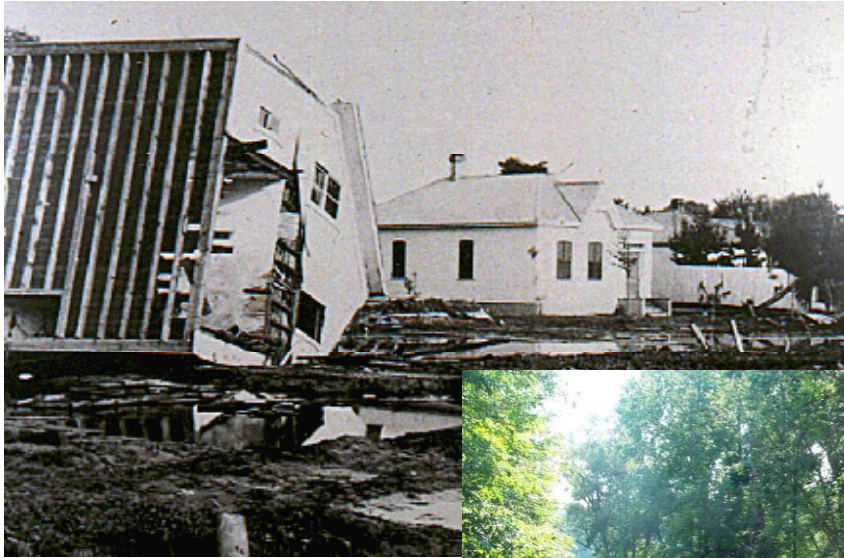


Conservation Authorities & Water Quantity Management



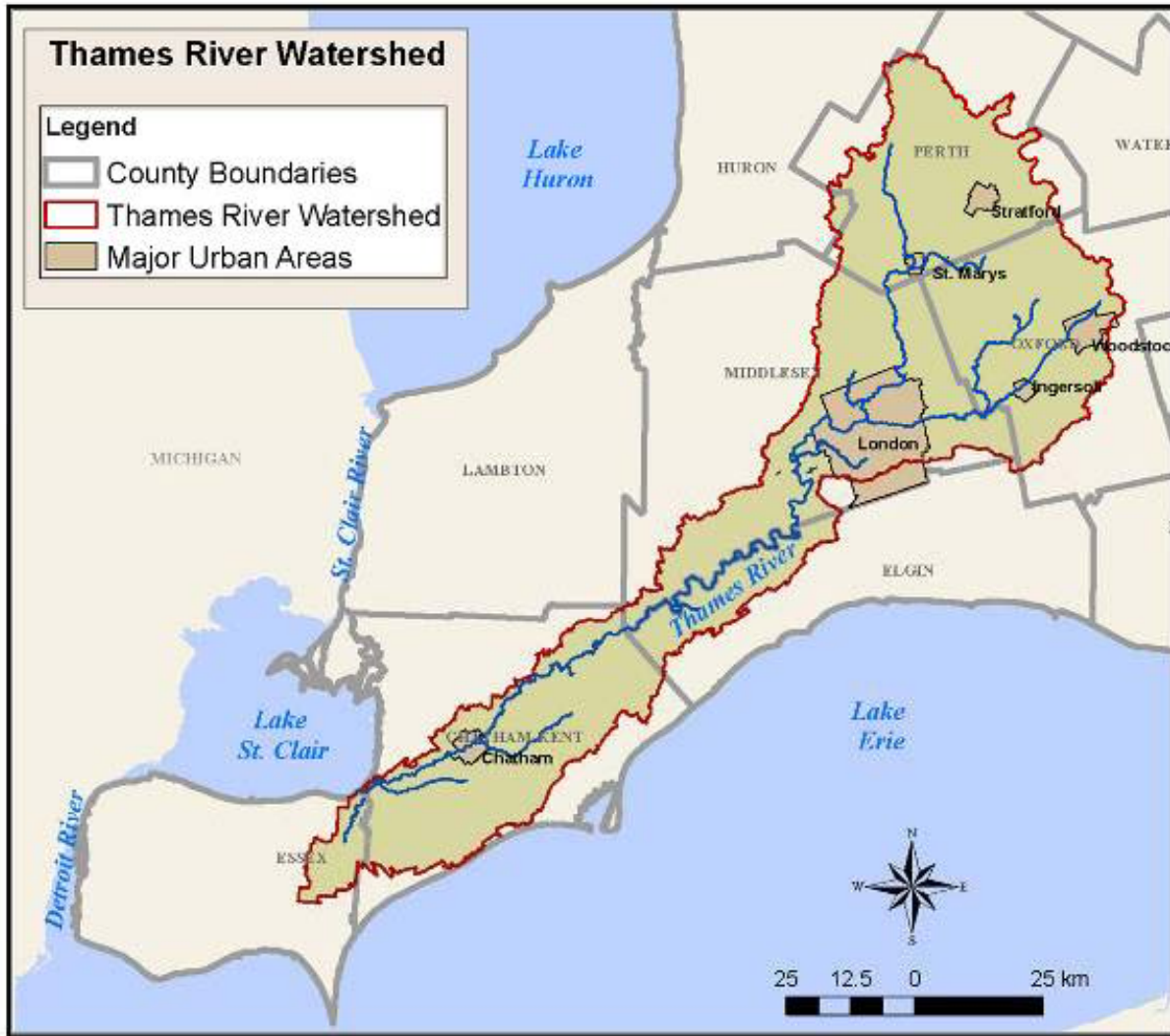
www.thamesrevival.ca


ThamesRiver
CLEAR WATER REVIVAL



Committed to a Healthy and Vital Thames River

Thames Watershed



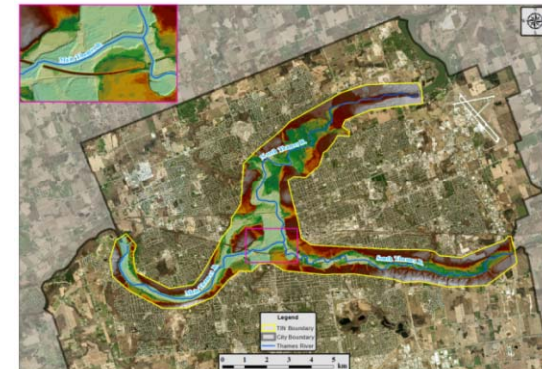
UTRCA Vision: “Inspiring a Healthy Environment”

- To protect life and property from **flood and erosion**
- To protect and enhance **water quality**
- To preserve and manage natural areas
- To provide outdoor **recreation** opportunities



Conservation Authorities & Water Quantity Management

- Flood Forecasting and Warning
- Water Management Infrastructure
- Hazard Preventative Measures
- Low Water and Drought

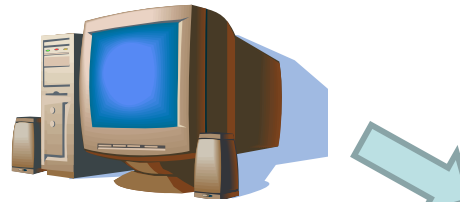


Flood Forecasting and Warning

Forecast							AQHI
Wed 5 Mar	Thu 6 Mar	Fri 7 Mar	Sat 8 Mar	Sun 9 Mar	Mon 10 Mar	Tue 11 Mar	
40%			40%		40%	60%	
-6°C	-3°C	3°C	0°C	-3°C	0°C	0°C	
-15°C	-8°C	-4°C	-8°C	-6°C	-4°C		



Data



Forecast



Actions

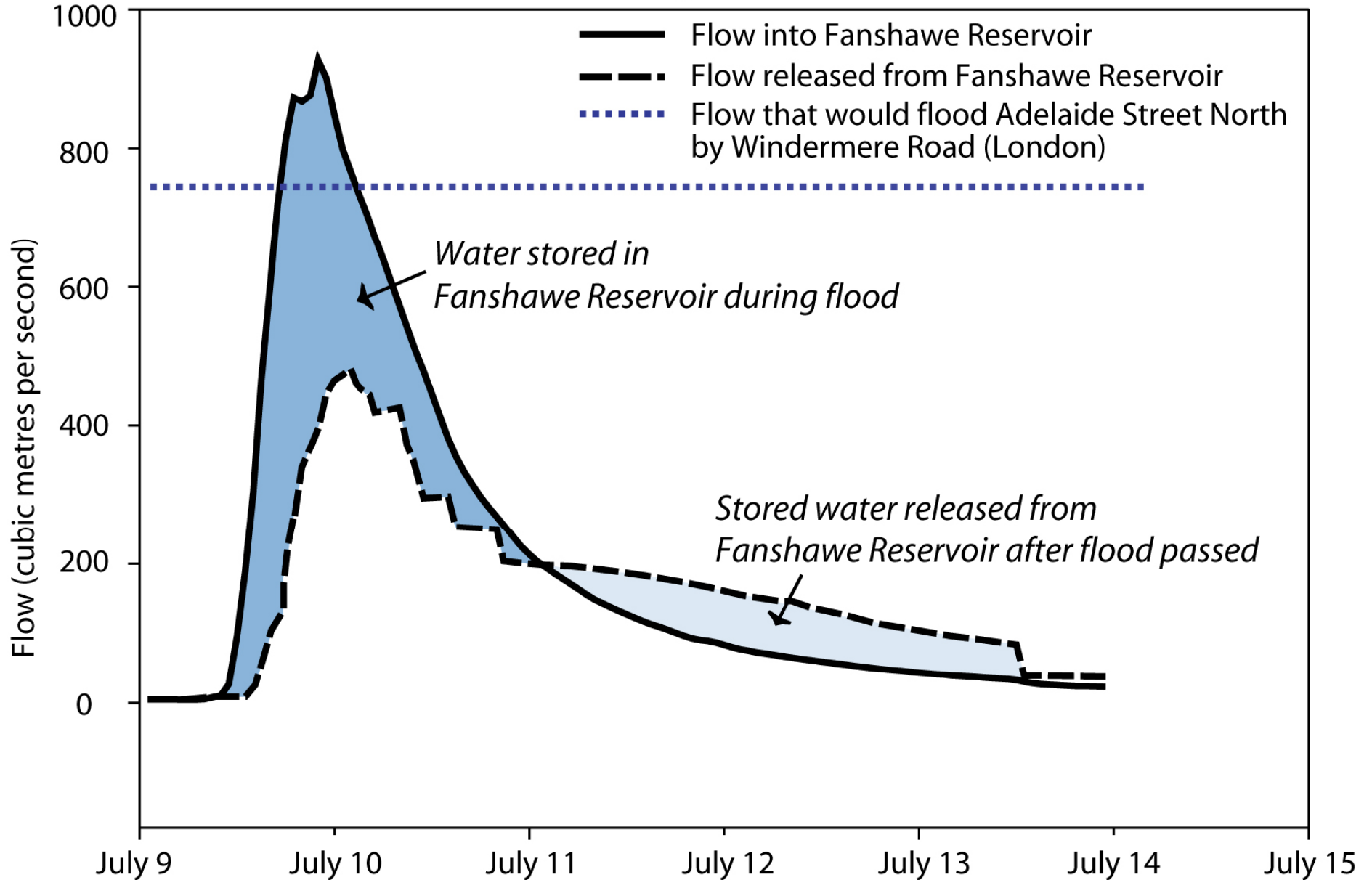


Water Management Infrastructure

- Operation and Maintenance
 - Dams and Reservoirs
 - Dykes and Floodwalls
 - Flood Control Channels
 - Recreation Structures (non-flood control)



