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PROGRESS REPORT: YEAR 3
THE MCGILL CHAIR IN NORTHERN RESEARCH:
WILDLIFE CONSERVATION AND TRADITIONAL FOOD SECURITY

1. GENERAL OBJECTIVES OF THE CHAIR RESEARCH PROGRAM

Three general objectives of the McGill INQ Chair in Northern Research are to:

1. Capitalize on new technologies in wildlife biollogging and remote sensing to assess the impacts of resource development and environmental change on northern wildlife and traditional food security.
2. Locate and characterize northern research conducted at McGill to foster cross-faculty and inter-disciplinary collaborations within McGill's northern research community and to provide northern exposure to McGill's excellence in sustainability science.
3. Enhance McGill's contributions to Institut Nordique du Quebec (INQ).

2. PROGRESS MADE TOWARDS THESE OBJECTIVES FOR THE PERIOD COVERED BY THE REPORT

Objective 1. Capitalize on new technologies in wildlife biollogging and remote sensing to assess the impacts of resource development and environmental change on northern wildlife and traditional food security.

We have continued to conduct a wide variety of field-based research projects oriented around the biollogging and remote sensing of northern wildlife species, which are important to local communities as furbearers and traditional food sources (Table 1), in partnership with federal and territorial governments as well as co-management and Indigenous organizations. We also pursued document- and data-based research on the traditional food systems and subsistence economies of Indigenous communities from across northern Canada. The integration of the wildlife biollogging and traditional foods research axes is occurring through the research programs supported by the NSERC CREATE Environmental Innovation graduate training program, with a dedicated focus on the impacts of resource development on wildlife in northern Canada, as well as our research program, entitled *Wildlife, environmental change, and local indigenous food systems (WECLIFS) in Northern Quebec*, focusing on the impacts of climate change on traditional food security in Eeyou Istchee and Nunavik territories.

Since our last report, we have:

- 1) Actively engaged and collaborated with organizations with mandates related to health and food security (e.g., Cree Health Board, Nunavik Regional Board of Health and Social Services), wildlife harvest and subsistence economies (e.g., Cree Trappers Association, Nunavik Hunters, Fishermen and Trappers Association (R/LNUK), the JBNQA Hunting, Fishing and Trapping Coordinating Committee), and regional governance, environmental protection, and sustainable development (e.g., Cree Nation Government, Makivik, Kativik Regional Government, Eeyou Marine Region Wildlife Board, Nunavik Marine Region Wildlife Board) to co-develop the research agenda in Eeyou Itschee and Nunavik territories. This includes the co-development of many graduate student research projects and internships (Table 2).
- 2) Completed national-scope review and synthesis papers highlighting the ecological diversity and socioeconomic value of wild food systems in northern North America. Currently these efforts have yielded three review and synthesis manuscripts, with the following titles:
 - a. Culture and the social-ecology of local food use by Indigenous communities
 - b. Valuing country food harvest in Nunavut, Canada
 - c. Weighing the importance of body size for the resilience of traditional food systems

Table 1. Research projects oriented around the bilogging and remote sensing of northern wildlife species (^l denotes projects initiated since our last report, ^o denotes field work ongoing in this reporting period, ^c indicates field work completed prior to this reporting period but analyses ongoing).

Wildlife species	Bilogging and remote sensing technology	Impacts of concern	Location	Community partners	Government partners	NGO partners
Muskox^o	GPS and satellite collars, satellite imagery	Interaction with caribou	Yukon-NWT North Slope	Aklavik Hunters and Trappers Committee	Yukon Territorial Government, Government of the Northwest Territories, Parks Canada	Wildlife Management Advisory Council, Gwich'in Renewable Resources Board
Beaver^o	Aerial survey, satellite imagery	Range expansion, interaction with salmonids	Nunavik	Hunting	Makivik, Nunavik Research Center, Ministère Forêts, Faune et Parc	
Lynx and their prey^c	Satellite collars, accelerometers, audio recorders, camera traps	Climate change, ecological drivers	South-western Yukon		Yukon Territorial Government, US Fish and Wildlife Service	
Sharp-tailed grouse^c	Radio-collars, camera traps	Placer mining	Central Yukon		Yukon Territorial Government	Yukon Fish and Wildlife Enhancement Trust
Wolverines^c	Satellite collars, accelerometers	Cumulative Impacts	Northern Alberta	Alberta Trappers Association		Alberta Conservation Association
Muskrats and their predator^o	Aerial survey, carcass collection, satellite imagery	Changes in water regime and ice phenology	Mackenzie Delta, NT	Gwich'in Renewable Resources Board	Government of Northwest Territories, Aurora College, Canadian Wildlife Service	
Muskrats^c	Aerial survey, carcass collection, satellite imagery	Changes in water regime and ice	Old Crow Flats, Yukon	Vuntut Gwich'in First Nation	Yukon Territorial Government, Parks Canada	North Yukon Renewable Resource Council

