

**A State of Emergency:  
Ending Boil Water Advisories in British Columbia**

**by  
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## **Abstract**

Clean water is essential for human survival, yet many communities in British Columbia (BC) do not have access to this resource. Boil water advisories are one identifier of this problem. There are many reasons why providing clean water continues to be a challenge, including ambiguity in governance structure, data limitations, and geographical restrictions. These issues play a significant role especially in rural regions, and can impose serious mental, physical, and spiritual health implications in these communities. This capstone project presents a background on boil water advisories in BC, critiques current management practices within regional health authorities, explores water management practices in other provinces, and highlights current class-action lawsuits. Immediate and continuous work is necessary for all British Columbians to attain access to an internationally recognized human right of clean drinking water. Policy recommendations are directed to the BC provincial government – to terminate boil water advisories once and for all.

**Keywords:** Boil Water Advisory; Drinking Water Advisory; Water Security; British Columbia

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## Executive Summary

We have a drinking water crisis in British Columbia (BC). Despite having a reputation for a clean environment, BC entered the year 2022 with 672 boil water advisories.<sup>1</sup> Although many boil water advisories occur in rural and remote regions, urban areas are not immune to this problem. Inadequate drinking water is becoming increasingly ubiquitous and serious – exacerbated by climate change – as witnessed by the recent flooding and forest fire events directly impacting drinking water in BC. This is an urgent issue that has continued far too long and has affected the lives and livelihoods of many Canadians, especially those in rural and remote communities.

I performed a series of research methodologies to complete this study. I conducted literature reviews and interviews to understand the current challenges BC faces. I analyzed current water management systems in BC, including an analysis of the following health authorities: Fraser Health, Interior Health, Island Health, Northern Health, Vancouver Coastal Health, and the First Nations Health Authority. Moreover, I conducted additional jurisdictional analyses on drinking water management practices in two other provinces, Alberta and Ontario. In addition, I examined case studies of the Flint Water Crisis and the class-action lawsuits brought by First Nations in Canada. Overall, the findings identified various gaps regarding current drinking water management systems and provided many lessons to be incorporated in BC.

Three policies are recommended to (1) Declare a state of emergency on boil water advisories in BC; (2) Create a provincial database for drinking water data; and (3) Provide opportunities for local capacity building. The policies were assessed using four government management objectives: ease of implementation, effectiveness, compliance, and acceptance. Policy recommendations aim to take a systemic approach to reduce and eliminate boil water advisories in BC, allowing British Columbians to access clean drinking water without encountering undue barriers.

The issue of inadequate drinking water is a serious problem. This multifaceted issue requires a range of immediate and continuous actions to address the situation; therefore, I provide recommendations for future research. Let us begin this journey.

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<sup>1</sup> Snapshot total on January 1, 2022.

# Chapter 1.

## Introduction

A long and persistent legacy of boil water advisories have existed in Canada for decades. Without immediate action, the cases of inadequate drinking water will increase – with further exacerbation from climate change and increased frequencies of natural disasters. British Columbia (BC) is very susceptible to this problem and continues to experience the consequences. Boil water advisories are a type of drinking water advisory that communicate potential health risks regarding inadequate drinking water quality (Government of BC, n.d.a). A boil water advisory recommends that residents in the area bring water to a rolling boil for at least 1 minute before consumption (ISC, 2021a). Studies have demonstrated potential negative health effects for communities and individuals experiencing boil water advisories, especially for an extended period, impacting mental, physical, and economic wellbeing (Bradford *et al.*, 2016; Galaway, 2016; Harden and Levalliant, 2008). These results are in addition to the specific health risks of consuming unsafe water.

“In August 2001, there were 304 boil water advisories in effect in British Columbia ... [and] in May 2008 there were 528” (Office of the Ombudsman, 2008, p. 11, para. 1). This year, on January 1, 2022, there were 672 boil water advisories in BC. There are too many boil water advisories in BC. This capstone investigates and addresses the underlying issues of persistent and increasing number of boil water advisories in BC, to present policy recommendations directed to the BC provincial government. This research seeks to highlight the consequences of this important provincial issue to support and encourage further actions to eliminate boil water advisories once and for all.

Chapter 2 provides the legal background to situate international, national, and provincial perspectives on drinking water. This groundwork helps to clarify the role of governments regarding responsibilities to provide clean drinking water for their citizens. With this foundation, Chapter 3 discusses the definitions of drinking water advisories and the limitations to drinking water advisory data. The summary of the initial findings is provided in Chapter 4. Chapter 5 provides an explanation of the methodologies used in

this study, which include literature reviews, jurisdictional analyses for provinces, case studies on class-action lawsuits, expert interviews, and limitations of the study.

Drinking water advisories are primarily managed by the six health authorities in BC; therefore, Chapter 6 presents a jurisdictional analysis of health authorities – with a synthesis of their similarities and differences, including lessons learned from each authority. Furthermore, impacts of recent events that influence access to clean water in BC are also discussed in this chapter. Chapter 7 examines current management practices, existing limitations, and significant events regarding the drinking water in Alberta and Ontario. Chapter 8 provides an overview and a synthesis of lessons learned from two case studies – the Flint Water Crisis and the recent class-action lawsuit brought by First Nations in Canada. Chapter 9 and 10 present the criteria and measures that were used to assess policy recommendations indicated by the research, in addition to future considerations to eliminate boil water advisories in BC.

## Chapter 2.

# Background: Legal Recognition for the Right to Water

## 2.1. International Recognition

The right to water is an internationally recognized human right. The United Nations (UN) recognizes that “the human right to water is indispensable for leading a life in human dignity. It is a prerequisite for the realization of other human rights” (UN, 2014, para. 2; UNOHCHR, 2010). In 2010, the UN General Assembly and the Human Rights Council first recognized the right to water as a binding international law (UN Water, n.d.). The UN has identified five definitions, and their measures, to describe the right to water – sufficient, safe, acceptable, physically accessible, and affordable (UN, 2014; UN Water, n.d.) (Table 1).

**Table 1 UN definitions on the human right to water**

Sufficient	“According to the World Health Organization (WHO), between <b>50 and 100 litres of water per person per day</b> are needed to ensure that most basic needs are met and few health concerns arise” (UN Water, 2014, para. 4).
Safe	“The water required for each personal or domestic use must be safe, therefore <b>free from micro-organisms, chemical substances and radiological hazards</b> that constitute a threat to a person's health.” (UN Water, 2014, para. 5).
Acceptable	“Water should be of an <b>acceptable colour, odour and taste for each personal or domestic use</b> . [...] All water facilities and services must be culturally appropriate and sensitive to gender, lifecycle and privacy requirements.” (UN Water, 2014, para. 6).
Physically accessible	“According to WHO, the water source has to be <b>within 1,000 metres of the home</b> and collection time should not exceed 30 minutes.” (UN Water, 2014, para. 7).
Affordable	“The United Nations Development Programme (UNDP) suggests that water costs <b>should not exceed 3 per cent of household income</b> .” (UN Water, 2014, para. 8).

Source: UN, 2014; UN Water, n.d., emphasis added.

The right to water is also addressed in the UN Sustainable Development Goals (SDG) under Goal 6, which explicitly aims to “ensure access to water and sanitation for all” by 2030 (UN SDG, n.d.; UN Water, 2021). Overall, the UN emphasizes that the

inability to access water undermines basic human rights and can also lead to detrimental consequences that prohibit the realization of other human rights without water.

In particular, the rise of the global COVID-19 pandemic has led to greater international emphasis regarding “sanitation, hygiene, and adequate access to clean water for preventing and containing diseases” (UN SDG, n.d., para. 2). The UN highlights the right to sanitation which “entitles everyone to have physical and affordable access to sanitation, in all spheres of life, that is safe, hygienic, secure, and socially and culturally acceptable and that provides privacy and ensures dignity” (UN Water, n.d., para. 6). The World Health Organization has recognized hand washing to be one of the most effective preventative actions to reduce the spread of the COVID-19 virus (UN SDG, n.d.). As the inadequate access to clean water which prevents hygienic practices poses a threat to our modern-day society, access to clean water for sanitation and hygiene purposes has also been highlighted during the recent global pandemic.

## 2.2. National Recognition

Canada has recognized the right to water at the international stage. During the 2012 Rio United Nations Conference on Sustainable Development, Canada joined the consensus and agreed that water is indeed fundamental to sustainable development. The document indicated that:

**“Canada recognizes the human right of everyone to safe drinking water and basic sanitation as essential to the right to an adequate standard of living, and therefore, implicit under article 11 of the International Covenant on Economic, Social and Cultural Rights. Canada interprets the right to safe drinking water and basic sanitation as the right to a sufficient quantity and safe quality of reasonably affordable and accessible water for personal and domestic uses (i.e., for drinking, cooking and for personal and household hygiene), and to basic sanitation that is safe and hygienic. Water and sanitation services should be physically and economically accessible on an equal and non-discriminatory basis.”** (UN, 2012, p. 2, para. 2, emphasis added)

Furthermore, Canada ratified the United Nations International Covenant on Economic, Social and Cultural Rights (UN ICESCR) in 1976, which defines the right to an ‘adequate standard of living’ to include food, *water*, and housing (BCOHRC, 2020a; emphasis added). However, although Canada recognizes this international law, there is no national legislation that directly enforces this human right in Canada.

As such, the right to water is neither explicitly defined or binding within Canadian legislatures. However, the right to water can be indirectly translated in Canadian documents. Alluding to the principals of fundamental justice and equal benefit of the law, detailed in sections 7 and 15 under the *Charter of Rights and Freedoms*, these statements indirectly suggest that the provision of water should be an essential legal right.<sup>2,3</sup> Furthermore, section 36 of the *Constitution Act* indicates that the government of Canada and provincial governments are committed to provide “essential public services of reasonable quality to all Canadians”, which suggests that the provision of clean water is considered an essential public service (*The Constitution Acts*, 2021).

Health Canada also published its Guidelines for Canadian Drinking Water Quality in 1968, which outlines acceptable levels of microbiological, chemical, and physical, and radiological contaminants present in water (Government of Canada, 2018). However, these guidelines are not enacted in law and are not legally binding standards. Additionally, these standards have been criticized for being below international drinking water standards (Christensen & MacDonald, 2014; Lui, 2015).

### **2.3. Provincial Recognition**

Like the Canadian government, the Government of BC does not have legislation that explicitly defines the human right to water. However, section 8 of the *BC Human Rights Code* notes that a person must not “deny to a person or class of persons any accommodation, service or facility customarily available to the public” (*BC Human Rights Code*, 1996). In this context, the use of the term “service” suggests the inclusion of the public provision of clean drinking water. Although the human right to water is not explicitly stated in BC legislation, the re-establishment of the BC’s Office of the Human Rights Commissioner (BCOHRC) and BC’s first poverty reduction strategy indicates recent efforts with limitations.

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<sup>2</sup> Section 7 of the *Charter of Rights and Freedoms* states that: “Everyone has the right to life, liberty and security of the person and the right not to be deprived thereof except in accordance with the principles of fundamental justice”.

<sup>3</sup> Section 15 of the *Charter of Rights and Freedoms* states that: “Every individual is equal before and under the law and has the right to the equal protection and equal benefit of the law without discrimination and, in particular, without discrimination based on race, national or ethnic origin, colour, religion, sex, age or mental or physical disability”.



Within BC, the legal recognition of human rights has been a contentious issue as the BC former human rights commission was dismantled in 2002, creating a vacancy of this responsibility for 17 years until the re-establishment of the BCOHRC in 2019 (BCOHRC, 2020b). This left BC as the only province without a commissioner to investigate, prevent or address systemic inequalities, resulting in only the BC Human Rights Tribunal as a quasi-judicial body and BC Human Rights Legal Clinic as an advocate offering legal assistance during this time. However, since its re-establishment in 2019, the BCOHRC has recognized the UN ICESCR, meaning that the right to an adequate standard of living has also been formally recognized (BCOHRC, 2020a). It is important to note that the first few years of BCOHRC operation have an emphasis on building and growing the new organization instead of investigating specific cases (BCOHRC, 2020b). The re-establishment of the BCOHRC may step towards recognizing the right to water for British Columbians.

The provincial government also released its first-ever poverty reduction strategy in 2019; however, it does not address the issue regarding the issue of access to clean water and fails to recognize the definitions under the UN ICESCR (Government of BC, 2019). Through the strategy, also known as *TogetherBC*, the provincial government passed the *Poverty Reduction Strategy Act* in 2018 (*BC Poverty Reduction Strategy Act*, 2018); however, the act uses the definition of poverty defined by the federal government, which measures poverty according to the market basket measure, now known as 'Canada's Official Poverty Line' (ESDC, 2018).<sup>4</sup> As defined by the federal government, "the basket of goods and services includes items such as clothing and footwear, transportation, nutritious food and shelter (including electricity, heat and *clean water*), and other necessary goods and services, such as personal care items and household supplies" (ESDC, 2018, p. 68, para. 6, emphasis added). It is important to note that these resources are not measured in terms of their access, but with levels of income to purchase these resources. This is explained further through Canada's definition of the official poverty line:

Canada's Official Poverty Line: A household is considered to be in poverty if it does not have **enough money** to buy a specific basket of goods and services that allows it to meet its basic needs and achieve a modest standard of living in its community. As **this measure is based on having**

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<sup>4</sup> In 2018, Canada also adopted its first Poverty Reduction Strategy (ESDC, 2018).

**or not having enough money** to purchase a fixed basket of goods and services, it is an absolute measure of poverty. (ESDC, 2018, p. 69, para. 2, emphasis added).

Although the BCOHRC and provincial poverty reduction strategies have been established, these initiatives do not specifically address the issue regarding the access to clean water. Emphasis on the economic definitions and measurements for poverty can also prevent accurate knowledge to fully understand the barriers to this access.

Overall, access to sufficient, safe, acceptable, physically accessible, and affordable water is recognized as an essential human right at all governance levels. However, federal and provincial governments have not legally recognized and enforced the human right to clean water, which suggests that the lack of legal recognition leads to challenges for Canadians receiving access to clean water. Especially with current measurements of poverty being recorded by income levels, the issue regarding access to clean water can be undermined. Too little has been done to address the barriers to clean water faced by British Columbians, including the issues of ongoing boil water advisories in the province.

## Chapter 3.

### Background: Drinking Water Advisories

*“Canada is home to a fifth of the world’s freshwater resources, and Canadians rank water as the country’s most important resource.”* (ECCC, 2020a, para. 8)

Although Canada is known for its pristine environmental resources, many communities face inequities regarding the access to clean water. Once poor drinking water quality is identified and determined as a threat to public health, one of several water quality notification levels are communicated to the community. The BC government identifies three main types of notifications regarding drinking water: Water quality advisories, Boil water notices, and Do not use water notices (Government of BC, n.d.a).<sup>5</sup> These advisories are meant to offer temporary notices as the first protection response for a community, and can range from being short-term (i.e., under 1-year) or long-term (i.e., over 1-year). The provincial government definitions for each type of notice are provided in the table below:

**Table 2 BC Water Public Notification Levels**

Type of Advisory	Provincial definitions
Water Quality Advisory	A water quality advisory is the lowest-level notification. A water quality advisory is used in situations where the public health threat is modest, and actions can be taken to reduce the risks by ways other than requiring a boil water notice or do not use water notice.
Boil Water Notices (also known as boil water advisories)	A boil water notice is used in situations where the public health threat is significant and the nature of the threat is one that can be effectively addressed by boiling the water. Water supply systems may remain on a boil water advisory for an extended period of time due to a substantial concern about the system’s treatment equipment or distribution infrastructure. Infrastructure changes are usually quite costly and require lengthy planning before they can become operational.
Do Not Use Water Notices	A do not use water notice is the highest-level notification. It is used in situations where a significant public health threat exists and the threat cannot be adequately addressed through a water quality advisory or boil water notice.

Source: Government of BC, n.d.a

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<sup>5</sup> According to the Government of BC website, the level of seriousness of each notification is ordered from least to greatest: Water quality advisory, boil water notice, and do-not-use water notice (Government of BC, n.d.a).

Of the three advisories, boil water notices (also known as boil water advisories) are most commonly issued and accounts for 98% of all water related advisories in Canada (ECCC, 2020b); therefore, this research will primarily focus on boil water advisories (BWAs). Furthermore, within literature and governing bodies, various terms are used to describe boil water advisories. They include, and are not limited to, drinking water advisories, boil water notices, and boil water orders (Grover, 2011). However, this report will use the term 'boil water advisory' (BWA) to refer to the notices.

When a boil water advisory (BWA) is issued, it is recommended for water to be brought to a rolling boil for at least 1 minute before it is used for drinking, cooking, feeding pets, making soups or ice cubes, washing fruits and vegetables, and making infant formula or other drinks (ISC, 2021a). It is also advised that unboiled water is not used to bathe infants, toddlers, and the elderly, in case water is consumed during the washing process (ISC, 2021a). In particular, it is advised that individuals with weakened immune systems may be at higher risk and need to take additional precautions (HealthLinkBC, 2017).

### **3.1. BWAs in Canada**

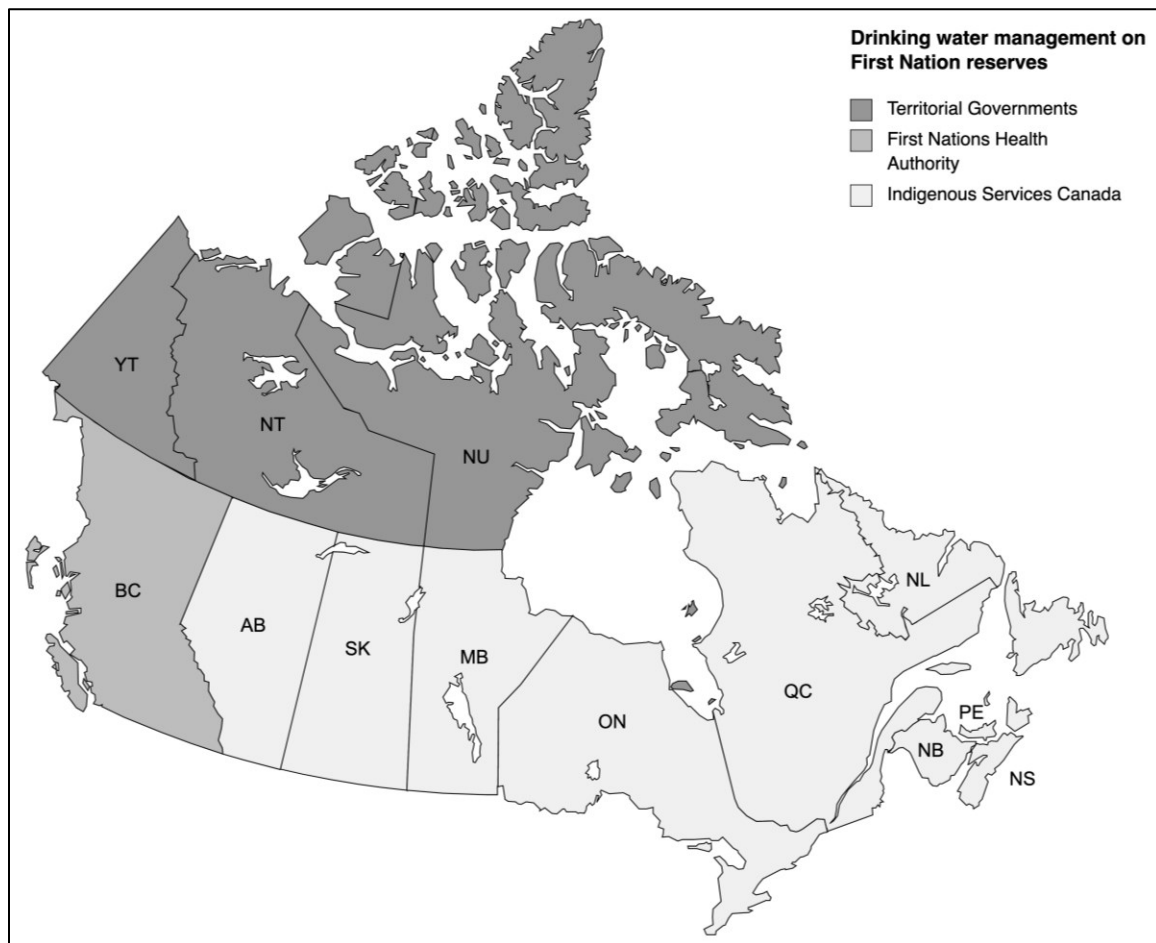
In Canada, individual provinces and territories are responsible for drinking water throughout their jurisdiction, and the federal government is responsible for drinking water on First Nations reserves (ISC, 2021a). Within the federal government, Indigenous Services Canada (ISC), with support from Health Canada, is the lead government organization for managing drinking water and wastewater on First Nation reserves in Canada.<sup>6</sup> The federal regulation for clean water is provided under the 2013 *Safe Drinking Water for First Nations Act*, outlining the role of the minister to ensure “access to safe, clean and reliable drinking water; effective treatment of wastewater; and protection of sources of drinking water on First Nation lands” (ISC, 2017b, para. 6; *Safe Drinking Water for First Nations Act*, 2013).

