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Report of the
**Commissioner of the
Environment and
Sustainable Development**
to the House of Commons

FALL

Chapter 3
Adapting to Climate Impacts



Office of the Auditor General of Canada

The Fall 2010 Report of the Commissioner of the Environment and Sustainable Development comprises The Commissioner's Perspective, Main Points—Chapters 1 to 3, an appendix, and four chapters. The main table of contents for the Report is found at the end of this publication.

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Chapter

3

Adapting to Climate Impacts

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Adapting to Climate Impacts

Main Points

What we examined

Government reports have demonstrated that climate change affects all regions of the country and a wide range of economic sectors. These impacts and the need to adapt to them touch on virtually all federal government portfolios, with significant implications for policies and programs related to Canadians' health and the country's industry, infrastructure, and ecosystems. The federal government is well positioned to help Canadians reduce their exposure to risks from climate change by providing them with information on impacts and adaptive measures.

We examined five key federal departments whose mandates are affected significantly by climate change—Environment Canada, Natural Resources Canada, Health Canada, Indian and Northern Affairs Canada, and Fisheries and Oceans Canada. We looked at whether the departments are identifying and assessing the risks posed by climate change in their areas of responsibility. We also looked at whether they are taking steps to adapt to the risks by considering them in their planning and decision making.

We looked at four climate change adaptation programs in these departments to determine whether they have collected and disseminated information in a usable way to those who need the information—for example, other federal departments, provinces and territories, Aboriginal communities, municipalities, industry sectors, non-governmental organizations, and academics.

Audit work for this chapter was substantially completed on 8 June 2010.

Why it's important

The health of Canadians and Canada's natural environment, communities, and economy are vulnerable to the impacts of a changing climate. Some of these impacts are already occurring from coast to coast. They are most evident in Canada's North where, for example, the thawing of permafrost as a result of temperature increases is affecting the stability of roads, buildings, pipelines, and other infrastructure.

Adapting to actual or expected changes in climate involves adjusting our decisions, activities, and thinking. These adjustments are essential both to minimize adverse effects and to take advantage of new and beneficial opportunities. The government acknowledges that climate change is inevitable and that we must adapt to its impacts in order to reduce their severity.

What we found

- The government has not established clear priorities for addressing the need to adapt to a changing climate. Although the government committed in 2007 to produce a federal adaptation policy to assist it in establishing priorities for future action, there is still no federal adaptation policy, strategy, or action plan in place. Departments therefore lack the necessary central direction for prioritizing and coordinating their efforts to develop more effective and efficient ways of managing climate change risks.
- Overall, the departments we examined have not taken concrete actions to adapt to the impacts of a changing climate. With few exceptions, they have yet to adjust or develop policies and practices to better respond to the risks. However, Fisheries and Oceans Canada, Natural Resources Canada, Health Canada, and Environment Canada have taken the first steps of risk management by completing assessments of the risks to their mandate areas from climate change, and they have prioritized the risks. Indian and Northern Affairs Canada has initiated but not yet completed a department-wide assessment of climate change risks it must manage.
- The four programs we examined have shared information on climate impacts and adaptation in a manner that responds to the needs of their specific clients, stakeholders, and partners. However, the programs cannot meet the increasing demand for information. Funding for adaptation programs under the Clean Air Agenda is scheduled to end in March 2011, and there is no plan in place to address ongoing needs after that date.

The departments have responded. The departments agree with all of the recommendations addressed to them. Their detailed responses follow the recommendations throughout the chapter.

Introduction

Climate change—Any change in climate over time, whether it is the product of natural factors, human activity, or both.

Adaptation—The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects. Adaptation moderates harm or exploits beneficial opportunities.

Intergovernmental Panel on Climate Change—A scientific body established under the United Nations Environment Programme and the World Meteorological Organization to review and assess the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change.

3.1 Adapting to actual or expected changes in climate involves adjusting our decisions, activities, and thinking. Making these adjustments is central to both minimizing the adverse effects of these changes, and taking advantage of any new and beneficial opportunities. The government acknowledges that **climate change** is inevitable due to past and ongoing emissions of greenhouse gases, and that therefore **adaptation** to the impacts is essential.

The impacts of a changing climate

3.2 In 2007, the **Intergovernmental Panel on Climate Change** (IPCC) provided the most comprehensive and up-to-date global scientific assessment of the impacts of climate change, the vulnerability of natural and human environments, and the potential for response through adaptation. The IPCC concluded that warming of the climate system is unequivocal. It also concluded that there is a very high level of confidence (at least 90 percent probability) that natural and biological systems are being affected by the changing climate. Negative effects include increasing ground instability in permafrost regions, shifts in ranges of plant and animal species, earlier migrations of fish in rivers due to rising water temperatures, and warming of lakes and rivers in many regions with effects on water quality. Exhibit 3.1 provides further detail about how climate change is expected to affect water resources in different regions of Canada.

Exhibit 3.1 Expected effects of climate change on freshwater resources

More frequent water shortages are among the most serious climate risks. In Canada's Prairies, lower river flows are projected for the summer when demand for surface water is greatest. For example, average annual flows of the Red Deer, Bow, Oldman, and South Saskatchewan rivers are all expected to decline due to climate change. In the case of the Red River, the decline is expected to be as much as 13 percent by the year 2050.

Many regions of British Columbia are projected to experience increasing water shortages due to shrinking glaciers, declining snow-packs, changes in the timing and amount of precipitation, and prolonged drought. The Okanagan watershed will have earlier peaks in spring snowmelt, with reduced summer stream flows and increased winter stream flows. Similar changes are foreseen for the Columbia River.

In southern Ontario, communities in areas such as Durham County, Waterloo County, Wellington County, and southern Georgian Bay are becoming more vulnerable to water shortages due to higher summer temperatures combined with population growth. Water levels in the Great Lakes are projected to continue to drop. This means that communities accessing water from the Great Lakes may experience problems from more frequent low water levels.



Dry docks and low water levels on Georgian Bay, Ontario

Photo: Karl Schiefer

Source: Adapted from Natural Resources Canada report From Impacts to Adaptation: Canada in a Changing Climate 2007.

Risk—The expression of the likelihood and impact of a future event that can affect an organization's ability to achieve its objectives. Assessing risks is one way to manage outcomes in the face of uncertainty.

Vulnerability—The degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.



Flooding in Peterborough, Ontario, July 2004, after an intense rain storm

Photo: Ontario Ministry of Natural Resources

3.3 Canada ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and, under that framework, also ratified the Kyoto Protocol in 2002. Among other things, the framework and the protocol commit signatories to cooperate in preparing for adaptation to the adverse effects of climate change. As a party of the UNFCCC, Canada also committed to support adaptation through decisions made under the Bali Action Plan; the Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change; and the Buenos Aires Programme of Work. As a member of the G8, Canada has declared that adaptation to the impacts of climate change is a high priority for all nations.

3.4 The government has also produced a series of reports identifying the **risks** posed by a changing climate and the need to take adaptation measures. In 1998, Environment Canada published *The Canada Country Study: Climate Impacts and Adaptation*. The study concluded that Canadians need to be well informed when preparing to respond to the potential impacts of climate change. The government's climate change plans of 2000, 2002, and 2005 also recognized the need to take action on adaptation. In 2008, the government published two more reports that assessed **vulnerabilities**, impacts, and potential adaptation measures across the country. Exhibit 3.2 illustrates in a timeline that climate change and the need to adapt to its impacts have been of concern to the government, both nationally and internationally, since the early 1990s.

Two key vulnerability assessments on climate impacts and risks for Canada

3.5 Building on the Canada Country Study, Natural Resources Canada led the development of the report *From Impacts to Adaptation: Canada in a Changing Climate 2007*. The assessment identified major impacts in regions across Canada, including

- damage to infrastructure in the North from changes in permafrost;
- ecological and socio-economic losses in Atlantic Canada's coastal communities due to accelerated erosion and more extensive flooding from rising sea levels and more frequent storms;
- increasing stress in British Columbia's fisheries from rising water temperatures and in its forest industry from more severe pest infestations and fires; and
- more frequent drought, wildfires, and severe floods in the Prairies.

