Climate Change and the Impact on Saskatchewan

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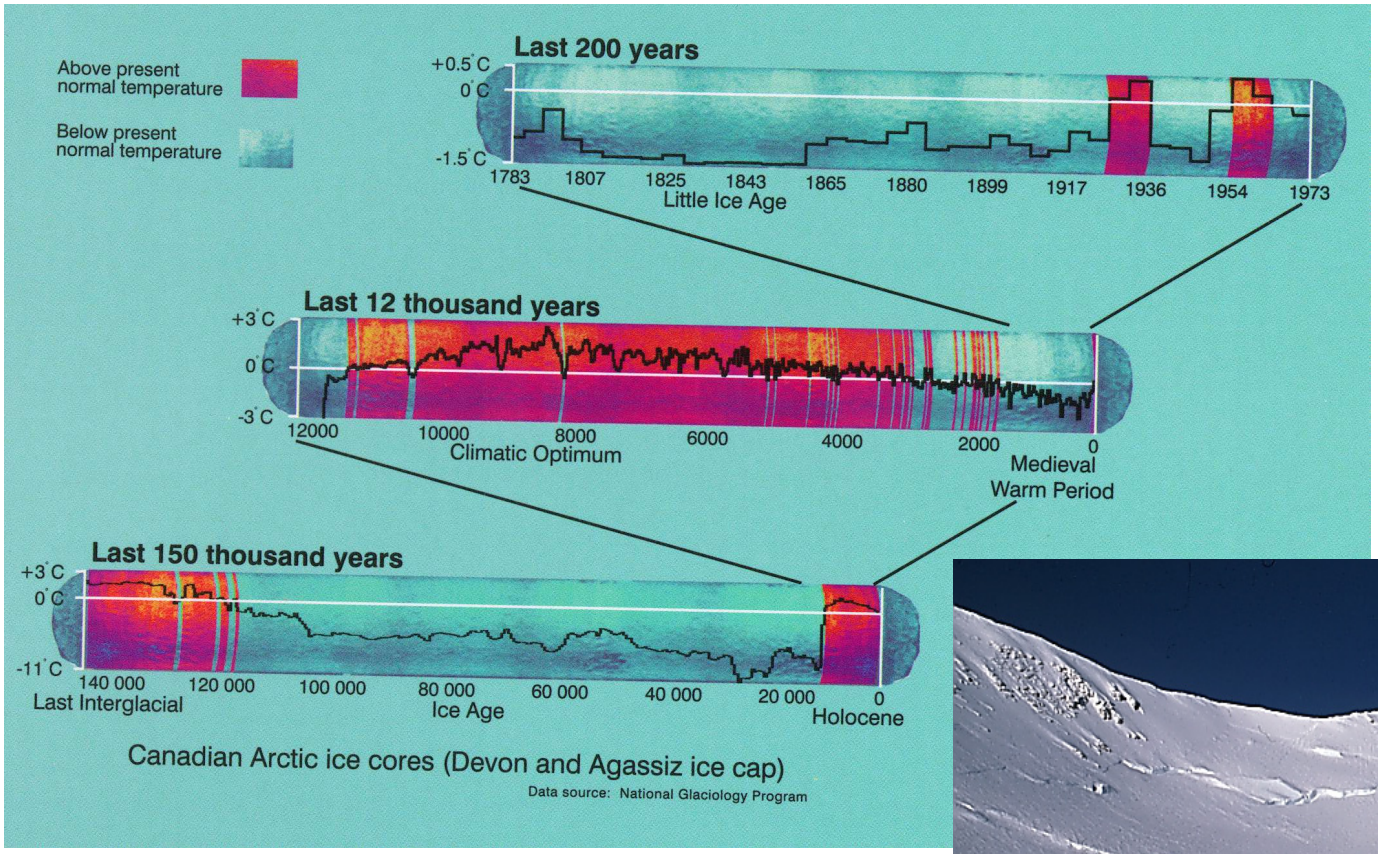
University of Regina

SaskEnergy Leadership Forum
Regina, October 21, 2002

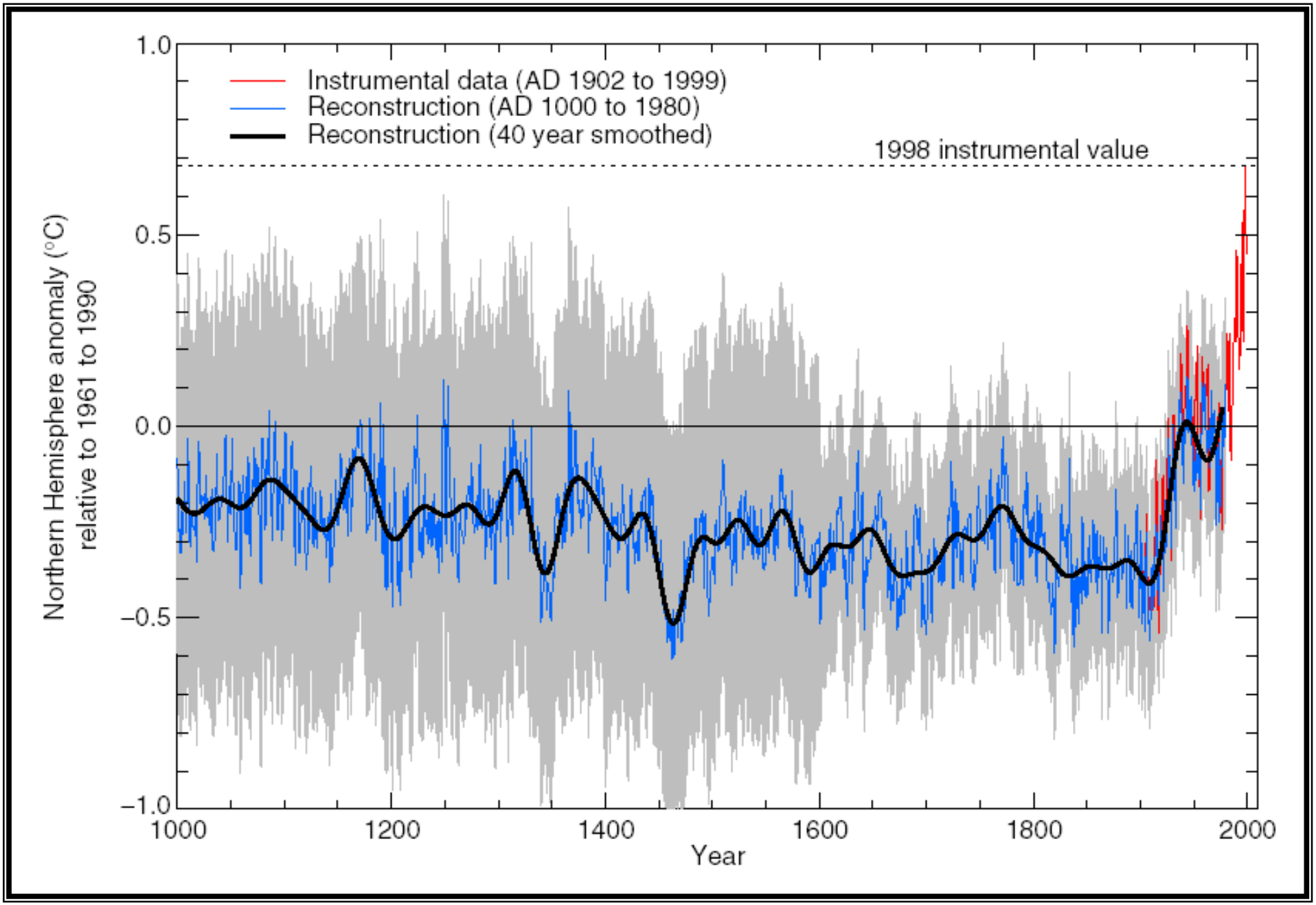
Climate is Always Changing

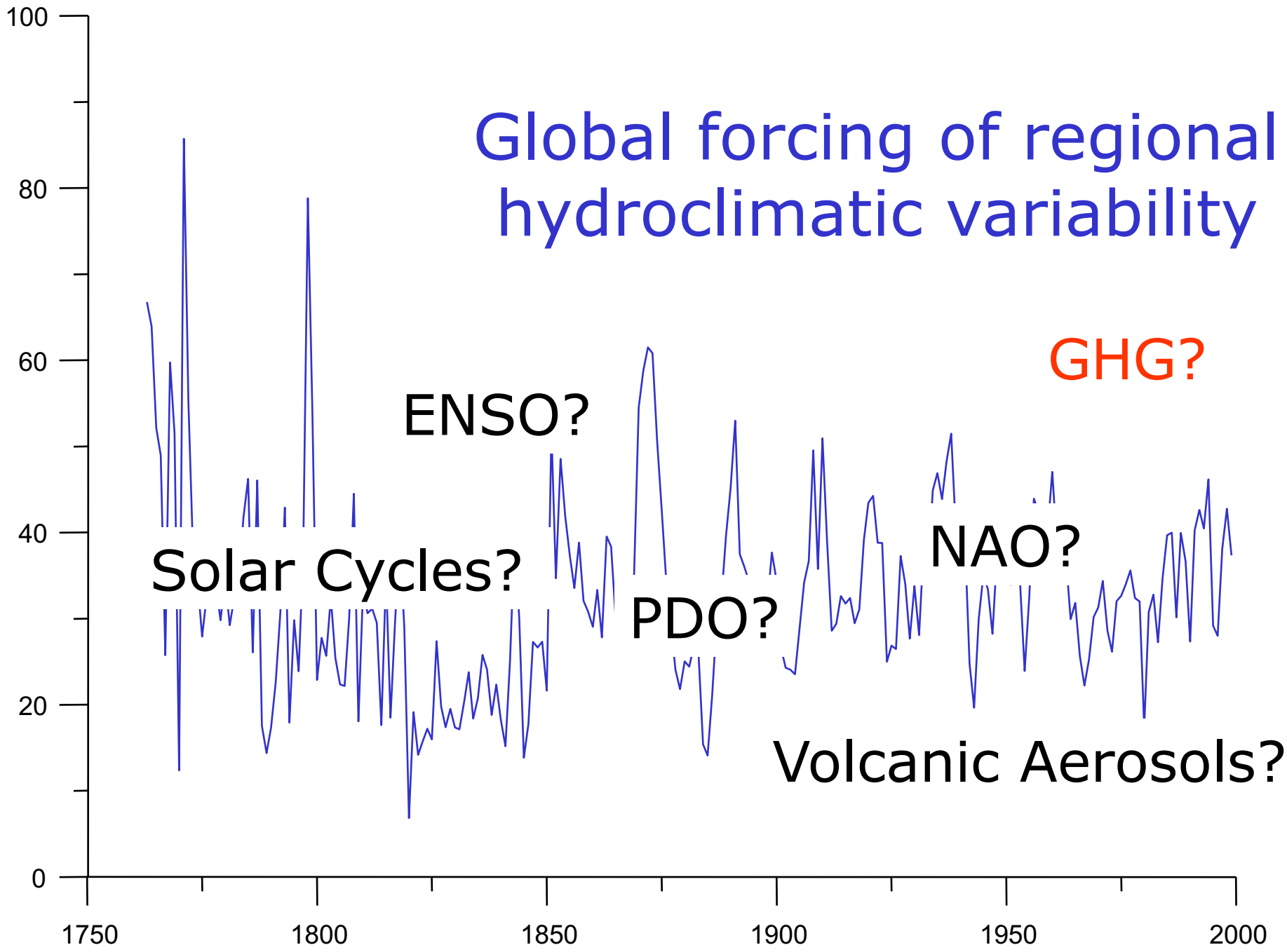


From GSC Misc. Report 71 (2001)

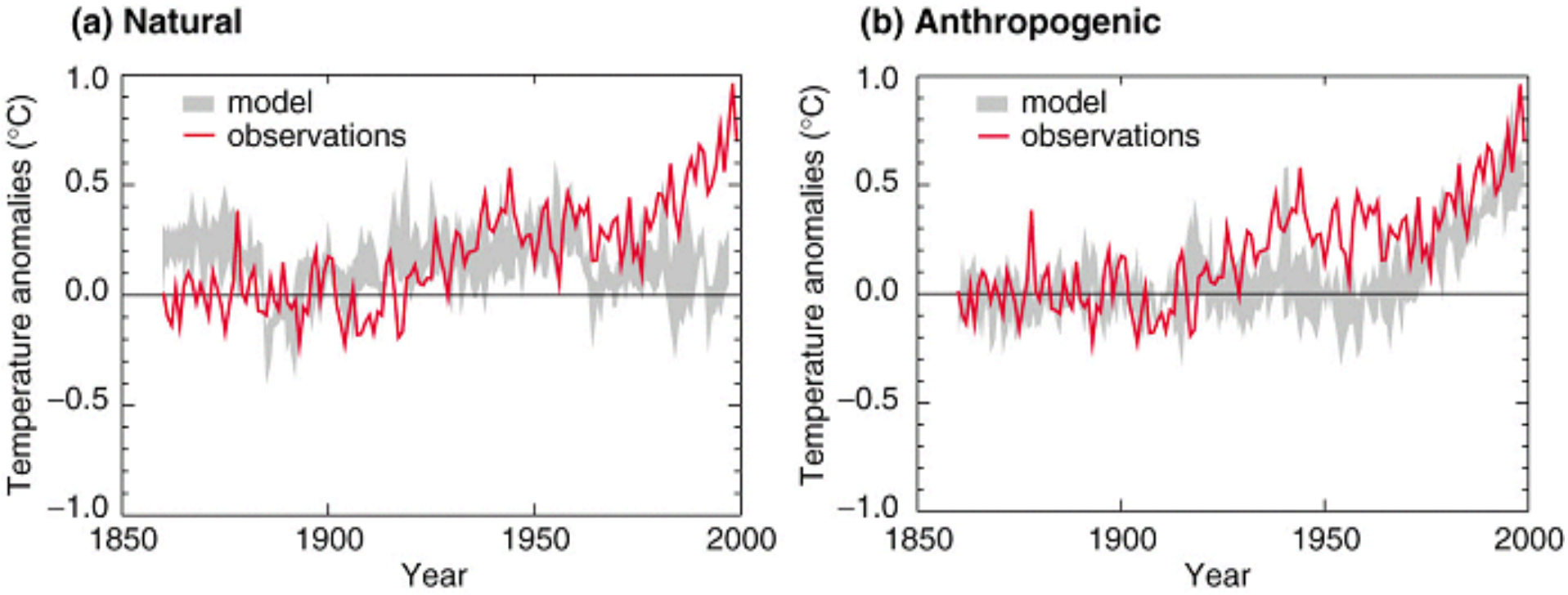
Ice cores, tree rings,
lakes and oceans sediments:
windows on the past

