Environmental Research and Monitoring Results Workshop: North and South Slave Regions

Summary Report

Mission Island – near Fort Resolution, NT

October 17- 18th, 2017

Contents

Executive Summary

The Environmental Monitoring Results Workshop for the North and South Slave Regions was held at Mission Island, near Fort Resolution, NT on October 17-18th, 2017. The event was co-hosted by the Government of the Northwest Territories' NWT Cumulative Impact Monitoring Program (NWT CIMP), Northwest Territory Métis Nation (NWTMN), North Slave Métis Alliance (NSMA) and Akaitcho Territory Government (ATG). The Deninu K'ue First Nation (DKFN) and Fort Resolution Métis Council (FRMC) generously assisted with logistical support.

The objectives of the workshop were to:

1. Bring together researchers, northern decision-makers and communities to share results of environmental research and monitoring related to wildlife, fish and water in the North and South Slave regions; and
2. Provide a forum for discussion between researchers, communities and northern decision-makers. Feedback from these discussions to be used to improve presented projects.

The workshop examined research and monitoring conducted in the North and South Slave Regions and focused primarily on NWT CIMP-supported projects centered on water, fish and caribou. Thirteen presentations were given by researchers and resource staff. Small, interactive break-out groups (Talking Circles) were held to generate discussion on how to include Traditional Knowledge and make research, monitoring and reporting more useful as well as to gather feedback on presented projects.

Facilitated by Joanne Barnaby, sixty-four people participated in the workshop. Other additional individuals attended parts of the workshop. NWT CIMP provided funding for community representatives to attend the workshop to promote information sharing with communities and decision-makers. The Northwest Territory Métis Nation, North Slave Métis Alliance, and Akaitcho Territory Government identified attendees and administered their travel arrangements. **The main purpose of this Summary Report is to provide a tool for community members and decision-makers who attended the workshop to communicate its results and discussions.**

From the discussions in the Talking Circles, communities want to be more involved in planning of a project and in monitoring (identifying local questions, training of local monitors, helping analyze data, communication etc.), which would build capacity. It is important to communicate with community members in plain language before, during, and after a project.

The quality and relevance of the workshop and its presenters were evaluated by participants using a short survey. The majority of the feedback was positive and expectations for the workshop were met. Quality and relevance scores for presenters ranged from 69% to 87%. This information is shared with presenters to help improve their future communications with communities and decision-makers.

1. Background

The Environmental Monitoring Results Workshop for the North and South Slave Regions was held at Mission Island, near Fort Resolution, NT on October 17-18th, 2017. The event was co-hosted by the Government of the Northwest Territories' NWT Cumulative Impact Monitoring Program (NWT CIMP), Northwest Territory Métis Nation (NWTMN), North Slave Métis Alliance (NSMA) and Akaitcho Territory Government (ATG). The Deninu K'ue First Nation (DKFN) and Fort Resolution Métis Council (FRMC) generously assisted with logistical support.

This was the seventh annual NWT environmental monitoring results workshop and the fifth regional results workshop supported by NWT CIMP.

NWT CIMP-funded results workshops are held annually in the NWT to provide environmental monitoring results to key audiences (Aboriginal governments, community members, industry, government, regulatory authorities and non-governmental organizations) and to provide information for informed decision-making. These workshops provide opportunities to network, strengthen ties between communities, monitoring and decision-making, and to understand cumulative impacts in regions of the NWT. Regional workshops are supported to encourage participants to transmit information about NWT CIMP and the projects it supports back into their communities.

The 2017/18 workshop examined research conducted in the North and South Slave Regions and focused primarily on past and current NWT CIMP-supported projects centered on water, fish and caribou. Thirteen presentations were given by researchers and resource staff. Small, interactive break-out groups (Talking Circles) were held to generate discussion on how to include Traditional Knowledge and make research, monitoring and reporting more useful.

The objectives of the workshop were to:

1. Bring together researchers, northern decision-makers and communities to share results of environmental research and monitoring related to wildlife, fish and water in the North and South Slave Regions; and
2. Provide a forum for discussion between researchers, communities and northern decision-makers. Feedback from these discussions to be used to improve related presented projects.

Facilitated by Joanne Barnaby, sixty-four people participated in the workshop. Other additional individuals attended parts of the workshop. NWT CIMP provided funding for community representatives to attend the workshop to promote information sharing with

communities and decision-makers. The Northwest Territory Métis Nation, North Slave Métis Alliance, and Akaitcho Territory Government identified attendees and administered their travel arrangements.

A questionnaire was given to each participant daily to obtain feedback on the presenters, usefulness of the material, the balance between presentations, questions and discussion, and how well the objectives were fulfilled. Please see Appendix C for the sample evaluation forms.

Brief History of Fort Resolution:
"People have resided in Fort Resolution for over 200 years and have depended on the use of natural resources such as fish and trees." Fort Resolution was the gathering point to move on to further exploration of the north, just as we are doing today – gathering to discuss these projects. The Akaitcho Territory has hosted many of the northern mining projects, but in order to continue this type of development we need to study, to point out our shortfalls, and also lead us to making more informative decisions about future developments.

Don Balsillie, Akaitcho Government Chief Negotiator

Opening remarks from Chief Louis Balsillie (left), Shawn McKay (middle) and Deputy Mayor Patrick Simon (right).

2. Presentations

A total of 13 presentations were given over the two-day workshop. Each workshop participant was provided with an abstract volume (see Appendix D) for each presentation. The presentations are available by searching the NWT Discovery Portal at http://nwtdiscoveryportal.enr.gov.nt.ca and the direct link has been included beneath the title of each presentation, followed by a summary of discussion (if available).

Day 1
Tuesday October 17th, 2017

Presentation #1 - *About the NWT Cumulative Impact Monitoring Program (NWT CIMP): Impact on Resource Decision-Making*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Kanigan%20-%20NWT%20CIMP%202017.pdf

Julian Kanigan, NWT CIMP (GNWT-ENR)

Summary of Discussion
- NWT CIMP overview video available in 7 languages at www.nwtcimp.ca
- NWT CIMP supports monitoring that is directly relevant to environmental decision making, key activities and encourages all to engage with the program through priority-setting and project collaboration
- For 2016/17, ten (10) NWT CIMP projects contributed to the regulatory process and eight projects were Traditional Knowledge related. Page eight of the NWT CIMP Annual Report includes a table with this information.

Presentation #2 - *Understanding legacy mining impacts to lake waters in the Yellowknife area*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Kanigan%20(Palmer)%20-GNWT%20%26%20Carleton%202017.pdf
Julian Kanigan, NWT CIMP (GNWT-ENR) on behalf of Mike Palmer, project lead

Summary of Discussion
- In addition to the wind direction, the research should also consider the time of year for a better understanding of how contaminants from the mine were carried through the air. The mine's dusty "haze" could still be seen from the air in the early 2000's.
- It was clarified that this project focused past the Giant Mine property.
- When asked if the drinking water is safe, the answer was the Department of HSS tests YK drinking water, and yes.

- Important to hear updates and information from the Giant Mine Oversight Board on any studies on impacts to wildlife and fish.
- This project is of great value to the Yellowknives Dene First Nation and is important that they are a part of the research as well.

