Animals in Disasters

MODULE A
UNIT 4

Meteorological Hazards: Applying the Four Phases

Overview

This unit covers meteorological hazards including tornadoes, floods, thunderstorms and winter storms. It defines each of these hazards and provides practical information for applying the four phases of emergency management in relation to these hazards. It focuses on protecting animals during such emergencies.

Objectives

Upon completion of this unit you should be able to:

- Define meteorological hazards that threaten the United States
- Protect yourself against meteorological hazards
- Protect animals against meteorological hazards
- Apply the four phases of emergency management to meteorological hazards

Types of disasters

The most common disasters result from meteorological (weather-related) and geological events and can affect any area of the United States. Their impact can be localized or widespread, predictable or unpredictable. Damage can range from minimal to major. Depending on the severity of the incident, they can have a long-term impact on the infrastructure (roads, bridges, and utilities) of any location. Threats involving natural forces include thunderstorm, flood, tornado, hurricane, winter storm, drought, wildfire, landslide, earthquake, tsunami, volcano and dam failure. Technological (man-made) hazards include hazardous materials releases and spills, nuclear accidents and many consequences of natural disasters.

Natural hazards are usually more predictable than any other type of hazard. Although we cannot know exactly when or where they will

strike, or how severe they will be, we recognize from past experience which geographical areas are most vulnerable to certain types of natural hazards. This knowledge helps us better prepare for and respond to natural hazards.

As you read through the following information on natural hazards, remember that each type of hazard has unique characteristics, yet common elements. These characteristics allow you to prepare and protect yourself and your animals. In particular, you should learn about the disasters most likely to occur in your geographical area.

Thunderstorms

Thunderstorms are a violent form of air convection. As warm air rises, storm clouds develop that can dump large amounts of rain or hail on localized areas. Violent lightning can strike the ground several miles away from its parent cloud. Thunderstorms can cause tornadoes and flash floods.

At least 100,000 thunderstorms occur annually across the United States. Their frequency and potential for violence makes them one of nature's greatest killers and destroyers. In an average year, lightning kills between 200 and 300 people. Lightning also kills grazing livestock and horses. Annual property loss resulting from thunderstorms, including damage to farms and barns, is estimated in the hundreds of millions of dollars. Lightning is also a major cause of wildfires.

The National Severe Storms Forecast Center in Kansas City, Missouri, issues severe thunderstorm watches. Local National Weather Service offices issue warnings and statements about severe weather and localized storms.

Severe thunderstorm watch	Conditions are right for: ◣ Lightning or damaging winds greater than 58 mph, ◣ Hail that could reach a diameter of 0.75 inches, and ◣ Heavy rain. A thunderstorm watch indicates that you should take action to protect yourself and your animals.

Severe thunderstorm warning	Severe thunderstorms have been sighted in your area.

Animals, especially dogs, can often hear thunderstorms before humans and may show this by becoming anxious, hiding, and vocalizing. Horses will sometimes run frantically around their pasture.

Mitigation

There are a number of specific measures you can adopt to mitigate the impact of thunderstorms. Here are a few examples:

- Install lightning suppression systems on all high-risk buildings, including those where animals are kept.
- Insure crops against storm damage loss through the Federal Crop Insurance Corporation of the U.S. Department of Agriculture.
- Because lightning strikes can cause fire; install appropriate sprinkler systems and smoke detectors.
- Support the adoption and enforcement of a floodplain management ordinance.
- Buy flood insurance through your local property insurance agent (thunderstorms often cause flooding).
- If you live in a manufactured (mobile) home, securely tie it to a solid foundation or anchors to keep the wind from shifting it or turning it over.
- Build fences around single trees in pastures where horses and livestock graze so they will not congregate under these trees in storms.

Preparedness

There are several steps that you can take to keep yourself and your animals safe during thunderstorms. Some preparedness actions are listed below.

- If you plan to be outdoors or your animals are kept outside, check the latest weather forecast and keep an eye on the sky. When you observe signs of an impending storm, such as towering thunderheads, darkening skies, lightning, and increasing winds, listen to the National Oceanic and Atmospheric Administration (NOAA) weather forecast, or a local radio or television station for the latest information.

- Designate a safe area in or near your home to shelter your family and animals in a severe thunderstorm. Teach family members what to do in a storm if they are at home, outside, or in a car, including how to relocate animals to safe locations.
- Prepare a disaster supply kit that includes:
  - flashlights and extra batteries
  - a battery-powered radio
  - a carrier to confine smaller animals
  - enough drinking water for you and your animals
  - contact your local Red Cross for information on other essential supplies

If you have animals that get nervous and pose a safety risk in thunderstorms, contact your veterinarian for advice on how to mitigate this situation.

Response

Here are some recommendations that you should consider when responding to a thunderstorm hazard:

- Evacuate from a manufactured (mobile) home with your animals during a severe thunderstorm.
- Get inside a storm shelter, home or large building. Avoid using the telephone except for emergencies, and stay away from windows.

If you are outside and do not have time to reach a safe building or an automobile, follow these rules:

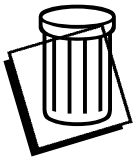
- Avoid standing under a natural lightning rod such as tall, isolated trees in an open area.
- Keep yourself and any animals away from open water, such as a lake, pond, or river.
- Keep yourself and any animals away from tractors and other metal farm equipment.
- Get off of and stay away from motorcycles, scooters, golf carts, and bicycles. Put down golf clubs.

- Keep yourself and any animals away from wire fences, clotheslines, metal pipes, rails, umbrellas and other metallic paths that could carry lightning to you from some distance away.
- Move yourself and any animals to a low place such as a ravine or valley but remain alert for flash floods.
- If you feel your hair stand on end (which shows that lightning is about to strike), stand on the tip of your toes and curl your body into a tight ball. Ideally you want to be as low as possible with as little contact with the ground as is possible. Do not lie flat.
- A person or animal struck by lightning will receive a severe electrical shock and may be burned. They will carry no electrical charge and can be handled safely. Give first aid and get emergency medical assistance immediately.
- Victims who appear only stunned or otherwise unhurt may also need appropriate medical attention. Check for burns in people especially fingers and toes next to buckles and jewelry. In animals check areas around collars and leashes.
- More than one storm may strike an area within a few hours. Once one storm subsides, be certain there are no more storms approaching before resuming normal activity.
- Provide fresh feed for animals, many will refuse to eat waterlogged feed and minerals.

Recovery

Severe thunderstorms cause extensive power outages, agricultural damage, and may lead to flooding.

- Make sure that any animal enclosures are secure before placing animals in them.
- In pasture areas, remove any debris that might injure animals or that animals may accidentally eat.
- If your house or farm have sustained damage, have the damage assessed as required by your property insurance company.
- Clean up and repair damage as soon as authorized by your insurer.



LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT THUNDERSTORMS?

This activity is designed to assess your understanding of the information presented in this unit.
Directions: Answer the questions – use the Answer Key in Unit 10 to check your answers.

True or False

1. In an average year lightning kills between 200 and 300 people in the United States.

2. Lightning is a significant cause of wildfires.

3. A severe thunderstorm watch indicates that thunderstorms have been sighted in your area.

4. Animals in pastures should be provided with sources of shade and shelter that are not prone to a lightning strike during thunderstorms.

