FROM IMPACTS TO ADAPTATION:
Canada in a Changing Climate 2007
From Impacts to Adaptation: Canada in a Changing Climate 2007 reflects the advances made in understanding Canada’s vulnerability to climate change during the past decade. Through a primarily regional approach, this assessment discusses current and future risks and opportunities that climate change presents to Canada, with a focus on human and managed systems. It is based on a critical analysis of existing knowledge, drawn from the published scientific and technical literature and from expert knowledge. The current state of understanding is presented, and key knowledge gaps are identified. Advances in understanding adaptation, as well as examples of recent and ongoing adaptation initiatives, are highlighted throughout the report.

From Impacts to Adaptation: Canada in a Changing Climate 2007

Editors
Donald S. Lemmen Natural Resources Canada
Fiona J. Warren Natural Resources Canada
Jacinthe Lacroix Environment Canada
Elizabeth Bush Environment Canada

Lead Authors
Alain Bourque Ouranos, Montreal, QC
James P. Bruce Soil and Water Conservation Society, Ottawa, ON
Ian Burton Independent scholar, Toronto, ON
Norm R. Catto Memorial University of Newfoundland, St. John’s, NL
Quentin Chiotti Pollution Probe, Toronto, ON
Paul Egginton Natural Resources Canada, Ottawa, ON
Chris Furgal Trent University, Peterborough, ON
Erik Haites Margaret Consultants, Toronto, ON
Suren Kulshreshtha University of Saskatchewan, Saskatoon, SK
Beth Lavender Natural Resources Canada, Ottawa, ON
Donald S. Lemmen Natural Resources Canada, Ottawa, ON
Terry D. Prowse Environment Canada and University of Victoria, Victoria, BC
David Sauchyn Prairie Adaptation Research Collaborative, Regina, SK
Guillaume Simonet Ouranos, Montreal, QC
Robin Sydneysmith University of British Columbia, Vancouver, BC
Liette Vasseur Laurentian University, Sudbury, ON
Ian J. Walker University of Victoria, Victoria, BC
Fiona J. Warren Natural Resources Canada, Ottawa, ON

Advisory Committee
Alain Bourque Ouranos
James P. Bruce Soil and Water Conservation Society
Ian Burton Independent scholar
Claude Desjarlais Ouranos
Cindy Dickson Council of Yukon First Nations
Paul Egginton Natural Resources Canada
Don Forbes Natural Resources Canada
Jenny Fraser British Columbia Ministry of Environment
Denis Isabel Canadian Council of Professional Engineers
Linda Mortsch Environment Canada
Scot Nickels Inuit Tapiriit Kanatami
Mary Jane Roberts Federation of Canadian Municipalities
Jacinthe Séguin Health Canada
Barry Smit University of Guelph
Elaine Wheaton Saskatchewan Research Council
Leslie Whitby Indian and Northern Affairs Canada

Secretariat (Natural Resources Canada)
Tanuja Kulkarni - Coordinator
Maja Cholich, Amber Lindstedt, Dawn Lirette

Additional copies of this report can be obtained from:
Climate Change Impacts and Adaptation Division
Earth Sciences Sector
Natural Resources Canada
601 Booth Street
Ottawa, Ontario K1A 0E8
adaptation@nrcan.gc.ca

©Her Majesty the Queen in Right of Canada, 2008
Cat. No.: M174-2/1-2007

This publication is also available at:
FROM IMPACTS TO ADAPTATION: CANADA IN A CHANGING CLIMATE 2007

Edited by

Donald S. Lemmen
Climate Change Impacts and Adaptation Division
Natural Resources Canada

Fiona J. Warren
Climate Change Impacts and Adaptation Division
Natural Resources Canada

Jacinthe Lacroix
Atmospheric Science Assessment and Integration Office
Environment Canada

Elizabeth Bush
Atmospheric Science Assessment and Integration Office
Environment Canada

Recommended Citation:
The following people are gratefully acknowledged for providing critical reviews of individual chapters of this assessment report:

Phil Adkins
Shardul Agrawala
Gary Anka
Harry Archibald
Elizabeth Atkinson
Trevor Bell
Lianne Bellisario
Pierre Bernier
Andrea Bertram
Yvonne Bialowas
Henning Bjornlund
Dominique Blain
Darcy Blais
Marie Boehm
Martin Bouterice
Gilles Boulet
Jackie Bourgeois
Denis Bourque
Chris Burn
Phil Burton
Elizabeth Bush
Michel Campagna
Ian Campbell
Ann Cavlovic
Yanie Chauret
Ian Church
Kaila-Lea Clarke
Stewart Cohen
Steve Colombo
Neil Cunningham
Jeff Curtis
Jean-Francois Cyr
Graham Daborn
Rob Davis
Edward Dean
Rob de Loë
Ray Desjardins
Jean-Francois Dionne
John Drover
Peter Dzikowski
Ainslee Emerson
Tim Ewanchuk
Jimena Eyzaguirre
Mike Flannigan
Melissa Foley
Donald Forbes
James Ford
Colin Fraser
Jenny Fraser
Samuel Gameda
Sarah Gammell
Rory Gilsenan
Tom Goddard
Pierre Gosselin
Pascale Groulx
Donald Haley
Don Hayley
Elizabeth Harvey
Bruce Hayes
Ross Herrington
Harvey Hill
Phil Hill
Ted Hogg
Altick Huebener
Paul Hunt
Jean-Willy Ileka
Milan Ilnyckyj
Tracey Jones-Cameron
Ben Kangasniemi
Tim Karlsson
Stephen King
Joan Klaassen
Gail Krantzberg
Daniel Lebel
Claudel Lemieux
Tony Lempriere
Benoit Limoges
Gary Lines
Bob MacGregor
Tim Marta
Greg McKinnon
Felix Meunie
Terry Mills
Kyla Milne
Alex Milton
Linda Mortsch
Nerissa Mulligan
Dean Mundee
Chad Nelson
Denise Nielsen
Peter Neily
Marie-Eve Néron
Sheilah Nolan
Carey Ogilvie
Dean Stinson O’Gorman
Jeff Ollerhead
Sonia Pellow
Gina Penny
Monique Plamondon
Patrick Quealey
Andy Reisinger
Mary Jane Roberts
Scott Robinson
David Schindler
Kim Schmidt
Ryan Schwartz
Daniel Scott
Tiina Searle
Jacinthe Séguin
Michael Seneka
Robert Sexton
Barry Smit
Johanna Smith
Sharon Smith
Jim Sparling
John Stone
Tana Stratton
Erin Swansburg
Tim Takaro
Eric Taylor
Lisa Van Buren
Henry Venema
Anita Walker
Ellen Wall
Holly Hongxin Wang
David Welch
Tim Williamson
Mary-Ann Wilson
Kenneth Wong
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthesis</td>
<td>1</td>
</tr>
<tr>
<td>D.S. Lemmen, F.J. Warren and J. Lacroix</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 1</td>
<td>21</td>
</tr>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>D.S. Lemmen and F.J. Warren and J. Lacroix</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 2</td>
<td>27</td>
</tr>
<tr>
<td>Background Information:</td>
<td></td>
</tr>
<tr>
<td>Concepts, Overviews and Approaches</td>
<td></td>
</tr>
<tr>
<td>Lead authors: F.J. Warren and P. Egginton</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 3</td>
<td>57</td>
</tr>
<tr>
<td>Northern Canada</td>
<td></td>
</tr>
<tr>
<td>Lead authors: C. Furgal and T.D. Prowse</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 4</td>
<td>119</td>
</tr>
<tr>
<td>Atlantic Canada</td>
<td></td>
</tr>
<tr>
<td>Lead authors: L. Vasseur and N. Catto</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 5</td>
<td>171</td>
</tr>
<tr>
<td>Quebec</td>
<td></td>
</tr>
<tr>
<td>Lead authors: A. Bourque and G. Simonet</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 6</td>
<td>227</td>
</tr>
<tr>
<td>Ontario</td>
<td></td>
</tr>
<tr>
<td>Lead authors: Q. Chiotti and B. Lavender</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 7</td>
<td>275</td>
</tr>
<tr>
<td>Prairies</td>
<td></td>
</tr>
<tr>
<td>Lead authors: D. Sauchyn and S. Kulshreshtha</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 8</td>
<td>329</td>
</tr>
<tr>
<td>British Columbia</td>
<td></td>
</tr>
<tr>
<td>Lead authors: I. Walker and R. Sydneysmith</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 9</td>
<td>387</td>
</tr>
<tr>
<td>Canada in an International Context</td>
<td></td>
</tr>
<tr>
<td>Lead authors: J.P. Bruce and E. Haites</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 10</td>
<td>425</td>
</tr>
<tr>
<td>Moving Forward on Adaptation</td>
<td></td>
</tr>
<tr>
<td>I. Burton</td>
<td></td>
</tr>
<tr>
<td>Glossary</td>
<td>441</td>
</tr>
</tbody>
</table>