Environment and Climate Change Canada | Environnement et Changement climatique Canada

Canada

INTRODUCTION TO THE CANADIAN CENTRE FOR CLIMATE SERVICES

FCM Asset Management Workshop
February 11-12, 2020

CANADIAN CENTRE FOR CLIMATE SERVICES

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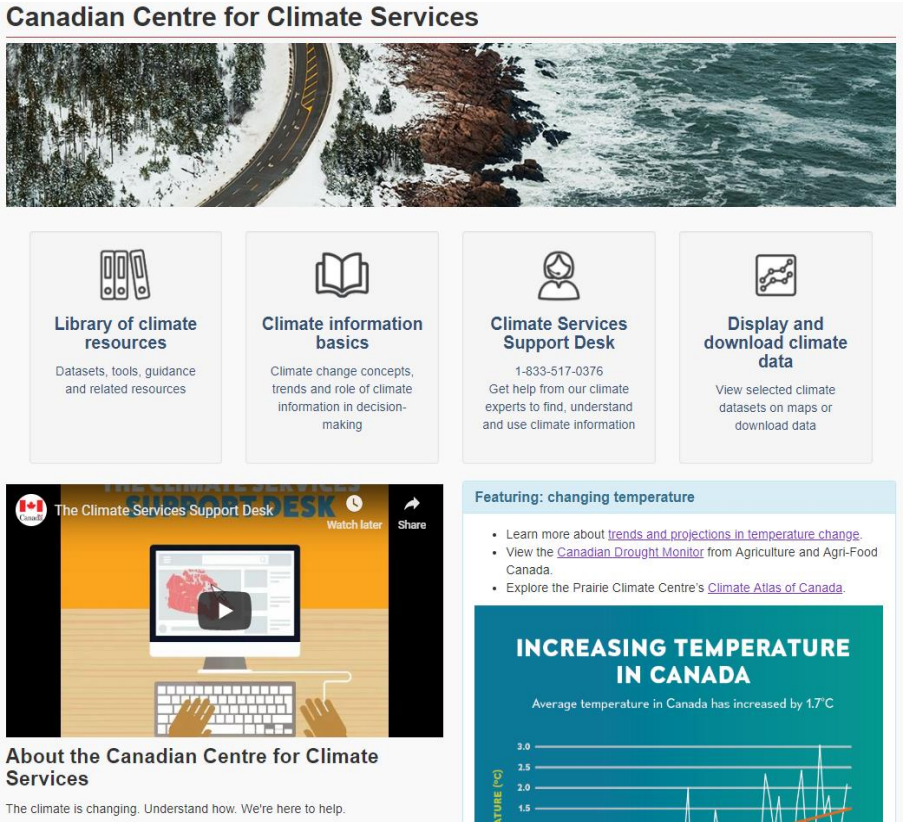

Provides Canadians with information and support to consider climate change in their decisions

- Support Desk to help answer your questions
- Website with:
  - ✓ Access to climate datasets and a suite of climate data portals to meet the varied needs of users
  - ✓ Links to 300+ resources
  - ✓ Intro to climate information concepts
- Training
- User engagement initiatives
- Co-development of new information and data products
- Collaboration with regional climate organizations to co-deliver services with locally-relevant information to users

www.canada.ca/climate-services 1-833-517-0376 info.cccs-ccsc@canada.ca

CANADIAN CENTRE FOR CLIMATE SERVICES

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INTRODUCING CLIMATE INFORMATION FOR DECISION-MAKING

FCM Asset Management Workshop
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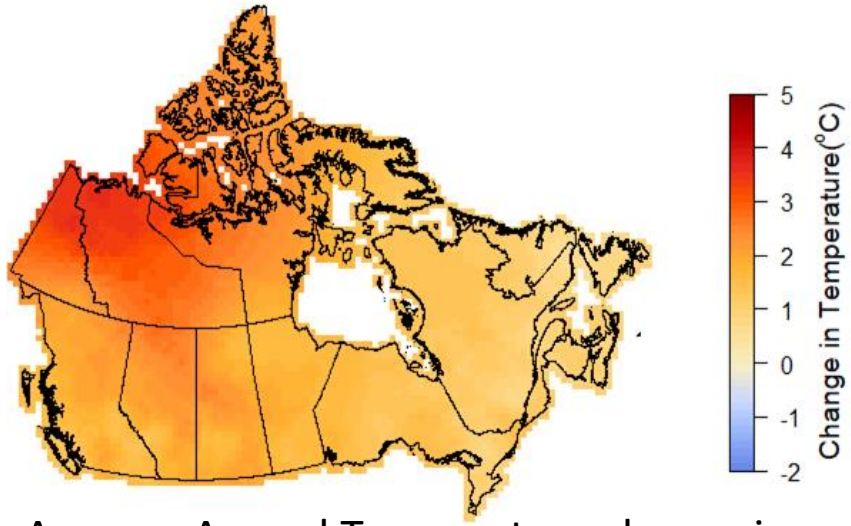
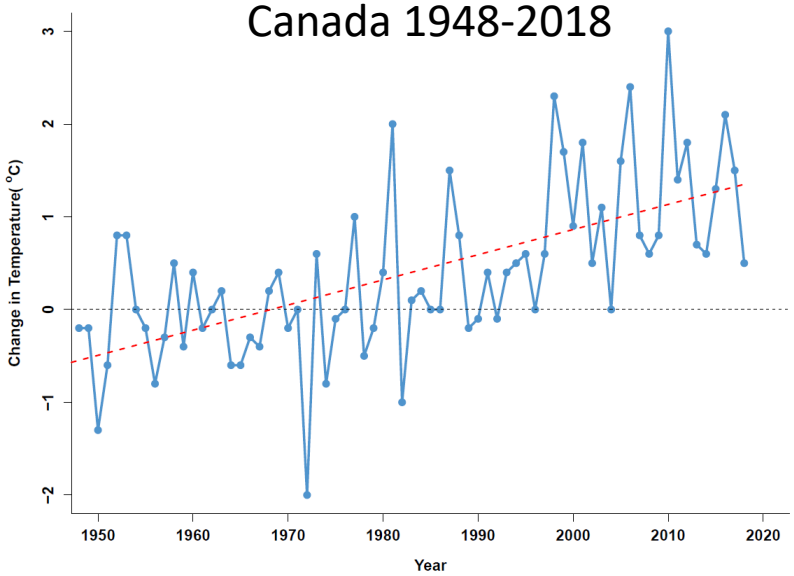
CANADIAN CENTRE FOR CLIMATE SERVICES

WHY USE CLIMATE INFORMATION?

