British Columbia Drought and Water Scarcity Response Plan

Updated April 2023

Prepared by the Ministry of Water, Land and Resource Stewardship
on behalf of the Inter-Agency Drought Working Group

B.C. Drought Response Plan Authorship and Editions

This plan was originally authored in 2010 and is reviewed annually. The 2021 edition included considerable changes to drought level definitions and criteria to better align with federal and North American drought monitoring frameworks, and more accurately describe the severity of water scarcity in an area. The April 2023 edition includes changes to ministry names, roles and responsibilities to align with new mandates, and to align with the aims of the Declaration of the Rights of Indigenous Peoples Act (DRIPA).

Cover image: Ministry of Forests, Lands, Natural Resource Operations and Rural Development, 2017, West Kettle River at confluence with Kallis Creek.

Accessibility: This document has been formatted to maximize accessibility. We welcome your feedback to LivingWaterSmart@gov.bc.ca.

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- British Columbia Ministry of Environment and Climate Change Strategy
- British Columbia Ministry of Agriculture, Food and Fisheries
- British Columbia Ministry of Municipal Affairs
- British Columbia Ministry of Health
- British Columbia Ministry of Transportation and Infrastructure
- Emergency Management B.C., B.C. Ministry of Public Safety and Solicitor General
- British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- Fisheries and Oceans Canada
- Agriculture and Agri-Food Canada
- Environment and Climate Change Canada

Legal Disclaimer

This plan does not address emergency response measures as defined in the *Emergency Program Act* (1996). The declaration of any drought level or condition and subsequent response does not imply municipal or provincial compensation for economic loss.

The information provided in this plan is offered as a provincial public service. Many factors may influence local water supply availability including, but not limited to precipitation, topography, geography, microclimates, storage capacity, water utility systems, and population demands. As a result, the information in this plan is general in nature and should not be relied upon as specific advice for responding to particular circumstances. You will have to review your particular circumstances and then determine whether the suggestions in this plan are appropriate to those circumstances.

Water suppliers, local governments, improvement districts, other authorities, and water licensees should consider the appropriateness of the suggestions in this plan and adapt them to suit their specific local conditions and requirements; water suppliers or users should not put plans and bylaws in place without receiving appropriate professional and legal advice.

While information provided within this plan is believed to be accurate at the time of publication, we cannot confirm its currency, accuracy, or completeness or its applicability to or suitability for individual circumstances. Therefore, persons using this plan should take steps to independently verify the information.

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Acronyms Used in this Document

AAFC	Agriculture and Agri-Food Canada
ADM	Assistant Deputy Minister
ADMCDREM	Assistant Deputy Ministers Committee on Disaster Risk and Emergency Management
AF	British Columbia Ministry of Agriculture and Food
BCAC	BC Agriculture Council
BCER	BC Energy Regulator
CEF	Critical Environmental Flow
CEFT	Critical Environmental Flow Threshold
DFO	Fisheries and Oceans Canada
DMCDREM	Deputy Ministers' Committee on Disaster Risk and Emergency Management
DMCNR	Deputy Ministers' Committee on Natural Resources
DRI	Drought Research Initiative
EHU	Essential Household Use
EMCR	British Columbia Ministry of Emergency Management and Climate Readiness
ENV	British Columbia Ministry of Environment and Climate Change Strategy
FITFIR	First-in-time First-in-right
FNHA	First Nations Health Authority
FNESS	First Nations Emergency Services Society
FOR	British Columbia Ministry of Forests
GCPE	Government Communications and Public Engagement
HLTH	British Columbia Ministry of Health
IADWG	Inter-Agency Drought Working Group
IIABC	Irrigation Industry Association of British Columbia
ISC	Indigenous Services Canada
FN/LG/WS	First Nations, Local government, and/or water suppliers
MAD	Mean Annual Discharge
MUNI	British Columbia Ministry of Municipal Affairs
NDMC	National Drought Mitigation Centre
NIDIS	National Integrated Drought Information System

PECC	Provincial emergency coordination centre
PREOC	Provincial regional emergency operations centre
PTDWG	Provincial Technical Drought Working Group
RHA	Regional Health Authority
SWS	Significant water shortage
WLRS	British Columbia Ministry of Water, Land and Resource Stewardship
WSA	*Water Sustainability Act*

1. Overview

1.1. What is Drought?

Drought is a recurrent feature of climate involving a deficiency of precipitation over an extended period, resulting in a water shortage for activities, communities or aquatic ecosystems.[1] In British Columbia (B.C.), combinations of insufficient snow accumulation, hot and dry weather, or a delay in rainfall may cause drought.

Drought conditions can affect communities and individuals in different ways. Drought can lead to reduced water availability for household and business use, and Indigenous communities' access to traditional foods and medicines. Lower stream flows may cause warmer river temperatures, affecting fish and other aquatic life. Low stream flows can also affect the growth of agricultural crops and limit the water available for irrigation. Impacts to fish populations and crop growth affect food security. Low flows and extended periods of low precipitation can also have impacts on groundwater levels. Aquifers – particularly those at shallow depths - may develop a lower water table due to drought in any given year and from previous drought seasons, as there may not be enough water to recharge the aquifer. If natural water sources or adequate storage are not available in a community, it may also lead to insufficient supplies for firefighting. Drought season in B.C. also coincides with summer tourism and associated increased demand for water. Reduced water availability during the summer can have significant economic impacts where communities rely on the summer tourism industry.

Drought can be defined as meteorological, hydrological, ecological, agricultural or socioeconomic; each of which implies different impacts. Definitions of these different types of drought, developed in conjunction with other western and northern provinces and territories through the Western Water Stewardship Council, can be found in Appendix 1. The focus of this document is on **hydrological drought**.

Being prepared to respond to drought will help communities protect water resources for potable use (drinking water), sanitation, fire protection, as well as for fish and aquatic ecosystems. Being able to meet the requirements of the *Water Sustainability Act* (WSA) during times of drought will help the Province in a variety of areas, including water and watershed management, wildfire response, and assisting to sustain agricultural production and a wide range of other economic activities.

1.2. Low Flows and Drought

Low flows in a river or stream occur during prolonged dry weather. In many watersheds, low flows occur periodically and are a natural component of the hydrology of the area. For

[1] Adapted from definitions in National Drought Mitigation Centre (2006). What is Drought? Accessed at http://drought.unl.edu/DroughtBasics/WhatisDrought.aspx, accessed 12 June 2015.

example, low flows typically occur seasonally during the summer “dry season" on the South coast of B.C., or during winter in cold climates throughout the interior, mountainous areas, or the north.

A **drought** is characterized by more than just seasonal low flows. It indicates a period of unusually dry conditions (compared to normal), resulting in water scarcity. While droughts include low flows, a seasonal low-flow event is not necessarily a drought.[2] Both low flows and drought can result in water scarcity events that can impact water users, fish, or the environment, and both require attention, particularly in watersheds with many competing uses and limited storage.

1.3. About the Drought and Water Scarcity Response Plan

This plan focuses primarily on hydrological drought and water scarcity *response:* the actions taken preceding, during and immediately following a hydrological drought to reduce its impacts. It will assist with ensuring water needs for people and aquatic ecosystems are met in times of drought and water scarcity. This plan:

- provides context and outlines the principles that informed plan development;
- outlines the responsibilities of agencies at both the provincial and regional/local levels;
- briefly recommends actions to take prior to the onset of drought;
- describes drought indicators, the six provincial drought levels and recommended actions;
- includes Drought Indicators Criteria used to determine which provincial drought level is in effect, and an overview of actions that should be taken by different levels of government and water users; and
- recommends actions to undertake after drought conditions have subsided.

While this plan does include some discussion on *drought preparedness* (actions taken before a drought to increase the level of readiness by all parties) this is not its primary focus. Issues around drought preparedness and water conservation during normal conditions are addressed in several other provincial government policies and guidelines.

This plan is intended primarily to guide the actions of staff in provincial government agencies, but also provides general recommended actions for federal government agencies, local governments, Indigenous governments, and water licensees under the WSA (Appendix 2).

In providing guidance to provincial staff, it is important to note that the Province’s ability to regulate water during drought does not depend on an area’s drought level. Provisions

[2] United States Environmental Protection Agency. Definitions and Characteristics of Low Flows. Accessed at https://www.epa.gov/ceam/definition-and-characteristics-low-flows#drought, accessed 22 April 2021.

under the WSA can be applied independently of an area's drought level and can be used to deal with conflicts and concerns in a single water source or with significant water shortages (SWS) in a specific area. In addition, it is critical to understand that local authority and First Nations bylaws and water restriction "stages" implemented by water purveyors and water utilities are based on highly local drought conditions, including available storage in local water infrastructure. Often these will **not** match the provincial drought levels at the regional scale.

1.4. Context

Drought response in B.C. is based on existing legislation and regulations. The Drought and Water Scarcity Response Plan is supported by established legal authorities provided in the *Water Sustainability Act,* the *Drinking Water Protection Act,* the *Environmental Management Act,* the *Local Government Act,* the *Emergency Program Act* and their supporting regulations. However, the actions available under these enactments are independent of this Plan. Appendix 3 provides an inventory of key provincial legislation and programs relevant to drought management.

This Plan was developed, in part, by drawing from experience with previous droughts, including the summers of 2009 and 2015, both of which saw extremely low flows in many streams, and low groundwater levels in wells across B.C.

1.5. Principles

The following principles guided development of this plan:

Partnership: Federal, provincial, Indigenous governments, locally affected groups and individuals need to work together to manage drought. B.C. is a large and climatically diverse province. In any year drought may strike some geographic areas and watersheds while others experience normal conditions or even flooding. Our response to drought must occur at two levels. At the federal and provincial level, agencies' roles include communication and coordination, science, and emergency support services. At the local level, water providers, local governments, Indigenous governments, and other authorities undertake duties including data collection, water conservation promotion and enforcement, and emergency response.

Knowledge: Sound science, traditional knowledge, education and innovation are the foundation for adapting to changing environmental conditions. In times of drought, this includes using the best available information on stream water, groundwater, snowpack and soil conditions to assess current and forecasted circumstances.

Stewardship: All British Columbians are responsible for the sustainability of water and aquatic ecosystems. This means that all water users in drought-affected areas are asked to cooperate and contribute to the goal of conservation. Wherever possible,

reductions in water use will be achieved through voluntary measures, recognizing that at times it may be necessary to turn to regulatory responses to protect fish, aquatic ecosystems and the rights of water users.

Timely communication: Communicating early in the season is essential to ensuring cooperation and effective water conservation. Providing timely, clear and appropriate information ensures that communities and water users are aware of environmental conditions, can take on shared responsibility, have the opportunity to implement conservation measures and are notified in advance of essential regulatory responses by government.

2. Drought Management Responsibilities

Drought impacts are complex and affect many different sectors of society. As a result, several local, provincial and federal agencies share responsibility for managing and responding to drought. The working groups and committees may change from time to time. Figure 1 below describes regional and local level response and how they are working together.

