.** Floodwater may have contaminated public water supplies or wells. Local officials should advise you on the safety of the 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-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.

For information on **portable-generator safety** and **carbon monoxide poisoning,** see Appendix: Portable Generators.

Media and Community Education Ideas

- Have your community join the National Flood Insurance Program (NFIP). Any community may join the NFIP. Check with your local emergency management office for more information.
- Ask your local newspaper or radio or television station to:
  - -Do a series on the dangers of floods and flash floods.
  - -Do a story featuring interviews with local officials about land use management and building codes in floodplains.
  - -Highlight the importance of staying informed about local weather conditions.
  - -Run public service ads about how to protect lives and property in a flood.

  Help the reporters to localize the information by providing them with the local emergency telephone number for the fire, police, and emergency medical services departments (usually 9-1-1) and emergency numbers for the local utilities and hospitals. Also provide the business telephone numbers for the local emergency management office and local American Red Cross chapter.
- Work with officials of the local fire, police, and emergency medical services departments; utilities; hospitals; emergency management office; and American Red Cross chapter to prepare and disseminate guidelines for people with mobility impairments about what to do if they have to evacuate.
- Periodically inform your community of local public warning systems. Explain the difference between flood watches and warnings.
- Help hospitals and other operations that are critically affected by power failures to obtain auxiliary power supplies.
- Contact your local National Weather Service (NWS) office or emergency management agency for information on local flood warning systems. 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.

Facts and Fiction

Fiction: A 100-year flood occurs only once every 100 years.
Facts: The 100-year flood is a climatic average; the same area could experience, for example, two 100-year floods in the same year. There is a 1% chance that a 100-year flood will occur in any given year.

Fiction: Flash floods occur mainly in the eastern United States.
Facts: Flash floods occur in all 50 states, including Alaska and Hawaii.

Fiction: Flash floods occur only along flowing streams.
Facts: Flash floods can occur in dry arroyos and in urban areas where no streams are present.

Fiction: Flash floods occur mainly in the late afternoon and evening.
Facts: Flash floods occur at any time.

Fiction: Homeowners' insurance policies cover flooding.

Facts: Unfortunately, many homeowners do not find out until it is too late that their homeowners' policies do not cover flooding. Contact your insurance company or agent to buy flood insurance. It takes 30 days for flood insurance to take effect.

Fiction: You cannot buy flood insurance if your property has been flooded.
Facts: You are still eligible to purchase flood insurance after your home, apartment, or business has been flooded, provided your community participates in the National Flood Insurance Program (NFIP). Any community may join the NFIP. Check with your local emergency management office for more information.

Fiction: Larger vehicles, such as SUVs and pickup trucks, are safe to drive through floodwater.
Facts: Two feet (0.6 meters) of rushing water can carry away most vehicles, including SUVs and pickup trucks.

Fiction: Water stored in bathtubs and sinks is a good source of drinking water if flooding interrupts or contaminates the public water supply.
Facts: Over time, lead can leach from the glaze in bathtubs and sinks into water stored in them. Water stored in bathtubs and sinks should never be used for drinking or for bathing young children. You can use water stored in bathtubs and sinks for tasks such as flushing the toilet or washing the floor or clothing.

Heat (Heat Wave)

Learn what heat hazards may occur where you are and how to plan for excessive heat should it occur in your area. Different areas have different risks associated with prolonged heat. Contact your local emergency management office, National Weather Service office, or American Red Cross chapter for information.

(Review acknowledgment: The Environmental Protection Agency, Office of Atmospheric Programs, Global Programs Division, Global Change Information Branch, reviewed this chapter, in addition to the agencies listed in the acknowledgments and on the cover of *Talking About Disaster: Guide for Standard Messages*.)

AWARENESS INFORMATION

Why talk about excessive heat?

In recent years, excessive heat has caused more deaths than all other weather events, including floods. The American Meteorological Society reports that on average heat kills more than 1,000 people each year. During the July 1995 heat wave in Chicago, approximately 525 people died over a 5-day period. Thousands of people were taken to local hospitals as a result of excessive heat.

What is a heat wave?

A heat wave is a prolonged period of excessive heat, often combined with excessive humidity. Generally, excessive heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region during summer months, last for a prolonged period of time, and often are accompanied by high humidity.

What is the heat index?

The heat index is the temperature the body feels when the effects of heat and humidity are combined. Exposure to direct sunlight can increase the heat index by up to 15°F.

What are heat cramps, heat exhaustion, heatstroke, and sunstroke?

Heat cramps are muscular pains and spasms caused by heavy exertion in high heat. Heat cramps are often the first sign that the body is having trouble with the heat.

Heat exhaustion typically involves the loss of body fluids through heavy sweating when someone strenuously exercises or works in high heat and humidity. In someone suffering from heat exhaustion, blood flow to the skin increases while blood flow to vital organs decreases, resulting in a mild form of shock. If not treated, body temperature will continue to rise and the person may suffer heatstroke.

Heatstroke (also known as sunstroke) is a life-threatening condition in which a person's temperature control system, which produces sweating to cool the body, stops working. The body temperature of someone suffering from heatstroke can rise so high that brain damage and death may result if the body is not cooled quickly.

How can I protect myself in a heat wave?
The best ways to be protected from the ill effects of excessive heat are to dress appropriately, stay indoors, refrain from strenuous work or exercise during the hottest part of the day, and stay hydrated. Spending at least two hours a day in air conditioning significantly decreases a person's risk of heat-related illnesses.

Heat can kill by pushing the human body beyond its limits. Under normal conditions, the body's internal thermostat produces perspiration that evaporates and cools the body. However, in excessive heat and high humidity, evaporation is slowed and the body must work extra hard to maintain a normal temperature.

Elderly people, young children, and those who are sick or overweight are more likely to become victims of excessive heat. Because men sweat more than women do, they become more quickly dehydrated and are more susceptible to heat illness.

The duration of excessive heat plays an important role in how people are affected by a heat wave. Studies have shown a significant rise in heat-related illnesses when excessive heat lasts more than two days.

People living in urban areas may be at greater risk from the effects of a prolonged heat wave than are people living in rural regions. An increased health problem, especially for those with respiratory difficulties, can occur when stagnant atmospheric conditions trap pollutants in urban areas, thus adding unhealthy air to excessively hot temperatures. In addition, asphalt and concrete store heat longer and gradually release heat, resulting in significantly higher temperatures, especially at night—an occurrence known as the "urban heat island effect."

Pets, horses, and livestock are also susceptible to difficulties from excessive heat. Animals do not perspire and rely on panting, wetting down, shade, cool earth, and drinking water for cooling. Animals cannot explain their needs, so it is up to people to take extra care that during heat waves, their needs are met.

What is the best source of information in a heat wave?
Local radio, television stations, and NOAA Weather Radio are the best sources of information in a heat wave.

NOAA Weather Radio is the prime alerting and critical information delivery system of the National Weather Service (NWS). NOAA Weather Radio broadcasts warnings, watches, forecasts, and other hazard information 24 hours a day over more than 650 stations in the 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific territories.

The NWS encourages people to buy a weather radio equipped with the Specific Area Message Encoder (SAME) feature. This feature automatically alerts you when important excessive heat information is issued for your area. Information on NOAA Weather Radio is available from your local NWS office or at www.nws.noaa.gov/nwr.

Watch, Warning, Advisory
The National Weather Service issues alerts for excessive heat on a county-by-county basis. **The alerts are broadcast on NOAA Weather Radio and on local radio and television stations.** The parameters of an excessive heat watch, warning, and advisory vary by location. Generally:

- **Excessive Heat WATCH** means conditions are favorable for an event to meet or exceed local excessive heat warning criteria in the next 12 to 48 hours. .
- **Excessive Heat WARNING** means that heat values are forecast to meet or exceed locally defined warning criteria for at least two days.
- **Excessive Heat ADVISORY** means hazardous heat conditions have begun or will begin within 36 hours and, if caution is not exercised, they could become life threatening.

ACTION MESSAGES
Be Prepared for a Heat Wave
Protect Yourself

Core Action Messages

- Learn the risks.
- Prepare members of your household.
- Plan how to get relief from and avoid the dangerous effects of excessive heat.

For general preparedness, every household should create and practice a Family Disaster Plan and assemble and maintain a Disaster Supplies Kit. In addition, households at risk from heat waves should take precautions to stay safe in case one occurs. Review your Family Disaster Plan before summer heat is expected and be sure to stock additional water.

If you are at risk from excessive heat, you should:

- **Discuss with members of your household the precautions they should take to stay safe in excessive heat.** Everyone should know what to do in the places where they spend time. Some places may not be air conditioned or safe during a heat wave, so plan alternatives.

- **If your home does not have air conditioning, choose other places you could go to get relief from the heat during the warmest part of the day.** Schools, libraries, theaters, and other community facilities often provide air-conditioned refuge on the hottest days. See if your area designates cooling centers. Air conditioning provides the safest escape from excessive heat. During the 1995 Midwest heat wave, most deaths happened to people who were not in air conditioned places.

- **Plan how you can change daily activities to avoid strenuous work during the warmest part of the day.** Ill effects of heat can quickly overcome the healthiest people, if they perform strenuous work during the warmest parts of the day. Symptoms of dehydration are not easily recognized and are often confused with symptoms of other conditions. Dehydration occurs fast and makes you ill very quickly.
- **Discuss with a physician any concerns about members of the household who are taking medications or have medical conditions that may cause poor blood circulation or reduced ability to tolerate heat.** A physician can advise you about temporary changes to medication or other activities that can relieve the effects of heat.
- **Plan to check on family, friends, and neighbors who do not have air conditioning or who spend much of their time alone.** Elderly persons who live alone or with a working relative might need assistance on hot days. The majority of people who died because of the 1995 Midwest heat wave were persons who were alone.
- **Plan to wear lightweight, light-colored clothing.** Light colors will reflect away the sun's rays more than dark colors, which absorb the sun's rays.
- **Get training.** Take an American Red Cross first aid course to learn how to treat heat emergencies and other emergencies. Everyone should know how to respond, because the effects of heat can happen very quickly.
- **Ensure that your animals' needs for water and shade are met.** Bring companion animals into cooler areas.

What to Do During a Heat Wave

CORE ACTION MESSAGES
- Never leave a child or pet alone in a vehicle.
- Take it easy and stay indoors in excessive heat.
- Drink plenty of water and eat lightly.

During a heat wave, you should:

- **Listen to NOAA Weather Radio or local radio or television stations for up-to-date information.**
- **Never leave children or pets alone in closed vehicles.** Temperatures inside a closed vehicle can reach more than 140°F (60° C) within minutes. Exposure to such high temperatures can kill in minutes. Even on days that feel pleasantly warm outside, temperatures in a closed vehicle can raise high enough to kill children and pets.
- **Slow down. Avoid strenuous activity.** Reduce, eliminate, or reschedule strenuous activities. High-risk individuals should stay in cool places. Get plenty of rest to allow your natural "cooling system" to work. If you must do strenuous activity, do it during the coolest part of the day, which is usually in the early morning. Many heat emergencies are experienced by people exercising or working during the hottest part of the day.
- **Take frequent breaks if you must work outdoors.** Frequent breaks, especially in a cool area, can help people tolerate heat better.
- **Use a buddy system when working in excessive heat.** Partners can keep an eye on each other and can assist each other when needed. Sometimes exposure to heat can cloud judgment, and, if you work alone, you may not notice this.
- **Watch for signs of heat exhaustion and heatstroke. (**See Appendix: How to Recognize and Treat Heat Exhaustion and Heatstroke.)

