Monitoring food insecurity among Inuit: The Forgotten Pillar of Fisheries Management

Melina Kourantidou* [1] and Megan Bailey[1]

[1]Marine Affairs Program, Dalhousie University, Life Sciences Centre, 1355 Oxford Street, PO Box 15000, Halifax NS, B3H 4R2 Canada

** Corresponding Author,* mkour@dal.ca

Several lines of evidence reveal an important role of marine resources as a primary food source to which Inuit have historically had a strong cultural attachment. We assess the limitations and barriers of marine resource governance in northern Labrador in securing access to these traditionally important food sources, and offer commentary on opportunities and recommendations for long-term management and monitoring of marine resources, in line with self-determination. These opportunities are largely present due to the creation of Nunatsiavut (2005), the first Inuit self-governance region. We discuss Federal Food policies within Canada which largely fail to capture important aspects of food security in the Arctic and highlight the need for better resource management policies that focus on treating the cause rather than the symptom. Lack of information and monitoring tools that can adequately track the changes in locally harvested marine resources can threaten the wellbeing, social, economic and cultural integrity of coastal communities dependent upon those resources. We explore the roles of subsistence marine resource harvesting and commercial fishing in safeguarding food security and argue that the way marine resources are managed or mismanaged has direct relevance to Inuit food security and socioeconomic wellbeing. We further describe the needs for monitoring and propose the use of indicators that capture the contribution of locally harvested marine resources to food security along with a framework that allows for utilizing local knowledge and observations. Using preliminary results from research in Nunatsiavut, this piece responds to the gap in knowledge on seafood sovereignty in Indigenous communities of the Arctic. The approach contributes to the knowledge base needed in Inuit food security research to build a better understanding of the political and institutional legacies that continue to contribute to food insecurity, their connection to the marine environment, and of ways to address those through policy making.

1. Introduction

Access to food, especially for remote and geographically challenged parts of the world, is a primary concern that merits careful consideration in policy planning. In Canada, food insecurity disproportionately manifests in Atlantic Canada and in the northern territories. Among Inuit in the Arctic there is continuous evidence that it is an ubiquitous problem (Ford, 2009; Huet, Rosol, & Egeland, 2012). The additional vulnerability of Arctic communities relates to a number of different reasons that range from extreme and shifting climate conditions, inadequate transportation infrastructure network, lower socio-economic status, and abundance of and access to natural resources (Beaumier & Ford, 2010; Ford, 2009; Huet et al., 2012; Orttung, 2019). With regards to access to natural resources, access specifically to harvested marine resources remains a critical necessity for Inuit across Inuit Nunangat (the collective Inuit homelands in what is now Canada). This access, to both species and potential markets for harvested products, provides food, employment and income, and supports cultural practices, health, and knowledge transfer (Durkalec, Furgal, Skinner, & Sheldon, 2015; C. Hoover, Bailey, Higdon, Ferguson, & Sumaila, 2013; Knopp, Furgal, Reist, & Babaluk, 2012).

While Canada's food and health policy documents acknowledge that historical, economic, political and social factors are important determinants of Inuit health (Agriculture and Agri-Food Canada, 2019), there remains a disconnect between this acknowledgment and the guidance provided for encompassing these determinants into policy-making. Canada's new Food Guide, along with other regional and federal food policies that address food insecurity issues in the North, despite acknowledging the need for approaching the problem through a holistic lens (Health Canada, 2019), fail to account for the important dimensions of 'food sovereignty' that relate to self-sufficiency, capacity to harvest, access to harvesting grounds and production as well as stable supply. Most importantly though, despite recognizing the existence of socioeconomic inequalities, they fail to acknowledge that those inequalities are not only barrier to accessing food sources but also the outcome of inadequate resource policies that do not address access and equity in resource management. This is particularly true for fisheries management, where the critical necessity of access to fish and fishing opportunities mentioned above does not appear to be supported in federal policy.

The idea of food sovereignty emerged in the mid 1990s, and has been used ever since in support of the notion that food security goes beyond just food supply and encompasses the means of food acquisition and is ultimately about control and self-determination (E. Hoover, 2017). The UN Food and Agriculture Organization (FAO) defines food security as 'a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life' (FAO, 1996, 2001). Similar to the Guide and other federal mandates in Canada, the UN FAO definition and its interpretation have placed more emphasis on adequacy of food and food production maximization rather than access to decisions around food procurement and consumption, including access.

This piece sheds light on the challenges related to natural resource management in Northern Labrador, and specifically marine resources that are critical to nutrition and food security and an important part of the wage and subsistence economy among Inuit that has not received much attention by policy makers and economists. We describe the dimensions of marine resource governance that are important to safeguard food security in those communities and we propose the use of indicators as a monitoring tool that can help diversify risks and contribute to sustainability of fish stocks and marine mammals.

2. Identifying the problem and the importance of marine resource management in food security

The challenge of food security in Inuit Nunangat is a well-recognized one; the food insecurity among households in Northern Labrador has been found to be 'over four times the level reported for the province of Newfoundland and Labrador in 2012 and five times the level of food insecurity measured for households in Canada in 2014' (Nunatsiavut Government, 2017). The geographically challenged location of those households is often seen as a large barrier to accessing food since none of the five communities of Nunatsiavut are accessible by road. This creates a high dependency on deliveries for 'store-bought foods' through ships or planes, with unpredictable weather conditions often driving costs very high and quality quite low and therefore making nutritious food unaffordable and in many cases inaccessible for residents of these communities (Aningmiuq & Sarazin, 2018; Goldhar et al., 2012).

