Changing Climate and Impacts in the Prairies Region

Dr. Dave Sauchyn, Director, PARC,
University of Regina

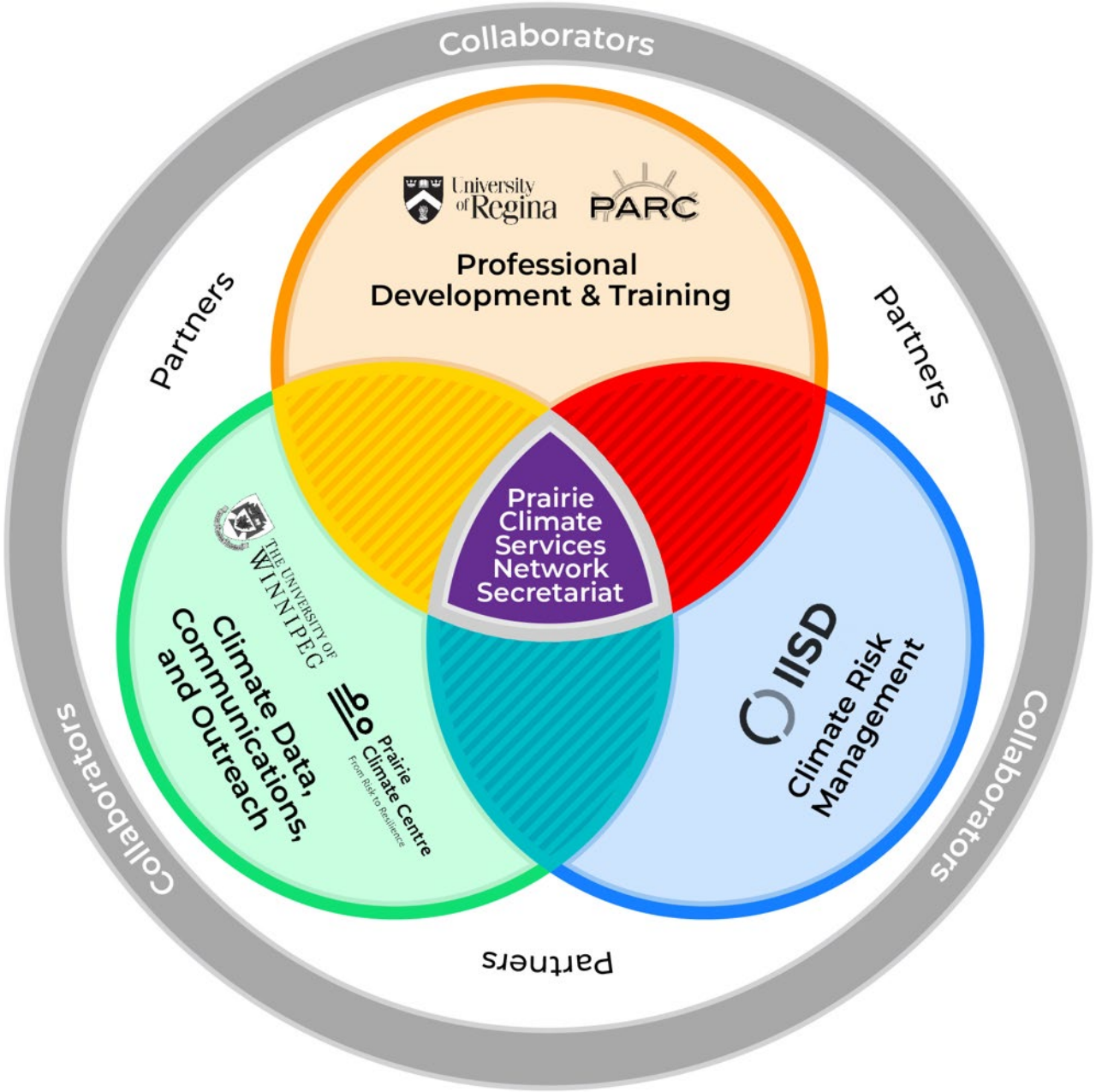
First Nations Land Management Resource Centre

Climate Change – Prairie Region Workshop, 28 Nov 2019, Calgary

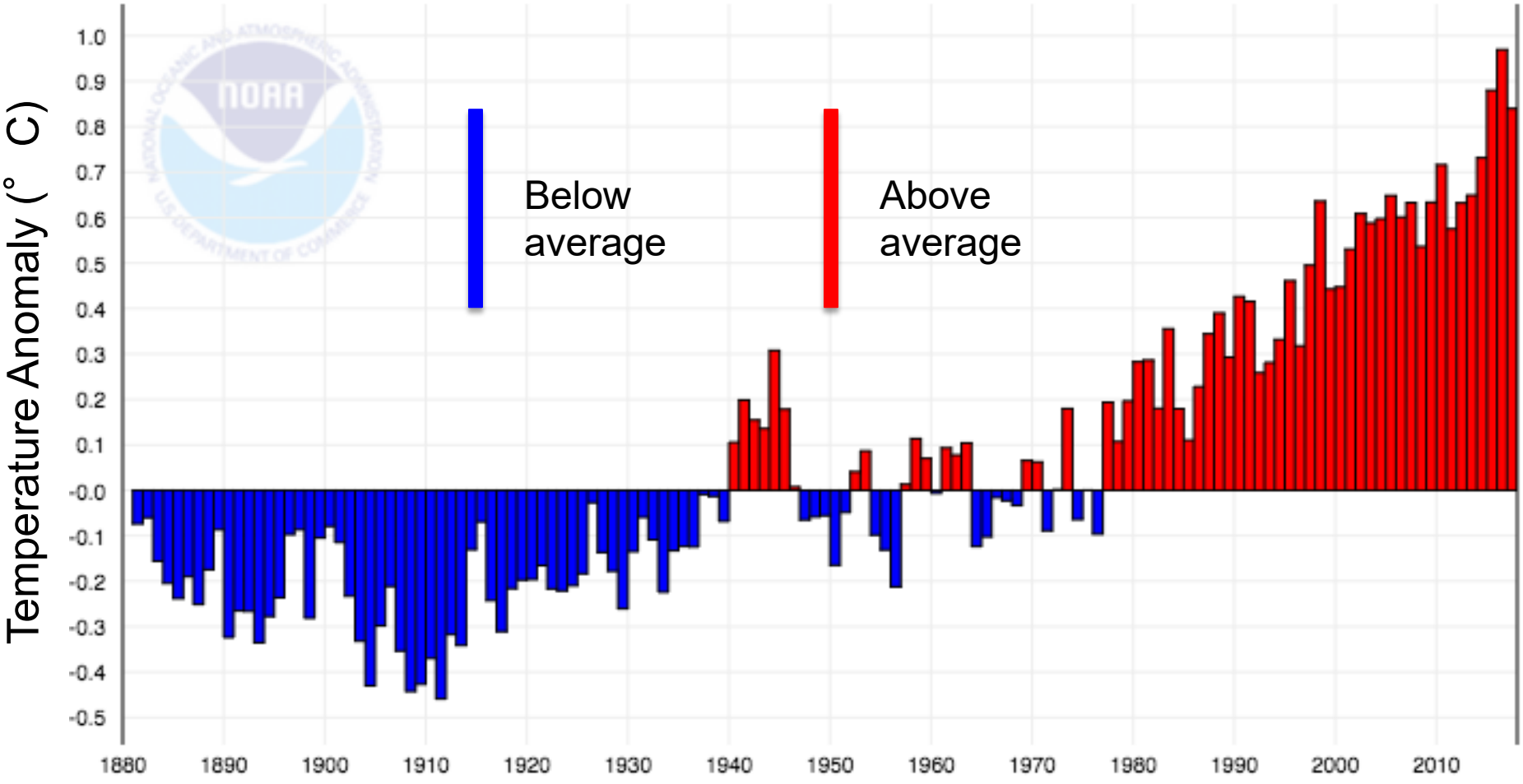
PARC

The Prairie Adaptation Research Collaborative (PARC) was **established in 2000** to undertake research on climate change science, impacts and adaptation in the Prairie Provinces. The aim of this applied research is to **support science-based adaptation** to current and future climate change. PARC also contributes to training in the emerging field of climate change adaptation and resilience planning.

