



NWT Environmental Research and Monitoring Results Workshop: Dehcho Region



Summary Report

Fort Simpson, NT

January 19 & 20 2016

Contents

Executive Summary.....	3
1. Background.....	5
2. Presentations.....	7
Day 1.....	7
Day 2.....	11
3. Break out Group Discussions.....	14
1. What could be done to make research, monitoring and reporting more useful?	14
2. Are there different ways to better include Traditional Knowledge in research/monitoring?	16
Appendix A: Agenda.....	18
Appendix B: Attendee list	24
Appendix C: Evaluation Questionnaires.....	27
Appendix D: Project Abstracts	36

Executive Summary

The NWT Regional Environmental Monitoring Results Workshop: Dehcho Region was held in Fort Simpson, NT on January 19th and 20th 2016. The event was co-hosted by the Government of the Northwest Territories' NWT Cumulative Impact Monitoring Program (NWT CIMP), Dehcho First Nations and Wilfrid Laurier University.

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 Dehcho region
2. Provide a forum for discussion between researchers, communities and northern decision-makers. Feedback from these discussions to be used to improve related projects and programs.

The workshop examined research and monitoring conducted in the Dehcho Region and focused primarily on NWT CIMP-supported projects centered on caribou, water, and fish. Fourteen 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.

Sixty-eight people participated in the workshop with many additional individuals who partially attended. NWT CIMP provided funding for Dehcho community representatives to attend the workshop to promote information sharing with communities and decision-makers. The Dehcho First Nations 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.**

In addition to results presentations, discussions throughout the workshop were held on ways to make research, monitoring and reporting more useful as well as ways to better include Traditional Knowledge. Communities want to be more involved in monitoring (identifying local questions, training of local monitors, helping analyze data, communication etc.), which would build capacity. Communities want to be involved from the beginning planning of a project. It is important for these relationships to communicate with community members in plain language before, during, and after a project. It was noted that this approach is already occurring in the Dehcho region but more work needs to be done.

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 78% to 97%. This information is shared with presenters to help improve their future communications with communities and decision-makers.



Grand Chief Herb Norwegian addresses workshop participants.

***Dehcho K'ehodi means 'taking
care of the Dehcho'***

Dahti Tsetso, DFN

1. Background

The NWT Environmental Research and Monitoring Results Workshop: Dehcho Region was held in Fort Simpson, NT on January 19th and 20th 2016. The event was co-hosted by the Government of the Northwest Territories' NWT Cumulative Impact Monitoring Program (NWT CIMP), Dehcho First Nations and Wilfrid Laurier University. This was the fifth annual NWT environmental monitoring results workshop and the third 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 (industry, government, Aboriginal governments, community members, 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 2016 workshop examined research conducted in the Dehcho Region and focused primarily on NWT CIMP-supported projects centered on caribou, water, and fish. Fourteen 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.

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 Dehcho region
2. Provide a forum for discussion between researchers, communities and northern decision-makers. Feedback from these discussions to be used to improve related projects and programs.

Sixty-eight people (Appendix B) participated in the workshop with many additional individuals who partially attended. NWT CIMP provided funding for Dehcho community representatives to attend the workshop to promote information sharing with communities and decision-makers. The Dehcho First Nations 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.

During the evening of Day 1, workshop participants and the general public had the opportunity to attend an Open House to discuss various environmental research and monitoring projects in an informal setting while enjoying some local musical talent, beading and crafts, and light refreshments. Over 50 people attended the Coffee House/Open Mic night with all proceeds going to the Open Sky Creative Society.



Participants discussing the Mapping Exercise



2. Presentations

A total of 14 presentations were given over the two-day workshop. Each workshop participant was provided with an abstract volume 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.

The following section provides the title of the presentation, a link to its location on the NWT Discovery Portal, and a summary of the discussion that followed the presentation.

Day 1

Tuesday January 19, 2016

Dehcho K'ehodi

http://sdw.enr.gov.nt.ca/nwt dp_upload/Tsetso%20-%20Dehcho%20K'ehodi.pdf

Dahti Tsetso, Decho First Nations

- Key Messages: Dehcho K'ehodi means 'taking care of the Dehcho'
- The Dene Language is central to understanding the Dene Perspective
- Need to implement Dene Laws, Values and Principles
- Youth need to be on the land with Elders learning the Dene ways
- "Being on the land, protects the land"

The NWT Cumulative Impact Monitoring Program Regional Results in the Dehcho Region

http://sdw.enr.gov.nt.ca/nwt dp_upload/Kanigan%20-%20NWT%20CIMP.pdf

Julian Kanigan, NWT CIMP (GNWT-ENR)

- 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
- As directed by its Steering Committee, NWT CIMP currently focuses on caribou, fish and water. The program funding process has changed to include separate Traditional Knowledge and Scientific proposal guides.
- 25 projects funded in Dehcho since 1999 mostly related to 4 themes: boreal caribou, contaminants, development and landscape change
- Definition of cumulative impacts is complex. NWT CIMP uses definition from CCME

Presentation #1- Assessment of Critical Bull Trout Habitat in the South Nahanni Watershed

http://sdw.enr.gov.nt.ca/nwtdp_upload/1%20Mochnacz_Bull%20Trout%20movement%202015-01-18_ver2.pdf

Neil Mochnacz, Department of Fisheries and Oceans Canada

- How sensitive are bull trout to water quality changes?
 - on-going questions that can't be answered yet. However, when there are many impacts, a decline in population is evident. More monitoring of thresholds is needed.
- No data collected for genetic purposes (i.e. do male/female fish move differently?)
- Moving forward with this study, there are opportunities to incorporate TK at the outset to help start in the right direction.

Presentation #2 – Understanding and predicting fish mercury levels in the Dehcho region using models of bio-magnification and bio-accumulation

http://sdw.enr.gov.nt.ca/nwtdp_upload/2%20Swanson%20Fish%20mercury%20levels%20using%20models.pdf

Heidi Swanson, University of Waterloo

- Based on your research, what do fish scales tell us?
 - Many things such as helping determine age and type of growth like a tree ring
- It was mentioned that beavers are an invasive species and could be monitored locally. Elders note a change with more and more beavers over the years.



Presentation #3 – A watershed-scale sampling protocol for accurate distribution and trend assessment of stream salmonids in the Northwest Territories

http://sdw.enr.gov.nt.ca/nwtdp_upload/3%20Mochnacz_Stream%20Sampling%20Protocol_2015-01-07.pdf

Neil Mochnacz, Department of Fisheries and Oceans Canada

- This study could contribute to a larger regional-scale monitoring program – one that could feed into environmental assessments - would require funding and collaboration
- Bull trout is the best suited species to track change due to it being highly sensitive (vs. slimy sculpin). The effect on an ecosystem and the distribution patterns affects what species to monitor.

Presentation #4 - Boreal Caribou Collaring; Seasonal Range Use and Movement Patterns of Boreal Caribou in the Dehcho; Monitoring the Dehcho boreal caribou population

http://sdw.enr.gov.nt.ca/nwtdp_upload/4%20Larter_Boreal%20Caribou%20Ecology%20-%20final.pdf

Nic Larter, GNWT – Environment and Natural Resources

- Information from this project has been and continues to be used by decision makers (for baseline, range planning, land use planning, assessing candidate Protected Areas, wildfire action planning etc.)
- Need to work together with all partners to help understand population trends in order to make harvest level decisions?

