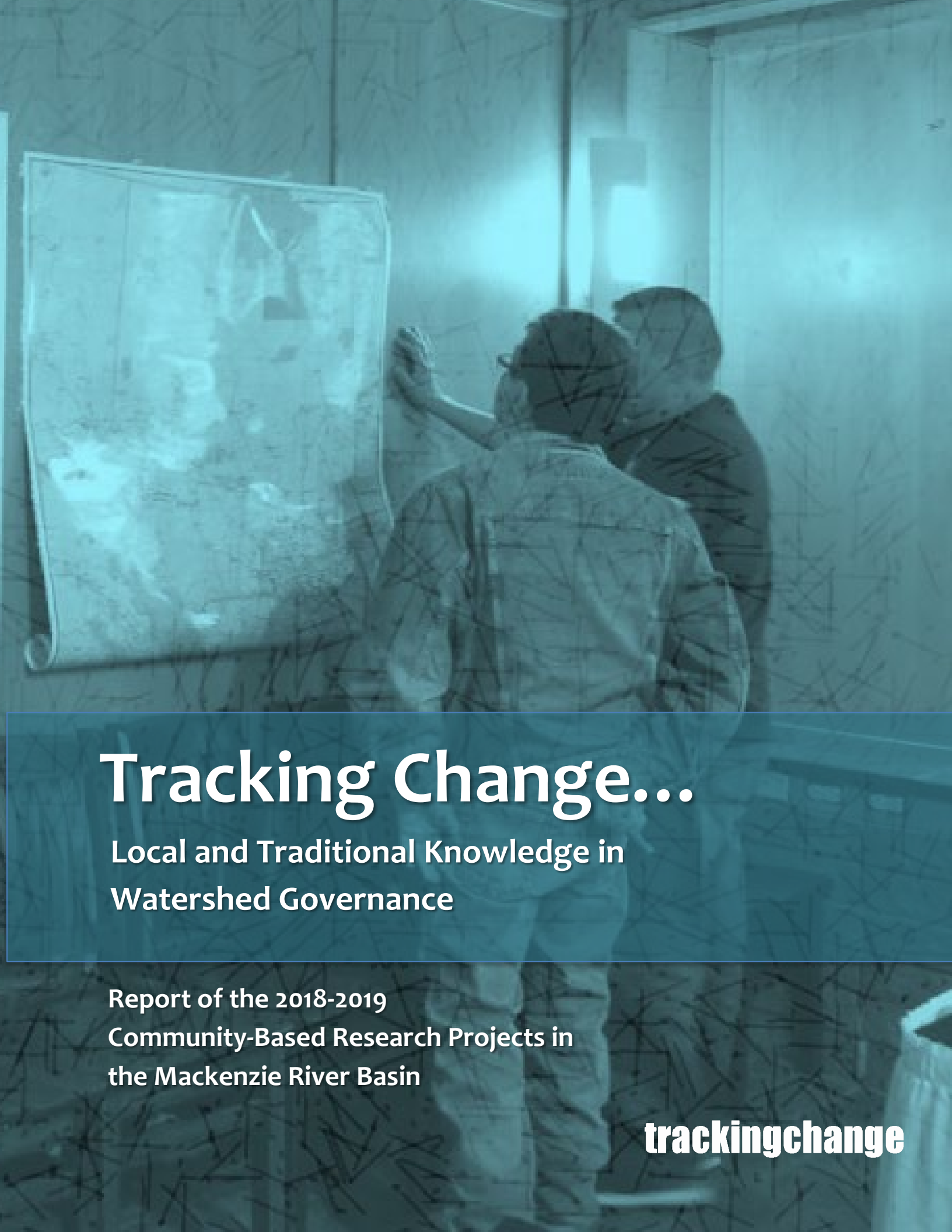

Tracking Change...

Local and Traditional Knowledge in Watershed Governance

Report of the 2018-2019
Community-Based Research Projects in
the Mackenzie River Basin

trackingchange

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Local and Traditional Knowledge in Watershed Governance

Report of the 2018-2019 Community-Based Research Projects in the Mackenzie River Basin

Elaine Maloney,
Tracy Howlett and
Brenda Parlee

(Editors)

Cover:
Placenames Mapping Workshop/Field Trip Participants
(Photo credit: Kevin Ahkimnachie, Treaty 8 of Alberta)

Inside:
Remains from the massive forest fire behind Desnethche. Burned landscape to the horizon.
62.775112, -108.901967.
(Photo credit: Lutsel Ke Dene First Nation)

Back:
The Mackenzie Basin
(Photo credit: The Mackenzie River Basin Board)

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Any opinions, findings, and conclusions or recommendations expressed in this report are those of the authors and do not necessarily reflect the views of these funders.

The report contributes to the project *Tracking Change…* which is a six-year research program aimed at building capacity for communities in the Mackenzie River Basin to document and share local and traditional knowledge about aquatic ecosystem change.

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Contact Information for Community Project Leads

For permission to cite from within the project proposals and reports and for more information about each project, please contact:

Kiyo Campbell, Fisheries Joint Management Committee fjmc-fisheries@jointsec.nt.ca	P.O. Box 2120, 107 Mackenzie Road, Inuvik, NT, X0E 0T0 Tel: (867) 777-2828 Fax: (867) 777-2610 www.fjmc.ca
Amy Amos, Gwich'in Renewable Resources Board aamos@grrb.nt.ca	105 Veterans' Way, Inuvik, NT X0E 0T0 Tel: (867) 777-6600 Fax: (867) 777-6601 **www.grrb.nt.ca**
Deb Simmons, Sahtú Renewable Resources Board director@srrb.nt.ca	ʔehdzo Got'ı̨nę Gots'ę́ Nákedı, P.O. Box 134, Tulít'a, NT Tel: (867) 588-4040 Fax: (867) 588-3324 **www.srrb.nt.ca**
Shonto Catholique, Łutsel K'e Dene First Nation, Wildlife Lands and Environment Department lkdfnlands@gmail.com	Box 28, Łutsel K'e , NT, X0E 1A0, Tel: (867) 370-7000 Fax: (867) 370-3010 **www.lutselke.com www.landoftheancestors.ca**
Melody Lepine - Mikisew Cree First Nation Government & Industry Relations melody.Lepine@mcfngir.ca	Suite A - 8219 Fraser Avenue | Fort McMurray, AB, T9H 0A2 Tel: (780) 714-6500 Fax: (780) 715-4098 **www.mikisewgir.com**
Joe Tsannie, Prince Albert Grand Council – Vice Chief jtsanniejr@pagc.net	Box 2770, 2300-9th St. Ave East, Prince Albert, SK S6V 6Z1 Phone: (306) 953-7200 Fax: (306) 764-6272 **https://www.pagc.sk.ca/**
Kevin Ahkimnachie, Treaty 8 First Nations of Alberta kahkimnachie@treaty8.org	18178 102 Ave NW, Edmonton, AB T5S 1S7 Tel: (780) 444-9366, Fax: (780) 484-1465 **www.treaty8.ca**
Corinne Porter, Dena Kayeh Institute denakayah@gmail.com	P.O. Box 76, Lower Post, BC V0C 1W0 **http://www.kaskadenacouncil.com**
Diane Giroux, Akaitcho Territory Government aarom.coordinator@akaitcho.ca	Box 1768, N'dilo, NT. X0E 2P3 Tel: (867) 873-9282 Fax: (867) 873-8738 **www.akaitcho.info**

*See Appendix 3 for a list of students affiliated with community-based projects.

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Overview

Tracking Change: Local and Traditional Knowledge in Watershed Governance is a six-year research program funded by the Social Sciences and Humanities Research Council of Canada, led by the University of Alberta, the Mackenzie River Basin Board, and the Government of the Northwest Territories, in collaboration with many other valued Aboriginal organization partners and universities. The broad goal of the project is to create opportunities to collaboratively document and share local and traditional knowledge (LTK) about social-ecological change in the Mackenzie River, Lower Mekong, and Lower Amazon basins and determine its role in watershed governance. The project aims to address the following themes and priorities[1]:

Themes and Priorities for *Tracking Change…*

- ✓ historical and contemporary observations and perceptions of conditions and change in the health of the **aquatic environment** (e.g., water quality, quantity, flow, groundwater, permafrost conditions);
- ✓ historical and contemporary observations and perceptions of conditions and change in **fish species** (population, movements, diversity, invasive species) and other **aquatic species** (e.g., geese, beaver);
- ✓ sustainability of **fishing livelihoods** (e.g., harvesting levels and practices, diet, health, access issues, perceptions of change in the health of valued fish species);
- ✓ implications of change for **governance** (e.g., maintaining healthy relationships to the aquatic ecosystem, maintaining respectful and spiritual relationships, respecting treaty

In 2018-2019, nine community research projects across the Mackenzie River Basin were funded (through a request for proposals process) including fish camps, canoe trips, youth-elder knowledge exchanges, workshops and gatherings, and semi-structured interviews. As in previous years, a 'toolbox' of methods was provided to guide research projects in ways considered synergistic (linked) to other projects in the basin.

The third year of research saw a few new projects introduced, and the continuation of a few from previous years. As in the first years, various oral histories, narratives, and observations were documented about local issues of concern and priority to local communities. In general, the 2018-2019 project findings aligned with those reported previously, however, this third year of funding focused more specifically on validating earlier results and filling gaps, with further evidence gathered through additional monitoring, and exploring how the results of the research might inform policy and governance of these regions.

[1] *These priorities were recommended in a workshop with the NWT Water Stewardship Strategy Aboriginal Steering Committee and the Mackenzie River Basin Board Traditional Knowledge Steering Committee (2016). Additional input was solicited from Aboriginal organization partners and other members of the Project Team.*

All nine of the approved projects (some deferred from 2017-2018) submitted project reports. These reports were produced by the following organizations:

- Inuvialuit-Canada Fisheries Joint Management Committee
- Dena Keyah Institute
- Gwich'in Renewable Resources Board / Gwich'in Tribal Council
- Sahtú Renewable Resources Board
- Łutsël K'e Dene First Nation
- Prince Albert Grand Council
- Mikisew Cree First Nation
- Treaty 8 First Nations of Alberta
- Akaitcho Territorial Government

The project reports are based on a set of guidelines produced by the Tracking Change Traditional Knowledge Steering Committee. They include a project overview, research about fishing practices, water and well-being and a summary of stewardship priorities and youth involvement. The project reports include quotes from Elders and project participants as well as additional questions or issues identified during each project.

In the following pages, each submitted report is summarized with an outline of the project, a discussion of 'What was learned…' and information about how youth were involved. As of the writing of this document, the full reports have not been made available publicly and the complete research datasets reside with each lead community. Contact information for project leads has been provided on page 5 if readers are interested in reaching out to the community research leads for more information.

Terminology that is used extensively in the Tracking Change project includes concepts such as *Community Based Monitoring*, *Local and Traditional Knowledg*e and *Capacity Building*. These terms, and others that may be relevant, are included in a glossary as Appendix 1 of this document.

New Insights

Fishing and being on the land are vital aspects of culture, identity and sustenance for all communities and regions in the Mackenzie. The river systems provide a rich source of nutrition and supply what many people require to live off the land. Alternative foods (store-bought) are expensive and often less desirable. Fish is a dependable food source for which there is no accessible alternative. As the waterways of the Basin are inextricably linked to well-being, changes in these waterways greatly affect the people of this region.

As in previous years, many oral histories, narratives and observations were documented about local issues of concern and of priority to local communities. The key themes and issues highlighted in 2017 built upon the many findings outlined in our 2016 report. New insights and observations noted this year include:

Validating Earlier Results

One objective was to build on changes documented in previous years. Many changes and common themes emerged, from changes in weather, in animal and fish populations, in water and waterways, and in the environment generally. Notable changes include lakes drying up and affecting fishing and hunting; high waters in some areas caused by heavy rains and beaver populations; rougher waters, turbidity and sandbars due to runoff and heavy rains impacting accessibility; water level changes and erosion affecting access; intense forest fires impacting water and habitats. Concerns were expressed regarding fish populations and the quality and quantity of fish available due to changing temperatures, water levels, and unpredictable weather patterns. Changes in the quality of fish (parasites, warm waters causing softer flesh) was also a common theme. Litter on ancestral lands was also brought to light. Changes have also been observed in fishing culture. For example, more harvesting is being done within communities because it is difficult to go 'out on the land' for extended periods. Other changes relate to technology and fewer traditional tools.

Applying Knowledge to Secure Futures

A second objective is to build traditional knowledge for land-based program management by strengthening community leadership—in research, monitoring and stewardship; exploring strategies for sustainable fishing; providing opportunities for cross-community, cross-regional and cross-cultural knowledge and skills transfer; and documenting traditional and evolving systems for knowledge transfer. The results of the research will be used to develop water and fisheries components of governance, and contribute to the implementation and further development of policy and water-related climate adaptation strategies using adaptive management approaches.

Spiritual Journeys

The experience of travelling the land is not only a cultural experience but a ‘spiritual journey’; fishing is an activity that keeps people connected with the land and culture. The 2018-19 results emphasized that land-based education, framed by deep philosophical and spiritual teachings of health and wellness is critical. The goal is to reclaim and reorient people to local worldviews and practices to honour who they are by experiencing the teachings in context.

Youth Involvement

All projects emphasized the importance of youth and elder interactions and connections and sought to provide youth with opportunities to spend time on the land and learn from elders and active fishers and encourage knowledge transmission between generations. The goals were to learn about fish and traditional practices; develop capacity for monitoring programs; gain training in fish sampling; pique interest in getting on the land to fish; and, foster interest in environmental sciences and land-based knowledge. Although community members feel youth should try and hold onto their culture, the hope is that they will also adapt to the changes observed and discussed and that the past will guide the future. Knowledge transfer has historically been through Elders and land users to the Youth, but now some of the old

ways can be improved with the use of newer technology, especially as language is proving to be a barrier to communication between generations.

The full list of findings from previous reporting years is included in Appendix 2.