- **Avoid too much sunshine.** Sunburn slows the skin's ability to cool itself. The sun will also heat the inner core of your body, resulting in dehydration. Use a sunscreen lotion with a high sun-protection factor (SPF) rating.
- **Postpone outdoor games and activities.** Excessive heat can threaten the health of athletes, staff, and spectators of outdoor games and activities.
- **Avoid extreme temperature changes.** A cold or even a cool shower taken immediately after coming indoors from hot temperatures can result in hypothermia, particularly for elderly and very young people.
- **Stay indoors as much as possible.** If air conditioning is not available, stay on the lowest floor, out of the sunshine. Even in the warmest weather, staying indoors, out of sunshine, is safer than long periods of exposure to the sun.
- **Keep heat outside and cool air inside.** Close any registers that may allow heat inside. Install temporary reflectors, such as aluminum foil-covered cardboard, in windows and skylights to reflect heat back outside.
- **Conserve electricity not needed to keep you cool.** During periods of excessive heat, people tend to use a lot more power for air conditioning. Conserve electricity not used to keep you cool so power can remain available and reduce the chance of a community-wide outage.
- **Vacuum air conditioner filters weekly during periods of high use.** Air conditioner filters can become clogged or filled with dirt, making them less efficient. Keeping them clean will allow your air conditioner to provide more cool air.
- **If your home does not have air conditioning, go to a public building with air conditioning each day for several hours.** Air conditioned locations are the safest places during excessive heat because electric fans do not cool the air. Fans do help sweat evaporate, which gives a cooling effect. However, when temperatures exceed 90° F (32° C), fans become ineffective in reducing heat-related illness.
- **Dress appropriately:**
  -Wear loose-fitting, lightweight, light-colored clothing that will cover as much skin as possible. Lightweight, light-colored clothing reflects heat and sunlight and helps maintain normal body temperature. Cover as much skin as possible to avoid sunburn and the over-warming effects of sunlight on your body.
  -Protect your face and head by wearing a wide-brimmed hat. A hat will keep direct sunlight off your head and face. Sunlight can burn and warm the inner core of your body.
- **Drink plenty of fluids even if you do not feel thirsty.** Drink regularly and often. Your body needs water to keep cool. Water is the safest liquid to drink during heat emergencies. Injury and death can occur from dehydration, which can happen quickly and be unnoticed until too late. Symptoms of dehydration are often confused with symptoms of other conditions.
- **People who have epilepsy or heart, kidney, or liver disease; who are on fluid-restricted diets; or who have a problem with fluid retention should consult a doctor before increasing liquid intake.**
- **Avoid drinks with alcohol or caffeine.** They can make you feel good for a little while, but they dehydrate the body.
- **Eat small meals and eat more often.** Large, heavy meals are more difficult to digest and cause your body to increase internal heat to aid digestion, worsening overall conditions. Avoid foods that are high in protein, such as meats and nuts, which increase metabolic heat.

- **Avoid using salt tablets unless directed to do so by a physician.** Salt causes the body to retain fluids, resulting in swelling. Salt impedes sweating, which helps keep you cool.
- **Check on your animals frequently** to ensure that they are not suffering stress from the heat. Make sure they are indoors or in the shade. Use fans to cool areas that are not air conditioned or open to breezes. Provide plenty of water for drinking as well as for cooling the animals. If you see signs of heat stress, call your veterinarian. Very young and older animals, as well as animals with short snouts, are more susceptible to problems with heat.

How to Make Your Home Safer for Occupants in a Heat Wave

CORE ACTION MESSAGE
- Keep heat out of your home and cooler air in.

To make your home safer during a heat wave, you should:

- **Install window air conditioners snugly.** Insulate spaces around air conditioners for a tighter fit. An air conditioner with a tight fit around the windows or wall openings will make less noise and allow less hot air in from the outside.
- **Make sure your home is properly insulated.** This will help you to conserve electricity and reduce your home's power demands for air conditioning. Put weather stripping around doors and windows to keep cool air inside.
- **Consider keeping storm windows installed throughout the year.** Storm windows can keep the heat out of a house in the summer the same way they keep the cold out in the winter.
- **Check air-conditioning ducts for proper insulation.** Insulation around ducts prevents cool air from leaking and keeps it directed through the vents.
- **Protect windows from the sun.** Hang shades, draperies, awnings, or louvers on windows receiving morning or afternoon sun. Outdoor awnings or louvers can reduce the heat entering the house by as much as 80 percent.
- **Use an attic fan.** If you have a fan installed to vent warm air out of your attic, use it to help keep your home cool.
- **Check buildings that house animals.**

How to Recognize and Treat Heat Exhaustion and Heatstroke

CORE ACTION MESSAGE

- **Cool down the body as quickly as possible.**

Heatstroke

The signs of heatstroke in a person are hot, red skin; changes in consciousness; rapid, weak pulse; and rapid, shallow breathing. A person experiencing heatstroke can have a very high body temperature—sometimes as high as 105°F (41° C). If the person was sweating from heavy work or exercise, the skin may be wet; otherwise, it will feel dry.

Heatstroke is a life-threatening situation. If you suspect someone is suffering from heatstroke, call 9-1-1 or your local emergency number immediately. Move the person to a cooler place. Quickly cool the person's body— immerse it in a cool bath or wrap it in wet sheets and fan it. Watch for signs of breathing problems. Keep the person lying down and continue to cool the body any way you can. If the person refuses water, is vomiting, or exhibits changes in the level of consciousness, do not give him or her anything to eat or drink.

Do not give liquids that contain alcohol or caffeine because they can cause further dehydration, making conditions worse.

Heat Exhaustion

The signs of heat exhaustion in a person are cool, moist, pale, or flushed skin; heavy sweating; headache; nausea or vomiting; dizziness; and exhaustion. A person experiencing heat exhaustion may have a normal body temperature, or it is likely to be rising.

If you suspect someone is suffering from heat exhaustion, move the person to a cooler place. Remove or loosen tight clothing and apply cool, wet cloths, such as towels or sheets dipped in water. If the person is conscious, give him or her cool water to drink. Make sure the person drinks slowly. Give a half glass of cool water every 15 minutes. Let the person rest in a comfortable position, and watch carefully for changes in his or her condition.

Do not give liquids that contain alcohol or caffeine because they can cause further dehydration, making conditions worse.

Heat Cramps

Heat cramps are muscle spasms that are caused by excessive sweating that results in a deficiency of salt. Although not as serious as heat exhaustion or heatstroke, heat cramps sometimes precede them. **If someone is suffering from heat cramps, move the person to a cooler place** and have him or her rest in a comfortable position. Lightly stretch the affected muscle and replenish fluids. Give a half glass of cool water every 15 minutes.

Do not give liquids that contain alcohol or caffeine because they can cause further dehydration, making conditions worse.

Heat Stroke in Animals

Animals are also susceptible to heat stroke, or hyperthermia, which is considered an emergency as it is with people. Signs in animals include excessive panting; increased body temperature,

heart rate, or respiratory rate; unusual salivation; collapse, stupor, seizures, or coma; redder than normal mucous membrane (gums, for example); or capillary refill that is too fast. Be aware also of signs of dehydration, which is also an emergency. For more information about first aid for cats and dogs, refer to *Pet First Aid,* by Barbara Mammato, DVM, MPH, a handbook sponsored by the American Red Cross and The Humane Society of the United States. For information about other animals, talk with your veterinarian.

If you suspect heat stroke, get the animal out of direct heat and spray it with cool water or place water-soaked towels on its head, neck, feet, chest, and abdomen. The consequences of heat stroke may be life-threatening, but might not be visible to you for several hours, so take the animal to your nearest veterinary hospital right away.

Media and Community Education Ideas

- Ask your local newspaper or radio or television station to:
  -Do a series with information about excessive heat emergencies. Help the reporters to localize the information by providing the telephone numbers of local emergency services offices, the local American Red Cross chapter, and nearby hospitals.
  -Do a story featuring interviews with local physicians about the dangers of sunburn, heat exhaustion, heatstroke, and other conditions caused by excessive heat.
  -During a drought, run a series suggesting ways individuals can conserve water and energy in their homes and their workplaces.
  -Interview local officials and representatives of the U.S. Department of Agriculture about special steps farmers can take to establish alternative water supplies for their crops and ways to protect livestock and poultry from the effects of excessive heat.
- Sponsor a "Helping Your Neighbors" program through your local school system to encourage children to think of how they can help people who require special assistance during severe weather conditions, such as elderly people, infants, or people with disabilities.
- Arrange for air-conditioned shelters to be opened when necessary for community members who do not have air conditioning at home.
- Arrange for special programs to provide air conditioners to vulnerable people in their homes.

Facts and Fiction

Fiction: Beer and other alcoholic beverages satisfy thirst in excessive heat.
Facts: Although beer and alcoholic beverages appear to satisfy thirst, they actually cause further body dehydration. You should limit your intake of alcoholic beverages in excessive heat. Drink plenty of water. Your body needs water to keep cool. Drink plenty of fluids even if you do not feel thirsty. (People who have epilepsy or heart, kidney, or liver disease; are on fluid-restricted diets; or have a problem with fluid retention should consult a physician before increasing their consumption of fluids.)

Fiction: It's always good to exercise, no matter how hot it is.
Facts: Many heat emergencies are experienced by people exercising or working during the hottest parts of the day. Reduce, eliminate, or reschedule strenuous activities. If you must do strenuous activity, do it during the coolest part of the day which is usually in the morning between 4:00 a.m. and 7:00 a.m.

Fiction: A heatstroke (sunstroke) is not life-threatening.
Facts: A heatstroke or sunstroke is life threatening. If someone has heatstroke, his or her temperature control system, which produces sweat to cool the body, stops working. The body temperature can rise so high that brain damage and death may result if the body is not cooled quickly.

Fiction: You will get sunburned only on really hot days.
Facts: Sunburn (and tanning) results from exposure to ultraviolet (UV) radiation, which is distinct from the light and heat emitted by the sun. You cannot see or feel UV rays. They can, however, be quite damaging. UV exposure has been linked to skin cancer and other skin disorders, cataracts and other eye damage, and immune-system suppression. The ozone layer absorbs most of the sun's harmful UV rays, but this layer has thinned in recent years as a result of the emission of ozone-depleting chemicals. This thinning can lead to a greater chance of overexposure to UV radiation. To protect yourself:

- Limit time in the midday sun.
- Seek shade.
- Use a broad-spectrum sunscreen of at least SPF15+ and reapply it every two hours.
- Wear a hat, protective clothing, and sunglasses.
- Watch for the UV Index (reported in local news and newspapers).

UV exposure is a year-round issue—you can sustain damage on the ski slopes just as easily as on the beach, and clouds provide only partial protection. For more information, visit http://www.epa.gov/sunwise.

Hurricanes and Tropical Storms

Learn about your community's hurricane risk. Contact your local emergency management office, National Weather Service office, or American Red Cross chapter for more information on hurricanes and how to prepare for them. Contact your local emergency management office or planning and zoning office to find out if you live in an area prone to flooding 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 floodwater. Knowing the elevation of your property will let you know if forecasted flood levels will affect your home.

AWARENESS MESSAGES

Why talk about hurricanes?

There are no other storms like hurricanes on earth. 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, on average, five hurricanes strike the United States coastline every three years. Of these five, two are major hurricanes, category 3 or higher on the Saffir-Simpson Hurricane Scale. Major hurricanes have sustained winds above 110 miles (177 kilometers) 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, we can prepare for hurricanes and alert people when a hurricane threatens. To this end, the National Oceanic and Atmospheric Administration's National Weather Service (NWS) field offices and Tropical Prediction Center cooperate 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?

Hurricanes and tropical storms are cyclones with tropical origins (tropical cyclones). Tropical storms have winds of 39 to 73 miles (63 to 117 kilometers) per hour. When these winds reach 74 miles (119 kilometers) per hour or more, the storm is called a hurricane. Hurricane winds blow in a large counterclockwise spiral around a relatively calm center known as the "eye." The eye is generally 20 to 40 miles (32 to 64 kilometers) wide and the storm may have a diameter of 300 miles (483 kilometers). A single hurricane can last more than two weeks over open waters and can run a path along the entire length of the eastern U.S. seaboard.