UNIVERSITY OF REGINA


Collaborators
Partners
Partners
Collaborators
Collaborators
Partners
University of Regina
PARC
Professional Development & Training
Prairie Climate Services Network Secretariat
The University of Winnipeg
Climate Data, Communications, and Outreach
Prairie Climate Centre
From Risk to Resilience
IISD
Climate Risk Management

Average global temperature relative to the 20th century average



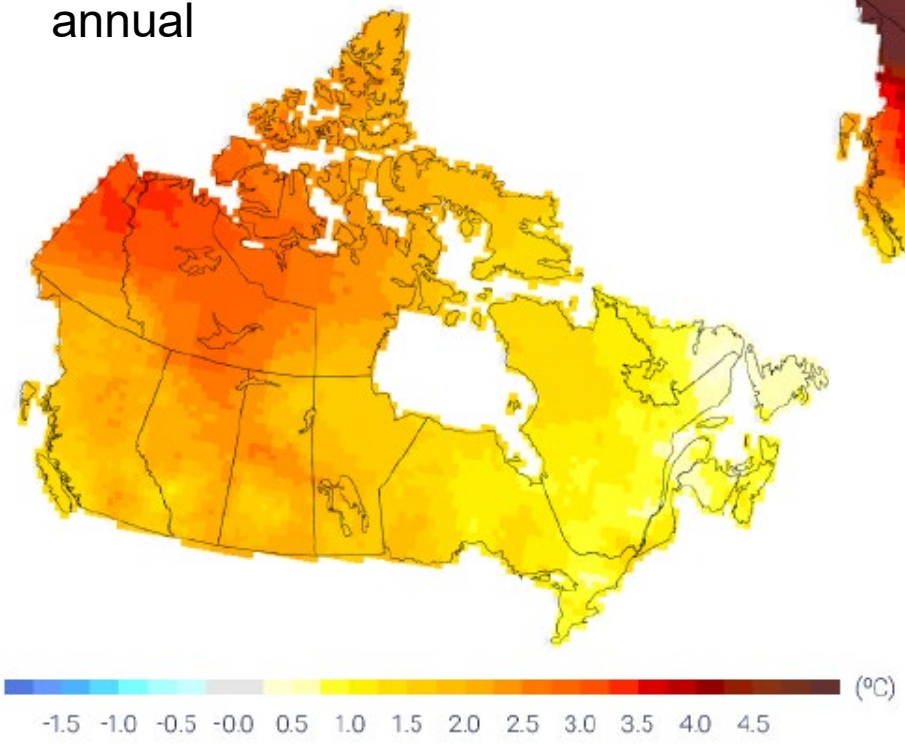
www.ncdc.noaa.gov/sotc/global/201801

CNN Health » Food | Fitness | Wellness | Parenting | Live Longer Live TV U.S. Edition +

Canada is warming at twice the global rate, report says

winter

annual



Temperature Trends across Canada, 1948-2016

Canada's Changing Climate Report

This report is about how and why Canada's climate has changed and what changes are projected for the future. Led by Environment and Climate Change Canada, it is the first report to be released as part of *Canada in a Changing Climate: Advancing our Knowledge for Action.*

Natural Resources Canada

Environment and Climate Change Canada

Canada in a Changing Climate - Regional Perspectives

- British Columbia
- **Prairies**
- Ontario
- Quebec
- Atlantic Provinces
- Northern Canada

https://changingclimate.ca/CCCR2019/

Canada in a Changing Climate- National Issues

Our Society

- Urban
- Rural
- Indigenous

Our Environment

- Water Resources
- Ecosystem Services

Our Economy

- Costing Impacts and Adaptation
- Economic Sector Perspectives

Looking Forward

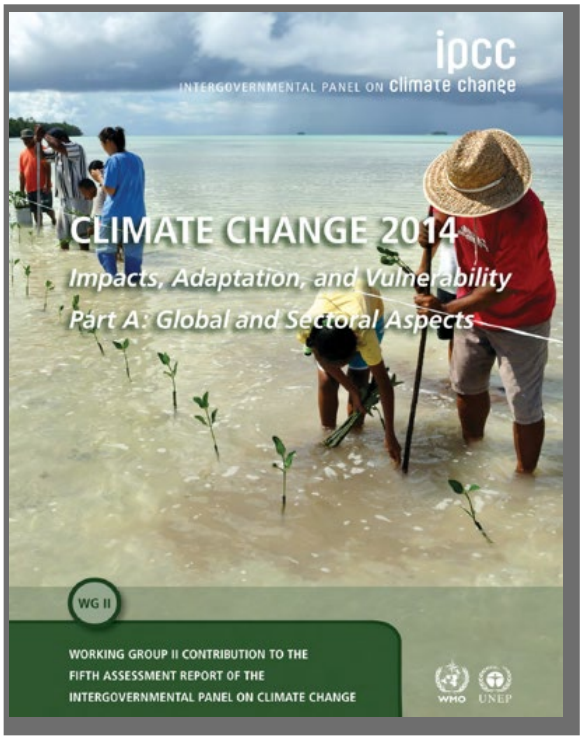
- International Dimensions
- New and Emerging Issues

What are assessments?

Credible, useful** and **decision-relevant products** that synthesize **existing knowledge** on climate change **risks, opportunities and adaptation

Assessment goals:

- **raise awareness** of issues
- **provide a foundation** for decision-making
- **build capacity** for adaptation through the assessment development process



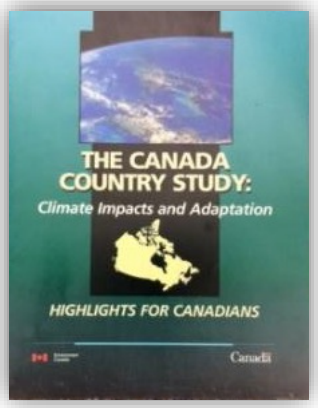
Science-Based Decision Making

Between 1980 and 2014, 222,060 papers (articles and reviews only) on climate change were published. The number of papers doubled every 5–6 years.

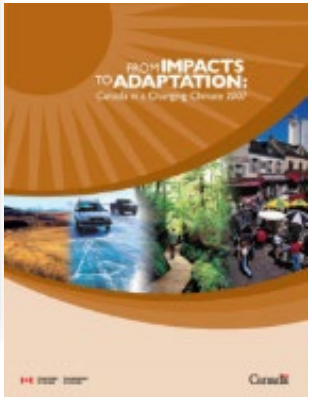
Therefore, by the early 2020s there could be **nearly half a million scientific articles** on climate change published since 1980.

