Water Knowledge Camps: Building Capacity for Cross-Cultural Water Knowledge, Research, and Environmental Monitoring

Report for the Water Knowledge Camp held at Sahtú Dǝ (Great Bear River) at Tek'áícho Dǝ (Marten River) Tulít'a, NT. August 19 - 26, 2019

Prepared for the ʔehdzo Got'ı̨nę Gots'ę́ Nákedı
(Sahtú Renewable Resources Board)

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Table of Contents

Executive Summary

The purpose of the water camps are to:

1) Build cross-cultural understanding of water and environmental knowledge, risk perception and healthy water consumption practices.
2) Respect, support and protect traditional knowledge processes.
3) Support regional and regulatory decision-making based on evidence from science and traditional knowledge.
4) Identify opportunities for collaborative research and monitoring, communication, and cross-cultural interpretation of research results.
5) Build local capacity in the Sahtú to collaborate in, coordinate and lead research through the co-development of a water and environmental monitoring network.

The overarching goal of the camp was to create an environment where experiential on-the-land learning helped to facilitate co-production of knowledge grounded in the traditional knowledge and experiences of community members.

Community members, researchers, and partners want to better integrate current and planned research initiatives, identify research and capacity needs, and support new and innovative research to address these concerns in the Sahtú. The Water Knowledge Camps are a step towards these goals.

Research activities at the camp included:

- Talking circles including terminology and language education
- Focus groups on drinking water, environmental monitoring, climate change, and youth leadership to share concerns and to determine priority areas and interest in future research and monitoring programs
- Water sampling using citizen science kit
- Insects sampling demonstration
- Water monitoring and data collection presentation/workshop by the Department of Environment and Natural Resources (ENR)
- Mapping activity
- Tree coring activity
- Presentation of a water purification system (use and benefits)

On-the-land activities at the camp included:

- Fishing and dry fish making, both Lake Trout and Grayling
- Hunting for moose and dressing moose ribs
- Harvesting and preparing porcupine
- Berry picking
- Collecting spruce boughs
- Collecting Labrador Tea plants
- Hiking
- Constructing and de-constructing canvas tents
- Collecting and cutting firewood

Introduction

Cross-Cultural Water Knowledge Camp

The first of three Cross-Cultural Water Knowledge Camps, held at Sahtú Dé (Great Bear River) at Tek'áícho Dé (Marten River) from August 19-26, 2019, was an opportunity for Dene people of the Sahtú and academic researchers to come together on the land to share knowledge about water, climate change, and environmental monitoring. Two additional camps are planned for the summers of 2020 and 2021 and will be held in different regions of the Sahtú. The 2020 camp is planned for Fort Good Hope and 2021 camp on Great Bear Lake with the UNSECO Tsá Tué Biosphere Reserve.

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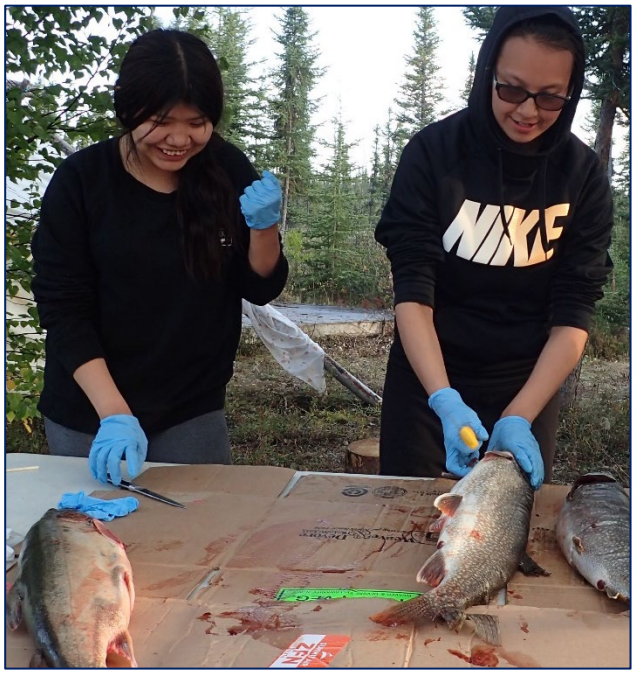
The collaborative nature of the camp's activities were designed to add value to the research and to encourage open discussion and knowledge sharing between community members and researchers.



Left to right: Natalie Etchinelle and Rosanne Taneton preparing Lake Trout

"We are here at this camp to teach the young people the importance of water and to teach them about the science of water. Not only from new visitors from the south, researchers and scientists, but we also talk to them about traditional knowledge, about Dene knowledge, what our ancestors and our prophets have predicted. So, we are combining the two."
- Michael Neyelle, Délı̨nę

The camp's design was patterned on the Cross-Cultural Research Camp model for co-production of knowledge that is established in the Sahtú. The model aims to provide interactive experiences from on-the-land practices and dialogue with traditional knowledge holders combined with science-based research and monitoring techniques and methods. Previous cross-cultural camps in the Sahtú include the 2014 At Home on the Land camp held at Taalé Túé (Stewart Lake), the Building Environmental Leadership Cross-Cultural

Research Camp in July 2015 at the Sans Sault area on the Mackenzie River, and Délı̨nę̨'s Cross-Cultural Research Camp in August 2016.

Funding for this year's camp was provided mainly by Global Water Futures (GWF). The project's partners provided additional financial support, including Wilfrid Laurier University, University of Waterloo, the Nę K'ə Dene Ts'ı̨lı̨ - Living on the Land Forum, the Ɂehdzo Got'ı̨nę Gots'ę́t Nákedı (Sahtú Renewable Resources Board [SRRB]), Fort Good Hope, Tulít'a and Norman Wells Renewable Resources Councils, and the Government of the Northwest Territories (GWNT).

"The Board's strategy included decolonizing, Dene Ts'ı̨lı̨, the other side of the same coin, also on-the-land orientation, so centred on the land as much as possible...we also have youth centred…those are key elements of the Board's strategy. Oh, and community-driven conservation planning. That's the approach."
- Deborah Simmons, Tulít'a

This report aims to share the perspectives of the camp's participants. To do this, quotes and photographs of camp participants are used throughout. These words and images were captured throughout the camp with an audio-recorder and photographs were taken by the camp's lead photographer, Kyanna Lennie-Dolphus. Similar to previous camps, the act of audio-recording became second nature, and all camp participants used the recorder as a type of talking-stick. The recorder symbolized the need for respect as each person was awarded the full attention of the group by having the recorder. The inclusion

Michael Neyelle, Délı̨nę̨

of images and quotes from the camp's participants aims to follow the respectful atmosphere of the camp and to place emphasis and value on the importance of peoples' voices.

"It helps us at meetings like this to record people, so that people can hear you later on maybe in the future, maybe after we're gone. Our voice will be there because of this. That story is so beautiful and it's recording. Like yesterday, it was just beautiful. I would love to share that with young people and youth. That's why recording is so important. Not only that, it keeps us on track to make sure what people say is correct, so we can write it down correctly."
- Michael Neyelle, Délı̨nę̨

Background and Context

"My Elders always said, water is life. It's what makes everything go around. Due to climate change I have a feeling that the water is not the same anymore. Our mountain glaciers are melting a bit and faster than one would think. We know the river and lakes have warmed up at least 2 percent. That's a concern. So, we have some challenges ahead of us. That's what I think."
- Leon Andrew, Le Gohlini (Norman

The Mackenzie River Basin is Canada's largest river basin with a drainage area one-fifth the landmass of Canada (1.8 million km^2) (GNWT, 2010). Dene and Métis communities in the Sahtú rely on these waters for their public water supply, for travel within the region, for recreation, and subsistence harvesting of wildlife, fish, and plants. Importantly, these waters are also home to numerous cultural, historical, and sacred sites (Sahtú Land Use and Planning Board [SLUPB], 2010). Sahtú Dene and Métis have come to know their waters and lands through the teachings and oral stories of their ancestors and this traditional ecological knowledge continues to be passed down to youth from Elders (SLUPB, 2010). For the Peoples of the Sahtú, their relationship with the landscape continues to evolve over time and is deeply impacted by climate change and industrial development.

Tek'áicho Dé (Marten River)

Bear Rock (Pətęnį ʔa), Tulít'a

"Water is alive, he [David] says. We can't take anything away from the water that we have. You must respect the water. You must pay it and ask the water, just like feeding the fire, to take care of you. The land is the same."
– David Etchinelle, Tulít'a,
translated by Michael Neyelle, Délı̨nę

Recognizing the importance and significance of freshwater within the NWT, the GNWT implemented the territorial Water Stewardship Strategy in 2010.

"The goals of the Strategy are to assure:

- Waters that flow into, within or through the NWT are substantially unaltered in quality, quantity and rates of flow.
- Residents have access to safe, clean and plentiful drinking water at all times.
- Aquatic ecosystems are healthy and diverse.
- Residents can reply on their water to sustain their communities and economies.
- Residents are involved in and knowledgeable about water stewardship.
- All those making water stewardship decisions work together to communicate and share information." (GWNT, 2010)

Stewardship and reliance on the integration of traditional and local knowledge and western scientific knowledge are at the heart of the Strategy and are used to guide decision-making (GNWT, 2010). As a lead partner, the Ɂehdzo Got'ı̨nę Gots'ę́ Nákedı (SRRB) plays an essential role in the implementation of the Strategy's action plan to establish traditional knowledge research guidelines across the Sahtú (GNWT, 2016).

In response to concerns over water quality and the expansion of the shale oil and gas play in the Tulít'a District as well as increased research and environmental monitoring programs in the Sahtú, the SRRB established the Nę K'ə Dene Ts'ı̨lı̨ - Living on the Land Forum (formerly known as the Sahtú Environmental Research and Monitoring Forum). The Nę K'ə Dene Ts'ı̨lı̨ aims to "support environmental research and monitoring by providing a venue for discussing plans and accommodating the priorities of and traditional knowledge of Sahtú communities" (SRRB, 2016). In pursuit of this goal, the Board supports youth leadership and to work in collaboration with the Sahtú Dene Council in developing the Nę K'ə́dí Ke (Keepers of the Land Network).

"The Sahtú Dene Council has sponsored the Nę Kə́dıkə program; the keepers of the land guardian program. There are three years of funding for that too. So, there is going to be three years of activities, at minimum, to help build a long-term program for guardianship in all the communities of the Sahtú."
- Deborah Simmons, Tulít'a,

Délı̨nę's Nę K'ə́dí Ke is one of three Indigenous Guardians Pilot Programs in the NWT (Environment and Climate Change Canada, 2019). Currently, across Canada, there are 33 Indigenous Guardian Programs funded by the Indigenous Guardians Pilot Program.
Guardian programs are unique to each community's needs, but they all share the common goal of protecting their community's cultural and ecological values to improve community well-being.

Sahtú Də́ (Great Bear River)

Guardians are the "moccasins and mukluks" of the community and act to monitor, steward, and conserve the lands and waters by integrating local and traditional knowledge (Courtois, 2019). By establishing relationships and partnerships with local resources boards, governments, industry leaders, and academic institutions, Guardian Programs help to influence land management plans and increase the decision-making capacity of communities (TNC Canada, 2016). The first Guardian program in Canada began in Haida Gwaii in 1973 and the word 'Guardian' comes from an Innu word, *Minashkuat Kanakutuataku*, meaning "to care for and to watch over" (Kakfwi, Courtois, & Enzoe, 2018).

Stephen Kakfwi, senior advisor with the Indigenous Leadership Initiative and former Premier of the NWT and Dene Nation President, says that Guardian programs will "give our Indigenous governments, our nations, the ability to have our people, our Elders, working with youth to not only reconnect with the land but to watch over it using the latest technologies as well as the traditional knowledge of our people. To know this land the way we should have done for the last thousands of years." (Kakfwi et al., 2018).

