

## Chapter 7: Drought



### KEY FINDINGS

- Drought is a **slow-onset disaster** often characterized by a lack of precipitation, and is considered a **high-risk climate hazard for B.C.**, leading to seasonal and long-term water shortages.
- An **increase in the duration and frequency** of seasonal drought—particularly summer drought—is projected for B.C., as a result of declining seasonal snow accumulation, warmer summers, and reduced summer rainfall.
- The **health impacts from drought** in B.C. include a reduction in the availability, quality, and safety of drinking water, including the intrusion of salt water in coastal areas. Lowered quality and quantity of aquatic habitat due to low flow conditions can also impact the numbers of fish and wildlife species available for subsequent harvest and consumption.
- Drought can **lower the quantity of water** in groundwater levels/aquifers needed for drinking and sanitation, and decrease water stores used for fire suppression.
- **Mental health impacts** of drought described by people in B.C. include feeling worried and concerned during periods of high drought levels. Some report experiencing increased climate anxiety due to worries about the longer-term impacts of drought.
- In B.C., drought has had **disproportionate health impacts** on some populations including Indigenous, rural, and remote communities; farmers and ranchers; and those who rely on forestry and fishing for their livelihoods.
- **Health care facilities in B.C. are at risk** of drought-related impacts, such as damage to landscaping and limited available water for essential needs—including for medical equipment sanitization and sterilization, and patient drinking, washing, and bathing. In addition, critical systems, such as cooling towers and boilers, may be affected by water shortages, leading to disruptions in essential health care services.
- **Drought adaptations in B.C.** include enhancing leadership and collaboration for emergency preparedness and response across the province and the health system, strengthening drought monitoring and public awareness, reducing reliance on water in B.C. health care facilities, and promoting nature-based adaptation solutions.

## THE 2021–2023 DROUGHT EVENTS—UNPRECEDENTED LONG-TERM DROUGHT IN B.C.

For three consecutive years beginning in 2021, B.C. experienced some of the most extreme drought conditions ever recorded in the province (see Figure 12). Following the June 2021 heat dome, many watersheds across the province were experiencing extremely dry conditions by mid-July <sup>[41]</sup>. As drought conditions threatened agriculture and wildlife, people and communities were asked to reduce their water use <sup>[613]</sup>, and several streams fell below the Critical Environmental Flow Threshold for several weeks in the Vancouver Island, South Coast and Southern Interior regions <sup>[41]</sup>.

River flows and groundwater levels in B.C. were initially at closer to normal levels in 2022 due to heavy precipitation from multiple atmospheric rivers in the fall of 2021 <sup>[41]</sup>. These back-to-back atmospheric rivers wiped out portions of snowpack, however. The drought season of late summer 2022 started after a cold, wet spring with a very delayed freshet <sup>[41]</sup>. There was hot and dry weather through the summer and into the fall of 2022, and multiple regions hit drought Levels 4 and 5 by October 2022. Rivers and groundwater remained below normal levels through the end of the year <sup>[41]</sup>.

In 2023, B.C. experienced some of the most severe drought conditions on record. Level 4 and 5 drought conditions blanketed much of the province by August, and water restrictions were imposed on specific sectors. Farmers and ranchers had to make extremely tough decisions, such as culling cattle or buying hay at uneconomical prices as a result of the dry conditions <sup>[614]</sup>. Conservation and local water restrictions, regulatory action, and emergency preparedness efforts took place across many regions of the province.

### KEY STATISTICS



By August and September 2021, drought conditions in one or more water basins within 13 of 16 health service delivery areas (HSDAs) had reached **Level 4** or higher—at which adverse socioeconomic or ecosystem impacts are likely or almost certain<sup>48</sup>.



By summer 2023, B.C. had experienced its earliest mountain snowpack melt since 1988, and precipitation ranged from **40 to 85 percent of normal**, depending on the region <sup>[41]</sup>.



In October 2022, the Lower Mainland, Sunshine Coast, and West Vancouver Island water basins reached **Level 5** drought conditions <sup>[41]</sup>.

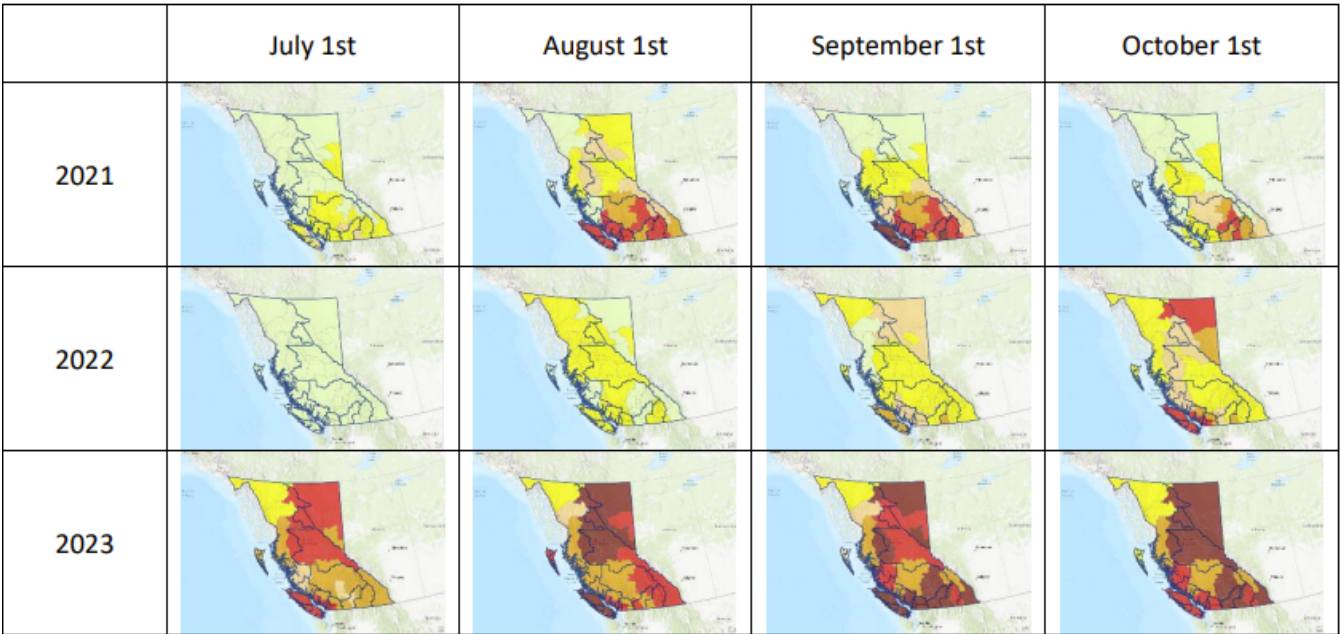


In 2023, 26 of B.C.'s 34 water basins experienced at least one week with **Level 5** drought <sup>[41]</sup>.



Also in October 2022, the Sunshine Coast Regional District declared a local **state of emergency** due to the ongoing drought and associated risk to the Chapman Water System <sup>[615]</sup>.

