Exploring the Vision of Qikiqtani Food Sovereignty

Qikiqtani Food Sovereignty Implementation Solution

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Qikiqtaaluk Business Development Corporation

SEPTEMBER 2022

ABOUT THIS REPORT

This report was developed as part of Qikiqtaaluk Business Development Corporation's (QBDC) **Qikiqtani Food Sovereignty Implementation Solution** (QFSIS) Project.

The QFSIS Project is one of nine projects funded through Phase 1 of the Canadian Northern Economic Development Association's Northern Food Innovation Challenge. The goal of the QFSIS Project is to collaboratively develop a solution for sustainable economies that advance food sovereignty while promoting a conservation economy. Phase 1 of the project will ultimately develop an implementation solution that will identify the resources and infrastructure needed to support community access to country food, implement innovative food technologies, and promote the inshore fishery development.

The Food Sovereignty Vision presented in this document may not represent the vision of all Qikiqtani Inuit. The Vision was developed based on the engagements and research QBDC conducted and is intended to be a general representation of the priorities and interests of those engaged.

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Qikiqtaaluk Business
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Thank you to Qikiqtani Inuit Association for providing images and photography shown in this report.

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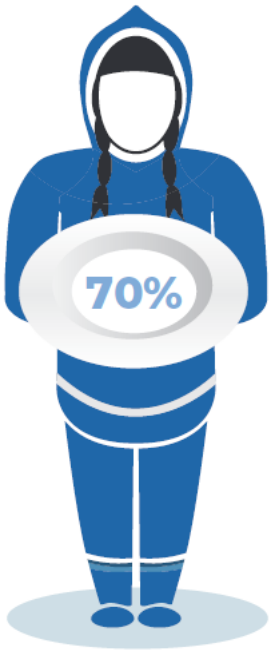
INTRODUCTION

Indigenous communities experience high rates of food insecurity due to forced relocation practices and degradation of traditional food systems (Jernigan, 2021). Food insecurity remains a daily issue for 70 percent of Inuit families in Nunavut and remains eight times higher than the Canadian national average (Nunavut Food Security Coalition, 2016).

There are thirteen remote communities located in the Qikiqtani Region of Nunavut. None of these communities are connected by road and all are reliant on the shipment of goods, including food, being freighted from southern provinces by air year-round or by boat during the ice-free season.

As defined by Nunavut Tunngavik Inc. and Qikiqtani Inuit Association (QIA), Inuit food sovereignty means the right to healthy and nutritious food, the right to culturally appropriate food, the right to food harvested through ecologically sound and sustainable methods as guided by the Nunavut Agreement wildlife management regime, and the right to access wildlife in ways that empower communities and stimulate local economies. Food sovereignty incorporates Inuit knowledge, language, cultural continuity, and community self-sufficiency (QIA, 2019).



Food security remains an issue on a daily basis for 70% of Inuit families.

Country food and harvesting are central to Inuit culture, community, and well-being. Food is a part of a relationship that nurtures cultures and communities. The Nunavut Agreement gives Inuit the right to control natural resources and food supply (Nunavut Agreement, 1993).

It is widely recognized that resources and supports are lacking and are needed to promote a future for Nunavut Inuit where country food is a readily available choice for families and harvesting is a viable livelihood. Through Qikiqtaaluk Business Development Corporation's (QBDC) Qikiqtani Food Sovereignty Implementation Solution (QFSIS) Project, these resources and supports will be identified in collaboration with the Qikiqtani communities and QIA. Together we are working to build the food sovereignty movement across the Region.

This document, *Exploring the Vision of Qikiqtani Food Sovereignty,* explores the current strengths, weaknesses, opportunities and threats to bolstering the food sovereignty movement across the Qikiqtani Region. Recognizing that food sovereignty is a complex issue for which a solution cannot be achieved overnight, a short-, medium-, and long-term vision is imagined and presented from a Qikiqtani Inuit perspective towards bolstering food sovereignty for the Region. The vision is a culturally and community-minded approach to food management, driven and delivered by Inuit.

CURRENT STATE OF FOOD SOVEREIGNTY MOVEMENT

To set the foundation for imagining the Qikiqtani Region's collective vision for building the food sovereignty movement the current food sovereignty state must be described. To this end, QBDC undertook a baseline literature and project review as well as a series of engagements and workshops, to understand the status quo of food sovereignty across the Region.

The *Baseline Literature and Projects Review Report* and the *Annotated Summary of Reports Pertaining to Food Sovereignty in Nunavut* are provided in the appendix as well as summaries of QBDC conducted engagements and other research. This information was used to assess the current strengths, weaknesses, opportunities, and threats pertaining to building the food sovereignty movement across the Qikiqtani Region.

Strengths

Many positive food systems and programs exist in the Qikiqtani Region as well as organizations and groups whose programming contribute to providing food for communities. These food systems have created the foundation to grow the food sovereignty movement and must be utilized and enhanced to their fullest potential as a springboard to advance action.

Inuit Traditional Knowledge

Inuit hold knowledge of the land, waters, and animals. Many Inuit harvest animals for food, sharing, as well as using animal parts to make tools, clothing, and art. Each Qikiqtani community has experienced harvesters who understand the seasonal availability of specific wildlife. Elders and knowledge holders are keen to pass their understanding to younger generations.

Hunters and Trappers

All Qikiqtani communities have a local Hunters and Trappers Association or Organization (HTA/O) as created and established by the Nunavut Agreement. HTA/Os play an important role in sustainable harvesting development and management and help to manage economic and work opportunities related to marine and wildlife resources. They are often key providers of country food for their communities.

Food Sharing

Sharing is at the core of Inuit culture. A QIA survey recently highlighted that feeding and providing for their own families brings a sense of immense pride for Inuit harvesters. This act of sharing extends beyond the household to include others in the community, especially those in need.

> QIA conducted a harvesting survey in six Qikiqtani communities. 60 percent of Inuit households surveyed indicated a willingness to share country food with Elders and community members unable to hunt or fish. (QIA, 2019)

Nunavummiut in the Qikiqtani Region have started an ad hoc regional country food distribution system often using Facebook community groups as a marketplace tool to sell or share country food within their community and with other communities. Many communities also have school breakfast programs, food banks and periodic community feasts to share and provide food for community members.

Nauttiqsuqtiit Program

Qikiqtani Inuit Association's (QIA) Nauttiqsuqtiit Inuit Steward program is well supported by the communities in which it is currently run. The program currently includes Arctic Bay, Clyde River, Grise Fiord, Pond Inlet, and Resolute Bay as well as a pilot program in Sanikiluaq. As stewards, the Nauttiqsuqtiit use their knowledge of the local landscape to support fellow harvesters operate safely on the land. As harvesters, the Nauttiqsuqtiit share their catch with Elders and the community to help Inuit access country food.

Infrastructure and Equipment

The QIA has made progress on securing investments in infrastructure to support country food harvesting. Funding has been secured as part of the Tallurutiup Imanga National Marine Conservation Area Inuit Impact and Benefit Agreement and Tuvaijuittuq Agreements.

Through these agreements, QIA secured funding from Parks Canada for multi-use facilities and food processing units in each of the five High Arctic communities adjacent to the conservation area. Additionally, all five communities will receive harbour infrastructure. Community Harbours funded by Transport Canada will be constructed in Grise Fiord and Resolute Bay. Small Craft Harbours funded by Fisheries and Oceans Canada will be constructed in Arctic Bay and Clyde River. A Small Craft Harbour in Pond Inlet is under development by the Government of Nunavut.

Programming

There are various funding programs which support harvesters to purchase harvesting and safety equipment, fund community hunts and deliver youth on-the-land programs. There are funding programs specifically designed to support cultural activities such as bringing youth on the land and teaching youth to sew and butcher country food. Many of these funding programs are through Nunavut Tungavik Inc (delivered by QIA), QIA and the Government of Nunavut. The main airline in Nunavut offers reduced flat rates on shipping country food.

Commercial Operations

There is an operational commercial fish plant in one Qikiqtani community, Pangnirtung, which supports more than 70 licensed local harvesters.

The Nunavut Agreement has established a system for wildlife management in Nunavut. Designed to ensure species are not over-harvested for commercial purposes and that Inuit will always be given the right of first refusal for their basic needs. Article 5 of the Nunavut Agreement allows the right for Inuit to

"sell, barter, exchange and give, lawfully harvested wildlife, either inside or outside the Nunavut Settlement Area" with some exceptions relating to migratory birds. In some cases, permits are required to transport wildlife outside the Nunavut Settlement Area.

There are quotas established for several wildlife species in Nunavut including muskox, polar bears, Baffin Island caribou, beluga, narwhal, bowhead and walrus. With quotas in place, access to this wildlife is regulated and managed to balance Inuit harvesting rights and conservation of wildlife resources.

Weaknesses

There are challenges with the current food systems that have restricted programs and organizations or groups to achieve their fullest potential. These challenges must be recognized to enhance and alter how they are being delivered, understand what needs to change, and identify what further supports are required.

Inuit Traditional Knowledge

Inuit are well-known for their ability to survive extreme conditions, having inhabited the Arctic for millennia. However, it has been suggested the impacts of colonialism and its legacy have led to less harvesting of traditional foods in younger generations and less intergenerational transfer of traditional knowledge.

Hunters and Trappers

Many community HTA/Os lack adequate office space and equipment storage facilities. They are expected to fulfill a large mandate however often feel they are not fully compensated for their time and efforts as most members are volunteers. The HTA manager is the only salaried position, and the salary is not sufficient for their level of responsibility and the amount of work that is expected. Some projects suffer as a result.

Food Sharing and Supply Chain

Often harvesters need to be employed by the wage economy to be able to afford to go out on the land and harvest. With more time spent in the wage economy, the less country food there is to share with their communities.

Nunavummiut in the Qikiqtani Region have expressed that often the airline does not prioritize country food. In many Qikiqtani communities the flight schedules are limited, and planes are small. Anecdotal evidence suggests that passengers and other cargo such as southern food are prioritized over country food. Most airports in Nunavut contain very limited infrastructure and have a lack of freezer space to store country food until it is shipped. With unpredictable Arctic weather, flights are often cancelled, and the probability of food spoilage is high.

