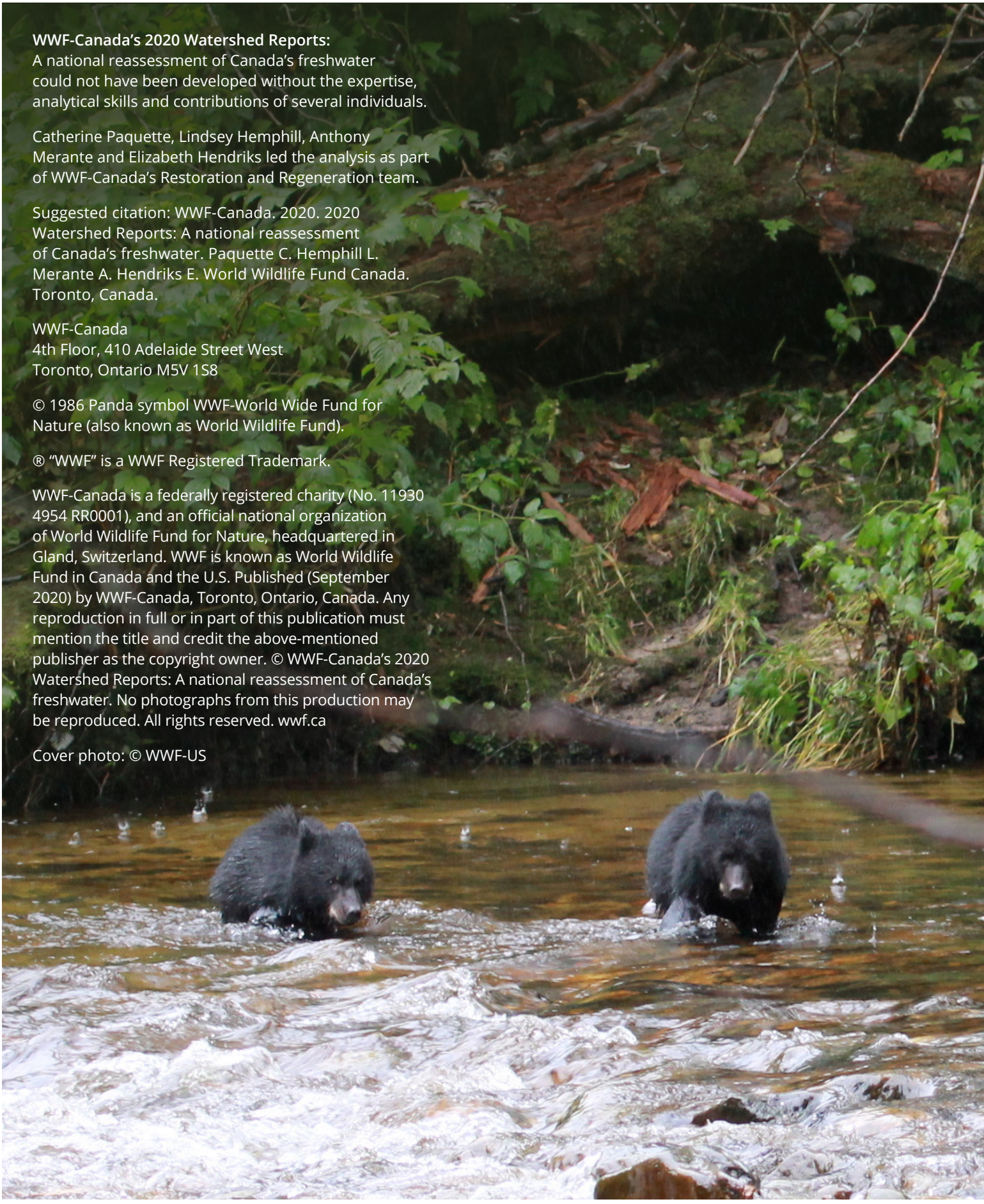
WWF
CANADA

WWF-CANADA'S 2020 WATERSHED REPORTS:

A NATIONAL REASSESSMENT OF CANADA'S FRESHWATER



WWF-Canada's 2020 Watershed Reports:
A national reassessment of Canada's freshwater could not have been developed without the expertise, analytical skills and contributions of several individuals.

Catherine Paquette, Lindsey Hemphill, Anthony Merante and Elizabeth Hendriks led the analysis as part of WWF-Canada's Restoration and Regeneration team.

Suggested citation: WWF-Canada. 2020. 2020 Watershed Reports: A national reassessment of Canada's freshwater. Paquette C. Hemphill L. Merante A. Hendriks E. World Wildlife Fund Canada. Toronto, Canada.

WWF-Canada
4th Floor, 410 Adelaide Street West
Toronto, Ontario M5V 1S8

© 1986 Panda symbol WWF-World Wide Fund for Nature (also known as World Wildlife Fund).

® "WWF" is a WWF Registered Trademark.

WWF-Canada is a federally registered charity (No. 11930 4954 RR0001), and an official national organization of World Wildlife Fund for Nature, headquartered in Gland, Switzerland. WWF is known as World Wildlife Fund in Canada and the U.S. Published (September 2020) by WWF-Canada, Toronto, Ontario, Canada. Any reproduction in full or in part of this publication must mention the title and credit the above-mentioned publisher as the copyright owner. © WWF-Canada's 2020 Watershed Reports: A national reassessment of Canada's freshwater. No photographs from this production may be reproduced. All rights reserved. wwf.ca

Cover photo: © WWF-US

Table of Contents

Since 2017, the Watershed Reports have been used by many different organizations for a variety of actions. Environment and Climate Change Canada highlighted the reports during its Ottawa River Watershed Study. The St. Lawrence River Institute based in Cornwall, Ontario, uses the benthic indicator developed by WWF-Canada in its Great River Rapport. Multiple watershed groups use the Watershed Reports to support funding applications seeking to address data deficiencies in their areas. The Watershed Reports have also been referred to as essential information by national and local media and in peer-reviewed papers.

© Victor Daggberg

INTRODUCTION

The twin crises of accelerating biodiversity loss and climate change are a devastating test for natural systems that were already at a breaking point. In Canada, the continued population declines of our most vulnerable species is a warning that current conservation efforts are not working fast enough.

To truly reverse the decline of wildlife we must look beyond single species efforts to broad-based solutions that protect and restore the health of entire ecosystems. That is especially true for freshwater systems.

Canada's lakes and rivers face major threats from pollution, overuse, habitat loss and fragmentation, alteration of flow, climate change and invasive species. These threats are affecting the health of watersheds and the wildlife that depend on them. On the Pacific coast, freshwater-dependent wildlife declined by 14 per cent on average between 1970 and 2017. And in Lake Ontario, native fish species dropped 32 per cent on average between 1992 and 2014.

Despite the threats and wildlife declines, freshwater habitats are largely unprotected and understudied.

In 2017, WWF-Canada released the Watershed Reports, the first-ever national assessment on the health of and threats to freshwater in Canada. By identifying standard key health and threat indicators, WWF-Canada was able to explore the state of our streams and rivers and give further insight into their stressors. At the time, we reported that most sub-watersheds—the smaller, secondary units of watersheds—lacked sufficient data to gain a meaningful understanding of where threats, like climate change and habitat loss, were having the greatest impact on watershed health.

In order to keep data relevant and up to date, reassessment should be carried out every three to five years to provide a more holistic understanding of the current state and ensure healthy freshwater ecosystems throughout Canada. To that end, over the last three years, WWF-Canada reconnected with past data providers as well as new ones to produce an updated Watershed Reports. This reassessment was only done for the health indicators (flow, water quality, benthic invertebrates and fish) as the threats assessment data sources are more established and are unlikely to have significantly changed in three years. One example of this is urban sprawl: while it continues to be a concern, major urban areas haven't moved to the extent of making a difference to this large-scale assessment in a matter of three years.