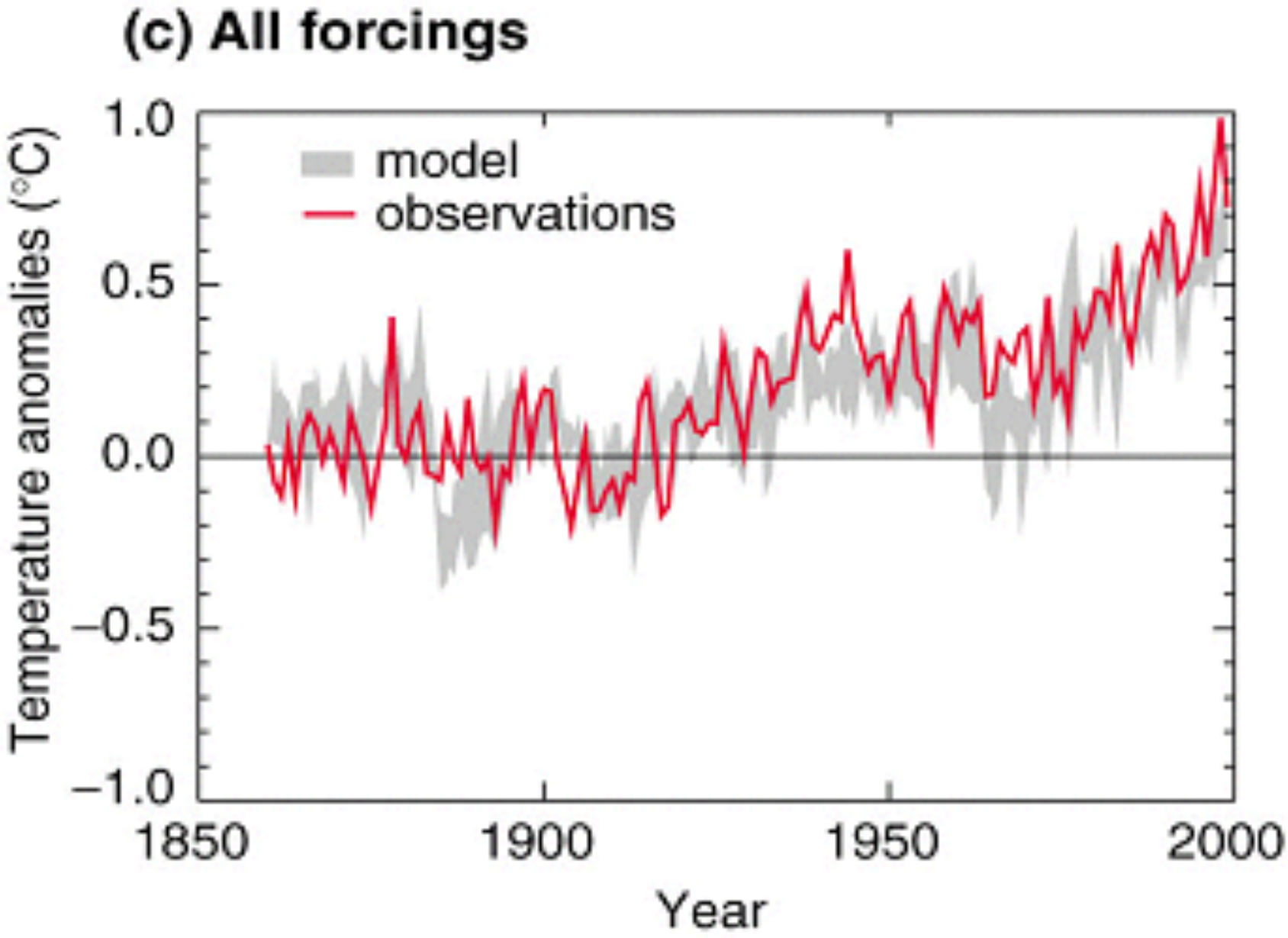
Northern Hemisphere (1000 years) temperature records



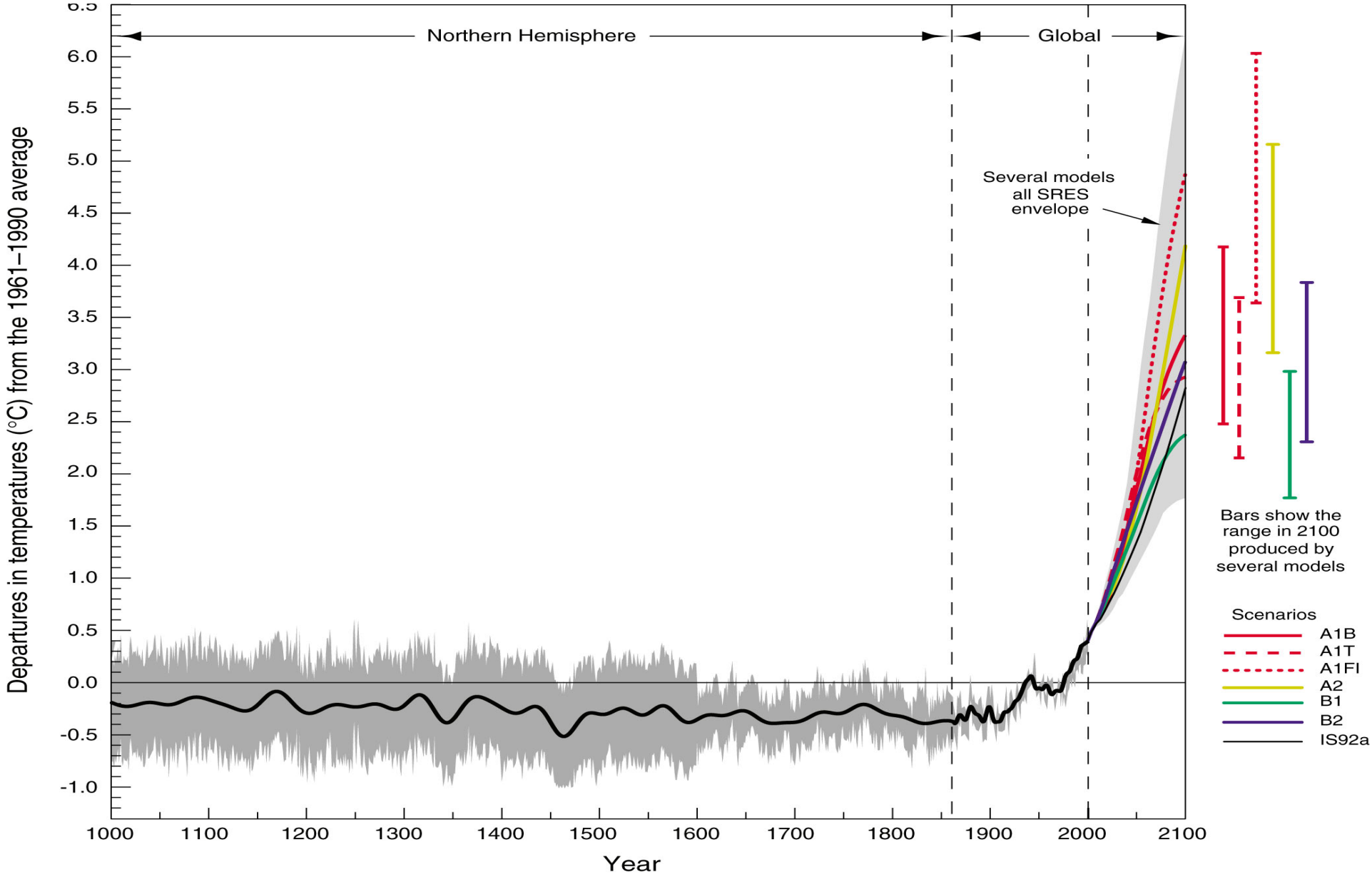

Global forcing of regional hydroclimatic variability
GHG?
ENSO?
Solar Cycles?
PDO?
NAO?
Volcanic Aerosols?
100
80
60
40
20
0
1750
1800
1850
1900
1950
2000

Climate Change involves both human and "natural" factors

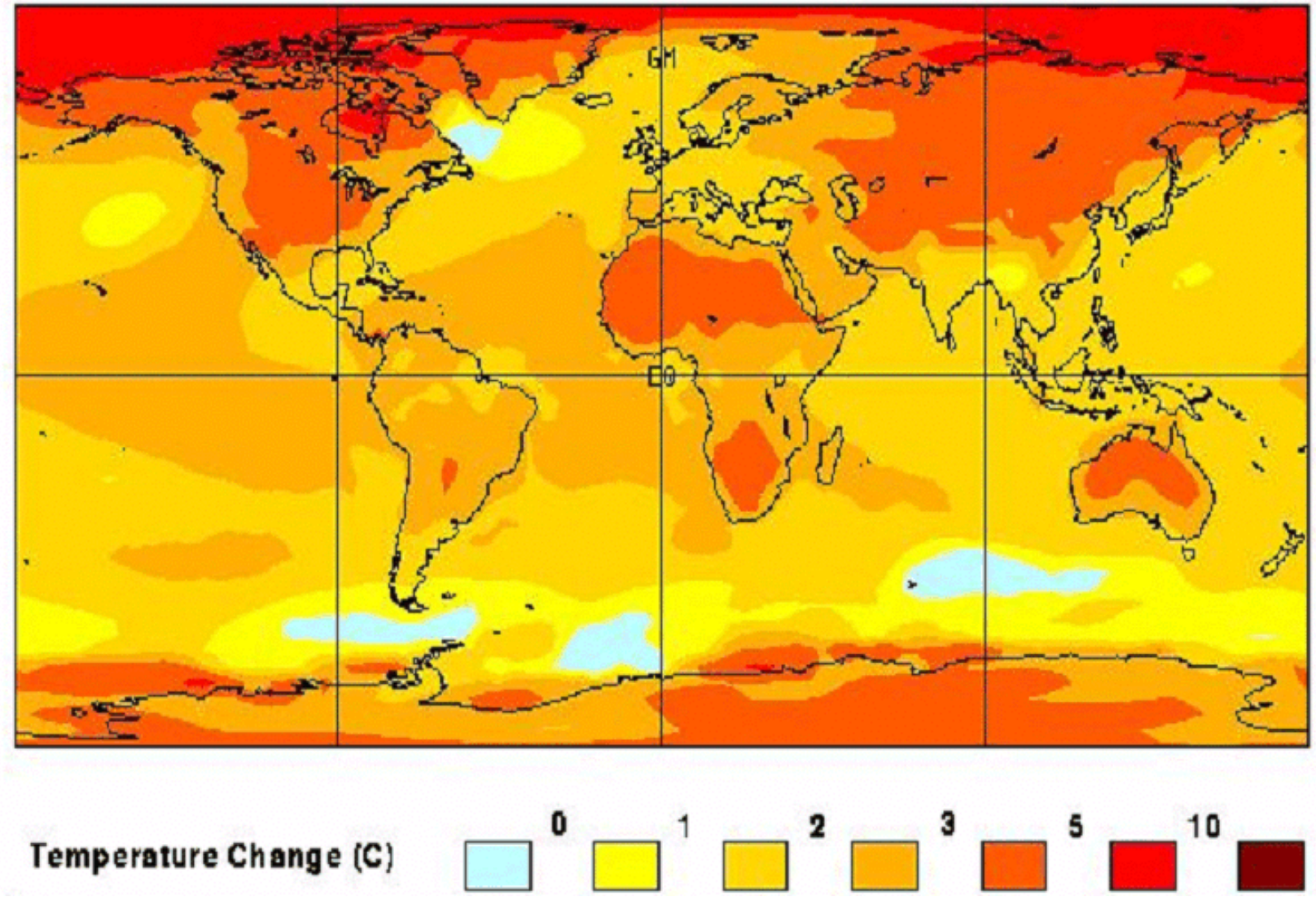



(c) All forcings
model
observations
Temperature anomalies (°C)
1.0
0.5
0.0
−0.5
−1.0
1850
1900
1950
2000
Year

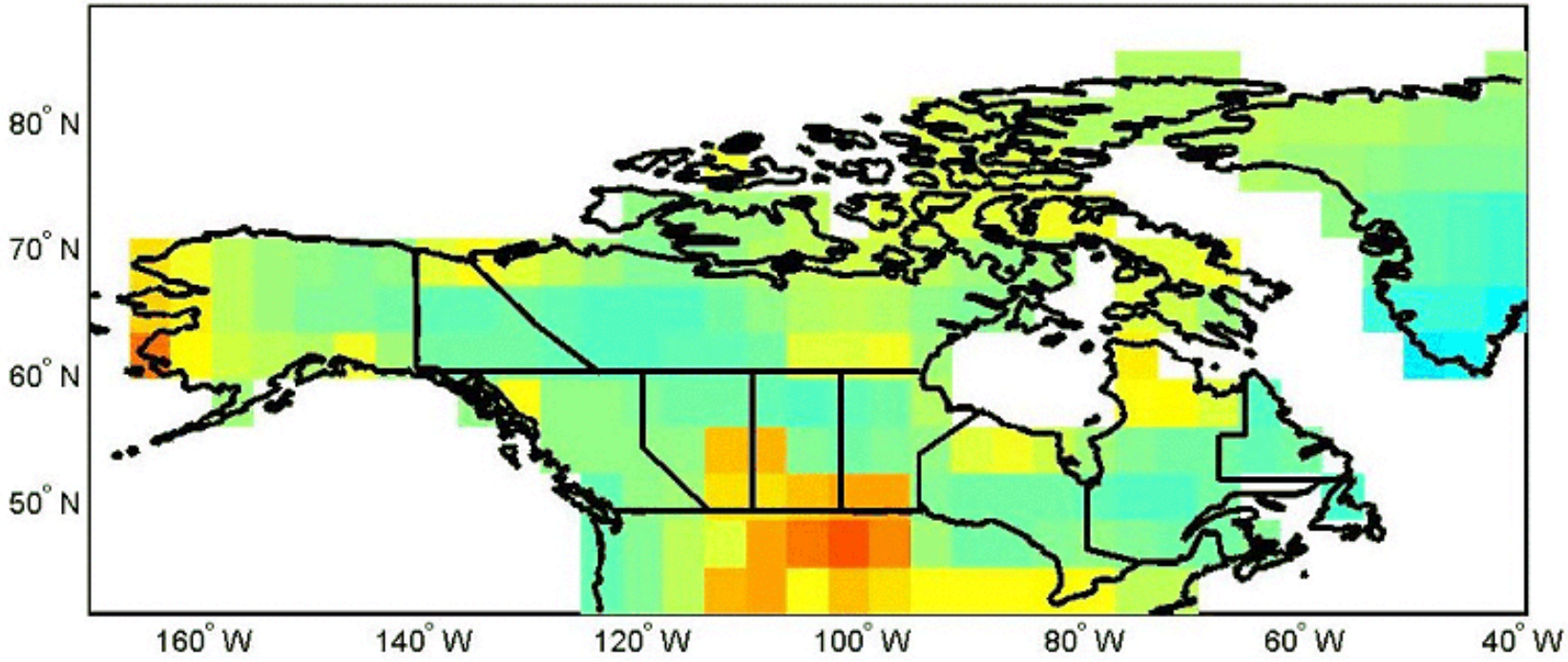
Temperature Projections for 21st Century