Inuvialuit Knowledge of Fish Stocks and Habitat in the Mackenzie River Delta

Vanessa Cunningham, Fisheries Joint Management Committee, the Inuvik Hunters and Trappers Committee, and the Aklavik Hunters and Trappers Committee

In 2018/19, Tracking Change supported a project in the Inuvialuit Settlement region which included two on-the-land fish camps near the communities of Aklavik and Inuvik. The Aklavik Fish Camp was held from September 21-23, 2018 at Eddie and Florence Greenland's camp and the Inuvik Fish Camp was held from March 20-21, 2019 at Ellen Firth and James Maring's camp. During each camp, community members participated in activities such as fishing (e.g., net setting and jiggling), storytelling, cooking and meal sharing, etc. Each HTC conducted interviews with community members regarding environmental change, changes in water levels and access to fish/fishing. Interviews revealed concerns regarding water level changes typically attributed to changes in environmental conditions (e.g., permafrost thaw). Additionally, changes in fishing practices were discussed and questions were answered regarding changes in abundance, species, and timing of catch. The interview portion of the project allowed those who spend vast amounts of time on the land and waters to discuss what they believe to be the most prevalent issues in the region regarding fishing practices and environmental change.

What we learned…

Fishing and being on the land are most commonly related to well-being. Fishing is a vital aspect of Inuvialuit culture, identity, and sustenance. The river systems in the Mackenzie Basin provide a rich source of nutrition and supply what many people require to live off the land. Alternative foods (store-bought) are expensive and often less desirable. Fish is a dependable food source for which there is no accessible alternative. As the waterways of the Basin are inextricably linked to well-being, changes in these waterways greatly affect the people of this region.

Many changes have been observed in the last 5 to 20 years, and some common themes have emerged—from changes in weather, changes in animal and fish populations, to changes in

water that have affected the quality and quantity of fish species. Concerns were expressed regarding the quality and number of fish caught due to changing temperatures, water levels, and unpredictable weather patterns.

> *... As I was saying before this was a strange year… not only [for] people here in the delta... in Aklavik, but people that were at Shingle. …before I could… easily come home with 400 herring, salmon, whatever. [but] This year, talking to fellow harvesters they never even got 20! … Whitefish … is good but for char… we're … allowed to harvest up to 90, we only got 6 …. the weather was so damp, so rainy, so wet. … windy, … it's too windy to set your net … . Plus the water was dirty. …* (Michelle Gruben, 2018)

> *It was only once in a while. Long time ago, … People used to catch a lot of salmon … And then they were gone for 20 years nobody caught one, and then all of a sudden, … somebody caught a salmon and said, 'hey this never happened before we never seen this before.' It was. […] was always there […] long ago.* (William Storr, 2018)

> *…another thing to watch for when you're fishing is… how … the temperature of the water … make your fish soft. The… flesh of the fish .. and you know …can't work with it… it's hard to cut fish like that … like it just falls apart … It's not firm. So … I think it's lot to do with industry too down south… that we're affected by it… and … the dams. … I can't say much about the pollution …because … they have to take samples and send stuff … to the labs …?* (Allen Kogiak, 2018)

More parasites in fish

> *… Loche … started to get more … bad liver, bad eggs, ... You gotta throw it all away cuz it's no good. But …we see more parasites in the fish at Shingle…, … kinda the same, whitefish and coney. But … people notice … I [don't know] if that's to do with the water or,… fish being drowned in your net … […] … so soft you can't even cut [it]…, I would just either chuck that fish or […] roast it or something… And … the loche …[have].. more parasites at Shingle …. Salmon I've never ever seen any parasites. Char, maybe… the odd … worm … a little white worm. Rarely in… whitefish… loche … [has] that ugly liver and eggs and herring has got more.* (Michelle Gruben, 2018)

Contamination by industry

> *… we're fortunate here but … that water coming from south is bringing not only high water but … probably contaminants too…. In the 90s … they moved… our garbage dump and sewage … from where it was at one time, which was no problem, … to the current location … and they're dumping into that one lake... . And immediately after they … made that move, we start seeing problems.* (Allen Kogiak, 2018)

Beaver were spoken about by nearly all participants and their negative impacts to water quality and drinkability (beaver fever) as well as fishing practices, as they can block creeks, changing water levels and flow.

> *… in the 80s… there [were]… only so much beaver. Used to be scarce …. And now there's so many … that … last year … they put a bounty on them 'cause they're almost pests.* (Dean Arey, 2018)

> *And then … the beaver just overpopulate everything. We haven't [been drinking] any water from … up at our camp for probably 15 years. … we haul our water from here.* (Cheryl Arey, 2018)

> *… the beaver.. [is] the biggest factor because they dam… the little creeks … and they feed …. so there's … no minnows and stuff … I think that's probably a good reason for a number of fish we catch to be down.* (William Storr, 2018)

Many participants commented on changes in water including overall lower levels, off-season high waters due to unexpected precipitation, and more sandbars.

More rain creates high water. Water levels that become high unexpectedly affect fishing practices as high water is related to high amounts of dirt and silt. The increased turbidity and debris, makes it difficult to catch fish and necessary to dedicate more time to net maintenance and cleaning.

> *So we never used to see … high water … in the fall or fluctuating levels in the fall… . … now sometimes we'll have high water where it shouldn't be high, or it should be low… and this year … with all the rain … everywhere was flooding. … as long as [there is] high water there's lots of silt… . So as soon as you drop your net in… it's just black and stuff just sticks to it …. Pretty hard … to catch fish like that.* (Allen Kogiak, 2018)

Water level changes and erosion are concerns. Sandbars are typically related to lower water levels and increased erosion due to permafrost thaw. The low water levels appear to affect access to certain areas, but more often they produce safety concerns as boating in these location can be hazardous.

> *But now I notice it's not as strong as it used to be. And the water there is … getting shallower… . I used to find that when the nets were lower in the water… we get more char… But with the water being so low … it's changed… the eddy's not where it used to be. Lot of erosion.* (Cheryl Arey, 2018)

Lakes drying causing changes in accessibility

> *… we hit a sand bar and had to jump out of the boat and … rock the boat off […] 'Til we got off. It's really different compared to long ago. In the '50s, '60s, '70s even big boats used to be going back and forth… now they can't…. the rivers are no longer rivers and lot of sandbars.* (Renie Arey, 2018)

> *Now we can't even make it into those back lakes… they're… either dried out.. or we can't go through… have to go a different route ….* (Michelle Gruben, 2018)

Widening of rivers due to erosion is a common theme. This is typically associated with shallower water in rivers which, in turn, is associated with slower currents.

> *Yeah, they're quite a bit different […] A lot less water. […] … a lot of the banks have eroded. … some … rivers got wider … but they're shallower.* (William Storr, 2018)

> *… a few years ago now… we've been traveling down there since we were young… [we] did a lot of trips… and didn't really worry too much about sand bars, but now we get … sand bars about in every river. You can … get around those sandbars … there's … other ways around but … some places you can't get to. Like Running River, they can't use their camps there no more.*
> (Johnny Storr, 2018)

Permafrost thaw is a common argument for why erosion has increased which creates more sandbars, widens rivers, and lowers water levels.

> *… the erosion … in the rivers is when the ice moves …. it pulls the sediments out and… lots of erosion [...]. Filling the bottoms of the river … and making sand bars. Or there's low, low current ….* (Johnnie Storr, 2018)

Youth Involvement…

This program supported knowledge- and skill-sharing with youth through participation in the fish camps. Youth were hired as camp coordinators to provide leadership in the planning and organization of the on-the-land components. Others participated in camp activities, such as assisting with day-to-day tasks, which provided an opportunity to learn from elders and active harvesters. Youth were involved in interviewing and mapping information.

The goals were to provide youth with opportunities to spend time on the land and learn about traditional fishing practices from elders and active fishers and encourage knowledge transmission between generations; gain skills in leadership; and, experience in leading interviews and group discussions. The major accomplishments included knowledge transmission and relationship building between generations, and increased skills in traditional subsistence harvesting. Youth hired as camp coordinators were trained in program planning and gained valuable leadership experience. Participating in the interviews and group discussions exposed youth to different perspectives and trained them in the collection of information. The main challenge was providing sufficient leadership/support for the camp coordinator positions and providing a balanced structure to fish camp activities.

Harvester-Driven Monitoring of Broad Whitefish and Water Levels in the Gwich'in Settlement Area (GSA)

Amy Amos and Sarah Lord, Gwich'in Renewable Resources Board and Tracey Proverbs, MA Candidate, University of Victoria

In 2018/19, the Gwich'in Renewable Resources Board (GRRB) extended monitoring initiated in 2017 to the Arctic Red River at Tsiigehtchic and the Mackenzie River Delta (Peel Channel) at Aklavik. This allowed for a greater understanding of habitat use and population status of broad whitefish harvested in these areas while making it possible to produce baseline information for the detection of any changes that occur. Baseline data are vital for understanding how this important food fish will be affected by climate change and increased harvesting pressure by proposed commercial fisheries. The project employs five harvester-collaborators and has sampled over 800 fish in the first two years.

In addition to the expansion of monitoring programs, interviews with Gwich'in land-users regarding environmental change, changes in water levels, access to fish and traditional fishing areas and changes in the numbers and distribution of Pacific Salmon were undertaken. All interviews were transcribed (all recordings are held in Gwich'in Tribal Council Department of Cultural Heritage and University of Victoria offices), coded and are currently being analyzed.

What we learned…

Fishing and being on the land are most commonly related to well-being in the communities of the GSA. Fishing is a vital aspect of Gwich'in culture, identity and sustenance. The river systems in the Mackenzie River Basin provide a rich source of nutrition and supply what many people require to live off the land. Alternative foods such as those that are store-bought are expensive and often less desirable. Fish is a dependable food source for which there is no readily accessible alternative.

As the waterways of the Mackenzie River Basin are inextricably linked to the well-being of the Gwich'in Peoples, changes in these waterways will undoubtedly affect the region.

Interviews revealed concerns regarding water level changes, changes in environmental conditions, increased erosion, and changes in accessibility to important fishing areas. The interview portion of the project allowed those who spend vast amounts of time on the land and waters to discuss what they believe to be the most prevalent issues regarding traditional fishing practices and environmental change.

Some of the notable changes included: lakes drying up and affecting fishing and hunting practices; high waters in some areas caused by heavy rains and beaver; rougher waters impacting accessibility; dirty water and sandbars due to runoff and heavy rains; water level changes and erosion affecting fishing practices. Changes in fish species populations (more salmon, fewer herring) were noted. Concerns were expressed regarding the quality and number of fish caught due to changing temperatures, water levels, and unpredictable weather patterns. Change in the quality of fish (parasites, warm waters causing softer flesh) was also a common theme.

> *You get a lot less fish when the water is high*. (Harry Carmichael, 2018)

> *… weather get[s] hot we have to stead[ily] look at [the] net. And even … fish got soft because the water was too hot […] And then when [there's] no fish,… when it's too hot. The elders said … they go to the bottom … to keep cool.* (Emma Kay, 2018).

> *Well back when I was a kid we used to get herring […] galore. Both in the spring and fall. […] … I don't think they even run… here anymore. …either that or they… run at different times… . Just don't know. And we used to get really few coney. […] Now a coney run is quite common. You get … the one in … late June early July. […] And … then you'll get another one in the fall. […]. When I was a kid it was kind of something to get a …coney here. Probably only caught one … or a couple a week... […]. … I moved away from here in '77 and … several years later … I hear my dad… fished like 6, 700 coneys in the fall and I was surprised you know?* (Harry Carmichael, 2018).

Beavers are talked about by nearly all participants and they are related to having a negative effect on fishing practices due to the blocking of waterways.

Many participants commented on changes in water including overall lower levels, off-season high waters due to unexpected precipitation, and more sandbars. Sandbars are typically related to lower water levels and increased erosion due to permafrost melt. Low water levels affect accessibility to certain areas, but more often they produce safety concerns as boating in these locations becomes hazardous.

Water levels that become high unexpectedly affect fishing practices as high water is correlated with a high amount of dirt and silt. Increased turbidity of the water makes net-fishing challenging as debris is often caught in nets, making it difficult to catch fish and necessary to dedicate more time to net maintenance and cleaning.

We're not going to get anymore high water. Not, not floods. And … the reason I say that is because I remember the old people, … told us one time that when we have a warm … winter, it won't flood because the ground stays soft. And when the snow and everything melts, it goes into the ground. … since we start getting warm winters, I was, … thinking about it. I don't think we're gonna get, … any more floods, major floods. (Abe Stewart, 2018).

Well, you have a hard time to travel … for instance, last year I had traps set and, … it got big snow and … all the creeks opened up and I had a, a hard time to get to my traps… . I had to cut some trails around them […] and it really affects the muskrats and that because … there's not that much water for them anymore […]. There used to be… lots of muskrats. But I don't think we'll … see … lots like … before because […] you don't have that. The lakes are kind of shallow now. […] The whole delta is getting shallow, drier.
(Eddy Macleod, 2018)

Yeah we used to go 300 miles up Peel River […] watershed they call it […] And the last couple years some guys go about maybe 80 to 100 mile. And they have a hard time to go past there because not enough water. (Ernest Vittrekwa, 2018)

Youth Involvement…

Several young people were engaged in project activities and learned how to take fish measurements, sample and process samples, and how to conduct semi-structured interviews. They were involved in multimedia training, including using digital DSLR cameras and audio recorders to document camp activities and assist with interviews. One youth was employed to continue with sampling through the remainder of the season (Aug-Oct 2018). An additional youth was engaged through fall 2017 and winter 2018 to help with data input and post-processing of samples. Youth gained the opportunity to be at fish camp--on the land--with elders, sharing stories, knowledge, and experience between generations.

The goals were to **c**reate an opportunity for youth to learn about fish and traditional practices; develop capacity for monitoring programs; gain training in fish sampling; pique interest in getting on the land to fish; and, foster interest in environmental sciences and Gwich'in land-based knowledge. A further objective was to provide a summer activity/job for youth, and opportunities for elders to familiarize youth with Gwich'in stewardship principles and generate interest in pursuing careers in resource management opportunities like the Environment and Natural Resources Technology Program at Aurora College.

