



Government
of Canada

Gouvernement
du Canada



Self-Help Advice

Severe Storms



Canada

TABLE OF CONTENTS

Introduction	1
Listen for the warnings	2
Be prepared	3
When a severe storm is forecast	4
Things to do after the storm	5
Tornadoes	6
Severe thunderstorms	8
Winter storms	11
Hurricanes	15
Mobile homes	16
Additional information	17

ACKNOWLEDGEMENTS

This publication was produced by the Government of Canada's **Office of Critical Infrastructure Protection and Emergency Preparedness** in cooperation with **Environment Canada**.

An electronic version of this brochure is available via www.ocipep.gc.ca on the Internet.

This publication can be obtained in alternative formats (audio-cassette, large print, computer diskette and Braille) through InfoTouch. Call 1-800-788-8282 on a touch-tone phone or through teletypewriter (TTY).

Cette publication est aussi offerte en français.

ISBN: 0-662-30879-4
Catalogue No: D82-27/2001-1E

© Minister of Public Works and Government Services
Revised June 2003



Severe storms



THUNDERSTORMS, TORNADOES, HAIL, BLIZZARDS, HIGH WINDS AND HEAVY RAIN CAN DEVELOP QUICKLY AND HIT HARD, POSING A THREAT TO LIFE AND PROPERTY.

If you are like most Canadians you have probably had to clean up after these storms and you know the damage they cause.

Some problems cannot be prevented. High winds will topple trees, and heavy rains will cause rivers to flood. But some damage can be avoided, or at least reduced, if you take a few simple precautions such as knowing the type of storms common to your area and what time of year they are likely to strike.



The purpose of this booklet is to help you prepare for severe weather by listing a few steps which you can take to protect your family, yourself and your property when a severe storm hits your area.

Listen for the warnings



ENVIRONMENT CANADA
MONITORS THE
WEATHER 24 HOURS A
DAY, SEVEN DAYS A
WEEK. IF A SEVERE
STORM IS ON THE HORIZON,

THE WEATHER SERVICE ISSUES WATCHES,
ADVISORIES AND WARNINGS THROUGH
NATIONAL, REGIONAL AND LOCAL RADIO AND
TELEVISION STATIONS, AND ENVIRONMENT
CANADA'S WEATHERADIO.

- **WEATHER WATCH**

Conditions are favourable for a severe storm, even though one has not yet developed. This is usually issued early in the day. Keep monitoring weather conditions and listen for updated statements.

- **WEATHER WARNING**

Severe weather is happening or hazardous weather is highly probable.

If a weather warning is issued for a tornado, it means that one or more tornadoes have been observed or are forecast for the specified area. Other warnings include those for a severe thunderstorm, blizzard, high winds, heavy snow, snow squall, heavy rain and significant freezing rain.



Be prepared

STORMS SUCH AS TORNADOES OFTEN STRIKE TOO QUICKLY TO ALLOW YOU TO CHOOSE A SHELTER OR TO PACK AN EMERGENCY KIT. YOU MAY WANT TO HAVE A PLAN THAT OUTLINES WHERE YOU WILL GO AND HOW YOU WILL KEEP IN TOUCH WITH MEMBERS OF YOUR FAMILY IF A SEVERE STORM HITS. MUNICIPAL, PROVINCIAL AND TERRITORIAL EMERGENCY MANAGEMENT ORGANIZATIONS CAN PROVIDE VALUABLE ADVICE TO HELP YOU PREPARE FOR EMERGENCIES.

CHOOSE YOUR SHELTER AREA

A basement, storm cellar or a closet beneath the stairs are good places to take shelter in the event of a severe storm. If none of these is available, sit underneath a sturdy piece of furniture on the ground floor in the centre of the building, away from the outside walls and windows. Be sure you discuss the shelter area with your family.

PACK AN EMERGENCY KIT

This should include food, clothing, blankets, medication, water-purification tablets and first aid and tool kits, as well as flashlights and a battery-powered radio – with extra batteries for both.

REDUCE THE HAZARDS

Trim dead or rotting branches and cut down dead trees to reduce the danger of these falling on your house. You may also want to consider checking the drainage around the house to reduce the possibility of your basement flooding after a heavy rain.

