



INTRODUCTION TO THE CANADIAN CENTRE FOR CLIMATE SERVICES

Hilary Hove & Brian Sieben

Meeting with AFN Climate Change Coordinators

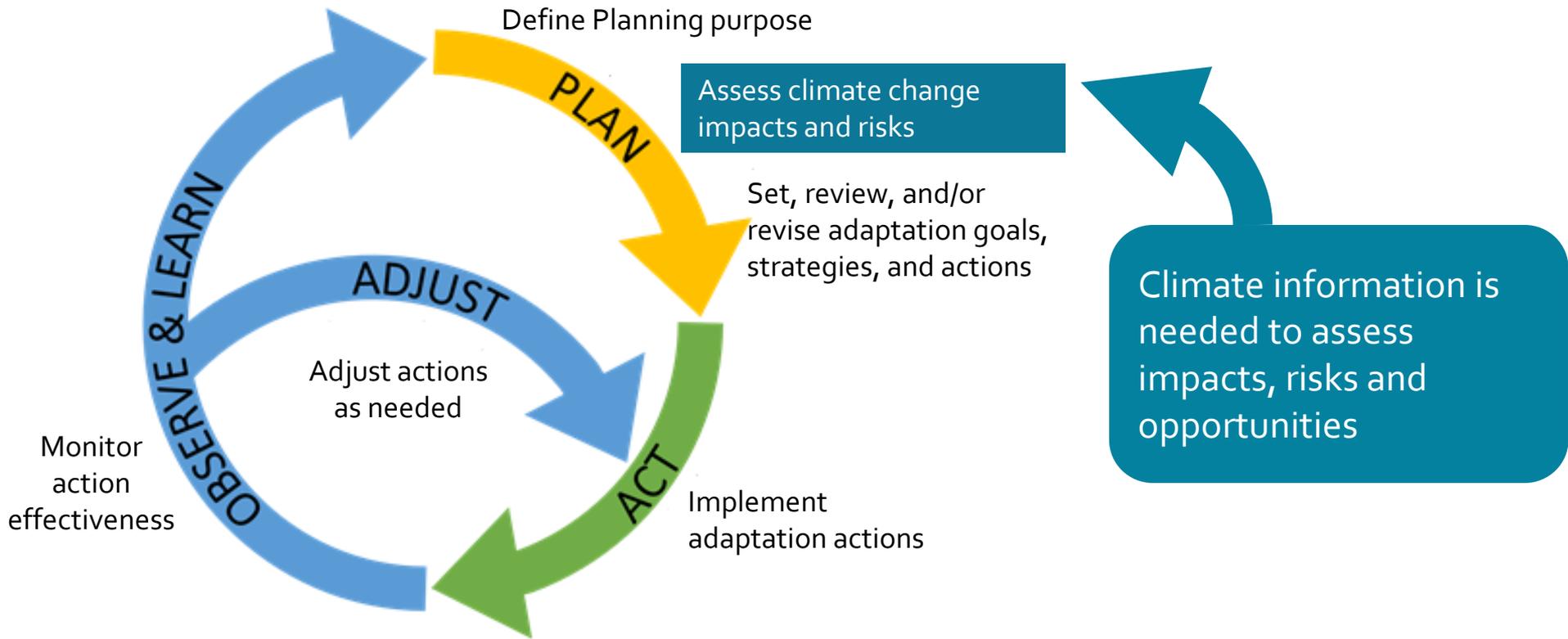
Whitehorse

March 4, 2020

**CANADIAN
CENTRE FOR
CLIMATE
SERVICES**



CLIMATE INFORMATION INFORMS ADAPTATION MEASURES



Source: Modified from blackfeetclimatechange.com

CANADIAN CENTRE FOR CLIMATE SERVICES

Provides Canadians with information and support to consider climate change in their decisions

Climate services include:

Increasing awareness and access to climate data and information

Providing training and guidance on using climate data

Engaging with users to understand needs

Developing new products by collaborating with experts and users

The CCCS helps answers questions like:

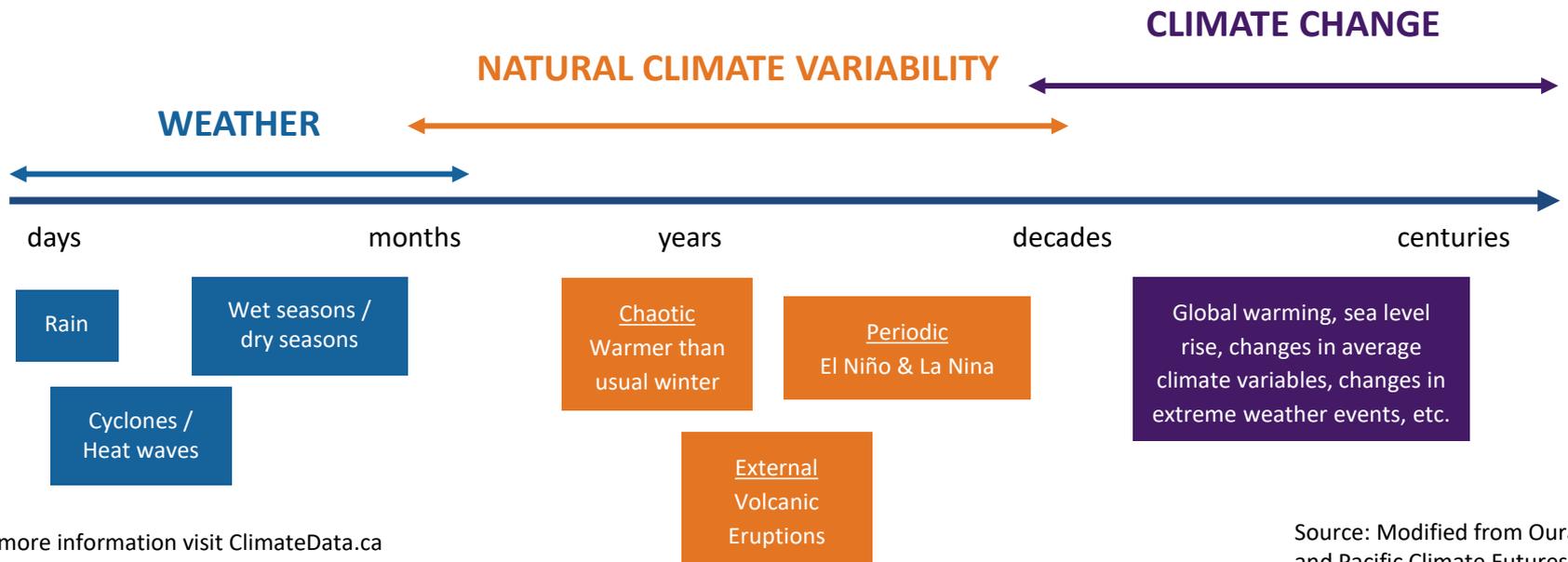
The climate is changing in my region... what can I expect in 10, 50, 100 years?

