



Elk River Watershed
Qukin
ʔamakʔis Collaborative
Monitoring
Program

Interim Monitoring Working Group

Seventh Meeting - Sep 29, 2023 - Meeting Notes

Attendance

1. Ashlee Jollymore, Consultant, *MacHydro* - in-person
2. Bill Annable, Associate Professor, *University of Waterloo* - in-person
3. Cait Good, Senior Lead Aquatic Sciences, *Teck Coal* - online
4. Dwayne Minton, Impact Assessment Biologist, *ENV* - online
5. Evgeni Matveev, Outreach & Education Coordinator, *Elk River Alliance* - in-person
6. Jeremy Krogh, Geomatics and Data Science Specialist, *ENV* - online
7. Joanna Line, Project Engineer, *City of Fernie* - online
8. Jon Bisset, Owner, *Jon Bisset & Associates* - in person
9. Jonathan Jeffery, Hydrometrics Specialist, *ENV* - online
10. Kaileigh McCallum, Ecologist, *Elk River Alliance* - in person
11. Karen Bergman, *Collective for Lower Elk Aquifer Restoration* - online
12. Nicolas Francoeur-Leblond, Sr. Engineer Water Quality, *Teck Coal* - in-person
13. Nick Lapointe, Senior Conservation Biologist, *CWF* - online
14. Paige Thurston, Database Community Engagement Coordinator, *LLC* - online
15. Stella Swanson, Director, *Elk River Alliance* - in-person
16. Samantha Mertens, Ecosystem Biologist, *WLRS* - online
17. Stewart Rood, Professor Biological Sciences, *Uni Lethbridge* - in-person

Meeting objectives

Data assessment progress based on April 2023 work plan	The Elk River Alliance created an R-script to interrogate federal, provincial and regional databases. R-packages already available for data-mining purposes were linked to and data was extracted meeting the following criteria: <ul style="list-style-type: none">- 1) collected within the geographical boundaries of the Elk River watershed- 2) collected from “rivers/streams/creeks”- 3) collected for “background and trend” purposes
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	<ul style="list-style-type: none"> - 4) collected “after 1980” - 5) there are “ >20 points” i.e. sampling events per station and - 6) one of the parameters of interest was measured (metals, nutrients, major ions, etc...). <p>The R-package found data on 299 sites and 74 parameters meeting the above criteria.</p>
Data assessment next steps based on April 2023 work plan	<p>The MWG asked the Elk River Alliance to prepare public data annotations (metadata) for the data visualisation tool to provide information on what data owners did in term of data collection methodologies, the assumptions made by data owners, the intended purpose of data collection efforts (i.e. intended data uses).. Etc.. The Monitoring Working Group recommended the Elk River Alliance work with Teck to get in-kind help to “flesh out our plans” to answer our questions on changes in stream indicators in time and space, and distinguish between competing causes behind changes. The Monitoring Working Group also supported the next step to start consolidating data on climate and land use, and asked the Elk River Alliance to work with BC WLRS and Dr Susanne Bailey from the Columbia Wetlands Stewardship Partners (CWSP) to work out best practices for the overlay of land use data (including aerial photos) and water data.</p>
Decide on plan for third annual forum	<p>Obtained the Monitoring Working Group’s support to present an overview of the available data, and what patterns were emerging when we displayed the available data across time and across space.</p>

Meeting minutes

Why is data consolidation needed?

Evgeni Matveev	<p>Explained that a lot of data on the Elk River watershed was stored in different databases, i.e. spread across different places, making it challenging to produce an overview of the available data. Explained that his proposed solution was to collect the data from all these databases, validate the data and visualise data, to identify strengths, weaknesses and gaps in the available data. Explained that his goal was to find a way for people with different educational backgrounds to see and understand the available data.</p>
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How do we consolidate data? How do we visualise consolidated data?

