



# Yukon Water Forum, 2015

## *Workshop Summary Report*

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February 17 - 18, 2015

Kwanlin Dün Cultural Centre, Whitehorse

**PREPARED FOR:**



**PREPARED BY:**



**Cambio**

#208 4109 4<sup>th</sup> Ave.  
Whitehorse YT  
Y1A 1H6  
(867) 335-3499

cambioconsulting.ca  
mnelson@cambioconsulting.ca

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# 1. BACKGROUND & CONTEXT

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## Building Relationships Among Water Managers

The Yukon government developed the [Yukon Water Strategy and Action Plan](#) to act on its responsibilities for water management in Yukon, and it was released in June 2014 following extensive stakeholder engagement regarding water management priorities and relationships. As a step towards enhancing cooperation, coordination and collaboration among water managers, the strategy includes a commitment to “host an annual or biennial Water Forum to exchange information, collaboratively address water issues and promote continuous improvements.”

Water management in Yukon is shared between Government of Canada, Yukon government, First Nations, municipalities and boards and councils. Non-governmental organizations also have an interest in water management. The 2015 Water Forum focused on engagement and collaboration with water managers from these various governments and organizations. Organizers sought feedback on Yukon government’s plans for the strategy’s action items, and encouraged discussion on comparing these plans with those of other water managers and finding ways to work together. In total, 70 representatives from these agencies attended the Water Forum held on February 17<sup>th</sup> and 18<sup>th</sup> at the Kwanlin Dün Cultural Centre. Please refer to Appendix 1 for a list of participants.

## Developing the Water Forum

In preparing for the first Water Forum, Yukon government’s Strategic Water Initiatives Group (SWIG) issued a survey to potential participants to help shape an agenda that would address key water management needs relevant to the diverse group. SWIG endeavored to create a balance between: A) providing participants with important information on water research, programs and initiatives and B) hearing input regarding water management priorities, concerns, and innovations. The outcome was an agenda that focused on the following topics:

### Safe Drinking Water

- Roles involved from “Source to Tap”
- Challenges faced by managers, potential solutions and collaboration

### Groundwater

- Foundational information (“Groundwater 101”)
- Priorities and concerns for Yukon’s groundwater program

### Improved Sharing of Water Information

- Relevant water initiatives in Yukon
- Climate change effects on hydrology
- Research priorities and partnerships
- Data collection needs and shortcomings
- Data integration options

## Participant Engagement - Breakouts and Brainstorms

The developers of the Water Forum wanted to ensure opportunity for active engagement by participants. Aside from an information session about Yukon water initiatives, each session included collaborative engagement with the participants, either by a structured breakout discussion (for Safe Drinking Water and Groundwater) or a guided brainstorming exercise (for Water Research and Innovative Data Collection/Sharing). The general results of these discussions are summarized under the relevant section, and the ideas recorded by the small groups can be found in Appendix 2.

## Report Content

This report summarizes the main ideas heard in the Forum presentations (including audience questions), and the overall outcomes of the discussion activities among the participants. The presentations from the Water Forum are available at [YukonWater.ca](http://YukonWater.ca). Detailed notes from the breakout groups and brainstorming sessions are available as Appendix 2. For further information about the Forum, please contact Yukon government's Water Resources Branch at (867) 667-3171 or email [water.resources@gov.yk.ca](mailto:water.resources@gov.yk.ca).



## 2. WATER STRATEGY IMPLEMENTATION

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### Opening Address by the Hon. Wade Istchenko, Minister of Environment



Minister Istchenko welcomed all participants to the Forum. He thanked participants for taking the time to attend the first Water Forum held under the *Yukon Water Strategy and Action Plan*. He emphasized the opportunities for enhanced cooperation and collaboration among water managers and highlighted the main themes to be discussed at this event. Minister Istchenko also attended the 'wrap-up' session to hear the summary of participants' ideas and recommendations for future action.

### Implementation Highlights

Heather Jirousek, Director of Water Resources Branch, provided a background and update about the status of Water Strategy Implementation. When the Water Strategy was released in June of 2014, \$2.7 million was allocated towards its three-year implementation. Since then an additional \$150,000 has been approved from the Department of Education for the Yukon Water and Waste Operator Training Program at Yukon College and \$355,000 was provided to Community Services in support of drinking water priorities.

To date, several important implementation milestones have been achieved. Working together with its partners in water management, Yukon government has:

- Installed 6 new hydrometric stations, upgraded 23 stations with real time satellite telemetry and expanded the water quality network by two stations
- Hired a Hydrogeologist to expand the existing groundwater program
- Strengthened the Yukon government's flood forecasting capabilities
- Improved data accessibility and functionality through the website [Yukonwater.ca](http://Yukonwater.ca)
- Continued the Water and Wastewater Operator Program at the Yukon College

In addition to continuing to support these items, Water Strategy funding will also be allocated to formalize an approach for community water monitoring and for the promotion of source water protection planning.

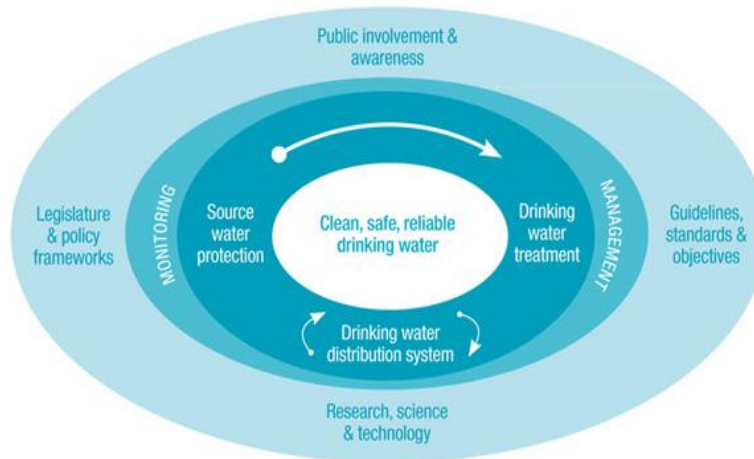
### 3. SAFE DRINKING WATER

#### Multi-Barrier Approach to Protecting Drinking Water

*Pat Brooks, Environmental Health Officer at Environmental Health Services, Health and Social Services*  
*Dwayne Muckosky, Director of Community Operations and Programs Branch, Community Services*

The water that we eventually consume for drinking can be affected by many factors along the chain from “source to tap”. For example, groundwater and surface water may be contaminated by poor well construction or by leaking fuel tanks. Protecting drinking water therefore requires a “multi-barrier” management approach where everyone considers the following factors:

- **Risk Prevention** - ensuring that source waters are not contaminated (e.g., well regulations, water licenses)
- **Risk Management** - addressing risks of contaminants (e.g., treatment, filtration)
- **Monitoring and Compliance** - using legislation and policy together with guidelines and standards to ensure sound management practices
- **Individual Action** - involving public water users in discussions and decisions and supporting their awareness of drinking water management to enable good individual decisions



**Figure 1: Roles in a "Source to Tap" Multi-Barrier Approach**

In Yukon, standards for water wells, treatment facilities and operator requirements are addressed by Yukon’s Environmental Health Services through the *Drinking Water Regulation* under the *Public Health and Safety Act*. This regulation applies to the municipal governments who manage water systems and also individual actions such as water well drilling. The Department of Community Services supports communities to develop proper drinking water facilities and management.



