

# WORKSHOP REPORT

## BC WATER FUNDERS WORKSHOP:

### COLLABORATIVE WATER MONITORING AND REPORTING IN B.C.

Monday, March 11, 2019 8:30 a.m. to 4:30 p.m.

Vancouver, B.C.

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## 1.0 INTRODUCTION

The [BC Water Funders Collaborative](#) (“Water Funders”) is a group of funding organizations working together to facilitate the strategic use of collective resources to advance freshwater protection in British Columbia (BC). The Water Funders *Working Group on Water Monitoring and Reporting* (“*Working Group*”) convened a workshop to advance Collaborative Water Monitoring and Reporting (WMR) in BC. The event brought together 24 participants, including Water Funders Working Group members and consultants, senior staff from Federal and Provincial Government ministries involved in water monitoring, and community leaders involved in collaborative regional initiatives (See Appendix A: Participants).

The workshop sought to build on the Working Group’s initiatives over 2017-18, including:

- *Water Funders Roundtable on Water Monitoring and Reporting*, (December 2017) which brought together 17 water leaders, funders and resource guests to develop a shared vision for WMR in BC, and identify opportunities for collaborative approaches.
- [Water Monitoring in BC: Scanning the Data Landscape](#): Public Report: a research report that assessed the state of water monitoring in BC, including key initiatives, successes and gaps; and
- *Regional Water Champions Workshop* (November, 2018) to support information-sharing, peer learning and needs assessment among 12 collaborative water monitoring champions from NGOs, First Nations and municipalities.

**WORKSHOP GOAL:** To identify opportunities for strategic alignment and use of resources from the BC Water Funders Collaborative and other sources that could advance collaborative water monitoring and reporting in BC over the next 1-3 years.

### WORKSHOP OBJECTIVES:

1. Develop a common understanding of provincial water monitoring and reporting (WMR), including roles, partnerships, programs, databases and limitations of government agencies.
2. Based on recent Water Funders and others research, identify opportunities to address priority WMR issues, gaps and needs that might benefit from a collaborative approach and alignment of resources.
3. Identify possible strategies and actions to address WMR priorities, and next steps to pursue them (what, who, when, how/resources).

### ORGANIZATION OF THE WORKSHOP REPORT

Section 1 is the Introduction. Section 2 summarizes possible collaborative strategies and actions, as developed by participants through small group and plenary discussions on the four core topics identified by the Organizing Committee. Section 3 identifies recommended priority actions and proposed next steps, as discussed in the final plenary session.

Appendix A lists participants. Appendix B presents the results of a pre-workshop participant survey on priorities for collaboration (11 responses). Appendix C is consultant Carol Luttmer’s summary of previous Working Group products (as listed above). Appendix D is consultant Susan Abs’ summary of priority WRM collaboration opportunities identified in those products. Appendix E is the Workshop Agenda. Appendix F summarizes the morning sessions, which consisted of presentations by all organizations on their WMR role and programs, while Appendix G includes their PowerPoint slides. Readers are encouraged to review the wealth of ideas in the Appendices. NOTE: Appendices E, F and G are available as separate documents in a workshop Google folder, or upon request.

## 2.0 POSSIBLE COLLABORATIVE STRATEGIES AND ACTIONS

This section summarizes recommendations generated through a small group brainstorming exercise, followed by small group presentations and plenary discussions on four topics, as identified by the Workshop Organizing Committee, based on previous WMR Working Group work (see Section 1). Participants were asked to suggest strategies and actions that (a) could be started in the next 1-3 years, and (b) would benefit from a strategic alignment of resources between government, water funders and regional groups. The suggested strategies are listed below, followed by one or more actions. Bold is used to highlight the main ideas (Note: will be used for Executive Summary in Final Report).

### 2.1 Data Collection, Analysis and Interpretation

#### Possible Strategies and Actions

**Promote consistent data collection, analysis and interpretation.** See suggestions in Box A.

- **Create a (multi-stakeholder) task group** to develop and seek agreement on guidelines, standards and protocols for data monitoring and management.
- **Develop and disseminate best practices** for communicating data sets, e.g., how to use data, Water Literacy – Data 101 training.
- Water Funders could **align grant requirements with government best practices** by specifying in grant agreements the protocols to be used, i.e., refer to government weblinks (see below).