<p>Evgeni Matveev</p>	<p>Presented his workflow to consolidate data. Started assembling the data from all available databases on the chosen stream response indicators and, as a future step, promised he would move on to assemble the data from the available databases on the chosen stressors of land use and climate change. Explained his work accomplished so far, starting with 1) interrogating the federal databases of the Water Survey of Canada, and of the Canadian Aquatic Biomonitoring Network Protocol (CABIN), the provincial Environmental Monitoring System database (EMS), as well as the regional Columbia Basin Water Hub database 2) extracting data contained within the geographical boundaries of the Elk River watershed, 3) filtering data to include only “rivers/streams/creeks,” “background and trend,” “after 1980”, and “with >20 points”, for selected parameters in the April 3rd work plan (e.g. “major ions”, “metals”, “nutrients”, flow”, etc...). 4) building a data visualisation tool to show obvious patterns and obvious shortcomings in the available data. After going through these work steps, obtained data on 299 sites and 74 parameters, which he considered to be too much for visualisation. Asked for feedback.</p>
<p>Paige Thurston</p>	<p>Shared that Living Lakes Canada had built a Ckan/R package to help database managers like Evgeni pull from data out of their Columbia Basin Water Hub data.</p>
<p>Nick Lapointe</p>	<p>Insisted we include data outside of the Elk River watershed geographical boundaries, such as Bull River.</p>
<p>Evgeni Matveev</p>	<p>Responded that there was already too much data for now, within the Elk River watershed, but the code being built would be easy to adapt to pull data from the EMS database outside the watershed boundaries, at a later work step.</p>
<p>Stella Swanson</p>	<p>Added to Evgeni’s response that we wanted to get this system working first and then we would expand to other geographical areas, including the Oldman, Bull, Flathead, etc.</p>
<p>Stewart Rood</p>	<p>Commented that the forest logging industry had a big impact on streams but the flow time series data would reflect everything, i.e. the combined effect of all impacts happening over time</p>
<p>Jon Bisset</p>	<p>Explained that changes to greenhouse gas emissions would not readily</p>

	<p>translate to changes in climate as the study of climate change takes decades, and we would need to communicate this to set realistic expectations. Explained that changes in forestry and land-use practices translated more readily to changes in streams, keeping in mind that even instant improvements in stream indicators were not possible. Asked to keep in mind what data is, what data is meant for, what it is not meant for, what data limitations are, and add comments to that effect on the data visualisation tool. Provided the CABIN protocol as an example which generates good benthic invertebrate data, but individual flow measurements taken in the CABIN protocol cannot be used on their own, i.e. not useful as stand-alone data. Added that for small streams, you can apply perfect hydrometric measurement methods but would still get a 50% error on your measurement of streamflow, so we would need to explain the specifics of data collection methodologies.</p>
Stewart Rood	<p>Agreed that data annotations would need to be public, including what data owners did in terms of data collection methodologies and the assumptions made by data owners, etc. Provided one example for useful data annotations: the Water Survey of Canada hydrographs noting the presence of ice.</p>
Bill Annable	<p>Commented that it would always be difficult to provide data for a wide range of users. Commented on his needs as a data user for the data published by the Water Survey of Canada. Said he always started looking at metadata, before looking at the actual data. He would look for the rating curves that the WSC had used and assess how many times the rating curves had changed. Explained his thinking: when the Water Survey of Canada used 1 rating curve over 50 years, for a given hydrometric station, he would know it's a stable location, while more than 1 rating curve over 50 years meant less stable hydrometric stations. Cautioned against interpretations on changes in discharge, when these could simply be the result of unstable stream sections rather than being the result of climate change, or other human pressures. Reiterated the importance of being aware of data collection methods (metadata) before even looking at data, with metadata including calibration records, and acknowledging that some data owners did not even calibrate their hydrometric equipment (e.g YSI probes and Sontek flow trackers).</p>
Stella Swanson	<p>Proposed for Evgeni to continue vetting and validating data and to convene a sub-group of this Monitoring Working Group to check data, trace where data comes from and how it was collected.</p>

