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

FALL

**Chapter 2**  
Monitoring Water Resources



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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Office of the Auditor General of Canada  
240 Sparks Street, Stop 10-1  
Ottawa, Ontario  
K1A 0G6

Telephone: 613-952-0213, ext. 5000, or 1-888-761-5953  
Fax: 613-943-5485  
Hearing impaired only TTY: 613-954-8042  
Email: [distribution@oag-bvg.gc.ca](mailto:distribution@oag-bvg.gc.ca)

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Chapter

# 2

Monitoring Water Resources



# Table of Contents

<b>Main Points</b>	<b>1</b>
<b>Introduction</b>	<b>3</b>
Federal role in water management	3
Monitoring the quality of surface fresh water	5
Monitoring the quantity of surface fresh water	7
Focus of the audit	9
<b>Observations and Recommendations</b>	<b>10</b>
<b>Management of water monitoring programs</b>	<b>10</b>
The Department has not fully defined the extent of its water monitoring responsibilities	10
Water monitoring activities are not risk-based	13
Water monitoring arrangements are sometimes fulfilled	16
The programs have not systematically assessed client needs	17
The Fresh Water Quality Monitoring program does not validate the quality of the data it disseminates	19
The Fresh Water Quality Monitoring program does not systematically track or communicate variances from water quality thresholds	20
The Fresh Water Quality Monitoring program does not measure its performance	22
Neither program has developed or implemented action plans for program improvement	23
<b>Reporting on results</b>	<b>24</b>
Environment Canada has not fulfilled its reporting obligations under the <i>Canada Water Act</i>	24
<b>Conclusion</b>	<b>24</b>
<b>About the Audit</b>	<b>26</b>
<b>Appendix</b>	
List of recommendations	30





# Monitoring Water Resources

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## Main Points

### What we examined

Canada is home to roughly seven percent of the Earth's renewable fresh water. From the Gander River in the east to Campbell River in the west, to the Mackenzie River in the north, and thousands of other rivers and lakes in between, water defines our landscape. Environment Canada maintains two programs to monitor the long-term quality and quantity of surface fresh water resources in Canada.

The Department's Fresh Water Quality Monitoring program monitors long-term water quality at 456 sites across the country to assess and report on the status of Canada's rivers and lakes and on changes to the health of aquatic ecosystems. The data and information produced by the program are intended to serve various water management activities and needs, such as establishing baseline conditions, determining trends in aquatic ecosystem health, and detecting emerging water quality issues. The data and information provided by the program are also intended to inform regulatory activities.

The Department's National Hydrometric Program monitors the quantity of surface water resources at 2,107 sites across the country and is intended to provide Canadians with the data, information, and knowledge they need to make water management decisions. Water quantity data and information are used to determine how much water is available for various uses such as irrigation and industrial and domestic uses, to make trans-boundary water allocation decisions, and for flood forecasting.

We examined how Environment Canada manages each of these programs and how it measures and reports on the programs' performance.

Audit work for this chapter was substantially completed on 30 June 2010.

### Why it's important

According to recent public opinion polls, Canadians regard fresh water as the country's most important natural resource, more important than oil and gas and forestry. Fresh water is a critical factor in most economic and industrial activities, from the production of goods and

services, including food, to recreation and tourism. Canadians count on fresh water for just about every aspect of their lives. Water is also essential to the health of ecosystems and, in turn, to the well-being of Canadians.

Understanding the status and long-term trends in the quality and quantity of the country's fresh water resources is of vital importance to Canada's future prosperity.

### What we found

- Environment Canada is not adequately monitoring the quality and quantity of Canada's surface water resources. Although it has run the Fresh Water Quality Monitoring program and the National Hydrometric Program since the 1970s, the Department has not fully defined the extent of its water monitoring responsibilities, particularly on federal lands such as First Nations reserves, Canadian Forces bases, national parks, and national wildlife areas. The Department is not monitoring water quality on the majority of federal lands and does not know whether other federal departments are doing so. As a result, there may be vast areas under federal jurisdiction where fresh water quality and quantity conditions are not being monitored.
- Environment Canada has not located its monitoring stations based on an assessment of risks to water quality and quantity. As a result, it may not be focussing its monitoring efforts on the activities and substances that pose the greatest risks.
- Both of the water monitoring programs we audited developed quality control procedures intended to ensure that the data they disseminate is fit for their intended uses. The National Hydrometric Program has consistently applied its quality control procedures to validate the data from the stations we examined. The Fresh Water Quality Monitoring program has not. As a result, Environment Canada cannot assure users that its water quality data is fit for their intended uses.
- The Department has not established many of the essential management practices needed to plan, implement, assess, and improve its long-term monitoring programs. It has not taken the initial steps to clearly establish the extent of each program's monitoring responsibilities, risk-based priorities, and client needs. As a consequence, the Department has no objective basis on which to identify opportunities for improvement or take corrective actions to improve these programs.

**The Department has responded.** The Department agrees with all of our recommendations. Its detailed responses follow the recommendations throughout the chapter.

## Introduction

**2.1** Canada faces water management challenges. The quality and quantity of its water resources are under pressure from a range of sources, including urban runoff and sewage, agriculture, and industrial activities. Other long-term threats include population growth, economic development, climate change, and scarce fresh water supplies in certain parts of the country.

**2.2** In 1984, Environment Canada commissioned a comprehensive review of the federal government's water-related policies and programs. This gave rise to what is commonly referred to as the Pearce Report, which noted the high priority attached by Canadians to water issues. In 1987, the government adopted the Federal Water Policy, intended to improve water management in Canada. Today, public concern about water remains high. Recent public opinion surveys reveal that Canadians are very concerned about water pollution and fresh water shortages, and regard fresh water as the country's most important natural resource.

**2.3** Adequate long-term trend information on water quality and quantity and the status of Canada's rivers and lakes is important for the timely identification of current and emerging threats and preventative actions. Inadequate or insufficient information could result in expensive remediation activities that might have been avoided had good quality information been readily available.

### Federal role in water management

**2.4** The federal and provincial governments share responsibility for fresh water management. The provinces have authority to legislate with respect to various aspects of water supply and use, pollution control, hydroelectric and non-nuclear power development, irrigation, and recreation within their borders. The federal government also has jurisdiction over aspects of fresh water regulation, including fisheries, navigation, boundary and trans-boundary waters shared with the United States, and federal lands.

**2.5** Section 44 of the *Canadian Environmental Protection Act, 1999* requires the federal Minister of the Environment to establish, operate, and maintain a system for monitoring environmental quality. According to the Act, environment means the components of the earth and includes water, while the definition of environmental quality includes the health of ecosystems. Section 5 of the *Canada Water Act*

empowers the Minister of the Environment to enter into intergovernmental arrangements to

- establish and maintain an inventory of any waters where there is a significant national interest in the management of such water resources; and
- collect, process, and provide data on the quality, quantity, distribution, and use of those waters.

**2.6** A number of federal departments have management responsibilities related to federal lands, including Indian and Northern Affairs Canada for First Nations reserves and for the territories, the Department of National Defence for national defence bases, Parks Canada Agency for national parks, and Environment Canada for national wildlife areas. Adequate long-term monitoring data and information on the quality and quantity of fresh water is critical in supporting these and other departments in administering a range of federal responsibilities. It is also critical to enabling the federal government to work effectively with provincial/territorial and international partners in addressing shared water quality and quantity concerns. Long-term data and information on water quality and quantity also support regulatory enforcement activities, international arrangements, and priority government initiatives and reporting responsibilities (Exhibit 2.1).

