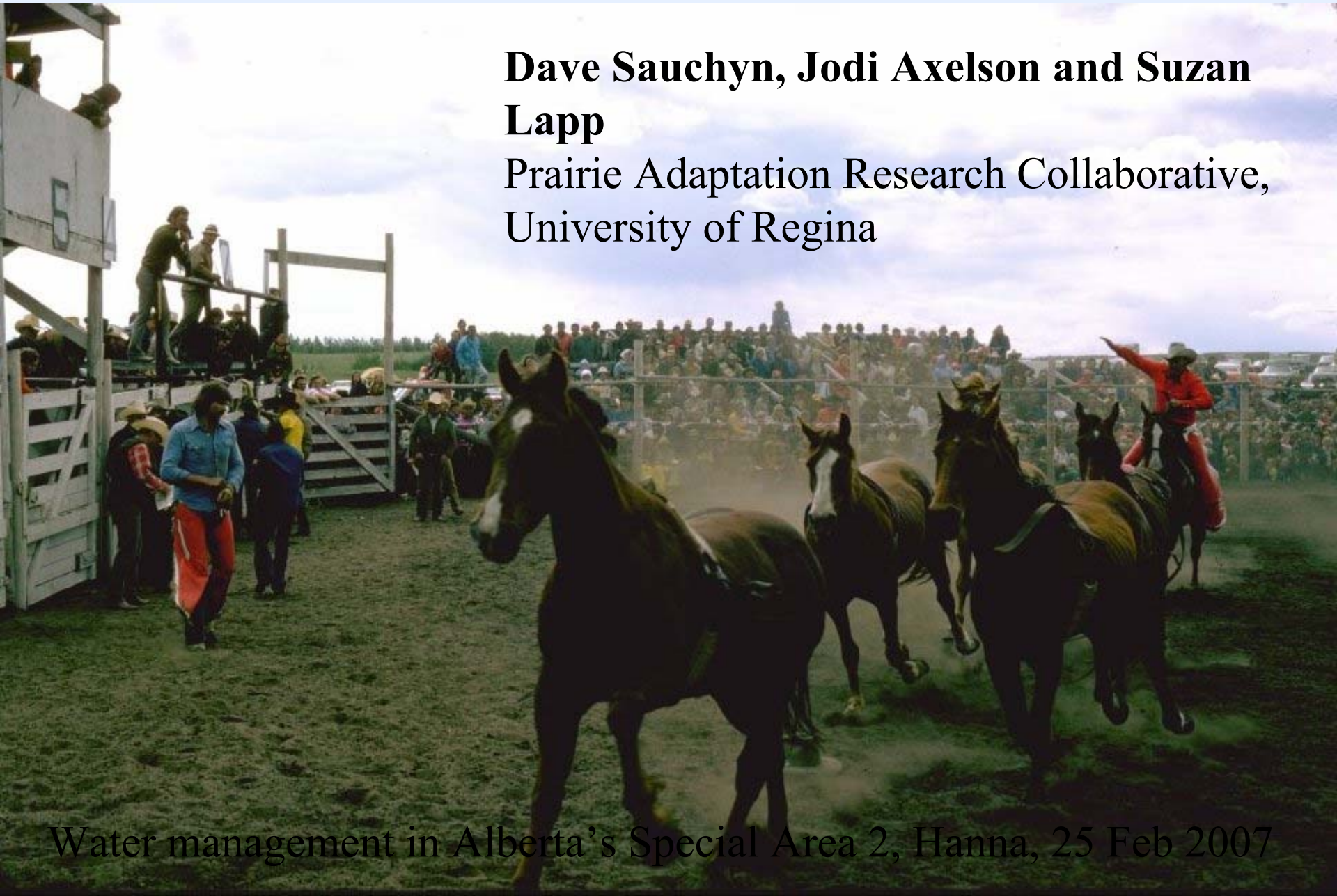


Future Climate and Water Conditions in Central Alberta

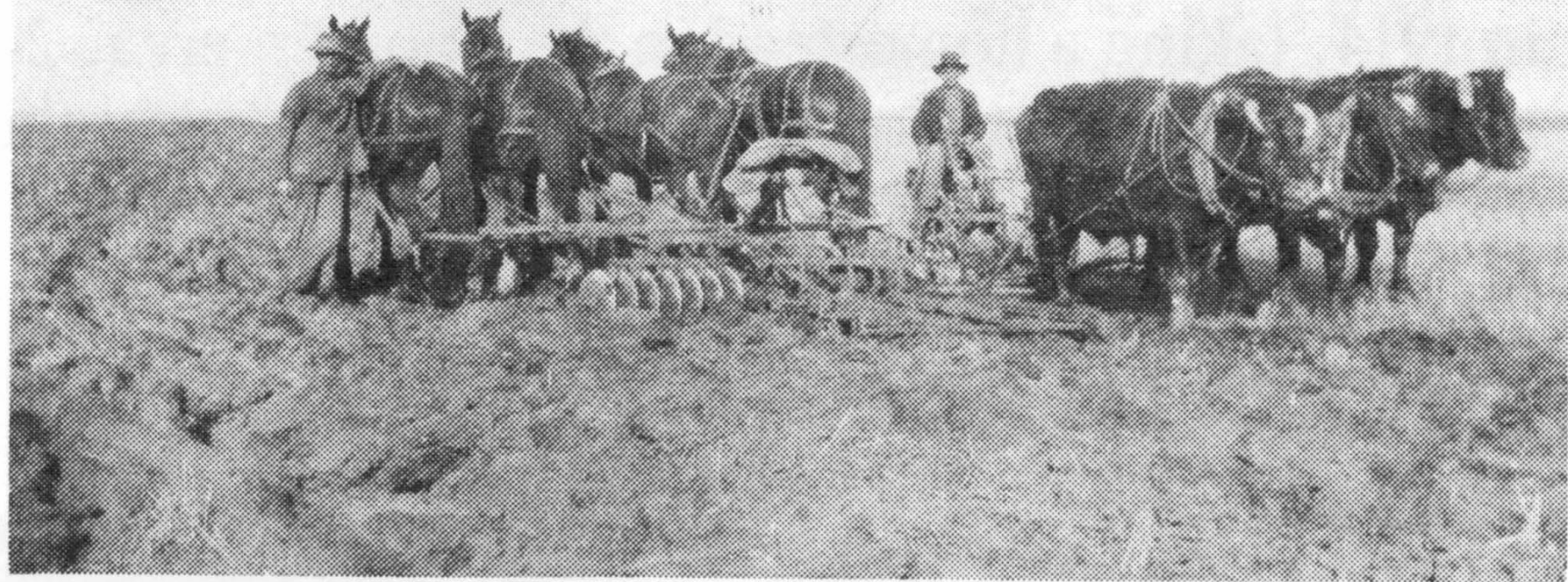
Dave Sauchyn, Jodi Axelson and Suzan Lapp

Prairie Adaptation Research Collaborative,
University of Regina

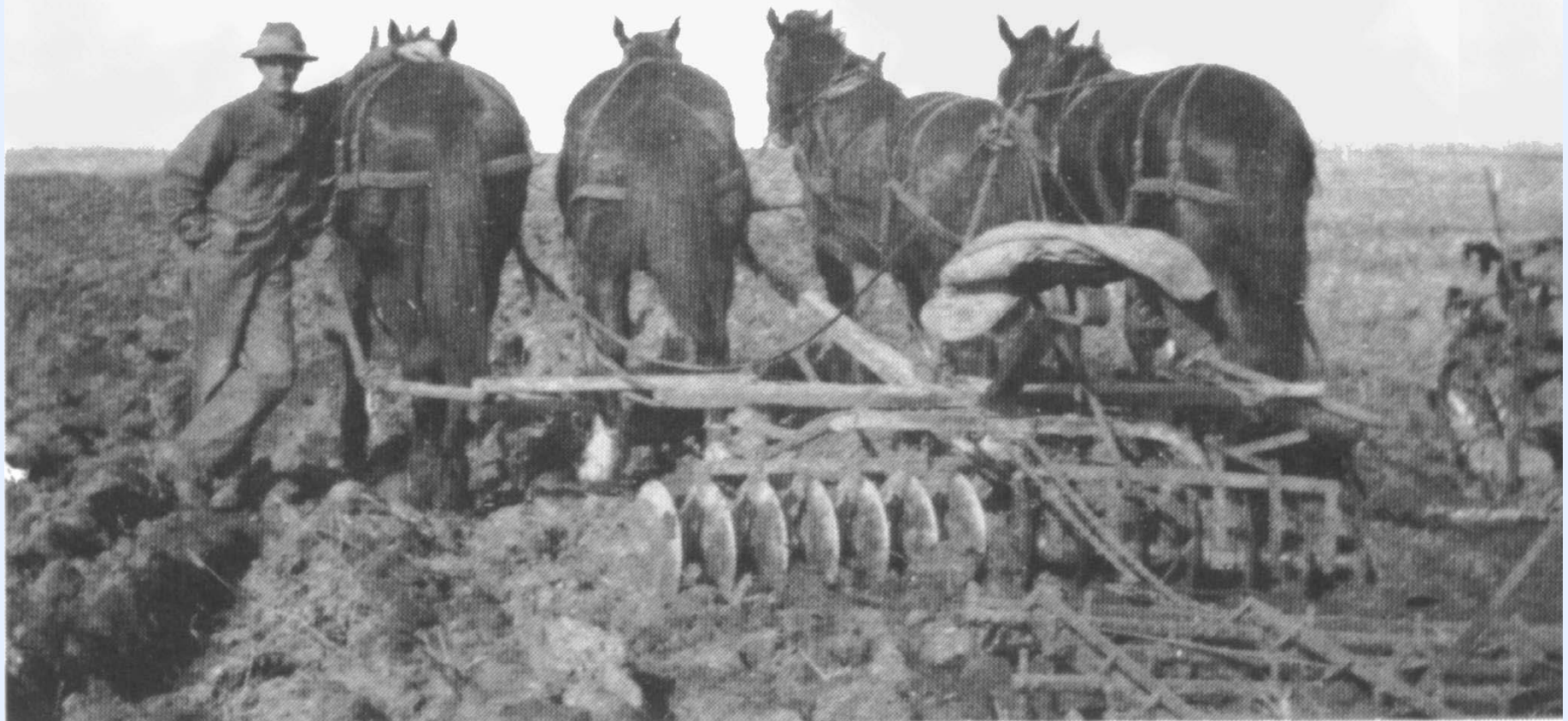


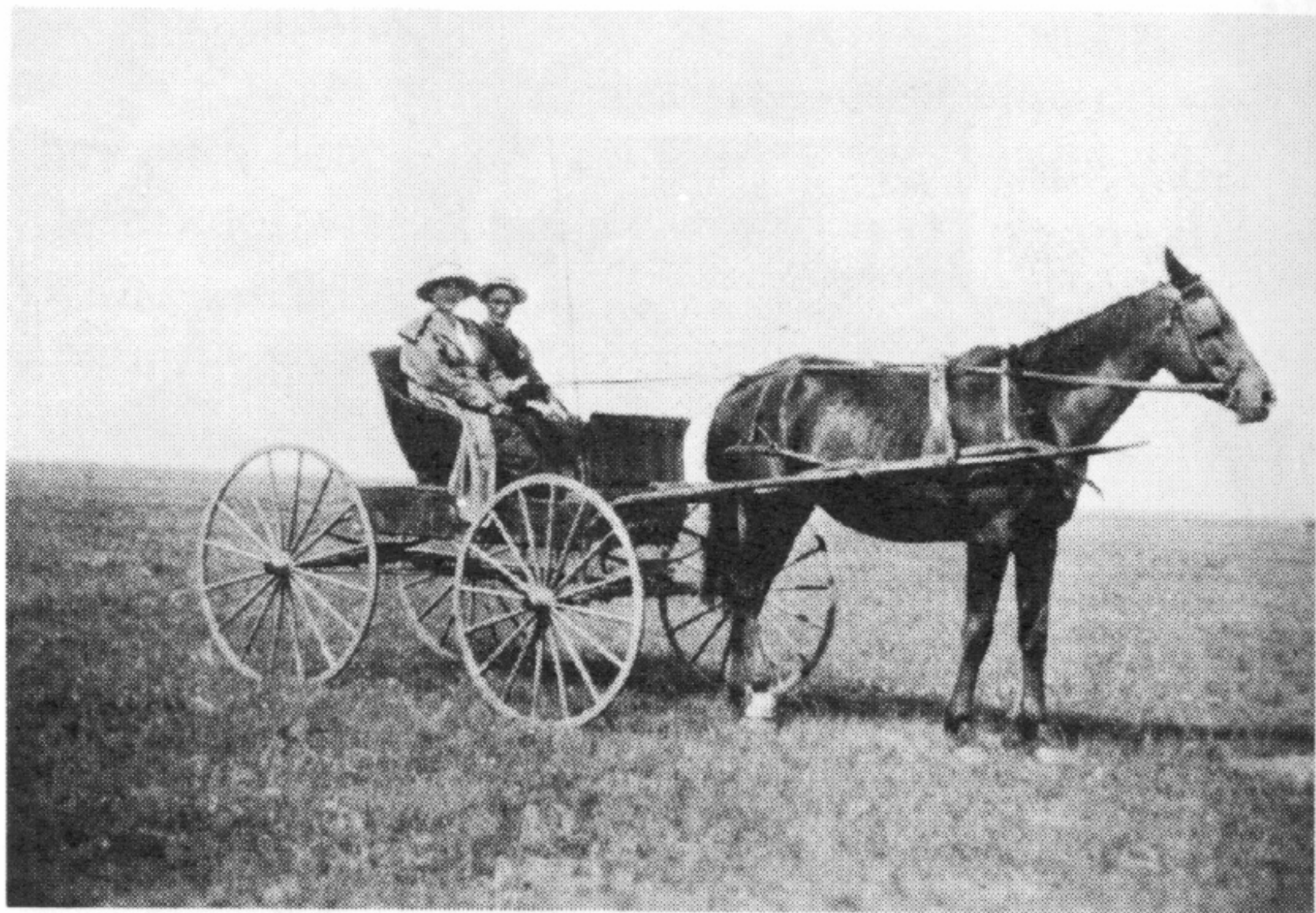
Water management in Alberta's Special Area 2, Hanna, 25 Feb 2007

