Collaborating on Climate Change Impacts and Adaptation

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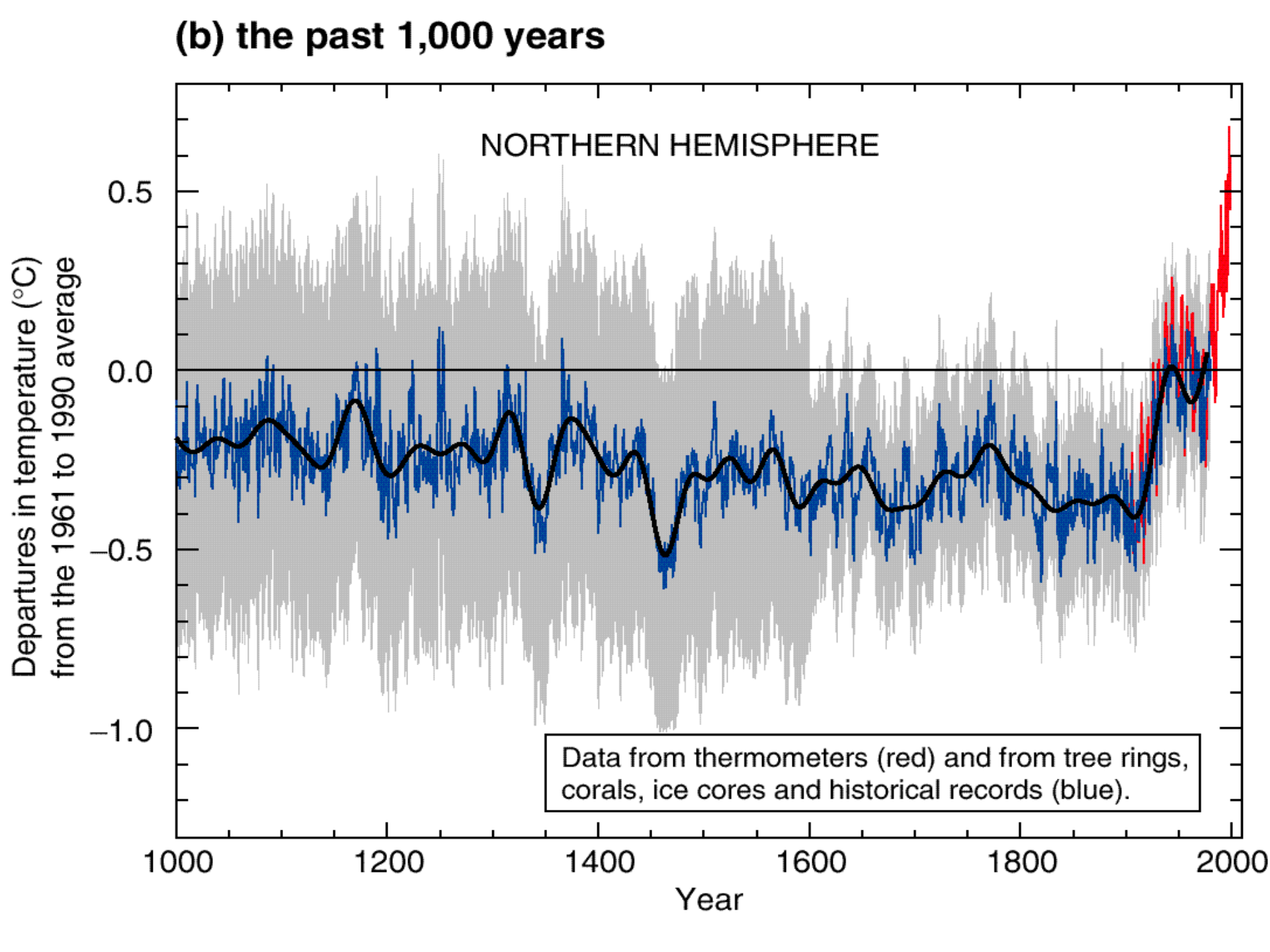
Outline

- Why adaptation?
- Climate change; recent and future
- Major impacts
- Moving from impacts to adaptation
- Government role in I&A
- Opportunities for collaboration

Why Adaptation?

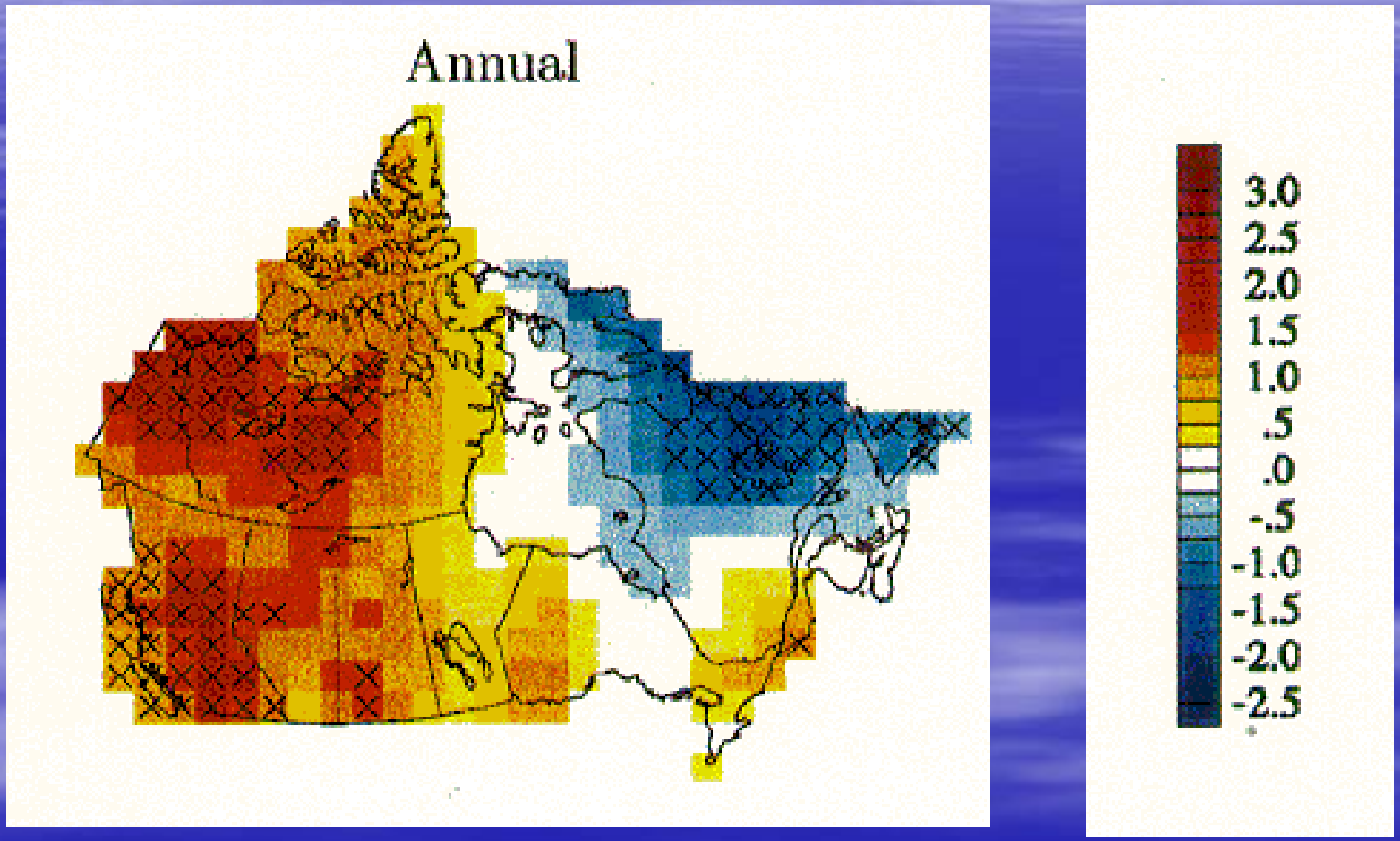
- Possibility of continued global warming presents serious risks to society
- Society needs to understand these risks and consider the need to adapt