Presentation #5 – Impacts of wildfire extent and severity on caribou habitat: from woodland to barren ground

[http://sdw.enr.gov.nt.ca/nwtdp_upload/5%20Baltzer_\(PORTAL\)%20Wildfire%20Impacts%20on%20caribou%20habitat.pdf](http://sdw.enr.gov.nt.ca/nwtdp_upload/5%20Baltzer_(PORTAL)%20Wildfire%20Impacts%20on%20caribou%20habitat.pdf)

Jennifer Baltzer, Wilfrid Laurier University

- Why are results different than in Alaska?
 - Many reasons including the density of soil in the NWT is higher. Fires get 'stuck' in low-lying levels.
- What is probability of permafrost returning and the impacts to caribou?
 - mapping session before and after regrowth gives us a better understanding over time. Therefore, monitoring that now to get answers in future.



***“Traditional Knowledge is
who we are, where we came
from and what we’re made
of”***

-Grand Chief Norwegian

Presentation #6 – Update on Range Planning for Boreal Woodland Caribou

[http://sdw.enr.gov.nt.ca/nwtdp_upload/6%20Elkin%20\(Hodson\)%20Boreal%20caribou%20range%20plans.pdf](http://sdw.enr.gov.nt.ca/nwtdp_upload/6%20Elkin%20(Hodson)%20Boreal%20caribou%20range%20plans.pdf)

Brett Elkin, GNWT – Environment and Natural Resources, Wildlife Division (on behalf of James Hodson)

- How can impacts from fire be incorporated?
 - Initiative is long-term but can reassess (re-evaluate in 5 years) and incorporate as needed.
 - Projecting fire patterns is a challenge (need to evaluate and predict). Further discussion required.
- Involvement of Parks Canada needed in future discussion to discuss policies (when/how they decide to let fires burn)
- There was discussion on explaining/clarifying the calculations used to determine critical habitat areas

EVENING OPEN HOUSE:

From 6:00-8:30 pm, workshop participants and the general public had the opportunity to discuss various environmental research and monitoring projects in an informal setting while enjoying some local musical talent, beading and crafts, and light refreshments. Over 50 people attended the Coffee House/Open Mic night with all proceeds going to the Open Sky Creative Society.

Day 2

Wednesday January 20, 2016

Presentation #7 – Developing a Community Based Aquatic Research and Monitoring Program

http://sdw.enr.gov.nt.ca/nwtdp_upload/7%20Low%20Developing%20a%20community%20based%20aquatic%20program.pdf

George Low, AAROM Dehcho First Nations

- Very limited time allocated for questions however, it was noted that a significant amount of TK goes into this project and it would be good to share this information to the communities

Presentation #8 – Investigating the cumulative effects of environmental change and human activity in the Tathlina watershed (Mike Palmer and Melaine Simba)ENR-KTFN

http://sdw.enr.gov.nt.ca/nwtdp_upload/8%20Simba%26Palmer%20Tathlina%20watershed.pdf

Mike Palmer, and Melaine Simba, Ka'a'gee Tu First Nation

- Cameron Hills fracking; none of the lakes tested had wells adjacent to them that were fracked

Presentation #9 – Mackenzie River Basin Transboundary Bilateral Water Management Agreements: Progress Update

http://sdw.enr.gov.nt.ca/nwtdp_upload/9%20Faria%20Mackenzie%20River%20Transboundary%20Water%20Agreements%20Progress%20Update.pdf

Derek Faria – GNWT Environment and Natural Resources

- How are concerns related to spills addressed when the impact is outside of the spill area?
 - Agreements fall into responsibilities of each jurisdiction. Therefore, some are outside of the NWT. Concerns should be address/forwarded to GNWT since it is their agreement. Can also talk to Tim Heron, (Aboriginal representative)

- Sam Gargon requested follow-up and a presentation on these Agreements be made to Fort Providence

Presentation #10 – Landscape Scale Flooding in the Great Slave Lake Plain

http://sdw.enr.gov.nt.ca/nwtdp_upload/10%20Elkin%20%28Armstrong%29%20Landscape%20scale%20flooding%20in%20the%20GSL%20Plain.pdf

Brett Elkin, GNWT – Environment and Natural Resources, Wildlife Division (on behalf of Terry Armstrong)

- It was noted that science sometimes duplicates what people already know (TK). The approach should be to find out what people already know and move on from that. Traditional Knowledge confirms the 30-35 year cycles, but are only 20yrs into the current cycle

Presentation #11 – The Scotty Creek Research Station: Overview of past and present activities, and plans for the future

http://sdw.enr.gov.nt.ca/nwtdp_upload/Quinton_Scotty%20Creek%20Research%20Station.pdf

Bill Quinton, Wilfrid Laurier University

- Is the thaw of 10 metres in 8 years deemed as a natural disaster? This limits and shortens access for trappers who should receive compensation. Can science confirm this and will the thaw get worse?
 - Not sure. Can provide some information like once a seismic line is cut, the permafrost is affected forever. The information confirms what is happening. Hard to predict future given natural changes – need team expertise.
- What are impacts of mercury leaching?
 - Initial mercury studies underway but no results yet.
- What are impacts on caribou habitat (specifically lichen)?
 - Don't know – access (seismic lines) used by caribou. Forest transforms to a wetland. Trees do come back but succession takes a long time.
- What is mitigation for logging for land management?
 - Logging makes compacted soils which is wetter and holds higher energy (not great for regrowth).

Presentation #12 – Inventory of Landscape Change: Tracking human activity throughout the NWT

http://sdw.enr.gov.nt.ca/nwtdp_upload/12%20Palmer%20%20Inventory%20of%20Landscape%20Change.pdf

Mike Palmer, NWT CIMP

- Communities have been trying to build local and regional capacity in GIS but need funding for participation. The GNWT should develop a sharing agreement for a GIS specialist for each community
- Example provided of the high resolution maps developed by the DCLUPC 10 years ago
- Encouraged to see this information being made available. Boards have capacity issues too for GIS. Encourages the GNWT Geomatics to make information available to the public.



Mike Palmer (NWT CIMP) presenting the 'Inventory of Landscape Change'

3. Break out Group Discussions

Throughout the workshop, interactive discussions (Talking Circles) were held to generate understanding of monitoring concepts and gather feedback on presented projects. The following section summarizes these discussions. The ideas of all workshop participants are represented, and do not necessarily reflect the opinions of NWT CIMP. Feedback on projects was taken by researchers who were present at the workshop and will be used to inform their future monitoring efforts.

1. What could be done to make research, monitoring and reporting more useful?

Relationship Building and Capacity

- Research and monitoring are based on relationships so best to engage early and establish relationships first (Assembly, K'ehodi gatherings, AAROM, etc.)
- Keep strengthening connections, partnership and relationships
- Understand questions and values of importance
- Build in cross-cultural opportunities (during field work, before Assembly)
- Capitalize on opportunities to take part in meetings, workshops, field work etc.
- Make clear expectations both ways (of researchers and communities)
- Reduce duplication (no need to confirm if TK is validated)
- Planning is important now due to climate warming
- Create core funding positions from existing funding sources (IRMA, CIMP, AAROM)
- Need consistent funding
- Need more local training
- Better understanding of Dene values
- Coordination through AAROM network
- Come prepared to engage positively
- Frame engagement as 'healing' perspective -awareness of people/communities (impact of past)
- Share awareness/perspective to communities
- Inclusion/capacity for social science (TK Policy etc.)

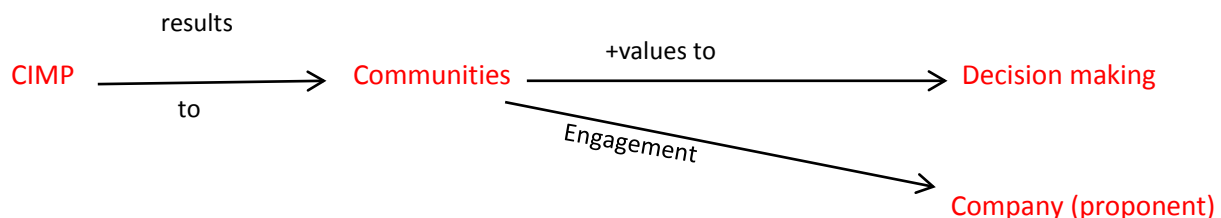
Research and Monitoring

- Need for consistency, regional framework, standard methods (comparable)
- Must be community driven and implemented (capacity, training)
- Plan for life of project to determine how long to monitor
- Reduce replication and make publicly accessible
- 100% ownership and tracking of recommendations (link to ARI?)