Geo M and Jas Bebe
Jan 1914



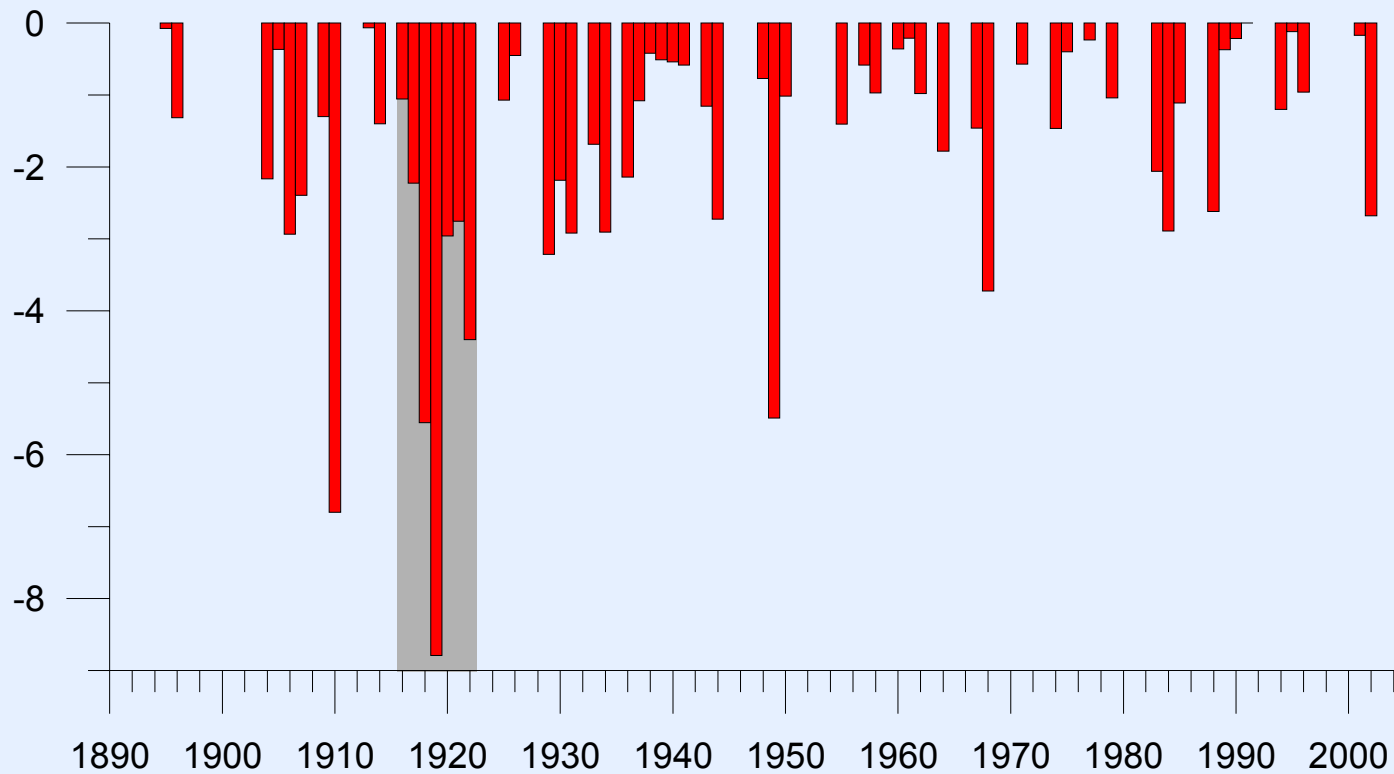
SE 6-33-11-W4, May 1914



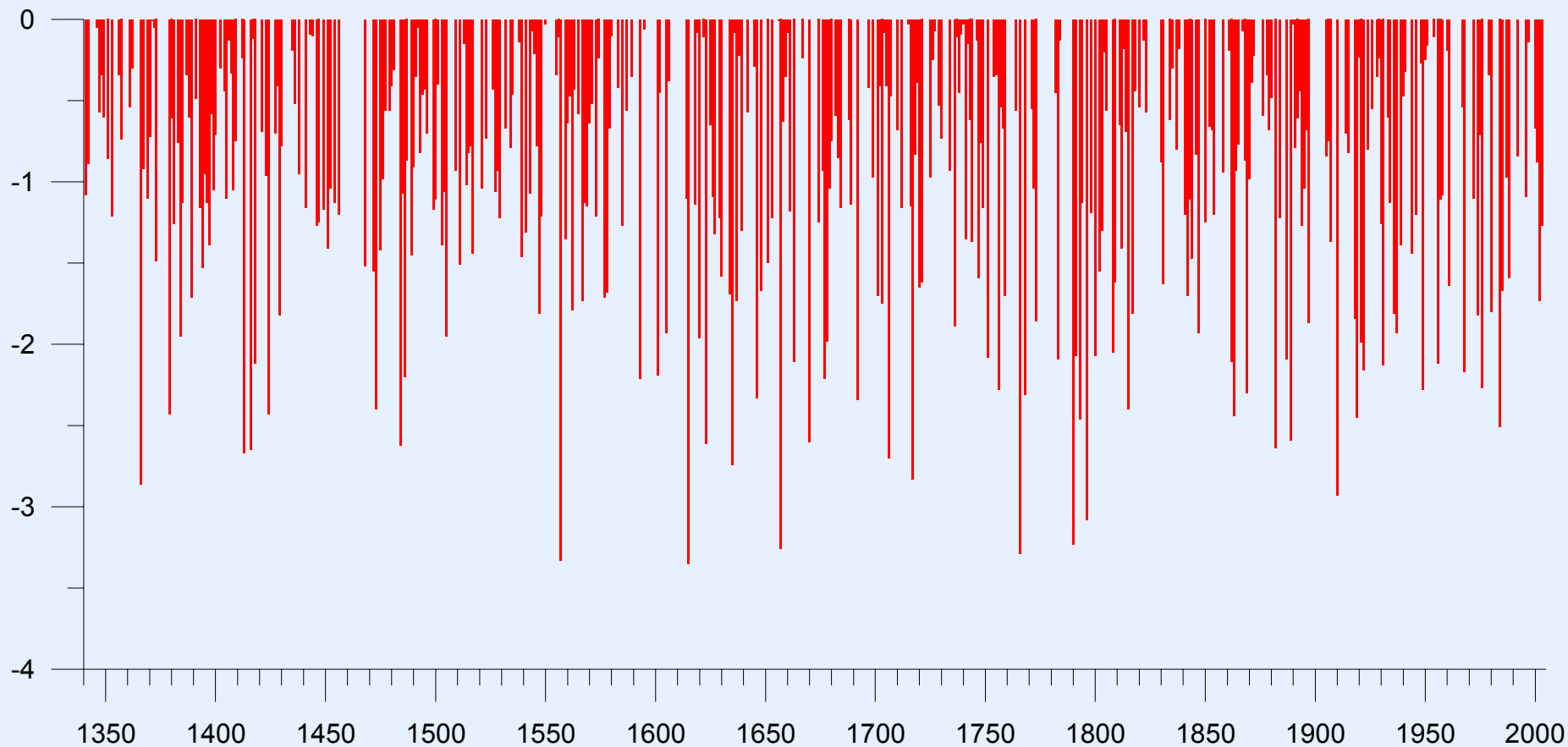


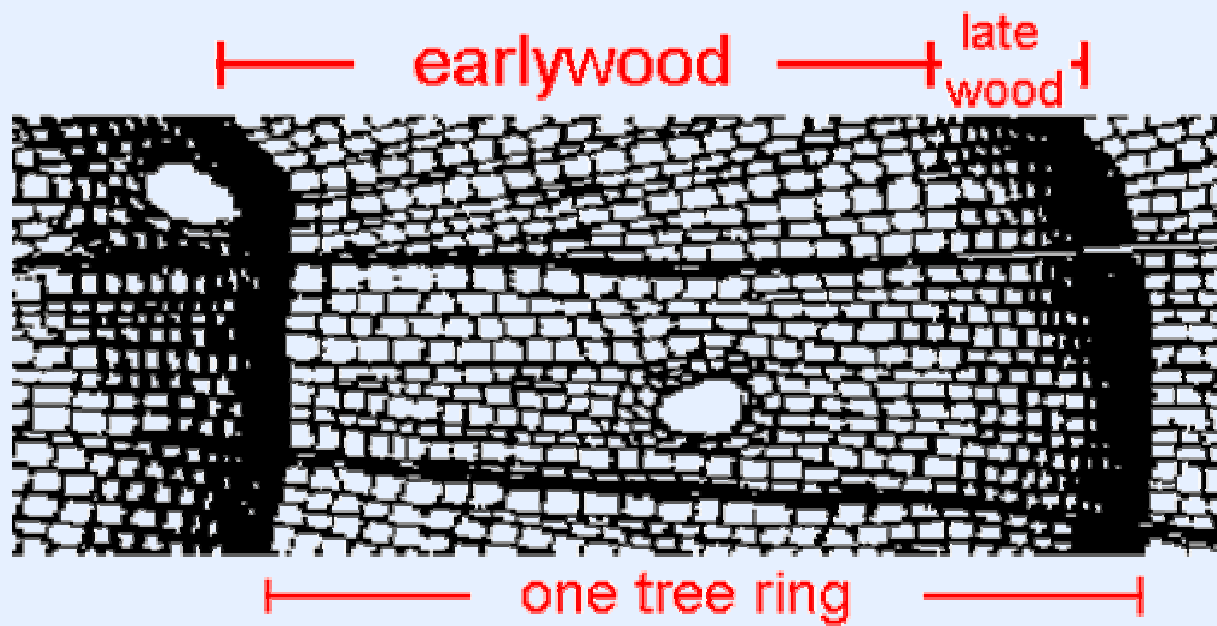
Mr. and Mrs. Guy Bebee Oct. 1919.

Summer (JJA) PDSI < 0, Calgary, 1895-2002



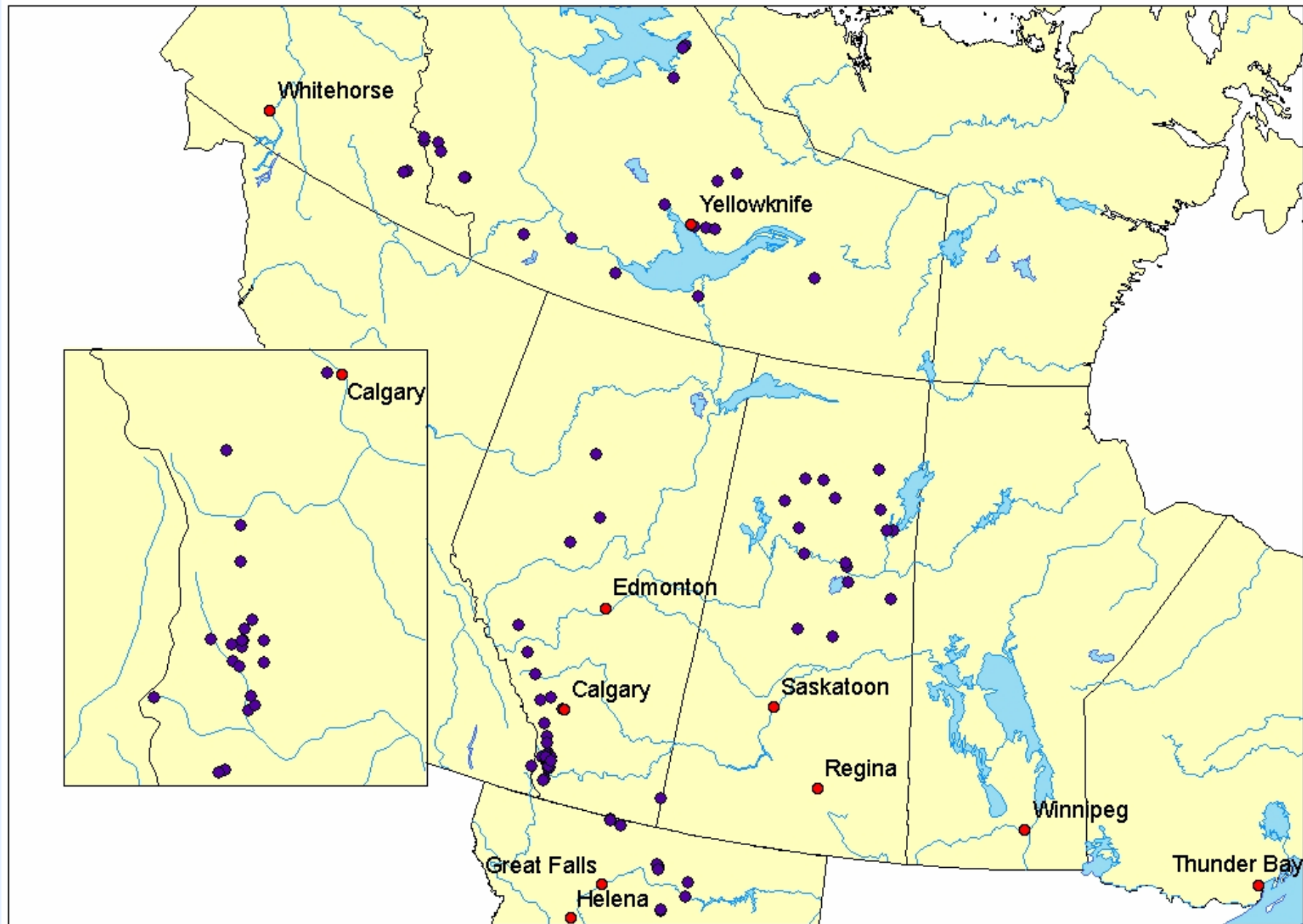
Summer (JJA) PDSI < 0, Calgary, 1341-2004



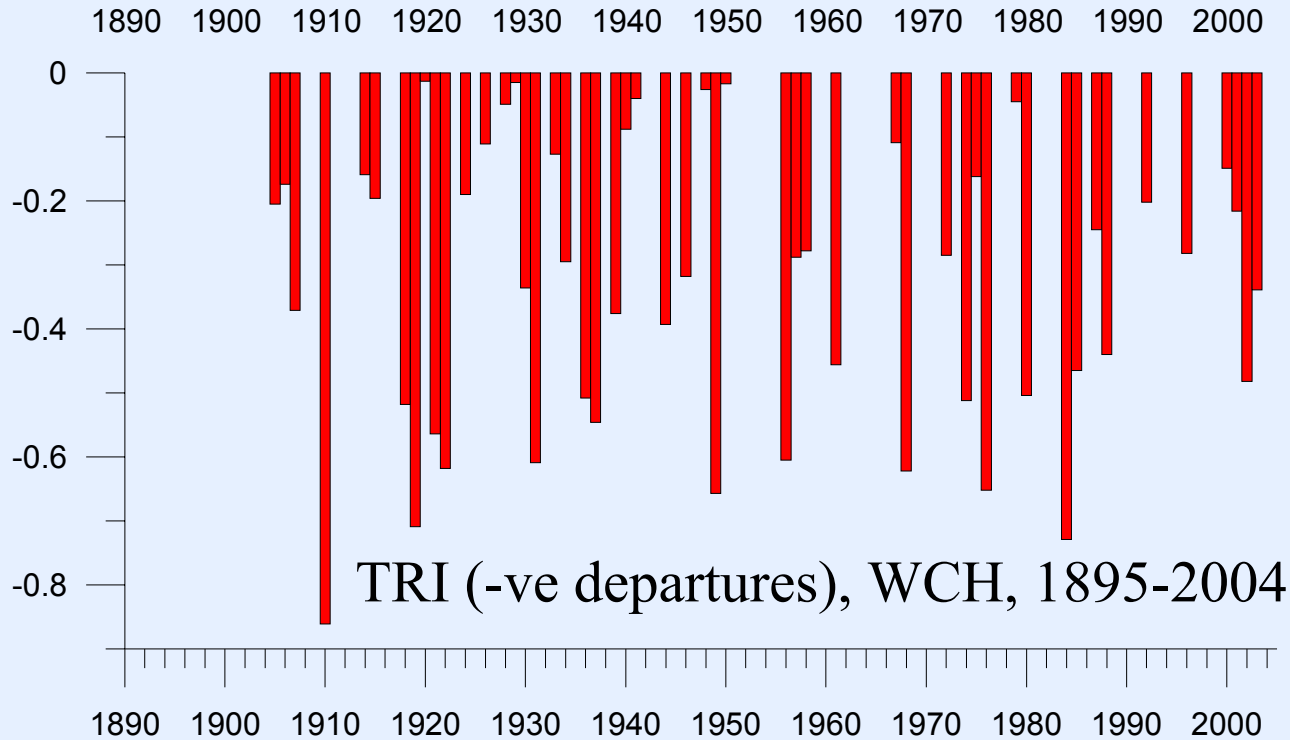
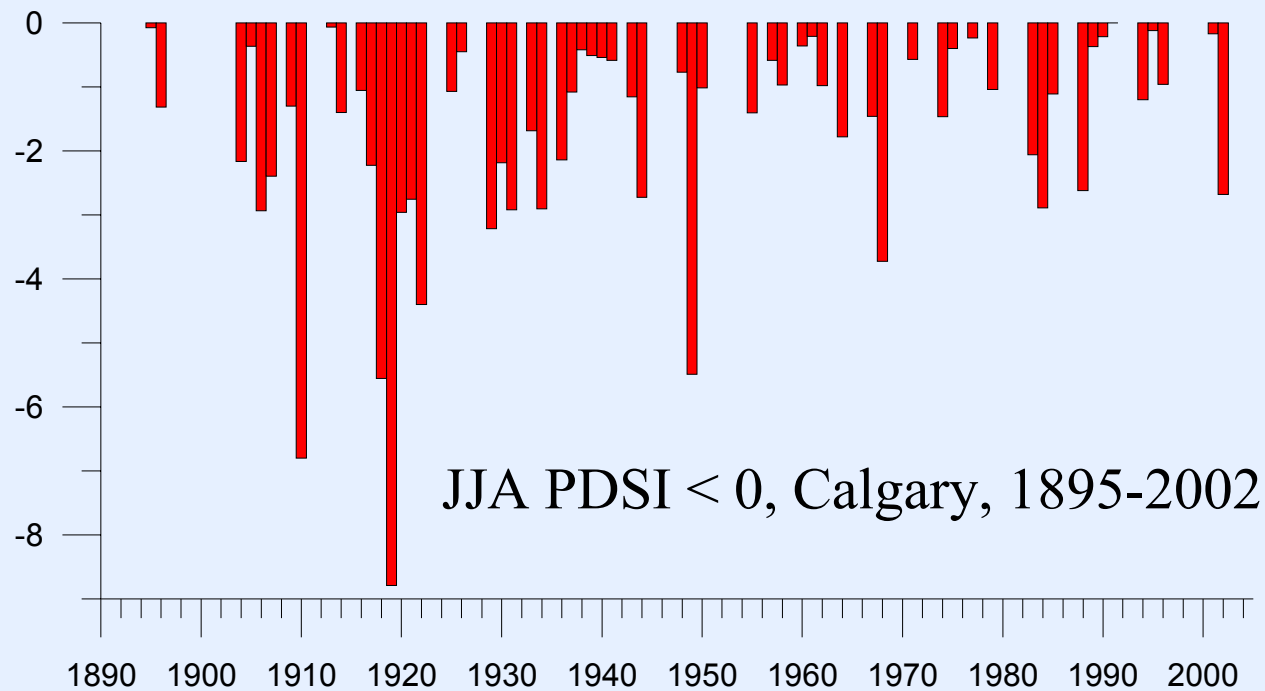