CHOOSE A PLACE TO MEET

When a severe storm strikes, members of your household may be at work, school or a friend's place. To avoid unnecessary worry, plan a meeting place or some system of communicating with one another to check that everyone is safe.

When a severe storm is forecast

SEVERE WEATHER CAN OCCUR ANY TIME OF THE YEAR, WINTER OR SUMMER. MAKE IT A HABIT TO LISTEN TO THE LOCAL RADIO OR TELEVISION STATIONS FOR SEVERE WEATHER WARNINGS AND ADVICE. MAKE SURE YOU HAVE A BATTERY-POWERED RADIO ON HAND, AS THE ELECTRICITY FREQUENTLY FAILS DURING A SEVERE STORM.



Secure everything that might be blown around or torn loose – indoors and outdoors. Flying objects such as garbage cans and lawn furniture can injure people and damage property. If hail is

forecast, you may want to protect your car by putting it in the garage.

Never venture out in a boat. If you are on the water and you see bad weather approaching, head for shore immediately. Always check the marine forecast first before leaving for a day of boating, and listen to weather reports during your cruise.

If you are advised by officials to evacuate, do so. Take your emergency kit with you.

If you are outdoors when a storm hits, take shelter immediately.

Stay calm. You will be able to cope better with emergencies.

Things to do after the storm

LISTEN TO YOUR RADIO FOR INFORMATION AND FOLLOW INSTRUCTIONS.

Give first aid to people who are injured or trapped.
Get help, if necessary.

Unless you are asked to help or are qualified to give assistance, please stay away from damaged areas.

Do not go near loose or dangling power lines. Report them and any broken sewer and water mains to the authorities.

Lightning and downed power lines can cause fires. Report fires to the fire department. Know how to fight small fires.

Water supplies may be contaminated, so purify your water by boiling it for 10 minutes, or by adding water-purification tablets, or by adding one drop of unscented chlorine bleach to one litre of water (or three drops for cloudy water).

If you use chlorine bleach to purify the water, stir the bleach in and wait 30 minutes before drinking. The water should have a slight chlorine smell.

Please leave the telephone lines free for official use.
Do not use the telephone except in real emergencies.

Drive cautiously and only if necessary. Debris, broken power lines and washed-out or icy roads and bridges will make driving dangerous after a severe storm. Please give way to emergency vehicles at all times.

Finally, if the power has been off for several hours, check the food in the refrigerator and freezer in case it has spoiled.

Tornadoes

TORNADOES FORM SUDDENLY, ARE OFTEN PRECEDED BY WARM, HUMID WEATHER, AND ARE ALWAYS PRODUCED BY THUNDERSTORMS, ALTHOUGH NOT EVERY THUNDERSTORM PRODUCES A TORNADO. THERE ARE WARNING SIGNS, INCLUDING:

- severe thunderstorms, with frequent thunder and lightning;
- an extremely dark sky, sometimes highlighted by green or yellow clouds;
- a rumbling sound, such as a freight train might make, or a whistling sound, such as a jet aircraft might make; and
- a funnel cloud at the rear base of a thundercloud, often behind a curtain of heavy rain or hail.



Tornadoes are violent windstorms characterized by a twisting, funnel-shaped cloud which forms at the base of cloud banks and points towards the ground. Tornadoes usually move over the ground at anywhere from 20 to 90

kilometres per hour and often travel from the southwest to the northeast. They are erratic and can change course suddenly. It is not a good idea to chase tornadoes.

Generally speaking, May to September are prime tornado months. Tornadoes usually hit in the afternoon and early evening but they have been known to strike at night too.

Canada has several high-risk areas, including Alberta, southern Ontario, southern Quebec, and a band of land which stretches from southern Saskatchewan and

Manitoba through to Thunder Bay, Ontario. There are also tornado zones in the interior of British Columbia and in western New Brunswick.

THINGS TO DO IN CASE OF A TORNADO

If you live in one of Canada's high-risk areas, you should listen to your radio during severe thunderstorms. As a rule, when Environment Canada issues a tornado warning, radio stations broadcast it immediately. If you hear that a tornado warning has been issued for your area, take cover immediately.