Wildlife species	Biologging and remote sensing technology	Impacts of concern	Location	Community partners	Government partners	NGO partners
		phenology				
Narwhals^c	Satellite tags, satellite imagery	Shipping	Eclipse Sound, Nunavut		Department of Fisheries and Oceans	World Wildlife Fund
Canada Geese^o	Automated acoustic recording units, camera traps	Aquaculture	Tabusintac Bay, New Brunswick		Canadian Wildlife Service	Tabusintac Watershed Association, Wildlife Habitat Canada
Caribou^o	GPS and satellite collars, satellite imagery	Cumulative impacts	Northwest Territories		Government of Northwest Territories	

Table 2. Graduate and undergraduate thesis, research, and internship projects focusing on the impacts of environmental change on traditional food security in Eeyou Istchee and Nunavik territories.

Internship and Thesis Focus	Community	Collaborating Organization
Participatory video: climate adaptation in Waskaganish	Waskaganish	CNG
Sturgeon case study of local food systems	Nemaska	CNG
Cumulative impact assessment	Eeyou Istchee	JBACE
Cumulative impact assessment	Eeyou Istchee	JBACE/CNG
Social-ecological determinants of dietary overlap and distinctiveness	Eeyou Istchee	Ouranos
Booklet : culturally important plants in Eeyou Istchee	Misstissini	CBHSS
Culturally important plants, climate change, and traditional phenological knowledge in northern Québec	Eeyou Istchee & Nunavik	Ouranos, CBHSS, ULaval
Anticipated climate change impacts on key wildlife species	Eeyou Istchee & Nunavik	Ouranos, MFFP, ULaval
Modelling wildlife production in northern Quebec	Montreal	Ouranos, ULaval
Economic valuation of local food systems	Northern Canada	
Participatory video: climate adaptation in Whapmagoostui	Whapmagoostui	CNG
Health & nutrition, traditional food & climate change	Whapmagoostui	Ouranos, Whapmagoostui First Nation
Greenhouse food production in Chisasibi	Chisasibi	Chisasibi School Greenhouse
Agricultural food production across Northern Canada	Northern Canada	Many
Climate change, beaver expansion, and stream connectivity for Arctic char in Nunavik	Nunavik	MFFP, Makivik, LNUK, RNUK
Remote sensing of riparian shrubification and beaver activity in Nunavik	Nunavik	Ludwig Maximilian University of Munich, Ouranos, ULaval
Comprehensive coastal habitat research	Eeyou Istchee	Niskamoon, UQTR, UBC, UNB

Objective 2. Locate and characterize northern research conducted at McGill to foster cross-faculty and inter-disciplinary collaborations within McGill’s northern research community and to provide northern exposure to McGill’s excellence in sustainability science

The McGill Chair in Northern Research has initiated an institution-wide northern research network called McGill North, with the objective to promote, mobilize, and interdisciplinize northern, arctic, and circumpolar research at McGill by organizing networking and training events involving northern researchers across McGill faculties.

Since our last report, we have:

- 1) Maintained and updated the McGill North website (<https://www.mcgill.ca/mcgillnorth/>) and the McGill North Student Facebook page (114 members) for McGill students and researchers working in northern and Arctic environments to share news, events, ideas, questions, funding resources, and training opportunities.
- 2) Organized and hosted the Third Northern Research Day (Jan 2019) attended by almost 100 McGill and INQ researchers, featuring talks on Race and Identity in Northern Canada, Northern Health, Energy in the Arctic, Northern Water, and Arctic Wildlife under Climate Change (Figure 2).
- 3) Contributed to secure large scale funding opportunities, including an NSERC ResNet-funded project led by Elena Bennett (Natural Resource Sciences and School of Environment) on applications of ecosystem services to Canadian landscape, including northern environments.
- 4) Allocated McGill North Engagement Grant, in the value of \$4,000 each, to six McGill researchers conducting engagement and outreach activities in the North.



Figure 1. Around 100 participants attended the Third McGill Northern Research Day including presentations, posters, and networking.

Objective 3. Enhance McGill’s contributions to *Institut Nordique du Quebec (INQ)*

As McGill Chair in Northern Research, I have been very active at McGill, the *Institut Nordique du Québec* (INQ), and the broader northern Quebec, northern Canadian, and circumpolar research communities to ensure McGill is well represented at INQ and conversely that INQ is well represented at McGill. Table 3 summarizes the activities that I have been involved in within the last year that I believe have contributed to fostering McGill’s relationship with the INQ.

Since our last report, we have

1. Continued to participate, with the other INQ chairs, in a working group on sustainable development, ensuring INQ research is relevant and applicable to sustainable

development priorities and that there are synergies between the three chairs. Up to now, the group has created a virtual library that contains sustainable development documents (academic articles, chapters, books, strategies) relevant to INQ and its members. In addition, the working group has started an analysis to understand how the INQ research axis address the United Nations Sustainable Development Goals.