The Cross-Cultural Water Knowledge Camp was designed in collaboration with the Nę K'ə Dene Ts'įlį - Living on the Land Forum and the Ɂehdzo Got'įnę Gots'ę́t Nákedı (Sahtú Renewable Resources Board), which includes representatives from each of the five Sahtú communities, including youth.

Communities throughout the Sahtú are particularly interested in the health of their waters. As part of Nę K'ə Dene Ts'įlį, communities throughout the Sahtú have expressed concerns about the cumulative impacts of development and climate change on the quality and quantity of the waters in the region and consequent risks to human and ecosystem health. Some of these concerns are related to mining and other industrial developments in the region and beyond, including Port Radium on the eastern shore of Great Bear Lake and oil and gas development in Norman Wells, long-range transport of contaminants, and downstream effects of oil sands development in Alberta. More recently, the impacts that climate change play, which include increased frequency of forest fires, changes to hydrological regimes and landscape changes due to permafrost thaw, as well as the potential for the development of the Canol shale oil and gas, are adding to these concerns.

Community members and local and southern researchers need to engage in these discussions to support wise decision-making in a culturally and socially respectful manner. Community members, researchers, and partners want to integrate current and planned research initiatives better, identify research and capacity needs, and support new and innovative research to address these concerns in the Sahtú. The Cross-Cultural Water Knowledge Camp are a step towards these goals.

Lex Scully, Tulít'a

"One of the things I worry about is there is supposed to be meaningful community consultation before these projects go forward. For me, what that means is there needs to be workshops and education clinics about what is involved in these projects, so that community members with whatever level of education they have, can understand what is going to be done to the land, what kind of remediation is possible and what is never going to be fixed. That education cannot come from the mines and the fracking companies. That education needs to be from an independent body. Again, it's something I care about so much. There is no meaningful consultation without shared understanding. This is something we know from the treaties. So, this is super important that there be these workshops and education opportunities, so that everybody understand what's being asked and the potential of what's going to be done in the communities."
- Lex Scully, Tulít'a

Objectives and Methodology

The objectives of the Water Knowledge Camps are to:

1. Promote knowledge sharing between researchers and communities in the Sahtú.
2. Hold focus groups with community partners to enhance effective communication of water-related research results to communities.
3. Establish new baseline water quality and environmental research monitoring sites and work with communities and partners build a water quality and environmental monitoring framework for the region.

Research methods include talking circle discussions and focus groups (Objectives 1 and 2), and baseline sampling and monitoring for water quality and other environmental ecosystem research areas.

"[David] says he's really thankful for being here at Tek'áícho Dé for the work that we're doing to work with water, to do research on water... he says when he came here, it felt really good to come here and see all these tents here, to see it. It's just like the old days… when the Dene people travelled around the mountains, it was just like that, you would see tents and dogs… just like the way we are doing right now."
- David Etchinelle, Tulít'a,
translated by Michael Neyelle, Délı̨nę

Overview of Participants

Community members from Tulít'a were invited to participate in the camp (see Appendix B for list of participants) as well as key individuals from Délı̨nę, Radilih Koe (Fort Good Hope) and Gohlini (Norman Wells). Elders, youth, men, women, and children were all welcome to participate. The goal was to have 20 participants from the Sahtú.

A research team comprised of eight academics from three Canadian universities, including the Universities of Waterloo, Wilfrid Laurier, and Guelph were also invited to participate. A ratio 1:1:2 was expected for the support staff (e.g., cooks, camp attendants, facilitators, translators) academic researchers, and community members. Recruitment of the participants was through direct invitations, word-of-mouth, and posters which were distributed in the communities. Each participant received an honorarium for their time commitment. The costs of attending the camp were covered, including for food and transport to and from the campsite. People at the camp were invited to provide oral consent to participate in the camp; consent forms asked whether participants approved having their photographs, video, and audio recorded, and their quotes associated with their names to be included in reports and research-related documents.

Left to right: Kyanna Lennie-Dolphus, Isaiah Takazo, Dawson Menacho, Brenden Takazo, Rosanne Taneton, Archie Erigaktuk, Lex Scully, Walter Behza, David Etchinelle, Richard Andrew

The Setting

Sahtú Dǝ́ (Great Bear River) at Tek'áicho Dǝ́ (Marten River)

The camp site was chosen because it is an important site for the community members, particularly those from Tulít'a and Délı̨nę. Notably, Sahtú Dǝ́ is a primary source of Tulít'a's drinking water. The site had been used previously for camps but had not been used for some time. There was a significant number of repairs and clean-up needed to make the site useable again. Prior to the camp, the Tulít'a Land and Financial Corp had requested that the site be restored and maintained so that it could be used for future on-the-land purposes and events. Since the camp, the land has been used for educational purposes by community members from Tulít'a. The site provided excellent opportunities for harvesting, water monitoring and sampling, had a large communal space that facilitated group discussions, and could support a large number of people.

"This is what we wanted to start way back with the band. Carl was the band manager when they put up this little camp here, this little shack. You see the cut out in the back there? That was to put a big arbour in there, so we don't sit when we're dancing. On the inside, that's where the tents were going to be set up in the clearing outside in a circle. That was the plan at that time, but our plan didn't work. We are coming back to the plan now, so that's good."
- Chief Frank Andrew, Tulít'a

Under the Sahtú Land Use Plan, Sahtú Dǝ́ (Great Bear River) is designated as a heritage site and is considered a Special Management Zone (SMZ 33) (SLUPB, 2013), meaning that the land is considered an "economic engine" (p.28) and is capable of being used for economic growth and sustainable development; however, special consideration is given for the conservation of cultural and ecological values for the land, including archaeological and burial grounds. The Sahtú Land Use Plan (SLUPB, 2013) states that Sahtú Dǝ́ is important to the people of the Sahtú because Great Bear River is essential for travel between the Mackenzie River and Great Bear Lake, is traditionally used for subsistence harvesting of mammals (e.g., moose and woodland caribou), furbearers (e.g., marten, beaver, muskrat), fish (e.g., grayling), waterfowl (e.g., ducks, geese), and plants and berries. Additional considerations are given to the importance of Bennett Field, located mid-river, on the southern shore, because it contains historic importance as a site of military use during WWII. A number of cabins are still used by community members from Tulít'a.

"[David] says this area – and in the mountains too – there is lots of areas that are so important to the Dene people. They are sacred areas. You have to respect them and pay respect to them."
- David Etchinelle, Tulít'a,
translated by Michael Neyelle, Délı̨nę

Left to right: Dawson Menacho, Camilla Rabisca, and Richard Andrew

Research Components

The research themes were based on previous research with the Sahtú region, and consultation and engagement with community members. The themes were divided into three areas: 1) climate change, 2) drinking water, and 3) environmental monitoring. Based on previous research and discussion with community members to identify interests, participatory activities such as mapping and place names, focus groups, water and insect sampling, and tree and soil sampling, were suggested to share knowledge on these topics. From the themes and participatory activities, discussion questions were created for each focus group

On the Land Activities

On the land activities are the ideal opportunity as a hands-on approach to share knowledge. A preliminary list of on the land activities were written on a flipchart, and the list was reviewed each morning with the group to determine which activities were of interest to the participants and feasible depending on the weather.

Youth Fishing
Clockwise: Kyanna Lennie-Dolphus, Brenden Takazo, Neil McCauley, Rosanne Taneton, Dawson Menacho, Natalie Etchinelle, Isaiah Takazo, Paul Bernard

"Youth have dreams and they are powerful, but the one thing I find is a lot of people need to feel accountable. You guys have a responsibility, especially the youth. You can dream, but you need to feel like you have to go back to school. You have to get an education to be able to protect and educate yourselves through the Dene way of life and the mola way of life… It's very important to understand that there are two ways of life. There is a mola way of life and Dene way of life. Mola way of life is always going to be around just like the Dene way of life."
- Archie Erigaktuk, Tulít'a

Results

Participants

There was a lot of interest to participate in the camp. In total, 46 people attended the camp; 38 (83%) of whom were community members from Tulít'a (n=29), Délı̨nę (n=5), Radilih Koe (Fort Good Hope) (n=2), and Le Gohlini (Norman Wells) (n=2). In total, the gender distribution of the camp's participants was 58% men (n=26) and 42% (n=20). This difference is largely due to the majority of the camp attendants being men.

Camp participants included
(see Appendix B)

- Elders, harvesters, and community leaders (14)
- Youth, (11)
- Nę K'ə Dene Ts'ı̨lı̨ Forum members (5)
- Camp staff: attendants and cooks (10)
- Scientists and researchers (9)

Of the 46 attendees, 38 (83%) people consented to participate in the camp's activities and to have their photographs and audio recorded.

Structure of the Camp

The camp was initially planned to have a mixture of research activities in the mornings and traditional land-based activities during the afternoon and evenings. For the most part, this was how the days were structured with some changes made for weather and other considerations (see Appendix C for daily agenda).

Typical Daily Rhythm

Before our arrival at camp, Wilbert Menacho and his crew work to clean the site. They removed much garbage that had been there from previous use. They repaired damage to the kitchen that was caused by bears and constructed outhouses. When we arrived at the camp, there was a lot to do. We all worked collectively to haul all the gear up the banks. Our excellent camp attendants worked diligently to help construct our Fort McPherson canvas tents, teaching researchers along the way. With the guidance of community members, we gathered and lined the tent pads with spruce boughs. Communal meeting space was set up, and tarps placed so that we would have shelter from the rain.

Archie Erigaktuk and Paul Bernarde constructing Fort McPherson canvas tent

Each day, we continued to make improvements to our campsite. Collecting and cutting wood for fires, cooking, and warming of our tents was a daily occurrence and required the hard work and dedication of our camp attendants. Trips back to Tulít'a were frequent and required to pick up missing supplies and to safely dispose of garbage, including food waste, due to safety concerns related to recent problematic bear activity in the area. It quickly became apparent to all that teamwork was required to keep the camp running smoothly and to ensure that we were all comfortable and safe.

We helped the camp cooks and camp attendants by collecting garbage, harvesting firewood, boiling water for tea and coffee, and doing dishes. We quickly realized that Deb's trusty label-maker was needed to keep track of the numerous tea and coffee cups; once everyone was responsible for their cups, it significantly reduced the number of cups that needed to be washed after each meal. Eating became a welcomed time where participants had an opportunity to bond over casual conversation and hearty foods.

Beef Stew and Bannock

Although the camp organizers worked hard to develop an agenda for the week, adjustments were made to best suit the needs of the participants and the natural ebb and flow of camp life. Harvesters typically went out to fish or hunt moose during the early morning hours or late evening. Leadership meetings, including youth, were held each morning before breakfast where camp leaders discussed the plans for the day and any safety concerns. Following breakfast, we had opening prayer that led us into the day's

"It's always good to start with a prayer. If you have a prayer with drums, that's good too. It's always good to teach our young people how to pray. When I was growing up, the Elders always talked about all these wonderful things about what you are doing in your lifetime. Somewhere along the line, we went a little bit off but what you do here, this is what we should be working towards."
- Chief Frank Andrew, Tulít'a

Left to right: Brenden Takazo, David Etchinelle, Richard Andrew, Michael Neyelle

talking circle. The talking circle became a safe space where we set the agenda for the day, debriefed the previous day(s), and shared our stories, histories, and concerns; our talking circles often took up the majority of the mornings.

> "It was just meeting people and just learning about each other and understanding what people are going through. I think that's what the circle does. One of the things I learned up to now, there's a lot of people who are very afraid of the circle. They are. They don't say it… I guess what I'm saying is the circle will help to be part of this camp and to be equal to everybody else."
> - Walter Bezha, Délı̨nę

Throughout the camp, a particular emphasis was placed on terminology (see Appendix D); numerous flip charts were used during the talking circle to record the names of plants, animals, places in both English and Sahtúot'ı̨nę Yat (Northern Slavey) with consideration given to the three different dialects: K'áshogot'ıne, Sahtúgot'ıne, and Shıhgot'ıne.