If you are at home, go to the basement or take shelter in a small interior ground floor room such as a bathroom, closet or hallway. Failing that, protect yourself by taking shelter under a heavy table or desk. In all cases, stay away from windows, outside walls and doors.

If you are in an office or apartment building, take shelter in an inner hallway or room, ideally in the basement or on the ground floor. Do not use the elevator and stay away from windows. Avoid buildings such as gymnasiums, churches and auditoriums with wide-span roofs. These roofs do not have supports in the middle and may collapse if a tornado hits them. If you are in one of these buildings, take cover under a sturdy structure.

Do not get caught in a car or mobile home. More than 50 per cent of all deaths from tornadoes happen in mobile homes. Take shelter elsewhere – such as a building with a strong foundation. If no shelter is available, lie down in a ditch away from the automobile or mobile home. However, beware of flooding from downpours and be prepared to move.

If you are driving and spot a tornado in the distance, try to get to a nearby shelter. If the tornado is close, get out of your car and take cover in a low-lying area. If a tornado seems to be standing still, then it is either travelling away from you or heading right for you.

In all cases, get as close to the ground as possible, protect your head and watch out for flying debris. Small objects such as sticks and straws can become lethal weapons when driven by a tornado's winds.

Severe thunderstorms – lightning, heavy rain and hail

A THUNDERSTORM
DEVELOPS IN AN
UNSTABLE
ATMOSPHERE
WHEN WARM,
MOIST AIR NEAR
THE EARTH'S
SURFACE RISES



QUICKLY AND COOLS. THE
MOISTURE CONDENSES TO FORM RAIN
DROPLETS AND DARK THUNDERCLOUDS CALLED
CUMULONIMBUS CLOUDS. THESE STORMS ARE
OFTEN ACCOMPANIED BY HAIL, LIGHTNING, HIGH
WINDS, HEAVY RAIN AND TORNADOES.
THUNDERSTORMS ARE USUALLY OVER IN AN
HOUR, ALTHOUGH A SERIES OF THUNDERSTORMS
CAN LAST FOR SEVERAL HOURS.

LIGHTNING

The air is charged with electricity during a thunderstorm. The most striking sign of this is lightning. Bolts of lightning hit the ground at about 40,000 kilometres per second — so fast that the lightning appears to be a single main bolt with a few forks, when actually the opposite is true. The main bolt is a whole series of lightning strikes, all taking the same path, but at such a pace that the eye cannot distinguish between them.

To estimate how far away the lightning is, count the seconds between the flash of lightning and the thunderclap. Each second is about 300 metres. If you count fewer than 30 seconds, look around for shelter; if fewer than five seconds, take shelter urgently. Lightning is near and you do not want to be the tallest object in the area. It is recommended to wait 30 minutes after the last lightning strike in a severe storm before venturing outside again.

At the office or at home

- If indoors, stay there, but away from windows, doors, fireplaces, radiators, stoves, sinks, bathtubs, appliances, metal pipes, telephones and other materials which conduct electricity. (You can use a cellular telephone.)
- Unplug radios and televisions.
- Do not go out to rescue the laundry on the clothesline, as it conducts electricity.

Outside

- Take shelter, preferably in a building; failing this, in a depressed area such as a ditch or a culvert, but never under a tree.
- Do not ride bicycles, motorcycles or golf carts, or use metal shovels or golf clubs, as they conduct electricity.
- If swimming or in a boat, get back to shore immediately.
- If caught in the open, do not lie flat but crouch in the leapfrog position and lower your head.
- If you are in a car, stay there, but pull away from trees where heavy branches might fall on you.

HEAVY RAIN

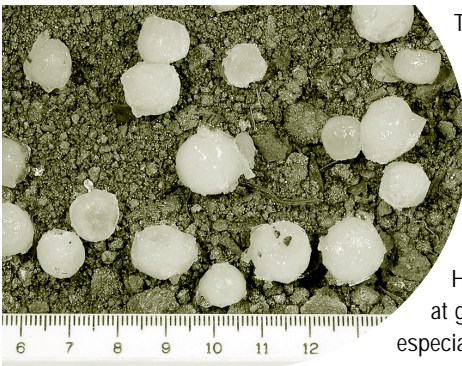
A heavy rainfall can result in flooding. This is particularly true when the ground is still frozen or already saturated from previous storms. Floods may also result if a heavy rain coincides with the spring thaw.