**Identify and support new data topics, sources and collection methods:**

- **Explore emerging tech and innovation approaches for WMR**, e.g., smart linking for WF work and data sets, new monitoring apps, aqueous drones, interrelating data sets: perhaps a sub-working-group. (See AquaHacking Challenge, pg. 13.)
- **Identify options to access remote sensing data**, e.g., work with Canadian Space Agency to get climate change and provincial data.
- **Collect more water use data**; lack of data on water withdrawals is one of the biggest knowledge gaps in managing water resources.
- **Expand project funding to include water quality.**
- **Conduct comprehensive watershed reporting**, e.g., like WWF watershed reports, but with the data.

#### Discussion:

There are issues around who can/should use and interpret data:

- Experts often argue over results. It would help to have open data with everyone using a recommended set of data protocols to ensure consistent data quality, baselines and processes.
- How can we ensure that data isn't misinterpreted and that it's valid for interpretation? Out-of-context data can be dangerous, e.g., data has been misinterpreted and misused for fear-mongering (by media and others). This presents both technical and public engagement issues.
- Ideally all data should be made publically available, with minimal barriers (subject to data owner/access protocols). We don't want to restrict data or make people hesitant to share. "Collaboration creates trust."
- Caveats could be added to data. Could there be collaborative ranking of data?

- There may be a role for Qualified Environmental Professionals to interpret data and create different data products for different users.
- Federal funding contracts include a technical review to review what protocols are being used.
- The BC Government publishes [hydrometric protocols](#) on the Knowledge Management Branch website that are periodically updated.
- Funders can't be expected to keep up with technical protocols and/or driving the process. It's preferable to use protocols and best practices agreed by government and regional champions.
- **Guidelines could be added to funding agreements to help support transparency, accessibility and consistency for water data.** (See Box A.)

**Box A. Possible Additions to Funding Agreements with a Data Collection Component**

1. Recommended guidelines, protocols and formatting for data
2. Requirement that data be made public
3. Data ownership and sharing protocols
4. Adoption of [FNIG OCAP Principles](#) (First Nations Information Governance Centre: Ownership, Control, Access and Possession)
5. Recommendation on where data be housed (not just kept on private computers)
6. Identification of reasonable embargo times and end date in contract when data must be released, (e.g., within 12 months).<sup>1</sup>

## 2.2 Data Organization, Management, Sharing and Access

### Possible Strategies and Actions

**Promote standardization and consistent approaches to open data and metadata**, including terms of use for open data, and terminology for sharing and accessing info.

- **Require a standard format for data naming**, e.g., date (yy/mm/dd) and project name, to clean up data and ease integration. Address sample naming upfront to match parameter names; method codes.
- **Consider creating collaborative business plan for managing WMR data**, with a third party platform managed by a multi-stakeholder board.

**Resource a position/role to coordinate standardization and build user capacity and increase “water data literacy”**, through providing resources and training on data stewardship and terminology, e.g., Gordon Foundation uses WQX standardization and has Datastream coordinators to help CBM groups standardize data. (See suggested WMR Coordinator position in Section 3.1.)

**Take advantage of trends towards more open data and emerging technologies for data management and sharing**, e.g., eDNA, remote sensing data, new types of sensors, new data portals.

<sup>1</sup> Contractors often delay because they want to publish. Great Northern Landscape Coalition Cooperatives in Europe developed data embargo times and rules about contributing to the knowledge base through one-off projects. See also [CBM National Roundtable](#) recommendations to come.

## 2.3 Data Application and Use in Decision-Making

### *Possible Strategies and Actions*

**Develop and disseminate standardized QA/QC controls for raw vs. analyzed data.**

**Develop collaborative working group(s) on best practices in data application and use.**

- Could be organized by geography (OBWB, Skeena Watershed) or by theme, e.g., groundwater, EFNs. Exchanges among practitioners within and across water basins are valuable. Possibly partner with post-secondary institutions.

**Identify ways to make metadata, community data and watershed health data publicly available,** and make data collected for one purpose useful for others. Define audiences and data needs.

**Devise a switchboard approach to connect users to existing data and respond to user questions** on data application and use, e.g., PSF Salmon Explorer, ECCC Canadian Centre for Climate Services – climate science and information hub. (See also 2.1 and 2.2)

**Identify the needs, gaps and priority data applications for decision-making.**

- Under the Provincial Cumulative Effects Framework, FLNRORD is **consulting decision-makers across ministries to identify the spectrum of decisions they make** and any information needs and gaps that could be addressed through WMR, e.g., for authorization around streams in WSA, they need to prepare a package with recommendations to statutory decision-makers.
- **Identify ways to support the inclusion of “cumulative benefits” from watersheds** (not just impacts) as part of funding priorities, e.g., ecosystem services/eco-assets and natural resource accounting (see Town of Gibsons).

