

Fall 2017

# A Critical Examination of the Climate Change Vulnerability and Adaptation Literature in Nunavut, Canada

Sarah Prentice  
*SIT Study Abroad*

Follow this and additional works at: [https://digitalcollections.sit.edu/isp\\_collection](https://digitalcollections.sit.edu/isp_collection)

 Part of the [Climate Commons](#), [Environmental Studies Commons](#), [Human Ecology Commons](#), [Indigenous Studies Commons](#), [Place and Environment Commons](#), and the [Social and Cultural Anthropology Commons](#)

---

## Recommended Citation

Prentice, Sarah, "A Critical Examination of the Climate Change Vulnerability and Adaptation Literature in Nunavut, Canada" (2017). *Independent Study Project (ISP) Collection*. 2750.  
[https://digitalcollections.sit.edu/isp\\_collection/2750](https://digitalcollections.sit.edu/isp_collection/2750)

This Unpublished Paper is brought to you for free and open access by the SIT Study Abroad at SIT Digital Collections. It has been accepted for inclusion in Independent Study Project (ISP) Collection by an authorized administrator of SIT Digital Collections. For more information, please contact [digitalcollections@sit.edu](mailto:digitalcollections@sit.edu).

**A Critical Examination of the Climate Change Vulnerability and Adaptation**

**Literature in Nunavut, Canada**

Sarah Prentice

School for International Training

November 24, 2017

Advisor: Jennifer Smith

### **Abstract**

This paper attempts to study the climate change vulnerability and adaptation literature in Nunavut, a province in the Canadian Arctic. The paper begins with a review of literature produced by Inuit organizations on colonization in the Canadian Arctic and Nunavut specifically, then systematically reviews the literature on climate change vulnerability and adaptation. Using a post-colonial analysis, this study found that while the climate change vulnerability and adaptation literature attempts to attend to colonial histories and legacies, it often falls short. Climate change vulnerability and adaptation literature had minimal representation of colonization, residential schooling, sanatoria, and Inuit Qaujimagatuqangit. This may perpetuate unequal power relationships between researchers and participants, and can potentially lead to maladaptation. The literature references mining and shipping more often, however they rarely mention or attempt to quantify the vulnerabilities these activities pose to communities in the Canadian North. The paper ends with recommendations for future research.

### **Acknowledgements**

First, I would like to thank my academic advisor Dan Govoni for his patience, endless support, and genuine concern for my health and well-being throughout the process of my ISP. I cannot emphasize enough how much your support and humor truly meant to me. I would also like to thank Alex Tyas for her support and advice, and for listening to me rant and sharing her stories. Another thank you is extended to my project advisor, Jennifer Smith for allowing me to fall in love with the country of Greenland, and for her support throughout this process!

I would like to thank my roommates Story and Doodle for doing my dishes, providing constant humor, and for binge watching Stranger Things with me. I would also like to thank Palina, my girl from Braud & Co, for both the free and discounted pastries from my favorite bakery in Reykjavik. She supported the grind with endless gingerbread rolls, caramel muesli rolls, and rhubarb bars.

Finally, I would like to thank my entire SIT Iceland and Greenland: Climate Change and the Arctic group for an incredible semester. Every single one of you has made a lasting impact on my life, and I am forever grateful to have met and gotten to know all of you. I wish you all the best in your pursuit of saving the environment, and I have endless love for all of you.

**Table of Contents:**

<b>Abstract</b> .....	<b>2</b>
<b>Acknowledgements</b> .....	<b>2</b>
<b>1. Introduction</b> .....	<b>4</b>
<i>1.1 Climate Change Research in the Canadian North</i> .....	4
<i>1.2 Community-Based Adaptation Research and Criticisms in the Canadian North</i> .....	5
<i>1.3 Traditional Ecological Knowledge</i> .....	8
<i>1.4 Nunavut Land Claims Agreement and Inuit Qaujimajatuqangit</i> .....	8
<i>1.5 Research Question</i> .....	10
<b>2. Ethics</b> .....	<b>11</b>
<b>3. Methods</b> .....	<b>12</b>
<b>4. Results</b>	
<i>4.1 Colonization Histories and Legacies: Literature Review</i> .....	14
<i>4.2 Climate Change Adaptation Literature Review</i> .....	17
<b>5. Discussion</b> .....	<b>21</b>
<b>6. Conclusion</b> .....	<b>25</b>
<b>7. Figures</b> .....	<b>26</b>
<b>8. References</b> .....	<b>27</b>

## **Introduction**

Almost all scientists have come to a consensus on climate change: it is happening, and it is anthropogenic. Anthropogenic, in this sense, means the experienced warming of the Earth is attributed to human influences such as industrial activities, land use changes, and subsequent fossil fuel combustion (Myrhe et al., 2013). While global warming is occurring everywhere, it is amplified in Arctic regions. This is largely a result of the reduction in surface albedo from less snow and ice cover, more energy going into warming than evaporation, a significantly thinner ozone layer than in the tropics, a reduction in ocean albedo contributing to ocean warming, and the subsequent alterations in ocean circulation due to increasing temperature and decreasing salinity from ice melt (ACIA, 2004; Vaughan, 2013). These feedback loops create unique conditions that make the Arctic especially vulnerable to the effects of climate change, and have attracted many western scientific researchers to study the drastic and widespread biophysical effects of climate change in the Arctic.

### *1.1 Climate Change Research in the Canadian North*

Both the Intergovernmental Panel on Climate Change Fifth Assessment Report (IPCC AR5) and the Arctic Climate Impact Assessment (ACIA) note that the Canadian Arctic specifically is warming two times faster than the global annual average temperature increase (ACIA, 2004; Hewitson et al., 2014). This considerable warming contributes to significant alterations in biophysical systems in Northern Canada, including reductions in multi-year sea ice, reductions in sea ice thickness and extent, and lengthening of ice-free open water season. Other climate change impacts in the Canadian

Arctic include increases in permafrost thaw, coastal erosion, extreme weather events, precipitation, and unpredictable weather patterns (ACIA, 2004; Ford, Bell, & Couture, 2016; Larsen et al., 2014). Some of the most intense and rapid changes to biophysical systems impact the Canadian North Coast, which encompasses the coasts of the Yukon, Northwest Territories, Nunavut, Newfoundland and Labrador, Quebec, Ontario, and Manitoba provinces and territories (Ford et al., 2016a). These biophysical impacts influence ecosystem functioning and human systems as well.