2. Participated in the First Peoples Working Group Knowledge Workshop.
3. Engage McGill researchers in research events and training activities organized by INQ, such as the 3e journée de la science de l'INQ and the MOOC Northern Quebec : Issues, Spaces And Cultures.
4. Attended and presented at the Arctic Circle conference in Reykjavik, Iceland, where all three INQ Chairs were represented among over 2000 participants from more than 60 countries.

Table 3. List of July 2018-June 2019 activities of the McGill Chair in Northern Research related to INQ and northern research at McGill

DATE	ACTIVITY	ROLE	LOCATION	PEOPLE INVOLVED
July 2018	Call to Action – Climate Change Adaptation in Waskaganish	Participant, observer, meeting	Waskaganish	Cree Nation Government, Eeyou Marine Region Wildlife Board, Cree Trappers Association
November 2018	Eeyou Istchee Climate Change Regional Forum	Participant, presenter, facilitator	Eastmain	Cree Nation Government, Eeyou Marine Region Wildlife Board, Cree Trappers Association, Cree Board of Health and Social Services
November 2018	RNUK Annual Meeting	Presenter	Akulivik	RNUK, LNUK
November 2018	Scéance d'information sur la biodiversité nordique du Québec	Presenter	Quebec	Assemblée des Partenaires de la Société du Plan Nord
November 2018	3e journée de la science de l'INQ - Penser ensemble pour l'avenir	Organizer, presenter	Quebec	INQ Chairs, students
December 2018	Comité d'implantation, Planification stratégique 2018-2023	Member	Quebec	INQ
December 2018	Rencontre pour définir les besoins Mitacs -sécurité alimentaire traditionnelle	Meeting	Montreal	Ouranos
January 2019	3rd McGill Northern Research Day	Organizer, presenter	Montreal	McGill researchers, students
February 2019	Annual Nutrition meeting & training	Presenter	Montreal	Cree Board of Health and Social Services
March 2019	Internship plan focused on edible wild plants of Eeyou Istchee	Meeting	Montreal	Cree Board of Health and Social Services
March 2019	Steering committee	Meeting	Quebec	MFFP, MELCC, Ouranos, Makivik, Kativik Regional Government, Nunavik Regional Board of Health and Social Services,

DATE	ACTIVITY	ROLE	LOCATION	PEOPLE INVOLVED
				Nunavik Marine Regional Wildlife Board, RNUK, Cree Nation Government, Cree Board of Health and Social Services, Eeyou Marine Region Wildlife Board
April 2019	First Peoples Working Group Knowledge Workshop	Presenter	Oujé-Bougoumou	INQ First Peoples Working Group
April 2019	Research collaboration between McGill and ULaVal	Meeting	Quebec	Stéphane Boudreau and students
June 2019	Comité d'implantation	Member	Quebec	INQ

3. RESEARCH TEAM

Through our new research program, *Wildlife, environmental change, and local Indigenous food systems (WECLIFS)*, co-led by Murray Humphries, Treena Wasonti:io Delormier, and Gordon Hickey, we have actively engaged and collaborated with many research partners (Table 3 and Figure 2).



Figure 2. Funding and partner organizations involved in the WECLIFS program.

As in the previous year, coordination of research activities conducted by the McGill Chair in Northern Research has been led by Ms. Manuelle Landry-Cuerrier, who also serves as the coordinator of the NSERC CREATE Environmental Innovation graduate training program and the WECLIFS project. Coordination of outreach activities conducted by the McGill Chair in Northern Research has been led by Ms. Beatriz Osorio, Research Advisor, Strategic Initiatives, McGill Vice-Principal Office, assisted by Ms. Landry-Cuerrier. Ms. Osorio also coordinated McGill North activities and served as a critical liaison between the McGill Chair in Northern Research and the INQ, as well as with Ouranos. Other members of the research team are the students, post-doctoral fellows (PDF), technicians, research professionals indicated in section 4 (Table 4) and the organizations indicated in Table 1, 2 & 3 and Figure 2.

4. RECRUITMENT AND TRAINING

Through out the duration of the McGill Chair, we have recruited, trained, and worked with 12 undergraduate students, 7 MSc students, 8 PhD students, 3 post-doctoral fellows (PDF), 6 field technicians, and 4 research professionals (Table 4).

Table 4. List of students, technicians, and research professionals supervised by the McGill Chair in Northern Research