Will it be cold enough for a winter road in this location in 50 years?

What climate information is available to help my community plan for climate change?

WEATHER, NATURAL VARIABILITY AND CLIMATE CHANGE

Decisions often need to consider many different time scales



 For more information visit ClimateData.ca

Source: Modified from Ouranos and Pacific Climate Futures

JOINT DELIVERY OF SERVICES TO PROVIDE LOCALLY RELEVANT INFORMATION AND EXPERTISE

THE CANADIAN CENTRE FOR CLIMATE SERVICES



CANADIAN CENTRE FOR CLIMATE SERVICES



Library of climate resources

Datasets, tools, guidance and related resources



Climate information basics

Climate change concepts, trends and role of climate information in decision-making



Climate Services Support Desk

1-833-517-0376

Get help from our climate experts to find, understand and use climate information



Display and download climate data

View selected climate datasets on maps or download data



About the Canadian Centre for Climate Services

The climate is changing. Understand how. We're here to help.

Featuring: changing temperature

- Learn more about [trends and projections in temperature change](#).
- View the [Canadian Drought Monitor](#) from Agriculture and Agri-Food Canada.
- Explore the Prairie Climate Centre's [Climate Atlas of Canada](#).

INCREASING TEMPERATURE IN CANADA

Average temperature in Canada has increased by 1.7°C



www.canada.ca/climate-services

Phone: 1-833-517-0376

Email: info.cccs-ccsc@canada.ca

CANADIAN
CENTRE FOR
CLIMATE
SERVICES



CLIMATE SERVICES SUPPORT DESK

The Climate Services Support Desk provides support to meet individual needs:

- Helps users find the right datasets and information
- Provides guidance for understanding and using data
- Draws on a network of experts to respond to inquiries



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CLIMATEDATA.CA

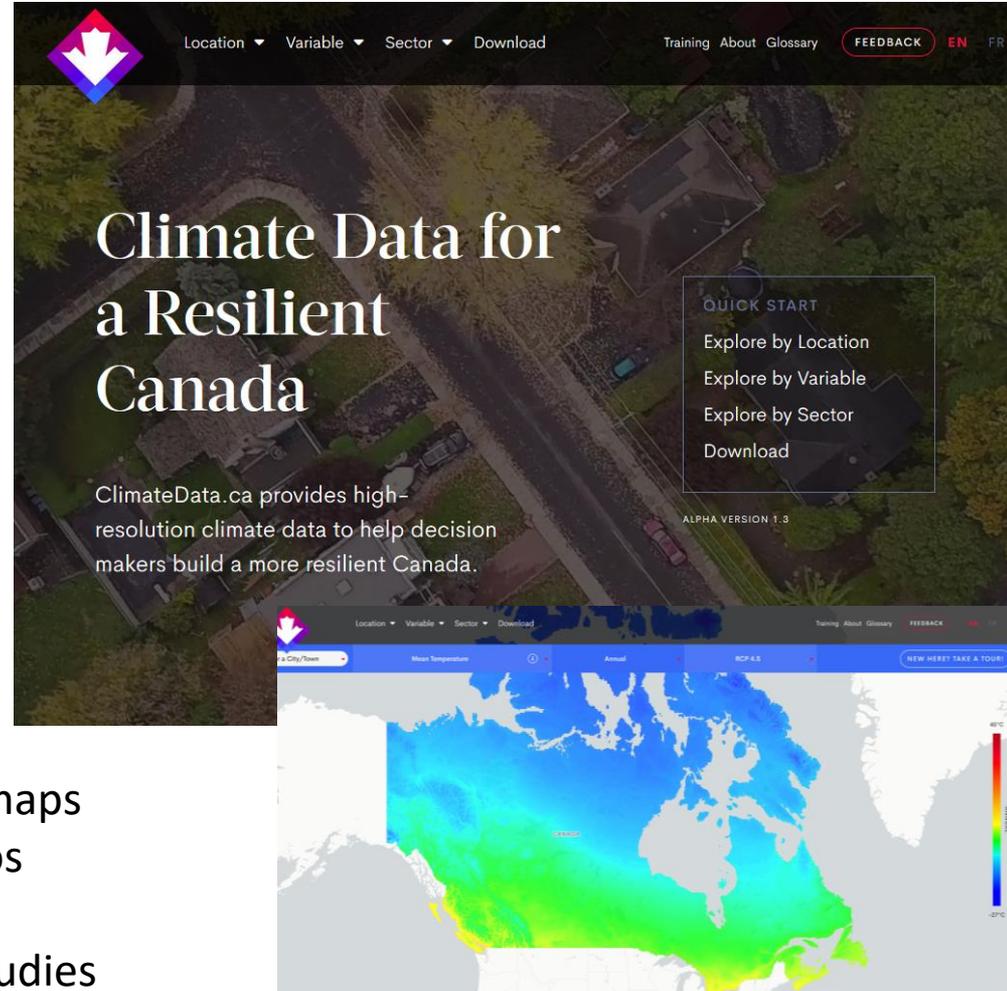
High-resolution climate data to help decision makers build a more resilient Canada