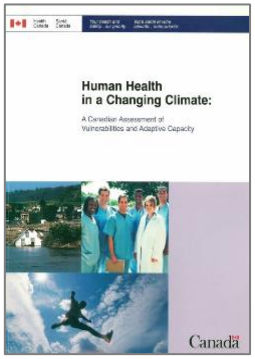
Haunschild R, Bornmann L, Marx W (2016)
Climate Change Research in View of Bibliometrics

Previous Canadian (national) Products

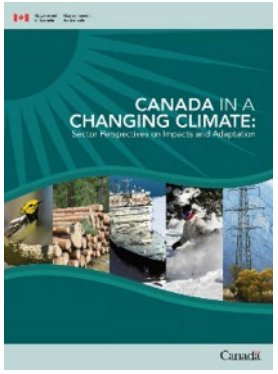


1998

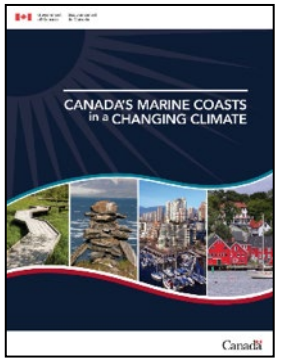




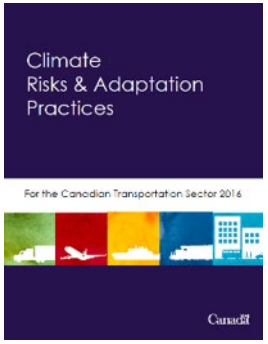
2008



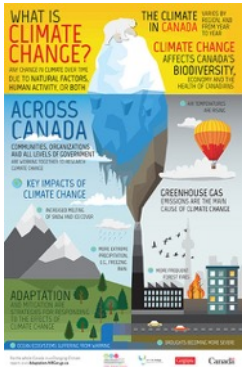
2014



2016



2017



Spin-off products

PRAIRIES

CHAPTER 7
Prairies

Lead authors:
Dave Sauchyn[1] and Suren Kulshreshtha[2]

Contributing authors:
Elaine Barrow (*University of Regina*), Danny Blair (*University of Winnipeg*), Jim Byrne (*University of Lethbridge*), Debra Davidson (*University of Alberta*), Polo Diaz (*University of Regina*), Norm Henderson (*University of Regina*), Dan Johnson (*University of Lethbridge*), Mark Johnston (*Saskatchewan Research Council*), Stefan Kienzle (*University of Lethbridge*), Justine Klaver (*University of Alberta*), Jeff Thorpe (*Saskatchewan Research Council*), Elaine Wheaton (*Saskatchewan Research Council*)

New approaches to reflect:

1. How information is being consumed
    - Demand for quick, easily accessible and tailored information
2. New technologies that enhance availability and accessibility
    - Web-based applications
3. The prominence of climate change as a government priority and a public policy issue
    - Importance of ensuring discussions are informed by the best available knowledge

This new approach includes:

- **Key messages:** to focus chapters on priority issues
- **Multiple products** released throughout the process; include writing for multiple audiences
- More inclusive and transparent process – input from **stakeholders** and public
- Inclusion of **Indigenous knowledge** (guidance to be provided)
- Early and sustained engagement of **amplifier organizations**; collaborative process and products
- All writing and figures developed for **digital** delivery

Scope of the knowledge to be assessed

Existing knowledge, from the following sources:

- relevant peer-reviewed articles;
- broader literature, such as government reports, NGO/private sector publications and websites;
- **Indigenous knowledge** that can be referenced;
- documented knowledge based on practical learning experiences (e.g., case studies, planning or engineering reports; survey results); and
- international articles that can help benchmark how Canada compares to other countries, and highlight relevant examples from which we could learn.

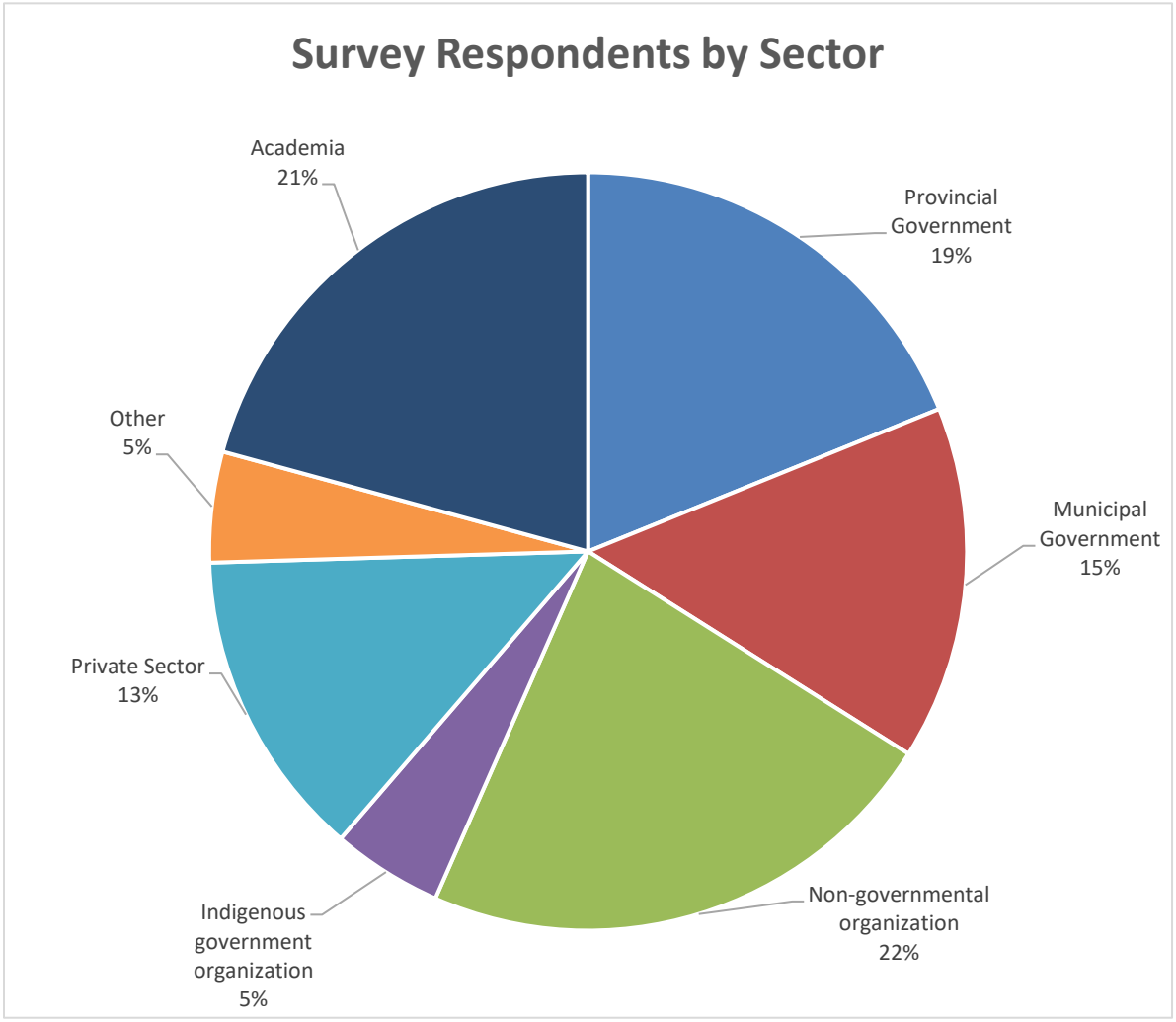
In all cases, **maintaining scientific credibility is of paramount importance** and authors are expected to carefully assess the available knowledge to determine each source's relevancy and reliability before including the findings in the chapter.

