Annual Report of Activities under the *Drinking Water Protection Act* in BC 2022 to 2023

BRITISH COLUMBIA
Office of the Provincial Health Officer

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Provincial Health Officer

www.health.gov.bc.ca/pho/reports/drinkingwater

Ministry of Water, Land and Resource Stewardship
Victoria, BC
lək̓ʷəŋən Territory

December 2024

The Honourable Randene Neill
Minister of Water, Land and Resource Stewardship

Dear Minister:

Under section 4.1 of the *Drinking Water Protection Act*, the Provincial Health Officer must prepare and deliver to the Minister an annual report respecting activities under the Act. I have the honour of submitting to you the first Provincial Health Officer's *Annual Report of Activities under the Drinking Water Protection Act in BC, 2022 to 2023*.

Sincerely,

Bonnie Henry
OBC, MD, MPH, FRCPC
Provincial Health Officer

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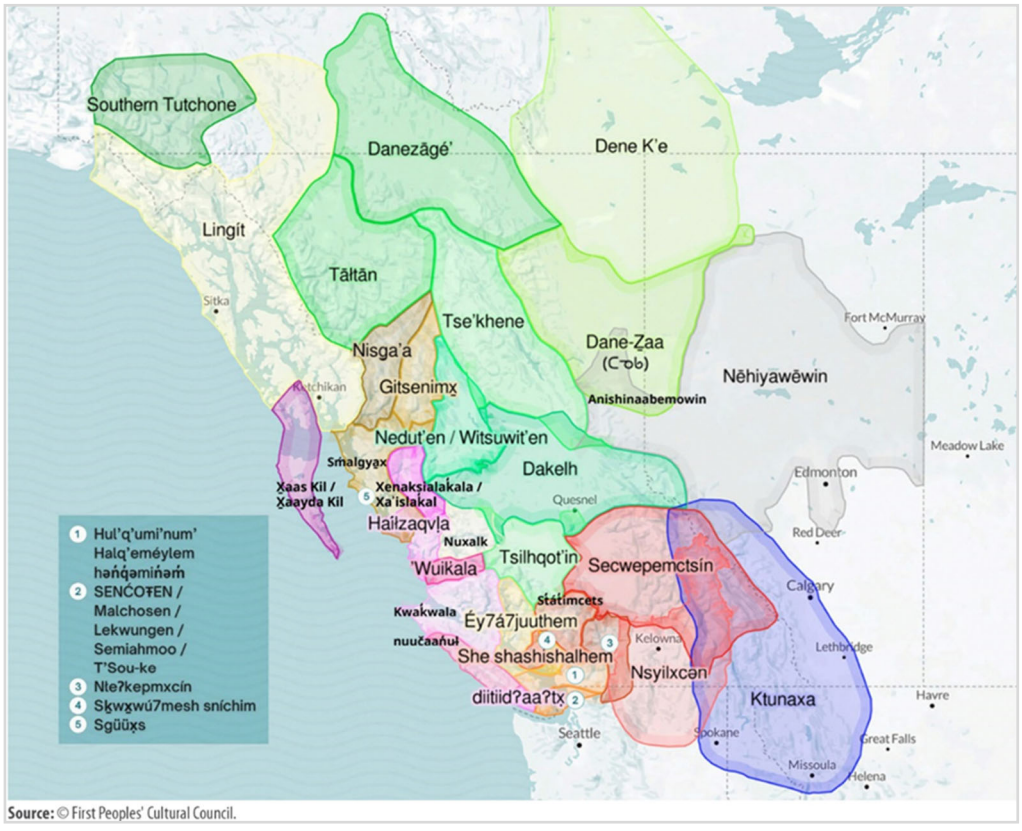
Acknowledgements

Land and Waters Acknowledgement

We acknowledge with great respect the territories of the lək̓ʷəŋən peoples on which the Office of the Provincial Health Officer stands, and the Songhees, Esquimalt, and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day. We recognize and express our gratitude for the medicines within these territories, and the First Nations territories that stretch across every part of the province of British Columbia.

There are 34 First Nations language groups in BC, whose territories stretch across every part of the province as highlighted in Figure A. To learn more about the First Peoples' Map of BC, visit *https://maps.fpcc.ca/*.

Figure A: First Peoples' Map of BC



Source: © First Peoples' Cultural Council.

Inherent Indigenous Rights Acknowledgement

We acknowledge with respect the inherent rights of the First Nations whose ancestral territories cover all of the province now known as British Columbia, including their unextinguished land and water rights and rights to self-determination, health, and wellness within these territories. Laws and governance systems rooted in the lands and waters have upheld the sovereignty of these diverse Nations for thousands of years. The rights and responsibilities of First Nations to their ancestral territories have never been ceded or surrendered, and are upheld in provincial, national, and international law.

We also recognize that many Indigenous Peoples (First Nations, Métis, and Inuit) from elsewhere in what is now known as Canada and beyond also call these lands and waters home, and they too have inherent Indigenous rights to self-determination, health, and wellness. This includes Métis Nation British Columbia and its Chartered Communities across BC, as well as those whose ancestral territories are outside of BC.

We recognize that the BC *Declaration on the Rights of Indigenous Peoples Act*[1] and other legislation requires us to uphold the United Nations Declaration on the Rights of Indigenous Peoples,[2] meaning that we must change our processes to align with this declaration. We acknowledge that this report-writing process was not yet in alignment with these requirements, and that we continually strive to do better going forward.

Specific acknowledgments related to this report include:

- Within many Indigenous perspectives, "The ecosystems of Mother Earth need to be recognized as foundational to the health of all beings because the ecosystem is our health system."[3]
- The colonial structure of BC provincial law was created and imposed over existing First Nations laws and governance systems that are tied to land and water, and imposed laws are rooted in an understanding of Crown sovereignty, which is now called into question by the *United Nations Declaration on the Rights of Indigenous Peoples Act*[4] and the Vatican repudiation of the Doctrine of Discovery.[5]

- The *Drinking Water Protection Act* and the ways in which the Provincial Health Officer is mandated to report as per this legislation diminishes the conversation regarding First Nations and water to the imposed *Indian Act*'s "on-reserve" jurisdiction rather than Aboriginal rights and title upheld in the Canadian constitution and Canadian courts. At this time, this report continues to uphold the legislative framework of *Indian Act* understandings of "First Nations territory" rather than Aboriginal rights and title upheld in our constitution and Canadian courts.
- The BC *Declaration Act Action Plan*[6] acknowledges legal pluralism in BC, recognizing that within Canada there are multiple legal orders, including Indigenous laws and legal orders with distinct roles, responsibilities, and authorities. Future reports will seek to better uphold shared decision-making and First Nations legal systems within the province.

Foundational Obligations to Indigenous Rights in Relation to Water

We understand that we have been given Foundational Instructions from Indigenous Peoples related to inherent rights and water:

International

United Nations Declaration on the Rights of Indigenous People:[2]

- Article 25 states: "Indigenous Peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard."
- Article 26 states in part: "Indigenous Peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired" and "States shall give legal recognition and protection to these lands, territories and resources. Such recognition shall

be conducted with due respect to the customs, traditions and land tenure systems of the Indigenous Peoples concerned."

- Article 32 states in part: "States shall consult and cooperate in good faith with the Indigenous Peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources."

National

Truth and Reconciliation Commission of Canada: Calls to Action:[7]

- Call to Action 43 states: "We call upon federal, provincial, territorial, and municipal governments to fully adopt and implement the United Nations Declaration on the Rights of Indigenous Peoples as the framework for reconciliation."
- Call to Action 47 states: "We call upon federal, provincial, territorial, and municipal governments to repudiate concepts used to justify European sovereignty over Indigenous Peoples and lands, such as the Doctrine of Discovery and terra nullius, and to reform those laws, government policies, and litigation strategies that continue to rely on such concepts."

Reclaiming Power and Place: The Final Report of the National Inquiry into Missing and Murdered Aboriginal Women and Girls:[8]

- Call for Justice 4.1 states: "We call upon all governments to uphold the social and economic rights of Indigenous women, girls, and 2SLGBTQQIA[a] people by ensuring that Indigenous Peoples have services and infrastructure that meet their social and economic needs. All governments must immediately ensure that Indigenous Peoples have access to safe housing, clean drinking water, and adequate food."

[a] 2SLGBTQQIA: Two-spirit, lesbian, gay, bisexual, transgender, queer, questioning, intersex and asexual. Terminology and acronyms continue to evolve. A glossary of common acronyms used by the Government of Canada can be found at: *https://women-gender-equality.canada.ca/en/free-to-be-me/2slgbtqi-plus-glossary.html*.

BC Provincial

BC Declaration Act Action Plan:[6]

- Action 2.7 calls for the Ministry of Water, Land and Resource Stewardship to: "Collaborate with First Nations to develop and implement strategies, plans, and initiatives for sustainable water management, and to identify policy or legislative reforms that support Indigenous water stewardship, including shared decision-making. Co-develop the Watershed Security Strategy with First Nations and initiate implementation of the Strategy at a local watershed scale."

First Nations Population Health and Wellness Agenda:[9]

- Under the description of the indicator of ecological wellness and connection to land, this report underscores the importance of acknowledging and monitoring ecological health from a First Nations perspective. This section includes reminders that:
  - ◊ "Land, water, and territory permeate all aspects of First Nations wellness, as they are sources of healing, and of mental, physical, spiritual, and emotional health and wellness."
  - ◊ "Many population health reports include a measure of environmental health, but they tend to be reductionist measures that focus on human risks from environmental hazards (e.g., water pollution, soil contamination) and environmental deficits (e.g., fishery declines, deforestation). Those measures are useful to monitor risks to human health resulting from human contaminants or development, but they do not reflect a First Nations perspective of the land."[b]

[b] Note that the term "land" in the First Nations Population Health and Wellness Agenda is defined as "an all-encompassing concept that includes land, water, and the animals and plants and other beings that live on this earth."

Report Acknowledgements

The Provincial Health Officer would like to thank the following organizations for lending their expertise and assistance to the Provincial Health Officer's team during the development of this report (alphabetical):

Environmental Operators Certification Program
Fraser Health
Interior Health
Island Health
Ministry of Health
- Health Protection Branch

Northern Health
Provincial Health Services Authority
- BC Centre for Disease Control Public Health Laboratory
- Enhanced Water Quality Assurance Program

Vancouver Coastal Health

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2022/23 Report Highlights

The Provincial Health Officer (PHO) is the senior public health official for BC and holds monitoring, oversight and reporting responsibilities under the *Drinking Water Protection Act* (DWPA). Section 4.1 of the DWPA requires the PHO to prepare a report on the activities conducted under the Act for the past year.[10] This is the first annual report to the Minister of Water, Land and Resource Stewardship summarizing activities under the DWPA using a new simplified reporting framework which is focused on key legislated activities under the Act. This report presents metrics for permitting, inspection, monitoring and enforcement activities for the 2022/23 fiscal year. These annual reporting metrics of legislated activities were identified in partnership with the regional health authorities, the Ministry of Health (HLTH), the Ministry of Water, Land and Resource Stewardship (WLRS), and the BC Centre for Disease Control (BCCDC). This reporting framework will change as the DWPA is brought into alignment with the *Declaration on the Rights of Indigenous Peoples Act*.

In 2022/23:

- The number of drinking water supply systems permitted under the DWPA in BC increased from 4,968 in 2021/22 to 5,240. While many water systems in the province are small (93 per cent), most people are served by large local government water systems.
- HLTH released an updated version of the *Drinking Water Officers' Guide* (2022), which was later supplemented with the *Design Guidelines for Drinking Water Systems in British Columbia* (March 2023). These guidelines help to ensure system infrastructure meets provincial requirements, increase efficiency and consistency of designs, and build on leading practices in BC.
- All regional health authorities except for Interior Health reported more than 90 per cent of large water systems in their jurisdictions had an emergency response and contingency plan. Large water systems usually have paid operators with increased

levels of training and operational knowledge that are required to develop and execute an emergency response and contingency plan.

- Small water systems are less likely to have an accepted emergency response and contingency plan than large systems, especially in Interior Health. This is due to the large number of small water systems in the health region, and the operational and management challenges they face. To support small water system compliance, Interior Health has developed templates and training for small water system operators on how to build effective emergency response and contingency plans.
- Operators of small and medium-sized water systems submitted 95,572 drinking water samples to the BCCDC Public Health Laboratory (BCCDC PHL) and BCCDC-subcontracted labs for testing, an increase of 8 per cent over 2021/22. Despite this increase, the number of positive *E. coli* reports remained stable. The BCCDC PHL supports small and medium-sized public water systems by providing subsidized routine bacterial water quality testing for total coliform and *E. coli*, as required under the DWPA and regulation.
- Large water systems generally have good compliance with bacteriological monitoring requirements, exceeding 85 per cent within the health regions able to report. Small water system compliance decreased for the 2022/23 fiscal year, partly due to the ongoing challenges faced by these types of systems.
- The number of drinking water systems on advisory on March 31, climbed from the 803 recorded in 2022 to 864 advisories (16 per cent of water systems) in 2023, which is the highest number of advisories ever recorded by the PHO. While the number of total advisories increased in 2023, the percentage of water systems on advisory remained the same, as the number of water systems in 2023 also increased.
- Drinking water advisories of all types increased: boil water notices by 7 per cent, water

quality advisories by 7 per cent, and do not use/consume notices by 22 per cent. In addition, more water systems that were placed on advisory during 2022/23 appeared to have stayed on advisory.

- The growing number of advisories may be the result of several different factors. Most advisories affect small water systems (97 per cent), which often have operational capacity and compliance challenges that are difficult to resolve. New or revised guidelines with more stringent water quality targets or design standards can also contribute to new advisories, such as the increasing number of water quality advisories after the 2019 drinking water guideline for manganese was introduced.
- The majority (73 per cent) of active advisories recorded on March 31, 2023, were long-term advisories lasting 18 months or longer. Forty-six per cent had been in place for over five years, and 30 per cent for greater than ten years. Ninety-nine per cent of advisories lasting over five years are for small water systems.
- In 2022, BC experienced another hot and dry summer. The ongoing drought conditions in the fall of 2022 and winter of 2022/23 resulted in much of the province entering 2023 with water level deficits. While the ongoing impacts from extreme climate-related events may be contributing to the growth in advisories, it is unlikely to fully explain this increase. Another contribution to the rise may include drinking water officers catching up on overdue inspections from the COVID-19 pandemic and discovering new problems that warrant a drinking water advisory.
- Workforce shortages continue to be a challenge for some regional health authorities. In 2023, there were 52.65 filled Drinking Water Program full-time equivalent (FTE) positions in BC, an increase of 5 per cent from 2022, when 49.95 FTEs were filled. Despite the

increase in filled FTEs, 17.8 positions remained vacant, most of which were in Northern Health.

Water system inspections increased for all health authorities, except for Northern Health where inspections declined by 3 per cent. While the percentage of water systems receiving an inspection has not returned to pre-2020/21 levels, the upward trend in inspections suggests that improvements are occurring within the regional health authorities where available staffing has improved.