Climate Data

- 10x10km resolution climate data
- Temperature and precipitation variables and climate indices
- Observed climate normals and daily data download
- IDF curves

Helpful resources

- Location-based summaries
- Local and national scale charts and maps
- Ability to compare emission scenarios
- Custom heat wave analysis tool
- Sector modules with tailored case studies
- Training modules



ENGAGEMENT WITH INDIGENOUS COMMUNITIES

- CCCS has begun engaging with First Nation, Inuit, and Métis communities to better understand their unique climate service needs
- One form of engagement with First Nations (FN) to date has been through the **First Nations-Canada Joint Committee on Climate Action** (JCCA) under the Pan-Canadian Framework on Clean Growth and Climate Change
 - Have shared more about our products and services
 - Expressed our interest in feedback to tailor our services to better meet the needs of FN communities
- CCCS has also attended FN workshops and meetings, valuable opportunities to build relationships and seek input

TAILORING OUR PRODUCTS AND SERVICES FOR FIRST NATION AUDIENCES

- Communities engaged to date have indicated they prefer graphical, clear climate summaries for their location.
- We have also learned that communities would like training and assistance to translate climate data and information into key risks.
- CCCS is working to develop pilot community summaries of future climate conditions by location in an easy-to-understand format.
- We are glad to have time in the agenda today to talk more about how to tailor products and services for First Nations users.

DISPLAY AND DOWNLOAD

Climate data from Environment and Climate Change Canada



Climate data viewer

View mapped climate data from Environment and Climate Change Canada.



Climate data extraction tool

Download subsets of Environment and Climate Change Canada datasets.

CLIMATE DATA VIEWER

Dataset
High resolution future climate simulations

Variable
Daily maximum temperature

Time of year
Annual

Scenarios
High emission

Download

Choose historical or future data, including on **sea ice** and **snow depth**

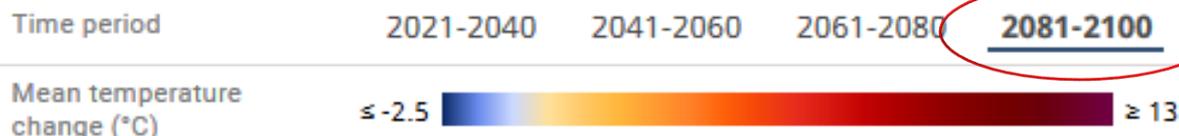
Choose different variables

Choose annual or seasons

Choose low, moderate or high emission scenarios

Download data as GeoTiff, NetCDF (CSV available for historical only)

Choose time period



THE CONTINUUM OF CLIMATE DATA PORTALS

Different levels of detail and complexity for various purposes

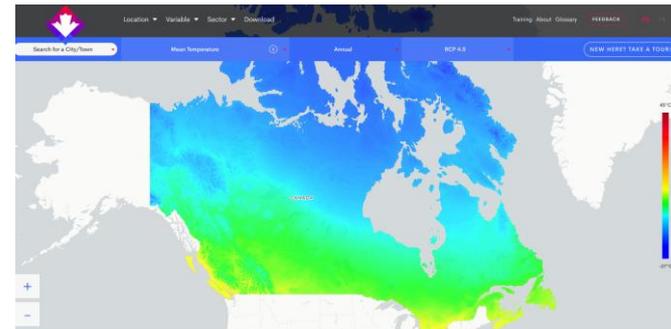
Climate Atlas of Canada



Start learning about climate change in Canada through mapping and storytelling

Prairie Climate Centre

ClimateData.ca



Start exploring case studies and downloading location-based climate data by variable or sector

CLIMATE ATLAS: MAP OF DIFFERENCE FROM RECENT PAST – CLICK A COMMUNITY

MENU



MAP



Change (Days)

-40 40



Very Hot Days (+30°C)