Emission reduction policies and measures are not discussed in this presentation


(b) the past 1,000 years
NORTHERN HEMISPHERE
0.5
0.0
−0.5
−1.0
Departures in temperature (°C)
from the 1961 to 1990 average
Data from thermometers (red) and from tree rings,
corals, ice cores and historical records (blue).
1000
1200
1400
1600
1800
2000
Year

Temperature trends in Canada

annual - from 1950–1998

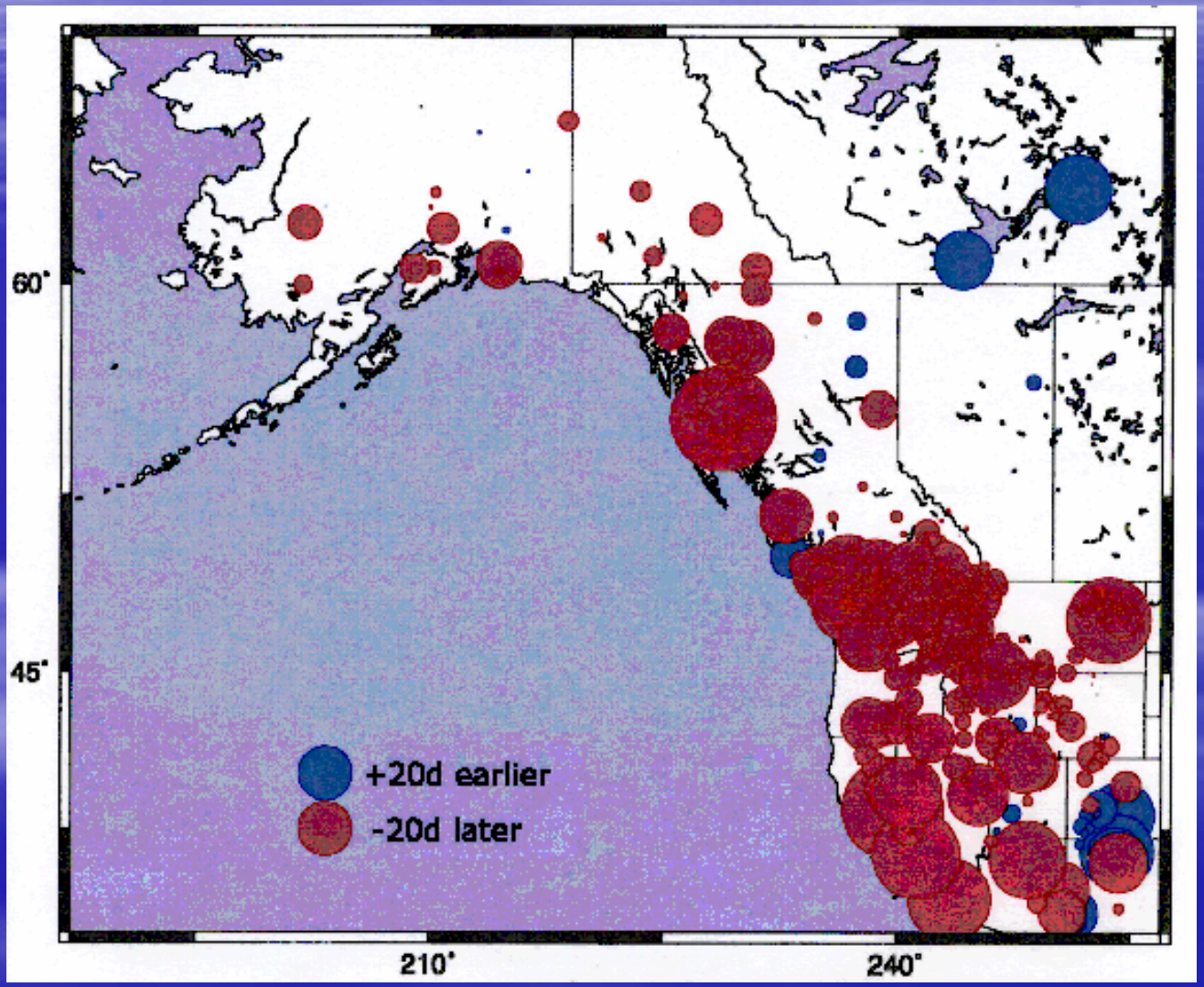


Units are degrees C per 49-year period. Grid squares with trends statistically significant at 5% are marked by crosses.