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<sup>6</sup> Indigenous Services Canada (ISC) was formed in 2017, after Indigenous and Northern Affairs Canada (INAC) was replaced by ISC and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC).

### 3.1.1. Drinking Water Management in First Nations Reserves

Specific roles and responsibilities are determined depending on one of three categories for the location of the First Nations reserves: the territories, provinces south of the 60<sup>th</sup> parallel, or BC (ISC, 2021b). The organization is summarized by the map in Figure 1.



**Figure 1 Organization of drinking water management on First Nations reserves in Canada**

Note: Government of Canada does not manage drinking water for the seven First Nation members of the Saskatoon Tribal Council (Map Chart, n.d.).

All jurisdictions south of the 60<sup>th</sup> parallel are managed by the Government of Canada (i.e., ISC), with the exception of drinking water for BC First Nations managed by the First Nations Health Authority (FNHA) and the member nations of the Saskatoon Tribal Council (ISC, 2021e). In particular, in 2013, First Nations in BC were separated as a part of the British Columbia Tripartite Framework Agreement on First Nations Health

Governance to “give First Nations a major role in the design and delivery of health care for their own people while ensuring increased coordination and integration with the provincial health care system” (Canada, 2011; ISC, 2021b; ISC, 2020, para. 3). However, the agreement affirms that ISC remains the funder and governance partner, but no longer delivers or defines the services provided (ISC, 2020). On the other hand, territories above the 60<sup>th</sup> parallel (i.e., Yukon, Nunavut, and Northwest Territories) are managed by individual territorial governments with support from Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) and are not examined in this research.<sup>7</sup> To summarize, the following table provides a breakdown of roles and responsibilities of jurisdictions south of the 60<sup>th</sup> parallel and BC.

**Table 3 Summary of drinking water management on First Nations reserves: Canadian provinces**

Location	Provinces south of the 60 <sup>th</sup> parallel, excluding BC <sup>8</sup>		BC
Management Responsibility	Shared between First Nations and the Government of Canada (ISC and Health Canada)		First Nations Health Authority (FNHA)
Roles	First Nations Chiefs and Councils <ul style="list-style-type: none"> <li>• Sampling and testing drinking water</li> <li>• Issuing notices in their communities</li> <li>• Planning and developing facilities that provide basic infrastructure needs</li> </ul>	Government of Canada <ul style="list-style-type: none"> <li>• ISC: funding and advice</li> <li>• Health Canada: develops guidelines for drinking water quality</li> </ul>	FNHA <ul style="list-style-type: none"> <li>• Providing independent health advice and guidance for BC First Nations communities</li> <li>• Providing funding and technical support for monitoring programs</li> </ul>

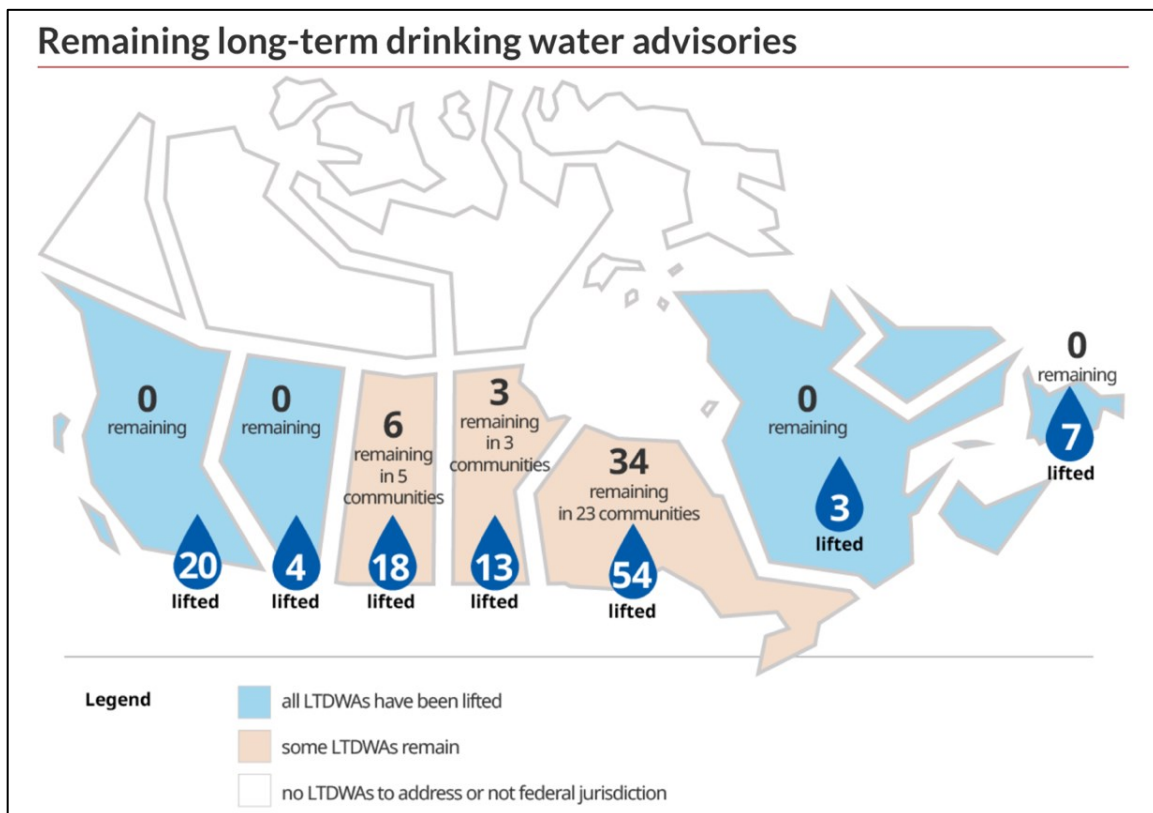
### 3.1.2. Limitations to BWA Data

The data for BWAs in First Nations reserves located in provinces are recorded and made publicly available on the ISC website. However, there are many limitations and important considerations to understand BWA data. For instance, BWAs that have been lifted (i.e., resolved) are removed from the website, making it difficult to determine

<sup>7</sup> According to ISC, “Crown Indigenous Relations and Northern Affairs Canada also helps to help protect water quality in Canada’s North and is responsible for managing water resources in and around Nunavut and some of the Northwest Territories. The Government of the Northwest Territories is responsible for the rest of the water in the Northwest Territories while the Government of Yukon is responsible for its water resources.” (ISC, 2021b)

<sup>8</sup> Excluding First Nations in BC and the Saskatoon Tribal Council.

whether the same advisories are reoccurring over time (ISC, 2021c; 2021d). It is also important to note that short-term and long-term BWAs are organized in different locations on the ISC website. Data for short-term BWAs are presented in a table format and is organized to provide information regarding the specific First Nation impacted, type of advisory, date set, population size, upon other details (ISC, 2021d). Long-term BWA data is visually represented through a map, where details can be accessed by individual links for each long-term advisory (Figure 2; ISC, 2021c).<sup>9</sup>



**Figure 2 Remaining long-term drinking water advisories on First Nations reserves in the ten Canadian provinces, as of November 1, 2021**  
 Source: ISC, 2021c. Image accessed on November 19, 2021.

It is important to note that BWAs on First Nations reserves in BC are not under the responsibility of the federal government, but under the First Nations Health Authority (FNHA). There is discrepancy between the number of long-term BWAs on the FNHA

<sup>9</sup> To note, although short-term BWAs are notices that persist less than a year (i.e., less than 365 days), there is no upper cap for long-term BWAs, as the requirement is ‘over 1 year’ (i.e., more than 365 days). Therefore, both a 366 day BWA and a 1000 day BWA are both considered long-term advisories.

website, compared to the visual in Figure 2.<sup>10</sup> Therefore, the zero remaining long-term drinking water advisories for the province of BC is misleading and needs to be comprehended with caution. Furthermore, it is important to note that the number of long-term BWAs shown in the map only represents a snapshot in time. Due to the highly variable nature of BWAs, the number of advisories in one province can fluctuate vastly within a given month, indicating the need for critical understanding when observing the number of advisories in a given period of time.

### 3.1.3. Considerations for BWA Data

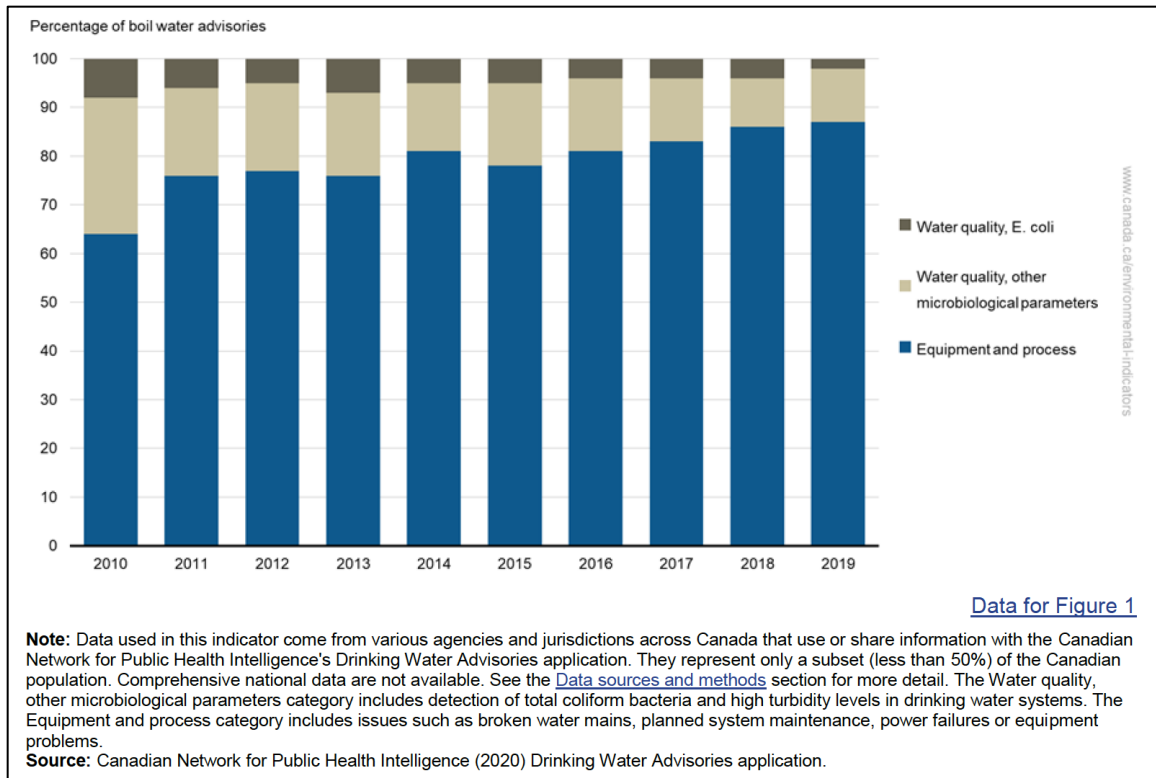
In addition to the limitations presented, there are additional considerations for BWA data. The issuance of a BWA could be due to several reasons such as, but not limited to, the presence of indicator bacteria such as *E. coli*, treatment failure, water main breaks and equipment failure, source water contamination, and unacceptable turbidity (ECCC, 2020b; Government of BC, n.d.a; Lui, 2015).<sup>11</sup> However, research by Environment and Climate Change Canada (ECCC) have indicated that in 2019, over 80% of the main causes for BWAs were due to the equipment and process issues of drinking water (ECCC, 2020b). Further examination of “equipment and process” present that a wide range of classifications are included under this category. For instance, “suspected contamination” and “insufficient quantity” are both reasons that are categorized under “equipment and process”, highlighting the very broad range of what “equipment and process” could really mean. Therefore, a critical lens of the reasons for a drinking water advisory must be critically considered to understand the true causes of BWAs.

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<sup>10</sup> As of October 31, 2021, there were 2 of long-term BWAs in the FNHA. See Appendix.

<sup>11</sup> It is also important to understand the historic and current use of the land, which lead to the rise of conditions listed above. BC is home to major resource extraction projects including forestry, fracking, and mining. Although these activities are not implicitly measured for their effects on drinking water, there is supporting evidence that these industries have played a role in contaminating water sources (Liu, 2015, p. 10). Several resource extraction projects put rivers, lakes, and groundwater at risk from contamination. Projects include a Fort Nelson fracking project operated by Encana, which withdraws 10 million liters of water per day. Furthermore, Nestle bottles 250 million liters per day in Hope. Further construction of the Site C dam in the Peace River Valley may also significantly impact drinking water sources in the region. Imperial Metals is moving forward with other mining projects in northern BC, after the Mount Polley Mine disaster in 2014. All of these extraction activities directly and indirectly impact drinking water sources for British Columbians. (Lui, 2015)





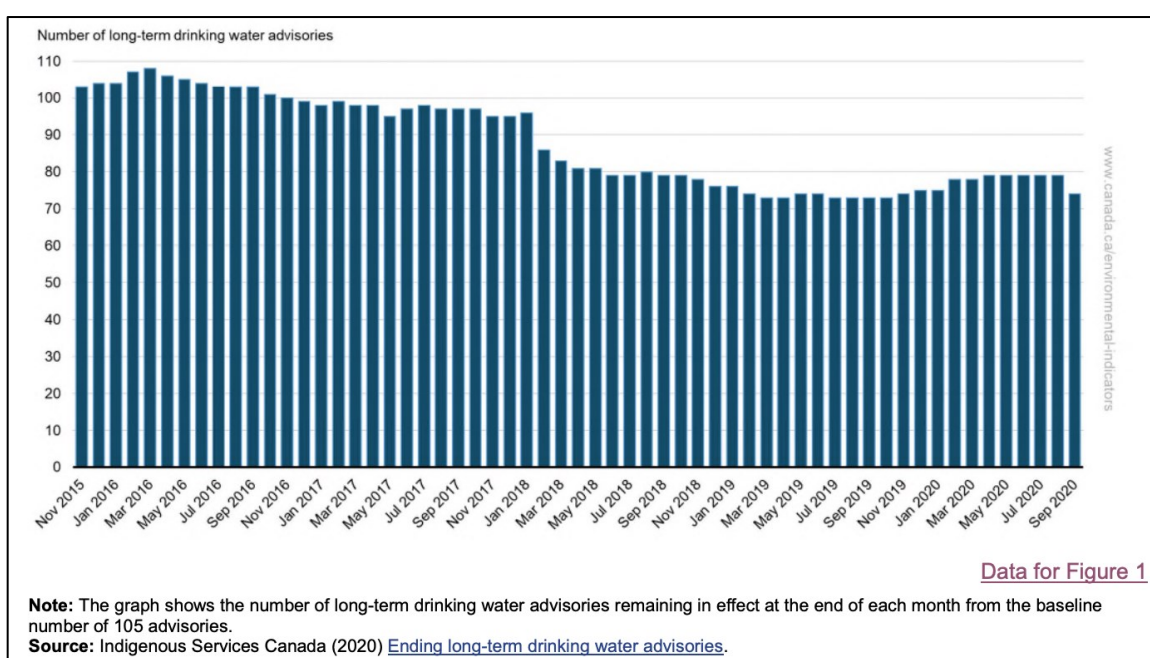
**Figure 3 Causes of boil water advisories, Canada, 2010 to 2019**  
Source: ECCC, 2020b.

**Table 4 Further details indicating equipment and process**

Indicator category	Reason	Definition
Equipment and process	Water main breaks or pressure losses	Includes instances when distribution system pipes break resulting in a breach of integrity, leakage and loss of system pressure. It also includes system pressure losses due to maintenance work, power failures or depleted reservoir storage.
Equipment and process	Suspected contamination	Used when contamination is suspected due to observed operational conditions, not test results.
Equipment and process	No applicable water quality reason	Used when an advisory is issued solely for operational reasons with no observed water quality issues.
Equipment and process	Insufficient quantity	Used when the capacity of water storage is depleted resulting in a potential loss of pressure in the drinking water system.
Equipment and process	Significant deterioration of source water quality	Used when a decline in source water quality has potentially impacted drinking water quality.
Equipment and process	Cross-connection, backflow suspected or confirmed	Applies to inappropriate connections to a drinking water system resulting in potential contamination of drinking water.

Source: ECCC, 2020b.

Furthermore, a level of caution is required when observing the number of long-term drinking water advisories over time, such as the data presented in Figure 4. For instance, there could have been a hundred long-term BWAs in November 2015 and fifty long-term BWAs in November 2020. The total number of long-term BWAs do not indicate that of the hundred BWAs, fifty of them have been lifted between November 2015 and November 2020. In theory, fifty drinking water advisories from November 2015 could have been lifted, and an entirely new fifty advisories could have been set in September 2020. As such, particular caution is required since BWA data is fluid and is not a static measure.



**Figure 4 Progress of long-term drinking water advisories on public systems on reserve as of September 30, 2020, Canada, 2015 to 2020**  
 Source: ECCC, 2021.

