Cowichan Water Use Plan

Public Information Meeting

June 11th, 2018

A community planning initiative in partnership with:

compass kwl ECOFISH RESEARCH

CVRD Cowichan Watershed BOARD Catalyst

Goals for Tonight

- To provide an update on the community planning process for the Cowichan WUP
- To summarize the main conclusions and recommendations of the Public Advisory Committee
- To discuss the implications of the recommendations and the next steps in the process

The meeting tonight is an opportunity to learn and ask questions about the proposed solutions to address climate change and water insecurity issues

Agenda

Presentations

- Background and Overview
- Water Management in the Cowichan Region
- Conclusions and Recommendations

Question and Answer Period

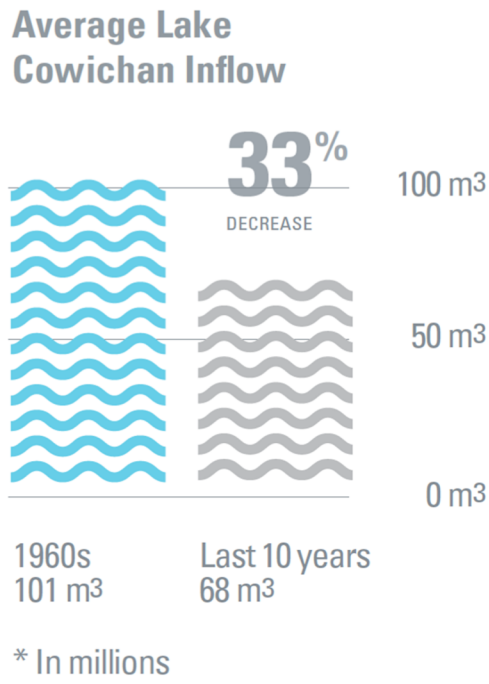
Next Steps and What to Expect

Water Management on Cowichan Lake

The current Cowichan water management system and weir – *built in the 1950s* – no longer has the capability to reliably provide enough water (for fish and other uses) down the Cowichan River during dryer summers & falls

Water Management and Climate Change

- Climate change is the key driver that has resulted in a third less water coming into Cowichan Lake since the 1960s. 8 out of the last 15 years have been drought summers (including three of the last four). In 2016, lake levels were so low in September that pumps were installed with the anticipation of pumping lake water to increase flows to the river.



- This drying trend is only expected to worsen in coming years with much smaller snowpacks and longer warmer drier summers by the 2050s.
- A critical point has arrived to make hard decisions on how future water resources will need to be managed between river flows, lake levels and potentially building new infrastructure to store more water.

Without action, what's at stake?

By the 2050s,

- Chinook, Coho and Steelhead populations will reach critically low levels well before the 2050s
- Significant portions of the Cowichan Estuary will be dewatered in the summers
- Significant adverse impacts to nearshore and riparian habitats around the lake, further threatening endangered species
- River flows will be too low to support water based recreation and tubing in most summers
- Less recharge for valley aquifers impacting irrigation wells and domestic water supply wells
- Catalyst Paper will regularly need to shut down in the summers as a result of low river flows
- Domestic water supply around the lake will be affected and river flows will not be adequate to dilute waste water effluent in most summers





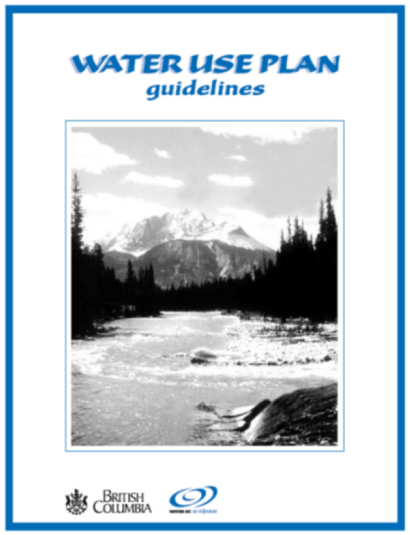

Community Planning Process

The CVRD, Cowichan Tribes, the Cowichan Watershed Board, and Catalyst Paper partnered together to initiate a community planning process to explore future water use needs alongside a range of different potential water supply and storage options. The goal was to seek agreement on a long-term solution to better ensure water resources are sustainable and available to meet the region's future water use requirements.

The costs for the community planning process were made through a grant from the Canada and BC Clean Water and Wastewater Program with additional funding provided by Catalyst Paper, Cowichan Tribes and the Cowichan Watershed Board.

Water Use Planning in BC

Key Points



- BC Provincial WUP Guidelines (1998)
- Technical plan defining the operating parameters of existing or new water control facilities under the *Water Sustainability Act*
- Not a comprehensive watershed management plan
- Recognizes existing legal and constitutionally protected Aboriginal Rights and title
- Seeks input from the full range of water use interests
- Community based planning is a requirement with an aim of reaching consensus
- Follows a structured process where formal trade-off analysis is undertaken to find a balance across competing interests

Cowichan Water Use Plan

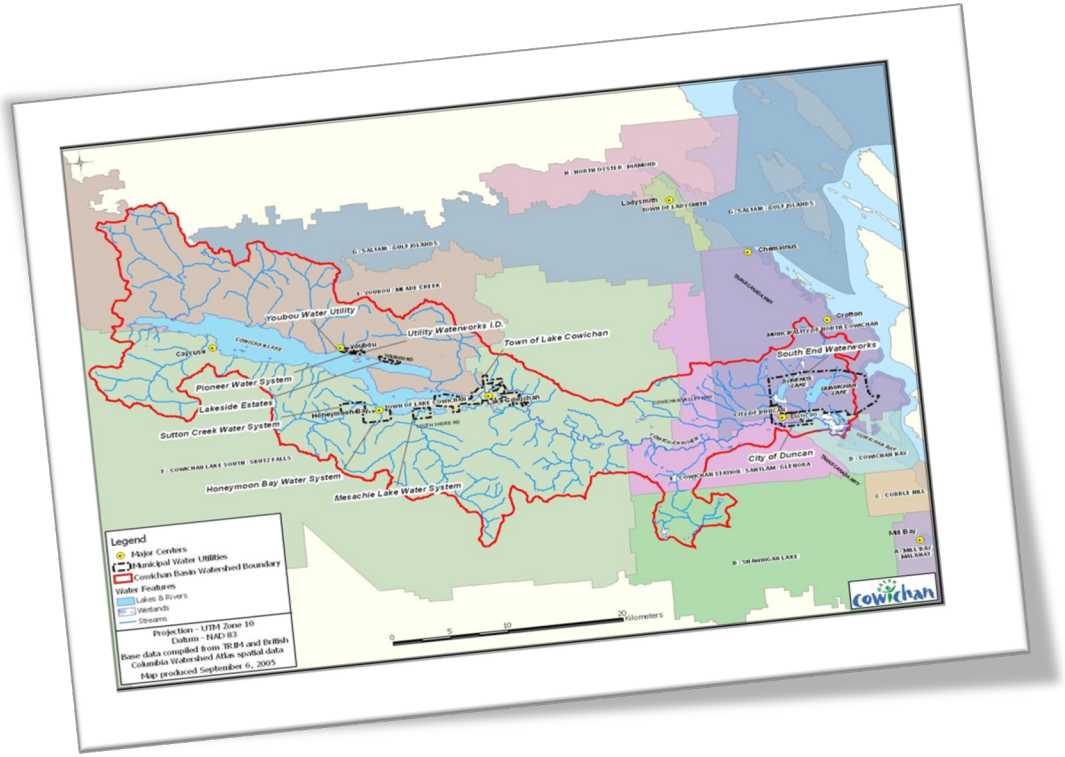
- A public planning process was initiated in the fall of 2017
- A **public advisory group** (PAG) was established and comprised of 19 community members representing First Nations, local governments, residents, businesses, industry, lakefront property owners, community groups, and provincial and federal agencies

- The **PAG** has been meeting regularly over the past 7 months and had their final meeting on May 8, 2018
- The **PAG**'s mandate was to identify and assess different water use alternatives and seek agreement on a balanced long-term solution to meet the region's water use needs into the future, taking into account social, economic and environmental values.

Cowichan Water Use Plan

Scope of the Planning:

- Limited to water use associated with potential changes in lake levels on Cowichan Lake and potential changes in flows down the Cowichan River.
- Based on future hydrology in the 2050s (under climate change)



- The scope of options was constrained by those issues that can be addressed under the *Water Sustainability Act*, i.e.,
  - Changes in flows released to the Cowichan River,
  - Changes in spring and summertime water levels (i.e., Rule Curve) for Cowichan Lake,
  - Potentially new infrastructure to store more water in Cowichan Lake (e.g., weir modifications, permanent pump station, etc.)

Cowichan Water Use Plan: Hydrology and Water Management

Cowichan Water Use Plan Open House

June 11th, 2018

Craig Sutherland, P.Eng. KWL

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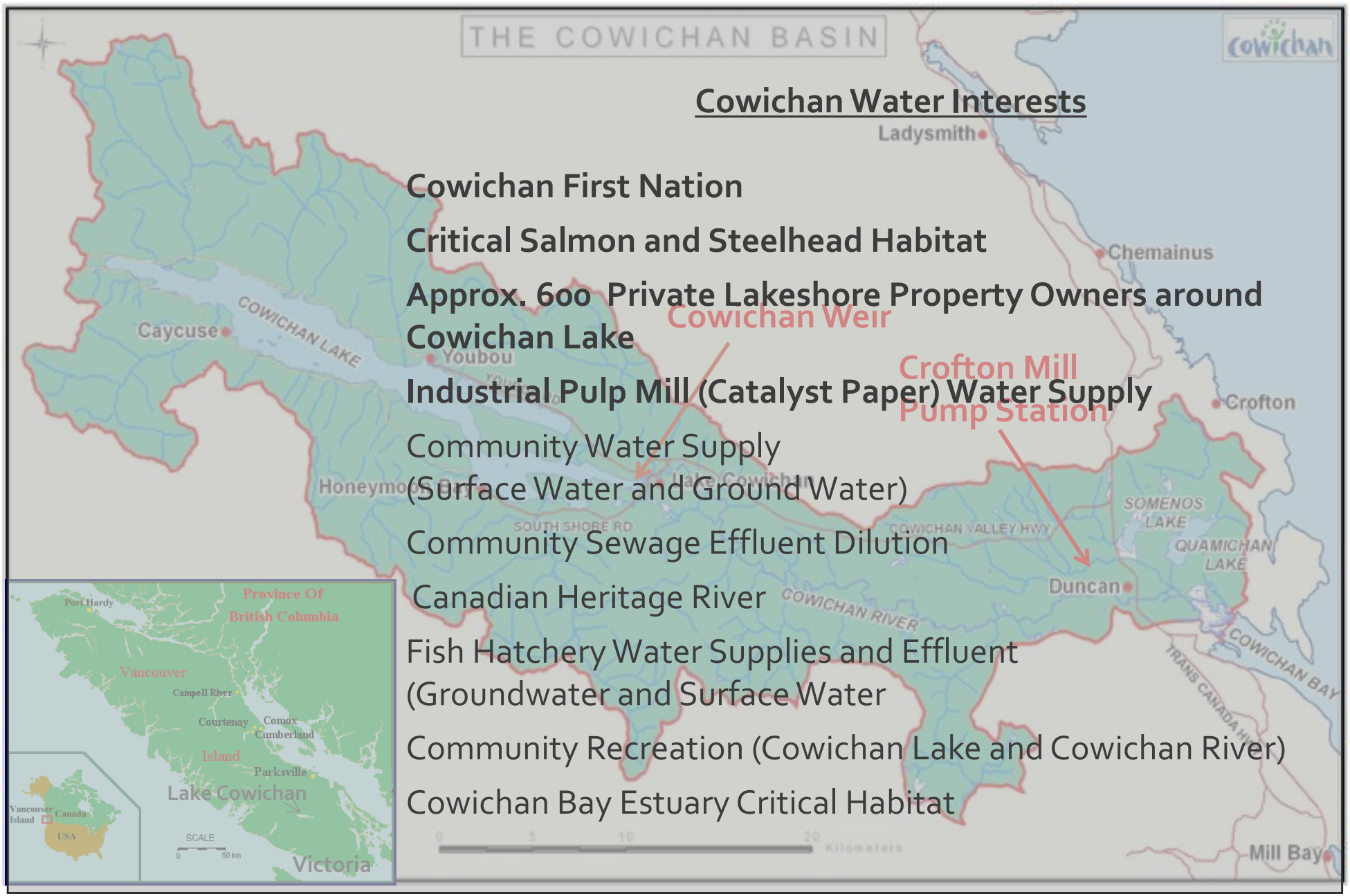
compass kwl ECOFISH RESEARCH CVRD Cowichan Watershed BOARD Catalyst


THE COWICHAN BASIN
Cowichan Water Interests
Cowichan First Nation
Critical Salmon and Steelhead Habitat
Approx. 600 Private Lakeshore Property Owners around Cowichan Lake
Industrial Pulp Mill (Catalyst Paper) Water Supply
Community Water Supply (Surface Water and Ground Water)
Community Sewage Effluent Dilution
Canadian Heritage River
Fish Hatchery Water Supplies and Effluent (Groundwater and Surface Water
Community Recreation (Cowichan Lake and Cowichan River)
Cowichan Bay Estuary Critical Habitat
Cowichan Weir
Crofton Mill Pump Station
Ladysmith
Chemainus
Crofton
Duncan
Mill Bay
Caycuse
Youbou
COWICHAN LAKE
Honeymoon Bay
Lake Cowichan
SOUTH SHORE RD
COWICHAN VALLEY HWY
COWICHAN RIVER
SOMENOS LAKE
QUAMICHAN LAKE
COWICHAN BAY
TRANS CANADA HWY
Province Of British Columbia
Port Hardy
Vancouver
Campell River
Courtenay
Comox
Cumberland
Island
Parksville
Lake Cowichan
Victoria
Vancouver Island
Canada
USA
SCALE
0
50 km
Kilometers

The "Wet" West Coast Conundrum…

E. Coast Vancouver Island
Rainfall/Snow
~1,000 mm to 3,000 mm per year

But 75 % of total falls in six months from Oct to March

TIMES COLONIST ≡ MENU

Cowichan anxious to solve a drying river

Amy Smart / Times Colonist
JULY 19, 2015 06:00 AM

Pumps installed, climate change blamed as Cowichan River dries up

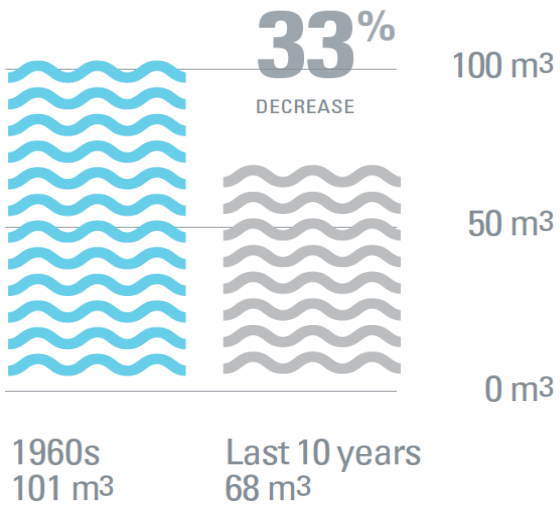
CVRD installs water pumps to combat climate change

High volume water pumps have been installed at the Cowichan weir, aimed at preventing the river from running dry.

