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Evaluation of ECCC's Freshwater Quality Science

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As of the date of publication, the document has been verified for accessibility.

If you have any questions about this document, please contact us at: evaluation@ec.gc.ca

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List of Acronyms and Abbreviations

AAFC	Agriculture and Agri-Food Canada
CABIN	Canadian Aquatic Biomonitoring Network
CEPA	<i>Canadian Environmental Protection Act</i>
CCG	Canadian Coast Guard
CMP	Chemicals Management Plan
CSSP	Canadian Shellfish Sanitation Program
CWA	Canada Water Agency
DFO	Fisheries and Oceans Canada
EB	Enforcement Branch
ECCC	Environment and Climate Change Canada
EDI	Equity, Diversity, and Inclusion
EPB	Environmental Protection Branch
ESTL	Environmental Science and Technology Laboratories
GBA Plus	Gender-based Analysis Plus
HC	Health Canada
IJC	International Joint Commission
MOU	Memorandum of Understanding
MSC	Meteorological Service of Canada
NGO	Non-Governmental Organizations
OPP	Oceans Protection Plan
RBAMF	Risk-Based Adaptive Management Framework
SFSC	Synthesis of Freshwater Science in Canada
SPIAB	Strategic Policy and International Affairs Branch
STB	Science and Technology Branch
VNR	Voted net revenue
WSTD	Water Science and Technology Directorate
WQEPP	Water Quality and Ecosystems Partnerships Program
WQMSD	Water Quality Monitoring and Surveillance Division

1. Introduction

This report presents the findings from the evaluation of Environment and Climate Change Canada (ECCC)'s freshwater quality science. The evaluation was conducted in accordance with the [Treasury Board Policy on Results](#) (2016). It covers a 5-year period from 2020-2021 to 2024-2025 and is part of ECCC's [Audit and Evaluation Plan 2024 to 2029](#).

The evaluation considered the themes of Relevance, Governance, Efficiency, and Effectiveness.

1.1. Overview

ECCC's freshwater quality science activities are designed to support Canadians in having access to clean water. The department's freshwater quality science activities include:

- Long term monitoring and surveillance aimed at reporting on freshwater quality and aquatic ecosystem health;
- Laboratory analysis, analytical method development, and other technical services;
- Research and modelling;
- Reporting on and sharing science; and
- Science activities/advice in support of programs, policy, regulation, and enforcement.

These actions also support the federal government's freshwater management priorities including the Freshwater Action Plan led by the Canada Water Agency (CWA). They enable and support program, regulatory, and policy needs for internal and external partners and stakeholders.

1.1.1. Governance and Organization

From the start of the evaluation period until the end of 2023-2024, the department's freshwater quality activities were primarily grouped under the Water Quality and Ecosystems Partnerships Program (WQEPP). In 2024-2025, the WQEPP was archived, and the associated activities were re-aligned. Today, the ECCC's freshwater quality science activities currently fall under ECCC's Core Responsibility of "Preventing and Managing Pollution". The activities are led by the Water Science and Technology Directorate (WSTD) within the Science and Technology Branch (STB).

The WSTD consists of the following 4 divisions:

- Aquatic Contaminants Research Division.

- Environmental Science and Technology Laboratories Division.
- Water Quality Monitoring and Surveillance Division.
- Watershed Hydrology and Ecology Research Division.

The WSTD's science activities support the needs of other ECCC branches, including the Environmental Protection Branch (EPB), the Enforcement Branch (EB), and the Strategic Policy and International Affairs Branch (SPIAB).

Within ECCC, the Director General Science Table for Preventing and Managing Pollution facilitates pollution-related decision-making, prioritization, science advice, and sets the strategic direction for delivery of environmental services. This table meets at least quarterly with the objective of making STB experts predictably available to client branches and increasing the responsiveness of the STB science activities to emerging client needs.

Collaboration also occurs with other branches such as employees from the former Climate Change Branch currently embedded in the Program Operations and Regional Affairs Branch (PORAB), and employees from the Meteorological Service of Canada (MSC) who have complementary responsibilities for freshwater availability and quantity programming and weather services.

ECCC also works with many external partners on freshwater quality science, including other federal departments and agencies, such as the CWA, Fisheries and Oceans Canada (DFO), Department of National Defence, Canadian Coast Guard (CCG), Parks Canada, Agriculture and Agri-Food Canada (AAFC), Health Canada, Natural Resources Canada, and the National Research Council, as well as provinces and territories, academic institutions, non-governmental organizations (NGOs) and others. Several of these partnerships are governed by formal agreements. Furthermore, the department engages with Indigenous groups and peoples through various means. [Section 2.2](#) provides a complete analysis of the governance.

1.1.2. Resources

Funding for freshwater quality science activities comes mainly from ongoing, permanent sources, supported by temporary, initiative-specific funding and some cost recovery activities. Over the course of the evaluation period, budgets and expenditures increased. Expenses increased from \$66.05M in 2020-2021 to \$97.95M in 2024-2025¹ mostly due to contributions

¹ A-Base (permanent funding) expenses were stable from 2020-2021 and 2022-2023 and increased by 42% in 2024-25, mostly attributed to a shift from B-Base to A-Base. B-base (temporary funding) increased from 2020-2021 to 2023-2024 and decreased in 2024-2025.

from multiple water related initiatives (Freshwater Action Plan, Chemicals Management Plan (CMP), Oceans Protection Plan (OPP), etc.)².

Over the same period, the human resources allocated to the WSTD have increased slightly, from 513 full time equivalents in 2020-2021 to 528 in 2024-2025. This increase comes from new term and casual positions, while indeterminate positions decreased from 487 to 477 during this same timeframe.

Section 2.3 provides further analysis of the related financial resources and expenditures.

1.2. About this Evaluation

Due to recent evaluation/review coverage, the results and activities in the list below were not included in the present evaluation's scope. However, freshwater quality science activities undertaken in support of these results and activities may have been in scope:

Actions aimed at restoring, protecting, and at stewarding priority ecosystems per Canada Freshwater Action Plan, now led by the CWA.

- The Canada-Alberta Joint Oil Sands Monitoring Program
- The Marine water quality monitoring under the Canadian Shellfish Sanitation Program (CSSP)
- The OPP
- The CMP
- Activities related to water availability and quantity led by the MSC

The following lines of evidence were used to carry out the present evaluation:

- **Document review:** The review covered key documents including presentations; governance documents and agreements; reports on plans and priorities; annual reports and performance reports; and funded projects documentation.
- **Interviews:** 26 interviews were conducted. These include interviews with ECCC and CWA staff (n=17), as well as interviews with external partners/stakeholders involved with the water quality science activities (n=9).
- **Case studies:** 3 case studies were conducted to assess and understand the unique challenges, delivery, and key impacts of the water quality science activities. These include the Canadian Aquatic Biomonitoring Network (CABIN); Indigenous science; and

² B-base (temporary funding) accounted for 11% of total funding in 2020-21 and for an increasing proportion until 2023-24 where it reached 24%. It then decreased to 15% of total funding in 2024-25.

the implementation of the Risk-Based Adaptive Management Framework (RBAMF) in water quality monitoring.

- **Analysis of administrative, performance, and financial data:** These data provided information on the achievement of results and on the availability, use, and quality of performance information.

The following legend was used throughout the report to indicate the proportion of individuals interviewed that responded in the same manner:

- Few: findings reflect less than 25% of the observations.
- Some/several: findings reflect at least 25% but less than 50% of the observations.
- Half: findings reflect 50% of the observations.
- Majority: findings reflect more than 50% and less than 75% of the observations.
- Most: findings reflect 75% but less than 90% of the observations.
- All/almost all: findings reflect 90% or more of the observations.

2. Findings

The findings related to the evaluation of ECCC's freshwater quality science fall into four main headings, including Relevance, Governance, Efficiency, and Effectiveness.

