



Canadian Polar Commission  
Commission canadienne des affaires polaires

# The State of NORTHERN KNOWLEDGE IN CANADA



## Board of Directors

---

The Board of Directors is the governing body of the Canadian Polar Commission. Appointed by Governor in Council, they are responsible to Parliament through the Minister of Aboriginal Affairs and Northern Development. The Board provides direction and delegates authority to the Executive Director, who manages the Commission.

Nellie J. Cournoyea, (acting chair)  
Inuvik, Northwest Territories

Barrie Ford,  
Kuujuaq, Quebec

Martin Fortier,  
Quebec City, Quebec

Robert A. Gannicott,  
Yellowknife, Northwest Territories

David S. Hik,  
Edmonton, Alberta

Rob Huebert,  
Calgary, Alberta

Maxim Jean-Louis,  
Sudbury, Ontario

John Nightingale,  
Vancouver, British Columbia

Darielle Talarico,  
Whitehorse, Yukon

March 2014

This report is a key Canadian contribution towards the Third International Conference on Arctic Research Planning (ICARP III), a transformative priority-setting exercise that will provide a roadmap to guide research-focused organizations across the globe in their Arctic research planning and delivery over the next decade. Please visit <http://icarp.arcticportal.org/> for more information.



**Cover:**  
Debbie Iqaluk, from Resolute Bay, looks for trilobites on Truro Island, Nunavut.  
Photo: Janice Lang, PCSP/NRCan

**This page:**  
Photo: David Natcher

**Opposite page:**  
Photo: Katriina O'Kane





## Mandate of the Canadian Polar Commission

---

Established in 1991, the Canadian Polar Commission is Canada's primary polar knowledge agency and has responsibility for:

- Monitoring polar knowledge in Canada and around the world;
- Working with Canadian and international institutions to determine scientific and other priorities;
- Encouraging support for Canadian polar research;
- Communicating polar research information to Canadians; and,
- Fostering international cooperation in the advancement of polar knowledge.

In carrying out its mandate the Commission builds and maintains polar knowledge networks, hosts conferences and workshops, publishes information regarding the polar regions, and works closely with other governmental and non-governmental partners to promote and support Canadian polar knowledge.

The Commission serves as Canada's primary point of contact with the circumpolar knowledge community, and is Canada's adhering body to the International Arctic Science Committee (IASC) and the Scientific Committee for Antarctic Research (SCAR). In addition, the Commission maintains liaison with research organizations and institutes throughout the circumpolar world, providing guidance into bi-lateral and multi-lateral scientific projects relevant to Canadian interests.



## Table of Contents

---

- 5 Message from the Board
- 6 Introduction
- 7 How This Study was Conducted
- 9 Findings
  - 9 *Preparing for Large-scale Resource Development*
  - 12 *Increasing Community Sustainability*
  - 17 *Strengthening Resilience*
  - 22 *Understanding Environmental Change*
- 27 Concluding Observations
- 32 Acknowledgements
- 35 References



## Message from the Board of Directors

---

The Canadian Polar Commission's mandate requires it to monitor and report to Canadians on the state of knowledge of the polar regions. The focus of this report is the Canadian North, comprising Yukon, Northwest Territories, Nunavut, Nunavik in northern Quebec, and Nunatsiavut in northern Newfoundland and Labrador.

The purpose of this report is to inform Canadians, especially those living in Canada's North, of the state of northern research so they can better influence its direction. It will also assist decision-makers in identifying and acting on those key knowledge gaps most critical to Northerners and the Canadian North. This report also provides an opportunity to reflect on the praiseworthy work carried out by our nation's community of northern researchers. Their collective efforts, the calibre of their work, and their accomplishments are a source of national pride.

The published research considered in this report is the product of one of the busiest, most fruitful periods of scientific investigation in the history of the Canadian North, the seven-year period starting with International Polar Year in 2007. The knowledge gains of this period raise new questions that will set the course of northern research for years to come. This report examines those gains and some of the pressing knowledge gaps that remain in order to chart that course forward. The timing is opportune, coinciding as it does with a number of other inter-related circumstances each important to the future of northern research in Canada. These include:

- Canada's current leadership of the Arctic Council, the dominant international forum for circumpolar cooperation in northern knowledge creation
- Increasing political and economic empowerment of Northerners—exemplified most recently by the devolution of responsibility for lands and resource management to the Government of the NWT—which is gradually shifting control of the research agenda northward
- Recent \$85 million revitalization of Canada's network of northern research facilities, better equipping them to meet the varied and complex needs of northern research
- Planned opening in 2017 of the Government of Canada's signature deliverable under its integrated Northern Strategy, the world-class Canadian High Arctic Research Station (CHARS) in Cambridge Bay as a catalyst for the next wave of targeted northern research
- Ongoing advances in Aboriginal self-government taking place throughout the region and their positive effects on government policies, including how research is undertaken
- Heightened northern interest on the part of Canadians

Consistent with Canada's Northern Strategy, this report focuses on the need for science and technology to support sound decision-making. As such, "knowledge to action" research is emphasized, consisting of new knowledge that translates readily into improved policies, programs, interventions and services with a near- to mid-term time horizon. Since Northerners have the greatest vested interest in northern research, the focus of this report is also on knowledge gains and opportunities that align with the priorities of Northerners. This knowledge creation value is illustrated in the research project "vignettes" that are highlighted in this report. These vignettes showcase examples of northern collaboration, involvement and leadership, attributes of northern knowledge creation that the Canadian Polar Commission strongly endorses.

In closing, the members of the Board wish to express their gratitude to all those who have contributed over the past 18 months to the creation of this report.







## Introduction

---

Canada's North is undergoing significant change driven by a number of complex factors, some global in nature, others rooted in the dynamics of the region's unique history, and others stemming from the increased empowerment of Aboriginal peoples through settled comprehensive land claims. These changes have overlapping consequences for Northerners, their communities, their cultures, their natural and built environments, the northern economy, and Canada as a nation. This interconnectedness makes it difficult to discuss human health and well-being, for example, without touching on the issues of overcrowded housing, the cost of living, building technologies and the warming of permafrost.

To reflect the interconnected consequences of this change, and in turn, the interdisciplinary responses that are required, the Commission has identified four over-arching functional themes. They are based on a thorough analysis of recurring and inter-related issues and research priorities of Northerners, identified in the literature and by informants, especially those who are based in the North. These themes provide the framework for our analysis and the context for our findings. The four themes are the following:

- **Preparing for large-scale resource development**—which includes employment and training, understanding and mitigating negative impacts, governance, and mapping and surveys
- **Increasing community sustainability**— which includes housing, infrastructure, transportation, energy security, food security, supporting local and regional economies, and health care systems
- **Strengthening resilience**— which includes determinants of health, impacts of socio-economic and cultural change, Inuit suicide, education and cultural preservation, fetal alcohol spectrum disorder, and physical health including tuberculosis, obesity, cancer, and lower respiratory tract infections
- **Understanding environmental change**—which includes the cryosphere, ocean and marine ecosystems, terrestrial ecosystems, pollutants and contaminants, and monitoring

This report views northern research in terms of what is beneficial to the people who live in the region. The institutional barriers to greater local influence over northern research, while relevant, are systemic issues beyond the scope of this report. Public policy focused research also falls largely outside the scope of this report. Research focused on the humanities, including the epistemological study of traditional or indigenous knowledge systems, is significant and vast, and therefore merits a separate, in-depth investigation. The interview, literature review and validation phases of this study have confirmed to us the crucial value of traditional knowledge to northern research, especially in the environmental and social domains. We have attempted to reflect this in corresponding areas of this report.

Finally, a word must be said about the physical sciences which, especially in the Arctic, are foremost in their contribution to the global understanding of climatic change. Other national and international research and policy agencies are evaluating physical science gains and gaps as part of their own far-reaching priority-setting and research planning activities for the polar regions, including the Canadian North. As a consequence, the physical science aspects of this report concentrate primarily on those environmental research questions with more immediate "knowledge to action" potential for Northerners, especially in terms of personal and community well-being.

In closing, Canada is not unique in the world for its heightened interest in northern knowledge creation. Other nations have embraced the challenge. The result is an unprecedented opportunity for global expansion of northern knowledge. For the sake of focus, this report concentrates primarily on those key knowledge gains and gaps specifically relevant to the Canadian North and its people.

## How This Study Was Conducted

---

Our methodology was developed and the study initiated under the guidance of a five-person advisory committee of northern research specialists.<sup>1</sup> This support was supplemented by ongoing consultations with the science advisors of the governments of Yukon, Northwest Territories and Nunavut, as well as other northern experts. The study focuses on knowledge gains primarily during the seven-year period commencing with International Polar Year in 2007. As an initial step, some 114 subject matter experts were engaged in semi-structured interviews, two-thirds of them based in northern Canada. These informants were asked to identify key research gains, gaps and opportunities within their areas of expertise. Their observations were validated and supplemented with peer reviewed and “grey” literature.

The resulting input was analyzed to identify predominant cross-cutting functional themes. The data were screened for key gains, gaps and opportunities, organized by themes areas, then reviewed and prioritized with input from northern research experts in terms of relevance to Northerners and alignment with northern priorities. This report constitutes the Commission’s high-level synthesis of the resulting output.

Methodological hurdles include the challenging volume of research implicit in the report’s comprehensive scope and time period covered, as well the limited time and staff resources available to undertake this effort. A detailed methodology and subject area summaries will be made available on the Canadian Polar Commission’s website as a compendium to this study:

<http://www.polarcom.gc.ca/eng/content/download-northern-knowledge-report>



### *Natural Resources Canada’s Polar Continental Shelf Program*

Established in 1958, Natural Resources Canada’s Polar Continental Shelf Program (PCSP) assists scientists from around the world to better understand the Arctic by providing Canadian and international research teams with cost-effective, safe and coordinated field logistics and support services.

These services are crucial to working in the Canadian Arctic, where remoteness, a harsh climate, and rapidly changing weather make it challenging to conduct research. With the help of PCSP, however, scientists continue to safely visit and study this region. In doing so, they are expanding our knowledge of and our respect for the Arctic.

Every year, PCSP serves as many as 1100 researchers and students annually. Through its Arctic logistics hub in Resolute and its field equipment hub in Ottawa, PCSP supports 140 projects a year on average in field camps spread across the Arctic. Researchers count on PCSP as a reliable and cost-effective source of research equipment, supplies and support and look to PCSP for expert advice from trained individuals who know the Arctic first-hand.

<sup>1</sup> The Advisory Committee consisted of: Dr. Frances Abele (Chair) – Professor, School of Public Policy and Administration, Carleton University; Jean-Marie Beaulieu – Senior Science Advisor, Canadian Polar Commission; Dr. Carolyn Relf – Director, Yukon Geological Survey; Dr. David J. Scott – Executive Director, Canadian Polar Commission; and Tom Sheldon – Director, Environment Division, Nunatsiavut Government







## Findings

---

### **Preparing for Large-Scale Resource Development** *through knowledge focused on mitigating impacts and maximizing benefits*

---

#### Overview

Mineral and oil and gas exploration, development and production will be the primary private sector drivers of Canada's northern economy for the foreseeable future (Huntington, 2007; Prowse & Furgal, 2009; Kativik Regional Government & Makivik Corporation, 2010; The Conference Board of Canada, 2010; Centre for the North, 2011; Rhéaume & Caron-Vuotari, 2013). There are few people across the region whose lives are not already impacted by the mineral and fossil fuel industries. Projected long-term demand for energy, metals and precious gems accompanied by shrinking global reserves will continue to gradually shift competitive advantage to the region's high cost deposits prompting future growth of the North's non-renewable resource sector (Huntington, 2007; Kesler, 2007; Deloitte, 2010; Rhéaume & Caron-Vuotari, 2013). That will further strengthen the economic predominance of the minerals and fossil fuels in the region. Meanwhile, Northerners expect that resource development will provide meaningful economic benefits to their regions, that development will proceed in a sustainable manner and that negative environmental and social consequences be minimized.

#### Recent Advances and Current Challenges

##### Employment and Training

- The northern minerals sector is characterized by high wages (Sisco & Stonebridge, 2010) and is a major contributor to the quality of northern life. However, the employment benefits of resource development in the North have been unevenly distributed in favor of those with the requisite skills. The education and skill levels of many Aboriginal Northerners can limit both their employment and advancement prospects in the industry (Fenge, 2009; Sisco & Stonebridge, 2010; Howard et al., 2012). Some ways in which Aboriginal workers can be better engaged, supported and retained have been examined (Martin, 2011; Howard et al., 2012). However, in the face of a persistent northern skills gap (Fenge, 2009; Howard et al., 2012), resource development companies continue to hire significant numbers of workers from southern Canada (Fenge, 2009; CBC News, 2013) while many Aboriginal Northerners remain unemployed or under-employed.

##### Understanding and Mitigating Impacts

- Some Northerners are concerned about the strain that increased industrial development can place on the environment and on their communities (Centre for the North, 2011). There is a better understanding of some of the socio-economic impacts of northern resource development (e.g. Gibson & Klinck, 2005; Buell, 2006; Bowes-Lyon et al., 2009; Storey, 2010; Haley et al., 2011; Peterson, 2012; Davison & Hawe, 2012). Also, more indicators are available to assist in assessing socio-economic conditions (Duhaimé & Caron, 2009). There is also more data regarding the environment, driven in part by regulatory requirements (Centre for the North, 2011) and by such multi-stakeholder research initiatives as ArcticNet's Integrated Regional Impact Studies and the Beaufort Regional Environmental Assessment (BREA). However the extent of resource development in the North is creating a continued need for ever more varied and detailed baseline data to better assess change, to appropriately regulate development, to guide adaptive strategies and minimize negative impacts (Huntington, 2007; Centre for the North, 2011; Christensen et al., 2013).



**The NWT Cumulative Impact Monitoring Program (Aboriginal Affairs and Northern Development Canada): Partners in baseline stream sampling**

The NWT Cumulative Impact Monitoring Program collects, analyzes, and disseminates key environmental information, contributing to informed resource management decisions. Designed and guided by Northerners, its study of the health of streams in the Mackenzie River basin between Tulita and Norman Wells, where oil and gas exploration is taking place, includes a water quality and stream health assessment program designed with input from communities, academics, and regulators from the Sahtu Land and Water Board. Elders, as well as other community members, identified traditionally important sites in oil and gas exploration areas. The study, which began in April 2013, is sampling streams throughout the watershed to determine baseline conditions.



## Governance

- If the decisions of land management regimes, especially co-management bodies, are to have meaning for Aboriginal Northerners, their regulatory practices, procedures and governance structures must reflect local cultural values. White (2005, 2006), Dowsley (2009) and others have shed light on the functioning of northern co-management boards and the issue of their compatibility with Aboriginal perspectives. We also know more about 'social license to operate' in a mining context and the underlying implications of governance arrangements for industry-community relations (Prno & Slocombe, 2012). However the workings and outputs of the North's regulatory mechanisms need still further attention if approved projects are to proceed with sufficient degrees of social license.

## Mapping and Surveys

- Much has been learned through private sector exploration initiatives, the activities of provincial and territorial geosciences offices and the Geological Survey of Canada, and as a consequence of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) Program. That federal program, renewed to 2020, has produced some 700 geoscience maps and reports on the Canadian North since 2008 (Natural Resources Canada, 2012). However, the vastness and remoteness of the Canadian North means large tracts remain insufficiently mapped and assessed. This includes the bathymetry of the region's marine shipping channels (Arctic Council, 2009).

## Knowledge Gaps and Research Opportunities

### ***Employment and Training: Further knowledge is needed respecting***

- models of Aboriginal learning in order to improve academic success and skills acquisition while respecting Aboriginal culture and language; this applies to both young people and adult learners (Rogers & Rowell, 2007; Berger, 2007 & 2009; Ronning & Wiborg, 2008; Aylward, 2009; Higgins, 2011; Lafferty, 2012; Sisco et al., 2012; Ayres, 2012; Ross, 2012). Such research must demonstrate gender-sensitivity where necessary (Ilitaqsiq-Nunavut Literacy Council, 2012)
- factors affecting recruitment and retention of Aboriginal employees in the wage economy, especially the large-scale, non-renewable resource industry (Université Laval, 2012; Howard et al., 2012).

### ***Understanding and Mitigating Impacts: Further knowledge is needed respecting***

#### ***Socio-economic and cultural impacts***

- socio-economic and cultural impacts of prolonged major resource development on Aboriginal peoples, their communities and families, including the effects of fly-in/fly-out arrangements (Gibson & Klinck, 2005; Angell & Parkins, 2011; Davison & Hawe, 2012; Schweitzer et al., 2013; Resources and Sustainable Development in the Arctic, 2013a)
- resilience indicators and models in order to improve our understanding of the ways in which impacts are distributed, experienced and mediated (Gibson & Klinck, 2005; Angell & Parkins, 2011). This includes the extent to which resource development activities may contribute to family breakdown, family violence, and addictions (Gibson & Klinck, 2005)
- the needs of communities in order to support the collection of culturally appropriate, community-based socio-economic and environmental data to measure impacts and inform standards, legislation, policies and programs (Hallett, 2005; Angell & Parkins, 2011; Centre for the North, 2011).

#### ***Environmental impacts***

- how northern ecosystems (including terrestrial, coastal, freshwater, and marine) function, and how environmental and human-induced change will affect those ecosystems, including cumulative effects (Post et al., 2009; Conservation of Arctic Flora and Fauna, 2010; Arctic Monitoring and Assessment Program,



2012; Conservation of Arctic Flora and Fauna, 2013). As well, more data is needed to better understand baseline conditions (Conservation of Arctic Flora and Fauna, 2010; Arctic Monitoring and Assessment Program, 2012)

- climate change impacts on oil and gas exploration, production and delivery to inform adaptive measures and technologies (Prowse & Furgal, 2009). Similarly, further research is needed to adapt mining infrastructure (including tailings retention structures and storage sites) to climate change in both the operational and post-operational phases (Prowse & Furgal, 2009; Pearce et al., 2011).

### **Governance:** *Further knowledge is needed respecting*

- the dynamics of co-management and other resource governance regimes, including factors that can strengthen or undermine their effectiveness (Caulfield, 2004). The regions' resource management and regulatory boards, many born out of Aboriginal land claims, are still in their formative stages. Research is needed to inform the evolving operations of these governance innovations to ensure the developments they regulate proceed with a sufficient degree of 'social license' (Prno & Slocombe, 2012).
- means for adequately incorporating climate change considerations into the assessment and regulation of large-scale resource development projects (Pearce et al., 2011)
- the development of best practices and templates for negotiating and advocating for appropriate process and content in impact and benefit agreements (IBAs) (Knotsch & Warda, 2009; Southcott & Irlbacher-Fox, 2009). As well, there is a need to identify alternatives to IBAs that have the potential to enhance economic development and social justice for communities (Bradshaw, n.d.).

### **Mapping and Surveys:** *There is a need to*

- undertake further geological mapping in the Canadian North (including the three territories and northern parts of provinces) to meet modern international exploration standards and land-use planning needs (Benoit, 2012), especially the sedimentary basins of the eastern and western Arctic and Hudson Bay, the Canadian Shield of the central Arctic, and the High Arctic Islands and northern mainland (A. Leclair, Geo-mapping for Energy and Minerals Coordinator, Natural Resources Canada, personal communication, March 4, 2014)
- increase and update hydrographic data and charting to support safe navigation (Wright, 2012). This is particularly important in the face of retreating multi-year Arctic sea ice with its potential implications for increased marine traffic in the Canadian Arctic (Arctic Council, 2009)
- examine Arctic shipping regulations and standards to ensure they are appropriate to the levels of human and environmental risk (Arctic Council, 2009; Chircop, 2009).



### **ReSDA:** *Bridging the link between resource development and sustainable communities*

ReSDA, a circumpolar social sciences research network, looks at the social impacts of resource developments to help find ways of increasing community benefit from these developments. The network is funded mainly by the Social Sciences and Humanities Research Council of Canada (SSHRC) with financial and in kind support from its many northern partners and researchers.

ReSDA supports the establishment of five regional social science lab facilities with funding from the Canada Foundation for Innovation (CFI). These will assist social science research in the Yukon, Northwest Territories, Nunavut, Nunavik and Labrador through the ReSDA northern partner offices at the Yukon Research Centre, Aurora Research Institute, Nunavut Research Institute, Makivik Corporation and the Labrador Institute. The new labs will provide dedicated resources to build local capacity for research that looks for ways to sustain and improve the health and well being of Canada's northern communities.



---

## ***Increasing Community Sustainability*** *through knowledge of the material aspects of northern living*

---

### **Overview**

Many of the 99 communities of the Northwest Territories, Yukon, Nunavut, Nunavik and Nunatsiavut are isolated and widely scattered. Approximately half of those communities have a population of five hundred people or less (Statistics Canada, 2011c), and less than half have all-weather road connections with the rest of the country (Government of Yukon et al., 2008; Kativik Regional Government & Makivik Corporation, 2010; Goldhar et al., 2012). The cost of living, cost of public services and construction costs are among the highest in the world.

Although the region is endowed with significant natural resources, distance to and from markets and inadequate transportation infrastructure are significant impediments to the development of those resources. However, remoteness has also been a buffer, especially at the settlement, hamlet and village levels where traditional cultures still predominate and the connection with the land remains relatively intact. It is in these smaller northern communities that the question of sustainability weighs most heavily as they attempt to balance new expectations with traditional values, wage employment with subsistence pursuits, and “splendid isolation” with the paucity of public and commercial services they face. Research can play an important role in helping northern communities, organizations, and governments find the balance needed for secure, sustainable community futures.

### **Recent Advances and Current Challenges**

#### **Affordability**

- The high cost of living is central to the sustainability of northern communities (Bolton et al., 2011; Pulla, 2012). This is especially the case in smaller communities where lower median and average wages (Kativik Regional Government & Makivik Corporation, 2010; Statistics Canada, 2011a & b) make affordability an issue of far-reaching consequences (Sisco & Stonebridge, 2010; Kativik Regional Government & Makivik Corporation, 2010; Goldhar et al., 2012). Northerners, especially Aboriginal Northerners, cite the cost of living almost as frequently as climate change as a quality of life concern (DataPath Systems, 2007).