Exhibit 3.3 provides further detail about how climate change is expected to affect forest resources in different regions of Canada.

Exhibit 3.2 Governments have been concerned with the need to adapt to climate change since the early 1990s**International commitments and reports**

The Copenhagen Accord commits Canada and other developed countries to providing adequate, predictable, and sustainable financial resources, technology, and capacity building to support adaptation in developing countries.

One objective of the Bali Action Plan is to enhance action on adaptation, including international cooperation on urgent actions, risk management and reduction, disaster reduction, and economic diversification to build resilience.

The Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change (2005–2010) is established.

The Buenos Aires Programme of Work on Adaptation and Response Measures supports building institutional capacity for preventing, planning and preparing for, and managing disasters related to climate change, in particular for droughts, floods, and extreme weather.

The Kyoto Protocol under the United Nations Framework Convention on Climate Change (UNFCCC) is adopted, requiring all parties to formulate, implement, publish, and regularly update national and regional programs containing measures to facilitate adequate adaptation to climate change.

The United Nations Framework Convention on Climate Change (UNFCCC) is adopted, requiring that all parties develop national and regional programs to facilitate adequate adaptation to climate change.

The First Assessment Report by the Intergovernmental Panel on Climate Change includes a volume on Impacts Assessment of Climate Change, and Response Strategies. Reports are later released in 1995, 2001, and 2007.

Domestic plans, actions, and reports

2009

- A Government of Canada adaptation policy framework was to be in place by the end of 2008.

2008

- Release of two federal reports: From Impacts to Adaptation, Canada in a Changing Climate 2007; and Human Health in a Changing Climate: A Canadian Assessment of Vulnerabilities and Adaptive Capacity.

2007

The federal \$1.9 billion Clean Air Agenda allocates \$85.9 million to adaptation over four years.

2005

- Project Green: Moving Forward on Climate Change calls for adaptation strategies to minimize the risks to quality of life.
- The National Climate Change Adaptation Framework is developed by a federal/provincial/territorial working group but not adopted as federal policy, and no official follow-up has been made.

2004

- The Climate Change Plan for Canada notes that impacts of climate change are already being felt and proposes that collaboration among governments, academics, and the private sector on adaptation continue.

2002

- Canada ratifies the Kyoto Protocol, which is in effect until 2012.

2000

Government of Canada Action Plan 2000 on Climate Change notes the need to improve understanding of the impacts of climate change and ways to adapt.

1998

The Canada Country Study: Climate Impacts and Adaptation is the first national assessment on climate impacts and adaptation.

1997

1992

Canada signs and ratifies the UNFCCC.

1990

Exhibit 3.3 Expected effects of climate change on forests

The effects of climate change on forests vary from region to region. In Atlantic Canada, for example, drought may become more frequent and severe as a result of lower rainfall in summer and higher temperatures. Hemlock and spruce trees can be affected since they are much more sensitive to drought than those with deep root systems. In Quebec, a longer growing season is already visible, as sugar maple and white spruce are budding earlier. While a longer season might seem positive to industry, gains may be cancelled out by the emergence of invasive species and more frequent and severe droughts and wildfires. In 2003, the wildfires in British Columbia and Alberta cost an estimated \$700 million in financial loss, caused three deaths, and required the evacuation of approximately 45,000 people.

In British Columbia, warmer summers and milder winters have helped the mountain pine beetle to thrive, contributing to the largest outbreak of the insect in history and enormous consequences for the forest industry. Warmer temperatures may enable a northward shift of the infestation to the pine forests of Yukon and the Northwest Territories and an eastward shift across the continent through the boreal forest. The current and projected infestation will kill enough trees to cause greater exposure of soils to precipitation, thereby increasing the risks of flooding.

Source: Adapted from Natural Resources Canada report *From Impacts to Adaptation: Canada in a Changing Climate 2007*

3.6 Health Canada prepared a second key report, *Human Health in a Changing Climate: A Canadian Assessment of Vulnerabilities and Adaptive Capacity*. This report is an in-depth assessment of the current and anticipated health effects of a changing climate and Canada's ability to adapt. It concluded that climate change poses risks to the health of Canadians through impacts associated with food, air, water, infectious diseases, and exposure to extreme weather such as heat waves. For example, changing climate conditions can influence the transmission of West Nile virus and Lyme disease from mosquitoes and ticks to people. According to the Health Canada report, over 1,800 cases of West Nile virus were reported in Canada between 2002 and 2005, with 46 of those resulting in death.



Erosion of permafrost that undercut a road
Photo: Natural Resources Canada

3.7 Both the Natural Resources Canada and Health Canada assessments indicated that the health of Canadians and Canada's natural environment, communities, and economy are vulnerable to the impacts of a changing climate, some of which are already occurring. Impacts are most evident in Canada's North where, for example, thawing permafrost is affecting the stability of roads, buildings, pipelines, and other infrastructure as a result of temperature increases. The government has noted that communities in the North, particularly Aboriginal communities, are among the most vulnerable. These and other government reports also illustrate how climate change affects a wide range of sectors, which touch on virtually all federal portfolios. These concerns have significant implications for the policies and

programs of departments, particularly those related to Canadians' health and the country's industry, infrastructure, and ecosystems.

Findings from past audits

3.8 The federal government's activities with respect to climate impacts and adaptation were examined in the 2006 Report of the Commissioner of the Environment and Sustainable Development, Chapter 2, *Adapting to the Impacts of Climate Change*. In the report, the Commissioner concluded that the government had made limited progress in collecting the information needed to identify potential impacts and address vulnerabilities, and in ensuring that those who will most need to adapt can obtain appropriate information to help them do so. The Commissioner also concluded that federal departments had made only limited progress in assessing the potential impacts of climate change and how these impacts might affect their policies and programs.

Focus of the audit

3.9 The objectives of this audit were to determine whether selected entities have put in place adequate risk management processes and measures to address climate impacts, and to determine whether selected entities have shared information on climate impacts and adaptation in a manner that responds to the needs of users.

3.10 Under the objective of managing climate risks, we examined the following five departments:

- Environment Canada, which has responsibilities in areas such as environmental protection, weather services, fresh water, wildlife, and terrestrial ecosystems;
- Natural Resources Canada, which has responsibilities in areas that include monitoring permafrost and glaciers, and carrying out forest research;
- Health Canada, which is responsible for helping Canadians maintain and improve their health;
- Indian and Northern Affairs Canada, whose mandate is to support the well-being and economic prosperity of Aboriginal peoples and Northerners; and
- Fisheries and Oceans Canada, which is responsible for maintaining safe and accessible waterways, healthy and productive aquatic ecosystems, and sustainable fisheries and aquaculture.

3.11 Under the objective on sharing information on climate impacts and adaptation, we examined the following four programs:

- The Atmospheric Change Adaptation Strategies Program of Environment Canada
- The Climate Change Geoscience Program of Natural Resources Canada
- The Climate Change Adaptation Program of Indian and Northern Affairs Canada
- The Pilot Heat Alert and Response Systems Program of Health Canada

These programs do not constitute the complete set of government initiatives that address climate impacts and adaptation.

3.12 The audit covered the period from 2006 to June 2010. More details about the audit objectives, scope, approach, and criteria are in **About the Audit** at the end of this chapter.

Observations and Recommendations

Managing climate risks

3.13 The impacts of climate change can affect the government's activities and assets. The 1994 Risk Management Policy of the Treasury Board requires that federal departments identify the potential threats, influencing factors, and types of risks to which their assets, program activities, and interests are exposed. Departments are required to assess the risks and implement cost-effective measures to control them. An important part of this process is to rank the major risks identified in terms of their priority and determine what must be done to address them. Treasury Board's 2001 Integrated Risk Management Framework provides further guidance to departments on identifying and assessing significant risks associated with policies, plans, programs, and operations, and on implementing appropriate measures to control them.