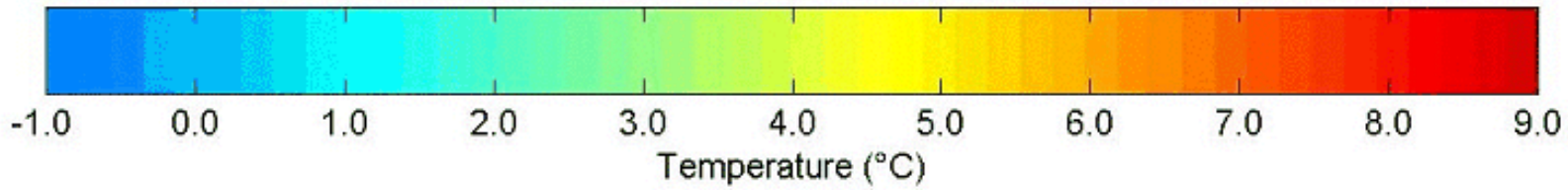
Projected Temperature Change, 1910 - 2040



Combined Effect of Projected Greenhouse Gas and Sulphate Aerosol Increases.- Canadian Model



CGCM1, Mean Spring Temperature Change 2050



http://www.cics.uvic.ca/scenarios/index.cgi

Projections (broad generalizations) **for the future climate of the Prairie Provinces**

Temperature: increasing, greater in winter than summer, greater at night than during day

Precipitation: great uncertainty, annually small increase to significant decrease

