**Briefing Paper: Exploration of Indigenous Food Sovereignty and the Climate Crisis in Tuktoyaktuk, Northwest Territories**

*Brianna Poirier, MSc*

**Introduction**

Arctic communities across the globe are at the forefront of climate change and are already experiencing the devastating implications of temperature and sea level rise, reduced summer sea-ice, glacial melting, coastal erosion and decreased permafrost. Climate change indicators observed by Inuit across Arctic Canada include longer summers, shorter winters and faster thawing of ice; these changes hinder traditionally accurate climate predictions and make travelling on land and ice dangerous (Bonesteel, 2006). Ecosystem upset can result in decreased climate regulation, loss of nutrient cycling, poor soil formation and reduced photosynthesis (Markkula, Turunen, & Rasmus, 2019). These environmental conditions, among others, have severe impacts on Arctic life, culture, food and infrastructure (Andrachuk & Smit, 2012). Recently, discussions around climate predictions in Northern Canada have appropriately shifted to adaptation discussions, as numerous communities are already experiencing effects of climate change in their everyday life (Furgal & Seguin, 2006). Despite living in Canada, an industrialized country, Inuit communities are disproportionately exposed and sensitive to the impacts of changing environmental conditions due to community characteristics similar to those in developing countries (Andrachuk & Smit, 2012). Inuit communities have historically persevered in extreme conditions and adapted to significant change; when looking to the future it is uncertain how these communities will navigate their relationship with the land in the face of the new challenges presented by climate change (Andrachuk & Smit, 2012). The livelihoods of Indigenous Peoples, especially Inuit communities, are rooted in cyclic, physical, and biological resources that are continuously evolving and the ability of communities to adapt to changes is ultimately restricted by social, institutional and economic resources. Due to heavy financial and sustenance reliance on hunting and fishing, the Inuit of Inuvialuit have a substantial relationship with both wildlife and weather (Andrachuk & Smit, 2012). Traditional subsistence practices, such as salmon gathering and caribou hunting, are altered when ecosystems are disrupted, ultimately resulting in decreased access to land-based traditional knowledge and language (Markkula, Turunen, & Rasmus, 2019). While financial security is necessary for Inuit families, involvement in employment, outside of hunting, restricts individuals’ time and ability to participate in traditional methods of harvesting and hunting (Kuhnlein, & Receveur, 1996; Andrachuk, & Smit, 2012)

Climate change is one of the most prevalent challenges facing Arctic communities, and Inuit perspective deserves recognition and inclusion in tackling this international concern. Inuit Qaujimajatuqangit (IQ) collectively refers to traditional ways of knowing that are central to all aspects of Inuit livelihood and continues to help individuals navigate the changing Arctic landscape (Bonesteel, 2006). Homage to historical struggles, resilience and collective desires for healthy, sovereign futures amongst Inuit communities is crucial in developing an understanding of the current impact climate change has on Inuit life (Griffin, 2019). IQ is especially useful when discussing long-term environmental observations, patterns, cycles and changes related to climate change (Bonesteel, 2006). Changes in ecosystems alter Indigenous Peoples’ relationship with the land by disrupting traditional cultural practices and understandings attached to the physical land (Markkula, Turunen, & Rasmus, 2019). Environmental concerns related to climate change impact animal habitats and ultimately, the ability of Inuit communities to uphold traditional subsistence activities (Bonesteel, 2006). Utilizing IQ in conjunction with scientific knowledge is valuable and helps create a holistic understanding of the relationship between the environment and humans (Markkula, Turunen, & Rasmus, 2019). Invaluable information regarding natural ecosystems exists in the experience of Indigenous Peoples in Canada because dependency on the land and its resources for survival develops an intimacy with the environment that many people never experience (Carmack & Macdonald, 2008). Further, the incorporation of IQ is essential in contemporary environmental research to ensure environmental risks and directions of development are meaningful and accurate for those at the forefront of climate change (Bonesteel, 2006).

An exploration of the Tuktoyaktuk community context, current Indigenous Food Sovereignty (IFS) efforts in Northern Canada and in the community, the impacts of climate change on IFS as well as the community response to these challenges will enable this paper to set the stage for the research project, *Four Stories About Food Sovereignty*. The focus of this paper is to gain an understanding of the impacts of the climate crisis in Tuktoyaktuk and gauge the future of IFS efforts in this community.