The youth gained important skills, and they were actively engaged in camp activities. Youth and knowledge holders/camp owners were able to spend time together, providing opportunities for knowledge and cultural transmission. Some challenges included finding enough interested youth for the Peel River fish camps and scheduling on-the-land activities around other jobs or commitments.

Keeping the K'áhsho Got'ı̨nę Fishing Livelihood Strong for the Future

Deborah Simmons, Leon Andrew, Kirsten Jensen Sahtú Renewable Resources Board, Harry Harris, Fort Good Hope ʔehdzo Got'ı̨nę (Renewable Resources Council) and Anne Marie Jackson, Fort Good Hope

Although fish harvesting techniques have changed through colonization and amongst generations, some people still retain important practices that keep them connected to the land. Fish has always been a food staple for communities of the Sahtú region, available when other foods like caribou and moose are scarce. However, ongoing climate-related changes are raising newfound concerns about the future of fishing and fishing livelihoods and culture. Since 2016 this project has focused on environmental change in and around the Dəhogá (Mackenzie River) through hands-on activities, participant sharing and interpreted traditional knowledge about the changing ecology of water and fishing livelihoods. In the summer of 2018, similar questions were explored during a fish camp in the K'áhsho Got'ı̨nę District and focused on working with and teaching the younger generation the necessary knowledge and skills in fish harvesting and preservation, and sharing stories about the changes that have been seen. The design of the camp focused on bringing entire families together. By using a family-centered approach, the camp promoted healing across generations and allowed for the passing down of family traditional knowledge while further encouraging the younger generation to participate in traditional fish camps, research initiatives in the region, and to learn about the environment and how it is changing. Through a collaboration with the National Centre for Collaboration in Indigenous Education (NCCIE) and the Community Researcher at the camp, Anne Marie Jackson, the camp was filmed in an effort to keep these lessons and stories for future K'áhsho Got'ı̨nę families.

What we learned…

This project brought together four K'áhsho Got'ı̨nę families from Fort Good Hope at a fall fish camp at the Lafferty family's cabin, where they have been fishing for decades. Lafferty elders Michel and Judy are known as expert fishermen and one of a few families that still practices

land-based harvesting 'out on the land' in specific camps outside the community. The first objective of this camp was for participants to have a greater understanding of traditional fishing practices, and fish and water ecology, and how these have changed. Through interviews, it became clear that most participants joined because they wanted to learn from Judy and Michel Lafferty given their vast experience on the land. Skills the participants were especially excited to learn include how to set up a proper fish camp (smoking/drying area, butchering tables, etc.), how and where to set nets , and how to prepare the fish itself (knife and butchering techniques).

A second objective was to build on the changes documented in previous camps. Changes have been observed in fishing culture. For example, it was noted that more harvesting is now being done within the community. With full-time jobs and their children committed to education, it is difficult to go 'out on the land' for extended periods. Some find it more accessible to set nets close to the community and harvest outside their homes with teepees at their doorstep.

Other inevitable changes relate to technology and fewer traditional tools. This includes the use of dog sleds. Now that most community members are using snowmobiles, there is less need for fish to feed the dogs, so fewer fish need to be caught and less time is spent at camps. Hunting has become more popular than fishing. This is partly because there are now more moose (another consequence of environmental change in the region).

Changes in the river include more open areas, landslides where permafrost has melted and where flooding and other factors have caused erosion. Break-ups have also changed, causing floods in some areas, and lower water levels in others. Ice is getting thinner which coincides with warmer winters.

One of the major changes is that the weather now is one month ahead of time, which means that you can't fish at the end of July anymore because the water is too warm and the fish rot or burn in the nets before you can get to them.

The long-term goal of this project is to strengthen the voice of Indigenous communities in the governance of the Mackenzie River. Local and traditional knowledge can help us understand and interpret the long-term patterns of both cultural and ecological change and the connection between the wellbeing of the river system and the community. Participants in the camp left with a greater understanding of traditional fishing practices, and fish and water ecology, and how these have changed over the years, as well as a new set of skills in traditional fishing practices.

Three videos were developed that tell the story of the Lafferty family. The first tells of how the Laffertys set up their cabin and spent time on the land and the changes in the climate they have noticed. The second describes the benefits of coming to fish camp and why the participants chose to join the camp (e.g., spending time with family, learning new skills and eating healthy foods and getting away from the distractions in town). Video 3 describes fish

harvesting techniques (seasons, types of fish to harvest and how to clean, prepare and dry the fish), as well as more general bush skills.

This project seeks to build traditional knowledge research and monitoring for land-based program management; strengthen community leadership--in research, monitoring and stewardship; explore community strategies for sustainable fishing; document traditional knowledge; provide opportunities for cross-family, cross-community, and cross-regional knowledge and skills and document traditional and evolving systems for knowledge transfer; develop water and fisheries components of the Sahtú Research and Monitoring Strategy (Nę K'ə Dene Ts'ı̨lı̨ - Living on the Land Forum); and, contribute to the implementation and further development of the NWT Water Strategy, including water-related climate change adaptation strategies.

Youth Involvement…

The younger generations learned directly from their elders on how to gather wood and keep the camp running smoothly. They also attended the interviews where they learned some of their histories and heard stories about the past. It became very evident that the skills were being passed on when the elders at the camp had to leave from time to time. When Michel had to go into town because the boat broke down, his grandson took on the role of gathering and chopping firewood. When Judy had to leave early for a moosehide tanning event she was leading, her granddaughter took charge of ensuring the fire was stoked, the dishes washed and the meals prepared. It was very inspiring to watch them come into their own and grow through this experience.

Three videos produced by the Community Researcher, Anne Marie Jackson and edited by NCCIE are available from the Tracking Change… and the SRRB websites (hosted on Vimeo). Use a QR Code reader to open the link directly from your smartphone.

The Lafferty Family	Importance of Camp	We Live with the Fish
https://vimeo.com/358890181/f01204a963	https://vimeo.com/358923195/07bc79794e	https://vimeo.com/359120928/90dc459ea0

Retracing Our Roots

Lauren King, Joseph Catholique, and Edward Drybones
Lutsel K'e Dene First Nation;
Wildlife, Lands and Environment Committee

The objective in 2018 was to record and interpret Denesoline Traditional Knowledge (TK) and stories transmitted during a multi-day travel experience. Eight participants (5 youth, an elder, a respected land-user, and a researcher) undertook a 7-day canoe trip to the spiritual gathering site (Desnethch'e). During the trip youth paddled from Shelter Bay into Desnethch'e, learned TK skills (paddling, orienteering, fishing, etc.), shared traditional stories and travelled along ancestral waters partaking in a spiritual journey. Youth took part in a life history interview before departure and an exit interview on return. One of the objectives was to document and understand how traditional land-based knowledge and narratives can contribute to Dene self-determination, land and water governance, and cultural livelihoods. The trip gave space to community members to express their stories and experiences with a specific interest in what TK narratives were shared on cultural, environmental, and social change, how these stories are used to transmit knowledge, how this knowledge contributes to governance, and what impact the land camp experience has on youth connections with the land, traditional knowledge, and culture.

What we learned…

Fishing is a recreational activity that also provides a major source of food for the LKDFN. Families in communities depend on locally harvested fish and go out fishing daily during the summer months. There are 35-40 (likely more) active fishers in the community who are passionate about fishing and monitoring practices, several of whom participated in interviews or collected samples for testing.

Mining operations in the north are quite abundant and community members are concerned about mercury and arsenic pollution. Community members are wary of eating fish from some areas around the mine and adjacent waterways.

…. I don't know. I think the water is getting contaminated. With, I think, arsenic. Arsenic. This the mine and people used to dump there…. (Eric Marlowe, 7/22/17).

Elders are worried that consumerism is pulling Denesoline away from their culture evidenced by the lack of drying meats and fish while at the spiritual gathering and the abundance of '*store food*.' Consumerism has also affected how goods and gear are prepared, contributing to a loss of traditional skills. As youth begin to focus more on education and making money to maintain their livelihood, it is not surprising to see how purchasing goods and technology have taken precedence over learning traditional skills Consumerism has also changed how people travel:

Back then you had to do everything by hand. You gotta take your time with it. Even landmarks, and travelling. You've gotta remember a lot. You've gotta sit, watch, listen, look closely. That's what he tells me. (Roger Catholique, 160-162, 7/21/17).

Every participant noted changes in water levels. The summer of 2017 was considered a 'high water' season, but the ongoing narrative is that water levels have been decreasing.

It went down quite a bit before but it looks like we got it back again.. In the old days, elders say we don't get water from anywhere but the barren lands. If there's a lot of snow in the barren lands, we get good water. Most know about that, in the barren lands, the water don't go down. Cause' that is where all the watershed comes from. (Eddy Drybones & Marcel Basil. 8/8/17).

Many community members mentioned the disappearance of small waterways and ponds. Canals used for travel (like those around Pike's Portage) were of particular importance.

The water dropped… Yeah a couple years ago. The ponds are dried up over here [referring to the ponds around Lutsel K'e]. (Sweetgrass Cassaway 7/21/17)

Image 1. *Lower water levels at Pike's* Portage 62.759166, -108.936728

'Climate change' was a consistent theme in stories of changes to the land. Discussions of climate change have been going on for years; however, changes within lifetimes have been noted. Community members say it is warmer than it was even a year ago in places they frequent often, but there are also fluctuations in climate year in and year out.

> *Climate change, that's for sure. I've seen lots of weather change. It kind of feels like it's always in the middle of July. Oh, yeah, it's pretty hot here. The weather just changes often. It rains, windy, it's stormy. Then it gets hot.* (Anonymous 7/21/17).

Climate change has been linked to pollution, fluctuations in water levels, and forest fires, all of which were prevalent themes of physical changes in Denesoline ancestral waters and lands.

> *Well, the weather's changing, but slow. I notice it's getting warmer.. But … some years it stays colder. Now it gets nasty when it gets hot, it's really hot. … . Other than that, …nothing much changes. Some years, there's some birds. Not as much as last year. …this year, those brown birds… used to pass through… not very many. But next year, there might be lots, so everything changes every year.* (Eddy Drybones, 1116-1121 8/8/17)

> *In the old days, elders say we don't get water from anywhere but the barren land. If there's a lot of snow in the barren lands, we get good water… . Land doesn't spoil too much water. Like people think it does. It doesn't. Because I know the earth is alive, it kills itself…* (Eddy Drybones, 419-428 8/8/17)

Forest fires have caused changes to the landscape. Many told stories about the huge forest fire behind the Spiritual Gathering site. Even today the land has a huge scar through it from the raging fires. The land around the area of Desnethche is very sacred. Denesoline travel there for a plethora of reasons but for some, it is to heal and pay respect to the Lady of the Falls. On the way to Desnethche, there are several areas that had recent fires:

> *In an area like that too, black sand and stuff like that. It's just a lot of burnt grounds to it, a lot of forest fires in the past. In the woods. I could tell it might grow. Regrow itself, animals come back. It's like a circle, I guess.* (Roger Catholique, 555-561, 8/8/17)

Image 2. *Remains from the massive forest fire behind Desnethche. Burned landscape from here to the horizon.* 62.775112, -108.901967

Pollution does not just relate to that of outsiders and mining but also to trash in the bush. Litter on ancestral lands is a major concern. Youth on the trip noticed areas where litter was prevalent on the land, in particular, the Ni Hat'ni cabin and on the portage into Shelter Bay;

> *I see little garbage and barrels. Not lots, just like in the area, like quite a long way you see something.* (Roger Catholique 8/8 17).

Image 3*. Litter along the way* 62.740037, -109.082330

> *They [outsiders/miners] don't care what's happening with that ground or anything. They want that money. But our people, …. They love the land. They love their water. They love to keep everything alive. So, it's different … Dene people, they love the land, they wanna' keep it …* (Eddy Drybones, 8/8/17).

Many of the youth face a language barrier when talking to Elders; many cannot speak their traditional language; many also express frustrations when they feel that their discussions with Elders are circular.

> *...I didn't really pay much attention … when they're talking in Chipewyan, but now I start to pay attention more. Because when my grandpa passed away he told me to listen to what everybody has to say in Chipewyan.* (Eric, 199-205, 7/21/17).

However, these barriers do not deter youth, and all the participants noted that a major reason for participating in this study and travel experience was to re-connect with their culture.

> … Makes me want to learn my culture more … to pass it down. So I could teach the youth, so they can know what's up. I've always enjoyed being in the bush and being Dene and wanting to know my culture. … (Sweetgrass, 209-214, 07/21/17).

Although community members feel youth should try and hold onto their culture, the hope is that they will also adapt to the changes observed and discussed and that the past will guide the future;

> *You know, all the stories about the old day, but you can't think about that all the time. You gotta think about the new ways.* (Eddy Drybones, 702-703, 8/8/17).

Changes in wildlife behaviour was a consistent theme. Many told stories about when they'd have to chase caribou off the runway for the planes to land. Many remember shooting Caribou a mere few steps from their front porch.

> *Cause' … a lot of the changes I've seen … from the animals, they're not … around. … The mining and the cutting, trying to stop a natural disaster. Gotta protect the land, try and keep it as pristine as it was a thousand or a hundred years ago. Like how our ancestors kept it. Because the land is very important to us. The animals, we are all just a part of nature. That's how I was taught. You have to respect nature because you can't control the weather….* (Roger Catholique, 7/21/17).

The movement of wildlife from ancestral to new locations is not exclusive to caribou. During the trip, and even while in town, we came across a solo musk ox in dense brush, which is abnormal.