While grocery store shelves void of fresh produce and meats due to cancelled flights has long been a reality in remote communities, the COVID-19 pandemic emphasized the vulnerabilities of food, fuel, and medical supply chains in Nunavut.

On average, it takes five to ten days to transport food harvested in the United States to a southern province such as Ontario (York, 2022). Fresh food is then shipped to Nunavut via airline, which depending on the community location, may take another two to seven days to reach grocery store shelves. It is not uncommon for 'fresh' produce to be spoiled before even hitting the grocery store shelves.

Moreover, there is evidence of declining nutritional value in some fruits and vegetables transported over long distance. Foods must be harvested early to meet travel requirements. With a five-to-ten-day gap between harvest and consumption, there may be a nutritional value loss of up to 50 percent (York, 2022).

Additionally, dependence on fossil fuels is widely recognized in transportations networks. Air freight has the highest greenhouse gas emissions per tonne-km in the transportation sector (York, 2022). Air transport is the only method of shipping fresh produce to Nunavut.

Equal Access to Country Food

Not all communities have equal access to country food. Wildlife species vary across the Region, and therefore the same species are not available to locally harvest in all communities. The most notable gap identified in QBDC's baseline research was the two most northern communities, Grise Fiord and Resolute Bay, which lack local access to Arctic Char. Additionally, many Qikiqtani communities identified that caribou is often outsourced from other communities, including those in the Kivalliq Region.

Infrastructure and Equipment

Communities lack adequate harvesting support infrastructure such as community freezers, food preparation space and equipment, and food markets. Of the few freezers that are operational, they are

too small and expensive to operate. There is a lack of trained technicians to maintain and fix freezers. With a lack of adequate freezers, often country food is wasted and/or spoils.

Harvesting equipment is expensive and with new digital technology, difficult to maintain. If harvesters do not have wage-based jobs, they often cannot afford to harvest. Harvesters can no longer repair their snow machines and all terrain vehicles and often communities do not have available technicians to work on this equipment. Communities lack secure storage for boats and small vehicles which often means harvesters' equipment is susceptible to the harsh environment and vandalism.

Qikiqtani communities lack adequate marine infrastructure to safely access the water. Currently there is only one harbour overseen by Fisheries and Oceans Canada (QIA, 2019). While there are six additional communities which currently have marine infrastructure projects under development, the remaining six communities are lacking infrastructure to access the water safely and efficiently.

Communities continue to identify the need for this basic harvesting and food sharing infrastructure on their Integrated Community Sustainability Plans (ICSP) however due to severe infrastructure gap in Nunavut, government funding is prioritized for critical infrastructure such as schools, health centers and water and waste management. See the Appendix for examples of harvesting infrastructure identified on Qikiqtani communities' ICSPs.

Many communities and retail stores lack infrastructure to store non-perishable items. This often results in these items being stored outside in shipping containers.

Programming

There are often challenges in the set-up and operations of harvester support programs, including restrictive benefits and lack of administrative support. There are disparities between traditional food sources and government funded food programs as often these programs provide support for purchasing southern food rather than supporting Inuit self-reliance and traditional harvesting.

The Nutrition North Canada (NNC) Subsidy Program preferentially supports availability of imported, store-bought food rather than locally harvested food. Despite NNC providing Nunavut Tungavik Inc. $14.9 million in 2020 to support harvesting activities across Nunavut over a five-year period, the program still falls short of helping northern communities operate more independently.

Commercial Operations

There are many obstacles to food markets and selling country food. For one, there is a lack of commercial infrastructure with only one Canadian Food Inspection Agency (CFIA) certified plant in the Qikiqtani Region and only one brick and mortar establishment dedicated to selling country food. Additionally, communities have expressed the lack of business and administrative capacity to start-up and operate commercial processing facilities and retail outlets.

Existing research in Nunavut is insufficient for informing the regulatory structure needed to support commercial operations. Total allowable harvests and basic need levels (quotas) have not been established for all species that could potentially be harvested for commercial purposes. This is especially true for inshore marine species. Without established harvest levels, commercial operations cannot exist. Sustained research is needed to enable the opportunity to obtain commercial licenses, and regular monitoring and evaluation of wildlife populations for species being commercially sold needs to be in place.

The movement of food in Nunavut is limited to air transportation and marine shipping of dry goods from the south to Nunavut in the ice-free season. Airline transportation is often unreliable, disrupted by weather and some communities have limited airline schedules that would not support commercial operations. For example, the commercial fish processing plant in Pangnirtung had to limit their operations to align with the airline schedule.

Community Country Food Markets

The pricing of country foods in markets needs to be examined. If country food markets are to enhance food security, they need to provide enough food at an affordable price consistently. However, it is currently unclear if harvest levels supplying country food markets would be enough to achieve competitive pricing, or if an affordable price would cover the costs of harvesting.

Opportunities

Many exciting opportunities surrounding food security in the Qikiqtani Region are being developed and are underway. Some of these opportunities are being demonstrated in a small scale in communities and could be expanded with adequate funding, training and delivery. There is a lot of potential for organizations across the Region to collaborate on the good work and programs that are currently underway and to build and expand these to other communities.

Inuit Traditional Knowledge

With increasing impacts of climate change in Nunavut, harvesters are having a harder time predicting ice conditions and weather patterns. There are programs, such as SmartICE, that integrate Inuit traditional knowledge with western science and research. SmartICE is a community-based initiative that offers climate change adaptation tools and services that integrate Inuit traditional knowledge of the sea ice with modern technology.

> *"When people hunt for their own food they have food security."*
> *-community member, Arctic Bay*

Food Sharing and Supply Chain

There are organizations across the Region that are dedicated to food sharing and providing better access to more affordable food. One example is the Qajuqturvik Community Food Centre in Iqaluit who started a "pay-what-you-can" model for food boxes. They provide both fruit and vegetable boxes, and country food boxes. Another example is Arctic Fresh who operate an online retail store that provides Northern customers access to a wide assortment of affordable products from fresh produce to household items.

Opportunities for an alternative supply of fruits, vegetables and other food products exist such as freeze-dried products. Shipping freeze-dried products would be more cost effective as they are approximately 60 percent less weight. Freeze dried food has a long shelf life and is convenient to take out on the land as it is light and typically you only need to add water to rehydrate the food for consumption.

Infrastructure and Equipment

The typical country food preservation method is freezing raw meat. With most Qikiqtani communities having inadequate community freezers, alternate methods can be explored for preserving food. These include inexpensive equipment such as vacuum sealers, pressure canning, smokers, dehydrators, and canning equipment. With access to these items, less food would be wasted and spoiled. Additionally, low-tech freezers, such as insulated pits in the ground, would offer a more affordable, low maintenance alternative to freezing harvested meats.

In Canada's territories there is a growing number of local food production initiatives such as community greenhouses, hydroponic containers, and local food processing. Several agricultural technology companies specialize in using technology suited for remote, northern communities. Specifically, these hydroponic containers use minimal technology and staffing requirements and have been proven in northern climates. Some communities already have initiatives in place to explore food cultivation such as Pond Inlet who is expected to have a vertical garden operational in 2023 and Iqaluit has had a society-driven operational greenhouse since 2007. A full review of indoor farming technology opportunities in the North can be found in the Appendix.

Renewable energy including wind and solar power, have been proven to be technically and economically feasible in the North. Renewable energy installations can support food sovereignty infrastructure to be more sustainable and contribute to reducing Nunavut's greenhouse gas emissions, while empowering communities to take control of their energy production.

Qikiqtaaluk Corporation and Group of Companies has a clean energy developer, Nunavut Nukkiksautiit Corporation (NNC), dedicated to working with Qikiqtani communities to develop renewable energy projects. NNC has the expertise and capacity to deliver renewable energy infrastructure including anything from small solar installations to autonomous clean energy microgrids to commercial scale wind projects. NNC works with communities from the preliminary project planning stage through to project execution.

Commercial Operations

The Qikiqtani Region's inshore fishery is largely untapped. There are research initiatives currently underway conducting the baseline research needed to acquire exploratory commercial licenses. Qikiqtaaluk Corporation (QC) and the Government of Nunavut Department of Economic Development and Transportation both have inshore research vessels. The QC Fisheries Division is currently working with four Qikiqtani communities to conduct the baseline inshore fishery research and has plans to expand their research program to additional Qikiqtani communities.

There is a huge market opportunity for Nunavut to take advantage of their truly wild food. Country food in Nunavut comes from a pristine environment; it is not farmed and is unique and not available anywhere else. These are high-value products with niche markets.

Much of the country food harvested across the Region does not go to waste as most parts of the animal are used for either consumption, clothing or arts and crafts. There is an opportunity to further explore using the animal parts for new products. QC is currently exploring ringed seal blubber for its potential as an omega-3 oil health supplement. The long-term goal will be to establish a Nunavut processing facility to render the ringed seal blubber into oil. The processing facility could offer stable employment for ringed seal harvesters in Nunavut as well as create employment in the processing plant. It would also improve food security by supporting seal harvests and distributing the meat and seal skins for community use.

Threats

There are several threats that pose a risk to advancing food sovereignty initiatives in Nunavut. These threats must be mitigated and overcome for food sovereignty initiatives to succeed.

Demographics and Environment

The population in Nunavut has increased significantly and household size and crowding have become a problem. Research has shown that population growth can dilute traditional food-sharing networks (Ford, 2019).

Nunavut has also experienced significant impacts from climate change. Canada's circumpolar regions are warming, on average, three times faster than the rest of the world (Harvey, 2022). This has led to declining caribou populations and increasing stress on other species regularly consumed by Inuit. These changes in wildlife species impacts the availability of country food and harvesting quotas determined by the Nunavut Wildlife Management Board.

Moreover, societal changes, climate change, and increased shipping traffic have and are contributing to a decrease in traditional harvesting and shorter ice seasons. With these changes comes less chance for passing harvesting knowledge to younger generations. A decrease in harvesting and a dependence on store bought foods by younger generations has and will continue to contribute to a loss of traditional knowledge.

Inflation

The rising inflation rate is impacting everything in Nunavut including food, the cost of fuel, and increased sealift shipping costs.