CTV Vancouver Island September 29, 2016

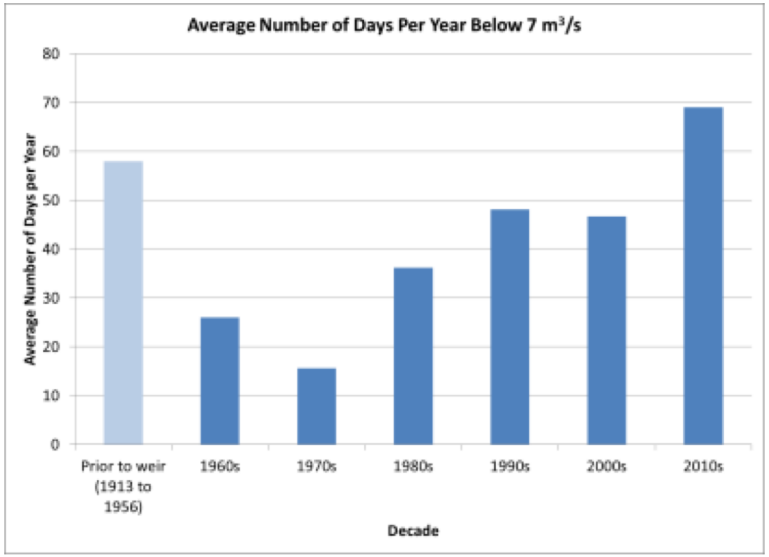
Cowichan Water Management

Avg. Spring/Summer Cowichan Lake Inflow is decreasing



* In millions

Decreased Water Security



# of days river flow below 7 m3/s has doubled between 1960s/70s and 2000/2010s

- Changing Climate
- Changing Land Cover

Cowichan Weir

Constructed in 1957 – Operated by Catalyst Paper

Stores 59.5 million m^3 of water in Cowichan Lake
(equivalent to 97 cm depth of water over lake surface)
(about 97 days of supply at minimum flow)

Original design

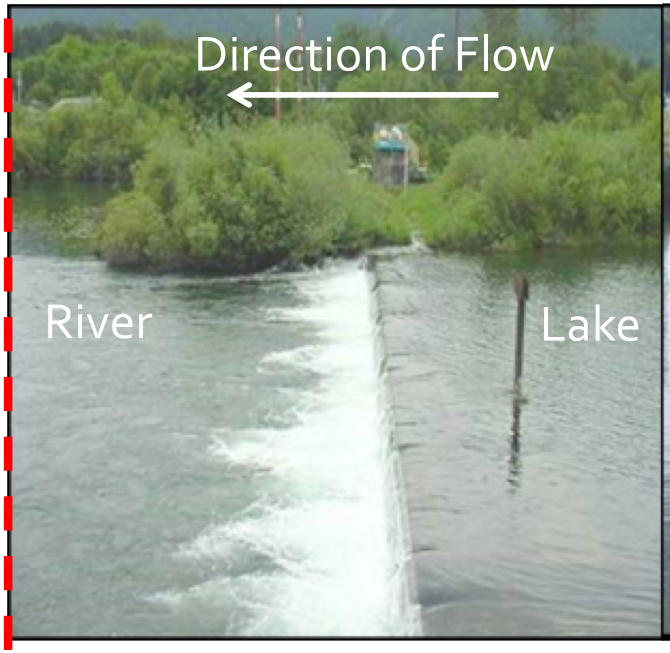
Design Intent	Water Licence Flow
Maintain min. flow in Cowichan River below weir	250 cfs (about 7 m^3/s)
Provide water for Crofton Mill	100 cfs (about 2.8 m^3/s)
Maintain min. flow below the Crofton Mill Pump Station	100 cfs (about 2.8 m^3/s)

Cowichan Weir

Operation during the Year

Weir/Gates Controlling Flow/Lake Level

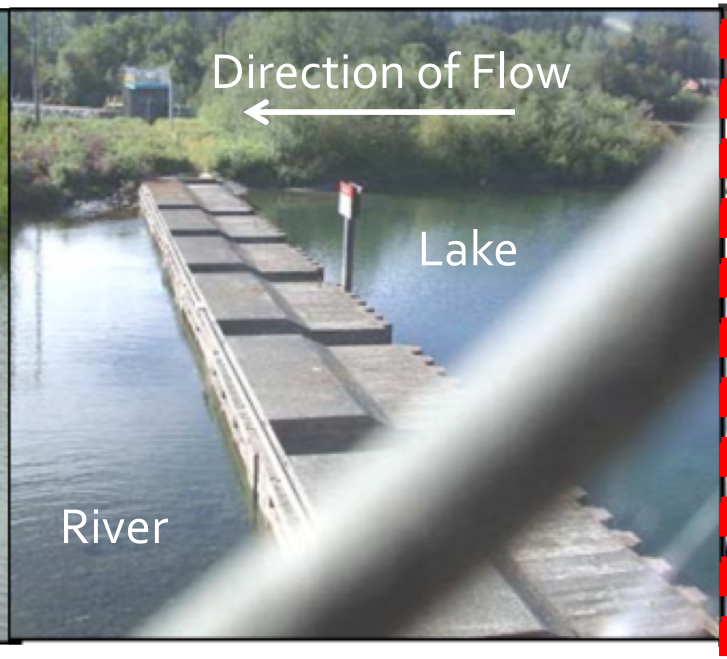
Late Spring/Early Summer
(April to July)



Gates are fully raised and
Boat lock is closed

Try to maintain Lake level
Near top of weir to
Store water for summer
(but depends on inflow)

Late Summer/Early Fall
(August to October)

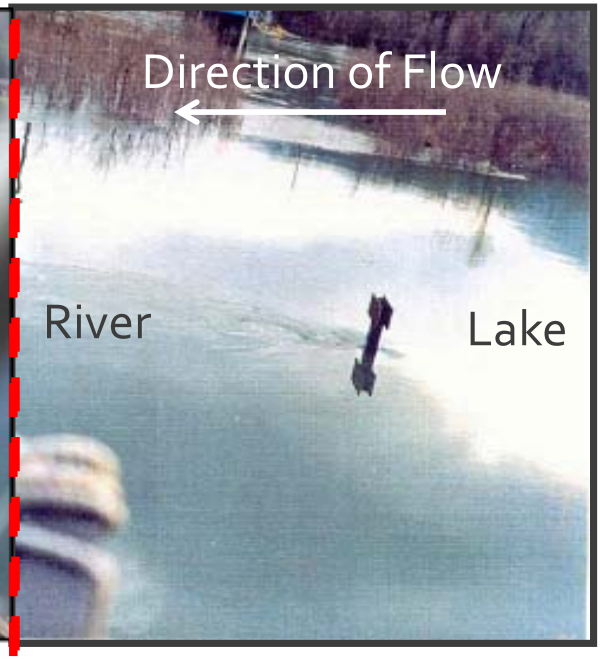


Gates are operated to
Maintain required minimum
Flow

Water levels drop in lake as
Water stored in spring is used to
maintain summer flows.

Weir/Gates Not Controlling Flow/ Lake Level

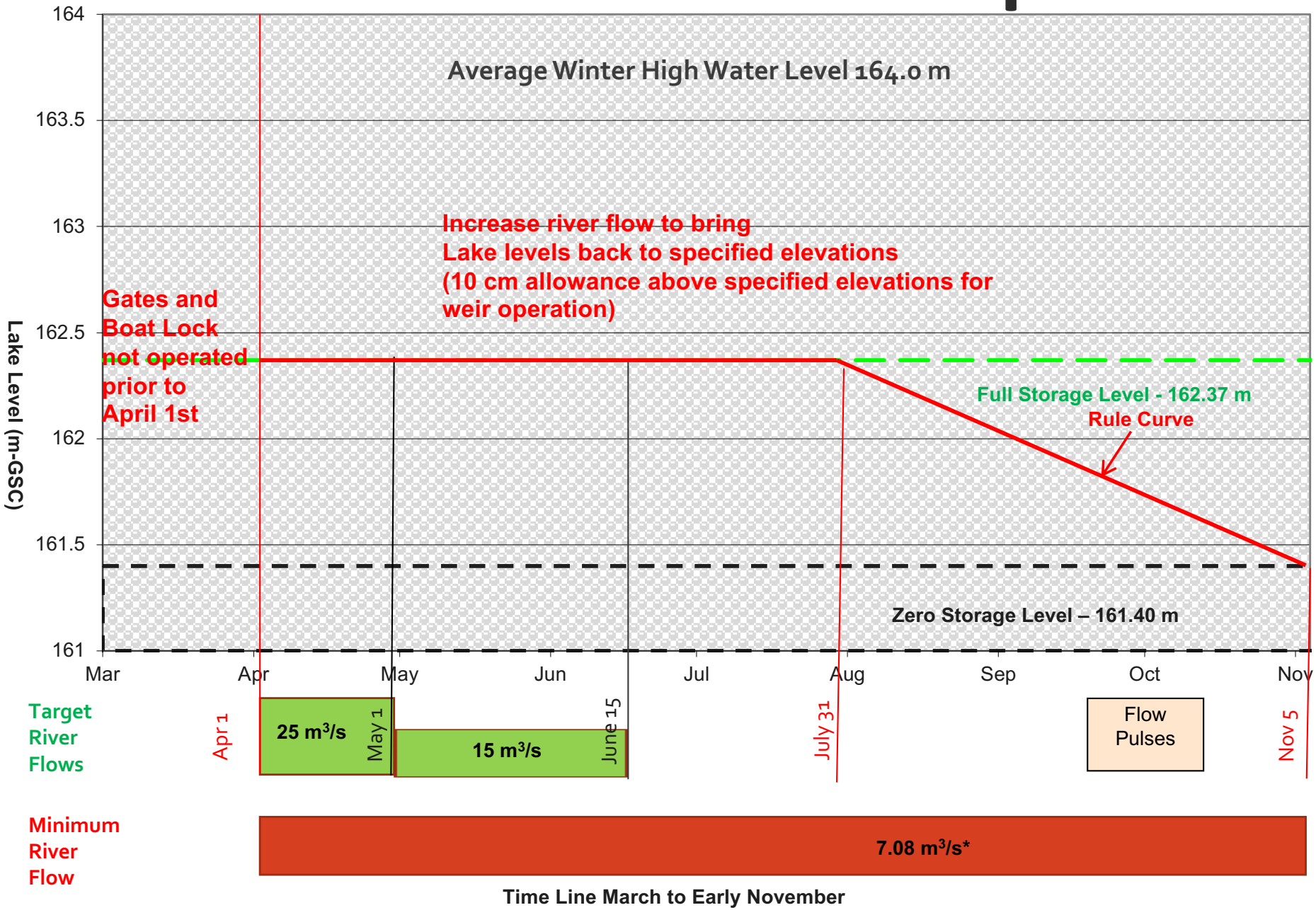
Winter



Gates are fully lowered and
Boat lock opened

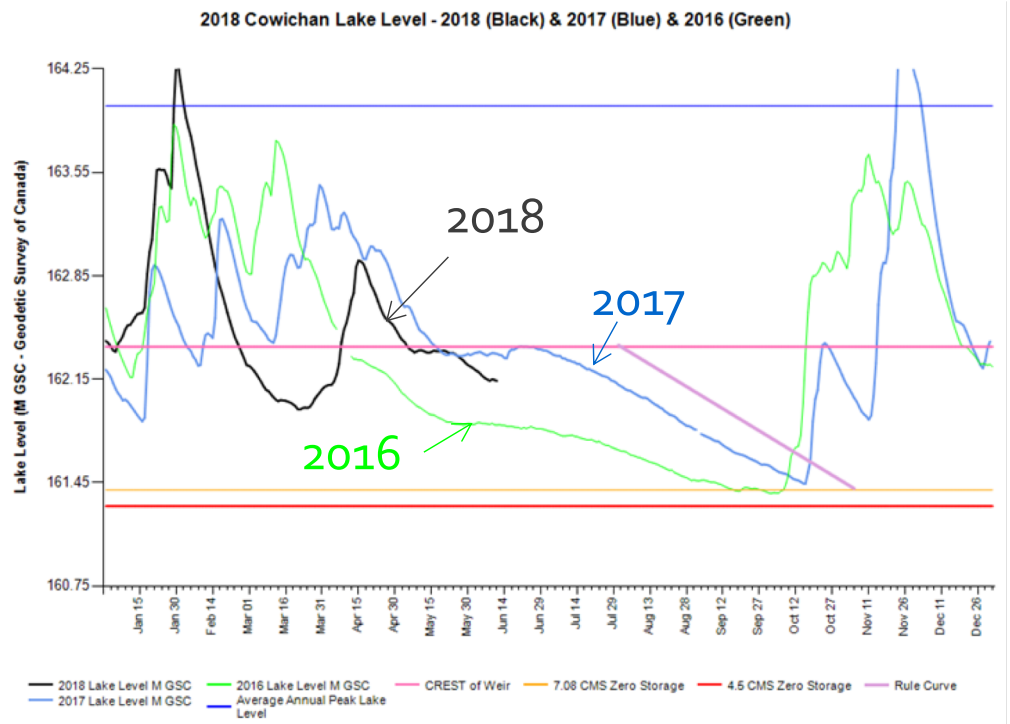
Lake levels rise above
the weir
- increased lake inflow
- flow constriction in
river channel downstream