Name	Status	Period
Pascale Ropars	PDF	Jan 2019-present
Mikhaela Neelin	MSc	Sep 2018-present
Allison Ford	PhD	Sep 2018-present
Tian Qi Che	MSc	Sep 2018-present
Christine Ha	PhD	Sep 2018-present
Rose Séguin	MSc	Sep 2018-present
John Godfrey	BSc visiting	May 2019-Aug 2019
Vanessa Caron	MSc visiting	May 2019-present
Filip Rakic	BSc	Sep 2018-present
Kata Kuhnert	BSc	Sep 2018-Apr 2019
Nathan Badry	PhD	Jun 2018-present
Nathalie Chéhab	BSc	Mar 2018-Aug 2018
Emily Charry Tissier	Professional	Mar 2018-Mar 2019
Hekia Bodwitch	PDF	Feb 2018-present
Anne Kirsten Bowser	Professional	Jan 2018-Jan 2019
Laurence Carter	MSc	Jan 2018-present
Noah Israel	Technician	Jan 2018-Apr 2018
Heather Sterling	Technician	Jan 2018-Apr 2018
Roxanne Tremblay	BSc	Jun 2017-present
Sereena Moore	BSc	Oct 2016-present
Joanna Griffin	BSc	Nov 2016-Aug 2018
Katelyn Depot	BSc	Sep 2017-Aug 2018
Alec Robitaille	BSc	May 2016-Jul 2017
Juliana Balluffi-Fry	BSc	Oct 2015-Aug 2017
Gabrielle Rimok	BSc	Oct 2016-Apr 2017
Dylan Yaffy	BSc	May 2015-Aug 2016
Laurence Carter	Technician	May 2017-Dec 2017
Shannon Whelan	Technician	Nov 2016-Jan 2017
Claire Hoffmann	Technician	Nov 2016-Mar 2017
Hannes Schraft	Technician	Nov 2016-Jan 2017
Joël Potié	MSc	Sep 2015-present
Bertrand Charry	MSc	Jan 2015-May 2018
Duncan Wartier	PhD	Sep 2016-present
Jeremy Brammer	PDF	Jul 2016-Dec 2017
Emily Studd	PhD	Jan 2014-present
Allyson Menzies	PhD	Sep 2014-present
Melanie Leblanc	PhD	Jan 2014-present
Xavier Giroux-Bougard	PhD	Jan 2015-present
Manuelle Landry-Cuerrier	Professional	Nov 2008-present
Beatriz Osorio	Professional	Jul 2018-Mar 2019

5. COLLABORATION WITH PARTNERS

As indicated in Table 1-3 and in Figure 2, the *WECLIFS* research program, the McGill Chair has teamed up and collaborated actively with numerous research partners, including organizations involved in health and food security (e.g. Cree Health Board, Nunavik Regional Board of Health and Social Services, Indigenous and Northern Affairs Canada), wildlife harvest and subsistence economies (e.g., Cree Trappers Association, Nunavik Hunters, Fishermen and Trappers Association (HFTA,R/LNUK), JBNQA Hunting, Fishing and Trapping Coordinating Committee, Ministère des Forêts, de la Faune et des Parcs du Québec), and regional governance, environmental protection, and sustainable development (e.g., Cree Nation Government, Makivik, Kativik Regional Government, Eeyou Marine Region Wildlife Board, Nunavik Marine Region Wildlife Board, Société du Plan Nord).

Furthermore, the alignment of the McGill Chair with the NSERC CREATE Environmental Innovation program broadens the McGill Chair collaborative network to multiple organizations, which are serving as collaborators, steering committee members, and internship hosts of the graduate students being trained through that program (Figure 3).

Other key research partnership and collaborations are recently being developed through the new ResNet and Canadian Mountain Network research programs.



Figure 3. Organizations and locations currently collaborating in the NSERC CREATE Environmental Innovation graduate training program, led by the McGill Chair in Northern Research

6. THE ADDED VALUE IN THE CONTEXT OF THE CREATION OF THE INQ

The creation of INQ has added value to the research program of the McGill Chair in Northern Research and, more broadly, to northern research at McGill, by providing a platform for transdisciplinary and intersectoral collaborations oriented around northern research and its contributions to sustainable development. The profile offered by INQ's funding and promotion of the McGill Chair in Northern Research has created opportunities for the chair to engage with organizations like Ouranos, the *Ministère des Forêts, de la Faune et des Parcs du Québec*, and the *Société du Plan Nord*. From this engagement, the *WECLIFS* project has emerged as an unprecedented, large scale, and well-funded opportunity for truly interdisciplinary and community co-developed research on traditional food systems in Northern Quebec. The INQ has helped to ensure that McGill's excellence in sustainability science will contribute to the sustainable development of northern Quebec and that the substantial northern research expertise offered by Laval and INRS is better synergized with McGill researchers and organizations.

Through engagement and knowledge exchange activities, the Chair has identified an interest and need for training specifically designed for professionals and representatives of indigenous organizations with mandates related to wildlife, environment, and land management in Eeyou Istchee. The Chair has co-developed, with the Eeyou Marine Region, a professional training program of 120 hours to enhance scientific competencies related to local fish, wildlife, and environmental research by:

- Gaining familiarity and fluency in the concepts, conventions, and applications of scientific research
- Understanding the ecological and evolutionary principles underlying wildlife management policies and study designs
- Identifying, understanding, and communicating scientific research
- Managing, analyzing, interpreting, and communicating scientific data
- Understanding research ethics, how to protect intellectual property, and the professional obligations and worldview of scientists

This training program will be offered in 2019-2020 and delivered in part at McGill University and in part at local Eeyou Marine Region offices.