Managing and collecting information on drinking water and source water supplies continues to be a challenge. To help address this, HLTH is working with key partners to implement a drinking water module as part of a larger Environmental Health Information System (EHIS). A technical release, including the drinking water module is planned for the spring of 2025. Further to this work, WLRS is supporting the development and interoperability of EHIS with the establishment of a spatial dataset of drinking water intake locations and their sources. This dataset is being designed to link with EHIS; together, they will improve the accessibility and reliability of the data on drinking water supply systems, regional health authority drinking water programs, and risks to drinking water sources.

The ongoing trends and challenges relating to data, staffing, inspections, advisories, climate change, and small water systems documented throughout this report reinforce the need for urgent action and continued work on the recommendations outlined in the recent Provincial Health Officer's report, *Clean, Safe, and Reliable Drinking Water: An Update on Drinking Water Protection in BC, 2017/18 to 2021/22,*[11] which offers an in-depth discussion of drinking water protection in BC.

Introduction

The protection and oversight of drinking water sources and drinking water supply systems is a shared responsibility in BC. First Nations have had laws based on relationships with the lands and the waters within their territories for thousands of years. Since 2003, the *Drinking Water Protection Act* (DWPA) has been the principal provincial statute concerning drinking water protection and remains the responsibility of the Ministry of Health (HLTH) to administer and the regional health authorities to implement and enforce.[10] While the DWPA is the primary statute regarding drinking water quality from water suppliers, it is only one of many pieces of legislation that are important in the management and protection of drinking water. Bringing the DWPA into alignment with the *Declaration on the Rights of Indigenous Peoples Act* will be an important step to protecting water.

The Provincial Health Officer (PHO) is the senior public health official for BC and holds monitoring, oversight, and reporting responsibilities under the DWPA. Under section 4.1 of the DWPA, the PHO must prepare a report on the activities conducted under the Act for the past year.[10] To satisfy this regulatory requirement, the PHO has released six drinking water reports that include data on activities conducted under the DWPA covering multiple fiscal years, and progress updates on the *Action Plan for Safe Drinking Water in British Columbia* (the Action Plan).[12] On October 19, 2023, the responsibilities of the Minister under section 4.1 were transferred from the Minister of Health to the Minister of Water, Land and Resource Stewardship to align with the new ministry's mandate for coordinating across ministries for drinking water protection.[13]

In 2019, in response to a recommendation from the Office of the Auditor General to provide drinking water reports annually,[14,15] the PHO committed to separating the reports of activities under section 4.1 of the Act from the broader progress

reports on drinking water and the Action Plan. This is the first report submitted to the Minister of Water, Land and Resource Stewardship summarizing activities under the DWPA using this new annual reporting framework. It presents permitting, inspection, monitoring, and enforcement activities under the Act, for the 2022/23 fiscal year.

To determine which metrics to include in this report, the PHO distributed a survey to the regional health authorities, HLTH, the Ministry of Water, Land and Resource Stewardship (WLRS), and the BC Centre for Disease Control (BCCDC) and asked them to rate each metric under the Act according to its importance and its feasibility to collect and report to the PHO annually. Metrics that were identified as important but not feasible to report on were flagged for inclusion in future reports pending information system improvements.

This report is intended to be read by people with responsibilities for the oversight and operation of drinking water supply systems and by members of the public who have an interest in drinking water protection. The PHO will continue to release periodic progress reports on the protection of drinking water, such as the recently released *Clean, Safe, and Reliable Drinking Water: An Update on Drinking Water Protection in BC, 2017/18 to 2021/22*. These broader reports will include new recommendations, along with updates to previous recommendations, to improve the protection of drinking water in BC.

Managing and collecting information on drinking water systems and water quality from source to tap continues to be a challenge in BC. Currently, half the regional health authorities are using data systems that have reached end-of-life status and require replacement. To help address this, HLTH is working with key partners, including the Office of the Provincial Health Officer and the regional health authorities, to standardize key data elements for drinking water systems and to implement a drinking water module as part of a larger Environmental Health Information System (EHIS). Work is underway to build the drinking water module for EHIS with an initial technical release planned for the spring of 2025. In alignment with this work, WLRS is engaging with key partners to support

the development and interoperability of EHIS with the establishment of a spatial dataset of drinking water intake locations and their sources. This is the first step in identifying known hazards to drinking water sources.

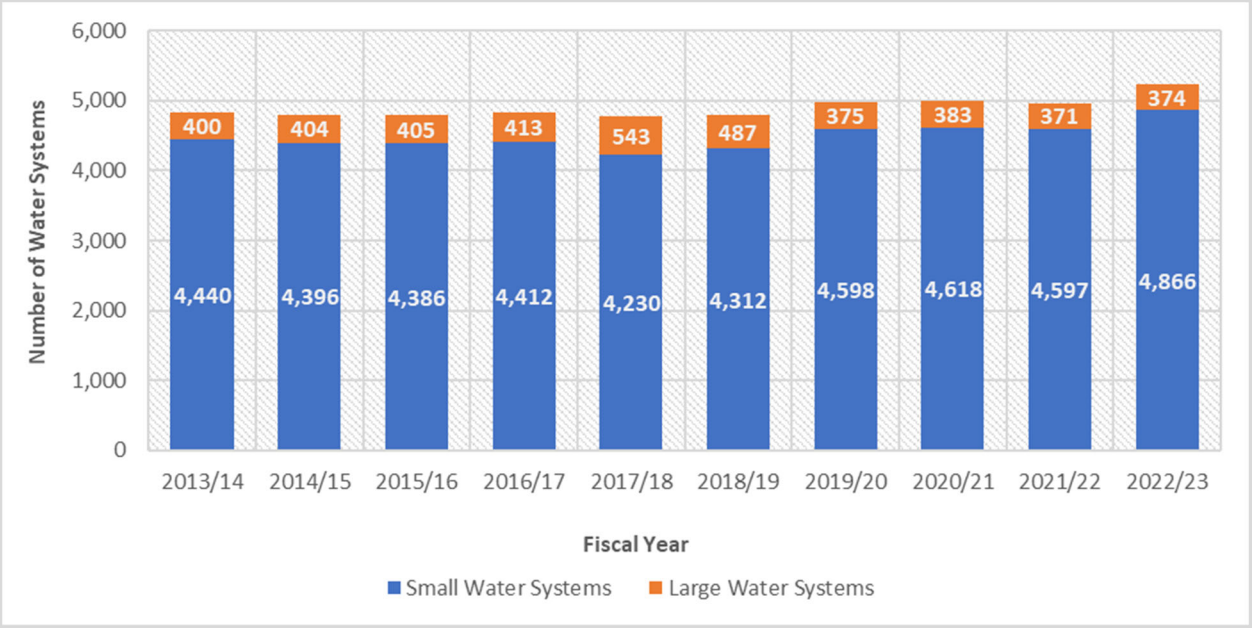
Implementation of EHIS will improve the accessibility and reliability of the data the PHO collects on drinking water supply systems and the actions taken by regional health authority drinking water programs. In the interim, the data the PHO has access to are limited and inconsistently reported. This report provides a summary of activities such as permitting, water system classification levels, operator certification, inspections, water quality monitoring, public notification, and enforcement actions.

Summary of Water Systems in BC

Water System Size

In British Columbia, private water systems serving single-family residences and water systems on First Nations reserves are not regulated under the *Drinking Water Protection Act* (DWPA). Any mention of water systems in this report refers to drinking water supply systems permitted under the DWPA.[10] The number of water systems in BC continues to grow, from 4,968 in 2021/22 to 5,240 in 2022/23 (Figure 1). While the majority of water systems in the province are small (93 per cent), most of the population is served by a small number of larger local government water systems. Compared to March 31, 2022, the number of large water systems increased marginally, while the number of small water systems grew by 6 per cent.

Figure 1: Number of Small and Large Water Systems by Fiscal Year, BC, as of March 31, 2013/14 to 2022/23



Note: Small water systems serve 500 or less people in a 24-hour period. Large water systems serve greater than 500 people in a 24-hour period.

Source: Regional health authorities; 2013/14–2022/23.

Fluctuations in the number of systems can be observed throughout the entire data set in Figure 1, which may be due to the creation or discovery of unregulated small systems, misclassification between small and large systems when the data are counted, the amalgamation of systems, small commercial systems shutting down and no longer requiring a permit to operate, or the removal of closed files from the database.

Table 1 shows the number of recorded water systems in the province as of March 31, 2023, categorized by size and health authority. Interior Health holds the largest number of water systems (38 per cent) followed by Northern Health (27 per cent), Island Health (20 per cent), Fraser Health (8 per cent) and Vancouver Coastal Health (7 per cent).

Bulk Water Haulers in BC

Trucks used for bulk drinking water delivery are included in the definition of a domestic water system and require a permit to operate under the DWPA.[10] Table 2 shows the number of bulk water haulers and private bulk water delivery fill stations, by regional health authority, on March 31, 2023. Permitted trucks have increased by 8 per cent over 2022.

The majority of permitted water hauler vehicles operate within Northern Health.

Table 1: Number of Small and Large Drinking Water Systems, by Regional Health Authority, BC, as of March 31, 2023

Regional Health Authority	Small	Large	Total
Island Health	955	86	**1,041**
Northern Health	1,333	65	**1,398**
Vancouver Coastal Health	340	36	**376**
Interior Health	1,857	150	**2,007**
Fraser Health	381	37	**418**
Total	**4,866**	**374**	**5,240**

Source: Regional health authorities; 2022/23.

Table 2: Number of Bulk Water Haulers and Private Bulk Water Delivery Fill Stations, by Regional Health Authority, BC, as of March 31, 2023

Regional Health Authority	Permitted Trucks	Permitted Fill Stations with Stand alone Water Source
Island Health	25	6
Northern Health	161	7
Vancouver Coastal Health	5	0
Interior Health	25	–
Fraser Health	5	0
Total	**221**	**–**

Notes: At present, not all regional health authorities track information in their data systems on permitted fill stations with a private stand-alone water source. No data available from Interior Health on the number of permitted fill stations.
Source: Regional health authorities; 2022/23.

Guidelines and Permits

Drinking Water Guidelines and Directives

Under the *Drinking Water Protection Act* (DWPA) (s. 4), the Minister of Health may establish guidelines and directives that must be considered or followed. The Provincial Health Officer (PHO) must monitor compliance with the guidelines and directives established by the Minister.[10] In 2022/23, Ministry of Health (HLTH) released an updated version of the *Drinking Water Officers' Guide* (2022),[16] which was later supplemented by the *Design Guidelines for Drinking Water Systems in British Columbia* (March 2023).[17] The design guidelines support the following:

- help ensure that water treatment and distribution system infrastructure meet provincial requirements for the provision of clean, safe, and reliable drinking water;
- provide clear guidance to increase the efficiency and consistency of the design and construction of new drinking water systems and when making changes to existing systems; and
- build on leading practices currently in place in BC, incorporate applicable standards from other jurisdictions, and reflect the diversity of water systems that serve communities across the province.[17]

Construction Permits

Table 3 shows the number of construction permits issued across all health regions for the 2022/23 fiscal year. During this period, 699 permits were issued. Improvements/upgrades and extensions accounted for most of the permits, at 87 per cent. New systems and construction permit waivers accounted for the remaining 13 per cent of the total permits. Twenty-five permits were issued for the construction of new water systems since March 31, 2022, which only accounted for 9 per cent of the 272 water systems added to the number of systems counted during the 2022/23 fiscal year. The discrepancy between the number of additional

Table 3: Number of Construction Permits, by Regional Health Authority, BC, as of March 31, 2023					
Regional Health Authority	**Improvements /Upgrades**	**Extensions**	**New Systems**	**Construction Permit Waivers**	**Total**
Island Health	92	135	1	46	**274**
Northern Health	53		10	11	**74**
Vancouver Coastal Health	30	17	10	0	**57**
Interior Health	103	142	1	11	**257**
Fraser Health	14	20	3	0	**37**
Total	**606**		**25**	**68**	**699**

Note: Northern Health indicated that their data system does not capture the specific reason for a construction permit—whether an improvement/upgrade or an extension. Thus, their counts and the totals for those permit types are combined.

Source: Regional health authorities; 2022/23.

water systems and the number of new construction permits is in part due to ongoing data cleanup efforts with the regional health authorities. This can result in the discovery of new systems, the reclassification of existing systems, and/or the removal of old systems or systems no longer in operation. Also, if a drinking water officer discovers a small water system operating without health authority permits or approvals, a construction permit would typically not be issued for existing works. Instead, the system would undergo a "Record Purposes Only" review, which can include a source water assessment/system assessment and a public health engineer review of the existing system (the public health engineer review can result in a "Letter of Record"). An operating permit with any required terms and conditions is issued and the system is then managed as a regulated system.

Water Operations and Management

Water System Facility Classification

In BC, the Environmental Operators Certification Program (EOCP) classifies water systems and certifies operators using standards adopted by the Association of Boards of Certification.[c] Water system facility classifications include small water systems, water treatment systems (Levels I to IV), and water distribution systems (Levels I to IV). Classification levels are based on a system's operational complexity. This is determined by an overall point score, where points are given based on the level of technical complexity, the capacity (size), and the population served. Level IV represents the highest level of complexity for either water treatment or water distribution systems; however, certification for Level IV operators is not a requirement under the Drinking Water Protection Regulation (DWPR). A water system's facility classification determines the certification level required for the operator of that system (i.e., the degree of knowledge and training an operator must have). Table 4 shows the number of water treatment facilities and water distribution systems at each classification level (I to IV) as of March 31, 2023.

The overall number of water treatment and distribution systems classified by the EOCP increased marginally by 15 systems since March 2022[11]; however, the number of systems with an expired classification grew by 39 during the same period (20 treatment systems and 19 distribution systems). The EOCP tracks water system classifications based on their status with the EOCP—active versus expired. The EOCP requires all water treatment and distribution systems to reclassify every five years and following any major process change. If a water system owner fails to reclassify (for reasons such as forgetting to submit their classification renewal forms, retiring or changing careers, or if the system is no longer operational), the EOCP flags the system as expired.

[c] The Association of Boards of Certification is an international organization that provides the standards for classification and certification, and issues examinations for operators.

