Cowichan Lake and River
Catalyst Paper Crofton Division
Presentation to Cowichan Watershed Board

March 27, 2017,

Presentation by Brian Houle

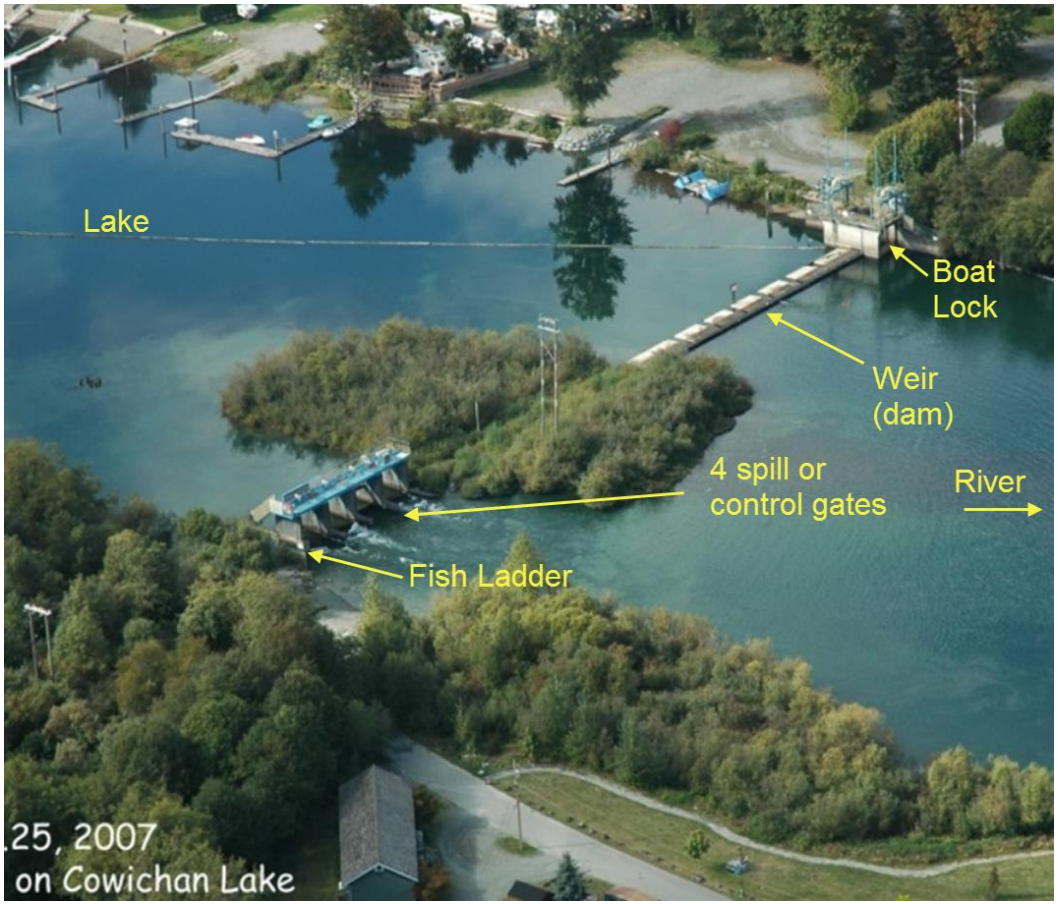
Catalyst

Fresh thinking on paper

Agenda

- Summary overview of 2016 dry season
- Update of 2017 year to date conditions in watershed (lake level, snow pack)
- Cowichan Lake Weir, boat lock and spill gates
  - Physical structures
  - Operational considerations
- Cowichan River Pump House
  - Physical structures
  - Operational considerations