### 3.2. BWAs in BC

Although the federal government can provide financial resources to supply water as indicated in the *Constitution Act* and the *Charter of Rights and Freedoms*, and federal agencies such as Health Canada are involved in developing the guidelines for Canadian Drinking Water Quality, the BC provincial government has the recognized responsibility to provide clean water to British Columbians. Public water notices are provided under the *Drinking Water Protection Act* and the Drinking Water Protection Regulation, and the

*BC Health Act* outlines restrictions for contamination surrounding drinking water sources (*Drinking Water Protection Act*, 2001; Drinking Water Protection Regulation, 2018; *Health Act*, 1979; OBWB, n.d.).<sup>12,13</sup>

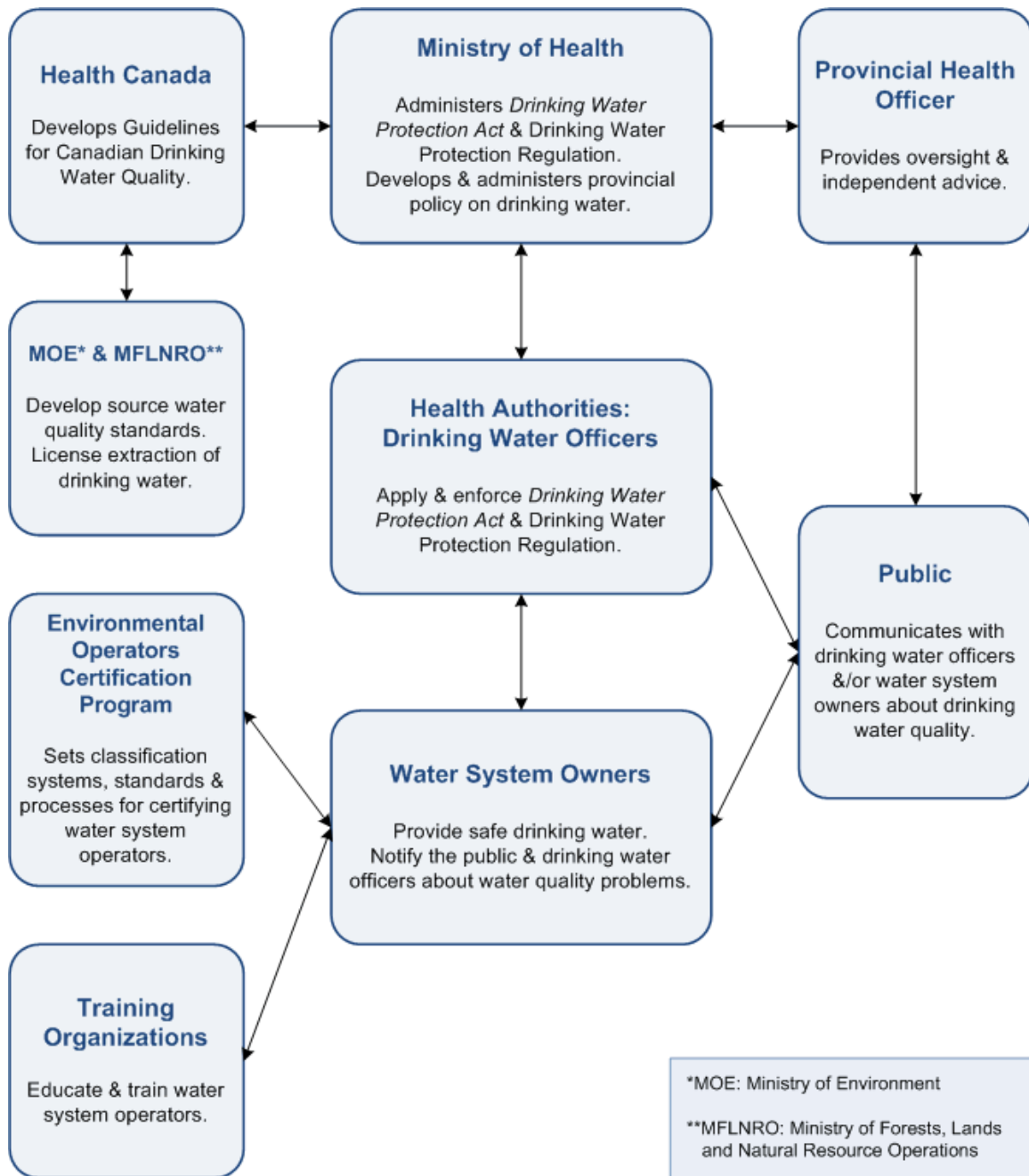
Furthermore, as indicated by Figure 5, several levels of governments (i.e., federal, provincial, and municipal), ministries (i.e., Ministry of Health, Ministry of Environment, and Ministry of Forests, Lands, and Natural Resources), and organizations (i.e., water system owners and certification programs) are involved in the provision and management of drinking water, highlighting the importance of cooperation and communication throughout management practices. BC also utilizes a multi-barrier approach, which “is a system of procedures, processes, and tools that collectively prevents or reduces the risk of contamination of drinking water from source to tap to reduce risks to human health” (PHO, 2019, p. x, para. 1).

It is important to note that the same BWA data limitations and considerations (presented in Chapter 3.1.2 and 3.1.3) are applicable to provincial BWA as well. The jurisdictional analysis section in Chapter 6 provides further information regarding provincial BWA data.

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<sup>12</sup> In brief, the provincial *Drinking Water Protection Act* is a broad policy which outlines “requirements for drinking water operators and suppliers to ensure the provision of safe drinking water to their customers” in addition to outlining additional responsibilities for the Provincial Health Officer concerning drinking water (BC government, n.d.).

<sup>13</sup> There are other provincial legislations, including the *Water Sustainability Act*, which also addresses regulations and operating policies regarding freshwater sources. However, this act focuses on the environmental health aspect and does not include policies directly related to water for consumption purposes (BC *Water Sustainability Act*, 2016; Government of BC, n.d.b).



**Figure 5** Shared roles and responsibilities in protecting drinking water in BC  
Source: BC Government, n.d.

## Chapter 4.

### Background: Identified Policy Gaps

As indicated through the background research, there are many areas requiring improvements and advancements to address boil water advisories in Canada. Chapters 2 and 3 have indicated limitations identified in legislation, complex management, and BWA data. Legislation gaps include the formal and direct recognition of the human right to water within federal and provincial laws. There is an absence of legally binding standards on the national and provincial level that defines, enforces, or binds this human right within the regions. More specifically for BC, additional efforts need to be taken within the recently formed BCOHRC to address the lack of clean drinking water for British Columbians. Lastly, the mechanisms used to measure poverty, through the first ever poverty reduction strategy *TogetherBC*, needs to be re-evaluated. Canada's Official Poverty Line does not measure the *access* to clean water, but only measures *income* (emphasis added). An emphasis on economic definitions do not fully encompass the barriers to access.

The roles and responsibilities for drinking water management are complex in Canada. Canada is responsible for First Nations reserves located on the south of the 60<sup>th</sup> parallel, excluding First Nations reserves in BC and the Saskatoon Tribal Council. This leaves 370 First Nations under Canada's management, out of a total of 617 First Nations.<sup>14</sup> Efforts to clarify the roles and responsibilities of all members managing clean drinking water on First Nations reserves, is recommended. Furthermore, there are gaps in the collection, categorization, and presentation of BWA data. Due to the fluid nature of BWAs, presented data may be misleading and limited in portraying a complete picture. Moreover, the categorizations of the reasons for BWAs can be problematic. For instance, "suspected contamination" and "insufficient quantity" are both categorized under "equipment and process". Further clarification of categories is recommended.

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<sup>14</sup> According to the Government of Canada website, there are 42 First Nations in the territories and 198 First Nations in BC (CIRNAC, 2014). Furthermore, there are 7 First Nation members within the Saskatoon Tribal Council (Saskatoon Tribal Council, n.d.). Therefore, there are a total of 247 First Nations are excluded from the federal government management, leaving the responsibility of 370 First Nations to the Government of Canada.

## **4.1. The Policy Problem**

Chapters 2 and 3 have provided the necessary background information to situate the BC context. There is a lack of legislation that clearly states the role of the international and national responsibility to provide clean drinking water. It is up to the provincial government to address the drinking water crisis faced in BC. As of January 1, 2022, there were 672 BWAs in BC. In addition to the complex management system in BC (Figure 5), there is a need to understand the provincial context to identify the key barriers for British Columbians to access clean drinking water.

## **Chapter 5.**

### **Methodology**

Both quantitative and qualitative data were examined to understand the underlying challenges regarding BWAs and to inform policy recommendations to address BWAs in BC. The primary methodologies included a literature and data review, jurisdictional analyses and case studies, as well as a series of expert interviews.

#### **5.1. Literature and Data Review**

I conducted a literature review to understand the background, current standards, and recent data on BWAs in Canada and BC. To do this, I gathered existing research and data from the following web sources:

- Health authorities in BC;
- First Nations, local, provincial, and federal government websites;
- Academic peer-reviewed articles;
- Data from government websites such as Statistics Canada; and
- News articles through various media sources.

#### **5.2. Jurisdictional Analyses and Case Studies**

For the purposes of gaining further understanding of the organizational structure of drinking water management in BC, jurisdictional analyses were conducted on the six health authorities within the province. Additionally, analyses of Alberta and Ontario were conducted to provide additional context and comparative analysis. Furthermore, two case studies of the Flint Water Crisis and class-action lawsuit brought by First Nations in Canada were studied as examples of possible scenarios and outcomes of BWAs.

### **5.3. Expert Interviews**

Three interviews were conducted with experts to assess the policy recommendations of this study:

- Dr. Zafar Adeel, Executive Director of the Pacific Water Research Centre, and Professor of Professional Practice of the School of Sustainable Energy Engineering
- Joanne Edwards, Provincial Drinking Water Officer at the BC Ministry of Health
- *Anonymous*

Interview design and processes were evaluated and approved by the SFU Ethics Office. Interviews were conducted over Zoom video conferencing during the spring of 2022. Participants provided valuable information regarding the feasibility, limitations, and key considerations for the three policy recommendations (Chapter 10). Additionally, Participants provided further insights regarding additional policy areas for consideration to address the access to clean drinking water and drinking water advisories in BC. The findings were incorporated in the policy analysis sections of this report.

### **5.4. Limitations of the Study**

There are few academic researchers that directly study drinking water advisories, especially for non-Indigenous communities. This directly impacted the availability of academic literature reviews and the number of interviewees outside health authorities and governments. Furthermore, the majority of individuals contacted for an interview indicated that their focal area of research was indirectly associated with drinking water advisories, acknowledging their limited understanding of drinking water advisories. This highlights the niche environment for drinking water advisory research – this is an area that deserves more attention.

Another critical limitation to this study was the inability to interview or consult with employees in regional health authorities and members of First Nations due to the ethical and time restraints of the SFU ethics application process. As the six health authorities are fundamental to understanding the day-to-day management in addressing BWAs; this fact was a major limitation.



Finally, I want to acknowledge that this study does not encompass all considerations for drinking water advisories in BC. This study merely brings awareness to this issue faced by many British Columbians today. There are many aspects of drinking water advisories that need further research, highlighted in Chapter 10 of this report.

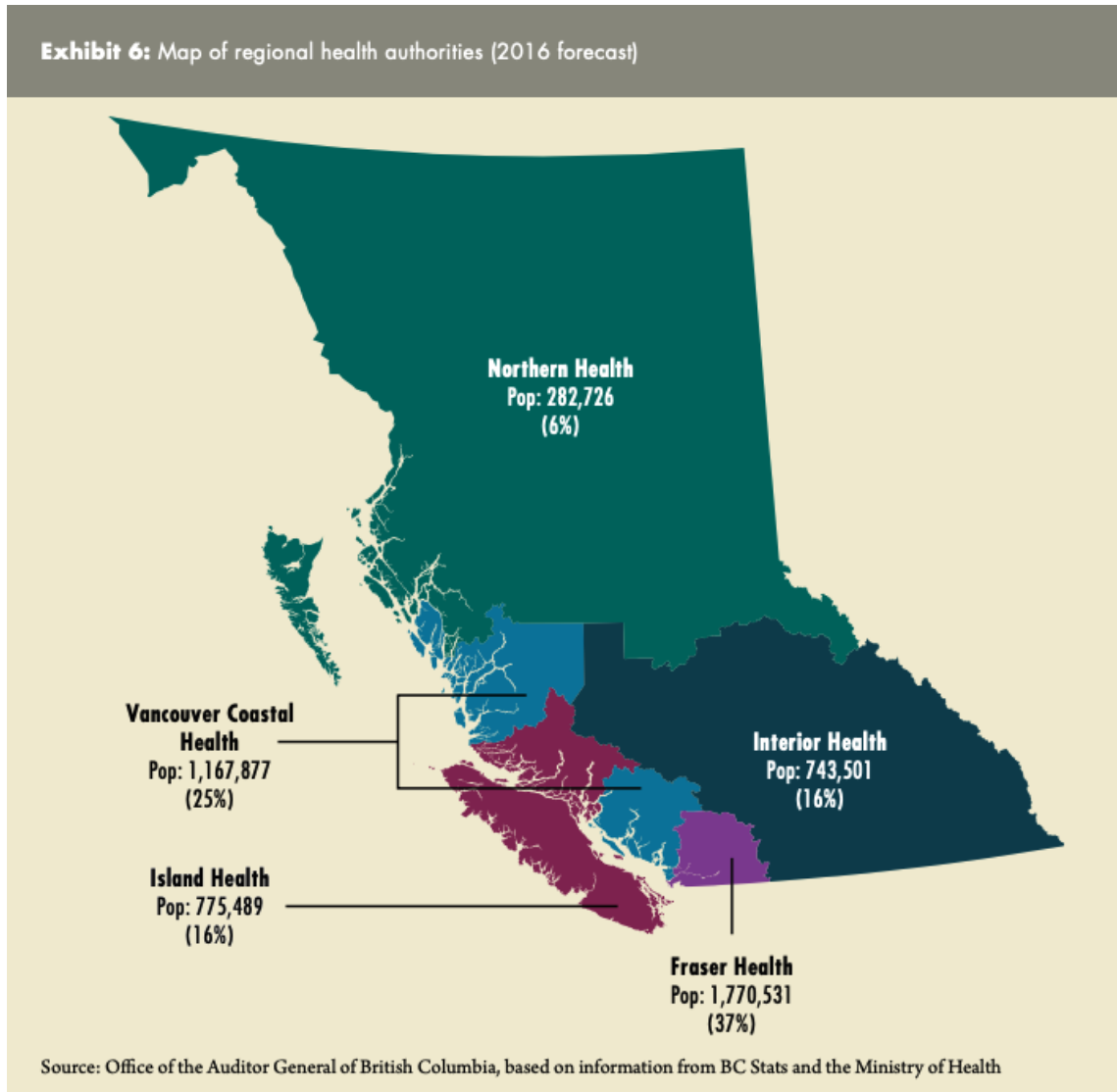
## Chapter 6.

### Drinking Water Management in BC

At the core, health authorities have the greatest responsibility in managing drinking water in their region. There are six health authorities in BC that provide oversight and public notices (listed in alphabetic order):

- First Nations Health Authority
- Fraser Health
- Interior Health
- Island Health
- Northern Health
- Vancouver Coastal Health

A geographical representation of each health authority is provided in Figure 6. To note, the First Nations Health Authority (FNHA) encompasses all First Nations in the province and is not represented in the figure. As of 2016, Fraser Health was largest in population size (37%), followed by Vancouver Coastal Health (25%), Island Health (16%), Interior Health (16%), and Northern Health (6%). Moreover, as of 2016, Aboriginal people made up 6% of BC's population (Statistics Canada, 2019).



**Figure 6 Map of regional health authorities in BC with 2016 populations**  
 Source: BC Auditor, 2017.

Although all regions aim to address the same issue of BWAs, many inconsistencies exist between health authorities. Therefore, in order to understand the management of drinking water in BC, the following section provides analyses of the six health authorities and the lessons learned from each region. Because FNHA has a different management system than the other five regional health authorities, the analysis of FNHA was completed separately. Therefore, a comparative jurisdictional analysis for the five regional health authorities is presented first, followed by the analysis for FNHA.

## 6.1. Regional Health Authorities in BC

The following table provides a snapshot of the number of boil water advisories (BWAs) and drinking water advisories on January 1<sup>st</sup> of 2022.<sup>15</sup> Further detailed information regarding the number of BWAs in each health authority are provided in Appendix.

**Table 5 Snapshot of the number of boil water advisories and drinking water advisories among BC regional health authorities**

	Fraser Health	Interior Health <sup>16</sup>	Island Health	Northern Health	Vancouver Coastal Health	Snapshot Total
<b>Number of boil water advisories*</b>	9	420	46	128	51	654
<b>Total number of drinking water advisories**</b>	9	1964	48	143	54	2218

\*As of January 1, 2022. Includes both short-term and long-term BWAs.<sup>17</sup>

\*\*Includes all drinking water advisories (i.e., water quality advisories, boil water notices/advisories, do not consume notices, and do not use advisories) from January 1, 2022.

It is important to note that population size and geographical size of each regional health authority does not correlate or indicate the number of BWAs in a region. However, the number of advisories is more linked to the number of individual and smaller drinking water systems and the rural nature of a community. For instance, there are over 1,900 individual drinking water systems within the Interior Health region, which makes the region more susceptible to technical failure (Interior Health, 2017). Furthermore, it is important to note that each advisory location is different. Some indicates residential communities, but others can be a community building such as a community centre or church building. Overall, the analysis of each regional health authority led to the

<sup>15</sup> Please be aware of the limitations to BWA data presented in Chapter 3.

<sup>16</sup> Interior Health is divided into three key regions (1) Thompson/Caribou/Shuswap, (2) Okanagan, and (3) Kootenay (Interior Health, 2021a).

<sup>17</sup> BWA data was collected for all six health authorities on January 1, 2022 at approximately 22:00 PST.

following synthesis of regional jurisdictions, presenting various similarities and differences regarding the management of BWAs.

### 6.1.1. Similarities and Differences

All five regional health authorities follow the regulations under the *Drinking Water Protection Act*. They also refer to the bacterial standards stated in the Drinking Water Protection Regulation and health related chemical parameters stated in the Guidelines for Canadian Drinking Water Quality (Fraser Health, n.d.a; Healthspace, n.d.a). All drinking water operations are managed under an Environmental Health Office through programs such as a Drinking Water Safety Program, where Environmental Health Officers approve, inspect, and monitor “drinking water supplies for compliance to regulatory requirements and [prevent] the spread of water-borne diseases” (Fraser Health, n.d.b, para. 1; Northern Health, n.d.c & n.d.d).

In terms of BWA data, all five regional health authorities provide the implementation date of a BWA, detailed information for the reasons for the BWA, and additional information bulletins for businesses. However, there are differences regarding the data provided by each health authority, summarized in Table 6.

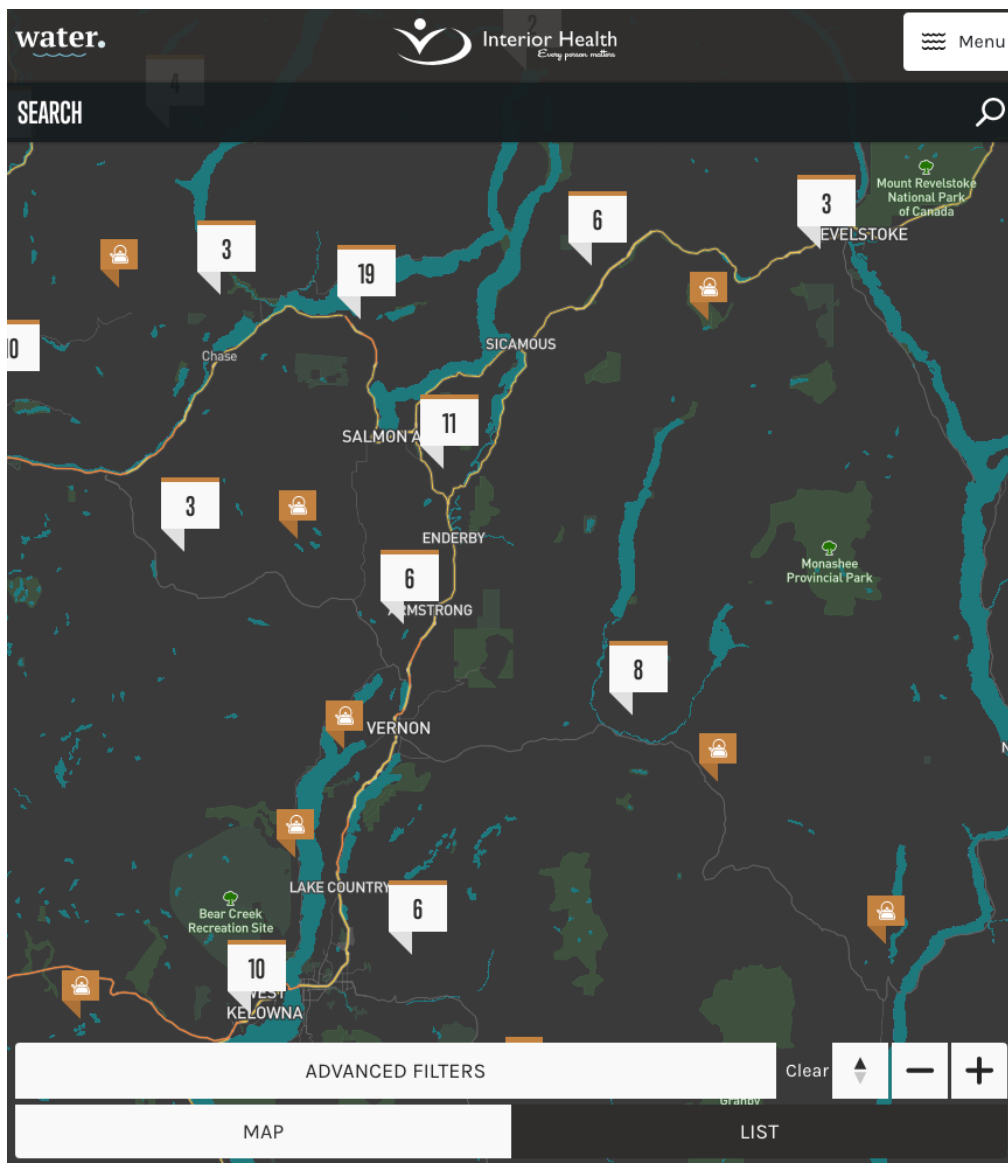
**Table 6 BWA related data provided by each regional health authority**

