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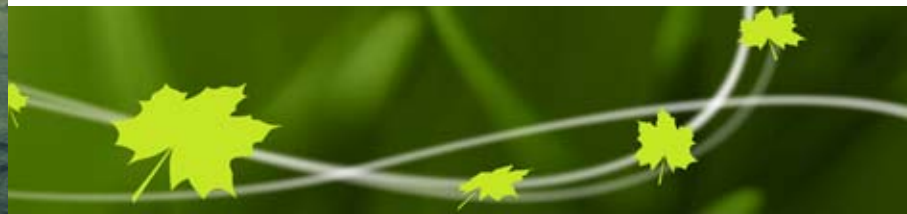
Wildlife and Climate Change Adaptation:

A perspective from Canada



**Trilateral Committee Plenary
12 May 2009
Canadian Wildlife Service
Environment Canada**

Presented by: Dr. Kathryn Lindsay





Climate Change & Resulting Effects

- **Changes in climate are evident in every region of Canada – especially notable in the Arctic**
 - Warmer air and water temperatures; longer growing season
 - Link between area of forest burned and summer air temperatures
 - Reduction in snow area & duration; longer-ice free periods on lakes & rivers
 - Changes in permafrost distribution
- **Projected changes in climate include:**
 - Warming in all seasons but greatest in winter and spring
 - Changes in the timing, amount and type of precipitation (snow or rain)
 - Increase in disturbance (fire, invasives, pests, e.g. mountain pine beetle)
- **Key concerns include**
 - rate and magnitude of change
 - effects of extreme events will challenge our capacity to cope or adapt





Climate Change & Resulting Effects

- **Relative to other ecosystems, climate change is expected to have greater impacts on**
 - Arctic (tundra, sea ice)
 - Prairie wetlands and rivers (changes in rain, snow and glacial melt)
 - Coastal ecosystems (squeezed by sea-level rise)
 - Mountain tops (shrinking area and no where to disperse to)

- **Species' phenology, productivity, migratory patterns and ranges are changing**
 - earlier leaf-out and flowering
 - declines in condition of some polar bear populations
 - species range expansions northward

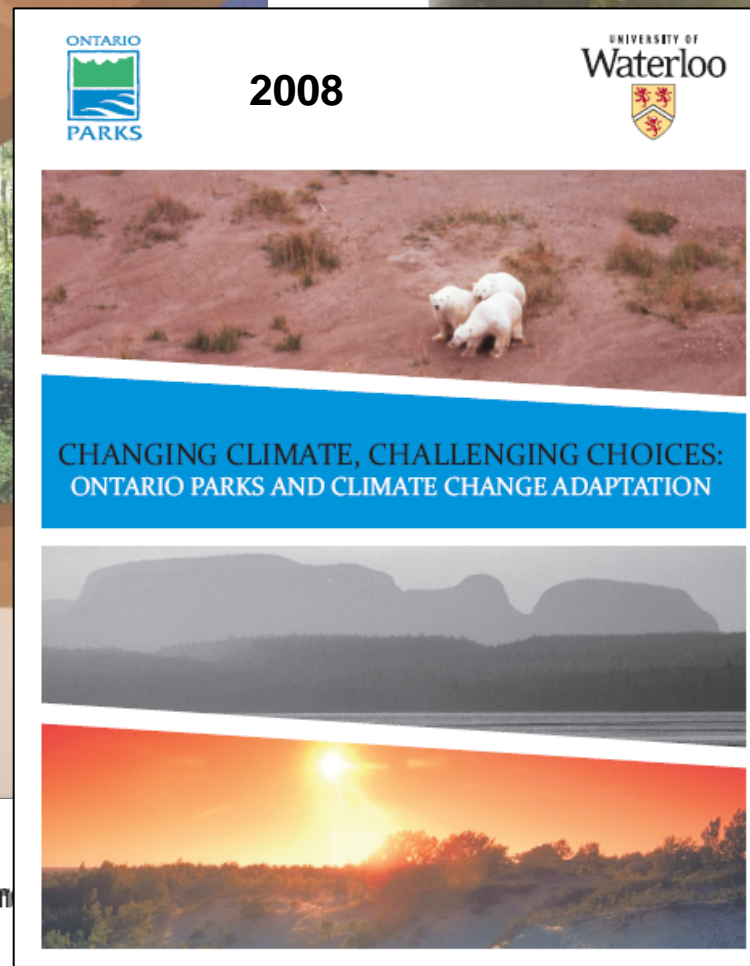
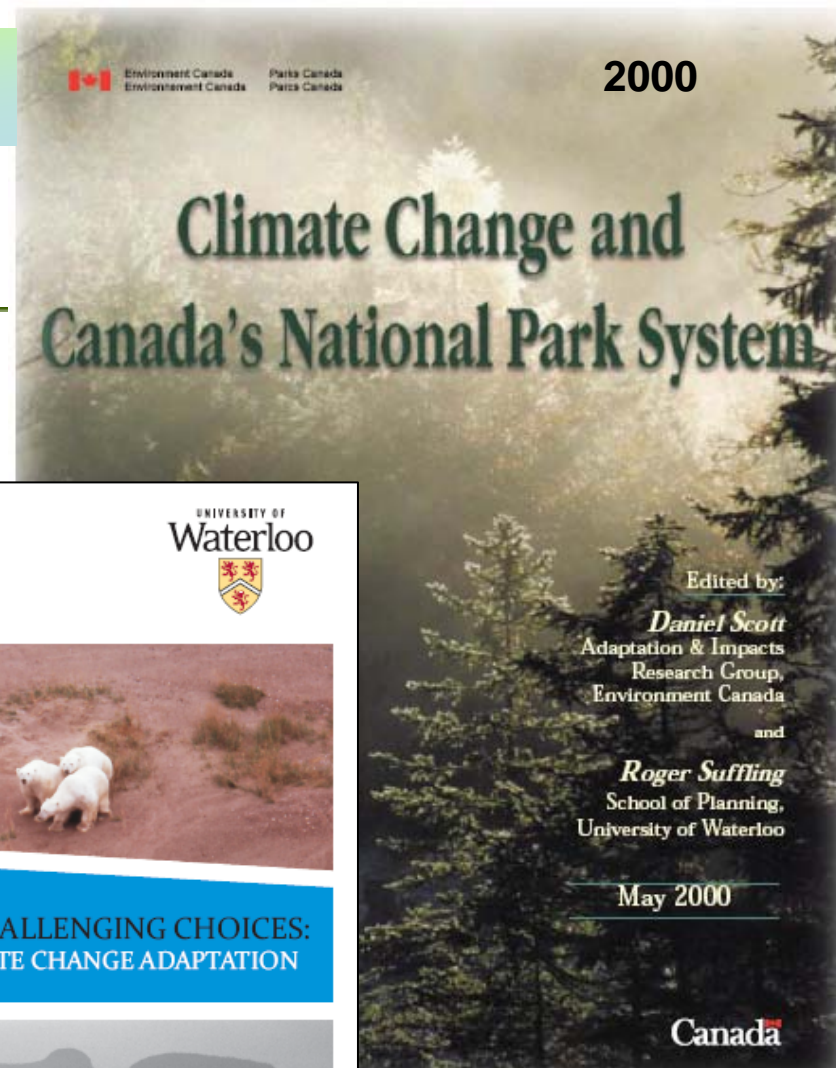




