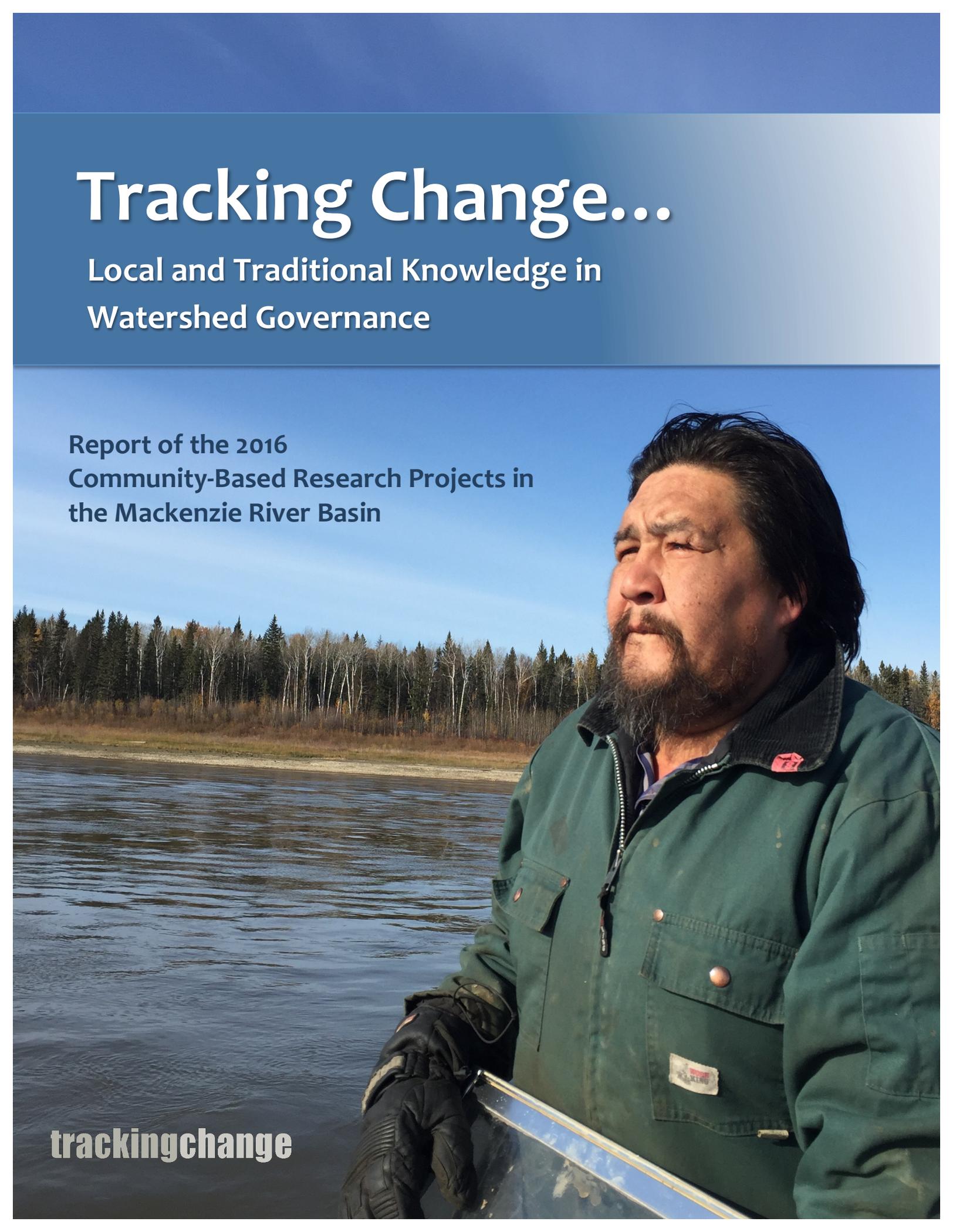


Tracking Change...

Local and Traditional Knowledge in
Watershed Governance

Report of the 2016
Community-Based Research Projects in
the Mackenzie River Basin

trackingchange



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Report of the 2016
Community-Based Research Projects in the
Mackenzie River Basin

Brenda Parlee and
Elaine Maloney (Editors)

Cover:
Floyd Auger, Jean D'Or Prairie on the Peace River
Photo Credit – Brenda Parlee



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Canada

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

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Executive Summary

Tracking Change: Local and Traditional Knowledge in Watershed Governance is a six year research program funded by the Social Sciences and Humanities Research Council, 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 Basin, Lower Mekong, and Lower Amazon basins and determine its' role in watershed governance. In 2016-17, the project aimed to address the following themes and priorities:¹

Themes and Priorities for *Tracking Change...* Sub-Projects in 2016-2017

- ✓ 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., how maintain healthy relationships to the aquatic ecosystem, maintaining respectful and spiritual relationships, respecting treaty rights);

In 2016, twelve research projects were funded (through a request for proposals process) that involved similar kinds of research methods and activities including fish camps, canoe trips, youth-elder knowledge exchanges, semi-structured interviews, workshops and secondary literature reviews. An interview guide and a 'toolbox' of methods was provided to guide communities seeking to carry out their research projects in ways considered synergistic (linked) to other projects in the Basin.

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 (Feb. 10, 2016). Additional input was solicited for the research priorities from Aboriginal organization partners and other members of the Project Team by email in October 2015.

Reports were shared in December 2016 from the following organizations:

- Nacho Nayak Dun First Nation
- Inuvialuit Fisheries Joint Management Committee
- Gwich'in Renewable Resources Board / Gwich'in Tribal Council
- Sahtú Renewable Resources Board
- Deh Cho First Nations
- Wek'èezhì Renewable Resources Board
- Akaitcho Territorial Government
- Łutsël K'e Dene First Nation
- Treaty 8 First Nations of Alberta
- Mikisew Cree First Nation
- Treaty 8 Tribal Association (British Columbia)

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 these reports included the following:

- ✓ 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 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 in northerly areas of the Basin, 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;
- ✓ 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;
- ✓ 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;

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 Peach 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.



Fish Camp on the Peace River
July, 2016. Photo Credit – Art Napoleon

- ✓ 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.

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 (TK)

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 (Berkes 1998). 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?

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.

Youth Knowledge Fair

Partners and collaborators involved in *Tracking Change...* identified the importance of engaging youth in all aspects of our research project, including the definition of research priorities and key issues for study. Some of the youth/young adults involved in the project will be graduate students from different universities. But given that post-secondary enrollment in the north is low, finding ways to engage with students at the junior and high school level is also a key priority.



Tracking Change Youth Knowledge Fair, University of Alberta
 East Three Secondary School (Inuvik) Participant and
 Jennifer Fresque Baxter, GNWT
 May, 2016. Photo Credit – Brenda Parlee

Tracking Change Youth Knowledge Fair, held in May 2016, brought together more than 40 students from across the Mackenzie River Basin. The initiative was created to support students with an interest in learning about their own histories, ecosystems and communities from elders, their communities, and their schools through submissions of poster projects; as well as to create networking opportunities for students to learn from one another.

Graduate Students involved in Tracking Change in the Mackenzie River Basin

Chelsea Martin, MSc in Risk and Community Resilience
University of Alberta
Collaboration with: Sahtu Renewable Resources Board
 Brenda Parlee – Supervisor

Sahtu Got'ine Traditional Knowledge: The Impact of Climate Change on Fishing Livelihoods

This project was developed with the Sahtu Got'ine of Deline who have, over many generations, developed valuable knowledge, practices and institutions that are deeply integrated with their spiritual worldview. Great Bear Lake, for example, is conceptualized as the source or 'heart' of the community and their livelihood. Traditional knowledge about local ecosystems, including ecosystem dynamics, is important to the continued sustainability of fishing livelihoods in this region and in many other northern communities. As the stresses of climate change and resource development grow, this knowledge will become even more important to the community and others concerned with the sustainability of the arctic environment.

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

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 down-stream jurisdiction. Drawing on an analysis of peer-reviewed and grey literature, and qualitative interviews conducted with 10 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 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.

Johanne Johnson, MA in Native Studies
University of Alberta
Collaboration with Prince Albert Grand Council
 Brenda Parlee – Supervisor

Local and Traditional Knowledge in the Watershed Social Economy of Saskatchewan's Athabasca Basin Region

This project considers local and traditional knowledge (LTK) related to the Athabasca Basin watershed and the social economy of the region. Within the Athabasca Basin Region, as in many other Indigenous communities, the social economy encompasses the notion of environmental stewardship. The first objective was to investigate and document the meanings of the social economy from the perspective of LTK holders in the Athabasca Basin watershed. The second objective was to identify 'wise' Indigenous practices related to the successful development of the social economy of the Athabasca Basin watershed.

Kristine Wray – PhD Candidate in Environmental Sociology
University of Alberta
Collaboration with: Akaitcho Territorial Government / Deh Cho First Nations
Brenda Parlee – Supervisor

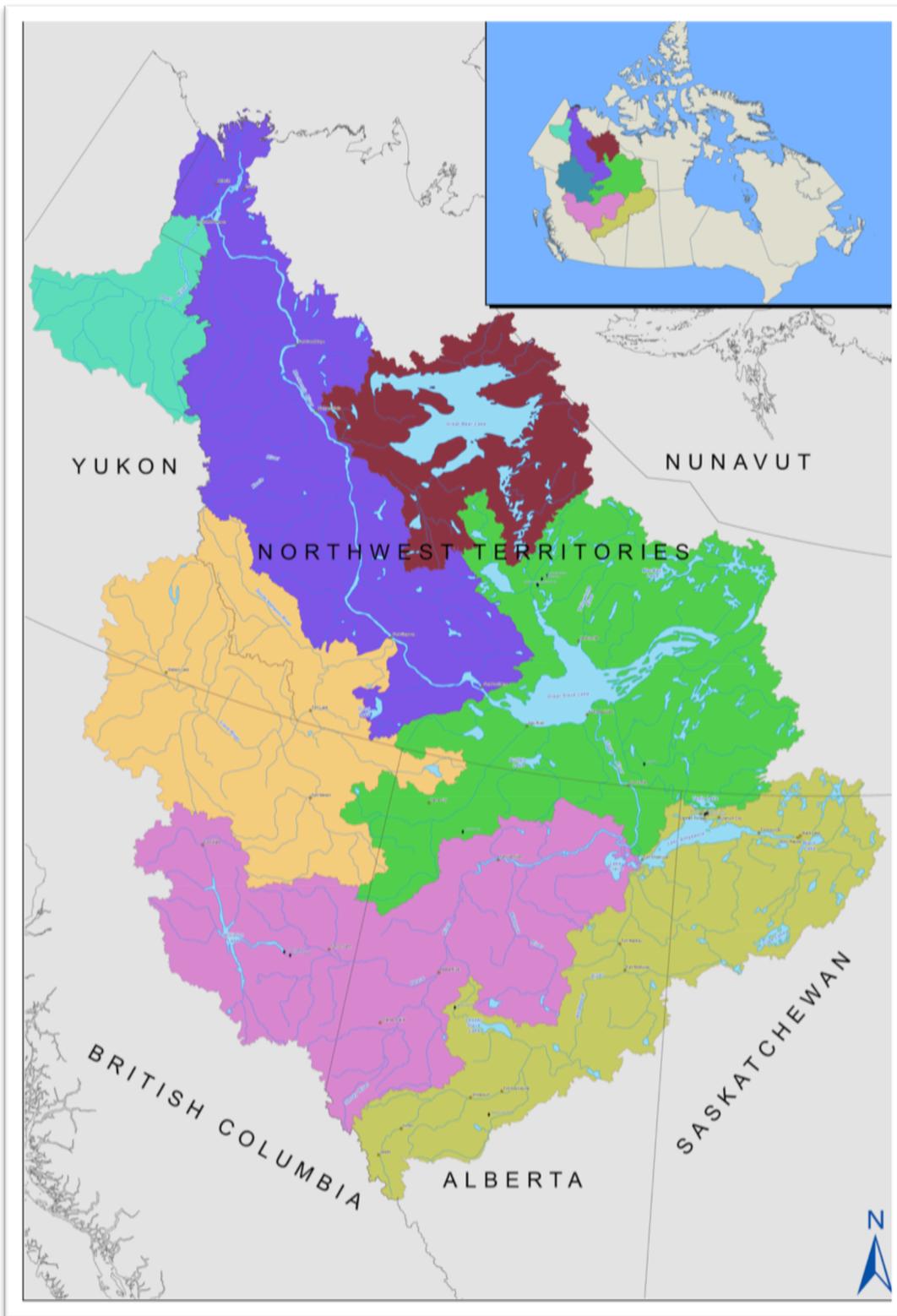
Linking Fishers Knowledge and Science to Understand Ecological Change in the Mackenzie River Basin

Efforts to link traditional knowledge and science to address issues of environmental change are increasingly common across the circumpolar north. This is particularly true in respect of building and interpreting evidence about historic ecological variability. While much of this kind of knowledge integration and co-production has developed in respect of wildlife species (e.g., barren ground caribou), little work in northern Canada has been done in relation to freshwater ecosystems and valued fish species such as lake trout and loche. Guided by social science research methodologies developed in marine ecosystem (e.g., east coast cod fishing communities) and techniques for otolith analysis, this project has been developed collaboratively with the Akaitcho and Deh Cho communities to develop oral histories about fish population dynamics and health in different areas of Great Slave Lake and link the stories about the health of fish in their region to scientific data.

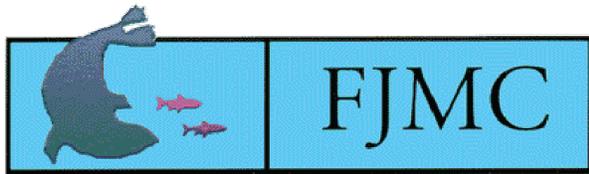
Tracey Proverbs - MA Collaboration with: in Environmental Studies
University of Victoria
Collaboration with: Gwich'in Renewable Resources Board
Trevor Lantz– Supervisor

Impacts of Environmental and Socioeconomic Change on Gwich'in Fishing Livelihoods and Cultural Resources

Arctic communities are experiencing rapid climatic and social change. In the Gwich'in Settlement Area, environmental change is affecting regional ecology, altering hydrological and terrestrial systems through changes like permafrost thaw and shifts in vegetation. These changes are coupled with social shifts stemming from development pressures, and the arrival of European settlers, traders and missionaries in the mid-19th century. In partnership with the Gwich'in Tribal Council (GTC), Gwich'in Renewable Resources Board and the GTC Department of Cultural Heritage, we are exploring two fundamental research questions: 1) How are environmental and socioeconomic changes affecting Gwich'in fishing livelihoods in the Gwich'in Settlement Area?, and 2) What is the current overlap between environmental disturbances and cultural resources in the Gwich'in Settlement Area? For the first question, land-based observations and interviews will be used to elicit land users' observations of changes to fishing livelihoods and assess how these changes are, or have the potential to, affect community well-being. To address the second question, spatial overlay analysis will be used to examine overlap between areas of cultural significance and environmental disturbance in Gwich'in territories. The findings from this research will increase our understanding of regional socioecological change, inform cultural and resource management decision making, and foster adaptive capacity.



Mackenzie River Basin



Inuvialuit Knowledge and Use of Fisheries in the Mackenzie Delta

Kristin Hynes, Sonia Wesche, and the Aklavik Hunters and Trappers Committee

The Fisheries Joint Management Committee (FJMC) led a project focused on documenting and assessing the importance of fisheries in the Mackenzie River Delta area to Inuvialuit from Aklavik and Inuvik through TK interviews, mapping of environmental change with implications towards fish habitat, and engaging Inuvialuit from each community in a fish camp that included youth, elders and active fishers as a knowledge-sharing event. TK interviews focused on collecting information on: 1) the relative importance of different fish species to Inuvialuit livelihoods; 2) observed changes in fish species for health/condition, distribution and harvest levels; and 3) observations of environmental change in the Mackenzie River Delta area. This program has resulted in valuable feedback from Inuvialuit harvesters toward their concerns, questions and priorities for the Mackenzie River Delta that will assist the FJMC, the Aklavik Hunters and Trappers Committee (AHTC) and the Inuvialuit Hunters and Trappers Committee (IHTC) in the development of future programs in the area.

The Inuvialuit Settlement Region is the furthest downstream jurisdiction of the Mackenzie River Basin. The communities of **Inuvik**, **Aklavik** and **Tuktoyatuk**, located in the Mackenzie Delta system; depend significantly on aquatic resources of the delta for their culture, community, and economy. The Fisheries Joint Management Committee is one of several Inuvialuit co-management boards involved in environmental research and monitoring with a focus in ensuring harvesting rights and subsistence economies of the region are sustained for future generations.



Specifically, *Tracking Change...* supported knowledge and skill-sharing with youth through participation in two fish camps, as well as the collection of Inuvialuit knowledge, observations and opinions on fish and fish habitat in the Mackenzie River Delta. Winter fish camps were coordinated by the Aklavik and Inuvik Hunters and Tappers Committees (HTCs). The Aklavik camp was held from 18 to 19 November 2016 at a river site in close proximity to the community. More than 50 community members participated in the camp by fishing under the ice by net or by jigging. The Inuvik event was held from 28 November to 1 December 2016, and hosted at the camp of a knowledgeable harvester and elder, Hank Rogers Sr., who shared his knowledge about fishing and the area with three youth. Fish and fish habitat interviews were completed by Jessi Pascal and Monica Jacobson with ten fishers from Aklavik, and by Iria Heredia Vazquez and Liz Gordon with 18 fishers from Inuvik.

What we found out...

The Mackenzie River Delta area is an important source of subsistence fisheries for the Inuvialuit, that contributes to the overall sustainability of fishing livelihoods for the communities of Aklavik, Inuvik and Tuktoyaktuk. The interviews highlighted a number of environmental changes in the Mackenzie River Delta that were largely attributed to climate change, including an increase in the number of beaver dams in the area, increased turbidity in Mackenzie River waters (causing dirtier water), erosion, the drying up of creeks and lower water levels, warmer water temperatures, and reduced ice thickness in certain areas.



Truck goes through the ice near Inuvik.
Photo Credit – CBC North.



How to Set a Net

Photo Credit - Inuvialuit Communications Society.
<https://i.ytimg.com/vi/ZVXH9iDbll4/hqdefault.jpg>

Some observations that were reported on the condition of Mackenzie River Delta fish included softer meat in whitefish, fish with high parasite loads, sores and scars, and discoloured burbot ('loche') livers.

A number of changes in the health of fish have been observed in the last 5-10 years. Some harvesters have observed that more fish harvested from the Mackenzie River Delta are in poor condition: whitefish with soft meat, burbot (loche) with discoloured livers, and some fish with high parasite loads or other irregularities such as sores and lumps. These changes have been observed more regularly within the last five years. Environmental conditions are more variable and unpredictable now; in the past there was little change so they did not have to adapt their fishing practices, as is becoming more common in

recent years. For example, reduced ice thickness in certain areas can make it less safe to travel to some places. This change has been observed in the last 5 to 10 years. Some harvesters are observing lower harvest rates for Broad Whitefish and Burbot (Loche) in the Mackenzie River Delta, as well as new observations of chum salmon in the area. This change has been observed more regularly in the past five years. Climate-related changes seem to be leading to changes in the access of community members to traditional fishing areas. Landslides or bank erosions into the river are being observed with greater frequency.

