



MEMORANDUM

DATE: May 31, 2019

FILE No:

To:

FROM: Jeff Moore, Environmental Analyst / Technician, Environmental Services Division

SUBJECT: Drought Conditions Update for the Cowichan Region

The late winter, early spring of 2019 has seen generally below normal precipitation and above normal temperatures in the Cowichan Valley, leading to concerns about drought conditions, both now and throughout the summer. The Province of BC's Technical Drought Working Group analyzes conditions throughout the province and makes determinations as to the Drought Level for large water basins throughout the province, including for East Vancouver Island, a basin which includes most of the CVRD. The working group meets regularly during the spring and summer to re-assess conditions and update the provincial Drought Levels. These updates occur at least monthly, or more frequently if conditions merit, and the determination has just been made to move East Vancouver Island to Drought Level 2. The CVRD Environmental Services Division has conducted our own analysis of local drought conditions using the provincial methodology. The conclusion of the CVRD's analysis is that the CVRD is currently at or approaching drought level 3 as of the end of May, 2019.

Core Indicators

Drought levels are calculated based on four core indicators (Table 1) and are supplemented by additional indicators to guide decisions as to local drought conditions.

Table 1. Core Indicator Thresholds

	Level 1 (Green)	Level 2 (Yellow)	Level 3 (Orange)	Level 4 (Red)
Basin Snow Measures	>80%	80-65% of normal	<65% of normal	
Seasonal Volume Runoff Forecasts	>80%	80-61% of normal	60-45% of normal	<45% of normal
30 Day % of Average Precipitation	>80%	80-51% of average	50-25% of average	<25% of average
7-Day Average Streamflow	>25 th percentile	11-25 th percentiles	6-10 th percentiles	<6 th percentile

For the Cowichan Region, the core indicators combined with the supplemental indicators suggest that the current Drought Level is actually between 2 and 3. Details of the results for the core indicators are summarized in Table 2, with more details provided in the following sections for both core and supplemental indicators.

Table 2. Cowichan Region Drought Indicators – May 29, 2019

Indicator	Current Level	Drought Level thresholds	Notes
Basin Snow Indices ¹	Both Jump Creek and Heather Mountain snow pillows indicate zero snowpack.	Level 3 (less than 65% of normal)	Jump Creek was at zero snowpack by mid-May and Heather Mountain by the end of May.
Seasonal Volume Runoff Forecasts ²	<i>Cowichan River – Cowichan Lake Inflows</i> May-June – 56% of normal May-Sept – 58% of normal	Level 3 (45-60% of normal) Level 3 (45-60% of normal)	
30 Day Percent of Average Precipitation ³	30 Day – 40-85% of normal 60 Day – 60-85% of normal 90 Day – 40-60% of normal 180 Day – 85-115% of normal	Level 2-3 Level 2 Level 2-3 Level 1	30 Day average is 40-60% (level 2-3) in the north part of the region and 60-85% (level 2) in the south. Primary indicator is 30 Day average; 60, 90, & 180 day averages are supplementary.
7-Day Average Streamflow ⁴	Chemainus River – 11th percentile Bings Creek – 11th percentile Cottonwood Creek – 15th percentile	Level 2 (11-25 th percentiles)	Cowichan River flow is at the 24 th percentile (Level 2), but this is a weir-controlled system.
	Koksilah River – 6th percentile Harris Creek – 10th percentile	Level 3 (6-10 th percentiles)	
	Renfrew Creek – 0 percentile – lowest level on record San Juan River – 2nd percentile	Level 4 (<6 th percentile)	

¹BC River Forecast Centre Automated Snow Pillow Realtime Data (May 28, 2019).