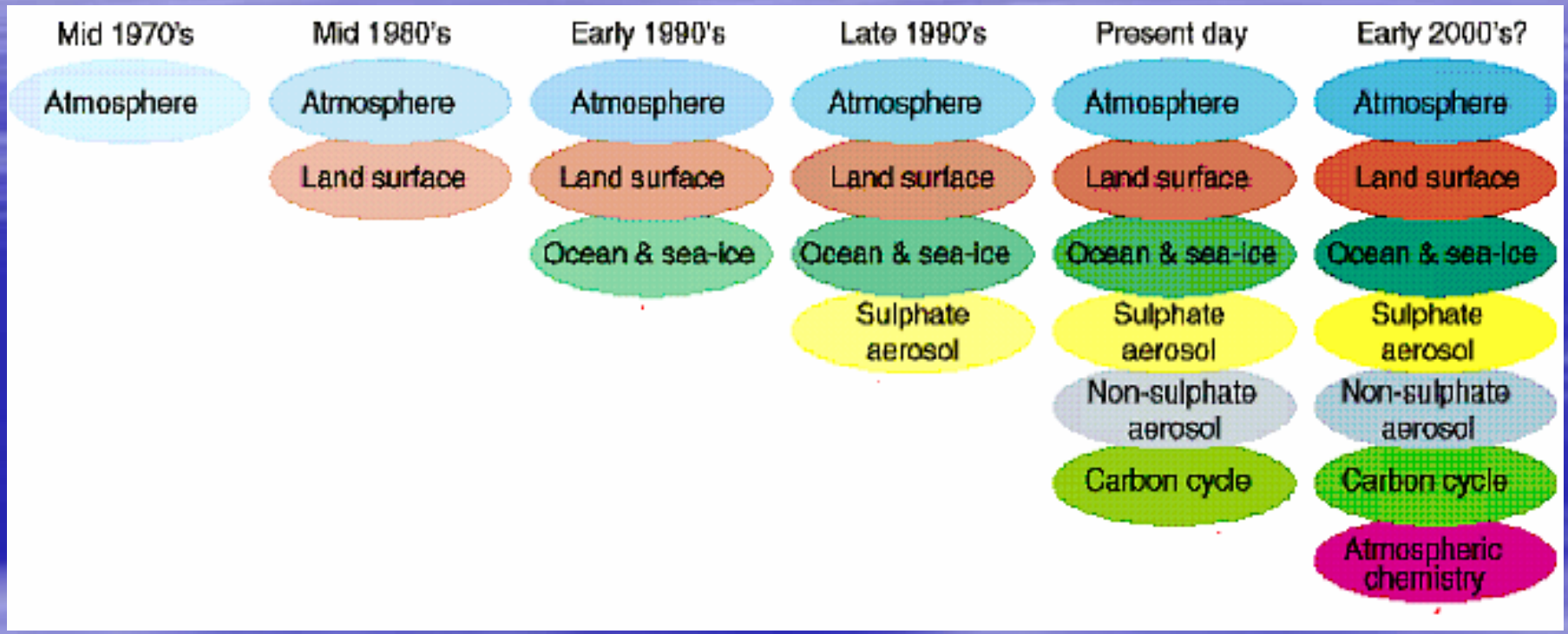
Source: Zhang et al, 2000

Snowmelt starting sooner

(1948-2000)

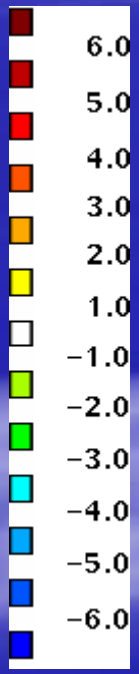


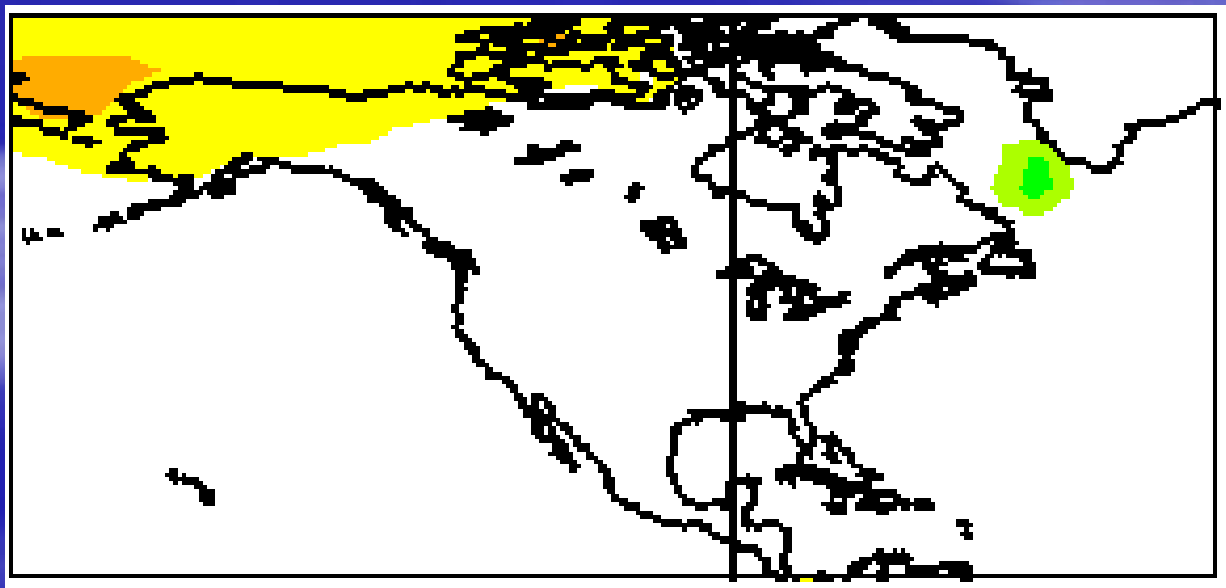
Evolution of global climate models



Research Centers: Canada, US, UK, Germany, Australia, Japan

North America Simulation
5 year Mean Surface Temperature
Change Relative to Current Conditions
Starts 1990
Ends 2100