48 Data source: Water Management Branch, B.C. Ministry of Water, Land and Resource Stewardship (see Appendix 1 for more details)



### British Columbia Drought Levels

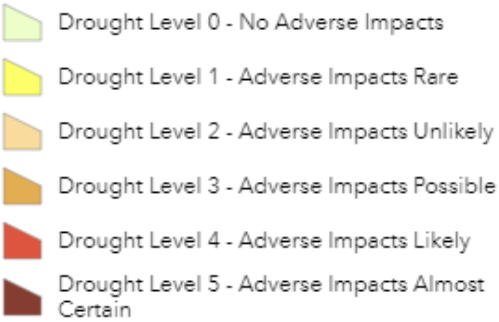


Figure 12. Drought levels between 2021 and 2023 in B.C., by health service delivery area (HSDA)<sup>49</sup>

<sup>49</sup> Map created by GeoBC. Note: for this panel of drought maps, the date requested for the drought levels may not coincide with the drought update day for some time periods. In those cases, the latest drought status during those time periods are used.



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## 7.1 Exposure to drought in B.C.

### Drought trends in B.C.

Drought is often described as a slow-onset disaster characterized by a lack of precipitation, resulting in water shortages <sup>[616]</sup>. Droughts are different from other climate hazards in that they can last several weeks, extend to several years, and often lack a clear beginning and end <sup>[617]</sup>. They can also vary in their geographic scales from highly localized to regional <sup>[617]</sup>.

It can be challenging to identify and monitor drought, as it can be defined in different ways <sup>[618,619]</sup>. The B.C. Drought and Water Scarcity Response Plan defines five types of drought: meteorologic, hydrologic, agricultural, socioeconomic, and ecologic <sup>[618]</sup>. These are interconnected, and can have cascading impacts on health, livelihoods, and ecosystems through a range of pathways <sup>[619]</sup>.

Drought is considered a significant climate hazard for B.C. In the 2019 Preliminary Strategic Climate Risk Assessment, the Province ranked seasonal water shortage<sup>50</sup> and long-term water shortage<sup>51</sup> at high risk for B.C. by the year 2050 (ranking second and sixth overall when compared to all risks) <sup>[30]</sup>. Seasonal water shortages could occur once every two years, or more frequently, by 2050. Predictions for longer-term water shortages are less certain <sup>[30]</sup>. Decreased seasonal snow accumulation, warmer summers, and reduced summer rainfall are projected to increase the duration and frequency of seasonal—particularly summer—drought in B.C. <sup>[30]</sup>



For more than a decade, B.C. watersheds and aquifers have been experiencing longer and more geographically extensive droughts <sup>[620]</sup>. Since 2021, one or more regional health authorities have had at least one water basin at drought Level 3 or higher for a total of 59 weeks—meaning that adverse impacts on both communities and ecosystems are possible to almost certain (Appendix 1 – Table A1.10).

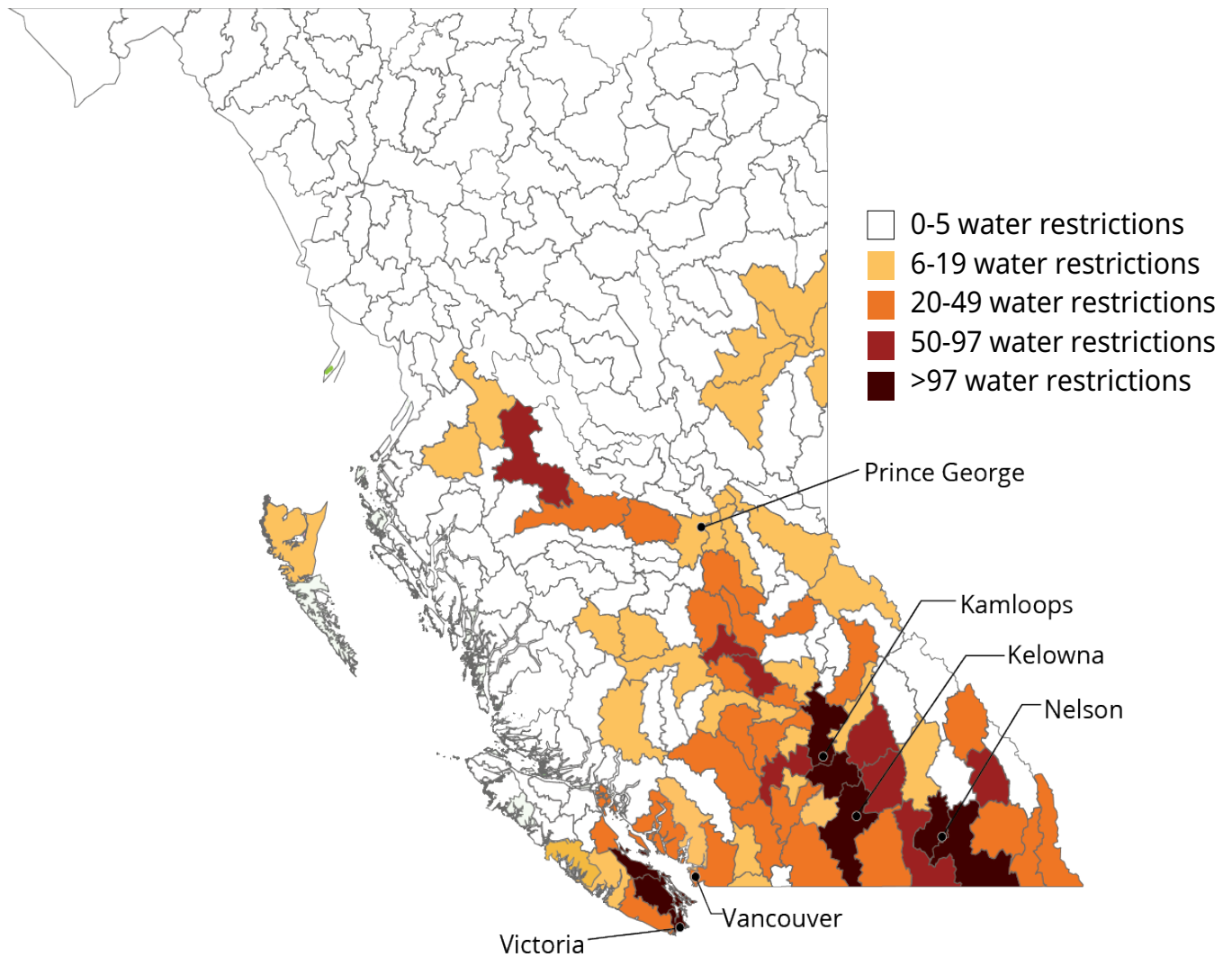
Much of the B.C. population (approximately 63 percent, or 2.9 million people) currently live in water-stressed areas<sup>52</sup>, particularly in the Southern and Interior regions <sup>[621]</sup> (Figure 13). Areas with the highest levels of water stress cover only 3.7 percent of the province but are home to 23 percent of the population. B.C.'s population has doubled since the 1970s; some water-stressed areas have higher-than-average growth rates, which puts additional strain on water infrastructure <sup>[621]</sup>. Rising population density can also exacerbate the strain on areas already grappling with sustainable water supply, particularly in water-stressed regions of the province, as illustrated in Figure 14.

