

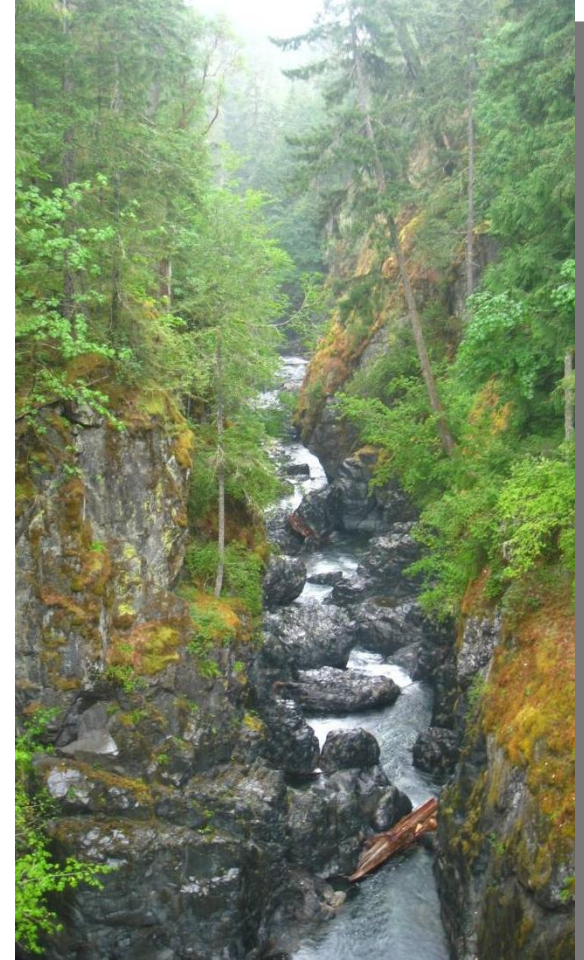
Monitoring forest and rangeland species and ecological processes in British Columbia in light of climate change.

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OUTLINE:

1. Explore the path taken in developing a set of monitoring indicators and identifying their data sources.
2. Examine the resulting FFEI Climate Change Monitoring Strategy
3. Look at the areas recommended for future work



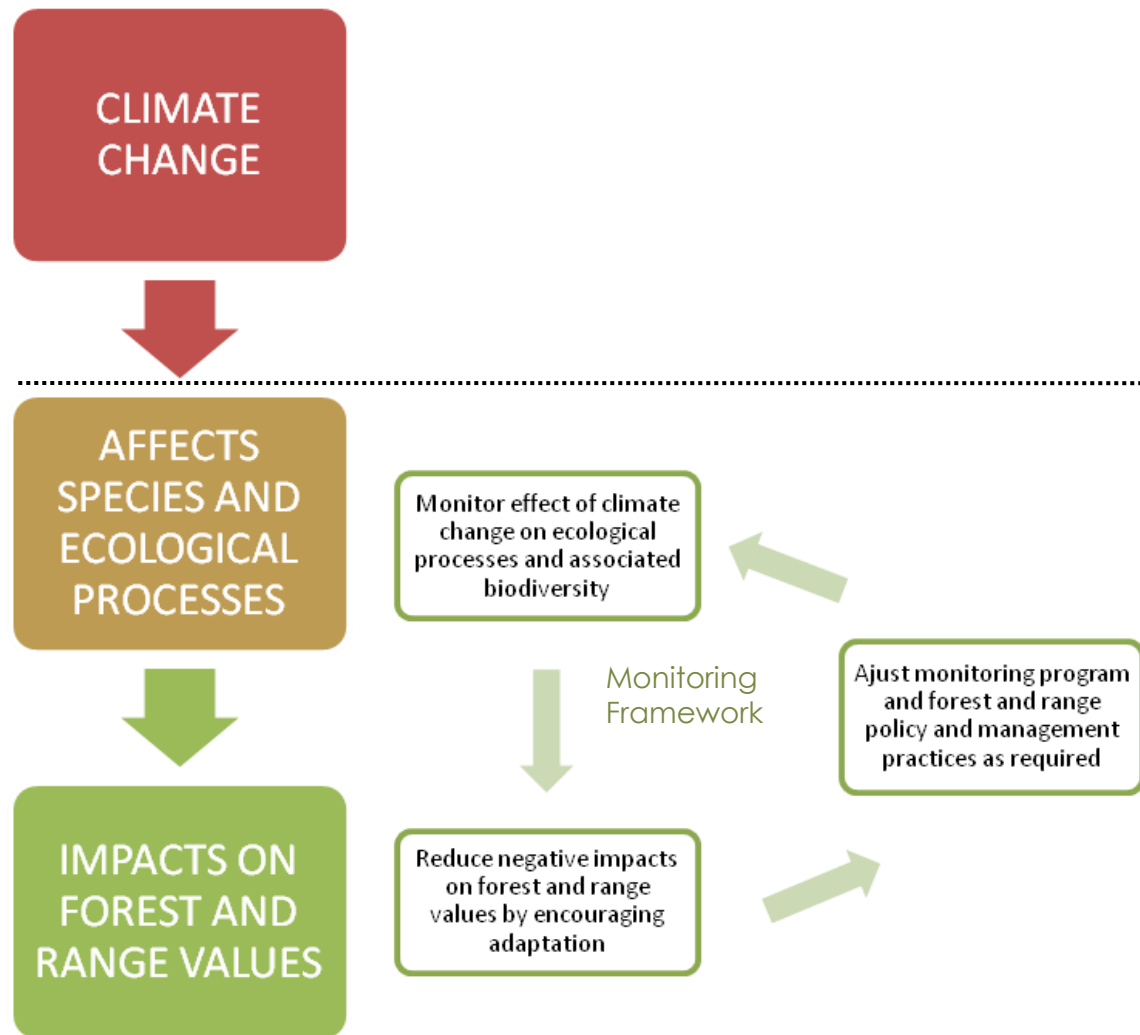
PROJECT AIM:

