Cumulative Impact Monitoring Program
2011/12 Project description summary

Project name: Evaluation of hydro-climatic drivers of contaminant transfer in aquatic food webs in the Husky Lakes Watershed (Inuvialuit Settlement Region, Northwest Territories)

Program theme: Cumulative impacts

Project keywords and valued components:

Climate and Climate Change; Snow, Ground Ice, Permafrost Water and Sediment Quality; Fish Habitat, Population, Harvest; Fish Quality (contaminants and condition), Human Health and Community Wellness (Knowledge on contaminants).

Project team/partners:

Southern Research Team 2011/12
Dr. Nikolaus Gantner (PI, University of Victoria, Victoria, BC)
Dr. Olaf Niemann (University of Victoria, Victoria, BC Canada; co-PI)
Dr. Fred Wrona (Environment Canada and University of Victoria, Victoria, BC)
Dr. Jim Reist (FWI, Fisheries & Oceans Canada and UManitoba, Winnipeg, MB)
Dr. Gary Anderson (UManitoba, Winnipeg, MB)
Dr. Holger Hintelmann (Trent University, Peterborough, ON)
Dr. Chris Furgal (Tent University, Peterborough, ON)
Shannon McFadyen, MSc student UVic (UVictoria – Food web and Hg work, co-advised Gantner/Niemann)
Benjamin Kissinger (UManitoba – Otolith microchemistry, co-advised Anderson/Reist)
Jennie Knopp (PhD student, Trent University, advised by J. Reist and C. Furgal, TK component)
Northern Partners 2011/12
Donald Ross (Aurora Research Institute, Inuvik, NT)
Aurora Research Institute (co-lead, ARI Inuvik)
Hunters and Trappers Committee of Tuktoyaktuk
Tuktoyaktuk Community Corporation (TCC)
Inuvialuit Land Administration (ILA)
Tuk-Inuvik Working Group, Inuvik
Hunters and Trappers Committee of Inuvik
Traditional Inuvialuit Knowledge Interview participants/Local Experts: 14 Local residents of Tuktoyaktuk
Fieldguides Nov 2011: Charles Pokiak and Chris Felix (both Tuktoyaktuk)
Local Fishermen: Rex Noksana, John Tedjuk, Peter Keevik (all Tuktoyaktuk)

Status: In Progress

Location:

Inuvialuit Settlement Region; several lakes located North of Inuvik and South/West of Tuktoyaktuk; Noell Lake, Big Lake, Yaya Lake, Husky Lakes; lakes along Source 177 road (south of Tuktoyaktuk).

Brief project description:

Describe the objectives/goals of the project

Long term goals of this research

1. Identify and quantify the physical, chemical and ecological processes that affect contaminant transfer in Arctic aquatic food webs in response to observed and predicted Climate Variability & Change (CVC) in the Husky Lakes Watershed (HLW).
2. Provide people and regulators of Inuvik and Tuktoyaktuk with tools to effectively monitor their highly valued environment.

Short term goals

1. Baseline information on HLW's cryosphere, food web, and contaminants, and their interactions.
2. Explore existing Traditional Knowledge (TK) on fish condition, health, diet, lake characteristics, lake ice and food web dynamics.

Objectives

1. Characterize the lake-ice conditions and associated lake productivity and aquatic food webs along a hydroclimatic/salinity gradient within the Husky Lakes Watershed (HLW);
2. Using MYLAKE as the physically-based modeling platform, develop and validate a process based hydro-ecological food-web sub-component coupling changes in hydro-climatology and ice conditions to water column productivity and food webs;
3. Use the characterized food webs to explain uptake of Hg including isotopes as tracer/marker through a comparison of: i) spatial comparison of Hg bioaccumulation in food webs; ii) Hg stable isotope ratios in biota along a salinity gradient in the HLW and with lakes outside the HLW.
4. Review of existing and new documentation of Traditional Knowledge (TK) on historical and present ice and climate conditions and fish biology and subsistence fisheries.

3. Combine both knowledge bases to help develop future strategic monitoring of locally relevant sites.

We are studying hydro-climatic effects on food webs and related contaminants transfer to top predators of lakes near the communities of Inuvik and Tuktoyaktuk using a mixed methods approach. Sample collections for this project are conducted following TK interviews and in conjunction with fall/spring fishing by residents of Tuk/Inuvik. Local people will be hired for this work and will be trained in relevant methods for future work on lakes. We will compare sites in the Husky Lakes Watershed (along a local salinity gradient) with Big Lake and Yaya Lake. This project will allow us to better understand the effects of marine and fresh waters entering Husky Lakes, controlled by changes in climatic conditions, guided by the existing TK on the systems. The research will establish a baseline against which the future changes of climate and land use in the ISR can be assessed, in particular the proposed Inuvik-Tuk all-weather road. We expect to see differences in productivity related to ice cover, differences in food web structure, and subsequently contaminants transfer along those hydro-climatic/salinity gradients. We would also expect to see different contaminant concentrations in Lake Trout related to growth rates as a result of differences in diet in the freshwater and marine influenced basins. We will use the chemical makeup of the Lake Trout earbone (otolith) to determine how much trout move within the Husky Lakes. We will also use a method that could allow us to track the 'fingerprint' of mercury through the food web. We will compare how the mercury 'fingerprint' differs in Yaya, Big, Noell lakes, and the Husky Lakes. We will inform the community about the concentrations in the Lake Trout in all sites. This study will build on and utilize knowledge from previous fisheries work in tundra upland lakes, the Husky Lakes, Yaya, and Big Lake. This project could aid in the future design of a community-based monitoring plan of the fisheries in the area and is linked to other environmental pre-assessments underway on the Inuvik-Tuk road corridor.