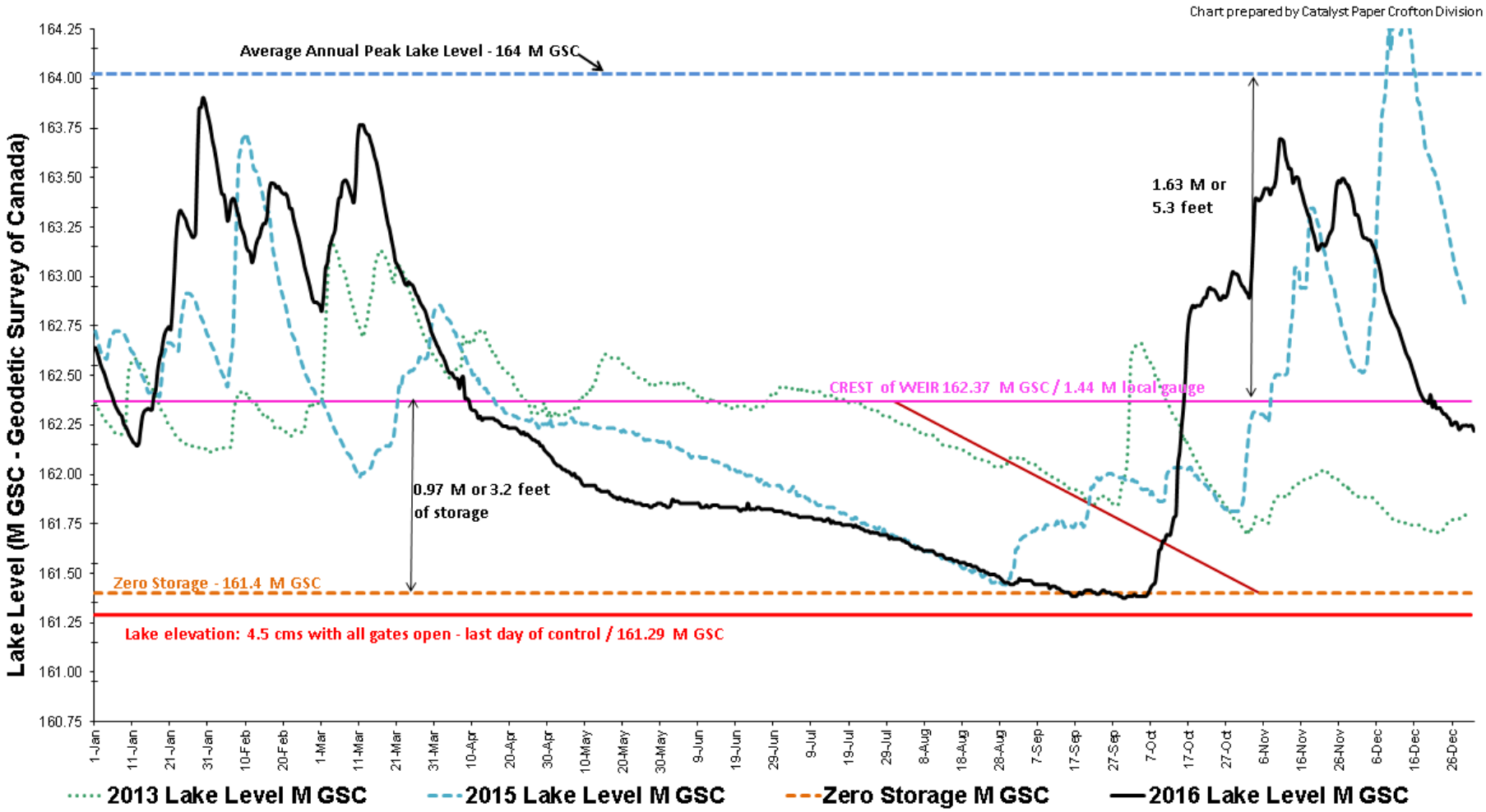
Aerial view of Lake Cowichan Weir



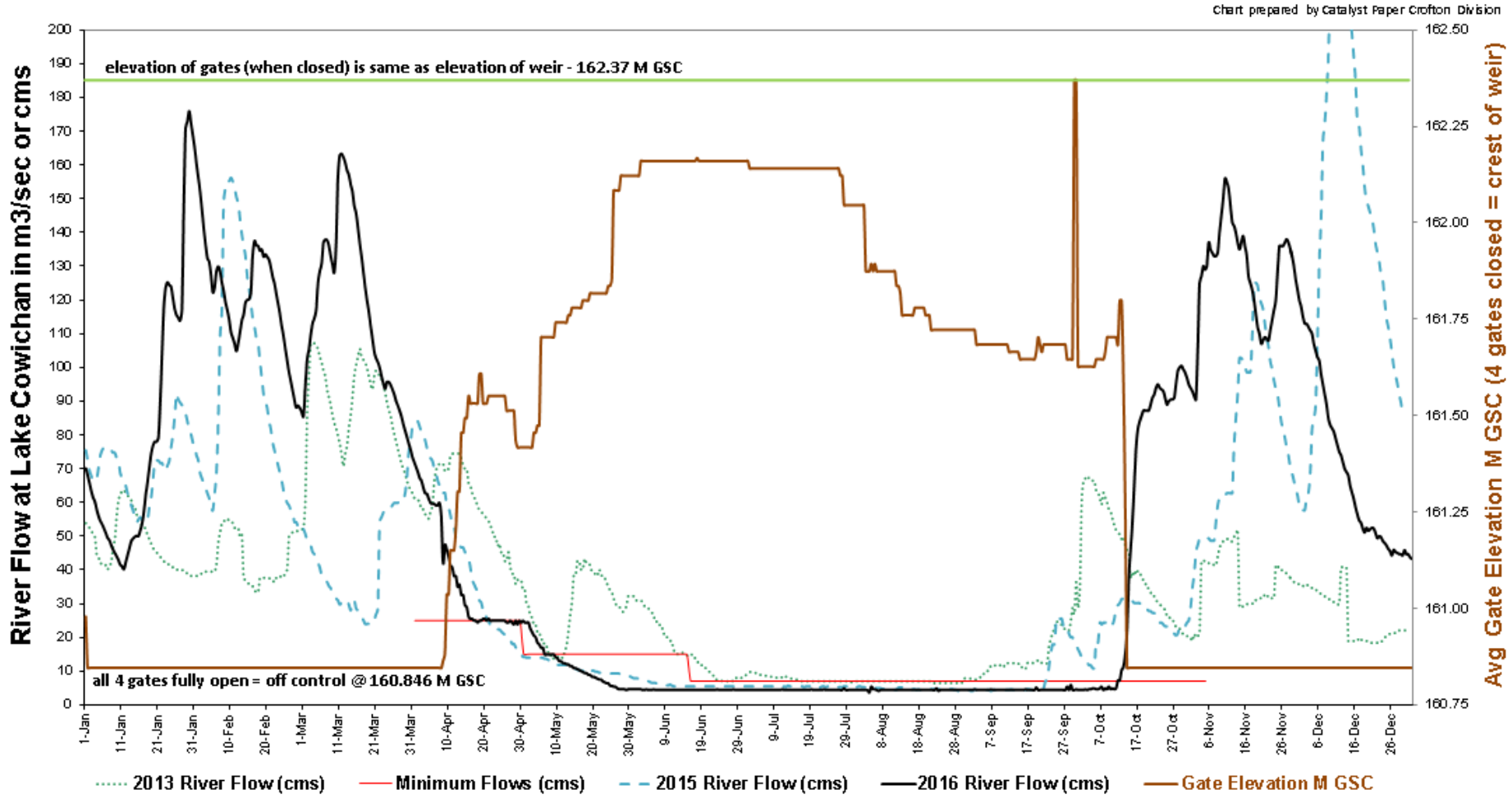
2016 Operations review

- Due to higher river flows through wet season, concern for fish survival (mostly emerging redds) prevented reduction of release flow to below 25 cms prior to April 30 – optimal flows
- Evident from as early as April 1, expectation that 2016 would be most challenging year for low lake levels / lower river flows
- Electrical infrastructure installed to be ready to use pumps to sustain river. Pumps and piping fine tuned for environmental concerns and operated successfully in trial mode – not needed in 2016 – rainfall began before loss of flow

2016 Cowichan Lake Level - 2016 (black) & 2013 (Green) & 2015 (Blue)



2016 Cowichan River Flow: 2016 (black) 2013 (Green) & 2015 (Blue)



While challenging- 2016 had increased Chinook escapement reported by DFO

Table 1: **Chinook** escapement counts to date for 2016 Strait of Georgia salmon surveys. Counts include adults and jacks. Chinook escapement estimates are normally completed by November, so comparisons between current totals and average historical estimates should be interpreted with caution. Also some counts are minimal due to weather and limited surveys during the peak of the run.