High Carbon → More climate change • 2021-2050

HELP



Small grid



Change



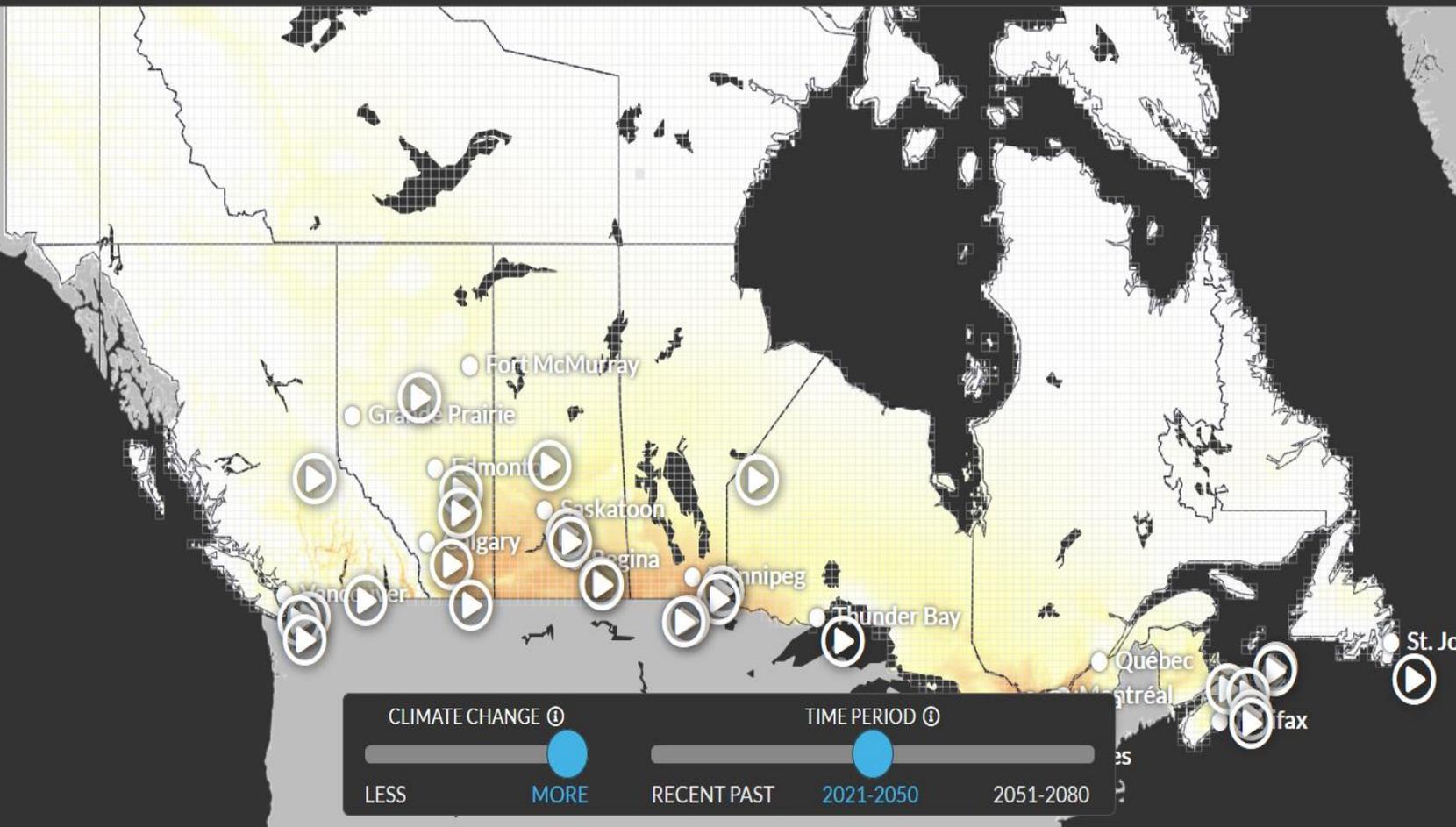
Settings

+

-



Find me



CLIMATE CHANGE ⓘ

TIME PERIOD ⓘ

LESS

MORE

RECENT PAST

2021-2050

2051-2080



Hot Weather



Cold Weather



Temperature



Precipitation



Agriculture

CLIMATE ATLAS: FIND AND DISPLAY LOCAL DATA

Find & Display Local Data

⊖ Location

⊕ Variable

⊕ Type of display
TIME SERIES



Find me

Display climate change information for the region where you are right now.

FIND ME

Find a municipality

Type in some characters and choose the name of the municipality to display detailed climate data. If your municipality isn't listed, you can search instead for regional data using the map or "Find a region" below.

Inuvik GO

Find a region

Enter an address or location to display climate variables for that general region.

Enter a location GO

Region type

Select a type of region to use with "Find me", "Find a region", and "Select a region on the map".

- Large grid Small grid Provinces/Territories



Select a region on the map



How could the growing season change in my location?