7. DISSEMINATION OF RESULTS AND KNOWLEDGE OR TECHNOLOGY TRANSFER

Peer-reviewed Publications (*since last report)

*Tremblay, R., M. Landry-Cuerrier, M.M. Humphries. Under review. Culture and the social-ecology of local food use by Indigenous communities. *Ecology and Society*.

*Cooley, D., H. Clarke, S. Graupe, M. Landry-Cuerrier, T. Lantz, H. Milligan, T. Pretzlaw, G. Larocque, M. Humphries. Under review. The seasonality of a migratory moose population in northern Yukon. *Alces*.

- Humphries, M.M., H.E. Milligan, J. Samson. In Press. Mammals of Wemindji: multiple scales and multiple perspectives. In *Partnerships, Politics and Perspectives: Protected Area Creation in Wemindji Cree Territory*. M. Mulrennan, C. Scott, K. Scott (eds.). UBC Press.
- *Studd, E.K., M. Boudreau, Y. Majchrzak, A.K. Menzies, M. Peers, J. Seguin, S. Lavergne, R. Boonstra, D. Murray, S. Boutin, M.M. Humphries. 2019. Use of acceleration and acoustics to classify behavior, generate time budgets, and evaluate responses to moonlight in free-ranging snowshoe hares. *Frontiers in Ecology and Evolution*. <https://doi.org/10.3389/fevo.2019.00154>.
- *Studd, E.K., M. Landry-Cuerrier, A.K. Menzies, S. Boutin, A.G. McAdam, J.E. Lane, M.M. Humphries. 2019. Behavioral classification of low-frequency acceleration and temperature data from a free-ranging small mammal. *Ecology and evolution* 9(1): 619-630.
- Charry, B., M. Marcoux, M.M. Humphries. 2018. Aerial photographic identification of narwhal (*Monodon monoceros*) newborns and their spatial proximity to the nearest adult female. *Arctic Science* <https://doi.org/10.1139/AS-2017-0051>.
- Lemieux Lefebvre, S., M. Landry-Cuerrier, M.M. Humphries. 2018. Identifying the critical habitat of Canadian vertebrate species at risk. *Canadian Journal of Zoology* 96(4): 297-304
- Williams, C.M., Ragland, G.J., Betini, G., Buckley, L.B., Cheviron, Z.A., Donohue, K., Hereford, J., Humphries, M.M., Lisovski, S., Marshall, K.E. and Schmidt, P.S. 2017. Understanding evolutionary impacts of seasonality: an introduction to the symposium. *Integrative and Comparative Biology** 57:921-933
- Humphries, M.M., E.K. Studd, A.K. Menzies, S. Boutin. 2017. To everything there is a season: summer-to-winter food webs and the functional traits of keystone species. *Integrative and Comparative Biology** 57:961-979
- Brunet, N.D., G.M. Hickey, and M.M. Humphries. 2017. How can research partnerships better support local development? Stakeholder perceptions on an approach to understanding research partnership outcomes in the Canadian Arctic. *Polar Record* 53:479-488
- Kuhnlein, H.V. and M.M. Humphries. 2017. Traditional Animal Foods of Indigenous Peoples of Northern North America: <http://traditionalanimalfoods.org/>. Centre for Indigenous Peoples' Nutrition and Environment, McGill University, Montreal.
- Levesque, D., A.K. Menzies, M. Landry-Cuerrier, G. Larocque, M.M. Humphries. 2017. Embracing heterothermic diversity: non-stationary waveform analysis of temperature variation in endotherms. *Journal of Comparative Physiology B* doi:10.1007/s00360-017-1074-9
- Brammer, J.R., N.D. Brunet, C. Burton, A. Cuerrier, F. Danielsen, K. Dewan, T.M. Herrmanne, M. Jackson, R. Kennett, G. Larocque, M. Mulrennan, A.K. Pratihasth, M. Saint-Arnaud, C. Scott, M.M. Humphries. 2016. The role of digital data entry in participatory environmental monitoring. *Conservation Biology* 30:1277-1287
- Brunet, N., G. Hickey, M.M. Humphries. 2016. Local participation and partnership development in Canada's Arctic research: Challenges and opportunities in an age of empowerment and self-determination. *Polar Record* 52:345-359

Conference Presentations (*since last report)

- *MacMillan, G.A., M. Falardeau, C. Girard, S. Dufour-Beauséjour, J. Lacombe-Bergeron, A.K. Menzies, D. Henri. 2019. Highlighting the potential of peer-led workshops in training early