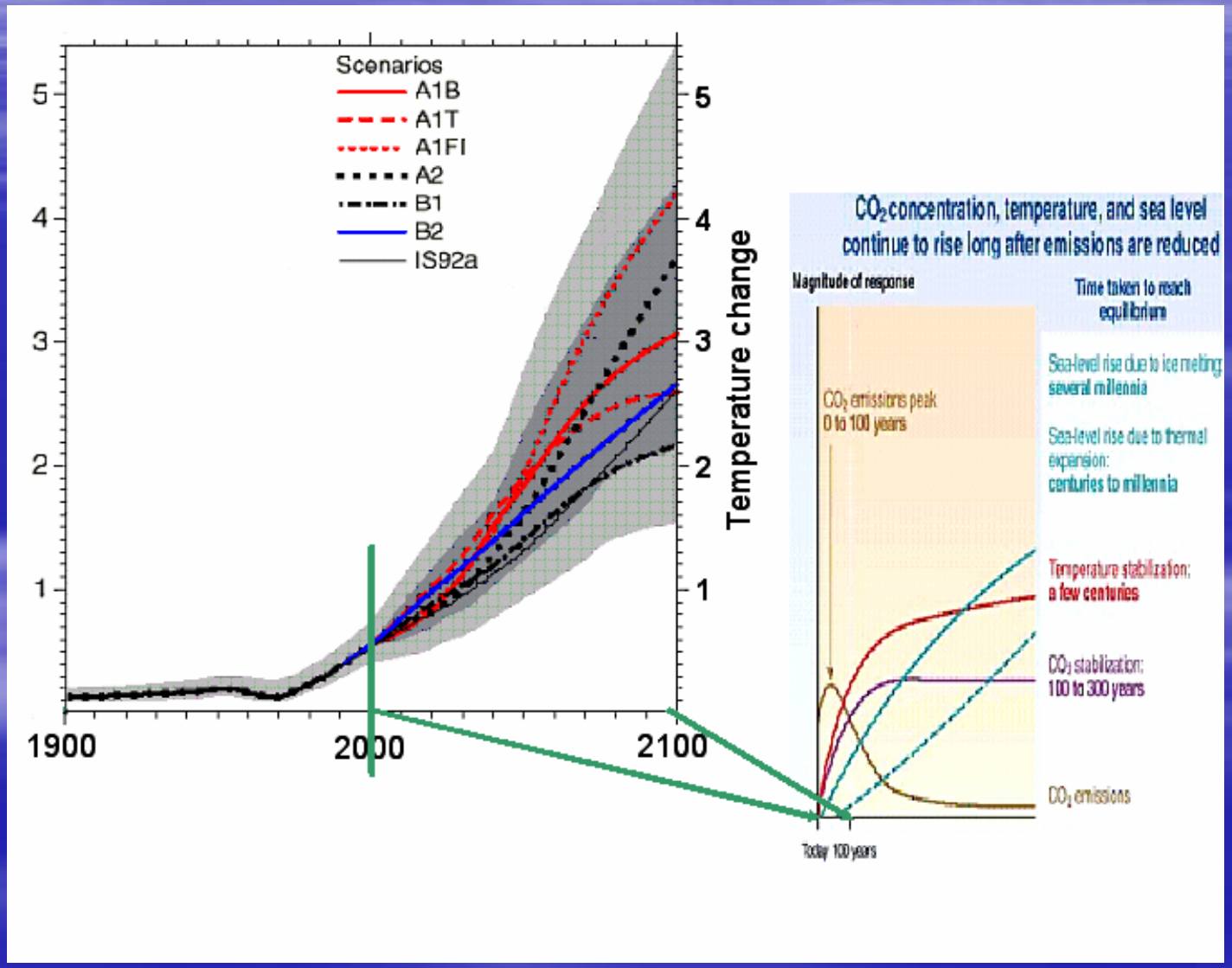




Year: 1990

CGCM2 GHG+

Warming expected for 100-200 years for all emission scenarios



Western US/Canada Major Impacts

Assuming model simulations are correct

- Coastal zone
- Water Resources
- Fisheries
- Vegetation
- Agriculture
- Forests
- Economy

Sea Level Rise

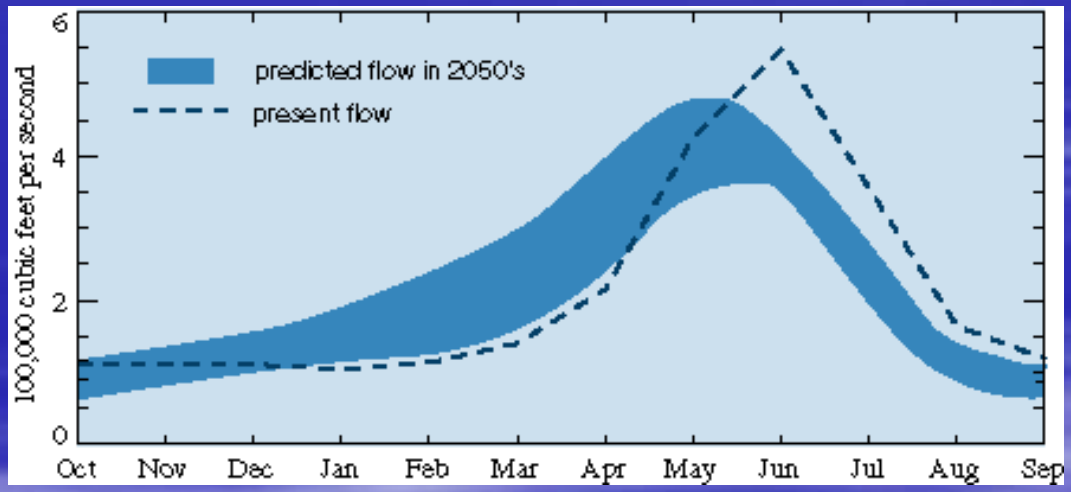
- Global range: 9 to 88 cm rise (IPCC) during next 100 years
- BC/Washington coast
  - geologic uplift & subsidence
  - 1 m rise could flood 4600 ha of farmland & 15,000 ha industrial/residential land
- High tide & storms combine to create storm surge

Coastal Impacts

- Damage to coastal infrastructure: erosion, flooding
- Loss of coastal ecosystems, heritage sites
- Contamination of coastal groundwater
- Salinization of agricultural lands

Columbia Basin
Impacts of Climate Change on Streamflow

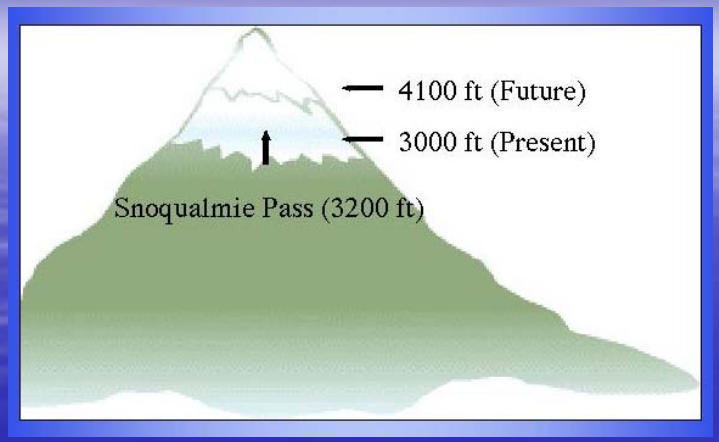
- Less snow, earlier melt means less water in summer
  - irrigation
  - urban uses
  - fisheries protection
  - energy production
- More water in winter
  - energy production
  - flooding