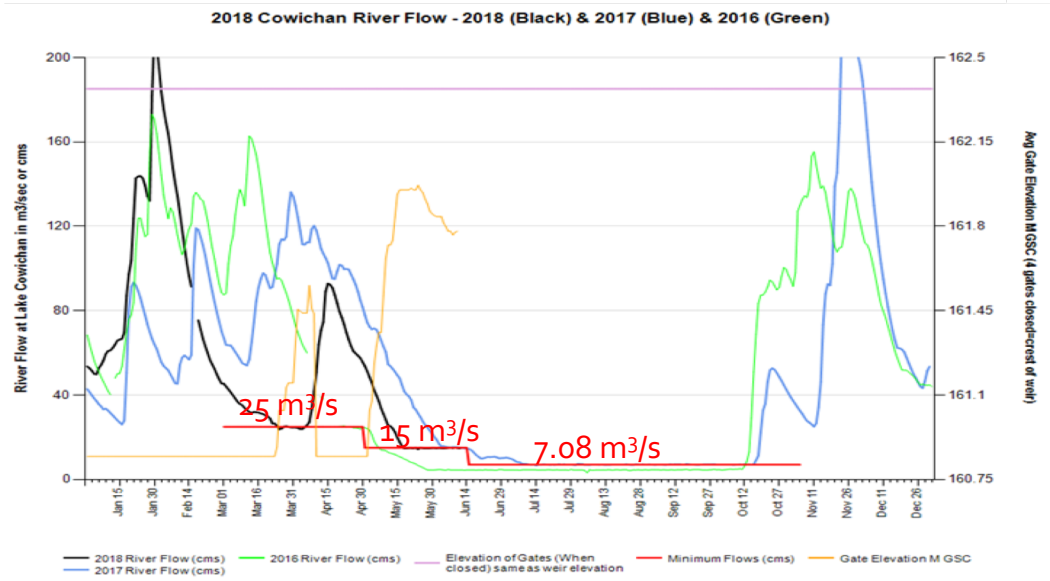
Cowichan Weir – Current Operation



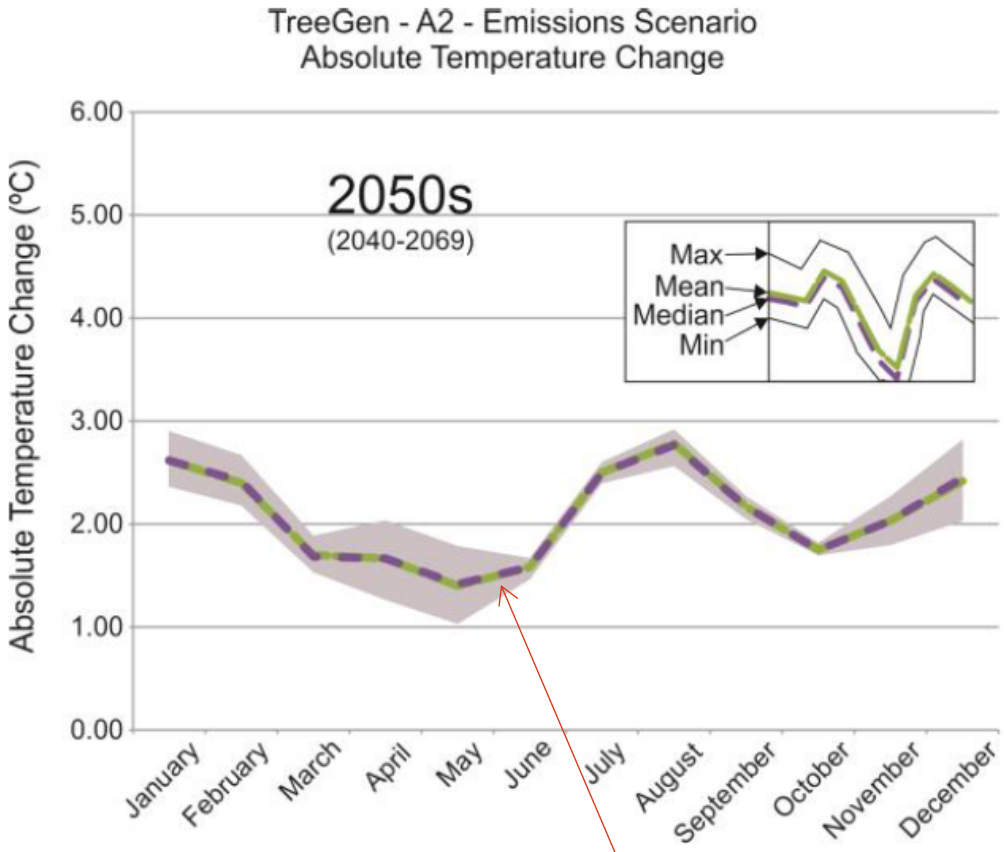
* - 7.08 m³/s equal to 250 cfs minimum flow required by water licence

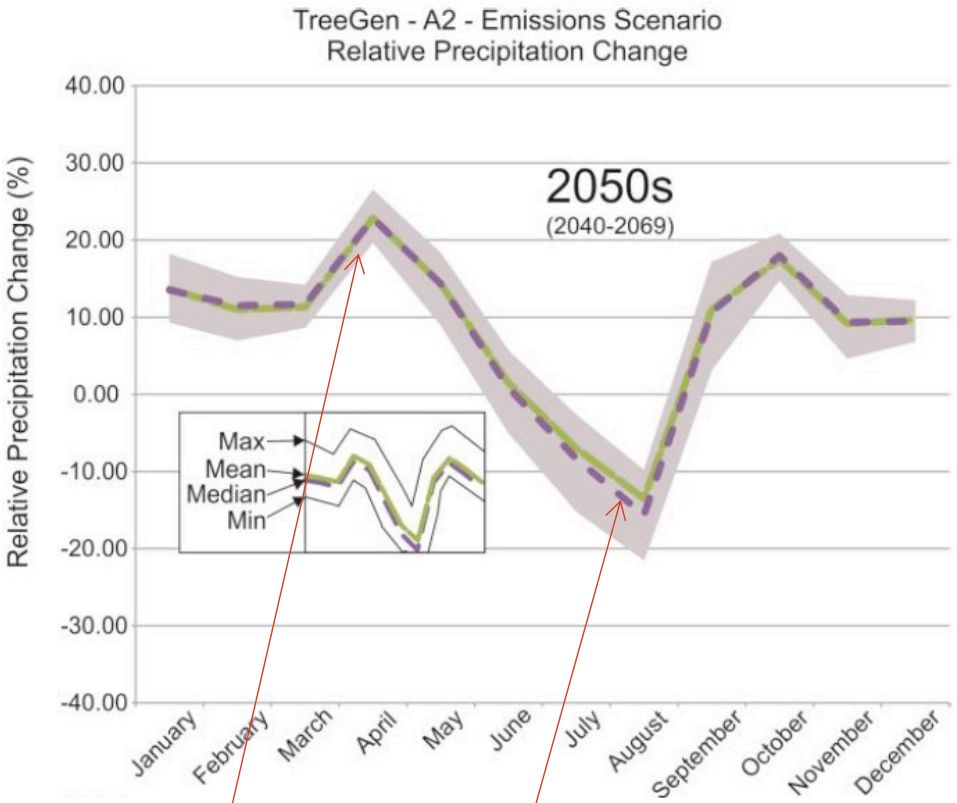
Cowichan Weir – Current Operation





Climate Change





+1.5 °C to +2.8 °C increase in average monthly temperature

10% to 25% **increase** in monthly precipitation in fall/winter/spring

Up to 15% **decrease** in monthly precipitation in summer

Climate Change =
Winter Temp. Above Freezing

Current Climate

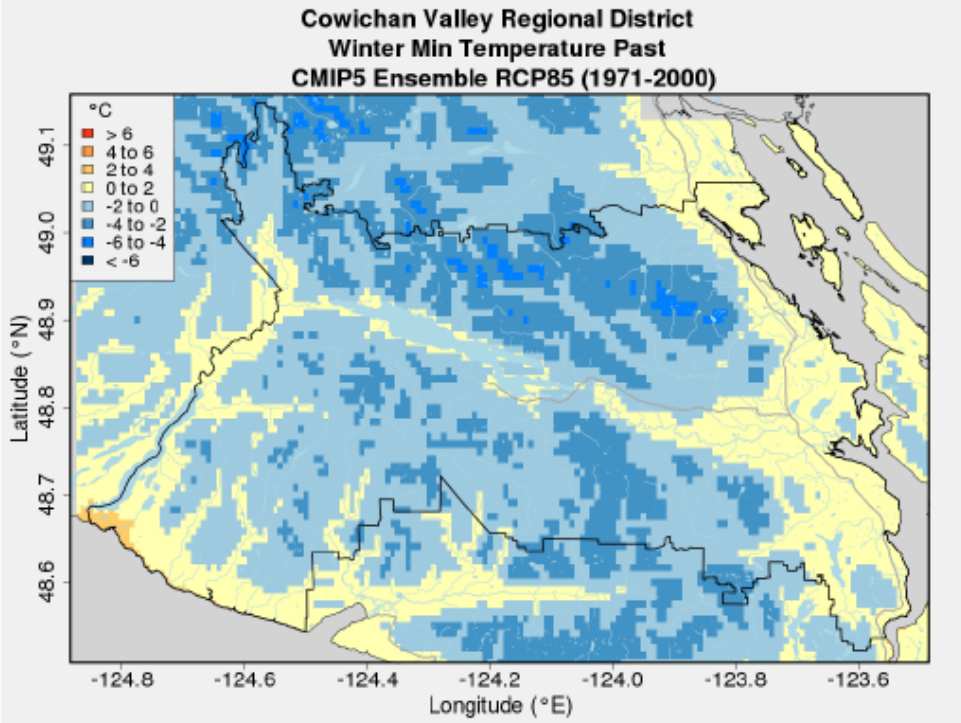


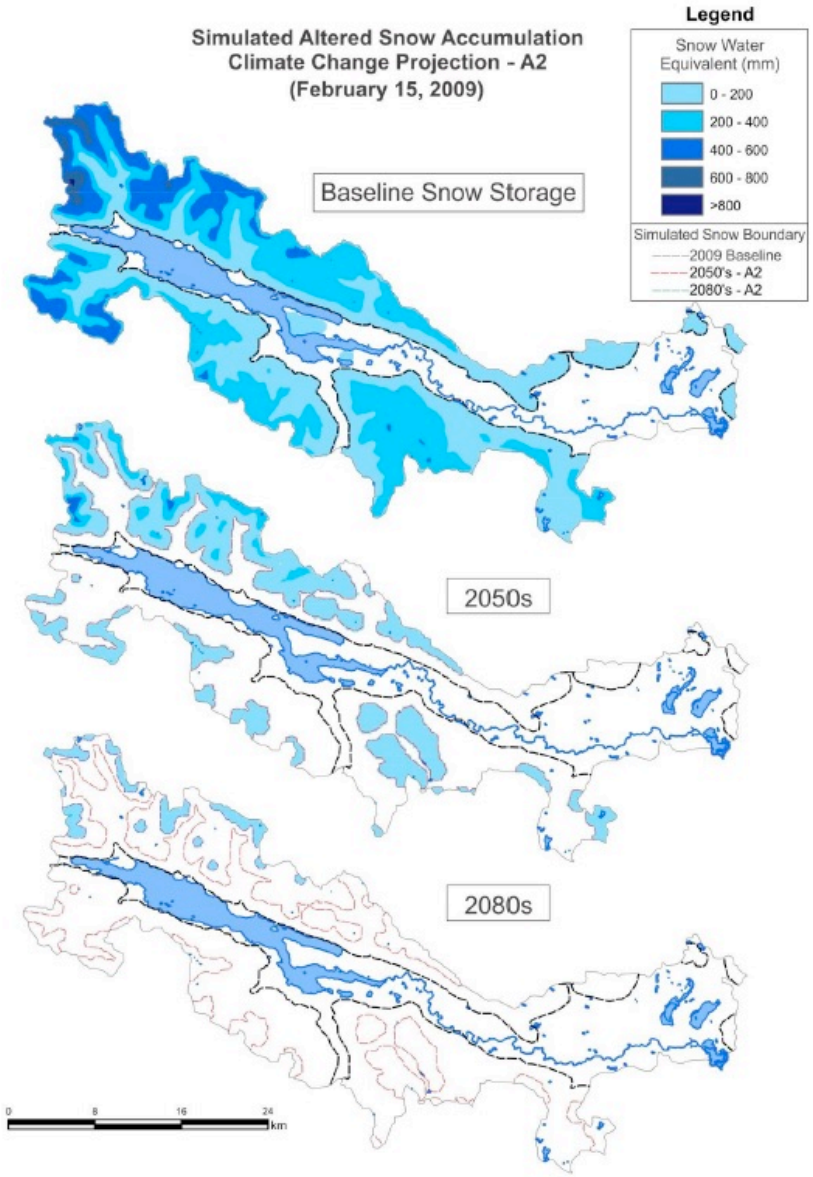
Figure 6: Winter Average Nighttime Low Temperature – Past