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50 Seasonal water shortage was defined as a summer water shortage affecting two or more regions of the province and lasting two or more months. The magnitude of this water shortage was equal to drought Level 4 as defined in the B.C. Drought Response Plan (the highest level where water supply is insufficient to meet socioeconomic and ecosystem needs)—with cause dependent on hydrology of streams in the region.

51 Long-term water shortage was defined as a water shortage lasting for two or more years, affecting one or more regions of B.C., and characterized by insufficient supplies of both blue water and green water (i.e., liquid water in reservoirs, lakes, aquifers, rivers, etc., and moisture in the soil and vegetation)—driven by a year-on-year decrease in precipitation and increase in temperature.

52 Defined by the Province's designations used to support water licensing decisions (i.e., water allocation restrictions that are fully recorded or fully recorded with exceptions) as a proxy for water scarcity. Water-scarce area is defined as a watershed in which three or more surface-water sources are under restrictions.



Major B.C. watersheds or regions categorized by number of water restrictions (Fully Recorded and Fully Recorded with Exceptions). The darkest areas are the most water stressed and encompass 3.7% of the province.

*Figure 13. Major B.C. watersheds categorized by number of water allocation restrictions* <sup>[621]</sup>

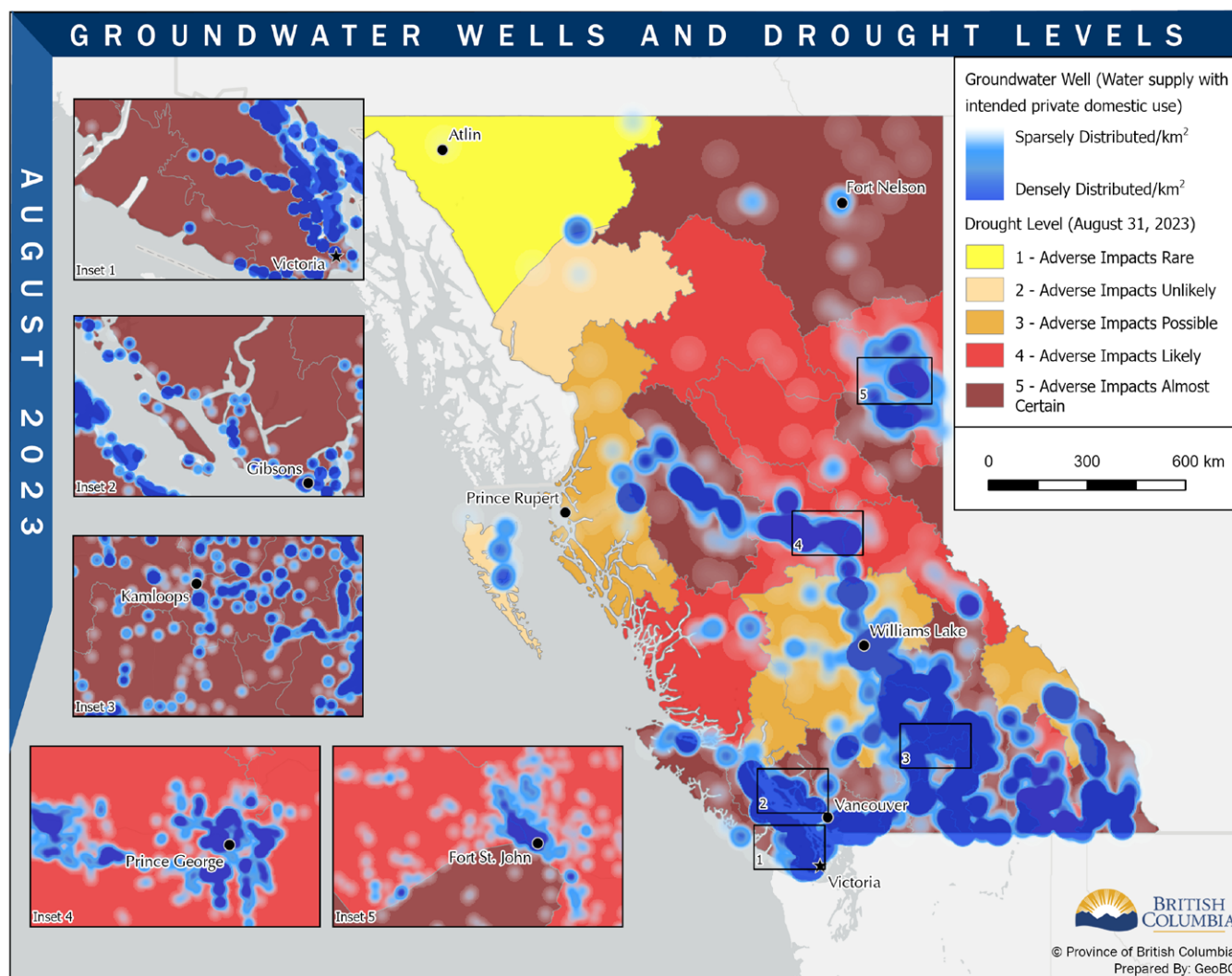


Figure 14. Groundwater well density and drought levels in B.C. health service delivery areas, August 2023

## 7.2 Drought impacts on B.C. population health and the health system

Drought can have cascading impacts in B.C. Prolonged dry spells can increase wildfire risks <sup>[622]</sup>, while heavy rain events on soils that have become hydrophobic (i.e., water repelling) from drought can lead to increased overland flood risk <sup>[623]</sup> and landslides <sup>[624]</sup>. Drought can also worsen air quality due to dust and fine particulate matter from airborne dry soil <sup>[625]</sup>. Crops can become more susceptible to mycotoxin contamination and insect attacks, leading to reduced agricultural yields and ultimately impacting food quantity and quality <sup>[618]</sup>. Drought can also lead to ecological impacts and environmental degradation <sup>[625]</sup>—such as vegetation loss and lower stream flows leading to warmer river temperatures, which affect fish and aquatic life <sup>[618]</sup>. In addition, breeding conditions for mosquito vectors can proliferate when water sources become stagnant <sup>[124]</sup>.

Drought can also impact the availability, accessibility, quality, and safety of drinking water, as a result of depleting water sources putting pressure on critical infrastructure <sup>[625]</sup>. These drinking water impacts lead directly to health impacts:

- **Reduced water quality and safety:** During drought, there may be a greater risk of turbidity and need for enhanced water treatment to reduce risk of adverse health outcomes<sup>53</sup>. Lower water levels and reduced stream flows can result in stagnation and lower dilution at contaminant (or discharge) sources, increasing the concentration of contaminants in ground and surface waters <sup>[625]</sup>, such as total coliforms<sup>54</sup> or arsenic, leading to a decline in water quality <sup>[626,629]</sup>. Drought can also lead to increased development of harmful algae blooms <sup>[630]</sup>.

In coastal areas, increased groundwater extraction and decreased recharge during droughts can lead to salt water being drawn into aquifers used as drinking water sources. This intrusion of salt water into the aquifer will progress inland with additional water withdrawals, permanently contaminating the aquifer and those wells drawing from it <sup>[631]</sup>. This problem is exacerbated on small islands with increasing population and associated water withdrawals, but limited fresh water aquifer recharge. Increasing well density and groundwater extraction on the B.C. Gulf Islands has led to saltwater intrusion and potential contamination of wells nearest to the coast <sup>[632]</sup>.