And there's lots of landslides. And I got a lot of dead water on my place... We can't drink it... A lot of banks falling... more places where there is no more lakes because the water ran out. You know, it ran to the river. Like, even behind my house, I used to have a nice big lake. It doesn't exist anymore. That part just opened up to the river. – Clara Day, Inuvik,

There was common concern about water levels decreasing in many areas and many creeks drying up. People observe water levels dropping by a number of indicators, including the number of sandbars visible in the delta when compared to the past. Related is the concern that the water is warmer than it used to be in the Delta, which is leading to softer fish or changes in the location of good fishing areas.



Permafrost Slumping

Photo Credit – Scott Zolkos, Canadian Press.

<https://www.thestar.com/news/canada/2015/07/22/lake-falling-off-cliff-due-to-permafrost-melt-is-new-normal-for-nwt.html>

There was widespread concern about an increase in the number of beaver dams and lodges in the Mackenzie River Delta which is affecting fish and fish habitat and causing certain areas to no longer be considered good fishing spots.

The degree of resource development upstream in the delta is a concern to many Inuvialuit. The Mackenzie River Delta is a very important area for the subsistence and cultural activities of the Inuvialuit; upstream development projects could be impacting local fish and their habitat. These impacts should be mitigated to ensure stocks remain healthy.

We are very lucky in this area because we have everything: water everywhere, ocean and a lot of wildlife. So we can rely on fish, or whales, or caribou, or moose, or muskrats. We have a lot of different sources of food so we have alternatives if we have bad hunting, trapping, fishing seasons. The Inuvialuit are very resilient people and were able to survive relying on the land and everything that it provides. – Richard Binder, Inuvik, NT



Changes affecting Fishing Livelihoods in the Gwich'in Settlement Area

**Janet Boxwell, Trevor Lantz, Tracey Proverbs,
Tas-tsi Catholique, Sharon Snowshoe and Ingrid
Kritsch,- Gwich'in Renewable Resources Board and
Gwich'in Tribal Council**

In the summer of 2016, four knowledge exchange fish camps were organized near each Gwich'in community in the Northwest Territories (Inuvik, Aklavik, Fort McPherson, and Tsiigehtchic). At each 1 to 2-day camp, youth representatives from each community and project team members discussed changes in fishing livelihoods with traditional knowledge holders and camp owners. Before every camp, youth representatives were trained to use GPS units and interview equipment, including digital cameras, audio recorders, and video cameras. In addition to numerous open-ended conversations (several recorded), four semi-structured interviews were completed. Over the course of the summer, this project engaged eight youth, and eight knowledge holders or camp owners. Open-ended conversations and interviews focused on a range of topics, including: fish and river health, water quality and quantity, environmental and socioeconomic changes, access to fishing camps and equipment, knowledge transmission, and future project activities and goals. At most camps, youth also had the opportunity to learn how to make fish sticks. Youth received additional training in fish monitoring techniques and at each camp assisted the project team with fish sampling. In November 2016, Tracey Proverbs (UVic MA Student) travelled to Inuvik, Fort McPherson, and Aklavik to meet with project participants, discuss future project activities, and conduct two additional interviews. Between the three communities, she was also able to meet at least one individual who participated in a summer fish camp. The project team has also been working with the Gwich'in Tribal Council Department of Cultural Heritage to obtain spatial and qualitative data that is relevant to the project.





'Youth of the Peel' on Facebook 2017

Youth from Fort McPherson and other communities of the Peel River Watershed are working together to educate and raise awareness about the need to protect the Peel River Watershed.

Gwich'in Youth Involvement in Tracking Change

Research activities were developed to involve youth in research activities such as interviewing and/or mapping information. Youth were also involved in other learning activities such as: a) Operating cameras (video and photo) during interviews and general camp goings-on. Such hands-on activities as photography and videography effectively engaged youth participants; and b) Fish monitoring activities. Youth were trained to use GPS units. The goals and objectives of the research activity involving youth were to:

- Create an opportunity for youth to learn about fish and fishing practices from Gwich'in land users.
- Train youth to build skills (fish sampling, geographical positioning systems, interviews, photography, and videography).
- Pique youth interest in getting on the land to fish.
- Foster interest in environmental sciences.
- Provide a summer activity/job
- Train youth to familiarize them with Gwich'in stewardship principles.
- Generate interest in careers in resource management and educational opportunities like the Environment and Natural Resources Technology Program at Aurora College.

What we found out ...

The discussion on fish health revealed various kinds of observations. Some participants have observed fewer fish now than in the past, but this observation was not consistent across all participants. Other participants were catching different fish species than they have in the past. A discussion on how the fish runs are becoming less predictable was important to some participants. According to those interviewed, in the last 5 to 10 years there has been less certainty about when to catch certain species. There were a number of concerns about the health of fish that were being caught in both the Mackenzie and Peel Rivers. People are finding white spots on the livers of the fish that are being caught. Some participants noted an increase in scarred or scabbed fish, but this observation was not consistent across all participants. Unusual tumours was another concern; one participant and other community members in Aklavik discussed a fish that someone caught with a growth on its' face. In general though, participants noted having healthy fish in 2016.

There were numerous concerns raised about the pace of change increasing with particular concern about the health of the water.

Every year is changing. Everything changing, even the water someday. I could see it from the air when I go on a plane... See some lakes are just black or brown water. Everything is changing - we used to have good water. You know down the bank you see all those willows. It never used to be like that. White river, the boats used to land right down the bank from the Northern. Even, those days they call banana boats. Schooners and that, they'd land on the bank. You can't do that now... Too much willows, and ah, just like, mostly sandbars like that all over. Even up the river is like that. - Emma Kaye, in her home in Fort McPherson, Nov. 17, 2016

There was general concern about water levels and creeks drying up.

And the river changes so much [shakes head]. Sometimes you used to know where, sometimes, you go in a river and boy, goodness me it's a sandbar... Yeah. Like we used to go up this creak [points to map]. We used to drive in the boat and go all the way up and hunt rabbits. Last year we went up and we ran out of water. -- Anonymous Participant



James Creek in the Peel River Watershed, Gwich'in Settlement Area
Photo Credit – Brenda Parlee

There were numerous concerns raised about the quality of the water, including water levels and access to important fishing areas.

There were reports of lower water levels and narrower channels; willows are encroaching on channels, making them narrower and making it harder to maintain portages. Participants noted an increase in sandbars in the river, making it more dangerous and challenging to travel in certain areas. People discussed the importance of local, current river knowledge to travel safely. Sandbars were a frequent topic of discussion. One participant noted that the water has become lower over the last 30 years.

Contaminants in the water from upstream sources was a major topic of conversation for some participants, their friends and families. Some participants mentioned concerns that contaminants from the south may flow downstream in the rivers from the oilsands or other industrial areas. Some wondered when contaminants would make it downstream to their territory, and mentioned other communities upriver that have been affected by contaminated water.

Some participants talked about how river water is warmer, and discussed how local kids were swimming in the river more because of this. Some expressed worry that warmer water causes fish to die faster and make them softer. Others discussed how soft fish just fall off of their racks, especially when the weather is hot.



Drying Rat River Char - Abe Stewart's Family Camp, Gwich'in Settlement Area

Photo Credit – Brenda Parlee

The erosion of the river banks and consequent widening of the Mackenzie River channel was also highlighted. Some participants discussed how there are more cut banks, and taller cut banks now, because slopes keep falling away. As a result, more cabins are beginning to fall into the rivers (i.e., hunting and trapping cabins). People also discussed how some infrastructure in towns has been built potentially too close to rivers, and may be damaged in the future. Participants also discussed seeing 'holes,' or thaw slumps, in the landscape, especially when driving along the Dempster Highway.

The potential risks of contamination of the water and the fish was a worry to numerous people who were interviewed.

Like say, you know, in the summer I make a living off fish, and I don't wanna be selling bad fish myself, you know, without myself knowing it... You know, I don't wanna sell fish to somebody, and then have them get sick. ... You hear them talking about if they've got chemicals in them you know and people up the river don't even like. There's people up the river buy fish from down here.

– Anonymous Participant

Many participants mentioned climate change impacts. While some participants talked directly about climate change or global warming, others talked more generally about warmer summers, permafrost thaw, warmer water, and changes in wildlife, birds and insects.



Sahtú hé Dəocha hé Dene Naó werá Chets'elə – Great Bear Lake and Mackenzie River Dene Knowledge: Research Camps 2016

Leslee Mackey, Chelsea Martin, Christine Wenman,
Deborah Simmons, Michael Neyelle
Sahtú Renewable Resources Board

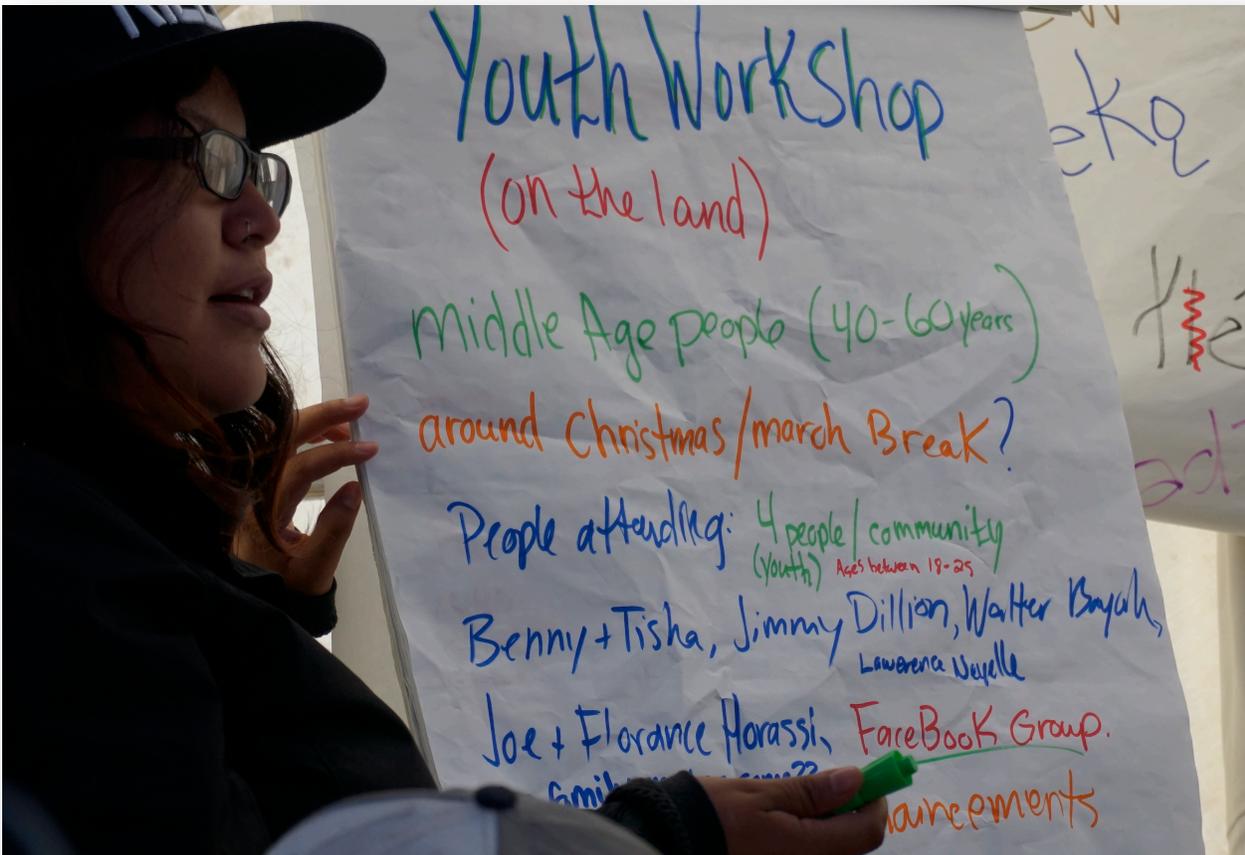
www.srrb.nt.ca

This project involved on-the-land activities designed by the Sahtú Environmental Research and Monitoring Forum, including the annual Sahtú Cross-Cultural Research Camp on Sahtú (Great Bear Lake) in 2016 and Dəocha (Mackenzie River) watershed in the summer of 2017, and participation in a cross-regional initiative in travel and knowledge exchange along traditional water routes in the Dəocha Basin. Through hands-on activities, participants shared and interpreted traditional knowledge about the changing ecology of water and fishing livelihoods. Activities addressed four main objectives: 1) document narrative and practice-based systems for cross-family, cross-community and cross-generational transfer of traditional knowledge and skills in water safety, subsistence fishing, fish preparation, and the sharing economy; 2) document traditional knowledge narratives and spatial information about water and fish ecology 3) strengthen planning processes for traditional knowledge research and monitoring; 4) strengthen community governance and leadership in water stewardship and fish conservation; and 5) foster networking and collaboration in ongoing and new community-driven traditional knowledge research and monitoring in the region.

Déline is located in the Sahtú Region of the Northwest Territories, Canada, on the western shore of Great Bear Lake. Déline is the only community on the shores of Great Bear Lake, the eighth largest lake in the world and the largest within Canada's borders draining into the Mackenzie River system. Déline means 'where the waters flow,' a reference to the headwaters of the Great Bear River, Sahtúdé.



Deline Fish Camp
(2016) – Photo
Credit Christine
Wenman



Angela Bernarde, from Tulit'a, led a presentation of the youth to their elders, explaining their plans for a Dene T'sili course.

Photo Credit – Sahtu Renewable Resources Board

The Cross-Cultural Research Camp involved a dynamic group of youth from the five communities of the Sahtú Region; several youth caucuses were held to address *Tracking Change...* themes. A key outcome of these caucus sessions was the plan for a Dene Ts'ılı (Being Dene) On-the-Land School for youth that would provide an opportunity for them to gain knowledge of the land and water, and the skills required for subsistence harvesting, with a focus on fishing. The first Dene Ts'ılı session took place from 17 February to 5 March on Sahtú Də (Bear River) between Sahtú and Dehcho (Mackenzie River). Plans for a second session are being prepared based on input from youth at the 2016 event, as well as activities of the Sahtú Youth Network. A Sahtú Youth Network website is in the works. The youth presented back to their elders twice about the themes of their caucuses and asked the elders for feedback and advice. Youth emphasized the importance of learning from their own elders about Dene values, identity, language and culture. One spoke about feeling alienated and out of place within a western school system and had left school to learn traditional skills from his grandfather. He has continued to practice these skills and lives much of his year on the land, trapping and harvesting. Another, who has continued to pursue western education through post-secondary instruction, emphasized the need to have more integration for youth between the two ways of knowing. “We have to learn both ways at once,” she said “so that it doesn’t take us two lifetimes to figure out who we are.”

What we found out...

Interviewees shared a wealth of knowledge about fishing practices and their harvesting travels, past and present. People are still very actively harvesting fish in the region, particularly *sahba* (lake trout), *łue* (whitefish) and *łuehya* (herring or cisco). While there is no doubt that fish has always been and continues to be important to the people of Délı̨ne, eating and fishing practices vary substantially between families in the community. Moreover, there is a lot of variation in fish consumption through the seasons of the year. Over time, some changes to fish, fish habitat and fishing practices have occurred. Two participants noted that herring numbers have noticeably decreased with one person attributing this decline to the winter road, which traverses the fishing grounds.



One person noted that despite an abundance of fish, there were some areas where the fish were not thought safe to eat due to high levels of minerals and mercury. Unusual species have been noted in the area. Both salmon and char have been caught in recent years although they were never seen in this region in the past.

Changes in fish have been observed. Most commonly noted was that fish are getting skinnier.

Water quality and fish health is a major concern in certain areas that have been used by industry. One respondent discussed the situation near Port Radium, where the river was blasted to make room for a barge to travel to mines. There are five abandoned mine sites in that region, and when the oil companies left, they abandoned equipment on the ice. When the ice melted the equipment sunk to the bottom of the lake and remains there. Since then, oil and other contaminants have been observed in the water.

The most common change referenced throughout interviews was that the ice did not freeze as thick and melted earlier and faster than in the past.

“You have to really watch where you’re going. You have to check the ice before you cross the lake. But it’s not as thick as before so you really need to watch.”

From 30 July to 7 Aug., 2016 a Cross-Cultural Research Camp involving participants of all ages from five Sahtú communities ʔok'aibe on Great Bear Lake was held under the leadership of the Sahtu Renewable Resources Board

Michael Neyelle interviewed five Sahtú elders and active fishers about the changes they have observed and experienced in the Great Bear Lake area.

Photo: Christine Wenman



This has been a major change affecting people's ability to travel in the winter and their general safety even closer to home. Freeze-up and break-up times are becoming unpredictable and people are unable to plan as they have in the past. Ice is melting much earlier in the year, affecting both travel and fishing. One respondent was remembering in the past they never used to travel down to Tulít'a until July because the ice was still breaking up at the end of June.

There was general agreement that water levels in the region are also lower than in the past. Water temperature has also increased. Two respondents talked about needing to check their fish nets every day now, because fish in the nets die and spoil much faster than in the past because of warmer water temperatures.





DehCho K'ehodi Youth Trip: Fort Simpson to Willow Lake River

Dahti Tsetso, Christine Wenman
Deh Cho First Nations
www.dehcho.org

Tracking Change... supported a canoe trip from Fort Simpson to Willow Lake River and interviews with Liidli Kue First Nation (Fort Simpson) elders and fishers about changes in the Mackenzie River system. The canoe trip was part of a locally developed initiative called the *Dehcho K'ehodi* Program which focuses on encouraging Dehcho youth to develop a sense of self, place and identity. It recognizes elders as experts and creates opportunities for youth to learn skills and knowledge directly from them.

The five-day river trip involved youth, elders, land users and other resource people; they traveled from Fort Simpson to Willow River, approximately 85 kilometres downstream on the Mackenzie River. In August, 2017, members of Ka'a'gee Tu First Nation hosted a five day camp in their community of Kakisa. Youth of all ages, land users and elders spent four nights at cabins just outside the community where participants could share traditional skills and stories. In both cases, interviews for the *Tracking Change...* project were integrated into the camp schedules, allowing youth to actively participate in hearing from their elders about their lives, traditions and changes they have experienced. The interviews also emphasized place. By asking and hearing about place names, youth are better able to understand the unique relationship that their families have had and continue to have with the environment.