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**Exhibit 2.1** Key federal legislation, arrangements, and initiatives supported by long-term monitoring information

- *Fisheries Act*
  - *Canada Shipping Act, 2001*
  - *Canadian Environmental Protection Act, 1999*
  - *Canadian Environmental Assessment Act*
  - *Navigable Waters Protection Act*
  - *Arctic Waters Pollution Prevention Act*
  - *International Boundary Waters Treaty Act*
  - *International River Improvements Act*
  - Prairie Provinces Water Board
  - Great Lakes Water Quality Agreement
  - Federal Action Plan on Clean Water
  - Canadian Environmental Sustainability Indicators initiative
-

**2.7** In its 1987 Federal Water Policy, Environment Canada identified two goals: to protect and enhance the quality of Canada's water resources, and to promote the wise and efficient management and use of water. To achieve these goals, the policy set out strategies for science leadership, integrated planning, water pricing, legislation, and public awareness.

**2.8** Under its science leadership strategy, the policy notes the need for reliable and readily available data (on water quantity, quality, and use) describing the health and value of Canada's fresh waters. In particular, the policy recognizes the federal government's national responsibility for developing and maintaining water data and information systems to help manage Canada's water resources. In support of its integrated planning strategy for the development and management of water resources, the federal government committed to cooperation between the various government agencies and institutions.

**2.9** The federal government's two main surface water monitoring programs—the National Hydrometric Program and the Fresh Water Quality Monitoring program—have been managed by Environment Canada since the early 1970s. Both programs help to ensure that aquatic ecosystems are conserved and protected so that Canada's water is clean, safe, and secure.

### **Monitoring the quality of surface fresh water**

**2.10** When Environment Canada was restructured in the early 1990s, the Fresh Water Quality Monitoring program shifted from national coordination to a decentralized approach that allowed regional monitoring programs to run independently. It shifted back to a national approach in 2006 and has been managed on a national basis since then.

**2.11** The program manages 456 long-term water quality monitoring stations as well as a number of short-term surveillance and biological monitoring stations through five regional offices across Canada (Exhibit 2.2). It is part of Environment Canada's Science and Technology Branch. In the 2009–10 fiscal year, total program spending was \$14.1 million, of which \$10.5 million was allocated to its long-term water quality monitoring component. This represents approximately one percent of Environment Canada's overall budget. Program funding for long-term water quality monitoring remained relatively stable from the 2006–07 to 2009–10 fiscal years.

**Exhibit 2.2** Location of long-term water quality monitoring stations

Source: Environment Canada, Fresh Water Quality Monitoring program, 2010

**Aquatic ecosystem health**—Healthy aquatic ecosystems are those where human activities have not impaired the natural functioning (for example, nutrient cycling) or appreciably altered the structure (for example, species composition) of the system. An unhealthy aquatic ecosystem is one where the natural state is out of balance.

Source: Environment Canada

**2.12** The Fresh Water Quality Monitoring program is intended to provide knowledge and understanding of the impacts and risks of human activities to water quality and the health of aquatic ecosystems. The objective is to assess and report on the status of Canada's rivers and lakes, as well as changes to **aquatic ecosystem health**. The program aims to provide data and information for users with various needs, such as

- establishing baseline and reference conditions of water quality;
- determining long-term trends;
- determining compliance with established guidelines for water, fish, and sediment;
- detecting emerging issues and threats;
- measuring response to remedial measures and regulatory decisions;
- establishing water quality guidelines;
- assessing and managing risk; and
- reporting on the Canadian Environmental Sustainability Indicators' water quality indicator.

**2.13** In 2004, the federal government launched the Canadian Environmental Sustainability Indicators (CESI) initiative. The aim was to establish a core set of environment and sustainable

development indicators for tracking issues of importance to Canadians. The Fresh Water Quality Monitoring program played a key role in developing the CESI water quality indicator. Together with 21 other water quality monitoring programs operated by various levels of government and water boards, the Fresh Water Quality Monitoring program contributes data for the CESI water quality indicator.

Water quality was rated as “fair,” “marginal,” or “poor” at 61 percent of monitoring sites; and “excellent” or “good” at 39 percent of sites from 2005 to 2007.

Source: Environment Canada

**2.14** The CESI water quality indicator is intended to provide an overall measure of the ability of water bodies to support aquatic life at selected monitoring sites in Canada. The indicator combines measurements of a wide range of substances found in water to reflect the general state of water quality. It focuses on how suitable the water is for plants and animals. Measurements for the indicator are taken at sites across Canada. According to Environment Canada’s April 2009 report on the water quality indicator, there is no integrated national network of water quality monitoring sites designed to report on the state of Canada’s water quality, or to comprehensively cover all geographic areas with potential water quality issues.

### Monitoring the quantity of surface fresh water

**2.15** Environment Canada’s National Hydrometric Program collects, interprets, and disseminates data and information on surface water quantity. The program has operated continuously as the Water Survey of Canada since 1908. Environment Canada assumed responsibility for the program in the early 1970s. The program objective is to provide Canadians and their institutions with the hydrological data, information, and knowledge they need to make water management decisions.

**2.16** The program operates 2,107 water level and/or stream flow stations under arrangements with the provinces and territories. It also has arrangements with the private sector (Exhibit 2.3).

**2.17** Hydrometric information has many uses in Canada, including

- in hydroelectric power generation, irrigation, and industrial and infrastructure planning, design, and operation;
- in aquatic ecosystem and climate change research, and environmental impact studies;
- by water boards (including the Prairie Provinces Water Board) and the International Joint Commission to determine compliance with water allocation arrangements;
- in negotiating inter-jurisdictional water sharing and water management arrangements;

- by various levels of government for the enforcement of regulations; and
- for calibrating and validating mathematical models used to predict water levels and flow.

**2.18** The National Hydrometric Program is managed by the Meteorological Service of Canada's Weather and Environmental Monitoring Program. Since 2007, the quality management system of the Department's weather and environmental services function has been certified under the International Organization for Standardization's (ISO's) 9001 standard.

**2.19** Spending for the National Hydrometric Program in the fiscal year 2009–10 was \$20.9 million or 2.1 percent of departmental spending. In addition, \$13.9 million was cost-recovered through arrangements with the provinces, other federal departments, and the private sector. The number of full-time equivalent staff was 258. Water quantity monitoring equipment represents 7.7 percent of the Department's assets. The program's budget has increased by just over 50 percent from the fiscal year 2006–07 to 2009–10. Program management told us that the increase was largely due to investments in monitoring technology.

**Exhibit 2.3** Location of hydrometric monitoring stations



Source: Environment Canada, National Hydrometric Program, 2010

**Surface fresh water and groundwater—**  
Surface fresh water flows in streams, rivers, lakes, and wetlands. Groundwater is found beneath the earth's surface.

