Prairie Climate Centre
From Risk to Resilience

Prairie Communities

Altona

MANITOBA

Altona and Climate Change

The climate determines almost everything about how we design, build, and live in our communities. As the climate continues to change, the safety and prosperity of our communities are put at risk. Climate change is a challenge that requires us to work together, locally, nationally, and globally. With technical know-how, political will, targeted investments, and collective commitment, we can mitigate the severity of climate change and build resilience to its hazards and impacts.

Climate Change and Health

High temperatures can be hazardous, especially for the elderly, the chronically ill, and those without air conditioning. High and prolonged heat can also impact air quality, facilitate the spread of harmful diseases, inhibit outdoor activities, and cause stress and anxiety. We can adapt with measures such as shaded areas, green roofs, and supports for those who need help during heat waves.

Climate Change and Extreme Weather

A warmer climate increases the chance and severity of more extreme weather, including high winds, flash floods, hail, lightning, tornadoes, drought, and wildfires. Communities must improve their planning and engineering, emergency preparedness, and water management to build resilience.

Climate Change and Infrastructure

Climate change threatens the integrity of infrastructure such as roads, bridges, water supply, and telecommunications, most of which has not been built to withstand current and future extremes. Emergency preparedness, planning, and construction practices for retrofits and new development that take the new climate reality into account can increase our adaptive capacity. Acting now will reduce economic risk and save on the rapidly increasing long-term damages and costs associated with climate change.

High-Carbon Climate Change Projections*

Change	Recent Past	2051-2080 Low (10th percentile)	2051-2080 Mean	2051-2080 High (90th percentile)	Direction of change
Typical hottest summer day	35.3 °C	36.5 °C	**40.5 °C**	44.5 °C	↑
Typical coldest winter day	-34.2 °C	-31.3 °C	**-26.2 °C**	-20.8 °C	↑
Number of +30 °C days per year	19	32	**60**	85	↑
Spring precipitation	123 mm	77 mm	**145 mm**	226 mm	↑
Summer precipitation	216 mm	114 mm	**208 mm**	322 mm	↓
Number of below-zero days per year	183	121	**145**	166	↓
Number of +20 °C nights per year	1	5	**22**	41	↑

*See back page for details and source of climate model data

Wetter springs, drier late summers

Much warmer winters

Many more hot days

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Summer Change	Recent Past	2021-2050 10th percentile	2021-2050 Mean	2021-2050 90th percentile	2051-2080 10th percentile	2051-2080 Mean	2051-2080 90th percentile	Importance
Typical hottest summer day	35.3 °C	34.3 °C	**37.8 °C**	41.4 °C	36.5 °C	**40.5 °C**	44.5 °C	*Measure of extreme heat that affects social and ecological systems*
Number of +30 °C days per year	19	17	**37**	59	32	**60**	85	*Indicator of summer severity that affects human health, recreation, ecosystems, impacts on machinery operations and equipment failure*
Number of +20 °C nights per year	1	1	**7**	16	5	**22**	41	*Impacts on human health including psychological stress and heat stroke, increased A/C and energy usage*
*Number of heatwaves**	3	2	**5**	8	3	**6**	10	*Causes heat-related illnesses, and strain on social services such as emergency rooms, shelters, community structures*
Summer precipitation	216 mm	120 mm	**218 mm**	320 mm	114 mm	**208 mm**	322 mm	*Affects water availability, risk of drought, stormwater issues*

Longer, more persistent drought

Long periods (six months or longer) of below-normal precipitation can reduce plant growth and crop yields. Persistent periods of low ground moisture content can lead to ground heaving, which can damage critical pieces of infrastructure. Droughts threaten water reservoir levels and intakes.

Heavier rainfall events

The risk of very intense rainfall events is projected to increase because of hotter summer temperatures. Intense rainfalls can lead to overland flooding and storm-sewer backups. Low lying areas may become temporarily inaccessible due to standing water. These intense rainfall events can be accompanied by other thunderstorm hazards, including high winds, hail, lightning, and tornadoes. These events can cause damage to infrastructure and residential homes.

