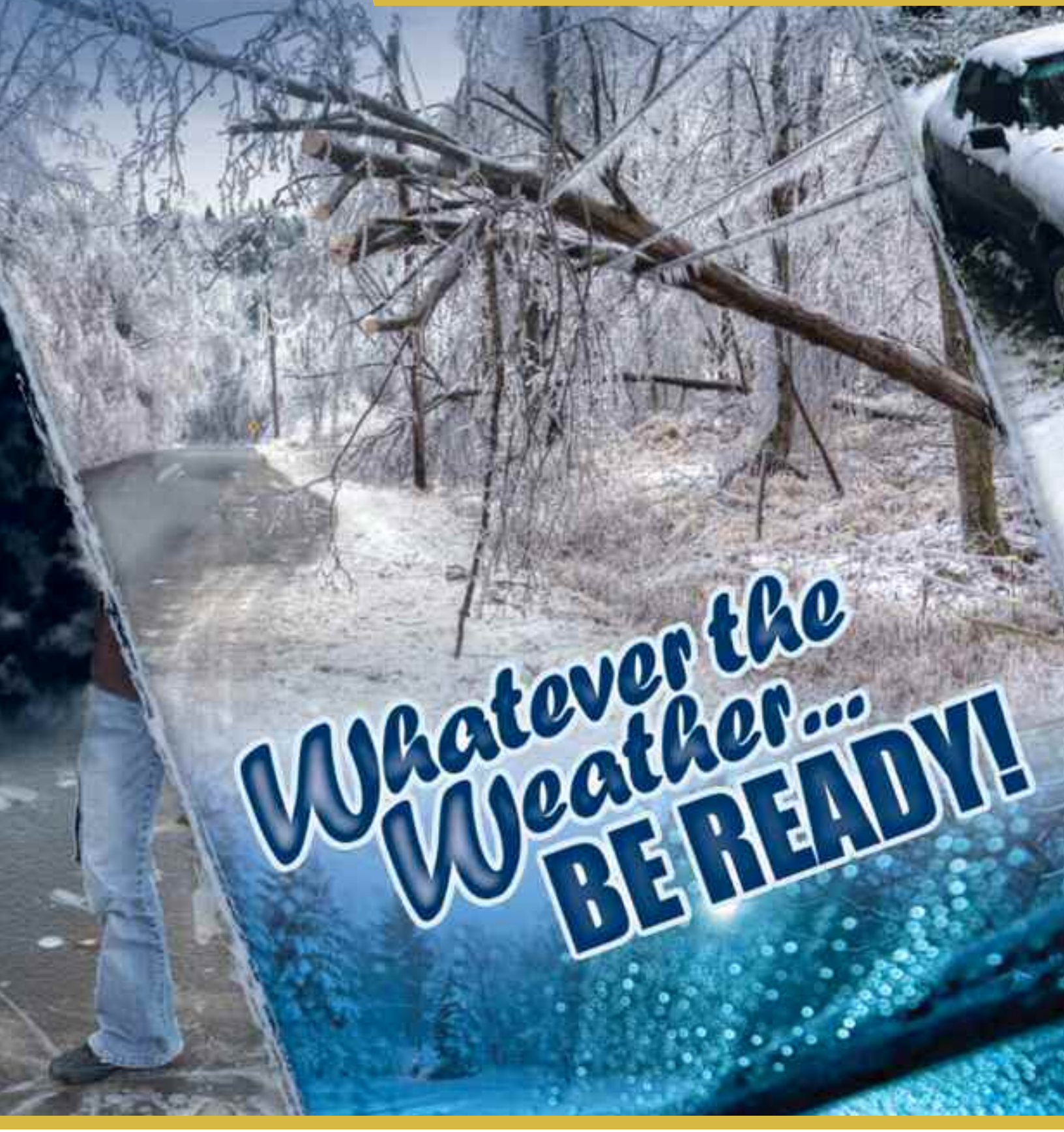
SEVERE WEATHER AWARENESS IN MANITOBA

A Teacher's Guide for Grade 5 Science

Fall/Winter Poster



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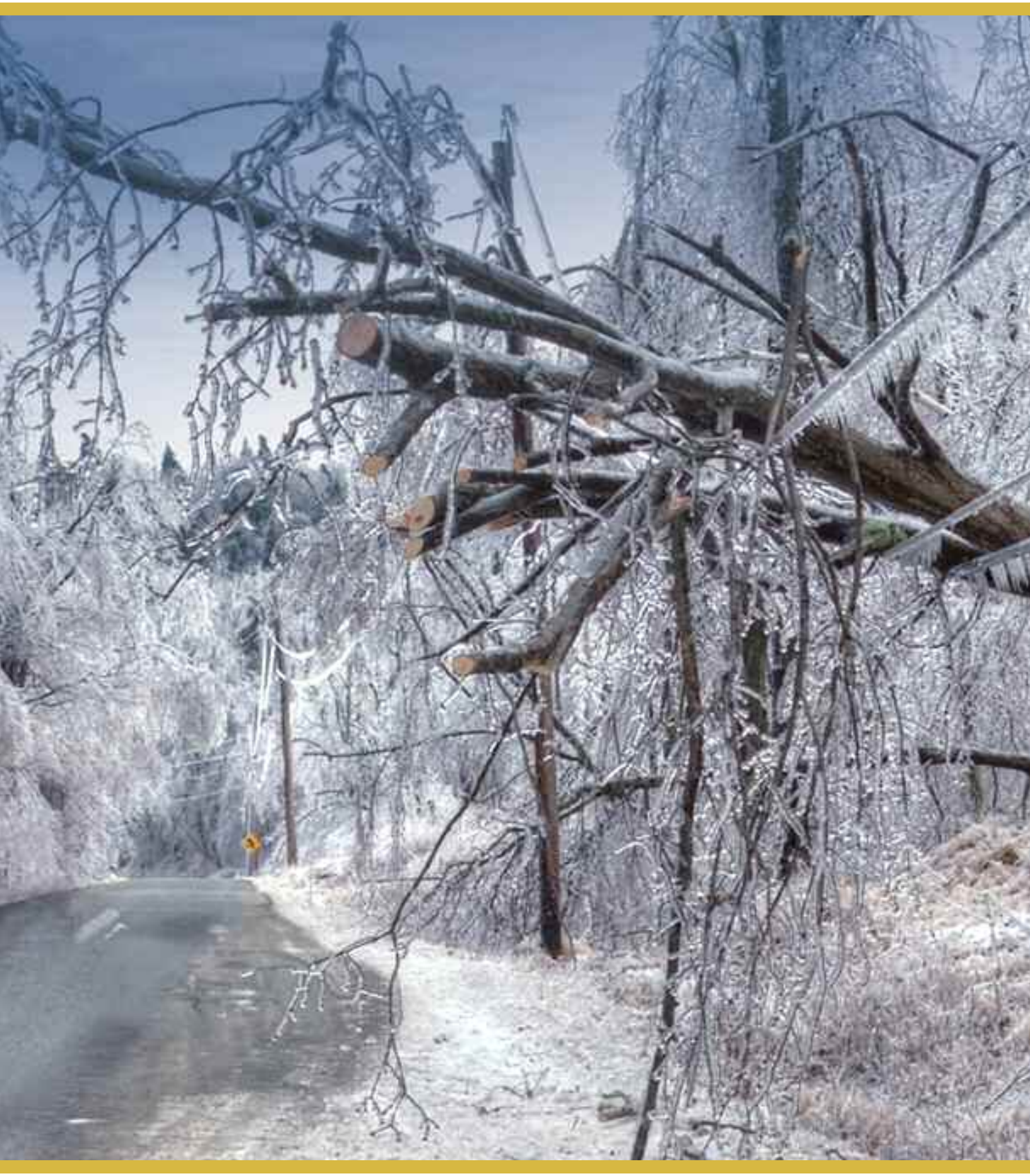