**Find ways to more effectively involve the people collecting the data in decision-making.**

Success story: “We have enough years of data collected at Regional District of Nanaimo that we can now advise on decision-making on developments. As data collectors, we can now be part of referrals.”

## 2.4 Capacity-Building for Water Monitoring Regional Groups and Initiatives

### *Possible Strategies and Actions*

**Identify options for extension type support to build the capacity of community groups to collect, manage and apply data and information.** This could be modeled on agricultural extension programs and First Nations liaison and community outreach programs, such as those described in Box B.

**Ascertain if the Province could provide staff time/person for capacity building, community outreach and liaison** – to provide technical assistance, training, access to expertise and coaching on data standards and protocols, management, access and use, e.g., DFO Community Advisors coordinate activities, connect with communities and provide technical assistance on protocols; and the [Ecological Monitoring and Assessment Network](#) does outreach and liaison with communities.

- Some groups already work with the Province to upload data; it would be useful to have a position/function to assess user needs and to monitor and improve processes.
- The model should be designed as “two-way street” to facilitate government outreach to regional groups and input from the latter on their needs and recommendations.

### Box B. Examples of Community Extension-type Programs

- OBWB and Okanagan Nation Alliance (+FLNRORD involvement): The aim is to do Environmental Flow Needs studies that are credible to the ONA and the Province. OBWB has agreements with three First Nations to build capacity, including budget for FN liaison and stipends so they can gather their own data for decision-making. This builds trust.
- Oil and Gas Commission FN Liaison Program: OGC sponsors one person in each of the five communities to get training on areas related to their oil and gas concerns.
- Northeast BC: The region has unique challenges from its vast geography, low population, and socio-economic challenges. They focus on data needed for decisions. Their Aboriginal Liaison Program has funding to train a liaison, including providing professional certification.
- U.S.A. Some agencies partner with post-secondary institutions to support extension, especially for agriculture, and fund positions to help business and community organizations apply research.
- Ontario water wells: Anyone who wanted to use the growing body of data had to contribute their own data and the database rapidly grew to 1000s of wells.
- Atlantic DataStream: Atlantic Water Network funded a position to train communities on data management and address challenges. Data blitzes became massive upload sessions. (CURA - wetpro tool)

**Identify best practices and lessons learned from successful regional initiatives and look for opportunities to replicate, transfer or adapt them elsewhere.**

- **Identify the most effective and efficient ways to share, learn and transfer best practices, models and experiences**, e.g., from the Columbia River Framework Initiative, OBWB, RDN, NE Water Strategy (NEWS), BC Lake Monitoring Project, (e.g., website, network, workshops).

**Document and disseminate WMR resources, building on the Water Funders Inventory Scan 2018, and including:**

- technical resources and tools;
- reports and references;
- expertise/consultants, e.g., “finding people to do the right research”;
- ways to link funders with WMR groups and their needs and *vice versa*; and
- connecting needs with services (“Match.com” for WMR)

Results of the Landscape Scan show that regions with a champion, networks for collaboration, and sufficient and sustained capacity have made the most headway in addressing regional and issue-specific data gaps to support effective water, land, and resource management.

[Water Monitoring in BC: Scanning the Data Landscape Public Report](#) (October 2018)

**Support focused, strategic WMR capacity building for WMR groups:**

- Keys to effective capacity-building on WMR include:
  - Engage Province from the beginning to provide the backbone for a collaborative approach with funders and communities, and secure sustained commitment and investment by participants.
  - Collaboratively develop guidelines and protocols, whenever possible.
- Capacity building techniques could include:

- networking and partnerships within and across B.C. regions (and in the rest of Canada);
- briefings, training and training-of-trainers (ToT) program;
- Provincial Trainer Network to sustain capacity results;
- formal and informal peer learning, knowledge and experience-sharing, e.g., on-line; networking, workshops, field visits; regional exchanges, e.g., Coastal FN share with NE FN, regional districts with RDs; and
- linking community groups to experts in government, industry and consultants.

➤ Priority capacity building topics include:

- guidelines, standards and protocols on data collection, management, storage, access;
- existing WMR tools, e.g., Water Tool;
- linking regional groups and data to Provincial systems (EMS, third party portal); and
- water quality initiatives.

**Sustain capacity through providing resources – core funding and staff** – so that watershed organizations have the stability to continue to engage communities.

- Water champions identified issues arising from funding/budget uncertainty, the administrative burden from grant applications; and changing personnel (part-time, contract and seasonal workers), etc. as a key obstacle to effective WMR work.

**Build the capacity of government, community groups and funders on open data and information-sharing protocols**, including the FAIR and the [FNIG OCAP Principles](#).