Presents the following information (Y/N)	Fraser Health	Interior Health	Island Health	Northern Health	Vancouver Coastal Health
Population impacted	N	Y	N	N	N
Supplier contact information	N	Y	N	N	N
Useability and aesthetics of website	N	Y	Y	N	N
Hazard rating	N	Y	Y	Y	N
Water sample reports	N	Y	Y	Y	N

First and foremost, Interior Health is the only health authority which provides information surrounding the population size of the community impacted by the BWA and

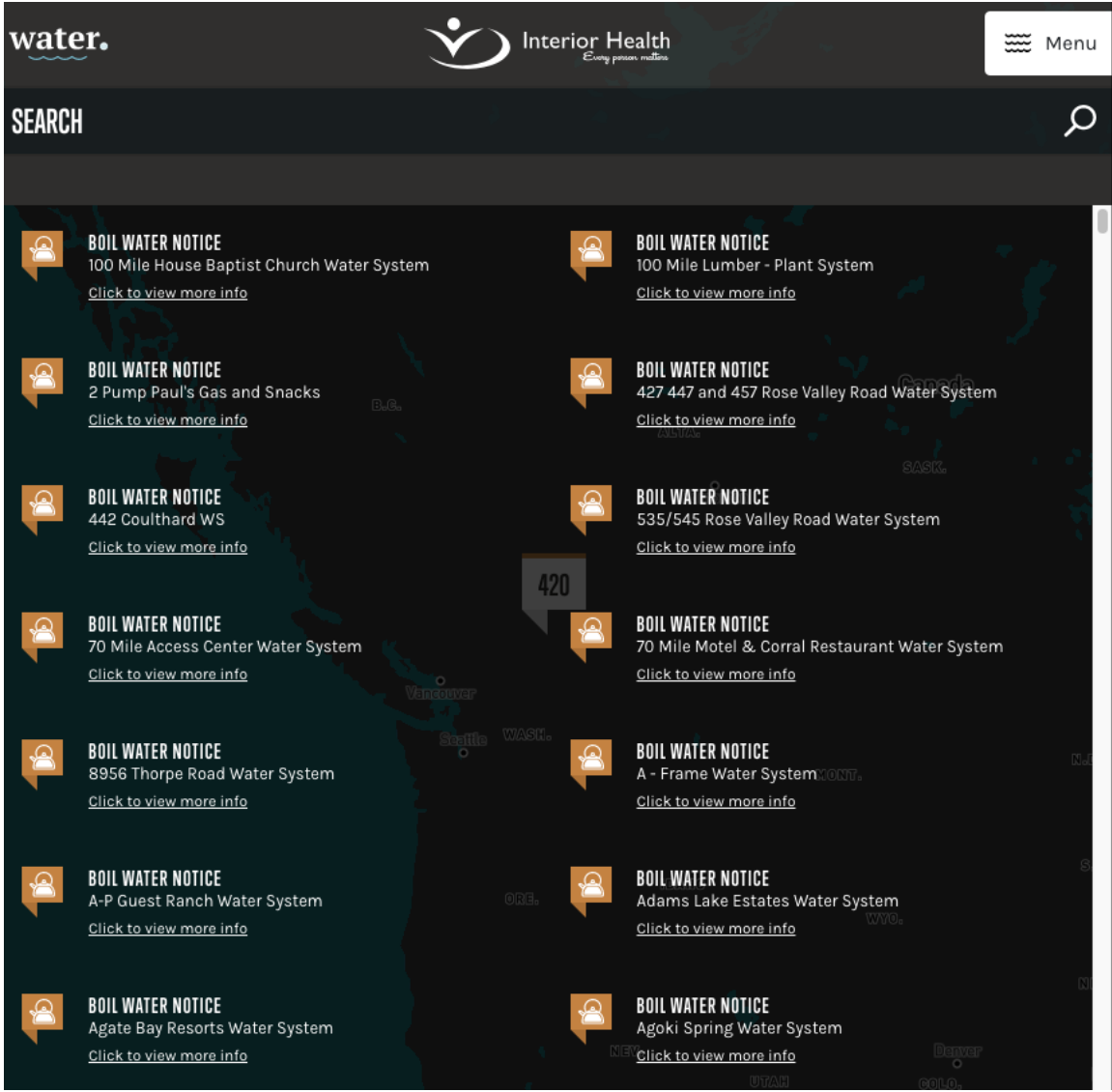
contact information of the supplier directly on the specific advisory page. Other regional health authorities do not provide these pieces of information on their website.

There are also differences concerning data useability between health authority websites. For instance, unlike most health authorities which provide a table with BWA data, Interior Health provides an interactive website providing water advisory data. The Interior Health website provides both an interactive map and detailed list of drinking water advisories (Figure 7 and Figure 8), and further information, including contact information, for each notice when selected (Figure 9).



**Figure 7 Drinking water advisory map from the Interior Health website**

Source: Screenshot from Interior Health Water Advisories, n.d.a.



**Figure 8** List of current boil water advisories in the Interior Health region  
 Source: Interior Health Water Advisories, n.d.a.

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**BOIL WATER NOTICE**

**100 Mile House Baptist Church Water System**

Print this notice

**ADVISORY LAST UPDATED**

1 January 2022  
11:31pm

**REASON(S) FOR ADVISORY**

- Unacceptable water quality results (microbiological)

**WEBSITE**

N/A

**POPULATION SERVED**

51-500

**SUPPLIER CONTACT INFORMATION**

(250) 791-9253

REPORT A PROBLEM OR MISTAKE WITH THIS PAGE

See All Recent Water Sample Reports

Back to Map

**WHAT DOES THIS NOTICE MEAN?**

**BOIL WATER NOTICE**

A boil water notice tells you that there are organisms in the water that can make you sick. To safely consume (swallow) the water, you must bring it to a rolling boil on a stovetop for at least 60 seconds to kill these harmful organisms. [Click here](#) to learn more about all types of water advisories.

**UNACCEPTABLE WATER QUALITY RESULTS (MICROBIOLOGICAL)**

Water is unsafe due to an unacceptably high amount of disease-producing organisms such as viruses and bacteria. Water samples failed testing and show there could be germs in the water that can make you sick.

[Click here](#) to learn more about the reasons for water advisories.

Not sure who your water supplier is or if this affects your house? [CLICK HERE](#) to learn how you can find out who your water supplier is.

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**Figure 9 Example of a boil water notice from Interior Health**  
Source: Screenshot from Interior Health Water Advisories, n.d.b.

Furthermore, Interior Health, Island Health and Northern Health use a rating system that corresponds to recent inspection results (i.e., high, moderate, and low hazard) (Table 7). For instance, “a high rating may be given to a water system that has an inadequate treatment system. Conversely, a low hazard rating may be given to a system that has no system deficiencies” (Healthspace, n.d.a, para. 9). Furthermore,



these three health authorities provide drinking water reports and summaries for each advisory; whereas, Fraser Health and Vancouver Coastal Health, do not (Healthspace, n.d.a).

**Table 7 Drinking water hazard definitions**

Hazard Level	Definition
Low	The water system was found to be in general compliance with the <i>Drinking Water Protection Act</i> and Regulation. No significant problems or presence of hazards were identified.
Moderate	The water system was found to be in general compliance with the <i>Drinking Water Protection Act</i> and Regulation. However, some issues related to the operation of the water system were identified that require correction in order to ensure long-term protection of public health. This category may include water systems that do not have a source water protection plan or do not use multiple barriers of treatment and disinfection in accordance with VIHA Policy 3.3, Drinking Water Treatment for Surface Water Supplies.
High	Significant problems were noted relating to the safety of the water and /or the maintenance and operation of the water system. The water system is not in compliance with the <i>Drinking Water Protection Act</i> and Regulation. A high hazard rating may be accompanied by a Boil Water Notice or other notification if it is determined that the microbiological quality of the water is unsafe or there are potential and significant risks that the water is susceptible to microbiological contamination. A high hazard may also be attributed to unacceptable concentrations of chemicals in the water or malfunctioning or inadequate treatment facilities.

Source: Healthspace, n.d.a.

## 6.2. First Nations Health Authority

The First Nations Health Authority (FNHA) serves over 200 diverse First Nations in BC (FNHA, n.d.a). They were formed as a result of BC’s Tripartite Framework Agreement in 2013. For administrative purposes, FNHA divides the province into regions similar to the five health authorities, with exceptions to support cultural boundaries appropriate for First Nations health planning purposes (FNHA, n.d.b).

One major difference between the five regional health authorities and FNHA is that FNHA is the only health authority that provides monthly PDF updates, whereas other health authorities provide instant updates. Furthermore, the FNHA monthly summary provides additional details regarding the advisory length (i.e., categorized as brief, short, or long), and whether the remediation of this advisory is funded by ISC (FNHA, 2021b; Appendix).

### **6.2.1. Notable Cases: Drinking Water Advisories on the Semiahmoo First Nations Reserve**

There are several notable BWA events on First Nations reserves; one such instance was on the Semiahmoo First Nations reserve. Located adjacent to the City of White Rock and the City of Surrey in the lower mainland of BC, Semiahmoo First Nations reserve was home to one of the longest BWAs in the province. The community water distribution system needed replacement in 1991 (Gamage, 2021). Water quality issues have been experienced since 1995, and the BWA was in effect since 2005 as there were unsafe levels of *E. coli* and other contaminants in the water (Chan, 2020; Gamage, 2021). There are social implications to this advisory, as members of the community chose to leave the reserve because of long-term inadequate access to clean water (Ryan, 2021). One of many reasons for poor water quality could be due to areas of the reserve being “previously leased by the municipal governments of Surrey and White Rock for parkland and landfill uses” (Chan, 2020, para. 9). Furthermore, the City of White Rock had voted to cut off water supplies to the Semiahmoo First Nation reserve in 2016 (Ryan, 2021). Semiahmoo First Nations reached an agreement with the City of Surrey in 2018 “to provide potable water and sewer connections to the reserve”, resulting in the construction of piping in March 2019 with federal funding (Chan, 2020, para. 5). Although there were delays in the construction due to the coronavirus pandemic, the project was completed in 2021, ending the 16-year-old BWA on the Semiahmoo First Nations reserve.

## **6.3. Lessons Learned**

All six health authorities in BC manage BWAs and BWA data in slightly different ways, and because of this, there are things that can be learned from each health authority. For instance, the best data scenario could incorporate the following:

- Include population or demographic data to indicate the number people impacted by the advisory
- Provide water supplier contact information
- Increase usability of BWA data
- Utilize a hazard rating system

- Provide access to water sample reports

There are additional practices BC health authorities could incorporate to address current gaps in BWA management and data. First, further assessment of issues to provide information explaining the disproportionate number of drinking water advisories in some health authorities would be beneficial (e.g., land mass and population size are not the indicators determining the number of advisories in a health authority). It is also important to note that health authorities do not present archived BWA data on their websites. It would be beneficial for the community or for researchers to be able to identify whether the same BWAs are reoccurring, or if each advisory is new.

Furthermore, FNHA indicates the following message on their website: “Please note that this information is not intended to be used for public health messaging. First Nations community members can obtain the most up-to-date information on their drinking water through their Chief and Council, or their local FNHA [Environmental Health Officer] EHO.” (FNHA, n.d.a). If FNHA chooses to do so, the provision of instantaneous data could benefit the communities impacted, having the information provided on the FNHA website.

## **6.4. Recent Events Impacting Access to Clean Water and BWAs in BC**

There are many factors that impact drinking water for British Columbians. In particular, several recent events – including the coronavirus pandemic, flooding events, climate change, and community opinions – play a role in affecting access to clean water. The following sections presents a reflection on each event which impacts access to clean drinking water in BC.

### **6.4.1. COVID-19 Pandemic**

The current coronavirus pandemic (COVID-19) has impacted the local and international society in drastic ways. Since March 2020, many government and daily business operations have been impacted, causing economic functions and livelihoods to change – including the shift of government and societal objectives towards health and public safety. This is particularly important as health epidemics and drinking water are both managed by the Ministry of Health in BC. Furthermore, COVID-19 has prevented

normal operations and could have increased the burden for communities facing drinking water advisories. For instance, the construction of the Woodworth Dam replacement project near Prince Rupert had been put on hold during the COVID-19 pandemic (Azizi, 2021). Heavy rainfall is affecting water quality (i.e., greater turbidity and suspended particles in water), prompting most of the BWAs in the region (Azizi, 2021). Therefore, the construction of the Woodworth Dam was a solution to address drinking water advisories, but experienced delays in its completion due to COVID-19. Furthermore, sample collection and laboratory testing could have been deferred, and delivery services for drinking water may have been impacted due to the pandemic. The phenomena of 'panic-buying' has been seen throughout the pandemic as well. The province experienced a temporary shortage of basic necessities such as toilet paper, basic groceries, and water bottles, due to impacts on global supply chains and international shipping (Hopper, 2021). In addition to the impacts of global supply chains, there are lasting physical, mental, and societal impacts on individuals and communities, indicating the need for more research in understanding the role of COVID-19 with the challenge of accessing clean drinking water in BC.

#### **6.4.2. Recent Flooding Events**

A provincial state of emergency was called during October and November 2021 when several atmospheric rivers were present in BC. These flooding incidents not only required residents in certain regions to be evacuated, but several drinking water systems, including private well systems were impacted, initiating several BWAs. High rainfall and flooding incidents have resulted in a greater number of BWAs in municipalities that have previously experienced few BWAs in the Fraser Health region (Lypka, 2021). The BC government also created a temporary program for private well water testing for homes that were evacuated or were given an evacuation notice during the flooding events (HealthLinkBC, 2021). This new program was offered to two health authorities (i.e., Fraser Health and Interior Health) and lasted until January 15, 2022. Prior to these flooding events, there were no programs that tested for water quality in private wells.

### **6.4.3. Climate Change**

The effects of climate change are happening now, presenting implications for drinking water in the future. With climate change, natural climate events will only be exacerbated, as seen by increased heat waves, forest fires and greater volumes of rainfall in BC. Because forest fires decrease air quality, remove forest stocks, and negatively impact rural communities, fires play a role in altering climate and the surrounding environment. Furthermore, changing climate can lead to greater rainfall, which causes greater turbidity – one of the determining factors for BWAs (Azizi, 2021). All of these factors can negatively impact water quality and availability, indicating the need for continuous action to prevent further climate change exacerbation. Action is crucial in addressing drinking water for British Columbians.

### **6.4.4. Community Opinions**

Some of the longest lasting BWAs are located in the Northern Health region. One example is the Dodge Cove Community Water System, where they have had a boil water advisory since March of 1988 (Healthspace, n.d.b). This isolated community had an opportunity to build a water treatment system in 2008; however, 81% of Dodge Cove residents, including the community board member, voted against the project (Hale, 2011). This was due to the high annual operating costs that would be put upon a small number of community residents (Hale, 2011). Therefore, this example highlights the importance to consider the conditions and local opinions of each community when addressing challenges to drinking water in BC.

## Chapter 7.

### Jurisdictional Analysis: Other Provinces

As indicated by an independent media source called *WaterToday*, drinking water advisories exist throughout Canada (2022). This chapter aims to understand how drinking water is managed in other jurisdictions and will focus on the province of Alberta and Ontario. Alberta has been selected for having the fewest number of BWAs and its close proximity to BC (Figure 10). Ontario has been selected for its history of BWAs and for examination of the Walkerton Tragedy.

<u>Province</u>	<u>Red</u>	<u>Yellow</u>	<u>Cyan</u>	<u>Purple</u>
Alberta	0	14	0	0
British Columbia	5	216	1	0
Manitoba	3	83	0	0
New Brunswick	1	6	4	0
Newfoundland & Labrador	1	121	0	0
Northwest Territories	0	1	0	0
Nova Scotia	0	45	0	0
Nunavut	0	1	0	0
Ontario	1	71	1	0
Prince Edward Island	0	0	0	0
Quebec	26	85	0	0
Saskatchewan	4	148	0	0
Yukon Territory	0	1	0	0

**Figure 10 Drinking water advisories in Canadian provinces and territories**  
Source: Accessed on January 15, 2022 (*WaterToday*, 2022).  
Note: Red = Do not consume; Yellow = Boil water; Cyan = Cyanobacteria bloom; and Purple = Water shortage.

#### 7.1. Drinking Water in Alberta

Alberta is a province that has one of the fewest number of drinking water advisories in Canada; however, further examination indicates this being due to the exclusion of advisories on First Nations reserves, private wells, and water systems throughout the province. More discussion on the limitations concerning drinking water advisories in Alberta is presented in the following section.

Despite limitations, there are various reasons to why Alberta has few drinking water advisories for the systems that are accounted for. One reason is that Alberta was the first jurisdiction in North America to require Drinking Water Safety Plans for all water supplies (Perrier *et al.*, 2014). The province emphasizes how the plans “do not replace the Guidelines for Canadian Drinking Water Quality or the drinking water monitoring and reporting requirements under the *Environmental Protection and Enhancement Act*” but are additional assessments that consider “the source of the water; how drinking water is treated; and how treated water is stored and distributed” (Alberta, n.d.e; para. 3 and 2). Essentially, for the Drinking Water Safety Plan, the Albertan government provides a resource package for water suppliers and provides steps for the development of these plans (Alberta, n.d.e). During the assessment, risks against four critical barriers are assessed: “(1) the source water supply; (2) the treatment facility; (3) the distribution system; and (4) the consumer” (Perrier *et al.*, 2014, p. 1132, para. 3). Overall, the adoption of the Drinking Water Safety Plan indicates proactive efforts by the province to provide safe drinking water in Alberta.

Alberta additionally uses a multi-barrier<sup>18</sup> ‘Source to Tap’ approach which refers to “the continuum of processes to treat the water between the water source and [the] drinking water tap” (Alberta, n.d.b, para. 1). Monitoring in Alberta is conducted using the parameters provided by the Canadian Drinking Water Quality Guidelines published by Health Canada (Alberta, n.d.d). Drinking water is regulated by the Alberta Environment and Parks, and is organized by five zones: North, Edmonton, Central, Calgary, and South (Alberta, n.d.b; Figure 11). Unlike in BC, zones are not managed by individual health authorities, which conveniently allows for drinking water advisory information to be compiled onto one website instead of accessing the information through several (Alberta, n.d.b).

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<sup>18</sup> Whereas, a single-barrier approach puts emphasis on one mechanism (i.e., treatment against contamination) to protect water.



**Figure 11 Five zones of Alberta**  
 Source: Alberta, n.d.a.

### 7.1.1. Limitations

There are several limitations to current drinking water management practices in Alberta. As indicated, water systems on First Nations reserves and “private wells and water systems are not regulated by Alberta Environment and are not included” on the government website, indicating the responsibility of private owners to ensure the safety of their water (Alberta, n.d.c, para. 1). This is an issue as up to 450,000 Albertans rely on private water wells and “small communities are often at a greater risk of failure as they lack the human, technical and financial capacity necessary to maintain water infrastructure, retain qualified operators and adapt to changing regulatory requirements” (Caffrey *et al.*, 2020; Perrier *et al.*, 2014, p. 1141, para. 1). Therefore, the impact and true number of BWAs may be unknown because water systems on First Nations reserves and private water systems are not accounted for in the total number of advisories in Alberta.

One study that interviewed water system operators in Alberta also found that poor inter-personal relationships and communication dynamics were barriers against the



adoption of Alberta's Drinking Water Safety Plan (Perrier *et al.*, 2014). Communities that had good working relationships with government liaison officers found resources helpful, whereas communities with a poor relationship with liaison officers viewed Drinking Water Safety Plans "as a major inconvenience" (Perrier *et al.*, 2014, p. 1151, para. 2). This highlights the need to have open discussions and supportive relationships between operators and decision makers to ensure desirable results for safe drinking water.