HEALTH INDICATORS

Hydrology

Water quality

Benthic invertebrates

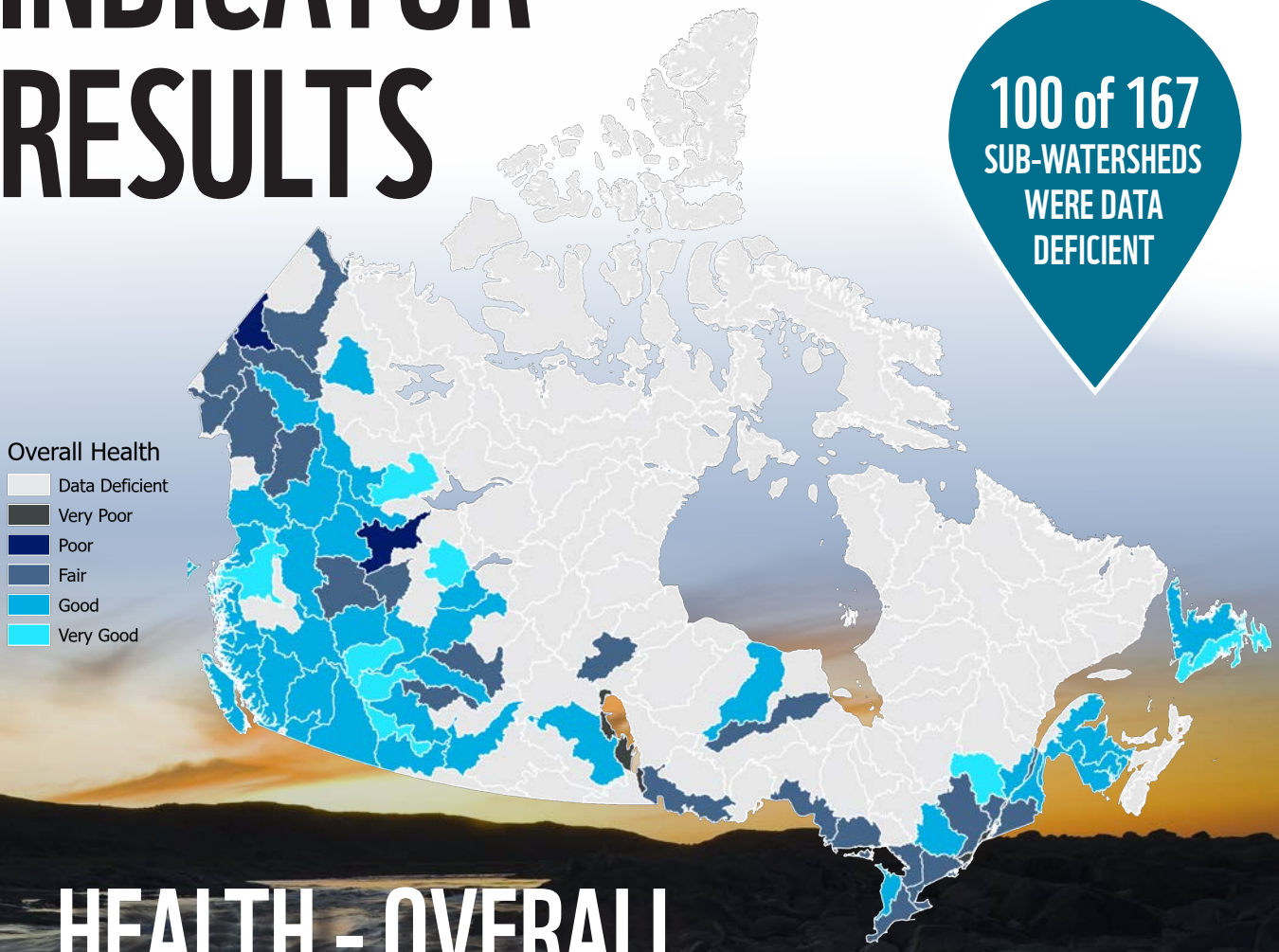
Fish

As this data was compiled and re-assessed, we were pleased to note that most sub-watersheds that had enough data to assign a score received a Good or Very Good designation. While this bodes well for the state of freshwater in Canada, the flip side to this assessment was that we were unable to assign scores for 60 per cent of Canada's sub-watersheds due to data deficiencies. The lack of available and comprehensive, open-access water data was evident in the 2017 report and remains a major concern today.

As further sections will show, an increase in community-based monitoring programs through organizations, such as Water Rangers, Lake Winnipeg Foundation, Atlantic Water Network, G3E (Groupe d'éducation et d'écosurveillance de l'eau), ROBVQ (Regroupement des organisms de bassins versants du Québec), Living Lakes Canada, and Swim Drink Fish, and the emergence of large open data platforms, such as DataStream and CABIN, have begun to make it easier to understand the impacts human activities are having on freshwater ecosystems. But clearly, more work is needed. Until we have a coordinated approach, including a standardized, widespread and consistent national monitoring system, we will be unable to make the evidence-based decisions that our watersheds, and the wildlife and people who depend on them, need.

INDICATOR RESULTS

100 of 167
SUB-WATERSHEDS WERE DATA DEFICIENT



HEALTH - OVERALL

While the data we do have paints a promising picture of watershed health, data deficiencies are obscuring how threats are impacting most watersheds in Canada.

Sixty-four per cent of Canada's sub-watersheds that have sufficient data to be assessed (43 of 67 sub-watersheds) received a score of Good or Very Good in this 2020 assessment. While this may sound like good news, Canada is home to 167 sub-watersheds and nearly 60 per cent of them (100 sub-watersheds) are Data Deficient. For sub-watersheds that scored Poor or Fair, the lower rankings were often associated with poor flow and water quality indicator performance.

This is a slight improvement from 2017, where 110 sub-watersheds were data deficient, with 19 receiving a score less than Good. Despite significant efforts, data deficiency remains a major challenge in understanding the health of Canada's watersheds.

New knowledge has shown us that areas that were previously data deficient may still receive Fair or Poor overall health scores with newly collected data. For example, the Attawapiskat sub-watershed in Northern Ontario was previously data deficient and now has an overall score of Fair, partly driven by a Fair water quality score. The Upper St. Lawrence sub-watershed was also previously data deficient but is now considered in Very Poor health due to a Very Poor benthic invertebrate score.

© Andrew S. Wright

HYDROLOGY

The disruption of river flow from man-made structures, such as dams, ongoing water extraction for agriculture, resource development and climate change, can negatively impact the aquatic ecosystem and health of a watershed.

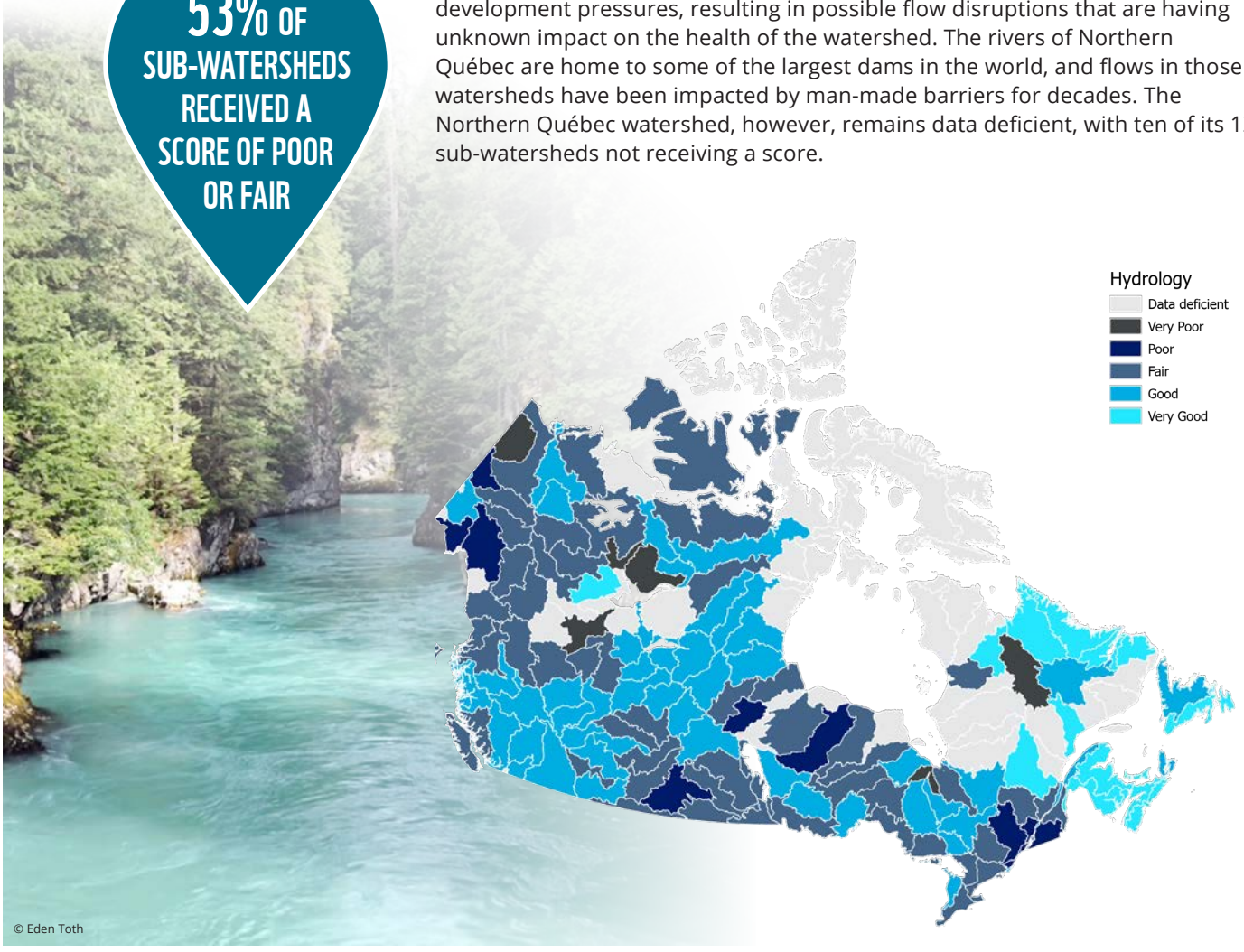
Seventy-six per cent of Canada's sub-watersheds (127 of 167) received scores, with 53 per cent (67 of 127) of sub-watersheds that have sufficient data scoring below Good. In 2017, the baseline report calculated scores for 129 sub-watersheds, with only 37 receiving a score below Good.