- If you know there is flooding or the possibility of flooding in your area, keep your radio on to find out what areas are flooded, what areas are likely to be flooded, as well as what roads are safe, where to go and what to do if the local emergency team asks you to leave your home.

- Generally speaking, it is a good idea to avoid driving through flooded roads and underpasses. The water may be a great deal deeper than it looks and you could get stuck. You may also want to avoid crossing bridges if the water is high and flowing quickly.

HAIL

Hail forms when updrafts in thunderclouds carry raindrops upwards into extremely cold areas of the atmosphere. The raindrops freeze and are bounced around in the powerful winds within thunderclouds while new layers of ice are added. Eventually, the hailstones grow too heavy to be supported by the updrafts and fall to the ground. Some hailstones are the size of peas, while others can be as big as grapefruits.



Take cover when hail begins to fall. Do not go out to cover plants, cars or garden furniture, or to rescue animals. Hail comes down at great speed, especially when accompanied by high

winds. Although no one in Canada has ever been killed by hail, people have been seriously injured by it.

Winter storms – freezing rain, heavy snow, blowing snow and blizzards

BLIZZARDS COME IN ON A WAVE OF COLD ARCTIC AIR, BRINGING SNOW, BITTER COLD, HIGH WINDS AND POOR VISIBILITY IN BLOWING SNOW. WHILE THESE CONDITIONS MUST LAST FOR AT LEAST SIX HOURS TO BE DESIGNATED A BLIZZARD, THEY MAY LAST FOR SEVERAL DAYS. THE SNOWFALL MAY NOT BE HEAVY, BUT THE POOR VISIBILITY, LOW TEMPERATURES AND HIGH WINDS CONSTITUTE A SIGNIFICANT HAZARD.

Freezing rain occurs when the air in an upper air layer has an above-freezing temperature, while the temperature at the surface is below freezing. The snow that falls melts in the warmer layer; as a result, it is rain – not snow – that lands on the surface. But since the temperature is below 0°C, raindrops freeze on contact and turn into a smooth layer of ice spreading on the ground or any other object like trees or power lines. More slippery than snow, freezing rain is tough and clings to everything it touches. A little of it is dangerous, a lot can be catastrophic.

In Canada, blizzards are most common in the Prairies, and the eastern Arctic. Heavy snowfalls are most common in British Columbia, areas around the Great Lakes, southern and eastern Quebec, and the Atlantic provinces. Freezing rain can occur pretty much anywhere in the country, but is particularly common from Ontario to Newfoundland.

On average, the storms and cold of winter kill more than 100 people every year. That is more than the total number of people killed by hurricanes, tornadoes, floods, lightning, and extreme heat.

AT HOME

If you live in a community located in one of the areas where blizzards or heavy snows are frequent, you may want to consider stocking up on heating fuel and ready-to-eat food, as well as battery-powered flashlights and radios – and extra batteries.



- When freezing rain, heavy snow, blowing snow or a blizzard is forecast, leave your radio on to stay informed of the situation and hear updated forecasts.
- If a blizzard or heavy blowing snow is forecast and if you are on a farm with livestock, bring the animals into the barn. Make sure they have plenty of water and food. You may also want to string a lifeline between your house and any outbuildings to which you may have to go during the storm.
- When a winter storm hits, stay indoors. If you must go to the outbuildings, dress for the weather. Outer clothing should be tightly woven and water-repellent. The jacket should have a hood. Wear mittens – they are warmer than gloves – and a hat, as most body heat is lost through the head.
- In wide open areas, visibility can be virtually zero during heavy blowing snow or a blizzard. You may easily lose your way. If a blizzard strikes, do not try to walk to another building unless there is a rope to guide you or something you can follow.
- Ice from freezing rain accumulates on branches, power lines and buildings. If you must go outside when a significant accumulation of ice has already occurred, pay attention to branches or wires that could break, due to the weight of the ice, and fall on

you. Ice sheets could also do the same. Above all, do not touch power lines: a hanging power line could be charged (live) and you would run the risk of electrocution. Remember also that ice, branches or power lines can continue to break and fall for several hours after the end of the precipitation, so be vigilant.