- To develop a set of indicators
- Identify sources and data sets able to support analysis of the indicators.

FRAMEWORK SCOPE:

- Species that depend on BC's forest and/or rangeland habitat for all or part of their life cycle (either native and introduced).
- Ecological processes affecting BC's forests or rangelands either directly or indirectly.

WHY MONITOR THE EFFECTS OF CLIMATE CHANGE?



Adaptation refers to:

“an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities”.

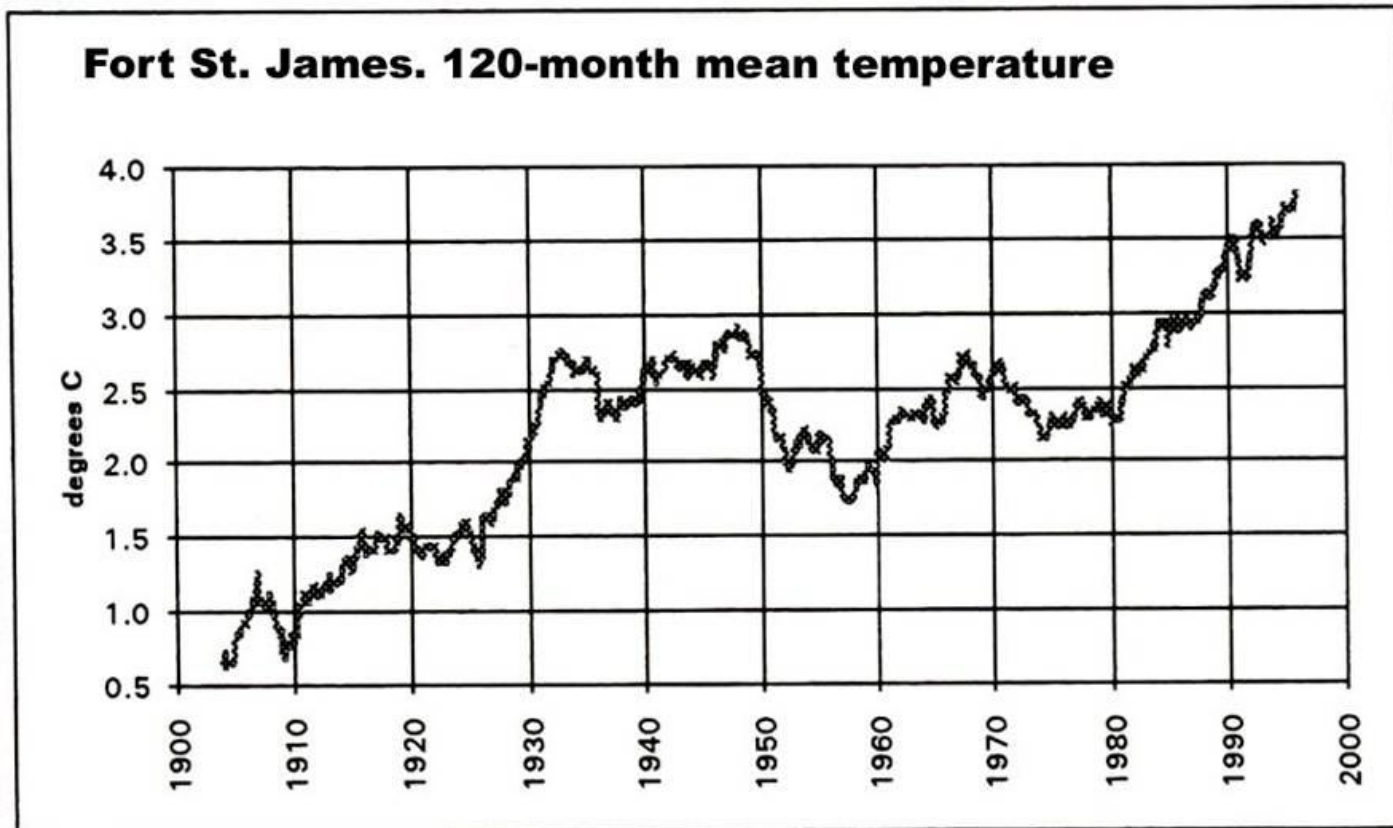
Intergovernmental Panel on Climate Change