#### **Growing Local and Regional Economies**

- Changing markets and historic sectorial declines have altered the economic foundations of a number of northern communities leaving many largely reliant on government employment and transfer payments. The sustainability of others is affected by dependence on a single industry or the general depth of their economic base. These economic weaknesses can be offset in part by the economic and social contribution of subsistence, traditional and not-for-profit activities, with positive synergies noted between wage and traditional economies (Natcher, 2008 & 2009; Southcott & Walker, 2009). The role of entrepreneurship as a generator of employment and diversification is also better understood, as are entrepreneurial barriers unique to the region and some means of overcoming them (Mason et al., 2007, 2008 & 2009; Walker, 2009; Sisco & Stewart, 2009). Some sectors such as the knowledge sector in the Yukon and the northern film industry have been examined to identify how their economic contributions could be strengthened (Outcrop Communications, 2011; Lutra Associates, 2011; Voswinkel, 2012). Some economic development and diversification opportunities have also been examined in Nunatsiavut and Nunavik in the context of community and regional sustainability (Kativik Regional Government & Makivik Corporation, 2010; Goldhar et al., 2012; Rodon & Schott, 2013; Makivik Corporation, 2013). Also notable are major economic planning initiatives currently underway or completed in each of the three territories (Yukon Economic Development, 2006; Nunavut Economic Forum, 2012; NWT Chamber of Commerce et al., 2013). However, additional scholarship is needed to further support economic diversification, job creation, entrepreneurship and social economies at the regional and community



levels and to address the competitive disadvantages faced by communities throughout the region (Petrov, 2008; Abele, 2009a; MacPherson, 2009; Walker, 2009; Olfert & Natcher, 2013; Southcott, in press).

## Climate Change and Infrastructure

- Climate change makes infrastructure a critical research issue in Canada's North. This is due to the effects of warming permafrost on soil stability and the consequences for structural integrity (Allard et al., 2012). Much has been learned about the implications of climate change on the built environment, with some progress made and other initiatives underway to assess infrastructure vulnerability, improve infrastructure monitoring and engineering tools and approaches, test and adapt building technologies, develop operations and management guidelines, and adapt building codes and standards to better cope with environmental change (e.g. I. Holubec Consulting, 2008; National Round Table on Energy and the Environment, 2009; Transportation Association of Canada, 2010; BGC Engineering, 2011; Université Laval, 2011; National Research Council, 2011; Allard et al., 2012; Standards Council of Canada, 2012; Morse & Doré [Eds.], 2012; Boucher & Guimond, 2012; CSA Group, 2012; Yukon College, 2012). Much has also been learned about permafrost degradation processes, some of the factors that can aggravate or accelerate degradation, and the associated consequences (e.g. Natural Resources Canada, 2007; Transportation Association of Canada, 2010; Université Laval, 2011; Allard et al., 2012; Coulombe et al., 2012; Boucher & Guimond, 2012). The magnitude of environmental challenge calls for improved climate data and projections as well as more infrastructure vulnerability assessments and ongoing monitoring, and further research to inform engineering approaches, and guidelines and tools to support practitioners (I. Holubec Consulting, 2008; National Round Table on Energy and the Environment, 2009; Prowse et al., 2009; Ford et al., 2010a; Bristow & Gill, 2011; BGC Engineering, 2011; Allard et al., 2012).

## Housing

- Residential housing can be viewed from a climate change perspective. But it also presents critical research challenges from the socio-economic, micro-economic, and public and mental health perspectives. This is especially the case in the smaller communities where, due to low incomes and limited housing stock, there can be a substantial reliance on public housing. There has been more documentation of housing conditions (The Bayswater Consulting Group Inc., 2005; Kativik Regional Government & Makivik Corporation, 2010; Minich et al., 2011; Nunavut Housing Corporation, 2012a; Government of Newfoundland and Labrador, 2013) and the relationship between housing and health and social conditions (Kovesi et al., 2007; Verhille et al., 2009; Knotsch & Kinnon, 2011). Inuit in particular face some of the most crowded housing conditions in Canada (Kativik Regional Government & Makivik Corporation, 2010; Knotsch & Kinnon 2011; Sheppard & Hetherington, 2012).

## Access to Country Food

- Traditional game meats such as seal, moose, geese and caribou offer relief from imported, store-bought food, especially for First Nations, Métis and Inuit, and particularly in small communities. Subsistence harvesting is also a way of life and a means to transfer culture and community values (Nickels et al., 2006; Schuster et al., 2011). However a dependence on game leaves communities vulnerable to fluctuations in wildlife populations (Meakin & Kurvits, 2009), as is currently the case with the Bathurst, George River and South Baffin caribou herds. Vulnerabilities are heightened by climate change with its unpredictable effects on the wilderness travel conditions faced by hunters and fishers (Ford, 2009; Ford & Pearce, 2010). The culturally induced shift from country foods to store-bought products presents food security issues, especially in light of the cost of imported foods and their varying nutritional content. Some of the implications of the latter, such as nutrition related diseases and conditions have been examined (Kuhnlein et al., 2004; Egeland et al., 2011; Huet et al., 2012; Aboriginal Affairs and Northern Development Canada, 2012a).

## Other Food Security Issues

- There is an improved understanding of some of the other factors affecting the food security of Northerners. For example, the Council of Canadian Academies recently completed a major assessment of factors such as country food and market/imported food systems, environmental change, intergenerational well-being, and



### *Yukon Research Centre: Forecasting hydro security for the future of the Yukon*

The Yukon Research Centre is working with Yukon Energy Corporation (YEC) and the Yukon Geological Survey to assess how climate change will affect the Yukon River headwaters. Those headwaters feed the Whitehorse dam, which supplies electricity for much of southern Yukon. The project, which has \$790,000 of shared funding from the YEC and the Natural Sciences and Engineering Research Council of Canada, will gather data from the glaciated headwaters of the Yukon River to help create hydrological and glaciological models that will provide important insights into the hydro security of Yukon. These tools will predict how a changing climate will alter the flow of the Yukon River, and will allow Yukon Energy to operate their hydropower facilities efficiently under different levels of demand for electricity.



governance. Potential long-term health and well-being implications of food insecurity, such as increased incidence of chronic disease were also highlighted (Council of Canadian Academies, 2014). Initiatives such as greenhouses and community freezers have been developed and implemented in some communities in response to food security challenges (Prowse & Furgal, 2009). However, with the varying contextual factors and levels of adaptive capacity within communities and regions (Lambden et al., 2006; Wesche & Chan, 2010; Council of Canadian Academies, 2014), further understanding of food security determinants is needed to inform evidence-based policies, programs and interventions with evaluations to understand their effectiveness (Institute of Nutrition, Metabolism, and Diabetes, 2010; Organ, 2012; Council of Canadian Academies, 2014).

### Health Care Systems

- Isolation and a widely dispersed population pose key challenges in the delivery of health care in northern Canada (Romanow, 2002; Yukon Health Care Review Steering Committee, 2008; Nunavut Tunngavik Inc., 2008; Health and Social Services – Government of the Northwest Territories, 2011). Such circumstances can lead to fragmented and uncoordinated health care delivery (Nunavut Tunngavik Inc., 2008; King et al., 2009; Ford et al., 2010b; Cameron, 2011). Low patient thresholds outside the major centres exacerbate these delivery problems and contribute to health care inequities (Marrone, 2007; King et al., 2009; Ford et al., 2010b; Cameron, 2011). The health care practices of some other circumpolar countries have been studied for their relevance to the Canadian North (Young & Chatwood, 2009). Some organizational and delivery alternatives have been examined (Mitton et al., 2011). As well, some e-Health initiatives implemented in the North have been examined, providing better understanding of the ways in which implementation challenges can be overcome and some of the socio-technical barriers to their use (Peddle, 2007; Powers, 2011). However, given the region's wide diversity, disparities in the provision of local services, the high cost of delivery and the fundamental importance of community-based health care, more research is needed at the pan-northern, regional and community levels.

## Knowledge Gaps and Research Opportunities

### *Affordability: Further work is needed respecting*

#### *Renewable energy and conservation*

- the adaptation and marketing of renewable energy systems and technologies to help reduce the region's dependency on high cost fuel oil, especially in small northern communities. This includes energy-complement technologies and cost-effective energy storage technologies (Energy, Mines and Resources – Yukon Government, 2009; National Energy Board, 2011; Rodon & Schott, 2013)
- the adaptation and marketing of energy efficiency and conservation programs and initiatives to reduce energy consumption (Energy, Mines and Resources – Yukon Government, 2009; A Northern Vision, 2011; Nunavut Housing Corporation, 2012b)
- low-cost, energy-efficient building envelope options and cost-effective cold climate building technologies (Northwest Territories Housing Corporation, 2008; Pulla, 2012)

#### *Transportation*

- the full range of life-cycle costs and benefits associated with transportation infrastructure investment by means of quantitative analysis (Bristow & Gill, 2011)
- the best balance of responsibilities between the public and private sectors with respect to developing and maintaining northern transportation systems (Bristow & Gill, 2011)



### ***Municipal service delivery***

- best practices for the cost-effective delivery of municipal services in isolated, remote and harsh climates (Government of the Northwest Territories, 2009).

## ***Growing Local and Regional Economies: Further knowledge is needed respecting***

### ***Economic development***

- the internal development of the regions of Canada's North through a synthesis of existing economic research to better understand the internal dynamics of regional economies (Abele, 2009a)
- northern and Aboriginal entrepreneurship, especially that generated and directed by Aboriginal peoples, in order to inform appropriate policies and programs that can more effectively address barriers to entrepreneurship (Peredo et al., 2004; Walker, 2009; Hindle & Moroz, 2009)
- community-level social capital, networks and conditions to help inform long-term sustainable economic development policies (Olfert & Natcher, 2013)
- cultural preconditions for successful socio-economic development, including the influence of evolving relations between Aboriginal peoples and other northern residents on the northern social economy (Southcott, in press)

### ***Labour force***

- the relationship between northern education systems and local/regional labour markets (Ronning & Wiborg, 2008), including longitudinal analyses to track both Aboriginal and other northern students in order to better understand education and mobility including learning-to-work transitions and the pathways of different population groups (Hodgkins, 2013)
- labour force characteristics at the industry and community levels as well as the capacity of multi-stakeholder partnerships to improve training strategies and labour force capacity (Martin, 2011)

### ***Fisheries***

- commercial fisheries opportunities, including their identification and how to sustainably develop them (Rompkey & Patterson, 2010)

### ***Tourism***

- external and community factors influencing northern tourism as well as the cultural, social, environmental and economic impacts of northern tourism (Stewart et al., 2005)
- the management of tourism in the face of rapid environmental change (Economic Development & Transportation – Government of Nunavut, 2013; Johnston et al., 2013)

### ***Forestry***

- ways to build local forest management capacity through participation in research and monitoring (Ogden & Innes, 2009; Energy, Mines and Resources – Yukon Government, 2011), as well as the economic benefits associated with the forestry sector.

## ***Climate Change and Infrastructure: Further knowledge is needed respecting***

- the implications of climate change for built environments, by means of improved data collection, modeling and projections, with a view to informing infrastructure planning, design, construction, operations and maintenance, and monitoring (National Round Table on Energy and the Economy, 2009; Prowse et al., 2009; Ford et al., 2010a; BGC Engineering, 2011; Bolton et al., 2011; Bristow & Gill, 2011; Allard et al., 2012)



### ***Ikaarvik: From Barriers to Bridges***

The Ikaarvik: From Barriers to Bridges project is a collaboration led by the Vancouver Aquarium and its partners in five Inuit communities in Nunavut's Kitikmeot and Qikiqtaaluk regions, ArctiConnexion, research scientists, zoos, and aquariums that is building partnerships between communities and scientists to study and address issues ranging from food security to socio-economic capacity building. The partners will integrate their different ways of knowing and describing the world to identify each community's research priorities, and then plan, conduct and interpret the research. One example is the Canadian Rangers Ocean Watch (CROW), which trains Inuit to collect oceanographic data on factors such as temperature, salinity, dissolved oxygen and productivity that could have significant food security implications. Through Ikaarvik, the communities will become active partners in the CROW research. Through these partnerships, the communities are empowered to ensure that the knowledge gained will lead to meaningful action on the issues that impact them directly. This project was a winner of the 2013 Arctic Inspiration Prize.



- improved methods for detecting and characterizing permafrost (Allard et al., 2012)
- solid waste management options in a changing northern environment, including their identification and assessment, with a view to determining waste capacity levels, storage impacts, and how permafrost and solid waste interact including the extent of associated impacts (Government of the Northwest Territories, 2009).

### ***Housing: Further knowledge is needed respecting***

- the relationship between housing and socio-economic conditions to inform housing and socio-economic policies and programs (Knotsch & Kinnon, 2011; Nunavut Housing Corporation, 2012a)
- factors that will affect housing demand in the future including the demand for various types of accommodation along the housing continuum (Nunavut Housing Corporation, 2012a; Pulla, 2012)
- risks associated with residential construction in small northern communities with a view to strengthening private housing and rental markets (Nunavut Housing Corporation, 2012b).

### ***Food Security: Further knowledge is needed respecting***

- environmental, social, cultural and economic factors effecting food security from a multi-disciplinary, community-based perspective, with links to similar regional and pan-northern assessments (Allard et al., 2012; Ford & Pearce, 2012)
- food security implications of climate change (Furgal, 2008; Meakin & Kurvits, 2009) and of the loss of traditional knowledge (Meakin & Kurvits, 2009; Université Laval, 2012; Allard et al., 2012)
- population dynamics and habitat productivity of species that provide significant contributions within the country food system (Université Laval, 2012)
- impact of changing food webs on the occurrence and behaviour of game species (Arctic Monitoring and Assessment Program, 2009b; Donaldson et al., 2010; Conservation of Arctic Flora and Fauna, 2010 & 2013)
- the impact of a warming climate on wildlife diseases that are zoonotic or have an effect on wildlife population health (Prowse & Furgal, 2009; Davidson et al., 2011).

### ***Health Care Systems: Further knowledge is needed respecting***

- the state of public health by means of enhanced surveillance (Indian Health Service, 2008; Nunavut Tunngavik Inc., 2008; Young & Chatwood, 2009; Ford et al., 2010b) to better gauge trends, detect public health threats and support planning
- patterns of disease transmission between northern communities to better inform intervention strategies (Parkinson & Evengård, 2009)
- how to enhance the efficacy of e-Health in addressing respiratory diseases in remote communities (Wesche et al., 2011)
- the appropriate distribution of medical services between those provided locally and those accessed from a distance through medical evacuations (Mitton et al., 2011).



---

## Strengthening Resilience

*through knowledge focused on individual and cultural well-being*

---

### Overview

The North's most important resource is its people. Northerners are resourceful and adaptive, stemming, in the case of its Aboriginal peoples, from deep relationships with the land transmitted across generations in a cumulative manner (Andrews & Buggay, 2008; Aporto, 2010; Berkes, 2012). However, the dislocating forces of northern history, government policy and social, environmental and economic changes have resulted in significant indigenous language loss as well as inequities in physical health, mental well-being, economic opportunity and living conditions. This has weakened cultural foundations (Usborne et al., 2009; Ford, 2009; Bolton et al., 2011) and influenced individual and community resilience, which can be defined as the ability to cope with stress or adversity. The consequences of this demonstrate the close interplay of cultural strength, mental and physical health and socio-economic circumstances. For instance, the suicide rates of Aboriginal Northerners significantly exceed those of other northern residents (Abele, 2009b; Cameron, 2011) as do rates of residential overcrowding, tobacco use, incarceration and unemployment (Latimer & Casey Foss, 2004; Fenge, 2009; Lix et al., 2009; Cameron, 2011; Knotsch & Kinnon, 2011; Sheppard & Hetherington, 2012; Office of the Correctional Investigator, 2013). This multi-dimensional dynamic underlines the value of integrated approaches to fostering human wellness.

### Recent Advances and Current Challenges

#### Health Status and Determinants of Health

- The health status and health inequities between Aboriginal and other northern residents are better understood, as well as some of the social determinants associated with these inequities (Furgal & Seguin, 2006; Parkinson, 2008; King et al., 2009; Gracey & King, 2009; Reading & Wien, 2009; Egeland et al., 2010; Donaldson et al., 2010; Cameron, 2011; National Collaborating Centre for Aboriginal Health, 2012a & b; Peters, 2012; Reading & Halseth, 2013; Halseth, 2013). This includes documentation of higher rates of preterm birth, stillbirth and infant death, notably in Inuit communities (Luo et al., 2010). More baseline data on a range of determinants of Inuit health has also been gathered from the IPY Inuit Health Survey and a similar survey conducted in Nunavik to support the identification of health risks and inform evidence-based and targeted programs and interventions (Anctil [prepared by], 2008; Egeland et al., 2010; Cameron, 2011; Rosol et al., 2011; Huet et al., 2012; Owens et al., 2012; Chan et al., 2012). We also have a better understanding of the relationship between well-being and other factors such as employment opportunities, a sense of local control, and the availability of wildlife (Poppel et al., 2007).

#### Mental Health and Personal Well-being

- **Effects of socio-economic and cultural change:** There is greater knowledge of the direct and indirect effects of Canada's residential school system on the mental health of succeeding generations of Aboriginal peoples (Wesley-Esquimaux, 2007; Truth and Reconciliation Commission of Canada, 2012). This has been greatly augmented by work of the Truth and Reconciliation Commission of Canada (TRC) which has documented the extent of residential school and intergenerational trauma and is assembling considerable data on the subject. However, further understanding of "residential school syndrome," a form of post-traumatic stress disorder, is needed in support of healing so that families and communities can restore their spiritual, emotional and cultural values in ways that they choose (Robertson, 2006). As well, more is known about the effects of imported institutional norms, values and practices on Aboriginal mental health research and services (Nelson, 2012). This underscores the need for more culturally relevant interventions and systems of mental health delivery.



#### *The Men's Project: Narrowing the Gender Gap*

"Why are so many young Inuit men not in school, working or learning traditional skills?" This question, asked by elder Quluqaq Pilakapsi, initiated the development of the Northern Men's Research Project. A collaboration of the Nunavut, NWT, Yukon and Newfoundland and Labrador literacy councils, the purpose of this research project is to better understand the barriers that northern First Nations, Inuit and Métis men face and, most important, what will help them succeed. Locally trained researchers drive the research—from initial engagement and dialogue with community groups, through developing and asking research questions to the interpretation and sharing of results. Using respected community members as researchers facilitates local engagement, creates a positive experience for research participants and ensures the collection of useful data. This empowering process supports the development of relevant and meaningful program and policy recommendations that can work to support northern Aboriginal men's learning, work and well-being.



- **Inuit suicide:** Inuit, especially young males (Hicks, 2007), have among the highest suicide rates in the world (Tester & McNicoll, 2004; Kral et al., 2011; Oliver et al., 2012). Significant work has been done to better understand the determinants of Inuit suicide (Lehti et al., 2009; Hicks, 2009; Chachamovich & Tomlinson, 2013; Chachamovich et al., 2013), and implement and evaluate more Inuit-driven and community-based prevention initiatives (Kral et al., 2009). Still, significant knowledge gaps remain with respect to cultural and gender factors, prevention, treatment, as well as the broader community implications (Hicks, 2009; Sustainable Development Working Group, 2010; Cameron, 2011; Kral, 2012; Chachamovich et al., 2013).
- **Fetal alcohol spectrum disorder:** A report published by the National Collaborating Centre for Aboriginal Health (NCCA) examined literature regarding the prevalence and incidence of Fetal Alcohol Spectrum Disorder (FASD) and Fetal Alcohol Syndrome (FAS) among Aboriginal peoples in Canada, noting that “the true extent of FAS and FASD among Aboriginal and non-aboriginal populations is not known and thus no assessment of higher prevalence is possible” (Pacey, 2009a). While little is known about the prevalence of FASD in northern correctional facilities, studies based on Canadian data suggest young people with FASD are as much as 19 times more likely to be incarcerated as those without in a given year (Popova et al., 2011). There is a need for more research on FASD and the criminal justice system (Pacey, 2009b; Popova et al., 2011). Several researchers note that FASD in northern communities can only be understood in light of the overall impact of the social determinants of health (Healey & Meadows, 2007; Badry & Wight Felske, 2013a). Salmon and Clarren stress the need to understand northern contexts in light of significant diversity while finding collaborative approaches that allow for knowledge transfer and capacity building amongst researchers and communities (Salmon & Clarren, 2011).

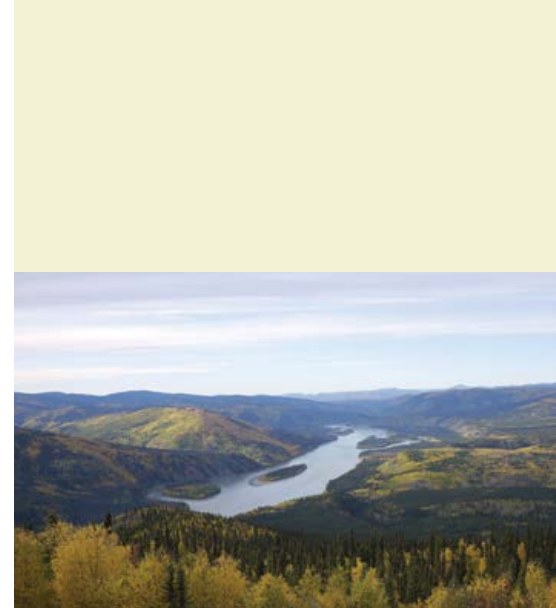
### Education and Cultural Preservation

- **Culturally-based learning:** Educational research has added to our knowledge of non-formal, culturally-based learning initiatives for youth and adult learners, especially of the benefits (Driedger, 2009; Tulloch et al., 2012; Iliataqiniq-Nunavut Literacy Council, 2013). From research conducted in Tuktoyaktuk, NT we also know more about some of the ways in which individuals negotiate between traditional and more formal ways of learning, and some of the factors that can impact learning opportunities (Salokangas & Parlee, 2009). An examination of a crime prevention program in Yellowknife highlighted the effectiveness of culturally-based and resiliency-focused education (Lafferty, 2012).
- **Aboriginal language acquisition:** We have a better understanding of dynamics of indigenous language acquisition and use in the context of a dominant outside language, including the contemporary value and use of traditional and multiple literacies (Balanoff et al., 2006). We know about the importance of establishing baseline skills in an indigenous language and the longitudinal relationship between that and the later acquisition of skills in a second language from research examining the use of Inuktitut along with French or English among Inuit students in Nunavik (Taylor et al., 2008; Osborne et al., 2009). We have a better understanding of the importance of first language instruction and culturally and contextually appropriate subject matter to improve success in formal education (Ayles, 2012).