Finally, if the power has been off for several hours, check the food in the refrigerator and freezer in case it has spoiled.

IN YOUR CAR

As a rule, it is a good idea to keep your gas tank almost full during the winter and to have extra windshield washer fluid and antifreeze on hand. You may want to prepare two small emergency kits – one to put in the trunk of your car and the other in the cab of the car.

The trunk kit should include:

- shovel, sand, or salt, kitty litter or other traction aids;
- tow chain and booster cables;
- fire extinguisher, warning light or flares; and
- extra clothing, including mittens, hats and boots.

The kit in the cab of the car should include:

- flashlight;
- blanket;
- first-aid kit; and
- matches, candles (in a deep can to warm hands or heat a drink) and emergency food pack.



If you do not already have a cellular telephone and if the cellular network works in your area, you may want to consider having one with you in your car for emergencies.

Remember that freezing rain, even just a little freezing rain, can make roads extremely slippery. Driving is not recommended when freezing rain is forecast, or for several hours after freezing rain ends, so that road maintenance crews have enough time to spread sand or salt on icy roads.

If you must travel during a winter storm, do so during the day and let someone know your route and arrival time.



If your car gets stuck in a blizzard or snow-storm, remain calm and stay in your car. Allow fresh air into your car by opening the window slightly on the sheltered side – away from the wind. You can run the car engine about 10 minutes every half-hour if the exhaust system is working well. Beware of exhaust fumes and check the exhaust pipe periodically to make sure it is not blocked with snow. (Remember: you can't smell potentially fatal carbon monoxide fumes.)

Finally, to keep your hands and feet warm, exercise them periodically. In general, it is a good idea to keep moving to avoid falling asleep. If you do try to shovel the snow from around your car, avoid overexerting yourself, as shovelling and bitter cold can kill. Keep watch for traffic or searchers.

Hurricanes

HURRICANES ARE VIOLENT TROPICAL STORMS WHICH BLOW UP FROM THE CARIBBEAN AND OCCASIONALLY HIT EASTERN CANADA, USUALLY BETWEEN JUNE AND NOVEMBER, WITH SEPTEMBER BEING THE PEAK MONTH. THE EAST AND WEST COASTS, HOWEVER, DO GET FALL AND WINTER STORMS WHICH HAVE HURRICANE-FORCE WINDS. HURRICANES CAUSE MORE WIDESPREAD DAMAGE THAN TORNADOES BECAUSE THEY ARE BIGGER. SOME ARE AS LARGE AS 1,000 KILOMETRES ACROSS.

In Canada, heavy rain and flooding are usually greater hazards than strong winds, although the winds are still strong and potentially dangerous. If a hurricane warning has been issued, and you live on the coast or in a low-lying area near the coast, you are advised to move inland and to higher ground. The high winds create huge waves at sea which, when they reach the shore, may become tidal waves or storm surges.

Do not go down to the water to watch the storm. Most people who are killed during hurricanes are caught in large waves, storm surges or flood waters.

As a rule, hurricanes move slowly and batter communities for several hours. If the eye of the hurricane passes over, there will be a lull in the wind, lasting from two or three minutes to half an hour. Stay in a safe place. Make emergency repairs only, but remember that once the eye has passed over, the winds will return from the opposite direction, and with possibly even greater force.

A note for owners and residents of mobile homes

OWNERS AND RESIDENTS OF MOBILE HOMES MUST TAKE SPECIAL CARE TO PROTECT THEMSELVES AND THEIR PROPERTY IN THE EVENT OF STORMS.



Position your trailer near a natural wind-break such as a hill or clump of trees. As severe storms usually come in from the southwest, west or northwest, the narrow end of the trailer should face in a westerly direction to make a smaller target.

Make sure your trailer is securely anchored. Consult the manufacturer for information on secure tie-down systems.

Finally, when a severe storm approaches, you should still seek shelter in a more secure building. Trailers are the exception to the stay-indoors rule.

