BARRIERS TO WILDLIFE HARVESTING AMONG ABORIGINAL COMMUNITIES IN CANADA AND ALASKA

A Thesis Submitted to the College of
Graduate Studies and Research
In Partial Fulfillment of the Requirements
For the Degree of Master of Environment and Sustainability
In the School of Environment and Sustainability
University of Saskatchewan
Saskatoon, SK, Canada

By

SHEA MARIE SHIRLEY

PERMISSION TO USE

In presenting this thesis in partial fulfilment of the requirements for a Postgraduate degree from the University of Saskatchewan, I agree that the Libraries of this University may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purposes may be granted by the professor or professors who supervised my thesis work or, in their absence, by the Head of the Department or the Dean of the College in which my thesis work was done. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of Saskatchewan in any scholarly use which may be made of any material in my thesis.

Requests for permission to copy or to make other use of material in this thesis in whole or part should be addressed to:

School of Environment and Sustainability
University of Saskatchewan
Room 323 Kirk Hall, 117 Science Place
Saskatoon, Saskatchewan, S7N 5C8
Canada

ABSTRACT

A large body of research confirms that access to wildlife resources can reduce conditions of food insecurity and health-related illness among Aboriginal peoples in Canada and Alaska. This thesis is premised on the belief that food insecurity is experienced unevenly among individuals, households, and communities, and is socially and economically differentiated within Aboriginal communities. This premise was tested through research that was conducted in Alaska, Alberta, Nunavik, and Nunatsiavut, and included an analysis of 2,463 household harvesting surveys. The purpose of this research was to examine the barriers that constrain Aboriginal households from harvesting wildlife resources to their desired extent. The objectives were to quantify the principle barriers that affect wildlife harvesting, examine how those barriers are experienced at various levels (e.g. age and gender) within the regions, and contribute to a more informed understanding of Aboriginal food security. The results demonstrate that the constraints experienced by Aboriginal peoples in Canada and Alaska in accessing wildfoods are experienced differently depending on region, community, age, gender, and the political environment in which wildlife harvesting occurs. These findings underscore the diversity of factors that can influence one's access to wildlife resources, and one's chance of being food insecure. These findings will contribute to a more informed understanding of Aboriginal food security in the Arctic and Sub-Arctic Regions of North America and will lead to more flexible policies that can account for the social, economic and political diversity in which Aboriginal food insecurity is experienced.

ACKNOWLEDGEMENTS

I would like to first thank the 17 communities that participated in this project. I would like to thank my supervisor Dr. David Natcher for his guidance and assistance through this thesis project and my Advisory Committee members, Drs. Ken Belcher and Hayley Hesseln. My statistical analysis would not have been completed without the help of Dr. Sun Chun, Lorelei Ford, and Dr. Lianne McLeod. As well, GIS assistance provided by Alexandra Gresiuk and all those who provided their writing guidance and editing. I would also like to thank my family for their continued support through my lengthy university attendance. Last, I would like to acknowledge the financial support provided by the Social Sciences and Human Research Council (SSHRC), Resources and Sustainable Development in the Arctic (ReSDA), and the School of Environment and Sustainability.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Figure page

LIST OF ABBREVIATIONS

ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
FMP	Food Mail Program
GHS	Gwich’in Harvest Study
GRRB	Gwich'in Renewable Resources Board
HSP	Hunter Support Programs
IDHL	Inuit Domestic Harvest Limits
IHS	Inuvialuit Harvest Study
JBNQA	James Bay and Northern Quebec Agreement
LILCA	Labrador Inuit Land Claims Agreement
LRRCN	Little Red River Cree Nation
NLCA	Nunavut Lands Claim Agreement
NWHS	Nunavut Wildlife Harvest Study
NWMB	Nunavut Wildlife Management Board
ReSDA	Resources and Sustainable Development in the Arctic
SSHRC	Social Sciences and Human Research Council

CHAPTER 1.0

INTRODUCTION

The traditional economies of Aboriginal peoples in northern Canada and Alaska have changed dramatically over the past century. Once reliant solely on the procurement of wildfoods, Aboriginal peoples adjusted their residency, land use, and social organization according to the seasonal and spatial availability of foods harvested from the land. Soon following contact with European settler populations, the subsistence-based economies that long sustained the cultures and economies of Aboriginal peoples underwent irreversible change. While the intensity of these changes was experienced differently, across regions and over time, the impacts on Aboriginal peoples in Canada and Alaska have been very much the same; a slow yet consistent transition from the consumption of wildfoods to a diet composed largely of commercially-produced foods.

Despite this transition, wildlife harvesting and subsistence economies continue to be resilient and remain critical to the health and well-being of northern Aboriginal communities (Natcher 2009). Subsistence research, carried out through wildlife harvest studies (Carrière 2012; GRRB 2009; Priest and Usher 2004;), demonstrate that fishing, hunting, and gathering wild resources remains integral to the economies of many, if not most, Aboriginal communities located across northern Canada and Alaska (Nuttall et al. 2005). For example, the Aboriginal Peoples Survey (Tait 2001) found that wildfoods (e.g. caribou, whales, seals, ducks, Arctic char, shellfish, and berries), compose more than half of the total dietary intake of 78% of Inuit households in Nunavik, 73% in Nunavut, 70% in Inuvialuit, and 56% in Nunatsiavut. In Alaska, the Department of Fish and Game estimates that 75% to 98% of all Alaskan Native households harvest wildfoods (ADFG 2010). Collectively this harvest results in an annual consumption of approximately 52,114,490 pounds of wildfoods by Alaska Native households (ADFG 2010).

Notwithstanding the contribution of wildfoods to the livelihoods of Aboriginal peoples, there remains considerable disparity in the degree to which Aboriginal peoples procure food resources from the land. This disparity has been attributed to a number of factors, including time limitations associated with school attendance (Nelson et al. 2005), a greater degree of involvement in wage labour (Egeland 2010), generational change (Gombay 2010) and transitions in food preference (Hanrahan 2013), the high cost of harvesting equipment and the need to access more distant harvesting locations (Sharma 2010), a lack of skills and harvesting proficiency (Ford et al.

2006), and legislative obstacles that limit Aboriginal harvesting rights (Thornton 2001). Experienced together or in isolation, these factors limit the opportunities for Aboriginal peoples to participate in wildlife harvesting, and by implication, are having a direct bearing on Aboriginal food security (CCA 2014). It is in this context that this research examined the barriers that affect wildlife harvesting among a culturally (Gwich'in, Cree, and Inuit) and geographically (Alaska to Labrador) diverse sample of 2,463 Aboriginal households.

1.1 Research Purpose and Objectives

This research examined the barriers that affect wildlife harvesting among Aboriginal peoples in Alaska (Gwich'in), Alberta (Cree), Nunavik (Inuit), and Nunatsiavut (Inuit). Utilizing a data set collected between 2007 and 2013, this research identified a range of barriers that Aboriginal households encounter in accessing wild foods. This research identified the similarities and differences that exist between households, communities, and regions, and examined how barriers to wildlife harvesting were experienced differently depending on age and gender. Based on the hypothesis that barriers to wildlife harvesting are socially, economically and politically differentiated, my specific research objective was to examine how these barriers are articulated at various scales of experience, including:

a. Regionally and by community.
b. Within households as reflected in age and gender.
c. The political setting in which harvesting occurs (historic treaty or comprehensive land claims regions).

It is my hope that the results of this research will lend to a more informed understanding of Aboriginal food security in the Arctic and Sub-Arctic Regions of North America and can lead to more flexible policies that can account for the social, economic and political diversity in which Aboriginal food insecurity is experienced.

1.2 Chapter Outline

This thesis has been formatted as a manuscript thesis involving three chapters. Chapter One includes an introduction that sets out my research purpose and objectives. This is followed by a review of the most pertinent literature to my research topic, including northern and Aboriginal food security, wildlife harvesting, Aboriginal food systems, and the political and legal regimes that

influence the ways in which Aboriginal wildlife harvesting now occurs in Canada and Alaska. Chapter Two serves as my principle manuscript and has been formatted for submission to the journal *Food Security*. This manuscript presents in detail the data, methods, analysis, and results, followed by a discussion and conclusion. Chapter Three, the final chapter, summarizes my findings and relates them back to my research objectives. I then discuss some of the limitations encountered in this research as well as suggestions for future research. Following Chapter Three I include Appendices A to O, which provide more detailed information on the statistical analysis of the survey data and all of the descriptive statistics tables for the individual communities and regions.

1.3 Background and Literature Review

This section reviews the literature that was most informative to my research. This includes literature on Aboriginal food security, with a specific focus on northern Canada and Alaska. Also included in this review is literature on wildlife harvesting and the importance of subsistence production in meeting the social, cultural, economic, and nutritional needs of Aboriginal communities. Last, I review the literature that links Aboriginal land rights to food security, and discuss the impacts of historic treaties and comprehensive land claims on Aboriginal harvesting rights in Canada and Alaska. Together, this literature provided a foundation for interpreting, and to a certain extent, contextualizing the results of my data analysis. It is important to note that the literature in these subject areas is extensive, and includes some of the earliest ethnographic interpretations of Aboriginal food systems (Balikci 1964; Jenness 1965; Chance 1987). While acknowledging the importance of these early contributions, this review focuses most directly on some of the more recent literature, particularly since 2000, when Aboriginal food security began to receive considerable multidisciplinary research attention, both internationally (FAO et al. 2012), and in Canada (CCA 2014).

1.3.1 Food Security in Northern Regions

As defined by the United Nation Food and Agriculture Organization (1999, p.8), food security occurs "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." Conversely, food insecurity, occurs when the availability and/or quality of healthy food sources are difficult or impossible to access (Mikkonen and Raphael 2010). In

northern Canada and Alaska, considerable effort has been put into measuring (Jones et al. 2013) and monitoring food insecurity (FSN 2009). The results of these research efforts have been used to inform community economic development strategies (Chan et al. 2012), have contributed to the design of local, regional and national food aid programs (FBC 2012), and have assisted in developing food and nutritional standards for northern regions (Jones et al. 2013). Most relevant to my research is the common finding that access to wildfoods by Aboriginal peoples can help in significant ways to achieve food security, while providing for the nutritional (Kuhnlein et al. 2006), social (Wilson 2003), and psychological (Alfred 2009) needs of Aboriginal peoples (Schuster et al. 2011). Unfortunately, Aboriginal access to wild foods is not fully being achieved by all, and in some cases has contributed to growing concerns about the declining health and social well-being of Aboriginal peoples. As noted by Olivier De Schutter, the United Nation's Special Rapporteur on the Right to Food, there are 1.1 million Aboriginal people in Canada who are susceptible to (De Shutter 2012). In both the De Shutter report, as well as subsequent government sponsored research publications (CCA 2014), the disproportionate rates of food insecurity among Canada's northern Aboriginal population are profound. Some of the more stark findings include:

- Aboriginal households across Canada experience food insecurity at a rate two times higher than that of non-Aboriginal households (CCA 2014).
- 54.2% of Aboriginal households in Canada are considered food insecure (FNIGC 2011).
- The risk of being food insecure increases by 60% if you are Aboriginal (McIntyre 2003).
- The food insecurity rate in Nunavut is 45.2%.
- Nunavummiut have the highest food insecurity rate for any Aboriginal population in a developed country (International Polar Year Inuit Health Survey 2008).
- 90.4% of Inuit children regularly experience conditions of hunger, 75.8% missed meals, and 60.1% often go an entire day without eating (Egeland et al. 2010).
- Inuit households with children under the age of 18 were more likely to be food insecure than those that did not have children (Tarasuk et al. 2013).
- Households without an active hunter or a substantial income earner are particularly vulnerable to food insecurity (Chan et al. 2006).

Power (2008) argues that it is difficult to fully understand the effects of food insecurity among Aboriginal peoples in Canada because of the significant diversity within the population, and their

differing access to food sources. Nonetheless, given this evidence, it is clear that food insecurity is a reality commonly faced by Aboriginal peoples in northern regions (CCA 2014).

1.3.2 Subsistence Harvesting

Subsistence harvesting has been defined as the taking of wildlife "into possession, and includes hunting, trapping, fishing, netting, egging, picking, collecting, gathering, spearing, killing, capturing or taking [wildlife] by any means" (Nunavut Land Claims Agreement 1993, p.4). Defined in this way subsistence has been characterized by some as the minimum resources necessary to support life (Lonner and Berry 1986) and conceptualized as static, and minimalist in meeting material needs. This conception has in effect advanced a notion that subsistence represents simply a meagre economic existence, and a relic of the past (Wheeler and Thornton 2005: 70). Yet Williamson (1997, p. iv) notes that subsistence is not simply an economic activity, but rather only a facet, albeit a central one, of a way of life laden with values that connect Aboriginal peoples to one another and to the "land." Subsistence should be seen as a cultural system that has imbedded in it important economic attributes. For Inuit, "subsistence" does not imply poverty, but rather its practice indicates wealth, freedom, and wholeness (Williamson 1997, p. iv). Kishigami (2008) argues that subsistence is a unified system that entails both food-obtaining activities (harvesting, processing, sharing, consuming, and disposal) together with the cultural values that include the norms, social relationships, technology, worldview, identity, and environmental knowledge that are embedded in food procurement systems. Natcher et al. (2014) similarly emphasizes the relational integration and complimentary unity (Hart 2006) of subsistence, where economic and social interactions elude dualistic representations. In this way subsistence is a "seamless whole," where culture and economy overlap, and boundaries become blurred (Ortner 1984, p.148).

Notwithstanding this broader and more holistic view, subsistence is, more often than not, characterized in the literature and public policy as purely an economic activity, and a means of household provisioning. This rather myopic notion of subsistence is found for example, in comprehensive land claims agreements, where subsistence is characterized as "the non-commercial means of providing food and other household necessities from the land (see for example the LILCA 2005: 161). It is this definition that has informed a great deal of subsistence research in both Canada and Alaska.

Natcher (2012), in his review of subsistence research in Canada, argues that subsistence-related research can be classified into two general groupings: theoretical and applied. For Natcher

the more theoretical grouping includes those studies that utilize subsistence data to advance social theory, for instance theories of acculturation (Chance 1987) and modernization (Dombrowski 2007). Other noteworthy contributions in this area include a number of small-scale theoretical studies carried out by Chabot (2003) and Gombay (2010) in Nunavik, and Thornton (2001) in Alaska. These and other similar studies provide important insights on cultural and political changes as seen through the lens of subsistence. Wenzel's (1981) research in Clyde River, Nunavut is particularly illustrative of this type of research, yet is unique in that it offers a detailed and longitudinal account of the social organization of Inuit subsistence harvesting over time (Harder and Wenzel 2012).

General nutrition studies that address the food habits and nutrition of Aboriginal peoples in the North have long been conducted (Wein et al 1990; Kuhnlein et al. 2004, others) as have traditional ecological knowledge studies that include subsistence and environmental monitoring data (Gilchrist et al. 2005; Ferguson et al. 1997). A more recent emergence in the area of subsistence studies can be found in the growth in food security literature. Here the works of Duhaime and Bernard (2008), Furgal (2008), and Ford (2009) are representative of this important research. A comprehensive and synthesizing review of Aboriginal food security in northern Canada can be found in the Canadian Council of Academies Report on the *State of Aboriginal Food Security in the Canadian North* (2014).

The second category, or applied subsistence studies, includes close-range studies of food procurement in regions, communities, or for specific resources. This category includes harvest studies that are designed to estimate the harvest of fish, wildlife and plants by Aboriginal harvesters. Perhaps most representative of this research are the publications produced by researchers from the Alaska Department of Fish and Game (Fall 1990; Wolfe & Walker 1987; Ellanna & Sherrod 1984; Magdanz et al. 2002). Since the 1980s the Division of Subsistence has carried out research on all aspects of subsistence hunting and fishing in the lives of the residents in Alaska. As noted by Fall (nd), the Division has focused its efforts on understanding the "who, what, when, where, how, and how much" of wildlife harvesting. In Canada, the work of Usher (1983), Berkes (1979), Gamble (1984), Felt et al. (2012), and Natcher et al. (2013), would also fall into this category of harvest studies.

In Canada, one of the earliest subsistence studies was conducted in Nunavik. In September 1975, the Northern Quebec Inuit Association initiated a seven-year study entitled *Research to*

Establish Present Levels of Native Harvesting. The study set out to determine the extent of Inuit harvesting, the results of which would be used to establish a best estimate of harvest levels by species and community (JBNQRMC 1988: v). The objective of the harvest study was to provide data needed to establish guaranteed harvesting levels for Inuit households.

Since the completion of the Nunavik study, other land claims regions have carried out their own harvest assessments. The Inuvialuit Harvest Study (IHS) was conducted from 1988 to 1997. The object of the IHS was to obtain a continuous, long-term record of Inuvialuit harvest levels for each of the six regional communities (Joint Secretariat 2003: 2-3). Harvest data were to be used by co-management boards and other wildlife and fisheries agencies to determine and recommend subsistence quotas. Environmental screening and impact review boards also use harvest information to fulfill their role in dealing with resource development and for determining compensation in cases of loss or damage [13(2), 13(8) and for remedies 13(18)(b)] (Joint Secretariat 2003).

The Gwich'in Harvest Study (GHS) was a requirement of the Gwich'in Comprehensive Land Claim Agreement (1992) (Section 12.5.6). The objective of the GHS was to record the number of animals, fish and birds harvested by Gwich'in within the Settlement Area. These harvest levels would then be used to calculate Gwich'in Minimum Need Levels for Gwich'in households and would inform the management efforts of the Gwich'in Renewable Resources Board (GRRB) and other government partners.

The Sahtu Settlement Harvest Study was required under the Sahtu Land Claim Agreement (1993). Administered by the Sahtu Renewable Resource Board, the study recorded the total number of fish and wildlife harvested by Sahtu Dene and Métis between 1998 and 2003. Those harvest estimates were then used to also establish the 'minimum need levels' of Sahtu Dene and Métis and were used for wildlife management purposes in the Sahtu region.

The Nunavut Wildlife Harvest Study (NWHS) was mandated by the Nunavut Lands Claim Agreement (NLCA) and carried out under the direction of the Nunavut Wildlife Management Board (NWMB). Harvest data were collected monthly from Inuit hunters between June 1996 and May 2001. The purposes of the Harvest Study were to determine current harvesting levels and patterns of Inuit use of wildlife resources, aid in the management of wildlife resources of Nunavut, and once again to establish 'basic needs levels' (BNLs).

With the settlement of the Labrador Inuit Land Claims Agreement (LILCA - 2005), Inuit

of Nunatsiavut secured clearly defined rights to a 72,500km^2 land-base and a 48,690km^2 of coastal zone. Within the settlement region, Inuit residents have the right to harvest wildlife resources to meet their domestic needs or, as defined by the LILCA, Inuit Domestic Harvest Limits (IDHL). Domestic need is defined as the amount of resources necessary to satisfy individual non-commercial use. The use of domestic harvest levels as a basis for wildlife harvesting policy was promoted by the federal and provincial governments for its ability to set clearly defined harvest limits and facilitate effective monitoring and enforcement capabilities. Since its settlement, the Nunatsiavut Government has implemented a community harvest study program that is establishing IDHLs for 138 different species and resources used by Inuit residing within the Nunatsiavut Settlement Region.

With few exceptions (e.g., Wenzel 1981; Dombrowski 2007) the research conducted on Aboriginal food systems has employed methodologies that are more or less consistent with what Halperin (1994: 144), defines as "householding." This approach is perhaps best reflected in Usher and Wenzel's (1987) model of household production. While making some allowances for inter-household cooperation, this approach generally treats the household as an autonomous socio-economic unit that engages in a variety of capitalist and non-capitalist opportunities in different combinations that vary from year to year, and season to season.

The literature on inter-household cooperation is perhaps best reflected in the emergence of food sharing studies. This literature shows that food sharing between households is a practice deeply rooted in Aboriginal traditions and remains an important part of Aboriginal cultures today (Gombay 2010). For example, Tait (2001) found that 91% of Inuit households share wildfoods with others. Natcher (2015) found food sharing among the Cree of northern Alberta to be ubiquitous and crucial to the maintenance of social and cultural capital within their communities. In Nunavik, Gombay (2005) has also shown that food sharing among Inuit is critical to strengthening the social, cultural, economic, and political ties with others. While strengthening relationships between people, sharing is also an important way to demonstrate respect for the animals that offer themselves to hunters. Langdon (2007) for example, refers to the mutual agency of hunter and prey as 'relational sustainability,' where a moral charter (McIntosh et al. 2000) is observed through the act of food sharing. This in turn gives rise to specific cultural behaviors that are exhibited through ceremony and practice (Dale and Natcher 2015).

More pragmatically, food sharing, and the customary trade of food goods, was critical to

the survival of Aboriginal peoples (Magdanz et al. 2010). Aboriginal peoples in northern Canada and Alaska have for centuries learned to adapt to the temporal and spatial variability of wildlife migrations—for instance caribou and salmon—where in some years wildlife populations are/were plentiful and accessible, but in other years, less so. McMillan and Parlee (2013) note that food sharing among Arctic and sub-Arctic peoples served as a coping mechanism to mitigate the effects of variability in resource procurement. Others have similarly characterized food sharing as a form of insurance (Jarvenpa 2004) that is used among other strategies to deal with ecological uncertainty (Berkes and Jolly 2001). Under these conditions, food sharing helps to minimize the impacts affecting an individual, household, or community who, for various reasons, may have lacked access to wildfoods (Natcher 2009). Failing to share foods with others would have surely left Aboriginal peoples vulnerable to the vagarious nature of migratory food sources. Contributing in these ways, food sharing served an integral component of the socio-cultural and economic systems of Aboriginal peoples (Natcher et al. 2016). For these and other reasons, the harvest and subsequent distribution of wild foods is considered by many to be a necessary condition for overcoming food insecurity in the north.

1.3.3 Barriers to Wildlife Harvesting

While the reasons for Aboriginal food insecurity are complex, and defy simplistic causation, a number of contributing factors have been identified. Health behaviours, changes in the physical environment, resource extraction, employment, education, and climate change have all been implicated in the decline of Aboriginal wildlife harvesting. The effects of colonialism and residential schools were also widespread and traumatic in Aboriginal communities (Smith et al. 2005). During this period of Canadian and Alaskan history, parents and elders were unable to pass their knowledge on due to the forced removal of children from the home, and generations of children did not receive the knowledge needed to practice traditional harvesting (CCA 2014). These spheres of influence serve today as formidable obstacles to Aboriginal peoples who hope to secure even a partial livelihood from the land.

In addition to the above obstacles, the limited access to hunting and fishing equipment and the actual cost to harvest (e.g. gas and ammunition) are also significant barriers to harvesting (Lambden et al. 2006; Chan et al. 2006; Gombay 2005). The Nunavut Harvesters Support Program estimates that is takes on average $200 to cover the costs of a weekend hunting trip; a cost that is prohibitive for low-income families (Boult 2004) who need to direct household incomes

elsewhere, for instance to rent or household utilities (Collings 2005). Having the time to hunt is also a formidable barrier for some (Nelson et al. 2005; Natcher et al. 2012b). Animals in the boreal and Arctic environments tend to be spatially and temporally dispersed. While some years or seasons may bring relative abundance, for instance caribou migrations close to communities, more often than not harvesters must travel considerable distances to access game, and even then their efforts may prove unsuccessful. Regardless of success those harvesters who are employed in their communities must return home in time to meet employment commitments (Gombay 2005). Finding the time to harvesting wildlife resources and also maintain wage employment is often a difficult balance to achieve. Yet having enough time to harvest is also influenced by factors including school attendance or childcare. The scheduling demands often result in children consuming less wildfoods than their parents' generation because less time is being spent on the land and less wildfoods are being harvested (Kuhnlein et al. 2013). In Nunavik the limited time spent harvesting has contributed to Inuit youth not learning the necessary land-based skills that will allow them to be providers of wildfoods for their own families (Nickels et al. 2005). In a study on egging conducted in Nunatsiavut, Natcher et al. (2012a) similarly found that limited time spent on the land has contributed to a lack of interest among Inuit youth to harvest wildlife resources and has contributed to a general preference for store bought foods.

Accompanying these intergenerational effects, financial pressures, and lack of time, geographic circumstances also present challenges to wildlife harvesting. The changing ice conditions in the Arctic has increased the time and cost of harvesting due to the need to develop new trails for safe transportation (Beamier and Ford 2010). Similarly, the changing environmental conditions have made it more difficult for Inuit elders to share their predictive knowledge of the weather, which has contributed to growing uncertainty among younger harvesters to access the land, sea and ice (Nickels et al. 2005).

1.3.3.1 Mixed Food Systems

Given the transitions that have occurred in Aboriginal food systems, the contemporary food system of northern Aboriginal communities is best characterized as a mixed food system that is composed of both wild and store-bought foods (Ericksen 2007). The integration of both wild and store-bought foods in Aboriginal communities is considered a contemporary food system (Ford 2009). The consumption of wild and commercial foods by Aboriginal peoples varies by region and

socio-demographic conditions (Earle 2011), and can vary by household and season of the year. For example, during certain times of the year when wild resources are more readily available (caribou or salmon migration), wildfoods might represent a significant portion of the total household diet. However, during other times wildfoods might be less available, and store bought foods are more heavily relied on. In some northern regions these periods often coincide with fall freeze-up and spring break-up when unstable ice conditions on rivers or sea limit travel and resource access. However, the general remoteness of northern communities, and the resulting high price of commercial foods, make it difficult for many northern households to secure an adequate supply of store bought foods (Loppie Reading and Wein 2009). For example, it has been estimated that the price of store-bought foods in northern regions can be two to three times greater than the same products in the south (Chan et al. 2006). Natcher et al. (2016) found that in order to meet the nutritional needs of a family of four, the cost to purchase a healthy food basket in the Yukon community of Old Crow is approximately $496/week. This amount is more than double ($206/week) the cost it takes to purchase the same food basket in Yukon's capital city of Whitehorse (AANDC 2011). Limited employment opportunities in northern communities compound these conditions and further limits opportunities to purchase store bought foods, with periodic food insecurity occurring frequently for some (Loppie Reading and Wien 2009; CCA 2014). Yet, as noted above, limited income can also affect the ability to harvest wild foods and leads to an increased reliance of market food; foods that are expensive and often of poor nutritional quality (Loring and Gerlach 2009). Store bought diets generally preclude fruits and vegetables are more often composed of highly processed carbohydrates and saturated fats (Boult 2004).

Food preference also influences the proportion of wild and store bought foods being consumed. In some cases younger generations prefer store-bought foods over those harvested from the land. A decline in the interest in subsistence harvesting from the older to younger generations has been identified in recent years (Gombay 2010), with younger generations transitioning to a more consumer-based diet (Duhaime et al. 2002). While change is nothing new, and Aboriginal peoples have been effective at adapting to changing social, political and ecological environments for centuries, communities are nonetheless experiencing a dietary shift between generations that in many ways is threatening the health and well-being of Aboriginal communities (Hanrahan 2012). Loring and Gerlach (2009) examined the transition from wildfoods to store-bought foods in rural Alaskan communities and found a number of negative effects on physical health and

deteriorating social and cultural well-being of community members. Conversely, they and other researchers have documented the cultural, psychological, and nutritional benefits associated with wildfood consumption. In terms of physical health some of these benefits include the intake of essential nutrients, vitamins, and minerals, and a diet low in saturated fats and excess carbohydrates typically found in consumer based foods (Wesche and Chan 2010; Kuhnlein et al. 2006). In addition to health and nutritional benefits, Kuhnlein et al. (2006) emphasize the link between cultural identity and wildlife harvesting. For example, for the Denesuline of Lutselk'e, in the Northwest Territories, the harvesting of caribou is an integral part of their traditional connection to the land (Parlee et al. 2005). Land to the Dene and other Aboriginal peoples cannot be described just as "the basis of livelihood but of life and must be treated as such" (RCAP 1996). However, the increasing reliance on store-bought foods is putting at risk the cultural connection some Aboriginal peoples have with the land, and in some cases is causing a generational loss of territorial identity among Aboriginal peoples (Chabot 2003).