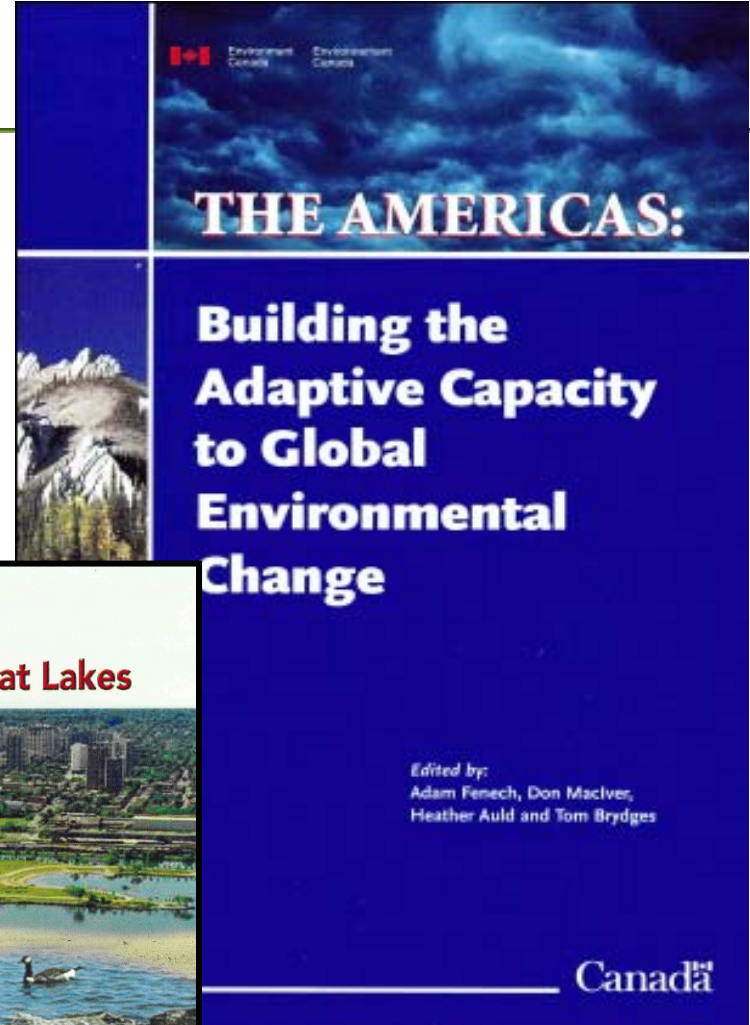
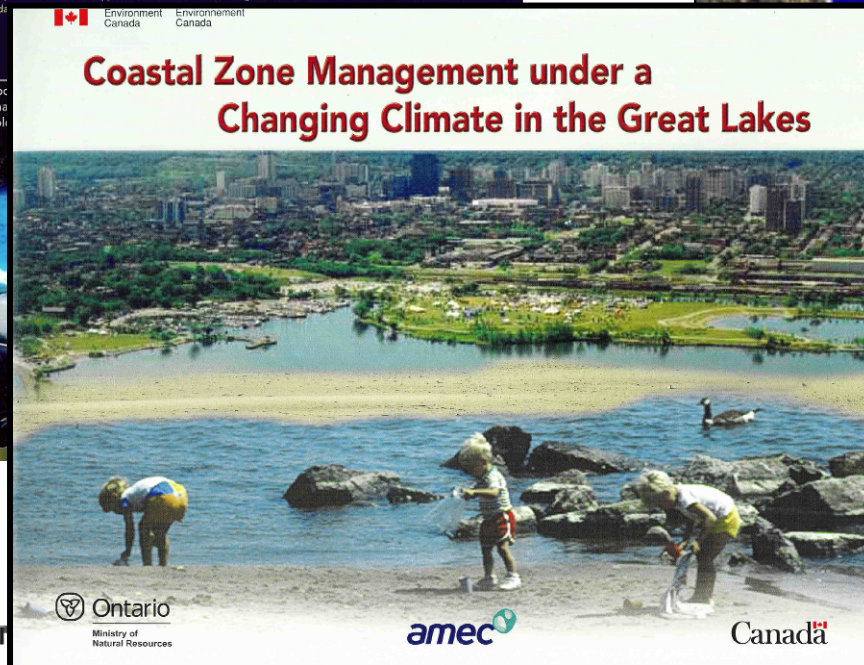
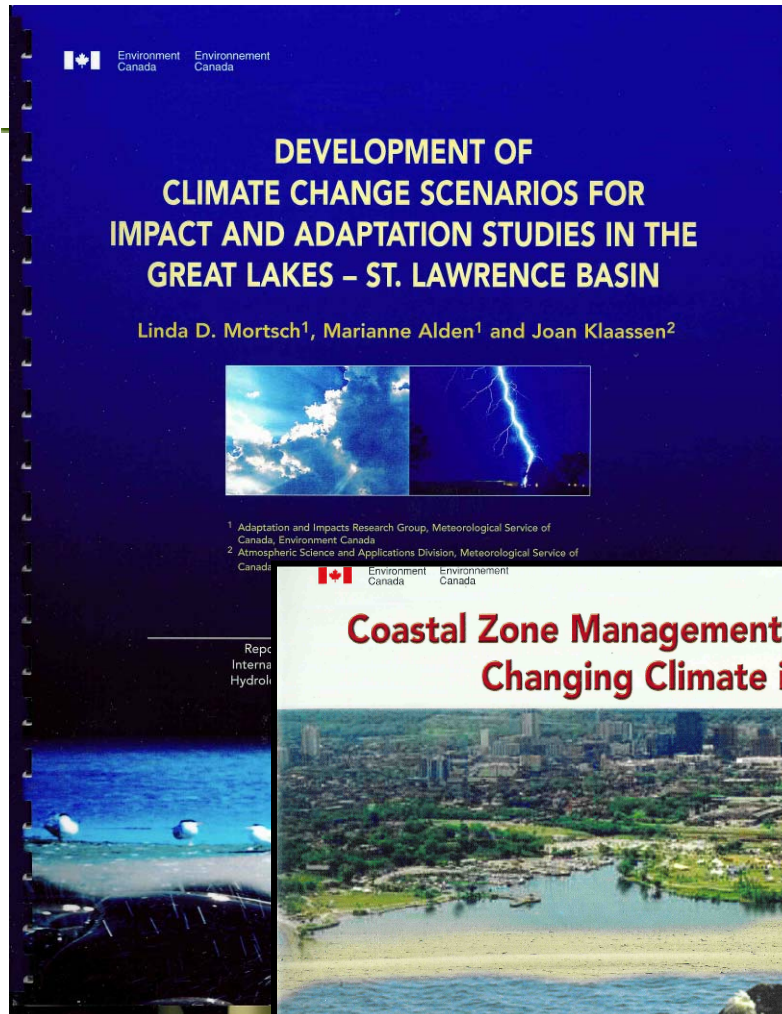
Key Messages on Wildlife and Climate Change Adaptation