A serene landscape photograph of a forested lake. The water is calm, reflecting the dense evergreen forest on the opposite shore. A large, moss-covered rock sits in the water on the right side. The sky is overcast and misty, creating a soft, atmospheric light. The text is overlaid in the center in a bold, white, sans-serif font.

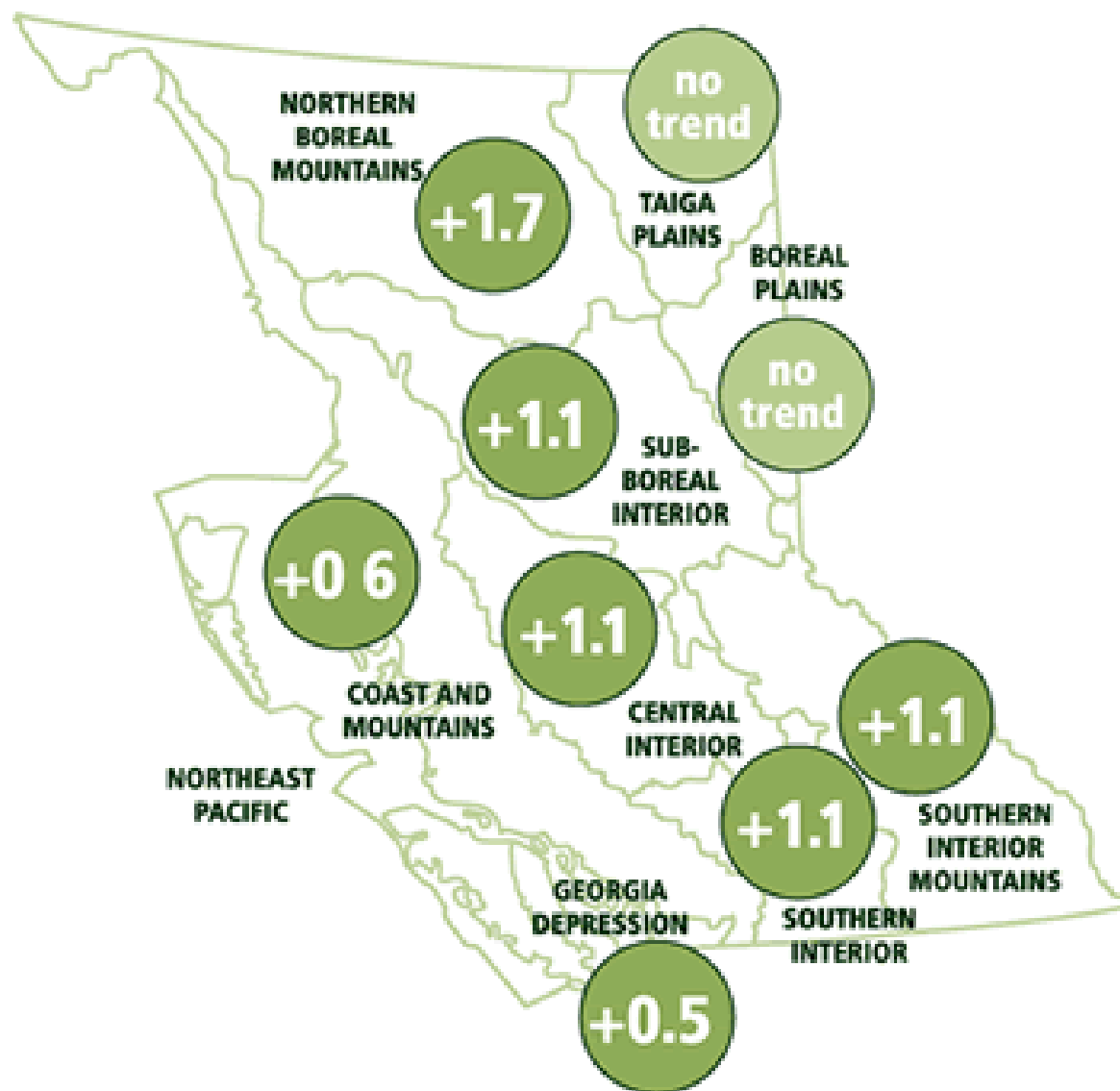
DEVELOPING THE INDICATORS AND IDENTIFYING THEIR DATA SOURCES