1.3.3.2 Attempts to Address Food Insecurity

Attempts by the Federal Government have been made to address the food insecurity in northern Canada. Initiatives such as the Food Mail Program (FMP) that ran from 1999 to 2011 and Nutrition North Canada that began in 2011, were designed to help mitigate the high food costs in the North (CCA 2014). The FMP was funded by the Federal Government to provide assistance in the cost of transporting healthy food options that were normally not available year round in northern communities (AANDC 2009). However, due to the time and distance it takes for food to be transported North, the condition and quality of those foods, particularly perishables, were often compromised (Boult 2004). Tait (2001) found that 33% of Inuit adults in Nunavik and Nunatsiavut were dissatisfied with the condition and quality of foods that reached their community stores. There were also issues associated with purchasing and the requirement that individuals ordering food from the South use a credit card. For those households most in need, financial credit is inaccessible. Despite contributions of Federal funding, food prices under the FMP were still unaffordable for many northern residents (AANDC 2009). In response the Federal Government terminated the FMP, and replaced it with the Nutrition North Canada program. This new program relies on two subsidy levels (i.e., cost assistance for food purchases): the first subsidy level is applied to nutritious food that are perishable (e.g. milk, fruit, and eggs); and a second lower subsidy

level that is applied to foods like crackers and ice cream (Nutrition North Canada 2015). These subsidies, however, are available only to northern purveyors (i.e. Northern Stores) who are then supposed to pass those saving on to customers. While it is unclear whether this cost saving approach is aiding those most in need, or whether the Nutrition North Program is more efficient than the FMP in meeting the food needs of communities, all seem to agree that Federal programs alone will not remedy food insecurity in the north.

1.3.4 Land Tenure and Aboriginal Harvesting Rights

The research noted above underscores the importance of wildlife harvesting in achieving food security in northern Aboriginal communities. A similar body of research also acknowledges the critical role of Aboriginal land rights in securing access to wild foods and other natural resources (Usher 1983; Scott and Feit 1992; Usher et al. 1992; Theriault et al. 2008). In Canada, the treaty making process between European nations (France and England) and Aboriginal peoples of Atlantic Canada began as early as the mid-1600s. These treaties were Peace and Friendship Treaties and were entered into under mutually beneficial terms of trade and to fortify military alliances. These early treaties did not involve any forms of land transfer or conveyance but rather set the terms for shared occupation of the land. However, by the late 1800s Canada began to expand its territorial base westward. Between 1867 and 1930, Historic Treaties were negotiated and settled with Canada's First Nations. Unlike the peace and friendships treaties that preceded them, these new treaties involved the 'surrendering' of significant tracks of lands. In exchange, First Nations were provided reserve lands that would be off limits to European encroachment and were provided various treaty annuities (health and livelihood provisions). These treaties also guaranteed First Nations the continued right to hunt, trap, and fish for subsistence needs. Shortly after signing, the Crown's own negotiators wrote: "We had to solemnly assure them [First Nations] that ... they would be as free to hunt and fish after the treaty as they would be if they never entered into it. We assured them that the treaty would not lead to any forced interference with their mode of life..." (Laird, Ross and McKenna, Report of Commissioners for Treaty No. 8, 1899, p.2). To this day, the treaties provide the legal basis for First Nation harvesting rights in Canada.

Unlike in the Canadian provinces and the continental United States (U.S.), treaty negotiations did not extend into most of northern Canada or Alaska. Rather, since the 1970s, comprehensive land claims have been negotiated between federal, territorial/provincial, state, and

Aboriginal governments. Comprehensive lands claims are based on the recognition that there are continuing Aboriginal rights to lands and natural resources that have not been dealt with by treaty and other legal means. Land claims are considered "comprehensive" because they involve a wide scope of provisions, including financial compensations, land title, and wildlife harvesting rights.

The first land claim settled in North America was the Alaska Native Claims Settlement Act (ANCSA 1971). Motivated by an emerging political consciousness of Alaska Natives in the 1960s, the settlement of ANCSA was ultimately achieved due to the U.S. federal and Alaska state governments' desire to clear a political path for the development of oil reserves in Prudhoe Bay, and the need to complete a property rights transaction with Alaska Natives (Morehouse 1987). To a lesser extent the government was motivated by what it saw as a responsibility to address Native social welfare problems brought about by the "inevitable disappearance of the traditional subsistence sector" (Nettheim et al. 2002: 68) and the desire to draw Alaska Natives into the social and economic mainstream (Morehouse 1987). With its settlement, ANCSA awarded Alaska Natives 44 million acres of land and a cash settlement of $962.5 million to be administered through the formation of 13 regional and 200 village for-profit corporations. However, a condition of ANCSA was the extinguishment of land title to the remaining 365 million acres of state and federal land and the relinquishment of all Native hunting and fishing rights.

Soon following the settlement of ANCSA (1971), the Cree and Inuit of northern Quebec settled came to terms with the federal and provincial governments for what became Canada's first comprehensive land claims agreement – the James Bay and Northern Quebec Agreement (JBNQA – 1975). With the passage of the JBNQA, the Cree and Inuit were awarded $225 million in compensation and a land settlement of 14,000 km^2 of Category I Lands that are reserved exclusively for the use of the Inuit and Cree; 150,000 km^2 of Category II Lands that are owned by the Crown-in-right-of-Quebec, but where hunting, fishing and trapping rights are reserved for Inuit and Cree; and 908,000 km^2 of Category III Lands on which some specific hunting and harvesting rights are reserved for Inuit and Cree, but all other rights are shared subject to a joint regulatory scheme. Since the settlement of the JBNQA (1975) there have been 20 other comprehensive land claims signed in Canada. The most recent, and final Inuit land claim, was the Labrador Inuit Land Claims Agreement Act (LILCA - 2005).

In both Canada and Alaska the impetus for the signing of treaties and the settlement of comprehensive land claims was to enable resource development to proceed unabated from Native

conflict and to a lesser extent out of concern for the social welfare of Native communities (Case 1989, 1998). Yet for Aboriginal peoples, treaties and land claims related primarily to their aspirations for self-determination and the preservation of their valued way of life, a life predicated largely on the harvesting of wildlife resources (Doubleday 1989). The actual scope and practical significance of maintaining this valued way of life for Aboriginal peoples has largely been determined by how those rights and interests are reflected in their respective agreements. As exercised through treaty or land claims agreements, Aboriginal harvest rights function along a continuum of authority, with Aboriginal peoples exercising significant authority in some areas and less so in others. Whether in the context of historic treaties or in the settlement of comprehensive lands claims, the policy and legislative environment created by these institutions have a major effect at the community level by influencing what forms of livelihood can be attained. These varying institutional arrangements may either reinforce subsistence rights or produce additional food insecurities.

1.4 Transition

This chapter identified the purpose and objectives of my research. This was followed by a review of the most pertinent literature to my research topic. This includes northern and Aboriginal food security, wildlife harvesting, Aboriginal food systems, and the political and legal regimes that influence the ways in which in Aboriginal wildlife harvesting now occurs in Canada and Alaska. It was this literature that informed my analysis of the barriers that limit Aboriginal wildlife harvesting in Canada and Alaska. The next chapter represents my principle manuscript. It has been formatted for submission to the journal *Food Security*.

References

Aboriginal Affairs and Northern Development Canada (AANDC). (2009). Summative Evaluation of INAC's Food Mail Program. https://www.aadnc-aandc.gc.ca/eng/1100100011721/1100100011735. Acessed 5 June 2015.

Alaska Department of Fish and Game (ADFG). (2010). Subsistence in Alaska: A Year 2010 Update. Achorage, AK.

Alaska Native Claims Settlement Act. (1971). (P.L. 92-203). United States of America: Washington, DC.

Alaska National Interest Lands Conservation Act (ANILCA). (1980). Washington, DC.

Alfred, T. (2009). *Colonialism and State Dependency. Prepared for the National Aboriginal Health Organization Project "Communities in Crisis"*. Ottawa, (ON): National Aboriginal Health Organization and the School of Aboriginal Governance, University of Victoria.

Balikci, A. (1964). *Development of basic socio-economic units in two Eskimo communities*. Ottawa: National Museum of Canada.

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

Berkes, F. (1979). An investigation of Cree Indian domestic fisheries in northern Quebec. *Arctic*, *32*(1), 46-70.

Berkes, F., & Jolly, D. (2002). Adapting to climate change: social-ecological resilience in a Canadian western Arctic community. *Conservation ecology*, *5* (2), 18.

Boult, D.A. 2004. Hunger in the Arctic: Food (in) Security in Inuit Communities. Ottawa, ON. http://www.naho.ca/documents/it/2004_Inuit_Food_Security.pdf. Accessed 6 January 2015.

Carrière, S. (2012). *Resident Hunter Surveys, 1997–2009: Update and Review*. Yellowknife, (NT): Department of Environment and Natural Resources, Government of the Northwest Territories.

Case, D. (1989). Subsistence and Self-Determination: Can Alaska Natives Have a More Effective Voice? *Colorado Law Review*, Vol. 60(4): 1009-35.

Case, D. (1998). Will Federal or State Management Afford Alaska Natives a More Effective Voice? *Cultural Survival*. Source URL: http://www.culturalsurvival.org/ourpublications/csq/article/will-federal-or-state-management-afford-alaska-natives-a-more-effective. Accessed 2 September 2015.

Chabot, M. (2003). Economic Changes, Household Strategies, and Social Relations of Contemporary Nunavik Inuit. *Polar Record*, 39 (208), 19–34.

Chan, L., Fediuk, C., Hamilton, S., Rostas, L., Caughey, A., Kuhnlein, H., & Loring, E. (2006). Food Security in Nunavut, Canada: Barriers and Recommendations. *International Journal of Circumpolar Health,* 65 (5), 416–31.

Chan, L., Receveur, O., Sharp, D., Schwartz, H., Ing, A., Fediuk, K., & Tikhonov, C. (2012). First Nations Food, Nutrition & Environment Study: Results from Manitoba (2010). Prince George, B.C.

Chance N. (1987). Subsistence Research in Alaska: Premises, Practices and Prospects. *Human Organization*, 46(1), 85-89.

Collings, P. (2005). Housing Policy, Aging, and Life Course Construction in a Canadian Inuit Community. *Arctic Anthropology,* 42 (2), 50–65.

Council of Canadian Academies (CCA). (2014). *Aboriginal Food Security in Northern Canada: An Assessment of the State of Knowledge*. Edited by The Expert Panel on the State of Knowledge of Food Security in Northern Canada. Ottawa: Council of Canadian Academies.

Dale, C. & Natcher, D.C. (2014). What Is Old Is New Again: The Reintroduction of Aboriginal Fisheries Technologies in British Columbia. *Local Environment: The International Journal of Justice and Sustainability, 1-13.*

De Schutter, O. (2012). Report of the Special Rapporteur on the right to food, Olivier De Schutter: Mission to Canada. *United Nations General Assembly*, 1-21.

Dombrowski, K. (2007). Lifestyle and Livelihood: Culture Politics and Alaska Native Subsistence." *Anthropologica*, 49(2), 211-230.

Doubleday, N.C. (1989). Co-Management Provisions of the Inuvialuit Final Agreement. *In* Evelyn Pinkerton (ed.), *New Directions for Improved Management and Community Development* (pp. 74-93). Vancouver, British Columbia: University of British Columbia Press.

Duhaime, G. & Bernard, N. (2008). *Arctic Food Security*. Edmonton, (AB): Canadian Circumpolar Institute Press, University of Alberta, and Centre interuniversitaire d'études et de recherches autochtones, Université Laval.

Duhaime, G., Chabot, M., & Gaudreault, M. (2002). Food Consumption Patterns and Socioeconomic Factors among the Inuit of Nunavik. *Ecology of Food and Nutrition,* 41(2), 91–118.

Earle, L. (2011). Traditional Aboriginal Diets and Health. Prince George, B.C.

Egeland, G. (With Inuvialuit Settlement Region Steering Committee, CINE staff members, and graduate students for the International Polar Year Inuit Health Survey: Health in Transition and Resiliency). (2010). *Inuit Health Survey 2007–2008: Inuvialuit Settlement Region*. Montréal, (QC): Centre for Aboriginal Peoples' Nutrition and Environment (CINE).

Egeland, G., Pacey, A., Cao, Z., & Sobol, I. (2010). Food insecurity among Inuit preschoolers: Nunavut Inuit Child Health Survey, 2007–2008. *Canadian Medical Association Journal,* 182(3), 243.

Ellanna, L. J. & Sherrod, G.K. (1984). The role of kinship linkages in subsistence production: Some implications for community organization. Technical Paper No.100. Alaska Department of Fish and Game, Division of Subsistence, Juneau.

Ericksen, P.J. (2007). Conceptualizing Food Systems for Global Environmental Change Research. *Global Environmental Change,* 18(1), 234–45.

Fall, J. A. (1990). The division of subsistence of the Alaska Department of Fish and Game: an overview of its research program and findings: 1980-1990. *Arctic Anthropology*, 68-92.

Fall, J. (nd). Why There is a Division of Subsistence at ADF&G. Alaska Fish and Wildlife Management News (391(65): http://www.adfg.alaska.gov/index.cfm?adfg=wildlifenews.view_article&articles_id=391&issue_id=65. Accessed August 9, 2015.

Felt, L., Natcher, D.C., & Procter, A. (2012). Going forward: Challenges and opportunities for Nunatsiavut Self-Government. *In* D.C. Natcher, L. Felt & A. Procter (eds.), *Settlement, Subsistence and Change among the Labrador Inu*it. Winnipeg, Manitoba: University of Manitoba Press: 253-263.

Ferguson, M. A., & Messier, F. (1997). Collection and analysis of traditional ecological knowledge about a population of Arctic tundra caribou. *Arctic*, 17-28.

First Nations Information Governence Centre (FNIGC). (2011). First Nations Regional Health Survey: RHS Phase 2. Ottawa, ON.

Food and Agricultural Organization (FAO), World Food Programme (WFP), International Fund for Agricultural Development (IFAD). (2012). The State of Food Insecurity in the World 2012. Economic Growth Is Necessary but Not Sufficient to Accelerate Reduction of Hunger and Malnutrition. Rome, Italy.

Food Banks Canada (FBC). (2012). Hunger Count. Toronto, ON.

Food Safety Network (FSN). (2009). Safe Preparation and Storage of Aboriginal Traditional/country Foods: A Review. Guelph, ON.

Ford, J.D., Smit, B., Wandel, J., & MacDonald, J. (2006). Vulnerability to Climate Change in Igloolik, Nunavut: What We Can Learn from the Past and Present. *Polar Record,* 42 (2), 127–38.

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.

Furgal, C. (2008). Health Impacts of Climate Change in Canada's North. In *Human Health in a Changing Climate: A Canadian Assessment of Vulnerabilities and Adaptive Capacity*. Ottawa, ON: Health Canada.

Gamble, R. (1988). *Native Harvest of Wildlife in the Keewatin Region, Northwest Territories, for the Period October 1985 to March 1986 and a Summary for the Entire Period of the Harvest Study from October 1981 to March 1986.* Canadian Data Report of Fisheries and Aquatic Sciences. Winnipeg, (MB): Department of Fisheries and Oceans: Central and Arctic Region.

Gilchrist, G., Mallory, M., & Merkel, F. (2005). Can local ecological knowledge contribute to wildlife management? Case studies of migratory birds. *Ecology and Society*, *10*(1), 20.

Gombay, Nicole. 2005. "The Commoditization of Country Foods in Nunavik : A Comparative Assessment of Its Development, Applications, and Signifcance." *Arctic* 58 (2): 115–28.

Gombay, N. (2010). Community, obligation, and food: Lessons from the moral geography of Inuit. *Geografiska Annaler Series B-Human Geography*, 92B (3), 237-250.

Gwich'in Comprehensive Land Claim Agreement. (1992). Comprehensive Land Claim Agreement between Her Majesty the Queen in Right of Canada and the Gwich'in as represented by the Gwich'in Tribal Council. http://publications.gc.ca/collections/Collection/R32-121-1992E.pdf. Accessed November 9, 2015.

Gwich'in Renewable Resource Board (GRRB). (2009). *Gwich'in Harvest Study: Final Report*. Inuvik, (NWT): GRRB.

Halperin, R. H. (1994). *Cultural economies past and present* (No. 18). University of Texas Press.

Hanrahan, M. (2012). Tracing Social Change among the Labrador Inuit: What Does the Nutrition Literature Tell Us? *Settlement, Subsistence, and Change among the Labrador Inuit: The Nunatsiavummiut Experience*, *2*, 121.

Harder, M. T., & Wenzel, G. W. (2012). Inuit subsistence, social economy and food security in Clyde River, Nunavut. *Arctic*, 305-318.

Hart, T. (2006). The socioeconomics of subsistence farmers and the contribution of the social sciences to agricultural development. In *Science-based improvements of rural/subsistence agriculture.* Forum proceedings of the committee on science for poverty alleviation, 18, 69-83.

Jarvenpa, R. (2004). Silot'ine: An insurance perspective on Northern Dene kinship networks in recent history. *Journal of anthropological research*, 153-178.

JBNQNHRC (James Bay and Northern Quebec Native Harvesting Research Committee). (1988). *Final Report: Research to Establish Present Levels of Harvesting for the Inuit of Northern Quebec.* 1976-1980. Québec City, (QC): JBNQNHRC.

Jenness, D. (1965). Eskimo Administration. Vol. III: Labrador. Arctic Institute of North America. Technical Paper no. 16.

Joint Secretariat. 2003. Inuvialuit Harvest Study, Data and Methods Report 1988 – 1997, Inuvik: Inuvialuit Joint Secretariat

Jones, A.D, Ngure, F.M., Pelto,G., & Young,S.L. (2013). What Are We Assessing When We Measure Food Security ? A Compendium and Review of Current Metrics 1 , 2. *Advances in Nutrition,* 4,481–505.

Kishigami, N. (2008). Homeless Inuit in Montréal. *Études/inuit/studies*, 73-90.

Kuhnlein, H.V., Barthet V., Farren A., Falahi E., Leggee D., Receveur O., & Berti P. (2006). "Vitamins A, D, and E in Canadian Arctic Traditional Food and Adult Diets." *Journal of Food Composition and Analysis,* 19 (6-7), 495–506.

Kuhnlein, H., Receveur, O., Soueida, R., & Egeland, G. (2004). Arctic Aboriginal Peoples experience the nutrition transition with changing dietary patterns and obesity. *Journal of Nutrition*, *134*(6), 1447-1453.

Labrador Inuit Land Claims Agreement (LILCA). 2005. 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. https://www.aadnc-aandc.gc.ca/eng/1293647179208/1293647660333. Accessed 5 May 2014.

Laird, D., Ross, J. H., & McKenna, J. A. (1899). Report of commissioners for treaty no. 8 Winnipeg, Manitoba, 22nd September, 1899. Accessed 10 August 2015.

Lambden, J., Receveur O., Marshall, J., & Kuhnlein, H.V. (2006). Traditional and Market Food Access in Arctic Canada Is Affected by Economic Factors. *International Journal of Circumpolar Health,* 65 (4), 331–40.

Langdon, S.J. (1986). *Alaska Native Economies*. New York, NY: University Press of America.

Langdon, S. J. (2007). Sustaining a Relationship: Inquiry into the Emergence of a Logic of Engagement with Salmon among the Southern Tlingits. *Native Americans and the Environment: Perspectives on the Ecological Indian*, 233-273.

Lonner, W. J., & Berry, J. W. (1986). *Field methods in cross-cultural research*. Sage Publications, Inc.

Loppie Reading, C. & Wien, F. (2009). Health Inequalities and Social Determinants of Aboriginal Peoples' Health. Prince George, B.C.

Loring, P., & Gerlach S.C.. (2009). Food, Culture, and Human Health in Alaska: An Integrative Health Approach to Food Security. *Environmental Science & Policy,* 12 (4), 466–78.

Magdanz, J.S., Braem N.S., & McIntyre, L. (2003). Food Security: More than a Determinant of Health. *Policy Options,* 24 (3), 46–51.

Magdanz, J.S., Utermohle, C.J. & Wolfe, R.J. (2002). The Production and Distribution of Wild Food in Wales and Deering, Alaska. Division of Subsistence, Alaska Department of Fish and Game, Technical Paper 259. Juneau, Alaska.

Martin, T. (2003). De la banquise au congélateur: mondialisation et culture au Nunavik. Québec: Les Presses de l'Université Laval.

McIntyre, L. (2003). Food Security: More than a Determinant of Health. *Policy Options,* 24 (3), 46–51.

McMillan, R. & Parlee, B. (2013). Dene Hunting Organization in Fort Good Hope, Northwest Territories:" Ways We Help Each Other and Share What We Can". *Arctic,* 435-447.

Mikkonen, J, & Raphael, D. (2010). Social Determinants of Health: The Canadian Facts. Toronto, ON: York University School of Heatlh Policy and Development

Morehouse, T.A. (1987). Native Claims and Political Development: A Comparative Analysis. Paper presentation at 1987 Annual Meeting of Western Regional Science Association Kona, Hawaii.

Natcher, D.C. (2015). Social Capital and the Vulnerability of Aboriginal Food Systems in Canada. *Human Organization,* 74 (3), 230–42.

Natcher, D.C. (2009). Subsistence and the Social Economy of Canada's Aboriginal North. *The Northern Review,* 30, 83–89.

Natcher, D., Felt, L., Chaulk, K., & Procter, A. (2012a). The Harvest and Management of Migratory Bird Eggs by Inuit in Nunatsiavut, Labrador. *Environmental Management,* 50 (6), 1047–56.

Natcher, D.C., Felt, L., & Procter, A. (2012b). *Settlement, Subsistence, and Change among the Labrador Inuit*. Winnipeg, MB: University of Manitoba Press.

Natcher, D., Maracle, T., Titlichi, G., & Kassi, N. (2016). Maintaining Indigenous Traditions in Border Regions of Northern Canada. *In* Robert Bone and Robert Anderson (eds.), Natural Resources and Aboriginal Peoples in Canada. Ontario: Captus Press (in press).

Natcher, D.C., Schmit, T., & Allen, T. (2014). Balancing Politics and the Dispersal of Business Revenues among First Nations in Saskatchewan, Canada. *Journal of Aboriginal Economic Development,* 9(1), 16-29.

Nelson, M., Natcher, D.C., & Hickey, C.G. (2005). Social and Economic Community Barriers to Subsistence Harvesting Aboriginal in a Northern Alberta. *Anthropologica,* 47 (2), 289–301.

Nettheim, G., Meyers G.D., & Craig, D.. (2002). *AboriginalPeoples and Governance Structures: A Comparative Analysis of Land and Resource Management Rights*. Canberra, Australia: Aboriginal Studies Press.

Nickels, S., Furgal, C., Buell, M., & Moquin, H. (2005). Unikkaaqatigitt: Putting the Human Face on Climate Change. Perspectives from Inuit in Canada. Ottawa, ON.

Nunatsiavut Government. (2014). Resources. http://www.nunatsiavut.com/resources/. Accesssed February 5, 2014.

Nunavut Land Claims Agreement. 1993. Nunavut Land Claims Agreement Act. *Government of Canada*. http://laws-lois.justice.gc.ca/eng/acts/N-28.7/page-1.html#h-1. Accessed 4 November 2013.

Nutrition North Canada. (2015). How Nutrition North Canada Works. http://www.nutritionnorthcanada.gc.ca/eng/1415538638170/1415538670874. Accessed 14 July 2015.

Nuttall, M., Berkes, F., Forbes, B., Kofinas, G., Vlassova, T., & Wenzel, G. (2005). Hunting, Herding, Fishing, and Gathering: AboriginalPeoples and Renewable Resource Use in the Arctic. In R. W. Corell (Ed.), *Arctic Climate Impact Assessment*. Cambridge, England: Cambridge University Press

Ortner, S. B. (1984). Theory in Anthropology since the Sixties. *Comparative studies in society and history*, 26 (1), 126-166.

Parlee, B., Manseau, M., & Lutsël K É Dene First Nation. (2005). To Adapt to Ecological Change : Knowledge Using Traditional Movements of Caribou Denésçhné Monitoring. *Arctic,* 58 (1), 26–37.

Power, E.M. (2008). Conceptualizing Food Security for Aboriginal People in Canada . *Canadian Journal of Public Health / Revue Canadienne de Sante ' E Publique* , 99(2), 95–97.

Priest, H.,Usher, P.J., & Nunavut Wildlife Management Board. (2004). The Nunavut Wildlife Hravest Study. Iqualuit, NU.

Royal Commission on Aboriginal Peoples (RCAP). (1996). People to People, Nation to Nation.Sahtu Land Claim Agreement. (1993). Sahtu Dene and Metis Comprehensive Land Claim Agreement. https://www.aadnc-aandc.gc.ca/eng/1100100031147/1100100031164. Accessed 3 November 2015.

Schuster, R., Gamberg, M., Dickson, C., & Chan, H.M. (2011). Assessing Risk of Mercury Exposure and Nutritional Benefits of Consumption of Caribou (Rangifer Tarandus) in the Vuntut Gwitchin First Nation Community of Old Crow, Yukon, Canada. *Environmental Research,* 111 (6), 881–87.

Scott, C., & Feit, H. (1992). "Income Security for Cree Hunters: Ecological, Social, and Economic Effects. Montreal, QC.

Sharma, S. (2010). Assessing Diet and Lifestyle in the Canadian Arctic Inuit and Inuvialuit to Inform a Nutrition and Physical Activity Intervention Programme." *Journal of Human Nutrition and Dietetics : The Official Journal of the British Dietetic Association* 23 (Suppl 1): 5–17. doi:10.1111/j.1365-277X.2010.01093.x.

Smith, D., Varcoe, C., & N. Edwards, N. (2005). Turning around the Intergenerational Impact of Residential Schools on Aboriginal People: Implications for Health Policy and Practice. *Canadian Journal of Nursing Research,* 37 (4), 38–60.

Tait, H. (2001). Inuit in Canada: Findings from the Aboriginal Peoples Survey: Survey of Living Conditions in the Arctic, Harvesting and Country Food: Fact Sheet. *Statisitcs Canada*. Ottawa, ON.

Tarasuk, V, Mitchell, A., & Dachner, N. (2013). Household Food Insecurity in Canada, 2011 (Proof). Toronto, ON.

Theriault, S., Otis, G., Duhaime, G., & Furgal, C. (2008). The Legal Protection of Subsistence: A Prerequisite of Food Security for the Inuit of Alaska." In *Arctic Food Security*, edited by G. Duhaime and N. Bernard, 21–70. Edmonton, AB: Canadian Circumpolar Press.

Martin, T. (2003). De la banquise au congélateur: mondialisation et culture au Nunavik. Québec: Les Presses de l'Université Laval.

Thomas, F., & Thornton, T. (1998). Alaska Native Subsistence: A Matter of Cultural Survival. *Cultural Survival,* 22. http://www.culturalsurvival.org/ourpublications.csq/article/alaska-native-subsitence-a-matter-cultural-survival. Accessed November 14, 2013.

Thornton, T. (2001). Subsistence in Northern Communities: Lessons from Alaska. *The Northern Review,* 23, 82-102.

Usher, P.J. (1983). The Basis of Wildlife Management in National and Regional Interests in the North. Ottawa, ON.

Usher, P.J., Tough, F.J., & Galois, R.M.. (1992). Reclaiming the Land: Aboriginal Title, Treaty Rights and Land Claims in Canada. *Applied Geography,* 12 (2), 109–32.

Usher, P. & Wenzel, G. (1987). Native harvest surveys and statistics: A critique of their construction and use. *Arctic, 40*(2).

Wein, E., Henderson Sabry, J., & Evers, F. (1990). Food consumption patterns and use of country foods by Native Canadians near Wood Buffalo National Park, Canada. *Arctic, 44*(3).

Wenzel, G. (1981). Clyde Inuit Adaption and Ecology: The Organization of Subsistence. National Museum of Canada: Ottawa, ON.

Wesche, S.D., & Chan, H.M.. (2010). Adapting to the Impacts of Climate Change on Food Security among Inuit in the Western Canadian Arctic. *EcoHealth,* 7, (3), 361–73.

Wheeler, P., & Thornton, T. (2005). Subsistence research in Alaska: a thirty year retrospective. *Alaska Journal of Anthropology*, *3*(1), 69-103.

Williamson, T. (1997). Sina to Sikujâluk: Our Footprint. Mapping Inuit Environmental Knowledge in the Nain District of Northern Labrador. Prepared for the Labrador Inuit Association. Nain, Labrador.

Wilson, K. (2003). Therapeutic landscapes and First Nations peoples: An exploration of culture, health and place. *Health and Place, 9*, 83-93.

Wolfe, R.J. & Walker, R.J. (1987). Subsistence Economies in Alaska: Productivity, Geography, and Development Impacts. *Arctic Anthropology*, 24 (2), 56-81.