Describe the methodology and sampling techniques used

Summary of 2011/12 progress:

We set out to obtain initial data to characterize the abiotic lake conditions and aquatic food webs along a hydro-climatic/salinity gradient within the Husky Lakes Watershed (HLW), Noell Lake, Yaya Lake and Big Lake. This project started in September 2011. A planned September field-trip was not possible, due to funding agreements not having been signed off by all parties. Considerable research activities occurred since the project started this fall, including sampling and community involvement. We have made good progress toward achieving our goals to 1. investigate the physical, chemical and ecological processes that affect contaminant transfer in Arctic aquatic food webs and that may respond to cumulative effects on the Husky Lakes Watershed (HLW) and to 2. provide people and regulators of Inuvik and Tuktoyaktuk with tools to effectively monitor selected highly valued components of their environment. Recent samples (and in part data) for two of the proposed sampling sites (Noell Lake and Big Lake) are available to be included in this project from current work of our group on Tundra Lakes and a collaboration with B. Shuter (U. Toronto).

Fall-Fieldwork (2011):

This fall field campaign was a multi-purpose trip that included some helicopter-supported work, land-based work, and more outreach/consultation. The timing for the late fall/winter work was suggested to us by the Tuk HTC and during the review by the Regional Contaminants Committee in the proposal stage of this work. We were asked to come when fishermen set fishing nets under the ice to conduct sampling of fish and other parameters at that time, thereby limiting helicopter use and our scientific fishing efforts in the ecologically and culturally sensitive ecosystem. Prior to arranging flights to Inuvik, we communicated with ARI Inuvik and Tuk HTC to assure the ice on the lakes was safe to travel on. We spent 3 weeks in the ISR, split between Inuvik and Tuktoyaktuk; we meet with local partners (ARI, FJMC, DFO, Tuk HTC) and the public in Tuktoyaktuk to discuss project details and future directions. We went to all large study lakes to develop methods related to sample collections for both MSc projects (at U Victoria and U Manitoba). The field crew at all sites consisted of Donald Ross, Shannon McFadyen (U Victoria, MSc student) and Dr. Nikolaus Gantner, with 2-4 local people helping in Tuktoyaktuk.

Describe how communities and/or partner organizations were or will be involved

Inuvik-based sampling (Nov 15-23 2011):

With the support of our Inuvik based co-lead ARI and PCSP/Canadian Helicopter's, and despite the limited available daylight (~11am-4pm), our field crew was able to access all large lakes via helicopter, drill up to 3 holes per site in the ~15 inch ice using an auger and ice-saw and to collect abiotic data/samples (ice thickness, salinity measurements, water chemistry, surface grabs of lake sediments). Our attempts to collect zooplankton through/under the ice were of limited success, as biomass appeared extremely low. Our time at each site was limited due to the daylight. Dissolved oxygen, conductivity and temperature profiles in the lake water columns were obtained on site using YSI probes through the ice at 1-3 holes per site (see Pictures section). Limnological parameters (e.g., secchi depth; ~2x2m snow cleared off around the ice) were characterized and water chemistry samples were obtained using standard methods of collection (water samples - about 2 L per lake). Currents were observed (during zooplankton tows) and direction noted, but not otherwise quantified. Water samples were kept cold and shipped to DFO Freshwater Institute (FWI Winnipeg) laboratories for analysis. We did not fish during this week, with exception of a few minutes of

jigging while other work was being completed at a given site. Keeping the minimal effort in mind, our fishing resulted in one Fourhorn Sculpin ('Gannyuk') collected by means of scientific sampling (see 'traditional fishing' below for how other fishes were caught).

While working out of ARI Inuvik, Shannon and Nikolaus gave a presentation to ARI staff and management, with a number of other researchers in the audience. We had ARI technician and Inuvialuit representative Donald Ross with us for much of the work. Donald was aboard to provide the support in the field that we have grown accustomed to and to help us 'getting the message across' during meetings with local organizations and the public. We plan additional public presentations in Inuvik in the future.

Tuktoyaktuk-based sampling (Nov 23-27 2011):

Donald, Shannon and Nikolaus flew to Tuk to access the Husky Lakes sites via snowmobile. We hired 2 persons locally in Tuk who took us out to meet with two fishermen (one youth) at a fishing camp. We joined these two fishermen, who spent the month on the land, when they checked the nets set under ice to fish for 'crooked back' (Whitefish) for dog food during winter. Lake Trout were caught as 'edible by-catch' and other species were also caught in the nets. The fishermen allowed us to take samples of specimen we selected together. Obtaining samples of fishes that are already caught has reduced the number of fish we need to catch ourselves for this study. We camped at the cabin and collected abiotic samples during the day via snowmobile.

In total, tissue samples were collected from 58 fishes caught by 'traditional fishing': (29 Lake trout; 20 Lake Whitefish [NOTE: previously labelled 'Round Whitefish']; 5 Blue Herring; 2 Broad Whitefish; 2 Fourhorn Sculpin) from two locations at the Husky Lakes. A range of sizes (ages) of each species was selected for tissue sampling. Fish size (fork length) and weight were recorded (see Table 1;). Samples of fish muscle (~20 grams) and liver (~5 grams) were obtained from fish caught by fishermen via dissection in the field or at the accommodations. Sub-samples/tissue samples of all species were collected and preserved for trophic analysis (stable isotopes C, N and S) and contaminants (all ongoing). Ageing structures (otoliths) were removed from all fish sampled (see pictures section). Fish stomachs were either kept whole or opened and stomach contents recorded. This was necessary to characterize the food web including dietary preferences of fish at several life stages. Once samples were obtained, these were preserved (frozen). All samples obtained were brought back to the laboratories of the University of Victoria. No unexpected fish species was collected. The meat of lake trout was either returned to the fishermen or provided to Elders in the Tuk.