Tree-Ring Sampling Sites







$r = 0.628$

Spring 1796, Edmonton House

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.

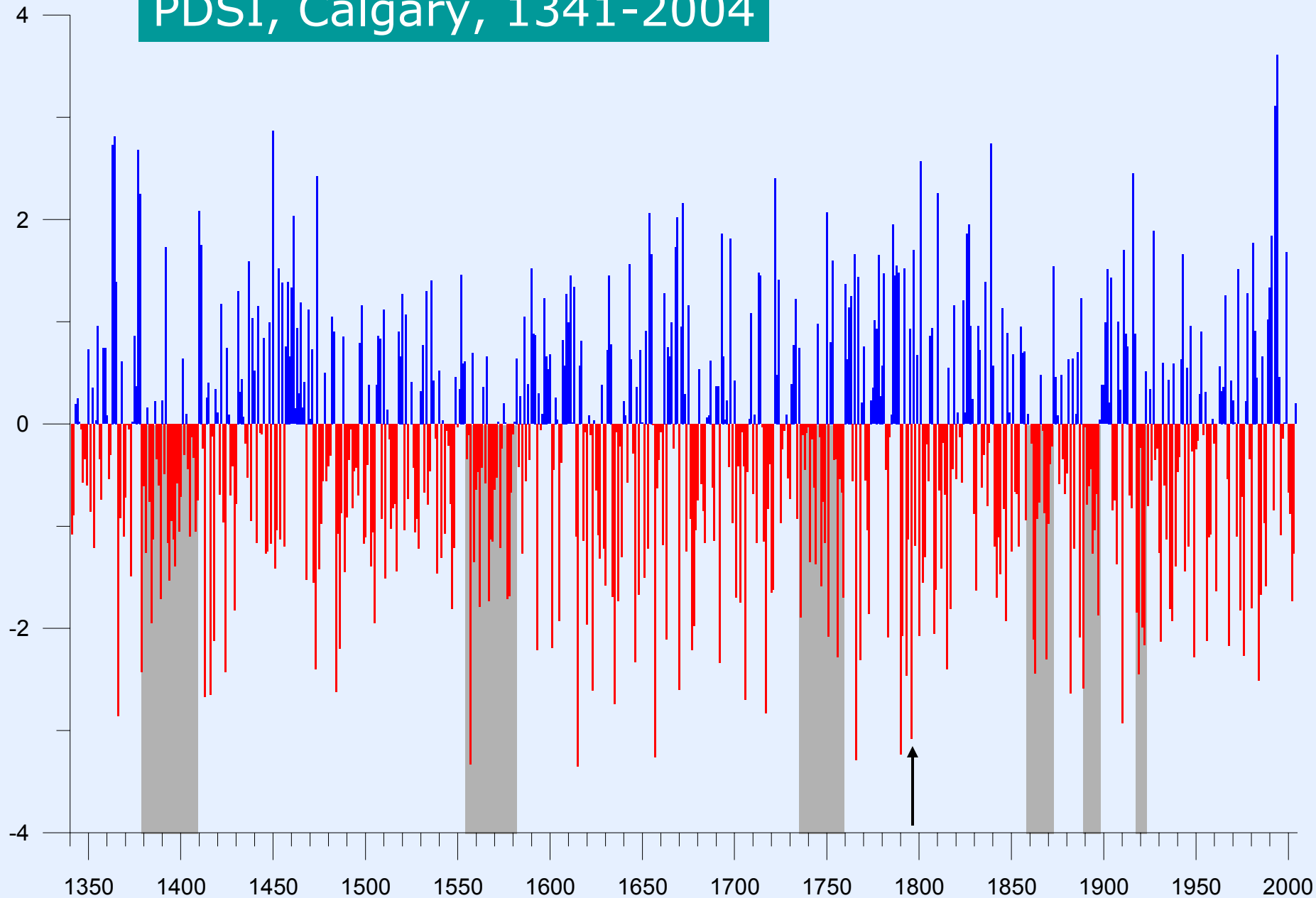
Timber intended to be used at Edmonton House could not be sent to the post “for want of water” in the North Saskatchewan River. On May 2nd, William Tomison wrote to James Swain that furs could not be moved as, “there being no water in the river.” (Johnson 1967: 33-39, 57)

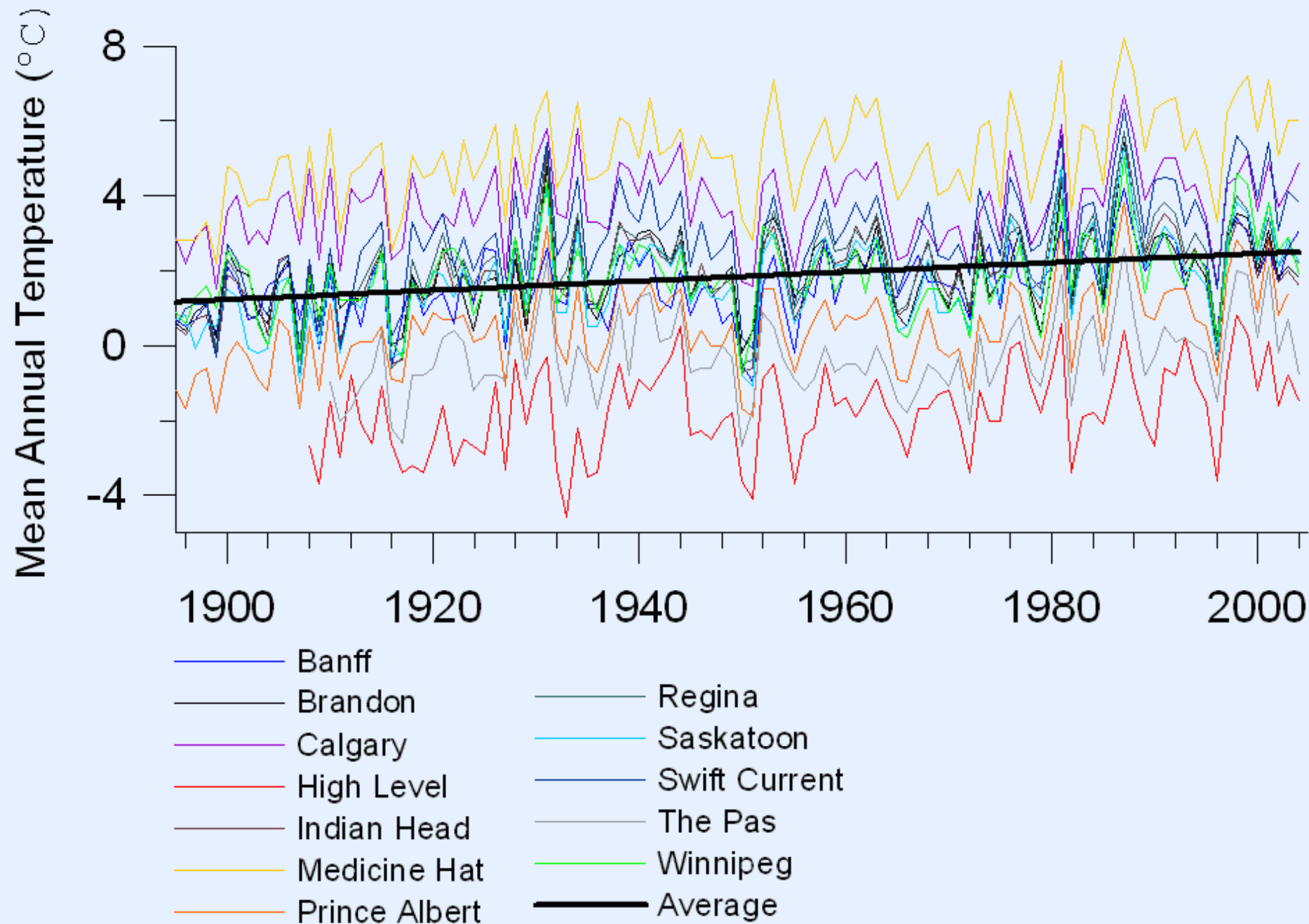
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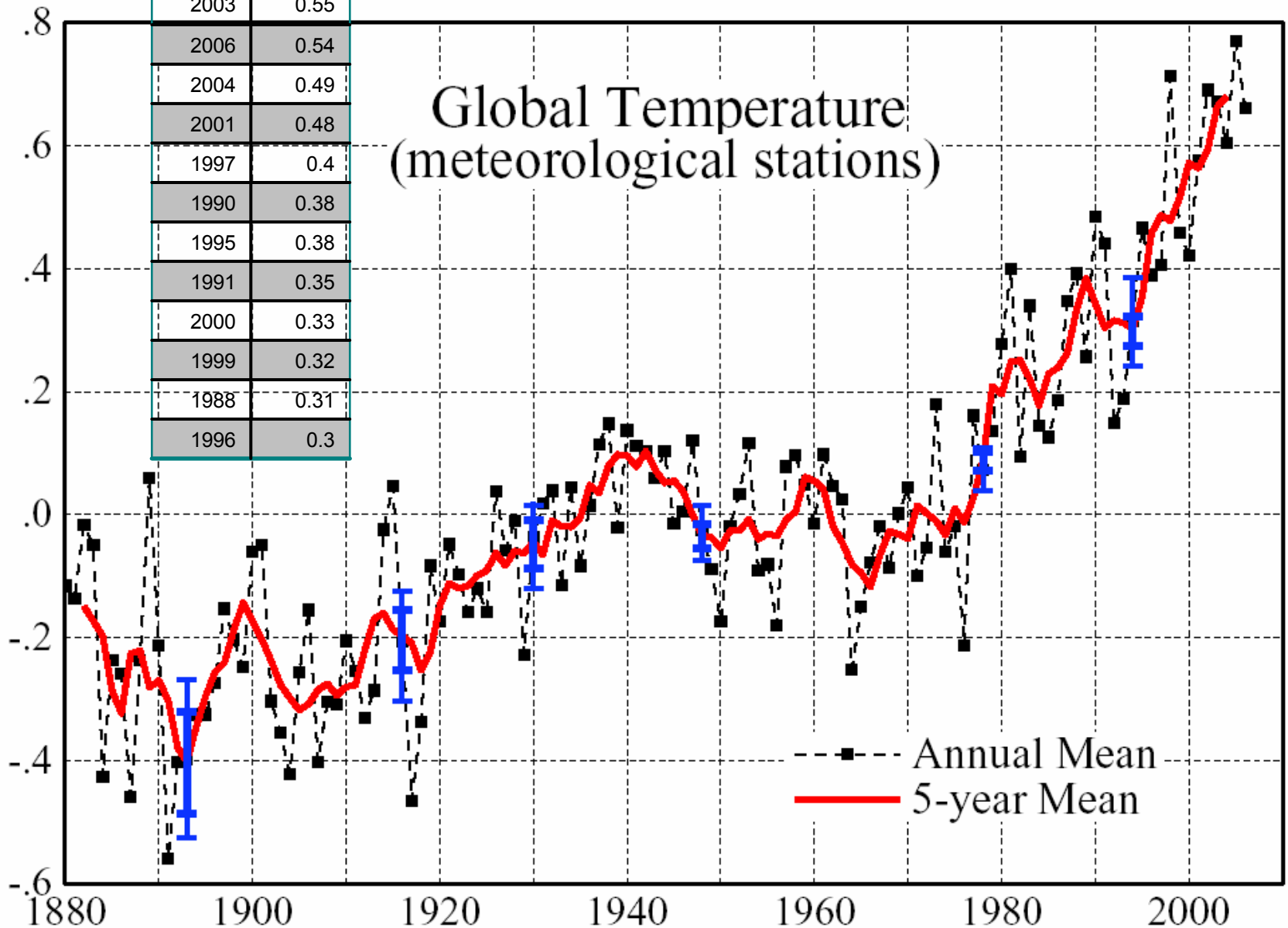
PDSI, Calgary, 1341-2004