What hazardous conditions do hurricanes cause?

Hurricanes bring a variety of life-threatening hazards—chief among them is flooding. Most deaths due to tropical cyclones are flood related.

Hurricanes commonly cause inland flooding. Torrential rains from decaying hurricanes and tropical storms can produce extensive urban and river flooding, landslides, and mudslides in mountainous regions. Winds from these storms can drive ocean water up the mouth of coastal rivers, compounding the severity of inland flooding.

The storm surge, though, remains the greatest threat from a hurricane. A storm surge is the rise in ocean level along a coastline caused by a hurricane. It can be a dome of ocean water 20 feet (6 meters) high at its peak and 50 to 100 miles (80 to 161 kilometers) long. If a storm surge occurs near the time of high tide, the height of the water will be even greater. A storm tide is the combination of storm surge and high tide. A storm 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 in coastal communities.

Strong winds can create large areas of devastation, destroying mobile homes, tearing off roofs, and toppling power lines and trees. Hurricane-force winds can extend well inland from the coast, with the strongest sustained winds normally on the right side of the hurricane based on the heading. If the hurricane is heading north, the strongest winds will be in the eastern half of the storm. In addition, hurricanes can spawn tornadoes, which add to the destructiveness of the storm.

How can I protect myself in a hurricane situation?
Preparation is the best protection against the dangers of a hurricane. Well before a hurricane threatens, people should make their homes as "hurricane proof" as possible and plan and practice what they will do if they are advised to evacuate. And most important, people should evacuate the area if advised by authorities to do so, even if they themselves do not think the situation looks threatening.

Eighty to 90 percent of the people who live in hurricane-prone areas have never experienced the core of a major hurricane. Many of these people have been through weaker storms and have a false impression of a hurricane's damage potential. This can lead to complacency and delayed actions that result in injuries and death. Over the past several years, the hurricane warning system has provided adequate time for people on barrier islands and the immediate coastline to move inland when hurricanes threaten. However, it is becoming more difficult to evacuate people from the barrier islands and other coastal areas because road construction has not kept pace with the rapid population growth. If authorities advise people to evacuate, it is best to leave as soon as possible to avoid traffic tie-ups.

The best ways to protect your home are to install permanent hurricane shutters on windows and doors, tie the roof to the mainframe of your home with metal straps, and prepare a "wind safe" room. (See Appendix: "Wind Safe" Room.) NOTE: a "wind safe" room would be used only for locations where residents have not been asked to leave or evacuate. If you do not have permanent hurricane shutters, use plywood. Well before there is the threat of a hurricane, buy half-inch plywood boards suitable for outside use—marine plywood is best. Cut the boards to fit the outside frame of each window and door; drill the holes for the screws and install the anchors so you can quickly board up your home if necessary. Write on each board which opening it fits. Do not tape glass. Taping does not prevent glass from breaking and takes critical time from more effective preparedness measures.

Every home in hurricane-prone areas should have ready the items needed to board up windows and doors. When a hurricane threatens, supplies are quickly sold out at stores. Most homes destroyed during recent hurricanes had no window protection. When wind enters a home through broken windows, the pressure that builds against the walls can lift a roof and cause walls to collapse.

Make sure that you protect any outbuildings that may house animals in the same way you protect your home.

What is the best source of information in a hurricane situation?
Local radio or television stations or a NOAA Weather Radio are the best sources of information in a hurricane situation for official weather and weather-related bulletins.

NOAA Weather Radio is the prime alerting and critical information delivery system of the National Weather Service (NWS). NOAA Weather Radio broadcasts warnings, watches, forecasts, and other hazard information 24 hours a day over more than 650 stations in the 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific territories.

The NWS encourages people to buy a weather radio equipped with the Specific Area Message Encoder (SAME) feature. This feature automatically alerts you when important information is issued about hurricanes or other weather-related hazards for your area. Information on NOAA Weather Radio is available from your local NWS office or at www.nws.noaa.gov/nwr.

Watch, Warning

- A **Hurricane/Tropical Storm WATCH** means there is a threat of hurricane/tropical storm conditions within 36 hours. People in a watch area should review their hurricane plans (Family Disaster Plan, Disaster Supplies Kit, evacuation routes), keep informed, and be ready to act if a warning is issued.
- A **Hurricane/Tropical Storm WARNING** means hurricane/tropical storm conditions are expected in 24 hours or less. When a warning is issued, people should complete their storm preparations and leave the threatened area if directed to do so by local officials.

A **hurricane/tropical storm local statement,** issued every two to three hours by local National Weather Service (NWS) offices, summarizes all of the watches and warnings, evacuation information, and most immediate threats to an area.

Watches and warnings for hurricanes and tropical storms are issued by the NWS and broadcast on NOAA Weather Radio and on local radio and television stations.

Is your community StormReady? To help people prepare for the ravages of hazardous weather, the National Weather Service has designed StormReady, a program aimed at arming America's communities with the communication and safety skills necessary to save lives and property. More information is available at www.stormready.noaa.gov/.

ACTION MESSAGES
Be Prepared for a Hurricane
Protect Yourself

CORE ACTION MESSAGES
- Determine your risk.
- Consider flood insurance.
- Make an evacuation plan.
- Prepare members of your household.

For general preparedness, every household should create and practice a Family Disaster Plan and assemble and maintain a Disaster Supplies Kit. In addition, every household should take hurricane-specific precautions and plan for and practice what to do in a hurricane situation.

If you are at risk from hurricanes, you should:

- **Talk to your insurance agent.** Homeowners' policies do not cover flooding from hurricanes. Ask about the National Flood Insurance Program (NFIP) or visit www.fema.gov/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, and what conditions would trigger a recommendation to evacuate certain areas.
- **Develop a hurricane evacuation plan.** (See Appendix: "Evacuation and Sheltering and Post-disaster Safety.") All members of your household should know where to go if they have to leave. Making plans well in advance will help you avoid last-minute confusion.
- **Discuss hurricanes with members of your household.** Everyone should know what to do in case all members are not together. Discussing hurricanes and reviewing flood safety and preparedness measures ahead of time will help reduce fear and save precious time in an emergency.
- **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 an approaching hurricane.
- **Protect your animals.** Ensure that any outbuildings, pastures, or corrals that house animals are protected in the same way as your home. When installing or changing fence lines, consider placing them in such a way that your animals are able to move to higher water in the event of flooding. Get rid of debris around your home and any outbuildings as well as in pastures.
- **Know where to go with your animals.** Because evacuation shelters generally do not accept pets, except for service animals, you must plan ahead to ensure that your family and pets will have a safe place to stay. Do this research well before disaster strikes. See chapter on **Evacuation and Sheltering, and Post-disaster Safety** for more information on planning for evacuating your animals.

Protect Your Property

CORE ACTION MESSAGES
- Keep an "in case of hurricane" to-do list.
- Get proper protection for all windows and doors.

If you are at risk from hurricanes, well before a hurricane threatens, you should:

- **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.
- **Install permanent hurricane shutters if possible.**
- **If you do not have hurricane shutters, buy the plywood and other items needed to board up windows and doors.** Get half-inch outdoor plywood— marine plywood is best. Cut it to fit the outside frame of each window and door and drill the holes and install the anchors for the screws. Write on each board which window it fits. **Do not tape windows.** Taping does not prevent windows from breaking and takes critical time from more effective preparedness measures.
- **Remove any debris or loose items in your yard.** Hurricane winds, often in excess of 100 miles (161 kilometers) per hour, can turn unanchored items into deadly missiles.
- **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, damaging whatever they hit. Debris collection services may not be operating just before a storm, so it is best to do this well in advance of an approaching storm.
- **Fix loose rain gutters and downspouts and clear them if they are clogged.** Hurricanes often bring long periods of heavy rain. Cleaning and securing drainage systems will help protect your home from water damage.
- **Strengthen garage doors.** Hurricane winds can enter through a damaged garage door, lift the roof, and destroy the home.
- **Have an engineer check your home and tell you 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 local planning and zoning regulations that could help you protect your home, and can inspect your home to see if the roof is tied to the mainframe securely with metal straps, the house is bolted to its foundation, and the best place in your home to prepare a "wind safe" room.
- **Elevate coastal homes.** Raising structures to a certain height will make them more resistant to hurricane-driven water. There may be many local codes affecting how and where homes can be elevated. Meet with your emergency manager or planning and zoning official to learn about having your home elevated. Community funds may be available for such measures.
- **If you live in a floodplain or area prone to flooding, follow flood preparedness precautions.** Tropical cyclones can bring great amounts of rain and frequently cause floods. Some hurricanes have dropped more than 10 inches (25 centimeters) of rain in just a few hours.
- **Take similar measures to protect your animals.** Make sure that you strengthen and protect any outbuildings that may house animals in the same way you protect your home.

- **Explore sheltering options for your pets.** Contact relatives, friends, hotels and motels, and other facilities to make a definite plan for sheltering your animals. Many communities are developing emergency animal shelters similar to shelters for people. Contact your local emergency management agency to find out about emergency animal shelters in your community, in the event that you have nowhere else to go and need to go to public shelter with your animals.
- **Include your pets in your evacuation and sheltering drills.** Practice evacuating your pets so they will get used to entering and traveling calmly in their carriers. If you have horses or other large animals, be sure that they are accustomed to entering a trailer. Practice bringing your pets indoors, into your safe room, so that if you are required to shelter in place, they will be comfortable.

What to Do During a Hurricane/Tropical Storm Watch

CORE ACTION MESSAGES
- Listen to and watch local news.
- Prepare your home.
- Evacuate if advised by authorities.
- Avoid floodwater.

You should:

- **Use a NOAA Weather Radio or listen continuously to a local station on a portable, battery-powered radio or television.** Hurricanes can change direction, intensity, and speed suddenly. What was a minor threat several hours ago can quickly escalate to a major threat.
- **Heed the advice of local officials, and evacuate if they advise it.** (See Appendix: What to Do if Evacuation Is Necessary Because of a Storm.) Following their advice is your best protection. Avoid flooded roads and watch for washed-out bridges. Local officials may close certain roads, especially near the coast, when effects of the hurricane reach the coast.
- **Prepare your property for high winds.** Hurricane winds can lift 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.
  - •Secure your home by closing the windows and doors and then closing the hurricane shutters. If you do not have hurricane shutters, close and board up all windows and doors.
  - •If possible and if it can be safely done, remove outside antennas.
  - •Moor a boat securely or move it to a designated safe place. Use rope or chain to secure a boat to a trailer. Use tie-downs to anchor a trailer to the ground or to a building.
- **Fill your car's gas tank.** If advised to evacuate, you may have to travel a long distance or you may be stuck in traffic for a long time. Gas stations along the route may be closed.
- **Stock up on prescription medications.** Stores and pharmacies may be closed after the storm.

- **If you are in a mobile home, check the tie-downs.** Mobile homes may be less 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. Historically, mobile homes suffer the greatest amount of damage during hurricanes. Prior to 1994, most mobile homes were not designed to withstand even moderate winds.
- **Check your Disaster Supplies Kit.** Some supplies may need to be replaced or restocked.
- **Turn the refrigerator and freezer to the coldest setting.** Open them only when absolutely necessary, then close them 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 safe-deposit box or in a waterproof container on the highest level of your home.** Hurricanes can cause much water damage inside homes. 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, if you shut if off, 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.
- **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 your 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 floodwater.** If you come upon a flooded road, turn around and go another way. Most hurricane-related deaths are caused by floods from heavy rainfall. The National Hurricane Center reports that more then one-third of inland flooding deaths involve people trapped in cars while trying to escape rising 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. As little as six inches of water may cause you to lose control of your vehicle and two feet (0.6 meter) of water will carry away most automobiles, SUVs, and pickup trucks.
- **Consider a precautionary evacuation of large or numerous animals.** If you think an evacuation might be advised or ordered and if you have large, unusual, or numerous animals, start evacuating them as soon as you are aware of impending danger. If you are using a horse or other trailer to evacuate your animals, move early rather than wait until it may be too late to maneuver a trailer through slow traffic. The winds or water may be too high, or other hazards may make this too dangerous for you and for them.