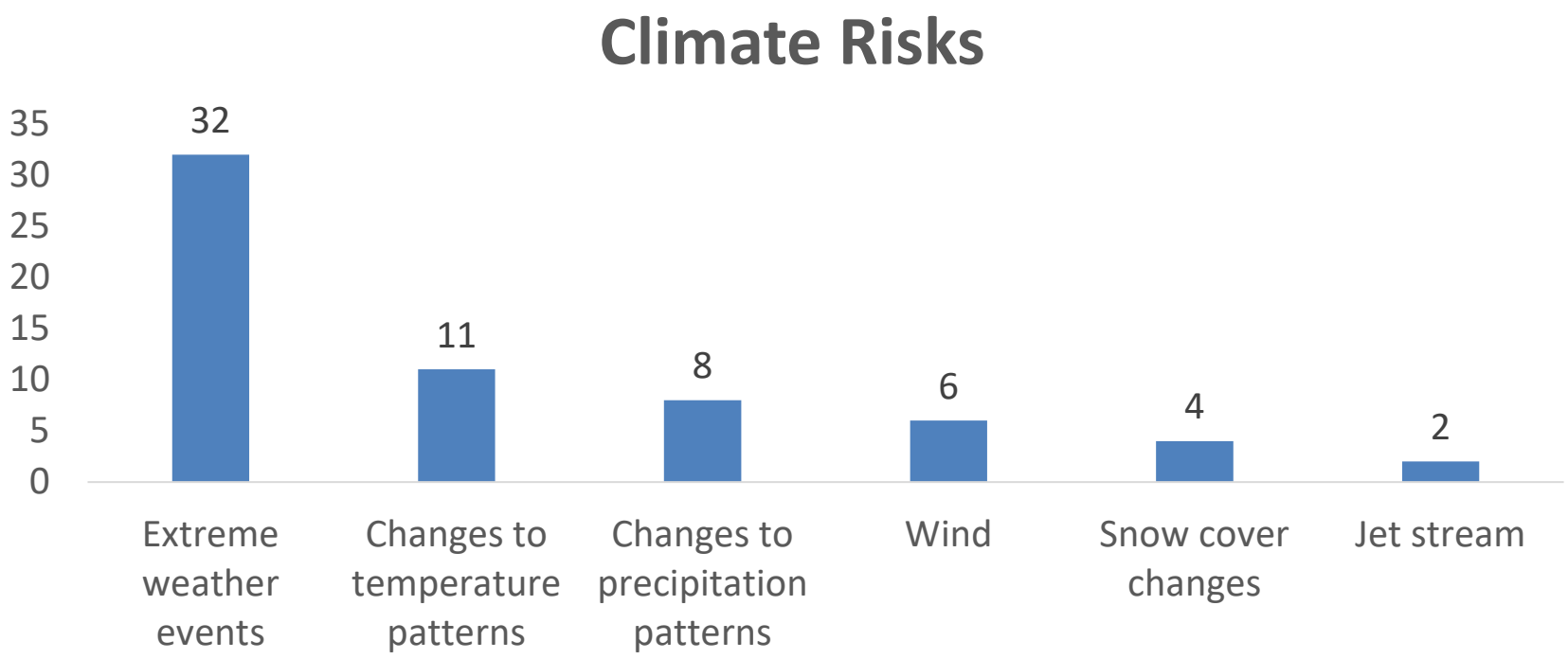
Stakeholder Survey

- The survey was drafted and externally reviewed during March 2018.
- It was emailed to over 800 stakeholders in Alberta, Saskatchewan and Manitoba on April 9, 2018.
- The survey was also made available through the PRAC web site.
- Responses were provided either by submission of a Word document or Google form.
- Reminder emails were sent in mid-April.
- A total of 106 responses were received by the end of April

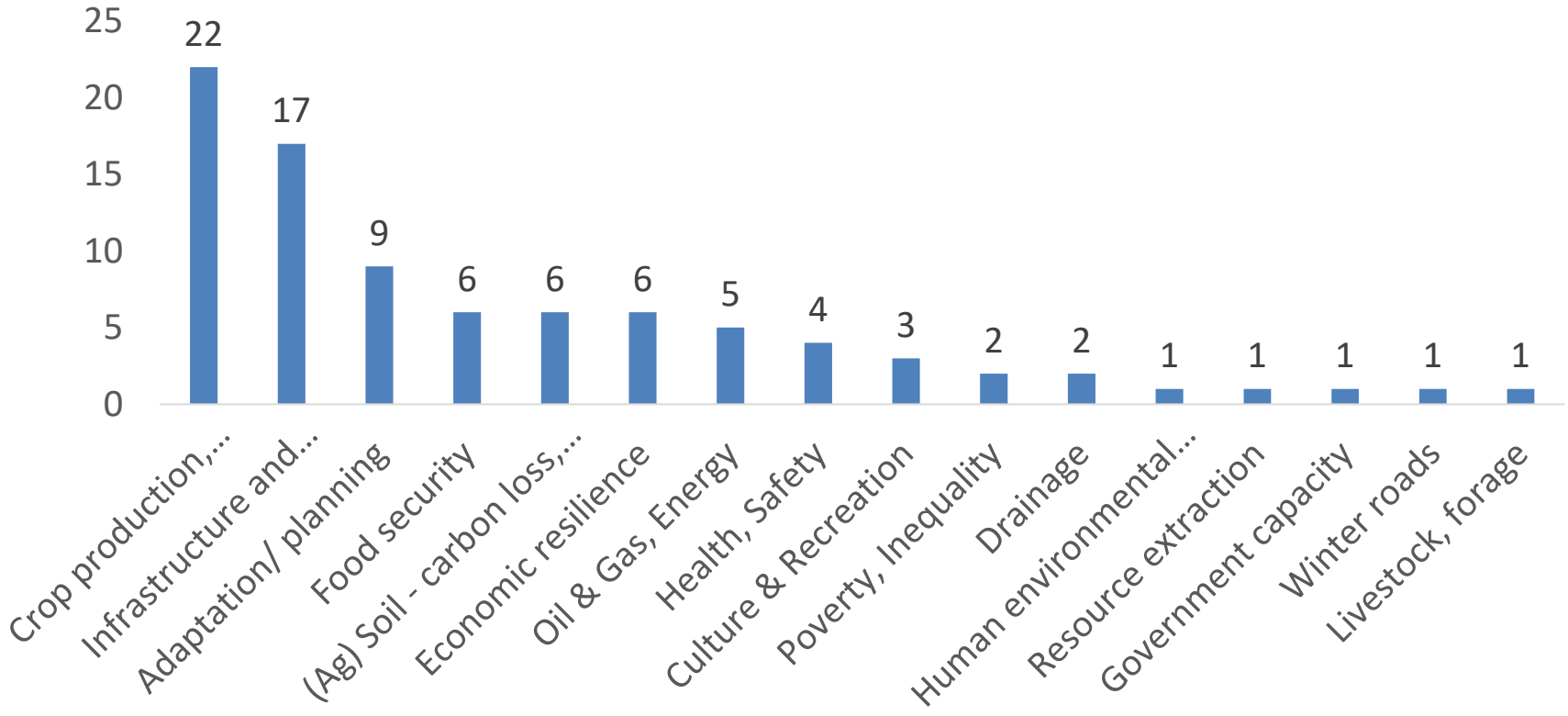
Jo-Ellen Parry
Adaptation Lead, Resilience program
International Institute for Sustainable Development

Respondents




Climate Risks
35
30
25
20
15
10
5
0
32
11
8
6
4
2
Extreme weather events
Changes to temperature patterns
Changes to precipitation patterns
Wind
Snow cover changes
Jet stream

Potential Socio-economic Implications



Overview of the Assessment Process

Engage: Surveys, workshops and conferences.