Since the 2017 assessment, the number of sub-watersheds scoring below Good has nearly doubled. During that time, new hydrological station data became available for use, allowing us to better understand flows in each sub-watershed. The new data has revealed that river flow is a much bigger problem than we thought, with half of the scores now below the Good threshold.

The lower hydrology scores vary by region and likely can be attributed to a mix of physical or climatic disruptions. For example, in the Arctic Coast Islands a significant change in flow during recent time periods versus historic, and a lack of major dams, suggest that lower scores may be driven by climate change.

Twenty-three per cent of Canada's sub-watersheds (38 of 167) continue to be Data Deficient for flow, and two sub-watersheds that were data sufficient in 2017 are now considered to be Data Deficient. While many of these sub-watersheds are in remote areas that are difficult to assess, they still experience development pressures, resulting in possible flow disruptions that are having unknown impact on the health of the watershed. The rivers of Northern Québec are home to some of the largest dams in the world, and flows in those watersheds have been impacted by man-made barriers for decades. The Northern Québec watershed, however, remains data deficient, with ten of its 12 sub-watersheds not receiving a score.

53% OF SUB-WATERSHEDS RECEIVED A SCORE OF POOR OR FAIR



© Eden Toth

WATER QUALITY

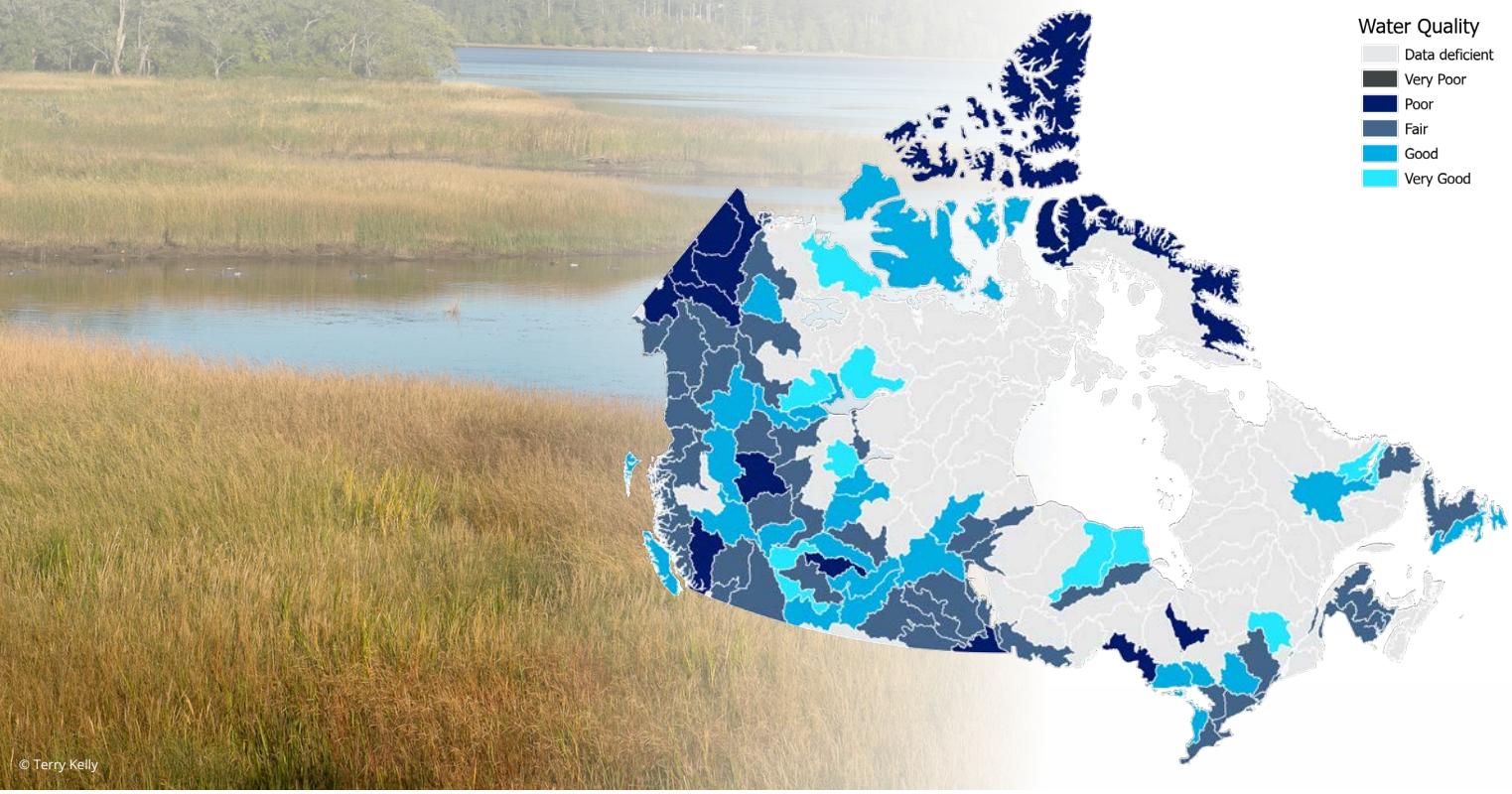
Data deficiency is a challenge to water quality assessment in Canada with 46 per cent of sub-watersheds (77 of 167) not having enough data to assign a score.

Of the sub-watersheds with sufficient data, 61 per cent (55 of 90) received a score of either Poor or Fair. Since 2017 we have observed an increase in available water quality data either from additional water quality monitoring or access to more data. The number of sub-watersheds obtaining a score jumped from 67 to 90. Despite this, the percentage of sub-watersheds scoring below Good is the same as the 2017 results. This means we cannot assume that remote sub-watersheds that are data deficient are in good health.

The main drivers of water quality scores vary depending on land use and geology. In urban areas, such as the Lake Ontario and Niagara Peninsula sub-watershed, the main parameters driving the Fair score were exceedances of aluminum, chloride, iron and phosphorus, as well as levels of dissolved oxygen below the concentration required for healthy aquatic life. High levels of phosphorus and low concentrations of dissolved oxygen are often associated with agriculture. High chloride in urban areas is often a product of road salt application.

61%
OF SUB-WATERSHEDS WITH SCORES WERE POOR OR FAIR

While this analysis cannot precisely identify the sources of pollutants and contaminants, knowing and understanding land-use practices can often be a starting point. High concentrations of aluminum and phosphorus were found to be the most common drivers for most low water quality scores, while high concentrations of chloride and low levels of dissolved oxygen appear to be unique to heavily populated sub-watersheds. In the more resource extraction focused areas of the Columbia or Battle River sub-watersheds, metals such as aluminum, cadmium, zinc, iron and mercury, along with nutrients (ammonia, nitrogen and phosphorus), were the main parameter drivers.



© Terry Kelly

BENTHIC INVERTEBRATES

Benthic invertebrates — small creatures such as insects, worms, snails and mussels living at the bottom of streams — are sensitive to changes in their environment. The presence of certain species in a given area can help indicate if the water is healthy or not.