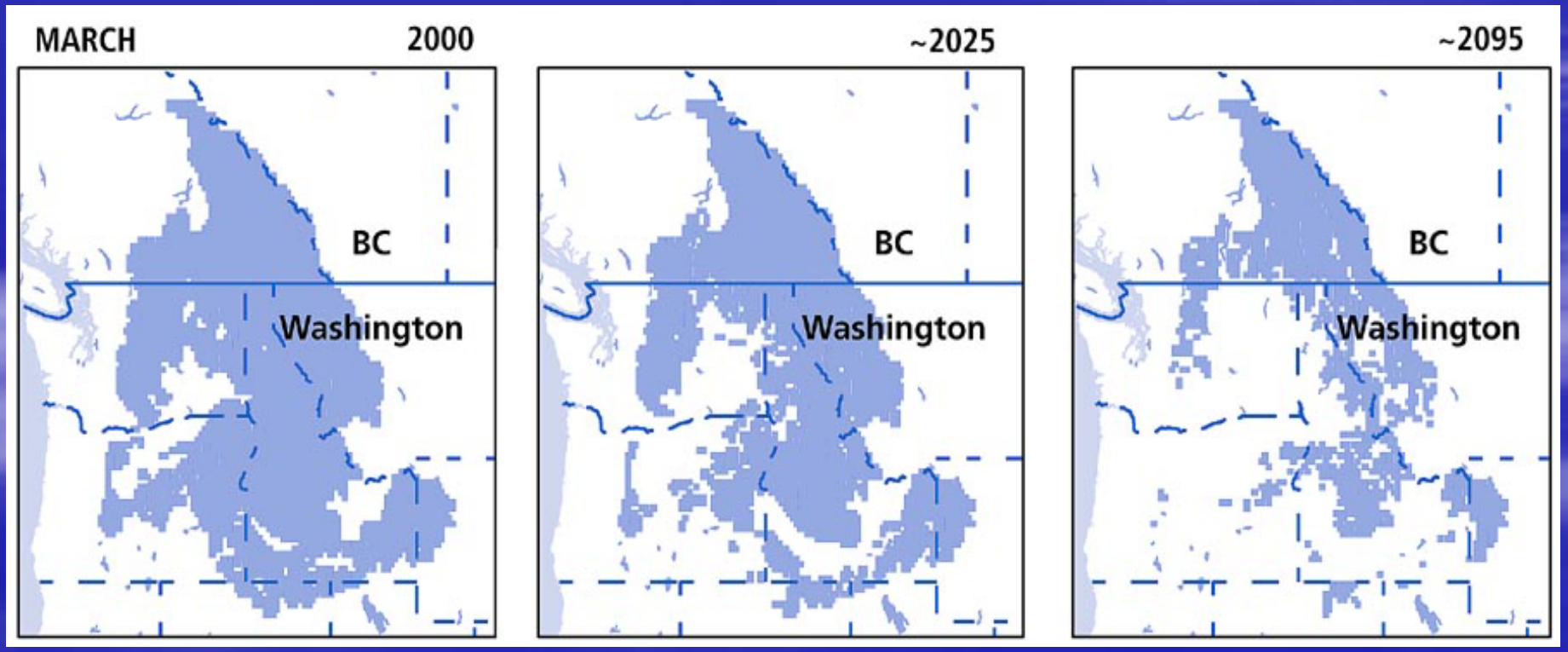


Natural Columbia River flow at the Dales, OR.

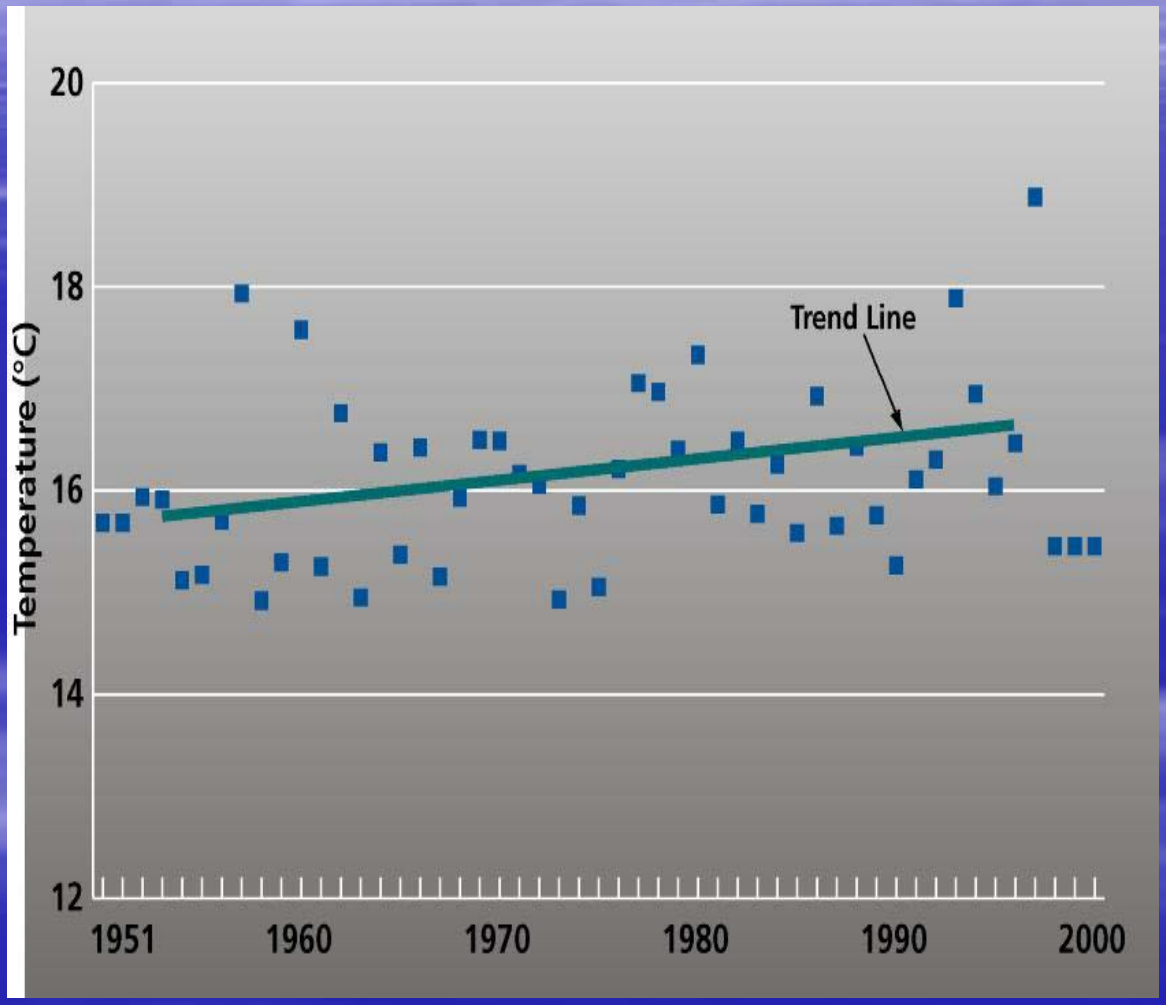
Source: P. Mote, University of Washington

Less snow


4100 ft (Future)
3000 ft (Present)
Snoqualmie Pass (3200 ft)