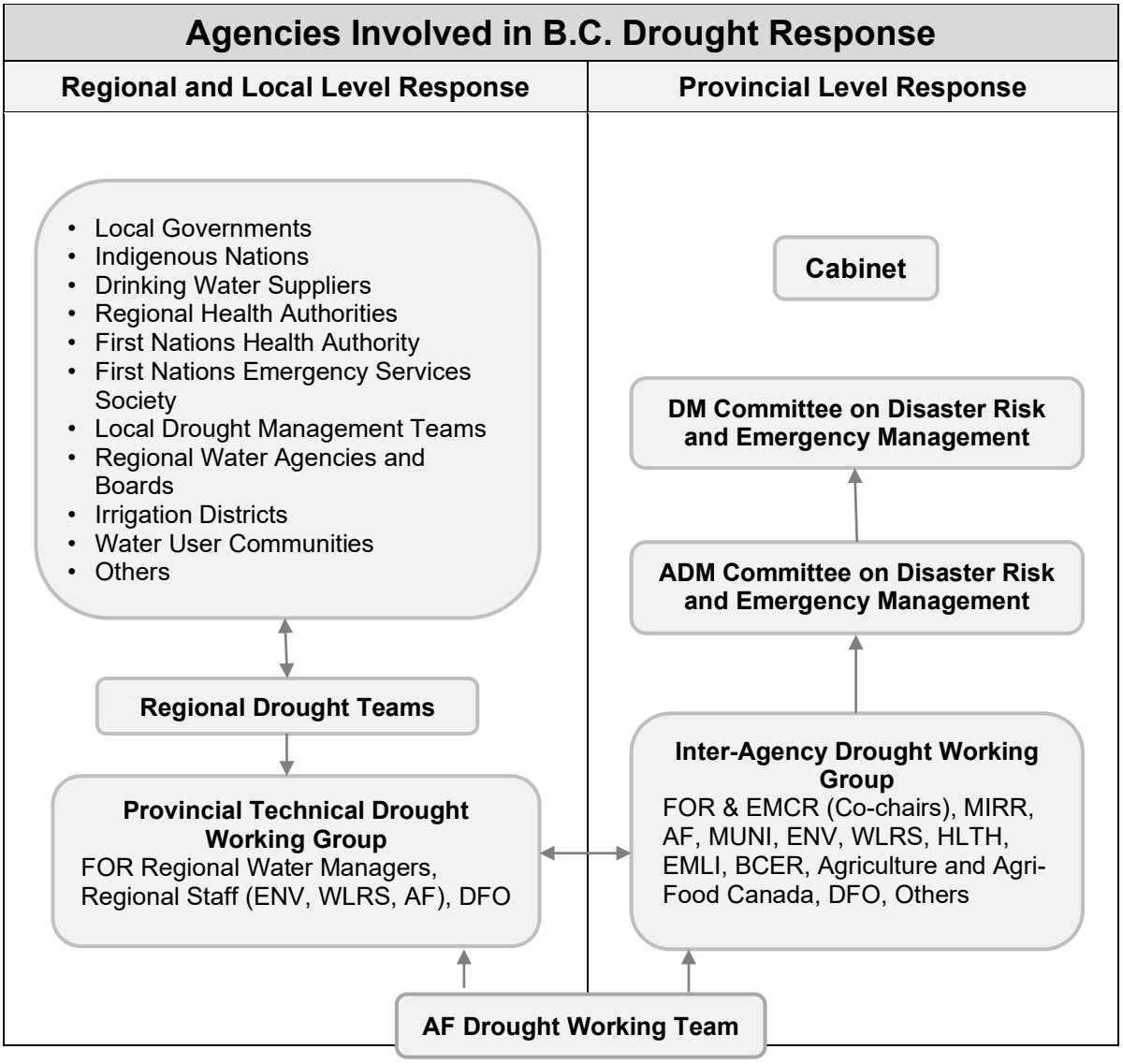

Figure 1: Key coordinating bodies and groups involved in B.C. drought response.

2.1. Provincial Level Response

Many provincial and federal agencies are involved in drought management (Appendix 4). They cooperate to effectively respond to drought and mitigate its impacts. To harmonize

their responses, several organizing bodies and individual decision makers have been delegated specific responsibilities (Table 1).

Table 1: Key Provincial Level Drought Coordination Committees and Individuals.

Who	Responsibilities
Deputy Ministers Committee on Disaster Risk and Emergency Management (DMCDREM)	• Resolves higher level issues and recommendations • Provides strategic guidance and approval for regulatory, policy and financial decisions during both drought preparation and response
Assistant Deputy Ministers Committee on Disaster Risk and Emergency Management (ADMCDREM)	• Role as stand-up activation decision-making group with respect to strategic drought response • Ensures broad corporate objectives are considered and addressed • Vets, approves and provides direction on IADWG recommendations • Oversees functioning of the IADWG and PTDWG working groups • Provides a bridge from working groups to the DMCDREM • Resolves issues and gaps, and elevates to DMCDREM if necessary
Inter-Agency Drought Working Group (IADWG)	• Ensures effective delivery of the B.C. Drought and Water Scarcity Response Plan • Oversight of drought event response actions • Develops and oversees drought response projects • Identifies trends, issues and gaps, and elevates to next level if necessary • Ensures that roles and responsibilities during low flow and drought conditions are clearly defined, communicated and understood by both government and non-government parties • Ensures documentation and shared learning from drought events
Provincial Technical Drought Working Group (PTDWG)	• Ensures effective delivery of the B.C. Drought and Water Scarcity Response Plan • Coordinates operational level cross-agency response to drought or low stream flow conditions • Works with regional cross-government drought teams • Determines drought levels at the watershed basin scale • Determines when to take regulatory action
Ministry of Environment and Climate Change Strategy (ENV)	• Administers the *Environmental Management Act*

Ministry of Forests (FOR)	• Oversight responsibility for managing drought planning and response in B.C. • Regulatory action under the WSA including, Orders of the Minister, Comptroller, Engineer and Lieutenant Governor in Council (LGIC) under the WSA (s.22, 86, 87, 88 and 93) • Provides technical information on stream flows and public communication through information bulletins
Ministry of Water, Land and Resource Stewardship (WLRS)	• Leads development of legislation and policy related to drought management in B.C. • Oversee updates to the B.C. Drought and Water Scarcity Response Plan • Provides internal-to-government guidance on drought • Supports regions in their development of Temporary Protection Orders • Oversees and coordinates the science required to assess impacts and monitor water before, during, and after droughts
Ministry of Emergency Management and Climate Readiness (EMCR)	• Provides advice and the historic context of response activities in regions related to loss of supply (potable water and firefighting). • Provides support to Local Authorities and First Nations during emergency response activities. • Supports provincial emergency response coordination, including the activation of PREOCs and/or PECCs • Office of the Fire Commissioner (OFC) provides advice and support on pre-planning, risk assessment and Fire Code requirements relating to water supplies for fire-fighting purposes • Chairs the Disaster Risk Management Committee (DRMC), to collaborate with partner ministries to support Disaster Risk Management across government, in accordance with the United Nations' Sendai Framework for Disaster Risk Reduction.
Ministry of Health (HLTH)	• Provides policy development and guidance related to the *Drinking Water Protection Act.*
FOR Executive	• Oversees Ministry of FOR responsibilities for drought management including River Forecast Centre activities and regional office activities • Coordinates with other ministries at a strategic level through the DMCNR
Engineer, Water Manager or Comptroller of Water	• Makes statutory decisions on priority of water rights under s.22 WSA • Comptroller establishes CEFT orders under s.87 for streams under a s.86 SWS order (either minister or LGIC order)

Rights, Ministry of FOR	• Engineer or water manager may restrict water use by lower priority licensees or those with conditional clauses in their water licence • Authority to regulate non-licensed water use including use approvals, transitioning groundwater users, domestic groundwater users, and unauthorized water use
AF Drought Working Team	• Coordinates role of AF staff within Provincial Technical Drought Working Group • Informs WSA s.88 order on the needs of and estimated economic impact to agriculture sector • Assesses impacts of drought on dry land farming areas and range capacity to carry livestock • Provides lead drought response in non-irrigated areas and assesses livestock needs in drought impacted areas • Assesses livestock feed requirements • Provides information on drought programs and initiatives to producers by liaising with B.C. Agriculture Council and Agriculture and Agri-food Canada
Regional Drought Teams	• Advises on region and watershed specific drought response levels based on scientific data • Issues advisories/notifications on drought conditions • Supports pre-drought preparedness particularly in drought vulnerable regions

The Inter-Agency Drought Working Group (IADWG), co-chaired by the Ministry of Forests (FOR) and Emergency Management and Climate Readiness (EMCR), reports to ADMC DREM. The IADWG has an important role in responding to drought and extreme low flows. This committee, with membership drawn from key provincial and federal government agencies, is tasked with ensuring that the B.C. Drought Response Plan is fully delivered and addresses strategic level drought related issues that may require elevation.

The Provincial Technical Drought Working Group (PTDWG), chaired by FOR consists of members from regional cross-government drought teams with membership from FOR, ENV, WLRS, AF and other agencies. These teams conduct the work in each region to evaluate and determine when to elevate drought levels based on stream flow. This is discussed in more detail in Section 4. The PTDWG ensures that regional teams can coordinate responses across the province. This group also ensures that specific actions set out in this plan are considered and delegated to the appropriate person or body for further action and that drought conditions are clearly understood and communicated to government and non-government parties.

The AF Drought Team provides coordination to AF staff on the Technical working groups and coordinates with agricultural commodity groups and Agriculture and Agri-food Canada.

The Inter-Agency Drought Working Group meets at least once every year and on an as needed basis when dry conditions or low stream flows prevail. The PTDWG meets monthly prior to the onset of drought and bi-weekly, or more frequently, if drought conditions or low stream flows occur and require more immediate action. If circumstances warrant, subgroups of the PTDWG may meet on an as needed basis to address specific issues, such as confirming a region-specific drought level. The regional cross-government drought teams and the AF Drought Working Team meet on an as needed basis and provide a link with the PTDWG to coordinate if additional resources are needed for effective drought response.

2.2. Regional Level Response

Regional responses are essential in managing drought. At the regional/local level, emphasis is placed on collecting information, delivering programs, communicating with residents and responding to emergencies.

2.2.1 Regional Drought Teams

Regional Drought Teams may be established to provide a coordinated regional drought response; these teams are usually led by the Province. Their focus is often on current low water flows, as well as long-term preparedness strategies. The responsibilities of a regional drought management team may include:

- establishing a Regional Drought Management Plan and drought communication plan;

- compiling data on water supplies and users in specific watersheds;
- coordinating efforts with locally affected parties (including the fisheries sector, the agricultural sector, industry, recreation groups and neighbouring communities);
- coordinating with provincial regional emergency operations centre (PREOC) and/or provincial emergency coordination centre (PECC) as necessary;
- providing timely information to the public about water supplies, low stream flows, projected flow states without water conservation efforts, and drought; and,
- continually encouraging water conservation and appropriate responses to drought conditions.

Membership should be modified and adapted to suit local circumstances, but may include:

- staff from provincial and federal government regional offices;
- representatives of local water users;
- local governments;
- Indigenous governments;
- water suppliers;
- non-government agencies; and
- business and recreation sector groups.

The scale at which Regional Drought Teams operate may vary. They usually focus on larger geographic areas or sub-watersheds depending on local climate, geography and other circumstances. The Regional Drought Team may work with Local Drought Management Teams. These local teams are often led by local governments aimed at managing specific water supplies and can work with or replace Regional Drought Teams to manage water in that area. Some areas in B.C. already have multi-party committees that address water sustainability issues. These committees would work with the Regional Drought Teams.

2.2.2 Regional Drought Plans

Regional Drought Plans are developed by Regional Drought Teams. They are intended to build on and provide further detail to the plans and actions set out in this document, but specific to the geographic region they cover.

They should identify actions and responses related to the provincial drought response. They should clearly assign responsibilities for these actions to appropriate provincial and local agencies, or locally affected groups. Ideally, these plans will be in place prior to the onset of drought and will be recognized and supported by the major water users in the watershed.