## **Breakout Discussion Outcomes**

For each of the topic areas below, breakout groups were asked to identify the key roles involved, the main challenges faced, along with some potential solutions and any important collaboration needed.

### *1. Source Water Protection*

Planners and regulators face challenges in regards to lack of baseline data, competing interests around land uses and awareness among public users and landowners. Suggested solutions include more research to generate baseline data; continue collaboration through venues such as the Water Forum, the Yukon Environmental and Socio-economic Assessment Board (YESAB) and the land use planning process; and increased public education and awareness about their role in protecting source water.

### *2. Treatment & Transmission*

It is important that consultants involved in water treatment facility design communicate with the community and the future operators to ensure that the facility is a good fit and can be well managed. It can be a challenge for small communities to train and retain local water treatment operators. More effort should be put into this training and facilities should be simple enough to manage without extensive training. Water managers are challenged with ensuring good water quality without significant effects on water taste. More research on treatment options (possibly in partnership with Yukon College) could address this issue. The governments involved in water treatment and transmission must collaborate to ensure all aspects of this system are well connected.

### *3. Legislation, Policy & Guidelines*

There are many players involved in this area (Yukon government, Canada, First Nations, municipalities, various boards) and there are significant challenges with capacity, communication and the ability to implement. There is sometimes confusion about roles and responsibilities and the expectations of what legislation and policy can achieve. Ultimately, the success of legal and regulatory tools depends on good dialogue and positive relationships among the players, buy-in among users about the value of water and a willingness to work towards the protection of water.

### *4. Public Users*

Challenges faced by public water users (families, businesses, municipalities, First Nations) include differing standards for testing and cleaning wells/tanks, and water infrastructure designed for southern climates. There are potential issues with surface contaminants affecting groundwater (for instance by flooding) and melting permafrost affecting aquifers. It is important to have reliable water infrastructure that is locally designed, and can be serviced by local people. Education is critical to ensuring that the public understands the potential effect users can have on safe drinking water, and what role they can play in protecting it. The public also needs access to key information about water quality and contamination in an understandable format.

## 4. GROUNDWATER

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### “Groundwater 101” - Basic Concepts

*John Miller, Hydrogeologist, Water Resources Branch, Environment Yukon*

Of all the water on Earth usable by humans (i.e., freshwater that is not frozen in glaciers or ice caps), groundwater accounts for 99% of it, while lakes and rivers account for only 1%. Groundwater flows through **aquifers**, which are permeable underground areas that water can flow through, and are made up of materials such as gravel sediments, cracked bedrock, or fractured limestone. Groundwater typically travels very slowly through these aquifers, from metres per day to metres per year.

Groundwater has an important role in aquatic health as groundwater eventually comes to the surface and has effects on, for instance, fish habitat and fish over-wintering, and as a nutrient delivery system.

Groundwater is measured either through water supply wells, monitoring wells or through mathematical modeling. Water supply wells are typically 6-12” in diameter while monitoring wells are typically smaller in diameter, and can vary widely in costs to drill from tens to hundreds of thousands of dollars, depending on factors such as depth, mobilization and supply needs. Mathematical models use calculations to “fill in the blanks” where there is incomplete data on groundwater.

### Yukon’s Groundwater Program: Where Are We?

*John Miller, Hydrogeologist, Water Resources Branch, Environment Yukon*

Currently, the groundwater program within Yukon government is in early stages of development. The Hydrogeologist joined the Water Resources team in late 2014 and there is fairly limited information on Yukon’s groundwater resources at this time. There are only nine monitoring wells throughout the Yukon (four within Whitehorse), which is not adequate for mapping and monitoring purposes. There are many agencies that have a management interest in groundwater and many who have potential effects on it (e.g., landowners, industry, and well drillers). Legislation relating specifically to groundwater is minimal.

Given the emerging state of Yukon’s groundwater program and the gaps mentioned above, potential program components could include:

- Water well standards and registry program
- Centralized groundwater database
- Expanded monitoring network and aquifer mapping
- Partnerships and collaboration - Interdepartmental Working Group
- Research partnerships - climate change effects, resource development effects

## Contaminated Sites

*Brendan Mulligan, A/Contaminated Sites Coordinator, Environmental Programs Branch, Department of Environment*

The *Contaminated Sites Regulation* (CSR) defines what constitutes a “contaminated site” and this definition depends, in part, on the quality of the groundwater on, or flowing from, the site. Information about groundwater at, or flowing from, a potentially contaminated site can be gained by conducting a site investigation or a site assessment, which are defined in the CSR. A plan of restoration, also defined in the CSR, may also be developed to ensure that a contaminated site is remediated adequately. Hydrogeological assessments are required for solid waste disposal facilities and some land treatment facilities.

There are twelve protocols pursuant to the CSR (available online at [www.env.gov.yk.ca](http://www.env.gov.yk.ca)) that provide guidance and transparency on regulatory expectations for people working on issues related to contaminated sites. Protocols explicitly related to groundwater include Protocol No. 5 (“Petroleum Hydrocarbon Analytical Methods and Standards”), Protocol No. 6 (“Application of Water Quality Standards”), Protocol No. 7 (“Groundwater Monitoring Well Installation, Sampling and Decommissioning”) and Protocol No. 10 (“Determining Background Groundwater Quality”).

## Breakout Discussion Outcomes

For each of the sub-topic areas about groundwater listed below, breakout groups were asked to identify priorities and concerns, information needs and ways to protect values regarding groundwater.