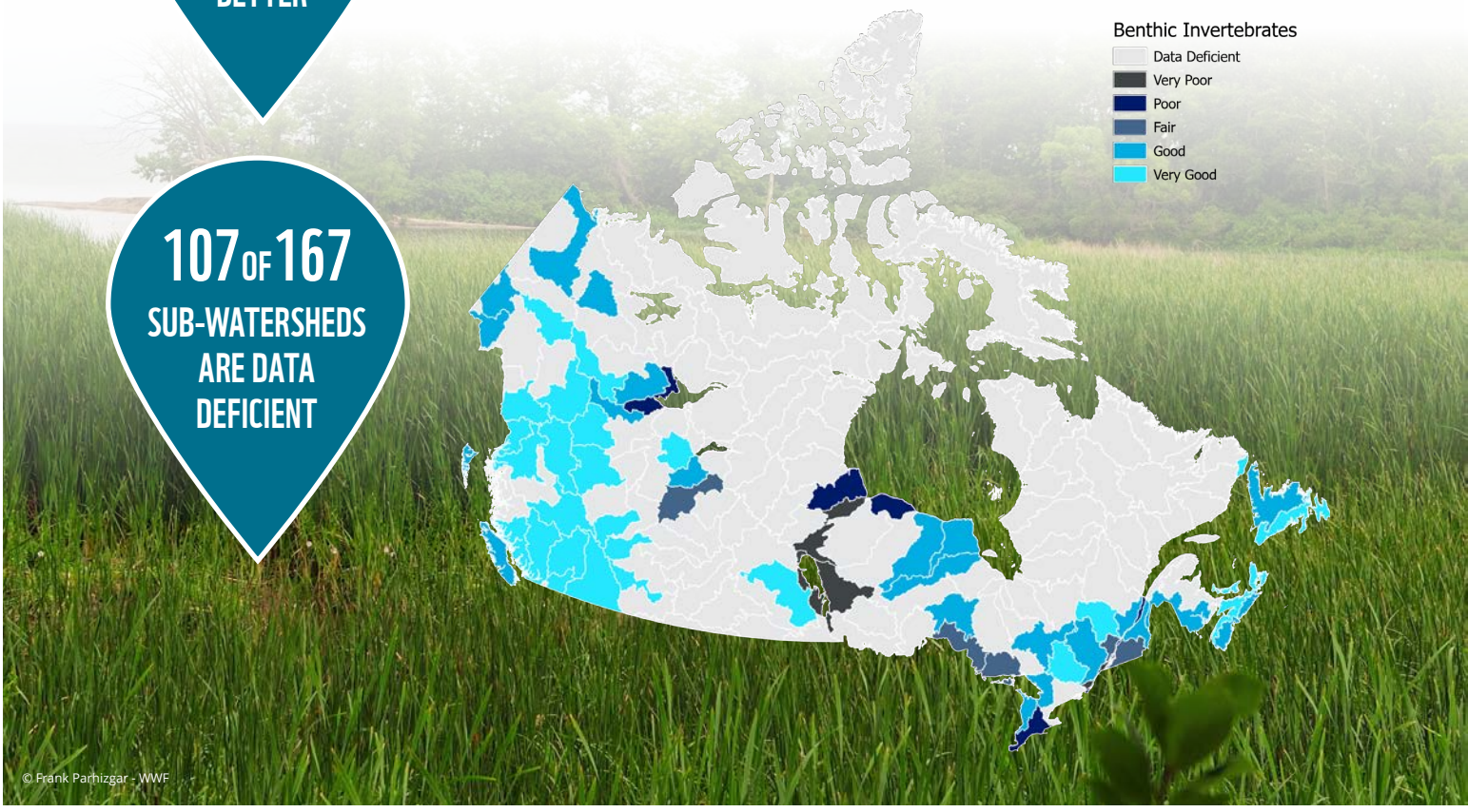
Sixty-four per cent (107 of 167) of Canada's sub-watersheds are Data Deficient for this metric, indicating more sampling and analysis efforts are needed. Where we do have sufficient data, however, it tells a good news story with 78 per cent (47 of 60) of sub-watersheds earning a score of Good or better. This is a slight improvement from our 2017 report, when 112 sub-watersheds lacked enough data, and only 65 per cent (36 of 55) of sub-watersheds with sufficient data scored Good or better.

While at first glance the increase in sub-watersheds with scores Good or better appears to suggest certain sub-watersheds are becoming healthier, a deeper look at the data underscores the need for consistent monitoring. For example, we noted that of the 20 sub-watersheds with scores below Good in 2017, eight of those now score as Data Deficient. These data deficiencies are now hiding areas with likely poor health scores that need help.

One of the sub-watersheds that became Data Deficient was the Qu'Appelle in the Assiniboine-Red watershed. The watershed is now Data Deficient for all four sub-watersheds for this indicator, while remaining in an agriculturally dense area. Agricultural activity can be a concern for benthic invertebrate communities due to run-off leading to pesticides and nutrients in the water, increased temperature because of lack of shade and increased turbidity because of erosion from overworked soils. Some benthic invertebrate species are very sensitive to changes in their environment, which is why they are important to study. This also means that they are particularly susceptible to land-use changes and activities. Without consistent monitoring, data can be easily lost or become out of date and our understanding of areas that need conservation efforts shift.

78% OF SUB-WATERSHEDS WITH SUFFICIENT DATA SCORED GOOD OR BETTER

107 OF 167 SUB-WATERSHEDS ARE DATA DEFICIENT



© Frank Parhizgar - WWF

FISH

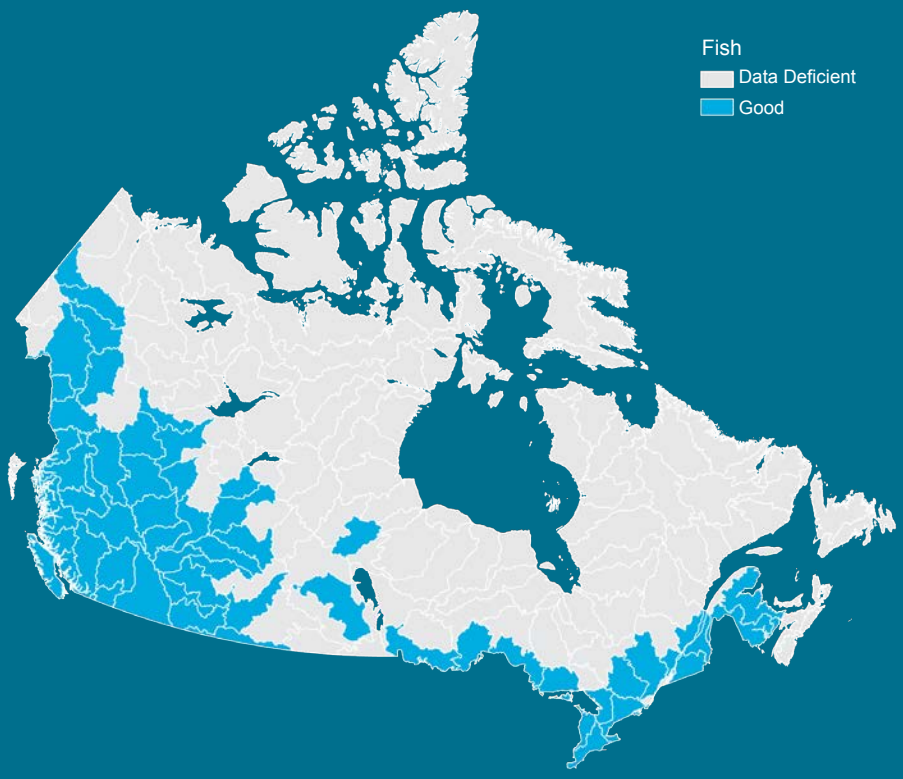
Fish are important for both recreational and commercial fisheries and play an essential role in the ecosystem.

Thirty-four per cent (56 of 167) of Canada's sub-watersheds obtained a score of Good and the rest remain Data Deficient. Nothing has changed since the 2017 report, which stresses how the lack of long-term and consistent monitoring may be obscuring our understanding of watershed health in Canada.

Since 2017, nine sub-watersheds lost their score due to a lack of spatial or temporal variability in monitoring. For example, the Abitibi and Harricanaw Coast sub-watersheds in the Northern Ontario watershed both lost their fish scores in this update, so all sub-watersheds are now Data Deficient, even though the watershed is of interest for significant development proposals for mining and smelting. At the same time, it was possible to calculate a score for nine other sub-watersheds where either monitoring efforts were increased, or we were able to access additional data.

In the Great Lakes watershed, access to more data enabled us to obtain scores of Good for four additional sub-watersheds, and in turn calculate a score of Good for the overall watershed.

While the Good scores might seem like good news, we are not convinced that they are representative of the state of fish population health in Canada. These scores were assigned because there is no observable downward trend in native species presence and abundance within the watersheds. However, there is a pronounced lack of long-term data for fish in Canada, making it difficult to identify trends in species presence and abundance. This leads us to conclude that the grading is not representative of conditions on the ground. Localized assessments with traditional knowledge of keystone species would complement this analysis.



© IStock/Shaun Lowe

REGIONAL SPOTLIGHT

Great Lakes, Ottawa, St. Lawrence

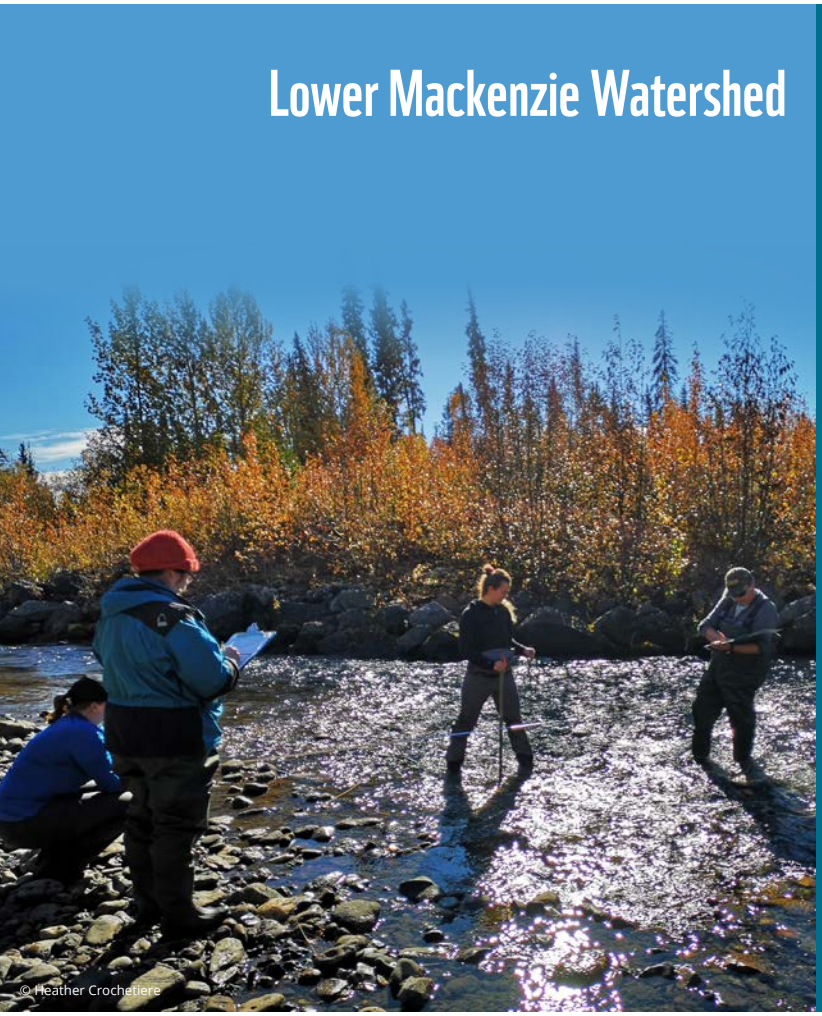
More than half of Canada's population lives within the Great Lakes, Ottawa or St. Lawrence watersheds, meaning the pressures on regional water resources are significant and growing as urban areas themselves continue to expand. Both the Great Lakes and the Ottawa watersheds were overall data deficient in the 2017 assessment, which was mainly driven by a lack of data for the benthic-invertebrate indicator. Focused water monitoring through programs like WWF-Canada's Sequencing the Rivers for Environmental Assessment and Monitoring (STREAM) resulted in a data sufficiency in the Ottawa basin. Increased availability and accessibility of data can be credited for giving the Great Lakes, the Ottawa and the St. Lawrence watersheds overall scores.