Table 4: Number of Water Treatment and Water Distribution Facilities, by Level of Classification, as of March 31, 2023					
Type of System	**Classification Level**				**Total**
	IV	**III**	**II**	**I**	
Water Treatment	26	38	86	65	**215**
Water Treatment (Expired)	1	3	37	27	**68**
Water Treatment Total	**27**	**41**	**123**	**92**	**283**
Water Distribution	28	68	129	69	**294**
Water Distribution (Expired)	4	13	44	54	**115**
Water Distribution Total	**32**	**81**	**173**	**123**	**409**

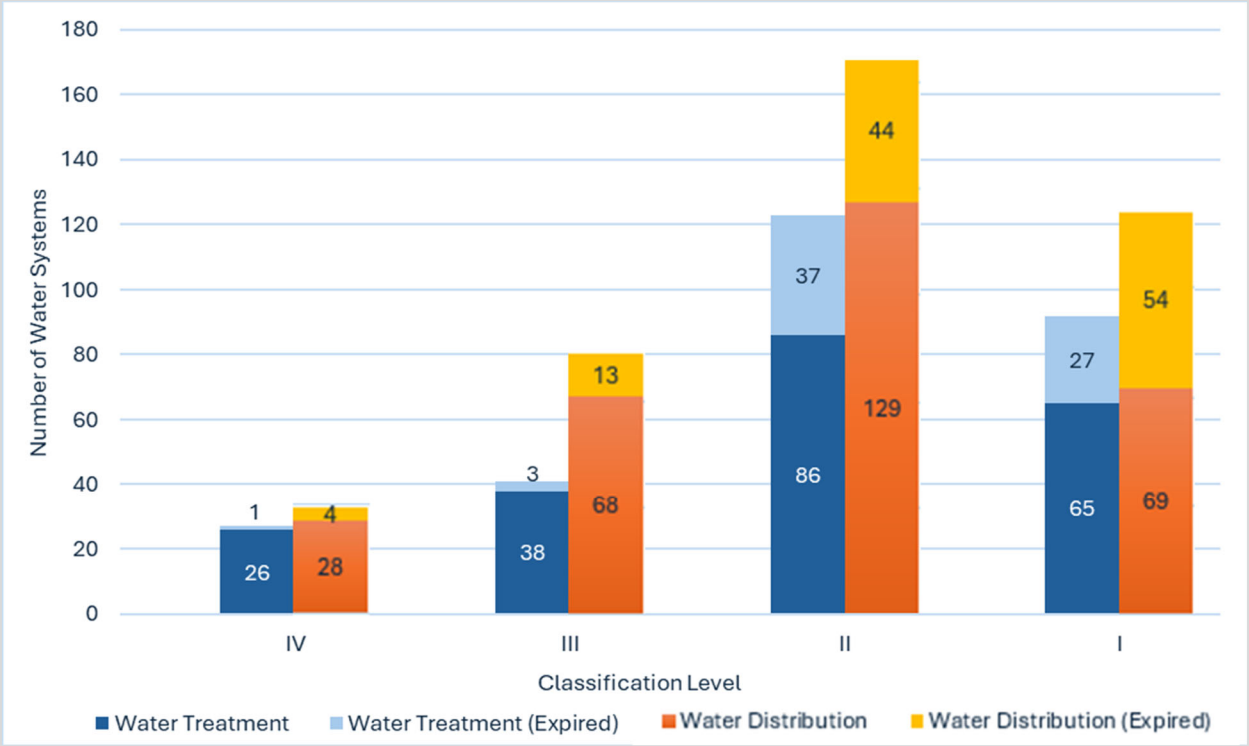
Note: Expired facilities are an internal flag set within the Environmental Operators Certification Program Customer Relations Manager system. It indicates that a facility's classification status is expired and needs to be renewed. It does not imply an operational status. Data are included here for completeness.
Source: Environmental Operators Certification Program; 2022/23.

The data for 2022/23 indicate that the EOCP classified most water systems at Level II (Figure 2): treatment systems accounted for 40 per cent and distribution systems for 44 per cent. This was followed by Level I (23 per cent and 30 per cent respectively), Level III (23 per cent and 18 per cent respectively), and Level IV (10 per cent and 12 per cent respectively). In 2022/23, the EOCP flagged 183 facilities with an expired classification status: 37 per cent of these were water treatment facilities and 63 per cent were water distribution facilities.

Operator Certification

Table 5 and Figure 3 show the number of operators certified by the EOCP based on their level of certification. Most water treatment operators were certified at Level I (38 per cent), and most water distribution operators were also certified at Level I (43 per cent). This was followed by Level II for both water treatment operators (36 per cent) and water distribution operators (39 per cent). Level III and IV made up the remainder of water treatment operators (26 per cent combined) and water distribution operators (18 per cent combined).

Figure 2: Number of Water Treatment and Water Distribution Facilities, by Level of Classification, BC, as of March 31, 2023



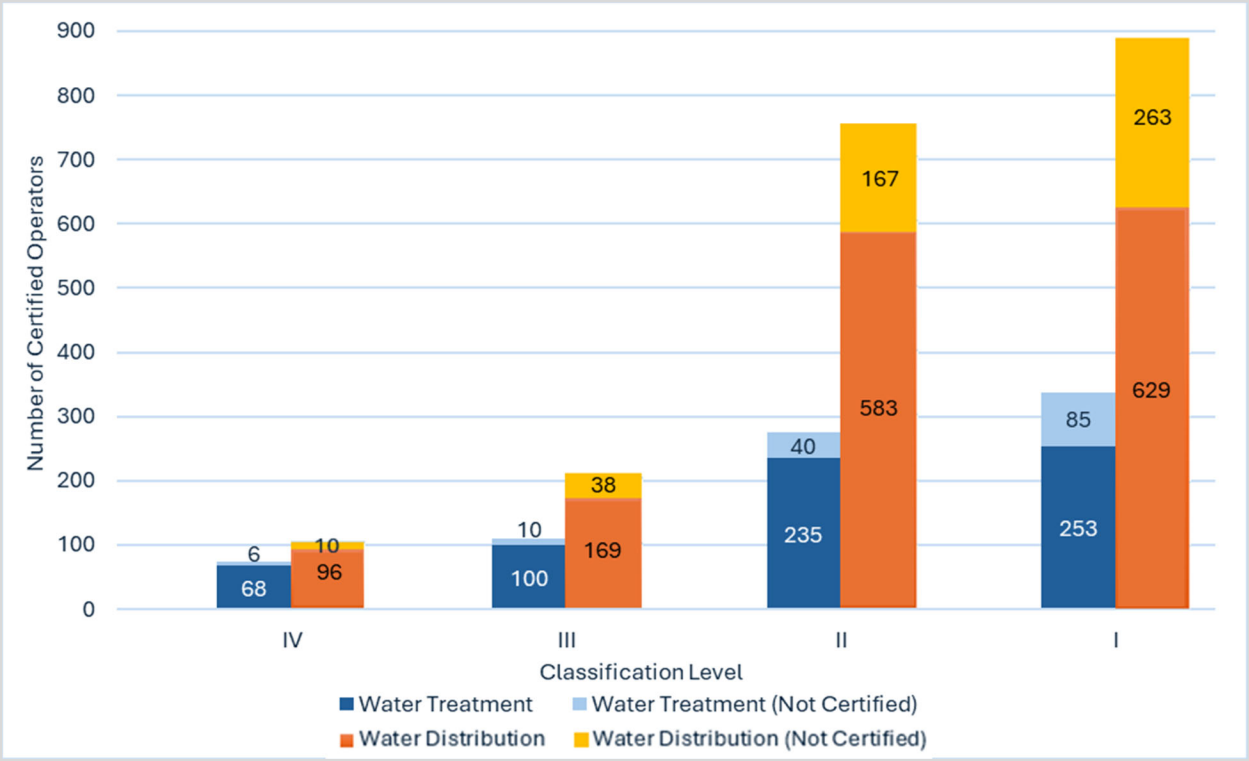
Source: Environmental Operators Certification Program; 2022/23.

Table 5: Number of Certified Water Treatment and Water Distribution Operators, by Level of Certification, BC, as of March 31, 2023

Type of System	Certification Level				Total
	IV	III	II	I	
Water Treatment	68	100	235	253	**656**
Water Treatment – Not Certified	6	10	40	85	**141**
Water Treatment Total	**74**	**110**	**275**	**338**	**797**
Water Distribution	96	169	583	629	**1,477**
Water Distribution – Not Certified	10	38	167	263	**478**
Water Distribution Total	**106**	**207**	**750**	**892**	**1,955**

Source: Environmental Operators Certification Program; 2022/23.

Figure 3: Number of Certified Water Treatment and Water Distribution Operators, by Level of Certification, BC, as of March 31, 2023



Source: Environmental Operators Certification Program; 2022/23.

Based on the data in Table 5, 18 per cent of all water treatment operators and 24 per cent of all water distribution operators were considered no longer certified by the EOCP.[d] The number of certified operators can fluctuate for a few reasons: operators may not have met the certification criteria set out by the EOCP or may have retired or left the industry.[11] Since March 2022,[11] the number of certified treatment and distribution operators grew by 209, while the number of uncertified treatment and distribution operators (i.e., operators not in good standing with EOCP certification requirements) decreased by 204.

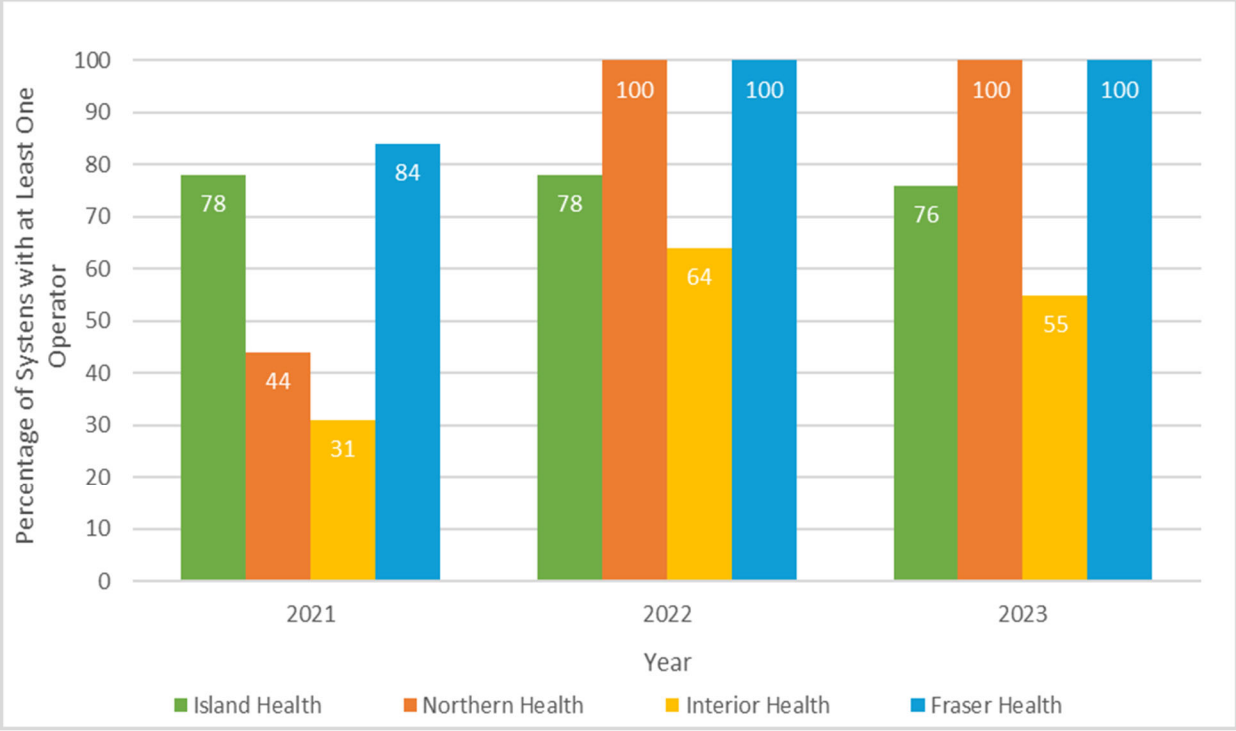
As an indicator for good operations, the Provincial Health Officer (PHO) tracks the number of large water systems that have at least one operator certified to the level of

[d] During the preparation of this report, the term "not in good standing" was changed. The EOCP now uses the term "not certified," which applies to operators who for example, have unpaid dues or have not kept their continuing education units up to date.

classification for the system. As discussed in the previous PHO drinking water report, some data are available, however data system limitations still restrict data completeness.[11]

Figure 4 shows the per cent of large water systems that have an operator certified to the level of classification for the system in four out of five regional health authorities. For 2023, from those regional health authorities reporting data, an average of 83 per cent of large systems that serve more than 500 people per day have at least one operator certified to the level of classification for the system. This is a decrease from 86 per cent in 2022. Interior Health experienced a decrease in 2023, which is attributed to a changeover in certified operators. However, Interior Health anticipates that the number of certified operators for large systems will increase in 2024.

Figure 4: Percentage of Large Water Systems Serving > 500 People per Day with at Least One Operator Certified to the Level of Classification for the System, by Regional Health Authority, BC, as of March 31, 2021 to March 31, 2023



Note: No data were available from Vancouver Coastal Health due to data system limitations.

Source: Regional health authorities; 2020/21–2022/23.

Emergency Response and Contingency Plans

Table 6 shows the number and percentage of water systems within each regional health authority that have an accepted emergency response and contingency plan. Apart from Interior Health, all regional health authorities reported greater than 90 per cent of large water systems having an accepted emergency response and contingency plan. This is consistent with 2022 data from the regional health authorities. However, Interior Health saw an increase in 2023 for both small and large water systems. Large water systems usually have paid operators with increased levels of training and operational knowledge, which are required to develop and execute an emergency response and contingency plan. This accounts for the higher compliance rates for large systems compared to small water systems. At Interior Health, the lower compliance rates of small water systems with an accepted emergency response and contingency plan are due in part to the large number of small water systems in the health authority, coupled with the operational and management challenges they face.

To support small water systems, Interior Health has developed templates and training for small water system operators on how to build effective emergency response and contingency plans to an acceptable standard. Other provincial guidance for water system operators includes the 2023 *Guide to Emergency Response and Contingency Plans for Water Supply Systems*[18] and the 2016 *Emergency Response and Contingency Planning for Small Water Systems.*[19] How health authorities determine what is an acceptable plan over and above these guidelines for region-specific threats is unknown and may also influence how data in Table 6 are reported regionally.

Table 6: Number and Percentage of Water Systems with an Accepted Emergency Response and Contingency Plan, by Regional Health Authority, BC, as of March 31, 2023

Regional Health Authority	Small	Large	Total
Island Health	820 (86%)	81 (94%)	**901 (86%)**
Northern Health	760 (57%)	64 (98%)	**824 (59%)**
Vancouver Coastal Health	259 (76%)	34 (94%)	**293 (78%)**
Interior Health	402 (22%)	109 (73%)	**511 (25%)**
Fraser Health	381 (100%)	37 (100%)	**418 (100%)**

Source: Regional health authorities; 2022/23.

Water Quality Compliance Monitoring

Guidelines for Canadian Drinking Water Quality

Health Canada leads the Federal-Provincial-Territorial Committee on Drinking Water (Committee on Drinking Water), which develops and publishes the *Guidelines for Canadian Drinking Water Quality* (the Canadian Guidelines).[20] The Canadian Guidelines set out the maximum acceptable concentration (MAC) or treatment goals for substances in drinking water. These limits are based on scientific studies that examine potential harm for both short-term and long-term exposure to a parameter at concentrations above certain levels.[21] In BC, drinking water officers refer to the Canadian Guidelines when assessing potability.