FROST FREE SEASON 2021-2050 – HIGH EMISSIONS

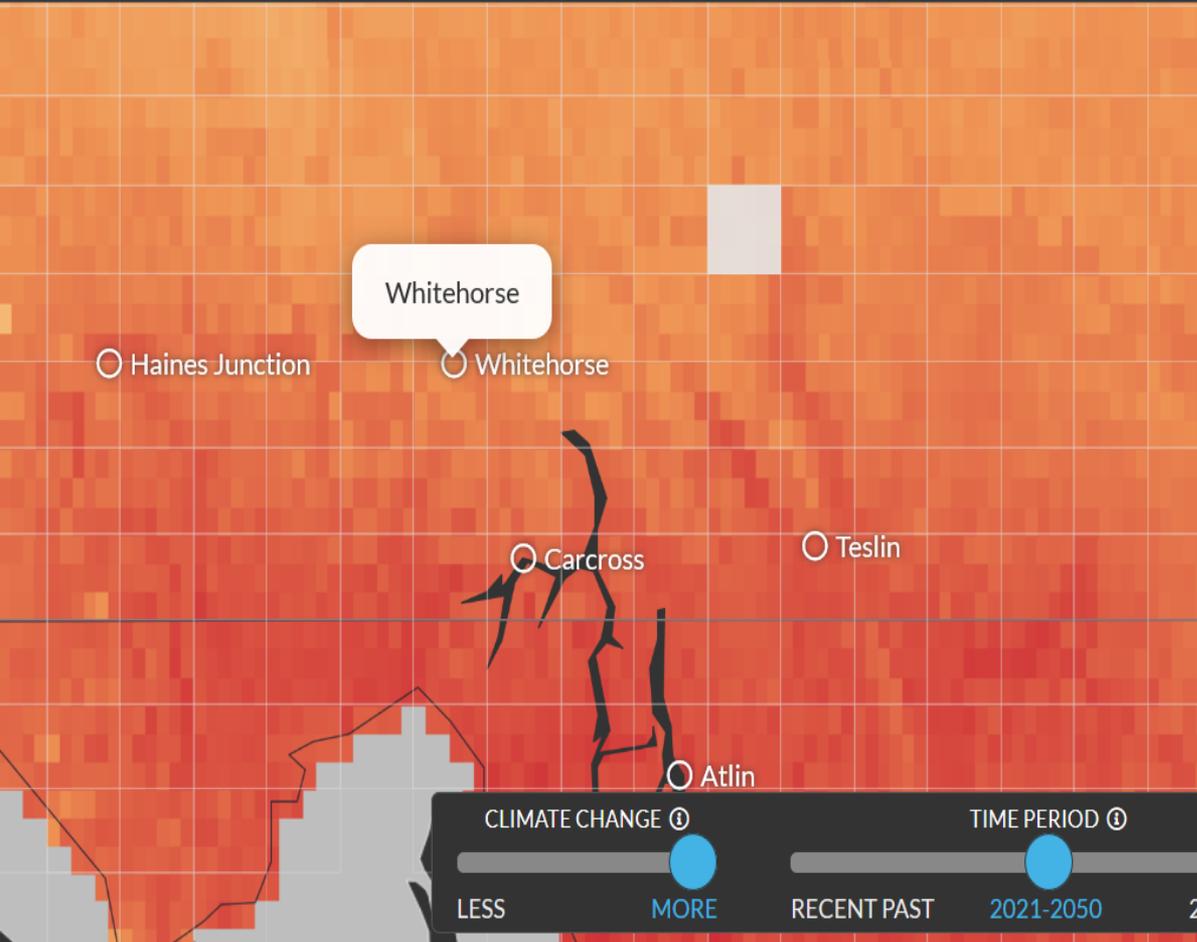
Change (Days)