In what follows we explore the roles of subsistence marine resource harvesting and commercial fishing in safeguarding food security in northern Labrador. We highlight important dimensions of marine resource management that food policies tend to overlook when addressing food insecurity.

2.1 Subsistence marine resource harvesting

Typically, Canadian food security surveys have relied on measuring food affordability rather than accounting for the subsistence harvesting of country food (Lysenko & Schott, 2019). No studies to date have sought to examine the relationship between marine resource harvesting and food insecurity in Nunatsiavut. Despite the fact that Nunatsiavut communities have over the years diversified their economies in ways that allows them to engage in the wage-based economy, subsistence harvesting is still a fundamental direct and indirect contributor in their economies.

Much of the northern food insecurity research to date has focused on the intersection between food webs and human health, i.e., whether traditionally harvested resources are safe to eat (Donaldson et al., 2013; Laird, Goncharov, Egeland, & Man Chan, 2013; Muir, Shearer, Van Oostdam, Donaldson, & Furgal, 2005). More recently, the effects of climate change that affect traditional subsistence harvesting activities, such as changing sea ice conditions and snow, that create risks and barriers to accessing country food have also attracted significant research attention (Huntington, Quakenbush, & Nelson, 2016, 2017; Pearce, Ford, Willox, & Smit, 2015). However, the role of resource management and its link to socioeconomic and socioecological dynamics related to access to country food has not received adequate attention. Fishing in particular is a very valued cultural activity and an important source of food for many residents of these communities (Goldhar et al., 2012).

Northern Labrador communities have experienced important changes in their connection with the land and their ability to access and harvest traditional country food. Many of these changes are attributed to colonial practices of the past such as forced shifts from their nomadic lifestyle to being situated in permanent communities, as well as being forced into residential schools. These legacies of colonialism have resulted in a disconnect from their lands, a declining ability to access healthy nutritious country food and a shift to processed food. We view the costs of processed food due to the geographical isolation of the region as only one part of the problem for the food insecurity rates Nunatsiavut is experiencing. Not being able to actively participate in fishing or marine mammal harvesting not only represents a loss in food production, but also a loss in opportunities for intergenerational knowledge transfer, specifically the transfer of Traditional Ecological Knowledge (TEK) that Inuit hold. The importance of TEK in marine resource management has long been recognized in Indigenous settings (Brook et al., 2009; Huntington et

al., 2002; Kaiser et al., 2019). Across Inuit Nunangat, there are successful examples that provide strong evidence for TEK knowledge holders' holistic understanding of local marine biodiversity, the ecology and spatial dynamics of subsistence harvested marine resources and how these translate to food safety and security for their communities (Breton-Honeyman, Hammill, Furgal, & Hickie, 2016; Ostertag et al., 2018). However, the implementation of TEK in designing marine resource management policies largely remains evasive for decision makers and marine resource managers; bridging understanding across multiple knowledge systems prevents TEK integration into decision-making. Although recognized as a result of mandates of agreements or treaties with Indigenous People, TEK is often viewed as 'subjugated' knowledge and rendered marginal to Western ontologies (Natcher, Haley, Kofinas, & Parker, 2005).

In Nunatsiavut, specific language in the Labrador Inuit Land Claims Agreement (LILCA, Ch. 12.4.7, 13.3.6) requires that harvest levels should be determined using any data that may be compiled on an ongoing basis using Inuit traditional knowledge. Under the LILCA, Labrador Inuit have established subsistence rights for local marine resources with the Nunatsiavut Government assuming responsibility for Inuit harvesting within the Labrador Inuit Settlement Area. However, reflecting on research conducted in the area over the past decades and also upon the truism that research priorities are determined primarily with limited or no input from Nunatsiavut communities, the subsistence economy and its connection to food security is largely understudied. Besides misguided research priorities often determined outside the communities, the coverage of questions and knowledge gaps of ongoing and recent research projects, in many cases fail to reflect the concerns of community members directly or indirectly involved in subsistence harvesting.

Preliminary results from focus group discussions with community members in Nain and Makkovik, two of Nunatsiavut's five coastal communities, and semi-structured interviews with local and regional stakeholders have shown that there is a high cultural, social and economic importance attached to subsistence harvested fish. The Arctic char (*Salvelinus alpinus*) is a historically important species throughout Nunatsiavut that has been fished for many years for both subsistence and commercial purposes. Data scarcity and knowledge gaps on ecological and biological characteristics of Arctic char stocks restricts the ability to understand how current levels of subsistence harvesting may impact harvest opportunities in the future. The lack of monitoring in subsistence fishing which seems to be a concern among people in Nunatsiavut, together with climate change uncertainties, high costs and difficulty in enforcement of any illegal fishing practices[1] exacerbate concerns about whether Arctic char can continue to be a staple in the Inuit diet. There are similar concerns for the health of stocks of other marine resources harvested for subsistence purposes in Nunatsiavut such as ringed seal and salmon (Goldhar et al., 2012), both very important food sources for Labrador Inuit.