MARCH
2000
BC
Washington
~2025
BC
Washington
~2095
BC
Washington

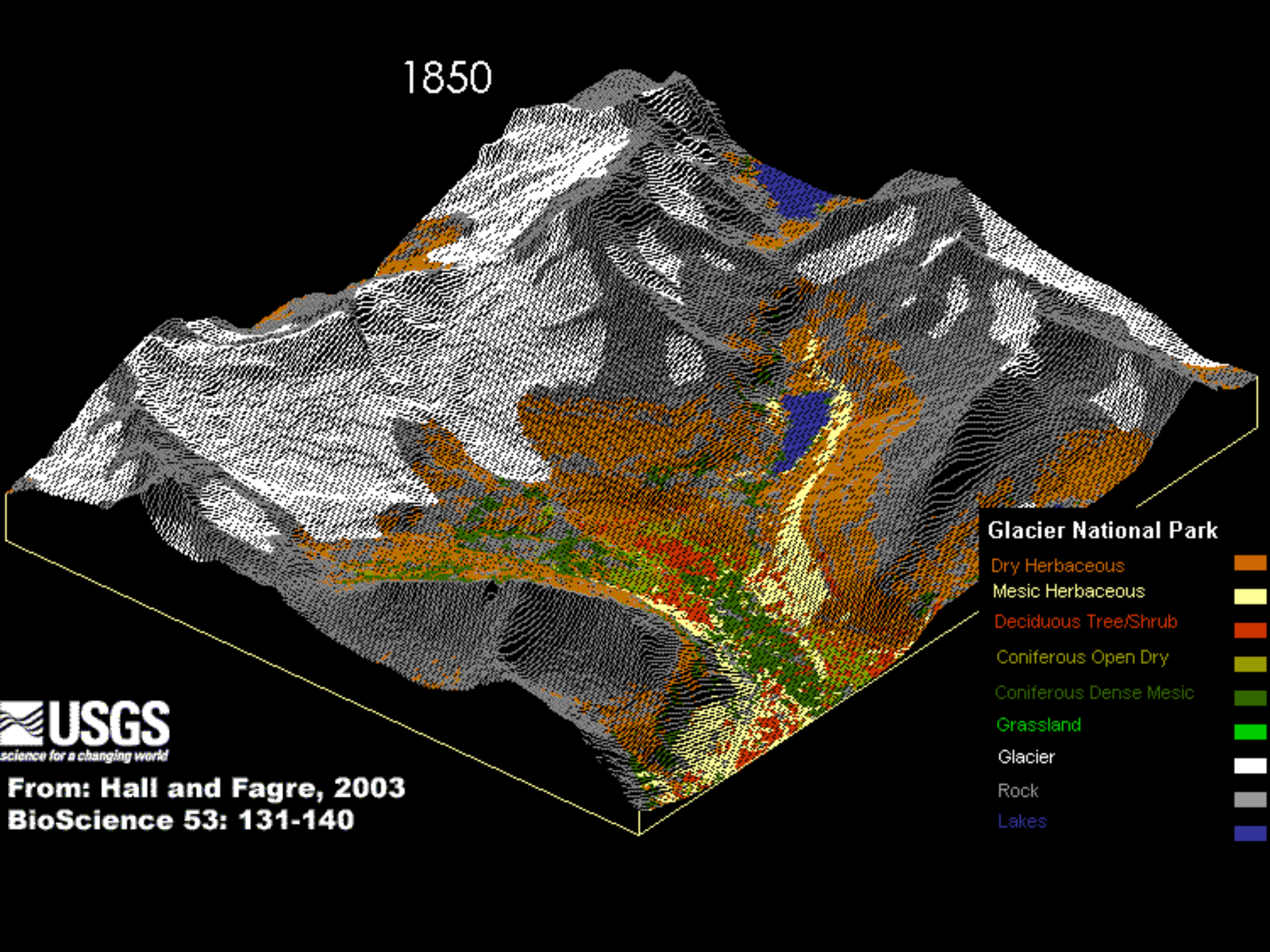
Change in Average Fraser River Temperature, 1953-1998



J. Morrison

Salmon Survival

Temperature regulates many physiological processes in fish. Temperatures higher than 15ºC can be stressful to sockeye salmon.


1850
Glacier National Park
Dry Herbaceous
Mesic Herbaceous
Deciduous Tree/Shrub
Coniferous Open Dry
Coniferous Dense Mesic
Grassland
Glacier
Rock
Lakes
USGS
science for a changing world
From: Hall and Fagre, 2003
BioScience 53: 131-140