Image 4. *Solo Musk Ox just outside town sizing us up in the van* 62.352397, -110.646733

The experience of travelling the land is not only a cultural experience but a '*spiritual journey.*' For many youths, the route brought up memories of past Elders before their passing. To travel the land like this was a way in which they could pay their respects. Getting to pay respects for prior Elders, and to see the land which they cherished is of major importance to youth, as is instilling the pride to maintain LKDFN governance toward ancestral lands. For many youths, travelling the land is a way to reconnect with family and experience life from their perspective. Many youth discussed places their families had been and the importance of seeing the places in the physical and not just through stories.

> *Last time I talked to my grandfather I told him I was going on this canoe trip and he was really happy for me. Yeah. So does it almost feel like this was a way to like connect with your grandpa, or to like… Yeah, cause his grave's here.* (Anonymous, 151-161, 08/08/17).

> *… my dad would tell me "this where I went hunting once" or "this is where they stop when they go." That is usually about it. I would see them as pretty interesting. Knowing where he'd been. Feeling like I'd been there too with him.* (AJ, 72-80, 07/21/17).

The LKDFN community wants to continue to focus on TK and youth involvement with programming like Ni Hat'ni, Youth Wildlife Monitors, Tanning Camp, Culture Camp, and canoe trips. This study was built on existing capacities of land monitoring and the Dene way of life. There is an incentive to continue to build these capacities with youth and within the community so that these programs endure.

> *I think this experience, everyone should do, that's young. Cause it's great for them. Makes you feel like … Marcel said; more responsible for your own things, feel pride in those things and to be positive…* (AJ, 275-281, 08/08/17).

It's important that the capacities that already exist and the decision-making process of those within the community are respected.

Youth Involvement…

Youth were involved in learning activities such as:

- Travelling the land with a local Elder and land-user;
- Learning about TK skills and traditional stories associated with the travel experience; and,
- Managing self-confidence and using their skills.

Some of the major accomplishments were that youth: felt 'empowered;' were able to 'experience their culture;' learned TK skills from a respected Elder and land user; generated their own stories to share with future youth and the current community; and, developed a desire to get out on the land more often. Some of the challenges to achieving the goals were: tight timelines; youth lacking land skills (many youths could not start a fire, or paddle effectively, etc,); and, the researcher feeling like an outsider. It is important that the researcher spend time in the community to gain the respect necessary to partake on a spiritual journey with participants.

Denesuline Perspectives from the Hatchet Lake First Nation Sector Gathering: Tracking Changes in Lakes and Rivers in the Athabasca Region

Vice Chief Jose Tsannie, Chief Bartholomew Tsannie,
Rosalie Tsannie-Burseth (PhD Stuent),
Prince Albert Grand Council
and Herman Michell, Consultant to PAGC

Denesuline Elders and Traditional Land Users were interviewed at Hatchet Lake First Nation in Wollaston Lake Saskatchewan to share local and traditional knowledge about the social-ecological changes occurring in the lakes and rivers in the Athabasca region and to determine roles in watershed governance. This research builds on interviews that took place in the community of Black Lake in 2017. Hatchet Lake First Nation is an adjacent Denesuline community. Interviews were completed, audio recordings have been transcribed and are held in the PAGC offices. Selected quotes from the interviews are used in this report.

What we learned…

Fish is a reliable food source that the community depends on daily. Families in Hatchet Lake First Nation depend on locally harvested fish on a year-round basis to offset the high cost of store-bought food in the region. The main species harvested are Lake Trout, Lake Whitefish (Crooked Back), Grayling (Bluefish), Loche (Burbot), Jackfish (Northern Pike), Sucker, and Walleye. There are 10 commercial and 20 subsistence fishers in the community; many who participated in interviews and collected samples for testing.

> *Now, I think we have lots of trout. The outfitters take most of our fish. Back then, we had lots of fishermen, but times were different. They would go fishing even if the lake was rough. It was a way of living.* (TJ)

Historically, Denesuline used fish traps, nets, weirs, hooks and various other tools.

… they had trap nets. And the fish … went in there and they [would] pick what they want and released the others. …. (NC)

Fish weir. People also … used birch to make traditional fishnets. … This is only used in summertime. Our people used to make bait for fish from anything. They would use squirrel meat as bait and leave it over time. People made hooks too. (AJ)

… people use to make fishnets. It was made of some cloth and given out on treaty days. It wasn't nylon. Nylon came later. … They also used a big fork like weapon for fishing. …. They speared fish this way using this weapon. … It was made from caribou antlers. This was spearing for suckers. 1700s I believe. (PJ)

Using fishing rods, poles, no auger used to drill holes in the ice. They used to find ice ridges (cracks in the ice) to fish. In the spring, they used to make a fire and heated rocks. They put the heated rock on the ice, and the heat melted the ice until it melted through. …I was told they carved a piece of wood to make a hook, they would set the stick across the ice hole, and when the stick moved, they would pull the fish up. Dad told us sometimes it broke the stick. I just heard of this type of fishing; I have never seen it. (JD)

Fishing is declining for various reasons.

Fishing is not popular anymore. Fishing has declined. It was a way of life for us, we had no welfare. We worked hard fishing. Our ancestors fished even though they had little. No jobs back then. We worked hard, getting ice, making ice shack. We struggled. (PJ)

Nothing for commercial fishing. The store buyer in Prince Albert has closed and also our local fish plant. But for fishing to eat, it is our treaty right and we continue to practice that right. George also talked about his encounter with a conservation officer threatening him about fishing a while back. (GSP)

The health of the waters and rivers is inseparable from the health and wellness of Denesuline Peoples that live in the Athabasca region. Water is life. Without water, there is no life. Dene peoples believe that all humans come from water. It has spirit. It is alive. It must be respected. Humans and animals depend on water for existence. Water is a gift from the Great Spirit. Dene peoples have been protectors of their waters and lands from the beginning of time. They have Traditional Knowledge that dates back to pre-contact times. They know firsthand when there are changes on the lands and lakes.

There are many changes these days. It is not the same as when we first moved here back in the old days. In those days, the weather was calm, you can hear what is happening across the bay because it was that calm on the lake. Nowadays, the lake is always rough and have huge waves since people started commercial fishing and outsiders come in. The lake is reacting to strangers on the lake, is what we believe. …. So, yes, huge changes have occurred. … Even

> *some rivers have changed and ran out of water. I don't know why. …. When you are out on the land, you notice many things and when you do, you see the changes that have taken place. Even the animals have changed. They have changed their ways. You can't consume most of the animals these days as we did at one time. Our people used to pass down stories to us, in one of the stories, elders predicted the land will change by doing things backwards. ….* (GSP)

> *I still drink water from this lake. I never heard of anyone [getting] sick from this lake.* (AJ)

There have been changes in water quality, flow, and water levels

> *Water level [has] changed. Land [has] also changed. … [there are] strong winds and more rain now.*
> (PJD)

> *When I boat, I feel the change, I feel something changing. Like, land … it is changing. When I boat the air is cold.* (JK)

Traditional Ecological Knowledge, stewardship, and harvesting practices based on Dene Laws and values are inseparable from health and wellness. The people, land, lakes, river, animals, and fish are interdependent. Some of the interviewers talk about unhealthy and deformed fish. Other animals depend on fish for their existence. When one aspect of the life cycle is destroyed or misused, there is a domino effect. Imbalance occurs that leads to sickness and ill-health. The people are profoundly impacted on many levels.

The interviews conducted in the Athabasca region clearly send warning signals the lands and waters are being impacted by industrial activity, forestry practices, climate change, forest fires, and extreme weather conditions. Some of the interviewees talk about the depletion of animal habitats and disappearing caribou herds both barren land and woodland. More intensive on-going research and monitoring are strongly recommended complemented by restorative action, political will, and humanitarian wisdom.

> *Some fish are different. Some have scars. One time we ate fish and it tasted different. One time I caught a fish and it had something inside its stomach. They were round. I threw that fish away. That was by Gilly's island*. (PJD)

> *There are boils on fish. I caught some trout and it had boils. White fish never used to have boils but they do now. If fish have boils, they are thrown away.* (AJ)

> *Some fish have big heads and are long and skinny. It never[used] to look that way. I'venever seen growth on fish, just from scars.* (TJ)

External outfitters in the north threaten livelihoods:

> *Tourism is not good for us. They don't hire local people. It will be a big thing for us. There are lots of outfitters on this lake.* (NC)

> *… Money controls everything now. Outfitters used to hire our local people but they don't anymore. …. Outfitters buy licenses and are allowed to fish all over our lake; we seem to have no say. ... If we try to ask for a license on our own lake, we are told someone or some outfitters have the license to fish on that area of the lake. No consultation with us, the locals who have [been] living here for long time. If people are not actively fishing with that license in two years, it gets taken back. We want to be able to fish … but we are not a priority. The government favors them. It belongs to us but I don't think it actually does belong to us now.*
> (AJ)

Elders in the interviews talk about the changes in Dene culture. Many youth do not know their traditions, ceremonies, and teachings of stewardship. Land-based education framed by deep Dene philosophical and spiritual teachings of health and wellness is critical in K-12 schools, outreach programs, and post-secondary institutions. The goal is to reclaim, re-teach, and re-orient people to their Dene worldview and practices to honour who they are. More importantly, they need to share what they know about stewardship with scientists and external people who come to live and work in the Athabasca region. Traditional land users and Elders—both women and men—are essential in this on-going work. Documentation and curriculum development are recommended so Dene knowledge is not lost.

> *Our ability to work for ourselves… living off the land… that was our way of life. We made a living this way …. People worked hard but were happy. Work made us happy. If a person has many children, they would be working constantly up north; the land provided for them. Our lifestyle has changed and you can see it in young people. Their behavior is different from our ancestors.* (GSP)

> *Back in the day, our ancestors respected the land. We respected the land and we pay the land and water. Nothing was wasted nor destroyed. We used to use caches, …. We survived by those caches. We have cultural things happening, we should use at least three elders to teach our ways. Even our language is changing. At cultural events, we see and hear young people's language. Their language has changed. … We teach them proper way to saying words in Dene. English language is strong now.* (GSP)

Denesuline peoples are protectors of their treaty rights and treaty relationships. Dene sovereignty, governance, and cultural identity are inseparable from the care and stewardship of the land, water, wild foods, and resources. Dene Peoples have retained their traditional worldview that frames their culture, language, value system, and practices that reinforce sustainable stewardship practices and traditional harvesting protocols. There are hunters,

trappers, fishers, and gatherers that depend on the land and lakes for survival. Dene laws and protocols are based on respect for the natural world.

Capacity-building is important in environmental stewardship. Dene peoples need to be trained and supported in becoming champion protectors of their lands and waters. Training of land and water guardians must include traditional ecological knowledge (TEK), western science, traditional stewardship practices, First Nations' history and knowledge of treaty rights and treaty relationships. On-going, multi-year projects are needed to monitor Dene lands, lakes, and rivers. More importantly, green energy projects are essential in the north with appropriate funding that will lead to new economic opportunities.

Several recommendations were made from this Gathering:

- Curriculum changes to reflect Denesuline values and respect for the living water.
- Climate change awareness; combating climate change.
- Water stewardship management policy.
- Land-based experiences for youth.
- Denesuline land-education, watershed education, language, culture and history must be taught in Dene schools.
- Gather elders and youth to dialogue about water to understand future water issues – develop policy to water rights on Denesųłįne terms.
- Effect changes in policy to reflect fishers' concern – fishing rights, treaty rights.
- Encourage water and land gatherings that bring elders and youth together.
- Invest in local environmental testing: water, air, and plants.
- Develop training for elder and youth watershed steering committee.

Youth Involvement…

Youth involvement included assisting in interviews with fisher-people and elders, and participating in the pre-interview workshop. The goals were to learn protocols regarding land and water, traditional Dene values that respect all living things, traditional place names, traditional ways of fishing, the history of commercial fishing, traditional ways of fishing, and, to encourage participation in the fishing industry and family sustenance. Youth learned about their own history and why fishing is important to fisher-people and elders. Also important was the acknowledgement and confirmation that they will one day be involved in the commercial fishery. Some of the challenges were that some students did not understand the concepts or language, (the researcher assisted in translating for the youth while they listened to elders), and some had no knowledge of fishing history, while the majority knew or helped in commercial and family sustenance fishing.

Youth also learned the names of islands, the majority of islands were named after fishermen; local and non-local people. There is a story to every island, and the youth really enjoyed the storytelling portion of the project.

Placenames and Oral Histories of Change in the Peace River Sub-Basin

Kevin Ahkimnachie, Sharlene Alook and Dustin Twinn, Livelihood and Climate Change, and Elders Committee Treaty 8 First Nations of Alberta

Many kinds of change have happened over the last 100 years in the Mackenzie River Basin; some of the most significant have been in northern Alberta's Peace, Athabasca and Slave River areas. This region falls within the Treaty 8 territory; the area called 'Beh Shih Ne' in Dene (South Slavey)—the river is called 'Deh', 'Tsa gheh' in our languages.

Five workshops involving elders from many communities were held between June 2018 and February 2019 in Edmonton, Wabasca, Slave Lake, Fort McMurray, and Peace River. The workshops provided a forums in which to document and verify place names in three languages (Dene/Beaver, Cree and Denesoline). They used 1:250 000 and 1:50 000 scale wall maps as well digital maps on google to assit in identifying locations.

Participating elders from across the region worked to identify key place names based on their own knowledge and experience and in their own languages. Translators were involved to ensure the names were recorded accurately. The names are written in hard copy on the maps and later digitized. Where possible, elderswere also interviewed (audio/video recorded) to share knowledge about the places and details about the name. The questions used to prompt the answers included:

- *What is the name of this place? Why is it called this in your language?*
- *What is the best English translation of this name?*
- *What are your earliest memories of where, when and how people used to use this area (e.g., fish or travel)?*
- *How has this place changed in the last five, ten, twenty, fifty years or earlier?*

Eleven individuals were interviewed, including nine elders, the Treaty 8 Grand Chief and the Director of Livelihood and Climate Change of Treaty 8. Permission was sought from participants to record the interviews. The interviews were semi-structured, and each interviewee talked about what they thought was important to them. Approximately 70 pages have been transcribed to date. The data has been analyzed and coded. The data, interviews, and knowledge gathered are held by Treaty 8 First Nations of Alberta. The information can be shared with partners and sharing of the information will be guided by the application of First Nations OCAP (Ownership, Control, Access, and Possession) standards and principles

A preliminary boat trip was planned for the North Peace River to conduct on-the land interviews and place names work to learn more about the social, ecological significance of the place names and 'stories' of change. However, the initial boat trip could not be completed because of inclement weather.