We demonstrated our sampling procedures and provided training to those with us in the field. All lent a hand to assist in the field work. Once we returned to Tuk, we were notified that other fishermen had collected fishes from a second location and we were able to collect samples of these fishes as well (numbers included in the total above).

Public meeting in Tuktoyaktuk and HTC board meeting (Nov 28 2011): We held a public meeting at Kitti Hall in Tuktoyaktuk, which was announced for about one week via community radio, our facebook group, and posters around town; The feedback was impressive as ~20 local residents attended and showed interest in what we had to present, while the attendees also made suggestions on the project, which we are currently including in our preparation for TK work (see pictures below). We were subsequently invited to the HTC board meeting to present the project to the board. We accepted the invitation, explained our project and discussed ways to make the project better. We met with ILA and TCC staff about the project on Nov 29. In Inuvik, we met with FJMC and DFO members to discuss next steps regarding the postponed September sampling.

Describe how Traditional Knowledge was or will be involved, if applicable

Inuvialuit communities have a deep and thorough understanding of their local aquatic ecosystem and fish biology that has developed over many centuries. Extensive knowledge about subsistence fisheries and ice conditions resides with hunters and fishers in the communities of Tuktoyaktuk and Inuvik (Carmack et al. 2008). This TK based understanding of the local environment can provide expert information for the study of environmental conditions and northern species (Riedlinger and Berkes, 2001; Furgal et al., 2006). A mixed methods approach (Creswell 2009) is used in this project to bring together both quantitative (instrumental western science) and qualitative (TK as gathered and analysed through social science methods) information.

TK interviews (February 2012):

Traditional Inuvialuit Knowledge (T/IK) Component, by Jennie Knopp and Chris Furgal:

Semi-directed interviews on Inuvialuit Knowledge (IK) of fish and ecology of the Husky Lakes were completed with 14 local experts in the community of Tuktoyaktuk, NT in the last two weeks in February 2012. Topics covered in the interviews included fish species composition, fish health and fish habitat as well as knowledge about the aquatic ecosystems, food webs and lake ice conditions. The geographic focus of the interviews was on the Husky Lakes watershed and locations in the Beaufort Sea near the community. These topics were also covered for smaller lakes near the community of Tuktoyaktuk. Over 24 hours of interviews were audio recorded and are in the process of being transcribed verbatim. Once the transcriptions are complete, the qualitative analyses of the interviews will be conducted to identify common and emerging themes in the knowledge shared by the local experts. Participant mapping of local fishing

locations and areas of significance to study the Husky Lakes food webs and ecosystem in relation to Lake Trout and other fish species was also completed in association with the interviews. These maps will be digitally scanned and entered into a GIS database for future use by the researchers and the communities. Once the interview qualitative analyses are complete, verification meetings will take place in Tuktoyaktuk to ensure that the knowledge has both been documented accurately and that the interpretations of the knowledge are correct from the perspectives of participants. These meetings are planned for early summer and late fall in Tuktoyaktuk. As this is a mixed methods project, IK will be used to inform sampling locations and parameters within the scientific sampling efforts.

Communication and outreach: We gave a presentation to the staff of the co-lead at ARI; We held a public meeting in Tuk; we attended HTC board meeting (invited); An overview poster was printed and displayed at ARI Inuvik; Field work included 5 Inuvialuit and 2 southern researchers. We have generated 'IPY frostbytes', short video clips related to the project, which are available via YouTube (see links below). We submitted our report to ARI regarding our NT license, which has been approved in March 2012. We submitted our progress report with our renewal application to NCP, supplied confirmations of community consultation in late March, and are awaiting results regarding the renewal. We submitted our harvest report related to our license to DFO.

Student involvement:

Shannon McFadyen, University of Victoria

Course work UVic: Since starting her degree in September, Shannon completed all five courses required for the UVictoria's MSc degree in Geography. Shannon is in the process of completing her literature review and her research proposal, which will be defended in April 2012. In the past term, Shannon was also a teaching assistant for two laboratory classes in the Department of Geography in Biogeography, leading 50 students on various field exercises in and around campus.

Fieldwork: In November 2011, Shannon participated in the preliminary sampling trip to the communities of Inuvik and Tuktoyaktuk. We were able to gather our first round of samples, spend time in the communities, host a meeting with Tuktoyaktuk community members to discuss the project and answer questions and concerns, and met with the Tuktoyaktuk HTC to discuss future plans. During this trip we collected samples including fish, zooplankton, sediment and water. Additional data was collected on limnological parameters and water chemistry.

Labwork: Once samples were prepared for contaminants analysis in our labs at UVictoria under the guidance of Dr Gantner, Shannon traveled to Ontario to work in the laboratories of our collaborators. At Trent University, under the supervision of Dr. Hintelmann and Brian Dimcock, Shannon learned and applied techniques for digesting and processing muscle, liver, and sediment samples to be measured for mercury stable isotopes. At the Center for Canadian Inland Waters (Burlington) Shannon learned to analyse total mercury concentrations using the Direct Mercury Analyzer in collaboration with Dr Kirk and Muir (EC/UoGuelph). Parallel to course work and TAing, Shannon continued to process samples in our laboratory here at the U Victoria. Two undergraduate volunteers currently assist Shannon in preparing samples for Carbon, Nitrogen and Sulphur stable isotope analysis. Currently, we have preliminary results for total mercury concentrations in fish and sediment, as well as first abiotic measurements. Analysis on mercury stable isotopes is ongoing and results are expected shortly.