<https://governmentofbc.maps.arcgis.com/apps/webappviewer/index.html?id=c15768bf73494f5da04b1aac6793bd2e>

²BC River Forecast Centre Snow Survey and Water Supply Bulletin, May 1, 2019. <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/drought-flooding-dikes-dams/river-forecast-centre/snow-survey-water-supply-bulletin>

³Agriculture and Agri-food Canada. Precipitation – Percent of Normal maps. <http://www.agr.gc.ca/DW-GS/current-actuelles.jsp?lang=eng&isEnabled=true>

⁴BC River Forecast Centre 7-Day Average Streamflow map and hydrographs <https://governmentofbc.maps.arcgis.com/apps/MapSeries/index.html?appid=838d533d8062411c820eef50b08f7ebc>

Basin Snow Indices

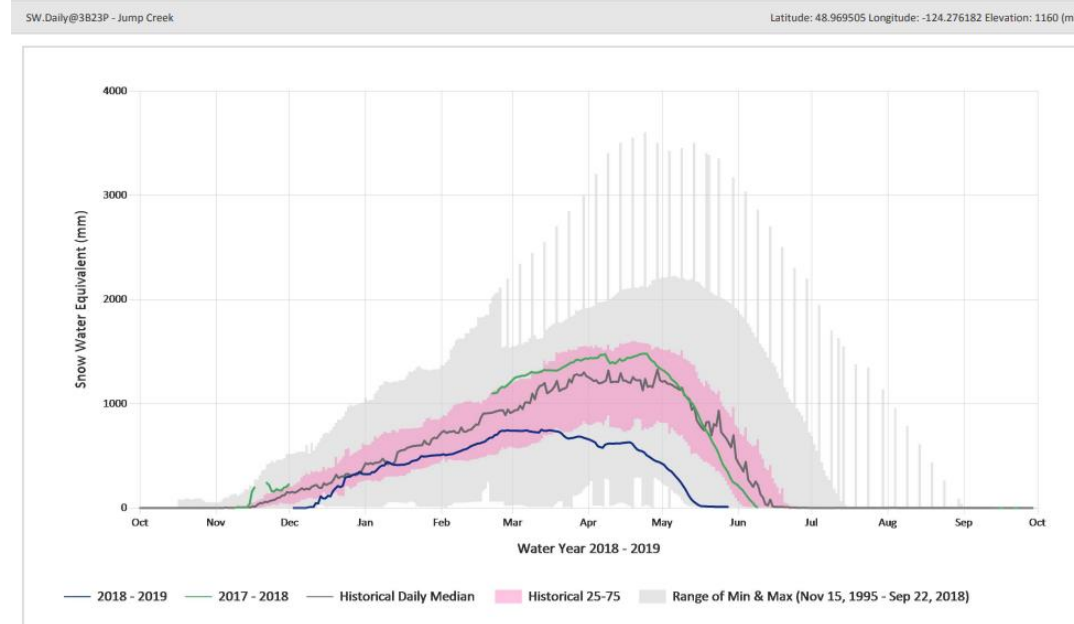
The snow water equivalent (SWE) as a percent of the historical normal SWE for this time of year.

Both the Jump Creek and Heather Mountain snow pillows indicated that by late May the snowpack had completely melted. Under normal conditions, snowpack persists until mid-late August. At less than 65% of normal, the basin snow indices suggest a **drought level of 3**.

Figure 1. Jump Creek & Heather Mountain Snow Pillow Snow Water Equivalent

Automated Snow Weather Station Graph

Plot created: May 28, 2019 05:22



Statistics are based on the period of record prior to the current Water Year
Statistics are only displayed for locations with at least two years of data
Automated Snow Weather Station Graph is only available for Active locations

