



## Technical Memorandum

**DATE:** June 19, 2024

**TO:** City of Abbotsford

**FROM:** Mike Currie, P.Eng.

**RE: Reclaiming the Xhotsa  
Technical Commentary on Article Published in Frontiers in Conservation Science  
Our File 0510.210-300**

In response to the City's request, this technical memorandum provides some brief technical commentary on an article that was recently published in Frontiers in Conservation Science. The article is titled *Reclaiming the Xhotsa: climate adaptation and ecosystem restoration via the return of Sumas Lake*<sup>1</sup>, authored by Finn et al, and published on June 3, 2024.

The article contains valuable and interesting content regarding Indigenous history, perspectives, and interests. The article also indicates that since the 2021 flood (presented as having "caused the lake to return") the "response has been a continuation of the status quo". However, the article reflects only limited knowledge of the ongoing flood mitigation work being undertaken by the City (with the support of KWL), and makes no reference to the important discussions ongoing in the Sumas River Watershed Flood Mitigation Plan (SRWFMP) and Nooksack River Transboundary Flood Initiative (TFI) collaborative planning processes, both of which recognize the critical need for Indigenous participation.

KWL is a proponent of an integrated and collaborative approach to flood risk management. This approach is (formally or otherwise) reflected in the missions of the SRWFMP and TFI. An integrated and collaborative approach implies that participants will work together from a carefully-constructed foundation of shared knowledge. The article includes content on flood mitigation options and costs that has some technical limitations, and potentially risks becoming misinformation.

The points below provide some brief commentary on the above-noted issues as presented in the article. Some of the commentary and concerns raised in this discussion are similar to issues documented in the more recent article published by the Fraser Valley Current<sup>2</sup>.

### Costs of Retreat from Sumas Lake

The Frontiers article includes cost estimates for retreat from the former Sumas Lake bottom area, defined in the article as a footprint of 6,073 ha. These cost estimates have technical limitations in the land valuation and the scoping of the works required.

- The article uses 2020 data from BC Assessment to estimate land value. For Sumas Prairie properties with farm classification, the values published by BC Assessment are much less than market value. Recent

<sup>1</sup> Finn, R.J.R., Ned-Kwilosintun, M., Ballantyne, L., Hamilton, I., Kwo, J., Seymour-Hourie, R, Carlson, D., Walters, K.E., Grenz, J., Martin, T.G. (2024). Reclaiming the Xhotsa: climate adaptation and ecosystem restoration via the return of Sumas Lake. Frontiers in Conservation Science.

<sup>2</sup> Olsen, Tyler (2024). The benefits, opportunities, costs and challenges of restoring Sumas Lake (Part 2). Fraser Valley Current. June 11, 2024. <https://fvcurrent.com/p/cost-challenges-sumas-lake>



research<sup>3</sup> indicates that market value is an appropriate starting point for societal acceptance of a buy-out program. The recent Fraser Valley Current article suggested a value of \$120,000 per acre as representative of market value for farmland in Sumas Prairie. In 2022, the City's Real Estate Division provided KWL with a range of market value estimates from \$140,000 to \$475,000 per acre depending on the size and type of farm. All of these values significantly exceed the \$63,700 per acre average value implied by the cost and area included in the Frontiers article.