2.1. Relevance

Key findings: Federal involvement in freshwater quality science is critical to addressing national priorities, transboundary issues, and international obligations. ECCC provides standardized monitoring, long-term data, environmental emergency support, and scientific expertise that support policy and regulatory development, implementation, and environmental law enforcement. Retaining these activities within ECCC supports integration with broader environment, climate change, and nature priorities and enhances evidence-based decision-making. Emerging pressures stemming from climate change and environmental security and sovereignty further underscore the need for federal leadership to maintain consistent standards and to fulfill regulatory obligations and uphold commitments to Indigenous rights and international agreements.

There is a need for continued federal involvement in freshwater quality science in Canada, mainly rooted in the complexity of water governance and the interjurisdictional nature of freshwater management.

While provinces hold primary jurisdiction over water as a resource, their focus is primarily on regional concerns which do not fully address national priorities, multi-jurisdictional watersheds, transboundary issues, federal lands, or international obligations. Federal leadership in these areas is essential in supporting a consistent, science-based approach to safeguarding human health, protecting aquatic ecosystems, and to managing water-related hazards such as floods and droughts.

These ECCC responsibilities are reinforced by legal obligations under multiple statutes, including the [Canada Water Act](#), which require the federal government to maintain a national water inventory, enter joint water management agreements with Provinces/Territories, conduct research, and implement water monitoring programs.

Additional legislation such as the [Department of the Environment Act](#), [the Fisheries Act](#), and the [Canadian Environmental Protection Act, 1999](#) (CEPA) mandates ECCC to carry out research and monitoring on pollution impacts and ecosystem disturbances. These obligations

cannot be met by individual provinces alone as they involve standardizing monitoring protocols across jurisdictions, maintaining national databases for long-term trend analysis, and fulfilling commitments under international treaties and agreements.

Furthermore, ECCC's freshwater quality science activities generate a significant volume of data and research in support of policy and regulatory development, foresight analysis of emerging or re-emerging environmental issues, guideline setting, risk identification and mitigation, and ecosystem health assessments. The science is delivered in coordination with provincial monitoring and freshwater research, and provides a long-term, comprehensive view of Canada's freshwater quality. This scientific information is essential for effective resource management and policymaking and compliance monitoring.

Interviewees also highlighted their role in maintaining internal scientific expertise, which strengthens Canada's capacity to respond to environmental incidents and provide expert witnesses during investigations related to environmental misconduct.

This continued need for federal involvement also means that freshwater quality science activities and analytical capacity remain relevant to ECCC's mandate following the creation of the CWA.

While the CWA was established to strengthen coordination among jurisdictions, it does not have regulatory authority. In contrast, ECCC's freshwater science is embedded in its broader environment, nature, and climate change mandate, supporting not only freshwater quality monitoring but also pollution prevention, climate modeling, and ecosystem health assessments. These scientific functions are interconnected with policy development, regulatory development and enforcement, and emergency response, making them inseparable from ECCC's core responsibilities.

Furthermore, ECCC supports national standardization of monitoring protocols, maintains long-term trend data, and contributes to work towards fulfilling international commitments and commitments to Indigenous groups. These roles benefit both scientific expertise and regulatory authority.

Freshwater quality science activities within ECCC support an integrated, science-driven approach to freshwater management. This integration ensures that research informs policy, regulatory frameworks, and activity delivery across multiple domains.

The need for federal involvement is amplified by emerging pressures such as climate change, environmental security and sovereignty, population growth, and increasing industrial activity, which increases potential risks to freshwater quality and ecosystem health. Federal leadership

ensures that Canada can address these challenges through evidence-based decision-making and by fulfilling its commitments to Indigenous rights and international agreements.

2.2. Governance

Key findings: Roles and responsibilities are mostly clear, although coordination with the new CWA is still evolving. There is room for improvement in the identification and uptake of research priorities, especially as planning science against needs, risks, and priorities becomes increasingly important in the current fiscal context. Some aspects of the suite of activities incorporate equity, diversity, and inclusion (EDI), but there is still room to further contribute to environmental justice. Collaboration is efficient with some partners, but less consistent with academic and Indigenous groups.

2.2.1. Roles and responsibilities

Multiple governance structures are in place. They define and support implementation of roles, responsibilities, and accountabilities within ECCC and with partners and key stakeholders (including the CWA; other federal departments and agencies; and provinces and territories).

2.2.1.1. Within ECCC

The WSTD leads the implementation of ECCC's freshwater quality science activities and responds to the needs of other ECCC branches. Collaboration amongst branches is led by the Director General Science Table for Preventing and Managing Pollution, whose role is to provide other ECCC branches with access to STB experts and to increase responsiveness to emerging issues and priorities.

Additionally, individual initiatives and groups have their own governance structures and mechanisms, such as those shown below.

- **CABIN³ leadership:** Includes a National CABIN Team and a CABIN Science Team. The Science Team provides science advice to the National Team, which works towards achieving ECCC's CABIN objectives.

³ The Canadian Aquatic Biomonitoring Network (CABIN) is a collaborative network, managed by ECCC, for the biomonitoring of freshwater ecosystem health. Biomonitoring is conducted by collecting and assessing benthic macroinvertebrates (like worms, mites, mussels, crayfish, and early life stages of some insects that live in aquatic environments before they develop wings) from an aquatic

- **National Work Plans, led by Environmental Science and Technology Laboratories (ESTL):** They are equipped with clear processes for developing work plans within WSTD and with EB.

Many of these governance structures have roles and responsibilities that are clearly defined in terms of reference or other documentation. However, interviewees mentioned some exceptions:

- **Unofficial/unwritten responsibilities:** Some ECCC interviewees, especially from outside of the WSTD, noted cases where roles and responsibilities between groups were not formalized. This sometimes results in ECCC users of freshwater quality science experiencing challenges to have their needs met by WSTD, such as difficulties identifying who to ask questions or not getting questions answered. In cases where the WSTD does take on unofficial responsibilities (such as unpredictable, one-off requests to respond to incidents), this sometimes impacts its ability to action other requests due to finite resources.
- **Lack of clarity around research responsibilities:** Agreements for priority watersheds often define research priorities. However, outside those priority watersheds, research responsibilities are less clear. It is also unclear to what extent research questions must align with needs and fit neatly within the parameters of the agreements. Research planning against the baseline of priorities is discussed further in Section 2.2.2.

2.2.1.2. With the CWA

The CWA was created in June 2023 as a branch within ECCC, and then CWA became a standalone agency in October 2024.

The CWA and ECCC established a Memorandum of Understanding (MOU) that covers the relationship, collaboration, and governance mechanisms. As per the MOU, STB is responsible for delivering the freshwater quality science activities, while CWA is responsible for leading on policy; for developing and strengthening governance mechanisms and relationships; and for delivering components that support restoration and protection. CWA, STB, and other branches such as MSC work in partnership in coordinating and integrating freshwater science with freshwater policy.

The MOU outlines a collaborative governance structure. This includes meetings at multiple levels as shown below:

ecosystem. To facilitate this, CABIN provides training, tools, and standardized protocols to network participants. Participants include government, Indigenous groups, community-based monitoring groups, industry, and academia.

- Two yearly oversight meetings (ADM/DG level).
- Two yearly steering meetings (DG/director level); and
- Three yearly planning and implementation meetings (executive director, director, and manager level).

Additionally, a secretariat which is housed within the CWA provides support to the governance structure and facilitates information sharing.

Coordination between ECCC and CWA is still at an early stage but is evolving as expected, given the recent creation of the agency. Several WSTD interviewees noted that professional relationships were already established thanks to many current CWA employees being former ECCC colleagues.

Interviewees had mixed opinions regarding the clarity of the roles and responsibilities of the two organizations. Multiple ECCC interviewees raised concerns about potential complications of the CWA negotiating agreements with components that the implementation of which is under the purview of ECCC. Furthermore, interviewees noted a lack of clarity around whether ECCC or CWA employees should be part of International Joint Commission (IJC) boards, meaning there is a need to work with CWA to ensure that positions are filled based on the necessary expertise required for the board to fulfill its obligations.

2.2.1.3. With other partners

ECCC's freshwater quality science activities have formal governance structures with some external partners.

ECCC's partnerships with other federal departments and agencies are governed by mechanisms such as MOUs or interdepartmental letters of agreement. For example, ECCC and Parks Canada have multiple MOUs related to freshwater quality monitoring in national parks. AAFC and ECCC have developed and revised their MOU to strengthen collaboration. Interviewees from other federal departments and agencies highlighted that roles and responsibilities with ECCC were clear.

