

Memorandum

Written by: Kristina Anderson

Date: February 2021

Re: Review of the 2020 drought conditions for the Boundary Region

Boundary Region

The RDKB Boundary region encompasses two watersheds: Kettle River Watershed (majority of the area) and the Okanagan Watershed (53km²).

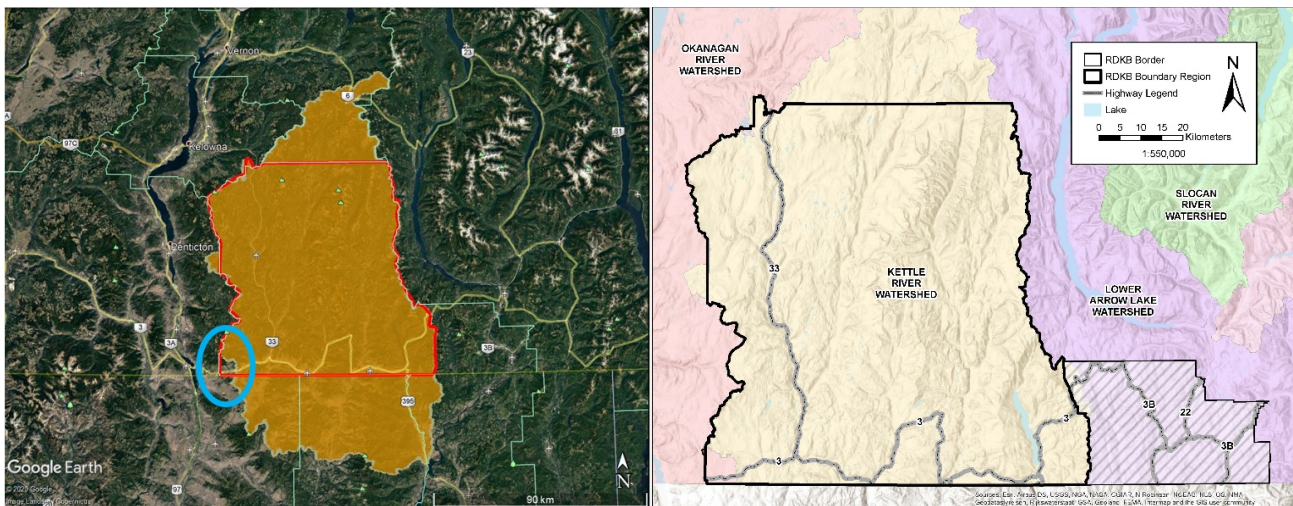


Figure 1. Left image: RDKB Boundary region outlined in red, with the Kettle River Watershed shown as orange polygon. Blue circle identifying the area in the Okanagan River watershed. Right image: Solid black line representing the RDKB boundary, with colour coded Kettle River Watershed and Okanagan River Watershed (western corner) identified.

The Provincial Drought Readings

In 2020, the Boundary region was managing the impacts from this year's freshet through to the end of June, which was also seen as many Boundary rivers and streams were flowing higher than normal through until July. As the summer progressed, the Boundary Region received minimal rain and warm to very warm temperatures, resulting in low water levels in many of the valley bottom systems. The hydrological drought conditions remained normal until mid-August when the Province shifted the drought level reporting to dry conditions (Level 2), remaining at Level 2 until the end of the drought monitoring season (Table 1). As the dry conditions continued throughout the Boundary region, by late summer into fall there were discussions whether the drought level should be shifted to level 3 (very dry), but the Province decided to remain at Level 2.

There are many tools used to monitor and track the drought conditions throughout the Boundary region. The drought levels used to initiate the RDKB response is determined by the Province, with local input provided (Province of BC, 2018). This year was no different. With a slow start into the season, communication ramped up between the Boundary Water Suppliers, RDKB and the Province as it became apparent that the minimal precipitation, warm temperatures and water use was resulting in lower stream flow levels throughout some parts of the region.

Near the end of September, the Province discussed whether to increase the Boundary drought rating to Very Dry (Level 3). Stream water levels were lower than normal, with some systems reaching lower quartile and close to minimum levels for that time of year. As the drought level is set to cover the entire Boundary region with one rating, there were reasons for the Province to both remaining at a Level 2 (dry conditions) stage and to shift to a Level 3 (very dry conditions). At the end of September, the Province completed a flow measurement on the Kettle River (near Westbridge) to determine the accuracy of the low flow readings from the Water Survey of Canada (WSC) stations. Their findings showed that the Kettle River was flowing slightly higher flow than what was reported by the WSC. Through visual inspections of neighbouring streams, the Provincial representatives confirmed low flows but determined nothing urgent from an aquatic health perspective. Inquiring with the RDKB regarding Water Supplier concerns, the RDKB was able to report that all but one supplier reported acceptable water levels at their monitoring site. The one Boundary Water Supplier reporting water level concerns was located in the Southwest and West portion of the watershed.