- The article acknowledges that some costs (such as new dike infrastructure, planning, communication, cleanup of infrastructure, and decontamination) will be necessary but are not included. The article goes on to suggest that in many cases the “transactional” costs of buy-outs comprise 80% of the total program cost, implying that these “other” costs could be in the range of \$200M for the former Sumas Lake bottom area.
- The Frontiers article notes that there would be additional “other” costs beyond land acquisition, and we do not dispute its reference to other projects in the published literature. However, retreat from the former Sumas Lake bottom area would be extremely complex, and the suggestion that \$200M may be a sufficient allowance for these other costs is misleading in view of the need to address the following issues:
  - reconfiguration of existing river systems (Sumas River and Chilliwack/Vedder River) as well as associated infrastructure like Barrowtown Dam and Barrowtown Pump Station to supply and sustainably support a fundamentally different hydrologic and hydraulic regime in Sumas Prairie (assuming – though unstated in the article – that protection against flooding from the Fraser River will remain in place);
  - relocating major regional infrastructure out of the former lake bottom (pipelines, power lines);
  - redesign and reconstruction (potentially including re-routing) of major transportation infrastructure currently passing through the former lake bottom (Highway 1, Southern Railway);
  - removal of the extensive local servicing infrastructure in the former lake bottom area;
  - costs associated with acquisition or relocation of farm businesses (over and above the cost of acquiring land and buildings) and replacing their contribution to the broader food security of BC;
  - losses to the regional and provincial economy, recognizing that flooded areas of Abbotsford and Chilliwack accounted for about 0.7% of BC's Gross Domestic Product (valued at about \$1.9B annually in 2018), over 3,800 jobs and approximately 5,600 businesses<sup>4</sup>; and
  - mitigating flood risk in other areas like Huntingdon outside the former lake bottom that may also be exposed but are beyond the scope of retreat from the former lake bottom area considered in the article.

The cost for addressing these items would significantly increase the other costs suggested in the Frontiers article, a threshold that the article presents as an unlikely high outlier. In summary, we believe that the scope of action and related costs for retreat from the former lake bottom area have been grossly underestimated.

## Analysis of City of Abbotsford Mitigation Options

- The Frontiers article contrasts retreat from the former lake bottom area favourably against a range of comprehensive mitigation options for Sumas Prairie considered by the City of Abbotsford. Information on the City's options appear to be based exclusively on publicly-available information from an April 4, 2022 City of

<sup>3</sup> Thistlethwaite, J., Le Geyt, M., Martin, G., Cottar, S., & Whittaker, L. (2023). Buying Out the Floodplain: Recommendations for Strategic Relocation Programs in Canada. Partners for Action, University of Waterloo.

<sup>4</sup> Bemrose, R. & MacDonald, R. (2022). Estimates of the economic activity in and around flooded areas in British Columbia. Statistics Canada Economic and Social Reports. Catalogue 36-28-0001. DOI: <https://doi.org/10.25318/36280001202101200003-eng>.



Abbotsford Committee of the Whole meeting. The discussion of complex flood mitigation options based on summary-level information alone invites misunderstandings such as those discussed below.

- The meeting materials indicate that “a number of different mitigation options have been reviewed” and that four options have been selected for discussion purposes. These four options were selected by City staff as most appropriate for public engagement, and eventually led to development of a preferred option by the City. However, the four options discussed in the meeting materials were not the only options reviewed.
- While not noted in the referenced meeting materials, it is noteworthy that potential restoration of Sumas Lake has been discussed during the ongoing flood risk mitigation planning activities. During these discussions, KWL has compiled a tabular list of “Issues Associated with Potential Restoration of Sumas Lake” which is attached to this technical memorandum as a ‘working draft’ for information. Ultimately it is recognized that such an initiative is beyond the City’s jurisdiction and would require a senior government ‘champion’.
- The article highlights the fact that “none of the proposed options by the City of Abbotsford include managed retreat”. In making this statement, the article appears to incorrectly imply that managed retreat is an ‘all or nothing’ approach that can only be applied as full retreat from the former lake bottom area. In fact, the City’s preferred option incorporates various elements drawn from an ‘all tools in the toolbox’ approach, including a component of managed retreat (nearly \$150M was allowed for managed retreat from areas of the river corridor and lake bed at highest risk, including approximately \$80M to acquire lands at the deepest part of the former lake bottom).