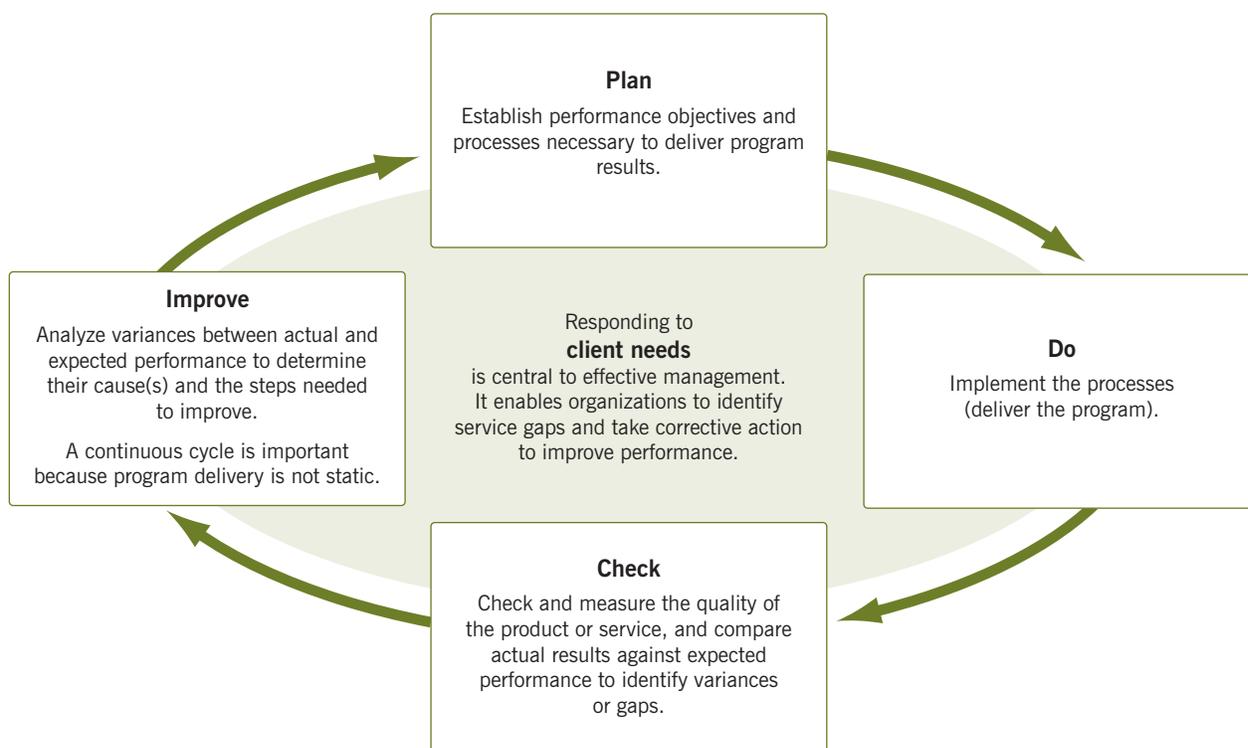
### Focus of the audit

**2.20** The audit examined whether Environment Canada managed the Fresh Water Quality Monitoring program and the National Hydrometric Program to adequately monitor and report on **surface fresh water** quality and quantity in Canada.

**2.21** We did not audit the Department's water quality and quantity research activities, biological monitoring activities, or short-term water quality surveillance activities carried out under the Pesticide Science Fund, the Chemicals Management Plan, or the Mercury Science Program of the Clean Air Regulatory Agenda. We also did not audit the management of federal **groundwater** or precipitation monitoring programs.

**2.22** We assessed the management of the two surface water monitoring programs using the "Plan-Do-Check-Improve" model (Exhibit 2.4). Given the cyclical nature of these management activities, our audit covered six fiscal years from 2004–05 to 2009–10; we judged this period sufficient to allow for a complete management cycle.

**Exhibit 2.4** Plan-Do-Check-Improve management model



Source: Adapted from the Deming Cycle, used in business improvement and quality management and the Management Accountability Framework, Treasury Board of Canada Secretariat, 2009

**2.23** More details about the audit objectives, scope, approach, and criteria are in **About the Audit** at the end of this chapter.

## Observations and Recommendations

### Management of water monitoring programs

**2.24** Well-managed programs strive for continuous improvement and operate according to a systematic management cycle consisting of planning, doing, checking, and improving. In examining Environment Canada's Fresh Water Quality Monitoring program and its National Hydrometric Program, we looked for evidence that

- the programs were planned to address key risks and user needs;
- plans were implemented;
- progress on the plans was periodically checked to ensure that risks were addressed and user needs were met; and
- action was taken to make improvements where required, with the aim of ensuring the achievement of program objectives.

### **The Department has not fully defined the extent of its water monitoring responsibilities**

**2.25** To effectively plan and manage a program, it is essential to clearly define the program's objectives. For long-term water monitoring programs, the geographic extent of monitoring should be clearly established as part of the planning process so that relevant risks and monitoring priorities can be identified. Since Environment Canada manages the federal government's long-term national surface water monitoring programs, we examined whether the Department, in consultation with other jurisdictions and other federal departments and agencies, had defined the geographic extent of water monitoring to be carried out by each program.

**2.26 Monitoring arrangements.** We found that the National Hydrometric Program had clearly established its responsibilities for monitoring international boundary and interprovincial/territorial waters through formal monitoring arrangements. The National Hydrometric Program has been carried out under formal cost-sharing arrangements between Environment Canada and each of the provinces, and between Environment Canada and Indian and Northern Affairs Canada (representing the Northwest Territories and Nunavut).

**2.27** We found that the Fresh Water Quality Monitoring program has not established water quality monitoring arrangements with most of

the provinces and does not have arrangements to monitor water quality in the territories. The program has four active federal/provincial arrangements. It also has a number of site-specific arrangements to monitor water quality, including in the Great Lakes and the Slave River. Since it has not established a consistent set of water quality monitoring arrangements across the country, the program cannot fully capitalize on the many benefits associated with formal monitoring arrangements. According to the Department, these include

- a cooperative approach to water resource assessment;
- comparable, reliable, and accessible data across the country;
- consultation on the need for and use of data from each monitoring station;
- sharing of costs according to need; and
- the exchange of information and expertise.

**2.28 Federal lands.** In addition to international boundary and interprovincial/territorial waters, federal jurisdiction extends to federal lands. Federal lands include First Nations reserves, Canadian Forces bases, national parks, and national wildlife areas.

**2.29** Establishing program objectives that specify what will be done by the program and where is a prerequisite for effectively planning and managing program activities. Environment Canada has run the key federal government programs for monitoring surface water quality and quantity for approximately 40 years, yet it has not delineated the extent of its management responsibilities for water monitoring on federal lands.

**2.30** The Department has established a number of site-specific arrangements with other federal departments for monitoring water on some federal lands; however, it has not established comprehensive arrangements with other federal departments that clarify who will carry out water monitoring on federal lands.

**2.31** Based on information provided by the Fresh Water Quality Monitoring program, we found that the program is not monitoring water quality on most of these lands (Exhibit 2.5). The Department provided us with its criteria for choosing water quality monitoring sites. However, it was unable to show how current monitoring sites on federal lands met the criteria or why some federal lands are monitored and others are not. The National Hydrometric Program could not provide us with information on the number of water quantity monitoring stations on federal lands. The Department does not know whether other federal departments may be monitoring water quality or quantity on these lands.

**Exhibit 2.5** The Fresh Water Quality Monitoring program is not monitoring on most federal lands

Federal lands	Number of federal lands	Number monitored by the Fresh Water Quality Monitoring program <sup>4</sup>
First Nations reserves	3,000 <sup>1</sup>	12
National Parks	42 <sup>2</sup>	31
National Wildlife Areas	54 <sup>3</sup>	2

Source: <sup>1</sup>Indian and Northern Affairs Canada

<sup>2</sup>Parks Canada

<sup>3</sup>*Wildlife Area Regulations*

<sup>4</sup>Environment Canada, Fresh Water Quality Monitoring program

**2.32** We found that the Department has not carried out a risk assessment to determine whether long-term monitoring on these lands is needed. Fresh Water Quality Monitoring program officials told us that they do not seek new monitoring opportunities on federal lands, but that they may establish monitoring stations when other federal departments and authorities request them.