Effect of Fanshawe Dam on Flood Flows in the North Thames River July 2000



Wildwood Dam & Reservoir

▶ Balance Multi-uses

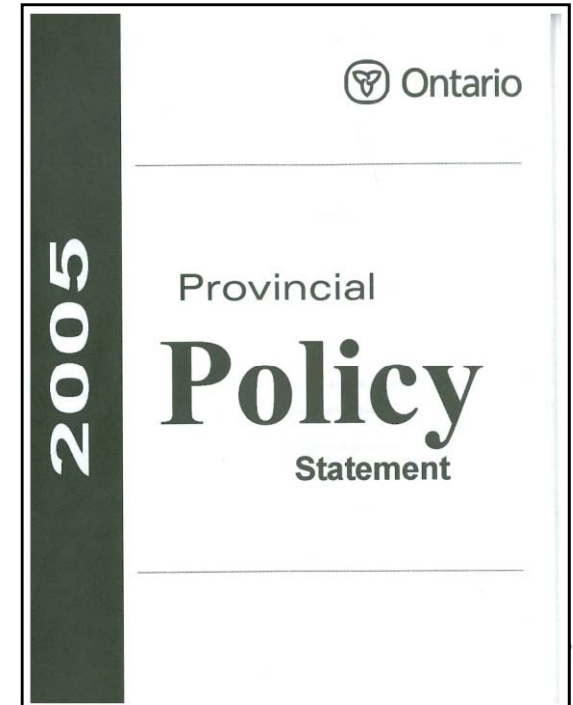
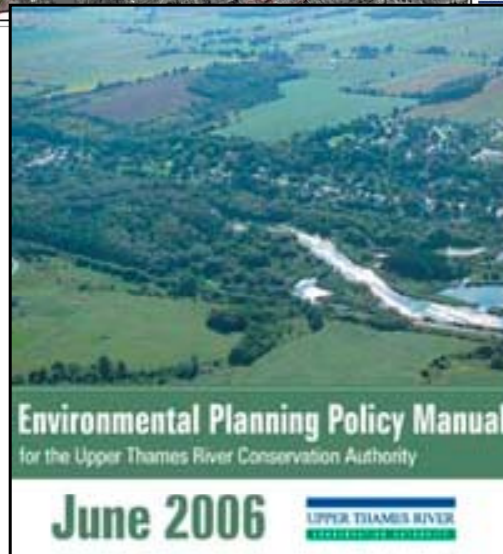
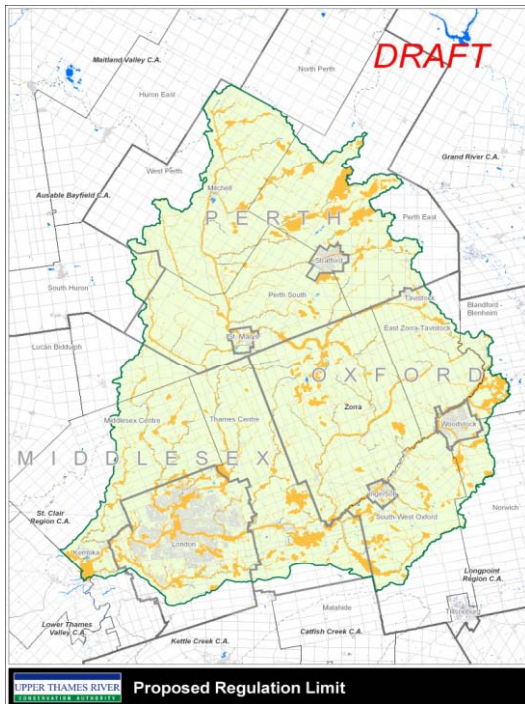
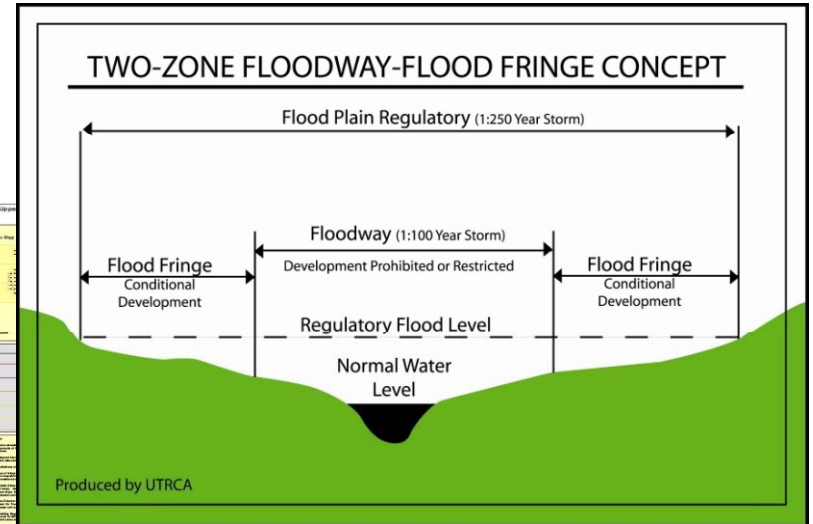
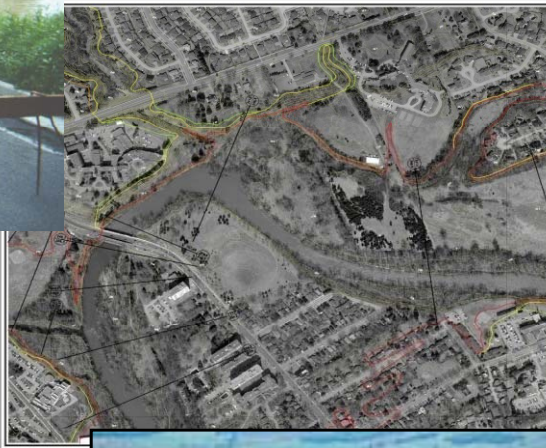
- ▶ Flow Augmentation
- ▶ Flood Control
- ▶ Recreation



▶ Low flow augmentation – water stored in spring (left) and released through summer and fall (right)



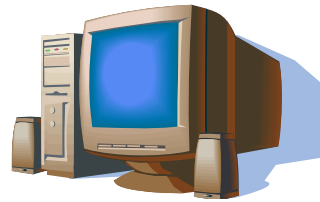
Preventative Measures



Low Water Program



Data



Interpret



Communicate



Water Quantity Management - Challenges

- Aging Infrastructure
- Land-Use / Population Change
- Political / Policy Change



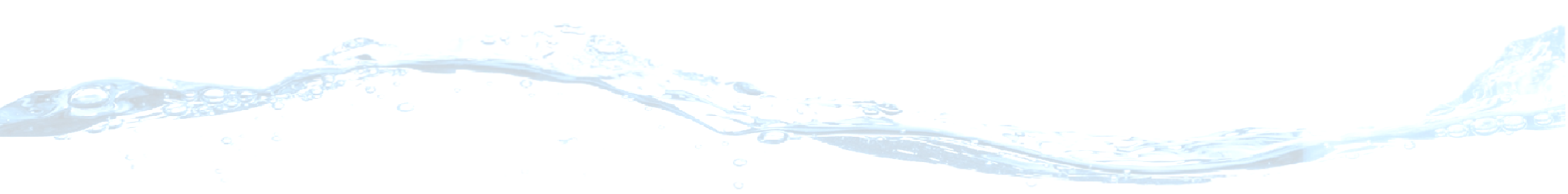
Water Quantity Management - Challenges

- State of the Science
 - Data Management
 - Hydrologic and Hydraulic Models



- Climate Change





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A Local Perspective on Climate Change



Mark Shifflett



Senior Water Resources Engineer
Upper Thames River Conservation Authority

A Local Perspective on Climate Change



- What we know
- Predicting the future
- What can we do
 - Mitigation
 - Adaptation
 - Understanding