- The climate is changing.
- We need to make decisions and design for a future climate.
- Future climate projections can help us prepare and adapt to changing conditions.



Average Annual Temperature change in Canada 1948-2018



Source: ECCC

For more information visit ClimateData.ca

EXAMPLES OF CLIMATE CHANGE IMPACTS

Reduced reliability of ice roads threatens access to northern communities and remote mine sites

Reduced sea ice cover affects traditional ways of life and economic development

Degrading permafrost affects infrastructure

Ecosystem changes in species distribution affecting country food supply and species at risk

Increased pest (e.g. pine beetle) and fire activity threaten wildlife

Increased frequency of drought affects agriculture and forests

Sea level rise and increased coastal erosion affecting coastal communities, property value, and insurance

Reduced glacier cover and precipitation affecting hydro electric power resources

Heat stress and vector-borne diseases cause health issues

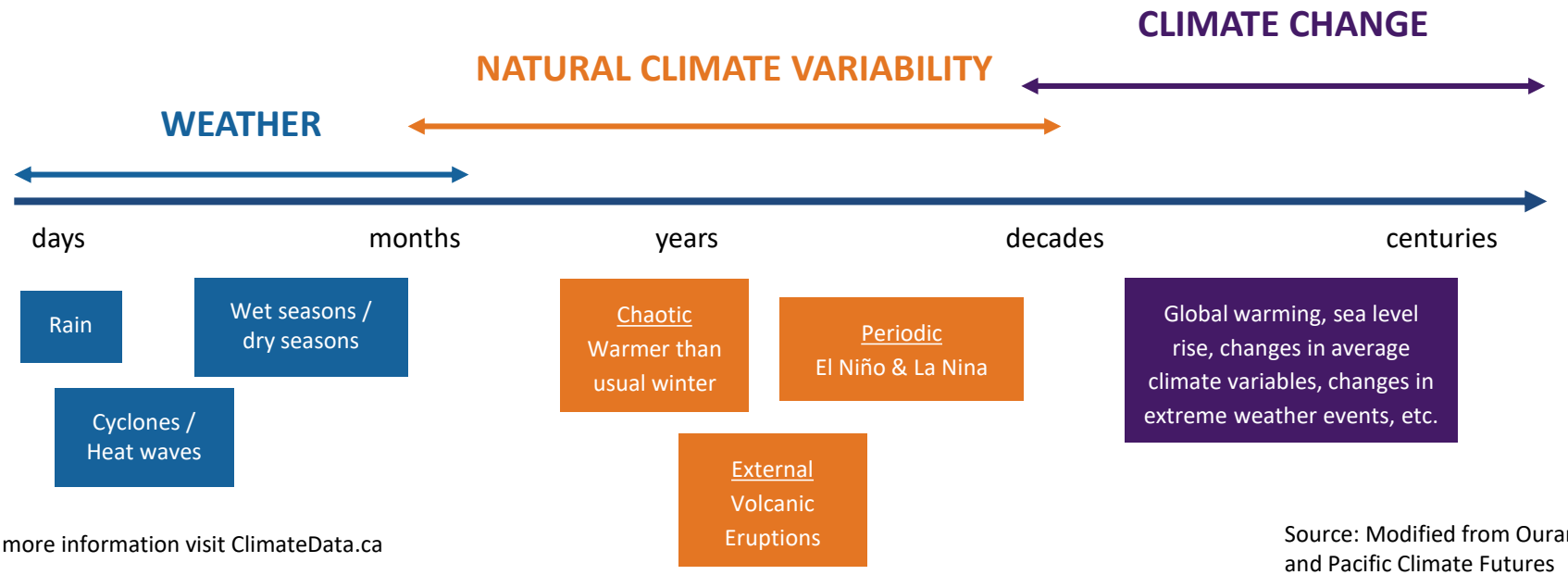
For more information visit ClimateData.ca

Figure modified from Government of Canada 2014

Photo sources: AAFC, SmartICE, GNWT ENR, BC Hydro, flickr, Government of Canada, Archinect

WEATHER, NATURAL VARIABILITY AND CLIMATE CHANGE

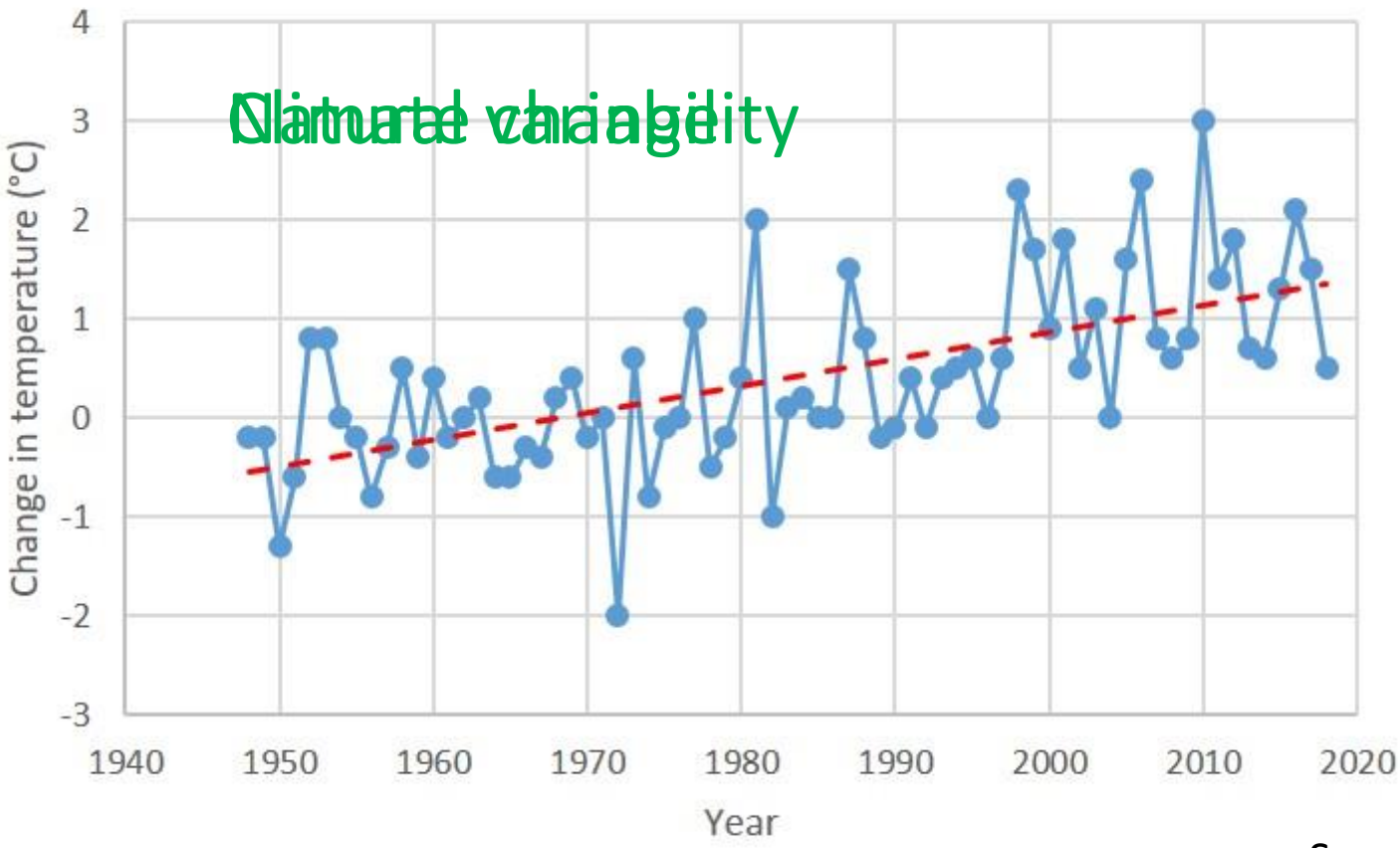
Decisions often need to consider many different time scales