Following the on-the-land trips, DFN staff hired a Dehcho youth to help lead five follow-up interviews, two were with participants of the canoe trip while the other three were additional interviews. Through the follow-up interviews, the project team was able to validate the knowledge that had been shared on the trip and seek additional detail where gaps or questions had emerged. Three youth who participated in the *Dehcho K'ehodi Program* were also interviewed in a focus group setting about what the experience meant to them. Their insights are summarized to provide further direction both to the *Tracking Change* project and to the *Dehcho K'ehodi Program*

The Dehcho First Nations is a regional coalition representing the Dene (South Slavey people) and Métis people of Dehcho Region of the Northwest Territories, Canada. It is made up of ten First Nations bands and two Métis Locals. The community of Fort Simpson is located on the Mackenzie River which is known as Deh Cho (“big river”) in the South Slavey language.

What we found out...

Water levels are decreasing in the Deh Cho and water is becoming siltier with increasing landslides and permafrost thaw. Many of the respondents were also aware of reports of increasing mercury concentrations within the food chain, particularly in some kinds of fish. In spite of these changes, most respondents indicated that there was nowhere in the region (likely outside of the Mackenzie River itself) they felt they could not drink the water. Respondents also tended to describe at least one and sometimes multiple places where they thought the water was especially pure and high quality.

There's not too many places I wouldn't drink water from in our territory. We have the spring behind the mountain, which would be an awesome place to get water from because it's glacial fed, which is probably some of the purest water you could drink. And pretty much anywhere there's a tributary flowing into the Nahanni River, you could pretty much dip your cup into and drink.



In contrast, several respondents had concerns about the quality of the water in the Mackenzie system and noted a change in the colour of the Mackenzie River.

[T]he Mackenzie River is changing, and we're finding that out because the water used to be just a nice, nice color of blue, and now it's just dull grey.

One respondent described his changing perception of the river as he transitioned from drinking it to drinking it no longer:

Even about 20 years ago, back in the 60s, when I was on the river, ... at that time we used to take water right from the river, and I used to get sick from it and I didn't know what it was, I had stomach problems and then I found out it was actually water from the Mackenzie River, and more and more I talked to people around the river, they were saying they do notice the water quality on the Mackenzie. It's not as crystal clear as it used to be, it's a marshy kind of green, and you see a lot of muck at the bottom, and slime on the rocks, and you never used to have that before. The quality of the water has changed drastic.

Two respondents also noted concerns about the high mercury levels in the Mackenzie River and stated the community would like to understand what is causing that.

One person observed that the water levels seemed to fluctuate from too high to too low, while the rest of the respondents reported that water levels in the region were decreasing overall.

In the last 10 or 20 years, the water level has changed dramatically. There have been some springs where the Nahanni River has almost dried up to a trickle, where the river itself is only 10 feet wide, and that was all the water that was coming down, and that was before the spring run on. So, elders have noticed this change as well and they do bring it up a lot. In the fall time, when the water level drops, it drops a lot, more than it did 20 years ago, and they're also noticing that change. That's a big issue for us.

Changing water levels and quality has and continues to affect Deh Cho people, interrupted travel patterns, as one participant explained:

The last 10-15 years water levels have been going down. It's kind of so gradual that we, those of us that spend a lot of time on the river, we kind of eased into it, I guess. Nowadays you really have to be careful if you're travelling on the river.

Lower water levels in the Mackenzie was among the most striking and strongly validated changes. One participant explained how expert his people had been at travel in the past and how safety was now jeopardized:

People would travel by boat in the dark a lot, and they memorized the locations of rocks so they could avoid them in the dark. Water level changes are affecting this ability to safely travel at night by changing where the rocks are in the water.

Some participants spent much of their time traveling along or harvesting in waters in the mountains (tributaries to the Deh Cho or inland lakes) while others spoke of traditional ties on or near the Deh Cho itself. Changes in water quality and quantity appeared, from the interviews available, to impact the Deh Cho most drastically and most negatively.

Participants also shared observations about thinner ice with resulting dangers to winter travel, quicker spring break-ups, less snow overall and changes in the consistency of ice when it freezes. One described the warming temperatures:

It is warmer than before, and --- and wetter [in winter]. You don't need a parka for skidooing now, you get wet, not cold. The skidoo heat keeps you warm but wet." In his early life, this participant described, his family lived in a cabin and in the winter it would "be so cold the locks would burst.

The most consistent report among respondents was of the ice being thinner than in the past, making it dangerous to travel in the winter.

It's really dangerous to go out in the winter time because it's not freezing as much anymore.... The ground where the people want to go can't freeze anymore. Even

right now its -33 there's some places they can't go right now because it's not freezing.

Others agreed. "Ice used to be three to four feet thick," explained one participant while another added that now you are lucky to see two feet of ice. One described ice up to six feet thick at break-up in the past comparing it to much thinner ice now and "a different kind of ice – slushy, not thick solid and clear."

Another participant reported that the ice breaks up, as slush, much faster than in the past. Another explained that the warming is happening from both directions, not just from the top of the ice but also from underneath. "Scary," he said, "you can't tell what the land is doing underneath." He explained that he is constantly hearing of people falling through the ice and that people need to travel very carefully now, constantly 'being on guard.' "It's hard to follow your grandfather's trails," he said.

There is also less snow now overall than in the past according to two respondents. They also noted that water is freezing differently close to shore making it impossible to travel along the shore during winter.

In the winter time it's different too, because you see the ice pile up on the Mackenzie. Like last year on the Mackenzie...you could actually take a skidoo right from here and right to Rabbit Skin and drive along the shoreline, just nice and flat. But this year the ice is just piled up like humongous, like mountains along the way, so it's pretty hard to follow the shoreline nowadays.

Overall, the changes to ice and snow described by participants had one strong commonality – that changes are making travel more difficult and more dangerous. There is strong agreement and validation that ice is drastically thinner and of a different, slushier consistency.

Land and land/water interactions

Changes in the land and wildlife were reported by all participants and were frequently spoken of with concern. The erosion of river banks, shallower water, and gravel bars appearing in rivers are making travel to some areas impossible and making travel overall more dangerous. The land is becoming drier. Increased mudslides were emphasized by a majority of participants as a major, negative change.

[T]oday with all the activity and all the sunlight, and everything that's happening around the world, you're starting to see massive changes, like major mud floods in the Mackenzie, channels changing on the river, places where water levels are extremely low, and some places where sandbars just show up and never used to be there before.

Mudslides did not happen in the 1950s and 1960s with the same frequency as today. Some participants described this change as being quite recent "within the last few years." "These

started recently,” another agreed, “below the Marten River, a landslide there forty feet back from the river. The river is getting shallower.” As water levels decrease and shorelines erode, there are more trees in the water, creating another barrier to travel.

Three respondents referred to thawing permafrost as another important change and one that engenders further changes to the landscape: increases in mudslides, less water in the bush, and increased mercury levels in the Mackenzie River. Permafrost thaw has also affected travel, limiting the accessibility of important places because of thawing frost heaves or “craters and lumps in the ground and trails.”

The landscapes where [the harvesters] used to go trapping are somewhat flooded or somewhat uprooted because the permafrost is thawing and all of a sudden you're having trees laying all over, like somebody dumped toothpicks. So, all of the trees are just uprooting. They're just all falling down. Like when you come to the muskeg area, they used to have these big frost heaves, when you're travelling. But all of a sudden, these frost heaves are here no more. And all of a sudden there's big craters in the ground.

Another participant echoed these sentiments, noting that trees are falling much more than before and generally seem less healthy, “drying up for some reason”. He also described the changes in terrain to the muskeg explaining that when he used to duck hunt in June, he would wear rubbers and moccasins.² As he walked through the muskeg, he would sink down only as far as his ankle making this footwear adequate. “You could walk anywhere on the muskeg then” These days, however, he explains, the permafrost thaw makes travel more difficult as he now will sink up to just below his knee. One respondent also reported an increase in forest fires, as compared to the past.

Changes in the Health of Fish Populations

Participants consistently reported that people in the Dehcho are now harvesting fewer fish overall than in the past. Decreases in fishing can be attributed both to a change in lifestyle and also to decreases in some fish stocks (grayling and suckers) in some places, particularly in the Mackenzie River. However, it was also clear from participants’ reflections, that fishing remains a crucial component of livelihoods, lifestyles and culture to people in the region.

Participants spoke of fish declines both generally and with reference to specific types and locations. One participant commented:

[T]here's a number of places where people still harvest fish, and we're just not seeing the numbers we saw 25 years ago. Which brings us again to the decline in fish that were once there... [The decline is in] mostly all kinds of fish, because it's mostly due likely to climate change, and it could be toxicities in the water.

² ‘Rubbers’ are rubber outer footwear for moccasins that protect the soles of moccasins but come up only as high as a regular shoe.

Other participants specified that bottom feeders and grayling were the fish most in decline.

However certain fish, bottom feeders, like suckers have gone missing. There are no more bottom feeders. That's in the Liard River. In the Mackenzie, there are no more bluefish or grayling... Now you could go fishing for a week and you won't even catch 1 – 2 grayling. They all disappeared.

The almost complete disappearance of grayling from the Mackenzie River was strongly validated. Another participant described that grayling would make the Mackenzie River at Fort Simpson in the 1960s “boil with their activity as they jumped for bugs to eat.” In those days, people fished grayling frequently from the Deh Cho, using horseflies and grasshoppers for bait. “You could fill up a bucket in an hour with graylings,” he said, “now you are lucky if you get one.” In accordance with other observations, the drastic decline in grayling along the Mackenzie happened in the 1970s, “they all just seemed to disappear. Maybe they went up the creeks. Grayling were always plentiful but not anymore.”

Several participants attributed the grayling decline to the same cause—seismic testing for oil and gas in the 70s, 80s and 90s. One described the sight:

A tugboat pushing three or four barges would stop every kilometre or so and set off an explosion—blasting. Each blast sent water shooting up above the trees. There were many dead fish floating down the river.

These days, one participant explained, you can now catch jackfish (pike), coney, cod, loche, pickerel and suckers in the Deh Cho, though fewer suckers than in the past. Three respondents noted the research that found high mercury levels in fish, and one person reported that the community and public were informed and encouraged not to eat too many of the types of fish from that area known to have high levels of mercury.

In the Deh Cho, the land that we live is like the bread and butter for us, because it clothes us and it feeds us and it heats us... we're really worried about it because when we did studies on the water and the fish we saw a lot of mercury. But even the scientists today say, what is contributing to the mercury in the fish? Is it the climate change, is it the permafrost thawing? They're still figuring it out.



Youth Canoe Group on the Mackenzie near Fort Simpson

Photo Credit Dahti Tsetso

Two respondents mentioned an increase in one species, salmon, which had been seen only very rarely in the past.

[W]e know for a fact that within the last five years there has been a change with the salmon. Where let's say fifteen years ago you would be lucky to harvest two to three salmon, but today we're harvesting five to ten so the numbers are going up, and we're learning a lot more about the salmon and how global warming and chemicals in the water might be affecting them. It helps to know what's going on out there in different seasons of the year, and we know this because like I said there's five to ten more salmon coming up our rivers than there was twenty years ago.

One respondent in the group interview mentioned that Tathlina Lake is home to a population of unique whitefish:

The bigger whitefish, those ones are like prehistoric whitefish, they've got big scales. They're like old fish. I don't know where they come from but you catch them in Tathlina.

Several participants described changes in the consistency of fish's flesh, particularly in the summer time because the water is warmer than it used to be. "The water is shallower, and warmer and the fish can't go down to deep, cold water" explained one participant, "in the winter the flesh is okay. Cli Lake has good fish—it is deep and cold." Another participant explained that these unhealthy fish will come in waves or batches. For some, he can feel the stomach and it is solid like a bone whereas the next batch will be thin and he will almost put his thumb right through the stomach of the fish.

All participants noted incidences of people catching unhealthy fish over the years, including skinnier fish, fish with less fat around their entrails, fish with a liver or stomach with an unhealthy colour, or fish not looking healthy enough to eat. Others mentioned sores on the fish.

[T]here have been instances where people have caught fish where the fish wouldn't even be considered [to be] eaten because of either the way it looked- where it didn't look as healthy as that fish we caught in August. The pickerel, it would have like a skinnier body and not as much meat as a healthy fish would. People see these things.

Several participants described using the fish's liver to determine the health of the fish. "If it is red, it is no good" one said, "white livers are healthy. The fish will tell you what state your water is in." Generally, participants were particularly concerned about fish health in the Mackenzie. When asked where to find the healthiest fish, one answered, "Not the Mackenzie River for sure. Every fish caught in the Mackenzie have sores."

However, three participants noted they themselves had never caught an unhealthy fish. More discussion and work would help to clarify differences in fish health depending on where they are caught. The greatest concern for fish health and fish stocks is focused on the Mackenzie River.

Fishing Practices

In participants' descriptions of fishing practices, the importance of fishing to traditional livelihoods is clear. Fish were critical to feeding not only families themselves but also their dog teams, which were important for transportation. Deh Cho people were skilled fishers who, before European contact (and for some time thereafter) made effective tools such as nets and weirs from willow and other materials locally available from the land. Over time, there have been fewer people fishing or eating fish, or some of those that do fish, do so less frequently.

Participants described several fishing practices that are no longer used and they described how patterns of fishing have changed over time.

In the past, fish nets were made out of willow and had to be kept in the water to prevent them from drying out. Fish weirs were made and put in the water to trap fish as they swam upstream.

Fish were harvested and then buried in permafrost along the shore so that people could come back in times of scarce food. In time, scows³ that people would make from plywood were used for fishing in place of canoes. One participant described these boats as being generally eight feet wide, four feet high and fifty feet long. These boats would drift downstream with nets while small engines (one participant described an eight horsepower Johnson motor) would be used to propel the boats upstream. When engines weren't available, the women would be in the boat and the men would walk the boat upstream in shallow waters or from the shore, or a dog team would be harnessed to the boat and would pull it upstream from shore. These days, lund and jet boats are used, typically with two hundred horsepower engines. Seasonal harvesting determined travel patterns of families who would frequent specific areas at different times of year in order to harvest abundant species. For instance, one participant described that his family would travel to three in-land lakes west of the Mackenzie River from April until the first week of June (Cli Lake, Little Doctor Lake and Mid Lake). Little Doctor and Cli Lakes are two lakes west of the Deh Cho and east of the north Nahanni River, toward the mountains. There, his family would make canoes and hike with the canoes in to the mountains to Mid Lake. Men would set the nets and catch the fish while women would process and dry the fish.

Another participant explained that his family spent the majority of the year at Burnt Island where there were three houses, passing the winter trapping and spending only June to October in town (Fort Simpson). While summer patterns were focused on water and fish, the fall was for moose and woodland caribou hunting. This particular family would spend the winter at "Two Islands" from where they would trap at Ebbut Hills and Sahki. At that time, there was a small community at *Two Islands* with approximately twenty houses. Through the winter, it was this participant's chore, along with his brothers and sisters, to check their father's trap lines every two days. They would also help with hunting, packing meat that his father had killed out from the bush—a journey that could take up to two days. "Dad wouldn't go for the easy prey," he said. At the end of November the family would make dry meat and stretch moose furs so that these could be taken to town to sell for Christmas money. They trapped for lots of furs at that time—marten, lynx, beaver, weasel and squirrel. The family would harvest approximately five moose in the fall and three to four over the winter.

Two respondents described how their families used to harvest hundreds of fish in the fall and dry them on sticks. One respondent indicated that this practice is no longer used because fish are less abundant while another indicated that this practice was typically used to feed dog teams, but few families maintain a dog team anymore. For many, in the past, travel was largely by dog team in the winter and by boat in the summer. Another participant agreed, without dog teams there is less need to fish, "people have skidoos instead of dogs."

Traditional harvesting patterns have also changed in response to changes in the landscape and waterscape. Low water levels prevent boat access to some fish lakes that were once frequented and thin ice prevents travel to some areas in winter. There are also fewer fish in some places where they had once been abundant, affecting how, when and where people fish.

³ Scows are flat bottomed boats with a blunt bow.

Two participants also emphasized the importance of inter-generational teaching to carrying on the traditions of fishing livelihoods, explaining that many people don't know where the traditional fishing lakes are; this knowledge has been lost to a lot of people. Two individual respondents explained that fewer people were eating fish in general, and one person noted concern that fewer youth are eating fish.

I guess my generation, we grew up on fish basically, it was the main diet. And I've noticed over the years that a lot of young people don't eat fish...Elders tell us that if you eat lots of fish you're more energetic. You're actually stronger. And if you eat a lot of fish you don't feel the cold. Because we got seven months of winter in our country here. So, I think those kind of points and information people need to know. We should share that.

These words capture a sentiment that was shared by several participants, that fishing is important to people's way of live in the Dehcho and to the health of its people.



Dahti Tsetso on the Mackenzie (2016)
Photo Credit – Deh Cho First Nations



Nacho Nayak Dun First Nation Traditional Knowledge Camp

Joella Hogan
Nacho Nayak Dun First Nation

The **Traditional Knowledge Camp in the Peel Watershed Region** was a trip of a lifetime for five youth to travel out with respected Nacho Nayak Dun elder Jimmy Johnny and an experienced guide to learn the traditional way of living off the land, traveling historic trails, and visiting old Nacho Nayak Dun campsites in the Peel River Watershed. The youth travelled by horseback and on foot through various terrain learning how to forage for berries and traditional medicine as well as subsisting on fish and wildlife. In addition to the important cultural component, the youth also learned more about modern scientific research (e.g., water sampling); collecting water samples from the major drainages within the watershed. Upon their return to Mayo, the Youth hosted a community dinner and presented a slideshow on their experiences in the Peel Watershed region. Community members were able to ask questions of the youth or elder Jimmy Johnny.

Methodological Approach

Youth Camp in the Wind River

Watershed: The youth were introduced to water sampling devices prior to the trip and were given instructions on where to take what kind of samples. They then boarded a plane and flew to the Rackla Airstrip, where outfitter Chris Widrig and his guides met up with them. From there they traveled to Goz Lake via horseback. During this entire time the youth were under the supervision of Jimmy Johnny, Chris Widrig and his guides as well as NND citizen Gerry Buyck. They spent time fishing and hiking and berry picking and learning from Jimmy Johnny's knowledge. Due to prior medical appointments, Jimmy Johnny left the group after Goz Lake. The youth, still under supervision from Gerry Buyck were transported to Carpenter Lake, where they spent further time fishing and hiking and hunting sheep. The plan was for them to hike from Carpenter Lake to Nash Creek Hot Springs



Photo Credit - Nacho Nayak Dun First Nation

(NND Outpost Site). However, high water made it impossible to cross the Wind River and therefore we helicoptered them into Nash Creek. Meanwhile, three elders left Mayo on a helicopter to meet up with the Youth at Nash Creek. There they spent several more days learning from the elders and soaking in the natural hot springs and exploring the surrounding area before we transported them back to Mayo.

What we found out...



Incorporation of Previously Documented Local and Traditional Knowledge: The project incorporated previously documented local and traditional knowledge from an earlier study. This project was carried out to learn what is changing in the environment in the watershed. It is part of an environmental monitoring system that records what people are seeing on the land.