- Define purposes
 - understand natural systems to help predict and plan
 - inform public and SHARE
 - satisfy CIMP priorities
 - baseline (investigate observations of land users)
 - address questions/concerns about development
- Better and common understanding up front of:
 - How to use/apply results
 - Defining what the question/problem is
 - Coordinate questions among communities, government and universities
- Culture and communities should drive research as people are most impacted
- Coordinate priorities between communities and take initiative to USE results
- Prioritize and transfer knowledge to youth
- Leverage community monitors (trained for regional monitoring)
- Identify local (community-specific) values and priorities

Reporting

- Reporting tools vary per region/community
- Develop a communication strategy that is early, with all partners and include strong and meaningful reporting
- Need a full cycle of information (must be useful/available for decision-making)
- Discuss and decide upon what information is useful
- Don't overload researcher – help find easy and fast ways of keeping communities informed
- Need for plain language (have technical person available to explain results)
- Need instructions to researchers on how to communicate
- Need information to be able to influence decision-making
- Need for Terminology (e.g. Scientific 'dictionaries' in Dene Zhatie and plain language)
- Effective forums and formats (communities to provide direction to researchers on what is best for them)
 - Posters, Community radio, Web portals/websites etc.
- Inform Land Use Planning Committee, various Boards
- Consistency in reporting (participants, relationships, thought out the project)
- Plain language...technical person/researcher needed to explain and interpret
- Community participants can report to communities
- Help put results in context of other programs (connections, issues, claims, LUP, development)
- Ensure reporting is timely and accessible
- Full Cycle of information usage:



- Key TK indicators developed by community members
- Seek regional help communicating (ie. DFN regional announcements, etc.)
- Increase educational opportunities at local levels (research centers, conservation centers, labs, northern university that include local and southern researchers etc.)
- Use pictures/diagrams to communicate

2. Are there different ways to better include Traditional Knowledge in research/monitoring?

- TK is a lifestyle and has a spiritual component. Can't read about it – must learn it by living it. or while doing a TK activity
- TK perspective is relationship with the land and its people.
- TK should stand on its own and no need validation
- How (and who) the language is transmitted is important
- Validate existing TK agreements, policies, templates etc.
- If/once TK is validated, a broader program should be established (not just project by project). Who would fund such a long-term TK program? (not CIMP only) Must be based on the land and living it.
- Take a humble approach and take it SLOW!
- Learn through observation – we have been monitoring forever and it is everyone's responsibility to take care of the lands, water and animals.
- TK equals who we are, where we came from and what we're made of.
- Bring Dene Place Names onto one map (extensive work through the DCLUPC exists so need to build from that)
- TK can help save time by helping to identify where to sample/monitor
- Dene language contains important values to understand
- Level of comfort is key (especially around industrial projects) which takes relationship building over time
- Need a dedicated TK research program for each region (not just an add-on) that needs adequate funding
- Communities could alert researchers WHO has TK about particular places
- What if TK was accepted as truth? – monitoring follows from there – use TK was of monitoring (instead of science to verify TK)
- TK should be complementary, not duplication (eg. Presence/absence of fish where people regularly fish -use science where people don't go often)
- Sometimes science used to investigate concerns raised through TK

- Communication between scientists and TK holders is improving
- Most success when use TK as base for questions and keep revisiting
- Would help if more researchers are based in communities (vs. southern universities) – rules are barrier
- Invite TK holders into camp while research being designed – early collaboration
- Host more TK engagement workshops (TK is focus – invite researchers, youth/descendants of TK holders)
- Community has role – training and mentoring youth in TK research and knowledge
- CIMP should move away from project-based to program-based (develop guiding frameworks from both scientific and TK points of view. Identify parameters or questions)
- CIMP already bringing scientific projects together into longer term programs- do similar things with TK
- Peer review TK- regional and local scale (language based)
- Need funding for rigorous on the land TK learning programs (parallel to science degree) or at least fund smaller scale TK mentorship on the land.
- Difficult to design what a TK monitoring program actually looks like in practice (ard to understand unless you live it)
- Big loss of TK with loss of language - connection with the land is powerful
- Ensure effective TK Sharing Agreements are in place
- How to navigate different TK-sharing agreements between communities (e.g. NIRB has a TK navigator, this would be an idea for CIMP)
- Would be nice to have TK observations recorded (need more thought about how to incorporate in methodology)
- Create an opportunity for science and TK holders to work together before presentation as part of a meeting
- Who has the skills to do TK studies? Where are the resources? (local and academic)
- Develop a ‘dream checklist’ of how to incorporate TK
- Sometimes TK and science are 2 separate paths
 - This can change over time as relationships evolve.
 - Need to better fund studies (e.g. pool resources? Industry and govt. a regional study?)
- TK database would be useful, even if not specific or attributable (e.g. KIA, YKDFN and Sahtu databases)
- Have a research mentor for new researcher in a region or list someone on proposal has worked in the region before
- TK liaison house with Aurora Research Institute?

Appendix A: Agenda



AGENDA

NWT Environmental Research and Monitoring Results Workshop: Dehcho Region

January 19th – 20th, 2016

Recreation Centre, Fort Simpson, NT

The Government of the Northwest Territories (GNWT)'s NWT Cumulative Impact Monitoring Program (NWT CIMP), the Dehcho First Nations (DFN) and Wilfrid Laurier University (WLU) are partnering to host the a regional Environmental Research and Monitoring Results workshop.

OBJECTIVES:

The 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 Dehcho region
- Provide a **forum for discussion** between researchers, communities and northern decision-makers. Feedback from these discussions to be used to **improve related projects and programs**.

INFORMATION:

Copies of presentations, abstracts and other relevant materials will be provided and will be available on the NWT Discovery Portal:

<http://nwtdiscoveryportal.enr.gov.nt.ca:8080/geoportal/catalog/main/home.page>

For additional workshop details, please contact Meredith Seabrook at 867-767-9233 ext. 53086 or email nwtcimp@gov.nt.ca

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AGENDA

NWT Environmental Research and Monitoring Results Workshop: Dehcho Region

Tuesday, January 19th - DAY 1

Time	Activity	Lead
8:30 am	Coffee and Mingling Registration	
9:00 am	Welcome, Opening Prayer and Introductions	Facilitator – Shauna Morgan
9:15	Dehcho K’ehodi	Dahti Tsetso (DFN)
9:45	Talking Circles (small break-out groups) <ul style="list-style-type: none"> Mapping Exercise : <i>Identifying important community land use areas, research and monitoring project areas, seasonal considerations, areas undergoing landscape change and Dene Zhatie place names</i> Discuss gaps and opportunities for partnerships 	Facilitator – Shauna Morgan
10:15 – 10:30	Summary of Talking Circles as a Full Group	Facilitator – Shauna
10:30- 10:45	BREAK	
10:45	About the NWT Cumulative Impact Monitoring Program: Impact on Resource Decision-Making <ul style="list-style-type: none"> Q & A 	Julian Kanigan (GNWT-CIMP) Dahti Tsetso (DFN CIMP SC member)
11:45- 12:30 pm	LUNCH (provided)	
12:30 pm	Fish Projects: <ul style="list-style-type: none"> <i>Presentation #1- Assessment of Critical Bull Trout Habitat in the South Nahanni Watershed</i> <i>Presentation #2- Understanding and predicting fish mercury levels in the Dehcho region using models of bio-magnification and bio-accumulation</i> 	Neil Mochnacz (DFO) Heidi Swanson (University of Waterloo)