In the Great Lakes, Fair scores for hydrology and water quality, driven by changes in flow and high levels of aluminum, lead and uranium, led to a Fair score overall. Poor hydrology scores and Fair water quality in the Lower Ottawa sub-watershed are the main drivers of the overall Fair score. While water quality is data deficient in the St. Lawrence, its Poor hydrology and Fair benthic invertebrate scores drove the overall Fair score.

					OVERALL
GREAT LAKES BASIN	FAIR	FAIR	GOOD	GOOD	FAIR
OTTAWA BASIN	POOR	GOOD	GOOD	GOOD	FAIR
ST. LAWRENCE BASIN	POOR	DATA DEFICIENT	FAIR	GOOD	FAIR

© Anthony Merante/WWF-Canada

Lower Mackenzie Watershed


© Heather Crochetiere

The most significant change in the Lower Mackenzie Watershed since the previous assessment is the water quality indicator. While it was previously rated as overall Data Deficient, with 11 of its 22 sub-watershed lacking a score, it now has a Good score overall. Additional monitoring in the Western Great Slave Lake, Central Liard and Fort Nelson sub-watersheds made a significant difference and contributed to the area of the watershed where Yukon, Northwest Territories, British Columbia and Alberta meet. Except for the Western Great Slave Lake sub-watershed (which scored Poor), all other sub-watersheds scored either Good or Very Good, which is ideal and expected in a more remote region such as the Lower Mackenzie.

The success in obtaining a water quality score in this watershed is due almost entirely to community-based monitoring group members gathering critical information about the health of their shared waters and to Mackenzie DataStream, an open access database. The spatial coverage of the database is excellent despite the remoteness of the area. Spatial coverage is due to the large number of groups, including First Nations and Métis communities, federal, provincial and territorial agencies, NGOs and others who use this database to input their data from a diversity of monitoring, stewardship and guardian programs, to be shared for assessments such as this one.

Atlantic Canada

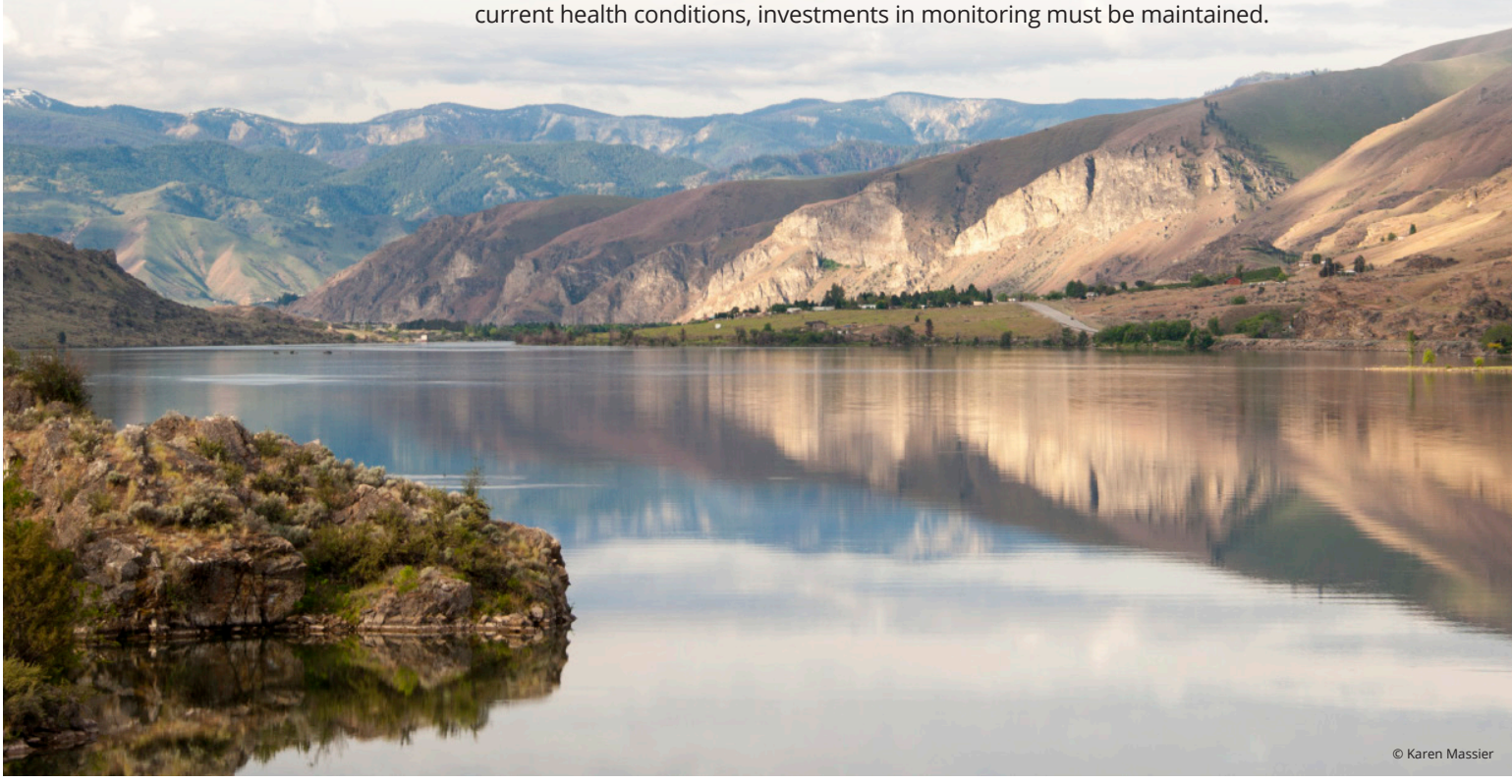
Consisting of three watersheds—Newfoundland and Labrador, Saint John-St. Croix, and the Maritime Coastal—Atlantic Canada has become a national model for linking data collection, open platform and collaboration for action. Through the Atlantic Coastal Action Program structure and the Atlantic Water Network, this model exemplified how monitoring is coordinated to avoid duplicating efforts or overlooking more remote areas. This coordination of data resources also makes the outreach done for this and other similar assessments easier and less time consuming, making it easier to understand the health of regional watersheds. Despite this unprecedented collaboration, we still observed a significant change in data availability in one watershed—Newfoundland and Labrador—where the benthic-invertebrate indicator scores went from Very Good to Data Deficient. The reason for this drastic change is explored in the section below.

IMPORTANCE OF CONSISTENT MONITORING

While more data was available for the 2020 Watershed Reports than in 2017, there are two major exceptions. Yukon and the Newfoundland and Labrador watersheds had benthic indicator scores go from Poor, Good or Very Good to Data Deficient in the reassessment.

In Yukon's 2017 assessment, all but one of its eight sub-watersheds received a score, while only two did in 2020. In Newfoundland and Labrador's 2017 assessment, all but two of its seven sub-watersheds received a score, while only the two in Newfoundland did in 2020 – leaving the Labrador portion of the watershed completely data deficient. The data for this indicator comes almost entirely from the CABIN database, and the resulting 2020 data deficiencies seem to be due to fewer sites being monitored because of less funding. The high cost of benthic monitoring is often a barrier for groups, and inconsistent funding can lead to sporadic monitoring. These barriers were an impetus for STREAM, a program discussed later, that trains and supports community-based water monitoring.

The stark contrast between the 2017 and 2020 reports for these three watersheds reveals how quickly data and assessments can become outdated and highlights the need for more strategic and consistent monitoring. Investments in a standardized national monitoring system are needed to track the state of freshwater as climate change and increased human populations put pressures on freshwater ecosystems and wildlife. Data and any assessment derived from it can only be considered a snapshot in time. In order to continue to be accurate and sufficiently portray current health conditions, investments in monitoring must be maintained.