- **Climate change adaptation work is still largely at the “idea” stage**
- **Continued investment in research and monitoring is vital** to improve our ability to detect and predict effects of climate change and other stressors, and to guide adaptation strategies and actions
- **“Mainstream” climate change adaptation for wildlife**
- **Take action now**; proceed with actions that have benefits now as well as for reducing climate change effects (i.e. co-benefits)
- **Encourage multi-scale and cross-jurisdictional research and planning**
 - to understand and accommodate shifts in species and ecosystems
 - to maintain the productive capacity of the continent for species at risk, waterfowl & other migratory birds and their habitats
- **Protected areas are an integral component of a continental adaptation strategy**

1/ Policy & Planning



1/ Policy & Planning



1/ Policy & Planning

Recognize:

- **Need to be responsive to new knowledge, threats and opportunities for adaptation**
- **Need to “mainstream” climate change adaptation:**
 - developing climate change information through research and monitoring
 - incorporating new knowledge into planning processes, policies, programs and management strategies
 - Using the 5 R’s strategies (resistance, resilience, respond, realign, reduce)
 - addressing inherent uncertainties using risk management approaches
- **Need to act now:** proceed with “no regret” or “low regret” actions that address current stressors and also reduce climate change impacts
 - Actions that are relatively low cost, easily implemented and reduce existing vulnerability/sensitivity to changes in climate and other stressors
- **Value of using “targeted collaboration”. “focused collaborative networks” and structured decision analysis approaches to guide the path forward**
 - e.g. Climate Change Task Teams - BC forestry, Canadian Council of Resource Ministers for Biodiversity



Climate Change and Environmental Stewardship / Parks & Protected Areas

Current Understanding and Principles for Action

Implications of climate change now and into the future:

1. Future climate and ecosystems will be different than what exists today.
2. The ongoing rate of climate change will increase relative to historic rates.
3. Climate change includes more frequent and more severe weather events and may include permanent shifts from one climatic state to another.
4. Unstressed ecosystems tend to be more resilient to climate change than stressed ecosystems.
5. Diverse natural ecosystems tend to be more resilient to climate change than those simplified by humans.
6. Climate change affects ecological, hydrological and geomorphologic processes such as nutrient and water cycling.
7. Climate change affects the timing, scale and effects of natural disturbances and processes, resulting in more and larger wildfires, disruption of peak water flows, and altered pathogen-host relationships, disease cycles, predator-prey systems, and pollination patterns.
8. Climate change affects species in the context of ecosystems.
9. Climate thresholds exist for species and ecosystem processes.
10. Species will respond to climate change in different ways and at different rates (move, adapt behaviour, perish).
11. Natural landscape and watershed connectivity facilitates dispersal and flow.
12. Natural migration of many plant and animal species will not keep up with the rate of climate change.

