



Main Menu
<a href="#">Introduction</a>
<a href="#">About Us</a>
<a href="#">Partners</a>
<a href="#">Events</a>

Database
<a href="#">Search References</a>
<a href="#">Search Membership List</a>
<a href="#">Join C-CIARN BC</a>

Resources
<a href="#">Reports</a>
<a href="#">Funding opportunities</a>
<a href="#">Calls for submissions</a>
<a href="#">Employment opportunities</a>
<a href="#">Links</a>
<a href="#">Feedback</a>

## Workshop

### A Workshop on Impacts and Adaptation to Climate Change: Developing a Regional and National Research Network

March 29, 2000  
Simon Fraser University at Harbour Centre,  
Vancouver, B.C.

#### Contents

1. [Introduction](#) including organizing committee and summary.
2. Climate Change Impacts and Adaptation Research Network Workshop [Agenda](#).
3. Panellist and speaker plenary [presentations](#).
4. A summary of the [reports from the working groups](#).
5. [History](#) of climate change events and research, focussing on British Columbia.
6. [Bibliography](#) of climate change impacts and adaptation research, focussing on British Columbia.
7. Workshop [registration list](#).

#### Introduction

A workshop was held on March 29, 2000 to assess a proposal to improve the state of climate change impact and adaptation research in Canada. Natural Resources Canada, Environment Canada and the Climate Change Action Fund sponsored this and other workshops across the country as a first step in the planning of a National Climate Change Impacts and Adaptation Research network. The research network is expected to be made up of a series of regional centres and networks of research scientists.

Workshop participants consisted of approximately 100 people from universities and colleges in Canada and the United States, the Federal, Provincial and Regional governments, resource industries, insurance associations, environmental groups, non-profit science based institutions, consulting companies, small business, and interested citizens.

The workshop goals were:

- 1) *To alert the research community, governments, resource managers and other stakeholders that a national climate change impacts and adaptation research network is being planned.*
- 2) *To determine the level of interest in B.C. of establishing a Regional climate change impacts and adaptation research network that would be a part of a National research network.*

#### Organizing Committee.

The workshop organizing committee was made up of the following people.

1. Brian Bornhold, University of Victoria
2. John Clague, Simon Fraser University
3. Stewart Cohen, Sustainability Research Institute, University of British Columbia and Environment Canada;
4. Mauro Coligado, British Columbia Ministry of Environment, Lands and Parks
5. Paul Egginton, Natural Resources Canada;
6. Nicholas Heap, Greater Vancouver Regional District
7. Kim Hyatt, Fisheries and Oceans Canada
8. Darlene Langlois, Environment Canada
9. Dave Spittlehouse, British Columbia Ministry of Forests
10. Bill Taylor, Environment Canada
11. Eric Taylor, Environment Canada

### **Workshop Summary.**

There was considerable enthusiasm expressed for the proposal to establish a climate change impacts and adaptation research network or program in British Columbia and Canada. For this activity to be successful, sufficient start-up funding is essential.

The Workshop committee will move to establish a small group to act as a point of contact so that further discussions on the proposed climate change impacts and adaptation research network can take place.

[BACK TO TOP](#)

### **Workshop Agenda**

0800. Registration

0830 Introduction on a proposal to improve climate change impact and adaptation research in Canada. Paul Egginton, Natural Resources Canada, Ottawa.

0900 A chronology of climate change science, impacts and adaptation activities in British Columbia. Eric Taylor, Environment Canada, Vancouver.

0910 British Columbia climate change impacts and adaptation research results. Stewart Cohen, U.B.C. and Environment Canada.

0930 Should public education be part of the function of a research network? Richard Littlemore, Public Education and Outreach Table.

### **0950 Coffee**

10:10 Panel Discussion. Panel Members:

- Robert Hicks (GVRD) - Municipalities
- Kim Hyatt (DFO) - Fisheries
- Anne Edwards (Columbia Basin Trust) – the Columbia Basin
- Dave Spittlehouse (B.C. Forest Service). – Forest Sector

These representatives of climate-vulnerable sectors in British Columbia will discuss the climate change impact and adaptation research questions that their sector or resource has and how a regional or national climate change impacts and adaptation research network could help answer these questions.

