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Field Report

Greening Canada's Arctic food system: Local food procurement strategies for combating food insecurity

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Abstract

Across northern Canada community gardens and greenhouses are being used as alternatives to imported foods that are often unaffordable, are of compromised quality, or are simply unavailable in local retail outlets. Community gardens and greenhouses are seen as part of the solution to lessen local reliance on costly nutrient-poor market foods imported from the south. In spite of their acknowledged benefits, research on community gardens and greenhouses in northern Canada, including their numbers and locations, remains sparse and anecdotal. The objectives of this research were to inventory and map community gardens and greenhouses in northern Canada, encompassing Labrador, Nunavik, Nunavut, Yukon, and the Northwest Territories. This inventory represents an initial stage of research that will determine the extent to which community gardens and greenhouses, as local procurement strategies, are meeting the food needs of northern residents. This research is part of a circumpolar research project supported by the Arctic Council's Sustainable Development Working Group, which is examining the opportunities for the Arctic to become a self-sustaining food-producing region.

Keywords: Community gardens, greenhouses, Northern Canada, food security, food procurement

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Introduction

Food insecurity in northern Canada has reached epidemic proportions. Long known by northerners themselves, this situation received international attention following the release of the United Nation's Report on the Right to Food (De Schutter, 2012) that made known the disproportionately high rates of food insecurity among Canada's Aboriginal population. These conditions are experienced most prominently among Inuit who have the highest rate of food insecurity[1] for any indigenous population in a developed country (Rosol et al., 2011). The impact on Inuit youth is particularly troubling as 90 percent of all Inuit children experience hunger on a regular basis (Egeland, Pacey, Cao, & Sobol, 2010). The health implications stemming from these conditions include increased rates of anaemia and delayed physical and social development (Pirkle et al., 2014), high prevalence of diabetes (CDA, 2012), and increasing rates of obesity (Butler Walker, Kassi, Friendship, Blottner, & Van Bibber, 2011).

While the factors contributing to food insecurity are complex, the Council of Canadian Academies (2014) identified a number of contributing factors. In particular the high cost of imported foods, poorly developed transportation networks, and inadequate storage systems have all been implicated for these crisis conditions. In terms of cost, it is estimated that the purchase of a healthy food basket in Nunavut is six times higher than the same food basket purchased in southern Canada (Action Canada Foundation, 2014). These cost differences are attributed to an additional 20 percent price increase due to transportation costs (Sorobey, 2013), high electricity rates (e.g., 74.9c/kWh in Nunavik compared to 11.8 c/kWh in Montréal) (CCA, 2014), and additional labour, storage, and building maintenance costs (Duhaime & Caron, 2013). When combined, these added costs result in residents of Nunavut needing to pay as much as $10/kg for celery (Action Plan Canada, 2014). Although the federal government subsidizes these costs through its Nutrition North Program ($68 million in 2016), including $21 million to subsidize the shipment of 7.4 million kg of fruits and vegetables, high food costs continue to be a formidable purchasing constraint. Yet even at these high prices, the quality of perishable foods is often compromised due to lengthy transportation distances and frequent delays in delivery times to the point of limiting consumer acceptability. Because of these constraints (cost, quality, and acceptability) perishable foods are often replaced by non-perishable and highly processed foods that lack equivalent nutritional value.

In his concluding remarks to the UN General Assembly, De Schutter (2012, p. 20) called upon Canada to enact specific measures to rebuild local food systems and find ways to support Aboriginal communities to secure their own food needs. Although generally critical of the De Schutter report, the Federal Government has nonetheless responded through targeted programming in northern agriculture, including Growing Forward, Growing Forward II, and

[1] Food insecurity is defined here as a condition where all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice (Boult, 2004).

significant financial investments in northern agricultural training (e.g., $2 million investment in the Northern Farm Training Institute in Hay River, NWT). These programs and targeted investments are being made to rebuild local food systems and provide sustainable access to fresh, nutritious, and affordable foods. While these programs do not address the root causes of food insecurity and are not considered a panacea to the food-related challenges northerners face, community gardens and greenhouses are seen as part of the solution to lessen the reliance on costly nutrient-poor market foods imported from the south (Ford, Lardeau, & Vanderbilt, 2012).