For more information visit ClimateData.ca

Source: Modified from Ouranos and Pacific Climate Futures

NATURAL VARIABILITY VS CLIMATE CHANGE

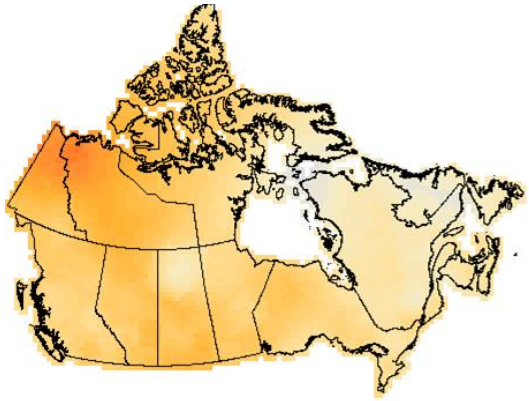


Source: ECCC

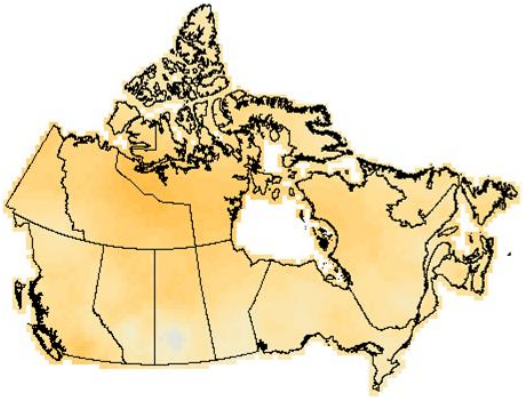
For more information visit ClimateData.ca

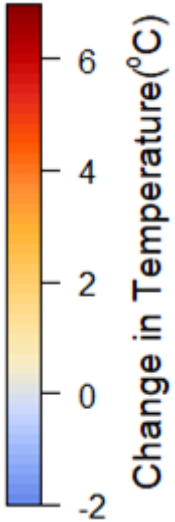
TEMPERATURE CHANGE VARIES WITH SEASON

Spring (+1.3°C*)



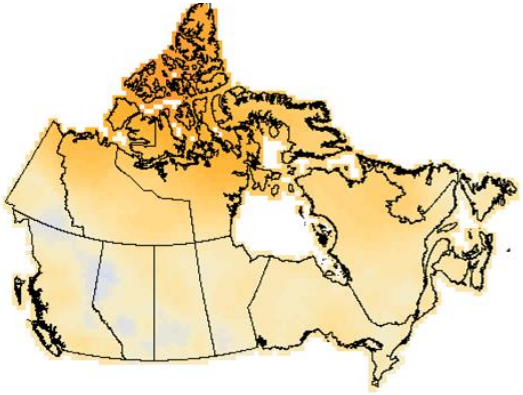
Summer (+1.1°C*)



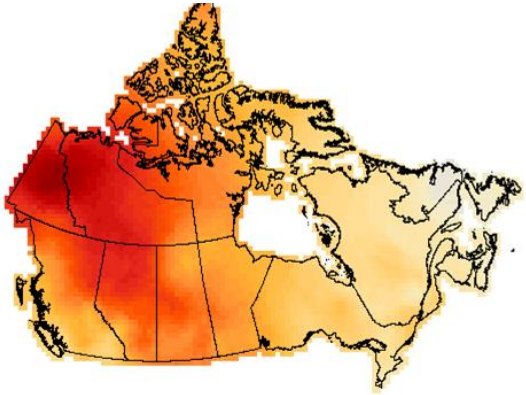


1948-2018

Autumn (+0.9°C*)



Winter (+2.1°C*)



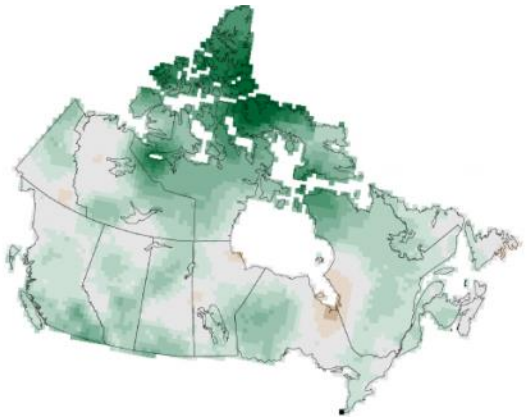
***Values in brackets are for Ontario**

For more information visit ClimateData.ca

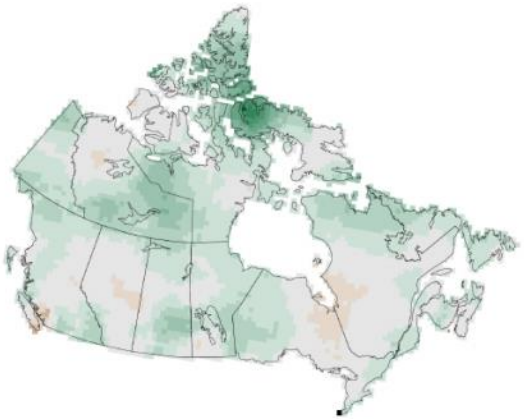
Source: ECCC

PRECIPITATION CHANGE VARIES WITH LOCATION

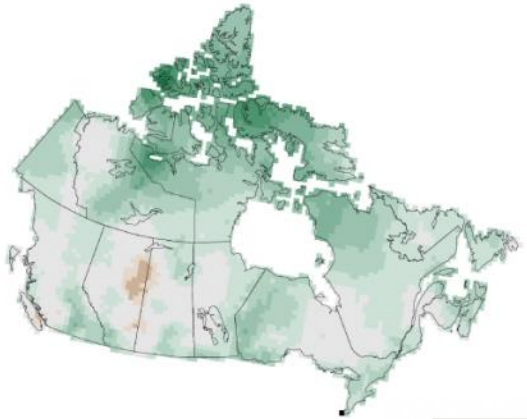
Spring (+12.5%)