5. It is not safe to stay in a manufactured (mobile) home during a severe thunderstorm.

6. People and animals are protected from lightning during thunderstorms by taking cover under a tall isolated tree in an open area.

7. A person or animal struck by lightning will receive a severe electrical shock; however, they will carry no electrical charge and can be safely handled.

Multiple Choice

8. Thunderstorms are NOT associated with which one of the following events?
   a. Tornadoes
   b. Flash floods
   c. Wildfires
   d. Drought

9. A measure to mitigate the impact of thunderstorms includes which one of the following?
   a. Check weather forecasts
   b. Evacuate with your animals
   c. Clean up and repair damage
   d. Obtain appropriate insurance

10. When preparing for thunderstorms, which one of these items should be available for the care of animals?
    a. Carriers for small animals
    b. Important documents
    c. Enough food for one week
    d. Electric powered radio

Floods

The transformation of a calm, slow-flowing river into a violent and destructive flood occurs hundreds of times each year. Floods are one of the most common natural disasters in the United States and no area is completely free from the threat of floods. In the average year:

- More than 300,000 people are driven from their homes by floods,
- 200 flood-related fatalities occur,
- $2 billion in total flood damages are sustained, and
- Animals that are affected by floods risk death from hypothermia and drowning.

Floods are classified according to whether they are slow or fast rising. Slow-rising floods are typical as flood waters move down a river or stream and can often be predicted to reach a certain height. Flash floods are usually the result of extremely heavy rain or melting snow and occur suddenly. They can also result from a dam or levee failure.

If you live near a dam you should understand your community's dam failure warning signals. Warnings may be issued by sirens, horns, radio, television, or door-to-door canvassing by local emergency personnel. Federal agencies also conduct stream-flow monitoring to provide advanced warning of a flash flood.

The National Weather Service, local police, the sheriff, the highway patrol, the county flood control district office, or other local agencies issue flood watches and warnings.

Flash flood watch	Issued when flash flooding is possible within the designated watch area: be alert. Listen to your radio for flood forecasts and prepare for evacuation with your animals.
Flash flood warning	Issued when a flash flood has been reported or is imminent: take necessary precautions.
Flood warning	Issued as an advance notice that a flood is imminent or is in progress at a certain location or in a certain river basin. Take precautions as directed. Start to relocate large animals that are in danger.

Mitigation

Proper land-use management and strict enforcement of building codes, with special attention to floodplains, has helped reduce some of the high cost of losses due to flooding. There are other actions that may mitigate the impact of floods.

- Determine if you are in the floodplain. You can obtain this information from your county government. The National Flood Insurance Program (NFIP) is a Federal program enabling property owners to purchase flood insurance. Ask your local property insurance agent about flood insurance.
- Before you build or buy a home below a dam, learn as much as you can about its safety record.
- Check local building codes and ordinances. Install check valves in building sewer traps to prevent floodwater from backing up in sewer drains. The cost of protecting your home or farm may be expensive, but the investment may save the lives of people and valued animals.
- Avoid building in a floodplain. If you graze livestock or horses in floodplains, be prepared to move them to higher ground before low-lying evacuation routes become flooded. Consult with your State natural resources department if you plan to alter landscape on your property in such a way that it may affect the flow of water in a flood.
- Many farms operate manure pits and lagoons that are susceptible to flooding. Consult with your State departments of environmental management or natural resources on how to prevent overflow of these waste treatment facilities into local streams, rivers, or even the drinking water supply.
- Construct buildings for the storage of farm chemicals such as fertilizer, herbicides, pesticides and fuels so that these have minimal chance of contaminating the environment. Spilled chemicals are a potential cause for liability suits after disasters.

Preparedness

Preparing for floods includes actions such as stockpiling and replenishing emergency supplies, planning evacuation routes, and ensuring that equipment and vehicles are in proper working condition. Listed below are some guidelines to follow when preparing for a flood emergency.

- Stockpile and replenish emergency building materials such as sandbags, plastic sheeting, and lumber.

- Keep your car, truck, or other vehicles fueled. If electric power is disrupted, gas station pumps may be out of operation for several days.
- Check your horse or livestock trailers to make sure they are in useable condition.
- Make family and animal evacuation plans. If you are in a flash flood area, have several alternate routes to ensure rapid evacuation. If you have a large number of cattle or horses, anticipate the course flood waters might take. Start moving animals in advance of any danger. Even if the evacuation turns out to have been unnecessary, at least you have practiced for the time when it might be.
- Maintain a disaster supply kit that includes items such as a first aid kit, water, foods that require little or no cooking or refrigeration, a portable radio, emergency cooking equipment, flashlights, and batteries. Be sure to also maintain a supply of food for your animals.
- You should have a way to keep animals safely confined while they are evacuated and living in a temporary setting.
- Ensure that animals are properly identified – keep a collar and identification tag on pets at all times so that if they get lost during a flood, you have a better chance of getting them back. Ideally tags should also list an out-of-state contact.
- Store drinking water in jugs, bottles, and pans. Be sure to include enough water for the animals in your household.
- Maintain your animal's vaccinations against rabies and tetanus.

Response

The immediate danger from flash floods is from the strength of the water current as it surges through an area, carrying debris and causing injuries and drowning. This is a particular concern for farms and livestock.

- Floods can interrupt power, disable fuel sources, and make roads impassable.
- People may be stranded in their homes and farms or be unable to reach their homes.
- Landslides may follow flooding.

Seconds may make the difference between life and death. If you hear a flash flood warning on the radio or television, or hear the roar of approaching waters, act immediately.

- Head for the nearest high ground without hesitation, bringing with you animals in danger.
- Even if you are not sure where to take your animals, do not leave them behind (unless it would compromise your safety).
- If you must leave an animal behind, ensure that it always has an easy escape route. Never tie an animal up if floods are pending. Many animals have died during floods when owners left them confined.

As flood waters rise, take these key precautions:

- Secure all outdoor items or store them inside on upper levels.
- Move all valuable household possessions to upper levels above rising water.
- Move cars, machinery, and all livestock to higher ground.
- Check emergency food and water supplies and move them to a high-and-dry place.
- Listen to radio announcements from emergency officials. If you are told to evacuate, do so immediately. Use only those routes recommended by local authorities. Any other route could be blocked or otherwise made impassable by flooding. At the earliest sign of danger, start moving your animals to a safe location.
- If there is time before evacuation, turn off all utilities at the main switch. Do not touch any electrical equipment unless it is in a dry area. Always wear well insulated rubber footwear and gloves.
- Do not attempt to drive over a flooded road; you can become stranded or trapped. If your car stalls while in flowing water, abandon it immediately, taking with you any animals (unless it would compromise your safety). Cars may only serve as traps in the face of a raging flood. If you are evacuating horses, do not ride them through swift moving, deep water.
- Do not attempt to cross flowing water that is above your knees.

Recovery

Large-scale flooding can disrupt a community for a long time while utilities are restored, debris is cleared, and property is repaired. Dangers include:

- Outbreak of disease,
- Widespread animal death,
- Broken sewage lines and widespread water supply pollution,
- Broken gas lines, downed power lines, and fires.