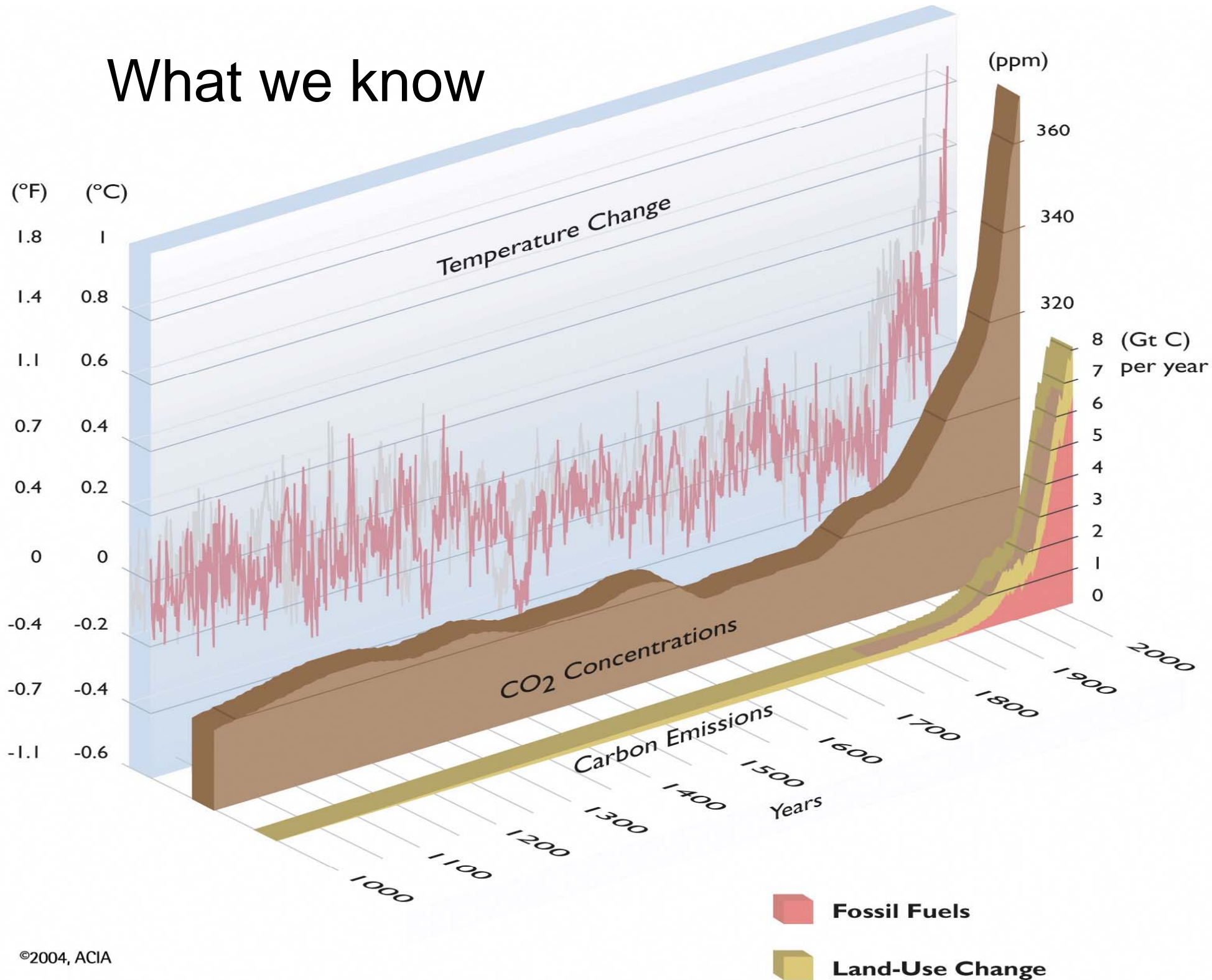


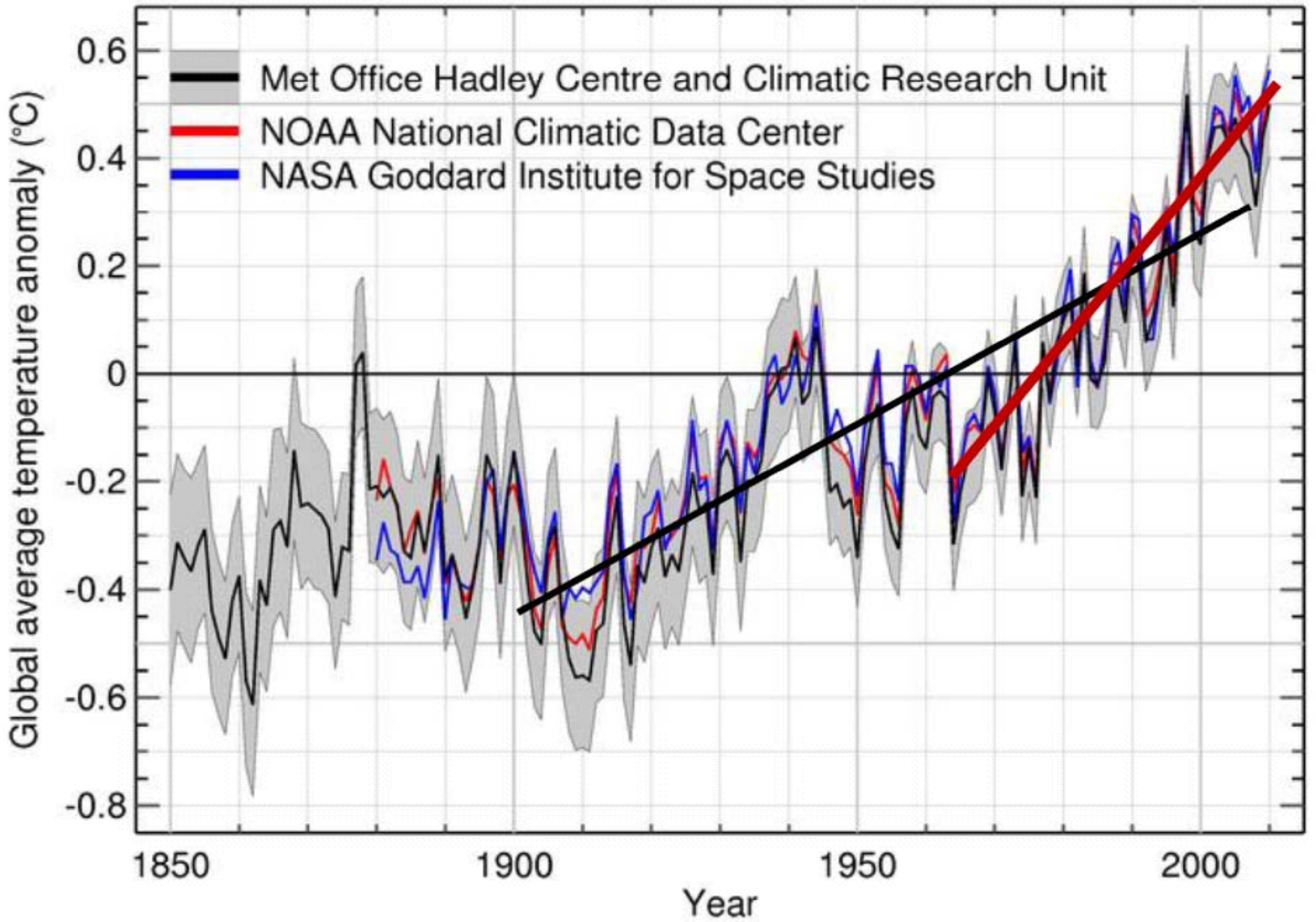
What we know



The climate is changing

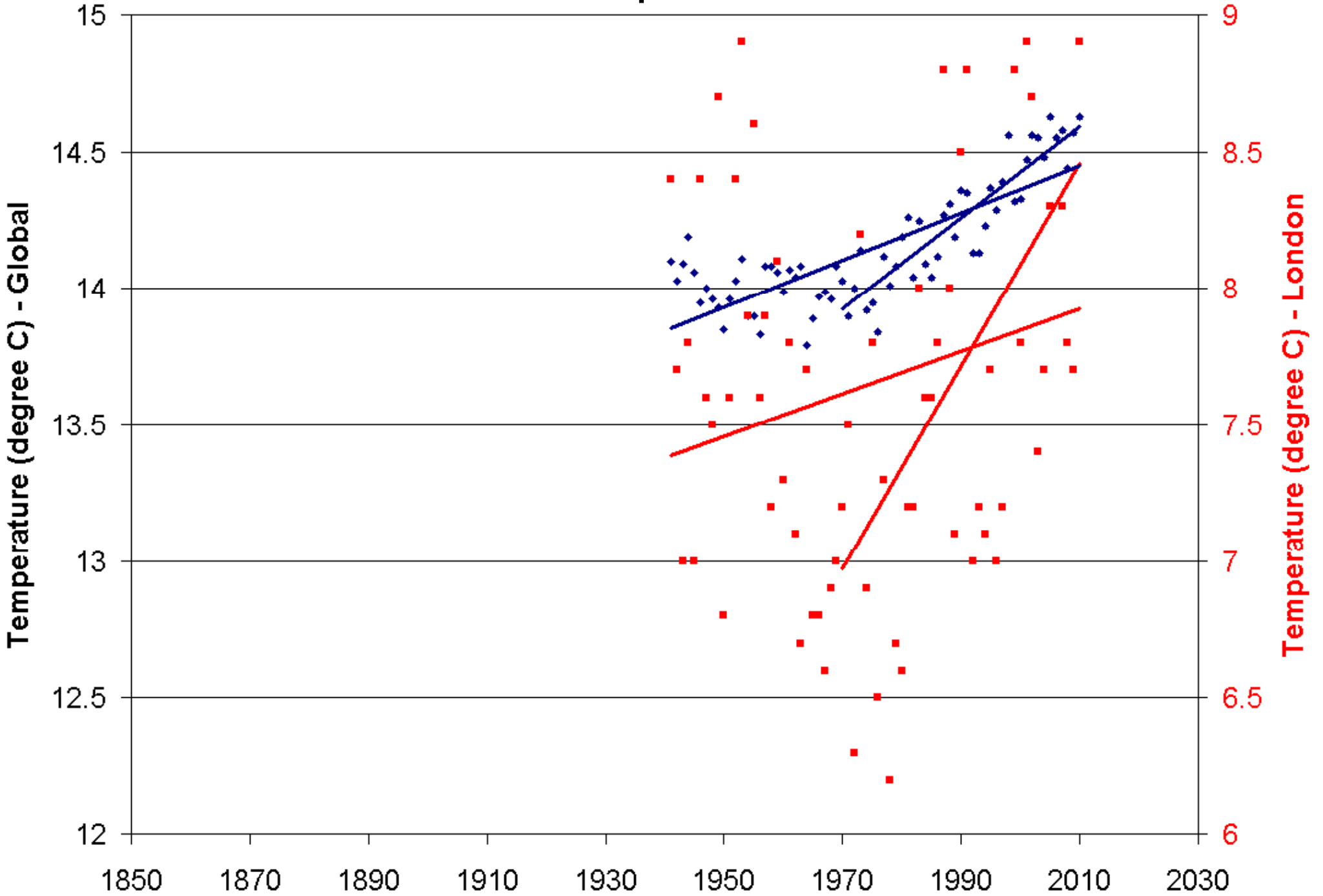
What we know



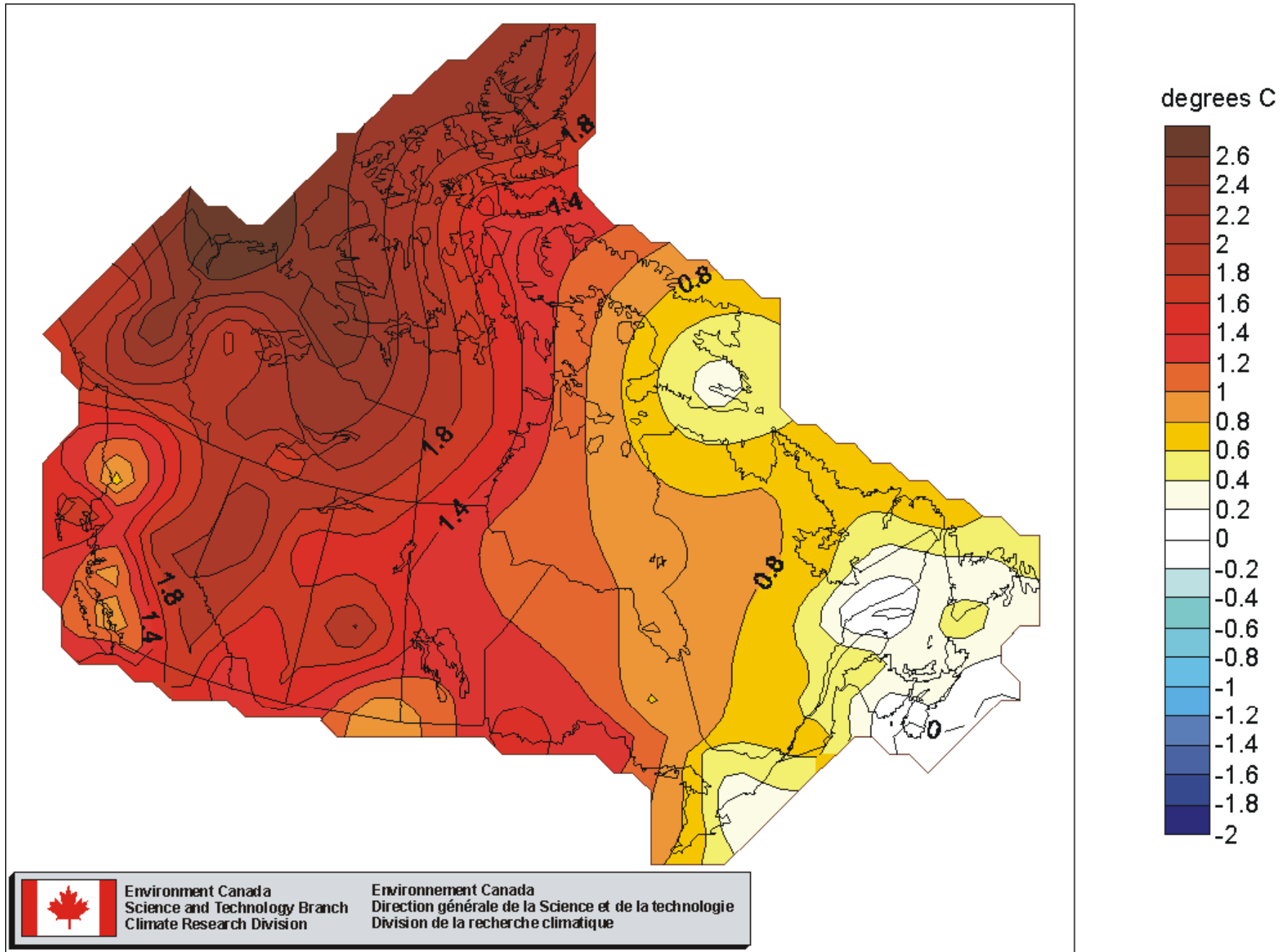


Graphic Source: Gord McBean, UWO

Local Air Temperature Trend

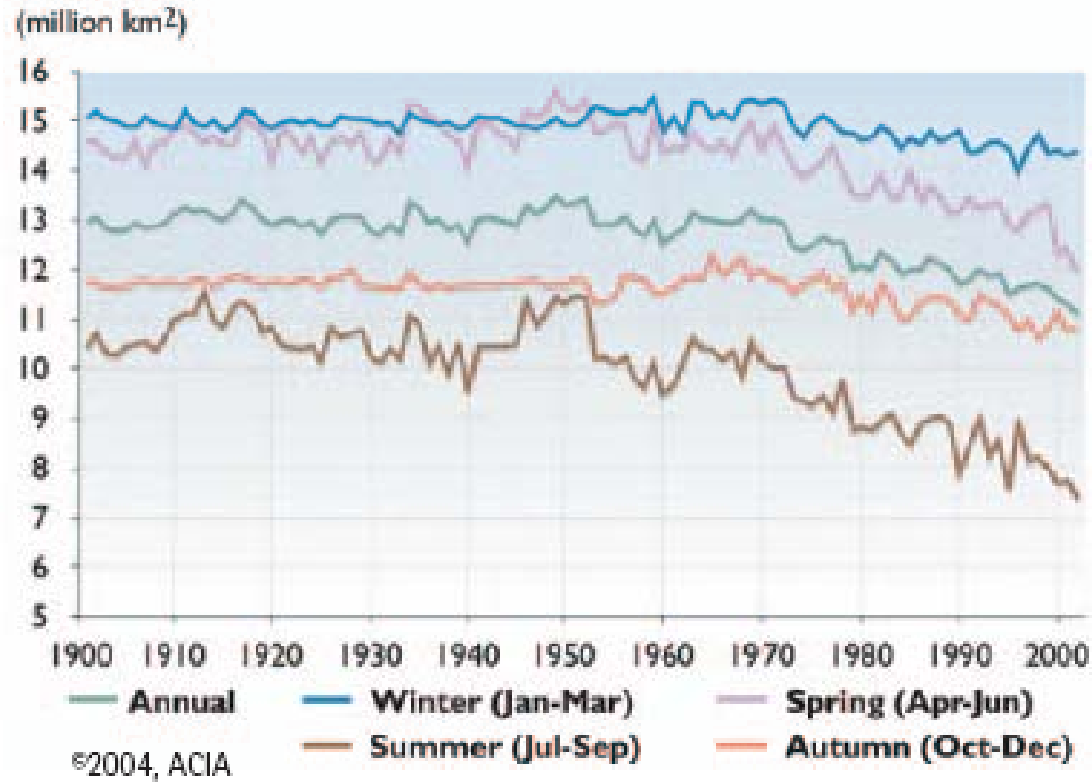