This rising cost of fuel and equipment will exasperate harvesters' already strained financial ability to go on the land to harvest country food. With fewer hunting trips, less country food will be distributed to food sharing networks.

The impact of inflation on food prices has shown people are relying more on food sharing networks. The Qajuqturvik Community Food Centre in Iqaluit is serving more than double the number of daily meals in 2022 than it did in 2021 (Nunatsiaq News, 2022).

The Nutrition North Canada program is not scaled for inflation, so as cargo rates increase, the Nutrition North subsidy will remain stable.

Government Policies

Historical government policy frameworks and funding models do not recognize Inuit leadership in decision-making and long-term strategic planning around food sovereignty in Nunavut. The lack of policy implementation resources and political will to make changes is a potential threat to building the food sovereignty movement.

IMAGINING FOOD SOVEREIGNTY ACROSS THE QIKIQTANI REGION

As described by Jernigan et al., there are seven food sovereignty indicators: access to resources, production, trade, food consumption, policy, community involvement, and culture. These seven indicators, along with input from Inuit and other stakeholders have guided the development of the vision for the Qikiqtani food sovereignty movement.

1. **Access to resources** is the availability of culturally appropriate foods. It is also the knowledge of community members of food history, traditions, beliefs, and goals.
2. **Production** is the steps in getting food from the environment to Inuit households. In the Qikiqtani Region this includes the harvesting, processing, and distribution of country food.
3. **Trade** is the exchange or sharing of food with community members. This includes fair and affordable country food prices in communities.
4. **Food consumption** includes access to affordable healthy food, including country food and produce, to minimize the consumption of processed foods and decrease dependence on store bought food. All community members should have access to sufficient food to maintain a healthy lifestyle.
5. **Policy** needs to foster Inuit self-governance. Policies must be in place to ensure harvesters have access to the resources they need to maintain production of country food.
6. **Community involvement** is driving change at the community level and approaching food sovereignty from a community-minded approach. The transfer of knowledge, traditional food practices and a focus on teaching youth are all prioritized.
7. **Culture** is prioritizing culturally appropriate food and ensuring connection to culturally significant resources.

In shaping the Vision, the strengths, weaknesses, opportunities, and threats of the current state of food sovereignty were recognized and considered. The vision responds by enhancing the strengths, addressing the weaknesses, taking advantage of the opportunities, and mitigating and overcoming the threats.

The Qikiqtani Food Sovereignty Vision defines the food systems to foster food sovereignty over the next 20 years. While this Vision focuses primarily on promoting local, country food, QBDC recognizes that significant improvements are needed to make store bought food more accessible to Qikiqtani communities as well. The Vision is intended to be a culturally and community-minded approach to food management, driven and delivered by Inuit. The Vision outlines what

Inuit leadership in food sovereignty responds to the Nunavut Agreement objective: to provide rights for Inuit to participate in decision making concerning the use, management and conservation of land, water and resources, including the offshore.

(preamble Nunavut Agreement)

infrastructure, equipment, programming, and training is envisioned to build the food sovereignty movement in the short-, medium- and long-terms.

The Vision first focuses on feeding Qikiqtani communities through local means, to then enhancing feeding Qikiqtani communities through regional sharing and distribution food systems and farming technologies, to then supporting food sovereignty sustainability through commercial operations and export.

The Qikiqtani Food Sovereignty Vision is guided by short-, medium-, and long-term goals of:

Years 1-8
Addressing food first within Qikiqtani communities

Years 4-12
Building regional food sharing and distribution networks

Years 10-20 and beyond
Establishing commercial operations to support food sovereignty sustainability

Years 1-3 Vision

Years one to three focus on accomplishments that require relatively low financial and capacity resources while realizing a high return toward addressing food first within Qikiqtani communities.

Basic food preservation equipment and community freezers are available in all communities and harvesters have access to safety equipment. Supports are in place for training to use this equipment. Seamstresses and artists have access to the resources they need which encourages less wastage of harvested animals. Research is underway to support inshore commercial fisheries.

Infrastructure and Equipment

- Community members have access to small-scale food preservation equipment such as vacuum sealers, smokers, pickling and jam making equipment, and dehydrators.
- Harvesters have access to adequate safety equipment such as VHF antennas, radios, survival gear and PPE
- Harvesters have access to chest freezers to store shared food
- Seamstresses have access to sewing machines and supplies to make clothing and artists have access to tools and supplies to make tools, art and crafts
- All communities have operational and adequately sized freezers

Training and Programming

- Communities have access to training on using food preservation equipment
- Harvesters have access to training on communication equipment
- Nauttiqsuqtiit program expanded to additional communities
- Inshore fishery research program in four communities

Years 4-6 Vision

Years four to six continue to focus on accomplishing food first within Qikiqtani communities and start initiatives to promote regional trade for communities which experience the biggest gap in access to country food.

Country food is a readily available food choice for families and harvesting is a viable livelihood. All communities have adequate harvesting equipment storage and garage space as well as trained mechanics to maintain and repair equipment including community freezers. Communities receive compensation for harvesters to provide country food and for those preparing food to share with their communities. Regional trade supports are initiated for communities that have insufficient access to country food locally.

Infrastructure and Equipment

- All hunters have access to hunting equipment and gear (boats, skidoos, qamutiit, etc) and secure space to store equipment
- All communities have adequate garages to work on small machines and boats with diagnostic tools

Training and Programming

- Harvesters are compensated for their harvests shared with communities
- Community members are compensated for food prepared for and shared with communities
- Nauttiqsuqtiit program expanded to all other Qikiqtani communities
- Community freezer maintenance program in place
- Mechanic training programs and/or trained mechanics available in all communities
- Inshore fishery research program expanded to more communities
- The Nutrition North Canada Subsidy Program has redirected the relationship between the federal government and retailers to providing more support to Inuit and northern communities to participate and strengthen local food systems
- Renewed policy frameworks and funding models are in place between Inuit and governments
- Intercommunity trade program in place for communities with the largest gap in access to local country food

Years 7-10 Vision

In years seven to ten it is envisioned that food first within Qikiqtani communities is achieved and efforts and initiatives are now focusing on regional food sharing and distribution networks.

Harvesters have readily available harvesting equipment and parts. Community-to-community food sharing, and locally grown produce is a viable option for accessing food. Inshore fisheries research has either finished or commenced in all Qikiqtani communities.

Infrastructure and Equipment

- All communities have food preparation facilities with butchering equipment
- All community Hunters and Trappers Associations/ Organizations have adequate programming space
- Communities have access to small-scale indoor farming technology and greenhouses
- Communities have a small community market and cold/dry storage for local and regional distribution
- All communities have a community kitchen to support food banks and soup kitchens
- A regional distribution hub is established with large freezer space
- Equipment hubs are established to stock harvesting equipment, vehicles, parts, and gear
- Everyday equipment and parts are stockpiled in communities such as ammunition, fishing gear, and smaller equipment parts
- A second Qikiqtaaluk Corporation inshore fishery research vessel is operational

Training and Programming

- All community HTA/Os are adequately funded and resourced
- Cooperative harvests programs are in place
- Food maps and harvesting calendars are available for all communities
- Traditional and conventional butchering training and programming in place
- Programs and training in place to share recipes, cooking classes, nutritional classes, etc.
- Business support programs in place to provide business and financial training and support such as audits, reporting, computer literacy, and financial literacy
- Programming and supports are in place for everyone to access the food they want, including store bought food
- Inshore fishery research program expanded to all communities

Year 11 — Year 20

Years 11-20 Vision

In years 11 to 20 regional food sharing and distribution networks are achieved and commercial inshore fishery operations are emerging and will become fully operational.

Certified processing plants are established and alternative distribution networks will support the commercial operations and regional food sharing. Infrastructure will be autonomously powered, and communities will explore livestock to enhance food first for communities. Value-added products and niche markets are established to further support food sovereignty sustainability.

Infrastructure and Equipment

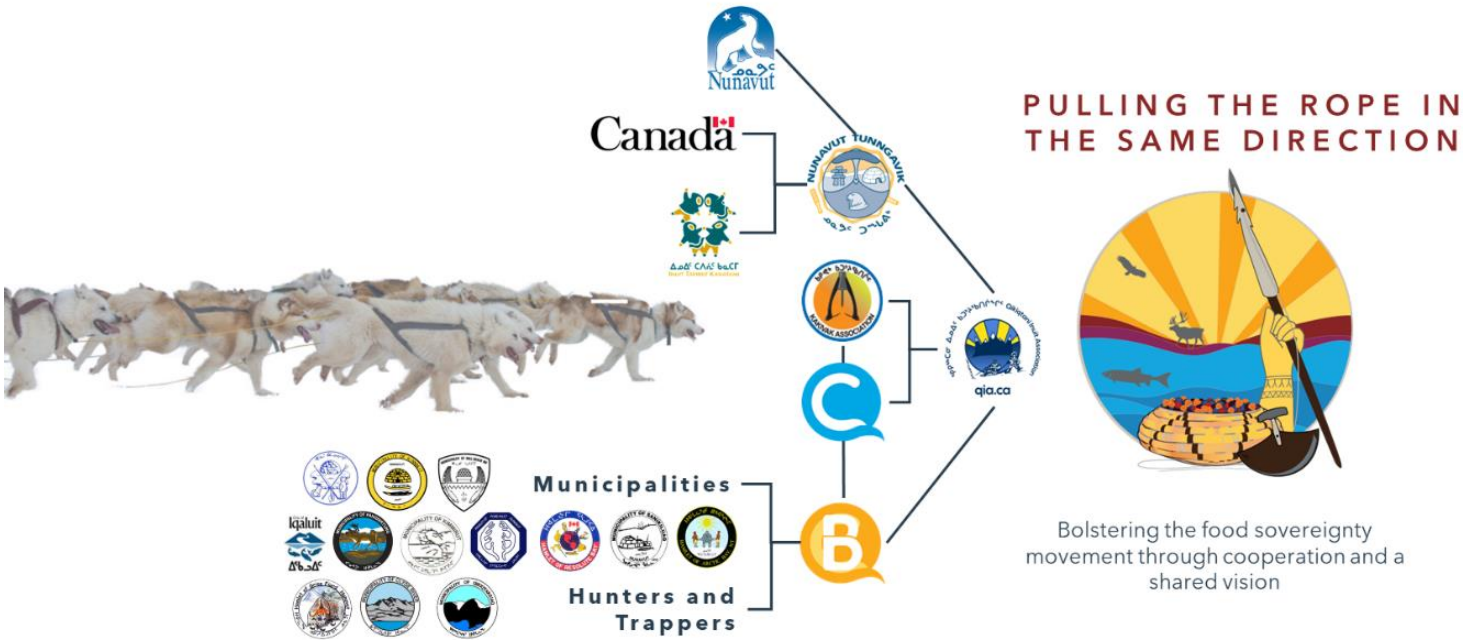
- All communities have access to Canadian Food Inspection Agency (CFIA) certified commercial marine processing plants
- All communities have access to CFIA certified commercial meat processing plants
- All communities have access to market space for regional sale of food products, and arts and crafts
- All communities have cold/freezer/dry storage space for regional and commercial distribution
- Communities have access to community farms with greenhouses and/or indoor farming, and including reproducible livestock (chickens and hens)
- Adequate and efficient food transportation infrastructure is available including airports and planes with adequate cold/freezer space, autonomous aircraft, and ships with reefer containers
- All infrastructure has renewable energy and microgrids to provide heat and electricity
- Seal blubber, and potentially other animal blubber, rendering plant is operational to support value added products
- Storage facility is established to store research vessels