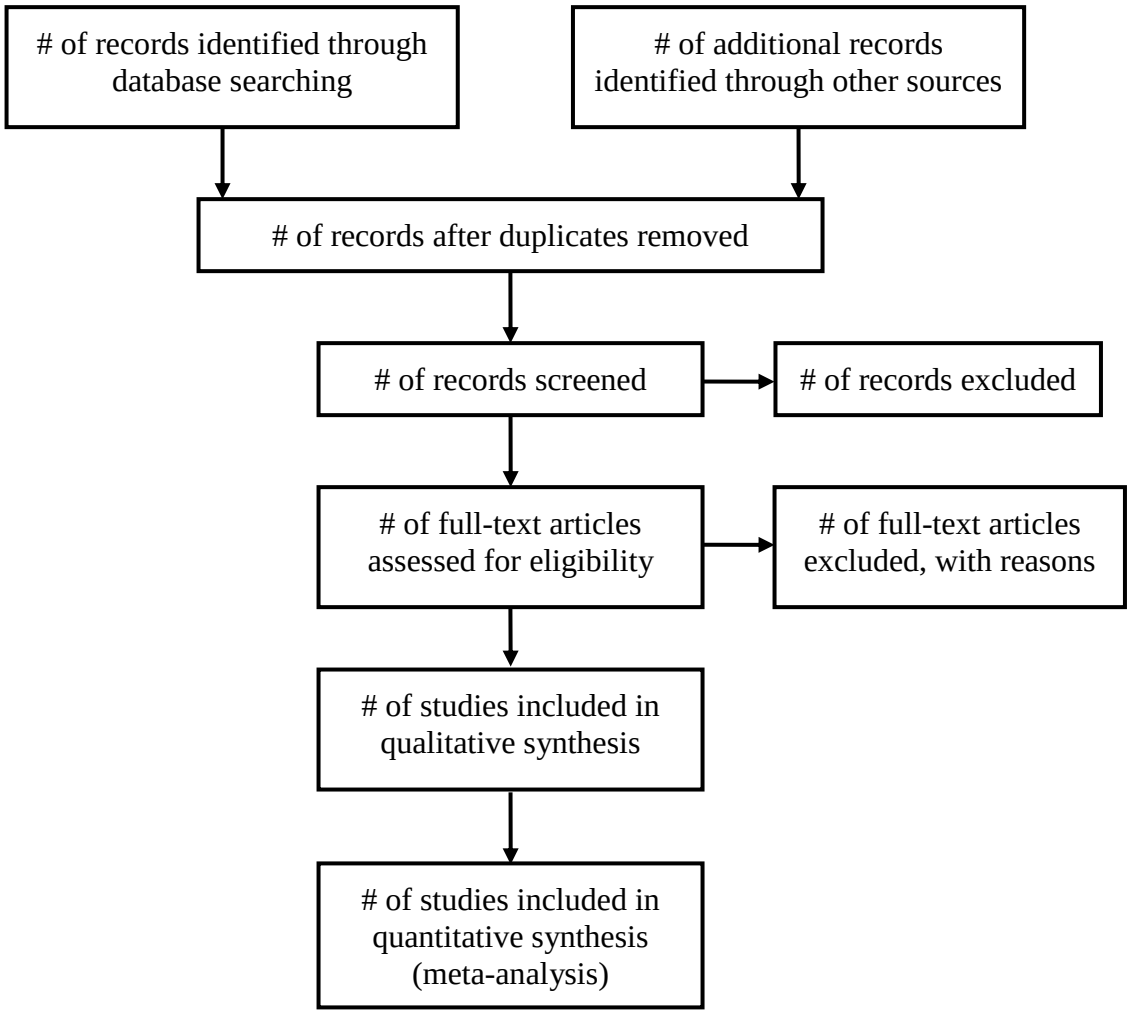
Despite the optimism surrounding community gardens and greenhouses, research on actual benefits remains sparse. Even our most basic understanding of the number and locations of community gardens and greenhouses has been largely anecdotal. Without this information it has been difficult to accurately determine the impact that community gardens and greenhouses have on alleviating food insecurity in northern Canada. This information is necessary, given the growing interest among northern communities to establish their own community gardens and greenhouses as local food procurement strategies for combating food insecurity, as well as to justify the significant financial commitments being made by territorial and federal governments in these types of initiatives.