Severe Weather Awareness in Manitoba

A Teacher's Guide for Grade 5 Science

Fall/Winter Poster

2010
Manitoba Education

Manitoba Education Cataloguing in Publication Data

Severe weather awareness in Manitoba : a teacher's guide for
Grade 5 science. Fall/winter poster
[electronic resource]

ISBN-13: 978-0-7711-4663-3

1. Meteorology—Manitoba—Study and teaching (Elementary).
2. Storms—Manitoba—Study and teaching (Elementary).
3. Emergency management—Manitoba—Study and teaching (Elementary).
4. Winter—Manitoba—Safety measures—Study and teaching (Elementary).
5. Autumn—Manitoba—Safety measures—Study and teaching (Elementary).
6. Manitoba—Climate—Study and teaching (Elementary).
7. Weather—Study and teaching (Elementary).
I. Manitoba. Manitoba Education.
551.6

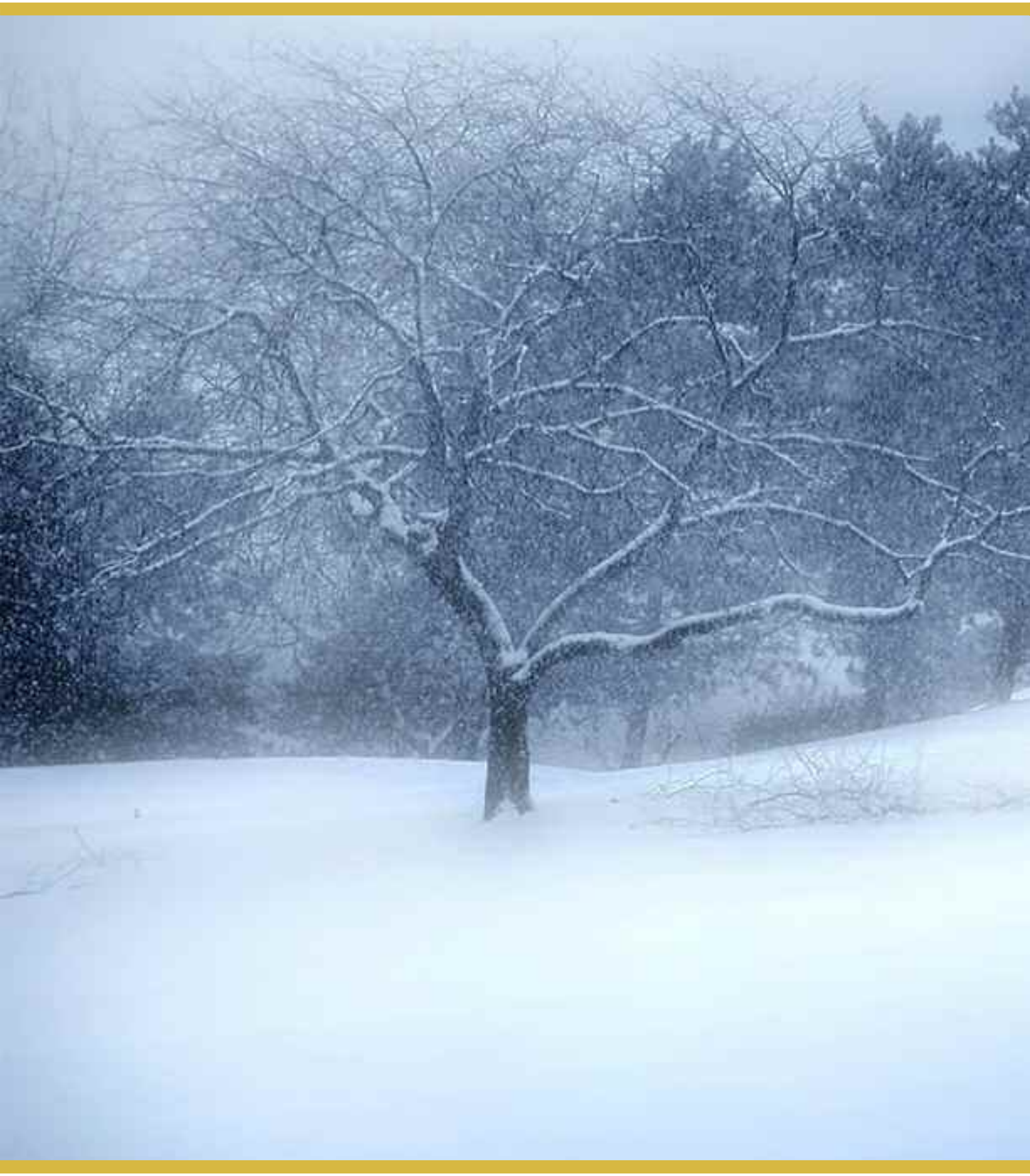
Manitoba Education
School Programs Division
Winnipeg, Manitoba, Canada

This resource and the posters are available on the Manitoba Education website at <www.edu.gov.mb.ca/k12/cur/science/index.html>.

Print copies of the set of two posters (spring/summer and fall/winter) can be purchased from the Manitoba Text Book Bureau (stock number 80662). Order online at <www.mtbb.mb.ca>.

Ce document est disponible en français.