More frequent, intense heat and heatwaves

Presently, heat wave events are rare, which may mean that communities are not prepared for the heat. Since human health risks increase drastically in extreme heat, the demand for health services may be large if a heat wave occurs. Communities need to be prepared to provide places of refuge from the heat for the public in such scenarios.

Wild animal activity

As summer days and nights get warmer, wild animals will become more active and may become more commonly encountered. This proximity could increase safety concerns within communities and when traveling on highways.

Longer, more intense allergy season

Warmer summer months and higher levels of carbon dioxide (CO_2) in the atmosphere may cause some species of trees to release more pollen into the air. People who suffer from seasonal allergies could see more intense symptoms for longer periods of the summer, and more people in general may begin to experience allergies.

More frequent and more intense wildfires

Hotter temperatures and drier summers greatly increase the risk of wild forest, bush, and grass fires. Poor air quality and breathing related issues will occur more often with increased instances of forest fires, even if the fires are far away.

New infectious diseases

Warmer summers could allow different insects to move north into areas where they were not previously found. Certain species of ticks, mosquitos, and other insect vectors can carry diseases that are harmful to humans, such as West Nile Virus and Lyme disease.

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Extended severe storm and wildfire season

The summer season is expected to expand into the spring and fall months, increasing the risk of summer-like thunderstorm development and extending the wildfire season. Thunderstorms bring several hazards with them, including heavy rainfalls, damaging hail, and high winds, as well as lightning, a cause of wildfire ignition. During the spring, overland flooding could arise from fast melting snow while the ground is still frozen.

Shifting seasons

Spring is expected to start earlier and fall to end later, creating a longer period of time when the ground is not frozen, resulting in a longer growing season. This shift will likely affect the timing of seasonal activities and operations, and agricultural activities. Unseasonably hot temperatures during the spring can be very harmful to saplings, seedlings, and crops.

Jet stream changes

There is growing concern in the scientific community that climate change is having an impact on the jet stream, specifically leading to a 'more wavy' pattern that can elevate the risk of abnormal weather conditions. In particular, there is concern that 'polar vortex' events will become more frequent. These can produce unusually severe and long outbreaks of cold and stormy weather, especially in the fall, winter, and spring. These outbreaks can also be associated with intense temperature swings and weather transitions. Large swings in temperature and extreme weather can cause several issues, including challenges to the heating of buildings, increased stress on roadways and walkways caused by freeze-thaw cycles, and damages to power lines and trees. Early cold snaps and snowfalls can also affect agriculture, especially when they occur before crops have been harvested.

Spring and Fall Seasons	Recent Past	2021-2050			2051-2080			Importance
		10th percentile	Mean	90th percentile	10th percentile	Mean	90th percentile	
Date of last spring frost	May 13	April 15	**May 4**	May 21	April 4	**April 25**	May 13	*Defines the start of growing season, and the return of summer*
Date of first fall frost	Sept. 29	Sept. 23	**Oct. 10**	Oct. 27	Oct. 1	**Oct. 19**	Nov. 5	*Affects plants, animals, and experience of seasons*
Spring precipitation	123 mm	69 mm	**137 mm**	220 mm	77 mm	**145 mm**	226 mm	*Affects seeding and planting of crops, spring flood risk*
Fall precipitation	108 mm	57 mm	**116 mm**	186 mm	61 mm	**116 mm**	189 mm	*Impacts surface and soil moisture*
Length of frost-free season (days)	136	131	**155**	182	146	**173**	202	*Indicator of the length of the growing season.*