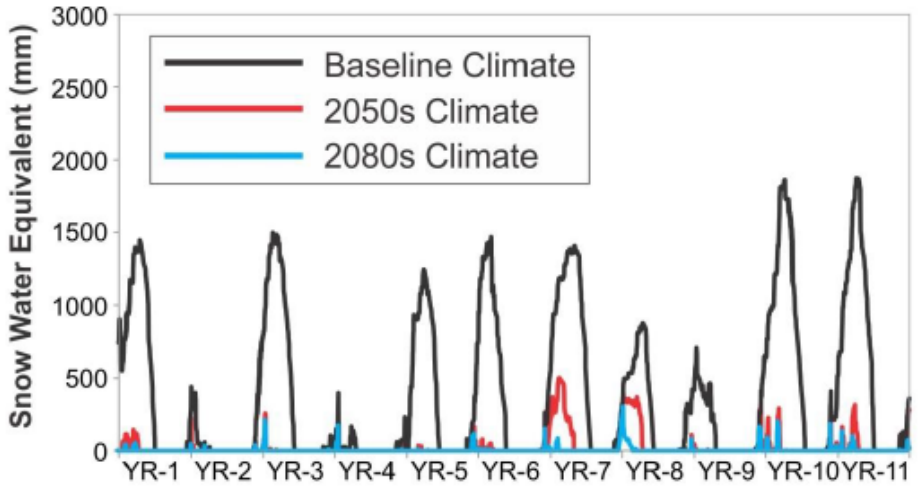
Yellow/Orange = above Freezing

Blue = Below Freezing

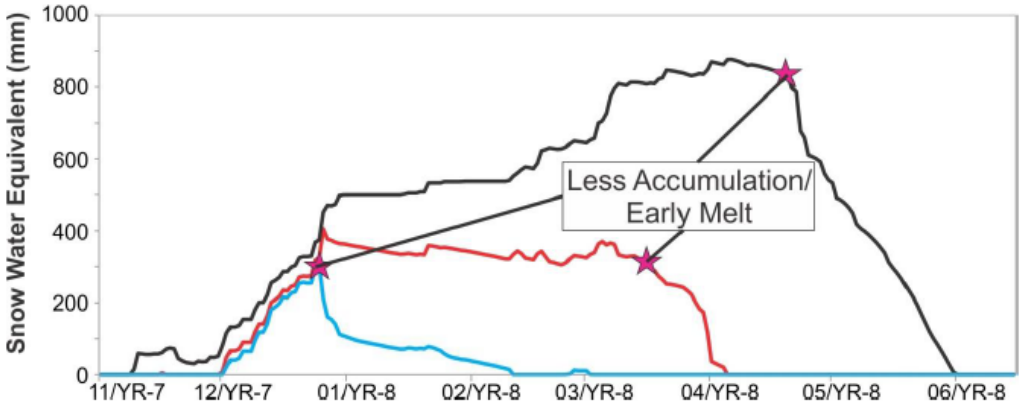
Source: CVRD 2017, Climate Projections for the Cowichan Valley Regional District

Climate Change = Less Snowpack





By 2050s model indicates 4 years out of 10 with any significant snow pack



. **Simulated SWE (mm) at the Jump Creek Snow Pillow Station for the baseline, 2050s and 2080s.**

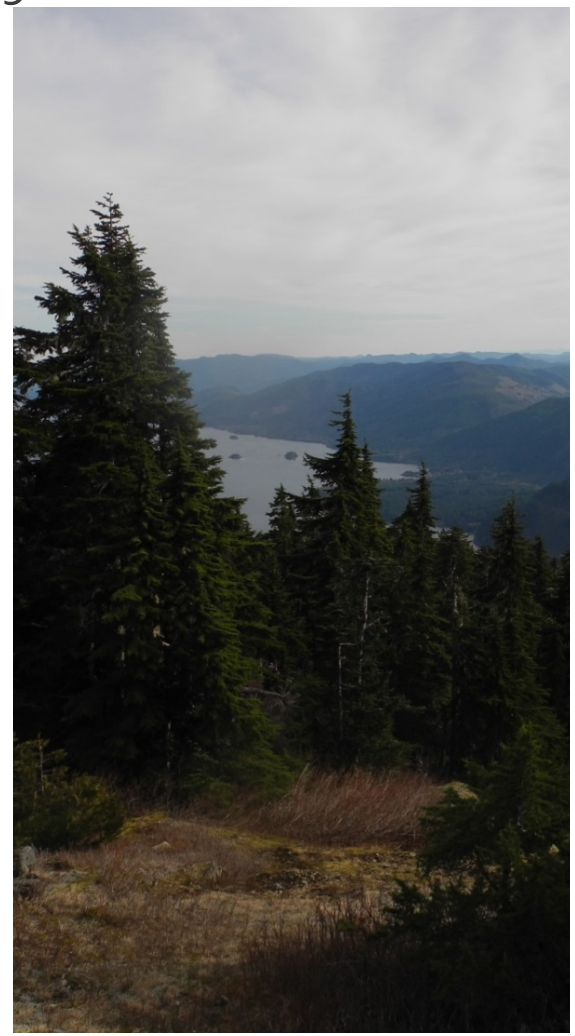
Source: Foster and Allen, 2015

Climate Change = Less Snowpack

Heather Mountain Climate Station – El. 1190 m

"Typical" March Snowpack
March 2016
SWE >1,000 mm

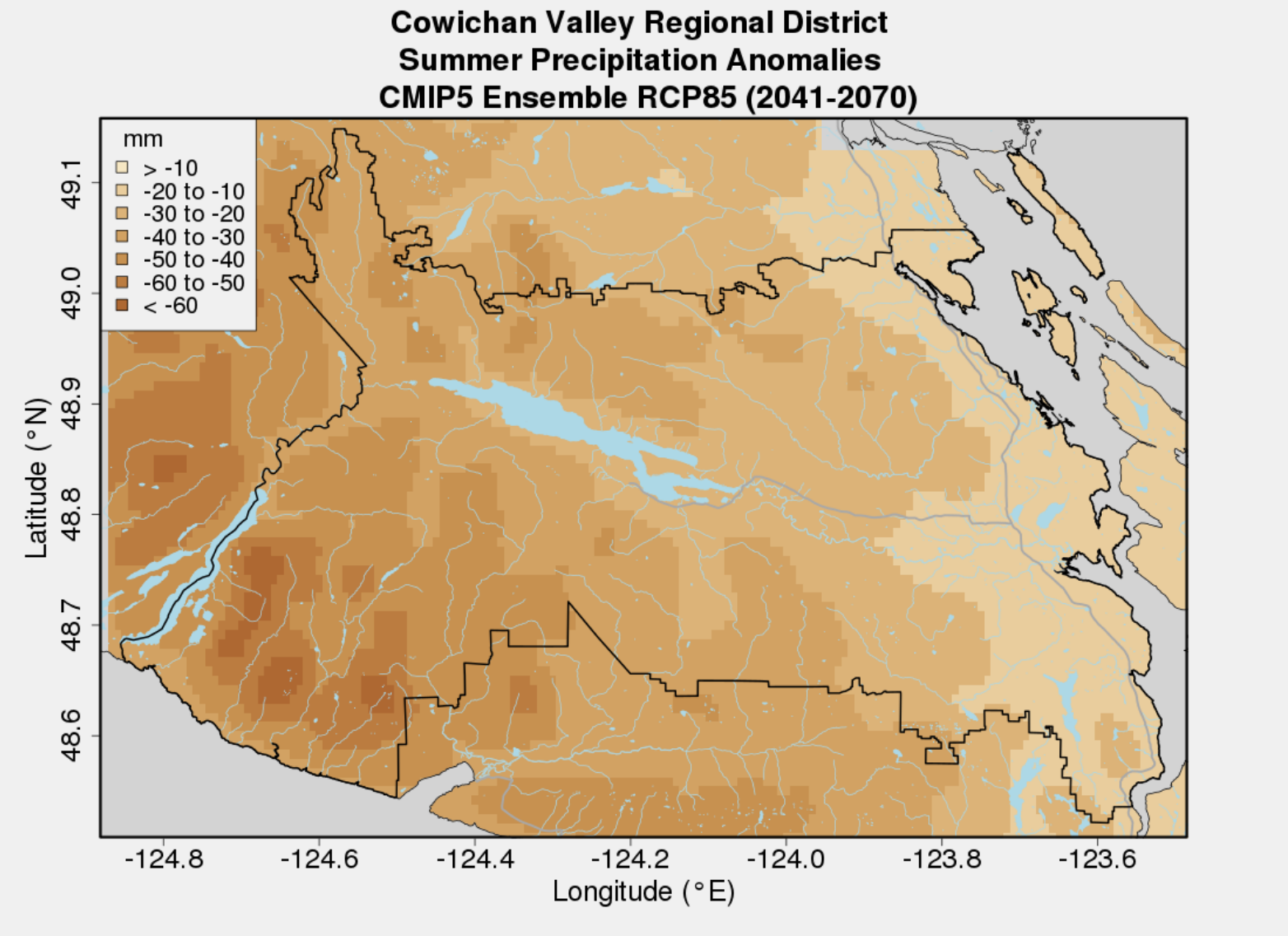
2015 March Snowpack
March 6, 2015
SWE < 100 mm



Feb 2015 No Snowpack
February , 2015

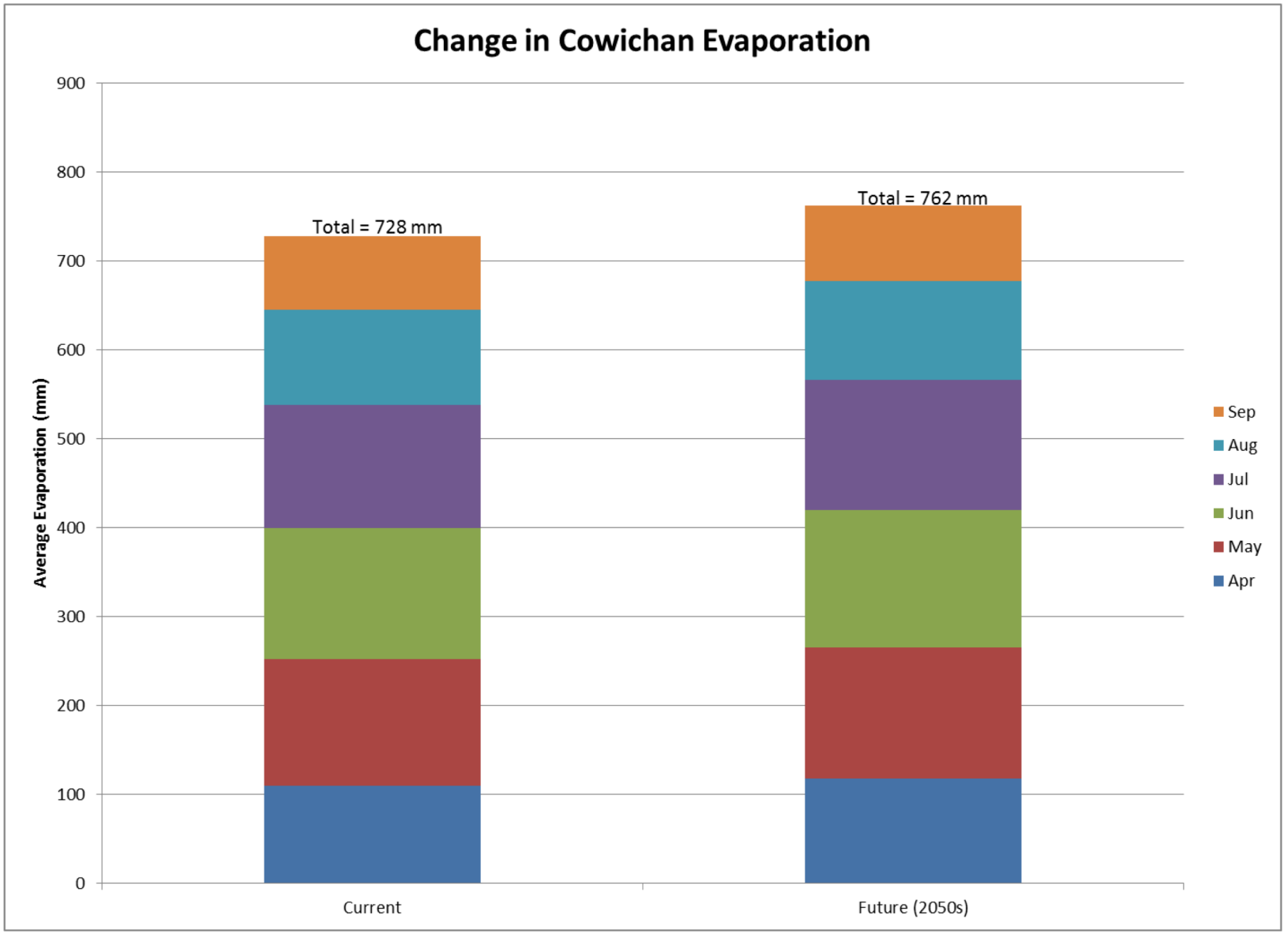
SWE – Snow Water Equivalent = Amount of water in snow