Data last appended: May 28, 2019 11:00 UTC

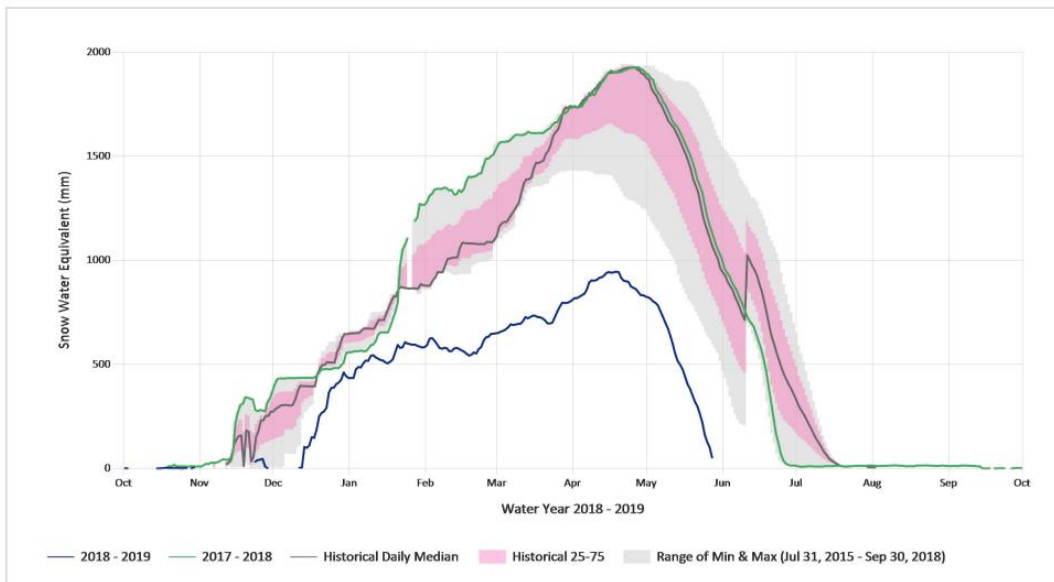
Status: Active

Automated Snow Weather Station Graph

Plot created: May 28, 2019 05:22

SW.Daily@3B24P - Heather Mountain Upper

Latitude: 48.943875 Longitude: -124.452113 Elevation: 1190 (m)



Statistics are based on the period of record prior to the current Water Year
Statistics are only displayed for locations with at least two years of data
Automated Snow Weather Station Graph is only available for Active locations

Data last appended: May 28, 2019 11:00 UTC

Status: Active

Source: BC River Forecast Centre

Seasonal Volume Runoff Forecasts

Quantitative forecasts of seasonal runoff provided by the BC River Forecast Centre.

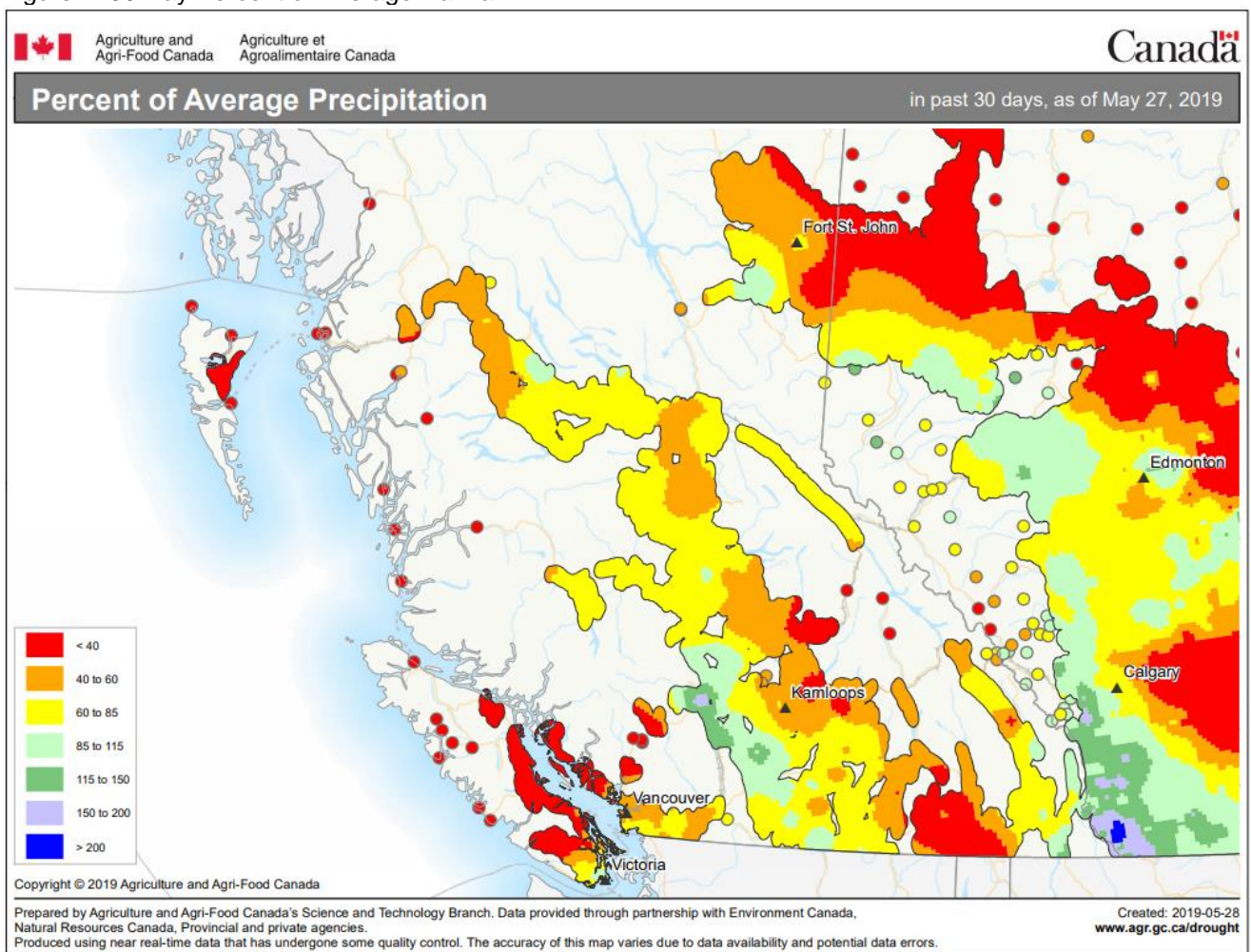
The May 1 seasonal volume runoff forecasts for the Cowichan Lake Inflows for both the May-June and May-Sept. periods are in the 45-60% of normal range, corresponding to a **drought level of 3**. It should be noted that the virtually complete lack of rainfall in March led to water levels in Cowichan Lake dropping to 28% of full storage, a level normally seen in mid-August. Despite some rain in April, lake levels never returned to the level of the weir crest.