ECCC has freshwater quality monitoring agreements with six provinces and territories⁴. These agreements establish the federal and provincial or territorial roles and responsibilities related to freshwater quality monitoring, as well as governance structures such as a coordinating committee or management committee associated with the agreement. In addition, some basin-specific agreements with provinces and territories also cover freshwater quality monitoring

⁴ British Columbia, New Brunswick, Newfoundland and Labrador, Prince Edward Island, Quebec, and Yukon.

and/or research. Most provinces that provided feedback felt roles and responsibilities between their province and ECCC were clear.

2.2.2. Decision-making and science planning

This evaluation examined the extent to which governance bodies made transparent decisions, including science planning, in support of effective delivery and in achieving results.

Half of interviewees from ECCC agreed that most decisions were made in a timely manner to support water quality science activities and operations. Concerns about timely decision-making included slow and last-minute decisions related to:

- **Funding:** Last-minute funding decisions made planning more challenging, especially for seasonally dependent activities.
- **Human Resources/staffing:** Slow Human Resources/staffing decisions were noted, also making planning and decision-making more complex.
- **Analytic method development by labs:** Timely decisions around what methods are needed to support regulatory clients are important to efficiently allocate the limited capacity for method development.

Some interviewees pointed to the impacts of departmental decisions related to imposing travel reductions that have come into effect in recent years as part of refocusing government spending decisions. The interviewees noted that limited travel budgets impacted freshwater quality science activities and operations. They were of the belief that undertaking travel was essential in gathering samples and equally important in fostering and maintaining relationships with partners. It was also reported that travel reductions also limited conference attendances, which might limit opportunities for scientists to expand professional networks, and exchange best practices and innovative approaches with external and international scientists and experts.

In addition, the evaluation assessed the effectiveness of the governance structures established in support of science planning and in managing the resources allocated to identified needs, risks, and priorities in the context of freshwater quality monitoring, laboratory work, and research.

ECCC's scientists work aims to uphold the [ECCC Policy on Scientific Integrity](#) in delivering high-quality science. The policy guarantees that research and science contribute to science advice, government policy, and evidence-informed decision-making.

For purpose of monitoring, annual workplans are developed with provinces and territories that have monitoring agreements with ECCC. Other science priorities, including monitoring, are also defined through agreement or basin-related planning.

The WQMSD develops internal workplans based on priorities stemming from partnerships and formal agreements with OGDs, provincial and territorial governments, and binational and international organizations; from the WQMSD's RBAMF; and from other federal government programs – for example, CMP and Canadian Environmental Sustainability Indicators (CESI) – whose needs are identified via annual planning exercises.

For laboratory work and research field support, there is an annual exercise via a call-out letter from ESTL to WSTD and EB clients to guide planning. Service requests include routine analytical needs, small boat and larger science vessel time management, calibration, engineering and other field support services. However, interviewees raised concerns over the fact that the prioritization of regulatory needs was making it difficult to fulfill the needs of other programs and that better science planning tools would be useful.

A decision-making tool aimed at prioritizing method development initiatives has been developed but has not yet been implemented.

As far as freshwater quality research is concerned, priorities are currently taken from agreements for major basins⁵ and from needs tied to ECCC's legislative and regulatory mandate. Meetings between researchers and CWA staff contribute to research planning. The Preventing and Managing Pollution DG Science Table also contributes to research planning. In the Fall of 2025, there was a research prioritization exercise that aimed to address urgent and pollution-related high-risk science questions. Table 1 summarizes the planning processes.

Table 1: Summary of science planning process

Directorate	Science planning process
Monitoring: Water Quality Monitoring and Surveillance Division (WQMSD)	Monitoring priorities are identified via: • Annual workplans with provinces and territories, associated with their monitoring agreements with ECCC • Other agreement- or basin-related planning (for example, the Great Lakes Water Quality Agreement) • The WQMSD's risk-based approach (RBAMF) • Annual exercises with other federal programs (like the Freshwater Action Plan, CMP, CESI, Oil Sands Monitoring, Whales, Plastics)

⁵ Like the [Canada-Ontario Great Lakes Agreement](#) and [Canada-US Great Lakes Water Quality Agreement \(2023-2025 priorities\)](#).

	These priorities inform the WQMSD's internal annual workplans.
Labs: Environmental Science and Technology Laboratory Division	Analytical lab and research field support priorities are identified via annual call-out letters sent to key partners, including WSTD and EB.
Research: Aquatic Contaminants Research Division and Watershed Hydrology and Ecology Research Division	Research priorities are identified via: • Agreement or basin-related planning • Needs tied to ECCC's legislative and regulatory mandate • Working-level and high-level meetings with research users These priorities inform research planning. However, the project assignment process is unclear.

In the future, the [National Freshwater Science Agenda](#), which is still in development, will identify national freshwater science priorities and needs. The agenda will be informed by the [Synthesis of Freshwater Science in Canada](#) (SFSC), which summarizes the state of freshwater knowledge and key needs, gaps, and opportunities over 25 freshwater issues.

All activities mentioned above enable STB to define what general subjects should be matters for research. However, it was not possible to obtain any evidence demonstrating that there are formal, centralized prioritization and decision-making processes on freshwater quality research as an activity. In other words, how ECCC organizes its freshwater research activities to meet the needs identified through agreements and the upcoming National Freshwater Science Agenda remains to be clarified.

Research funding allocation decisions are decentralized and proposal-based, according to a series of programs, and the evaluation found that the process of prioritizing and choosing research subjects is unclear. While attempts to ensure responsiveness and alignment with needs were noted, some research decision-making may not be based on end user needs. ECCC users of water quality science research confirmed that it is sometimes challenging for them to get research work done on the questions they need answered. Timely access to clear scientific data and advice enables decision-makers (mostly ECCC) and eventually the public to respond and adapt to current and emerging issues.

In alignment with the Comprehensive expenditure review announced in Budget 2025, ECCC has committed to prioritizing activities within its core mandate as it works to implement a 15% budget reduction over three years. Therefore, it will be important for ECCC's freshwater quality science activities to be prioritized based on priority information needs in support of decision-making. In all areas, the current fiscal context will impact science activity planning. Multiple

interviewees mentioned the impacts of the fiscal context in science planning and the need to prioritize core activities. Similarly, there may be a need to carefully prioritize work in labs and on vessels.

Recommendation 1: The Assistant Deputy Minister of Science and Technology Branch should work at developing an integrated and centralized research tracking, resource allocation prioritization and decision-making framework that integrates water research. The framework should consider interdisciplinary requirements and stakeholder expectations to ensure that resources are directed towards key activities in line with overall departmental priorities. The framework should also be presented at the Executive Management Committee for approval.

2.2.3. Equity, Diversity, and Inclusion

Consideration of EDI is important in the governance structures and in the planning, delivery, and reporting of science related to freshwater activities.

2.2.3.1. Inclusive Governance

Various guidelines on science and science governance include advice related to inclusiveness. These can be found in documents such as the Government of Canada's [Principles and Guidelines for the Effective Use of Science and Technology Advice in Government Decision Making](#) and ECCC's [Science Strategy 2024 to 2029](#). Inclusive governance means integrating a variety of actors (including Indigenous governments and rights holders, provincial and territorial governments, academia, and other partners) and various types and sources of knowledge (including Indigenous knowledge, multiple disciplines of science, community-based monitoring, external and international sources, and solicited and unsolicited advice).

There are some good examples of inclusiveness within ECCC's freshwater quality science activities, including the following:

- A variety of groups, including Indigenous governments and organizations, were engaged in the development of the National Freshwater Science Agenda aimed at weaving western and Indigenous science towards an integrated approach.
- Indigenous representatives are included on some water boards/committees, such as the Canada-United States Great Lakes Water Quality Agreement governance mechanisms and the Mackenzie River Basin Board. CWA now has leadership in freshwater governance and programming and is dedicating ongoing efforts to enhance representation and collaboration.