Evaporation: increased

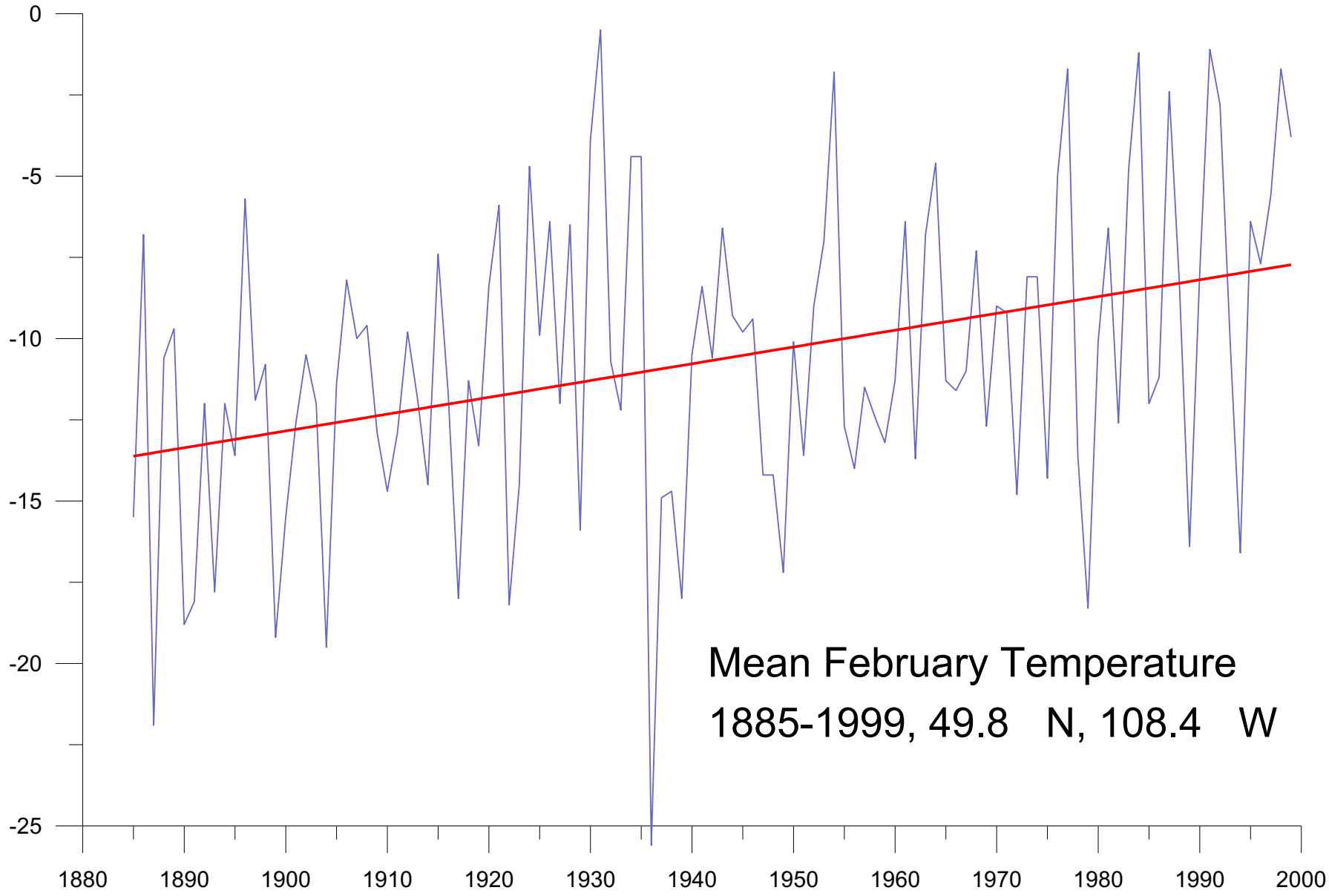
Soil moisture: decreased

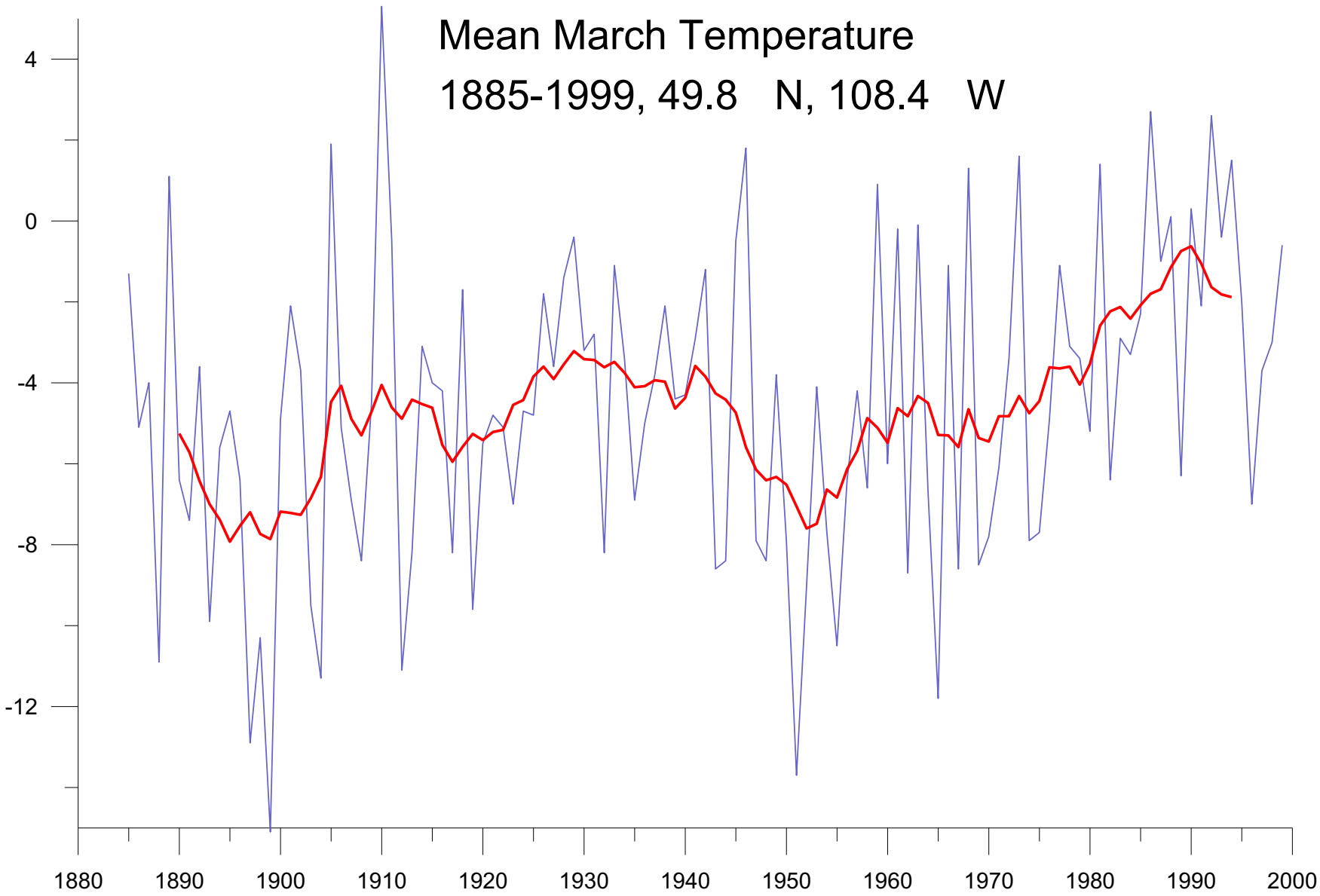
Growing season: increased

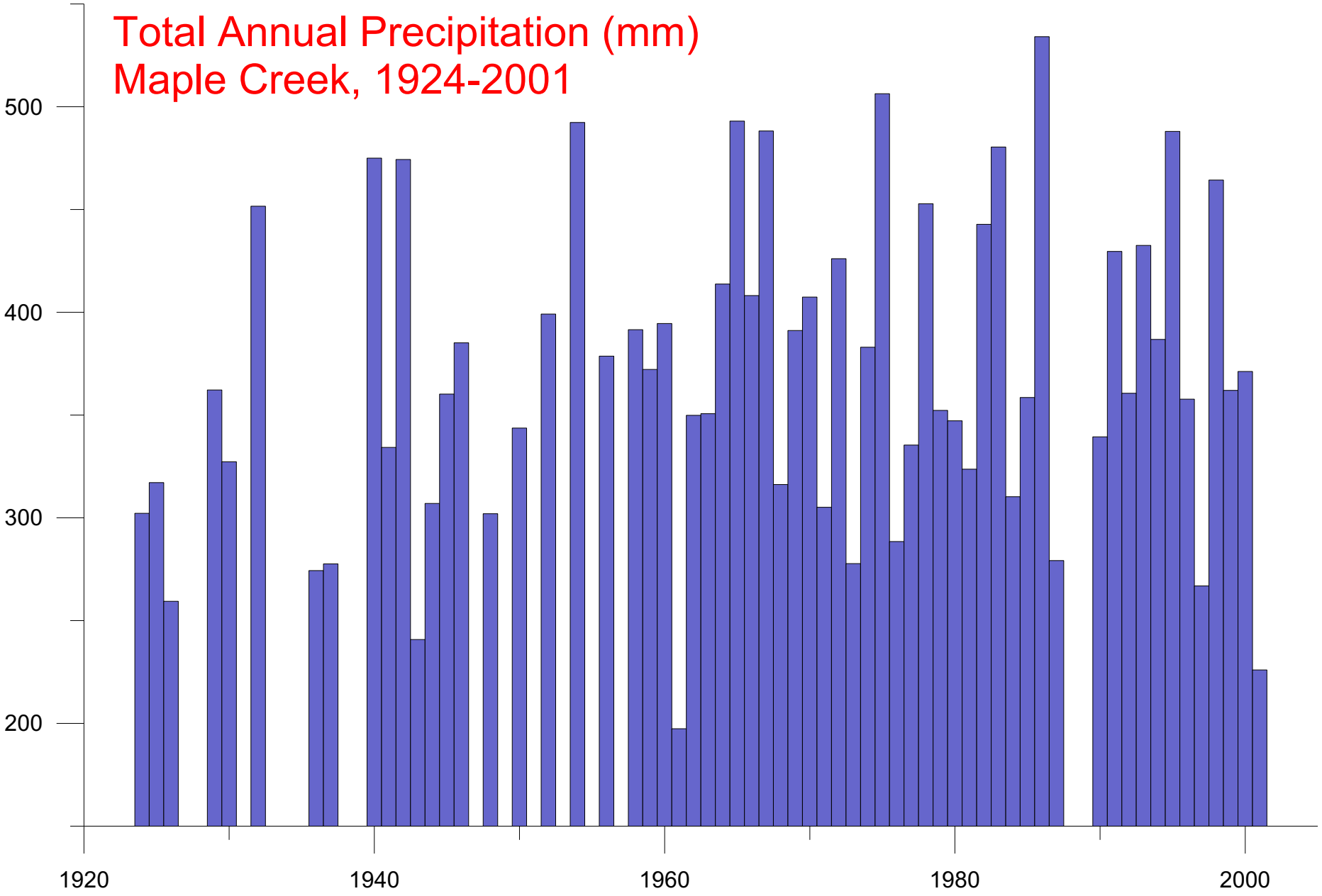
Atmospheric CO_2: increased

Extreme events: increased frequency and magnitude

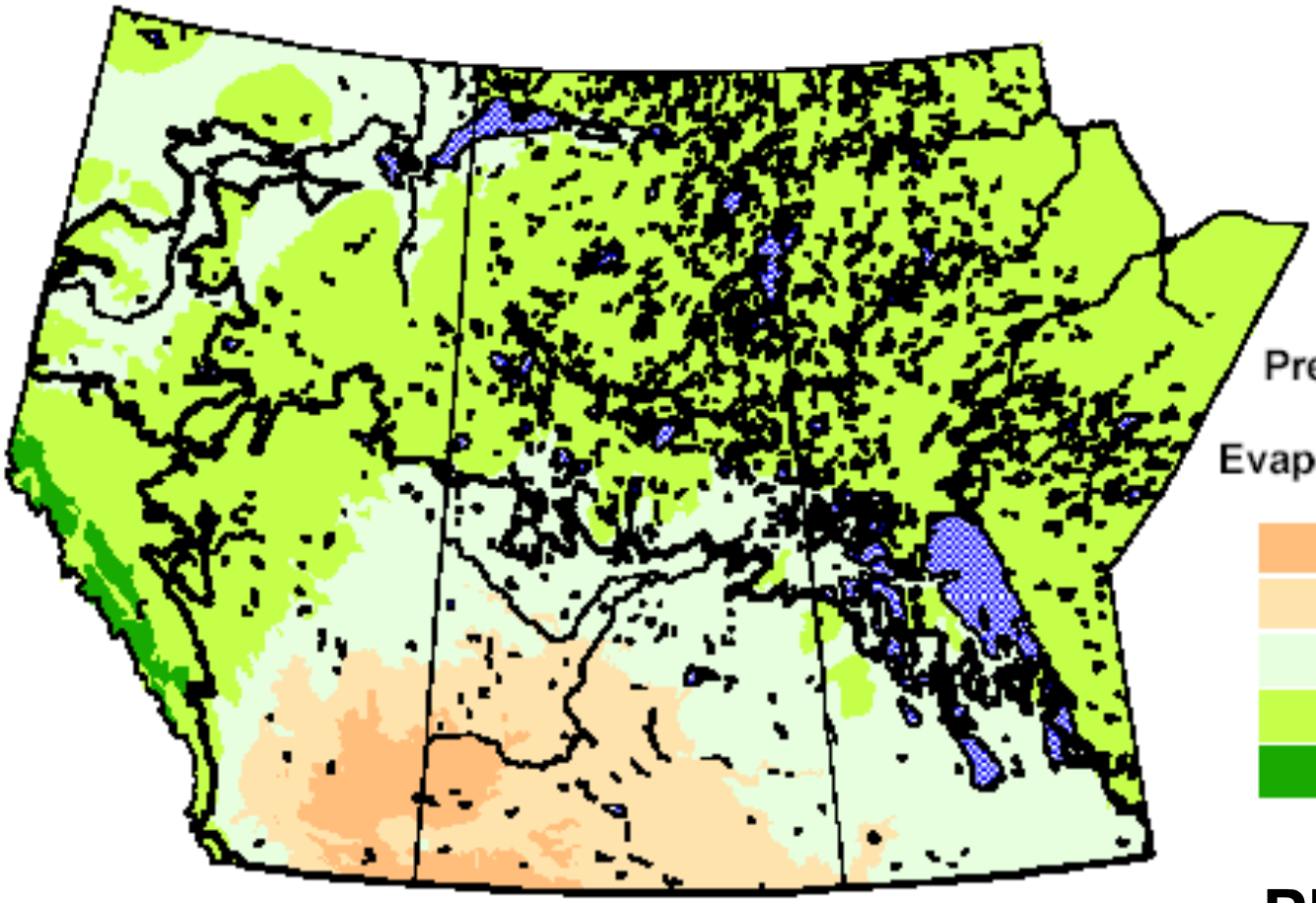
Hydrology: increased variability, earlier peak flows


0
-5
-10
-15
-20
-25
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
Mean February Temperature
1885-1999, 49.8 N, 108.4 W


Mean March Temperature
1885-1999, 49.8 N, 108.4 W
4
0
-4
-8
-12
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000

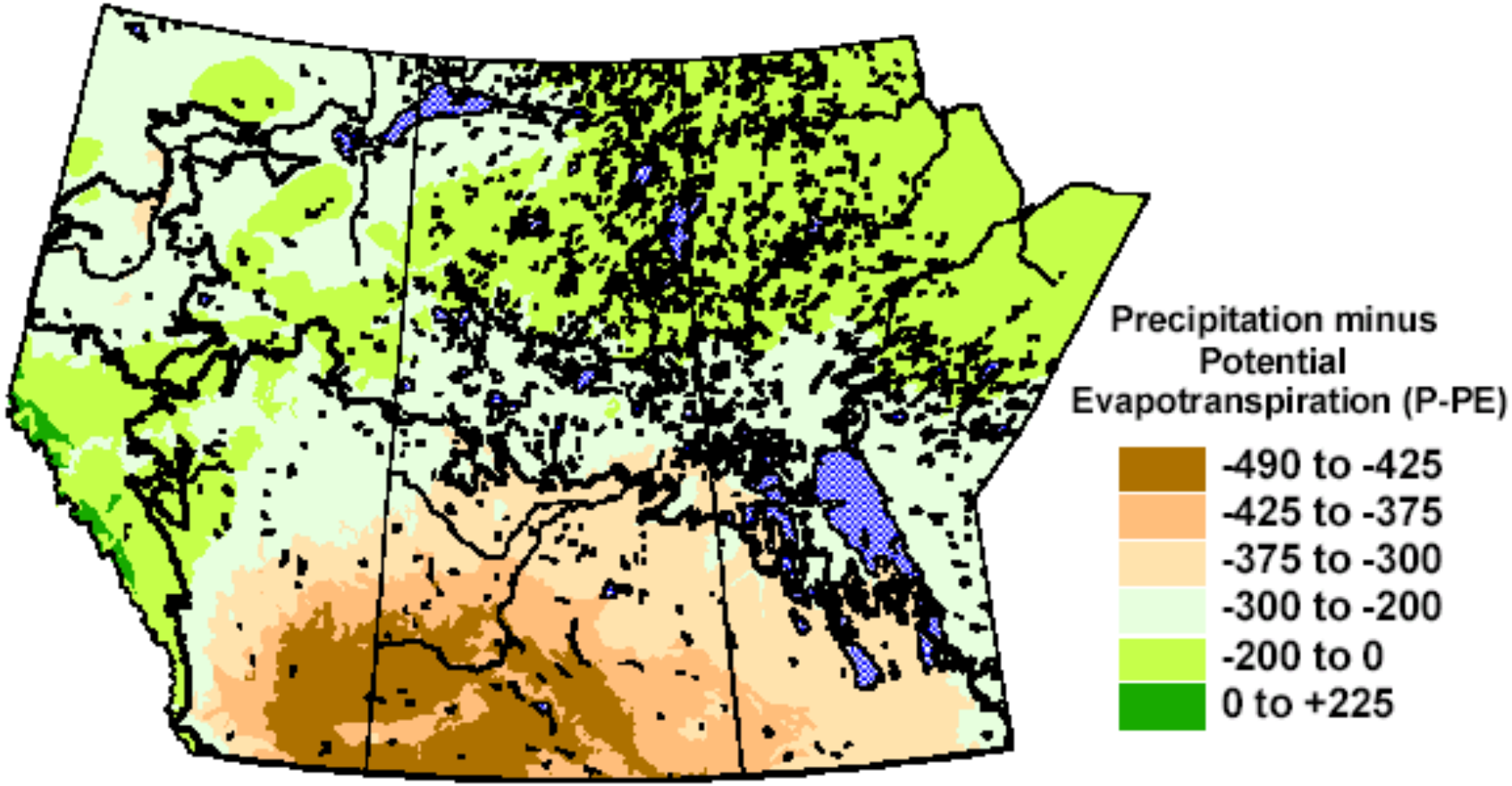

Total Annual Precipitation (mm)
Maple Creek, 1924-2001
500
400
300
200
1920
1940
1960
1980
2000

Moisture Deficit (P-PE) (1961-90)



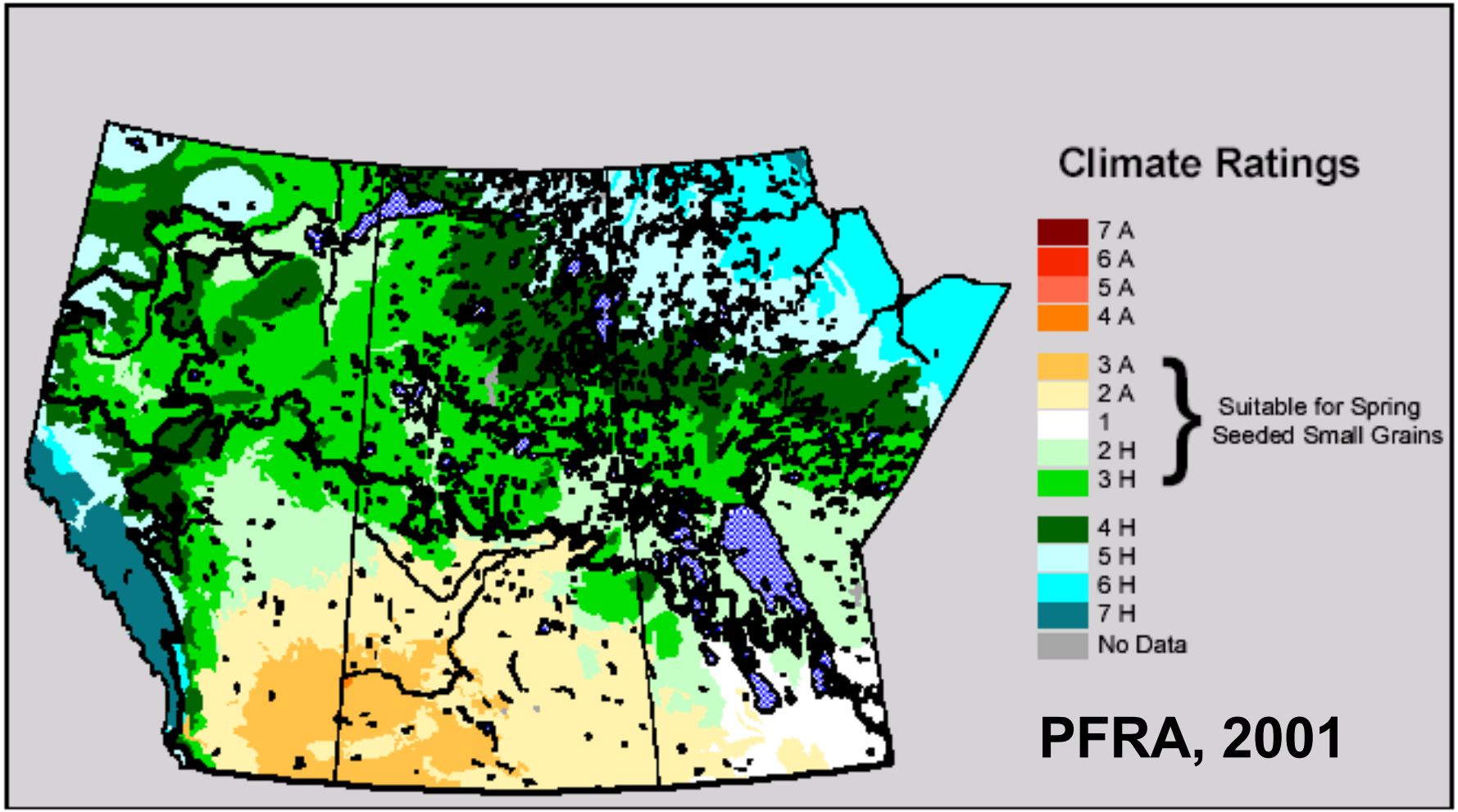
PFRA, 2001

Moisture Deficit (P-PE) (2040-69)



PFRA, 2001

Land Suitability Rating System (LSRS)
Climate Classification (1961-90)