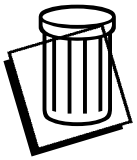
Keep animals away from any of these dangers. Agricultural and grazing lands can be ruined and crops destroyed by flooding, decreasing the food supply for people and livestock. Fungal contamination of animal feed can be toxic to animals and humans who consume the meat or milk of cattle that ingest these fungal toxins.

During the recovery process, safety precautions may prevent further damage. Listed below are some precautions that will help you as you recover from a flood.

- Do not use food that has come in contact with flood waters. This includes any feed for animals. If there is a boil water order in effect, continue to take this precaution until officials tell you the tap water is safe to drink. Do not give animals tap water until it has been boiled or determined safe. Wells should be flushed out and the water tested before drinking.
- Before entering a building or barn, check for structural damage. Also, look for any poisonous snakes or wildlife that may have gotten trapped inside buildings or barns.
- When entering a building, open the building and let it air out for several minutes to remove foul odors or escaped gas before entering. Do not use a match or lantern as a source of light because of the possibility of gas buildup. A battery-powered flashlight is recommended.
- Once inside a building, check for electrical shorts and live wires. Make sure the power is turned off and do not use any electricity until an electrician has checked your system. Report broken utility lines to appropriate authorities.
- Open all doors and windows to help dry the building. Shovel out mud while it is still moist to give walls and floors an opportunity to dry. If horses or livestock have to stand in mud for extended periods, they can develop foot problems.

- In a barn, empty any water containers that contain flood water, and be sure to clean them with dilute chlorine bleach or some other type of disinfectant before they are used again. Any feed or bedding that has gotten wet or damp must be disposed of so that animals cannot eat it. Moldy food can lead to serious disease in horses and livestock.
- Before horses or livestock are returned to property that has flooded, be sure that all perimeter fences are intact and any debris has been removed.

The release of hazardous materials during floods may also become a problem. This can lead to poisonings in animals that ingest or come into contact with the hazardous materials and exposure to humans that handle contaminated animals. Ingestion of and skin contact with hazardous materials by farm animals could also cause the hazardous materials to enter the human food chain. Consult with your veterinarian, department of agriculture, county extension educator or State chemist to determine the safety of the feed for animals and products for human consumption.



LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT FLOODS?

This activity is designed to assess your understanding of the information presented in this unit.
Directions: Answer the questions – use the Answer Key in Unit 10 to check your answers.

True or False

1. Fungal contamination of animal feed will not harm animals or humans.

2. Floods can be classified according to whether they are slow or fast rising.

3. After a flood, empty all containers that contain contaminated water and clean them with dilute chlorine bleach.

4. Hazardous material releases can occur during flooding.

5. Keeping animals confined during a flood is essential.

6. Following a flood, check the perimeter fences of pastures to ensure they are intact and that all debris is removed before allowing animals to graze.

7. If your car stalls while in flowing water, wait a few minutes and attempt to restart the ignition.

Multiple Choice

8. Which notification is issued when flash flooding is possible within a designated watch area.
   a. Flood watch
   b. Flood warning
   c. Flash flood watch
   d. Flash flood warning

9. Good flood preparedness includes which one of the following?
   a. Before entering a building or barn, check for structural damage
   b. Replenish emergency building materials such as sandbags, plywood and lumber in the spring
   c. Wear insulated rubber gloves and footwear
   d. Install check valves in building sewer traps

10. When returning to a building that has been flooded, take which one of the following actions?
    a. Allow animals to eat food that has gotten wet
    b. Use a match or lantern as a source of light
    c. Allow animals such as horses to return immediately
    d. Allow the building to air out before entering

Tornadoes

Tornadoes are violently rotating columns of air that descend in a funnel shape from thunderstorm cloud systems. Tornadoes can occur anywhere at any time.

The National Severe Storms Forecast Center in Kansas City, Missouri, issues tornado watches. Local National Weather Service offices issue tornado warnings.

Tornado watch	Conditions are right for a tornado to develop and that the sky should be watched.
Tornado warning	A tornado has been sighted or is spotted on radar. Warnings will give the location of the tornado and the area immediately affected by the warning.

Mitigation

Tornado warning networks save many lives each year. Each community in high and moderate risk tornado areas should have a group of volunteer spotters who watch the sky during threatening weather and report signs of a tornado to local emergency management officials, the regional office of the National Weather Service, and local farmers.

The following is a list of other mitigation activities.

- Follow relevant building code practices such as the use of wind-resistant design.
- Build tornado shelters for manufactured (mobile) home parks and implement policies that provide sheltering for pets when there is a pending tornado or other disaster.
- Replace windows in barns with materials that will not shatter and cut animals or people when broken. Store or secure any loose materials including strapping and label hazardous material tanks such as heating, oil, or propane.

Preparedness

Tornadoes develop during severe thunderstorms and hurricanes. While not all thunderstorms and hurricanes create tornadoes, the potential is there. During violent weather, stay tuned to a local television or radio station for tornado reports.

The best preparation for a tornado is to designate a tornado shelter for yourself and your animals. Tornado shelters are safest if they are underground – a storm cellar or basement away from windows offers the best protection.

If a storm shelter or basement is not available, follow these guidelines when preparing for a tornado hazard.

- Plan to find shelter under heavy furniture or mattresses near an inside wall of your house on the ground floor. Provide animals in your household with a safe area and keep them confined.
- Keep collars and identification tags on all your pets, at all times. When you evacuate take current pictures of the animals in your household, their most recent vaccination and health records, and any bills of sale for them with you.
- Conduct tornado drills with your family.
- Know the location of the designated shelter where you work or go to school. If you frequently travel with your dog in the car, keep a leash in the vehicle at all times in case you have to vacate the car during a tornado.
- If you are boarding an animal or using a pet-sitting service ask about their disaster plans and make sure they are familiar with your disaster plan while the animals are in their care.
- Plan to evacuate your manufactured (mobile) home taking your pets with you. Even if you are not sure where to take them, do not leave them behind.
- If a watch is issued, turn horses and other livestock out to an open pasture to avoid injuries from building collapse. Try to turn animals out into areas where they will not be harmed by flying debris. Ideally this will be a low-lying area where animals can choose to lie down and protect themselves.

Response

The destructive path of a tornado averages about 250 yards in width and 15 miles in length. However, in extreme conditions, a tornado may travel more than 300 miles and leave a path of total destruction more than a mile wide. Tornadoes will travel up to 60 mph with wind speeds approaching 400 mph within the tornado's center. When nearby, a tornado has a sound comparable to the combined roars of several jet engines. The immediate threat from tornadoes is danger to life and damage to property from violently whirling winds and debris hurled through the air.

Take the following actions when responding to tornadoes.

- If you have a storm cellar or shelter, go to it immediately with your family and animals. If no shelter is available, go to your basement and get under a heavy workbench or stairs.
- If your home has no basement, stay in the center of the house away from the windows or in a small room on the ground floor that is away from outside walls. Take cover under solid furniture or mattresses. Protect your head.
- In manufactured (mobile) homes or vehicles, leave and take shelter in a substantial structure, taking your animals with you. If there is no nearby shelter, lie flat in the nearest ditch or ravine with your hands shielding your head.
- Do not drive. If you are driving and spot a tornado, get out of your car and go into a nearby building or ditch taking your animals with you. Protect your head and stay low to the ground.
- After a tornado passes, stay tuned to the local radio or television station to get an all-clear signal before leaving your shelter. Sometimes more than one tornado will develop during a violent storm.

