



## Yukon Water Forum 2019

Co-Hosted by Government of Yukon and Carcross/Tagish First Nation

November 27-28, Carcross House of Learning

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# 1. INTRODUCTION

The 2019 Yukon Water Forum (Forum) was co-planned and co-hosted by the Government of Yukon (YG) and Carcross-Tagish First Nation (C/TFN).<sup>1</sup> The Forum is a biennial gathering of water stewards from a wide range of organizations: governments, boards & committees, researchers, industry, and NGOs. The Forum was started in 2015 following completion of the Yukon Water Strategy (2014-2019), which called for the hosting of this Forum as a venue “to exchange information, collaboratively address water issues and promote continuous improvements.” A complete list of participants can be found in Appendix A.

As with past years, the Forum included a variety of ceremonial elements, presentations, and roundtable breakout discussions. This report summarizes the information shared and discussions that took place.

## Opening Remarks

### **Charlie James, Executive Council (Dakl’aweidi Clan), C/TFN**

Charlie expressed that it was good to see everyone here to talk about water together. He remembered attending meetings with the Yukon Inter-Tribal Watershed Council years ago, where they said that in fifty years, everyone should be able to drink from the Yukon River. Everybody needs to work together - Indigenous peoples, governments, and individuals - to ensure we take care of water for the future.

### **John Bailey, Deputy Minister, Environment Yukon**

John began by acknowledging C/TFN’s Traditional Territory, and that he’s very glad that we have so many First Nation citizens participating. This Forum is an important opportunity to talk together about water stewardship. John has a background in water research, so this work is very important to him.

There has been a lot of progress in water stewardship and collaboration - increased water monitoring capabilities, more accessible water data, and more partnerships with First Nations governments and other researchers. John affirmed the idea that “we are all water stewards”.

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<sup>1</sup> In the Tlingit language, the word for water is *Héen*; in Tagish, it is *Tū*. This report will sometimes use Héen/Tū when referring to water.

Through work on the water strategy, YG has focused on areas such as groundwater information, surface water monitoring, and flood forecasting. The effects of climate change on our water is also a key topic for more discussion and learning. YG recently declared a climate change emergency, and has a draft strategy out for consultation.

## Water Connects Us – Opening Ceremony

Harold Gatensby lead a ceremony to open the forum, where people combined water they had brought from their part of the world into a common jar in the centre of the room. This water was now a participant in the forum and was present throughout the forum as a symbol of how we are all connected by water. At the end of the Forum, the water was released into Nares Lake at the end of the forum (see section 8 of this report), so that a part of everyone from the forum remains.

Harold began the ceremony with some guiding words that are summarized here:



Harold Gatensby leading the opening water ceremony

*We are all related to each other. When people introduced themselves this morning, I saw human beings who are all made of water.*

*Water is spirit, and this is a sacred place that we are in. These mountains are where the animal mother gathered all the animals together and rearranged things so the animals and people would live together. Indigenous peoples' laws come from the spirit world. The lake is part of this, it's where the fish mother spirit lives. When I fish there, I make a gift of tobacco to show respect, and ask for blessing.*

*We have to remind ourselves of our relationship to water, that it is not just a "resource". We forget that we are all made of water, and we need to remember this to help us keep our responsibilities to the future. The birds that*

are singing outside are also made of water. I am here to help remind people of who we are.

My water is talking to your water. My spirit is talking to your spirit. We are all equal here. Every one of us is a water steward, and we all have a responsibility towards water. We need to celebrate what we have, and work to make things good for the generations to come.



Forum attendees participating in the opening Water Ceremony

## 2. WATER GOVERNANCE

YG and C/TFN set the stage for the Forum by talking about water governance, and our shared responsibility to water as water stewards.

### Yukon Water Strategy - Five Year Report

Heather Jirousek and Emma Seward of YG's Water Resources Branch (WRB) presented an overview of the five-year report that has been prepared at the conclusion of the Yukon Water Strategy and Action Plan. The report is [available here](#).

While the strategy was developed to guide YG, it is recognized that water does not follow administrative boundaries; many other governments, boards, committees and stakeholders provided input into the strategy and have been involved in its implementation. The strategy focused on six main goals:

1. Better understand Yukon's groundwater regime
2. Maintain and improve access to safe drinking water
3. Promote the sustainable use of water
4. Improve the sharing of information about Yukon's water
5. Improve water management programs
6. Plan for water needs now and in the future

The five-year report includes the key achievements and future priorities for each of these goals. Specifically, the Government of Yukon is proud to have advanced key initiatives such as establishment of a permanent groundwater unit for Yukon, writing of Yukon-specific reports on drinking water management and protection, delivery of more than 200 presentations for Canada Water Week, creation of a regular Yukon Water Forum, updating of Yukon's Water Data Catalogue, establishment of water monitoring partnerships with four First Nations, enhancement of water monitoring capabilities and advancement of research partnerships with other governments and academic Institutions. Moving forward, the Government of Yukon will continue to advance work to strengthen legislation and guidance around groundwater, advise on sustainable water use, advance the development of a Yukon Wetland Strategy, advance agreements with First Nations and other jurisdictions on transboundary waters, coordinate efforts to monitor water quality and carry out floodplain mapping for 13 Yukon communities.

## C/TFN Water Governance and Héen/Tu Declaration

Colleen James of the Dakl'aweidi Clan introduced herself in her Tlingit language (Gooch Tla, "Wolf Mother") and where she comes from (Natasse Heen, "water flowing between lakes"/Nares River area). Colleen talked about Tagish-Tlingit people's traditional practices, their relationship to the land and water, and the importance of the land claim agreements in water stewardship.

In days past, the Tagish/Tlingit leader Taku Jim would gather the families together to talk about where people would go to hunt and fish that year. They were very aware of the needs for conservation. Today, money creates incentives for people to use land, animals and water as resources. We need to be aware of our responsibility towards water, and work together to put it into practice.

Starting back at the Klondike Gold Rush, Chief Jim Boss (Kishwoot) of Taa'an Man (Lake Laberge) saw how the land and animals were being affected by the huge influx of newcomers. He wrote to the King of England to bring attention to this, and to ask for protection of them for his people. Eventually, Yukon First Nations people took their concerns to the Government of Canada in the 1973 document *Together Today for Our Children Tomorrow*. Through a long road, this led to eleven Final and Self-Government Agreements. These agreements contain many chapters related to land, animals and water, including Chapter 14 specifically about water resources.

The concept of "land tenure", owning land and water, is a foreign one to First Nations people. Today, C/TFN is working with its partners in YG to bridge different ways of doing things, different approaches to laws that guide our relationship to water.

As a self-governing nation, C/TFN has been working towards developing a declaration about their relationship with water (*Tu* in Tagish, *Heen* in Tlingit,) in collaboration with interdisciplinary scholar Dr. Eleanor Hayman. This Tu/Heen Declaration is rooted in Tagish and Tlingit Elder's wisdom (Yaa Heen Koosge), C/TFN knowledge keepers and Tagish and Tlingit archival research. The Haa Heen Kusteeyi (Our Water Way) and Nda' Tu (Water Medicine) exemplifies the acknowledgement of 'Ldakat at ayakghwaheiyagu khudzitee (the spirit in all things). Tu/Heen (water) has agency. It is a relative. It connects everything on earth both literally and metaphorically. The Tagish and Tlingit cultures have always understood this as evidenced by traditional oral narratives, oratory, song and customary practices. The Tu/Heen Declaration attempts to synthesise these vast, philosophical and sustainable ways of knowing.