Departments have identified and assessed climate risks

3.14 For each of the five departments, we examined corporate, sectoral, and other risk management documents and processes to determine whether they had identified, assessed, and prioritized climate change risks associated with their mandates or areas of responsibility. Exhibit 3.4 lists examples of climate change risks that

selected departments have identified. We also looked at whether managers had access to tools, guidance, and training to help them incorporate climate change risks in their ongoing work.

3.15 Assessing risks and setting priorities. We found that Fisheries and Oceans Canada, Natural Resources Canada, Health Canada, and Environment Canada had completed assessments of the risks that climate change poses to their mandate areas and prioritized the risks

Exhibit 3.4 Examples of climate change risks selected departments have identified

Department	Risks
Environment Canada	<ul style="list-style-type: none"> • Changes to biodiversity, including species at risk and the health and viability of protected areas. • Increase in severe weather events, requiring timely and accurate warnings to the public. • Changes in the extent of sea ice resulting in new risks, like oil spills, for sea transport activities.
Fisheries and Oceans Canada	<ul style="list-style-type: none"> • Lower water levels in the Great Lakes and St. Lawrence River, which create risks to navigation and shipping. • Habitat changes that alter fish stocks and affect the viability of commercial, recreational, and subsistence fisheries and aquaculture. • Sea-level rise in the Atlantic region, which requires adjustments to infrastructure such as wharves and small craft harbours.
Health Canada	<ul style="list-style-type: none"> • Heat-related illnesses and deaths as well as respiratory and cardiovascular disorders from more frequent and severe heat waves. • Contamination of food and water from heavy rainfall or changes in marine environments that result in higher levels of toxins in fish. • Risks to traditional livelihoods, and to food and water security, in northern Aboriginal communities.
Indian and Northern Affairs Canada	<ul style="list-style-type: none"> • Effects of changing species migration and distribution on food supply for Aboriginal communities. • Damage to housing and other infrastructure in the North from permafrost melt and sea-level rise. • Changed hunting conditions in the North, with health and safety implications due to unpredictable sea ice.
Natural Resources Canada	<ul style="list-style-type: none"> • Increase in the frequency and severity of insect outbreaks (for example, the mountain pine beetle) and forest fires. • Complications in energy supply and demand. • Effects of permafrost degradation on waste management and reclamation for Northern mines.



Wharf destroyed by ice pile-up from a storm surge in southeast New Brunswick

Photo: Environment Canada

accordingly. In 2005, Fisheries and Oceans Canada completed a departmental climate change risk assessment that covered risks to aquatic ecosystem management, the safety and accessibility of waterways, and fisheries management (Exhibit 3.5). The Department had also concluded that the impacts of climate change were of strategic importance and had included them in its corporate risk profile. In 2010, Natural Resources Canada completed a detailed analysis that assessed its sensitivity to a changing climate. The analysis found that all of its participating sectors recognized that a changing climate presents risks to its activities, associated long-term outcomes, and broader policy goals. The analysis ranked the identified climate-related risks by level of severity, and it also determined that a changing climate will directly influence 6 of the 13 risks identified in the Department's 2008–09 corporate risk profile. Health Canada had also thoroughly assessed the risks that a changing climate presents for human health. Its report entitled *Human Health in a Changing Climate* served as a foundational study, and the risks that report identified were considered at the corporate level through Health Canada's medium- to long-term policy agenda. Environment Canada approached its climate risk assessment in a manner distinct from the other departments. The Department's Priority Ecosystem Initiative Management Framework has included threats and pressures due to climate change as one of 14 factors used to identify priority ecosystems and hot spots for intervention. The results have been considered in developing new proposals for action in the priority areas.

3.16 Indian and Northern Affairs Canada also began to apply a similar approach to that of Fisheries and Oceans Canada and Natural Resources Canada with respect to the systematic, department-wide assessment of the risks of climate change. However, at the time of our audit, this assessment work was not complete and risks had not been prioritized.

3.17 Developing internal tools, guidance, and training. Among the departments we examined, Natural Resources Canada and Fisheries and Oceans Canada have recently developed tools, guidance, and training to help managers in diverse program areas identify and assess the risks flowing from a changing climate. For example, Natural Resources Canada has developed a tool to help its managers identify, prioritize, and respond to the climate change risks and opportunities that are relevant to the activities, programs, and policies for which they are responsible. The tool also enables them to determine where programs and policies need to be adjusted to manage climate-related risks. The Department's Risk Management Centre of Expertise as well

as its Task Team on Climate Change Impacts and Adaptation provide training and materials to encourage managers to consider climate sensitivities when assessing the overall risks facing their programs and activities. Given that the impacts of climate change and the need to adapt to them touch on virtually all government portfolios, other federal departments and agencies would benefit from access to these best practices, tools, and guidance.

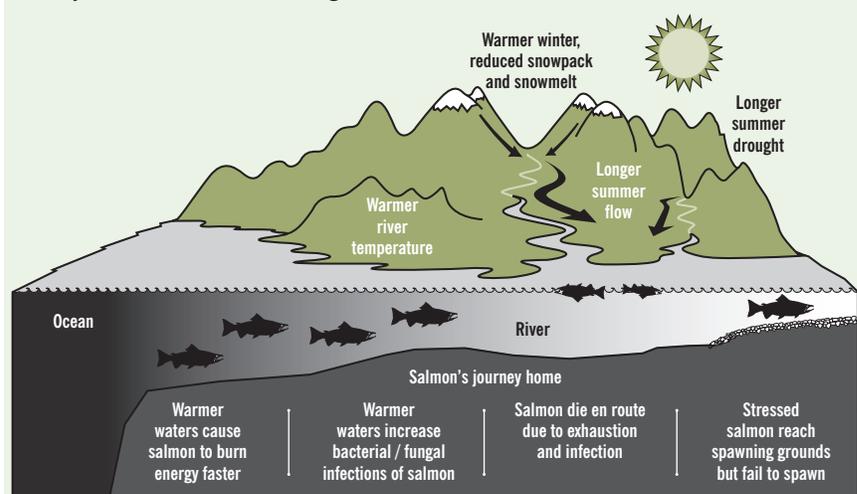
Exhibit 3.5 Understanding the risks of a changing climate on sockeye salmon

For Fisheries and Oceans Canada to uphold its mandate for the protection and sustainable use of fisheries resources and habitat, it needs to understand the impacts of climate change and consider them when developing its programs, policies, and research. For example, the Department's research shows that the Fraser River sockeye salmon face risks from a changing climate in both the marine and freshwater environments.

Salmon live part of their lives in freshwater before migrating to the ocean. Warming ocean temperatures can decrease the sockeye's survival rate because of, for example, the acidification of the ocean, reduced oxygen content in coastal waters, changes in food supply, and loss of habitat. Inland, a changing climate is leading to warmer winters with less snow and warmer river temperatures. Warmer waters cause more fish to die en route to spawning grounds. The salmon that do reach spawning grounds are stressed and often fail to spawn. In the summer of 2009, water temperatures in the Fraser River rose to above 20 degrees—a temperature that can be fatal to sockeye.

British Columbia's commercial and recreational salmon fisheries generate hundreds of millions of dollars a year for the Canadian economy and support thousands of jobs. However, since the 1990s salmon stocks have declined. The Fraser River sockeye has been hit especially hard. In 2009, the total return of the Fraser River sockeye was the lowest in over 50 years.

In stark contrast to the years of steady decline, the total estimated return of sockeye in 2010 was the highest in almost a century. The Department recognizes that climate change is expected to increase such variability while decreasing its ability to predict sockeye returns before the fishing season.



Source for image: Adapted from Fisheries and Oceans Canada

3.18 Recommendation. Environment Canada, as the lead on horizontal adaptation policy, should engage other departments to coordinate the dissemination of best practices and tools to improve how the government integrates climate-risk identification, assessment, and adaptation into its decision making and planning.