The Committee on Drinking Water also establishes aesthetic objectives, operational guidance values, and guidance documents, which are included in the Canadian Guidelines. Aesthetic objectives (such as taste or odour) are a factor in determining whether consumers will consider the water drinkable. Operational guidance values are used to determine if a substance will interfere with a treatment process or negatively affect drinking water infrastructure. Guidance documents provide operation and management guidance related to specific drinking water-related matters (e.g., drinking water advisories).[20] For 2022/23, Health Canada and the Committee on Drinking Water published or updated guidance on four parameters—dimethoate (MAC of 0.02 mg/L), omethoate (MAC of 0.02 mg/L), malathion (MAC of 0.29 mg/L), boron (MAC of 5 mg/L)— and one guidance document on waterborne pathogens in drinking water.[20]

Bacteriological Monitoring

Table 7 shows the number and percentage of community water systems across the regional health authorities that met the 90 per cent sampling frequency requirement for fiscal years 2021/22 and 2022/23. Generally, more large water systems than small water systems met the sampling frequency reporting requirement, likely because large

Table 7: Number and Percentage of Water Systems Meeting the Sampling Frequency Requirement 90 Per Cent of the Time, BC, 2021/22 to 2022/23			
Regional Health Authority		**2021/22 Community Water Systems Only**	**2022/23 Community Water Systems Only**
Island Health	Small	255 (97%)	164 (58%)
	Large	54 (75%)	64 (89%)
	Total	**309 (92%)**	**229 (65%)**
Northern Health	Small	66 (38%)	48 (28%)
	Large	34 (100%)	31 (91%)
	Total	**100 (48%)**	**79 (38%)**
Interior Health	Small	255 (36%)	187 (28%)
	Large	27 (45%)	106 (87%)
	Total	**282 (36%)**	**293 (38%)**
Fraser Health	Small	98 (83%)	70 (62%)
	Large	29 (91%)	32 (100%)
	Total	**127 (85%)**	**102 (70%)**

Notes: Reporting on the frequency requirement is averaged over the fiscal year. Results presented may include data from seasonal operations, which has been noted to cause inconsistencies in how data are reported. Data are presented for community water systems only; stand-alone water systems are not included. Vancouver Coastal Health was unable to report for 2022/23 due to inaccurate data fields discovered during the reporting period, and their previous data for 2021/22 were also removed due to inaccuracies discovered.
Source: Regional health authorities; 2021/22–2022/23.

systems have a much greater operational and financial capacity to fulfill their requirements. Often for these same reasons, large system operators are highly trained and educated on monitoring and reporting requirements. Small water systems meeting the sampling frequency requirements decreased for 2022/23, possibly because of the challenges faced by small water systems discussed in detail in previous Provincial Health Officer (PHO) drinking water reports,[e] in addition to ongoing data cleanup efforts at the regional health authorities.

Water Quality Testing – Chemical and Physical Parameters

Regional health authorities continue to adapt their data systems to track the number of drinking water systems that are monitoring chemical water quality parameters in accordance with their monitoring plan; however, due to data system limitations, only four health authorities can report data at this time. For the 2022/23 fiscal year, large water systems in the Fraser, Island, Interior and Northern Health regions generally have good compliance with

[e] PHO drinking water reports are available at: *www.health.gov.bc.ca/pho/reports/drinkingwater*

chemical water quality monitoring, averaging 77 per cent compared to 56 per cent for small water systems (Table 8).

Water suppliers must conduct chemical and radiological sampling at a frequency determined by the drinking water officer to assess whether any parameter exceeds a drinking water quality guideline. Chemical sampling for specific parameters as a condition of a water supplier's operating permit can occur in regions where source waters are identified as being at risk of exceeding known chemical parameters from either naturally occurring elements (e.g., arsenic, manganese, uranium); land uses in the area (e.g., agriculture, industry, logging, recreation, and development); or by-products of disinfection or corrosion where source water chemistry is known to lead to their formation.

Table 9 shows the number of water systems with parameters that exceeded the Canadian Guidelines for 2022/23, and Figures 5 and 6 show the exceedances for 2017/18 to 2022/23, based on whether the exceedance occurred at the source prior to treatment or in water delivered at the tap. The data shows manganese exceedances continuing to increase in 2022/23 over 2021/22—27 per cent for source water, and 9 per cent for water delivered at the tap. Manganese levels at both source and delivered to the tap remain elevated due to increased monitoring and a change in the MAC for manganese in 2019, which caused existing high levels of manganese to become exceedances in the following years. Until enhanced treatment options are implemented, manganese levels in water delivered at the tap are likely to remain high as more systems are identified with levels above the new MAC.

Table 8: Number and Percentage of Small and Large Community Water Systems Monitoring Chemical Water Quality in Accordance with Their Monitoring Plan, BC, 2022/23

Regional Health Authority	Small	Large	Total
Island Health	202 (71%)	63 (88%)	**265 (75%)**
Northern Health	16 (9%)	11 (32%)	**27 (13%)**
Interior Health	344 (52%)	107 (88%)	**451 (58%)**
Fraser Health	103 (92%)	32 (100%)	**135 (94%)**

Notes: Data were not available from Vancouver Coastal Health. Data include only community water systems, not stand-alone water systems.

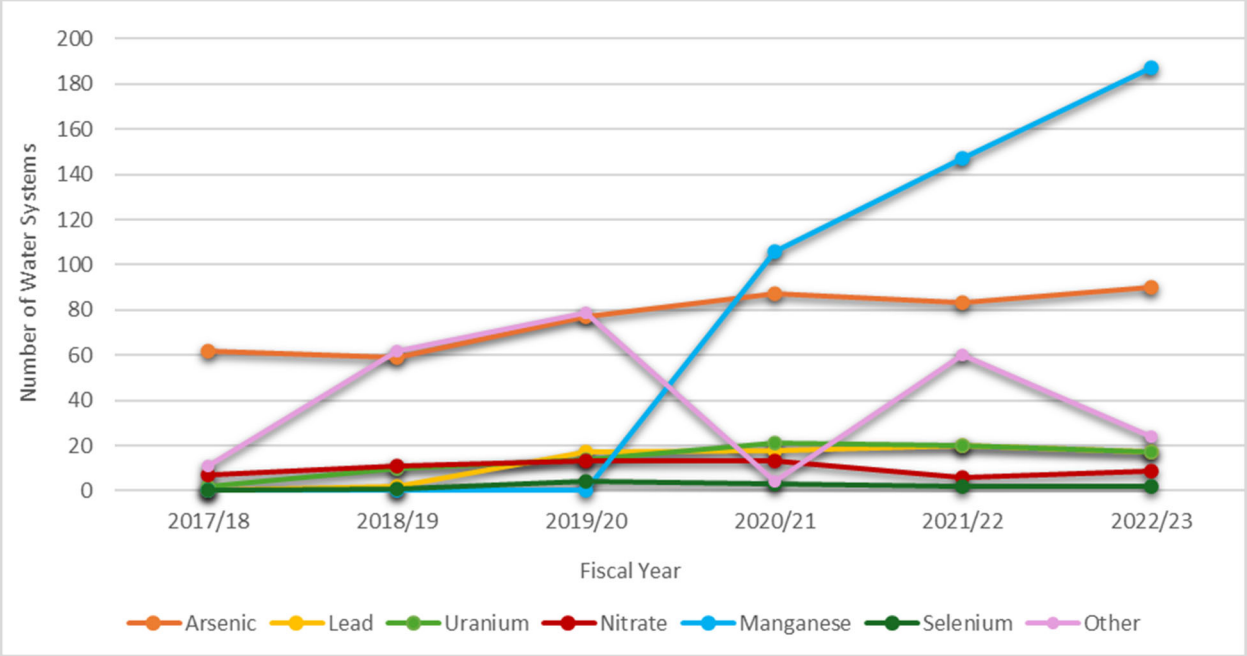
Source: Regional health authorities; 2022/23.

Table 9: Number of Water Systems Exceeding the Guidelines for Canadian Drinking Water Quality, BC, 2022/23		
Parameter of Concern	Health-based Guidelines – Exceedances in Maximum Acceptable Concentrations at the Source and Delivered to the Tap	
	Source	Delivered
Arsenic	90	31
Lead	17*	18
Uranium	17	14
Nitrate	9	6
Manganese	187	105
Selenium	2	2
Disinfection By-products	N/A	23
Other	24	14

Notes: Exceedances are totals for all regional health authorities. The Vancouver Coastal Health data system does not track compliance with the *Guidelines for Canadian Drinking Water Quality*; results were derived from communication with drinking water officer staff. *It could not be conclusively verified that lead parameters for "source" were not the result of leaching from taps or plumbing lines. In 2014, BC established its own selenium drinking water guideline separate from the *Guidelines for Canadian Drinking Water Quality* (MAC of 0.01 mg/L).[22]

Source: Regional health authorities, 2022/23.

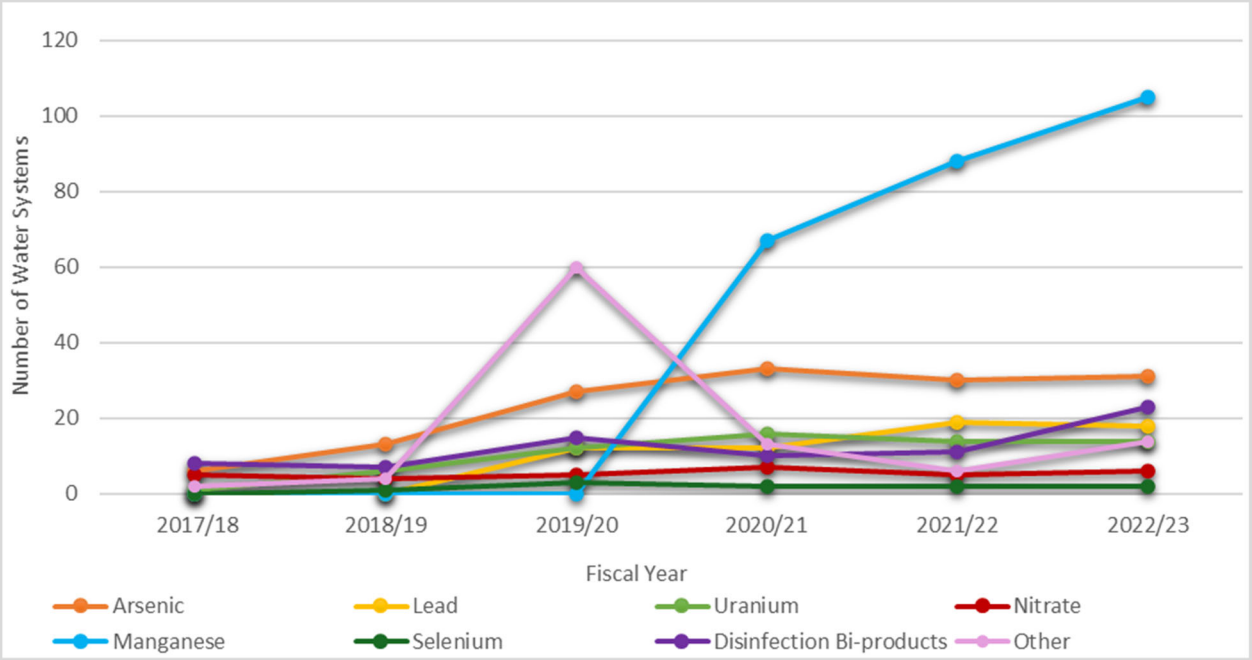
Figure 5: Total Number of Water Systems Exceeding the Guidelines for Canadian Drinking Water Quality, At Source, BC, 2017/18 to 2022/23



Notes: The maximum acceptable concentration (MAC) for manganese changed in 2019, which caused existing high levels of manganese to become exceedances in the following years. In 2014, BC established its own selenium drinking water guideline separate from the *Guidelines for Canadian Drinking Water Quality* (MAC of 0.01 mg/L).[22]

Source: Regional health authorities, 2017/18–2022/23.

Figure 6: Total Number of Water Systems Exceeding the Guidelines for Canadian Drinking Water Quality, Delivered to the Tap, BC, 2017/18 to 2022/23



Notes: The maximum acceptable concentration (MAC) for manganese changed in 2019, which caused existing high levels of manganese to become exceedances in the following years. In 2014, BC established its own selenium drinking water guideline separate from the *Guidelines for Canadian Drinking Water Quality* (MAC of 0.01 mg/L).[22]
Source: Regional health authorities, 2017/18–2022/23.

Since 2020/21, arsenic has had the second highest at source exceedance rate, after manganese (Figure 5). This was reduced by, on average, 64 per cent by the time water was delivered to the tap. Many of the Canadian Guidelines parameters, such as lead, uranium, selenium, and nitrate exceedance rates delivered to the tap have remained relatively stable over the past two fiscal years (Figure 6).

Parameters in the "other" category include fluoride, aluminum, boron, barium, strontium, antimony, iron, nitrite, sodium, and total dissolved solids. From 2021/22 to 2022/23, the concentration of approximately 40 per cent of the "other" parameters were reduced by treatment prior to delivery at the tap. This could be due to improvements in filtration and treatment at water treatment plants or to the selection of different water sources.

Reporting data on water samples that exceed the Canadian Guidelines is onerous and challenging for the regional health authorities. The data

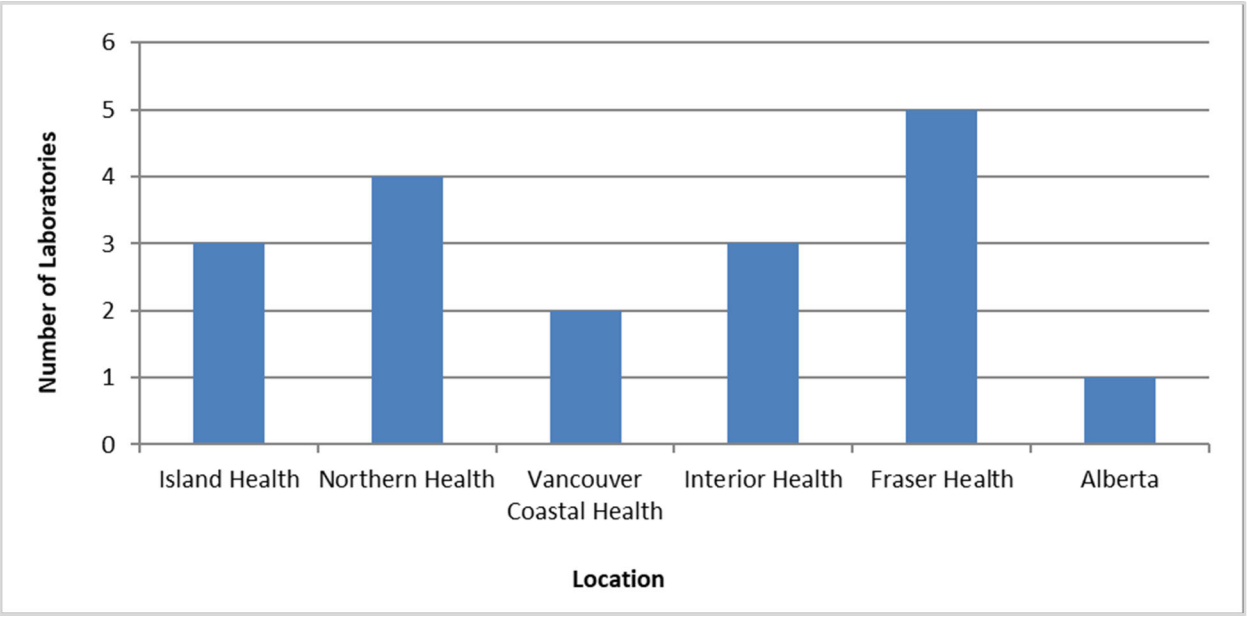
are typically manually entered and retrieved from the health authority data system or tabulated from lab reports, both of which can lead to errors in reporting. Collecting and reporting on water sample data has been identified as a priority area for improvement in the development of the Environmental Health Information System (EHIS). As a result, future summary reports of activities will not include data on chemical and physical sampling until the integration of laboratory data with EHIS is finished to ensure completeness of these data.