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Winter Change	Recent Past	2021-2050 10th percentile	2021-2050 Mean	2021-2050 90th percentile	2051-2080 10th percentile	2051-2080 Mean	2051-2080 90th percentile	Importance
Typical coldest winter day	-34.2 °C	-34.5 °C	**-30.4 °C**	-26.2 °C	-31.3 °C	**-26.2 °C**	-20.8 °C	*Affects safety, recreation, buildings, transportation use, energy use, etc.*
Number of -15 °C days per year	73	33	**55**	77	15	**36**	59	*An indication of how much heating will be required in a given year*
Winter precipitation	67 mm	43 mm	**75 mm**	110 mm	47 mm	**80 mm**	118 mm	*Affects snowpack, spring flooding, and ground insulation*
Number of -30 °C days per year	8	0	**2**	8	0	**1**	2	*Affects survival and overwintering of pest and pathogens, indication of cold and*
Number of below-zero days per year	183	144	**164**	182	121	**145**	166	*Measure of cold affecting snow/ice accumulation and energy use*

Heavier, wet snowfalls

Removing heavy and wet snow can be very challenging and sometimes dangerous, as workers are exposed to increased health risks due to difficult shoveling. Snow removal equipment must work harder, leading to higher operating costs and increased maintenance issues.

Freezing rain and rain-on-snow events

When surface temperatures hover near 0° C, the risk of freezing rain increases. Freezing rain can result in ice accumulation on power lines, increasing the risk of power interruptions. Since freezing rain is also a major roadway and sidewalk hazard, sanding and salting needs may increase. Additionally, freezing rain can damage trees and powerlines, and impact ice surfaces and snowpack quality. This can affect wildlife and disrupt services and winter recreational activities.

Loss of insulating snowpack

A melted or partially melted snowpack does a poor job of insulating the ground from frost, creating an increased risk of deep frosts which can damage underground water and sewer lines. Less snow on rivers and lakes can also increase the depth of the freeze, leading to dangerous transportation conditions, spring ice breakup challenges, and potentially an increase in ice jamming.

Winter thaw events

Extended periods of above-freezing mid-winter temperatures have a major impact on snow cover and can lead to several ice-related issues. Melted snow often pools in half-frozen culverts and sewers, and when temperatures later fall below freezing, this water can partially or fully block these important drainage systems. This leaves property vulnerable to flooding during the spring thaw or during a winter rain event. Temperatures closer to freezing will also likely lead to more freeze-thaw cycles, causing increased risk of frost heave and other kinds of physical and thermal stress on the built environment.

Shorter winter seasons

Warmer temperatures will lead to shorter, less severe winters. This may lead to less snow and ice accumulation. Many cold-temperature dependent activities, such as flood protection systems, access to remote communities and recreation activities such as skating, skiing, and snowmobiling will be impacted by these changes.

Overwintering pests and pathogens

Warmer winters increase the ability of invasive species, pests, and pathogens to overwinter. The number of extremely cold winter days acts as a control for insect pests such as the emerald ash borer. As those days become less frequent, this can lead to increased populations and associated ecological damage.

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Preparing today to foster tomorrow

As the climate continues to change, temperature conditions south of us are projected to shift northward. In other words, climates that we generally know to be quite different are 'heading our way'. A **climate analogue map** is a useful tool to visualize this thermal climate shift.

Answering the question "What places currently have the climate that my community is projected to have in the future?" can help us understand what climate to expect and, by looking to those places for examples, how to prepare for it.