Training and Programming

- Monitoring and evaluation programs of wildlife populations being commercially sold are in place to ensure sustainable wildlife management and food safety.
- Regional, national, and international distribution programs in place that get product to communities, and to export without spoilage
- Marketing programs in place to market high value products from Nunavut and to penetrate niche markets

COMMITMENT OF RESOURCES AND ACTIONS

Achieving the Qikiqtani Food Sovereignty Vision will take a cooperative effort between Inuit, Inuit organizations, governments, social enterprises and philanthropic groups; with all groups pulling the rope in the same direction. All organizations need to work collaboratively with the same vision in mind – feeding Qikiqtani Inuit first.



The vision requires working in partnership with governments to renew policy frameworks and funding models to acknowledge the centrality of country food to Inuit culture, economy and well-being. Government support for the Vision will show a commitment towards reconciliation.

Support from philanthropic groups to provide core funding and investments in infrastructure will also help to leverage investments from government.

The next stage of the QFSIS project will explore a framework outlining potential resources and actions that are needed to support actioning the vision.

NEXT STEPS

QBDC will continue to work with QIA and Qikiqtani communities to confirm and enhance the Qikiqtani Food Sovereignty Vision. QBDC will seek to have a letter of intent signed by Qikiqtani Inuit Association, Qikiqtaaluk Corporation, Kakivak Association, the Qikiqtani Municipalities and the community Hunters and Trappers Associations. Signing the letter will indicate the intent to work cooperatively to build the food sovereignty movement with the ultimate goal of improving food security, supporting harvesters, improving access to desired food, exploring inshore fishery opportunities, and building capacity, self-reliance and economic self-sufficiency.

A strategic framework will be developed that examines the resources and actions that are needed to support actioning the vision. QBDC will assess anticipated infrastructure costs, core funding for programming, actions needed by Inuit organizations and governments, and other supports and resources to realize the Qikiqtani Food Sovereignty Vision.

QBDC will also be working to secure funding and resources to start on years one to three initiatives.

REFERENCES

Ford, J., Clark, D., and Naylor, A. (2019). Food insecurity in Nunavut: Are we going from bad to worse? Canadian Medical Association Journal, Vol 101

Harvey, C. (2022). *The Arctic is warming found times faster than the rest of the planet.* Scientific American. Retrieved October 19 from https://www.scientificamerican.com/article/the-arctic-is-warming-four-times-faster-than-the-rest-of-the-planet/

Jernigan et al., (2021) Food Sovereignty Indicators for Indigenous Community Capacity Building and Health. *Frontiers in Sustainable Food Systems*. doi: 10.3389/fsufs.2021.704750

Lochead, D. (2022) Inflation could affect Nunavut hunters, sealift prices. *Nunatsiaq News.* https://nunatsiaq.com/stories/article/inflation-hits-nunavut-more-impact-potentially-coming/

Nunavut Food Security Coalition (2016). *Food Security*. Retried October 17, 2022, from https://www.nunavutfoodsecurity.ca/Rates

Nunavut Tunngavik Inc. (1993) *Nunavut Agreement*. Retrieved October 17, 2022, from https://nlca.tunngavik.com/?page_id=268

Qikiqtani Inuit Association (2019). *Food Sovereignty and Harvesting.* Retried October 1, 2022 from https://www.qia.ca/wp-content/uploads/2020/02/food-sovereignty-and-harvesting_final_english_2019-03_low.pdf

York. (n.d.) *Challenges of food transport in Canada*. Retrieved October 19 from https://foodpolicyforcanada.info.yorku.ca/goals/goal-5/sustainable-transportation/challenges-transport/

APPENDIX

Review of Best Available Food Cultivation Technologies for Nunavut

Best Available Technologies for Community Food Cultivation in Nunavut

Qikiqtani Food Sovereignty Implementation Solution

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Qikiqtaaluk Business
Development Corporation

OCTOBER 2022

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Introduction

Inuit have been masters of sustainably harvesting local flora and fauna for thousands of years; the ability to self harvest is a key part of Inuit culture. But the impacts of settler society and colonialism over the last two centuries has meant that many Inuit are less reliant on harvesting traditional food, especially in younger generations. In addition, there has been less intergenerational knowledge transfer, meaning that many youths have not had hunting and harvesting mentors to rely on.

The Nunavut's 26 communities rely on the southern regions of Canada for vital goods and services, including food. Northern grocery stores have brought with them a wide variety of non-traditional foods, from nutritious fruits and vegetables to highly processed foods. This over-reliance on non-traditional foods and food systems has led to a dependence, and hence less control over community-based food harvesting.

Implementing and updating community infrastructure to address the dual challenges of food sovereignty and food security will require, among other things, a suite of best available technologies. A scalable solution that grows, produces and processes food in Nunavut requires an analysis of technologies that exist on the market today. This goes for both traditional and non-traditional food. Advances in agricultural technology (Ag Tech) over the last few decades have transformed farming. Not only have crop varieties been engineered to become bigger, more nutritious, and resistant to pests and harsh climate conditions, advances in Ag Tech have also enabled farming to be possible indoors.

Gardening and agriculture in the north are nascent industries but not new. Various forms of agriculture, from traditional farming to greenhouses and indoor farms have been practiced for decades, and in some cases, centuries across the North. Little research exists on indoor farming in the Canadian North in particular, but what research that is available shows numerous examples of indoor farming facilities from the Yukon in the West to Nunavik and Nunatsiavut in the East.

Inuit have expert traditional knowledge of hunting, fishing and gathering, but perhaps less knowledge or experience with agriculture, unlike many First Nations and Metis communities further South. There are many reasons for this, a main one being the extreme climate in the High Arctic. As a result, agriculture and horticulture are not traditional activities practiced by Inuit. This doesn't mean, however, that the interest is lacking. As food security and food sovereignty issues have increased in prominence in recent decades, studies have shown that many Inuit are open minded to the idea of growing their own produce. Indeed, many similarities exist with gathering and gardening practices. Inuit are resilient and adaptable; as more technology and western lifestyle has influenced Inuit culture, Nunavummiut have managed to retain their cultural traditions, through the blending of customs and technology such as hunting using snowmobiles and motorboats, for example.

This paper discusses current applicable technologies that could be implemented across Nunavut to increase food security and promote food sovereignty. It is broken down into two sections. Part 1 gives an overview of current indoor farming technologies. Part 2 begins with an overview of the history and

current landscape of indoor farming in northern Canada. This section also highlights some organizations and technologies that are operating indoor farming facilities in the North and discusses elements of indoor farming that could be incorporated as part of action towards the Qikiqtani Food Sovereignty Vision.

Part 1 - Indoor Farming

Indoor farming encompasses a wide variety of methods for growing crops indoors. Indoor farming can be as simple as growing vegetables and ornamental plants in a backyard greenhouse, or as technically complex as a factory-sized building which includes vertical farming technology. The many processes of indoor farming utilize many different technologies and terminologies; there is no single definition for an indoor farm. For the purposes of this report indoor farming is collectively defined as Controlled Environment Agriculture (CEA). CEA can be further categorized into **vertical farming systems** (VFS), and **greenhouses.**

CEA is when growing crops is done under strictly controlled environmental conditions. In these systems, virtually all elements that plants need for growth are controlled, such as type and amount of light, nutrient levels, temperature, humidity, and CO_2. CEA systems can range from simple greenhouses, from simple greenhouses to fully automated vertical farms. There are a wide range of technologies that are typically found in a modern CEA system. They include, LED growing lights, advanced heating, ventilation and air conditioning (HVAC) systems, dehumidifiers, CO_2 enrichment instruments, humidifiers and coolers. The precise control of these variables means that they can be fine tuned to produce optimum growing climates[1]

Controlled Environment Agriculture Terminology

The world of growing crops is vast, and so are the various terms used to describe the different crop cultivating techniques used in CEA.

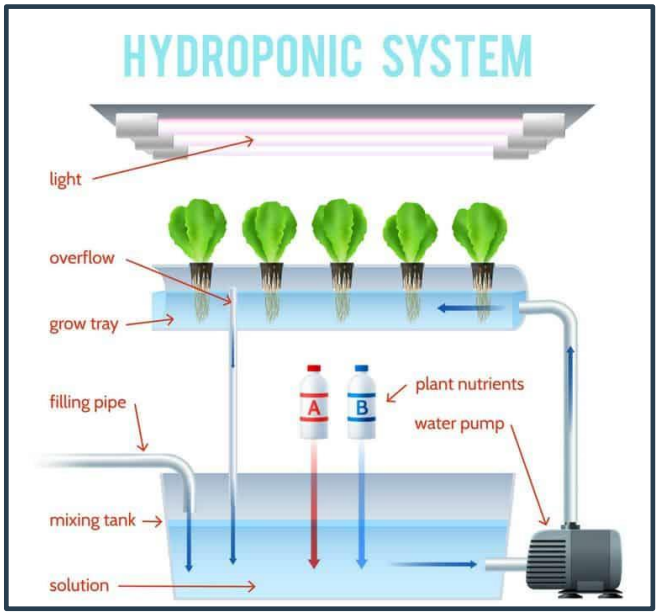
Agriculture is essentially an all-encompassing word for farming. It is the science of cultivating, or growing crops and raising livestock for farming, generally practiced at a large scale.