**2.33 Recommendation.** Environment Canada should work proactively with other federal departments and authorities to

- determine where on federal lands water quality and quantity monitoring is needed,
- determine who will carry out the long-term monitoring at these locations, and
- formalize arrangements with other federal departments and authorities to clarify roles and responsibilities for long-term water monitoring on federal lands.

**The Department's response.** Agreed. The Department will update the inventory of federal lands and waters of federal interest under its own jurisdiction by fall 2011.

The Department will also review and improve criteria used to assess water monitoring needs where appropriate and will, on an ongoing basis, continue to share information with federal stakeholders and work with them to clarify and document roles and responsibilities for long-term water quality and quantity monitoring.

### Water monitoring activities are not risk-based

**2.34** To ensure that Canada's fresh water resources are being conserved and protected, it is important to identify, assess, and monitor risks to water quality and quantity. Since it is not feasible to monitor conditions everywhere, a risk-based approach would enable Environment Canada to focus available resources on monitoring the activities and substances that pose the greatest risks to water quality and quantity.

**2.35** We examined whether Environment Canada applied a risk-based approach to establish its water monitoring priorities. A risk-based approach involves a number of important steps (Exhibit 2.6).

#### Exhibit 2.6 Steps in a risk-based approach to water monitoring

<b>Responsibilities</b>	Define the scope of responsibilities to be managed by the program.
<b>Needs and risks</b>	Identify and assess client needs and key risks within the scope of the program.
<b>Performance gaps</b>	Identify performance gaps by assessing current program activities in relation to the identified responsibilities, needs, and risks.
<b>Priorities</b>	Establish and rank program priorities for action.
<b>Action plan</b>	Develop and implement an action plan to close the performance gaps.

Source: Adapted from Treasury Board of Canada Secretariat, Integrated Risk Management Framework, 2001 and Treasury Board of Canada Secretariat, Management Accountability Framework, 2009

**2.36** Both programs have periodically undertaken some of the steps identified above. For example, in 2004 the National Hydrometric Program identified some gaps in its long-term monitoring network. These included not assessing wastewater disposal from major industries for the impact on water availability downstream, and not enhancing long-term monitoring of climate change impacts on water in northern Canada.

**2.37** With respect to monitoring climate change impacts, in 1999, the National Hydrometric Program identified 255 of its existing monitoring stations best suited to provide information on climate change trends. However, we found that the program did not establish new monitoring stations, adjust its long-term monitoring activities, or set monitoring priorities based on climate change or other threats to water quantity that it had identified. According to the Department, it has not expanded its monitoring network to track the effects of climate change because of the scientific complexities of doing so.

**2.38** Similarly, in 2001, the Department identified a number of inadequately monitored substances that posed threats to human and aquatic ecosystem health. They included toxins produced by algae (Case Study on Lake Winnipeg), pollutants from activities such as oil sands mining (Case Study on oil sands development), and endocrine-disrupting substances. We found that these threats to water quality were not prioritized, and no action plans were developed to address them.

**2.39** Fresh Water Quality Monitoring program officials told us that the Department's short-term research and surveillance activities address some identified threats to water quality. However, we found no systematic link during the period covered by our audit between the program's short-term research and surveillance activities and changes to long-term water quality monitoring activities intended to provide information on the status of Canada's lakes and rivers and on trends in aquatic ecosystem health.

#### Case Study—Environment Canada has insufficient data to monitor Lake Winnipeg pollution

Lake Winnipeg's watershed extends across several Canadian provinces and areas of the United States. It includes the Red River, which crosses the international border, as well as the Saskatchewan, Winnipeg, and Assiniboine rivers and their tributaries.

The lake plays a critical role in commercial and sport fisheries, tourism, and recreation. As home to Manitoba's largest commercial fishery, it contributes substantially to the region's economy. The total value of commercial fish production on Lake Winnipeg was over \$20 million in the 2001–02 fiscal year. Lake-based tourism contributes an estimated \$100 million a year to the province's gross domestic product.

For more than 30 years, there have been suspicions that nutrient loading from agricultural activities posed a threat to the lake, including its fish and fish habitat. Although Environment Canada monitors water quality on major tributaries that drain into Lake Winnipeg, it did not begin long-term water quality monitoring in Lake Winnipeg until 2006, one year after the Government of Manitoba recommended collaboration with the federal government to address water quality issues in the lake. The Department's long-term water quality monitoring was inadequate to signal this emerging threat.

Costly remedial measures are now under way to mitigate the problem of excess algae caused by nutrient loading. The March 2007 federal budget committed \$7 million to respond to the problem in Lake Winnipeg. An additional \$11 million of federal funds has since been allocated for cleaning up the lake, increasing understanding of nutrients in its water, and expanding and improving the network of water monitoring sites in the basin. Through these measures, the federal government aims to reduce blue-green algae levels, restore the ecological integrity of the lake, ensure a sustainable fishery, and reduce beach closures.

The Fresh Water Quality Monitoring program has recently increased its surveillance activities in the Lake Winnipeg basin. However, Environment Canada informed us that it is still in the process of evaluating the water quality monitoring network and that it is too early to know whether the network is capable of monitoring how effective cleanup activities will be in reducing nutrient loading in the lake.



Excess algae in Lake Winnipeg, Manitoba

Photo: Lori Volkart

**2.40** We found that neither program has applied a risk-based approach to establish its monitoring activities. As a consequence, there may be significant risks to the quality and quantity of fresh water that have not been assessed and are not being monitored in areas of federal jurisdiction. Water management decisions may be made without long-term data and information on the quantity and quality of water resources (Case Study on threats related to population growth and economic development).

#### Case Study—Environment Canada has insufficient data to monitor oil sands development



Oil sands operation, Alberta

Photo: Louis Helbig

Alberta's oil sands cover roughly 140,200 square kilometres in the Athabasca River, Cold Lake, and Peace River regions in the province. The first large-scale oil sands commercial operation began in 1967. Studies have suggested that oil sands mining has environmental impacts as a result of freshwater use and pollutant releases. Environment Canada recently identified the oil sands region as a priority ecosystem and hotspot for further assessment and intervention. At the time of our audit, the Department had one long-term water quality monitoring station located on the Athabasca River in Wood Buffalo National Park, about 150 kilometres downstream from the oil sands. The provincial government and private sector monitor water quality in this region, but their data is not available in the Department's regional long-term water quality database.

Environment Canada's water quality monitoring station in Wood Buffalo National Park has been in place upstream from the First Nations community of Fort Chipewyan since 1989. The station was originally established to track the long-term status and trends of nutrients in the river that could be affected by pulp and paper production.

In 2009, the Department issued a report on water quality status and trends in Wood Buffalo National Park. The report recommended expanding the monitoring parameters to include pollutants related to oil sands development. At the time of our audit, the Department was still considering their recommendation. Consequently, the Department's Fresh Water Quality Monitoring program has no baseline measures or long-term data to track changes in water quality and aquatic ecosystem health in the river associated with oil sands development.