### Physical Health

- **Tuberculosis:** More is known about the state of tuberculosis (TB) in Inuit Nunangat where TB rates are “significantly higher than those of any other Canadian-born population group,” as well as some of the prevention, intervention and education activities that have been implemented in each of the regions (Demmer, 2011; Inuit Tapiriit Kanatami, 2013). While not specific to the North, TB-related research is being carried out to better understand outbreaks (e.g. Walker et al., 2013), to shorten treatment regimens (Inuit Tapiriit Kanatami, 2013) and to support the application of new technologies (e.g. Kirwan & Gilman, 2013). We have improved understanding of the critical problem of treatment adherence as a cause of initial treatment failure and disease relapse (Orr, 2010a), including the role of systemic, personal and societal factors and the need for strategies that focus more attention on the social context (Orr, 2010a & b).





#### ***Yukon River Inter-Tribal Watershed Council: Hands Across the Waters***

The Yukon River Inter-Tribal Watershed Council (YRITWC) comprises representatives from over 70 First Nations and Tribes in the Yukon River basin. It assists these groups in protecting and improving the water quality of the Yukon River and all its tributaries. In August 2013, the First Nations (from Yukon and northern British Columbia) and Tribes (from Alaska) at the YRITWC's Biennial Summit approved a Yukon River Watershed Plan designed with exactly that purpose in mind. The plan combines the best of modern science and policy with the traditional knowledge of the Indigenous governments and people of the Yukon River, and includes specific, enforceable objectives and standards to protect the quality and quantity of the water in the river. The Watershed Plan is meant to assure that the Yukon River will continue to sustain the coming generations of all the people, fish, wildlife and plants of the Watershed.

- **Obesity:** We have more knowledge of the prevalence of obesity in Canada's North (Deering et al., 2009; Chateau-Degat et al., 2010; Galloway et al., 2012), where, in the case of Nunavik, the prevalence of severe obesity increased by nearly four times in the 12-year period ending in 2004 (Kellett et al., 2012). The problem of obesity among children and youth and its extent is better understood as a result of surveys in Nunavut and the Northwest Territories (Freeman et al., 2012; Owens et al., 2012). The need for the further development of obesity prevention and management strategies remains (Deering et al., 2009).
- **Cancer:** There is more knowledge respecting the growing rate of cancer in the North among Inuit (Kelly et al., 2008a & b), with lifestyle-associated cancers of the lung, breast and colon being among the most malignant of all diseases among Inuit (Friborg & Melbye, 2008). Some socio-economic characteristics such as housing and income have been identified as potential contributors (Carrière et al., 2012).
- **Lower respiratory tract infections:** Research has advanced our knowledge of the higher rates of hospital admission for lower respiratory tract infections (LRTIs) among Inuit children than among non-Inuit children (Young et al., 2007), and some of the associated risk factors such as overcrowding (Kovesi et al., 2006; Cameron et al., 2008; Banerji et al., 2009 & 2013). The significant costs of hospital admissions associated with LRTIs are also better understood (Banerji et al., 2013). Further work is, however, needed to develop and implement prevention strategies, especially in regions where there is an elevated occurrence (Banerji et al., 2013).

## **Knowledge Gaps and Research Opportunities**

### ***Health Status and Determinants of Health: Further knowledge is needed respecting***

- the relationship between Aboriginal self-government, community control of health services, and health equity in Canada's North (Young & Chatwood, 2011)
- the social determinants of health among Aboriginal populations living in the North (King et al., 2009; Cameron, 2011; Sheppard & Hetherington, 2012)
- health outcomes from more local knowledge and observations obtained through the collection of long-term data that is comparable temporally and spatially (Furgal & Seguin, 2006)
- the development of more culturally appropriate indicators of health and well-being that reflect the values of Aboriginal peoples, such as the use of local country food (Cameron, 2011; Pauktuutit Inuit Women of Canada et al., 2012)
- the consequences of the shift from traditional foods to imported foods, specifically investigations into correlations and relationships between that and increasing levels of chronic diseases (Donaldson et al., 2010).

### ***Mental Health and Personal Well-being: Further knowledge is needed respecting***

#### ***Effects of socio-economic and cultural change***

- the determinants of social and mental health among northern peoples, especially the impact of rapid socio-cultural change (Tester & McNicoll, 2004; Lehti et al., 2009; Kronstal, 2009; Whitbeck, 2010) and changing livelihoods (Bolton et al., 2011)
- interventions that incorporate community values and traditional healing practices (Kronstal, 2009)
- community-based methods for determining the impacts of trauma, especially consequences of the Canadian residential school system. More needs to be known about how residential school trauma is transferred inter-generationally
- ways in which individual and community resilience can be strengthened to support adaptation to change
- the variables that influence intimate partner violence (Moffitt et al., 2013).



### ***Inuit Suicide***

- the social determinants of Inuit suicide from epidemiological, socio-cultural and community-based perspectives (Lehti et al., 2009; Hicks, 2009; Sustainable Development Working Group, 2010; Cameron, 2011)
- the factors behind the higher prevalence of suicide among young Inuit men including research into the cultural and gender specific bases of suicide (Hicks, 2009; Sustainable Development Working Group, 2010; Cameron, 2011; Kral, 2012)
- the development, implementation and evaluation of community-driven and designed prevention interventions (Hicks 2009; Sustainable Development Working Group, 2010; Cameron 2011).

### ***Education and Cultural Integrity***

- comparative education research in the circumpolar Arctic (Johansson et al., 2004) and within Canada
- education policies and programs from research that has been co-designed and co-directed by Northerners (Blakesley, 2008; Inuit Tapiriit Kanatami, 2011)
- educational supports needed for Aboriginal student success (Lees et al., 2010), and the empirical evaluation of the impact of those supports (Friesen & Krauth, 2012)
- ways in which the engagement of parents and communities with schools can be increased through more evidence-based strategies (Friesen & Krauth, 2012; Ives et al., 2012)
- educational leadership, especially in the context of self-government agreements (Blakesley, 2008), including the documentation of experiences of Aboriginal educators and the barriers they face, as a basis for developing better training and professional supports (Lees et al., 2010; Blakesley, 2010)
- the development, implementation and evaluation of experiential learning pilot programs (e.g. land-based programs, etc.), especially those which target struggling students (Ives et al., 2012)
- the “causal effect of culturally-based instruction on academic outcomes” (Friesen & Krauth, 2012).

### ***Fetal Alcohol Spectrum Disorder (FASD)***

- the extent and prevalence of fetal alcohol spectrum disorder in the North (Pacey, 2009b; Ospina & Dennett, 2013) and ways in which impediments to diagnosis and treatment such as capacity and lack of resources can be overcome (Pacey, 2009b)
- the effectiveness of prevention and treatment programs through evaluations in order to inform future program design, life course trajectories and the associated implications for communities (Pacey, 2009b), and non-stigmatizing prevention therapies and care for women (Badry & Wight Felske, 2013b)
- more accurate estimates of prevalence of FASD in the criminal justice system through further data collection with screening (Popova et al., 2011)
- interventions which could help to rehabilitate offenders with FASD (Pacey, 2009b; Popova et al., 2011).

## ***Physical Health: Knowledge is needed respecting***

### ***Tuberculosis***

- ways in which health inequities can be reduced as an approach to lowering TB rates in northern populations (Orr, 2010b)
- the development of more culturally and contextually appropriate TB prevention, control and care programs (Inuit Tapiriit Kanatami, 2013), especially those focused on personal, family and socio-economic barriers to TB treatment adherence (Volmink & Garner, 2007; Orr, 2010b; Kulmann & Richmond, 2011).

### ***Obesity***

- health outcomes through cohort studies that examine obesity (Galloway et al., 2012).



## Cancer

- the impacts of contaminants on the incidence of cancer especially through the collection of more comprehensive, long-term data on cancer rates (Cameron, 2013)
- the knowledge, attitudes and behaviour of Inuit with respect to cancer to inform ways in which cancer health literacy can be improved and to better engage Inuit in prevention and screening programs (Pauktuutit Inuit Women of Canada, 2013).

## Lower Respiratory Tract Infections (LRTIs)

- the risk factors for lower respiratory tract infection hospitalizations among infants in Canada's North (Young et al., 2007). Further research is also needed to determine optimal measures to decrease rates of hospital admissions for lower respiratory tract infections in regions of the North that are experiencing high rates (Banerji et al., 2013).
- ways of enhancing the efficacy of tele-health to address respiratory diseases in remote communities (Wesche et al., 2011).



### ***Sakkijânginnatuk Nunalik: An integrated action plan for healthy homes in thriving Nunatsiavut communities***

*Sakkijânginnatuk Nunalik is a Knowledge to Action plan for housing in Nunatsiavut that originates from the communities in the region and builds on a solid knowledge base. It is part of the broader Nunatsiavut Sustainable Communities Initiative, an inter-governmental, inter-departmental, multidisciplinary research program that aims to provide information and guidance for best practices and community sustainability in coastal subarctic environments. Sakkijânginnatuk Nunalik will build and evaluate a pilot multi-unit residential dwelling tailored to the needs of Nunatsiavummiut—culturally relevant, affordable, energy efficient, technologically “smart”, and adapted to new climatic and environmental realities. The Knowledge to Action plan integrates expert knowledge of current housing challenges, local knowledge of housing needs and preferences, and professional knowledge of construction methods and materials in order to build modern healthy housing as a cornerstone of sustainable communities in Nunatsiavut. Equally important, the information gained will offer priceless lessons for future homes in other Arctic regions. This project was a winner of the 2013 Arctic Inspiration Prize.*



---

## **Understanding Environmental Change** *through knowledge in the natural sciences*

---

### **Overview**

The polar regions are displaying the consequences of climatic warming more acutely than elsewhere in the world. This distinction makes northern Canada a prime location for the study of global warming and its implications for the planet. It also brings a degree of urgency to Canada's northern climate-related research so that the ecosystemic consequences of a warming North can be understood in time to develop and implement the appropriate adaptive responses. Canadian researchers at the federal, territorial, regional and university levels are providing leadership in this critical area while working cooperatively with other nations. This was demonstrated by our country's quarter billion dollar investment in International Polar Year (IPY), and by Canada's commitment to open a cutting-edge, world-class northern research station, CHARS, in Cambridge Bay, Nunavut in 2017.

Much scientific knowledge has been created in the seven years covered by this report. The period commences in 2007 with International Polar Year (IPY), the accomplishments of which were covered in the Polar Commission's 2012 *IPY Canadian Science Report: Highlights* (Canadian Polar Commission, 2012), as well as in a number of other reports and journal articles (e.g. Environment Canada, 2010; Fisheries and Oceans Canada, 2010a; Aboriginal Affairs and Northern Development Canada, 2012a; Kulkarni et al., 2012; Parlee & Furgal, 2012; Perrie et al., 2012; Derksen et al., 2012; Melling et al., 2012; Barber et al., 2012a & b; Tremblay et al., 2012b; Darnis et al., 2012; Henry et al., 2012; Ferguson et al., 2012). IPY, with its increased cooperation between scientists and communities, significantly improved our understanding of Canada's North, contributing greatly to predictive modeling and decision making. The international Working Groups of the Arctic Council, currently under Canada's leadership, continue to undertake collaborative research to better understand environmental change, the associated impacts and potential ways forward. As well, major interdisciplinary initiatives such as ArcticNet and the Beaufort Regional Environmental Assessment are working with local people to collaboratively advance our knowledge of Canada's Arctic marine and coastal environments. As successful as these initiatives have been, critical knowledge gaps remain. Unless they are addressed expeditiously, the consequences for northern ecosystems and northern communities could be severe and the costs to the country significant.

### **Recent Advances and Current Challenges**

#### **Cryosphere**

- **Sea ice is changing:** The extent and duration of sea ice has been rapidly declining in recent years, with the 2012 minimum extent the lowest on satellite record (Arctic Monitoring and Assessment Program, 2012; National Snow and Ice Data Center, 2014). Projections now indicate that the Arctic Ocean will be almost ice-free during late summer by mid-century (Arctic Monitoring and Assessment Program, 2012).
- **Glaciers and ice caps are melting more rapidly:** The rate of glacier mass loss in the Canadian High Arctic has increased extensively since 2000 (Environment Canada, 2010; Sharp et al., 2012). These melting glaciers and ice caps may contribute as much freshwater to the Arctic Basin as the Greenland Ice Sheet (Wolken et al., 2013), with significant implications for ocean circulation and global climate (Arctic Monitoring and Assessment Program, 2012).
- **Permafrost is warming and losing integrity:** Analysis of long-term records indicates that permafrost is warming across almost all regions of northern Canada and the US, with greater warming in colder permafrost and in sites above treeline (Smith et al., 2010). For example, at Alert, Nunavut the rate of warming has been increasing since 2000, with permafrost temperatures in 2012 being the highest since measurements began in 1978 (Romanovsky et al., 2013). Widespread monitoring activities have contributed to a better understanding of the current thermal state of permafrost and the impact of environmental factors and substrate characteristics on permafrost integrity (Environment Canada, 2010; Smith et al., 2010; Bonnaventure et al., 2012; Throop et al., 2012).

## Ocean and Marine Ecosystems

- **Changing ocean ecosystems:** An integrated assessment of the physical, chemical, and biological structure of sub-Arctic and Arctic waters found that ocean currents are shifting, non-Arctic species are encroaching, food webs are changing, and the ocean is acidifying (Fisheries and Oceans Canada, 2010a). Current and anticipated impacts of climate change on fish species include the northward migration of species, competition with invasive species, and changes in population size, distribution and recruitment (e.g. Reist et al., 2006; Prowse et al., 2009; Fisheries and Oceans Canada, 2010a; Chavarie et al., 2010).
- **Important ecological areas:** In order to support ecosystem-based management, ecologically and biologically significant areas (EBSAs) have been identified across Canadian waters (Paulic et al., 2009; Fisheries and Oceans Canada, 2010b, 2011 & 2013), with a detailed assessment of the Beaufort Sea (Cobb et al., 2008; Beaufort Sea Planning Office, 2009; Niemi et al., 2012). The Canadian Arctic Archipelago was noted as particularly significant given its multi-year ice, the high productivity of Lancaster Sound, and its association with the Northwest Passage (Fisheries and Oceans Canada, 2011).
- **Informing fisheries management:** In addition to the impacts of climate change, recent gains in knowledge regarding anthropogenic activities (e.g. van der Velden et al., 2013a & b), commercial fisheries (e.g. Dempson et al., 2008; Zeller et al., 2011), and subsistence fisheries (e.g. Roux et al., 2011; Felt et al., 2012) will help inform conservation and sustainable fishery management plans.
- **National maritime boundaries:** Recent seismic and bathymetric surveys have been undertaken to assist in defining the extended limits of Canada's continental shelf. This has significantly advanced our understanding of the sea floor and sub-sea geology of the Arctic Ocean, the product in many cases of cutting-edge joint international effort. This knowledge is needed for seeking international recognition of Canada's sovereign limits under the United Nations Convention on the Law of the Sea (UNCLOS), and in turn the rights to the related seabed resources as well as jurisdiction over scientific research within these limits (Foreign Affairs, Trade and Development Canada, 2012).

## Terrestrial Ecosystems

- **Declining caribou populations:** Many populations of caribou and reindeer across the circum-Arctic have been in decline (Vors & Boyce, 2009), including most herds of migratory tundra caribou in Canada (Festa-Bianchet et al., 2011). Although tundra caribou populations fluctuate with multi-decadal cycles, changes in harvest technologies, climate change, and increases in industrial development and human presence are prompting concerns over the ability of populations to recover from the recent declines (Festa-Bianchet et al., 2011). Meanwhile, extensive gains in understanding of the diversity and impacts of caribou pathogens (Ducrocq et al., 2012; Forde et al., 2012; Hoar et al., 2012; Hoberg et al., 2012; Kutz et al., 2012) will be integral to informing management decisions.
- **Food webs and climate change:** The IPY project ArcticWOLVES has improved knowledge of the linkages within Arctic food webs (Gauthier & Berteaux [Eds.], 2011), enabling better predictions of climate change impacts on species. For example, climate change may increase goose populations via an expansion of suitable range, however this may be counteracted by mismatches in the dates of hatching and peak food quality, by increased polar bear predation, and by habitat loss due to permafrost degradation (Gauthier & Berteaux [Eds.], 2011).
- **Tundra shrub expansion:** There is widespread evidence of circum-Arctic vegetation change, and specifically an increase in deciduous shrubs (Hudson & Henry, 2009; Jia et al., 2009; Forbes et al., 2009; Elmendorf et al., 2012b; Epstein et al., 2012; Ropars & Boudreau, 2012; Tremblay et al., 2012a). As berry-producing plants get shaded out by taller shrubs, berry production may decline, with important implications for the health and culture of Northerners (Lévesque et al., 2012) and for wildlife habitats.

## Pollutants and Contaminants

- **Pathways for impact:** Contaminant cycling, bio-accumulation, and human exposure is becoming better understood (Ancil [prepared by], 2008; Arctic Monitoring and Assessment Program, 2009a and 2011;



### *ArcticNet: Together, tackling the impacts and opportunities of the changing Canadian Arctic*

Climate change and modernization are having significant impacts on the people and the ecosystems of the Canadian Arctic. ArcticNet, a Network of Centres of Excellence of Canada, is working with its partners in Canada's four Inuit regions—the Inuvialuit Settlement Region, Nunavut, Nunavik, and Nunatsiavut—as well as with stakeholders from the public, private, and government sectors, to focus its research efforts on priority issues for Canadians as they deal with today's challenges and opportunities.

As part of this ongoing effort, ArcticNet has released the first of four regional impact studies, Nunavik and Nunatsiavut: From Science to Policy. An Integrated Regional Impact Study (IRIS) of Climate Change and Modernization. The document, a synthesis of research results, makes recommendations to policy makers, highlighting key concerns for Canadians such as human health, safety and security, infrastructure vulnerability, and resource exploitation in the changing Canadian North.





Donaldson et al., 2010; Conservation of Arctic Flora and Fauna, 2010; Chan et al., 2012; Aboriginal Affairs and Northern Development Canada, 2012b; Northern Contaminants Program, 2012; Donaldson et al., 2013).

- **Increasing levels of some contaminants:** Mercury toxicity remains a major concern since the levels in certain Arctic species have continued to rise despite reduction in emissions from anthropogenic activities in some parts of the world over the past 30 years (Arctic Monitoring and Assessment Program, 2011).
- **Decreasing levels of many pollutants:** The levels of many persistent organic pollutants (POPs) in Arctic air and biota have been declining, in association with historic decreases in emissions (Arctic Monitoring and Assessment Program, 2009a; Muir & de Wit, 2010).

### Monitoring

- **Large-scale regional initiatives:** Environmental monitoring and reporting at the territory level continues to provide baseline and trend information on climate and weather, air quality, snow and ice, vegetation, and marine, freshwater, and terrestrial fish and wildlife. This is helping to inform resource development activities and wildlife management through the Nunavut General Monitoring Plan (Nunavut General Monitoring Plan, 2012), the State of the Environment reports of the governments of the NWT and Yukon (Environment and Natural Resources – Government of the Northwest Territories, 2012; Environment Yukon – Government of Yukon, 2013), and the NWT Cumulative Impact Monitoring Program (Environment and Natural Resources – Government of the Northwest Territories, 2012).
- **Circum-Arctic initiatives:** Both on-going and recently established monitoring initiatives and networks are furthering understanding of the interconnected impacts of environmental change on wildlife and terrestrial ecosystems. Examples include the Arctic Council's Circumpolar Biodiversity Monitoring Program (CBMP) (Gill et al., 2008), the CircumArctic Rangifer Monitoring and Assessment Network (CircumArctic Rangifer Monitoring and Assessment Network, n.d.), the International Tundra Experiment (ITEX) (Elmendorf et al., 2012a), and the Arctic Program for Regional and International Shorebird Monitoring (Arctic PRISM) (Environment Canada, 2012).
- **Technological developments:** Enhanced ecological monitoring of federal parks and reserves across the North can be facilitated by new remote sensing protocols developed and tested under the ParkSPACE program from 2008-2012 (Natural Resources Canada, 2011; Parks Canada, 2012).
- **Community-based monitoring:** Some of the challenges and opportunities with respect to community-based monitoring are better understood (Huntington, 2008; Johnson et al., 2013).

## Knowledge Gaps and Research Opportunities

### **Cryosphere:** *Further knowledge is needed respecting*

- climate-vegetation-hydrology-permafrost relationships, feedback loops, and the broader ecosystem implications of warming permafrost (Arctic Monitoring and Assessment Program, 2012)
- subsurface carbon, methane and contaminant stores estimates and characterization in order to determine the potential for their release into the atmosphere as permafrost and seabeds warm, as well as the resulting feedbacks to the atmospheric carbon cycle (Smith et al., 2010; Arctic Monitoring and Assessment Program, 2012; Xu et al., 2013)
- socio-economic and environmental impacts of a changing cryosphere, including impacts on resource development, marine productivity, and northern lifestyles (Arctic Monitoring and Assessment Program, 2012)
- permafrost change and terrain instability through improved mapping and modeling to facilitate the development of adaptive management plans for communities.

### **Ocean and Marine Ecosystems:** *Further knowledge is needed respecting*

- ocean-ice-atmosphere interactions and the effects on marine ecosystems to better predict future cryospheric change and implications for resource management, communities, and economies (Arctic Monitoring and Assessment Program, 2012; Council of Canadian Academies, 2012; National Science and Technology Council, 2013)

- long-term impacts of climate change, ocean acidification and invasive species on marine biodiversity, especially as they relate to ecosystem services and human health and well-being (Archambault et al., 2010; Council of Canadian Academies, 2012; Fisheries and Oceans Canada, 2012)
- fish life history traits and population trends (Felt & Natcher, 2011; Five Arctic Coastal States, 2013) and the cumulative impacts of climate change and anthropogenic activities (Conservation of Arctic Flora and Fauna, 2013) to inform sustainable fisheries management
- measures to enable and encourage the participation of coastal communities in marine management and governance (Council of Canadian Academies, 2012).