What to Do During a Hurricane/Tropical Storm Warning

CORE ACTION MESSAGES

- Listen to and watch local news.
- Evacuate if advised by authorities, or stay inside.
- If in a mobile home, evacuate immediately.
- Avoid floodwater.

You should:

- **Use a NOAA Weather Radio or continuously listen to a local station on a portable, battery-powered radio or television.** Hurricanes can change direction, intensity, and speed suddenly.
- **If officials advise you to leave your home, go as soon as possible.** (See Appendix: What to Do if Evacuation Is Necessary Because of a Storm.) Take your Disaster Supplies Kit and go to a shelter or to the out-of-town contact identified in your Family Disaster Plan. Call your contact and tell him or her when you are leaving and where you are going. Local officials will advise you to evacuate only if they conclude that you are 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.
- **If you evacuate, take your pets with you.** If it is not safe for you, it is not safe for them. Be sure to take your pet disaster kit with you. (See Disaster Supplies Kit for information about what should be in this kit.) Leaving them will endanger not only your pets, but also yourself and emergency responders.
- **If you are not advised to evacuate, stay indoors, away from windows, skylights, and doors, even if they are covered.** Stay on the floor least likely to be affected by strong winds and floodwater. 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 external doors. Closed doors will help prevent damaging hurricane winds from entering rooms.
- **Have a supply of flashlights and extra batteries handy.** Flashlights provide the safest emergency lighting source. DO NOT USE CANDLES. Do not use kerosene lamps, which require a great deal of ventilation and are not designed for indoor use.
- **Store drinking water in clean plastic bottles and cooking utensils.** (See Appendix: Storing Water.) Public water supplies and wells may become contaminated, or electric pumps may be inoperative if power is lost. Often, a person's greatest need following a disaster is water.
- Fill bathtubs and sinks with water to use for flushing the toilet and washing floors and clothing. Do not use water that has been stored in glazed tubs or sinks for drinking or to bathe young children because over time lead can leach from the glaze into the 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 you are in a mobile home, recheck the tie-downs and evacuate immediately.**
- **Be aware that the calm "eye" is deceptive; the storm is not over.** Once the eye passes over your area, the winds increase and 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 rain 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 rain and flooding as major hurricanes.
- **Be alert for tornadoes.** Tornadoes can happen during a hurricane. If a tornado occurs in connection with a hurricane, remain indoors on a lower level, in the center of your home, in a closet or bathroom without windows.
- **Bring your companion animals indoors and maintain direct control of them.** Be sure that your pet disaster kit is ready to go, along with your family disaster kit, should you need to evacuate.
- **If the storm is predicted to be not very strong and if pastured animals have access to high ground, it is better to let them out into their pastures than to leave them in a barn**, unless that barn is very well constructed and protected. Horses and cattle are able to avoid windborne debris if they have enough area to move. In the last hours before a hurricane or tropical storm hits, it may be safer to do this than to attempt a last-minute evacuation.

What to Do After a Hurricane/Tropical Storm

CORE ACTION MESSAGES
- Listen to and watch the news.
- Watch for floodwater.
- Check for dangers inside and outside.

After a hurricane is over, you should:

- **Continue using a NOAA Weather Radio or listening to a local station on a portable, battery-powered radio or television.** 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 about 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 floodwater.** Drive only if absolutely necessary and avoid flooded roads and washed-out bridges. Continue to follow all flood safety messages. Floodwaters may last for days following a hurricane. If you come upon a flooded road, turn around and go another way. Never try to walk, swim, or drive through swiftly moving water. Many 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 (15 centimeters) deep can sweep you off your feet, and two feet (0.6 meter) can carry away most vehicles. Also, standing water may be electrically charged from underground or downed power lines.

- **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 beyond them can be a serious risk.
- **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 people who require special assistance**—infants, elderly people, those without transportation, large families who may need additional help in an emergency situation, people with disabilities, and the people who care for them.
- **If someone needs to be rescued, call professionals with the right equipment to help.** Many people have been killed or injured trying to rescue others in flooded areas.
- **Stay away from damaged 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 water, crumbled roads, landslides, mudflows, and other hazards.
- **Avoid loose or dangling power lines;** immediately report them to the power company or the police or fire department. Reporting potential hazards will get the utilities turned off as quickly as possible, preventing further hazard and injury.
- **Stay out of any building that has water around it.** Floodwater often undermines foundations, causing buildings to sink, floors to crack, or walls to collapse.
- **Wear long pants, a long-sleeved shirt, and sturdy shoes.**
- **Use battery-powered lanterns or flashlights when examining buildings.** DO NOT USE CANDLES.
- **Examine walls, floors, doors, staircases, and windows to make sure that the building is not in danger of collapsing.**
- **Look for fire hazards.** There may be broken or leaking gas lines, flooded electrical circuits, or submerged furnaces or electrical appliances.
- **Check for gas leaks.** If you smell gas or hear a blowing or hissing noise, open a window and get everyone outside quickly. 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 made before the hurricane struck. Turn off the main water valve before using water from these sources.
- **Avoid drinking or preparing food with tap water until you are certain it is not contaminated.** Hurricane-driven floodwater may have contaminated public water supplies or wells. Local officials should advise you on the safety of the drinking water.
- **Check refrigerated food for spoilage.** (See Appendix: Keeping Refrigerated Food Safe if the Power Goes Out.) If power was lost, some foods may be spoiled. If in doubt, throw it out.
- **Watch out for animals,** especially poisonous snakes, that may have come into buildings with the floodwater. Use a stick to poke through debris. Floodwater flushes 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.**
- **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.
- **Watch animals closely.** Keep all your animals under your direct control. Pets may become disoriented, particularly if the disaster has affected scent markers that normally allow them to find their home. Pets may be able to escape from your home or your fence may be broken. Be aware of hazards at nose and paw or hoof level, particularly debris, spilled chemicals, fertilizers, and other substances that might not seem to be dangerous to humans. In addition, the behavior of pets may change dramatically after a disaster, becoming aggressive or defensive, so be aware of their well-being and take measures to protect them from hazards, including displaced wild animals, and to ensure the safety of other people and animals.

For information on **portable-generator safety** and **carbon monoxide poisoning,** see Appendix: Portable Generators.

Media and Community Education Ideas

- Ask your local newspaper or radio or television station to:
  - -Do a series on the dangers of hurricanes and the importance of evacuating when authorities advise it.
  - -Do a story featuring interviews with local officials about land-use management and building codes for coastal areas.
  - -Highlight the importance of staying informed about local weather conditions.
  - -Run public service ads about how to protect lives and property in a hurricane.

  Help the reporters to localize the information by providing them with the local emergency telephone number for the fire, police, and emergency medical services departments (usually 9-1-1) and emergency numbers for the local utilities and hospitals. Also provide the business telephone numbers for the local emergency management office and local American Red Cross chapter.

- Work with officials of the local fire, police, and emergency medical services departments; utilities; hospitals; emergency management office; and American Red Cross chapter to prepare and disseminate guidelines for people with mobility impairments about what to do if they have to evacuate.

- Sponsor a "Helping Your Neighbors" program at your local schools to encourage students to think about how to help people who require special assistance, such as elderly people, infants, or people with disabilities, and the people who care for them.

- Provide hurricane tracking charts to local schools.

- 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.

Facts and Fiction

Fiction: It is safe to go outside during the "eye" of the hurricane.
Facts: It is not safe to go outside during the "eye" of the hurricane. You have no way of knowing how long the light winds will last. Strong winds will return very quickly from the opposite direction. Stay indoors.

Fiction: Evacuations are ordered only because of liability.
Facts: Evacuations are ordered because there is a real danger of storm surge.

Fiction: Hurricanes strike only southern states.
Facts: Hurricanes have hit the coast from Texas to Maine.

Fiction: Hurricanes/tropical storms strike only during the official hurricane season of June 1 through November 30.
Facts: Hurricanes/tropical storms sometimes occur before or after the hurricane season. Tropical Storm Anna happened in April 2003. Hurricane Lili occurred in late December 1984.

Fiction: Hurricane destruction occurs only along the coast.
Facts: A hurricane's effects (flooding, tornado, and wind damage) can be felt well inland. For instance, during Hurricane Hugo (September 10-22, 1989), Charlotte, N.C., which is 100 miles (161 kilometers) inland, experienced winds of 87 miles (140 kilometers) per hour, resulting in a swath of downed trees and power lines 50 miles (80 kilometers) wide.

Fiction: Taping windows protects them as effectively in a hurricane as boarding them up.
Facts: Taping does not prevent windows from breaking and takes critical time from more effective preparedness measures. All tape does is help prevent broken glass from scattering inside your home.

Fiction: Water stored in bathtubs and sinks is a good source of drinking water if the public water supply is interrupted or contaminated.
Facts: Over time, lead can leach from the glaze in bathtubs and sinks into water stored in them. Water stored in bathtubs and sinks should never be used for drinking or for bathing young children. You can use water stored in bathtubs and sinks for tasks such as flushing the toilet or washing the floor or clothing.

Thunderstorms, Severe

Learn about your area's severe thunderstorm risk. Severe thunderstorms can occur year-round and at any hour. Contact your local emergency management office, National Weather Service office, or American Red Cross chapter for more information.

More information about lightning and lightning safety is available at www.lightningsafety.noaa.gov/.

AWARENESS MESSAGES

Why talk about thunderstorms?

Despite their small size, all thunderstorms are dangerous. Every thunderstorm produces lightning, which kills more people each year than tornadoes and hurricanes. Heavy rain from thunderstorms can lead to flash flooding. Strong winds, hail, and tornadoes are also dangers associated with some thunderstorms. High winds from thunderstorms can cause damage to homes, overturn vehicles, and blow down trees and utility poles, causing widespread power outages.

Many strong thunderstorms produce hail. Large hail, and the glass it may break, can injure people and animals. Hail can be smaller than a pea, or as large as a softball, and can be very destructive to automobiles, glass surfaces (skylights and windows), roofs, plants, and crops.

Downbursts and straight-line winds associated with thunderstorms can produce winds of 100 to 150 miles (161 to 241 kilometers) per hour—enough to flip cars, vans, and pickup trucks. The resulting damage can equal the damage of most tornadoes.

What are severe thunderstorms?

Thunderstorms affect relatively small areas when compared with hurricanes and winter storms. The typical thunderstorm is 15 miles (24 kilometers) in diameter and lasts an average of 20 to 30 minutes. Of the estimated 100,000 thunderstorms occurring each year in the United States, only about 10 percent are classified as severe.

The National Weather Service (NWS) considers a thunderstorm severe if it produces hail at least three-quarters of an inch (2 centimeters) in diameter, has wind gusts of 58 miles (93 kilometers) an hour or higher, or produces a tornado.

Thunderstorms may occur singly, in clusters, or in lines. Some of the most severe weather occurs when a single thunderstorm affects one location for an extended time.

How can I protect myself in a severe thunderstorm?

Each year, many people are killed or seriously injured by severe thunderstorms despite advance warning. While some did not hear the warning, others heard the warning but did not heed it. The following preparedness information, combined with timely severe weather watches and warnings could save your life. Once you receive a warning or observe threatening skies, you yourself must make the decision to take shelter before the storm arrives. It could be the most important decision you will ever make.

In a hailstorm, take cover immediately. Pets and livestock are particularly vulnerable to hail, so bring animals into shelter before storms begin.

If a severe thunderstorm warning is issued, take shelter. Get out of structures, such as mobile homes, that are susceptible to being blown over in high winds. Stay away from downed power lines and report them immediately.