Visit the Climate Change Adaptation Sharepoint site at:

<http://sharepoint.env.gov.bc.ca/climatechangeadaptation>



Ministry of Environment

Consider and apply the following as a climate change lens:

1. Consider how the divisions conduct their operations and adapt service delivery to lower Greenhouse Gas emissions to help reduce the rate of climate change.
2. Increase the knowledge, skills, and adaptive capacity of the divisions to develop and implement climate change adaptation strategies for species and ecosystems.
3. Engage and collaborate with partners, clients and stakeholders in developing a mutual understanding of the effects of climate change on species and ecosystems, and in devising and implementing adaptation strategies and initiatives.
4. Monitor, assess and continuously learn about changing climate conditions and the effects on species and ecosystems and adjust the divisions' management strategies and investments accordingly.
5. Promote and use a diverse set of strategies to help species and ecosystems deal with climate change and the uncertainty of future climate impacts. These include:
 - › Creating and/or maintaining natural landscape and watershed connectivity to enable dispersal and flow;
 - › Identifying and reducing threats to ecosystem resilience;
 - › Maintaining a diversity of ecosystems whenever possible.
6. Consider and address implications of climate change mitigation measures on the adaptive capacity of species and on ecosystem resilience.
7. Consider and address the implications of adaptation strategies for species and ecosystems on mitigation efforts.



Photo Credit: Judy Miller



Photo Credit: Judy Miller

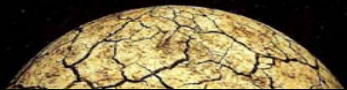


Photo Credit: Judy Miller



2/ Monitoring & Assessment

Canadian Drought Alert and Monitoring Program (CDAMP)



GREAT LAKES COASTAL WETLAND COMMUNITIES: VULNERABILITIES TO CLIMATE CHANGE AND RESPONSE TO ADAPTATION STRATEGIES

2006

Edited by
LINDA MORTSCH
JOEL INGRAM
ANDREA HEBB
SUSAN DOKA



Climate Change and Biodiversity in the Americas

Edited by
ADAM FENECH
DON MACIVER
FRANCISCO DALLMEIER

2008

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CLIMATE CHANGE 2007

IMPACT, ADAPTATION AND VULNERABILITY



Protected Area Policies and Climate Change: The Case of the Prairie Ecozone, Saskatchewan

2006



SUMMARY DOCUMENT

Summary edited by Derek Froese, John Vandall and Norm Henderson

No. 08-02



TAKING NATURE'S PULSE THE STATUS OF BIODIVERSITY IN BRITISH COLUMBIA

2008



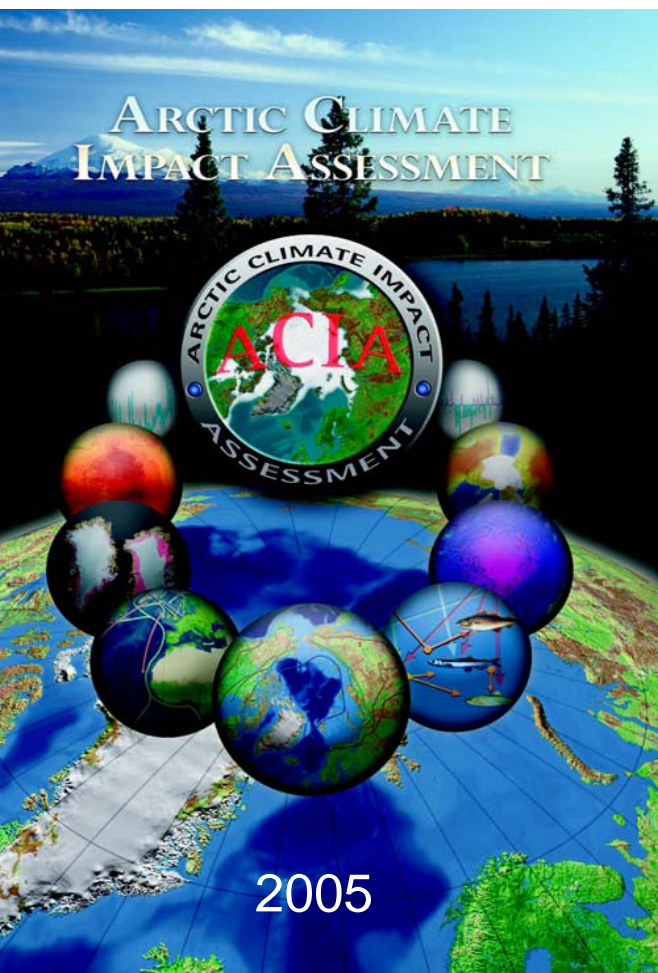
2/ Monitoring & Assessment



International Polar Year 2007-08

Funding of science and research projects on climate change impacts and adaptation for

- Arctic biodiversity (polar bear, caribou, seals, whales, seabirds, char, sharks, insects, plants)
- Tundra and freshwater ecosystems
- Forests, peatlands
- Treelines



2/ Monitoring & Assessment

Designing a Knowledge System to Manage a Changing World: A Case History for Ivvavik NP, Yukon

Parks Canada Agency 2009

- Predicted change at arctic latitudes is estimated at 2X global average
- Expect that most Arctic national parks will experience a shift in the ecological biome that they were established to represent
- Changes in arctic landscapes are already occurring