The impacts of climate change on human systems in the Arctic are fairly well documented. Important technical reports such as the ACIA (2004) helped facilitate the growth of research on the human dimensions of change by explicitly reporting on impacts of climate change on Arctic peoples. The coproduction traditional ecological knowledge (TEK) and western science ecological knowledge (WSEK), has historically been utilized to quantify these observed environmental changes (Brewster, 1997; Gearhead et al., 2010; Krupnik et al., 2010; Riedlinger & Berkes, 2001). These studies defined “traditional ecological knowledge” from a western scientific standpoint, and chose specific aspects of TEK to use, disregarding many aspects of traditional ecological knowledge. Community-based adaptation research in the Canadian Arctic grew out of these historical “collaborations” between Indigenous communities and non-Indigenous scholars.

### *1.2 Community-Based Adaptation Research and Criticisms in the Canadian North*

Community-based adaptation research emerged out of studies on the human dimensions of climate change and studies attempting to integrate WSEK and TEK. The

origins of community-based adaptation research begin with Riedlinger and Berkes' (2001) paper on "Contributions of traditional knowledge to understanding climate change in the Arctic," where they explain how TEK can help expand adaptation, a "poorly understood" aspect of climate change. Since this paper, scores of scholarly journal articles on adaptation and TEK have emerged within the climate change literature.

In 2004, Ford and Smit outlined the first ever framework for community-based adaptation research in the Canadian Arctic, and coined the "vulnerability and adaptation" framework. Noting Arctic communities particular vulnerability to climate change, the authors present a conceptual model for understanding community vulnerability, and how to assess communities' ability to adapt to these vulnerabilities. They call for community involvement in the research process and in assessing current risks communities face. However, they do not mention the colonization of Inuit people in the Canadian North or the subsequent socio-economic and political hardships faced by these communities in the paper.

Out of these papers came specific, community-based vulnerability assessments, and following these, specific, community-based adaptation literature appeared. A literature review on research discussing the human dimensions of climate change in the eastern and central Arctic found that from 2000-2012, research focusing on vulnerability frameworks increased, and adaptation research began, but was still in early stages of development. Only 7% of lead authors on this research were associated with northern institutions or communities, and only 55% of studies reported collaboration with community members (Ford et al., 2012). This is problematic, as the point of this community-based vulnerability and adaptation literature was to involve local

communities and incorporate traditional ecological knowledge. Obviously, the literature failed on both fronts.

The community-based vulnerability and adaptation literature in the Canadian Arctic has been criticized for many reasons. As Cameron (2012) states, the literature has been largely silent on the colonial histories of Canadian Arctic communities. As the Canadian North has been profoundly shaped by colonization, and as this research claims to be decolonizing in nature, this is entirely problematic. Cameron (2012) and MacDonald and Steenbeek (2015) apply post-colonial critiques, which involve examining the political and social affects of colonization, and how these legacies continue to affect people today. McGregor (2009), Simpson (2001, 2004), and Tester and Irniq (2008) criticize the use of a western conception of TEK that decontextualizes TEK from the people who live this knowledge and their colonial histories. The intricacies of this argument will be explored in the next section.

The community-based adaptation literature in Canada, prior to 2012, has also been silent on the possibilities of resource extraction in Canada emerging as sea-ice subsides. Cameron (2012) argues this is a direct result of the exclusion of colonial histories in the Canadian North. By excluding colonial histories, adaptation scholars depoliticize the issue of climate change itself, and ignore the fact that Inuit people did not contribute to the fossil fuels from resource extraction and land use changes that have caused the effects of climate change these people are feeling. Scholars have also questioned whether community members are actually active participants or passive subjects, and whether community members actually contribute in all aspects of the research process (Koster, Baccar, & Lemelin, 2012). These issues must all be addressed

when conducting community-based vulnerability and adaptation research in the Canadian North.

### *1.3 Traditional Ecological Knowledge*

The concept of traditional ecological knowledge was created through uneven and unaddressed power relations between non-Indigenous researchers and Indigenous peoples' interactions. "Traditional ecological knowledge" is a term popularized by western researchers, which has historically limited the scope of TEK to a western, disciplinary approach to ways of knowing. The use of the term "traditional" implies this knowledge is ancient and unchanging. TEK is often decontextualized from the people and colonial histories that have shaped this knowledge, and the uneven power relations that create this misconception of TEK go unaddressed. While colonization is depoliticized, the non-Indigenous researcher continues to benefit from the research, reinforcing the privileging of western science over Indigenous knowledge (McGregor, 2009; Simpson, 2004; Tester & Irniq, 2008). For these reasons, many Indigenous scholars reject definitions of traditional knowledge posed by non-Indigenous researchers.

### *1.4 Nunavut Land Claims Agreement and Inuit Qaujimajatuqangit*

The territory of Nunavut was created in 1999 as a result of the 1993 Nunavut Land Claims Agreement, and Inuit currently have surface rights to 356,000 km<sup>2</sup> (15% of the land), and 38,000 km<sup>2</sup> of these lands include subsurface rights (Campbell, Fenge, & Hanson, 2011). The agreement also gave the Inuit of Nunavut the right to compensation for any environmental damages that may affect the harvesting economy, the right to

impact and benefit assessment input on proposed projects on Inuit lands, and representation on boards to manage wildlife and evaluate development impacts.

However, Campbell, Fenge, and Hanson (2011) also note there have been significant setbacks in the implementation of the Nunavut Agreement that revolve around the Canadian federal government's aversion of responsibility and fundamentally different understandings of the underlying meaning of the Agreement.

In a 1998 conference discussing the creation of the Government of Nunavut and traditional knowledge, the concept of Inuit Qaujimajatuqangit (IQ) was created. This creation stemmed from the fact that the limited, western science-defined conception of traditional knowledge did not encompass Inuit traditional knowledge. Inuit Qaujimajatuqangit was conceptualized to include language, values, and beliefs, and was meant to free IQ from western definitions. With two further conferences on IQ, the Government of Nunavut publicly acknowledged that Inuit Qaujimajatuqangit would be the driving force behind all government activities (Wenzel, 2004). Although the actual integration of IQ into the Government of Nunavut's agenda is questionable (Tester & Irniq, 2008), that topic is out of the scope of this paper. This paper will not attempt to define IQ either, for reasons that will be discussed later.