Furthermore, a study highlighted some challenges for smaller communities, regarding knowledge preservation and resources to support operations. For smaller local communities, knowledge about some systems was from information that was passed down verbally and therefore, had "inadequate record keeping" (Perrier *et al.*, 2014, p. 1151, para. 5). However, this became a challenge as additional administrative paperwork was required as part of the Drinking Water Safety Plan (Perrier *et al.*, 2014). Moreover, the study found that costs to improve or maintain "a water supply was a significant concern for many operators", indicating the opportunity for governments to step in to support operations (Perrier *et al.*, 2014, p. 1150, para. 2).

Lastly, it is important to note that Alberta is also home to many major resource extraction projects, including tar sands operations. There are potential risks as "the Athabasca River is the primary source for water used for tar sands development, putting one of the worlds' largest freshwater deltas at risk" (Lui, 2015, p. 11, para. 6). Any reduction in environmental monitoring efforts can impose serious risks for local water quality and supply.

### **7.1.2. First Nations Reserves in Alberta**

In one of the more recent studies from 2006, researchers evaluated "56 drinking water systems on First Nations reserves in Alberta", of which, "50 of the water supply systems were ranked at high risk, 5 were ranked at medium risk, and there was 1 low risk site" (Smith *et al.*, 2006, p. S1, para. 1). Authors also indicated the "lack of source water characterization for pathogens" and highlighted the "inadequacies in the bacteriological monitoring and testing programs on the reserves" (Smith *et al.*, 2006, p. S1, para. 1). This indicates the need of understanding the problems experienced in jurisdictions in order to address the root causes of the problems.

Furthermore, the study highlighted the need to understand the “unique cultural, political, social, and economic environment in First Nations reserves” in order to address current challenges faced with access to safe drinking water (Smith *et al.*, 2006, p. S16, para. 2). This is well summarized by the statement below:

Training of water quality importance and treatment techniques should be tied to the First Nations cultural value system in the context of state-of-the-knowledge practice for the long-term sustainability of these training efforts. Merely providing the water treatment and distribution infrastructure without respecting these unique challenges in First Nations communities will not meet the objective of providing water that meets [Guidelines for Canadian Drinking Water Quality] and related quality requirements. Provision of safe drinking water and public health protection must be proactive – not reactive – to the outbreaks of diseases. (Smith *et al.*, 2006, p. S16, para. 2)

A difference to the BC FNHA is that water systems on First Nations reserves in Alberta “rely on federal government money from Indian and Northern Affairs Canada (INAC) for capital and operational funding, and Health Canada’s First Nations and Inuit Health Branch for monitoring the quality of finished drinking water” (Smith *et al.*, 2006, p. S2, para. 2).<sup>19</sup> This indicates that the provision of safe drinking water in Albertan First Nations reserves fully depends on the federal government for the provision of resources.

The situation is bleak for water systems on First Nations reserves. Significant research, prevention, and action is necessary for the provision of safe drinking water for individuals on First Nations reserves in Alberta.

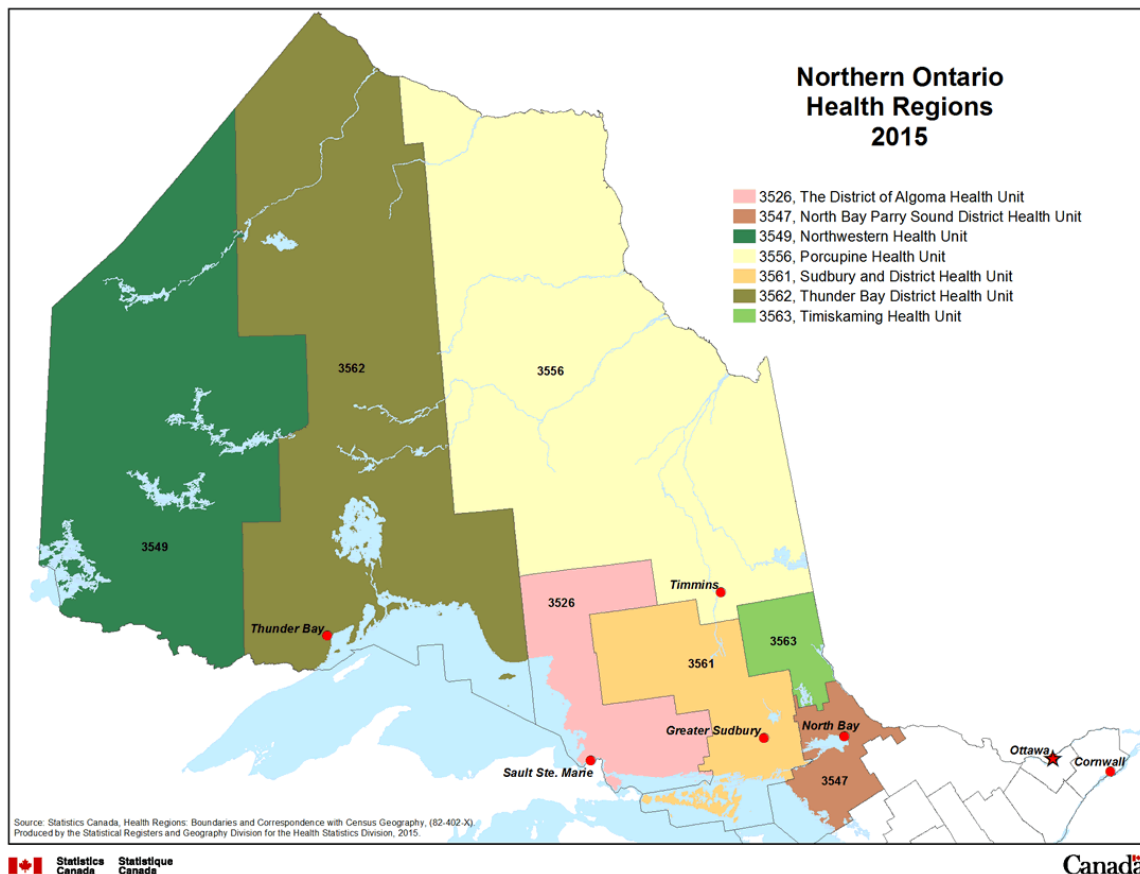
## **7.2. Drinking Water in Ontario**

In Ontario, the Ministry of the Environment, Conservation and Parks is responsible for drinking water management (Ontario Government, 2021a). The *Safe Drinking Water Act* recognizes “that the people of Ontario are entitled to expect their drinking water to be safe” and provides “for the protection of human health and the prevention of drinking water health hazards” (*Safe Drinking Water Act*, 2002, part 1.1 and 1.2). Moreover, drinking water advisories are managed by the 36 Public Health Units (PHU) in Ontario (Statistics Canada, 2015; Figure 12 and Figure 13). PHU’s provide resources for owners and operating authorities of municipal and non-municipal

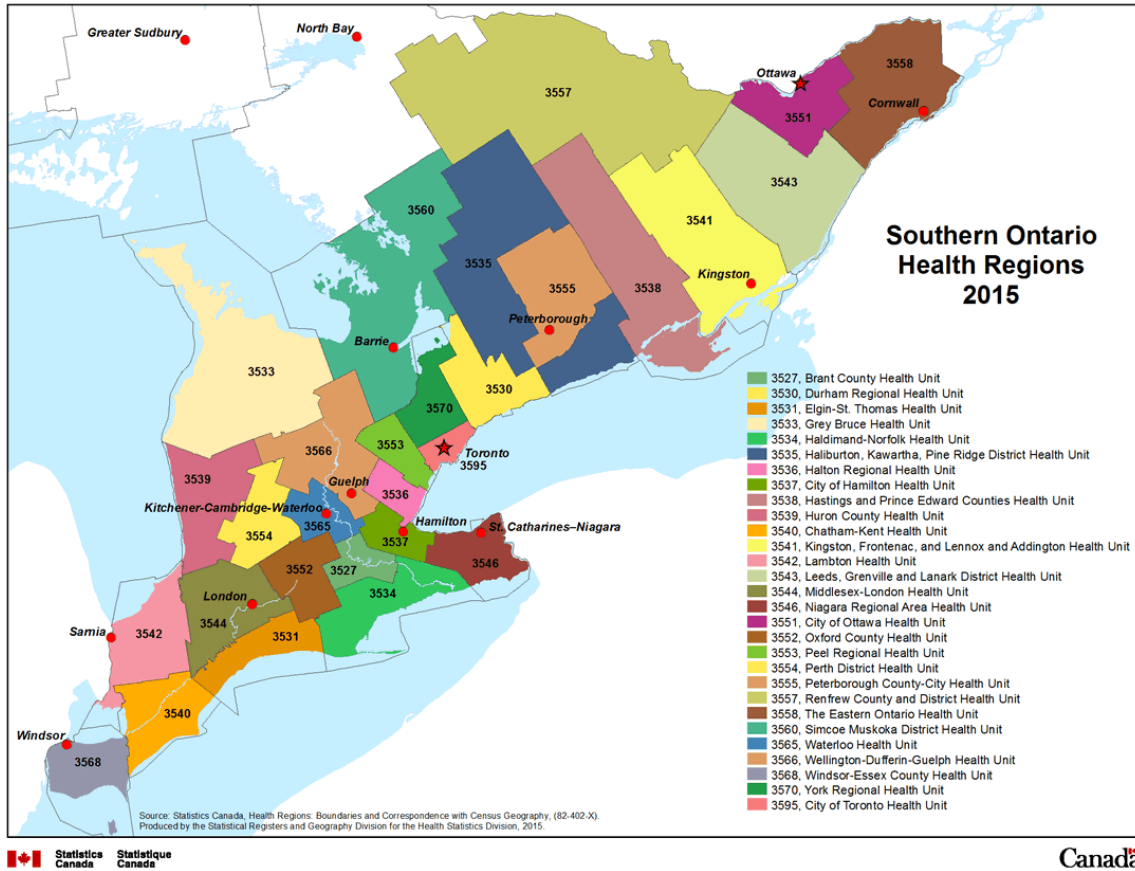
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<sup>19</sup> This study was published in 2006, before INAC became ISC and CIRNAC in 2017.

drinking water systems, and also provides the list of drinking water advisories – a similar data dissemination process as the health authorities in BC (Eastern Ontario Health Unit, n.d.). Furthermore, Ontario’s Drinking Water Quality Management Standard (DWQMS) was developed in partnership between the Ministry of the Environment, Conservation and Parks and Ontario’s water sector from a recommendation from the report of the Walkerton Inquiry (Ontario Ministry of the Environment, 2007). As such, many other recommendations were adopted from the Walkerton Inquiry report, which greatly improved overall drinking water management in Ontario.



**Figure 12 Northern Ontario health regions 2015**  
 Source: Statistics Canada, 2015a.



**Figure 13 Southern Ontario health regions 2015**  
Source: Statistics Canada, 2015b.

### 7.2.1. Walkerton Tragedy

In May 2000, widespread *E. coli* and *Campylobacter jejuni* contamination in the Walkerton drinking water system led to the deaths of seven people, over 2300 ill individuals, and chronic health effects on vulnerable populations, including children.<sup>20</sup> The Walkerton Inquiry report indicates that the extent of the crisis could “have been prevented by the use of continuous chlorine residual and turbidity monitors” in addition to proper operating practices, adequate doses of chlorine, and daily monitoring (O’Conner, 2002a, p. 3, para. 7). Furthermore, there had been “clear indications that the water quality in Walkerton was deteriorating” – meaning that the drinking water systems in Walkerton should have been reevaluated and assessed earlier and highlights the

<sup>20</sup> The population of Walkerton at the time, was approximately 5000 people.

failures of Ontario’s Ministry of Environment not fulfilling their regulatory and oversight duties (O’Conner, 2002a, p. 21, para. 2).

As a result of the Walkerton Inquiry, a total of 121 recommendations were provided (O’Conner, 2002a and 2002b). Many lessons can be learned from all the recommendations presented; however, notable recommendations have been selected and presented in the table below.

**Table 8 Select Recommendations from the Walkerton Inquiry Report, Part 2**

Recommendation 34	The provincial government should encourage the federal government, working with the Standards Council of Canada and with advice from municipalities, the water industry, and other stakeholders, <b>to develop standards for materials, including piping, valves, storage tanks, and bulk chemicals, that come into contact with drinking water.</b>
Recommendation 44	Municipalities should <b>review the management and operating structure for their water system</b> to ensure that it is capable of providing safe drinking water on a reliable basis.
Recommendation 60	The Ministry of the Environment should <b>require water system operators who currently hold certificates obtained through the grandparenting process</b> to become certified through examination within two years, and it should require operators to be recertified periodically.
Recommendation 63	The Ministry of the Environment should take measures to <b>ensure that training courses are accessible to operators in small and remote communities</b> and that the courses are <b>tailored to meet the needs</b> of the operators of these water systems.
Recommendation 77	A <b>steering group should be established</b> within each public health unit area in the province, comprised of representatives of affected local hospitals, municipalities, local Ministry of the Environment offices and local boards of health, <b>for the purpose of developing in a coordinated fashion emergency response plans</b> for the control of, or the response to, infectious diseases and public health hazard outbreaks.
Recommendation 78	The provincial government should ensure that programs relating to the safety of drinking water are <b>adequately funded.</b>
Recommendation 88	Ontario <b>First Nations should be invited to join</b> in the watershed planning process outlined in Chapter 4 of this report.
Recommendation 92	The provincial government should <b>actively offer</b> , on a cost-recovery basis, its <b>training facilities and curriculum</b> to First Nations water system operators.
Recommendation 93	As a matter of principle, the provincial government should make technical assistance, drinking water testing, inspection, and enforcement <b>available to First Nations communities</b> on a cost-recovery basis, if requested.

Source: O’Conner, 2002b, emphasis added.

One of the positive outcomes of the Walkerton Tragedy is the establishment of the Walkerton Clean Water Centre (WCWC) which has provided training for over

100,000 participants and additionally “provides training for the 133 First Nations communities in Ontario” (Water Canada, 2022; WCWC, n.d., para. 5). They additionally provide pilot testing programs and provide courses online as well (WCWC, n.d.). The creation of an equivalent BC Clean Water Centre could satisfy the recommendations provided above and could act as a proactive catalyst to promote clean drinking water in BC.

Over 20 years have passed since the Walkerton Tragedy and discussions regarding the Tragedy are not over yet. Environmental critics have opposed the incumbent Progressive Conservative government for rolling back environmental protections and climate strategies (Butler, 2020). Environmental protection and aggressive climate change prevention strategies are critical when addressing drinking water issues, and should not lead to cost-cutting agendas, which were “partly to blame for the [Walkerton] disaster” 20 years ago (Butler, 2020). This reminds us of the fact that drinking water management and environmental protection are ongoing requirements and are operations that should not be taken for granted.

### **7.3. Lessons learned**

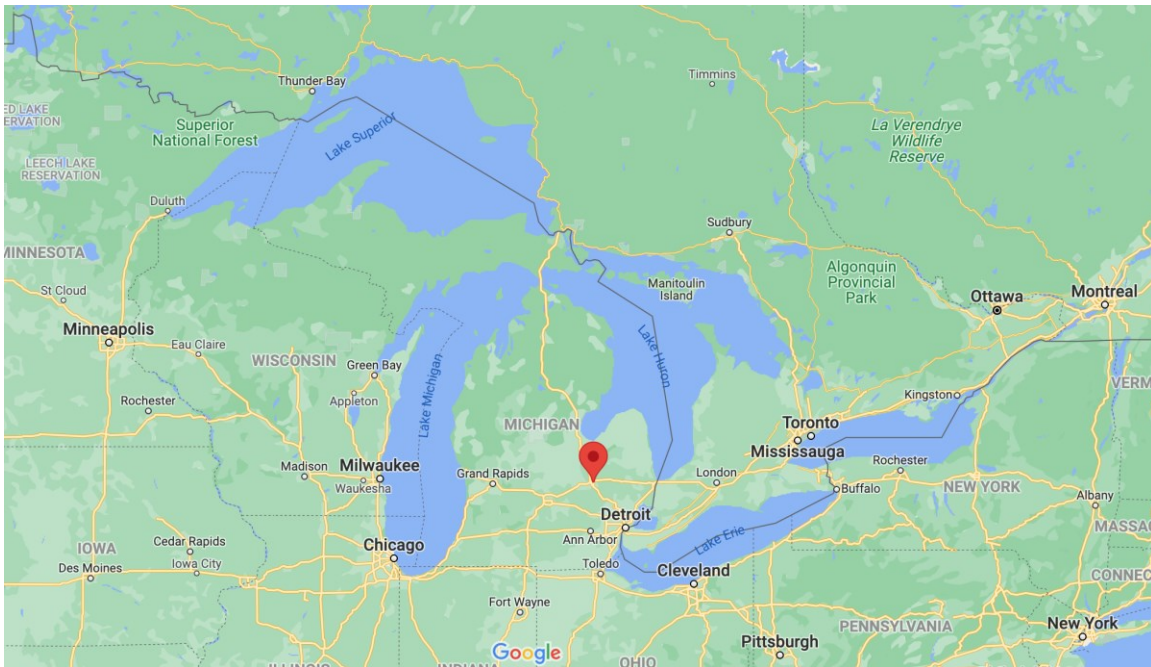
Jurisdictional analyses of Alberta and Ontario have indicated the importance to be cautious in cross jurisdictional comparisons. Analyses have indicated that data collection, drinking water regulation, and management structure (i.e., Ministry of Health versus Ministry of Environment) is different among all three provinces. Furthermore, the topography of each province is different. For instance, the construction of long water pipelines to connect communities is possible in Alberta. However, BC is geographically mountainous in most regions, making the construction of long water pipelines impossible in most cases. Therefore, a level of caution should be taken when comparing across jurisdictions, and when incorporating recommendations in BC.

## Chapter 8.

### Class Action Case Studies

This chapter examines two class-action lawsuits which resulted from the widespread contamination of drinking water, affecting large populations in Canada and the United States. Case studies were conducted to understand potential outcomes of long-term drinking water advisories and the legal actions of communities with lived experience. The first case examines the 2014 Flint Water Crisis and the outcomes of various lawsuits. The second case examines the 2019 class-action lawsuit filed against the Canadian government by First Nations for long-term drinking water advisories on First Nations reserves. Each section provides a brief history followed by details on the class-actions.

#### 8.1. Flint Water Crisis



**Figure 14** Location of Flint, Michigan, USA

Source: Google Maps, 2022.

Flint used to be an economically flourishing town as the home of one of the largest General Motors production plants (CNN, 2021). However, the downsizing of the

company in the 1980s caused the city to suffer financial difficulty, leading the state of Michigan to oversee the city's finances (CNN, 2021). In order to save approximately "\$200 million over 25 years", Flint officials decide to switch from the Detroit Water and Sewerage Department to the Karegnondi Water Authority (Kennedy, 2016, para. 6). There, as a result of fund shortages, the city "switched its municipal water supply to the Flint River while it awaited the construction of a new water pipeline to Lake Huron" as an interim solution in 2014 (Pauli, 2020, p. 2, para. 1; CNN, 2021). However, the treatment plant was ill-equipped for the switch, as they were understaffed and did not have the experience to treat river water. As indicated by one researcher, "failure to treat the water properly at the Flint Water Treatment Plant led to a variety of problems with water quality and public health", which were also exacerbated with aging pipes throughout the city (Pauli, 2020, p. 1, para. 1).

After the switch in water supply, studies by Virginia Tech indicated the increasing concentrations of lead in residents' homes (Kennedy, 2016). Throughout 2014 and 2015, levels of contamination increased throughout the city. Several BWAs were issued and repealed, and residents, children in particular, continued to experience negative health effects due to drinking water (CNN, 2021).

On December 14, 2015 – 16 months after the discovery of high concentration of contaminants in the water – the city of Flint declared a state of emergency (CNN, 2021; City of Flint, Michigan, n.d.). A state of emergency was also declared in Genesee County on January 5, 2016, followed by a declaration of a federal emergency in Flint on January 16, 2016 (CNN, 2021). As a result, the National Guard was involved in distributing water and filters to residents, \$5 million was provided in aid, and the Federal Emergency Management Agency was allowed to step in (City of Flint, Michigan, n.d.; CNN, 2021). All levels of government were mobilized to address the crisis.