All our trails in the territory lead to water, because we travelled where we need to survive. Chief Kohklux and his two wives, Tu-eek (Leek) and Kaatchixich, drew a map of the coast at Klukwan to Ft. Selkirk in the interior for the American researcher Davidson. This included names for all the rivers and lakes along the way. C/TFN has also been documenting and mapping Tlingit and Tagish place names, which reflect the importance of these places in sustaining people as they travel on the land.

## Participant Reflections on Water Governance

Following these two presentations on water governance, Forum participants shared thoughts on what stood out for them and what they would like to learn more about. These are summarized here, and verbatim documentation of what people shared can be found in Appendix B:

- Connections & Relationships: how water connects us all, how we can connect in new ways, the importance of land claims agreements (including Chapter 14 - Water)
- Diversity in Perspectives: how to make space for different ways of thinking about water and bring them together well, the value that comes from traditional and scientific knowledge
- Sharing Knowledge and Information: the importance of drawing on diverse sources for the best knowledge and information (traditional knowledge, science, history, place names), communicating and sharing it effectively,
- Action for Water Stewardship: the need for action around priorities like groundwater knowledge and protection, climate change impacts, sustainable use, and protection of habitats for animals and fish

***Aju dan utth'at kwach'e - "No one is the boss of the water"***  
- Kluane First Nation Elders (Dan Kwänje-Southern Tutchone)

The audience also posed several questions and comments following the water governance presentations:

Q: *Places like California are having severe water shortages, and are looking at running out in the coming years. Is there a plan in place to ensure that we will always have clean drinking water?*

A: The WRB monitors water levels, like the low snowpack we had last year. These levels might be different in different places throughout Yukon. The Yukon Water Board makes decisions about specific projects and how they might affect water, and should consider the information we have about water levels.

C: My dad visited Africa, and somebody said to him, "I can't believe you people go to the toilet in clean water!". We need to rethink how we use water, and be more conscious of how to reduce our use and re-use where we can.

C: I spoke to people in Fort Nelson who say they can no longer drink water from the streams and lakes because of fracking activity. We need to take care of water for our grandchildren, so they have clean water.

Q: Noticed the different styles in the two presentations, and curious about ways to support different worldviews to work together?

A: Our Elders tell us that we need to get into the room together and talk, and that when we do, we will find middle ground, we will find ways to work together.

Q: Are there any plans for water in tailings ponds at mines, ways for being able to re-use that water?

A: BMC has a proposed project in Ross River Dena territory; Elders do not like submerged tailings, so we are looking at dry stack on the side of the valley.

### 3. ŁINGIT - TAAGISH WATER LANGUAGE

C/TFN Adult Language Coordinator Gary Johnson led the group in learning how to use some water-related words and phrases in the Łingit and Taagish languages<sup>2</sup> through the card game *Ast'ieᖃ Nagú!* (Go Fish!). Below are the words and place names he taught to the participants:

English Word/Place Name	Łingit Word or Taagish (T) Word
Water	Héen (L), Tū (T)
Lake	Áa (L), Mén (T)
Ocean	E'il'
Spring	Goon
Creek	Héenák'w
ᖃáat	Fish
Salmon (Chinook)	T'á
Pike	Taasleyí
Grayling	T'ási

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<sup>2</sup> Gary told the participants that the common spellings of “Tlingit” and “Tagish” are English approximations of how the Indigenous terms for their peoples’ languages would be said and spelled; Łingit and Taagish are more accurate.



Forum attendees participate in a Lingit - Taagish language card game

## Taagish Water Place Names

**Mén Chó** - Bennett Lake (Big Lake)

**Tséi Zhéte' Méné** - Windy Arm (Howling Rock Lake)

**Taagish Méné** - Tagish Lake (Break up of ice, Lake)

**Taagish héeni\*** - Tagish River (Sound of the break up of ice, River)

## Łingit Water Place Names

**L'ál Héeni** - Wheaton River (Jackpine River)

**Naataase Héen** - Nares River (Water running through the Narrows)

**Taasleiyí Áayi** - Nares Lake (Pikefish Lake)

**Shaanakhéeni** - Yukon River (Water that comes from the mountains)

**S'à tłani** - Marsh Lake (Sand Beach)

**T'ahéeni** - McLintock River (King Salmon River)

**T'ooch' Áayi** - Tutshi Lake (Charcoal Lake)

**X'áat Tlein Áayi** - Little Atlin Lake (Big Fish Lake)

**Kaxwéix' Áayi** - Crag Lake (Highbush Cranberry Lake)

**Keshuwaa Áayi** - Chootla Lake (Grayling Lake)

**Dasgwaanga Áayi** - Squanga Lake (Whitefish Lake)

**Dal'eiyí Áukú** - Spirit Lake (Trout Lake)

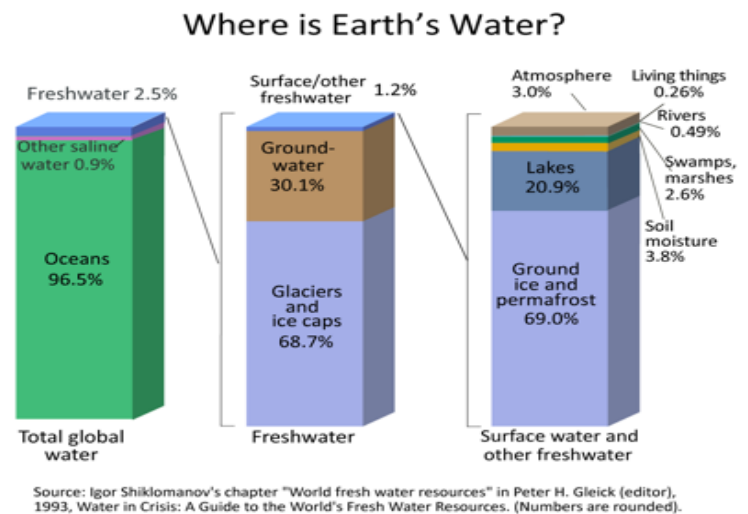
*\*Combination of Taagish place name with Łingit word for "river"*

## 4. WATER STEWARDSHIP ROUNDTABLE

This session featured breakout tables with various projects and stories on water stewardship. Each is summarized below, along with the main points discussed, key questions raised, and emerging patterns in the discussions.

### Advancing YG's Groundwater Program

People and ecosystems rely on groundwater. As an outcome of the Yukon Water Strategy, YG established a permanent groundwater unit in the Department of Environment's WRB. Brendan Mulligan, a groundwater scientist, discussed [groundwater and wells](#), shared details of the work within the branch including the Yukon Water Well Registry and Yukon Observation Well network.



#### Key discussion points:

- About 50 monitoring wells at various locations (measures groundwater levels and chemistry)
- A Well registry was created; now has almost 2,000 records; submission of well logs is currently voluntary
- Importance of understanding surface/groundwater interactions
- What are groundwater trends?

### Transboundary Water Management Agreements

The flow of surface and groundwater does not follow administrative boundaries, which often creates challenges in water governance. Heather Jirousek of YG WRB and Corrine Porter of the Dena Kayeh Institute gave an overview of agreements among provincial/territorial governments and Transboundary Aboriginal Groups in the Mackenzie River basin. They provided an overview of the [Mackenzie River Basin board](#) as well as the process of incorporating traditional knowledge into transboundary water management.