Launch

Scoping Meeting- Nov. 2016

Plan

Outlines, scope, approach…

Build author teams

Teams of 6-15 authors led by a CLA

Assess

Writing teams assess the knowledge

Review

Extensive external review process

Finalize

Finalizing content, editing, translation, layout etc.

Release

Plan to release chapters as complete

Advise: A 20-member Advisory Committee, composed of assessment users and subject-matter experts, provides ongoing advice and input.

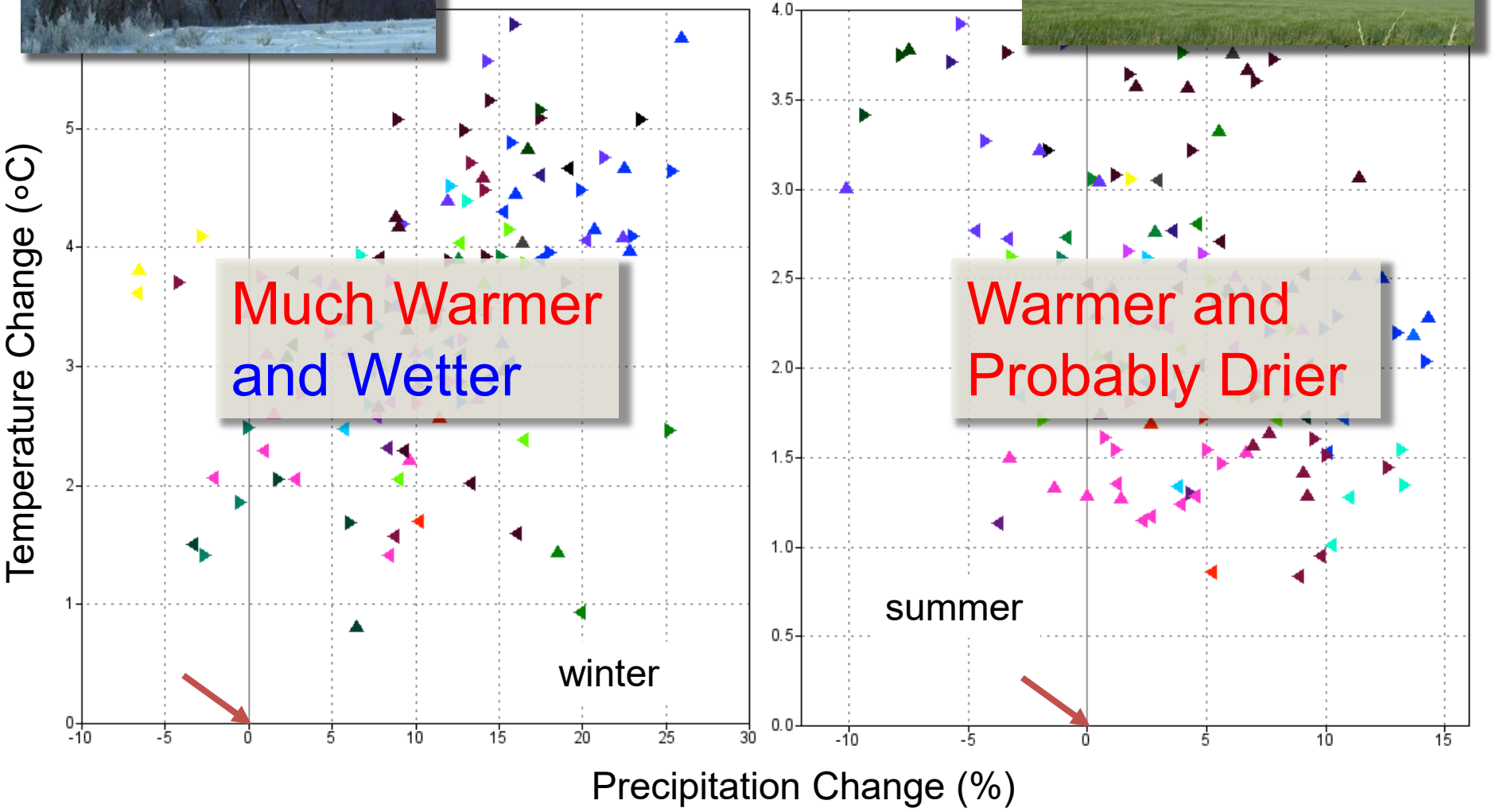
Prairie Chapter - Lead and Contributing Authors

Name	Affiliation
Dave Sauchyn	PARC (U of R)
Debra Davidson	U of A
Mark Johnston	SRC
Amber Fletcher	U of R
Brenda Parlee	U of A
David Natcher	U of S
Elaine Wheaton	U of S
Ian Mauro	PCC (U of W)
Jeremy Pittman	Waterloo
Kendra Isaac	GoA
Maureen Reed	U of S
Megan Van Ham	Alberta WaterSmart
Mike Flannigan	U of A
Richard Schneider	U of A
Suren Kulshreshtha	U of S

