Northwest Territories Cumulative Impact Monitoring Program

# 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: Dehcho Region Abstracts; Northwest Territories Cumulative Impact Monitoring Program, Yellowknife, NT. NWT CIMP Abstracts Volume 2016

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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]

(1) Environment and Natural Resources, Government of the Northwest Territories
(2) Department of Geography, Brock University
(3) Department of Geography and Environmental Studies, Carleton University
(4) Department of Biology, University of Ottawa
(5) Department of Geography, University of Ottawa
(6) NWT Geological Survey, Government of the Northwest Territories
(7) Aurora Research Institute, Aurora College
Terry_Armstrong@gov.nt.ca

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 $km^2$ 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*, J[1], Cumming, S[2], Day, N[1], Johnstone, J[3], McIntire, E[4], Schmiegelow, F[5] and Spring, A[1]
(1) Wilfrid Laurier University, Waterloo, ON
(2) Université Laval, Quebec City, QC
(3) University of Saskatchewan, Saskatoon, SK
(4) Canadian Forest Service, Pacific Forestry Centre, Victoria, BC
(5) University of Alberta at Yukon College, Whitehorse, YT
jbaltzer@wlu.ca

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 Tłı̨cho 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

## Update on Transboundary Water Management Agreements

Faria*, D.[1] and Czarnecki, A.[1]
(1) Water Resources Division, Environment and Natural Resources, GNWT
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]
(1) Environment and Natural Resources, Government of the Northwest Territories
James_Hodson@gov.nt.ca

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

**NWT CIMP Regional Results in the Dehcho Region**

Kanigan, J.
NWT Cumulative Impact Monitoring Program, Government of the Northwest Territories
Julian_Kanigan@gov.nt.ca

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

Larter*, N.C. and Allaire, D.G.
Department of Environment & Natural Resources, Government of the Northwest Territories, PO Box 240, Fort Simpson, NT X0E0N0
Nic_Larter@gov.nt.ca

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 Łíídlįį 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 km$^2$. 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 ($\lambda$). 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
geobarbgeo@hotmail.com

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**

Mochnacz*, N.J.[1], M. Suitor[2], J. L. Larter[3], C.C. Barth[3], L. Brekke[4], D. Tate[5], and J.D. Reist[1]
(1) Fisheries and Oceans Canada, Winnipeg, MB
(2) Yukon Environment, Dawson City, YT
(3) North/South Consultants, Winnipeg, MB
(4) Government of the Northwest Territories, Yellowknife, NT
(5) Parks Canada Agency, Fort Simpson, NT
neil.mochnacz@dfo-mpo.gc.ca

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 of 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

Mochnacz*, N.J.[1,5], Teleki, D.[2], Maier, K. [3], Lewis, B.[4], Docker, M.[5], Reist, J.D.[1], Cott, P.A.[6], and Isaak, D.[7]
(1) Fisheries and Oceans Canada, Winnipeg, MB;
(2) Teleki GIS, Radium Hot Springs, BC;
(3) Gwich'in Renewable Resource Board, Inuvik, NT;
(4) Parks Canada Agency, Fort Simpson, NT;
(5) University of Manitoba, Winnipeg, MB;
(6) University of Alberta, Edmonton, AB;
(7) United States Forest Service, Boise, ID;
neil.mochnacz@dfo-mpo.gc.ca

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 Chars (*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**

Palmer*, M.[1], McPherson, J.[2] Laing, I.[2], and Kirizopolous, E.[3]
(1) Cumulative Impact Monitoring Program, GNWT, Yellowknife, NT
(2) Caslys Consulting Ltd., Victoria, BC
(3) NWT Center for Geomatics, GNWT, Yellowknife, NT
Mike_Palmer@gov.nt.ca

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

Simba*, M.[1], Palmer*, M.[2], Korosi, J.[3], Coleman, K.[4], Stewart, E.[4], Thienpont, J.[3], Low, G.[5], Low, M.[5], Chin, K.[2], Lister, A.[6], MacLatchy, D.[6], Smol, J.[4], Blais, J.[3], and Chief Lloyd Chicot[1]

(4) Ka'a'gee Tu First Nation, Kakisa, NT
(5) Cumulative Impact Monitoring Program, GNWT, Yellowknife, NT
(6) Univeristy of Ottawa, Ottawa, ON
(7) Queen's University, Kingston, ON
(8) AAROM, Hay River, NT
(9) Wilfrid Laurier University, Waterloo, ON
Mike_Palmer@gov.nt.ca

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 ($\partial^{13}$C, $\partial^{15}$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**

Swanson*, H[1]., Low, G[2]., Low, M[2]., Branfireun, B[3].
(1) University of Waterloo
(2) Dehcho AAROM Program, Hay River
(3) Western University
Heidi.swanson@uwaterloo.ca

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

Tsetso, D.
Dehcho First Nations
Dahti_tsetso@dehcho.org

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

Quinton*, W. [1],Adams, J.[1], Baltzer, J.[1], Berg, A.[2], Chasmer, L.[3], Craig, J.[4], Hayashi, M.[5], Kurylyk, B.[5], , Sonnentag, O.[6], Tank, S.[7]
(1) Wilfrid Laurier University
(2) University of Guelph
(3) University of Lethbridge
(4) University of Waterloo
(5) University of Calgary
(6) University of Montreal
(7) University of Alberta
wquinton@wlu.ca

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