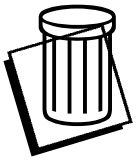
Recovery

Tornadoes are part of a severe thunderstorm and may bring with them the dangers of lightning, high winds, floods, and flash floods from extremely heavy rainfall. Other risks include:

- The possibility of building collapse,
- Fallen trees and downed power lines,
- Broken gas lines,
- Broken sewer or water mains,
- Hazardous materials releases, and
- Fires.

Be alert to additional hazards and take the following precautions.

- Consult with your veterinarian if you are concerned about the health of your animal, or with the agriculture department, county extension educator or State chemist if you are concerned about contamination of your livestock or your animals' feed.
- Re-enter buildings with extreme caution.
- Be alert to fire hazards such as broken electrical wires or damaged electrical equipment, gas or oil leaks, other hazardous materials or smoldering piles of wet hay or feed. Report downed utility lines or other hazards to appropriate authorities.
- Do not use food that may have been contaminated. This includes any food for animals. If there is a boil water order in effect, continue to take this precaution until officials tell you the tap water is safe to drink. Do not give tap water to pets until it has been boiled or otherwise determined safe.
- Keep animals safely confined until the area has been cleared of debris.



LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT TORNADOES?

This activity is designed to assess your understanding of the information presented in this unit.
Directions: Answer the questions – use the Answer Key in Unit 10 to check your answers.

True or False

1. Thunderstorms and tornadoes have the potential to create hurricanes.

2. Tornado shelters are safest if they are underground.

3. It is usually safe to leave your pet in a mobile home during a tornado.

4. During a tornado, turning horses and livestock out will help prevent them from being injured by a building collapse, but may put them at risk from flying debris.

5. If there is no indoor shelter during a tornado, lie flat in a ditch or depression shielding your head.

6. Tornadoes usually travel at up to 60 mph with winds approaching 400 mph.

7. Tornadoes are part of a severe thunderstorm and may occur along with lightning, high winds, floods and extremely heavy rainfall.

8. Furniture and mattresses may offer some protection against injury caused by a tornado.

Multiple Choice

9. A mitigation activity that will reduce the effects of tornadoes includes which one of the following?
   a. Evacuate with your pets
   b. Do not drive if a tornado warning has been issued
   c. Wait for an all-clear signal before leaving your shelter
   d. Create a volunteer tornado spotting network

10. Which of the following is NOT a risk following a tornado?
    a. Hazardous materials
    b. Flying debris
    c. Fires
    d. Broken gas lines

Hurricanes

Hurricanes usually strike coastal areas, but may also affect inland regions. They begin as tropical depressions (low-pressure center), progress to become tropical storms and finally hurricanes.

Hurricanes	Storms that develop in the northern hemisphere and have winds with constant speeds of at least 74 mph. These winds blow in a counterclockwise spiral around a relatively calm center known as the eye of the hurricane. Around the rim of the eye, winds may gust to more than 200 mph. The entire storm dominates the ocean surface and the lower atmosphere over tens of thousands of square miles. In the western Pacific, hurricanes are called typhoons. South of the equator and in the Indian Ocean, they are called cyclones.

Hurricanes are very destructive. The worst recorded event in the United States happened in Galveston, Texas, in 1900, when approximately 6,000 lives were lost. The greatest economic damage resulted from Hurricane Andrew in 1992, with an estimated loss in excess of $20 billion.

Hurricanes can move inland and cause extensive flooding. For example, in 1955 Hurricane Diana brought floods to Pennsylvania, New York, and New England that killed 200 people and caused an estimated $700 million in damage. In 1972, Hurricane Agnes and another storm system caused more than a foot of rain in less than 12 hours, resulting in severe flooding from Virginia to New England. That hurricane killed 117 people and caused $4.7 billion in damage.

One of the greatest dangers associated with hurricanes a storm surge.

Storm surge	A dome of water that may cause flooding up to 20 feet above normal sea level along major stretches of coastline where the eye of the hurricane makes landfall. This surge of water is topped by battering waves and incredibly strong winds. Nine out of 10 hurricane-related fatalities are caused by the storm surge.

On the average, six Atlantic hurricanes occur each year. Most occur in August, September, and October, but the six-month period from June 1 to November 30 is considered the Atlantic hurricane season. Not all of these violent storms strike land. The National Hurricane Center in Miami monitors weather data and issues forecasts for hurricanes in the Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and the eastern Pacific Ocean. Your local National Weather Service office and local and State officials may disseminate hurricane information.

Hurricane advisory	Tells where the storm is located, the intensity of wind speeds, and the direction of movement.
Hurricane watch	Issued for a coastal area when there is a threat of hurricane conditions within 24 to 36 hours. In vulnerable areas, actions for protection of life and property should begin at this point. This includes starting to evacuate large animals, such as horses and cattle, or large populations of dogs and cats, i.e., an animal shelter, boarding, or breeding kennel. Zoos should also start to move or secure their animal population. If you have cats put them in transport cages. Cats often sense an approaching storm and search for a hiding spot. However, do not depend on behavior changes to indicate the severity of storms.
Hurricane warning	Issued when hurricane conditions are expected in a specified coastal area in 24 hours or less. Hurricane conditions include winds of 74 mph (64 knots) and dangerously high tides and waves. Final actions for protection of life and property should be completed as quickly as possible before high winds and heavy rains arrive.

Mitigation

Communities in areas that may be threatened by hurricanes should develop action plans that specify what areas would need to be evacuated and by what routes, what shelters would be used, and how local emergency services units would respond. Special attention should be given to evacuation routes for trucks and trailers that would carry livestock or horses.

The following are some actions that you can take to help mitigate hurricane hazards.

- Retrofit your home to withstand wind and flooding. Coastal homes in flood hazard areas should be elevated. All windows should be shuttered and structural connectors reinforced. Check for hurricane strapping. Strengthen masonry that is not reinforced. Consult *FEMA's Coastal Construction Manual* (FEMA-55) for guidance.
- Support the adoption and enforcement of floodplain management requirements.
- In some cases the best mitigation may be not to build at all. Protecting wildlife in areas such as dunes, wetlands, reefs and barrier islands should also be a consideration.
- In addition to your property insurance, buy a flood insurance policy. Renters also can buy a flood policy for personal property.
- Determine sheltering options for you and your animals – consider the following in your area and within a 100 mile radius:
  - motels/hotels that allow pets,
  - boarding kennels,
  - veterinary offices with boarding facilities,
  - grooming shops,
  - dog or horse race tracks, and
  - approved areas at fairgrounds or parks.

In addition, individuals should be encouraged to set up buddy systems with friends or relatives that live outside their area, where an animal can be safely evacuated.

- Learn about warnings, dangers, and how to protect property, family, animals, and yourself in hurricanes. Before hurricane season, recheck your window shutters and supply of boards, tools, batteries, nonperishable foods, bottled water, and other equipment.
- If you have a horse that is not accustomed to being transported in a trailer, practice leading and loading under a variety of circumstances, such as rain, extreme heat, at night, and when you are tired. Plan a flood-free evacuation route if your area is vulnerable to flooding or if you live in a manufactured (mobile) home.