Approved Laboratories and Testing

The Drinking Water Protection Regulation (s. 8(4)) requires laboratories that conduct water quality monitoring for *E. coli* and total coliform in drinking water to be approved in writing by the PHO.[23]

Figure 7 shows the distribution of approved laboratories across the regions; most are in the Fraser Health region. Compared to 2021/22,[11] Northern Health gained one laboratory and Interior Health lost one.

Figure 7: Number of Provincial Health Officer-approved Laboratories, by Region, BC, 2023



Note: Approved laboratories have been approved in writing by the Provincial Health Officer, per section 8(4) of the Drinking Water Protection Regulation.

Source: Enhanced Water Quality Assurance Program; 2022/23.

As of March 31, 2023, there were 18 PHO-approved laboratories available for testing *E. coli* and total coliform in water, which remains consistent with the previous fiscal year. These laboratories are reviewed and recommended to the PHO by technical experts in the Enhanced Water Quality Assurance Program.[f]

Laboratory testing of water samples submitted by water suppliers is shown in Table 10, by fiscal year, and by number of positive *E. coli* reports. Data are available only for BCCDC Public Health Laboratory (BCCDC PHL) or BCCDC PHL sub-contracted labs (CARO Analytical Services – Kelowna, Northern Laboratories (2010) Ltd and Wellness Water Testing Laboratory Inc.).

For the 2022/23 fiscal year, 95,572 samples were submitted for testing, which is an increase of 8 per cent over 2021/22. The number of wasted samples also increased over the same period, from 1.66 per cent to 2.25 per cent of the total samples submitted. Despite the increase in sampling, the number of positive *E. coli* reports remained relatively stable between 2021/22 and 2022/23.

Table 10: Number of Water Samples Submitted, and Number and Percentage of Wasted Samples and Positive *E. coli* Reports, BC, 2022/23

Reporting Laboratory	Samples Submitted	Samples Wasted	Positive *E. coli* Reports
BCCDC PHL	73,725	1,257 (1.70%)	127 (0.17%)
CARO Analytical Services - Kelowna	16,784	847 (5.05%)	21 (0.13%)
Northern Laboratories (2010) Ltd	4,275	26 (0.61%)	22 (0.51%)
Wellness Water Testing Laboratory Inc.	788	25 (3.17%)	18 (2.28%)
Total	**95,572**	**2,155 (2.25%)**	**188 (0.20%)**

Notes: Untreated source water samples are not included. A sample is considered wasted if analysis did not occur because of issues impacting the reliability of results, such as holding time beyond 30 hours of the sample being collected; this may occur due to issues with transportation, laboratory issues, or other challenges.
Source: BC Centre for Disease Control Public Health Laboratory (BCCDC PHL); 2022/23.

[f] The Enhanced Water Quality Assurance Program also conducts onsite laboratory inspections and audits for drinking water laboratories that use a peer-auditor inspection model, and provides educational materials, workshops, and consultation services to laboratories to improve the quality of water testing.

Public Notification of Drinking Water Quality Concerns

As described in the previous Provincial Health Officer (PHO) drinking water report, if a water quality standard is not met or the water supplier believes there is a threat to drinking water, they must notify the drinking water officer under the *Drinking Water Protection Act* (DWPA)[10] (see PHO drinking water report*, Clean, Safe, and Reliable Drinking Water: An Update on Drinking Water Protection in BC*, *2017/18 to 2021/22*[11] for a description of the different types of advisories and how they might be used).

Table 11 lists the number and percentage of water systems with drinking water advisories in effect, by regional health authority, as of March 31, 2023. Boil water notices remain the most used advisory type, comprising 81 per cent of all the advisories issued across all the regional health authorities. This is followed by water quality advisories (15 per cent) and do not use/consume notices (4 per cent). The number of drinking water systems on advisory on March 31, climbed from the 803 recorded in 2022 to 864 advisories (16 per cent of water systems) in 2023, which is the highest number of advisories ever recorded by the PHO. While the total number of advisories increased in 2023 by 8 per cent, the percentage of water systems on advisory remained the same as the

Table 11: Number and Percentage of Drinking Water Systems with Advisories in Effect as of March 31, by Advisory Type and Regional Health Authority, BC, 2023

Advisory Type	Island Health	Vancouver Coastal Health	Northern Health	Interior Health	Fraser Health	Total
Boil Water Notice	36 (3%)	59 (16%)	124 (9%)	474 (24%)	7 (2%)	**700 (13%)**
Water Quality Advisory	2 (<1%)	2 (1%)	30 (2%)	94 (5%)	3 (1%)	**131 (3%)**
Do Not Use/ Consume Notice	0 (0%)	4 (1%)	6 (<1%)	23 (1%)	0 (0%)	**33 (1%)**
Total	**38 (4%)**	**65 (17%)**	**160 (11%)**	**591 (29%)**	**10 (2%)**	**864 (16%)**
Number of Water Systems	**1,041**	**376**	**1,398**	**2,007**	**418**	**5,240**

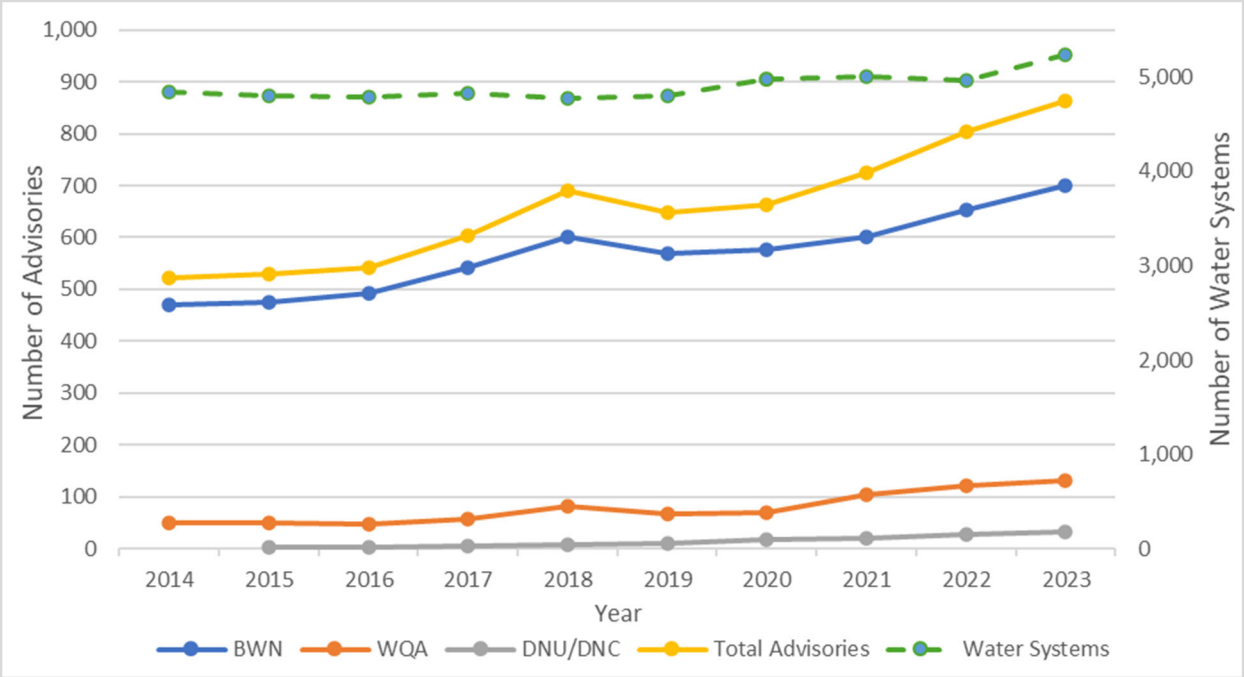
Source: Regional health authorities; 2022/23.

number of water systems in 2023 also increased. Interior Health issued the most advisories (of all types), because they have the most drinking water systems in their region and 93 per cent are small water systems that may face the capacity challenges outlined in previous PHO drinking water reports.[g]

Figure 8 shows the increasing trend in the number of drinking water advisories continuing into 2023. Advisories of all types increased in 2023 – boil water notices by 7 per cent, water quality advisories by 7 per cent, and do not use/consume notices by 22 per cent.

The growing number of advisories may be the result of several different factors. As demonstrated in Figure 9, most advisories (97 per cent) affect small water systems, which often have operational capacity and compliance challenges that are difficult to resolve. Small water systems often suffer from

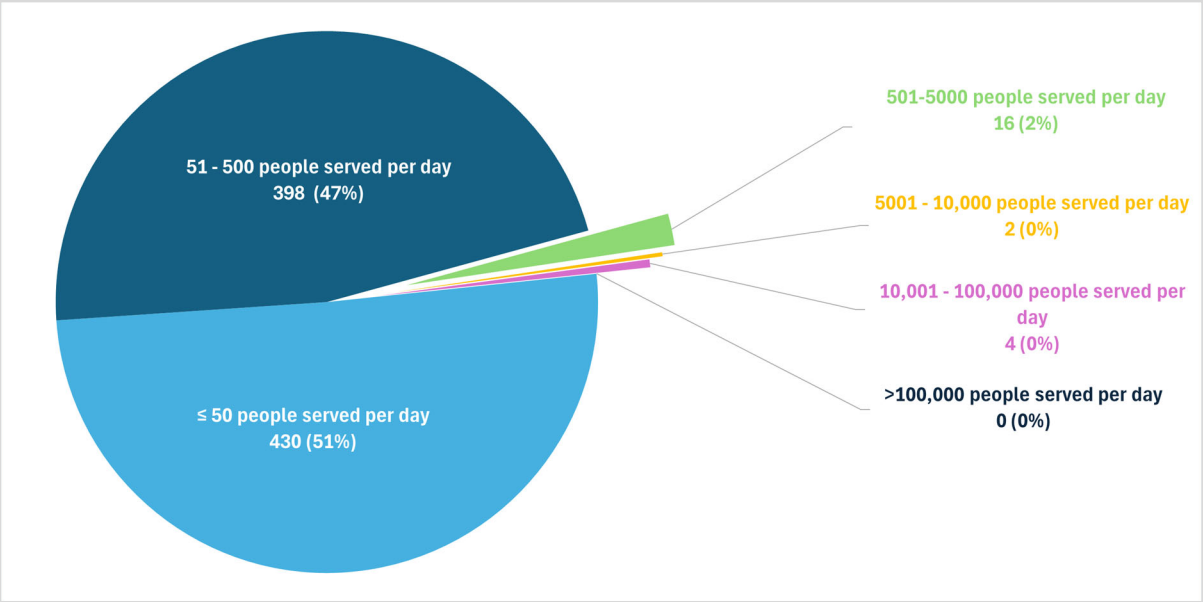
Figure 8: Number of Total Drinking Water Advisories and Drinking Water Systems as of March 31, by Advisory Type and Year, BC, 2014 to 2023



Notes: BWN = boil water notice; WQA = water quality advisory; DNU/DNC = do not use/do not consume. "Total advisories" is the sum of all advisories for that fiscal year. "Do not use/do not consume" data were not available for 2014.
Source: Regional health authorities; 2014–2023.

[g] PHO drinking water reports are available at: *www.health.gov.bc.ca/pho/reports/drinkingwater*

Figure 9: Number and Percentage of Small and Large Water Systems on Advisory as of March 31, 2023, by Population Served



Note: The data in this chart excludes 14 water systems from Northern Health that did not have information on the size of the population served.
Source: Regional health authorities; 2022/23.

deficient infrastructure components, inadequate treatment, and a lack of funds or access to funding to make improvements; these challenges are exacerbated by the introduction of new or revised guidelines with harder-to-reach water quality targets or design standards (e.g., the introduction of the maximum acceptable concentration (MAC) for manganese subsequently led to an increase in water quality advisories for many systems that no longer meet potability requirements).

Small water systems are also the most vulnerable and least resilient to the effects of climate change.[11] While the ongoing impacts from extreme climate-related events in recent years may be contributing to the growth in advisories it does not fully explain the growth in numbers seen on March 31, 2023.

Unlike 2021/22, when BC experienced unprecedented floods, fires, and heat events that damaged critical infrastructure, including drinking water systems, in 2022/23, people living in BC were not exposed to the same level of devastation associated with such extreme climate-related events. A cool, wet spring delayed the

wildfire season, which remained below normal in terms of number of fires (1,758) and area burned (133,437 hectares),[24] and no major floods occurred.

While spring was cool and wet, summer 2022/23 was hot and dry. BC had one of the hottest Augusts on record.[25] On September 2, 2022, Lytton reached 39.6°C—the highest temperature ever observed in BC during the month of September.[25] From July 19 to October 19, BC was North America's dry spot. For example, in Victoria, less than 2 mm of rain fell during that period compared to the normal 120 mm.[25] We cannot say if the hot, dry weather is responsible for any advisories, but it did contribute to severe ongoing drought conditions for parts of the province that continued into 2023. On the Sunshine Coast, in the fall of 2022, drought conditions prompted the Sunshine Coast Regional District to declare a state of local emergency to conserve drinking water.[26]

The Province provides current and historical information on drought conditions across BC on the Drought Information Portal.[27] Drought levels are updated from post-freshet (usually the start of June) to the beginning of winter (typically the end of November), but timing will vary depending on actual drought conditions.[28]

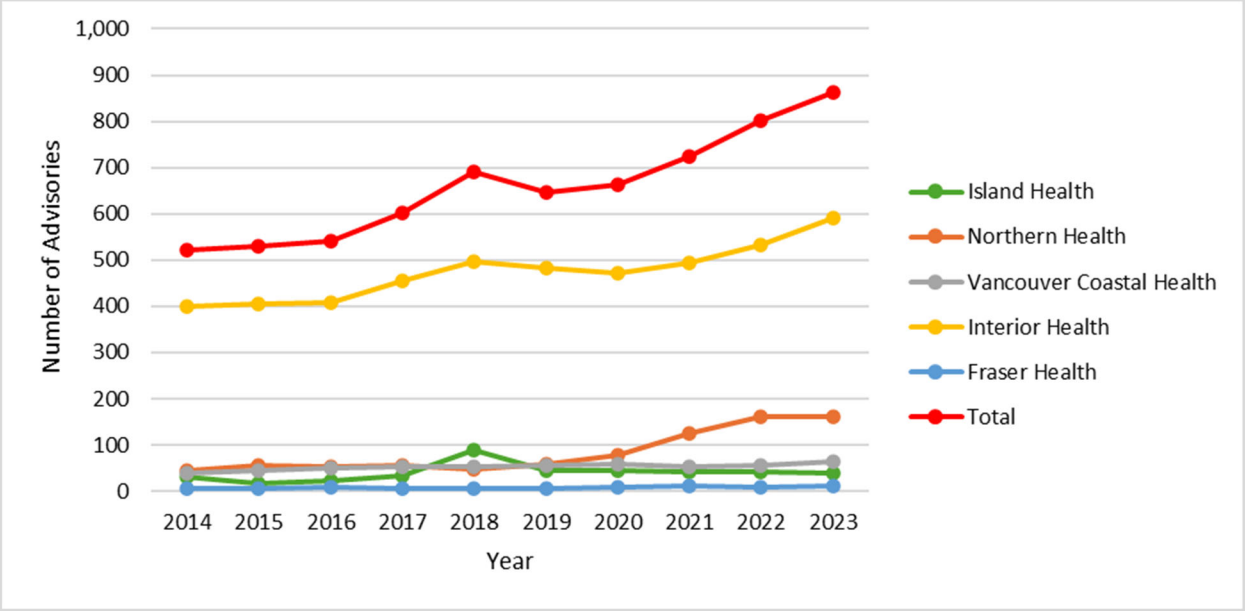
The ongoing drought conditions into the fall of 2022 and winter of 2022/23 resulted in much of the province entering 2023 with water level deficits. On December 1, 2022, four basins in the province were at drought level 4 and three basins were at drought level 5, compared to zero basins at drought levels 4 and 5 in November 2021.[29] At drought level 4, adverse impacts to socio-economic or ecosystem values are likely, and at drought level 5, adverse impacts to socio-economic or ecosystem values are almost certain.[28] Water scarcity conditions vary locally depending on water storage, supply, and demand in each community. Island Health reported coming into 2023 with a groundwater deficit, as groundwater aquifers require two to three months of sustained precipitation to recharge.[30]

As shown in our last report, drinking water system inspections declined in 2020 due to COVID-19 pandemic restrictions, which initially limited the access of drinking water officers to drinking water systems, and resulted

in staffing shortages due to staff redeployments within the health authorities for pandemic response.[11] These staffing pressures were strained further between 2020 and 2022 when drinking water officers had limited availability for routine work as they responded to floods, wildfires, and droughts.[11] Since our last report, the routine work of the drinking water programs through inspections and other engagement work has begun to return to more normal levels in most health authorities. The increase in advisories may also be due to drinking water officers catching up on overdue inspections from the COVID-19 pandemic and discovering new problems that warrant a drinking water advisory.