Contents

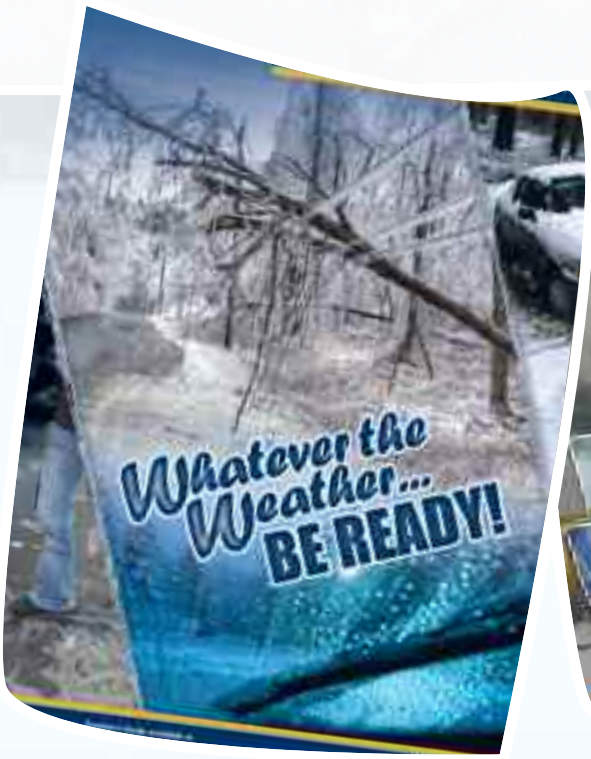


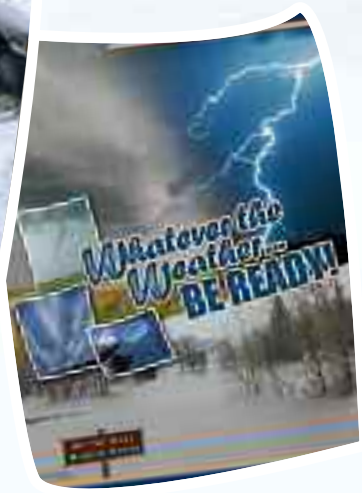
Introduction

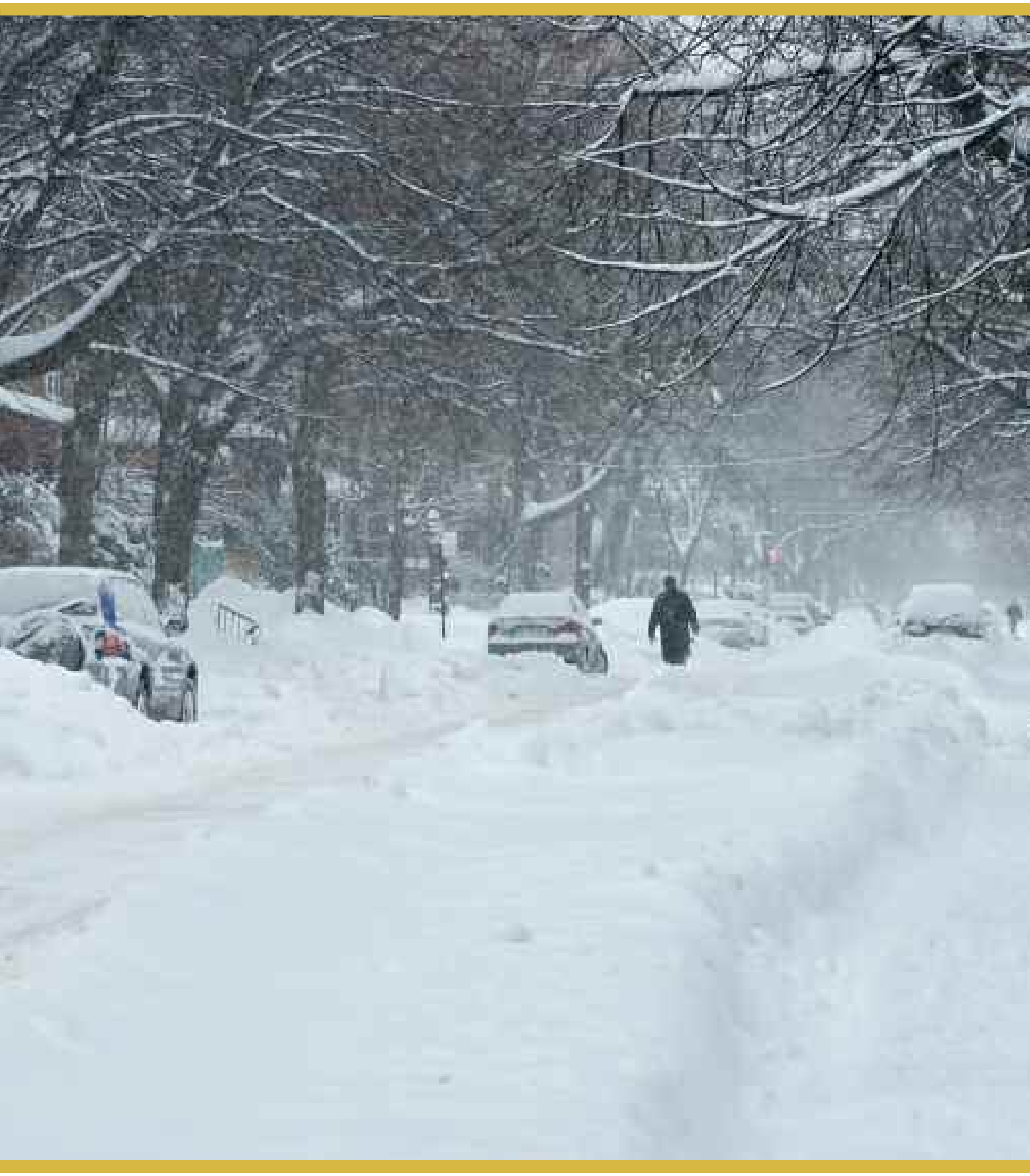
Manitoba Education has acted on the recommendation from the Manitoba Emergency Measures Organization (EMO) to provide learning resource supports for teachers and students directed toward severe weather awareness and response by developing two Severe Weather Awareness in Manitoba posters. The posters feature

- spring/summer severe weather in Manitoba
- fall/winter severe weather in Manitoba

Severe Weather Awareness in Manitoba: A Teacher's Guide for Grade 5 Science—Fall/Winter Poster is intended to support teachers in addressing the specific learning outcomes identified in the weather unit of Manitoba's Grade 5 Science curriculum and the general weather awareness strategies encouraged by EMO. This guide includes information on a variety of severe weather phenomena experienced in Manitoba during fall and winter, and suggests student learning experiences aligned with Manitoba's Grade 5 curricula. The links to online resources found throughout this guide are intended to assist teachers and students in becoming regular observers of the skies and in gaining familiarity with the conditions and warning signs of imminent severe weather.