How dangerous is lightning?
Lightning is a major threat during a thunderstorm. Lightning produces thunder in a thunderstorm and is very unpredictable, increasing the risk to individuals and property.

According to the National Weather Service, lightning kills on average more than 70 people and injures at least 300 others each year in the United States. While only about 10 percent of those struck are killed, the large majority of the 90 percent who survive suffer long-term injuries, such as memory loss, dizziness, muscle spasms, depression, and fatigue. Lightning also causes about $5 billion in economic loss each year in the United States.

Lightning often strikes outside the area of heavy rain and may occur as far as 10 miles (16 kilometers) from any rainfall. Heat lightning is actually lightning from a thunderstorm too far away for thunder to be heard.

You are in danger from lightning if you can hear thunder. Because light travels so much faster than sound, lightning flashes can sometimes be seen long before the resulting thunder is heard. When the lightning and thunder occur very close to one another, the lightning is striking nearby. To estimate the number of miles you are from a thunderstorm, count the number of seconds between a flash of lightning and the next clap of thunder. Divide this number by five.

More than 50 percent of lightning deaths occur after the thunderstorm has passed. The National Weather Service encourages you to practice the 30/30 lightning safety rule: If the time between seeing the lightning and hearing the thunder is less than 30 seconds, you are in danger. Stay indoors for 30 minutes after hearing the last clap of thunder.

What is the best source of information about severe thunderstorms in my area?
Local radio or television stations or NOAA Weather Radio are the best sources of information about severe thunderstorms and other weather-related bulletins in your area.

NOAA Weather Radio is the prime alerting and critical information delivery system of the National Weather Service (NWS). NOAA Weather Radio broadcasts warnings, watches, forecasts, and other hazards information 24 hours a day over more than 650 stations in the 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific territories.

The NWS encourages people to buy a weather radio equipped with the Specific Area Message Encoder (SAME) feature. This feature automatically alerts you when important information is issued about severe thunderstorms or other weather-related hazards in your area. Information on NOAA Weather Radio is available from your local NWS office or at www.nws.noaa.gov/nwr.

Watch, Warning

A **Severe Thunderstorm WATCH** means severe thunderstorms are possible in and near the watch area. People in a watch area should keep informed and be ready to act if a severe thunderstorm warning is issued.

A **Severe thunderstorm WARNING** means severe weather has been reported by spotters or indicated by radar. Warnings indicate imminent danger to life and property.

Is your community StormReady? To help Americans prepare for the ravages of hazardous weather, the NWS has designed StormReady, a program aimed at arming America's communities with the communication and safety skills necessary to save lives and property. More information is available at www.stormready.noaa.gov/.

See chapter on "Floods and Flash Floods," "Tornadoes," "Hurricanes and Tropical Storms," and "Evacuation and Sheltering and Post-disaster Safety."

ACTION MESSAGES
Be Prepared for Severe Thunderstorms
Protect Yourself

CORE ACTION MESSAGES
- Determine your risk.
- Prepare members of your household.
- Pick a safe place.

For general preparedness, every household should create and practice a Family Disaster Plan and assemble and maintain a Disaster Supplies Kit. In addition, every household should take precautions for severe thunderstorms and lightning and plan for and practice what to do if a thunderstorm occurs.

You should:

- **Discuss thunderstorm safety with members of your household**. Be aware that a thunderstorm could produce a tornado. Tornadoes develop from severe thunderstorms along and ahead of cold fronts. (See chapter on "Tornadoes.")
- **Pick a safe place in your home for household members to gather during a thunderstorm.** This should be a place where there are no windows, skylights, or glass doors, which could be broken by strong winds or hail and cause damage or injury. In preparation for possible tornado warnings, consider making your severe thunderstorm safe place on the lowest floor of the building. See Appendix: "Wind Safe" Room for information on how to build a reinforced room in your home or school.

- **Learn about your community's warning system for severe thunderstorms.** Make sure all members of your household understand the system. Use a NOAA Weather Radio or listen to a local radio or television station to keep aware of watches and warnings while you are indoors. Make sure everyone in your household knows the name of the county or parish where you live because severe thunderstorm watches and warnings are issued for counties or parishes. People should also know the name of the county or parish they are in if they are away from home.
- **Learn how to crouch low to the ground on the balls of your feet.** Place your hands on your knees and your head between your knees. Minimize your body's surface area, and minimize your contact with the ground. Lightning current often enters a victim through the ground rather than by a direct overhead strike.

Protect Your Property

CORE ACTION MESSAGES
- Actively prepare your home.
- Check your insurance coverage.

You should:

- **Make a list of items to bring inside in the event of a severe thunderstorm.** Having a list will help you remember things that may be broken or blown away in strong winds.
- **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. Strong winds frequently break weak limbs and hurl them at great speed.
- **Remove any debris or loose items from around your home and outbuildings and from pastures.** Branches and firewood may become missiles in strong winds.
- **Protect your animals.** Ensure that any outbuildings, pastures, or corrals that house animals are protected in the same way as your home. When installing or changing fence lines, consider placing them in such a way that your animals are able to move to higher ground in the event of flooding.
- **Consider installing permanent shutters to cover windows.** Shutters can be closed quickly and provide the safest protection for windows.
- **Install lightning rods on your home and on barns or any other building that house animals.** Lightning rods will carry the electrical charge of lightning bolts safely to the ground, greatly reducing the chance of a lightning-induced fire.
- **Insure crops against financial loss from storm damage through the Federal Crop Insurance Corporation of the U.S. Department of Agriculture.** If applicable, it is recommended that you obtain separate specific insurance to cover your crops. Losses are not covered through usual insurance policies. Each year, severe storms cause millions of dollars in crop damage. Hail, in particular, has been known to wipe out entire fields.

What to Do Before a Severe Thunderstorm

CORE ACTION MESSAGES
- Stay informed.
- Prepare to shelter.

You should:

- **Use a NOAA Weather Radio to keep you informed of watches and warnings issued in your area.**
- **If planning a trip or extended period of time outdoors, be aware of the weather forecast.** Knowing what the weather could be will help you be prepared to respond if necessary. Having a raincoat, umbrella, and disaster supplies kit available will make it easier to deal with severe weather if it occurs.
- **Postpone outdoor activities if thunderstorms are imminent.** Coaches of outdoor sports teams should use a NOAA Weather Radio during practice sessions and games. Threatening weather can endanger athletes, staff, and spectators. Remember that many people struck by lightning are not in an area where rain is falling. Postponing activities is your best way to avoid being caught in a dangerous situation.
- **Keep an eye on the sky.** Pay attention to weather clues around you that may warn of imminent danger. Look for darkening skies, flashes of lightning, or increasing wind, which may be signs of an approaching thunderstorm.
- **Be aware of your surroundings.** Look for places you could go if severe weather threatens.
- **Listen for the sound of thunder.** If you can hear thunder, you are close enough to the storm to be struck by lightning. Go to safe shelter immediately.
- **Even if there is no official thunderstorm warning, if you see signs of a thunderstorm, take precautions.**

What to Do During a Severe Thunderstorm Watch

CORE ACTION MESSAGES
- Keep informed.
- Prepare to shelter.
- Avoid lightning attractors.

You should:

- **Use a NOAA Weather Radio or listen to a local radio or television station.** Local authorities will provide you with the best information for your particular situation.
- **Avoid natural lightning rods, such as golf clubs, fishing poles, tractors, bicycles, and camping equipment.** Lightning is attracted to metal and poles or rods.
- **Be prepared to take shelter.** A sturdy building is the safest place to be during a severe thunderstorm. Avoid gazebos, rain or picnic shelters, golf carts, baseball dugouts, bleachers, and other isolated structures in otherwise open areas because such places are often struck by lightning. In addition, gazebos and picnic shelters are often poorly anchored and subject to being uprooted and blown around in strong thunderstorm winds. They also offer little protection from large hail.

- **If you perceive that a severe thunderstorm is approaching:**
  -Secure outdoor objects such as lawn furniture that could blow away or cause damage or injury. Take lightweight objects inside.
  -Bring your companion animals indoors and maintain direct control of them. Be sure that your pet disaster kit is ready to go.
  -If possible, bring horses and livestock into your barn. Do not allow horses or livestock to gather under an isolated tree or otherwise present a risk from a lightning strike.
  -Shutter windows and close outside doors securely. This will help protect your home from damaging winds or flying debris.
  -Avoid electrical equipment and telephones. Lightning could follow the wire. Television sets are particularly dangerous at this time. Use a battery-powered radio or television.
  -Avoid bathtubs, water faucets, and sinks because metal pipes can transmit electricity.

What to Do During a Severe Thunderstorm Warning

CORE ACTION MESSAGES
- Stay informed.
- Go to shelter.
- Avoid lightning attractors.

You should:

- **Use a NOAA Weather Radio or listen to a local station on a battery-powered radio or television for updated emergency information.** If the power goes out, you still will have access to important information.
- **Draw the blinds and shades over windows.** If windows break because objects are blown by the wind or large hail, the shades will help prevent glass from shattering into your home.
- **Unplug appliances** and avoid using the telephone or any electrical appliances. If lightning strikes, telephone lines and metal pipes can conduct electricity. Leaving electric lights on, however, does not increase the chances of your home being struck by lightning.
- **Avoid taking a bath or shower, or running water for any other purpose.** Metal pipes and plumbing can conduct electricity if struck by lightning.
- **Turn off the air conditioner.** Power surges from lightning can overload the compressor, resulting in a costly repair job.
- **Maintain direct control of your animals.** Many animals are unsettled by thunderstorms and it is more comforting and safe for them to be with you.

What to Do if You Are Outside and a Severe Thunderstorm Is Approaching

CORE ACTION MESSAGES
- Get to shelter.
- Avoid likely lightning targets.

You should:

- **Find shelter immediately. If you are boating or swimming, get to land, get off the beach, and find shelter immediately.** Stay away from rivers, lakes, and other bodies of water. Water is an excellent conductor of electricity. When lightning strikes nearby, the electrical charge can travel through the water. Each year, people are killed by nearby lightning strikes while in or on the water.
- **Take shelter in a substantial, permanent, enclosed structure,** such as a reinforced building. A sturdy building is the safest place to be. Avoid gazebos, rain or picnic shelters, golf carts, baseball dugouts, bleachers, and other isolated structures in otherwise open areas because such places are often struck by lightning. In addition, gazebos and picnic shelters are often poorly anchored and subject to being uprooted and blown around in strong thunderstorm winds. They also offer little protection from large hail.
- **If there is no reinforced building in sight, take shelter in a vehicle.** Keep the windows closed and avoid convertibles. Rubber-soled shoes and rubber tires provide no protection from lightning. However, the steel frame of a hard-topped vehicle provides increased protection if you are not touching metal. Although you may be injured if lightning strikes your vehicle, you are much safer inside a vehicle than outside.
- **If you are in the woods, find an area protected by a low clump of trees.** Never stand beneath a single large tree in the open. Be aware of the potential for flooding in low-lying areas.
- **As a last resort and if no suitable structure or vehicle is available, go to a low-lying, open place away from trees, poles, or metal objects**. Make sure the place you pick is not subject to flooding. Crouch low to the ground on the balls of your feet. Place your hands on your knees and your head between your knees. Minimize your body's surface area, and minimize your contact with the ground. Lightning current often enters a victim through the ground rather than by a direct overhead strike.
- **Avoid tall structures, such as towers, tall trees, fences, telephone lines, and power lines.** Lightning strikes the tallest objects in an area.
- **Stay away from natural lightning rods, such as golf clubs, tractors, fishing rods, bicycles, and camping equipment.** Lightning is attracted to metal and poles or rods.
- **If you are isolated in a level field or prairie and you feel your hair stand on end (which indicates that lightning is about to strike), crouch low to the ground on the balls of your feet.** Place your hands on your knees and your head between your knees. Minimize your body's surface area, and minimize your contact with the ground. Lightning current often enters a victim through the ground rather than by a direct overhead strike.