The objectives of this research were to inventory and map community gardens and greenhouses in northern Canada and discuss their role in satisfying community food needs. This inventory represents an initial baseline of data (2018) that will help us to determine the extent to which community gardens and greenhouses, as local food procurement strategies, are meeting the food needs of northern residents. This research is part of a circumpolar research project supported by the Arctic Council's Sustainable Development Working Group, which is examining the unique potential and opportunities for the Arctic to become a self-sustaining food-producing region.

Methods

The geographical focus of this study included Labrador, Nunavik, Nunavut, Yukon, and the Northwest Territories. Secondary data were collected through an online query to identify locations of community gardens and greenhouses. Descriptions of garden and greenhouse initiatives were composited from a literature review, including primary and secondary sources such as peer-reviewed journals, government publications, news articles, social media pages, and community websites. These sources were analysed for content relating to northern Canada, community gardens, greenhouses, food insecurity, behavioural, and lifestyle change, health, community development, and local adaptation. Selected studies were included or excluded based on pre-defined criteria for screening. The authors screened all studies, resolving areas of disagreement by consensus. The identification and screening procedures used in our review are shown in Figure 1.

Figure 1: Steps followed in systematic literature and web-based review



The results from the literature and web-based review were then reviewed by the territorial research institutes (Labrador Institute, Nunavik Research Institute, Nunavut Research Institute, Aurora Research Institute, and the Yukon Research Institute), which identified other territorial initiatives known locally. Lastly, our project Steering Committee, with representatives from the Inuit Circumpolar Council, Gwich'in Council International, and the Arctic Athabasca Council, contributed their own regional knowledge of local food production initiatives.

Visualization of community gardens and greenhouses was performed on ESRI ArcMap[2] 10.4. The Microsoft Excel inventory was formatted to be read as XY data by ArcMap, added as

[2] ESRI ArcMap is a geospatial processing program that is used to view, edit, create, and analyze geospatial data. In the case of this research it was used to position and view the locations of community gardens and greenhouses in northern Canada.

an attribute table layer to the ArcMap workspace, and referenced by longitude and latitude decimal degrees of the communities where garden and greenhouse initiatives were located.