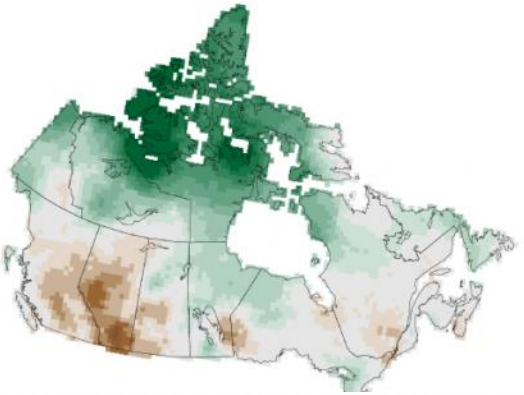
Summer (+8.6%)



Autumn (+17.8%)



Winter (+5.2%)



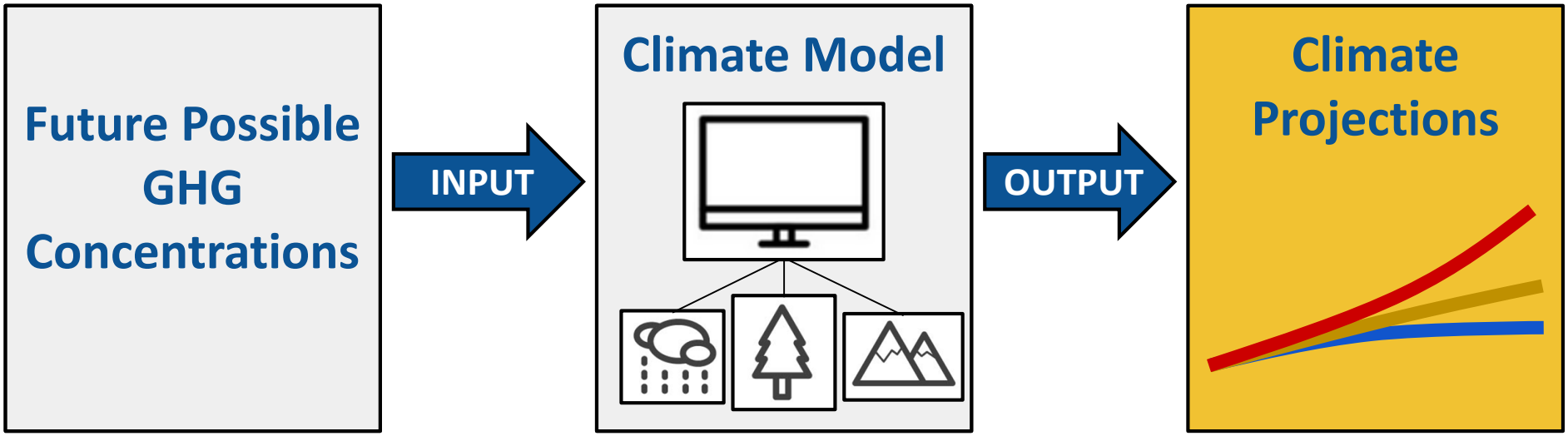
Seasonal precipitation change (%) 1948-2012

***Values in brackets are for Ontario**

For more information visit ClimateData.ca

Source: ECCC

WHERE DO CLIMATE PROJECTIONS COME FROM?



For more information visit ClimateData.ca

EMISSIONS SCENARIOS

- An important input into climate models
- Because we don't know what will happen in the future, trajectories called emission scenarios are used
- These describe plausible future releases of greenhouse gases and other emissions into the atmosphere

High Emissions (RCP 8.5)

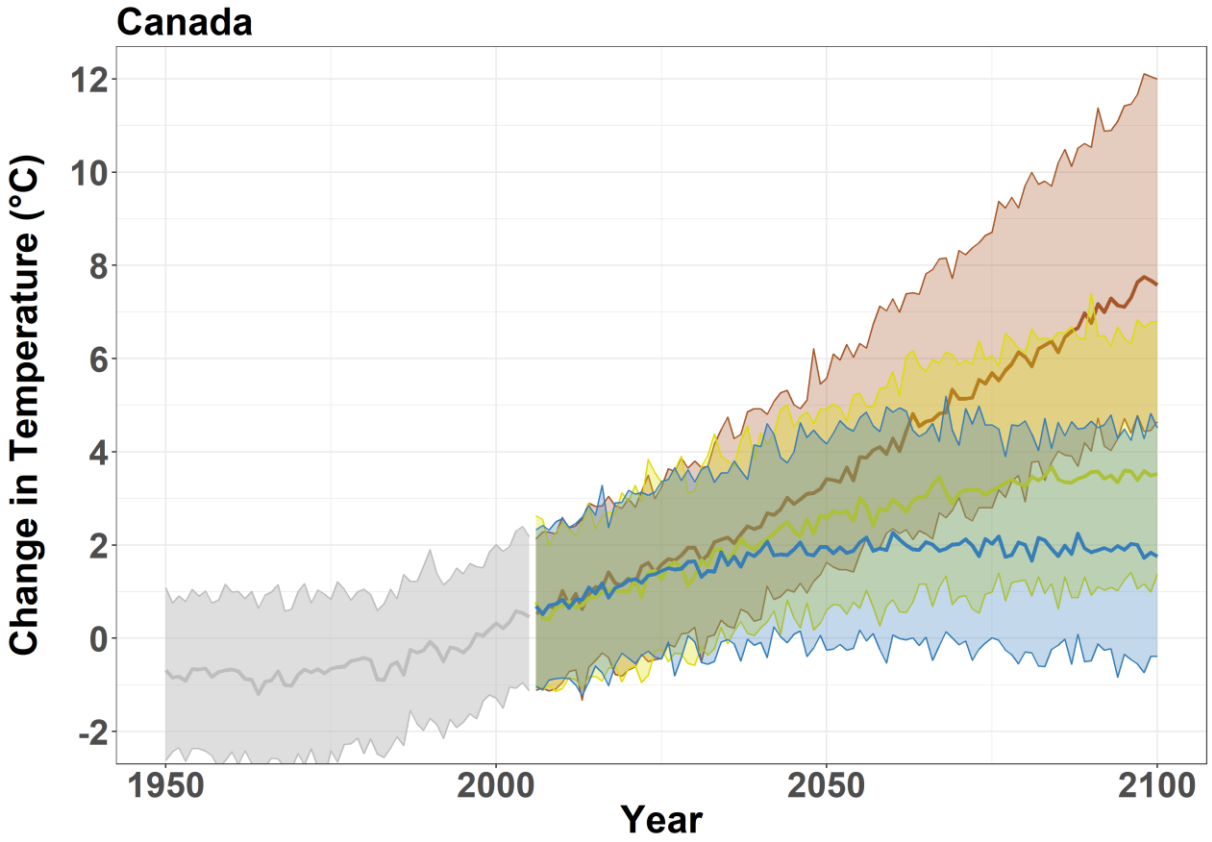
Moderate Emissions (RCP 4.5)