Typically, a Regional Drought Plan will include:

- area the plan covers;
- members of drought management team;
- roles and responsibilities of Team Members;
- details surrounding a Stream Watch List;
- how drought will be assessed and the corresponding response;

- a data management plan;
- a communication plan; and
- any training that will need to occur.

2.2.3 Local Authorities and First Nations

IMPORTANT REMINDER

Local authority and First Nations bylaws and water restriction 'stages' are implemented by water purveyors and water utilities, not the provincial government. These are based on highly local drought conditions - including available storage in local water infrastructure, and community supply and demand factors.

Local decisions on appropriate water restriction stages are not required to match the provincial drought levels at the regional scale. Although local water restriction stages and provincial drought levels will tend to both increase as drought worsens, they are not expected to move in perfect lockstep with one another.

Local authorities that may be involved in drought management include local governments, water suppliers, Regional Health Authorities First Nations Health Authority and other regional agencies with responsibilities for water (e.g., the Okanagan Basin Water Board, the Columbia Basin Trust, the Salmon River Watershed Roundtable, Cowichan Water Board, etc.).

First Nations are a separate and distinct level of government that have laws and legal systems related to their title and rights in and to the waters, lands, territories and resources that they have traditionally owned, occupied, or otherwise used or acquired. They have the inherent right of self-determination, which includes the ability to form their own governments, laws and stewardship practices including drought management and response approaches for their communities.

The structure of governance arrangements for water varies from region to region and First Nation to First Nation, as do climatic and geographic conditions. Reflecting this, it is appropriate to have different organizational approaches to drought preparedness and response. The document *Dealing with Drought: A Handbook for Water Suppliers in B.C.* includes the recommendation to form a local drought management team. In certain areas, this team could provide a link between the Regional Drought Team and water suppliers, while in others, the regional team may play that role. There is no “one size fits all” solution for B.C.

Roles of local authorities and First Nations may include the following:

- gathering available drought information for the community;
- identifying information gaps;
- identifying vulnerable aquatic ecosystems;
- targeting water management needs;
- implementing water conservation strategies (e.g., seasonal and/or escalating outdoor watering restrictions);
- managing community water supplies and local water infrastructure;
- communicating with the public; and
- participating as part of Regional Drought Teams in the coordination of drought response.

Early and frequent communication about water supply conditions and responses is key to successful drought management. Local authorities and First Nations may use a combination of communication tools, water supply and demand data, regulatory instruments, and other tools to advocate for water conservation across the community. They may communicate directly with residents about drought management goals, actions, water supply status, and forecasts. They can also conduct one-on-one meetings with major water users in the community to discuss water conservation plans, and their role in implementation.

Local Drought Management Plans are developed by local authorities, First Nations and water suppliers to help manage their water supply in times of drought. These plans can include:

- documentation on the water system profile;
- evaluation of the potential impacts of drought on the region's economy;
- data requirements, frequency of data collection and reporting protocols on local water supplies and climate;
- clear definitions of local stages of water restrictions, and corresponding local responses including emergency response and contingency plans;
- streams or aquatic ecosystems of concern; and
- communication plans.

See Appendix 2 and 3 in the *Dealing with Drought: A Handbook for Water Suppliers in B.C.* for more information on local drought management plans, water conservation plans and emergency drought planning.

2.2.4 Emergency Activations

During emergencies, Indigenous and local governments lead local responses. If the emergency is beyond their capacity, PREOCs can be activated in support. They are staffed with emergency management professionals and assist Indigenous and local governments with response planning, coordination and logistics. There are six PREOCs in B.C., one in each EMCR region.

If more than one PREOC is opened or it is deemed operationally necessary, the PECC at EMCR headquarters in Victoria can also be opened to provide support. The PECC:

- Coordinates resources and communications
- Requests assistance from the provincial government, and
- Contacts other provinces or the federal government for support

2.2.5 Water Bailiffs

An important role at the local level is that of the water bailiff. Under s.38 in the *WSA,* the Comptroller of Water Rights, or water manager, can appoint a water bailiff to act on behalf of the province to manage conflicts in a stream before or during a drought. These people are given the authority to enter on any land and to regulate and control the diversion and use of water by all users (authorization holders as well as users that are not authorization holders) and control all diversion works on these streams or aquifers.

3. Pre-Drought Preparedness

Droughts can vary dramatically in duration and severity and be difficult to forecast. They can result in great social and economic upheaval, requiring the concerted efforts of numerous parties if a response is to be effective. It is best to not delay preparing for them until the last minute.

Note: The escalation of a drought level by the Province is not needed to take non-regulatory and regulatory actions.

During normal conditions, there are many tasks that communities and individual water users can do to prepare for drought. For example, they may target water use efficiency improvements within the household, across agricultural irrigation systems or other industries.

At the provincial level, the main activities undertaken to prepare for drought include:

- monitor and characterize stream flows, critical environmental flow thresholds, lake levels, aquifer levels and groundwater data; (FOR in partnership with other organizations);
- deliver seasonal volume forecasts based on meteorological, hydrometric and snowpack data and the use of hydrological models (FOR);
- provide regular updates on stream flow and groundwater data on the internet (ENV, FOR and WLRS);
- develop, refine and maintain hydrological hazard and risk models to guide community planning and emergency response (WLRS);
- monitor water levels in priority aquifers through the Provincial Observation Well Network (ENV and FOR);
- monitor snowpack conditions using automated and manual techniques to support stream flow forecasting (ENV and FOR);
- monitor the Drought Code and Fire Danger Class (FOR and FOR Wildfire Branch);
- maintain infrastructure and systems that support monitoring, data collection and data processing (ENV, FOR and WLRS);
- conduct data quality assurance and auditing on water and snow related data collected using up-to-date standards (ENV and WLRS);
- work with water suppliers and local communities to ensure that they have the necessary information to respond when droughts are forecast (FOR, MUNI);
- provide local governments and water suppliers with planning tools to prepare for drought (FOR, MUNI);
- support Indigenous Communities and Peoples to ensure they have the necessary planning tools and information to prepare for and respond to drought (ISC, FNHA, FNESS)
- implement the *Drinking Water Protection Act* (HLTH in partnership with the Regional Health Authorities);

- maintain a list of available contractors e.g., Environmental monitors or qualified persons, in each region that can be called in as needed (All);
- prepare and update factsheets, guidelines and policies to aid agricultural producers to understand, prepare for and manage drought (AF); and,
- maintain and update provincial drought management policies, procedures and plans including this document (AF, FOR, HLTH, MUNI).

Under the *WSA*, critical environmental flow thresholds (CEFTs) will need to be calculated for the streams in those areas where a significant water shortage has been declared under a s. 86 order. The s. 86 orders enable the CEFT orders under s. 87. The CEFT order becomes the highest priority at this point and can mean an increase in regulating stream water and groundwater use in hydraulically connected aquifers. Where sufficient water is available, these CEFT orders will allow for the protection of the CEFT for the regionally significant aquatic ecosystems in the stream. For an ecosystem to be at risk of significant or irreversible harm there must be at least one stream that has fallen or is at risk of falling below the CEFT. It is therefore beneficial to calculate the CEFTs for different aquatic ecosystems at different times of the year.

At the regional level, the main activities undertaken by provincial agencies (in collaboration with federal agencies, local authorities, First Nations and water users) to prepare for drought may include:

- establish Regional Drought Teams;
- gather available local information on historic droughts, water supply and climate conditions; identify information gaps;
- identify streams and aquatic ecosystems of concern and calculate the Critical Environmental Flow Thresholds for those streams;
- encourage water conservation, stewardship and education through local media;
- continuously promote improvements of the efficiency of agricultural irrigation systems;
- encourage agricultural producers to consider water status from the previous season when planning the next year's production. Soil moisture levels, reservoir levels, stream flows, snowpack and groundwater levels are all important factors;
- encourage agricultural producers to review information on crop selection, irrigation efficiency and water conservation.

As part of drought preparedness, local authorities' or First Nation's responsibilities may include:

- complete a water supply and demand analysis, local drought management plans and emergency response and contingency plans; update and practice implementation of plans annually;
- establish water conservation strategies and water use reduction targets;
- implement water conservation programs; continuously improve water use efficiency;

- incorporate water conservation into planning and daily operations;
- municipal authority is required to enforce water restrictions. Local governments and First Nations should develop bylaws for water conservation, drought management and emergency drought preparedness including water restriction stages and requirements to respond to low water supplies.

4. Drought Response Levels, Indicators and Actions

4.1 Drought Response Levels

The B.C. Drought Response Plan has historically categorized drought into four response levels targeted at the water basin and watershed/stream levels. Government updated the provincial drought level rating scale in 2021 to generally correspond to the North American Drought Monitor's six-level framework and provide more information and transparency on water scarcity conditions across the province.

Early in the season (early spring), the drought level represents a forecast of potential dry conditions developing, based on snowpack data and seasonal outlooks. Once the early season is considered over, the likelihood and extent of drought is assessed based, among other indicators, on stream flows and precipitation and their departure from normal values. The timing of when provincial drought monitoring and reporting occurs will depend on the conditions present in any individual year and can vary considerably from year to year.

B.C. is a place of extreme biogeoclimatic diversity. These levels are intended to be applied in water basins and where feasible, based on the best available scientific data, within specific watersheds. It is therefore likely that different areas and watersheds will be at different levels of response during any given drought year.

The drought levels and their corresponding objectives are summarized in Table 2. These Provincial drought levels are determined by the Province – with consideration of input and feedback from interested parties – based on stream flow levels, precipitation records, and a range of supplemental indicators where appropriate. Actions under the B.C. Drought and Water Scarcity Response Plan are based on these levels. Note that the provincial drought levels are not equivalent to local watering restriction stages, which are decided upon by the local water supplier. Targeted drought actions are further discussed in Section 4.5 and Appendix 2.

The Provincial drought level in any given area does not affect the availability of the regulatory tools to manage water in a specific water source during a time of scarcity. It is therefore important to undertake much of the preparatory work described in this document early in the season.

Level 0: Green

At Level 0, conditions are average or wetter than average. Emphasis is on preparedness**,** taking proactive actions in advance of potential droughts to increase readiness of water users and communities where drought may occur.

Level 1: Yellow

At Level 1, conditions are starting to become dry and the likelihood for adverse impacts to socio-economic or ecosystem values is rare. Emphasis is on stewardship, voluntary conservation through education, communication and planning, and investigating unauthorized water uses.

Level 2: Peach

At Level 2, conditions are becoming very dry. Potential adverse impacts to ecosystem or socio-economic values are unlikely. Emphasis continues to be on voluntary conservation and restricting or curtailing unauthorized use. Water suppliers may consider invoking water restrictions where appropriate. If serious impacts are occurring in an area, the provincial government may begin considering regulatory action.

Level 3: Orange

At Level 3, conditions are becoming severely dry. Potentially serious ecosystem or socio-economic impacts are possible in some circumstances. All unauthorized use should be curtailed. Water suppliers are much more likely to impose watering restrictions, and data collection for regulatory action by the provincial government may start to occur.

Level 4: Red

At Level 4, conditions are extremely dry and adverse impacts to socio-economic or ecosystem values are likely. Voluntary measures and increasing use of watering restrictions will continue and may be augmented by regulatory action by the provincial government where necessary to reduce water user conflicts or protect the environment.