Water scarcity directly impacts public health by reducing water quality and straining sanitation systems. Diminished water levels in water bodies, coupled with stagnant flows, can elevate concentrations of pollutants and pathogens. <sup>[633]</sup> Drought can also create conditions in which organic matter is carried to water bodies during subsequent rainfall <sup>[631]</sup>.

- **Reduced water quantity:** Aquifers are recharged through infiltration of water from precipitation and surface water bodies. Low stream flows and extended periods of low precipitation can impact groundwater levels. Aquifers, particularly those at shallow depths or along stream systems, can develop a lower water table during a drought year. If the aquifer is not fully recharged year over year, there will be a cumulative result. <sup>[618]</sup> If natural water sources or adequate storage are not available in a community, drought may lead to insufficient supplies for firefighting and for human use and sanitation. When wells run dry or have been contaminated with salt water, people who rely on those wells must obtain potable water for drinking, bathing, sanitation, and cooking elsewhere. Other water sources, like bottled water, can also have considerable economic and environmental impacts <sup>[618]</sup>.

Drought also indirectly impacts health by increasing vulnerability <sup>[634–636]</sup>. For example, drought can accelerate the spread of foodborne, vector-borne, airborne, dust-related, and fungal diseases <sup>[631,635]</sup>. Additionally, drought-driven food insecurity can increase the risks of undernutrition and micronutrient deficiencies <sup>[635]</sup>, and of mental health impacts <sup>[637,638]</sup>. While the health impacts of drought vary depending on its severity and duration, populations that rely on land- or water-based industries for their livelihoods (such as farming, forestry, or fishing), hold local water sources in cultural significance, and/or lack the capacity to address water scarcity are at greater risk of direct impacts <sup>[625]</sup>.

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53 Turbidity refers to the amount of substance concentration (i.e., silt, clay, fine particles of organic and inorganic matter, soluble organic compounds, plankton, and other microbial pathogens) that impacts water clarity <sup>[626]</sup>.

54 Total coliforms are bacteria commonly found in soil, surface water, and the intestinal tracts of animals <sup>[627]</sup>. The presence of total coliforms, including *E. Coli* and fecal coliforms, in drinking water may indicate bacterial contamination of regrowth in water-distribution systems that can have potential health risks to humans <sup>[626,627]</sup>. Viruses, bacteria, and parasites can attach to suspended particles in turbid water, and particles can interfere with the disinfection process, limiting chlorine's ability to remove or inactivate the contaminants and reducing water quality <sup>[628]</sup>.





### 7.2.1 Drought impacts on B.C. population and public health

The physical health impacts of drought on B.C.'s population health have not been widely investigated. There is some evidence of an association between drought and cases of gastrointestinal illness in B.C., with Metro Vancouver experiencing a significant rise in *Cryptosporidium* and *Giardia* cases up to six weeks after heavy rainfall that followed severe drought <sup>[480]</sup>. Mental health impacts have been described in B.C., with people reporting feeling concern during periods of high drought levels and intensified climate anxiety due to worry about the longer-term impacts of drought <sup>[639,640]</sup>. Many of the reported health impacts of drought on B.C. populations are related to impacts on the security of drinking water and food <sup>[641,642]</sup>.

Water restrictions have been implemented in response to drought conditions in some B.C. communities. While they are an important adaptation, water restrictions can impact both social and physical determinants of health in a community. For example, in Stage 4 watering restrictions, all outdoor water use is halted. In Sechelt on the Sunshine Coast, for example, operations for some businesses were impacted and the community delayed opening recreational facilities such as pools and its local ice rink, amid concerns about retaining sufficient water for homes, fire protection, and hospitals <sup>[643]</sup>.

In addition to water restrictions, concerns about drought and high temperatures increasing wildfire risks in B.C. also impact communities. In the summer of 2023, the Interior municipality of Kamloops took the unprecedented step of closing all nature parks in and around the community because of the heat and drought, and put strict watering restrictions in place. These steps were taken to ensure that, in the event of a fire, firefighters would have enough water pressure and be able to access trails <sup>[644]</sup>.

### 7.2.2 Disproportionate impacts of drought on populations in B.C.

Drought has also had disproportionate health impacts on B.C.'s Indigenous, rural, and remote communities; farmers and ranchers; and those who rely on forestry and fishing for their livelihoods. The greater the severity and length of the drought, the greater the likelihood that it will increase the vulnerability of communities and populations to future extreme weather events—particularly a future drought or flood—if there is not adequate time for community recovery due to water insecurity, mental health issues, and/or displacement <sup>[635]</sup>.



### ***Impacts of drought on Indigenous communities***

Drought was named as one of the top three climate concerns in the 2019 [BC First Nations Leadership Council Climate Leadership Survey](#) <sup>[61]</sup>, which included a sample of respondents from 139 First Nations and Tribal Councils across B.C. Drought is having significant impacts on Indigenous communities:

- Drought is impacting traditional food sources for Indigenous Peoples in B.C., including through loss of salmon and other fish species. Higher water temperatures during summer months often coincide with drought conditions in B.C. Salmon have a low thermal tolerance threshold and warmer water temperatures can cause en-route mortalities for adult salmon returning to their freshwater spawning grounds. Warmer temperatures associated with droughts can also accelerate snowmelt, increase freshet river discharges, and create “hydraulic barriers” for upstream fish migration, increasing fish mortality rates. Drought conditions can also impact salmon survival by reducing both the quantity and quality of water <sup>[645]</sup>. For example, in Bella Bella on B.C.’s Central Coast, over 65,000 dead salmon were found washed up on the shore in October 2022, an event attributed to the severe drought conditions. One researcher estimated that hundreds of thousands of fish could have died along rivers and streams in Heiltsuk territory in 2022 due to the warm temperatures and low water levels, with the full impacts to be realized over four to five years <sup>[646]</sup>. Similar extreme drought conditions on Vancouver Island have also created dire conditions for salmon habitats <sup>[647]</sup>.
- Drought-induced water scarcity is creating concerns about a lack of safe drinking water or adequate water stores for fire suppression in many B.C. First Nations communities <sup>[648]</sup>. As reported in 2023, some water wells have nearly run dry in the Penticton Indian Band due to record low water quantities. In response to low water levels, tiger dams (large water-filled tubes typically used to offset flood impacts) are being used to store water for fire protection for Kitasoo/Xaixais First Nation <sup>[648]</sup>.
- Many B.C. First Nations rely on local water sources for cultural practices, customs, and traditions <sup>[649]</sup>. With water quality impacting fish abundance, associated indirect risks on fishing can create cascading impacts on cultural determinants of health that impact mental health and well-being.

Indigenous communities in B.C. are demonstrating leadership to address the cultural, ecological, and health impacts of drought by taking a collaborative watershed-based approach to ecosystem management ([see the example](#) of the Cowichan Watershed Board’s Collaborative Governance model).