Figure 10 shows the total number of advisories on March 31 from 2014 to 2023 by regional health authority. Most of the advisories (68 per cent) occurred in the Interior Health Region, with Northern Health accounting for the second most advisories (19 per cent in 2023), although the growth was flat for Northern Health from 2022 to 2023. In Island Health, advisories decreased slightly from 2022 to 2023. Vancouver Coastal Health's total drinking water advisories increased by 14 per cent from

Figure 10: Number of Total Drinking Water Advisories in Effect as of March 31, by Regional Health Authority, BC, 2014 to 2023



Source: Regional health authorities; 2014–2023.

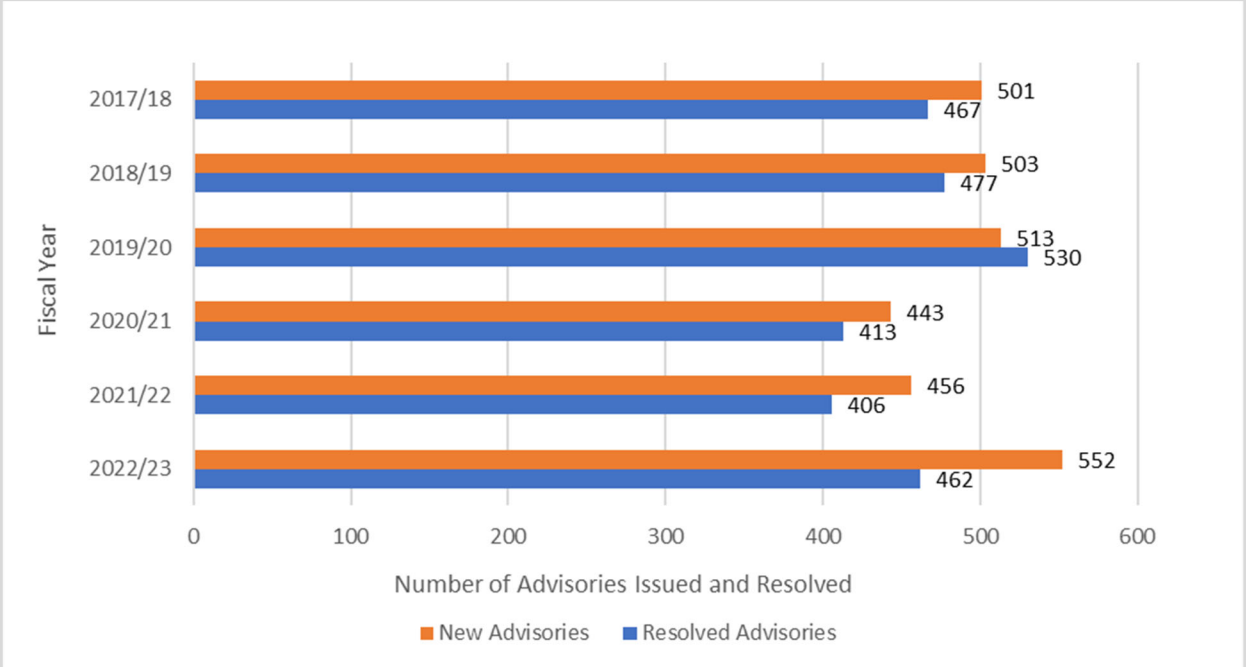
2022 to 2023; however, the number of systems on advisory only increased by 1 per cent over the same period. In Fraser Health, the total number of drinking water advisories in effect remained stable.

The number of new drinking water advisories increased by 21 per cent for 2022/23 over 2021/22 and exceeded the previous highest count in 2019/20 by 8 per cent (Figure 11). While the number of resolved advisories also increased over 2021/22 (14 per cent), there is a larger disparity between new and resolved advisories in 2022/23 than in previous years (Figure 11).

Looking at the number of resolved drinking water advisories in Figure 12, 54 per cent were resolved within one month, and an additional 24 per cent were resolved within six months of their issuance for 2022/23. The number of resolved, longer term advisories (those greater than six months) also improved in 2022/23: they comprise 22 per cent of the total resolved advisories, almost matching the percentage of resolved advisories in 2019/20.

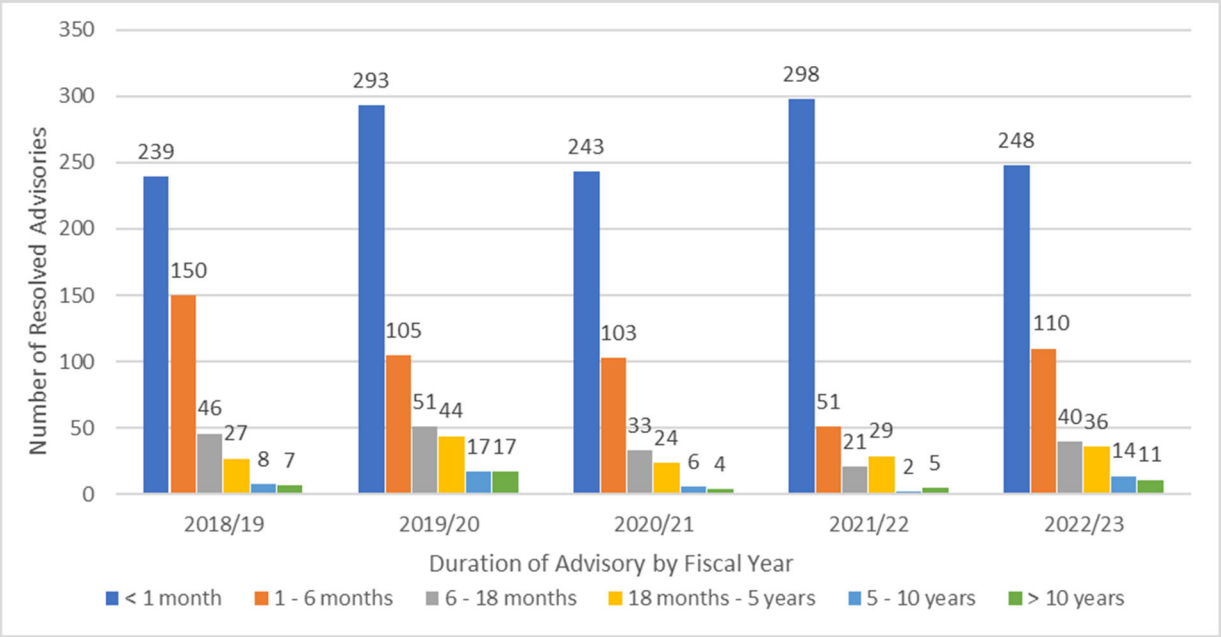
The number and duration of active drinking water advisories is shown in Figure 13. Active advisories lasting less

Figure 11: Number of New Drinking Water Advisories Issued and Resolved within Each Fiscal Year, BC, 2018/19 to 2022/23



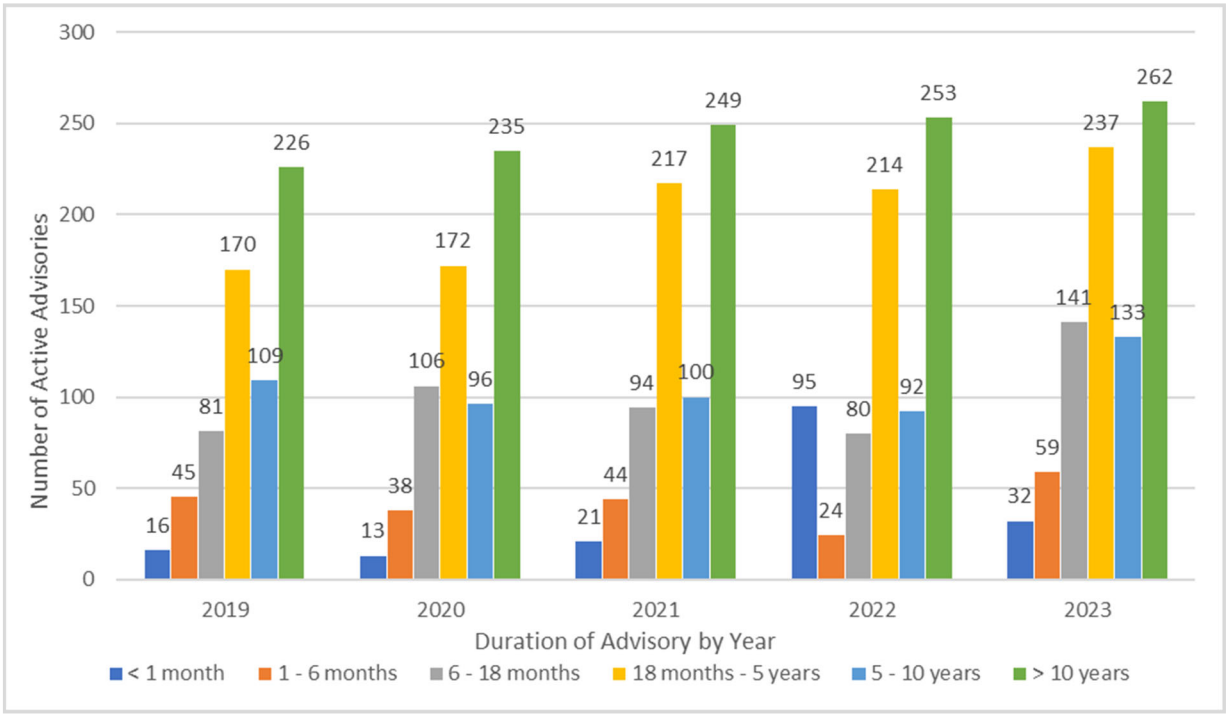
Source: Regional health authorities; 2017/18–2022/23.

Figure 12: Number and Duration of Resolved Drinking Water Advisories by Fiscal Year, BC, 2018/19 to 2022/23



Note: The number of resolved advisories does not balance with the number in Figure 11 due to data system limitations.
Source: Regional health authorities; 2018/19–2022/23.

Figure 13: Number and Duration of Active Drinking Water Advisories as of March 31, BC, 2019 to 2023

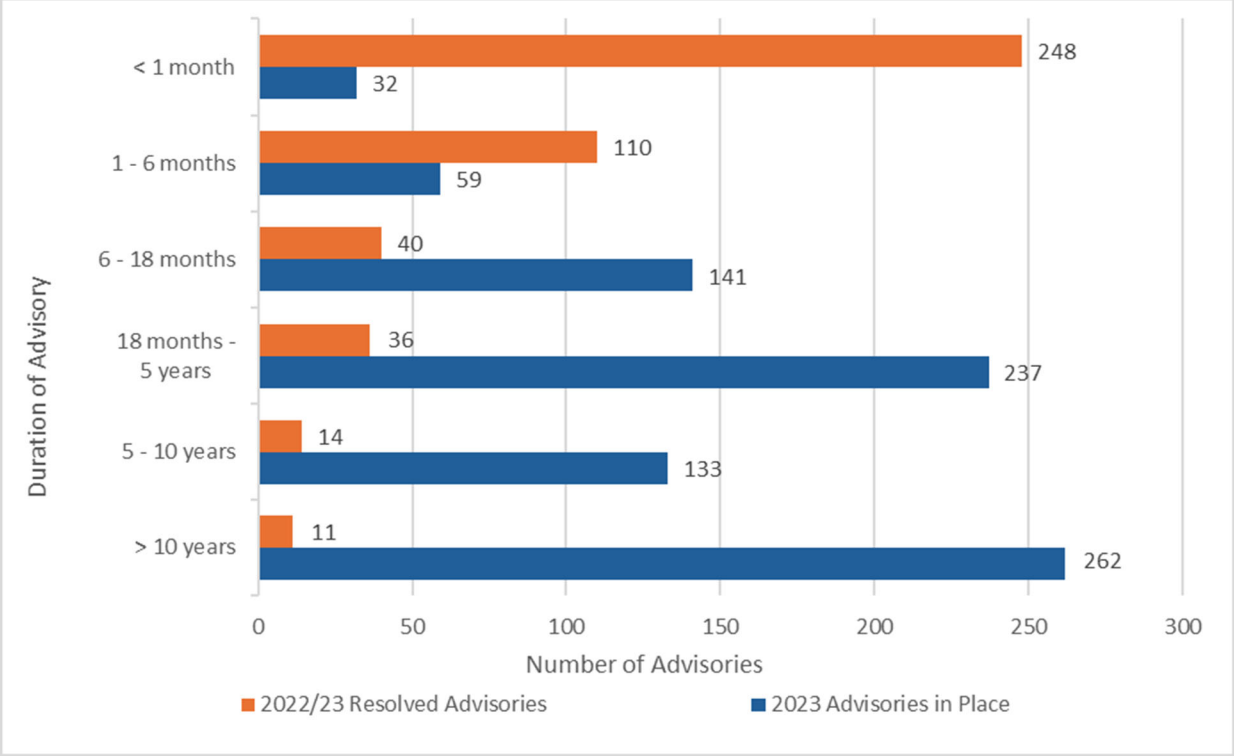


Note: The combined total across all durations of advisories by year does not match the total number of advisories from Table 11, Figure 8, and Figure 9 due to data system limitations.
Source: Regional health authorities; 2018/19–2022/23.

than one month decreased by 66 per cent, while active advisories lasting 6 to 18 months increased by 76 per cent compared to 2021/22. Advisories of other durations also increased by varying amounts. Thus, while a large number of advisories are quickly resolved, more water systems that were placed on advisory over the past year seem to have stayed on advisory compared to previous years.

