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2020 in summary, one of the wettest years following one of the driest (2019)

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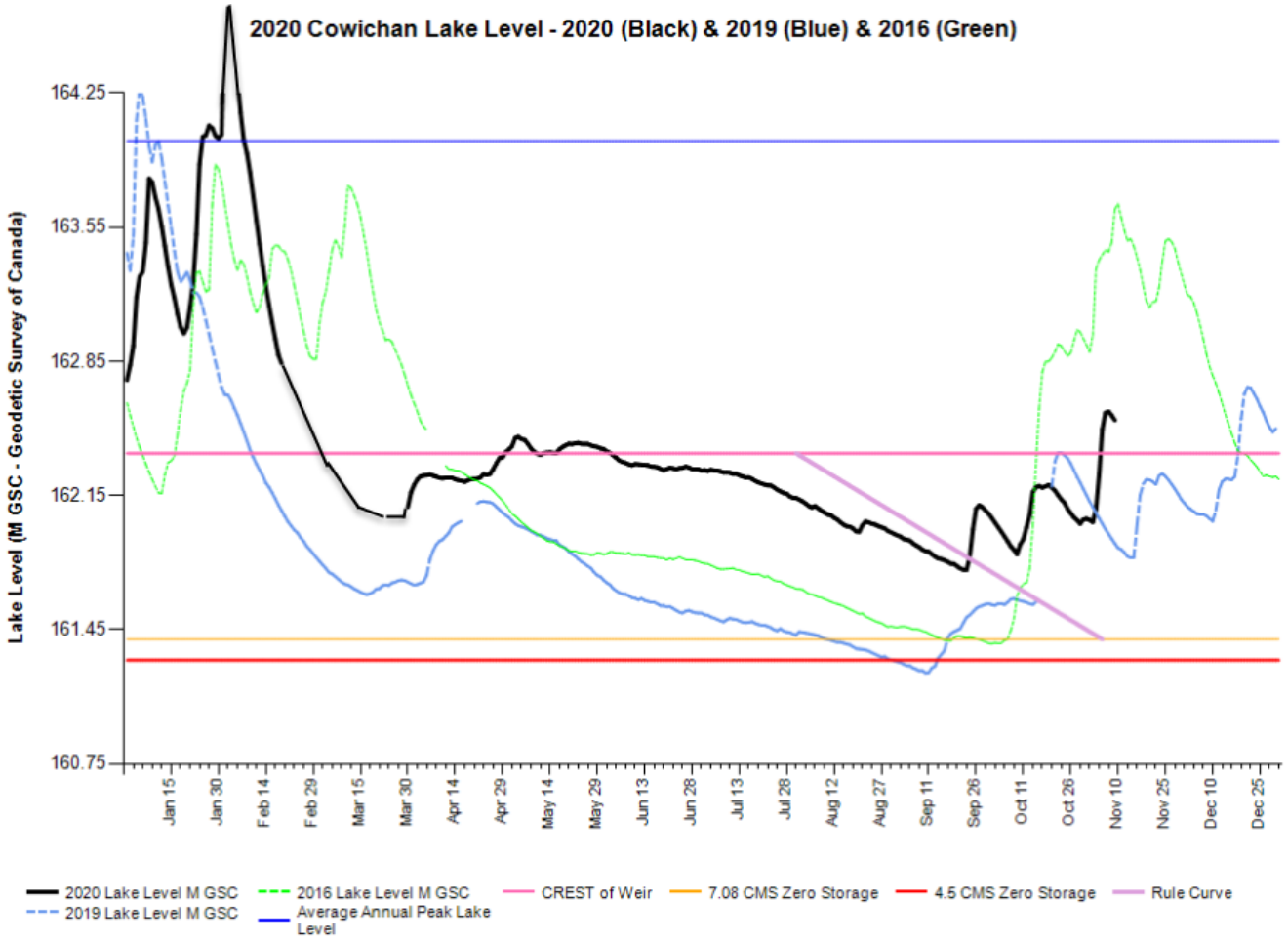
Brian Houle
Manager, Environment