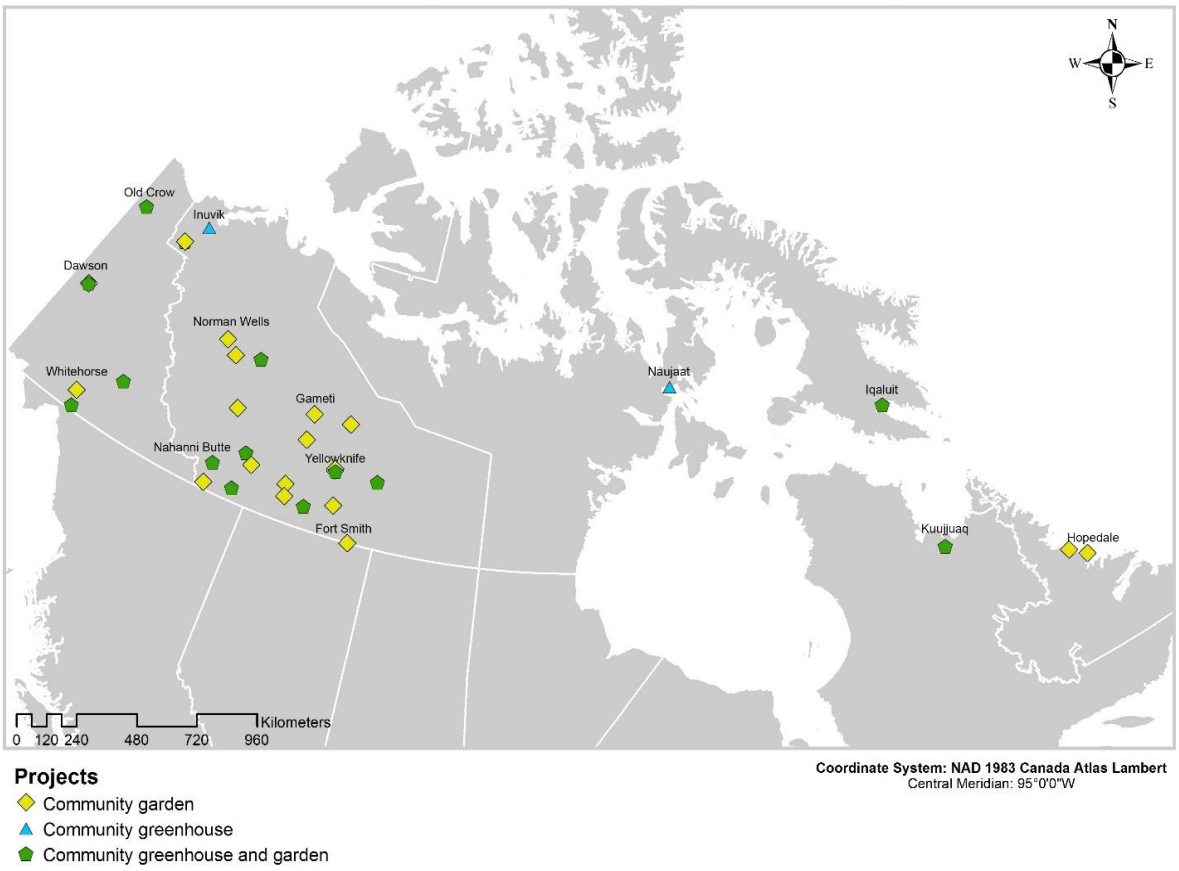
Results

Our inventory identified 36 community gardens and 17 greenhouses across northern Canada (Table. 1). Of these 53 initiatives, 36 are located in the Northwest Territories, 10 in the Yukon, three in Nunavut, two in Labrador, and two in Nunavik (Figure 2). Thirty-four (64 percent) of these initiatives were in communities with populations under 1000 residents. The largest projects, in terms of production space, were the Gameti Community Garden in the Northwest Territories (21,600 ft^2), the Tr'ondek Hwech'in Teaching and Working Farm in Dawson City (35 ha.), and the Inuvik Community Greenhouse in the Northwest Territories (4,000 ft^2). Greenhouses (ten) in the Northwest Territories account for 60,180 ft^2 of planting space. Community gardens tend to produce various root crops, including potatoes, carrots, turnips, beets, and onions as well as lettuce, sunflowers, berries, chives, and even rice. In addition to vegetable production, community gardens and greenhouses are also stimulating other forms of local food production. For example, the communities of Deline, Wrigley, and Gameti in the Northwest Territories, and Kuujjuaq in Nunavik, have incorporated poultry operations as part of their community gardens, as a source of organic fertilizer and meat production.