CHAPTER 2.0

CONSTRAINTS TO WILDLIFE HARVESTING AMONG ABORIGINAL COMMUNITIES IN ALASKA AND CANADA

Abstract

A large body of research confirms that access to wildlife resources can reduce conditions of food insecurity and health-related illness among Aboriginal peoples in Canada and Alaska. Yet the procurement of wildfoods depends on the ability of Aboriginal households to overcome a range of obstacles that impede such access. Utilizing a data set collected between 2007 and 2013, this paper identifies a range of barriers that Aboriginal households in Alaska (Gwich'in), Alberta (Cree), Nunavik (Inuit), and Nunatsiavut (Inuit) encounter in accessing wildfoods. The results demonstrate that the constraints experienced by Aboriginal peoples in Canada and Alaska in accessing wildfoods are experienced differently depending on region, community, age, gender, and the political environment in which wildlife harvesting occurs. These findings underscore the diversity of factors that can influence one's access to wildlife resources, and one's chance of being food insecure. It is hoped that the results of this research will lead to a more informed understanding of Aboriginal food security in the Arctic and Sub-Arctic Regions of North America, and can contribute to more flexible policies that can account for the social, economic and political diversity in which Aboriginal food insecurity is experienced.

2.1 Introduction

The traditional economies of Aboriginal peoples in northern Canada and Alaska have changed dramatically over the past century.[1] Once reliant solely on the procurement of wildfoods, Aboriginal peoples adjusted their residency, land use, and social organization according to the seasonal and spatial availability of foods harvested from the land. Soon after contact with European settler populations, the subsistence-based economies that long sustained the cultures and economies of Aboriginal peoples underwent irreversible change. While the intensity of these changes were experienced differently, by regions and over time, the impacts on Aboriginal peoples

[1] As defined in Section 35 of the Canadian Constitution (1982), the term Aboriginal includes Inuit, Metis and First Nation peoples. In Alaska the term Alaska Native is more commonly used. In this chapter the term Aboriginal is used in the general text but the more culturally specific terms of Gwich'in, Cree, and Inuit are used when referencing specific communities in the four study regions.

in Canada and Alaska have been very much the same; a slow yet consistent transition from the consumption of wildfoods to a diet comprised largely of commercially produced food products.

Despite this transition, wildlife harvesting continues to make a significant contribution to the health and well-being of northern Aboriginal communities (Natcher 2009). Subsistence research, carried out through wildlife harvest studies, demonstrate that fishing, hunting, and the gathering of wild resources remains integral to the economies of many, if not most, Aboriginal communities located across northern Canada and Alaska (Nuttall et al. 2005). For example, from 1996 to 2001, communities in Nunavut harvested and consumed an estimated 6,622,522 kg of wildfood (Priest and Usher 2004), which comprised approximately 73% of the total dietary intake of Inuit households (Tait 2001). In Alaska, it has been estimated that 75% to 98% of all Alaska Native households harvest wildfoods (ADFG 2010). Collectively this harvest results in an annual consumption of approximately 19.8 million kilograms of wildfood, or an average of 170 kg per person (Wheeler et al. 2010). Even in the more southern and populated regions of provincial Canada, some Aboriginal peoples consume, on average, over 45 kg of wild meat per person annually (Natcher 2015).

Notwithstanding the contribution of wildfoods to the livelihoods of Aboriginal peoples, there remains considerable disparity in the degree to which Aboriginal peoples procure food resources from the land. While a number of studies have been conducted to understand why this disparity exists (e.g., CCA 2014; ICC 2015), general conclusions remain elusive due to most of these studies involving only single communities, and the results reported with substantial variability. For these reasons, some (e.g. Power 2008) argue that it is difficult to fully understand the relationship between wildlife harvesting and food insecurity because of the significant diversity within northern Aboriginal populations. Yet, arriving at a more informed understanding of the various factors that limit Aboriginal access to wildlife resources is critical if we are to develop effective and responsive public policies capable of mitigating the conditions of food insecurity that are now prevalent throughout the North American Arctic and Sub-Arctic regions.

It is in this context that a comparative analysis of the constraints to Aboriginal wildlife harvesting was conducted. Utilizing a data set collected between 2007 and 2013, this research identified a range of barriers that Aboriginal households in Alaska (Gwich'in), Alberta (Cree), Nunavik (Inuit), and Nunatsiavut (Inuit) encounter in accessing wildfoods. The analysis identified the similarities and differences that exist between households, communities, and regions, and

examined how barriers to wildlife harvesting were experienced differently depending on age and gender. It is our hope that the results of this research will lend to a more informed understanding of Aboriginal food security in the Arctic and Sub-Arctic Regions of North America, and can lead to more flexible policies that can account for the social, economic and political diversity in which Aboriginal food insecurity is experienced.

2.2 Background

In northern Canada and Alaska, a considerable amount of research has been conducted on the food security of Aboriginal peoples (Duhaime and Bernard 2008; FSN 2009; Jones et al. 2013). The results of that research highlight the disproportionate rates of food insecurity among northern Aboriginal populations. Some of the more stark findings indicate that: 1) Aboriginal households across Canada experience food insecurity at a rate four times the Canadian national average (CCA 2014); 2) 54% of Aboriginal households in Canada are considered food insecure (FNIGC 2011); 3) Nunavummiut (Inuit of Nunavut) have the highest food insecurity rate for any Aboriginal population in a developed country (Rosol et al. 2011); and 4) 90% of Inuit children regularly experience conditions of hunger, 76% miss meals, and 60% often go an entire day without eating (Egeland et al. 2010). The health implications stemming from these conditions include increased rates in anaemia and delayed physical and social development (Pirckle et al. 2014), high prevalence of diabetes (CDA 2012), and increasing rates of obesity (Butler Walker et al. 2009).

This body of research also confirms that access to wildfoods by Aboriginal peoples can help in significant ways to mitigate these conditions, while providing for the nutritional, social, cultural, and psychological needs of Aboriginal peoples (ICC 2015). In fact, it has been found that those households that have an active hunter, and thus have regular access to wildfoods, are significantly less vulnerable to food insecurity and health related illness (Chan et al. 2006). Unfortunately, Aboriginal access to wildfoods is not being achieved by all households, and in some cases has contributed to growing concerns about the declining health and social well-being of Aboriginal peoples. As noted by Olivier De Schutter, the United Nation's Special Rapporteur on the Right to Food, Aboriginal peoples in Canada are disproportionately vulnerable to food insecurity and diet-related illness due in part to their limited access to traditional foods (De Schutter 2010).

While the reasons for Aboriginal food insecurity are complex, and defy simplistic causation, a number of factors that limit Aboriginal access to wildfoods have been identified.

Those factors most often implicated include changing dietary preferences within Aboriginal populations, changes in the physical environment, cost and limited household incomes, changing employment patterns, resource extraction, and climate change. The effects of colonialism and residential schools are also widespread and remain traumatic for many Aboriginal communities (Truth and Reconcilaition Report 2015). During the early to mid-20th century, Aboriginal parents and Elders were unable to share their knowledge due to the establishment of residential schools and the removal of Aboriginal children from their homes. A generation of children subsequently lost the opportunity to learn from the parents and Elders, and failed to acquire the knowledge and necessary skills to harvest wildfoods (CCA 2014). These spheres of influence continue today as formidable obstacles to Aboriginal peoples who hope to secure even a modest livelihood from the land.

The high cost of harvesting and the need for financial resources has also limited the opportunity for some Aboriginal people to harvest wildlife resources (Lambden et al. 2006; Chan et al. 2006; Gombay 2005). For example, the Nunavut Harvesters Support Program estimates that it takes on average $200 to cover the costs of a weekend hunting trip; a cost that is prohibitive for low-income families (Boult 2004) who need to direct household incomes elsewhere, for instance rent or household utilities (Collings 2005). Having the time to hunt is also a formidable barrier for some (Nelson et al. 2005). Animals in the sub-Arctic and Arctic environments tend to be spatially and temporally dispersed. While some years or seasons may bring relative abundance, for instance caribou migrations close to communities, more often harvesters must travel considerable distances to access game, and even then their efforts may prove unsuccessful. Regardless of success, those harvesters who are employed in their communities must return home in time to meet employment commitments. Finding the time to harvesting wildlife resources and also maintain wage employment is often a difficult balance to achieve.

Having enough time to harvest is also influenced by factors including school attendance or childcare. The scheduling demands often result in parents and their children spending less time on the land and consuming less wildfoods than their parent's generation (Kuhnlein et al. 2013). In Nunavik the limited time spent harvesting has contributed to Inuit youth not learning the necessary land-based skills that would otherwise enable them to be providers of wildfoods for their own families (Nickels et al. 2005). In a study on wildlife harvesting in Labrador, Natcher et al. (2012) found that the limited time Inuit youth spend on the land has contributed to a lack of interest to

harvest wildlife resources and has contributed to a general preference for store bought foods. This generational trend has also been reported in Alaska, where wildfoods provide, on average, 43% of dietary energy for Alaska Natives over the age of 50, but only 7% of the dietary energy for those under 18 (Wheeler et al. 2010).

Compounding these social and economic barriers are the biophysical changes that are affecting access to wildlife resources. For example, changing ice conditions due to climate change has increased the time and cost of harvesting due to the need to develop new trails for safe transportation (Beamier and Ford 2010). Similarly, the changing environmental and meteorological conditions have made it more difficult for Inuit Elders to share their predictive knowledge of the weather, which has contributed to growing uncertainty among younger harvesters to access the land, sea and ice (Nickels et al. 2005). Experienced together or in isolation, these factors are limiting the opportunities for Aboriginal peoples to participate in wildlife harvesting, and by implication, are having a direct bearing on Aboriginal food security in northern Canada and Alaska.

2.3 Methodology

The data used for this analysis were collected between 2007 and 2013. Data were derived from four wildlife harvest studies carried out by the Nunatsiavut Government in Labrador (Felt et al. 2012), the Council of Athabascan Tribal Governments (CATG) in Alaska (Stevens and Maracle 2011), Makivik Corporation in Nunavik (Rodon and Natcher 2013), and the Little Red River Cree Nation (LRRCN) in Alberta (Natcher 2015). These harvest studies were commissioned by each of these Aboriginal governments to satisfy a number of wildlife management and Aboriginal rights objectives.

In 2007, the Nunatsiavut Government commissioned wildlife harvesting research that would help them to establish Inuit Domestic Harvest Levels (IDHL). IDHLs represent the annual sum of all non-commercial uses of plants and wildlife that are used by Inuit to satisfy nutritional, cultural and ceremonial needs. If conservation or other wildlife management concerns arise, Inuit harvesters retain the right, as set out in the Labrador Inuit Land Claims Agreement (2005), to harvest up to the determined IDHL. In order to determine IDHL, the Nunatsiavut Government commissioned research that would quantify the annual harvest of all wildlife species used by Inuit households.

In 2010, the Council of Athabascan Tribal Governments (CATG) in Alaska conducted a

wildlife harvest study in order to protect and sustain their traditional and customary use of wildlife resources in the Yukon Flats. The collection of harvest data was considered by the CATG as necessary in order to: provide accurate harvest numbers to demonstrate subsistence needs; produce data that would be acceptable to wildlife management and regulatory decision-makers; and to inform the development of wildlife harvesting regulations in ways that protect and accommodate traditional and customary use of wildfoods (Stevens and Maracle 2011).

In 2012, the Makivik Corporation commissioned research that would document the wildfood harvest of Inuit communities in the Nunavik region. Prior to this study, Inuit harvesting was last documented in the years immediately following the signing of the James Bay and Northern Quebec Agreement (JBNQA 1975) and one of the objectives of this study was to compare present harvest levels to those recorded from 1976 to 1981.

In 2013, the Little Red River Cree Nation (LRRCN) of Alberta conducted a wildlife harvesting study in order to quantify the contribution of environmental resources to the livelihoods of First Nation members. Faced by industrial and agricultural encroachment into their traditional lands, the LRRCN leadership endorsed wildlife harvesting research in order to obtain sufficient data to engage the provincial government in a rights-based dialogue on how future resource development activities in the LRRCN territory can proceed without infringing on the rights and livelihood needs of First Nation members.

In each of the four harvest studies a common methodology and survey instrument was used, although modifications were made for the regional differences in wildlife populations, for instance beluga whales in Nunavik and bison in Alberta. The data collection occurred in four regions, with a total of seventeen communities and 2,463 surveyed households (see Figure 2.1 and Table 2.1).

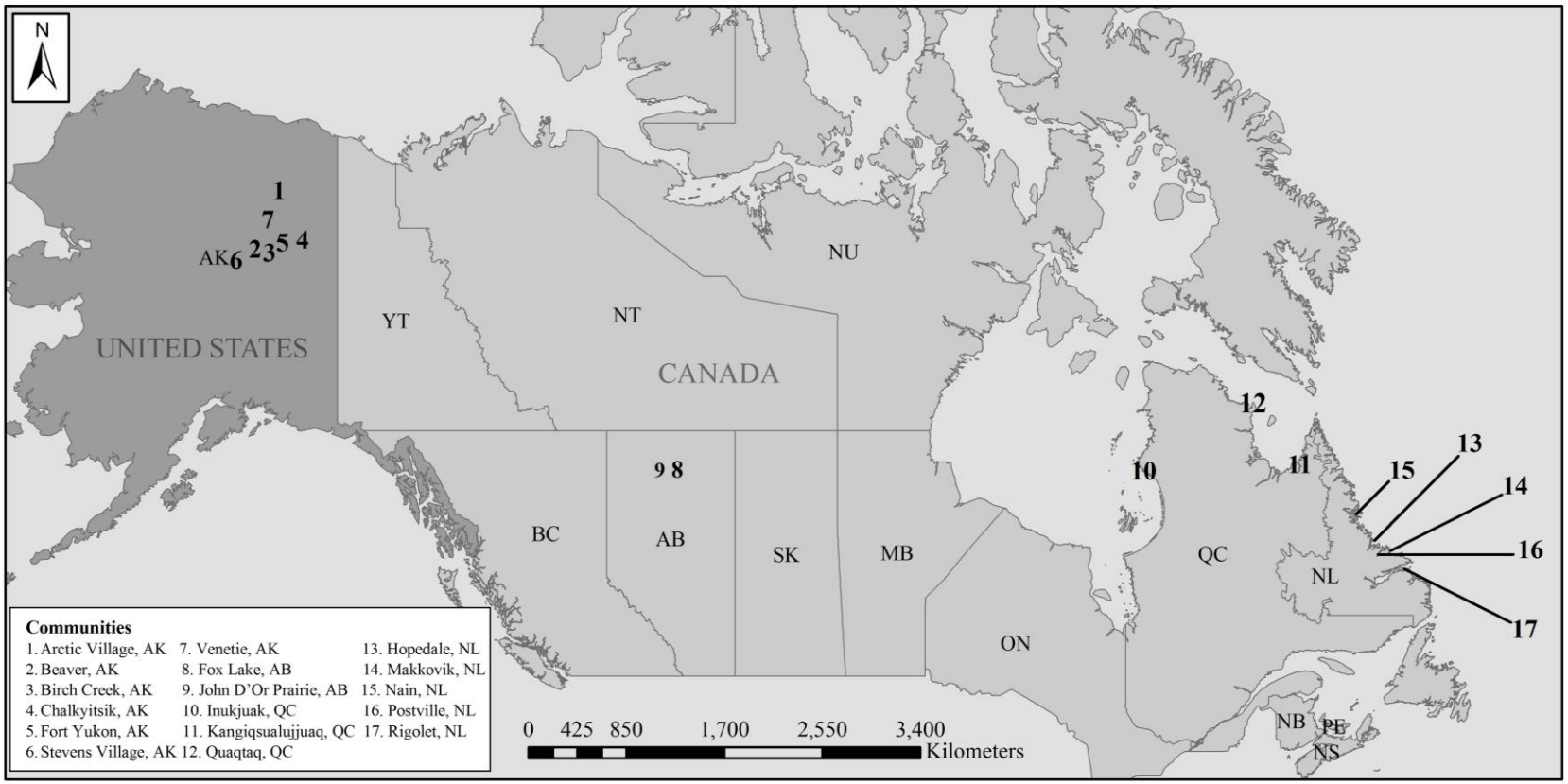


Figure 2.1 Map of surveyed communities.

Table 2.1 Community descriptions.

Community	Population	Male	Female	# of HHs	Road Accessible	Land Regime
Arctic Village, AK[1]	152	86	66	65	No	ANCSA 1971
Beaver, AK[1]	84	43	41	36	No	ANCSA 1971
Birch Creek, AK[1]	33	18	15	17	No	ANCSA 1971
Chalkyitsik, AK[1]	69	35	34	24	No	ANCSA 1971
Fort Yukon, AK[1]	583	325	258	246	No	ANCSA 1971
Stevens Village, AK[1]	78	48	30	26	No	ANCSA 1971
Venetie, AK[1]	166	100	66	61	No	ANCSA 1971
Fox Lake, AB[2]	1,865	920	940	280	Yes	Treaty 8 1899
John D'Or Prairie, AB[2]	1,100	550	555	190	Yes	Treaty 8 1899
Inukjuak, QC[2]	1,520	805	715	380	No	JBNQA 1975
Kangiqsualujjuaq, QC[2]	810	425	385	165	No	JBNQA 1975
Quaqtaq, QC[2]	360	185	175	85	No	JBNQA 1975
Hopedale, NL[2]	505	260	240	150	No	LILCA 2005
Makkovik, NL[2]	320	170	150	115	No	LILCA 2005
Nain, NL[2]	1,085	555	525	295	No	LILCA 2005
Postville, NL[2,3]	231[4]	-	-	-	No	LILCA 2005
Rigolet, NL[2]	265	140	130	100	No	LILCA 2005

Notes: [1](State of Alaska 2013); [2] (Statistics Canada 2013 and 2014); [3]Postville's population was not large enough for a National Household Survey; and [4](Tourism Nunatsiavut 2014).

Prior to collecting harvest data, community researchers were hired by their respective governments and took part in a one-week training program. In Alaska community researchers came to Fort Yukon, in Nunavik training took place in the three surveyed communities, in Nunatsiavut training occurred in Happy Valley – Goose Bay, and in LRRCN the training took place in John D'Or Prairie. During the course of the one-week training (four weeks in total), community researchers were trained in all aspects of survey delivery (see Natcher et al. 2012a).

Once the surveys were tested and approved by community partners, community researchers administered household surveys. The survey was administered to all heads-of-household in each community and recorded the total amount of wildlife resources harvested by household members during the preceding 12-month period. The surveys then identified the barriers that household members experienced in their efforts to harvest wildlife resources to their desired extent. Approached in this way, a single household might have experienced several barriers over the course of the survey period. For example, a household with several eligible harvesters might be challenged by not having the necessary time to harvest due to work or school, other members may lack the interest or skills to harvest effectively, still others might be limited by the demands of childcare. In such cases, heads-of-household identified those barriers on the behalf of other household members, whose age and gender[2] were recorded. While it would have been most ideal to survey each household member, it was generally accepted that heads-of-household were aware of the economic activities of household members and could speak to the barriers that limited household participation in wildlife harvesting.

Once compiled, the data were analyzed using two methods. The first was through Excel where data were organized by region, community, gender, and age. Frequencies and percentages were derived to identify differences or similarities within these categories. The second approach was binomial logistic regression. The regression tests the effect of various variables (e.g. cost or time) on the outcome of influence on harvesting (Yes=1, No=0). Logistic regression was chosen for the analysis of this data set due to the outcome variable being dichotomous (McLeod et al. 2014). The predictor variables that were included in the model varied slightly between regions, but were consistent in the sense that the variables were either dichotomous (gender) or categorical (age or region).

The outcomes were then modeled with the Statistical Package for Social Sciences Version 22 (SPSS) by using the generalized linear model, through a binary logistic distribution and link function. The models were built by first screening each independent variable (e.g. Cost) individually against the outcome (dependent variable of harvesting), with those having a p-value of <0.25 being included in the model building for another step of significance testing (McLeod et al. 2014). The manual backwards elimination strategy was then applied to build the final model.

[2] In Nunavik, gender was not identified in the household surveys.

This process involved placing all the variables in the model and removing the variables that had a p-value > of 0.05 (McLeod et al. 2014). Two-way interaction factors remained in the model if the p-value was at a significance of < 0.05. The final significant variables that remained in the model were then interpreted based on their effect on whether they increased or decreased the likelihood of the outcome variable occurring (e.g. Alaska's final regression equation was $y = (-b) + (-\beta_{Gender}) + (\beta_{Age}) + (-\beta_{Cost}) + (-\beta_{Employment}) + (-\beta_{Lack\ of\ Knowledge/Interest}) + (-\beta_{Health/Physically\ Unable}) + (\beta_{Health/Physically\ Unable*Lack\ of\ interest/Knowledge})$).

2.4 Results

Based on 2,463 completed household surveys, 1,119 barriers were identified. The barriers identified by respondents include: 1) financial costs of harvesting; 2) time limitations associated with attendance in school/training; 3) time limitations associated employment; 4) being physically unable; 5) childcare; 6) a lack of interest or knowledge to harvest; and 7) limited availability of game during the survey period. In some cases a single household may have identified several barriers. For example some household members may have been challenged by the costs of wildlife harvesting, others may have been physically unable to harvest wildfoods, and others may have been constrained by the demands of childcare. In these cases each barrier was recorded along with the age and gender of the household member who experienced the constraint.

Among the barriers reported, time limitations associated with employment was identified most frequently (366/1,119 or 33%). This barrier was followed by financial cost, which accounted for 22% (243/1,119) of all responses. Together, employment and financial cost served as the primary barriers to wildlife harvesting for over 55% (609/1, 119) of all respondents. In many ways these two constraints represent a double-edged sword in that employment is necessary to attain the necessary financial resources to harvest (i.e., equipment, gas, supplies), but the time involved in wage employment often limits harvesting opportunities. For those who are employed this often results in harvesting close to the community and opportunistically before or after work, on weekends, and during holidays. The third most frequently cited response was the lack of interest and/or knowledge to harvest wildlife resources. This constraint was reported by 188 of the 1,119 respondents (17%). The remaining barriers—physically unable (16%), childcare (4%), lack of game (2%), school attendance (7%)—accounted for 323/1,119 or 29% of the total responses (Table 2.2).

Within the total sample, there were regional differences in how these barriers were experienced. In Alaska, time limitations associated with employment represented the single greatest obstacle to harvesting, with 187/442 or 42% of all responses. The financial cost of wildlife harvesting was the second most frequently cited constraint (62/441). Noteworthy is the fact that only in Alaska did respondents note a lack of game as a constraint to harvesting (24/441). This barrier might be experienced in the short term, as in seasonal availability of migratory wildlife resources, or over the long term as reflected in downward wildlife population trends, for instance declines in the salmon returns on the Yukon River in Alaska. In fact, since the mid-1980s, the per-capita of wildlife harvest by Alaskan Natives has declined by an estimated 25%. According to James Fall, Director of the Division of Subsistence, the greatest declines have been experienced in Alaska's interior (survey region) due to failing salmon returns (in Rosen 2014).

Similar to Alaska, the Little Red River Cree (LRRCN) residents of Fox Lake and John D'Or Prairie cited time limitations associated with employment as the most significant constraint to wildlife harvesting (90/269). However, the second most cited constraint was the lack of interest or knowledge to harvest effectively. This constraint was reported by 85/269 individuals, and represented 32% of all LRRCN responses. The remaining constraints were reported more or less evenly and included poor health (11%), childcare (11%), and cost (10%). School attendance (3%) was reported least frequently.

In Nunavik, the cost to harvest wildlife resources was reported most often (127/288) and represented 44% of all responses. The next most frequently cited constraint was time limitations associated with employment (23%), followed by the lack of knowledge and interest (13%). Poor health (12%) and school attendance (6%) represent the remaining barriers to participation. Last, Inuit residents of Nunatsiavut cited poor health as the primary constraint to wildlife harvesting (41/121). This was followed by cost (21%) and employment (20%). The lack of interest was also noted by 20/121 individuals, as was childcare (5%) and school attendance (3%).

While a common set of barriers to wildlife harvesting was identified in each of the four study regions, the extent to which those barriers constrained harvesting differed considerably. In Alaska, time limitations associated with employment was cited most frequently. Among the LRRCN in Alberta, the lack of interest and knowledge was noted as a significant constraint. In Nunavik, the high cost of harvesting was the most significant deterrent. In Nunatsiavut, poor health and being physically unable was cited most frequently. When these constraints are examined at

the community level additional variability is observed. For example, despite being two communities within the same First Nation, and separated geographically by only the Peace River, John D'Or Prairie and Fox Lake each experienced very different constraints to wildlife harvesting. Most notably, the financial cost of harvesting was cited as a significant constraint among 28% of John D'Or Prairie households whereas only one household (<1%) in Fox Lake identified cost as a barrier to wildlife harvesting. However, 46% of Fox Lake households noted that time limitations associated with employment constrained local harvesting compared to only 12% of John D'Or Prairie households. Similar differences can be observed between other communities, such as Kangiqsualujjuaq and Quaqtaq in Nunavik, and between Hopedale and Rigolet in Nunatsiavut.

Table 2.3 presents a summary of the key findings from the regional logistic regression models (the entire models can be found in Appendices D, H, K, and O). The dependent variable in each of the four models was the variable of "harvesting." The independent predictor variables varied in the final model output for each region, depending on which ran significant (e.g. Cost, School, Employment). The Odds Ratio (OR) can be interpreted to determine whether or not the predictor variables (in the final model output) increased or decreased the likelihood of the outcome variable occurring (e.g. OR<1 decreases likelihood of harvesting, an OR>1 increases likelihood of harvesting, and an OR=1 has no effect). For Alaska, the final model included the significant barriers of cost (OR=0.06, $p<0.001$), employment (OR=0.13, $p<0.001$), lack of knowledge or no interest (OR=0.03, $p<0.001$), and health/physically unable (OR=0.10, $p<0.001$) that all decreased the likelihood of harvesting. In the LRRCN final model there were no significant variables that decreased the likelihood for harvesting. The final model for Nunavik showed that cost (OR=0.28, $p<0.001$) and employment (OR=0.16, $p<0.001$) were both found to decrease the likelihood of harvesting. The significant variables that decreased the likelihood of harvesting for those surveyed in Nunatsiavut, were cost (OR=0.01, $p<0.001$), employment (OR=0.02, $p<0.001$), physically unable (OR=0.05, $p<0.001$), and lack of knowledge or no interest (OR=0.01, $p<0.001$).

Table 2.2 Barriers to wildlife harvesting by region and community.

Region & Community	Total	Cost	School	Employment	Childcare	Poor Health or Physically Unable	Lack of Knowledge/ Interest	No Game
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
ALASKA	n=441	62 (14)	42(10)	187 (42)	7 (2)	72 (16)	47 (11)	24 (5)
Arctic Village	n=31	1(3)	0	16(52)	3(10)	9(29)	2(6)	0
Beaver	n=23	5(25)	3(15)	4(20)	0	5(25)	5(19)	1(5)
Birch Creek	n=2	0	0	1(50)	0	0	1(50)	0
Chalkyitsik	n=3	0	0	0	0	1(33)	2(67)	0
Fort Yukon	n=273	53(19)	16(6)	99(36)	4(1)	42(15)	36(13)	23(8)
Stevens Village	n=3	0	0	0	0	2(67)	1(33)	0
Venetie	n=106	3(3)	23(22)	67(63)	0	13(12)	0	0
LRRCN	n=269	28(10)	8 (3)	90 (33)	29 (11)	29 (11)	85 (32)	0
John D'Or Prairie	n=99	27(28)	1(1)	12 (12)	2(2)	2(2)	55(56)	0
Fox Lake	n=170	1(1)	7(4)	78(46)	27(16)	27(16)	30(18)	0
NUNAVIK	n=288	127(44)	26 (6)	65(23)	0	34(12)	36(13)	0
Inukjuak	n=101	32(31)	9(9)	31(30)	0	10(10)	19(18)	0
Kangiqsualujjuaq	n=56	14(25)	5(9)	8(14)	0	13(23)	16(29)	0
Quaqtaq	n=131	81(62)	12(9)	26(20)	0	11(8)	1(1)	0
NUNATSIAVUT	n=121	26 (21)	4 (3)	24 (20)	6 (5)	41 (34)	20 (16)	0
Hopedale	n=47	16(35)	0	7(15)	2(4)	7(15)	15(33)	0
Makkovik	n=10	2(20)	0	1(10)	1(10)	2(20)	4(40)	0
Nain	n=43	7(16)	3(7)	10(23)	3(7)	19(44)	1(2)	0
Postville	n=7	0	1(14)	1(14)	0	5(71)	0	0
Rigolet	n=14	1(7)	0	5(36)	0	8(57)	0	0
TOTAL	n=1119	243(22)	80(7)	366(33)	42(4)	176(16)	188(17)	24(2)

Table 2.3 Summary of the key findings of regional logistic regression models on the likelihood of harvesting occurring.