Area	System	Survey Type/Count Type	Enumeration conducted by	Date of last count	Number of surveys	PL+D count	4 yr Average	12 yr Average
14	Puntledge River - summer run	Mixed/PL+D	SEP	02-Nov	-	843	780	1,290
14	Puntledge River - fall run	Mixed/PL+D	SEP	02-Nov	-	8,523	5,140	7,090
14	Qualicum River	Mixed/PL+D	SEP	14-Nov	-	5,150	6,290	8,080
14	Little Qualicum River	Periodic/PL+D	SEP/StAD	14-Nov	-	5,641	3,260	4,060
14	Englishman River	Periodic/PL+D	BCCF/StAD	01-Nov	5	249	890	890
15	Sliammon Creek	Fence/Cumulative	Tla'amin Nation	03-Nov	-	37	210	180
15	Theodosia River	Periodic/PL+D	Tla'amin Nation	10-Nov	5	102	N/A	N/A
17	Nanaimo River - fall run	Periodic/PL+D	Hatchery	12-Oct	5	1,947	3,260	3,590
17	Chemainus River -summer run	Periodic/PL+D	QARS/StAD	19-Jul	2	36	N/A	N/A
18	Cowichan River - fall run	Fence/Cumulative	Cowichan Tribes/StAD	14-Oct	-	9,109	6,660	4,780
19	Goldstream River	Periodic/PL+D	SEP/Goldstream	16-Nov	-	13	25	90

Cowichan total includes fence count (5331 adults and 3551 jacks) plus 427 collected for broodstock