30 Day Percent of Average Precipitation

Rainfall in the past 30 days as a percentage of the 30 year average rainfall for the same time period.

Maps produced by Agriculture and Agri-Food Canada indicate that for the northern portion of the Cowichan Region, the 30 day rainfall is 40-60% of normal with portions <40% of normal. This equates to a **drought level of 2 or 3**. For the southern portion of the region, the 30 day rainfall is 60-85% of normal, or a **drought level of 2**.

Figure 2. 30 Day Percent of Average Rainfall



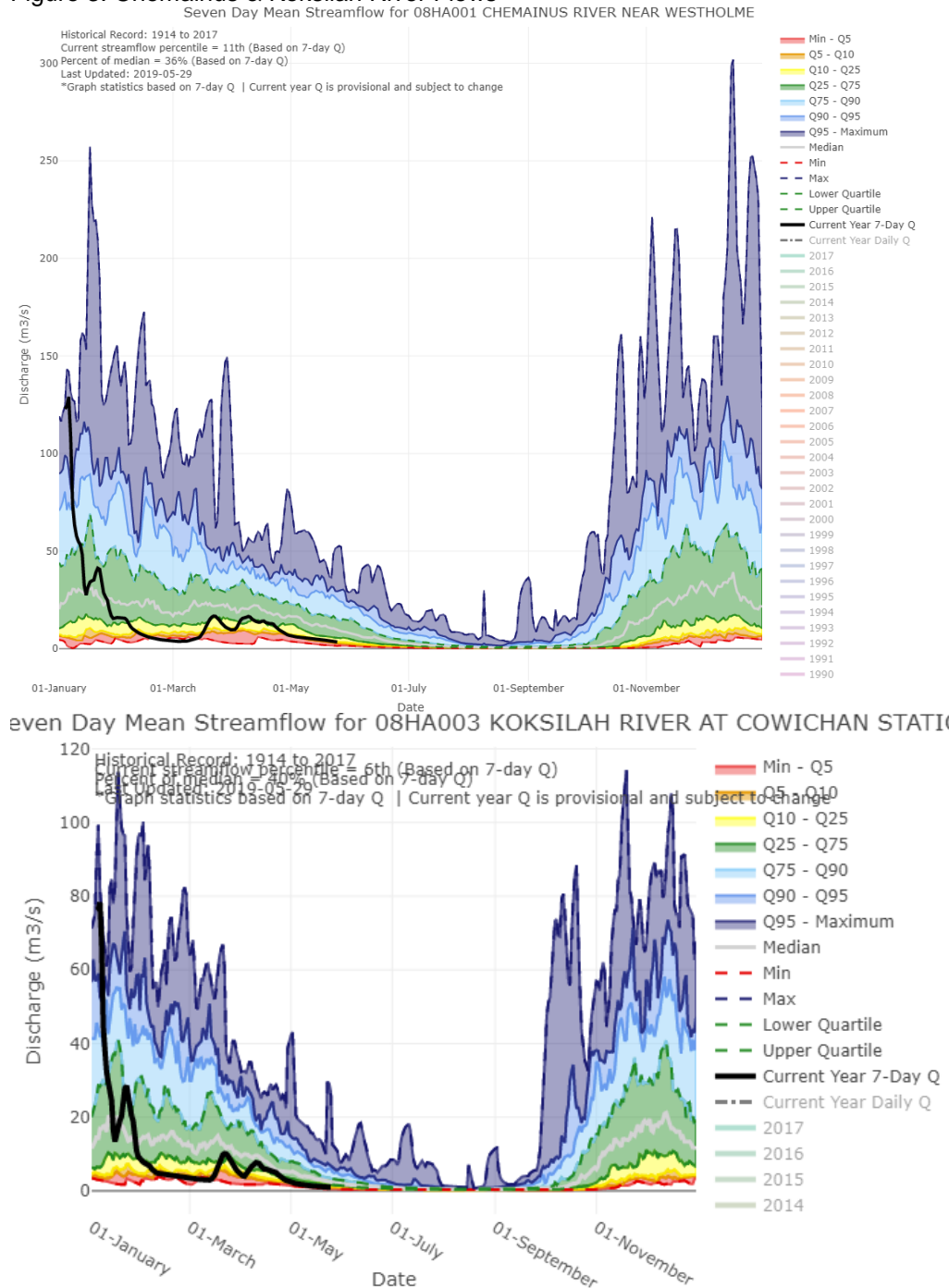
Source: Agriculture and Agri-Food Canada