### *1. Drinking Water*

Priorities and concerns include adequate supply of groundwater for drinking, risk of contaminants, and the high costs of monitoring and sampling. Limited aquifer mapping means limited understanding of water availability. There is currently no central registry of water wells, and limited information on old solid waste dumpsites that may be contaminated. Legislation and regulation can help protect our values for these areas by establishing requirements for buffer distances, fuel storage, etc. Regulatory gaps need to be addressed, such as those between the *Public Health and Safety Act* and the *Contaminated Sites Regulation* in regards to drinking water and aquatic life. It is important that public understand how the groundwater system works and how human activities can affect it.

### *2. Fish and Aquatic Life*

Groundwater plays a significant role in surface water aquatic systems, and in particular around fish spawning and overwintering areas. There is a need to better understand this role and to identify specific sensitive locations as well as water quality concerns in those locations (e.g., from nearby public or industrial activities). Community-based monitoring and traditional knowledge can play an important role here, for example the Indigenous Observation Network. Groundwater effects need

to be considered during watershed planning and in managing industrial activity; regulations and policies are needed to protect aquatic health values as they relate to groundwater.

### 3. Climate Change - Hydrologic Cycle

Understanding how climate change affects the groundwater system was identified as a challenge due to the uncertainty surrounding climate change and the lack of baseline understanding of groundwater in the Yukon. In particular, it is important to understand permafrost interaction with groundwater and the cumulative effects of changes. Assembling the necessary comprehensive baseline data will require partnerships with industry (to acquire well logs and geo-data) and with communities (to collect local and traditional knowledge). Working on a watershed level will help ensure connection among research projects. Downscaled climate change projections for Yukon would also facilitate research in this area. At this point, we are not ready to develop strategies to protect our groundwater values from climate change impacts, as there is such a lack of data and limited understanding of impacts.

### 4. Resource Development

Adequate understanding of resource development's effects on groundwater requires good baseline monitoring of water quantities and quality at various stratigraphic levels, coordinated data collection and storage, and clear understanding of roles and responsibilities among developers, assessors, and regulators. To foster public confidence, there is a need to develop appropriate impact thresholds for groundwater along with standards for data collection that are fair, consistent and predictable. Clear decision-making processes should be complemented by accountability measures and financial security requirements.



## 5. WATER INITIATIVES

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### Yukon Mine Licensing Improvement Initiative

*Bryony McIntyre, Project Director, Mine Licensing Improvement Initiative, Executive Council Office*

This project is designed to improve coordination, effectiveness, consistency and accountability in mine licensing between the Yukon Water Board, the Yukon government, and YESAB. The *Waters Act* and *Regulation* and procedures of the Yukon Water Board have not been reviewed in the context of major changes in management of natural resources in Yukon and other resource legislation and regimes. Such legislation developed and amended since the late 1990s through to present include the *Quartz Mining Act*, *Placer Mining Act*, and *Oil and Gas Act*, and the implementation of *Yukon Environmental and Socio-economic Assessment Act* (YESAA). Further, there has been significant development in regards to First Nations consultation requirements around mining activities. This initiative will produce regulatory changes to help address overlaps and inconsistencies (e.g., the number of years of baseline data required by project proponents). It will also address roles and responsibilities among the agencies involved, including between various Yukon government departments involved in mine licensing.

### Champagne & Aishihik First Nations' Water Strategy

*Roger Brown, Manager of Environment and Natural Resources, Champagne and Aishihik First Nations*

Champagne and Aishihik First Nations' (CAFN) water strategy has been under development since 2010. It includes seven major goal areas along with action items (such as "Protect Water for Traditional and Cultural Values", "Strengthen CAFN Governance of Water", and "Adapt and Plan for Climate Change Impacts"). Recently, CAFN Elders suggested taking a step back to ensure that the strategy captures the spiritual importance of water to their people. They suggested the Southern Tutchone title *Chu ähu ät'et* - "Water in Me" to capture this relationship. CAFN intends to continue moving forward with the strategy, and developing partnerships with other governments for the implementation. They hope to provide a progress update at a future Yukon government Water Forum.



## Waterline Database and Coordinated Online Information Network

Carola Sheu, Director, Yukon Water Board Secretariat, Executive Council Office

Kim Hobus, A/ Data Manager, Yukon Water Board Secretariat, Executive Council Office

Waterline is an online database maintained by the Yukon Water Board that provides public access to information about Yukon water licenses. The overall goal is to create transparency and encourage participation in the water licensing process by providing information to the public in an easy to use format.

Waterline contains all information that is submitted with an application, the licence, reasons for decision, and reports created by proponents. Until three years ago, most records were in paper format. Significant effort has been put into digitizing them and there are now many old licenses that are fully accessible online. The intention is to have future license documents scanned in a searchable format (i.e., text, not image). The system offers convenient search functions and criteria selections for automatic notifications.

The screenshot shows the 'WATERLINE | Yukon Water Board' website. It features a search bar with a 'Go' button and a 'Reset' button. Below the search bar, there are three tabs: 'Applications (25)', 'Licences (712)', and 'Closed (1709)'. The 'Applications (25)' tab is selected, displaying a table with the following columns: File No., Undertaking, Submission Type, Applicant, Status/Phase, Water Source, and Traditional Territories.

File No.	Undertaking	Submission Type	Applicant	Status/Phase	Water Source	Traditional Territories
<a href="#">MN99-025-1</a>	Municipal	Amendment	Village of Teslin	Board Review	New groundwater well	Teslin Tlingit
<a href="#">MS09-282-2</a>	Miscellaneous	Amendment	GY-Highways & Public Works	Board Review	Ten Mile Creek	Little Salmon/Carmacks
<a href="#">MS14-056</a>	Miscellaneous	New Licence	GY - Hwys and Public Works - Transportation Engineering Branch	Board Review	Grayling Creek	Little Salmon/Carmacks, Nacho Nyak Dun
<a href="#">MS14-057</a>	Miscellaneous	New Licence	GY - Hwys and Public Works - Transportation Engineering Branch	Board Review	Willow Creek	Nacho Nyak Dun, Selkirk
<a href="#">MS14-070</a>	Miscellaneous	New Licence	GY-Highways and Public Works	Board Review	Snafu and Tarfu Creeks	Carcross/Tagish
<a href="#">MS14-071</a>	Miscellaneous	New Licence	Yukon Government - Highways and Public Works	Board Review	Tartu Creek	Carcross/Tagish
<a href="#">PM10-043-1</a>	Placer Mining	Amendment	Eric Stretch	Public Comment (Deadline: 2015-03-10)	Frisco Creek	Tr'ondëk Hwëch'in
<a href="#">PM14-012</a>	Placer Mining	New Licence	Peter & Grace Tyerman	Board Review	VanBibber Creek	Nacho Nyak Dun
<a href="#">PM14-020</a>	Placer Mining	New Licence	Cameron MacKinnon	Board Review	Boutellier Creek	Champagne and Aishihik, Klwane, White River
<a href="#">PM14-026</a>	Placer Mining	Renewal	Gimlex Enterprises Ltd	Board Review	Indian River, McKinnon Creek, Un-named Left Limit Tributaries of Indian River	Tr'ondëk Hwëch'in
<a href="#">PM14-034</a>	Placer Mining	Renewal	James Donald Connelly	Board Review	Vancouver Creek	Nacho Nyak Dun
<a href="#">PM14-043</a>	Placer Mining	New Licence	Second Chance Gold Mines Inc	Board Review	Dominton Creek	Nacho Nyak Dun, Tr'ondëk Hwëch'in
<a href="#">PM14-045</a>	Placer Mining	Renewal	Darrell Carey	Public Comment (Deadline: 2015-03-10)	Out of Stream Dredge Ponds - 300m from Klondike River	Tr'ondëk Hwëch'in