Low Emissions (RCP 2.6)

For more information visit ClimateData.ca

RCP = Representative Concentration Pathway

PROJECTED TEMPERATURE CHANGE



By the end of the century:

High Emissions Scenario (RCP 8.5):
Global: +4.7°C
Canada: +6.1°C

Moderate Emissions Scenario (RCP 4.5)
Global: +2.1°C
Canada: +2.9°C

Low Emissions Scenario (RCP 2.6)
Global: +1.1°C
Canada: +1.8°C

(Change relative to 1986-2005 baseline)

For more information visit ClimateData.ca

Source: ECCC

FUTURE TEMPERATURE - ONTARIO

By the end of century (2081-2100)

Average annual change (°C)	RCP2.6	RCP4.5	RCP8.5
Ontario	+1.7	+3.2	+6.3
Canada	+1.8	+3.2	+6.3

(Average annual change compared to 1986-2005, median value)

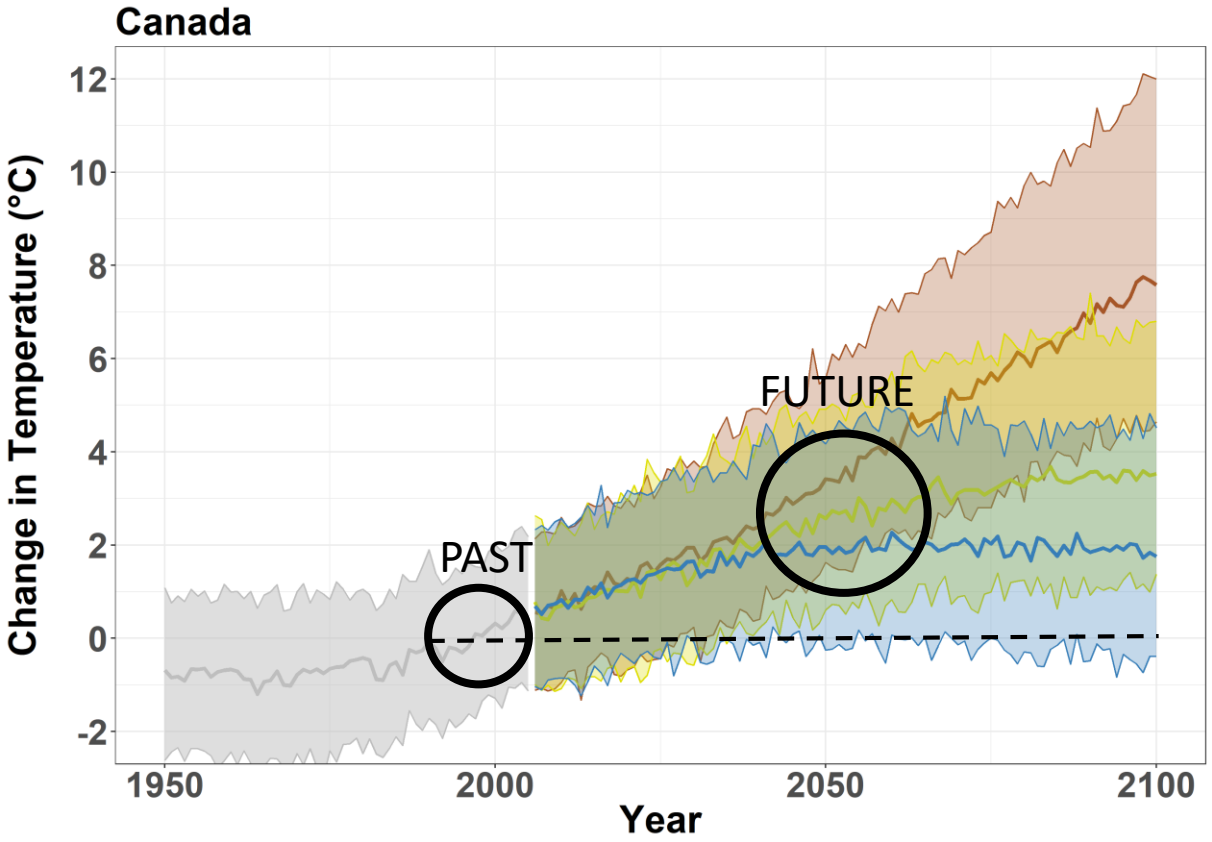
Average winter change (°C)	RCP2.6	RCP4.5	RCP8.5
Ontario	+2.4	+4.4	+8.2
Canada	+2.4	+4.2	+8.2

(Average winter change compared to 1986-2005, median value)

Average summer change (°C)	RCP2.6	RCP4.5	RCP8.5
Ontario	+1.3	+2.9	+6.0
Canada	+1.4	+2.6	+5.4

(Average summer change compared to 1986-2005, median value)

DECISION-MAKING USING CLIMATE INFORMATION



High Emissions Scenario (RCP 8.5)

Moderate Emissions Scenario (RCP 4.5)

Low Emissions Scenario (RCP 2.6)

For more information visit ClimateData.ca

Source: ECCC

TYPES OF CLIMATE INFORMATION NEEDS

Climate Information Needs	Example of Purpose	Type of Climate Information Commonly Provided
BASIC	**To raise awareness:** • Initial awareness • Risk scanning • High level governance	Historical trends and future mean changes over large spatial and temporal scales and for simple climate variables
INTERMEDIATE	**To evaluate vulnerability/impact study:** • Vulnerability assessment • Impact study • Increase resilience • Early development of adaptation plan	Future changes or future absolute values of more complex climate variables over finer spatial scales
DETAILED	**To evaluate adaptation options:** • Evaluate adaptation measures • Research and development • Local governance	Future changes in means, absolute values and extremes (including low-confidence climate indices and events) over finer spatial scales