2/ Monitoring & Assessment

- **Wildlife databases for monitoring and assessing effects of climate change in Canada**
 - **Volunteer-based programs (e.g.):**
 - Plantwatch – flowering phenology
<http://plantwatch.sunsite.ualberta.ca>
 - Trees <http://planthardiness.gc.ca>
 - North America Breeding Bird Survey
 - Ontario Nest Record Scheme
 - **Government-based programs (e.g.):**
 - Waterfowl/shorebird/seabird surveys
 - Circumpolar biodiversity monitoring
- **Use of remote-sensing monitoring methods**
- **Use of Parks and Protected Areas as benchmarks for monitoring effects of climate change among other stressors**
 - Parks Canada ecological integrity monitoring



2/ Monitoring & Assessment

Designing a Knowledge System to Manage a Changing World: A Case History for Ivvavik NP, Yukon

Parks Canada Agency 2009

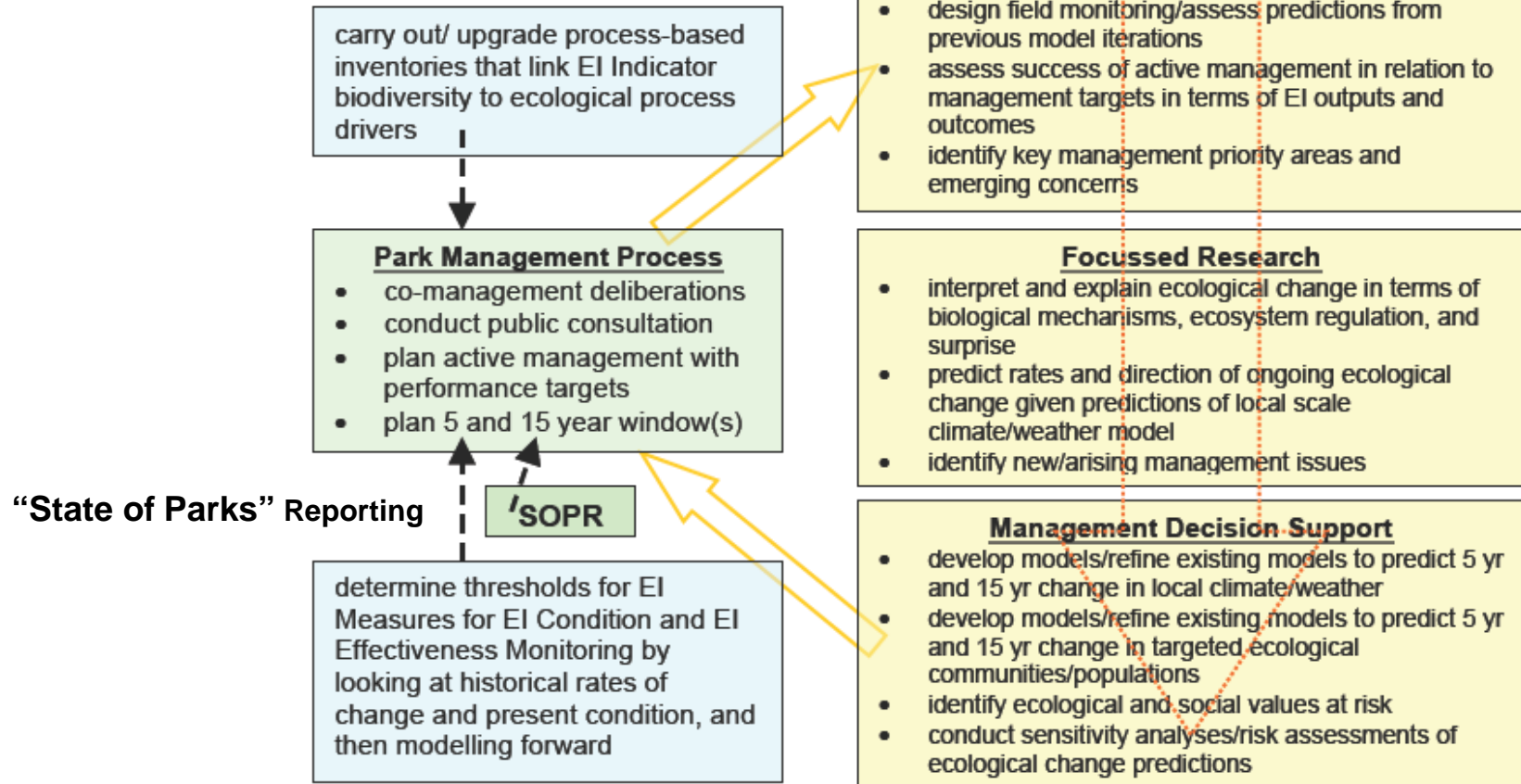
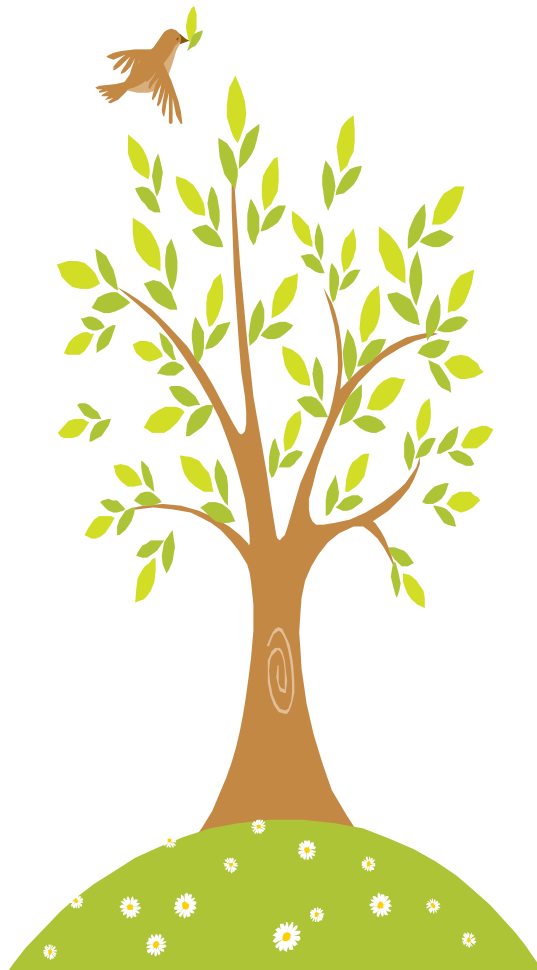