Horticulture, on the other hand, is a branch of agriculture that specifically deals with the science, management and development of cultivated food crops and garden plants, such as fruits, vegetables, nuts and ornamental plants. There are several types of horticultural methods that are used in indoor farming (greenhouses, VFS, hybrid systems). They can be categorized into CEA, as most of these growing methods require precise control of environmental variables required for plant growth. The methods are broken down into four main categories – soil-based horticulture, hydroponics, aeroponics and aquaponics[2].

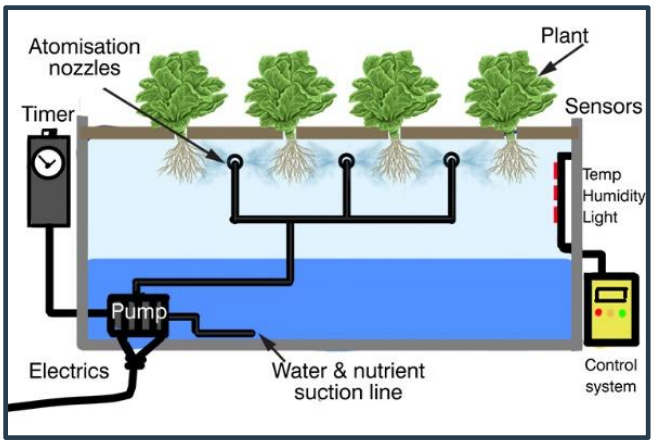
[1] Rajan, P., Lada, R. R., & MacDonald, M. T. (2019). Advancement in indoor vertical farming for microgreen production. *American Journal of Plant Sciences*, *10*(08), 1397.
[2] https://education.nationalgeographic.org/resource/agriculture

In **soil-based horticulture**, seeds are planted in soil where they absorb a variety of nutrients and grow in the soil medium. Fertilizers can also be applied to increase plant yields, while pesticides are also used to minimize the spread of pests and diseases.

Hydroponics is a type of horticulture or gardening method that grows plants in the absence of soil. In this growing method, a liquid nutrient solution is used in the growing of plants. Through hydroponics, plants can be grown in a variety of mediums like sand, gravel, rockwool, coconut fiber and oasis cubes. The main crop varieties grown under hydroponic methods include microgreens, leafy greens, tomatoes, peppers, strawberries, herbs and medicinal cannabis. Although almost any plant can be grown in a hydroponic system, including root vegetables, larger crops are still uneconomical to produce due to high energy input costs[3].

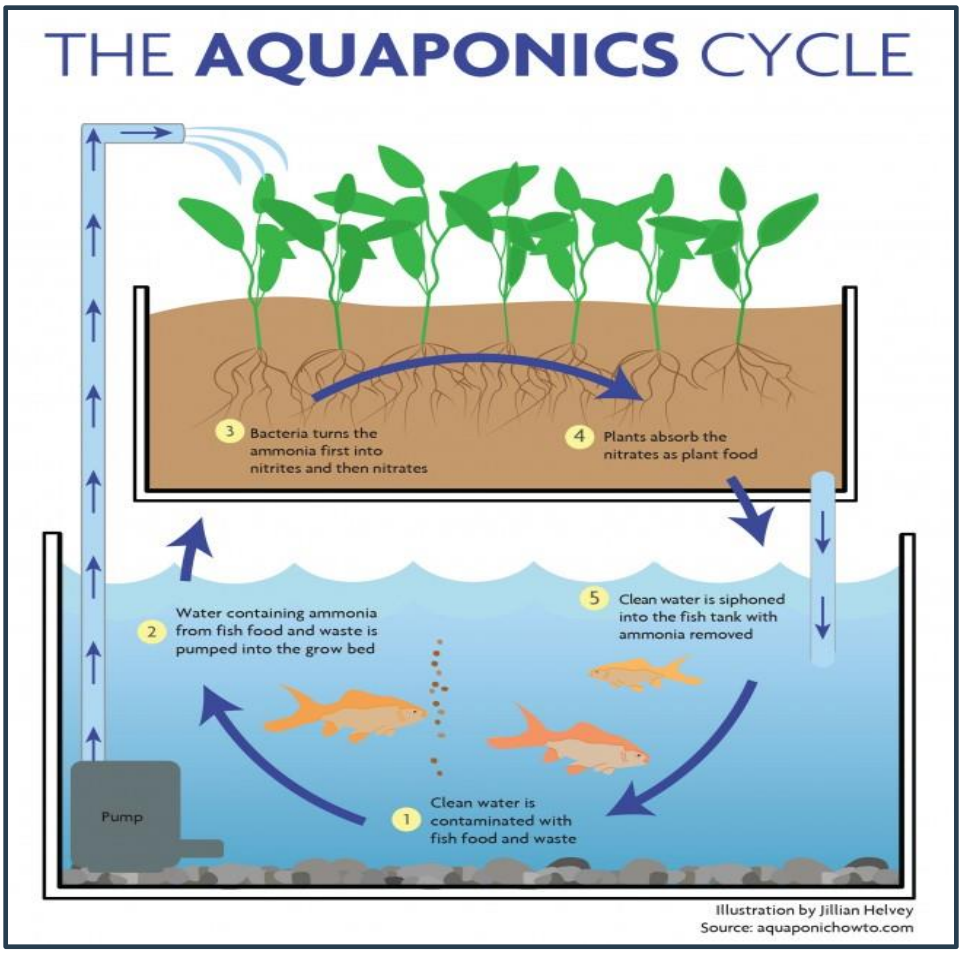


Aeroponic growing methods are an extension of hydroponics, in which roots are suspended in a soilless growing medium. The difference is that aeroponic systems provide nutrients to plants with nutrient-laden mist, rather than being suspended in water. The plant roots are suspended in air, rather than water, where they are periodically sprayed by specially designed misting or atomizing devices. Seeds are 'planted' in pieces of foam stuffed into mini pots, which are then exposed to light on one end and the nutrient mist on the other. The foam serves to hold the stem and root mass in place while the plants grow.



[3] Agrylist (2016). State of Indoor Farming. Retrieved from: www.agrylist.com

Aquaponics is a growing method that utilizes a combination of aquaculture (raising fish) and aquaponics. In this type of CEA, fish waste (ammonia and urea) and bacteria in the system provide the required nutrients to the plants. These systems rely on fast growing fish such as tilapia, perch, catfish and trout to supply the needs of plants. The water used in this process is then recycled back to the fish. The fish and plant species under this environment nurture each other, without the need for chemical fertilizers[4].



[4] Agrylist (2016). State of Indoor Farming. Retrieved from: www.agrylist.com

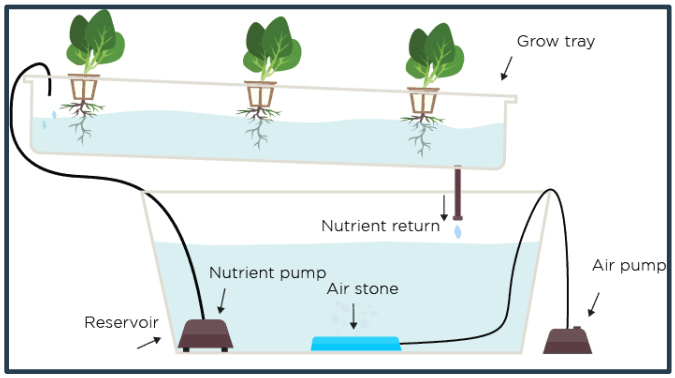
Vertical Farming Systems

Vertical farming systems (VFS) are indoor farms that utilize a combination of CEA technologies and are characterized by the several vertical layers of crops that are stacked on top of each other. These indoor vertical farms are usually constructed in existing warehouses or other structures that have been retrofitted to provide controlled HVAC to maximize plant production and artificial light. In addition, VFS utilize various types of hydroponic, aeroponic and aquaponic systems. By controlling for these variables, VFS offer several benefits over traditional farming techniques, such as reduction of pests, diseases, increased efficiencies, increased yields, and potential cost savings[5].

The growing methods for VFS also vary from farm to farm, but typically include an array of hydroponic methods explained below. The use of these techniques, combined with CEA means that plants can be grown all year round.

Nutrient Film Technique

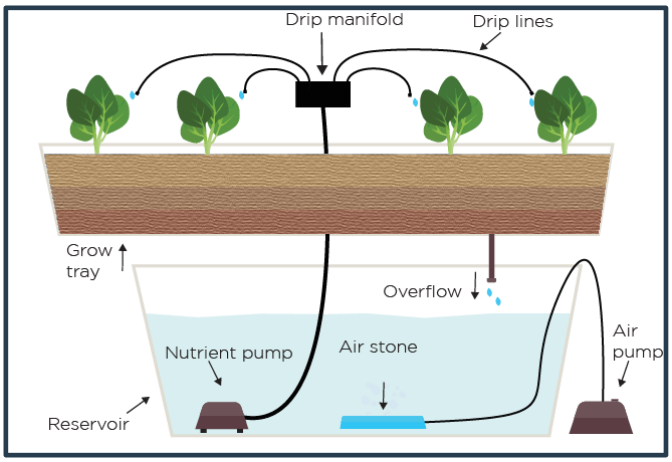
In this hydroponic method, a shallow stream of nutrient-rich water recirculates past the bare roots of the plant in watertight channels.



Source: https://plantsheaven.com/wp-content/uploads/2021/06/Nutrient-Film-Technique-Advantages-And-Disadvantages-2.jpg

Drip System

Nutrient-rich water is fed to the plant roots via drip irrigation, which can supply the solution above or below the growing medium.