Aerial view of Lake Cowichan Weir

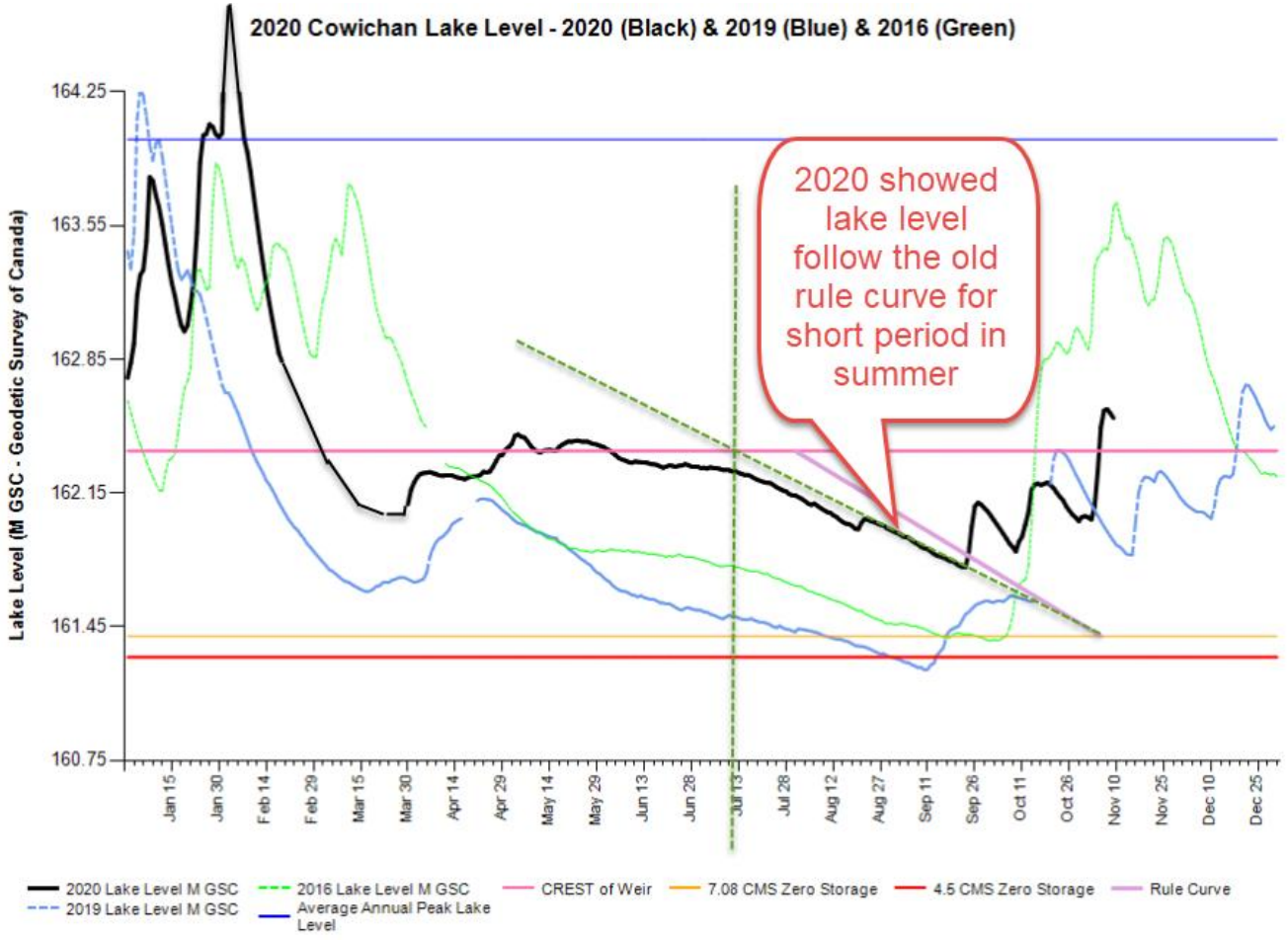
2020 in summary

- 2020 was a wet and cool year and the higher (ideal) river flow rates were sustained all year.
- In contrast, 2019 was driest year for weir operations with 3 weeks of pumping lake into negative storage. 2019 was the most difficult year for weir operations due to dry summer weather and half of normal winter snow pack as winter ended.
- 2016 was the second most difficult year and showed the same lake level as 2020 in spring – 2016 was very dry summer resulting in threat of running out of water while 2020 was wet and of no threat to running out of water