Today, Nunavut has a population of 35,580, and Inuit people make up 84.2% of this population (Statistics Canada, 2017b). Nunavummiut, or citizens of Nunavut, live in 25 small, rural, coastal communities along Nunavut's north coast. The people of Nunavut rely on a mixed subsistence and wage-based economy, with 70% of Inuit adults in Nunavut participating in harvesting activities (Inuit Tapiriit Kanatami, 2008). Nunavut faces several challenges associated with the effects of colonization on the region, such as

high poverty rates, unemployment, food insecurity, housing insecurity, and high suicide rates. There is a huge housing shortage in Nunavut, with 49% of residents living in homes that need major repairs or overcrowded homes (Nunavut Kiglisiniartiit, 2011). Nunavut Tunngavik Incorporated, Nunavut's regional Inuit corporation, is still fighting for the full implementation of the Nunavut Land Claims Agreement and the right to self-determination on the terms of social and cultural policies (Nunavut Tunngavik Incorporated, 2016). These issues are complicated by the presence of climate change researchers attempting to draw attention to issues other than the pressing issues Nunavummiut face daily.

#### *1.4 Research Question*

Due to the ongoing colonial legacies in the region, and previous criticisms of exclusion of colonization in climate change adaptation research, my research focuses on the intersection of colonial histories and climate change adaptation research. Following Cameron (2012), MacDonald and Steenbeek (2015), McGregor (2009), Simson (2001, 2004), and Tester and Irniq (2008), I attempt to critically examine the literature on climate change adaptation in Nunavut, focusing on the years of 2012-2018 through a post-colonial perspective. I chose the time frame of 2012-2018 as an attempt to expand Cameron's 2012 critique to the literature published after Cameron's review. This literature is examined to see if Cameron's review sparked change within the adaptation research field.

I chose to focus on Nunavut due to the unique terms of the Nunavut Land Claims Agreement and the supposed self-determination this agreement gave to the

Nunavummiut. This region also has a large amount of community-based adaptation assessments to assess, and is still experiencing the effects of colonization. My research question is as follows:

How does the current climate change vulnerability and adaptation research in Nunavut address colonial history, legacies, resource extraction, and shipping possibilities?

### **Ethics**

I am not an Indigenous person, and I do not intend to speak for Indigenous peoples. When discussing issues such as colonization and its continuing legacies, I use sources from Indigenous organizations and scholars whenever possible. While I understand that including only scholarly journals may exclude some Indigenous voices on climate change adaptation, the focus of this paper is to critique the climate change adaptation field as presented in scholarly journals and academic literature. I acknowledge I may have made mistakes, and I welcome any criticisms of my work.

It should be noted, however, that as a western researcher, my ability to choose what information I include and do not include reflects on my background in western research and may reflect biases I hold because of this. I note that the summary I have given on colonization does not come close to a full summary of the horrors that Aboriginal Canadians experienced for so many years, and I hope to do more research on this subject in the future. While I try to include as much information as possible, but this paper was limited by a 5-week scope. Again, any criticisms of this work are welcome.

## Methods

For the literature review of colonization in the Nunavut, three main documents on colonization were reviewed. The Truth and Reconciliation documents were created as part of the Truth and Reconciliation Commission of Canada to document the effects of residential schools on Canada's Indigenous peoples. From the Truth and Reconciliation Commission, the documents "The Inuit and the Northern Experience," and "The Legacy," were reviewed, as these documents were relevant to the subject matter discussed here. The Qikiqtani Truth Commission was created by the Qikiqtani Inuit Association to document the government policies, programs, and actions that affected the Inuit of the Qikiqtaaluk region of Nunavut during colonization. The "Qikiqtani Truth Commission Final Report" was chosen because it was specific to the region of study, and it was the final report and summary of the findings of the Qikiqtani Truth Commission. All of these documents were chosen because they were led by Aboriginal peoples in Canada, used interviews with Aboriginal peoples of Canada to document the affects of colonization on Aboriginal Canadians, and were created to right the wrongs of colonization by accurately documenting experiences shared by the Aboriginal peoples of Canada. Additional documents were included when found. These documents will be summarized to provide a background on colonization, and to inform me on how colonization is discussed from an Indigenous perspective. This will aid in my comparison to how colonization is discussed in the climate change adaptation literature.

For the review of climate change adaptation studies, literature was selected systematically using multiple Google Scholar searches, following a framework similar to that of McNamara and Buggy (2017). The first search included the terms "climate,"

“change,” and “adaptation” in the article title, and the terms “community-based,” “case study,” “Canadian Arctic,” “Canada,” “Nunavut,” “Inuit,” and “vulnerability” were used to further specify the search. This search produced 46 articles. Limiting results to the time frame of 2012-2018 provided 34 articles for this search. An additional Google Scholar search was conducted using the terms “climate,” “change,” and “vulnerability” in the article title, and was further specified with “community-based,” “case study,” “Canadian Arctic,” “Canada,” “Nunavut,” “Inuit,” and “adaptation.” This search was then produced 34 articles. Limiting results to the time frame of 2012-2018 provided 17 articles for this search. Patents and citations were not included in any of the searches.

The literature found in this search was then screened using the following exclusion criteria:

1. Duplicate document
2. Irrelevant location
  - a. Case studies from areas other than Nunavut
  - b. Scope wider than Canadian Arctic
3. Irrelevant content
4. Document other than scholarly journal

Literature reviews on the adaptation landscape in the Canadian Arctic and Nunavut were included, as they provide reflections necessary for successful vulnerability and adaptation studies.

The 41 articles produced by the given search strings were then screened using the exclusion criteria stated above. After excluding documents, 11 documents were available for further analysis. Documents were then searched for the terms “colonization,” “colonial,” “residential schools,” “residential schooling,” “compulsory schools,” “compulsory schooling,” “sanatoria,” “housing crisis,” “housing,” “traditional ecological knowledge,” “TEK,” “Inuit Qaujimagatuqangit,” “IQ,” “mining,” and “shipping” to find

mentions of relevant terms. Documents were then fully read and analyzed on the use of these terms.

## **Results**

### *4.1 Colonization History and Legacies: Literature Review*

MacDonald and Steenbeck (2015), the Truth and Reconciliation Commission (2015a, 2015b) and the Qikiqtani Truth Commission (2013) all note that the Canadian government's colonization of Indigenous people of Canada was devastating to Indigenous peoples' health physically, emotionally, and spiritually. Residential schools became a part of Canadian governmental law in 1879, justified by the Canadian Government's will to improve Indigenous culture by assimilating them to European ways of living and knowing. This meant the forcible removal of Indigenous people from their homes and communities, and relocation to religious residential schools, where children were subject to consistent abuse and neglect. Indigenous children were prohibited from speaking their language and practicing their culture and religion while simultaneously being denied food, witnessing abuse of classmates, being subjected to beatings, and being chained to beds. In the case of Nunavut, children were relocated thousands of miles away from their home communities (MacDonald & Steenbeck, 2015; Truth and Reconciliation Commission, 2015a; Qikiqtani Truth Commission, 2013). Truly addressing the horrible abuse endured by Indigenous children in residential schools is beyond the scope of this paper, but the Truth and Reconciliation Reports offer an in-depth chronicle of life in Canadian residential schools.