**Tuktoyaktuk Community Context**

Tuktoyaktuk is an Inuit community of approximately 900 people, located in the Western Canadian Arctic, within the Inuvialuit Settlement Region of the Northwest Territories. The Tuktoyaktuk community resides on the shores of the Beaufort Sea and residents are descendants from the Siglit people, who were distinctly sea-oriented and traditionally fur trappers, hunters and herders (Alunik et al., 2003; Usher, 1993). During the early post-contact period, the Mackenzie Inuit who resided around the Beaufort Sea were almost entirely eradicated due to exposure to smallpox and other foreign diseases; this significant loss also resulted in a loss of IQ particular to the region (Carmack & Macdonald, 2008). Starting in the 1960s, Tuktoyaktuk’s harbour became an epicentre for oil and gas after the discovery of onshore and offshore reserves (Bonesteel, 2006). Residents remember the best fishing spot as a source of diversity, rare in Arctic aquatic ecosystems, wherein fisherman could bring up to 14 different species home after a day’s work; unfortunately, oil industries decisively built docks for extraction and export at this location, prohibiting residents from fishing there (Carmack & Macdonald, 2008).

In terms of climate change impacts, all of the infrastructure within the community is currently at risk due to the location of the settlement in relation to coastal shores and unprecedented rates of coastal erosion and permafrost deterioration (Andrachuk & Smit, 2012). Tuktoyaktuk was built on a low and narrow permafrost peninsula consisting of ice lenses, glacial deposits and a surface layer of vegetation (Andrachuk & Smit, 2012; Hamlet of Tuktoyaktuk, 1984). Prior to the initiation of shoreline protection efforts in the 1970s, shorelines were eroding at a rate of one to two meters per year (Hamlet of Tuktoyaktuk, 1984). Protection efforts prior to the 1990s were financially unsustainable and mainly experimental. The Northwest Territories government provided funding for boulder reinforcement along the community shorelines in the 1990s, this method was much more successful than previous tactics; additional boulder and concrete block deposits have been added over the years. However, the municipal government in Tuktoyaktuk acknowledges that the boulders are a short-term solution that is financially practical, the increasing impacts of climate change are forcing the community to consider long-term plans (Andrachuk & Smit, 2012).

**Indigenous Food Sovereignty**

*Indigenous Food Sovereignty in Northern Canada*

The history of food security and sovereignty in Northern Canada is complex and unique in comparison to the rest of the country, due to a continued reliance on subsistence practices among Inuit as well as distinct environmental conditions. Northern food insecurity is rooted in the impacts of colonization and a diverse history of economic hardship and consequential starvation. Initial colonial contact in Northern Canada occurred in the nineteenth and early twentieth century, first with whalers and Hudson’s Bay Company (HBC) fur traders, followed by missionaries and the Northwest Mounted Police (NWMP). Due to extensive involvement in European commercial trapping, Inuit livelihood became progressively reliant on European economic forces and imported goods; this dependence contributed to mass starvation after the 1930s fur price collapse and a shortage of caribou resources due to overhunting. Many Inuit shifted their way of life from self-sufficient nomadic living to stationary living in close proximity to HBC trading posts prior to 1930. Later development of defence infrastructure in the North provided employment, medical services, and goods, which further promoted the development of sedentary communities. Despite rampant poverty and starvation across Arctic Canada, the government did not provide relief for communities, maintaining its advisory of a self-sufficient livelihood for Inuit until the 1950s (Bonesteel, 2006).

The historic legacy of starvation and economic instability has resulted in mass food insecurity among Inuit households in the present today. Northern food security is complex due to changing Inuit livelihoods and distinctive characteristics of the Arctic environment; the climate crisis and a population surge place further stress on food systems (Ford, & Beaumier, 2011). Unfortunately, many families in Northern communities experience undernourishment due to irregular economic income; a 2002 study in Nunavik identified that 55% of households live below the poverty line. Further complications of low-income includes high Inuit birth rates when compared to the rest of the country (Bonesteel, 2006). Food insecurity coping strategies in the North are predominantly reactive and provide immediate solutions that could increase long-term vulnerability of communities (Beaumier & Ford, 2010). Low income levels make it impossible for Inuit families to rely solely on market foods due to extremely high preservation and transportation costs of fresh, nutrient-dense produce in Northern communities. Consumption of processed, nutrient-poor and energy dense foods and beverages is widespread amongst Inuit communities, while fruit and vegetable intake are severely below national recommendations (Sheehy, Roache, & Sharma, 2013). A lack of nutrition education and food skills confounded with high food prices and varying availability may further contribute to low produce consumption in these communities (Sheehy, Roache, & Sharma, 2013; Wesche & Chan, 2010). Economic development at the community-level that supports local and sustainable food production will help increase food security and strengthen IFS. When discussing food sovereignty, communities have identified that both country foods and market foods are key elements to ensuring nutritious diets amongst Inuit. (Skinner, Hanning, Desjardins, & Tsuki, 2013). Market foods play a role in ensuring food security due to changes in lifestyle and abilities to participate in traditional food systems but they cannot replace the superior nourishment country foods provide (Rosol, Powell-Hellyer, & Chan, 2016). The food security crisis in Northern Canada is of utmost importance due to the long-term ramifications on Inuit health and well-being (Fillion et al., 2014).