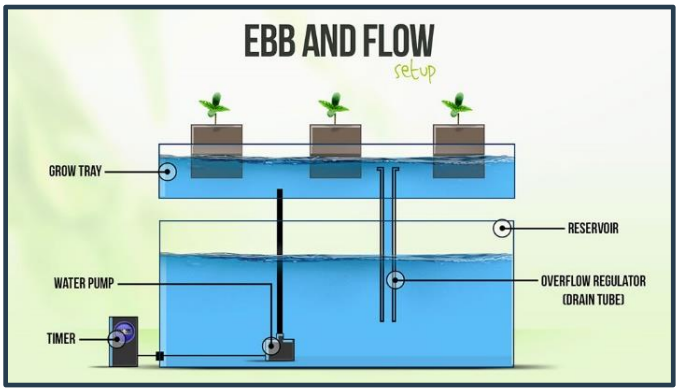


Source: https://www.trees.com/wp-content/uploads/files/inline-images/Drip-System.png

[5] Van Delden S., SharathKumar M., Butturini M. et al. (2021) Current status and future challenges in implementing and upscaling vertical farming systems. *Nature Food, 9440956, 2(12).*

Ebb and Flow

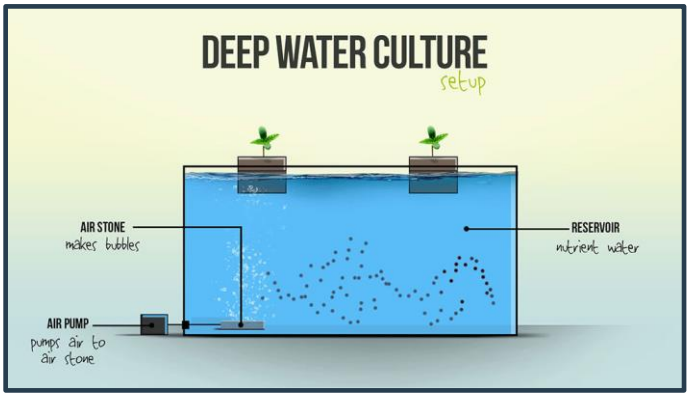
In ebb and flow systems (also known as flood and drain), plants are fed with nutrient-rich water pumped out of a reservoir below. The water is then returned via gravity to be reused in the cycle.



Source: https://greencamp.com/wp-content/uploads/2017/09/ebb-flow-system.jpg

Water Culture

In water culture hydroponics (also known as deep water culture), the roots of plans re continually suspended in nutrient-rich water. The 'deep' part of water culture comes from the concept that the plants are completely submerged in water at all points, as opposed to partially submerged (like in drip or ebb and flow methods).



Source: https://greencamp.com/wp-content/uploads/2017/09/deep-water-culture-system.jpg

Greenhouses

Although high tech indoor farming technologies have advanced significantly, greenhouses still make up approximately 50 percent of indoor growing installations.

Modern greenhouse designs were developed in the Netherlands in the mid 20th century, although historical records show greenhouses in Rome, Italy and Korea going back almost a thousand years. Greenhouses have been the dominant form of indoor agriculture for decades, particularly in the production of vegetables, flowers and ornamental plants.

All greenhouse designs share the same common elements: growing takes place on one level, translucent cladding materials transmit natural sunlight, while climate control and irrigation equipment facilitate the growing of plants inside the greenhouses. Greenhouses can use soil-based or soilless horticulture techniques to grow plants. Modern greenhouses now usually have some form of CEA in their designs, such as artificial light to supplement sunlight during the winter months.

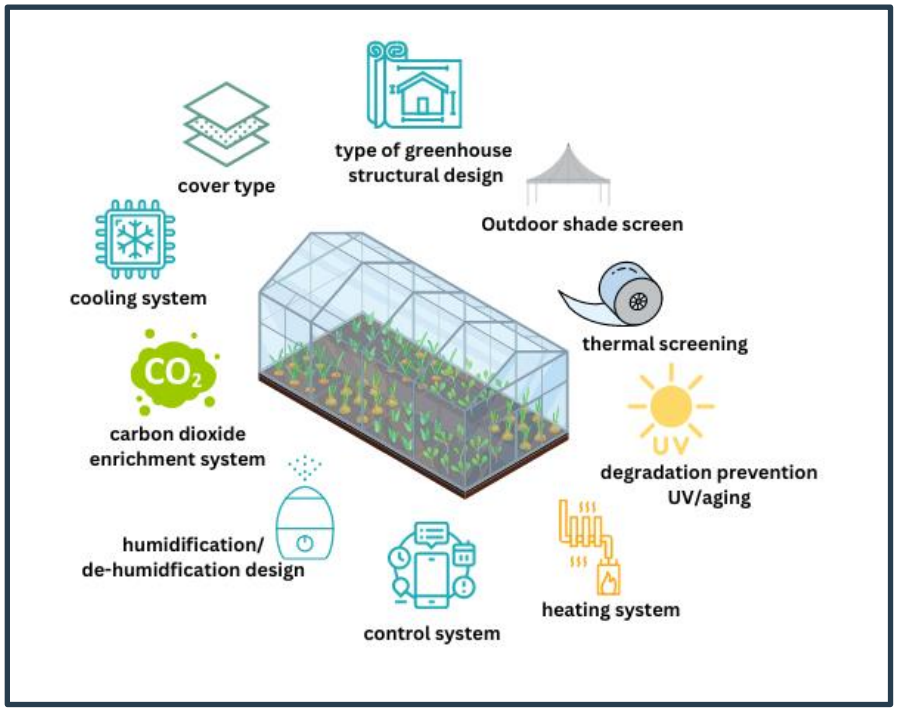
Greenhouses use natural light and work by harnessing solar energy, which comes in through its translucent panel material (glass, or polyethylene). Most wavelengths of solar radiation, except for long thermal infrared waves, enter the greenhouse and are converted from solar radiation to heat via the

soil, plants, floor and other materials. The plants, soil and other materials then convert the solar radiation into longer wavelengths that are 'trapped' through the transparent panes, which results in heating the greenhouse. Since the heat becomes trapped, temperatures can stay relatively high, while also causing water to evaporate and lead to high relative humidity to assist in plant growth.

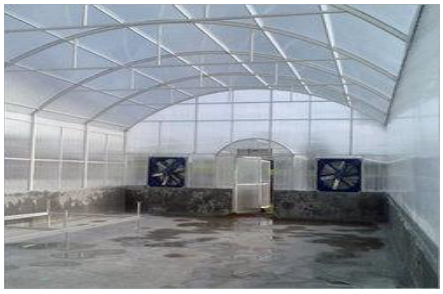
Greenhouse designs vary from low technology, low-cost and low productivity to high technology, high cost and higher productivity designs. They can range from sealed high-tunnels covered with polyethylene cladding, to large industrial-type structures built from steel with glass cladding.

It is important to note that indoor agriculture and horticulture using greenhouses in the north ranges from personal gardens and/or cheap grow tunnels, to community-based greenhouses and, in some cases, commercial-type greenhouses. This means that there is no one dominant design; greenhouses in the north come in a variety of designs and levels of complexity. Thus, a single greenhouse design will not meet the needs of Nunavummiut or Nunavut communities potentially interested in greenhouse crop production.

Generally, greenhouse design elements consist of the following:



Greenhouses can be classified in two main categories – open and closed systems. Open system greenhouses use natural ventilation as a medium of air exchange. Closed systems, on the other hand, rely on mechanical ventilation, which is the only means of air exchange. This means that the closed systems do not require any external air. Closed greenhouses offer superior control over the indoor air circulation, temperature and temperature gradients.

Greenhouse Type	Image	Description, Pros/Cons
High-tunnel Greenhouse	 https://www.rimolgreenhouses.com/sites/default/files/images/blog/Discovery2.JPG	• Low-tech/low-cost • Good for communities with limited skills in indoor farming • Low cost/low tech make this style good choice for northern farming operations • Low productivity due to low level environmental controls • Only extends growing season by ~1 month; year-round production not possible
Hoop Greenhouse	 https://www.buildmyowngreenhouse.com/images/1111111111.jpg	• Low-tech/low cost (generally less expensive than high-tunnel greenhouses • Can be easily disassembled and moved to new locations • Do not provide same level of weather protection as other designs • Are not considered permanent structures
Stand-alone Greenhouse		• Durable, double polyurethane covering and engineered steel structure • Range of tech options – from low tech soil-based to soilless production with CEA • Skills required vary with type of technology used
Gutter-connected Greenhouse	 https://ggs-greenhouse.com/sites/default/files/poly5.jpg	• Ideal for growing multiple crops, large scale farming operations • Capable of year-round production • High skill level required to utilize, could be difficult in the North • Superior air flow and temperature control • High tech and high cost

Chinese-style Solar Greenhouse /Passive Solar Greenhouse	 http://krisdedecker.typepad.com/.a/6a00e0099229e8883301bb08a0b7c8970d-pi	• Energy efficient (key consideration for northern regions) • Not many proven commercially viable models available • High capital costs
Geodesic Dome Greenhouse	 https://zipgrow.com/wp-content/uploads/2022/08/green-iglu.FB-3-1.jpg	• Extremely stable structures; stress is distributed over whole structure and no angular spaces for snow accumulation • Maximum use of sunlight; geodesic domes utilize sunlight at higher efficiency than standard greenhouses • Heat retention due to high heat retention – can be con for warmer climates but advantageous for the North

Controlled Environment Agriculture Market

The CEA market is a diverse industry, with many different facility types and technologies. Over half of the CEA market is still dominated by greenhouses, hydroponics (including aeroponics and aquaponics) makes up the other half of all indoor farms. Although 25 percent of indoor farms still use soil, they control their environment in a closed system using different set-ups. They vary from greenhouses, vertical systems, containers and sometimes basic hoop-style greenhouses.