The Qikiqtani Truth Commission (2013) outlines Inuit experiences with colonization from 1950-1975 in the Qikiqtani region of Nunavut [Figure 1]. Inuit in this region experienced even further trauma from colonization during this time period. Inuit were forced to relocate to permanent settlements where there were housing shortages and poor housing quality. Inadequate housing was a main cause of elevated rates of illness among Inuit in this region. Before forced relocation, qimmiit (Inuit sled dogs) were integral to Inuit society, as they allowed hunters to traverse the land. Qimmiit were a symbol of independence, masculinity, and status in society. To further limit Inuit to permanent settlements, The Royal Canada Mounted Police (RCMP) slaughtered hundreds, and possibly thousands, of qimmiit. Many Inuit consulted in the Qikiqtani Truth Commission process still remembered the day their or their father's qimmiit were shot, and associated this loss with a loss of independence, self-reliance, and identity. The RCMP justified this as "good-intentioned," as they claimed to shoot qimmiit to prevent the spread of disease.

The Qikiqtani Truth Commission (2013) also outlines the relocation of Inuit from Nunavut to southern Canadian sanatoriums for tuberculosis (TB) treatment beginning in 1950. Many Inuit were unable to say goodbye to their families or communities, children were separated from their parents, and some people weren't even returned to their homes. Tester, McNicoll, and Irniq (2001) translate heartbreaking letters from sanatorium patients sent to relatives in the North during this time period, outlining themes of powerlessness, homesickness, cross-cultural misunderstandings, loss of self-esteem, and loss of control. This relocation was justified with the intention to help Inuit access medical care, but created significant traumas. Another instance of the Canadian

government's will to improve Inuit citizens' lives was the forced relocation of 11 Inuit families to the High Arctic communities of Grise Fjord and Resolute Bay in Nunavut circa 1953 and 1955. The Canadian government justified this move as beneficial to the Inuit, but in reality they were relocated to areas with unfamiliar hunting, climate, and topography (Morrison, 1993). The relocated families struggled to feed themselves in these conditions, and were not given the supplies necessary to live comfortably in these conditions (CBC News, 2010). These mistreatments by the Canadian government were all done, from the government's standpoint, as acts of benevolence towards the Inuit.

The effects of colonization are still felt today in many Inuit communities. The Truth and Reconciliation Commission (2015b) states that during the forced removal from families and communities and relocation to residential schools, Inuit children were not allowed to speak their language or practice their culture and rituals. The Commission states they also faced and witnessed physical, sexual, and emotional abuse frequently. Due to these constant abuses, the residential school system failed to educate Inuit children, and Inuit children only half of each year's enrollment in the 1950's made it to the 6<sup>th</sup> grade. This low educational attainment, which is definitely not the fault of the Inuit, has carried on to present generations, influencing income gaps and poverty levels for Inuit across Canada. The child welfare system in northern Canada echoes the pains of residential schooling by removing Aboriginal children from their homes for relocation to non-Aboriginal communities. MacDonald and Steenbeek (2015) and the Truth and Reconciliation Commission (2015b) articulate that as a result of this history of abuse, lack of formal education due to residential schools, forced relocation and subsequent loss of traditional lands, and cultural genocide experienced during colonization, Indigenous

people today are faced with higher rates of physical and sexual abuse, drug and alcohol addiction, suicide, poverty, marginalization, job discrimination, loss of traditional culture and knowledge, and intergenerational trauma. Many of the hardships Inuit communities face today are directly related to colonization.

#### *4.2 Climate Change Adaptation Literature Review*

Five climate change adaptation articles focusing on the Canadian North were published in 2012. One article was published in 2013, one was published in 2015, one was published in 2016, and three were published in 2017. There were no articles on climate change adaptation in the Canadian North published in 2014. This trend is represented in Figure 2.

Of the eleven articles reviewed, only 6 mention the words “colonization,” or “colonial.” Only 3 of the eleven articles specifically mention the word “colonization.” One of these papers is a critique of the climate change adaptation literature (Cameron, 2012), and discusses the lack of representation and misrepresentation of colonization in climate change adaptation literature. Another is a case study on the readiness for climate change adaptation of Iqaluit, Nunavut, and this study mentions colonization only once (Ford, Labbé, Flynn, Araos, & IHACC Research Team, 2017). The final study to explicitly mention colonization was also released in 2017, and is an article on longitudinal climate change adaptation studies (Fawcett, Pearce, Ford, & Archer, 2017). This study also mentions climate change one time. Overall, there are minimal representations of colonization in the climate change adaptation research from 2012 to 2017.

When I looked at articles that mentioned the word “colonial,” I found three additional articles. One is a literature review on climate change and adaptation research in the Canadian Arctic, and uses the word “colonial” once in reference to previous colonial relations in research (Ford & Pearce, 2012). The other is a study on the usage of “vulnerability” in climate change adaptation research (Haalboom & Natcher, 2012). This study uses the word “colonial” once as well. In “The Dynamic Multiscale Nature of Climate Change Vulnerability: An Inuit Harvesting Example,” Ford, McDowell, Shirley, Pitre, Siewierski, Gough, Duerden, Pearce, Adams, and Statham (2013) reckon with the colonial histories of the Canadian North in a paragraph. They discuss the fact that colonization is the root of many of the vulnerabilities faced by communities in the Canadian North, and claim their work is situated within the context of this colonization. This will be further analyzed in the discussion section.

Two articles explicitly mention residential schooling in the Canadian North. The first is the Cameron (2012) critique of climate change adaptation research. The second study is the Ford et al. (2013) work on the nature of climate change vulnerability in the Canadian North. The final study that discusses residential schooling is the Ford et al. (2013) study on the nature of climate change vulnerability. While Ford and the other authors mention residential schooling, they fail to identify residential schooling as one of the major factors contributing to the loss of IQ. With only 3 specific mentions of residential schooling, the literature also falls short on this front.