Socioecological dynamics and their influence on access and availability to country food also deserve more research attention. Caribou used to be a major food source in the Labrador Inuit diet. In recent years, the caribou stocks in Northern Labrador have declined significantly which could in turn create pressure upon Arctic Char stocks; both traditionally very important food sources for the diet of Inuit. In fact, the moratoria on salmon, caribou, and collapse of the seal market all likely impact the amount of pressure put on remaining country food options. Substitution of food sources is a major concern among country foods; when stocks are low for one species that people harvest for subsistence, it can be expected that harvesting pressure may increase for another species that people depend upon so as to supplement the

[1] Concerns about illegal harvesting activity from non-locals that may be putting pressure on stocks, previously depleted, such as salmon for example have been documented (Goldhar et al., 2012).

calories and nutrients needed. These are complex yet very important socioecological dynamics which have not yet been explored. Although it is likely that no single driver prevails for the choices made in subsistence harvesting, in the presence of shifting ecological conditions, building a better understanding of, and monitoring these dynamics throughout time can help address some components that allow for food insecurity to persist in the region. Specifically, more interdisciplinary efforts are needed to address how shifts in socio-ecological systems influence subsistence fishing, in order to develop a more comprehensive picture of the subsistence economy.

Furthermore, important questions that relate to the ability of people to access harvesting grounds have not adequately been addressed. Accessibility is a large concern especially for low-income community members that may not have the financial capacity or the technical means to go fishing or hunting. Accessibility issues are bringing in more problems and are increasing risks of food insecurity; lack of access to fishing or harvesting grounds may lead to gradually declining TEK, undermining Inuit values such as knowledge sharing, an increased need to substitute country food with expensive processed store-bought food and a limited research interest in areas where harvest is limited. The existing knowledge gaps of these dimensions limit the ability to assess and understand how resource management can address the increasing food insecurity rates.

Additionally, more robust evidence is needed to understand the contribution of fish and marine mammals to food security and nutrition. Laying out the arguments for why it is essential to invest in building a solid understanding of this, may spark efforts to better monitor the subsistence economy and the role it plays in food security. Specifically, we hope to spur interest in and attention to the development of robust, meaningful and measurable indicators that can help Nunatsiavut communities track consistently throughout time the contribution of marine resources to peoples' diet and understanding their contribution to food security. Examples of such indicators may include: a) Fish/marine mammals protein intake as a percentage of the total protein intake, b) Annual harvestable biomass per household of subsistence fisheries/marine mammals, c) Contribution of subsistence harvested fish/marine mammals in reducing persistence insecurity health related issues (e.g. diabetes, heart diseases etc), d) Percentage of food insecurity alleviated from fish and marine mammals shared within the community (e.g. through the community freezer programs), e) Per capita annual consumption of fish and marine mammals. These are only a few examples of straightforward, easy to capture indicators that can provide evidence for the magnitude of importance of locally harvested marine resources. The next step would then be for fisheries policies and regulations to prioritize Inuit access to fish in line with the implications for food security as informed by the indicators. Identifying such research needs should be community-driven with research efforts directly involving locals in the research process to produce informative indicators that empower marine resource users rather than following a western paradigm of setting research priorities. Historically, in other parts of the Arctic, scientists have focused on monitoring the health of marine mammal stocks important to subsistence harvesting such as beluga whales (Choy, Rosenberg, Roth, & Loseto, 2017; Loseto et al., 2018; Loseto, Stern, & Ferguson, 2008; MacMillan, Hoover, Iacozza, Peyton, & Loseto, 2019). Integrating community perspectives has led to a more holistic approach focused on individual beluga health and how this translates to food safety and security (Ostertag et al., 2018). For Inuit in the Inuvialuit Settlement Region these research endeavors are very important since they address their long-standing concerns on beluga health, whether and how they will be able to continue covering their subsistence needs using the adjacent marine resources, and how they might need to adapt to the ongoing environmental changes. The beluga monitoring program has increased over the past 10 years to

include increased sampling to address health concerns of users and beluga-specific indicators emerged to meet the needs of the communities (Loseto et al., 2018; MacMillan et al., 2019).

Efforts to monitor indicators like the ones described above, can help not only improve marine resource management but also foster (sea)food sovereignty among those communities, including greater self-determination and cultural revitalization of their traditional values that relate to harvesting and sharing country food. Such efforts for long-term monitoring can also help communities in Nunatsiavut build resilience foundations in the face of changing marine resource governance systems. Local observations, narratives and TEK are critical in informing the selection of these indicators. Co-development of indicators with communities is therefore essential for effectively addressing marine resource management issues and food insecurity concerns from the lens of those who experience them. A fundamental challenge is grounded in the difficulties embedded in integrating the Inuit Knowledge system into the development and use of indicators. Progress is also limited by observational challenges that relate to the high costs of ongoing data collection and monitoring of stocks and subsistence harvest in these geographically challenged locations.

2.2 Commercial fishing

Seafood production is not only critical as a source of food that covers subsistence needs, but is also an important source of income and contributes to employment opportunities in the pre and post harvesting sector (the largest seasonal employment sector in Northern Labrador)[2]. In Nunatsiavut there is a strong dependence on fisheries which is not only economic, but also social and cultural with direct connections to subsistence fishing. This connection has roots that reach back centuries and remains strong despite the shifts in the species of interest in commercial fishing operations[3]. People in Nunatsiavut whether directly involved or not in fishing, hunting or processing seem to derive benefits from non-market economic values attached to these species[4].

In Nunatsiavut there is a formalized integration between the federal and local government authorities for the management of commercial fisheries. The political transition to self-governance came after more than 30 years of negotiations between the Labrador Inuit Association and the provincial and federal governments and is the result of the Labrador Inuit's vote to accept the LILCA. The LILCA defines the Labrador Inuit Settlement Area, the 'Zone' and 'Waters Adjacent to the Zone'[5] (Figure 1), it establishes access rights to Inuit and describes the conditions for commercial fishing (Chapter 13) (Indigenous and Northern Affairs Canada, 2005). The LILCA also resulted in the creation of the Torngat Joint Fisheries Board (TJFB), a tri-partite co-management fisheries board which among else provides recommendations on fish stock management and conservation. However, notwithstanding the provisions of the LILCA that describe a co-management approach to marine resources in the region, decision-making still allows for Ministerial

[2] The Torngat Fish Producers Co-Operative, an Indigenous co-operative, formed in the early 1970s and owned by harvesters and plant employees. The Co-operative operates fish plants in Nain (processing Arctic char and intermittently Icelandic Scallop) and Makkovik (Snow Crab and Turbot).