- **Improve and share methods to integrate western science and traditional and community knowledge**, including TEK/AST/IST, citizen science and LEK (Local Environmental Knowledge).
- **Share examples and experiences on open access and information protocols**, such as:
  - [FAIR Data Principles](#) (findable, accessible, interoperable, reusable principles of open data), as used by Gordon Foundation; and
  - OCAP: First Nations Information Governance Centre: Ownership, Control, Access and Possession).

**Develop policies and grant conditions that address data ownership and access**, which can be sensitive, especially for First Nations (FN) traditional knowledge.

e.g., Data from Water Funder projects is intended to be public, but conditions may be added to address sensitivities. Ownership issues are not often addressed in WF contracts.

e.g., The OBWB sent scientific data to Okanagan Nation Alliance, but found their framework didn't align with traditional knowledge, so developing a new one that is acceptable to the Nation and Province.

### **3.0 NEXT STEPS: PRIORITY STRATEGIES AND ACTIONS**

In the final Plenary Session participants proposed the following next steps and priority strategies, based on the previous discussion on the four WMR workshop topics (as discussed in Section 2).

#### **3.1 Share Workshop Results**

- Convene the Organizing Committee to debrief the workshop to identify next steps.
- Disseminate the workshop results (report and presentations) to the Water Funders Collaborative. The results will help to (a) inform individual grant-making decisions, and (b) identify opportunities for collaboration.
- Disseminate the results of the workshop to workshop participants, regional champions that attended the November WMR Workshop, and their respective networks.

#### **3.2 Collaboratively Develop and Implement a Work Plan**

Collaboratively develop a WMR work plan, with recommended goals, objectives, priority topics, strategies and actions, building on the Water Funders' work over 2016-2019.

- Identify which organization can house the coordination function, oversee and manage the Work Plan, and take the lead on collaborative implementation. (The Water Funders Collaborative can't implement this initiative as its work is meant to be catalytic. Their role would be to champion the effort and identify initial resourcing for an organization/position to develop the initiative.)
- The work plan could focus around an initiative to (a) build on and sustain collaboration among regional champions, government and funder, and (b) better link provincial and regional level programs. Box C lists suggested components of the initiative, as identified at the workshop. "The plan should have "the right mix of priority and urgency over a 1-3 year timeframe".

Support a WMR provincial level coordinator position/function, using a shared cost funding model.

- Explore options to collaboratively resource this position/role, for example, using shared cost funding for a coordinator who could sit outside or inside a host organization and/or auxiliary staff to work on project basis. (Robyn Roome of ENV is a contact person for the Province.)
- Draw from other B.C. examples/models, e.g., [MaPP](#) funders supported seconded government staff for the project duration (leading to creation of new full-time marine planning positions); and the [South Okanagan-Similkameen Conservation Program](#) (SOSCP) is 20-year partnership between funders, NGOs and multiple levels of government, with a full-time coordinator.

Water Funders and the Province could support a strategy to improve data collection, interpretation and management practices, standards and protocols through assistance to community groups, consultants and other data collectors (as noted in section 2.1). Elements might include:

- A project to update and disseminate data collection protocols, tools, and standards, e.g. Provincial [Resource Inventory Committee Standards](#) (RISC); and data standards and grading of third party data.
- Identification of options to access remote sensing data (satellite, etc.) from the Canadian Space Agency to get climate change and provincial data at a reasonable cost.
- Development and testing of innovative, cost-effective tech approaches for WMR, e.g., new monitoring apps, aqueous drones, interrelating data sets. (See AquaHacking Challenge, pg. 13.)
- Funding for program development and data management, not just data collection.



- Create a “switchboard” (or “Front Counter” for water) to connect users to data and data collection standards and protocols, and to respond to user questions on data application and use (e.g., PSF Salmon Explorer, ECCC Canadian Centre for Climate Services – climate science and information hub).

The Water Funders and the Province could work with regional groups to enhance and communicate mechanisms to allow third parties to upload data to government portals, including the EMS and new third party data webpage.

- BC ENV has created a [webpage](#) and streamlined process for the collection of third party environmental data with goal of “enabling sound decision-making and resource management”. Data is stored and published under the BC Open Government License, and the process uses a standard third party data-sharing agreement. The agency is inviting third party data submission, and considering funding a position to coordinate third party data.
- The agency is also improving EMS data upload capabilities to address permitting issues and facilitate uploading of third party data. All the data in the system are available to the public, and there is a page outlining available data and who is providing it.