With regard to water quantity, the Department has not determined whether it currently has an adequate number of stations to monitor water flow related to oil sands development.

#### Case Study—Environment Canada has insufficient data to monitor threats related to population growth and economic development

Key threats to the quality and quantity of Canada's freshwater resources are related to population growth and economic development. Between 2001 and 2006, the population growth rate in many mid-sized urban centres of northern Alberta and the Northwest Territories was the highest in Canada. Economic development patterns were similar for these regions, with the Northwest Territories and Yukon experiencing some of Canada's highest growth rates in the mining and oil and gas extraction sectors from 2002 to 2008.

During the period covered by our audit, the Department's long-term water quality and quantity monitoring networks have not responded to this growth. There is limited monitoring in the northern parts of most provinces and in the territories. As a result, Environment Canada has insufficient data to monitor threats related to population growth and economic development in regions experiencing the highest growth.

**2.41** With Canada's participation, the World Meteorological Organization (WMO) has developed guidelines for the optimum number of water monitoring stations per square kilometre. The number of stations recommended under the guidelines varies by terrain type. We found that neither federal water monitoring program had assessed whether its network meets WMO guidelines.

**2.42** A risk-based approach is needed to focus available monitoring resources on activities and substances that pose the greatest risks to water quality and quantity.

**2.43 Recommendation.** Using the 2008 World Meteorological Organization guidelines for water monitoring networks as a benchmark, Environment Canada should

- determine the optimum number of water monitoring stations across Canada;
- identify gaps in its existing coverage; and
- apply a risk-based approach to establish new monitoring stations, focusing on activities and substances that pose the greatest risks to water quality and quantity.

**The Department's response.** Agreed. The Department will use the 2008 World Meteorological Organization (WMO) guidelines for water monitoring networks as a benchmark and will continue to consider them and other benchmarks (for example, the U.S. Geological Survey) whenever appropriate.

The Department will re-evaluate the current network density in accordance with recent WMO guideline for various physiographic regions across Canada and assess the implications by spring 2012.

The Department will continue to apply, and will enhance and document on a national basis, a risk-based approach based on the analysis of the scientific results of its surveillance programs, its Canadian Aquatic Biological Monitoring Program, and its aquatic ecosystem monitoring programs to improve its long-term water quality monitoring.

#### **Water monitoring arrangements are sometimes fulfilled**

**2.44** We also examined whether the two programs carried out water quality and quantity monitoring activities in accordance with the Department's monitoring arrangements. For each program, we randomly selected 10 monitoring sites within each of three provinces to determine whether monitoring occurred at the specified frequency.

We reviewed site data collected over five fiscal years, from 2004–05 to 2008–09. We also examined whether the Fresh Water Quality Monitoring program monitored core parameters recommended by the Canadian Council of Ministers of the Environment (CCME) and identified in the water monitoring arrangements.

**2.45** For the National Hydrometric Program we found that monitoring activities for the stations we selected were carried out in accordance with two of the three water monitoring arrangements we examined. Since the third did not specify the frequency of station visits that should take place, we could not determine whether the actual number of visits carried out was appropriate.

**2.46** For the Fresh Water Quality Monitoring program we found that the monitoring activities for the stations we selected were carried out as agreed in two provinces. Environment Canada missed 25 percent of its scheduled visits in the third province and two of the six core monitoring parameters recommended by the CCME were not consistently monitored as planned. As a result, some of the data and information considered necessary to monitor water quality in the region covered by this monitoring arrangement is not available.

### **The programs have not systematically assessed client needs**

**2.47** To plan activities and improve products or services, an organization needs to clearly identify its clients, understand their specific needs and expectations, and assess how well it is serving them. Responding to client needs is central to the Plan-Do-Check-Improve management model (Exhibit 2.4). This information enables the organization to identify service shortcomings or gaps and take action to improve performance. We examined whether Environment Canada

- periodically identified its key clients and their information needs,
- determined how well it was serving those needs, and
- took action to address identified issues.

**2.48** We found that neither program determined whether it is satisfying client needs. The National Hydrometric Program has established a National Administrators Table with federal, provincial, and territorial partners to discuss a variety of issues, including monitoring needs. However, the program has not developed or implemented action plans to address partners' monitoring needs.

**2.49** The National Hydrometric Program has a process for periodically assessing client needs to identify shortcomings or gaps in the

information it supplies. However, the program does not use the process it has established. For example, program management informed us that they aim to hold three to four regional workshops a year to determine client needs. However, it has not convened a workshop since 2007 and has held only two regional workshops during the six-year period covered by this audit. The program did not use the results of these two workshops to develop concrete action plans or make program improvements. According to the workshop summaries, clients indicated that Environment Canada should give more attention to collecting their feedback and engaging them in information sharing.

**2.50** The Fresh Water Quality Monitoring program has not established a process for periodically assessing client needs to identify shortcomings or gaps in the information it supplies. The program has consulted with some clients about specific bodies of water, but it has not consolidated the results regionally or nationally to determine client needs and priorities for improvement.

**2.51** Given that we found that the Department has not systematically consulted with the clients of the programs, we surveyed clients identified by the Department to determine the extent to which the programs are addressing their information needs (Exhibit 2.7). In response to our request, Environment Canada identified clients of the National Hydrometric Program and Fresh Water Quality Monitoring program. Clients for both monitoring programs include other federal government departments and agencies; provincial, territorial, and international partners to arrangements; academics; and the private sector.

**2.52** While approximately half of the survey respondents indicated that the monitoring data provided by the programs met their needs, our survey results indicate that clients of the National Hydrometric Program were more satisfied. Just over two-thirds of the clients who

**Exhibit 2.7** Survey respondents indicate that their information needs are not always met

Federal lands	National Hydrometric Program	Fresh Water Quality Monitoring program
The data meets the users' needs	56%	43%
The users rely on the data	83%	57%
The data allows users to gain an adequate understanding of the state of water quantity/quality	71%	51%
The users indicated that key gaps exist in the information available	68%	67%

responded to our survey said that key gaps exist in the information provided by the programs. Additional information about the survey is included in **About the Audit** at the end of this chapter.

**The Fresh Water Quality Monitoring program does not validate the quality of the data it disseminates**

**2.53** Quality assurance is a key aspect of program management and an important element of the Plan-Do-Check-Improve management model. It is also essential for identifying opportunities for improvement and satisfying client needs.

**2.54** The purpose of the Fresh Water Quality Monitoring program and the National Hydrometric Program is to collect and disseminate data and information—on water quality in the case of the Fresh Water Quality Monitoring program, and on water quantity in the case of the National Hydrometric Program. In the context of data and information, quality refers to the extent to which the information is fit for its intended uses. The production and dissemination of unreliable water data is, at the least, a waste of human and financial resources, and could result in inappropriate decisions regarding urban, industrial, or agricultural expansion, water allocation; or infrastructure needs.

**2.55** Quality assurance involves a variety of tasks aimed at enhancing the quality of the data and its adequacy for intended uses. These tasks include field work, laboratory analysis, and data validation. Data validation is a process used to determine if data are accurate and complete prior to its dissemination.

**2.56** We examined whether the programs have put in place and applied quality assurance procedures to validate the data and information they disseminate to assure that the data and information are fit for use. We did not examine the application of other quality assurance procedures, including field and laboratory procedures, nor did we directly assess the quality of the monitoring data itself.