Severe Weather Awareness in Manitoba: Fall/Winter Poster

The Severe Weather Awareness in Manitoba fall/winter poster illustrates several severe weather conditions that we experience in Manitoba in autumn and in winter. These images were selected to support student discussions and explorations of the various weather phenomena that can occur in Manitoba. Descriptions and explanations of the images represented on the poster follow.

What Are the Hazards of Freezing Rain?

The image in the centre of the poster represents an ice storm. Many of us will recall the devastating ice storm that struck the St. Lawrence River Valley region of Ontario and Quebec in 1998. When conditions are right, an ice storm takes the form of steady, significant amounts of rainfall that freezes upon contact with the ground, trees, metal structures, or any other object that can be coated with a layer of ice. Difficulty arises when the weight of ice can no longer be supported by the strength of the object that it is building upon, particularly on branching structures such as trees and high-tension electricity towers. This layer of ice can break trees, cause falls of electrical wiring, or make roads extremely slippery.

Although ice storms are more frequent in the eastern part of Canada than on the Prairies, they can nevertheless develop in Manitoba. In February 2009, an ice storm event occurred in southern Manitoba, and resulted in road closures, delayed flights, and caused temporary power failures.

Resource Link

For more information about hazardous conditions due to freezing rain, refer to the following website:

Environment Canada. “Winter Hazards” *Weather and Meteorology*. <www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=46FBA88B-1>.



Are You Prepared for Manitoba Blizzards?

In Manitoba, just what do you get when you combine falling snow, steady high winds, and weather conditions that tend to linger? The classic Manitoba blizzard! Most of us have experienced a blizzard event that left an impression on us for a long time, as the image of the snow-covered car on the poster reminds us. For some people, it might be the blizzard of early April 1997, which immediately preceded Manitoba's "flood of the century," caused by melting of record snowfalls in the Red River Basin from the winter of 1996–1997. Perhaps your students will recall the two-day blizzard of February 2008, with wind gusts of 70 kilometres per hour and wind chills in the range of minus 45 degrees Celsius, which kept southern Manitobans in their homes.

According to Environment Canada, blizzards are severe winter storms that have the following minimum characteristics: snow actively falling or blowing snow with winds of 40 kilometres per hour or more, with visibility reduced to less than one kilometre in snow and/or blowing snow, and a wind chill of minus 25 degrees Celsius or colder. All these conditions are expected to last at least three hours to be officially classified as a blizzard. In most instances, there is plenty of warning that blizzard conditions could develop, and still many people do not take the threat seriously. If blizzard conditions do develop, it is advisable to take certain precautions.

Resource Link

For more information on what to do if a blizzard warning has been issued for your area, refer to the following website:

Government of Canada. "Severe Storms in Canada." *Is Your Family Prepared?* <www.getprepared.gc.ca/knw/ris/str-eng.aspx#b1>.

Do You Know Your Wind Chill Index?

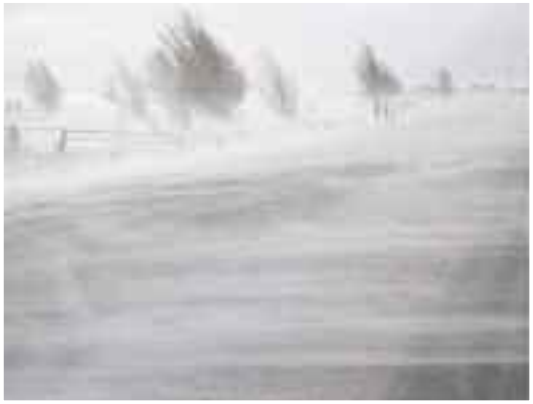
The images on the poster remind us of the extremely cold temperatures with which we must deal in Manitoba's winters. Exposure to extreme wind chill – even for a few minutes – can cause exposed skin to freeze, or cause hypothermia to develop, and can even result in death.

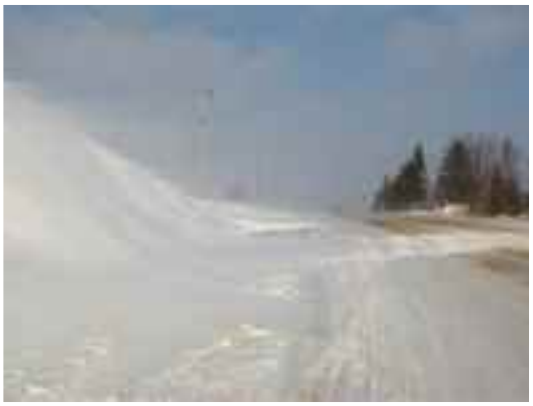
We feel the cold more when it is windy because the movement of air removes the protective warm layer of air that is constantly being created by our body heat. From 2001 to 2003, Canadian scientists embarked upon a new set of wind chill experiments using rugged volunteers who were willing to endure some discomfort in the name of developing new understandings related to wind chill. Since the winter of 2004, Environment Canada has used the newly established wind chill index scale. The new scale indicates the "feeling of cooling" that is caused by the combined effects of both wind and the outside temperature.

Resource Link

A detailed treatment of wind chill (including the new wind chill index and Canada's involvement in developing it) is available on the following website:

Environment Canada. "Canada's Wind Chill Index." *Weather and Meteorology*. <www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=5FBF816A-1>.





Are You Standing on Thin Ice?

The image on the bottom left corner of the poster represents the dangers of walking or playing on ice. Even if it is cold during the winter, the ice on the rivers and lakes of Manitoba is not always thick enough to support our weight. Several factors, such as the extent and amount of snow on top of the ice, strong currents under a thin layer of ice, and fluctuating water levels, can affect the thickness and stability of ice. Moreover, one sudden fall of temperature can create cracks in the ice, which can also pose danger.

The Canadian Red Cross websites listed below include learning activities you can do with students to increase their awareness of the potential dangers that ice conditions present.

Resource Links

For information on ice safety, refer to the following websites:

Canadian Red Cross. *Canadian Red Cross Society School Resource Package: Supporting Curriculum Outcomes for Manitoba Schools*. <www.redcross.ca/cmslib/general/manitoba_new_school_resource2006.pdf>.

This comprehensive resource addresses, among other personal safety topics, how to deal with the emotional impacts of facing severe weather phenomena.

———. *Drownings and Other Water-Related Injuries in Canada: 10 Years of Research. Module 2: Ice and Cold Water*. 2006. <www.redcross.ca/cmslib/general/ws_final_m2_english2006_04_19.pdf>.

An analysis of cold water and ice safety is available in this research report on the circumstances of drowning deaths in Canada from 1999 to 2000.

———. "Ice Safety." *How We Help*. <www.redcross.ca/article.asp?id=2570&tid=024>.

———. *Water Safety: Injury Prevention Resource for First Nations Communities*. Jan. 2010. <www.redcross.ca/cmslib/general/h2oresourcefirst.pdf>.