IFS in Northern Canada remains heavily reliant on country food acquisition and food sharing because climate change and various socioeconomic factors create barriers for many families to obtain adequate food and nutrition (Beaumier & Ford, 2010; Skinner et al., 2013). Community participation in the annual spring hunt remains strong, with many students and workers taking holiday time to enjoy this tradition while surrounded by family; unfortunately, school and work restrictions prohibit individuals from participating in hunting year-round. While provisions of fresh meat are an incentive for many to participate in the spring hunt, however many community members cite the social and cultural activities at the hunt as having the greatest value (Andrachuk & Smit, 2012; Fillion et al., 2014; Wesche & Chan, 2010). Barriers to traditional methods of hunting and communal food sharing include increased cost of hunting equipment and ammunition, contamination risks, lack of skills and climate-related changes in migration patterns, ultimately resulting in decreased consumption of country food (Sheehy, Roache, & Sharma, 2013). Issues around harvesting country foods impact Inuit livelihood because Indigenous communities around all of the circumpolar area rely on them for sustenance due to cost and availability of other food sources; country foods provide nutrient-dense nourishment and are vital to Inuit identity and culture (Fillion et al., 2014). Genuine access to country foods for Inuit entails a sufficient amount of nutritious and culturally acceptable food that preserves Inuit culture and health. Country foods positively impact physical health, mental wellbeing and social involvement while promoting longevity of Inuit culture (Rosol, Powell-Hellyer, & Chan, 2016). Inuit populations have 10 times higher levels of omega-3 fatty acid intake than the rest of the Canadian population, which are known to protect against heart disease, because of their continued reliance of country foods. Despite high consumption of omega-3 fatty acids, the shift from country foods to market foods has led to an increased occurrence of obesity, diabetes, heart disease and anemia in Inuit communities. Poor nutrition resulting from increased intake of market foods diminishes the immune system and also increases susceptibility to disease (Bonesteel, 2006). The significant contrast in prices between processed and perishable foods provides some reasoning for the rapid transition away from healthful foods (Kenny et al., 2018). The climate crisis significantly affects food security, health, and overall well-being due to the intrinsic cultural relationship between Inuit and the environment (Wesche, O’Hare-Gordon, Robidoux, & Mason, 2016). Climate change further interferes with accessibility of country food resources and increases wildlife susceptibility of disease while simultaneously increasing mobilization and biomagnification of contaminants, affecting both human and ecosystem health (Dudley, Hoberg, Jenkins, & Parkinson, 2015). Indigenous research participants have identified that support at the individual, family and community level in pursuing harvesting of country foods as the most beneficial strategy to alleviate household food insecurity. Research has also found that a desire to pursue health and wellness education exists in Inuit communities and is a potential tool for empowerment (Fillion et al., 2014). Government support at municipal, territorial and federal levels would enhance community efforts, strengthen local food sovereignty, and decrease future vulnerability (Beaumier & Ford, 2010).

While country foods remain the most nutrient-dense, culturally preferred and economic form of sustenance for Inuit, there are contamination risks associated with heavy consumption. Entire food systems amongst Northern Indigenous communities have been polluted with heavy metals, persistent organic pollutants and radionuclide contaminants, all of which are hazardous for human health, especially breastfed babies (Kuhnlein & Chan, 2000). Indian and Northern Affairs Canada’s Northern Contaminants Program has discovered high levels of the aforementioned contaminants in Arctic water, land, air and human residents. Specifically, seal, walrus, caribou, Arctic char and whale, which provide vital sources of minerals, vitamins and omega-3 fatty acids, have been identified as sources of high contaminants such as mercury and polychlorinated biphenyls (Bonesteel, 2006). Considering the risks and benefits of relying on traditional food sources is not an easy process as it encompasses a variety of perspectives. While advisories are consistently issued without proper circulation and garnered community respect, consumption of country foods persists (Kuhnlein & Chan, 2000). This issue is particularly distressing for many Inuit because they had no significant contribution to improper chemical disposal in the Arctic and discussions regarding contamination in breast milk and country foods brings anxiety to many communities due to the cultural importance of both practices. Some researchers argue that the known hazards of contaminants are less than the potential biological and social impacts of shifting diets to available market foods (Kinloch, Kuhnlein & Muir, 1992). Appropriate international, political, and economic responses are required to lessen the impacts of industrial pollution on Inuit well-being while simultaneously advancing environmental conservation (Kuhnlein & Chan, 2000).