For more information visit ClimateData.ca

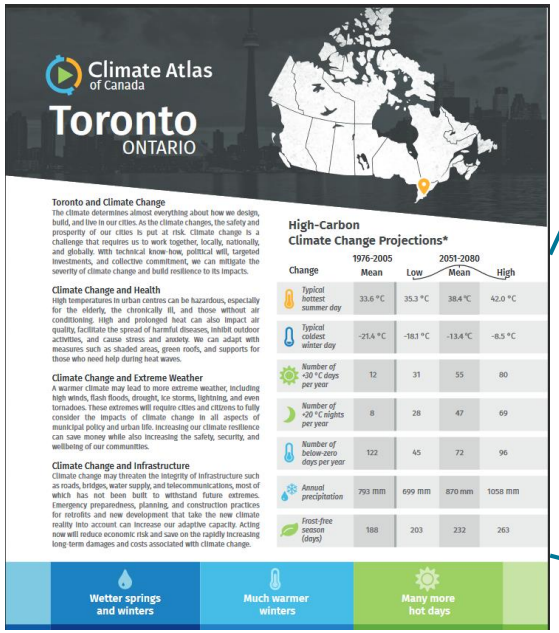
Modified from Charron (2016) – A Guidebook on Climate Scenarios: Using Climate Information to Guide Adaptation Research and Decisions.

EXAMPLE OF BASIC CLIMATE INFORMATION NEED

Synthesis Table:

Climate Change Projections for Toronto (High Emissions Scenario)

Source: Climate Atlas of Canada, Prairie Climate Centre (www.climateatlas.ca)



High-Carbon Climate Change Projections*

Change	1976-2005 Mean	2051-2080 Low	2051-2080 Mean	2051-2080 High
Typical hottest summer day	33.6 °C	35.3 °C	38.4 °C	42.0 °C
Typical coldest winter day	-21.4 °C	-18.1 °C	-13.4 °C	-8.5 °C
Number of +30 °C days per year	12	31	55	80
Number of +20 °C nights per year	8	28	47	69
Number of below-zero days per year	122	45	72	96
Annual precipitation	793 mm	699 mm	870 mm	1058 mm
Frost-free season (days)	188	203	232	263

Climate Atlas of Canada

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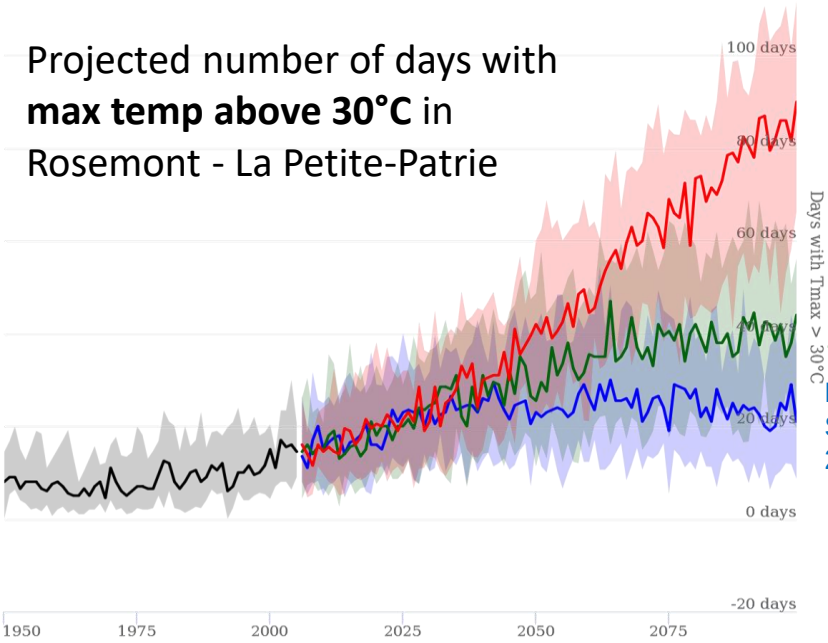
CLIMATE INFORMATION NEEDS ARE CONTEXT DEPENDENT

Basic climate information needs example: Rosemont - La Petite-Patrie borough of Montreal

Projected number of days with **max temp above 30°C** in Rosemont - La Petite-Patrie



By 2100:

High Emissions Scenario (RCP 8.5): 90 days

Moderate Emissions Scenario (RCP 4.5): 44 days

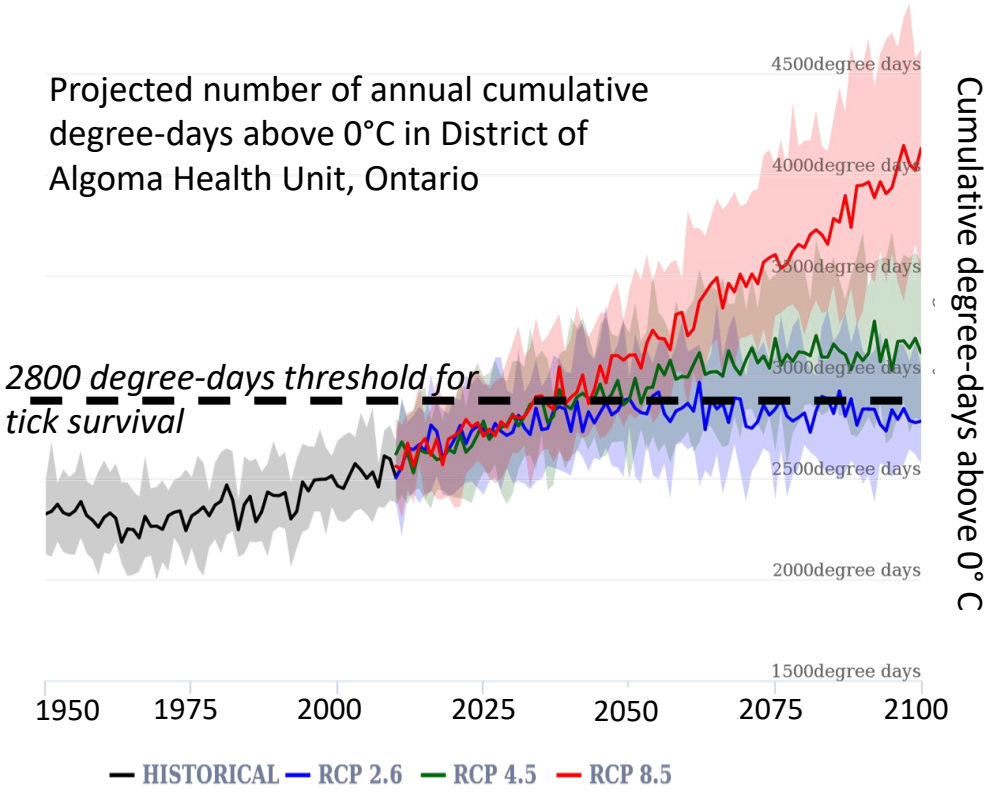
Low Emissions Scenario (RCP 2.6): 21 days