Annual Temperature Trend, 1948-2008



Observed seasonal Arctic sea-ice extent (1900-2003)

What
we
know

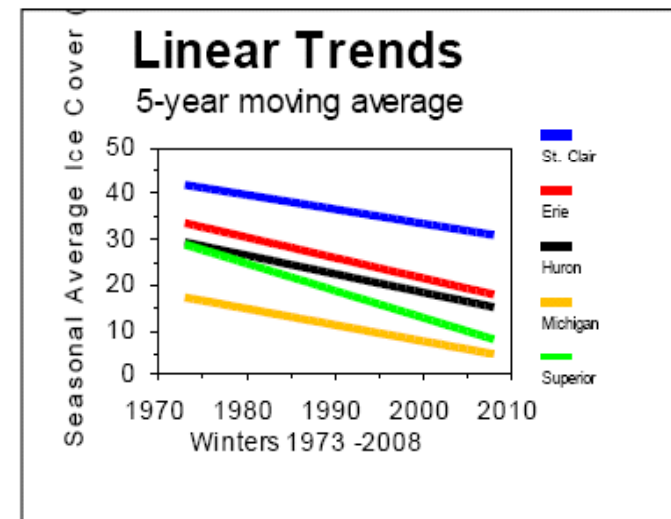
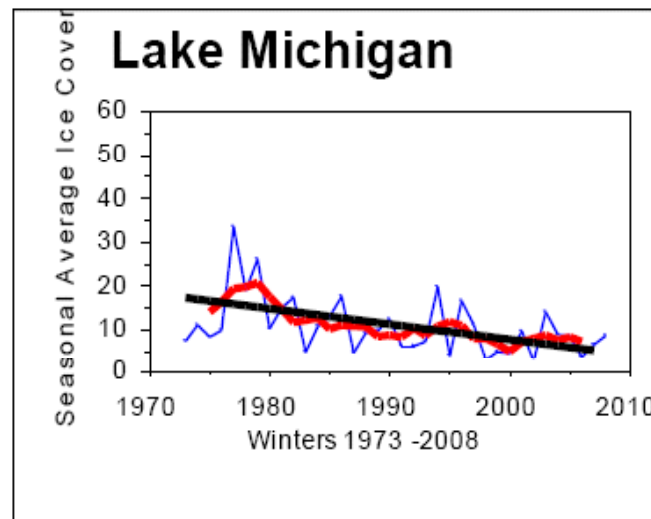
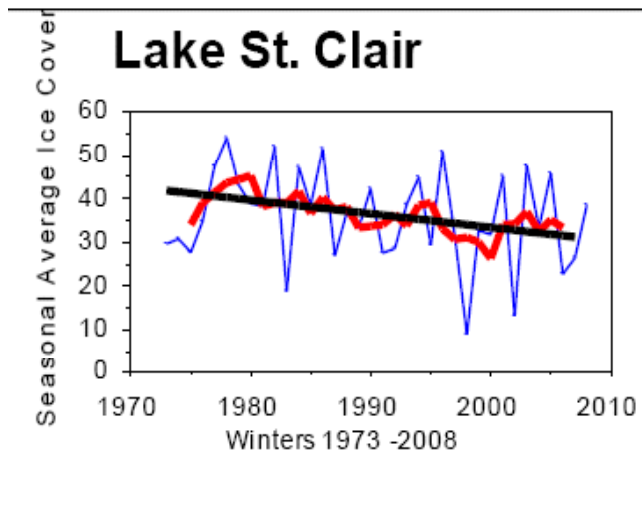
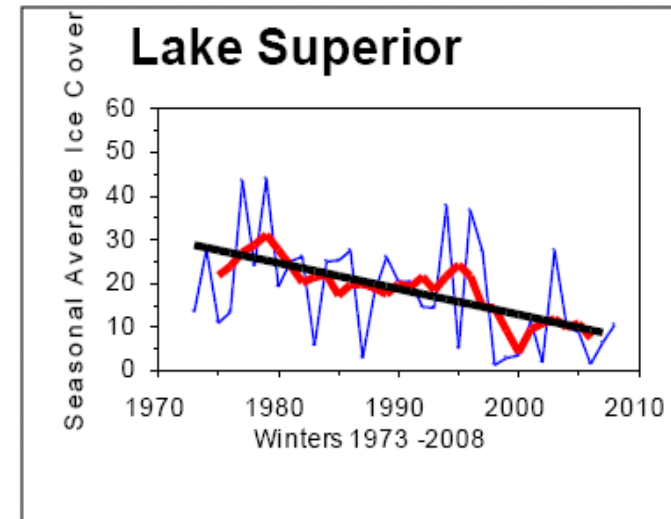
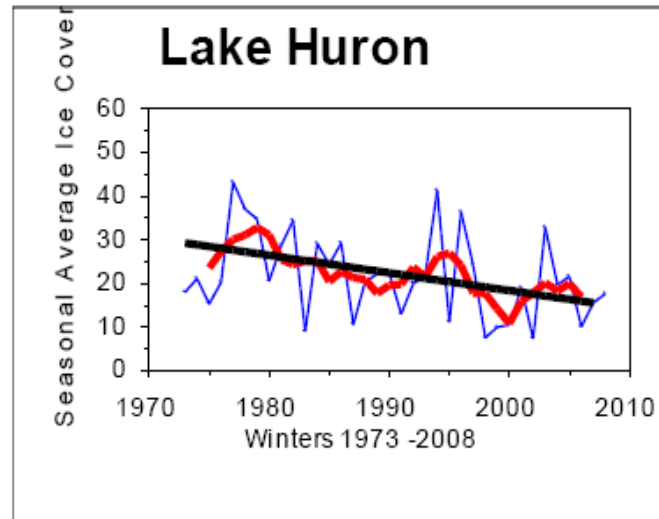
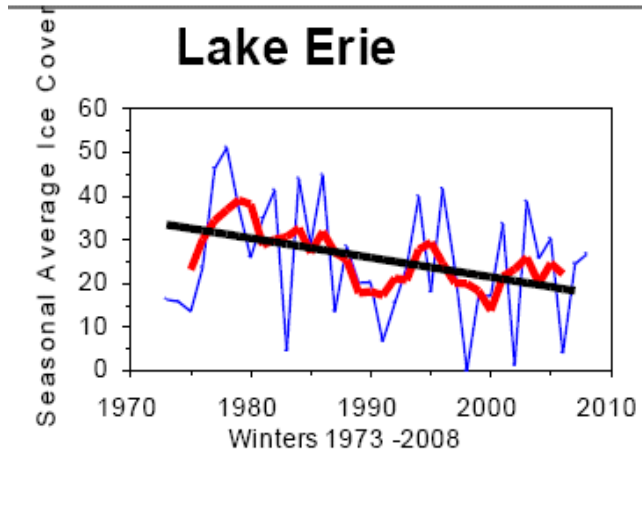