Accessibility of market foods in Northern Canada heavily depends on government programming that provides subsidies for high costs associated with the transportation and storage of fresh foods. The food mail program, first implemented in 2001, had the goal of increasing food security in Canada’s North by subsidizing postage costs and thereby, decreasing cost of healthy food options (Bonesteel, 2006). The program yielded mixed reviews and many Inuit did not utilize the program because they were either unaware of its existence or they identified little to no cultural value in the foods that qualified for subsidization (Majid & Grier, 2010). Additionally, many Inuit that did utilize the program reported an inadequate quality of fresh foods (Bonesteel, 2006). A formal review of the program in 2008 yielded recommendations to replace the program with the current program, Nutrition North Canada (NNC). Specific recommendations from this review included revisions of both community and item eligibility, incorporation of country food options and establishment of clear objectives and performance indicators (Dargo, 2008). While stakeholders agreed that the program was valuable to Northern communities at this time, they also identified that changes were required for the program to reach its full potential; for example, the lack of staple Inuit food items was a major criticism (Majid & Grier, 2010). The NNC program replaced the food mail program with an altered structure that provided subsidies directly to community retailers, with the intention of increasing accessibility of perishable and nutritious foods. Unfortunately, a lack of retailer accountability and high variability in pricing and food availability is hindering the program from providing effective retail subsidies that ensure equitable pricing across communities. Food prices remain substantially higher than in other regions of the country; cost estimates are unavailable for costumers, resulting in high consumer vulnerability regarding retail price variation, particularly in communities with one retailer (Galloway, 2017). The current reporting system makes it impossible to gauge how retailer subsidies are being utilized to benefit Northern consumers and if program resources are being equally distributed across and within Northern communities. The provision of more detailed information concerning operations, freight prices and subsidy calculations would enable a proper evaluation of program objectives (Galloway, 2014). While NNC emphasizes challenges experienced by Northern communities that struggle to find healthy and affordable foods, it does not represent the magnitude of the circumstance. Indigenous food insecurity is a consequence of Canada’s colonial history, and while food subsidy programs may alleviate some of the difficulties experienced in Northern Canada they will never solve the underlying problems (Burnett, Skinner, & LeBlanc, 2015). Northern communities not only have severe rates of food insecurity, but at the forefront of climate change, they are impacted by reduced availability of country foods they have traditionally relied on. The program structure of NNC currently presumes a competitive marketplace which is not true for most of the eligible communities. Both a more rigorous accountability system for retailers and a stronger, public food pricing framework would improve the current program by providing a more effective means of measuring consumer benefit (Galloway, 2017).

*Indigenous Food Sovereignty in Tuktoyaktuk*

Tuktoyaktuk experiences similar low-income frequencies as the rest of Northern Canada. The 2016 census found an almost 50% unemployment rate amongst individuals between the ages of 25 and 65 in the community. Reports of such high unemployment reflects an increased dependence on economic income, especially in communities that traditionally depended on a subsistence economy (Statistics Canada, 2017). Limited employment opportunities exist within the community, including government, social and health services as well as retail, construction, tour guides, and natural gas exploration (Hamlet of Tuktoyaktuk, 1984). Despite a recent rise in high school graduation rates, pursuit of post-secondary education remains low for youth in Tuktoyaktuk. Few job prospects upon return to the community after completion of a diploma or degree results in a “holding pattern” for community youth who are unable to generate income and are also often lacking traditional skills because they did not grow up on the land, as previous generations have. The inability to cover basic household needs and essential items results in high stress for many families in the community (Andrachuk & Smit, 2012). This stress extends to the ability to consistently provide nutritious food for families and dependents; the appeal of cost-effective nutrient-poor market foods is understandable. However, the health benefits of prioritizing country food consumption in comparison to processed market foods are vast; high levels of fats and sugars in processed items have been associated with increased incidents of obesity, heart disease and diabetes (Andrachuk, & Smit, 2012; Duhaime, Chabot, & Gaudreault, 2002; GNWT, 2008; Kuhnlein, & Receveur, 1996).

Tuktoyaktuk culture is bound to the land and follows seasonal changes. The tundra landscape and coastal sea ecosystem provide sparse but essential sources of sustenance for Tuktoyaktuk residents (Andrachuk, & Smit, 2012). Traditional food gathering methods continue to provide most or all of the meat in more than half of the households in the community (Statistics Canada, 2002). Activities that support the community’s traditional food system include trapping Arctic hare, fox, caribou, bears, seals, herding reindeer and gathering blueberries, cloudberries and wild rhubarb. Summertime beluga whale harvests along the Tuktoyaktuk coastline provides nutrient-dense food supplies that sustain the community through lengthy winters (Andrachuk, & Smit, 2012; Harwood et al., 2002). Beluga is an essential source of nutrients for all communities in Inuvialuit and the processes of harvesting and sharing the meat is a significant cultural tradition (Harwood et al., 2002). Harvested beluga feeds the community and is also distributed on a wider scale through food sharing networks of extended family and friends. Beluga is considered a staple source of food for many residents of Tuktoyaktuk and the wider region of Inuvialuit, as it provides nutrient-dense sustenance for many months (Waugh et al., 2018). The spring waterfowl hunt is also a significant annual event that provides an essential opportunity for the community to strengthen their cultural relationship with the land (Bromley, 1996). While subsistence harvesting remains a key component of livelihood in Tuktoyaktuk and a source of cost-effective food, it also provides opportunities for wage employment in the community (Usher, 2002). Research suggests that factors such as country food consumption, sharing networks and IQ play an even more significant role in smaller Arctic communities, such as Tuktoyaktuk, when compared to larger Inuit settlements (Guo et al., 2015).