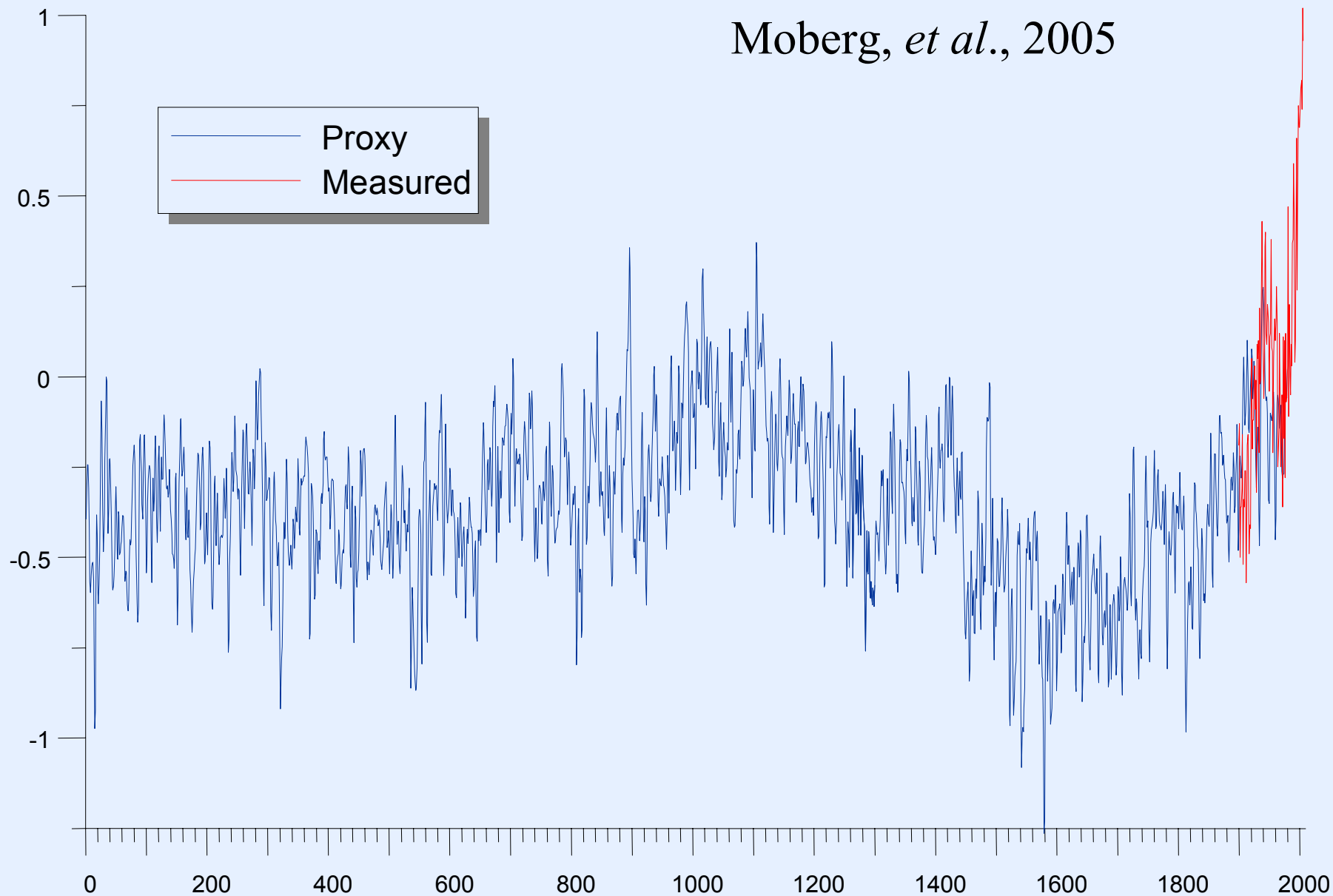
Temperature Anomaly ($^{\circ}\text{C}$)

Global Temperature (meteorological stations)

