

Cultural Eutrophication in Cultus Lake

Summary Report on Summit Event



**Prepared by Fraser Basin Council, Christina Toth, March 2020
for Fraser Valley Watersheds Coalition**

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Canada



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Project Scope – Cultus Lake Summit

Fraser Basin Council was contracted by the Fraser Valley Watersheds Coalition in late January to organize, convene, facilitate and report on a stakeholder summit event to be held before the end of March 2020, in order to review the state of cultural eutrophication in Cultus Lake, the sources of the excess nutrient loadings into the lake, the impacts of the continued advance of eutrophication on the lake's ecosystem services, and in particular, on the lake's two vulnerable endemic species, the Coastrange Sculpin, Cultus population, and the Cultus Lake Sockeye Salmon.

Impact of COVID-19 Virus on Cultus Lake Summit delivery

- Preparatory work for the in-person symposium began in late January and continued to early March. On March 11, 2020, the UN World Health Authority (WHO) declared that the spread of the Covid-19 virus had become a pandemic. Subsequent orders by Canadian governments and public health authorities curtailed all public gatherings in order to slow the spread of the virus.
- The emergency orders meant that Fraser Basin Council (FBC) could not deliver the planned in-person Cultus Lake Summit as outlined under the terms of a funding agreement with the Fraser Valley Watersheds Coalition (FVWC). Prior to the pandemic emergency measures, the summit was scheduled to take place on March 25, 2020 at the Cultus Lake Golf Club, Cultus Lake, B.C. By mid-March approximately 20 people were confirmed to attend.
- FVWC and FBC agreed to postpone the Cultus Lake summit to comply with public health orders and to avoid health risks to our staff and guests. Conducting an online webinar format was considered but not pursued due to unsettled, changing circumstances for many of the confirmed participants. The ability of FBC to convene a symposium in some format in the future will be subject to the availability of funding for this purpose.
- A revised agreement was drawn up to reflect the modified outcomes of this project.

Revision of agreement between FVWC and FBC

Goals: In lieu of holding an in-person event, FVWC and FBC agreed in a revised contract to apply the remaining funding resources to the development of a set of communications products to partially fulfill the goals of an in-person symposium, which were to:

- 1) Provide participants with the latest science-based data on the state of cultural eutrophication in Cultus Lake, the sources of excess nutrients entering the lake, and its prognosis under various lake models;
- 2) Inform participants on the impacts of eutrophication on the Cultus Pygmy Sculpin and Cultus Lake Sockeye Salmon, and lake ecosystem services;
- 3) Stimulate discussion and questions, share ideas and seek further collaboration with participants and potentially others in the short and long term;
- 4) Identify areas where actions are needed, such as data gathering, monitoring, stakeholder outreach, committee development, field work;
- 5) Identify ways and means to implement the recommended actions to reverse cultural eutrophication and its impacts on the lake's ecosystem services and on the Cultus Pygmy Sculpin and Cultus Lake Sockeye Salmon.

Communications Product Package

In lieu of the summit, FVWC and FBC agreed to repurpose project resources as follows:

1. Develop an overview paper that reflects data that was to be presented at the summit, including highlights of recent research on Cultus Lake water quality status, the potential consequences of water degradation on Cultus Lake Pygmy Sculpin and Cultus Lake Sockeye Salmon habitat as well as other impacts; actions underway or soon to be underway to mitigate excess nutrient influx; articulation of FBC's interest in advancing broad-based collaboration toward improved Cultus Lake water quality. The primer will be compatible with the information sheet meant as an education tool for a more general public audience.
2. Produce an infographic/information sheet to simply and clearly provide information to lay audiences on the following topics:
 - a. The importance of Cultus Lake, past, present and future, including its cultural importance to indigenous peoples;
 - b. The current nutrient loading challenges facing the lake and its endemic fish species at risk, the Cultus Pygmy Sculpin and Cultus Lake Sockeye Salmon;
 - c. The potential for an enhanced collaborative approach to improving the health of the lake in ways that also benefit the region;
 - d. An invitation to the reader to stay abreast of opportunities to engage with respect to Cultus Lake by accessing FVWC and FBC websites.
3. Modify the FBC and CLASS websites to i) update users on Cultus Lake and FBC's interest in advancing collaboration in support of Cultus Lake water quality improvement; ii) introduce the infographic; and iii) provide an online email sign-up capability.
4. A final agenda for a potential Cultus Lake Summit to be held in the future, subject to funding availability. See below, Appendix A.