© Karen Massier

COMMUNITY-BASED WATER MONITORING

© Living Lakes Canada

Community-based water monitoring (CBWM) is done by groups of concerned citizens, ENGOs, watershed organizations and First Nations among many others, that monitor, track and collect data regarding their local watersheds. These groups play a significant role in monitoring watershed health across Canada.

CBWM can be used for all water-related issues, including water quality, quantity and biodiversity. It can range from volunteer monitoring to large-scale partnerships. In Indigenous contexts, CBWM further relates to Indigenous sovereignty and self-determination, and may be understood as “both a method for generating data useful for decision-making and an expression of governance itself, rooted in understandings of stewardship, kinship and responsibility” (Wilson, et al., 2018).

Community-based monitoring is currently thriving and expanding in Canada. The increased involvement of local communities in their local environments is exemplified by ongoing efforts to co-develop monitoring programs.

In the 2017 report, WWF-Canada recognized that CBWM was underutilized in Canada. Detailed community-level data could and should be used to fill data gaps. The ability to collect long-term baseline data and to quickly respond to environmental crises are key to this task. There is an opportunity to "build a proactive, collaborative agenda to engage the public in environmental science" (EPA, 2016). Through technological advances, this is becoming more feasible. The ability to share data, information and stories is amplified. Tools exist to support data collection, data literacy, management and distribution.

The increased use of CBWM had a significant impact on the 2020 results by contributing to additional scores, as seen in the Regional Focus section, and providing a more comprehensive picture of freshwater health in certain jurisdictions. Some of the jurisdictions include the Columbia watershed and Central Liard and Western Great Slave Lake sub-watersheds in the Lower Mackenzie watershed

WWF-CANADA'S TARGETED INVESTMENTS - STREAM

WWF-Canada partnered with Living Lakes Canada, the University of Guelph and Environment and Climate Change Canada (ECCC) to create STREAM, Sequencing the Rivers for Environmental Assessment and Monitoring, to address data deficiency across Canada's watersheds.

STREAM has led the way in supporting and helping to legitimize CBWM in Canada by providing training, equipment and resources to groups interested in creating or expanding a monitoring project for benthic invertebrates. Since its launch, STREAM has trained more than 100 individuals from more than 30 groups, including First Nations communities, academia, government, municipalities and watershed groups.

The STREAM team piloted this initiative in the Central Ottawa sub-watershed, which was Data Deficient in the 2017 assessment. By making this targeted investment in an area that only required a little additional sampling, the sub-watershed now has a benthic score of Very Good, and an overall health score of Good.

STREAM targets areas where a small increase in monitoring could lead to a health score, or areas where there is significant interest from groups to set up or expand a benthic monitoring program. In 2019, STREAM worked with the Junction Creek Stewardship Committee (JCSC), based in Sudbury, Ontario, who is working on restoring a large urban waterway found within the Northern Lake Huron sub-watershed of the Great Lakes Watershed. JCSC was interested in receiving benthic invertebrate monitoring training, which, combined with the water quality and fish monitoring they already carry out, would provide them with a better understanding of the health of their stream, as this sub-watershed was Data Deficient in 2017.

BENTHIC HIGHLIGHT:

One way to begin understanding the health of a body of water is to look at what lives on its bottom. In general, streams with a higher proportion of EPT (Ephemeroptera, or mayflies, Plecoptera, or stoneflies and Trichoptera, or caddisflies) in its benthic populations are considered healthier, or less perturbed.

Data availability for benthics was one of the main challenges to overall data sufficiency in 2017. By providing capacity, training, equipment and analysis we have made targeted investments that move the mark on data sufficiency in Canada.

© Rebecca Spring/WWF-Canada

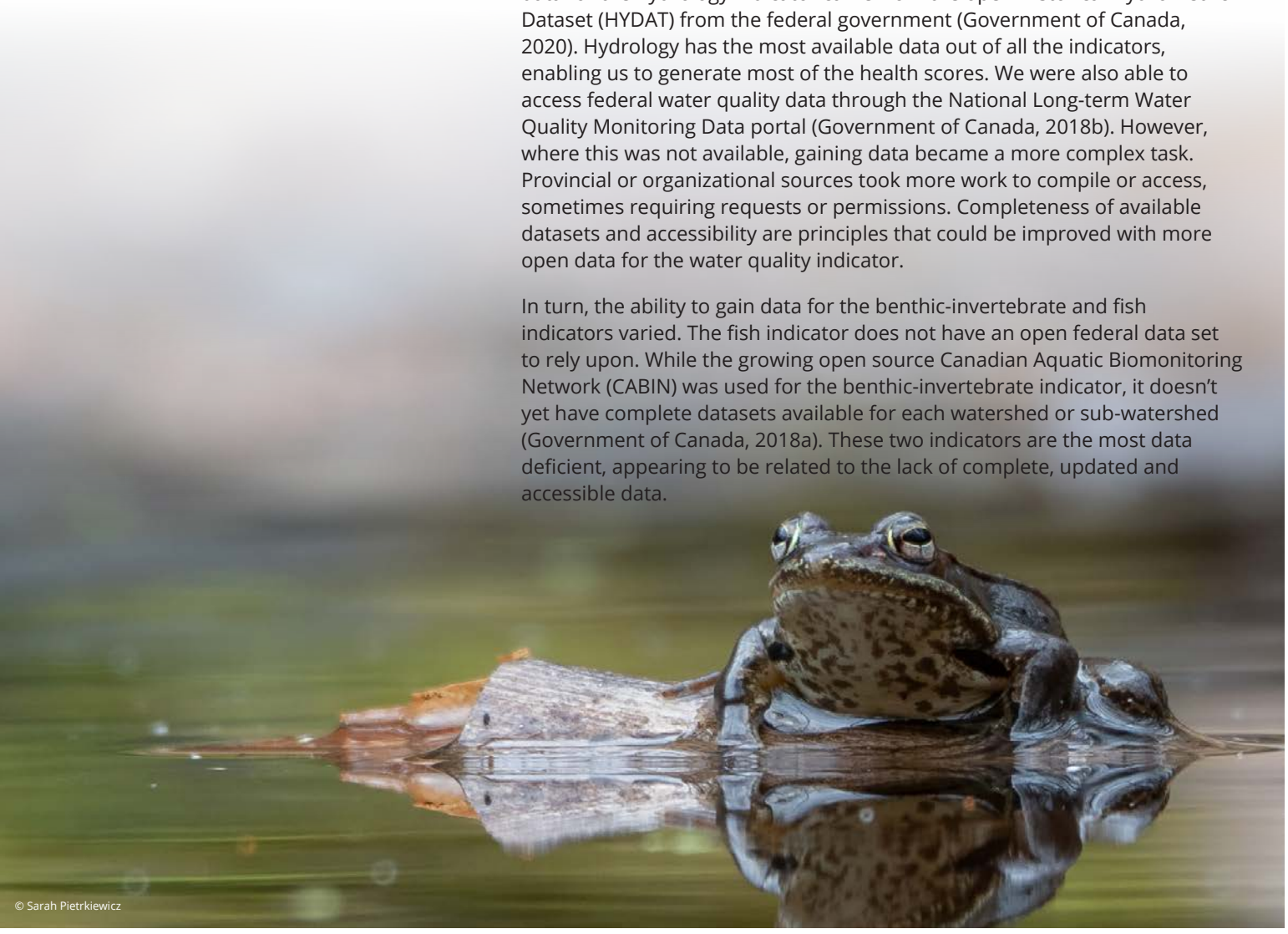
THE IMPORTANCE OF OPEN DATA

Open data is information that is available without any restrictions (Open Knowledge Foundation, n.d.a).

Internationally recognized principles for open data consist of datasets being open by default, timely and comprehensive, accessible and useable, comparable and interoperable, for improved governance and citizen engagement, reusable and redistributable and for inclusive development and innovation (Open data charter, n.d., Open Knowledge Foundation, n.d.b). The Canadian government has recently committed to open federal data that align with these principles.

In our experience, open data is efficient, timesaving and directly related to the amount of useful data available for each watershed. The main source of data for the hydrology indicator came from the open Historical Hydrometric Dataset (HYDAT) from the federal government (Government of Canada, 2020). Hydrology has the most available data out of all the indicators, enabling us to generate most of the health scores. We were also able to access federal water quality data through the National Long-term Water Quality Monitoring Data portal (Government of Canada, 2018b). However, where this was not available, gaining data became a more complex task. Provincial or organizational sources took more work to compile or access, sometimes requiring requests or permissions. Completeness of available datasets and accessibility are principles that could be improved with more open data for the water quality indicator.

In turn, the ability to gain data for the benthic-invertebrate and fish indicators varied. The fish indicator does not have an open federal data set to rely upon. While the growing open source Canadian Aquatic Biomonitoring Network (CABIN) was used for the benthic-invertebrate indicator, it doesn't yet have complete datasets available for each watershed or sub-watershed (Government of Canada, 2018a). These two indicators are the most data deficient, appearing to be related to the lack of complete, updated and accessible data.