Presentations: To date, Shannon presented her project plans at the 19th NCP Results Workshop (September 2011), in Victoria BC, and was awarded first place poster prize for our poster titled, "Cryosphere-food web-contaminant interaction in the Husky Lakes Watershed (Inuvialuit Settlement Region, NT)" and at the APECS DOM Webinar virtual poster presentation (Title: 'Preliminary Insights into mercury concentrations in selected fish species from the Husky Lakes Watershed (Inuvialuit Settlement Region, Northwest Territories, Canada'). Shannon also submitted a description of her project to the WDCAG spring Newsletter. Shannon further attended the 2012 PEEC Conference in Bamfield, BC. Shannon will be presenting preliminary findings at the International Polar Year (IPY) conference in Montreal April 22-27 2012 (see frostbite – weblink). For this conference she received a travel award ($700) and accommodation award through APECS, and an additional travel award from the University of Victoria ($600).

Benjamin Kissinger, University of Manitoba

Ben Kissinger, had initially been recruited last Fall for the second MSc student position, to investigate otolith microchemistry to determine the extent of movement of fishes amongst lakes/basins. Ben had made a commitment to complete a position at Cornell University (US), used the time to apply for relevant visa and acceptance to UManitoba, while helping out on the project remotely. Ben is available to begin in the spring 2012, was accepted in the Department of Biological Sciences at UManitoba and has been conducting preliminary work towards method development. This work may be expanded to include physiological parameters in fishes. Ben has recently moved to Winnipeg to begin his degree and will be part of future field work. Samples for his work are available from the past sampling trips.

Notes:

- Two poster presentations on the project are accepted at IPY Montreal meeting (April '12).
- May field work plans are in full swing.
- We will continue to communicate research plans and progress before and after the fieldwork to

Northern partners.

Links:
Related summary: http://banting.fellowships-bourses.gc.ca/about-a_propos/gantner-eng.html
IPY Frostbyte McFadyen: http://www.youtube.com/watch?v=Gce-A7t3QZs
IPY Frostbyte Gantner: http://www.youtube.com/watch?v=RpdZY02KpAc
Project facebook group**:** https://www.facebook.com/groups/105659876193939/

Acknowledgements for 2011 fieldwork: Thanks to PCSP and Aklak-Canadian Helicopters for logistical support. Cathy and Don Ross allowed us to stay with them in Inuvik. Thanks to all staff at UVic, among much support, for timely review of Animal Use and Ethics protocols. Support for laboratory work was gratefully provided by Amy Sett (EC Burlington) and Brian Dimock (TrentU).

Were the objectives of your project achieved?

This project started in September of 2011 and is laid out for min. 2 years, thus all results are preliminary. To date, we have completed tasks possible under the present timelines and thus think that we have achieved the objectives for the project start. As 2011/2012 was the first of a multi-year research project. based out of the University of Victoria (Victoria, BC), we engaged in two independent collaborations with Trent University (Peterborough, ON), one each with the UManitoba (Winnipeg), Environment Canada (Victoria), Fisheries and Oceans Canada (DFO Winnipeg) and the Aurora Research Institute (ARI Inuvik). The project is co-led by the Aurora Research Institute. Funding has been provided by NSERC via a Banting Fellowship (to NG), the Northern Contaminants Program (NCP), and Cumulative Impact Monitoring Program (CIMP) (both DAAND) as well as Fisheries Joint Management Committee (FJMC); Required licenses in place include: NT License: 14974 (renewal pending), DFO: S-11/12-3043-YK, ILA permit: 11TN021, EISC: Exception letter (07/11-02); Approved protocols in use: UVic animal Care: 2011-025, UVic human ethics: 11.442; All other funding sources indicated in our original proposal were approved. We confirmed northern co-lead through ARI as per request; S. McFadyen has started her MSc project out of UVictoria in Sept 2011; Ben Kissinger, the 2nd MSc position based at UManitoba will begin in April 2012.

Significance of the results (rationale):

Local people of Inuvik and especially Tuktoyaktuk utilize the Husky Lakes lake trout extensively for subsistence hunts as a country food resource. Many families from Tuktoyaktuk spend the spring on the lakes to collect lake trout for subsistence consumption (jigging through the ice), while some families use nets under the ice in the fall to, in part, collect food for their dogs. All other lakes in this study (Noell, Yaya and Big Lake) are currently frequently utilized by members of both communities, while lakes along the proposed road could become of interest, once they are more easily accessible. Mercury concentrations in fish from the lakes that are commonly used for subsistence fishing by community members are mostly unknown.

Key outcomes that will be relevant to local communities:

- Determination of the contaminant concentrations in fishes utilized by the residents of Tuktoyaktuk and Inuvik communities (e.g., Lake Trout, White fish);
- Provide a more comprehensive explanation of the role of climate variability and change on contaminant concentrations in aquatic food webs and associated traditional foods;
- Linkage of Traditional Knowledge with science to better understand the aquatic ecosystem, fish resource and using the local residents' knowledge of the resource.
- Help inform comprehensive monitoring plans for Husky Lakes in association with other researchers (L Harwood), the people and regulators of Tuktoyaktuk in the Inuvialuit Settlement Region (ISR).

What are the key contributions to science/our knowledge base of northern environments

- Information on the biogeochemical processes mercury undergoes in lakes from water to apex predator under varying ice conditions and salinity.
- Further process-level understanding of climate-contaminant interactions in Arctic Lake ecosystems.

In addition, the study will advance our understanding of: how changes in ice conditions in the ISR are projected to affect lake productivity; how contaminant cycling through food webs may be affected by increasing temperatures and ice-free seasons as a result of warming; and, whether there a difference in mercury 'fingerprints' in the freshwater versus marine influenced sub-catchments.