Level 5: Maroon

At Level 5, conditions are exceptionally dry and adverse impacts to socio-economic or ecosystem values are almost certain. All efforts should be made to conserve water and protect critical environmental flows.

Further action including emergency responses may be required in the event that a community or system experiences complete loss or near loss of supply. More information can be found in the regional drought plans and in the document; Dealing with Drought: A Handbook for Water Suppliers in B.C.

Table 2: B.C.'s Drought Response Levels

Level	Impacts	General Response Measures
0	There is sufficient water to meet socio-economic and ecosystem needs	Preparedness
1	Adverse impacts to socio-economic or ecosystem values are **rare**	Conservation
2	Adverse impacts to socio-economic or ecosystem values are **unlikely**	Conservation Local water restrictions where appropriate
3	Adverse impacts to socio-economic or ecosystem values are **possible**	Conservation Local water restrictions likely
4	Adverse impacts to socio-economic or ecosystem values are **likely**	Conservation and local water restrictions Regulatory action possible
5	Adverse impacts to socio-economic or ecosystem values are **almost certain**	Conservation and local water restrictions Regulatory action likely Possible emergency response

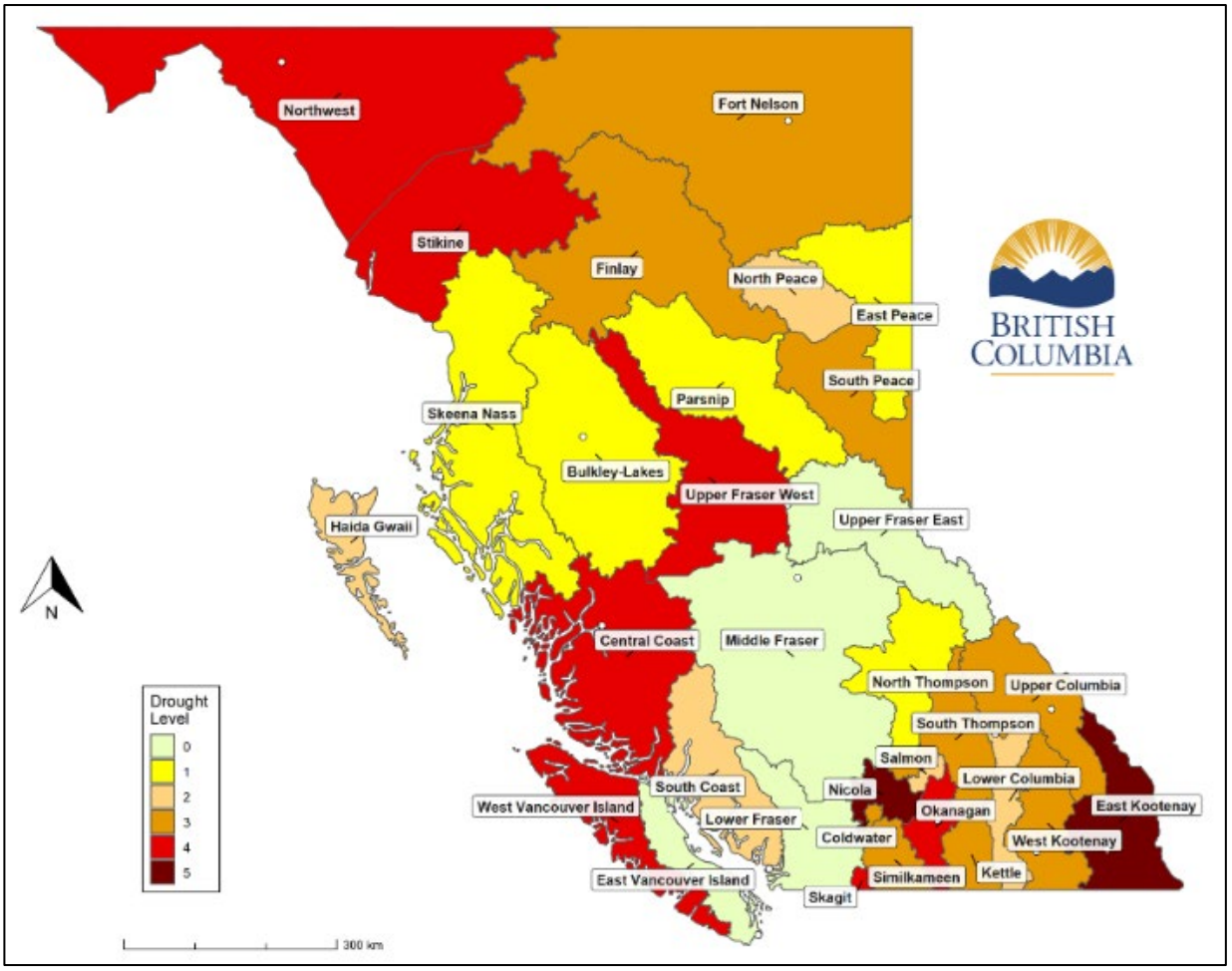

Figure 2: British Columbia watershed basin map representing the corresponding drought level. The levels shown are for illustrative purposes only.

4.2 Drought Indicators Criteria

The Drought Indicators Criteria described in this section assists decision makers with determining when it is necessary to elevate drought response to incrementally higher levels in any particular region or watershed in the province.

Measuring drought is a complex process, particularly in a place like B.C. with its geographic diversity and complex regional microclimates. Most indicators also require comparison to other droughts, which demands robust sets of historical climatic data.

Analysis of previous droughts indicates that there are three major factors typically involved with drought occurrence: low winter snow accumulation (as measured near the end of the winter), spring weather (low precipitation during May and June) and summer weather (low precipitation during July and August). For significant drought to occur, often two of the three factors need to exist. For severe drought (as in 1929, 1931, 1955, 2003, 2009 and 2015), often all three factors need to exist, in addition to multiple years of reduced precipitation.

As a result, multiple indicators usually need to be considered to know if drought is occurring or is likely to occur.

B.C.'s drought indicators need to refer to the causative factors (snow conditions, spring and summer precipitation, preceding drought) and the resultant factors (stream flow, lake and reservoir levels).

The Drought Indicators Criteria is comprised of four core indicators and a number of supplemental indicators. The core indicators are as follows:

Early Season Forecast Indicators:

- Basin Snow Measures (Indices)
- Seasonal Volume Runoff Forecasts

Drought Season Core Indicators:

- 30 Day Precipitation (Percentiles); and
- 7-Day Average Stream Flow (Percentiles)

These core indicators were chosen because data tends to be readily available, they are relatively easy to use and communicate, and FOR's River Forecasting Centre and other agencies have experience working with them. Good historical data is usually available. They can be used to speak consistently about water supply in particular watersheds while also allowing for meaningful comparisons across the province. Although early season indicators are used to forecast the risk of drought, assessing drought and setting drought levels relies primarily on the drought season core indicators.

The following provides a very brief description of each indicator:

Basin Snow Indices

Calculated as the mean of snow water equivalent values for representative snow courses and snow pillows in major river basins in B.C. Data is expressed as % of the 30-year normal. This normal is the mean snow water equivalent value from historic station data for a specific date taken over a moving 30-year window that shifts every decade. For example, % of snow normal for 2021 uses a normal period from 1991-2020. The critical reporting dates are the first days of the month from January through to May.

Seasonal Volume Runoff Forecasts

This indicator is based on multi-variate statistical analysis, and represents quantitative forecasts of seasonal runoff (e.g., Mar-Aug, Apr-Aug, or Mar-Jun, Apr-Jun) for river basins. These forecasts have the advantages of being quantitative, consistent, repeatable, and having definable confidence limits.

30 Day Precipitation (Percentiles)

This value shows how the amount of precipitation that fell over the last 30 days for a particular period compares to the same period within the historic record. Percentiles that are close to the 50th percentile are near normal; percentiles that are very low (e.g., below the 10th percentile) indicate that a very small amount of precipitation has fallen over the last 30 days relative to what normally falls for the same period within the historical record. For example, a 30-day precipitation percentile value of 5 indicates more precipitation fell historically during that same time 95% of the time.

7-Day Average Stream flow (percentiles)

As the name suggests, this indicator looks at 7-day average stream flows in selected systems expressed in percentiles. It uses a weekly average stream flow for a number of different streams in a particular region or watershed. Data is sourced from indicator Water Survey of Canada hydrometric stations and reviewed or validated by provincial hydrologists.

In addition to the core indicators, the Provincial Technical Drought Working Group may also refer to additional information from the supplemental indicators. Although there are no quantitative thresholds associated with these supplemental indicators, supplemental indicators can be very helpful at the regional scale, may be used to help assess current and forecasted drought conditions, and may be used as important situational awareness a local scales to help guide activities and planning, particularly at higher levels of drought alert (i.e. Levels 4 and 5).

Supplemental indicators that may be considered include:

- Air temperatures;
- Stream water temperature;
- Aquifer levels;
- Community or commercial operations responding to low snowpack or low water supplies;
- Forecasts of stream flows from hydrologic models;
- Groundwater levels and soil moisture deficits;
- Indicator aquatic species;
- Individual indicator hydrometric station results;
- Measured flows at discontinued WSC or provincial hydrometric stations;
- Multi-year trends;
- Percent mean annual discharge (% MAD);
- Precipitation deficits at longer timescales (2-6 months);
- Reports of fish stress and other ecosystem impacts;
- Reports of low flows;
- Reservoir inflows, storage, or lake levels;
- Scientific drought indicators (e.g., Palmer Drought Severity Index, Standardized Precipitation Index);

- Short- and long-term weather forecasts;
- Streamflow characteristics at longer timescales (e.g., cumulative streamflow over 1-6-month periods); and,
- Wildfire danger class ratings and wildfire “Drought Codes”.

Table 3 provides a summary of the different indicators and their time of use. Tables 4 and 5 set out the quantitative thresholds for the core indicators.

Table 3: Drought Indicators Criteria Summary.

		Timing of Use	
		Early Season	**Drought Season**
Indicator	**Core Indicators**	Basin Snow Measures	7-Day Average Stream flow (Percentiles)
		Seasonal Volume Runoff Forecasts	30 Day Precipitation (Percentiles)
	Supplemental Indicators	All supplemental indicators listed above may be used throughout early season or drought season as appropriate	

**These criteria differ from those used for the regulatory tools under the WSA.*

Table 4: Early Season Forecast Core Indicator Thresholds.

Thresholds	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
Basin Snow Measures* (% of normal)	>80%	80-65%	<65%	NA	NA	NA
Seasonal Volume Runoff Forecasts (% of normal)	>80%	80-61%	60-45%	<45%	<45%	NA

**Basin Snow Measures would not normally be relied on as a basis for elevating drought response to Level 3 (Orange). However, the Inter-Agency Drought Working Group may decide that this elevation is warranted in the case of exceptionally low results.*

Table 5: Drought Season Core Indicator Thresholds and Levels.

Indicator	Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
30 Day* Precipitation (Percentiles)	>30th	21st - 30th	11th - 20th	6th – 10th	2nd – 5th	< 2nd
7-Day Average Streamflow (Percentiles)	>30th	21st - 30th	11th - 20th	6th – 10th	2nd – 5th	< 2nd

**The 30-day time scale is used for this criterion, but other timescales (60, 90 or 180 days) will also usually be referred to.*

4.3. Moving from One Level to Another

The Provincial Technical Drought Working Group determines when to move to an elevated level of drought response – Level 0 (Green) through to Level 5 (Maroon) – in any particular watershed or geographic area based on consideration of the Drought Indicators Criteria, the advice of local authorities and First Nations, and other factors.