### Key Discussion Points:

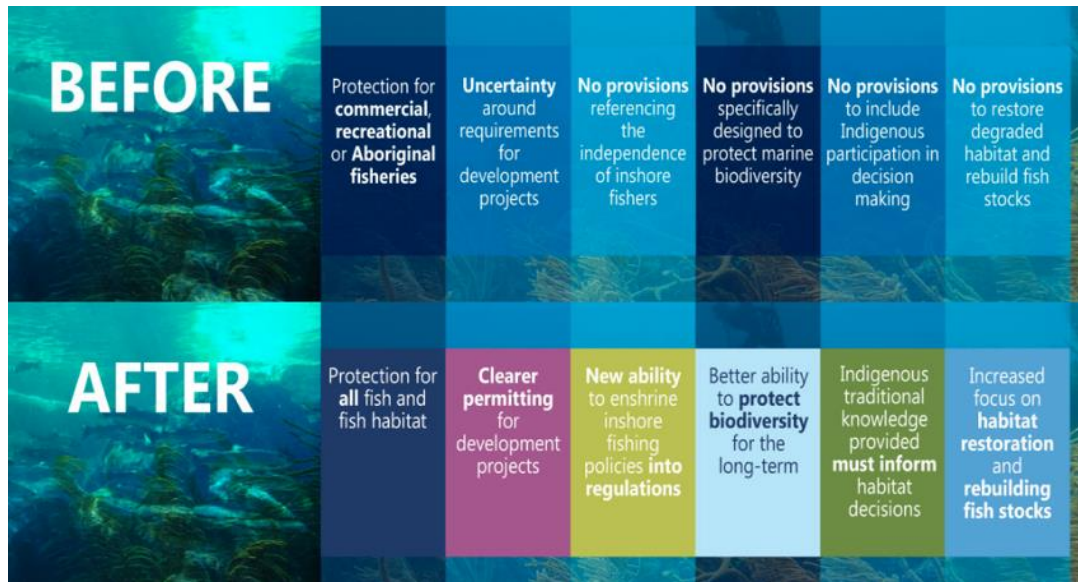
- NWT communities face the most downstream effects within the Mackenzie River Basin.
- Need a “braided” approach to science and TK
- Potential to expand the approach to Yukon River basin?

### **Fisheries Act Modernization**

Jeska Gagnon from the Department of Fisheries and Oceans (DFO) shared the [updates and changes to the modernized Fisheries Act](#). This includes reconciliation with indigenous peoples, new program information, indigenous engagement, standards and codes of practice, and the fish and habitat provisions.

### Key discussion points:

- Act applies to any water frequented by fish (added to definition and includes all species)
- Need to work proactively with Alaska so fish are available for traditional use
- Need for engagement on cumulative effects, including indigenous knowledge
- connections with regards to food supply of fish.



Canada's Modernized Fisheries Act. Source: [Department of Fisheries and Oceans](#)

### **Water Guideline for Developers**

Yukon Energy Mines and Resources (EMR) has developed two draft water-related guidelines that set out YG's expectations for project proponents: *Yukon Guide for*

Developing Water Quality Objectives and Effluent Quality Standards, and Guidelines for Developing Adaptive Management Plans in Yukon. Amelie Janin and Lawrence Ignace of EMR gave an overview of these guides, and more information can be found about guidelines for adaptive management plans in Appendix 4.

#### Key Discussion Points:

- Requirement for at least 3 years of baseline data and one intensive sampling
- Trying to reduce the uncertainties of development effects on water systems
- Importance of engagement with First Nations via the Mining MOU table
- Water data gathered by proponents as a condition of water licenses is available through the [Yukon Water Board's Waterline online platform](#)

### Climate Change and Water

YG has released a draft climate change strategy called [Our Clean Future: A Yukon strategy for climate change, energy and green economy](#). The strategy was out for public engagement at the time of the Forum, and will be finalized in early 2020. Ryan Davis of the YG Climate Change Secretariat reviewed the draft strategy, which commits YG to *continue to improve our understanding of how climate change will impact watersheds, including water quality, quantity and habitat for fish and other wild species.*

#### Key Discussion Points:

- Overall target of 30% reduction in GHG emissions by 2030
- Importance of considering different industrial effects
- Effects on permafrost and wetlands are critical
- Importance of collaborating with First Nations gov'ts and communities

### Mandate of the Yukon River Inter-Tribal Watershed Council

The [Yukon River Inter-Tribal Watershed Council](#) (YRITWC) is a treaty-based Indigenous grassroots organization, consisting of 73 First Nations and Tribes, dedicated to the protection and preservation of the Yukon River Watershed. Coralee Johns from C/TFN and Edda Mutter from the YRITWC hosted this table, with the intention of building awareness and interest about the YRITWC, its mandate, purpose and target of “one people, one river”. The YRITWC coordinates the Indigenous Observation Network in the Yukon River Basin, which is considered one of the largest Indigenous-led water quality monitoring networks in the world.

## Key Discussion Points:



- Importance of citizen science and partnerships
- Climate change indicators (i.e temperature increase, drought, salmon die-offs)
- Heavy metals mining and unique geology
- How often do you test, what do you sample for and how do you analyze the data?

## **Collaborative Stewardship Initiative**

Cathy Merkel from EMR shared information about this pilot project, which will explore methods of working collaboratively with Yukon First Nations (YFNs) on compliance monitoring on both Settlement and Non-settlement land. Four YFNs will be helping to develop the framework for the pilot project – Tr'ondëk Hwëch'in, Selkirk First Nation, Kluane First Nation and Kwanlin Dün First Nation.

### Key Discussion Points:

- Importance of capacity building and cross-training opportunities
- Link to other organizations and partnerships (i.e. YRITWC, Yukon College, City of Whitehorse)
- Need communications improvement - YG and First Nations doing things differently
- Improved data collection/sharing

### **Elders Tea Discussion**

C/TFN Elders Annie Auston, Bessie Jim, Jean Desmarais, Patrick James, and Ida Calmegan shared tea and stories with participants in the Elders Lounge. Some of their words dealt directly with water, and others addressed the bigger ecological picture:

- We are not exercising traditional values, this is missing, e.g. throwing fish bones back in the water. Moose, caribou, sheep and goat hides are not being tanned anymore. Would like to sit down and talk about it, get this going again.
- Climate change is making things quiet, not hearing frogs anymore. Snowbirds don't see the flocks anymore
- Elders talked about some of the planes that crashed into Bennet Lake
- The creosote-soaked railroad ties used by White Pass & Yukon Route were made in Carcross; used to play on them as kids, and they would get sick from the gas and dog teams would die off - cancer rates are high in the community and they believe there is a correlation there
- Southern Lakes Caribou recovery program - for 30 years, we volunteered to not hunt the caribou, we have not skinned, eaten, used antlers, need to talk about that again. Leaving it to try to save it. Maybe to take one for the kids again?

## 5. CARCROSS/TAGISH ELDERS' STORIES AND WISDOM

Contents of this section is currently being finalized. A new version that includes elders' stories will be circulated once complete.