There are also examples of areas that could be improved, including the incorporation of EDI in hiring with some success (i.e. women in science) with a need for improvement in areas such as Indigenous representation.

- The inclusion of Indigenous science is viewed as inconsistent and often informal across activities. Indigenous engagement and representation can be improved in formal frameworks, as past evaluations have noted. For example, there are opportunities for ECCC to improve communication (notice and feedback) with Indigenous communities on freshwater quality monitoring in or near their lands. Regarding research, it was mentioned that the approach to engagement with Indigenous organizations or communities on place-based research was “ad hoc” and could be improved further by being based on a formal but adaptable framework. In some instances, engagement works well, especially if there are existing relationships in the research location, however this is not consistent in all locations.

2.2.3.2. Gender-based Analysis Plus in Science

Consideration of Gender-based Analysis Plus (GBA Plus) factors, in research and monitoring, helps science contribute to improving environmental justice. Environmental justice seeks to mitigate or eliminate disproportionate health, environmental, economic, and climate impacts on marginalized communities.

In general, based on key documents, interviews, and past evaluations⁶, GBA Plus factors may not always consistently be considered by ECCC in planning, delivering, and reporting on freshwater quality science.

Within ECCC's freshwater quality science activities, GBA Plus factors are considered in research and monitoring in the following ways:

- **Targeted activities:** Some activities target specific groups, especially Indigenous groups, which are good examples of considering GBA Plus. For example, the CIRNAC-led [Northern Contaminants Program](#) involves and responds to concerns relevant to northern Indigenous peoples.
- **Indirect inclusion:** The [National Strategy Respecting Environmental Racism and Environmental Justice Act](#) acknowledges that “a disproportionate number of people who live in environmentally hazardous areas are members of an Indigenous, racialized or other marginalized community”. Since RBAMF risk-based site analysis considers upstream threats to the environment, it may indirectly consider GBA Plus factors due to the link between these threats and marginalized communities.

⁶ 2024 Federal Evaluation of the St-Lawrence Action Plan.

- **Future work:** Among other examples, there was evidence of ongoing efforts to further incorporate Indigenous science into the RBAMF.
- **Partners:** GBA Plus factors may be considered by partner organizations. For example, Health Canada collects data on the impacts posed to humans by chemicals and other substances in the environment.

2.2.4. Collaboration

ECCC's 2024 [SFSC](#) noted a crucial need for better collaboration and communication in freshwater science. ECCC's freshwater quality science activities feature collaboration with partners within the federal, provincial, and territorial governments; academia; Indigenous organizations and communities as discussed in Section 2.2.3; and others.

Within ECCC, the WSTD collaborates with groups in other branches, including MSC, EPB, EB, and SPIAB. Most interviewees from ECCC branches felt their group's collaboration with STB was efficient, although most of them also mentioned that capacity issues (for both STB and partners) have impacted collaboration.

Within the federal government more broadly, there are examples of strong collaboration. Key outputs such as the [SFSC](#) are evidence of this. This report involved over 100 experts from ECCC, AAFC, Natural Resources Canada, and DFO. ECCC and DFO also collaborated on the Canadian Great Lakes Baseline Coastal Habitat Survey and Lake Winnipeg Habitat and Bathymetry Study and have effective coordination through the Cooperative Science and Monitoring Initiative in the Great Lakes.

There is also some room for improvement in collaboration within the federal government. Previous studies noted that mandates and silos can impact federal departmental collaboration in Lake Winnipeg and the Great Lakes. Additionally, ECCC partners noted inconsistent uptake of other programs' research priorities by the WSTD researchers (see Section 2.2.2). While CWA has a leadership role in engaging with OGDs, such as with the Federal Freshwater Committee, ECCC has leadership in some areas, such as the development of the science agenda. Based on departmental feedback on the process to develop the [SFSC](#), ECCC has an opportunity to provide enhanced leadership and engagement with freshwater science departments.

Provincial and territorial monitoring agreements support efficiency by sharing work and costs between the federal and provincial/territorial governments. All three provinces that provided input agreed on the fact that their province's collaboration with ECCC was efficient.

The document review highlighted a need for STB to improve collaboration with academia and grant and contribution recipients to generate scientific knowledge. In 2023-2024, STB

developed an academic agreement plan to provide a structured, strategic approach to its partnerships with academia in addressing needs, priority setting, and communication. This plan is expected to enhance collaboration with academia and address issues such as the lack of flexible funding mechanisms to facilitate collaboration, and communication gaps with federal granting departments and agencies regarding the selection of priorities related to freshwater science.

2.3. Efficiency

Key findings: Partnerships are employed in a cost-effective and efficient delivery model. It has improved over time through the application of different initiatives such as the risk-based adaptive management framework. There is also a focus on implementing modern approaches such as better collection, analysis, and use of information and data to support informed decision-making. Access to vessels in the Great Lakes is an important opportunity that requires timely resolution to support the achievement of results.

2.3.1. Efficient and cost-effective delivery

For the purpose of this evaluation, the financial information corresponds to the expenses of the WSTD⁷, within STB, which is the identified provider of ECCC's freshwater quality science activities.

Overall, there has been an increase in budget and expenses over the evaluation period, as Table 2 shows. Budgets have steadily increased, from \$70.90M in 2020-2021 to \$98.68M in 2024-2025. Expenses followed a similar trend, from \$66.05M in 2020-2021 to \$97.95M in 2024-2025. Over the period, the variance between the budget and expenses has been of an average of \$3.10M, or 3.9%.

⁷ The expenditures of WSTD in this evaluation captured all programs but their scientific activities were not evaluated.

Table 2: WSTD Financial Information

In \$M	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025
Budget	70.90	72.41	81.34	96.45	98.68
Expenses	66.05	67.96	80.40	91.91	97.95
Balance	4.85	4.45	0.95	4.54	0.73

Source: Financial information provided by the WTSD.

With regards to the types of expenses over the evaluation period, the majority covered salaries (60.4%), followed by operations and maintenance (19.5%), grants and contributions (5.0%) and capital (4.3%). The balance is for voted net revenue (VNR) (10.7%), where other organizations fund ECCC to conduct freshwater quality science activities (for example, activities related to oil sands monitoring). Over the evaluation period, no notable shifts were observed in the types of expenses, as they have followed the overall spending trend (i.e., proportional increase to budget), with the exception of capital (from \$1.9M to \$9.7M) and grants and contributions (from \$3.9M to \$8.4M) that have seen important increases for 2024-2025 from the previous year.

When analyzing the expenses against the Program Activity (PA) Architecture, the evaluation noted results in line with overall interview discussions, in that 82% of the work is under the Water Quality and Ecosystems Partnerships PA, 8% under Compliance Promotion and Enforcement, and 7% for Substances and Waste Management.

Internally, within the WSTD, expenses have been attributed to the following divisions:

- Environmental Science and Technology Laboratories (32.8%)
- Water Quality Monitoring and Surveillance (28.2%)
- Watershed Hydrology and Ecology Research (16.6%)
- Aquatic Contaminants Research (13.3%)
- Water Science and Technology Directorate (9.1%)

With regards to the sources of funding for 2024-2025, approximately 78% comes from ongoing, permanent funding (representing \$77.8M), while 16% comes from temporary funding (\$15.4M), with the remaining balance coming from VNR (\$6.5M). Similar proportions were noted in earlier years, albeit with lower funding. For 2024-2025, when looking specifically at funding sources for the ongoing, permanent funding, there are 26 different sources, with the larger amounts being General Account (respectively \$42M for salary, \$6M for O&M and \$6M for G&C), followed by smaller items such as funding associated with the Freshwater Action Plan (\$10M), Oceans Protection Plans (\$6.6M) and other smaller funding sources.

With regards to the temporary funding, there are 36 different sources, including Experimental Lakes Area (\$5M); CMP (\$2M); Whales Initiative (\$1M); CSSP – Strengthen Food Policy (\$2.9M), and several more. Finally, the VNR only has 2 sources of funding: General Account (\$1.7M) and Oilsands (\$4.7M).