**Climate Crisis and Tuktoyaktuk’s Food Sovereignty**

Tuktoyaktuk experiences a tundra climate with dry, long winter seasons and shorter summers, having only 3 to 4 months without completely frozen sea ice (Andrachuk & Smit, 2012). The warming Arctic climate is shifting ecological borders, altering wildlife migration patterns and endangering plant life in tundra climates. Traditional harvesting events of beluga whales and other species revolve around seasonal changes and are reliant on sea ice. Therefore, food security for Tuktoyaktuk community members is at risk due to rising temperatures and subsequent loss of sea ice, which decrease accessibility of country foods (Post et al., 2009). Additionally, the recent experience of decreased availability of caribou in the region has resulted in significant stress for the people of Tuktoyaktuk. Arctic research has found that the reproduction cycle of caribou depends on timing of seasonal changes, warmer temperatures result in earlier vegetative growth but caribou migration relies on daylight cues and many herds miss optimal vegetation availability (Post et al., 2009; Post, & Forschhammer, 2008). Decreased caribou health and overall population adversely impacts Inuit communities with older populations, high unemployment rates and less retail stores by limiting access to country foods (Chiu, Goddard, & Parlee, 2016). The spring arrival of whales is also impacted by sea ice levels and many communities have identified the changing timing of whales as one of the most notable impacts of climate change, with whales arriving two and a half weeks earlier than previously experienced. Individuals have also noticed an observed decrease in body mass amongst the whales that arrive. Additionally, community members have cited irregular weather patterns and an inability to predict the weather, which hinders the ability of the community to participate in traditional hunting methods (Waugh et al., 2018). The inability of the community to safely and sustainably harvest wildlife utilizing their IQ limits Tuktoyaktuk’s ability to maintain food sovereignty efforts and uphold subsistence livelihoods. Country foods such as beluga whales and caribou are not only nutrient-dense food sources but hunting events strengthen important values for the community, such as sharing (The Wainwright Traditional Council, 2011).

While climate change is directly having a major impact on food security and IFS efforts, lack of stable housing and infrastructure is further complicated by climate induced coastal erosion in Tuktoyaktuk, which ultimately impact community livelihoods and poverty levels (Mathias et al., 2008). Housing costs directly influence the ability of families to afford nutrient-dense foods on a consistent basis. All of the infrastructure in Tuktoyaktuk is built on permafrost, making the community vulnerable to coastal erosion and flooding, which are results of increasing Arctic temperature, longer summer seasons and increased sea-ice melting (Manson, & Solomon, 2007). Safe and adequate housing is necessary for families to prepare and store healthy, nutritious foods (Fillion et al., 2014). Many homes in Tuktoyaktuk sit on blocks and stilts, construction only happens during colder months due to unstable swamp-like conditions of permafrost when the temperature rises above zero degrees (Manson, & Solomon, 2007). Current environmental estimations predict that the land of Tuktoyaktuk will be eroded within the next 20 to 30 years. Changes in ice conditions have resulted in the loss of Gull Island, near Tuktoyaktuk, due to a decrease in overall ice, coastal erosion and increased wave action (Waugh et al., 2018). Less ice means less natural protection against destructive waves hitting the shorelines in Tuktoyaktuk and increased susceptibility of flooding (Andrachuk, & Smit, 2012). Long-term ramifications of thawing permafrost on the ecosystem are not fully understood, but the subsequent impacts of ocean acidification, coastal erosion and flooding on marine wildlife are equally concerning for community members due to the continued reliance on traditional hunting for food sources (Manson, & Solomon, 2007). As Arctic communities prepare for an unpredictable future, the value of IQ, community ecological knowledge and historical Inuit adaptability will strengthen efforts to navigate the impacts of climate change (The Wainwright Traditional Council, 2011).

**Tuktoyaktuk Community Response**

The climate crisis and resulting changes will have profound impacts on the livelihood and wellbeing of Arctic communities. How communities will navigate these changes is still unknown, but Tuktoyaktuk, among others, is taking the necessary action to ensure that IQ and Inuit culture is embedded within projects and policies. In 2006, Tuktoyaktuk hosted an Arctic change and coastal communities conference which sought to bring together perspectives from governments, universities and Inuit Peoples to discuss observations of rapid climate change in Arctic coastal areas. Attendees of the conference discussed ways to support adaptation to changing landscapes in the North including education for youth, respect for IQ and increased awareness around the climate crisis. Community representatives highlighted the importance of aligning development with Inuit culture because of the stark difference between Inuit values of connection and collaboration rather than ownership and authorship as in Academic research settings. In order for economic, resource and living development to be effective and sustainable in Northern communities it must be relevant to community-specific local, economic, and social circumstances (Mathias et al., 2008).