Although the city of Flint was able to switch its water sources back to the Great Lakes in October 2015 with great public pressure, residents still found high levels of lead and other contaminants in their tap water (City of Flint, Michigan, n.d.; Pauli, 2020). Furthermore, out of approximately 100,000 people afflicted, over half were African American, highlighting the racial inequality of the crisis (Hammer, 2016; Reuters Staff, 2021; Pauli, 2020). Health implications included, and were not limited to, negative implications to the heart, kidneys, and nerves; as well as "impaired cognition, behavioral



disorders, hearing problems and delayed puberty” for children due to lead exposure (CNN, 2021, para. 5; Guardian staff and agencies, 2021). Symptoms such as skin rashes and hair loss were commonly reported throughout the years, and long-term studies have also indicated that increased contaminant exposure had led to long-term health effects, including decreased fertility (Grossman and Slusky, 2019; Pauli, 2020). Moreover, these negative health effects imposed economic challenges, as individuals were required to spend additional finances on securing necessities (i.e., bottled water and filters) and on health (i.e., doctors’ appointment and medication) (Heard-Garris *et al.*, 2017).

### **8.1.1. Legal Outcomes**

As a result of the Flint Water Crisis, several civil class-action lawsuits and criminal charges were filed against the State, the city, individual government officials, the Environmental Protection Agency (EPA), private corporations, school districts, and banks (CNN, 2021). Justifications included the violation of the federal and state *Safe Drinking Water Act*, “misconduct, neglect of duty and conspiracy to tamper with evidence”, for financing faulty pipeline projects, and for exposing children to highly contaminated water (CNN, 2021; Kennedy, 2016, para. 58; Ridley, 2015).

Lawsuits filed against the State of Michigan and City of Flint, were settled over many years with a wide range of remedies (CNN, 2021; United States District Court, 2015). In 2017, a federal judge approved a \$97 million settlement “to fund the replacement of water lines for at least 18,000 Flint households by 2020” and to “hire an independent third party to monitor water quality for at least three years after the replacement” (Boyette, 2017, para. 1). In 2019, a federal ruling allowed Flint residents to move forward with legal action regarding the Flint Water Crisis (Waldrop, 2019). In 2020, a \$600 million preliminary settlement for Flint water civil lawsuits was announced to provide direct payments to residents impacted (Attorney General, 2020). In November 2021, the final approval for the \$626 million settlement for tens of thousands of victims was declared (Egan, 2021; Guardian staff and agencies, 2021). Some residents argued that the settlement portrayed the “lack of legal accountability for those behind the crisis”, as the class-action lawsuit had raised expectations for at least a \$1 billion settlement (Bellamy, 2021; Oladipo, 2021, para. 6). Starting this year, in 2022, impacted residents

by the Flint Water Crisis are able to file claims as part of the settlement (Michigan Radio, 2022).

Today, 8 years later, many issues still remain. Lawsuit cases against private corporations and the EPA remain in court, while further investigation continues to understand the role of additional state officials who played a role in poisoning the city, but were not charged (Chariton and LeDuff, 2022; Michigan Radio, 2022). Moreover, city residents will continually need to heal through the mental and physical trauma left by the Flint Water Crisis. Although remediation actions to achieve access to clean water has been initiated, a study indicated that 20% of adults do not drink tap water, compared to 14% before the Flint Water Crisis (Associated Press, 2022). Furthermore, “the figures are [especially] higher among Black adults, with 35% saying they avoid drinking tap [water], up from 25% before Flint [and] among Hispanic adults, the figure rose to 38% up from 27%” (Associated Press, 2022, para. 8). Residents have expressed their feelings of distrust and betrayal towards government (Associated Press, 2022). There is lots of work still needing to be done to address the lasting legacies and long-term impacts imposed on Flint residents.

## **8.2. First Nations in Canada: Class-Action Lawsuits**

North of the 49<sup>th</sup> parallel, the Canadian government also faced class-action lawsuits regarding long-term drinking water advisories on First Nations reserves. Throughout Canada, many individuals on First Nations reserves do not have access to clean drinking water. In 1995, Indigenous and Northern Affairs Canada had committed to address “all deficient water systems on First Nations reserves by 2004”, which was not met (McLeod, 2021, para 4). In 2015, Prime Minister Justin Trudeau promised to eliminate all drinking water advisories on First Nations reserves by March 2021, which was also not met (Goldfinger, 2021). As a result, another promise was made by Indigenous Services Minister Marc Miller, to eliminate all long-term drinking water advisories by 2026 (Goldfinger, 2021). Continual persistence of the prohibited access to clean drinking water has attributed to various illnesses and higher mortality rates for individuals living on First Nations reserves (Feir and Akee, 2019).

In 2019, Emily Whetung (Chief of Curve Lake First Nation) and Chris Moonias (Chief of Neskantaga First Nation) filed a class-action in the federal court “over lack of

access to potable water in communities” (APTN National News, 2021, para. 11). Another class-action was filed by Doreen Spence (Chief of Tataskweyak Cree Nation) in the Manitoba Courts the same year (APTN National News, 2021). These class-action lawsuits were filed against the Canadian government “for failing to address prolonged drinking-water advisories on First Nations reserves across Canada, ... failing to ensure that reserve communities have clean water, ... [and because Canada has] breached its fiduciary duties, breached the honour of the Crown, and breached various rights under the *Canadian Charter of Rights and Freedoms*” (McCarthy, n.d.a., para. 1). Furthermore, class-action lawsuits assert that First Nations communities have additionally been “harmed emotionally, physically, financially, and spiritually” through this failure as well (McCarthy, n.d.b, p. 1, para. 4). Overall, the class-actions aimed “to advance the rights and well-being of First Nations communities and their members by (1) obtaining compensation for individuals and communities that have suffered from a lack of reliable access to clean water; and (2) obtaining a declaration that Canada has an ongoing responsibility to work with First Nations to provide access to clean water ... [including the requirement for] Canada to construct and fund appropriate water systems for First Nations communities” (McCarthy, n.d.a., para. 2).

These class-actions were combined in 2020 and an agreement was made the following year. On December 22, 2021, the Government of Canada agreed a settlement of approximately \$8 billion for the next nine years, to address the long-term drinking water advisories experienced on First Nation reserves (First Nations Drinking Water Settlement, n.d.a). First Nations that “were subject to a long-term drinking water advisory ... which lasted at least one year from November 20, 1995” to June 20, 2021 are eligible, indicating the anticipated eligibility of 142,000 individuals from 258 First Nations (APTN National News, 2021; McCarthy, n.d.a., para. 4). Individuals and First Nations can submit a claim for compensation until March 7, 2023 (First Nations Drinking Water Settlement, n.d.a). The financial settlement is to be used for the following purposes (First Nations Drinking Water Settlement, n.d.b; ISC, 2021g):

- \$1.8 billion in compensation to individuals and Impacted First Nations
- An additional \$50 million allocated for eligible individuals who suffered Specified Injuries due to a drinking water advisory that lasted at least one year between November 20, 1995, and June 20, 2021

- \$6 billion to support construction, upgrading, operation, and maintenance of water infrastructure in First Nations communities [by March 31, 2030]
- A renewed commitment to Canada’s Action Plan for the lifting of all long-term drinking water advisories
- Planned modernization of Canada’s First Nations drinking water legislation
- The creation of a First Nations Advisory Committee on Safe Drinking Water
- Support for First Nations to develop their own safe drinking water by-laws and initiatives

### **8.2.1. Limitations and Key Considerations**

There are several limitations and key considerations for this class-action lawsuit brought by First Nations. The most prominent caveat of the proposed settlement is summarized by the following statement:

“If the courts approve the settlement, you will give up your right to sue Canada for the claims resolved by the proposed settlement. That means you will not be able to sue Canada for damages incurred before June 20, 2021, that arise from Canada's failure to provide safe drinking water on your reserve.” (ISC, 2021f, para. 41)

This indicates that the settlement would be an agreement that rectifies all wrongdoings of Canada’s negligence of addressing unsafe water on First Nations reserves. To reiterate, individuals and First Nations will no longer be able to sue the government concerning long-term drinking water advisories; however, individuals and Nations that do not claim for a settlement are not bound to this limitation.

Moreover, the per person compensation value is unknown, and will be determined after March 7, 2023 (i.e., the last day to submit a claim). Although the compensation per person depends on the duration of the advisory experienced, the \$1.8 billion would be divided among the individuals and Nations submitting a claim, inferring a reduction in compensation value if many people choose to submit the claim.

There are also limitations regarding the eligibility for the settlement. The eligibility criteria require individuals to be a member of a First Nation to submit a claim. This raises concerns regarding the existing challenges and complexities of Indian Status and blood quantum calculations – issues that have persisted since the implementation of the *Indian Act*. Furthermore, if Indigenous women or children lost their Indian Status between

November 20, 1995, and June 20, 2021, they are no longer eligible to submit a claim as they are no longer members of a First Nation. Additionally, only First Nations located in the ten provinces are eligible to submit a claim. This excludes cases in the territories, indicating the gap of addressing water security issues in the north. The terminology of a long-term BWA is also of concern, as individuals and Nations impacted by short-term BWAs are not eligible for this settlement. Therefore, in theory, if several short-term advisories frequently reoccurred on a First Nations reserve, members of this Nation would not be eligible to claim due to the definition of the advisory, despite potential impacts of frequent short-term BWAs in communities.

### **8.3. Key Takeaways**

Both the Flint Water Crisis and the First Nations class-actions brought the issue to the courts. They exemplify the consequences of long-term inaction and highlight detrimental legacies on the communities impacted. Although class-action lawsuits are a long and expensive process, these cases indicate the positive potentials of the legal outcomes.

From the Flint Water Crisis, the declaration of the state of emergencies on all levels of government were essential to address the situation, especially since the city of Flint did not have the financial capability to support the installation of clean water. Additionally, both cases highlighted the importance of robust monitoring methods, early warning systems that identify unsafe drinking water, and the capacity of water treatment plants to ensure that infrastructures can support their community in a reliable and safe manner.

Moreover, it is important to prevent further exacerbation of racial and socioeconomic inequities during the provision of safe drinking water. Flint has an African American population of 57%, “with over 40% of residents living below the poverty line” (Pauli, 2020, p. 8, para. 3). In Canada, most individuals living in First Nations reserves experience the highest rates of poverty – this includes 25% of all Indigenous peoples (Metis, Inuit, and First Nations) and 40% of all Indigenous children living in poverty (Poverty Institute, n.d.). In both events, historically vulnerable populations were disproportionately affected. Therefore, these class-action case studies also highlight the

importance of understanding the sociodemographic of the population impacted by water crises to ensure the protection for all people.

## Chapter 9.

### Policy Objectives

The ultimate goal is to have access to clean and safe drinking water at the taps of all water systems in BC. The previous chapters have described current barriers, inhibiting the achievement of this goal. Through policy recommendations, my hope is that all British Columbians, including First Nations, will have equal access to this essential resource – creating a foundation for a brighter future in this province and for the quality of life for all residents.

In order to evaluate, analyze, and assess viable policies, criteria and measures have been selected to weigh the advantages and disadvantages of policies. There are two general groups of objectives, societal and government management objectives, and the details of each objective group is explained in the following sections.

#### 9.1. Societal Objectives

General societal objectives include efficiency, equity and fairness, freedom and liberty, protection and security, development, and sustainability. The reduction and elimination of all BWAs achieves the goal to access clean drinking water in BC, meeting all societal objectives:<sup>21</sup>

- **Efficiency** will be increased for the whole province of BC with reduced travel and other dispensable costs when finding alternatives to clean tap water.
- **Equity and fairness** will be achieved with equal access to clean water in all regions of the province.
- **Freedom and liberty** will be fulfilled as individuals residing in BC will receive access to the provincially recognized human right – access clean water.
- **Protection and security** will be achieved by preventing negative mental health consequences in regard to the stress of finding alternative clean drinking water sources and the added economic stress of having to continually purchase alternative sources. Having access to clean drinking water will also

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<sup>21</sup> The examples presented within each societal objective do not encompass all aspects and does not represent an exhaustive list.

improve physical health by nourishing the body with water that is free from contaminants.

- **Development** will be achieved in various ways. As one example, clean water will allow communities to grow and develop sectors that depend on safe water (i.e., tourism).
- **Environmental sustainability** objectives will be met with the reduction of plastic water bottle purchase and use. Greenhouse-gas emissions and overall energy-use can also be reduced through decreased water truck delivery services and minimized efforts to boil water before use.

Overall, improving the access to clean drinking water in BC contributes to all societal objectives. Although these are all significantly and equally important objectives to satisfy, there is insufficient differentiation among the societal objectives to discern and evaluate policies. As successful reduction in the number of BWAs meets all societal objectives, these objectives were not used to assess final policy recommendations.

## 9.2. Government Management Objectives

Government management objectives (government objectives) need to be met in order to assess the feasibility and efficacy of a policy. Therefore, to assess policy recommendations, four government management objectives have been selected: ease of implementation, effectiveness, compliance, and acceptance.

It is important to note that ease of implementation has been selected as the key objective of this analysis. This is because without the ability to implement policies, the opinions of organizations and members, would be irrelevant. Once the feasibility of a policy is assessed, opinions can then be considered for further policy analysis. Therefore, the ease of implementation was weighed greater than other objectives, accounted by multiplying each positive outcome by a factor of 2.

Objectives, criteria and measures are summarized in Table 9. The following sections provide additional descriptions for each government objective that was used to assess policy options.



**Table 9 Objectives, criteria and measures used to assess policy recommendations**

<b>Objectives</b>	<b>Criteria</b>	<b>Measures</b>
Ease of Implementation*	1. Clarifies Responsibilities 2. Minimal Legal Barriers 3. Fast Implementation 4. Low Cost	1. Yes or No 2. Yes or No 3. Yes or No 4. Yes or No
Effectiveness	5. Reduces the number of boil water advisories in BC 6. Contributes to the long-term security of reliable, safe, and clean water for communities 7. Benefits the population impacted by a boil water advisory	5. Yes or No 6. Yes or No 7. Large (i.e., 50% and greater) or Small (i.e., less than 50% of population)
Compliance	8. Compliance by communities and water system operators	8. Increases or Decreases
Acceptance	9. Acceptance by First Nations 10. Acceptance by Health Authorities 11. Acceptance by Municipalities	9. Increases or Decreases 10. Increases or Decreases 11. Increases or Decreases

\*Key objective

### 9.2.1. Ease of Implementation

The ease of implementation is the key objective in this analysis. For successful integration of policies, it is important for the implementation process to be relatively simple. As indicated by the jurisdictional analysis of drinking water management in BC, current practices in drinking water management are complex and contain many governing layers of authority. Therefore, a set of four criteria and measures were selected to assess administrative ease.

As many responsibilities are shared among various levels of government, it is important to increase working efficiency by reducing potential overlaps within the governing system. Therefore, the first criterion examines efforts to clarify responsibilities or remove redundant processes. For instance, this could be measured by the presence of any overlapping steps and the number of departments or organizations involved. Policies with fewer overlaps with greater simplicity received a more positive rating. The second criterion examines whether there are any legal issues in adopting policies. Successful policies will have none or minimal legal barriers in its processes. The absence of legal barriers to adopting policies was given a more positive rating. The third criterion examines the implementation time of the policy. The time it takes to implement

and perform the policy is a measure of the degree of implementation ease. Therefore, the shorter the time it takes (i.e., in terms of months/years) until implementation and full operation received a more positive rating. The fourth criterion examines the cost of implementing the policy. Greater cost-effectiveness of the policy received a more positive rating.<sup>22</sup>

### **9.2.2. Effectiveness**

The effectiveness of each policy recommendation, in terms of outcomes, is an important consideration. Therefore, three criteria and measures were selected to measure effectiveness. The first criterion evaluates the effectiveness in reducing the number of boil water advisories in BC. Successful policies were measured by the reduction in the number of advisories. The second criterion examines whether each policy contributes to the long-term security of reliable, safe, and safe clean water for communities. Policies that were able to secure this criterion received a positive rating. The third criterion measures whether a large proportion of the community impacted is benefited from the resulting policy. Therefore, the greater percentage of community members positively impacted received a positive rating for this criterion.

### **9.2.3. Compliance**

For successful policies, the compliance of communities and water system operators for their willingness to adopt new policies, is critical. Therefore, the criterion for compliance was measured by the higher likelihood of compliance or the reduction of non-compliances. The greater likelihood of compliance received a positive rating.

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<sup>22</sup> For the analysis, it is important to note that the implementation cost of the policy was assessed – not the capital and operational cost to build new water facilities. The cost of construction and management of all water facilities can be an unavoidable and expensive price that needs to be financed regardless of the policy implemented. It can be expected that millions of dollars may be required to build clean water infrastructure. Moreover, the Flint Water Crisis and the First Nations class-action case studies have indicated that the government decisions to provide billions of dollars in compensation for those that were affected. These financial compensations are absolutely necessary, but were not associated with clean water infrastructure, and indicates that the cost of inaction is greater. Ultimately, high cost is an unavoidable factor for the development of proper water systems and for compensation. Therefore, only the costs to implementing the policy (not construction and compensation costs) are considered for the analysis.

#### **9.2.4. Acceptance**

The acceptance of policies by impacted First Nations, health authorities, and municipalities is an important government objective for consideration. These impacted organizations need to be receptive of policies in order for the successful implementation of final recommendations. Therefore, acceptance was measured by increased or decreased acceptance, where greater acceptance received a positive rating.

## Chapter 10.

### Policy Recommendations

Several aspects of the current challenge need to be addressed. The societal problem of the inadequate access to clean drinking water in BC requires all hands on deck – namely, engineers, scientists, private organizations, non-governmental organizations, in addition to other professionals. In order to inform the final policy recommendations, I identified existing and potential challenges of the issue surrounding BWAs in BC to determine further recommendations to consideration (Table 10):

**Table 10 Existing and potential challenges concerning BWAs in BC**

Challenges	Potential Challenges
<ul style="list-style-type: none"> <li>• <i>Culture of distrust</i> due to the hesitancy of tap water use impacted by long-term advisories</li> <li>• <i>Ambiguity of governance structures</i> with absence of a single point of responsibility</li> <li>• <i>Low priority health issue</i> as the problem is dispersed throughout the province, very few people experience adverse health effects, there is no sense of urgency, this issue “can wait”</li> <li>• <i>Unresolved land disputes</i> with First Nations in BC</li> <li>• <i>Geographical limitations</i> with leadership located geographically away from the problem; diminishing sense of urgency and incentives to address local issues</li> <li>• <i>Data limitations</i> (see Chapter 3)</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Conflict of interests</i> due to current economic activities that may currently benefit from the problem – for instance, economic benefits for rural communities that may have jobs to deliver water to affected communities and corporations that sell water bottles to consumers dependent under a BWA</li> <li>• <i>Financial burden</i> on local communities through increased taxes or operation fees may cause opposition in the construction of a new water system</li> </ul>

Note: This table does not encapsulate an exhaustive list of current and potential challenges.

#### 10.1. Additional Recommendations for Consideration

Before arriving at key policy recommendations, research and discussions with experts indicated a range of solutions that could be adopted to address the issue of BWAs in BC. It is evident that there is no single solution to the elimination of BWAs and provision of clean drinking water for all British Columbians. There are multiple facets to achieving the solution. Therefore, the following bullet points provide additional recommendations for consideration. These additional recommendations are organized in themes: clarifying roles and responsibilities, raising awareness, diversifying financial sources, creating individual level solutions, integrating solutions, and continuing

important efforts. Moreover, it is highly recommended to consult additional recommendations from the Provincial Health Officer's 2019 Drinking Water Report as well (PHO, 2019). It is important to note that these policies are in no particular order but are all areas which need to be considered moving forward.