Context /Background

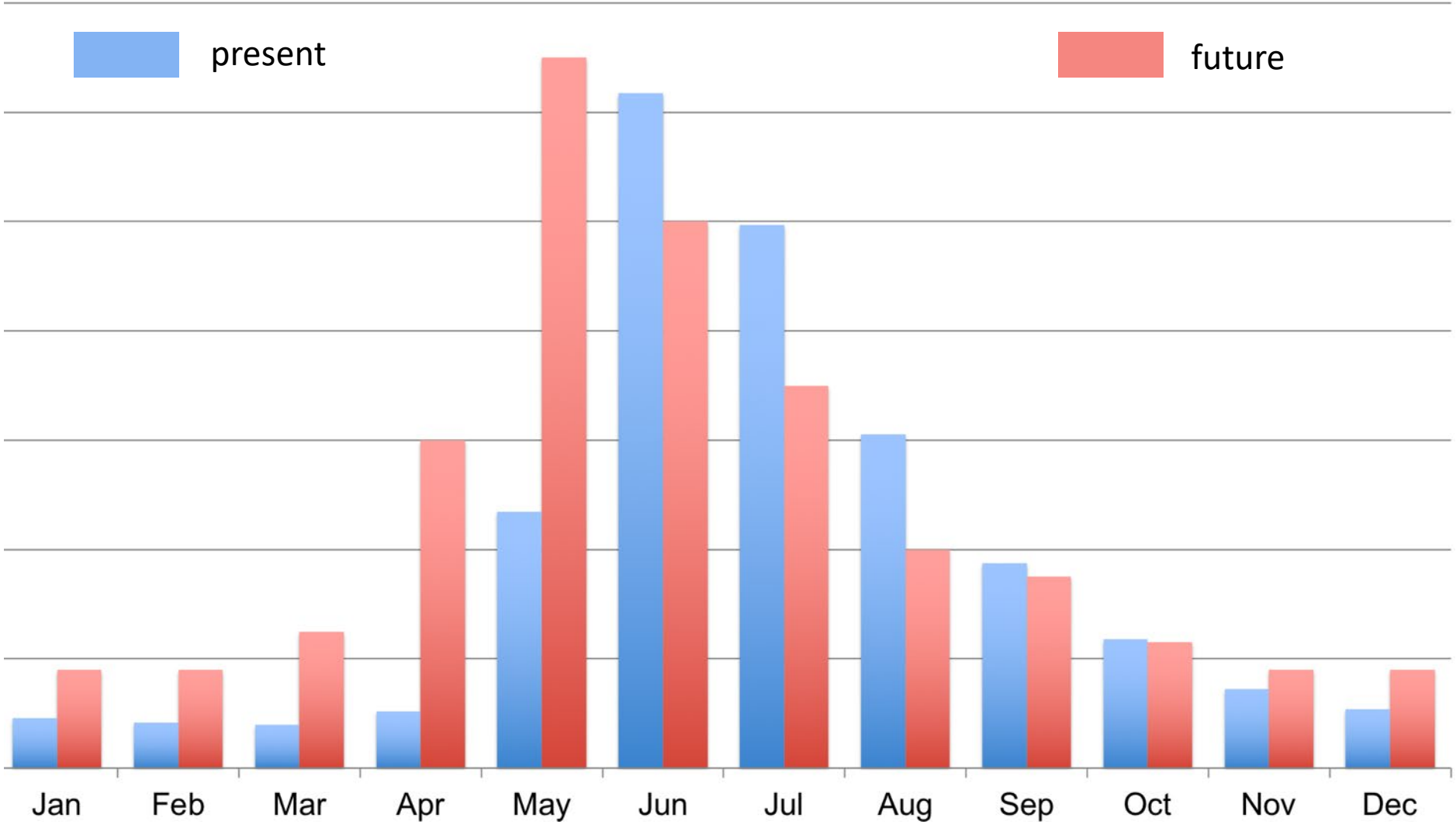
- Diverse region from Rocky Mountains to subarctic Canadian shield; and from large cities to remote rural communities
- More than 80% of Canada's agricultural land and most of the country's irrigated land
- Exposed to projected temperature increases that are greater than elsewhere in southern Canada.
- The water resources, ecosystems and resource economies are sensitive to variations in climate (e.g. drought)
- Relatively large urban indigenous population
- Non-renewable resources - oil and gas, mining – a major economic driver
- Periodic rapid economic growth (especially in Alberta), a population shift from rural to urban

Projected Climate Changes
Western Canada
1971-2000 vs 2040-69



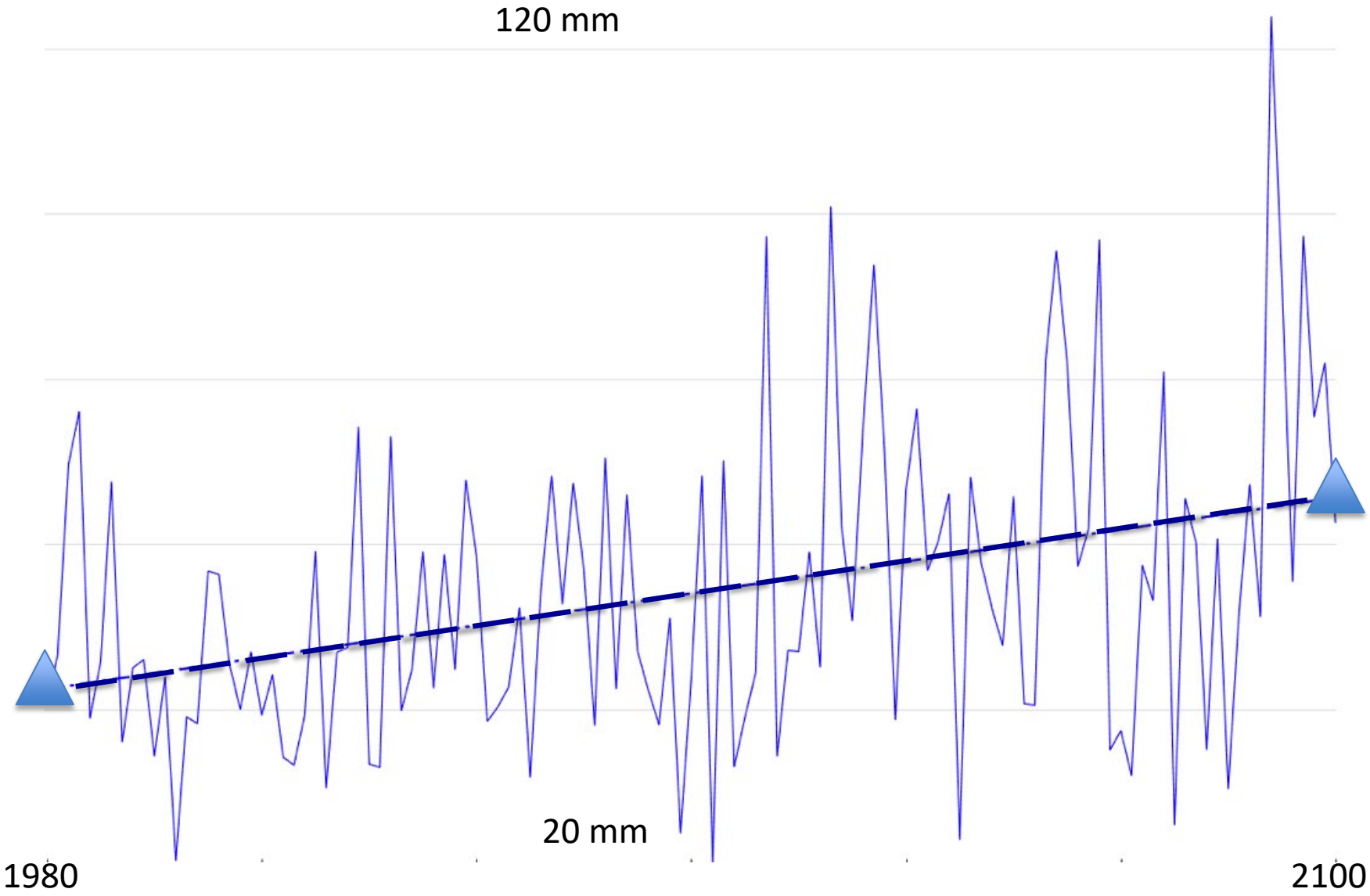
We are losing the advantage of a cold winter