The development of the Tuktoyaktuk Community Climate Resilience Project in 2018 was grounded in a desire to ensure community input in climate change efforts. This research program works to address cultural gaps experienced in other projects by employing community members to undertake the work itself and including IQ in all aspects of the project. Collaboration with communities is particularly necessary when identifying impacts of the climate crisis because changes directly impact resident livelihood, and an in-depth knowledge about the history of the land is invaluable in climate comparison research (Pearce, Ford, Caron, & Kudlak, 2012). Dialogue-focused community engagement is extremely useful in establishing local baselines and generating an understanding of changes (Furgal, & Seguin, 2006). The Tuktoyaktuk Community Climate Resilience Project measures key climate indicators including ice thickness, harvest yields, bloom dates, permafrost depth, air and water temperature as well as ice formation and thawing dates. Historical and modern-day observations will be collected from elders and other key knowledge holders regarding invasive plants and insects, changes in migration patterns, extreme weather events, traditional harvesting events and observed land changes due to water drying up or erosion. The project also hopes to develop educational resources to use while promoting climate engagement with youth in the community. Both qualitative and quantitative data are crucial for the success of the project. Data collection includes: interviews, quantitative indicator measurements and samples, reviews of historical information and community engagement and feedback at local events. Directly engaging youth and elders in interviews supports intergenerational sharing and knowledge transfer and ensures youth are educated on the adaptability of their ancestors. Project developers hope to develop novel ways to present findings in a powerful way to share within and outside of the community (Tuktoyaktuk Community Corporation, 2018).

**Conclusion**

This paper has discussed the ways in which climate change is disrupting the ability of the Tuktoyaktuk community to rely on traditional food sources, sustain IFS efforts and the community response to their changing environment thus far. As the ramifications of the climate crisis continue to impact the community, traditional food sources will become increasingly unavailable, affecting not only the health but the wellbeing of the community due to the intrinsic link between the health of the land and of Tuktoyaktuk’s residents. Tuktoyaktuk is taking steps to increase the focus of environmental needs in the community, which will hopefully provide a path forwards for the community; monitoring the environment, wildlife changes and migrations are all of community-identified importance. Involvement in the *Four Stories About Food Sovereignty* project will enable the community to share their struggles with other communities, collaborate with Indigenous communities around the globe and help them navigate a way forward.

**References**

Alunik, I., Kolausok, E., & Morrison, D. (2003). *Across time and tundra*. Vancouver: Seattle.

Andrachuk, M., & Smit, B. (2012). Community-based vulnerability assessment of Tuktoyaktuk, NWT, Canada to environmental and socio-economic changes. *Regional Environmental Change*, *12*(4), 867–885. <https://doi.org/10.1007/s10113-012-0299-0>

Beaumier, M., & Ford, J. (2010). Food Insecurity among Inuit Women Exacerbated by Socioeconomic Stresses and Climate Change. Canadian Journal of Public Health, 101(3), 196–201. <https://doi.org/10.1007/BF03404373>

Bonesteel, S. (2006). *Canada's Relationship with Inuit: A history of police and program development*. Ottawa: Indian and Northern Affairs Canada.

Bromley, R. (1996). Characteristics and management implications of the spring waterfowl hunt in the western Canadian Arctic, Northwest Territories. *Arctic*, *49*(1), 70-85. Retrieved from <https://link-gale-com.subzero.lib.uoguelph.ca/apps/doc/A30276783/AONE?u=guel77241&sid=AONE&xid=fbea39b5>

Burnett, K., Skinner, K., & LeBlanc, J. (2015). From Food Mail to Nutrition North Canada: Reconsidering federal food subsidy programs for Northern Ontario. *Canadian Food Studies / La Revue Canadienne Des Études Sur L'alimentation*, *2*(1), 141. <https://doi.org/10.15353/cfs-rcea.v2i1.62>

Carmack, E., & Macdonald, R. (2008). Water and ice-related phenomena in the coastal region of the Beaufort Sea: some parallels between Native experience and Western science. *Arctic*, *61*(3), 265+. Retrieved from <https://link-gale-com.subzero.lib.uoguelph.ca/apps/doc/A186582317/AONE?u=guel77241&sid=AONE&xid=47736846>

Chiu, A., Goddard, E., & Parlee, B. (2016). Caribou consumption in Northern Canadian communities, Journal of Toxicology and Environmental Health, Part A, 79:16-17, 762-797. <https://doi.org/10.1080/15287394.2016.1174011>

Dargo, G. (2008). *Food Mail Program Review*. Yellowknife, NT: Dargo & Associates Ltd.