Environment Canada's response. Agreed. While individual departments continue to develop adaptation tools and best practices according to their primary areas of expertise, Environment Canada will assume the role of coordinator in the sharing of these tools and best practices across the federal government and will establish an interdepartmental committee before the end of this fiscal year.

Adaptation to climate impacts has been piecemeal

3.19 For each of the five departments, we examined whether departments had adjusted existing policies and plans or created new ones for adapting or responding to the risks associated with climate change. We also examined whether key programming areas had considered climate impacts and the need to adapt.

3.20 We found limited examples where policies and plans were adjusted or created to address risks arising from climate change. For example, climate change was taken into consideration in the development of Fisheries and Oceans Canada's 2005 Wild Salmon Policy and 2007 Ecosystem Science Framework, and science to support adaptation was made a priority of the Department's 2007–2012 research agenda. Risks and opportunities resulting from a changing climate have also been taken into consideration in Environment Canada's 2007 Science Plan.

3.21 Health Canada has identified key areas of vulnerability, which include, for example, health impacts related to conditions in the North, extreme weather (including extreme heat), air pollution, and infectious disease. In collaboration with other departments and agencies responsible for these issues, Health Canada has developed specific programs to address key risk areas. These programs involve

- supporting climate change and health adaptation research in northern Inuit communities;
- developing and testing heat alert and response systems;
- developing and testing infectious disease alert and response systems (implemented by the Public Health Agency of Canada); and
- developing an air quality and health index (implemented jointly with Environment Canada).

However, the funding for each of these programs is coming to an end in March 2011. Although some minimal capacity will remain for Health Canada to disseminate publications and other results of its programs, there is no indication from the Department or the government whether the adaptation work will continue. Other risk areas the Department identified have not led to new programming or adjustments of policies or strategies, including risks to water quality and quantity, as well as food security for northern communities.

3.22 At the program level, some initiatives whose core objectives do not target climate change nevertheless are at risk from a changing climate. However, adaptation to these risks has not become part of planning and decision making for those initiatives. We found only limited cases in which departments had taken climate adaptation into consideration at the program level.

3.23 Indian and Northern Affairs Canada has considered the impacts of climate change on its program to clean up contaminated sites in the North. A protocol used in the contaminated sites program specifically requires consideration of the implications that a changing climate has for the spread of contaminants to a wider area due to thawing permafrost. In contrast, climate change impacts have not been taken into consideration in other activities of the Department such as oil and gas management; land claims and treaties; or housing, water, and wastewater infrastructure in communities. Although Fisheries and Oceans Canada, Natural Resources Canada, Health Canada, and Environment Canada have done research on climate impacts affecting their mandate areas, they could provide little evidence of concrete adaptation measures that they have implemented at the program level in response to the identified risks.

3.24 Until departments adapt their policies and practices based on good risk assessments, they remain unprepared for the impacts of a changing climate; adaptation efforts could be more costly and less effective; and departmental mandates to protect ecosystems, infrastructure, communities, or the health of Canadians may go unfulfilled.

3.25 Recommendation. Environment Canada, Natural Resources Canada, Health Canada, Fisheries and Oceans Canada, and Indian and Northern Affairs Canada should identify the adaptation measures necessary to respond to the risks that climate change presents for their areas of responsibility.

Environment Canada's response. Agreed. Environment Canada has conducted a thorough and systematic assessment of ecosystem health across Canada, including risks associated with a changing climate.

Knowledge about ecosystem health derived from this assessment will support decision making for Environment Canada's interventions in vulnerable ecosystems. Targeted responses to ecosystem health risks, including adaptation measures, will, beginning in 2010, be identified through the departmental planning process and actioned through national programs, as well as through proposals to undertake new or renewed ecosystem initiatives in concert with federal, provincial, and territorial partners.

The Department will also continue to provide science-based information on Canada's changing climate and future impacts to inform and manage risks, through climate change prediction and scenarios development.

In addition to these actions, Environment Canada is also developing initiatives to improve warnings to Canadians about expected increases in occurrence and severity of severe weather events that can affect their health, safety, livelihood, and property. These initiatives will be designed to both improve the overall provision of information as well as to include improvements to services for areas of heightened risk such as heat episodes, water management (floods, droughts), and expected increases in poor air quality episodes.

Natural Resources Canada's response. Agreed. The Climate Change Sensitivity Assessment conducted in 2009 and 2010 provided Natural Resources Canada with a good basis to help identify appropriate adaptation measures to mitigate climate-related risks faced by the Department in its areas of responsibility. Within the next year, the Department will review its existing adaptation measures and identify new ones that would be deemed necessary to manage its climate-related risks in the context of its Risk Management Framework. The Department will also monitor these risks on a regular basis to make sure corresponding adaptation measures remain appropriate.

Health Canada's response. Agreed. In 2008, Health Canada undertook an extensive process to identify the scope and magnitude of the potential health effects of climate change in Canada related to air quality, infectious diseases, and natural hazards. These effects, and Canada's capacity to respond, were detailed in the report *Human Health in a Changing Climate: An Assessment of Vulnerabilities and Adaptive Capacity*. Health Canada and the Public Health Agency of Canada then implemented programs to address the key priority areas identified in the report (weather extremes—extreme heat events; spread of infectious and vector borne diseases; climate change impacts on northern and Inuit communities; and air pollution).

Health Canada will continue to support measures to address the health impacts of climate change, such as heat alert and response systems and air quality and health indices. The Department will continue to provide science-based advice on best practices, such that products can be taken up and applied by communities, researchers, and planners to inform and manage potential health risks related to climate change. Finally, in an effort to advance the understanding of the impacts of climate change, and to increase adaptive capacity in the health sector, the Department will continue to engage stakeholders, partners, and decision makers across Canada.

Health Canada will identify adaptation strategies that may be appropriate in program areas for which Health Canada is responsible.

Fisheries and Oceans Canada's response. Agreed. Climate change continues to be a priority for Fisheries and Oceans Canada, which conducted a Climate Change Risk Assessment in 2005. The Department has since incorporated climate change into its corporate risk profile and is working to create an internal policy framework for climate change adaptation.

In 2009, the international scientific community acknowledged that the role of the oceans in the broad climate change picture is very important. The Department has made it a priority to better understand the oceanic and aquatic elements of the climate system through research and monitoring. For this reason, the Department is actively pursuing avenues toward filling knowledge gaps with regard to the oceans aspects of climate change as a foundation for effective adaptation measures, both internally and interdepartmentally.

The Department is at a distinct disadvantage with respect to identifying the adaptation measures needed to respond to the risks that climate change presents. The Department has not received incremental climate adaptation funding; however, it has reallocated funds to begin this work. The Department is attempting to secure a resource base to move the program forward to keep pace with other departments. Significant action to identify adaptation measures for the Department's mandate (for example, managing the fisheries, the civil Canadian Coast Guard fleet, aquaculture, and Small Craft Harbours) will be required.

Indian and Northern Affairs Canada's response. Agreed. Indian and Northern Affairs Canada has initiated a Climate Change Vulnerability Assessment that will look at the impacts of climate change on departmental programs and policies, and enable the consideration of

climate change impacts in future planning for departmental policies, programs, and operations. The Department expects to complete the assessment in fiscal year 2010–11. Once vulnerabilities are assessed and validated, the Department will integrate climate change considerations into the corporate risk profile update process and the program renewal and management cycle. The Department is committed to implementing program measures to address priority impact areas. It will continue to build on partnerships with Aboriginal communities, organizations, and governments to build capacity at the local level to manage impacts from climate change and better inform the Department's efforts to address climate change impacts on their areas of responsibility.

Sharing information on climate impacts and adaptation



Attempting to adapt to sea-level rise by armoring the shore

Photo: Environment Canada

3.26 Most climate impacts and adaptive actions occur at the regional and local levels. For example, the expectation that sea levels will rise in the future poses an increased risk of damage to the infrastructure, residences, ecosystems, and economies of coastal communities. Through its programs, the government has roles and responsibilities for helping Canadians reduce their exposure to risks from climate change. These responsibilities include providing information to a range of clients, stakeholders, and partners such as other federal departments, provincial and territorial governments, municipalities, Aboriginal communities, professional associations, academics, and international bodies.