Long-term advisories remain the most difficult to resolve, as shown in Figure 14, which shows a combined view of resolved advisories for the 2022/23 fiscal year and active advisories on March 31, 2023. Of those active advisories, 73 per cent had been in place over 18 months, 46 per cent over five years, and 30 per cent for longer than ten years.

Figure 14: Number and Duration of Drinking Water Advisories in Place as of March 31, 2023, Compared to the Number and Duration of Resolved Drinking Water Advisories for the Entire Fiscal Year, BC, 2022/23



Note: Drinking water advisories in place were as of March 31 for each year, whereas the number of resolved advisories were for the entire fiscal year.

Source: Regional health authorities; 2022/23.

Long-term advisories are more difficult to resolve because of the necessary infrastructure improvements and funding often required to resolve them. As highlighted in our previous reports, most long-term advisories affect small water systems, which typically lack the financial and administrative capacity to make the necessary upgrades in a timely manner. In fact, as of March 31, 2023, 99 per cent of the advisories that had been in place for at least five years were active among small water systems (Table 12). Of the 22 large water systems with an advisory on March 31, 2023, 72 per cent serve populations under 5,000 people.

The only large system serving over 10,000 people per day on a long-term advisory lasting over ten years is a stand-alone water system serving an outdoor festival venue in the interior.

The continuing trend of increasing numbers of advisories and water systems staying on advisory, highlights the critical need for the Province to take action on the recommendations of the PHO to overcome the challenges and barriers facing many small- and medium-sized water suppliers.[11] The development of a provincial small water system strategy is particularly urgent.

Table 12: Length of Advisories as of March 31, by Water System Size, BC, 2023

System Size	Small Water Systems (SWS)			Large Water Systems					SWS and Large Total
Population served per day	≤ 50	51 500	Total ≤500	501 5,000	5,001 10,000	10,001 100,000	>100,000	Total >500	
< 1 month	14 (44%)	15 (47%)	**29 (91%)**	2 (6%)	0 (0%)	1 (3%)	0 (0%)	**3 (9%)**	**32**
1 6 months	24 (42%)	31 (54%)	**55 (96%)**	2 (4%)	0 (0%)	0 (0%)	0 (0%)	**2 (4%)**	**57**
6 – 18 months	73 (53%)	59 (42%)	**132 (95%)**	5 (4%)	1 (1%)	1 (1%)	0 (0%)	**7 (5%)**	**139**
18 months – 5 years	115 (50%)	107 (47%)	**222 (97%)**	5 (2%)	1 (0%)	1 (0%)	0 (0%)	**7 (3%)**	**229**
5 – 10 years	62 (47%)	69 (53%)	**131 (100%)**	0 (0%)	0 (0%)	0 (0%)	0 (0%)	**0 (0%)**	**131**
>10 years	142 (54%)	117 (45%)	**259 (99%)**	2 (1%)	0 (0%)	1 (0%)	0 (0%)	**3 (1%)**	**262**
Total	**430 (51%)**	**398 (47%)**	**828 (97%)**	**16 (2%)**	**2 (0%)**	**4 (0%)**	**0 (0%)**	22 (3%)	**850**

Note: The data in this table excludes 14 water systems from Northern Health that did not have information on the size of the population served.

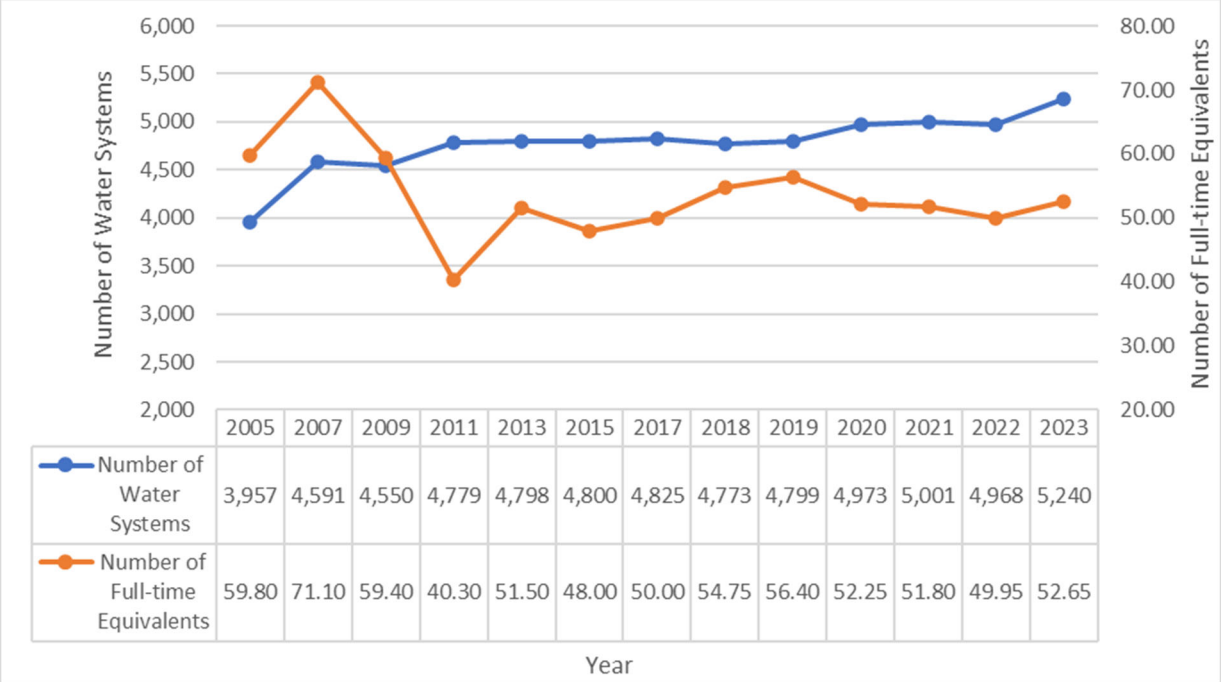
Source: Regional health authorities; 2022/23.

Abatement and Enforcement

Drinking Water Program Resources

Filled full-time equivalent (FTE) positions by regional health authority as of March 31, 2023, is presented in Figure 15 and Table 13. In 2023, there were 52.65 filled FTE positions (excluding clerical and administrative support staff) and 17.8 vacant FTE positions. Environmental health officer positions in Northern Health accounted for most of the vacancies. The number of filled positions in 2023 was 5 per cent higher than the previous year, when 49.95 FTEs were filled. The number of permitted water systems also increased by 5 per cent in 2023, from 4,968 to 5,240 (Figure 15). In 2023, Island Health and Northern

Figure 15: Number of Full-time Equivalent Positions Working within Regional Health Authority Drinking Water Programs Compared to the Number of Permitted Water Systems, BC, as of March 31, 2005 to 2023



	2005	2007	2009	2011	2013	2015	2017	2018	2019	2020	2021	2022	2023
Number of Water Systems	3,957	4,591	4,550	4,779	4,798	4,800	4,825	4,773	4,799	4,973	5,001	4,968	5,240
Number of Full-time Equivalents	59.80	71.10	59.40	40.30	51.50	48.00	50.00	54.75	56.40	52.25	51.80	49.95	52.65

Notes: Full-time equivalents (FTEs) for clerical support were not included in these data. Data points reflect the number of FTEs as of March 31 of each year. These numbers represent filled FTE positions and do not capture ongoing vacancies within the programs. Data on the number of FTEs are not available for 2006, 2008, 2010, 2012, and 2014.
Source: Regional health authorities; 2004/05–2022/23.

Table 13: Number of Full-time Equivalent (FTE) Staff Appointed or Delegated the Duties of a Drinking Water Officer under the *Drinking Water Protection Act*, by Regional Health Authority and Position, BC, as of March 31, 2023

Regional Health Authority	Medical Health Officers	Environmental Health Officers (EHOs)			Public Health Engineers in Support of Drinking Water Program	Managers in Support of Drinking Water Program	Total
		Drinking Water-focused/ Specialist	Generalist with Duties in Drinking Water	Supervisors of EHOs with Duties in Drinking Water			
Island Health	1.75	2.75	5.75	2.50	2.00	0.20	**14.95**
Northern Health	0.20	1.00	3.00	1.00	2.00	0.20	**7.40**
Vancouver Coastal Health	0.25	1.00	2.75	0.50	0.50	0.30	**5.30**
Interior Health	0.50	10.00	2.00	2.00	2.50	1.00	**18.00**
Fraser Health	0.25	5.5	0.00	0.00	0.75	0.50	**7.00**
Total	**3.70**	**20.50**	**17.50**	**7.00**	**7.75**	**2.20**	**52.65**

Notes: The FTEs listed are the number of filled FTEs for the regional health authority drinking water programs, and do not reflect any temporary staffing reassignments or other competing responsibilities. The amount of an EHO's time spent on drinking water is difficult to capture with perfect accuracy; therefore, it is estimated by the regional health authorities.

Source: Regional health authorities; 2022/23.

Health both increased their drinking water programs' FTE complement, but other health authorities had similar staffing levels to the previous year.[11] In Island Health and Northern Health, environmental health officer staff (specialist, generalist, or supervisor) accounted for most of this change. Despite this increase in FTEs, Northern Health reported that 50 per cent of positions were still vacant. Based on the number of filled FTEs and water systems as of March 31, 2023, there were approximately 138 water systems per environmental health officer, and 676 water systems per public health engineer.

Drinking Water System Inspections

Each regional health authority establishes drinking water inspection frequency targets using an approach that prioritizes inspections using factors such as risk, system complexity, system size, water quality, and performance history (Table 14). This approach is guided by the

Table 14: Drinking Water Inspection Frequency Targets, by Regional Health Authority, BC	
Island Health	Based on a priority risk assessment: • High priority – two inspections per year • Moderate priority – one inspection per year • Low priority – one inspection every other year
Northern Health	Based on water supply system size: • Large systems – one inspection per year • Small systems – one inspection every other year
Vancouver Coastal Health	Based on a priority risk assessment: • High priority – two inspections per year • Medium priority – one inspection per year • Low priority – one inspection every other year
Interior Health	Based on a focused approach: • Large systems – bi-annual, once every two years • Small systems – comprehensive inspections on a four-year cycle • Environmental health systems – one inspection per year
Fraser Health	Based on time period: • One routine inspection per year for every water system

Note: Interior Health defines environmental health systems as water systems that only provide drinking water to a licensed or permitted facility, such as a daycare or a restaurant.
Source: Regional health authorities; 2022/23.

importance of compliance and oversight activities, and of the possibility of adverse impacts to public health. High-priority systems generally undergo more frequent inspections than do low-priority water systems.

Table 15 shows the number and percentage of water systems receiving an inspection annually plus the percentage of water systems meeting their inspection frequency targets using the targets set out in Table 14, across the regional health authorities for 2022/23. As the inspection frequency is typically based on several different factors, not every water system receives an annual inspection. Inspection data are limited in scope because it is not possible to account for the extensive amount of work drinking water officers do outside of inspections to engage with water suppliers. This includes activities such as consultations, plan reviews, public meetings, presentations, investigations, and education. Unfortunately, regional health authority data systems were not designed to capture these types of engagement activities—Interior Health manages to approximate this data,

Table 15: Number and Percentage of Drinking Water Systems Inspected and Percentage of Water Systems Meeting Inspection Frequency Targets, by Regional Health Authority, BC, 2022/23		
Regional Health Authority	**Number and Percentage of Water Systems Receiving an Inspection or Assessment**	**Percentage of Water Systems Meeting Inspection Frequency Targets**
Island Health	376 (36.0%)	16.0%
Northern Health	75 (5.4%)	10.8%
Vancouver Coastal Health	163 (43.0%)	–
Interior Health	380 (19.0%)	77.0% large systems 60.0% small systems 14.0% environment health systems
Fraser Health	363 (87.0%)	85.0%

Notes: Data on "Water Systems Meeting Inspection Frequency Targets" were not available for Vancouver Coastal Health. Interior Health defines environmental health systems as water systems that only provide drinking water to a licensed or permitted facility, such as a daycare or a restaurant.
Source: Regional health authorities; 2022/23.

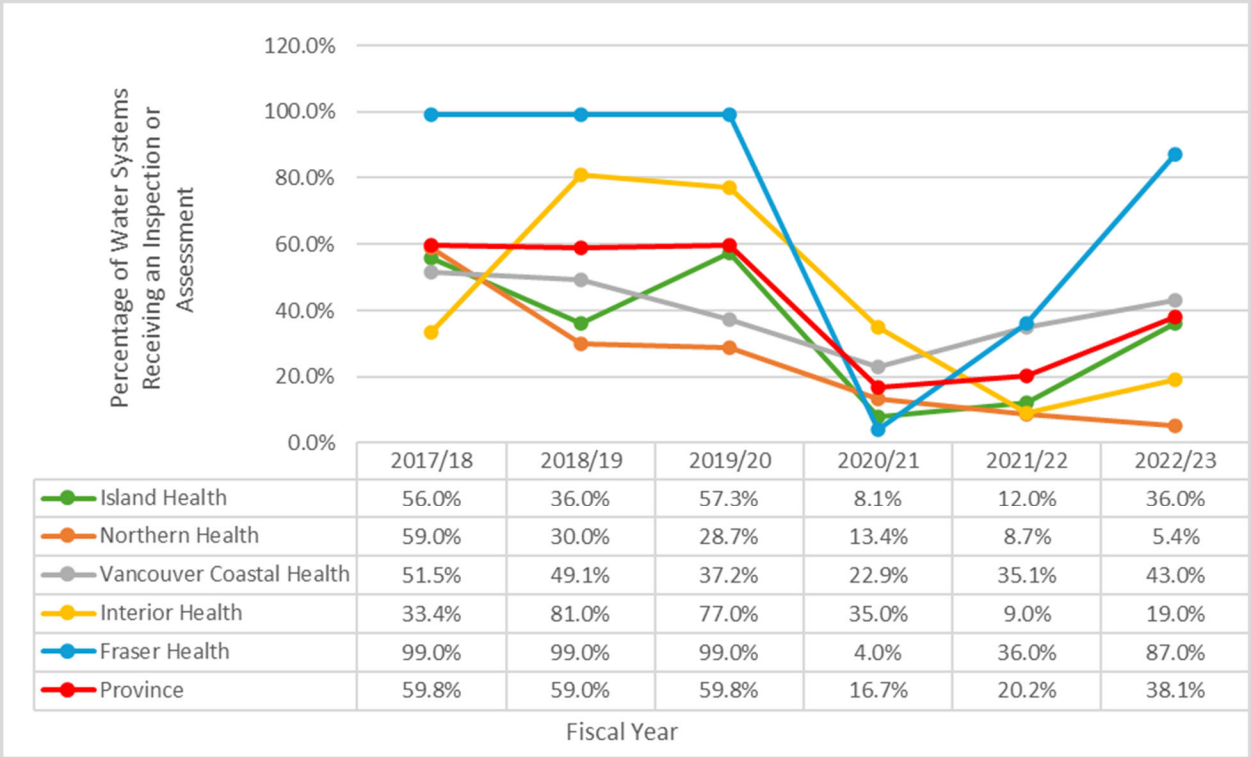
and this is presented for informational purposes only (Table 16).