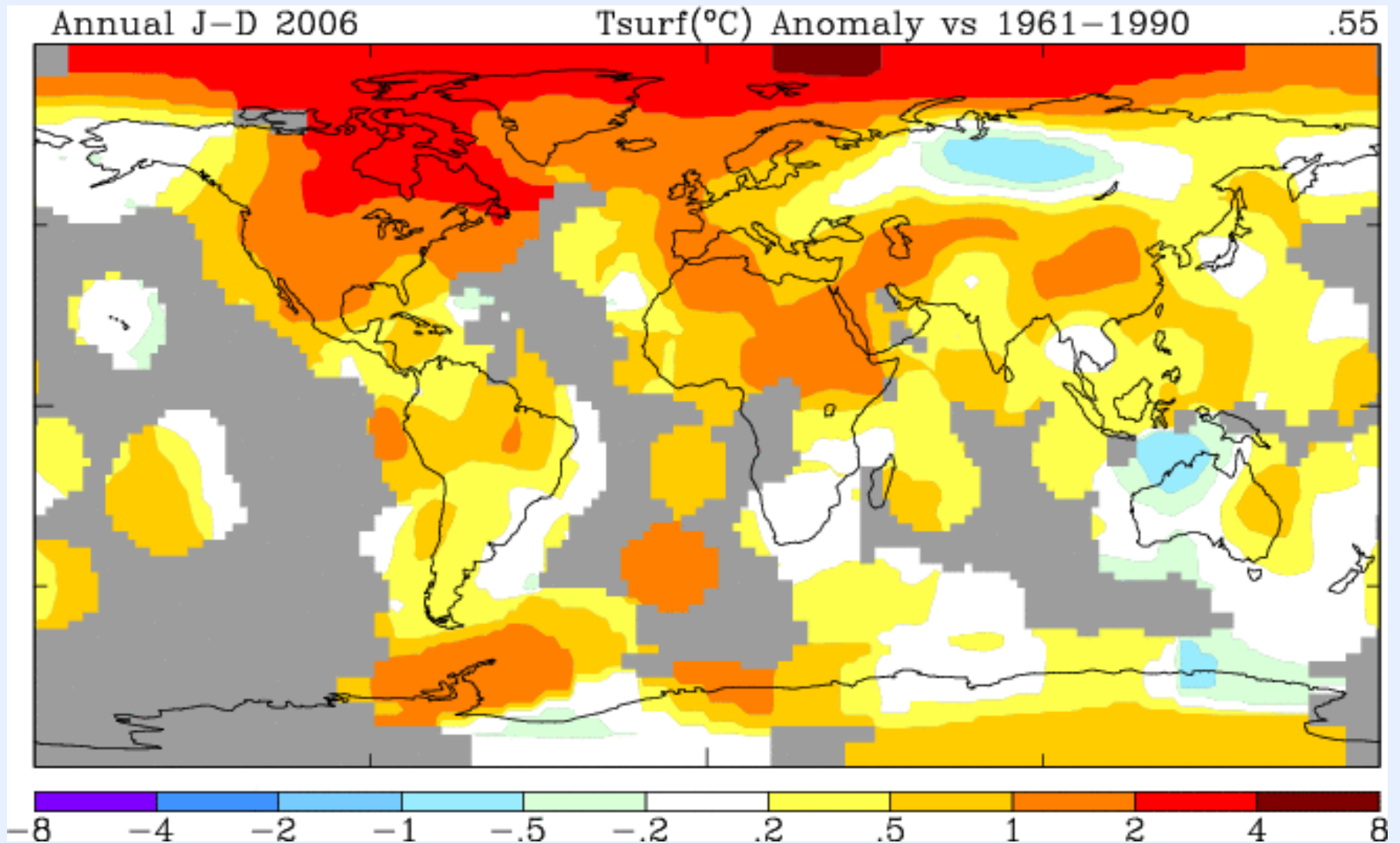


Northern Hemisphere temperature, past 1000 years

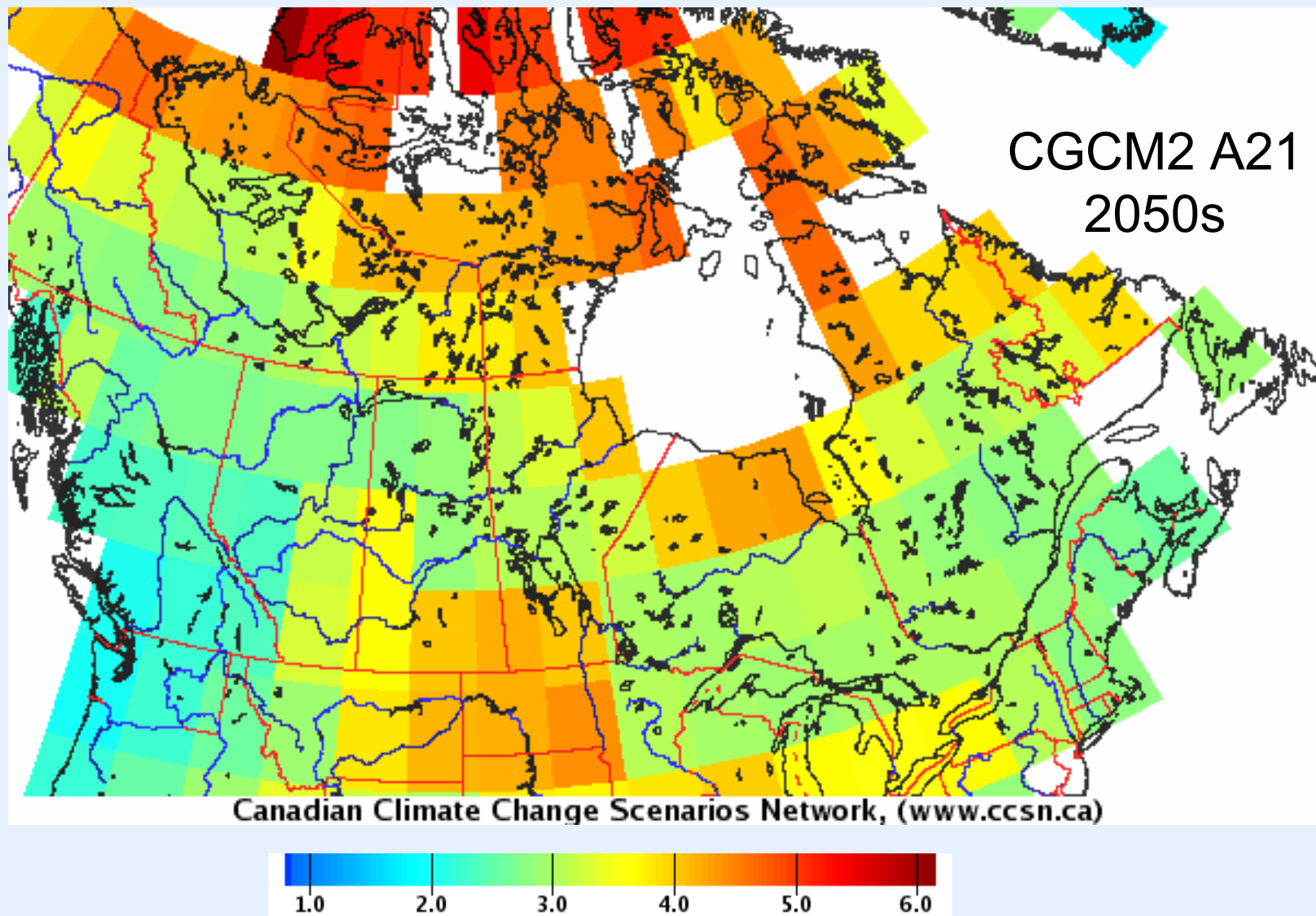
Moberg, *et al.*, 2005



2006 Temperatures: Departures from Normal (1961-90)

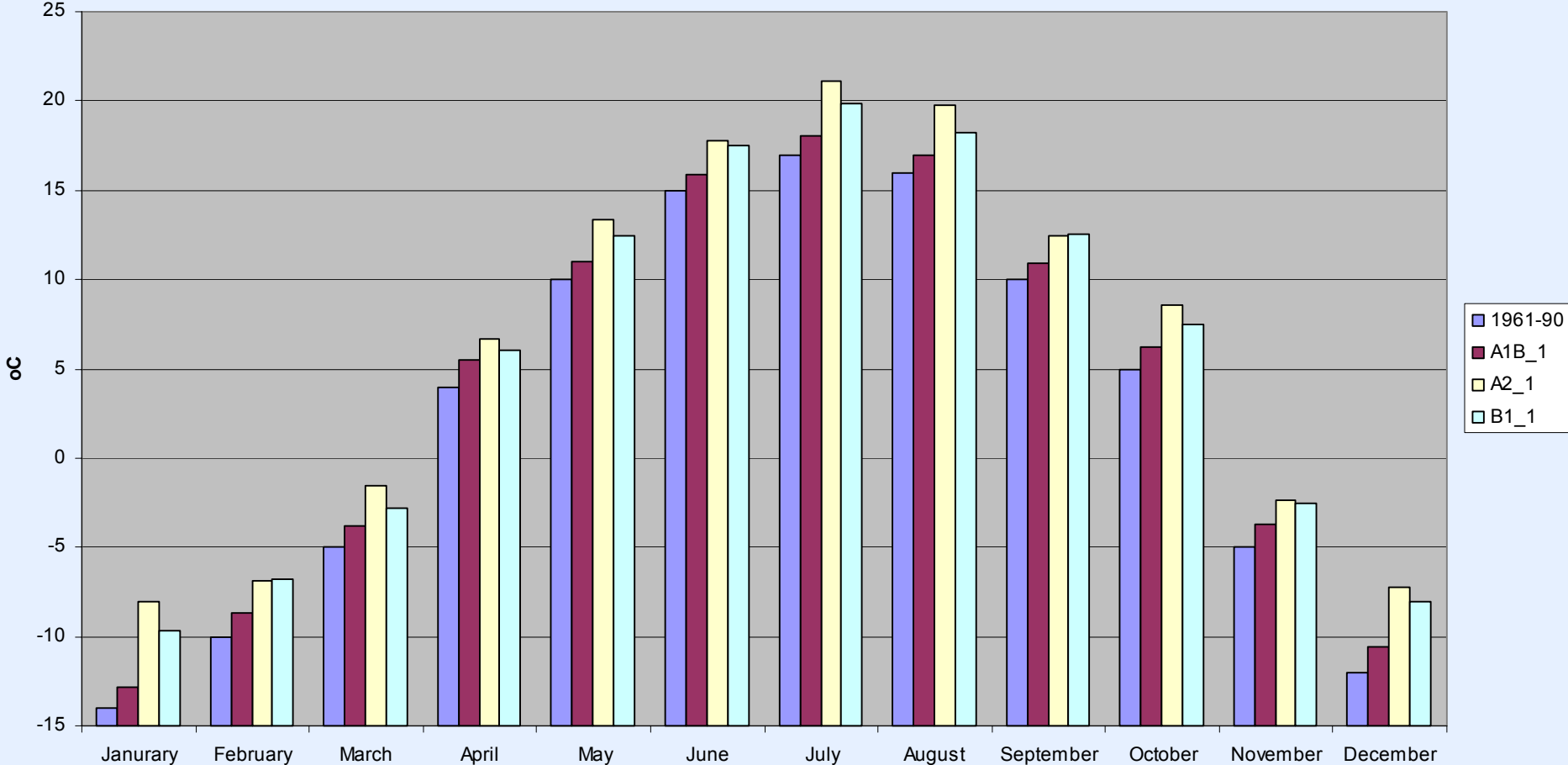


<http://data.giss.nasa.gov/gistemp/>

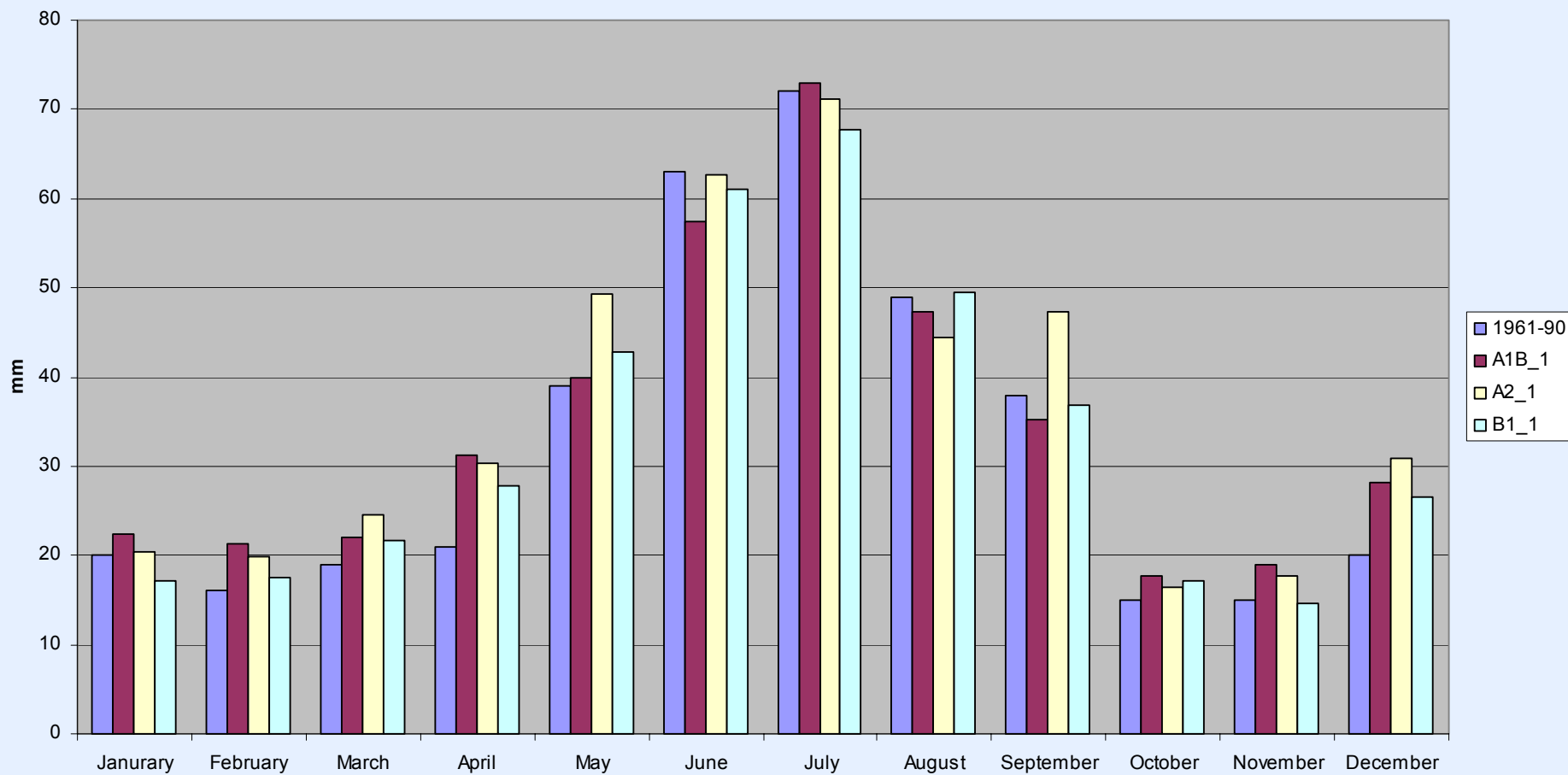


Change in temperature (C) from baseline (1961-90)

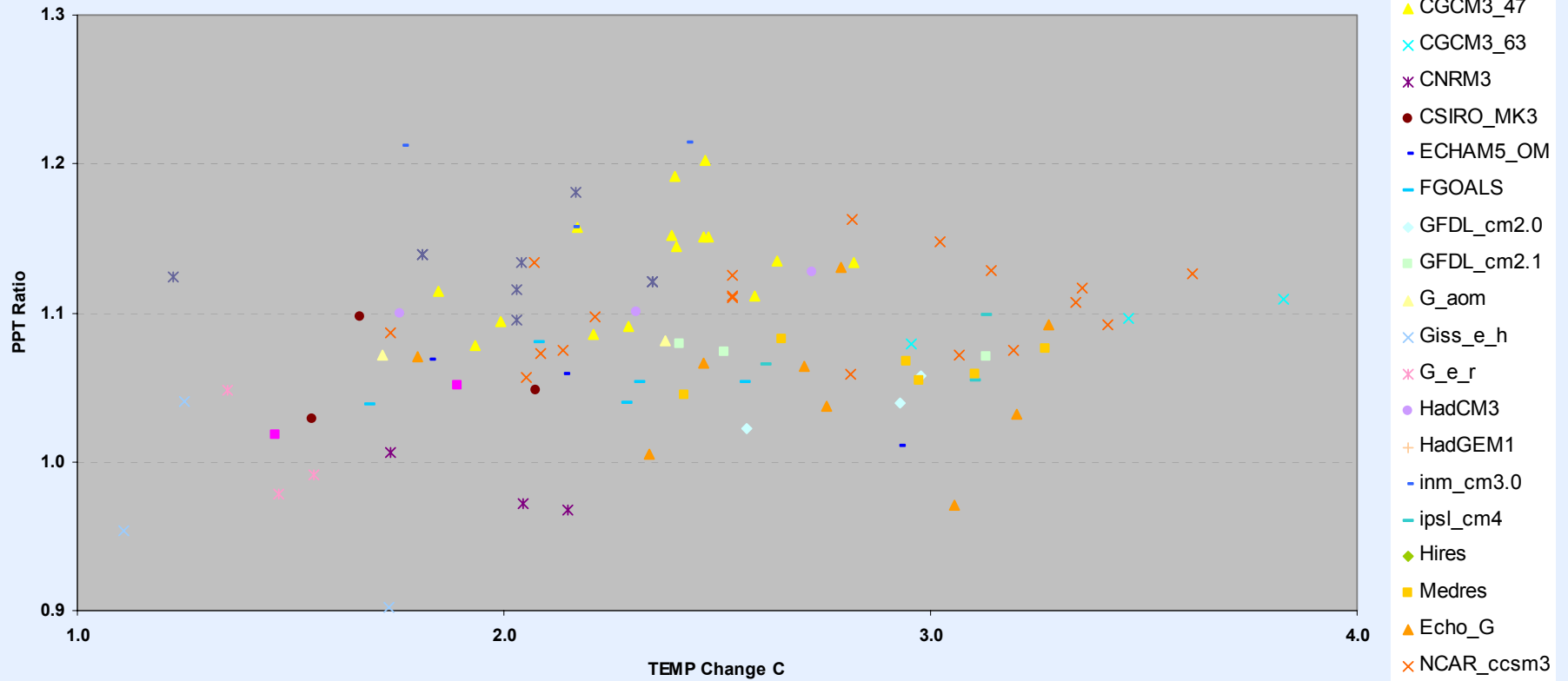
Hanna - Mean Temperature 2050 - CGCM3



Hanna - Mean Precipitation 2050 - CGCM3

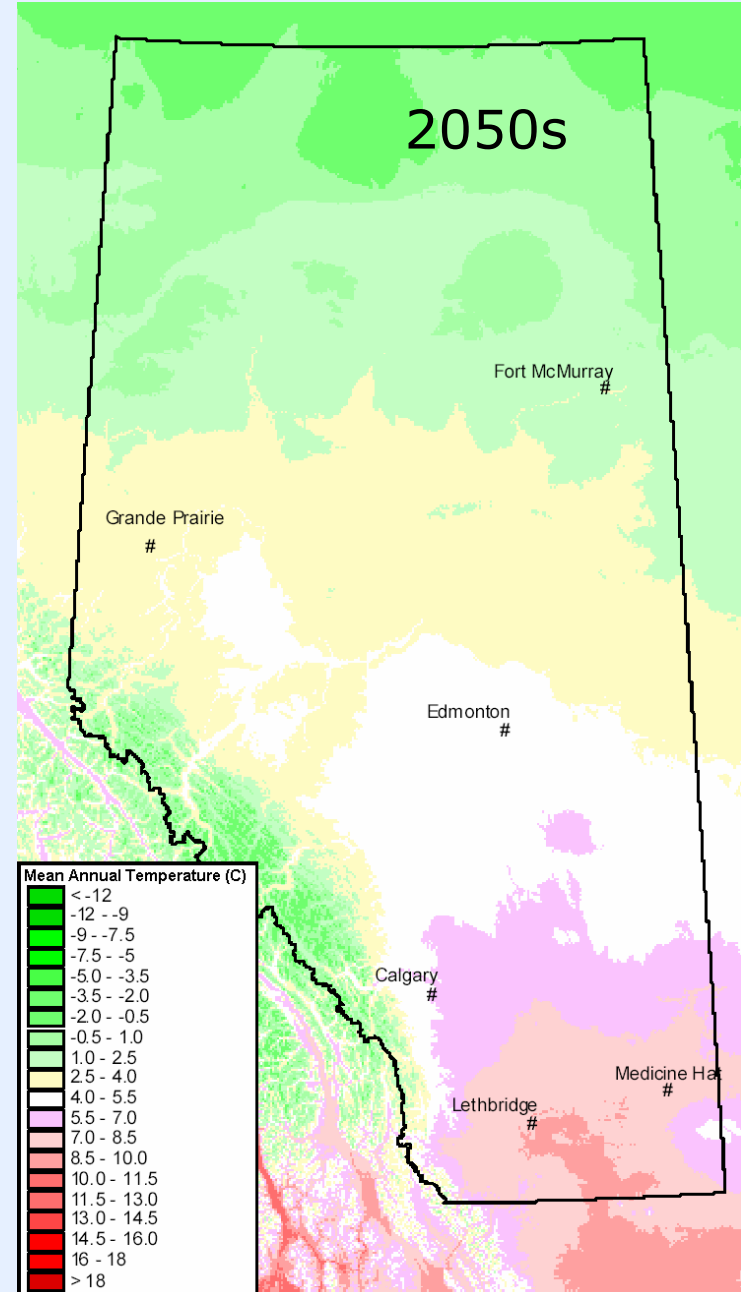
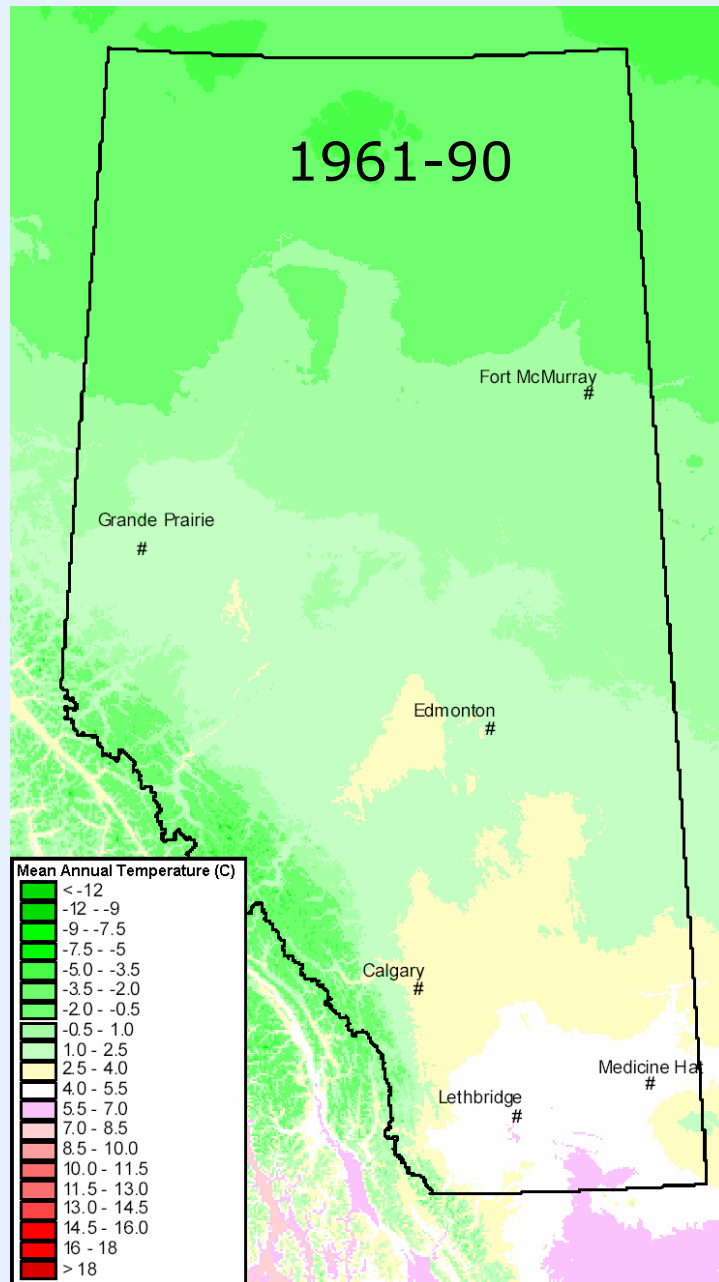