[3] From cod and salmon fisheries to seals that stopped being harvested for commercial purposes to new fisheries emerging in the region such as the snow crab, turbot (Greenland halibut) and northern shrimp. The commercial fishery for Arctic char has continued throughout the years but production has been significantly reduced.

[4] Examples of such prominent values identified include bequest value (the possibility of future generations to fish) and existence value (the right of existence in the future).

[5] Canadian fisheries waters within the portions of Northwest Atlantic Fisheries Organization Divisions 2G, 2H and 2J adjoining and lying due eastward of the Zone

discretion with fisheries management remaining driven primarily by objectives in Ottawa that largely differ from the socioeconomic objectives of Nunatsiavut communities. The extent to which Inuit communities have achieved control of their fisheries to address food insecurity issues therefore remains limited owing to conditions of limited sovereignty of marine resources adjacent to their zone.

Despite the establishment of Nunatsiavut as a self-governance region that came with rights to governing and accessing their marine resources, control and access has remained rather static for most commercially fished species. Some fisheries have experienced significant declines in production in recent years; the Arctic char fishery in Nain this year (2019) was operated by 4 commercial fishers only (versus 75 – 100 fishers in the 1970s and 1980s), with the processing plant operating for a few weeks only. The Arctic char has traditionally been a very important fishery for Nunatsiavut from a cultural, social and economic point of view. Indeed, the commercial char fishery used to operationalize a summer-long exodus from Nain, with whole families heading out of the community to fish at camps several hours away. Carrier vessels would collect the harvested char up and down the coast and deliver the catches to the processing plant in Nain. Today, the lack of collector vessels has meant that the few fishers that remain, fish only day trips out of Nain Bay, which is likely having severe local depletion effects on the stock. According to focus group participants, the winter subsistence harvest still indicates that there are likely healthy char populations in bays north of Nain, however, there is no active scientific sampling regime in the area. The management plan has remained rather static since the early 1990s fueled by insufficient scientific funding. The Arctic char fishery and processing operations that once used to be the cornerstone of the regional economy have shrunk significantly in recent years due to shifting market conditions. The discontinuation of science on the fishery as a result of bottom-down determined research priorities within the Federal Government also contributed to the downsizing of commercial operations.

The pre and post commercial harvesting sector is innately connected with food security in the region. The commercial char fishery in Nain is supposed to support food security across Nunatsiavut through the community freezer program. The Nunatsiavut Government purchases processed char from the Nain processing plant to make char available in the four other coastal communities, as well as in Happy Valley-Goose Bay. Declining commercial operations in the fishery sector result in not only declining employment opportunities and incomes for community members, and declining community freezer supply, but also in increased socioeconomic inequalities and a declining interest of the younger generation to engage professionally in the fishery sector. Preliminary results from interviews with key regional stakeholders indicate that the main driving factors for the limited participation in the char fishery is the lack of skilled fishers with fishing gear and equipment (including boats) necessary to participate in the commercial fishery.

Similar to the char fishery, participation in the shrimp, snow crab and turbot pre and post harvesting sector is also limited, but for a different set of reasons that relate to access to the stocks, limited regional processing capacity, market conditions and lack of independent fishing licenses. Despite the adjacency described in the federal government's own policies, in the integrated fisheries management plans (IFMPs) and the LILCA, Nunatsiavut gets access through its communal license to only 3.38% of the Canadian allocation for turbot in NAFO Subarea 2 and Division 3KLMNO[6] (Figure 1). The allocation to northern shrimp in Shrimp Fishing Areas (SFAs) 4 and 5, despite the recent increase to 10% and 9.9% respectively, still remains small and only provides limited socioeconomic benefits to community members in

[6] Access for turbot to 0B is through Special, Enterprise and Competitive Allocation and is also very limited

Nunatsiavut. Many Nunatsiavut designates, given the lack of access to capitalization and assets (for example independent licenses that could allow them to invest in boats and fishing equipment), go into lease arrangements instead with commercial harvesters out of the region who fish their allocation for them. The fact that none of the shrimp harvested in Nunatsiavut waters is processed locally, exacerbates the leak of socioeconomic benefits that could otherwise be retained locally. Similar to the shrimp, participation in the snow crab fishery is limited to very few independently owned boats. The lack of local boat ownership and fishing capacity is partly attributed to the nature of the communal licenses under which fisheries are managed by the Nunatsiavut Government. The communal licenses are successful in ensuring that property rights for fisheries stay within Nunatsiavut communities whereas in other Indigenous small fishing communities rights-based management systems have led to consolidation of quotas and concerns about equity in allocation, access and distribution of benefits from the fisheries (Bess, 2001; Carothers, 2011; Carothers & Chambers, 2012). However, the communal licenses system does not allow independent harvesters to access support from financial institutions for investments that will enable them to enter the commercial fishery.