In 2010, the Canadian Red Cross published this comprehensive water and ice safety resource that specifically addresses conditions in Canada's First Nations communities.

Did You Know?

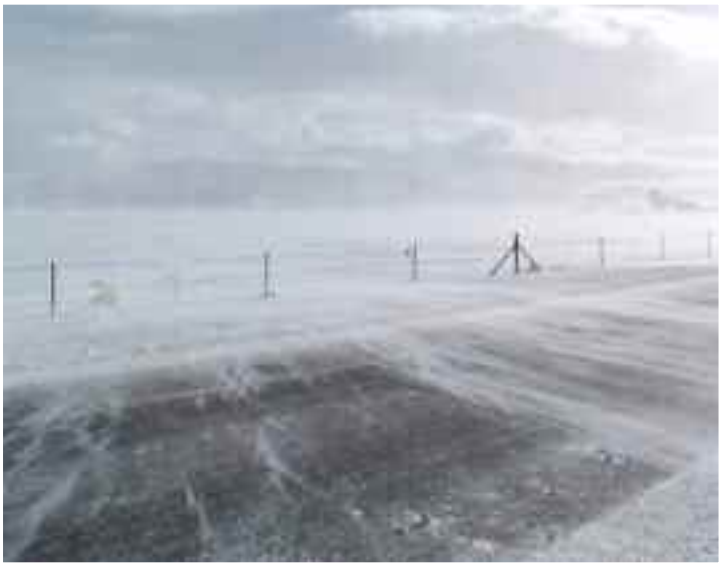
An ice thickness chart, developed by Niagara River Anglers Association, is available on the following website:

MuskokaOutdoors. *Recommended Ice Thickness Chart*. 2001. <http://muskokaoutdoors.ca/blog/2007/12/27/recommended-ice-thickness-chart/>.

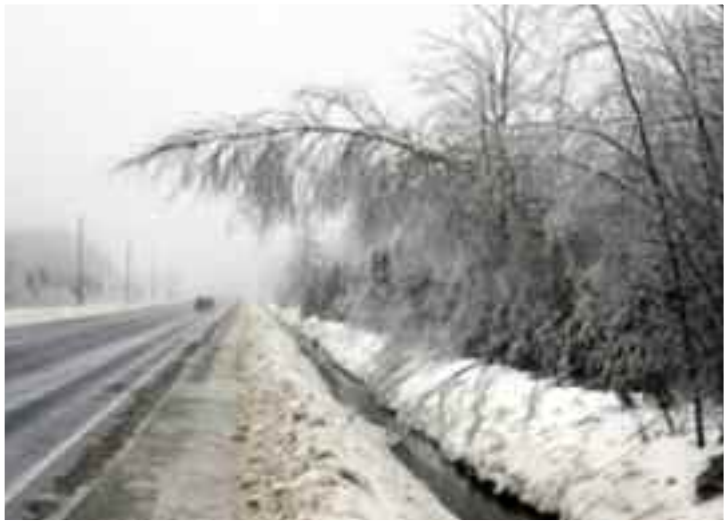
Severe Weather Phenomena in Manitoba

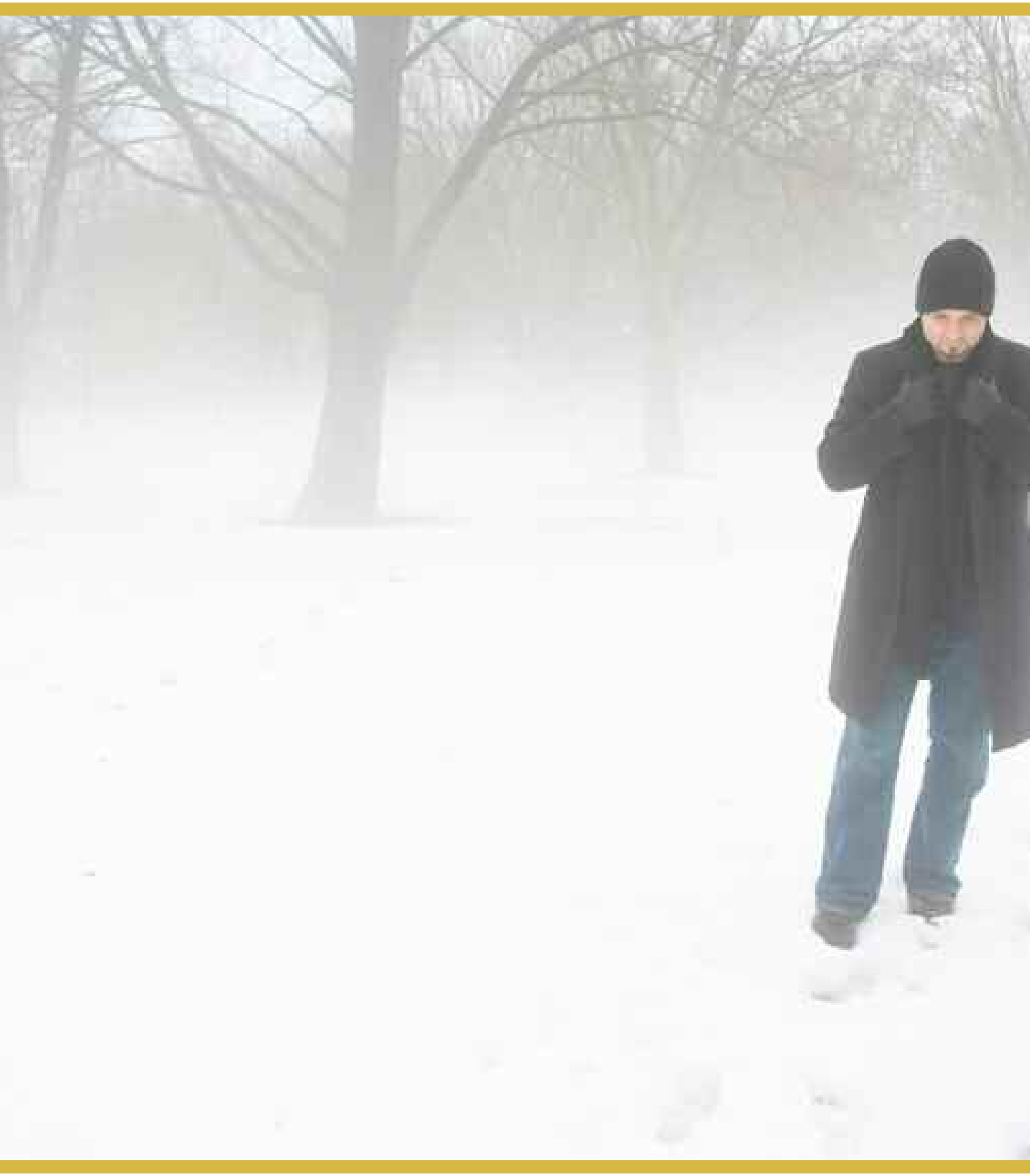
Being Prepared for Severe Winter Weather

During the winter in Manitoba, severe weather conditions can rapidly become dangerous. We need to be prepared for conditions such as bitter cold, high wind chills, freezing rain, or blizzards. Our best defence against having something go wrong as a result of severe weather is knowing what to expect, how to prepare ourselves, and how to stay safe.