Regions	Cost		Employment		School		Lack of Knowledge/ Interest		Health/ Physically Unable		Childcare	
	OR	*p*	OR	*p*	OR	*P*	OR	*p*	OR	*p*	OR	*p*
Alaska	0.06	<0.001	0.13	<0.001	0.48	0.09	0.03	<0.001	0.10	<0.001	2.79E-10	1.00
LRRCN	0.27	0.08	9.90	<0.001	1.04	0.93	0.50	0.27	0.78	0.63	0.41	0.42
Nunavik	0.28	<0.001	0.16	<0.001	26.73	<0.001	1.14	0.73	0.86	0.66	-	-
Nunatsiavut	0.01	<0.001	0.02	<0.001	1.11	0.93	0.01	<0.001	0.05	<0.001	0.11	0.06

Notes: Significant variables (<0.05) appeared in the final logistic regression models for each region. Non-significant variables (>0.05) were eliminated in the preliminary analysis of the model building.

The results showed that even within the regions and communities, the barriers to wildlife harvesting were experienced differently depending on age and gender. For example, the lack of knowledge, or having no interest to harvest wildfoods, was identified by respondents in all age groups. However, this barrier was more prevalent among those between the ages of 20 to 39 (25% or 87/355). The other age categories had slightly lower frequency with 15% (75/490) among 40 to 59 year olds, and 9% (26/275) among those 60 years of age and older. This result was not all that surprising given that harvesting, and the knowledge base that informs those activities, is acquired over time. As one ages, more experience is accrued, as are the social and economic responsibilities to provide for one's family. However, it is also true that this generation (20-39 years of age) did not have the same opportunities as older generations to learn the land-based skills of their parents and grandparents given the colonial experiences that fundamentally altered the educational systems, economies, and cultures of Aboriginal peoples in Canada and Alaska. Given these impacts, the lack of knowledge to harvest effectively, or the interest to do so, may be generationally entrenched.

Being physically unable to harvest was identified by 43% (118/274) of respondents 60 years of age and over. To a much lesser degree this barrier was identified by 5% (16/355) of those between the ages of 20 to 39, and 9% (42/490) of those between the ages of 40 to 59. As noted by Natcher (2015), the opportunities for Elders, or those over the age of 60, are sometimes limited due to the physical demands associated with harvesting wildlife resources, for example hunting caribou or marine mammals. Due to the physical demands associated with these activities, those harvesters over the age of 60 might no longer have the physical capacity to harvest wildlife resources or might need to redirect their harvesting efforts to activities that are less physically taxing, for example fishing or snaring small game. These activities might also occur in close proximity to their respective communities – areas that might be more accessible but also less productive in terms of harvesting returns. For example, thirteen respondents over the age of 60 reported a lack of game to be a constraint to harvesting. This constraint, together with physical limitations, may indicate that some within this age cohort lack the capacity—financial and physical—to access more distant locations where wildlife resources can be found. For instance, moose hunting most often requires significant time, labour, and financial resources to be successful. In the case of Birch Creek in Alaska (Natcher 2004) and John D'Or Prairie in Alberta (Natcher 2015), residents have, since the 1990s, needed to expand their moose hunting territories

in response to changing ecological conditions and increased hunting pressure from sportsmen and other Aboriginal harvesters. In both of these cases, hunters must travel greater distances, thereby expending significantly more time and financial resources, to be successful. These requirements can often preclude some households from taking part in moose hunts.

While being physically unable is a constraint to harvesting for those over 60, school attendance (15%) and childcare (7%) limited harvesting opportunities for those between the ages of 20 to 39. Similar to the challenges faced by those over the age of 60, the constraints of school attendance and childcare limit the amount of time families can spend on the land, thereby forcing younger households to harvest opportunistically and in close proximity to their communities where game may be limited (2% of responses) and harvesting pressure is more intense.

While it might seem that the limited availability of game might affect all age groups evenly, there are some households in communities who are more adversely affected than others. Those who have the means (time, financial resources) have greater flexibility to expand their harvesting range and are able to expand the breadth of species harvested, for example harvesting deer or elk when moose populations are low as in the case of Alberta. Those households that lack the means are limited in the adaptive capacity and are therefore limited to the availability of wildlife resources found in the more immediate vicinity of their communities (Table 2.4).

Table 2.4 Barriers to wildlife harvesting reported by ages of heads-of-household surveyed in all regions.

Age	Cost	School	Employment	Childcare	Poor Health or Physically Unable	Lack of Knowledge /Interest	No Game
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
20 to 39 (n=355)	72 (20)	53 (15)	96 (27)	24 (7)	16 (5)	87 (25)	7 (2)
40 to 59 (n=490)	128 (26)	24 (5)	200 (41)	17 (3)	42 (9)	75 (15)	4 (1)
60+ (n=274)	43 (16)	3 (1)	70 (25)	1 (<1)	118 (43)	26 (9)	13 (5)
Total (n=1119)	243 (22)	81 (7)	366 (33)	42 (4)	176 (16)	188 (17)	24 (2)

The survey results indicate that there are differences in the ways in which harvesting constraints are experienced by gender. For example, the lack of knowledge or interest to harvest wildlife resources was identified by 23% of female respondents (n=99) compared to 13% of males (n=53). This difference may be a reflection of a gendered division of labour in wildlife harvesting. For instance, the traditional roles of First Nation men in the Yukon often involved the hunting and harvesting of wildlife, while women processed meat, distributed portions of the harvest, and used hides to make clothing and supplies (Whitehorse Aboriginal Women's Circle 2010). While these roles were not steadfast, they were complimentary and flexible in meeting the domestic needs of Aboriginal households. Staples and Natcher (2015) found that in some ways this division of labour still exists, and may affect the level of knowledge and associated interest that Aboriginal men and women have in harvesting wildlife resources. Poppel (2015: 288) for example, found that younger Aboriginal women have a general preference for wage earning employment and are less interested in wildlife harvesting. This may help to explain why in the sample more men than women between the ages of 20 to 39 are interested in wildlife harvesting (Table 2.5). It is important to note, however, that the gendered dimensions of wildlife harvesting do not function in a vacuum, but rather are influenced by a number of social, cultural and economic factors that together shape the knowledge, perspectives, and economic opportunities available to all community members. For example, Staples and Natcher (2015) found that Aboriginal men tend to have fewer constraints on their time than women who must balance employment, childcare, and other domestic responsibilities. In the household sample a relatively large percentage of men (38%) and women (35%) identified employment as a constraint to wildlife harvesting. Yet only two men (<1%), compared to 40 women (9%), identified childcare as a constraint to harvesting (see Table 2.5). What may seem to be a lack of interest may in reality reflect the lack of time Aboriginal women have after balancing professional and domestic responsibilities.

Table 2.5 Barriers to wildlife harvesting reported by the gender and age of heads-household surveyed in all regions.

Age	Gender	Cost	School	Employment	Childcare	Poor Health or Physically Unable	Lack of Knowledge /Interest	No Game
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
20 -39 (n=294)	Male (n=117)	20 (17)	22 (19)	50 (43)	1 (<1)	1 (<1)	20 (17)	3 (3)
	Female (n=177)	15 (8)	22 (12)	43 (24)	23 (13)	4 (2)	66 (37)	4 (2)
40-59 (n=278)	Male (n=131)	25 (19)	1 (<1)	67 (51)	1 (<1)	17 (13)	17 (13)	3 (2)
	Female (n=147)	18 (12)	7 (5)	72 (49)	16 (11)	8 (5)	25 (17)	1 (<1)
60+ n=259	Male (n=160)	26 (16)	2 (1)	37 (23)	0	67 (42)	16 (10)	12 (8)
	Female (n=99)	12 (12)	0	32 (32)	1 (1)	45 (45)	8 (8)	1 (1)
Total n=831	Male (n=408)	71 (17)	25 (6)	154 (38)	2 (<1)	85 (21)	53 (13)	18 (4)
	Female (n=423)	45 (11)	29 (7)	147 (35)	40 (9)	57 (13)	99 (23)	6 (1)

2.5 Political Constraints to Wildlife Harvesting

The above results indicate that the constraints to wildlife harvesting differ by region, community, age and gender. Limiting factors identified include time limitation associated with employment, financial costs and limited household incomes, lack of interest, childcare, and being physically unable to harvest. Each of these factors have, to a greater or lesser extent, constrained the opportunities for Aboriginal households to harvest wildlife resources. In addition to these constraints, the opportunities for Aboriginal peoples to harvest wildlife resources are also affected, both positively and negatively, by the political context in which Aboriginal land rights are exercised (Usher 1983; Scott and Feit 1992; Usher et al. 1992; Theriault et al. 2008).

Within the four study regions there are considerable differences in the extent to which Aboriginal peoples can exercise their rights to traditional food sources. For example, the seven Alaskan communities included in this study are beneficiaries of the 1971 Alaska Native Claims

Settlement Act (ANCSA); the first comprehensive land claims agreement signed in North America. While the geneses of ANCSA was motivated by an emerging political consciousness of Alaska Natives in the 1960s, the settlement of ANCSA was ultimately achieved due to the U.S. Federal and Alaska state governments' desire to clear a political path for the development of oil reserves in Prudhoe Bay, and the need to complete a property rights transaction with Alaskan Natives (Morehouse 1987). To a lesser extent the U.S. government was motivated by a sense of moral responsibility to alleviate the social welfare problems of Alaska Natives who were seen as suffering from the "inevitable disappearance of the traditional subsistence sector" (Nettheim et al. 2002: 68). It was this acculturative view of Native social development that informed the design of ANCSA.

Believing that subsistence was a fleeting remnant of a lower rung of social and economic development, the U.S. government saw ANCSA as a mechanism to draw Alaska Natives into the social and economic mainstream (Morehouse 1987). The was done by exchanging 178,061 km^2 of land, and a cash settlement of $962.5 million, for the extinguishment of land title to the remaining 1,477,103 km^2 of tribal land in the state and the relinquishment of all Native hunting and fishing rights. A further condition called for ANCSA's cash settlement to be administered by 13 regional and 200 village for-profit corporations. With the extinguishment of Native hunting rights (Langdon 1986; Nettheim et al. 2002), together with the corporatization of Native culture (Dombrowski 2007), some argue that there is virtually no connection between ANCSA and the subsistence needs of Alaskan Natives. This has also meant that Native subsistence rights are determined by state and federal agencies. Although the passage of the Alaska National Interest Lands Conservation Act (ANILCA 1980) did later provide a subsistence priority in times of resource scarcity, it failed to establish an allocation preference to Alaskan Natives. By failing to protect the subsistence rights of Alaskan Natives, ANCSA and ANILCA have been criticized for being the most pervasive forms of social engineering legislation to have ever affected Alaskan Native tribes, and largely responsible for fundamentally changing the cultural practices, social relationships, and economies of Alaskan Native communities (Thomas and Thornton 1998). Given that 42% of all Alaskan Native respondents cited time limitations associated with wage employment, the objectives of ANCSA—to move Alaskan Natives off the land and into the mainstream industrial economy—may have been achieved. Yet as noted by Walter Peter Jr., Alaskan Natives remain resistant to such change: "I would like to see the political leaders amend the ANCSA to restore our rights to

hunt and live off the land. Times are getting hard for us to feed our families. We must have the right to live off the land" (in Survival Denied 2013: 12).

The lessons of ANCSA were carefully considered by the Cree and Inuit of northern Quebec who were engaged in their own land claims negotiations (Nettheim et al. 2002). These negotiations, motivated by similar socio-political conditions as in Alaska (in this case, hydro-electric development), led to the 1975 settlement of the James Bay and Northern Quebec Agreement (JBNQA), Canada's first modern day comprehensive land claim. Like the terms of ANCSA, the JBNQA provided a substantial cash settlement ($225 million). However, unlike ANCSA, the JBNQA protected subsistence rights through a tiered land settlement, including: 14,000 km^2 of Category I Lands that are reserved exclusively for the use of the Inuit and Cree; 150,000 km^2 of Category II Lands that are owned by the Crown-in-right-of-Quebec, but where hunting, fishing and trapping rights are reserved for Inuit and Cree; and 908,000 km^2 of Category III Lands on which some specific hunting and harvesting rights are reserved for Inuit and Cree. Although the JBNQA required Inuit to cede certain territorial rights, they gained additional forms of recognition and protection for wildlife harvesting activities (Morehouse 1987), most notably through Hunter Support Programs (HSP). The Inuit HSPs are funded by the Québec government and administered pursuant to Section 29 of the JBNQA and are designed to offset the high costs of wildlife harvesting. According to Martin (2003), the inclusion of the HSPs in the JBNQA has served as a stabilizing force for Nunavik's subsistence-based economy. However, HSPs are mostly used to compensate hunters for brining wild meat to a communal freezer (Martin 2003), which is then made available to community members, and to subsidize the high costs of gas. The HSPs does not contribute to equipment purchases (snowmobiles, boats and ATVs) that constitutes the greatest household expenditures for hunters.

Notwithstanding the inclusion of HSPs in the JBNQA, the most significant barrier reported by Nunavik households continues to be the high financial cost of harvesting. This barrier was noted by 44% of respondents in Quaqtaq, Inukjuak, and Kangiqsualujjuaq. In Kangiqsualujjuaq alone the costs to harvest wildlife resources is roughly $474,672. This includes $242,148 for major capital investment (i.e. skidoos, ATVs), $73,115 for smaller capital investments such as nets, guns, and ammunition, and $158,409 for fuel (Rodon and Natcher 2013). For the past 40 years the JBNQA has protected Inuit rights to harvest wildlife resources. This has been achieved by securing a region of sufficient size to support the land-based activities of Inuit households and is protected

from other competing and potentially detrimental land uses. The JBNQA has also established various HSPs that have offset the high costs associated with harvesting. While Inuit in Nunavik have the legal right and legislative support to harvest wildlife resources, the high costs associated with wildlife harvesting remains the single greatest constraint to harvesting for Inuit households in Nunavik.

The situation in Nunatsiavut appears more complex and the causal effects between Aboriginal land rights and wildlife harvesting are less well defined than either Alaska or Nunavik. Inuit of Labrador have been in contact with Europeans since the 17th century (Heritage NL 2016). Since this time Inuit have endured centuries of conflict with Portuguese, French and English explorers who sought to exploit Labrador's natural resources. By the mid-eighteenth century, missionaries from the Moravian Church came to the Labrador coast to establish permanent settlements where they could to spread Christianity and the virtues of European of culture. Over the next two hundred years, the seasonally mobile lifestyle of Inuit was slowly replaced by more or less permanent year round community settlement as economic activities became increasingly centralized (Procter 2012). By the late 1950s, the provincial government chose to resettle some of the more northern Inuit communities and amalgamate them with those in the south. This was done to ease the costs of administration and to hasten the rate of Inuit acculturation. As noted by Procter (2015), the attempt to modernize and assimilate Inuit into Canadian society has long been a conscious policy decision of government. The Labrador Inuit Land Claims Agreement or LILCA, is a reflection of government's modernist vision of Inuit social and economic development.

Unlike in the adjacent territory of Nunavik, where the JBNQA provided specific mechanisms to support harvesting activities, no such provisions were made in LILCA. While Inuit harvesting rights in Labrador are protected to a certain extent through the establishment of Inuit Domestic Harvest Levels, those rights are subject to rescindment from the Federal Minister of Environment and Climate Change who has authority to determine annual harvest levels for migratory species. For example, in the case of polar bears, the Federal Government permits a subsistence hunting season that extends from February 1 to June 30. During this time Inuit hunters from the five Nunatsiavut communities can harvest twelve polar bears. Similar regulations have been set for migratory birds where Nunatsiavut households are permitted to harvest up to four Canada geese and eight freshwater or diver ducks. In some cases conservations concerns have given rise to complete hunting moratoriums, as in the case of the George River Caribou Herd.

Although not being listed as either threatened or at risk, the Federal and Provincial Governments imposed a 5-year ban on hunting (2011 to 2016), after which the herd's status will be evaluated. While the decision to ban caribou hunting was motivated by legitimate concerns over the herd's population, the implications for Inuit households have been significant, both economically and culturally. As noted by Joey Agnatok, caribou used to be the main source of protein for Inuit in Labrador but it is also a "cultural thing, passed down from generation to generation. To wake up one morning and not be able to do it anymore is a hard thing to swallow" (in APTN January 8, 2015).

The political situation of the LRRCN is also informative for understanding how Aboriginal rights to harvest wildlife can be constrained by the very institutions designed to protect those rights. In the case of the LRRCN it has been the Federal government's failure to honour the terms and conditions of Treaty 8 (1899). As described by Natcher (2015) the lives of the LRRCN were largely unaffected in the immediate years following the signing of treaty. In fact, First Nation leaders demanded assurances that their way of life would not be affected nor would they be confined to the reserves. Based on those demands, government negotiators assured First Nation leaders that "... they would be as free to hunt and fish after the treaty as they would be if they never entered into it …. the treaty would not lead to any forced interference with their mode of life..." (Laird, Ross and McKenna, Report of Commissioners for Treaty No. 8, 1899). With these assurances, and an initial policy of non-interference, LRRCN families continued to disperse seasonally across the land with residential patterns influenced by the availability of wildlife resources. However, believing that the mobile existence of Aboriginal peoples in northern Alberta was thwarting European settlement and opportunities for land development, the federal and provincial governments began, in the 1950s, to encourage the LRRCN, and other regional Aboriginal groups, to abandon "life in the bush" and to settle permanently on established Indian reserves (Natcher et al. 2009). Government encouragement came in the form of threats from officials that LRRCN children who did not attend school would be removed from the care of their families, and the condition that LRRCN families would only qualify for treaty annuities if they resided permanently on reserve. Owing to these measures, the majority of LRRCN families had, by the 1960s, began settling more or less permanently on either the Fox Lake or John D'Or Prairie Indian Reserves (Natcher 2015).

Fifty-five years later we learn that a predominant constraint to wildlife harvesting for both

John D'Or Prairie and Fox Lake residents is the lack of interest or knowledge to harvest wildfoods, particularly among men and women between the ages 20 to 49. As noted above, the policies of the federal government during the 1950s resulted in many LRRCN families settling on reserve where children where immersed in western education. Many children of this generation never had the opportunity to learn the land-based skills of their parents and grandparents. While the treaty still provides the legal basis for LRRCN harvesting rights, having never acquired the necessary knowledge to harvest wildlife resources, it is not surprising that many First Nation members lack of interest to do so (Natcher 2015).

In both Canada and Alaska the impetus for the signing of treaties and the settlement of comprehensive land claims was to enable resource development to proceed unabated and to a lesser extent out of concern for the social welfare of Aboriginal communities (Case 1998). Yet for Aboriginal peoples, treaties and land claims related primarily to self-determination and the preservation of their valued way of life; a life Doubleday (1989) argues is predicated on the harvesting of wildlife resources. The actual scope and practical significance of maintaining this valued way of life has largely been determined by how those rights are reflected in their respective agreements. Whether in the context of historic treaties as in Alberta, or in the settlement of comprehensive lands claims in Alaska, Nunavik and Labrador, the policies and legislative environment created by these institutions have had a major effect at the community level by influencing what forms of livelihood can be attained. As reflected in the results of this research, the political institutions to which Aboriginal peoples are party to can either reinforce subsistence rights and harvesting opportunities, or can contribute to additional food insecurities.

2.6 Conclusion

A large body of research confirms that access to wildlife resources can reduce conditions of food insecurity and health related illness among Aboriginal peoples in Canada and Alaska. Yet the procurement of wildfoods depends on the ability of Aboriginal households to overcome a range of obstacles that impede such access. The above results demonstrate that the constraints experienced by Aboriginal peoples in Canada and Alaska in accessing wildfoods are experienced differently depending on region, community, age, gender, and the political environment in which wildlife harvesting occurs. These findings underscore the diversity of factors that can influence one's access to wildlife resources, and one's chance of being food insecure.

The factors that currently limit Aboriginal access to wildlife resources are complex, dynamic, and occur at multiple scales of experience. Because of this we should not expect a single strategy or policy response to reverse the trends that have long been in the making. Rather, if Aboriginal access to wildlife resources is to help mitigate conditions of food insecurity, a range of programs and policy instruments will be required. Fortunately there are promising examples that provide direction.

The single most cited constraint to wildlife harvesting was the limited time that was available due to employment. This constraint was noted by 33% (366/1,119) of all respondents. For those involved in wage labor, and are also interested in wildlife harvesting, more flexible work rotation schedules can be designed in ways that allow Aboriginal employees the time to engage in those activities. Schedules involving two-weeks-on and two-weeks-off have been used successfully to achieve some semblance of economic balance, particularly in the resource sector where employees reside away from home. The Red Dog Mine in Alaska is but one example where employees have flexible work schedules that provide the necessary income and time to pursue subsistence activities when away from their jobs. In addition to work rotation, more flexible schedules during key harvesting times (i.e. wildlife migration periods) allow employees to harvest important migratory species while they are available locally. Job sharing strategies also offer opportunities for community members to gain access to wage earning opportunities without needing to commit to a full-time work schedule. In these cases, job sharing can be beneficial to employees who then have greater financial and scheduling freedoms and also for employers who can retain more satisfied employees.

These same employment strategies might also help to mitigate the high cost of harvesting, which was the second most frequently cited constraint. However, in addition to these strategies, additional efforts to offset the high costs of harvesting could be made. In particular the broader application of Hunter Support Programs may prove useful in regions of the North where such support programs have not yet been made available. HSPs could lessen the financial demands of harvesting and allow those with an interest, but the not the financial means, to procure wildfoods for oneself and family, but as we have seen, HSPs need to be carefully designed to be effective. Hunter support could take the form of subsidies to purchase harvesting equipment, fuel, and supplies. Community freezer programs can be used to store and reallocate wildfoods to those who lack regular access. Communal harvesting programs could also be used where hunters, together

with Aboriginal youth, are supported to harvest and the distribute wildfoods to those in need. These and other similar programs are being employed by various Aboriginal communities and have proven successful in alleviating food insecurity. While these local and ad hoc initiatives have proven successful, they now need to be made available to other Aboriginal communities that are being challenged to meet their food needs.

The third most cited constraint to wildlife harvesting was the lack of knowledge or interest to wildlife harvesting. This might be the greatest barrier to overcome. Unfortunately we cannot simply undo the colonial history of the past. The legacies of residential schools, community relocations, loss of language, and other profound impacts have left a scar that is far from being healed. Part of this healing process might include reconnecting with the land and breathing life back into the land-based traditions that have been threatened. This could include youth-Elder programs where young hunters are exposed to the knowledge and harvesting skills of Elders and other active land users. Culture camps can also be held where youth learn the traditions and values of their leaders, Elders and knowledge holders. Last, school breaks can be scheduled to coincide with important harvesting seasons, thereby allowing families to spend time on the land during these informative periods. Each of these strategies could be institutionalized and incorporated into the social fabric of communities.

Each of the above strategies holds potential for enhancing the harvesting opportunities of Aboriginal peoples. However, if wildfoods are going to making a meaningful contribution to alleviating food insecurity in the North, subsistence harvesting will need to be normalized as a vital and equally legitimate form of economic production in the eyes of government. For too long Canada's policies regarding Aboriginal food security have been premised on modernization schemes that fail to consider other viable and culturally relevant forms of economy that exist. By normalizing subsistence economies, Aboriginal communities can gain comparable levels of support as those directed to other economic activities, for instance the $25 billion that the Canadian Government has committed to extractive resource development in the North (Canada's Northern Strategy 2009). If even a small proportion of this investment was directed to Aboriginal food security, a range of institutional support systems, some of which were identified above, could be introduced in ways that provide Aboriginal peoples with sustained opportunities to participate in the land-based economy. This will, however, require a committed effort on the part of government to allow for flexibility in policy design, and a responsiveness to the plurality of constraints that

challenge Aboriginal food systems. If this flexibility can be reflected in more informed public policy, wildlife harvesting may once again help support the culture, economies and food security needs of Aboriginal communities in the North.

REFERENCES

Alaska Department of Fish and Game (ADFG). (2010). Subsistence in Alaska: A Year 2010 Update. Achorage, AK.

Aboriginal Peoples Television Network (APTN). (2015). Tracing the steps of the disappearing Labrador Caribou. Accessed December 20, 2015. http://aptn.ca/news/2015/01/08/tracing-steps-disappearing-labrador-caribou/. Accessed 30 January 2015.

Alaska National Interest Lands Conservation Act (ANILCA). (1980). Washington, DC.

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

Boult, D.A. 2004. Hunger in the Arctic: Food (in) Security in Inuit Communities. Ottawa, ON. http://www.naho.ca/documents/it/2004_Inuit_Food_Security.pdf. Accessed January 6, 2015.

Butler Walker, J., Kassi, N., Friendship, K., Blottner, B., & Van Bibber, M. (2011). *Arctic Health Research Network Highlights Report, 2007–2011*. Whitehorse, YT: AHRN-Yukon.

Canada's Northern Strategy. (2009). Canada's Northern Strategy: Our North, Our Heritage, Our Future. http://www.northernstrategy.gc.ca/cns/cns-eng.asp. Accessed 27 January 2016.

Canadian Diabetes Association (CDA). (2012). Diabetes in Special. www.diabetes.ca/research/specialpopulations. Accessed 14 February 2016.

Case, D. (1998). Will Federal or State Management Afford Alaska Natives a More Effective Voice? *Cultural Survival*. Source URL: http://www.culturalsurvival.org/ourpublications/csq/article/will-federal-or-state-management-afford-alaska-natives-a-more-effective. Accessed 24 April 2015.

Chan, L., Fediuk, C., Hamilton, S., Rostas, L., Caughey, A., Kuhnlein, H., & Loring, E. (2006). Food Security in Nunavut, Canada: Barriers and Recommendations. *International Journal of Circumpolar Health,* 65 (5), 416–31.

Collings, P. (2005). Housing Policy, Aging, and Life Course Construction in a Canadian Inuit Community. *Arctic Anthropology,* 42 (2), 50–65.

Council of Athabascan Tribal Governments (CATG). (2013). Survival denied. Accessed January 12, 2016. http://allianceforajustsociety.org/wp-content/uploads/2013/03/Survival-Denied2.pdf. Accessed 29 November 2013.

Council of Canadian Academies (CCA). (2014). *Aboriginal Food Security in Northern Canada: An Assessment of the State of Knowledge*. Edited by The Expert Panel on the State of Knowledge of Food Security in Northern Canada. Ottawa: Council of Canadian Academies.

De Schutter, O. (2012). Report of the Special Rapporteur on the right to food, Olivier De Schutter: Mission to Canada. *United Nations General Assembly*, 1-21.

Dombrowski, K. (2007). Lifestyle and Livelihood: Culture Politics and Alaska Native Subsistence." *Anthropologica*, 49(2), 211-230.

Doubleday, N.C. (1989). Co-Management Provisions of the Inuvialuit Final Agreement. *In* Evelyn Pinkerton (ed.), *New Directions for Improved Management and Community Development* (pp. 74-93). Vancouver, British Columbia: University of British Columbia Press.

Duhaime, G. & Bernard, N. (2008). *Arctic Food Security*. Edmonton, AB: Canadian Circumpolar Institute Press, University of Alberta, and Centre interuniversitaire d'études et de recherches autochtones, Université Laval.

Egeland, G., Pacey, A., Cao, Z., & Sobol, I. (2010). Food insecurity among Inuit preschoolers: Nunavut Inuit Child Health Survey, 2007–2008. *Canadian Medical Association Journal*, 182(3), 243.

Felt, L., Natcher, D.C., & Procter, A. (2012). Going forward: Challenges and opportunities for Nunatsiavut Self-Government. *In* D.C. Natcher, L. Felt & A. Procter (eds.), *Settlement, Subsistence and Change among the Labrador Inu*it. Winnipeg, Manitoba: University of Manitoba Press: 253-263

First Nations Information Governence Centre (FNIGC). (2011). First Nations Regional Health Survey: RHS Phase 2. Ottawa, ON.

Food Safety Network (FSN). (2009). Safe Preparation and Storage of Aboriginal Traditional/country Foods: A Review. Guelph, ON.

Gober, P.A., Strickert, G.E., Clark, D., Chun, K.P, Payton, D., & Bruce, K. (2015). Divergent Perspectives on Water Security: Bridging the Policy Debate. *The Professional Geographer*, no. April 2015.

Gombay, N. (2005). "The Commoditization of Country Foods in Nunavik : A Comparative Assessment of Its Development, Applications, and Signifcance." *Arctic* 58 (2): 115–28.

Government of Canada. (1982). Constitution Acts, 1867 to 1982. http://laws-lois.justice.gc.ca/eng/const/. Accessed 19 February 2016.

Heritage Newfoundland and Labrador. (Heritage NL). (2016). Inuit Post-Contact History. http://www.heritage.nf.ca/articles/aboriginal/inuit-history.php. Accessed 19 February 2016.