As local food procurement strategies, community gardens and greenhouses provide users with multiple benefits well beyond food production. Community gardens and greenhouses are being used as sites for the delivery of training and education modules on food utilization and storage, food preparation, food safety, nutrition and healthy eating behavior (Inuit Tapiriit Kanatami, n.d.a). Communities in the Northwest Territories (Jean Marie River, Fort Simpson, Nahanni Butte, and Sambaa K'e) and Labrador (Hopedale) also deliver community workshops on home gardening and food preservation techniques (Government of Northwest Territories, 2016; Inuit Tapiriit Kanatami, n.d.b). Having access to such programs enhances the wellbeing of participants by decreasing anxiety and feelings of helplessness, as well as providing a social environment and a safe communal space (Ford, Lardeau, & Vanderbilt, 2012). The development of community gardens and greenhouses in northern Canada also provides communities with a method of adapting to rapid climate and socioeconomic change being experienced by Northern communities (Government of Yukon, 2013). These multiple benefits are being explored by members of our research team and will be presented in more detail in our final report to the Arctic Council's Sustainable Development Working Group (spring of 2019).

The following section provides brief regional descriptions of the more notable garden and greenhouse initiatives in northern Canada.

Figure 2: Distribution of Community Gardens and Greenhouses in Northern Canada (Created by authors using ArcGIS)



Yukon

Tr'ondek Hwech'in Teaching and Working Farm

The Tr'ondek Hwech'in Teaching and Working Farm is located 15 km from Dawson City. The farm was established in 2014 and represents a unique partnership between the Tr'ondek Hwech'in First Nation and Yukon College (Windeyer, 2015). The Tr'ondek farm provides fresh produce for Tr'ondek members, with the surplus sold in Dawson City. Over 2,500 pounds of vegetables were produced in 2015, including potatoes, beets, and onions (Windeyer, 2015). The objectives of the Tr'ondek farm include preserving of ways of life based on connection to the land, securing year-round supply of fresh food, creating a healthy environment for working and learning, and creating opportunities and developing skills for agricultural operations (Yukon College, n.d.).

Northwest Territories

Inuvik Community Greenhouse

In 1999, the Inuvik hockey arena was repurposed to support the Inuvik Community Greenhouse. This 4000 ft^2 facility has 174 individual plots that measure eight by four feet. Individual plots are available for rent at an annual fee of $50 (Inuvik Community Greenhouse, 2015). The greenhouse receives funding support from the Government of Canada and the Government of the Northwest Territories, as well as corporate sponsors such as Conoco Phillips and Shell Canada (Public Health Agency of Canada, 2009). Membership in the Inuvik Community Garden requires a membership fee of $25, plus a minimum of 15 hours of volunteer time (Inuvik Community Greenhouse, 2015). Community Elders are exempt from the $50 plot feed and are not required to commit the fifteen hours of volunteering (Inuvik Community Greenhouse, 2015). The greenhouse's ground floor consists of individual plots available to community members while the second floor consists of a commercial greenhouse (Public Health Agency of Canada, 2009). The commercial greenhouse produces and markets bedding plants and hydroponic produce, which helps to offset operational costs (Public Health Agency of Canada, 2009). Beyond food and plant production, the Inuvik Community Greenhouse serves as a center for school groups, workshops, and is among Inuvik's top tourism destinations (Public Health Agency of Canada, 2009).

Fort Simpson Community Garden Society

The Fort Simpson Community Garden Society operates multiple community garden sites in Fort Simpson. The main garden site has 51 garden boxes, a communal planting area, school planting area, and 34 active participating members (Government of Northwest Territories, 2016). Two agricultural businesses, Forest Gate Greenhouse Gardens and Dehcho Gardens, also operate out of Fort Simpson. Forest Gate Greenhouse Gardens opened publicly in the spring of 2016 and produces vegetables, herbs, and wild teas available for purchase. Dehcho Gardens sells root vegetables including potatoes, carrots, beets, and turnips (Government of Northwest Territories, 2016). The local elementary schools in Fort Simpson are involved with an in-class seed starting program, which allows students to plant, tend, and grow seeds. The students are also involved in a spring culture camp where they apply their seeding knowledge to planting potatoes, onions, cabbages, and various root vegetable seeds (Government of Northwest Territories, 2016).