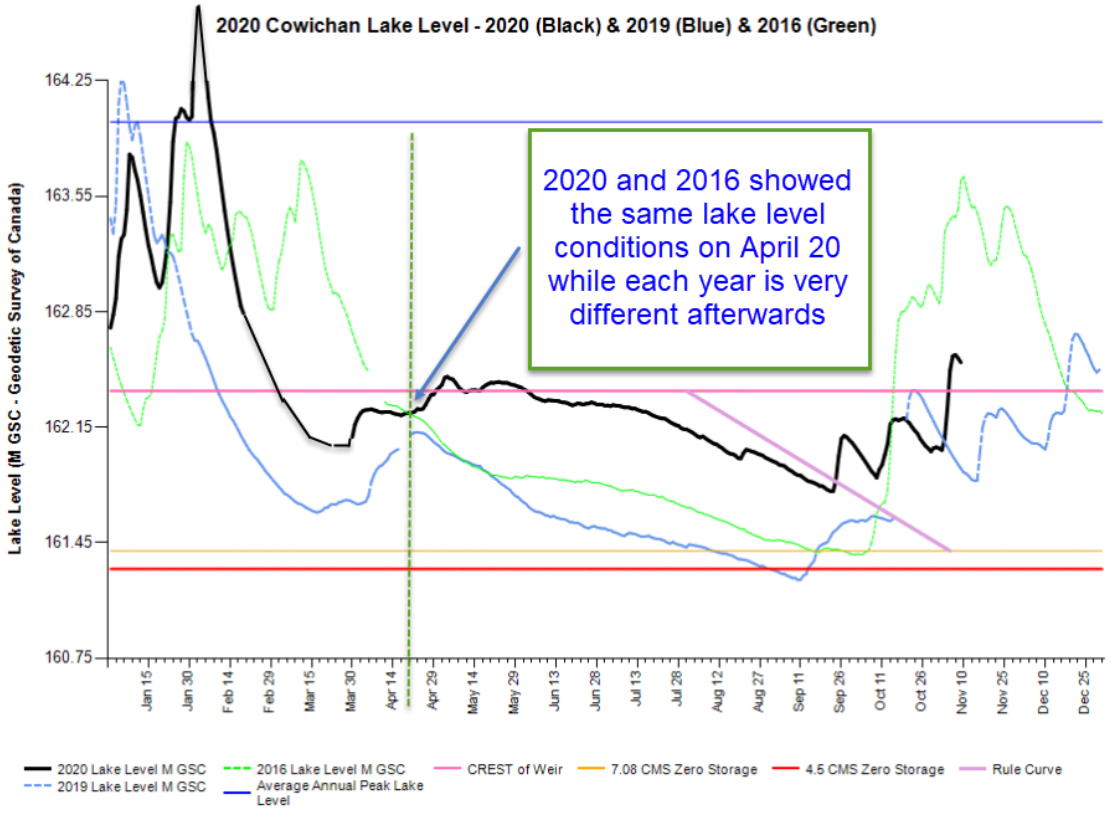
2020 Lake level trend



During 2020 the lake level was at the old rule curve for short period

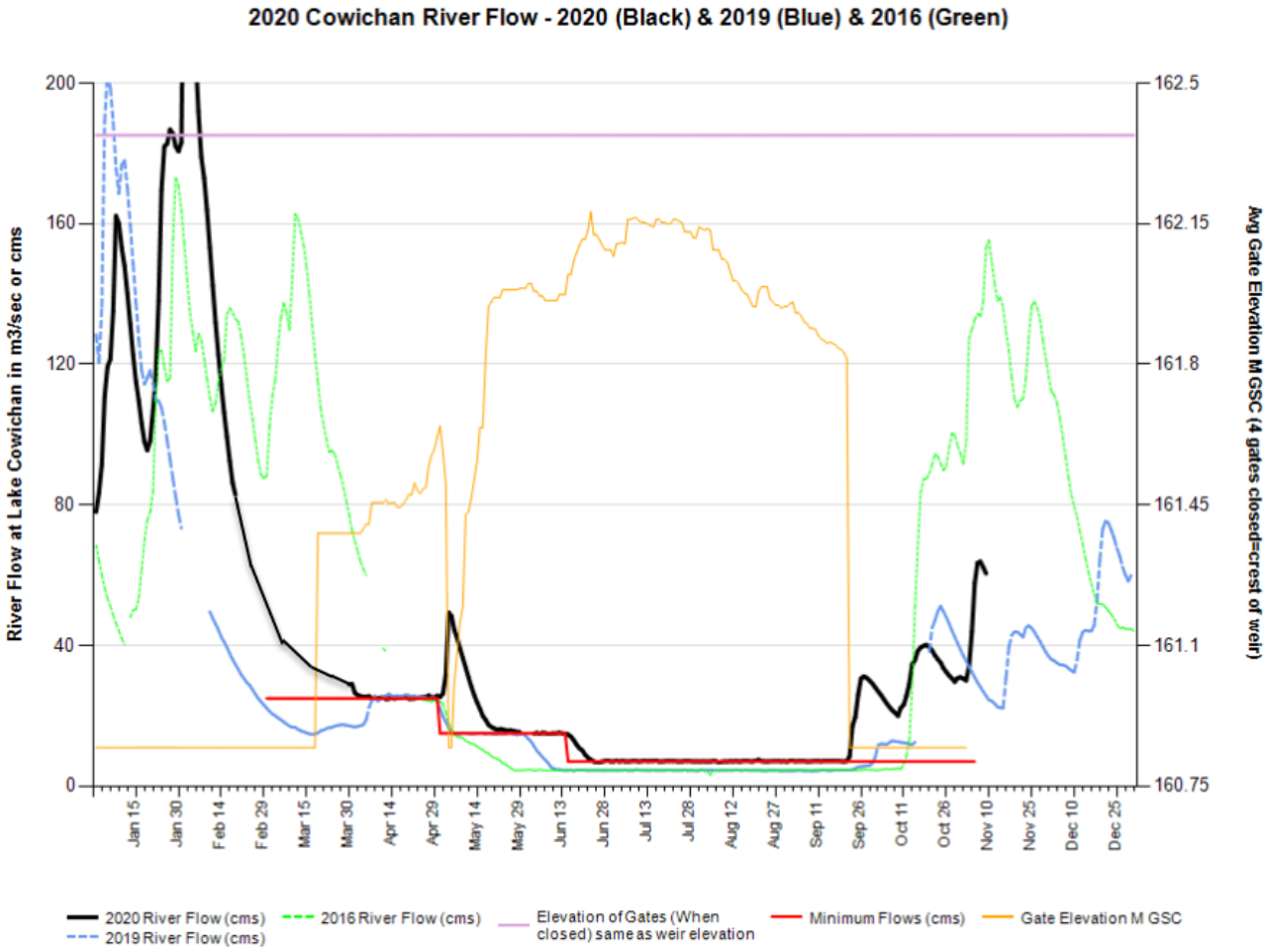


2020 and 2016 had same lake level on April 20. 2016 had dry weather requiring flow reductions, 2020 did not have dry weather and flow held