### **Rural and remote communities**

As droughts become more frequent in B.C., rural and remote communities may struggle with water security. These communities have less capacity to effectively monitor and regulate their water resources, which can create barriers to drought adaptation <sup>[650]</sup>. Rural communities are typically less economically diversified than urban regions, with a heavy reliance on key industries that require a sustainable and reliable water supply, such as agriculture or natural resource extraction. Impacts on small, rural, and remote areas are compounded by existing challenges, such as limited financial, administrative, and management capacity of their water supply and related system infrastructure <sup>[651]</sup>.

### **Rural B.C. residents protect water in the face of drought**

The East Vancouver Island water basin (including Quadra Island and the Gulf Islands) has experienced Level 5 droughts three summers in a row (2021–2023) <sup>[41]</sup>. Most of Quadra Island's 2,700 residents depend on groundwater from shallow or deep drilled wells to meet their water needs <sup>[652]</sup>. As B.C.'s summers become hotter and drier, the vulnerability of the island's deeper water wells and groundwater resources are a growing concern. As with many rural communities in B.C., more research and monitoring are needed to understand the impact of drought on Quadra's groundwater resources and the community's water security. Quadra Island's Climate Action Network (I-CAN) water security team has launched an ambitious project to gather data on the health of the island's aquifers, collecting information on how much water is being extracted and if they are recovering or not. The ultimate aim is to determine sustainable water-use thresholds, boost the community's climate resilience, and avoid a water crisis <sup>[652]</sup>.

### **Farmers and ranchers**

Drought has economic impacts for farmers and ranchers who depend on water and rainfall for their livelihoods. Recent droughts in B.C. resulted in failure of hay crops and subsequent rising hay prices, which led to inadequate access to feed for livestock <sup>[653]</sup>. Some B.C. farmers are having to truck in water to feed livestock <sup>[654]</sup>, while others have been forced into early selling and culling of cattle to deal with feed shortages <sup>[655]</sup>. In 2023, some farmers abandoned crops due to water shortages <sup>[656]</sup>. The impacts of climate change, including drought-related impacts have been associated with mental health impacts among farmers and ranchers, such as increased depression, anxiety, and suicide <sup>[657]</sup>. See Chapter 9: Mental Health for more discussion of mental health impacts on farmers and ranchers, as well as on workers in other sectors, who may be unable to access water or their worksites during drought conditions.





## 7.2.3 Drought impacts on the B.C. health system

### Drought impacts on health facilities and infrastructure

*“Soon we will have more drought problems, more wildfire, and more and more water restrictions, and that will lead to the prioritization of water projects.”*

—Lower Mainland Facilities Energy and Environmental Sustainability team member <sup>[658]</sup>



Sechelt District Hospital (photo: Vancouver Coastal Health)

### Impact of drought on Sechelt District Hospital and Sunshine Coast communities

Limited water supply during droughts has wide-ranging implications for hospital operations, such as sanitation, sterilization of medical equipment, and patient care.

In 2022, amidst severe drought conditions and Stage 4 water restrictions, numerous initiatives were implemented across the Sunshine Coast Regional District (SCRD) to keep water flowing to communities between West Howe Sound and Secret Cove. These efforts were the focal point of an Emergency Operations Centre implemented by the SCRD on September 27, 2022, and water supply was prioritized for essential services, including the Sechelt Hospital and fire suppression <sup>[615]</sup>.

Many community members and institutions helped conserve water; the Sechelt Hospital sent their laundry off-coast, and the regional district prepared to truck in water to fill critical system reservoirs, including the one supplying the hospital <sup>[659]</sup>.

Currently, the community of Sechelt is exploring several adaptation options to protect water supply during drought conditions. These include modifying siphoning systems, installing additional pumps, and tapping new sources of water. BC Emergency Health Services is also looking to install a water storage tank at the community ambulance station, to supplement the water supply during periods of drought <sup>[660]</sup>.



Droughts are slow-onset phenomena, which generally develop over an extended period of time and lack highly visible and structural impact <sup>[661]</sup>. However, the increasing frequency and intensity of drought in B.C. are noted as concerns in health care facility risk assessments, and adaptation strategies are needed to ensure continuity of care during water shortages.

*“There are multiple conversations going on now for how to plan, but it's not until something happens like [water loss or loss of pressure at a health care site] that those conversations really come to light.”*

—Risk to Resilience Project focus group participant

Health care facilities in B.C. are recognizing the risks associated with drought-related water shortages <sup>[662]</sup>, citing impacts such as reduced availability of water to support processes, damage to landscaping, and increased irrigation needs <sup>[234]</sup>. In one Lower Mainland health authority, 26 percent of 630 staff survey respondents reported negative regional impacts as a result of drought and water shortages <sup>[663]</sup>. Other drought-related concerns raised in B.C. health facility climate risk assessments include:

- **Design:** The design of health care facilities may not account for water shortages during prolonged dry periods, putting the reliability of crucial water services for health care operations at risk <sup>[150]</sup>.
- **Landscaping:** Landscaping around health care sites can be vulnerable to drought, necessitating adjustments to maintenance plans—such as reducing water usage by irrigation and using more drought-resistant plants (xeriscaping) <sup>[150]</sup>.
- **Operations:** Water restrictions during droughts can limit the availability of essential sanitation and sterilization supplies for medical equipment, as well as for patient drinking, washing, and bathing. In addition, critical systems, such as cooling towers and boilers, may be affected by water shortages, leading to disruptions in essential health care services <sup>[150]</sup>. In some cases, water shortages may become severe enough to require water to be trucked in for essential health services <sup>[150]</sup>.

*“There are a number of procedures [in health care facilities] that need water, such as infection prevention and control, sanitation, food service, and laundry.”*

—Risk to Resilience Project focus group participant



- **Energy supply:** Droughts have the potential to impact energy supply, particularly in communities relying on hydropower. Reduced snowpack and receding glaciers, which feed storage reservoirs, can lead to decreased hydropower capacity. This can pose supply challenges, especially during climate-related events (e.g., extreme heat events, storms) when increased electrical loading may require backup energy <sup>[150]</sup>.
- **Compound risks:** Drought and associated water shortages often occur during summer months, potentially coinciding with extreme heat events, when the availability of potable drinking water is vital, and wildfires, when the availability of water for fire protection is critical. Some regional health authorities have noted heightened risks from drought-induced water shortages, such as interrupted water supply for long-term care residents or reduced fire protection <sup>[150]</sup> during summer months. In recent years, communities such as the Sunshine Coast (2022) <sup>[664]</sup> and McBride (2023) <sup>[665]</sup> have declared states of emergency due to severe drought conditions. To ensure adequate water supply for drinking, fire protection, and sanitary services, residents were prohibited from washing vehicles or building exteriors, filling up swimming pools, or watering lawns and gardens.