## 6. OBSERVATIONS OF CHANGE WITH WATER

### Keynote: Climate Change Impacts on Yukon's Rivers & Lakes

This session began with a presentation from Benoit Turcotte, Senior Scientist - Hydrology at the WRB, about recent scientific observations of seasonal water quantity around the Yukon. Key points from these and related observations are as follows:

- Average temperature increase is happening faster in northern regions
- More snowfall in northern Yukon, less snow southern Yukon
- More intense rainfall events overall
- Mid-winter breakups are occurring more frequently
- Glaciers are retreating
- River ice processes in Dawson - freeze-up patterns are changing because river morphology changes with flow; was open water in November 2018, while there is a complete ice cover this year in November
  - Dyke in Dawson protects community up to 1979 high water level; according to last 40 years of data, water level is now actually 3m lower; maybe for Dawson climate change will result in fewer flooding events.
- Hydrological trends: Liard River - increase in minimum flows because winter is getting shorter, average flows are stable, maximum flows are lower on average with a great variability. Porcupine River - minimum, average and maximum flows are all increasing.
- The majority of monitoring stations show minimum flows are increasing due to shorter winters.
- Mayo Lake is 1m below historical levels, really dry over the last year (which has impacts on power generation potential of the Mayo River).

For future activities, YG water scientists will need to continue to update climate change trends, and modernize our monitoring network, while supporting other departments in adapting infrastructure and tools. We also need to put effort into promoting the value of the research and observations.

Q: Do we as industry need to change how we do business in order to adapt to these changes?

A: We get new data every year. Industry and public sector should update their statistics and ensure relevant events are included to see how climate change will affect the trend. It is possible that the trend might reverse. Perhaps we can create datasets that can foresee the future. When infrastructure is designed, it needs to be designed for the future.

Q: Climate change and global warming - are they the same thing? Is there something more than the human race can do?

A: They refer to the same thing - globally, most climates are warming. Humans have been introducing greenhouse gases that impact our planet, and we are seeing changes happening faster and faster. Climate change is impacting everyone at different scales.

## Participants' Observations About Water

Throughout the Forum, and specifically after Benoit Turcotte's presentation (page 19), participants were asked to share their observations around changes related to water. These observations were posted on the "Water Observations Wall", for everyone to see, and can be found in Appendix 3. People's observations revolved around the following themes, and are summarized here:

### **Natural environment, fish and wildlife:**

- Generally reduced water levels and precipitation
- More erratic weather changes, more extreme weather events (storms, melts)
- Warmer winters and spring weather; later freeze-ups, earlier break-ups; permafrost sluffing
- Warming water temperatures – reaching distress levels for fish in some cases
- Some animals seen/heard less often (e.g. frogs, bats, mosquitoes) and some more often (e.g. ground squirrels in November)

### **Human interaction with the landscape:**

- Issues with ice safety for travel
- Trappers being affected by low snowfall and winter rains – harder travel and poorer fur

- Snow sports – fewer powder days, colder spring temps, sometimes need Klister wax on X-C skis in mid-winter

### Responses to climate change:

- More awareness and care about climate change
- Cancellation/rescheduling of camps and events because of changes in snow cover, water flows or ice thickness
- Changing equipment – e.g. more jet boat use to access low-water areas



Attendees gather in long hall of the Carcross Learning Centre

## 7. COMMUNITY WATER MONITORING

### Keynote: Lhù'ààn Män Water Monitoring

This session began with a keynote presentation from Rachael Thom of Kluane First Nation (KFN), Pauly Sias of the Dän Keyi Renewable Resource Council (DKRRC and

KFN citizen), and Ellorie McKnight of the University of Alberta (U of A) about water monitoring work in the Lhù'ààn Män (Kluane Lake) region.

The Dän Kwänje (Southern Tutchone) term for water is *chu*, which water is a living entity in the Dän worldview. *Chu* nourishes life, and when taken away it depletes. *Chu* deserves respect and needs to be honoured.

We are witnessing undeniable change and constant movement. In 2016, A'ay Chu (Slims River) was largely diverted from flowing into Kluane Lake due to a change in its channel (called "[river piracy](#)"). This has resulted in its meltwater flowing towards the Asek River drainage instead, with a huge impact on Kluane Lake water levels and on the Yukon River into Alaska.

How will the fish and animals adjust to these changes, and to effects of climate change? There is concern that the water temperature may be warming as the timing and weather of the seasons are changing. The lake ice is part of a way of life, a means of safe passage, which is now in question. Safe travel historically started as early as September. In 2018 Kluane Lake did not freeze until December and still had soft spots.

In response to these changes and concerns, KFN and DKRRC have started monitoring programs for water and fish in partnership with Environmental Dynamics Inc. (EDI) and University of Alberta. This is an example of a northern monitoring project built on shared interests, collaboration and respect. It includes monitoring of stream discharge, ground water discharge, and effects on Chinook and Chum salmon habitat and spawning runs. Results of this work have been shared at Kluane research summits held in Burwash Landing.

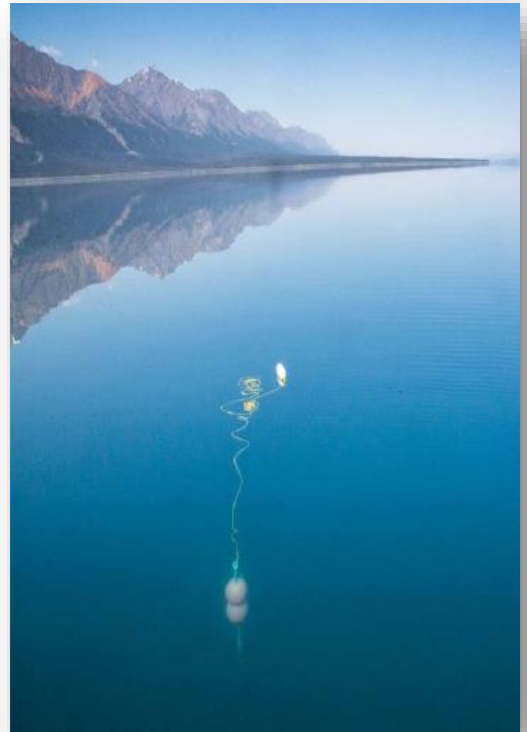




Photo Credit: KFN Nourishing Our Futures Project

This work is meant to make us think and to focus on the opportunity to adapt, be resilient and to find new tactics. Change starts with each one of us doing simple things in our lives to respect and honour *chu*. We should take this message home, and share it with others in our work.

## Fish Bowl Panel on Community Water Monitoring

Following the keynote presentation, a panel discussion was held in a “fishbowl” format, with panel participants sitting in a circle in the centre of the room surrounded by the rest of the Forum audience. The panel began with each member introducing themselves and their work related to water monitoring, and then responding to questions from the facilitator and the audience.

Corinne Porter, Dena Kayeh Institute (DKI) - DKI has worked on developing the Dane Nan Yé Dāh Kaska Guardian Program to provide eyes and ears on the land; includes training Guardians in the collection of baseline water data; bringing youth and elders together to share their knowledge.

Edda Mutter, Yukon River Inter Tribal Watershed Council (YRITWC) - This organization was formed in 1997 by concerned Tribal and First Nation members; strong focus since 2006 on the Indigenous Observation Network to gather information about water quality, quantity, how the permafrost is changing; provide support for the communities in the Yukon River basin to participate, collaborate with U.S. Geological Survey.

Kirsten Scott, Tr'ondëk Hwëch'in - TH are “people of the river”; have been working in partnership with YG on monitoring water quality in the Eagle, Ogilvie and Klondike Rivers; also monitoring permafrost layers; have a strong interest in salmon habitat restoration especially on the Klondike River.

Jillian Chown, Golden Predator (GP) - Works to build capacity in communities, including Three Aces project, Dane Nan Yé Dāh Kaska Guardian Program; for monitoring at Brewery Creek, hired Klondike H2O and spent a week on site to train young women that have now taken over; started project with LSCFN youth to monitor water quality in the Mount Nansen area at 14 sites for six months of the year.