A later boat trip took place in the Peace River region from Fort Vermillion to Garden River including the communities of Fox Lake, Chateh, Garden River and Jean D'or Prairie. The trip began with a feast at Beaver First Nation; travel launched from Fort Vermillion Bridge to Little Red River First Nation (Garden River) on the Peace River. Elders/knowledge keepers shared firsthand knowledge about oral histories, land stewardship, linguistic and world views, customs and traditions, and knowledge of the lakes and rivers of the territory to impart wisdom on preserving the lands for future generations. The community impacts were documented, as well as TEK and possibly knowledge transfer.

What we learned…

Oral Histories about Social and Ecological Change

Elders in the Treaty 8 region were interviewed about water quality, flow, water levels and other aspects of aquatic ecosystem health across the basin. There was also a lot of concern about the health of fish populations valued for harvesting; what can we learn from elders and fishers about the fish species that people value? How are changes in the health, distribution, diversity and abundance of fish affecting the livelihoods, economies, health and culture of communities in the Mackenzie River Basin?

- How did you and your family travel on the Mackenzie River in the past? What travel routes were most important? Have you noticed any changes in the areas of the river system where people can travel? What kinds of changes have you observed? Are there some areas that have changed a lot? Do you know any stories about these places from grandparents or others from very olden times? What were these areas like in the 1930s, 1940s, 1950s… etc. the past five years?
- What are your earliest memories of where, when and how people used to fish in this region?
- Why were these important areas for fishing? (Can these be identified on a map)? Why were these places important to you/your family/your community? For example, are there fish camps that you can identify that used to be important or are still used today?

- Do you remember these fishing locations changing seasonally, from year to year or over time? If people have stopped fishing in some areas, why did people stop fishing in these areas? What do these changes mean for people (i.e., food, wellbeing, way of life, passing of knowledge, etc.)? How did people cope with the changes going on in these areas? How should these areas be cared for in the future**?**

Elders shared a great deal of knowledge. Some of the changes observed over time are included here from their perspective.

> *The lake, the Lesser Slave Lake... I have seen big changes in my time. I saw it go from a productive lake to a sucker polluted lake. They wiped out everything, and how they wiped out all the different species was they had mink ranches along the lake. And they were harvesting herring out of that lake. Herring is a pretty small fish, so in order to catch it; you need to have a small mesh net. Well, when you have those kinds of nets set out in the lake, you catch everything. That's how they ended up destroying all the native species of that lake.* (Elder, Sucker Creek First Nation)
>
> *Today is so different; life is different, the climate is completely different. I say that because we live on a hill, and below the hill was the road, and in the winter time, when the wagon went by, all you see was the top of the horses and the guys sitting on the wagon sit, you did not see the wagon, you did not see the legs, that's how deep the snow was.* (Sturgeon Lake First Nation)
>
> *The only way the lake will rectify the damage that was done is to leave it; it will heal itself. The lake is there, but is not the same lake, I remember as kid I could smell the water, I could hear the roar of the waves, you don't hear that no more. It is a dead lake. Like dead in comparison to what I remember, you know there is a lot of algae, we can't drink the water, when I was a kid I used to go down the lake and pail the water, we can't do that anymore. Our creeks, rivers they all have some kind of chemicals flowing down them, you are scared to drink it, you have to boil the water, make tea to have a drink before you go into the bush and can drink water right out the creek and the river.* (Sucker Creek First Nation)
>
> *Because of these industries and everything else we don't consume our wild meats and things. Now we go to the canned meat, ok now. Changing so much on the diet, our diet, consuming all these stuff that is in a can, people are getting diabetes, more and more all the time, whereas before there was none that I know of,… no I don't think [there was] diabetes[a] long time [ago]. Now what's happening, cancer, that comes from our diet, that's where it comes from. The big change in diet, that's where it comes from, diabetes, cancer and whatever else we have right now. Even the kids born kind of deformed … some places and everything else… right now that's because the stuff they eat, the diet.* (Elder, Swan River First Nation)

Too much, there is too much logging, too much industry, all over... Before, when I was young, we used to go across the river and hunt…, now today, you go across the rivers, and I don't know, you may get something, or you may not.
(Elder, Duncan's First Nation)

Youth Involvement…

To date, youth have not been engaged in this project; however, it is intended that the Placenames Atlas web tool that is being developed as part of this project will become a resource for teachers across Treaty 8 and that students will become engaged in learning language through placenames.

Tracking Change in the Peace Athabasca Delta through Community-Based Monitoring

Melody Lepine, Jocelyn Marten, Mikisew Cree First Nation – Government and Industry Relations
and Bruce Maclean, Maclean Environmental Consulting

The Mikisew Cree hosted a 5-day whitefish camp in the Peace Athabasca Delta in 2018, which brought together fish scientists with Elders, in order to co-develop a culturally and scientifically relevant monitoring methodology, which included monitoring and management triggers, ultimately designed to protect Mikisew rights.

Index gillnets were placed in Lake Claire and whitefish were sampled for polycyclic aromatic compounds, mercury (Hg) content, k-values, age and sexual maturity. In-depth interviews were also undertaken with Elders to create an Indigenous Knowledge index to gauge overall fish abundance and health.

Findings from this camp and subsequent research have been used to develop a long-term whitefish monitoring program. This will integrate with ongoing efforts of the existing Mikisew Community Based Monitoring program.

What we learned…

> *In the summer, I come here and hunt. That's what we used to do. Long ago we used to stay here, my family. All summer all we would do is fish and hunt, stuff like that. We used to have a lot of dogs and the only way we could feed them is fish, so that's what we did is fish. My mom used to make dry fish and feed the dogs and other kinds of fish. All my life I spent, I was growing up here, that's what I was doing, hunting and fishing.* (Mikisew Elder)

> *It's more like dark red, that's a good liver. The fish is more lively when you catch it in the net. I seen them catch yesterday, when they checked net, I seen them when they gut them open, that's a good fish line. I will always go by the liver, then I know I'm eating the right fish.* (Mikisew Elder)

Mom would boil it in a pot with all she takes from the Whitefish and the sucker heads. All in one pot and that's how I got to like sucker heads. (Mikisew Elder)

Changes (observed since the development of the Athabasca oil sands):

- Increase in Lake Trout catch – moving into areas of the Peace Athabasca Delta from Lake Athabasca as a response to the closure of the commercial fishery.
- Increase in deformities, such as:
    - Presence of pimples/ skin tags on the flesh; pushed in faces
    - Short little faces; crooked tails; bulging eyes; humpbacks; pustules; sores; tumours; scales that are red; large head – with a skinny body (and observed at the whitefish camp 2018).

I've been fishing all my life. At one time, I caught a fish with 2 mouths. I gave it to Steve. That was years ago, about 5 years ago. 2 mouths. A fish. So now I can tell you if one is sick or deformed. Some fish I caught, they have lumps all over their body—red lumps. Those I don't bother with, destroy them. I don't even feed them to the dogs. Some of them, they are abnormal, they look like whitefish, but they have a big hump back. They look like those fish that eat people, piranhas. They look something like that, deformed fish. (Mikisew Elder)

- Reduced fish consumption due to concern about mercury and oil sands pollution.

Through ongoing Community Based Monitoring work, MCFN continues to push to have Indigenous policies around Athabasca River flow and depth adhered to by the government of Alberta and the Federal Government, namely Transport Canada. The summary below, describes this work as it relates to the Tracking Change program.

The Mikisew Cree have been aware of changes to the water regime in their traditional territories and have described these changes articulately on many occasions. Elders speak to the general decline in water levels, and have related these to extreme events that began with the filling of the Williston reservoir.

The Bennet Dam wasn't on yet, so [there was] lots of water and lots of fish, as far back as I can remember…. Now the water has dropped by 4 feet… (Larry Marten)

Elders attribute the lack of flooding recharge in the Peace Athabasca Delta to the Bennet Dam, and they feel it is at least partially responsible for the collapse of their very profitable muskrat harvest (Straka 2014). "Muskrats, years ago, in the 70s… even early 70s and 60s. There were lots of muskrat around this area. People used to kill 3000 or 4000 rats in a trapping season. I guess the reason there [were] lots of rats in those days was [that] there was a lot of water. Water was high. [There was] always water out in the lakes and ponds and …. Lots of muskrats all over. Once the water started going down, once the water dropped… Every year after the

Bennett Dam, the water is worse than ever. Now there's no muskrats anymore. They're gone." -Joe Vermillion, MCFN (from McLachlan, 2012).

> *After the Bennett Dam, the fish went down, it got too shallow. During freeze up, [there were] no fish in Quatre Fourche River. I tried it a couple of years now in the spring time, 2 years ago. Under the ice and there's no fish, as soon as the ice broke up then there was fish.* (Mikisew Elder)

> *Fishing has always been good until [the] Bennet Dam. When [the] Bennet Dam started, losing the water, there's no more fresh water that comes in. Like every 4 years we used to have fresh water. We used to have ice jams, and clear out all the bad water, clean everything out, strain it out and then clean water would come in. We don't see that anymore after the Bennet Dam. Before that, we used to have lots of clean water that would come in. You don't have to pack water like today. Out there you got fresh water all the time and that's what. Now the fish, we are losing that slowly, and where they used to spawn. They can't make it over there anymore because it's all blocked off. We don't have no more floods, and that's the reason why the fish is not as many as before. They getting down, down all the time, every year, next year. Winter time there used to be fish and sometimes there's nothing now. No fish now in the winter months, there's not as many.* (Mikisew Elder)

Elders then began recognizing secondary changes to the Athabasca River flows beginning 20-25 years ago when water levels began to excessively drop, most notably in the late summer and early fall. Many Elders attribute this to the land clearing and bitumen mining/ upgrading in the lower Athabasca River. Changes to the flow and depth of the river have caused increasing difficulty in accessing traditional-use areas. The Elders have given certain sites a higher risk label, known as 'pinch points'.

Pinch points are defined as critical water passageways that are: a) essential for accessing important Traditional Territories or travel routes and b) are known to be the limiting locations in that they are the first to become impassable when water levels decline. When a pinch point becomes impassable, prohibitive steps (if available) are required to pursue alternatives (Carver and Maclean 2016). Prompted by these navigational difficulties, a 2010 study by Firelight and subsequent report, *As Long as the Rivers Flow* was commissioned by the Mikisew (with partners Athabasca Chipewyan FN).

Methods and Approach

The Firelight 2010 report defined an Aboriginal Extreme Flow (AXF) which is the Athabasca River (AR) discharge below which widespread and extreme disruption of traditional use occurs for the ACFN and MCFN due to loss of access to prime/essential seasonal harvesting areas because of low waters. This threshold refers to the discharge of the Athabasca River as

measured at Water Survey of Canada's hydrometric station called "Athabasca River below McMurray" (QFM). (Carver and Maclean, 2016).

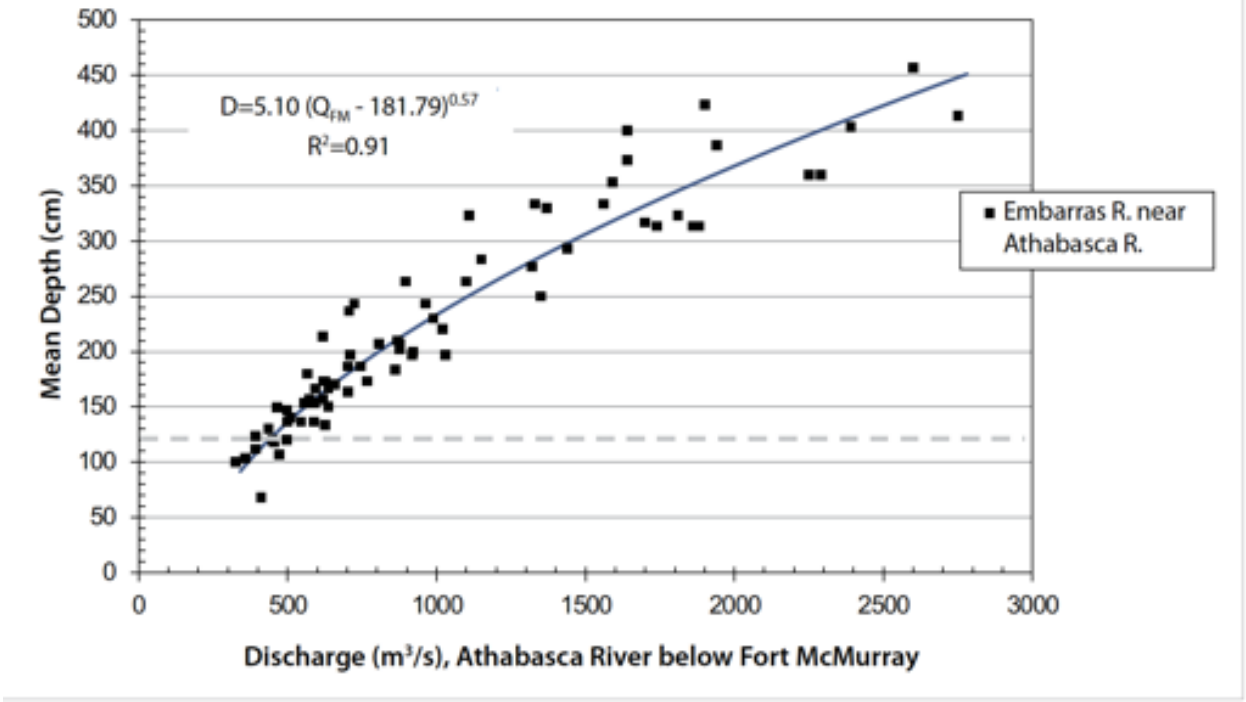
Subsequently, the Mikisew Cree and Athabasca Chipewyan First Nations, in 2011 developed, in partnership,a methodology to test the AXF and implemented a Community Based Monitoring (CBM) depth study. Site selection was known pinch points, selected in partnership with Elders, experienced river users, and monitoring staff. Data is generated in three ways: weekly transect depth at known pinch points; hazard data collected via use of a custom app named Geokeeper; and, navigational tracks collected by river users.