## Comparison of City and “Full Retreat” Alternatives

- The Frontiers article concludes that “the cost of buying out properties in the lakebed and allowing the lake to return is close to half the cost (\$1 billion) of maintaining the status quo (\$2.4 billion)”. While the article does acknowledge that that “our analysis is not intended to represent a complete account of the cost and benefit of reclaiming and revitalizing the lake, or continuing to invest in protecting the prairie”, it nonetheless goes on to assert that it “demonstrates the economic feasibility of returning Sumas Lake relative to the other alternatives under examination”.
- As presented above, the article’s finding of economic viability is based on application of BC Assessment property valuations that are well below market value, a grossly under-scoped discussion of other costs required to retreat from the former lake bottom area, and a misunderstanding of the purpose of the City’s referenced potential mitigation options.
- Applying a representative unit cost for land of \$150,000 per acre based on data obtained from the City’s Real Estate Division in 2022 would inflate the cost of acquiring 6,073 ha in the former lake bottom area from the \$956M stated in the Frontiers article to about \$2.25B (i.e., more than double). The other cost items noted above but excluded from the article’s analysis would be measured in billions of dollars.
- In general, the simplistic approach taken by the article does not reflect the complexity of this issue, in part as documented in the attached tabular list as noted above.

## Conclusion

The Frontiers article provides unique and valuable information on the history, perspectives, and interests of First Nations in considering the possible return of Sumas Lake. This information will be of significant value to the ongoing collaborative processes. However, while the article’s authors acknowledge that they do not provide a full picture of the scope and cost of works required to achieve a retreat from the former lake, they present their work as sufficient to draw conclusions about how one alternative approach to mitigation is economically better than



others. The article’s assessment of the potential costs for retreat from the former lake bottom area is grossly underrepresented. As a result, the article does not justify its conclusion that the analysis “demonstrates the economic feasibility of returning Sumas Lake relative to the other alternatives under examination”. Such a determination could only be supported on the basis of a far more comprehensive assessment of economic costs.

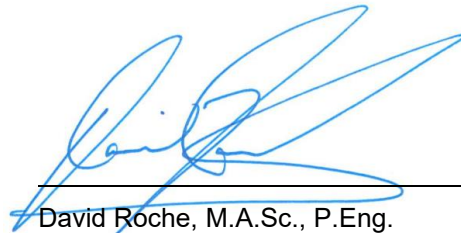
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Enclosure: Issues Associated with Potential Restoration of Sumas Lake

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**Revision History**

Revision #	Date	Revision Description	Author
0	June 17, 2024	Final	MVC
1	June 19, 2024	Revised	MVC

## Issues Associated with Potential Restoration of Sumas Lake

Aspect	Issue
Extent of Restoration	<ul style="list-style-type: none"> <li>• What degree of lake restoration should be considered?</li> <li>• What scope of work would be required for decontamination prior to flooding?</li> <li>• To what extent would existing infrastructure (e.g., asphalt roads, watermains, sewer pipes) need to be removed?</li> <li>• What extent of restoration would be required for channel networks feeding a restored Sumas Lake?</li> <li>• Would Sumas Prairie East be significantly excavated to create storage capacity and/or remove anthropogenic materials?</li> </ul>
Agricultural Considerations	<ul style="list-style-type: none"> <li>• How would agricultural production change (extent, intensity, and diversity of operations) and what would be the local, regional, and national impact of the resultant loss?</li> <li>• How would the loss of production affect BC's food security goals, particularly in the context of climate change?</li> <li>• What would be the ecological impact of accumulated nutrients, chemicals and agricultural waste products that may already be present within Sumas Prairie East and/or be washed into and retained within the restored lake?</li> <li>• How would irrigation demand for surrounding lands be served from a lake with highly variable seasonal water level and increasing evaporation?</li> </ul>
Land Acquisition	<ul style="list-style-type: none"> <li>• How much land would be acquired? Would it include all lands below some defined flood level? Or some other metric?</li> <li>• What would be the mechanism to re-acquire the Sumas Prairie East lands?</li> <li>• What would be the land acquisition cost, and who would pay?</li> <li>• In addition to acquiring land, how would the value of farm businesses and farm quotas be considered?</li> </ul>
Critical Infrastructure	<ul style="list-style-type: none"> <li>• How would Highway 1 need to be modified?</li> <li>• What changes to the local and regional transportation system would be needed?</li> <li>• Would existing "backbone" utility corridors (500 kV hydro, oil, gas, telecommunications) need to be modified or relocated? If so, who would pay?</li> <li>• How would the alignment and/or profile of Southern Railway need to be modified?</li> <li>• What other critical infrastructure would need to be relocated or modified?</li> </ul>
River Management	<ul style="list-style-type: none"> <li>• Would the high sediment load of the Chilliwack River be directed into the restored lake, or toward Vedder Canal?</li> <li>• How would the function of Vedder Canal be affected?</li> <li>• What would happen to river reaches that are abandoned or subject to significant reduction in flow?</li> <li>• Would the Fraser River be allowed to flood into Sumas Prairie once again?</li> <li>• If not, what pump capacity (if any) would be provided to manage the lake level during Fraser River freshets and Sumas River floods?</li> <li>• Who would take responsibility (and liability) for operational decisions and management of the lake?</li> <li>• How would the work impact the overall flood risk to the community?</li> </ul>
Lake Inflow	<ul style="list-style-type: none"> <li>• What amount of seasonal inflow would be required to maintain lake health?</li> <li>• How will the inflow be achieved from Vedder River, Sumas River, Saar Creek, and Arnold Creek while also minimizing the impact on these creek and river channels?</li> <li>• Can the desired water balance of the lake be achieved and maintained under climate change scenarios without negatively impacting other ecosystems?</li> </ul>