It is important to know where to find information about hazardous winter conditions, such as severe weather watches and warnings, and to plan ahead. Listening to weather forecasts on the radio or on television or checking forecasts on the Internet before going out in the winter, dressing warmly, staying dry, knowing when to stay out of the wind, and being aware of signs of hypothermia or frostbite can help keep us safe in cold weather. Understanding the wind chill index is also important. It provides information about how cold it feels outside, which can help us make decisions about dressing appropriately for the cold or determining whether it is safe to be outdoors.





Student Learning Activities

The following suggested learning activities align with Manitoba's Grade 5 curricula.

Severe Fall/Winter Weather Phenomena and Personal Safety

Specific Learning Outcomes

Grade 5 Science

5-4-08 Describe the key features of a variety of weather phenomena.
5-4-09 Provide examples of severe weather forecasts, and describe preparations for ensuring personal safety during severe weather and related natural disasters.
5-4-10 Investigate various ways of predicting the weather, and evaluate their usefulness.
5-4-11 Contrast the accuracy of short- and long-term weather forecasts, and discuss possible reasons for the discrepancies.
5-4-12 Describe examples of technological advances that have enabled humans to deepen their scientific understanding of weather and improve the accuracy of weather predictions.

Science Skills and Attitudes

5-0-1A Formulate, with guidance, specific questions that lead to investigations.
5-0-1B Identify various methods for finding the answer to a specific question and, with guidance, select one to implement.
5-0-2A Access information using a variety of sources.
5-0-2B Review information to determine its usefulness using predetermined criteria.
5-0-2C Record information in own words and reference sources appropriately.
5-0-4C Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise.
5-0-4D Assume various roles and share responsibilities as group members.
5-0-5A Make observations that are relevant to a specific question.
5-0-5F Record and organize observations in a variety of ways.
5-0-6F Evaluate the methods used to answer a question or solve a problem.
5-0-7F Use prior knowledge and experiences selectively to make sense of new information in a variety of contexts.
5-0-7G Communicate methods, results, conclusions, and new knowledge in a variety of ways.
5-0-7H Identify, with guidance, connections between the investigation results and everyday life.

Grade 5 Physical Education/Health Education

K.3.5.B.2 Describe ways to respond appropriately to potentially dangerous situations related to environmental conditions (e.g., fires, extreme weather conditions, icy conditions) relevant to self and others.

Activating

- **Discussion and Research—Weather-Related Sayings**
  Students discuss the possible meanings of weather-related sayings and their usefulness (past and present) in predicting winter weather phenomena.

  Examples:
  - Clear moon, frost will be soon.
  - A year of snow is a year of plenty for the harvest.
  - Halo around the sun or moon, rain or snow soon.
  - Sundogs in the morning will give cold weather a fair warning.

  Students research the intended meanings of sayings such as these and discuss their scientific basis in terms of repeatable observations.

  Students submit, as an Admit Slip, a weather-related saying, a phrase from weather folklore, or the observations of an Elder. Post these sayings and phrases on a class-developed display. Students discuss the possible origin(s) and usefulness of each. As a class, discuss the technological advances that are currently used to identify or forecast similar elements of weather.

  Teacher Tip
  Students may research or interview family members, an Elder, and neighbours to access weather-related sayings or weather folklore.

- **Planning an Outdoor Event Based on Weather Forecast**
  Cooperative groups of students access an extended weather forecast (from an online source such as Environment Canada) and choose a specific day to plan an appropriate outdoor event based, in part, on the forecasted weather (e.g., skating on a pond or river, taking a skiing/snowboarding day trip, sketching the position of sundogs in the sky, calculating wind chill from temperature, humidity, and wind speed). On the specific day, students evaluate the success of their planning based on the actual weather and discuss possible reasons for discrepancies in the forecast. It may also be important to discuss proper clothing preparations in the event of severe conditions of cold, snow, or wind.

Acquiring

- **Field Trip—Weather Forecasting Technology**
  On a field trip to an Environment Canada weather office or to a local weather data collection centre (or a “virtual field trip” online), students record examples and descriptions of the technologies that have improved our ability to forecast winter weather conditions.

- **Interview—Traditional Knowledge of Weather Forecasting**
  Students compose questions and interview, email, or otherwise contact individuals who use traditional knowledge (e.g., hunters, trappers, fishers, Elders) to determine methods they use to understand and predict the weather in winter (e.g., determining ice conditions for safety, observations of animal habits on the trapline) and identify the importance of each method. Students discuss responses and record information in their science journals.

Applying

- **Multimedia/Dramatic Presentation—Weather-Prediction Methods**
  Cooperative groups of students create a multimedia or dramatic presentation related to a specific winter weather phenomenon (e.g., freezing rain, severe wind chill, presence of sundogs in the morning, an impending blizzard, icy road conditions). Students illustrate the weather phenomenon in a stage-setting introductory way. Additional components of the presentation include explanations of methods of predicting the selected weather phenomenon (e.g., weather-related sayings, traditional knowledge, folklore knowledge, observations of the natural environment, technological advances such as Doppler radar and satellite imaging). Students describe the usefulness of each weather-prediction method, its origin, and how it may enable us to deepen our scientific understanding of winter weather.

- **Online Learning—Web 2.0 Applications**
  Increasingly, students are making use of interactive online learning tools and platforms for research, collaboration, and discussion of issues and trends that matter to them (collectively known as Web 2.0 applications).