Figure 2: A model for conducting proactive adaptive management for managing Arctic national parks under conditions of evolving uncertainty. The process cycles every five years with management planning and State of the Park reporting.

2/ Monitoring & Assessment



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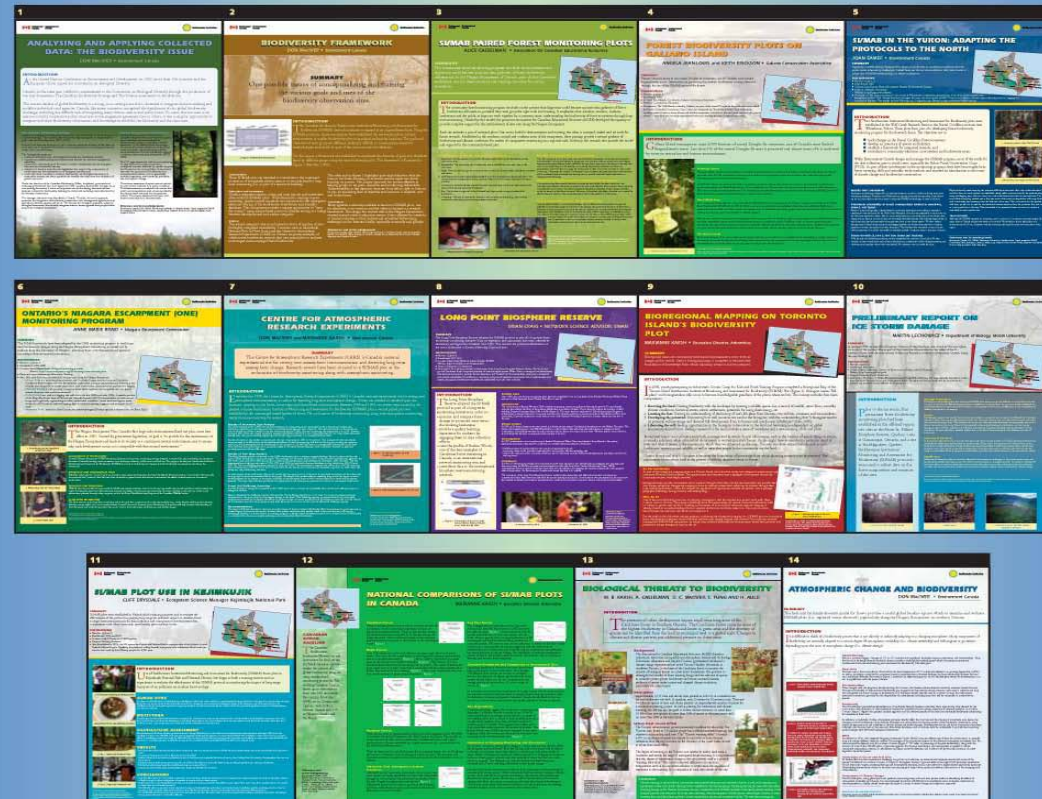
Network of Biodiversity Observing Sites (NBOS) in Canada

Don MacIver and Marianne Karsh



• Biodiversity in Canada • Coast to Coast Examples of Biodiversity • Analysis • Atmospheric Change and Biological Threats

www.canadabiodiversity.ca



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related sites: www.cccsn.ca and www.hazards.ca

3/ Science Needs

- **Need for continued investment in research and monitoring to improve ability to predict effects and to inform adaptation strategies and actions**
 - To establish baseline conditions
 - To detect ecosystem (and services) and socio-economics impacts
 - To inform ecosystem, wildlife and habitat model development and identify potential thresholds
 - To develop and assess adaptation strategies
 - To down-scale climate models to scale of management units (e.g. protected areas)
 - Approaches need to be cost-effective and sustainable for a long time

 **Perspective of interacting and cumulative effects is critical**   

3/ Science Needs

Environment Canada's Science Plan

2006



A Strategy for
Environment Canada's Science

Strategic Directions:

- Developing an integrated environmental monitoring and prediction capability
- Understanding cumulative risks
- Managing risks, optimizing opportunities and building resilience