11:00 Interdisciplinary break-out groups to identify ways to create and operate a British Columbia and a national climate change impacts and adaptation research network. 12:30 Lunch

1315 Break out groups continued

### **1445 Coffee**

1515 Plenary: Break-out groups will briefly report results of their discussions.

1545. Paul Egginton will respond to what has been discussed at the workshop in the context of a national strategy to develop a climate change impacts and adaptation research network

1600. A summary of next steps in this process. Paul Egginton

1615 Adjourn

## [BACK TO TOP](#)

### **Plenary Discussions**

The following are summaries of the presentations given by panellists and plenary speakers in the morning of the workshop. The panellists addressed the question of what kinds of information would be required from a climate change impacts and adaptation research network that could help their agencies manage for the future. by their agencies

#### **Robert Hicks, Greater Vancouver Regional District (GVRD) Policy and Planning Department.**

The GVRD requires information on future climate changes and their potential impacts for a number of reasons:

1. GVRD considers climate change as part of an overall risk analysis in the context of utility planning.
2. GVRD is a regional utility service to over 2 million people, and strategic planning is necessary for the next fifty to one hundred years, the time frame on which climate is projected to significantly change.
3. The issues that GVRD feels are related to climate change are:
  - Long term drinking water supply – how will the Regional District be affected by changes in snowpack, precipitation, and demand?
  - Sewage and drainage – how will rainfall intensity and return period, infrastructure capacity for increased runoff, and the potential for increased localized flooding change as the climate warms.
  - Solid waste management – how should incineration and landfills be managed in the context of a changing climate?
1. GVRD is currently working with Environment Canada on a report to identify current knowledge of climate variability and change in GVRD and to identify what is needed for follow-up work (risk analysis).

#### **Kim Hyatt, Department of Fisheries and Oceans**

1. Climate variability has a significant influence on Pacific salmon stocks as well as their freshwater and marine habitat.
2. ENSO patterns and accompanying changes in the productivity and range of Pacific salmon demonstrate the climate sensitivity of salmon.
3. Climate change will broadly impact both the fresh water and ocean habitat of salmon.
4. The long term survival of salmon is threatened given projections of climate warming, so climate change potentially could have major impacts on the fishing industry and coastal communities .
5. Identification and resolution of climate change impacts and adaptation as related to salmon, other fish and their habitat requires a higher level of transdisciplinary research effort than the Department of Fisheries and Oceans will be able to supply on its own.

#### **Anne Edwards, Columbia Basin Trust**

1. The Columbia Basin Trust is a unique organization which works with the people of the Canadian Columbia Basin to bring social, economic and environmental benefits to the region most affected by dam construction under the Columbia River Treaty.

2. The Trust is concerned about lifestyle choices particular to rural dwellers (e.g. transportation).
3. Climate change could affect water supply, including the water table, and could reduce icefield and glacier extent, river flow, lake levels, groundwater availability, and wetlands.
4. The Trust currently relies on USA research on climate change impacts and adaptation.

### Dave Spittlehouse, Ministry of Forests

1. BC's forests are important for recreation and biological diversity as well as being a source of timber, paper, mushrooms and fresh water.
2. Potential climate change impacts on British Columbia forests include:
  - **Disturbance:** An increased incidence of fire, insects and disease due to warmer and dryer conditions could occur. Ageing forests in BC will increase their susceptibility to these agents of change.
  - **Growth rates:** This may increase due to warming in cooler ecosystems - e.g. northern lodgepole pine forests may grow faster in a warmer climate. Conversely, reduced summer rain for Douglas fir could reduce growth, but carbon dioxide fertilization may offset this reduction.
  - **Habitat:** As the climate of an area changes, conditions for trees and other plants may not be at an optimum, leading to shifts in the forest range. As this vegetation changes, so will animal habitat.
  - **Competitiveness:** Climate change may alter the competitive balance between plant species in a forest. Also, climate change could affect the competitiveness of the forest industry as increased fibre is projected to be produced internationally, partially from climate warming.
  - **Forest values:** As climate change threatens to reduce the range of certain forest types, they may increase in value in the context of recreation, timber, and biodiversity. Forests may also come under increasing pressure to be managed to mitigate climate change, such as devoted to being carbon sinks.
1. Because forests are biological systems, there is a limit to the adaptation and mitigation actions that can be taken in the forestry sector.
2. There are limitations to action in adapting to climate change in forestry:
  - **Cost of change vs. cost of action:** It may be less expensive to merely accept the impacts that global warming has on a forest. Adjustments can be made after harvest, such as replanting with more appropriate tree species or genotypes.
  - **One of many uncertainties:** Future markets, technology, and regulations are current uncertainties driving changes to forest management. Forest managers know how to respond to these kinds of changes, but they have difficulty in responding to climate change, which in most cases is more ambiguous than other uncertainties. Also, climate change effects are beyond the planning horizon, since most negative effects on forests are projected to occur many years in the future, and the forest planning horizon is at best 10 years.
  - **Options limited:** Forest managers need to be provided with more useful information that will allow them to take future climate change into account. At the moment there is little available to help them identify actions that can be done with current cost constraints.
  - **Not yet time for action:** There is too much of a negative risk in planting "climate warming-sensitive" genotypes on the assumption that they might experience a more suitable climate many years down the road.
5. There are a number of actions that contribute to a response to the climate change issue in British Columbia forests:
  - **Efficiency measures:** Fuel switching, more efficient systems in mills, and recycling will reduce greenhouse gas emissions.
  - **Forest carbon balance:** An evaluation of the forest carbon balance will provide options for enhanced carbon sequestration or minimising carbon losses.
  - **Development of options:** By identifying the magnitude of the potential climate change impacts, a range of options could be developed for forest land. As an example, changes to culvert design and slope stability estimates could be made if rainfall rates were expected to increase.
  - **Maintain diversity of ecosystems:** It would be wise to maintain a range of ecosystems and ages