KEY FINDINGS – OBSERVED CHANGES

All reported temperature trends show that BC has warmed in recent decades.



From: Coulson (1997)



1900-2000

- BC has become wetter, with northern BC wetter in all four seasons.
- Decrease in the snow to total precipitation ratio.
- Increase in the number of growing degree days.
- Lakes and rivers have become ice-free earlier in the year.

PREDICTED CHANGES:

Shift to warmer, wetter years, more frequent wet years, greater year-to-year variability, and more extreme weather events.

Alterations in the composition, diversity and spatial distribution of ecosystems along with the formation of new ones.

Changing productivity (both quantity and quality).

Increases in the severity and frequency of disturbances caused by insects and pathogens

Increased scale and severity of wind throw damage

More fires and area burnt

More soil erosion and landslides

Loss of some glaciers and permanent snowpacks

Reduced summer stream flows

INDICATOR DEVELOPMENT WORKSHOP

Objective:

To have expert input on indicator selection and approaches to measurement.

At the workshop, delegates were asked to:

- Develop the critical selection criteria for choosing indicators for monitoring
- Prioritize information needs
- Identify any further sources of readily available data that would support the monitoring framework



RESULTING FRAMEWORK

INDICATORS AND THEIR DATA SOURCES:

- A total of sixteen indicators were recommended and presented under the criteria-level headers:
 - Biodiversity (5 indicators),
 - Natural disturbance (4 indicators)
 - Ecosystem drivers (7 indicators).
- Almost thirty diverse data sources were identified as able to support these indicators.

FFEI CLIMATE CHANGE MONITORING STRATEGY

CRITERION 1 - BIODIVERSITY

1	Ecosystem distribution and composition	H	P
2	Ecosystem productivity	H	M
3	Species diversity	H	P
4	Genetic diversity	M	M
5	Ecosystem connectivity	H	M

FFEI CLIMATE CHANGE MONITORING STRATEGY

CRITERION 2 - NATURAL DISTURBANCES

6	Insects and diseases	H	M
7	Wind throw	M	A
8	Fire	M	A
9	Mass movements	H	P

FFEI CLIMATE CHANGE MONITORING STRATEGY

CRITERION 3 - ECOSYSTEM DRIVERS

10	Precipitation	H	P
11	Snowpack	M	A
12	Streamflow	H	P
13	Water temperature	H	P
14	Water quality	M	M
15	Glaciers	M	A
16	Unseasonable or unexpected weather conditions	M	A

INDICATOR 3 - SPECIES DIVERSITY

- This indicator would examine trends in population, range and phenology information for species from a range of taxa and habitats.



Photos: J. Innes



Photo: J. Innes

Species of importance to BC: Barrow's Goldeneye



Photo: J. Innes

**BC species with a problem:
major decline in barn swallow populations**

Photo: . Innes



Couer d'Alene Salamander
(*Plethadon idahoensis*)



Western Red-backed Salamander
(*Plethodon vehiculum*)

Photos: J. Innes

Species of that might be sensitive to climate change



Dark-bodied Glass Snail
(Oxychilus draparnaudi)



Common Wall Lizard
(Podarcis muralis)

Photos: J. Innes

Species of concern because of their invasive potential

- There is no single species or even group of species that will be an ideal indicator for determining the impacts of climate change on forests and rangelands.
- Consequently, we proposed including information for the widest possible range of species in climate change monitoring and analysis.

QUESTION:

Should we include semi-professional programs and citizen volunteer programs?



Nature
watch

FROG
watch

ICE
watch

plant
watch

WORM
watch



RECOMMENDATIONS FOR FURTHER WORK

FURTHER WORK:

- Data gaps
- Data integration
- Implementation - Climate Change Monitoring and Trend Reporting System

CONCLUSION:

This is an ambitious, but potentially essential project if climate change is to be incorporated into decision-making on natural resource management and conservation in BC

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