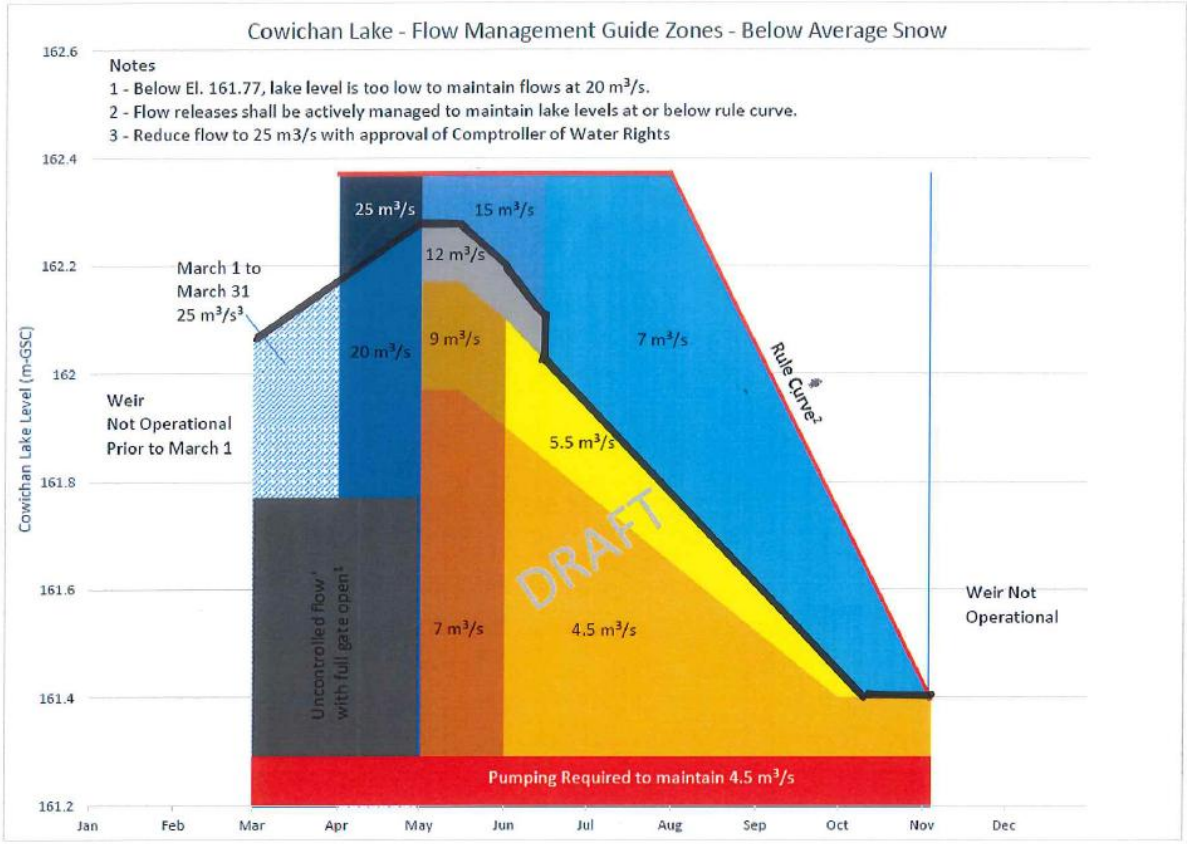


2020 Cowichan River Flows

Low lake levels early in 2020 resulted in call for and approval of early control. Wet weather in April & early control was not needed in 2020

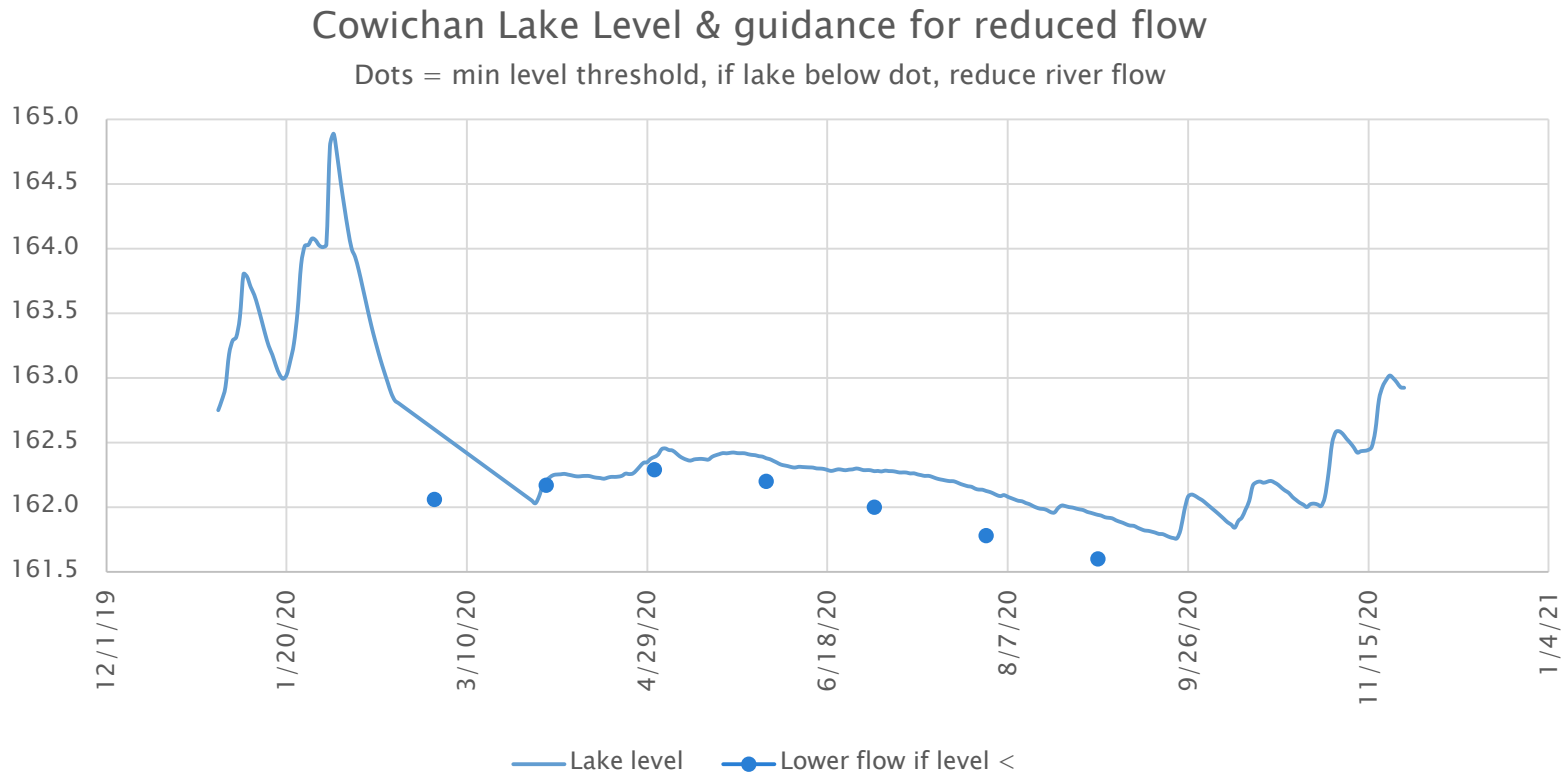


New and still draft – guidance program developed in 2020 (next slide shows lake level remained above the black line)