Table 1. Provincial Drought Ratings for specific areas throughout British Columbia. The focus here is the Kettle and Okanagan (Province of BC, 2020)

2020 DROUGHT LEVELS AT A GLANCE												
Drought Levels:	1	Normal	2	Dry	3	Very Dry	4	Extremely Dry				
BASINS	24-Jun	13-Jul	22-Jul	05-Aug	19-Aug	02-Sep	10-Sep	16-Sep	23-Sep	28-Sep	30-Sep	14-Oct
East Kootenay	1	1	1	1	2	2	2	2	2	2	2	1
Kettle	1	1	1	1	2	2	2	2	2	2	2	2
Middle Fraser	1	1	1	1	1	1	1	1	1	1	1	1
-Coldwater River	1	1	1	1	3	3	4	4	4	4	4	1
Okanagan	1	1	1	1	1	1	1	1	1	1	1	1
Similkameen	1	1	1	1	2	2	2	2	2	1	1	1

Link: <https://governmentofbc.maps.arcgis.com/apps/MapSeries/index.html?appid=838d533d8062411c820eef50b08f7ebc>

Monitoring

Water levels were monitored throughout the season using the Water Survey of Canada stations only. The Province of BC completed spot measurements at the upper section of the Kettle River and the West Kettle River end of September showing it to be in the 10th percentile¹. Water temperature was not monitored for the river systems in 2020. Overall, river levels remained near or above normal until mid-July, with water levels decreasing to below normal in August.

¹ Province measured the Kettle River (near Westbridge) on September 22, 2020: We measured 1.7m³/s with a FlowTracker, while WSC at the same time reported 1.16 m³/s. So it seems that the stage-discharge relationship for that gauge is off for now. 1.7 m³/s puts the stream around 10th percentile.

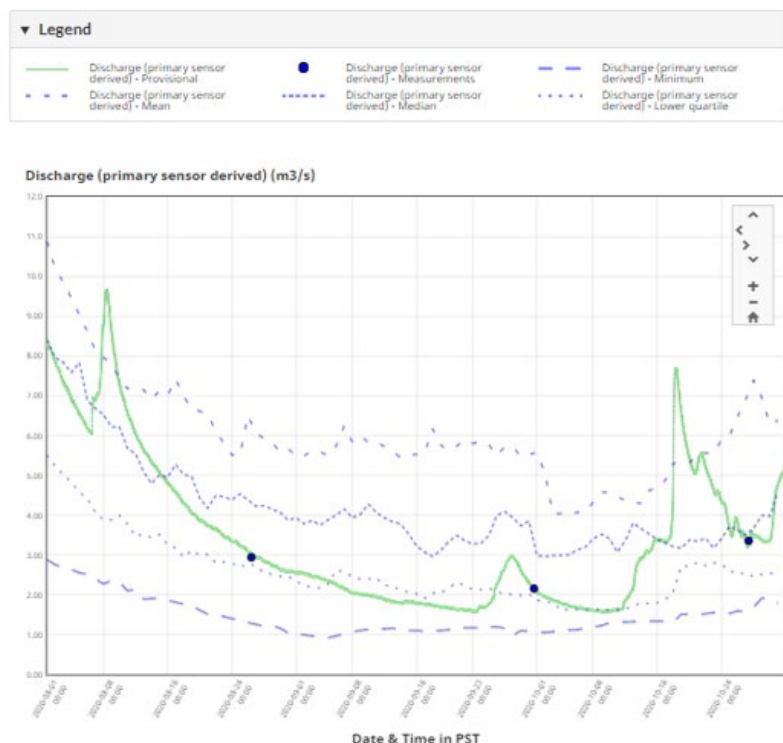
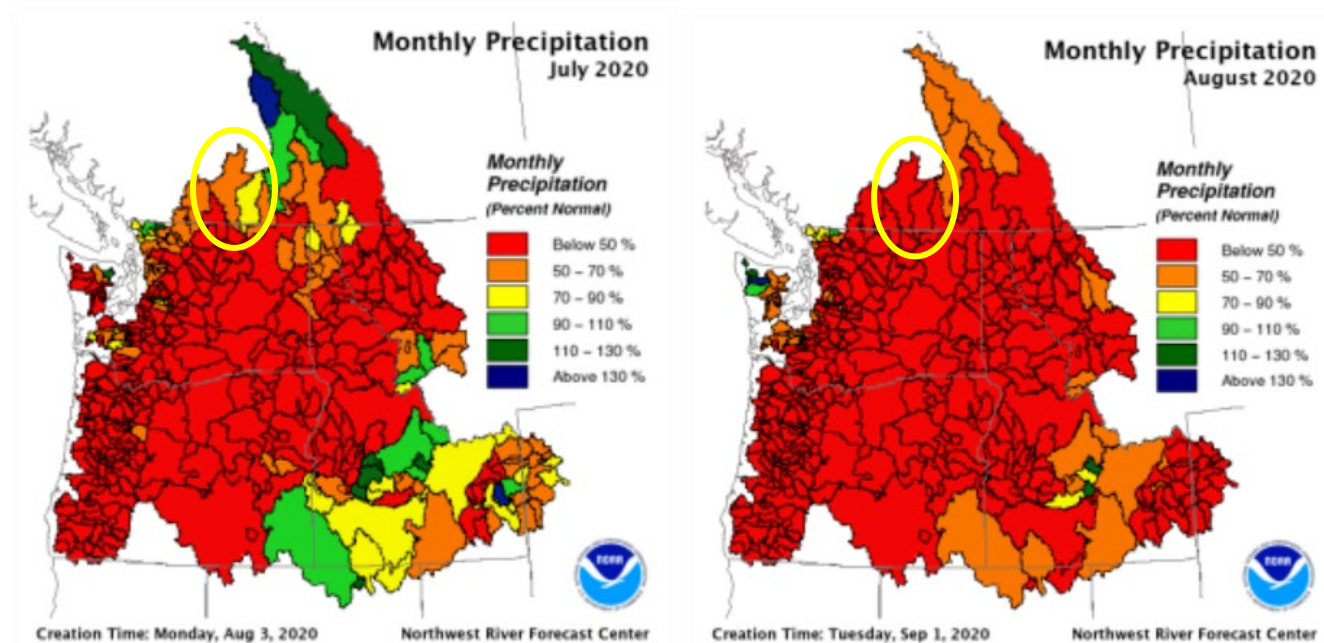