© Sarah Pietrkiewicz

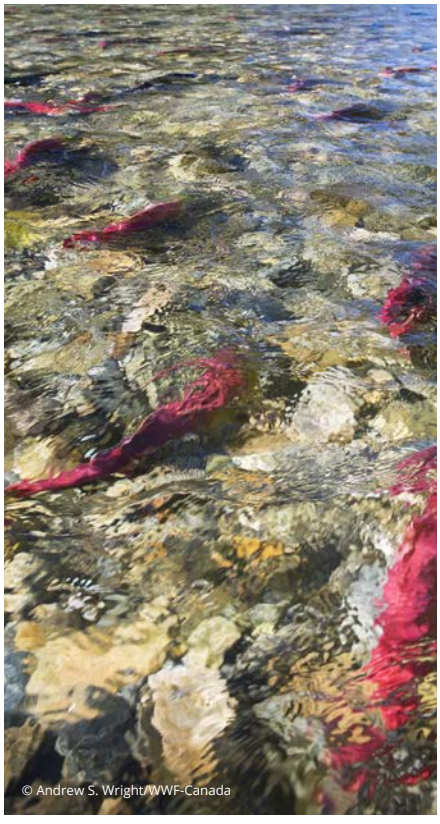
THE IMPACT OF OPEN DATA AND INNOVATION

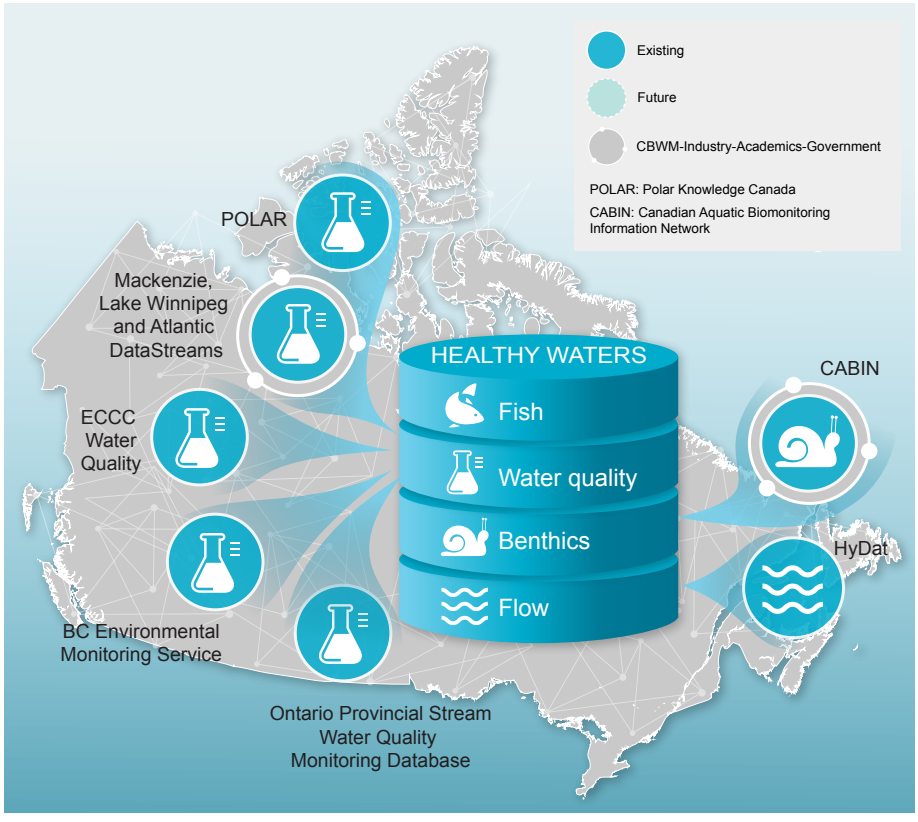
In 2018, ECCC made part of CABIN publicly accessible, opening hundreds of thousands of benthic invertebrate data across Canada.

This database provides organizations like WWF-Canada with access to verified data from contributing researchers right at their fingertips. To illustrate the impact of this open-access database, we can look at the Maritime Coastal watershed. In 2017, we had 15 organizations (government, parks and community groups) contribute benthic data (2000-2016) after three months of public outreach. While this effort resulted in scores for most of the sub-watersheds, the effort to access that data were significant and unsustainable for future iterations of the assessment. In 2020, through CABIN, we accessed data from nearly twice the number of organizations from a single download. This enhanced data accessibility, helped improve the Cape Breton sub-watershed's benthic score from Fair to Good and gave us insight into benthic trends in northern New Brunswick.

Atlantic DataStream, the open database created by the Gordon Foundation in collaboration with Atlantic Water Network, allowed WWF-Canada to access 45,000 data points from eight organizations across the watershed in support of our analysis. In partnership with WWF-Canada and the RBC Foundation, this platform is built on blockchain, an innovative approach to ensuring secure availability. The addition of blockchain technology to this platform provides a distributed ledger and traceability that allows users to see how data changes over time, improving the security and authenticity of data. Blockchain is completely transparent and tells users the full story of the datasets they're working with, starting from the moment the data is first created and shared. With the click of a button, users can determine who created the datasets, whether it has changed and, most importantly, why it was collected.

Through this collective effort, the data within Atlantic DataStream is more accessible to communities, scientists and decision-makers and will play a critical role in filling data gaps and advancing evidence-based decision-making that ensures waters remain healthy for generations to come.





RECOMMENDATIONS

In a country and a world where threats to freshwater are only increasing, where our lakes and rivers are experiencing wildlife population declines, where Indigenous guardians are observing troubling ecosystem changes, and where climate change is already affecting water temperatures and flows, we need to know: Which watersheds should be prioritized for conservation efforts?


© Sarah Pietrkiewicz

Only by having a clear understanding of health will we be able to assess watersheds and identify those in the most need of support. To do this, we need to prioritize the following actions.

Increase support for community-based water monitoring

Community-based water monitoring is required to ensure we have the data and science to move towards comprehensive assessment. These groups are often well situated geographically to monitor water where it might be difficult or unfeasible for government and professional scientists to do so. Programs and tools provided through organizations like Atlantic Water Network, Lake Winnipeg Foundation, Water Rangers, Living Lakes and Swim Drink Fish have proliferated across the country. Further, CBWM data must be recognized as relevant and of sufficient quality to inform decisions. There is enough evidence to show that when standardized training and protocols are in place, CBWM data can be just as accurate as data collected by professional scientists.

Expand the coverage and representation of Canada's varied landscapes

The concentration of monitoring doesn't always reflect the realities on the ground. Monitoring is still concentrated in areas of historical concern — where Canadians have lived longer, such as along the St. Lawrence — as opposed to areas of emerging concern, such as Northern Ontario and Quebec, where populations are lower but impacts from resource extraction and electricity generation are high. This hasn't changed significantly in the last three years. Monitoring must be more geographically representative and utilize innovative technology for us to gain a better understanding on the health of our waters, and any impact future development might have on them.

Invest in large-scale and standardized models and data hubs

The emergence of standardized data hubs and open databases since 2017 has had positive impacts on the Watershed Reports assessment process. Having as much data as possible for a given region in a single source makes large-scale assessments easier and less time-consuming. By allowing multiple data sources, like The Gordon Foundation's DataStream, these data hubs also lead to more democratic and accessible water management. Further investment in such resources, including additional geographical representation and input of all government data into these hubs would only further assist in the creation of such large-scale assessments.

Create standard protocols and guidelines for analysis

Standardization of monitoring, analysis and assessment would only benefit the broader freshwater management discussion in Canada. Without certain standards, the integration of different datasets can be difficult and sometimes impossible.

The limitations identified in the last report, including the inconsistency and inaccuracy of health guidelines, varied reliability levels, issues with scaling and timing and varying standardized monitoring and assessment protocols are all still valid and lead to difficulties in creating health assessments such as this one.

Respect open data standards

Important advancements in open data have been made throughout the country since 2017. ECCC has begun acting on its commitment to open data by making additional water quality information easily accessible, in consistent and near machine-readable formats, limiting the amount of data organization and restructuring needed prior to analysis. Additionally, CABIN has made much of its data collected by government departments and agencies available and is moving towards an open-by-default policy.

WWF-Canada believes these efforts must continue and must broaden to include data used in assessments required through the Canadian Environmental Assessment Act, data from publicly funded academic research and data from industry.

Commit to consistent and timely monitoring and assessments

As shown through this updated report, aquatic health can change rather rapidly and data can become outdated, like it did in the Yukon and Newfoundland and Labrador watersheds. In the face of climate change impacts, a commitment to continuous monitoring is required to provide critical information on the state of freshwater in Canada. Up-to-date standardized freshwater health assessments go hand in hand with continuous monitoring and are critical to ensure appropriate management policy and decisions.

© Shutterstock

LOOKING FORWARD

The health of freshwater systems for wildlife and human communities depends on evidence-based conservation and decision-making. And that evidence requires a foundation of up-to-date and comprehensive watershed data.

That's why efforts to train new collection sources and to advocate for more data sharing are so important. However, collecting the data is only the first half of the equation. We need to get that information into the hands of communities, water stewards and decision-makers, to make sure development decisions and local actions for improvement and stewardship are made with a solid understanding of the current health of the watershed.

And so, while we will continue to advocate for new data collection and sources, we also need to ensure a strong link between data, Indigenous knowledge and action.