Note: Coordinators of outdoor events should monitor the weather with a NOAA Weather Radio and evacuate participants when appropriate.

Note: School buses are an excellent lightning shelter due to the amount of metal shielding but a substantial building is still a better shelter due to the high-winds associated with sever storms.

What to Do If You Are Driving During a Severe Thunderstorm or Heavy Rain

CORE ACTION MESSAGES
- Pull over.
- Stay in the vehicle.
- Be alert for flooding.

You should:

- **Pull safely onto the shoulder of the road and stop, making sure you are away from any trees or other tall objects that could fall on the vehicle.**
- **Stay in the vehicle and turn on the emergency flashers until the heavy rain subsides.** Heavy rain produced by thunderstorms can greatly reduce visibility. Emergency flashers will alert other drivers that you have stopped. Keep the windows closed. You are safer from lightning in a vehicle than out in the open.
- **Avoid contact with metal or other conducting surfaces outside or inside the vehicle.** Lightning that strikes nearby can travel through wet ground to your vehicle. The steel frame of a hard-topped vehicle provides increased protection if you are not touching metal. Rubber tires provide no protection from lightning. Avoid contact with potential conductors to reduce your chance of being shocked. Although you may be injured if lightning strikes your vehicle, you are much safer inside than outside.
- **Avoid flooded roads.** Many 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. As little as six inches of water may cause you to lose control of your vehicle and two feet (0.6 meter) of flowing water will carry away most automobiles, including SUVs and pickup trucks. (See Appendix: What to Do When There Is Flooding.)

What to Do After a Severe Thunderstorm

CORE ACTION MESSAGES
- Stay informed.
- Be alert to hazards.
- Help others.

You should:

- **Continue using a NOAA Weather Radio or listening to a local radio or television station for updated information and instructions.** Access may be limited to some parts of the community or roads may be blocked.
- **Help people who require special assistance**—infants, elderly people, those without transportation, large families who may need additional help in an emergency situation, people with disabilities, and the people who care for them.
- **Stay away from storm-damaged areas** to avoid putting yourself at further risk from the residual effects of severe thunderstorms. Sightseers cause additional problems and hamper local responders assisting those in need.
- **Watch out for fallen power lines and report them immediately**. Reporting potential hazards will get the utilities turned off as quickly as possible, preventing further hazard and injury. If assistance is needed in your area and telephone communications are disrupted, go to your nearest fire or police station to request assistance.

- **Watch animals closely.** Keep all your animals under your direct control. Pets may become disoriented before, during, and after severe thunderstorms. If there has been wind damage, pets may be able to escape from your home or your fence may be broken. Be aware of hazards at nose and paw or hoof level, particularly debris, downed power lines—things that can be dangerous to humans. In addition, the behavior of pets may change dramatically after a severe storm, becoming aggressive or defensive, so be aware of their well-being and take measures to protect them from hazards, including displaced wild animals, and to ensure the safety of other people and animals.

For information on **portable-generator safety** and carbon monoxide poisoning, see Appendix: Portable Generators.

What to Do if Someone Is Struck by Lightning

CORE ACTION MESSAGES
- Get help.
- Give first aid.

You should:

- **Call for help.** Get someone to dial 9-1-1 or your local emergency number. Medical attention is needed as quickly as possible.
- **Give first aid.** If the person has stopped breathing, begin rescue breathing. If the person's heart has stopped beating, a trained person should give CPR. If the person has a pulse and is breathing, look for other possible injuries and care for them if necessary.
- **Check the person for burns in two places.** The injured person has received an electrical shock and may be burned both where the current entered and where it exited his or her body. Being struck by lightning can also cause nervous system damage, broken bones, and loss of hearing or eyesight. People struck by lightning carry no electrical charge that can shock other people, and they can be handled safely.

Media and Community Education Ideas

- Ask your local newspaper or radio or television station to:
  - -Do a series on the dangers of thunderstorms and lightning and place special emphasis on what people should do if they are caught outside.
  - -Highlight the importance of staying informed about local weather conditions.
  - -Run public service ads about how to protect lives and property from severe thunderstorms and lightning.
  - -Interview officials of the U.S. Department of Agriculture about the Federal Crop Insurance Corporation.
  - -Inform the community about local public warning systems.
  - -Interview a representative of the American Red Cross about giving first aid to people who have been struck by lightning.
  - -Interview agents from various insurance companies about what kinds of severe thunderstorm and lightning damage homeowners' insurance does and does not cover.

Help the reporters to localize the information by providing them with the local emergency telephone number for the fire, police, and emergency medical services departments (usually 9-1-1) and emergency numbers for the local utilities and hospitals. Also provide business telephone numbers for the local emergency management office and American Red Cross chapter.

- Ask a local meteorologist to speak to school and youth groups about the dangers of thunderstorms, lightning, and hail.

Facts and Fiction

Fiction: If it is not raining, there is no danger from lightning.
Facts: Lightning often strikes outside heavy rain and may occur as far as 10 miles (16 kilometers) away from any rainfall. This is especially true in the western United States where thunderstorms sometimes produce very little rain.

Fiction: The rubber soles of shoes or rubber tires on a vehicle will protect you from being struck by lightning.
Facts: Rubber-soled shoes and rubber tires do not provide protection from lightning. The steel frame of a hard-topped vehicle provides increased protection if you are not touching metal. Although you may be injured if lightning strikes your vehicle, you are much safer inside a vehicle than outside.

Fiction: People struck by lightning carry an electrical charge and should not be touched.
Facts: Lightning-strike victims carry no electrical charge and should be attended to immediately. Contact your local American Red Cross chapter for information on CPR/AED and first-aid classes.

Fiction: Heat lightning occurs after very hot summer days and poses no threat.
Facts: "Heat lightning" is a term used to describe lightning from a thunderstorm too far away for thunder to be heard. All lightning is dangerous.

Fiction: Lightning never strikes twice in the same place.
Facts: Just because lightning struck a place once does not make it less likely that it will strike again in the same place. In fact, it may indicate that the place is more vulnerable to lightning strikes than other places in the immediate area.

Winter Storms

AWARENESS MESSAGES

Why talk about winter storms?

Each year, exposure to cold, vehicle accidents caused by wintry roads, and fires caused by the improper use of heaters injure and kill hundreds of people in the United States. Add these to other winter weather hazards and you have a significant threat to human health and safety.

A major winter storm can last for several days and can include high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. People can become marooned at home without utilities or other services. Heavy snowfall and blizzards can trap motorists in their vehicles and make walking to find help a deadly effort. Storm effects, such as severely cold temperatures, heavy snow, and coastal flooding, can cause hazardous conditions and hidden problems. The aftermath of a winter storm can impact a community or region for days, weeks, or even months.

What are winter storms?

Winter storms can range from a moderate snow over a few hours to a blizzard with blinding, wind-driven snow that lasts for several days. Some winter storms are large enough to affect several states, while others affect only a single community. Many winter storms are accompanied by dangerously low temperatures and sometimes by strong winds, icing, sleet, and freezing rain.

Winter storms are defined differently in various areas of the country, and each area is equipped differently to deal with the challenges and hazards of severe winter weather. A snowstorm that would be unremarkable in Buffalo, N.Y., could bring a city in the southern states to a standstill. Local emergency management offices, National Weather Service (NWS) offices, and American Red Cross chapters can provide definitions specific to each area.

What damages can snow cause, and what are the different kinds of snow?

Heavy snow can immobilize a region and paralyze a city, stranding commuters, closing airports, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can cause roofs to collapse and knock down trees and power lines. Homes and farms may be isolated for days. In rural areas, unprotected livestock can be lost. In urban areas, the cost of snow removal, damage repair, and lost business can have severe economic impacts. In the mountains, heavy snow can lead to an **avalanche**—a mass of tumbling snow. More than 80 percent of midwinter avalanches are triggered by a rapid accumulation of snow, and 90 percent of those occur within 24 hours of snowfall. An avalanche can reach a mass of a million tons and travel at speeds up to 200 miles (322 kilometers) per hour.

Various intensities of snow are defined differently:

- **Blizzard** describes winds of 35 miles (56 kilometers) per hour or more with snow and blowing snow that reduce visibility to less than one-quarter mile (0.4 kilometer) for at least three hours.
- **Blowing snow** describes wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground that is picked up by the wind.
- **Snow squall** describes a brief, intense snow shower accompanied by strong, gusty winds. Accumulation from snow squalls can be significant.
- **Snow shower** describes snow that falls at varying intensities for short durations with little or no accumulation.

What damages can ice cause, and what are the different kinds of ice?
Heavy accumulations of ice can bring down trees and topple utility poles and communication towers. Ice can disrupt communications and power for days while utility companies repair extensive damage. Even small accumulations of ice can be severely dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces.

Ice forms in different ways:

- **Sleet** is rain that freezes into ice pellets before it reaches the ground. Sleet usually bounces when hitting a surface and does not stick to objects; however, it can accumulate like snow and cause roads and walkways to become hazardous.
- **Freezing rain (also known as an ice storm)** is rain that falls onto a surface that has a temperature below freezing. The cold surface causes the rain to freeze so the surfaces—trees, utility wires, vehicles, and roads—become glazed with ice. Even small accumulations of ice can cause significant hazards to people—especially pedestrians and motorists—and property.

What damages can severe cold cause?
What constitutes severe cold varies in different parts of the country. In some northern regions, cold temperatures are not considered severe until they are well below 0° F (−18° C). In most southern regions, near-freezing temperatures (around 32° F, or 0° C) are considered severe cold. Severe cold can cause much harm; for example, it can damage crops and other vegetation and freeze pipes causing them to burst. Unusually cold temperatures are especially dangerous in areas not accustomed to them because residents are generally unprepared and may not realize the dangers severe cold present.

Exposure to cold can cause frostbite and life-threatening hypothermia. **Frostbite** is the freezing of body tissue, and it most frequently affects fingers, toes, earlobes, and the tip of the nose. Frostbite damage ranges from superficial and reversible to deep and permanent. Frostbite can result in tissue loss and even loss of digits and limbs.

Hypothermia begins to occur when a person's body temperature drops to 3° below its normal temperature. On average, a person would begin to suffer hypothermia if his or her temperature dropped to 96° F (35.6° C). Cold temperatures can cause hypothermia in anyone who is not adequately clothed or sheltered in a place with adequate heat. Hypothermia can kill people, and those who survive hypothermia are likely to suffer lasting ill effects. Infants and elderly people are the most susceptible. Elderly people account for the largest percentage of hypothermia victims, many of whom freeze to death in their own homes. Most of these victims are alone and their heating systems are working improperly or not at all. People who are taking certain medications, who have certain medical conditions, or who have been drinking alcohol also are at increased risk for hypothermia.

What is winter flooding?
Winter flooding can result from winter storms or long periods of cold temperatures, and it can cause significant damage and loss of life. The winds of intense winter storms can cause widespread tidal flooding and severe beach erosion along coastal areas. Long cold spells can cause rivers and lakes to freeze so that when a rise in the water level or a thaw breaks the ice into large chunks, the chunks become jammed at man-made and natural obstructions. These ice jams can act as dams, resulting in severe flooding. In addition, the sudden thawing of a heavy snow pack can often lead to flooding.

How can I protect myself in winter storms?
Winter storms are considered deceptive killers because most winter storm deaths are related only indirectly to the storms. Overall, most winter storm deaths result from vehicle or other transportation accidents caused by ice and snow. You should avoid driving when conditions include sleet, freezing rain or drizzle, snow, or dense fog. These are serious conditions that are often underestimated, and they make driving—and even walking outside—very hazardous.