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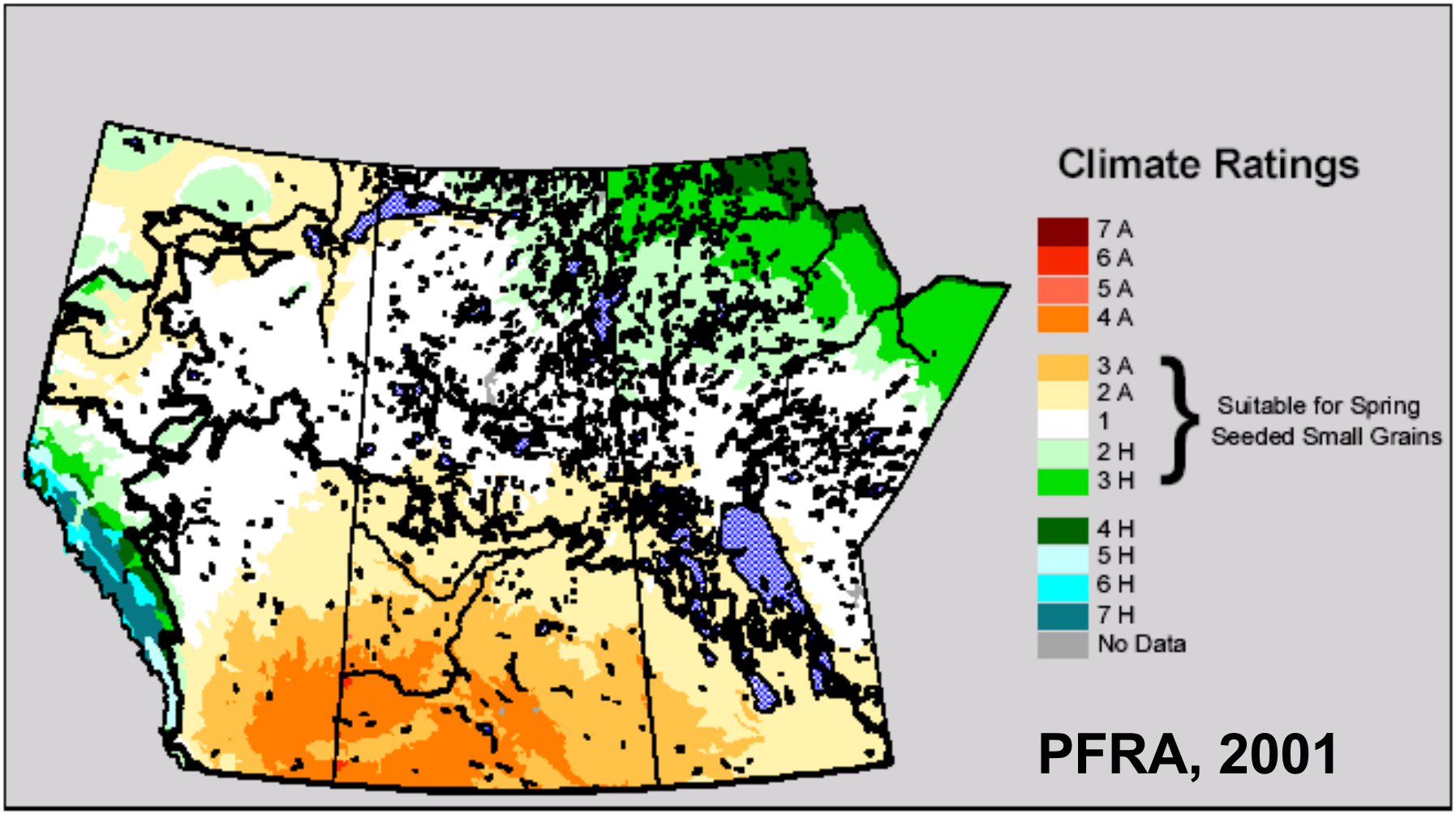
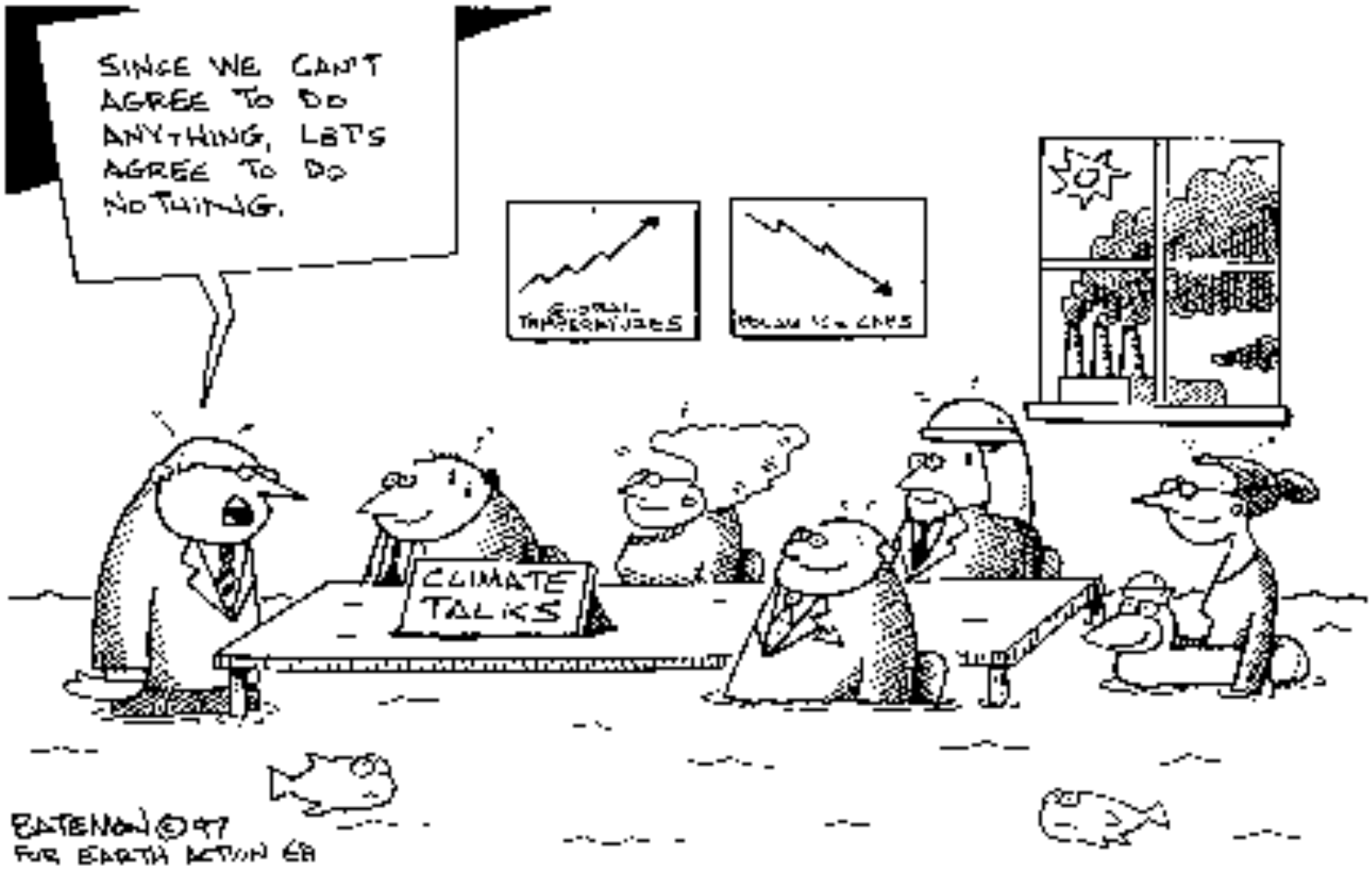
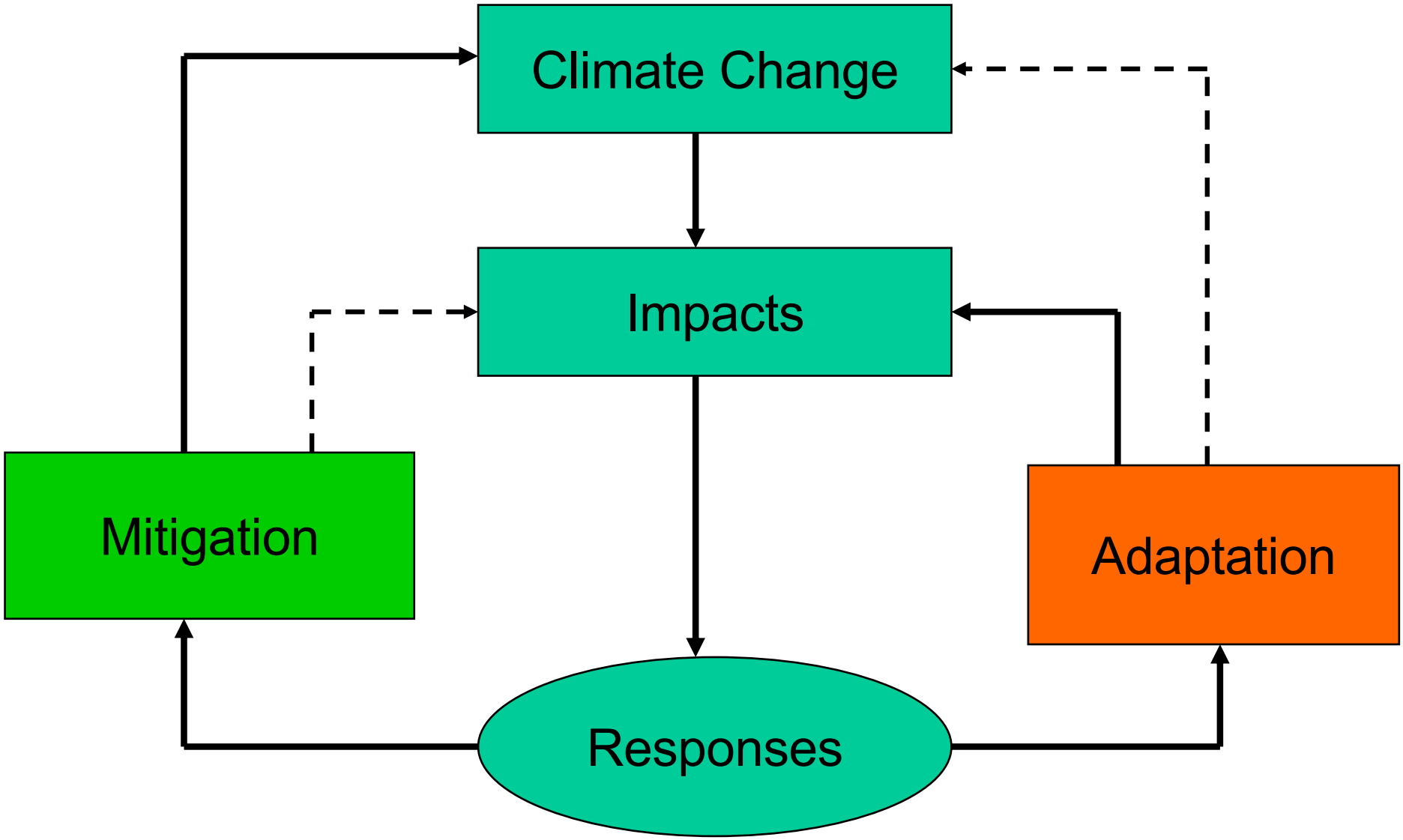


What can we do?



Addressing Climate Change:
Mitigation and Adaptation

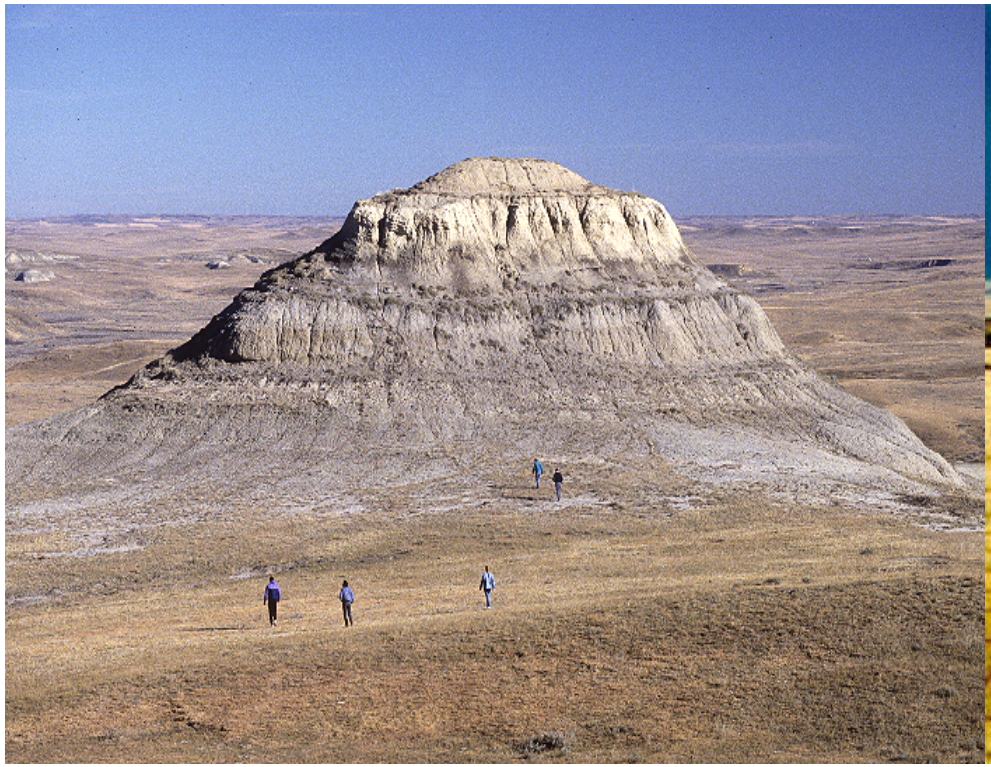


PRAIRIE ADAPTATION RESEARCH COLLABORATIVE

www.parc.ca

The Prairie Adaptation Research Collaborative is a facilitative, interdisciplinary research network established to understand the potential impacts of climate change on the Canadian Prairie Provinces and conduct research necessary to develop appropriate adaptation strategies.

The Canadian Plains



Natural and socio-economic systems are sensitive to climatic variability, climatic change and extreme hydroclimatic events

ADAPTATION:

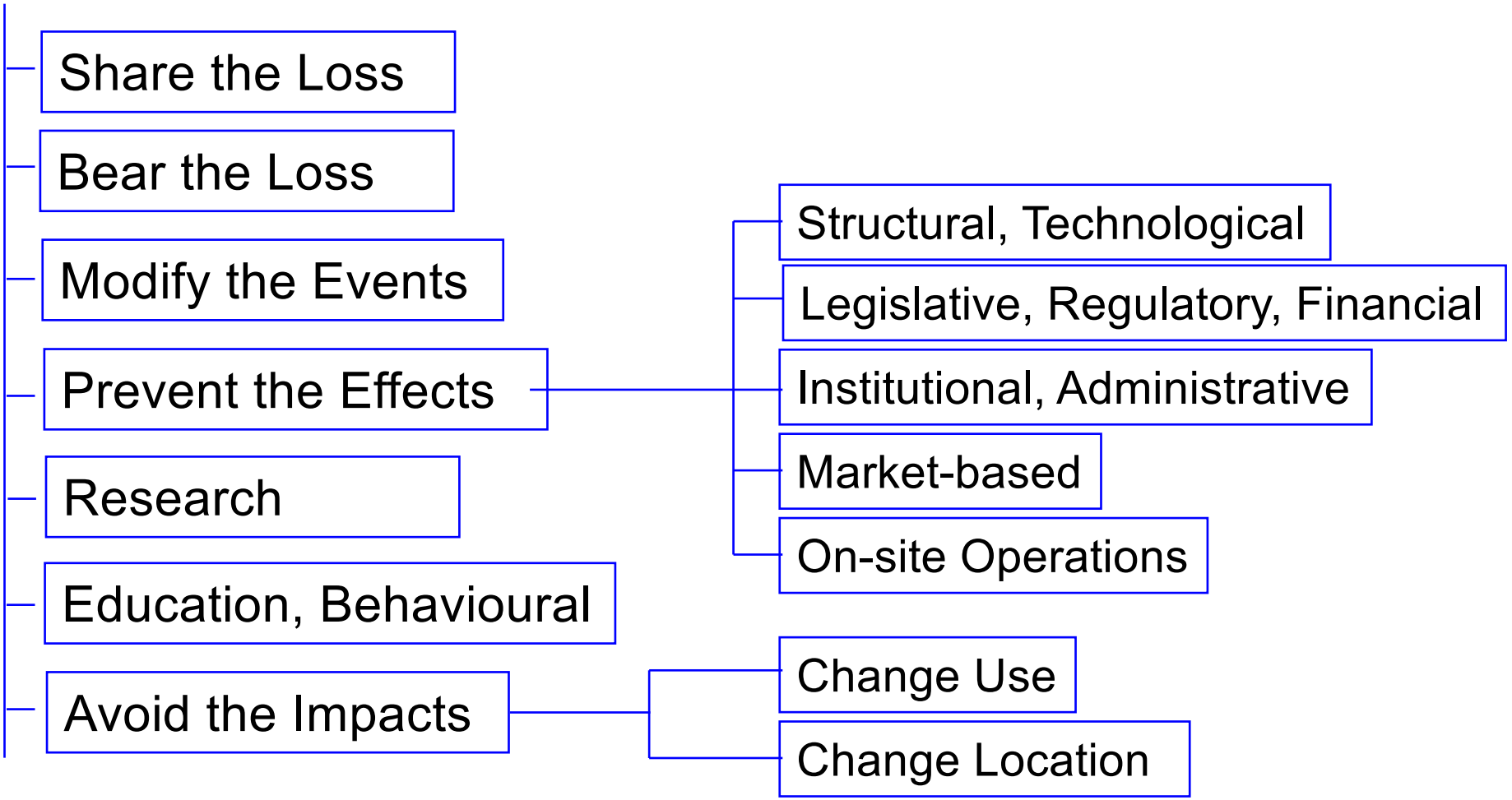
- Degree to which adjustments are possible in practices, processes, or structures of systems to projected or actual changes of climate