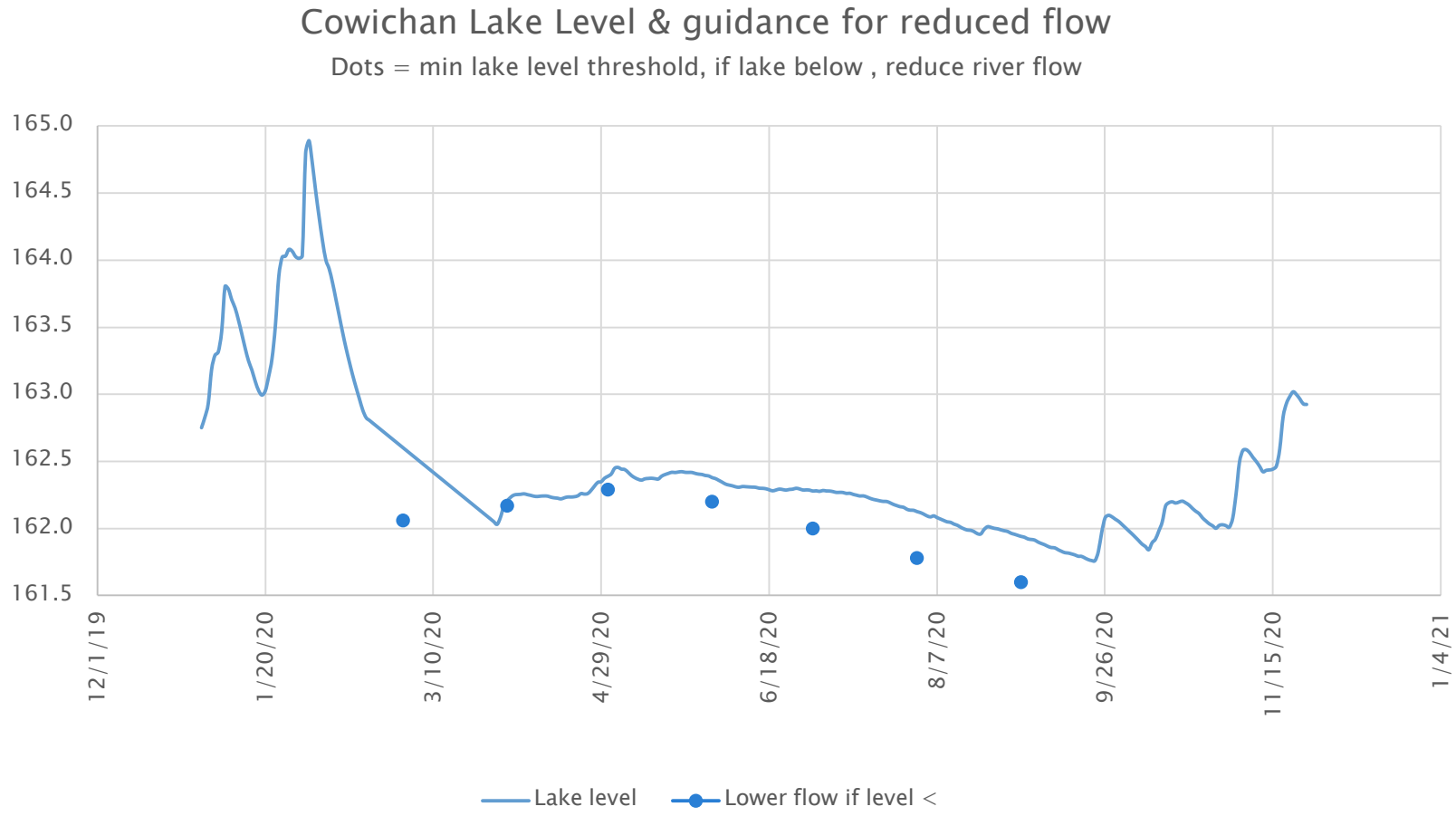


KERR WOOD LEIDAL
consulting engineers

Draft guidance – Lake remained above "minimum" lake level all season – reduced flows not needed



2020 conditions showed model is appropriate in a wet year, model provides guidance to reduce flow only when lake level is lower



2020 control season released 1.5X as much water as 2019 and used only 66% of available water supply