Observed sea ice September 1979

Observed sea ice September 2003



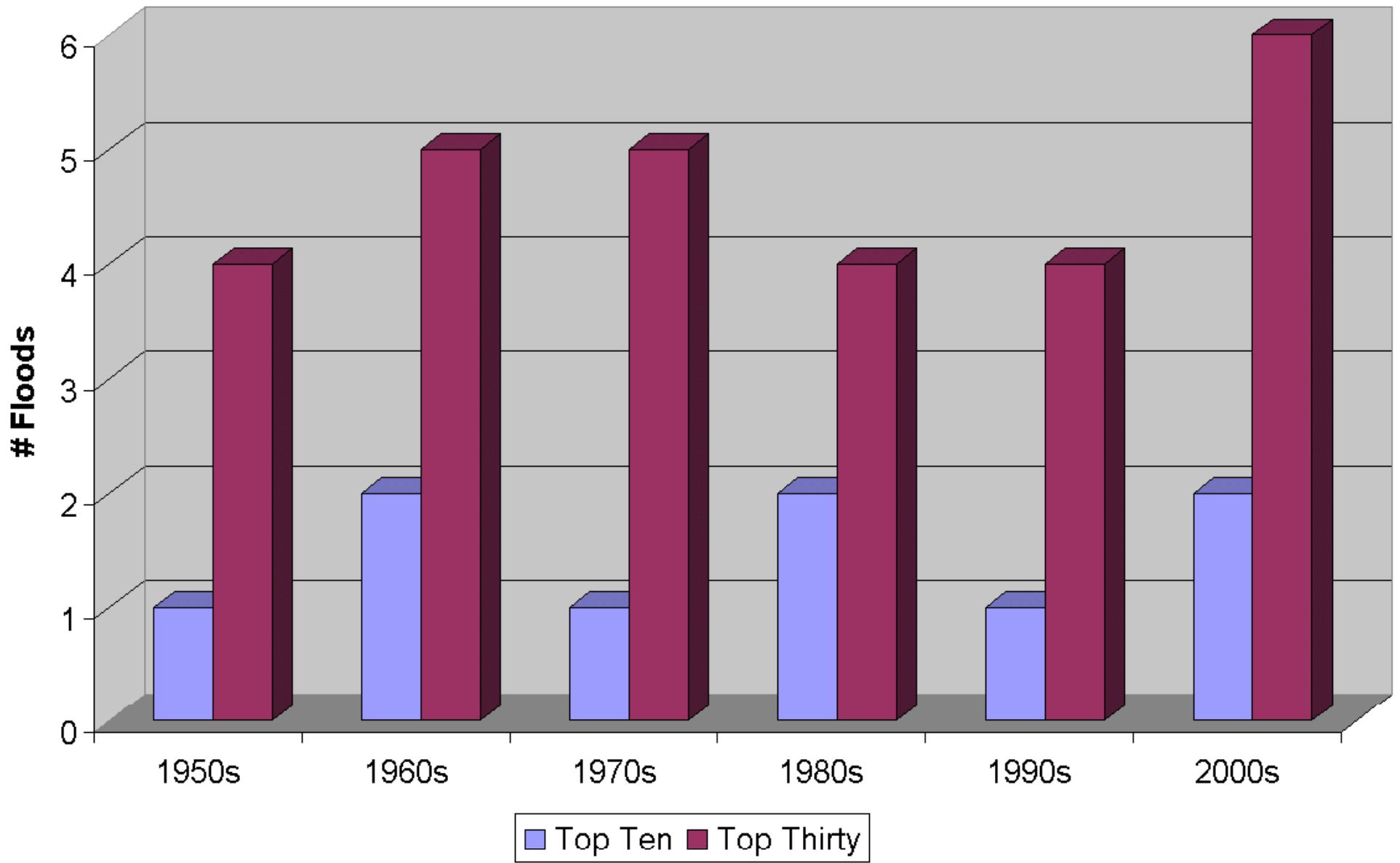
Reduction in duration & thickness of lake & river ice



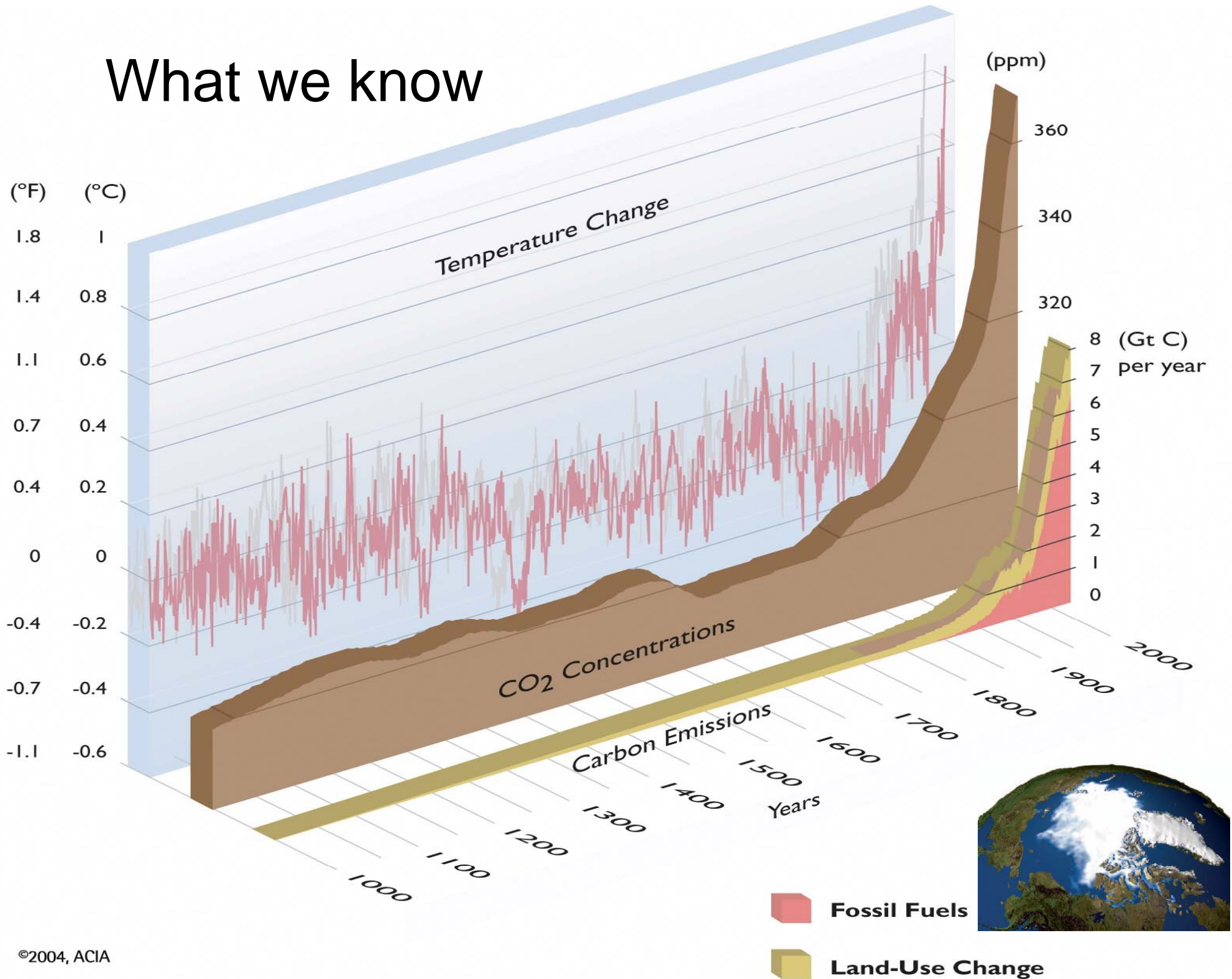
Climate Change ? ?