On the subject of sanatoria, the literature is almost completely silent. Two studies explicitly state the word “sanatoria,” and one of the studies is the Cameron (2012) study. The other study to mention sanatoria is Ford et al. (2013), and the authors mention

sanatoria in the same short paragraph as they mention residential schooling. Again, they do not capture either the extent of the traumas experienced at sanatoria, or the lasting effects of being sent to sanatoria. No additional studies mention sanatoria or the tuberculosis treatments or their effects on northern communities today.

Four studies mention the phrase “housing,” but only 3 explicitly name the housing crisis in Nunavut. Haalboom and Natcher (2012) mention inadequate housing in the Canadian North, and name “relocation” as the cause of these issues. They explain the Canadian government created these relocation initiatives, but they don’t explicitly state the word “colonization,” or that these forced relocation initiatives were a part of Canadian colonization. Bunce, Ford, Harper, Edge, and IHACC Research Team (2016) mention housing shortages, and acknowledge that climate change is not the biggest challenge facing most communities in the Canadian North. They argue climate change exacerbates existing vulnerabilities. Labbé, Ford, Araos, and Flynn (2017) mention the housing crisis in a single table on factors affecting adaptation in Nunavut, but the housing crisis is not discussed in the rest of the paper. Finally, Ford, Labbé, Flynn, Araos, and IHACC Research Team (2017) mention the housing crisis in Nunavut, but they refer to this crisis as a “short-term problem.” This vastly misrepresents the depth and extent of the housing crisis in the Canadian North.

Two articles use the phrase “traditional ecological knowledge,” and neither attempt to define the term. Both Cameron (2012) and Haalboom and Natcher (2012) use the term to criticize the way climate change adaptation literature discusses traditional ecological knowledge. Four articles mention Inuit Qaujimajatuqangit, and three of these studies define IQ. Cameron (2012) defines IQ, but calls attention to the issues with a

western definition of the concept. Haalboom and Natcher (2012) mention IQ and equate the concept to traditional knowledge. Ford et al. (2017) use the term “Inuit Qaujimajatuqangit,” and define the term, citing a western-science research paper as the source of this definition. Seven articles do not mention Inuit Qaujimajatuqangit at all.

Six articles mention mining and resource extraction. Cameron (2012) critiques the lack of attention climate change adaptation studies have given to mining and resource extraction in the Canadian North in terms of how they affect caribou populations and health of community members. Johnston, Johnston, Stewart, Dawson, and Lemelin (2012) discuss the economic opportunity of mining in Nunavut. When they speak of this economic opportunity, they fail to define who will benefit from this process. Ford, Champalle, Tudge, Riedlsperger, Bell, and Sparling (2015) discuss mining in terms of the protection of mining infrastructure, but also mention the possible effects of mining on caribou populations. Bunce et al. (2016) discuss Inuit women’s concerns regarding the effects of mining on caribou and seal populations in Iqaluit, Nunavut. This representation is absolutely necessary.

Shipping is also discussed in 6 studies. Cameron (2012) again criticizes the lack of coverage on shipping-related vulnerabilities in climate change adaptation literature. Ford and Pearce (2012) mention shipping in one sentence where they claim mining and shipping will actually reduce vulnerabilities in the Canadian North. Johnston et al. (2012) discuss the Arctic Shipping Pollution Prevention Regulations, and claim the regulations are fairly strict, updated regularly, and preventative in nature. However, they do not discuss if the Inuit living in the Canadian North are involved in creating these shipping regulations, and only have the perspective of decision makers in the industry. Ford et al.

(2015) mention the possibility of resource development and shipping as a potential vulnerability in one sentence, but do not discuss the subject further. Bunce et al. (2017) mention shipping once in terms of the effects on seal populations in Iqaluit. Finally, Labbé, Ford, Araos, and Flynn (2017) mention shipping twice as a possible source of vulnerabilities, but it is only represented in two tables, and is not discussed further.

## **Discussion**

Given the compounding effects of colonization, the Indigenous peoples of Canada's ability to their cultures, spirituality, and language is astounding. Seventy percent of Inuit people living within Inuit Nunangat (the Inuit homeland) feel they have strong or very strong family ties (Morris, 2016). Many Inuit have strong family sharing networks, with 96% of Inuit households sharing country foods in their communities (Inuit Tapiriit Kanatami, 2008). However, Morris (2016) also states that while 95% of Inuit aged 55 and older in Nunavut are able to speak an Inuit language very well or relatively well, this number is only 65% for Inuit aged 15 to 24 in Nunavut. Additionally, in 2006 (the most recent Inuit employment data), the Inuit employment rate was 20.5% lower than the employment rate for all Canadians, and in 2012, the percentage of Inuit aged 18-44 with a postsecondary degree was 38% lower than the percentage of non-Indigenous Canadians aged 18-44 with a postsecondary degree. Morris also reports that Inuit have faced discrimination in moving to urban areas due to stereotypes about Inuit people and culture. Many of these statistics are reflective of ongoing colonial legacies.

I provide a brief, and by no means complete, literature review of Canadian colonization in the Qikiqtani region of Nunavut to outline the historical context and

resultant socio-economic, cultural, and political circumstances that compound to shape how climate change and climate change adaptation research is conducted in the Canadian Arctic. Attending to colonial histories is essential to unpacking existing legacies of colonialism, and it has been argued that climate change is inextricably linked to colonization (Cameron, 2012; MacDonald & Steekbeek, 2015). Allowing these systems to go unacknowledged is to forget the colonial systems of knowledge that shape many official relationships between Indigenous peoples and non-Indigenous peoples today.

The large amount of climate change vulnerability and adaptation studies produced in 2012 may be a result of extreme interest in the Arctic from the International Polar Year funding cycle from 2007-2011 (Ford, Bolton, Shirley, Pearce, Tremblay, & Westlake, 2012). The renewed interest in the Canadian Arctic in 2017 may be attributed to the release of the Pan-Canadian Framework on Clean Growth and Climate Change (Government of Canada, 2016). Due to this increased interest in the Canadian North, a reflexive approach such as this paper is necessary to assess the directions and implications of this research.

In this context, it is extremely important that climate change adaptation research in the Canadian North grapples with these colonial histories and their place within this history. No authors examined their place as a western researcher and the possible power relations that come with this status in depth. The fact that only 3 studies even mentioned colonization is extremely troubling, and obviously most scholars are not fully capturing the source of many vulnerabilities in the Canadian North, as Cameron (2012) points out. The critique Cameron (2012) articulates still holds true in many ways, and this may lead to maladaptation, as she states. The minimal representation of residential schooling and

tuberculosis treatment at sanatoria is also troubling given the depth of these situations and their ongoing legacies. This, again, misinterprets the root causes of vulnerabilities in the Canadian Arctic, and can also lead to maladaptation. However, as Simson (2004) notes, some studies may be rejected by scientific journals if they include too much “off topic” information such as colonial histories. This can hugely affect coverage of colonization in climate change adaptation and vulnerability research, as published papers are integral to academic prowess.