2.3.1.1. Observations on efficient and economical delivery

The evaluation noted different approaches that support an efficient and cost-effective delivery of freshwater quality science activities. In the case of the Water Quality Monitoring Network, work is organized around stations (approximately 100) that fall within the federal responsibilities for freshwater, which are transboundary areas, whether provincial, territorial, or international. Furthermore, there are an additional 480 stations that inform other federal priorities, such Canadian Environmental Sustainability Indicators, Saint Lawrence Action Plan, CMP, Oil Sands Monitoring, Freshwater Action Plan, to name a few. Most monitoring stations are strategically selected to serve multiple programs and objectives simultaneously towards effective use of funding, expertise, and infrastructure. ECCC also supports Parks Canada with its expertise, frequently using these data as reference points.

Through agreements with provinces and territories, there are arrangements in place to optimize and enhance the network, with over 300 stations monitored across the country that support all of the above governmental priorities, providing a more fulsome appreciation of aquatic ecosystem health, better access to freshwater quality status under CESI, and improving coordination with partners on regional issues of national significance. ECCC estimates that these agreements provide savings of \$6.1M, while the cost of operating its network noted in the paragraph above costs \$11.3M. In discussing the network with partners, it was viewed as a positive and great way of leveraging expertise and of maximizing efficiencies where possible.

However, the design of the monitoring network comes with associated risks. First, there are dependencies inherent in having several stations being dependent on funding that are initiative-based, which are inherently time-bound (can vary from 3 to 5 years). Secondly, jurisdictional partners can also face financial constraints, leading to less funding available to monitor stations. Interviewees (both internal and external) noted that the key is continuous, long-term data to support proper analysis of trends and impacts. At the time of this evaluation (November 2025) an analysis was being conducted, leveraging information from the RBAMF to identify further efficiencies and/or gaps.

The RBAMF was established in response to two audits of the Commissioner of Environment and Sustainable Development (CESD). Both the [2010 Audit](#) (Monitoring Water Resources) and

the [2021 Audit](#) (Scientific Activities in Selected Water Basins) noted challenges in its monitoring approaches and practices.

The RBAMF is a set of tools and procedures intended to guide ECCC's network management and decision-making and to provide a national framework for the freshwater quality monitoring activities across 5 key pillars: 1) roles and responsibilities, 2) semi-quantitative analysis of risks, 3) optimizing monitoring operations, 4) data quality assurance and control and 5) reporting outcomes. It is applied to its long-term freshwater monitoring activities across Canada, including those under Federal-Provincial-Territorial agreements.

It draws from analytical tools like the Risk-based Basin Analysis (RBBA), which uses geospatial mapping to produce a map of aggregated risk scores across all watershed in the country using 15 different water quality stressor layers, and the Risk-based Site Analysis (RBSA) to derive a risk ranking for each of ECCC's monitoring stations by assessing and ranking: a) upstream threats (b) observed impacts, and c) aquatic ecosystem vulnerability factors.

Since 2021, five-year cycles were instituted for implementing the RBAMF in each of the three main ocean drainage areas of Canada (i.e., Atlantic, Pacific, and Arctic). Work plans are established annually under a National Advisory Committee. Then, it is implemented at the national-level and the RBAMF tools are refined. The first five-year cycle was completed in 2025-2026.

RBAMF has supported results in the following important ways:

- Improved risk management and decision support tools.
- Improved quality assurance and control with the development of SOPs to ensure harmonization and consistency at the national scale.
- Contributed to the development of a Power BI visualization tool for all stations across the country; and
- Provided a solid foundation to support the transition to the new national water quality data management solution.

Following two RBAMF full cycles (2010-2021 and 2021-2026), which resulted in both the development of well-established processes and the completion of action items under the CESD audits, there is now an opportunity to define priorities for RBAMF improvements in the future, drawing from past exercises and determining its course considering the current and future fiscal reality.

The evaluation found that steps were taken towards modernizing its approaches towards freshwater quality science, which could be observed in several different aspects:

- At ECCC, the new National Water Quality-Data Management Solution (NWQ-DMS) is expected to result in improved efficiency through the replacement of multiple data storage systems to a single platform and facilitate the integration of business workflows into a single software solution.
- Satellite-based remote-sensing monitoring is being experimented, for example in detecting algal blooms from space in Canada's inland waters, using technology to do the analysis. It is expected to be cost-effective in covering large geographic areas and remote areas that would be costly to access or may not be accessible by ground observations.
- Likewise, the use of technology, such as ECCC's supercomputer, enables freshwater quality modelling to support predictions of changes to freshwater quality and to understand the relationship between hydrological, biogeochemical, ecological and other factors that would otherwise not be possible.
- With six laboratories across the territory, from east to west, efforts are taking place to ensure they are efficient and can serve numerous purposes, with a current stated goal of making them multipurpose as much as possible. For example, two laboratories (water and wildlife) were consolidated in one location recently in Saskatchewan, and building a modern facility in the Atlantic is currently being undertaken, regrouping numerous research fields.
- In collaboration with the CWA, efforts have taken place to advance a CWA-led National Freshwater Data Strategy, with a vision towards establishing guidelines and principles for how freshwater information should be organized, connected, and shared in Canada.

The AI Strategy for the Federal Public Service 2025 to 2027 was published in March 2025 with the expectation that *the Government of Canada can deliver world-class services to its clients, protect our people and interests, achieve a more innovative and efficient workplace, and accelerate scientific discovery for the benefit of all*. When asked, interviewees recognized the potential of AI, but current implementation is limited. As noted earlier, some powerful computing and analytical tools have been used for research projects and in the prediction sphere. Some staff further emphasized that it could prove useful for administrative tasks (Access to Information and Privacy requests, human resources processes, and e-mail) as well various disciplines in biology and high-resolution technology.

Finally, some interviewees noted that improvements to data management systems are required to fully leverage AI. This is an objective that the transition to the new NWQ-DMS centralized system is expected to help achieve.

One important challenge highlighted was access to, and funding for, vessels to conduct science and research work in the offshore waters of the Great Lakes. Large research vessels are critical platforms for observing and understanding marine ecosystems, as they support advanced instruments and multidisciplinary teams to collect data from remote and deep-water

environments. It was noted that numerous factors are hindering vessel access and deployment, which include increasing costs and decreasing availability⁸ of aging CCG vessels, increased costs of vessels that would impact scientific capabilities similarly, uncertainty with sharing vessel infrastructure with partners given the current geo-political context. As there is variability in individual service agreements with CCG for vessel access, the program highlighted that moving to one corporate agreement could give better leverage and stronger partnerships.

Government-wide fiscal priorities are also a factor. To address the issue, a working group has been formed to search for viable solutions for optimizing Great Lakes monitoring networks and research stations, including identifying and adopting technical solutions to complement, supplement or replace original methods, identify partners, and secure research vessels within current limitations and adaptations. Timeliness of resolution is essential to ensure freshwater quality monitoring and research takes place to inform various programs, policies and commitments.

2.4. Effectiveness

Key findings: The evaluation has identified an opportunity to improve the freshwater quality science activities' performance measurement framework by establishing better measures and indicators to track progress against expected results. Progress was observed towards achieving the result of developing science and objectives by priority ecosystem and informing freshwater decision-making. These activities support the long-term goal of clean water provision to Canadians by enabling programs, regulation administration, enforcement, and by supporting protection and restoration actions. Opportunities for advancement include addressing gaps in knowledge and ecosystem assessment and enhancing the application of Indigenous Science.

2.4.1. Performance Information

The evaluation noted the occurrence of reporting on annual outputs such as monitoring and research. There was also evidence of the generation of important performance information through assessments and other mechanisms. These may be found in various documents such

⁸ While the research vessel Limnos was requested for 131 days in 2022, only 107 (82%) were delivered. For 2023, it was 34 of 130 (26%), and for 2024, 103 of 164 day (63%). For the smaller Kelso, delivered days were higher for the period (93%; 80%; 76%).

as the Canada Water Act Annual Report and the CESI website. ECCC's freshwater quality science activities also contribute to generating valuable status and trends on aquatic ecosystem health through State of the Lake/Basin ecosystem health assessments.