	<ul style="list-style-type: none"> <i>Presentation #3 – A watershed-scale sampling protocol for accurate distribution and trend assessment of stream salmonids in the Northwest Territories</i> 	Neil Mochnacz (DFO)
1:45 – 2:30 pm	<p>Talking Circles</p> <ul style="list-style-type: none"> 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? Is there a different way to do this research starting from a TK perspective? 	Facilitator – Shauna
2:30 – 2:45	Summary of Talking Circle as a Full Group	Shauna
2:45-3:00	BREAK	
3:00 pm	<p>Caribou Projects:</p> <ul style="list-style-type: none"> <i>Presentation #4 – Boreal Caribou Collaring; Seasonal Range Use and Movement Patterns of Boreal Caribou in the Dehcho; Monitoring the Dehcho boreal caribou population</i> <i>Presentation #5 – Impacts of wildfire extent and severity on caribou habitat: from woodland to barren ground</i> <i>Presentation #6 –Boreal Caribou Range Planning</i> 	<p>Nic Larter – GNWT ENR</p> <p>Jennifer Baltzer – Wilfrid Laurier University</p> <p>Brett Elkin –GNWT ENR</p>
4:15 pm	<p>Talking Circles</p> <ul style="list-style-type: none"> Making the research and reporting more useful Opportunities for better coordination TK perspectives 	Facilitator – Shauna
4:45 – 4:55	Summary of Talking Circle as a Full Group	Shauna
4:55 – 5:00 pm	Wrap up and Closing Prayer	Facilitator – Shauna

Evening Coffee House (6:00 – 8:00 pm)

Meet & Greet, poster session, local fiddling talent, refreshments for sale (proceeds to Open Sky Creative Society)..... Public welcome!

AGENDA

NWT Environmental Research and Monitoring Results Workshop: Dehcho Region

Wednesday, January 20th - DAY 2

8:30 am	Coffee and Mingling Registration	
9:00 am	Welcome and Opening Prayer	Facilitator – Shauna
9:10 am	Water Projects: <ul style="list-style-type: none"> <i>Presentation #7 – Developing a Community Based Aquatic Research and Monitoring Program</i> <i>Presentation #8 – Investigating the cumulative effects of environmental change and human activity in the Tathlina watershed</i> <i>Presentation #9 – Mackenzie River Basin Transboundary Bilateral Water Management Agreements: Progress Update</i> 	George Low DFN) Mike Palmer (GNWT-CIMP) and Melaine Simba (KTFN) Derek Faria (GNWT Water Resources)
10:25- 10:45	BREAK	
10:45 am	Talking Circles <ul style="list-style-type: none"> Making the research and reporting more useful Opportunities for better coordination TK perspectives 	Facilitator – Shauna
11:30 – 11:45	Summary of Talking Circle as a Full Group	Shauna
11:45 - 12:30 pm	LUNCH (provided)	
12:30 pm	Related Projects: <ul style="list-style-type: none"> <i>Presentation #10 - Landscape Scale Flooding in the Great Slave Lake Plain</i> <i>Presentation #11 – The Scotty Creek Research Station: Overview of past and present activities, and plans for the future</i> 	Brett Elkin (GNWT) Bill Quinton (WLU)

	<ul style="list-style-type: none"> • <i>Presentation #12 – Inventory of Landscape Change: Tracking human activity throughout the NWT</i> 	Mike Palmer (GNWT-CIMP)
1:45 pm	Talking Circles <ul style="list-style-type: none"> • Making the research and reporting more useful • Opportunities for better coordination • TK perspectives 	Facilitator - Shauna
2:30 – 2:45	Summary of Talking Circle as a Full Group	Shauna
2:45-3:00	BREAK	
3:00 pm	<i>“Weaving the Threads Together”</i> <ul style="list-style-type: none"> • Synthesis of key themes • Dehcho K’ehodi priority setting in context of monitoring partnerships • Relationship between CIMP & Dehcho K’ehodi (similarities, differences and moving forward) 	Shauna (plenary and break-out caucuses)
4:45 pm	Wrap-Up, Closing Comments and Closing Prayer	Facilitator

Mahsi Cho!

Thank you for participating

Appendix B: Attendee list

Name	Organization	e-Mail
1 Albert Clille	PKFN	
2 Allen Bonnetrouge	LKFN	
3 Allen Bouvier	DCLUPC	denecarlito@gmail.com
4 Bill Quinton	WLU	wquinton@wlu.ca
5 Brett Elkin	GNWT - ENR	Brett_Elkin@gov.nt.ca
6 Brett Wheler	MVEIRB	bwheler@reviewboard.ca
7 Brian Branfireun	U of W	bbranfir@uwo.ca
8 Brian Laird	U of W	
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Legend

CIMP SC - Cumulative Impact Monitoring Program Steering Committee

DCLUPC (Dehcho Land Use Planning Committee)

DFN - AAROM (Dehcho First Nations - Aboriginal Aquatic Resources and Oceans Management)

DFN (Dehcho First Nations)
DFO - Department of Fisheries and Oceans Canada
DGDB (Deh Gah Gotie First Nation)
EC (Environment Canada)
FPMC (Fort Providence Metis Council)
FSMC (Fort Simpson Metis Council)
GNWT - ENR (Government of the Northwest Territories - Environment and Natural Resources)
GTC (Gwich'in Tribal Council)
IJS (Inuvialuit Game Council)
JMRFN (Jean Marie River First Nation)
KFN (Katlodeeche First Nation)
KTFN (Ka'a'gee Tu First Nation)
LKFN (Liidlíi Kue First Nation)
MVEIRB (Mackenzie Valley Environmental Impact Review Board)
MVLWB (Mackenzie Valley Land and Water Board)
NBDB (Nahanni Butte Dene Band)
NSMA (North Slave Metis Alliance)
NWTMN (Northwest Territory Metis Nation)
PC (Parks Canada)
PKFN (Pehdzeh Ki First Nation)
SKDB (Sambaa K'e First Nation)
SSI (Sahtu Secretariat Incorporated)
TG (Tlicho Government)
U of W (University of Waterloo)
WLU (Wilfrid Laurier University)
WPFN (West Point First Nation)

Appendix C: Evaluation Questionnaires

NWT Environmental Research and Monitoring Results Workshop – Dehcho Region

Participant Evaluation Tool – Day 1 (Tuesday, January 19th)

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 ☐ NGO/Not-for-profit
☐ Industry ☐ 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.

Dehcho K'ehodi: Dahti Tsetso (DFN)

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

Introduction/CIMP Context: Julian Kanigan (GNWT-CIMP) and Dahti Tsetso (DFN) About the NWT Cumulative Impact Monitoring Program: 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 1: Neil Mochnacz (DFO) Assessment of critical bull trout habitat on the South Nahanni watershed

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

Presentation 2: Heidi Swanson (U of Waterloo) Understanding and predicting fish mercury levels in the Dehcho region using models of bio-magnification and bio-accumulation

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

Presentation 3: Neil Mochnacz (DFO) A watershed-scale sampling protocol for accurate distribution and trend assessment of stream salmonids 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

Presentation 4: Nic Larter (GNWT) Boreal caribou collaring; seasonal range use, movement patterns and population monitoring in the Dehcho region

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

Presentation 5: Jennifer Baltzer (WLU) Impacts of wildfire extent and severity on caribou habitat: from woodland to barren ground

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

Presentation 6: Brett Elkin (GNWT) Boreal Caribou Range Planning

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 Dehcho.

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 CIMP projects and workshops.

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

We welcome any additional comments or suggestions:

Mahsi Cho

Thank you for your participation and input!