-50 50

Frost-Free Season

High Carbon → More climate change • 2021-2050

HELP TOUR SHARE



Municipality
WHITEHORSE

Projected change in mean
**Length of the Frost-Free
Season**

High Carbon → More climate change

1976-2005 2021-2050
82.3 → 109.7

Up ▲
+27.4

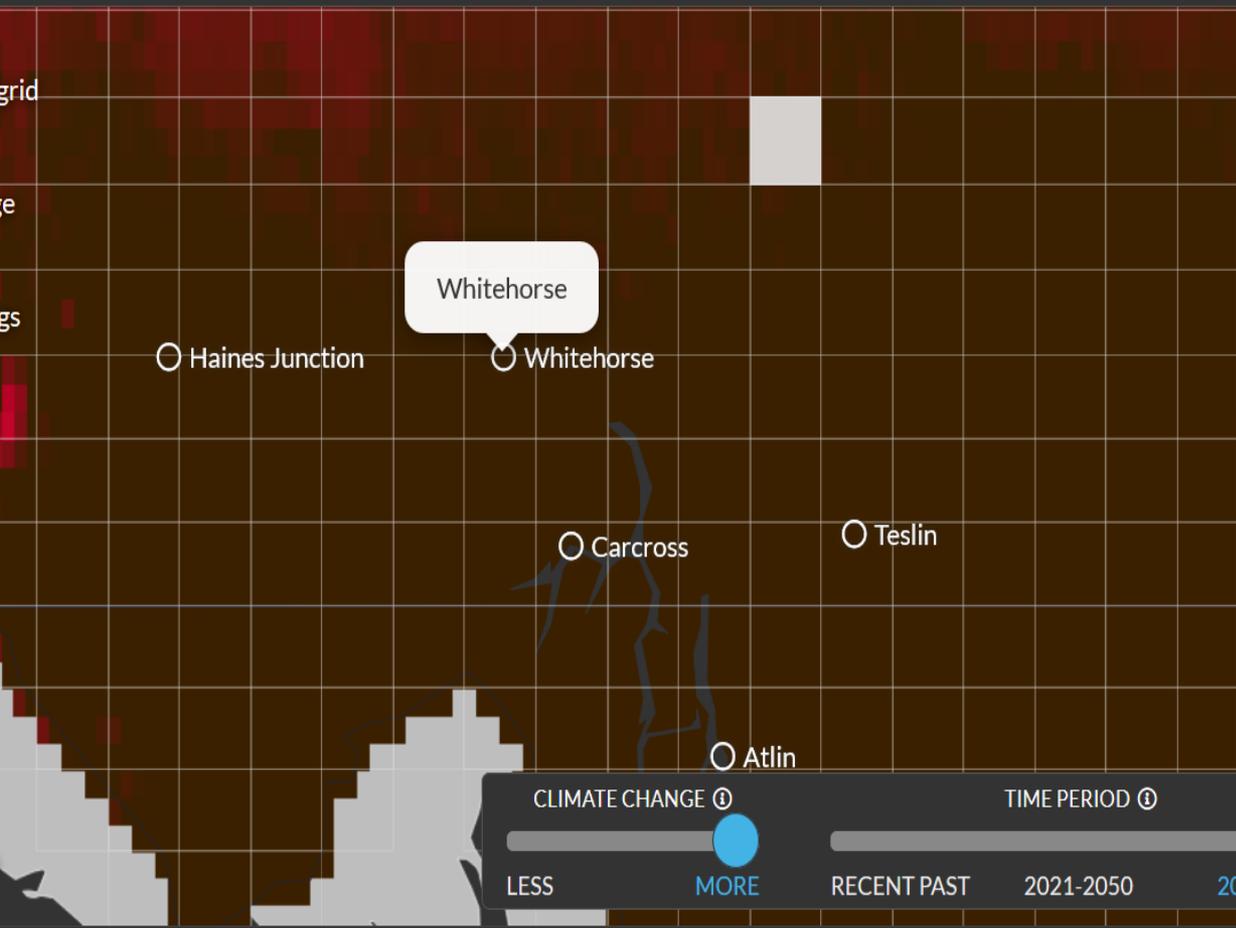
CLIMATE CHANGE ⓘ TIME PERIOD ⓘ

LESS MORE RECENT PAST 2021-2050 2051-2080

- Hot Weather
- Cold Weather
- Temperature
- Precipitation
- Agriculture

FROST FREE SEASON 2050-2080 – HIGH EMISSIONS

AP Change (Days) Frost-Free Season HELP TOUR SHARE
-50 50 High Carbon → More climate change • 2051-2080



Municipality
WHITEHORSE

Projected change in mean
Length of the Frost-Free Season
High Carbon → More climate change

1976-2005	2051-2080
82.3	135.3

Up ▲
+53.0

CLIMATE CHANGE ⓘ TIME PERIOD ⓘ

LESS MORE RECENT PAST 2021-2050 2051-2080

- Hot Weather
- Cold Weather
- Temperature
- Precipitation
- Agriculture

CLIMATE ATLAS: CLIMATE CHANGE AND CANADA'S CITIES



Yellowknife and Climate Change

The climate determines almost everything about how we design, build, and live in our cities. As the climate changes, the safety and prosperity of our cities is 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 impacts.

Climate Change and Infrastructure

Climate change may threaten the integrity of infrastructure such as roads, bridges, water supply, and telecommunications, most of which has not been built to withstand 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.

Climate Change and Transportation

Life and industry in northern cities is, in part, sustained by transportation links to the rest of the world. Changes to permafrost and ice cover will affect the roads, winter travel routes, and airports in these centres. Action on emissions will minimize the severity of these impacts, while innovative technologies and local northern knowledge will help communities adapt.

Climate Change and Northern Way of Life

Northern livelihoods—stem life in the city to life on the land—may be affected by climate change. Warmer winters and summers will affect important activities such as recreation, tourism, hunting and fishing. It may also create new opportunities for development and associated economic prosperity.

High-Carbon Climate Change Projections*

Change	1976-2005		2051-2080	
	Mean	Low	Mean	High
Typical hottest summer day	27.9 °C	28.3 °C	31.9 °C	35.5 °C
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Number of $-30\text{ }^\circ\text{C}$ days per year	53	3	16	34
Number of below-zero days per year	236	178	195	211
Number of $>25\text{ }^\circ\text{C}$ days per year	10	11	25	58
Annual precipitation	291 mm	265 mm	244 mm	430 mm
Frost-free season (days)	111	121	144	160

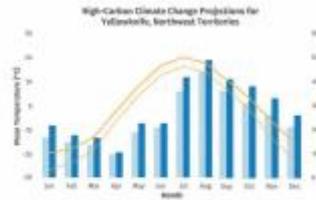
Wetter throughout the year

Much warmer winters

Fewer very cold days

Climate Change and Canada's Cities
Version 2.0

climateatlas.ca
March 2019



Climate Data That Supports Your Community

Yellowknife's climate is expected to change in important ways in the coming decades.

This graph shows projected monthly mean temperature and precipitation totals. **Blue bars** are temperature and **vertical bars** are precipitation. Dashed lines/hatched bars represent the 1976-2005 baseline period, while solid lines/bars are projections for 2051-2080 under a High Carbon scenario.* All months are expected to become much warmer.

This warmer future will require communities to become better informed, more resilient, and increasingly committed to climate action.

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.

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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

* Climate Data: The Climate Atlas of Canada includes climate change indices derived from 21 downscaled climate models obtained from the Prairie Climate Centre, Forecast Unit (FCCU) and the University of Regina. For each model, two emissions scenarios, the Low Carbon scenario (RCP2.6) and the High Carbon scenario (RCP8.5), and two time slices periods, 2021-2050 and 2051-2080, are provided. The high and low-emission projections include the 50th and 75th percentiles values for the 21-model ensemble.

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Climate Change and Canada's Cities



CLIMATE ATLAS OF CANADA: VIDEOS

Explore Videos



All

Cities

Climate Science

Take Action

Agriculture

Health

Forests



Biogas and Biochar

Offsetting emissions from agriculture

🕒 2:42

Agriculture is responsible for 8% of Canada's greenhouse gas emissions. "It's part of the problem, but it's also part of the solution," says Kunbi Adetona, an energy systems researcher at the University of Calgary. In this video, Adetona talks about the potential of converting manure and other agricultural waste products into biogas, which can offset fossil fuel usage. But what's really exciting is that researchers have now started converting manure into biochar — or more simply charcoal — which can be used to...