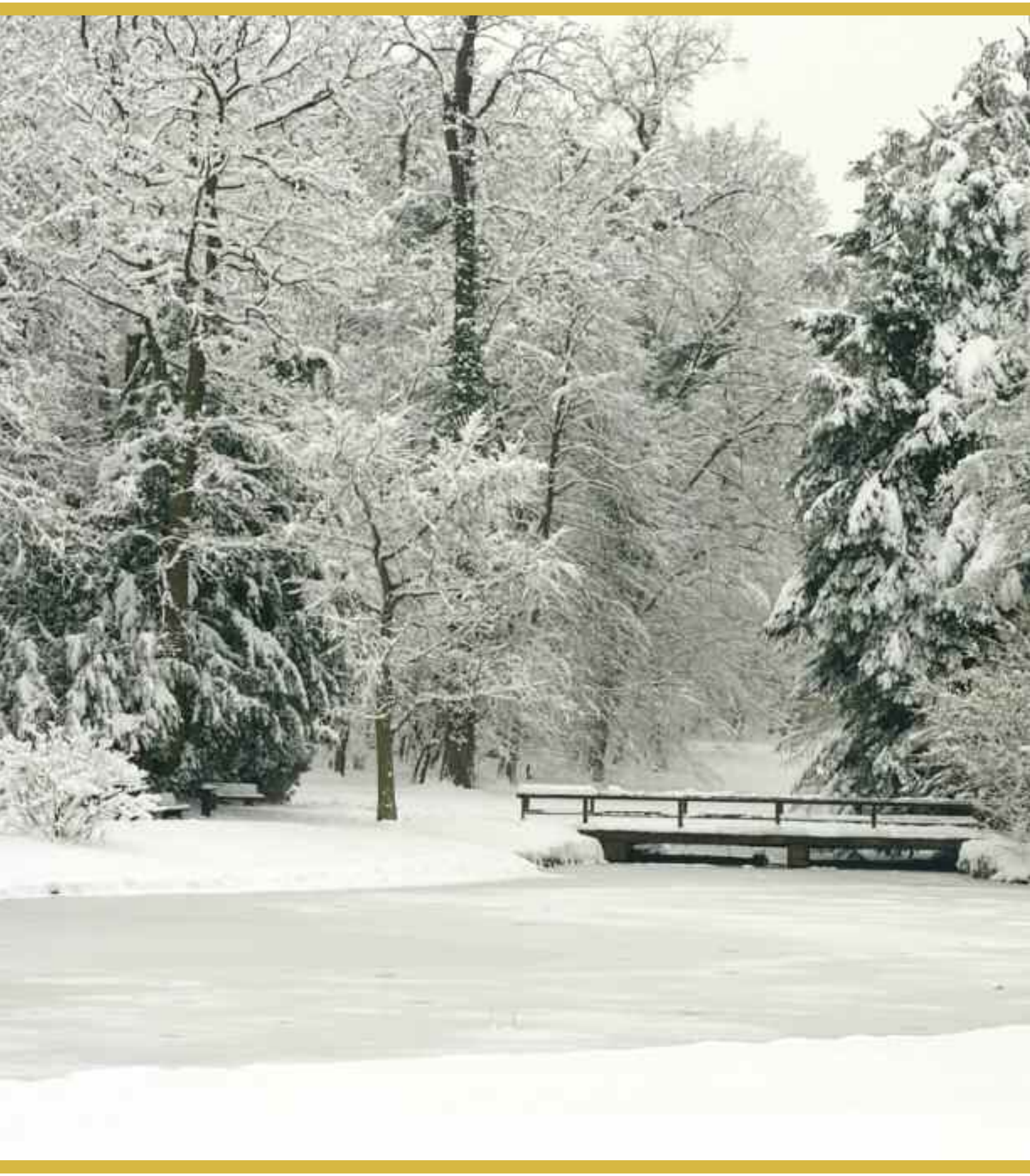
  Students can use Web 2.0 tools to create an online eLearning environment about severe winter weather in Manitoba. Explore the many information-sharing options that are available, and apply them to weather-related student learning activities.

Teacher Tip

Most animals are vulnerable to environmental changes that humans often cannot detect.

Examples:

- Swallows flying low indicates the air pressure is dropping.
- Static electricity may increase the grooming activities of cats.
- The calls of some birds, including crows and geese, become more frequent with falling air pressure.
- Deer and elk react to wind and air pressure by coming down from the mountains and seeking shelter.
- Some animal species feed more before a storm so they can seek shelter.
- Deer are seen more often at the roadside during particular times of the winter season as they feed.



Manitoba Emergency Measures Organization

The Manitoba Emergency Measures Organization was established in 1959 with the original purpose of developing emergency procedures for dealing with events related to a nuclear attack from the Soviet Union. Over the years, as the threat of nuclear war diminished and the risk of both natural and human-caused disasters increased, the emphasis shifted toward peacetime emergencies. In fall 1996, the organization was amalgamated with the Manitoba Disaster Assistance Board to form the Manitoba Emergency Management Organization, broadening its scope to all phases of disaster management—from preparedness and response to recovery. In 2001, the organization was renamed the Manitoba Emergency Measures Organization (EMO).

EMO assists with the preparation, review, and enhancement of emergency preparedness programs in Manitoba, training exercises, and resource development for municipalities, school divisions, government departments and agencies, and the private sector. EMO also reviews and recommends amendments to emergency measures legislation and ensures that departmental, municipal, and private sector emergency plans are consistent with existing legislation.

Why Should You Know about Manitoba EMO?

EMO assists with major emergencies and disasters through coordination of the disaster response process, including the coordination of provincial, federal, and non-government agency resources to assist municipalities. Services provided to the municipalities include consulting, planning assistance, post-emergency reports, and public information on response activities.

With respect to severe weather events such as winter blizzards, hazardous ice conditions created by precipitation, unusual winter warming events, or wind-chill risks to people, the EMO serves in the important role of disaster financial assistance and recovery for Manitoba's citizens. The purpose of the disaster financial assistance is to assist victims, municipalities, government departments, and other agencies to recoup some of the costs incurred with respect to mitigating the consequences of disaster. Activities include coordination of partners in community recovery, developing and implementing guidelines for the evaluation, approval, and payment of disaster assistance claims.

Resource Links

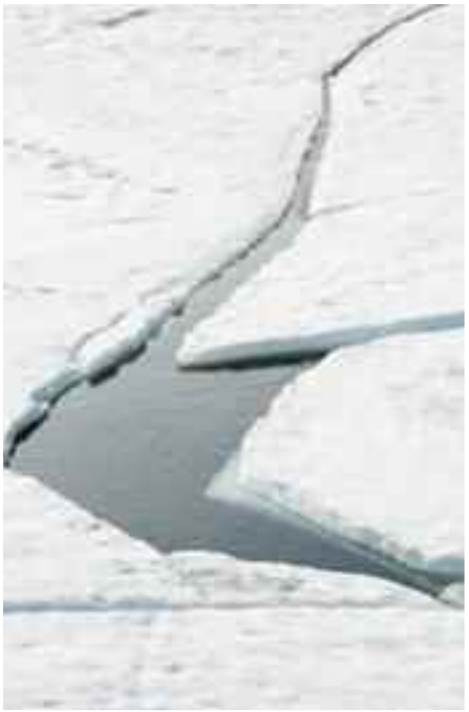
To obtain more information about preparing for, and coping with, severe weather events, refer to the following publications on the EMO website at <www.gov.mb.ca/emo/general/downloads.html>.