The Coordinated Online information Network (COIN) is under development. It is envisioned as a one-stop online shop for people to get a wide variety of Yukon water information, including hydrometric, meteorological, groundwater and water quality. The interface would be a map-based GIS style format, with specific feature data also accessible to users. COIN will draw on data from a wide range of sources and agencies, Over the next year, all data managers will further explore how to ensure that the various data formats are compatible The Water Board Secretariat is hoping to have initial information accessible by spring 2015, with ongoing population of the system as more data becomes available.

## 6. WATER RESEARCH

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### **Yukon's Hydrologic Response to Climate Change**

*Ric Janowicz, Manager of Hydrology, Water Resources Branch, Environment Yukon*

The warming climate has triggered measureable changes in Yukon's water cycle over the past thirty years. These changes include:

- Higher base flows in rivers at the winter low point due to more groundwater flowing in
- Later freeze-up times and earlier break-up times on rivers (Yukon River records back to 1896)
- More compressed runoff periods in the spring due to rapid snowmelt
- Increasing peak flows on glacial rivers
- Highest maximum flood recordings on record (e.g. Marsh Lake in 2007; Liard River in 2012)

In response, Yukon government is working to expand its hydrometric monitoring network, which will help improve flood forecasting capability. Researchers are monitoring river breakups via satellite to gather more data and they can observe degradation of permafrost using satellite imagery.

### **Water Research at the Yukon Research Centre**

*Dr. Bronwyn Benkert, Isotope Hydrologist and Research Project Coordinator, Yukon Research Centre*

The Yukon Research Centre (YRC) is a branch of Yukon College that works to build and carry out innovative research projects by developing project proposals, executing research and coordinating expertise at the College with other researchers and agencies. YRC is currently leading several research projects:

- Analyzing data from the Yukon River Intertribal Watershed Council's Indigenous Observation Network
- Impacts of glacial discharge and snowmelt on flow in the Yukon River with Yukon Energy Corporation
- Liard First Nation Drinking Water (with University of Saskatchewan) – infrastructure upgrades, well-quality monitoring, community awareness, baseline data to guide management decisions
- Industrial Research Chair Position – focused on mine life cycles, working with consortium of Yukon mines on water treatment options

YRC is also looking at several emerging projects, such as permafrost monitoring near Old Crow, expanding melt water monitoring to include Yukon Energy's Aishihik basin operations and working with CAFN on their Water Strategy (*Chu äyi ätl'et*). YRC has also applied for funds to acquire a laser isotope analyzer to assist with community monitoring and other research projects.

## **Brainstorm - Participants' Research Priorities**

Forum participants worked in small groups to brainstorm ideas regarding their own research priorities. Their input (as written on sticky notes) is presented below, with categories developed by the report authors:<sup>1</sup>

### *Contamination and Impacts*

- Wastewater treatment specific to Yukon conditions
- Improve mitigation and treatment methods
- Cumulative effects assessment
- Localized hazard assessments
- Yukon-centric research on contaminants
- Defining threshold of contaminants for particular values

### *Monitoring & Mapping*

- Groundwater recharge areas and flow paths
- Changes in chemical composition of groundwater over time
- Mapping aquifers and permafrost
- Hydrometric data in remote areas
- Improve small scale hydrologic mapping/modeling
- Meteorological data stations in remote high elevation locations
- More meteorological stations in key basins
- Water quality for watersheds have no long-term monitoring
- Spatially identifying traditional/local water sources

### *Climate Change*

- Impacts of climate change on groundwater quality
- Effects of permafrost melting on tailings ponds/dry stacks
- Climate change and permafrost degradation impacts on surface water hydrology
- Temperature data
- Effects of rapid snow melt on animals and habitats

### *Miscellaneous*

- Aquatic plants inventory (for biodiversity baseline)
- Salmon habitat enhancement - best options
- Geothermal technologies applications

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<sup>1</sup> Participants also identified a number of ideas related to research partnerships and data standards during this brainstorm exercise. These are captured in the brainstorm results for the next section on Innovative Data Collection and Sharing.



## 7. INNOVATIVE DATA COLLECTION & SHARING

### Yukonwater.ca

*Tyler Williams, A/Water Information Specialist, Water Resources Branch, Environment Yukon*

Launched by Yukon government in 2012, this website includes information about natural processes and water use (“Understanding Yukon Water”), management roles and licensing (“Managing Yukon Water”) and ongoing water projects and initiatives (“Water and You”). The site also features a Water Data Catalogue (under “Monitoring Yukon Water”) that provides information about 18 different water data networks that include almost 1000 different monitoring stations. Users can access information about each station, including location, sample types and parameters and the operating agency where the data from each station can be obtained.

### Integrated Water Data Management

*Laura Prentice, A/Program Advisor, Water Resources Branch, Environment Yukon*

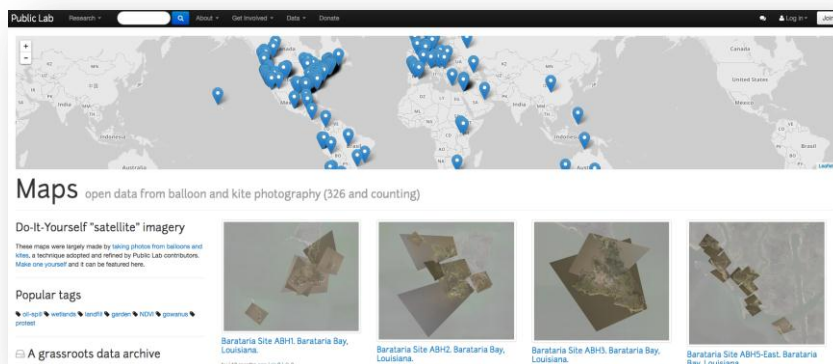
As water-related research in Yukon continues to grow and develop, we can look at approaches to data integration in other jurisdictions to help inform our choices in Yukon. The presentation provided a sample of data integration from simple, low-cost to high tech, big budget approaches.