Singeing Porcupine
Left to right: David Etchinelle, Harry Harris, Kelly Skinner, Mylène Ratelle

Although the activities varied daily, after lunch we typically split into smaller groups to partake in daily chores, fishing (a favourite among the youth), berry picking, making dry-fish, preparing moose ribs, quilling, singeing, and cooking a porcupine that had wandered into camp, collecting spruce boughs, or trying our hands at beading.

Beading and Sewing Workshop

> "I chose to try some beading and I was learning from a few people, learning how difficult it is and how much time it takes and how much skill the people have who do the beading."
> - Kelly Skinner, University of Waterloo

These experiential activities, facilitated by community members, had value for all participants because we learned how to be on the land and were taught about the cultural significance of being Dene and their holistic relationship with the lands, waters, wildlife, and community.

> "I'm a Dene woman from out on the land. I live on the land. I was born in the bush. There was 10 of us in our family. My dad had no girls, so when I was born, I was taught to hunt, trap, go fishing with my dad. So, when I grew up, I learned to hunt, I learned to skin caribou, moose, marten. I was taught all that. When I married my husband, we lived out on the land. We raised all our kids on the land. Now we're trying to teach our grandkids out there on the land and teach them what I was taught. It's good to teach the young ones when they're young. When they get older, they get used to watching TV and playing their games. But when you are out on the land, there's no games to play, there's no distractions."
> - Camilla Rabisca, Radilih Koe (Fort Good Hope)

"I really like listening to all the Elders' stories and the researchers telling us about the water. I like going fishing. I just like being out on the land."
- Dawson Menacho, Tulít'a

Research activities offered another form of experiential learning. One afternoon, when we were not out berry picking or fishing, we held three concurrent focus groups on drinking water, environmental monitoring, and climate change. At the request of the youth, the climate change focus group was amended to include a discussion on youth leadership. Additional research activities included a water sampling and data collection/management demonstration facilitated by the ENR, a tree coring and cookie activity, a mapping activity, and collected water samples from Great Bear River. An essential outcome of the camp was the drafting of a resolution (see Appendix E).

"I've enjoyed all week being here learning stuff from researchers, listening to stories, everyone helping each other. Helping with setting up the tents and making the campground nice."
- Neil McCauley, Tulít'a

On the second last evening, we all drum-danced together under the midnight sun. Many of the researchers had no problem jumping in as they listened to the beat of drums and the songs; this was a time of true friendship, and our hearts were happy. On the final morning, we had final prayer and camp tear down. Everyone pitched in. We deconstructed the tents, gathered all our gear, picked up garbage, and burnt the spruce boughs we had so lovingly collected throughout the week.

Camilla Rabisca and Emily Ogden Laying Spruce Boughs

Dancers left to right: Mylène Ratelle, Emily Ogden, Deborah Simmons, Rosanne Taneton
Drummers Left to right: Leon Andrew, Keith Widow, Chief Frank Andrew

Youth Caucus

The importance of youth involvement in this camp cannot be understated. Early on the youth decided that they required time and space to meet independently as a group to discuss their concerns and to make plans for the future well-being of Sahtú youth.

Camp leaders designated an empty tent as space for the youth to hold their meetings. Within this space, youth shared their stories, concerns, and aspirations amongst one another, but they were also emboldened to stand up and speak to the group on numerous occasions about their discussions. Having influential youth leaders, like Kyanna Lennie-Dolphus and Rosanne Taneton, at the camp meant that their voices were heard. At first, the youth were more or less hesitant to speak during the talking circles, but as the week progressed, the youth opened up and shared a great deal with the group. We learned a lot about their goals and the impacts of being part of camps like this.

"One of the Elders just spoke in Fort Good Hope talking about how he raised his children and all his children speak Slavey, but when he started to train other people, he said doing things the way the Dene people did like fishing, netting, making fire, is easy. That's easy. The kids can learn that easy. The hard thing is the language. For our kids to speak the language is the hardest, but the other things are easy to do."
- Chief Frank Andrew, Tulít'a

Having space where youth could speak directly to Elders about their experiences was vital for developing mutual understandings of their needs and wants. The Elders often spoke about the importance of intergenerational knowledge transfer and the need for youth to learn what it means to be Dene and how to take care of the land. Importantly, Elders were also able to reflect on the barriers to knowledge sharing that the youth mentioned.

"Me and Rosanne were talking the other night about how we want to do a Sahtú youth gathering every summer. We'll write proposals or get funding form corporations in our communities to fund the participants, the youth, in each community to go over to any community. We'll start off with Délı̨nę and we'll go with the sun. We'll go to each community and go to a traditional camping spot or place and we can have youth gatherings there. Not only for proposals and finding funding, but we'll also raise money during the year so we can have a big youth gathering for one spot where youth can come together."
- Kyanna Lennie-Dolphus, Tulít'a

Left to right: Isaiah Takazo, Dawson Menacho, Brenden Takazo, Rosanne Taneton

Description of Research Conducted

Water monitoring and data collection presentation by ENR

On the first full day of camp, the ENR came to discuss and demonstrate water quality monitoring techniques. To facilitate their presentation, they brought water monitoring instruments, including two types of pH meters. The presentation was engaging and provided opportunities for participant involvement, including asking for help to measure and compare the pH of bottled water and water taken from Great Bear River. Participants also learned how to measure levels of dissolved oxygen in the water and its importance. Nigel and Laura also fielded community questions about their concerns over drinking water quality and the effects of the development and climate change throughout the Sahtú. Nigel and Laura also brought educational materials on the Mackenzie Watershed's DataStream platform. DataStream is an open-access platform designed to effectively share data with researchers and communities on water quality in the Mackenzie River Basin (Mackenzie DataStream, 2019). They noted that the program is having difficulties in recruiting community members to participate in monitoring projects; the SRRB has committed to connecting community members with the program for next season. Having this visit on the first full day of camp was instrumental in setting the stage for the water camp and helped get people talking about the importance of water in their daily lives.

"I grew up in the bush. I know my stuff in the bush, but I can't see mercury. It's good to have you guys [researchers] around to help learn about stuff like that, contaminants that we can't see."
- Richard Andrew, Tulít'a

ENR Water Monitoring and Data Collection Presentation

Water sampling

Researchers from Wilfrid Laurier University spoke about the importance of using bugs from lakes to monitor and assess the overall quality of lakes and rivers. Many community members expressed concerns over the quality of their waters and had specific questions about the levels of mercury and other toxicants. During the camp, different researchers explained the concepts of bioaccumulation and biomagnification in relation to methylmercury concentrations in the water and the food chain. With permission from the community members, they collected water samples from Great Bear River using the collection kit left by the ENR (see Appendix F). The water samples were dropped off to the ENR in Norman

Wells and sent for analysis to the lab in Yellowknife. These types of baseline samples are instrumental in providing basic water chemistry measurement to compare trends over time. Additionally, this supports the camp's objective to build capacity through environmental monitoring training. Based on the limited water quality results obtained from our sample collected during the camp, it appears that water within the Great Bear River is of excellent quality and there are no indicators for concern.

Mapping activity

During a break between activities, a researcher from the University of Guelph brought out maps of the Sahtú Region and zoomed-in area of Great Bear River. Participants came over to look, with their tea and snacks. Participants began describing place names. Using sticky notes, and with the help of Deborah Simmons, both English and traditional place names were put onto the map. Participants described places they travelled, changes they have seen, and started sharing stories about times out on the land. As this was an informal activity and a recorder was not available. By using Google Earth images as the base map, as opposed to a topographic map, allowed for a discussion of what certain landscape features and ecosystem types look like. Participants were able to see how areas they knew were also replicated elsewhere on the landscape.

David Etchinelle teaching Carolyn Gibson about Traditional Place Names

activity on the agenda. Starting with places names is a great way to get individuals talking about the land. Researchers can engage in this activity by asking about a particular change in certain areas and mapping various ecological features on the landscape. Accompanying maps of fire scars, permafrost distribution, and land class cover (which were available at this camp but not used) would help facilitate these discussions.

> "I think it's in Bennett Field area where the crane legend says lay across so the person can cross the river… it's important to point it out if we can locate those locations."
> - Michael Neyelle, Délı̨nę

Tree coring activity

One afternoon, a researcher from Wilfrid Laurier University gathered a group of people to demonstrate how she uses tree cores and cookies to determine the effects of wildfires on the growth of trees. Participants had an opportunity to use increment borers to harvest cores from spruce and pine trees at the campsite. We learned that it is best to measure 1.3 meters

up from the base of the tree and that to obtain a viable sample you need to insert the shaft just past the pith or centre of the tree. When examining the harvested tree cores, participants learned that tree growth varies depending on the season, and each growth period can be seen the rings. The lighter rings denote the spring growth, whereas, the darker rings represent the summer period. The activity received much interest, and extra excitement was added by making a game where participants had to guess how old the tree was.

During this demonstration, participants also learned how to collect and examine a tree cookie. To do so, a participant cut down a young spruce tree as close to the base as possible and then used a hand-held saw to make a half-inch round. In addition to using tree cookies to determine a tree's age, cookies are used to help researchers understand how environmental factors like fire and disease affect growth patterns.

Emily Ogden teaching Harry Harris about Tree Cookies

For future camps, it is recommended to include these types of hands-on activities because they enable participants to gain a better understanding of environmental monitoring and methods that researchers use in the field to study the effects of wildfires on forest growth and cover.

Focus groups (see Appendix G for focus group questions)
Three concurrent focus groups were held on drinking water, environmental monitoring, climate change and youth leadership. The focus groups questions were designed in collaboration with the SRRB in response to community concerns with the goal of determining priority areas and interest in future research and monitoring programs. Following each focus group, we came together as a group to debrief and further the discussions.

1. Drinking Water

Academic researchers from the University of Waterloo facilitated this focus group in response to community concerns over drinking water quality.

> "When we talk about water, we take care of the water because water is our life."
> - Anonymous participant

Communities are especially concerned over the amount of chlorine being used to treat drinking water in town; they have noticed that the tap water tastes and smells bad because of the chlorination process. The residents of Radilih Koe (Fort Good Hope) have been concerned about the quality of their drinking water for decades and its impact on health. During the discussions, some community members expressed interest in learning more about the various

Left to Right: Walter Bezha, Camilla Rabisca, Mylène Ratelle, Kelly Skinner learning about Traditional Sources of Drinking Water

types of in-home filtration systems, including reverse osmosis, that may be used to minimize the off-putting scent and taste of chlorine in their tap water. Additionally, the participants inquired about the safety of water tanks at home. For example, how often should the tanks be cleaned, and what chemicals are used in the process? Participants also expressed concern over the number of plastics in the water and the fish, especially in Arctic waters and icebergs. As a result, community members would like to know if the ice and snow are safe to drink.

> "We were encouraged not to drink too much water. I am still trying to figure it out. There must have been a reason."
> - Walter Bezha, Dél̨ı̨ne

The focus group was also an opportunity to share stories about traditional practices relating to drinking water. At the focus group, we heard that the Dene way is to harvest ice and snow to make tea and broth because it is safer and purer than other sources of water and because it tastes better than tap water. Moose broth and fish broth have lots of healthy nutrients. Traditional knowledge tells people what water to choose and what sources are contaminated. We learned that traditional knowledge, passed down from their ancestors, says that they were encouraged to drink tea and broth.

> "We do everything to make a good cup of tea. Sometimes we use snow. In the winter sometimes we use ice from the Mackenzie. In springtime when ice breaks up, we try to collect the ice before it melts along the shores… when I was growing up, we hardly ever drank water, but we do drink broth. It could be fish broth. It could be meat broth."
> - Anonymous participant

Moose Meat Broth

> "We are connected to everything on Earth and in heaven. We are connected to everybody. You know, we are put on Earth not to own anything. We are to take care of each other, take care of the animals, the fish, birds, everything. We cannot control anything. That's not our work. Our work is just to take care. We need to take care of each other, take care of the water. We can't change the world. We can't change the way the animals live. We can't change the way the trees grow, the grass grows, anything. I can't change a person and they can't change me, but we can help each other. That's our work."
> - Anonymous participant

2. Environmental Monitoring

Researchers from Wilfrid Laurier University facilitated this focus group. The focus group was designed to elicit conversation regarding the communities' interest in environmental monitoring, the needs of the communities, and the ways that communities can partner with researchers to conduct monitoring projects of the land and waters. We learned that communities

are incredibly interested in collaborating with researchers to monitor their lands. However, to do so, community members need better opportunities to receive proper training and to further their knowledge of scientific methodologies and techniques that do not require them to leave their communities for training and education. Similarly, to effectively build relationships and develop monitoring projects, researchers also need to develop their understanding and incorporation of traditional knowledge further.