### Upstream impacts and adaptations to protect vital water supply systems

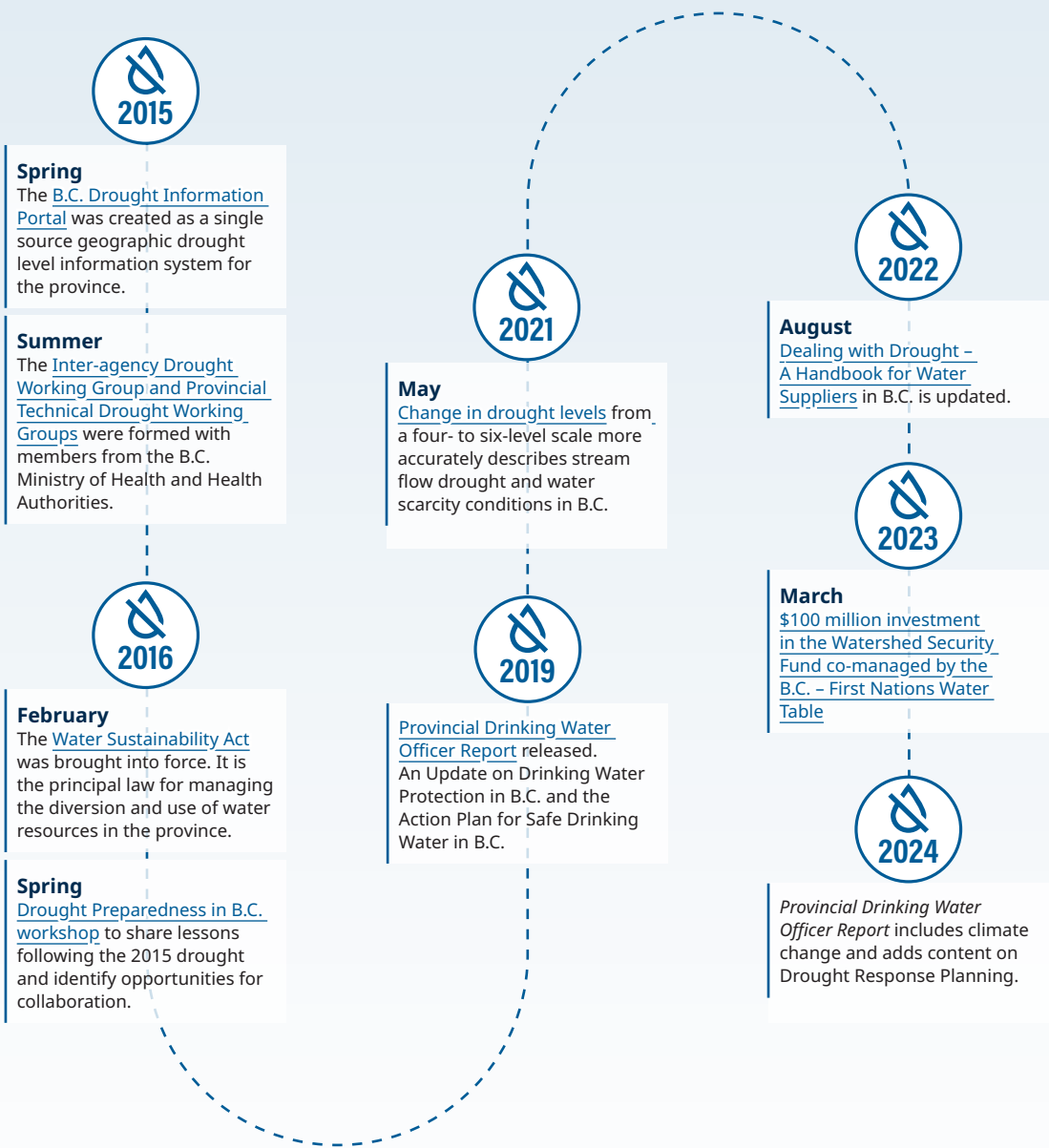
Drought's impacts on infrastructure begin at the source: the lakes, rivers, streams, creeks, and aquifers that supply our water systems with raw freshwater. There are more than 100,000 wells in B.C.; the majority are used domestically, followed by use by municipalities, agriculture and industry <sup>[666]</sup>. During periods of water scarcity, well pumps may be at risk of pumping dry (cavitation) and being damaged <sup>[667,668]</sup>. There are also over 32,000 kilometres of water pipes serving communities in B.C., much of which is aging <sup>[669]</sup>. Leaks in this infrastructure may contribute to water security problems.

Water supply systems across every sector (e.g., irrigation pipelines, municipal distribution systems, residences, and the health system) should undertake leak detection and repair programs, as outlined in the Handbook for Water Suppliers in B.C. <sup>[670]</sup>. Health facility building sites can enhance resilience to drought through on-site water storage and retention, guided by the B.C. Ministry of Health's Guidance for Treatment of Rainwater Harvested for Potable Use, released in 2020 <sup>[671]</sup>.



### 7.3 Health-related adaptations to drought in B.C.

#### A TIMELINE OF SELECT HEALTH-RELATED DROUGHT ADAPTATIONS IN B.C.





### Leadership and collaboration across the system

In 2010, the [B.C. Drought and Water Scarcity Response Plan](#) was first published, establishing a governance structure that includes inter-agency working groups and committees. The B.C. Drought and Water Scarcity Response Plan is reviewed and updated annually to maintain accurate and current approaches to drought response. In 2015, drought committees were formed for response and planning. Regional drought teams were also created to coordinate regional responses. Health representatives sit on the inter-agency committee and in Regional Technical Drought Working Group meetings to address implications on human health and well-being, with a particular focus on drinking water.

- **Inter-Agency Drought Working Group:** Formed in 2015, this group has a broad membership from provincial and federal agencies, including the Ministry of Health. It reports to the Assistant Deputy Ministers' Committee on Disaster Risk and Emergency Management and focuses on strategic tasks such as legislation, risk assessment, economic impact evaluation, and communications. Projects include the maintenance of the B.C. Drought and Water Scarcity Response Plan, engaging with First Nations, improving drought management tools, and enhancing communications through social media bulletins and drought status reports.
- **Provincial Technical Drought Working Group:** Also formed in 2015, this group reports to the Inter-Agency Drought Working Group and is made up of staff from various agencies, including the Ministry of Health. Its responsibilities involve monitoring stream flows, aquatic ecosystems, community water supplies, and agriculture sectors, to ensure adequate water supply across the province. It plays a key role in setting provincial drought levels and sharing information. It also monitors precipitation and groundwater levels, and snowpack and seasonal volume forecasts (early-season indicators).

Multiple local, provincial, and federal agencies bear the responsibility for drought management and response. The composition of working groups and committees may vary over time. Figure 15 below illustrates regional and local collaborative efforts underway to respond to drought <sup>[618]</sup>.