SEP = Salmonid Enhancement Program, DFO

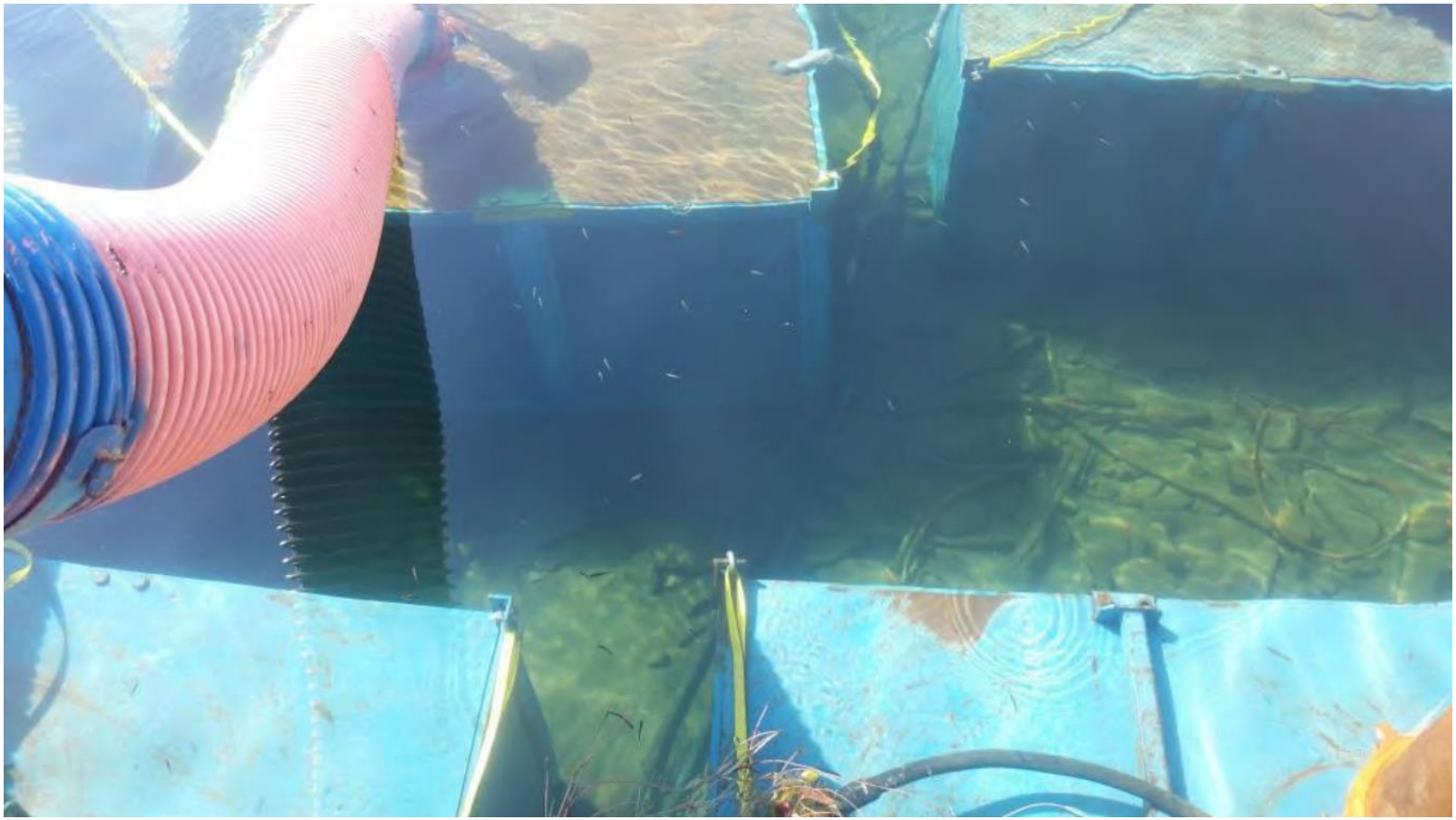
StAD = Stock Assessment Division, DFO

BCCF = British Columbia Conservation Foundation

QARS = Q'ul-lhanumutsun Aquatic Resources Society

While 20 pumps were trialed, 15 pumps required for base flow of 4.5 cms

Pumps within screened box – small fish in area not evidently impacted by pumps



Short, medium and long term strategy

- Immediate - manage water/use pumps if needed
  - Use pumps to sustain river in fall if needed to sustain 4.5 cms
  - Electrical infrastructure in place –
  - Manage existing storage to prevent this outcome
- Short/Medium term – Stop Logs on weir
  - Engineering/seismic assessment – not feasible/affordable
- Long term – rebuild weir for climate change impacts
  - Catalyst Paper working jointly with CVRD and First Nations
  - 1: Identify storage requirements in Lake Cowichan to meet all stakeholders needs given climate change and the impacts of recurring droughts.
  - 2: Apply for $1.25 Million funding request to develop shovel ready project to provide the needed additional storage to secure the Cowichan River and improve conditions for the many stakeholders that depend on this resource

Catalyst Paper spending for Cowichan River in 2016

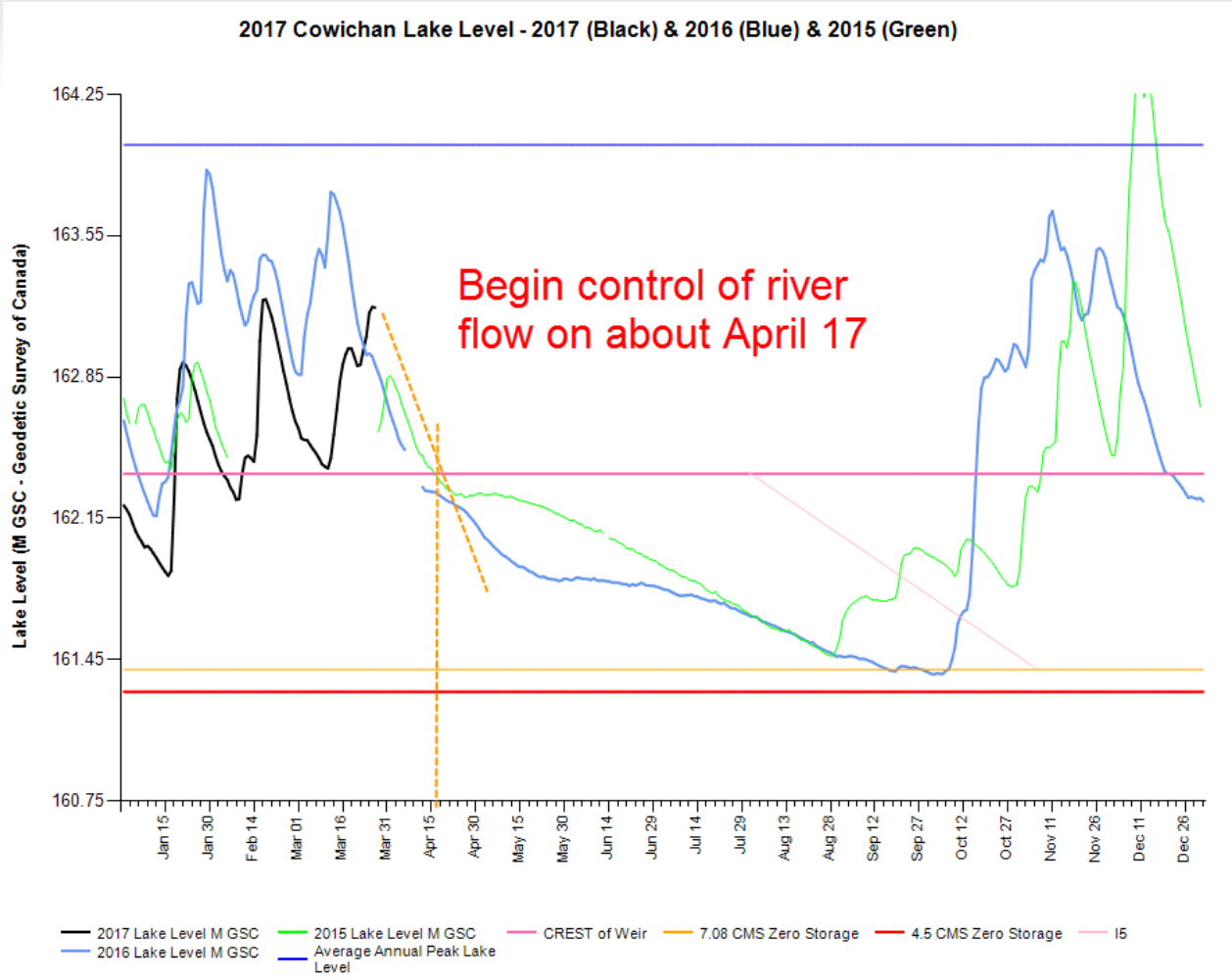
- One time electrical infrastructure: $320,000
- 2016 pumping operation: $497,000
- Secure potable water to town of LC: $4,000
- Consultant to assess stop logs on weir: $70,500
- LGL support in river/DFO authorization: $106,300
- Madrone support pumping from lake: $18,000
- Kerr Wood Leidal – modelling inventory: $5,000
- BCCF – support/Stoltz remediation: $30,500
- North West Hydraulics /North Arm flow: $2,500
- Cowichan Watershed Board – education: $1,700