Having this information recorded will help us to look back years from now and compare future conditions with today. The local knowledge gathered in these interviews complements technical monitoring that we're conducting annually in the Mayo area and in other areas of the Yukon. The interviews are aimed at recording both the observations of local people who are on the land the most and also their thoughts on the effects of any changes in the environment that they're seeing. This report represents a community 'diary' of what people are seeing on the land. We try to annually interview the people who spend the most time hunting, fishing, trapping, berry picking, or just spending time on the land.



Each year, we get a wide range of observations and not all people interviewed have the same information or thoughts on what they've seen.

Differences among people interviewed can be because they were spending time in different areas, are comparing what they've seen this year with their observations from different years in the past, or because they're basing their observations and thoughts on different signs and evidence. By interviewing a wide range of knowledgeable people, we hope to capture the main changes that are occurring in the local environment and how they are affecting people's subsistence activities.

Interviews have been conducted annually by teams of secondary students from J. V. Clark School since 2007. They were done in 2005 and 2006 by an elder-grandson team. The original interview forms, along with mapped information, are stored in the office of the Northern Tutchone Regional Biologist.

Fishing Livelihoods

The community *Nacho Nyak Dun First Nation* is a Northern Tutchone community located in Mayo, Yukon. The community has just over 400 people; the majority of its settlement areas are located in the Stewart River but the First Nation also has traditional use areas in the Peel River watershed in the Nash Creek area. The First Nation of Nacho Nyak Dun was involved in establishing the Bonnet Plume Canadian Heritage River and producing the management plan for this river. The culture and economy of Nacho Nyak Dun First Nation is interconnected with the natural resources of the Yukon. While salmon fishing in the Stewart River watershed is a major focus, the livelihoods Northern Tutchone peoples in the Peel River also included the harvesting of **Lake Trout, Round Whitefish** and **Grayling**.

The number of salmon in the adjacent Stewart river basin has been monitored for many years by Nacho Nyak Dun and similar plans to monitor changes in the Peel River Watershed near the community are planned. The key indicators being monitored include perception of population, total harvest, local of harvest, observations of fish condition (i.e., lesions, parasites etc.) as well as taste. Water quality and water flow indicators have also been monitored for several years including sediments, perceptions of contaminants, water levels, ice conditions, freezeup / breakup, and water access.

Salmon harvest was at a high during 2009-10 but there has been an observed decline since that time. Over the last several years, perceptions of the salmon declining in the Stewart River has been a major issue leading to a ban on salmon harvest in 2014-15. Although there was more pike, people caught fewer salmon and trout than normal with observations of changes in the health of fish harvested (e.g., cysts). Changes in water levels are a notable concern about all those that were interviewed since 2010 with associated observations of limited access to traditional fishing areas. In general people did not harvest enough salmon to meet their needs.

There was more variability in ice conditions. Freeze up and break up conditions are changing with freeze up of the local lake being about 3 weeks later in the last several years than previously. Warmer water conditions seem to be leading fish to be deeper (and less accessible in some lakes) and/or for harvested fish to be more mushy than is considered normal.

Nacho Nyak Dun First Nation has also been documenting changes to water levels on the Mayo River in our community for many years. A few years back, there were changes made to the hydro facility upstream. As a result, the river does not freeze the same, there is flooding and rapidly changing water levels, changes in ground water and ice jams. We are working with Yukon Energy and Yukon Government to monitor these changes.

A proposed hydro projects at Fraser Falls and 2 Mile site on the Stewart River are a concern to Nacho Nyak Dun First Nation. These developments are strongly opposed by the community due to their impacts to spawning areas and cultural sites.



Wek'èezhii Renewable Resources Board - Fish, Todzi, and Forest Fires

Jody Pellissey and Alice Legat
Wek'èezhii Renewable Resources Board

Among the Tlicho, the people of Whati are known as the 'people who know fish.' They have productive fisheries around the lake. The people depend particularly on *tih* (whitefish) and *hwezoo* (trout) as much as they depend on *todzi* (boreal caribou) and *?ekwo* (barren ground caribou). When observing the state of the *hwe* (fish) being harvested during the 2015 *todzi* and forest fire research season, elders and fishers expressed their concern that *hwe* are being impacted by the copious amounts of smoke and ash that settled in the water during the 2014 forest fire. They think there is a relationship between the forest fire and the smaller *hwe* they are now catching. The map entitled 'Wildfires within Mowhi Gogha de Niitlee' show the increase in number and size of fires since the 1990s. Of particular

importance to the elders and fishers

during the *Tracking Change...* project was their time guiding the youth to become respectful and knowledgeable about the fishery. For them, respect and knowledge will ensure fisheries stay productive. Youth mapped where their family place fishing nets, processed the *hwe* brought in from the nets, learned place names associated with good fishing areas, learned plant names, and briefly wrote about their

experience on the land. Although the elders wished to take the youth to more places during the August field trip, the extremely windy weather was not safe. Elders always prefer to talk about the positive aspects of their relationship with the land. Nevertheless, they expressed their concern about the impacts of low water levels and warmer water temperatures between 2012 and 2015. And, they stated how pleased they were with the increase in rain during 2016 in spite of the numerous thunderstorms.





Lutsel K'e Dene First Nation Wildlife, Lands and Environment Committee

Lauren King, Andreina Cambronerio Joseph Catholique, Ron Fatt
<http://landoftheancestors.ca>

Through the *Tracking Change...* collaborative research project, Lutsel K'e Dene First Nation (LKDFN) engaged land users and youth in canoe trip and collecting traditional knowledge about changes in the health of the fish and water in their region of the Mackenzie River Basin. Before the canoe trip, land users and Elders were interviewed by the project leads and youth to understand what the area used to be like 20-50 years ago. On the canoe trip, the leaders and youth learned and practiced on-the-land skills and heard stories about their ancestors. The canoe route was selected because of the route's historical and contemporary importance to the community. After the canoe trip, a workshop was held to document the land users and youth's observations of the area. The community-led research shows that the fish in the area are still healthy and abundant, but the water levels have dropped. Traditional Knowledge holders attribute the change in water levels to climate change. The summers are longer and there has been less rain and snow. There is growing concern about maintaining the health of the water and fish in the Lockhart watershed—part of the Mackenzie River Basin.



Madeline Drybones, Joseph Catholique mapping areas of their traditional territory for the youth canoe trip (2016).

Photo Credit – Brenda Parlee

Youth Involvement

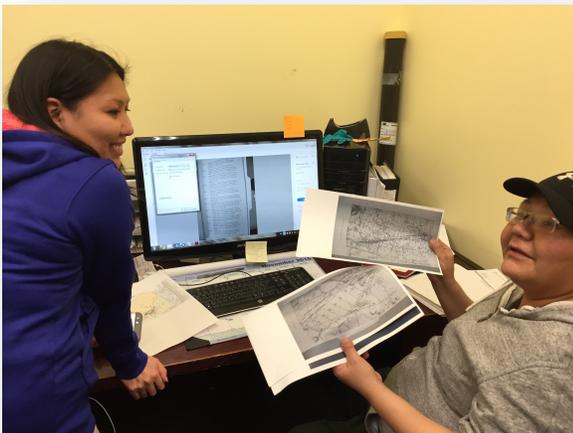
The canoe trip involved eight youth and two guides from the community who were able to travel over a ten day period through this traditional route. In addition to participating in the canoe trip, youth were involved in research activities such as interviewing and mapping places of importance of the elders. Youth were involved in other learning activities such as interviewing of their elders before and after the trip. The youth were given an interview guide and map to help them conduct the interviews.



Sunrise Lockhart at Artillery Lake, NT. Photo Credit – Brenda Parlee

All the youth were asked to share a story they were told by the Elder they interviewed on the educational canoe trip. The hope was to provide youth with interviewing experience, hearing stories they may not have heard before, and deepening connections between youth and Elders. By engaging youth as researchers, they were actively engaged in the process and gained experience in conducting research and documenting stories. This also fostered connections

between youth and Elders and youth learning from Elders. The stories and information collected will be stored in the community's online Traditional Knowledge Archive.



Laura Jane Michel and Jeanette Lockhart run the archival database for Lutsel K'e Dene First Nation's Wildlife, Lands and Environment Committee. Photo Credit – Brenda Parlee

The Lutsel K'e Dene School also provides opportunities for students to learn and practice cultural skills and lessons. In the fall and spring, they can participate in bi-annual caribou hunts. However, since the caribou have not come the last two years there have been no community hunts. Instead, the school has set up a cultural camp that students, teachers, and families can use to be on the land and develop traditional skills and practices. The cultural camp was established in November and will operate until the late

Spring. Since the school does not provide any summer activities, the Lutsel K'e Dene First Nation takes on this responsibility. This way of organizing and going on educational canoe trips is so important for the youth in the community. These trips provide an important opportunity for youth to learn and practice on-the-land skills, learn stories, and feel good about themselves.

What we found out...

Fish Species Commonly Harvested

There are numerous species valued for both commercial and subsistence fish harvesting in the traditional territory of Lutsel K'e Dene First Nation. Fishing in the east arm of Great Slave Lake is particularly valued by the community but also is a focus of angling and tourism. There are two major fishing lodges on the East Arm which focus on the harvesting of Lake Trout. The species most commonly harvested are the Lake Trout, Lake Whitefish, Inconnu and Round Whitefish.

Common Name of Fish Common Harvested	Species
Lake Trout	<i>Salvelinus namaycush</i>
Lake (Common) Whitefish	<i>Coregonus clupeaformis</i>
Round Whitefish	<i>Prosopium cylindraceum</i>
Broad Whitefish	<i>Salmondae coregoniae</i>
Jumbo Broad Whitefish	<i>Salmondae coregoniae</i>
Inconnu	<i>Stenodus leucichthys nelma</i>
Goldeye	<i>Hiodon alosoides</i>
Grayling	<i>Thymallus thymallus</i>
Cisco	<i>Amphiodion alosoides rafinesque</i>
Herring	<i>Coregonus autumnalis</i>
Burbot	<i>Lota lota</i>
Jackfish (Pike)	<i>Esox lucius</i>
Longnose Sucker	<i>Catostomus catostomus</i>



Fishing Livelihoods

The harvesting of fish from Great Slave Lake and other areas has always been a critical aspect of local livelihoods for the Denesoline of Great Slave Lake. Community members have always harvested fish during summer months when barren ground caribou populations returned to their spring and summer calving grounds. Today, fishing remains an important source of subsistence. Approximately 75-100 people from the community are active fishers (set nets). Harvests are shared or traded within the community; everyone consumes fish daily or weekly in the summer months and periodically during winter months. Setting nets during both the summer and winter months is an important skill valued by the community and one being passed on to younger generations.

Fishing Health and Populations

The community of Lutsel K'e has been involved in research about the health of fish populations for more than two decades. Baseline traditional knowledge studies in the 1990s identified common indicators of fish health in terms of a variety of signs and signals, with the most important being length-weight ratio (fish are skinny/not skinny), fat around the organs, colour of the organs and presence or absence of lesions or cysts. Although there are some areas where fish are considered unhealthy (e.g., Stark Lake), there is general agreement that there are no

problems with the health of the fish in Artillery Lake and Great Slave Lake. However, testing for contaminants such as mercury, toxaphene and other long-range contaminants have been ongoing. The fish in the area around Nonacho Lake are considered ‘ruined’ due to the impacts of the Talston River Hydro Electric Project. The flooding that occurred as a result of that project led to changes in mercury levels in fish as well as other changes in the quality of fish tissue such that people no longer consider them good to eat.

In areas immediately downstream of mining activity, perceptions of poor fish health are heightened. There is particular concern about how tailings water may be draining into downstream lakes such as Snap Lake and Gahcho Kue. The abandoned gold mines at Yellowknife on Great Slave Lake are a significant concern due to the presence of arsenic in the water (Yellowknife–Back Bay). There is also growing concern about the impacts of catch and release angling and tourism on the east arm of Great Slave. As a result, the community has developed a program to educate about Denesoline culture and collect data from visitors to Great Slave Lake. This monitoring through the Ni Hat Ni Program uses a variety of methods of tracking the health of fish including the identification of lesions or abnormalities.

Changes in Fishing Practices

There are approximately 100 active fishers in the community. The East Arm of Great Slave Lake and Artillery Lake are among the most important areas in Lutsel K’e Dene First Nation territory. Fishing in this region has also contributed significantly to food security, particularly during seasons and years when there were few caribou. As described by Joseph Catholique, *“In the past, people came to Artillery Lake in the fall to do a lot of fishing and they stock up in the fall time.”* Historically people used to set nets in Artillery Lake in order to harvest enough for their families. They harvested more than nine species, most significantly lake trout, lake whitefish, inconnu, gold eye, and Arctic grayling. A diversity of fish species is valued by the community, including multiple species of whitefish, each of which has a different name.

There is a different kind of whitefish in Artillery Lake. It is different from Whitefish Lake. It’s like *whitefish, but the scales are reddish.* - Albert Boucher and Sarahzine Basil

The habitat provided by the small creeks and streams flowing into Great Slave Lake and Artillery Lake are also critically important as noted by participants such as Ron Fatte.

Fishing around the islands on Artillery Lake is good. There is a lot of food there. Small rivers that feed into Artillery Lake brings fish into the Lake too. - Ron Fatt





Respecting the water has always been critically important to ensuring people are safe and secure and the water and fish are healthy. The region has deep spiritual value and significance to the community; elders have passed on important oral histories about both the Artillery Lake and Great Slave Lake areas featuring ‘giant beavers,’ the Dene giant name Hachoghe as well as the spiritual site

known as Desnethch’e or “the old lady of the falls.” The legend of the “Old Lady of the Falls” provides a unique perspective on the origins and significance of the Lockhart River (Parry Falls) and Denesôâine beliefs about the land as alive. The river is not simply a resource but is alive with human characteristics—a mother figure, a nurturer.

From what I know, the Lady of the Falls asked for beaver blood [for her soup] and she never received it. People ignored her at that time. They kind of left her behind when they were going back to Fort Reliance. And then, she decided to go to Perry Falls. She said she was going to sit there to the end of time and help people.

This principle of respecting the water has been passed on from elders such as the late Pierre Catholique.

In the olden days, our ancestors had lots of respect for the beaver lodge at Artillery Lake (edacho Tué). My grandfather used to tell me to respect the area by offering tobacco, even in winter. I remember Louis Drybones had a cabin at Artillery Lake (edacho Tué). On the way we would stop at the Beaver Lodge and he told us we would have to make offerings of respect – so we did. (PC 30 11 00)

Changes in the Fish and Water

There have been a variety of changes in the health of the water and fish over the last several decades of concern to elders. The increase in mining activity such as the advanced exploration

site for uranium at Stark Lake has long been a concern for the community. People stopped fishing there and there is fear the fish are polluted by the runoff from the abandoned advanced exploration site.

The draining of lakes and rerouting of ground water as a result of diamond mining activity is also a fundamental concern. The closest operating diamond mine - Gahcho Kue Diamond Mine - is less than 100 kms from the community of Lutsel K'e. The diamond mine is located in the Lockhart River system that travels from the diamond mine through Artillery Lake and Lockhart River.

...it's hard to get by sometimes. We aren't miners, we're bush people. It's really scary. What's happening at the mines. I know they say it's okay, it won't affect the environment, but when they're gone we're going to have to deal with it. I don't know what's going to happen there. - Joseph Catholique

There are also significant concerns about the health of Nonacho Lake where there is hydro-electric development. According to the elders, the fish are 'spoiled' in Nonacho Lake as a result of the dam. The threat of more large-scale hydro-electricity dam on the Lockhart River exists. This project was rejected in the past, but the threat still looms. The Lutsel K'e Dene First Nation believes that a powerful medicine woman sits in the Lockhart River. Each year, the Lutsel K'e Dene First Nation go to site for a Spiritual Gathering.

Elders began noticing a decrease in water levels since the early 2000s. According to some, the water has dropped 5 feet (i.e., the shoreline has extended 5 feet).

The whole [Artillery] Lake [water level] has gone down. About five feet, I'd say. And that's probably been within the last ten to fourteen years, something like that. I noticed, we started getting longer summers. And we're starting to see more storms. A lot of lightning storms. For me, the storms have also increased during the fall. People say they never used to see lightning storms in the barrenlands. Now you see them.

Elders have also not seen a lot of rain in recent years which may be causing or compounding the problem of lower water levels.

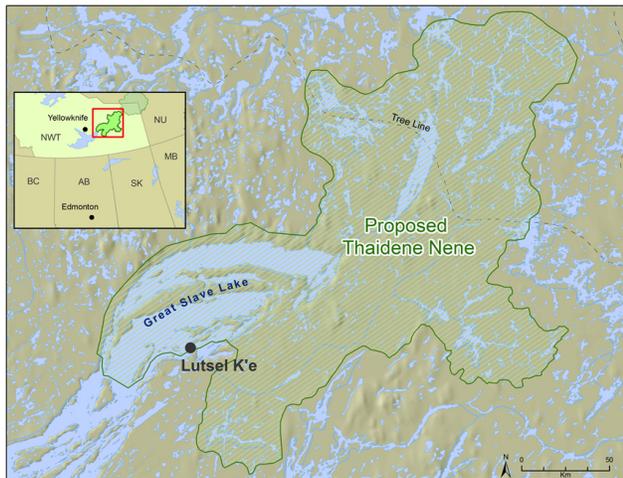
It's [the rain] is good for the berries. You need a lot of rain for the berries. And the last few years, we didn't get a lot of rain. So they dry out before they bloom. Some places close to the lake were good, but on the inland areas they seem to dry out due to a lack of rain. We used to get more rain. It would help the inland lakes be high when we got lots of rain.

We're getting shorter winters now. Sometimes we get a lot of snow, sometimes not much at all. We got less snow these last few years. More snow helps the lake level go up.

But, in general, there is limited concern about the quality of water in Great Slave Lake and Artillery Lake.

And the water [in Artillery Lake] is just pristine and the land is the same way. It is still clean. That's how the people kept the land. Clean. Make sure it's kept like that - Albert Boucher

People would like to keep it this way. Artillery Lake, Fort Reliance, Lady of the Falls in the Lockhart River, and Pike's Portage, among others, are very important areas to the Lutsel K'e Denesoline. Maintaining the health of the water and fish in those areas is of paramount importance to the community. This is one of the main reasons the Lutsel K'e Dene First Nation is negotiating the creation of Thaidene Nene (Land of the Ancestors)—a national and territorial park. Resource extraction would be prohibited in Thaidene Nene. Lutsel K'e Denesoline and other Indigenous peoples would continue to be allowed to fish, hunt, trap, and gather in Thaidene Nene.



The Lutsel K'e Dene First Nation participates in the Akaitcho Aquatic Monitoring Program (AAMP). The AAMP is an Akaitcho-wide aquatic program involving the Yellowknives Dene First Nation, Deniue Kue First Nation, and the Lutsel K'e Dene First Nation. Each community lives on a different part of Great Slave Lake and undertakes a summer water and fish monitoring program. The Lutsel K'e summer water and fish monitoring program is called Ni Hat'ni. Eight community members (four land users and four youth) are hired to monitor the east arm of Great Slave Lake. AAMP is mainly

funded by the Department of Fisheries and Oceans Canada (a federal government department) and the Department requires the collection of scientific data, not Traditional Knowledge. Unfortunately, this means that Traditional Knowledge is not being documented and stored in the community's database. This is an issue that needs to be addressed.