The Provincial Technical Drought Working Group, in collaboration with the Regional Cross-Government Drought Teams consider the current and forecasted status of all the core indicators in the Drought Indicators Criteria to determine the severity of the drought. Each measure and index serves only as a relative guide. Decisions may be based on what the majority of indicators show or may be based on any one particular indicator. The group may also consider results from the supplemental indicators and other information as appropriate.

During drought years, the Drought Indicators Criteria are re-assessed at a minimum of once a month and the drought levels are typically only adjusted biweekly or in some cases monthly, to facilitate a smooth transition for water users and to allow time for conservation measures to take effect. However, in some cases it may be necessary to use finer time scales. For example, FOR's River Forecast Centre analyses average stream flow data on a weekly basis. Results of this analysis may warrant escalating to a higher level of drought response more frequently.

In exceptional circumstances, the PTDWG may determine that it is necessary to "leapfrog" over one level to a subsequently higher one. For example, it may be necessary to move directly from Level 1 to Level 3 or Level 4. This could occur for any region as some streams may deteriorate rapidly.

Re-assessment of Drought Indicators Criteria may also lead to easing back of drought levels, such as a movement from level 3 to level 2 due to changing conditions. For example, basin wide drought level forecasts based on low snowpack may be eased by above-average precipitation in spring.

4.4 Drought Regulatory Tools

During a drought, when voluntary water conservation measures are not sufficient to meet all water user rights, protect critical environmental flows or the survival of a fish population, the WSA provides authority for statutory officials to regulate both stream water and groundwater. Implementing regulatory tools to address drought affects the ability of water users to exercise their water rights. Under the WSA, the Province can apply the following regulatory tools during water scarcity, alone or in combination.

Note: Implementing any of these regulatory tools is not dependent on the region being in a specific drought level.

Suspend water diversion and use that is not authorized or no longer allowed
One of the actions statutory officials can take at any time is to suspend water diversion and use that was never authorized, is no longer allowed, or is no longer authorized under an applicable authorization, statutory provision or regulation. This includes taking action against water users who are exceeding their allocation.

Enforce special terms and conditions in water authorizations
The WSA gives the decision maker the discretion, when deciding on water authorizations, to include special terms and conditions. These authorizations are issued with specific requirements that allow the user to divert and use water in specific circumstances. Enforcing these special clauses is an early regulatory action that government can take during times of water scarcity. This is an example of the wording that may be found in a licence term/condition: "The diversion of water authorized under this licence may be restricted or prohibited at any time by an Order in writing under the *Water Sustainability Act*, in order to maintain a minimum flow in a stream {optional: for the preservation of fish or for maintaining the health of aquatic ecosystems}."

First in Time, First in Right (FITFIR)
First in Time, First in Right (FITFIR) is the priority of water rights under s.22 of the WSA. FITFIR may be enforced during times of water scarcity to reduce or restrict water diversion and use from a stream (and any hydraulically connected aquifer) or an aquifer (and any other

hydraulically connected aquifer). In general, the oldest rights have priority over the newer rights, regardless of purpose of the water use. This general rule, however, is modified when critical environmental flow thresholds (CEFTs) are established through orders under s. 87 of the WSA to prevent significant or irreversible harm to aquatic ecosystems for streams in an area of declared water shortage. In addition, enforcement of FITFIR must still allow water use of up to 250 litres of water per day per private dwelling for essential household use (EHU).

WSA s. 86 order declaring a significant water shortage combined with WSA s. 87 order protecting a critical environmental flow threshold

The WSA includes two new regulatory tools that are applied together during water scarcity to give priority of water rights to CEFTs when there is potential for significant or irreversible harm to an aquatic ecosystem due to low water flow.

Under s. 86 of the WSA, the minister or the Lieutenant Governor in Council (LGIC) can make an order declaring a significant water shortage in an area, if one or more streams in an area have fallen or are at risk of falling below its CEFT. The term of an order set by the minister cannot exceed 90 days, whereas an order set by the LGIC can have any term limit.

Once a significant water shortage order is declared in an area, WSA s. 87 establishes that the Comptroller of Water Rights must, by order, determine the CEFT for each stream that meets a set of specific criteria. Once a s. 87 order has established the CEFT for a stream, the CEFT has precedence over other rights of water users.

WSA s. 88 Fish Population Protection Order

WSA s. 88(1) authorizes the minister, after considering agricultural needs, to make an order respecting the diversion and use of water from a specified stream or hydraulically connected aquifer if the minister considers that the flow in a stream is so low that the survival of a fish population may become threatened. A fish population protection order is a powerful tool that can be used to regulate specific water users regardless of their priority, when its application is expected to yield immediate, direct benefits to a fish population whose survival is threatened.

4.5 Drought Response Actions

This section provides a high-level summary of actions that may be undertaken at each level of drought. A much more detailed inventory of actions is provided in Appendix 2. The activities that follow are intended as general guidance for provincial drought response actions and will mostly be used during drought season.

Early season actions are not anticipated to reach Level 5 or include regulatory measures and will consist mainly of communication with water users and planning. Precipitation in May and June can indicate the extent and severity of a drought in the various regions across

B.C. In addition, every drought is different and creative responses are required to meet the situation at hand and unforeseen circumstances.

Note: Regional staff do not need to wait for a change in drought level to take actions that they judge necessary to respond to changing conditions. As such, deviation from specific actions listed in the framework below is expected.

Level 0 (Green)

At Level 0, conditions are normal, and emphasis is on drought preparedness. The recommended actions at both the provincial and local level are summarized in Section 3 of this document (pre-season preparedness). Note that some local authorities and First Nations will initiate seasonal summer water restrictions every year, particularly where summer precipitation is typically low and storage capacities are limited.

Level 1 (Yellow)

At Level 1, conditions are dry. Emphasis is on stewardship and voluntary conservation through education, communication, and planning. As a general guideline, water users should target a reduction in water use. The overall objective is to begin preparations under the precautionary assumption that stream flow conditions may deteriorate further.

Suggested actions include:

- ✓ issue information bulletins to local governments, water suppliers, Indigenous governments (all Indigenous governments communications should go through the First Nation Health Authority and be directed to the Ministry of Indigenous Relations and Reconciliation), industry and stewardship groups, major licensees and other key stakeholder in impacted water basins and specific watersheds/streams;
- ✓ review water conservation advice, guidelines and materials for local government, water suppliers and agricultural producers and update as appropriate;
- ✓ where appropriate, advise agricultural producers to take early actions such as filling reservoirs and filling soil profiles with freshet water if available;
- ✓ use direct and indirect communications to request water licensees voluntarily work together, conserve, share water and consider in-stream needs;
- ✓ local governments are more likely to initiate or escalate outdoor watering restrictions;
- ✓ increase monitoring effort as required on stream flow conditions and aquifer levels in impacted geographic regions.

Level 2 (Peach)

At Level 2, conditions are becoming very dry. Emphasis continues to be on voluntary conservation but increasing use of watering restrictions may be imposed by water service providers. As a general guideline, water users should aim to reduce use for all non-essential needs.

Suggested actions include:

- ✓ issue province-wide news release and targeted news releases in impacted geographic regions;
- ✓ intensify communication efforts as appropriate based on current conditions; issue updated province-wide news release, and on River Forecast Centre website;
- ✓ continue to issue local media releases and/or targeted advertising to advise of watering restrictions, encourage conservation, provide updates on local water supply status and forecast future conditions specific to the community;
- ✓ provide regular direct updates to local governments, water suppliers, Indigenous governments, industry and stewardship groups, major licensees and other key local groups in impacted geographic regions;
- ✓ assess vulnerability of water supplies;
- ✓ advise high volume water licensees (or all licensees on high risk streams) directly of conditions via mail or email and request that they implement voluntary conservation measures;
- ✓ local governments implement next stage watering restrictions to achieve targeted reduction in water use; enforce compliance through bylaws;
- ✓ determine list of streams at risk and, where feasible, calculate CEFT (if not already done) for these streams. Assess hydraulic connectivity between these streams and adjoining aquifers;
- ✓ Provincial government may take regulatory action.

Level 3 (Orange)

At Level 3, conditions are becoming severely dry. Actions in Level 3 overlap with some of the actions in Level 2, as it's possible that there may not be sufficient time to deliver key Level 2 actions before the drought level increases to 3. Once more, water users should aim to reduce use for all non-essential needs.

Suggested actions include:

- ✓ intensify communication efforts as appropriate based on current conditions; issue updated province-wide news release, and on River Forecast Centre website;
- ✓ continue to issue local media releases and/or targeted advertising to advise of watering restrictions, encourage conservation, provide updates on local water supply status and forecast future conditions specific to the community;
- ✓ provide regular direct updates to local governments, water suppliers, Indigenous governments, industry and stewardship groups, major licensees and other key local groups in impacted geographic regions;

- ✓ assess vulnerability of water supplies
- ✓ advise high volume water licensees (or all licensees on high risk streams) directly of conditions via mail or email and request that they implement voluntary conservation measures. This is especially important if this action was not taken during Level 2. If this is the second time staff are contacting water users, then communications may include a more urgent tone and could reference changing conditions since the previous message;
- ✓ local governments implement next stage watering restrictions, if appropriate, to achieve targeted reduction in water use. Some local governments only have three stages of watering restrictions, so if the stage was raised at Drought Level 2 it might be premature to increase to the highest stage at this time;
- ✓ provide access to waiver for agricultural producers seeking to meet minimum production levels to maintain farm status for tax purposes, thereby avoiding unnecessary use of water;
- ✓ determine list of streams at risk and, where feasible, calculate CEFT (if not already done) for these streams. Assess hydraulic connectivity between these streams and adjoining aquifers; and
- ✓ Provincial government may take regulatory action where necessary.

Level 4 (Red)

At Level 4, voluntary measures and increasing use of restrictions will continue but may be augmented by regulatory responses by the provincial government. This may include mandatory reductions or cessation of water use. Water users should work together to minimize water use wherever possible in order to ensure that community and ecosystem needs will be met.

Suggested actions include:

- ✓ Province-wide or targeted regional media release is almost certainly necessary;
- ✓ increase frequency of communication by all levels of government and water suppliers with all water users through media, advertising, internet, email updates and other channels;
- ✓ continue to issue information bulletins to local governments, water suppliers, Indigenous governments, industry and stewardship groups, major licensees and other key local groups in impacted geographic regions;
- ✓ local governments implement progressively stricter watering restrictions to achieve targeted reduction, including outdoor watering bans where necessary;
- ✓ likely that Provincial government may implement regulatory action under the *WSA* or other statutes (such as Federal action under the *Fisheries Act*) as appropriate if voluntary measures are not enough to protect water users, aquatic ecosystems and fish;
- ✓ consider diverting available water from annual crops to perennial crops and higher value crops to keep them alive for future years; and
- ✓ provide assistance to communities seeking alternative or temporary water supplies.

Level 5 (Maroon)

Level 5 shares some key actions with Level 4, but the focus shifts to a higher likelihood of regulatory action and preparation for possible emergency response. Regulatory actions may include mandatory reductions or cessation of water use. Water users should work together to minimize water use wherever possible in order to ensure that community and ecosystem needs will be met.