3.27 The government is well positioned to provide information about climate impacts and adaptation, because it plays a lead role in carrying out research on climate change and measures to adapt to its impacts. The government is also positioned to facilitate coordination and collaboration among governments, economic sectors, organizations, and communities.

3.28 We examined whether selected federal programs that address adaptation to climate impacts had processes and methods in place to identify key users of information, to assess the users' needs for this information, and to make that information accessible and understandable.

3.29 We selected the following programs for examination:

- The Atmospheric Change Adaptation Strategies Program of Environment Canada
- The Climate Change Adaptation Program of Indian and Northern Affairs Canada

- The Climate Change Geoscience Program of Natural Resources Canada
- The Pilot Heat Alert and Response Systems Program of Health Canada

Exhibit 3.6 provides the objectives of these four programs. Except for the Climate Change Geoscience Program, the climate impacts and adaptation programs that we examined received funding under the **Clean Air Agenda**. At the conclusion of our examination, the continuation of programs funded under the Clean Air Agenda after 31 March 2011 was uncertain. The government has not yet announced its intentions about these programs.

Clean Air Agenda—A \$1.9 billion federal government initiative from 2007–2011 to fund over 40 federal programs to reduce greenhouse gas emissions and air pollutants. Out of this total funding amount, \$85.9 million was allocated to six programs to help Canadians increase their capacity to adapt to a changing climate.

Exhibit 3.6 Objectives of the four programs we examined that provide information on climate impacts and adaptation

Atmospheric Change Adaptation Strategies Program (Environment Canada)

Objective: To develop and implement, with partners, adaptive strategies to address the impacts of climate change for the benefit of Canadians and the environment. The program includes all activities of the Adaptation and Impacts Research Section of Environment Canada, as well as contributions from regionally based scientists of the Meteorological Service of Canada.

Climate Change Adaptation Program (Indian and Northern Affairs Canada)

Objective: To provide funding and support for projects that assist Aboriginal and northern communities and organizations in addressing the impacts of a changing climate through partnerships that include these communities and organizations along with other partners such as federal departments and territorial governments. Climate change-related impacts, such as storm surges and coastal flooding, are a concern for emergency management, food security, infrastructure, land use and community planning, and traditional ways of life.

Climate Change Geoscience Program (Natural Resources Canada)

Objective: To apply geoscience and geomatics expertise to help Canadians understand, prepare for, and adapt to the impacts of a changing climate on their communities, infrastructure, and ways of life. The program is managed by the Earth Sciences Sector of Natural Resources Canada. Activities, notably in northern communities, include monitoring of permafrost, sea-level rise, and coastal erosion, as well as digital mapping of watersheds, vegetation, and climate change scenarios.

Pilot Heat Alert and Response Systems Program (Health Canada)

Objective: To develop information and capacity to address urgent risks to human health from extreme heat. The program aims to deliver four main results:

- a community best practices guide for extreme heat;
- extreme heat guidelines for health care workers;
- functioning pilot systems for heat alert and response in Fredericton, Windsor, Winnipeg, and the Assiniboine Regional Health Authority; and
- a national heat forum.

Needs for information about climate impacts and adaptation have been assessed

3.30 The Communications Policy of the Government of Canada (2006) states that the government has an obligation to consult and communicate with citizens. The government needs to learn as much as possible about public needs and expectations in order to respond to them effectively. We examined whether mechanisms were in place for identifying the key clients, stakeholders, and partners who use the programs' climate impacts and adaptation information and whether those users' needs were taken into consideration. By understanding what type of information is needed and by whom, the programs that provide it are more likely to be effective in delivering the right information to the right groups and individuals.

3.31 We found that each of the four programs had formal and informal mechanisms to identify their key clients, stakeholders, and partners and to assess their information needs on an ongoing basis. These mechanisms included advisory bodies, stakeholder workshops and conferences, and lessons learned and contacts gained through other programs. For example, Indian and Northern Affairs Canada's Climate Change Adaptation Program was built on a previous program in which the needs of Aboriginal and northern communities for information about the impacts of climate change were identified and assessed at workshops across the country. These assessments provided a basis for developing the current adaptation program.

Mechanisms are in place to help users access and understand information

3.32 The departments whose programs we examined each have mandates to collect and provide information to Canadians relating to the environment, natural resources, the economy, or health. We examined whether the four programs have mechanisms to allow ready access to understandable information on climate impacts and adaptation. In addition, the Communications Policy of the Government of Canada requires that government institutions facilitate public access to their publications and that published information must be available on request in multiple formats to ensure equal access. We therefore also looked at whether dissemination of the government's two key reports on climate impacts and adaptation in 2008 adhered to this policy.

3.33 Sharing information. The programs that we examined used a variety of approaches to provide access to information. These included websites, publications, fact sheets, newsletters, and stakeholder workshops and conferences. Another important means of providing information was to bring together key decision makers, stakeholders,

and specialists to exchange information and perspectives and deliberate cooperatively on specific issues. For example, for a project in Clyde River, Nunavut, supported by Indian and Northern Affairs Canada and Natural Resources Canada, scientists presented project findings concerning sea-level rise, coastal erosion, watershed impacts, and thawing permafrost to the community, using plain language and in both English and Inuktitut. Similarly, Health Canada engaged key local partners and experts to share information and experience to develop heat alert and response systems in their communities.

3.34 Low profile release of two climate change vulnerability assessments. In 2008, the government produced two major national-scale assessments of vulnerabilities, impacts, and adaptation options for a changing climate. From *Impacts to Adaptation: Canada in a Changing Climate 2007* was led by Natural Resources Canada, and *Human Health in a Changing Climate: A Canadian Assessment of Vulnerabilities and Adaptive Capacity* was led by Health Canada. From *Impacts to Adaptation* is the most comprehensive assessment of risks from a changing climate for Canadian ecosystems and the communities and economic sectors that depend on them. It was developed over four years and involved 18 lead authors and 145 contributors. Health Canada considers *Human Health in a Changing Climate* to be the most significant assessment of climate impacts on the health of Canadians. The assessment involved work over four years by 10 steering committee members, 16 lead authors, 31 contributors, 39 reviewers, and more than 350 participants.

3.35 In the case of the human health vulnerability assessment, we found that Health Canada had initial plans for a high-profile release, but the final communication strategy provided for only a low-profile one. For example, public presentations of the assessment's key findings were scheduled, then cancelled. Despite the significance of the assessment, neither the full technical report nor the summary that was completed at the same time has been made available for download on Health Canada's website. A news release on the assessment was published, but it focused on topics other than the subject of the assessment. In the years following the assessment's initial release, Health Canada has taken steps to raise awareness of its key findings—for example, by making presentations to targeted audiences at conferences and workshops.

3.36 We also found that while a detailed initial communications strategy was prepared for the assessment led by Natural Resources Canada, its release was also limited. For example, no news release was issued to inform Canadians about the risks the Department assessed.

However, in contrast to Health Canada, Natural Resources Canada made its assessment available on its website.

3.37 Although the risks to Canadians and Canada's ecosystems outlined in these assessments are severe and touch upon almost all aspects of our society, the government failed to take simple steps that would raise Canadians' awareness and understanding of the risks. The dissemination of these vulnerability assessments was inconsistent with the Communications Policy of the Government of Canada to facilitate Canadians' access to these publications.

3.38 Making information understandable. The programs that we examined had facilitated understanding of their information by clients, stakeholders, and partners using various means. Scientific and technical information had been provided in plain language. Visual displays such as maps and satellite imagery had also been used as a key method of conveying information in a way that is meaningful for decision makers and stakeholders. In-person, often one-on-one assistance or presentations had also been used to interpret complex information in a way that could be acted upon by users. Exhibit 3.7 describes the approach to presenting information on adaptation to climate change that was used in a project in Clyde River, Nunavut.