Bill Annable	Thought we would need to be more aware where data was being used and what it was being used for, as data is not necessarily “invalid” but may not be useful for all applications.
Jon Bisset	Commented that we should not forget about cultural perspectives as there was research on how traditional knowledge could also be quantified. Added that traditional data is often more long-term than data collected from “Western science.”
Stella Swanson	Said that we are working to find the best ways to include traditional knowledge and learn more about this knowledge.
Ashlee Jollymore	Explained that the US flood standard attempts to include First Nations knowledge of historical flood events.
Nicolas Lapointe	Asked whether we will be simply aggregating all these datasets from the existing databases or create a new database for this consolidated data, for e.g. CWF has a fish barriers database that bings in source data from different locations, then CWF applies QAQC to the consolidated dataset, corrects and adds to data. CWF tracks these changes and makes them available. Nick spoke on behalf of the CWF team to offer their support in creating a database.
Evgeni Matveev	Responded to Nick, that currently no data manipulation was done by him.
Nicolas Lapointe	Proposed that before manipulating, devise a plan for how you will do it and record all these manipulations.
Jon Bisset	Added that some data can be subjective, i.e., biological habitat assessments were subjective using best guesses or best assumptions
Stella Swanson	Added that we will need to understand the difference between bias and statistical error and be aware of our biases.
Bill Annable	Asked the group what is the overarching goal of the Monitoring Collaborative
Stella Swanson	Introduced Bill to the Adaptive Monitoring Framework that ensures data collected will feed into decision-making to protect the watershed. Added that we are simply assembling what we already know based on Themes 1 and 2. The goal would be to create a monitoring program that provides support for decision-makers.
Evgeni Matveev	Added to Stella’s comments that the goal for today is to create a

	common knowledge base for everyone here.
Bill Annable	Suggested getting all data owners involved for them to process and assess their data independently.
Stella Swanson	Responded to Bill that we may have to take on this data processing and assessment for some owners.
Ashlee Jollymore	Asked that we be clear on where responsibility lies for the data quality, she did not think it should be the responsibility of the Monitoring Collaborative.
Bill Annable	Stressed that we would need to be aware of who will be managing the database and think legally who will be responsible for data quality.
Nicolas Francoeur-Leblond	Asked what data would be used for, i.e., if you remove all data with less than 20 points – depending on what you want the data for, one point could still be valuable.
Stella Swanson	Explained that we already decided on our topics for data uses which were to look at data trends both spatially and temporally.
Nicolas Francoeur-Leblond	Raised concerns with assessing trends, i.e., would we have the ability to distinguish competing causes behind trends. Also asked to include symbols for those who can't see colour.
Jeremy Krogh	Suggested we use “colour-brewer” as a colour blind-friendly palette. [J.Bisset] Said that scale was another issue for visualising data.
Jon Bisset	Suggested that we use the “ Pacific Salmon Explorer ” as a template.
Evgeni Matveev	Commented that currently, his main concern was to present an overview of data to partners and eventually he would focus on presenting data to the public (to the community).
Bill Annable	Suggested we use heat maps to present flow data. Commented on station # E20661 in Evgeni’s database and that we are likely only seeing a variation in minimum detection limits.
Nicolas Francoeur-Leblond	Discussing another outlier for another station of interest in the EMS database, commenting that we were likely seeing an error in the process pulling data from EMS or an error in initial data input to EMS.
Jeremy Krogh	Agreed that we were looking at a result letter error, and likely, the data uploader at Teck made the mistake.