John Ryder, YG Water Resources Branch - Works as an operations manager and leads coordination of community monitoring; look at collaborations, importance of relationships, and building trust; because everyone has limited capacity, working to get creative about water monitoring; develop networks and collaborations on long-term monitoring to look for trends at different sites.

Ellorie McKnight, U of A - Works with Kluane First Nation and DKRRC on monitoring water temperature, quality and groundwater sites in the Lhù'ààn Män area.



Participants in the community-monitoring fishbowl came from a variety of professional background and shared a diversity of experiences and insights on the subject. From L to R, Corrine Porter, Edda Mutter, Kirsten Scott, Jillian Chown, John Ryder and Ellorie McKnight.

**Q: What are the benefits of “community water monitoring for your organization?”**

Kirsten, TH - Partnerships, being involved with a formalized program; opportunity to conduct on-the-land monitoring with a holistic approach; also provides an opportunity for training, both in water monitoring and related safety training.

Jillian, GP - Connection with the youth; in recent programs, the average age was 35, now getting 18-19 year olds; many took positions in the LSCFN lands department after our Mount Nansen project.

Edda, YRITWC - Having people on the ground, larger coordinated watershed approach with a holistic view of changes to inform policy.

John, YG - Opportunities to develop more personal relationships, benefits of talking about people and not just about water quality. Being able to draw on the network of people, individuals in community we can draw on.

Ellorie, U of A - Partnerships are no longer optional, we must include communities in research. Community water monitoring is about coming up with ideas, having tea, sharing knowledge and getting to know them, connecting with people as people.

Corrinne, DKI - personal growth that broadens peoples' horizons.

**Q: What do you think are the key priorities for water monitoring right now?**

John, YG – There are insufficient resources overall, so we need collaboration on monitoring; current focus is on water quality, but also need to look at groundwater and hydrology, especially in watersheds we don't know much about. We need to do a better job of describing changes, but not enough information available to identify the causes and correlations, to illustrate trends and understand the effects of climate change.

Kirstin, TH: Impacts on fish habitat and water quality (climate change, rising temps). Unknowns around water allocation for industrial activities, particularly placer mining, compounded by the unknown of how much water there is in the system.

Edda, YRITWC: Our dataset is short, about 50-60 years, so not sure of the long-term trends; going back talking to the Elders understanding how the hydrology and land is passed through their generations, help us.

Ellorie, U of A: Understanding the greatest threats to water quantity and quality; water use and climate change, monitoring related to those things is important. Prioritizing length of the scientific data set and the information and stories that proceed that timeline.

## **Audience Questions:**

Q: *First Nations are told this time and time again that there is a lack of resources. There are multiple breaches to our land claim agreement, such as regional land use planning and water quality, quantity and rate of flow. What is happening within their departments, do they budget resources to address these agreements?*

John, YG: In regards to Ch. 14 (water), following the creation of the Yukon Water Strategy, we put significant resources to increase monitoring, start a groundwater program, and create partnerships. So I think we've done a good job in these respects - can't speak to the broader picture of land claims.

Q: *What challenges have you faced in having multi-agency partnerships? Are partners willing to participate or are there hurdles?*

Edda, YRITWC: We work with various organizations (FNs, state, federal, territorial). Some researchers perceive that citizen-scientists do not uphold research standards - we need to overcome this. Some of our methods may be different.

Ellorie, U of A: Many academic projects are short term, and from a community perspective, there are many new projects and questions; whether the questions align with First Nations' priorities; people are getting tired of being asked the same questions, especially Elders.

Edda, YRITWC: People feel overwhelmed and wonder where the data is going and if there is no benefit for them. We need accessibility to the results, more report-backs including who's doing what in various communities.

Kirsten, TH: Community burnout answering questions or being asked to participate in activities.

Jillian, GP: Industry needs to do more to contract and hire community water monitors as permanent features on their project; continuous capacity and training to handle turnover. Knowledge can also be used on other community projects.

John, YG: Good example is the groundwater monitoring collaboration with KFN - we have a simple agreement with them to say if we're going out, we'll invite them with us and we'll cover their costs. Keeping it simple to work on common goals - doesn't

need to be complicated. The program is built from the ground-up: makes it easier to defend the program.

## 8. WATER HEALTH CAFÉ BREAKOUTS

This session began with a keynote presentation on microplastics in the Yukon River, and then moved into breakout tables that addressed a broad range of topics on water health. The keynote and table topics are summarized below, along with key discussion points and questions raised.

### Keynote: Microplastics in the Yukon River

Bruce Porter, a grade 9 student at FH Collins, presented the results of his 2018 research on microplastics in Whitehorse area water. This is the first such research in the Yukon, and so provides important baseline data.

Bruce drew water samples from four sites along the Yukon River, as well as snow samples, tap water samples, and atmospheric deposition samples. For river samples, he also measured the water flow rate and speed at each site in order to assess whether that could affect the volume of microplastics.

River and Wastewater	Snow	Tap Water	Atmosphere
<ul style="list-style-type: none"><li>• 500L sampled at 4 locations along the Yukon River and in wastewater before discharge into the river.</li><li>• Microplastic found at all locations, majority of the particles originating from synthetic clothing.</li><li>• Largest amounts were found before the City in the river and in treated wastewater.</li><li>• Sampling took place in the fall.</li></ul>	<ul style="list-style-type: none"><li>• 10L of snow collected at 3 sites around Whitehorse.</li><li>• Microplastics found at all locations and numbers were up to 95 particles</li><li>• Samples taken before flowing into the storm drains in spring.</li></ul>	<ul style="list-style-type: none"><li>• 650L of tap water collected from one household.</li><li>• Microplastics in tap water from one faucet showed higher amounts than the river and wastewater samples.</li></ul>	<ul style="list-style-type: none"><li>• 4 sample collectors were set in indoor locations for a week and an outdoor location for a day.</li><li>• Microplastics found in all samples. Highest levels in a living room.</li></ul>

**Over 600 million microplastic fibres flow past the City everyday, that's 7 microplastics per second. It adds up.**

General conclusions from the research:

- River samples contained between 12-19 microplastics per 500L sample; concentrations were higher from the two sites with lower water velocity, and the highest concentration was from the site near Marsh Lake
- Snow samples that had been on the ground for 6 months contained more microplastics (9.5 microplastics/10L) than snow deposited within the last 15 hrs (0.9 microplastics/10L)
- Three tap water samples contained an average of 0.05 microplastics/L

- Atmospheric deposition samples from a residence varied between about 4 particles/day for a living room and basement, and 7 particles/day for a backyard sample
- 92% of microplastics discovered were fibres from clothing

Q: What are the health impacts of consuming microplastics?

A: Limited research available, but some issues with abrasion, and with releasing chemicals that have been absorbed by plastics.

Looking ahead, Bruce emphasized the need for public education to help reduce the frequency of microplastics in our water systems and sources. Filters on dryers can help reduce the amount emitted from clothing, as can more use of natural fibers. Reducing single-use plastics, which account for 40% of consumer plastics, can also help.

## Relationships with Water

Colleen James of C/TFN and Elders Jean Desmarais and Annie Auston hosted this table to talk more about the spiritual connections among people, water and the land. Colleen talked about how clan relationships and protocols guide Tagish and Tlingit people in how they behave towards each other and the land. For example, if there was an offence committed by one clan to another, it might be rectified by offering the rights to use a particular place or waterbody, so that waterbody becomes at.oow (clan ownership).