Key deliverables and reporting: Link to needs of NWT

Presentations in communities (to date/planed):

- Presentation at ARI Inuvik (Nov 2011)
- HTC Tuktoyaktuk (Nov 2011 and Feb 2012),
- Public meeting/workshop in Tuk (Nov 2011)
- 14 TK interviews (Feb 12)

Field reports provided to: FJMC, NCP, DFO Inuvik

Scientific presentations:

Gantner/McFadyen et al. NCP workshop 2011
McFadyen et al. APECS workshop
Gantner - contribution to Fall WDCAG Newsletter
McFadyen - contribution to the Spring WDCAG Newsletter

Gantner et al. IPY Montreal (accepted; poster) McFadyen et al. IPY Montreal (accepted; poster)
Published Papers Presentations and Posters (see above); Publications are in preparation.
Are you willing to be part of GNWT's 'ask an expert program' (*Yes*) *
Contact Information Dr Nikolaus Gantner, gantnern@uvic.ca, phone 250 5853 3577

* ENR is developing an on-line resource through which the public can 'ask an expert'. There will be a drop-down box of subject areas and you will be asked to identify the subject area within which you can answer questions. The on-line service will be set-up so that questions posed within this subject area will be automatically sent to you.

Appendix to Gantner et al CIMP Report 2011-2012

Fig 1: The Husky Lakes Watershed (including Noell Lake) N/E of Inuvik and south of Tuktoyaktuk, NT. Red digits indicate the salinity of Husky Lakes water. Yaya Lake and Big Lake are indicated by red stars and will serve as comparative sites outside of the HLW. The Tuk-Inuvik all-weather road is proposed to run along the W of Husky Lakes, with the exact route yet to be determined.

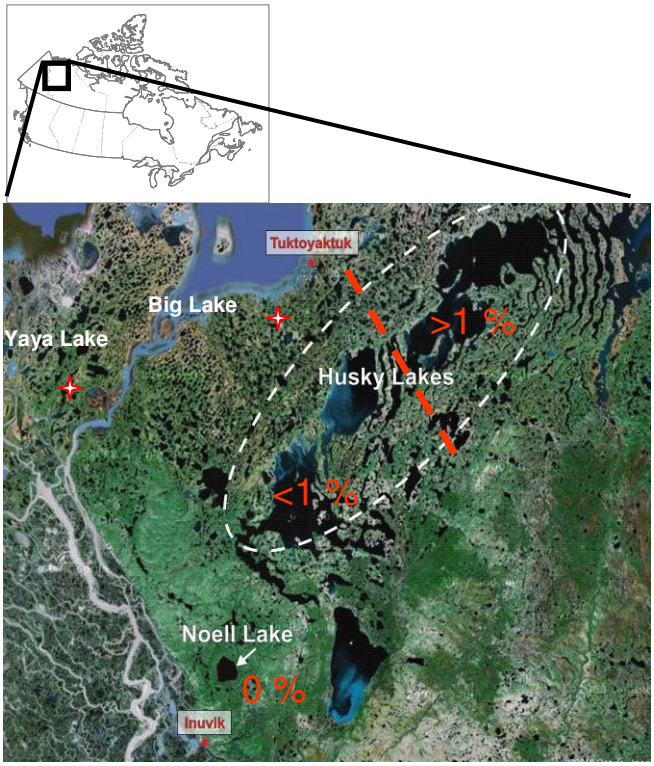


Fig 2: McFadyen et al. poster presented at the APECS VPS for DOM Limnology (Jan 26 2011)

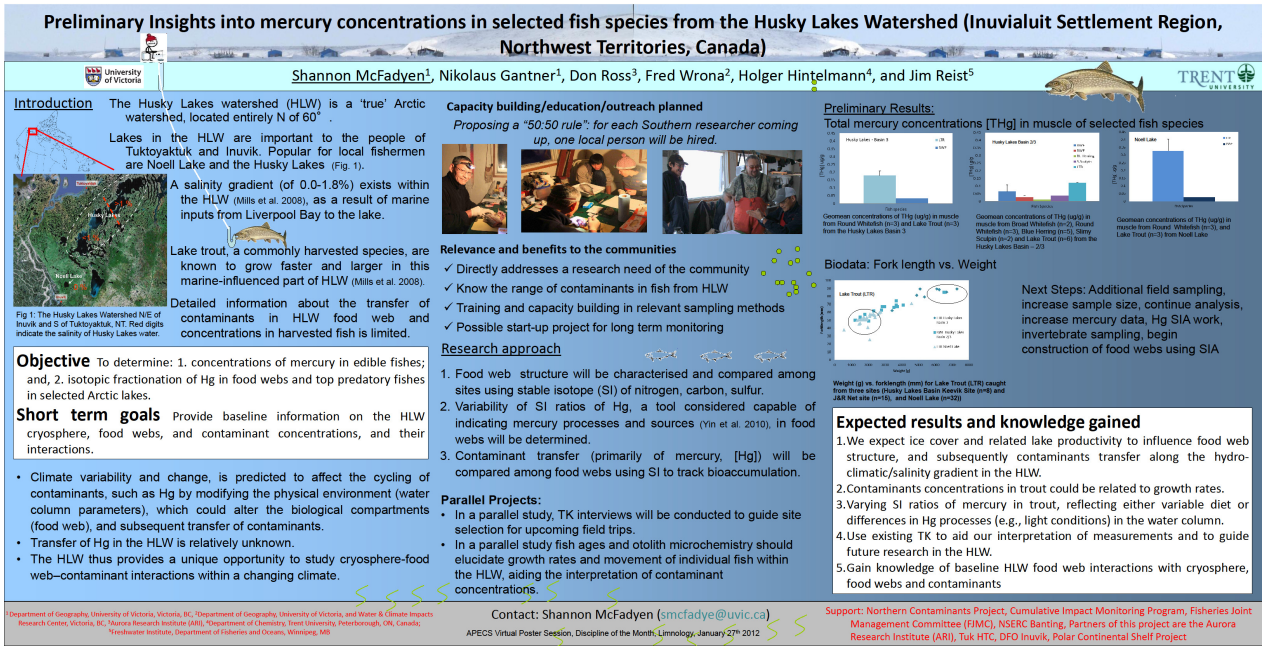


Table 1: Biodata of fishes selected for tissue collections in Nov 2011. Fish were caught by under ice nets at the Husky Lakes and one (Sculpin) by jigging. NOTE: WF = Whitefish; HLB = Husky Lakes Basin; Length corresponds to fork length.