While there is wide variety in the types of CEA systems in operation, what they are able to grow economically remains similar. Most CEA farms grow leafy greens and herbs, while a minority grow tomatoes (16 percent as of 2017), which are dominated by large scale modern greenhouses in the southwestern US. While some fruits can be grown in greenhouses, growing them in VFS facilities remains a challenge. This is mainly due to high energy costs, which make growing them uneconomical. The energy to grow fruit producing vegetables can also be a limiting factor, with high costs per edible biomass. Energy costs are one of the most significant challenges for the industry, which make up about 25 percent of operating costs for VFS (but around eight percent for greenhouses.

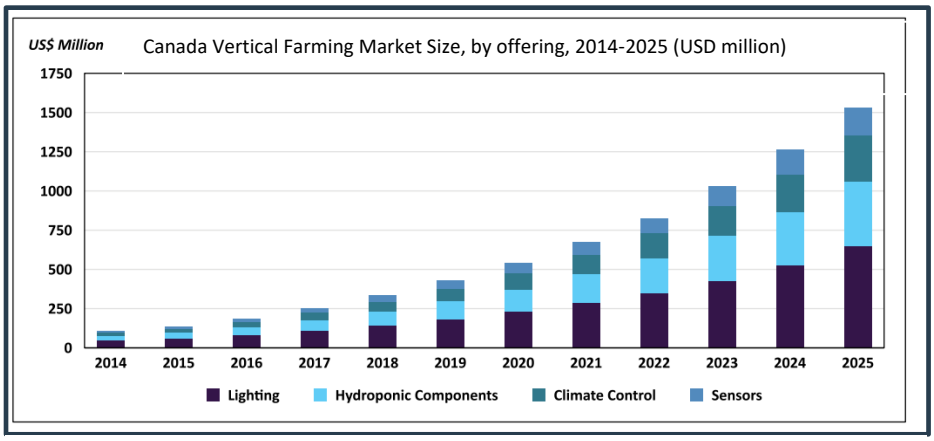
Within the CEA space, the VFS sector (which excludes greenhouses) has risen in popularity with the advancement of LED growing lights. These lights use far less energy and emit less heat than other types of lights, and their costs have dropped significantly over the years. But energy costs remain a major barrier to the growth of the VFS market globally, mainly due to the cost of lighting and excess heat

generated by the lights. These costs directly affect the economic feasibility of growing crops such as fruiting plants however herbs and leafy greens remain economically feasible.

Produce grown in CEA systems, and especially VFS is still more expensive than produce grown with conventional methods, even when shipping costs are accounted for. This is mainly due to higher energy and labour costs. For example, one study found that transportation costs for conventionally grown lettuce shipped from California to New York made up 67-70 percent of the landed cost, compared to just 12 percent for greenhouse and vertical farms. For a CEA farm, labour, management, energy and other operational costs account for over 80 percent of the total.

Despite the challenges, the CEA/VFS industry continues to grow at a steady pace. In 2017, the indoor farming industry in the US generated $848 million, growing at a rate of 3.4 percent. The revenue and scale of growth is largely due to the arrival of big market players, located in the southwestern US. These large farms grow crops in giant greenhouses and ship across the country and to some international markets[6].

The VFS sector within CEA is growing faster than all other types of hydroponics combined. The vertical farming industry grew from $3 billion in 2021 to $4 billion in 2022, with approximately 30 percent of the growth occurring in North America. Analysts predict that the market is set to grow at a compound annual growth rate (CAGR) of 26 percent to $21 billion by 2029. The predicted growth is the result of rising populations and the global demand for healthy and safe food[7][8]



Source: https://d3n8a8pro7vhmx.cloudfront.net/greenbelt/pages/12307/attachments/original/1623685363/GB_GrowthinFruitandVeg_REPORT_2021_E-ver_REV.pdf?1623685363

In Canada alone, $382 million (US dollars) was invested in vertical farming operations across Canada, with a CAGR above 20 percent. Over half of those investments were in containerized vertical farms (vertical farms set up in a shipping-like container) versus building based vertical farms.

[6] WWF (2020). Indoor soilless farming: Phase I: Examining the industry and impacts of controlled environment agriculture. Retrieved from: https://www.worldwildlife.org/publications/indoor-soilless-farming-phase-i-examining-the-industry-and-impacts-of-controlled-environment-agriculture

[7] https://www.foodincanada.com/features/vertical-farming-on-the-rise/

[8] https://jahaniandassociates.com/global-vertical-farming-market/

As of 2021, there were about a dozen commercial-sized vertical farms operating in Canada. One of the largest vertical farm operators is Elevate Farms, which can grow up to 454,000 kg per year of leafy greens including lettuce, arugula and basil in their 2,000 m^2 Welland, Ontario plant[9].

Although VFS has exciting potential, the industry is still new with many challenges to overcome. These challenges range from high capital costs and landed costs of grown produce, to high capital and energy costs, along with issues of scale.

Part 2 Agriculture in the North

Despite popular belief farming in Northern Canada is not new. It was home gardens in the Yukon that provided workers of the Klondike Gold Rush with greens and potatoes in the 1930s. Only after the Second World War and resulting fuel price declines, did a reliance develop on shipped produce (Nobel, 2013). In the Northwest Territories, small farms began appearing in the 1800s with the arrival of settlers, peaking around the time of the Klondike Gold Rush. Farms along the Yukon River, as well as in Dawson City and Mayo were producing substantial amounts of vegetables and hay until the mid 1950s. The decline of the horse-drawn carriage and rise of riverboats and road transportation, combined with declining populations post Gold Rush era led to a decline of farming in the region. Increased transportation infrastructure also facilitated this decline, as food could be imported at relatively low cost to the region[10].

The Hudson's Bay Company (HBC) also introduced farming and gardening in the Canadian Sub Arctic long before gardens sprouted further north. Archeological evidence has shown the former presence of gardens at Fort Albany, Moose Factory, Fort Severn, Fort York and Fort Churchill[11]. These gardens were set up for two main reasons – to counter the effects of scurvy and reduce the cost of shipping large amounts of food from England. Between 1670 and 1774, HBC policy mandated that gardening was to become a regular activity alongside all company posts[12] [13].

In the 1850's, the arrival of missionaries led to the expansion of garden plots in the North. These missionaries (who had experience in farming already) cleared and farmed the land; the produce was used to supplement the diets at missions, hospitals, and trading posts in the Canadian northwest[14].

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9 https://d3n8a8pro7vhmx.cloudfront.net/greenbelt/pages/12307/attachments/original/1623685363/GB_GrowthinFruitandVeg_REPORT_2021_E-ver_REV.pdf?1623685363

[10] ROBINSON, S. (2010) Humble Dreams: An Historical Perspective on Yukon Agriculture since 1846. Northern Review, (32): 135-167

[11] Avard, E. (2015). *Northern greenhouses: An alternative local food provisioning strategy for Nunavik* (Doctoral dissertation, Université Laval).

[12] LEECHMAN, D. (1978) "I Sowed Garden Seeds." The Beaver, Winter 1970: 24-37.

[13] HBC – HUDSON'S BAY COMPANY (2014) Our History - Business, Fur Trade, A Little Bit of Green: Gardening in Support of the Trade. http://www.hbcheritage.ca/hbcheritage/history/business/fur/a-little-bit-of-green-gardening-in-support-of-the-trade. Page consulted January 22, 2014.

[14] Avard, E. (2015). *Northern greenhouses: An alternative local food provisioning strategy for Nunavik* (Doctoral dissertation, Université Laval).

In the early 1900s, the village of Fort Simpson had one of the largest missionary-run farms in the Northwest, where over 100 acres were brought under cultivation. Around the same time, the Oblates were regularly cultivating gardens and even built small greenhouses on the west coast of Hudson Bay, which lasted until the 1980s.

On the East Coast, in Labrador, the Moravian Missionaries also cultivated large gardens, where Inuit women regularly took part in gardening activities[15].

While it was largely settler society that introduced agriculture to the north, Northern First Nations have actively been involved in agricultural activities. For instance, a study by Loring and Gerlach (2010) stated that "for over a century, various forms of crop cultivation, including family, community and school gardens were components of the foodways of many Alaska Native communities." While Loring and Gerlach often present positive aspects of historical First Nations' farming initiatives, it is important to put into context that introduced agriculture in Indigenous communities was often part of a larger strategy of assimilation. Across several First Nation communities across Canada, people were forced to abandon traditional hunting and gathering practices in favour of Euro-Canadian forms of farming[16].

Conversely, Indigenous agricultural practices have developed independently of settler agricultural practices in certain First Nation communities across Canada. Evidence points to Indigenous people practicing agriculture in the Dakotas and Manitoba in the early 1400s, predating the arrival of Europeans. The 'Three Sisters' plants (corn, beans, squash) and also sunflowers, were the predominant crops that were grown along fields, which provided an additional source of fat and protein. In Canada, the Iroquois cultivated the 'Three Sisters' as the most notable example of farming in Indigenous cultures in Canada[17].

Following the history of farming in Northern Canada, the small gardens and farms that have been established over the decades (and in some cases centuries) also led to several greenhouses that were built across the Canadian North, and, specifically, Inuit Nunangat. These greenhouses, like the farms and gardens that came before them, were often constructed by missionaries or by HBC employees.

Its important to note that the scientific literature on northern indoor farming is extremely limited. The information for this report was mainly gathered through media sources, government information, institutional websites and through personal communication. This has led to a high-level understanding of the current situation in indoor farming in the North.

Secondly, it is important to consider that many indoor farming structures (including greenhouses, vertical farming units, and other potential structures/technology combinations) are likely missed due to the lack of current availability of such information.

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[15] Avard, E. (2015). *Northern greenhouses: An alternative local food provisioning strategy for Nunavik* (Doctoral dissertation, Université Laval).
[16] Gurney, R. M., Caniglia, B. S., Mix, T. L., & Baum, K. A. (2015). Native American food security and traditional foods: a review of the literature. *Sociology Compass*, *9*(8), 681-693.
[17] Friedrich, D. L. (2021). Vegetable farming, climate change, and food security in the Arctic. In *Justice and food security in a changing climate* (p. 2545). Wageningen Academic Publishers.

VFS in the Arctic

The renewed interest in arctic agriculture has led to several companies setting up vertical farming systems in communities across the Arctic. The majority of these systems are installed as containerized vertical farming units, utilizing retrofitted or customized shipping containers, or 'sea cans' as they are called in the North.