Average Monthly Flow of the Bow River

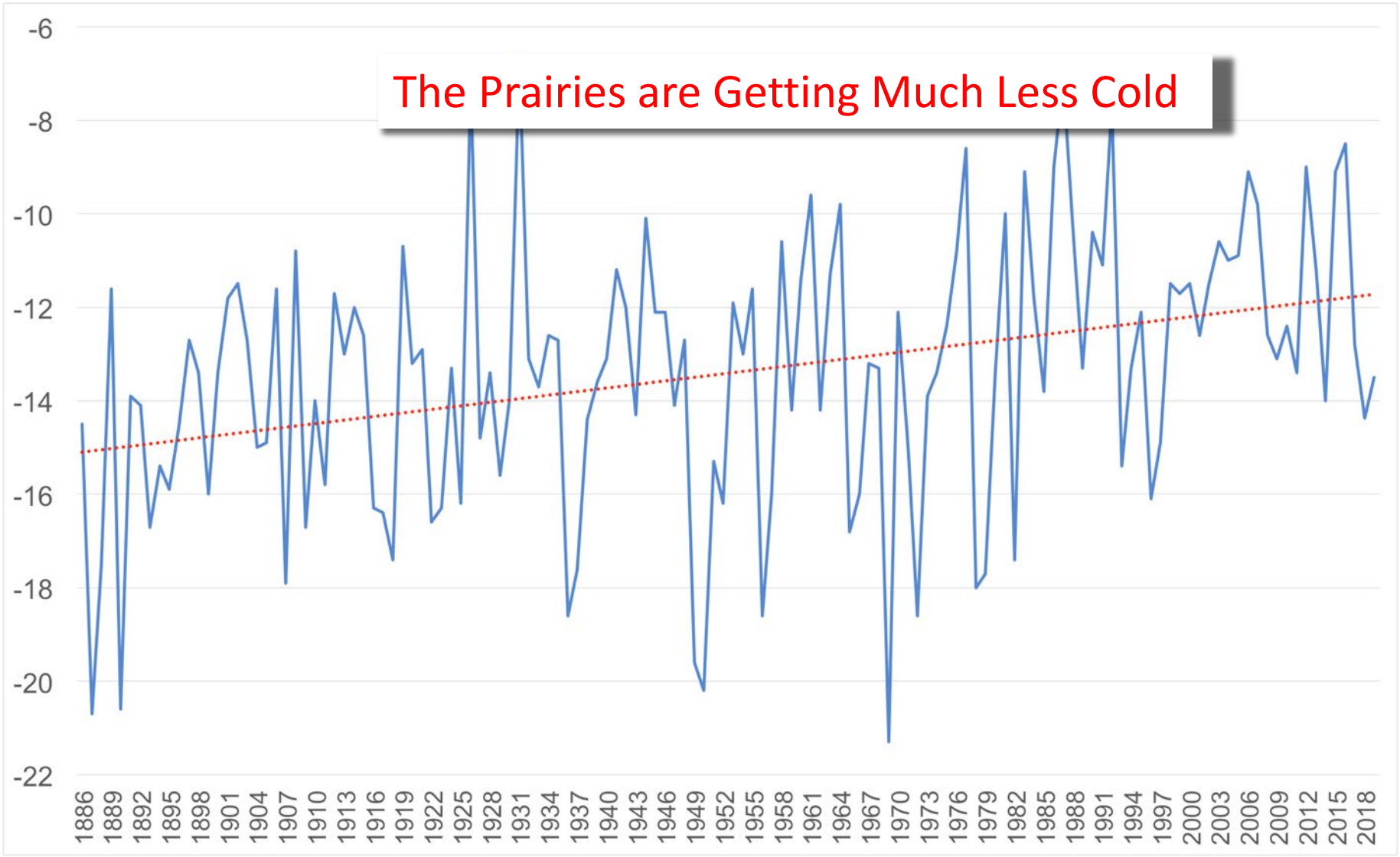


Winter Precipitation (mm) at Calgary, 1980 to 2100

Data from Canadian RCM version 5



Average Minimum Winter Temperature (°C) at Calgary, 1886 to 2019

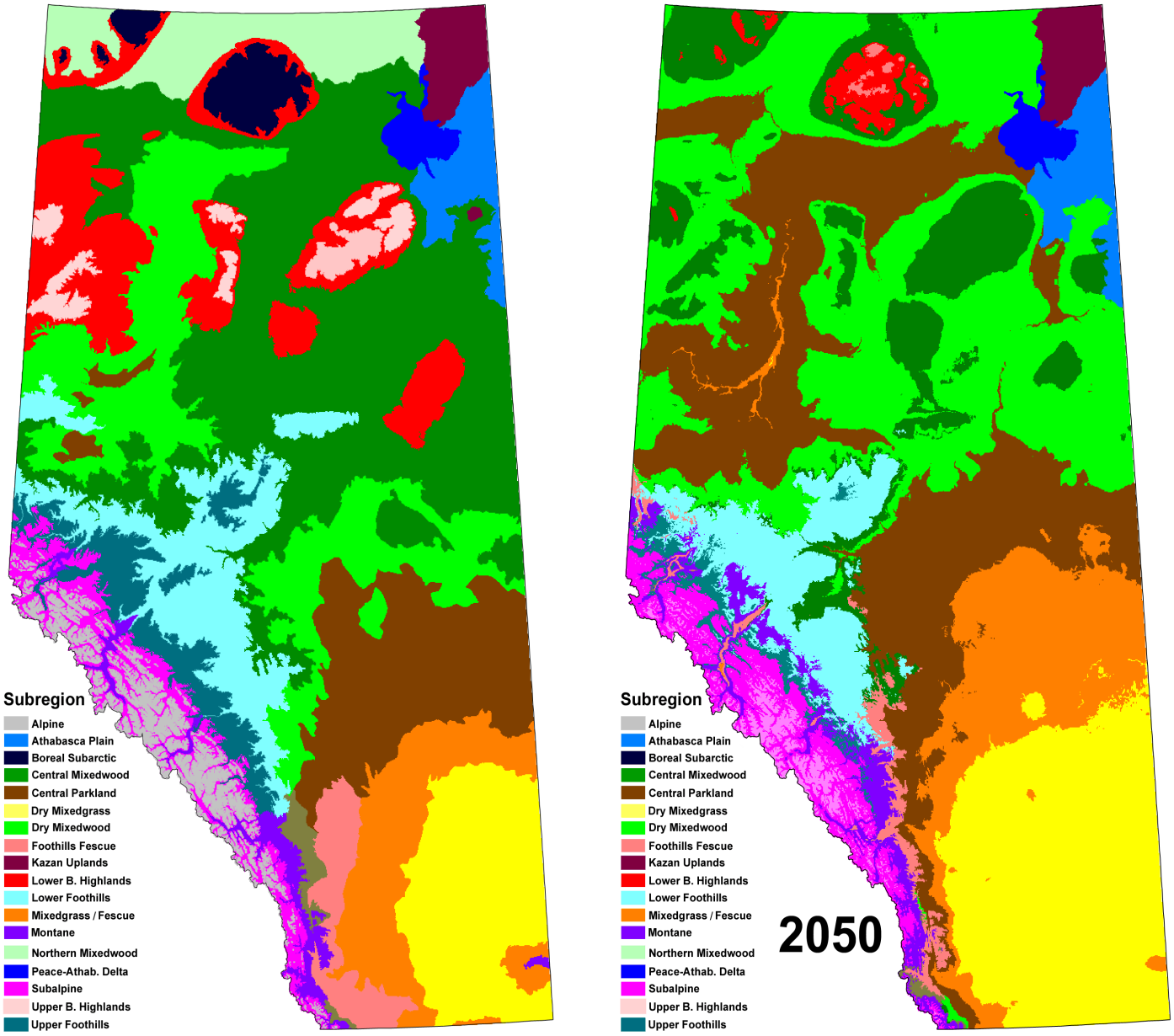


Prairies Chapter - Key Messages

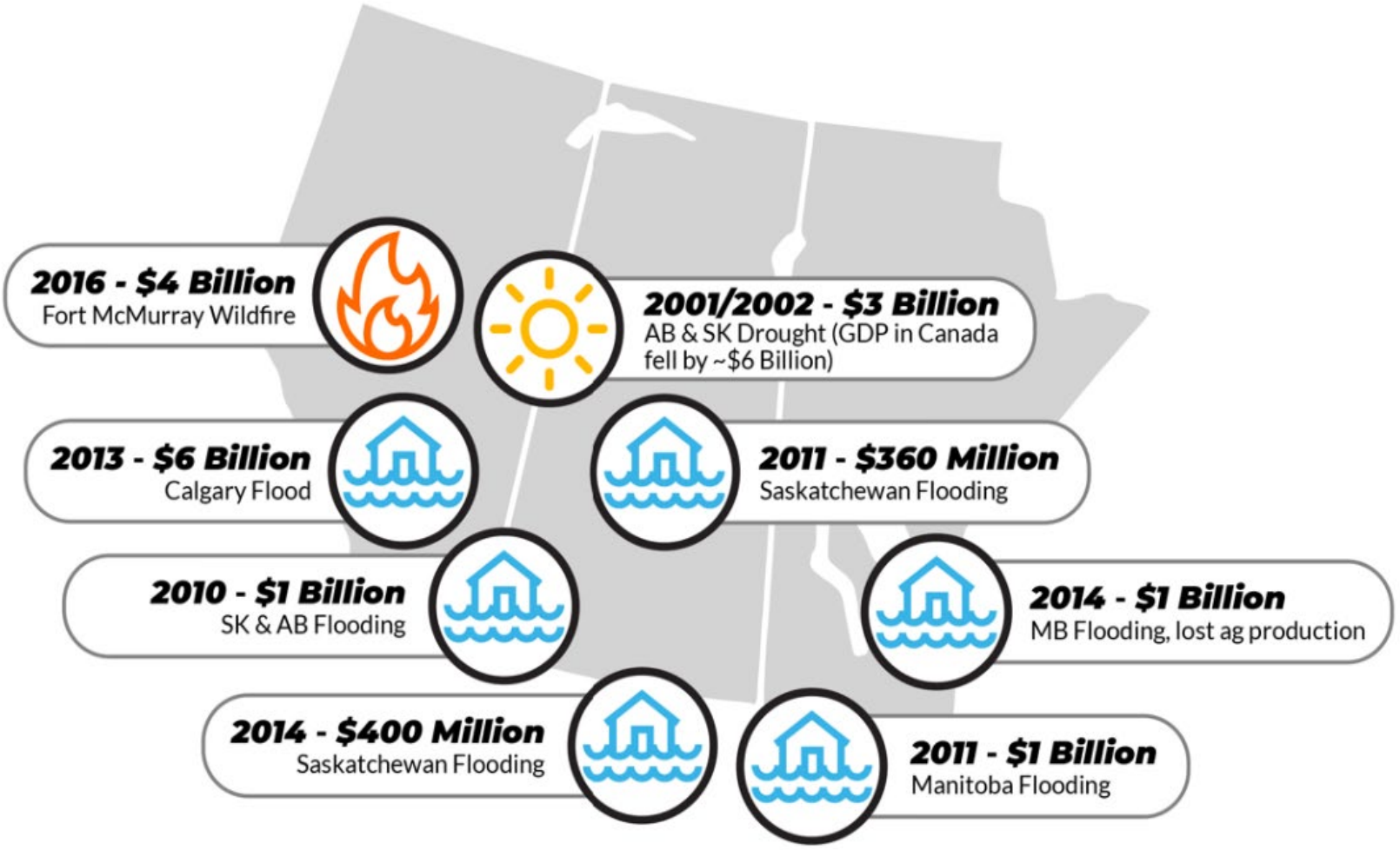
Ecosystems: ... large regions of boreal forest could eventually transition to aspen parkland and grassland ecosystems, while entire mountain ecosystems could disappear. Although biodiversity is expected to increase overall ... there would be both an absolute loss of some species and species redistribution. Successful adaptation will involve active management intervention ...

Extreme weather events: are among the most challenging consequences of climate change ... unprecedented impacts in recent years. Provincial and municipal governments have responded by proposing policies, structures and practices

Water Resources: Regional land use policy and planning, in addition to emergency preparedness, is critical ... collaboration improves the likelihood of successful implementation of adaptation measures at a regional level ... watershed stewardship groups, rural municipalities and conservation districts to encourage land and water practices that prevent or minimize adverse impacts of excesses and shortages of water



Schneider et al. (2015)



Source: Prairie Climate Centre

Prairies Chapter - Key Messages

Agriculture: Achieving the net benefits of higher temperatures and a longer growing season will require adaptation to limit the impacts of climate extremes and increased risks of pests, vector borne diseases and invasive species. ... limitations of financial resources and institutional support remain barriers to adaptation.

Social Considerations: The impacts of climate change may exacerbate existing societal inequities. Social groups, such as **indigenous peoples**, women, people of low socio-economic status, and youth or **elders have unique sources of vulnerability and strength**, which should be considered in public policy development. Adaptation planning and policy is more effective when it considers the means by which race, age, gender and poverty amplify people's vulnerability or resilience to climate hazards.

Adaptation planning: governments and businesses have begun to assess climate risks and develop adaptation strategies ... cities are at the forefront of adaptation and resilience planning in the Prairie Provinces. Risk assessments tend to focus on recent historical climate events, and do not consider future climate in decision-making, leaving some firms, governments, and sectors unprepared.