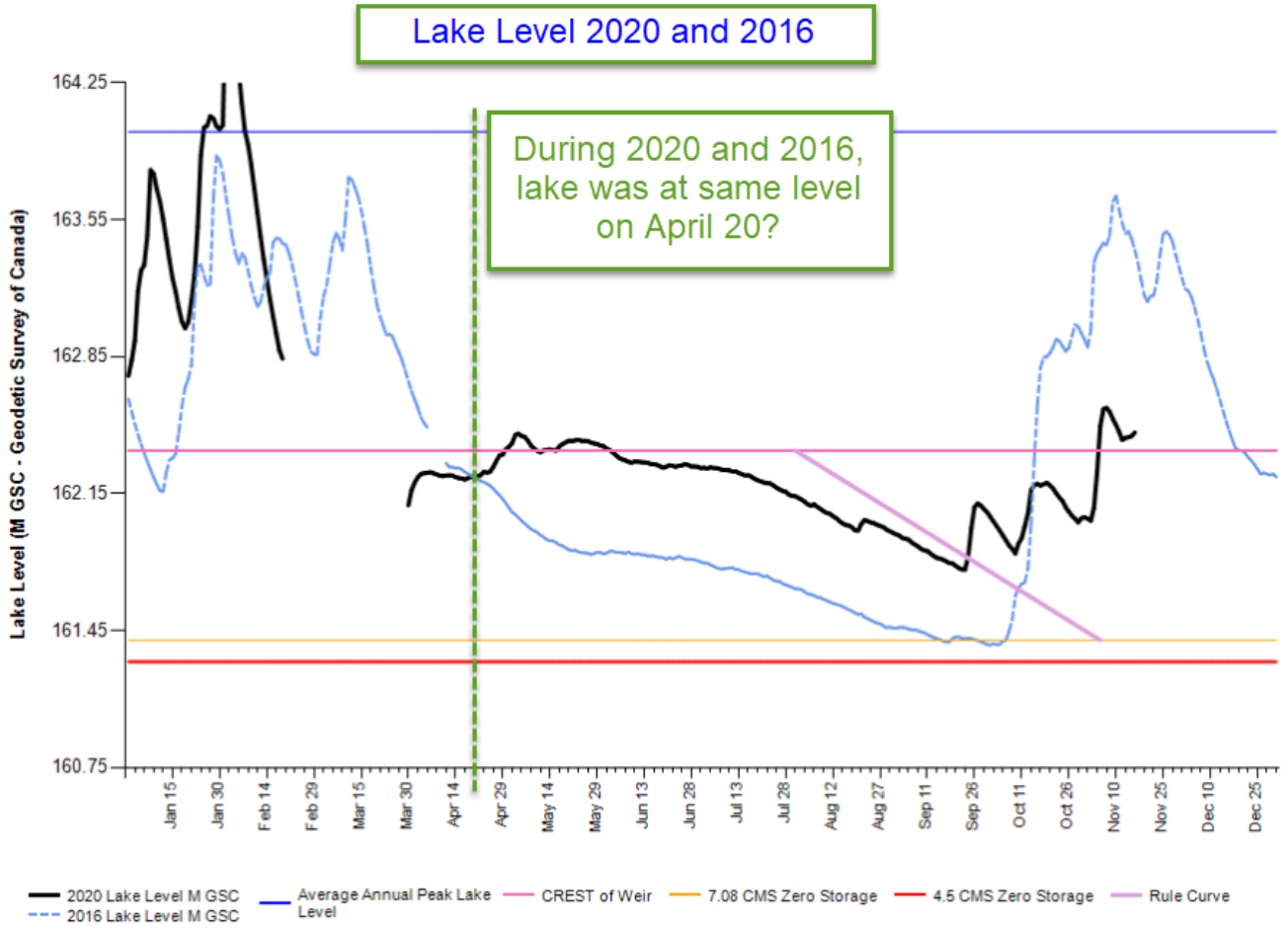
Cowichan River (2019 vs 2020)

Month (period)	2019 water release from lake M3	2020 water release from lake m3	Difference % vs 2019 (2020/2019)	Comments
Jan	356,822,709	362,124,720	101%	2019 and 2020 began with similar conditions - same volume of water releasing to river
Feb	106,067,751	320,937,678	303%	dry weather sets in in 2019, 2020 had 3X as much water released to river in Feb
Mar	46,641,255	126,170,052	271%	Still off control, wet weather of 2020 brought 3x as water to river compared to 2019
Apr	61,420,545	65,829,150	107%	April, with control in place holding 25 cms, both years show similar releases
May	42,345,450	67,699,180	160%	2020 had higher lake levels, 1.6X as much water released in 2020.
Jun	16,470,786	33,272,295	202%	2020 higher lake leves continue, 2 as much water released in 2020
Jul	12,128,736	19,043,292	157%	2020 higher lake levels continue, 1.5X as much water released in 2020
Aug	12,120,306	18,981,806	157%	2020 higher lake levels continue, 1.5X as much water released in 2020
Sep	12,242,171	35,235,114	288%	2020 wet in September, 3X as much water released compared to 2019
Oct	68,507,159	84,560,070	123%	2020 wet weather in October and 1.2X as much water released compared to 2019
Nov	90,543,330			
Dec	133,153,935			
sum of water Apr-Oct	225,235,152	324,620,907	144%	2020 watershed conditions showed 1.6X as much water released from lake to river (compared to 2019) and at end of dry season in 2019, pumping from lake to river or 3 weeks was needed to sustain the reduced flows
Sum of water Jan-Oct	734,766,867	1,133,853,357	154%	With January from 2019 and 2020 showing about same amount of water, year to date January to October showing similar values