Initially, 5 readings were taken across a transect at known pinch points, (since revised to 10). The average of the three deepest readings was employed to define the approximation of the thalwag available to a boat. This depth was then compared to the AR flow at QFM (with a delay of 3 days to account for flow time) to validate the AXF.

Findings

Analysis of the first 5 years of data by Carver and Maclean 2016 revealed a very good relationship between flow and depth especially at the southernmost sites. Based on the findings, the AXF was revised to 500 m3/s (increased from the hypothesized 400m3/s) and new 'cousin' sites added and more Peace River sites. This relationship has been validated now by Transport Canada (Donahue & Dillon 2019).

Figure 15. Preliminary power function relating depth at Embarras Low Point (CBM site M4) to the discharge of the Athabasca River below Fort McMurray.



The Alberta Government manages the flow of the Athabasca River by way of their Surface Water Quantity Management Framework (SWQMF). The SWQMF came into force in 2015. Arguably one of the most problematic scientific issues with the SWQMF is the lack of a minimum base flow in any season to protect seasonal streamflow in support of non-mining values such as PAD navigation. It also contains two very problematic assumptions.

- The SWQMF (p.75) arbitrarily and subjectively establishes 'zero' navigability at one-metre depth which is contrary to the scientific field research reported in Candler *et al.* (2010).
- The SWQMF arbitrarily and subjectively establishes 'zero' navigability at 300 m3/s (at Fort McMurray) rather than the preliminary value of 400 m3/s which was indicated by empirical scientific field research (Candler *et al.* 2010).

Implications
The consequences of lost access are significant. In a fly-in community where the rivers are the highways for food security, culture and even medical access, this decline or loss of safe navigation has serious repercussions: loss of cultural transmission and language and identity; loss of food security; increased cost of living and reliance on store bought food; and, increased risk of injury or death by boating.

The results of the Firelight report and the subsequent 8 years of field research, and TC Nav study, point to a fundamental/ deep opaqueness/ failure of Alberta Government policies to be able to protect federally protected treaty rights. While the Federal Government through the Transport Canada report validates Mikisew and ACFN concerns over navigation and access to harvesting rights among others, is not in alignment with Alberta Government policy, which prioritizes industrial needs over federal-indigenous rights.

As a result, the Mikisew are strongly advocating for changes to Alberta's SWQMF and for Transport Canada to establish a navigational threshold of 500m3/s.

Youth Involvement…

Youth are involved in Lake Whitefish sampling and traditional fishing activities associated with MCFN's CBM program. Youth are primarily engaged so that they can be taught scientific monitoring practices to understand the health of fish and so that traditional cultural fishing methods and activities can be passed on.

In 2018-2019, MCFN had 30 youth from the local school over 4 days attend the Whitefish camp. Students were involved in traditional dryfish-making and scientific dissections of fish. Students also had a chance to engage in CBM monitoring activities, hear stories from Elders, learn Cree place names and eat traditional food. The students participated in a electrofishing demonstration where they identified macroinvertebrates.

> *I'd love to see more of these camps, having them in different parts of the Delta, with different groups of people, then you could hear different stories. It gets people more engaged with being on the land, it gets people connected with the land, especially the young people. That's important. We need to let our young people know, this is what is happening, and they too need to stand up.*
> (Mikisew Elder)

The program received amazing support from Mike and Julia Mercredi and the Athabasca Delta School. In the future, project organizers would like to get some dedicated resources to build curriculum which integrates traditional activities and camps, space and resources for an environmental sciences room/lab in the school and a place for Elders to go to the school monthly to work with kids on some of the curriculum, especially around harvest and cultural understanding of the land.

The fish camp took place on the second week back from school. The timing made it difficult to plan ahead and work with the teachers to address the logistics of bringing 30 students out to a camp. In the future, program organizers hope to work with the school in the spring, prior to school letting out, to plan ahead for the fall fish camp.

Tracking Change on the Liard River

Corinne Porter, Dena Kayeh Institute

The Dena Kayeh Insitute of the Kaska Dena, focused their project on setting up a community water monitoring program. This program is part of the community's efforts to establish a Guardian program on their traditional lands.

The project started late due to the fires that burned through the community in August 2018 (the project was initially intended to be complete in late 2018). There were challenges in finding suitable locations for the staff gauges and our data reflects this. Site set up and data collection was conducted by the Dane nan yẽ dāh (Kaska Guardian Program) and the Dena Kayeh Institute's Natural Resource Technicians. All have been training in water sampling methodology and protocols, swift water rescue, first aid and data management. Elders and Youth were invited to accompany the team on field patrols where knowledge transfer could take place. Kaska terminology regarding water and surrounding environment was recorded and stored in a TK database.

The environmental monitoring data collected was plotted on graphs, however, community researchers don't consider it good baseline data as the locations of the staff gauges were moved multiple times. Initially data was collected just once a month and, then in August of 2019, the team decided to start collecting data twice a month to capture more potential variations in the parameters.

As of September 2019, there are 9 working staff gauge locations in Kaska Ancestral Territo: Iron Creek, Contact Creek, Hutchinson Creek, Tootsie River, Snow Creek, Troutline Creek, McDame Creek, French Creek and Simmons Creek. Only water parameters (no depth) will be collected For the Dease River, Blue River, Hyland River and Liard River.

This project has been a great learning experience and the community feels that they have succeeded in setting up their water monitoring program.

What we learned…

The summer monitoring program was all about learning. The main outcomes of the project were the development of permanent water sampling sites (Fig 1.), and the collection and storage of baseline water quality data for high priority water bodies and data sharing. Water from all sources is held in very high regard, and conservation of water is a very high priority. Elder and Youth involvement was built into the program. One of the key aims of the program is to educate community members on how water sampling is conducted and to showcase initiatives the Dena Kayeh Institute is working on to strengthen Daylu Dena Council and Dease River First Nation's role in the management of water resources in the Kaska Traditional Territory.

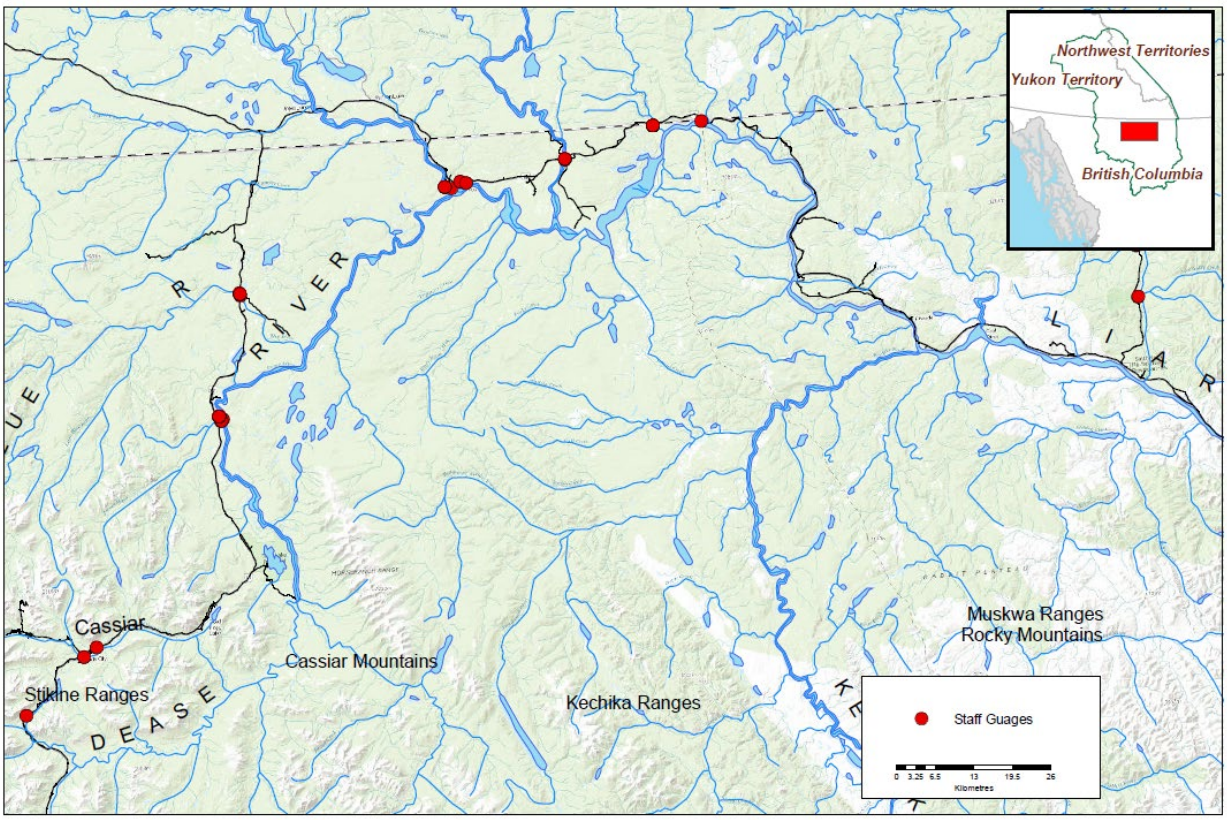


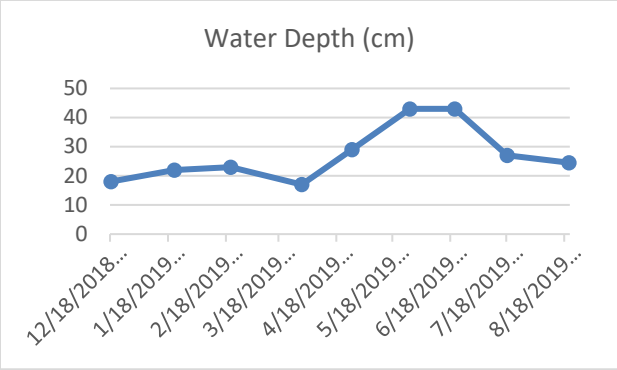
Figure 1 Map of Sampling Sites (prepared by Dena Kayeh Institute)

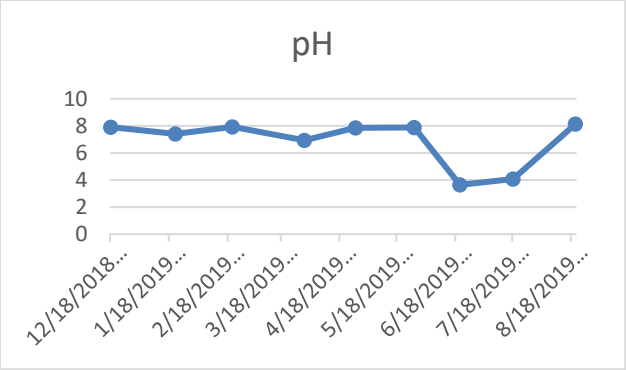
Some of the key milestones/activities in the project were:

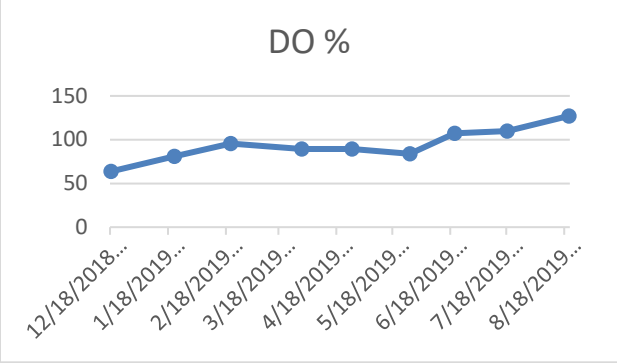
- Staff gauges were installed in September 2018 in the Liard River (SGLR01), Hyland River (SGHR01), Blue River (SGBR01) and Dease River (SGDR01 and SGDR02).
- Staff gauges in Blue and Dease rivers were missing when guardians went to collect data in November. Data for Blue River were taken on the opposite side of the river from original site and labelled SGBR02. Data for the Dease River was taken at SGDR02 which is located at the Blue River cultural camp.
- Staff gauges were installed in Dease River and Blue River in December. These new stations are called Blue River (SGBR03) Dease River (SGDR03).

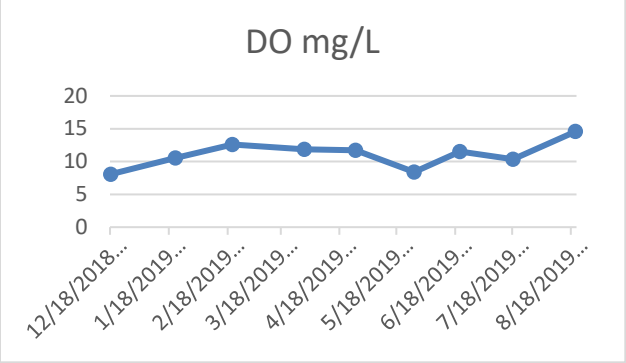
- A new station at Iron Creek also was installed in December (SGIC01). Measurements were taken at a chosen location and a staff gauge was installed in January 2019.
- All staff gauges were pulled from rivers and installed in tributaries to the rivers. Blue River and Hyland will have staff gauges installed on bridge structures as we are unable to find accessible tributaries to these two rivers.