### **10.1.1. Clarify Roles and Responsibilities**

- *Clarify roles and responsibilities.* There are many governing bodies responsible for the management of drinking water in BC (Figure 5). There should be studies to assess the work by each organization body, to ensure no work is duplicated and to minimize potential confusion in drinking water management. This can be done by recommitting and modernizing the 2002 Action Plan for Safe Drinking Water in British Columbia to create an accountability framework for ministries (Ministry of Health Services, 2002).
- *Create a single point of contact for when issues or inquiries arise.* In addition to contacting Environmental Officers, providing contact information for an individual of higher authority may be beneficial. At times, individuals may get frustrated and may want to contact an individual of higher authority. Promoting an apex authority may address potential hierarchical mismatch. One option to address this issue could be to have the contact information for the Provincial Drinking Water Officer on Health Authority websites.<sup>23</sup>
- *Establish Drinking Water Officers, who are distinguished from Environmental Officers.* Environmental Officers have the responsibility to investigate BWAs, but they have a lot of other responsibilities in addition to drinking water. Having designated Drinking Water Officers may create a better sense of organization, while creating a more reliable point of contact.
- *Create national and provincial legislation that directly enforces and legally binds the human right to drinking water.* One recommendation is to enact the Guidelines for Canadian Drinking Water Quality standards (published by Health Canada) as a legally binding standard. This will ensure that the government has the full responsibility in providing this human right to clean and safe drinking water to all Canadians.

### **10.1.2. Raise Awareness**

- *Conduct drinking water impact studies following the First Nations class-action lawsuit to ensure clean drinking water has been attained.* As a result of the class-action lawsuit for long-term drinking water advisories on First Nations reserves, \$8 billion has been committed for settlement. However, the one-time payment of \$8 billion may not be enough to address all issues in providing access to clean drinking water on First Nations reserves (especially as the per

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<sup>23</sup> The Provincial Drinking Water Officer provides oversight and accountability for the *Drinking Water Protection Act* and supports the Provincial Health Officer.

person compensation is dependent on the number of claims and as First Nations are giving up their right to sue the government regarding long-term drinking water advisories with this class-action; see Chapter 8.2.1). Therefore, I recommend impact studies to be initiated to investigate whether access to safe and clean drinking water has been achieved on First Nations reserves.

- *Initiate risk assessments on a provincial basis.* A broad assessment can help identify where the greatest risks to prevent access to clean drinking water to prioritize the communities at greatest risk. Identified priority areas would capture regions with BWAs and help address the underlying issues regarding BWAs throughout BC.
- *Integrate the media to raise awareness and educate the public of these issues.* A CBC documentary, which included information about the water systems of Shoal Lake 40 First Nations, was released in 2017. At the time, there had been no access to clean tap water at Shoal Lake 40 First Nations, for decades. However, in September 2021, a water treatment facility was built for the Nation (Petz, 2021). Although the documentary is not the single cause for the issue being resolved, media can play a role in public awareness, to create a sense of accountability for representatives and to keep the issue in public dialogue, encouraging leaders to address the issue with greater urgency. Furthermore, raising awareness can prevent political scoring of removing long-term BWAs, and support initiatives to address underlying problems and provide access to clean drinking water.

### **10.1.3. Diversify Financial Sources**

- *Utilize alternative financial arrangements to fund infrastructure projects.* The use of loans or other financial tools increases accountability that the funding will be used solely for addressing BWAs. One alternative is through the Canada Infrastructure Bank (CIB). Enacted in 2017, the CIB mandate is to invest in revenue generating projects, including green infrastructure water and wastewater projects. They are able to partner with governments and Indigenous communities, and is one way to diversify financial sources to build necessary infrastructure in a community.
- *Establish financial incentives to incentivize acquisition strategies for municipalities to adopt small water systems.* Some small water systems do not operate in sustainable ways. One reason could be because there is a lack of economies of scale to build more sustainable systems. However, municipalities may not want to take responsibility over a previously mismanaged system. Therefore, creating financial resources to encourage municipal acquisition can help the transfer of water sources to the municipality, increasing the sustainability of small water systems.

### **10.1.4. Create Individual Level Solutions**

- *Fix the problem at the tap as an additional temporary solution.* However, there are limitations to this solution. One issue is in regards to the history of mistrust

because in some cases, contaminated tap water has become a generational issue. People have become more skeptical about using tap water or any consumption of it. Another issue is the potential of this temporary solution becoming a long-term solution, with no follow-up actions on addressing the source of the problem (i.e., water system upgrades).

- *Invest in relationship building.* As a geographically large province, there are a wide variety of opinions that exist in BC. As indicated by the studies in Alberta, relationship building is critical for communities to adopt government policies. Therefore, building rapport and trust with communities throughout BC will be necessary to see compliance of policies.

### **10.1.5. Integrate Solutions**

- *Find intersections with other initiatives.* Water is not only a health problem, but is a problem that impacts other areas, such as economic development. With increasing economic development projects, finding ways for water system development to occur at the same time may be a way to expedite solutions for clean drinking water. For instance, establishing new business regulations with requirements to address issues of local water systems may be one solution, and tightening land use policies to prevent developers building more small water systems, is another.
- *Coordinate with other industries or agencies.* There are many provincial ministries that affect drinking water (i.e., Ministry of Transportation, Ministry of Forests, etc.). Furthermore, there may be issues other than drinking water in an area (i.e., housing, infrastructure, economic independence, treaties, etc.). Therefore, collaboration with other ministries, organizations, and private industries may develop innovative solutions. Opportunities to coordinate and collaborate with departments and agencies from the federal government can be beneficial as well.

### **10.1.6. Continue Important Efforts**

- *Continue advocating for the environment.* As indicated in previous chapters, a clean environment is directly correlated to clean drinking water. Therefore, to minimize the number of BWAs and address the core issue of protecting water sources, the provincial and federal need to continue ambitious efforts to protect the environment and prevent further climate change exacerbation.
- *Source finances from ISC to advance drinking water infrastructure projects in the FNHA.* Addressing drinking water advisories is an ISC mandate. Furthermore, the Canadian government has committed billions of dollars to support the operation, maintenance, and construction of water and wastewater systems (ISC, 2021h). Therefore, Nations within FNHA should continually source financial resources from ISC.

Although these recommendations for consideration are invaluable in addressing the multifaceted issue of BWAs, three separate policies were selected as final recommendations for analysis. These three policies were selected for their ability to have widespread impact on all populations living in BC without the influence of geographical hierarchy or preferential treatment of one region over another, and for their ability to have immediate impact throughout BC. The three policies are to (1) Declare a provincial state of emergency, (2) Create a provincial database for drinking water data, and (3) Provide opportunities for local capacity building. Details of each policy option will be discussed in the following sections, with individual assessments regarding the criteria and measures introduced previously.

## **10.2. Policy Recommendation 1: Declare A Provincial State Of Emergency**

Within the past year, two provincial state of emergencies have been declared for the pandemic and floods in BC. The state of emergency for the COVID-19 pandemic was declared “to support the province wide response to the novel coronavirus (COVID-19) pandemic” on March 18, 2020 and was extended until June 30, 2021 (BC Gov News, 2020, para. 1; BC Government, 2022a). Furthermore, on November 17, 2021, another provincial state of emergency was declared “to mitigate impacts on transportation networks and movement of essential goods and supplies, and to support the province wide response and recovery from the widespread damage caused by severe flooding and landslides” (BC Gov News, 2021, para. 1; BC Government, 2022b). As indicated by the case studies, the city of Flint had also declared a state of emergency, allowing the city to have access to resources necessary to address the situation.

Therefore, the first policy recommendation is to declare a state of emergency for drinking water advisories in BC. As drinking water is managed by the Ministry of Health in BC, a state of emergency should be issued by the Minister of Health. However, because drinking water has many overlaps with other ministries, I recommend for a state of emergency to be declared by both the Ministry of Health, under the *Public Health Act*, and Ministry of Public Safety and Solicitor General, under the *Emergency Programs Act*, in order to immediately address the ongoing challenges with drinking water throughout the province (*Public Health Act*, 2008; *Emergency Program Act*, 2022).



BWAs meet the requirements of being an emergency and disaster, as defined under the *Emergency Program Act (Emergency Program Act, 2022)*. An “emergency” is defined as “a present or imminent event or circumstance that (a) is caused by accident, fire, explosion, technical failure or the forces of nature, and (b) requires prompt coordination of action or special regulation of persons or property to protect the health, safety or welfare of a person or to limit damage to property” (*Emergency Program Act, 2022*). Furthermore, a “disaster” is defined as “a calamity that ... has resulted in serious harm to the health, safety or welfare of people, or in widespread damage to property” (*Emergency Program Act, 2022*). As such, BWAs meet the requirements of being considered both an emergency and a disaster, which allows it to be declared as a state of emergency under the *Emergency Program Act* as well.

Once the state of emergency is declared, a health officer can establish preventative measures and communicate with health authorities to address advisories and inadequate access to clean drinking water in specific regions (*Public Health Act, 2008*). Furthermore, the Minister of Public Safety and Solicitor General can also “prepare emergency plans respecting preparation for, response to and recovery from emergencies and disasters” in addition to a list of several other responsibilities given to the minister (*Emergency Program Act, 2022, section 4 (1)*). The declaration of a state of emergency allows the Ministry of Public Safety and Solicitor General to provide additional support to health authorities and communities experiencing challenges in obtaining clean drinking water. As such, the minister can provide one or more of the following, as stated in section 4 of the *Emergency Program Act*:

*(a) conduct public information programs relating to emergency preparedness and recommend preventive measures to alleviate the effects of emergencies or disasters;*

*(b) make surveys and studies to identify and record actual and potential hazards that may cause emergencies or disasters;*

*(c) make payments and grants, subject to any terms or conditions that the minister may impose, to local authorities or other persons or organizations for the purposes of assisting in emergency prevention, preparedness and response;*

*(d) enter into agreements with and make payments or grants, or both, to persons or organizations for the provision of services in the development or implementation of emergency plans or programs;*

*(e) enter into agreements with the government of Canada or of any other province, or with any agency of such a government, dealing with emergency plans and programs;*

*(f) review and recommend modification of local emergency plans of local authorities;*

*(g) establish training and training exercise programs;*

*(h) provide support to volunteers as prescribed in the regulations;*

Overall, during the state of emergency, the provincial government, municipalities, and the general public can collaborate efforts to minimize the impact and to implement quick recovery, ensuring that “federal, provincial and local resources can be delivered in a co-ordinated response to protect the public, which remains the provincial government's top priority” (BC Gov News, 2021, para. 5). BWAs can become a high priority issue to be addressed with an expedited resolution process with the implementation of this policy.

## 10.2.1. Analysis for BWA State of Emergency

**Table 11 Analysis of Policy Recommendation 1**

Criteria	Rating	Reasoning
Clarifies Responsibilities*	Yes (1)	There may be initial confusion if a state of emergency is declared by two ministries under the <i>Public Health Act</i> and <i>Emergency Programs Act</i> . However, over time, responsibilities will be clarified between ministries. Therefore, this criteria received a half rating.
Minimal Legal Barriers*	Yes (2)	During a state of emergency, all powers are carried over to the ministers.
Fast Implementation*	Yes (2)	A state of emergency can be implemented immediately.
Low Cost*	No (0)	There is a high cost to supply resources. There will be future costs if other activities or programs are being put on hold to address BWAs.
Reduces Advisories	Yes (1)	Successful policy implementation would reduce the total number of boil water advisories.
Long-term Water Security	Yes (1)	Successful policy implementation would ensure the long-term security of water to communities.
Impacted Population	Large (1)	It is expected that the whole province, or the specific region affected, will be benefited by this policy (i.e., 100% of the population).
Compliance by Communities and Operators	Increases (1)	We have seen from previous cases that there is high compliance among the general public during a state of emergency.
Acceptance by First Nations	N/A (0)	This criterion was given a negative rating due to the unavailability of data. Proper and meaningful consultation with First Nations is necessary to understand the level of acceptance. However, it should be up to the discretion of First Nations to partake in the process.
Acceptance by Health Authorities	Decreases (0)	BWAs are not perceived as an immediate public health threat as there are temporary solutions to inadequate water (i.e., boiling water or purchasing bottled water). Moreover, acceptance may depend on the level of resources made available.
Acceptance by Municipalities	Increases (1)	It is assumed that municipalities will be acceptive of this policy as the barriers to clean and safe water faced in communities will be addressed with successful implementation of this policy.

\*Key objective criteria received a rating out of 2; whereas, other criteria received a rating out of 1.

As indicated by Table 11, there are both advantages and disadvantages in declaring a state of emergency for BWAs in BC. The major benefits include the fact that declaring a state of emergency expedites action to address the problem, as BWAs become a priority issue. Creating the sense of urgency may also help resolve the situation with all hands on deck and as the issue becomes a focal point in the media and general public. Furthermore, during the state of emergency, ministers have the power to streamline the emergency plan for all of BC, so that all authorities would follow one

protocol. The minister would also have the power to “procure, fix prices for or ration food, clothing, fuel, equipment, medical supplies or other essential supplies and the use of any property, services, resources or equipment within any part of British Columbia for the duration of the state of emergency”, shifting the financial burden from the individual to the state (*Emergency Program Act, 2022, section 10 I*).

There are three broad disadvantages to declaring a state of emergency. A major disadvantage is that there may be low acceptance by health authorities due to alternative temporary solutions such as boiling the water or purchasing bottled water. Furthermore, the state of emergency for BWAs may last a long period of time, potentially creating societal numbness or notice fatigue, and the situation to become the new societal norm. In this case, the purpose of declaring a state of emergency may be defeated. Additionally, there is a risk for the rise of societal depression, similarly with the extended period of the state of emergency seen by the COVID-19 pandemic (i.e., state of emergency fatigue). Furthermore, a one-time policy is not adequate due to emerging BWAs and challenges of inadequate water systems that may emerge in the future.

If the policy is designed well, the policy can be a major success. However, it is vital to have thorough and meaningful consultations with First Nations and beneficiaries before the implementation of this policy. Therefore, the implementation of this policy is dependent on the responsiveness and desires of communities. Furthermore, there is a risk that poor preparation and implementation can lead to an erosion of frustrations. Careful planning is absolutely necessary to prevent this policy from becoming a distraction – focusing on methodologies rather than the problem itself.

### **10.3. Policy Recommendation 2: Create A Provincial Database For Drinking Water Data**

The research has informed the need for data preservation for storing archives. Currently, data is stored locally at each health authority and is removed once a BWA is resolved. This mechanism makes it difficult for the general public to know whether the same advisory is reoccurring at the same location. Additionally, there is the need to have the same categories of data presented at all health authorities to allow for cross-comparisons across health authorities. There also needs to be better representation of data, to include the number of people impacted by each advisory, including the option for

sociodemographic data – to ensure that environmental racism is not repeated as in the Flint Water Crisis and the class-action brought by First Nations in Canada. Current BWA data presents a snapshot in time, but there needs to be a way to present data in a more realistic format (i.e., as the number of BWAs may change depending on the time of day). Furthermore, as indicated by Chapter 3, the ECCC report presented limitations in its organization of the causes of drinking water advisories. Therefore, there needs to be better organization of causes. The useability of data for the general public needs improvement – plain text format should be avoided, and interactive layouts as presented by the Interior Health website, is recommended. Lastly, the data needs to be made usable and appropriate for research purposes. Currently, some health authorities insert statements indicating that the information may not be accurate and that the data shouldn't be used for other purposes.

Therefore, the second policy recommendation is to establish a BC Drinking Water Data Team within the Ministry of Health and to create a provincial database for drinking water data. Ideally, the provincial database will address all the issues and gaps mentioned above and will have the data located in one place. A data standard should be established to ensure that the same degree of data is presented for all water systems in BC. The data should include all BWAs within the geographical boundaries of BC; however, in terms of the data from First Nation reserves, it should be up to the discretion of First Nations to participate in the process.

### 10.3.1. Analysis for Provincial Drinking Water Database

**Table 12 Analysis of Policy Recommendation 2**

Criteria	Rating	Reasoning
Clarifies Responsibilities*	Yes (2)	The data will be managed under one database, creating a streamlined system to reduce overlaps. Furthermore, the BC provincial government will be the lead organization to manage drinking water data.
Minimal Legal Barriers*	Yes (2)	There are no foreseeable legal barriers.
Fast Implementation*	No (0)	A provincial database may take years to initiate and establish a new team. It will also take time to collect and organize data.
Low Cost*	Yes (1)	Initially, this policy requires major capital costs for new hires, development of the database, acquisition of computers, establishment of data collection methods, etc. However, once a database is established, it is expected that operational costs are minimal. Therefore, this criteria received a half rating for these considerations.
Reduces Advisories	No (0)	This policy does not directly affect the number of boil water advisories in BC. Following the provision of data, further action is necessary to reduce advisories.
Long-term Water Security	Yes (1)	In the long-term, the information provided by the database will contribute to understanding the problem. Furthermore, the information contributes to providing solutions in attaining water security in communities.
Impacted Population	Large (1)	With full implementation, all impacted British Columbians will have access to this information (i.e., 100% of population).
Compliance by Communities and Operators	Increases (1)	The general public, including residents experiencing drinking water advisories, would want to know this information.
Acceptance by First Nations	N/A (0)	This criterion was given a negative rating due to the unavailability of data. Proper and meaningful consultation with First Nations is necessary to understand the level of acceptance. However, it should be up to the discretion of First Nations to partake in the process.
Acceptance by Health Authorities	Decreases (0)	Currently, all data is housed at each Health Authority. The creation of a new central database can create additional laborious work to transfer data between departments.
Acceptance by Municipalities	Increases (1)	It would be beneficial for municipalities to have access to reliable drinking water data.

\*Key objective criteria received a rating out of 2; whereas, other criteria received a rating out of 1.

The analysis of the first policy recommendation is summarized in Table 12. A major advantage to this policy supports the phrase, “*what gets measured, gets fixed*”. As such, all of the current gaps and limitations to BWA data can be addressed with the implementation of this policy. As mentioned previously, it is difficult to get access to reliable BWA data with additional metainformation regarding the nature of the BWA and

the communities impacted. Having a public database with reliable and consistent data would allow independent researchers to investigate into issues and provide more innovative solutions in the future.

Notable disadvantages include the time and cost to fully implement this policy. Significant time will be necessary to source finances and establish a new data team. Creating a new team will require money for new hires, developing a new database, acquiring computers, establishing data collection methods, upon other costs associated with deliverables. However, the overall cost may not be significantly higher than before the implementation of this policy because there used to be separate resources provided by each health authority, but is now being streamlined into one. Furthermore, the ownership of data is a key consideration to this policy, especially for data regarding Indigenous communities. In order to centralize data, the details of this policy need to be precisely managed with transparency and consultations with First Nations and communities prior to its development.

It is important to note that data is not enough. A key caveat to this policy recommendation is that data alone does not solve the problem, but merely provides additional information to gain a better understanding in defining the problem. Therefore, this policy will only be successful if the provision of data is followed by actions necessary address the problems identified.

### **10.4. Policy Recommendation 3: Provide Opportunities for Local Capacity Building**

Many communities throughout BC are impacted by a BWA. Among the multi-barrier approaches in BC, water system operators are the individuals that provide the initial layers of protection. Therefore, the third policy recommends the BC provincial government to provide opportunities for local capacity building, especially for water system operators. The intention of this policy is to create resources for operators, create standards for education materials, hold regular meetings with operators in other jurisdictions and health authorities – to create learning opportunities to learn and collaboration where possible.

Current resources offered include the *Online Help Centre for BC Small Water Systems* (Small Water Systems BC, n.d.). The *Online Help Centre* is “developed and maintained by Thompson Rivers University and a team of technical experts” and currently provides online workshops and opportunities for networking (Small Water Systems BC, n.d., para. 1). However, the provincial government can provide additional resources and support, to allow further growth and expansion in these programs. The Walkerton Clean Water Centre in Ontario can be used as a model to provide other innovative ways for capacity building. More can be done in BC to foster educational programs, in-person training opportunities (i.e., including mobile training units), and relationship building.