Additionally, the housing crisis is pressing on many communities in Nunavut, and this crisis is one of the most pressing colonial legacies. Currently, 49% of housing in Nunavut is below housing standards, and only 60% of Nunavut citizens are satisfied with their housing situation (Nunavummiit Kiglisiniartiit, 2011). According to the Qikiqtani Truth Commission (2013), when Inuit were forced to move to major cities, such as Iqaluit, there was not enough housing, nor adequate quality housing in the cities. This legacy continues today, so it is difficult to understand referring to the housing crisis as a “short-term need,” as Ford et al. (2017) did.

These authors are still trying to influence policy, and if colonial histories or Inuit Qaujimajatuqangit are not taken into account during this decision making process, these policies can be detrimental to societies in the Canadian North. While Ford et al. (2013) address these critiques, the issues are lost on the later climate change adaptation literature. This is problematic if policies are created to combat vulnerabilities that stem from other underlying issues.

The lack of discussion of Inuit Qaujimajatuqangit is also troubling due to the Government of Nunavut’s commitment to incorporating IQ into all aspects of the

decision making process. Additionally, this lack of IQ inclusion has influenced government policy surrounding climate change. Labbé, Ford, Araos, and Flynn (2017) note that only 17% of government-led adaptation initiatives in Nunavut explicitly include IQ in some component of the initiative. Only 5% of projects include IQ in all aspects. Not only does this go against the Government of Nunavut's policies, but it may be representative of the lack of Inuit input in the decision making process (Campbell, Fenge, & Hanson, 2011; Labbé, Ford, Araos, & Flynn, 2017; Tester & Irniq, 2008). The equation of traditional ecological knowledge and IQ is problematic given the histories of both terms, and the definitions of IQ posed by western researchers are also problematic for similar reasons (Ford et al. 2017; Haalboom & Natcher, 2012; McGregor, 2009; Simpson, 2001, 2004). Both perpetuate unequal power relations and the delimitation of Inuit Qaujimagatunangit.

There are more articles that discuss mining, resource extraction, and shipping than there are articles that discuss colonization and colonial histories. This is illogical, as mining, resource extraction, and shipping are deeply tied to colonial practices. Canadian colonization occurred through the European quest for cheap land and resources (Cameron, 2012; Simpson, 2004, Qikiqtani Truth Commission, 2013). Speaking of mining, resource extraction, and shipping without discussing colonial histories and ongoing legacies is blatantly immoral. Additionally, the risks of these activities are numerous. Pollution, acid mine drainage, accident risk, and caribou and seal population depletion are among the few major risks these "economic opportunities" pose to the people of Nunavut, yet all but Cameron (2012) are fairly silent on these risks. This can be

extremely detrimental for communities in Nunavut, as they may not be informed of the risks involved in these activities.

### **Conclusion**

Although the climate change vulnerability and adaptation scholarship in the Canadian North is beginning to tend to colonial histories and legacies present in this area, the literature is not doing its due diligence in these fields. This research absolutely requires an interdisciplinary approach, and the researchers conducting studies in this area must be trained in post-colonial research practices and understand the specific issues facing certain communities in the Canadian North. To prevent maladaptation, the root causes of vulnerabilities must be identified and addressed properly.

In the future, I would like to research the effects of mining on Inuit communities in Nunavut. During this project, I found ample information on mineral exploration and proposed mines in Nunavut, and the Government of Nunavut often justified these activities. Obviously mining has detrimental effects on communities, and economic opportunities provided by mines are often short-lived. An in depth study of how mines propose they will help communities and the possible environmental effects on water sources and ecosystems would be a great place to start these studies.

Figures



Figure 1. Map of Nunavut, Canada  
 Maps. (n.d.). Map of Nunavut, Canada [map]. (ca. 1:400.) Retrieved from [http://games.maps.com/ref\\_map.aspx?pid=12253](http://games.maps.com/ref_map.aspx?pid=12253)

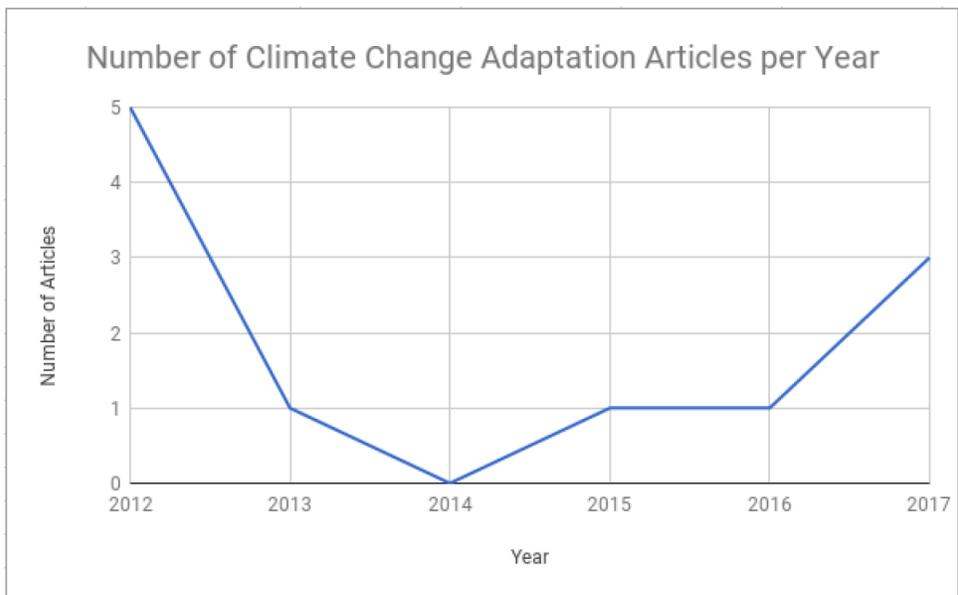


Figure 2. Graph of the number of climate change adaptation articles in the Canadian North per year