### Key Discussion Points:

- Tu/Heen is a teacher and has memory, metaphorically and literally
- Acknowledge both life-giving and potentially violent force of water
- Packing water for others is a privilege
- When thinking about water governance, what is respect, and what is reading and talking to Heen?
- Colonialism has brought different practices towards water - licensing, destructive uses, effects on cultural practices

## Mackenzie DataStream

Carolyn DuBois of The Gordon Foundation hosted a table about Mackenzie DataStream. Mackenzie DataStream is an open access platform for sharing information on freshwater health that was built by The Gordon Foundation in partnership with the Government of the Northwest Territories. It currently allows users to access, visualize,

and download full water quality datasets collected by over 30 communities in the Mackenzie River Basin.

### Key Discussion Points:

- Provides a neutral bucket for sharing data
- Data reflects community questions and concerns
- Must have an intentional water monitoring program in order to contribute
- The platform does not do quality assurance/quality control; users are expected to do their own quality assurance/quality control prior to contributing data and also provide metadata on their methods
- Currently operating in the Mackenzie Basin, Atlantic Canada and the Lake Winnipeg Basin. Potential for expansion to other water basins

## Salmon Migration and Spawning Habitat

Al von Finster, independent consultant and formerly of the Department of Fisheries and Oceans, hosted a breakout table on this topic. This includes results and observations about water temperatures and overall salmon spawning patterns from projects he has been involved with.

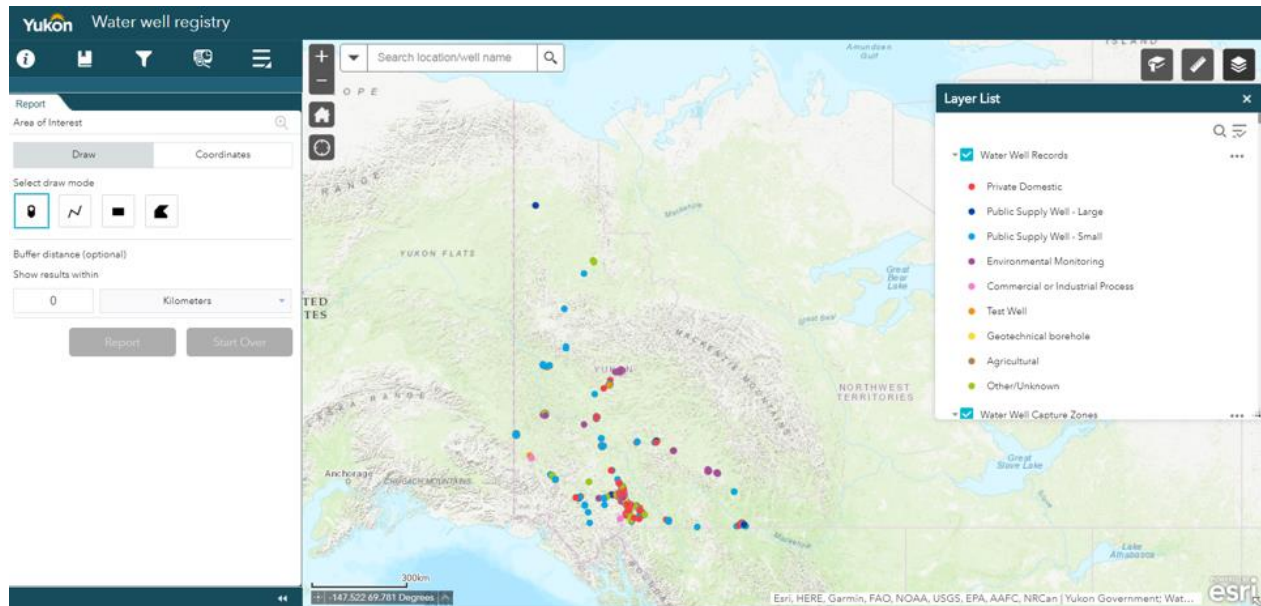
### Stand-Out Points:

- Water temperatures must be monitored for a long period to allow trends to be determined. The time of day affects water temperatures (coldest in mid-morning), as does proximity to tributaries
- Chinook salmon need 1000 degree days for emergence, but some spawning streams do not achieve this: implies adaptation on the part of Yukon R. Chinook Salmon
- Occurrence of parasites increased in the last warm water period in the late 1990s and early 2000s
- Overall, the number of Yukon River Chinook Salmon declined rapidly in late 1990s and has not rebuilt since then



## Groundwater Well Registry & Network

Brendan Mulligan of YG WRB explained that the [Yukon Water Well Registry web mapping application](#) allows users to search for water well records across the territory. The registry represents the best-known information available, but is not an exhaustive list of wells in Yukon. It currently includes records for nearly 2,000 wells including private domestic wells, public supply wells, environmental monitoring wells, commercial or industrial process wells, test wells, agricultural wells, and geotechnical boreholes.



## Co-Monitoring of Water Resources

Kelli Bergh of BMC Minerals and Jody Inkster of Dena Cho Environmental and Remediation talked about their partnership around the proposed Kudz Ze Kayah mine project. This is part of an effort to ensure that citizens and staff of Ross River Dena Council (who owns Dena Cho) are involved in discussions about the proposed mine, and are aware of information and data about environmental quality of the project area. Dena Cho has helped facilitate community involvement in the review of the project, and in developing a community-based environmental monitoring program

### Key Discussion Points:

- How to broadcast more of the great work being done?
- Important to include all generations in the planning and discussions
- Important to build in feedback mechanisms
- Important to be involved in the community beyond the project level

## Threshold Approach to Managing Ecosystem Impacts

Chrystal Mantyka-Pringle of the Wildlife Conservation Society Canada talked about the potential for a threshold approach to help buffer cumulative effects on ecosystems. An innovative approach called [Etuaptmumk \(Mi'kmaw for "two-eyed seeing"\)](#) is being used by the Institute for Integrative Science & Health, and could help to develop indicators based on both science and traditional knowledge to try to establish thresholds.

### Key Discussion Points:

- Traditional knowledge and thresholds are not mutually exclusive
- There are many unknowns about cumulative effects, including combined small projects
- Need data and innovative research about effects; thresholds are difficult to see on the land.
- Different thresholds for different values - caribou/moose habitat, fish and aquatic habitat, etc.

## Taking Care of Your Drinking Water System

Alison Anderson of Yukon College discussed this online course developed in partnership with YG Environmental Health Services, stemming from the Yukon Water Strategy: [WO CE60 - Taking Care of Your Drinking Water System for Decision Makers](#)

### Key Discussion Points:

- Free bacteriological testing is available to the public at YG Environmental Health Services.
- Household drinking water storage tanks should be cleaned at least once per year using an approved method.
- Chlorine residual dissipates over time in tanks. Chlorine residual is used to safely deactivate bacteria resulting from dirty tanks or other sources. If water sits for extended periods in household storage tanks, there is no chlorine residual left to deactivate bacteria.
- Trihalomethanes (THMs) are a by-product which can occur when chlorine reacts with organics in drinking water systems. THMs and other by-products can be a concern for surface water but are not a concern for ground water because ground water does not contain organics. Water systems in Yukon test regularly for THMs and other by-products to ensure there are no health concerns. By-products can be avoided by removing organics from water prior to chlorination. The health impacts of THMs and other by-products are much less serious than

the health impacts of bacteria, and the risk of by-products being present in Yukon drinking water is low, so chlorination is a good thing.