## 10.4.1. Analysis for Local Capacity Building

**Table 13 Analysis of Policy Recommendation 3**

Criteria	Rating	Reasoning
Clarifies Responsibilities*	Yes (1)	Health authorities may already be providing some resources, which may overlap with new material provided by the BC government in the short-term. However, overlaps will reduce in the long-term with the transfer of responsibility from health authorities to the provincial government. Therefore, this criteria received a half rating for these considerations.
Minimal Legal Barriers*	Yes (2)	There are no foreseeable barriers.
Fast Implementation*	No (0)	Time is required to identify needs of operators, create resources, organize workshops, and provide resources.
Low Cost*	Yes (2)	The development and provision of educational materials is not expected to be expensive.
Reduces Advisories	Yes (1)	Successful policy implementation would reduce the total number of boil water advisories.
Long-term Water Security	Yes (1)	Successful policy implementation would ensure the long-term security of water in communities.
Impacted Population	Large (1)	It is expected that the population impacted by a boil water advisory will benefit from this policy (i.e., 100% of population).
Compliance by Communities and Operators	Increases (1)	Water system operators will benefit from additional support and capacity building resources.
Acceptance by First Nations	N/A (0)	This criterion was given a negative rating due to the unavailability of data. Proper and meaningful consultation with First Nations is necessary to understand the level of acceptance. However, it should be up to the discretion of First Nations to partake in the process.
Acceptance by Health Authorities	Increases (1)	All health authorities will benefit from having additional resources to support operators.
Acceptance by Municipalities	Increases (1)	Municipalities will benefit from having additional resources to support operators.

\*Key objective criteria received a rating out of 2; whereas, other criteria received a rating out of 1.

Overall, the aim of the policy is to prevent BWAs by equipping water system operators and communities with additional resources available (Table 13). This policy may additionally create opportunities for partnerships and working relationships to flourish between communities and health authorities. Creating both offline and in-person conferences and training opportunities can additionally create a sense of community within the province. This policy will be especially beneficial for small water system operators. At times, small water systems are operated by volunteers or by individuals

that may have different day jobs. Moreover, depending on the size of the community, there may be no back up personnel to support operator activities. The additional resources provided can assist capacity building and directly support these individuals and communities in unique circumstances.

The greatest limitation to this recommendation is the limited number of staff to disseminate this policy. On average, one Environmental Health Officer is responsible for the monitoring and inspection of 144 water systems in BC (PHO, 2019). Furthermore, due to the recent impacts of COVID-19, it is expected that many Environmental Health Officers have been redeployed to administer the needs of the pandemic, putting the needs of programs for drinking water on hold. In addition to potential overlaps and slow implementation time, other limitations associated with this policy include the reduction of place-based solutions. There is a risk of creating an “one-size-fits-all” resource package that assumes that all regions across the vast province face the same issues. Therefore, the development process of this policy would have to ensure that place-based solutions and an equity lens is taken when approaching this policy.

It is important to recognize the nature of turnover among water system operators, indicating the significance of providing supports for capacity building a long-term policy. The provision of resources cannot be a one-time process.

## **Chapter 11.**

### **Summary and Conclusion**

This capstone project presented systemic policy recommendations to address boil water advisories in BC. This study provided a background on the different aspects of the current challenge and an understanding of the jurisdictional management within BC and other provinces. Overall, three policy were recommended to the BC provincial government: (1) Declare a state of emergency (2) Create a provincial database for drinking water data; and (3) Provide opportunities for local capacity building.

Out of the three policy recommendations, the third recommendation to provide opportunities for local capacity building received the highest score. However, as indicated by the final scores in Table 14, the two other policy recommendations received final scores that had negligible difference from the lead recommendation. This highlights the importance of all three recommendations. As such, it is recommended that all three policies are implemented in tandem to fully address boil water advisories and inadequate safe drinking water in BC.

**Table 14 Summary of all policy recommendations**

Objectives	Criteria	Policy 1: State of Emergency	Policy 2: Provincial Database	Policy 3: Capacity Building
Ease of Implementation*	Clarifies Responsibilities	Yes (1)	Yes (2)	Yes (1)
	Minimal Legal Barriers	Yes (2)	Yes (2)	Yes (2)
	Fast Implementation	Yes (2)	No (0)	No (0)
	Low Costs	No (0)	Yes (1)	Yes (2)
Effectiveness	Reduces Advisories	Yes (1)	No (0)	Yes (1)
	Long-term Water Security	Yes (1)	Yes (1)	Yes (1)
	Impacted Population	Large (1)	Large (1)	Large (1)
Compliance	Communities and Operators	Increases (1)	Increases (1)	Increases (1)
Acceptance	First Nations	N/A (0)	N/A (0)	N/A (0)
	Health Authorities	Decreases (0)	Decreases (0)	Increases (1)
	Municipalities	Increases (1)	Increases (1)	Increases (1)
<b>Final score (out of 15)</b>		<b>10</b>	<b>9</b>	<b>11</b>

\*Note that criteria under ease of implementation (key objective) are weighted greater than the other objectives. Moreover, positive outcomes were added together to come to the final score. Negative outcomes have not been included into the total summation.

It is important to emphasize that the implementation of these three policies will not be enough to fix the entire issue. The analysis of the three policy recommendations explores the trade-offs and key considerations. These three actions exemplify a positive movement towards the goal of eliminating BWAs and addressing the core issue of inadequate drinking water in BC. Additional research in other policy areas is required to investigate other solutions and increase awareness of the challenges; however, current efforts that protect people and the environment today must continue. These issue are urgent and need urgent action.

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## Appendix.

### Drinking Water Advisories in Health Authorities

**Fraser Health:** As of January 1, 2022, there were 9 boil water notices in the Fraser Health region (Healthspace, n.d.c). The oldest advisory was set on July 8, 1992 in the Southbright Water User’s Community water system in Chilliwack for untreated surface water. The most recent boil water advisory was placed on December 22, 2021 at Hazelmere RV Park & Campground located in Surrey. This advisory was due to the loss of pressure in the distribution system. A screenshot of drinking water advisories are provided in Figure A.1 below.

<b>Current Boil Advisories</b>		
<ul style="list-style-type: none"> <li>What to do if your water system has a boil advisory?</li> </ul>		
Facility Name	Location	Start Date
<b>Hazelmere RV Park &amp; Campground - WS</b> <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Loss of pressure in the distribution system	Surrey	22-Dec-2021
<b>Murray Creek Ranch Water System</b> <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Unacceptable levels of microbiological contamination detected in drinking water supply	Langley	3-Dec-2021
<b>Puesta Del Sol NW2881</b> <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Inadequate Disinfection or Disinfectant Residual	Surrey	17-Sep-2021
<b>Ruskin Townsite Water System</b> <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i>	Mission	1-Dec-2021
<b>Sasquatch Provincial Park - Hicks Lake Campground WS</b> <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Unacceptable levels of microbiological contamination detected in drinking water supply	Harrison Hot Springs	14-Sep-2018
<b>Southbright Water Users' Community WS</b> <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Untreated Surface Water	Chilliwack	8-Jul-1992
<b>Summer Road Rate Payers WS</b> <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Untreated Surface Water	Hope	29-Mar-2000
<b>Sunny Trails Club - Water System</b> <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Unacceptable levels of microbiological contamination detected in drinking water supply	Lake Errock	21-Aug-2014
<b>Winter's Inn Water System</b> <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Unacceptable levels of microbiological contamination detected in drinking water supply	Maple Ridge	27-Feb-2020

**Figure A.1. Fraser Health regional health authority: Current list of boil water advisories. Obtained on January 1, 2022 (Healthspace, n.d.c.)**

**Interior Health:** please see chapter 6 for details.

**Island Health:** As of January 1, 2022, there were 48 drinking water notices within the Vancouver Island Health region (Island Health, n.d.a). Of these, 46 were boil water advisories. The oldest advisory was set on April 21, 1994 in the Petes Lake water user society’s waste water system for inadequate disinfection. The most recent boil water advisory was placed on November 15, 2021 at the Port Renfrew Water System, but was given a hazard rating of low. A screenshot of drinking water advisories are provided in Figure A.2 below.

Facility Name	Location	Start Date
1785 ALBERNI HIGHWAY WWS	Port Alberni	15-Jan-2016
423 WHALETOWN ROAD	Cortes Island	13-Sep-2021
APRIL POINT DEVELOPMENTS SOUTH END WATER	Strathcona Regional District	9-Jun-2017
APRIL POINT RESORT AND MARINA	Discovery Islands-Mainland Inlets	7-Jul-2020
CAMP CREINA	Duncan	12-May-2020
CAMP LAKE WATER SYSTEM	Campbell River	7-Jun-2010
CHINA CREEK MARINA	Port Alberni	16-Aug-2021
COASTAL BLACK WATER	Puntledge-BlackCreek	3-Nov-2017
COASTAL SPRINGS FLOAT LODGE	RDMW Electoral Area A	10-Jul-2018
COTTONWOOD GOLF CLUB	Cassidy	12-Jul-2019

**Figure A.2. Screenshot of the list of current boil water advisories in the Vancouver Island Health region (Island Health, n.d.b).**

**Northern Health:** As of January 1, 2022, there were a total of 143 drinking water advisories (i.e., including water quality advisories, boil water notices, and do not use advisories) and of those, 128 were boil water advisories in the Northern Health region (Healthspace, n.d.d). The list of boil water notices are listed in alphabetical order (Figure A.3) with dates only available once the advisory of a certain location is selected (Figure A.4).

Types of Water Notices and Treatment	
Boil Water Notice	Boil Water Notice
<a href="#">10 Mile Lake Provincial Park</a> Quesnel	<a href="#">Andy Bailey Regional Park</a> Fort Nelson
9-Jul-2021	20-Aug-2021
Boil Water Notice	Boil Water Notice
<a href="#">Arbour Park</a> Quesnel	<a href="#">Babine Lake Resort</a> Burns Lake
30-Oct-2020	21-Jun-2018
Boil Water Notice	Boil Water Notice
<a href="#">Barendregt Water System</a> Smithers	<a href="#">Baru Farm Water System</a> Queen Charlotte
9-Apr-2018	22-Nov-2021
Boil Water Notice	Boil Water Notice
<a href="#">BCR Industrial Site - Fort St. James</a> Fort St James	<a href="#">Bearclaw Lodge</a> Hazelton
31-Jul-2020	22-Oct-2021

**Figure A.3. Screenshot of the list of current boil water advisories in the Northern Heath region (Healthspace, n.d.e).**

## Barendregt Water System

**Facility Location:**  
1121 Lowland Road  
Smithers, V0J 2N6

**Facility Information:**  
Facility Type: 2-14 Connections  
Current Hazard Rating: **◆ Low**

**◆ This facility is currently under a Boil Water Notice**

- ◆ Underlying Problems: Unknown - Adverse bacteriological water quality results within the distribution system. Annual cistern cleaning does not appear to have been conducted.
- ◆ Steps Taken to Remedy: 1. Renters notified of boil water notice. 2. Cistern and well cleaning/disinfection instructed by EHO. 3. Samples to be collected from source and distribution to further identify source of contamination.
- ◆ Corrective Actions Remaining: 1. Resampling of both the source (prior to cistern) and distribution (post cistern) to further determine the source of contamination is required. 2. Upon assessment of sample results a minimum of two samples (taken 24 hours apart) from each the source and distribution would be required to remove the boil water notice at this time.

**Facility Inspection History:**  
*Click on an inspection link below to see additional details*

Document Type	Details
■ <a href="#">Sample Range Report</a>	1-Jan-2013 to 31-Dec-2017
■ <a href="#">Sample Range Report</a>	1-Jul-2017 to 30-Sep-2017
■ <a href="#">Sample Range Report</a>	1-Jan-2017 to 31-Mar-2017
■ <a href="#">Sample Range Report</a>	1-Jul-2016 to 30-Sep-2016
■ <a href="#">Initial Inspection</a>	3-Sep-2015 <b>◆ Low</b>

**Figure A.4. Screenshot of an example of the level of detail provided for each advisory (Healthspace, n.d.f).**

**Vancouver Coastal Health:** As of January 1, 2022, there were 51 boil water notices in the Vancouver Coast Health region (Healthspace, n.d.g). The oldest advisory was set on December 18, 1992 in the Hagensborg Waterworks District water system for not meeting water quality standards. The most recent boil water advisory was placed on September 23, 2021 at the Stillwater ID Water System for having tested positive for *E.coli* testing. A screenshot of drinking water advisories are provided in Figure A.5 below.

<b>Current Boil Advisories</b>		
■ What to do if your water system has a boil advisory		
<u>Facility Name</u>	<u>Location</u>	<u>Start Date</u>
A & B Burge Water System <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Insufficient water treatment	Powell River	19-Feb-2018
Anahim Lake Resort WS <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Insufficient water treatment Not meeting conditions of operating permit	Anahim Lake	30-May-2018
Anahim Lake Trading WS <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Non compliance with potable water quality standards	Anahim Lake	14-Sep-2010
Anchor Way Strata Assoc. Water System <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Non compliance with potable water quality standards	Powell River	24-Mar-2020
Bailey Bridge Campsite Showers WS <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Non compliance with potable water quality standards	Hagensborg	30-Sep-2010
Beachkowski Springs WS <i>Advisory Type:</i> <i>Reason(s):</i>	Gillies Bay	27-May-2009
Black Gold Lodge WS <i>Advisory Type:</i> Boil Water Notice <i>Reason(s):</i> Non compliance with potable water quality standards	Bella Bella	17-Jul-2007

**Figure A.5. Screenshot of the list of current boil water advisories in the Vancouver Island Health region (Healthspace, n.d.h).**

**FNHA:** As stated in chapter 6, FNHA provides a monthly summary of drinking water advisories and does not have active lists on their website. Therefore, as of January 1, 2022, only the November 2021 summary document was made available on their website (FNHA, 2021a). In the month of November 2021, there were a total of 32 drinking water advisories, and of those, there were 18 boil water advisories. Within the month of November, 9 BWAs were revoked (i.e., resolved). The longest BWA was listed on July 10, 2012 for a duration of 3430 days within the Rockface Trailer Park of the Skawahlook First Nation (as of November 2021). The shortest BWA was noticed on November 17, 2021 in the Nicomen First Nation, a nation which has a population category of 51-100 individuals (as of November 2021). A full list of the current boil advisories are presented in Figure A.6 and Figure A.7.



**First Nations Health Authority**  
Health through wellness

**Monthly Drinking Water Advisories in First Nations Communities in BC - October 2021**

Water systems with 5 or more connections (CWS), and smaller water systems that have public facilities (PWS). Systems on leased land are not included.

**Summary - October 2021**

As of October 31, 2021, there were 4 Water Quality Advisories, 8 Boil Water Advisories and 9 Do Not Consume advisories for a total of 21 Drinking Water Advisories in effect in 21 Water Systems across 19 First Nation communities in British Columbia. This includes water systems with 5 or more connections (CWS) and smaller water systems that have public facilities (PWS).

**Water Quality Advisory: 4 (0 revoked in Oct)**

First Nation Name	Community Name	Water System Name	Date Set	Date Revoked	Population Category	ISC Funded	Duration	Term
KWAKWUTL	Cluxewe Campground	Cluxewe Campground PWS-NT	2019-05-15		251-500	No	900 days	Long
OKANAGAN	Irish Creek	Irish Creek/ Head of the Lake CWS	2019-05-10		101-250	Yes	905 days	Long
SAIK'UZ FIRST NATION	Stoney Creek Community	Stoney Creek CWS	2021-10-01		251-500	Yes	30 days	Brief
SPLATSIN	IR 2: Enderby	20 Enderby Grindrod Rd - Quilakwa RV Park	2020-11-04		Unknown	No	361 days	Short

**Boil Water Advisory: 12 (4 revoked in Oct)**

First Nation Name	Community Name	Water System Name	Date Set	Date Revoked	Population Category	ISC Funded	Duration	Term
ADAMS LAKE	Hustalen No.1	Indian Point CWS	2021-04-20		26-50	No	194 days	Short
BRIDGE RIVER	Bridge River	Bridge River Main CWS	2021-08-12		51-100	Yes	80 days	Short
CANIM LAKE	Canim Lake	Canim Lake Main CWS	2021-09-09	2021-10-12	101-250	Yes	33 days	Brief
CAYOOSE CREEK	Cayoos Creek IR1	Cayoos Creek IR1 CWS	2021-09-27		101-250	Yes	34 days	Brief
CAYOOSE CREEK	Cayoos Creek IR2	Cayoos Creek IR2 CWS	2021-09-27		26-50	Yes	34 days	Brief
GITANYOW	Kitwancool	Gitar'yow CWS	2021-08-27	2021-10-01	101-250	Yes	35 days	Brief
KITSUMKALUM	Kitsumkalum	Kitsumkalum CWS	2021-10-27	2021-10-30	101-250	Yes	3 days	Brief
SHUSWAP	Shuswap	Kinbasket CWS	2021-10-26	2021-11-01	251-500	Yes	5 days	Brief
SKAWAHLLOOK FIRST NATION	Skawahlook	Rockface Trailer Park CWS	2012-07-10		1-25	No	3400 days	Long
TIT'Q'ET	Texas Creek	Texas Creek CWS AKA Tominock	2021-10-08		1-25	Yes	23 days	Brief
TAKLA NATION	Takla Lake	Takla CWS	2021-09-27	2021-10-04	251-500	Yes	7 days	Brief
UCLUELET FIRST NATION	Wya Point Resort	Wya Point Lodges TPWS	2014-05-20		Unknown	No	2721 days	Long

**Figure A.6. FNHA: Monthly Drinking Water Advisories in First Nations Communities in BC - November 2021 (FNHA, 2021c).**

Do Not Consume: 10 (1 revoked in Oct)										
First Nation Name	Community Name	Water System Name	Date Set	Date Revoked	Population Category	ISC Funded	Duration	Term		
COLDWATER	IR #1 Coldwater-Private Systems	Journeys Into Tomorrow PWS NT	2019-04-23		Unknown	No	922 days	Long		
LHEIDL TENNEH	North Shelly	North Shelly CWS	*2020-11-19		51-100	Yes	346 days*	Short		
LHEIDL TENNEH	South Shelly	South Shelly CWS	2021-07-21		1-25	Yes	102 days	Short		
LYTTON	G'WSEP Gas Station (PWS-NT)	IR #24 Tuckozap PWS-NT (G'WSEP Gas)	2013-02-20		Unknown	No	3175 days	Long		
LYTTON	Village of Lytton Distribution	IR #17 (15 homes) and #18 CWS (33 homes)	2021-07-01		101-250	Yes	122 days	Short		
TSARTLIP	South Saanich #1	Coopers Trailer Park PWS-T	2019-10-18		Unknown	No	744 days	Long		
UCLUELET FIRST NATION	Wya Point Resort	Wya Point Campground PWS	2020-09-30		Unknown	No	396 days	Long		
UCLUELET FIRST NATION	Wya Point Resort	Wya Point Yurts TPWS	2014-05-20		Unknown	No	2721 days	Long		
UCLUELET FIRST NATION	Wya Surfshop and Campground	Ukee Poke (Wya Surfshop and Campground PWS)	2020-09-28	2021-10-05	Unknown	No	372 days	Long		
WHISPERING PINES/CLINTON	Whispering Pines No. 4	Whispering Pines Drive CWS	2007-02-20		Unknown	No	5367 days	Long		

**\* Notes**  
Advisory on North Shelly CWS changed from WQA to DNC on 2021-07-21.

Indigenous Services Canada (ISC) Financially Supported System Details	Term
ISC Funded: <b>No</b> System is not financially supported by ISC.	<b>Brief:</b> ≤ 60 days
ISC Funded: <b>Yes</b> System is financially supported by Indigenous Services Canada (ISC)	<b>Short:</b> 61 - 364 days
More Info <a href="https://www.sac-isc.gc.ca/eng/15161343158977/533663683531">https://www.sac-isc.gc.ca/eng/15161343158977/533663683531</a>	<b>Long:</b> ≥ 365 days

FNHA.ca : Drinking Water Advisories  
<https://www.fnha.ca/what-we-do/environmental-health/drinking-water-advisories>

Figure A.7. Bottom half of the November 2021 PDF document (FNHA, 2021c).