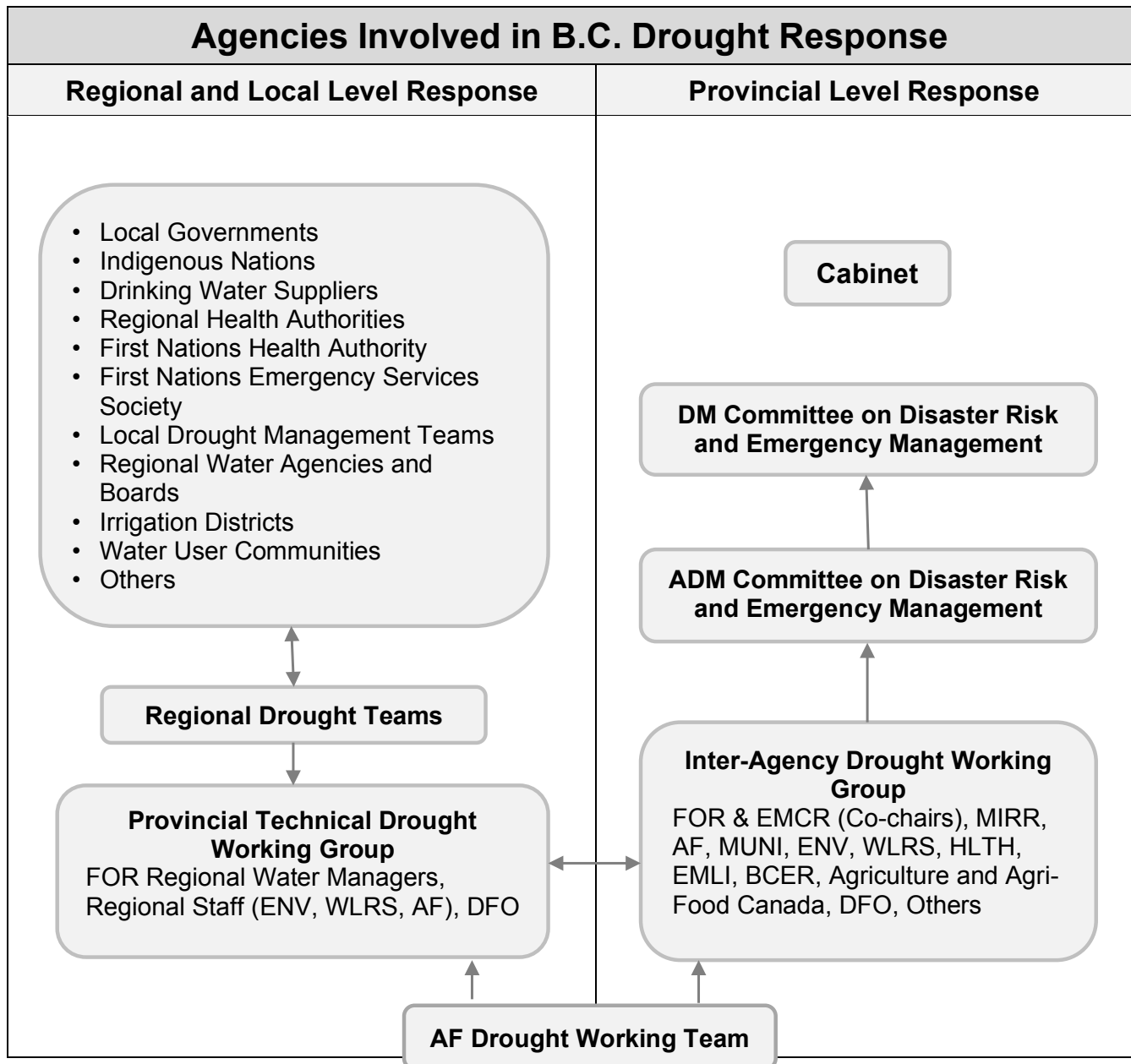


Figure 15. Key coordinating bodies and groups involved in B.C. drought response <sup>[618]55</sup>

55 ADM=Assistant Deputy Minister, DM=Deputy Minister



## The Cowichan Watershed Board: Indigenous collaborative governance

Recent droughts, heat waves, and aging infrastructure challenges have underscored the vital need for collaborative governance within the Cowichan Watershed to address ecological and health risks. The Cowichan Watershed Board (CWB) is a collaborative co-governance structure focused on the Cowichan and Koksilah watersheds. The Board is co-chaired by the Chief of Cowichan Tribes First Nation, and the Chair of the Cowichan Valley Regional District, with 10 to 12 other members appointed jointly by those partners and nominees from the federal and provincial governments <sup>[672]</sup>. The CWB recognizes

the profound connection between our health and the health of the watersheds. The well-being of the rivers, salmon, and water quality directly affects the community, people, well-being, and economic security of the Cowichan Valley and Estuary. The CWB members embrace this watershed-centered approach, prioritizing the needs of a healthy environment and engaging in decision-making that transcends boundaries, while sharing knowledge, stories and experiences <sup>[673]</sup>. Trust, collaboration, and meaningful partnerships have been vital to taking rapid action while embodying the core principle of Nutsamat kws syaay's tthu qa', meaning "coming together to work as a whole for the sake of our people and for the health of the watershed" <sup>[674]</sup>.



## Creating policy-enabling environments and role clarity

*"Right now, our [focus] is to make sure that all of our drinking-water systems have robust emergency response plans that specifically address the loss of source due to drought."*

*—Risk to Resilience Project focus group participant*

In the context of drought, B.C. follows an all-hazard approach, with responsibilities across multiple agencies and sectors. During periods of drought, the Ministry of Emergency Management and Climate Readiness (EMCR) supports provincial emergency response coordination under the *Emergency and Disaster Management Act* <sup>[618]</sup>. The Ministry of Water Land and Resource Stewardship plays a key role in the coordination of drought response and in developing policy to protect drinking water sources from risks including drought. WLRS is also responsible for maintaining the B.C. Drought and Water Scarcity Response Plan. The health sector acts as a key partner, offering guidance, enhancing preparedness, and mitigating risks during drought events. HEMBC works to reduce and respond to impacts on health care services, while the Provincial Health Officer, Medical Health Officers, Environmental Health Officers, and/or Drinking Water Officers provide oversight on drinking-water systems (under the *Drinking Water Protection Act*). Health Officers focus on addressing population-wide impacts, prioritizing at-risk facilities (e.g., schools, long-term care and childcare operations) and sub-groups <sup>[675]</sup>.

As identified in the [B.C. Drought and Water Scarcity Response Plan \(2023\)](#), when there is a loss, near loss, or failure of a community's potable water or water supply for firefighting, the drought response turns to an emergency response to protect public health and safety. Water suppliers remain responsible for ensuring adequate water supplies to maintain public health and safety. See the story below on drinking-water system resiliency to drought that illustrates how Environmental Health Officers work with water system operators on emergency response and contingency planning.

### Island Health—Drinking-water system resilience to drought

In 2015, the Island Health region experienced increasingly frequent localized droughts, which raised concerns about the capacity of drinking water supplies. While many local governments were actively engaged in provincial emergency preparedness activities, water-supply systems not operated by municipal or regional governments were excluded. Adequate water quantity falls outside the scope of the current *Drinking Water Protection Act*, but it remains crucial for public health, sanitation, fire suppression, and food security. The Island Health Environmental Public Health team responded by initiating a drought assessment survey for water-supply systems and encouraging conservation efforts.