- Total $ in 2016(excl. Catalyst salaries): $1,055,500

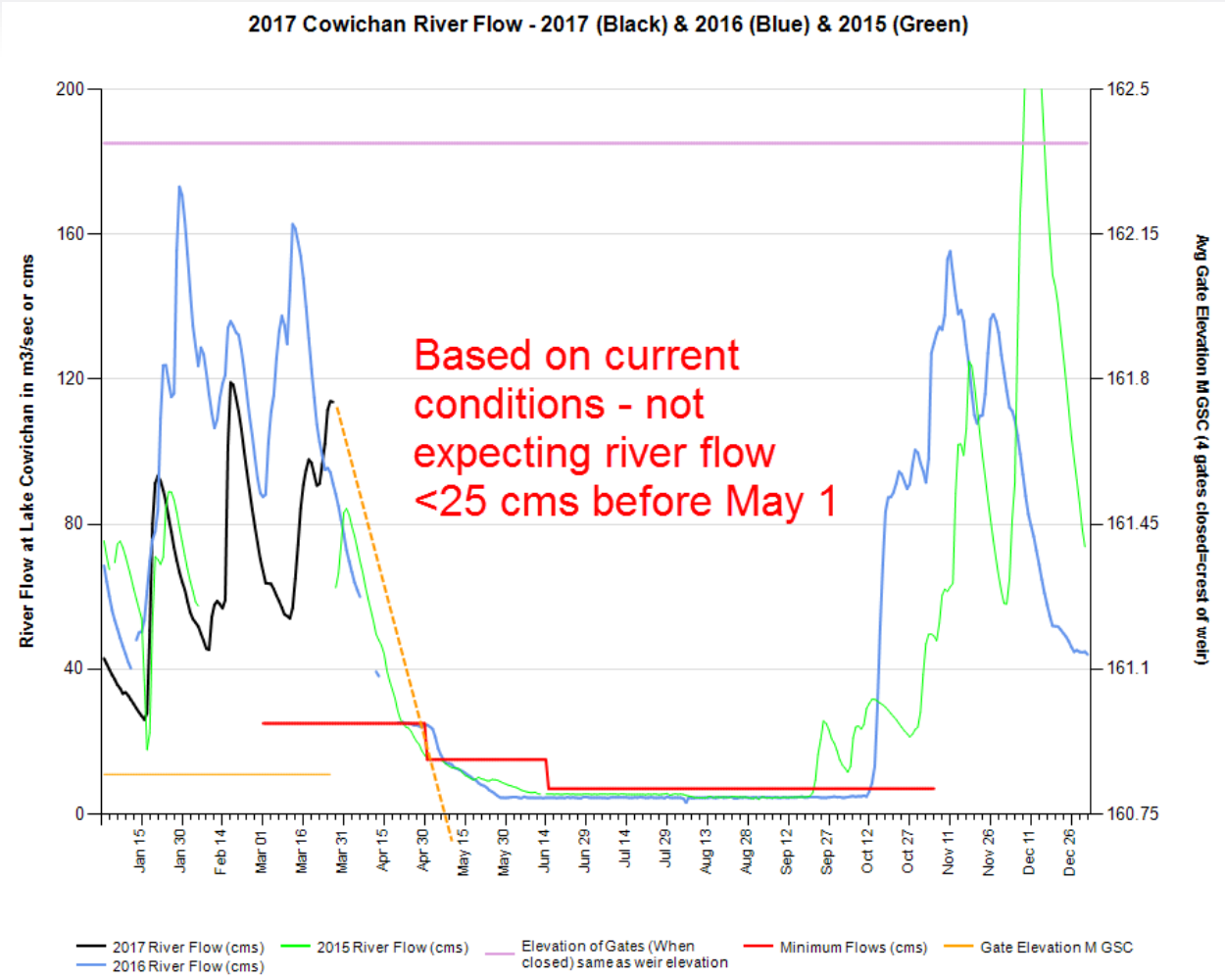
2017 Operations – current conditions

- Snow pack very recently climbing to levels that are higher than in 2016 on this date
- Recent rainfall adequate to allow river control to begin as per license – after April 1.
- Scheduled to begin weir operations on April 5
- April 5 (early evening) – boat lock gates to be lowered / river flow impacted but not on control
- April 7 (2 days later) first action to control river flow & lake level – expect control after April 15.
- Current conditions appear okay to sustain 25 cms through to end of that optimal flow period ending May 1.

Worst case conditions of dry weather – expect to begin control of river flow after April 15



With current lake level, enough water in lake to sustain 25 cms through entire April 1-30 time period



Heather Mountain snow pillow

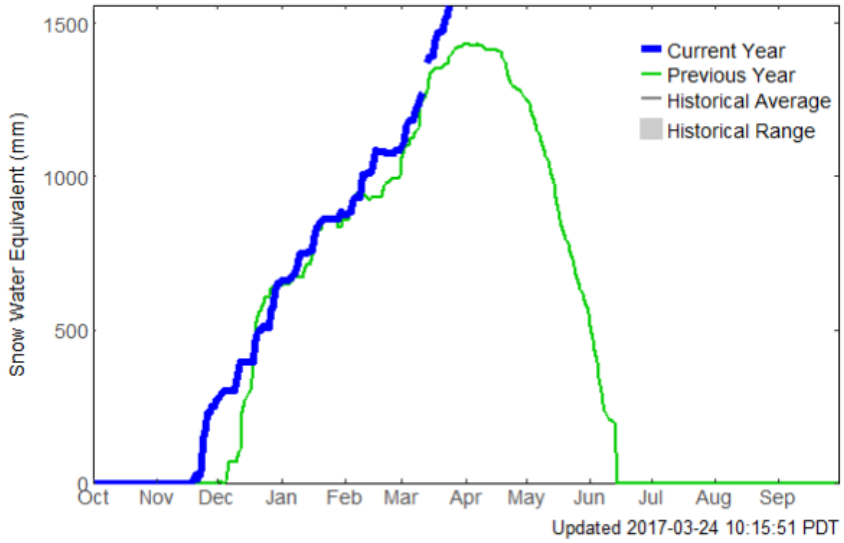
2017 now showing more snow than 2016 – very helpful