Presentation #3 - *Update on GNWT-ENR's Environmental Site Assessments and Monitoring Projects at Various NWT Contaminated and Operating Sites*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Abernethy%20-%20GNWT%20Contaminated%20Sites.pdf
Dave Abernethy, GNWT- Environment Division, Environment and Natural Resources

Summary of Discussion

- The Fort Resolution Underground Pipeline Phase II Environmental Site Assessment (ESA) Report was delayed being distributed to the community. The Phase III ESA was carried out in September/October 2017. The Final Phase III ESA is to be submitted to the GNWT by March 31, 2018. The Fort Resolution Metis Council has requested they be engaged in the remedial action plan.
- Community members raised the point that it is important for the reports to be in plain language. Clarification was requested on how GNWT's Contaminated Sites Section (CSS) and INAC's Contaminants and Remediation Directorate (CARD) are related. They are separate entities, each keeping their own sites to oversee. (CARD clarified their responsibilities in the next presentation).
- Concerns were raised about the uranium contamination and that community is challenged with bringing up sensitive subjects to the right people at the right time. Knowledge about the health of the environment is good but it's more important to know what it means for the people that live there. Health concerns and issues will never go away.
- Currently, the GNWT is in the assessment phase for the underground pipeline in Fort Resolution. After the assessment is complete they will negotiate responsibilities with the Government of Canada to determine who will assume responsibility for the underground pipeline. The Phase III ESA Report will delineate areas of contamination. The Remedial Options of the Remedial Action Plan will incorporate the removal of the pipeline. The GNWT is open to engaging with communities to discuss and clarify the findings of the reports.
- Need more bio-monitoring to look at health issues due to high cancer rates.
- *How are small operation gold miners being regulated? What criteria does GNWT use for a site specific remediation?* The GNWT follow follows legislation and guidelines including the Canadian Council of Minister of the Environment and Environmental Protection Act.
- Community concerns on water treatment – Increase communications with community on what is being tested, why, and what it means. The community needs help with cleaning out the tanks; they don't trust the water cleanliness. The community needs to know where their secondary water supply is supposed to come from in case the primary supply is contaminated. Representatives going to the

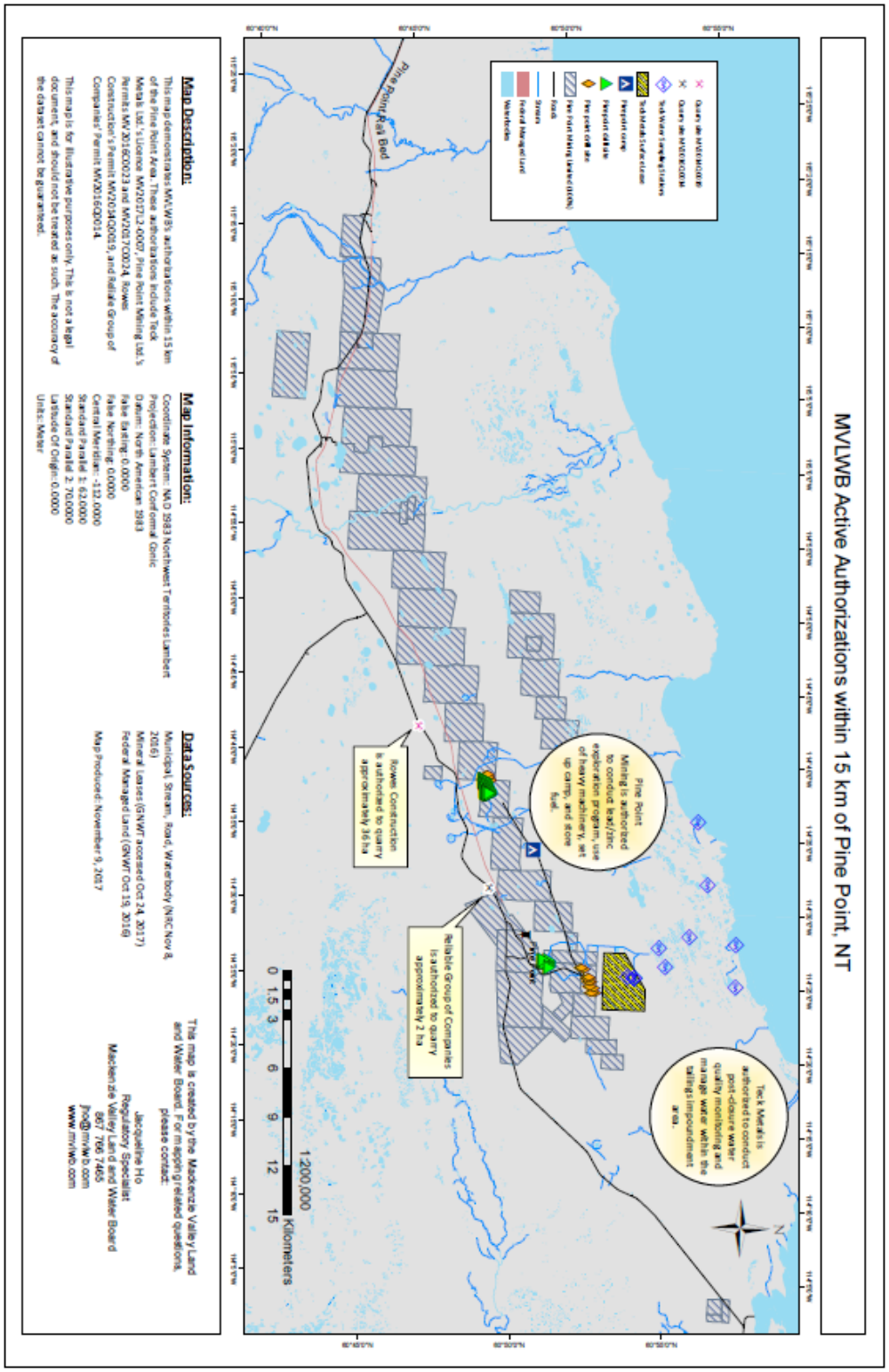
Water Stewardship Strategy Workshop were encouraged to bring forward these concerns.

Presentation #4 - *Monitoring of Remediated Federal Contaminated Sites in the NWT*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Eagles%20-%20Federal%20Monitoring%20Remediated%20Contaminated%20Sites%20-%202017.pdf
Kathryn Eagles, Indigenous Affairs and Northern Affairs Canada, - Contaminants and Remediation Division (INAC – CARD)

Summary of Discussion

- It was clarified that for the purpose of this presentation, the monitoring definition is post remediation. Any mines missing from the presentation are not at the monitoring stage yet.
- The criteria has not yet been established to transfer sites from INAC to GNWT.
- *Is Hidden Lake re-opening?* Not sure, however any re-opening would require negiotiations for maintaining the environment.
- *When does the monitoring of a site stop?* This process is being developed, however some sites will take much more monitoring due to the impact on the environment.
- *Are Indigineous people involved in your monitoring? Can they be? Are airstrips being used? How is TK involved?* Community monitoring models are slowly being implemented, community members are more active. Airstrips are kept in order to keep the site accessible. Generally they stay but they would be stripped down. Community members can request that water access be used instead of airstrips.
- *Is there a liner under the tailings cap at the Discovery Mine and what is it made of?* In areas where leaching from tailings was a risk, yes there is a liner. The cap material is taken from on site and using repurposed mining material. The fill starts very coarse and gets finer closer to the surface. A lining is used in areas at risk of leeching.
- The Pine Point mine (privately owned) has left a contaminated area around Little Buffalo Lake consisting of drill holes, drainage pipes. The property surrounding the mine belongs to the GNWT. INAC is only responsible for 80km of former rail bed.
- The Mackenzie Valley Land and Water Board (MVLWB) issued a new licence to the new owner of Pine Point Mine – however local hunters have observed numerous areas of debris and wast water discharge – that should be addressed prior to issuing a new licence. MVLWB should respond to what water licences are being issued to this area and why (MVLWB response below).
    - MVLWB staff has produced a map showing the authorizations within 15 km of the Pine Point area to show spatial distribution of the licences and permits.
    - On October 24, 2017, Teck Metals was authorized to conduct post-closure water monitoring within the tailings impoundment area.
    - On July 19, 2017, Pine Point Mining Limited was authorized to conduct mineral exploration. The map illustrates the area where Pine Point Mining Limited holds mineral leases and claims on the Territorial Lands that were issued by the Mining Recorder's Office. Pine Point Mining is therefore eligible to apply for licences and permits with the MVLWB.

- As illustrated on the map, Teck Metals monitoring area does not overlap with Pine Point's mineral claims and leases.



- *Will signs be put up where bridges have been removed along the Pine Point Rail Bed?* Kathryn will bring this concern/suggestion back to the project team.
- *Are the berries safe to eat?* According to our Human Health Environmental Risk Assessment, yes they are safe – please wash before eating.
- *Where can I find health advisories? GNWT MACA and Health should be here to hear our concerns.* The advisories have been distributed to all leadership and are available online at GNWT Health and Social Services website.
- Washed foods harvested 100 metres or more away from the rail bed are safe to eat.
- *Are the soils on Outpost Island going to be removed?* When we dig up the salt-stained soils, they will be removed from site.