The Lutsel K'e Dene First Nation has filed a court case against the dam on Nonacho Lake. The dam was built without any consultation with or compensation for the community. Nonacho Lake is within the asserted traditional territory of the Lutsel K'e Dene First Nation. People used to go hunting, trapping, and fishing there, and there are gravesites around the lake. The dam caused major flooding in the area and the fish have been ruined by high mercury levels as a result of the dam. In effect, people have been totally alienated from that part of their land and have not been compensated for that loss. Remediating the abandoned uranium advanced exploration site on Stark Lake and monitoring the water and fish in this lake is a high priority. LKDFN is working the Indigenous and Northern Affairs Canada, Contamination and Remediation Department (INAC-CARD) to ensure the site is remediated. The abandoned exploration site has been there since the 1940s.



Akaitcho Water and Traditional Knowledge Workshops

Akaitcho Territorial Government
 Boucher, Annie, Diane Giroux, Mike Tollis, Lauren King
 and Cochise Paulette

Between October 5th and 7th, the Akaitcho Aquatic Monitoring Program (AAMP) held an on-the-land workshop at Fort Resolution to bring together elders, land users, youth, Chiefs, and technical staff to discuss issues around water, ranging from historic observations, to current concerns, to future water governance in Akaitcho. The workshop provided valuable information for the leadership, and the development of the regional monitoring program in Akaitcho, as well as useful information for sharing to a wider audience through the *Tracking Change...* project. The project was also successful in conducting one-on-one interviews with elders in each of the Akaitcho communities for further explanations. These interviews allowed more responses from community members to speak to their own personal experiences, and their own identification of changes in the aquatic ecosystem.

Pete Enzoe of Lutsel K'e Dene First Nation and family checking winter fish nets on Great Slave Lake.

Photo Credit – Tessa McIntosh,
 Land of the Ancestors.
<http://landoftheancestors.ca>



What we found out...

Families in the communities depend on locally harvested fish as a major source of food; most families consume fish from Great Slave Lake at least once per week, however, it varies by community and by season (e.g., people tend to eat more fish in summer months). Each community varies in their responses, and at different times of year. In seasons and years when moose and caribou are not as available, people will also tend to eat more fish. The main fish harvested are Lake Trout, Lake Whitefish (Crooked Back), Broad Whitefish, Coney (Inconnu), Round Whitefish, Goldeye, Grayling (Bluefish), Loche (Burbot), Jackfish (Northern Pike), and Sucker.

Changes in the Health of Fish

There are noted changes in the health of fish populations compared to the past. In the Yellowknife area, there are far fewer people fishing in the vicinity of Yellowknife as a result of urban development and due to significant mining activity (gold mining) which has taken place over the last 100 years. Concerns about contamination of the fish with arsenic and related toxins from gold mining activity as well as other kinds of contaminants are a source of anxiety in that region and have limited the amount of fish consumed in local communities. The Yellowknives Dene First Nations have been deeply involved in various kinds of research initiatives and consultations regarding the impacts of this mine on their health, culture and livelihood. It has also made people suspicious about the impacts of other mines. In general, it is believed, that where there are mines the fish are unhealthy and *“where there are no mines the fish are healthy.”* (Yellowknives Dene First Nation Elder).

In some areas, there are fewer fish such as in the Slave River area. Fish never had a problem getting to their spawning areas on the creeks and small rivers off of the Slave River. With low water levels now people of SLFN and DKFN

have noticed that fish are not moving to their spawning habitat, and this is one of the reasons they see less fish in the river. The population is a lot lower now than in the past. According to some elders, this may be because *“sometimes the fish can’t move up creeks and small rivers along the Slave River to spawn because of low water”* (Elder – Smith’s Landing First Nation).

There are observations in some areas of Great Slave Lake of skinnier fish; fish with big heads and skinny bodies are of particular concern in the east arm of Great Slave Lake as observed by some fishers of Lutsel K’e Dene First Nation: *“The fish is different, skinny fish, the way they are growing is not the same, big head small tail, crooked fish, not straight, that’s what [we’ve] seen.”*

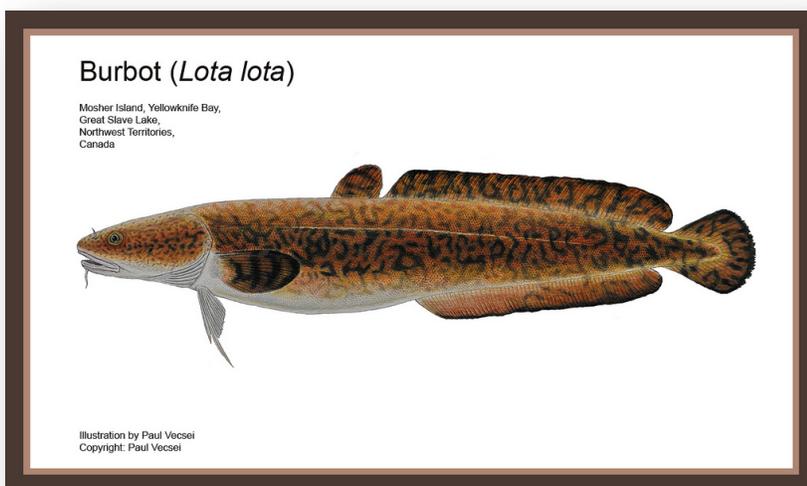
Through Coney Channel near Yellowknife, the fishers have seen a complete drop off in the Coney stock. But Lutsel K’e Dene First Nation members are reporting there being Coney caught in the East Arm where they haven’t seen them before. The movement of some fish species is an indicator of a changing water ecosystem, or a sign that there is a major change in the quality of water around YKDFN. Some causes for the change have been mentioned by Akaitcho members as pollutants from old mines, the fire season sending lots of ash and particulates into the water, climate change, pollutants coming from upstream in Alberta, and hydro dams in the south decreasing the total amount of water coming down the rivers and into Great Slave Lake.



Giant Mine Remediation Project

Photo Credit – Kevin O'Reilly

The fish in Great Slave Lake are comparatively better, however, than the fish in some other lakes such as Stark Lake and Nonacho Lake. In Nonacho Lake, there are “lots of sick fish, the colours are different, they’re blacker” according to elders from Lutsel K’e Dene First Nation. These are problems attributed to the Talston River Hydro project which was built to power nearby Pine Point mine back in 1965, but it resulted in the flooding of many areas on the Talston River and mercury poisoning of Nonacho Lake.



Fish with flesh sores are being observed in the south of the lake and from the river, while fish with skinny bodies and big heads, small tails, or crooked fish have been observed in the east arm. Mercury is a serious concern in the larger fish from certain areas around the lake. The liver is identified as a good indicator of fish health by fishermen in the communities and Loche in particular were noted to having discoloured (green) livers.

Around Yellowknife, the consistent observation is that the fish in this area are becoming soft. Some attribute this to warming water temperatures while others link changes in the fish to the development of the mines in that area. In order to address this problem, people from Yellowknives Dene First Nations are having to go further away from Yellowknife into deep water.

Loche are among the fish that provide people with knowledge about changes in the health of the water. Changes in climate or water temperature may be leading loche to spawn at different times than in previous years. Some fishers from Deninu Kue have observed that the loche eggs are not ready (“they are still white”) when they should be ready. In the Deninu Kue area and around Yellowknife there are many concerns about the health of loche. Those interviewed report catching more loche with sores and with livers of a odd colour (greenish).

Changes in the Diversity of Fish

Another major change is in the diversity or numbers of fish being caught in different areas. Around Yellowknife, fishers observe that the Coney stocks have decreased and seem to be gone from some areas where they used to fish. This might be attributed to over-fishing or in changes in the temperature of the water. Conversely, fishers are observing new incidences of fish that have been rarely seen before in this region of the Mackenzie River Basin. In the Lutsel K’e Dene region, there are increasing occurrences of Coney which some fishers had not seen before or had not seen for many years.



Coney - we started getting Coneys around here now, last spring, a guy came over said he caught a Coney, you want some? I said yaaa, I'll have some Coney (Lutsel K'e Dene First Nation Elder).

There are increasing reports of fishers catching salmon in the Yellowknife area.

Salmon – I caught salmon this fall. About 30 years ago when my dad was still trapping we caught some salmon and this summer again we caught them ... on the Slave River. (Deninu Kue First Nation elder).

There are extreme weather events affecting the health and population of fish valued in Akaitcho communities. Unseasonably warm temperatures may have caused a die-off of fish near Yellowknife at Wool Bay.

All the fish died in the winter, in the spring time there was a lot of dead fish on the shore/lake floating – Wool Bay (Yellowknives Dene First Nation elder).



Wool Bay Fish Plant near Yellowknife closed in 2007.

Photo Credit – Fran Hurcombe

<https://edgenorth.ca/article/yk-past-blast-wool-bay-fish-plant-1984>

Water Levels

There is less water in general. Less water in the Slave River, less water in inland lakes, and observations of smaller lakes and ponds completely drying up in the summer time. Community member have noted old markings on rocks where the water level used to be, and it has been seen between 4 and 10 feet lower in different locations. On the river, there hasn't been a flood in a long time, and travelers on the lake are seeing more reefs, making travel dangerous.

We always had water, fish, animals, I remember when I was a kid setting rabbit snares anywhere...you dig a hole anywhere in the ground for water, now there is nothing, you have to dig down about 10 feet before you find any water. (Deninu Kue First Nation)

It's not the same, no snow now-a-days. Long ago there was a lot of snow. You can't go out without snowshoes, we live in the bush most of the time, just to chop wood you need to put on snowshoe. That's why long ago there was a lot of water; snow melts and the water was deep, now no snow, water is low on Great Slave Lake. (Yellowknives Dene First Nation)

The current is not as strong. There used to be more whirlpools. You could through a log in and they would get sucked down. (Smith's Landing First Nation)

There is consistent observation across the Akaitcho region of decreasing water levels. Various theories are offered to explain what elders' consider unprecedented low water.

Its different, there's no water. Inland lakes, sometimes you have to put branches down, make a trail to get to the lake, it's not like before. (Lutsel K'e Dene First Nation).

Really low, way lower than before. Bennett Dam or something is taking our water. When I was a kid, the water was always swift, it went down 8 feet since I was a kid, and I'm 70 now. No water will be left for our grandkids if it keeps going down like that. (Deninu Kue First Nation)

Since the last two years it's not deep anymore, you never used to see algae floating on the lake, now you see them out in the waters now and it tells you there's changes to the water. (Yellowknives Dene First Nations)

There are also numerous concerns about the water not being as drinkable in many areas as it used to be:

Long time ago water was good. We used to drink water from the shore. Since 1950 we don't drink water from the shore anymore. In 1944 we lived at Burwash, I hauled water for my dad. Since 1950 water has not been good, we moved across, until this day we pay for water, before that we use to take water from the shore and drink water. (Yellowknives Dene First Nations).

Algae is growing in areas where river water has gone down to expose the river bottom, and near the river edges and on rocks and reefs that are exposed. (Yellowknives Dene First Nations).

Like the elders say, when you take a part of something—anything—it gets weak. That's what is happening to our land, they drill, blowing up land for mines, they are making our land weak. Just like you if your arm broke you won't be as strong as if you had 2 arms. (Deninu Kue First Nation).

Snow Pack and Ice Thickness

Weather patterns are changing, causing a ripple effect on the land and water. There can still be lots of snow but the snow is different. It doesn't pack the same, and there are no hard snowdrifts anymore. The snow is crystals and hard to walk on in snowshoes and hard for dogs.

Warmer water and thinner Ice

Akaitcho members all around the lake and on the river have observed warmer water and thinner ice. LKDFN members remember the ice being 6-8 feet thick in places, currently it doesn't get much more than 3-4 feet in most places. This causes serious travel concerns as most of the travel routes in wintertime are by water rather than land.

You gotta test the ice wherever you go, with weather changing so fast, climate change, it's a lot warmer now this time of year, ice is thinner than it used to be, dangerous for travel you know. (Lutsel K'e Dene First Nation)

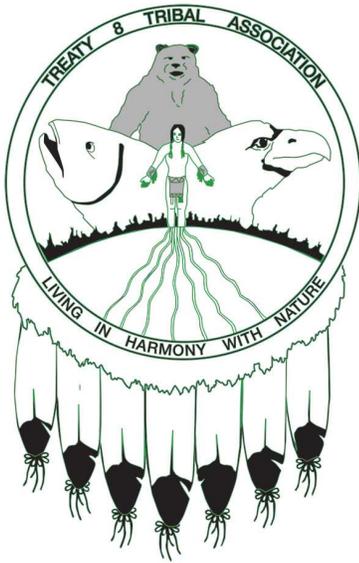
River Break Up

Ice freeze-up is happening later, and break-up is happening sooner. There is a shorter ice coverage season which is cause for travel concerns, limiting the amount of time for spring and fall hunting, and altering the trapping season for many. The ice was always solid before, now there are air pockets under them and it's much thinner than it used to be. Both issues have serious implications for community members who travel on the land and water. This, combined with lower water levels causing more reefs and sandbars to rise, is not only making travel more difficult, but more dangerous.

The river break-up is happening sooner now. Ice doesn't pile up on the shores anymore because it isn't thick. It doesn't scour the bank. There are no more floods. (Smith's Landing First Nation)

With warmer weather and changing weather, Akaitcho members are seeing wildlife that hasn't been around before, like white tailed deer, coyotes, cougars, magpies, and crows. They are seeing wildlife habitat changing, more moose in the barrenlands, and musk ox in the treeline, as well as musk ox moving further south, and trappers noticing the furs look better later in the season. With changing wildlife, there are concerns with ecosystem change coming with that, and changing the way people will have to live.

When asked what we can do, some respondents have said the damage is already done, and it will get worse. They won't stop the oil sands upstream of the Slave River, and they won't stop making the dams that have caused a decrease in water levels already (Bennett's impact on the Mackenzie, Site C forthcoming). There is concern among some members that it will get worse and the belief that whatever we try to do to prevent further impacts will be futile. This helpless attitude is a problem and we need to work toward solutions and do our own monitoring with the youth. As a Yellowknives Dene First Nation Elder said, "I don't know, it's hard for native people like us to watch the land even though we watch it they still do what they want".



Treaty 8 Tribal Association 2016 - Eagle Island Fish Camp

**Treaty 8 Tribal Association
Diane Abel, Art Napoleon and Karen Aird**

This project documented and recreated the traditional pre-European fishing methods of the Dane Zaa, such as netting with natural fibres, fish weirs and fish traps. A lot of old Dane Zaa fishing methods were abandoned long ago as a result of changes in the Peace River. Background research was required to identify these methods in addition to field research. A secondary aspect of the project was to identify Cree and Dunneza names and uses of specific fish species



Eagle Island Fish Camp was located on the Peace River between Hudson’s Hope and Fort St John. It lies within the BC portion of the Treaty 8 territory and is part of the Mackenzie River Basin. It is downstream of the WAC Bennett Dam and the Peace Canyon Dam. The Fish Camp focused on documenting fish species, the health, population and habitat required for healthy fish and traditional fishing methods and harvesting.

We aimed to promote good stewardship principles and the importance of maintaining healthy eco-systems and spiritual ties with the land and waters that sustain us. The many changes in the Peace River valley to this point and changes expected from a third hydroelectric project on the Peace River will be devastating to our people and the environment as we know it. We were interested in understanding how these changes may affect our communities today and into the future. Through this

project we wanted to expose our youth to the importance of the valley and discuss traditional use and current use. If the valle floods, the opportunity for this type of activity will be lost forever. We wanted our youth to spend time working with the Elders and mentors to get a sense of the significance this River had to our people.

We also wanted to focus on recreating some traditional fishing methods and making fish weirs and traps with natural fibres so they can have that experience. These activities allowed us to identify fish species and learn their Cree names. We had hoped to have a Dane Zaa speaking Elder to help us with the Dane Za names but he fell ill and wasn’t able to join us. There were

several other benefits that the youth were exposed to during the camp such as talking circles, ceremonies and protocols. One of the young boys took an interest in learning the basics of shooting an HD video recording during the course of the camp. The camp was very relaxing and peaceful—an excellent place for sharing traditional knowledge and having the undivided attention of several traditional teachers. Our original intent for this project was to introduce a team of eight youth to the basic concepts of research, that would include working with Elders to gain knowledge and to document and recreate traditional fishing methods. We also identified the Cree and Dane Zaa names of the fish species in the Peace. Below is a list of the outcomes based on the activities that were conducted:

- The camp created awareness on the cultural/historical significance of Peace River
- Youth gained hands-on knowledge on the biology & ecology of the river
- Youth and elders worked together in camp roles;
- The camp created visibility in a strategic location on banks of the Peace visible from the highway. This generated widespread interest & curiosity leading to visitors and photo-ops that continued long after the camp ended.
- Kids learned importance of fish populations, concerns about mercury contamination as well as traditional and contemporary fishing techniques
- The students participated in traditional hand games, drumming, smudging/prayer ceremonies and talking circles.



Participants setting a traditional fishnet on the Peace River (2016)
Photo Credit – Art Napoleon

What we found out...

Research about Fishing Practices

The communities of Treaty 8 Tribal Association have always valued the Peace River and its resources as the basis of culture, economy and food security. People depended on a diversity of fish species and other wildlife in this region to sustain their families over many generations. The main species of fish harvested are Lake Trout, Rainbow Trout, Lake Whitefish (Crooked Back), Grayling (Bluefish), Dolly Varden Char, Loche (Burbot), Jackfish (Northern Pike), and Bull Trout. Species harvested in tributaries include Lake Trout, Bull Trout (Dolly Varden Char), Rainbow Trout, Lake Whitefish, Rocky Mountain Whitefish, Northern Pike (jackfish), Grayling, Burbot (Fresh Water Ling Cod).



Medicine collecting on the Peace River (2016) – Photo Credit – Art Napoleon

Fish were more plentiful throughout the whole watershed prior to the fur trade, settlement and resource extraction, including forestry and hydro-electric development. Recreational use of the area has also led to a decline in fish stocks in tributary rivers like Halfway and Moberly.

First Nation communities located close to lakes and rivers (West Moberly, Sauleau and Macleod lakes) have relied more on fish than other First Nations in our region, but today there are only three fishers left from Moberly Lake who still set nets throughout the year to supplement their diets and provide fish for other community members. The rest are seasonal fishers who rely on cast and line fishing, but all consume the fish they catch. No information was obtained about Macleod Lake. In the Peace River itself, most community fishers are reluctant to eat a substantial number of fish due to fears of mercury contamination in the Williston reservoir.