Bringing Back the Buffalo

Native science and buffalo restoration

🕒 3:36

"The buffalo is the best environmentalist you can have," Dr. Leroy Little Bear of Kainai First Nation says. In the Prairies, the buffalo is not only a keystone species, but a critical part of Blackfoot culture. A professor at the University of Lethbridge, Dr. Little Bear is a strong advocate for why it's crucial to include Indigenous worldviews in environmental management. In this video, he discusses the environmental change he's witnesses, and why buffalo restoration is critical for restoring ecological balance.



Charlie Clark, Mayor of Saskatoon

Prairie cities are part of the solution

🕒 2:28

Charlie Clark, the Mayor of Saskatoon, speaks about the changing nature of cities, living in an era of global warming, and how the next generation of young people are demanding action. Despite being a "cold prairie city", Clark believes Saskatoon's sense of community will allow them to move quickly to "show leadership on environmental change".



How could the Athabasca River flow rate change in the future?

We'll use [ClimateData.ca](https://climatedata.ca) to answer this question.

CLIMATEDATA.CA: SEARCH BY LOCATION



FIND DATA SUMMARIES IN LOCATIONS YOU CARE ABOUT

Select a location

Please enter 1 or more characters





Location ▼

Variable ▼

Sector ▼

Download

52.1747222°N, 117.4061111° W

Columbia Glacier, AB

For the 1951–1980 period, the annual average temperature was **-4.7 °C**; for 1981–2010 it was **-3.6 °C**. Under a high emissions scenario, annual average temperatures are projected to be **-2.3 °C** for the 2021–2050 period, **-0.3 °C** for the 2051–2080 period and **1.1 °C** for the last 30 years of this century.

Average annual precipitation for the 1951–1980 period was **995 mm**. Under a high emissions scenario, this is projected to change by **6%** for the 2021–2050 period, by **12%** for the 2051–2080 period and by **15%** for the last 30 years of this century.

CLIMATEDATA.CA HEALTH MODULE



Location ▾ Variable ▾ Sector ▾ Download

Training About Glossary

FEEDBACK

EN FR

Sector

Health

Climate change threatens human health and well-being in many ways, including impacts from increased extreme weather events, wildfire, poor air quality and illnesses transmitted by food, water and disease carriers such as mosquitoes and ticks. This section explores some of these impacts and the associated data within ClimateData.ca relevant to human health.

EXPLORE SUB-SECTORS

Emergency Measures

Health Infrastructure

Public Health

Data by Health Region



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SERVICES



HEALTH MODULE – HEAT WAVES

Location ▾ Variable ▾ Sector ▾ Download

Sector ▸ Health

Emergency Measures

Climate change may result in various emergency situations that can quickly intensify and have important repercussions for health. Overwhelming heat, extreme cold, poor air quality, storms and other natural catastrophes can cause an increase in the number of emergency hospital admissions, ambulance transports, hospitalisations and even deaths.

CASE STUDIES VARIABLES

Location ▾ Variable ▾ Sector ▾ Download

Sector ▸ Health ▸ Emergency Measures

Extreme heat waves in Québec

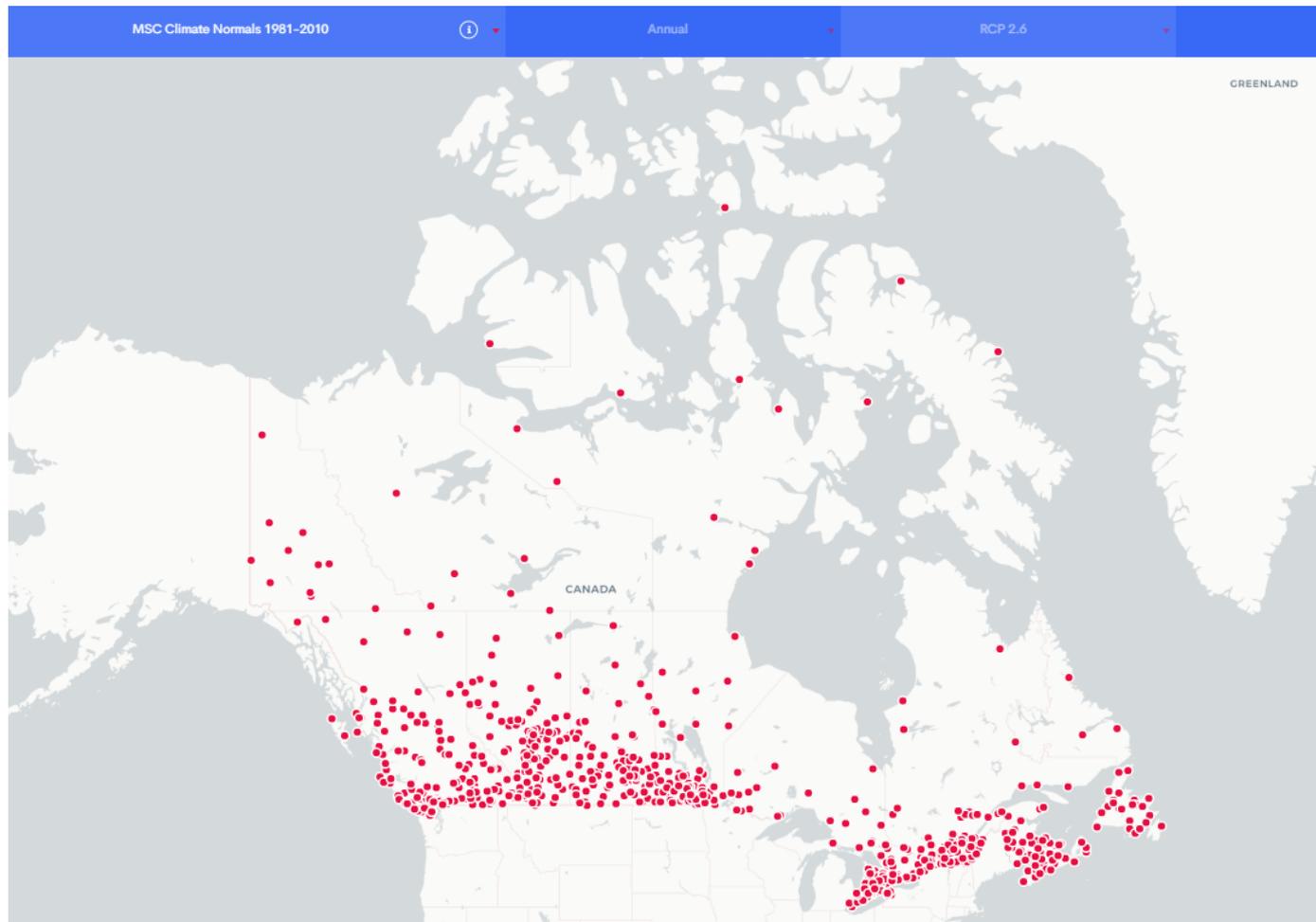
One of the uncontested consequences of climate change is an increase in the frequency and intensity of heat waves. In Québec, various monitoring, planning and response activities have been implemented to ensure prevention of health impacts and improve emergency preparedness.