7-day Average Streamflow

7-day average streamflows as a percent of historic median streamflows.

Creeks and rivers around the region are all experiencing low streamflows. These range from the Renfrew Creek at the lowest level on record Cottonwood Creek at the 15th percentile flow. Major rivers include the San Juan River at the 2nd percentile, the Koksilah River at the 6th percentile, and the Chemainus River at the 11th percentile. These streamflows equate to a drought level at the high end of level 2 (11-25th percentile), with many systems at level 3 (6-10th percentile), or even level 4 (<6th percentile). A regional estimate would equate to **drought level 3**.

Figure 3. Chemainus & Koksilah River Flows



Supplemental Indicators

In addition to the core indicators, several supplemental indicators can also inform the determination of the drought level for the region.

Precipitation

The Agriculture and Agri-Food Canada data are supported by data from local weather stations. Table 3 shows the percent of normal precipitation for four weather stations in the CVRD. While precipitation was above average in early winter, this was followed by an extremely dry March, followed by below average rainfall and above average temperatures in April and May.

Table 3. 2018-2019 monthly precipitation as a percentage of normal monthly precipitation

	2018			2019				
	October	November	December	January	February	March	April	May
North Cowichan	76%	95%	164%	103%	75%	10%	80%	40%
Shawnigan Lake	86%	88%	144%	105%	76%	12%	85%	57%
Chemainus	73%	87%	156%	125%	78%	9%	88%	48%
Lake Cowichan	58%	97%	187%	111%	41%	10%	84%	

Aquifer levels

The Ministry of Forests, Lands and Natural Resource Operations provided the following update on groundwater levels for 29 wells on southern Vancouver Island.

Date	May 24	April 9	April 1	March 25	Oct 2018
Wells below normal	45%	52%	50%	46%	32%

Lowest on record include: Saanich (065), Saturna (290), Cassidy (312), Cowichan (428 and 429), Cowichan (431), Yellowpoint (432)

Much below normal include: Nanoose (396)

Below normal include: Galiano (258), Cobble Hill (345), Quadra (383), Nanaimo (388), Cowichan (430)

West Coast PGOWN GWL Status (As of May 24, 2019)

Percentiles classes		Wells per class
High		0
Much above normal	>90	0
Above normal	75-90	2
Normal	25-75	14
Below normal	10-25	5
Much below normal	<10	1
Low		7