Research about Fishing Practices

Background interviews were carried out with four active fishers from the region with experience fishing on the Peace River and Moberly. The main focus of the project was on rejuvenating the historical knowledge about fishing gear and practices and creating an opportunity for youth from the community to learn related knowledge and skills. No elders with knowledge of pre-European fishing methods could be located, but Treaty 8 fishers have been using netting methods for several generations and some fish trapping methods are common to most indigenous people. The youth learned about pre-European twine making with natural fibres such as nettle and dogbane hemp and cordage using willow bark. With the help of the adults, they also witnessed the making of a willow basket net and helped to set it in the Peace waterway. Treaty 8 BC is a huge territory with communities widespread. A territory-wide study on any aspect of fishing is beyond the scope of this project. Using contemporary methods, four of the fish caught were sent out to be tested for mercury levels. The following were the primary questions asked:

- In your experience fishing around the Peace and its tributaries (anything that flows directly into the Peace), what are your concerns about fish populations overall? Are numbers down in recent years?
- What species are the lowest in population numbers and why do you think this is so?
- What is your understanding about mercury-contaminated fish in the region and what bodies of water are you most concerned about?
- Has the number of First Nations fishers that still use nets decreased in number in recent decades and if so, why?
- What are some possible ways to improve our traditional fisheries i.e., increasing fish numbers, minimizing damage, etc?

Voices of the Community

Many changes in the Peace River region have affected the livelihoods and well-being of Treaty 8 communities:

The Peace is everything for us. It's the historic river that gave birth to our treaty. It brought the treaty together. We will be lost without that river. All of our rivers are tied into it (Naomi Owens, B.Sci. SFN Land Use Manager).

We been setting nets for a long time, even every winter using those jiggers that go under the ice. People used to come from all over to fish here (Moberly). It was kinda like a fishing lake for people. Winter fishing. Other times of the year too like when lake trout are spawning. People from all over would set up little camps close to those spawning areas and they all set up nets. Different times of the year for different fish but the main ones were lake trout, whitefish and jackfish (Max Desjarlais, Elder WMFN (Personal correspondence with A. Napoleon, 1997).

Most people don't fish in the Peace anymore because they're scared to eat that fish because of the mercury. There's private property all along the banks from Hudson Hope to Fort St John so unless you own a boat, there's not many spots to fish from the banks. We are banned from the best fishing spots by Hydro anyway. They built a fence and put up signs and they have security (Thomas Hale, SFN fisher).

My Dad used to set nets around the middle of September in Moberly Lake when the Trout were spawning and this is also when the moose were rutting. He also set net for Jumbo Whites in Cameron Lake in February – March. There was fishing in the Peace River with lines and sometimes with handmade fishing traps made with wire. They used to trap beaver on the Peace River; they would camp on the islands to trap them. Mrs. Cameron used to collect medicines all over the place in the mountains and along the river. We used to pick blueberries too (Margaret Campbell, WMFN Elder).

I couldn't believe the number of eagles, bears, deer, beaver and other wildlife. The number of eagle nests is what stood out for me most. The wildlife is still abundant and I can't believe they're willing to flood this all out (Della Owens, BFA, SFN Elder).

There are concerns about the health of the fish from the river, which also affects the willingness of people to eat a lot of fish from the river. There is currently a Health Canada Advisory to limit the consumption of fish from the Williston (which flows into the Peace River), which has changed the dependence on fish as a major source in the past 20 years.

It was good to see the youth interacting with the older generations. It's important that the traditional teachings continue to be transferred from generation to generation in the proper way! (Chief Roland Willson, West Moberly First Nation)

Changes in Fish and Fishing Practices

Overfishing - With Highway 29 running the entire length of the Peace between Hudson Hope and Fort St. John, and several boat launches, traditional fishers believe that sport fishing has caused a decline in the number of fish. For instance, after an entire afternoon using two different fishing nets of up to 100 feet each, only two fish were caught at the Eagle Island Fish Camp. Another two were caught by line and lures after a full day of fishing. The best fishing on the Peace River is upstream just below the Peace Canyon dam but fishing is banned there. The number of fish seems to diminish further downstream. In tributary rivers like the Moberly,

Halfway, Pine, Sukunka, Murray, Burnt, Wolverine, it is common knowledge among local fishers that fish populations are in rapid decline. Most fishers believe it is due to overfishing because backcountry roads had created open access to once remote fishing spots. This change has been observed since the mid 1960s after the first dam was built on the Peace River (The WAC Bennett) and then again after the second dam was built in 1980 (The Peace Canyon).

Fears of mercury poisoning in Williston Reservoir and Peace River - Since BC Hydro placed warnings and signage pertaining to mercury levels in fish created by sediments buried under water in the reservoir, local fishers have limited their consumption of fish in those waters. There is also fear that fish in the Peace tributaries may also be affected by mercury. There have been a handful of fish studies conducted, but most have focused on Williston and Williston tributaries NOT on the outflowing rivers. So far, no studies have been conducted on mercury levels of fish in the Peace tributaries. It would be very useful to know if mercury contaminated fish are making it up the tributaries to bodies of water such as Moberly Lake, as most fish species are migratory. This would continue to hold true if Site C dam is built. A summary of the findings from the fish that were sent out for mercury testing are provided below. The three samples (2 bull trout, 1 whitefish) contained levels of Mercury that were below the threshold for safe consumptive levels of Mercury, and they are “safe for human consumption”.

- Bull Trout #1: .301 ppm
- Bull Trout #2: .274 ppm
- White Fish #3: .113 ppm

According to the Health Canada consumption guidelines, the maximum safe level of Mercury for edible portions of these species of fish is .5 mg/ KG (or PPM). Health Canada:<http://www.hc-sc.gc.ca/fn-an/securit/chem-chim/contaminants-guidelines-directives-ng.php> However, The Health Canada Standard also indicates that even at ‘Safe Levels,’ “... the general adult population [should] limit consumption of these fish to one meal per week and pregnant women, women of child bearing age and young children limit consumption to no more than one meal per month.” The testing of mercury levels was not comprehensive, however, so this data should not be considered representative of the condition of fish and or health risks of mercury to fishing communities in this region.

According to Health Canada, even though these fish are deemed safe with respect to the Health Canada guidelines, they are not conducive to the practice of Treaty Rights; that is unless the traditional levels of consumption are consistent with one meal per week, (or one meal per month for higher risk groups). They are basically saying that because we don’t eat fish more than once per week it is not considered traditional practice of treaty rights?

Cumulative Impacts - With the degree of logging, mining, petroleum, seismic and now hydro activity throughout Treaty 8, there is not only increased access to backcountry areas that once sustained local cultural practices, but there is no monitoring of the overall impacts that these industrial activities have on fish and wildlife. While project- by-project studies are conducted by companies, there are no comprehensive ‘big picture’ studies of cumulative impacts on fish or water. This change has been observed since the early 1960s. According to Thomas Hale, in the Moberly, lake trout populations are obviously not like what they once were but the numbers are sustainable. Lakers, Burbot and whitefish are doing ok but in all his years of fishing, he has never

caught one bull trout. He is also very concerned about pike as they are harder to find. A lake which up until 15 years ago was still fairly abundant with pike no longer produces any big ones. In Tom's words, "you can't catch more than 5 lbs anymore." The Williston was also artificially stocked with Kokanee (an invasive species) by the government back in the 1980s. Local fishers think this may be part of the reason that whitefish numbers are down in the Peace River. There are definite changes noticed by fishers but the biggest concerns, in addition to lower numbers of fish as a whole, are the disappearance of pike and bull trout in tributaries and whitefish numbers in the Peace River.

Other Issues and Questions

Issue 1: Cumulative Impacts: What are the impacts of overall development on fish and wildlife populations and on their health? Is this a gap and is a comprehensive study needed?

Issue 2: Mercury Studies: Past studies have not focused on the Peace downstream from the Williston reservoir or on any of the tributaries. Since fish populations are lower as a whole throughout Treaty 8 and since certain species such as pike, bull trout and whitefish are in noticeable decline, is there a correlation with mercury contamination? Related to this, how will the building of a new reservoir, resulting from the Site C dam, further impact migratory routes of fish between the Peace River and its tributaries?

Issue 3: Overfishing. In light of treaty rights and access to traditional First Nations cultural resources, is there a study needed to determine levels of overfishing and widespread access into backcountry fishing locations? What kind of mitigation measures can still be put into place? How can such studies be coordinated on a large-scale basis throughout all of Treaty 8 Territory?

Issue 4: Some of the attributes we've seen along the Peace River in comparison to the Halfway River were very different. The shorelines of the Peace were very sandy and silty, where the Halfway had more boulders and were more stable. The fear is that if this valley is flooded, the erosion problems will be disastrous for the Peace and its tributaries. The erosion will affect water quality, fish habitat and health among other things; what can be done about this?

Issue 5: We have ancestral grave sites in this valley and numerous archaeological sites yet to be discovered.

Issue 6: *According to Health Canada, even though these fish are deemed safe with respect to Health Canada guidelines, they are not conducive to the practice of Treaty Rights; that is unless the traditional levels of consumption are consistent with one meal per week, (or one meal per month for higher risk groups). They are basically saying that because we don't eat fish more than once per week it is not considered traditional practice of treaty rights?*

Prince Albert Grand Council Canoe Trip in the Lake Athabasca Watershed



Students from Black Lake and Fond du Lac participated in the Tracking Change Youth Knowledge Fair in 2016. The full project in the Prince Albert region is still being planned and will take place in 2017.



Fond Du Lac, Saskatchewan Students attend the Youth Knowledge Fair at the University of Alberta (2016)
Photo Credit – Brenda Parlee



Changing Water Depth in the Mikisew Cree Homelands

Implications on Traditional Harvest and Community-based Mitigation Strategies

**Mikisew Cree First Nation –
Government and Industry Relations
Melody Lepine and Bruce McClean**

The purpose of the Mikisew Cree First Nation (MCFN) Community-Based Monitoring program is to better understand the negative changes Elders have observed in the traditional territories. The database system is being developed will better enable the integration of local and traditional knowledge about water quality, fish ecology and fishing livelihoods, in communities and regions. Of greatest importance to communities

is the need to better understand the negative changes to water quality, quantity and flow in the Peace-Athabasca Delta. Findings have shown deterioration in water quality as a result of industrial development and have identified serious concerns with water quantity (flow) which constrains access to traditional areas.



Introduction

For eight years, the Mikisew Cree First Nation (MCFN) have been operating a Community Based Monitoring (CBM) Program, based out of Fort Chipewyan, Alberta, to understand the negative changes our Elders have observed in traditional territories. Of greatest importance to our people was the need to better understand the negative changes to water quality and quantity and fish and animal health in the Peace Athabasca Delta (PAD). Our CBM staff monitor

weekly the quality and quantity of water at 12 sites from May to October and undertake weekly winter monitoring activities from October through May. Our findings have identified serious concerns with water quantity, which constrains our access to traditional areas. Our CBM program has also selectively sampled fish, researching health implications for the consumption of foods related to a traditional diet. The fish collections undergo laboratory analysis in partnership with Environment Canada and the University of Ottawa to help us better assess the impacts from oil sands development upstream of the PAD. In our search to protect our Treaty and Aboriginal Rights we are looking to further professionalize our CBM program with a formal database, as well as sharing data on key parameters with other partners in the Mackenzie watershed. We are also actively engaged in looking at fish health in the Peace Athabasca Delta.

The *Tracking Change...* project has allowed us to further our efforts related to database development and fish health research.

Background

Low water affects the ability of Mikisew Cree First Nation (MCFN) members to reach traditional use areas along transportation routes (Figures 1&2). This access has been disrupted by hydroelectric development along the Peace River, the exploitation of the Oil Sands, and further exacerbated by climate change.



Ryan Castor (CBM Guardian) grounded on Lake Mamawi (2015)

Photo Credit Mikisew Cree First Nation

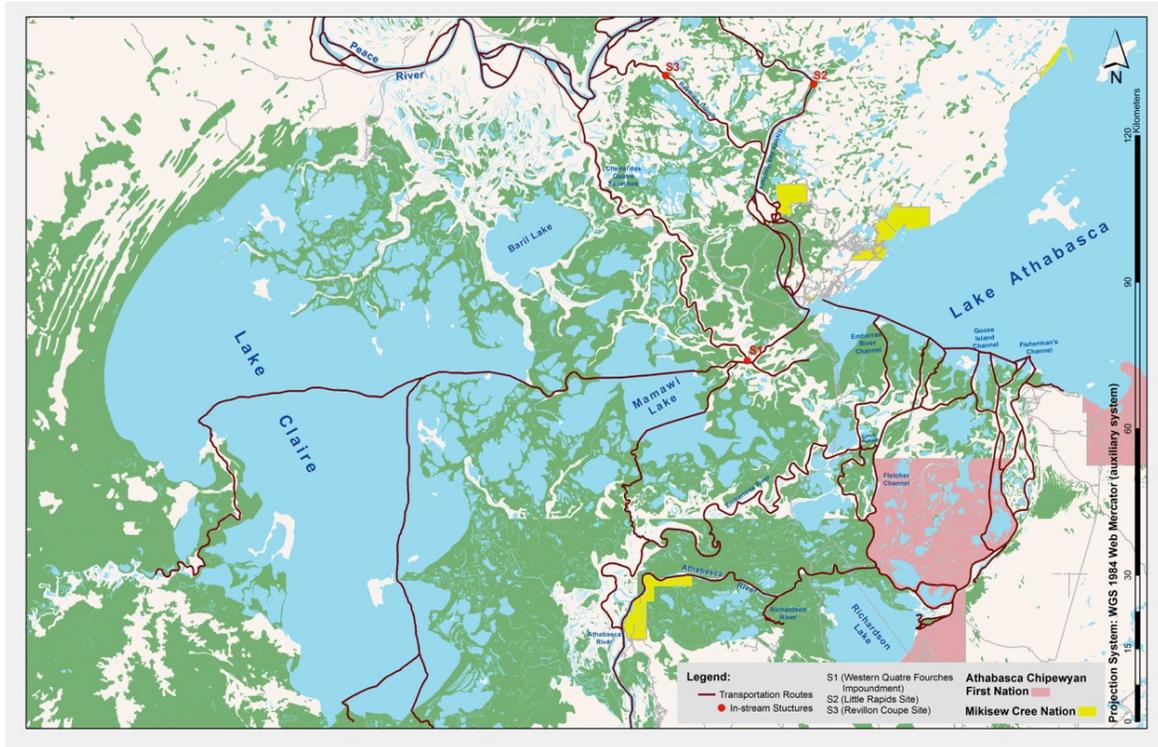
Aboriginal Base Flow

The Mikisew Cree, along with the Athabasca Chipewyan First Nation, have articulated our own water use policy for the Athabasca River and Delta, which acknowledges the practical and realistic needs for river transport related to exercise of Treaty and Aboriginal rights. We call this policy the Aboriginal Base Flow. It is predicated on the findings from the best available Traditional Knowledge and science. Extensive interviews with community members in 2010 determined a minimum depth needed at navigation pinch points (channels where low water restricts access to large areas of traditional use). This depth was estimated at four feet (122 cm)—also defined as the amount of water needed to get on step with a harvested moose in a boat.

The Aboriginal Base Flow policy links safe navigational depth (4 feet or 122 cm) with flow rates in the Athabasca River explained below.

TT

The science agrees with the Traditional Knowledge. The Athabasca River Use and Traditional Ecological Knowledge Study (2010) defined two thresholds for the ability of MCFN



Subset of Transportation routes in the PAD.- Photo Credit – Mikisew Cree First Nation

members to access our traditional territories, and to practice Aboriginal and Treaty Rights by water. The first threshold, an Aboriginal Base Flow (ABF), reflects a level on the Athabasca River and adjacent streams where MCFN and members are able to access territories fully. A conservative estimate of this level is 1600 m³/s (Candler 2010).

The second threshold, an Aboriginal Extreme Flow (AXF), reflects a level at which widespread and extreme disruption of Treaty and Aboriginal rights occurs along the Athabasca River, its tributaries and the PAD due to a loss of access related to low waters. The AXF was estimated at approximately 400 m³/s (Candler 2010). A 400 m³/s AXF allows for safe navigation, which translates into approximately four feet of water at important navigation levels. In late August of 2015, when flows dropped below the threshold of 400 m³/s, more than half of the combined ACFN and MCFN CBM depth monitoring sites were below 122 cm, and were in decline. Figures 3 and 4 demonstrate the extreme loss of access possible in the PAD at flow rates lower than 400 m³/s.



No water in both Fort Chipewyan harbours –
Photo Credit – Mikisew Cree First Nation

The photos shown were taken on September 27th, 2015 when Athabasca River flows were estimated at 368 m³/s. Navigation was essentially at zero, as no MCFN member could leave the harbor to fish, hunt, gather, pray, or otherwise exercise Treaty and Aboriginal rights. A more in-depth assessment of four years of field data gathered by MCFN Community- Based Monitoring (CBM) to validate the AXF (2011-2015) generated the report titled “Community-Based Water-Depth Monitoring in the Peace-Athabasca Delta: Insights and Evaluation.” Main findings suggest:

1. **AXF concept is valid.** The concept of the AXF is supported by the data, however there are portions of the delta where it doesn’t apply as configured because of the additional influence of the Peace River and potentially due to the lag-time effect of previous year(s).
2. **CBM data show patterns.** Despite the challenging monitoring environment and limited resources available to run the program, the CBM data reveal insightful patterns in water-level behavior that generally reflect our Nations’ direct experience of access to traditional territories.
3. **Convergence occurs in loss of use.** In the vicinity of a flow in the Athabasca River (at Fort McMurray) of between 400 – 500 m³/s, there is widespread *convergence* of declining passage such that there is an accelerated drop in access across the southern part of the delta in association with that threshold. This represents a loss in use over a significant extent of our territories.
4. **PAD demonstrates zones vis-à-vis water level behavior.** The CBM results point to a stratification of the delta into zones that show contrasting behavior with respect to the Athabasca River.
5. **Southern PAD is responsive to FM flow.** Sites along the southern fringe of the delta are clearly responsive to changes in Athabasca River flow at Fort McMurray.
6. **Peace River requires inclusion in the AXF.** A potential improvement to the formulation of the AXF concept could include a careful consideration of the hydrograph of the Peace River as part of a more complex formulation due to the varied recharge mechanisms involved with the Peace River.
7. **SWQMF not sensitive enough but could be fixed.** Alberta’s management regime for water quantity in the PAD (SWQMF) is not responsive to the degree of water level changes in the PAD that can cause significant loss of access for traditional use; the SWQMF structure may be workable, but to perform effectively, some key timing and stage thresholds would need to be adjusted to be more sensitive to change and to respond faster in modifying oilsands management of water resources. Further analysis is required to clarify such proposed changes.
8. **Improvements to CBM program needed.** Improvements are suggested for the site selection and monitoring methods which, after a few additional years of data gathering, should enable the identification of more robust/refined management relations and thresholds.