Included with this report:

- The overview primer *Cultus Lake – A Lake in Transition* and the illustrated information sheet accompany this package;
- Schedule A – Services is included below.
- The sample draft agenda is included below in Appendix A.
- The original list of summit attendees is in Appendix B.
- FBC and CLASS web pages will be updated: these will be at www.fraserbasin.bc.ca/fvr.html and www.cultusstewards.ca
- *Technical paper on eutrophication in Cultus Lake accompanies this package.

* In addition to the documents listed in the revised agreement, in lieu of his live presentation, the keynote speaker Dr. Daniel Selbie, DFO, Science Branch, Lakes Research Program, provided a technical paper, based on the two recent DFO studies on nutrient enrichment in Cultus Lake, and the cumulative data from the past decade of related DFO research on Cultus Lake. The paper, *Cultus Lake, British Columbia: A Changing Aquatic Ecosystem and Bellwether for Southern British Columbia Aquatic Ecosystem Responses to Regional Anthropogenic Stressors and Environmental Change*, accompanies this final report package.

The overview primer, the illustrated information sheet, and technical document will be distributed to the invited summit participants and other interested parties.

The original summit scenario:

The intent of the summit was to provide key regional experts and community leaders with information about Cultus Lake water quality and sources of nutrient loading; to facilitate discussion to identify strategies to address the accumulation and deposition of nitrogen and phosphorus in Cultus Lake (anthropogenic or cultural eutrophication); and to identify on the ground opportunities to reduce local watershed and airborne nutrients in the region.

- The summit would highlight current cumulative science on the state of Cultus Lake water quality, provide opportunities for questions, identify data gaps on the sources of nutrients entering Cultus Lake, and to explore potential responses and collaborative relationships.
- At the core of the discussions are the current and potential impacts of continued water degradation on its two threatened species, the Coastrange Sculpin, Cultus population (or Pygmy Sculpin), (SARA, threatened, COSEWIC, endangered), and the Cultus Lake Sockeye Salmon (COSEWIC, threatened).
- Scheduled keynote speaker Dan Selbie, an experienced limnologist and paleolimnologist with Fisheries and Oceans Canada's Science Branch, based at the Cultus Lake Salmon Research Laboratory in Chilliwack, B.C., is deeply familiar with Cultus Lake trophic conditions. His discussion would draw from a 2019 paper on the current oligo-mesotrophic state of Cultus Lake, and other research conducted on Cultus Lake in the past 10 years, which identifies the sources and quantities of nitrogen and phosphorus entering the lake and driving cultural eutrophication, including data that indicates there is airborne deposition of nutrients from the wider regional Fraser Valley, beyond the immediate Cultus Lake watershed.
- Shabtai Bittman, a soils and nutrient management specialist based at the Agriculture Canada research station in Agassiz, BC, was also invited to make a brief presentation to share data from studies that assess and calculate the sources, quantities and management of nitrogen and phosphorus in the Fraser Valley.
- Following this, through facilitated dialogue led by Bob Purdy of FBC, participants would be invited to ask questions, and share information on their related work and any programs that mitigate nutrient release into the environment. Discussion would also seek to identify any gaps in knowledge, what steps could be taken to protect the threatened Cultus Pygmy Sculpin and Cultus Lake Sockeye Salmon and lake water quality, what potential partnerships could be made, and how we could build on the momentum of the day.
- FBC to prepare a report of the discussions, next steps and recommendations that came from the summit, and distribute the report to participants and other interested parties.

The FBC overview primer contains extracts from studies Cultus Lake nutrient loading, and Fraser Valley nutrient distribution. These are:

- *Eutrophication forcings on a peri-urban lake ecosystem: Context for integrated watershed to airshed management* (Putt, MacIsaac, Herunter, Cooper, Selbie, 2019), and an earlier paper, *Spatiotemporal nutrient loading to Cultus Lake study* (A. Putt, 2014)
- *How efficient is modern peri-urban nitrogen cycling: A case study*, Bittman, Sheppard, Poon and Hunt (2017)
- *Phosphorus flows in a peri-urban region with intensive food production: A case study*, Bittman, Sheppard, Poon and Hunt (2016)