- career researchers for conducting research with Indigenous communities. 3rd McGill Northern Research Day. McGill Faculty Club, Montreal, Québec.
- * Giroux-Bougard, X., J. Cardille, M.M. Humphries. 2019. Monitoring freshwater ice phenology in Canada's North in the era of abundant open-access satellite sensors. 3rd McGill Northern Research Day. McGill Faculty Club, Montreal, Québec.
 - *Giroux-Bougard, X. 2018. Quand les données ouvertes abondent : télédétection de la phénologie des glaces d'eau douce dans le nord du Canada. 3e journée de la science de l'Institut nordique du Québec. Institut national de la recherche scientifique (INRS), Québec.
 - *Leblanc, M.-L. 2018. Analyse rétrospective des herbiers de zostère marine (*Zostera marina* L.) à partir d'images satellites Landsat. 3e journée de la science de l'Institut nordique du Québec. Institut national de la recherche scientifique (INRS), Québec.
 - *Neelin, M. Connaissances locales sur l'omble chevalier, le castor et la connectivité des cours d'eau au Nunavik. 3e journée de la science de l'Institut nordique du Québec. Institut national de la recherche scientifique (INRS), Québec.
 - *Carter, L., É. Bélanger, T. Davison, I. McDonald, D. Tavares, M. Sutor, M.M. Humphries. 2018. Impact of muskox herbivory on vegetation composition and biomass. 43ième congrès annuel de la Société Québécoise pour l'Étude Biologique du Comportement (SQEBC). Université du Québec à Trois-Rivières, Trois-Rivières, Québec.
- March, 2018. Studd, E.K., S. Boutin, A.K. Menzies, D.L.Murray, M.M. Humphries. New biologging techniques for quantifying individual-level predator behaviour and kill rates. Alberta Chapter of the Wildlife Society Conference. Lethbridge, AB.
- February, 2018. Warltier, D., M. Landry-Cuerrier, M.M. Humphries. Valuing country food harvest in Nunavut, Canada. Hudson Bay Summit. Sheraton Hotel, Montreal, Qc.
- December, 2017. Giroux-Bougard, X., M.M. Humphries, J.A. Cardille. Monitoring freshwater ice phenology in Canada's North in the era of abundant open-access satellite sensors. Arctic Change. Quebec City, Qc.
- December, 2017. Charry, B., M. Marcoux, M.M. Humphries, T. Schwinghamer, P. Dutilleul. Spatial use and distribution of narwhals in Tallurutiup Imanga, the Lancaster Sound National Marine Conservation Area. Arctic Change. Quebec City, Qc.
- November, 2017. Studd, E., S. Boutin, D.L. Murray, A.K. Menzies, M.M. Humphries. Bad hare day: new methods of estimating kill rates in Canada lynx. 42ième congrès annuel de la Société Québécoise pour l'Étude Biologique du Comportement (SQEBC). Université Ottawa, Ottawa, ON.
- October, 2017. Warltier, D., M. Landry-Cuerrier, M.M. Humphries. Valuing wild meat harvest in Nunavut, Canada: hidden contributions to wealth and wellbeing. Joint Conference of the Canadian Society for Ecological Economics and Economics for the Anthropocene. Concordia University, Montreal, Qc.
- Menzies, A.K., D.L. Levesque, M. Landry-Cuerrier, G. Larocque, B.J. McGill, M.M. Humphries. Embracing heterothermic diversity: non-stationary waveform analysis of temperature. 41ième congrès annuel de la Société Québécoise pour l'Étude Biologique du Comportement (SQEBC). Université du Québec à Rimouski. Rimouski, Quebec, Canada. November, 2016.

- Charry, B., M. Marcoux, M.M. Humphries. Narwhal identification and distribution Using High definition aerial photography. ArcticNet Annual Conference. Winnipeg, Manitoba, Canada. December, 2016.
- Brammer, J.R. Robitaille, A. Humphries, M.M. Changing ice phenology in the Old Crow Flats, Yukon, and its relationship with the population dynamics of traditionally harvested muskrats. Quebec Centre for Biodiversity Symposium 2016. December, 2016. Montreal, Quebec
- Levesque, D.L., M. Landry-Cuerrier, G. Larocque, A.K. Menzies, B.J. McGill, M.M. Humphries. Embracing heterothermic diversity: an analytical approach for comparing and categorizing patterns of temperature variation in endotherms. Annual Meeting of the Society for Integrative and Comparative Biology. New Orleans, LA, USA. January, 2017.

Invited Presentations (*since last report)