**2.57** We found that the National Hydrometric Program has a national database and had established national-level quality assurance procedures to validate its data. To determine whether it had applied its quality assurance procedures to validate the data it disseminates, we selected a sample of 34 hydrometric stations from across the program's five regions. We found that the program applied its quality assurance procedures in a consistent manner at these stations. As part of its quality assurance processes, the program carries out audits to ensure that both program officials and provincial or private sector technicians who collect data are following national practices.

**2.58** In contrast, we found that the Fresh Water Quality Monitoring program has no national database and lacks uniform procedures to assure that the quality of the data it disseminates from its regional databases is fit for its intended uses. Although each regional office has developed its own quality assurance procedures and manages its own database, at least 70 percent of the data collected in four of the five regions had not been validated since 2007. We found that the Quebec region validated the data it collected. The program does not assure the quality of data provided to it by partners such as the provinces and other federal departments. Rather, it relies on the provider to assure the quality of the data it receives. Since both the quality assurance procedures and their application are inconsistent across Canada, the Fresh Water Quality Monitoring program cannot assure that the monitoring data meets common quality standards across Canada or that it is fit for its intended uses. The program does not know whether it is disseminating good quality data and information on the state of water quality or aquatic ecosystem health.

**2.59 Recommendation.** Environment Canada should apply a quality assurance framework to assure that the data disseminated under the Fresh Water Quality Monitoring program meets common quality standards across Canada and is fit for its intended uses.

**The Department's response.** Agreed. The Department will complete the application of a national Quality Assurance/Quality Control data framework for the Fresh Water Quality Monitoring program by the end of 2012. The framework will build on the best practices, including regional ones, as well as Environment Canada Meteorological Service of Canada's International Organization for Standardization (ISO) quality assurance management framework for the National Hydrometric Program.

**The Fresh Water Quality Monitoring program does not systematically track or communicate variances from water quality thresholds**

**2.60** In 2006, the Canadian Council of Ministers of the Environment (CCME) recommended a core set of water quality parameters. The Council also established thresholds to be monitored for the protection of aquatic life. Where appropriate, it recommends that officials consider site-specific conditions in selecting which parameters to monitor and in establishing thresholds. Environment Canada is a member of the working group that developed these recommendations.

**2.61** We examined whether the Fresh Water Quality Monitoring program established a common set of core water quality parameters and tracked variances from established water quality thresholds to monitor aquatic ecosystem health, as recommended by the CCME. We also examined whether the program had a process in place to communicate variances from the established thresholds and negative trends to the appropriate authorities so that they could take corrective actions.

**2.62** We found that the Department has selectively tracked and reported variances from established water quality thresholds in some bodies of water. However, it has not established a common set of core water quality variables related to the protection of aquatic life, as recommended by the CCME and does not systematically monitor variances from thresholds across Canada. As a result, the Department does not know how often its water quality thresholds are exceeded across Canada.

**2.63** There is no procedure in place to ensure the communication of variances from water quality thresholds and trends in water quality so that appropriate and timely action can be taken. This means that negative trends in water quality and aquatic ecosystem health could be going undetected and unreported, with no corrective action taken.

**2.64 Recommendation.** Environment Canada should act on recommendations of the Canadian Council of Ministers of the Environment by monitoring a common set of core water quality parameters at each of its stations and communicating variances from thresholds and trends in water quality so that appropriate actions can be taken in a timely manner.

**The Department's response.** Agreed. The Department will continue to improve reporting of the status of water quality at the national, regional, and station level through the Canadian Environmental Sustainability Initiative (CESI) and by using the Canadian Council of Ministers of the Environment (CCME) Water Quality Index on an annual basis.

The water quality indicator uses the frequency and magnitude of exceedances of key parameters from the CCME guidelines for its assessment.

The Fresh Water Quality Monitoring program has a database that manages the program data and tracks variances so that appropriate actions can be taken in a timely manner. Environment Canada has also reported initial findings on nutrient status and trends (1990–2006) for selected long-term monitoring sites using the CESI website window.

**The Fresh Water Quality Monitoring program does not measure its performance**

**2.65** Both the National Hydrometric Program and the Fresh Water Quality Monitoring program are expected to contribute to Environment Canada's broader strategic outcome of ensuring that water is clean, safe, and secure, and that aquatic ecosystems are conserved and protected. It is therefore important that both programs clearly define their expected contributions to the strategic outcome, and that they measure and report program performance relative to those expectations.

**2.66** Assessing program performance relative to established priorities and expected results is a key feature of the cyclical Plan-Do-Check-Improve management model. Well-managed organizations measure and assess performance, learn and adjust program strategies, and report publicly on what they have accomplished. By measuring performance and assessing results, an organization can determine which strategies are working to achieve objectives and which are not.

**2.67** To assess program performance and identify priorities for improvement, management must first identify the extent of program responsibilities, relevant risks, and client needs. It must also establish clear priorities, expected results, and action plans for achieving results.

**2.68** We found that since the Department had not taken the initial steps to clearly establish the extent of each program's monitoring responsibilities, risk-based priorities, and client needs, it is not in a position to objectively assess the adequacy of its monitoring activities and identify opportunities for improvement. Nevertheless, we examined whether the programs had established clear priorities, expected results, and action plans for achieving them.

**2.69** For the National Hydrometric Program we found that Environment Canada has established concrete and measurable performance expectations. For example, one of the program's objectives is that Canadians have reliable and timely access to hydrometric data and information from across Canada. In order to achieve this objective, the program has specified that it plans to assure the quality of 100 percent of its data and ensure that real-time data is available via the Internet within 24 hours.

**2.70** For the Fresh Water Quality Monitoring program we found that while Environment Canada has established national-level performance expectations, they are not expressed in concrete, measurable terms. For example, one of the program goals is improved access to credible,

comparable data nationwide; however, the program has not defined what it means by improved access or credible data or described how it will measure progress against this goal at a national level.

**2.71** We found that while the National Hydrometric Program had measured its performance relative to the program's expected results, the Fresh Water Quality Monitoring program had not. As a result, the Fresh Water Quality Monitoring program is not in a position to learn and adjust program strategies and report publicly on what was accomplished relative to expected results.

### **Neither program has developed or implemented action plans for program improvement**

**2.72** In the six fiscal years covered by the audit, the management of both programs drafted various proposals for adjusting monitoring activities. For example, in 2006, each program developed proposals for comprehensive national coverage. The National Hydrometric Program proposed an additional 600 stations at an incremental cost of \$7 million a year. The draft proposal prepared by the Fresh Water Quality Monitoring program set out several alternatives that ranged from adding 300 stations over five years to adding 3,300 stations (eight times the existing number) over ten years. The Department has estimated the incremental cost of the least expensive option at \$17 million a year; it estimated the incremental cost of the most expensive option at \$170 million a year. We found that no action plans were developed or implemented by the Department to address these proposals.

**2.73** During the course of our audit, the Department completed an internal audit of the National Hydrometric Program. Its findings are consistent with the findings of our audit. For example, the internal audit report recommended that the National Hydrometric Program implement a new approach to strategic planning based on a regular assessment of strategic risk and the needs of clients and stakeholders.

**2.74 Recommendation.** Environment Canada should apply a risk-based, Plan-Do-Check-Improve model to manage its water monitoring activities by

- clearly defining the scope of responsibilities to be managed by each program, including the extent to which each program will carry out monitoring activities on federal lands;
- identifying client needs and key risks to be addressed by each program;

- identifying performance gaps by assessing current program activities relative to identified client needs and risks;
- establishing and ranking program priorities; and
- developing and implementing an action plan to close identified performance gaps.