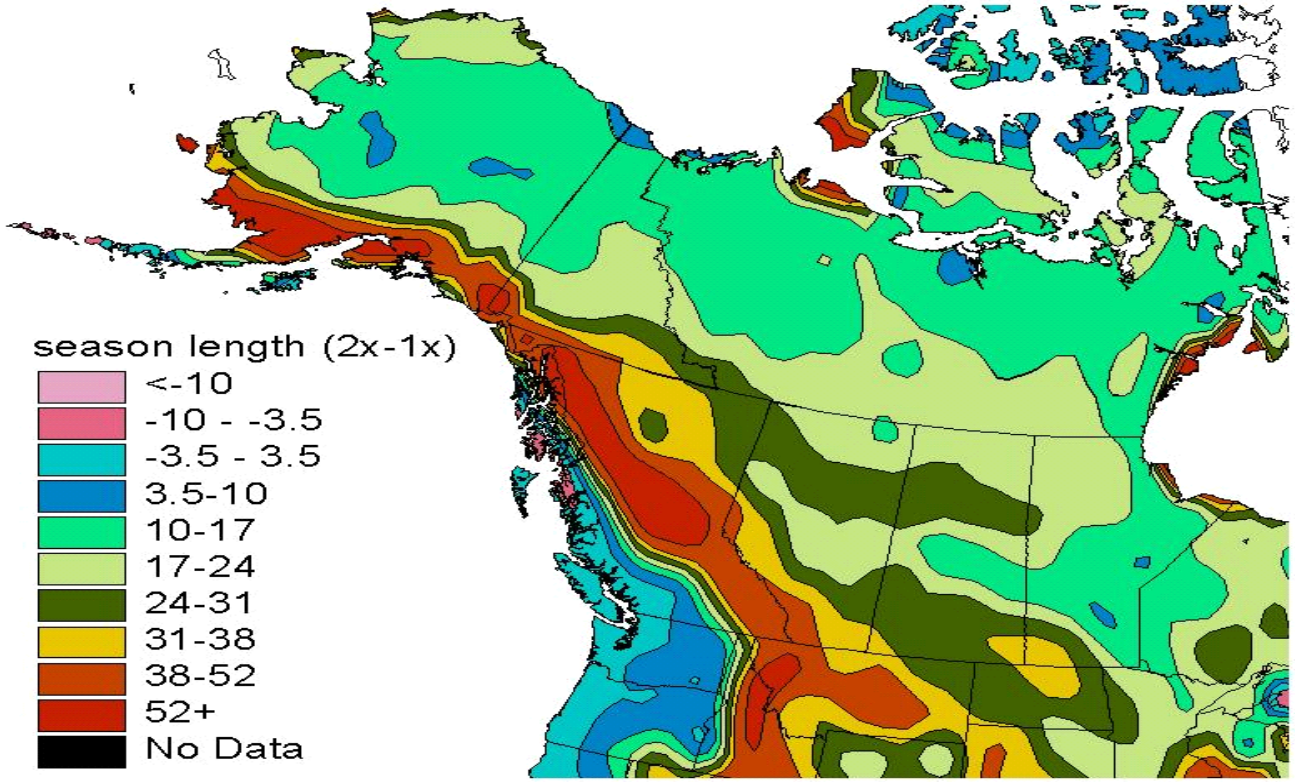
Forest Pests

Major pine beetle epidemic affecting 5.7 million hectares in BC

Mild winters contributing to expansion of range northward & upslope

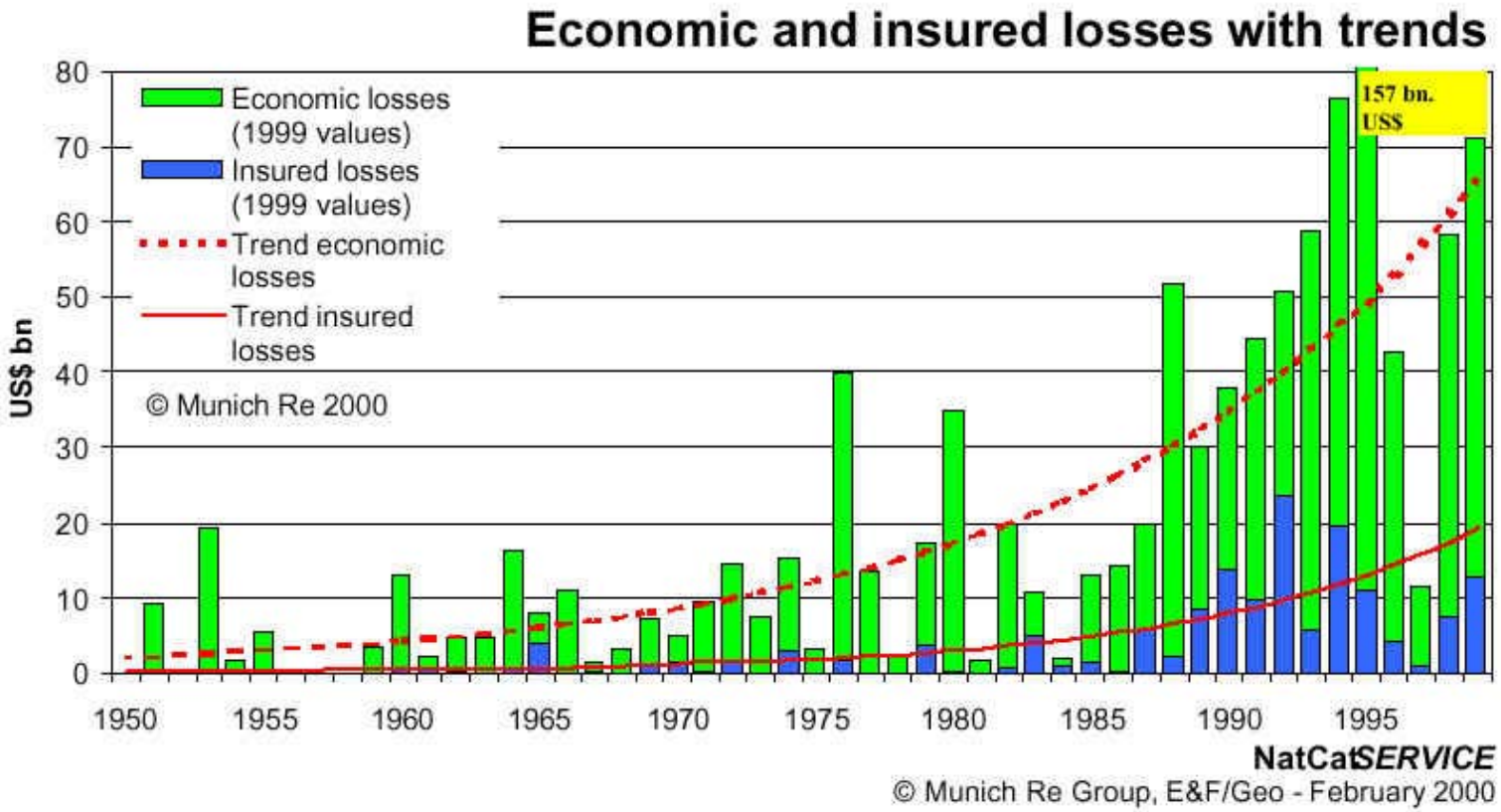
2001: Mountain pine beetle damage

Changes in length of fire season (days).



Global Economic Losses from Natural Disasters

(floods, storms, heat waves, earthquakes)

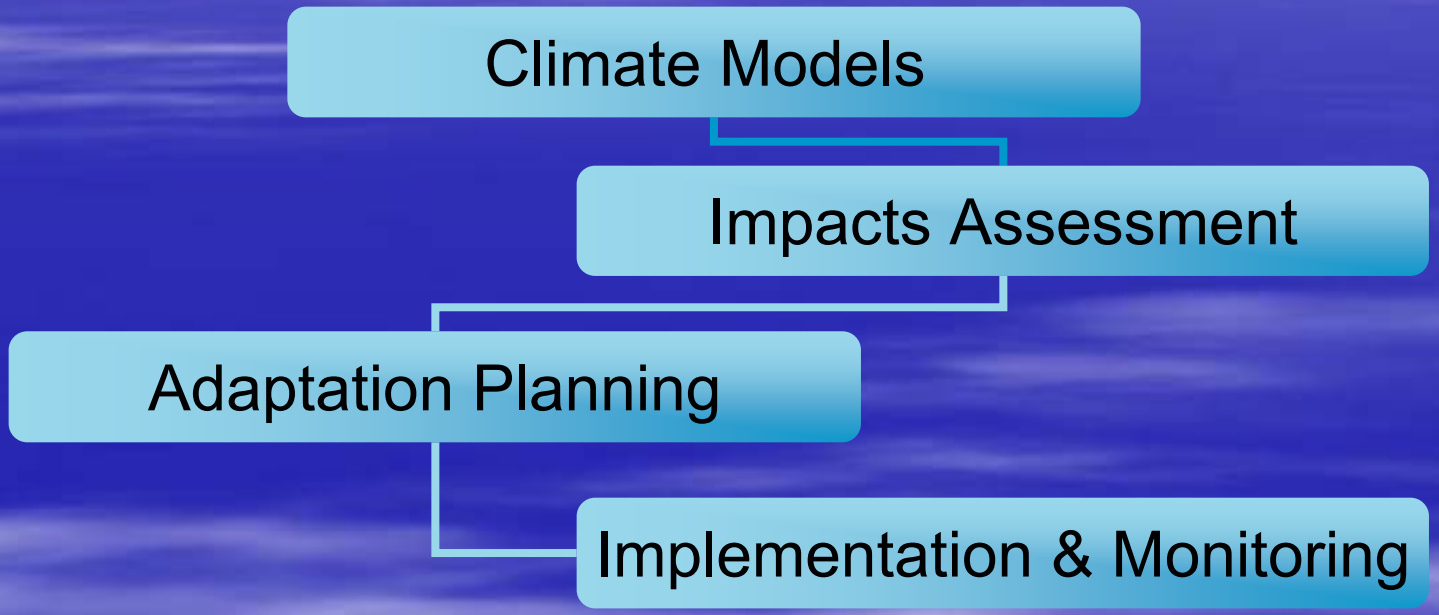


The chart presents the economic losses and insured losses –adjusted to 1999 values. The trend curves illustrate the alarming increase in catastrophe losses at the turn of the century.

Why should gov't be concerned about possible climate impacts?