Communities are troubled about the impacts of development and future exploration of the Canol shale operations south of Norman Wells and the Evrim Resource Corporation. Specifically, they noted that Evrim appears to be exploring the Mile 222 area for a potential gold mining operation. Fracking exploration by companies such as Husky is also of concern. Many community harvesters are worried about the impacts of tourism and outfitters in the region. They noted that the tourists and outfitters are not appropriately monitored and that they are using drones and helicopters for sport hunting which is disturbing the moose, caribou, and ram populations. Sport hunting is also extremely problematic because hunters are violating Dene ʔeʔah (Dene law) by disrespecting and desecrating the sanctity of the wildlife by only harvesting their antlers.

"We travel to the river and we see stuff and report it to RRC and trust ENR to check it out. They get money to fly around and get these fancy equipment and stuff like that. The money is there for them. They should be going with us, the local people."
- Neil McCauley, Tulít'a

Sharing the results of research projects is fundamental. Communities want the results to be shared in quickly and truthfully in ways that are accessible to everyone. For instance, the research should be shared via community meetings, newsletters, online platforms like Facebook and websites, and local radio stations. Importantly, it is necessary to share the results in both English and Slavey because many Elders do not speak English. Challenges for researchers include developing systems and relationships with other researchers and community partners to more effectively share results and develop projects founded in the co-creation of knowledge.

Clockwise: Derek Gray, Tom Pretty, and Harry Harris

"The other day we heard about the warming of water and there being less oxygen. There are some lakes we use all the time and we should take samples and test them five years down the road to see how much they change. Also test for contaminants.
Also, we should be monitoring wildlife that we eat for contaminants. We need more studies to work from over five years and then come back together. Then we will know what's in the animals. That's really important for us because we are talking about accumulation and getting stuff from all the different animals that we eat. We should be taking contaminant studies or research. Then people will have better communication from the monitors."
- Harry Harris,
Radilih Koe (Fort Good Hope)

3. Climate Change and Youth Leadership

At the request of the youth, we split the climate change focus group in half to include a separate discussion, but related, discussion of youth leadership. This focus group was facilitated by a mix of academic researchers and community members.

Clockwise: Carolyn Gibson, Kyanna Lennie-Dolphus, and Michael Neyelle discussing the Impacts of Climate Change on the Land

3.a. Climate Change

Youth in the Sahtú are significantly experiencing the effects of climate change, and it is negatively impacting their health and well-being as their relationships with the land change. Youth are a valuable source of first-hand knowledge of the changes, and they must continue to be actively involved in monitoring the land. The youth noted many changes resulting from changing climates such as increased landslides, disappearing ice cover in the mountains, caribou migration and susceptibility to diseases, slumping banks, land, and trees from thawing permafrost, and differences in the rate of spring thaws on the rivers. As a result of these changes, the youth told us that they have anxieties and are concerned about their health and the health of future generations. The youth want and need more opportunities for training so that they can be more involved with environmental monitoring to become stewards of their lands and waters. Researchers must develop projects that include youth in the Sahtú because they are the future.

> "I did some water sampling in the Redstone Mountains about a year ago now. That's what you see, just slumping. You see nice, green trees and everything and then you see where the slumps are and it's just black. That's what it looked like. It looks black. It looks like Mother Earth is getting cancer."
> - Kyanna Lennie-Dolphus, Tulít'a

In relation to climate change and environmental monitoring, youth cited that they know some youth experience barriers to being on the land. Specifically, we heard that some families cannot afford the necessary equipment (e.g., guns) and vehicles needed to travel and monitor the land, limiting their ability to participate in traditional activities like hunting and fishing.

> "The reason why I think the youth are not going out on the land is a lack of resources, but I'm happy my grandparents have most of the stuff. They have skidoos, a quad and I bought myself a quad just this summer just for me. I bought myself a skidoo, a second-hand skidoo. My parents have an old Lund boat, a 30-horse Yamaha, an old kicker. I see all these youth in Délı̨nę, their parents don't have the resources to go out on the land, like skidoo, boat, ATV and stuff."
> - Brenden Takazo, Délı̨nę

3.b. Youth Leadership

Left to Right: Rosanne Taneton and Kyanna Lennie-Dolphus leading the Group Discussion on Youth Leadership

The youth at the camp quickly expressed that they wanted to form a youth caucus to discuss their unique needs, desires, and concerns. To facilitate this, they requested that an empty tent become a dedicated space for them to gather with one another. As youth naturally tend to stay up later than the other participants, the youth also gathered around the fire many evenings.

"It's like a healing camp. I think we need a lot of healing camps because a lot of youth are hurting, and no one knows."
- Rosanne Taneton, Dél̨ı̨ę/Tulít'a

"Máhsı to the Elders for passing on their knowledge and teachings to me. It's because of you I can become a respectful Indigenous woman. Without programs like these, I would have never learned anything. I didn't have family that took me out on the land. I didn't have anyone to teach me these things. That's why we need more programs like this and for the youth. We need to make a difference."
- Kyanna Lennie-Dolphus, Tulít'a

During the youth leadership focus group, we heard that the Sahtú youth are extremely committed to their communities and that they want to be involved in all aspects of community development/management. Although, they believe that being on the land is the best, they recognize that they must also be involved in community meetings. Specifically, the youth told us that they request support to attend annual general meetings (AGMs), to be active participants in decision-making processes, and the opportunities to develop their own organizations that would connect youth throughout the Sahtú including the creation of the Sahtú Youth Network. The youth would like to fundraise throughout the year so that they can have an annual Guardian retreat and Sahtú Youth Gathering.

"Someday we will have another workshop here that will be on wellness alone. I want to have a workshop on wellness. That was my goal when I ran for chief, to help our people heal. People are really talking about that now. Even at the SSI meeting, people were saying we have to help our young people because they are the ones who are going to be taking over.
- Chief Frank Andrew, Tulít'a

Importantly, the youth told us that they feel disconnected to the land and to their culture and that being on the land is healing. In town, youth feel that there are too many distractions such as technology and that drugs and alcohol are affecting many people. Youth in the Sahtú need more opportunities to be on the land where they can learn about their histories and traditional practices. For instance, the youth would like to learn from their Elders about navigating the rivers and lakes. In town, the youth suggested that they would like more opportunities from their Elders to learn their language.

Discussion

The camp was a successful first step in the co-creation of knowledge between community members and researchers about climate change, drinking water, environmental monitoring, and youth leadership. Activities at the camp met the objectives of the project in the following ways.

> "I was saying we are here at this camp to teach the young people the importance of water and to teach them about the science of water. Not only from new visitors from the south, researchers and scientists, but we also talk to them about traditional knowledge, about Dene knowledge, what our ancestors and our prophets have predicted. So, we are combining the two."
> - Michael Neyelle, Délı̨nę

During the focus groups, and subsequent group discussions, community members and researchers identified priority areas of concern resulting in enhanced understanding of the need to merge scientific environmental knowledge with traditional knowledge. Interactions between researchers and Guardians resulted in the potential development of a research-based water and insect monitoring collaboration that would help build capacity and local employment opportunities for Guardians who could help researchers identify and navigate traditionally relevant locations.

> "Based on what everyone is describing, it seems to be the best approach is to have it very localized. Unfortunately, we discussed a lack of educational opportunities around here to train up the people. So, if it was me that was putting it in, there really needs to be the partnership between the universities, the researchers and the local people."
> - Thomas Pretty, Wilfrid Laurier University

Through the water sampling and data collection presentation by the ENR, a need was identified by the ENR for greater support from community partners, such as the SRRB, to better link Guardians and youth with current community-based water monitoring initiatives in the Sahtú. As a result, the SRRB has committed to facilitating this collaboration next season and will provide a direct opportunity for Guardians to train as environmental monitors. Additionally, the citizen water sampling kit provided by the ENR, and subsequent analysis, partially established a new water quality baseline and provided answers to long-term community concerns around drinking water quality around Tulít'a.

> "My idea is that we sample water from taps in participants' houses and water from where the next site is for our Global Water Futures Camp in advance of the camp and then have the results to discuss at the camp. Maybe the guardians can do the sampling." – Lex Scully, Tulít'a

Sahtú Dé (Great Bear River)

Throughout the camp, the youth were afforded many opportunities to continue developing their leadership skills. For many of the youth at camp, this was their first experience participating in scientific research and communicating with academic researchers. Opportunities like these contribute significantly to relationship building and encourage youth to become

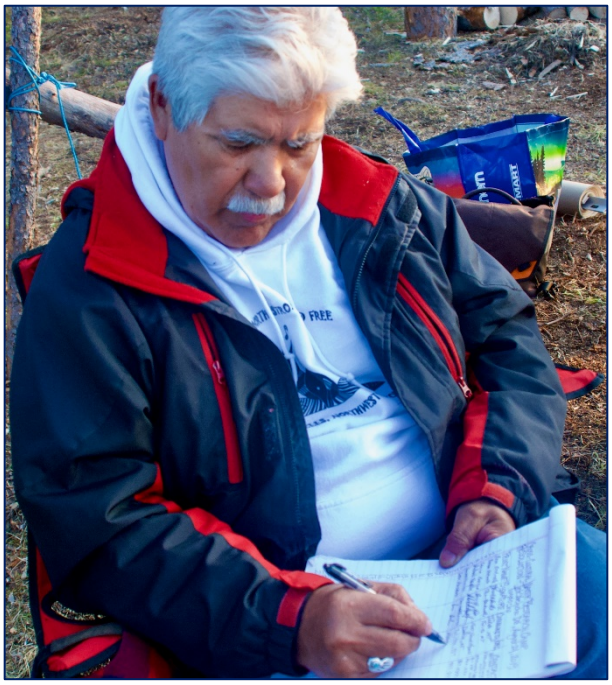
more involved with research projects. Researchers must continue to provide youth with opportunities to collaborate with researchers because the youth are the future Guardians of the land.

The youth caucus provided a forum for the youth to develop their plan for connecting with youth across the Sahtú, including a formal plan for the continued implementation of the Sahtú Youth Network and a Sahtú Youth Council. The SRRB continues to be a champion of youth leadership and strives to provide support for youth leadership.

"I learned how to make dryfish and it was really fun. I had fun going fishing and when we would go down, we had good laughs. I like to hear stories from Elders and the workshop was really good. The youth made a presentation on youth and climate change. What the youth were talking about is we want to push for a Sahtú Youth Network."
- Rosanne Taneton, Délı̨nę/Tulít'a

Left to Right: Rosanne Taneton and Carolyn Gibson Pumping Drinking Water

An essential output of the camp was the drafting of the Cross-Cultural Water Knowledge Research Camp Resolution (see Appendix E). The resolution outlines the agreed-upon actions that should be taken related to youth leadership, climate change, drinking water, and environmental monitoring. The resolution was signed by each participant and is monumental in supporting the project's objectives to facilitate communication between communities and researchers, to respect traditional knowledge, and to enhance decision-making capacity by identifying community concerns and planning for action.



Leon Andrew Signing the Camp's Resolution

The primary academic researchers from Wilfrid Laurier University and the University of Waterloo will continue to collaborate with the community partners, including the SRRB, to develop the content and structure of the two prospective water knowledge

camps, including the training of community participants in water monitoring techniques. This will support the project's long-term goal of establishing new baseline water quality and environmental research monitoring sites in the region.