Surface Water Quantity Management Framework

Unfortunately, Alberta’s water policy does not reflect these above findings. The Surface Water Quantity Management Framework (SWQMF, March 2015) for the Lower Athabasca River fails to protect Mikisew’s navigation rights for two main reasons. First, it does not put in place a weekly threshold to initiate short-term management actions responsive to the water requirements of Aboriginal navigation. The only fall threshold in the SWQMF is at 111.6 m³/s, which is ineffective to navigation because at this flow, no beneficial transport of any kind would be possible in this river. The situation would need to be three times worse than the above figures demonstrate before any management reactions (limited water withdrawals) begin. Even more disturbing is that cumulative industrial withdrawals of up to 29 m³/s are permitted throughout the fall season

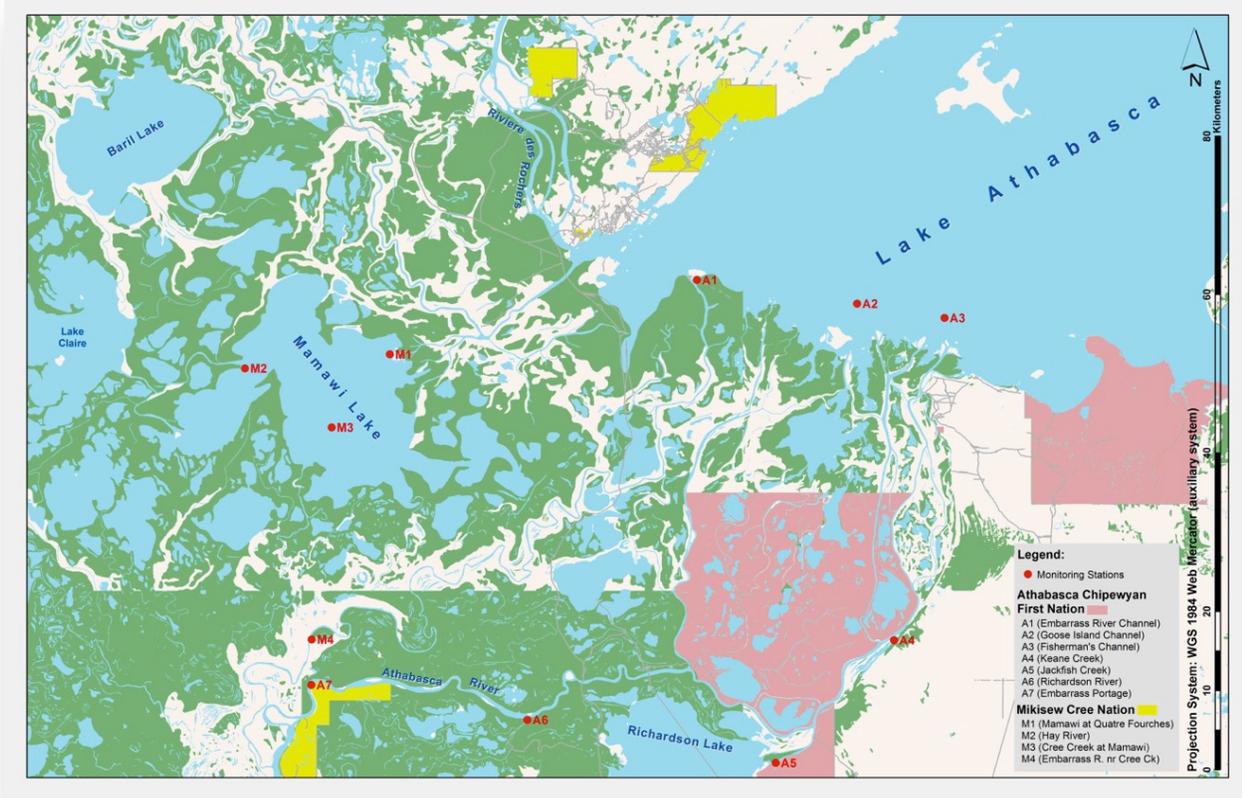
regardless of deep and enduring violations of the AXF threshold. Secondly, while the SWQMF does include adaptive management considerations related to Aboriginal navigation, these measures are currently ineffective at protecting our rights. A 10% incremental decrease due to oil sands withdrawals in the fall season navigability is required to prompt a management response in the Framework. Due to the mathematical formulation of the long-term trigger, even during widespread loss of our access rights it may be difficult for the condition to be met. Given the gaps in effective management of river levels and withdrawals to protect our rights, the Mikisew Cree First Nation has taken it upon ourselves to create adaptation plans for potential navigational hazards. Safety remains of foremost concern. As water withdrawals, hydro development and climate change impact river flows, more diligence will be required to safely navigate rivers. As Treaty and Aboriginal Rights are stressed due to these factors, it is imperative that tools be developed to help First Nations and other river/delta users adapt to these rapid changes.

Navigational Hazard App

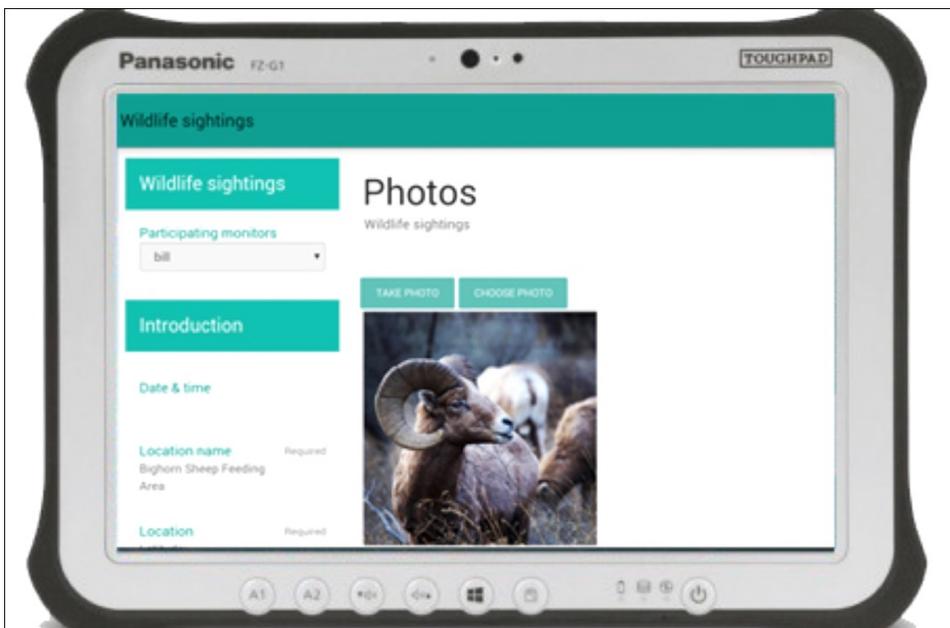
One response to the above problematique was to develop a Navigational Hazard App that could be broadly used to allow our Community Based Monitoring staff and community members together to continuously update a database of navigational hazards. Once functional, staff and members will log all potential hazards by recording a georeferenced description, qualitative navigation conditions and photograph. Users will employ either hardened tablets or their own smart phone/tablet devices. Field data will populate an interactive database and ultimately a map with real time hazard updates. This data will assist community members in adapting to the rapid navigational changes occurring in the Peace Athabasca Delta, by being better informed and thus prepared for safe navigation.

It is anticipated that this App will be used in conjunction with other tools (such as expanded CBM monitoring, revised policies, water diversion structures, dredging, modified Peace River flows) to effectively manage water levels in the PAD. CBM crews in particular will use this application to generate two datasets per week, since they visit all the sites highlighted in Figure 5. If the Athabasca Chipewyan First Nation joins, then there will be a total of 4 readings per week (at multiple sites), encompassing a large portion of the PAD (see Figure 5). We anticipate participation by the ACFN, Métis, other First Nations and non-Aboriginal community members as well in this project.

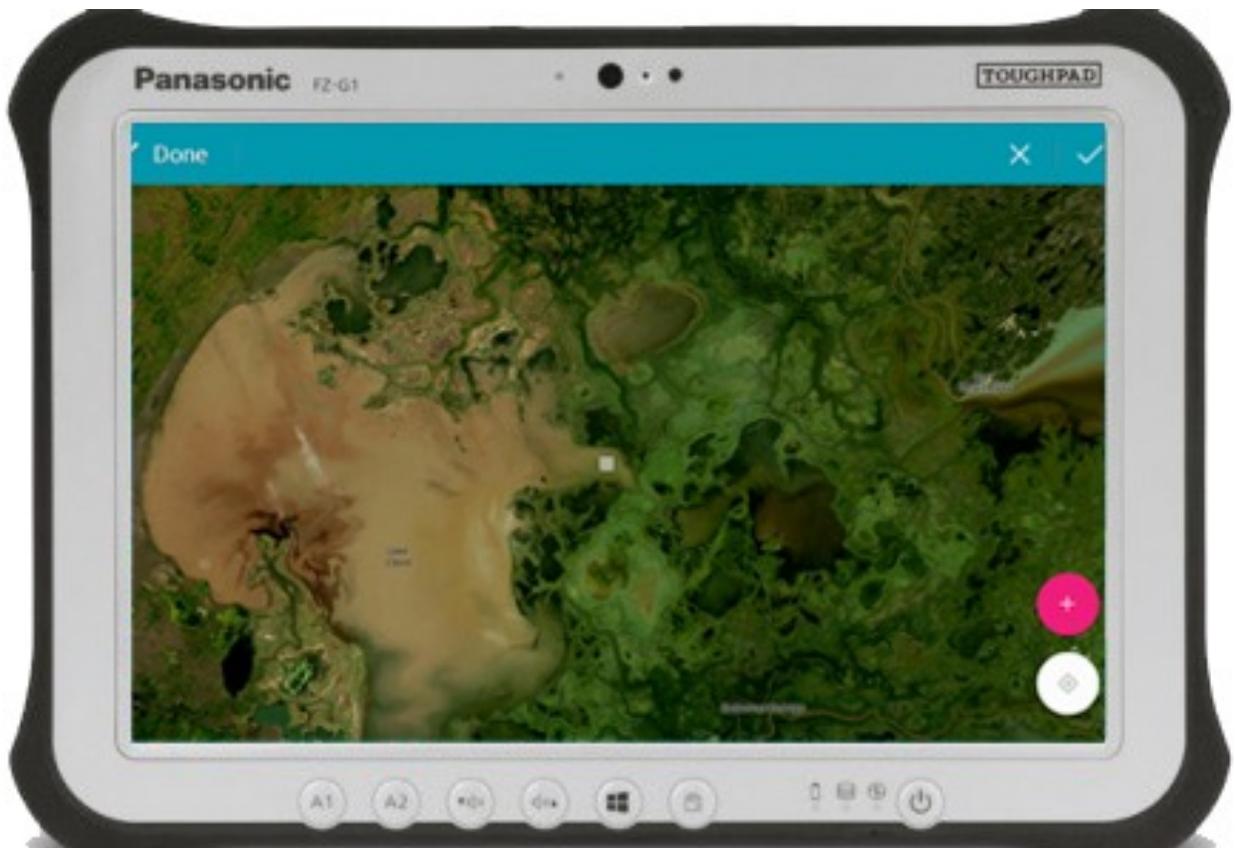
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CBM Depth Measurement Sites
Photo Credit – Mikisew Cree First Nation



Example CBM Screen Shot – Photo Credit – Mikisew Cree First Nation



Development Achievements

Initial development of the app was undertaken with financial support from the Government of Alberta. This capacity was used in planning with the Mikisew community in Fort Chipewyan about the Navigational Hazard App content and for initial software development. At the workshop, a presentation was given regarding the nature of the research. The concept of the Aboriginal Base Flow was revisited and CBM findings were discussed to demonstrate the relationship of flows to depth in the PAD. Participants described their reasons for being at the meeting, and about the regions they most often visit by water and they spoke to loss of access in general they may have experienced. Participants were unanimous that this past year (2015) was the worst since the filling of the Williston reservoir (1967-71). Together, the MCFN participants detailed a thorough list of navigational hazards, which was used to populate the categories of the Navigational Hazard App.

Following the initial workshop a Navigational Hazard App screen sequence was developed using some of the templates and coding already being tested for use in the broader CBM app and database (Figures 6&7).

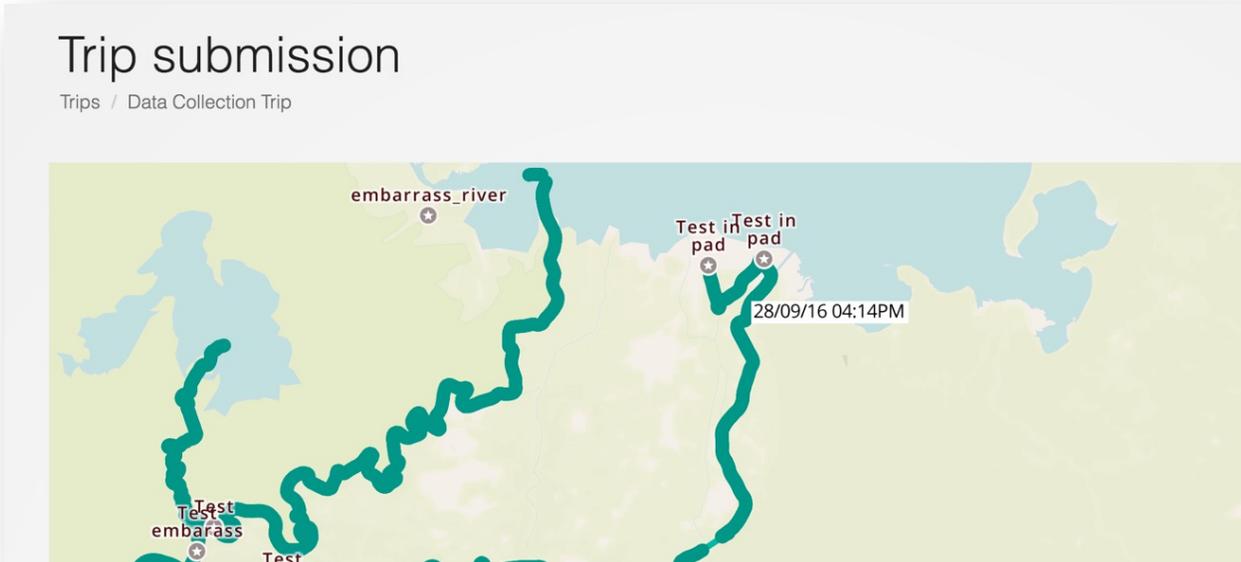
Further Navigational Hazard App Development

With *Tracking Change...* funding and further contributions from the Government of Alberta, the development of the Navigational Hazard App progressed to include the creation of a new survey (Figure 8) and a public registration process that will allow users to download the CBM App from the Google Play store. We also are now able to manage and export the data collected by the users, which required creating separate organizational access to the data server so that existing First Nation CBM App users and the Government of Alberta could both use the App in a way customized to their needs. Also the important feature of trip tracking (Figure 9) was developed to assist with data collection.

Hazard information	
Hazard type	Required
Reasons for using the river	Required
Route	
Intended travel location / direction?: Which route would you normally use?: Did you use your preferred route to arrive at your location of require a different route?: Why did you not use your preferred route?:	Required
Vessel	
Cargo weight (lbs): Type of water craft you will use?: Hull depth (cm):	Required

Sample screen sequence.-

Photo Credit Mikisew Cree First Nation



Sample of trip tracking feature

Photo Credit – Mikisew Cree First Nation

The development of the navigation hazard application will support communities and river/delta users in understanding real time navigability conditions and enable users to select more appropriate travel routes. The application will also support the provincial government in terms of better knowledge of how navigability in the region changes with flows and water levels. This knowledge can be used to refine aspects of the Aboriginal Navigation Index described in the SWQMF and support future considerations of navigation in the Framework.

Fish Health Research

The Mikisew Cree First Nation are concerned with the increase in contaminants noted in their Traditional Territories, including the Peace Athabasca Delta. Traditional Knowledge holders, Elders, and Mikisew land users have noted changes in the quality of the water in their harvest areas, and negative changes to the population of animals, as well as increases in malformations to individuals of a given species. Most notably, Mikisew members have seen a rise in the number of deformities in fish, to the degree that many members no longer consume wild caught fish. The problem was so acute that in 2008 the Mikisew formed a Community-Based Monitoring program to track changes in Indigenous Knowledge indicators of ecosystem health as well as western science parameters of water quality and animal health.

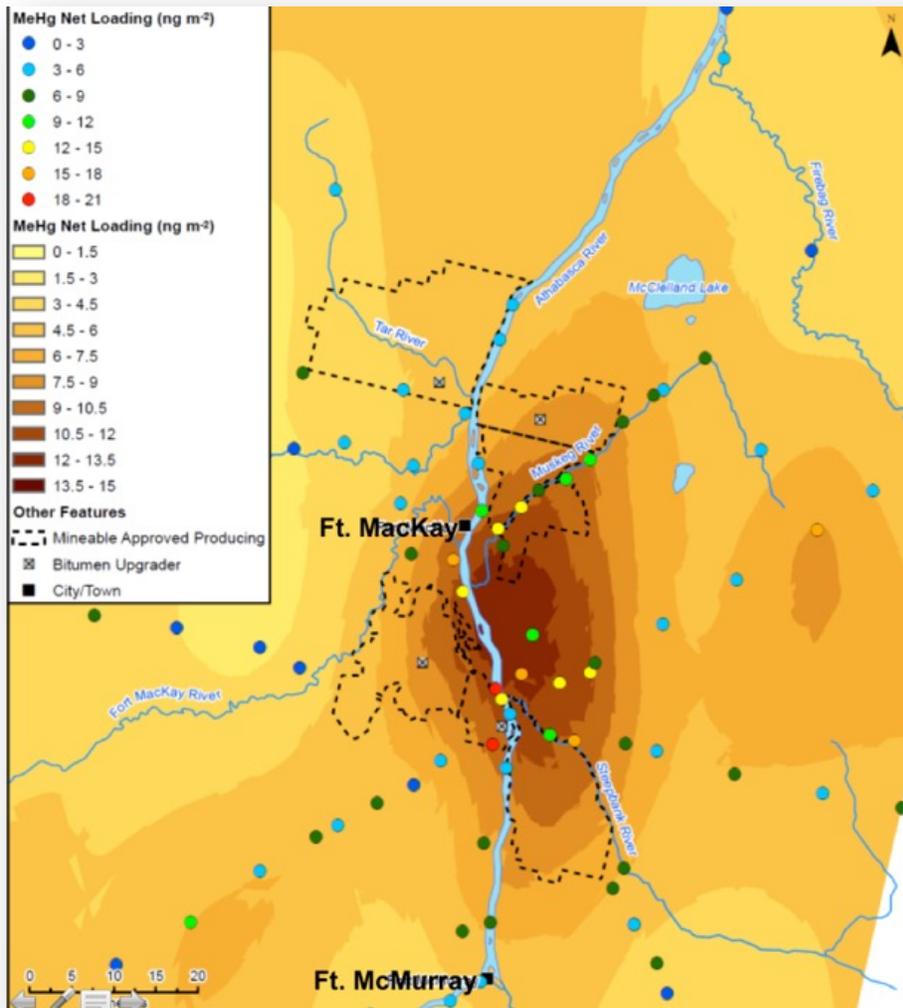
Animal and fish health

The CBM program serves as an intake for wildlife of concern collected by Mikisew members. The CBM has collected oiled ducks, dead and deformed fish, rabbits with extra genitals, and muskrats, otters, beavers, fox, and mink which were found dead for no apparent reason. The CBM has also recorded and sampled two large fish kills in the PAD and one incident of a large seagull die off (approx. 125 birds). The CBM has participated in 2 biomonitoring studies during this time in conjunction with Universities of Manitoba and Ottawa to better understand how

contaminants affect their health. Results from this program show elevated metals such as selenium, arsenic, and cadmium, as well as total PAH levels that warrant further examination of source. Muskrats collected by the CBM in the PAD have high incidences of parasites, and otters collected (in partnership with Environment Canada) have some of the highest body burden of mercury known.