Alberta - 2050s



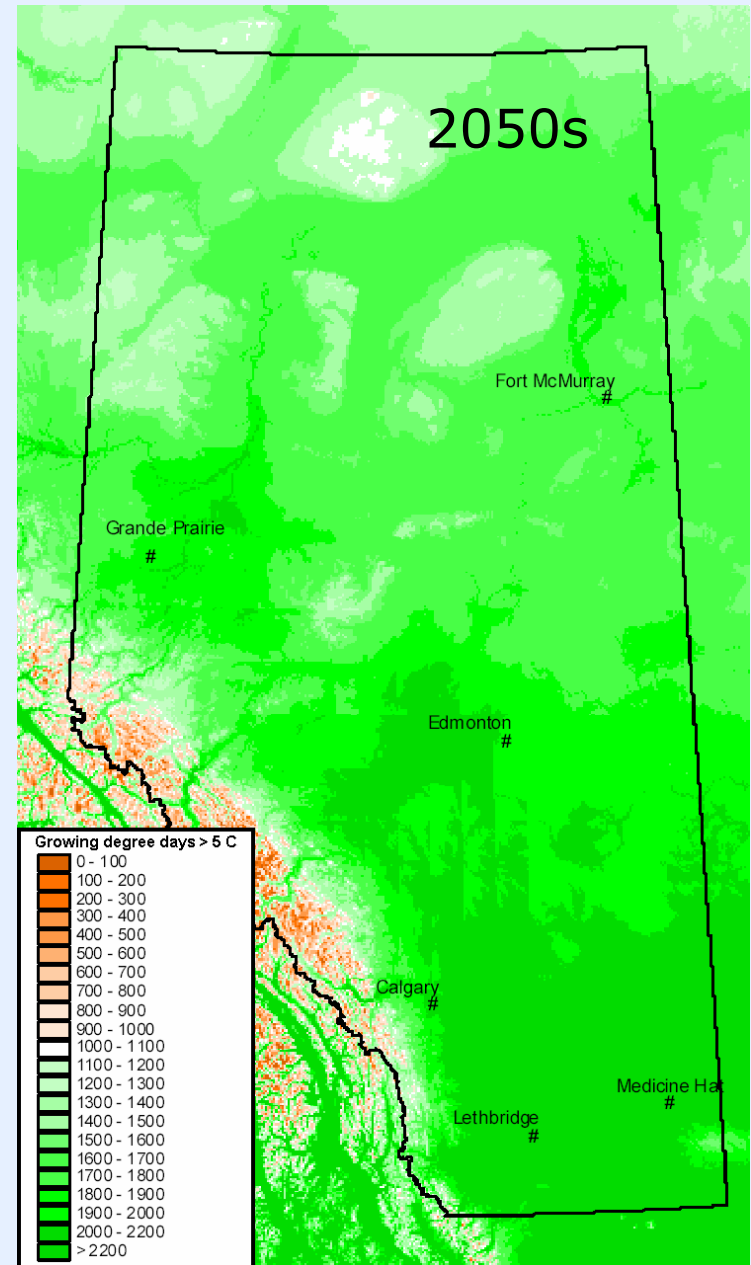
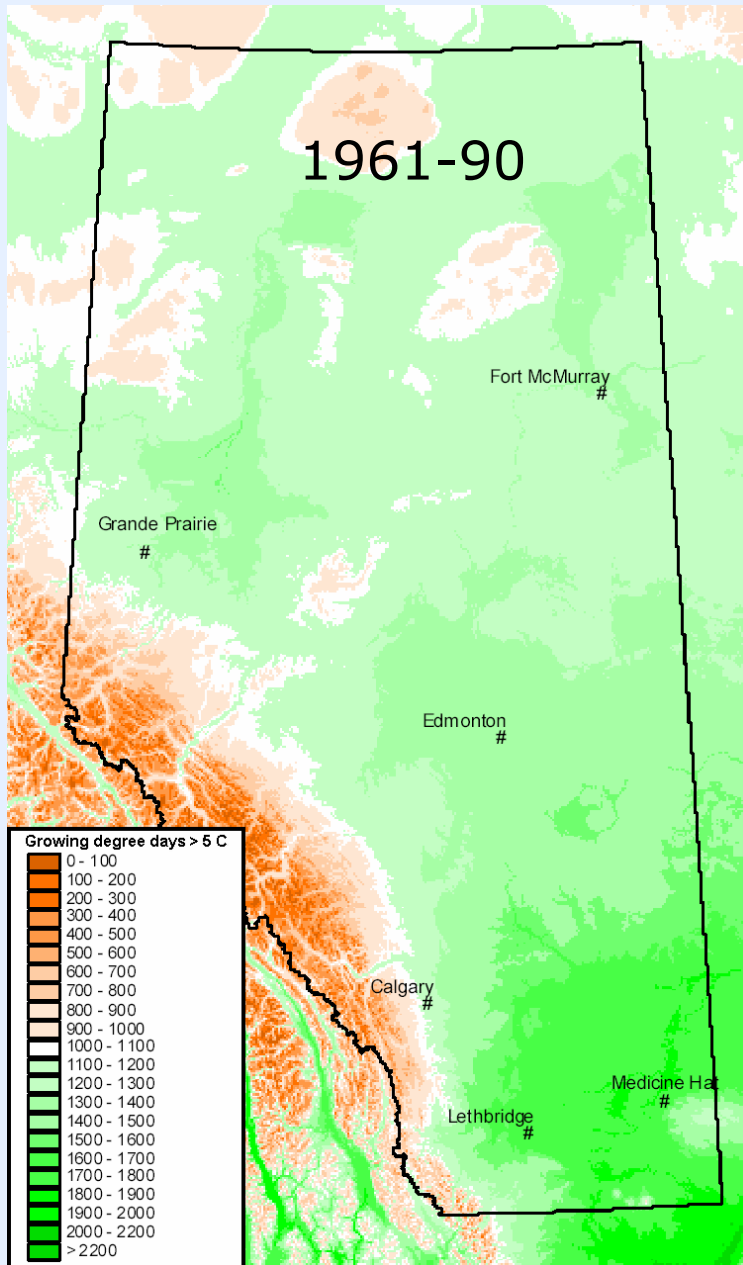
Mean Annual Temperature

Barrow and Yu, 2005



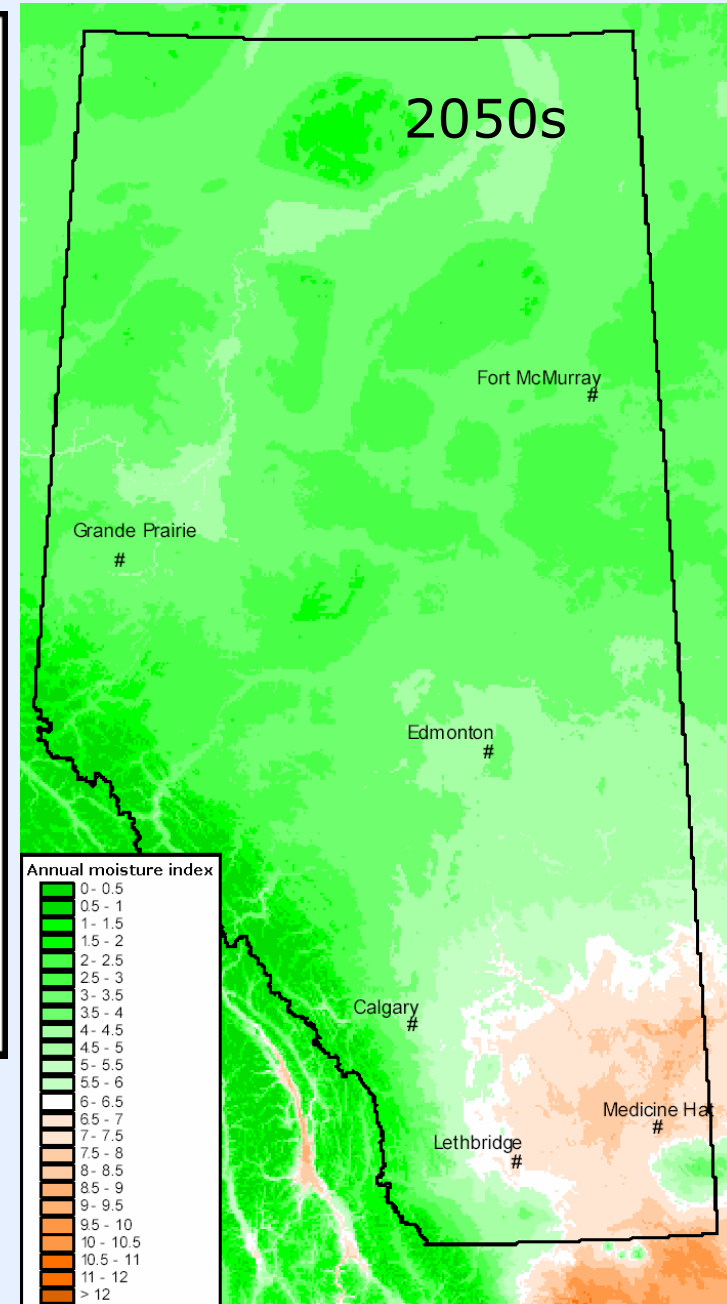
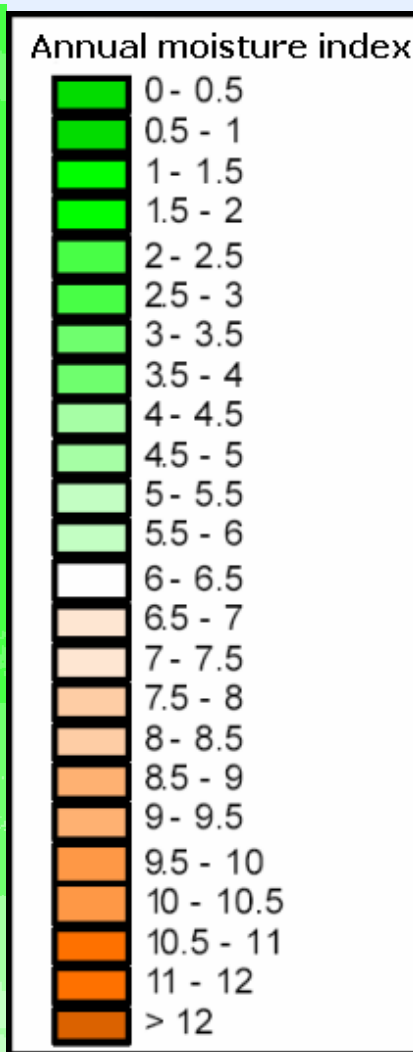
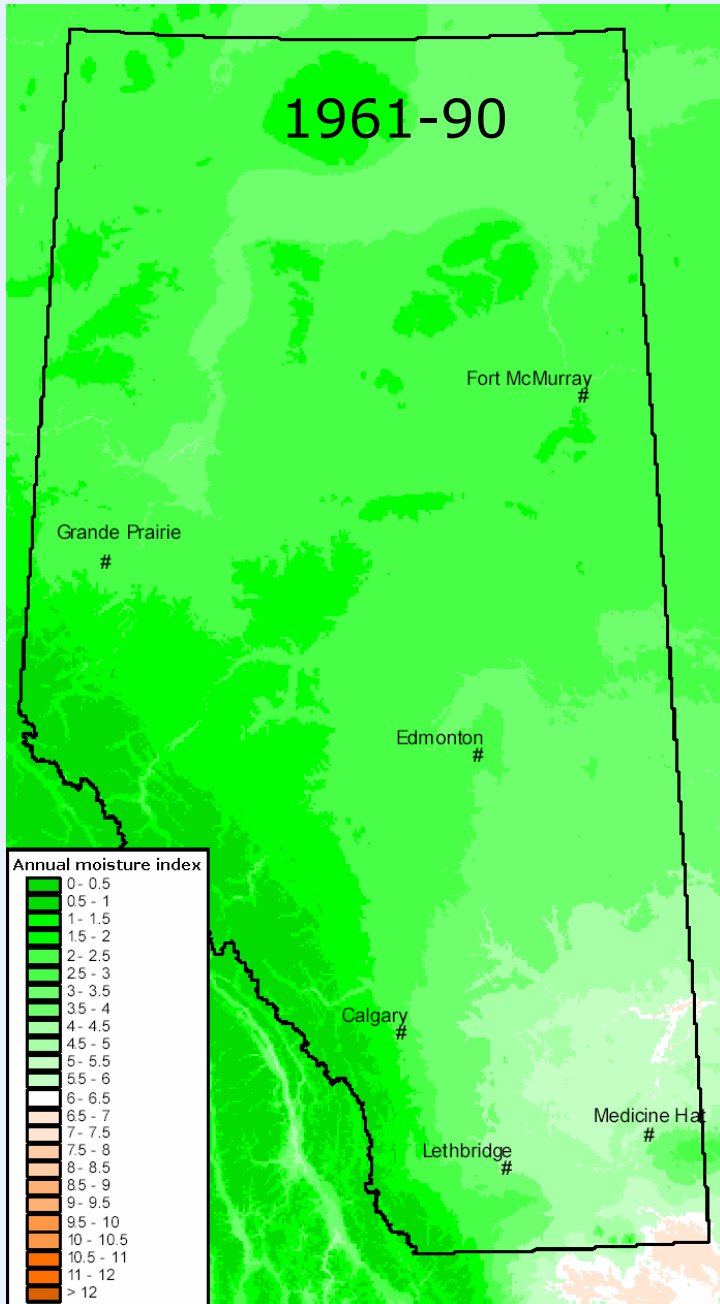
Growing Degree Days > 5° C

Barrow and Yu, 2005



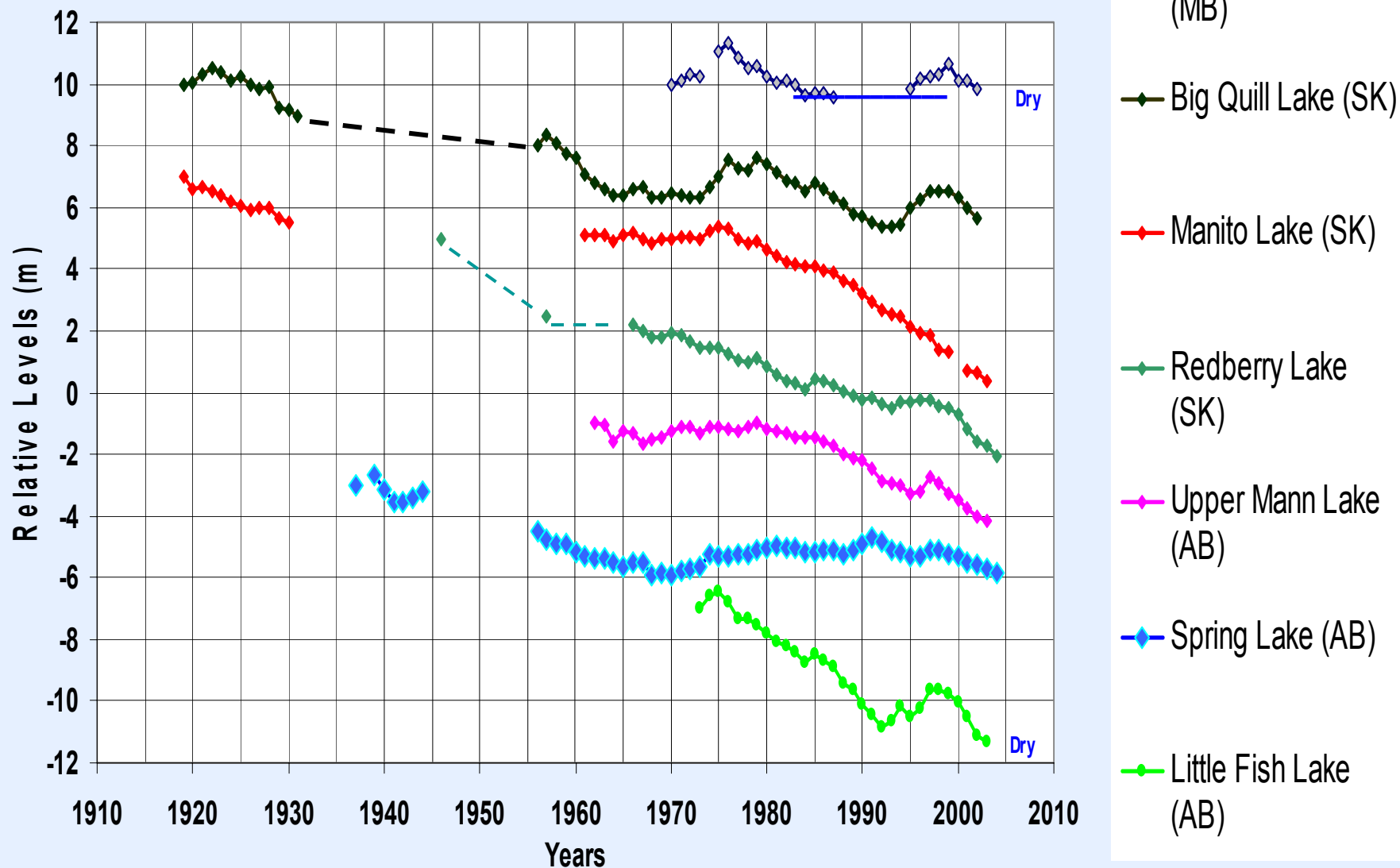
Annual Moisture Index - GDD/Annual Precip