Sahtú Dé (Great Bear River)

"Something we heard a lot this week is making sure, particularly the youth, can come out with southern researchers when we go out on the land. A really important piece is in more capacity than just a wildlife monitor. I think we really thought when we were taking the tree samples how quickly they catch on and how easy it is to do and to really get them to be part of our teams. One of my action items is going to be working with my university to figure out exactly what we have to do to make sure that at the start of next season, we can be taking youth out on the land with us and teaching them our skills and learning from them. I think we are all going to take that as an action item."
- Carolyn Gibson, University of Guelph

"In terms of whether there is any training you would like, a lot of people in the group said on-the-land training would be the most valuable, but coupled with once you get that information or collect the water sample, learning how to process it in the lab when you go back to the lab."
- Derek Gray, Wilfrid Laurier University

The goals of the research are to better understand how Dene knowledge and cross-cultural camps contribute to capacity-building and stewardship for Sahtú youth. The work will also include a process evaluation of the camp to examine the activities, characteristics, and implementation of the camp. The process evaluation of the camp will examine what some of the facilitators and barriers were. Lessons learned will be used for the planning and implementation of future cross-cultural research camps with youth and other community members.

This research is important because it will help build capacity for youth by supporting youth in their interest in being environmental stewards. Further, this research aims to foster increased collaboration with community partners and help to identify priority areas for future projects.

Kyanna Lennie-Dolphus and Natalie Etchinelle, Tulít'a

Recommendations Resulting from the Group Discussion and the Resolution

The youth need to be better supported

- Youth expressed the need for better support in accessing on-the-land camps.
- Support youth involvement in environmental decision-making and celebrate youth knowledge.
- Help with writing proposals for funding so that more youth are able to participate.
- Connecting with youth in each of the five Sahtú communities – resources to help develop the Sahtú Youth Network and the Guardian Network.
- Increase opportunities to be on the land.
- Increase environmental monitoring training.
- Increase involvement within community councils.
- Support from Elders to learn their histories and language.
- Camps designed solely for the youth, run by youth.

Guardian programs and environmental monitoring

- Increase training opportunities that do not require people to leave their communities to travel south for education.
- Build a strong Nę K'ədí Ke program (Keepers of the Land – Guardians).
- Make it easier for community members to get the tickets they need to work with industry, eco-tourism, and outfitters (e.g., boating licenses, PAL, Wilderness First Aid and Advanced Wilderness First Aid).
- Adopt a co-production of knowledge approach in partnerships with university, government, and industry researchers.

Drinking Water

- Develop a resolution about safe drinking water to be presented at the 2021 Sahtú leadership assembly.
- Conduct research about safe drinking water in town and develop and implement a strategy to communicate and educate the results.
- Document Dene Ts'įlį practices for drinking water on the land and pass on the knowledge and skills to youth.

Greater collaboration between researchers and community members

- Elders expressed the need for improved dialogue between researchers and communities.
- Desire for research results, especially around water quality, to be provided more quickly.
- Results should be shared in accessible formats including, via community newsletters, online platforms like social media (Facebook) and websites, local radio stations, and community meetings. These communications should be available in both English and Slavey.

Cross-Cultural Research Camps in the Sahtú

- Camps should be held in each of the five Sahtú communities.
- Where possible, community members request longer duration of camps because one week is not enough time to facilitate all of the desired activities.
- Future water knowledge camps should include water monitoring training opportunities for community members.
- Mapping activities, and other hands-on workshops should be included as formal research components of future camps.

Conclusions

We gathered at Sahtú Dǝ́ (Great Bear River) at Tek'áícho Dǝ́ (Marten River) with the intent to sharing knowledge about water, climate change, and environmental monitoring. What we accomplished went far beyond this goal. The opportunity to live together on the land for one week will not be forgotten. The collaborative nature of the camp was another step in the right direction for future partnerships between community members in the Sahtú and academic researchers in the south. The mix of experiential land-based activities (e.g., preparing dry fish) and research activities (e.g., mapping of traditionally important locations and place names) created new opportunities to learn from one another, especially for the youth. The youth at the camp learned from their Elders about the importance of being Dene and knowing the land.

At the same time, through discussions during the focus groups and talking circles the youth started to build relationships with researchers and learned about environmental monitoring techniques and opportunities to work as community-based monitors. Researchers at the camp have also committed to developing projects that can include youth and community Nę K'ǝ́dí Ke (Guardians). Moving forward, it is recommended that the next Water Knowledge Camp include researchers who can train youth and Nę K'ǝ́dí Ke (Guardians) to monitor the water because we learned that this is of particular importance to the communities. Doing so will also support the project's long-term goal of establishing new baseline water quality and environmental research monitoring sites in the region.

"There's a lot of work that we do here, and I would like to thank the young guys and everybody who pitched in. It really helps a lot. Like I said, from day one, I really like it here with everybody here. It brings my spirit back up. That's what we're here for. We are on the land and we really connect ourselves to the land and our spirituality is so important for me and everybody too. Every day we learn something new. We learn from different cultures, how they do stuff and how we do our traditional stuff. It helps us grow and to understand. I think someone said that's for the young people here. Keep doing what we're doing here. I would like to thank Debbie and the crew from the university that came here to put this program on. It's really good. I hope we have more of this here. We always talk about the young generation and we are here to teach them and to show them the right way, the right path. Máhsı."
– Wilbert Menacho, Tulít'a

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List of Appendices

Appendix A: Camp Activities

Research Activities

Focus Groups

1. Climate Change and Youth Leadership (n=10)
    - Facilitated by Candice Dimock, Emily Ogden, Carolyn Gibson, Deborah Simmons, and Michael Neyelle

2. Drinking Water (n=6)
    - Facilitated by Kelly Skinner and Mylène Ratelle

3. Environmental Monitoring (n=11)
    - Facilitated by Derek Gray and Tom Pretty

Workshops

1. Tree coring and cookie demonstration (n=20). Facilitated by Emily Ogden.
2. Mapping activity (n=7). Facilitated by Carolyn Gibson.
3. Insect sampling. Facilitated by Derek Gray and Tom Pretty.
4. Water monitoring presentation (all participants). Facilitated by the Department of Environment and Natural Resources.
5. Water monitoring - citizen sampling kit provided by the ENR. Sampling done by Derek Gray and Tom Pretty.
6. Water filtration system use and benefits on the land

Youth Leadership Interview

- With Rosanne Taneton and Kyanna Lennie-Dolphus. Facilitated by Candice Dimock.

On-the-land Activities and Traditional Knowledge

1. Knowledge Sharing

- Talking/sharing circles, daily with all participants
- Storytelling

2. Ceremonial and Prayer

- Feeding the Fire Ceremony, all participants
- Feeding the Land, all participants
- Opening and Closing prayer, all participants
- Drumming and dancing, all participants

3. Harvesting

- Fishing, daily with harvesters, youth, and researchers
- Dry-fish preparation (Lake Trout from Great Bear Lake, Grayling from Great Bear River), youth (n=3), researchers (n=5), Elders (n=2)
- Hunting, daily by harvesters
- Preparation of moose ribs (boiling and dry meat)
- Preparation of porcupine, many participants during each stage of quilling (n=10), searing (n=5), cutting and roasting (n=4)
- Berry picking (blueberries, knuckle berries, raspberries), daily with youth, Elders, researchers

- Plant harvesting (Spruce, Labrador Tea, Cinquefoil), led by Elders with help from youth and researchers
- Brewing tea (Spruce, Labrador Tea, Cinquefoil), led by Elders

4. Camp Setup and Tear Down

- Collecting/laying spruce boughs, ongoing, led by Elders with help of community members and researchers
- Collecting wood for tent poles, stoves, and fire, daily by camp attendants with the help of youth and researchers
- Constructing kitchen and outhouse by camp attendants
- Site clean-up and garbage removal, daily by attendants with help from all participants
- Fort McPherson tent setup and tear down, by attendants with help from participants
- Burning spruce boughs, final day by attendants with help from participants

5. Crafting

- Beading and sewing workshop (n=7), led by Elders with researchers

6. Surveying the Land

- Hiking to Marten River (n=7)

Appendix B: List of Participants

Camp Participants	
a. Elders, harvesters and community members	
Name	**Community**
David Etchinelle	Tulít'a – Elder
Chief Frank Andrew	Tulít'a – Chief, Tulít'a Band Council
Richard Andrew	Tulít'a
David Menacho	Tulít'a – President, Tulít'a Land and Financial Corp.
Walter Bezha	Délı̨nę
Keith Widow	Tulít'a
Camilla Rabisca	Fort Good Hope – Elder, Ranger
Stella Bayha-Yallee	Tulít'a – Board of Directors, Tulít'a Land and Financial Corp.
Archie Erigaktuk	Tulít'a – Harvester
*five participants wished to remain anonymous	
b. Youth	
Name	**Community**
Kyanna Lennie-Dolphus	Tulít'a
Rosanne Taneton	Délı̨nę/Tulít'a
Natalie Etchinelle	Tulít'a
Brenden Takazo	Délı̨nę
Dawson Menacho	Tulít'a
Isaiah Takazo	Délı̨nę
Archie Erigaktuk	Tulít'a
*four people wished to remain anonymous	
c. Nę K'ə Dene Ts'ı̨lı̨ - Living on the Land Forum members	
Name	**Community/Role**
Deborah Simmons	Tulít'a - ʔehdzo Got'ı̨nę Gots'ę́ Nákedı, co-facilitator
Lex Scully	Tulít'a - ʔehdzo Got'ı̨nę Gots'ę́ Nákedı, co-facilitator
Leon Andrew	Norman Wells - ʔehdzo Got'ı̨nę Gots'ę́ Nákedı, Dené language specialist, interpreter, co-facilitator
Michael Neyelle	Délı̨nę - ʔehdzo Got'ı̨nę Gots'ę́ Nákedı, co-facilitator
Harry Harris	Fort Good Hope - Ft. Good Hope Renewable Resource Council
d. Camp Attendants and Staff	
Name	**Community**
Wilbert Menacho (boat)	Tulít'a
Neil McCauley	Tulít'a
Paul Bernarde (boat)	Tulít'a
*seven people wished to remain anonymous	
e. Scientists/Researchers	
Name	**Community**
Kelly Skinner	Waterloo, ON – University of Waterloo
Mylène Ratelle	Waterloo, ON – University of Waterloo
Derek Gray	Waterloo, ON – Wilfrid Laurier University
Thomas Pretty	Waterloo, ON – Wilfrid Laurier University (MSc Candidate)
Emily Ogden	Waterloo, ON - Wilfrid Laurier University (MSc Candidate)
Candice Dimock	Waterloo, ON – University of Waterloo (MSc Candidate)
Carolyn Gibson	Edmonton, AB – University of Guelph (PhD Candidate)
Katarina Kuhnert	Montréal, QC – McGill University (MSc Candidate)
Sarah Dennis	Yellowknife – Sustainable Livelihoods Coordinator, ENR, GNWT

Appendix C: Daily Agenda - August 19-26, 2019

Camp Schedule, as planned:
1. Safety/camp leadership meeting 8am
2. Breakfast 7:30-9:30am
3. Daily prayer and gathering around 9:00am
4. Morning animating activity
5. Lunch 12:00-1:30pm
6. Afternoon activities 1:30-5:30pm
7. Dinner 5:30-7:00pm
8. Social activities after dinner

August 19, 2019
Chartered boats arrive from Tulít'a, Norman Wells, and Délı̨nę
Setting the camp • Fort McPherson tents set-up • Pop tents set-up • Kitchen set-up • Gear organized • Wood collected and cut (ongoing) • Collecting and laying spruce boughs (ongoing) • Drinking water pumping (ongoing) • Constructing new outhouse(s)
Informal introductions