Presentation #5 - *Cumulative Impact Monitoring of Aquatic Ecosystem Health of Yellowknife Bay, Great Slave Lake*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Chetelat%20-%20YKBay%202017.pdf
John Chetelat, Environnent and Climate Change Canada

No discussion.

Presentation #6 - *Impact of Wildfire on Northern Stream Ecosystems*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Garner%20-%20Wildfire%20Impacts%20on%20stream%20ecosystems%20-%202017.pdf
Caitlyn Garner, Brock University

Video – *Impact of Wildfire on Northern Stream Ecosystems* - Mike Pisaric, Brock University available at http://www.enr.gov.nt.ca/en/services/cumulative-impact-monitoring-program-nwt-cimp/videos-nwt-cimp

No discussion.

Talking Circles – ***Attendees divided into three small groups to discuss one of the following questions:***

1. **Is this information useful to you? What could be done to make the research and reporting more useful?**
    a) Include youth to forums like this (workshops, science fairs, schools). They will be carrying the torch for future generations.
    b) Improve 2-way communication; build trusting relationships (TK good for science and vice versa); use media instead of dry text.
    c) Hands on, more on the land experience; get the community involved in monitoring programs; involve students by incorporating it into the curriculum

2. **Are there opportunities for better coordination?**
    a) Researchers should be listening to elders' stories when they are gathered. Record and transcribe the stories they tell.
    b) The younger generation should also be listening to these stories as a traditional way of learning history.
    c) More communication and dialogue with regulators.
    d) Working with Climate Change to better understand the entire ecosystem.

3. **Are there ways to better involve TK holders and/or community monitors? Is there a different way to do this research starting from a TK perspective?**
    a) Develop a respectful relationship. It helps to do an activity with the community, (pick berries, etc.) spend some time in the community.
    b) Use several TK holders for a project instead of one. Youth can do the work with researchers under the advisement of the TK holders.
    c) TK should have equal (or higher) value to scientific knowledge.
    d) Communicate that there is a protocol that must be followed when obtaining TK. This empowers everyone in the value of sharing knowledge.
    e) Develop research from a TK question; develop the program to answer the question.

Day 2

Wednesday October 18th, 2017

Feedback from Day 1 - Joanne Barnaby commented that the previous days' Talking Circle demonstrated the relevance of NWT CIMP and its projects to the communities as well as the importance of building relationships.

Presentation #7- *Implementing collaborative cross-NWT water quality monitoring to address the needs of water partners, focusing on cumulative impacts*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Somers%20-%20GNWT%20WRD%20CBM%20-%202017.pdf
Gila Somers, GNWT – Water Resources Division

Summary of Discussion

- *Has there been any discussion with Alberta concerning the possibilities of flooded farmlands releasing pesticides into the water flow?* It is in discussion, but not part of the Community-Based Monitoring program due to high cost of samples. However, information is available through the Transboundary Waters Agreement process and will be discussed at the Waters Workshop in November. Gila will bring this concern to other Water Resources' colleagues.
- *Some water issues span across provinces/territories and agencies and many don't understand it. It's important to understand this exchange and what it means to the community.* We have a path forward in our sampling program that crosses the provincial boundaries to sample the water. It was also noted that NWT and Alberta collectively have money to start sampling in Alberta.
- *What are the challenges to winter sampling?* It is achievable and requires proper planning. Lab costs for analysis are more of a challenge than logistics.
- *Are the elevated levels of aluminum related to the high levels of breast cancer and dementia?* That finding is not conclusive.
- *Continuous monitors (sonnes) would increase the data available. Is there something more robust that would allow monitoring year-round with remote data collection?* Currently, the GNWT doesn't have that technology; however INAC is currently testing one, and will report on how it's working. They are very expensive at $27,000 per unit.

Presentation #8 – *Aboriginal Aquatic Resource and Oceans Management Program (AAROM): South Slave Region Update*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Salter%20-%20AAROM%202017.pdf
Jason Salter, Northwest Territory Metis Nation

Summary of Discussion

- *How does AAROM communicate with other programs in the area?* The program has just begun to network and looks forward to collaborating with other programs. The intention is to bring all the programs together for an annual forum to share ideas.

Presentation #9 - *Community monitoring of the Great Slave Lake Ecosystem*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Evans%20-%20Community%20and%20scientist%20monitoring%20of%20GSL%20-%202017.pdf
Marlene Evans, Environment and Climate Change Canada (below)

Summary of Discussion

- *Have the grab samples of raw water vs. water from the treatment holding tank been compared?* No. Samples are collected once the water has been moving for a bit. There are probably some differences but don't know what they would be. The intention is to collect samples from Resolution Bay and from the holding tanks.

Presentation #10 – *Integrated eco-monitoring and assessment of cumulative impacts of Great Slave Lake fisheries*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Zhu%20-%20GSL%202017.pdf
Xinhua Zhu- Fisheries and Oceans Canada

Summary of Discussion

- More information from the Talston River dam that would relay mercury levels would be appreciated.

Presentation #11 - *Barren-ground caribou: Traditional Knowledge Mapping and Analysis*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Wong%20-%20YKDFN.pdf
Pam Wong, Trailmark for YKDFN; Ambe Chenemu and Angus Charlo - YKDFN

Summary of Discussion

- There was strong feedback on the importance of elders acknowledging youth.
- Collaboration should extend past the mines on making a road, but to include all organizations and environmental issues.

Presentation #12 – *North Slave Métis Alliance Community-Based Traditional Knowledge Monitoring: Monitoring for Better Decision-Making*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Keats%20-%20NSMA%20TK%20%26%20Monitoring%20for%20better%20decisions%20-%202017.pdf
Beth Keats, Trailmark for North Slave Metis Alliance

Summary of Discussion

- The science world has forgotten the importance of TK and don't get the sense that TK is getting its due.
- The bridge between TK and science is the youth who live in both worlds.
- Some feel that bringing these issues up at scientific meetings is a struggle.
- There is a need for 'knowledge interpreters' as information must be transferred both ways.

Presentation #13 – *Making Use of Research and Monitoring Results Information*
http://sdw.enr.gov.nt.ca/nwtdp_upload/Kangian%20-%20Making%20Use%20of%20Results%202017.pdf
Julian Kanigan, NWT CIMP – GNWT ENR

- An update was provided on the NWT Environmental Audit, the Discovery Portal and the Inventory of Landscape Change Web Viewer.

No discussion.

Closing Comments:

Annoucement of Relevant Upcoming Meetings

- NWT Water Stewardship Strategy Workshop – November 21-22 in Dettah;
- Mackenzie Valley Resource Management Act Workshop - February 13-14, 2018 in Yellowknife .

One parting comment from a NWT CIMP Steering Committee member was that the program is moving well with Traditional Knowledge projects, discussing bridging science and TK and including more youth in our discussions and projects.

Youth Ethan McKay gives Closing Prayer, encouraged by Joanne Barnaby.

Marsi Cho - Thank you!

Appendix A: Agenda

AGENDA

North and South Slave Regions - Environmental Research and Monitoring Results Workshop

October 17- 18th, 2017

Mission Island – near Fort Resolution, NT

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*The Government of the Northwest Territories (GNWT)'s **NWT Cumulative Impact Monitoring Program** (NWT CIMP), **Northwest Territory Métis Nation** (NWTMN), **North Slave Métis Alliance** (NSMA) and **Akaitcho Territory Government** (ATG) are partnering to host the a regional Environmental Research and Monitoring Results workshop. The **Deninu K'ue First Nation** (DKFN) and **Fort Resolution Métis Council** (FRMC) are generously assisting with logistical support.*

OBJECTIVES:

The two objectives of the workshop are to :

- Bring together researchers, northern decision-makers and communities to **share results** of environmental research and monitoring related to wildlife, fish and water in the North and South Slave regions; and
- Provide a **forum for discussion** between researchers, communities and northern decision-makers. Feedback from these discussions will be used to **improve presented projects**.