3.39 In the field of climate impacts and adaptation, decision making is affected in part by limitations of the available data, including the confidence that can be placed in projections about the future. We found that programs that provided quantitative information about current and future trends in climate impacts—namely the Climate Change Geoscience Program at Natural Resources Canada, the Atmospheric Change Adaptation Strategies Program at Environment Canada, and Health Canada's Pilot Heat Alert and Response Systems Program—included measures to help users interpret this information. They had explained the assumptions and limitations associated with the information and provided tools for minimizing the influence of uncertainties on decisions to be made. In these ways, the programs increased the usefulness of their information for a wide range of clients, stakeholders, and partners.

Mechanisms are in place to assure users of the quality of the information

3.40 Individuals and organizations making adaptation decisions today—with consequences that may extend up to several decades in the future—need access to reliable information to support their adaptation planning and actions. Because Natural Resources Canada

and Environment Canada provide significant quantitative climate data, we assessed whether their programs had mechanisms in place to provide assurance about the quality of the information being shared. However, we did not audit the quality of the information itself.

3.41 We found that both programs are subject to internal and external quality management requirements, which provide assurance to clients, partners, and stakeholders about the quality of information being shared. Both departments have in place formal procedures to guide the preparation and review of publications produced internally by the programs we audited. Submissions to external publications, such as scholarly journals or international reports, are also subject to peer review and other quality management processes of the external body.

Exhibit 3.7 Helping communities in Nunavut adapt to climate change

In Nunavut, impacts from a changing climate, such as thawing permafrost and rising sea levels, cause damage to housing and other infrastructure and increase the risk of flooding and erosion. Located on the eastern coast of Baffin Island, Clyde River is one of many northern coastal communities vulnerable to these impacts.

In 2006, a multidisciplinary partnership was formed to help communities in Nunavut adapt. In Clyde River, Natural Resources Canada, Indian and Northern Affairs Canada, the Canadian Institute of Planners, and the Government of Nunavut's Department of Environment and Department of Community and

Government Services worked with community leaders and organizations to assess the impacts of climate change on the community and to develop an adaptation plan. Scientists with Natural Resources Canada focused their assessments on sea-level rise, coastal erosion, watershed impacts, and permafrost melt.

In the Clyde River project, Natural Resources Canada scientists regularly consulted and provided information to community members and organizations. They used a variety of formats to communicate their findings, including community workshops, presentations, and gatherings. Community members and partners indicated that it would be essential to communicate information visually in order to better facilitate understanding. Therefore, scientists also presented information in visual formats such as maps generated from satellite and aerial imaging, graphs, and posters. Findings were also communicated in both English and Inuktitut, and scientists worked closely with local organizations and community members to build capacity within the community to generate and use the information required for adaptation decision making.



Thawing of permafrost causes uneven shifting of building's foundation

Photo: Natural Resources Canada

Resilience—The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the same capacity for self-organization, and the same capacity to adapt to stress and change.

Adaptive capacity—The whole of capabilities, resources, and institutions of a country, region, community, or group to implement effective adaptation measures.



Tree damage caused by a storm, Stanley Park, Vancouver, December 2006

Photo: Environment Canada

3.42 Climate observations are used to develop models of the climate and the ocean, and these models in turn are used to develop scenarios of what future conditions may be for specific regions, areas, organizations, or communities. Climate scenarios can then be used as a basis for assessments of how vulnerable an organization, a community, or an economic sector may be to the risks posed by a changing climate. Such assessments provide important information to Canadians that can help them increase their **resilience** and **adaptive capacity**.

3.43 The Atmospheric Change Adaptation Strategies Program develops scenarios using data and models obtained from other sections of Environment Canada and external parties. It has taken measures to assure itself of the quality of the data that it uses to develop scenarios and other analyses of climate change impacts. Program staff routinely check the quality of the data used and share information internally about important contexts for properly understanding specific data sets. They also have initiated a project to improve the quality of historical climate data by comparing it to closely related data from other sources. Examples include historical data about wind damage in forests and insurance claims for severe weather events. Environment Canada has also helped its clients and partners to reduce uncertainties as they develop their own scenarios. It has provided a tool allowing users to assess the different outputs of various international models in order to identify the models that best suit their specific location of interest.

3.44 However, the products of the Atmospheric Change Adaptation Strategies Program are inherently limited by shortcomings in the network of stations that monitor weather and climate in Canada. One significant example of these shortcomings is the insufficient density of monitoring stations, particularly in Canada's North. The limitations of the monitoring network make it difficult to develop scenarios and analyze extreme weather events at the local and regional levels where adaptive action is taken. The Meteorological Service of Canada, which is responsible for the monitoring network, is aware of this issue and is exploring strategies to address it.

A federal adaptation strategy and action plan

3.45 In our examination of departments' efforts to manage climate risks and share information on impacts and adaptation, we noted that the government has not established clear priorities for addressing adaptation to a changing climate, and therefore, the need remains for a federal strategy and action plan.



Ice storm damage in Montréal, Quebec, January 1998

Photo: Environment Canada

There is still no federal strategy and action plan for adaptation

3.46 Over the last two decades, scientific reports and international agreements have recognized that the impacts from a changing climate pose serious risks, to which the health of Canadians and Canada's natural environment, communities, and economy are vulnerable (Exhibit 3.2). In 2007, the government established the four-year Clean Air Agenda with \$1.9 billion in funding. Most of this funding was directed to programs to reduce greenhouse gas emissions, while \$85.9 million (about 4.5 percent of the total) was committed over four years to six programs intended to assist Canadians in adapting to climate change. Three of the four programs that we examined in this audit received funding from the Clean Air Agenda.

3.47 The government has acknowledged that, at current funding levels, the programs we examined do not have the capacity to address the scale, magnitude, and long-term effort required to respond to the impacts of climate change in Canada. The government has also recognized that demand from organizations, governments, and others for climate impacts and adaptation information is currently increasing. In this context, the gap between demand for information and federal capacity to provide it is likely to widen.

3.48 Funding for the Clean Air Agenda is scheduled to end in March 2011. There is uncertainty about whether the programs under the Agenda will be renewed, extended, or expanded. This lack of certainty about the continuation of these programs—in addition to the lack of a strategy in place to provide direction on priorities—hinders the government's efforts to advance adaptation to climate change in Canada. In the case of the Climate Change Adaptation Program, Indian and Northern Affairs Canada found that community partners would probably stop work on their adaptation planning if existing program support were to cease. Similarly, partners in Health Canada's Pilot Heat Alert and Response Systems Program have expressed concerns that, without continued funding, the program's achievements in the four pilot communities will not be built upon or expanded to other communities across the country.

3.49 When we consulted clients, partners, and staff involved with Environment Canada's Atmospheric Change Adaptation Strategies Program, they expressed concern that the Department might reduce the capacity of its regional offices, which provide help in accessing, understanding, and applying information (Exhibit 3.8). Without such support, communities and organizations may make poor decisions about how to adapt to a changing climate.

3.50 A strategy and an action plan are needed to address uncertainties and shortfalls in the government’s capacity to work on adapting to the impacts of climate change. In the Commissioner of the Environment and Sustainable Development’s 2006 audit of adaptation, we recommended that the government develop and implement a federal adaptation

Exhibit 3.8 Adapting to sea-level rise in New Brunswick

In 2003, Environment Canada and Natural Resources Canada began a collaborative project to assess potential impacts of sea-level rise on the southeastern coast of New Brunswick. Other key partners in the project were Parks Canada, Fisheries and Oceans Canada, the Province of New Brunswick, academic researchers, and communities within the study area. Public interest in the project was heightened by major sea storm surges in 2000 and 2004, which caused extensive damage to residences and infrastructure and required the intervention of emergency response groups.