Climate Change = Less Summer Precipitation

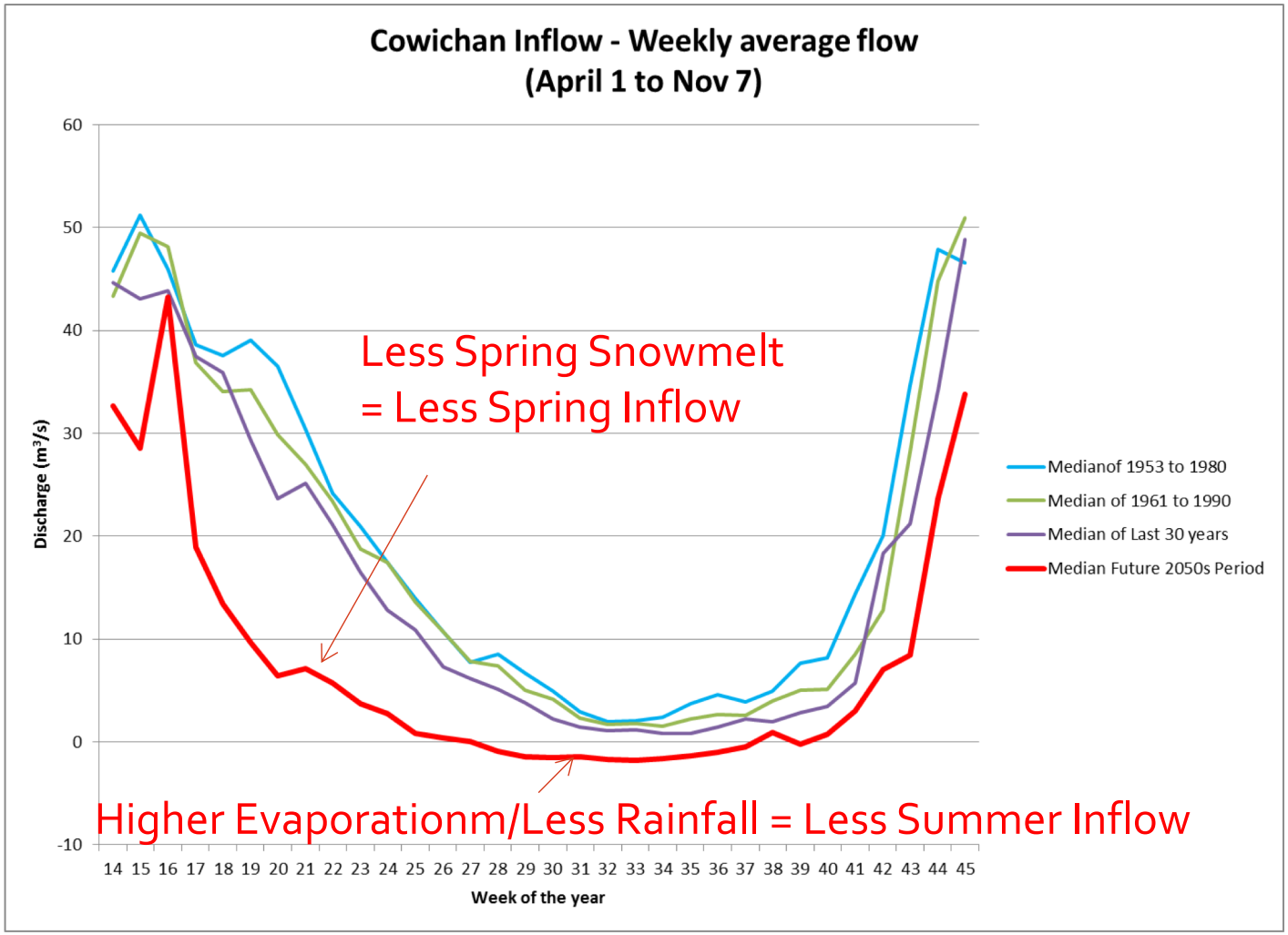


20 mm to 30 mm less rainfall in summer

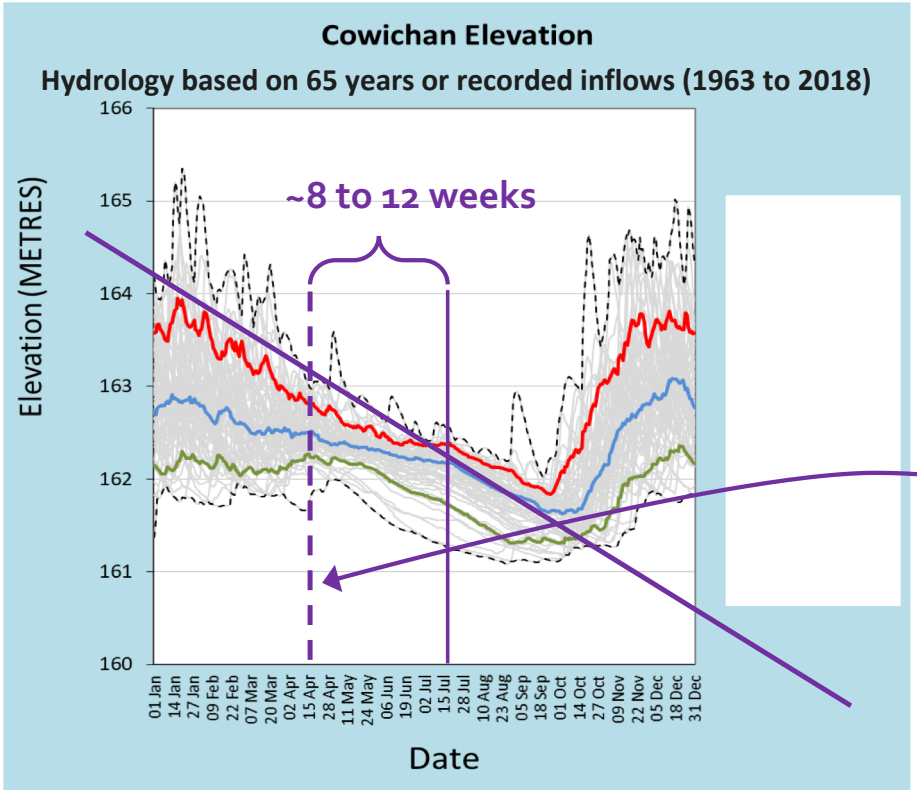
Climate Change = Increased Evapotranspiration

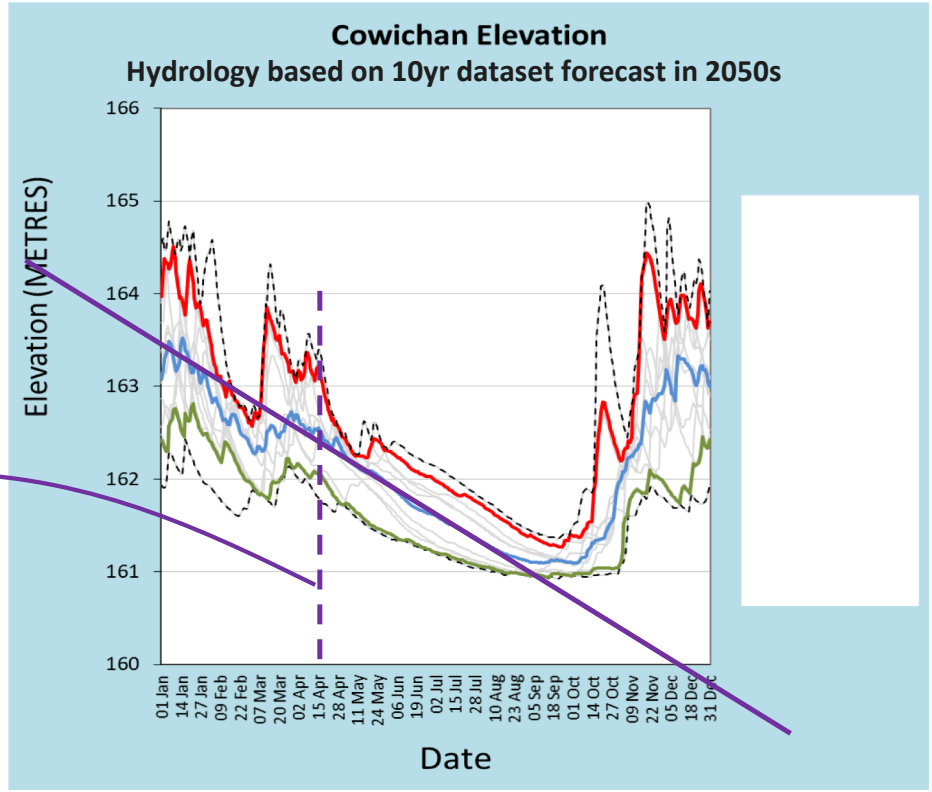


Climate Change = Less Spring Inflow



Climate Change = Longer Period for Storage





Summary

Increasing temperatures and changing precipitation

1. Less snowpack = Less spring inflow
2. Higher temperatures = greater evaporation
3. Less summer precipitation
4. Longer dry periods

Results in additional 8 to 12 weeks of additional storage (for current river flows)

Cowichan Water Use Plan

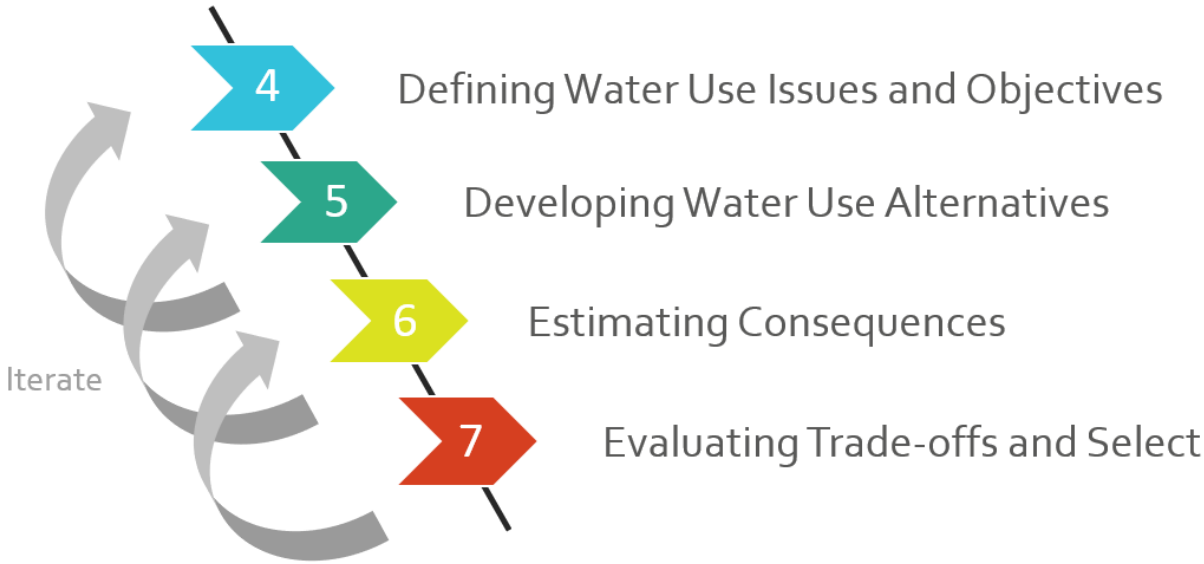
a community planning process

Cowichan Water Use Plan

a community planning process

Public Advisory Group (PAG)

- A core group of 19 community members representing the full range of water use interests met regularly over an 8 month period to work through the planning steps
- The PAG was supported through two technical sub-groups (TSG): Aquatic and Riparian TSG; Lakefront TSG
- PAG followed a structured process consisting of the following steps:



4 Defining Water Use Issues and Objectives

- **Culture and Heritage**
  - First Nations Salmon Harvesting Rights (FSC)
  - Traditional Knowledge Transfer & Generation
  - Ceremonial Bathing (Cultural Practices)
  - Archaeological Sites (Cowichan River)
- **Environment (Cowichan River)**
  - Geomorphology
  - Connectivity (lateral)
  - Water Quality
  - Fish Passage
  - Salmonid Rearing
  - Salmonid Spawning
  - Wildlife and Riparian
- **Environment (Cowichan Lake)**
  - Water Quality
  - Vancouver Lamprey
  - Lake Littoral Habitat
  - Wildlife and Riparian
- **Industry and Commercial**
  - Catalyst Paper
  - Agriculture (Irrigation / GW Wells)
  - Commercial Fisheries
- **Lakefront Properties**
  - Flooding and Inundation
  - Private Property Lakefront Areas
  - Docks / Wharves
  - Private water pump intakes
- **Municipal**
  - Waste Water
  - Water Supply - Lake
  - Water Supply - River
- **Recreation and Tourism**
  - Lake - Recreational Beach Use
  - Lake – Boat Access / Navigation
  - River – Boating and Tubing
  - Angling / Fishing
- **Water Management**
  - Infrastructure Capital and Operating Costs

5 Developing Water Use Alternatives

ROUND 1	ROUND 2	ROUND 3
Alt 1	Alt 1	Alt 1
Alt 2	Alt 2	Alt 2
Alt 3		
Alt 4		
Alt 5		
Alt 6		
Alt 7	Alt 7	Alt 7
	Alt 10	Alt 10
	Alt 11	Alt 11
	Alt 12	Alt 12
	Alt 13	Alt 13
		Alt 20
		Alt 21
		Alt 22
		Alt 23
		Alt 24

Alternatives

- Increased weir heights
  - ❑ 0m
  - ❑ +0.3m
  - ❑ +0.4m
  - ❑ +0.5m
  - ❑ +0.6m
  - ❑ +0.7m
  - ❑ +1.0m
- Decreased summer lake levels (below historical)
  - ❑ 0m
  - ❑ -0.15m
  - ❑ -0.3m
  - ❑ -1.0m
  - ❑ -1.5m
- Decreased fisheries flows
  - ❑ 15/25cms Spring flows
  - ❑ Summer min base flows
    - ➢ 5cms
    - ➢ <4.5cms
- Earlier date to fill lake
  - ❑ Mar 1
  - ❑ Feb 1