#### *The Open Water Project*

This community-driven project was launched through Public Lab, a nonprofit that develops and applies open-source tools to environmental exploration and investigation. It aims to develop and curate a set of low-cost, open source tools to enable communities everywhere to collect, interpret, and share their water quality. It is making water quality information accessible and sharable through five related open initiatives: hardware, software, data, education and community.

Website:

[www.publiclab.org/wiki/open-water](http://www.publiclab.org/wiki/open-water).

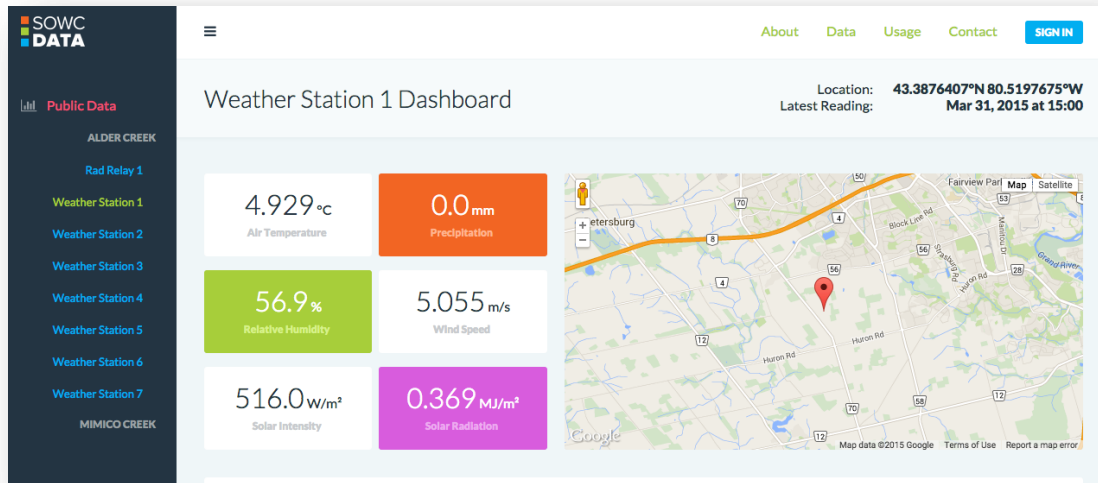


#### *Southern Ontario Water Consortium (SOWC) - Grand River Watershed*

The Grand River watershed is a unique mix of urban, pristine and agricultural lands with over 750,000 people living there. This consortium is a multi-million dollar project involving eight universities, governments and industry. The key to the SOWC project is the integration of all

elements of water management into a single platform. The platform comprises six complementary research and demonstration “nodes”: watersheds, data integration platform, wastewater, ecotoxicology, drinking water, and sensors that are integrated into a single platform. It includes 120 sensors in urban, agriculture and forested lands, providing 600 data points/hour about rain/snowfall, soil moisture, turbidity, flow, temperature, quality.

Website: [www.sowc.ca](http://www.sowc.ca)

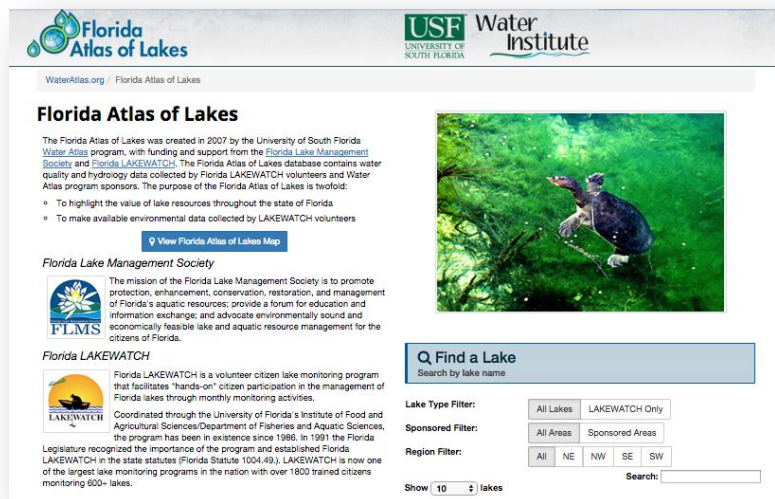


## Florida - Water Atlas Program

This program is managed by the Florida Center for Community Design and Research, using a modular and partnership approach. Individual project-based or watershed-based water atlases are developed and then integrated to provide a one-stop data warehouse of water resource information. The overall goal is “helping communities make informed decisions by providing up-to-date water resource information”. Currently the atlas provides data for eight counties over 11,000 sq. miles of land, using 41,393 sample locations on 7,845 water bodies. This information is presented using interactive graphs, tables, maps and graphics, so as to be understandable to both water research professionals and those people simply interested in learning more about the water resources within their area.

Website:

[www.wateratlas.usf.edu](http://www.wateratlas.usf.edu)



## Brainstorm Results - Integrating Yukon Water Data

Forum participants were asked to consider the questions, “How could data collection and sharing in Yukon improve? What have other jurisdictions done that could be valuable to Yukon?” The following is a summary of their input. Their responses recorded on sticky notes can be found in appendix 2.

### *Partnerships*

Joint data collection work would help build common understanding of what data is collected and how it is analyzed. This includes traditional knowledge, which requires agreements on definitions and sharing. Private industries collect and hold a lot of data, and partnerships with them could provide valuable information. Other jurisdictions have innovative projects that could be drawn upon, such as the Alaska Local Environmental Monitoring (LEO) network.

### *Data Standards & Centralization*

Participants emphasized the high importance of common standards for data collection, including sampling procedures, timelines and naming conventions. This would include private project proponents who submit data as part of their developments. Some suggested mandatory reporting of water data to one body, together with open source publishing to make information accessible. It is important that any centralized data repository has an accessible interface.