Suggested actions include:

- ✓ increase frequency of communication by all levels of government and water suppliers with all water users through media, advertising, internet, email updates and other channels;
- ✓ continue to issue information bulletins to local governments, water suppliers, Indigenous governments, industry and stewardship groups, major licensees, and other key local groups in impacted geographic regions;
- ✓ local governments should implement the strictest watering restrictions unless their use is fully supported by storage;
- ✓ highly likely that Provincial government may implement regulatory action under the *WSA* or other statutes (such as Federal action under the *Fisheries Act*) as appropriate if voluntary measures are not enough to protect water users, aquatic ecosystems and fish;
- ✓ consider diverting available water from annual crops to perennial crops and higher value crops to keep them alive for future years;
- ✓ provide assistance to communities seeking alternative or temporary water supplies; and
- ✓ prepare for emergency response where risk of loss of supply exists. Refer to section 4.6. Loss or Failure of Supply for Water Suppliers.

4.6. Loss or Failure of Supply for Water Suppliers

Drought can cause loss, near loss or failure of a community's potable water supply or supply for firefighting. In this event, drought response turns to an emergency response to protect public health and safety. Water suppliers remain responsible for ensuring that water supplies are adequate to maintain public health and safety.

Local governments and water suppliers should monitor their situation closely to ensure that mitigation measures undertaken are sufficient to prevent the loss or failure of water supplies. If loss of supply occurs or is forecast, water suppliers should follow the steps in their Emergency Response and Contingency Plan as required by the *Drinking Water Protection Act*. Depending on circumstances, it may be necessary to impose comprehensive and closely monitored watering restrictions, allocate water on a per capita basis, or seek use of alternative water supplies.

Local authorities and First Nations can find guidance on developing emergency drought plans or an Emergency Response and Contingency Plan in Appendix 3 of *Dealing with Drought: A Handbook for Water Suppliers in B.C.*

Where loss or failure is imminent, local governments and/or water suppliers should contact the local Drinking Water Officer at the Regional Health Authority. Where necessary, the provincial emergency management framework will provide coordination to address community specific requirements. Resources on emergency management in B.C. can be found in Appendix 7.

Note: All emergency situations that affect the health and safety of the public should be reported to Emergency Management B.C. at 1-800-663-3456.

5. Post-Drought Actions

Following the end of a drought, emphasis should shift to maintaining the resources affected and to applying the lessons learned to improve long term water sustainability. Some tasks to consider include:

- the Provincial Technical Drought Working Group should retract existing drought ratings and advise of return to Level 0 (Green);
- water suppliers should restore operations and ensure that drought-driven systems improvements and modifications are in compliance with relevant standards;
- provincial and federal data and information providers may review the effectiveness of systems to monitor and characterize stream flows, water levels, snowpack and groundwater during the drought and implement any identified improvements;
- the Inter-Agency Drought Working Group, the Provincial Technical Drought Working Group, and other involved parties should hold a post drought workshop to assess the equity, efficiency and effectiveness of communications, information, actions and monitoring that were undertaken. Lessons learned should be documented. This might result in recommended improvements to:
    - Local Drought Management Plans;
    - terms of reference for the Inter-Agency Drought Working Group and Technical Drought Working Group;
    - this plan (the British Columbia Drought Response Plan);
    - other provincial policies, guidelines and fact sheets; and
    - amendments to provincial legislation and municipal bylaws.
- local groups and individuals who demonstrated a strong stewardship ethic during the drought should be profiled and publicly recognized;
- revisit established water conservation strategies and reduction targets; continuously improve community water use efficiency; and
- refer to documented quantitative impacts on fish and aquatic ecosystems as related to indices of stream flow state (% LT MAD) such as delayed spawning access or impacts on smolt production.

6. Future Refinements

This plan is considered a living document and may be updated and revised based on experiences and learning. Changes may be made based on the approval of the IADWG and in consultation with the PTDWG.

Appendix 1: Drought Definitions

Meteorological Drought is generally defined by comparing the rainfall in a particular place and at a particular time with the average rainfall for that place. Meteorological drought leads to a depletion of soil moisture and this almost always has an impact on crop production. When we define drought this way, we only consider the reduction in rainfall amounts and do not take into account the effects of the lack of water on water reservoirs, human needs or on agriculture.[3]

Hydrological Drought is typically described by a reduction in lake storage, a decrease of stream flow discharge and a lowering of groundwater levels over large areas.[4] Hydrological droughts occur as a product of a period of unusually dry conditions (compared to normal), which can result in water scarcity. Hydrological drought affects uses that depend on groundwater and stream flows. Changes in water levels affect ecosystems, hydroelectric power generation, and recreational, industrial and urban water use.[5]

Agricultural Drought occurs when there is not enough water available for a particular crop to grow or livestock to thrive at a particular time. Agricultural drought may be driven by a lack of precipitation and/or inefficient use of water. Agricultural drought is typically seen after meteorological drought, but hydrological drought may also be a factor.[6]

Socio Economic Drought occurs when the demand for an economic good exceeds supply as a result of a weather-related shortfall in water supply. The supply of many economic goods, such as water, forage, food grains, fish, and hydroelectric power, depends on weather. Severity and impact are affected by water demand, the extent of water use efficiency measures, and the ability to bring new supplies on-line.[7]

Ecological drought is a prolonged and widespread deficit in naturally available water supplies — including changes in natural and managed hydrology — that create multiple stresses across ecosystems.[8]

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[3] This definition was agreed to by a working group of staff from BC, Alberta, Saskatchewan and Manitoba during the Western Water Stewardship Council Technical Workshop on Drought Preparedness held in Calgary on 4 May 2009 and adapted from the National Drought Mitigation Center (University of Nebraska) http://drought.unl.edu/Home.aspx

[4] United States Environmental Protection Agency. Definitions and Characteristics of Low Flows. Accessed at https://www.epa.gov/ceam/definition-and-characteristics-low-flows#drought, accessed 22 April 2021.

[5] This definition was agreed to by a working group of staff from BC, Alberta, Saskatchewan and Manitoba during the Western Water Stewardship Council Technical Workshop on Drought Preparedness held in Calgary on 4 May 2009 and adapted from the National Drought Mitigation Center (University of Nebraska) http://drought.unl.edu/Home.aspx

[6] Ibid.

[7] Ibid.

[8] National Drought Mitigation Center (2016) What is Drought? Understanding and Defining Drought, accessed on June 12, 2018, from http://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx

Appendix 2: Detailed Action Tables

Note: See Acronyms Used in this Document (page iv) for a list of terms.

Level 1 (Yellow) Actions

	Impacts	Adverse impacts to socio-economic or ecosystem values are rare
	General Response Measures	Conservation

Actions	Lead Responsibility
Communication and Coordination	
Notify IADWG and PTDWG; reaffirm duties and responsibilities; schedule regular meetings for duration of dry season	EMCR, FOR (Co-Chairs IADWG)
Update drought communications plans based on stream flow conditions and forecasts in impacted geographic regions	FOR (Co-Chair IADWG), GCPE
Initiate direct contact and information exchange protocols between FOR and DFO	FOR, DFO
Initiate direct contact and implement information exchange protocols between FOR and key contact(s) in water suppliers in impacted geographic regions	FOR (Regions), FN/LG/WS
Initiate direct contact and implement information exchange protocols between AF and key agricultural industry groups in impacted geographic regions	AF
Initiate direct contact and information exchange between FOR and key contact(s) in the FOR-Wildfire Management Branch in impacted geographic regions to coordinate on wildfire threats and potential impact on water supplies, including use of water in fire fighting	FOR (Co-Chair IADWG), FOR, Office of Fire Commissioner
Issue province-wide news release and targeted news releases in impacted geographic regions	FOR, GCPE
Issue information bulletin to local governments, water suppliers, Indigenous governments, industry and stewardship groups, major licensees and other key local groups in impacted geographic regions	FOR
Issue and distribute Low Stream Flow Advisories as required in impacted geographic regions	FOR, DFO
Provide regular updates via email to local governments, water suppliers, Indigenous governments, industry and stewardship groups, major licensees and other key local groups in drought areas	FOR

Update FOR drought and RFC internet sites to provide up-to-date stream flow and groundwater data and information	FOR (Co-Chair IADWG), FOR
Use local media releases and/or targeted advertising to advise of watering restrictions, encourage conservation, provide updates on local water supply status and forecast future conditions	FN/LG/WS
Review water conservation advice, guidelines and materials for local government and water suppliers (FN/LG/WS) and update as appropriate	FOR, MUNI
Designate local spokesperson to coordinate interaction with the public and media on local issues	FOR, GCPE
Review water conservation advice, guidelines and materials for agricultural producers and irrigators and update as appropriate	AF
Where appropriate, encourage agricultural producers to take early actions such as filling reservoirs and filling the soil reservoir where possible.	AF
Other Actions	
Notify local governments and water suppliers that they should communicate with residents and businesses to request voluntary conservation efforts	EMCR, FOR (Co-Chairs IADWG), MUNI
Implement appropriate watering restrictions to achieve targeted reduction in water use	FN/LG/WS
Temporarily cease issuing major new water licences or short-term use approvals as appropriate	FOR (Regions)
Request provincial agencies to conserve water at public facilities, particularly outdoors	FOR (Chair IADWG)
Use direct and indirect communications to request water licensees voluntarily work together, conserve, share water and consider in-stream needs	FOR (Regions)
Review inventory list of sensitive ecoregions and streams, and identify likely fish sensitive periods	FOR (Regions)
Educate agricultural producers on the use of irrigation scheduling techniques and other tools such as the on-line irrigation scheduling calculator on specific streams	AF
Monitoring	
Increase monitoring effort as required on stream flow conditions and aquifer levels in impacted geographic regions	FOR, FOR (Regions), DFO
Monitor stream conditions for additional information such as dry riffles, dewatered spawning redds, reported fish deaths, water temperature, etc. in impacted geographic regions	FOR, FOR (Regions), DFO

Monitor community water supply level	FN/LG/WS
Monitor water use by authorization holders (licensees and use approval holders)	FOR (Regions), FN/LG/WS
Monitor and enforce compliance with restrictions and allocations through bylaws	FN/LG/WS
Documentation and Preparation for Next Level	
Develop a database of water licensees and short-term use approval holders on streams that have or may have Low Stream Flow Advisories issued	FOR, FOR (Regions)
Identify and prepare to use additional communication channels for next level including social media (e.g. Twitter) and mass media advertising	FOR (Chair IADWG), GCPE
Identify possible community groups and key local groups that may assist with information distribution in next phase	FOR (Regions)
Inform Deputy Minister's Committee on Natural Resources (DMCNR) and Minister of FOR of possible move to the next drought level (Level 2: Peach)	FOR (Chair IADWG) FOR (Executive)
Document conservation actions taken to date; maintain registry of groups and individuals contacted	FOR (Chair IADWG), FOR (Regions), AF, MUNI

Level 2 (Peach) and 3 (Orange) Actions

		Impacts	Adverse impacts to socio-economic or ecosystem values range from “unlikely” to “possible”
		General Response Measures	Conservation. Local water restrictions range from “where appropriate” to “likely”.