Aspect	Issue
Fish and Wildlife Habitat	<ul style="list-style-type: none"> <li>• How would “lake health” be measured, and against what baseline or target?</li> <li>• Would the lake be restored to a fully natural state, or would it function as a managed reservoir?</li> <li>• If the reservoir is managed, what operational criteria would govern?</li> <li>• What would be the impact on salmon migration from the Fraser River to Chilliwack River (and reverse) if Vedder River flow must be provided to maintain lake health?</li> <li>• How would the Vedder River/Canal sport fishery be affected if Vedder River flow must be provided to maintain lake health?</li> </ul>
Dike Management	<ul style="list-style-type: none"> <li>• Would the Sumas Dike be removed, or alternatively reconfigured to provide some level of flood protection?</li> <li>• Would there need to be any changes to the Vedder Dike (protecting Sumas Prairie East from the Fraser River and Vedder River)?</li> <li>• What changes would be needed at Barrowtown Pump Station? Or would it be removed?</li> <li>• If the Fraser River would be allowed to flood Sumas Lake, would there be any benefit to downstream dike systems and how could that benefit be shared equitably with those flooded by the lake?</li> </ul>
Regulatory Issues	<ul style="list-style-type: none"> <li>• What would be the requirement for environmental impact assessment?</li> <li>• What approvals/licences would be required? Is it likely that such would be forthcoming?</li> <li>• How would aquatic health needs be prioritized against irrigation in the event of a major drought?</li> <li>• What (if any) additional requirements or concessions would the Agricultural Land Commission impose in exchange for the Sumas Prairie East lands being permanently taken out of the ALR?</li> <li>• What archaeological issues would need to be addressed?</li> <li>• Would there be a mosquito control program, and who would be responsible for implementing it?</li> </ul>
Intergovernmental Affairs	<ul style="list-style-type: none"> <li>• What issues would need to be addressed with First Nations and City of Chilliwack?</li> <li>• Would the restored lake be able to backwater enough to reach the international border, and if so how would cross-border flood risks be managed?</li> <li>• What other issues would need to be resolved with US interests?</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>• How long would it take to develop and implement a plan?</li> <li>• What transition issues would need to be addressed?</li> </ul>
Jurisdiction	<ul style="list-style-type: none"> <li>• Would it be necessary for a senior government organization to oversee development and implementation of a plan?</li> <li>• What would the future responsibilities for the City of Abbotsford, City of Chilliwack and First Nations?</li> </ul>
	<ul style="list-style-type: none"> <li>• How would targets for “lake health” evolve in response to climate change?</li> <li>• Would the restored lake be prone to eutrophication (i.e., from low throughflow and high nutrient loading from farm runoff)?</li> <li>• What degree of periodic dredging would be required to maintain the lake in view of sediment inputs?</li> <li>• Would the constant but low-level delivery of naturally occurring asbestos gradually contaminate lake sediment?</li> <li>• Would mosquito management become a problem (as it was prior to the 1920s drainage project)?</li> <li>• What sort of management and monitoring program would be required to support the lake, and who would take responsibility for it?</li> </ul>

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