INFORMATION:

Copies of abstracts and presentations will be provided and made available on the NWT Discovery Portal at www.nwtdiscoveryportal.enr.gov.nt.ca. For additional details, contact Meredith Seabrook at 867-767-9233 ext. 53086 or nwtcimp@gov.nt.ca

AGENDA

North and South Slave Regions - Environmental Research and Monitoring Results Workshop

Tuesday, October 17th - DAY 1

Air charter from Yellowknife to Fort Resolution arranged, arriving approximately at 8:30am. Confirmed passengers should be at the Summit Air hangar on Old Airport Road in Yellowknife no later than 7:30am. The DKFN has arranged taxi shuttles from Fort Resolution airstrip to Mission Island.

Time	Activity	Lead
8:30 am	Coffee and Mingling Registration	
9:00	Welcome, Opening Prayer and Introductions	Facilitator – Joanne Barnaby
9:15	**Talking Circles** • What is the difference between **monitoring** and **research**? • What monitoring exists in the North and South Slave Regions?	Facilitator
10:00 - 10:20	• Presentation #1 - *About the NWT Cumulative Impact Monitoring Program (NWT CIMP): Impact on Resource Decision-Making*	Julian Kanigan (GNWT-CIMP) *(Tim Heron – NWTMN, Shin Shiga – NSMA, Stephanie Poole - ATG CIMP SC members)*
10:20 – 10:30	**BREAK**	
10:30 - 12:00	**Contaminant-Related Projects:** • Presentation #2 – *Understanding legacy mining impacts to lake waters in the Yellowknife area* • Presentation #3 - *Cumulative Impact Monitoring of Aquatic Ecosystem Health of Yellowknife Bay, Great Slave Lake*	Julian Kanigan (GNWT CIMP) for Mike Palmer John Chetelat (Environment & Climate Change Canada)

12:00- 1:00 pm	**LUNCH** (provided)	
1:00 pm	• Presentation #4 - *Impact of wildfire on northern stream ecosystems* • Presentation #5 - *Monitoring of Remediated Federal Contaminated Sites in the NWT* • Presentation #6 - *Update on GNWT-ENR's Environmental Site Assessments and Monitoring Projects at Various NWT Contaminated and Operating Sites*	Caitlin Garner (Brock University) Kathryn Eagles (INAC – CARD) Dave Abernathy (GNWT ENR Environment)
2:15 - 2:30 pm	**BREAK**	
2:30 – 3:15 pm	**Talking Circles** • Is this information useful to you? What could be done to make the research and reporting more useful? • Are there opportunities for better coordination? • Are there ways to better involve TK holders and/or community monitors? Is there a different way to do this research starting from a TK perspective?	Facilitator
3:15 – 3:45 pm	Summary of Talking Circles as a Full Group • 3 key points from each group	
3:45 – 4:00 pm	**Wrap up**	Facilitator

Coach Bus Transportation: (optional) Departure from Mission Island to Ptarmigan Inn in Hay River by 4:30 pm for overnight accommodations.

AGENDA

North and South Slave Regions - Environmental Research and Monitoring Results Workshop

Wednesday, October 18th - DAY 2

Coach Bus Transportation: (optional) Departure from Ptarmigan Inn, Hay River to Mission Island at 7:30 am.

8:30 am	Coffee and Mingling Registration	
9:15 am	Welcome and Opening Comments	Facilitator
9:30 – 10:20 am	**Community-Based Monitoring Projects:** • Presentation #7- *Implementing collaborative cross-NWT water quality monitoring to address the needs of water partners, focusing on cumulative impacts* • Presentation #8 – *Aboriginal Aquatic Resource and Oceans Management Program (AAROM): South Slave Region Update*	Gila Somers (GNWT Water Resources), Ramona Fordy (DKFN) Jason Salter (NWTMN)
10:20 - 10:30 am	**BREAK**	
10:30 am	• Presentation #9 - *Community monitoring of the Great Slave Lake Ecosystem* **Fish Monitoring:** • Presentation #10 – *Integrated eco-monitoring and assessment of cumulative impacts of Great Slave Lake fisheries*	Marlene Evans (Environment & Climate Change Canada) Xinhua Zhu (Fisheries & Oceans Canada)

11:15 am – 12:00	**Talking Circles** • Is this information useful to you? What could be done to make the research and reporting more useful? • Are there opportunities for better coordination? • Are there ways to better involve TK holders and/or community monitors? Is there a different way to do this research starting from a TK perspective?	
12:00 - 1:00 pm	**LUNCH** (provided)	
1:00 – 2:00 pm	**Traditional Knowledge-Related Projects:** • Presentation #11 - *Barren-ground caribou: Traditional Knowledge Mapping and Analysis* • Presentation #12 – *North Slave Métis Alliance Community-Based Traditional Knowledge Monitoring: Monitoring for Better Decision-Making*	Pam Wong (Trailmark for Yellowknives Dene First Nation) Beth Keats (Trailmark for North Slave Métis Alliance)
2:00 – 2:15 pm	**BREAK**	
2:15 -2:30 pm	• Presentation #13 – *Making Use of Research and Monitoring Results Information* (NWT Discovery Portal, Inventory of Landscape Change Webviewer, NWT Environmental Audit)	Julian Kanigan (GNWT-CIMP)
2:30 pm	**Wrap-Up, Closing Comments and Closing Prayer**	Facilitator
3:30 pm	**Adjourn**	

DKFN to provide taxi shuttles from Mission Island to airstrip immediately at the end of the workshop. Air charter return to Yellowknife at Summit Air hangar on Old Airport Road – approximately departing at 4:30 pm, and arriving at 5:05pm.

Appendix B: Attendee List

Name	Email	Organization
Abernethy, Dave	dave_abernethy@gov.nt.ca	GNWT - ENR
Andrew, Leon	srrb.leon.andrew@gmail.com lamountaindene@theedge.ca	Sahtu Secretariat Inc.
Bailey, Violet		Deninu K'ue First Nation
Balsillie, Don		Akaitcho Territory Government
Barnaby, Joanne	jvbarnaby@gmail.com	Consultant (facilitator)
Beaulieu, Angus		Fort Resolution Metis Council
Beaulieu, Ronald		Fort Resolution Metis Council
Bessette, Carmon	carmon.bessette@canada.ca	INAC - CARD
Bird, Bradley	b.bird302@gmail.com	NWT Metis Nation
Bjornson, Rosy	ima_dkfn@northwestel.net	Deninu K'ue First Nation
Bourque, Albert	Albert_Bourque@gov.nt.ca	GNWT - ENR
Bouvier, Elsie		Hay River Metis Council
Cardinal, Lloyd	Lloydcardinal9711@gmail.com	Fort Resolution Metis Council
Catholique, Shonto	shontocatholique@outlook.com	Lutsel K'e Dene First Nation
Charlo, Angus	angus@ykdfn.com angus@ykdene.com	Yellowknives Dene First Nation
Chenemu, Ambe	achenemu@ykdene.com ambe.chenemu@gmail.com	Yellowknives Dene First Nation
Chetelat, John	john.chetelat@canada.ca	Environment and Climate Change Canada
Coleman, Ria	rcoleman@northwestel.net	Fort Smith Metis Council
Eagles, Kathryn	Kathryn.Eagles@canada.ca	INAC - CARD

Edjericon, Laura	Laurak07@msm.com	Deninu K'ue First Nation
Ellis, Andrea	Andrea_ellis@gov.nt.ca	GNWT - ENR
Evans, Marlene	marlene.evans@canada.ca	Environment and Climate Change Canada
Fabien, Edward		Fort Resolution Metis Council
Fatt, Ron		Lutsel K'e Dene First Nation
Fordy, Ramona	aquatics@dkfn.ca	Deninu K'ue First Nation
Goodman, Nicole	Nicole.goodman@nsma.net	North Slave Metis Alliance
Heron, Henry		Fort Smith Metis Council
Heron, Tim	rcc.nwtmn@northwestel.net	NWT Metis Nation
Huskey, Joline	jolinehuskey@tlicho.com	Tlicho Government
Ho, Jacqueline	jho@mvlwb.com	Mackenzie Valley Land and Water Board
Garner, Cait	cg09uy@brocku.ca	Brock University
Janes, Erica	ejanes@mvlwb.com	Mackenzie Valley Land and Water Board
Jones-Hubert, Heather	Heather_jones@northwestel.net	Hay River Metis Council
Kanigan, Julian	Julian_Kanigan@gov.nt.ca	GNWT – ENR (CIMP)
Keats, Beth	beth.keats@trailmarksys.com	North Slave Metis Alliance (consultant)
King, Raymond		Fort Resolution Metis Council
King, Trudy	fieldworker.frmc53@northwestel.net	Fort Resolution Metis Council
Lafferty, Toni		Deninu K'ue First Nation
Lines, William	wlines@ykdene.com	Yellowknives Dene First Nation
Louine, Stanley		Deninu K'ue First Nation
Low, Mike	jmichaellow@gmail.com	Dehcho First Nations