Most interviewees noted the availability of some performance information that supports decision-making, though many indicated that performance information could be improved. It was mentioned that the current performance information may not be available and that any performance information that is available may be too high level, unrepresentative/irrelevant, or not supportive of decision-making.

As already noted, the WQEPP was withdrawn from the department's performance framework, and most of the indicators were transferred to the CWA. This resulted in an adjusted Aquatic Ecosystems Health, Substances and Waste Management Program for ECCC.

While freshwater quality science activities continue within ECCC, it was observed that an integrated framework to measure and track freshwater quality science activity performance was not put in place after the creation of the CWA. Only initiative-specific indicators remain while performance measures for core program activities and outputs are not developed (freshwater quality monitoring and surveillance, research publications, ecosystem health assessment, science advice, knowledge, data and information sharing) including linkages to CWA results. There is a need to enhance the performance measurement framework to obtain robust information and data that supports a better understanding of the effectiveness of science activities such as timeliness, quality, and responsiveness to user-needs. There is an opportunity to update this given that the Department Results Framework and Program Inventory is currently being reviewed and updated. It is noted that a Water Pollution Science sub-program has been defined, which aligns with the new Environmental Pollution Management Program.

Recommendation 2: The Assistant Deputy Minister of the Science and Technology Branch should work at developing a performance measurement framework that may be used to improve measuring and reporting on progress, contributions, and results achieved including for ECCC's freshwater quality science activities.

2.4.2. Progress in Results

The following section provides details of results associated with freshwater quality science activities, namely: Canadians have clean water; the development of science and objectives by priority ecosystem; and information availability in support of decision-making on freshwater.

2.4.2.1. Canadians have Clean Water

The long-term result, ensuring Canadians have clean water relies on collaboration with other levels of government, various external partners, and engagement with Indigenous governments and peoples. Collaboration and engagement in this context are undertaken in support of monitoring and understanding building on freshwater issues and threats. They also aim at implementing actions, regulating pollution, enforcing laws and regulations related to clean water.

ECCC's freshwater quality science activities have advanced the knowledge and understanding of freshwater quality issues and threats. They have also generated critical data, information and reporting on the freshwater quality status and trends of ecosystem health, though data gaps and limitations remain in certain areas. Science supports programs, commitments and the regulatory cycle that contributes to clean water through regulation and enforcement and actions to restore, protect priority freshwater ecosystems, the latter (actions) now led federally by the CWA.

Long-term outcomes often take years to achieve results, and ecosystem health assessments and trends in freshwater quality indicators show that important work remains for clean water.

While there was evidence of progress against performance indicators for some specific initiatives for this result, there is currently no integrated framework to measure the performance of all ECCC's freshwater quality science activities.

There was evidence of progress in the development of science and objectives by priority ecosystems. As there are minimal performance metrics for the program core science activities, the department reports on expected outputs of the science activities contributing to this result: freshwater quality monitoring and surveillance including CABIN biomonitoring, research and modelling, and Indigenous science.

2.4.2.2. Development of Science and objectives by priority ecosystems

Freshwater quality monitoring and surveillance

The Freshwater quality monitoring and surveillance activities deliver foundational data and information to programs, partners, and decision-makers. They used a collaborative, risk-based approach to collect data and report on the status and trends of aquatic ecosystem health to inform freshwater management. Through long-term, automated and activity-specific monitoring and surveillance, ECCC and its partners monitored freshwater quality at sites on federal lands, transboundary watershed, and inland waters for various physical and chemical water quality

parameters⁹. From 2020 to 2024, sites sampled ranged from 171 to 191 in 2020-2022 to 626 in 2022-2023 and 496 sites in 2023-2024¹⁰, as indicated in annual Canada Water Act reporting.

ECCC and CABIN partners developed and shared biomonitoring data and information to understand ecosystem health and inform freshwater decision-making. This evaluation found that the CABIN program generally met its objectives on training and certification, increasing biomonitoring capacity and enabling data sharing and analysis with CABIN's web database and tools.

It was also noted that ECCC monitored and reported on the status, trends, and drivers of algal blooms in Canada's inland waters using satellite based remote-sensing monitoring. This information is publicly reported through the ECCC's [EOLakeWatch](#) website for priority Canadian lakes (Lake Winnipeg, Lake Erie and Lake of the Woods) to inform science and integrated management of the inland waters.

As evidenced during the site visits, and shared by numerous partners, the laboratories supporting freshwater quality science are viewed very positively, providing expertise and robust processes, as demonstrated by its ISO/IEC 17025:2017 accreditation and its quality assurance and control activities. The work of the laboratories in producing quality validated results is a foundation for the work of numerous ECCC activities, including monitoring activities, which were supported by foundational laboratory analysis, research support and technical operations, method development, and expert advice. It is further relied upon in litigation or court cases. However, analysis represents a significant effort. In 2024-2025, the laboratories conducted a total of 130,880 analyses with a primary focus on freshwater samples¹¹, representing 97,118 analytical work hours. Documents reveal that the current demand for lab services is stronger than the actual capacity and that there are delays in the analysis of the freshwater quality science activities. This has resulted in some work being transferred over to private laboratories, with efforts being made to find a sustainable way to continue its work. In 2025-2026, staff will undertake 84 analytical method development and analytical procedure improvement projects to address emerging environmental contaminants and regulatory needs, with 26 at the request of clients like EB and EPB.

⁹ The parameters include temperature, pH, alkalinity, turbidity, major ions, nutrients, and metals and additional parameters like pesticides, bacteria and where sites-specific issues are a concern.

¹⁰ Note that sites sampled can vary due to rotational sampling in the Great Lakes for example. The large increase sites monitored in the following two years are because sites not previously included were added to provide a more complete picture of freshwater quality activities.

¹¹ Additional matrices included sediments, biota, and less common materials such as wood and shotgun pellets. For genomic analyses, the sample matrices varied significantly and often involved specimens from species at risk.

Research on Freshwater Issues

Research and modelling were conducted in priority ecosystems to meet client needs and commitments. Research advanced knowledge and understanding of freshwater quality and aquatic ecosystem issues and stressors like aquatic ecosystem contaminants, plastics, excess nutrients, multi-year studies on the impacts of hydrological regimes and aquatic ecosystems to climate change, cumulative effects, among others. For example, in British Columbia, research examined the potential impact of shale gas development in the Horn River Basin and participated in important collaborative research in genomics with CABIN and others.

Furthermore, the SFSC is a significant contribution in knowledge synthesis of research findings and gaps, which was completed in collaboration with many partners. This report outlines the state of knowledge across 25 areas to inform the 10-year priorities for freshwater science in the forthcoming National Freshwater Science Agenda.

Additionally, research on freshwater issues and threats was funded via grants and contributions to research entities. Funding of \$13.8M was allocated in research to universities (12), NGOs (3), and Indigenous organizations (3)¹².

Also, a recent research prioritization exercise completed by ECCC branches has some high-ranking pollution-related research topics to be addressed. While some urgent and high-risk research questions are being actioned, there are ongoing needs that will not be addressed at this time including research to determine which aspect of municipal wastewater should be regulated (stormwater or combined sewer overflows) or to better understand the environmental impact of changing/upgrading municipal wastewater treatment facilities.

In modelling, ECCC is demonstrating leadership to develop a National Freshwater Modelling Framework using internal and external expertise. This will provide predictive information and tools on freshwater quality in diverse water bodies to inform decision-making and water management. The model is proposed for testing on the Mackenzie River.

Indigenous science and collaboration

The process of incorporating Indigenous Science and Knowledge into ECCC's freshwater quality science activities is at an early stage, meaning commitments, project-specific efforts, but limited operational integration. Foundational steps have been taken, such as the establishment of the Indigenous Science Division (ISD) in 2022 and the creation of the CWA, both aligned with reconciliation priorities and the UNDRIP Action Plan. These initiatives signal

¹² Excluding oil sands area related funding discussed separately in Indigenous Science and Collaboration.

intent to bridge, braid, and weave Indigenous and Western knowledge systems into environmental science. The ISD sits outside the Water Science and Technology Directorate and serves the entirety of the Science and Technology Branch with a small team. WSTD contributed two FTE towards the new team's creation. At this juncture, no freshwater science projects reviewed under this evaluation have benefited from ISD's expertise, however it was noted that there is ongoing dialog between WSTD and ISD.