**The Department's response.** Agreed. The Department will continue its current application of nationally ISO-certified performance measurement principles (Plan-Do-Check-Improve) to water quantity monitoring and incorporate best regional practices into departmental water quality monitoring activities across the country.

The Department will continue to engage and share information and best practices with federal partners annually through the National Administrators Table, as well as through bilateral discussions with federal partners.

## Reporting on results

### **Environment Canada has not fulfilled its reporting obligations under the *Canada Water Act***

**2.75** Under the *Canada Water Act*, Environment Canada is required to prepare an annual report to Parliament “on the operations under this Act.” We found that, from 2004 to 2009, the Department did not submit annual reports to Parliament as required under the Act. For example, the reports for the period 2006 to 2009 were submitted in 2010. The report for the year ending 31 March 2010 has yet to be submitted to Parliament. In addition, departments are required to submit annual departmental performance reports to Parliament on the performance of their programs. We found that information on key aspects of program performance and results for these two programs were not included in Environment Canada's Departmental Performance Reports.

## Conclusion

**2.76** The National Hydrometric Program has established clear program objectives and expected results, and has entered into arrangements with each province and territory to monitor water quantity. The Program has established a national database, and has applied common quality control procedures at the stations we examined to assure that the data it collects and disseminates is of consistently high quality and fit for its intended uses.

**2.77** Neither the Fresh Water Quality Monitoring program nor the National Hydrometric Program was well managed to adequately monitor and report on the quality and quantity of Canada's surface fresh water resources. Many of the essential management practices needed to do so have not been put in place by either program. The Department has not defined the extent of its water monitoring responsibilities. Neither program has applied a systematic, risk-based approach to plan, implement, check, and improve its water monitoring activities, and neither program has determined whether it is satisfying client needs or has developed and implemented action plans for program improvement.

**2.78** Consequently, Environment Canada does not know whether the greatest risks to water quality and quantity are being monitored. Canadians need water data and information for many purposes, such as determining the environmental impacts of projects; understanding emerging threats, including climate change and the cumulative effects of economic development; and guiding decisions associated with federal water arrangements and regulations, as well as energy, agriculture, industrial, and urban development. At present good quality data and information may not be available when and where it is needed.

**2.79** In the absence of timely reports on how well these programs are achieving their objectives parliamentarians and the public do not know the status of Canada's rivers and lakes, whether Canada's water resources are being protected and conserved, or whether aquatic ecosystem health is improving, deteriorating, or staying the same. In the absence of client surveys, risk analysis, and assessments of the adequacy of its monitoring activities, the Department has no objective basis upon which to take corrective actions to improve these programs.

## 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

The overall objective of this audit was to determine whether Environment Canada's Fresh Water Quality Monitoring program and its National Hydrometric Program were well managed to adequately monitor and report on surface fresh water quality and quantity in Canada.

The audit objectives for the two lines of enquiry were as follows:

- Determine whether Environment Canada applied a risk-based approach to plan, implement, check, and improve its Fresh Water Quality Monitoring program and its National Hydrometric Program.
- Determine whether Environment Canada measured and reported on the progress of the Fresh Water Quality Monitoring program and the National Hydrometric Program in achieving their planned results.

### Scope and approach

The audit focused on Environment Canada's long-term surface water quality and quantity monitoring programs: the Fresh Water Quality Monitoring program and the National Hydrometric Program. The audit examined the programs' risk-based management, as well as results measurement and reporting. We examined the programs' management according to the "Plan-Do-Check-Improve" management model.

We did not audit the Department's water quality and quantity research activities, biological monitoring activities, or short-term water quality surveillance activities. In addition, we did not audit the management of groundwater or precipitation monitoring programs.

During our audit, we interviewed officials at Environment Canada, including staff of the five regional offices. A main objective of the interviews was to identify documentation relevant to the audit. We also conducted an online survey of clients identified by the Department to determine the extent to which the information generated by its two monitoring programs met clients' needs. We contacted 1,464 clients who were available between 22 April and 7 May 2010. The response rate for the survey was 32 percent.

## Criteria

<b>To determine whether Environment Canada applies a risk-based approach to plan, implement, check, and improve its Fresh Water Quality Monitoring program and its National Hydrometric Program, we used the following criteria :</b>	
<b>Criteria</b>	<b>Sources</b>
Environment Canada defines the planned results of the Fresh Water Quality Monitoring program and the National Hydrometric Program in concrete, measurable terms.	<ul style="list-style-type: none"> <li>• Management Accountability Framework, Areas of Management, section 2, Treasury Board of Canada Secretariat, 2009</li> </ul>
Environment Canada applies a risk-based approach to identify the Fresh Water Quality Monitoring program's and the National Hydrometric Program's priorities for monitoring.	<ul style="list-style-type: none"> <li>• Risk Management Policy, Identification and Minimization, Treasury Board of Canada Secretariat, 2001</li> <li>• Integrated Risk Management Framework, Element 1, Developing the Corporate Risk Profile, Treasury Board of Canada Secretariat, 2001</li> <li>• Management Accountability Framework, Areas of Management, section 9, Treasury Board of Canada Secretariat, 2009</li> </ul>
Environment Canada identifies the information needs of key users of the Fresh Water Quality Monitoring program and the National Hydrometric Program.	<ul style="list-style-type: none"> <li>• Management Accountability Framework, Areas of Management, section 20, Treasury Board of Canada Secretariat, 2009</li> </ul>
Environment Canada establishes monitoring activities for the Fresh Water Quality Monitoring program and the National Hydrometric Program based on identified risks and priorities.	<ul style="list-style-type: none"> <li>• Integrated Risk Management Framework, Element 2, Establishing an Integrated Management Function, and Element 3, Practising Integrated Risk Management, Treasury Board of Canada Secretariat, 2001</li> <li>• Risk Management Policy, Minimization and Containment, Treasury Board of Canada Secretariat, 2001</li> <li>• Management Accountability Framework, Areas of Management, section 9, Treasury Board of Canada Secretariat, 2009</li> <li>• <i>Canada Water Act</i>, sections 4 and 5</li> </ul>
Environment Canada applies a quality assurance framework to the Fresh Water Quality Monitoring program and the National Hydrometric Program data.	<ul style="list-style-type: none"> <li>• Policy on Information Management, section 5.2.1, Treasury Board of Canada Secretariat, 2007</li> <li>• Quality Assurance Framework, Six Dimensions of Information Quality, Statistics Canada, 2002</li> <li>• Quality Framework and Guidelines for Statistical Activities, section 1.1, Organisation for Economic Co-operation and Development, 2003</li> <li>• Federal/provincial water quality and hydrometric monitoring arrangements</li> </ul>
Environment Canada assesses the adequacy of monitoring activities by the Fresh Water Quality Monitoring program and the National Hydrometric Program, and identifies areas for improvement.	<ul style="list-style-type: none"> <li>• Risk Management Policy, Compensation, restoration and recovery, Treasury Board of Canada Secretariat, 2001</li> <li>• Management Accountability Framework, Areas of Management, sections 6 and 8, Treasury Board of Canada Secretariat, 2009</li> </ul>