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Legend:
INAC – CARD – Indigenous and Northern Affairs Canada, Contaminants and Remediation Division
GNWT – ENR - Government of the Northwest Territories, Environment and Natural Resources
NWT CIMP – NWT Cumulative Impact Monitoring Program

Appendix C: Evaluation Questionnaires

North and South Slave Regions - Environmental Research and Monitoring Results Workshop

Participant Evaluation Tool – Day 1 (Tuesday, October 17th)

The sponsoring organizations are interested in participant feedback on the format and content of this workshop. After each presentation and activity, you will be asked to take a moment to provide your feedback in real time as the workshop unfolds. At the end of the day each day, please hand in or place your evaluation sheet in the box provided.

Please identify what type of organization to represent:

___ Federal/Territorial government ___ Aboriginal government/organization

___ Co-management Board ___ Researcher/Academic

___ Other (specify): _____

1. **Please rate each of the presentations using the scale provided based on the quality of the presentation and its relevance to you as a participant in this workshop.**

Presentation #1: Julian Kanigan (GNWT-CIMP) - About the NWT Cumulative Impact Monitoring Program (NWT CIMP): Impact on Resource Decision-Making

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

Presentation #2: Julian Kanigan (GNWT-CIMP) - Understanding legacy mining impacts to lake waters in the Yellowknife area

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

<u>Presentation #3</u>: John Chetelat (ECCC) - Cumulative Impact Monitoring of Aquatic Ecosystem Health of Yellowknife Bay, Great Slave Lake

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

<u>Presentation #4</u>: Caitlin Garner (Brock University) - Impact of wildfire on northern stream ecosystems

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

<u>Presentation #5</u>: Kathryn Eagles (INAC-CARD) - Monitoring of Remediated Federal Contaminated Sites in the NWT

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

<u>Presentation #6</u>: Dave Abernathy (GNWT-ENR) – Update on GNWT – ENR's Environmental Site Assessments and Monitoring Projects at Various NWT Contaminated and Operating Sites

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

2. Were the research results presented today useful to you?

1	2	3	4	5
Not useful		Somewhat useful		Very useful

3. How did you find the balance between presentations and time for questions and discussion (Talking Circles) today?

Too much presentation time	Good balance	Too much discussion time

4. Please rate the quality of the meeting facilitation today.

1	2	3	4	5
Poor quality		Adequate quality		Excellent quality

5. Please rate how well the workshop fulfilled its objectives today.

Bring together researchers, decision-makers and communities to share results of current NWT environmental monitoring and research related to water, fish and wildlife in the North and South Slave regions.

1	2	3	4	5
Did not meet		Partially met		Fully met

Provide a forum for discussion between researchers, communities and regional decision makers. Feedback to be used to improve future NWT CIMP projects and workshops.

1	2	3	4	5
Did not meet		Partially met		Fully met

We welcome any additional comments or suggestions:

Marsi Cho - Thank you for your participation and input!

North and South Slave Regions - Environmental Research and Monitoring Results Workshop

Participant Evaluation Tool – Day 2 (Wednesday, October 18th)

The sponsoring organizations are interested in participant feedback on the format and content of this workshop. After each presentation and activity, you will be asked to take a moment to provide your feedback in real time as the workshop unfolds. At the end of the day each day, please place your evaluation sheet in the box provided.

Please identify what type of organization to represent:

___ Federal/Territorial government ___ Aboriginal government/organization

___ Co-management Board ___ Researcher/Academic

___ Other (specify): _____

1. **Please rate each of the presentations using the scale provided based on the quality of the presentation and its relevance to you as a participant in this workshop.**

Presentation #7: Gila Somers (GNWT-ENR), Shawn McKay (FRMC) - Implementing collaborative cross-NWT water quality monitoring to address the needs of water partners, focusing on cumulative impacts

1	2	3	4	5
Poor quality		Average quality		Excellent quality
1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

Presentation #8: Jason Salter (NWTMN) - Aboriginal Aquatic Resource and Oceans Management Program (AAROM): South Slave Region Update

1	2	3	4	5
Poor quality		Average quality		Excellent quality
1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

Presentation #9: Marlene Evans (ECCC) - Community monitoring of the Great Slave Lake Ecosystem

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

<u>Presentation #10</u>: Xinhua Zhu (DFO) - Integrated eco-monitoring and assessment of cumulative impacts of Great Slave Lake fisheries

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

<u>Presentation #11:</u> Pam Wong (Trailmark for YKDFN) - Barren-ground caribou: Traditional Knowledge Mapping and Analysis

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

<u>Presentation #12:</u> Beth Keats (NSMA) - North Slave Métis Alliance Community-Based Traditional Knowledge Monitoring: Monitoring for Better Decision-Making

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

<u>Presentation #13:</u> Julian Kanigan (GNWT-CIMP) – Making Use of Research and Monitoring Results Information

1	2	3	4	5
Poor quality		Average quality		Excellent quality

1	2	3	4	5
Not relevant		Somewhat relevant		Highly relevant

2. **Were the research results presented today useful to you?**

1	2	3	4	5
Not useful		Somewhat useful		Very useful

3. **How did you find the balance between presentations and time for questions and discussion (Talking Circles) today?**

Too much presentation time	Good balance	Too much discussion time

4. **Please rate the quality of the meeting facilitation today.**

1	2	3	4	5
Poor quality		Adequate quality		Excellent quality

5. **Please rate how well the workshop fulfilled its objectives today.**

Bring together researchers, decision-makers and communities to share results of current NWT environmental monitoring and research related to water, fish and wildlife in the North and South Slave regions.

1	2	3	4	5
Did not meet		Partially met		Fully met

Provide a forum for discussion between researchers, communities and regional decision makers. Feedback to be used to improve future NWT CIMP projects and workshops.

1	2	3	4	5
Did not meet		Partially met		Fully met

We welcome any additional comments or suggestions:

Marsi Cho - Thank you for your participation and input!