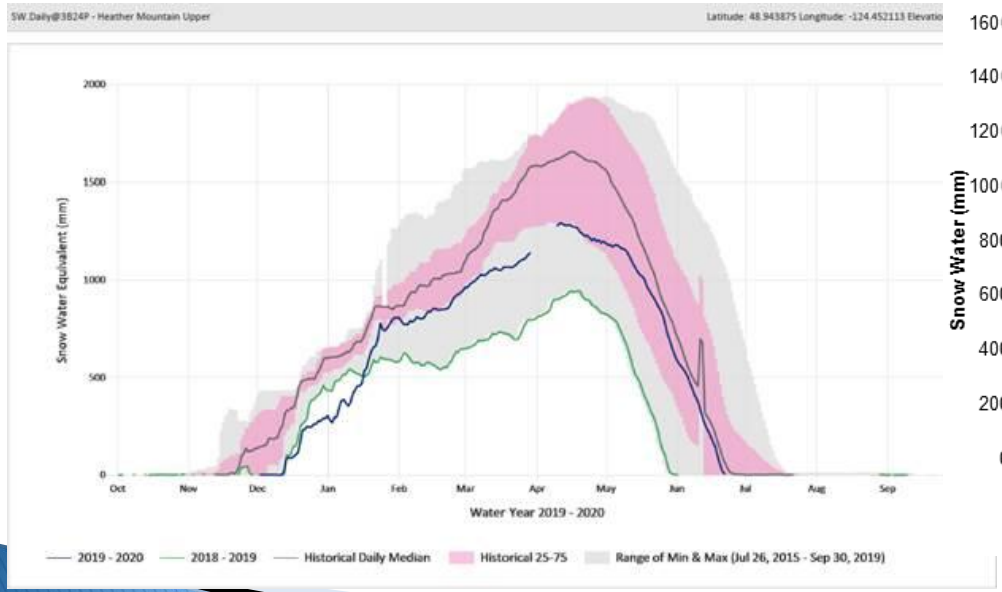
2020 and 2016 were very different years while both showed about the same amount of water released

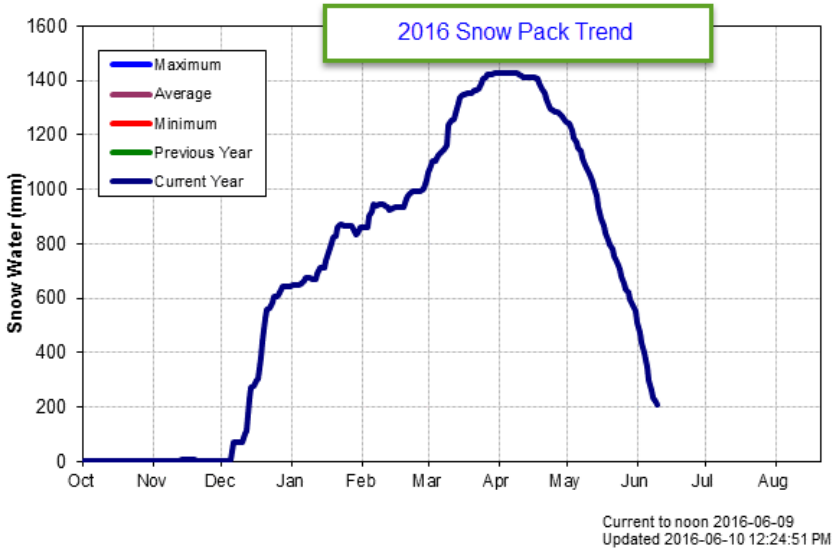
Cowichan River (2016 vs 2020)				
Month (period)	2016 water release from lake M3	2020 water release from lake m3	Difference % vs 2016 (2020/2016)	Comments (2016 was a very dry summer and release flow from lake reduced to <7 cms before end of May)
Jan	221,095,353	362,124,720	164%	Off control, 2020 much higher lake levels throughout January
Feb	293,397,603	320,937,678	109%	Still off control, similar amounts of water released from lake
Mar	312,670,130	126,170,052	40%	Wet spring in 2016, high flows throughout March
Apr	102,426,220	65,829,150	64%	Wet spring in 2016, high flows throughout April
May	30,978,619	67,699,180	219%	low lake level in 2016 resulted in early flow reduction to below 7 cms in May
Jun	11,760,645	33,272,295	283%	2020 showed release of almost 3X as much water as June 2016
Jul	12,162,188	19,043,292	157%	Full flow in 2020 supported 1.6X as much water release to river vs 2016
Aug	11,991,993	18,981,806	158%	Full flow in 2020 supported 1.6X as much water release to river
Sep	12,755,658	35,235,114	276%	2020 had rain in Sept, almost 3X as much water released in 2020 vs 2016
Oct	139,647,475	84,560,070	61%	Wet weather in 2016 supported higher flows in 2016 vs 2020
Nov	331,935,454			
Dec	179,391,968			
sum of water Apr-Oct	321,722,798	324,620,907	101%	April to Oct showed very similar conditions for these two years
Sum of water Jan-Oct	1,148,885,884	1,133,853,357	99%	January to October also showed very similar conditions for these two years while 2016 was difficult year and 2020 had no water shortage concners

2016 and 2020 had the same amount of water in lake on April 20 – what happened?