across the landscape. Older forests likely more susceptible to climate changes.

- **Evaluating genotypes:** Improved information on genotype climatic limits and performance will aid reforestation plans under a changed climate.

6. There is a need for:

- **An improved awareness of the climate change issue among forest managers:** There remains confusion about whether change is likely and what can be done to adapt to these changes. There is a need to get the forestry community to plan strategically for the future and ensure that current actions do not prejudice future responses.
- **Indicators of change:** The forest community requires forest and other environmental indicators that are linked directly or indirectly to climate changes.
- **Information at the appropriate scale:** Information is needed that is reliable at a smaller scale and that is useful to managers, seasonally if possible.
- **Management options.** Lists of options that management can take that will enhance the forest robustness to climate changes.
- **Contacts.** A list of experts capable of providing information on climate change science, impacts and adaptation to forest managers is necessary.

### **Richard Littlemore, Public Education and Outreach Table, Climate Change Secretariat**

Public Education and Climate Change.

1. A climate change impacts and adaptation research network should shoulder a responsibility of climate change impact and adaptation public education also.
2. Three examples where public education made a big difference in GVRD operations:
  - 50% reduction in garbage over 1990 baseline
  - 60% reduction in hazardous household waste
  - 21% reduction in per capita water consumption
1. Public education is relatively inexpensive compared to other alternatives. It is a small fraction of the total GVRD budget.
2. The Public Education and Outreach Table, a committee of the National Climate Change Secretariat, recommends regional public education "hubs", co-ordinated by a national education and outreach office.
3. There are special problem for climate change impacts and adaptation, since adaptation is seen as admission of failure to prevent the problem, and it is therefore difficult to motivate public to take action on reducing greenhouse gas emissions.

### **[BACK TO TOP](#)**

### **Working Group Summaries**

Five working groups were each asked to discuss two topics, each guided by a set of questions. The topics and questions were:

#### **Topic 1: *The function and form of a Climate Change Impacts and Adaptation Network in British Columbia and Canada.***

- a. What should be the prime function of a climate change impacts and adaptation research network? How could it improve impacts and adaptation research in British Columbia and in Canada?
- b. How would a British Columbia research network be structured? Who would be part of this research network? What information could the network provide to members and clients of the network? How could it link to other regional research networks in Canada?
- c. How should the regional research network connect with the rest of British Columbia? That is, should the network exist purely to serve its membership, should it serve as a climate change

resource within the wider scientific and professional community, and/or should it have an extensive public education component? What is the most appropriate balance for the network so that impact and adaptation research remains the focus?

## **Topic 2: A Strategy for developing a British Columbia Climate Change Impacts and Adaptation Network**

- a. What functions of a British Columbia Impacts and Adaptation research 'node' of a national network could be developed over the next 1 or 2 years with (a) no additional funding; (b) annual funding to support one or two people by 2001; (c) annual funding to support one or two people plus approximately \$100K annually by 2001?
- b. What steps need to be taken to implement a British Columbia Climate Change Impacts and Adaptation Network?
- c. How should it evolve? That is, in what areas would you most like to see the network grow – membership, scope of services offered, outreach activities, amount of available funding, no change desired, other?

This section will summarize the discussion of each of these items.