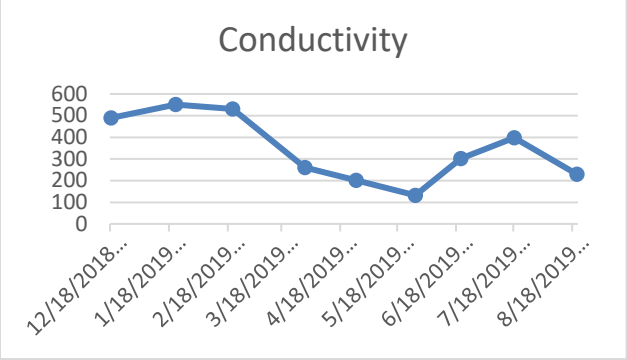
The following graphs represent the data collected for one of the sample sites (Iron Creek – SGIC01). Measures were collected for parameters including temperature, depth, turbidity, dissolved oxygen, pH and conductivity. While the Dena Kayeh reearchers don't feel that this data provides a high quality baseline, the learning that took place for community monitors during this season will set them up well for next summer when a more accurate baseline will be collected.

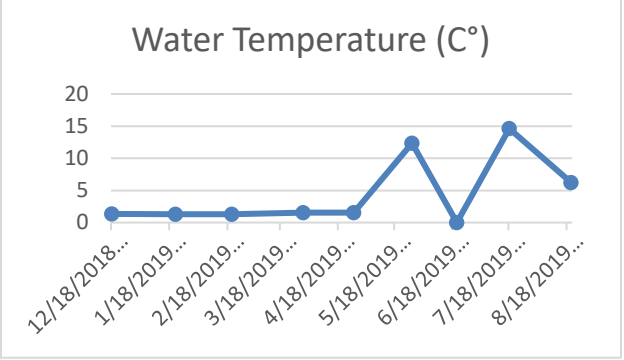












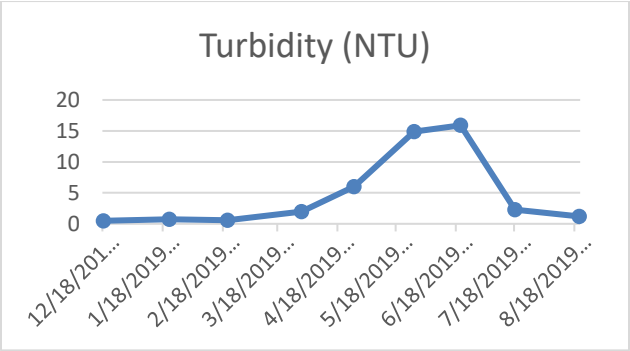


Figure 2-Sample data graphs for various parameters at Iron Creek

While the focus of this project was on collecting water data using western scientific measurements, it was important for the crews to have land users and knowledge holders with them to maintain traditional perspectives. Having Elders and youth participate also allowed for knowledge transfer on the areas that are being monitored. Kaska place names and terminology with respect to water were collected. Some of them are provided below:

Kaska Language	English Name /Translation
Ahdēh sus	Horn Creek- Fine vevlet on moose
Tsāh Tuēh	Beaver River
Tuełišdā	Blue Lake
Āhzah cōn'nih'	Graveyard Lake- A beach where the creek comes into the lake, also where there are many graves.
Ałashš-gha	Rabbit River- Flowing by the mineral lick because there are many mineral licks along this river.
Tsiēh Tuēh	Red River – abundance of red mineral on river bed
Łethīke Tuéh	Racing River
D'aelyu'	Lower Post – Trading Place
Dēhbē lēhsi	Toad River Hotsprings- Sheep, lick.
Tue Sūłkeh	Cry Lake – water hollering
The'kācha Tuēh	Frog River
Gāh'Cho	Turnagain River- Large open side hill. Cho-big. Three large open side hills along this river
Nighīdacgā	Crooked Lake-spiritual place, something that lives there at all times
K'lēćhosī	Moose Lake
Ehdā Metá	Niloil Lake
Gatā-gh'a	Gataga River
Agedze Tue	Hyland River – spiritual, refers to animals. "to much game"
Hih'łās	Liard Hotsprings - A mineral lick that all animals use.
Kłowāh́ – Chō	Northern Rocky Mountains - Big grass – the valley in that area is covered in grass from end to end.
Kwádátá	Kwadacha River – White River
Ne'ah	Horse Ranch Range
Netdātué	Grand Canyon of the Liard River - Refers to the teardrop of the drop off the Liard River as it enters toward the Mackenzie.
Tāgh'agah Tuēh	Liard River – big water shimmering in the distance with big banks

Kaska Language	English Name /Translation
Tā Ch'ilā Park	Boya Lake – Chain Lakes
Tāhad̄ź̌ěh'	Kechika River - Long and coming down on an incline.
Tū The	Finlay River – old man river
Tuēdāklōhi	Grayling River Hotsprings- Water that never freezes.
Mádota tsēh'sēh	Terminus Mountain - This mountain stands alone and means – The End.
Atse Dene Tunna	Davie Trail – Old People's Trail
Tāh'leh Tuéh'	Toad River - The name refers to the Kaska within that area.
Tsāhyahnātawēhā	Smith River Falls (Fort Halkett) - Where the beaver has a trail going on the side.
Tudāłônęh	Denetiah Lake - The water in the lake takes a long time to freeze over.
Łōweh sāghēh'	Sandpile – voice of fish
Wadsīh' Klōwah	Cariboo Range – Toad River Mountatins - Caribou grass.

Youth Involvement...

Youth joined crews, along with Elders, whenever possible. While it was not possible to get as many youth into the field as had been hoped, there were several successful field days. The Dena Keya Insititute continues to work hard to develop a guardian program, and the engagement of youth across the Kaska Territory will be key to ensure knowledge transfer not only from Elders but from current members of the Dane nan ye dah.

Life as Akaitcho Dene

Annie Boucher, Diane Giroux, and Mike Tollis
Akaitcho Territory Government, Rosie Bjournson
Deninu Kue First Nation and Cochise Paulette, Smiths Lake First Nation

In 2018, the Akaitcho Territorial Government (ATG) hosted a land camp with Elders, youth, Chiefs and technical staff. This camp was funded by the Government of the Northwest Territories (a partner of the Tracking Change project), and continues the work undertaken by the ATG as part of the Tracking Change project over the previous three years.

The Akaitcho land camp brought Elders, youth, Chiefs, and technical staff together in Lutsel K'e for four days of travel by boat and meeting together. It provided the opportunity for knowledge transfer between generations, the lack of which is a constant concern among Akaitcho communities. Elders, youth and Chiefs from different communities met and shared knowledge about the land, water, and wildlife, as well as their own lives growing up in Akaitcho. Each day during the week, groups split up and traveled by boat around Lutsel K'e. Each morning and evening everyone would get together for discussions or traditional games, including hand games and a drum dance. The coordinators met with the youth on their own during one day when weather didn't allow many boats to travel out on the land, and discussed with them for the first time, what they would want to learn while participating in a land camp like this. It was interesting listening to the youth and hearing what they value, as it is usually the Elders and leaders of the community that determine what the youth should be learning. Though there were some similarities in the values, the youth brought unexpected desires to the discussion and these recommendations will be used for future camps. Again it was expressed, that any and all opportunities to foster intergenerational connections should be taken full advantage of, for the benefit of the youth and the protection of the land.

What we learned…

> *You can't go out on the land, if you don't know the land.* (Elder on benefits of land camps)

Learning what reefs and rocks are in areas is good… next time we come back we can see how close they are to the surface now. (Youth on reefs in the water)

I really like going to new places in Akaitcho. (Youth on benefits of land camps)

Changes in Water Quality, Flow or Water Levels

Change 1: One of the guides from Lutsel K'e who was talking other Akaitcho Dene members out on the land spoke about how some new reefs are coming up in the fall time when water is low. Some old reefs that everyone always knew where they were are now up out of the water and some that were not threats before are showing up. This is a commentary on water levels in the areas, specifically in the East Arm.

Change 2: Travel routes are changing in Akaitcho with the changing water levels. Historically safe routes are now in danger with low water, reefs and bigger islands. As Lutsel K'e guides were trying to teach the youth old travel routes, they were also acknowledging that they weren't the same, and that the youth would need to start using technology to map the reefs better, and make newer, safer travel routes that stick to deeper waters.

Other Issues

*Issue 1***:** Knowledge transfer has historically been through Elders and land users to the youth. But learning from last year's Tracking Change workshop, we met with the youth to talk about what they want to learn, as some of the old ways can be improved with the use of newer technology. Though the youth were very interested in learning about old stories and oral history, they also expressed a desire to learn about mapping techniques using modern technology like drones and GPS, as well as learning about small engine repair and chainsaw use.

Issue 2: Meeting and looking at maps before leaving for trips would help the youth visualize their travel routes better. This is something that may not have been available to many Elders in their travel, but it is an example of how youth today are learning different skill sets and may have different learning techniques. It is important to consider that youth growing up today are going to school and being taught different methods of learning, so having technology, maps, and visual aids for the youth is a good cross between both cultures, in terms of travel on the land.

Issue 3: When the coordinators plan trips, we often seek to ensure that everyone is comfortable, with enough to eat and drink, enough gas for boat travel and the right tools to have an easy camp life. But this is not the best way to learn some of the skills that are of interest to youth. Life becomes almost too easy in the bush when it was rarely like that in the past. Some youth expressed interest in learning survival skills, they hear stories about how their grandparents would go into the bush with an axe and a knife and survive, and they want to learn how this was done. An Elder recommended travel by canoe for the next trip as well, to have the youth work to travel instead of sitting in boats. The moral is that making life easy for the youth in the bush isn't the best way to be teaching them, so instead of bringing

chainsaws, bring saws and axes, instead of boats, bring canoes, and instead of a substantial amount of food, bring fishing and hunting gear.

Issue 4: Though there is change in the climate and weather, some knowledge is still accurate and relevant for travel on the water. One major piece of knowledge that was shared that the youth were able to experience first hand is that weather is the boss, and if you can read the water to see when the wind is changing and when bad weather is coming, they will be safer when they travel. Many youth expressed that the best thing they learned was how the water looks when the wind blows, or how the colour of the water changes. Several youth had never spent time on the big lake before and everything they experienced there was new, but learning how to spot the changing weather was something that would always be remembered.

Well-Being

Sometimes it's easy to generalize the youth today in that they don't have the skillsets that were needed for survival in the old days. Times have changed, and the youth are growing up with less of a connection to the bush and therefore don't really care for it as much as past generations. This leads to an effort to make things as easy as possible for youth in the bush so that they might like it, when really, some of the youth have a desire to learn the old ways, but believe we are not making the most of our opportunities when we send them out on the land. The camps that ATG has hosted so far have been short and have not provided enough opportunities for youth to grow their skills or learn new ones. Travel on the water is part of every Dene's life and though this still happens at our camps, the youth are passengers and not learning the ways for themselves. It seems like the youth are willing to work when they go out on the land so although we don't want to deter youth from using the land, we want to make sure that they can get an authentic experience, and if that means traveling by canoe and cutting down firewood with an axe, then it's worth a try, especially if this is what they are asking for.

The recommendations that we received from the youth were somewhat in line with Elders' recommendations, but several weren't. The youth are interested in learning about survival skills, hunting techniques, and how to properly fix animals. They want to stay on the land longer so they don't feel so rushed. They want to travel to new areas and learn how to travel there and the stories that happened there. It is necessary for consultation with youth when planning these trips. We are starting to compile a list of recommendations from youth over the past workshops and are getting a better understanding of what it is that they are looking for. It is important to remember that youth have wants too, and although we trust the Elders to make decisions that will benefit the youth, it is necessary to consider their opinions if we want them to benefit fully.

This camp did well to bring young people of Akaitcho to an area that they aren't often able to visit. Lutsel K'e, with no roads in, an expensive round trip plane ticket, and not being able to access it by land or water during the shoulder seasons, is not a destination that is easily accessed by other communities. Some youth from Smith's Landing had never travelled on a

big lake before and were learning a new appreciation for this. Having them hear the stories from Elders about drinking straight from the lake, the youth learned how valuable this fresh water source is. One of the largest lakes in Canada that can still be drunk from is a priority for stewardship. It is difficult as many people live around the lake but as the East Arm feeds into the larger body of the lake, it could be the last fresh water area on the lake, and it is important that it stay that way.

Youth Involvement…

Youth were involved in other learning activities such as: Workshop, break-out groups with the Elders and Chiefs, sitting at the table for meeting discussions; youth meeting with coordinators and no Elders or Chiefs, and Hand games, drum dance.

The goals and objectives of the research activity involving youth were: a) to have youth speak freely about what they want to learn about, and what they value; and, b) have the youth be able to speak to their concerns was another goal of the effort, to have Elders and Chiefs hear what the youth of today are concerned about.

Major accomplishments of the youth activity included learning what the youth wanted in a land camp in terms of learning styles and the use or lack of use of technology. Learning what the youth value is an important tool for guidance and for using that knowledge to bring the old ways and the new ways together. It was good to hear that environmentally and ecologically, the things that youth wished to protect were very similar to the direction of Elders and Chiefs in Akaitcho. It is important to protect the water quality for all, and it is important to respect that water so that it will respect you in return. There was also much discussion on the importance of youth to maintain their hunting and fishing tradition for the future.

Some of the challenges of achieving the goals and objectives were logistical. Some of the youth were disappointed that we were staying in town. The plan was to travel out by boat every day and come back to stay in town at night, but this wasn't what the youth were expecting. They had hoped to stay out on the land, and we are going to make sure this happens next time. Also, as always, some of the youth were too shy to express themselves about their opinions.

Appendix 1: Glossary

Community-Based Monitoring

Community-based monitoring is an activity that is growing in recognition globally, and a concept well used among communities and organizations in Canada, including Aboriginal communities. It is among a variety of tools and processes that have come to be associated with community-based resource management. Like other kinds of programs, community-based monitoring is based on the recognition that ecosystems and the natural resources valued by Aboriginal peoples, are complex and dynamic. Predictive tools, like environmental assessments, can result in rigid management approaches, and have limitations in dynamic ecosystems. Adaptive management, which includes monitoring, is a more appropriate approach because it is more flexible and responsive to ecosystem uncertainties.