In addition to these problems of access and allocations, the interests of governments (federal, provincial, local) and management agencies (e.g. co-management boards) that lead marine resource management differ from one another and do not always align with those of the communities which may have fundamentally different views on how marine resources should be managed. Fisheries management and decision making in Northern Labrador is too fragmented, which creates barriers to capturing the social and economic benefits that commercial fisheries have the potential to produce. Communication channels between Fisheries and Oceans Canada, the Newfoundland and Labrador Province, the Nunatsiavut Government, the TJFB, the fishing and processing industry (e.g. Torngat Fish Producers Co-Operative), designates and beneficiaries are largely missing. This lack of a collective approach comes at the cost of food security that marine resource governance could be contributing to the region.

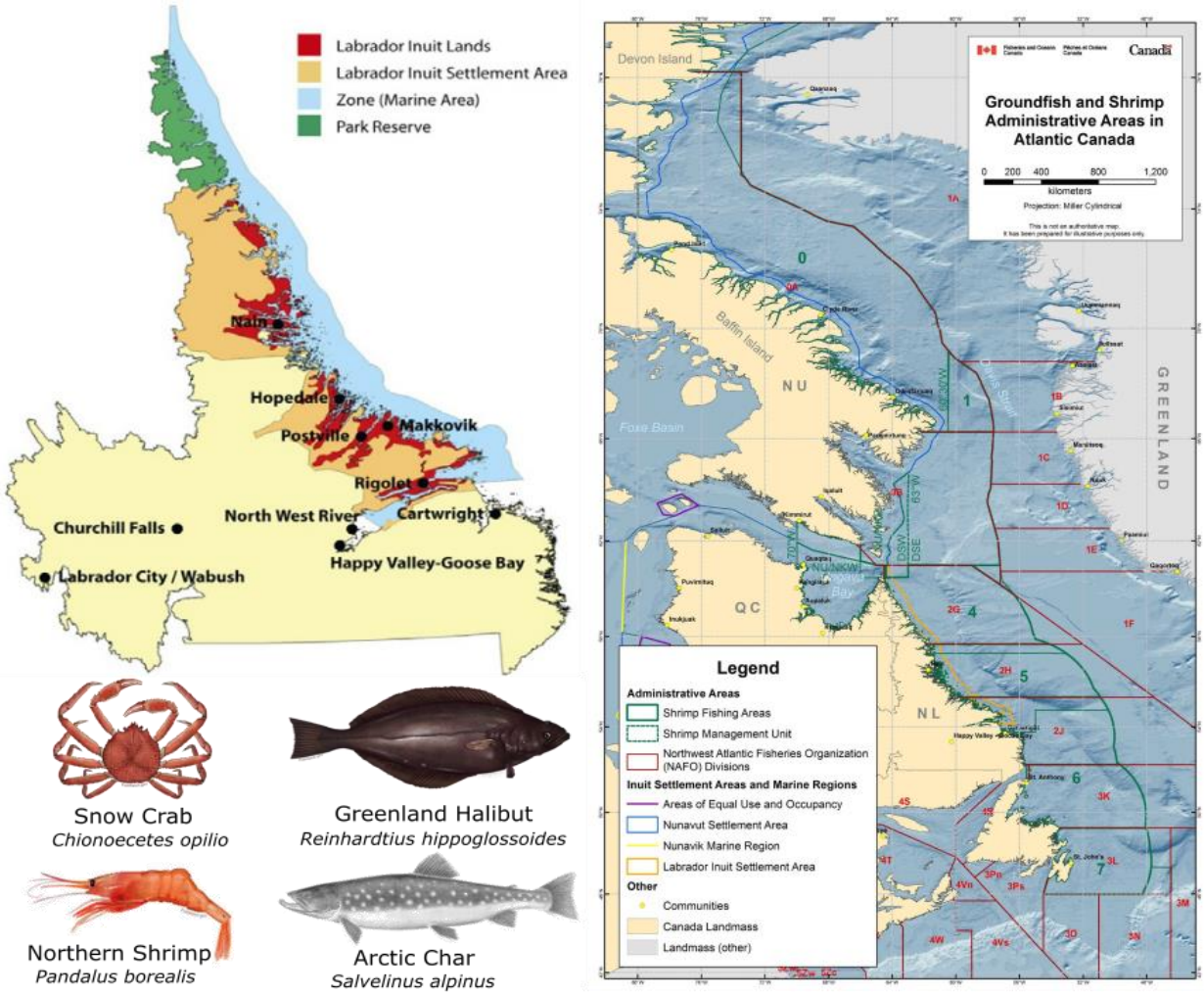

Figure 1 Commercially fished species in Nunatsiavut and fishing areas (Maps adapted from Fisheries and Oceans Canada and Bell & Sheldon (2014) *and species pictures adapted from Fisheries and Oceans Canada and NOAA Fisheries)*

3. Knowledge gaps and barriers to monitoring (sea)food insecurity

In Nunatsiavut there are ongoing efforts led by Researchers and the Nunatsiavut Government to identify food insecurity levels for all communities. In the 2013 - 2014 survey more than 60% of households were found food insecure to some extent[7] with two of the communities experiencing close to or more than 80%[8] food insecurity rates (Nunatsiavut Government, 2017). These types of surveys can be useful for providing a better understanding of the magnitude of the problem and the failure in addressing it, but also drawing attention to it. The province of Newfoundland and Labrador is portrayed as a food insecurity

[7] Food insecurity was measured through questions regarding the ability of households to afford food and experiences with food over a one-month period (PROOF, 2018). Then households were classified as food secure, marginally food insecure, moderately food insecure, or severely food insecure based on the number of affirmative responses (McTavish, Furgal, Martin, & IHACC Team, 2017), but with more specific thresholds for these classifications missing (PROOF, 2018).