Actions	**Lead Responsibility**
Communication and Coordination	
Increase frequency of IADWG meetings as appropriate	EMCR, FOR (Co-Chairs IADWG)
Intensify communication efforts as appropriate based on current streamflow conditions; issue updated province-wide news release and targeted news releases with updated information and conservation requests in impacted geographic regions	FOR, GCPE
Hold media news conference to announce activation of additional drought measures and to provide updated information; outline media plan to notify public of changes to streamflows and additional conservation measures	FOR, GCPE
Continue to issue local media releases and/or targeted advertising to advise of watering restrictions, encourage conservation, provide updates on local water supply status and forecast future conditions specific to the community	FN/LG/WS
Continue provision of regular updates on streamflow and groundwater data on the internet; increase frequency of updates as appropriate	FOR
Advise high volume water licensees (or all licensees on high risk streams) directly of conditions via mail or email and request they implement voluntary conservation measures	FOR (Regions)
Provide regular updates via email to local governments, water suppliers, Indigenous governments, industry and stewardship groups, major licensees and other key local groups in impacted geographic regions; intensify frequency of updates as appropriate	EMCR, FOR (Co-Chairs IADWG), FOR (Regions)
Begin using additional communication channels as appropriate to inform water users and the public about drought conditions including print advertising, social media (e.g. Twitter), community and agricultural associations, etc.	FOR, AF, GCPE
Ensure ongoing direct contact between key contacts in FOR and EMCR; review information exchange protocols on drought and emergency response	EMCR, FOR, HLTH, MUNI,
Provide agricultural producers access to information on drought management resources as required via provincial public-facing website and other forums	AF

Prepare information on provincial and federal programs that may assist producers to help cope with drought	AF
Organize workshops for producers in affected areas to provide guidance on water conservation activities and water use efficiency improvements	AF, FOR (Regions)
Submit drought assessment reports as necessary to deputy ministers and other senior executives	EMCR, FOR (Co-Chairs IADWG), FOR (Executive)
Other Actions	
Impose restrictions as appropriate based on priority water licence rights, in addition to voluntary water conservation requests	FOR (Regions)
Limit the number of, or impose restrictions on, new licences, regulate storage or invoke conditions on existing licences	FOR (Regions)
Implement next stage watering restrictions to achieve targeted reduction in water use	FN/LG/WS
Eliminate filling of public fountains (not including drinking fountains) and watering of public parks, gardens, medians and other similar areas	FN/LG/WS
Limit new connections or uses as appropriate	FN/LG/WS
Request Stop Work Diversion Initiatives on Flow Sensitive Fish Streams as appropriate	FOR (Regions), DFO
Ensure that water bailiffs are appointed and active on appropriate streams in drought areas; complete any necessary briefings or training with water bailiffs	FOR (Regions)
Modify flood prevention, flow augmentation and power generation reservoir activities as appropriate to minimize impact of drought	B.C. Hydro, FN/LG/WS
Provide technical assistance and specific measures to water suppliers experiencing problems with system management or promotion of conservation	MUNI
Commence reporting on status of water supplies and forecasted future scenarios to FOR and WLRS	FN/LG/WS, Potential help from Drinking Water Protection Officers
Request provincial government agencies elevate efforts to conserve water at public facilities	EMCR, FOR (Co-Chairs IADWG)
Monitoring	
Monitor and enforce compliance with next stage restrictions and allocations through bylaws	FN/LG/WS
Prioritize and intensify monitoring of stream conditions as required in impacted regions; identify most efficient alternatives for monitoring	FOR, FOR (Regions), DFO

Continue to monitor water use by communities and water licensees; increase monitoring as required	FOR (Regions), FN/LG/WS, Health Authorities
Monitor and enforce compliance with restrictions and allocations through bylaws; increase enforcement effort as appropriate	FN/LG/WS
Documentation and Preparation for Next Level	
Identify additional groups and associations that may assist with actions at next level	FOR (Regions)
Inform Deputy Minister's Committee on Natural Resources, Minister of FOR, and EMCR of possible move to next Drought and identify impacted geographic regions	EMCR, FOR (Co-Chairs IADWG), FOR (DM Office)
Assess impacts to livestock and crops in drought affected regions that are currently not irrigated	AF
Identify and document needs of agriculture in areas supplied by high risk streams	AF
Document conservation actions taken to date; maintain registry of groups and individuals contacted; record potential social, environmental and economic impacts	EMCR, FOR (Co-Chairs IADWG), FOR (Regions), AF

Level 4 (Red) and 5 (Maroon) Actions

	Impacts	Adverse impacts to socio-economic or ecosystem values range from “likely” to “almost certain”.
	General Response Measures	Conservation and local water restrictions, regulatory actions range from “possible” to “likely”, emergency response is possible.

Actions	**Lead Responsibility**
Communication and Coordination	
Increase frequency of communication by all levels of government and water suppliers with all water users through media, advertising, internet, email updates and other forums	FOR, FN/LG/WS
Increase frequency of communication between FOR and EMCR regarding geographic areas of concern	EMCR, FOR (Co-Chairs IADWG), Office of Fire Commissioner
Continue to issue information bulletins to local governments, water suppliers, Indigenous governments, industry and stewardship groups, major licensees and other key local groups in impacted geographic regions	FOR
Continue to issue and distribute Low Stream Flow Advisories as required in impacted geographic regions	FOR, DFO
Continue to provide regular updates via email to local governments, water suppliers, Indigenous governments, industry and stewardship groups, major licensees and other key local groups in impacted geographic regions	EMCR, FOR (Co-Chairs IADWG), FOR, FOR (regions)
Continue to update FOR drought and RFC internet sites to provide up-to-date stream flow and groundwater data and information	FOR (Co-Chair IADWG), FOR, FOR (regions)

Submit drought assessment reports as necessary to deputy ministers and other senior executives	EMCR, FOR (Co-Chairs IADWG),
	FOR (DM & ADMs),
	FOR (regions)

Prepare information on provincial and federal programs that may assist producers to help cope with drought	AF
Other Actions	
Use consensus building process to confirm priorities for water use reductions in drought affected areas	FOR (Regions), FN/LG/WS
Implement next stage watering restrictions to achieve targeted reduction in water use	FN/LG/WS

Implement regulatory tools under the *WSA* or other statutes as appropriate if voluntary measures are not enough to protect water users, aquatic ecosystems and fish	FOR
Restrict use by lower priority water users or those with conditional clauses in their water licences	FOR (Regions)
Review emergency response plans and prepare for implementation; ensure alternative water supplies are identified and available on short notice. Connect with Drinking Water Officers as required.	FN/LG/WS
Coordinate support to local authorities and First Nations as required to address community specific requirements.	EMCR
Ensure water bailiffs are actively regulating and controlling the diversion and use of water from the streams they are appointed to and are accurately communicating drought conditions and watering restrictions and targets	FOR (Regions)
Provide agricultural producers access to information on drought management resources as required via provincial public-facing website and other forums	AF
Continue to provide technical assistance and specific measures to water suppliers experiencing problems with system management or promotion of conservation	MUNI
Monitoring	
Monitor and enforce compliance with restrictions and allocations through bylaws; intensify enforcement efforts as appropriate	FN/LG/WS
Continue reporting on status of water supplies and forecasted future scenarios to FOR	FN/LG/WS
Monitor and enforce compliance with orders issued under provincial legislation	FOR
Intensify monitoring of stream conditions and aquatic ecosystems examining the efficacy of water conservation measures	FOR, FOR (Regions), DFO
Documentation and Preparation for Next Level	
Prepare for emergency response where risk of loss or failure of supply exists	FN/LG/WS
Coordinate support to local authorities and First Nations as required to address community specific requirements	EMCR
Inform Deputy Minister's Committee on Natural Resources and Minister of FOR of possible loss or failure of supply where the risk exists	EMCR, FOR (Co-Chairs IADWG) FOR (Executive)
Estimate economic losses from orders to reduce water use for livestock and crops	AF

Document conservation actions taken to date; maintain registry of groups and individuals contacted; record potential social, environmental (e.g., fish population and habitat loss) and economic impacts	FOR (Chair IADWG), FOR (Regions),

Appendix 3.A: Drought Legislation

Legislation	Primary Administering Agency	General Scope
Water Sustainability Act	Ministry of Forests	Provides for the allocation and management of groundwater and stream water. Sets out protective measures for wells and groundwater and identifies offences and penalties. Regulates groundwater, protects stream health, protects fish and fish habitat, and addresses water use during times of scarcity with declarations of SWS, critical environmental flow protection orders and fish population protection orders.
Fisheries Act	Department of Fisheries and Oceans Canada	Protection of fish and fish habitat.
Drinking Water Protection Act	Ministry of Health Regional Health Authorities	Requires water supply systems to provide potable water with appropriate construction and operating permits. It also establishes qualification standards for operators; and requirements for emergency response, water source and system assessments, a process for preparing a drinking water protection plan, and other protective measures for drinking water supplies. HLTH provides policy support and guidance relating to the Act. Regional Health Authorities administer and enforce the Act.
Emergency Program Act	Ministry of Emergency Management and Climate Readiness	Provides enabling legislation that authorizes the Minister to declare and designate any area of the province a disaster area (i.e. State of Emergency), and during an emergency, to obtain reserve powers. Enables local authorities and First Nations such as a mayor and council, or chief and council to declare a State of Local Emergency, which provides similar, wide-ranging emergency powers.
Environmental Management Act	Ministry of Environment and Climate Change Strategy	Regulates industrial and municipal waste discharge, pollution, hazardous waste, and contaminated site remediation. This Act also requires preparation of environmental plans for flood control, drainage, soil conservation, water resource management, waste management, and air quality management.
Local Government Act	Ministry of Municipal Affairs	Sets out the corporate authority of various types of local governments (municipalities, regional districts, improvement districts, etc.). From the perspective of water

and Community Charter		management, of greatest significance are powers and responsibilities relating to land use, growth, infrastructure (e.g. stormwater management), works, and similar matters.
Water Utility Act	Ministry of Forests	Provides for regulating privately operated water systems servicing five or more persons or a corporation. Operators are subject to the same duties, responsibilities and restraints that are imposed on a public utility under the *Utilities Commission Act*.
Farm Practices Protection Act	Ministry of Agriculture and Food	Only applicable if drought conditions result in a change from normal farm practices. For instance, irrigation practices or dust control practices may change as a result of lower water availability.
Milk Industry Act	Ministry of Agriculture and Food	This Act describes general farm requirements. If the producer were not able to have an adequate supply of water (i.e. they could not run their dairy farm), then the industry and marketing board would work with the producer to relocate those animals.

Appendix 3.B: Drought Relevant Programs for Agriculture

Program	Primary Administering Agency	General Scope
Production Insurance Program	Ministry of Agriculture/Business Risk Management	Helps producers manage their risk of crop losses caused by drought and other perils (hail, spring frost, excessive rain, flooding, etc.). Each crop has different coverage options and it must be purchased in advance of crop season. Only harvested crops are insured, not the regrowth feed for grazing. Producers need to inform program they are experiencing impacts due to water shortages whether voluntary or as a result of regulatory situations.
AgriStability Program	Ministry of Agriculture/Business Risk Management	Helps stabilize farm income by managing the risk of large income declines. It protects agricultural producers against declines in their net farming income due to market conditions, production loss or increased costs of production. Payments are made if a producer's current year margin falls more than 30% below their reference margin.
Western Livestock Price Insurance Program	Cross-provincial program	A risk management tool available in B.C., Alberta, Saskatchewan, and Manitoba. The program provides producers with protection against an unexpected drop in prices on cattle and hogs over a defined period.
AgriRecovery Framework	Ministry of Agriculture and Food/ Agriculture and Agri-Food Canada	AgriRecovery is a framework that forms the basis by which federal-provincial-territorial governments can work together when natural disasters occur to assess the impacts and determine whether there is need for an AgriRecovery initiative. AgriRecovery is for extra-ordinary expenses unrelated to production. It does not cover production or revenue declines which could be insured, including those resulting from disasters.
Livestock Tax Deferral Program	Agriculture and Agri-Food Canada (AAFC)	A provision designed to help defer the tax burden for livestock producers who sell all or part of their breeding herd due to drought or flooding in regions designated by AAFC.