The largest efforts to include Indigenous Knowledge have been region or project-specific where structured integration and governance models that include Indigenous participation and data sovereignty protections were integrated. This has resulted in the co-development of knowledge with Indigenous communities by certain ECCC freshwater quality science activities, particularly in terrestrial biology and surface water.

There were a few examples of Indigenous leadership at select partner monitoring sites in British Columbia, but this was an exception rather than the norm. While Indigenous organizations make up about 13% of the CABIN network, participation metrics underscore the gap: Indigenous groups contribute only 2–5% of annual samples.

Indigenous knowledge in key science outputs reflects this inconsistency. Of the five major reports on aquatic ecosystem health produced during the evaluation period, two¹³ contained no evidence of braiding, bridging, or weaving Indigenous Knowledge, and one included only minimal considerations. The [SFSC](#) acknowledges the need for Indigenous Science including the co-development of research and community-led monitoring where there is interest. As relationships are built with Indigenous governments and communities, working with partners like provinces and territories, Public Affairs and Communication Branch and CWA to align and complement efforts will be important.

Operational challenges compound these gaps. Staff turnover and unclear governance have hindered progress, and while collaboration with Indigenous partners can improve efficiency, such as through better site selection and sampling in remote areas, the process of incorporating Indigenous Knowledge requires a culturally sensitive and adapted approach reflecting the complexity of reconciliation. Technical measures to protect Indigenous data sovereignty, such as OCAP exemptions under CABIN and Oil Sands Monitoring, demonstrate awareness of ethical practices, but formal data-sharing agreements are largely inexistent.

¹³ The Mackenzie River Basin Board assessment and the Lake Winnipeg MOU Steering Committee.

2.4.2.3. Informing decision-making by reporting on and sharing science, knowledge transfer through science advice

There was evidence that ECCC freshwater quality science activities contributed to decision-making by developing, reporting on and sharing science, data and information through key assessments, publications, sharing data and science advice. These activities inform national priorities, resource management at transboundary, federal and provincial levels, and other commitments for freshwater quality monitoring, pollution research and trend analysis. Freshwater quality monitoring data and information supports a vast array of internal ECCC programs and priorities, enables many ECCC branches and external parties. Workplans indicate that CABIN data is used extensively by federal, provincial, and territorial governments as part of their freshwater quality monitoring programs. The CWA is also enabled by ECCC's science as the lead on Freshwater Action Plan programming, with ECCC science contributions to their results, discussed below.

Reporting on Freshwater Issues, Status and Trends, Needs and Gaps

There was evidence that ECCC freshwater quality science activities contributed to decision-making by developing knowledge, understanding, and reporting on freshwater issues, and the status and trends of aquatic ecosystems in collaboration with regional, national, and international partners. There have been numerous reports, studies, publications and conference presentations and other media to share findings publicly, though information on their use is limited. Partners recognized the valuable contribution and the critical role that the activities played in collecting standardized, long-term monitoring data and trends analysis as a valuable contribution through ecosystem health assessments for some priority ecosystems¹⁴, algal blooms data and information reporting other publications and reports on priority ecosystems. The activities also contributed to multiple other scientific initiatives¹⁵.

It was also noted that the ecosystem health assessments have varied evidence on their support to decision-making. In the Great Lakes, they are informing or refining science and management priorities and helping evaluate progress against objectives, with the Nearshore

¹⁴ [Great Lakes](#) (2022), [Lake Winnipeg](#) (2020), [Rainy River-Lake of the Woods](#) (2022), [St. Lawrence](#) (2024), and [Mackenzie River basin](#) (2021). These assessments have not been completed for all priority ecosystems in the Freshwater Action Plan (Fraser River, Wolastoq/Saint John River, Lake Simcoe).

¹⁵ Canadian Environmental Sustainability Indicators Program, Canada-U.S. first Great Lakes Nearshore Waters Assessment in 2022, the circumpolar State of the Arctic Freshwater Biodiversity, AMAP Climate Issues of Concern 2022, [Canada's Changing Climate Report \(2019\)](#), state of Aquatic ecosystems of Newfoundland, co-published with Newfoundland and Labrador, and the Synthesis of Freshwater Science (2024).

assessment also identifying navigation routes and inform actions on habitat protection/restoration at DFO. In the Mackenzie River Basin and St. Lawrence, sources indicate lack of evidence of impact or use of the reports in decision-making. Clarifying the audience, preparing outreach strategies, and documenting the use or impact of these assessments would be useful going forward.

ECCC's freshwater quality science activities provide foundational data, information, and reporting that builds knowledge and understanding of freshwater issues to support the Canada Water Agency's results. The CWA has an objective to improve water quality in priority water bodies through, amongst other things, the Freshwater Action Plan. Evidence suggests ECCC science has informed science-based decision-making on nutrient loading, algal blooms, restoration of priority ecosystems, and reduction of the release of harmful chemicals in multiple priority ecosystems of the Freshwater Action Plan through generating knowledge data and information through research, modelling and freshwater quality monitoring.

Opportunities exist to improve information generated by ECCC's freshwater quality science activities. Various sources point to data deficiencies to assess ecosystem health and the fragmented or limited nature of freshwater quality monitoring research and modelling. A few interviewees raised a need for greater data analysis overall. The ECCC-led National Freshwater Science Agenda was expected in Spring 2025 but is not yet available. The [SFSC](#), which supports the Agenda's development, also identified a host of gaps to fill going forward as well as five overarching needs for better national science coordination, user-driven freshwater science, user-centric knowledge mobilization, digital tools, critical and innovative infrastructure and standards, and Bridging, braiding, and weaving of Indigenous science and knowledge.

Sharing science - federal freshwater quality data

Sharing science is an expected output. It aligns with the department's data, AI, and analytics strategy and Government of Canada commitment to open science. Federal freshwater quality monitoring and surveillance data, satellite-based monitoring data and information are shared publicly online in various formats. The Government of Canada Open Data portal has 100 freshwater quality data collections that are national and regional in scope and updated monthly (see collections listed below). CABIN data became 'open by default' in 2020 in an effort to improve CABIN partner data sharing, and to facilitate accessibility to the public after training.

Various other websites, tools and portals host data and information from freshwater quality science activities. Still, analysis is limited with no measures to define success or achievement of commitments to open science. Interviewees indicated that data sharing could be improved by making the data available to provinces early in the process (before full quality assurance /

control), more user-friendly website and storytelling, and interoperability of data. It is expected that the modernized systems discussed in delivery will make advancements for interoperability.

Table 3: Freshwater quality data collections on the Open Data Portal

National	Regional
• National Long-term Water Quality Monitoring Data • Automated Fresh Water Quality Monitoring and Surveillance Data • CABIN Canadian Aquatic Biomonitoring Network • CMP: ◦ CMP Monitoring Program – Surface Water - Open Government Portal ◦ CMP - Sediment Monitoring Program - Open Government Portal ◦ Fish Contaminants Monitoring and Surveillance Data - Open Government Portal	• Great Lakes Water Quality Monitoring and Aquatic Ecosystem Health Data • Surface Water Quality and Benthic Invertebrates, Oil Sands Region • Freshwater Quality Surveillance Data – Pacific Basin • Field data for the mapping of wetlands of the St. Lawrence River between Cornwall and Trois-Pistoles, Lake St. Pierre wetlands and Boucherville Islands area • Clean Air Regulatory Agenda Freshwater Inventory and Surveillance of Mercury (CARA FISHg) https://open.canada.ca/data/en/dataset/e4fdb62d-1477-4596-a863-1e405ad025c8

Sharing science: Knowledge transfer through expert and science advice

A key objective of freshwater quality science is to inform freshwater management and decision-making through knowledge transfer through evidence-based expert advice. The availability, timeliness, or responsiveness of advice or expertise provided is not measured. However, there is evidence it is occurring.

The Director General Science Table for Preventing and Managing Pollution has been meeting for over a year. Discussion points have included the findings from a pollution research prioritization exercise. An example of a good practice is the Canadian Science Advisory Secretariat ([CSAS](#)) exercise at DFO, which uses a peer-review process designed to increase the transparency and consistency by publishing its advice publicly. There is evidence that open publication of the advice could be incorporated into the process design at ECCC.