Figure 1 Water Survey of Canada discharge information for the Kettle River Near Westbridge (08NN026) from August 1 to October 31, 2021 (Government of Canada, 2021).

Precipitation and Temperature

High than normal precipitation (Figure 2) was observed in the Boundary region until June. July showed slightly lower levels of precipitation than normal (50-90% of normal), whereas August and September showed very low precipitation levels (less than 50% of normal) with some regions receiving no rain in almost 2 months.



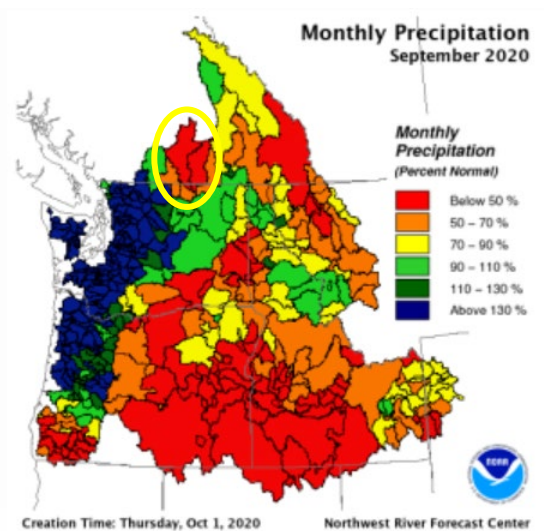


Figure 2. Historical precipitation mapping for the areas covered by the NOAA Northwest River Forecast Centre. Area of concern is the Kettle River Watershed and Okanagan Watershed that are identified by a circle in the first figure (National Oceanic and Atmospheric Administration, 2021).

Temperatures also shifted from normal conditions to warmer than normal for both August and September (Figure 3).