Exhaustion and heart attacks brought on by overexertion are two other common causes of deaths related to winter storms. Cold temperatures compound the strain of physical labor on a person's body. Tasks such as shoveling snow, pushing a vehicle, or even walking in heavy snow can cause a heart attack, particularly in people who are older or not used to high levels of physical activity. Before tackling strenuous tasks in cold temperatures, you should carefully consider your physical condition, the weather factors, and the nature of the task. If you are not sure how much you can safely do, you should avoid all heavy work in cold temperatures.

You should also dress to protect yourself from frostbite and hypothermia. When outside in cold temperatures, wear warm, loose-fitting, lightweight clothing in several layers. If you get too warm, you can remove one or more layers and if you get too cold you can add layers, so you can avoid the sweat-chills cycle. Your outer garments should be tightly woven, water repellent, and have a hood. Wear a hat. Half of your body heat can be lost from your head. Mittens, snug at the wrist, are better than gloves. Try to stay dry. If it is extremely cold, cover your mouth to protect your lungs.

If, during severe cold, your home loses power or heat, go to a designated public shelter. For information on designated shelters, contact your local emergency management office or American Red Cross chapter.

Home fires occur more frequently in the winter because people do not take the proper safety precautions when using alternative heating sources. Be sure all heating sources are installed according to local codes and permit requirements. To protect yourself, be sure that you never leave a fire unattended, that you dispose of ashes properly and only after they are completely cold, and that you operate and position space heaters only according to the manufacturer's instructions. Use only space heaters approved by an independent testing laboratory. Fire during winter storms is exceptionally dangerous because conditions may make it difficult for firefighters to get to the fire, and the water needed to fight the fire may be frozen.

In addition, every winter people are killed by carbon monoxide (CO) emitted by fuels they are using to heat their homes. Never operate unvented fuel-burning appliances in any closed room or where people are sleeping. CO poisoning from fuel-burning appliances kills people each year in the United States. Never use gas appliances such as ranges, ovens, or clothes dryers to heat your home. Do not use charcoal grills indoors or in attached garages.

Never use a portable generator in an enclosed or partially enclosed space, including in your home, or in a garage, basement, crawl space, or other partially enclosed area, even with ventilation. Opening doors and windows or using fans will not prevent CO buildup. Locate a portable generator outdoors and away from doors, windows, and vents that could allow CO to come indoors. Portable generators can produce high levels of deadly CO very quickly. In addition to producing toxic engine exhaust, portable generators can cause electric shock or electrocution and fire. (See Appendix: Portable Generators.)

What is the best source of information about winter weather?
Local radio or television stations or NOAA Weather Radio are the best sources of information about winter weather conditions.

NOAA Weather Radio is the prime alerting and critical information delivery system of the National Weather Service (NWS). NOAA Weather Radio broadcasts warnings, watches, forecasts, and other hazard information 24 hours a day over more than 650 stations in the 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific territories.

The NWS encourages people to buy a weather radio equipped with the Specific Area Message Encoder (SAME) feature. This feature automatically alerts you when important information about winter weather and other hazards is issued for your area. Information on NOAA Weather Radio is available from your local NWS office or at www.nws.noaa.gov/nwr.

Wind Chill Temperature
The wind chill temperature is how cold people and animals feel when they are outside. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As wind increases, heat is carried away from the body at a faster rate. This drives down the body temperature. Therefore, the wind makes it feel much colder. The wind chill temperature is not the actual temperature but rather how wind and cold feel on exposed skin.

Outlook, Watch, Warning, Advisory

A **Winter Storm OUTLOOK** means winter storm conditions are possible in the next two to five days. Stay tuned to local media for updates.

A Winter Storm WATCH means winter storm conditions are possible within the next 36 to 48 hours. People in a watch area should review their winter storm plans (Family Disaster Plan, Disaster Supplies Kit) and keep informed about weather conditions.

A **Winter Storm WARNING** means life-threatening, severe winter conditions have begun or will begin within 24 hours. People in a warning area should take precautions **immediately.**

A **Blizzard WARNING** means sustained winds or frequent gusts of 35 miles (56 kilometers) per hour or greater and considerable falling or blowing snow that reduces visibility to less than a quarter mile (0.4 kilometer) are expected to prevail for a period of three hours or longer. People in a warning area should take precautions **immediately.**

A **Winter Weather ADVISORY** means winter weather conditions are expected to cause significant inconveniences and may be hazardous. If you are cautious, these situations should not be life threatening.

Outlooks, watches, warnings, and advisories are issued by the National Weather Service (NWS) and broadcast on NOAA Weather Radio and on local radio and television stations

Is your community StormReady? To help people prepare for the ravages of hazardous weather, the National Weather Service has designed StormReady, a program aimed at arming America's communities with the communication and safety skills necessary to save lives and property. More information is available at www.stormready.noaa.gov/.

Carbon Monoxide Alarm
Every home should have properly installed and maintained carbon monoxide (CO) alarms that meet current safety standards. (See Appendix: Carbon Monoxide Alarms.) CO alarms can help detect CO, a colorless, odorless gas produced by burning any fuel. Exposure to high levels of CO can cause death. The initial symptoms of CO poisoning are similar to the flu and include dizziness, fatigue, headache, nausea, and irregular breathing.

ACTION MESSAGES

Be Prepared for a Winter Storm

Protect Yourself

CORE ACTION MESSAGES

- Install and maintain smoke and carbon monoxide alarms.
- Keep cold-weather clothing, supplies, and equipment ready.
- Inspect heating equipment and have it serviced as needed.

For general preparedness, every household should create and practice a Family Disaster Plan and assemble and maintain a Disaster Supplies Kit. In addition, every household should take specific precautions and make specific plans for cold weather.

If you live in an area where severe winter weather is possible, you should:

Talk with members of your household about what to do if a winter storm watch or warning is issued. Discussing winter storms ahead of time helps reduce fear and helps everyone know how to respond during a winter storm.

- **Install smoke alarms.** For new homes, interconnected smoke alarms are required on every level of the home, outside each sleeping area and inside each bedroom. Although this approach is ideal for all homes, as a minimum, existing homes should have smoke alarms on every level and outside each sleeping area. Test and maintain them according to the manufacturer's instructions. (See Appendix: Smoke Alarms.)
- **Install carbon monoxide (CO) alarms following the manufacturer's instructions. It is especially important to have one near sleeping areas.** Test and maintain them according to the manufacturer's instructions. (See Appendix: Carbon Monoxide Alarms.)
- **Get training.** Take an American Red Cross first aid course to learn how to treat exposure to the cold, frostbite, and hypothermia.
- **Service snow removal equipment before the winter storm season and maintain it in good working order.**
- **Keep your vehicle's gas tank full** so you can leave right away in an emergency and to keep the fuel line from freezing.
- **Keep a supply of non-clumping kitty litter** to make walkways and steps less slippery. Kitty litter temporarily improves traction on an icy surface. Rock salt melts ice on walkways, but it can damage vegetation and concrete. You may find other, less damaging, ice-melting products at building supplies stores.
- **Keep handy** a warm coat, gloves or mittens, hat, water-resistant boots, and extra blankets and warm clothing for each member of the household.
- **Make sure your home heating sources are installed according to local codes and permit requirements and are clean and in working order.** Many home fires are started by poorly maintained furnaces or stoves, cracked or rusted furnace parts, or chimneys with creosote buildup.
- **Be sure all portable and fixed electric space heaters have been certified by an independent testing laboratory.** Keep blankets, clothing, curtains, furniture, and anything that could get hot and catch fire at least three feet away from all heat sources.

Plug heaters directly into the wall socket rather than using an extension cord and unplug them when they are not in use.

- **Use kerosene heaters only if permitted by law in your area.** Refuel kerosene heaters outdoors only after they have cooled. Kerosene has a low flash point. If mistakenly dripped on hot surfaces, it can cause fires. Do not substitute gasoline for kerosene in the heater. Make sure the area is ventilated properly. Follow all of the manufacturer's instructions.
- **Have chimneys and wood stoves inspected annually and cleaned if necessary.** Chimneys and wood stoves build up creosote, which is the residue left behind by burning wood. Creosote is flammable and needs to be professionally removed periodically. Store ashes in a metal container with a tight-fitting lid.
- **Bring your companion animals inside during winter weather.**

Protect Your Property

CORE ACTION MESSAGES
- Guard against fire and CO poisoning.
- Insulate your home and protect the pipes.

If you live in an area where severe winter weather is possible, you should:

- **Make sure your home is properly insulated.** If necessary, insulate the walls and attic to reduce your home's power demands for heat. Caulk and weather-strip doors and windowsills to keep cold air out.
- **Install storm windows or cover windows with plastic from the inside** to provide an extra layer of insulation to keep cold air out.
- **Protect pipes from freezing by:**
  -Wrapping pipes in insulation or layers of newspaper and then covering them with plastic to keep out moisture.
  -Letting faucets drip a little.
- **Know how to shut off the main water valve and how to shut off and drain outside faucets.** Outside faucets are often controlled by a valve inside the home. Keep a wrench near the valves.
- **Install heat tape on water pipes.** Put the tape on all exterior water pipes and interior pipes located on outside walls or anywhere else that temperatures could go below freezing. Follow carefully the manufacturer's instructions for installation.
- **If the pipes freeze,** remove any insulation or newspaper and wrap the pipes in rags. Completely open all faucets and pour hot water over the pipes, starting where they were most exposed to the cold or where the cold most likely penetrated. A hand-held hair dryer, used with caution to prevent overheating, also works well.
- **Consider buying emergency heating equipment, such as a wood- or coal-burning stove or an electric or kerosene heater.** If you have a stove, be sure it is properly vented and in good working order and that you dispose of ashes safely. Keep a supply of wood or coal on hand. If you have an electric space heater, either portable or fixed, be sure it is certified by an independent testing laboratory. Plug a heater directly into the wall socket rather than using an extension cord and unplug it when it is not in use. Use a kerosene heater only if permitted by law in your area; check with your local fire department. If you have a kerosene heater, use only the correct fuel for your unit. Properly ventilate the area of use. Refuel the unit outdoors only, and only when the unit

is cool. Follow all of the manufacturer's instructions. Keep all heaters at least three feet away from furniture and other flammable objects.

- **When using fireplaces, stoves, and space heaters, ventilate properly and guard against fire.** Using alternative sources of heat such as these greatly increases your risk for fire and carbon monoxide (CO) poisoning.
- **Consider storing sufficient heating fuel.** Regular fuel sources may be cut off. Be cautious of fire hazards when storing any type of fuel.
- **If you have a fireplace, consider keeping a supply of firewood or coal.** Be sure the fireplace is properly vented and in good working order and that you dispose of ashes safely.
- **Install snow fences in rural areas** to reduce drifting snow on roads and paths, which could block access to homes, barns, and animals' feed and water.
- **Create a place where your animals can be comfortable in severe winter weather.** Bring your companion animals indoors. Horses and livestock should have a shelter where they can be protected from wind, snow, ice, and rain. Grazing animals should have access to a protected supply of food and non-frozen water.
- **Be aware of the potential for flooding when snow and ice melt and be sure that your animals have access to high ground that is not impeded by fencing or other barriers.** You may not be able to get to them in time to relocate them in the event of flooding.
- **Ensure that any outbuildings that house or shelter animals can withstand wind and heavy snow and ice.**
- **Consider purchasing flood insurance,** if you live in a flood-prone area, to cover possible flood damage that may occur during the spring thaw. Homeowners' policies do not cover damage from floods. Ask your insurance agent about the National Flood Insurance Program (NFIP) if you are at risk. More information on NFIP is available at www.fema.gov/nfip.

What to Do Before a Winter Storm

CORE ACTION MESSAGES
- Stay informed.
- Know the location of public shelters.

You should:

- **Keep handy a battery-powered radio or television or NOAA Weather Radio with the Specific Area Message Encoder (SAME) feature.**
- **Contact your local emergency management office or American Red Cross chapter for information on designated public shelters in case you lose power or heat.**
- **Check your Disaster Supplies Kit, and keep it handy.**
- **Be sure you have ample heating fuel.**
- **If you have alternative heating sources, such as fireplaces, wood- or coal-burning stoves, or space heaters, be sure they are installed according to local codes and permit requirements and are clean and in working order.**
- **Check that your fire extinguisher(s) is in good working order, and replace it if necessary.** (See Appendix: Fire Extinguishers.)