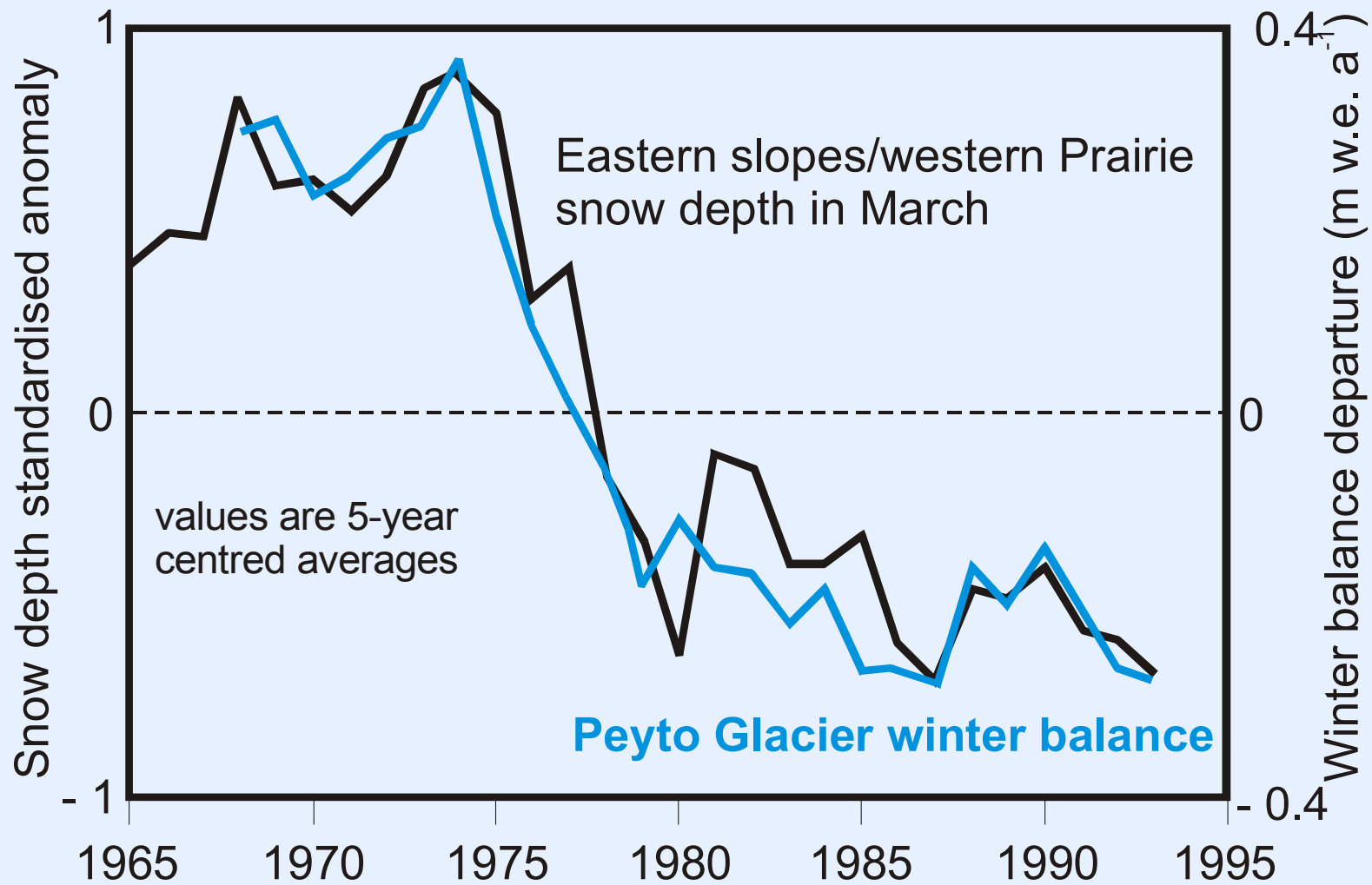
Barrow and Yu, 2005



Closed-basin prairie lakes

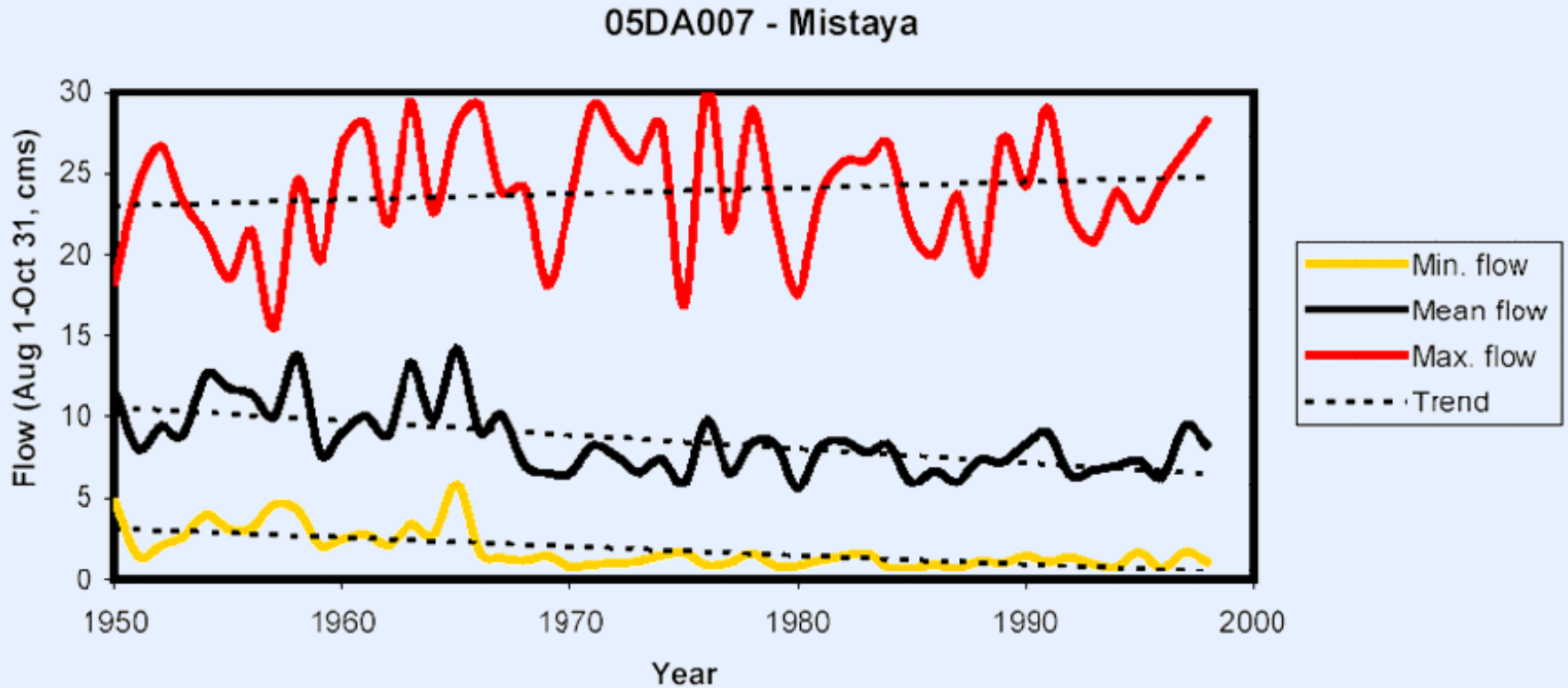
Water level changes, 1918-2004 (van der Kamp *et al.*)





Demuth and Pietroniro, 2001

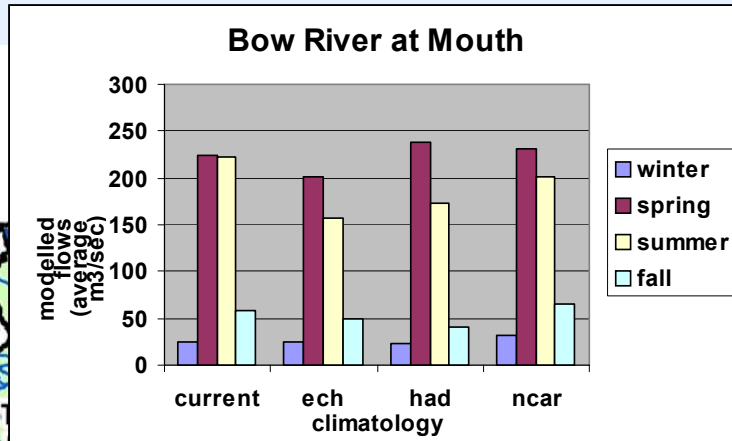
Declining Mean and Minimum Streamflow



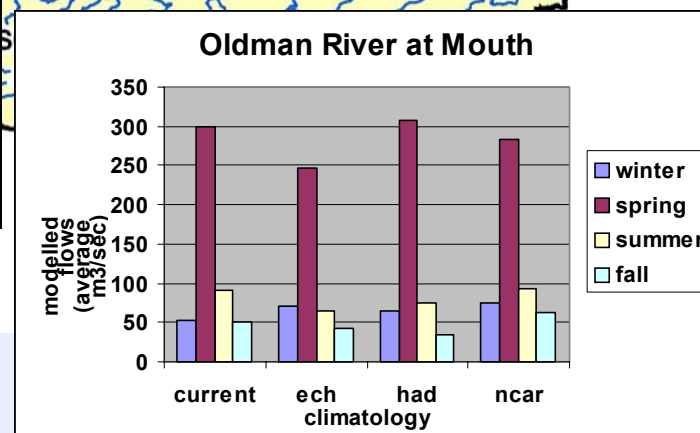
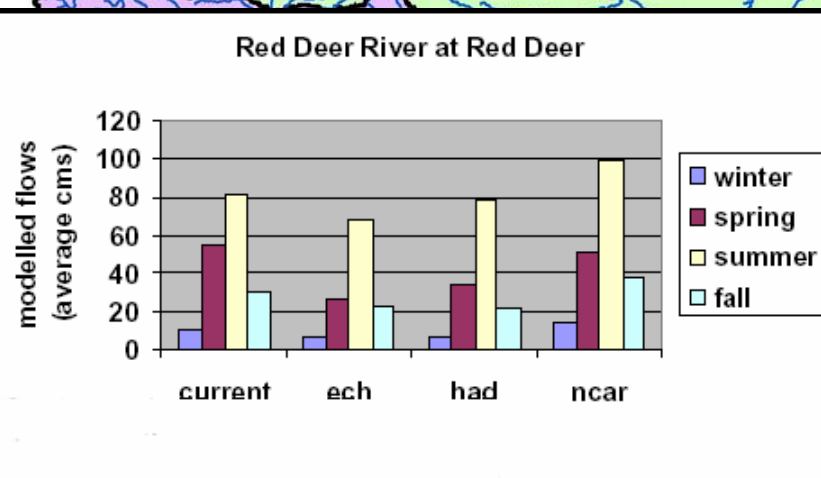
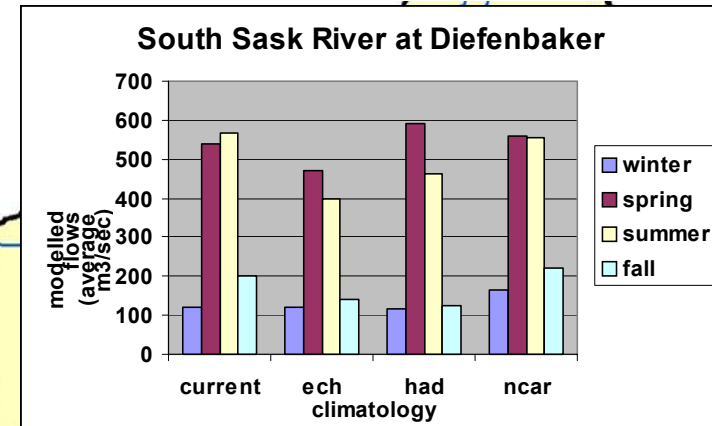
Demuth and Pietroniro 2001