- Make a household inventory with pictures or a video, and keep it with your insurance policies in a safe place such as a safety deposit box. Don't forget to inventory items in your barn used to maintain and care for animals.

Preparedness

Plans should include animal evacuation locations. Once the plan is in place, the community should conduct exercises (simulations of emergency situations). Include animal concerns in emergency preparedness drills.

Special thought should be given to senior citizens and others that have close bonds with their animals. People who cannot evacuate with their animals may refuse to evacuate. This puts their lives at risk and jeopardizes rescue workers.

Use the following list to check your animal disaster supplies.

- If your pet is on prescription medication keep an extra copy of this prescription in your pet's disaster kit. Remember that prescriptions have expiration dates – keep the prescription updated.
- Make sure that your animal's vaccination records are current.
- Keep a collar and an identification tag that includes your out-of-state contact phone number on your dogs and cats at all times.
- Take updated pictures of all your animals and put them with your important insurance papers, in case an animal should get separated from you during a disaster. Send a copy of important papers, including current photos, to your out-of-state contact. Also include any bill of sales or registrations for animals you own.

- If you do not have a horse trailer or the proper vehicle to transport other large animals, try to locate someone who would be willing to loan you what you need to evacuate your animals. You should also consider who would evacuate your animals if you were not in a position to do so.

When your area receives a hurricane watch notification, keep calm; plan your time before the storm arrives and avoid a last-minute rush that might leave you marooned or unprepared. Take the following precautions:

- Listen for weather updates.
- Board up your windows or protect them with shutters or tape.
- Secure outdoor objects such as tools, porch furniture, garbage cans, and bicycles that could become deadly projectiles in hurricane winds. Store them inside if possible.
- Store drinking water in clean bathtubs, bottles, pans and containers suitable for livestock. Remember to include enough for your animals.
- Ensure batteries are fresh and in sufficient quantity.
- Keep your car's gas tank filled. Service stations may be closed for several days after a hurricane due to power outages and flooding.

Manufactured (mobile) homes are extremely susceptible to high winds and most should be evacuated for more substantial shelter. Do not leave any animals in these types of homes.

Follow these basic guidelines at all times:

- Evacuate low-lying areas when ordered to do so by officials.
- Turn off utilities at the main switch, if time permits.
- Do not leave animals behind, even if you are not sure where to take them.

Response

The storm surge can destroy property along a coastline and is a major threat to life. Dangers associated with a hurricane emergency also include high winds that can demolish houses, uproot trees, and fill the air with debris. Tornadoes may develop as a hurricane passes.

- Stay at home only if it is safe. If you are advised to evacuate before the hurricane, follow directions. Do not attempt to evacuate during a hurricane – stay indoors in windowless rooms or hallways. Keep your small animals in carriers or confined areas.
- If the storm center passes directly overhead, the wind will calm. Don't think the hurricane has passed while the eye is

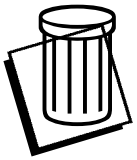
over your area. When winds begin again, they quickly grow to hurricane force and come from the opposite direction.

- Severe flooding may follow hurricanes as they move inland. Stay away from river banks and streams. Monitor National Weather Service advisories on flood stages.

Recovery

Long-term hazards include interrupted gas, water, and electric power, fires and explosions from gas leaks, fallen power lines, electrical short circuits, and contaminated food and water. The following actions should be taken when recovering from a hurricane.

- Dispose of perishable, contaminated, or water-soaked foods, including any water or food for animals. This will also ensure that stray or wild animals cannot eat it.
- If there is a boil water order in effect, do not drink or give animals tap water unless you know it is safe. Official notices will be given about the safety of the water supply.
- Avoid loose or dangling wires, and report them to the power company. Inspect areas where animals are kept for loose wires.
- Report broken sewer or water mains to the water department.
- Check for gas leaks. Do not strike a match or relight appliances until they have been inspected.
- Open windows and doors to let the air circulate. This will help remove foul odors and protect you from collected gas. It also will help dry out the house.
- Pump out the basement if it is flooded, but do it gradually. Drain one third of the flood waters each day to minimize further structural damage. Shovel out the mud while it is still moist, and dry rugs and carpets thoroughly. It is especially important to remove mud from barns as horses and livestock will develop foot problems if they stand in mud for too long.
- Make any temporary repairs necessary to prevent further losses, including repair to fencing needed to keep animals confined. Ensure that substantially damaged structures are elevated above the base flood elevation or relocated when reconstructed.



LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT HURRICANES?

This activity is designed to assess your understanding of the information presented in this unit.
Directions: Answer the questions – use the Answer Key in Unit 10 to check your answers.

True or False

1. Severe flooding may accompany a hurricane.

2. Your animal's vaccinations should be current before the hurricane season starts.

3. You should attempt to evacuate when a hurricane makes landfall.

4. Hurricane winds are the most violent in the center (eye) of the storm.

5. Your out-of-state contact should have a copy of important papers, including current photos.

6. Hurricanes are confined to inland areas where they cause extensive damage.

Multiple Choice

7. Which of the following regions is most likely to be hit by a hurricane?
   a. Southwestern States such as Arizona and New Mexico
   b. Great Plains States such as Oklahoma and Kansas
   c. The Great Lake region including Michigan and Ohio
   d. Coastal areas from Texas to Maine

8. This information is issued for an area when there is a threat of hurricane conditions within 24 to 36 hours.
   a. Storm surge
   b. Hurricane advisory
   c. Hurricane watch
   d. Hurricane warning

9. This information is issued when hurricane conditions are expected in 24 hours or less.
   a. Storm surge
   b. Hurricane advisory
   c. Hurricane watch
   d. Hurricane warning

10. This information tells where the storm is located, the intensity of wind speeds, and the direction of movement.
    a. Storm surge
    b. Hurricane advisory
    c. Hurricane watch
    d. Hurricane warning

Winter Storms

Winter storms vary in size and strength. A storm may be large enough to affect many States or only a portion of a single State. There are three categories of winter storms. These are defined in the following table.

Blizzard	The most dangerous of all winter storms. It combines low temperatures, heavy snowfall, and high winds that blow the snow into drifts and reduce visibility to only a few yards.
Heavy snowstorm	Drops four or more inches of snow in a 12-hour period or six or more inches in a 24-hour period. High winds may blow snow into drifts and cause poor visibility.
Ice storm	Occurs when moisture falls from clouds and freezes immediately upon impact. Ice storms make driving and even walking extremely hazardous.

In addition, the National Weather Service issues watches and warnings for hazardous winter weather. The terms used are defined to follow.

Winter storm watch	Severe winter weather may affect your area.
Winter storm warning	Severe winter weather conditions are expected.
Ice storm warning	Significant, possibly damaging, ice accumulation is expected.
Heavy snow warning	A snowfall of at least four inches in 12 hours or six inches in 24 hours is expected
Blizzard warning	Large amounts of falling or blowing snow and winds of at least 35 mph are expected for several hours.
Severe blizzard warning	Considerable falling or blowing snow, winds at least 45 mph, and temperatures of 10 F or lower are expected for several hours.
High wind warning	Winds of at least 40 mph are expected to last at least one hour.
Traveler's advisory	Ice and snow are expected to hinder travel but the anticipated weather conditions are not serious enough to require warnings.