- *November, 2018. M.M. Humphries. The wealth of the land: Wildlife harvesting in northern Quebec. Séance d'information sur la biodiversité nordique du Québec. Assemblée des partenaires, Société du Plan Nord, Quebec.
- *November, 2018. M.M. Humphries. WILD FOOD Indigenous Nutrition & Conservation & climate change in northern Quebec. RNUK/LNUK Annual Meeting, Akulivik, Nunavik.
- *November, 2018. M.M. Humphries. WILD FOOD Indigenous Nutrition & Conservation & climate change in northern Quebec. Eeyou Istchee Regional Climate Change Forum, Eastmain, Eeyou Istchee.
- July, 2018. M.M. Humphries. Warm in the middle: the seasonality of boreal food webs. Food Web Rewiring under Climate Change Symposium. 13th Annual Meeting of the Canadian Society for Ecology and Evolution, University of Guelph, Guelph, Ontario.
- April, 2018. M.M. Humphries. Récolte des ressources fauniques, consommation de nourriture sauvage et impacts des changements climatiques. Colloque sur les Vulnérabilités du Québec Arctique dans le Contexte des Changements Climatiques. Ministère Forêts, Faune et Parcs. Kuujuaq, Quebec, Canada.
- February, 2018. M.M. Humphries. The traditional food systems of Indigenous Peoples of Northern North America. Northern Lights cultural showcase of Nunavut, Nunavik, and Labrador / Nunatsiavut organized by the Baffin Regional Chamber of Commerce (BRCC) and the Labrador North Chamber of Commerce (LNCC). Ottawa, Canada
- February, 2018. M.M. Humphries. Traditional food systems and Indigenous Peoples in northern Canada. Centre d'Étude Nordique Annual Symposium. Université de Sherbrooke, Quebec, Canada.
- November, 2017. M.M. Humphries. Traditional food systems and community-based research. Indigenous Engagement Graduate Student Workshop, MSU Building, McGill University, Montreal, Quebec.
- October, 2017. M.M. Humphries. Northern Canada's longest and largest project in sustainable development. Northern Sustainable Development Challenges: A Comparative Approach. Arctic Circle 2017. Reykjavik, Iceland.
- August, 2017. M.M. Humphries. Sustainable development and community-based research. First Peoples Research Forum Val D'Or, Quebec

May, 2017. M.M. Humphries (Organizer and Presenter). Chaire de recherche nordique de l'Université McGill: la conservation de la faune et la sécurité alimentaire traditionnelle. INQ Colloquia at the 85e ACFAS Conference. McGill University, Montreal, Quebec

April, 2017. M.M. Humphries. The McGill Chair in Northern Research. Research Advisory Council Meeting Presenter McGill University, James Building, Montreal VP-RI Representatives and Associated Deans on Research from all Faculties

April, 2017. M.M. Humphries. Northern Canada's longest and largest project in sustainable development. Mining and Sustainable Development in Northern Canada: Current Development and Future Projects. McGill University, SSMU Ballroom, Montreal. Organized by McGill Mining Engineering Student's Association and attended by McGill professors and students from various faculties and departments

April, 2017. M.M. Humphries. Northern Canada's longest and largest project in sustainable development. 37th Annual Conference of the International Association for Impact Assessment. Sheraton, Montreal, Quebec.

April, 2017. M.M. Humphries. McGill Northern Research Chair –wildlife conservation and traditional food security. McGill Research Advisory Council. McGill University, Montreal.

March, 2017. M.M. Humphries. Sustainable development and Indigenous Peoples in northern Quebec. INQ First Peoples Research Forum. Val D'Or, Quebec.

March, 2017. M.M. Humphries. Traditional food systems of Indigenous Peoples in North America. McGill Student Sustainability Research Symposium, McGill Faculty Club. Montreal, Quebec

January, 2017. M.M. Humphries. Diet, Energetics, and Ecology of Boreal Mammals in Time and Space. University of Manitoba. Department of Biology seminar series. Winnipeg, Manitoba

January, 2017. M.M. Humphries. University of Manitoba. Faculty of Science. Distinguished Alumni Ceremony. Winnipeg, Manitoba

January, 2017. Humphries, M.M. McGill North and the Institut Nordique du Quebec. McGill 1st Annual Northern Research Day. McGill Faculty Club. Montreal, Quebec.

January, 2017. Humphries, M.M., A.K. Menzies, E.K. Studd. The seasons of things and the purposes of time: seasonal variation in morphology, metabolism, and behaviour in boreal endotherms. Annual Meeting of the Society for Integrative and Comparative Biology. New Orleans, LA, USA.

December, 2016. M.M. Humphries. Chaire de recherche nordique de l'Université McGill - Conservation de la faune et sécurité alimentaire traditionnelle. Northern Quebec Hunting, Fishing and Trapping Coordinating Committee, Makivik Offices, St. Laurent Quebec.

October, 2016. M.M. Humphries. Chaire de recherche nordique de l'Université McGill - Conservation de la faune et sécurité alimentaire traditionnelle. Institut Nordique du Québec Chairs and Director Announcement Event. Université Laval. Quebec City, Quebec, Canada.

August, 2016. M.M. Humphries, Keynote. Nutritional ecology of cold climate mammals in time and space. Comparative Nutrition Society, Rio Grande, Puerto Rico.

April, 2016 M.M. Humphries. Environmental change impacts on traditional food systems of Indigenous communities. Adaptation Canada 2016. Ottawa, Ontario.

June, 2016. M.M. Humphries. Indigenous People, Place, and Traditional Food in Changing Northern Environments. Institut Nordique du Québec Forum Santé Nord. Université Laval. Quebec City, Quebec, Canada.

Septembre, 2016. M.M. Humphries. Local knowledge and climate ecology of a migratory moose population in northern Yukon. International Moose Symposium. Brandon, Manitoba, Canada.