NWT Environmental Research and Monitoring Results Workshop – Dehcho Region

Participant Evaluation Tool – Day 2 (Wednesday, January 20th)

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 ☐ NGO/Not-for-profit
☐ Industry ☐ 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: George Low (DFN) Developing a community-based aquatic research and monitoring program

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

Presentation 8: Mike Palmer (GNWT-CIMP) and Melaine Simba (KTFN) Investigating the cumulative effects of environmental change and human activity in the Tathlina watershed

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

Presentation 9: Derek Faria (GNWT) Mackenzie River Basin Transboundary Bilateral Water Management Agreements: Progress Update

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

Presentation 10: Brett Elkin (GNWT) Landscape scale flooding in the Great Slave Lake Plain

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

Presentation 11: Bill Quinton (WLU) The Scotty Creek Research Station: Overview of past and present activities, and plans for the future

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

Presentation 12: Mike Palmer (GNWT-CIMP) Inventory of Landscape Change: Tracking human activity throughout the NWT

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. Was the 'Weaving the Threads' discussion and Dehcho K'ehodi priority-setting exercise useful to you?

1	2	3	4	5
Not useful		Somewhat useful		Very useful

4. 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
----------------------------	--------------	--------------------------

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

1	2	3	4	5
Poor quality		Adequate quality		Excellent quality

6. 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 Dehcho.

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 CIMP projects and workshops.

1

2

3

4

5

Did not meet

Partially met

Fully met

We welcome any additional comments or suggestions:

Mahsi Cho

Thank you for your participation and input!

Appendix D: Project Abstracts

**Northwest Territories Environmental Research and
Monitoring Results Workshop: Dehcho Region
January 19-20, 2016**



Abstract Volume



Cover Photograph

Cameron River, Cameron Hills, NWT;
Krista Chin, NWT CIMP

Compiled by C. Marchildon

Recommended Citation:

Marchildon, C. (compiler), 2016. NWT Environmental Research and Monitoring Results Workshop:

Table of Contents – Ordered by Author (*denotes presenter)

Climate-Driven Habitat Change: Causes and Implications of Rapidly Expanding Lakes in the Great Slave Lake Plain and Lowlands Armstrong, T. , Elkin*, B., Pisaric, M., de Montigny, P., Thienpont, J., Korosi, J., Perrault, J., Wesche, S., Kokelj, S., Condon, W., van der Wielen, S.	4
Impacts of wildfire extent and severity on caribou habitat: from woodland to barren ground Baltzer*, J. , Cumming, S., Day, N., Johnstone, J., McIntire, E., Schmiegelow, F and Spring, A.	5
Update on Transboundary Water Management Agreements Faria*, D. and Czarnecki, A.	6
Update on Range Planning for Boreal Woodland Caribou Hodson*, J. , Wilson, J., Smith, A., Larter, N., McLaren, A., Elkin, B.	6
NWT CIMP Regional Results in the Dehcho Region Kanigan*, J.	7
Ecology of Boreal Caribou of the Dehcho Region, NWT Larter*, N.C. and Allaire, D.G.	8
Developing a Community Based Aquatic Research and Monitoring Program Low*, G. , Low, J.M.	9
Assessment of Critical Bull Trout Habitat in the South Nahanni Watershed Mochnacz*, N.J. , M. Sutor, J. L. Larter, C.C. Barth, L. Brekke, D. Tate, and J.D. Reist.....	10
A Watershed-Scale Sampling Protocol for Distribution and Trend Assessments of Stream Salmonids in the Northwest Territories Mochnacz*, N.J. , Teleki, D., Maier, K., Lewis, B., Docker, M., Reist, J.D., Cott, P.A., and Isaak, D.	11
The NWT Inventory of Landscape Change: a web-accessible platform for viewing and managing natural and human disturbance information Palmer*, M. , McPherson, J., Laing, I., and Kirizopolous, E.	12
Understanding the impacts of environmental change and human development in the Tathlina watershed	

Simba* , M., Palmer* , M., Korosi, J., Coleman, K., Stewart, E., Thienpont, J., Low, G., Low, M., Chin, K., Lister, A., MacLatchy, D., Smol, J., Blais, J., and Chief Lloyd Chicot	13
Understanding and predicting fish mercury levels in the Dehcho region using models of biomagnification and bioaccumulation	
Swanson* , H., Low, G., Low, M., Branfireun, B.	14
Dehcho K'ehodi	
Tsetso* , D.	15
The Scotty Creek Research Station: Overview of past and present activities, and plans for the future	
Quinton* , W. Adams, J., Baltzer, J., Berg, A., Chasmer, L., Craig, J., Hayashi, M., Kurylyk, B., Sonnentag, O., Tank, S.	15

Climate-Driven Habitat Change: Causes and Implications of Rapidly Expanding Lakes in the Great Slave Lake Plain and Lowlands

Armstrong, T.¹, Elkin*, B.¹, Pisaric, M.², de Montigny, P.³, Thienpont, J.⁴, Korosi, J.⁴, Perrault, J.³, Wesche, S.⁵, Kokelj, S.⁶, Condon, W.⁷, van der Wielen, S.⁷

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This project was initiated to find answers to questions raised by the community and resource managers about the causes of recent increases in levels of ponds and lakes in the Great Slave Lake Plain and Lowlands area between the Mackenzie River, Great Slave Lake and the Horn Plateau, and the effects of high water levels on wildlife. In order to understand the factors and effects of recent increases in lake levels, we took an approach combining multiple sources of knowledge.

We analysed satellite images and aerial photographs of the study area to measure the extent and timing of changes in water levels in lakes. The area covered by lakes increased by more than 500 km² and covered 11% of the study area by 2011 (5.7% in 1986). High water levels since the mid-1980s flooded lake margins and reduced the amount of grazing habitat for bison. These changes may have caused changes in how bison used these habitats and to move to other parts of their range. Traditional knowledge informed the study about wet and dry periods over the past century and how changing snow depths affected wildlife and travel on the land. Tree ring data confirmed the oral history of wet and dry periods over the past century and that local weather was related to changes in lake levels. Lake sediment core data showed that recent flooding was greater than at any previous time within the past 300 years. Changes in water levels between years were significantly correlated with the Pacific/North American anomaly, a large, regional weather pattern.

http://sdw.enr.gov.nt.ca/nwtdp_upload/10%20Elkin%20%28Armstrong%29%20Landscape%20scale%20flooding%20in%20the%20GSL%20Plain.pdf

Impacts of wildfire extent and severity on caribou habitat: from woodland to barren ground

Baltzer*, J¹, Cumming, S², Day, N¹, Johnstone, J³, McIntire, E⁴, Schmiegelow, F⁵ and Spring, A¹

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Ground-dwelling lichens are an important food source in winter for both barren ground and boreal caribou. Lichens are flammable when dry and are usually destroyed when a wildfire burns through an area. The amount of loss will depend on the intensity of the fire. Local shortages of food following wildfires are probably why both kinds of caribou avoid recently burned areas, but lack of refuge from predators or increased abundance of moose may also be factors. Shortages of lichen forage may be temporary, because plant communities regenerate. Unfortunately, we don't know how long this takes, as we have limited information about how quickly key habitat resources, especially caribou forage, recover after fire. To make matters worse, burned areas don't necessarily come back as they were. Black spruce/lichen forest, for example, sometimes

regenerates to deciduous forest where lichen does not grow, or to tundra-like vegetation. We don't know in detail how often this happens, or whether it happens in the NWT, but warmer and dryer climates may make alternate "successional trajectories" more likely, and also more frequent because of increased burning. Fires, including large fire years like 2014, are natural events in these ecosystems. In recognition of this, a priority action identified in the GNWT document "Caribou Forever" is to "manage habitat in relation to forest fires and land use activities". This remains challenging because caribou habitat arises from the interaction between fire and vegetation dynamics. Because of our incomplete knowledge, we can't predict how much caribou habitat there will be in the future, or where it might be found. Accordingly, the impact of fire on caribou habitat remains a central outstanding research question, which is the focus of this research program.