Government of Canada. Public Safety and Emergency Preparedness Canada, in cooperation with Canadian Red Cross. *Self-Help Advice: Be Prepared, Not Scared: Preparedness Starts with You*. Ottawa, ON: Public Safety and Emergency Preparedness Canada, Sept. 2005.

———. Public Safety and Emergency Preparedness Canada, in cooperation with Environment Canada. *Self-Help Advice: Severe Storms*. Ottawa, ON: Public Safety and Emergency Preparedness Canada, Sept. 2005.

Manitoba Emergency Measures Organization. *Family Emergency Handbook: Think Safety*. Winnipeg, MB: Manitoba EMO, Oct. 2003.

Manitoba Emergency Measures Organization, and The Winnipeg Humane Society. *Your Pets and Emergency Preparedness*. Winnipeg, MB: Manitoba EMO, n.d.



Government of Canada Resources

Canada is a vast country with extreme weather conditions and dramatic geological features that influence weather phenomena. The following websites provide information on a wide variety of natural hazards in Canada, including fall and winter weather. A *Natural Hazards of Canada* map details a 150-year history of natural hazards, including flooding from rapid snow melt, blizzard-prone areas of Canada, and areas of heavy snow risk. The Government of Canada resources also focus on emergency preparedness for Canadians.

Resource Links

Government of Canada. *Is Your Family Prepared?* <www.getprepared.gc.ca/index-eng.aspx>.

———. *Natural Hazards of Canada: A Historical Mapping of Significant Natural Disasters*. <www.publicsafety.gc.ca/res/em/nh/hazardsmap.pdf>.

———. Public Safety and Emergency Preparedness Canada, in cooperation with Canadian Red Cross. *Self-Help Advice: Be Prepared, Not Scared: Preparedness Starts with You*. Ottawa, ON: Public Safety and Emergency Preparedness Canada, Sept. 2005. <www.gov.mb.ca/emo/home/be_prep_e.pdf>.

———. Public Safety and Emergency Preparedness Canada, in cooperation with Environment Canada. *Self-Help Advice: Severe Storms*. Ottawa, ON: Public Safety and Emergency Preparedness Canada, Sept. 2005. <www.gov.mb.ca/emo/home/storm_e.pdf>.

Public Safety Canada. "Natural Hazards of Canada." *Publications*. <www.publicsafety.gc.ca/res/em/nh/index-eng.aspx>.

Environment Canada

Weatheroffice

Environment Canada's *Weatheroffice* is a comprehensive online source for gathering severe weather awareness resources on the Government of Canada website. By following the "Educational Resources" links from the home page, you can navigate among a host of information panes that will assist you and your students to conduct background research.

Resource Link

Environment Canada. *Weatheroffice*. <www.weatheroffice.gc.ca/canada_e.html>.

Weather and Meteorology

Environment Canada's *Weather and Meteorology* website provides weather-related information, tools, and services such as the following. To use the wind chill calculator, simply load in values for the current temperature outside from a thermometer and an estimate of the wind speed, and the wind chill values are at your fingertips.

Resource Links

Environment Canada. "Reporting Severe Weather." *Weather and Meteorology*. <www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=F3FC6CAA-1>.

———. "Wind Chill Calculator." *Weather and Meteorology*. <www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=0F42F92D-1>.

Meteorological Service of Canada

Acting under the guidance of Environment Canada, the Meteorological Service of Canada provides teachers with a wide variety of guides for doing background research and for developing classroom learning activities.

Resource Links

Environment Canada. Meteorological Service of Canada. *MSC Education Publications*. <www.msc-smc.ec.gc.ca/education/teachers_guides_e.cfm>.

———. ———. *Severe Weather Watcher Handbook*. <www.msc-smc.ec.gc.ca/education/severe_weather/index_e.cfm>.

Sky Watchers

Environment Canada's *Sky Watchers* program provides curriculum-aligned teacher resources. From the home page, you can navigate a variety of resources, including the following:

- **Teachers' Corner**
  This section of the *Sky Watchers* website provides the following resources:
  - student activities and experiments, information on making weather instruments, and forms and log sheets for recording daily weather
  - "Curriculum Correlations" provides outcome-by-outcome correlations to Manitoba's Grade 5 Science curriculum
  - "Free Teacher's Guides" provides access to laminated large-format weather log charts and a weather map of Canada, as well as resources such as *Sky Watchers Guide to Weather* and *Project Atmosphere Canada Teacher's Guide*
  - "Virtual Weather Office" offers tours for classrooms that do not have ready access to an airport weather station or to Environment Canada facilities
- **Traditional Ecological Knowledge**

If you have an interest in exploring traditional ecological knowledge as it connects to Grade 5 weather learning experiences, *Expanding the Circle: Traditional Ecological Knowledge and Weather* will take you on a journey with Elders' weather wisdom and many drawings done by students describing their relationship to the land.

- **Sky Watchers Weather**
  This link enables you and your students to engage actively with other schools across Canada in real-time weather watching, including the ability to upload students' weather observations. Once you have signed up to the *Sky Watchers* program, you can download archived weather data that has been posted by other schools for graphing and mapping purposes and view the weather reports submitted by other schools across Canada—a great way to network about weather phenomena.
- **Sky Watchers Glossary**
  This glossary defines and explains weather-related terminology.

Resource Links

Environment Canada. *Expanding the Circle: Traditional Ecological Knowledge*. <www.on.ec.gc.ca/skywatchers/skywtek/default.html>.

———. *Sky Watchers*. <www.on.ec.gc.ca/skywatchers/index_e.html>.

———. "Sky Watchers Glossary." *Sky Watchers*. <www.on.ec.gc.ca/skywatchers/swGlossary_e.html>.

———. "Sky Watchers Weather." *Sky Watchers*. <www.on.ec.gc.ca/skywatchers/swWeather_e.html>.

———. "Teachers' Corner." *Sky Watchers*. <www.on.ec.gc.ca/skywatchers/teachersCorner_e.html>.

Related Resources

Resource Links

Canada Safety Council. "The Chilling Facts about Wind Chill." *Safety Canada Online* Sept. 2009. <http://safety-council.org/eng/safety-canada-online/issues/2009/01/1/the-chilling-facts-about-wind-chill/>.

The section "Seven Steps to Cold Weather Safety" explains how to prepare and dress for, and adapt and respond to, severely cold temperatures.

Canadian Red Cross. *Drownings and Other Water-Related Injuries in Canada: 10 Years of Research. Module 2: Ice and Cold Water*. 2006. <www.redcross.ca/cmslib/general/ws_final_m2_english 2006_04_19.pdf>.

This document contains an in-depth analysis of ice and cold water safety.

———. "Ice Safety." *How We Help*. <www.redcross.ca/article.asp?id=2570&tid=024>.

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