Anne-Caroline Kroeger	Agreed to send EMS issues to Jeremy to explore further.
Jeremy Krogh	Added that there could be individual variations in detection limits, because, depending on the type of analyses used in laboratories, there would be different detection limits for the same metal (ie. different analytical methods used by laboratories) explaining the differences in detection limits.
Jon Bisset	Suggested adding bars to graphs with bottom notes somewhere to explain changes in things like detection limits, or issues with turbidity measurements. Asked us to remember that turbidity is only a proxy for TSS to allow you to get an idea of TSS in the field.
Bill Annable	Added that turbidity changes with viscosity and we would need to keep in mind water temperatures as that changes viscosity. To correct for this, we would need to examine TSS and turbidity separately for each site
Ashlee Jollymore	Suggested we flag this issue rather than trying to correct it.
Paige Thurston	Said she was happy to have herself or Maggie participate in future data standards discussions.
Stella Swanson	Said she would love to start exploring the effects of road density on TSS/turbidity in streams and look at the effects in TSS and turbidity based on proximity to roads.
Bill Annable	Asked us to start with good discharge records and look for geographical areas with established rating curves. Then, suggested we might start to work on TSS/turbidity.
Stewart Rood	Added that it would also be interesting to start monitoring turbidity changes after the forest fires on the steep slope by Sparwood over the summer 2023.
Jon Bisset	Agreed that we will need to understand how the whole watershed works and responds to freshet.
Stella Swanson	Asked folks to communicate with Anne if they had specific experience in dealing with outliers in time series data.
Evgeni Matveev	Reiterated that he would like to create a more interactive dashboard and include text/annotations to give more context to the data as proposed today.

Jon Bisset	Recommended we add links to real-time data for people to access.
Evgeni Matveev	Wanted to integrate land-use data, and asked for support for future data analyses
Bill Annable	Promised to connect with Evgeni on this research. Proposed we start by including aerial photos over time.
Stella Swanson	Suggested we discuss with CEMF how they brought together water quality data with land use data.
Jon Bisset	Confirmed that the Province of BC has extensive aerial photos over time and Doctor Suzanne Bailey may be able to help.
Jeremy Krogh	For final comments said he would welcome people reaching out to him if they had concerns with data stored on EMS
Dwayne Minton	Liked the direction of the database and this Monitoring Working Group.
Evgeni Matveev	Would love comments from partners about his “pdf viewer” i.e., his data visualisation tool.
Nicolas Francoeur-Leblond	Added that Teck was working on the same questions as the Monitoring Collaborative and he liked the idea but was unsure how we were planning to answer those questions. Stressed that Teck was currently developing ambitious and robust plans for how to address their questions.
Stella Swanson	Responded that she would like a briefing on Teck’s “robust” plan to address these questions
Nicolas Francoeur-Leblond	Thought Teck would like to provide in-kind time from their team to help flesh out plans and deal with data quality issues.
Stewart Rood	Commented he was happy with the meeting. Noted he has been working with modernising treaties for the Kooocanusa Dam.
Bill Annable and Jon Bisset	Both happy to get historical context on the initiative. Jon felt passionate about the Elk River Valley.
Ashlee Jollymore	Reported she was also happy with how Evgeni was making data usable and easy to access. Keep in mind why we are doing this data consolidation and then what were we planning as next steps, i.e. recommended we use data consolidation to plan our hypotheses.

Stella Swason	Concluded that this meeting was important for discussing where we are at, where we are going and getting feedback. Added that it will be important to get this briefing with Teck and discuss with CEMF as we do not want to reinvent the wheel. ERA is very small, and we always want as much help as possible.
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What are we planning for the upcoming community night?

Evgeni Matveev	Presented pitch for planned December 2023 community night. Consensus at the end of discussion was to move forward with community night.
Jon Bisset	Added that there is so much misinformation and people are starting to see factual information as being alarmist so stated that we would need to find a way to present information unbiasedly so it isn't dismissed immediately.
Stewart Rood	Thought last year was awesome and well received and agreed we do another community night. Suggested we may want to focus on wild fires as there is community interest on that topic.
Stella Swanson	Asked the group what type of story we should be presenting? Asked partners to reach out with thoughts/suggestions, and would like to ensure that we include the opinions on the indigenous understanding of things
Bill Annable	Suggested that we anticipate the top 6-7 questions the community might have and find the best ways to answer them. Suggested we communicate overall objectives of the Monitoring Collaborative, then, we would pull in all their new questions and try and answer. Stressed that it will be a multiyear process. Suggested no slides; just talk to the community and not getting too heavy into science and graphs.
Jon Bisset	Reiterated that the Ktunaxa language has many different words for water. Suggested we bring Jason in to explain why there are over 50 words. Suggested we tell the story of “why the river is the community's lifeblood”.