## **Topic 1: The function and form of a Climate Change Impacts and Adaptation Network in British Columbia and Canada.**

- a. *What should be the prime function of a climate change impacts and adaptation research network? How could it improve impacts and adaptation research in British Columbia and in Canada?*

It was proposed that the research network should have a clear focus and an efficient structure. The possible functions of the climate change impacts and adaptation research network suggested by the working groups could be categorized as a communication, action, or research co-ordination function.

### **Communication**

The climate change impacts and adaptation research network would:

- Provide a respected and objective voice on British Columbia and Canadian climate change impacts and adaptation information.
- Encourage communication of the issue both within and outside the climate change community.
- Promote awareness of the issue to influence policy and protect research programs through an ongoing and active synthesis of climate change impacts and adaptation information.

### **Action**

- Promote climate change adaptation actions.

### **Research co-ordination**

- Encourage impact and adaptation research partnerships, including cross-disciplinary collaboration, and British Columbia research projects.
- Identify issues and priority actions and fill information gaps.
- Identify funding sources and facilitate research.
- Support programs associated with monitoring, acquisition and improved access to high quality data.

- a. *How would a British Columbia research network be structured? Who would be part of this research network? What information could the network provide to members and clients of the network? How could it link to other regional research networks in Canada?*

**The working groups suggested a number of different options for structuring the network:**

- The network should have a simple name, and a clear and focussed mandate.
- It should have a steering committee representing diverse groups and stakeholders and a funded secretariat. Various approaches to structure could be assessed, such as the Model Forest concept,

a university chair, a centre of excellence, a non profit institute, or a framework similar to, but much smaller than, the Intergovernmental Panel on Climate Change structure.

- The EMAN model, that has visibility but is ineffective, should be avoided.
- The Network steering committee should provide annual direction to members and provide a regional summary of activities.
- The network structure should include a function to lobby for climate change impacts and adaptation research funding.

### **Membership:**

Some working groups suggested that the members of the network should include governments, non-government organizations, industry and university researchers involved in climate, politics, economics and engineering. Others suggested it should be open to all individuals and institutions. Still other suggested it should be limited to climate change impacts and adaptation researchers initially, and that other stakeholders and policy makers could be included later.

### **Information for Network members**

Reliable information on climate variability and change impacts, and climate change adaptation would be made available to members and researchers involved in the issue. The information would include climate observations and climate change scenarios.

- a. How should the regional research network connect with the rest of British Columbia? That is, should the network exist purely to serve its membership, should it serve as a climate change resource within the wider scientific and professional community, and/or should it have an extensive public education component? What is the most appropriate balance for the network so that impact and adaptation research remains the focus?*

### **Connecting to the rest of British Columbia**

This communication will occur through a steady outflow of relevant information on climate change impacts and adaptation, by regular scientific and public meetings and by restricting the type of information to that which is scientifically sound.

### **Topic 2: A Strategy for developing a British Columbia Climate Change Impacts and Adaptation Network**

- a. What functions of a British Columbia Impacts and Adaptation research 'node' of a national network could be developed over the next 1 or 2 years with (a) no additional funding; (b) annual funding to support one or two people by 2001; (c) annual funding to support one or two people plus approximately \$100K annually by 2001?*

### **Resources necessary for a British Columbia climate change impacts and adaptation Network.**

**Option A:** Some groups concluded that it was essential for a proposed regional climate change impacts and adaptation network to secure new resources of \$100K plus two dedicated people before it could achieve any significant results. Other groups felt that with no new resources, the following additional work could be accomplished:

1. A membership list for the network could be created, and a directory of climate change impacts and adaptation information pertinent to British Columbia could be posted on a web site.
2. An annual workshop on climate change science, impact and adaptation could be held to review recent developments applicable to British Columbia. A registration fee would be required. Also, focussed internet conferences could be organized.
3. An email service that provides members updates of climate change science, impact and adaptation research could be maintained.
4. The network could be structured as a non-profit professional and technical organization (such as the CWRA). It could therefore be a national association of individuals and organizations interested in climate change science, impact and adaptation, with branch organizations or nodes in each province and territory. These nodes would have a more regional focus. Membership fees would be necessary to sustain the network.

**Option B.** With resources for two people, some groups felt that the following additional work could be accomplished:

1. A secretariat could provide regional leadership and an anchor for the climate change impacts and adaptation community.
2. The secretariat could develop and maintain a network website, as well as provide climate change impacts and adaptation news and outreach materials to members through email. It could also facilitate proposal writing, organize workshops, provide synthesis of information.
3. The secretariat could also provide a directory of observational and future scenario climate data, names of current researchers and current climate change impacts and adaptation projects.