Medway Creek - Flood Events

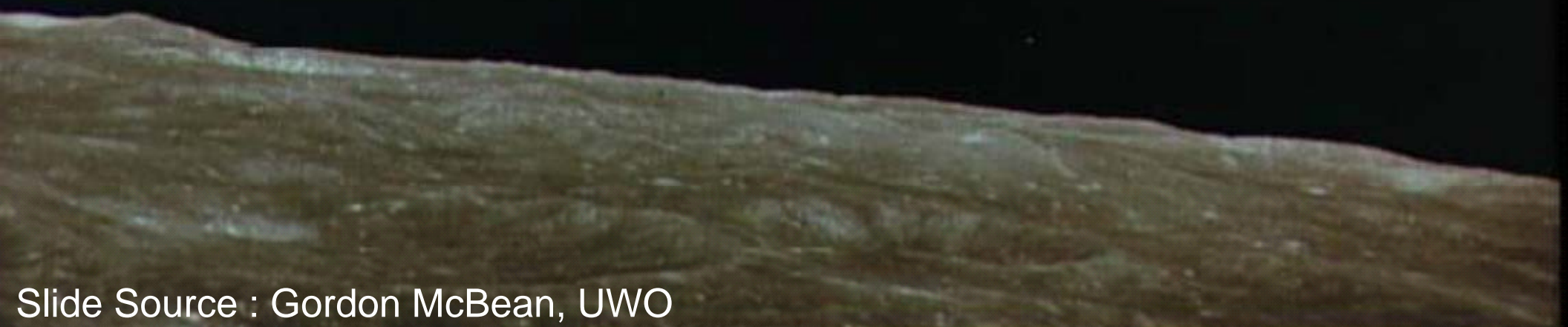


What we know

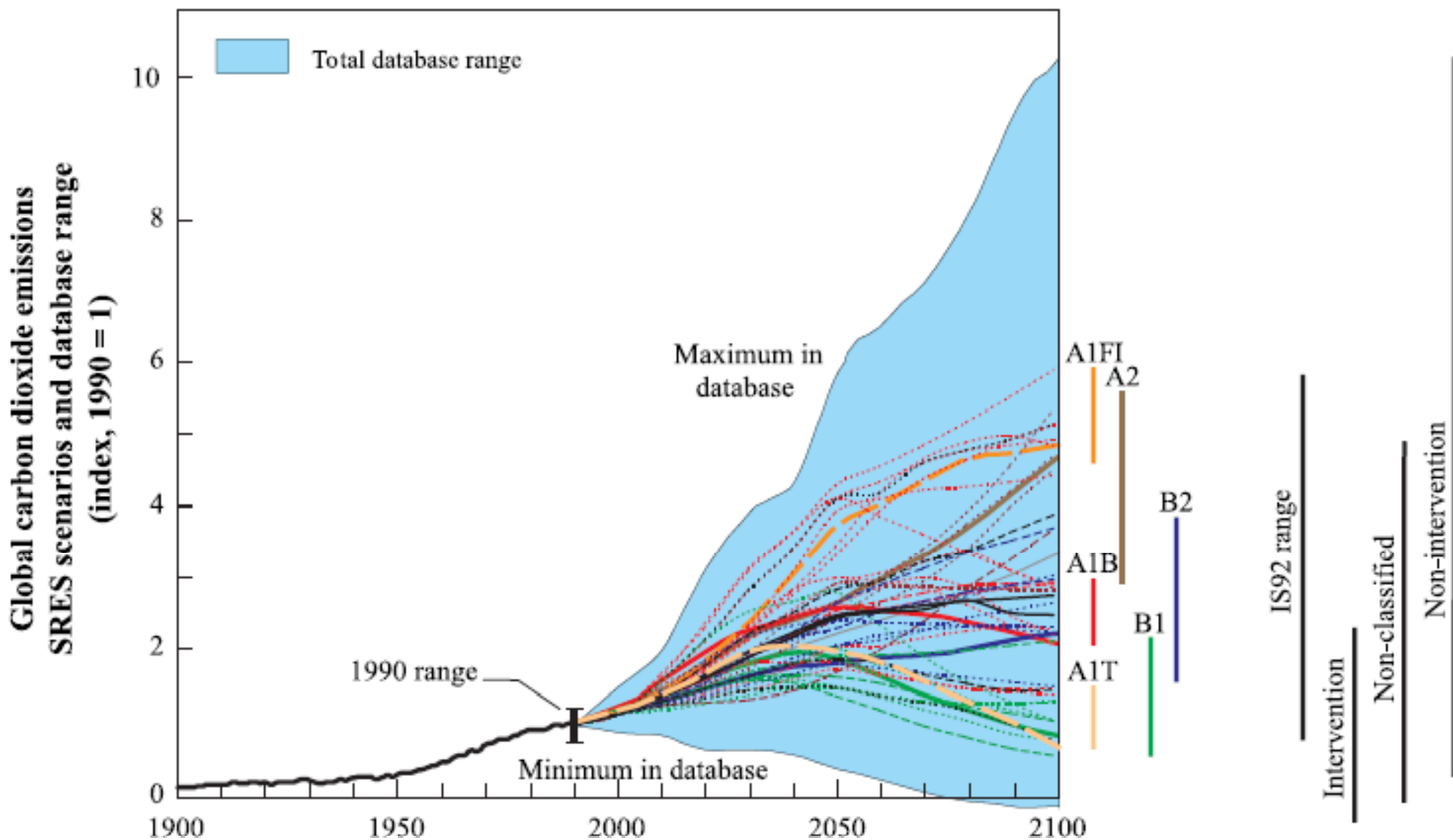




Projections for future

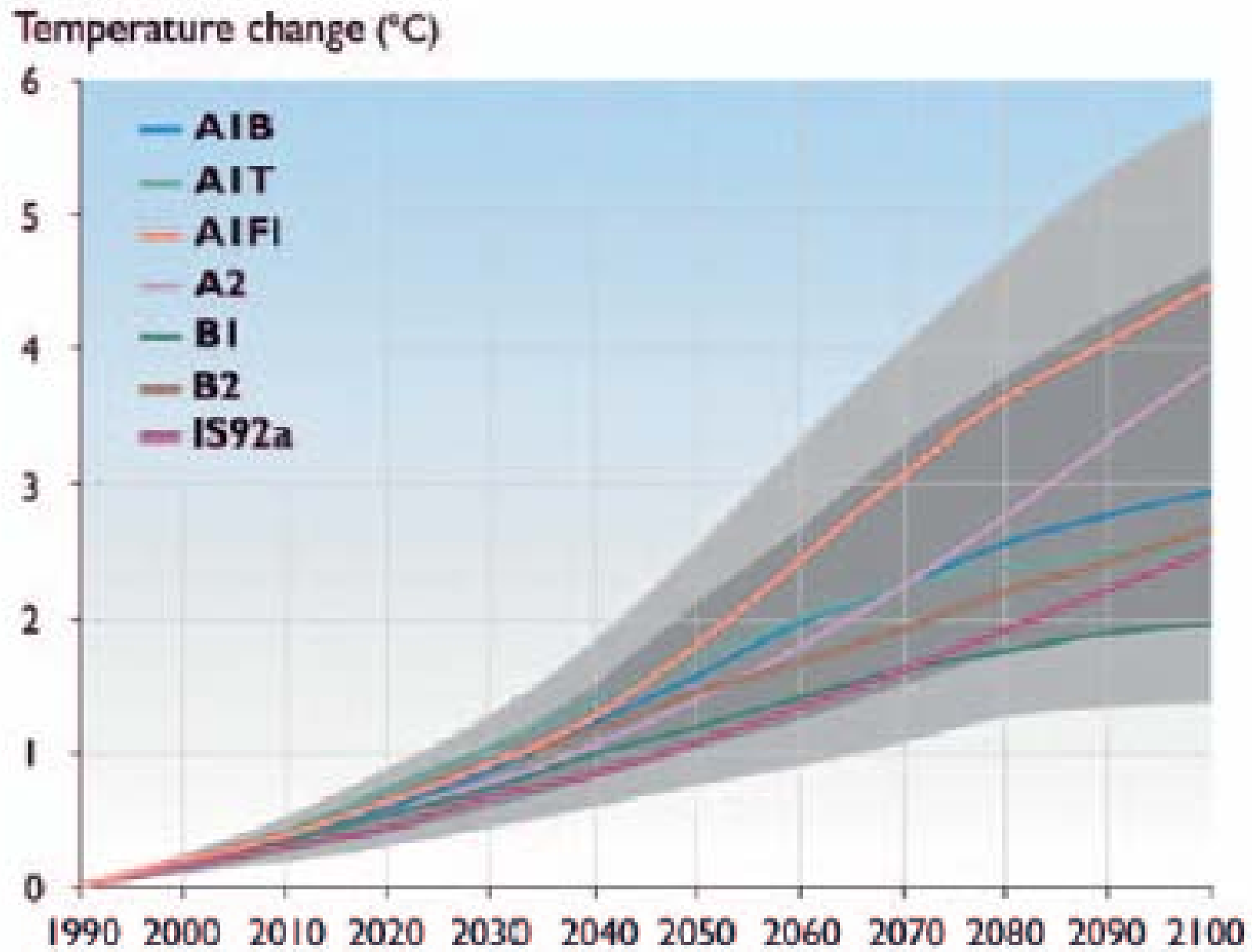


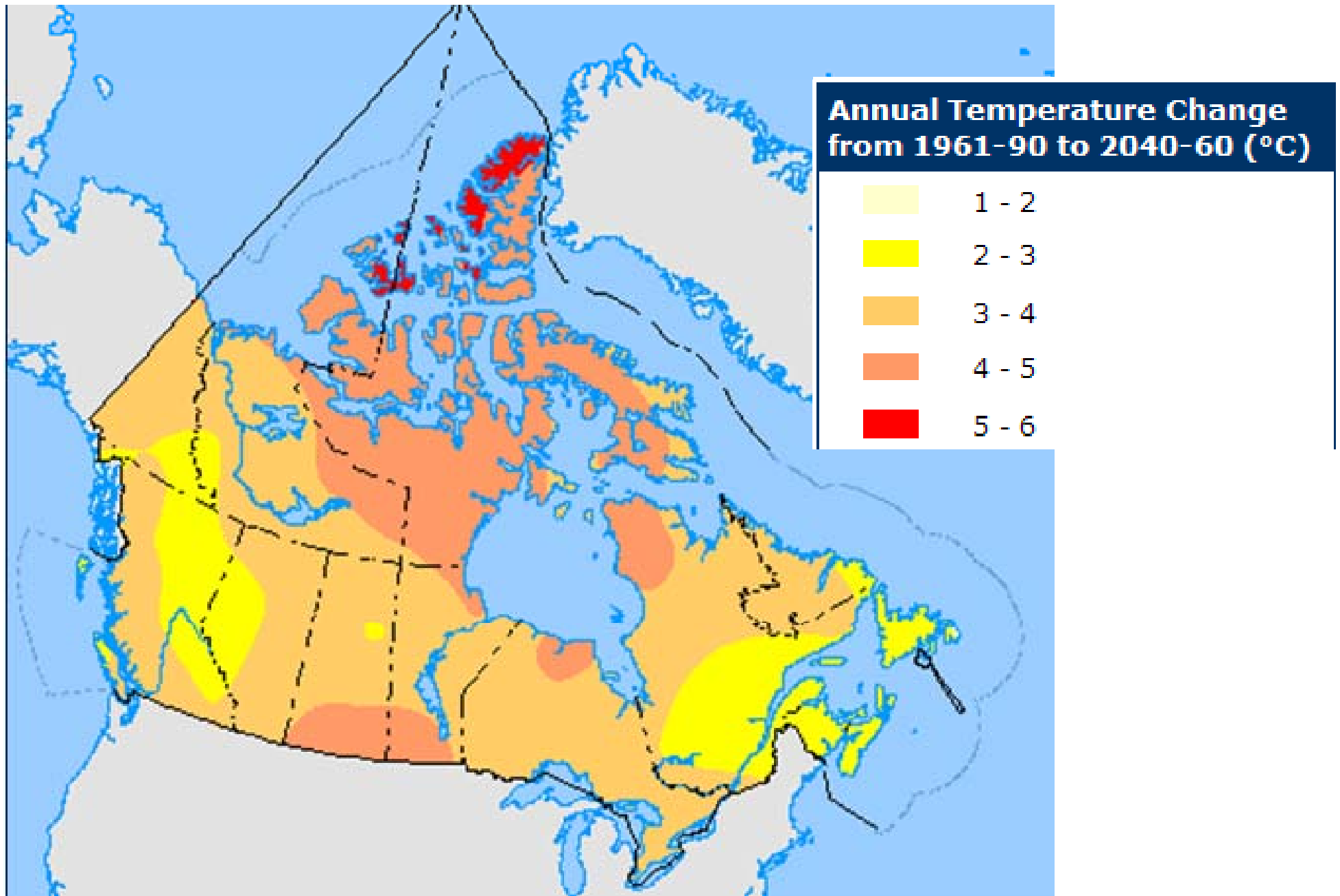
Future Projections - Carbon Dioxide Emissions



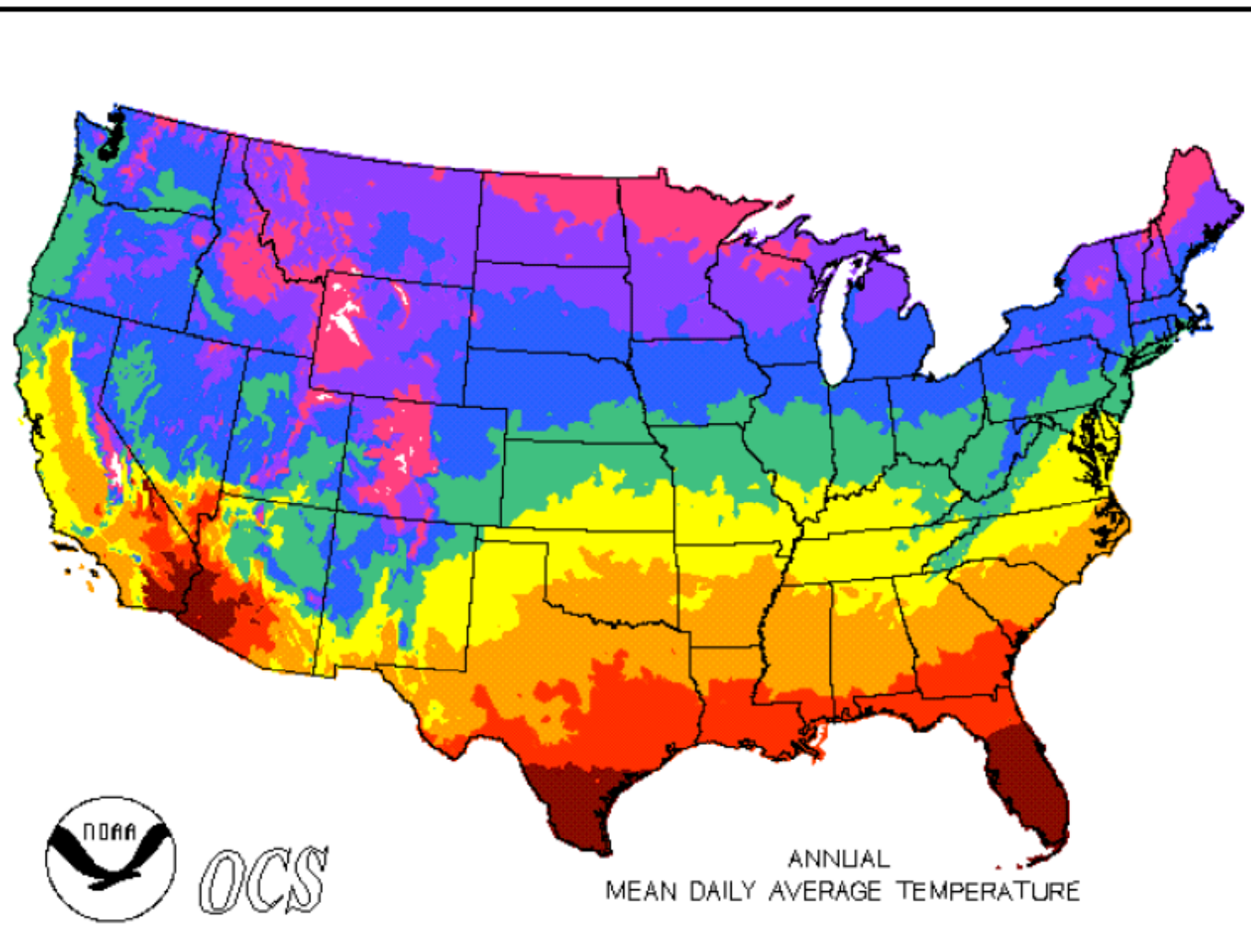
Source: IPCC Report to Policymakers – Emission Scenarios