- Adaptation can be spontaneous or planned and can be carried out in response to, or in anticipation of changes in conditions

- Represents a practical means of accommodating current climatic variability and extreme events, as well as adjusting to longer term climatic change

- Estimated that Canada spends $11 billion responding to current climatic variability

Adaptation Options



Adaptation to Climatic Variability

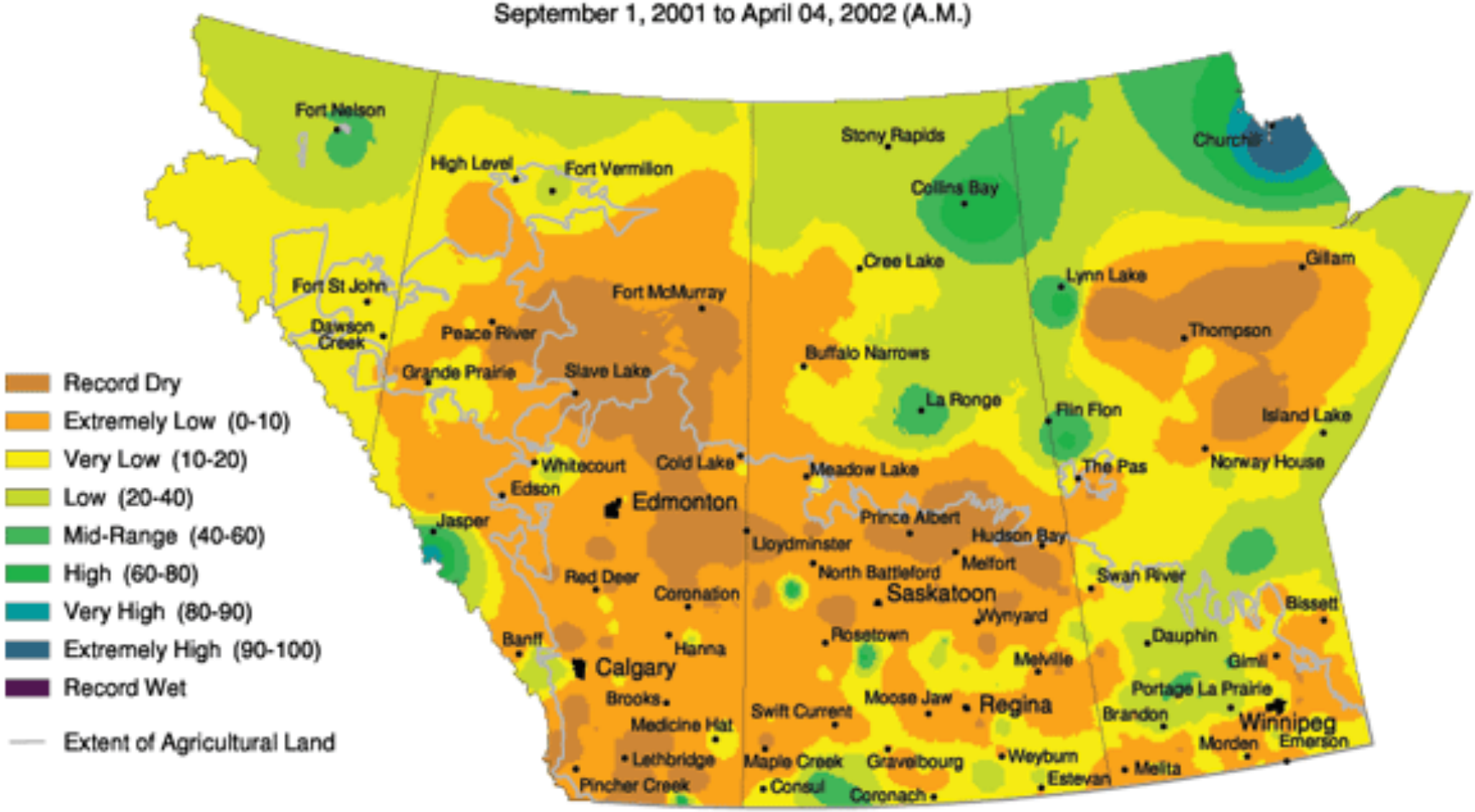
A projected increase in climate variability, including more frequent drought and major hydroclimatic events, is the most ominous climate change scenario. It is a more formidable and complex challenge than the adaptation of practices, processes and infrastructure to long-term climate trends. More extreme climate anomalies are more likely to exceed natural and engineering thresholds beyond which the impacts of climate are much more severe.

Drought Watch

on the Prairies

Precipitation Percentiles

September 1, 2001 to April 04, 2002 (A.M.)



Prepared by PFRA (Prairie Farm Rehabilitation Administration) using data from the Timely Monitoring Network and the many federal and provincial agencies and volunteers that support it.

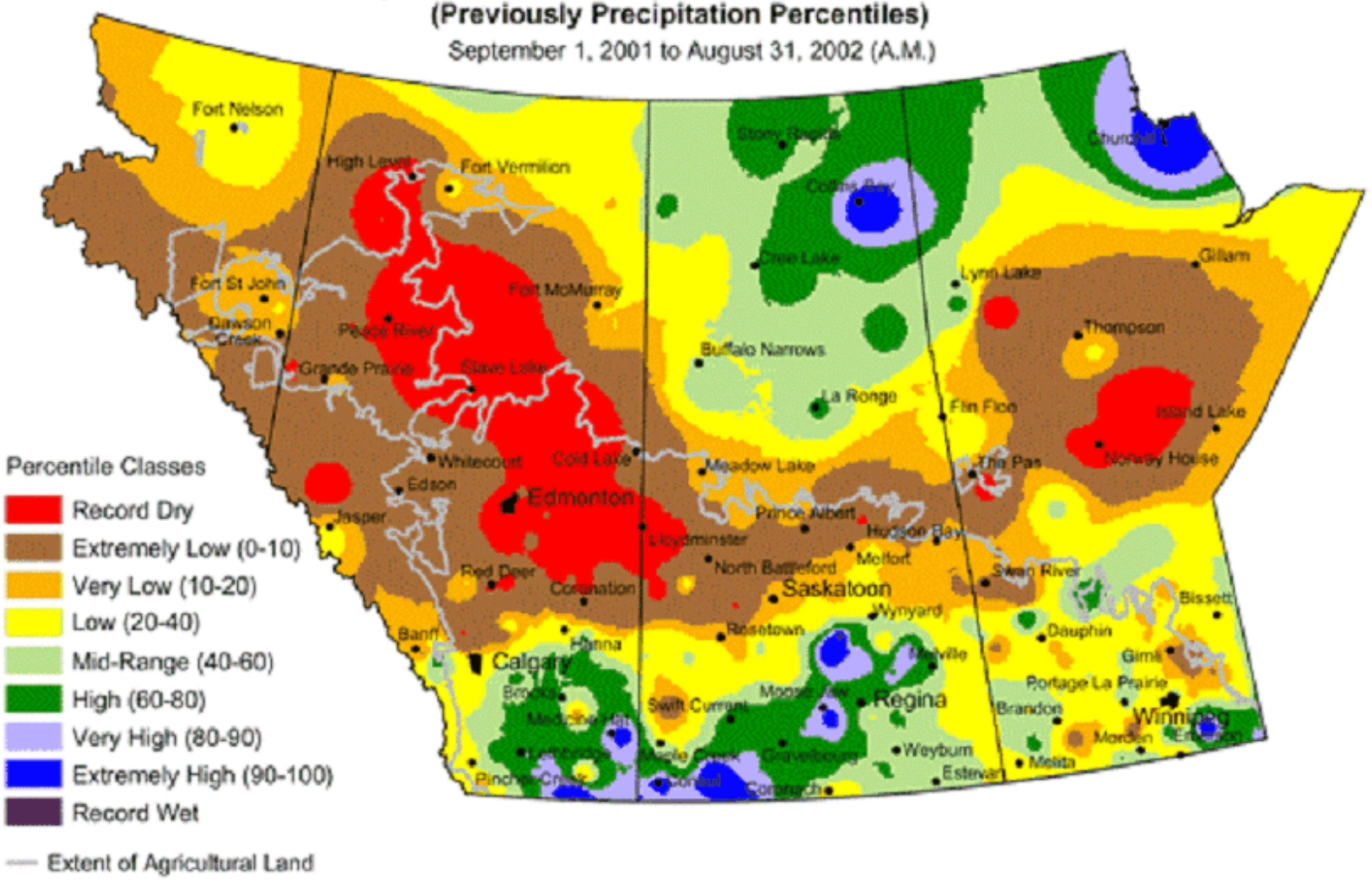

Near Outlook, Saskatchewan, May 2, 2002


Dust, Regina, May 22, 2002

Current Precipitation Compared to Historical Distribution

(Previously Precipitation Percentiles)

September 1, 2001 to August 31, 2002 (A.M.)



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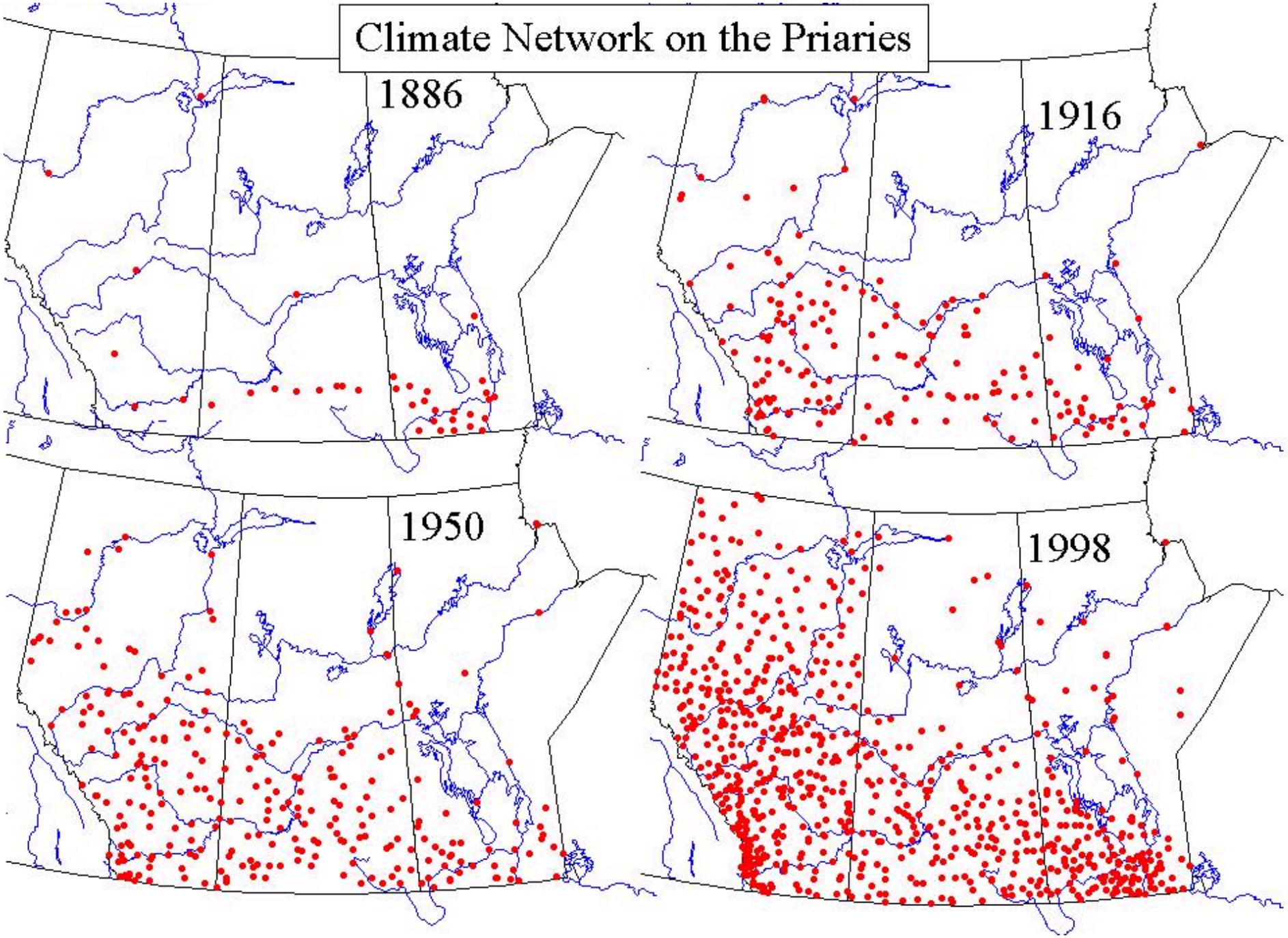
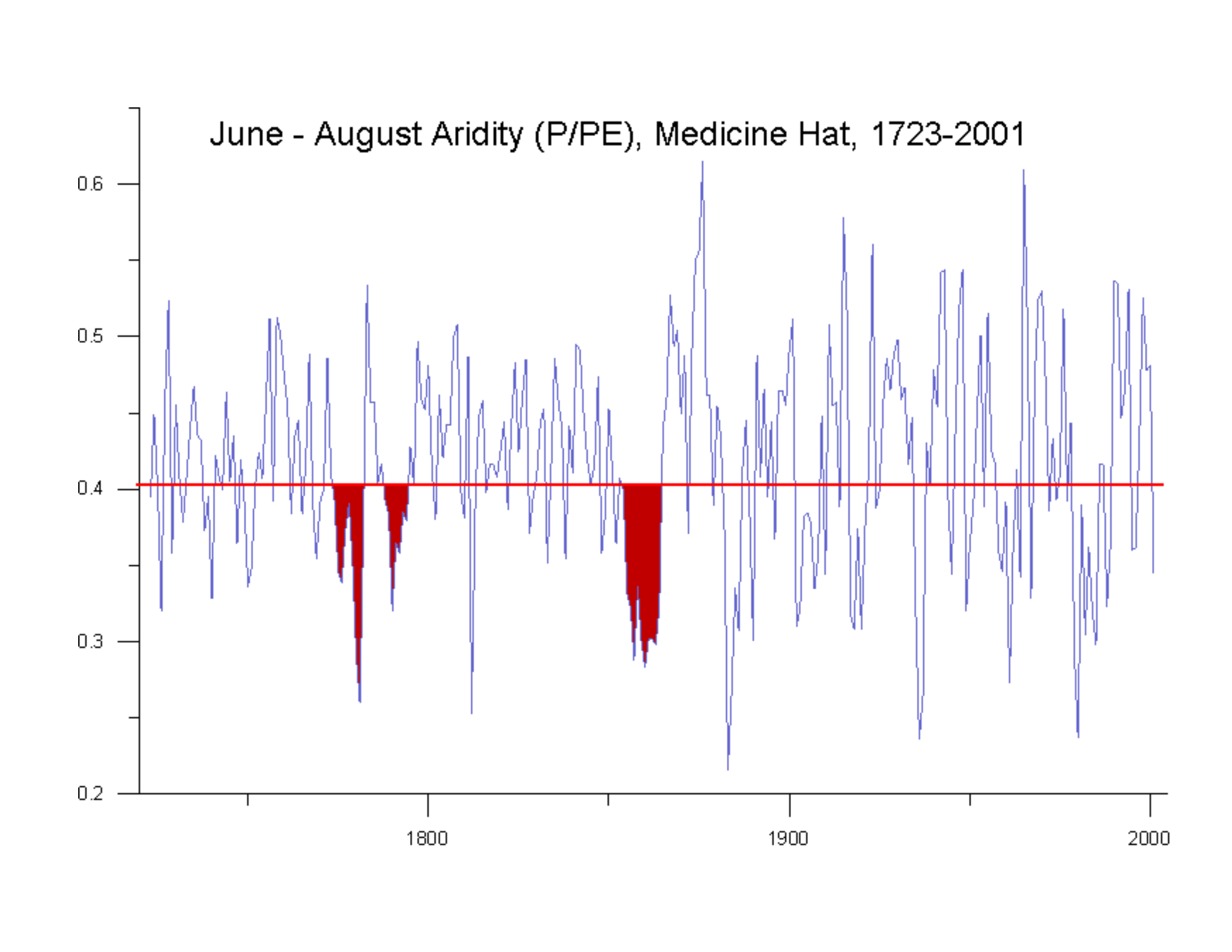