The project report, published in 2006, compared the impacts of the January 2000 storm with the potential impacts of that same event if the sea level had been 60 centimetres higher, as was projected for the year 2100. Municipal and provincial governments could use the report to identify areas and assets that would be at risk in such scenarios, and to take adaptive measures such as elevating building sites, retreating from the shoreline, and developing emergency plans. Findings from the study were disseminated through media coverage, a project website, and presentations to the public and to target audiences, such as the provincial government. A key means of making the information accessible and useful was for Environment Canada staff to work one-on-one with specific community and local government officials to help them understand and apply the information.

The government received requests to do similar work in other areas of the region, but a lack of clear higher-level direction and scarce resources have limited the ability of government representatives to engage. Many clients, stakeholders, and regional staff of Environment Canada and Natural Resources Canada are concerned that the federal government may not be able to meet this growing regional demand for climate impacts and adaptation information.



In January 2000, a storm surge flooded residences and infrastructure in the community of Pointe-du-Chêne, New Brunswick.



Area of flooding if the January 2000 storm surge were to occur after sea level rose by 60 cm, as was projected for the year 2100.

Flooded areas
 Land
 Water

Maps: Adapted from Environment Canada

strategy. This strategy would explain the government's role with respect to climate change adaptation and define its priorities. The strategy would indicate how the government intended to work with other levels of government and stakeholders (exhibits 3.7 and 3.8), and what it would contribute to collectively advance climate change adaptation in Canada. It would also include an assessment of the implications of a changing climate for federal policies and priorities.

3.51 In 2007, the government directed Environment Canada and Natural Resources Canada to prepare, by December 2008, an adaptation framework explaining the government's role with respect to adaptation and assisting it in establishing priorities. Since 2007, interdepartmental consultations on the development of an adaptation framework have taken place. However, to date no framework, strategy, or action plan has been completed on adaptation, nor has a plan to adapt to the impacts of climate change been incorporated into any other broader environment and sustainable development policies or strategies, such as the Federal Sustainable Development Strategy. We also found that the departments mandated for consultation on the framework are limited to those that received funding under the Adaptation theme of the Clean Air Agenda. Other departments that have mandates related to climate risks, such as Fisheries and Oceans Canada and Agriculture and Agri-Food Canada, have had limited involvement in the process.

3.52 Department officials confirm that they need an overall strategy to provide direction in their efforts on adaptation. Having a federal adaptation strategy is critical because it could

- outline the government's overall priorities, objectives, and goals with respect to adaptation;
- provide direction on incorporating adaptation into policy making and operational planning;
- provide direction to departments to prioritize and coordinate their adaptation efforts;
- communicate to external parties what support they can expect from the government;
- identify research that meets the needs of the government and its clients, partners, and stakeholders; and
- address capacity and growing demand for information on climate impacts and adaptation.

In addition, a federal adaptation strategy would allow the government to determine which climate adaptation needs, of those identified by the government's departments, partners, and clients, it wants to pursue in the medium to long term and what programs will be necessary to achieve them.

3.53 Recommendation. Building on the government's 2007 commitment to develop an adaptation policy framework, Environment Canada, with support from Natural Resources Canada and other departments and agencies, should develop a federal adaptation strategy and action plan.

Environment Canada's response. Agreed. Environment Canada will work closely with other federal partners to develop an adaptation policy framework that will guide future adaptation programming efforts. The framework will set out a vision for adaptation, objectives, definition of the federal role, and a set of criteria for identifying federal priorities.

Conclusion

3.54 Through our examination of departments' efforts to manage climate risks and share information on impacts and adaptation, what emerged from both areas of examination is that there is still no federal adaptation policy, strategy, or action plan in place. Departments therefore lack the necessary central direction for prioritizing and coordinating their efforts to develop more effective and efficient ways of managing climate change risks.

3.55 Overall, the departments we examined have not taken concrete actions to adapt to the impacts of a changing climate. With few exceptions, they have yet to adjust or develop policies and practices to better respond to the risks. However, Fisheries and Oceans Canada, Natural Resources Canada, Health Canada, and Environment Canada have taken the first steps of risk management by completing assessments of the risks to their mandate areas from climate change, and they have prioritized the risks. Indian and Northern Affairs Canada has initiated but not yet completed a department-wide assessment of the climate change risks it must manage.

3.56 The four programs we examined have shared information on climate impacts and adaptation in a manner that responds to the needs of their specific clients, stakeholders, and partners. This includes having mechanisms in place to assess user needs, to make information accessible and understandable, and, where relevant, to provide assurance of the quality of the information being shared. However, the programs cannot meet the increasing demand for information. Funding for adaptation programs under the Clean Air Agenda is scheduled to end in March 2011, and there is no plan in place to address ongoing needs after that date.

About the Audit

All of the audit work in this chapter was conducted in accordance with the standards for assurance engagements set by The Canadian Institute of Chartered Accountants. While the Office adopts these standards as the minimum requirement for our audits, we also draw upon the standards and practices of other disciplines.

Objectives

Our overall audit objective was to determine whether selected entities have mechanisms in place to share information and manage risk to support adaptation to the impacts of a changing climate. Our audit work included two sub-objectives:

- to determine whether selected entities have put in place adequate risk management processes and measures to address climate impacts; and
- to determine whether selected entities have shared information on climate impacts and adaptation in a manner that responds to the needs of users.

Scope and approach

The federal role. Canada ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, and under that Framework, Canada ratified the Kyoto Protocol in 2002. Both the Framework and the Protocol commit signatories to take action on climate change adaptation, and the government has taken on roles and responsibilities for adaptation. Our audit focused on two of the federal government's key roles: one, as an adaptor, whereby departments and agencies are responsible for minimizing the risks of climate change impacts on their own policies, programs, operations, and activities; and two, as a facilitator of adaptation by others, specifically by conducting research and disseminating information on climate change impacts and options for adaptation.

Selection of entities. The following entities were selected for examination in the audit:

- Environment Canada
- Natural Resources Canada
- Health Canada
- Indian and Northern Affairs Canada
- Fisheries and Oceans Canada

These departments were selected because the government has indicated that their mandates include areas most at risk from a changing climate—the North, human health, fisheries, forestry, and ecosystems. These departments also have programs related to the collection and dissemination of information on climate impacts and adaptation. Some of them have programs that have received short-term funding under the Adaptation theme of the four-year Clean Air Agenda, while others have longer term programs on impacts and adaptation that were in place before the Clean Air Agenda was developed. One of the longer term

programs also received additional funding under the Clean Air Agenda. The programs we selected for examination do not constitute the complete set of government initiatives that address climate impacts and adaptation.

During our audit, we conducted interviews with departmental officials and reviewed files and documents. We also met with individuals and groups outside the federal government who provided us with perspectives on users' needs for information on climate impacts and adaptation. They included officials with provincial, territorial, and municipal governments; Aboriginal organizations; academics; researchers; and industry associations. We also visited three different regions of Canada to examine federal involvement in understanding the climate risks affecting specific areas and the adaptation measures being developed. This work included visits to

- Clyde River and Iqaluit in Nunavut, to observe how Natural Resources Canada and Indian and Northern Affairs Canada had assisted Aboriginal communities to adapt to climate impacts in Canada's North;
- Southeastern New Brunswick, to understand the roles of Environment Canada and Natural Resources Canada in developing information to help coastal communities understand and adapt to risks from rising sea levels; and
- British Columbia, to understand the role of Fisheries and Oceans Canada in addressing climate change risks that affect the salmon fishery.

We also examined whether the selected programs had mechanisms in place to ensure the quality of the information being shared. We did not, however, audit the quality of the information itself or the adequacy of the programs' application of the mechanisms. We also did not examine the government's activities related to facilitating adaptation in other countries.