LOCATION	SPECIES	WEIGHT (g)	LENGTH (mm)
Pokiak Net	Round WF HLB 2 – 1	869	400
	Round WF HLB 2 – 2	952	420
	Round WF HLB 2 – 3	1101	420
	Round WF HLB 2 – 4	1123	440
	Round WF HLB 2 – 5	1131	450
	Round WF HLB 2 – 6	1225	460
	Round WF HLB 2 – 7	1242	470
	Round WF HLB 2 – 8	1608	510
	Round WF HLB 2 – 9	1734	500
	Round WF HLB 2 – 10	n/a	n/a
	Lake Trout HLB 2 – 1	1230	500
	Lake Trout HLB 2 – 2	1516	530
	Lake Trout HLB 2 – 3	1520	540
	Lake Trout HLB 2 – 4	1800	570
	Lake Trout HLB 2 – 5	2029	490
	Lake Trout HLB 2 – 6	2329	610
	Lake Trout HLB 2 – 7	2780	630
	Lake Trout HLB 2 – 8	2826	670
	Lake Trout HLB 2 – 9	2970	670
	Lake Trout HLB 2 – 10	3523	660
	Lake Trout HLB 2 – 11	3668	740
	Lake Trout HLB 2 – 12	3668	690
	Lake Trout HLB 2 – 13	3725	670
	Lake Trout HLB 2 – 14	4099	690
	Lake Trout HLB 2 – 15	6527	850
	Lake Trout HLB 2 – 16	n/a	260
	Lake Trout HLB 2 – 17	n/a	n/a
	Lake Trout HLB 2 – 18	n/a	n/a
	Lake Trout HLB 2 – 19	n/a	n/a
	Lake Trout HLB 2 – 20	n/a	n/a
	Lake Trout HLB 2 – 21	n/a	n/a
	Broad WF HLB 2 – 1	427	341
	Broad WF HLB 2 – 2	461	360
	Blue Herring HLB 2 – 1	n/a	n/a
	Blue Herring HLB 2 – 2	135	240
	Blue Herring HLB 2 – 3	178	270
	Blue Herring HLB 2 – 4	n/a	n/a
	Blue Herring HLB 2 – 5	n/a	n/a
	S. Sculpin HLB 2 – 1	42	200
	S. Sculpin HLB 2 – 2	47	170

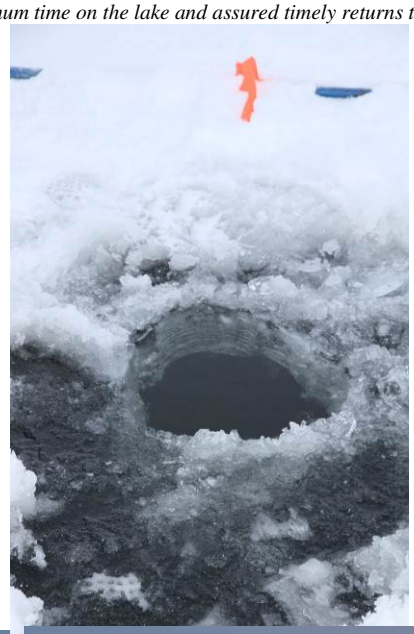
Table 1 (con't):

LOCATION	SPECIES	WEIGHT (g)	LENGTH (mm)
Keevik Net	Round WF HLB 3 – 1	844	420
	Round WF HLB 3 – 2	984	460
	Round WF HLB 3 – 3	1086	460
	Round WF HLB 3 – 4	1277	450
	Round WF HLB 3 – 5	1348	480
	Round WF HLB 3 – 6	1377	460
	Round WF HLB 3 – 7	1378	470
	Round WF HLB 3 – 8	1478	490
	Round WF HLB 3 – 9	1487	460
	Round WF HLB 3 – 10	1526	480
	Lake Trout HLB 3 – 1	3423	620
	Lake Trout HLB 3 – 2	4899	810
	Lake Trout HLB 3 – 3	5093	890
	Lake Trout HLB 3 – 4	5356	790
	Lake Trout HLB 3 – 5	6092	890
	Lake Trout HLB 3 – 6	6235	880
	Lake Trout HLB 3 – 7	6686	850
	Lake Trout HLB 3 – 8	7296	890
Jigging HLB 1	S. Sculpin HLB 1 – 1	117	230

Pictures (also see Husky Lakes Watershed Research Project Facebook group):

Week 1 – Inuvik-based activities

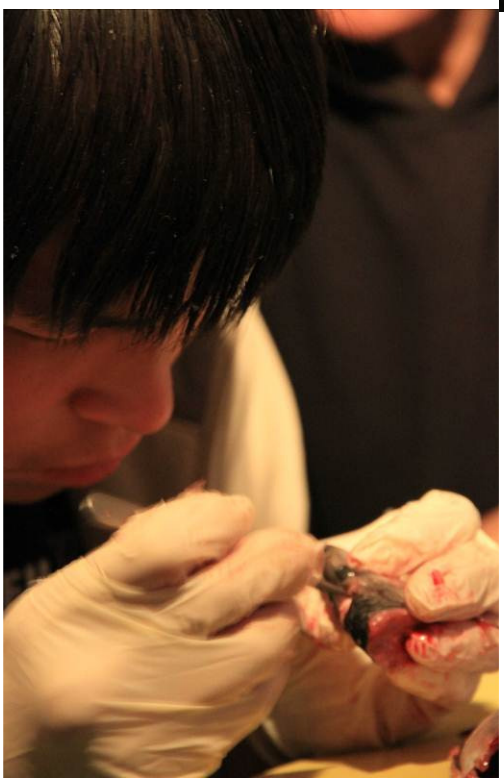
Equipment is lined up at Canadian Helicopter's ready to fly to the field. At the lakes, holes were drilled using a power auger and extended using an ice-saw. Data and samples were obtained through the ice (YSI profiles, water and sediment samples, zooplankton etc) by Shannon M .and Klaus G.. Day light was one limiting factor, but thanks to accurate landings that made lake access easy, pilots provided maximum time on the lake and assured timely returns to