Appendix 4: Provincial and Federal Agency Drought Responsibilities

Agency	Drought Management Responsibilities
Provincial Agencies	
Ministry of Water, Land and Resource Stewardship (WLRS)	• Lead development of legislation and policy related to drought management in B.C. • Oversees and coordinates the science required to assess impacts and monitor water before, during, and after droughts
Ministry of Environment and Climate Change Strategy (ENV)	• Administers the *Environmental Management Act* • Manages and coordinates the Provincial Groundwater Observation Well Network • Operates hydrometric, climate and water quality networks
Ministry of Forests, (FOR)	• Lead provincial agency for drought coordination and response • Administers the *Water Sustainability Act* • Operates the River Forecast Centre; collects and interprets snow, meteorological and stream flow data to provide warnings and forecasts of stream and lake runoff conditions • Operates the Provincial Groundwater Observation Well Network • Protects and restores fish habitat and aquatic ecosystems • Communicates directly with water users under the *Water Sustainability Act* about actions commenced under this plan • Manages and protects water as a forest resource under the *Forest and Range Practices Act* • Lead agency for managing wildfire threats
Ministry of Agriculture and Food (AF)	• Supports agricultural industry water requirements used in the production of food and other agricultural products • Communicates with the broad agricultural community about actions commenced under this plan • Collects and disseminates information on irrigation, crop, soil and livestock management during times of drought
Ministry of Municipal Affairs (MUNI)	• Oversees local government activities under the *Local Government Act* • Provides water conservation resources and advice to local government water suppliers • Communicates with local government about actions commenced under this plan
Ministry of Health (HLTH)	• Provides policy support and guidance relating to the *Drinking Water Protection Act*.

Regional Health Authorities (RHA)	• Administers and enforces the *Drinking Water Protection Act* • Drinking Water Officers provide guidance to water suppliers and local governments on emergency coordination, preparedness and response planning related to loss of water supply
First Nations Health Authority (FNHA)	• Plans, designs, manages and funds the delivery of First Nations health programs and services, including the Drinking Water Safety Program • Collaborates, coordinates and integrates with HLTH and the RHAs
Ministry of Emergency Management and Climate Readiness (EMCR)	• Coordinates emergency support to local authorities and First Nations as required to address community specific requirements • Activates provincial regional emergency operations centres and/or provincial emergency coordination centres as necessary • Office of Fire Commissioner
Federal Agencies	
Agriculture and Agri-Food Canada (AAFC)	• Delivers the federal Drought Watch program to provide timely information of the impacts of climatic variability on water supply and agriculture • Provides information on agricultural practices that reduce drought vulnerability and improve management during a drought
Environment and Climate Change Canada (ECCC) [Water Survey of Canada]	• Responsible for the collection, interpretation, and dissemination of standardized water resource information • Operates hydrometric, climate and water quality networks in partnership with the B.C. Ministry of Environment and Climate Change Strategy
Fisheries and Oceans Canada (DFO)	• Administers the federal *Fisheries Act*, which protects fish and fish habitats
Indigenous Services Canada (ISC)	• Supports Aboriginal people (First Nations, Inuit and Métis) and Northerners in their efforts to develop healthier, more sustainable communities • Provides guidance for First Nations communities to develop emergency response plans for drinking water systems

Appendix 5: Chronology of Key Government Actions in a Model Drought Year

Key Actions	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monitoring												
Complete snow surveys and assess Basin Snow Indices	■	■	■	■	■	■						
Assess Seasonal Volume Runoff Forecasts			■	■	■							
Assess 30 Day Percent of Average Precipitation conditions					■	■	■	■	■	■		
Assess 7 Day Average Stream flow conditions					■	■	■	■	■	■		
Augment stream flow and aquifer level monitoring as required						■	■	■	■			
Monitor community and licensee water use						■	■	■	■			
Coordination												
Inter-Agency Drought Working Group	■	■	■	■	■	■	■	■	■	■	■	■
Technical Drought Working Group				■	■	■	■	■	■	■		
Convene Local Drought Working Group meetings					■	■	■	■	■	■		
Elevate drought level ratings as appropriate					■	■	■	■	■	■		
Request water licensees voluntarily conserve and share water					■	■	■	■	■	■		
Retract drought level ratings										■	■	
Conduct post drought workshop											■	■
Communication												
Drought Portal Map				■	■	■	■	■	■	■		
Issue first province-wide news release for season					■							
Issue monthly info bulletins on water supply conditions			■	■	■	■	■	■	■			
Designate provincial and local drought spokespeople					■							
Webinars for local governments and Indigenous governments				■	■	■						

Recommend early activities to agricultural producers													
Issue local media advisories as required													
Issue targeted media advertising as required													
Escalate conservation messaging as appropriate													
Contact high volume users directly via mail as required													
Increase frequency and intensity of communication as required													
Other Action													
Undertake drought vulnerability survey of communities/water suppliers.													
Local authorities and First Nations introduce watering restrictions as required													
Local authorities and First Nations update and amend restrictions as appropriate													
Undertake regulatory actions as appropriate													
Undertake enforcement actions as appropriate													
Prepare emergency response where loss or failure of supply risk exists													

Appendix 6: Drought Response Communications Summary Table**

Drought Level(s)	Province Wide Communications		Region Wide Communications		Targeted Regional Communications*		Direct Communication with Water Licensees	
Level 1 (Yellow)	**Task**	**Who**	**Task**	**Who**	**Task**	**Who**	**Task**	**Who**
	Issue province-wide news release	GCPE	Issue targeted news releases in impacted geographic regions	GCPE	Provide updates via email to key stakeholder groups and major licensees	FOR	Use direct and indirect communications to request water licensees voluntarily conserve & share water	FOR, DFO
	Regularly issue updated online water supply and snow bulletins	FOR	Issue Low Stream Flow Advisories in impacted geographic regions	FOR	Attend public meetings	FOR, AF, DFO	Where appropriate, work with BCAC and other industry organizations to encourage agricultural producers take early actions	AF
			Designate local media spokesperson(s) for local level issues	GCPE				
Level 2/3 (Peach/ Orange)	**Task**	**Who**	**Task**	**Who**	**Task**	**Who**	**Task**	**Who**
	Issue updated province-wide news release	GCPE	Intensify local communication efforts as appropriate based on current stream flow conditions	GCPE FOR	Intensify frequency of updates as appropriate via email to key stakeholder	FOR	Advise high volume water licensees directly via mail; request voluntary conservation	FOR

Drought Level(s)	Province Wide Communications		Region Wide Communications		Targeted Regional Communications*		Direct Communication with Water Licensees	
					groups and major licensees			
	Potentially hold media news conference to announce activation of additional drought measures and to provide updated information	GCPE FOR	Issue updated targeted news releases in impacted geographic regions	GCPE	Commence utilization of additional communication channels (e.g. print, social media, associations, etc.)	GCPE FOR	Use direct and indirect communications to request water licensees voluntarily conserve & share water	FOR, DFO
	Continue to regularly issue updated online water supply and snow bulletins	FOR			Attend public meetings	FOR, AF, DFO	Where appropriate, work with BCAC and other industry organizations to encourage agricultural producers to take early actions	AF

Drought Level(s)	Province Wide Communications		Region Wide Communications		Targeted Regional Communications*		Direct Communication with Water Licensees	
Level 4/5 (Red/ Maroon)	**Task**	**Who**	**Task**	**Who**	**Task**	**Who**	**Task**	**Who**
	Increase frequency and intensity of province wide communication through media, advertising, internet, email updates and other forums	GCPE	Increase frequency and intensity of targeted local communication through media, advertising, internet, email updates and other forums	GCPE FOR	Continue to issue frequent updates as appropriate via email to key stakeholder groups and major licensees	FOR	Advise high volume water licensees directly of conditions via mail or other direct means	FOR
	Continue to regularly issue updated online water supply and snow bulletins	FOR					Continue to request voluntary conservation; undertake regulatory action as required	FOR
							Contact producers that may be required to reduce water use	AF

* Targeted regional communications includes direct communication with community groups, user groups, local governments, Indigenous governments and others as well as participation in community events, response to local media inquiries and other local level activities.
** A provincial drought communication plan will be prepared each year. Action items will differ from year to year based on the nature of the drought and communication priorities.

Appendix 7: Additional Resources

All emergency situations that affect the health and safety of the public should be reported to EMCR at 1-800-663-3456.

Provincial Government Resources

- General Drought Information B.C. webpage: Links to low provincial government drought information including stream flow advisories, handbooks, fact sheets, and more.
- River Forecast Centre (RFC): The RFC collects and interprets snow, meteorological and stream flow data to provide warnings and forecasts of stream and lake runoff conditions around the province.
- Drought in Agriculture webpage: Information on drought management in agriculture including information on irrigation, crops, soil, livestock, pasture and range management as well as links to resources on feed and pasture availability and financial programs.
- Emergency Management in BC: This site provides an overview of emergency management in B.C. and provides links to training and resources for use before, during and after emergencies.
- Emergency Info BC: This site provides up to date emergency alerts.
- *Dealing With Drought: A Handbook for Water Suppliers in British Columbia:* Updated in 2016, this document provides local government water suppliers with tools to help with drought planning, example bylaws, and links to other resources.
- Water Laws and Rules in B.C.: Information on provincial Acts and regulations including the *Water sustainability Act, Water Protection Act, Environmental Management Act*.
- Fire Danger Rating Reports: Maps on fire danger ratings across B.C., produced annually during fire season from April 15th to October 15th.

Federal Government Resources

- Drought Watch (Agriculture and Agri-Food Canada): This is Agriculture and Agri-Food Canada's web hub for national and regional information targeted at the agricultural sector. It links to information on current conditions and access to federal assistance programs.
- The Weather (Government of Canada): Current and forecasted weather, air quality, alerts, analyses and modelling.

Technical Resources

- Irrigation Industry Association of BC (IIABC): The IIABC provides access to tools and irrigation manuals that can assist in improving the operation of irrigation systems,

including: Irrigation Management Guide, BC Sprinkler Irrigation Manual, BC Trickle Irrigation Manual, and Irrigation Scheduling Calculators.
    - B.C. Sprinkler Irrigation Manual
    - B.C. Trickle Irrigation Manual
- BC Agriculture Council: The BC Agriculture Council has produced the Environmental Farm Planning documents that can provide information on conducting an irrigation system assessment. These documents assist in evaluating irrigation system operation.
    - Environmental Farm Plan Reference Guide
    - Irrigation Assessment Guide

Other Resources

- National Drought Mitigation Centre (NDMC) (University of Nebraska): The NDMC is dedicated to helping "people and institutions develop and implement measures to reduce societal vulnerability to drought, stressing preparedness and risk management rather than crisis management." While focused on USA, the NDMC website has a wealth of information on drought planning, monitoring, impacts and mitigation.
- U.S. Drought Portal: National Integrated Drought Information System (NIDIS): The U.S. National Oceanic and Atmospheric Administration leads implementation of the NIDIS. The U.S. Drought Portal is part of this interactive system to provide early warning about emerging and anticipated droughts, assimilate and quality control data, and provides information about risk and impact to different agencies and stakeholders.
- North America WaterWatch: Map of real-time stream flow compared to historical stream flow for B.C. and adjoining states using percentile flows.
- First Nations Emergency Services Society (FNESS): FNESS is a charitable non-profit organization. With the support of the First Nation Leadership Council, FNESS serves First Nations in developing and sustaining safer and healthier communities through emergency planning, training, response and recovery.