Appendix D: Project Abstracts

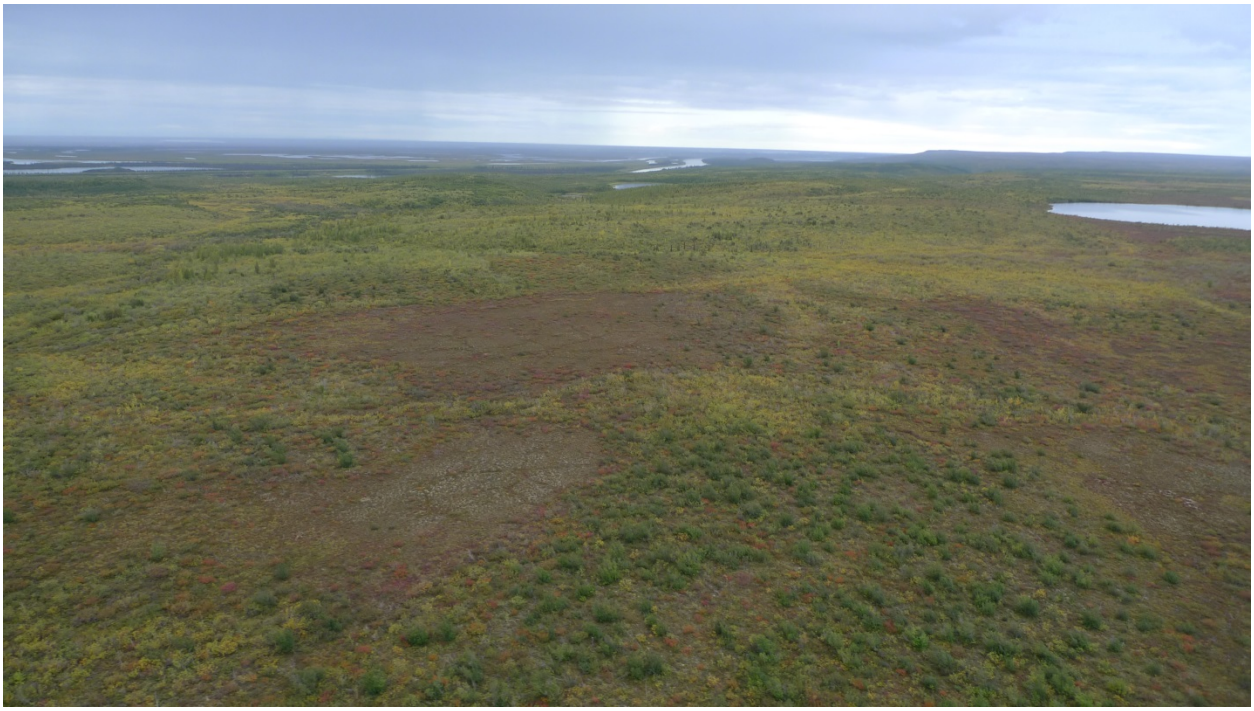
Government of Northwest Territories

Northwest Territory Metis Nation

NORTH SLAVE METIS ALLIANCE

Akaitcho

North and South Slave Regions: Environmental Research and Monitoring Results Workshop
October 17th – 18th, 2017



Abstract Volume

Cover Photograph

Peatland in North Slave Region, NWT;
Julian Kanigan

Compiled by M. Seabrook

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Update on GNWT-ENR's Environmental Site Assessments and Monitoring Projects at Various NWT Contaminated and Operating Sites

Abernathy*, D.

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The Department of Environment and Natural Resources (ENR), Government of the Northwest Territories (GNWT) is currently carrying out environmental site assessments and environmental monitoring projects at various contaminated and operating sites across the Northwest Territories.

The GNWT has carried out assessments on sites within the North and South Slave Regions such as; Ptarmigan Mine, Tom Mine, Tin Mine, Burwash Mine, Crestaurum Mine, Rodstrom Mine, Pine Point Rail Bed and the Fort Resolution Underground Pipeline.

The purpose of this presentation is to provide an update and next steps on the assessment and monitoring work being conducted in the North and South Slave Regions.

The Yellowknife Bay Aquatic Ecosystem 75 years After Gold Production Began: Arsenic, Antimony and Metals in Water, Sediment and Fish

Chételat*, J.[1], Black*, J.[2], Cott*, P.[3], Amyot*, M.[4], Muir*, D.C.G.[5], Cousens*, B.[6], Richardson*, M.[7], Evans*,M.[8], Palmer*, M.[9]

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(4) Université de Montréal, Centre d'études nordiques, Sciences biologiques, Montreal, QC
(5) Environment and Climate Change Canada, Canada Centre for Inland Waters, Burlington, ON
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Yellowknife Bay on Great Slave Lake is a water body of cultural, subsistence and recreational importance for the Yellowknives Dene First Nation and residents of Yellowknife. The bay has been impacted by releases of pollution from gold mining since the start of ore production in the late 1930s. The metalloids arsenic and antimony as well as metals were deposited in the bay through effluent and tailings releases, and air emissions from ore roasting. Local concerns remain over the long-term fate of legacy mining pollution. A study from 2013 to 2015 investigated the movement and environmental fate of metal(loid)s released into Yellowknife Bay, with a focus on water and sediment quality, and bioaccumulation in the food web.

Dated sediment cores, which can provide a historical record of pollution, showed significant enrichment of antimony, arsenic, copper, lead, manganese, mercury, silver and zinc in sediments corresponding with the timing of early mining operations in the area. Mining pollution extended approximately 30 km south of Giant Mine and into the main body of Great Slave Lake. The most intensive enrichment of metal(loid)s in sediments occurred at the north end of Yellowknife Bay within 5 km of Giant Mine. In Yellowknife Bay nearest to Giant Mine, levels of antimony and metals have declined near the sediment surface but remain above pre-mining levels. At farther sites, concentrations of elements in surface sediments have declined to background.

While sediments in Yellowknife Bay indicate recovery from legacy pollution of less-mobile metals (e.g., copper, lead), arsenic remains highly concentrated in younger surface sediment with solid-phase peaks of 800-4500 ppm in the top 5 cm. Levels and speciation of dissolved arsenic in sediment porewaters were related to oxygen conditions, with maximum concentrations found near the oxic-anoxic boundary. The arsenic peaks in near-surface sediment likely resulted from dissolution and upward migration of dissolved arsenic from arsenic-rich sediments in deeper layers.

Summer concentrations of arsenic in surface waters were relatively low (<4 µg/L) in Yellowknife Bay, although levels were several-fold higher at Back Bay compared to the mouth of Yellowknife Bay and main body of Great Slave Lake. Surface water arsenic was predominantly in the dissolved fraction as arsenate (As^{+5}) although arsenite (As^{+3}) was also present. Water concentrations of total arsenic declined to approximately 1 µg/L or less at a distance of 10 km south from Giant Mine, at the mouth of Yellowknife Bay.

Over 200 fishes, representing seven species, were collected in Yellowknife Bay and near Wool Bay on Great Slave Lake for arsenic and metals analysis of tissues. Arsenic concentrations in fish muscle were well below the Canadian Food Inspection Agency guideline of 3.5 ppm wet weight. The low arsenic in fish muscle can be explained by low arsenic in surface waters and the physiological behaviour of this element in fish.

Yellowknife Bay is showing positive signs of recovery with long-term declines of arsenic in water and metals in surface sediment. However, further study is recommended to better understand the potential for arsenic release from sediment, which remains a large and potentially leaky reservoir of legacy arsenic.

Monitoring of Remediated Federal Contaminated Sites in the NWT

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Indigenous and Northern Affairs Canada (INAC) is focused on accelerating the remediation of contaminated sites in the North to protect the health and safety of Indigenous people, Northerners, and the integrity of the environment. Once a contaminated site has been remediated, INAC continues to monitor those sites to ensure that all remedial actions continue to meet their intended purposes; that is, once a site is remediated, INAC ensures it remains safe for people and the environment.

In the North and South Slave regions, INAC Contaminants and Remediation Division (CARD) has remediated Colomac Mine, Discovery Mine, Hidden Lake Mine, Great Slave Lake area sites and North Inca Mine. Monitoring continues at Colomac Mine, Discovery Mine and Great Slave Lake area sites. Monitoring has been completed at Hidden Lake Mine and North Inca Mine; INAC is now investigating the possibility of transferring these remediated sites to the Government of the Northwest Territories. Additionally, CARD recently received results from a Traditional Knowledge and Users' Survey of the Pine Point Rail Bed.

The purpose of this presentation is to provide an overview of recently completed monitoring activities at the Colomac Mine, Discovery Mine, and the Great Slave Lake area sites, as well as to highlight successes and outline next steps for Remediated Sites Monitoring. Additionally, this presentation will offer a summary of the preliminary findings of the Pine Point Rail Bed Traditional Knowledge and Users' Survey.

Community and Scientist Monitoring of the Great Slave Lake Ecosystem

Evans*, M.[1], Giroux, E.[2], Carpenter, L.[2], Norn, L.[2], Fordy, R.[2], Fordy, K.[1], Janzen, K.[3], Bjornson, R.[2], and Giroux, D.[2]

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(3) University of Saskatchewan, Saskatoon, SK
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Community members and scientists are very interested in knowing how the Great Slave Lake ecosystem functions and how to protect its well-being. For example, community members have noticed differences in the appearance of the water and changes in the fish they are harvesting. Scientists are measuring changes in mercury concentrations in fish but, without knowing more about the environment in which the fish lives, are limited in how they can investigate what is causing changes. In this presentation, we present some of the highlights of community-based and scientific monitoring we have been conducting at Fort Resolution since 2010.