Seasonal flows, SSRB, 2039-2070

Pietroniro *et al.*, 2006

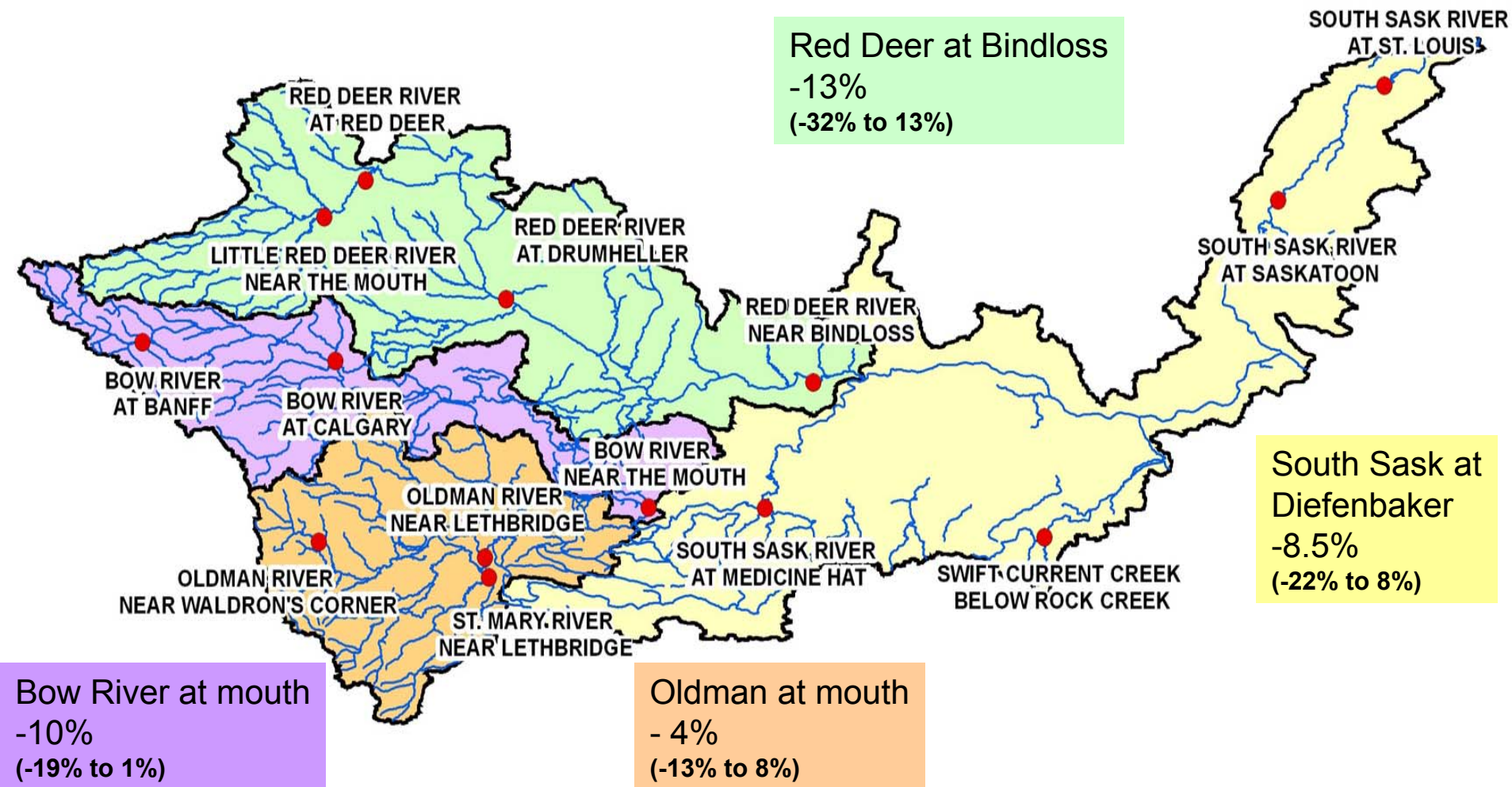


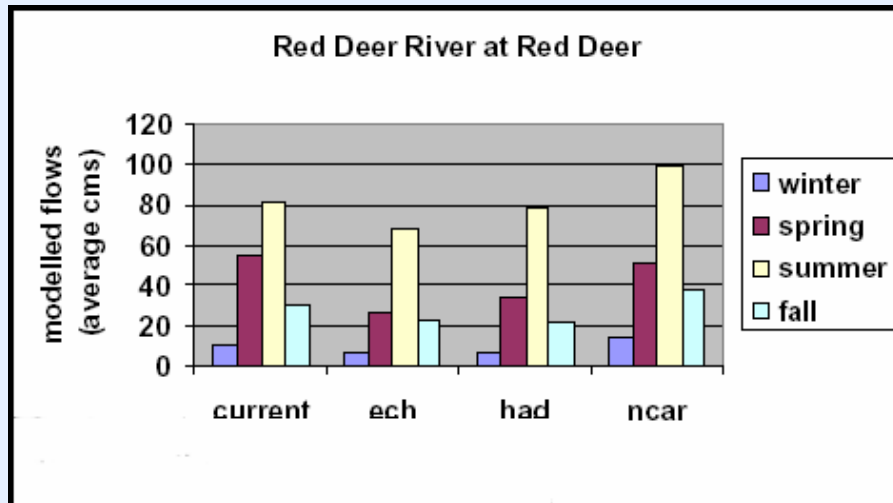
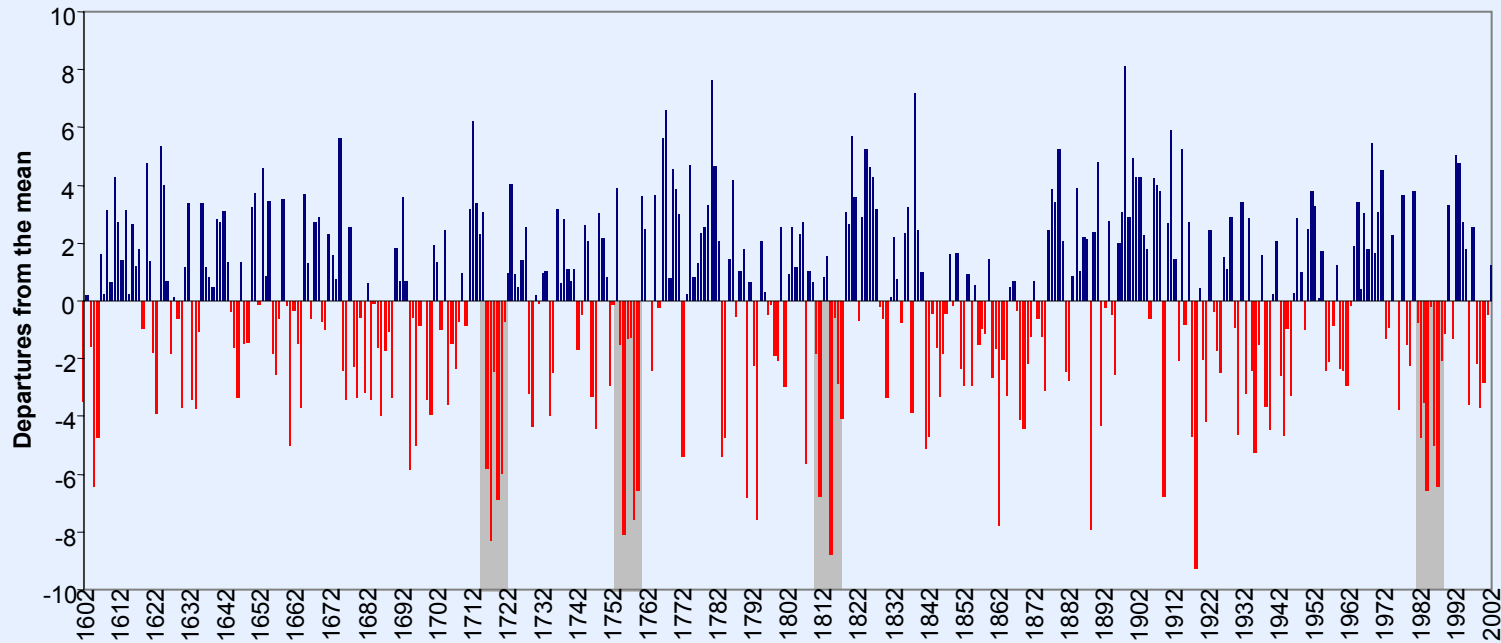
GCM	%Precip	+Temp	Description
echa21	-3.8	2.8	driest, warmest
echb21	-2.0	2.8	
hada21	6.4	2.3	moderately wet and warm
hadb21	0.2	2.1	
ncara21	11.5	1.7	wettest and least warm
ncarb21	9.1	1.5	



Projected annual flow, 2039 – 2070

Pietroniro *et al.*, 2006





A “myth of abundance” and an assumption that “the hydrological regime is stationary and will continue to be stationary in the future”.

Adaptation



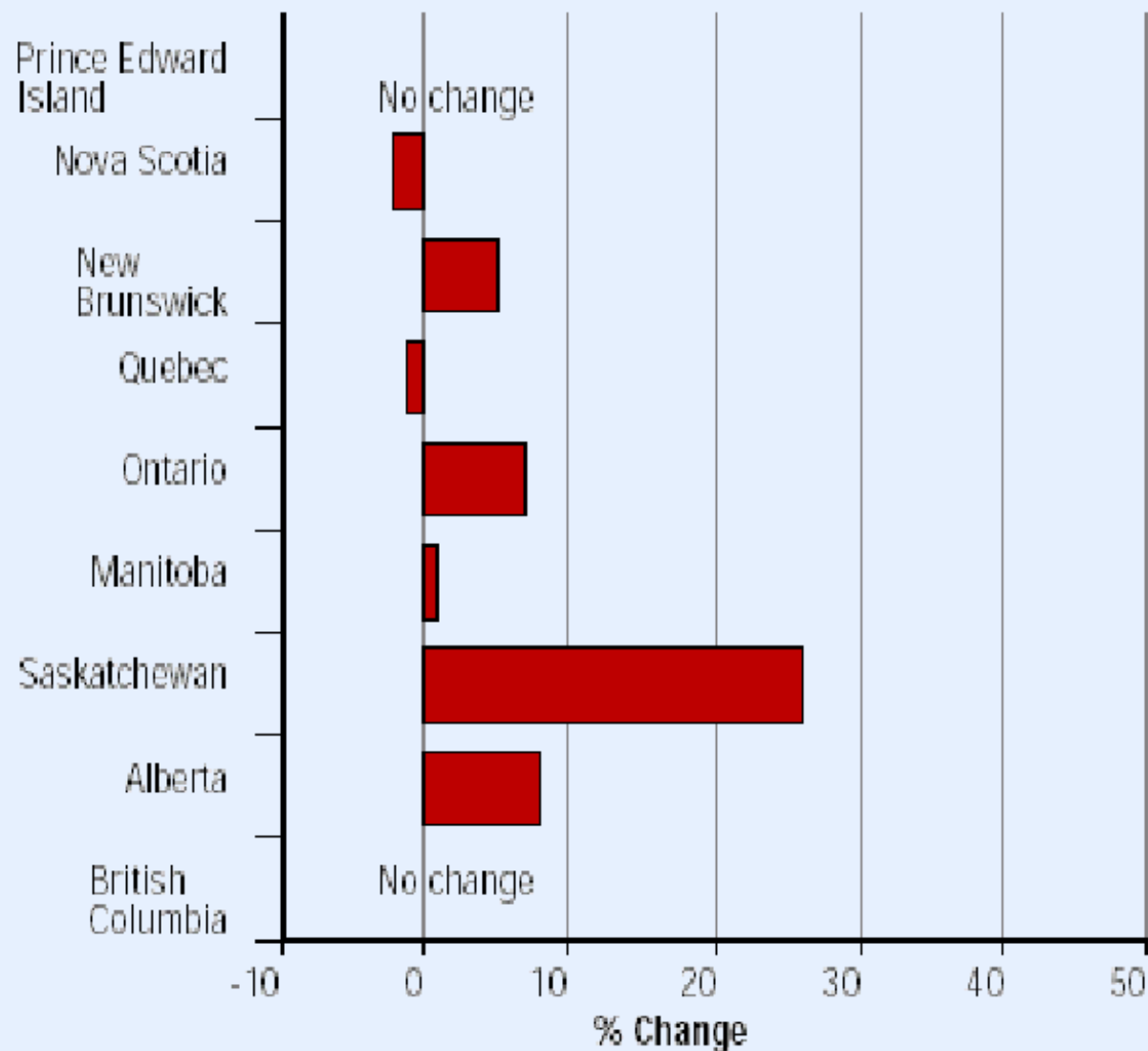
The degree to which **adjustments** are possible in practices, processes, or structures of systems to projected or actual changes of climate (IPCC, 2001).



Adaptive Capacity

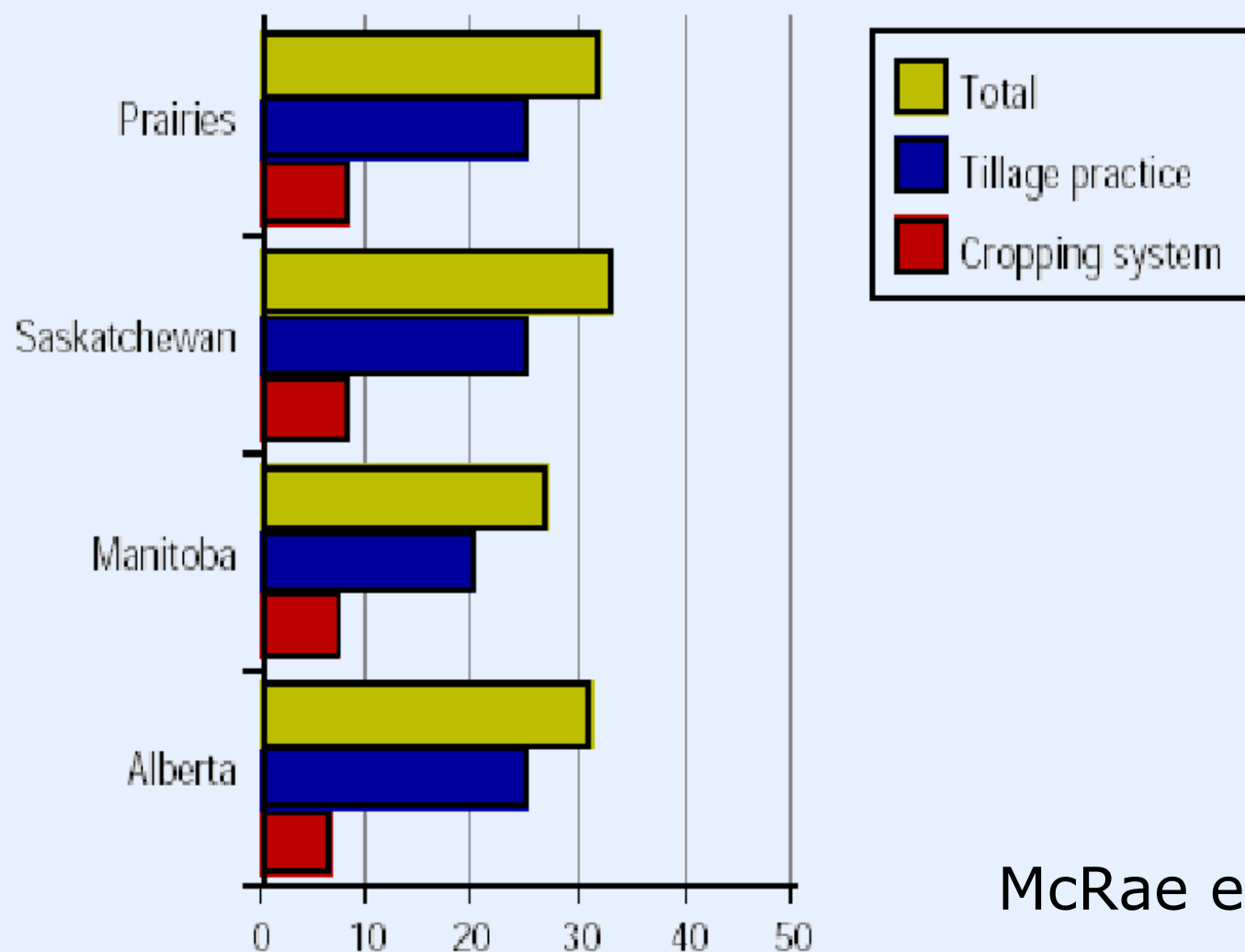
Determinant	Explanation
Economic resources	Greater economic resources increase adaptive capacity Lack of financial resources limits adaptation options
Technology	Lack of technology limits range of potential adaptation options Less technologically advanced regions are less likely to develop and/or implement technological adaptations
Information and skills	Lack of informed, skilled and trained personnel reduces adaptive capacity Greater access to information increases likelihood of timely and appropriate adaptation
Infrastructure	Greater variety of infrastructure can enhance adaptive capacity, since it provides more options Characteristics and location of infrastructure also affect adaptive capacity
Institutions	Well-developed social institutions help to reduce impacts of climate-related risks, and therefore increase adaptive capacity
Equity	Equitable distribution of resources increases adaptive capacity Both availability of, and access to, resources is important

Change in the area of cropland at risk of tolerable levels of water erosion between 1981 and 1996



McRae et al.
2000

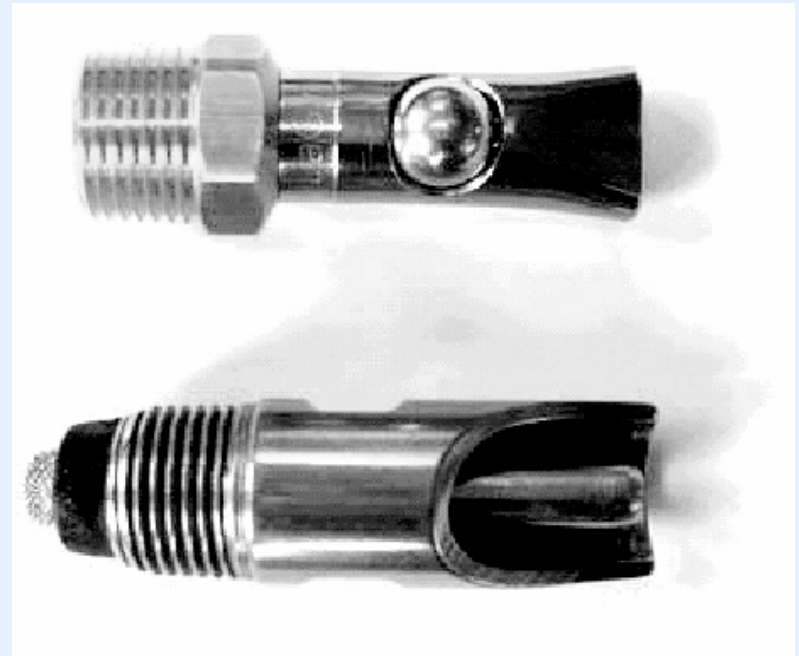
Reduction (%) in the risk of wind erosion in the Prairie Provinces between 1981 and 1996



McRae et al. 2000

ball-bite drinker

standard drinker



- one-year trial, from August 2004 to July 2005, the ball-bite drinker sections of the barn used 35 per cent less water than the standard drinker sections
- no detrimental effects on the animals or facility management. the
- significant decrease in water usage led to many secondary benefits

Dennis McKerracher
JV Farms, High River, AB

Resolution - 2005 PC AGM

Progressive Conservative Party of Alberta 2005 AGM

Resolution submitted by the Cardston-Taber-Warner PC Association

Resolved: The Government of Alberta recognizes and acknowledges that water is a very important commodity and valuable resource. The Government also recognizes the need for more storage of this valuable resource.

We will look at alternatives to costly and environmentally sensitive dams, by encouraging a study to look at the possibility of on farm storage, particularly on the corners of pivot irrigation land. This storage would help producers have water for agriculture in the early and late season if required.

Beaver Creek Watershed Group

"We are really the ones who manage the land every day and the positive actions we take today will ensure that our children have healthy riparian areas and clean water. Hopefully they will grow up understanding what it seemed to take us forever to learn."

Dixon Hammond