**Box C. Possible Components of a Water Monitoring and Reporting Initiative:  
... to link provincial and regional level programs and initiatives**

- Coordinator position to bridge regional, provincial and funder initiatives: event convener and project manager for communication and coordination meetings, workshops and thematic working groups
- Extension officer – do WMR community needs assessment and capacity-building
- First Nations Liaison person/function – for FN-specific collaboration
- WMR Switchboard: central office/contact providing -
  - centralized data collection methods, standards and protocols
  - knowledge mobilization, platforms and database
  - centralized hub/network; search by key words
- Capacity building strategy: with goals, objectives, topics and methods (see Section 2.4)

### **3.3 Foster Province of B.C. – Water Funders Alignment**

Investigate short-term collaborative strategies and actions that could be pursued without the need for formal agreements or work plans, including:

- Align upcoming funding and resources to advance priority topics identified in this report.
- Consider developing shared funding strategies for greater efficiency and effectiveness, including opportunities for pooled funding with aligned parameters (easier for grantees) to
- Support some immediate capacity building activities, as identified in Section 2.4, pg. 4-5).

Identify and address provincial and regional WMR priority data needs and gaps that could be addressed collaboratively by the Province and Water Funders.

- The Province has an internal list of priorities for the Water Science Series (ongoing program, with a focus on groundwater; funded internally). FLNRORD staff will see if these can be shared with funders to identify research gaps and align efforts to address them.
- Support regional/basin collaboration focused on addressing region-specific priorities.

Form small working groups/task groups (government, Water Funders, regional champions) to refine and advance strategies for priority topics over the intermediate term (e.g., 2-3 years), as identified in this report and including:

- alignment of protocols/guidelines for data collection and management;
- data needs: what provincial and regional data is needed and which organizations could collect it;
- framework and standards for EFN and groundwater; and
- assessing the needs of decision-makers and addressing their key needs and data gaps.

“... the world doesn’t change one person at a time. It changes as networks of relationships form among people who discover they share a common cause and vision of what’s possible.”

~ *Margaret J. Wheatley*

## APPENDIX A. PARTICIPANTS (24)

<b>WATER FUNDERS COLLABORATIVE</b>	
1. Ian Rogalski	Environment & Climate Change Canada
2. Nelson Jatel	Okanagan Basin Water Board
3. Leanne Sexsmith	Real Estate Foundation BC
4. Shayla Walker	Tides Canada Foundation
5. Kariann Aarup	de Gaspé Beaubien Family Foundation
6. Aislin Livingstone	Gordon Foundation
7. Deena Guffei	LUSH Fresh Handmade Cosmetics
8. Eileen Jones	Pacific Salmon Foundation
<b>GOVERNMENT AGENCIES</b>	
9. Sean Moore	BC Ministry of Environment (BC ENV)
10. Tarik Doussaki	BC ENV
11. Robyn Roome	BC ENV
12. Matthew Leroy	BC Ministry of Forests, Lands, Natural Resource Operations, and Regional Development (FLNRORD)
13. Lisa Nordin	FLNRORD
14. Bryan Jackson	FLNRORD
15. Liz Johnson	BC Ministry of Energy, Mines and Petroleum Resources
16. Suzan Lapp	Oil & Gas Commission
<b>OTHER WATER MONITORING INITIATIVES</b>	
17. Laura Wytrykush	Geoscience BC
18. Julie Pisani	Regional District of Nanaimo
19. Lara Hoshizaki	Coastal First Nations - Great Bear Initiative Society
20. Kat Hartwig	Living Lakes Canada
21. Carol Luttmer	Consultant
<b>WORKSHOP SUPPORT</b>	
22. Susan Abs	Eclipse Environmental Consulting Ltd.
23. Jennifer Archer	BC Water Funders Collaborative & BC Freshwater Legacy Initiative
24. Alex Etchell	BC Water Funders Collaborative & BC Freshwater Legacy Initiative

## **APPENDIX B. PRE-WORKSHOP PARTICIPANT SURVEY RESULTS**

(Number in brackets is # of people who provided a comment on this point.)

### **1. What you would like to get out of the workshop?**

#### ***Knowledge: Who is doing what?***

- Map, understand, identify and address opportunities and challenges, needs and gaps (including those from WC workshop); “solutions share in one jurisdiction are shared widely”. (4)
- Understand WM agencies, groups and activities: map priorities, objectives and financial/program investments of government, Water Funders and water leaders. (3)
- Decide how data can be stored, managed and shared at central location (a “home for the data”), with free access (& ongoing financial support). (3)

#### ***Practical, tangible results***

- Ensure more effective monitoring: agree on key WM areas, with plan to resource (new or continued) data collection and analysis (2)
- Actions that can be implemented on the ground, with measurable outcomes to support ecosystem and government needs
- Tangible idea of how an Aquahacking Challenge can help address WM issues in B.C.
- Plan to communicate workshop results to others

### **2. What specific strategies or activities could leverage major improvements in collaborative WMR?**

#### ***Build capacity (5)***

- Support CBM capacity-building, especially on standardized data collection protocols.
- Peer-peer, basin-basin, face-face, First Nations to non-FN learning and sharing best practices.
- Build understanding of data locations, input and access for practitioners in the field.