Ron Hopkinson, MSC


WESTCOTT® Flexible Stainless Steel Ruler
MADE IN U.S.A.

Battle Creek valley, West Block, Cypress Hills


June - August Aridity (P/PE), Medicine Hat, 1723-2001
0.6
0.5
0.4
0.3
0.2
1800
1900
2000

Fort Edmonton – HBC Archives

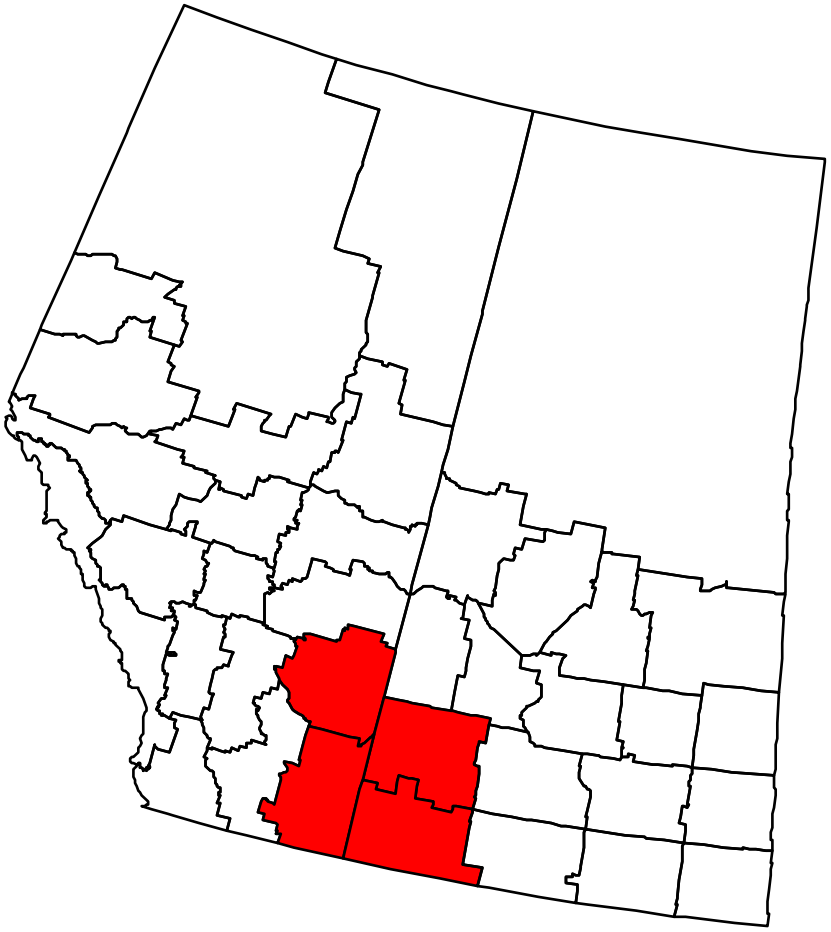
At Edmonton House, a large fire burned "all around us" on April 27th (1796) and burned on both sides of the river. On May 7th, light canoes arrived at from Buckingham House damaged from the shallow water. Timber intended to be used at Edmonton House could not be sent to the post "for want of water" in the North Saskatchewan River. On May 2nd, William Tomison wrote to James Swain that furs could not be moved as, "there being no water in the river." (Johnson 1967: 33-39, 57)

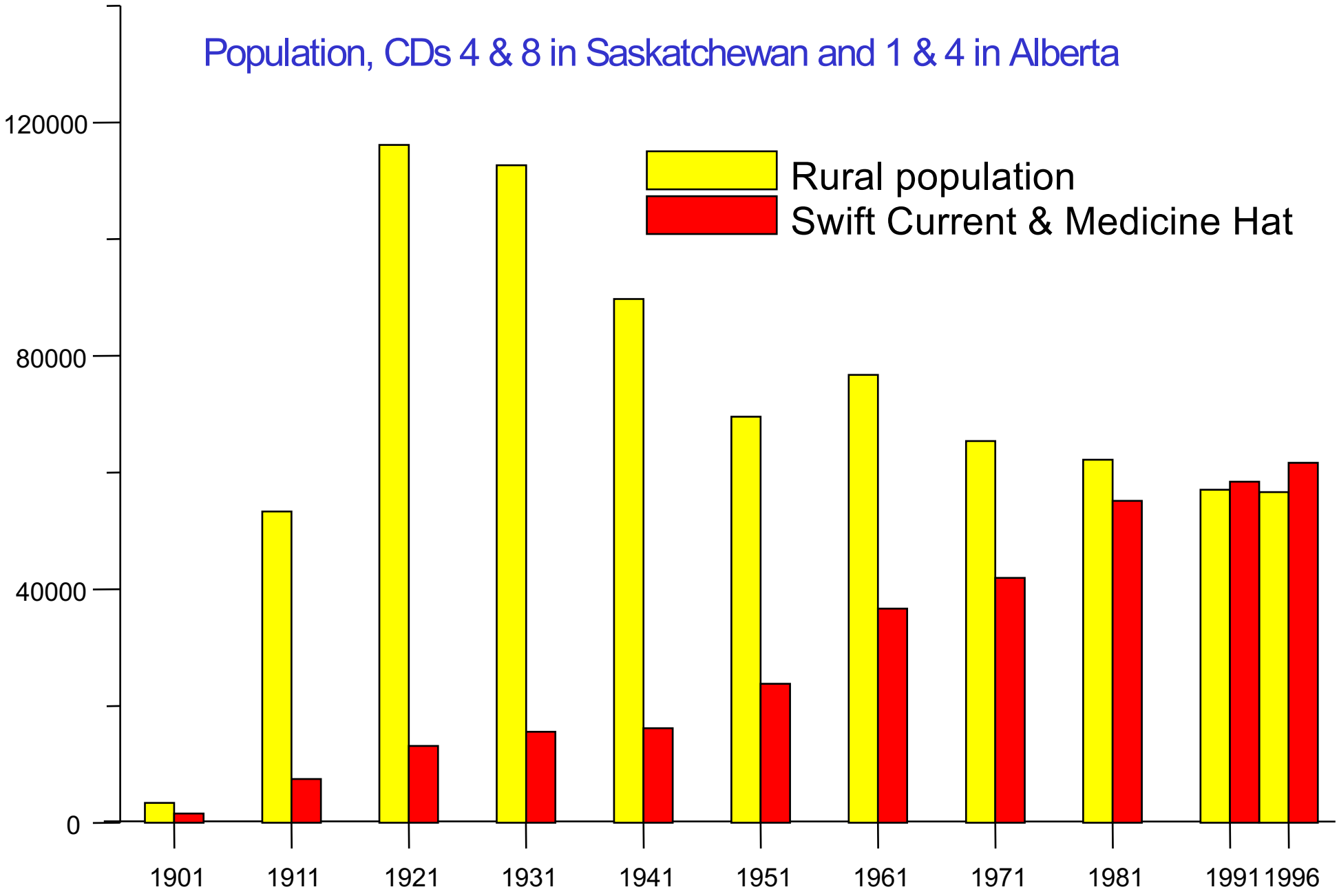
In 1800 "Fine weather" continued into April at Edmonton House. On April 18th, James Bird repeated his observation that the poor trade with both the Slave and Southern Indians was the result of "the amazing warmness of the winter" diminishing both the bison hunt and creating a "want of beaver." Bird reported "clear weather except for the smoke which almost obscures the sun. The country all round is on fire." On June 15th, he noted that the "amazing shallowness of the water" prevented the shipment of considerable goods from York Factory (Johnson 1967: 240-248)

This large belt of country embraces districts, some of which are valuable for the purposes of the agriculturalist, while others will for ever be comparatively useless. ... The least valuable portion of the prairie country has an extent of about 80,000 square miles, and is that lying along the southern branch of the Saskatchewan, and southward from thence to the boundary line, ...

CAPT^{N}. JOHN PALLISER,
London, July 8, 1860

Census Divisions 1 & 4 in Alberta and 4 & 8 in Saskatchewan




Population, CDs 4 & 8 in Saskatchewan and 1 & 4 in Alberta
120000
80000
40000
0
Rural population
Swift Current & Medicine Hat
1901
1911
1921
1931
1941
1951
1961
1971
1981
1991
1996

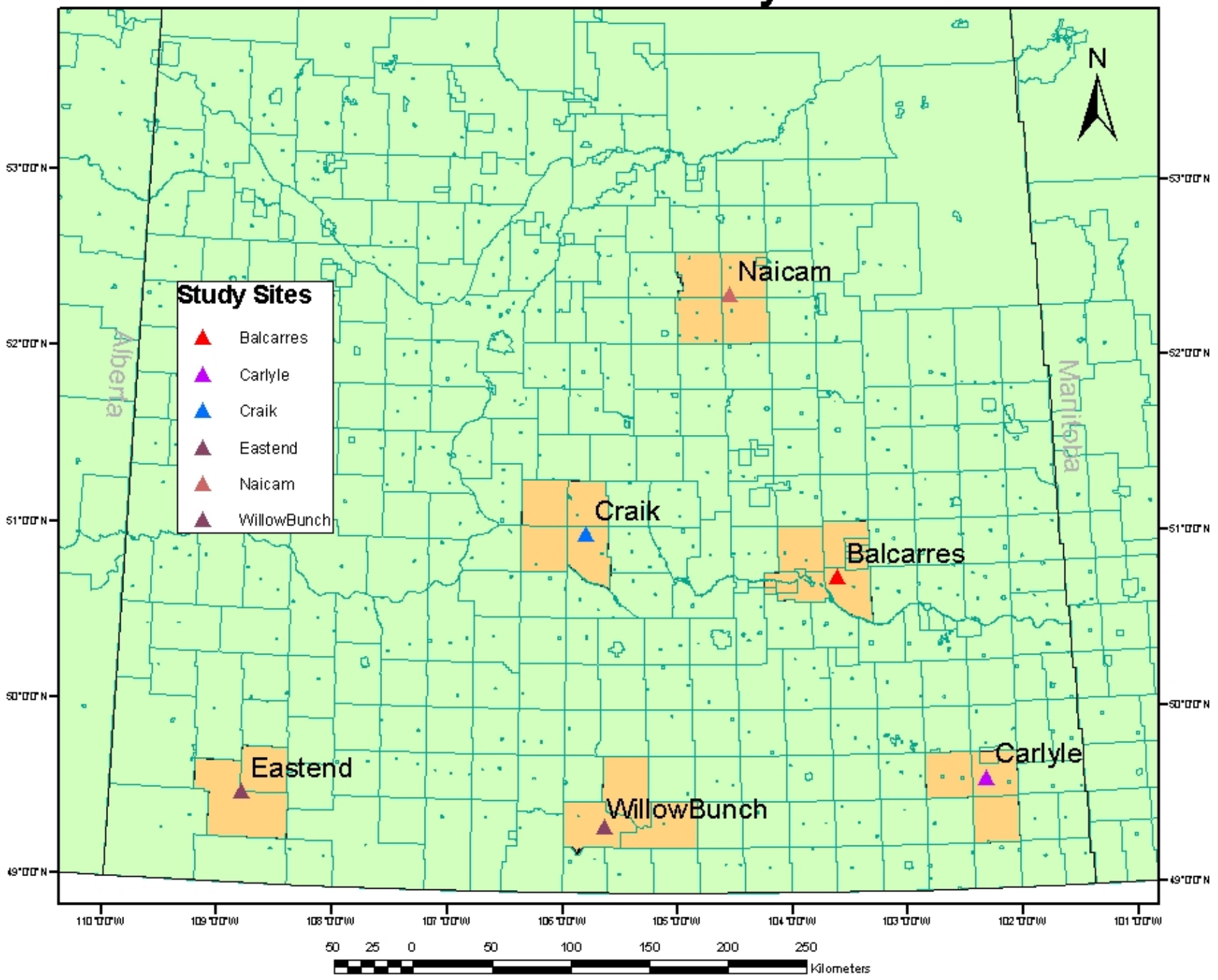
Agriculture
Drought Risk Management Plan
for Alberta

STRATEGIC PLAN

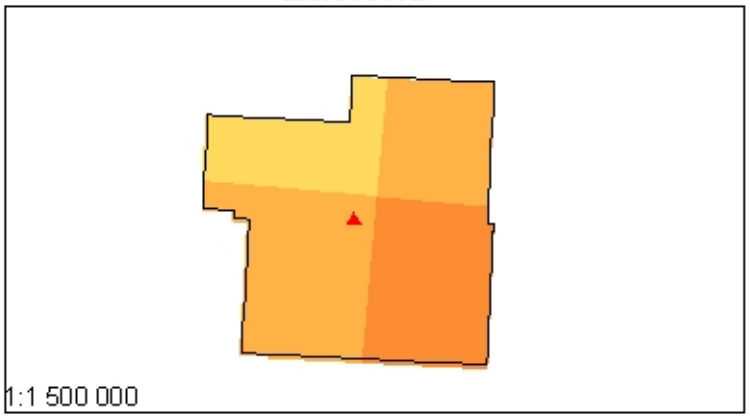
Agriculture Drought Risk Management Plan for Alberta

Ad hoc responses to an existing drought crisis may lead to untimely and costly short-term solutions. In contrast, a risk management approach to drought allows an immediate, effective response during a drought crisis, and also reduces drought impacts over the long term through planning and preparedness.