Dudley, J., Hoberg, E., Jenkins, E., & Parkinson, A. (2015). Climate Change in the North American Arctic: A One Health Perspective. *Ecohealth*, *12*(4), 713-725. <https://doi.org/10.1007/s10393-015-1036-1>

Duhaime, G., Chabot, M., & Gaudreault, M. (2002). Food consumption patterns and socioeconomic factors among the Inuit of Nunavik. *Ecol Food Nutr, 41*, 91-118.

Fillion, M., Laird, B., Douglas, V., Van Pelt, L., Archie, D., & Chan, H. (2014). Development of a strategic plan for food security and safety in the Inuvialuit Settlement Region, Canada. *International Journal of Circumpolar Health*, *73*(1), 25091. <https://doi.org/10.3402/ijch.v73.25091>

Ford, J., & Beaumier, M. (2011). Feeding the family during times of stress: experience and determinants of food insecurity in an Inuit community. *Geographical Journal*, *177*(1), 44–61. <https://doi.org/10.1111/j.1475-4959.2010.00374.x>

Furgal, C., & Seguin, J. (2006). Climate Change, Health, and Vulnerability in Canadian Northern Aboriginal Communities. *Environmental Health Perspectives*, *114*(12), 1964–1970. <https://doi.org/10.1289/ehp.8433>

Galloway, T. (2014). Is the Nutrition North Canada retail subsidy program meeting the goal of making nutritious and perishable food more accessible and affordable in the North?. *Canadian Journal Of Public Health*, *105*(5), e395-e397. <https://doi.org/10.17269/cjph.105.4624>

Galloway, T. (2017). Canada’s Northern food subsidy Nutrition North Canada: a comprehensive program evaluation. *International Journal Of Circumpolar Health*, *76*(1), 1279451. <https://doi.org/10.1080/22423982.2017.1279451>

GNWT. (2008). NWT Climate Change Impacts and Adaptation Report. *Government of Northwest Territories*, Yellowknife.

Griffin, P. (2019). Pacing Climate Precarity: Food, Care and Sovereignty in Iñupiaq Alaska. *Medical Anthropology*, 1–15. <https://doi.org/10.1080/01459740.2019.1643854>

Guo, Y., Berrang-Ford, L., Ford, J., Lardeau, M., Edge, V., Patterson, K., & Harper, S. (2015). Seasonal prevalence and determinants of food insecurity in Iqaluit, Nunavut. *International Journal of Circumpolar Health, 74*(1), 27284. <https://doi.org/10.3402/ijch.v74.27284>

Hamlet of Tuktoyaktuk. (1984). Community plan for the Hamlet of Tuktoyaktuk, N.W.T.

Harwood, L. A., Norton, P., Day, B., & Hall, P. A. (2002). The harvest of beluga whales in Canada’s Western Arctic: hunter-based monitoring of the size and composition of the catch. *Arctic, 55*(1): 10–20. <https://doi.org/10.14430/arctic687>

Kenny, T., Fillion, M., MacLean, J., Wesche, S., & Chan, H. (2018). Calories are cheap, nutrients are expensive -- The challenge of healthy living in Arctic communities. (Report). *Food Policy*, *80*, 39–54. <https://doi.org/10.1016/j.foodpol.2018.08.006>

Kinloch, D., Kuhnlein, H., & Muir, D. (1992). Inuit foods and diet: a preliminary assessment of benefits and risks. *Science of The Total Environment*, *122*(1-2), 247-278. [https://doi.org/10.1016/0048-9697(92)90249-r](https://doi.org/10.1016/0048-9697%2892%2990249-r)

Kuhnlein, H., & Chan, H. (2000). Environment and contaminants in traditional food systems of Northern Indigenous Peoples. *Annual Review of Nutrition*, *20*(1), 595-626. <https://doi.org/10.1146/annurev.nutr.20.1.595>

Kuhnlein, H., & Receveur, O. (1996). Dietary Change and Traditional Food Systems of Indigenous Peoples. *Annual Review of Nutrition*, *16*(1), 417-442. <https://doi.org/10.1146/annurev.nu.16.070196.002221>

Majid, K., & Grier, S. (2010). The Food Mail Program: “When Figs Fly” – Dispatching Access and Affordability to Healthy Food. *Social Marketing Quarterly*, *16*(3), 78-95. <https://doi.org/10.1080/15245004.2010.503009>

Manson, G., & Solomon, S. (2007). Past and future forcing of Beaufort Sea coastal change. *Atmos Ocean, 45*, 107–122.