[8] 79.4% in Nain and 83.1% in Hopedale (Nunatsiavut Government, 2017)

'success story' (PROOF, 2018) despite the situation in northern Labrador as depicted through the aforementioned 2013 - 2014 survey and the Inuit health survey conducted between 2007 - 2008 that found more that 44% food insecurity levels in Nunatsiavut[9].

At a regional level, the Nunatsiavut Government is working on developing a Food Security Strategy with the support of the Federal Government (Indigenous and Northern Affairs Canada, 2018; OKâlaKatiget Society, 2018a). A critical element in making these efforts successful is close collaboration, consultations and active engagement with community members for a better understanding the drivers of food insecurity that relate to management of local natural resources. As Nunatsiavut communities continue to struggle with food insecurity, more attention needs to be shifted towards understanding the role of the subsistence economy which has largely been neglected in the literature despite playing a very important role in securing sustainable livelihoods. Documenting food insecurity rates helps raise attention but coordinated efforts that involve locals directly in the research process can help speed up the process of producing community-driven informative tools applicable to policy and management of traditionally harvested resources. Preliminary results from interviews and focus group discussions in Nain and Makkovik (2019), directed towards capturing community priorities for the development on marine resource governance indicators (Kourantidou & Bailey, 2019), show that community members feel significantly less empowered to access resources and less able to afford food after the LILCA in 2005 that initiated the self-governance of the region and led to the creation of the Nunatsiavut Government (see also Goldhar et al., (2012), p.80). These preliminary results provide evidence for the fact that the views of community members do not always align with the views, goals and objectives of local government authorities.

Past Initiatives of the Federal Government, despite offering a seat at the table to Inuit organizations, have been accused of not valuing their input. This has led to all five major Inuit organizations, including the Nunatsiavut Government, leaving the Federal Government's Indigenous Working Group on food security (Murray, 2018).

Measures to alleviate food insecurity in Labrador, similar to elsewhere in Inuit Nunangat, have been taken in the past sometimes with success and others not. Examples include food subsidy programs such as Nutrition North, whose efficiency or success remains unclear and questionable among Inuit. Other community-level institutions such as the community freezers are seen through a more positive lens given that they align with local Inuit values[10] of sharing and provide access to wild country food traditionally consumed by Inuit. The initiative for the community freezers draws from the 'semi-nomadic' times of the Inuit when harvesters would bring food and store it in underground, permafrost freezers so that everyone in the community could have access (Aningmiuq & Sarazin, 2018). Today, harvesters can donate excess harvest to the freezer for those community members who can not harvest themselves (e.g. elders of the community or others in need of nutritious food).

[9] Note that the documented increase in food insecurity in Nunatsiavut between the 2007 – 2008 Inuit health survey and the 2013-2014 health survey in Nunatsiavut, was 7% (McTavish et al., 2017)

[10] See 'qanuqtuurniq' in Aningmiuq & Sarazin (2018) which in Inuktut, the Inuit language, means "innovation" or "resourcefulness" , 'to work together, draw on local knowledge, and overcome the hardships of living in this Arctic region'.

Figure 2 Community Freezer in Nain, November 2018

The freezers are supported in different ways from the communities; in some cases through direct food purchases meant to supplement the harvested food (Goldhar et al., 2012) and in others through supporting hunters for their harvesting costs (Aningmiuq & Sarazin, 2018). Programs like the community freezer have expanded in recent years to accommodate more people in need of the food provided there[11] (Food First NL, 2018). Despite the success of the program in supporting access nutritious food, it remains a measure that focuses on treating the symptoms that persist throughout time in these communities, rather than addressing the cause in an effective way.

Other recent efforts directed towards address the food security problem include food banks, such as the TaKuaKautik Food Bank, a recent community-led volunteer based initiative in Nain (OKâlaKatiget Society, 2018b) and local Government led initiatives such as the Nain Community Food Centre Project that aims at food/meal planning, preparation and dissemination, following the guidelines of the Canada's Food Guide[12].

4. Conclusions

This paper has briefly discussed the dimensions of marine resource governance that policies addressing food security issues in Inuit communities of the Arctic fail to account for. We have used Nunatsiavut as a case study, an Inuit-self-government region, where commercial fisheries and other subsistence marine resources are essential to the livelihoods of people. The analysis is informed by observations, views and perceptions of community members engaged in harvesting or processing now and in the past. Limited ability to participate in subsistence harvesting of marine mammals or subsistence fishing is a risk for food security today and in the future for reasons that go beyond just access to food and include degradation of TEK and intergenerational knowledge transfer. Understanding the subsistence economy, which is

[11] In the community of Hopedale for example there was an increase of close to 90% in the number of people using the freezer (Food First NL, 2018)

[12] For more community programs addressing food insecurity problems in Nunatsiavut, such as 'Gardening Program', 'Community Kitchens Program', 'Youth Outreach Program', 'Going Off, Growing Strong Program', 'Good Food Box Program' see Inuit Tapiriit Kanatami (n.d.)

largely understudied to date, is key to managing marine resources for safeguarding access to food. We propose that monitoring is key towards building this understanding and suggest that community-driven indicators over marine resource management and use can help serve this purpose. Meanwhile the foregone economic opportunities from lack of access to commercial fishing grounds and fish stocks adjacent to Nunatsiavut trigger even higher risks for food insecurity. Socioeconomic benefits from commercial fisheries are leaking out of Nunatsiavut due to allocations that do not align with the Federal Government mandates for fisheries management in the region. Despite recognizing the high levels of food insecurity, the institutional mechanisms to address the problem fail to capture marine resource governance issues and rather encourage measures that focus on treating the symptoms. Commercial operations for fisheries in the pre and post harvesting sector have direct connections to food security and their role needs to be factored in Federal food policies to develop a more comprehensive picture of the problem and address it in the long run. Integrating these missing marine resource governance perspectives is critical to addressing the persisting problem of food insecurity among Inuit and potentially a more economically efficient way compared to current Federal-led short-term response strategies.