- Water tastes differently from the tank than from the creek; C/TFN citizens have been drinking creek water for years.

## 9. CLOSING CEREMONY

Harold Gatensby addressed the group in order to close the ceremony. The urn containing the mixture of water was placed in the middle of the room. All participants stood in a circle, with hands connected and shared one word each for the water to take with it. Harold explained that the water had received our “word” as a positive intention.

Director of YG’s WRB, Heather Jirousek, was asked to take a small vessel of water to keep the water safe for the next Forum. This will then be brought forward with all participant’s positive intentions and used in the next water ceremony.

Harold had drilled a hole in the ice on the lake for the purpose of putting the water back in the lake. Harold asked for some strong young people to carry it to the lake. He stated that we have put our hearts into this water, which will pass through 100 villages and communities, up to 2300 miles from here. Every one of these communities will benefit from our intentions, when we put our prayers into the water. Harold told everyone that it will get to the ocean immediately and we are all instantaneously connected.

The two youth, Suezanna James from C/TFN and Bruce Porter from Whitehorse, carried the water to the lake. Participants were asked to share any additional messages and to shout out a *kiyiii!* as the water was presented to the lake.



## APPENDIX A – List of Participants

Note – based on sign-in sheets at the event; some participants may not have signed in

Organization	Name
<b>Governments – First Nation, Municipal, Territorial, Federal</b>	
Carcross/Tagish First Nation	Coralee Johns
	Daisy Gatensby
	Dominic Smith-Johns
	Eleanor Hayman
	George Shepherd
	Harold Gatensby
	Ida Calemagne
	James Kawchuck
	Margaret Hueberschweren
	Nicole Wilson
	Norman James
	Tami Grantham
	Susana James
Tanisha Lowbain	
Council of Yukon First Nations	Ed Schultz
Canada - Environment & Climate Change	Alison Van Hinte
	Scott Palfreyman
Canada – Fisheries and Oceans	Jeska Gagnon
Canada - Indigenous & Northern Affairs	Andrea Morgan
	Chris Potvin
City of Whitehorse	Arcadio Rodriguez
	Geoff Quinsey
Daylu Dena Council	Lisa Shepherd
Kluane First Nation	Rachael Thom
South Klondike Local Advisory Council	Collen James
Ta'an Kwäch'än Council	Denise Gordon
	Natalie Leclerc
	Nick Howitt
Teslin Tlingit Council	Hannah Turner
	John Martychuck
Tr'ondëk Hwëch'in	Adam Thom
	Kirsten Scott
Yukon Community Services	Chris Evans
Yukon Energy Mines and Resources	Cathy Merkel
	John Miller
	Juanita Power

<b>Organization</b>	<b>Name</b>
	Lawrence Ignace
Yukon Environment	Martin Heynen
	Nicole Goldring
	Ryan Davis
Yukon Health & Social Services	Craig Van Lankveld
	Nadine Nicholson
Yukon Dept. of Justice	Carmen Gustafson
Government of Yukon, Water Resources Branch	Amelie Janin
	Benoit Turcotte
	Brendan Mulligan
	Emma Seward
	Heather Jirousek
	John Ryder
	Nicole Novodvorsky
	Trevor Hanna
<b>Boards and Committees</b>	
Dän Keyi Renewable Resources Council	Pauly Sias
Mackenzie River Basin Board	Corrine Porter
Yukon Environmental and Socio-Economic Assessment Board	Carlene Hajash
	Martin Haefele
Yukon Fish and Wildlife Management Board	Graham Van Tighem
	Steven Hossack
Yukon Salmon Sub-Committee	James MacDonald
<b>Non-Government Organizations</b>	
The Gordon Foundation	Carolyn DuBois
Wildlife Conservation Society of Canada	Chrystal Mantyka-Pringle
Yukon Conservation Society	Lewis Rifkind
Yukon River Intertribal Watershed Council	Edda Mutter
<b>Academic Institutions</b>	
FH Collins Secondary School	Bruce Porter
McMaster University	David Barrett
	Tyler DeJong
University of Alberta	Ellorie McKnight
Yukon Research Centre	Brian Horton
	Spencer Sumanik
<b>Industry and Consulting Agencies</b>	
Alexco Environmental Group	Kai Woloshyn

<b>Organization</b>	<b>Name</b>
BMC Minerals	Kelli Bergh
Core Geoscience	Catherine Henry
	Eri Boye
AvF Consulting	Al Von Finster
Dena Cho Resources Environmental and Remediation	Jody Inkster
Environmental Dynamics Inc.	Alexandre Mischler
Golden Predator Mining Corp.	Jillian Chown
Golder	Tamara Reynolds
Hemmera	Kristen Range
Laberge Environmental Consulting	Ken Nordin
Sustaineo Blue Consulting	Kevin Rumsey
Waterlution	Olivia Allen
WSP-Opus	Virginia Sarrazin
Yukon Energy Corporation	Travis Ritchie

## APPENDIX B – Participant Input on Water Governance

### Connections and Relationships

- Water brings us all together and binds all living beings
- Water ceremony
- Harold's words about how we are all connected by water, all related by water
- We are gathering in new ways
- Listening to nature, seasonal rounds
- We can't own water
- No YG mining rep in attendance (Note: EMR staff did participate)
- Family, people will make change - not the job titles
- Need for more community-based water source education and involvement with water mgmt.
- Relationships, community
- Colleen (James)' passion
- Chapter 14 water committee
- Learning more about Chapter 14 and putting into practice, including the Schedule A for the Yukon River headwaters
- Learn more about Yukon River Watershed Mgmt. Working Group

### Diverse Perspectives

- Difference in presentations and how Government and First Nations approach water governance
- Two presentations with two different points of view (YG and C/TFN)
- Difference in presentations and how YG and FNs approach the topic of water governance
- Learn more about match/overlap of Indigenous water law and gov't programs/projects
- How can the two views (scientific and traditional/relationship-based) inform and complement one and other?
- Despite our differences, we need to come together to find the right solutions
- Approach strategies and how to integrate both and water mgmt.
- Positive perspective in challenging times

## Knowledge and Information

- Need to listen to science and TK
- More connecting data and info to knowledge and action
- How does the strategy bring in and disseminate traditional knowledge?
- How to apply traditional knowledge to water mgmt.?
- How to better find/gather groundwater information
- How has TK been included in YG mgmt tools and documentation?
- Impacts of climate change
- Data sharing platforms to bring stakeholders together
- Place names related to water, history of places
- Learn more about water well registry and how to use it
- What works and what doesn't for community water monitoring? Best practices, standardized equipment and data,

## Action for Water Stewardship

- Initiatives in groundwater protection and understanding
- What happens if we have to reserve water? Is there plans to re-use grey water?
- Does Monsanto or Coke have any rights to Yukon water?
- Worried about water being run through pipelines to places like California that are desperate for water
- Where does the path of sustainability begin?
- How does the climate change strategy impact water when developing renewable energy sources?
- Contaminated sites
- Priority 3 on sustainable use of water - ongoing work only talks about wetlands and mining! What can we all do on a day-to-day basis?
- Will there ever be a permit requirement to drill wells?
- I'd like to know more about how we are promoting sustainable use of water
- Permafrost
- Climate change planning, mapping, protection of wetlands, riparian zones
- Eliminate plastics in water → fish → plants → animals → rain → food