Yellowknife Community Garden Collective

The community of Yellowknife has the highest number of community garden and greenhouse initiatives operating in northern Canada. The Yellowknife Community Garden Collective (YCGC) began in 1995, and now maintains four community gardens: Weledeh Garden, Kam

Lake Gardens, Niven Garden, and Old Town Garden. YCGC also maintains the Kam Lake Community Orchard where community members and visitors are able to pick berries at a volume fee (Yellowknife Community Garden Collective, 2012). The objective of the Kam Lack Community Orchard is to promote local production of berries and knowledge on the resiliency and yield of various berry species when planted in Arctic environments (Yellowknife Community Garden Collective, 2012). Participants are required to pay an annual $15 membership fee as well as a $10 plot fee. However, plots must be shared between a minimum of two people. The objectives of the YCGC are to provide a place for production of fresh locally-grown foods, provide education on gardening in northern environments, and to assist in meeting food security needs of the community through donation of food to local charities. Over 200 gardening members participate in YCGC locations (Yellowknife Community Garden Collective, n.d.).

Gameti Community Garden

At 21,600 ft^2, the Gameti Community Garden is the largest garden and greenhouse initiative in the Northwest Territories (Tlicho News, 2014). The garden was built in 2014 with the support of the Department of Industry, Tourism and Investment (ITI) and the Community Government of Gameti. Funding is used to maintain the garden and also employ four full-time summer staff (Zelniker, 2015). The primary goal of the garden is to grow crops locally in a sustainable and environmentally responsible manner (Tlicho News, 2014). The garden grows medicinal plants, berries, and various vegetables but has also experimented with lettuce, sunflowers, potatoes, chives, and rice (Tlicho News, 2014). In 2015, the garden expanded to include goat and poultry operations and also added a greenhouse (Zelniker, 2015).

Nunavut

Iqaluit Community Greenhouse

The Iqaluit Community Greenhouse is a 1000 ft^2 facility that was opened in 2007 and is maintained by the Iqaluit Greenhouse Society. Production is primarily focused on fast-growing plants such as kale, spinach, climbing peas, beans, and lettuce (Minogue, 2008; Varga, 2014). Annual costs to operate the Iqaluit Greenhouse are an estimated $6,000, which is mainly covered by donations and fundraising efforts (Varga, 2014). Seasonal memberships cost $75 and include all necessary gardening equipment and supplies. The greenhouse previously operated through individually-managed plots, but switched to a communal operation in 2014 to maximize efficiency and support crops that require larger growing space. Surplus produce harvested from the Iqaluit Greenhouse are distributed to the Qayuqtuvik Soup Kitchen, Uquutaq Men's Shelter, and Sivummut House, the Iqaluit women and children shelter (Varga, 2014).

Growing North Greenhouse

The Growing North greenhouse in Naujaat was launched by students from Ryerson University in 2016 (Gould, 2016). The hydroponic greenhouse can grow over 2000 plants at full capacity, including peas, carrots, turnips, lettuce, and tomatoes. The facility's heating and lighting technology allows year-round growing, and it can maximize space by growing plants vertically using hydroponic towers (Gould, 2016).

Nunavik

Kuujjuaq Greenhouse Project

For over 20 years, the Kuujjuaq Greenhouse Project has been operating from May to October. Vegetables grown include varieties of leafy greens, herbs, and root vegetables such as lettuce, parsley, radishes, and potatoes (Inuit Tapiriit Kanatami, n.d.b). The Kuujjuaq Greenhouse is comprised of two greenhouse facilities. Individual plots are distributed by a lottery system and may be taken out for personal use, with produce grown being distributed amongst family members and friends, or plots may also be maintained collectively by organizations or groups of partnering families (Inuit Tapiriit Kanatami, n.d.b). Surplus produce is distributed to those in need. The Kuujjuaq Greenhouse has also undertaken additional projects such as composting, which collects waste from grocery stores and other producers in the community. Other spin-off programs include instruction on how to build protected home gardens and cold frames, as well as youth educational programs in home gardening, composting, and horticultural therapy (Carry & Carfagnini, 2012). A potato field project is also under consideration. Funding for the Kuujjuaq Greenhouse is provided by the Kativik Regional Government, and the Nunavik Regional Board of Health and Social Services provides additional funding for gardening and educational programs (Inuit Tapiriit Kanatami, n.d.b).