The purpose of this presentation is to provide an overview of the progress made toward closing these knowledge gaps. Specifically, we will report on the 2015 field season during which a network of 230 permanent sample plots was established throughout Dehcho and Tłı̄cho lands affected by the 2014 fires. The goal of these plots was to improve our understanding of successional trajectories following the largest fire season on record. Preliminary results from this field season will be presented as well as an overview of plans for the coming field seasons. The results from this three-year project have direct implications for forest and wildlife management in the face of changing boreal fire regimes.

[http://sdw.enr.gov.nt.ca/nwtdp_upload/5%20Baltzer \(PORTAL\)%20Wildfire%20impacts%20on%20caribou%20habitat.pdf](http://sdw.enr.gov.nt.ca/nwtdp_upload/5%20Baltzer%20(PORTAL)%20Wildfire%20impacts%20on%20caribou%20habitat.pdf)

Update on Transboundary Water Management Agreements

Faria*, D.¹ and Czarnecki, A.¹

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Andrea.Czarnecki@gov.nt.ca

Several departments of Canada's federal, provincial and territorial governments with jurisdiction in the Mackenzie River basin completed signing of the Mackenzie River Basin Transboundary Waters Master Agreement in 1977. The main purpose of this historical agreement is to establish common principles for the cooperative management of the water resources in the Mackenzie River Basin in a manner consistent with the maintenance of the ecological integrity of the aquatic ecosystem. The Master Agreement provides for creation of Bilateral Water Management Agreements through bilateral and multilateral negotiations using established common principles. This presentation provides a brief update on progress made toward signing and implementation of Bilateral Water Management Agreements between NWT and its neighbouring jurisdictions under the Mackenzie River Basin Transboundary Waters Master Agreement.

http://sdw.enr.gov.nt.ca/nwtdp_upload/9%20Faria%20Mackeznie%20River%20Transboundary%20Water%20Agreements%20Progress%20Update.pdf

Update on Range Planning for Boreal Woodland Caribou

Hodson, J.¹, Wilson, J.¹, Smith, A.¹, Larter, N.¹, McLaren, A.¹, Elkin, B.¹

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Boreal Woodland Caribou are listed as a threatened species under the federal *Species at Risk Act*. The national “Recovery Strategy for Woodland Caribou, Boreal population, in Canada”, released in October 2012, provides a definition of critical habitat that is necessary for the survival and recovery of this species. For boreal caribou, critical habitat requires maintaining a minimum of 65% of their range as undisturbed habitat and that these areas provide the biophysical attributes that caribou require to carry out their life processes. The Recovery Strategy tells us how much undisturbed habitat must be protected as critical habitat. Range plans need to be developed that outline where critical habitat is located and how it will be protected. ENR is proposing to divide the NWT range plan by administrative and land claim regions. When combined, the total area of critical habitat identified in each regional plan must add up to at least 65% of the entire range. Important areas for boreal caribou identified based on local knowledge from community members will be used as a primary source of information in developing the range plans. These areas will be used to select patches of undisturbed habitat for potential designation as critical habitat in the range plan. ENR has held meetings with 9 communities in the Dehcho and South Slave regions to date. An overview of the proposed approach for using community-based information in combination with collar data and other spatial habitat data to delineate areas of critical habitat will be presented.

[http://sdw.enr.gov.nt.ca/nwtdp_upload/6%20Elkin%20\(Hodson\)%20Boreal%20caribou%20range%20plans.pdf](http://sdw.enr.gov.nt.ca/nwtdp_upload/6%20Elkin%20(Hodson)%20Boreal%20caribou%20range%20plans.pdf)

NWT CIMP Regional Results in the Dehcho Region

Kanigan, J.

NWT Cumulative Impact Monitoring Program, Government of the Northwest Territories

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The Northwest Territories Cumulative Impact Monitoring Program’s (NWT CIMP) mandate 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 1999-2015 in the Dehcho Region.

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 Tlicho 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 Dehcho First Nations sit as an observer on the Steering Committee with a standing invitation to become a full member at any time. 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 land and water boards, review boards and renewable resource boards. In the Dehcho Region, regional and community organizations are consulted in lieu of a renewable resource board. The program strives to include communities in as many aspects of cumulative impact monitoring as possible.

NWT CIMP has supported 25 individual projects in the Dehcho Region since 1999. Most projects have been related to caribou, water, fish, and capacity building. Generally, projects have been short-term, lasting one to two years, reflecting the short-term funding cycle of NWT CIMP. However, with increased, stable funding in the last five years, NWT CIMP has supported several longer-term monitoring projects, including a nine year study of boreal caribou, and a five year study of the cumulative impacts of human and natural disturbance in the Tathlina watershed.

Four main themes have emerged from NWT CIMP-supported projects in the Dehcho Region, which likely reflect environmental concerns of community members. The themes include boreal caribou, contaminants, development, and landscape change. NWT CIMP has contributed significant baseline information and increased knowledge in each of these subject areas. 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.

http://sdw.enr.gov.nt.ca/nwtdp_upload/Kanigan%20-%20NWT%20CIMP.pdf

Ecology of Boreal Caribou of the Dehcho Region, NWT

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In response to the new federal Species at Risk Act (SARA), a request from Sambaa K'e Dene Band (SKDB) of Trout Lake and extensive consultation between the Department of Environment

and Natural Resources (ENR), Dehcho Region and SKDB an ecological study of boreal caribou in the Trout Lake traditional area was initiated in spring of 2004 with the deployment of ten satellite collars on adult female boreal caribou. SKDB saw the benefits of combining information from this study with their own traditional knowledge study (Yúndíit'qh TEK study) to fill information gaps about boreal caribou, and in supporting the Sambaa K'e Candidate Protected Area. In subsequent years, other First Nations saw the benefits of having collared caribou in their traditional areas. The number of First Nations partners increased to include Fort Simpson Métis Local, the Denendeh Harvesters Committee of Lı́ıdlı́ Kúé First Nation (Fort Simpson), the Fort Simpson Métis Local, Jean Marie River First Nation, Pehdzeh Ki First Nation (Wrigley), Nahanni Butte Dene Band, Acho Dene Koe Band (Fort Liard), and Ka'a'gee Tu First Nation (Kakisa).

From 2004 to 2015, 132 satellite or GPS collars have been deployed on adult female boreal caribou throughout the Dehcho over an area of *ca.* 80,000 km². Collars are programmed to provide location data for up to five calving periods before releasing. Location data have been used to determine seasonal range use, calf timing, calving locations, and individual fidelity to calving location and time, and seasonal movement patterns in relation to landscape disturbance features. Collared females are relocated during an annual aerial survey in March and all animals associated with them are classified into sex and age classes. Survey and collar data provide information on key demographic measures including calf production, adult female and calf survival, and recruitment and are used to estimate the annual rate of population increase (λ). Biological samples collected during capture operations and from carcasses visited while retrieving collars have provided information on pregnancy, disease, parasites, animal fatness, age at death and are banked as DNA samples for future analyses.