WISDOM OF AN ELDER

We are living in an environment of chaos and uncertainty. The current reality that we are living in today is in need of change. We cannot continue to walk the current path that threatens the future for all of us. It is our opinion that the real change needed around climate change is a change of the heart. We must become stewards of our own hearts before we can become stewards of the earth.

As Elders and Knowledge Keepers we share our knowledge to provide a direction that can help us move forward to a much more sustainable earth. Technological development has advanced without a foundation of values, which has brought a great deal of dehumanization and alienation to our present reality.

We don't advise you to build a pipeline, or not to build a pipeline, although obviously we are not in support of choices that harm the earth and our future.

We have an opportunity to set a completely new narrative. We can create a new economy and new opportunities for the nation based on stewardship.

We fully realize our current structures and systems will not change overnight. We have thousands of years of knowledge and experience on how to live in peace and in balance with nature. What is needed is to form an alliance, a reciprocal relationship with the earth supporting her natural laws.

Climate change should be viewed as an opportunity for us to reflect on ourselves and to make the necessary changes that will ensure a future for all our children.

- Elder Dave Courchene (Nii Gaani Aki Inini—Leading Earth Man)

Anishinabe Elder Dave Courchene spoke at the Turtle Lodge in Sagkeeng First Nation, Manitoba, at a gathering to discuss Indigenous perspectives on pipeline development in the province on November 18, 2016 (https://youtu.be/nMt5I9gpWTk). There were a diversity of participants in attendance, including federal and provincial government representatives, energy companies, environmental organizations, and other Indigenous Elders and leaders. Elder Courchene then offered his words for this report.

We have thousands of years of knowledge and experience on how to live in peace and in balance with nature. What is need is to form an alliance, a reciprocal relationship with the earth supporting her natural laws.

Climate change should be viewed as an opportunity for us to reflect on ourselves and to make the necessary changes that will ensure a future for all our children.

Elder Dave Courchene

Turtle Lodge International Centre for Indigenous Education and Wellness
Sagkeeng First Nation on the Southern tip of Lake Winnipeg