Schedule A – Services

<p>Activity 2: Address Knowledge Gap Related to Sources of Nitrogen and Phosphorus in Cultus Lake (“The Summit”)</p> <p>Results to provide to DFO:</p> <ul style="list-style-type: none"> a) A completed Schedule 7A from this contribution agreement; b) Copies of paid receipts or invoices, less 50% GST, for CNFASAR funded expenses for any expense line that is 5% or more of the annual contribution amount with the exception of costs categorized as Administrative Overhead; and c) A written report, including: *Modified <ul style="list-style-type: none"> o A general overview of the project works; o A summary of the multi-disciplinary/stakeholder Summit, which includes the results of the information sharing, identified strategies to consider for implementing change landscape level practices, which will lead to the reduction of nitrogen and phosphorous depositions in Cultus Lake. 	<p>X Complete (submit results with report *Modified outcomes)</p> <p><input type="checkbox"/> Complete (final results submitted with a previous report)</p> <p><input type="checkbox"/> In progress (submit draft results with report)</p> <p><input type="checkbox"/> Cancelled (provide explanation in table 2.2)</p> <p><input type="checkbox"/> Delayed (provide explanation in table 2.2)</p> <p><input type="checkbox"/> Not started (i.e., reporting prior to activity start date)</p> <p><input type="checkbox"/> Realized in part (i.e., project was begun but was not completed)</p>
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Cultus Lake Summit preparations: tasks completed before the workshop was cancelled:

A number of steps for organizing the events were carried out in February to early March.

1. Invite and confirm participation of invitees – **Complete.** (Approximately 20 people were confirmed by early March, with confirmation for about 5 guests pending. We sought a broad range of experts and interested parties from various sectors in air, soil, water and species management, as well as First Nations, local government policy and regulations specialists, and civil society and community stewardship representatives. There was keen response from most of those contacted, and strong interest in receiving the summary report from 2 or 3 people who were not able to attend.)
2. Confirm and convey to key target audiences the purpose, desired outcomes, structure and desired mix of invited attendees – **Complete.**
3. Secure summit venue and arrange logistics, Cultus Lake Golf Club was booked as the venue and caterer – **Complete**
4. Conduct initial research – **Complete**
5. Confirm draft summit agenda and process design – **Complete**
6. Confirm and secure facilitators, note-takers and other staff resources to host summit – **Complete**
7. Hold preparatory meetings and teleconferences with key subject matter experts (Dan Selbie, limnologist; Shabtai Bittman, soil scientist, Agriculture Canada; Dieter Geesing, soil

- specialist, BC Ministry of Agriculture; Marina Richter, policy analyst, Fraser Valley Regional District; Ken Reid, Manager, environmental monitoring, Metro Vancouver) – **Complete**
8. Convene special meeting with FVRD senior staff and elected official to mitigate sensitivities related to Cultus Lake Parks Board – FVRD litigation – **Complete**. (Bob Purdy met on March 11, 2020 with acting FVRD CAO Jennifer Kinneman, and Area H Director Taryn Dixon.)

Revised deliverables after workshop was cancelled:

9. Creation of a communications package including:
- An overview document (primer) describing the cultural eutrophication conditions in Cultus Lake, its effects on Cultus Lake Coastrange Sculpin and Cultus Lake Sockeye Salmon, potential paths to take to mitigate nutrient influx into the lake, and nutrient data in the in the context of the Fraser Valley; **Complete**.
 - Supporting document from keynote presenter on Cultus Lake changing water quality and its role as a bellwether ecosystem in the region; **Complete**.
 - An information sheet for the lay public summarizing the cultural eutrophication issue in Cultus Lake; **Complete**.
 - Update Fraser Basin Council and Cultus Lake Stewards web pages with Cultus Lake data and information sheet, and provide email sign-up capability. **In progress**.
10. The finalized communications items will be actively distributed to the original symposium participants and other interested parties, while the general public will be able to access web and information sheet material on Cultus Lake.

Fraser Basin Council (FBC) is a charitable non-profit organization that brings people together to advance sustainability in the Fraser River Basin and throughout British Columbia.

Our Vision: Social well-being supported by a vibrant economy and sustained by a healthy environment.

This report is for the Fraser Valley Watersheds Coalition, who is funded by the Canada Nature Fund for Aquatic Species at Risk, Fisheries and Oceans Canada to undertake the project.

The Fraser Basin Council also thanks Daniel Selbie, a limnologist and paleolimnologist with Fisheries and Oceans Canada's Science Branch, Lakes Research Program, Cultus Lake Salmon Research Laboratory, and Shabtai Bittman, soil researcher with Agriculture and Agri-Food Canada, based at the Pacific Agri-Food Research Site in Agassiz, for sharing their time, expertise and advice.

Appendix A – sample agenda for a future Cultus Lake symposium:

Cultus Lake Symposium – DRAFT AGENDA

Cultus Lake Golf Club

4200 Columbia Valley Rd, Chilliwack BC

Date to be determined

Symposium Theme:

A Lake in Transition – Addressing eutrophication drivers in Cultus Lake

OBJECTIVE: Participants (researchers, local governments, First Nations, NGOs/ENGOS) are invited to learn about developing trends in Cultus Lake water quality and habitat degradation, and their potential impacts on the Cultus Coastrange Sculpin, Cultus population, and Cultus Lake Sockeye Salmon. Expert presentations will include scientific data on the sources and quantity of local watershed and regional airborne sources of nutrients that contribute to cultural eutrophication in the lake. Participants will be encouraged to ask questions, to share their own knowledge on nutrient mitigation, to consider where there are gaps in data, and where there may be opportunities for collaborative partnerships with the participating groups and others. Fraser Basin Council will facilitate, and report on the discussions and outcomes to the participants, partners and funders.