### *Coordination & Collaboration*

Participants would like to establish a community of water practitioners, which should be active at the community level, in order to remove silos and avoid duplication. It is important to define needs for water data, and to target efforts accordingly. Working at a watershed level could help avoid data duplication and focus research efforts on key areas. A Yukon water data committee could help achieve this, and could also help to provide data standardization. Some suggested drawing upon the model for collaborative resources management bodies established under the Yukon and NWT land claims.

### *Resourcing*

Coordination of efforts and centralization of water data will involve many agencies and require a substantial amount of work. To be successful, this kind of initiative requires support from upper level managers and proper resourcing, including dedicated staff.



## 8. EMERGING THEMES

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### **Needs for Baseline Data and Modelling**

While there are many active monitoring stations in the Yukon, there are still gaps in baseline data, especially concerning groundwater. Collaboration among water agencies is important to identify key data gaps and to coordinate research activities. Good data will enable good modelling of current water processes and therefore improve our ability to predict changes and impact effects.

### **Data Standards and Coordination**

There is already a significant amount of Yukon water data available and a desire to generate much more. There are many water management agencies involved in data collection and there is potential for even more data being available through private industry partnerships. While it is not realistic to have all data in exactly the same format, it is important to coordinate among water agencies to maximize data compatibility and ensure good standards that make information collected as useful and possible. Some participants suggested a central water data management entity to promote standards and compatibility.

### **Watershed Level Research and Monitoring**

In several discussions, participants suggested working at a watershed level concerning research and management decisions. This will help to increase efficiency and minimize duplication in data collection and research projects. It also ensures that management efforts work in a way that mirrors natural processes and regional boundaries (rather than arbitrary geographical divisions).

### **Partnerships and Collaboration**

These elements of partnership and collaboration are especially important in Yukon water management, which includes so many different agencies spread across a vast geographic region. Further, there is a huge diversity of roles in water management, with different interests among the different players. There is tremendous opportunity for collaboration and coordination. Managers must be prepared to commit the time, energy and resources required to make this opportunity a reality.

### **Community-Based Monitoring**

Community-based monitoring emerged in several discussions through our the Water Forum, and this has links to the themes of Partnership and Collaboration as well as with Watershed Level Research and Monitoring. The Water Strategy includes a commitment to formalize an approach for community water monitoring, which would be done in partnership with First Nations and community organizations.

## 9. APPENDIX 1: List of Participants

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<b>Organization</b>	<b>Name</b>	
Aboriginal Affairs & Northern Development	Martin	Guilbeault
Alsek Renewable Resources Council	Jane	Vincent
Arctic Institute of North America	Ellorie	McKnight
BC Water and Wastewater Association	Virginia	Sarrazin
Cambio Consulting	Mark	Nelson
Cambio Consulting	Lou	Villeneuve
Canadian Parks & Wilderness Society Yukon	Amber	Church
Carcross/Tagish Renewable Resources Council	Albert	James
City of Whitehorse	Dave	Albisser
Dän Keyi Renewable Resources Council	Joe	Bruneau
Dän Keyi Renewable Resources Council	Louise	Bouvier
Department of Community Services	Kirsti	Muller
Department of Community Services	Elise	Bingeman
Department of Community Services	Dwayne	Muckosky
Department of Energy, Mines & Resources	Jocelyn	McDowell
Department of Energy, Mines & Resources	Lorraine	Millar
Department of Energy, Mines & Resources	Mark	Nowosad
Department of Energy, Mines & Resources	Derek	Fraser
Department of Environment	Brendan	Mulligan
Department of Environment	Lila	McConnell
Department of Environment	Barb	Coppard
Department of Environment	Ed	van Randen
Department of Environment	Hon. Wade	Istchenko
Department of Environment	Jim	Connell
Department of Environment	Richard	Cherepak
Department of Environment	Collin	Remillard
Department of Environment	Bengt	Pettersson
Department of Environment	Ric	Janowicz
Department of Environment	Jean	Beckerton
Department of Environment	John	Miller
Department of Environment	Tyler	Williams
Department of Environment	Heather	Jirousek
Department of Environment	Laura	Prentice

Department of Health & Social Services	Pat	Brooks
Department of Health & Social Services	Benton	Foster
Ducks Unlimited Canada	James	Kenyon
Environment Canada	Benoit	Godin
Executive Council Office	Andrea	Wilson
Executive Council Office	Aynslie	Ogden
First Nation of Na-Cho Nyak Dun	Ray	Sabo
Friends of McIntyre Creek	Michael	Bendall
Hamlet of Mount Lorne	Al	Foster
Kluane First Nation	Geraldine	Pope
Kwanlin Dün First Nation	Billie	Giroux
Kwanlin Dün First Nation	John	Pattimore
Laberge Renewable Resources Council	Dorothy	Bradley
Mayo District Renewable Resources Council	Kris	Pavlovich
Northern Climate Exchange	Bronwyn	Benkert
Selkirk Renewable Resources Council	Brian	Isaac
Selkirk Renewable Resources Council	Jerry	Alfred
Ta'an Kwäch'än Council	Michelle	Telep
Ta'an Kwäch'än Council	Brian	Bell
Ta'an Kwäch'än Council	Coralee	Johns
Teslin Tlingit Council	Gillian	Rourke
Teslin Tlingit Council	Kaitlin	Wilson
TIA Yukon	Blake	Rogers
Town of Faro	Tom	Lie
Village of Haines Junction	Dave	Hatherley
Village of Mayo	William	Hummel
Village of Mayo	Scott	Hamilton
Yukon College	Catherine	Mallet

## 10. APPENDIX 2: Breakout & Brainstorm Session Notes

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### BREAKOUT #1: SAFE DRINKING WATER

These are the reports from the breakout groups as they recorded on cardstock sheets.

#### *Source Water Protection*

- *Who plays a major **role** in this part of Source to Tap chain?*
  - Land and water users
  - Providers
  - Developers
  - Assessors and regulators
  - Planners and resource managers
  - FNs
  - Politicians
  - NGOs
  - Public
- *What is a significant **challenge** each player faces?*
  - Many players: working constructively, balance
  - Private land owners
  - Baseline data, information gaps
  - Wildlife
  - Political (will)
  - Money, capacity
  - Past sites and activities
  - Climate change
  - Competing interests
  - Infrastructure
  - Regulatory
- *What is a doable and meaningful **step towards a solution** for each challenge?*
  - Managing risk, using cautionary approach
  - Communication
  - Collaboration
  - Increasing public awareness
  - Land Use planning at all scales
  - Education
  - Providing alternatives, incentives, research
  - Collect baseline data
  - Supportive policy
  - Capacity/training

- *What **collaborations** would benefit?*
  - Partner with academics
  - Between FNs
  - Between Governments
  - Industries
  - Build on existing processes – YESAA, LUP, etc.