Local and Traditional Knowledge (LTK)

Traditional Knowledge refers to the cumulative body of knowledge, practices and beliefs that have developed over many generations by local communities about ecosystems and their relationship to it[2]. It is referred to in different ways by different cultural groups. Fishers' knowledge can refer to both local knowledge (knowledge of an observed area) of both Indigenous and non-Indigenous fishers. Traditional Knowledge is unique from local knowledge in that it is longitudinal or based on many years, if not generations, of observing, experiencing and interpreting ecosystems; whereas local knowledge is more short-term in scope. It is because of this longitudinal scope, that Traditional Knowledge is increasingly recognized as useful in monitoring by many wildlife biologists and some other scientists, resource managers and governments who see opportunities to understand long-term ecosystem change. In this context Traditional Knowledge may be able to help answer the following kinds of questions:

- What kinds of patterns of ecological variability are characteristic of different areas of the Mackenzie River Basin?
- What kinds of unusual events or patterns are visible and to what extent are these associated with the impacts of climate change and resource development?
- What is the meaning and significance of observed trends and patterns of ecosystem change?
- What are useful indicators for tracking aquatic ecosystem change in the Mackenzie River Basin?
- How should we respectfully and meaningfully track these changes over time?

[2] Berkes, F. (1998). **Sacred Ecology**: Traditional Ecological Knowledge and Resource Management. Philadelphia: Taylor and Francis, 209p

Capacity Building

The *Tracking Change…* program is focused on building capacity for partner communities in the Mackenzie River Basin to document and share local and traditional knowledge they consider relevant to the governance of the Basin. Capacity-building refers to advancing skills and knowledge needed for research and monitoring through training and mentorship. The program also aims to ensure experiential learning opportunities in which elders, youth and other members of the community are engaged in knowledge-building and multi-generational knowledge sharing. The kinds of capacity-building initiatives vary significantly from project to project and region to region, depending on a range of factors. Communities in settled land claim areas tend to have more capacity to carry out their work than communities in unsettled land claim areas. Those close to urban centers in the southern areas may be more or less advantaged than those living further north in the Mackenzie River Basin.

Appendix 2: Research Insights So Far…

2016-2017 Insights

The findings of the 2016 community research projects is provided below for reference. The 2016 Report is available online at www.trackingchange.ca

- ✓ The Mackenzie River Basin is a network in which people are interconnected with the aquatic ecosystem in many different ways. A holistic understanding of the social, economic, cultural and ecological changes occurring in the Basin is necessary to ensure that aquatic ecosystems are managed in ways that ensure the continued health and well-being of the Basin's Indigenous communities;

- ✓ The Mackenzie River is a dynamic cultural landscape in which local economies and cultures have been shaped by the seasonality as well as year-to-year variability in the availability and condition of basin resources;

- ✓ Fishing is important to the culture and well-being of communities in the Mackenzie River Basin and is an inherent right protected both by the Canadian constitution as well as in treaties and comprehensive land claim agreements;

- ✓ More than 20 species, and thousands of pounds of fish are harvested annually in the main river, the deltas and the numerous tributary rivers and lakes that comprise the Mackenzie River Basin. Fresh fish, dry fish and related dietary uses of fish have very high nutritional value, and are particularly important to food security in areas where other traditional/country food resources are variable or limited and where market foods are not an economically or nutritionally valuable alternative;

- ✓ Traditional practices for respecting (managing) fish and fish habitat are evident throughout the Basin. These practices have evolved based on generations of traditional knowledge. For example, 'take only what you need,' is the common principle for those fishing throughout the Basin;

- ✓ Indigenous communities play different roles in the governance of the Basin, depending on the jurisdiction. Although there are co-management boards and cooperative arrangements with territorial governments and the federal Department of Fisheries and Oceans that create opportunities for ongoing recognition of Traditional Knowledge in the management of fish stocks and key fishing areas in the Yukon and Northwest Territories, no such arrangements exist in British Columbia, Alberta, or Saskatchewan;

- ✓ In some jurisdictions, governments have created a clear role for traditional knowledge in decision-making about water resources. Where there is greater respect for traditional knowledge, resource conflicts are fewer. For example, in the Northwest Territories,

respectful inclusion of traditional knowledge is embedded in the *NWT Water Stewardship Strategy*. In British Columbia, where resource conflicts and uncertainties about natural resources are more common, there is little to no recognition of traditional knowledge (see *British Columbia Water Sustainability Act* [2016]);

- ✓ Although practices have changed over the last century, contemporary harvesting and use of fish continues to contribute significantly to the diets and economies of Indigenous communities;

- ✓ The high cost of fuel, boats and equipment is a challenge for some community members highly dependent on fishing for food security;

- ✓ The nature of fishing livelihoods varies from community to community as a result of many environmental and socio-economic factors. For example, wage employment affects how much time is available for fishing with consequent implications for household food security (i.e., families who have less time to fish eat less traditional / country foods);

- ✓ In some communities where there is limited access to healthy water and fishing resources, there are concerns about the continuity of knowledge and skills beyond the current generation. For example, elders in northern British Columbia and northern Alberta have limited opportunities to teach their grandchildren about traditional fishing practices;

- ✓ Indigenous youth are seeking different kinds of opportunities to influence the governance of the Mackenzie River Basin to ensure that their rights and interests in fishing resources are respected for the future.

Unusual Observations and Patterns in Aquatic Ecosystems

- ✓ Across the Basin, there are widespread reports of decreased water levels and water flows, including dried up creeks. Such widespread observations may be the result of warming weather and lower levels of precipitation;

- ✓ Lower water levels are complicating access and use of places valued for fishing and related cultural uses;

- ✓ Water temperatures are reported to be warming with consequent effects on water quality, fish habitat, fish health, and fish abundance and distribution;

- ✓ There is more greening water or algal blooms in some areas, which has been attributed to increased development activity (e.g., agricultural activity in northern Alberta), as well as warming temperatures;

- ✓ Warming temperatures are reportedly affecting the movements of some species, the timing and location of spawning areas and, consequently, the timing and location of

harvesting activities. Warming water is also perceived as an influence over the condition of fish including the size, health (e.g., lesions) and palatability of fish valued as food (e.g., softer fish);

- ✓ Warming temperatures are affecting the stability of permafrost in the northern regions of the Basin. Melting of permafrost is increasing river bank erosion, with consequent effects on fish habitat, fish movements, as well as access and use of the river for fishing and related practices;

- ✓ There is an increase in observation of fish considered new or invasive to the Mackenzie River. Most notably is the increase in incidence of salmon-catch; Fishers in some communities are observing different kinds of fish that are uncommonly found or never seen before in the Basin, such as salmon in many parts of the Northwest Territories, and other yet-to-be-identified species in Alberta.

- ✓ Warming winter temperatures have led to earlier break-up and later freeze-up in many areas. There are observations of extreme weather events, such as unseasonably warm winter days. As a result, there is more uncertainty in communities about ice safety and an increase in accidents associated with thinning ice;

- ✓ Extreme forest fire events such as those in Saskatchewan, the Northwest Territories and Alberta have created problems of ash in the water in some areas of the Basin;

Impacts of Resource Development

- ✓ Commercial fishing activities (including historic trade of fish resources to trading posts over the last 150 years), impacted fish stocks valued for food security in different regions, and particularly in the Peace-Athabasca and Slave river regions;

- ✓ Numerous contaminated sites throughout the Basin, such as abandoned mines and exploration sites, have altered the relationship of communities to places that were traditionally valued for fishing and other cultural uses. Most notably, oil sands mining activity in northern Alberta, the Giant Mine near Yellowknife, and the Faro mine in Yukon, have fundamentally and adversely affected the value of local aquatic ecosystems, the cultural, economic and spiritual value of these places to local communities, and the capacity of First Nations to exercise their rights to harvest and maintain traditional livelihoods;

- ✓ In the Peace-Athabasca-Slave River systems, where hydro-electric projects have been developed and are expanding, lower water levels, decreased water quality and unpredictable water flows are fundamentally and adversely affecting the relationship of First Nations and other communities to these river systems, the integrity of sacred and cultural sites (e.g., burial areas), access to traditional fishing areas, the health of fish valued for food security, and many other related values and uses;

- ✓ Hydro-electric development in the Peace-Athabasca-Slave systems have changed water flows and the dynamics of the delta. As a result, there is more uncertainty in communities about ice safety and an increase in accidents associated with thinning ice;

- ✓ In the southern part of the Basin (Alberta, British Columbia, Saskatchewan and southern Northwest Territories), there is limited access to key fishing and cultural use areas as a result of forestry, mining, petroleum extraction and hydro-electric development;

- ✓ The loss of biodiversity, including fish valued for food security by First Nations communities in the southern part of the Basin, has been impacted over the last century by both agriculture, forestry and petroleum exploration and development. For example, Lake Trout were extirpated from Lesser Slave Lake in the 1930s;

- ✓ In the provincial jurisdictions (Alberta, British Columbia, Saskatchewan), there is limited access to key fishing and cultural use areas, and compromised rights to fish, as a result of provincial government regulation;

- ✓ There are many concerns throughout the Basin about contaminated water and fish species; these perceptions of fish being contaminated and not healthy to eat are greater in the southern part of the Basin (i.e., Alberta, Saskatchewan, and British Columbia) where resource development activity is significant;

- ✓ There are ongoing and emergent resource-user conflicts between recreational anglers and First Nations and other communities who depend on fishing for food security, particularly where anglers use (disrespectfully) areas valued for food security and cultural use by First Nations communities;

- ✓ Community-based monitoring and collaborative research initiatives are becoming more common throughout the Basin; communities are producing their own data about the impacts of resource development, climate change as well as other kinds of knowledge considered important for stewardship.

2017-2018 Insights

General

- ✓ Elders are concerned about the impact of 'consumerism' and increased technology on the decline in knowledge transference. They noted that the loss of skill in youth is difficult to pinpoint and that people just "don't want to go into the bush no more" (Willie Martel).

- ✓ Elders noted the language barrier and limited land skills of youth but were very hopeful about how the young people would be able to carry on their traditions into the future. It

is important to find the right structure for Elder/youth engagement programs and it can be very challenging to find the right leadership and support for youth.

- ✓ More monitoring, more engagement and more on-the-land programming is needed across the basin to help identify issues, determine causes, and, most importantly, develop adaptive solutions.

Unusual Observations and Patterns in Aquatic Ecosystems

- ✓ Some changes may be deemed out of the ordinary, but they have also been predicted. Many Indigenous communities have knowledge of ancestors foreseeing or predicting some of the changes we are seeing today and this has been further evidenced through conversations with Tracking Change participants.

Concerns about Resource Development

- ✓ Changes in biodiversity are not always attributed to changes in development. Change is observed to be happening for a variety of reasons. These changes are not just in aquatic ecosystems but also in terrestrial environments and are not solely attributed to resource development or climate change.

- ✓ Indigenous peoples have been adapting to change for a very long time, even before the clear impacts of climate change and development. Change is always happening and while the pace of change, and the required adaptive response, is hastening, the need to make adjustments remains and Indigenous People across Canada's north have been making these adjustments for many generations.

Appendix 3: Graduate Students involved in Tracking Change Community-led Projects in 2018-2019

Iria Heredia Vasquez, MA in Geography
University of Ottawa
Collaboration with: Inuvialuit Fisheries Joint Management Committee
Supervisor – Dr. Sonia Wesche

Local and Traditional Knowledge Indicators for Tracking Socio-Ecological Changes in Inuvialuit Fishing Livelihoods

Given the vulnerability of northern ecosystems and communities, socio-ecological changes in the Mackenzie Delta region of the Western Arctic have a significant impact on Inuvialuit fishing livelihoods. Local and traditional knowledge from the Inuvialuit Settlement Region offers an opportunity to learn about change in this part of the Basin which is the furthest downstream jurisdiction. Drawing on an analysis of peer-reviewed and grey literature, and qualitative interviews conducted with ten fishers from the communities of Aklavik and Inuvik, we examine how Inuvialuit fishers track and understand change in the Delta. Themes covered relate to: a) determining the importance of Mackenzie Delta fisheries for Inuvialuit subsistence and livelihoods; b) documenting Inuvialuit knowledge about change regarding fish habitat and fishing conditions; and, c) identifying how fishers track and monitor changes in the Delta. We identify a range of temporally- and seasonally-sensitive indicators used by local fishers. Changes are observed in water temperature, water levels, slumps, fish quality, and delta-reliant wildlife populations.

Tracey Proverbs - MA in Environmental Studies
University of Victoria
Collaboration with: Gwich'in Renewable Resources Board and Gwich'in Tribal Council Department of Cultural Heritage
Supervisor – Dr. Trevor Lantz

Social-ecological Change in Gwich'in Territory: Cumulative Impacts in the Cultural Landscape, and Determinants of Access to Fish

In the Gwich'in Settlement Region, environmental, sociocultural, and economic changes are affecting relationships between communities and the land and water. I conducted two research projects to explore the impacts of social-ecological change in the Gwich'in Settlement Region by examining cumulative impacts in the cultural landscape, and determinants of access to fish and well-being. In the first part of my MA, I used spatial overlay analysis to quantify and map: 1) cultural feature intensity, 2) cumulative environmental disturbance, and 3) overlap between disturbances and cultural features. I also interviewed four regional cultural heritage experts, who contributed critical insights

into representing Gwich'in cultural features. Many of the changes I mapped are affecting fishing practices central to Gwich'in livelihoods. To better understand these changes, in the second part of my MA I explored the relationship between drivers of access to fish and well-being amidst social-ecological change, by interviewing 29 Gwich'in individuals. My interviews showed that socioeconomic and environmental barriers have decreased access to fish. However, access to fish remains critical and related to well-being, driven by various socioeconomic factors. Many of these factors are reflected in sharing networks and adaptive practices that are encompassed in ecological monitoring and land-based education. These factors may strengthen Gwich'in fishing livelihoods, and highlight the importance of monitoring and land-based education programs.


Mackenzie River Basin