August 20, 2019	
8:00 am	Leadership/safety meeting
7:30 am – 9:30 am	Breakfast
8:30 am	Feeding the Fire and Opening Prayer led by David Etchinelle
9:30 am – 12:00 pm	Introductions first talking circle – oral stories: who we are, why we are here, hopes for the week • Research agenda • Terminology (ongoing) • Consent and explanation of ethics (ongoing)
12:00 pm – 1:30 pm	Lunch
1:30 pm – 3:00 pm	ENR visit
3:00 pm – 5:30 pm	Afternoon activities • Picking berries • Cutting wood • Tarps set-up
5:30 pm – 7:30 pm	Dinner
7:30 pm	Social activities

August 21, 2019 – rain in afternoon/evening	
8:00 am	Leadership/safety meeting
7:30 am – 9:30 am	Breakfast
9:30 am – 10:30 am	Talking circle – breaking barriers, recap of previous day
10:30 am – 12:00 pm	Morning activities
12:00 pm – 1:30 pm	Lunch

1:30 pm – 5:30 pm	Afternoon activities • Collecting and laying spruce boughs • Afternoon meeting under the tarp • Beading workshop
5:30 pm – 7:00 pm	Dinner
7:00 pm – 8:30 pm	Storytelling in tent

August 22, 2019	
8:00 am	Leadership/safety meeting
7:30 am – 9:30 am	Breakfast
8:30 am	Morning prayer, led by Rosanne Taneton
8:30 am – 11:00 am	Talking circle • Recording protocol
9:30 am – 11:00 am	Porcupine harvested and quilled
11:30 am	Mapping activity with Carolyn Gibson
12:00 pm	Group photo – Sarah Dennis and Kata Kunhert leave by boat to catch flights out of Norman Wells
12:00 pm – 1:30 pm	Lunch
1:30 pm – 5:30 pm	Afternoon activities • Preparing moose • Porcupine harvesting and quilling • Youth interview, led by Candice Dimock • Focus groups: Drinking water; Environmental monitoring; Climate change and Youth leadership • Making dry fish • Labrador Tea harvesting/making • Tree coring/cookie activity, led by Emily Ogden
5:30 pm – 7:30 pm	Dinner
7:30 pm – 9:30 pm	Evening meeting and activities • Recap of youth focus group • Dry-fish preparation with youth

August 23, 2019	
8:00 am	Leadership/safety meeting
7:30 am – 9:30 am	Breakfast
8:00 am	Morning prayer, led by Wilbert Menacho
10:00 am – 3:00 pm	Talking circle • Recap of monitoring focus group • Recap of drinking water focus group
12:00 pm – 1:30 pm	Lunch
3:00 pm	• Feeding the fire • 3 boats arrive from SSI meeting, including Chief Frank Andrew + family • McPherson tent set-up
4:00 pm – 5:30 pm	Afternoon/evening activities • Fishing • Hike to Marten River
5:30 pm – 7:30 pm	Dinner
7:30 pm – 12:00 am	Evening activities • Dry-fish preparation with researchers • Porcupine singeing, washing, preparing • Drum dancing

August 24, 2019	
8:00 am	Leadership/safety meeting
7:30 am – 9:30 am	Breakfast
8:00 am	Morning prayer, led by Chief Frank Andrew
9:00 am – 4:00 pm	Talking circle
12:00 pm – 1:30 pm	Lunch
4:00 pm – 5:30 pm	Afternoon activities • Dry meat
5:30 pm – 7:30 pm	Dinner
8:30 pm – 9:30 pm	Evening meeting • Camp Resolution
9:30 pm	Closing ceremony

August 25, 2019	
8:00 am	Leadership/safety meeting
7:30 am – 9:30 am	Breakfast
8:30 am	Closing prayer, led by Elders
9:30 am	Water sampling, led by Derek Gray and Tom Pretty
9:30 am	Camp tear-down and clean-up • Burning spruce boughs • Taking down tents • Collecting garbage • Organizing gear • Cleaning and packing up kitchen
11:00 am	Researchers leave by chartered boats to catch flight from Norman Wells

Appendix D: Terminology

Terminology	
Dene Language	**English**
Ch'oh	Porcupine
Deh	River
Deho	Mackenzie River
Dekǫ	Sacred site, coal seam
Dene béré	Dene food
Dene godí	Dene words/stories
Dene náowerǝ́	Dene knowledge
Dene nezǫ gots'udí tatsǝa	Living on the land in a good way
Dene ta	Our Father
Dene Ts'ı̨lı̨	Being Dene, Dene way of life
Dene ʔeʔah	Dene Law
Det'onecho	Bald Eagle
Dǝocha	Rapids (Bear River)
Ehpáe	Dry fish
Got'ı̨nę	People
Gots'ı̨gó	Cinquefoil
ı̨ts'é	Moose
lǝdí mahgǝ	Labrador Tea
Máshi nahfę	Be happy
Móla nádwerǝ́	Non-Dene knowledge
Nę dídaʔǫ	I love the land
Nę K'ádí Ke	Keepers of the Land - Guardians
Nehtsi nátse	It's windy
Pǝtęnı̨ ʔa	Bear Rock, sacred site
Pǝts'enikǝ	
Sahtú	Bear Lake
Sahtú Déh	Bear River
Shazhǫnéh	Sheep (ram)
Surí máhsi	Thank you very much
Tę	Ice
Tek'áehcho Dǝ́	Marten River
Tı̨ch'ádíı	Wildlife
Tu	Water
Tu dafetǫ	Lake
Tu Dene	Water People
Tu tsédo	Drinking water
Wage (KG) nodele (S)	Golden Eagle
Yák'e Got'ı̨nę	People from heaven/snow people
ʔáhtsǫ	Grandmother
ʔehdzo	Trap
ʔehdzo Got'ı̨nę	Renewable Resource Councils
ʔehdzo Got'ı̨nę	Trap People
ʔehtęnę	Trail
ʔenı̨tł'é	Cranberry
ʔeschaah	Quills (Porcupine)
ʔı̨t'á bet'areʔa	

Appendix E: Resolution

Cross-Cultural Water Knowledge Research Camp Resolution
Sahtú Dé (Great Bear River) at Tek'áícho Dé (Marten River) Tulít'a, NT.

August 24, 2019

The participants at the 2019 Cross-Cultural Water Research Camp resolve that the following actions should be taken related to youth leadership, climate change, drinking water, and monitoring:

Climate Change and Youth Leadership

- Establish youth councils and spaces for youth activities
- Promote on the land programs for youth training
- Support youth involvement in environmental decision-making and celebrate youth knowledge
- Organize annual youth gatherings
- Bring together three generations – youth, current land users, and Elders to document long-term changes on the land

Drinking Water

- Do research about safe drinking water in town, and develop and implement a strategy to communicate and educate the results
- Document Dene Ts'įlį practices for drinking water on the land, and pass on the knowledge and skills to youth
- Develop a resolution about safe drinking water to be presented at the 2021 Sahtú leadership assembly

Monitoring

- Contribute to a community-based water monitoring system for our valued rivers and lakes
- Establish a mentoring system for university researchers and youth in on the land research and monitoring projects
- Provide opportunities for community members to learn about scientific methods and laboratory work, and to train as scientists
- Do the research and monitoring needed to be ready for wise decisions when oil and mining companies want to develop the land
- Support communities to be aware of, understand, govern, and benefit from research on our land
- Use Dene language and concepts as part of research and monitoring
- Adopt a co-production of knowledge approach in partnerships with university, government, and industry researchers
- Build a strong Nę K'ədí Ke program (Keepers of the Land – Guardians), as soon as possible

Moved by David Etchinelle
Seconded by Keith Widow
Signed by 41 participants

Appendix F: Citizen Sampling Water Analysis

Taiga Batch No.:
190841

Taiga Environmental Laboratory
4601-52nd Ave., Box 1320, Yellowknife, NT. X1A 2L9
Tel: (867)-767-9235 Fax: (867)-920-8740

- FINAL REPORT -

Prepared For: Sahtu Renewable Resources Board

Address: P.O. Box 134
Tulita,NT
X0E 0K0

Attn: Lex Scully **Facsimile:**

Final report has been reviewed and approved by:

Judy Mah
Client Service Officer

NOTES:

- Test methods and data are validated by the laboratory's Quality Assurance Program. Taiga Environmental Laboratory is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) to ISO/IEC 17025 as a testing laboratory for specific tests registered with CALA.
- Routine methods are based on recognized procedures from sources such as
  - Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF;
  - Environment Canada
  - USEPA
- Samples shall be kept for thirty (30) days after the final report is issued. All microbiological samples shall be disposed of immediately upon completion of analysis to minimize biohazardous risks to laboratory personnel. Please contact the laboratory if you have any special requirements.
- Final results are based on the specific tests at the time of analysis and do not represent the conditions during sampling.

ReportDate: Thursday, September 19, 2019
Print Date: *Wednesday, October 30, 2019*

Taiga Environmental Laboratory
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Tel: (867)-767-9235 Fax: (867)-920-8740

Taiga Batch No.: 190841

- CERTIFICATE OF ANALYSIS -

Client Sample ID: Bear R. at Marten R. **Taiga Sample ID:** 001

Client Project: CBM 2019
Sample Type: Water
Received Date: 06-Sep-19
Sampling Date: 25-Aug-19
Sampling Time:
Location:
Report Status: Final

Test Parameter	Result	Detection Limit	Units	Analysis Date	Analytical Method *	Qualifer
Inorganics - Nutrients						
Ammonia as Nitrogen	< 0.005	0.005	mg/L	11-Sep-19	SM4500-NH3:G	
Nitrogen, Dissolved	0.29	0.06	mg/L	07-Sep-19	ISO/TR 11905:1997(E)	
Nitrogen, Total	0.30	0.06	mg/L	08-Sep-19	ISO/TR 11905:1997(E)	
Organic Carbon, Dissolved	2.0	0.5	mg/L	09-Sep-19	SM5310:B	
Organic Carbon, Total	2.1	0.5	mg/L	10-Sep-19	SM5310:B	
Ortho-Phosphate as Phosphorus	< 0.002	0.002	mg/L	06-Sep-19	SM4500-P:D	
Phosphorous, Dissolved	< 0.002	0.002	mg/L	13-Sep-19	SM4500-P:D	
Phosphorous, Total	< 0.002	0.002	mg/L	13-Sep-19	SM4500-P:D	
Inorganics - Physicals						
Alkalinity, Total (as CaCO3)	57.1	0.4	mg/L	06-Sep-19	SM2320:B	
Conductivity, Specific (@25C)	158	0.4	µS/cm	06-Sep-19	SM2510:B	
pH	7.86		pH units	06-Sep-19	SM4500-H:B	
Solids, Total Dissolved	130	10	mg/L	09-Sep-19	SM2540:C	
Solids, Total Suspended	< 3	3	mg/L	09-Sep-19	SM2540:D	

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Turbidity	1.08	0.05	NTU	06-Sep-19	SM2130:B
Major Ions					
Calcium	16.3	0.1	mg/L	06-Sep-19	SM4110:B
Chloride	5.4	0.7	mg/L	06-Sep-19	SM4110:B
Fluoride	< 0.1	0.1	mg/L	06-Sep-19	SM4110:B
Hardness	68.3	0.7	mg/L	06-Sep-19	SM4110:B
Magnesium	6.7	0.1	mg/L	06-Sep-19	SM4110:B
Nitrate as Nitrogen	0.23	0.01	mg/L	06-Sep-19	SM4110:B
Nitrate+Nitrite as Nitrogen	0.23	0.01	mg/L	06-Sep-19	SM4110:B
Nitrite as Nitrogen	< 0.01	0.01	mg/L	06-Sep-19	SM4110:B
Potassium	0.7	0.1	mg/L	06-Sep-19	SM4110:B
Silica, Reactive	2.36	0.025	mg/L	10-Sep-19	SM4500-Si:D
Sodium	4.6	0.1	mg/L	06-Sep-19	SM4110:B
Sulphate	18	1	mg/L	06-Sep-19	SM4110:B
Organics					
Chlorophyll a	< 1.0	1	ug/L	18-Sep-19	SM10200:H
Trace Metals, Dissolved					
Aluminum	1.5	0.6	µg/L	12-Sep-19	EPA200.8
Antimony	0.3	0.1	µg/L	12-Sep-19	EPA200.8
Arsenic	0.2	0.2	µg/L	12-Sep-19	EPA200.8
Barium	22.8	0.1	µg/L	12-Sep-19	EPA200.8
Beryllium	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Bismuth	< 0.2	0.2	µg/L	12-Sep-19	EPA200.8
Boron	10.8	0.9	µg/L	12-Sep-19	EPA200.8
Cadmium	< 0.04	0.04	µg/L	12-Sep-19	EPA200.8