Markkula, I., Turunen, M., & Rasmus, S. (2019). A review of climate change impacts on the ecosystem services in the Saami Homeland in Finland. *Science of the Total Environment, 692*, 1070–1085. <https://doi.org/10.1016/j.scitotenv.2019.07.272>

Mathias, J., Ayles, B., Blakney, S., Charles, T., Fast, H., & Irniq, P. (2008). Arctic Change and Coastal Communities: overview of the Coastal Zone Canada Conference, Tuktoyaktuk, August 2006. *Arctic*, *61*(4). Retrieved from <https://link-gale-com.subzero.lib.uoguelph.ca/apps/doc/A193313346/AONE?u=guel77241&sid=AONE&xid=9813f2ed>

Pearce, T., Ford, J., Caron, A., & Kudlak, B. (2012). Climate change adaptation planning in remote, resource-dependent communities: an Arctic example. *Regional Environmental Change*, *12*(4), 825–837. <https://doi.org/10.1007/s10113-012-0297-2>

Post, E., & Forschhammer, M. (2008). Climate change reduces reproductive success of an Arctic herbivore through trophic mismatch. *Philosophical Transactions of the Royal Society B, 363*, 2369-2375.

Post, E., Pedersen, C., Wilmers, C., & Forschhammer, M. (2009). Warming, plant phenology and the spatial dimension of trophic mismatch for large herbivores. *Philosophical Transactions of the Royal Society B, 275*, 2005-2013.

Rosol, R., Powell-Hellyer, S., & Chan, H. (2016). Impacts of decline harvest of country food on nutrient intake among Inuit in Arctic Canada: impact of climate change and possible adaptation plan. *International Journal of Circumpolar Health*, *75*(1), 31127. <https://doi.org/10.3402/ijch.v75.31127>

Sheehy, T., Roache, C., & Sharma, S. (2013). Eating habits of a population undergoing a rapid dietary transition: portion sizes of traditional and non-traditional foods and beverages consumed by Inuit adults in Nunavut, Canada.(Report). *Nutrition Journal, 12*(1), 70. <https://doi.org/10.1186/1475-2891-12-70>

Skinner, K., Hanning, R., Desjardins, E., & Tsuji, L. (2013). Giving voice to food insecurity in a remote indigenous community in subarctic Ontario, Canada: traditional ways, ways to cope, ways forward. *BMC Public Health, 13*(1), 427. <https://doi.org/10.1186/1471-2458-13-427>

Statistics Canada. (2002). *2001 Community Profiles: Tuktoyaktuk, Northwest Territories*. Retrieved 14 May 2020, from <https://www12.statcan.gc.ca/english/Profil01/CP01/Details/Page.cfm?Lang=E&Geo1=CSD&Code1=6107036&Geo2=PR&Code2=61&Data=Count&SearchText=Tuk&SearchType=Begins&SearchPR=01&B1=All&Custom>

Statistics Canada. (2017). *Focus on Geography Series, 2016 Census*. Statistics Canada Catalogue no. 98-404-X2016001. Ottawa, Ontario. Data products, 2016 Census. Retrieved 14 May 2020, from <https://www12.statcan.gc.ca/census-recensement/2016/as-sa/fogs-spg/Facts-csd-eng.cfm?LANG=Eng&GK=CSD&GC=6101036&TOPIC=11>

Tuktoyaktuk Community Corporation. (2018). *Tuktoyaktuk Community Climate Resilience Project*. Tuktoyaktuk: Tuktoyaktuk Community Corporation.

Usher, P. (1993). Northern Development, Impact Assessment, and Social Change. In N Dyck and J. B. Waldram (eds), *Anthropology Public Policy and Native Peoples in Canada.* Montreal and Kingston: McGill-Queen’s University Press: 98-130.

Usher, P. (2002). Inuvialuit use of the Beaufort Sea and its resources, 1960-200. *Arctic 55*, 18-28.

The Wainwright Traditional Council. (2011). Climate Change, Food, and ‘Sharing’ among the Iñupiat of Wainwright, Alaska. Ithica, New York: Cornell University. [Online]. Available: <http://www2.dnr.cornell.edu/kassam/publications/Climate_Change_Food_and_Sharing_in_Wainwright_Alaska.pdf>

Waugh, D., Pearce, T., Ostertag, S., Pokiak, V., Collings, P., & Loseto, L. (2018). Inuvialuit traditional ecological knowledge of beluga whale (Delphinapterus leucas) under changing climatic conditions in Tuktoyaktuk, NT. *Arctic Science*, *4*(3), 242–258. <https://doi.org/10.1139/as-2017-0034>

Wesche, S., & Chan, H. (2010). Adapting to the Impacts of Climate Change on Food Security among Inuit in the Western Canadian Arctic. *EcoHealth*, *7*(3), 361–373. <https://doi.org/10.1007/s10393-010-0344-8>

Wesche, S., O'Hare-Gordon, M., Robidoux, M., & Mason, C. (2016). Land-Based programs in the Northwest Territories: Building Indigenous food security and well-being from the ground up*. Canadian Food Studies / La Revue Canadienne Des Études Sur L'alimentation, 3*(2), 23. <https://doi.org/10.15353/cfs-rcea.v3i2.161>