Information from this project has been and continues to be used by decision makers for such things as range planning and Environment Canada modeling as part of the National Boreal Caribou Recovery Strategy, landuse planning, assessing candidate Protected Areas, developing Forest Management Agreements, wildfire action planning, and as a baseline for boreal caribou studies in other regions of the Northwest Territories. This presentation will touch on only a few program highlights.

http://sdw.enr.gov.nt.ca/nwtdp_upload/4%20Larter_Boreal%20Caribou%20Ecology%20-%20final.pdf

Developing a Community Based Aquatic Research and Monitoring Program

Low*, G., Low, J.M.
Dehcho First Nations

Aboriginal Aquatic Resources and Ocean Monitoring (AAROM) program

A major function of Dehcho AAROM has been to develop community based aquatic research and monitoring programs in our nine member communities. Meeting people and building trust in the communities is the first step in the process. This trust develops as you visit and consult with the community to find out what their issues and concerns are regarding aquatic resources. Meeting with the leadership; Chiefs and council members, elders and harvesters, as well as developing a rapport with administrative staff are necessary steps for a successful program which includes community input and involvement. For a large program such as AAROM, team building is essential. You need the right mix of partners to contribute to the process including trained community monitors to collect the data as well as researchers and funding partners. Project planning with First Nation input is required to develop successful funding proposals. Getting the program off the ground requires hiring community members with traditional skills and knowledge through contracts with the Bands. Formal training may be required (MED 3 and SVOPC - boat safety, first aid, environmental monitoring certificates etc.) as well as on-the-job training by AAROM staff. First Nation partners participate by contributing traditional knowledge and expertise on the land and water right from the start. Results are brought back to the involved communities through meetings, workshops and reports.

In 2011, with funding from CIMP, Bruce Townsend of Beat Environmental Inc. was contracted to analyze the Dehcho AAROM program using the CIMP Pathways approach. The resulting assessment was presented at the CIMP/Geophysical Forum in Yellowknife in 2011. Beat found that the AAROM program was well managed with stable multi-year funding from Fisheries and Oceans Canada. Several recommendations were made to strengthen the program by:

- Harmonizing Dehcho AAROM with NWT CIMP, the ENR NWT Water Stewardship Strategy, DFO Fisheries Management and Science Assessment and other government programs through partnership agreements that would improve monitoring protocols, data management systems and reporting.
- Widening the scope of the program by pursuing partnerships with university researchers to address community concerns resulting from complex cumulative impacts on the aquatic ecosystems. (Effecting their water, fish and fisheries)
- Organizing an annual results workshop to bring together community leaderships and environmental managers with government and university partners, primarily to discuss projects addressing community concerns.

We encourage positive suggestions to further strengthen the Dehcho AAROM program especially regarding communications and traditional knowledge studies.

http://sdw.enr.gov.nt.ca/nwtdp_upload/7%20Low%20Developing%20a%20community%20based%20aquatic%20program.pdf

Assessment of Critical Bull Trout Habitat in the South Nahanni Watershed

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Our understanding of seasonal movement and habitat use of Bull Trout, *Salvelinus confluentus*, in watersheds at the northern extent of the range is limited. These data gaps make effective environmental assessment challenging and hinder development of monitoring programs. In this study, acoustic transmitters were implanted into 78 Bull Trout in the Prairie Creek Watershed, a tributary to the South Nahanni River, Northwest Territories, Canada. Movement data were collected over a 30 – 36 month period from June 2010 to December 2012 using an array of 21 stationary receivers (VEMCO; model VR2 stationary receivers). The acoustic telemetry system was effective for monitoring Bull Trout movement in this high gradient mountain watershed; however, landslides, as well as rapidly changing and extremely high water levels, limited the detection efficiency of some receivers. Despite these challenges, movement and habitat use data were collected throughout the late spring, summer, fall, and winter seasons.

The annual extent of individual Bull Trout movement was highly variable, and inextricably linked to their state of maturity. Results indicate that other than migrations to spawning areas, movements were often limited in spatial extent, as individuals were presumably able to fulfill their seasonal habitat requirements (foraging, overwintering) in very short sections of Prairie Creek. During winter the extent of movements were limited, as several tagged fish were detected within a single pool for the entire winter period. Spawning movements occurred in late August during all three years of the study, corresponding with water temperatures ranging from 8 to 10°C. Movements observed during the spawning season suggest that spawning tributaries exist in the upper reaches of the Prairie Creek watershed, including Funeral and Fast creeks. Limited movement by a large proportion of adult fish suggests that either these fish did not spawn over the two-year tagging period, or that spawning habitat exists within Prairie Creek proper. This finding differs from other studies on this species and implies that northern Bull Trout populations residing in low productivity and harsh environments, with extended winters and short growing seasons, may not be able to procure enough energy to spawn annually. Such an adaptation is conceivable for northern fishes and has been observed in both Arctic char and Dolly Varden populations. This difference should be taken into consideration when assessing potential adverse effects on northern populations and when planning monitoring programs.

http://sdw.enr.gov.nt.ca/nwtdp_upload/1%20Mochnacz_Bull%20Trout%20movement%202015-01-18_ver2.pdf

A Watershed-Scale Sampling Protocol for Distribution and Trend Assessments of Stream Salmonids in the Northwest Territories

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Understanding factors that limit the distribution and abundance of species is of key importance to ecologists and resource managers; however, this complex question becomes even more challenging for species found in remote locations. Stream salmonids, which include Charrs (*Salvelinus* spp.) and graylings (*Thymallus* spp.), are important subsistence and recreational fishes, and are integral to ecosystem functioning. These fishes are highly sensitive to natural and anthropogenic disturbances, yet this inherent vulnerability makes them ideal indicators of aquatic ecosystem health. The objectives of this project were: 1) develop a scientifically defensible and practical protocol to delineate the distribution and define critical habitat factors for salmonids in the Northwest Territories (NWT), and 2) develop a framework for monitoring populations across stream networks. Conventional monitoring based on site-level abundance is not appropriate for these species because they naturally occur at low densities. Also, these species tend to use spatially distinct habitats across large river networks, and the use of these habitats varies seasonally. So their presence can be easily missed using conventional sampling practices. Alternative inventory and monitoring strategies based on spatial and temporal patterns of species occurrence have recently been developed that require less intense sampling at individual sites, while minimizing false-absences, allowing for accurate detections across broad areas.

From 2013 to 2015 we tested this distributional sampling approach on Bull Trout (*Salvelinus confluentus*) in the Prairie Creek watershed. Streams that possessed suitable spawning and rearing habitat were identified and a sub-set of these streams were intensively surveyed to quantify juvenile occupancy at both the site and stream level. Juveniles (< 150 mm) were targeted because individuals remain in their natal stream for 3 to 5 years; therefore, their presence within a stream is indicative of a local population. Occupancy and detection efficiency of juvenile Bull Trout was highest in second order streams (~80%) and lowest in high-gradient first order streams (~30%). Because detection efficiency in second order streams was relatively high we suggest that users consider single pass surveys of 8-10 sites per stream to assess occupancy in similar watersheds. Patch occupancy was relatively low across the watershed (~30%); however, abundance was relatively high in occupied patches.

In 2014 and 2015 we further tested the same stream sampling method to assess its applicability in different systems and for different species. Initial results from sampling Arctic Grayling (*Thymallus arcticus*) in the Little Nahanni watershed and Dolly Varden (*Salvelinus malma*) in

the Rat River watershed indicate that this method is broadly applicable for salmonids in northern streams. Further, data acquired using this protocol can be used to: 1) build robust models to map spawning and rearing habitat over broader regions, and 2) describe baseline conditions to assess cumulative impacts and monitor population trends over time.

http://sdw.enr.gov.nt.ca/nwtdp_upload/3%20Mochnacz_Stream%20Sampling%20Protocol_2015-01-07.pdf

The NWT Inventory of Landscape Change: a web-accessible platform for viewing and managing natural and human disturbance information

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Information on the location and extent of past development and natural disturbance is required by regulators, industry, co-management boards, wildlife managers, communities and other stakeholders to make effective decisions about future development in the Northwest Territories (NWT). It is currently the responsibility of the interested party to compile information on developments and natural disturbances in the area of interest in order to be able to conduct cumulative effects assessment. The lack of a comprehensive and standardized disturbance dataset leads to inconsistencies in assessments, and subsequently leads to challenges in wildlife management and regulatory and land use planning processes.