In 2021, Vancouver Island experienced Level 4 or Level 5 drought for 72 consecutive days, from June 1 to October 1 <sup>[676]</sup>. Since then, drought on the island has been increasing in severity and duration—even pushing into the winter months <sup>[677]</sup>. In 2021 and 2022, Island Health re-launched the drought survey to evaluate the impact of drought on water systems and assess system capacity and mitigation plans. Of the water systems surveyed, some key survey findings were:

- 16 percent of water systems have experienced shortages in the past, and 53 percent of systems have included water loss as part of their Emergency Response and Contingency Plans (ERCP). Only 55 percent of water systems have their water usage measured.
- Of the water system operators surveyed, only a small majority (54 percent) have a Water Conservation Plan in place. About 75 percent of water systems rely on voluntary water-use reductions to curb overuse, and about 15 percent of operators rely on bylaws <sup>[678]</sup>.

Island Health has now distributed the survey findings to over 1,000 water operators and emphasized the importance of having an ERCP to address drought risk. Constant monitoring, contingency planning, and proactive adaptation are highly recommended <sup>[678]</sup>. More specifically, Drinking Water Officers continue to provide guidance, review existing plans, and advise on water conservation to support the resiliency of drinking water systems <sup>[678]</sup>.

In 2023, the emergency management landscape in B.C. was updated with specific reference to a changing climate through the updated [Emergency Management and Disaster Act](#). In 2023, states of emergency were declared in response to the province-wide drought conditions and concurrent wildfires <sup>[679]</sup>; this exceptional situation “stress tested” emergency response <sup>[680]</sup> to a combined drought and extreme wildfire season.

## Using bulk water haulers to maintain vital infrastructure during droughts

Known for its lush surroundings, the town of Tofino on the west coast of Vancouver Island found itself on the precipice of a water crisis in the summer of 2023. The community faced an unprecedented drought due to record-low precipitation that would require drastic measures to protect its local water supply. Measures discussed included declaring a local state of emergency, suspending some businesses, limiting tourism, and relying on tanker trucks to bring in water <sup>[681,682]</sup>.

The availability of water haulers during droughts improves access to clean and safe drinking water for those needing to supplement their water supply. In some areas, bulk water shipments have become necessary to satisfy water demand <sup>[641]</sup>. In 2017, 190 bulk water haulers in B.C. were permitted to carry and deliver potable water to users, the vast majority (138) located in the Northern Health region <sup>[651]</sup>. During recent droughts, some communities experienced a shortage of haulers due to increased transportation costs.

### Enhancing monitoring and growing awareness

Setting up clear leadership structures and policy-enabling environments has paved the way for improved access to technical information across provincial, regional, and local levels of government and the public. The following platforms support information dissemination and indicate areas where messaging and monitoring can be enhanced:

- [\*\*ClimateReadyBC\*\*](#) is an online portal and central repository of information to support communities in understanding both climate risk and the potential for adaptation. It provides climate and disaster-risk data, details on how B.C. is responding to drought, alongside information and resources to assist in identifying, understanding, and effectively managing drought-related risks. In 2023, it added a dedicated drought and water scarcity webpage.
- [\*\*EmergencyInfoBC\*\*](#) is a communications platform that provides crisis communications directly to the public during major emergencies and disasters, including drought.
- [\*\*B.C. Drought Information Portal\*\*](#) was created in 2015 as a single-source geographic drought-level information system for people in B.C. The portal consists of multiple maps embedded with information on provincial drought levels, historical drought time-lapse information, and other drought information. Drought levels are tracked from May to November and regularly updated on an approximately weekly basis <sup>[41]</sup>.
- [\*\*Water Data & Tools\*\*](#), a webpage of resources hosted by the Province, includes a number of detailed data sets, such as the location of groundwater wells and related water-use licenses, for example. Although administrative boundaries, like HSDAs, do not align well with watershed boundaries, there is powerful potential to better connect environmental data sets to inform health decision-making.
- [\*\*B.C. Ministry of Agriculture's Drought in Agriculture\*\*](#) webpage provides information on financial assistance, health and wellness supports, and drought management strategies for producers.

## Reducing water usage in B.C. health care facilities

Health facilities teams have been actively working to identify ways to reduce water usage. Vancouver Coastal Health's Water Management Program, as one example, seeks to actively optimize the use and possible reuse of water resources by Lower Mainland health care sites <sup>[662]</sup>. Focused largely on conservation, this program promotes measures such as optimizing landscape irrigation, capturing/reusing rainwater, and managing sewage and wastewater <sup>[662]</sup>. In 2021, researchers at the University of British Columbia, in collaboration with Provincial Health Services Authority, completed a research project <sup>[683]</sup> that explored water-saving opportunities applicable to health care settings.

## Improving communications on built environment and nature-based solutions

While health agencies have not historically developed guidance on built environment and nature-based solutions specifically for drought, drought messaging and interventions are increasingly being recommended to the public, communities, and facilities. For instance:

- **The First Nations Health Authority** has developed fact sheets on [Drought Planning and Response Guide for Communities](#) and [Severe Drought and How to Cope with a Hot and Dry Summer](#).
- **Island Health** has posted on [social media](#), published [articles](#), and created a [video](#) to support water conservation efforts.
- **Interior Health** has created the [Drinking Water for Everyone](#) website. While not specific to drought, it offers an awareness-raising platform to enhance public knowledge on where their drinking water comes from.

The messages in these resources are clear and consistent, emphasizing the importance of environmental sustainability through water conservation. They advise installing water meters in communities to efficiently detect leaks and identify high water consumers.

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## 7.4 Opportunities for action

**Addressing the population health and health system impacts of drought in B.C. requires a comprehensive and collaborative approach. Some key opportunities for action include:**

### Collaboration and communications

- Clarify roles, responsibilities, and mandates of health agencies relative to those of other sectors and ministries to develop and share public messaging about the health risks associated with drought, and to promote preventive measures.
- Collaborate with local governments, First Nations, Métis, and communities to prepare for drought by providing information, resources, and support for sustainable water-use practices.

### Surveillance and research

- Explore the cross-cutting impacts of drought alongside other hazards (heat, wildfires).
- Seek out co-benefits for drought adaptations, and be aware of maladaptation where actions to respond to one hazard create vulnerabilities for another (e.g., implications of using water for misting tents or water wagons during simultaneous heat and drought events; planning for water needed for fire suppression in wildfire/drought events).



- Support the continuation and expansion of water monitoring to include:
  - Saltwater intrusion testing for water systems on the coast;
  - Enhanced watershed monitoring; and
  - Enhanced drought-related water testing for groundwater and provincially monitored wells.
- Research the long-term health impacts of drought on different population groups (e.g., farmers and ranchers).
- Research the mental health impacts of prolonged drought, including stress, anxiety, and depression.

### **Proactive planning**

- Ensure drought is included in health sector risk assessments and plans, including assessing implications on critical infrastructure and health facility operations.
- Develop drought management plans for health facilities that include demand-side management for water use.
- Collaborate with water system operators to ensure they have robust emergency response plans, and to support the implementation of water sustainability plans that address the loss of source water due to drought.
- Encourage and support communities to form partnerships with bulk water haulers to keep up with water demand, especially for rural and remote communities.
- Develop strategies to safeguard food security during drought periods (e.g., providing information to food premises during times of water scarcity).

### **Capacity building**

- Training and information resources for health care professionals to recognize and manage drought-related health conditions.

### **Health facility preparedness**

- Implement water conservation measures within health care facilities, including the use of water-efficient technologies, recycling, and reuse systems, as permitted by legislation.