#### ***Build First Nations capacity and integrate TEK and western science (5)***

- Support FN communities to collect & analyse water data in their territories, considering TEK and western science; ensure samples meet prov./fed. standards and can be added to databases. (4)
- Facilitate common approach to Indigenous water knowledge.
- Increase understanding and collaboration between FN and non-FN on WM.

#### ***Improve data management and application/use***

- Get more third party data on government portals, make it public, with appropriate provisos on quality/confidence. (3)
- Increase regional-provincial collaboration.
- Agency collaboration to collect/use data for (operational) decision support (not just research).
- Decision-makers’ commitment to use publicly-available data to inform decision-making. (2)
- Funding for long-term WMR, e.g., who will monitor 30 new groundwater monitoring wells?

### **3. In which areas of your work are there possible benefits from provincial-regional collaboration?**

- Greater effectiveness and efficiency inside & outside government from communication and cooperation (“build trust”), across local, regional, provincial, academic and industry bodies, e.g., expand network of observation well stations. (5)
- Identify what data are needed to support WSA and monitoring of water use (gap in budgets).
- Inform strategic and efficient funding: support under-resourced areas and struggling programs; establish funding base for new or innovative programs to address needs.
- Provincial support will mobilize local efforts from those closest to the resource, and these are useful to the provincial mandate and to support better local decisions.

## **APPENDIX C. WATER MONITORING & REPORTING COLLABORATION OPPORTUNITIES (based on 2016-2018 Water Funders' work)**

Prepared by Susan Abs, Consultant and Workshop Facilitator

This appendix summarizes the priority opportunities to advance collaborative water monitoring and reporting, and the recommended strategies and actions to address those opportunities, as identified in the Water Funders WMR Working Group activities over 2016 – 2018.

### **1. OPPORTUNITY: Share information on WMR in B.C. (who's doing what?): sectors, organizations, initiatives, governance to support alignment of efforts and increase effectiveness and efficiency.**

#### *Possible Strategies*

- **Continue to help funders understand the WMR landscape** and where coordinated, complementary, strategic support – including aligning with government programs – **could leverage gains** on priority topics, in multiple regions.
- **Disseminate information on WMR:** data portals and tools, industry-government collaboration; Provincial agencies & policy; Crown & First Nations knowledge-sharing, e.g., Water Sustainability Act, Modernized Land Use Planning Initiative; provincial tools in watershed planning.
- **Build knowledge and capacity** to use, contribute to, and collaborate **on enhancing “backbone” WMR networks**, including integrating third party data with appropriate QA/QC.
- Increase **communication and collaboration between Provincial Government and regional initiatives** (see below): Find ways to maximize local-regional-provincial complementarity and synergies, while building systemic approaches in government, e.g., BC Lake Monitoring Network.
- **Develop, fund and maintain an interactive, web-based Water Monitoring inventory and map**, with data sites, initiatives and contacts (build on 200+ inventory in the 2017 landscape scan).
- **Enhance the role of industry**, e.g., increase access to industry data; include industry reps in regional/CBM initiatives.
- **Align WMR with other Indigenous-led monitoring** initiatives, e.g., Guardian Watchmen, Territorial patrols.

#### *Possible Actions/Next Steps*

- **Disseminate WM Workshop results** through Water Funders (WF) and participant websites.
- **Create inter-agency group or newsletter** on water monitoring (WM), to reduce duplication and identify collaboration opportunities, including working with First Nations communities.
- **Provincial capacity-building and/or technical support/guidance/expertise** for regional programs & methods? Strategy to support regional WM? Water stewardship or similar community liaison/advisor function or position(s)?

### **2. OPPORTUNITY: Collaborate to improve data collection (KMF 1), analysis and interpretation (KMF 4) (latter in top 3 Water Champions workshop priorities)**

#### *Possible Strategies*

- **Build regional capacity on data collection, analysis and interpretation** methods and tools to enhance consistency and credibility of results (through, for example, training, guidance and peer learning).
- **Identify provincial and regional data gaps** and devise actions to address priority gaps, e.g., support regional collaboration focused on addressing region-specific data gaps (see 4).