5 Developing Water Use Alternatives

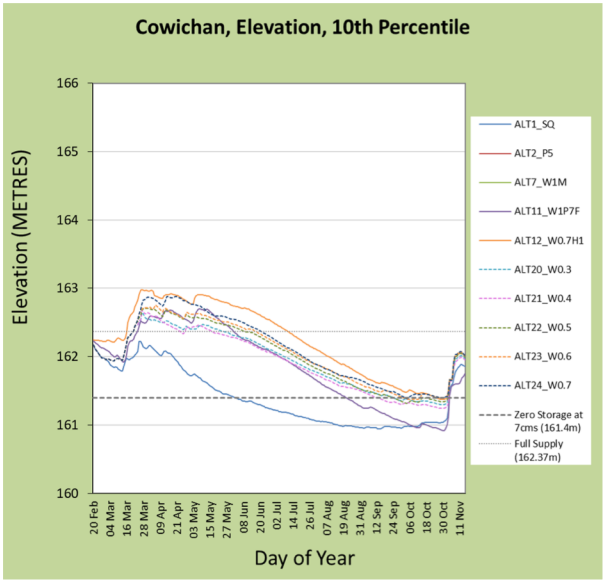
Design Criteria for Round 3 Alternatives

- Avoid any increased lake levels during spring flood events (Note. There will still be flooding, just no increased risk over current conditions)
- Limit increases in the weir height to below where there would be impacts on property rights for storing water for portions of the spring and summer (i.e., below natural boundary)
- Limit drawing down the lake to 0.2m below historical low levels during summer time droughts to avoid impacts to threatened species and because of the uncertain environmental impacts around the lake
- Continue to provide some form of spring fishery flows (15cms or 25cms) for a shorter duration than what is currently provided without threatening late summer fishery base flows (of either 7 or 5cms), if possible
- Avoid river flows dropping below 5cms during summer droughts

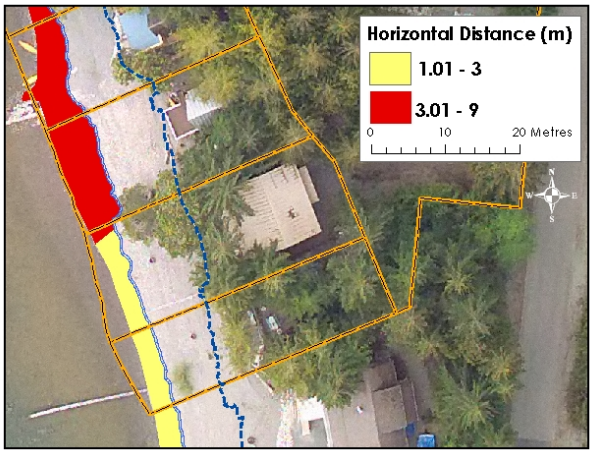
ROUND 3

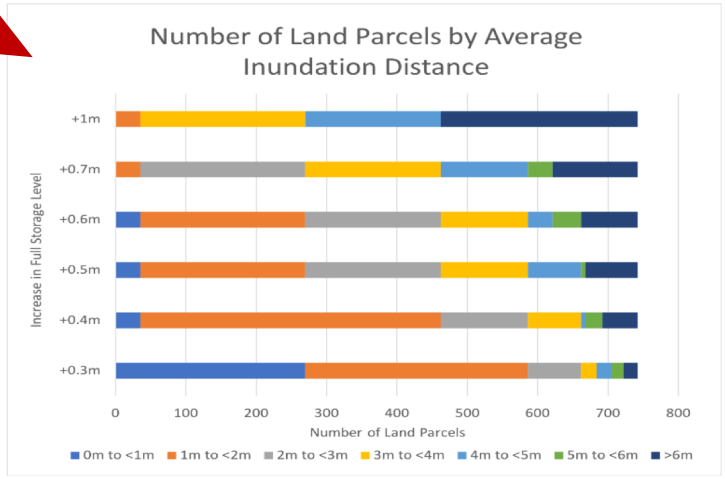
Alt 1
Alt 2
Alt 7
Alt 10
Alt 11
Alt 12
Alt 13
Alt 20
Alt 21
Alt 22
Alt 23
Alt 24

6 Estimating Consequences

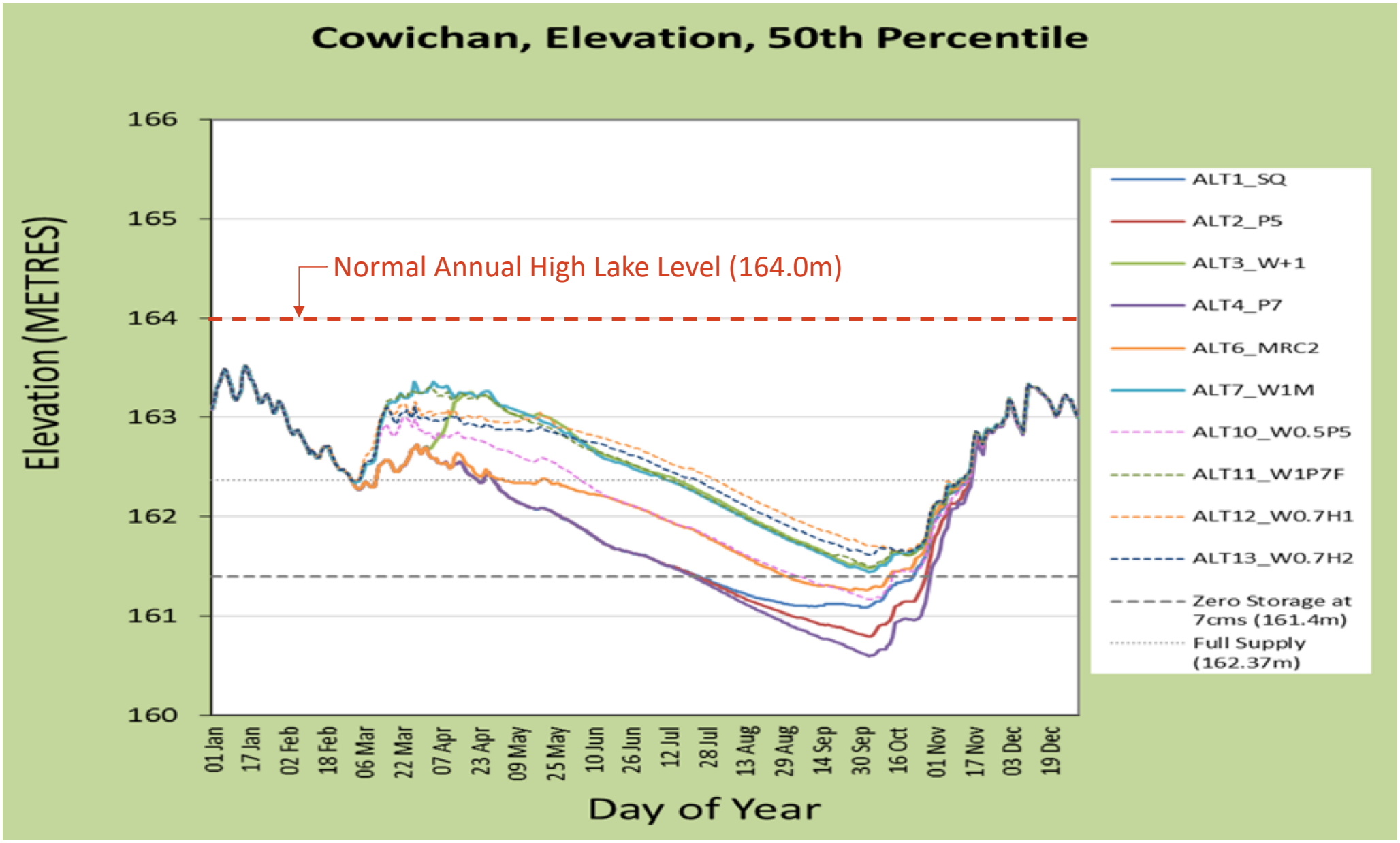


Objective	Performance Measure	Units	Dir	Alt 1	Alt 2	Alt 11	Alt 12	Alt 20	Alt 21	Alt 22	Alt 23	Alt 24
Environ - River (10%ile PMs)												
Fish Passage	10%ile - Adult summer CHK migration	HSI	H	0.00	0.00	0.09	0.09	0.00	0.00	0.08	0.00	0.08
Fish Passage	10%ile - Adult fall CHK migration	HSI	H	0.00	0.00	0.26	0.20	0.00	0.00	0.00	0.00	0.00
Lateral Connectivity	10%ile - Side channel connectivity	%	H	0.78	0.78	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Rearing	10%ile - Steelhead parr	HSI	H	0.00	0.75	0.80	0.80	0.75	0.75	0.75	0.75	0.75
Rearing	10%ile - Chinook fry	HSI	H	0.39	0.39	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Spawning	10%ile - Early Steelhead incubation	HSI	H	0.31	0.31	0.45	0.00	0.00	0.00	0.00	0.00	0.00
Environment - Lake												
Vancouver Lamprey	Lamprey rearing habitat (Scale 1-6)	#	L	7	9	8	1	6	5	4	3	2
Littoral Productivity	Littoral rearing habitat	#	H	0.45	0.10	0.44	0.78	0.72	0.68	0.73	0.72	0.78
Lakefront Properties												
Flooding and innundation	Max High Water Event - Mar 1 to Apr 30	meters	L	164.3	164.3	164.7	164.5	164.3	164.3	164.3	164.3	164.3
Private Property Lkfrnt Areas	Frontage length - un-vegetated, mod slope	meters	H	10.7	11.1	8.2	8.1	9.1	9.0	8.7	8.4	8.3
Municipal												
Community Water Supply	Intake pumping cap. - Town of Lk Cowichan	days/yr	L	45.5	59.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Community Water Supply	Intake invert El. - Town of Lk Cowichan	days/yr	L	0.0	16.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recreation and Tourism												
Beach Use Areas - Lake	Beach user days - un-vegetated, steep slope	wt days	H	0.0	0.0	17.6	30.0	4.8	10.0	9.0	16.9	27.3
Boat Access/Navigtn-Lake	Decrease in dock use days	days	L	113.0	113.0	37.5	15.5	51.5	42.5	46.0	36.0	26.0
Lake Aesthetics	Visual Quality	#	L	3	5	3	1	2	2	2	1	1
Water Management												
Capital Costs	Capital costs	M$	L	0	0	26	18	12	13.5	15	16.5	18
Operational Costs	AVG Operational costs (over 10yrs)	M$	L	0.0	5.0	1.0	0.0	2.5	2.0	2.5	2.5	1.0





7 The Fundamental Trade-offs



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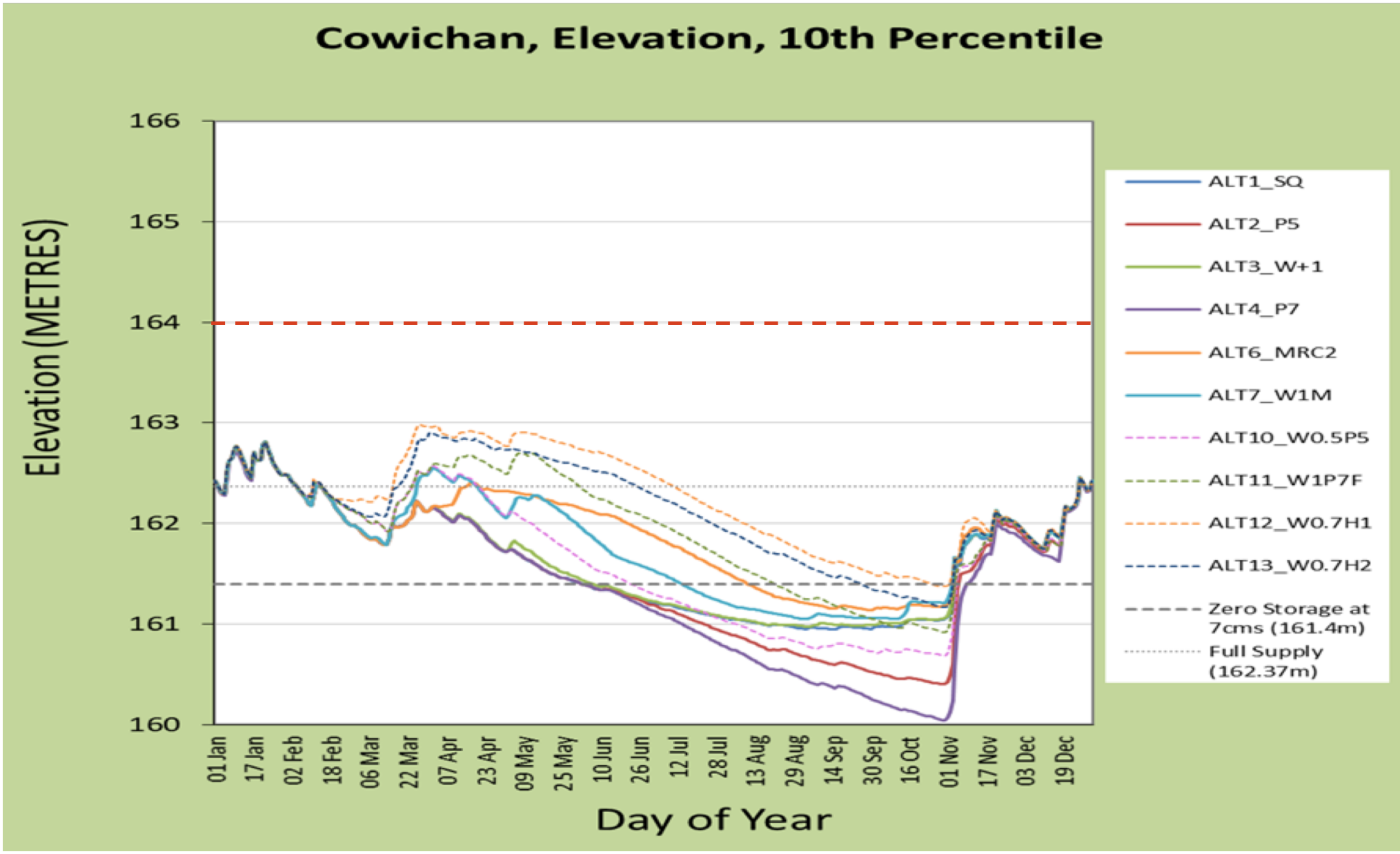