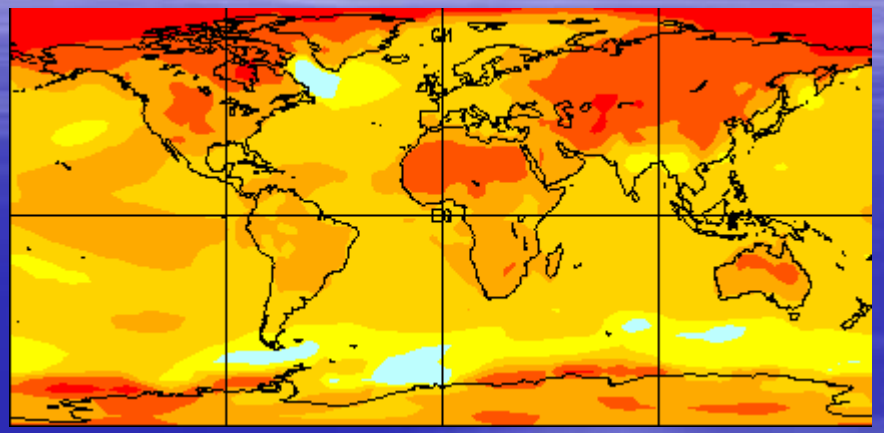
- Economic sustainability
  - Forestry, agriculture, power generation, fisheries
- Resource Management
  - Water allocation, fish habitat protection, forestry policy
- Disaster preparedness & liability
  - Flooding, erosion

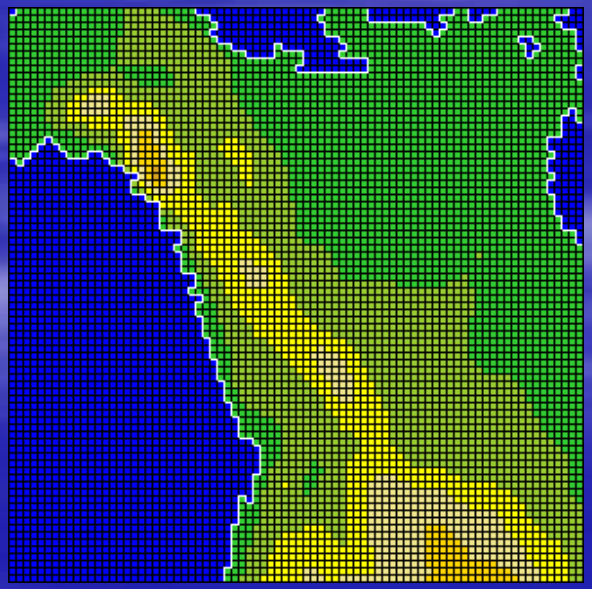
From Impacts to Adaptation



Climate Models

- Future climate
- Future impacts
- Possible Futures
- Scale Important
- Data Important





Climate Change Impacts

- Physical systems e.g. river flow
- Biological systems e.g. plant growth
- Socio-economic systems
- Specific to place
- Specific to time period

What is Adaptation?

- "**adjustments** in ecological, social, or economic systems in response to **actual** or **expected** climatic **stimuli** and their effects or impacts" IPCC 2001

Autonomous Adaptation

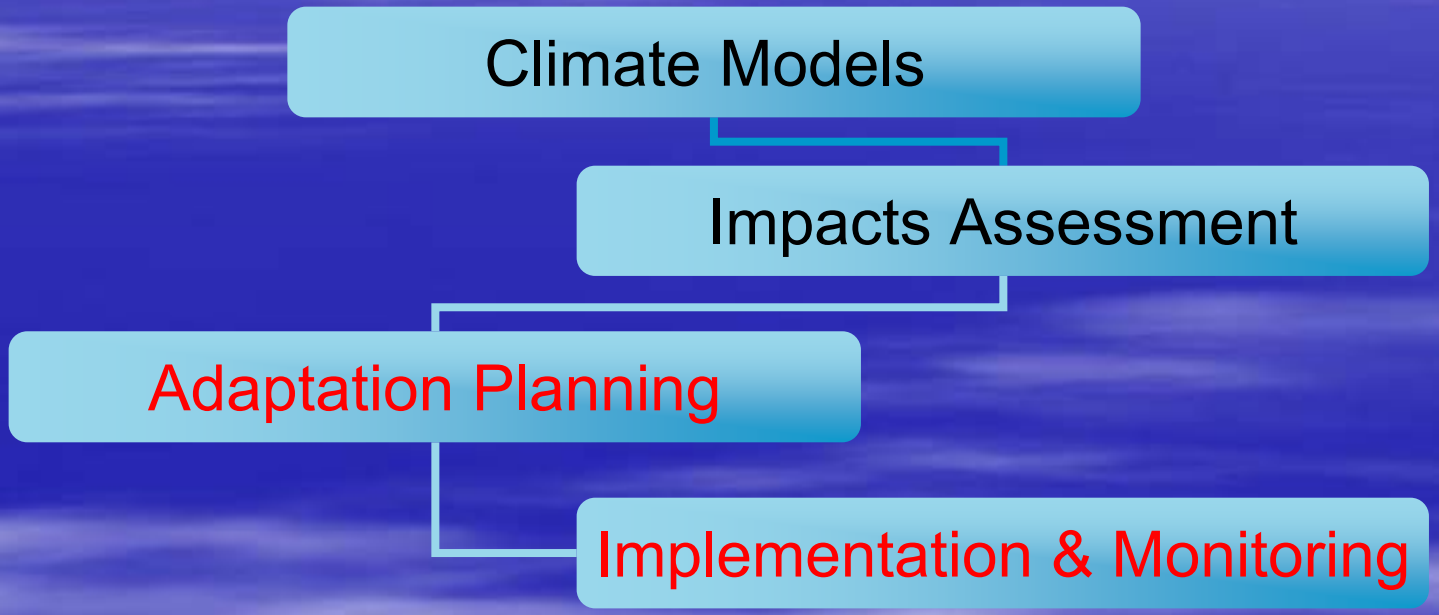
Planned Adaptation

Protect Past Investments

Recognize a Different Future

Which Options?

From Impacts to Adaptation



Path Forward

- Integrated case studies
- Connect scientists, resource managers, stakeholders
- Develop methodologies and tools

Government Role

- Case studies
- Monitoring
- Sharing
- Leadership
- Policies & programs

Why Collaborate?

- Use resources efficiently
- Recognize similarities
- Support policy discussion

Collaboration

- "Explore collaboration on climate protection with other Northwest and west coast states and provinces, as the northeastern governors and eastern Canadian premiers have done"
  - Sustainable Washington Advisory Panel (2003)

New England Governors/Eastern Canadian Premiers

- Adaptation Working Group
- Regional monitoring
- Documentation of impacts
- Information exchange
- Adaptation measures
- Resource guide

BC – WA Opportunities

- Monitoring
- Regional Climate Models
- Case studies: GB/PS, Nooksack
- Information exchange
- Others?

Thank You!