- **Bring your companion animals inside and ensure that your horses and livestock have blankets if appropriate and unimpeded access to shelter, food, and non-frozen water.**

What to Do During a Winter Storm Watch

CORE ACTION MESSAGES
- Stay informed.
- Shelter animals.
- Stay inside if possible.

- **Listen to NOAA Weather Radio or a local radio or television station for updated information.**
- **Watch for changing weather conditions.** Severe weather can happen quickly. Temperatures may drop rapidly, winds may increase, or snow may begin to fall at heavier rates. Even local media may not know moment by moment what is happening in your particular area.
- **Move animals to sheltered areas with a supply of non-frozen water.** Most animal deaths in winter storms are caused by dehydration.
- **Ensure that you have supplies for clean-up for your companion animals,** particularly if they are used to eliminating outdoors (large plastic bags, paper towels, and extra cat litter).
- **Avoid unnecessary travel.** The safest place during a winter storm is indoors. About 70 percent of deaths related to ice and snow occur in automobiles.

What to Do During a Winter Storm Warning or a Blizzard Warning

CORE ACTION MESSAGES
- Stay informed.
- Stay inside if possible.
- Dress warmly in layers.
- Watch for dangers.

- **Stay indoors and wear warm clothes.** Layers of loose-fitting, lightweight, warm clothing will keep you warmer than a bulky sweater. If you feel too warm, remove layers to avoid sweating; if you feel chilled, add layers.
- **Listen to a local station on battery-powered radio or television or to NOAA Weather Radio for updated emergency information.**
- **Bring your companion animals inside before the storm begins.**
- **Eat regularly.** Food provides the body with energy for producing its own heat.
- **Keep the body replenished with fluids to prevent dehydration.** Drink liquids such as warm broth or juice. Avoid caffeine and alcohol. Caffeine, a stimulant, accelerates the symptoms of hypothermia. Alcohol, such as brandy, is a depressant and hastens the effects of cold on the body. Alcohol also slows circulation and can make you less aware of the effects of cold. Both caffeine and alcohol can cause dehydration.

- **Conserve fuel.** Winter storms can last for several days. Great demand may be placed on electric, gas, and other fuel distribution systems (fuel oil, propane, etc.). Suppliers of propane and fuel oil may not be able to replenish depleted supplies during severe weather. Electric and gas services may be temporarily disrupted when many people demand large amounts at the same time. Lower the thermostat to 65° F (18° C) during the day and to 55° F (13° C) at night. Close off unused rooms, and stuff towels or rags in cracks under the doors. Cover the windows at night.
- **If you must go outside, protect yourself from winter storm hazards:**
  -Wear layered clothing, mittens or gloves, and a hat. Layered clothing will keep you warmer than a single, heavy coat. Outer garments should be tightly woven and water repellent. Mittens or gloves and a hat will prevent the loss of body heat. Mittens are warmer than gloves because your fingers maintain more warmth when they touch each other. Half of your body-heat loss is from your head.
  -Cover your mouth to protect your lungs from severely cold air. Avoid taking deep breaths; minimize talking.
  -Watch for signs of hypothermia and frostbite. (See Appendix: Frostbite and Hypothermia.)
  -Keep dry. Change wet clothing frequently to prevent a loss of body heat. Wet clothing loses much of its insulating value and transmits heat rapidly away from the body.
  -Stretch before you go out. If you go out to shovel snow, do a few stretching exercises to warm up your body. This will reduce your chances of muscle injury.
  -Avoid overexertion, such as shoveling heavy snow, pushing a vehicle, or walking in deep snow. The strain from the cold and the hard labor may cause a heart attack. Sweating could lead to a chill and hypothermia.
- **Walk carefully on snowy, icy sidewalks.** Slips and falls occur frequently in winter weather, resulting in painful and sometimes disabling injuries.
- **If you must go out during a winter storm, use public transportation if possible.** About 70 percent of winter deaths related to ice and snow occur in automobiles.
- **Check on relatives, neighbors, and friends, particularly if they are elderly or if they live alone.**

Driving in Winter Conditions

CORE ACTION MESSAGES
- Winterize your vehicle and stock it with emergency supplies.
- Avoid driving in a winter storm.
- If stranded, stay with the vehicle and keep warm.

You should:

- **Have your vehicle winterized** before the winter storm season. Keeping your vehicle in good condition will decrease your chance of being stranded in cold weather. Have a mechanic check your battery, antifreeze, wipers and windshield washer fluid, ignition system, thermostat, lights, flashing hazard lights, exhaust system, heater, brakes, defroster, and oil level. If necessary, replace existing oil with winter-grade oil. Install good winter tires. Make sure the tires have adequate tread. All-weather radials are usually adequate for most winter conditions. However, some jurisdictions require that vehicles on their roads be equipped with chains or snow tires with studs.

- **Check your vehicle emergency supplies kit and replenish it if necessary.** (See Appendix: Emergency Supplies for Your Vehicle.)
- **If you will be driving in wintry conditions, in addition to the usual emergency supplies you keep in your vehicle, be sure to keep enough of the following for each person:**
  -Blankets or sleeping bags.
  -Rain gear, extra sets of dry clothing, mittens, socks, and wool hats.
  -Newspapers for insulation.
  -Plastic bags for sanitation.
  -Canned fruit, nuts, and high energy "munchies." (Include a non-electric can opener if necessary.)

  Keep in your vehicle:
  -A windshield scraper and small broom for ice and snow removal.
  -A small sack of sand for generating traction under wheels and a set of tire chains or traction mats.
  -Matches in a waterproof container.
  -Cards, games, and puzzles.
  -A brightly colored (preferably red) cloth to tie to the antenna.
- **Keep a cell phone or two-way radio with you when traveling in winter.** Make sure the battery is charged.
- **If you must be on the road during a winter storm, bring warm broth in a thermos and several bottles of water for each person.**
- **Keep your vehicle's gas tank full so you will be ready in case of emergency and to prevent the fuel line from freezing.**
- **Plan to travel during daylight and, if possible, take at least one other person with you.**
- **Let someone know your destination, your route, and when you expect to arrive.** If your vehicle gets stuck along the way, help can be sent along your predetermined route.
- **Before leaving, listen to weather reports for your area and the areas you will be passing through, or call the state highway patrol for the latest road conditions.**
- **Be on the lookout for sleet, freezing rain, freezing drizzle, and dense fog, which can make driving very hazardous.**
- **Avoid traveling during a winter storm.**
- **If you must travel and do become stranded, it is better to stay in the vehicle and wait for help.** Do not leave the vehicle to search for assistance unless help is visible within 100 yards (91 meters). You can quickly become disoriented and confused in blowing snow.
- **If you are stuck in a vehicle:**
  -Display a trouble sign to indicate you need help. Hang a brightly colored cloth (preferably red) on the radio antenna and raise the hood after snow stops falling.
  -Run the engine occasionally to keep warm. Carbon monoxide can build up inside a standing vehicle while the engine is running, even if the exhaust pipe is clear. Running the heater for 10 minutes every hour generally is enough to keep the occupants warm. Running the engine for only short periods reduces the risk of carbon monoxide poisoning and conserves fuel. Turn on the engine for about 10 minutes each hour (or five minutes every half hour). Use the heater while the engine is running. Keep the exhaust pipe clear of snow, and slightly open a downwind window for ventilation.
  -Leave the overhead light on when the engine is running so that you can be seen.

-**Do light exercises to keep up circulation.** Clap your hands and move your arms and legs occasionally. Try not to stay in one position for too long.
-**If more than one person is in the vehicle, take turns sleeping.** One of the first signs of hypothermia is sleepiness. If you are not awakened periodically to increase body temperature and circulation, you can freeze to death.
-**Huddle together for warmth.** Use newspapers, maps, and even the removable floor mats for added insulation. Layering items will help trap more body heat.
-**Watch for signs of frostbite and hypothermia.** Severe cold can cause numbness, making you unaware of possible danger. Keep fingers and toes moving for circulation, and drink warm broth to reduce the risk of further injury.
-**Drink fluids to avoid dehydration.** Bulky winter clothing can cause you to sweat, but cold dry air will help the sweat evaporate, making you unaware of possible dehydration. When people are dehydrated, they are more susceptible to the ill effects of cold and to heart attacks.
-**Avoid overexertion.** Cold weather puts an added strain on the heart. Unaccustomed exercise, such as shoveling snow or pushing a vehicle, can bring on a heart attack or make other medical conditions worse.

What to Do After a Winter Storm

CORE ACTION MESSAGES
- Stay informed.
- Avoid travel.
- Avoid overexertion.

You should:

- **Keep listening to a local radio or television station or NOAA Weather Radio for updated information and instructions.** Access to some parts of the community may be limited or roads may be blocked.
- **Help people who require special assistance**—infants, elderly people, those without transportation, large families who may need additional help in an emergency situation, people with disabilities, and the people who care for them.
- **Avoid driving and other travel until conditions have improved.** Roads may be blocked by snow or emergency vehicles.
- **Avoid overexertion.** Heart attacks from shoveling heavy snow are a leading cause of death during the winter.
- **Keep up with local weather forecasts and be prepared when you go outside.** Major winter storms are often followed by even colder conditions.
- **Check on your animals and ensure that their access to food and water is unimpeded by drifted snow, ice, or other obstacles.**

For information on **portable-generator safety** and **carbon monoxide poisoning,** see Appendix: Portable Generators.

Media and Community Education Ideas

- Sponsor a "Winter Weather Awareness Day" a week or so before winter storm season begins. This is a good way to get emergency management officials and local Red Cross representatives involved.
- Ask your local newspaper or radio or television station to:
  -Do a series on the dangers of winter storms and severe cold, with special emphasis on what people should do if they are caught out in the open or in a vehicle.
  -Highlight the importance of staying informed about local weather conditions.
  -Run public service ads about how to protect lives in winter storms and extreme cold.

  Help the reporters to localize the information by providing them with the local emergency telephone number for the fire, police, and emergency medical services departments (usually 9-1-1) and emergency numbers for the local utilities and hospitals. Also provide business telephone numbers for the local emergency management office and American Red Cross chapter.
- Inform your community about the different National Weather Service announcements—winter storm outlook, winter storm watch, winter storm warning, blizzard warning, winter weather advisory.
- In the fall, present information sessions about safe practices for the coming season of cold weather and winter storms. Include information on alternative heat sources and home insulation.
- Interview local physicians about the dangers of hypothermia and other winter health conditions. Include discussions of exhaustion and heart attacks caused by overexertion.
- Advise people of the dangers of winter driving, and warn them that driving in winter storms can be a risk to their lives. Produce a series of announcements on what people should do if they are stuck in a vehicle during a blizzard.

Facts and Fiction

Fiction: If you are stuck in a car in a snowstorm, the best thing to do is to get out and look for help.
Facts: You should stay in your vehicle and wait for rescuers. If you leave your vehicle in wind-driven snow, you could quickly become disoriented. Make the vehicle visible to rescuers (tie a colored cloth to the antenna or door, turn on the dome light when running the engine for heat, raise the hood when the snow stops falling). If you have a cell phone, call a towing company or 9-1-1 or the local emergency number.

Fiction: In severe cold, it is best to stay warm by wearing a very heavy coat.
Facts: You should wear loose, lightweight, warm clothes in layers. Trapped air insulates. Remove layers to avoid perspiration and subsequent chill. Outer garments should be tightly woven, water repellent, and hooded. Wear a hat. Half your body-heat loss can be from the head. Cover your mouth to protect your lungs from extreme cold. Mittens, snug at the wrist, are better than gloves. Try to stay dry.