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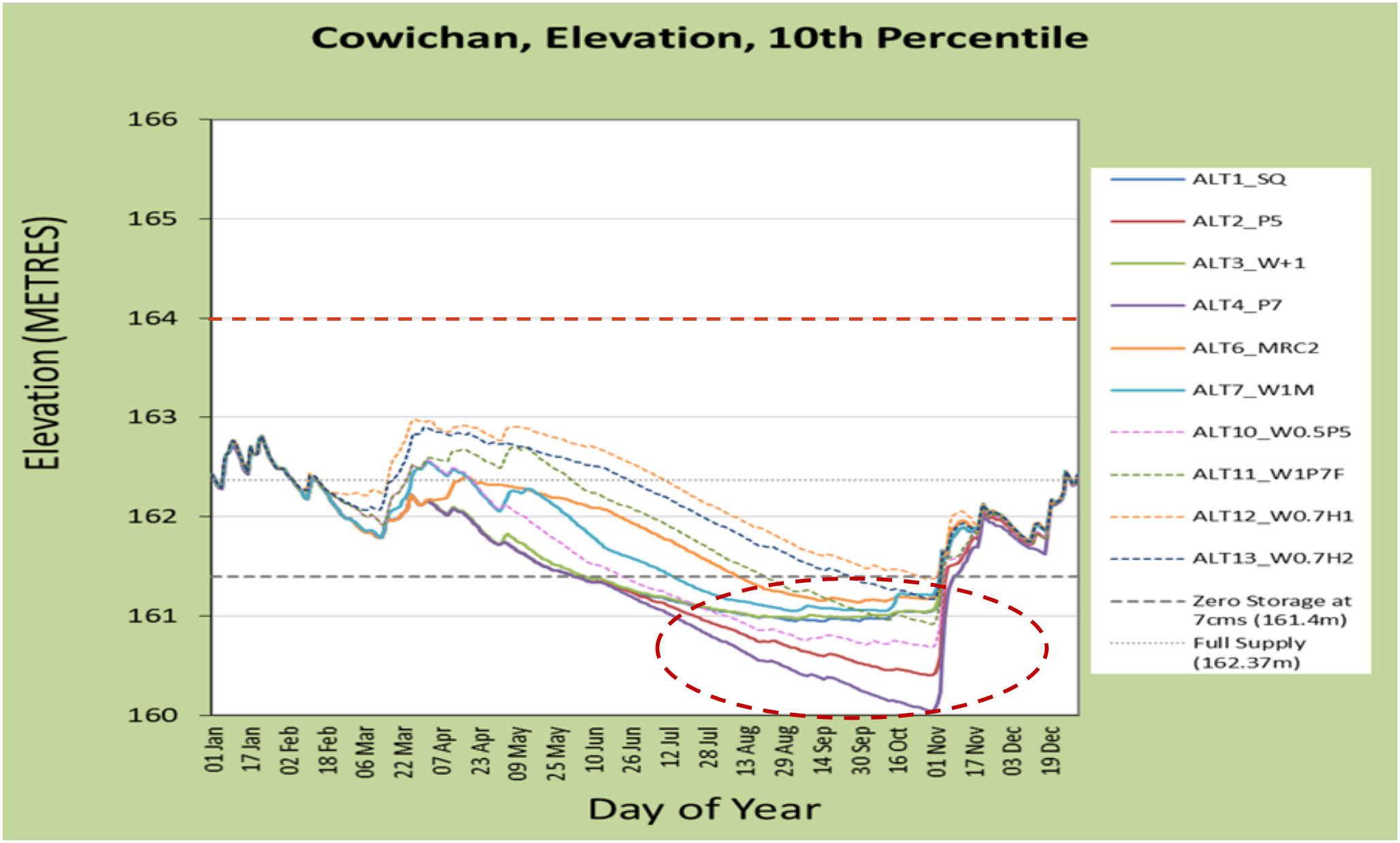

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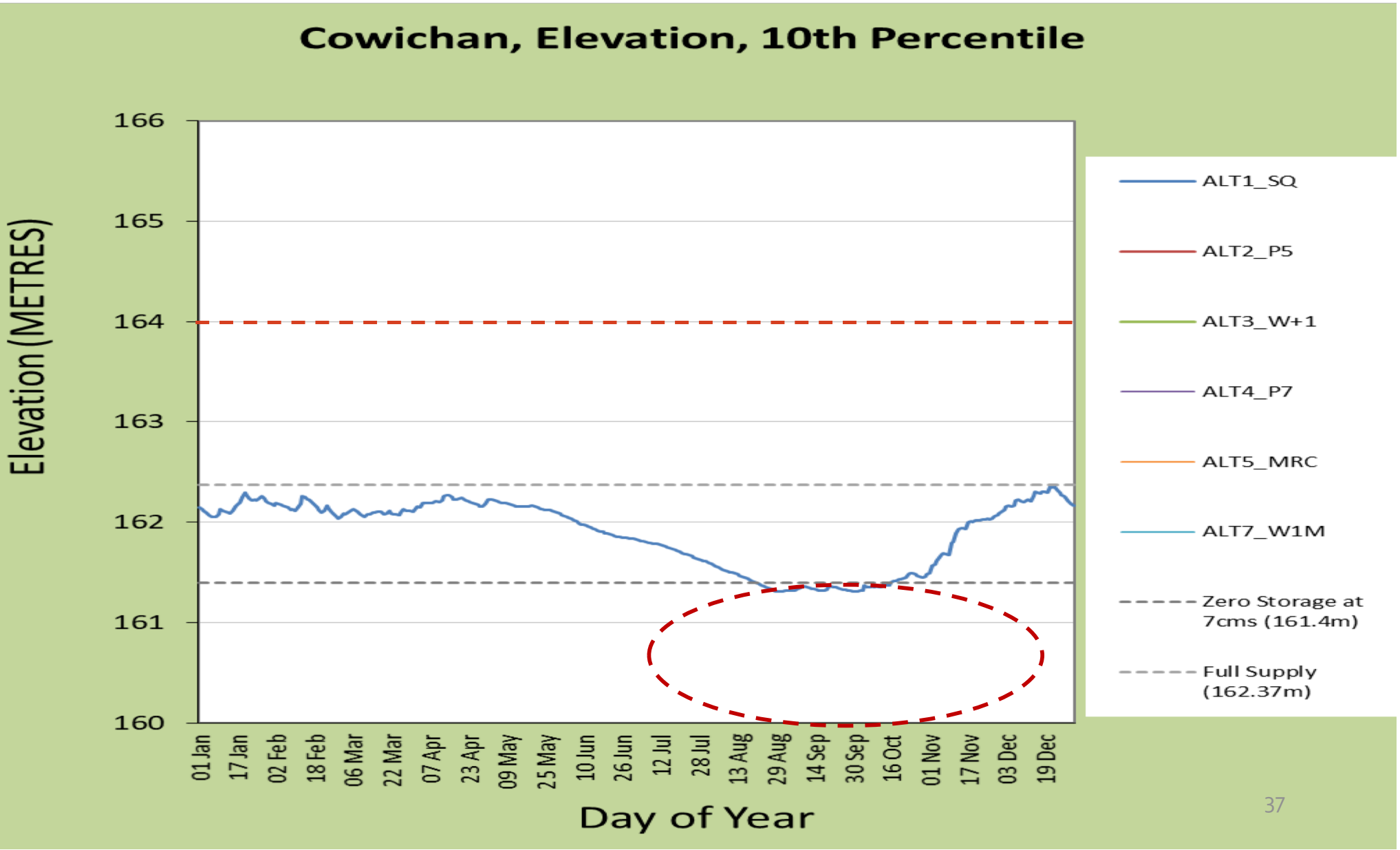

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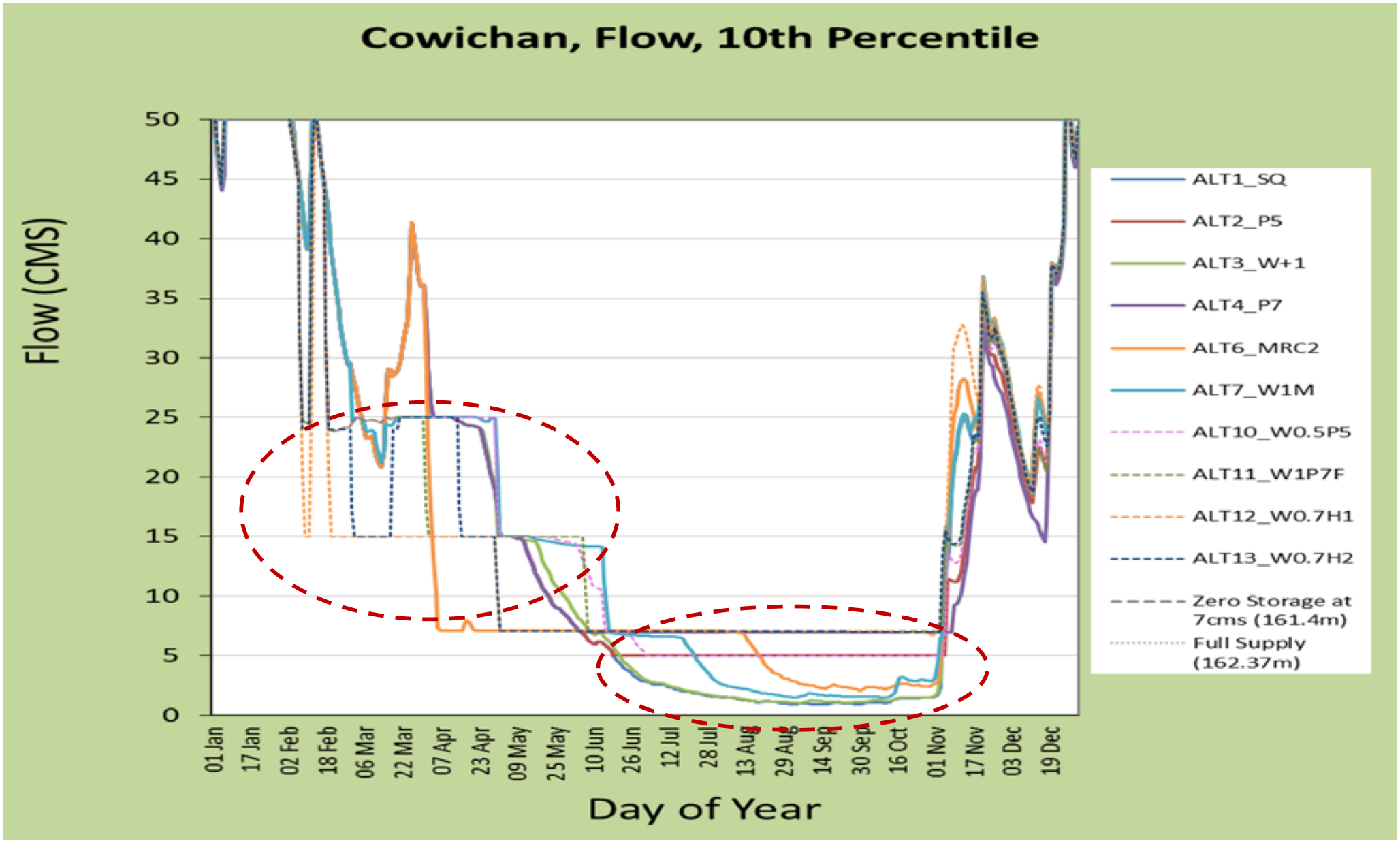

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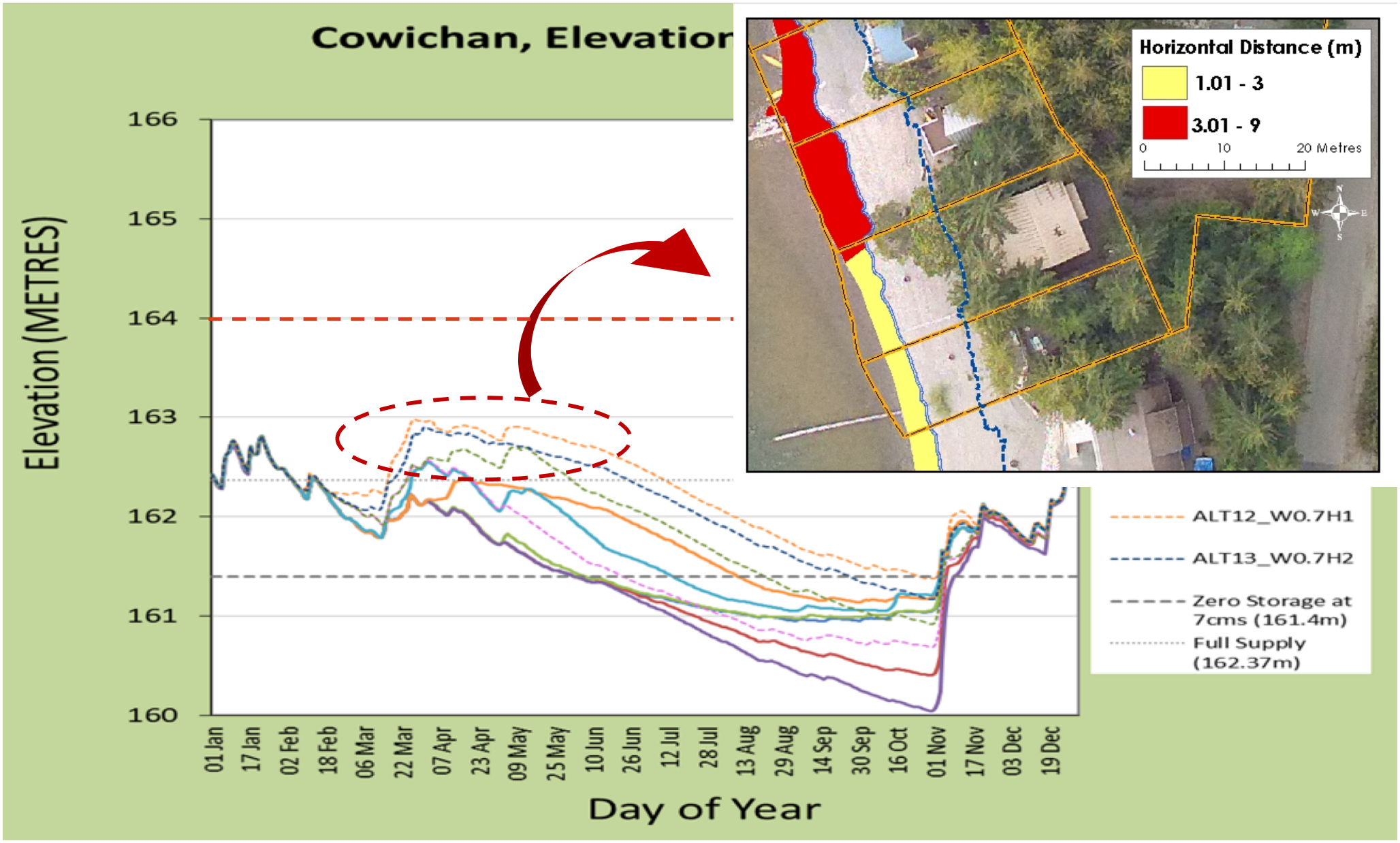