Heavy snowfall and blizzards can trap people and animals in their cars or inside buildings. These conditions can cause the loss of livestock.

Ice storms can break power lines causing widespread blackouts. This can be a serious problem for dairy farmers, making it difficult for them to milk their cows. Intensive farm industries, such as swine and poultry farms, may suffer during these storms if their heating systems fail or fuel cannot be delivered for power generators. Frozen water troughs and snow-covered feed bunkers and pasture predispose animals to malnutrition and dehydration.

Fires during winter storms present a great danger because water supplies may freeze and fire-fighting equipment may not be able to get to the fire. Large amounts of snow can also lead to localized flooding when warmer temperatures melt the snow in a short period of time.

Mitigation

The following is a list of actions that can be taken to mitigate the possible effects of winter storms.

- Purchase a flood insurance policy to cover possible flood damage that may occur during the spring thaw.
- Store adequate amounts of fuel and extra feed before the severe winter weather starts.
- Construct barns to withstand typical snow accumulations in your area.

Preparedness

Preparedness actions before winter storms include following weather conditions, insulating the areas where your pets are kept, and ensuring that family members know how to use emergency lighting and heating equipment. Use the following guidelines for further preparation.

- Use your radio, television, and newspapers to keep informed of current weather conditions in your area.
- Be prepared for isolation at home, particularly if you live in a rural area. It is highly possible that a severe winter storm could isolate you for one or two weeks.
- If possible, insulate any buildings used to house animals. Dog houses should be built to withstand extreme cold – putting straw inside will provide added protection. Under extreme conditions, animals should be housed inside. Avoid leaving animals to rest on hard surfaces (e.g., in garages).

- Have fuel and a safe type of emergency heating equipment available in case of power failures that would shut down standard furnaces – a camp stove with fuel or a supply of wood or coal for your fireplace could be used. Be prepared to keep at least one room of your house warm enough to live in for at least a week or two.
- Be sure that all family members know how to use your emergency heating and lighting equipment. Proper ventilation in homes and barns is essential. Never use fuel in equipment that was not designed for that fuel. Burning charcoal indoors will give off deadly carbon monoxide. If you are trying to heat a barn, use something with a safely contained heating element. Do not place it near hay or any other combustible materials or leave a heater unattended in the presence of animals. Keep fire extinguishers nearby.
- Stock an emergency supply of food and water for yourself and your animals. Keep foods that do not require cooking or other preparation. If you or your animals are on continual medications, be sure to always have at least a two-week supply on hand.
- Should a power failure occur, have a battery-powered radio and extra batteries on hand. Have flashlights ready for use. A generator may be necessary to prevent the loss of life in livestock production facilities.
- Keep simple tools and other equipment to fight a small fire easily accessible. The chance of fire may increase when wiring and ventilation is inadequate. Winter storms may interrupt fire department services.
- Only keep animals outdoors that have had sufficient time to acclimatize to the cold weather. Provide extra feed and wind breaks for any animals kept outdoors. See the tables at the end of this section.
- Keep your car winterized with antifreeze, but use it in a safe manner. Carry a winter care kit that includes food and water, a windshield scraper, a flashlight with extra batteries, a tow chain or rope, a shovel, tire chains, a blanket, a bag of sand, a fluorescent distress flag, and an emergency flare. If you have to travel, keep a supply of high-energy foods, candles and matches with you. Keep extra mittens, hats, boots, socks and outerwear in the car. If you routinely take your dog in the car, be sure to

keep a leash in the car. Put extra blankets in the car to keep the dog warm.

Response

Do not be fooled if a winter storm seems mild as it begins. Some storms may take several hours to move into an area and may last for several days. When responding to a winter storm, keep the following guidelines in mind.

- Cold weather itself, without any physical exertion, puts an extra strain on your heart. If strenuous physical activity such as shoveling snow, pushing a car, or even walking fast or far through deep snow is added to your body's overworked system, you risk serious or fatal results.
- Avoid all unnecessary trips. If you are at home when a winter storm strikes, plan to stay there. Keep all domestic animals inside if possible. If they must be outdoors, be sure to provide them with proper sheltering to keep them warm and dry.
- If you must be outdoors, wear several layers of loose-fitting, lightweight, protective clothing rather than a single layer of thick clothing. Mittens are warmer than gloves. Hoods should be worn to protect your head and face. Cover your mouth to protect your lungs from the extremely cold air.
- If you are traveling and your car breaks down or if you become lost, decide what is the safest and best thing to do and do it slowly and carefully. If you are stuck on a well-traveled road, display a trouble signal. Turn on your flashing hazard lights, raise the hood of your car, or hang a bright cloth from the antenna or car window. Stay in your car and wait for help. Do not leave your car to search for assistance unless you are absolutely certain you can find help within 100 yards of your car. It is very easy to become disoriented and lost during a severe storm. If you have animals in the car, leave them in the car while you go to get help.
- While in your car awaiting assistance, take the following precautions:
  - If you run your engine to keep warm, remember to keep snow away from the exhaust pipe. Keep a window open slightly to provide proper ventilation and protection from carbon monoxide poisoning.

- Do not let everyone in the car sleep at the same time.
- At night, turn on the inside dome light so work and rescue crews can spot you.

Recovery

If the storm lasts more than one or two days, there is an increased possibility of utility failures and interruption of services. This can lead to extreme hardship and even death from extended exposure to cold temperatures. Animals that live outside require additional feed and owners must make sure that the animals have water available. Although some livestock and horses will eat snow and ice in the winter as a source of water, this varies among animals and cannot be relied upon for all animals.

Use the following list of suggestions as you recover from a winter storm.

- After the storm, check on your neighbors and their animals. Be sure they have proper heating and sufficient supplies to get them through the emergency.
- Check roofs of your house and barns for damage from heavy snow. Remove the snow to prevent the roof from collapsing.
- Avoid overexertion while clearing snow by working slowly and taking frequent breaks, particularly if you become dizzy or tired.
- Check and replenish emergency provisions.

Estimated lower critical temperature for beef cattle

Hair coat	Feed level	Lower critical temperature (°F)
summer coat or wet	maintenance	60
fall coat	maintenance	45
winter coat	maintenance	32
heavy winter coat	maintenance	19

Adapted from Brownson R, Ames D. Winter Stress in Beef Cattle. Alberta Beef Herd Management. Alberta Agriculture, Calgary, Canada.

Feed requirements for livestock kept under various temperature ranges

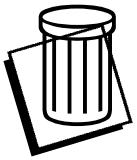
Deviation in °F below critical temperature	Energy increase to be metabolized		
	1,000 lb. pregnant cow	770 lb. yearling	550 lb. cows gaining 1.5 lb. per day
0	0.0	0.0	0.0
5	0.9	1.0	0.9
10	2.0	1.9	1.7
15	3.2	2.8	2.5
20	3.6	3.7	3.3
25	4.5	4.6	4.2
30	5.4	5.5	5.0
35	6.4	Above intake capacity	Above intake capacity
40	7.3	Above intake capacity	Above intake capacity

Adapted from Brownson R, Ames D. Winter Stress in Beef Cattle. Alberta Beef Herd Management. Alberta Agriculture, Calgary, Canada.