Week 2 - Tuktoyaktuk-based activities

Traditional under-ice netting in the fall of 2011 at Husky Lakes. A net is pulled onto the ice from underneath. A mix of species was caught and tissues were collected from selected specimen for contaminant analysis (e.g. Lake Trout, Whitefish, Blue Herring). The trout get quite big..., as shown on the bottom right (held by D. Ross).

Week 2 (con't): Fish dissections



Once fishes were brought back to the camp at Husky Lakes, tissue samples were obtained. U Victoria MSc student Shannon McFadyen is taking muscle and liver samples from a Whitefish and is removing the otolith from the fish head. Shannon is learning the procedures from Klaus Gantner and Chris Felix and passing her new skills on to a youth from Tuk (John Tedjuk), who was learning the skills quickly.

Week 2 (Con't): Public meeting Tuktoyaktuk

Attendees of the public meeting in Tuk on November 28 2011 listen to the presentation and provide feedback..

After demonstrating a fish dissection, Klaus and Don listen to attendees that share their thoughts on the project.

September work report (November 7 2011):

Evaluation of hydro-climatic drivers of containment transfer in aquatic food webs in the Husky Lakes Watershed (Inuvialuit Settlement Region, NWT) *by N. Gantner et al.*

Since receiving notification of full approval of all funding (FJMC/PCSP/CIMP/NCP) this spring, we initiated preparations for the proposed start date September 1st 2011. Preparations were ongoing all summer: the University of Victoria and Geography Department provided me (NG) with appointments to enable me to co-supervise students and conduct the research. We further recruited an MSc student at U Victoria (Shannon McFadyen), to join the project team at U Victoria. Dr Olaf Niemann (Department of Geography, U of Victoria) has joined the project as the adviser to the Banting Fellowship as per requirements of U Victoria. Together with our team members at W-CIRC/EC, we started setting up the laboratory space and office space for myself and Shannon McFadyen in the Department of Geography. While we advertised for a second student position at U Manitoba, we were unable to make firm offers to the selected candidate, who subsequently joined another project. With our collaborators at Trent U we worked on preparing for the TK components of the project. With our Northern partners, we worked on licensing and field preparations.

Unfortunately, PCSP, CIMP and NCP funding agreements had not been signed off by all parties by September 1, and the release of funds for the project by the University had been delayed, which prevented project members from going into the field. Most challenges related to funding release have now been, or are currently being, resolved with the aid of CIMP, NCP and U Victoria staff. The PCSP (Oct 24th 2011) and CIMP funding agreements (Nov 4th 2011) have now been signed off by the University, and the NCP funding agreement is en route to the University for signatures.

Although we have since been limited in our spending, we have continued to prepare for the project and related field work. We have keep partners and collaborators appraised on the progress of the project along the way. As one consequence, one component of the field work (small lakes along the road) of the overall project had to been postponed and given the freeze up can not be conducted as planned this year. The target lakes were identified and this information provided to FJMC/DFO Inuvik. We will discuss the implications regarding the component that could not be sampled for with FJMC in the coming months. No contaminant work was planned and only very limited NCP/CIMP funds were allocated for this trip. Thus, related field work and subsequent contaminant analysis as outlined in the PCSP/CIMP/NCP proposals are still on track.

We made use of the unexpected delay in using this opportunity to attend the 19th NCP results workshop in Victoria, BC as kick-off for the first presentation of the funded project. At this workshop we introduced the new graduate student Shannon McFadyen (MSc student, UVic) to NCP, who was promptly and gratefully, awarded a poster prize for her presentation of an overview poster (Figure 1). At NCP, we met with collaborator Holger Hintelmann (TrentU) to discuss mercury stable isotope analysis, which will be part of Ms. McFadyen's project.

We are now ready to conduct our winter field work (~Nov 14-Dec 7). All regulatory approvals and/or licenses are now in place and the field work for mid-November can commence as outlined in last years proposal. Apart from the postponed component, we currently do not anticipate any related impacts on the project due to the aforementioned delays. Should these arise, we will be notifying partners accordingly.

2. Radio announcement for public meeting and scoping session for the Husky Lakes study:

Date: Monday, Nov 28 2011
Time: 5:30-7:00pm
Where: Kitti Hall Tuktoyaktuk

Klaus Gantner and Shannon McFadyen from the University of Victoria and Donald Ross from the Aurora Research Institute are in town this week to start the new study on the lake trout and food chain in the Husky Lakes. The researchers want to share information about this project that looks at contaminants in the fish and food chain. They are also interested in collecting small muscle samples and fish heads from fish fishermen in town have caught this fall at Husky Lakes. There will be a public meeting at Kitti Hall on Monday, November 28th from 5.30-7:00pm. Everyone in Tuk interested in the study on fish from Husky Lakes is invited to attend. Snacks and door prizes will be provided.