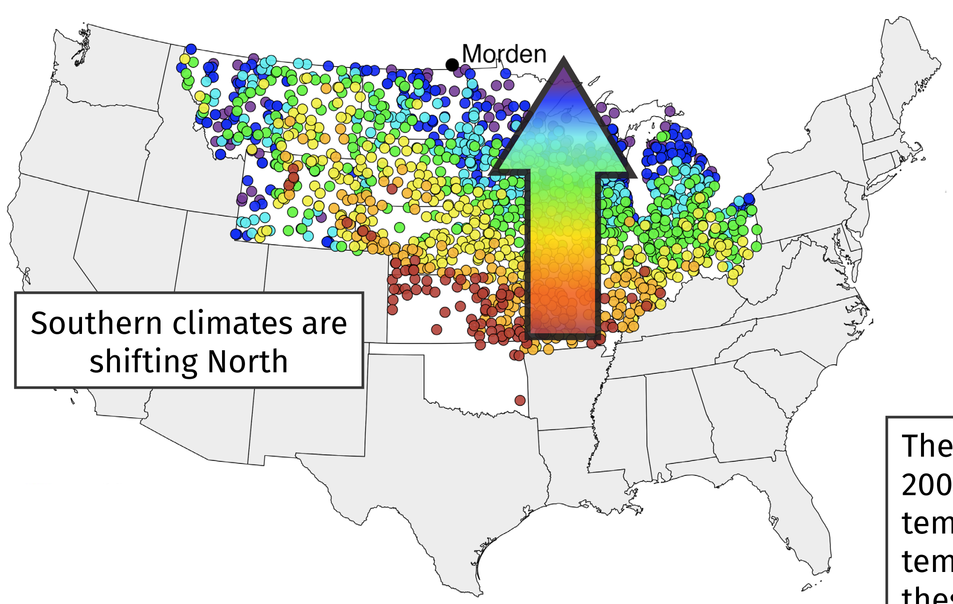
The analogue map below shows the places that currently have the same summer average maximum temperatures that Morden is projected to have for several future time periods. As the time periods reach later into the century, the places with matching temperatures are located further and further south.

"What places currently have the climate that my community is projected to have in the future?"

Taking immediate action to prepare for climate change will have long-term benefits. For every dollar that is spent on climate change adaptation measures, it is estimated that $13-$15 will be saved in the long-run through preventing or reducing the direct and indirect impacts caused by climate change[1]. Building a resilient community starts by taking action today to prepare for tomorrow.

For additional maps and variables, as well as information on how the maps are made, visit the ***Climate Analogues*** page on the Climate Atlas of Canada. **www.climateatlas.ca/analogues**

Summer Average Maximum Temperature



Analogue Years (Average Temp)

- 1991 - 2005 (25.4° C)
- 2006 - 2020 (26.1° C)
- 2021 - 2035 (27.0° C)
- 2036 - 2050 (27.9° C)
- 2051 - 2065 (29.2° C)
- 2066 - 2080 (30.5° C)
- 2081 - 2095 (31.8° C)

These are American stations whose 2006-2020 average summer maximum temperatures are within 0.5°C of the temperatures projected for Morden in these 15-year periods.

*Morden is presented here as it is the closest location to the Town of Altona with available analogue data.

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About the climate data

The climate model data presented in this report is sourced from The Climate Atlas of Canada, which includes climate change indices derived from 24 downscaled climate models obtained from the Pacific Climate Impacts Consortium (PCIC; pacificclimate.org), using the BCCAQv2 downscaling methodology. The values presented in this report represent the projections from the 24-model ensemble for the 'High Carbon' emissions scenario (RCP8.5). There is a baseline time period called "The recent past" 1976-2005, and two future time periods, 2021-2050 and 2051-2080. The high (90th percentile), mean, and low (10th percentile) model projections indicate the range of values across the 24 model ensemble.

Prairie Climate Centre

The Prairie Climate Centre is committed to making climate change meaningful and relevant to Canadians of all walks of life. We bring an evidence-based perspective to communicating the science, impacts, and risks of climate change through maps, documentary video, research reports, and plain-language training, writing, and outreach.

The Climate Atlas Of Canada

The Climate Atlas of Canada is an interactive tool for citizens, researchers, businesses, and community and political leaders to learn about climate change in Canada. It combines climate science, mapping and storytelling to bring the global issue of climate change closer to home, and is designed to inspire local, regional, and national action and solutions.

The Atlas is one of the only tools in the world that integrates interactive web design with climatology, cinema, and cartography to geovisualize and connect scientific data with personal experience in compelling and easy-to-use ways.

***Learn More at:* climateatlas.ca**

1. Sawyer, Dave, Ryan Ness, Caroline Lee, and Sarah Miller. 2022. Damage Control: Reducing the costs of climate impacts in Canada. Canadian Climate Institute. https://climateinstitute.ca/reports/damage-control/

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