The community monitoring began in summer with measurements of water temperature, muddiness (how clear the water is) and color at three locations in Resolution Bay. Slave River flow and winds stirring up the lake bottom make the water muddy and microscopic plants (algae) can made the water green or brownish. This study continued through the year by monitors working with water treatment plant operators to put their water quality measurements into a data base that could be examined for seasonal patterns and differences between years; water plant operators make a series of measurements of the intake water to know how to treat it to meet drinking water standards. Over two years, additional measurements were made of the water including the concentrations of metals, chemicals needed for algae to grow and of the algae. Since then, with skills gained, monitors conducted a special study of the discharge waters at the water treatment plant and measured additional aspects of Resolution Bay waters including metals and plant nutrients. Two special studies were conducted to record which fish were being caught in the domestic fishery and how catches changed through the winter with fish movements and location of the nets.

The water studies are providing information on how the water, algae (which can form scums), and taste may change with the season, Slave River flow, winds mixing up the sediments, temperature and plant nutrients such as phosphorus and nitrogen. These records can be used by the community to document change and can be shared with researchers so that they can understand what is going on in the Great Slave Lake ecosystem and work to implement protective action if needed. The monitoring of the domestic fishery is useful by documenting fish catch. It can show how fish move in and out of an area, if these patterns are changing (e.g., lake trout becoming more common in Resolution Bay waters) and new species appearing. In addition, the airport at Fort Resolution routinely makes weather measurements which are recorded and can be used to document change in climate. With all the monitoring going in Fort Resolution, community monitors are in a very good position to record and record change.

Impact of Wildfire on Northern Stream Ecosystems

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High-latitude regions are currently undergoing rapid ecosystem change due to increasing temperatures and modified precipitation regimes. Since 2012, the Northwest Territories (Canada) has been experiencing severe drought and wildfire seasons. In 2014 alone, fires within the Northwest Territories consumed over 3.4 million hectares of forested land; 1.4 times larger than the national yearly average for Canada. Wildfire is one of the most important agents influencing age structure and composition of the forest stand, as such, it is a critical factor in ecosystem dynamics. The impacts of wildfire on terrestrial systems garner more attention compared to aquatic habitats. This is especially true when considering aquatic ecosystems located in the boreal forest biome, where the impacts of fires on stream ecology and chemistry is relatively understudied. Freshwater ecosystems, such as lakes and streams, are highly relied upon by northern communities for their cultural significance and economic and environmental goods and services they produce, including country foods.

This study examines the impact of recent wildfire on freshwater streams within the North Slave, South Slave, and Dehcho regions of the Northwest Territories through analysis of their water chemistry and benthic macroinvertebrate assemblages. Benthic macroinvertebrates, or the organisms living within/on the bottom of these streams, were sampled following methods outlined by the Canadian Aquatic Biomonitoring Network (CABIN). Biological indices (ex. Relative abundance and richness) were calculated and compared to determine relationships regarding diversity and abundance. Results of this study suggest that recent wildfires cause at minimum short-term impacts in water quality, such as increased turbidity and total suspended solids (TSS). In addition, results indicate slight changes in invertebrate communities of burned streams compared to unburned streams, including increased richness and abundance of collector-gatherer taxa.

NWT Cumulative Impact Monitoring Program Results in the North and South Slave Regions, NT

Kanigan*, J.

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The mandate of the Northwest Territories Cumulative Impact Monitoring Program (NWT CIMP) is to analyze scientific and traditional knowledge to monitor the cumulative environmental impacts of land and water use in the NWT. Cumulative impacts are changes to the environment caused by human actions or a combination of human actions and natural factors through time and space. This abstract provides a brief description of NWT CIMP and summarizes NWT CIMP-supported monitoring results from 2002-2017 in the North and South Slave regions.

Monitoring cumulative impacts is an important part of environmental regulation and integrated system of environmental management in the NWT. The legal mandate for NWT CIMP comes from the Gwich'in, Sahtu and Tłı̨chǫ land claim agreements, and Part 6 of the *Mackenzie Valley Resource Management Act*. Aboriginal governments and organizations help to guide the program through the NWT CIMP Steering Committee. The Northwest Territory Métis Nation, Akaitcho Territory Government, and North Slave Métis Alliance represent the North and South Slave regions on the NWT CIMP Steering Committee. Decisions are made by consensus with input from both members and observers.

NWT CIMP is focused on cumulative impact monitoring that informs environmental decision-making. As such, the program emphasizes the monitoring priorities of co-management boards. In the North and South Slave Regions, this includes the Mackenzie Valley Environmental Impact Review Board and the Mackenzie Valley Land and Water Board. The program strives to include communities in as many aspects of cumulative impact monitoring as possible.

NWT CIMP has supported 39 individual projects specific to the North and South Slave regions since 2002. Many other supported projects are relevant to both the North and South Slave regions and other regions of the territory. Most projects have been related to water and fish, caribou, traditional knowledge and capacity building. Generally, projects have been short-term, lasting one or two years. However, with increased, stable funding in the last seven years, NWT CIMP has supported several longer-term monitoring projects.

Last year, NWT CIMP provided $337,000 to support 13 projects in the North and South Slave regions, 10 of which overlapped with other regions. Approximately 15% ($70,000) of this funding was provided directly to regional and community organizations. This year, five projects are being supported directly in the regions in addition to seven multi-region projects.

Project results for these and all NWT CIMP projects are available for download on the NWT Discovery Portal www.nwtdiscoveryportal.enr.gov.nt.ca or by contacting nwtcimp@gov.nt.ca.

The Recovery of Yellowknife Area Lakes From 50 Years of Mining Emissions: The Influence of Landscape Scale and Within-Lake Processes

Palmer, M.J.[1], Chételat, J.[2], Richardson, M.[1], Jamieson, H.E.[3], and Galloway, J.[4]

Presented by: **Kanigan*, J.** (NWT CIMP)

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(2) Environment and Climate Change Canada, Ottawa, ON
(3) Queen's University, Kingston, ON
(4) Geological Survey of Canada, Calgary, AB

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Lakes are a dominant feature of the landscape in the Yellowknife area and are an important part of the cultural and recreational fabric of the community. The early years of historical mining activities in the region resulted in the release of large amounts of arsenic, antimony, and metals to the surrounding area. Fifty years after the bulk of these emissions were deposited, surface waters of many small shallow lakes continue to exhibit elevated concentrations of contaminants, particularly arsenic. This talk will highlight recent research investigating the influence of landscape factors and within-lake processes on the chemical recovery of Yellowknife area lakes.

A recent survey of 98 lakes within a 30-km radius of Yellowknife was used to investigate the distribution of arsenic in surface waters across the landscape. Regionally, the concentration of arsenic in surface waters decreased with distance from the historical ore roasting operations, and concentrations were highest in lakes downwind (to the west) and proximal to the historical stacks. Four lakes within this hotspot area representing a range of physical and hydrological properties were sampled regularly for one year to investigate seasonal variation in the concentration and speciation of arsenic in surface waters. Arsenic concentrations increased considerably (93 to 182%) under ice throughout the winter for three of the four study lakes. Peak under ice concentrations of arsenic were accompanied by large increases in iron and manganese concentrations and were observed under low oxygen or completely anoxic conditions. These data suggest that two important winter processes may lead to under-ice increases in lake water arsenic concentrations, the exclusion of solutes from the development of overlying lake ice and/or the diffusion of metal(loid)s from sediment porewaters to lake waters.

These results demonstrate that impacts to Yellowknife area lakes from legacy mining pollution vary across the region and highlight the importance of understanding both landscape level and within-lake processes. It is particularly important that regulators and land managers consider the importance of winter processes in a region where lakes are ice covered for two-thirds of the year.

Traditional Knowledge in Resource Decisions and Community-Based Monitoring: Current Challenges and Recommendations

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Research and documentation of traditional knowledge (TK) is a social science exercise, a discipline that differs greatly from the natural sciences. The inclusion of TK in natural resource decisions can result in decisions that are better for humans and the environment, more responsive to unique interactions between the two, and more reflective of local concerns and scenarios. The Government of the Northwest Territories has unique obligations to include TK in all environmental management actions and decisions. Its policies and *Acts*, as well as frameworks for implementation, are intended to ensure that TK has meaningful influence on environmental decision making and empowers indigenous people in environmental governance.