Recommendations for wind break requirements for livestock under winter conditions

- Wind has the most serious effects on livestock performance. Cold by itself has little influence on feed performance, particularly for animals on full feed.
- Wind and snow must always be considered as a joint problem.
- Simple shelters, sheds and wind break fences are essential.
- Porous fences of 80 percent density offer the best wind protection for about 75 to 100 ft downwind.
- Solid fences provide the best snow barrier, because 90 percent of drifting snow moves within one foot of the ground.
- Buildings should be separated by at least 30 to 50 feet to prevent snowdrifts developing between them.

Adapted from Publication 1461. Snow and wind control for farmstead and feedlot. Agriculture Canada. Calgary, Canada, 1978.



LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT WINTER STORMS?

This activity is designed to assess your understanding of the information presented in this unit.
Directions: Answer the questions – use the Answer Key in Unit 10 to check your answers.

True or False

1. A single layer of thick clothing offers the greatest protection if you must be outdoors during a winter storm.

2. Winter storms may start deceptively mild, and escalate into severe weather within a few hours.

3. Snow may be used as a supplement to fresh water for some animals.

4. Burning charcoal in a fireplace is a good method for keeping warm during winter storms.

5. Access to farms may be compromised for many weeks in winter storms.

6. Cold weather itself does not put extra strain on a person's heart; therefore adding strenuous physical activity during these times is not a problem.

7. Nutritional requirements for livestock remain the same during cold weather.

Multiple Choice

8. Which of the following describes moisture falling from clouds and immediately freezing upon impact?
   a. Blizzard
   b. Heavy snowstorm
   c. Ice storm
   d. Winter storm

9. Which type of information is issued when severe winter weather conditions are expected.
   a. Winter storm watch
   b. Winter storm warning
   c. Heavy snow warning
   d. Blizzard warning

10. Which type of information is issued when large amounts of falling or blowing snow and winds of 35 mph are expected for several hours?
    a. Winter storm watch
    b. Winter storm warning
    c. Heavy snow warning
    d. Blizzard warning

Drought and Extreme Heat

A drought occurs when there is no substantial rainfall for a long period of time. Since different areas of the country receive widely differing amounts of rainfall, the amount of time it takes for drought conditions to develop varies.

Extreme heat is defined as temperatures 10 degrees or more above the average high temperature, lasting for several weeks. Throughout the country, extreme heat conditions vary. When drought and extreme heat occur at the same time, the conditions can be very dangerous.

Local community officials will alert you through your local newspaper, radio station, or television station when drought and extreme heat conditions exist in your area. Although extreme heat conditions are easily recognized, drought conditions often develop slowly and can only be tracked through local weather advisories.

Mitigation

The following guidelines will help you mitigate the effects of a drought or extreme heat hazard.

- Practice personal water conservation measures to avoid depletion of water supplies both before and during periods of extended drought. If you are a farmer, consider establishing alternative sources and supplies of water for your crops and your animals.
- Conserve electricity. During periods of heat and drought, people use a lot of power for air conditioning. Excessive drain on the community's energy supply could lead to another emergency, such as a power shortage or outage. Insulating your home will reduce the demand for air conditioning. Keeping the thermostat set to 78 F will also reduce energy use.
- For large animals, consider creating artificial shade and installing humidifiers to keep animals cool.

Preparedness

All family members should learn to recognize heat impairment symptoms and administer appropriate first aid for animals. Causes of heat stroke or hyperthermia in pets are:

- Being left in parked cars (the most common reason),
- Lack of appropriate shelter for an animal outdoors,
- Animals not acclimated to the heat, and
- Excessive exercise in hot and humid weather.

Never leave your pet in a parked car in the heat of the summer. Even with the window open, pets can quickly suffer heat stroke and die.

Response

The signs of heat stress in animals are identified below.

- Excessive panting or difficulty breathing,
- Body temperature 104 F or above,
- Collapse,
- Increased heart and respiratory rate,
- Salivation, and
- Depression, stupor.

In addition to recognizing the signs of heat stress in animals, follow these guidelines when responding during periods of drought and extreme heat.

- Keep animals in areas where they have access to shade.
- Provide animals with plenty of water. Hosing off an animal periodically will also help to cool it.
- Do not exercise animals when it is especially hot outside, e.g. playing Frisbee, jogging or riding. If you have to work with animals, provide regular rest periods. This allows the body's natural cooling system to work. A few minutes of sweat-free rest every hour will help restore physical and mental energy. Animals often are willing to please their owners to the point of endangering themselves.
- Since dogs don't sweat, dogs must be allowed to pant to dissipate heat. Do not encourage them to carry objects in their mouths if they are hot.

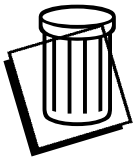
- Do not dress animals with vests, blankets and other clothing-type materials that would prevent them from sweating.
- Animals in cages require special attention because the ventilation may not be very good. Provide caged animals with extra ventilation.
- Provide plenty of fresh cool water for all animals to drink. Offer it in a shady place as some species may not venture into the sun if it is very hot.
- Be sure to provide salt licks for animals that require them regularly.

Recovery

A prolonged drought can have a serious economic impact on a community. Agricultural production can be severely reduced by loss of crops or livestock, resulting in food shortages. Increased demand for water and electricity can result in shortages of these resources. When combined with extreme heat, droughts can make life very difficult, especially if the situation lasts for a long time. Droughts are probably the largest cause of death in livestock throughout the world.

Follow these guidelines when recovering from extreme heat or drought conditions.

- Continue to conserve water even after the drought appears to have ended.
- If you own a farm and your crop is lost, contact the county Farmer's Home Administration Office for disaster assistance information.
- Avoid any activities that could precipitate fires. As the forest dries up, debris falls on the forest floor. Trees become prone to fire, even from the slightest spark.



LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT HEAT AND DROUGHT?

This activity is designed to assess your understanding of the information presented in this unit.
Directions: Answer the questions – use the Answer Key in Unit 10 to check your answers.

True or False

1. If they are provided with plenty of water to drink, it is safe to exercise animals when it is extremely hot outside.

2. Animals should be offered a shady place to drink water in hot weather.

3. Dogs sweat to dissipate heat.

4. If you have to work with animals in extreme heat, you should provide regular rest periods for the animals.

5. Animals that regularly require salt licks should not be provided with them during periods of extreme heat or drought.

6. Hosing off animals periodically is a good method to help cool them off in hot weather.

7. As long as a window is partly rolled down, it is safe to leave pets in parked cars in the summer.

8. A prolonged drought can result in food shortages for people and animals.

Multiple Choice

9. Which of the following is a sign of heat stress in animals?
   a. Excessive agitation
   b. Slowed heart and respiratory rate
   c. Body temperature greater than 104 F
   d. Lack of panting and little salivation

10. Extreme heat is defined as _____ degrees above the average high temperature.
    a. 5
    b. 10
    c. 15
    d. 20

Wildfires

A wildfire is any instance of uncontrolled burning in grasslands, brush, or woodlands. Wildfires destroy property and valuable natural resources, and may threaten the lives of people and animals.

Wildfires pose an increasing threat to the residential United States. In 1987, 53,000 fires consumed more than two million acres. By October 1988, almost 70,000 fires had claimed more than four million acres. The increase in fires is the result of population growth in rural communities and in the wild land/urban interface.