Social Cohesion Project RMs



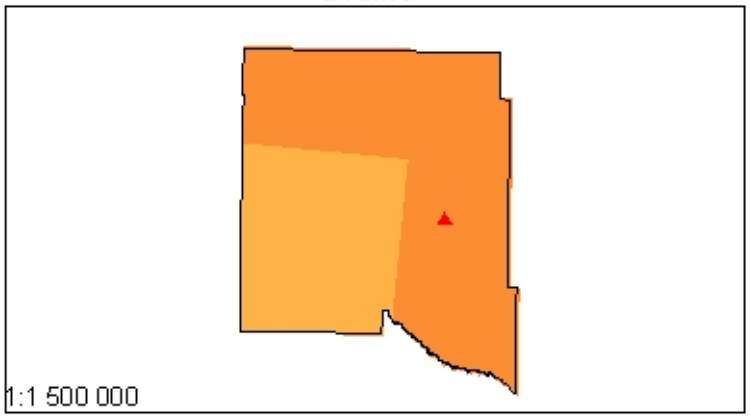
Eastend



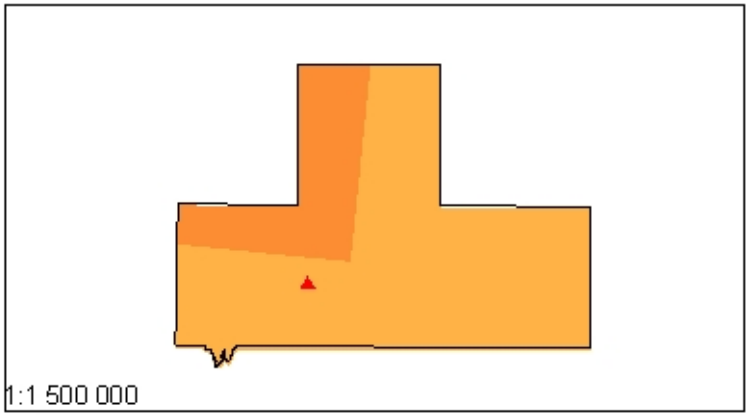
P / P E
1961 - 1990

(Thornthwaite Method)

Craik



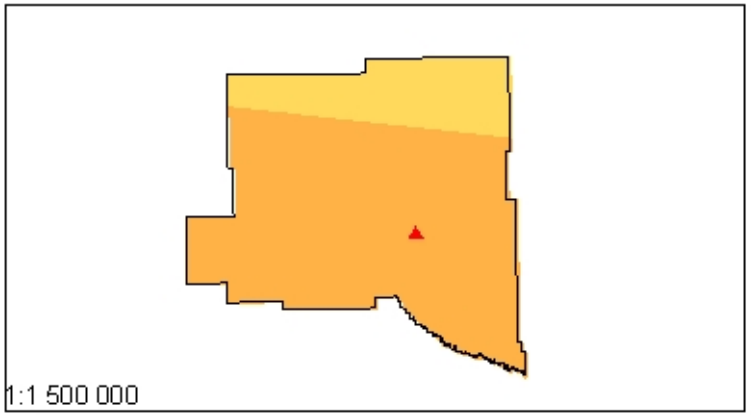
Willowbunch



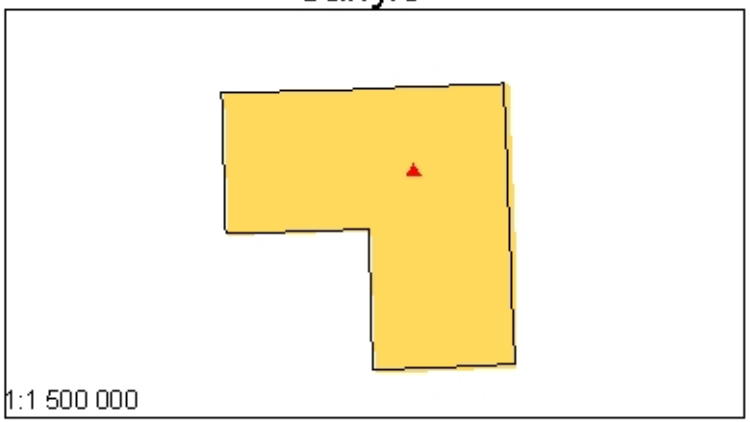
Aridity Index (AI)

- 0 - 0.05
- 0.05 - 0.2
- 0.20 - 0.5
- 0.50 - 0.65
- 0.65 - 0.75
- 0.75 - 0.85
- 0.85 - 1.0

Balcarres

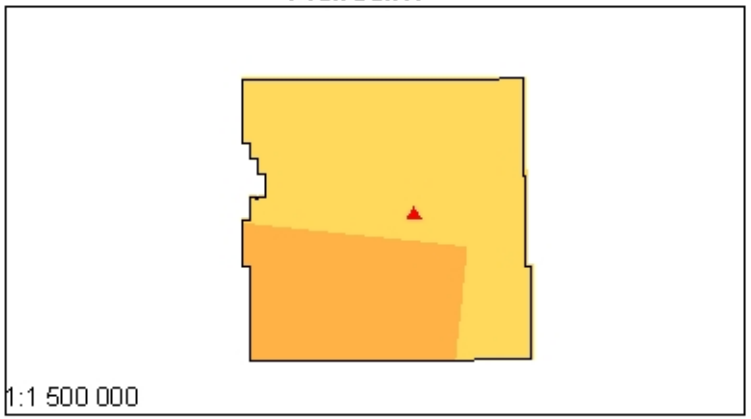


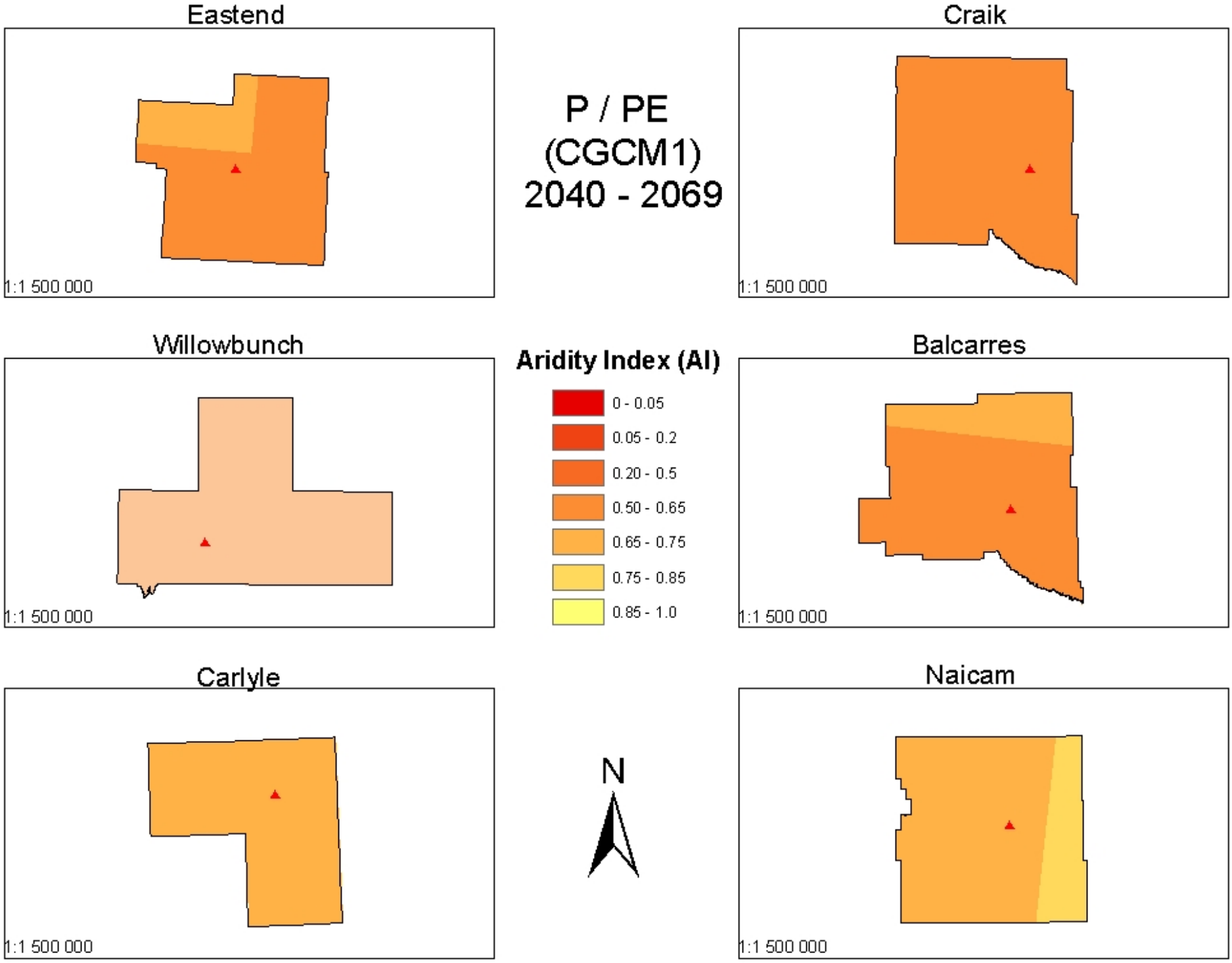
Carlyle



N

Naicam




Eastend
1:1 500 000
P / PE
(CGCM1)
2040 - 2069
Craik
1:1 500 000
Willowbunch
1:1 500 000
Aridity Index (AI)
0 - 0.05
0.05 - 0.2
0.20 - 0.5
0.50 - 0.65
0.65 - 0.75
0.75 - 0.85
0.85 - 1.0
Balcarres
1:1 500 000
Carlyle
1:1 500 000
N
Naicam
1:1 500 000

Social Cohesion Survey

B1 Seriousness of Climate Change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Serious	209	43.3	45.2	45.2
	Somewhat Serious	205	42.4	44.4	89.6
	Not at all Serious	48	9.9	10.4	100.0
	Total	462	95.7	100.0	
Missing	Don't know	19	3.9		
	Refusal	2	.4		
	Total	21	4.3		
Total		483	100.0		

B2 Doing Anything to Adjust to Climate Change?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Doing Nothing About it Yet	221	45.8	46.2	46.2
	Following Climate Change Issues	161	33.3	33.7	79.9
	Doing Something More Active	96	19.9	20.1	100.0
	Total	478	99.0	100.0	
Missing	Don't Know	1	.2		
	No Response	4	.8		
	Total	5	1.0		
Total		483	100.0		

B3.1 Attempting to Produce Less Greenhouse Gasses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	35	7.2	36.5	36.5
	No	61	12.6	63.5	100.0
	Total	96	19.9	100.0	
Missing	System Missing	387	80.1		
	Total	387	80.1		
Total		483	100.0		

B3.3 Modifying Farm/Business Management Reduce Vulnerability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	47	9.7	49.0	49.0
	No	49	10.1	51.0	100.0
	Total	96	19.9	100.0	
Missing	System Missing	387	80.1		
	Total	387	80.1		
Total		483	100.0		

B1 Seriousness of Climate Change: Own Farm and/or Business? Crosstabulation

			D3 Own Farm and/or Business?				
			1 Yes, Own a Farm	2 Yes, Own a Business	3 Yes, Own a Farm & Business	4 No	Total
B1 Seriousness of Climate Change	Very Serious	Count	78	20	12	99	209
		% within D3 Own Farm and/or Business?	**46.7%**	**34.5%**	24.5%	52.7%	45.2%
	Somewhat Serious	Count	71	33	30	71	205
		% within D3 Own Farm and/or Business?	42.5%	56.9%	61.2%	37.8%	44.4%
	Not at all Serious	Count	18	5	7	18	48
		% within D3 Own Farm and/or Business?	10.8%	8.6%	14.3%	9.6%	10.4%
Total		Count	167	58	49	188	462
		% within D3 Own Farm and/or Business?	100.0%	100.0%	100.0%	100.0%	100.0%

B2 Doing Anything to Adjust to Climate Change? Own Farm and/or Business? Crosstabulation

			D3 Own Farm and/or Business?				
			1 Yes, Own a Farm	2 Yes, Own a Business	3 Yes, Own a Farm & Business	4 No	Total
B2 Doing Anything to Adjust to Climate Change?	Doing Nothing About it Yet	Count	68	35	17	101	221
		% within D3 Own Farm and/or Business?	39.5%	62.5%	34.7%	50.2%	46.2%
	Following Climate Change Issues	Count	54	14	18	75	161
		% within D3 Own Farm and/or Business?	31.4%	25.0%	36.7%	37.3%	33.7%
	Doing Something More Active	Count	50	7	14	25	96
		% within D3 Own Farm and/or Business?	**29.1%**	12.5%	**28.6%**	12.4%	20.1%
Total		Count	172	56	49	201	478
		% within D3 Own Farm and/or Business?	100.0%	100.0%	100.0%	100.0%	100.0%


PIONEER