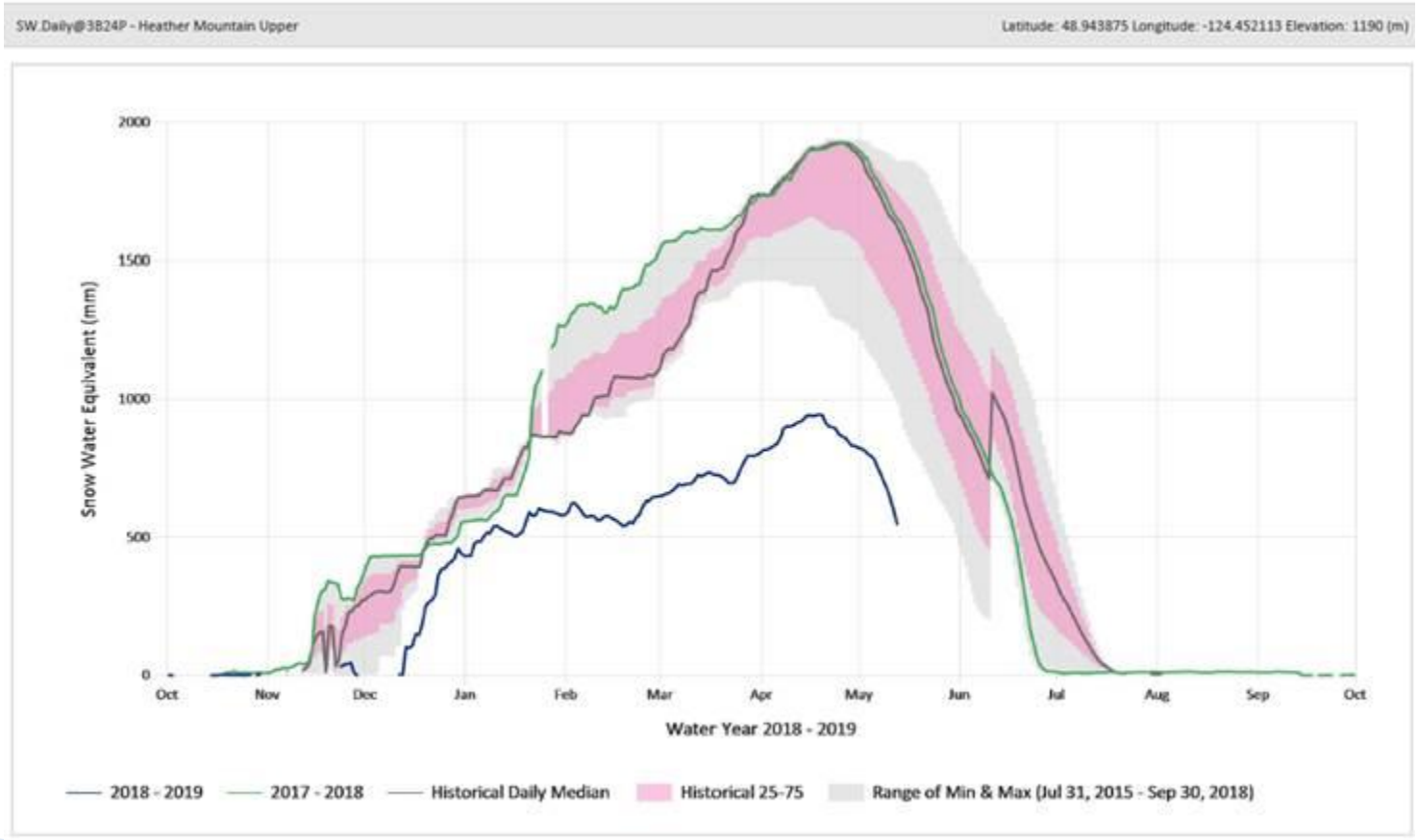


2016 and 2020 show similar snow pack conditions including snow pack melting by mid/late June. 2020 included enough precipitation and cool weather to keep lake water level high all summer, 2016 did not have rainfall during summer.





2019 was the most difficult year ever due to lack of snow pack combined with dry summer weather



And most importantly, annual returning Chinook counts showing high numbers being sustained

Table 1: **Chinook** escapement counts to date for 2020 Strait of Georgia salmon surveys. Counts include adults and jacks combined as well as brood removals. When available jack totals are provided below the table. Averages are total return to river.

Area	System	Survey Type/Count Type	Enumeration conducted by	Date of last count	Number of surveys	Peak Estimate	4 yr Average	12 yr Average
14	Puntledge River - summer ru	Mixed/Cumulative	SEP	2-Nov	-	400*	770	950
14	Puntledge River - fall run	Mixed/Cumulative	SEP	2-Nov	-	9765*	12,080	7,510
14	Big Qualicum River	Mixed/Cumulative	SEP	19-Nov	-	12235*	6,980	7,030
14	Little Qualicum River	Mixed/Cumulative	SEP/StAD	19-Nov	9	5932*	6,840	4,750
14	Englishman River	Periodic/PL+D	BCCF/StAD	9-Nov	7	588*	1,050	1,010
15	Sliammon Creek	Fence/Cumulative	TFN	17-Nov	-	14*	110	130
15	Theodosia River	Periodic/PL+D	TFN	16-Nov	11	25*	70	50
16	Chapman Creek	Mixed/PL+D	SN/JW/SCSES	-	-	-	20	N/A
17	Nanaimo River - spring run	Periodic/PL+D	SFN/StAD	9-Oct	2	9*	N/A	N/A
17	Nanaimo River - summer rur	Periodic/PL+D	NRSS	22-Oct	19	574*	560	730
17	Nanaimo River - fall run	Periodic/PL+D	NRSS	9-Nov	0	4030*	4,600	3,880
17	Chemainus River -fall run	Mixed/Cumulative	QARS/StAD	6-Oct	1	6	120	290
18	Cowichan River - fall run	Fence/Cumulative	CT/StAD	6-Nov	-	22390*	20,000	10,090
19	Goldstream River	Fence/Cumulative	GVSEA	9-Nov	-	3	10	50
20	Sooke River	Periodic/PL+D	BCCF	3-Nov	4	614*	630	610

*Jacks included: Puntledge summer unknown & fall 731, Big Qualicum 1277, Little Qualicum 930, Englishman 168, Theodosia 4, Sliammon 5

Nanaimo Summer 353, Nanaimo Fall 1532, Nanaimo Spring (above second lake) 3, Cowichan 13,290, Sooke 112

In conclusion

- 2020 was excellent water year for the Cowichan
- Wet and cool weather during April and rest of summer kept lake level high throughout the dry season
- With mostly dry summers predicted (an impact of climate change), added storage of water in Cowichan Lake is needed to ensure sustained flows in Cowichan River until return of fall rains
- When faced with dry summer weather, new draft flow guidance model can help guide weir operations. River flow reductions are key actions to be taken when faced with water supply shortages.

Thank you – Any questions?

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