Water quality decline

Water quality shows the persistence of phosphorus levels above CCME guidelines, which is a driver of the eutrophication, beginning to seriously alter the PAD ecosystem, and possibly the cause of recent fish kills. As well, frequent exceedances of the CCME guidelines persist for Oilsands-generated heavy metals such as mercury, lead, silver, cadmium, arsenic, selenium, zinc and chromium. The Mikisew has paid their own staff to extend the range of collections for Environment Canada’s snow sampling under the Joint Oil Sands Monitoring and are worried by initial findings (figures 10 and 11) that indicate a source of mercury originating from oil sands mining activities.





Mercury rates in the Oil Sands mining areas and Suncor Upgrader

Photo Credit Unknown

These mercury findings are concerning to the Mikisew Cree, as other research done by Environment Canada also shows elevated levels of mercury in gull and tern eggs and aquatic mammals, such as the otters mentioned above, in the Peace Athabasca Delta. Their research also rules out long-range transport of mercury leading to further indications, as noted in Figure 1, that the origin of this mercury stems from the Oil Sands. While not conclusive, these findings certainly warrant further investigation. Meanwhile, there are fish advisories in Lake Athabasca because of elevated levels of mercury, and in 2013 the Government of Alberta issued a mercury advisory on the consumption of gull and tern eggs—a food consumed by the Mikisew. This increase in mercury is affecting food security for a remote community already plagued by a high cost of living owing to exorbitant food prices.

Polycyclic Aromatic Hydrocarbons

Sixteen Polycyclic Aromatic Hydrocarbons (PAHs) have been designated as priority pollutants by the United States Environmental Protection Agency. PAHs are also listed under Schedule 1 of the *Canadian Environmental Protection Act* because of their high toxicity and the need to regulate their release in the environment. As a result of their hydrophobicity and lipophilicity (i.e., they like binding to fat), their capacity for long-range transport, their toxicity to aquatic organisms, their bioaccumulation potential, and their strong interactions with sedimentary organic carbon, PAHs have also been included in the *Convention for Long-Range Transboundary Air Pollution's (CLRTAP's) Persistent Organic Pollutants (POP) protocol* (UNECE 1998). Community members and the CBM program have collected fish from traditional use areas that demonstrate deformities and tumours. Some fish also demonstrate what is known as a neoplasm (Figure 12).



Neoplasm on walleye caught at Quatre Fourches (PAD) – Photo Credit Unknown

Liver tumors, (also known as neoplasms), as well as skin tumors, have been observed in wild fish collected from Quatre Fourches and Jackfish areas. These tumours and lesions are often caused by elevated concentrations of PAHs. Some fish from environments high in PAHs may also display what are known as toxicopathic hepatic lesions. Many studies have demonstrated that the occurrence and intensity of liver tumors or lesions was related to PAH concentrations in sediments. The occurrence of these liver tumors and lesions can be used as an indicator of PAH exposure.

These incidences of deformed fish, along with an increase in monitored Indigenous Knowledge Indicators of negative water quality prompted the Mikisew Cree and the CBM program to undertake research looking at PAH contamination. Kelly et al. (2010) had previously demonstrated a significant increase in PAHs near oil sands mining activities.

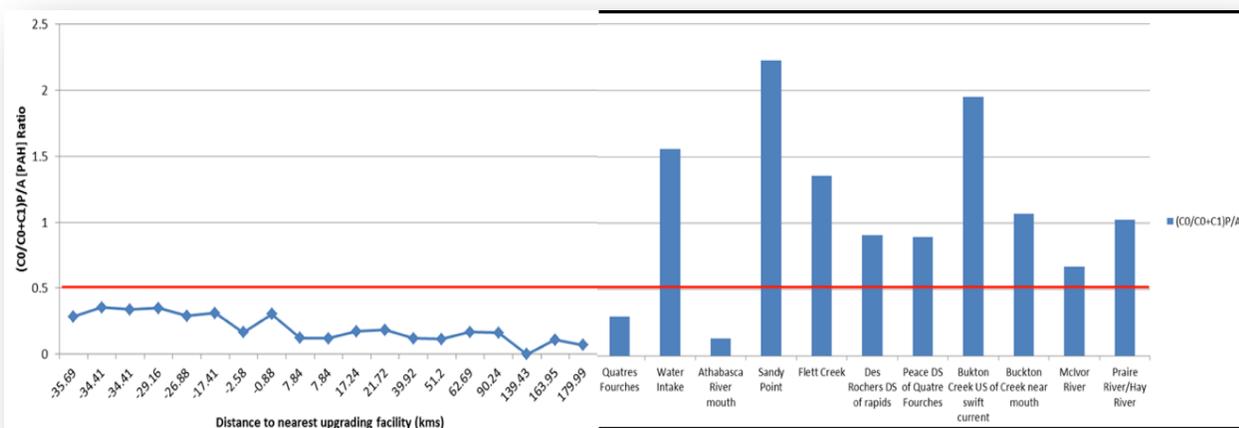


A clear oil sands contaminant signal from upgrading and mining activities was detected in the river near the source locations. These PAH levels slowly declined to background levels at sampling sites downstream from the mining activity, however this oilsands signal was still detectable at the Quatres Fourches and the Athabasca River mouth sites. Sites in the Athabasca River, at the mouth of the Athabasca River and the Quatres Fourches sites are influenced by petroleum derived PAHs, while the reference sites are mostly likely influenced by forest fire activity and/or residential wood burning;

Site selection for PAH sampling
Photo Credit Mikisew Cree First Nation

Diagnostic ratio of CO/(CO+C1)P/A displayed in distance from OS mining areas

Source: Mikisew Cree First Nation



Although detectable, these PAH levels fell below currently accepted Canadian water quality guidelines. However, future research and monitoring should focus on increasing this dataset to allow us to determine if these levels are increasing or decreasing in the Athabasca River and the PAD, and on determining the toxicological impacts of complex environmental mixtures (as many of these compounds are not present alone, but with a variety of other toxic organic and inorganic chemicals that interact together to increase toxicity responses).

Contaminant research

The MCFN have been collecting fish at several sites. The contractor will also submit to the scientific authority 1kg of prey fish species (under 6” in length) from each of five sites in the Peace Athabasca Delta (Site 1- Lake Athabasca at Fort Chipewyan, 2- Lake Athabasca at mainland shore N of Egg Island, 3- Wood Buffalo National Park (Mamawi Lake), 4- Wood Buffalo National Park (Lake Claire) and 5- Wood Buffalo National Park (Rocky Point - Peace River)).

The *Tracking Change...* program allowed, for the first time, the inclusion of a Mikisew youth and a Mikisew Elder as part of the fish collections. JJ Courtoreille, a Mikisew youth, who is also studying Environmental Monitoring as part of the Alberta Environmental Monitoring and Science Division teamed up with CBM Guardian Kevin Couroreille and Elder Albert Powder to seine the beaches of Sandy Point for two days in October. These collections will be part of the Environment Canada studies that try to link PAHs and Hg in gull and tern eggs to local prey fish contaminant burdens. (Figures 15-17).



Elder Albert Powder and youth JJ Courtoreille seining for prey fish.
Photo Credit – Mikisew Cree First Nation



Elder Albert Powder and Youth JJ Courtoreille seining for prey fish at Sandy Point
Photo Credit – Mikisew Cree First Nation



Elder Albert Powder and youth J.J. Courtoreille seining for prey fish at Sandy Point

Photo Credit – Mikisew Cree First Nation

Conclusions

The CBM program continues to address concerns about environmental decline brought forward by the Mikisew knowledge holders, and are doing so with strategic research that combines Traditional Knowledge with science and emerging technologies. These studies are intended to defend Aboriginal and Treaty rights with more appropriate policies in the lower Athabasca region. However, where useful monitoring and research is being undertaken by the Government of Alberta and Canada, the results do not appear to be informing decisions that may prevent loss of navigability, and the increased contamination of wild foods that combined impact the ability of Mikisew members to exercise those rights. Our research is not being included into these already broken decision-making processes. Therefore, much more work is still needed for the successful joint application of science and TEK in the context of long-term monitoring. We remain hopeful, however, that a shift has already taken place, and that the Government of Alberta is supporting community solutions to community problems such as the Navigational Hazard App, and that Environment Canada continues to support community based inclusion in contaminants research on fish. These are positive signals, and once these relationships can be formalized and greater capacity given to the Nation, better decisions about industrial development can be made with the inclusion of Traditional Knowledge, that protect the Mikisew's land and water, rights, and way of life.



Place Names and Canoe Trip in Treaty 8 Territory

Treaty 8 First Nations of Alberta
Kevin Ahkimmachie, Frieda Cardinal
and Dustin Twinn

Many kinds of changes have happened over the last 100 years in the Mackenzie River Basin. Among the most significant have been in northern Alberta in the Peace, Athabasca and Slave river areas. This region falls within the Treaty 8 territory. This area is called “Beh Shih Ne” in Dene (South Slavey); the

river is called “Deh”, “Tsa gheh” in our languages. Both workshops and a boat trip are required to document the histories about these areas as well as details about observed changes in water, fish ecology, and fishing livelihoods. The project will be carried out collaboratively between the Livelihood Committee and the Elders Committee of Treaty 8 First Nations and include elders from Jean D’or Prairie, Chateh and Beaver. The project timeline included two elders meetings and follow up semi-structured interviews (July-October) and a preliminary boat trip from the North Peace River from Fort Vermillion to Garden River to conduct on-the land interviews and place names work (August-September). We specifically wanted to 1) document places of social, ecological significance and ‘stories’ of change in the health of the Peace-Athabasca-Slave area including changes in water levels, fish health, and fishing livelihoods. 2) By including youth in the boat trip and during the elders’ meetings, we also wanted to ensure that this knowledge is passed on for future generations.



Canoe Trip – Jean D’Or Prairie

A canoe trip was planned during the summer of 2016 to bring Treaty 8 First Nations youth on a journey along the Peace River. In addition to learning how to paddle, and experience an important area of Treaty 8 territory, the youth would be working close with elders from the region to learn more about the oral histories of the Peace River and how it has changed over the last 100 years. Many areas of the river in Alberta have been drastically affected by resource development activity including the WAC Bennett Dam.



Observing the Peace River near Fox Lake
Photo Credit – Brenda Parlee

What we found out...

There have been many changes in the Slave Lake area of concern to elders from this region. Among the most significant have been to the lake itself and the impacts of harvesting fish for commercial purposes and mink farming. This pressure on fish resources led to the extirpation of lake trout from Lesser Slave Lake. Today, people can't fish for food from this lake any more.

To me there has been lots of changing going on to the lake as a result of oil and gas and other things. The water is just not nice anymore. I don't drink my water. I always just buy the water where it is filtered. The creeks up south – the rivers – I don't ever drink that water either. It's not like the old days where you could take water from any creek and just start drinking it or making tea. It's not the same. If you want to get sick, drink it (Lesser Slave Lake Elder).

The muskeg water used to be just like spring water from the fridge. It used to be just good water. But no one drinks that muskeg water anymore but we all buy water now. I don't know what's going on (Lesser Slave Lake Elder).

You can find some water that is good in certain areas but you really have to know what is going on up stream. You can look at it and know if its ok. In some places its very clear, you can take a chance (Lesser Slave Lake Elder)..

If we mapped those areas where there is still good drinking water, would it help to protect those areas? If they want to clear cut, there is nothing we could do. If it is slated to be clear cut, they are just going to do it. There is nothing we can do about it. It doesn't matter if we have mapped it to be protected or not. You can protest but its too late. If you wanted to protect it you have to do it 5-10 years ahead. Those companies plan 5-10 years ahead. If there are nice creeks coming out of those forested areas, it doesn't matter, they are going to cut it anyway (Lesser Slave Lake Elder).

There are a lot of salt licks and plants and moose habitat that are really important. They are going to dry up all those areas and the moose will move away. The moose are right down to nothing now. You would be lucky now to see a moose anywhere when you are travelling (Lesser Slave Lake Elder).

If you find a track and you want to find that moose, you should look at the track closely. It was probably there from last year. If I shoot a moose on the farmer's field, they could put me in jail. There are moose and elk in some areas north of Millet and south of Edmonton. All those farmers will throw you in jail if you shoot them. The animals are leaving the bush because it's safer on the farmer's fields (Lesser Slave Lake Elder).

All that clearcutting, every time it rains, all the silt and chemicals from the forestry area, it drains down and eventually comes down to our lakes. And the fish are

affected. It's true those chemicals are in the sand but the fish eat from the bottom. Everything is going downhill. There is already mercury in this lake (Lesser Slave Lake Elder).

There are a lot of fish that look like they have cancer. People might eat it but if you open it up and you see how it looks, then there are things growing in the stomach, then you throw it away. There are more and more fish that seem to have growths inside. There are little spots and little lumps in it. About 2 of 10 fish you



Watching the Peace River (2016)– Photo Credit Brenda Parlee

might get are no good. It's all kinds of fish—whitefish, walleye, jackfish etc. but there is no lake trout. The trout left a long time ago. When they had mink farms and fox farms back before the 1950s, they were allowed to fish all year round. The Indians could not fish for food to feed their families but the mink farmers could take as much fish as they wanted (Lesser Slave Lake Elder).

The fish were good back in the 1950s because there was no forestry and oil activity in the hills. But since then the fish are becoming poor. It's also the farmer's fields and all the chemicals that they use for their crops and it drains into the creeks and streams and goes into the lake (Lesser Slave Lake Elder).

We go fishing in different areas where there is less activity. There are more and more clear cuts and once that happens the streams and lakes are no good. Pretty soon there will be nothing left. The government doesn't even care. It's all about the money. It doesn't matter if we try and protest. The only thing we can do is go with the flow and try to survive, that is what my dad taught me—go with the flow

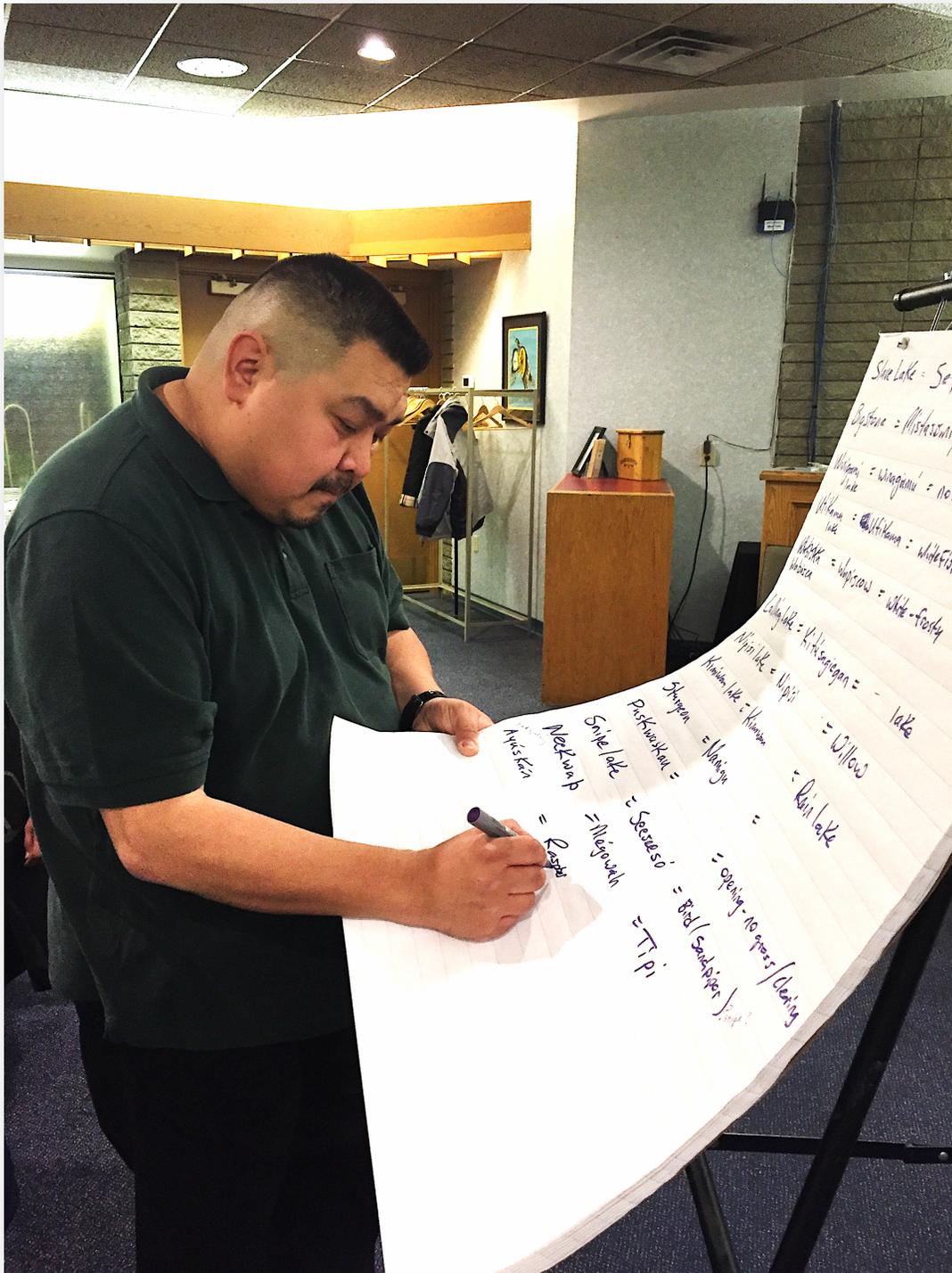


Russell Willer, Place Names Workshop, Slave Lake
Photo Credit – Brenda Parlee

and try and survive. . We have cut down on our hunting, we have cut down on our fishing. What else can we do? There are lots of people who don't even go out any more; there is too much trouble with fish and wildlife officers. People used to be able to go out and camp and enjoy life, and get food from the land, but now the fish and wildlife people will chase you down and ask you what you are doing. If the Natives are camping anywhere around here, they will come find you and push you around. I say, "I am coming to the bush to go shopping for meat for my family. I don't bother you if you go shopping at IGA and try and buy a side of beef." It's the same situation.

Place Names Workshops

There were more than 250 place names documented for the Treaty 8 region based on workshops in Slave Lake, High Level, and Grande Prairie.



Kevin Ahkimmachie, Treaty 8 Place Names Workshop, Slave Lake
Photo Credit – Brenda Parlee