Projected Global Temperature Rise





Source: 'The Atlas of Canada', National Resources Canada



STATES
 13 MEAN DAILY AVG TEMP (DEG_F)
 - ANNUAL -
 A < 32.0
 B 32.0 - 40.0
 C 40.1 - 45.0
 D 45.1 - 50.0
 E 50.1 - 55.0
 F 55.1 - 60.0
 G 60.1 - 65.0
 H 65.1 - 70.0
 I > 70.0
~ TITLE



OCS

ANNUAL
MEAN DAILY AVERAGE TEMPERATURE

Projections of Weather Extremes





Future Projections

Effects on Living Things

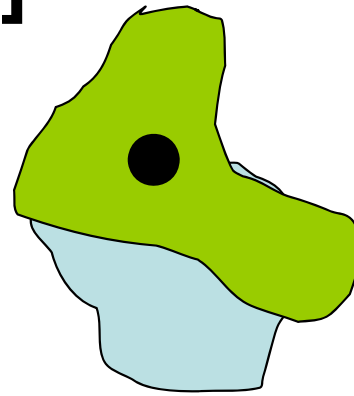


Source :
Gary
Nielsen,
MNR

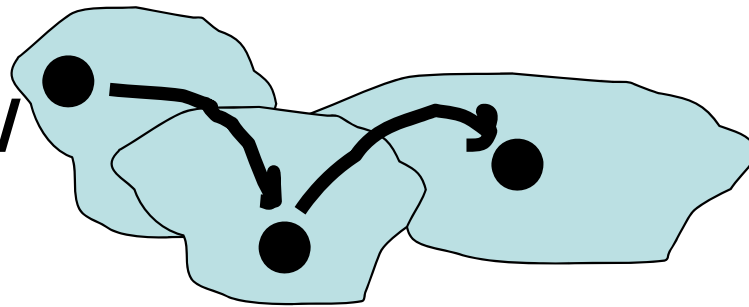


Organism Response to Rapid Climate Change [Adapt, Move, or Die]

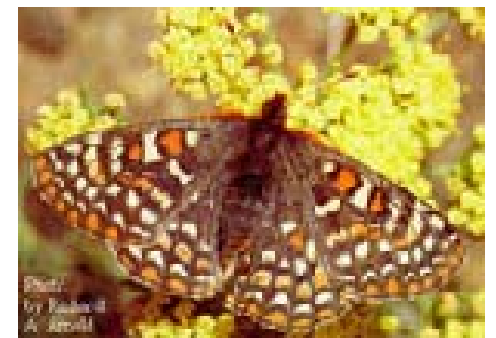
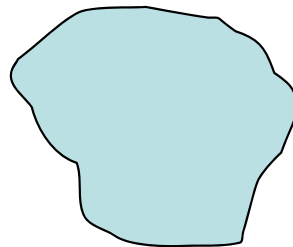
Adaptation/Micro-evolution



**Home Range Change/
Migration**

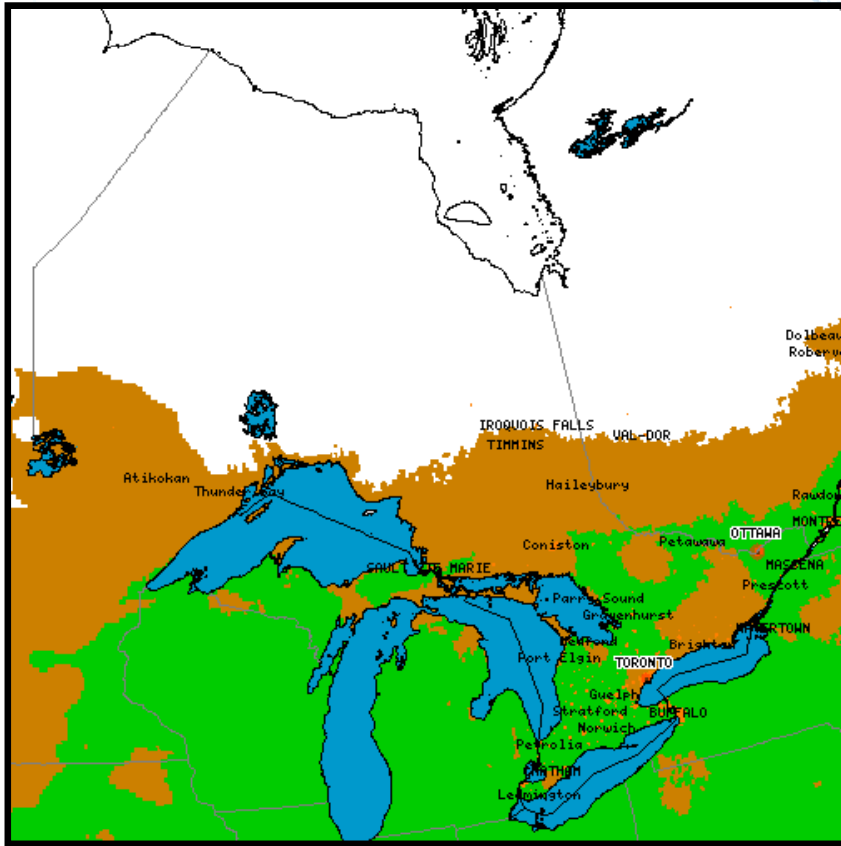


Extirpation/Extinction

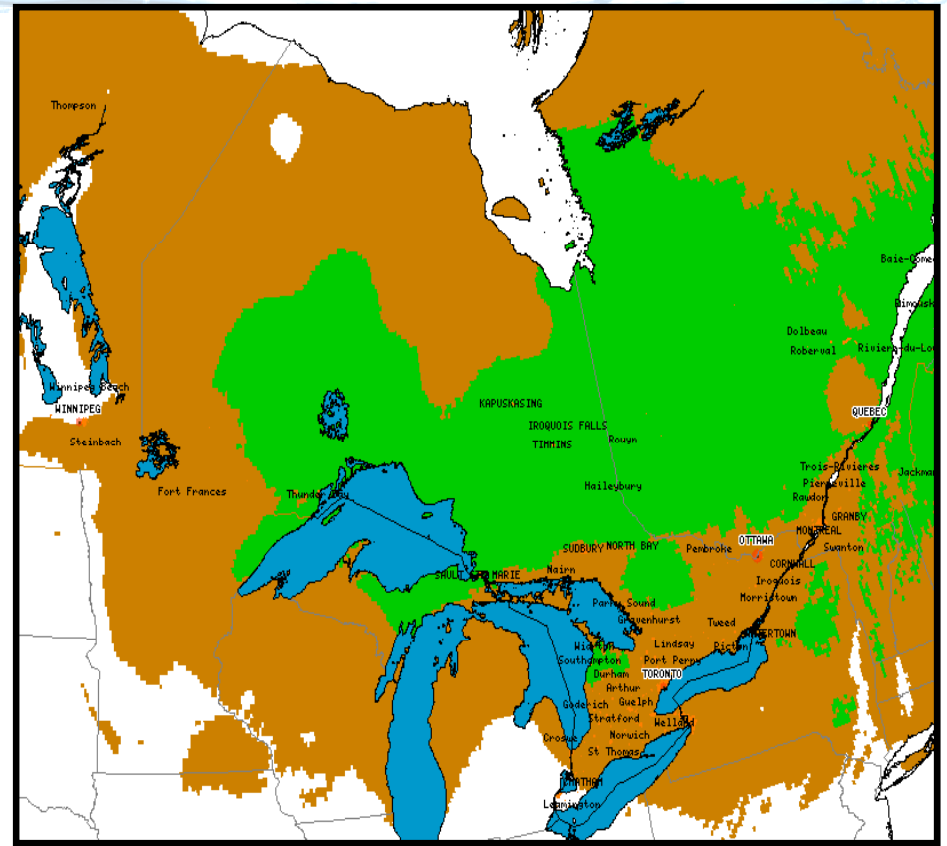


Slide Source : Gary Nielsen, MNR

Future species distribution potentials in Ontario



Red Oak *Quercus rubra* 1971-2000



Red Oak *Quercus rubra* 2071-2100

■ Full Climatic Range
■ Core Climatic Range

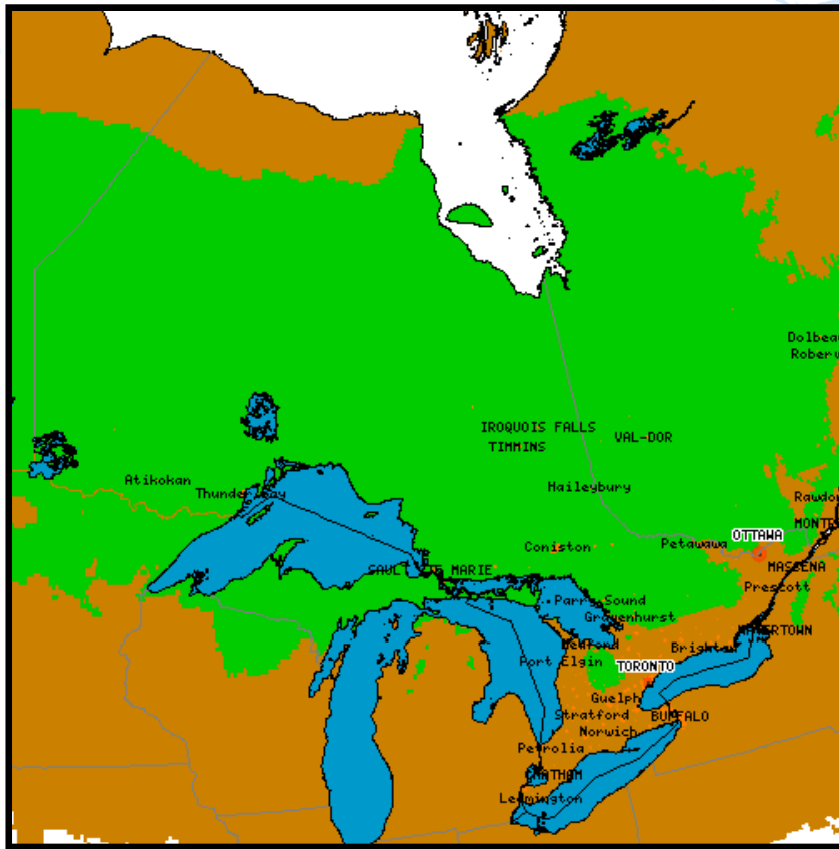
Source: Dan McKenney, CFS (<http://planthardiness.gc.ca>),