## References

- ACIA. (2004). *Impacts of a Warming Climate: Arctic Climate Impacts Assessment*. Retrieved from <http://www.amap.no/documents/doc/impacts-of-a-warming-arctic-2004/786>
- Brewster, K. (1997). Native Contributions to Arctic Science at Barrow, Alaska. *Arctic*, 50(3), 277-288. Retrieved from <http://www.north-slope.org/assets/images/uploads/Brewster.%201997.%20Native%20Contributions%20to%20Arctic%20Science%20at%20Barrow%20AK.pdf>
- Bunce, A., Ford, J.D., Harper, S., Edge, V., & IHACC Research Team. (2016). Vulnerability and adaptive capacity of Inuit women to climate change: a case study from Iqaluit, Nunavut. *Natural Hazards*, 83(2), 1419-1441. <https://doi.org/10.1007/s11069-016-2398-6>
- Cameron, E. (2012). Securing Indigenous politics: A critique of the vulnerability and adaptation approach to the human dimensions of climate change in the Canadian Arctic. *Global Environmental Change*, 22(1), 103-114. <https://doi.org/10.1016/j.gloenvcha.2011.11.004>
- Campbell, A., Fenge, T., & Hanson, U. (2011). Implementing the 1993 Nunavut Land Claims Agreement. *Arctic Review on Law and Politics*, 2(1), 25-51. Retrieved from <https://nordicopenaccess.no/index.php/arctic/article/view/17>
- CBC News. (2010, August 18). Inuit get federal apology for forced relocation. *CBC News*. Retrieved from <http://www.cbc.ca/news/canada/north/inuit-get-federal-apology-for-forced-relocation-1.897468>
- Fawcett, D., Pearce, T., Ford, J.D., & Archer, L. (2017). Operationalizing longitudinal approaches to climate change vulnerability assessment. *Global Environmental Change*, 45, 79-88. <https://doi.org/10.1016/j.gloenvcha.2017.05.002>
- Ford, J.D. & Smit, B. (2004). A Framework for Assessing the Vulnerability of Communities in the Arctic to Risks Associated with Climate Change. *Arctic*, 57(4), 389-400. <http://dx.doi.org/10.14430/arctic516>
- Ford, J.D., Bolton, K., Shirley, J., Pearce, T., Tremblay, M., & Westlake, M. (2012). Mapping Human Dimensions of Climate Change Research in the Canadian Arctic. *AMBIO*, 41(8), 802-822. doi:10.1007/s13280-012-0336-8
- Ford, J.D. & 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. doi:10.1111/j.1541-0064.2012.00418.x
- Ford, J.D., McDowell, G., Shirley, J., Pitre, M., Siewierski, R., Gough, W., Duerden, F., Pearce, T., Adams, P., & Statham, S. (2013). The Dynamic Multiscale Nature of Climate Change Vulnerability: An Inuit Harvesting Example. *Annals of the Association of American Geographers*, 103(5), 1193-1211. <https://doi.org/10.1080/00045608.2013.776880>

- Ford, J.D., Bell, T., and Couture, N.J. (2016a). Perspectives on Canada's North Coast region. In *Canada's Marine Coasts in a Changing Climate*, (5). Retrieved from [http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2016/Coastal\\_Assessment\\_Chapter5\\_NorthCoastRegion.pdf](http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2016/Coastal_Assessment_Chapter5_NorthCoastRegion.pdf)
- Ford, J.D., Champalle, C., Tudge, P., Riedlsperger, R., Bell, T., & Sparling, E. (2015). Evaluating climate change vulnerability assessments: a case study of research focusing on the built environment in northern Canada. *Mitigation and Adaptation Strategies for Global Change*, 20(8), 1267-1288. <https://doi.org/10.1007/s11027-014-9543-x>
- Ford, J.D., Cameron, L., Rubis, J., Maillet, M., & Nakashima, D. (2016b). Including indigenous knowledge and experience in IPCC assessment reports. *Nature Climate Change*, 6(4), 349-353. <http://dx.doi.org.colorado.idm.oclc.org/10.1038/nclimate2954>
- Ford, J.D., Labbé, J., Flynn, M., Araos, M., & IHACC Research Team (2017). Readiness for climate change adaptation in the Arctic: a case study from Nunavut, Canada. *Climatic Change*, 145(1-2), 85-100, <https://doi.org/10.1007/s10584-017-2071-4>
- Gearhead, S., Pocernich, M., Stewart, R., Sanguya, J., & Huntington, H.P. (2010). Linking Inuit knowledge and meteorological station observations to understand changing wind patterns at Clyde River, Nunavut. *Climatic Change*, 100(2), 267-294, <https://doi.org/10.1007/s10584-009-9587-1>
- Government of Canada. (2016). Pan Canadian Framework on Clean Growth and Climate Change. Retrieved from <http://www.tunnngavik.com/files/2016/09/SICS-Report-2015-ENG091316.pdf>
- Haalboom, B., & Natcher, D.C. (2012). The Power and Peril of "Vulnerability": Approaching Community Labels with Caution in Climate Change Research. *Arctic*, 65(3), 319-327. <http://dx.doi.org/10.14430/arctic4219>
- Hewitson, B., Janetos, A.C., Carter, T.R., Giorgi, F., Jones, R.G., Kwon, W.-T., Mearns, L.O., Schipper, E.L.F., and van Aalst, M. (2014). Regional Context. In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (21). Retrieved from [https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap21\\_FINAL.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap21_FINAL.pdf)
- Inuit Tapiriit Kanatami. (2008). *Inuit in Canada: A Statistical Profile*. Retrieved from [https://www.itk.ca/wp-content/uploads/2016/07/InuitStatisticalProfile2008\\_0.pdf](https://www.itk.ca/wp-content/uploads/2016/07/InuitStatisticalProfile2008_0.pdf)
- Johnston, A., Johnston, M., Steward, E., Dawson, J., & Lemelin, H. (2012). Perspectives of decision makers and regulators on climate change and adaptation in expedition cruise ship tourism in Nunavut. *The Northern Review*, 35, 69-95. Retrieved from <http://journals.sfu.ca/nr/index.php/nr/article/view/239>