ECCC also provided essential freshwater science advice for transboundary, binational, and international freshwater related initiatives over the evaluation timeframe. The MSC's survey

data¹⁶ from 2021 to 2023 suggests high satisfaction with ECCC's participation in the IJC boards and committees¹⁷, and agreement that ECCC provides quality information and advice to support the board's decision-making, quality technical advice, products and support and in a timely manner and overall has met its transboundary commitments. ECCC's freshwater quality science activities also provided subject matter expert reviews on science-based grants and contributions offered by the CWA.

Scientists also provide expert advice, scientific support and court testimony¹⁸ to inform decisions. About 20 expert opinions per year are provided in the review of third-party data, and the likely environmental effects of a release or pollution or other advice in support of potential prosecutions. Scientific activities in the oil sands region have been shared for decision-making at local, federal and provincial levels, as well as with Crown-provincial and territorial indigenous entities and regulation working groups.

¹⁶ While the data is summarized in reporting, the generic nature of the questions suggest these findings can be applied to ECCC contributions at the IJC including MSC and the program's efforts.

¹⁷ 90% of respondents rated their satisfaction as high or very high in 2021-2022 and 75% were quite satisfied with ECCC's participation in 2022-2023.

¹⁸ to fulfill agreement of the [Fisheries Act](#) related to pollution prevention, a HC, ECCC, DFO collaboration.

3. Recommendations, Management Responses and Action Plan

Recommendation 1: The Assistant Deputy Minister of Science and Technology Branch should develop an integrated and centralized research tracking, resource allocation prioritization and decision-making framework that integrates water research. The framework should consider interdisciplinary requirements and stakeholder expectations to ensure that resources are directed towards key activities in line with overall departmental priorities. The framework should also be presented at the Executive Management Committee for approval.

Management Response:

The Assistant Deputy Minister of the Science and Technology Branch agrees with the recommendation.

The STB is undergoing a period of restructuring, with a transition towards functional lines, which is expected to include creation of the new Applied Environmental Research and Modelling Directorate that will encompass water-related scientific activities. As this transition is underway, the Branch is committed to developing an integrated research tracking, prioritization, and decision-making framework that is responsive to stakeholder needs and departmental priorities. The Action Plan timelines reflect the timelines of the Branch restructuring, to ensure the framework is robust, coherent, and positioned for effective and meaningful implementation.

Action 1: Develop the research framework

Deliverables	Timeline	Responsible
Environmental scan of high-level priorities, including for water research across STB	October 5, 2026	DG [Applied Environmental Research and Modelling Directorate], STB

Draft framework outlining key elements such as tracking approach, prioritization criteria, resource allocation, decision points, and alignment with departmental priorities for consultation	March 31, 2027	DG [Applied Environmental Research and Modelling Directorate], STB
Consultation results with consideration of interdisciplinary requirements and stakeholder expectations	October 5, 2027	DG [Applied Environmental Research and Modelling Directorate], STB
Final research framework	March 31, 2028	DG [Applied Environmental Research and Modelling Directorate], STB
Briefing material for EMC to secure approval	March 31, 2028	DG [Applied Environmental Research and Modelling Directorate], STB

Action 2: Develop the resource allocation process under the framework

Deliverables	Timeline	Responsible
Draft resource allocation decision framework	January 29, 2027	DG [Science Policy, Planning, and Assessment Directorate], STB
Stakeholder-informed resource allocation summary	February 26, 2027	DG [Science Policy, Planning, and Assessment Directorate], STB
Final resource allocation decision framework	February 28, 2028	DG [Science Policy, Planning, and Assessment Directorate], STB

Recommendation 2: The Assistant Deputy Minister of the Science and Technology Branch should develop a performance measurement framework that may be used to improve measuring and reporting on progress, contributions, and results achieved including for ECCC's freshwater quality science activities.

Management Response:

The Assistant Deputy Minister of the Science and Technology Branch agrees with the recommendation.

The creation of the CWA has led to changes in roles and responsibilities within ECCC, mainly affecting regional and policy capacities that are typically informed by ECCC's water quality science. There has also been a revised ECCC Departmental Results Framework (DRF) and Program Inventory for ECCC. With these changes, there is an opportunity to work with Corporate Management to update the performance measurement approach to ensure it captures results achieved through the ongoing delivery of ECCC's water quality science activities. It should generate results information that supports decision-making and enables monitoring of ECCC's capacity to respond to stakeholders' science needs, including those of the CWA. Measures will be designed to be meaningful to decision-making.

The Science and Technology Branch is also undergoing a period of restructuring, with a transition towards functional lines such as research and monitoring. As of April 1, 2026, the

Branch will no longer include a dedicated Water Science and Technology Directorate. At this stage, specific responsibilities within the Branch for supporting this Action Plan have not yet been assigned. The Action Plan timelines work to recognize this transition and once the new structure is in place and roles are clarified, work on this initiative will move forward with the appropriate expertise.

Action 1: Develop a performance measurement framework for ECCC's water science activities

Deliverables	Timeline	Responsible
Environmental scan of existing water quality science related indicators	September 14, 2026	DG, Science, Policy, Planning, and Assessment Directorate, STB
Consultation summary of decision-makers (predominantly internal to ECCC) who use results information to understand their needs.	November 16, 2026	DG, Science, Policy, Planning, and Assessment Directorate, STB
Draft a performance measurement framework, strengthening ECCC's ability to consistently measure and report on progress, contributions, and results achieved. The Framework is contingent on CER realities and STB reorganization.	March 31, 2027	DG, Science, Policy, Planning, and Assessment Directorate, STB
Work with CMD to ensure that the performance management framework is aligned with the DRF, current departmental program inventory, and performance information profile.	March 31, 2027	DG, Science, Policy, Planning, and Assessment Directorate, STB
Finalize the performance measurement framework.	March 31, 2028	DG, Science, Policy, Planning, and Assessment Directorate, STB

4. Appendices

4.1. Appendix A – Evaluation Matrix

Theme 1: Relevance

Questions:

1.1 To what extent is there a continued need for federal involvement in freshwater quality science?

Indicators:

- Evidence of/views on the need for these activities.
- Evidence of the alignment with federal government priorities.

Sources and methods:

- Interviews (internal and external partners)
- Document review
- Case studies

Theme 2: Governance

Questions:

2.1 To what extent is the governance of freshwater quality science clear, appropriate and efficient?

2.2 In the transition, have both ECCC and CWA established well-defined responsibilities of water quality activities?

Indicators:

- Evidence of / views on roles and responsibilities are clearly defined and understood in governance structures, including with CWA.
- Evidence of / views on the effectiveness of governance structures to guide science planning and resourcing against identified needs, risk, priorities.
- Evidence of / views on transparent decision-making by governance bodies for effective delivery and results.
- Evidence of / views on governing structures being representative and inclusive.
- Evidence of / views on whether collaboration and communication with partners is facilitated by arrangements and processes.

Sources and methods:

- Interviews (internal and external partners)
- Document review
- Case studies

Theme 3: Effectiveness

Questions:

1. 3.1 To what extent do the activities deliver the expected results?
2. 3.2 To what extent have the activities developed and implemented sound practices, processes, systems, tools, equipment, and technical solutions to ensure efficient and economical delivery?
3. 3.3 What is the availability, quality and utility and use of the activities' performance information?

Indicators:

- Evidence of / views on achievement of activity outputs and outcomes
- Evidence of / views on factors facilitating or hindering the achievement of results.
- Evidence / views of development and implementation of measures, sound practices, processes, systems, tools and technical solutions that ensure efficient and economical delivery.
- Evidence / views of effective cost management, and resource use, prioritization, and allocation across activities, and cost-effectiveness.
- Evidence resources were spent as planned (comparison of planned to actual spending) and explanation of variances.
- Existence of quality and utility of results, performance indicators, targets, and financial data.

Sources and methods:

- Interviews (internal and external partners)
- Document review
- Case studies
- Performance and financial data analysis