References

Agriculture and Agri-Food Canada. (2019). *Food Policy for Canada*. Retrieved from https://www.canada.ca/en/campaign/food-policy/thefoodpolicy.html

Aningmiuq, A., & Sarazin, T. (2018). A Path to Community Driven Food Innovation. *Stanford Social Innovation Review*. Retrieved from https://ssir.org/articles/entry/a_path_to_community_driven_food_innovation#

Beaumier, M. C., & Ford, J. D. (2010). Food insecurity among Inuit women exacerbated by socio-economic stresses and climate change. *Canadian Journal of Public Health*, *101*(3), 196–201.

Bell, T., & Sheldon, T. (2014). Understanding and Responding to the Effects of Climate Change and Modernization in Nunatsiavut. In ArcticNet (Ed.), *ArcticNet Annual Research Compendium (2012-13)*. Quebec City, Quebec, Canada: ArcticNet Inc. Retrieved from http://www.arcticnet.ulaval.ca/2013-14-research-compendium

Bess, R. (2001). New Zealand's indigenous people and their claims to fisheries resources. *Marine Policy*, *25*(1), 23–32.

Breton-Honeyman, K., Hammill, M. O., Furgal, C. M., & Hickie, B. (2016). Inuit Knowledge of beluga whale (Delphinapterus leucas) foraging ecology in Nunavik (Arctic Quebec), Canada. *Canadian Journal of Zoology*, *94*(10), 713–726.

Brook, R. K., Kutz, S. J., Veitch, A. M., Popko, R. A., Elkin, B. T., & Guthrie, G. (2009). Fostering community-based wildlife health monitoring and research in the Canadian North. *EcoHealth*, *6*(2), 266–278.

Carothers, C. (2011). Equity and access to fishing rights: exploring the community quota program in the Gulf of Alaska. *Human Organization*, 213–223.

Carothers, C., & Chambers, C. (2012). Fisheries privatization and the remaking of fishery systems. *Environment and Society*, *3*(1), 39–59.

Choy, E. S., Rosenberg, B., Roth, J. D., & Loseto, L. L. (2017). Inter-annual variation in environmental factors affect the prey and body condition of beluga whales in the eastern Beaufort Sea. *Marine Ecology Progress Series*, *579*, 213–225.

Donaldson, S. G., Curren, M. S., Adlard, B., Provost, J., Leech, T., Tikhonov, C., … Shearer, R. (2013). Future human health research directions for the Canadian Northern Contaminants Program. *International Journal of Circumpolar Health*, *72*(1), 23049.

Durkalec, A., Furgal, C., Skinner, M. W., & Sheldon, T. (2015). Climate change influences on environment as a determinant of Indigenous health: Relationships to place, sea ice, and health in an Inuit community. *Social Science & Medicine*, *136*, 17–26.

FAO. (1996). Rome Declaration on World Food Security and World Food Summit Plan of Action. World Food Summit 13-17 November 1996. Rome.

FAO. (2001). The State of Food Insecurity in the World. Rome.

Food First NL. (2018). Expansion of the Community Freezer Program in Hopedale. Retrieved from https://www.foodfirstnl.ca/expansion-of-the-community-freezer-program-in-hopedale

Ford, J. D. (2009). Vulnerability of Inuit food systems to food insecurity as a consequence of climate change: a case study from Igloolik, Nunavut. *Regional Environmental Change*, *9*(2), 83–100.

Goldhar, C., Bell, T., Sheldon, T., Andersen, T., Piercy, W., Gear, D., … Allice, I. (2012). *SakKijânginnatuk Nunalik: Understanding opportunities and challenges for sustainable communities in Nunatsiavut, Learning from the coast. Nain, NL. Nunatsiavut Government*.

Health Canada. (2019). *Canada's Dietary Guidelines for Health Professionals and Policy Makers*. Ottawa. Retrieved from Canada.ca/FoodGuide

Hoover, C., Bailey, M., Higdon, J., Ferguson, S. H., & Sumaila, R. (2013). Estimating the economic value of narwhal and beluga hunts in Hudson Bay, Nunavut. *Arctic*, 1–16.

Hoover, E. (2017). "You Can't Say You're Sovereign if You Can't Feed Yourself": Defining and Enacting Food Sovereignty in American Indian Community Gardening. *American Indian Culture and Research Journal*, *41*(3), 31–70.

Huet, C., Rosol, R., & Egeland, G. M. (2012). The prevalence of food insecurity is high and the diet quality poor in Inuit communities. *The Journal of Nutrition*, *142*(3), 541–547.

Huntington, H. P., Brown-Schwalenberg, P. K., Frost, K. J., Fernandez-Gimenez, M. E., Norton, D. W., & Rosenberg, D. H. (2002). Observations on the workshop as a means of improving communication between holders of traditional and scientific knowledge. *Environmental Management*, *30*(6), 778–792.

Huntington, H. P., Quakenbush, L. T., & Nelson, M. (2016). Effects of changing sea ice on marine mammals and subsistence hunters in northern Alaska from traditional knowledge interviews. *Biology Letters*, *12*(8), 20160198.

Huntington, H. P., Quakenbush, L. T., & Nelson, M. (2017). Evaluating the effects of climate change on indigenous marine mammal hunting in Northern and Western Alaska using traditional knowledge. *Frontiers in Marine Science*, *4*, 319.