Criteria

To determine whether selected entities have put in place adequate risk management processes and measures to address climate impacts, we used the following criteria:	
Criteria	Sources
The selected entities identify and assess climate risks and, where appropriate, implement control measures (adaptation measures).	<ul style="list-style-type: none"> • Risk Management Policy (Policy Requirements 1 and 2, and Appendix B), Treasury Board, 1994 • Integrated Risk Management Framework (Introduction section, Integrated Risk Management section, and A Common Process section), Treasury Board, 2001

To determine whether selected entities have shared information on climate impacts and adaptation in a manner that responds to the needs of users, we used the following criteria:	
Criteria	Sources
For selected climate impacts and adaptation information programs, the selected entities identify users and take their needs into consideration.	<ul style="list-style-type: none"> • <i>Department of the Environment Act</i>, section 5(a)(iii) • <i>Department of Natural Resources Act</i>, section 6(i) • <i>Department of Indian Affairs and Northern Development Act</i>, section 5(c) • <i>Department of Health Act</i>, sections 4.2(c) and 4.2(h) • Communications Policy of the Government of Canada (Policy Statement, bullet 6), Treasury Board, 2006 • Management Accountability Framework, Areas of Management, Round VI (Citizen-Focused Service element, line of evidence 20.2), Treasury Board of Canada Secretariat, 2008
For the selected programs, the selected entities have mechanisms in place to share information with users that include facilitating access to and interpretation of information on climate impacts and adaptation.	<ul style="list-style-type: none"> • United Nations Framework Convention on Climate Change, 1992, article 4(1)(h) • Communications Policy of the Government of Canada, Treasury Board, 2006 • Statistics Canada Quality Assurance Framework, page 3, Statistics Canada, 2002

Management reviewed and accepted the suitability of the criteria used in the audit.

Period covered by the audit

The audit covered the period from 2006 to June 2010. Audit work for this chapter was substantially completed on 8 June 2010.

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Appendix List of recommendations

The following is a list of recommendations found in Chapter 3. The number in front of the recommendation indicates the paragraph number where it appears in the Chapter. The numbers in parentheses indicate the paragraph numbers where the topic is discussed.

Recommendation	Response
Managing climate risks	
<p>3.18 Environment Canada, as the lead on horizontal adaptation policy, should engage other departments to coordinate the dissemination of best practices and tools to improve how the government integrates climate-risk identification, assessment, and adaptation into its decision making and planning. (3.13–3.17)</p>	<p>Environment Canada’s response. Agreed. While individual departments continue to develop adaptation tools and best practices according to their primary areas of expertise, Environment Canada will assume the role of coordinator in the sharing of these tools and best practices across the federal government and will establish an interdepartmental committee before the end of this fiscal year.</p>
<p>3.25 Environment Canada, Natural Resources Canada, Health Canada, Fisheries and Oceans Canada, and Indian and Northern Affairs Canada should identify the adaptation measures necessary to respond to the risks that climate change presents for their areas of responsibility. (3.19–3.24)</p>	<p>Environment Canada’s response. Agreed. Environment Canada has conducted a thorough and systematic assessment of ecosystem health across Canada, including risks associated with a changing climate. Knowledge about ecosystem health derived from this assessment will support decision making for Environment Canada’s interventions in vulnerable ecosystems. Targeted responses to ecosystem health risks, including adaptation measures, will, beginning in 2010, be identified through the departmental planning process and actioned through national programs, as well as through proposals to undertake new or renewed ecosystem initiatives in concert with federal, provincial, and territorial partners.</p> <p>The Department will also continue to provide science-based information on Canada’s changing climate and future impacts to inform and manage risks, through climate change prediction and scenarios development.</p> <p>In addition to these actions, Environment Canada is also developing initiatives to improve warnings to Canadians about expected increases in occurrence and severity of severe weather events that can affect their health, safety, livelihood, and property. These initiatives will be designed to both improve the overall provision of information as well as to include improvement to services for areas of heightened risk such as heat episodes, water management (floods, droughts), and expected increases in poor air quality episodes.</p>

Recommendation	Response
	<p>Natural Resources Canada’s response. Agreed. The Climate Change Sensitivity Assessment conducted in 2009 and 2010 provided Natural Resources Canada with a good basis to help identify appropriate adaptation measures to mitigate climate-related risks faced by the Department in its areas of responsibility. Within the next year, the Department will review its existing adaptation measures and identify new ones that would be deemed necessary to manage its climate-related risks in the context of its Risk Management Framework. The Department will also monitor these risks on a regular basis to make sure corresponding adaptation measures remain appropriate.</p> <p>Health Canada’s response. Agreed. In 2008, Health Canada undertook an extensive process to identify the scope and magnitude of the potential health effects of climate change in Canada related to air quality, infectious diseases, and natural hazards. These effects, and Canada’s capacity to respond, were detailed in the report <i>Human Health in a Changing Climate: An Assessment of Vulnerabilities and Adaptive Capacity</i>. Health Canada and the Public Health Agency of Canada then implemented programs to address the key priority areas identified in the report (weather extremes—extreme heat events; spread of infectious and vector borne diseases; climate change impacts on northern and Inuit communities; and air pollution).</p> <p>Health Canada will continue to support measures to address the health impacts of climate change, such as heat alert and response systems and air quality and health indices. The Department will continue to provide science-based advice on best practices, such that products can be taken up and applied by communities, researchers, and planners to inform and manage potential health risks related to climate change. Finally, in an effort to advance the understanding of the impacts of climate change, and to increase adaptive capacity in the health sector, the Department will continue to engage stakeholders, partners, and decision makers across Canada.</p> <p>Health Canada will identify adaptation strategies that may be appropriate in program areas for which Health Canada is responsible.</p>

Recommendation	Response
	<p>Fisheries and Oceans Canada's response. Agreed. Climate change continues to be a priority for Fisheries and Oceans Canada, which conducted a Climate Change Risk Assessment in 2005. The Department has since incorporated climate change into its corporate risk profile and is working to create an internal policy framework for climate change adaptation.</p> <p>In 2009, the international scientific community acknowledged that the role of the oceans in the broad climate change picture is very important. The Department has made it a priority to better understand the oceanic and aquatic elements of the climate system through research and monitoring. For this reason, the Department is actively pursuing avenues toward filling knowledge gaps with regard to the oceans aspects of climate change as a foundation for effective adaptation measures, both internally and interdepartmentally.</p> <p>The Department is at a distinct disadvantage with respect to identifying the adaptation measures needed to respond to the risks that climate change presents. The Department has not received incremental climate adaptation funding; however, it has reallocated funds to begin this work. The Department is attempting to secure a resource base to move the program forward to keep pace with other departments. Significant action to identify adaptation measures for the Department's mandate (for example, managing the fisheries, the civil Canadian Coast Guard fleet, aquaculture, and Small Craft Harbours) will be required.</p> <p>Indian and Northern Affairs Canada's response. Agreed. Indian and Northern Affairs Canada has initiated a Climate Change Vulnerability Assessment that will look at the impacts of climate change on departmental programs and policies, and enable the consideration of climate change impacts in future planning for departmental policies, programs, and operations. The Department expects to complete the assessment in fiscal year 2010–11. Once vulnerabilities are assessed and validated, the Department will integrate climate change considerations into the corporate risk profile update process and the program renewal and management cycle. The Department is committed to implementing program measures to address priority impact areas. It will continue to build on partnerships with Aboriginal communities, organizations, and governments to build capacity at the local level to manage impacts from climate change and better inform the Department's efforts to address climate change impacts on their areas of responsibility.</p>

Recommendation	Response
<p>A federal adaptation strategy and action plan</p> <p>3.53 Building on the government’s 2007 commitment to develop an adaptation policy framework, Environment Canada, with support from Natural Resources Canada and other departments and agencies, should develop a federal adaptation strategy and action plan. (3.45–3.52)</p>	<p>Environment Canada’s response. Agreed. Environment Canada will work closely with other federal partners to develop an adaptation policy framework that will guide future adaptation programming efforts. The framework will set out a vision for adaptation, objectives, definition of the federal role, and a set of criteria for identifying federal priorities.</p>

Report of the Commissioner of the Environment and Sustainable Development to the House of Commons—Fall 2010

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Chapter 2	Monitoring Water Resources
Chapter 3	Adapting to Climate Impacts
Chapter 4	Environmental Petitions