For more information visit ClimateData.ca

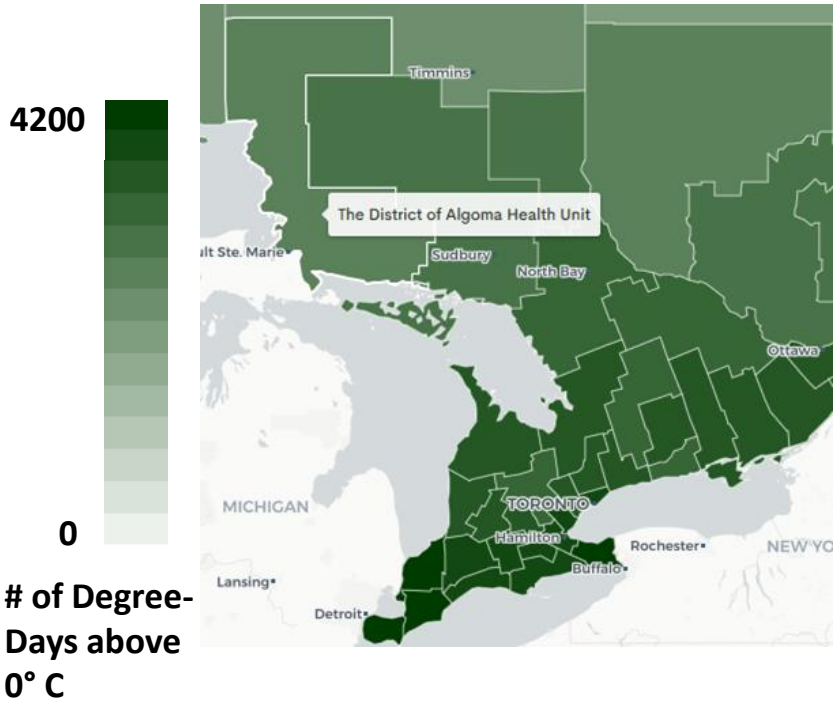
Photo source: flickr
Figure source: climatedata.ca

CLIMATE INFORMATION NEEDS ARE CONTEXT DEPENDENT

Intermediate climate information needs example: Lyme disease in Ontario



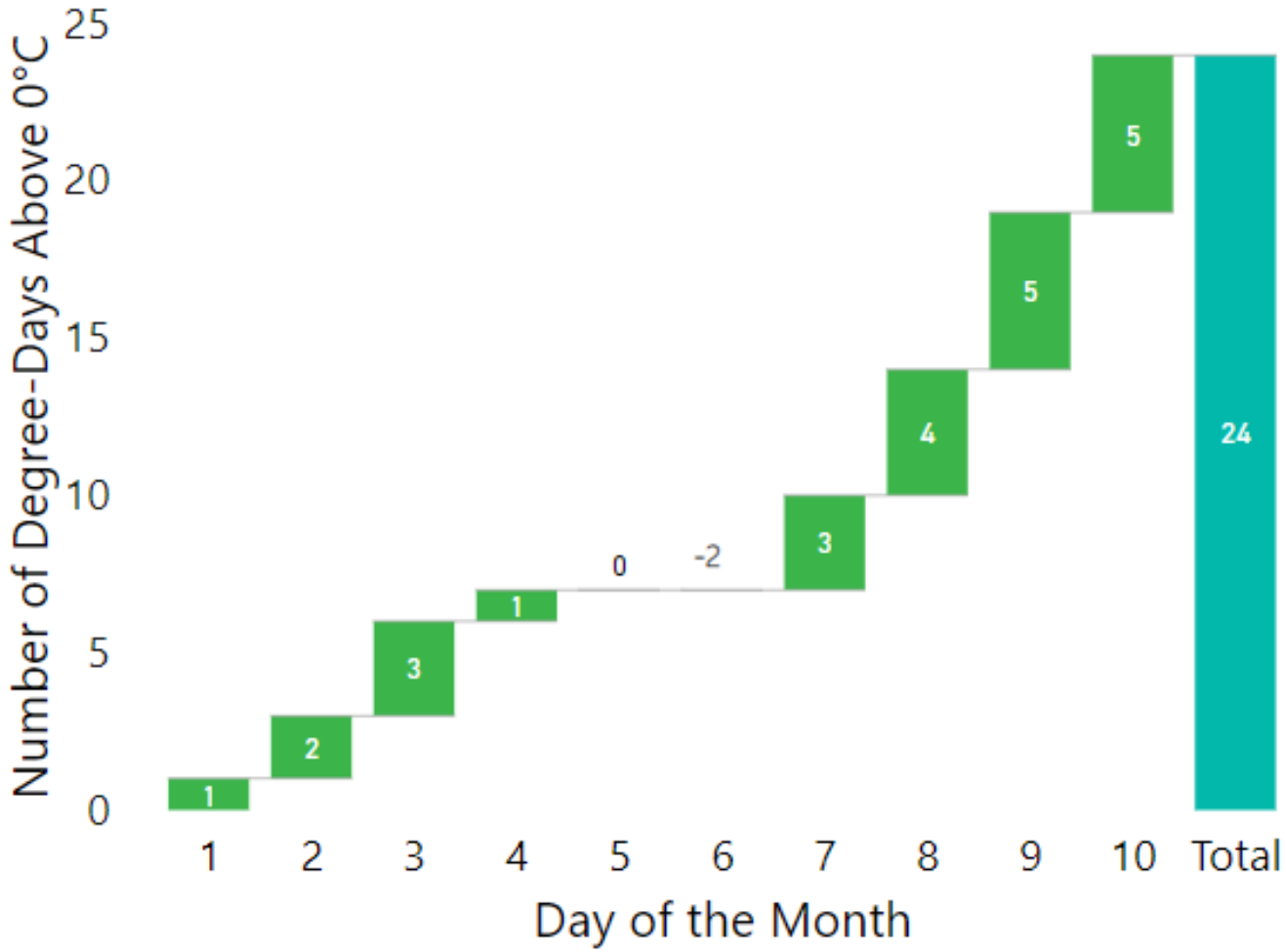
2030s, high emissions scenario (RCP8.5)