### ***Terrestrial Ecosystems: Further knowledge is needed respecting***

- changing ecosystem structure, including its nature, rate of change and associated implications. This includes changes in tundra vegetation and soil community composition (Callaghan et al., 2011; Elmendorf et al., 2012b; Henry et al., 2012), the boreal to tundra transition (Jia et al., 2009; Lévesque et al. 2012; Scheffer et al., 2012), and encroachment by southern species (Post et al., 2009; Hofgaard et al., 2012)
- reproductive timing, including the cues for breeding timing and the impacts of mismatches in reproduction and peak food resources on growth, survival, and recruitment to help manage wildlife populations and identify species at risk (Gauthier & Berteaux [Eds.], 2011)
- wildlife population sizes, trends, and geographic ranges of animals, and the impacts of habitat alteration and other ecological changes in order that rapid declines can be detected before populations become threatened. This data is presently lacking for caribou populations and is essential for the development of caribou and land-use management plans (Festa-Bianchet et al., 2011).

### ***Pollutants and Contaminants: Further knowledge is needed respecting***

- the effects of local sources of contaminants, such as fuel spills and abandoned mines (Northern Contaminants Program, 2014)
- how global climate and socio-economic changes affect emissions, movement and accumulation of contaminants in order to better predict environmental and human health impacts (Muir & de Wit, 2010; Stow et al., 2013)
- impacts of contaminants on human development and health including effects on physical, cognitive, behavioural, and emotional development from infancy through to adulthood, as well as implications for diabetes, cardiovascular disease, other chronic diseases, and immune system function (Donaldson et al., 2013)
- how people perceive and act upon information regarding contaminant risks, and how to best communicate contaminant information to a variety of audiences to mitigate human health risks (Donaldson et al., 2013).

### ***Environmental Monitoring: There is a need to***

- further develop and optimize monitoring networks with dedicated long-term funding to support their maintenance and operation in order to continue providing baseline and trend data to support sound decision-making in prioritized geographic areas. As well, better coordination is needed between site-based (e.g. research stations), regionally-based (e.g. programs based on regional areas or themes such as caribou herds), and remotely-based (e.g. satellite and aerial observing systems) research and monitoring systems to help integrate knowledge across these scales (Christensen et al., 2013)
- increase environmental baseline research for a range of ecosystem components through geographically broad and representative networks to inform decision-making (Conservation of Arctic Flora and Fauna, 2010 & 2013; Arctic Monitoring and Assessment Program, 2012), especially in areas where changes are occurring in the absence of adequate baseline data
- increase community involvement in monitoring through low-cost, low-maintenance and easy-to-deploy tools that can be used for outreach and capacity building by engaging stakeholders such as the northern colleges and community organizations (Post et al., 2009; Stow et al., 2013).



#### ***CHARS: Arctic Science and Technology: Building a Research Station in Canada's Arctic – the Canadian High Arctic Research Station***

The Canadian High Arctic Research Station, or CHARs, is being built in Cambridge Bay, Nunavut and is a signature initiative of Canada's Northern Strategy.

Through a series of workshops, commissioned studies and reports, Aboriginal Affairs and Northern Development Canada has sought advice and engaged Inuit and other Northerners, members of the Cambridge Bay community, Aboriginal organizations, academia, government (federal and territorial) and the private sector. This broad range of scientific and institutional experience and geographic scope has informed the design of the infrastructure as well as the science and technology (S&T) research program that will be undertaken.

Acting on the proposed plans for CHARs, the Government of Canada announced an investment of \$142.4 million over six years for the construction, equipment, and fit-up of CHARs and an additional \$46.2 million over six years for the phase-in of its S&T program. As of 2018-2019, an additional \$26.5 million has been set aside for the ongoing program and operations of the station.

As Northerners are engaging more and more in cutting-edge S&T to address their needs and to adapt to the changing North, CHARs will provide a world-class hub that complements and that further strengthens the network of smaller regional research facilities across Canada's North.

The new station will strive to provide a suite of services including a technology development centre, a knowledge sharing centre, and advanced laboratories, such as a necropsy lab. Both the infrastructure and the S&T program will focus on the mandated themes of: Resource Development; Exercising Sovereignty; Strong and Healthy Communities; and Environmental Stewardship and Climate Change.







---

## Concluding Observations

---

This report recognizes that Northerners have a central role in shaping their destinies and the destiny of their region, and this should apply to the research that underpins the policies and programs influencing those destinies. Thus, northern research experts and practitioners were consulted extensively from the outset of our work to ensure that northern views and values prevailed in this report. This consultation also helped to ensure that the research opportunities this report identifies are relevant to Northerners.

This report was guided by another principle important to effective “knowledge to action” research. That is the premise of the inter-related nature of all things. This is the basis of the four cross-cutting themes along which this report’s findings are organized. It is also the basis for these concluding observations. If research is to successfully address the challenges of Canada’s North, it must reflect the elegant complexity inherent in that North and in its peoples. In the highly differentiated world of science this demands conscious collaboration and deliberate cross-disciplinary effort. It also demands continued openness to Aboriginal ways of knowing. Especially in the North, traditional knowledge should not be viewed as supplementary to western science, but rather as a model of the very cross-cutting research values advocated throughout this report. The concluding observations of this report are intended to demonstrate those values.

The focus of the concluding observations is on ways in which northern capacity can be increased to support greater involvement of Northerners in research and decision-making. Numerous challenges are also faced by southern-based researchers when conducting research in the North. They include, but are not limited to establishing and maintaining relationships with communities; satisfying an array of permitting, research licensing and funding agency requirements; incorporating traditional knowledge; and securing adequate funding for all stages of the research process including consultation and dissemination of findings with Northern communities. While these are important challenges to address, they are outside of the scope of this report.

### **Preparing for Large-Scale Resource Development: Mitigating Impacts, Maximizing Benefits**

Canada’s North has an enviable resource endowment providing diverse employment opportunities, with some of the highest skilled and semi-skilled wages in the country. The region’s resource development sector, however, continues to rely on southern-based workers to meet its labour requirements while Aboriginal Northerners who lack the requisite education and skills remain disproportionately unemployed or under-employed. This paradox illustrates perhaps the most significant resource development issue facing the region today: the job-readiness gap relating to the region’s Aboriginal peoples. Its causes are complex, rooted simultaneously in the region’s dual economy, educational and training methods, high school success rates, labour mobility, cultural norms, family and community structures, as well as social and personal circumstances.

These causal factors lend themselves well to cross-disciplinary, collaborative research responses integrating the specialized knowledge of cultural anthropologists, educational theorists, industry, workers and union officials, Aboriginal elders, community-based researchers, labour market analysts, adult educators, school boards and government. Cross-disciplinary synergies, difficult at first to realize, could launch more true-to-life, evidence-based, and perhaps more integrated solutions to the challenge of Aboriginal participation, including those which address the skills shortage. Northern society stands to gain significantly from the direct and indirect economic and fiscal benefits that those solutions imply.



#### **WWF Canadian Arctic Program: Polar Bear sea-ice habitat— future scenarios in the Arctic Archipelago**

Reductions in Arctic sea ice extent, thickness and duration have raised concerns about the long-term future of polar bears. The Arctic Archipelago is an important future refuge for ice-dependent species like the polar bear. The WWF has developed and funded an interdisciplinary research collaboration with the University of Alberta, McGill University and the Nunavut Department of Environment to investigate the potential future of polar bears in the Arctic Archipelago. WWF developed the concept, Nunavut Department of Environment provided their archive of polar bear location data, McGill University developed the sea ice projections (2006-2100), and University of Alberta contributed its polar bear ecology and habitat modeling expertise. By working together it is possible to model critical thresholds of habitat loss and the potential effects on polar bear distribution and populations. The results are anticipated to be beneficial in the development of long-term polar bear conservation and management.



### ***Increasing Community Sustainability: Affordability***

The geographic realities of the North make it a uniquely high-cost environment. This makes “affordability” one of the most fundamental challenges to the sustainability of communities in the region. The concept of affordability places cost of living in the multi-variant context of income and livelihood, economics, social economy, mobility, community infrastructure, access to health and social services, socio-cultural circumstances and wild game endowment.

Affordability is most critical in the region's smaller communities that are faced with higher transportation costs, lower incomes, remoteness from central services, diseconomies of scale, and lower levels of educational attainment. Further collaborative work can be helpful in identifying innovative ways to reduce the high cost of living, increase income levels, and optimize resources to support the sustainability of these smaller communities.

Climate change, with its impacts on community and transportation infrastructures and building integrity, imposes one of the most acute affordability challenges throughout the region now and in the foreseeable future. This is due to increased weather extremes and permafrost degradation that are among its consequences. These factors make improved modeling essential for the evidence-based plans, policies, programs, procedures and product development needed to avert the very significant affordability implications of climatic change for all northern communities. Effective mitigation calls for more research collaborations involving physical scientists, traditional knowledge practitioners, planners, building technologists and engineers in partnership with the communities affected by these changes.

### ***Strengthening Resilience: Mental Wellness***

The mental wellness of the North's Aboriginal peoples is critical to the region's vitality and success. Cultural dislocation, rapid social and economic change and a “colonial” past—epitomized in the residential school system—have left a legacy of dysfunction that by extension touches every Northerner. The issue of mental wellness manifests itself across all aspects of northern life: emotional, spiritual, physical health, educational, economic, familial, societal. It is evident in correctional facilities and in treatment centres across the North. Its common yet multi-variant roots and its inter-related consequences call for a more integrated approach to the research that will inform the various policies and programs intended to deal with this complex issue. This integrated approach must have a strong community base while responding to ethnographic, gender and age diversity.

In a more populous region, an issue of this magnitude might give rise to a special research institute integrating the work of psychologists, cultural anthropologists, shamans, educational theorists, curriculum professionals, political scientists, historians, language specialists, traditional healers, linguists, elders and experts in early childhood development, all vigilantly focused on the related objectives of cultural integrity, language preservation, empowerment, recovery, treatment and healing. In the absence of such an institution, the North and its sub-regions must find ways of mirroring this integrative research mode through pooled resources, enhanced communication, collaborative efforts and strong leadership. Aboriginal heritage, research and training institutes exist within the region, many of them concerned with healing; in addition, an Aboriginal mental wellness research network exists in southern Canada. These could form the collective nucleus around which a broader, rigorous, northern-oriented research effort could be built. At stake are human cultures and human potential, neither of which can be recovered once lost.

Also at stake, in the case of suicide, are human lives. The problem is particularly acute among Aboriginal youth, especially Inuit youth for whom suicide accounts for one half of all deaths (Oliver et al., 2012). That is 11 times the national average and twice the rate of First Nations' young people (Health Canada, 2013). Enhanced knowledge that could underpin a comprehensive suicide prevention strategy is urgently needed for the North incorporating strength, resilience and protective factors (McMaster Health Forum, 2012) and built on a variety of coordinated research foundations including comparative analysis of the influence of life events on suicide risk and an evidence-based assessment of culturally sensitive intervention models (Aboriginal Affairs and Northern Development Canada, 2012c). Ethnographic variables need to be considered to facilitate transferability across cultural lines. Collaborative and community-based approaches will be necessary, involving health workers, youth, psychologists, elders, doctors, nurses, public health educators and community leaders.

## ***Understanding Environmental Change: Integrated, Long-term Monitoring***

Sophisticated, high quality monitoring data is critical to our understanding of the causes and consequences of rapid environmental change in the North. It is also paramount if Northerners are to adapt their communities and diversify their livelihoods accordingly.

Current monitoring efforts in the North could benefit from greater coordination that encompasses a more global, long-term perspective to better generate outputs that have broader applicability. This suggests a need for more comprehensive, better organized, and integrated monitoring systems that:

- balance technical sophistication with community capabilities and values
- cover in an integrated manner the necessary continuum of spatial scales from site-based sampling to satellite-based remote sensing
- span a representative range of ecosystems and geographical regions
- serve the necessary breadth of interrelated research disciplines
- better capture data generated by resource development projects, and
- are sustainable to facilitate the collection of long-term data and observations.

Implementing well-structured, broader monitoring systems will produce more robust, meaningful, applicable, standardized data thereby enabling more reliable modeling.

Monitoring also needs to focus on community involvement through attention to community needs and values, the active engagement of community members and the incorporation of their unique local knowledge and perspectives. For research integrity purposes, this extends to their participation in developing, implementing, and evaluating monitoring programs. A local focus is also necessary if monitoring is to keep up with the real time, rapid rate of change on the ground. It is also required if Northerners, especially Aboriginal Northerners, are going to have faith in the products of that monitoring. Finally, community involvement can be a window on traditional knowledge and the additional dimensions that that form of knowledge can lend to physical and social sciences in the North.

## ***Additional Observations: Northern Capacity Building***

Input to this study by northern researchers and practitioners, corroborated by peer-reviewed and “grey” literature, signals a desire for more community-based, culturally relevant, and locally-driven research across the North. Increased northern capacity building can help in supporting greater involvement of Northerners in knowledge creation and research decision-making.

The increased empowerment of Northerners stemming in part from devolution, self-government agreements, and land claims obligations and conditions is changing the way in which governmental policy is developed and implemented. Strengthened capacity is also important in this regard. In some regions of the North where school attendance and educational attainment is low, collaborative research could inform strategies and programs to better engage and support students and their families. The following additional measures would stimulate increased northern involvement in northern knowledge creation:

- 1) Increased outreach, engagement and education support for Northern elementary and secondary students, teachers and boards of education
- 2) Increased levels and availability of targeted higher education based in the North, including additional college-based degree partnerships with southern institutions



***Scotty Creek: Studying changing northern boreal landscapes***

The integrative research program at Scotty Creek, a lowland site surrounded by black spruce and muskeg near Fort Simpson, Northwest Territories, exemplifies the importance of partnerships in northern research. There, scientists from university, federal and territorial agencies—with diverse expertise, interests, and objectives—are studying the landscape change that is occurring as discontinuous permafrost under the forest disappears rapidly due to climate warming. The hydrology and ecology is changing and affecting wildlife habitat, a major concern to neighbouring communities and First Nations. These local groups have become partners in the program’s field research and planning. Regular consultations with local partners provide opportunities for exchange of information, advice and support, and these have enhanced the program’s success at every stage. Scotty Creek represents one of Wilfrid Laurier University’s key nodes in the NWT, contributing to a formal ten-year research and training partnership between Laurier and the territorial government.





- 3) The extension of eligibility for funding from the three federal funding agencies\* to the region's public colleges, their affiliated research institutes and other qualified northern research establishments
- 4) Increased research partnerships involving Aboriginal governments and their affiliated research institutes
- 5) More field-based and other meaningful mentored research relationships
- 6) An examination of integrated capacity-building opportunities involving northern research institutes, southern-based research institutes and the nascent Canadian High Arctic Research Station (CHARS) and its pan-northern research program
- 7) Development of mechanisms and policies to nurture and expand the resident northern research community
- 8) Greater acknowledgement of the northern knowledge industry as a distinct economic sector with growth needs and income-generating potential.

Steps such as these would prompt increased northern ownership of northern research and the outcomes of that research. Additionally, it could infuse an already exemplary and dynamic research community with even greater energy and creativity, leveraging Canada to new heights of northern knowledge creation.

\* The three federal funding agencies are a major source of research funding for post-secondary institutions in Canada. They include the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Social Sciences and Humanities Research Council (SSHRC). All research that is funded by the tri-agencies must be in accordance with the Agreement on the Administration of Agency Grants and Awards by Research Institution (see <http://science.gc.ca/default.asp?lang=En&n=56B87BE5-1>) and the Tri-Agency Framework: Responsible Conduct of Research (see <http://www.rcr.ethics.gc.ca/eng/policy-politique/framework-cadre/#2>).





## Acknowledgements *The following is a list of individuals who have provided their input and feedback for this report:*

---

Frances Abele – Professor, School of Public Policy and Administration, Carleton University

Paul Adlakha – Program Sustainability, LOOKNorth

Coordinated input from individuals at Air Quality Research Division, Environment Canada

Peter Allen – Principal, Nexus Group

Tom Andrews – Territorial Archaeologist, Prince of Wales Northern Heritage Centre

Andrew Applejohn – Senior Science Advisor, Department of Environment and Natural Resources, Government of the Northwest Territories

Helen Balanoff – Executive Director, Northwest Territories Literacy Council

David Barber – Professor, Faculty of Environment, Earth and Resources and Canada Research Chair Tier I, Arctic System Science, University of Manitoba

Karen Barnes – President, Yukon College

Elizabeth Beckett – Acting Senior Policy Advisor, Atlantic Canada Opportunities Agency

Trevor Bell – Professor, Department of Geography, Memorial University

Paul Berger – Associate Professor, Faculty of Education, Lakehead University

Fikret Berkes – Distinguished Professor and Canada Research Chair, Natural Resources Institute, University of Manitoba

Mitch Bloom – Vice President, Policy, Planning, Communications and Northern Projects Management Office, Canadian Northern Economic Development Agency

Adrian Boyd – Director, Policy, Nunavut Planning Commission

Birgit Braune – Research Scientist, Ecosystem Health Research, Environment Canada

Carol Brice-Bennett – Director of Aboriginal Health Programs and Research, Labrador Grenfell Health

Chris Burn – Professor, Geography and Environmental Studies, Carleton University

Dollie M. Campbell – Fisheries Biologist, Nunavik Research Centre

Hector Campbell – Director, Resource, Planning and Regulatory Affairs, Yukon Energy

Laurie Chan – Full Professor, Department of Biology and Canada Research Chair in Toxicology and Environmental Health, University of Ottawa

Susan Chatwood – Executive Director, Institute for Circumpolar Health Research

Graeme Clinton – Principal, Impact Economics

Marie Clément – Research Scientist, Centre for Fisheries Ecosystems Research, Fisheries and Marine Institute in partnership with the Labrador Institute

Ken Coates – Professor and Canada Research Chair in Regional Innovation, University of Saskatchewan

Dawn Conway – Executive Director, Canadian Climate Forum

Andre Corriveau – Chief Medical Officer, Government of the Northwest Territories

Greg Cousineau – Senior Transportation Planner, Department of Transportation, Government of the Northwest Territories

Richard Cracknell – Manager, Technical Services, Public Works & Services, Government of the Northwest Territories

Kim Crockatt – Executive Director, Nunavut Literacy Council

Michael Crowe – Executive Director Policy and Partnerships, Meteorological Service of Canada

Suzanne De La Barre – Professor, Recreation/Tourism, Vancouver Island University

Mike Demuth – Glaciology Research Scientist, Natural Resources Canada

Cindy Dickson – Executive Director, Arctic Athabaskan Council

Bill Doidge – Director, Nunavik Research Centre

Guy Doré – Professor, Department of Civil Engineering, Université Laval; Yukon Cold Climate Innovation Centre Natural Sciences and Engineering Research Council Industrial Research Chair in Heavy Load, Climate and Pavement Interaction

Marianne Douglas – Professor, Earth & Atmospheric Sciences, University of Alberta

Marlene Doyle – Science Officer, Landscape Science and Technology, Environment Canada

Lori Duncan – Director, Health and Social Services, Council of Yukon First Nations

Megan Duncan – Environmental Coordinator, Environmental Public Health, Health Canada

John England – Professor Emeritus, Department of Earth and Atmospheric Sciences, University of Alberta

Jo-Anne Falkiner – Director, Policy & Planning, Department of Environment, Government of Nunavut

Louis Fortier – Professor, Department of Biology, Université Laval

Watson Fournier – Director General, Kativik Municipal Housing Board

Erin Freeland Ballantyne – Board Member and Founder, Dechinta Bush University

Milton Freeman – Professor Emeritus of Anthropology, University of Alberta

Frédéric Gagné – Director, Municipal Public Works, Kativik Regional Government

Shari Gearheard – Research Scientist II, National Snow and Ice Data Center and Co-Chair of the Ittaq Heritage and Research Centre of Clyde River, Nunavut

Peter Geller – President, Association of Canadian Universities for Northern Studies

Michael Gill – Wildlife Biologist, Northern Conservation Division, Environment Canada

Christina Goldhar – Environmental Protection Analyst, Nunatsiavut Government

Neil Greig – Director of Economic Development and Marine Division, Makivik Corporation

Minnie Grey – Executive Director, Nunavik Regional Board of Health and Social Services

Kiah Hachey – Policy Analyst - Health, Department of Social and Cultural Development, Nunavut Tunngavik Inc.