3B24P - HEATHER MOUNTAIN UPPER

Drainage:	Vancouver Island	Owner:	BRITISH COLUMBIA | Ministry of Environment
Latitude:	48° 57'	Year Established:	2015
Longitude:	124° 33'	Variables:	Air temperature,
Elevation:	1190 m		snow water equivalent, and snow depth

Download last 7 days of hourly real-time data*: Click here

Download daily archive data: Click here

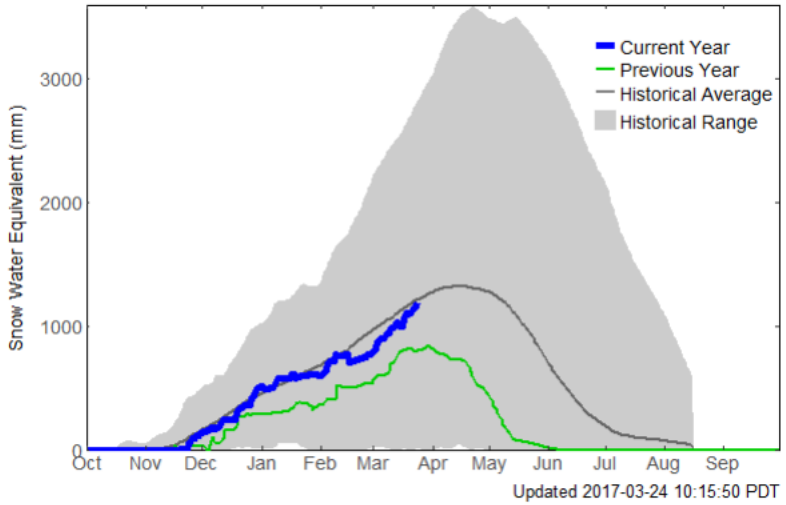


Jump Creek snow pillow showing improved conditions, @ historical avg

3B23P - JUMP CREEK

Drainage:	Vancouver Island	Owner:	BRITISH COLUMBIA | Ministry of Environment
Latitude:	48° 58' N	Year Established:	1995
Longitude:	124° 16' W	Variables:	Air temperature, precipitation,
Elevation:	1,134 m		snow water equivalent, and snow depth

Download last 7 days of hourly real-time data*: Click here
Download daily archive data: Click here



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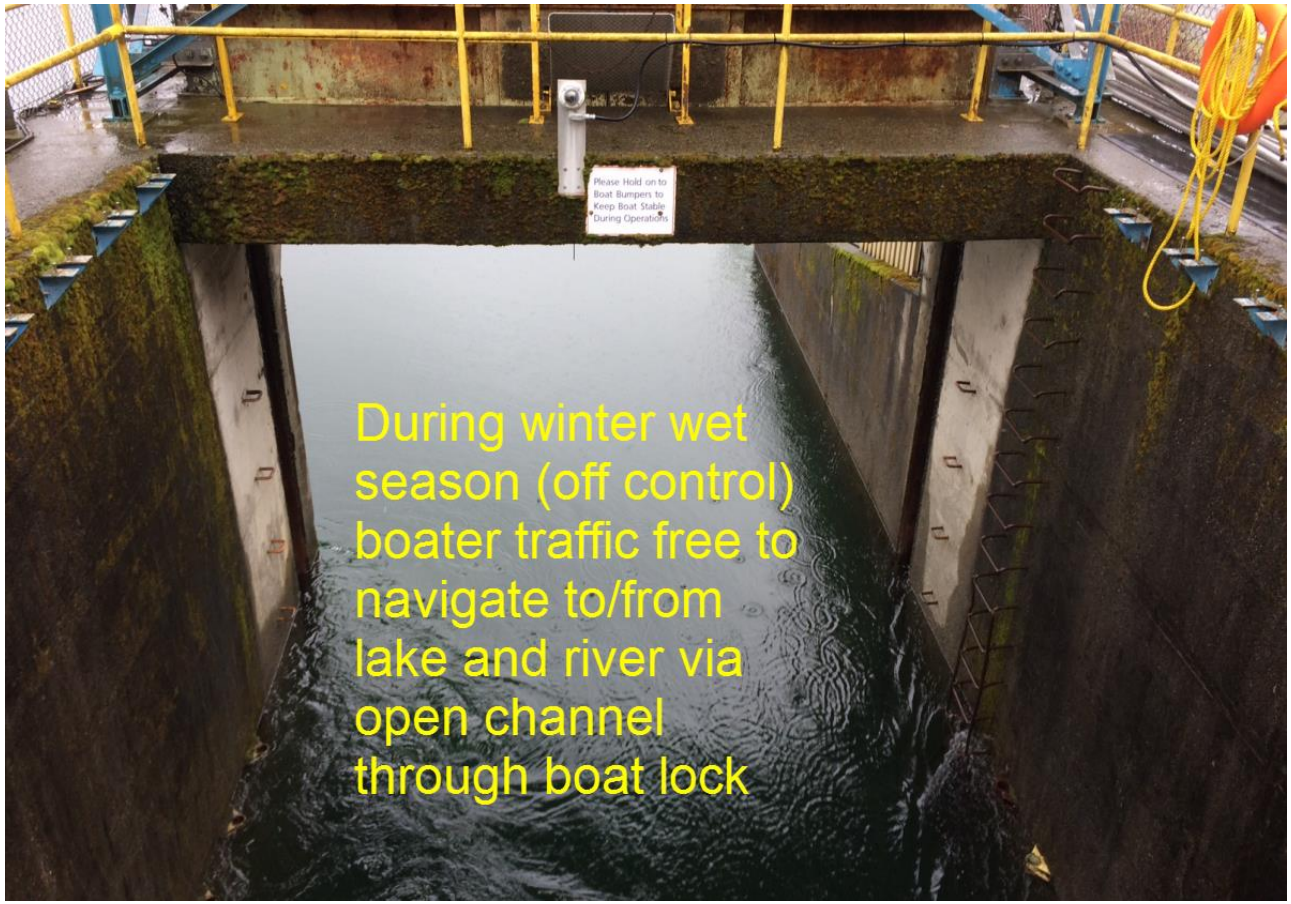
Cowichan Lake Weir, Boat Lock, Spill Gate Control Structure and Fish Ladder