Inuit Circumpolar Council Canada (ICC). (2015). Press releases – 2015. Accessed December 12, 2015. http://www.inuitcircumpolar.com/press-releases-2015.html

James Bay and Northern Quebec Agreement (JBNQA). (1975). Ottawa, ON.

Jones, A.D, Ngure, F.M., Pelto,G., & Young,S.L. (2013). What Are We Assessing When We Measure Food Security ? A Compendium and Review of Current Metrics 1 , 2. *Advances in Nutrition,* 4,481–505.

Kuhnlein, H., Goodman, L., Receveur, O., Spigelski, D., Duran, N., Harrison, G., & Zheh, T. (2013). Gwich'in Traditional Food and Health in Tetlit Zheh, Northwest Territories, Canada: Phase II. In H. Kuhnlein, B. Erasmus, D. Spigelski & B. Burlingame (Eds.), *AboriginalPeoples' Food Systems & Well-being: Interventions & Policies for Healthy Communities*. Rome, Italy: Food and Agricultural Organization of the UN and Centre for Aboriginal Peoples' Nutrition and Environment (CINE).

Labrador Inuit Land Claims Agreement (LILCA). (2005). "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." https://www.aadnc-aandc.gc.ca/eng/1293647179208/1293647660333. Accessed 25 March 2014.

Laird, D., Ross, J. H., & McKenna, J. A. (1899). Report of commissioners for treaty no. 8 Winnipeg, Manitoba, 22nd September, 1899. Accessed 10 August 2015.

Lambden, J., Receveur O., Marshall, J., & Kuhnlein, H.V. (2006). Traditional and Market Food Access in Arctic Canada Is Affected by Economic Factors. *International Journal of Circumpolar Health,* 65 (4), 331–40.

Langdon, S.J. (1986). *Alaska Native Economies*. New York, NY: University Press of America.

Martin, T. (2003). De la banquise au congélateur: mondialisation et culture au Nunavik. Québec: Les Presses de l'Université Laval.

McLeod, L., Bharadwaj, L., & Waldner, C. (2014). Risk Factors Associated with the Choice to Drink Bottled Water and Tap Water in Rural Saskatchewan. *International Journal of Environmental Research and Public Health,* 11 (2), 1626–46.

Morehouse, T.A. (1987). Native Claims and Political Development: A Comparative Analysis. Kona, HI.

Natcher, D.C. (2004). Implications of Fire Policy on Native Land Use in the Yukon Flats Alaska. *Human Ecology*, 32 (4), 421-441.

Natcher, D.C. (2009). Subsistence and the Social Economy of Canada's Aboriginal North. *The Northern Review,* 30, 83–89.

Natcher, D.C. (2015). Social Capital and the Vulnerability of Aboriginal Food Systems in Canada. *Human Organization,* 74 (3), 230–42.

Natcher, D., Felt, L., Chaulk, K., & Procter, A. (2012). The Harvest and Management of Migratory Bird Eggs by Inuit in Nunatsiavut, Labrador. *Environmental Management,* 50 (6), 1047–56.

Natcher, D.C., Hickey C.G., Nelson M., & Davis, S. (2009). Implications of Tenure Insecurity for Aboriginal Land Use in Canada. *Human Organization,* 68 (3), 245-57.

Natcher, D., Maracle, T., Titlichi, G. & Kassi, N. (2016). Maintaining Indigenous Traditions in Border Regions of Northern Canada. *In* Robert Bone and Robert Anderson (eds.), Natural Resources and Aboriginal Peoples in Canada. Ontario: Captus Press (in press).

Nelson, M., Natcher, D.C., & Hickey, C.G. (2005). Social and Economic Community Barriers to Subsistence Harvesting Aboriginal in a Northern Alberta. *Anthropologica,* 47 (2), 289–301.

Nettheim, G., Meyers G.D., & Craig, D. (2002). *AboriginalPeoples and Governance Structures: A Comparative Analysis of Land and Resource Management Rights*. Canberra, Australia: Aboriginal Studies Press.

Nickels, S., Furgal, C., Buell, M., & Moquin, H. (2005). Unikkaaqatigitt: Putting the Human Face on Climate Change. Perspectives from Inuit in Canada. Ottawa, ON.

Nuttall, M., Berkes, F., Forbes, B., Kofinas, G., Vlassova, T., & Wenzel, G. (2005). Hunting, Herding, Fishing, and Gathering: AboriginalPeoples and Renewable Resource Use in the Arctic. In R. W. Corell (Ed.), *Arctic Climate Impact Assessment*. Cambridge, England: Cambridge University Press

Parliament of Canada. Our Country, Our Parliament – Constituitiion Act 1982. (1982). http://www.lop.parl.gc.ca/About/Parliament/Education/ourcountryourparliament/html_booklet/constitution-act-1982-e.html. Accessed 15 January 2016.

Pirkle, C.M., Lucas, M., Dallaire, R., Ayotte, P., Jacobson J.L., Jacobson S.W., Dewailly, E., & Muckle, G. (2014). Food Insecurity and Nutritional Biomarkers in Relation to Stature in Inuit Children from Nunavik. *Canadian Journal of Public Health,* 105(4): e233-e238

Poppel, B, J Kruse, G Duhaime, and L Abryutina. (2007). "Survey of Living Conditions in the Arctic – Results." Anchorage, AK.

Power, E.M. (2008). Conceptualizing Food Security for Aboriginal People in Canada . *Canadian Journal of Public Health / Revue Canadienne de Sante ' E Publique* , 99(2), 95–97.

Priest, H. & Usher, P.J. (2004). The Nunavut Wildlife Harvest Study. Iqaluit, NU and Ottawa, ON.

Procter, A. (2012). “Nunatsiavut Land Claims and the Politics of Inuit Wildlife Harvesting.” In *In Natcher, D., L. Felt, and A. Procter (eds.). Settlement, Subsistence, and Change among the Labrador Inuit: The Nunatsiavummiut Experience*. Winnipeg, MB: University of Manitoba.

Procter, A. (2015). Uranium and the Boundaries of Indigeneity in Nunatsiavut, Labrador. *The Extractive Industries and Society*.

Rodon, T. & Natcher D.C. (2013). Measuring the Land-Based Economy of Nunavik. Report prepared for Makivik Corporation, Kuujjuaq, Nunavik.

Rosen, Y. (2014). Shift from traditional foods takes toll on Alaska Native populations. Accessed January 7, 2016. http://www.adn.com/article/20140928/shift-traditional-foods-takes-toll-alaska-native-populations

Rosol, R., Huet, C., Wood, M., Lennie, C., Osborne, G., & Egeland, G. M. (2011). Prevalence of affirmative responses to questions of food insecurity: International Polar Year Inuit Health Survey, 2007–2008. *International Journal of Circumpolar Health*, *70*(5).

Scott, C. & Feit, H.. (1992). “Income Security for Cree Hunters: Ecological, Social, and Economic Effects.” Montreal, QC.

Staples, K., & Natcher, D.C.. (2015). “Gender, Decision Aking , and Natural Resource Co-Management in Yukon.” *Arctic* 68 (3): 356–66.

State of Alaska: Department of Labor and Workforce Development. (2013). Demographic profile for DOYON Alaska Native regional corporation. http://live.laborstats.alaska.gov/cen/dp.cfm. Accessed 14 November 2013.

Statistics Canada. (2013). NHS Aboriginal population profile, Nunavik, Inuit region, Quebec, 2011. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/aprof/details/page.cfm?Lang=E&Geo1=BAND&Code1=640002&Data=Count&SearchText=Nunavik&SearchType=Begins&SearchPR=24&A1=All&Custom=&TABID=1. Accessed 29 September 2013.

Statistics Canada. (2014a). NHS Aboriginal Population Profile, Fox Lake 162, IRI, Alberta, 2011. http://www12.statcan.gc.ca/nhsenm/2011/dppd/aprof/details/page.cfm?Lang=E&Geo1=CSD&Code1=4817835&Data=Count&SearchText=Fox%20Lake%20162&SearchType=Begins&SearchPR=01&A1=All&B1=All&GeoLevel=PR&GeoCode=4817835&TABID=1. Accessed 27 July 2014.

Statistics Canada. (2014b). NHS Aboriginal Population Profile, John d'Or Prairie 214, IRI, Alberta, 2011. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/aprof/details/page.cfm?Lang=E&Geo1=CSD&Code1=4817837&Data=Count&SearchText=John%20d%27Or%20Prairie%20215&SearchType=Begins&SearchPR=01&A1=All&B1=All&GeoLevel=PR&GeoCode=4817837&TABID=1. Accessed 14 November 2014.

Statistics Canada. (2014c). Census Profile: Inukjuak, VN, Quebec. http://www12.statcan.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=2499085&Geo2=CD&Code2=2499&Data=Count&SearchText=inukjuak&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=1. Accessed 12 November 2014.

Statistics Canada. (2014d). Census Profile: Quaqtaq, VN, Quebec. http://www12.statcan.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=2499115&Geo2=CD&Code2=2499&Data=Count&SearchText=quaqtaq&SearchType=Begins&SearchPR=24&B1=All&Custom=&TABID=1. Accessed 12 November 2014.

Statistics Canada. (2014e). Census Profile: Kangiqsualujjuaq, VN, Quebec. http://www12.statcan.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=2499090&Geo2=CD&Code2=2499&Data=Count&SearchText=Kangiqsualujjuaq&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=1. Accessed 12 November 2014.

Statistics Canada. (2014f). NHS Profile, Nain, T, Newfoundland and Labrador. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=1011035&Data=Count&SearchText=Nain&SearchType=Begins&SearchPR=01&A1=All&B1=All&TABID=1. Accessed 7 May 2014.

Statistics Canada. (2014g). NHS Profile, Hopdale, T, Newgoundland and Labrador. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=1011030&Data=Count&SearchText=hopedale&SearchType=Begins&SearchPR=01&A1=All&B1=All&Custom=&TABID=1. Accessed 7 May 2014.

Statistics Canada. (2014h). NHS Profile, Makkovik, T, Newfoundland and Labrador. http://www12.statcan.gc.ca/nhs-enm/2011/dppd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=1011020&Data=Count&SearchText=makkovik&SearchType=Begins&SearchPR=01&A1=All&B1=All&Custom=&TABID=1. Accessed 7 May 2014.

Statistics Canada. (2014i). NHS Profile. Rigolet, T, Newfoundland and Labrador. http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=1011010&Data=Count&SearchText=rigolet&SearchType=Begins&SearchPR=01&A1=All&B1=All&Custom=&TABID=1. Accessed 7 May 2014.

Stevens, C. & B. Maracle. (2011). "Subsistence Harvest of Land Mammals, Yukon Flats, Alaska." Fort Yukon, AK.

Tait, H. (2001). Inuit in Canada: Findings from the Aboriginal Peoples Survey: Survey of Living Conditions in the Arctic, Harvesting and Country Food: Fact Sheet. *Statisitcs Canada*. Ottawa, ON.

Theriault, S., G. Otis, G. Duhaime, & C. Furgal. (2008). "The Legal Protection of Subsistence: A Prerequisite of Food Security for the Inuit of Alaska." In *Arctic Food Security*, edited by G. Duhaime and N. Bernard, 21–70. Edmonton, AB: Canadian Circumpolar Press.

Thomas, F. & Thornton, T. (1998). Alaska Native Subsistence: A Matter of Cultural Survival." *Cultural Survival,* 22. http://www.culturalsurvival.org/ourpublications.csq/article/alaska-native-subsitence-a-matter-cultural-survival. Accessed 14 November 2013.

Tourism Nunatsiavut. (2014). Communities. Retrieved from: www.tourismnunatisiavut.com

Truth and Reconciliation Report. (2015). TRC Findings. http://www.trc.ca/websites/trcinstitution/index.php?p=890. Accessed 10 January 2016.

Usher, P.J. (1983). "The Basis of Wildlife Management in National and Regional Interests in the North." Ottawa, ON.

Usher, P.J., Tough, F.J., & Galois, R.M.. (1992). "Reclaiming the Land: Aboriginal Title, Treaty Rights and Land Claims in Canada." *Applied Geography* 12 (April): 109–32.

Wheeler, P., Ford, V., Konstantin, K., & Syroechkvskiy, E. (2010). Arctic Biodiversity Trends 2010 - #20 Changes in harvest. http://arcticbiodiversity.is/abt2010/index.php/en/ecosystem-services/changes-in-harvest. Accessed 5 January 2016.

Whitehorse Aboriginal Women's Circle. (2010). "Traditional Roles of Yukon First Nations Women." htt p://www.wawc.ca/index.php?option=com_content&view. Accessed 24 August 2015.

CHAPTER 3.0

SYNTHESIS AND CONCLUSION

The objective of this research was to identify the barriers that Aboriginal households experience in their efforts to harvest wildlife resources. Premised on the belief that barriers to wildlife harvesting are experienced differently depending on social, economic and political factors, this research set out to: 1) quantify, through an analysis of 2,463 household harvesting surveys, the barriers that affect wildlife harvesting in Alaska, Alberta, Nunavik and Nunatsiavut, and 2) examine those barriers at various scales, including regionally, by community, age, gender, and the political settings in which wildlife harvesting occurs. These results will enable a more informed understanding of how Aboriginal food insecurity is experienced in the North American Arctic and Sub-Arctic regions.

3.1 Summary of Findings

Of the 2,643 households surveyed, 1,119 respondents identified barriers that constrained their efforts to harvest wildlife resources. Among all of the households surveyed the barriers that were identified most frequently were time limitations due to employment, cost of harvesting, and the lack of knowledge or interest in wildlife harvesting. Regionally, there were differences in the barriers that were identified. In Alaska, the barriers of time limitation due to employment, financial cost, and lack of game were most often identified. LRRCN also experienced time limitations associated with employment, with the lack interest or knowledge to harvesting being the second most significant barrier. Within Nunavik the financial cost of harvesting was the most reported barrier, followed by time limitations of employment and the lack of knowledge and interest to harvest. In Nunatsiavut, poor health or the physical inability to harvest was identified as the most experienced constraint, followed by financial cost and employment. There were also differences within regions where communities reported varying levels of constraints. For example, John D'Or Prairie and Fox Lake both identified the cost of harvesting as a barrier. However, this constraint was reported by 28% of John D'Or Prairie households whereas <1% of Fox Lake households identified cost as a constraint. Similar inter-regional variability was found in Nunavik and Nunatsiavut.

Constraints to wildlife harvesting also varied depending on age and gender of respondents. For example, the lack of knowledge or interest to harvest wildlife resources was most frequently identified by those between the ages of 20 to 39, while being physically unable to harvest was identified by those 60 years of age and over. In the former, the lack of knowledge/interest to harvest may reflect the impact of colonialism and the introduction of other educational, economic and social institutions that have had a profound impact on this generation. Certainly the effects of residential schools and resulting generational disruption has affected the opportunities access the land-based knowledge of preceding generations. Time limitations associated with employment was identified by all ages, although those between the ages of 40 to 59 were affected most often. Being physically unable may simply reflect the physical demands associated with wildlife harvesting and a household development stage that has transitioned away from harvesting activities.

Constraints to wildlife harvesting were also experienced differently between male and female respondents. For example, 40 women noted childcare as a constraint to harvesting compared to only 2 men. Women also identified a lack of knowledge or interest to harvest wildlife resources more often than men. While the factors that influence these constraints are complex and can vary by household and individual, the results do show, that in general, these constraints are experienced quite differently. Another significant factor that influences this variation is the political context in which wildlife harvesting occurs. Whether in the case of historic treaties, or in the settlement of comprehensive land claims, the resulting legislative conditions can either limit, as in the case of Alaska and the Little Red River Cree, or supported the continuation of subsistence economies, as reflected in Nunavik.

3.2 Limitations

This research was based on data that were collected through four wildlife harvesting studies conducted between the years of 2007 to 2013. While providing a unique data set, my results are nonetheless limited due to the lack of context and an inability to interpret how these constraints are actually experienced within the household or how they may change over time. An admitted limitation of the above approach is that without an understanding of the context in which subsistence harvesting is situated, data interpretation is speculative and temporally limited. Quantitative surveys alone do not reveal how choices are made concerning household livelihood

strategies or how those choices are embedded in culture and political histories of community members. For the communities included in this study, wildlife harvesting occurs within a context that is broadly defined by biophysical conditions, demographic change, cultural preferences, political and market-related factors, mandates of state\federal agencies, and by the involvement of various external actors and interests groups (i.e., animal rights organizations) (Natcher 2012). Having this type of contextual information would have been valuable for interpreting how these constraints are experienced and internalized within communities and households. Notwithstanding this limitation, these results do provide important insights, based on a relatively large and geographically and culturally diverse data set, of the constraints that Aboriginal household face in accessing wildlife resources.

3.3 Contributions of Research

Over time Aboriginal peoples in both Canada and Alaska have been experiencing a consistent transition from a diet composed mainly of wildfoods to one dominated by commercial food products. Yet, subsistence research has shown that among some Aboriginal households, wildlife harvesting remains integral to their cultural, nutritional, and economic well-being. For these households, access to wildlife resources is contributing to the security of their household food needs. For other Aboriginal households, wildlife harvesting is limited, and is constrained by a range of actors. For these households, wildfoods are making limited or no contribution to achieving food security. Some have argued that it is difficult to fully understand the relationship between wildlife harvesting and food insecurity because of the significant diversity within northern Aboriginal populations. Yet it was this variability that motivated this research. Approached through a comparative analysis of Aboriginal harvest studies, this research identified a range of barriers that Aboriginal households in Alaska (Gwich'in), Alberta (Cree), Nunavik (Inuit), and Nunatsiavut (Inuit) encounter in accessing wildfoods. The analysis identified the similarities and differences that exist between households, communities, and regions, and examined how barriers to wildlife harvesting were experienced differently depending on age and gender. In doing so the results of this research provide a more informed understanding of the various factors that limit Aboriginal access to wildlife resources of Aboriginal food security in the Arctic and Sub-Arctic Regions of North America. These results can now be used to develop more flexible policies from the local to federal levels. These policies can reflect and be responsive to the social, economic and

political diversity in which Aboriginal food insecurity is experienced and can help mitigate the conditions of food insecurity that are prevalent among Aboriginal communities throughout the North American Arctic and Sub-Arctic regions.

3.4 Future Research Recommendations

Throughout Canada and Alaska, Aboriginal peoples are being constrained in their access to traditional lands and wildlife resources; a point highlighted in the United Nations Special Report on the Right to Food. The effects on Aboriginal peoples include the reduced consumption of traditional foods, the severing of food sharing networks, the loss of control over traditional lands, a breakdown of supporting cultural institutions, and a generational reorientation of socially important roles within First Nation communities. The secondary or downstream effects of these changes include deteriorating social, mental and physical health, and a general sense of isolation, vulnerability, and social malaise.

The results presented in this thesis provide a baseline of data that can be used to assess how various land uses, be they industrial and conservationist in intent, might affect the food security of Aboriginal peoples. These data, if accounted for in the planning and assessment process, can assist governments, be they Aboriginal, U.S. or Canadian, in making informed decisions regarding the impacts stemming from economic and social policy formation. Based on these results, the next phase of research might involve a longitudinal assessment of Aboriginal food systems in Canada and Alaska. This could involve developing a framework for monitoring wildlife harvesting over time and the constraints that household experience through various stages of household development. This might also involve identifying critical ecosystem services that are most important to Aboriginal households, and developing a research program that could monitor how the presence and actions of others might alter or influence future access. By identifying vulnerabilities or livelihood threats, various strategies can be developed for mitigating or buffering known and unexpected changes in Aboriginal food systems with the desired outcome to mitigate conditions of food insecurity.

References

Chabot, M. (2003). Economic Changes, Household Strategies, and Social Relations of Contemporary Nunavik Inuit. *Polar Record*, 39 (208), 19–34.

Council of Canadian Academies (CCA). (2014). *Aboriginal Food Security in Northern Canada: An Assessment of the State of Knowledge*. Edited by The Expert Panel on the State of Knowledge of Food Security in Northern Canada. Ottawa: Council of Canadian Academies.

Duhaime, G. & Bernard, N. (2008). *Arctic Food Security*. Edmonton, AB: Canadian Circumpolar Institute Press, University of Alberta, and Centre interuniversitaire d'études et de recherches autochtones, Université Laval.

Gombay, N. (2010). Community, obligation, and food: Lessons from the moral geography of Inuit. *Geografiska Annaler Series B-Human Geography*, 92B (3), 237-250.

Natcher, D.C. (2009). Subsistence and the Social Economy of Canada's Aboriginal North. *The Northern Review*, 30, 83–89.

Natcher, D.C. (2012). Aboriginal Land Claims and Environmental Livelihoods (ReSDA Draft Gap Analysis Report #10). Whitehorse, YT: Resources and Sustainable Development in the Arctic.

Natcher, D.C., Felt, L., Chaulk, K., & Procter, A. (2012). The Harvest and Management of Migratory Bird Eggs by Inuit in Nunatsiavut, Labrador. *Environmental Management*, 50 (6), 1047–56.

APPENDIX A

Alaska Male Head-of-Household Frequency of Response

Table A.1. Alaska male heads-of-household.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
20 - 29								
	Total	81	81	81	81	81	81	81
	Yes	0	13	0	0	1	0	1
	No	81	68	81	81	80	81	80
	%Yes	0	16	0	0	1	0	1
	%No	100	84	100	100	99	100	99
30 - 39								
	Total	47	47	47	47	47	47	47
	Yes	7	6	9	0	2	3	0
	No	40	41	38	47	45	44	47
	%Yes	15	13	19	0	4	6	0
	%No	85	87	81	100	96	94	100
40-49								
	Total	50	50	50	50	50	50	50
	Yes	3	0	23	0	2	1	0
	No	47	50	27	50	48	49	50
	%Yes	6	0	46	0	4	2	0
	%No	94	100	54	100	96	98	100
50 - 59								
	Total	66	66	66	66	66	66	66
	Yes	8	1	22	3	8	2	0
	No	58	65	44	63	58	64	66
	%Yes	12	2	33	5	12	3	0
	%No	88	98	67	95	88	97	100
60 - 69								
	Total	108	108	108	108	108	108	108
	Yes	21	1	32	21	13	10	0
	No	87	107	76	87	95	98	108
	%Yes	19	1	30	19	12	9	0
	%No	81	99	70	81	88	91	100
70+								
	Total	33	33	33	33	33	33	33
	Yes	2	0	2	21	2	2	0
	No	31	33	31	12	31	31	33
	%Yes	6	0	6	64	6	6	0
	%No	94	100	94	36	94	94	100

APPENDIX B

Alaska Female Head-of-Household Frequency of Responses

Table B.1. Alaska female heads-of-household.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
20 - 29								
	Total	68	68	68	68	68	68	68
	Yes	0	6	0	0	0	0	0
	No	68	62	68	68	68	68	68
	%Yes	0	9	0	0	0	0	0
	%No	100	91	100	100	100	100	100
30 - 39								
	Total	49	49	49	49	49	49	49
	Yes	1	8	14	1	3	4	2
	No	48	41	35	48	46	45	47
	%Yes	2	16	29	2	6	8	4
	%No	98	84	71	98	94	92	96
40 - 49								
	Total	35	35	35	35	35	35	35
	Yes	3	2	26	0	5	1	0
	No	32	33	9	35	30	34	35
	%Yes	9	6	74	0	14	3	0
	%No	91	94	26	100	86	97	100
50 - 59								
	Total	59	59	59	59	59	59	59
	Yes	7	4	27	1	6	0	3
	No	52	55	32	58	53	59	56
	%Yes	12	7	46	2	10	0	5
	%No	88	93	54	98	90	100	95
60 - 69								
	Total	57	57	57	57	57	57	57
	Yes	7	1	29	6	1	0	2
	No	50	56	28	51	56	57	55
	%Yes	12	2	51	11	2	0	2
	%No	88	98	49	89	98	100	98
70+								
	Total	28	28	28	28	28	28	28
	Yes	3	0	3	19	4	1	0
	No	25	28	25	9	24	27	28
	%Yes	11	0	11	68	14	4	0
	%No	89	100	89	32	86	96	100

APPENDIX C
Alaska Communities Frequency of Response by Gender

Table C.1. Arctic Village male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
20 - 29								
	Total	6	6	6	6	6	6	6
	Yes	0	0	0	0	0	0	0
	No	6	6	6	6	6	6	6
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
30 - 39								
	Total	7	7	7	7	7	7	7
	Yes	0	0	0	0	0	0	0
	No	7	7	7	7	7	7	7
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
40 - 49								
	Total	4	4	4	4	4	4	4
	Yes	0	0	1	0	0	0	0
	No	4	4	3	4	4	4	4
	%Yes	0	0	25	0	0	0	0
	%No	100	100	75	100	100	100	100
50 - 59								
	Total	9	9	9	9	9	9	9
	Yes	0	0	1	0	0	0	0
	No	9	9	8	9	9	9	9
	%Yes	0	0	11	0	0	0	0
	%No	100	100	89	100	100	100	100
60 - 69								
	Total	15	15	15	15	15	15	15
	Yes	0	0	1	1	0	0	0
	No	15	15	14	14	15	15	15
	%Yes	0	0	7	7	0	0	0
	%No	100	100	93	93	100	100	100
70+								
	Total	4	4	4	4	4	4	4
	Yes	0	0	0	3	0	0	0
	No	4	4	4	1	4	4	4
	%Yes	0	0	0	75	0	0	0
	%No	100	100	100	25	100	100	100

Table C.2. Arctic Village female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
20 - 29								
	Total	12	12	12	12	12	12	12
	Yes	0	0	0	0	0	0	0
	No	12	12	12	12	12	12	12
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
30 - 39								
	Total	12	12	12	12	12	12	12
	Yes	0	0	1	0	0	0	0
	No	12	12	11	12	12	12	12
	%Yes	0	0	8	0	0	0	0
	%No	100	100	92	100	100	100	100
40 - 49								
	Total	8	8	8	8	8	8	8
	Yes	0	0	6	0	0	0	0
	No	8	8	2	8	8	8	8
	%Yes	0	0	75	0	0	0	0
	%No	100	100	25	100	100	100	100
50 - 59								
	Total	10	10	10	10	10	10	10
	Yes	0	0	4	0	2	0	2
	No	10	10	6	10	8	10	8
	%Yes	0	0	40	0	20	0	20
	%No	100	100	60	100	80	100	80
60 - 69								
	Total	8	8	8	8	8	8	8
	Yes	1	0	2	1	0	0	1
	No	7	8	6	7	8	8	7
	%Yes	13	0	25	13	0	0	13
	%No	88	100	75	88	100	100	88
70+								
	Total	4	4	4	4	4	4	4
	Yes	0	0	0	4	0	0	0
	No	4	4	4	0	4	4	4
	%Yes	0	0	0	100	0	0	0
	%No	100	100	100	0	100	100	100

Table C.3. Beaver male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
20 - 29								
	Total	2	2	2	2	2	2	2
	Yes	0	0	0	0	0	0	0
	No	2	2	2	2	2	2	2
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
30 - 39								
	Total	6	6	6	6	6	6	6
	Yes	1	3	0	0	0	1	0
	No	5	3	6	6	6	5	6
	%Yes	17	50	0	0	0	17	0
	%No	83	50	100	100	100	83	100
40-49								
	Total	1	1	1	1	1	1	1
	Yes	0	0	0	0	0	0	0
	No	1	1	1	1	1	1	1
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
50 - 59								
	Total	5	5	5	5	5	5	5
	Yes	0	0	0	0	1	0	0
	No	5	5	5	5	4	5	5
	%Yes	0	0	0	0	20	0	0
	%No	100	100	100	100	80	100	100
60 - 69								
	Total	9	9	9	9	9	9	9
	Yes	3	0	0	3	1	0	0
	No	6	9	9	6	8	9	9
	%Yes	33	0	0	33	11	0	0
	%No	67	100	100	67	89	100	100
70+								
	Total	3	3	3	3	3	3	3
	Yes	0	0	0	2	0	0	0
	No	3	3	3	1	3	3	3
	%Yes	0	0	0	67	0	0	0
	%No	100	100	100	33	100	100	100

Table C.4. Beaver female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge / Interest	Lack of Game	Childcare
30 - 39								
	Total	3	3	3	3	3	3	3
	Yes	1	0	1	0	1	0	0
	No	2	3	2	3	2	3	3
	%Yes	33	0	33	0	33	0	0
	%No	67	100	67	100	67	100	100
40 - 49								
	Total	2	2	2	2	2	2	2
	Yes	0	0	2	0	2	0	0
	No	2	2	0	2	0	2	2
	%Yes	0	0	100	0	100	0	0
	%No	100	100	0	100	0	100	100
50 - 59								
	Total	2	2	2	2	2	2	2
	Yes	0	0	1	0	0	0	0
	No	2	2	1	2	2	2	2
	%Yes	0	0	50	0	0	0	0
	%No	100	100	50	100	100	100	100
60 - 69								
	Total	1	1	1	1	1	1	1
	Yes	0	0	0	0	0	0	0
	No	1	1	1	1	1	1	1
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
70+								
	Total	1	1	1	1	1	1	1
	Yes	0	0	0	0	0	0	0
	No	1	1	1	1	1	1	1
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100