Siu-Ling Han – Unit Head, Eastern Arctic, Canadian Wildlife Service, Environment Canada

Brendan Hanley – Chief Medical Officer, Government of Yukon

Chris Hawkins – Vice President, Research, Yukon Research Centre, Yukon College

Gwen Healey – Executive Director, Qaujigiartiit Health Research Centre

Perry Heath – Director, Infrastructure Planning, Health & Social Services Department, Government of the Northwest Territories

Greg Henry – Professor, Biogeography, University of British Columbia

David Hik – Professor, Department of Biological Sciences, University of Alberta

Andrew Hodgkins – Researcher, Ph.D., University of Alberta

Susan Hopkins – Director, Planning, Research & Evaluation, Education, Culture and Employment, Government of the Northwest Territories

Angela James – Director, Early Childhood & School Services; Education, Culture & Employment, Government of the Northwest Territories

Amelie Janin – Industrial Research Chair, Yukon Research Centre

Ric Janowicz – Manager, Hydrology, Government of Yukon

Lawrence Joe – Director, Lands and Resources, Champagne and Aishihik First Nation

Margaret Johnston – Professor, School of Outdoor Recreation, Parks & Tourism, Lakehead University

Coordinated input from individuals at Joint Health and Social Services, Government of Nunavut

Julian Kanigan – Section Head, Cumulative Impact Monitoring Program, Aboriginal Affairs and Northern Development Canada

Cheri Kemp-Long – Senior Project Manager, Headquarters, Iqaluit, Canadian Northern Economic Development Agency

Malcolm King – Scientific Director, Canadian Institutes of Health Research, Institute of Aboriginal Peoples Health

Elizabeth Kingston – General Manager, Nunavut Office, NWT & Nunavut Chamber of Mines



Michelle Kinney – Deputy Minister, Department of Health and Social Development, Nunatsiavut Government

Sabrina Kinsella – Health Research Analyst, Yukon Government

Shawn Kitchen – Assistant Deputy Minister, Advanced Education, Yukon Department of Education

Ingrid Kritsch – Research Director, Gwich'in Social and Cultural Institute

Susan Kutz – Associate Professor, Ecosystem Public Health, University of Calgary

Elena Labranche – Assistant to the Director, Public Health Department, Nunavik Regional Board of Health and Social Services

Caroline Larrivée – Program Coordinator, Built Environment and Northern Environment, Impacts and Adaptation, Ouranos

Alain Leclair – Geo-mapping for Energy and Minerals Coordinator, Natural Resources Canada

Olivia Lee – Manager, Infrastructure and Project Management, Municipal and Community Affairs, Government of the Northwest Territories

Joe Linklater – Chief, Vuntut Gwitchin First Nation

David Livingstone – Land Use Planner/Biologist, Aboriginal Affairs and Northern Development Canada (former)

Dave Lough – Deputy Minister of Culture, Recreation and Tourism, Nunatsiavut Government

Brian Lyall – Implementation Analyst, Nunatsiavut Government

Bruce MacDonald – Manager, Canadian Wildlife Service, Environment Canada

Jennifer Macgillivray – Director, Infrastructure Development, Yukon Government

Jim Martin – Senior Policy Advisor, Priorities and Planning, Tlicho Government

Humfrey Melling – Research Scientist, Institute of Ocean Sciences, Fisheries and Oceans Canada

Christine Michel – Research Scientist, Marine Productivity, Arctic Aquatic Research Division, Fisheries and Oceans Canada

Stephen Mooney – Director, Cold Climate Innovation Centre, Yukon Research Centre, Yukon College

David Moore – Assistant Director, Pollutants, Inventory and Reporting, Science and Risk Assessment, Environment Canada

David Muddiman – Masters of Arts in Public Administration Candidate, Carleton University

Rita Mueller – Assistant Deputy Minister, Education, Culture and Employment, Government of the Northwest Territories

Mishal Naseer – Regional Planner, Nunavik Marine Region Impact Review Board

Dave Nightingale – Director, Energy Planning, Industry, Tourism and Investment, Government of the Northwest Territories

Verdun Noel – Economic Development Advisor, Whitehorse, Canadian Northern Economic Development Agency

Kevin O'Reilly – Executive Director, Independent Environmental Monitoring Agency

Coordinated input from individuals at Ocean, Coastal & River Engineering Section, National Research Council

Aynsle Ogden – Senior Science Advisor, Yukon Government

Serge Payer – Associate Director, Transportation, Kativik Regional Government

Serge Payette – Professor, Department of Biology, Université Laval

John Percival – Program Manager, Geo-Mapping for Energy and Minerals, Geological Survey of Canada, Natural Resources Canada

Marc Perreault – Acting Director, Program Delivery, Yukon Housing Corporation

Filip Petrovic – Science Officer, Aboriginal Affairs and Northern Development Canada

Annie Popert – Director General, Kativik School Board

Coordinated input from individuals at Public Health Agency of Canada

Seth Reinhart – Manager, Nunavut General Monitoring Plan, Aboriginal Affairs and Northern Development Canada (former)

Carolyn Relf – Director, Yukon Geological Survey

John Robson – Manager Design Development, Northwest Territories Housing Corporation

Thierry Rodon – Northern Sustainable Development Research Chair, Université Laval

Steve Rose – Director Policy, Planning and Research, Economic Development, Government of Yukon

Lia Ruttan – Manager of Social Science Research, Aurora Research Institute

Mark Salvor – Senior Policy Analyst, Industry, Tourism and Investment, Government of the Northwest Territories

Clint Sawicki – Director, Office of Research Services, Yukon Research Centre, Yukon College

Pippa Secombe-Hett – Director, Aurora Research Institute

Bill Semple – Senior Northern Housing Researcher, Canada Mortgage and Housing Corporation

Kelland Sewell – Manager, Risk and Policy, Qulliq Energy Corporation

Tom Sheldon – Director, Environment Division, Nunatsiavut Government

Jamal Shirley – Manager, Research Design and Policy Development, Nunavut Research Institute

Manon Simard – Parasitologist, Nunavik Research Centre

Frédéric Sirois – Policy Analyst, Transport Canada

Scott Slocombe – Professor, Department of Geography and Environmental Studies, Wilfred Laurier University

Kent Smedbol – Manager, Ocean and Ecosystem Sciences Division, Fisheries and Oceans Canada

Sharon Smith – Permafrost Research Scientist, Natural Resources Canada

Simon Smith – Coordinator, Northern Contaminants Program, Aboriginal Affairs and Northern Development Canada

Kam So – Corporate Capital Planner, Public Works & Services, Government of the Northwest Territories

Chris Southcott – Professor, Department of Sociology, Lakehead University

Matthew Spence – Director General, Northern Projects Management Office, Yellowknife, Canadian Northern Economic Development Agency

Oana Spinu – Executive Director, Nunavut Broadband Development Corporation

Marc St-Onge – Senior Research Scientist and Head, Regional Geology, Natural Resources Canada

Sara Statham – Food Security Project Coordinator, Government of Nunavut

Arielle Stockdale – Policy Analyst, Nunavut Housing Corporation

Don Taylor – Professor, Psychology, McGill University

Frank Tester – Associate Professor, School of Social Work, University of British Columbia

Mary Ellen Thomas – Senior Research Officer, Nunavut Research Institute

James Thorbourne – President, Nunatsiavut Group of Companies

Constantine Tikhonov – Chief, Surveillance and Risk Analysis, Health Canada

Scott Tomlinson – Coordinator, Northern Contaminants Program, Aboriginal Affairs and Northern Development Canada

Coordinated input from individuals at Transport Canada

Sandra Turner – Corporate Representative, Canada Mortgage and Housing Corporation

Bob Van Dijken – Director, Circumpolar Relations, Council of Yukon First Nations

Warwick Vincent – Professor, Department of Biology, Université Laval

Fiona Walton – Associate Professor, Faculty of Education, University of Prince Edward Island

Michelle Watkins – Director, Labrador Affairs Office, Government of Newfoundland and Labrador

Nadine Wells – Aquatic Sciences Biologist, Fisheries and Oceans Canada

Bill Williams – Institute of Ocean Sciences, Fisheries and Oceans Canada

Brent Wolfe – Professor, Faculty of Arts, Wilfred Laurier University

Stephen Wolfe – Research Scientist, Natural Resources Canada

Michele Wood – Health Researcher, Nunatsiavut Government

Adel Yassa – Director, Regional and Local Development, Kativik Regional Government

Paul Zorn – Ecological Integrity Branch, Parks Canada





## References

- A Northern Vision. (2011). *Paths to a renewable North: A pan-territorial renewable energy inventory*. Governments of the NWT, Nunavut, and Yukon.
- Abele, F. (2009a). The State of the Northern Social Economy: Research Prospects. *The Northern Review*, 30, 37-56.
- Abele, F. (2009b). Northern Development: Past, Present and Future. In F. Abele, T.J. Courchene, F.L. Seidle, and F. St-Hilaire (Eds.), *Northern exposure: peoples, powers and prospects in Canada's North*. Montreal, QC: Institute for Research on Public Policy.
- Aboriginal Affairs and Northern Development Canada. (2012a). *International Polar Year Canadian Science Report: Collection of Abstracts*. Ottawa, ON: Aboriginal Affairs and Northern Development Canada, Government of Canada.
- Aboriginal Affairs and Northern Development Canada. (2012b). *Synopsis of Research Conducted under the 2011-12 Northern Contaminants Program*. Ottawa, ON: Aboriginal Affairs and Northern Development Canada.
- Aboriginal Affairs and Northern Development Canada. (2012c). *Science and Technology Blueprint for the Canadian High Arctic Research Station*. Ottawa, ON: Aboriginal Affairs and Northern Development Canada [Unpublished report].
- Allard, M., Lemay, M., Barrett, M., Sheldon, T., and Brown, R. (2012). From Science to Policy in Nunavik and Nunatsiavut: Synthesis and recommendations. In: M. Allard & M. Lemay (Eds.), *Nunavik and Nunatsiavut: From science to policy. An Integrated Regional Impact Study (IRIS) of climate change and modernization*. Quebec City, QC: ArcticNet Inc.
- Anctil, M. (prepared by). (2008). *Survey Highlights. Nunavik Inuit Health Survey 2004. Qauñipitaa? How are we?* Quebec: Institut national de santé publique du Québec and Nunavik Regional Board of Health and Social Services.
- Andrews, T. D. and Buggey, S. (2008). Authenticity in Aboriginal cultural landscapes. *APT Bulletin: Journal of Preservation Technology*, 39(2-3), 63-71.
- Angell A.C., and Parkins, J.R. (2011). Resource development and aboriginal culture in the Canadian north. *Polar Record*, 47(240), 67-79.
- Aporto, C. (2010). The sea, the land, the coast and the winds: Understanding Inuit sea ice use in context. In Krupnik, I., Aporta, C., Gearheard, S., Laidler, G. J., and Kielsen-Holm, L. (Eds.), *Siku: Knowing Our Ice, Documenting Inuit Sea Ice Knowledge and Use*. Netherlands: Springer. pp. 165-182.
- Archambault, P., Snelgrove, P.V.R., Fisher, J.A.D., Gagnon, J.-M., Garbary, D.J., et al. (2010). From Sea to Sea: Canada's Three Oceans of Biodiversity. *PLoS ONE*, 5(8): e12182. doi:10.1371/journal.pone.0012182
- Arctic Council. (2009). Arctic Marine Shipping Assessment 2009 Report. Arctic Council.
- Arctic Monitoring and Assessment Program. (2009a). AMAP Assessment 2009: POPs in the Arctic. *Science of the Total Environment* 2010, 480, 2851 – 3051.
- Arctic Monitoring Assessment Program. (2009b). *Human Health in the Arctic*. Oslo, Norway: Arctic Monitoring Assessment Program.
- Arctic Monitoring and Assessment Program. (2011). *Arctic Pollution 2011*. Oslo, Norway: Arctic Monitoring Assessment Program.
- Arctic Monitoring and Assessment Program. (2012). *Arctic Climate Issues 2011: Changes in Arctic Snow, Water, Ice and Permafrost. SWIPA 2011 Overview Report*. Oslo, Norway: Arctic Monitoring Assessment Program.
- Aylward, M.L. (2009). Journey to Inuuqatigiit: Curriculum Development for Nunavut Education. *Diaspora, Indigenous, and Minority Education: Studies of Migration, Integration, Equity and Cultural Survival*, 3(3), 137-158.
- Ayres, M. (2012). *The impact of Inuit Qauñimajatuqangit on formal education in Nunavut*. (Masters thesis). Royal Roads University, Victoria, BC.
- Badry, D. and Wight Felske, A. (2013a). An examination of the social determinants of health related to health, healing and prevention of fetal alcohol spectrum disorder in a northern context- the brightening our home fires project, Northwest Territories, Canada. *International Journal of Circumpolar Health*, 72, 1-6.
- Badry, D. and Wight Felske, A. (2013b). Exploring the prevention of Fetal Alcohol Spectrum Disorder in the Northwest Territories of Canada: Brightening our home fires. *International Journal of Alcohol and Drug Research*, 2(3), 7-15.
- Balanoff, H., Chambers, C., Kaodloak, A. and Kudlak, E. (2006). "This is the way we were told...": Multiple Literacies in Ulukhaktok, Northwest Territories. Presented at the 15<sup>th</sup> International Inuit Studies Conference. Paris. Retrieved from <http://www.nwt.literacy.ca/resources/research/way/way.pdf>
- Banerji, A., Greenberg, D., White, L.F., Macdonald, W.A., Saxton, A., Thomas, E., Sage, D., Mamdani, M., Lanctôt, K.L., Mahony, J.B., Dingle, M., and Roberts, A. (2009). Risk Factors and Viruses Associated with Hospitalization Due to Lower Respiratory Tract Infections in Canadian Inuit Children: A Case-Control Study. *Pediatric Infectious Disease Journal*, 28(8), 697-701.
- Banerji, A., Panzov, V., Robinson, J., Young, M., Kaspar, N., Mamdani, M. (2013). The cost of lower respiratory tract infections hospital admissions in the Canadian Arctic. *International Journal of Circumpolar Health*, 72.
- Barber, D.G., Asplin, M.G., Raddatz, R.L., Candlish, L.M., Nickels, S., Meakin, S., Hochleim, K.P., Lukovich, J.V., Galley, R.J., Prinsenberg, S.J. (2012a). Change and variability in sea ice during the 2007-08 Canadian International Polar Year program. *Climatic Change*, 115(1), 115-133.
- Barber, D.G., Asplin, M.G., Papkyriakou, T.N., Miller, L., Else, B.G.T., Iacozza, J., Mundy, C.J., Gosselin, M., Asselin, N.C., Ferguson, S., Lukovich, J.V., Stern, G.A., Gaden, A., Pučko, M., Geilfus, N.-X., and Wang, F. (2012b). Consequences of change and variability in sea ice on marine ecosystem and biogeochemical processes. *Climatic Change*, 115(1), 135-159.
- Beaufort Sea Planning Office. (2009). *Integrated Ocean Management Plan for the Beaufort Sea: 2009 and beyond*. Inuvik, NT: Beaufort Sea Planning Office.
- Benoit, L. (2012). *Resource Development in Northern Canada*. Report of the Standing Committee on Natural Resources, 41<sup>st</sup> Parliament, 1<sup>st</sup> Session. Ottawa, ON: Senate of Canada.
- Berger, P. (2007). Some Thoughts on Qallunaat Teacher Caring in Nunavut. *Journal of Teaching and Learning*, 4(2).
- Berger, P. (2009). Eurocentric roadblocks to school change in Nunavut. *Inuit Studies*, 33(1-2), 55-76.
- Berkes, F. (2012). *Sacred Ecology, 3<sup>rd</sup> Ed*. New York: Routledge.
- BGC Engineering. (2011). *Highway 3 – Climate Change Vulnerability Assessment*. Submitted to Department of Transportation, Government of Northwest Territories. Vancouver, BC: BGC Engineering Inc.
- Blakesley, S. (2008). Remote and unresearched: educational leadership in Canada's Yukon Territory. *A Journal of Comparative and International Education*, 38(4), 441-454.
- Blakesley, S. (2010). *Remote and Unresearched: A Contextualized Study of Non-Indigenous Educational Leaders Working in Yukon Indigenous Communities*. (Doctoral dissertation). University of British Columbia, Vancouver, BC.
- Bolton, K., Lougheed, M., Ford, J.D., Nickels, S., Grable, C., & Shirley, J. (2011). *What we know, don't know and need to know about climate change in Inuit Nunangat: A systematic literature review and gap analysis of the Canadian Arctic*. Ottawa, ON: Inuit Tapiriit Kanatami.
- Bonnaventure, P.P., Lewkowicz, A.G., and Sawada, M.C. (2012). A permafrost probability model for the Southern Yukon and Northern British Columbia, Canada. *Permafrost and Periglacial Processes*, 23(1), 52-68.
- Boucher, M. and Guimond, A. (2012). Assessing the Vulnerability of Ministère des Transports du Québec Infrastructure in Nunavik in a Context of Thawing Permafrost and the Development of an Adaptation Strategy. In B. Morse & G. Doré (Eds.), *Cold Regions Engineering 2012: Sustainable Infrastructure Development in a Changing Cold Environment*. Québec City, QC: American Society of Civil Engineers.
- Bowes-Lyon, L.-M., Richards, J.P., and McGee, T.M. (2009). Socio-economic impacts of the Nanisivik and Polaris mines, Nunavut, Canada. In J. Richards (Ed.), *Mining, Society, and a Sustainable World*. London: Springer.
- Bradshaw, B. (n.d.). IBA-Relevant Research Priorities for ReSDA. Developed in consultation with IBA stakeholders. Resources and Sustainable Development in the Arctic. Retrieved from <http://yukonresearch.yukoncollege.yk.ca/resda/wp-content/uploads/sites/2/2013/09/GA9priorities.pdf>
- Bristow, M. and Gill, V. (2011). *Northern Assets: Transportation Infrastructure in Remote Communities*. Ottawa, ON: Centre for the North.
- Buell, M. (2006). *Resource Extraction Development and Well-Being in the North: A Scan of the Unique Challenges of Development in Inuit Communities*. Ottawa, ON: Ajunnginiq Centre, National Aboriginal Health Organization.