- Krupnik, I., Aporta, C., Gearhead, S., Laidler, G.J., & Kielsen Holm, L. (Eds.). (2010). *SIKU: Knowing Our Ice. Documenting Inuit Sea Ice Knowledge and Use*. Available from [https://link-springer-com.colorado.idm.oclc.org/book/10.1007%2F978-90-481-8587-0](https://link.springer-com.colorado.idm.oclc.org/book/10.1007%2F978-90-481-8587-0)
- Labbé, J., Ford, J., Araos, M., & Flynn, M. (2017). The government-led climate change adaptation landscape in Nunavut, Canada. *Environmental Reviews*, 25(1), 12-25, <https://doi.org/10.1139/er-2016-0032>
- Larsen, J.N., Anisimov, O.A., Constable, A., Hollowed, A.B., Maynard, N., Prestrud, P., Prowse, T.D., and Stone, J.M.R. (2014). Polar Regions. In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (28). Retrieved from [https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap28\\_FINAL.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap28_FINAL.pdf)
- MacDonald, C., & Steeneek, A. (2015). The Impact of Colonization and Western Assimilation on Health and Wellbeing of Canadian Aboriginal People. *International Journal of Regional and Local History*, 10(1), 32-46. <https://doi.org/10.1179/2051453015Z.00000000023>
- McGregor, D. (2009). Linking Traditional Knowledge and Environmental Practice in Ontario. *Journal of Canadian Studies*, 43(3), 69-100. <https://doi.org/10.3138/jcs.43.3.69>
- McNamara, K., & Buggy, L. (2017). Community-based climate change adaptation: a review of academic literature. *Local Environment*, 22(4), 443-460. <https://doi.org/10.1080/13549839.2016.1216954>
- Morris, M. (2016). A Statistical Portrait of Inuit with a Focus on Increasing Urbanization: Implications for Policy and Further Research. *Aboriginal Policy Studies*, 5(2), 4-31. <http://dx.doi.org/10.5663/aps.v5i2.27045>
- Morrison, W.R. (1993). Out in the cold: the legacy of Canada's Inuit relocation experiment in the high Arctic: Review. *Arctic*, 46(2), 181-182. Retrieved from <http://arctic.journalhosting.ucalgary.ca/arctic/index.php/arctic/article/viewFile/1829/1808>
- Myhre, G., Shindell, D., Bréon, F.M., Collins, W., Fuglestedt, J., Huang, J., Koch, D., Lamarque, J.-F., Lee, D., Mendoza, B., Nakajima, T., Robock, A., Stephens, G., Takemura, T., and Zhang, H. (2013). Anthropogenic and Natural Radiative Forcing. In *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (8). Retrieved from [https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5\\_Chapter08\\_FINAL.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf)
- Nunavummiit Kiglisiniartiit. (2011). Nunavut Fact Sheet. In *Nunavut Housing Needs Survey*. Retrieved from

- <http://www.stats.gov.nu.ca/Publications/Housing/Fact%20Sheets/NHNS%20Fact%20Sheets%20-%20Nunavut%20and%20Regions.pdf>
- Nunavut Tunngavik Incorporated. (2016). 2014-2015 Annual Report on the State of Inuit Culture and Society. Retrieved from <http://www.tunngavik.com/files/2016/09/SICS-Report-2015-ENG091316.pdf>
- Pennesi, K., Arokium, J. & McBean, G. (2012). Integrating local and scientific weather knowledge as a strategy for adaptation to climate change in the Arctic. *Mitigation and Adaptation Strategies for Global Change*, 17(5), 897-922. <https://doi.org/10.1007/s11027-011-9351-5>
- Riedlinger, D., & Berkes, F. (2001). Contributions of traditional knowledge to understanding climate change in the Canadian Arctic. *Polar Record*, 37(203), 315-328. <https://doi.org/10.1017/S0032247400017058>
- Simpson, L.R. (2001). Aboriginal Peoples and Knowledge: Decolonizing Our Processes. *The Canadian Journal of Native Studies*, 21(1), 137-148. Retrieved from [http://www3.brandonu.ca/cjns/21.1/cjnsv21no1\\_pg137-148.pdf](http://www3.brandonu.ca/cjns/21.1/cjnsv21no1_pg137-148.pdf)
- Simpson, L.R. (2004). Anticolonial Strategies for the Recovery and Maintenance of Indigenous Knowledge. *The American Indian Quarterly*, 28(3&4), 373-384. <http://doi.org/10.1353/aiq.2004.0107>
- Statistics Canada. (2017a). *Estimates of population, by age group and sex for July 1, Canada, provinces and territories* [Data file]. Retrieved from <http://www5.statcan.gc.ca/cansim/a47>
- Statistics Canada. (2017b). *Nunavut [Territory] and Canada [Country]* [Table]. Census Profile, 2016 Census. Retrieved from <http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=PR&Code1=62&Geo2=PR&Code2=01&Data=Count&SearchText=Nunavut&SearchType=Begins&SearchPR=01&B1=Ethnic%20origin&TABID=1>
- Tester, F.J., & Irniq, P. (2008). Inuit Qaujimaqatunqangit: Social History, Politics and the Practice of Resistance. *Arctic [S.I.]*, 61(5), 48-61. <http://dx.doi.org/10.14430/arctic101>.
- Truth and Reconciliation Commission. (2015a). Canada's Residential Schools: The Inuit and Northern Experience. In *The Final Report of the Truth and Reconciliation Commission of Canada* (2). Retrieved from [http://nctr.ca/assets/reports/Final%20Reports/Volume\\_2\\_Inuit\\_and\\_Northern\\_English\\_Web.pdf](http://nctr.ca/assets/reports/Final%20Reports/Volume_2_Inuit_and_Northern_English_Web.pdf)
- Truth and Reconciliation Commission. (2015b). Canada's Residential Schools: The Legacy. In *The Final Report of the Truth and Reconciliation Commission of Canada* (5). Retrieved from [http://nctr.ca/assets/reports/Final%20Reports/Volume\\_5\\_Legacy\\_English\\_Web.pdf](http://nctr.ca/assets/reports/Final%20Reports/Volume_5_Legacy_English_Web.pdf)

- Qikiqtani Inuit Association. (2013). QTC Final Report: Achieving Saimaqatiingniq. In *Qikiqtani Truth Commission: Thematic Reports and Special Studies 1950–1975*. Retrieved from [http://qtcommission.ca/sites/default/files/public/thematic\\_reports/thematic\\_reports\\_english\\_final\\_report.pdf](http://qtcommission.ca/sites/default/files/public/thematic_reports/thematic_reports_english_final_report.pdf)
- Vaughan, D.G., Comiso, J.C. , Allison, I., Carrasco, J., Kaser, G., Kwok, R., Mote, P., Murray, T., Paul, F., Ren, J., Rignot, E., Solomina, O., Steffen, K., and Zhang, T. (2013). Observations: Cryosphere. In *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Retrieved from [https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5\\_Chapter04\\_FINAL.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter04_FINAL.pdf)
- Wenzel, G.W. (2008). From TEK to IQ: Inuit Qaujimajatuqangit and Inuit Cultural Ecology. *Arctic*, 41(2), 238-250. doi:10.1353/arc.2011.0067