Additional information

For more information about severe weather or weather in general, contact:

METEOROLOGICAL SERVICES

ENVIRONMENT CANADA

351 St. Joseph Boulevard

Gatineau, QC K1A 0H3

Telephone: (819) 997-2800

Toll-free: 1-800-668-6767

Fax: (819) 953-2225

TTY: (819) 994-0736

E-mail: enviroinfo@ec.gc.ca

Internet: www.msc-smc.ec.gc.ca

WEATHER MENU

A menu of recorded specialized weather forecasts

1-900-565-5000

There is a \$.95 per minute fee for this service.

WEATHER ONE-ON-ONE

To consult an Environment Canada weather expert

1-900-565-5555

There is a \$2.99 per minute fee for this service.

For general information or to order our self-help brochures, please contact:

The Office of Critical Infrastructure Protection and Emergency Preparedness

Public Affairs Division

122 Bank St., 2nd Floor, Ottawa, Canada K1A 0W6

Telephone: (613) 944-4875

Toll-free: 1-800-830-3118

Fax: (613) 998-9589

E-mail: communications@ocipep.gc.ca

Internet: www.ocipep.gc.ca

Please contact your provincial/territorial emergency management organization (EMO) for regional or local information on emergency preparedness.

Newfoundland and Labrador

Emergency Measures Organization

Telephone: (709) 729-3703

Fax: (709) 729-3857

Prince Edward Island

Emergency Measures Organization

Telephone: (902) 888-8050

Fax: (902) 888-8054

Nova Scotia

Emergency Measures Organization

Telephone: (902) 424-5620

Fax: (902) 424-5376

New Brunswick

Emergency Measures Organization

Telephone: (506) 453-2133

Toll-free: (800) 561-4034

Fax: (506) 453-5513

Québec

Direction générale de la sécurité civile et
de la sécurité incendie

Telephone: (418) 646-7950

Fax: (418) 646-5427

Toll-free Emergency Number: 1-866-776-8345

Emergency Number: (418) 643-3256

Or one of these regional offices:

- Bas-Saint-Laurent – Gaspésie –
Îles-de-la-Madeleine: (418) 727-3589
- Saguenay – Lac-St-Jean – Côte-Nord: (418) 695-7872
- Capitale Nationale – Chaudière –
Appalaches – Nunavik: (418) 643-3244
- Mauricie – Centre-du-Québec: (819) 371-6703
- Montréal – Laval – Laurentides –
Lanaudière: (514) 873-1300
- Montérégie – Estrie: (514) 873-1324
- Outaouais – Abitibi – Témiscamingue –
Nord-du-Québec: (819) 772-3737

Ontario

Emergency Management Ontario

Telephone: (416) 212-3468

Fax: (416) 212-3498

Manitoba

Emergency Measures Organization

Telephone: (204) 945-4772

Toll-free: 1-888-826-8298

Fax: (204) 945-4620

Saskatchewan

Saskatchewan Emergency Planning

Telephone: (306) 787-9563

Fax: (306) 787-1694

Alberta

Emergency Management Alberta

Telephone: (780) 422-9000

Toll-free in Alberta, dial 310-0000-780-422-9000

Fax: (780) 422-1549



British Columbia

Provincial Emergency Program (PEP)

Telephone: (250) 952-4913

Fax: (250) 952-4888

Northwest Territories

Emergency Measures Organization

Telephone: (867) 873-7785

Fax: (867) 873-8193

Yukon

Emergency Measures Organization

Telephone: (867) 667-5220

Fax: (867) 393-6266

Nunavut

Nunavut Emergency Management

Telephone: (867) 975-5300

Fax: (867) 979-4221

Towards a safer, more secure Canada

The Office of Critical Infrastructure Protection and Emergency Preparedness (OC�PEP), an agency of the Department of National Defence, leads the Government of Canada's emergency and business continuity planning.

Through its programs and information products, OC�PEP enhances the capacity of individuals, communities, businesses and governments to manage risks to their physical and cyber environments.

www.ocipep.gc.ca

SAFE GUARD

Safeguard is a national partnership that helps increase the public awareness of emergency preparedness in Canada.

Other titles in this self-help series include:

- Be Prepared, Not Scared
- Floods – What to do before and after
- Prepared for the Woods
- Prepare to Survive a Major Earthquake
- Preparing for the Unexpected
- Storm Surges
- Winter Power Failures
- Winter Driving –
You, your car and winter storms