**Option C.** With an additional \$100K per year, the working groups suggested the following additional responsibilities of the Network:

1. A full time co-ordinator and extra funding would allow a Regional climate change impacts and adaptation research program to be developed. The co-ordinator could ensure co-ordination with related research, co-ordinate funding, provide administrative support and link to the national and global climate change impacts and adaptation research community.
2. Synthesis and publication of recent research into climate change impacts and adaptation would be possible.
3. Annual climate change impacts and adaptation research and stakeholder meetings would be easier to organize,. Funding would be available for travel to these meetings. Also, climate change outreach seminars and conferences could be organized.
4. A physical library with journals and appropriate climate change impacts and adaptation books could be developed.
5. The website could be enhanced and continually updated with a registry of researchers, stakeholders, research material, climate and related data, project summaries, newsletters and contacts.
6. An advisory panel could be established to actively identify priorities and knowledge gaps.
7. Links to the national and global climate change impacts and adaptation community could be improved.
8. Partial funding for some climate change impacts and adaptation research could be provided.

a. *What steps need to be taken to implement a British Columbia Climate Change Impacts and Adaptation Network?*

1. Establish a steering committee of five to seven people to develop basic vision, mission and goals of the network.
2. The steering committee then will develop a plan of action which will include:

- Acquiring basic funding.
- Inviting institutions or government agencies to host the network.
- Hiring people as funding becomes available.

a. *How should it evolve? That is, in what areas would you most like to see the network grow – membership, scope of services offered, outreach activities, amount of available funding, no change desired, other?*

1. Stable funding is the key ingredient in the evolution of the network. Without basic funding only minimal objectives can be reached.
2. It could evolve from a mere network to a research program with adequate funding.
3. Climate change outreach partners could be enlisted to improve public education on the issue.
4. The mandate and scope of the network should be periodically reviewed.
5. The network should become active in acquiring seed research funding.

## **Conclusion.**

The workshop concluded with a session chaired by Paul Egginton and Eric Taylor.

1. Paul Egginton, Natural Resources Canada, appreciated the enthusiasm among the workshop participants for the development of a climate change impacts and adaptation research network. He also acknowledged the need stated by many that new funds are essential for a functioning



- research network.
2. The Workshop Committee will prepare a report on the March 29 workshop.
  3. A small group needs to act as a point of contact so that further discussions on the proposed climate change impacts and adaptation research network can take place. The Workshop Committee is asked to create this small group.

[BACK TO TOP](#)

**History of the Climate Change Impacts and Adaptation Research Community:**

**British Columbia Focus**

Eric Taylor

Environment Canada

Below are selected highlights in the history of climate change events and research since 1970. Highlights in italics refer to climate change science and climate change impacts and adaptation research in and around British Columbia.

1970s, Predictions of an impending ice age spurred climate research.

1979, First World Climate Conference established the World Climate Program to further research aimed at understanding the climate system;

1982, First Canadian Climate Model produced by Environment Canada. (5 year computer simulation took six months to run.)

1985, Villach, Austria, "Assessment Conference on the Role of Carbon Dioxide and Radiatively-Active Constituents in Climate Variation and Associated Impacts," concluded that there were justifiable concerns about potential climate change and climate change impacts;

1987, Villach, Austria ("The Effects of Future Climatic Changes on the World's Bioclimatic Regions and their Management Implications) and in Bellagio, Italy ("Priorities for Future Management - A New Policy Agenda, November, 1987) led to recommendations that greenhouse gas emissions be limited and that adaptation measures be adopted;

1988, Toronto Conference on "The Changing Atmosphere: Implications for Global Security," called for a comprehensive international framework convention and a 20-percent reduction in carbon dioxide releases from fossil fuels by 2005.

*1988, Symposium on the Impacts of Climate Variability and Change on British Columbia. Environment Canada, December 18.*

1988, UNEP established the Intergovernmental Panel on Climate Change (IPCC).

1990, IPCC First Assessment Report The IPCC presented its First Assessment Report to the Second World Climate Conference convened in Geneva from October 29 to November 7, 1990.