To determine whether Environment Canada applies a risk-based approach to plan, implement, check, and improve its Fresh Water Quality Monitoring program and its National Hydrometric Program, we used the following criteria (continued):	
Criteria	Sources
Environment Canada took corrective action to improve the Fresh Water Quality Monitoring program's and the National Hydrometric Program's monitoring activities in areas identified in an assessment.	<ul style="list-style-type: none"> <li>• Risk Management Policy, Compensation, restoration and recovery, Treasury Board of Canada Secretariat, 2001</li> <li>• Integrated Risk Management Framework, Element 4, Ensuring Continuous Risk Management Learning, Treasury Board of Canada Secretariat, 2001</li> <li>• Management Accountability Framework, Areas of Management, sections 6 and 8, Treasury Board of Canada Secretariat, 2009</li> </ul>
To determine whether Environment Canada measures and reports on the progress of the Fresh Water Quality Monitoring program and National Hydrometric Program in achieving their planned results, we used the following criteria:	
Criteria	Sources
Environment Canada regularly measures the performance of the Fresh Water Quality Monitoring program and the National Hydrometric Program against their planned results.	<ul style="list-style-type: none"> <li>• Policy on Active Monitoring, Policy Objectives and Results, and Departmental Roles and Responsibilities, Treasury Board of Canada Secretariat, 2009</li> <li>• Management Accountability Framework, Areas of Management, section 7, Treasury Board of Canada Secretariat, 2009</li> <li>• Federal/provincial water quality and hydrometric monitoring arrangements</li> </ul>
Environment Canada reports annually to Parliament and the public on significant aspects of the performance of the Fresh Water Quality Monitoring program and the National Hydrometric Program.	<ul style="list-style-type: none"> <li>• <i>Canada Water Act</i>, sections 29 and 38</li> <li>• Guide to the Preparation of Part III of the 2009–10 Estimates, Treasury Board of Canada Secretariat, 2009</li> <li>• Management Accountability Framework, Areas of Management, section 7, Treasury Board of Canada Secretariat, 2009</li> </ul>

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

**Period covered by the audit**

The audit covered the fiscal years from 2004–05 to 2009–10. This period was chosen because we considered this time frame to be sufficient for examining the “Plan-Do-Check-Improve” management cycle.

Audit work for this chapter was substantially completed on 30 June 2010.

**Audit team**

Commissioner of the Environment and Sustainable Development: Scott Vaughan

Principal: Andrew Ferguson

Director: Doreen Deveen

Nikoo Boroumand

Véronique Dupuis

Johanne Sanschagrin

Erin Windatt

For information, please contact Communications at 613-995-3708 or 1-888-761-5953 (toll-free).

## Appendix List of recommendations

The following is a list of recommendations found in Chapter 2. 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
<b>Management of water monitoring programs</b>	
<p><b>2.33</b> Environment Canada should work proactively with other federal departments and authorities to</p> <ul style="list-style-type: none"> <li>• determine where on federal lands water quality and quantity monitoring is needed,</li> <li>• determine who will carry out the long-term monitoring at these locations, and</li> <li>• formalize arrangements with other federal departments and authorities to clarify roles and responsibilities for long-term water monitoring on federal lands. (2.25–2.32)</li> </ul>	<p>Agreed. The Department will update the inventory of federal lands and waters of federal interest under its own jurisdiction by fall 2011.</p> <p>The Department will also review and improve criteria used to assess water monitoring needs where appropriate and will, on an ongoing basis, continue to share information with federal stakeholders and work with them to clarify and document roles and responsibilities for long-term water quality and quantity monitoring.</p>
<p><b>2.43</b> Using the 2008 World Meteorological Organization guidelines for water monitoring networks as a benchmark, Environment Canada should</p> <ul style="list-style-type: none"> <li>• determine the optimum number of water monitoring stations across Canada;</li> <li>• identify gaps in its existing coverage; and</li> <li>• apply a risk-based approach to establish new monitoring stations, focusing on activities and substances that pose the greatest risks to water quality and quantity. (2.34–2.42)</li> </ul>	<p>Agreed. The Department will use the 2008 World Meteorological Organization (WMO) guidelines for water monitoring networks as a benchmark and will continue to consider them and other benchmarks (for example, the U.S. Geological Survey) whenever appropriate.</p> <p>The Department will re-evaluate the current network density in accordance with recent WMO guideline for various physiographic regions across Canada and assess the implications by spring 2012.</p> <p>The Department will continue to apply, and will enhance and document on a national basis, a risk-based approach based on the analysis of the scientific results of its surveillance programs, its Canadian Aquatic Biological Monitoring Program, and its aquatic ecosystem monitoring programs to improve its long-term water quality monitoring.</p>

Recommendation	Response
<p><b>2.59</b> Environment Canada should apply a quality assurance framework to assure that the data disseminated under the Fresh Water Quality Monitoring program meets common quality standards across Canada and is fit for its intended uses. (2.53–2.58)</p>	<p>Agreed. The Department will complete the application of a national Quality Assurance/Quality Control data framework for the Fresh Water Quality Monitoring program by the end of 2012. The framework will build on the best practices, including regional ones, as well as Environment Canada Meteorological Service of Canada’s International Organization for Standardization (ISO) quality assurance management framework for the National Hydrometric Program.</p>
<p><b>2.64</b> Environment Canada should act on recommendations of the Canadian Council of Ministers of the Environment by monitoring a common set of core water quality parameters at each of its stations and communicating variances from thresholds and trends in water quality so that appropriate actions can be taken in a timely manner. (2.60–2.63)</p>	<p>Agreed. The Department will continue to improve reporting of the status of water quality at the national, regional, and station level through the Canadian Environmental Sustainability Initiative (CESI) and by using the Canadian Council of Ministers of the Environment (CCME) Water Quality Index on an annual basis.</p> <p>The water quality indicator uses the frequency and magnitude of exceedances of key parameters from the CCME guidelines for its assessment.</p> <p>The Fresh Water Quality Monitoring program has a database that manages the program data and tracks variances so that appropriate actions can be taken in a timely manner. Environment Canada has also reported initial findings on nutrient status and trends (1990–2006) for selected long-term monitoring sites using the CESI website window.</p>
<p><b>2.74</b> Environment Canada should apply a risk-based, Plan-Do-Check-Improve model to manage its water monitoring activities by</p> <ul style="list-style-type: none"> <li>• clearly defining the scope of responsibilities to be managed by each program, including the extent to which each program will carry out monitoring activities on federal lands;</li> <li>• identifying client needs and key risks to be addressed by each program;</li> <li>• identifying performance gaps by assessing current program activities relative to identified client needs and risks;</li> </ul>	<p>Agreed. The Department will continue its current application of nationally ISO-certified performance measurement principles (Plan-Do-Check-Improve) to water quantity monitoring and incorporate best regional practices into departmental water quality monitoring activities across the country.</p> <p>The Department will continue to engage and share information and best practices with federal partners annually through the National Administrators Table, as well as through bilateral discussions with federal partners.</p>

Recommendation	Response
<ul style="list-style-type: none"><li>• establishing and ranking program priorities; and</li><li>• developing and implementing an action plan to close identified performance gaps. (2.65–2.73)</li></ul>	

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

## Main Table of Contents

	<b>The Commissioner's Perspective</b>
	<b>Main Points—Chapters 1 to 3</b>
	<b>Appendix</b>
<b>Chapter 1</b>	Oil Spills from Ships
<b>Chapter 2</b>	Monitoring Water Resources
<b>Chapter 3</b>	Adapting to Climate Impacts
<b>Chapter 4</b>	Environmental Petitions