Wildfires can occur at any time of the year, but usually occur during hot, dry weather. Wildfires are usually signaled by dense smoke which may fill the air for miles around. The National Weather Service, U.S. Forest Service, and State forestry agencies combine to give wildfire probability forecasts. Local radio and television stations broadcast information and warnings on local fire conditions.

Mitigation

There are many actions you can take to mitigate the effects of wildfires. Many of these are listed to follow.

- Use only fire-resistant materials on the exterior of your home or barn, including the roof, siding, decking, and trim.
- Consider installing sprinkler systems for buildings on your property, and lawn sprinkler systems outdoors.
- When constructing pools and ponds, make them accessible to fire equipment – they may serve as a source of water for fighting wildfires.
- Have hoses that are long enough to reach all parts of your building.
- Use fire carefully and wisely so that you do not cause a wildfire. Teach family members and employees safe practices.
- Keep your chimney clean and install a spark arrestor.
- Avoid open burning during dry weather. Store firewood away from your home and barns.
- Store hay, sawdust, or straw in a building separate from where animals are housed. This is especially important during the summer when freshly cured hay can suddenly ignite from spontaneous combustion.

- Be extremely careful with open flame when shoeing horses or welding.
- Gas and other hazardous materials should be stored in separate buildings from animals.
- To reduce the risk of structural fires, make sure that the wiring in your barn is in good condition. Rodents can chew through the wiring, putting the barn at risk for fire. Keep all areas around your barn free of cobwebs.
- Clear leaves and other vegetation off roof surfaces and out of gutters regularly. Meet local fire code requirements by clearing brush away from all structures.
- Implement and enforce no smoking policies on your property.
- Teach all personnel working with animals where the fire extinguishers are and how to use them. Practice a fire drill every month throughout the fire season.

Preparedness

The following list outlines steps that you can take to prepare for wildfires.

- Learn to recognize dangerous fire conditions and consult with your local fire department on how to improve the safety of your house and barns.
- Provide wide spacing between trees. Cut back vegetation overhanging any building.
- Clear vegetation, including dead brush, from around your house or barn to serve as a fire break. Fire breaks should be at least 30 feet wide for all structures and 75 feet wide for homes built in pine forests.
- Use fire-resistant plants on your property. Check with local fire officials or a nursery about the best species for your area.
- Plan several evacuation routes with your animals in case fires block your escape. If you have horses or livestock, make arrangements ahead of time for a place to temporarily relocate them. Fairgrounds, parks, racetracks, large animal shelters, or with family or friends may be options available to you.
- Make sure your trailer is in good condition and keep the gas tank of your car and truck filled. If you do not have enough trailers, identify who else could help you evacuate. Practice

your buddy system, teach your horse how to load into a trailer, and practice your evacuation routes.

- Purchase rope or leather halters for horses and livestock because nylon halters can melt when they heat up in a fire. This may lead to deep burn wounds on the animal.
- Have fire tools handy at your home and in your barn: a ladder, garden hoses, fire extinguishers, gas-operated water pumps, shovels, rakes, and buckets.
- Keep your horses' tetanus vaccinations current.

Response

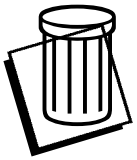
Use the following list to guide your actions when responding to a wildfire.

- Place a sprinkler on the roofs and anything else that might be damaged by fire to wet down the surfaces. Be sure that your efforts do not jeopardize the water supply and pressure needed by firefighters.
- If officials evacuate your area, leave immediately. Fires can spread rapidly and unpredictably. If you have large numbers of animals, horses, or livestock, it will take a much longer time to evacuate these animals. If you are evacuating horses when the fire is close, it may help to temporarily place a blindfold over their eyes. Place pieces of cloth around the horses' nostrils to reduce the inhalation of smoke. Wet the horses' tails and manes and remove blankets on the horses' backs.
- If you are unable to take animals with you, do not leave them confined. If you have horses and livestock, let them out of the barn and close all the doors. A horse may run back into a burning barn if it gets frightened. Turn off the power and gas and disconnect any electrical fences so that animals will not injure themselves trying to escape. (These recommendations are for livestock, poultry and other types of animals; house pets should be leashed/crated and taken with you.)
- If you are on an outing in the woods when a fire breaks out, note the weather conditions and wind direction. Determine the direction of the fire and plan your escape routes in other directions. If you had a campfire burning, be sure to extinguish it before leaving. As you leave the area, be cautious of wild animals crossing the road.

Recovery

The following list provides suggested actions during the recovery phase of a wildfire emergency.

- Consult with your insurance agent and have damages assessed as soon as possible. Take pictures or a video of damages.
- Wildfires can leave scorched and barren land, reducing grazing land for livestock. This land may take many years or decades to return to its previous condition. Major fires can destroy ground cover, which leads to erosion.
- The most common cause of death in fires and in the days afterward are complications from smoke inhalation. All animals exposed to fire should be monitored for smoke inhalation pneumonia. A veterinarian should be consulted immediately for any burn injuries. Burn injuries can be difficult and expensive to treat. They often require intensive care.
- Care must be taken in re-entering burned areas. There may be hot spots that could flare up without warning. Partially burned structures and trees can be very unstable, and may suddenly fall over. Do not tie animals to burned trees. Don't allow animals into areas where there may be ash pits (root systems that have burned underground).
- Check any areas where animals and people will be for dangerous debris – use a metal detector. Consult medical personnel about tetanus vaccinations for your family and animals.
- Debris from burned buildings should be removed before animals re-enter the area. Metal pipes heated during a fire may be coated with toxic residues from the heat damaged galvanized components. If this occurs to your pasture fences, they need to be cleaned before any animals come in contact with them.
- Replant burned forests quickly and efficiently to reduce the soil erosion. Ask your State forestry commission for guidelines. Landslides, mud flows, and floods can follow wildfires due to vegetation damage.



LEARNING CHECK – WHAT HAVE YOU LEARNED ABOUT WILDFIRES

This activity is designed to assess your understanding of the information presented in this unit.
Directions: Answer the questions – use the Answer Key in Unit 10 to check your answers.

True or False

1. Wildfires are primarily caused by population growth among animals.

2. One way to decrease the chance of barn fires is the implementation and enforcement of no smoking policies.

3. Sources of water to fight wildfires could include pools and farm ponds.

4. Animals recover quickly from burn injuries and usually do not require veterinary care.

5. If you have installed sprinkler systems, it is not necessary to evacuate from a wildfire when officials ask that you do so.

6. Areas around burned buildings may contain debris that is hazardous to animals.

7. Vegetation damage caused by wildfires creates a flood risk.

8. It is the natural instinct of horses to flee from fire; therefore, you do not need to worry about them returning to a burning barn.

Multiple Choice

9. Which of the following is the most common cause of animal death in fires?
   a. Complications from smoke inhalation
   b. Tetanus from stepping on debris
   c. Burn injuries
   d. Viral infection

10. Wildfires can occur at any time during the year, but most often occur when conditions are:
    a. Hot and humid
    b. Hot and dry
    c. Cool and humid
    d. Cool and dry

Summary

In this unit you learned how the four phases of emergency management – mitigation, preparedness, response and recovery – can be applied to the emergency management and response to natural meteorological hazards. At each level you were given practical advice to protect yourself and your animals from the dangers that these hazards cause.