- Preserve traditional food sources: return the salmon, reduce dam fluctuation of water levels
- More info about the goals/use of new upcoming groundwater info network
- Need to know more about community based monitoring
- Don't want our water to go outside of the Yukon; only flow from Bennett Lake to Bering Sea (i.e. no water exports)
- Mining tailings ponds - is there a plan in place for green mining?
- Look along Alaska Hwy for contaminated sites left behind from construction and army; check along Canol Road to old pipeline sites

## APPENDIX 3 – Participants' Observations About Water

### **Natural environment, fish and wildlife:**

- Warmer water everywhere
- Glaciers and waterfalls disappearing
- Warmer winter and spring
- More snow intense huge snowfall/melting
- Animals disappearing: birds, frogs, fish, bats, mosquitoes, bees
- In August 2019, I paddled the Beaver River near Mayo. Water levels in that watershed were way down.
- No berries =unpredictable
- Chum salmon are staying in Kluane Lake longer (15-20cm Chum were discovered in the belly of a trout in 2019)
- Slims River re-routed impact on wildlife
- Change in snow cover
- Timing of low and high flows unpredictable
- Dry forests, dry wetlands
- More wind, rain in August
- Hot, humid, temps = glacier melt = fluctuating water levels
- Asek = less/no water in the rivers
- Land sluffing for permafrost melt
- Forest fires = land sluffing
- More willows growing on Delta with low water levels
- More mud flats appear
- Weed beds change from low water levels
- Thunder shows up later
- Water and lakes freezing later
- More rain events in winter months - impacts to freeze up
- More freezing of culverts
- Global warming affecting waterfowl migration
- Less snow in the spring
- Used to be colder (-40 degrees) when we were kids

- More rain in the summer and winter
- Salmon runs are late due to high temperature and low dissolved oxygen and low water
- Changes to the trees, they are dry on top
- Montana Mountain used to have snow year-round, now it is all gone
- Trees are getting smaller
- Low water when river freezes, beaver are freezing out
- Warmer water for spawning salmon
- More humidity and wind
- More freeze/thaw cycles
- Change in permafrost causes changes in aquifer movements, peak flow later and lower, groundwater storage larger
- Changes in wind. Windstorms more common. No word for “Chinook”. Does it means there were no “Chinooks in the past”
- Precipitation levels more scattered and unpredictable
- Headwaters are disappearing
- Water too warm for fish. Pike and Lake Trout
- Lower water levels on Bennett and Nares
- High winds, really cloudy days
- Caribou are going to different places
- Fish are at different places because of water levels
- Gardening burn up, too hot for plants
- More snow in Dawson and the north.
- More midwinter melting
- Increased humidity
- Permafrost lost
- River/Lake drought
- More overflow in new areas, its affecting wildlife i.e. wolves using overflow to hunt moose
- at 5 years old I could build Igloos, now no more snow
- More rain events in the winter months, impacts to freeze up
- Water opening earlier
- Haunka Creek dried up and round-fish used to be there

### **Human interactions with the landscape:**

- Very low snow fall harder for people to trap; Trappers are having economical problems
- Frost coming out of the ground, slippery roads with black ice
- River unsafe to travel
- Colder spring for kiting/paragliding
- Ice availability on lakes and rivers is changing and affecting winter traveling and winter safety
- Very low water in rivers, which impacts moose hunting
- Rain in the winter is impacting fur harvest for Marten
- Fewer powder days for skiing
- Yukon Quest/Yukon River needs to change dates of the event due to weather

### **Human response to changes:**

- Burning less heating fuel in the winter
- Muskrat camp was cancelled because the ice was too thin
- More people caring about climate change
- More people, more cars, more garbage, more solid waste
- Less awareness about safe drinking water
- Ice road truckers having less work because of warmer temperatures
- More jet boat usage compared to propeller powered watercraft
- Old folks won't drink safe-treated water and still get it off the land
- Lots of boats on the Southern Lakes, because of trout closures on other lakes "canary in the coalmine"

# APPENDIX 4 – YG Guidelines for Adaptive Management Plans

## GUIDELINES FOR DEVELOPING ADAPTIVE MANAGEMENT PLANS IN YUKON

### WATER RELATED COMPONENTS OF QUARTZ MINING PROJECTS

This guide provides technical guidance on the approaches and process of developing an Adaptive Management Plans (AMPs) for water-related components of quartz mining projects in Yukon. Specifically, the Guide describes components of an AMP, and supports proponents in developing various responses to different to changes in water quality and quantity.

**There are three types of AMPs outlined in this guide:**

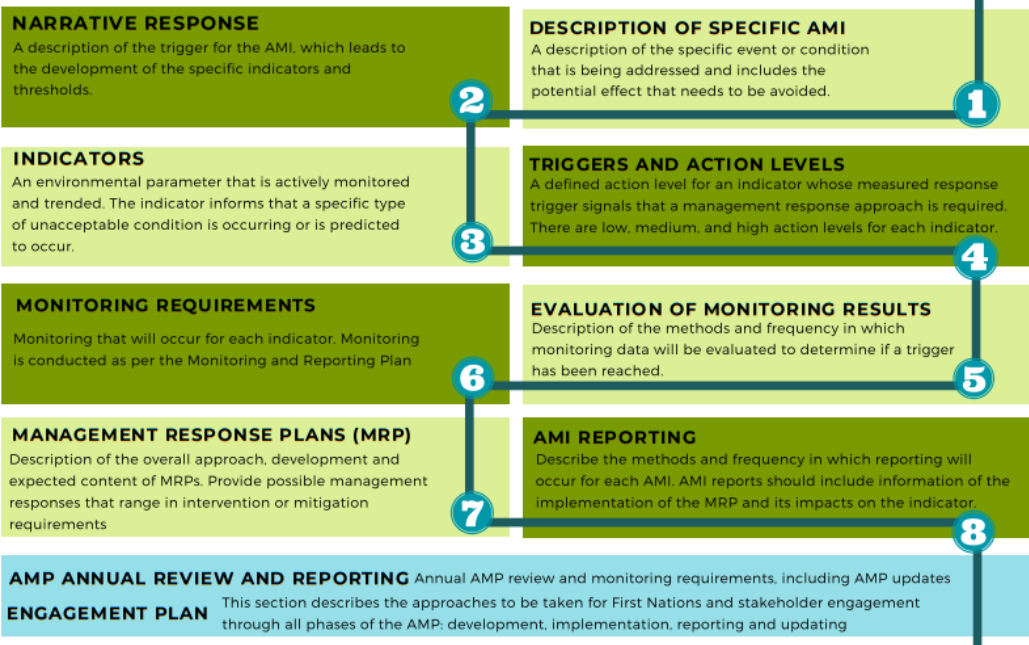


It is recommended that proponents develop all three. Comprehensive AMPs are the most rigorous, with many necessary components. Key components include:

#### Required components:

- PROJECT CONTEXT** An overview of the mine site, environmental monitoring program, and regulatory context.
- AMP OBJECTIVES AND SCOPE** A description of the AMP goals, objectives, and approach that includes outlining the plan's adaptive management initiatives (AMIs).
- LIST OF ADAPTIVE MANAGEMENT INITIATIVES** The AMP should have a list of the individual AMIs that are covered in the AMP. Each individual AMI should then be detailed with the following elements:

#### Adaptive Management Initiatives



**AMP ANNUAL REVIEW AND REPORTING** Annual AMP review and monitoring requirements, including AMP updates

**ENGAGEMENT PLAN** This section describes the approaches to be taken for First Nations and stakeholder engagement through all phases of the AMP, development, implementation, reporting and updating

**Ongoing updates as more information is gathered**