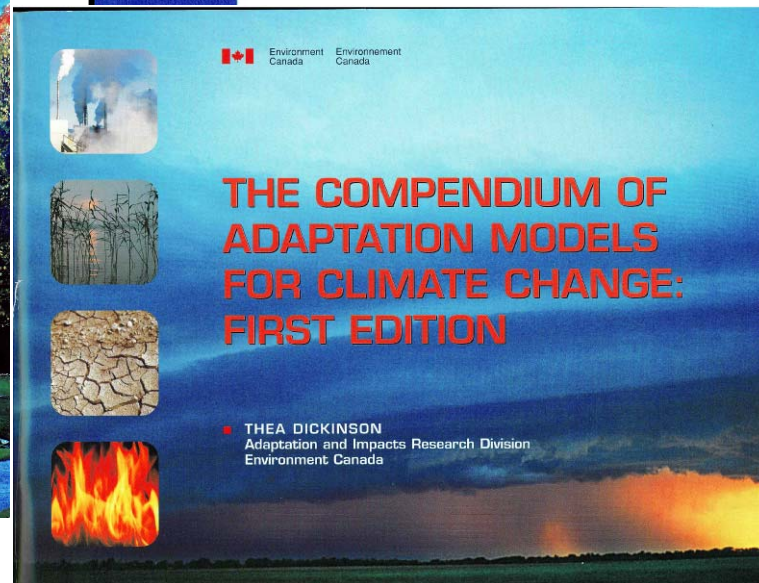
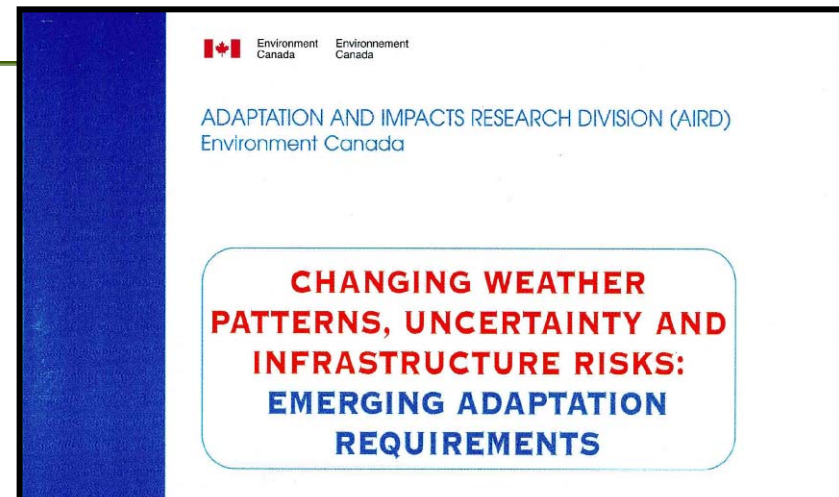
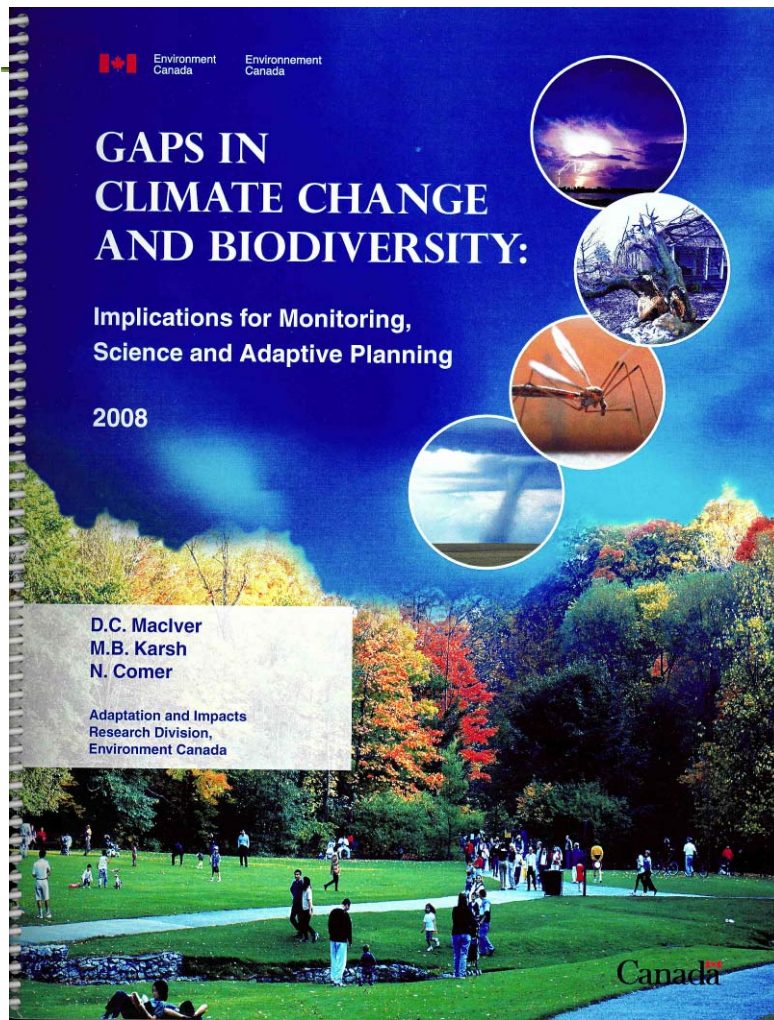


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3/ Science Needs



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3/ Science Needs

- **Need for decision support tools (e.g. ecological forecasting and scenario tools)**
- **Need systematic national-scale habitat monitoring**
- **Need to explore and understand how institutional, social and cultural factors influence the uptake of proactive adaptation**