- **Increase number and distribution of climate and hydrometric stations** (“boots on the ground”) to increase availability of data to inform water, land and resource management, including climate change adaptation.

#### *Possible Actions/Next Steps*

- **Standardize data collection and coordination methods** (“a willingness to change our ways”):
  - Develop and/or make more accessible provincial WMR protocols, tools, standards and templates for data collection, analysis and storage. Provide guidance on data handling and management, and QA/QC.
  - Standardize methods to analyze and report data for consistency across scales.
- **Promote the testing and application of innovative technologies** for data collection, analysis, storage and access, e.g., new types of sensors, environmental DNA, data management tools, apps and visualization tools.

### **3. OPPORTUNITY: Collaborate to improve data coordination: storage, organization, and management (KMF 2); and data-sharing, access and distribution (KMF 3).**

#### *Possible Strategies*

- **Support groups to use existing databases/tools:** e.g., help groups use Provincial Environmental Management System; reduce costs for labs to upload WQ data to EMS; and integrate data analyses into existing systems, e.g., include guidelines, thresholds and Water Quality objectives in [EMS Surface Water Monitoring Map](#).
- **Facilitate data entry into existing databases and portals,** e.g., incentivise data collectors to collect, manage and share data in formats useable to others.
- **Ensure support – funding, expertise, resources and tools – for data management,** not just data collection.
- Build **regional capacity on data handling, storage, organization and management** (see 2).
- Do research to **identify open source data analysis and visualization tools,** and disseminate to regional groups.
- Facilitate common approaches to **recognizing FN rights, title and interests** in WMR initiatives.
- **Improve and share methods to integrate western science – and traditional and community knowledge/science,** including TEK/AST/IST, citizen science and LEK (Local Environmental Knowledge), including data governance principles, e.g. OCAP (ownership, control, access and possession).
- **Improve data availability, accessibility and integration** – promote open access:
  - **Address barriers to accessing data:** a lot are unavailable, e.g., aren’t in useful formats; don’t include metadata or geospatial tags; are proprietary or otherwise unavailable; are “buried” in reports; and/or are not entered into data portals.
  - **Increase sharing, integration and use of third-party data,** e.g., CBM, First Nations, industry.
  - Require **new WM data to be in the public domain,** especially if it gets public funding.
  - Make data collected for one purpose available for others, e.g., water purveyor and Health Authorities data.
  - **Assess the needs of data users,** e.g., what formats do they need it in.

4. **OPPORTUNITY: Enhance data application and use in decision-making and operations, including using data for multiple purposes. (In FLRNORD KMF 7, this is called “Communication, reporting and use”) (in top 3 Water Champions priorities)**

*Possible Strategies*

- **Improve data and knowledge-sharing across geographic regions and sectors** through incentives, training, and collaboration opportunities.
- **Enhance methods and transparency in data application and use**, (including third party data), in planning, management and decision-making (all levels of government, First Nations, community and private sector decisions, including: policy, planning, environmental assessment, regulations, standards, permitting and compliance).
- **Address challenges in integrating CBM data:** e.g., unpredictable funding, inconsistent protocols, and difficulty in translating diverse, region-specific data into coherent recommendations for decision-makers. (Carlson et al., 2016)

- 5 **OPPORTUNITY: Build the capacity of regional water monitoring groups and initiatives.**

*Possible Strategies*

- **Enhance capacity of regional groups and initiatives on priority topics** (identified above) through: (1) enhancing knowledge and skills; (2) increasing access to tools and resources (e.g., technologies), and (3) strategic provision of resources (e.g., expertise, guidance and funding).
- **Build capacity of FN communities** to collect and analyse data in their territories, integrating TEK and western science, and to access data useful for planning and responding to referrals.
- **Identify models for long-term and sustained funding** (“uncertain funding is a persistent operational challenge”), e.g., pooled or complementary programs and resources; dedicated trust or fund.

*Possible Actions/Next Steps*

- **Support formal and informal training, networking and peer learning**, by region and sector (e.g., local government, forest sector) through in person and on-line training/learning, e.g., workshops, webinars, field visits and exchanges.
- **Assess various regional collaboration models in B.C. and identify opportunities to:** (1) **replicate** successful models, (2) **strengthen/improve** current initiatives, and/or (3) **test new/innovative models.**  
Projects could be in different regions, and each could have a specific focus for improvement or testing (e.g., unlocking private data, using a new technology, training on data collection methods and protocols).
- **Refine funding criteria and procedures**, and increase flexibility, e.g., fund core, program and projects; reduce reporting requirements especially for small groups and grants.