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Cesium	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Chromium	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Cobalt	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Copper	< 0.2	0.2	µg/L	12-Sep-19	EPA200.8
Iron	< 5	5	ug/L	12-Sep-19	EPA200.8
Lead	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Lithium	3.3	0.2	µg/L	12-Sep-19	EPA200.8
Manganese	0.3	0.1	µg/L	12-Sep-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	12-Sep-19	EPA200.8
Molybdenum	0.3	0.1	µg/L	12-Sep-19	EPA200.8
Nickel	0.2	0.1	µg/L	12-Sep-19	EPA200.8
Rubidium	0.6	0.1	µg/L	12-Sep-19	EPA200.8
Selenium	< 0.3	0.3	µg/L	12-Sep-19	EPA200.8
Silver	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Strontium	106	0.1	µg/L	12-Sep-19	EPA200.8
Thallium	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Tin	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Titanium	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Uranium	0.3	0.1	µg/L	12-Sep-19	EPA200.8
Vanadium	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Zinc	< 0.4	0.4	µg/L	12-Sep-19	EPA200.8
Trace Metals, Total					
Aluminum	26.1	0.6	µg/L	12-Sep-19	EPA200.8
Antimony	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Arsenic	< 0.2	0.2	µg/L	12-Sep-19	EPA200.8

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Barium	23.6	0.1	µg/L	12-Sep-19	EPA200.8
Beryllium	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Bismuth	< 0.2	0.2	µg/L	12-Sep-19	EPA200.8
Boron	10.7	0.9	µg/L	12-Sep-19	EPA200.8
Cadmium	< 0.04	0.04	µg/L	12-Sep-19	EPA200.8
Cesium	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Chromium	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Cobalt	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Copper	0.2	0.2	µg/L	12-Sep-19	EPA200.8
Iron	50	5	ug/L	12-Sep-19	EPA200.8
Lead	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Lithium	3.4	0.2	µg/L	12-Sep-19	EPA200.8
Manganese	2.2	0.1	µg/L	12-Sep-19	EPA200.8
Mercury	< 0.01	0.01	µg/L	12-Sep-19	EPA200.8
Molybdenum	0.3	0.1	µg/L	12-Sep-19	EPA200.8
Nickel	0.3	0.1	µg/L	12-Sep-19	EPA200.8
Rubidium	0.6	0.1	µg/L	12-Sep-19	EPA200.8
Selenium	< 0.3	0.3	µg/L	12-Sep-19	EPA200.8
Silver	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Strontium	107	0.1	µg/L	12-Sep-19	EPA200.8
Thallium	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Tin	< 0.1	0.1	µg/L	12-Sep-19	EPA200.8
Titanium	2.5	0.1	µg/L	12-Sep-19	EPA200.8
Uranium	0.3	0.1	µg/L	12-Sep-19	EPA200.8
Vanadium	0.1	0.1	µg/L	12-Sep-19	EPA200.8

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Zinc	< 0.4	0.4	µg/L	12-Sep-19	EPA200.8

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* Taiga analytical methods are based on the following standard analytical methods
SM - Standard Methods for the Examination of Water and Wastewater
EPA - United States Environmental Protection Agency

ReportDate: Thursday, September 19, 2019
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During the Water Knowledge Camp, water samples were collected from the Great Bear River and sent to the Taiga Environmental Laboratory for analysis. Below we present the results of this analysis and provide some context for the results. We concentrate on three groups of variables that are important measures of water quality: 1) Variables related to nutrient pollution; 2) Variables commonly affected by industrial and agricultural pollution; and 3) Variables that are related to the natural features of a river's watershed. For each variable we show the variation in the variable for all sites within the NWT-wide Community-based Monitoring Program as well as the variation within the Great Bear River for samples collected at Tulít'a. Community-based monitoring data were obtained from Mackenzie DataStream (https://mackenziedatastream.ca/). Red dots on each figure below show the value for the samples collected from the Great Bear River at Marten River during the Water Knowledge Camp.

Based on the limited water quality results obtained from our sample during the Water Knowledge Camp, it appears that water within the Great Bear River is of excellent quality and we do not see any indicators for concern.

Category 1: Variables related to nutrient pollution: Total phosphorus, chlorophyll-a, total nitrogen

Table 1. Values for variables related to nutrient pollution measured on the Great Bear River.

Variable	Value
Total phosphorus	Below detection limit (<0.002 mg/L)
Chlorophyll-a	Below detection limit (<1.0 µg/L)
Total nitrogen	0.30 mg/L

The nutrients phosphorus and nitrogen are two of the most common water quality variables measured for lakes and rivers. High levels of these nutrients can lead to algae blooms, reducing water clarity and having negative effects on organisms living in aquatic habitats. Chlorophyll-a is an important component of plants and algae. It is the pigment that gives most plants their green colour and takes part in photosynthesis. In lakes and rivers, chlorophyll-a is a measure of how much algae is present in the water. Waters polluted with nutrients will have high chlorophyll-a levels.

The samples collected from the Great Bear River showed very low levels of chlorophyll-a and phosphorus (Figures 1, 2). The levels for these two variables were below the limit of detection for the instrumentation at Taiga Laboratories. The red dots on the chlorophyll a and total phosphorus figures below show the detection limit with a red dot, demonstrating that values for these variables fall below the median value for all NWT sites, and match well with values measured on the Bear River in the past (Figures 1, 2). The values for total nitrogen are within the range found for all Northwest Territories Sites but were slightly higher than the median for samples collected on the Great Bear River (Figure 3). The values for total nitrogen are not concerning and are within the range expected given natural variability.

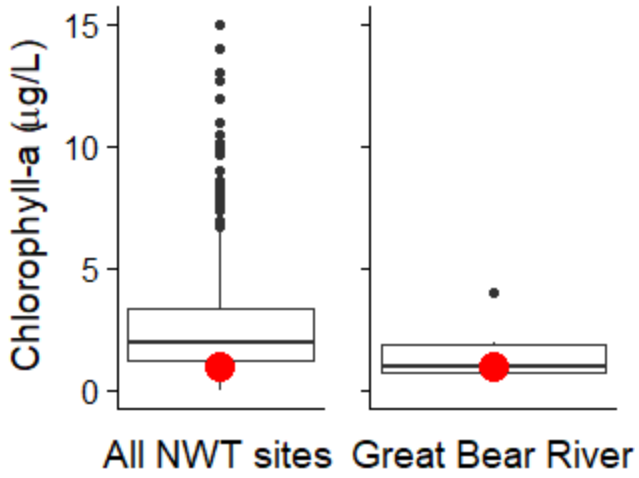

Figure 1. Variation in chlorophyll-a levels across all sites monitored in the NWT-wide Community-based Monitoring Program (left) and at the Tulít'a sampling site on the Great Bear River (right). The red point represents the value measured on the Great Bear River during the Water Knowledge Camp. In all figures in this report, the center line in each box represents the median value, the bottom of the box is the first quartile and the top of the box is the third quartile.

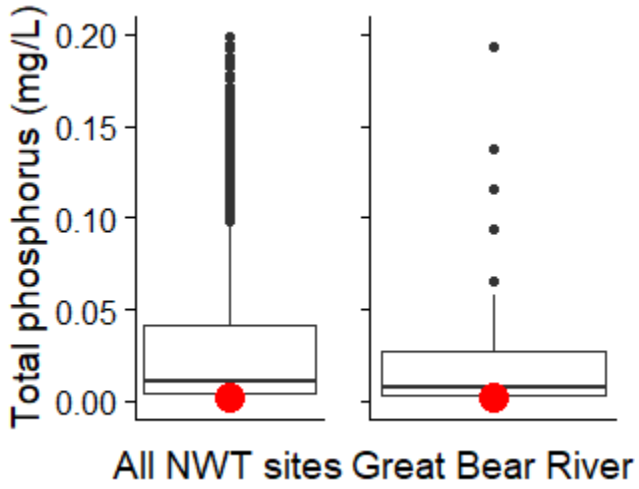

Figure 2. Variation in total phosphorus levels across all sites monitored in the NWT-wide Community-based Monitoring Program (left) and at the Tulít'a sampling site on the Great Bear River (right). The red point represents the value measured on the Great Bear River during the Water Knowledge Camp.

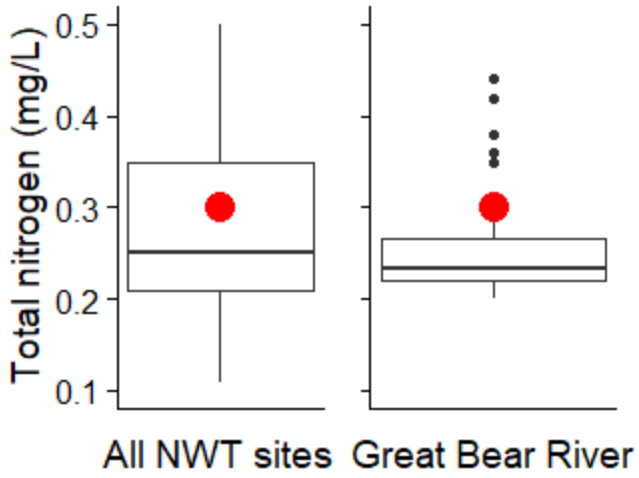

Figure 3. Variation in total nitrogen levels across all sites monitored in the NWT-wide Community-based Monitoring Program (left) and at the Tulít'a sampling site on the Great Bear River (right). The red point represents the value measured on the Great Bear River during the Water Knowledge Camp.

Category 2: Variables potentially affected by industrial and agricultural pollution: Total suspended solids, turbidity, conductivity, pH.

Table 2. Variables potentially affected by industrial and agricultural pollution measured on the Great Bear River.

Variable	Value
Total suspended solids (TSS)	Below detection limit (3 mg/L)
Turbidity	1.08 NTU
Conductivity	158 µS/cm
pH	7.86

Total suspended solids (TSS) is a measure of how much suspended material is being transported by a stream. Turbidity is a measure of how cloudy the water appears. Low turbidity corresponds with a clear stream. Increases in TSS and turbidity occur naturally during storm events and other periods of high flow but can also be caused by industrial development or deforestation in the watershed of a river. Conductivity measures how much dissolved salt is in the water, as more salt in the water makes it easier for an electric current to flow through the water. Industrial discharge and de-icing salts can contaminate rivers, leading to higher conductivity values. The pH of water is a measure of acidity and is mostly controlled by the type of bedrock in a river basin. Most natural streams have a pH ranging from 6-8. Mining and other industrial activity can lead to the discharge of acidic compounds that can lower pH.
Total suspended solids, turbidity, and conductivity in the Great Bear River were below levels for the Northwest Territories as a whole (Figure 4). The values measured are within ranges expected for rivers in northern Canada and are similar to values measured in Great Bear in the past. The pH level for the river also matches well with previous samples collected in the Great Bear river. All variables are within the expected range for a river that has not been contaminated by industry or agriculture.