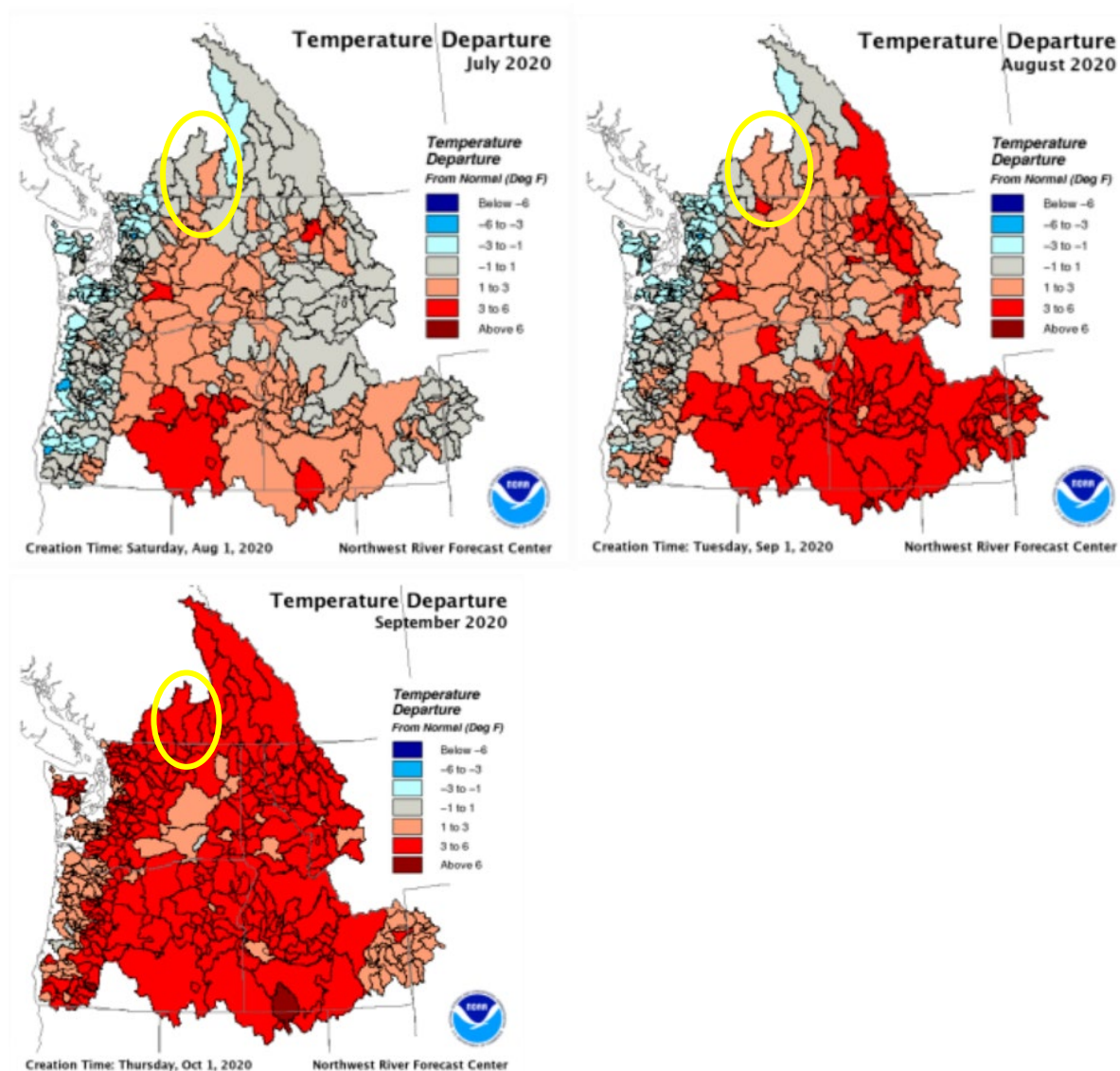


Figure 3 Historical temperature mapping for the areas covered by the NOAA Northwest River Forecast Centre. Area of concern is the Kettle River Watershed and Okanagan Watershed that are identified by a circle in the first figure (National Oceanic and Atmospheric Administration, 2021).

Canada Drought Monitor (Agriculture and Agri-Food Canada, 2021) monitors agriculture drought over the country. Even though the Boundary region showed no indication of hydrological drought (water level in the streams) in the spring and early summer periods, the agricultural monitoring systems showed an D0 “abnormally dry” rating for the Boundary region from May through to end of August. By early fall this rating had changed to D1 “moderate drought” for the southwest portion of the Boundary region, shifting back to dry and normal conditions by winter. As a comparison to a year (2015) where the Boundary region experienced significant drought impacts, the Canadian Drought Monitor was showing a D1 “moderate drought” rating by May 2015, with a fast progression to extreme drought by September 2015².

Works Cited

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² Agricultural drought ratings for 2015: June (D2 “severe drought”), July (D1 “moderate drought” to D2 “severe drought”), August (D3 “extreme drought”), September (D3 “extreme drought”) and October (D2 “severe drought”). (Agriculture and Agri-Food Canada, 2021)