This presentation will describe recent efforts by the NWT Cumulative Impact Monitoring Program to move towards a standardized, publically accessible database of human and natural disturbance in the NWT. Specifically, we will highlight the comprehensive human disturbance mapping approach that we have used in 4 of 5 administrative regions of the NWT and the soon to be released Inventory of Landscape Change (ILC) webviewer.

A multiproxy approach using existing geospatial datasets and permitting records from regulatory agencies in the Northwest Territories was used to identify and locate historical activities in the study area. Additional information for each activity was then gleaned from permitting records, so that the database contained detailed attributes for each activity. The location of these data was validated using a combination of remotely sensed imagery and hard copy maps that were submitted as part of the permitting processes. The resulting database includes information on the timing, location, extent and nature of more than 500 human activities within the NWT between 2000 and present. The majority of validated features produced from this project are accurate at a scale of 1:100,000 (or +/-100 metres of their true location).

The Inventory of Landscape Change webviewer is a web-based application that provides access to over 50 previously developed geospatial datasets from a range of data providers. Users can add/subtract these layers from the webviewer to explore the extent of disturbance features in

their area of interest. An integrated toolbar allows users to perform simple analytical functions, including querying of data by date and disturbance type. Users can also extract layers of interest so that additional higher level analyses can be performed in a GIS. A built-in feedback form allows users to highlight errors and provide comments on specific datasets or on the ILC webviewer in general. A regular update schedule will ensure that feedback is integrated into the webviewer on a timely basis.

Initiatives such as this are critical as resource managers and industry are increasingly responsible for determining and estimating cumulative effects of human and natural disturbance on wildlife and other valued parts of the northern environment. The intention is to further refine these products so that we continue to move towards a robust database of human and natural disturbance in the NWT.

http://sdw.enr.gov.nt.ca/nwtdp_upload/12%20Palmer%20-%20Inventory%20of%20Landscape%20Change.pdf

Understanding the impacts of environmental change and human development in the Tathlina watershed

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The Tathlina watershed is a culturally and economically significant area for the Ka'a'gee Tu First Nation (KTFN), as community members have hunted, trapped and fished in the region for hundreds of years. The lake itself supports a commercial fishery, which employs KTFN members and contributes significantly to the economy of the community. The area is also downstream of one of the only producing oil and gas fields in the NWT, in the Cameron Hills. Multiple resource pressures and environmental change in the region have led the KTFN to question the cumulative effects of these influences on the current and future health of aquatic systems in the Tathlina watershed.

The Tathlina watershed has undergone substantial landscape changes in response to recent climate warming. In particular, there is evidence to suggest that permafrost-supported peat plateaus are actively degrading in this region, which may be releasing significant amounts of nutrients, carbon, and previously stored mercury to surface waters. We present evidence from two lake sediment cores on whether landscape changes are altering mercury inputs to lakes. Diatom assemblages and chlorophyll *a* were analyzed to infer changes in phytoplankton

communities, and total mercury (THg), organic carbon, nitrogen, and their stable isotopes ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$), and terrestrial plant biomarkers were analyzed to reconstruct changes in biogeochemical cycling over time.

Little is known about the impact that oil and gas development in the Cameron Hills may be having on the loading of contaminants into lakes and streams in the area, and ultimately to Tathlina Lake itself through the Cameron River. In particular, polycyclic aromatic hydrocarbons (PAHs) are commonly released to the environment as a result of industrial activity, have been shown to be carcinogenic to humans, and have the ability to bioaccumulate and cycle through terrestrial and aquatic food webs. Using a variety of environmental monitoring techniques we assessed whether oil and gas development in the Cameron Hills has increased PAH loading to local streams and lakes.

This is a multidisciplinary research project coordinated by the Ka'a'gee Tu First Nation and NWT CIMP, involving communities, universities and government. The concept for the program and the research questions arose from concerns of the KTFN regarding upstream oil and gas development and the cumulative effects of environmental change and multiple resource pressures on the Tathlina Lake area.

http://sdw.enr.gov.nt.ca/nwtdp_upload/8%20Simba%26Palmer%20Tathlina%20watershed.pdf

Understanding and predicting fish mercury levels in the Dehcho region using models of biomagnification and bioaccumulation

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Dehcho community members are concerned about levels of mercury in food fishes such as Northern Pike, Walleye, and Lake Whitefish. In some traditional fishing lakes, mercury levels are high enough to have led to consumption advisories. Fishers, community members, regulators, monitors, and scientists want to understand why fish mercury levels are relatively low in some lakes but higher in others, and why fish mercury levels are increasing in some lakes but stable in others. By understanding the dominant drivers of fish mercury in the Dehcho, we can more accurately predict how climate change and resource development may affect fish mercury.

From 2013-2015, 8 Dehcho lakes were sampled for fish, benthic invertebrates, zooplankton, and sediment. We determined fish mercury levels, as well as fish age, size, trophic level, and food source. We also determined mercury levels in invertebrates, zooplankton, water, and sediment. Water chemistry samples were also analyzed for a suite of variables. Interim results (data from 2015 not yet available) indicate that Lake Whitefish are safe to eat in all lakes, whereas Northern Pike have intermediate mercury levels and Walleye have the highest mercury levels. Mercury differences among species appear to be best explained (as expected) by fish size, age, and trophic

level. Mercury differences among lakes are more complicated. In Walleye, size-standardized differences in mercury among lakes appear to be best predicted by concentrations of chlorophyll-a (negative) and sulfate in lakes (positive). In Northern Pike, size-standardized differences in mercury among lakes appear to be partly explained by differences in habitat use. Future analyses will focus on effects of fish age on among-lake differences in mercury levels (ageing not yet complete), and addition of lakes sampled in 2015.

These results indicate that future monitoring and predictions of fish mercury levels should consider general lake chemistry parameters. Results are also informing discussions regarding mercury mitigation strategies, such as fish-downs.

http://sdw.enr.gov.nt.ca/nwtdp_upload/2%20Swanson%20Fish%20mercury%20levels%20using%20models.pdf

Dehcho K'ehodi

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Dehcho K'ehodi is a regional stewardship initiative being developed in the Dehcho region under the direction of DFN member communities with the support of the DFN regional office. The objective of this program is to develop on-the-land initiatives that support land management issues in a manner that is consistent with Dene culture and worldview. Dehcho K'ehodi, once fully established, will be designed to play a role in supporting the protected area strategies, land use planning, environmental monitoring, community capacity-building, Dene language revitalization and youth-elder mentorship.

http://sdw.enr.gov.nt.ca/nwtdp_upload/Tsetso%20-%20Dehcho%20K'ehodi.pdf

The Scotty Creek Research Station: Overview of past and present activities, and plans for the future

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This talk introduces the Scotty Creek Research Station, located 50 km south of Fort Simpson, NWT, in the wetland-dominated zone of discontinuous permafrost. The history of this station, its current activities and plans for the future are described. Monitoring at Scotty Creek began in 1994 with snow surveys. In 1995, the Water Survey of Canada installed a gauging station near the outlet of the basin. In 1999, the first research infrastructure was located in the headwaters for continuous monitoring. Initially, studies at Scotty focused on water resources and hydrology, however in recent years, research at Scotty has broadened to investigate the impacts of permafrost thaw on the form and functioning of ecosystems. Scotty Creek also enjoys the support of local communities. Over the coming years, Scotty Creek is expected to transition into a regional research park. As such it will serve the Dehcho in regards to environmental monitoring and capacity building for environmental management.

http://sdw.enr.gov.nt.ca/nwtdp_upload/Quinton_Scotty%20Creek%20Research%20Station.pdf