8. FINANCIAL INFORMATION

The total funding available to the McGill Chair in Northern Research is \$80,000 per year for three years (Jul 2016-Jun2019), divided into four components (annually):

1. \$30,000 for the Chair **research** activities
2. \$30,000 for **outreach, networking, and knowledge mobilization** activities
3. \$10,000 as **salary stipend** related to the Chair appointment
4. \$10,000 for **teaching release**

As indicated in the first progress report, expenses incurred in the first year of the Chair (July, 2016 – June, 2017) totaled \$22,638 for **research** activities and \$6,860 for **outreach, networking, and knowledge mobilization** activities. With these expenditures, we carried over to the second year a balance of \$7,362 for **research** activities and of \$23,139 for **outreach, networking, and knowledge mobilization** activities. In the first year, the Chair received \$10,000 in **salary stipend** and used \$10,636. It also received \$10,000 for **teaching release** and used \$7,198. We carried over the \$2,802 difference to the second year.

As indicated in the second progress report, in the second year of the Chair (July, 2017 - June, 2018), expenses totaled \$31,376 for **research** activities and \$32,811 for **outreach, networking, and knowledge mobilization** activities. In that year, the Chair received \$10,000 in **salary stipend** and used \$9,406. The difference was carried forward into the third year. The Chair also received \$10,000 for **teaching release**. This amount was not used and was carried forward into the third year, along with the \$2,802 from the first year.

In the third year of the Chair (July, 2018 – June, 2019), expenses totaled \$35,985 for **research** activities, \$50,328 for **outreach, networking, and knowledge mobilization** activities, \$9,915.92 for **salary stipend**, and \$22,802.18 for **teaching release**. Expenses incurred over the third year of the Chair are summarized in Table 5 for **research** activities and in Table 6 for **outreach, networking, and knowledge mobilization** activities.

Table 5. Summary of expenditure related to research activities in the third year of the Chair

Expenditure Category	Details	Amount
Student stipend	Graduate student	\$8,500.00
Student stipend	Undergraduate student	\$5,600.00
Salaries and benefits	Undergraduate work study	\$1,336.92

Salaries and benefits	Research coordinator	\$9,860.44
Materials and supplies	Research materials and supplies	\$1,090.55
Repairs and maintenance	Field vehicle repairs and maintenance	\$820.15
Special event	Venue rental for research event	\$550.59
Travel	Research-related travel and conference	\$8,226.82
TOTAL EXPENDITURE		\$35,985.47
AVAILABLE FUND		\$35,985.47
YEAR END BALANCE		\$0

Table 6. Summary of expenditure related to outreach, networking, and knowledge mobilization activities in the third year of the Chair

Expenditure Category	Details	Amount
Salaries and benefits	Research coordinator	\$10,934.11
Professional & technical contract services	Translation services, honorarium for invited speakers and facilitators	\$3,317.14
Communication	Chair cell phone service	\$75.39
Special events	Third Northern Research Day venue rental and catering charges	\$7,815.34
Materials and supplies	Materials and supplies for engagement activities and Northern Research Day	\$698.66
Travel	Engagement travel activities and outreach-, networking-, and knowledge-related travel and conference	\$27,487.36
TOTAL EXPENDITURE		\$50,328.00
AVAILABLE FUND		\$50,328.00
YEAR END BALANCE		\$0

9. DEMONSTRATED SYNERGY, NETWORKING AND STRUCTURING EFFECT BETWEEN THE THREE INQ CHAIRS

The three INQ chairs (Humphries-McGill, Rodon-Laval, Raymond-INRS) are all members of the INQ sustainable development working group (led by the McGill Chair in Northern Research). Examining how research can best contribute to sustainable development, and the priorities of local communities, provides an important conceptual and practical intersection for the diverse

research programs pursued by the three chairs (centred in wildlife biology, political ecology, and renewable energy).

The McGill Chair in Northern Research led and presented at a meeting with the INQ sustainable development working group to discuss sustainable development perspectives and strategies, internationally, federally, provincially, and regionally, and future steps towards ensuring INQ research is relevant and applicable to sustainable development priorities. The working group has created a virtual library that contains sustainable development documents (academic articles, chapters, books, strategies) relevant to INQ and its members. This virtual library will be shared with INQ members via the INQ website, and should continue to be populated by INQ members in the future. The working group also met representatives of the Société du Plan Nord to learn more about their vision of sustainable development in northern Quebec. Furthermore, under the leadership of André Potvin (Université Laval), we are now analyzing how the different INQ research axes address the United Nations Sustainable Development Objectives.

Beyond our collective efforts within the INQ sustainable development-working group, the three chairs participated in the Journées de la Science de l'INQ, an information booth, at *Arctic Change 2017* and attended and presented at the Arctic Circle 2017 conference in Reykjavik, Iceland at the session entitled “Northern Sustainable Development Challenges: a comparative approach”.