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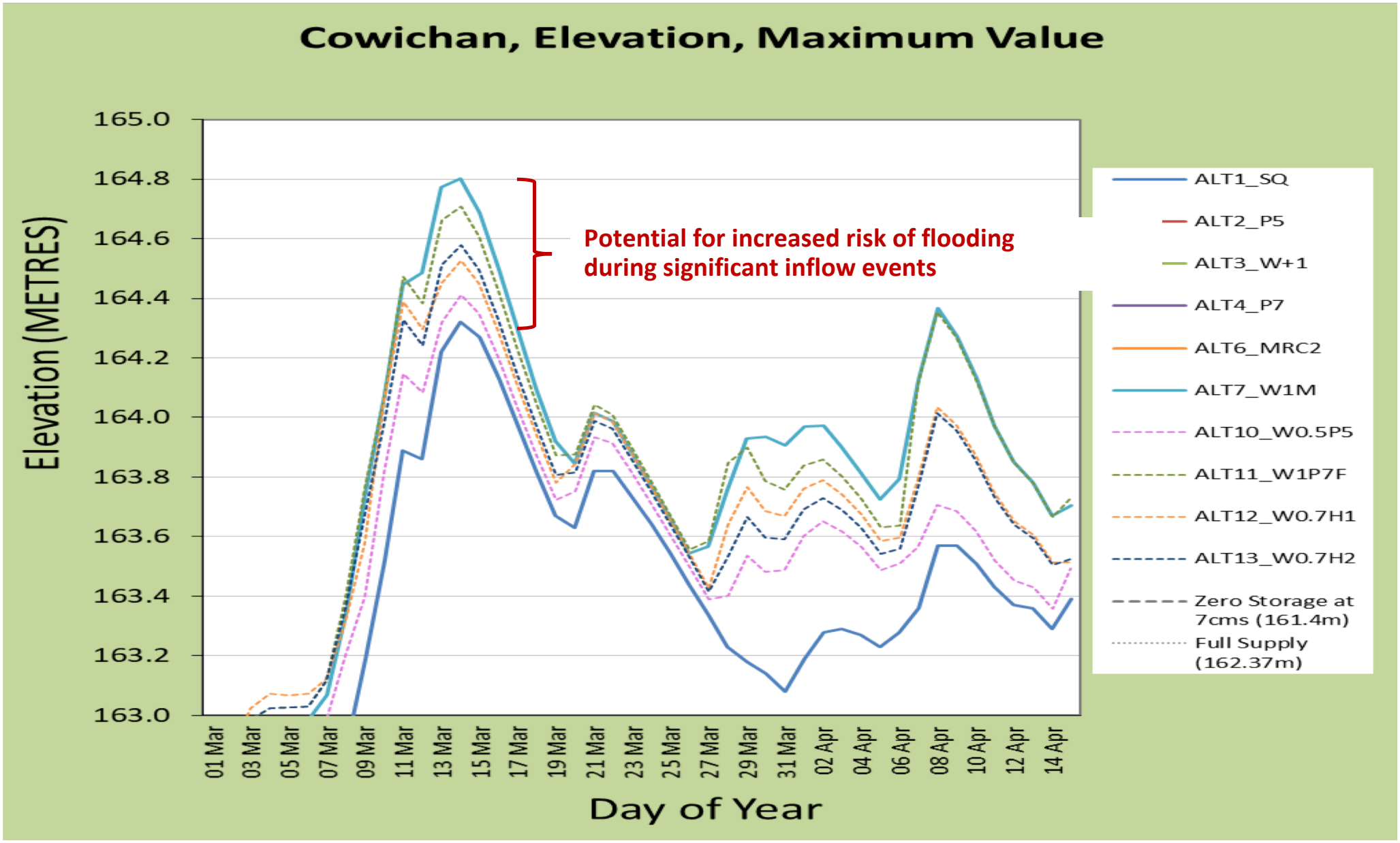

7 Reaching Agreement

PAG Meeting Held on May 8th, 2018

- The PAG reviewed and evaluated a third round of water use alternatives consisting of 5 new alternatives plus 4 alternatives carried forward from past meetings. None of these alternatives were broadly supported however, as many PAG members felt strongly and opposed multiple alternatives, with most members opposing at least one alternative. In the end, all 9 of the alternatives were not supported by at least 4 or more members.

PAG Member	ALT 1 SQ	ALT 2 SQ w/Pumps	ALT 11 W_1.0 F	ALT 12 W_0.7 H	ALT 20 W_0.3	ALT 21 W_0.4	ALT 22 W_0.5	ALT 23 W_0.6	ALT 24 W_0.7
A	o	ac	a	a	ac	ac	ac	ac	ac
B	o	o	o	e	o	o	o	o	o
C	o	o	a	ac	a	a	e	a	e
D	o	o	a	o	o	o	o	o	a
E	o	ac	ac	ac	ac	ac	ac	ac	ac
F	o	a	a	o	o	o	a	a	a
G	o	o	o	o	ac	o	o	o	o
H	o	o	ac	ac	ac	ac	ac	ac	ac
I	o	o	ac	ac	a	a	a	a	a
J	o	o	ac	a	ac	ac	a	ac	ac
K	o	o	ac	ac	ac	ac	ac	e	e
L	o	o	e	e	o	o	o	o	e
M	o	o	o	o	ac	ac	ac	o	o
N	o	o	e	e	ac	ac	ac	ac	e
O	o	o	o	e	o	o	o	o	o
P	o	ac	ac	ac	ac	ac	a	e	e
Q	o	o	ac	ac	o	o	ac	ac	e

- A new hybrid alternative was proposed that bridged the main differences highlighted across PAG members' lack of support for the other options. The PAG reached conditional agreement (i.e., "consensus") on the new alternative and recommended it as an outcome to be included along with a series of other supporting recommendations for the Cowichan WUP.

Cowichan Water Use Plan

Summary of PAG Recommendations

PAG Recommended Alternative

Infrastructure

Weir Height – Increased Storage Capacity

The PAG recommends **increasing the height of the weir by +30cm on an interim basis** until a more detailed assessment is carried out to confirm that the height of the weir is below the minimum elevation range of the natural boundary. New infrastructure would be built to accommodate up to a +70cm increase in storage capacity but be operated at +30cm until such time as the compensation issues are resolved.

A longer term **maximum weir height increase to +70cm,** would only be allowed after a compensation mechanism was established and agreed to by individual property owners for any increases above the natural boundary and their affected property rights.

Pumping – "Negative" Storage Capacity

The PAG recommends allowing for **temporary pumping to be used as an emergency measure** to maintain a minimum flow of 5cms down the Cowichan River during future severe summer droughts.

Operations

Timing of Control Period

The PAG recommends **starting to store water and control outflows to the Cowichan River one month earlier** than current start date. Timing of control may be modified based on a review of in-season hydrological conditions*

This recommendation is conditional that control should start **no earlier than March 1** unless a detailed flood risk analysis concludes that there would be no increased flood risk associated with an earlier start date.

Flow Releases to Cowichan River

The PAG recommends **adjusting the magnitude and timing of spring flows,** which incorporate:

- **Minimum flow targets,** including "hard" targets, to meet in all years, and "soft" targets, to meet in wetter years when water is available.
- **Lake level targets,** including a target date (April 1st) for when water should be stored to the top of the weir and a drawdown limit to no more than 20cm below historical "zero storage" levels.
- These flows may be modified based on in-season hydrological conditions*

This recommendation is conditional that a detailed assessment of flood risk demonstrates there **no increase in spring flood risk** over the current weir and operations.

Rule Curve Updates

The PAG recommends modifying the rule curve to ensure that lake levels are targeted to reach close to the zero storage by the end of the control period (to avoid increased flood risk associated with fall storms)

Conditions on Recommended Alternative

1. The selected alternative be refined using updated projected **future climate change inflow record** including a longer time series (more than 10 years) and using most recent downscaled climate change projection data,

2. More detailed **flood risk analysis** to be carried out using a longer projected time series to ensure no incremental increase in flood risk,

3. A more detailed assessment of the **natural boundary** be carried out to determine the elevation range in relation to any changes in the weir height*; and, depending on the results, development of a preliminary compensation framework to be implemented with the alternative,*

4. An **adaptation plan** be developed to assess how the selected alternative is to be implemented over the following 30-year period (until 2050s) including adjustments to operating guidelines, the timing of physical upgrades to the weir and adaptive measures within the proposed weir design (such as a flexible crest weir),

5. The selected alternative be operationalized to allow for **in-season management** within the parameters of better meeting the defined target levels and with consideration to snow pack monitoring, seasonal forecasting, weather forecasting, environmental field work, etc., which may include mandatory pre-spilling criteria being developed,

6. A more detailed **erosion assessment and mitigation** mechanism be developed should it demonstrated that adverse erosion impacts are occurring as a result of the operations of any new alternative,

7. The selected alternative should have a **review period** of no more than 10 -15 years once implemented and based on the necessarily environmental field work and monitoring being carried out,

8. The PAG recommends that the Partner Organizations petition the provincial and federal governments to take responsibility and follow through with the consensus recommendations reached by the PAG during the Cowichan WUP planning process.

Recommended Alternative - Benefits

Environment – Cowichan River and Estuary	
Salmon Stocks	The new recommended alternative will more than double base river flows in most years and better support passage flows in the spring and early fall for returning spawning salmon. As a result, salmon stocks will be more resilient to climate change effects and their populations would not be expected to reach a threatened status[1]. Compared to the "Do Nothing" alternative in the 2050s, the new alternative will lead to significant improvements to rearing, spawning, and side channel habitat critical for salmon survival; improved passage conditions for returning adult salmon to spawn and for juvenile salmon to return to the ocean.
Cowichan Estuary	Cowichan River flows to the estuary will be maintained at present summer and fall time levels on average in the 2050s. Accordingly, aquatic and terrestrial ecosystems in the estuary would not be expected to be impacted from a water quantity perspective.
Environment – Cowichan Lake	
Aquatic and Riparian Ecosystems	Lake levels would drop by no more than 20cm in the driest summer forecast in the 2050s for the new alternative. In 9 out of 10 years, lake levels would not fall below the normal minimum summer time level. Accordingly, there would not be expected to be any significant impacts to aquatic and threatened species relying on nearshore habitats.
Recreation & Tourism	
River – Water based recreation	River flows will be maintained and provide suitable tubing flows (i.e., greater than 5cms) throughout all summers in the 2050s.
Lake – Water based recreation and beach areas	Once the weir height was increased by 0.7m, lake levels would be up to 45cm higher at the beginning of May and then dropping to 0cm higher by the end of July in most summers by the 2050s. These higher levels will reduce beach areas for portions of the late spring and early summer from between 1m to up to 6m depending on the beach slope. There would be no anticipated adverse impacts to boating / navigation, dock access, wharves and docks, and no visual impacts associated with lower lake levels with this alternative.

Recommended Alternative - Benefits

Industry & Commercial	
Catalyst Paper	River flows will be maintained and provide flows for both mill withdrawals and minimum environmental flows throughout all summers in the 2050s. No impacts to the mill operations are expected in all future years.
Municipal	
Waste Water	River flows will be maintained and provide flows needed to meet projected waste water dilution requirements in all future years.
Water Supply – Lake	Lake levels would drop by no more than 20cm in the driest summer forecast in the 2050s for the new alternative. Lake levels would not fall below the Town of Lake Cowichan's current water intake infrastructure. Accordingly, there would not be expected to be any impacts to community water supply or upgrades to infrastructure.

Recommended Alternative - Costs

Interest	"PAG Recommended Alternative"
Lakefront Properties	
Flooding	The new alternative is NOT associated with any greater risk of flooding during the control period when the weir will be operated.
Water Levels and Lakefront Areas	Once the weir height is increased on an interim basis by +0.3m, lake levels are expected to be about 0.15m higher through May and June on average and unchanged from current levels through the remainder of the summer and fall. It should be emphasized that these higher levels are not expected to affect property rights (i.e., below the 'natural boundary' elevation). Once compensation is resolved with lakefront property owners and the weir height is increased to its full maximum height of +0.7m, lake levels would be up to 45cm higher at the beginning of May and then dropping to 0cm higher by the end of July in most summers by the 2050s.
Water Management	
Infrastructure Capital	There are costs associated with building new water management infrastructure. Based on previous studies, costs are expected to be in the range of $15 million plus whatever compensation for any affected property rights.
Operating Costs	There will be costs required to mobilize and operate emergency pumps (in 1 out of 10 years).

Questions?

Thank you

Cowichan Water Use Plan

Public Information Meeting

June 11th, 2018

A community planning initiative in partnership with:

compass kwl ECOFISH RESEARCH

CVRD Cowichan Watershed BOARD Catalyst