Labrador

Natuashish Community Garden

The Natuashish Community Garden is a six-bed, 450 ft^2 garden in the Innu community of Natuashish. Funded by the Natuashish band council since 2010, the garden produces beets, kale, carrots, strawberries, lettuce, and swiss chard (Breen, 2016). Due to the success in Natuashish, the Innu community of Sheshatshiu has launched its own community garden (Breen, 2016).

Hopedale Community Garden

The Hopedale Community Gardening Program was launched in 2013. The garden produces potatoes, turnips, carrots, spinach, cabbage, onion, calendula, mesclun, and beets. In addition to food production the garden is used as a space for networking among community members where educational programs and workshops are held, and community members learn skills in keeping home garden containers, raised beds, composting, seed preparation, and strategies to optimize the short growing season in Labrador (Inuit Tapiriit Kanatami, n.d.a). The garden is managed and run on a strictly volunteer basis (Food First NL, 2015).

Discussion and conclusion

Community gardens and greenhouses are being introduced across northern Canada as a local food procurement strategy to improve local access to high quality and low cost vegetables (Inuit Tapiriit Kanatami, n.d.a). Communities that have traditionally harvested traditional food from the land, but have increasingly turned to commercial foods to meet their dietary needs, are recognizing the benefits of growing their own foods (Kwantlen Polytechnic University, 2014). Community gardens and greenhouses are seen as an alternative to imported foods that are often unaffordable, of compromised quality, or simply unavailable in local retail outlets. This recognition has motivated some northern communities to shift their food procurement strategies to local production with the hope of becoming self-sufficient and food secure in the future. Optimism in the health and nutritional benefits of community gardens and greenhouses is well-founded. We know from research conducted in regions outside the Arctic that community gardens and greenhouses have proven successful at promoting the availability and consumption of healthy foods. Castro, Samuels, & Harman (2013) found that those who participate in community garden programs consumed more vegetables than those who relied solely on commercial outlets. Algert, Diekmann, Renvall, & Gray (2016) similarly found that those who participated in community gardens often doubled their intake of vegetables to a level that met national dietary recommendations, while instilling healthy eating and lifestyle habits in children (Douglas et al., 2014).

Notwithstanding the purported benefits of community gardens and greenhouses as local food procurement strategies, there is limited research on the actual impact that community gardens and greenhouses have on alleviating food insecurity in northern Canada. The little research that has been conducted suggests that the value of community gardens and greenhouses rests not in their food production capacity but rather in providing community social services, such as serving as centres for community development or providing youth training and educational opportunities (Allen, 2014). It is well known that northern communities favor locally-grown produce over imported market foods, citing freshness, sustainability, and nutrition as reasons for preference, but the actual impact on nutrition and food security remains unknown.