## APPENDIX D. BC WATER FUNDERS – WMR WORKING GROUP: KEY FINDINGS (2016-18)

Prepared by Carol Luttmmer, Consultant (See also PowerPoint Presentation, in workshop Google folder)

### A. Water Monitoring and Reporting in BC: Scanning the Data Landscape (report)

[https://www.obwb.ca/newsite/wp-content/uploads/water\\_monitoring\\_in\\_british\\_columbia\\_2018.pdf](https://www.obwb.ca/newsite/wp-content/uploads/water_monitoring_in_british_columbia_2018.pdf)

- Summary information on surface and groundwater monitoring and reporting in BC
- Focus was water quality and quantity – baseline, status & trends.
- Identified types of monitoring (Table 1): 122 monitoring programs and 42 data hubs
- Not included: environmental components needed to understand the state of water resources, e.g., mapping wetlands & aquifers, water withdrawals, info on glaciers, snowpack & climate

**Table 1: Types of Monitoring**

<b>Baseline</b>	Collection of data over a specified time period with which to compare future conditions. Typically designed to assess variability to make statistically sound comparisons with future data sets.
<b>Status &amp; Trends</b>	Systematic collection of data in a standardized manner to assess conditions over time.
<b>Regulatory &amp; Compliance</b>	Monitoring to ensure laws and regulations are upheld.
<b>Effectiveness</b>	Monitoring to determine whether policies and decisions are having the intended effect. Integral part of adaptive management.
<b>Applied Research</b>	Monitoring to address a specific question or unknown. Used to inform resource management decisions.

### Key Findings

- *Five province-wide networks* managed by Provincial Gov't. or jointly with Federal Gov't: Hydrometric Monitoring Network, Water Quality Monitoring Network, Provincial Groundwater Observation Well Network, Provincial Lake Monitoring Program, Canadian Aquatic Biomonitoring Network (CABIN): provide "backbone" of monitoring, but not comprehensive enough to address smaller scale regional or issue specific needs (nor are they designed to).
- *Data is collected at local and regional scales* by First Nations & FN organizations, community-based monitoring (CBM) groups, Federal, Provincial, regional and local governments, water purveyors, industry, academia, other NGOs and collaborations, but much of it is hard to access.
- *Over half* the initiatives identified in the Scan *involved partnerships*.
- Regions with *sufficient capacity, champions to lead, and collaboration networks have made the most headway* towards identifying and filling regional and issue-specific data needs.
- There is *little incentive for data collectors to collect, manage, and share data* in formats that make it useable to others.
- There is *significant redundancy in data reporting*; most portals and models present and rely on existing long-term data sets & don't incorporate local or regionally collected data.



## **B. Roundtable on Water Monitoring & Reporting: Vancouver Dec. 11<sup>th</sup>, 2017**

17 water leaders, funders and resource guests.

*Goal:* To develop a shared vision for water monitoring and reporting (WMR) in BC and identify opportunities to further develop collaborative approaches.

### *Key Findings*

Gaps identified through the landscape scan include:-

- analysis of who is collaborating and how;
- analysis of the degree to which WMT are connected to specific objectives; and
- ways to secure sustainable funding for collection and management of water monitoring data.

### *Topics where support is needed:*

1. Standardizing how we collect data
2. Reviewing and interpreting data
3. Data sharing/databases
4. Using data to inform decision-makers
5. Government engagement and capacity
6. Sustainable funding and resources

## **C. Workshop on Regional & Local Collaborative Water Monitoring in BC, Vancouver Nov. 29, 2018**

12 reps from regional water monitoring programs: FN, NGO, Regional Districts, monitoring trusts

*Goal:* To articulate how government, water funders, and regional initiatives can work together more effectively on water monitoring and reporting to advance freshwater management and protection.

### *Objectives:*

1. To share successes and challenges & identify support needed for programs;
2. To identify roles & functions; and
3. To identify priority needs, opportunities & recommendations for funders and governments.

### *Key Findings*

- Uncertainty around funding is among the most pressing operational challenges
- Learning from others one of the most useful parts of the workshop

### *Priority needs include:*

- Clarity on WM roles, functions, and responsibilities within and outside government
- Increased capacity, including increased and more flexible funding
- Guidance on accessing and applying resources and tools
- Increased number of monitoring stations (including climate and hydrometric)

## **APPENDIX E. WORKSHOP AGENDA (Google Folder)**

## **APPENDIX F. PRESENTATIONS: WATER MONITORING ORGANIZATIONS (Google folder)**

## **APPENDIX G. POWERPOINT PRESENTATIONS (Google Folder)**