Figure 16 shows the percentage of water systems that underwent an inspection or assessment within each regional health authority, as well as for the province overall. Regional health authorities continue to manage the residual impacts of the COVID-19 pandemic, including the backlog of inspections and environmental health officer staffing shortages. For 2022/23, the percentage of water systems that underwent an inspection increased for all health authorities, except for Northern Health where staffing challenges continue, and inspections declined by approximately 3 per cent. As indicated in Table 14, inspection targets for water systems do not require an annual inspection of all

Table 16: Number and Percentage of Drinking Water System Engagement Activities, Interior Health Authority, BC, 2022/23			
Regional Health Authority	**Number of Water Systems Engaged With**	**Total Number of Water Systems**	**Percentage of Water Systems Engaged With**
Interior Health	1,696	2,007	84.5%

Notes: Interior Health data for the number of water systems engaged with does not include peer-to-peer training courses as these sessions are difficult to capture in the data system and link to each water system. Data on engagement activities were not available for Island Health, Northern Health, Vancouver Coastal Health, and Fraser Health.
Source: Regional health authorities; 2022/23.

Figure 16: Percentage of Water Systems Receiving an Inspection or Assessment, by Regional Health Authority and for the Province Overall, BC, 2017/18 to 2022/23



	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
Island Health	56.0%	36.0%	57.3%	8.1%	12.0%	36.0%
Northern Health	59.0%	30.0%	28.7%	13.4%	8.7%	5.4%
Vancouver Coastal Health	51.5%	49.1%	37.2%	22.9%	35.1%	43.0%
Interior Health	33.4%	81.0%	77.0%	35.0%	9.0%	19.0%
Fraser Health	99.0%	99.0%	99.0%	4.0%	36.0%	87.0%
Province	59.8%	59.0%	59.8%	16.7%	20.2%	38.1%

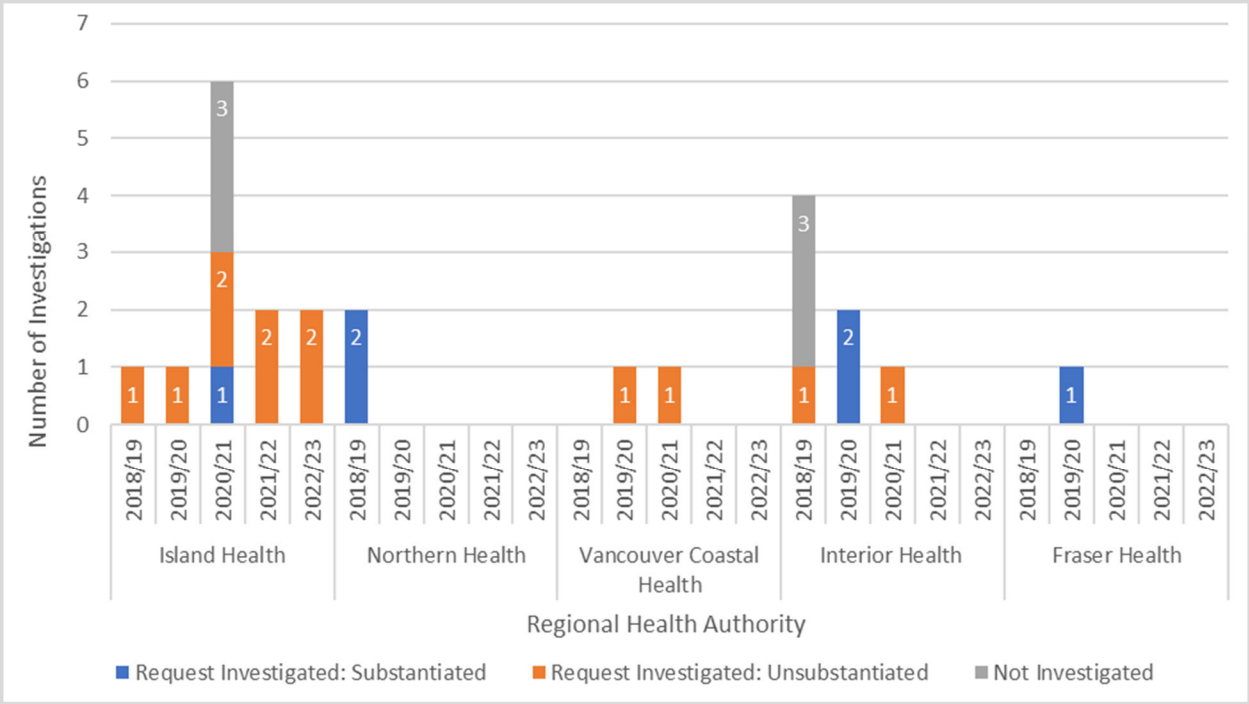
Source: Regional health authorities; 2017/18 – 2022/23.

water systems (except Fraser Health which has set a target of one inspection per year for all systems). As a result, we do not expect that all water systems will receive an inspection each year.

Investigation and Enforcement Activities

Drinking water officials routinely respond to complaints and conduct investigations and enforcement activity relating to drinking water quality concerns (see the previous Provincial Health Officer (PHO) drinking water report, *Clean, Safe, and Reliable Drinking Water: An Update on Drinking Water Protection in BC, 2017/18 to 2021/22*[11] for further descriptions). Figure 17 shows the number of investigations requested under section 29 of the *Drinking Water Protection Act* (DWPA), by regional health authority, for fiscal years 2018/19 to 2022/23. Island Health was the only health region to have received a request for a section 29 investigation in 2022/23. During that year, two investigations took place, but the

Figure 17: Number of Section 29 Investigations, by Regional Health Authority, BC, 2018/19 to 2022/23



Notes: "Request Investigated: Substantiated" refers to a request sent to a health authority that had sufficient evidence to proceed with an investigation, and a threat to drinking water was confirmed. "Unsubstantiated" requests were investigated, but evidence of a threat was lacking. Requests recorded as "Not Investigated" had insufficient evidence to begin an investigation or there was a lack of resources.
Source: Regional health authorities; 2018/19–2022/23.

claims were found to be unsubstantiated.

The claims in the Island Health cases were (1) surrounding potential aquifer contamination from livestock and manure used as fertilizer, and (2) potential contamination from materials stored on a property. In both cases, the aquifer and nearby wells were protected, and no contaminants were detected when testing was completed.

Enforcement actions undertaken by drinking water officials can include tickets, orders, injunctions, and prosecutions. The number of each of these actions within each regional health authority is shown in Figure 18 for 2018/19 to 2022/23. Enforcement actions were taken by Island Health (4 orders) and Fraser Health (2 tickets and 1 order) in 2022/23. No injunctions or prosecutions were taken for that year.

The sections of the DWPA or Drinking Water Protection Regulation (DWPR) used for these tickets and orders were as follows:

DWPA

Section 6: water supply systems must provide potable water

Section 7: construction permits and requirements for water supply systems

Section 8: operating permits and requirements for water supply systems

Section 10: emergency response and contingency plans

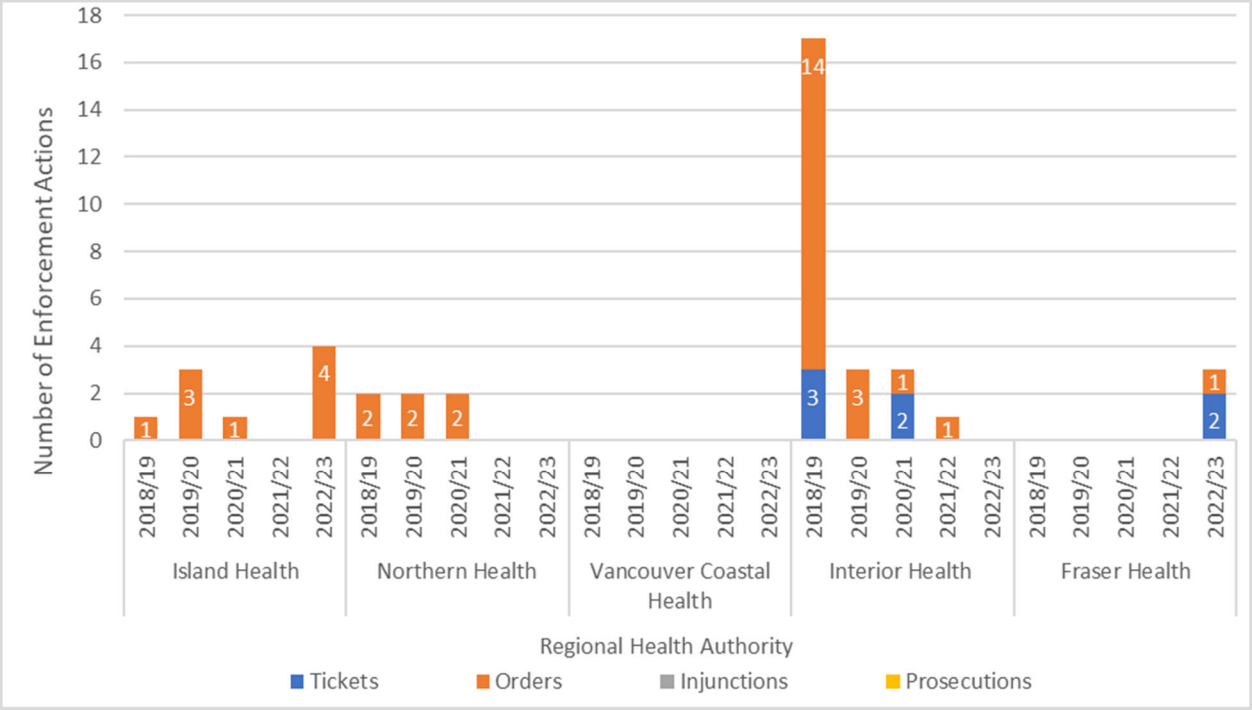
Section 11: water monitoring requirements

Section 26: orders respecting contraventions

DWPR

Section 5: treatment

Figure 18: Number of Enforcement Actions, by Regional Health Authority, BC, 2018/19 to 2022/23



Source: Regional health authorities; 2018/19–2022/23.

Under section 39.1 of the DWPA, a person who is affected by a decision of a drinking water officer that is made under specific sections of the Act can request a reconsideration or review of the decision.[10] For the 2022/23 fiscal year, Island Health received one reconsideration and the decision was upheld. Section 39.1 of the DWPA also allows for requests to be reviewed by the PHO, but these are not common. For the 2022/23 fiscal year, the PHO received no requests for review.

As of March 31, 2023, the PHO had made no reports to the Minister of Water, Land and Resource Stewardship that pertained to section 4.2 of the DWPA for the 2022/23 fiscal year. Under this section, the PHO must report to the Minister of Water, Land and Resource Stewardship on any actions or inaction of ministries, government corporations or other agents of government that significantly impedes the protection of public health in relation to drinking water.[10] Because the PHO uses a progressive enforcement approach to resolving situations that negatively affect public health in relation to drinking water, there have been no situations during this reporting period in which a section 4.2 report was required.

Conclusion

This report presents metrics for permitting, inspection, monitoring, and enforcement activities for the 2022/23 fiscal year that were decided upon in partnership with the regional health authorities, the Ministry of Health (HLTH), the Ministry of Water, Land and Resource Stewardship (WLRS), and the BC Centre for Disease Control. It is the first annual report to the Minister of Water, Land and Resource Stewardship summarizing activities under the *Drinking Water Protection Act* using this new reporting framework.

Workforce shortages continue to be a challenge for some regional health authorities. In 2023, there were 52.65 filled drinking water program full-time equivalent (FTE) positions in BC, an increase of 5 per cent from 2022, when 49.95 FTEs were filled. Despite the increase in filled FTEs, 17.8 positions remained vacant, most of which were in Northern Health.

In 2022/23, water system inspections increased for all health authorities, except for Northern Health, where inspections declined by 3 per cent.

While the percentage of water systems receiving an inspection has not returned to pre-2020/21 levels, the upward trend in inspections suggests that improvements are occurring within the regional health authorities where staffing levels have improved.

Drinking water advisories of all types increased in 2022/23, and more water systems that were placed on advisory over the past fiscal year seem to have stayed on advisory. As previous Provincial Health Officer drinking water reports have demonstrated, most advisories affect small water systems, which often have operational capacity and management challenges that are difficult to resolve. Small water systems are less resilient to the effects of climate change and often have inadequate infrastructure, while also lacking the financial capacity or access to funds to make necessary improvements.

In 2022, BC experienced another hot and dry summer. The ongoing drought conditions into the fall of 2022 and winter of 2022/23 resulted in much of the province entering 2023 with water

level deficits. While the ongoing impacts from extreme climate-related events may be contributing to the growth in advisories it does not fully explain this increase. The gain may also be due to drinking water officers catching up on overdue inspections from the COVID-19 pandemic and discovering new problems that warrant a drinking water advisory; this scenario is made more likely with the introduction of new or revised guidelines with stricter quality targets (e.g., manganese) or design standards.

Small water system operators continue to face operational and administrative challenges with their water systems, but most people living in BC receive high-quality drinking water from a few large drinking water systems. Water suppliers serving the larger urban areas, as well as some of the smaller centres, are staffed by professional engineers and certified operators who are well qualified to provide the public with the highest quality water possible.

Managing and collecting information on drinking water and source water supplies is a challenge in BC. To help address this, HLTH is working with key partners to implement a drinking water system module as part of a larger Environmental Health Information System (EHIS). A technical release, including the drinking water module, is planned for the spring of 2025. Further to this work, WLRS is supporting the development and interoperability of EHIS with the establishment of a spatial dataset of drinking water intake locations and their sources. This dataset is being designed to link with EHIS; together, they will improve the accessibility and reliability of the data on drinking water supply systems, regional health authority drinking water programs, and risks to drinking water sources.

Although there have been improvements in staffing levels and increased drinking water program activities during the 2022/23 fiscal year (i.e., inspections across most of the health authorities), staffing levels within the regional health authorities remained stretched, particularly in Northern Health where a resulting decline in routine work such as inspections continued. Other trends documented in the report, such as the increasing number of drinking water advisories and the many challenges facing small water systems—including threats from ongoing climate change—reinforce the need for urgent action on the recommendations

outlined in the most recent Provincial Health Officer's drinking water report, *Clean, Safe, and Reliable Drinking Water: An Update on Drinking Water Protection in BC, 2017/18 – 2021/22*.[11] The following recommendations from that report continue to be a high priority:

- developing a provincial Source-to-Tap strategy (Recommendation 1) that includes a small water system strategy (Recommendation 12);
- completing an interoperable data system for drinking water (Recommendation 10);
- addressing emergency response planning and climate resilience for drinking water (Recommendations 5 and 6);
- ensuring that drinking water protection programs are adequately resourced (Recommendation 15); and
- reviewing and modernizing the *Drinking Water Protection Act* and source water protection tools (Recommendations 3, 4, and 16).[11]

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