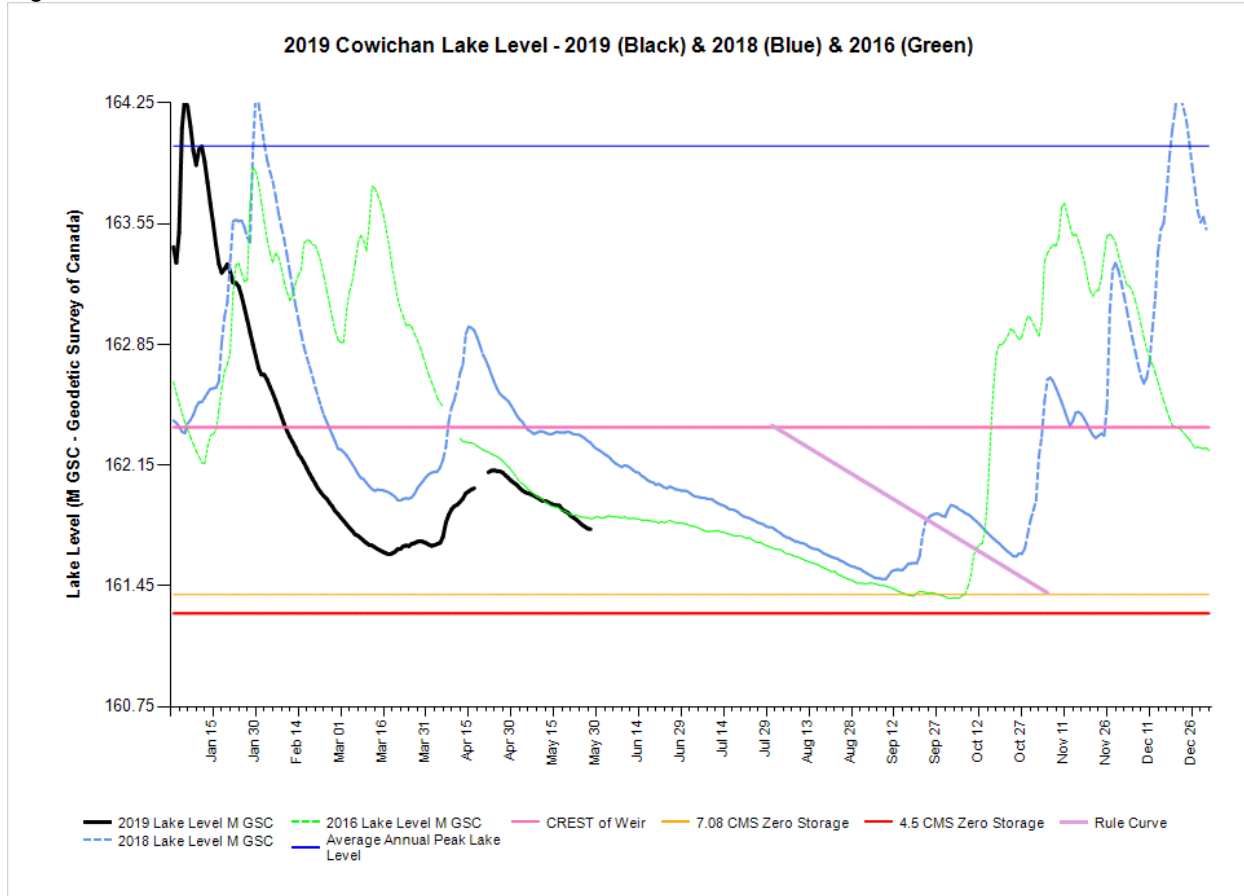
Wildfire danger class ratings

The fire danger level is at level 3-4 (moderate-high) throughout the Cowichan region.

Community or commercial operations that are responding to low snow pack or low water supplies

- Paper Excellence has just received approval to reduce flows through the weir at Lake Cowichan to emergency low flows (4.5 cms). Under this scenario, zero storage will be reached by July 26 with pumping to begin in early August.

Figure 4. Cowichan Lake Level



Source: Paper Excellence

Local stewardship groups are reporting that many tributaries to Cowichan Lake and River are already running dry and that fry salvage operations are underway. While fry salvage has become an annual activity in Cowichan tributaries, it is not usually required until mid-summer.

Environment Canada Forecasts

Environmental Canada seasonal forecasts are predicting above average temperatures for the summer for the Cowichan Region.