CGCM2, A2

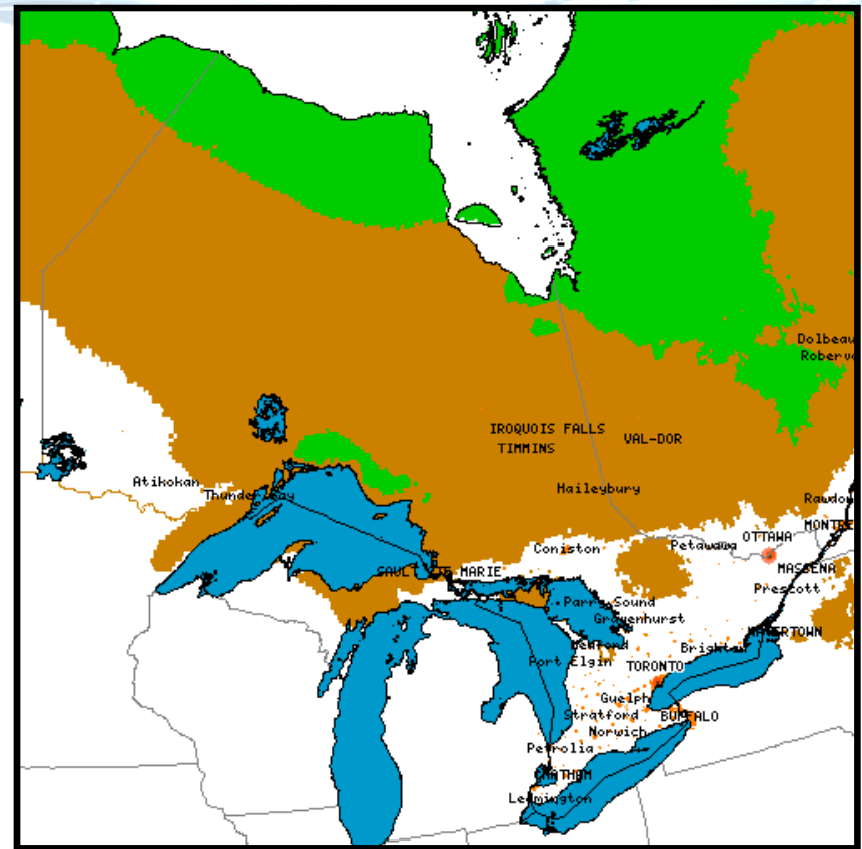
Slide Source : Gary Nielsen, MNR




Future species distribution potentials in Ontario



White Spruce *Picea glauca* 1971-2000



White Spruce *Picea glauca* 2071-2100

-  Full Climatic Range
-  Core Climatic Range

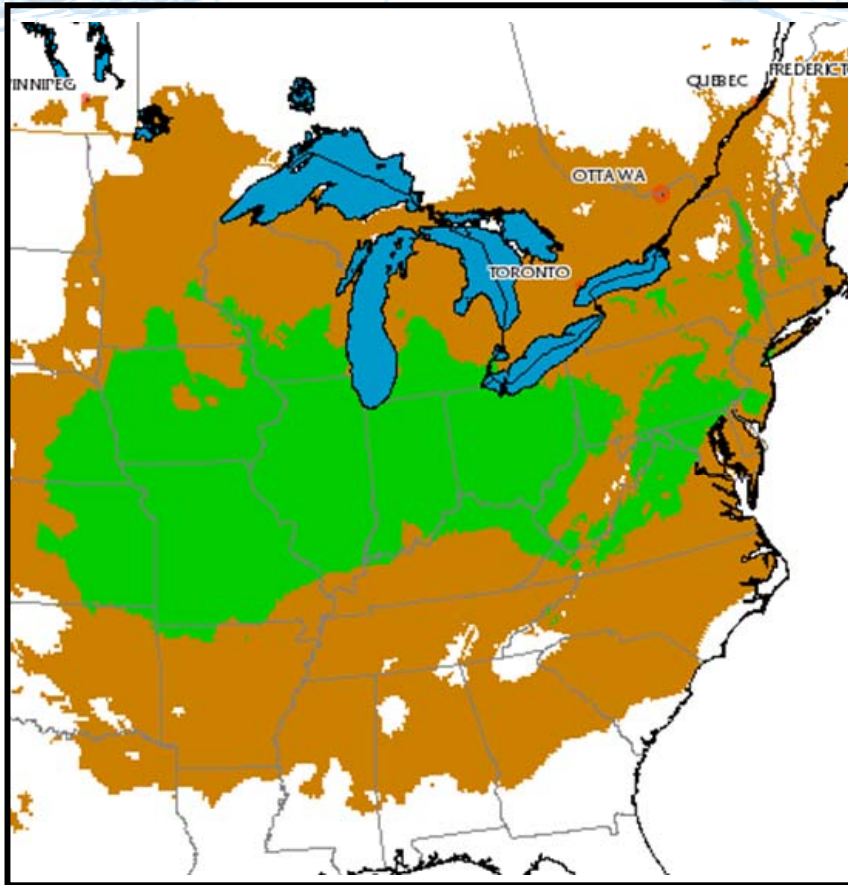
Source: Dan McKenney, CFS (<http://planthardiness.gc.ca>),

CGCM2, A2

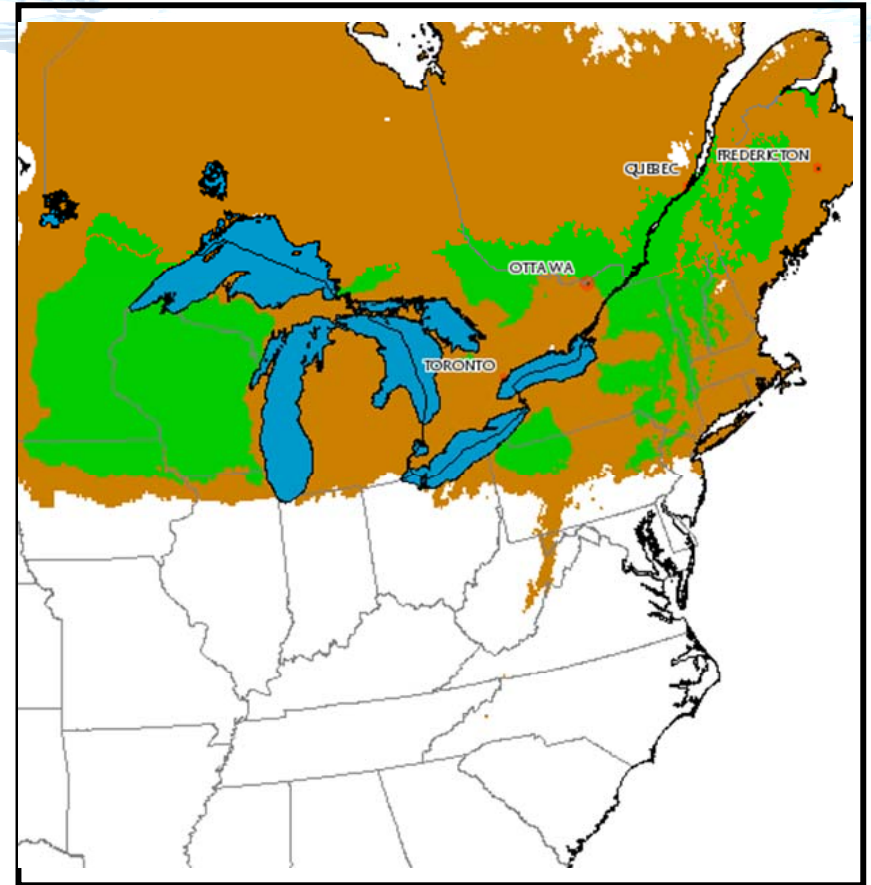
Slide Source : Gary Nielsen, MNR



Future species distribution potentials in Ontario



Kentucky Coffee *Gymnocladus Dioicus* 1971-2000



Kentucky Coffee *Gymnocladus Dioicus* 2071-2100



Source: Dan McKenney, CFS (<http://planthardiness.gc.ca>),

CGCM2, A2

Template Source : Gary Nielsen, MNR



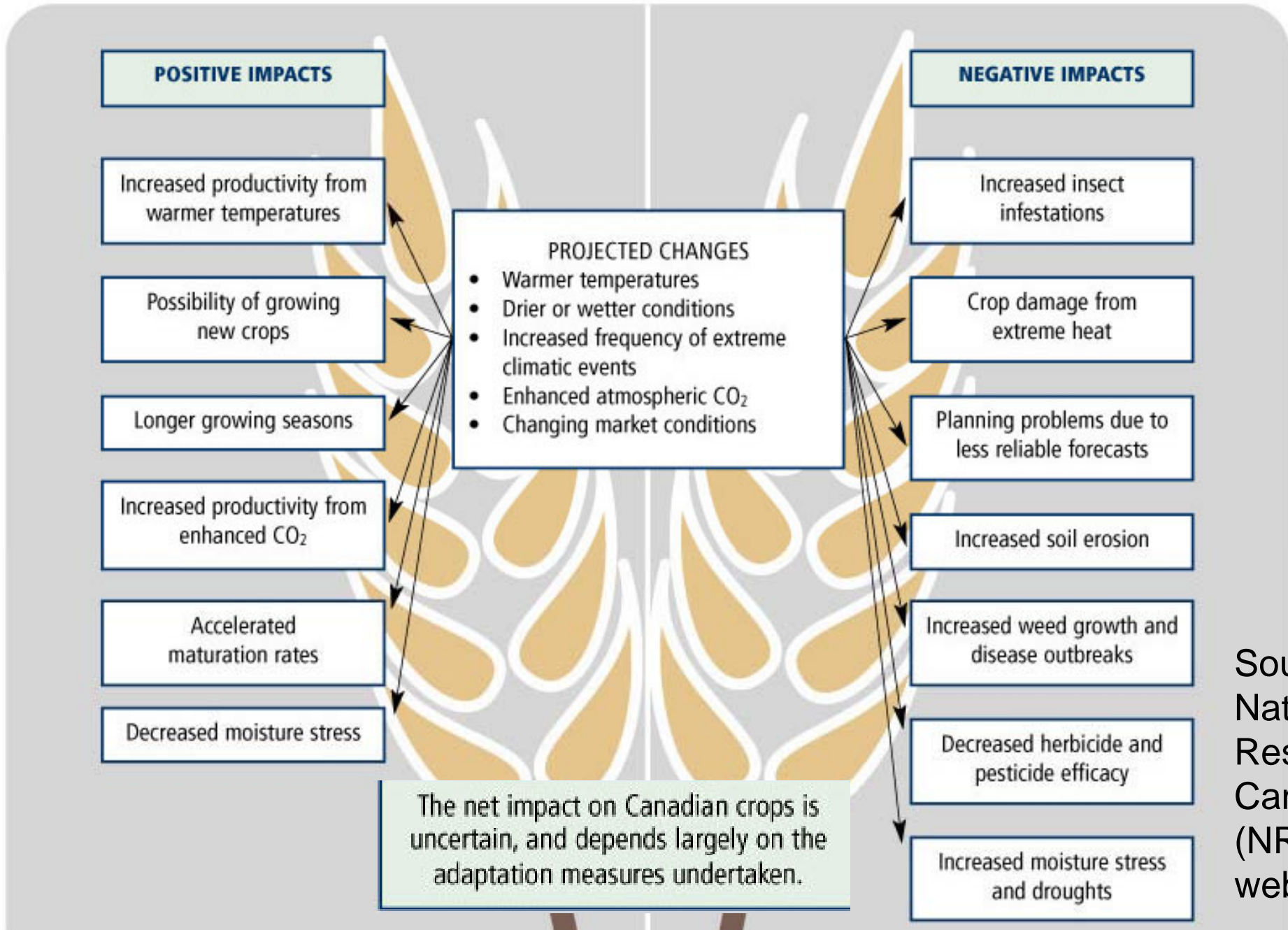


Tulip Tree

Kentucky Coffee Tree

Future Projections – Impacts on Agriculture

Figure 1: Potential impacts of climate change on agricultural crops in Canada



Source:
Natural
Resources
Canada
(NRC)
website

Future Projections – Summary

- Likely Increased Carbon Dioxide



- Increased Temperatures



- Likely Increased Extreme Weather



- Impact Living Things [Adapt, Move, or Die]

-and many more.....



What can we do ?



UPPER THAMES RIVER
CONSERVATION AUTHORITY



Mitigation

Adaptation

Understanding

Research

Education

Water Quantity Management - Challenges

- State of the Science
 - Data Management
 - Hydrologic and Hydraulic Models



- Climate Change



Positive proof of global warming.



**18th
Century**

1900

1950

1970

1980

1990

2006