Time	Agenda	Facilitator: Bob Purdy, FBC
8:00 a.m.	Staff arrive, set up	
8:30 am	Registration, coffee	
9:00 am	Welcome, acknowledgement, comments on conservation, collaborative Opening comments – Cultus is important Introductions, overview of day	Bob Purdy, facilitator Soowahlie First Nation Taryn Dixon, director FVRD
9:15 – 10 am	Cultus Lake in Transition – presentation on the state of eutrophication in the lake, sources of nutrients, prognosis Air disposition of nutrients	Dan Selbie, DFO limnologist
10 – 10:15 am	Q & A and discussion	Dan Selbie
10:15 – 10:30 am	Nutrient budget in the Fraser Valley Q & A and discussion	Shabtai Bittman, Ag Canada, soil and nutrient specialist
10:30 – 10:45	Coffee break	
10:50 – 12	Sharing information session with participants on what is being done to mitigate stressors on water quality and aquatic habitat.	Bob Purdy facilitating: i.e. Agricultural BMP Septics Smallmouth bass mitigation – AQ monitoring – Metro Van, FVRD
Noon	LUNCH	Lunch served in room
12:45 pm	Questions to raise and to answer; ID gaps in knowledge	Bob Purdy facilitating afternoon discussions.
1 pm	Small group discussion on above	
1:30 pm	Plenary share findings	
2 pm	Look for synergies, possible sharing of data, discuss benefits of and possible collaborations	
2:30 pm	Examine what work can be executed in short term.	
3 pm	Who else to engage?	Other key voices, champions
3:15 pm	How to keep momentum going.	Funding, roundtable, committee formation
3:30 pm	Review of results of discussions	Bob Purdy; Participants' remarks
4 pm	Closing remarks	Bob Purdy, Taryn Dixon and/or other.

Appendix B

List of invited guests to the original Cultus Lake Symposium

Name and title	Organization
Event Coordinators Bob Purdy, Director, External Relations & Corporate Development, facilitator Christina Toth, Ass. Regional Manager, Kelsey Taylor, Program Coordinator, Vancouver region, recorder	Fraser Basin Council
Natashia Cox	Fraser Valley Watersheds Coalition
Invitees	
Guest – project funder	CNAR-ASAR funder representative
Dan Selbie, limnologist, keynote speaker	Fisheries & Oceans Canada, Lakes Research Program, Cultus Lake lab
Shabtai Bittman, soils nutrient specialist	Agriculture Canada research centre, Agassiz
Dieter Geesing, soils nutrient specialist, and guest	BC Ministry of Agriculture, Abbotsford Centre
Darcy Bauer, director, CLASS liaison	Cultus Lake Park Board
Taryn Dixon, Area H director	Fraser Valley Regional District
Ken Reid, Superintendent of Environmental Sampling & Monitoring, Parks & Environment	Metro Vancouver Regional District
Meghan Jackson, parks technician	FVRD
Lance Lilley, Manager of Environmental Services	FVRD
Marina Richter, air quality, Environmental Policy Analyst	FVRD
Amy Ross, Senior Park Ranger, South Fraser Area	BC Parks
Kathy Ma, executive director	Fraser Valley Invasive Species Society
Brett van Poorten, Senior Aquatic Scientist Applied Freshwater Ecology Research Unit	BC Ministry of Environment and Climate Change Strategy (ECCS)
Jordan Rosenfeld, Stream Ecology Scientist	Ministry of Environment & Climate Change Strategy
Martina Beck, Invasive Fauna Unit Head	Ministry of Environment & Climate Change Strategy
Tara Friesen, Environment Services	City of Chilliwack
Norm Zirmhelt, Executive Director	BC Lake Stewardship Society
Dave Clyne, co-chair	Cultus Lake Stewards
Ernie Vance, chair	Lakeside Trail Society
Invited but not confirmed before plans changed	
Chief Brenda Wallace	Soowahlie First Nation
Keri Ardell, Operations & Projects Manager	Ts'elxweyeqw Tribe
Kevin Kelly, assistant land manager	Soowahlie First Nation
Mike Gass, Freshwater specialist	BC Freshwater
Roxanne Vingarzan, Manager, Applied Sciences Section	Environment and Climate Change Canada
Keith Jones, atmospheric specialist	ECCC