Location ▾ Variable ▾ Sector ▾ Download

Variables related to Emergency Measures

Explore variables to learn about how data was used to impact climate related decisions in specific contexts.

CLIMATEDATA.CA: STATION DATA



DISCUSSION OF PORTALS

1. How could we make these portals more accessible and useful for Indigenous audiences?
2. What are some of the decisions and actions in your community that would require climate information?
3. Would you use these tools for: a) general awareness raising of climate information, or b) planning for climate change in your community?

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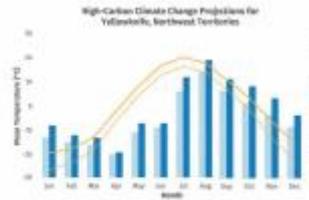
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Climate Change and Canada's Cities



Climate Change in Gameti

The climate is changing and poses risks to all Canadians. Climate information, traditional and scientific, can help us navigate these risks. This handout provides a sample of the scientific climate data available and provides guidance on how to work with scientific climate information.

Climate Conditions

Climate Variables	Recent past ¹ 1976-2005	Moderate emission future* 2051-2080	High emission future* 2051-2080
Average annual temperature	-6.1 °C	-2.7 °C	-1.0 °C
Average summer max temperature	18.4 °C	20.7 °C	22.1 °C
Average winter min temperature	-30.0 °C	-24.9 °C	-22.4 °C
-30°C days each year	60 days	31 days	19 days
Icing days ¹ each year	186 days	171 days	163 days
First frost	Sep. 15	Sep. 27	Oct. 5
Last frost	May 31	May 22	May 18
Frost-free season length	103 days	125 days	137 days
Winter precipitation	46 mm	54 mm	56 mm
Total precipitation	245 mm	282 mm	296 mm

¹Modelled historical values are taken from the BCCAQv2 dataset. Historical gridded data derived from observations are available on ClimateAtlas.ca.

*The moderate (RCP 4.5) and high (RCP 8.5) climate change scenarios are only two possible future climate scenarios.

¹ Icing days are days where the maximum temperature does not go above 0 °C. Definitions for the other variables are available on ClimateAtlas.ca.

Regional Impacts and Adaptation Examples

Changing Winter Conditions

Winter Precipitation
 Average winter min temperature
 -30°C days per year
 Icing days¹ each year

Possible Regional Impacts

Continued permafrost warming and thawing can lead to...

- Shortened winter road and shipping seasons
- Threatened structural integrity of buildings

Increased winter precipitation can lead to...

- Increased snow load on infrastructure
- Increased demand for snow removal

Shorter and less reliable ice seasons can lead to...

- Reduced safety of traditional hunting routes
- Coastal erosion
- Increases in marine shipping

Adaptation Examples

- Integrate best management practices from Standards Council of Canada's Northern Infrastructure Standardization Initiative
- Monitor and adapt foundations (e.g. steel piles, screw jacks) built on thawing permafrost
- Revised winter road loads and considerations to construct all season roads and/or alternative methods of transportation
- Access to real time information on ice thickness to promote safety
- Improved methods to determine ice freeze-up time periods

Ecosystems and Health

Average annual temperature
 Average summer max temperature
 -30°C days per year
 Frost-free season length

Possible Regional Impacts

- Increase in forest fire risk for certain regions
- Loss of barrier to invasive species with reduced extreme winter temperatures
- Possible increase in vector-borne diseases
- Changes to ecosystems and wildlife, with possible effects on country foods

Adaptation Examples

- Implement 'FireSmart' practices in communities and around homes
- Increased awareness regarding invasive species and vector-borne diseases
- Measures to improve food security



COMMUNITY CLIMATE PROFILES

1. Are there any terms that you don't understand?
2. Would First Nations communities want to add their own content to a Climate Change Profile? (e.g. sharing stories, TK)?
3. Is there any other climate information that you would like to see on this handout?
4. In it's current form, could this product be useful to you?
5. Any further suggestions?

CANADIAN CENTRE FOR CLIMATE SERVICES: CONTACT INFORMATION

Website:

English:

www.canada.ca/climate-services

Français:

www.canada.ca/services-climatiques

Climate Services Support Desk:



1-833-517-0376



info.cccs-ccsc@canada.ca