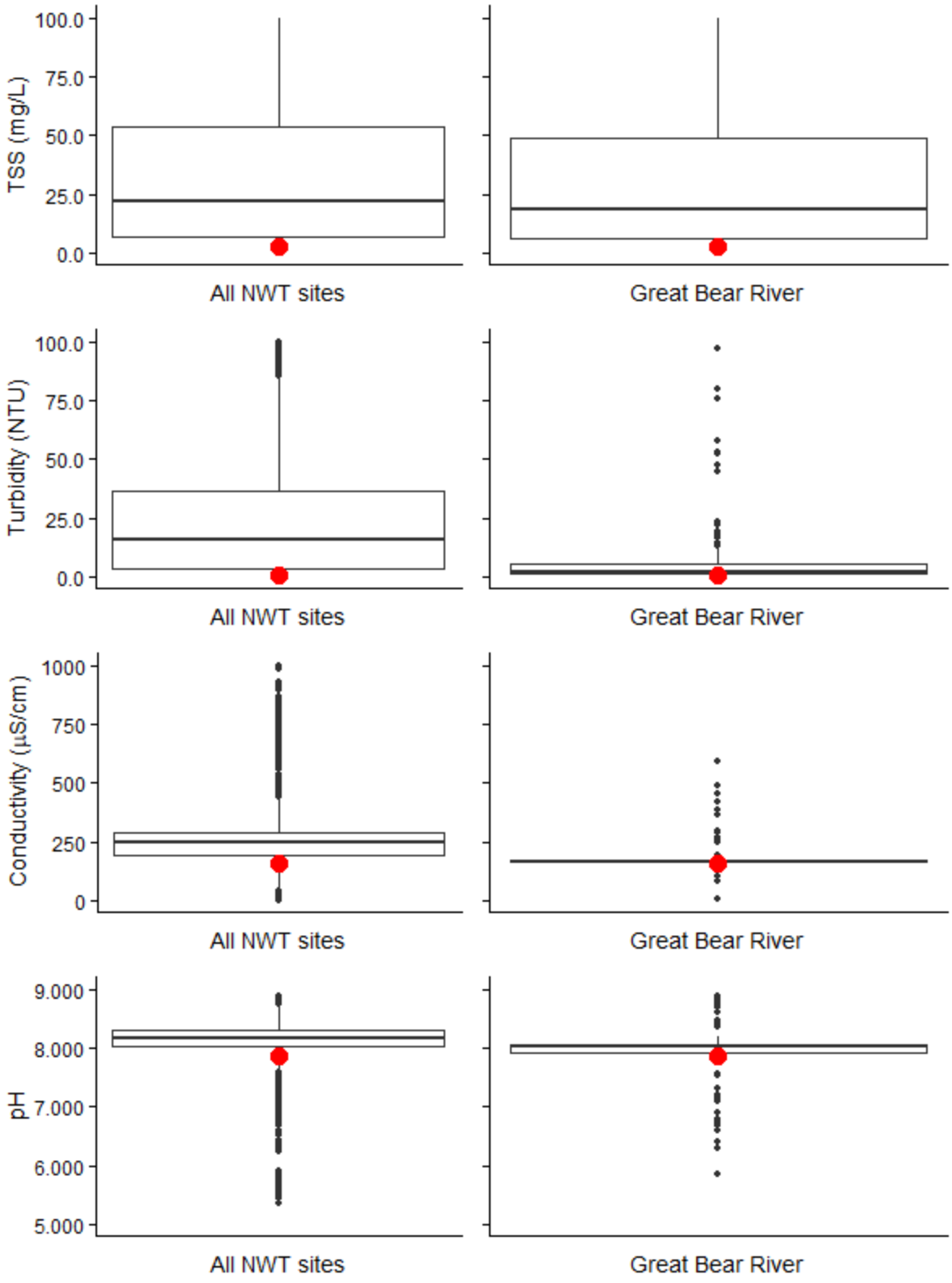

Figure 4. Variation in total suspended solids (TSS), turbidity, conductivity, and pH across all sites monitored in the NWT-wide Community-based Monitoring Program (left panels) and at the

Tulít'a sampling site on the Great Bear River (right panels). The red points represent the values measured on the Great Bear River during the Water Knowledge Camp.

Category 3: Variables determined by natural properties of the watershed: calcium, alkalinity, hardness, magnesium.

Table 3. Variables determined by natural properties of the watershed measured on the Great Bear River.

Variable	Value
Calcium	16.3 mg/L
Alkalinity	57.1 mg/L
Hardness	68.3 mg/L
Magnesium	6.7 mg/L

Calcium, alkalinity, hardness, and magnesium are interrelated variables that are determined by the geology of the watershed in which a river is found. Calcium and magnesium levels are often important for aquatic life, including bugs that live on the bottom of rivers. Alkalinity describes the amount of calcium carbonate in the water. Calcium carbonate acts as a pH buffer, so higher alkalinity levels mean that the water will resist changes in pH due to pollution or natural causes. Hardness is a combined measure of the amount of calcium and magnesium in water. Hard water has lots of dissolved minerals which can be beneficial for maintaining proper calcium and magnesium levels in the human body.

The levels of calcium, alkalinity, hardness, and magnesium all indicate that the Great Bear River has soft water without high levels of dissolved minerals. The values for all these variables are below the median levels for all sites in the Northwest Territories. The values are also similar to those measured at Tulít'a in the past. The low levels of these four variables in the Great Bear River is a natural consequence of the slowly eroding bedrock typical of the region.

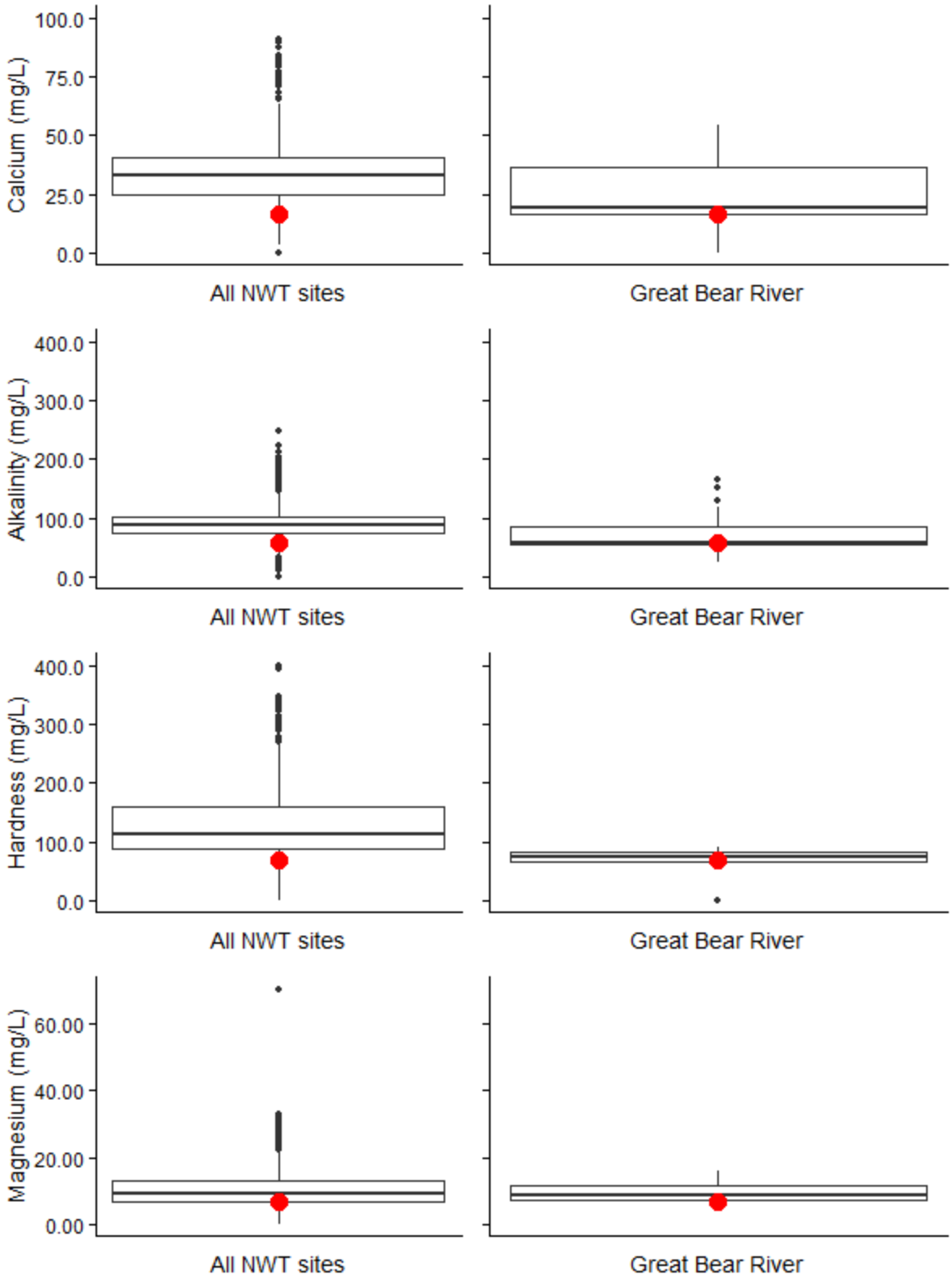

Figure 5. Variation in calcium, alkalinity, hardness, and magnesium across all sites monitored in the NWT-wide Community-based Monitoring Program (left panels) and at the Tulít'a sampling

site on the Great Bear River (right panels). The red points represent the values measured on the Great Bear River during the Water Knowledge Camp.

Appendix G: Focus Group Questions

Focus Group 1 – Drinking Water

Opening Question:

1. Do you have any stories you want to share about water quality for you and your community?

Preferences:

2. Where do you get your drinking water from? [Clarify whether they are referring to water in their home (tap water), community buildings, or from other places (lakes), or bottled water.] Why?

   Prompts: Are there seasonal differences in where you get your water from? What are the costs in general related to drinking water?

Quality perception:

3. What do you want to know about drinking water?
4. What are the main reasons why you think your water is safe or not safe to drink? Do you have concerns about the water that you drink?

   Prompts: Where or who did you hear from that your water is or isn't safe to drink? Does some of the tap water taste bad. What do you think? Do you drink water from the lakes, rivers or snow nearby? If yes, could you tell me why? Have you ever been told how frequently the tanks on the structures (houses, organizations) are cleaned? How about the lines? How about the trucks?

Availability/Access:

5. Do you limit the amount of water you drink? If so, why do you limit your water intake?

   Prompts: Concerns about how safe the water is? Cost of water? Difficulty getting water delivered to the household. Is there any other reason to limit the amount of water you drink?

Action

6. How can we work on the issues with water quality in our communities? What do you want to see happen in your community to improve knowledge about the drinking water?

Other:

7. Do you have any other stories you want to share about drinking water?

Focus Group 2 – Environmental Monitoring

1. Why is monitoring the land important to you? Who should do the monitoring? Does everyone have a role in monitoring? Do researchers/scientists have a role?

2. Are there places that you've seen change a lot over time? What do you notice now on the land that concerns you? Are there places you are concerned about? What do you want to monitor? Are there other things you'd like to map on the land (cabins, trails, traplines etc.)? Is there one thing you want to focus on (wildlife harvest? harvester safety?)

3. How do you want to monitor the land? Do you have access to a smartphone? Do you use your smartphone on the land to take pictures? How much information would you like to provide? Do you know how to use GPS? Do you own a camera? Is there any training you would like to receive to monitor the land?

4. How do you want to share the results/ data of the monitoring? Would you prefer to see it on a website? Or a print-out/ newsletter? On social media or Facebook? Are there results you don't want to share? What information about other research and monitoring would you like access to?

Focus Group 3 – Climate Change

Opening Question:

1. How would you describe yourself in relation to the land/how do you use/interact with the land?

2. Is the climate changing? Have you noticed changes in the weather? In the water? Is the landscape changing in a way that could be linked to climate change? What have you seen on the land that may indicate this change?

Concerns and Vulnerabilities

3. Are you concerned about these changes impacting your health? Is it harder to access to the land for water and food? How are these impacts on the land affecting you?

Possible Follow-up Questions:

4. Are you concerned that it is more difficult to be on the land? Is it impacting how you get country foods, how much country food you get, and what species you harvest? Can you comment on differences in the last 5 years? 10 years?

5. Is there a history of fire around the Tulít'a? How have fires impacted your ability to be on the land? Have fires changed how you use the land in the past? Do you have other concerns about forest fires in the region?