Table C.5. Birch Creek male respondents

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
40 - 49								
	Total	2	2	2	2	2	2	2
	Yes	0	0	0	0	0	0	0
	No	2	2	2	2	2	2	2
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
50 - 59								
	Total	2	2	2	2	2	2	2
	Yes	0	0	2	0	2	0	0
	No	2	2	0	2	0	2	2
	%Yes	0	0	100	0	100	0	0
	%No	100	100	0	100	0	100	100
60 - 69								
	Total	2	2	2	2	2	2	2
	Yes	0	0	0	0	0	0	0
	No	2	2	2	2	2	2	2
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100

Table C.6. Birch Creek female respondents

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
60 - 69								
	Total	1	1	1	1	1	1	1
	Yes	0	0	0	0	0	0	0
	No	1	1	1	1	1	1	1
	%Yes	0	0	0	0.00	0	0	0
	%No	100	100	100	100.00	100	100	100

Table C.7. Chalkyitsik male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
40 - 49								
	Total	2	2	2	2	2	2	2
	Yes	0	0	0	0	1	0	0
	No	2	2	2	2	1	2	2
	%Yes	0	0	0	0	50	0	0
	%No	100	100	100	100	50	100	100
50 - 59								
	Total	3	3	3	3	3	3	3
	Yes	0	0	0	0	0	0	0
	No	3	3	3	3	3	3	3
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100

Table C.8. Chalkyitsik female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
40 - 49								
	Total	1	1	1	1	1	1	1
	Yes	0	0	0	0	1	0	0
	No	1	1	1	1	0	1	1
	%Yes	0	0	0	0	100	0	0
	%No	100	100	100	100	0	100	100
70+								
	Total	1	1	1	1	1	1	1
	Yes	0	0	0	1	0	0	0
	No	1	1	1	0	1	1	1
	%Yes	0	0	0	100	0	0	0
	%No	100	100	100	0	100	100	100

Table C.9. Fort Yukon male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
20 - 29								
	Total	49	49	49	49	49	49	49
	Yes	0	3	0	0	1	0	1
	No	49	46	49	49	48	49	48
	%Yes	0	6	0	0	2	0	2
	%No	100	94	100	100	98	100	98
30 - 39								
	Total	24	24	24	24	24	24	24
	Yes	6	1	5	0	2	2	0
	No	18	23	19	24	22	22	24
	%Yes	25	4	21	0	8	8	0
	%No	75	96	79	100	92	92	100
40 - 49								
	Total	19	19	19	19	19	19	19
	Yes	3	0	6	0	1	1	0
	No	16	19	13	19	18	18	19
	%Yes	16	0	32	0	5	5	0
	%No	84	100	68	100	95	95	100
50 - 59								
	Total	32	32	32	32	32	32	32
	Yes	7	1	14	2	6	2	0
	No	25	31	18	30	26	30	32
	%Yes	22	3	44	6	19	6	0
	%No	78	97	56	94	81	94	100
60 - 69								
	Total	54	54	54	54	54	54	54
	Yes	18	1	15	13	12	10	0
	No	36	53	39	41	42	44	54
	%Yes	33	2	28	24	22	19	0
	%No	67	98	72	76	78	81	100
70+								
	Total	19	19	19	19	19	19	19
	Yes	2	0	2	13	2	2	0
	No	17	19	17	6	17	17	19
	%Yes	11	0	11	68	11	11	0
	%No	89	100	89	32	89	89	100

Table C.10. Fort Yukon female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
20 - 29								
	Total	36	36	36	36	36	36	36
	Yes	0	0	0	0	0	0	0
	No	36	36	36	36	36	36	36
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
30 - 39								
	Total	26	26	26	26	26	26	26
	Yes	0	5	9	1	2	4	2
	No	26	21	17	25	24	22	24
	%Yes	0	19	35	4	8	15	8
	%No	100	81	65	96	92	85	92
40 - 49								
	Total	13	13	13	13	13	13	13
	Yes	2	2	9	0	2	1	0
	No	11	11	4	13	11	12	13
	%Yes	15	15	69	0	15	8	0
	%No	85	85	31	100	85	92	100
50 - 59								
	Total	39	39	39	39	39	39	39
	Yes	6	2	20	1	3	0	1
	No	33	37	19	38	36	39	38
	%Yes	15	5	51	3	8	0	3
	%No	85	95	49	97	92	100	97
60 - 69								
	Total	34	34	34	34	34	34	34
	Yes	6	1	16	3	1	0	0
	No	28	33	18	31	33	34	34
	%Yes	18	3	47	9	3	0	0
	%No	82	97	53	91	97	100	100
70+								
	Total	17	17	17	17	17	17	17
	Yes	3	0	3	9	4	1	0
	No	14	17	14	8	13	16	17
	%Yes	18	0	18	53	24	6	0
	%No	82	100	82	47	76	94	100

Table C.11 Stevens Village male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
30 - 39								
	Total	1	1	1	1	1	1	1
	Yes	0	0	0	0	0	0	0
	No	1	1	1	1	1	1	1
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
40 - 49								
	Total	4	4	4	4	4	4	4
	Yes	0	0	0	0	0	0	0
	No	4	4	4	4	4	4	4
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
50 - 59								
	Total	4	4	4	4	4	4	4
	Yes	0	0	0	0	0	0	0
	No	4	4	4	4	4	4	4
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
60 - 69								
	Total	4	4	4	4	4	4	4
	Yes	0	0	0	1	0	0	0
	No	4	4	4	3	4	4	4
	%Yes	0	0	0	25	0	0	0
	%No	100	100	100	75	100	100	100
70+								
	Total	1	1	1	1	1	1	1
	Yes	0	0	0	0	0	0	0
	No	1	1	1	1	1	1	1
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100

Table C.12. Stevens Village female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
40 - 49								
	Total	2	2	2	2	2	2	2
	Yes	0	0	0	0	1	0	0
	No	2	2	2	2	1	2	2
	%Yes	0	0	0	0	50	0	0
	%No	100	100	100	100	50	100	100
50 - 59								
	Total	1	1	1	1	1	1	1
	Yes	0	0	0	0	0	0	0
	No	1	1	1	1	1	1	1
	%Yes	0	0	0	0	0	0	0
	%No	100	100	100	100	100	100	100
60+								
	Total	1	1	1	1	1	1	1
	Yes	0	0	0	1	0	0	0
	No	1	1	1	0	1	1	1
	%Yes	0	0	0	100	0	0	0
	%No	100	100	100	0	100	100	100

Table C.13. Venetie male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
20 - 29								
	Total	22	22	22	22	22	22	22
	Yes	0	10	0	0	0	0	0
	No	22	12	22	22	22	22	22
	%Yes	0	45	0	0	0	0	0
	%No	100	55	100	100	100	100	100
30 - 39								
	Total	8	8	8	8	8	8	8
	Yes	0	2	4	0	0	0	0
	No	8	6	4	8	8	8	8
	%Yes	0	25	50	0	0	0	0
	%No	100	75	50	100	100	100	100
40 - 49								
	Total	16	16	16	16	16	16	16
	Yes	0	0	16	0	0	0	0
	No	16	16	0	16	16	16	16
	%Yes	0	0	100	0	0	0	0
	%No	100	100	0	100	100	100	100
50 - 59								
	Total	10	10	10	10	10	10	10
	Yes	1	0	6	1	0	0	0
	No	9	10	4	9	10	10	10
	%Yes	10	0	60	10	0	0	0
	%No	90	100	40	90	100	100	100
60 - 69								
	Total	20	20	20	20	20	20	20
	Yes	0	0	16	3	0	0	0
	No	20	20	4	17	20	20	20
	%Yes	0	0	80	15	0	0	0
	%No	100	100	20	85	100	100	100
70+								
	Total	4	4	4	4	4	4	4
	Yes	0	0	0	3	0	0	0
	No	4	4	4	1	4	4	4
	%Yes	0	0	0	75	0	0	0
	%No	100	100	100	25	100	100	100

Table C.14. Venetie female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Lack of Game	Childcare
20 - 29								
	Total	20	20	20	20	20	20	20
	Yes	0	6	0	0	0	0	0
	No	20	14	20	20	20	20	20
	%Yes	0	30	0	0	0	0	0
	%No	100	70	100	100	100	100	100
30 - 39								
	Total	8	8	8	8	8	8	8
	Yes	0	3	3	0	0	0	0
	No	8	5	5	8	8	8	8
	%Yes	0	38	38	0	0	0	0
	%No	100	63	63	100	100	100	100
40 - 49								
	Total	10	10	10	10	10	10	10
	Yes	1	0	9	0	0	0	0
	No	9	10	1	10	10	10	10
	%Yes	10	0	90	0	0	0	0
	%No	90	100	10	100	100	100	100
50 - 59								
	Total	6	6	6	6	6	6	6
	Yes	1	2	2	0	0	0	0
	No	5	4	4	6	6	6	6
	%Yes	17	33	33	0	0	0	0
	%No	83	67	67	100	100	100	100
60 - 69								
	Total	13	13	13	13	13	13	13
	Yes	0	0	11	2	0	0	0
	No	13	13	2	11	13	13	13
	%Yes	0	0	85	15	0	0	0
	%No	100	100	15	85	100	100	100
70+								
	Total	4	4	4	4	4	4	4
	Yes	0	0	0	4	0	0	0
	No	4	4	4	0	4	4	4
	%Yes	0	0	0	100	0	0	0
	%No	100	100	100	0	100	100	100

APPENDIX D
Logistic Regression Analysis for Alaska

Table D.1. Variables for Alaska.

Variable	**Meaning**	**Variable Type**
Gender	Male or Female	Binomial 1 = Male 2 = Female
Age	Categorical Age	Categorical ex: 1 = 20-29
Childcare	Taking care of children and unable to have time to harvest	Binomial 1 = Yes 0 = No
Cost	The cost prevents ability to partake in harvesting	Binomial 1 = Yes 0 = No
No Interest	Do not want to harvest or do not have the traditional knowledge to take part	Binomial 1 = Yes 0 = No
Physically Unable	Due to age, injury, or other similar reasoning	Binomial 1 = Yes 0 = No
School	In school or away at school	Binomial 1 = Yes 0 = No
No Game	Lack of game to harvest	Binomial 1 = Yes 0 = No
Work	Work time prevents time spent on the land	Binomial 1 = Yes 0 = No
Communities	Communities where the surveys were taken.	Categorical ex: 1= Arctic Village

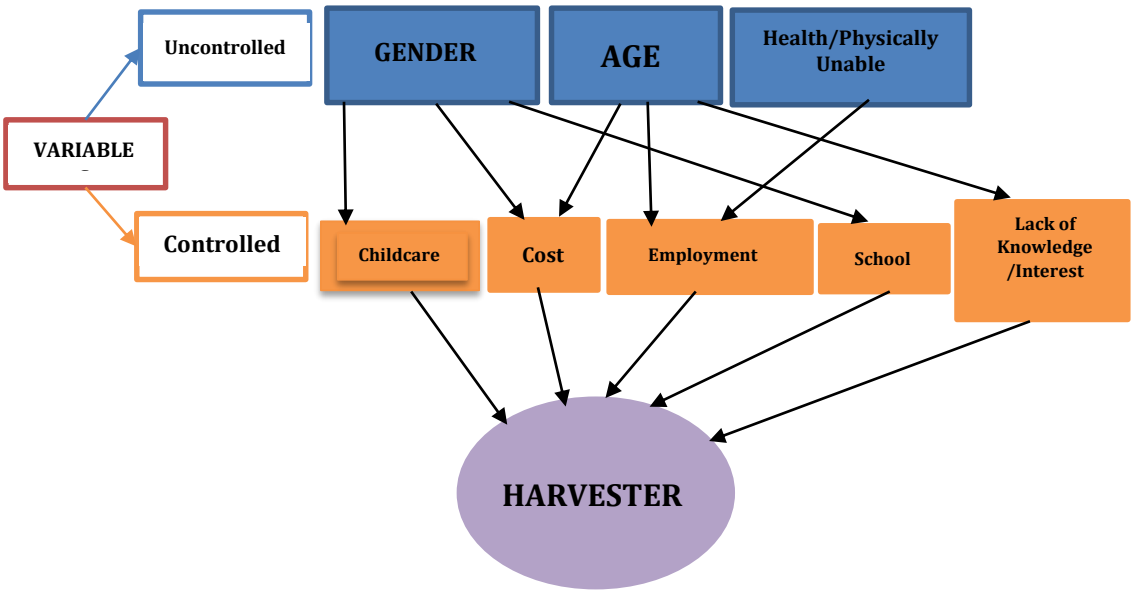


Figure D.1. Causal Diagram for Alaska

Table D.2. Descriptive statistics for Alaska.

Variable	Category	Frequency (Percent)	Total No. Observations
Gender	Male	389 (55.5)	701 (15 missing)
	Female	297 (42.4)	
Age (years)	20-29	150 (21.4)	701 (15 missing)
	30-39	99 (14.1)	
	40-49	85 (12.1)	
	50-59	125 (17.8)	
	60-69	165 (23.5)	
	70+	62 (8.8)	
Cost	Yes	62 (8.8)	701
	No	639 (91.2)	
School	Yes	42 (6.0)	701
	No	659 (94.0)	
Work	Yes	190 (27.1)	701
	No	511 (72.9)	
Health/Physically Unable	Yes	47 (6.7)	701
	No	654 (93.3)	
No Interest	Yes	47 (6.7)	701
	No	654 (93.3)	
No Game	Yes	25 (3.6)	701
	No	676 (96.4)	
Childcare	Yes	7 (1.00)	701
	No	694 (99.0)	

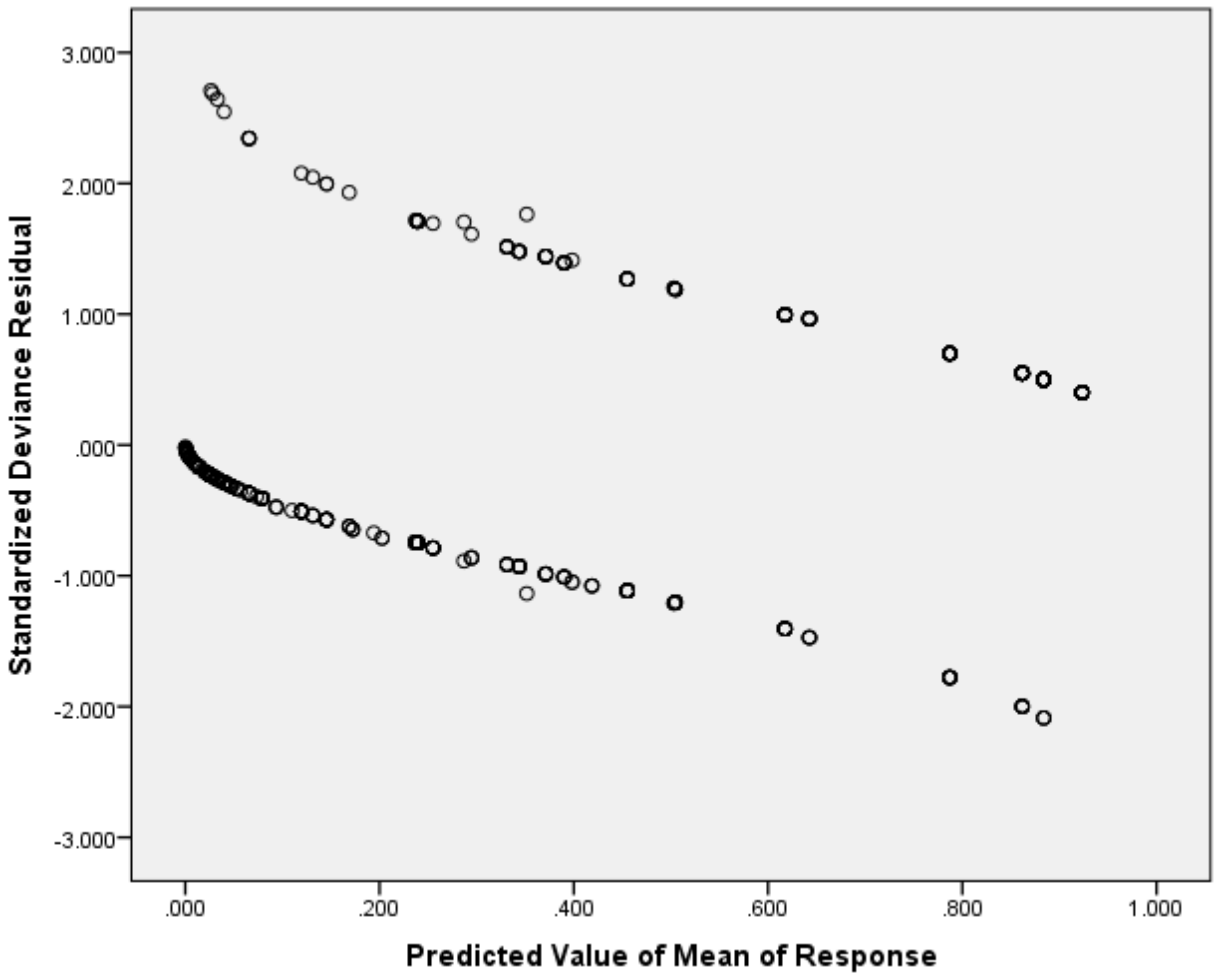
Table D.3. Preliminary analysis for Alaska.

Variable	Exp (B)	Probability (%)	P-Value	Significance
Barriers				
No Equipment (Cost)	0.188	15.825	0	Yes
School	0.478	32.341	0.091	No
Work	0.404	28.775	0	Yes
Elder/Physically Unable	0.263	20.823	0	Yes
No Interest	0.12	10.714	0	Yes
No Game	0.614	38.042	0.313	No
Childcare	2.79E-10	0.000	1	No
Other	1.065	51.574	0.932	No
Age				
20-30	0	0.000	0	Yes
31-40	3.905	79.613	0.001	Yes
41-50	6.364	86.420	0	Yes
51-60	5.047	83.463	0	Yes
61-70	4.427	81.574	0	Yes
71+	1.558	60.907	0.332	No
Gender				
Male	0	0	0	-
Female	0.117	10.474	0	Yes

Checking for Interaction

1. No Equipment x Work – Not Significant, p-value=0.236
2. No Equipment x Elder/Physically Unable – Not Significant, p-value=0.999
3. No Equipment x No Interest – Not Significant, p-value=0.999
4. Work x Elder/Physically Unable - Not Significant, p-value=1.00
5. Work x No Interest – Not Significant, p-value= 0.325
6. Elder x No Interest – Significant, p-value=0.001
7. Gender x No Equipment – Not Significant, p-value=0.168
8. Gender x Work – Not Significant p-value=0.686
9. Gender x Elder/Physically Unable – Not Significant, p-value=0.999
10. Gender x No Interest – Not Significant, p-value = 0.999
11. Age x No Equipment – Not Significant, p-value =0.608
12. Age x Work – Causes quasi-complete separation.
13. Age x Elder – Causes quasi complete separation.
14. Age x No Interest – Causes quasi complete separation.

Standardized Deviance Residuals vs Predicted Mean Response:



Predictive Ability of the Model:

Sensitivity and Specificity

Predicted Category Value * Active_Harvester Crosstabulation

			Active_Harvester		
			No	Yes	Total
Predicted Category Value	Yes	Count	38	134	172
		Expected Count	110.0	62.0	172.0
	No	Count	313	64	377
		Expected Count	241.0	136.0	377.0
Total		Count	351	198	549
		Expected Count	351.0	198.0	549.0

Sensitivity:

- Measure of how accurate the test acknowledges the presence of the outcome of interest.
- Sensitivity = (134/172)*100 = 77.91 % (Predicts presence of harvesting 77.91% of the time).

Specificity:

- Measure of how accurate the test acknowledges the absence of the outcome of interest.
- Specificity = (313/377)*100 = 83.02% (Predicts absence of harvesting 83.02% of the time)

Likelihood Ratio (LR)

LR is how much the test improves the likelihood of getting the correct answer or identifying the presence.

LR (+) = sensitivity/ (1-specificity)

Positive and large represents the greater the shift in a positive test probability and that more likely the test will help is come up with a true result.

1. Change of LR relative to 1 is large and high = strong chance it is improving the test
2. Change of LR relative to 1 is small and low = didn't really improve the test.

- LR (+) = 0.7791/(1-0.8302) = 4.59
    - Model does improve the likelihood that harvesting will be detected if present.

LR (-) = (1-sensitivity)/specificity

Want to see a number close to zero or lower than 1

1. Change of LR is small and low = Strong change, improving the test
2. Change of LR is large and high = didn't really improve the test

- LR (-) = (1-0.7791) /0.8302 = 0.266

Model does improve the likelihood that the presence of harvesting will be detected

Table D.4. Final logistic regression model for Alaska.

Variable	β	95% CI		OR	95% CI		*p*
		Lower	Upper		Lower	Upper	
Intercept	-1.158	-1.830	-0.486	0.314	0.160	0.615	0.001
Gender							
Female	-2.476	-3.044	-1.907	0.084	0.16	0.615	<0.001
Male	Ref[1]			Ref[1]			
Age Categories							
20 - 29	Ref[1]			Ref[1]			
30 - 39	2.465	1.521	3.41	11.765	4.575	30.253	<0.001
40 - 49	3.647	2.629	4.664	38.341	13.855	106.103	<0.001
50 - 59	3.187	2.262	4.112	24.21	9.599	61.058	<0.001
60 - 69	2.987	2.126	3.849	19.835	8.384	46.927	<0.001
70+	1.744	0.611	2.878	5.722	1.842	17.772	0.003
Cost							
Yes	-2.901	-3.919	-1.883	0.055	0.02	0.152	<0.001
No	Ref[1]			Ref[1]			
Employment							
Yes	-2.01	-2.615	-1.406	0.134	0.073	0.245	<0.001
No	Ref[1]			Ref[1]			
Lack of Knowledge/ No Interest							
Yes	-3.399	-4.98	-1.817	0.033	0.007	0.162	<0.001
No	Ref[1]			Ref[1]			
Health/Physically Unable							
Yes	-2.357	-3.274	-1.44	0.095	0.038	0.237	<0.001
No	Ref[1]			Ref[1]			
Interaction							
Physically Unable/ Health x No Interest							
Yes	4.557	1.593	7.522	95.336	4.92	1847.359	0.003
No	Ref[1]			Ref[1]			

Note: [1]Refers to the reference category during analysis.

In Alaska, there were 701 surveys that were collected. In the surveys, there were 15 respondents that did not identify "harvester" or "gender." These missing variables were not included in the analysis. The "communities" variable represents the number of surveys that were collected from each community (not the actual community populations).

APPENDIX E

LRRCN Male Head-of-Household Frequency of Response

Table E.1. LRRCN male heads-of-household.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Childcare
20 - 29							
	Total	39	39	39	39	39	39
	Yes	7	2	17	1	13	0
	No	32	37	22	38	26	39
	%Yes	18	5	44	3	33	0
	%No	82	95	56	97	67	100
30 - 39							
	Total	24	24	24	24	24	24
	Yes	3	0	20	0	1	0
	No	21	24	4	24	23	24
	%Yes	13	0	83	0	4	0
	%No	88	100	17	100	96	100
40-49							
	Total	16	16	16	16	16	16
	Yes	2	0	9	3	2	0
	No	14	16	7	13	14	16
	%Yes	13	0	56	19	13	0
	%No	88	100	44	81	88	100
50 – 59							
	Total	12	12	12	12	12	12
	Yes	1	0	6	4	2	0
	No	11	12	6	8	10	12
	%Yes	8	0	50	33	17	0
	%No	92	100	50	67	83	100
60 - 69							
	Total	8	8	8	8	8	8
	Yes	2	0	2	4	0	0
	No	6	8	6	4	8	8
	%Yes	25	0	25	50	0	0
	%No	75	100	75	50	100	100
70+							
	Total	4	4	4	4	4	4
	Yes	1	0	0	3	0	0
	No	3	4	4	1	4	4
	%Yes	25	0	0	75	0	0
	%No	75	100	100	25	100	100

APPENDIX F

LRRCN Female Heads-of-Household Frequency of Response

Table F.1. LRRCN female heads-of-household.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Childcare
20 - 29							
	Total	71	71	71	71	71	71
	Yes	3	4	11	0	43	11
	No	68	67	60	71	28	60
	%Yes	4	6	15	0	61	15
	%No	96	94	85	100	39	85
30 - 39							
	Total	38	38	38	38	38	38
	Yes	4	2	12	3	12	6
	No	34	36	26	35	26	32
	%Yes	11	5	32	8	32	16
	%No	89	95	68	92	68	84
40-49							
	Total	30	30	30	30	30	30
	Yes	4	0	8	3	7	8
	No	26	30	22	27	23	22
	%Yes	13	0	27	10	23	27
	%No	87	100	73	90	77	73
50 - 59							
	Total	13	13	13	13	13	13
	Yes	1	0	5	1	2	4
	No	12	13	8	12	11	9
	%Yes	8	0	38	8	15	31
	%No	92	100	62	92	85	69
60 - 69							
	Total	5	5	5	5	5	5
	Yes	0	0	0	4	1	0
	No	5	5	5	1	4	5
	%Yes	0	0	0	80	20	0
	%No	100	100	100	20	80	100
70+							
	Total	5	5	5	5	5	5
	Yes	0	0	0	3	2	0
	No	5	5	5	2	3	5
	%Yes	0	0	0	60	40	0
	%No	100	100	100	40	60	100

APPENDIX G

LRRCN Communities Frequency of Response by Gender

Table G.1. John D'Or Prairie male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Childcare
20 - 29							
	Total	16	16	16	16	16	16
	Yes	7	1	0	0	9	0
	No	9	15	16	16	7	16
	%Yes	44	6	0	0	56	0
	%No	56	94	100	100	44	100
30 - 39							
	Total	7	7	7	7	7	7
	Yes	3	0	3	0	1	0
	No	4	7	4	7	6	7
	%Yes	43	0	43	0	14	0
	%No	57	100	57	100	86	100
40 - 49							
	Total	5	5	5	5	5	5
	Yes	2	0	1	1	1	0
	No	3	5	4	4	4	5
	%Yes	40	0	20	20	20	0
	%No	60	100	80	80	80	100
50 - 59							
	Total	1	1	1	1	1	1
	Yes	0	0	0	0	1	0
	No	1	1	1	1	0	1
	%Yes	0	0	0	0	100	0
	%No	100	100	100	100	0	100
60 - 69							
	Total	3	3	3	3	3	3
	Yes	2	0	0	1	0	0
	No	1	3	3	2	3	3
	%Yes	67	0	0	33	0	0
	%No	33	100	100	67	100	100
70+							
	Total	1	1	1	1	1	1
	Yes	1	0	0	0	0	0
	No	0	1	1	1	1	1
	%Yes	100	0	0	0	0	0
	%No	0	100	100	100	100	100

Table G.2. John D'Or Prairie female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Childcare
20 - 29							
	Total	37	37	37	37	37	37
	Yes	0	4	8	0	17	9
	No	37	33	29	37	20	28
	%Yes	0	11	22	0	46	24
	%No	100	89	78	100	54	76
30 - 39							
	Total	26	26	26	26	26	26
	Yes	0	2	11	3	4	6
	No	26	24	15	23	22	20
	%Yes	0	8	42	12	15	23
	%No	100	92	58	88	85	77
40 - 49							
	Total	17	17	17	17	17	17
	Yes	0	0	4	3	2	8
	No	17	17	13	14	15	9
	%Yes	0	0	24	18	12	47
	%No	100	100	76	82	88	53
50 - 59							
	Total	11	11	11	11	11	11
	Yes	0	0	5	1	1	4
	No	11	11	6	10	10	7
	%Yes	0	0	45	9	9	36
	%No	100	100	55	91	91	64
60 - 69							
	Total	4	4	4	4	4	4
	Yes	0	0	0	4	0	0
	No	4	4	4	0	4	4
	%Yes	0	0	0	100	0	0
	%No	100	100	100	0	100	100
70+							
	Total	3	3	3	3	3	3
	Yes	0	0	0	3	0	0
	No	3	3	3	0	3	3
	%Yes	0	0	0	100	0	0
	%No	100	100	100	0	100	100

Table G.3. Fox Lake male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest
20 - 29						
	Total	23	23	23	23	23
	Yes	0	1	17	1	4
	No	23	22	6	22	19
	%Yes	0	4	74	4	17
	%No	100	96	26	96	83
30 - 39						
	Total	17	17	17	17	17
	Yes	0	0	17	0	0
	No	17	17	0	17	17
	%Yes	0	0	100	0	0
	%No	100	100	0	100	100
40 - 49						
	Total	11	11	11	11	11
	Yes	0	0	8	2	1
	No	11	11	3	9	10
	%Yes	0	0	73	18	9
	%No	100	100	27	82	91
50 - 59						
	Total	11	11	11	11	11
	Yes	1	0	6	4	1
	No	10	11	5	7	10
	%Yes	9	0	55	36	9
	%No	91	100	45	64	91
60 - 69						
	Total	5	5	5	5	5
	Yes	0	0	2	3	0
	No	5	5	3	2	5
	%Yes	0	0	40	60	0
	%No	100	100	60	40	100
70+						
	Total	3	3	3	3	3
	Yes	0	0	0	3	0
	No	3	3	3	0	3
	%Yes	0	0	0	100	0
	%No	100	100	100	0	100

Table G.4. Fox Lake female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Childcare
20 - 29							
	Total	37	37	37	37	37	37
	Yes	0	4	8	0	17	9
	No	37	33	29	37	20	28
	%Yes	0	11	22	0	46	24
	%No	100	89	78	100	54	76
30 - 39							
	Total	26	26	26	26	26	26
	Yes	0	2	11	3	4	6
	No	26	24	15	23	22	20
	%Yes	0	8	42	12	15	23
	%No	100	92	58	88	85	77
40 - 49							
	Total	17	17	17	17	17	17
	Yes	0	0	4	3	2	8
	No	17	17	13	14	15	9
	%Yes	0	0	24	18	12	47
	%No	100	100	76	82	88	53
50 - 59							
	Total	11	11	11	11	11	11
	Yes	0	0	5	1	1	4
	No	11	11	6	10	10	7
	%Yes	0	0	45	9	9	36
	%No	100	100	55	91	91	64
60 - 69							
	Total	4	4	4	4	4	4
	Yes	0	0	0	4	0	0
	No	4	4	4	0	4	4
	%Yes	0	0	0	100	0	0
	%No	100	100	100	0	100	100
70+							
	Total	3	3	3	3	3	3
	Yes	0	0	0	3	0	0
	No	3	3	3	0	3	3
	%Yes	0	0	0	100	0	0
	%No	100	100	100	0	100	100

APPENDIX H

LRRCN Logistic Regression Analysis

Table H.1. Variables for LRRCN.