For more information visit ClimateData.ca

Figure sources: climatedata.ca

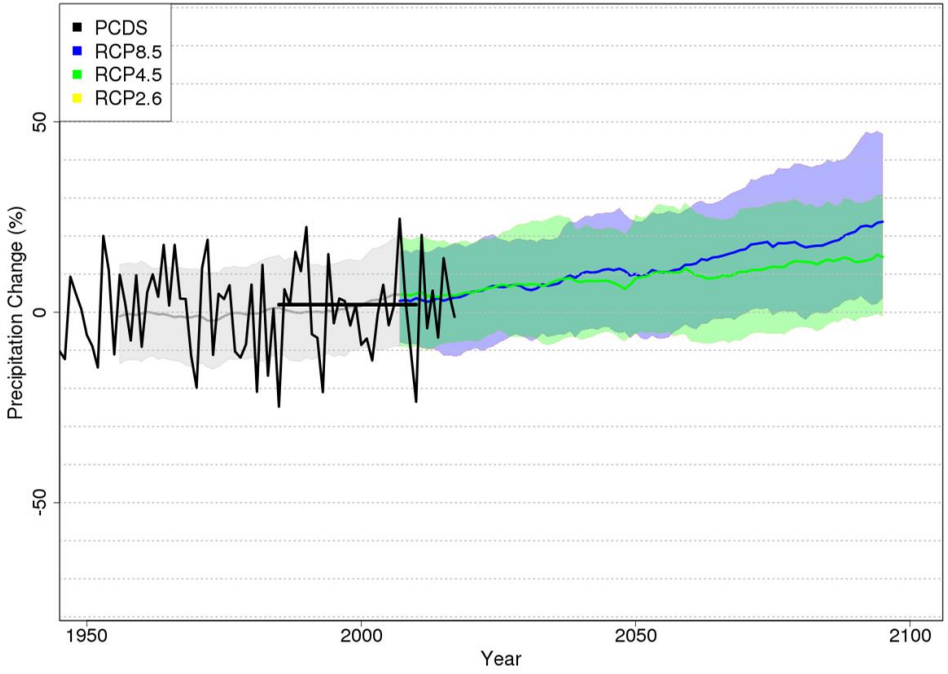
VISUALIZATION OF DEGREE-DAYS ABOVE 0˚C



CLIMATE INFORMATION NEEDS ARE CONTEXT DEPENDENT

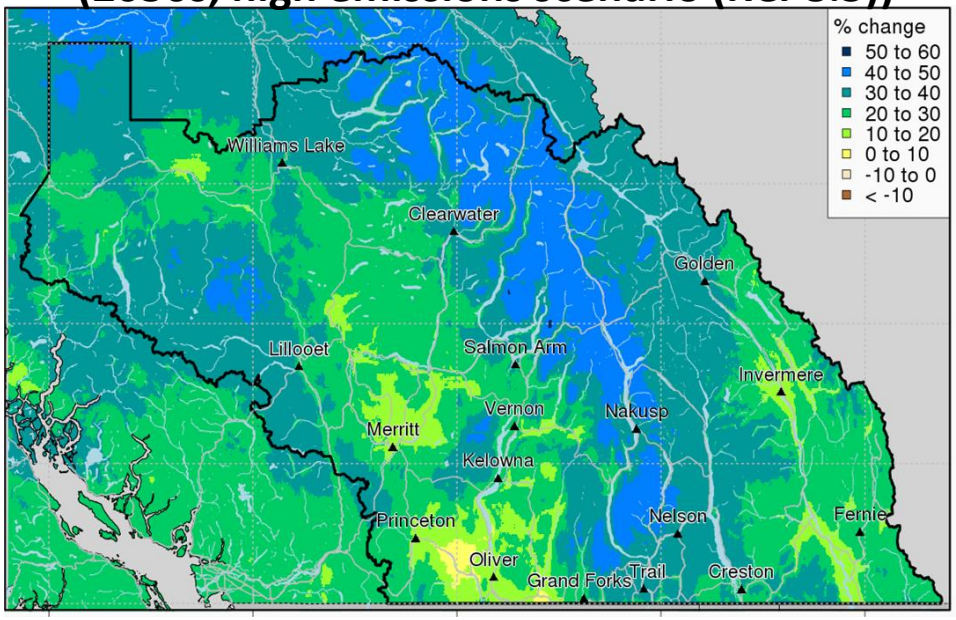
Detailed climate information needs example: Extreme precipitation in BC

Annual average precipitation



% change in volume of precipitation in high precipitation events

(2050s, high emissions scenario (RCP8.5))



For more information visit ClimateData.ca

Source: PCIC

EXAMPLES OF RELEVANT CLIMATE INDICES BY SECTOR

Infrastructure

- Precipitation amounts
- Frost and ice days
- Heating and cooling degree days

Health

- Maximum temperatures
- Heavy precipitation
- Number of hot days above certain temperature thresholds

Water management

- Seasonal precipitation
- Maximum precipitation
- IDF curves

Energy

- Seasonal and monthly temperatures
- Heating and cooling degree days

Agriculture/Forestry

- Temperatures
- Precipitation
- Growing degree days
- Frost and ice days

For more information visit ClimateData.ca

WHERE TO FIND CLIMATE INFORMATION - SUMMARY

NATIONAL CLIMATE SERVICES PROVIDER

Canadian Centre for Climate Services
www.canada.ca/climate-services

Government of Canada / Gouvernement du Canada

NATIONAL TOOLS

Climate Atlas of Canada
www.climateatlas.ca

Climate Atlas of Canada

Canadian Climate Data
www.ClimateData.ca

REGIONAL CLIMATE SERVICES PROVIDERS

Ouranos
www.ouranos.ca
(region: mostly Quebec)

OURANOS

Pacific Climate Impacts Consortium
www.pacificclimate.org
(region: mostly Pacific NW)

PACIFIC CLIMATE IMPACTS CONSORTIUM

For more information visit ClimateData.ca

TAKE HOME MESSAGES

1. Climate has changed and is changing.
2. Past climate information alone is not sufficient to make decisions about the future.
3. Know the current vulnerability of your system to weather and climate.
4. The future is uncertain so it is important to consider the range of possible future climates.
5. The Canadian Centre for Climate Services is here to help.

ClimateData.ca

Demo

CANADIAN CENTRE FOR CLIMATE SERVICES

Get in touch!


info.cccs-ccsc@canada.ca


1-833-517-0376


Canada.ca/climate-services

CENTRE CANADIEN DES SERVICES CLIMATIQUES

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