*1991, Symposium on Implications of Climate Change for Pacific Northwest Forest Management. Seattle, Washington.*

*1993, The Canadian Climate Centre's Numerical Modelling Division moved from Toronto to the University of Victoria and changed its name to the Canadian Centre for Climate Modelling and Analysis,*

1993, *The Canadian Institute for Climate Studies was established at the University of Victoria.*

1995, IPCC Second Assessment Report

1995, *Environment Canada's EARG, now the **Adaptation and Impacts Research Group (AIRG)**, moves from Downsview to the Sustainable Development Research Institute at U.B. C.*

1997, *Canada Country Study - Volume 1: This was a first step in developing a network of researchers interested in climate change impact and adaptation questions. A twenty-six chapter publication reported on the results of surveyed literature, a first step in establishing a network of scientists and stakeholders concerned about climate change impacts in British Columbia*

1997, *Canada Country Study Workshop in Vancouver. Over 100 stakeholders, scientists, and government and industry representatives participated.*

1997, *B.C. and Yukon Climate Change Program Communications Committee formed.*

1998, *Canada signed the Kyoto Protocol on Climate Change*

1999, *Southern British Columbia Climate Change Action Fund proposal – Okanagan, Southeast British Columbia, Georgia Basin. A great deal of interest in focussed research on impacts. Insufficient funding support.*

1999, *Southern British Columbia Climate Change Poster produced by a network of scientists, communicators, environmental groups and government agencies.*

1999, *Climate change and fisheries workshop- Vancouver*

1999, *Canadian Global Climate Model with a fully 3-D ocean, transient climate change, data widely distributed - IPCC entry. GCM3, the latest version of atmosphere model, about to be produced.*

2000 – *Climate change scenarios produced nationally and in B.C. (<http://www.pyr.ec.gc.ca/climate-change/>)*

2001, IPCC Third Assessment Report

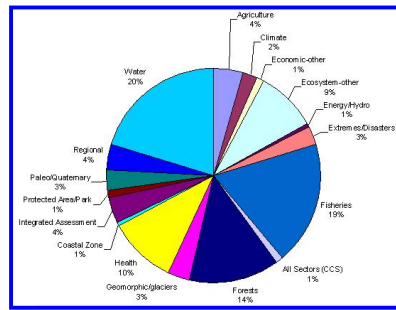
### [BACK TO TOP](#)

Bibliography of Climate Change Impacts and Adaptation Research in British Columbia and Neighbouring Regions, 1991-2000

**Stewart Cohen; Draft—May 3, 2000**

**(with contributions from Eric Taylor, Andrew Fabro, Jackie King, Barry Smith, and Lee Harding)**

One hundred and eighty three papers related to climate change impacts and adaptation research in British Columbia and neighbouring regions have been identified. Figure 1 breaks down the categories of the climate change issue that each of these papers address. References to this list of papers follows Figure 1.



**Figure 1.** The fraction of research papers that focus on specific climate change impact and adaptation topics in British Columbia and neighbouring regions. Click on the image to bring up the figure in a new browser window.

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**Bradford M.J. Irvine J.R. 2000. Land use, fishing, climate change, and the decline of Thompson River, British Columbia, coho salmon. *Canadian Journal of Fisheries & Aquatic Sciences*. 57(1):13-16, Jan.**

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## SECTORS

Agriculture 8  
All Sectors (CCS) 2  
Climate 4  
Coastal Zone 1  
Economic-other 2  
Ecosystem-other 17

Energy/Hydro 1  
 Extremes/Disasters 5  
 Fisheries 34  
 Forests 25  
 Geomorphic/glaciers 6  
 Health 19  
 Integrated Assessment 7  
 Protected Area/Park 2  
 Paleo/Quaternary 6  
 Regional 7  
 Water 37

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TOTAL 183

Includes: Mackenzie Basin Impact Study—Interim and Final Reports  
 Canada Country Study, BC, Sectoral and Cross-Cutting Volumes

Bering Sea Impact Study

JISAO/SMI Climate Impacts Group

Palliser Triangle Global Change Project (Lemmen et al.)

REGIONS-- BRITISH COLUMBIA & NEIGHBOURS

All BC 28

Boreal/high latitude/Alaska 9

Canada 22

Coastal 4

Columbia/U.S. Pacific Northwest 24

Fraser 4

Global 2

Interior/Rockies/Thompson 9

North America 4

Pacific Ocean 23

Peace/Liard/Mackenzie 31

Prairies 5

U.S. 9

Victoria 2

Other? 6

[BACK TO TOP](#)

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[BACK TO TOP](#)

 [Printable Page](#) | [National Site](#) with links to regions and sectors | [FRANÇAIS](#) | This page updated Mon Oct 21 23:21:00 2002

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