To do this, WWF-Canada is committing to a 10-year effort, working with Indigenous and local communities, companies and government to monitor and rebuild resilient habitat. Understanding where we are and how we move forward is critical in measuring our impact.

Of course, ensuring healthy freshwater systems across the country is too big for any one organization. Recognizing this, the Government of Canada has committed to creating a Canada Water Agency that aims to work with governmental and non-governmental partners and stakeholders to find the best ways to keep Canadian waters safe, clean and well-managed. It now has a short window of time to set a mandate to create an enabling framework for a successful Canada Water Agency. These efforts must be informed by evidence, making sure areas that are in good health remain that way. It is important to acknowledge that while the data we discuss in this report are important pieces of evidence, they are not the only ways by which we can assess watershed health and need for conservation efforts. Indigenous ways of knowing are a key component to any water policy discussions and decisions. WWF-Canada will contribute to this work by continuing with the Watershed Reports and assessing watersheds as new data becomes available.

If we want to protect and restore the health of Canada's freshwater ecosystems for the people and wildlife that rely on them, especially in the face of increasing pressures from climate change and biodiversity loss, then we must be more ambitious than ever before in protecting and conserving freshwater in the next decade. We all have a role in shaping freshwater conservation for the 21st century, by building water resilient communities, bringing water data to decision-makers and creating a culture of water stewardship across the country.

ACKNOWLEDGEMENTS

ACAP-Cape Breton

ACAP-Humber Arm

ACAP-Northeast Avalon

ACAP-Saint John

Agence de Gestion Intégrée des Ressources (AGIR)

Alberta Biodiversity Monitoring Institute

Arctic Great Lakes Observatory

Arrow Lake Environmental Stewardship Society (ALESS)

Athabasca Chipewyan First Nation - Community Based Monitoring Program

Atlantic DataStream

Atlantic Water Network

Atlas of Canada 1,000,000 National Frameworks, Hydrology - Dams

Banook Area Residential Association

Bedeque Bay Environmental Management Association

Belleisle Watershed Coalition

Bluenose Coastal Action Foundation

Canadian Aquatic Biomonitoring Network (CABIN) (multiple studies)

Canadian Dam Association

Canadian Data Report of Fisheries and Aquatic Science

Canadian Rivers Institute, University of New Brunswick

Centre d'expertise hydrique du Québec

Centre de bassin versant de la rivière Matapédia (CBVRM)

Centre for Community Mapping (CoMAP)

Centre La Pocatière

Centre St-Laurent

City of London

City of Ottawa

City of Winnipeg

Clean Nova Scotia

Columbia Basin Water Network (CBMN)

Columbia Basin Water Quality Monitoring Program (CBWQMP)

Comité de bassin de la rivière Chaudière (COBARIC)

Comité de bassin de la rivière de Mars

Comité de bassin de la rivière Etchemin (CBE)

Comité de bassin versant de la rivière Kamouraska (COBAKAM)

Community Based Environmental Monitoring Network (CBEMN)

CREATE H2O

Credit Valley Conservation (CVC)

CURAH2O

DataStream - Grand Council

DataStream - Kananaski ENSC

Dena Kayeh Institute

Ducks Unlimited

East Shore Freshwater Habitat Society (ESFHS)

Eastern Charlotte Waterways Inc.

Ecology Action Centre

EcoSpark

Elk River Alliance

Environment and Climate Change Canada

Experimental Lakes Area

Fish and Wildlife Enhancement Fund

Fish and Wildlife Management Information System

Fish Inventories Data Queries (FIDQ)

Fisheries Information Summary System (FISS)

Fisheries Information Summary System Yukon (FISS-Yukon)

Flowing Waters Information System (FWIS)

Fort Nelson First Nation Water Quality Monitoring

Freshwater Invertebrate Reference Network on Northern Ontario (FIRNNO)

GIRB

Government of Alberta

Government of British Columbia

Government of Manitoba

Government of New Brunswick

Government of Newfoundland and Labrador

Government of Nova Scotia

Government of Ontario

Government of Prince Edward Island

Government of Quebec

© Sarah Pietrkiewicz

Government of Saskatchewan

Government of the Northwest Territories

Government of the Yukon

Groupe d'éducation et d'écosurveillance de l'eau (G3E)

Gwich'in Renewable Resource Board

HYDAT, Water Survey of Canada

Hydro Manitoba

Hydro-Québec

Imperial Oil Resources Ventures Limited

Indian Bay Ecosystem Corporation (IBEC)

Joint Oil Sands Monitoring (JOSM)

Junction Creek Stewardship Committee

K'agee Tu First Nation Community Based Monitoring of Kakisa River watersheds

Kelligrews Ecological Enhancement Program

Kennebecasis Watershed Restoration Committee

Lake Simcoe Region Conservation Authority (LSCA/ LSRCA)

Lake Winnipeg basin Information Network

Lake Winnipeg DataStream

Lake Winnipeg Foundation

Lakehead University

Land Information Ontario (LIO) - Ontario Geospatial Data Exchange

Lesser Slave Watershed Council Tributary Monitoring Program

Lower Raritan Watershed Partnership

Lower Thames Valley Conservation Authority (LTVCA)

Mackenzie DataStream

MEAS Mainstream

Mikisew Cree First Nation - Community Based Monitoring Program

Mi'kmaw Conservation Group

Mississippi Valley Conservation Authority (MVCA)

Mochnaz, Backhouse, Bajno and Reist

Nashwaak Watershed Association

Niagara Peninsula Conservation Authority (NPCA)

North Bay-Mattawa Conservation Authority (NBMCA)

Nottawasaga Conservation Authority (NVCA)

NWT-Wide Community-Based Monitoring Program

Oatthill Lake Conservation Society (OLCS)

OBV St-Maurice

Ontario Benthos Biomonitoring Network (OBBN)

Organisme de bassin versant (OBV) du Saguenay

Parc National du Mont Tremblant

Parks Canada (multiple parks)

Petitcodiac Watershed Alliance

Regroupement des intervenants pour la valorisation et l'aménagement global et écologique (RIVAGE) de la rivière du Moulin

Regroupement des organismes de bassin versants du Québec (ROBVQ)

Sackville River Association

Salmo Watershed Streamkeepers Society (SWSS)

SaskH_2O

Shediac Bay Watershed Association (SBWA)

Shubenacadie Watershed

Slocan Lake Stewardship Society (SLSS)

South Central Eco Institute

South Shore Watershed Association (SSWA)

Southeast Environmental Association

Southern Gulf of St. Lawrence Coalition (SGSL)

St. Lawrence River Institute

Suncor Energy Fluvarium

Tabusintac Watershed Association

The Manuels River Experience

Toronto and Region Conservation Authority (TRCA)

Triton Environmental Consultants

Trout River Environmental Committee Inc. (TRECI)

Tusket River Environmental Protection Association (TREPA)

Unama'ki Institute of Natural Resources

University of Manitoba

Upper Thames River Conservation Authority (UTRCA)

Vale Living With Lakes Centre

Wildsight Golden

Wildsight Regional

Yukon River Inter-Tribal Watershed Council

*The 2020 Watershed Reports is generously supported by the **RBC Foundation** and our donors and supporters.*

REFERENCES

Government of Canada. (2019a). Open data 101. Retrieved from https://open.canada.ca/en/open-data-principles#toc95

Government of Canada. (2019b). Third Biennial Plan to the Open Government Partnership. Retrieved from https://open.canada.ca/en/content/third-biennial-plan-open-government-partnership#toc5-3-2

Open data charter. (n.d.). Principles. Retrieved from https://opendatacharter.net/principles/#open-by-default

Open Knowledge Foundation. (n.d.a). The open definition. Retrieved from https://opendefinition.org/

Open Knowledge Foundation. (n.d.b). What is open data? Retrieved from https://okfn.org/opendata/

Living Lakes Canada, WWF-Canada, & The Gordon Foundation. (2019, April). Final recommendations: Elevating community-based water monitoring in Canada. Retrieved from https://gordonfoundation.ca/wp- content/uploads/2019/04/CBWM_Roundtable_Recommendations-Final.pdf

National Advisory Council for Environmental Policy and Technology (NACEPT). (2016, December). Environmental protection belongs to the public: A vision for citizen science at EPA (EPA 219-R- 16-001). Retrieved from https://www.epa.gov/sites/production/files/2020- 04/documents/nacept_cs_report_final_508.pdf

WWF-Canada. 2020. Living Planet Report Canada: A national look at wildlife recovery. Currie J. Snider J. Giles E. World Wildlife Fund Canada. Toronto, Canada

International Union for Conservation of Nature (IUCN). (2020). Nature-based Solutions. Retrieved from https://www.iucn.org/commissions/commission-ecosystem-management/our-work/nature-based-solutions

Wilson, N. J., et al. 2018. Community-based monitoring as the practice of Indigenous governance: a case study of Indigenous-led water quality monitoring in the Yukon River Basin. Journal of Environmental Management, 210, pp.290-298. doi:10.1016/j.jenvman.2018.01.020

WWF

A Canada with abundant wildlife, where nature and people thrive.

wwf.ca

© Wilfried D. Schurig