3. Radio announcement in Tuktoyaktuk during TK interviews

Ice, lakes, and fish

Two young researchers, Jennie Knopp a student from Trent University in Ontario, and Klaus Gantner a researcher from the University of Victoria in BC, are visiting Tuktoyaktuk *next week* to conduct Traditional Knowledge interviews with local experts on fish, lake conditions and lake ice. The group studies freshwater fish, the habitat those fish occupy, what they eat, and if they are low or high in contaminants. They also study the lakes where the fish live and the lake ice. These researchers are studying the fish and their environment, but they would also like to learn about fish from those who have the most knowledge about the fish and the lakes, meaning the people who fish a lot in the community. They both look forward to being in Tuk from Tuesday February 22 to Saturday March 4. They will be staying at a local B&B breakfast and encourage any one who would like more information about the whole project to contact us at anytime. Posters are up at various places around town. Jennie and Klaus are really looking forward to this trip!

4. Poster posted in Tuktoyaktuk during TK interviews

Lakes, Ice and Fish:

A research project looking at lake food webs and contaminants in fish

Jennie Knopp and Klaus Gantner will be in town from **February 22 to March 4** to conduct Traditional Knowledge interviews with identified local experts on the topics of fish health and diet, lake habitat, water quality, and lake ice.

WE WOULD LOVE TO HEAR FROM YOU!

If you would like to talk to Jennie or Klaus about the research project, please call them at the local B&B where they are staying during their visit to the community.

5. Field report by Don Ross (Nov 2011 trip)

Husky lakes

Don Ross

Photo by: Don Ross

Evaluation of Hydro-Climatic drivers of Contamination transfer in Aquatic food Web in the Husky Lakes Watershed.

The trip to Husky lakes, Donald Ross, Klaus Gantner, Shannon McFadyen left at ten in the morning, we loaded up all of our gear and some supplies in the back of the truck and went out to the airport. On arrival out to Canadian helicopters, we transferred our gear and supplies to the helicopter; we then flew out to a few designated sites to collect water samples, (see fig. # 1)

Photo by: Shannon McFadyen

also collected mud samples from the bottom of the lakes, and collected data with the Horiba. Once we were done that, we flew to Tuktoyatuk. Once in Tuktoyaktuk, we loaded all of our gear and supplies into the truck and went to the bed & breakfast, where would be staying the night. Once getting all of our gear and supplies to the bed & breakfast, we sorted out all of our gear and purchased more food for the trip to Husky lakes. The next day, we would going to Husky lakes (see fig 2).

Photo by: Shannon McFadyen

by snowmobiles, we packed up all of our gear, supplies and food, sleeping blankets and met up with our local guide and his helper at his house and unloaded the truck with all of our gear, supplies and sleeping blankets and food for the trip to husky lakes, we spent a better part of the morning packing and sorting, where all the stuff would fit into the toboggan and komatik.

We had rented three snowmobiles and one toboggan and one Komatik for the trip. Two people would ride in the Komatik and I would operate the other snowmobile, pulling a toboggan behind me. The helper would be breaking trial ahead of us. The two people riding in the Komatik would be partially

covered under a tarp and be sitting on a musk's ox hide to keep them warm for the trip to husky lakes. The trip to husky lakes was slow going, due to pulling heavy loads and the rough travelling conditions and the cold temperatures, Once in a while we would stop and the people in the komatik would get out and move around and warm up a little bit before we continued on to Husky lakes.

When we finally arrived at the house where we were to be staying, it was good to see that the fire was going and the house would be warm. Once there, we unpacked the toboggan and the komitik and put all of our sleeping blankets and food into the cabin, along with our gear and supplies. So nothing would freeze, because the temperature outside was in the minus thirties and with the wind-chill even colder. After a good supper, we sat around looking at a map, deciding which lakes we were going to sample the next day. It was decided that we were going to sample the furthest lake first and then worked towards to cabin.

We would be staying out at the cabin for a few days collecting our water samples, fish samples, data needed for the study. In the morning, we gathered all of gear and headed out to the furthest lake, when we got there, we drilled a few holes in the ice, but the holes were too small for our equipment to go through, so we drilled three holes in a rectangle shape and used the ice saw to make one big hole in the ice and then we were able to get our samples and collect data with the horiba. We continued to go from lake to lake and gather our samples in that same process that day .One of the local fisherman from Tuktoyaktuk was out there at Husky lakes fishing for his family and on our way to gather some of our data and samples, we helped him in checking his net and were able to get some fish from him which were frozen. The local Hunter and his helper decided that they had enough fish and would be going back to Tuktoyaktuk the next day with his load of fish.as they had been fishing out for about three weeks.

Once we were done collecting our samples for the day, we went back to the cabin. Later on in the evening, we dissected a few of the fish samples (see fig. #4), after thawing them out by the wood stove.

Photo by: Shannon McFadyen

On completion of our data collection, water samples, fish collection, we headed back to Tuktoyaktuk, While we were in the process of packing up all of our gear, getting ready for the trip back to Tuktoyaktuk, the local hunter and his helper who had left earlier had returned back to the cabin with the

assistant of another local hunter who had been out hunting and had found them in the middle of husky lakes, stating that they had snowmobile troubles. They left their snowmobile and komatik full of fish on the lake, another local hunter decided to help take their komatik full of fish back the community for them. After the local hunter and his helper finished warming back up, we went back to their snowmobile and helped them fix their snowmobile, so they were able to get back to the community safety.

Once we arrived in Tuktoyaktuk, it was just a matter of unloading all of our gear and supplies, samples and load them back into the truck and back to the bed & breakfast where we were staying. when we arrived back to the bed & breakfast , where we staying we unloaded all of our gear, supplies and fish samples , which were frozen and we brought them into the house and laid them out in the floor on a piece of cardboard to thaw out. As we would be dissecting, weighing, measuring them for the study.

Once we were done taking our small samples from the fish. The remainder of the fish was given the elders of the community. After meeting with a few of the local committees, we left the community of Tuktoyatuk back to Inuvik.