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3/ Science Needs



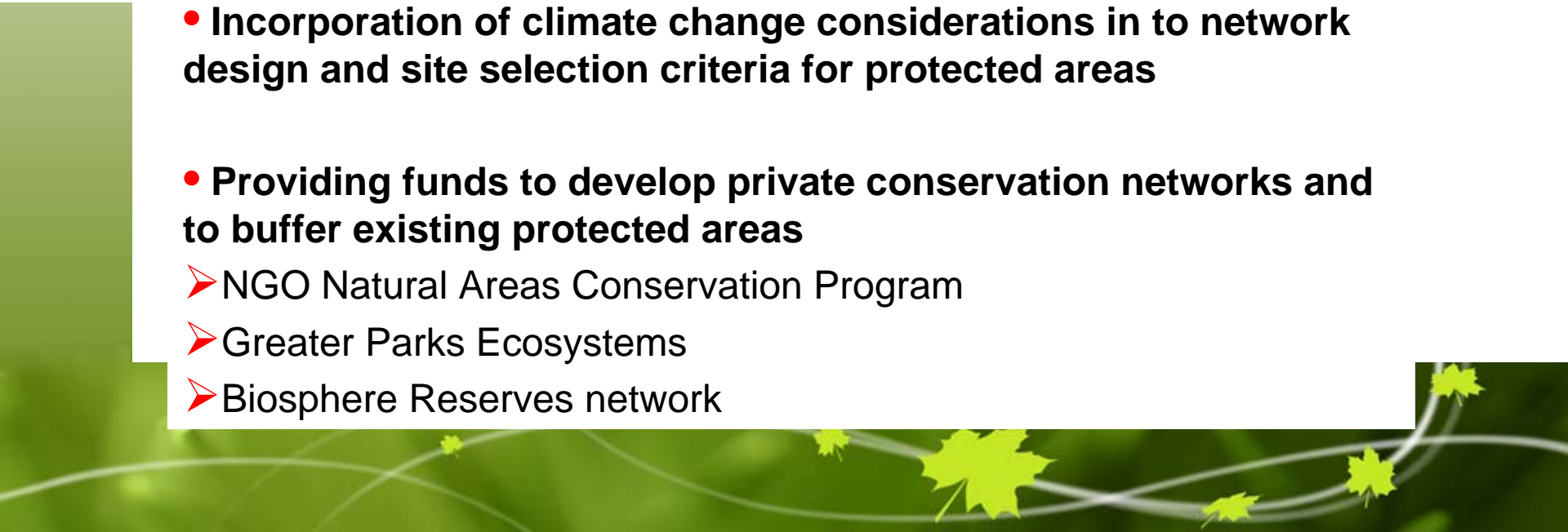
CANADIAN CLIMATE CHANGE SCENARIOS NETWORK (CCCSN)

Don Macher, Neil Comer, Brad Bass, Philippe Gachon

[illegible]



4/ *Building Resilience and Managing for Change*

- **Recognize need for replication of species populations and habitats, and connectivity within conservation networks, to allow for ecosystem changes and species shifts**
 - over large spatial scales (regional, national, continental, hemispheric) and
 - in relation to predicted and observed changes over time
 - **Expanding the protected areas network in the north of Canada**
 - **Incorporation of climate change considerations in to network design and site selection criteria for protected areas**
 - **Providing funds to develop private conservation networks and to buffer existing protected areas**
 - NGO Natural Areas Conservation Program
 - Greater Parks Ecosystems
 - Biosphere Reserves network
- 

4/ Building Resilience and Managing for change

PRINCIPLES AND GUIDELINES FOR ECOLOGICAL RESTORATION *in Canada's Protected Natural Areas*



Jurisdictions are using active management in some protected areas

- to minimize threats (overuse, invasives, pesticides, pollution, habitat loss and fragmentation)

- to maintain or restore ecosystems in order to

- to (re-)build resilience

- to sequester carbon

as a way to mitigate climate change and to enable adaptation to its effects



5/ Education/Outreach

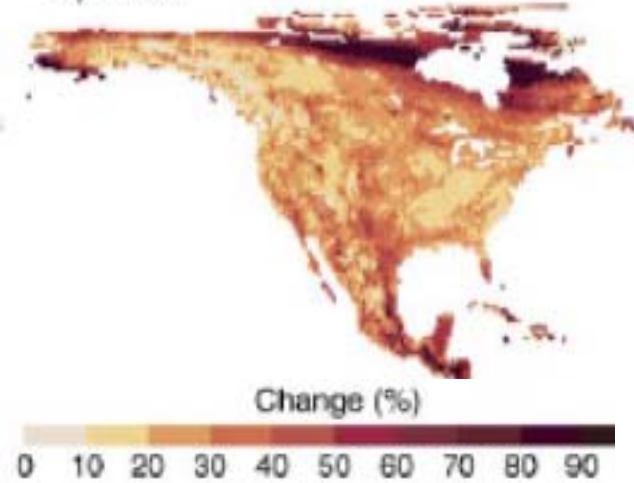
- Numerous Canadian websites, education/activity kits, media stories, etc., on climate change, but just beginning to focus on wildlife and habitat impacts and on adaptation (vs mitigation)
- Need more efforts to help decision-makers, policy and program planners and conservation practitioners to build knowledge and share information on wildlife and climate change adaptation





6/ Coordination/Cooperation among Agencies

B) Birds



- **Expand interagency collaboration, integration and lesson sharing**

- to understand and accommodate shifts in species and ecosystems
- to maintain the productive capacity of the continent for species at risk, waterfowl & other migratory birds

- **Involved in conservation forums and initiatives across scales grappling with how to incorporate adaptation to climate change:**

- Cdn Parks Council; Cdn Council Ecological Areas
- Carolinian Canada Coalition; Prairie Conservation **Action Plan Partnership**
- Yellowstone2Yukon, Adirondack2Algonquin, 2Countries1Forest
- NA Waterfowl Management Plan
- NA Bird Conservation Initiative
- Western Hemisphere Shorebird Reserve Network
- Trilateral “Sister Sites” programs – e.g. Monarch Butterfly