This presentation focuses on the preliminary results of research into the current challenges and opportunities associated with incorporating traditional knowledge in resource decisions and understanding and managing cumulative effects in the Northwest Territories (NWT). This research examines: the needs and challenges related to incorporating TK as expressed by those involved in TK research, regulatory review, and resource management, and; the role TK currently plays in regulators' informed decision-making and in managing cumulative effects in the NWT. It will also describe emergent methods, challenges, and opportunities associated with community-based or TK monitoring for use in integrated resource management.

This subject is explored in three ways: 1) interviews with individuals involved in this field, including regulatory board staff, Aboriginal lands department representatives, and traditional knowledge researchers; 2) a review of major environmental assessments and how they appear to have incorporated TK in their reasons for decision, and; 3) a comprehensive literature review and critical analysis of community-based/traditional knowledge monitoring for resource decision making as a major site for integrating TK in regional or science-dominant decisions, such as permitting. The final outcome of this project will be a description of the challenges of this process, and multi-level recommendations for improving how traditional knowledge can be integrated into monitoring cumulative impacts and resource management decisions.

Aboriginal Aquatic and Resource and Oceans Management (AAROM) Program: Northwest Territory Metis Nation

Salter*, J.

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In 2009-2010, the Northwest Territory Metis Nation (NWTMN) applied for and received funding under the Department of Fisheries and Oceans' Aboriginal Aquatic and Resource and Oceans Management **(**AAROM) program. In order to ensure that the program's mandate stay on track, a consulting firm was hired by the NWTMN to set goals and challenges. This exercise was completed in the 2014-2015 fiscal year resulting in a set of challenges along with strategies to keep the program on track with better communication from all three Metis councils (Fort Smith, Fort Resolution and Hay River). This would allow the program to be successful and meet the Councils questions and or concerns, allowing better communication from all parties involved.

The main focus of this presentation is to provide an overview of what has been done to date since filling the AAROM coordinator position last April. In addition, the presentation will show what activities have taken place this summer and what may be in works for the foreseeable future. For example, this includes the Elders' Fisheries workshop, Community-Based Water Quality program, net training, and the adopted Guardian program.

NWT-Wide Community-Based Water Quality Monitoring (CBM) Program

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During the development of Northern Voices, Northern Waters: NWT Water Stewardship Strategy (2010), NWT communities and Aboriginal governments highlighted the need to be more involved in and know more about water stewardship. As a result, the NWT-wide Community-based Monitoring (CBM) program was developed and sampling started in 2012. The goal of the monitoring program is to get communities involved in water stewardship and collect water quality monitoring information to answer community questions about water quality. The CBM Program is designed to allow community members to decide where to monitor water quality and to have community monitors collect samples.

There are over 40 water quality monitoring sites in the CBM program. Sampling at these sites is conducted by community members three to four times a year during the open water season (between June and October). GNWT-ENR staff supported the sampling by providing equipment, training, and other technical support. Many factors influence water quality, some are natural and some are from human activities.

Water quality varied across the NWT. Water quality can vary depending on the sources of water and its flow. Hydrocarbons and metals dissolved in water are more able to get into plants, bugs, and fish than those attached to dirt, so they are important to monitor. Fish reproduction and human health can also be affected by certain levels of dissolved hydrocarbons and metals. Hydrocarbons and metals usually stay attached to dirt unless things like the pH and temperature of the water changes. In some regions of the NWT, there is evidence that permafrost thawing, caused by climate warming, is affecting water quality.

Substances above the Canadian Council of Minsters for the Environment (CCME) guidelines for the protection of aquatic life most often included aluminum, iron, and copper. These metals often attach to dirt and total levels exceeded guidelines more often in waters with naturally high turbidity.

Hydrocarbon levels were highest in 2014 but have since come down to pre-2014 levels. Hydrocarbon levels at all sites remained well below values that would harm fish. In 2014, forest fires were very extensive which may be the cause of the increased PAH levels at that time.

Barren-ground Caribou Traditional Mapping and Analysis

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For years, the Yellowknives Dene First Nation (YKDFN) has recorded traditional knowledge (TK) of Elders, hunters, and plant gatherers onto maps through community-based projects. Unfortunately, most of this material has been difficult to access, being stored away in unfiled paper formats within the Lands Department or housed offsite with restricted access. These projects include important historical information on the barren-ground caribou and could, thus, inform current efforts to protect this threatened species. Our project aims to make past and current TK of barren-ground caribou available to YKDFN Lands and Environment, community members, researchers, regulators and decision-makers to improve understanding and monitoring

of caribou. Specifically, we focus on cultural, biophysical, and ecological aspects of the Bathurst caribou herd in the Chief Drygeese Territory. Using workshops, interviews, and interactive mapping to document TK, we: determine what TK can tell us about how, where, and why movement, migrations, and populations have changed over time; highlight indicators that YKDFN use to monitor the herd and how these indicators can assist in cumulative impact monitoring; and use this information to direct future on-the-land monitoring to support cumulative impact understanding and management.

Traditional Knowledge themes include caribou health, migration and population patterns, habitat and vegetation conditions, and local climate changes. Our broader objectives are to: bring together TK of caribou that has been recorded in the past; identify gaps in previously recorded TK using spatial, temporal, and contextual analyses; guide research using gaps identified by knowledge holders; make a public internet-based research tool that includes TK; explore partnerships with neighboring First Nations; and strengthen relationships between Elders and youth. The information from this project both works to fulfill the mandate of the CIMP, and is keeping with First Nations principles of Ownership, Control, Access, and Possession, and the vision and commitments set out by the United Nations Declaration on the Rights of Indigenous Peoples (Article 31).

We present our progress and findings for Year One and Two. In the last two years, we built a TK mapping database of past YKDFN TK research on caribou that was previously not available. This secure, data management system and GIS includes more than 40 years of 102 interview records linked to audio recordings, photographs, maps and transcripts, 62 community maps, and 47 land use surveys involving caribou. Yellowknives Dene members received training on how to digitize and enter information into the system, how to run searches on its information, and how to document on-the-land activities using a mobile app that is connected to the data management system. We made a public web portal, where YKDFN can manage, select, and publish information of their choosing. Based on identified research gaps, we discuss our objectives for Year 3—the final phase of the project.

Biological Adaptability of Great Slave Lake Fisheries Ecosystem

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Great Slave Lake (GSL) is a typical oligotrophic system, experiencing multiple vectors of natural and anthropogenic disturbance. Detection, assessment and predictions of the biological adaptability can be strategically promising and critically essential to understanding how the

subarctic great lake ecosystem service responds mechanically to resilience of the disturbance. Since 2011, a multidisciplinary survey, including limnology, zooplankton and benthos as well as fish and fisheries, has been taken in the main basin of GSL during June through mid-August. Through the field survey, the overarching objectives were 1) to establish baseline conditions and their variability, 2) to explore the effective indicators of cumulative changes, and 3) to characterize the aquatic productivity, biodiversity, and the environmental association with changing arctic climate.

During 2011-2016, the field survey has been conducted in a rotate format over Resolution Bay, Moraine Bay, Yellowknife Bay and Simpson Islands while the western basin of GSL has been surveyed every summer. Over six management areas and eight depth strata (20 m intervals), water temperature showed a consistent thermocline structure in 10-12 m below the surface, whereas turbidity changed by years when discharges from the Slave River were altered by water regulation and natural fluctuations of evaporation and precipitation. Copepods dominated zooplankton abundance, comprising 80% of all samples. Approximately 78 % of the total zooplankton density from all samples occurred in shallow sites (<20 m) and was negatively correlated to depth. Benthos was dominated by ostracods (mean ± SE; 599 ± 74 individuals/m^2) and amphipods (551 ± 47 individuals/m^2) which accounted for over 69% of the total density of benthic invertebrates, followed by oligochaetes, bivalves and chironomids. Among 387 effective gillnet settings, three coregonids, Lake Whitefish, Least Cisco and Lake Herring, dominated the multispecies community compositions. Spatial distribution of total fish abundance differed among management areas whilst significant difference in biomass density was found through depth stratified settings. Thus, site depth, temperature and turbidity have played in critical roles dictating the spatiotemporal dynamics and multispecies fisheries production in the lake.