### *Treatment/Transmission*

- *Who plays a major **role** in this part of Source to Tap chain?*
  - Design Consultants (build, operate...), contractors
  - YG, Rules and Regulation, CS + HSS
  - Federal Government, municipalities
  - Users, how they use it, well, filters..
  - Delivery and trucking
  
- *What is a significant **challenge** each player faces?*
  - Concerns in the tastes of water (people do not want the taste of Chlorine) through disinfection, balance between safe water and the taste, treatment and use of the water.
  - Training of the operators retention
  - Treatment systems are too complicated therefore are not used properly
  - Balancing safe drinking water vs. degrading water quality
  
- *What is a doable and meaningful **step towards a solution** for each challenge?*
  - Need to keep track on what is going on in research in disinfection options
  - Have local citizens trained for operation
  - Educating public ex: open house.
  
- *What **collaborations** would benefit?*
  - Communication between operators
  - Connect the designers (consultants) and operators
  - Yukon Research Center to keep track of drinking water, water and waste water treatment to help communities

### *Legislation, Policy and Standards*

- *Who plays a major **role** in this part of Source to Tap chain?*
  - Politicians are the game changers
  - YG



- FNs
  - Federal Gov.
  - Municipalities
  - Land use planners
  - Home owners/Individuals
  - RRCs
  - Industries
  - YWB, YESAB
  - Water plant operators
- *What is a significant **challenge** each player faces?*
    - Education and awareness
    - Lack of partnership in communities
    - Lack of communications
    - Capacity and budget (funding)
    - Clarity in the roles
    - Managing expectation
    - Baseline data for standards, role of Energy
    - Need for new legislations (ex: fracking)
    - Legislation
    - Water cycle....
- *What is a doable and meaningful **step towards a solution** for each challenge?*
    - Education
    - Better Use
    - FNs and YG capacity building and collaboration
    - Building tools for information sharing
    - Increasing positive Gov. to Gov. relationships with goal of reconciliation
    - Getting the public to understand the value of water
    - Find ways to measure value of water
    - Recycle and reuse
- *What **collaborations** would benefit?*
    - Multiple levels of leadership
    - Political, annual political summit
    - Resources, and resource sharing
    - More frequent meetings
    - Build consent
    - Policy need to have outreach components
    - FN to FN, FNs to YG
    - YEC and YDC, industry
    - MOUs

## *Public Users*

- *Who plays a major **role** in this part of Source to Tap chain?*
  - Individuals
  - FNs, \$
  - Regulators
  - End users, families
  - Distributors and dispensers
  - Water supply managers
  - Feds \$ and regulations
  - YG \$ and regulations
  - Municipal, \$
  
- *What is a significant **challenge** each player faces?*
  - Different schedule and standards in respect to cleaning and holding tanks and testing water wells.
  - Regulatory messaging conflicting in the design and use
  - Gaps in service
  - Water delivery
  - Who gets water and when
  - Design not fitting with northern climate
  - Finding locals to run the water treatment facilities
  - Historical contamination
  - Open tap philosophy (ex: water lawn)
  - Issues with contaminants
  - Gaps in the knowledge of the users and their expectations.
  - Costs, treatment...
  - Baseline: quality of the water
  - Capacity of the resource to meet the needs
  - Technical
  - Natural events
  - Access - distribution
  
- *What is a doable and meaningful **step towards a solution** for each challenge?*
  - Train locals to run their own treatment facilities
  - HSS, Env, FN, CS need to work and plan together
  - Infrastructure that works in the Yukon and run by locals
  - Plan by locals
  - Training needs to be followed up and be continuous
  - Education (kids in school, and all levels in society)
  - Dissemination of the info, easily accessible

- *What **collaborations** would benefit?*
  - Have all Gov'ts. involved from inception of the plan to maintaining the plan together
  - Funding between Gov'ts
  - Individuals being able to test their own well.

## **BREAKOUT #2: GROUNDWATER**

### *Drinking Water*

- **Priorities and Concerns**
  - Safety – clean
  - Supply
  - Infrastructure – sewage, reduce risk of contamination
  - Cost of monitoring & sampling, treatment
  - Central well registry, well logs, accessible to public, common format like ArcGIS
  - Gaps between Public Health and Safety Act and CSR for DW and aquatic life
  - Treatment of contaminants
  - Cataloguing
  - New water well construction guidelines – legislation
  - Develop clear fuel storage installation guidelines
- **Areas to Grow Knowledge**
  - Baseline data
  - Collaboration between stakeholders
  - Info from old mine sites
  - Central well registry, accessible to all
  - Workshops on Groundwater regulations
  - Knowledge of aquifers, how they work, and affect drinking water
  - Effects of climate change on Groundwater
  - Historical reports
  - Access to information
  - Public education
- **Protect Our Needs/Interests**
  - Identify values
  - Wellhead and source water protection regulations
  - Ongoing monitoring
  - Mandatory response plans
  - Source Water Protection plan & monitoring plan

- Ensure legislation is synchronized with values
- Education in schools, promote ownership of the resource
- Shared knowledge
- Provision of safe drinking water for all
- Value water as a natural resource
- Conservation, protection
- Building a sense of community/ownership of the resource

### *Fish and Aquatic Species*

- **Priorities and Concerns**

- Lack of understanding of connection between GW and fish/aquatic species
- Need understanding of quantity of GW for various uses
- Are we monitoring GW for aquatic health parameters?
- Permafrost, GW, fish (e.g., burbot example)
- Baseline quality data
- Overwintering areas
- Effects of “legacy sites” (e.g., pump stations)

- **Areas to Grow Knowledge**

- Baseline data – spawning areas, overwintering studies and areas
- Are we monitoring for GW effects on aquatic species? Or just drinking water?
- TK and local knowledge for monitoring – (e.g. small ponds drying up around HJ/Kluane – why?)
- Need better understanding of GW connection to aquatic species – permafrost, GW and fish (e.g. effects on burbot in Kloo Lake)
- GW and contaminant migration in Yukon – could affect buffer distances
- Expand GW network
- Baseline development
- Layman’s interpretation for use by managers
- Identify key areas and data gaps
- Increase general understanding of GW behaviour
- Community-based monitoring, community engagement