Variable	**Meaning**	**Variable Type**
Gender	Male or Female	Binomial 1 = Male 2 = Female
Community	Communities where survey was taken.	Categorical Ex: 1= John D'Or Prairie
Age	Categorical Age	Categorical ex: 1 = Under 20
Lack of Equipment	The cost prevents ability to partake in harvesting	Binomial 1 = Yes 0 = No
School	In school or away at school	Binomial 1 = Yes 0 = No
Work	Work time prevents time spent on the land	Binomial 1 = Yes 0 = No
Physically Unable	Due to age, injury, or other similar reasoning	Binomial 1 = Yes 0 = No
No Interest /Lack of Knowledge	Do not want to harvest or do not have the traditional knowledge to take part	Binomial 1 = Yes 0 = No
Childcare	Taking care of children and unable to have time to harvest	Binomial 1 = Yes 0 = No

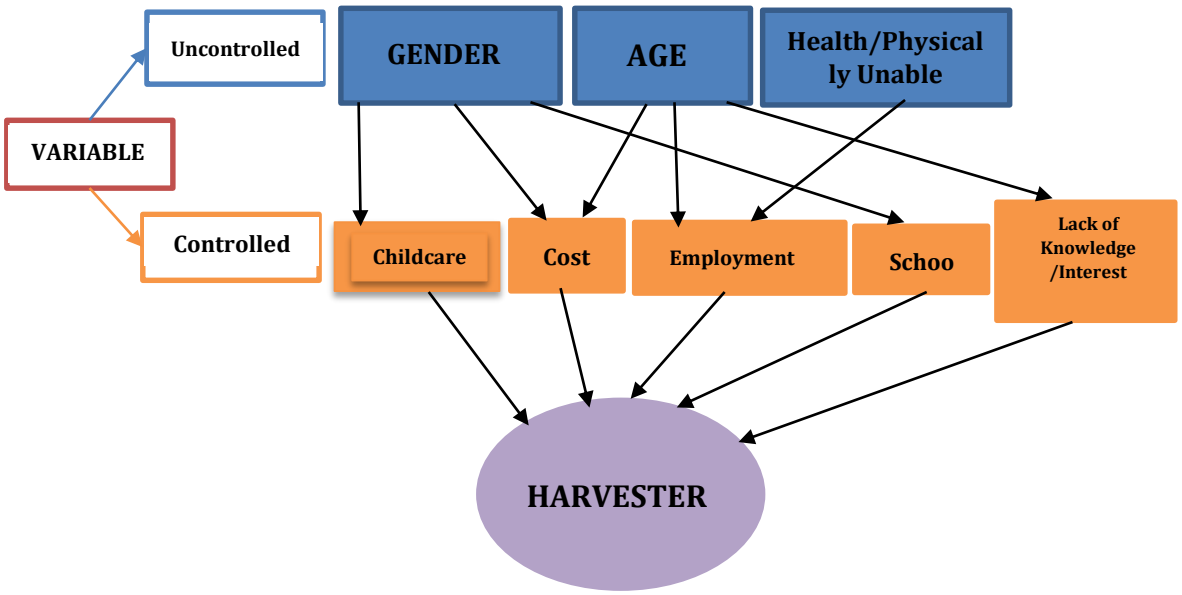


Figure H.1. Causal Diagram for LRRCN, AB

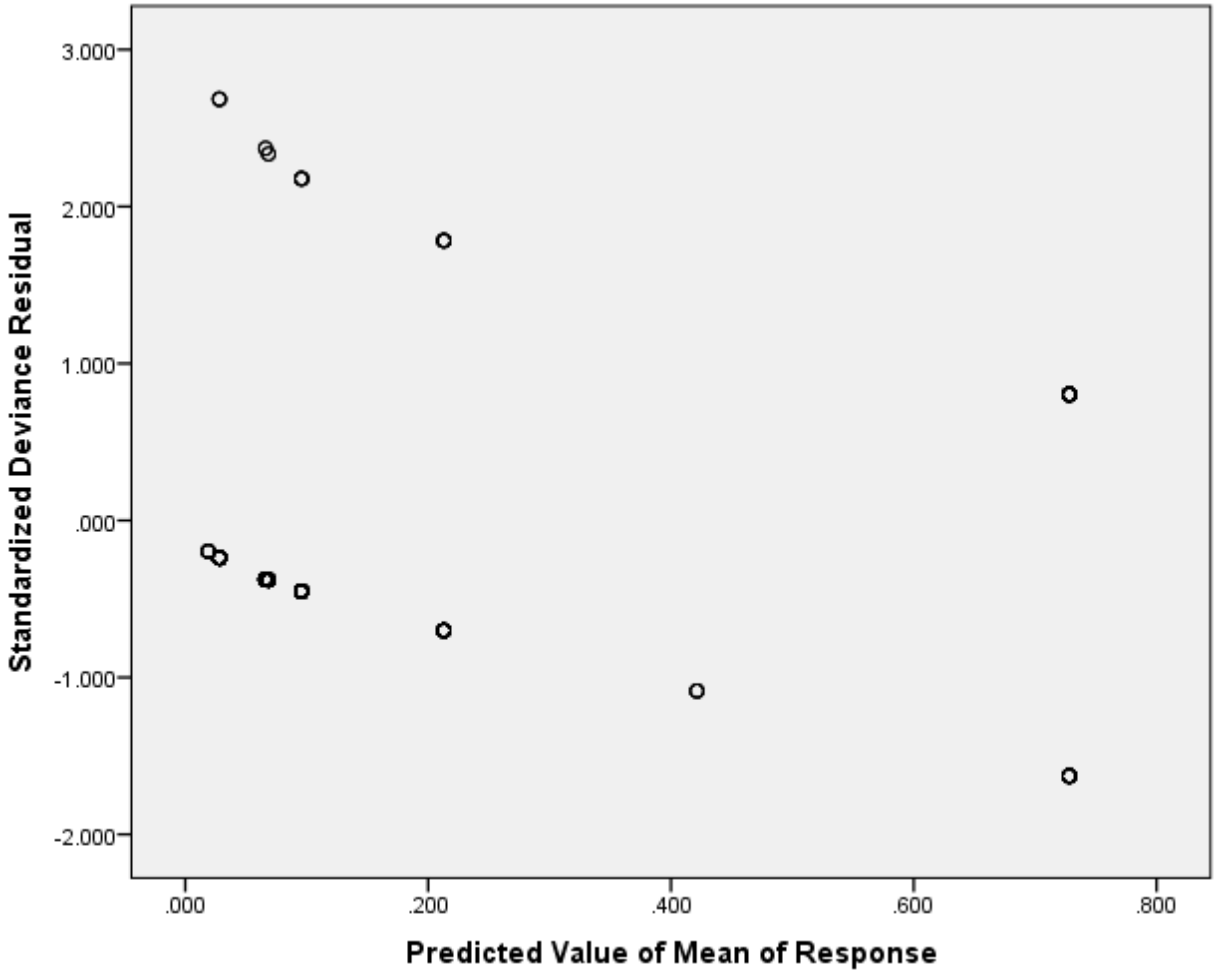
Table H.2. Descriptive Statistics for LRRCN.

Variable	Category	Frequency (Percent)	Total No. Observations
Gender	Male	124 (40.1)	309
	Female	185 (59.9)	
Age	Under 20	44 (14.2)	309
	20-29	110 (35.6)	
	30-39	62 (20.1)	
	40-49	46 (14.9)	
	50-59	25 (8.1)	
	60-69	13 (4.2)	
	70+	9 (2.9)	
Harvested	Yes	62 (20.1)	309
	No	247 (70.9)	
Lack of Equipment	Yes	29 (9.4)	309
	No	280 (90.6)	
School	Yes	29 (9.4)	309
	No	280 (90.6)	
Work	Yes	94 (30.4)	309
	No	215 (69.6)	
Physically Unable	Yes	30 (9.7)	309
	No	279 (90.3)	
No Interest/Lack of Knowledge	Yes	101 (32.7)	309
	No	208 (67.3)	
Childcare	Yes	30 (9.7)	309
	No	279 (90.3)	
Communities	John D'Or Prairie	110 (35.6)	309
	Fox Lake	199 (64.4)	

Table H.3. Preliminary analysis for LRRCN.

Variable	Exp (B)	Probability (%)	P-Value	Significance
Barriers				
Lack of Equipment	0.272	21.384	0.081	No
School	1.043	51.052	0.930	No
Work	8.698	89.689	0	Yes
Physically Unable	0.779	43.789	0.626	No
Lack of Knowledge/Interest	0.138	12.127	0	Yes
Childcare	0.123	10.953	0.042	No
Age				
Under 20	0	0.000	0	0
20-29	1.034	50.836	0.945	No
30-39	2.162	68.374	0.122	No
40-49	0.949	48.692	0.928	No
50-59	2.056	67.277	0.235	No
60-69	1.586	61.330	0.553	No
70+	1.51	60.159	0.647	No
Gender				
Male	0	0.000	0	0
Female	0.103	9.338	0	Yes
Community				
Fox Lake	0	0.000	0	0
John D'Or Prairie	6.788	87.160	0	Yes

Standardized Deviance Residuals vs. Predicated values of the Mean Response



Predictive Ability of the Model

Sensitivity and Specificity

Predicted Category Value * Harvested Crosstabulation

			Harvested		
			No	Yes	Total
Predicted Category Value	Yes	Count	13	41	54
		Expected Count	43.2	10.8	54.0
	No	Count	234	21	255
		Expected Count	203.8	51.2	255.0
Total		Count	247	62	309
		Expected Count	247.0	62.0	309.0

Sensitivity:

- Measure of how accurate the test acknowledges the presence of the outcome of interest.
- Sensitivity= (41/54)*100= 75.93% (Predicts presence of harvesting 75.93% of the time).

Specificity:

- Measure of how accurate the test acknowledges the absence of the outcome of interest.
- Specificity = (234/255)*100 = 91.77% (Predicts absence of harvesting 91.77% of the time)

Likelihood Ratio (LR)

LR is how much the test improves the likelihood of getting the correct answer or identifying the presence.

LR (+) = sensitivity/ (1-specificity)

Positive and large represents the greater the shift in a positive test probability and that more likely the test will help is come up with a true result.

1. Change of LR relative to 1 is large and high = strong chance it is improving the test
2. Change of LR relative to 1 is small and low = didn't really improve the test.

- LR (+) = 0.7593/(1-0.9177) = 9.23
    - Model does improve the likelihood that harvesting will be detected if present.

LR (-) = (1-sensitivity)/specificity

Want to see a number close to zero or lower than 1

1. Change of LR is small and low = Strong change, improving the test
2. Change of LR is large and high = didn't really improve the test
    - LR (-) = (1-0.7593) /0.9177 = 0.262 - Model does improve the likelihood that the presence of harvesting will be detected.

Table H.4. Final logistic regression model for LRRCN.

Variable	**β**	**95% CI**		**OR**	**95% CI**		***p***
		Lower	Upper		Lower	Upper	
Intercept	-2.609	-3.603	-1.615	0.074	0.027	0.199	<0.001
Gender							
Female	-0.938	-1.912	0.036	0.391	0.391	0.148	0.059
Male	Ref[1]			Ref[1]			
Employment							
Yes	2.292	1.348	3.236	9.896	3.849	25.442	<0.001
No	Ref[1]			Ref[1]			
Community							
Fox Lake	1.302	0.32	2.283	0.074	0.027	0.199	0.009
John D'Or Prairie	Ref[1]			Ref[1]			
Interaction							
Gender x Employment							
Yes	-2.27	-4.52	0.872	0.067	0.011	0.418	0.004
No	Ref[1]			Ref[1]			

Note: [1]Refers to the reference category during analysis.

LRRCN had a total of 309 completed surveys, with no missing values. The largest age group that had the most heads-of-household surveyed was 20 to 29 (n=110). The barrier that had the most responses to in LRRCN was lack of knowledge/no interest (n=110). Employment had the second most responses, with 94 people identifying it as a barrier that they encountered to wildlife harvesting.

APPENDIX I

Nunavik Heads-of-Household Frequency of Responses

Table I.1. Nunavik heads-of-household.

Household Type		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Childcare
Developing Household							
	Total	184	184	184	184	184	184
	Yes	37	9	3	11	1	0
	No	147	175	181	173	183	184
	%Yes	20	5	2	6	1	0
	%No	80	95	98	94	99	100
Mature Household							
	Total	307	307	307	307	307	307
	Yes	85	16	61	17	33	0
	No	222	291	246	290	274	307
	%Yes	28	5	20	6	11	0
	% No	72	95	80	94	89	100
Active Elder Household							
	Total	47	47	47	47	47	47
	Yes	5	1	1	6	2	0
	No	42	46	46	41	45	47
	%Yes	11	2	2	13	4	0
	%No	89	98	98	87	96	100

APPENDIX J
Nunavik Communities Frequency of Response

Table J.1. Inukjuak household categories.

Household Type		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Childcare
Developing Household							
	Total	7	7	7	7	7	7
	Yes	2	2	1	1	0	0
	No	5	7	6	7	7	7
	% Yes	29	0	14	14	0	0
	% No	71	100	86	86	100	100
Mature Household							
	Total	142	142	142	142	142	142
	Yes	25	9	29	7	17	0
	No	117	133	113	135	125	142
	% Yes	18	6	20	5	12	0
	% No	82	94	80	95	88	100
Active Elder Household							
	Total	25	25	25	25	25	25
	Yes	5	0	1	2	2	0
	No	20	25	24	23	23	25
	% Yes	20	0	4	8	8	0
	% No	80	100	96	92	92	100

Table J.2. Kangiqsualujjuaq household categories.

Household Type		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Childcare
Mature Household							
	Total	109	109	109	109	109	109
	Yes	14	5	8	10	16	0
	No	95	104	101	99	93	109
	% Yes	13	5	7	9	15	0
	% No	87	95	93	91	85	100
Active Elder Household							
	Total	5	5	5	5	5	5
	Yes	0	0	0	3	0	0
	No	5	5	5	2	5	5
	% Yes	0	0	0	60	0	0
	% No	100	100	100	40	100	100

Table J.3. Quaqtaq household categories.

Household Type		Cost	School	Employment	Health/ Physically Unable	Lack of Knowledge/ Interest	Childcare
Developing Household							
	Total	177	177	177	177	177	177
	Yes	35	9	2	10	1	0
	No	142	168	175	167	176	177
	% Yes	20	5	1	6	1	0
	% No	80	95	99	94	99	100
Mature Household							
	Total	56	56	56	56	56	56
	Yes	46	2	24	0	0	0
	No	10	54	32	56	56	56
	% Yes	82	4	43	0	0	0
	% No	18	96	57	100	100	100
Active Elder Household							
	Total	17	17	17	17	17	17
	Yes	0	1	0	1	0	0
	No	17	16	17	16	17	17
	% Yes	0	6	0	6	0	0
	% No	100	94	100	94	100	100

APPENDIX K
Nunavik Logistic Regression Analysis

Table K.1. Variables for Nunavik.

Variable	**Meaning**	**Variable Type**
Household Type	Categorical Household	Categorical ex: A = Young Adult
Communities	Communities where the surveys were taken.	Categorical Ex: 1= Inukjuak
Cost	The cost prevents ability to partake in harvesting	Binomial 1 = Yes 0 = No
School	In school or away at school	Binomial 1 = Yes 0 = No
Work	Work time prevents time spent on the land	Binomial 1 = Yes 0 = No
No Interest /Lack of Knowledge	Do not want to harvest or do not have the traditional knowledge to take part	Binomial 1 = Yes 0 = No
Childcare	Taking care of children and unable to have time to harvest	Binomial 1 = Yes 0 = No
Physically Unable	Due to age, injury, or other similar reasoning	Binomial 1 = Yes 0 = No
No Game	There is no game available to harvest.	Binomial 1 = Yes 0 = No

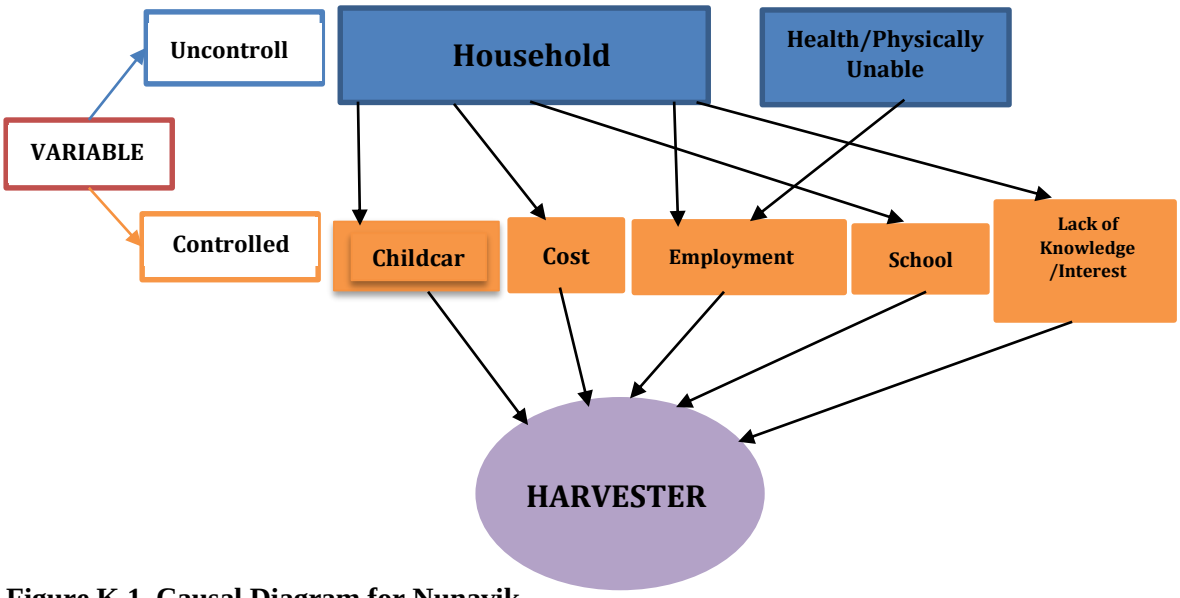


Figure K.1. Causal Diagram for Nunavik

Table K.2. Descriptive statistics for Nunavik.

Variable	Category	Frequency (Percent)	Total No. Observations
Household Type	Non-Harvesting	175 (20.0)	873 (16 missing)
	Developing	184 (21.1)	
	Mature	307 (35.2)	
	Active Elder	47 (5.4)	
	Active Single	159 (18.2)	
Communities	Inukjuak	258 (29.6)	873
	Kangiqsualujjuaq	166 (19.0)	
	Quaqtaq	449 (51.4)	
Cost	Yes	202 (23.1)	873
	No	671 (76.9)	
School	Yes	49 (5.6)	873
	No	824 (94.4)	
Work	Yes	96 (11.0)	873
	No	777 (89.0)	
No Interest/Lack of Knowledge	Yes	46 (5.3)	873
	No	827 (94.7)	
Childcare	Yes	0 (0.00)	873
	No	873 (100.0)	
Physically Unable	Yes	49 (5.6)	873
	No	824 (94.4)	
No Game	Yes	1 (0.1)	873
	No	872 (99.9)	

Table K.3. Preliminary analysis for Nunavik.

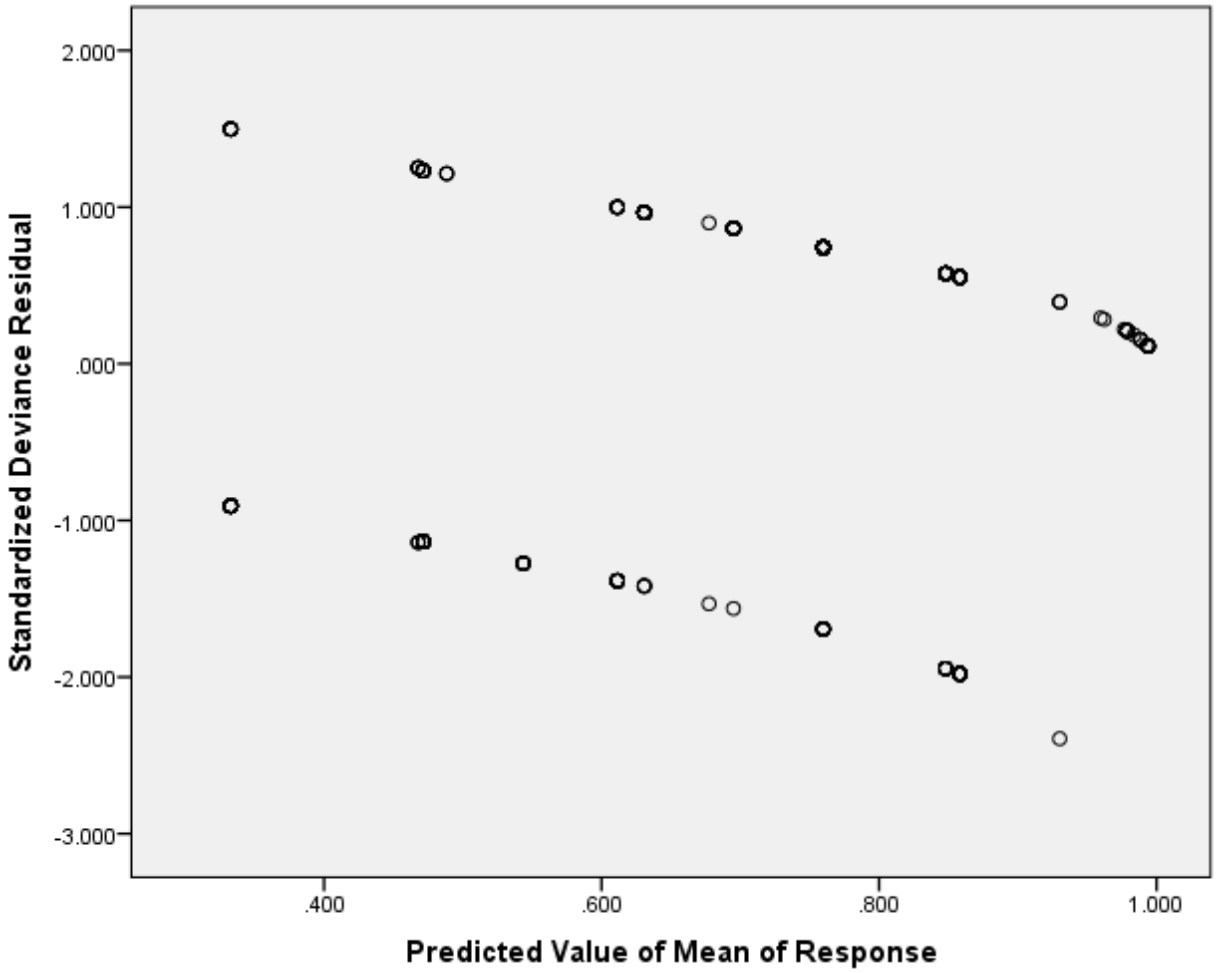
Variable	Exp (B)	Probability (%)	P-Value	Significance
Barriers				
Cost	0.42	29.577	0	Yes
School	16.156	94.171	0.006	Yes
Employment	0.273	21.445	0	Yes
No Interest/Lack of Knowledge	1.137	53.205	0.726	No
Physically Unable	0.861	46.265	0.655	No
Household Type				
Active Single	0	0.000	0	-
Active Elder	915102932.72	100	0.999	No
Mature	0.760	43.18	0.337	No
Developing	8.744	89.74	0.001	Yes
Non-Harvesting	0.042	4.03	<0.001	Yes
Community				
Inukjuak	0	0.000	0	-
Kangiqsualujjuaq	2.266	69.382	0	Yes
Quaqtaq	2.819	73.815	0	Yes

Checking for Interaction

1. Cost x School
    a. Not Significant, p-value= 0.99
2. Cost x Work
    a. Significant, p-value= 0.013
3. School x Work
    a. Not Significant, p-value= 0.999

Re-ran model with cost x work, significant, remains in the model.

Standardized Deviance Residuals vs. Predicated values of the Mean Response



Predictive Ability of the Model

Sensitivity and Specificity

Predicted Category Value * activeharvester Crosstabulation

			activeharvester		
			No	Yes	Total
Predicted Category Value	Yes	Count	134	628	762
		Expected Count	182.0	580.0	762.0
	No	Count	74	35	109
		Expected Count	26.0	83.0	109.0
Total		Count	208	663	871
		Expected Count	208.0	663.0	871.0

Sensitivity:

- Measure of how accurate the test acknowledges the presence of the outcome of interest.
- Sensitivity= (628/762)*100= 82.41% (Predicts presence of harvesting 82.41% of the time).

Specificity:

- Measure of how accurate the test acknowledges the absence of the outcome of interest.
- Specificity = (74/100)*100 = 74% (Predicts absence of harvesting 74% of the time)

Likelihood Ratio (LR)

LR is how much the test improves the likelihood of getting the correct answer or identifying the presence.

LR (+) = sensitivity/ (1-specificity)

Positive and large represents the greater the shift in a positive test probability and that more likely the test will help is come up with a true result.

3. Change of LR relative to 1 is large and high = strong chance it is improving the test
4. Change of LR relative to 1 is small and low = didn't really improve the test.

- LR (+) = 0.8241/(1-0.74) = 3.17
    - Model does improve the likelihood that harvesting will be detected if present.

LR (-) = (1-sensitivity)/specificity

Want to see a number close to zero or lower than 1

3. Change of LR is small and low = Strong change, improving the test
4. Change of LR is large and high = didn't really improve the test

- LR (-) = (1-0.74) /0.8241 = 0.315

Model does improve the likelihood that the presence of harvesting will be detected.

Table K.4. Final logistic regression model for Nunavik.