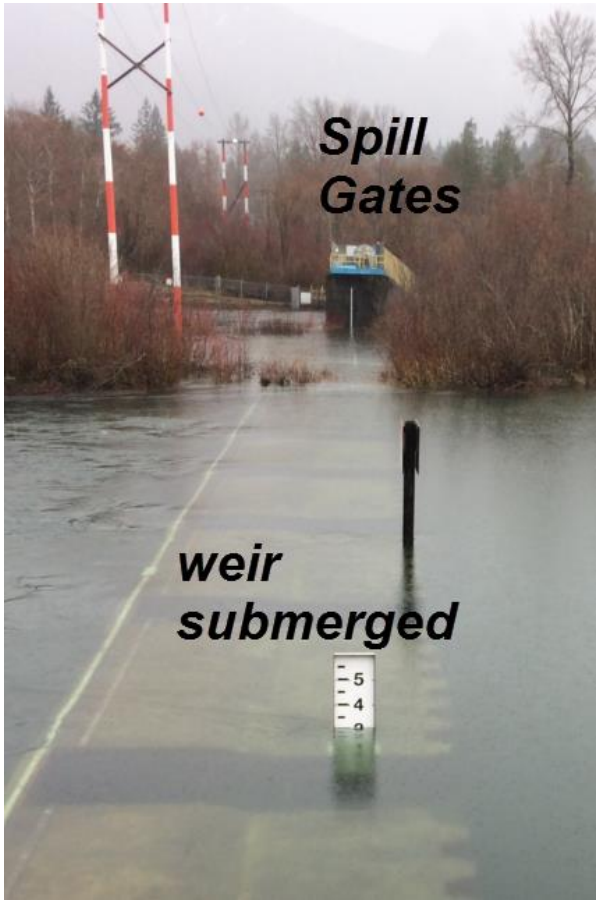
Winter season boat lock gates are raised