- Callaghan, T.V., Tweedie, C.E., Akerman, J., Andrews, C., Bergstedt, J., Butler, M.G., Christensen, T.R., Cooley, D., Dahlberg, U., Danby, R.K., Daniëls, F.J., de Molenaar, J.G., Dick, J., Mortensen, C.E., Ebert-May, D., Emanuelsson, U., Eriksson, H., Hedenäs, H., Henry, H.R.G., Hik, D.S., Hobbie, J.E., Jantze, E.J., Jaspers, C., Johansson, C., Johansson, M., Johnson, D.R., Johnstone, J.F., Jonasson, C., Kennedy, C., Kenney, A.J., Keuper, F., Koh, S., Krebs, C.J., Lantuit, H., Lara, M.J., Lin, D., Lougheed, V.L., Madsen, J., Matveyeva, N., Mcewen, D.C., Myers-Smith, I.H., Narozhnyi, Y.K., Olsson, H., Pohjola, V.A., Price, L.W., Rigét, F., Rundqvist, S., Sandström, A., Tamstorf, M., Van Bogaert, R., Villarreal, S., Webber, P.J., and Zemtsov, V.A. (2011). Multi-Decadal changes in tundra environments and ecosystems: Synthesis of the International Polar Year-Back to the Future Project (IPY-BTF). *AMBIO*, 40(6), 705-716.
- Cameron, E. (2011). *State of the Knowledge: Inuit Public Health, 2011*. Prince George, BC: National Collaborating Centre for Aboriginal Health.
- Cameron, C., Dallaire, F., Vézina, C., Muckle, G., Bruneau, S., Ayotte, P., and Dewailly, E. (2008). Neonatal vitamin A deficiency and its impact on acute respiratory infections among preschool Inuit children. *Canadian Journal of Public Health*, 99(2).
- Canadian Polar Commission. (2012). *International Polar Year Science Report: Highlights*. Ottawa, ON: Canadian Polar Commission. ISBN: 978-1-100-54195-2.
- Carrière, G., Tjepkema, M., Pennock, J., Goedhuis, N. (2012). Cancer patterns in Inuit Nunangat: 1998-2007. *International Journal of Circumpolar Health*, 71(10).
- Caulfield, R.A. (2004). Resource Governance. In *Arctic Human Development Report*. Akureyri, Iceland: Stefansson Arctic Institute.
- CBC News. (2013). *Southern workers dominate NWT mining workforce*. Retrieved from <http://www.cbc.ca/news/canada/north/southern-workers-dominate-nwt-mining-workforce-1.2439413>
- Centre for the North. (2011). *Striking a Balance: Impacts of Major Natural Resource Projects in the North: Briefing*. Ottawa, ON: Conference Board of Canada.
- Chachamovich, E. and Tomlinson, M. (2013). *Learning From Lives that Have Been Lived: Nunavut Suicide Follow-Back Study 2005-2010*. Montreal, QC: Douglas Mental Health University Institute.
- Chachamovich, E., Haggarty, J., Cargo, M., Hicks, J., Kirmayer, L.J. and Turecki, G. (2013). A psychological autopsy study of suicide among Inuit in Nunavut: methodological and ethical considerations, feasibility and acceptability. *International Journal of Circumpolar Health*, 72(10).
- Chan, L., University of Northern British Columbia Staff Members and Graduate Students, and Nunavut Steering Committee of the International Polar Year Inuit Health Survey. (2012). *Inuit Health Survey 2007-2008 Contaminant Assessment in Nunavut*. Retrieved from [http://www.tunnngavik.com/files/2012/06/IHS\\_Report\\_Nunavut-English-Final.pdf](http://www.tunnngavik.com/files/2012/06/IHS_Report_Nunavut-English-Final.pdf)
- Chateau-Degat, M.-L., Dewailly, É., Louchini, R., Couil, É., Noël, M., Ferland, A., Lucas, M., Valera, B., Ékoé, J.-M., Ladouceur, R., Déry, S., Egeland, G.M. (2010). Cardiovascular burden and related risk factors among Nunavik (Quebec) Inuit: Insights from baseline findings in the circumpolar Inuit Health in Transition cohort study. *Canadian Journal of Cardiology*, 26(6), 190-196.
- Chavarie, L., J. B. Dempson, C. J. Schwarz, J. D. Reist, G. Power and M. Power. (2010). Latitudinal variation in growth among Arctic charr in eastern North America: evidence for countergradient variation? *Hydrobiologia*, 650, 161-177.
- Chircop, A. (2009). The Growth of International Shipping in the Arctic: Is a Regulatory Review Timely? *The International Journal of Marine and Coastal Law*, 24(2), 355-380.
- Christensen, T., Payne, J., Doyle, M., Iburguchi, G., Taylor, J., Schmidt, N.M., Gill, M., Svoboda, M., Aronsson, M., Behe, C., Buddle, C., Cuyler, C., Fosaa, A.M., Fox, A.D., Heidmarsson, S., Henning Krogh, P., Madsen, J., McLennan, D., Nymand, J., Rosa, C., Salmela, J., Shuchman, R., Soloviev, M., and Wedege, M. (2013). *The Arctic Terrestrial Biodiversity Monitoring Plan*. Conservation of Arctic Flora and Fauna Monitoring Series Report Nr. 7. Akureyri, Iceland: Conservation of Arctic Flora and Fauna International Secretariat. ISBN 978-9935-431-26-4.
- CircumArctic Rangifer Monitoring and Assessment (CARMA) Network. (n.d.). About CARMA. CARMA Network. Retrieved from <http://www.caff.is/carma-about-carma>
- Cobb, D., Fast, H., Papst, M.H., Rosenberg, D., Rutherford, D., and Sareault, J.E. (2008). *Beaufort Sea Large Ocean Management Area: Ecosystem Overview and Assessment Report*. Canadian Technical Report of Fisheries and Aquatic Sciences 2780. Winnipeg, MB: Fisheries and Oceans Canada.
- Conservation of Arctic Flora and Fauna. (2010). *Arctic Biodiversity Trends 2010 – Selected Indicators of Change*. Akureyri, Iceland: Conservation of Arctic Flora and Fauna.
- Conservation of Arctic Flora and Fauna. (2013). *Arctic Biodiversity Assessment: Status and trends in Arctic biodiversity*. Akureyri, Iceland: Conservation of Arctic Flora and Fauna.
- Coulombe, S., Fortier, D., and Stephani, E. (2012). Using Air Convection Ducts to Control Permafrost Degradation under Road Infrastructure: Beaver Creek Experimental Site, Yukon, Canada. In B. Morse & G. Doré (Eds.), *Proceedings from Cold Regions Engineering 2012: Sustainable Infrastructure Development in a Changing Cold Environment*. Québec City, QC: American Society of Civil Engineers.
- Council of Canadian Academies. (2012). *40 Priority Research Questions for Ocean Science in Canada*. Ottawa, ON: Council of Canadian Academies.
- Council of Canadian Academies. (2014). *Aboriginal Food Security in Northern Canada: An Assessment of the State of Knowledge*. Expert Panel on the State of Knowledge of Food Security in Northern Canada. Retrieved from <http://www.scienceadvice.ca/en/assessments/in-progress/food-security.aspx>
- CSA Group. (2012). *CSA Group to Develop Four New Standards Addressing Climate Change Impact in Canada's Far North on Behalf of Standards Council of Canada*. CSA Group. Retrieved from <http://www.csa.ca/cm/ca/en/search/article/csa-to-develop-four-new-standards-addressing-climate-change-impact-in-canadas-far-north>
- Darnis, G., Robert, D., Pomerleau, C., Link, H., Archambault, P., Nelson, R.J., Geoffroy, M., Tremblay, J.-É., Lovejoy, C., Ferguson, S.H., Hunt, B.P.V. and Fortier, L. (2012). Current state and trends in Canadian Arctic marine ecosystems: II. Heterotrophic food web, pelagic-benthic coupling, and biodiversity. *Climatic Change*, 115(1), 179-205.
- DataPath Systems. (2007). *Voices of the North: Public Opinion Research Study Draft Final Report*. Prepared for the Department of Indian and Northern Affairs. Marsh Lake, YT: Department of Indian and Northern Affairs.
- Davidson, R., Simard, M., Kutz, S.J., Kapel, C.M.O., Hamnes, I.S., Robertson, L.J. (2011). Arctic parasitology: why should we care? *Trends in Parasitology*, 27(6), 239-245.
- Davison, C.M. and Hawe, P. (2012). All That Glitters: Diamond Mining and Tlicho Youth in Behchoko. *Arctic*, 65(2), 214-228.
- Deering, K.N., Lix, L.M., Bruce, S., and Young, T.K. (2009). Chronic diseases and risk factors in Canada's northern populations: Longitudinal and geographic comparisons. *Canadian Journal of Public Health*, 100(1).
- Deloitte. (2010). *Tracking the Trends 2011: The Top 10 Issues Mining Companies Will Face in the Coming Year*. Deloitte Global Services Limited. Retrieved from [https://www.deloitte.com/assets/Dcom-Canada/Local%20Assets/Documents/EandR/Mining/ca\\_en\\_energy\\_Tracking\\_the\\_trends\\_2011\\_113010.pdf](https://www.deloitte.com/assets/Dcom-Canada/Local%20Assets/Documents/EandR/Mining/ca_en_energy_Tracking_the_trends_2011_113010.pdf)
- Demmer, M. (2011). *The State of Tuberculosis in Inuit Nunangat*. Prepared for Inuit Tapiriit Kanatami.
- Dempson, J. B., Shears, M., Furey, G. and Bloom, M. (2008). Resilience and stability of north Labrador Arctic charr, *Salvelinus alpinus*, subject to exploitation and environmental variability. *Environmental Biology of Fishes*, 83, 57-67.
- Derksen, C., Smith, S.L., Sharp, M., Brown, L., Howell, S., Copland, L., Mueller, D.R., Gauthier, Y., Fletcher, C.G., Tivy, A., Bernier, M., Bourgeois, J., Brown, R., Burn, C.R., Duguay, C., Kushner, P., Langlois, A., Lewkowicz, A.G., Royer, A., and Walker, A. (2012). Variability and change in the Canadian cryosphere. *Climatic Change*, 115(1), 59-88.
- Dokis, C. (2010). *People, Land, and Pipelines: Perspectives on Resource Decision-Making Processes in the Sahtu Region, Northwest Territories*. (Doctorate dissertation). University of Alberta, Edmonton, AB.
- Donaldson, S.G., Van Oostdam, J., Tikhonov, C., Feeley, M., Armstrong, B., Ayotte, P., et al. (2010). Environmental contaminants and human health in the Canadian Arctic. *Science of the Total Environment*, 408(22), 5165-5234.
- Donaldson, S.G., Curren, M.S., Adlard, B., Provost, J., Leech, T., Tikhonov, C., Feeley, M., Tomlinson, S., and Shearer, R. (2013). Future human health research directions for the Canadian Northern Contaminants Program. *International Journal of Circumpolar Health*, 72.
- Dowsley, M. (2009). Community clusters in wildlife and environmental management: using TEK and community involvement to improve co-management in an era of rapid environmental change. *Polar Research*, 28(1), 43-59.
- Driedger, D. L. (2009). *Creative Writing, Publishing and the Empowerment of Inuit Adult Learners*. (Doctorate dissertation). University of Manitoba, Winnipeg, MB.
- Ducrocq, J., Beauchamp, G., Kutz, S.J., Simard, M., Taillon, J., Côté, S.D., Brodeur, V., Lair, S. (2012). Variables associated with *Besnoitia tarandi* prevalence and density in barren-ground caribou (Rangifer tarandus) populations. *Journal of Wildlife Diseases*, In Press.
- Duhaime, G., and Caron, A. (2009). In S. Glomsrod and I. Aslaksen (Eds.), *The Economy of the North 2008*. Oslo, Norway: Statistics Norway.
- Economic Development & Transportation – Government of Nunavut. (2013). *Tunnngasajji: A Tourism Strategy for Nunavummiut*. Iqaluit, NU: Economic Development & Transportation – Government of Nunavut.

- Egeland, G.M., Faraj, N., and Osborne, G. (2010). Cultural, socioeconomic, and health indicators among Inuit preschoolers: Nunavut Inuit Child Health Survey 2007-2008. *Rural and Remote Health*, 10, 1365.
- Egeland, G.M., Johnson-Down, L., Cao, Z.R., Sheikh, N., and Weiler, H. (2011). Food Insecurity and Nutrition Transition Combine to Affect Nutrient Intakes in Canadian Arctic Communities. *Journal of Nutrition*, 141(9), 1746-1753.
- Elmendorf, S.C., Henry, G.H.R., Hollister, R.D., Björk, R.G., Bjorkman, A.D., Callaghan, T.V., Collier, L.S., Cooper, E.J., Cornelissen, H.C., Day, T.A., Fosaa, A.M., Gould, W.A., Grétarsdóttir, J., Harte, J., Hermanutz, L., Hik, D.S., Hofgaard, A., Jarrad, F., Jónsdóttir, I.S., Keuper, F., Klanderud, K., Klein, J.A., Koh, S., Kudo, G., Lang, S.I., Loewen, V., May, J.L., Mercado, J., Michelsen, A., Molau, U., Myers-Smith, I.H., Oberbauer, S.F., Pieper, S., Post, E., Rixen, C., Robinson, C.H., Schmidt, N.M., Shaver, G.R., Stenström, A., Tolvanen, A., Totland, Ø., Troxler, T., Wahren, C.-H., Webber, P.J., Welker, J.M., and Wookey, P.A. (2012a). Global Assessment of Experimental Climate Warming on Tundra Vegetation: Heterogeneity Over Space and Time. *Ecology Letters*, 15(2), 164-175.
- Elmendorf, S.C., Henry, G.H.R., Hollister, R.D., Björk, R.G., Boulanger-Lapointe, N., Cooper, E.J., Cornelissen, J.H.C., Day, T.A., Dorrepaal, E., Elumeeva, T.G., Gill, M., Gould, W.A., Harte, J., Hik, D.S., Hofgaard, A., Johnson, D.R., Johnstone, J.F., Jónsdóttir, I.S., Jørgensen, J.C., Klanderud, K., Klein, J.A., Koh, S., Kudo, G., Lara, M., Lévesque, E., Magnússon, B., May, J.L., Mercado-Dí'az, J.A., Michelsen, A., Molau, U., Myers-Smith, I.H., Oberbauer, S.F., Onipchenko, V.G., Rixen, C., Schmidt, N.M., Shaver, G.R., Spasojevic, M.J., Þórhallsdóttir, Þ.E., Tolvanen, A., Troxler, T., Tweedie, C.E., Villareal, S., Wahren, C.-H., Walker, X., Webber, P.J., Welker, J.M., and Wipf, S. (2012b). Plot-scale evidence of tundra vegetation change and links to recent summer warming. *Nature Climate Change*, 2, 453-457.
- Energy, Mines and Resources – Government of Yukon. (2009). *Energy Strategy for Yukon*. Whitehorse, YT: Energy, Mines and Resources, Government of Yukon.
- Energy, Mines and Resources – Government of Yukon. (2011). Research. Energy, Mines and Resources, Yukon Government. Retrieved from <http://www.emr.gov.yk.ca/forestry/research.html>
- Environment and Natural Resources – Government of the Northwest Territories. (2012). *State of the Environment Report Northwest Territories*. Environment and Natural Resources. Government of Northwest Territories. Accessed: 5/15/13. Updated: 2012. [http://www.enr.gov.nt.ca/\\_live/pages/wpPages/SOE\\_Welcome.aspx](http://www.enr.gov.nt.ca/_live/pages/wpPages/SOE_Welcome.aspx)
- Environment Canada. (2010). *Environment Canada's International Polar Year Achievements*. Gatineau, QC: Environment Canada.
- Environment Canada. (2012). Arctic Program for Regional and International Shorebird Monitoring (Arctic PRISM). Environment Canada. Retrieved from <http://www.ec.gc.ca/reom-mbs/default.asp?lang=En&nav=FC881C1B-1>
- Environment Yukon – Government of Yukon. (2013). *Yukon State of the Environment Interim Report*. Whitehorse, YT: Environment Yukon, Government of Yukon. ISBN: 978-1-55362-653-4.
- Epstein, H.E., Reynolds, M.K., Walker, D.A., Bhatt, U.S., Tucker, C.J., and Pinzon, J.E. (2012). Dynamics of aboveground phytomass of the circumpolar Arctic tundra during the past three decades. *Environmental Research Letters*, 7, 015506.
- Felt, L. and Natcher, D. (2011). Preserving and managing Aboriginal small-scale fisheries: the experience of Labrador Inuit. In R. Chuenpagdee (Ed.), *World Small-scale Fisheries: Contemporary Visions*. The Netherlands: Eburon.
- Felt, L., Natcher, D., Procter, A., Sillit, N., Winters, K., Gear, T., Winters, D. et al. (2012). The more things change: patterns of country food harvesting by the Labrador Inuit on the North Labrador Coast. Chapter 6, In D.C. Natcher, L. Felt and A. Procter (Eds.), *Settlement, Subsistence, and Change Among the Labrador Inuit: The Nunatsiavummiut Experience*. Winnipeg, MB: University of Manitoba Press.
- Fenge, T. (2009). Economic Development in Northern Canada: Challenges and Opportunities. In F. Abele, T. Courchene, F.L. Seidle and F. St-Hilaire (Eds.), *The Art of the State IV: Northern Exposure: Peoples, Powers and Prospects in Canada's North*. Montréal, QC: The Institute for Research on Public Policy.
- Ferguson, S.H., Berteaux, D., Gaston, A.J., Higdon, J.W., Lecomte, N., Lunn, N., Mallory, J., Reist, D., Russell, N.G., Yoccoz, N.G., Zhu, X. (2012). Time series data for Canadian Arctic vertebrates: IPY contributions to science, management, and policy. *Climatic Change*, 115(1), 235-258.
- Festa-Bianchet, M., Ray, J.C., Boutin, S., Côté, S. and Gunn, A. (2011). Conservation of caribou (*Rangifer tarandus*) in Canada: an uncertain future. *Canadian Journal of Zoology-Revue Canadienne De Zoologie*, 89, 419-434.
- Fisheries and Oceans Canada. (2010a). Key Findings from International Polar Year 2007-2008 at Fisheries and Oceans Canada: Executive Summary. Ottawa, ON: Fisheries and Oceans Canada, Government of Canada. ISBN: 978-1-100-15820-9.
- Fisheries and Oceans Canada. (2010b). *Proceedings of the Workshop to Select Ecologically and Biologically Significant Areas (EBSA) in Northern Foxe Basin, Nunavut*. Canadian Science Advisory Secretariat Proceedings Series 2010/037. Winnipeg, MB: Fisheries and Oceans Canada.
- Fisheries and Oceans Canada. (2011). *Identification of Ecologically and Biologically Significant Areas (EBSA) in the Canadian Arctic*. Canadian Science Advisory Secretariat Science Advisory Report 2011/055. Ottawa, ON: Fisheries and Oceans Canada.
- Fisheries and Oceans Canada (2012). *Canada's State of the Oceans Report 2012*. Ottawa, ON: Fisheries and Oceans Canada.
- Fisheries and Oceans Canada. (2013). *Identification of Additional Ecologically and Biologically Significant Areas (EBSAs) Within the Newfoundland and Labrador Shelves Bioregion*. Canadian Science Advisory Secretariat Science Advisory Report 2013/048. St. John's, NL: Fisheries and Oceans Canada.
- Five Arctic Coastal States. (2013). *Report of 2<sup>nd</sup> Scientific Meeting on Arctic Fish Stocks*. 28-31 October 2013. Tromsø, Norway. Retrieved from <https://web.sfos.uaf.edu/wordpress/arcticeis/?p=1947>
- Forbes, B. C., Fauria, M. M. and Zetterberg, P. (2009). Russian Arctic warming and 'greening' are closely tracked by tundra shrub willows. *Global Change Biology*, 16, 1542-1554.
- Ford, J.D. (2009). Dangerous climate change and the importance of adaptation for the Arctic's Inuit population. *Environmental Research Letters*, 4(2).
- Ford, J.D. and Pearce, T. (2010). What we know, do not know, and need to know about climate change vulnerability in the western Canadian Arctic: A systematic literature review. *Environmental Research Letters*, 5(1).
- Ford, J.D. and Pearce, T. (2012). Climate change vulnerability and adaptation research focusing on the Inuit subsistence sector in Canada: Directions for future research. *The Canadian Geographer*, 56(2), 275-287.
- Ford, J.D., Bell, T., St-Hilaire-Gravel, D. (2010a). Vulnerability of Community Infrastructure to Climate Change in Nunavut: A Case Study from Arctic Bay. In G.K. Hovelsrud & B. Smit (Eds.) *Community Adaptation and Vulnerability in Arctic Regions*. London: Springer.
- Ford, J.D., Berrang-Ford, L., King, M., and Furgal, C. (2010b). Vulnerability of Aboriginal health systems in Canada to climate change. *Global Environmental Change*, 20(4), 668-680.
- Forde, T., Orsel, K., De Buck, J., Côté, S.D., Cuyler, C., Davison, T., Elkin, B., Kelly, A., Kienzler, M., Popko, R., Taillon, J., Veitch, A., Kutz, S. (2012). Detection of *Mycobacterium avium* subspecies paratuberculosis in several herds of arctic caribou (*Rangifer tarandus* spp.). *Journal of Wildlife Diseases*, In Press.
- Foreign Affairs, Trade and Development Canada. (2012). Canada's Extended Continental Shelf. Foreign Affairs and International Trade Canada. Retrieved from <http://www.international.gc.ca/arctic-arctique/continental/index.aspx?lang=eng>
- Freeman, J., King, M., Briand, P., and Pickett, W. (2012). *Health and Health-Related Behaviours Among Young People in the Northwest Territories*. Kingston, ON: Queen's University.
- Friborg, J.T. and Melbye, M. (2008). Cancer patterns in Inuit populations. *The Lancet Oncology*, 9(9), 892-900.
- Friesen, J.F. and Krauth, B. (2012). *Key Policy Issues in Aboriginal Education: An Evidence-Based Approach*. Toronto, ON: Council of Ministers of Education, Canada.
- Furgal, C. (2008). Human Health in a Changing Climate: A Canadian Assessment of Vulnerabilities and Adaptive Capacity. In J. Séguin (Ed.), *Human Health in a Changing Climate: A Canadian Assessment of Vulnerabilities and Adaptive Capacity*. Ottawa, ON: Health Canada.
- Furgal, C. and Seguin, J. (2006). Climate change, health, and vulnerability in Canadian Northern Aboriginal communities. *Environmental Health Perspectives*, 114(12), 1964-1970.
- Galloway, T., Blackett, H., Chatwood, S., Jeppesen, C., Kandola, K., Linton, J., and Bjerregaard, P. (2012). Obesity studies in the circumpolar Inuit: A scoping review. *International Journal of Circumpolar Health*, 71.
- Gauthier, G. and Berteaux, D. (Eds.). (2011). *Arctic WOLVES: Arctic Wildlife Observatories Linking Vulnerable EcoSystems. Final synthesis report*. Quebec City, QC: Centre d'études Nordiques, Université Laval.
- Gibson, G. and Klinck, J. (2005). Canada's resilient north: the impact of mining on aboriginal communities. *Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health*, 3, 116-139.