Indigenous and Northern Affairs Canada. (2005). Labrador Inuit Land Claims Agreement Act (S.C. 2005, c. 27). *Land Claims Agreement Between the Inuit of Labrador and Her Majesty the Queen in Right of Newfoundland and Labrador and Her Majesty the Queen in Right of Canada*. Retrieved from https://www.aadnc-aandc.gc.ca/eng/1293647179208/1293647660333

Indigenous and Northern Affairs Canada. (2018). New Federal Funding to Strengthen Nunatsiavut's Capacity to Address Climate Change Impacts. Retrieved from https://www.canada.ca/en/indigenous-northern-affairs/news/2018/02/new_federal_fundingtostrengthennunatsiavutscapacitytoaddressclim.html

Inuit Tapiriit Kanatami. (n.d.). NiKigijavut Nunatsiavutinni (Our Food in Nunatsiavut) Project. Retrieved from https://www.itk.ca/nuluaq-mapping-project/initiative/nikigijavut-nunatsiavutinni-our-food-in-nunatsiavut-project/

Kaiser, B. A., Hoeberechts, M., Maxwell, K., Eerkes-Medrano, L., Hilmi, N., Safa, A., … Theux Lowen, N. (2019). The importance of connected ocean monitoring knowledge systems and communities. *Frontiers in Marine Science*, *6*, 309.

Knopp, J. A., Furgal, C. M., Reist, J. D., & Babaluk, J. A. (2012). Indigenous and Ecological Knowledge for Understanding Arctic Char Growth. *Fishing People of the North: Cultures, Economies, and*

Management Responding to Change, 177.

Kourantidou, M., & Bailey, M. (2019). Economic and socioecological indicators for marine resource use and management in the Arctic. In *European Association of Fisheries Economists. EAFE 2019. April 2-4,*. Santiago de Compostela, Spain.

Laird, B. D., Goncharov, A. B., Egeland, G. M., & Man Chan, H. (2013). Dietary advice on Inuit traditional food use needs to balance benefits and risks of mercury, selenium, and n3 fatty acids. *The Journal of Nutrition*, *143*(6), 923–930.

Loseto, L. L., Hoover, C., Ostertag, S., Whalen, D., Pearce, T., Paulic, J., … MacPhee, S. (2018). Beluga whales (Delphinapterus leucas), environmental change and marine protected areas in the Western Canadian Arctic. *Estuarine, Coastal and Shelf Science*, *212*, 128–137.

Loseto, L. L., Stern, G. A., & Ferguson, S. H. (2008). Size and biomagnification: how habitat selection explains beluga mercury levels. *Environmental Science & Technology*, *42*(11), 3982–3988.

Lysenko, D., & Schott, S. (2019). Food security and wildlife management in Nunavut. *Ecological Economics*, *156*, 360–374.

MacMillan, K., Hoover, C., Iacozza, J., Peyton, J., & Loseto, L. (2019). Body condition indicators: Assessing the influence of harvest location and potential thresholds for application in beluga monitoring. *Ecological Indicators*, *104*, 145–155.

McTavish, K., Furgal, C., Martin, R., & IHACC Team. (2017). Inuit food security in Nunatsiavut: The community- specific nature of a widespread public health issue. In *ArctiNet. International Arctic Change Conference, 11-15 December, Québec City*.

Muir, D. C. G., Shearer, R. G., Van Oostdam, J., Donaldson, S. G., & Furgal, C. (2005). Contaminants in Canadian arctic biota and implications for human health: conclusions and knowledge gaps. *Science of the Total Environment*, *351*, 539–546.

Murray, N. (2018). “Tokenism and optics”: Inuit orgs slam feds on Nutrition North consultations. Retrieved from https://www.cbc.ca/news/canada/north/inuit-groups-indigenous-working-group-nutrition-north-1.4869314

Natcher, D. C., Haley, S., Kofinas, G., & Parker, W. (2005). Effective local institutions for collective action in Arctic communities. *Northern Review*, 259–273.

Nunatsiavut Government. (2017). Household Food Security Survey results released. Retrieved from http://www.nunatsiavut.com/wp-content/uploads/2017/05/NEWS-RELEASE-Food-security-survey-results-released.pdf

OKâlaKatiget Society. (2018a). Nunatsiavut Government Working on Food Security Strategy (short radio interview with Kristeen McTavish, the Food Security Coordinator for the Nunatsiavut Government.). Retrieved from http://www.oksociety.com/nunatsiavut-government-working-on-food-security-strategy-audio/

OKâlaKatiget Society. (2018b). TaKuaKautik Food Bank. Retrieved from http://www.oksociety.com/takuakautik-food-bank/

Orttung, R. (2019). Working for Food Security in Interior Alaska. Retrieved from https://www.arcus.org/witness-the-arctic/2019/7/highlight/1

Ostertag, S. K., Loseto, L. L., Snow, K., Lam, J., Hynes, K., & Gillman, D. V. (2018). “That’s how we know they’re healthy”: the inclusion of traditional ecological knowledge in beluga health monitoring in the Inuvialuit Settlement Region. *Arctic Science*, *4*(3), 292–320.

Pearce, T., Ford, J., Willox, A. C., & Smit, B. (2015). Inuit traditional ecological knowledge (TEK), subsistence hunting and adaptation to climate change in the Canadian Arctic. *Arctic*, 233–245.

PROOF. (2018). Household Food Insecurity in Canada: A Guide to Measurement and Interpretation. Retrieved from https://proof.utoronto.ca/resources/measurement-guide/