Variable	**β**	**95% CI**		**OR**	**95% CI**		***p***
		Lower	Upper		Lower	Upper	
Intercept	1.51	0.823	1.479	3.161	2.277	4.387	<0.001
Cost							
Yes	-1.265	-1.666	-0.864	0.282	0.189	0.421	<0.001
No	Ref[1]			Ref[1]			
Employment							
Yes	-1.847	-2.47	-1.224	0.158	0.085	0.294	<0.001
No	Ref[1]			Ref[1]			
School							
Yes	3.286	1.274	5.298	26.726	3.574	199.841	<0.001
No	Ref[1]			Ref[1]			
Community							
Inukjuak	Ref[1]			Ref[1]			
Kangiqsualujjuaq	0.567	0.082	1.052	1.763	1.086	2.864	<0.001
Quaqtaq	0.649	0.262	1.037	1.915	1.3	2.82	0.001
Interaction							
Cost x Employment							
Yes	2.136	1.14	3.313	8.462	3.126	22.904	<0.001
No	Ref[1]			Ref[1]			

Note[1]: Refers to the reference category during analysis.

Nunavik had 580 survey responses, with 64 missing responses. There were 16 missing values from "harvester" and 48 from "household type." The variable of "childcare" was not included in logistic regression analysis because there were no households that identify yes to those variables.

APPENDIX L

Nunatsiavut Male Heads-of-Household Frequency of Response

Table L.1. Nunatsivut male heads-of-household respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	No Interest/. Lack of Knowledge	Childcare
20 - 30							
	Total	41	41	41	41	41	41
	Yes	1	1	0	0	1	0
	No	40	40	41	41	40	41
	%Yes	2	2	0	0	2	0
	%No	98	98	100	100	98	100
31 - 40							
	Total	74	74	74	74	74	74
	Yes	2	0	4	0	2	0
	No	72	74	70	74	72	74
	%Yes	3	0	5	0	3	0
	%No	97	100	95	100	97	100
41 - 50							
	Total	112	112	112	112	112	112
	Yes	7	0	6	2	2	1
	No	105	112	106	110	110	111
	%Yes	6	0	5	2	2	1
	%No	94	100	95	98	98	99
51 - 60							
	Total	91	91	91	91	91	91
	Yes	4	0	1	5	1	0
	No	87	91	90	86	90	91
	%Yes	4	0	1	5	1	0
	%No	96	100	99	95	99	100
61 - 70							
	Total	42	42	42	42	42	42
	Yes	0	0	1	6	1	0
	No	42	42	41	36	41	42
	%Yes	0	0	2	14	2	0
	%No	100	100	98	86	98	100
71+							
	Total	22	22	22	22	22	22
	Yes	0	0	0	12	0	0
	No	22	22	22	10	22	22
	%Yes	0	0	0	55	0	0
	%No	100	100	100	45	100	100

APPENDIX M

Nunatsiavut Male Heads-of-Household Frequency of Response

Table M.1. Nunatsiavut female heads-of-housheold.

Age Category		Cost	School	Employment	Physically Unable	No Interest/Lack of Knowledge	Childcare
20 - 30							
	Total	28	28	28	28	28	28
	Yes	5	1	3	0	3	2
	No	23	27	25	28	25	26
	%Yes	18	4	11	0	11	7
	%No	82	96	89	100	89	93
31 - 40							
	Total	38	38	38	38	38	38
	Yes	2	1	3	0	5	2
	No	36	37	35	38	33	36
	%Yes	5	3	8	0	13	5
	%No	95	97	92	100	87	95
41 - 50							
	Total	37	37	37	37	37	37
	Yes	2	1	4	0	4	1
	No	35	36	33	37	33	36
	%Yes	5	3	11	0	11	3
	%No	95	97	89	100	89	97
51 - 60							
	Total	24	24	24	24	24	24
	Yes	1	0	2	3	1	0
	No	23	24	22	21	23	24
	%Yes	4	0	8	13	4	0
	%No	96	100	92	88	96	100
61 - 70							
	Total	15	15	15	15	15	15
	Yes	1	0	0	7	0	0
	No	14	15	15	8	15	15
	%Yes	7	0	0	47	0	0
	%No	93	100	100	53	100	100
71+							
	Total	10	10	10	10	10	10
	Yes	1	0	0	6	0	0
	No	9	10	10	4	10	10
	%Yes	10	0	0	60	0	0
	%No	90	100	100	40	100	100

APPENDIX N

Nunatsiavut Communities Frequency of Response by Gender

Table N.1. Hopedale male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	No Interest/Lack of Knowledge	Childcare
20 - 30							
	Total	10	10	10	10	10	10
	Yes	1	0	0	0	1	0
	No	9	10	10	10	9	10
	%Yes	10	0	0	0	10	0
	%No	90	100	100	100	90	100
31 - 40							
	Total	23	23	23	23	23	23
	Yes	1	0	1	0	0	0
	No	22	23	22	23	23	23
	%Yes	4	0	4	0	0	0
	%No	96	100	96	100	100	100
41 - 50							
	Total	29	29	29	29	29	29
	Yes	4	0	2	0	2	0
	No	25	29	27	29	27	29
	%Yes	14	0	7	0	7	0
	%No	86	100	93	100	93	100
51 - 60							
	Total	23	23	23	23	23	23
	Yes	2	0	0	2	1	0
	No	21	23	23	21	22	23
	%Yes	9	0	0	9	4	0
	%No	91	100	100	91	96	100
61 - 70							
	Total	5	5	5	5	5	5
	Yes	0	0	0	1	0	0
	No	5	5	5	4	5	5
	%Yes	0	0	0	20	0	0
	%No	100	100	100	80	100	100
71+							
	Total	2	2	2	2	2	2
	Yes	0	0	0	2	0	0
	No	2	2	2	0	2	2
	%Yes	0	0	0	100	0	0
	%No	100	100	100	0	100	100

Table N.2. Hopedale female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	No Interest/ Lack of Knowledge	Childcare
20 - 30							
	Total	20	20	20	20	20	20
	Yes	5	0	2	0	3	2
	No	15	20	18	20	17	18
	%Yes	25	0	10	0	15	10
	%No	75	100	90	100	85	90
31 - 40							
	Total	9	9	9	9	9	9
	Yes	0	0	0	0	5	0
	No	9	9	9	9	4	9
	%Yes	0	0	0	0	56	0
	%No	100	100	100	100	44	100
41 - 50							
	Total	14	14	14	14	14	14
	Yes	1	0	0	0	2	0
	No	13	14	14	14	12	14
	%Yes	7	0	0	0	14	0
	%No	93	100	100	100	86	100
51 - 60							
	Total	6	6	6	6	6	6
	Yes	1	0	2	1	1	0
	No	5	6	4	5	5	6
	%Yes	17	0	33	17	17	0
	%No	83	100	67	83	83	100
61 - 70							
	Total	2	2	2	2	2	2
	Yes	1	0	0	1	0	0
	No	1	2	2	1	2	2
	%Yes	50	0	0	50	0	0
	%No	50	100	100	50	100	100
71+							
	Total	1	1	1	1	1	1
	Yes	0	0	0	0	0	0
	No	1	1	1	1	1	1
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100

Table N.3. Makkovik male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	No Interest/ Lack of Knowledge	Childcare
20 - 30							
	Total	12	12	12	12	12	12
	Yes	0	0	0	0	0	0
	No	12	12	12	12	12	12
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
31 - 40							
	Total	13	13	13	13	13	13
	Yes	0	0	0	0	2	0
	No	13	13	13	13	11	13
	%Yes	0	0	0	0	15	0
	%No	100	100	100	100	85	100
41 - 50							
	Total	24	24	24	24	24	24
	Yes	0	0	0	0	0	1
	No	24	24	24	24	24	23
	%Yes	0	0	0	0	0	4
	%No	100	100	100	100	100	96
51 - 60							
	Total	13	13	13	13	13	13
	Yes	0	0	0	0	0	0
	No	13	13	13	13	13	13
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
61 - 70							
	Total	8	8	8	8	8	8
	Yes	0	0	0	0	1	0
	No	8	8	8	8	7	8
	%Yes	0	0	0	0	13	0
	%No	100	100	100	100	88	100
71+							
	Total	4	4	4	4	4	4
	Yes	0	0	0	0	0	0
	No	4	4	4	4	4	4
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100

Table N.4. Makkovik female respondents.

Age Category		Cost	School	Employment	Poor Health/ Physically Unable	No Interest/ Lack of Knowledge	Childcare
31 - 40							
	Total	1	1	1	1	1	1
	Yes	1	0	0	0	0	0
	No	0	1	1	1	1	1
	%Yes	100	0	0	0	0	0
	%No	0	100	100	100	100	100
41 - 50							
	Total	3	3	3	3	3	3
	Yes	1	0	1	0	1	0
	No	2	3	2	3	2	3
	%Yes	33	0	33	0	33	0
	%No	67	100	67	100	67	100
51 - 60							
	Total	3	3	3	3	3	3
	Yes	0	0	0	0	0	0
	No	3	3	3	3	3	3
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
61 - 70							
	Total	5	5	5	5	5	5
	Yes	0	0	0	0	0	0
	No	5	5	5	5	5	5
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
71+							
	Total	2	2	2	2	2	2
	Yes	0	0	0	2	0	0
	No	2	2	2	0	2	2
	%Yes	0	0	0	100	0	0
	%No	100	100	100	0	100	100

Table N.5. Nain male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	No Interest /Lack of Knowledge	Childcare
20 - 30							
	Total	13	13	13	13	13	13
	Yes	0	1	0	0	0	0
	No	13	12	13	13	13	13
	%Yes	0	8	0	0	0	0
	%No	100	92	100	100	100	100
31 - 40							
	Total	24	24	24	24	24	24
	Yes	1	0	0	0	0	0
	No	23	24	24	24	24	24
	%Yes	4	0	0	0	0	0
	%No	96	100	100	100	100	100
41 - 50							
	Total	39	39	39	39	39	39
	Yes	2	0	4	0	0	0
	No	37	39	35	39	39	39
	%Yes	5	0	10	0	0	0
	%No	95	100	90	100	100	100
51 - 60							
	Total	39	39	39	39	39	39
	Yes	2	0	0	1	0	0
	No	37	39	39	38	39	39
	%Yes	5	0	0	3	0	0
	%No	95	100	100	97	100	100
61 - 70							
	Total	18	18	18	18	18	18
	Yes	0	0	1	3	0	0
	No	18	18	17	15	18	18
	%Yes	0	0	6	17	0	0
	%No	100	100	94	83	100	100
71+							
	Total	10	10	10	10	10	10
	Yes	0	0	0	6	0	0
	No	10	10	10	4	10	10
	%Yes	0	0	0	60	0	0
	%No	100	100	100	40	100	100

Table N.6. Nain female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	No Interest /Lack of Knowledge	Childcare
20 - 30							
	Total	6	6	6	6	6	6
	Yes	0	1	1	0	0	0
	No	6	5	5	6	6	6
	%Yes	0	17	17	0	0	0
	%No	100	83	83	100	100	100
31 - 40							
	Total	24	24	24	24	24	24
	Yes	1	1	2	0	0	2
	No	23	23	22	24	24	22
	%Yes	4	4	8	0	0	8
	%No	96	96	92	100	100	92
41 - 50							
	Total	14	14	14	14	14	14
	Yes	0	0	2	0	1	1
	No	14	14	12	14	13	13
	%Yes	0	0	14	0	7	7
	%No	100	100	86	100	93	93
51 - 60							
	Total	10	10	10	10	10	10
	Yes	0	0	0	2	0	0
	No	10	10	10	8	10	10
	%Yes	0	0	0	20	0	0
	%No	100	100	100	80	100	100
61 - 70							
	Total	6	6	6	6	6	6
	Yes	0	0	0	5	0	0
	No	6	6	6	1	6	6
	%Yes	0	0	0	83	0	0
	%No	100	100	100	17	100	100
71+							
	Total	5	5	5	5	5	5
	Yes	1	0	0	2	0	0
	No	4	5	5	3	5	5
	%Yes	20	0	0	40	0	0
	%No	80	100	100	60	100	100

Table N.7. Postville male respondents.

Age Category		Cost	School	Employment	Poor Health/ Physically Unable	No Interest /Lack of Knowledge	Childcare
20 - 30							
	Total	3	3	3	3	3	3
	Yes	0	0	0	0	0	0
	No	3	3	3	3	3	3
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
31 - 40							
	Total	2	2	2	2	2	2
	Yes	0	0	0	0	0	0
	No	2	2	2	2	2	2
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
41 - 50							
	Total	5	5	5	5	5	5
	Yes	0	0	0	2	0	0
	No	5	5	5	3	5	5
	%Yes	0	0	0	40	0	0
	%No	100	100	100	60	100	100
51 - 60							
	Total	5	5	5	5	5	5
	Yes	0	0	0	0	0	0
	No	5	5	5	5	5	5
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
61 - 70							
	Total	3	3	3	3	3	3
	Yes	0	0	0	2	0	0
	No	3	3	3	1	3	3
	%Yes	0	0	0	67	0	0
	%No	100	100	100	33	100	100
71+							
	Total	1	1	1	1	1	1
	Yes	0	0	0	1	0	0
	No	1	1	1	0	1	1
	%Yes	0	0	0	100	0	0
	%No	100	100	100	0	100	100

Table N.8. Postville female respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	No Interest/ Lack of Knowledge	Childcare
20 - 30							
	Total	1	1	1	1	1	1
	Yes	0	0	0	0	0	0
	No	1	1	1	1	1	1
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
31 - 40							
	Total	1	1	1	1	1	1
	Yes	0	0	1	0	0	0
	No	1	1	0	1	1	1
	%Yes	0	0	100	0	0	0
	%No	100	100	0	100	100	100
41 - 50							
	Total	1	1	1	1	1	1
	Yes	0	1	0	0	0	0
	No	1	0	1	1	1	1
	%Yes	0	100	0	0	0	0
	%No	100	0	100	100	100	100

Table N.9. Rigolit male respondents.

Age Category		Cost	School	Employment	Health/ Physically Unable	No Interest/ Lack of Knowledge	Childcare
20 - 30							
	Total	3	3	3	3	3	3
	Yes	0	0	0	0	0	0
	No	3	3	3	3	3	3
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
31 - 40							
	Total	12	12	12	12	12	12
	Yes	0	0	3	0	0	0
	No	12	12	9	12	12	12
	%Yes	0	0	25	0	0	0
	%No	100	100	75	100	100	100
41 - 50							
	Total	15	15	15	15	15	15
	Yes	1	0	0	0	0	0
	No	14	15	15	15	15	15
	%Yes	7	0	0	0	0	0
	%No	93	100	100	100	100	100
51 - 60							
	Total	11	11	11	11	11	11
	Yes	0	0	1	2	0	0
	No	11	11	10	9	11	11
	%Yes	0	0	9	18	0	0
	%No	100	100	91	82	100	100
61 - 70							
	Total	8	8	8	8	8	8
	Yes	0	0	0	0	0	0
	No	8	8	8	8	8	8
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
71+							
	Total	5	5	5	5	5	5
	Yes	0	0	0	3	0	0
	No	5	5	5	2	5	5
	%Yes	0	0	0	60	0	0
	%No	100	100	100	40	100	100

Table N.10. Rigolit female respondents.

Age Category		Cost	School	Employment	Health Physically Unable	No Interest/ Lack of Knowledge	Childcare
20 - 30							
	Total	1	1	1	1	1	1
	Yes	0	0	0	0	0	0
	No	1	1	1	1	1	1
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
31 - 40							
	Total	3	3	3	3	3	3
	Yes	0	0	0	0	0	0
	No	3	3	3	3	3	3
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
41 - 50							
	Total	5	5	5	5	5	5
	Yes	0	0	1	0	0	0
	No	5	5	4	5	5	5
	%Yes	0	0	20	0	0	0
	%No	100	100	80	100	100	100
51 - 60							
	Total	3	3	3	3	3	3
	Yes	0	0	0	0	0	0
	No	3	3	3	3	3	3
	%Yes	0	0	0	0	0	0
	%No	100	100	100	100	100	100
61 - 70							
	Total	2	2	2	2	2	2
	Yes	0	0	0	1	0	0
	No	2	2	2	1	2	2
	%Yes	0	0	0	50	0	0
	%No	100	100	100	50	100	100
71+							
	Total	2	2	2	2	2	2
	Yes	0	0	0	2	0	0
	No	2	2	2	0	2	2
	%Yes	0	0	0	100	0	0
	%No	100	100	100	0	100	100

APPENDIX O
Nunatsiavut Logistic Regression Analysis

Table O.1. Variables for Nunatsiavut.

Variable	Meaning	Variable Type
Gender	Male or Female	Binomial 1 = Male 2 = Female
Community	Communities where survey was taken.	Categorical Ex: 1= Hopedale
Age	Categorical Age	Categorical ex: 1 = 20-29
Childcare	Taking care of children and unable to have time to harvest	Binomial 1 = Yes 0 = No
Cost	The cost prevents ability to partake in harvesting	Binomial 1 = Yes 0 = No
No Interest /Lack of Knowledge	Do not want to harvest or do not have the traditional knowledge to take part	Binomial 1 = Yes 0 = No
Physically Unable	Due to age, injury, or other similar reasoning	Binomial 1 = Yes 0 = No
School	In school or away at school	Binomial 1 = Yes 0 = No
Work	Work time prevents time spent on the land	Binomial 1 = Yes 0 = No

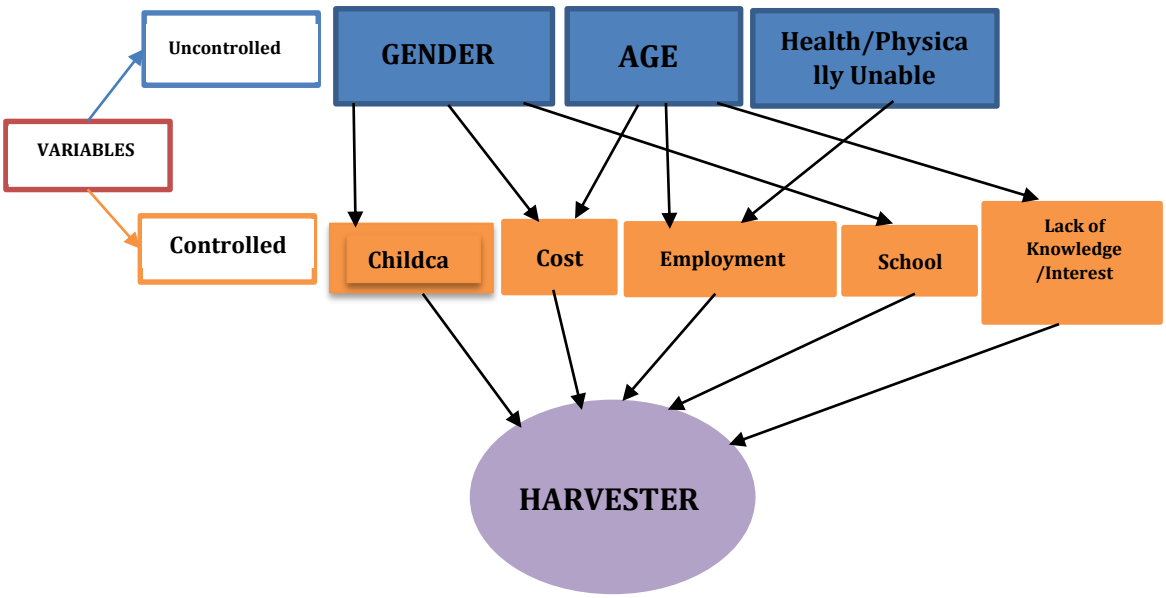


Figure O.1. Causal Diagram for Nunatsiavut

Table O.2. Descriptive statistics for Nunatsiavut.

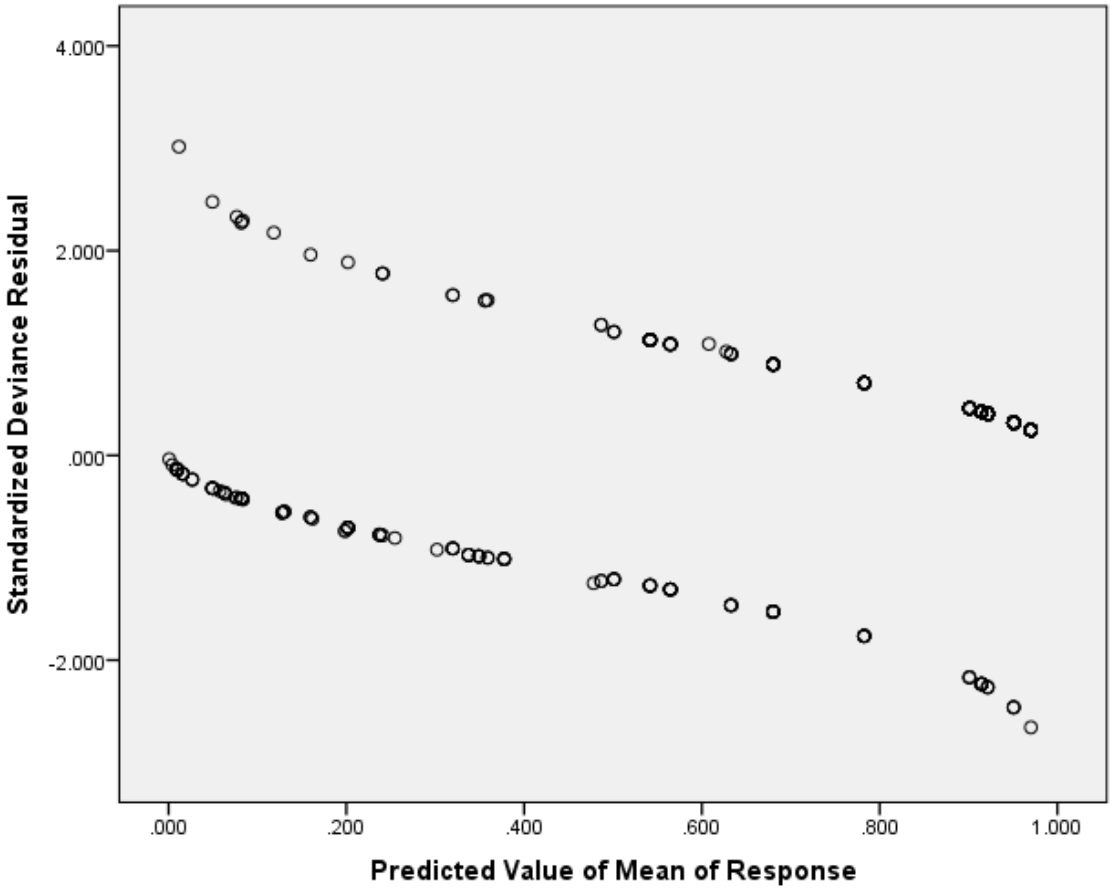
Variable	Category	Frequency (Percent)	Total No. Observations
Gender	Male	422 (72.8)	580
	Female	158 (27.2)	
Communities	Hopedale	145 (25.0)	580
	Makkovik	89 (15.3)	
	Nain	219 (37.8)	
	Postville	56 (9.7)	
	Rigolet	71 (12.2)	
Age (years)	20-30	69 (11.9)	580 (46 missing)
	31-40	112 (19.3)	
	41-50	149 (25.7)	
	51-60	115 (19.8)	
	61-70	57 (9.8)	
	71+	32 (5.5)	
Active Harvester	Yes	412 (71.0)	580 (16 missing)
	No	152 (26.2)	
Cost	Yes	27 (4.7)	580
	No	553 (95.3)	
School	Yes	4 (0.7)	580
	No	576 (99.3)	
Work	Yes	27 (4.7)	580
	No	553 (95.3)	
Physically Unable	Yes	44 (7.6)	580
	No	536 (92.4)	
No Interest/Lack of Knowledge	Yes	20 (3.4)	580
	No	560 (96.6)	
Childcare	Yes	6 (1.0)	580
	No	574 (99.0)	

Table O.3. Preliminary analysis for Nunatsiavut.

Variable	Exp (B)	Probability (%)	P-Value	Significance
Barriers				
School	1.108	52.562	0.93	No
Cost	0.098	8.925	0	Yes
Work	0.121	10.794	0	Yes
Physically Unable	0.66	39.759	0	Yes
No Interest/Lack of Knowledge	0.017	1.672	0	Yes
Childcare	0.072	6.716	0.016	Yes
Age				
20-30	0	0.000	0	0
31-40	1.426	58.780	0.304	Yes
41-50	2.028	66.975	0.038	No
51-60	1.39	58.159	0.337	No
61-70	0.804	44.568	0.569	No
71+	0.149	12.968	0	Yes
Gender				
Male	0	0.000	0	0
Female	0.171	14.603	0	Yes
Community				
Hopedale	0	0.000	0	0
Makkovik	2	66.667	0.032	No
Nain	1.353	57.501	0.196	No
Postville	3.214	76.270	0.008	Yes
Rigolit	1.045	51.100	0.887	No

Standardized Deviance Residuals vs. Predicated values of the Mean Response

The acceptable range for residuals is between -3.0 - +3.0.



Predictive Ability of the Model

Sensitivity and Specificity

Predicted Category Value * active harvester Crosstabulation

			active harvester		
			No	Yes	Total
Predicted Category Value	Yes	Count	59	393	452
		Expected Count	121.8	330.2	452.0
	No	Count	93	19	112
		Expected Count	30.2	81.8	112.0
Total		Count	152	412	564
		Expected Count	152.0	412.0	564.0

Sensitivity:

- Measure of how accurate the test acknowledges the presence of the outcome of interest.
- Sensitivity = (393/452)*100 = 86.95% (Predicts presence of harvesting 86.95% of the time).

Specificity:

- Measure of how accurate the test acknowledges the absence of the outcome of interest.
- Specificity = (93/112)*100 = 83.04.% (Predicts absence of harvesting 83.04% of the time)

Likelihood Ratio (LR)

LR is how much the test improves the likelihood of getting the correct answer or identifying the presence.

LR (+) = sensitivity/ (1-specificity)

Positive and large represents the greater the shift in a positive test probability and that more likely the test will help is come up with a true result.

5. Change of LR relative to 1 is large and high = strong chance it is improving the test
6. Change of LR relative to 1 is small and low = didn't really improve the test.

- LR (+) = 0.8695/(1-0.8304) =5.13
    - Model does improve the likelihood that harvesting will be detected if present.

LR (-) = (1-sensitivity)/specificity

Want to see a number close to zero or lower than 1

5. Change of LR is small and low = Strong change, improving the test
6. Change of LR is large and high = didn't really improve the test

- LR (-) = (1-0.8304) /0.8695 = 0.195
    - Model does improve the likelihood that the presence of harvesting will be detected.

Table O.4. Final logistic regression model for Nunatsiavut.

Variable	β	95% CI		OR	95% CI		*p*
		Lower	Upper		Lower	Upper	
Intercept	2.371	1.597	3.145	10.711	4.94	23.225	<0.001
Gender							
Female	-2.204	-2.818	-1.591	0.110	0.060	0.204	<0.001
Male	Ref[1]			Ref[1]			
Age Categories							
20 - 30	Ref[1]			Ref[1]			
31 - 40	0.587	-0.312	1.487	1.799	0.732	4.422	0.200
41 - 50	1.113	0.197	2.029	3.044	1.218	7.609	0.017
51 - 60	0.092	-0.804	0.988	1.097	0.447	2.687	0.84
61 - 70	-0.163	-1.215	0.889	0.850	0.297	2.432	0.761
71+	-1.827	-3.090	-0.564	0.161	0.045	0.569	0.005
Cost							
Yes	-4.860	-6.495	-3.225	0.008	0.002	0.04	<0.001
No	Ref[1]			Ref[1]			
Employment							
Yes	-4.108	-5.57	-2.645	0.016	0.004	0.071	<0.001
No	Ref[1]			Ref[1]			
Physically Unable							
Yes	-2.963	-4.042	-1.884	0.052	0.018	0.152	<0.001
No	Ref[1]			Ref[1]			
Lack of Knowledge/No Interest							
Yes	-4.881	-7.026	-2.735	0.008	0.001	0.065	<0.001
No	Ref[1]			Ref[1]			
Interaction Effects							
Gender x Cost=2.00	4.018	1.764	6.271	55.579	5.838	529.083	<0.001
Gender x Cost =1.00				Ref[1]			
Gender x Cost =.00				Ref[1]			
Gender x Employment =2.00	2.774	0.831	4.717	16.022	2.296	11.817	0.005
Gender x Employment =1.00				Ref[1]			
Gender x Employment =.00				Ref[1]			

Note: [1]Refers to the reference category during analysis.

In Nunatsiavut a total of 580 surveys were completed. There were 16 variables missing from the "harvester" category and 46 ages missing. These missing variables were excluded and 518 responses were included in the analysis. The barriers that had the most responses were physically unable (n=44) and employment (n=27). The age category that had the largest amount of heads-of-household surveyed was 41 to 50 (n=149).