- Gill, M.J., Raillard, M.C., Zöckler, C., and Smith, R.B. (2008). *Developing an Integrated and Sustained Arctic Biodiversity Monitoring Network: The Circumpolar Biodiversity Monitoring Program Five Year Implementation Plan*. Conservation of Arctic Flora and Fauna – Circumpolar Biodiversity Monitoring Program Report No. 14. Akureyri, Iceland: Conservation of Arctic Flora and Fauna International Secretariat.
- Goldhar, C., Bell, T., Sheldon, T., Andersen, T., Piercy, W., Gear, D., Wolfrey, C., Jacque, H., Furgal, C., Knight, J., Kouril, D., Riedlsperger, R., and Alice, I. (2012). *Sakkijânginnatuk Nunalik: Understanding opportunities and challenges for sustainable communities in Nunatsiavut, Learning from the coast*. Nain, NL: Nunatsiavut Government.
- Government of Newfoundland and Labrador. (2013). Joint Cabinet Meeting Further Strengthens Relationship between Provincial and Nunatsiavut Governments. Executive Council, Government of Newfoundland and Labrador. Retrieved from <http://www.releases.gov.nl.ca/releases/2013/exec/0516n04.htm>
- Government of the Northwest Territories. (2009). *Building a Path for Northern Science: Government of the Northwest Territories' Science Agenda*. Inuvik, NT: Government of the Northwest Territories.
- Government of Yukon, Government of the Northwest Territories, and Government of Nunavut. (2008). *Northern Connections: A Multi-Modal Transportation Blueprint for the North*. Whitehorse, YT: Government of Yukon.
- Gracey, M. and King, M. (2009). Indigenous health part 1: determinants and disease patterns. *The Lancet*, 374(9683), 65-75.
- Haley, S., Klick, M., Szymoniak, N., and Crow, A. (2011). Observing trends and assessing data for Arctic mining. *Polar Geography*, 34(1-2), 37-61.
- Hallett, D. (2005). *Aboriginal identity development, language knowledge, and school attrition: an examination of cultural continuity*. (Unpublished PhD dissertation). University of British Columbia, Vancouver, BC.
- Halseth, R. (2013). *Aboriginal Women in Canada: Gender, Socio-Economic Determinants of Health, and Initiatives to Close the Wellness Gap*. Prince George, BC: National Collaborating Centre for Aboriginal Health.
- Healey, G.K and Meadows, L.M. (2007). Inuit women's health in Nunavut, Canada: a review of the literature. *International Journal of Circumpolar Health*, 66, 199-214.
- Health and Social Services – Government of the Northwest Territories. (2011). *Building on Our Foundation 2011-2016: A Strategic Plan for the NWT Health and Social Services System*. Yellowknife, NT: Health and Social Services – Government of the Northwest Territories.
- Health Canada. (2013). Suicide Prevention. Health Canada. Retrieved from <http://www.hc-sc.gc.ca/fnihah-spnia/promotion/suicide/index-eng.php>
- Henry, G.H.R., Harper, K.A., Chen, W., Deslippe, J.R., Grant, R.F., Lafleur, P.M., Lévesque, E., Siciliano, S., Simard, S. (2012). Effects of observed and experimental climate change on terrestrial ecosystems in northern Canada: results from the Canadian IPY program. *Climate Change*, 115(1), 207-234. DOI 10.1007/s10584-012-0587-1.
- Hicks, J. (2007). The social determinants of elevated rates of suicide among Inuit youth. *Indigenous Affairs*, 4, 30-38.
- Hicks, J. (2009). Toward More Effective, Evidence-Based Suicide Prevention in Nunavut. In F. Abele, T.J. Courchene, E.L. Seidle, and St-Hilaire, F. (Eds.), *Northern Exposure: Peoples, Powers and Prospects in Canada's North*. Montreal, QC: The Institute for Research on Public Policy.
- Higgins, M. (2011). Finding Points of Resonance: Nunavut Students' Perspectives on Science. *[Indigenous education] in education*, 17(3), 17-37.
- Hindle, K. and Moroz, P. (2009). Indigenous entrepreneurship as a research field: developing a definitional framework from the emerging canon. *International Entrepreneurship and Management Journal*, 6, 357-385.
- Hoar, B.M., Ruckstuhl, K., and Kutz, S. (2012). Development and availability of the free-living stages of *Ostertagia gruehneri*, an abomasal parasite of barrenground caribou (*Rangifer tarandus groenlandicus*), on the Canadian tundra. *Parasitology*, 139, 1093-1100.
- Hoberg, E.P., Galbreath, K., Cook, J.A., Kutz, S.J., and Polley, L. (2012). Northern host-parasite assemblages: history and biogeography on the borderlands of episodic climate and environmental transition. *Advances in Parasitology*, 79, 1-97.
- Hofgaard, A., Harper, K.A., and Golubeva, E. (2012). The role of the circumpolar forest-tundra ecotone for Arctic biodiversity. *Biodiversity*, 13(3-4), 174-181.
- Hodgkins, A.P. (2013). *Regulation of Vocational Education and Training Fields in Northern Canada*. (Doctoral thesis). University of Alberta, Calgary, AB.
- Howard, A., Edge, J. and Watt, D. (2012). *Understanding the Value, Challenges, and Opportunities of Engaging Métis, Inuit, and First Nations Workers*. Ottawa, ON: Centre for the North.
- Hudson, J.M.G. and Henry, G.H.R. (2009). Increased plant biomass in a High Arctic heath community from 1981 to 2008. *Ecology*, 90, 2657-2663.
- Huet, C., Rosol, R., and Egeland, G.M. (2012). The prevalence of food insecurity is high and the diet quality poor in Inuit communities. *Journal of Nutrition*, 142(3), 541-547.
- Huntington, H. (2007). *Arctic Oil and Gas 2007*. Oslo, Norway: Arctic Monitoring and Assessment Program.
- Huntington, H. (2008). *A Strategy for Facilitating and Promoting Community-Based Monitoring Approaches in Arctic Biodiversity Monitoring*. Conservation of Arctic Flora and Fauna Circumpolar Biodiversity Monitoring Program Report No. 13. Akureyri, Iceland: Conservation of Arctic Flora and Fauna International Secretariat.
- I.Holubec Consulting Inc. (2008). *Adapting to Climate Change Canada's First National Engineering Vulnerability Assessment of Public Infrastructure. Appendix B-6 Thermosyphon Foundations, Northwest Territories and Yukon*. Oakville, ON: I. Holubec Consulting.
- Ilitaqsiq-Nunavut Literacy Council. (2012). Northern Men's Project. Ilitaqsiq-Nunavut Literacy Council. Retrieved from <http://www.ilitaqsiq.ca/mens-project>
- Ilitaqsiq-Nunavut Literacy Council. (2013). Miqqut Project. Ilitaqsiq-Nunavut Literacy Council. Retrieved from <http://www.ilitaqsiq.ca/miqqut-project>
- Indian Health Service. (2008). *Sexually Transmitted Diseases among Alaska Native and Inuit/First Nations/Métis in Canada: Discovering Opportunities for Collaboration*. Albuquerque, New Mexico: Indian Health Service.
- Institute of Nutrition, Metabolism, and Diabetes. (2010). *Advancing Food and Health Research Priorities*. Workshop Report. Edmonton, AB: Canadian Institutes of Health Research.
- Inuit Tapiriit Kanatami. (2011). *First Canadians, Canadians First: National Strategy on Inuit Education 2011*. Published for the National Committee on Inuit Education. Ottawa, ON: Inuit Tapiriit Kanatami.
- Inuit Tapiriit Kanatami. (2013). *Inuit-specific Tuberculosis (TB) Strategy*. Ottawa, ON: Inuit Tapiriit Kanatami.
- Ives, N., Sinha, V., Leman, D., Goren, A., Levy-Powell, R., and Thomson, W. (2012). Exploring the Intersection of Culture and Education in Nunavik. *Journal of Comparative Social Work*. Retrieved from [http://jcswno/local/media/jcsw/docs/jcsw\\_issue\\_2012\\_1\\_4\\_article.pdf](http://jcswno/local/media/jcsw/docs/jcsw_issue_2012_1_4_article.pdf)
- Jia, G.J., Epstein, H.E., and Walker, D.A. (2009). Vegetation greening in the Canadian Arctic related to decadal warming. *Journal of Environmental Monitoring*, 11, 2231-2238.
- Johansson, G., Paci, C., and Stenersen, S. (2004). Education. In *Arctic Human Development Report*. Akureyri, Iceland: Stefansson Arctic Institute.
- Johnson, N., Alessa, L., Gearheard, S., Gofman, V., Kliskey, A., Pulsifer, P., and Svoboda, M. (2013). Strengthening community-based monitoring in the Arctic: Key Challenges and Opportunities. A Community White Paper prepared for the Arctic Observing Summit 2013.
- Johnston, M.E., Dawson, J., Stewart, E., and de Souza, E. (2013). *Strategies for Managing Arctic Pleasure Craft Tourism: A Scoping Study*. A report prepared for Transport Canada. Thunder Bay, ON.
- Kativik Regional Government and Makivik Corporation. (2010). *Plan Nunavik*. Westmont QC: Avataq Cultural Institute.
- Kellett, S., Poirier, P., Dewailly, E., Sampasa, H., and Chateau-Degat, M.-L. (2012). Is Severe Obesity a Cardiovascular Health Concern in the Inuit Population? *American Journal of Human Biology*, 24, 441-445.
- Kelly, J., Lanier, A., Santos, M., Healey, S., Louchini, R., and Friberg, J. (2008a). Cancer among the circumpolar Inuit, 1989-2003. I. Background and methods. *International Journal of Circumpolar Health*, 67(5).
- Kelly, J., Lanier, A., Santos, M., Healey, S., Louchini, R., and Friberg, J. (2008b). Cancer among the circumpolar Inuit, 1989-2003. II. Patterns and trends. *International Journal of Circumpolar Health*, 67(5).
- Kesler, S.E. (2007). "Mineral Supply and Demand Into the 21st Century." In J.A. Briskey and K.J. Schulz (Eds.), *Proceedings for a Workshop on Deposit Modeling, Mineral Resource Assessment, and Their Role in Sustainable Development*. Reston, VA: U.S. Geological Survey. Retrieved from <http://pubs.usgs.gov/circ/2007/1294/circ1294.pdf>
- King, M., Smith, A., and Gracey, M. (2009). Indigenous health part 2: the underlying causes of the health gap. *The Lancet*, 374(9683), 76-85.
- Kirwan, D. and Gilman, R.H. (2013). Same-day diagnosis and treatment of tuberculosis. *The Lancet Infectious Diseases*, 13(2), 102-104.



- Knotsch, C. and Kinnon, D. (2011). *If Not Now...When? Addressing the Ongoing Inuit Housing Crisis in Canada*. Ottawa, ON: National Aboriginal Health Organization.
- Knotsch, C. and Warda, J. (2009). *Impact Benefit Agreements: A Tool for Healthy Inuit Communities?* Ottawa, ON: National Aboriginal Health Organization.
- Kovesi, R., Creery, D., Gilbert, N.L., Dales, R., Fugler, D., Thompson, B., Randhawa, N., and Miller, J.D. (2006). Indoor air quality risk factors for severe lower respiratory tract infections in Inuit infants in Baffin Region, Nunavut: a pilot study. *Indoor Air*, 16(4), 266-275.
- Kovesi, T., Gilbert, N.L., Stocco, C., Fugler, D., Dales, R.E., Guay, M., and Miller, D.J. (2007). Indoor air quality and the risk of lower respiratory tract infections in young Canadian Inuit children. *Canadian Medical Association Journal*, 177(2), 155-60.
- Kral, M.J. (2012). Postcolonial Suicide Among Inuit in Arctic Canada. *Culture, Medicine and Psychiatry*, 36, 306-325.
- Kral, M.J., Wiebe, P.K., Nisbet, K., Dallas, C., Okalik, L., Enuaraq, N., and Cinotta, J. (2009). Canadian Inuit Community Engagement in Suicide Prevention. *International Journal of Circumpolar Health*, 68(3).
- Kral, M.J., Idlout, L., Minore, J.B., Dyck, R.J. and Kirmayer, L.J. (2011). Unikkaartuit: Meanings of well-being, unhappiness, health, and community change among Inuit in Nunavut, Canada. *American Journal of Community Psychology*, 48, 426-438.
- Kronstal, A. (2009). *Negotiating change: Community mental health and addiction practice in the Northwest Territories of Canada*. (Masters thesis). University of Victoria, Victoria, BC.
- Kuhnlein, H., Receveur, O., Soueida, R., and Egeland, G. (2004). Arctic indigenous peoples experience the nutrition transition with changing dietary patterns and obesity. *Journal of Nutrition*, 124, 1447-1453.
- Kulkarni, T., Watkins, J.M., Nickels, S., and Lemmen, D.S. (2012). Canadian International Polar Year (2007-2008): An Introduction. *Climatic Change*, 115(1), 1-11.
- Kulmann, K.C. and Richmond, C.A.M. (2011). Addressing the Persistence of Tuberculosis Among the Canadian Inuit Population: The need for a social determinants of health framework. *The International Indigenous Policy Journal*, 2(1), 1-16.
- Kutz, S.J., Ducrocq, J., Verocai, G.G., Hoar, B.M., Colwell, D.D., Beckmen, K.B., Polley, L., Elkin, B.T., and Hoberg, E.P. (2012). Parasites of ungulates of arctic North America and Greenland: A view of contemporary diversity, ecology, and impact in a world under change. *Advances in Parasitology*, 79, 99-252.
- Lafferty, D. (2012). Dᓄ Edæzhe: Building Resiliency Among Aboriginal Youth. *Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health*, 10(2), 217-230.
- Lambden, J., Receveur, O., Marshall, J., and Kuhnlein, H.V. (2006). Traditional and market food access in Arctic Canada is affected by economic factors. *International Journal of Circumpolar Health*, 65(4), 331-340.
- Latimer, J. and Casey Foss, L. (2004). *A One-day Snapshot of Aboriginal Youth in Custody Across Canada: Phase II*. Ottawa, ON: Research and Statistics Division, Department of Justice.
- Lees, J., Burgess, J., and Walton, F. (2010). *Capacity Building in Inuit Education: A Literature Review*. Prepared for the National Committee on Inuit Education, Inuit Tapiriit Kanatami. Charlottetown, PE: University of Prince Edward Island.
- Lehti, V., Niemelä, S., Hoven, C., Mandell, D., and Sourander, A. (2009). Mental health, substance use and suicidal behaviour among young indigenous people in the Arctic: A systematic review. *Social Science & Medicine*, 69(8), 1194-1203.
- Lévesque, E., Hermanutz, L., Gérin-Lajoie, J., Bell, T., Boudreau, S., Cuerrier, A., Jacobs, J., Laroque, C., Lavallée, C., Stegwart Collier, L., and Tremblay, B. (2012). Trends in vegetation dynamics and impacts on berry production. In M. Allard, M. Lemay (Eds.), *Nunavik and Nunatsiavut: From science to policy. An Integrated Regional Impact Study (IRIS) of climate change and modernity*. Québec City, QC: ArcticNet Inc.
- Lix, L.M., Bruce, S., Sarkar, J., and Young, T.K. (2009). *Risk factors and chronic conditions among Aboriginal and non-aboriginal populations*. Ottawa, ON: Statistics Canada.
- Luo, Z.-C., Sénécal, S., Simonet, F., Guimond, É., Penney, C., and Wilkens, R. (2010). Birth outcomes in the Inuit-inhabited areas of Canada. *Canadian Medical Association Journal*, 182(3), 235-242.
- Lutra Associates. (2011). *NWT Film and Media Arts Industry: Growing the Sector: Summary Report of March 23, 2011 Meeting between Industry and Government*. Yellowknife, NT: Lutra Associates.
- MacPherson, I. (2009). What Has Been Learned Should be Studied and Passed On: Why the Northern Cooperative Experience Needs to be Considered More Seriously. *The Northern Review*, 30, 57-81.
- Makivik Corporation. (2013). Parnasimautik. Makivik Corporation. Retrieved from <http://www.parnasimautik.com/>
- Marrone, S. (2007). A Review of Disparities in Health Care Services Among Indigenous Populations. *International Journal of Circumpolar Health*, 66(3), 188-198.
- Martin, H. (2011). *Building Labour Force Capacity in Canada's North*. Ottawa, ON: Centre for the North.
- Mason, A.H.M., Dana, L.-P., and Anderson, R.B. (2007). Building local capacity to compete globally – A case study of the Inuit commercial caribou harvest and related agri-food industries in Nunavut. *International Journal of Entrepreneurship and Small Business*, 4(6), 785-806.
- Mason, A.H.M., Dana, L.-P., and Anderson, R.B. (2008). Entrepreneurship in Coral Harbour, Nunavut. *Entrepreneurship and Innovation*, 9(2).
- Mason, A.H.M., Dana, L.-P., and Anderson, R.B. (2009). A study of enterprise in Rankin Inlet, Nunavut: Where subsistence self-employment meets formal entrepreneurship. *International Journal of Entrepreneurship and Small Business*, 7(1).
- McMaster Health Forum. (2012). Preventing Suicide in Canada. Stakeholder Dialogue. 9 November 2012. McMaster University. Retrieved from: <http://www.mcmasterhealthforum.org/docs/default-source/Product-Documents/evidence-briefs/suicide-prevention-in-canada-eb.pdf?sfvrsn=2>
- Meakin, S. and Kurvits, T. (2009). *Assessing the impacts of climate change on food security in the Canadian Arctic*. Norway: GRID-Arendal.
- Melling, H., Francois, R., Myers, P.G., Perrie, W., Rochon, A., and Taylor, R.L. (2012). The Arctic Ocean – A Canadian perspective from IPY. *Climatic Change*, 115(1), 89-113.
- Minich, K., Saudny, H., Lennie, C., Wood, M., Williamson-Bathory, L., Cao, Z., Egeland, G.M. (2011). Inuit housing and homelessness: results from the International Polar Year Inuit Health Survey 2007-2008. *International Journal of Circumpolar Health*, 70(5), 520-31.
- Mitton, C., Dionne, F., Masucci, L., Wong, S., Law, S. (2011). Innovations in health service organization and delivery in northern rural and remote regions: a review of the literature. *International Journal of Circumpolar Health*, 70(5), 460-472.
- Moffitt, P., Fikowski, H., Mauricio, M., and Mackenzie, A. (2013). Intimate partner violence in the Canadian territorial north: perspectives from a literature review and a media watch. *International Journal of Circumpolar Health*, 72.
- Morse, B. and Doré, G. (Eds.). (2012). *Proceedings from Cold Regions Engineering 2012: Sustainable Infrastructure Development in a Changing Cold Environment*. Reston, VA: American Society of Civil Engineers.
- Muir, D.C.G., and de Wit, C.A. (2010). Trends of legacy and new persistent organic pollutants in the circumpolar arctic: Overview, conclusions and recommendations. *Science of the Total Environment*, 408, 3044-3051
- Natcher, D. (2008). *The Social Economy of Canada's Aboriginal North*. Submitted to Northern Research Forum, 24-27 September 2008. Saskatoon, SK: D. Natcher.
- Natcher, D. (2009). Subsistence and the Social Economy of Canada's Aboriginal North. *The Northern Review*, 30, 83-98.
- National Collaborating Centre for Aboriginal Health. (2012a). *The State of Knowledge of Aboriginal Health: A Review of Aboriginal Public Health in Canada*. Prince George, BC: National Collaborating Centre for Aboriginal Health.
- National Collaborating Centre for Aboriginal Health. (2012b). *The State of Knowledge of Aboriginal Health: A Review of Aboriginal Public Health in Canada. Annotated Bibliography (2000-2009)*. Prince George, BC: National Collaborating Centre for Aboriginal Health.
- National Energy Board. (2011). *Energy Use in Canada's North: An Overview of Yukon, Northwest Territories, and Nunavut*. Energy Facts. Calgary, AB: National Energy Board.
- National Research Council. (2011). High performance vacuum insulation panels tested in Arctic Canada. Retrieved from <http://www.nrc-cnrc.gc.ca/ci-ic/article/v16n4-5>
- National Round Table on the Environment and the Economy. (2009). *True North: Adapting Infrastructure to Climate Change in Northern Canada*. National Round Table on the Environment and the Economy: Ottawa.

National Science and Technology Council. (2013). *Science for an Ocean Nation: Update of the Ocean Research Priorities Plan*. Washington, D.C.: National Science and Technology.

National Snow and Ice Data Center. (2014). Arctic Sea Ice News and Analysis. National Snow and Ice Data Center. Accessed 02/06/2014. Retrieved from <http://nsidc.org/arcticseaicenews/>

Natural Resources Canada. (2007). *Municipal Case Studies: Climate Change and the Planning Process*. Ottawa, ON: Natural Resources Canada.

Natural Resources Canada. (2011). Remote Sensing and Ecological Monitoring of National Parks in the North. Natural Resources Canada. Retrieved from <http://www.nrcan.gc.ca/science/story/3555>

Natural Resources Canada. (2012). GEM: Geo-mapping for Energy and Minerals. Natural Resources Canada. Retrieved from <http://www.nrcan.gc.ca/earth-sciences/about/current-program/geomapping/7131>

Nelson, S. (2012). *Challenging Hidden Assumptions: Colonial Norms as Determinants of Aboriginal Mental Health*. Prince George, BC: National Collaborating Centre for Aboriginal Health.

Nickels, S., Furgal, C., Buell, M., and Moquin, H. (2006). *Unikkaaqatigiit – Putting the Human Face on Climate Change: Perspectives from Inuit in Canada*. Ottawa, ON: Inuit Tapiriit Kanatami.

Niemi, A., Johnson, J., Majewski, A., Melling, H., Reist, J., and Williams, W. (2012). *State of the Ocean Report for the Beaufort Sea Large Ocean Management Area*. Canadian Manuscript Report of Fisheries and Aquatic Sciences 2977. Ottawa, ON: Fisheries and Oceans Canada.

Northern Contaminants Program. (2012). *Synopsis of Research Conducted under the 2011-2012 Northern Contaminants Program*. Ottawa, ON: Aboriginal Affairs and Northern Development, Government of Canada. ISSN: 1929-2597.

Northern Contaminants Program. (2014). Blueprints – Strategic Long-Term Plans for NCP Subprograms. Human Health. Science.gc.ca. Retrieved from <http://www.science.gc.ca/default.asp?lang=En&n=7A442CC3-1&offset=1&toc=show>

Northwest Territories Housing Corporation. (2008). *Framework for Action 2008-2011*. Yellowknife, NT: Northwest Territories Housing Corporation.

Nunavut Economic Forum. (2012). *Nunavut Economic Development Strategy – II*. News Release. Iqaluit, NU: Nunavut Economic Forum.

Nunavut General Monitoring Plan. (2012). *Weaving our Tapestry. Nunavut General Monitoring Plan (NGMP) Strategic Plan: 2010-2015*. Iqaluit, NU: Nunavut General Monitoring Plan.

Nunavut Housing Corporation. (2012a). *Igluliuqatigiilauqta: Let's Build a Home Together. Summary: Framework for the GN Long-Term Comprehensive Housing and Homelessness Strategy*. Iqaluit, NU: Nunavut Housing Corporation

Nunavut Housing Corporation. (2012b). *The GN Long-Term Comprehensive Housing and Homelessness Strategy*. Iqaluit, NU: Nunavut Housing Corporation.

Nunavut Tunngavik Inc. (2008). *Nunavut's Health System*. Annual Report on the State of Inuit Culture and Society. Iqaluit, NU: Nunavut Tunngavik Inc.

NWT Chamber of Commerce, Northern Aboriginal Business Association, NWT Association of Communities, Canadian Northern Economic Development Agency, and Government of the Northwest Territories Department of Industry, Tourism and Investment. (2013). *Northwest Territories Economic Opportunities Strategy: Connecting Businesses and Communities to Economic Opportunities*. Yellowknife, NT: NWT Chamber of Commerce, Northern Aboriginal Business Association, NWT Association of Communities, Canadian Northern Economic Development Agency, and Government of the Northwest Territories Department of Industry, Tourism and Investment.

Office of the Correctional Investigator. (2013). Background: Aboriginal Offenders – A Critical Situation. Office of the Correctional Investigator. Retrieved from <http://www.oci-bec.gc.ca/cnt/rpt/oth-aut/oth-aut20121022info-eng.aspx>

Ogden, A.E. and Innes, J.L. (2009). Adapting to climate change in the southwest Yukon: Locally Identified Research and Monitoring Needs to Support Decision Making on Sustainable Forest Management. *Arctic*, 62(2), 159-174.

Olfert, R. and Natcher, D. (2013). Chapter 9: Social capital and place-based policy: Aboriginal communities in Canada. In H. Westlund and K. Kobayashi (Eds.), *Social Capital and Rural Development in the Knowledge Society*. Cheltenham, Great Britain: Edward Elgar Pub.

Oliver, L.N., Peters, P.A., and Kohen, D.E. (2012). Mortality rates among children and teenagers living in Nunangat, 1994 to 2008. Component of Statistics Canada catalogue no. 82-003-X Health Reports. Ottawa, ON: Statistics Canada.

Organ, J. (2012). *Community Freezers Supporting Food Security: Perspectives from Residents of Nain, Nunatsiavut*. (Masters dissertation). Dalhousie University, Halifax, NS.

Orr, P. (2010a). Adherence to tuberculosis care in Canadian Aboriginal populations. Part 1: definition, measurement, responsibility, barriers. *International Journal of Circumpolar Health*, 70(12), 113-127.

Orr, P. (2010b). Adherence to tuberculosis care in Canadian populations Part 2: a comprehensive approach to fostering adherent behaviour. *International Journal of Circumpolar Health*, 70(2), 128-140.

Ospina, M. and Dennett, L. (2013). *Systematic Review on the Prevalence of Fetal Alcohol Spectrum Disorders*. Edmonton, AB: Institute of Health Economics.

Outcrop Communications. (2011). *A Review of Film Commission Mandates and Support for the Film, Video and Digital Media Industry in Canadian Regions with 500,000 Population or Less*. Yellowknife, NT: Outcrop Communications.

Owens, S., De Wals, P., Egeland, G., Furgal, C., Mao, Y., Minuk, G.Y., Peters, P.A., Simard, M., and Dewailly, É. (2012). Public health in the Canadian Arctic: Contributions from International Polar Year Research. *Climatic Change*. Springer.

Pacey, M. (2009a). *Fetal Alcohol Syndrome & Fetal Alcohol Spectrum Disorder Among Aboriginal Peoples*. Prince George, BC: National Collaborating Centre on Aboriginal Health.

Pacey, M. (2009b). *Fetal Alcohol Syndrome & Fetal Alcohol Spectrum Disorder Among Aboriginal Canadians: Knowledge Gaps*. Prince George, BC: National Collaborating Centre on Aboriginal Health.