While other research has addressed the costs and technological performance of northern agriculture (Stevenson et al., 2014), as well as innovations in greenhouse technologies (Agriteam Canada Consulting, 2013), we have little understanding of whether community gardens and greenhouses promote healthy eating habits or whether participants of community gardens and greenhouses consume more vegetables than non-participating community members. Nor do we know the ethnic and socio-economic characteristics of those who participate and benefit from community gardens and greenhouses. For example, are participants in community gardens and greenhouses those most in need or do they represent a more transient population (e.g., school teachers or government employees) who are either accustomed to having regular access to fresh foods or are drawn to the company of others with similar socio-economic standing? If the latter, participation in community gardens and greenhouses could be viewed negatively by permanent community members, or even considered elitist and used only by those who can afford membership (e.g., membership and plot fees) and have flexible schedules to volunteer their time. This situation could then result in those who are most vulnerable to food insecurity being excluded from any potential benefits. The answers to these questions are, at this point, beyond the scope of this paper. However, if community gardens and greenhouses, as local food procurement strategies, are to make any measurable impact on northern food insecurity, these types of questions will need to be addressed. The objective of this research was to compile an inventory of active community greenhouse and garden initiatives in northern Canada. This inventory will now serve as a starting point for answering the types of questions posed above, which we hope will be used to identify future food security programs that best meet the needs of all northern residents.

Table 1: Community Gardens and Greenhouses in Northern Canada

Initiative	Community	Territory	Initiative Type
1. Hopedale Community Garden	Hopedale	NL	Garden
2. Natuashish Community Garden	Natuashish	NL	Garden
3. Fort McPherson Community Garden	Fort McPherson	NWT	Garden
4. Fort Simpson Community Garden	Fort Simpson	NWT	Greenhouse and Garden
5. Fort Smith Community Garden	Fort Smith	NWT	Garden
6. Inuvik Community Greenhouse	Inuvik	NWT	Greenhouse
7. Old Town Garden	Yellowknife	NWT	Garden
8. Weledeh Garden	Yellowknife	NWT	Garden
9. Niven Garden	Yellowknife	NWT	Garden
10. Kam Lake Garden	Yellowknife	NWT	Garden
11. Deline Community Garden Greenhouse	Deline	NWT	Greenhouse and Garden
12. Enterprise Community Garden	Enterprise	NWT	Greenhouse and Garden
13. Fort Providence Community Garden	Fort Providence	NWT	Garden
14. Fort Resolution Community Garden	Fort Resolution	NWT	Garden
15. Gameti Community Garden	Gameti	NWT	Greenhouse and Garden
16. Hay River Community Greenhouse	Hay River	NWT	Greenhouse and Garden
17. Jean Marie River Community Garden	Jean Marie River	NWT	Garden
18. Kakisa Community Garden	Kakisa	NWT	Garden
19. Lutsel K'e Community Garden	Lutsel K'e	NWT	Greenhouse and Garden
20. Nahanni Butte Community Garden	Nahanni Butte	NWT	Greenhouse and Garden
21. Norman Wells Community Garden	Norman Wells	NWT	Garden
22. Sambaa K'e Community Garden	Sambaa K'e	NWT	Greenhouse and garden
23. Tulita Community Garden	Tulita	NWT	Garden
24. Weekweti Community Garden	Weekweti	NWT	Garden
25. Whati Community Garden	Whati	NWT	Garden
26. Wrigley Community Garden	Wrigley	NWT	Garden
27. Dettah Community Garden	Dettah	NWT	Garden
28. Ford Liard Community Garden	Ford Liard	NWT	Greenhouse and Garden
29. N'Dilo Community Garden	N'dilo	NWT	Garden
30. Iqaluit Community Greenhouse	Iqaluit	NU	Greenhouse and Garden
31. Growing North Greenhouse	Naujaat	NU	Greenhouse
32. Kuujjuaq Greenhouse Project	Kuujjuaq	QC	Greenhouse and Garden
33. Carcross Community Garden	Carcross	YT	Greenhouse and Garden
34. Dawson City Community Garden	Dawson City	YT	Garden
35. Tr'ondek Hwech'in Teaching & Working Frm	Dawson City	YT	Greenhouse and Garden
36. Whitehorse Community Garden	Whitehorse	YT	Garden
37. Vuntut Gwitchin Community Greenhouse and Garden	Old Crow	YT	Greenhouse and Garden
38. Ross River Community Garden and Greenhouse	Ross River	YT	Greenhouse and Garden

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