During wet season, gates are elevated

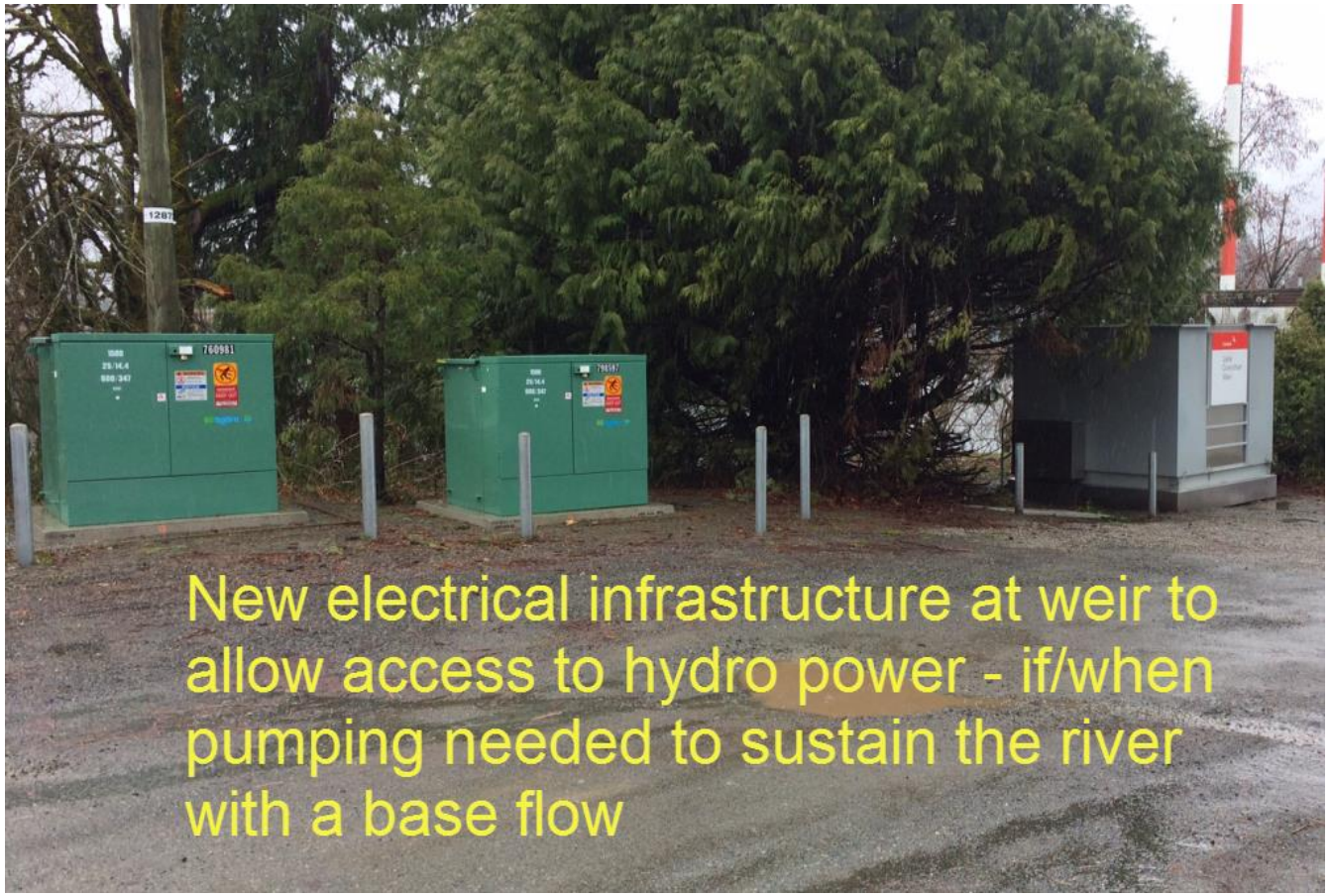


With high lake levels, weir submerged

View of weir and spill gate structure



New electrical infrastructure for pumps



Looking North from on top of gate structure

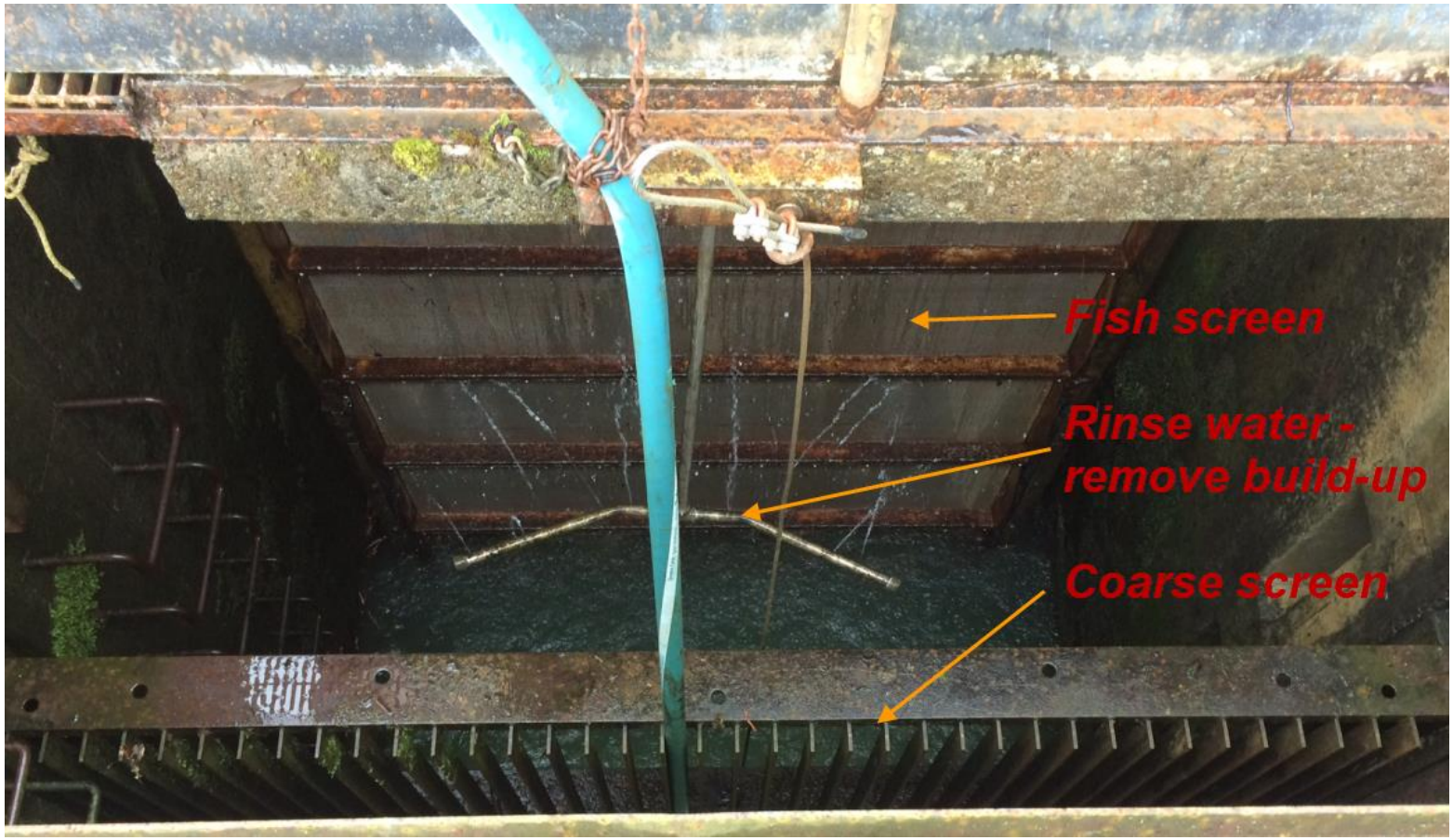
Catalyst Paper River Pump House

- Located on North side of River on Cliffs Road
- 7 installed pumps – 6 electrically connected and operable
- Pumps operated to meet demand for water at mill – starting and stopping pumps to meet water use rates
- Surge Tower just to North (West of Duncan Hospital) ensures sustained gravity feed to mill
- 15 km pipeline to deliver water to mill filtration – water treatment plant

Looking up river from pump house

Looking down river from pump house

Coarse and fine screens: To ensure only water removed from Cowichan River



Fine screen – fish cannot pass through

Pump House equipped with 7 pumps

Shown are the motors

Long vertical shafts down to water level where pumps are located

Earlier lower flows helps extend lake supply In previous 5 years, control preceded April 1 two times – and in the end not needed

Review of previous years activities related to managing water storage in Lake Cowichan

Year	Boat Lock lowered on:	*Control of river flow on:	Date flow <25cms	Date flow <15 cms	Date flow <7cms	Date flow at 4.5cms	Date lake at Zero storage	Date of flow recovery in fall
Guidance / License	1-Apr	3-Apr	1-May	15-Jun	not auth (request)	not auth (request)	5-Nov	weather dependent
2012	2-Apr	14-May	29-May	19-Jul	30-Aug	-	-	9-Oct
2013	11-Mar	22-Apr	May3-13, June 7	16-Jun	21-Aug	-	-	3-Sep
2014	15-Apr	5-May	15-May	11-Jun	27-Jun	7-Aug	-	14-Oct
2015	13-Mar	Mar 15-23, Apr 11	21-Apr	30-Apr	4-Jun	8-Aug	-	21-Sep
2016	6-Apr	8-Apr	1-May	9-May	23-May	27-May	15-Sep	11-Oct

* "Control" with gate adjustments to begin no sooner than 2 days after lowering boat lock

* After spring service is completed / electricity provided - boat lock gates to be lowered to prevent public access to electrical equipment