Parkinson, A.J. (2008). The International Polar Year, 2007-2008, An Opportunity to Focus on Infectious Diseases in Arctic Regions. *Emerging Infectious Diseases*, 14(1), 1-3.

Parkinson, A.J., and Evengård, B. (2009). Climate change, its impact on human health in the Arctic and the public response to threats of emerging infectious diseases. *Global Health Action*, 2, DOI: 10.3402/gha.v2i0.2075.

Parks Canada. (2012). Research in Northern National Parks. Parks Canada. Retrieved from <http://www.pc.gc.ca/nature/API-IPY/td-rs.aspx>

Parlee, B. and Furgal, C. (2012). Well-being and environmental change in the Arctic: A synthesis of selected research from Canada's International Polar Year program. *Climatic Change*, 115(1), 13-34.

Pauktuutit Inuit Women of Canada. (2013). *Inuit Cancer Project – Year One Final Report*. Ottawa, ON: Pauktuutit Inuit Women of Canada.

Pauktuutit Inuit Women of Canada, Rasmussen, D., and Guillou, J. (2012). Developing an Inuit-Specific Framework for Culturally Relevant Health Indicators Incorporating Gender-Based Analysis. *Journal of Aboriginal Health*, 8(2), 24-35.

Paulic, J.E., Papst, M.H., and Cobb, D.G. (2009). *Proceedings for the Identification of Ecologically and Biologically Significant Areas in the Beaufort Sea Large Ocean Management Area*. Canadian Manuscript Report of Fisheries and Aquatic Sciences 2865. Winnipeg, MB: Fisheries and Oceans Canada.

Pearce, T.D., Ford, J.D., Prno, J., Duerden, F., Pittman, J., Beaumier, M., Berrang-Ford, L., and Smit, B. (2011). Climate change and mining in Canada. *Mitigation and Adaptation Strategies for Global Change*, 16(3), 347-368.

Peddle, K. (2007). Telehealth in Context: Socio-technical Barriers to Telehealth use in Labrador, Canada. *Computer Supported Cooperative Work*, 16, 595-614.

Peredo, A.M., Anderson, R.B., Galbraith, C.S., Honig, B., and Dana, L.P. (2004). Towards a theory of indigenous entrepreneurship. *International Journal of Entrepreneurship and Small Business*, 1(1-2), 1-20.

Perrie, W., Long, Z., Hung, H., Cole, A., Steffen, A., Dastoor, A., Durnford, D., Ma, J., Bottenheim, J.W., Netcheva, S., Staebler, R., Drummond, J.R., and O'Neill, N.T. (2012). Selected topics in arctic atmosphere and climate. *Climate Change*, 115(1), 35-58.

Peters, P.A. (2012). Shifting Transitions: Health Inequalities of Inuit Nunangat in Perspective. *Journal of Rural and Community Development*, 7(1), 36-58.

Peterson, K. (2012). *Community Experiences of Mining in Baker Lake, Nunavut*. (Masters thesis). University of Guelph, Guelph, ON.

Petrov, A.N. (2008). Talent in the Cold? Creative Capital and the Economic Future of the Canadian North. *Arctic*, 61(2), 162-176.

Popova, S., Lange, S., Bekmuradov, D., Mihic, A., and Rehm, J. (2011). Fetal Alcohol Spectrum Disorder prevalence estimates in correctional systems: A systematic literature review. *Canadian Journal of Public Health*, 102(5), 336-340.

Poppel, B., Kruse, J., Duhaime, G., and Abruтина, L. (2007). *SLiCA Results*. Anchorage: Institute of Social and Economic Research, University of Alaska Anchorage.

- Post, E., Forchhammer, M.C., Bret-Harte, M.S., Callaghan, T.V., Christensen, T.R., Elberling, B., Fox, A.D., Gilg, O., Hik, D.S., Hoye, T.T., Ims, R.A., Jeppesen, E., Klein, D.R., Madsen, J., McGuire, A.D., Rysgaard, S., Schindler, D.E., Stirling, I., Tamstorf, M.P., Tyler, N.J.C., van der Wal, R., Welker, J., Wookey, P.A., Schmidt, M., Aastrup, P. (2009). Ecological Dynamics Across the Arctic Associated with Recent Climate Change. *Science*, 325(5946), 1355-1358.
- Powers, P. (2011). Integrating Healthcare and e-Health in the Territories. The Tasks Ahead for Yukon, the Northwest Territories and Nunavut. *Electronic Healthcare*, 9(4), 21-31.
- Prno, J., and Slocombe, D.S. (2012). Exploring the origins of 'social license to operate' in the mining sector: Perspectives from governance and sustainability theories. *Resources Policy*, 37(3), 346-357.
- Prowse, T.D. and Furgal, C. (2009). Northern Canada in a Changing Climate: Major Findings and Conclusions. *A Journal of the Human Environment*, 38(5), 209-292.
- Prowse, T.D., Furgal, C., Wrona, F.J., and Reist, J.D. (2009). Implications of Climate Change for Northern Canada: Freshwater, Marine, and Terrestrial Ecosystems. *Ambio*, 38(5), 282-289.
- Pulla, S. (2012). *Framing Sustainable Options for Housing in Canada's North*. Ottawa, ON: Centre for the North.
- Reading, C.L. and Wien, F. (2009). *Health Inequalities and Social Determinants of Aboriginal Peoples' Health*. Prince George, BC: National Collaborating Centre for Aboriginal Health.
- Reading, J. and Halseth, R. (2013). *Pathways to Improving Well-Being for Indigenous Peoples: How Living Conditions Decide Health*. Prince George, BC: National Collaborating Centre for Aboriginal Health.
- Reist, J. D., Wrona, F. J., Prowse, T. D., Power, M., Dempson, J. B., Beamish, R. J., King, J. R., Carmichael, T. J. et al. (2006). General effects of climate change on arctic fishes and fish populations. *Ambio*, 35, 370-380.
- Resources and Sustainable Development in the Arctic. (2013a). ReSDA Research Priorities 2013-14. Resources and Sustainable Development in the Arctic. Retrieved from <http://yukonresearch.yukoncollege.yk.ca/resda/wp-content/uploads/sites/2/2013/09/ReSDAResearchPriorities2013f.pdf>
- Rh eume, G. and Caron-Vuotari, M. (2013). *The Future of Mining in Canada's North*. Ottawa, ON: Conference Board of Canada.
- Robertson, L.H. (2006). The residential school experience: Syndrome or historic trauma. *Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health*, 4(1), 1-28.
- Rodon, T. and Schott, S. (2013). *Towards a sustainable future for Nunavik*. Polar Record. Cambridge University Press.
- Rogers, D., and Rowell, L. (2007). *Early Education and Special Needs in First Nations and Inuit Communities*. Roundtable, Phase II of Distance Learning on Special Needs for Early Childhood Educator Workers in Aboriginal Communities, Ottawa, ON.
- Romanovsky, V.E., Smith, S.L., Christiansen, H.H., Shiklomanov, N.I., Streletskiy, D.A., Drozdov, D.S., Oberman, N.G., Kholodov, A.L., Marchenko, S.S. (2013). Permafrost. In M.O. Jeffries, J.A. Richter-Menge, and J.E. Overland (Eds.), *Arctic Report Card 2013*. Accessed 02/06/2014. Retrieved from <http://www.arctic.noaa.gov/reportcard/permafrost.html>
- Romanow, R.J. (2002). *Building on Values: The Future of Health Care in Canada. Final Report*. Saskatoon, SK: Commission on the Future of Health Care in Canada.
- Rompkey, B. and Patterson, D.G. (2010). The management of fisheries and oceans in Canada's western Arctic. *Report of the Standing Senate Committee on Fisheries and Oceans, 40th Parliament, 3rd Session*. Ottawa, ON: Senate of Canada.
- Ronning, W. and Wiborg, A. (2008). *Education for All in the Arctic? A Survey of Available Information and Research*. Norway: Nordlandsforskning.
- Ropars, P. and Boudreau, S. (2012). Shrub expansion at the forest-tundra ecotone: spatial heterogeneity linked to local topography. *Environmental Research Letters*, 7, 015501.
- Rosol, R., Huet, C., Wood, M., Lennie, C., Osborne, G. and Egeland, G.M. (2011). Prevalence of affirmative responses to questions of food insecurity: International Polar Year Inuit Health Survey, 2007-2008. *International Journal of Circumpolar Health*, 70(5), 488-497.
- Ross, F.K.P. (2012). *Perspectives of northern researchers, residents and educators on science education and outreach in Yukon, Canada*. (Masters thesis). Dalhousie University, Halifax, NS.
- Roux, M.J., Tallman, R.F., and Lewis, C.W. (2011). Small-scale Arctic charr *Salvelinus alpinus* fisheries in Canada's Nunavut: management challenges and options. *Journal of Fish Biology*, 79(6), 1625-1647.
- Salmon, A. and Clarren, S.K. (2011). Developing effective, culturally appropriate avenues to FASD diagnosis and prevention in northern Canada. *International Journal of Circumpolar Health*, 70(4), 428-433.
- Salokangas, R. and Parlee, B. (2009). The influence of family history on learning opportunities of Inuvialuit youth. *Inuit Studies*, 33(1-2), 191-207.
- Scheffer, M., Hirota, M., Holmgren, M., Van Nes, E.H., and Chapin III, S. (2012). Thresholds for boreal biome transitions. *Proceedings of the National Academy of Sciences of the United States of America*, 109(52), 21384-21389.
- Schuster, R.C., Wein, E.E., Dickson, C., and Chan, H.M. (2011). Importance of traditional foods for the food security of two First Nations communities in the Yukon, Canada. *International Journal of Circumpolar Health*, 70(3), 286-300.
- Schweitzer, P. et al. (2013). Preview of Gap Analysis "The Impacts of Resource Development on Northern Communities." Resources and Sustainable Development in the Arctic. Retrieved from <http://yukonresearch.yukoncollege.yk.ca/resda/wp-content/uploads/sites/2/2013/09/GA2priorities.pdf>
- Sharp, M., Wyatt, F., Barrand, N., Bell, T., Way, R., Burgess, D., Cogley, J.G., and Gardner, A.S. (2012). Glacier change in northern Canada from the IGY to the IPY. From Knowledge to Action IPY 2012 Conference.
- Sheppard, A.J. and Hetherington, R. (2012). A decade of research in Inuit children, youth, and maternal health in Canada: areas of concentrations and scarcities. *International Journal of Circumpolar Health*, 71, 18383 - <http://dx.doi.org/10.3402/ijch.v71i0.18383>
- Sisco, A. and Stewart, N. (2009). *True to Their Visions: An Account of 10 Successful Aboriginal Businesses*. Ottawa, ON: Centre for the North.
- Sisco, A. and Stonebridge, C. (2010). *Toward Thriving Northern Communities*. Ottawa, ON: Centre for the North.
- Sisco, A., Caron-Vuotari, M., Stonebridge, C., Sutherland, G. and Rh eume, G. (2012). *Lessons Learned: Achieving Positive Educational Outcomes in Northern Communities*. Ottawa, ON: Centre for the North.
- Smith, S.L., Romanovsky, V.E., Lewkowicz, A.G., Burn, C.R., Allard, M., Clow, G.D., Yoshikawa, K., Throop, J. (2010). Thermal State of Permafrost in North America: A Contribution to the International Polar Year. *Permafrost and Periglacial Processes*, 21, 117-135.
- Southcott, C. (In press). Some Observations on the Social Economy in Northern Canada. In C. Southcott (Ed.), *Northern Communities Working Together: The Social Economy of Canada's North*. Toronto, ON: University of Toronto Press.
- Southcott, C. and Irlbacher-Fox, S. (2009). *Changing Northern Economies: Helping Northern Communities Build a Sustainable Future*. Victoria, BC: Northern Development Ministers Forum, 35 pp.
- Southcott, C. and Walker, V. (2009). A Portrait of the Social Economy in Northern Canada. *The Northern Review*, 30, 13-36.
- Standards Council of Canada. (2012). Northern Infrastructure Standardization Initiative. Retrieved from <http://www.scc.ca/en/stakeholder-participation/roadmaps-and-standardization-solutions/northern-infrastructure-standardization-initiative>
- Statistics Canada. (2011a). National Household Survey. Catalogue #99-014-X2011016. Retrieved from <http://www.gov.nu.ca/sites/default/files/files/Income-Earnings%20Tables%20by%20Nunavut,%20Region%20and%20Community,%202011%20NHS.xlsx>
- Statistics Canada. (2011b). Average Personal Income Northwest Territories by Community and Selected Geographic Aggregation. 1994-2011. Retrieved from <http://www.statsnwt.ca/labour-income/income/tables/Average%20Personal%20Total%20Income.xlsx>
- Statistics Canada (2011c). 2011 Census of Population. Retrieved from <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E>
- Stewart, E.J., Draper, D., and Johnston, M.E. (2005). A Review of Tourism Research in the Polar Regions. *Arctic*, 58(4), 383-394.
- Storey, K. (2010). Fly-in/fly-out: Implications for Community Sustainability. *Sustainability*, 2(5), 1161-1181.
- Stow, J., Shearer, R., Hung, H., Steffen, S., Harner, T., Braune, B., and Curren, M. (2013). Transboundary pollution in a changing Arctic. White Paper prepared for the 2013 Arctic Observing Summit, Vancouver.
- Sustainable Development Working Group. (2010). *Hope and Resilience: Suicide Prevention in the Arctic*. November 7-8, 2009 Conference Report. Sustainable Development Working Group, Arctic Council.



- Taylor, D.M., Caouette, J., Osborne, E., and Wright, S.C. (2008). Aboriginal Languages in Quebec: Fighting Linguicide with Bilingual Education. *Diversité urbaine*, automne 2008, 69-89.
- Tester, F.J., and McNicoll, P. (2004). Isumagijaksaq: mindful of the state: social constructions of Inuit suicide. *Social Science & Medicine*, 58, 2625-2636.
- The Bayswater Consulting Group Inc. (2005). *Nunavut Housing Requirements, Needs and Demand 2016: Background Report for a Ten-Year Nunavut Housing Strategy*. Ottawa, ON: The Bayswater Consulting Group Inc. (Prepared for the Government of Nunavut and Nunavut Tunngavik Inc.)
- The Conference Board of Canada. (2010). *Mapping the Economic Potential of Canada's North*. Ottawa, ON: Centre for the North.
- Throop, J., Lewkowicz, A.G., Smith, S. (2012). Climate and ground temperature relations at sites across the continuous and discontinuous permafrost zones in northern Canada. *Canadian Journal of Earth Sciences*, 49(8), 865-876.
- Transportation Association of Canada. (2010). *Primer on Developing and Managing Transportation Infrastructure in Permafrost Regions*. Ottawa, ON: Transportation Association of Canada.
- Tremblay, B., Lévesque, E. and Boudreau, S. (2012a). Recent expansion of erect shrubs in the low Arctic: evidence from Eastern Nunavik. *Environmental Research Letters*, 7, 035501.
- Tremblay, J.-É., Robert, D., Varela, D.E., Lovejoy, C., Darnis, G., Nelson, J.R., Sastri, A.R. (2012b). Current state and trends in Canadian Arctic marine ecosystems: I. Primary production. *Climatic Change*, 115(1), 161-178.
- Truth and Reconciliation Commission of Canada. (2012). *Truth and Reconciliation Commission of Canada: Interim Report*. Winnipeg, MB: Truth and Reconciliation Commission of Canada.
- Tulloch, S., Pilakapsi, Q., Uluqsi, G., Kusugak, A., Chenier, C., Ziegler, A. and Crockatt, K. (2012). Impacts of Non-Formal, Culturally-Based Learning Programs in Nunavut. In L.-J. Dorais and F. Laugrand (Eds.), *Linguistic and Cultural Encounters in the Arctic*. Quebec City, QC: Centre interuniversitaire d'études et de recherche autochtones.
- Université Laval. (2011). *ADAPT: Arctic Development and Adaptation to Permafrost in Transition*. Québec City, QC: Université Laval.
- Université Laval. (2012). *Mobilizing for a Sustainable North: Research Issues and Priorities*. Québec City, QC: Université Laval.
- Osborne, E., Caouette, J., Qumaaluk, Q., and Taylor, D.M. (2009). Bilingual education in an Aboriginal context: examining the transfer of language skills from Inuktitut to English or French. *International Journal of Bilingual Education and Bilingualism*, 12(6), 667-684.
- van der Velden, S., Dempson, J. B., Evans, M.S., Muir, D.C.G. and Power, M. (2013a). Basal mercury concentrations and biomagnification rates in freshwater and marine food webs: effects on Arctic charr (*Salvelinus alpinus*) from eastern Canada. *Science of the Total Environment*, 444, 531-542.
- van der Velden, S., Evans, M. S., Dempson, J.B., Muir, D.C.G. and Power, M. (2013b). Comparative analysis of total mercury concentrations in anadromous and non-anadromous Arctic charr (*Salvelinus alpinus*) from eastern Canada. *Science of the Total Environment*, 47, 438-449.
- Verhille, S., Marsden, T., and Shum, M. (2009). Indoor air quality issues in First Nations and Inuit communities in Canada. In S. Chatwood, P. Orr, and T. Ikäheimo, Proceedings from the 14<sup>th</sup> International Congress on Circumpolar Health: *Securing the IPY Legacy: From Research to Action*. Yellowknife, NT.
- Volmink J. and Garner, P. (2007). Directly observed therapy for treating tuberculosis. *Cochrane Database of Systematic Reviews 2007*, 4, CD003343. DOI: 10.1002/14651858.CD003343.pub3.
- Vors, L. S., and Boyce, M. S. (2009). Global declines of caribou and reindeer. *Global Change Biology*, 15.
- Voswinkel, S. (2012). *Survey of Yukon's Knowledge Sector: Results and Recommendations*. Whitehorse, YT: Ylynx Management Consulting, Inc. and Yukon Research Centre, Yukon College.
- Walker, K. (2009). *Northern Entrepreneurship*. Winnipeg, MB: International Institute for Sustainable Development.
- Walker, T.M., Ip, C.L.C., Harrell, R.H., Evans, J.T., Kapatai, G., Dediccoat, M.J., Eyre, D.W., Wilson, D.J., Hawkey, P.M., Crook, D.W., Parkhill, J., Harris, D., Walker, S., Bowden, R., Monk, P., Smith, E.G., and Peto, T.E.A. (2013). Whole-genome sequencing to delineate *Mycobacterium tuberculosis* outbreaks: A retrospective observational study. *The Lancet Infectious Diseases*, 13(2), 137-146.
- Wesche, S.D. and Chan, H.M. (2010). Adapting to the Impacts of Climate Change on Food Security among Inuit in the Western Canadian Arctic. *EcoHealth*, 7, 361-373.
- Wesche, S., Ryan, R., and Carry, C. (2011). *First Nations, Inuit and Métis: Respiratory Health Initiatives Environmental Scan*. Ottawa, ON: National Aboriginal Health Organization.
- Wesley-Esquimaux, C. (2007). The intergenerational transmission of historic trauma and grief. *Indigenous Affairs*, 4, 6-11.
- Whitbeck, L.B. (2010). Measuring the health effects of historical and contemporary cultural losses. *International Journal of Circumpolar Health*, S7, 405-409.
- White, G. (2005). *Culture Clash: Traditional Knowledge and EuroCanadian Governance Processes in Northern Claims Boards*. Paper presented at the 'First Nations, First Thoughts' Conference. Toronto, ON: G. White.
- White, G. (2006). Cultures in Collision: Traditional Knowledge and Euro-Canadian Governance Processes in Northern Land-Claim Boards. *Arctic*, 59(4), 401-414.
- Wolken, G., Sharp, M., Geai, M.-L., Burgess, D., Arendt, A. and Wouters, B. (2013). Glaciers and ice caps (outside Greenland). In "State of the Climate in 2012". *Bulletin of the American Meteorological Society*, 94, S119-S121.
- Wright, C. (2012). Navigability of the Canadian Arctic. Proceedings from Canadian Hydrographic Association 2012 Conference: The Arctic: Old Challenges, New Approaches. Niagara Falls, Canadian Hydrographic Association.
- Xu, L., Myneni, R.B., Chapin III, F.S., Callaghan, T.V., Pinzon, J.E., Tucker, C.J., Zhu, Z., Bi, J., Ciaia, P., Tømmervik, H., Euskirchen, E.S., Forbes, B.C., Piao, S.L., Anderson, B.T., Ganguly, S., Nemani, R.R., Goetz, S.J., Beck, P.S.A., Bunn, A.G., Cao, C., and Stroeve, J.C. (2013). Temperature and vegetation seasonality diminishment over northern lands. *Nature Climate Change*, 3, 581-586.
- Young, K. and Chatwood, S. (2009). *Public Health Practice in Circumpolar Regions: Lessons for Canada*. Report prepared for the Public Health Agency of Canada. Yellowknife, NT: Institute for Circumpolar Health Research.
- Young, T.K. and Chatwood, S. (2011). Health care in the North: What Canada can learn from its circumpolar neighbours. *Canadian Medical Association Journal*, 183(2), 209-214.
- Young, M., Kandola, K., Mitchell, R., and Leamon, A. (2007). Hospital admission rates for lower respiratory tract infections in infants in the Northwest Territories and the Kitikmeot region of Nunavut between 2000 and 2004. *Paediatrics & Child Health*, 12(7), 563-566.
- Yukon College. (2012). Arquluk Permafrost Project. Yukon College. Retrieved from [http://www.yukoncollege.yk.ca/research/projects/arquluk\\_permafrost\\_project](http://www.yukoncollege.yk.ca/research/projects/arquluk_permafrost_project)
- Yukon Economic Development. (2006). *Pathways to Prosperity: An Economic Growth Perspective 2005 to 2025*. Whitehorse, YT: Yukon Economic Development.
- Yukon Health Care Review Steering Committee. (2008). *The Yukon Health Care Review*. Whitehorse, YT: Health and Social Services – Yukon Government.
- Zeller, D., Booth, S., Pakhomov, E., Swartz, W., and Pauly, D. (2011). Arctic fisheries catches in Russia, USA, and Canada: baselines for neglected ecosystems. *Polar Biology*, 34, 955-973.