- **Protect Our Needs/Interests**

- Industry controls for fish (fracking, mining)
- Put info into layman’s terms so it actually gets used
- Focus on areas where there is pressure (e.g. agriculture, mining, etc.)
- Regulate and manage for uncertainty to protect our values from unknown threats
- Watershed-level planning with stricter water quality standards

- Identify sensitive, protected areas
- Community engagement
- Improve timelines to fill gaps

## *Resource Development*

- **Priorities and Concerns**

- Defining GW, especially for different projects
- Baseline monitoring
- Cradle to Grave project monitoring
- Leadership and direction
- Accountability and financial security for dealing with future effects on GW
- Develop protocols
- What level of impact is acceptable?
- Identify stakeholders, roles and responsibility
- Coordinated data collection and storage

- **Areas to Grow Knowledge**

- Baseline data
- Process, procedures
- Clarifying processes for decision-making
- Coordinated data, not in isolation, available to all – standards for how collected
- Interpretation of data
- Developing appropriate thresholds
- Evaluation of risks

- **Protect Our Needs/Interests**

- Fair consistent predictable and strong regulations and licensing – monitoring, inspections, enforcement and penalties (public confidence)
- Public knowledge/education
- Appropriate financial security
- Good management regimes
- Understanding the importance of balancing values through effective decision-making

## *Hydrological Cycle and Climate Change*

- **Priorities and Concerns**

- Understanding whole system, incl. cryosphere and permafrost role
- More TK
- Collecting baseline data to understand GW
- Developing partnerships

- Scalable climate projections
- **Areas to Grow Knowledge**
  - Don't know much – comprehensive baseline data
  - Develop networks to share data
  - Work to consider the watershed so projects are not in isolation
  - Identify shared values
  - Geological data
- **Protect Our Needs/Interests**
  - Collaboration on projects in a watershed
  - Hard to develop strategy without baseline data – we don't even know how climate change is affecting our values
  - Need to start by addressing gaps
  - Education and awareness about climate change and GW and showing connectivity
  - Identify connectivity between climate change and GW – not clear yet
  - Long-term planning

## BRAINSTORM #1: RESEARCH PRIORITIES

These are ideas provided by small groups from brainstorm sessions as recorded on sticky notes. They have been organized into section groupings by the report authors.

*What info and gaps could research projects address for you?*

- **Contamination and Impacts**

- Learning more about wastewater treatment specific to Yukon conditions
- Improve mitigation and treatment methods
- Cumulative effects assessment
- Localized hazard assessment (OHWM) -access/alienation –degradation
- Yukon-centric research re: contaminants, fracking...
- Threshold of contaminants for particular values

- **Increased Monitoring + Mapping**

- Where are groundwater recharge areas + flow paths?
- Understand changes in chemical composition of groundwater over time - (use existing data, tie it to Groundwater mapping)
- Mapping aquifers + permafrost
- Hydrometric data in remote areas (2 per all Eco region)
- Improve small scale hydrologic mapping/modeling
- Met ecological stations (data) in remote high elevation locations
- Increase meteorological stations in key basins – flow
- Info>data gap with surface water quality – many watersheds have no long-term monitoring
- Spatially identifying traditional/local water sources

- **Climate change**

- Impacts of climate change on groundwater quality
- How will permafrost that affect tailing pounds/dry stacks?
- Better understand climate change technology
- Climate Change + Permafrost Degradation impacts n surface water hydrology
- Temperature data, Community capacity building
- How will rapid melt affect animals, habitats?

- **Research Coordination**

- Coordination of research data and breaking down silos
- Coordinate and synthesize existing data in accessible manner (layman’s terms central repository)

- Website sharing, cause and effect, design of monitoring project to address C&E
- Not knowing what e don't know
- Where to find info about water
- Coordination for data collection and sharing

- **Standardized Data**

- Use same standards for data collection and monitoring etc.
- Access to standardized data at the watershed level
- Protocols for community-based monitoring
- Best practices within circumpolar context (permafrost)
- Recovering old data (pre-digital age)
- Data management and access

- **Policy**

- Establish guidelines for identifying priorities (Groundwater/permafrost)
- Resolve regulatory overlap

- **Miscellaneous**

- Aquatic plants inventory (for biodiversity baseline)
- Salmon enhancement best habitat? Data flow data local monitoring. Tools to loan
- Geothermal technologies applications

## **BRAINSTORM #2: INNOVATIVE DATA COLLECTION & SHARING**

These are ideas provided by small groups from brainstorm sessions as recorded on sticky notes. They have been organized into section groupings by the report authors.

*How could data collection/sharing improve?*

*What have other jurisdictions done that could be valuable to Yukon?*

*How could it be adapted?*

- **Data Standards**

- Mandatory reporting of water data to one body and open source publishing
- Methodological standardization, reporting transparency
- Meaningful sampling timelines, related to modeling change
- Share meaningful info, clear and concise)
- Clarify submission of data requirements to proponents
- Develop standard sampling procedures and naming conventions for data



- Standardize watershed and definitions
- **Coordination and Collaboration**
  - Improve coop and reduce duplication
  - Combine silos, stop reinventing the wheel
  - Use the advisory bodies and frameworks for collaboration resource management established in Y.T. land claims to coordinate or complete community based monitoring. Samples can be found in NWT – Inuvialuit –Gwitchin
  - Establish a Yukon community of water practitioners (Yukon water forum at community level)
  - Ongoing forums and training
  - Data committee – monthly coordination meetings
  - Clarify which data is needed + what will be done with it. Data might be the “weeds” start with the issue questions work backward
- **Centralized Data**
  - Focus on centralized site – manage data types the interface
  - Clarify who owns data
  - Proprietary data – tools for getting data into stream, water related online community – rotating moderator
  - Better awareness of wateryukon.ca capabilities. Ask
  - Centralized data repository + management group (common platform)
  - Support for data assessment and interpretation –web base explanations, public presentation webinars – individuals
  - Sharing data collection with Yukon water (methods and data) to publicized work that is happening
- **Resourcing**
  - High-level management buy-in and resources
  - Dedicated, focused staff and resources (to get complete datasets)
- **Partnerships**
  - Joint collection inspection to know what is collected, analyzed and meaning
  - Build on expertise (not work) example LEO network, Alaska state native tribe
  - Borrow ideas and tools from other jurisdictions
  - Industry/Gov. partnerships (and funding) PPP Private, Public Partnerships
  - Could be value from industry involvement (i.e., databases, approaches...)
  - Cooperation between data collectors (i.e., across jurisdictions)
  - Traditional knowledge.... Definition use sharing.