Below is a snapshot of some of currently operating systems across the Canadian Arctic by two companies. There are other similar VFS technologies and companies on the market, however only two are discussed below as an overview.

Growcer

Founded in 2019, The Growcer Inc. is a Canadian social enterprise that develops customized modular hydroponic farms, with the initial aim of being deployed in food insecure, remote communities across Canada. They have since expanded to partner with numerous schools, non-profits, businesses, and non-remote communities who see the value in locally grown produce[18].

Technology

Growcer uses hydroponic methods combined with automation to provide full control of environmental variables. Light, nutrients, temperature, humidity, carbon dioxide and water are monitored and adjusted in real time. This means that the company offers year-round, commercial farming regardless of outdoor weather conditions. Growcer's modular units are built as a turn-key solution, meaning they require minimal set up to being operational.

A Growcer VFS in Kugluktuk, Nunavut (Source: Growcer Presentation, 2022)

[18] https://www.thegrowcer.ca/

The company's systems are all grown in Canada. They report 95 percent less land use and 90 percent less water than traditional farming methods. In addition, the systems can be customized to northern climates and have been proven to be operationally effective in extreme temperatures of +/-40˚C.

Crops and Yield

Growcer's hydroponic systems allow operators to potentially grow over 140 different crop varieties. From seed to harvest, the average cultivation time is between 5-12 weeks, depending on the crop type.

Growcer's most common crops are:

- Lettuces
- leafy greens
- cultural crops
- herbs
- Asian greens
- microgreens

The total growing surface area of a typical container is 41.5 m^2 in the growing area and 1.5 m^2 in the seedling area. The yield potential is up to 2,624 planting slots, yielding more than 650 mature plants weekly.

Costs

The start up cost for one vertical farm is approximately $270,000 (CAD) plus installation and supplies.

Growcer - Investment Overview (one container farm)				
Growcer Farm	**Site Preparation**	**Installation, support, onboarding and training**	**Supplies**	**Ongoing support**
$270,000	Estimate varies based on local contractor(s)	$16,900	$7,470	$3,500

The operating expenses for one farm are broken down as follows:

Operating Expenses for 1 Growcer Farm	
Maintenance	8.7%
Depreciation and cost	12.5%
Software Subscription	6.7%
Growing Materials	12.5%
Utilities	11.5%
Labour	48.1%

Source: Growcer Presentation (2022).

Training

Growcer works with its clients throughout the project lifecycle. Once a sales contract has been signed, they provide the client with business planning, project planning, funding opportunities, site preparation

as well as installation and training. Support is available once installation is complete, to facilitate operation throughout the life span of the farm.

Case Studies

Churchill, Manitoba

After floods washed out the railway connecting Churchill to the rest of the province, the Churchill Northern Studies Centre (CNSC) was looking at solutions to help grow local produce. Due to the rail line disruption, food prices spiked, and all goods had to be shipped via air.

The CNSC bought a Growcer system, which is now the only source of consistent local food. The unit was installed in November 2017 and produced 320-340 vegetables that were sold in the community. The yield increased to 450 during tourism season. The container has been growing produce in temperatures below -40˚C. Currently, the leafy greens sold to the community are below the all-in cost of shipped greens, at $3.99.

Kugluktuk, Nunavut

The Hamlet of Kugluktuk in Nunavut installed their Growcer system in February 2019. The project has yielded 12,000 lbs of produce annually since 2019. The Hamlet owns the system, and the daily operations of the container are managed by the school with students participating. Produce grown is sold to the local grocery stores and directly to community members. With changes in Hamlet staff and competing priorities, the system is currently not operational.

Kuujjuaq, Quebec

In 2018, the Nunavik community of Kuujjuaq, Quebec installed its Growcer system. The initiative is part of the Pirursiivik ("a place to grow" in Inuktitut) Project, which aims to make fresh produce more readily available in the community while promoting health and wellness.

The first produce was harvested in January 2019, which included lettuce and the traditional qunqulik plant (mountain sorrel). The produce is being sold at Newviq'vi, the local grocery store[19].

[19] Growcer presentation (2022)

ColdAcre

ColdAcre Food Systems designs and manufactures containerized vertical farming systems out of Whitehorse, Yukon. In addition, they also sell prefabricated systems along with their customized units.

Source: Inuvik VFS installed by ColdAcre. Source: ColdAcre (2022)

The company uses its own technology to operate Northern Canada's largest hydroponic farm, in Whitehorse, Yukon.

Technology

ColdAcre grows their crops via hydroponic methods utilizing a nutrient film technique (NFT), meaning the greens are fed via a constant flow of nutrients, using low-maintenance, long lasting magnetic drive pumps. Plumbing is done with PVC piping to make fixing and replacement as easy, cheap, and quick as possible.

For systems operating in Arctic climates, ColdAcre has made various modifications. For one, the heating and cooling system has been modified to utilize the outdoor temperatures to reduce costs and component wear and tear. The insulation has been increased for northern climates and all direct thermal bridging was terminated. In addition, lights with dimmers were selected to allow for power reduction for communities with high power costs. All of their system changes have been implemented and tested on their own commercial farm in Whitehorse, Yukon.

ColdAcre systems have galvanized steel racks which each hold five mature planting shelves and one nursery shelf. Each shelf uses NFT and high-efficiency LED all-spectrum light to grow the greens. These are fed using low maintenance long lasting magnetic drive pumps. The use of dehumidifiers maintains humidity around 70 percent. Specialized fans offer lateral and vertical airflow ensuring the plants do not get carbon locked. CO2 controllers automatically inject CO_2, while also controlling the dehumidifiers, HVAC, and dimming the lights[20].

ColdAcre offers a variety of containerized system models, however the most applicable to northern communities is their Model 16-AE. This system has a built-in arctic entrance which doubles as a processing room. This allows products to be grown, cleaned, stored, packaged, and distributed directly from the unit. It has the same amount of growing space as their Model 12, which can grow approximately 250 lbs per week if growing a mix of greens.

[20] ColdAcre (2022)

ColdAcre CEO Tarek Bos-Jabbar estimates that through their extensive training, clients can hit 75 percent of the estimated yield in the first year, increasing to approximately 90 percent in the second year of operations.

Like Growcer, and most containerized VFS, ColdAcre's systems are also a turn-key solution, requiring minimal set up once the unit is installed, and training completed. The system generally requires one to two full time personnel for operations.

Crops and Yield

The main crops currently produced by ColdAcre's systems are:

- Most varieties of lettuce
- Basil
- Mizuna
- Bok choy
- Herbs

ColdAcre can guarantee crop yields for their main crop varieties. In the next three to five years, the company expects to have root vegetables, fruiting vegetables, and most lettuce varieties successfully growing in their systems. In addition, ColdAcre has built an attached greenhouse unit which utilizes waste heat to grow tomatoes, cucumbers, peppers, potatoes, and carrots. The company is also exploring the potential of raising chickens/eggs in their systems.

Costs

ColdAcre's Model 6 (6 metre container farm) costs between $100,000 and $120,000, while a model 12 (12 metre) costs approximately $190,000. Shipping and site preparation costs run approximately $25,000.

Training

ColdAcre has created an in-depth training program to help facilitate capacity building, as this is one of the major challenges for successful operations of their systems in remote northern communities. The training is important for three main reasons:

1. It allows the operator to understand and visualize how to efficiently operate the system
2. The operator learns about the terminology, making all subsequent remote service calls and general questions more effective
3. Provides an opportunity to train new staff if someone suddenly quits or becomes ill

Training is provided in Whitehorse, which includes accommodations for the two-week period. While CEO Tarek Bos-Jabbar says that modifying system components is critical for successful operations in the North, the most crucial factor is human resources. Adequately trained staff are the largest factor in the

successful or unsuccessful operation. As such, ColdAcre puts an equal focus on human resource development[21].

Solar Energy Option

ColdAcre has partnered with Solvest Inc. on some of their systems to integrate solar photovoltaic (PV) technology. Their system at the Kluane Lake Research Station was Canada's first completely off-grid system. It runs entirely on solar PV and battery storage for most of the year, with a generator providing power during the darkest months. For other systems, they have the potential to install solar PV on the roof of their containerized farms. This would reduce approximately 30 percent of the base load, and as such would not require any expensive battery systems. [22]

Greenhouses in the Arctic

A 2019 study identified there are 17 operational greenhouses across northern Canada with two of these in Nunavut (Iqaluit and Naujaat). From Iqaluit, to Kuujjuaq [23]and across the North, these greenhouses have yielded a variety of vegetables and herbs, including (but not limited to) carrots, tomatoes, peppers, and even potatoes and corn. Some operate solely with the assistance of volunteers, while others have full-time staff. And while most rely on fundraising and subsidies, they have all led to a greater sense of community and enabled crop growing at a community level.

There is extremely limited scientific literature on northern greenhouses. Additionally, no two greenhouses are the same and therefore reporting on crop yields and costs is not possible.

The following section summarizes some of the most well-known and currently operating greenhouse operations in the Canadian Arctic. These examples show that greenhouses are successful in the North and they have the potential to become a key element of a new northern food strategy.

Iqaluit, Nunavut

Greenhouse projects in Iqaluit date back until at least the 1960s, when a glass-covered greenhouse was constructed. Later, in 1976, a plastic-cladded greenhouse was constructed by the then Northwest Territories Department of Economic Development in partnership with the Manitoba

Source: https://iqaluitgreenhouse.com/

[21] ColdAcre (2022) correspondence with CEO Tarek Bos-Jabbar
[22] ColdAcre (2022) correspondence with CEO Tarek Bos-Jabbar
[23] CHEN, A., & NATCHER, D. (2019) Greening Canada's Arctic food system: Local food procurement strategies for combating food insecurity. Canadian Food Studies Vol. 6 No 1.

Greenhouse Research Project[24][25]. The greenhouse structure was prefabricated. In the end, it was plagued by project delays and improper planning; only small root crops and greens were harvested.

In 2001, local Iqaluit residents formed the Iqaluit Community Greenhouse Society (ICGS). The newly constructed greenhouse was made from polycarbonate cladding over a steel frame, covering an area of 90 m^2. As of 2012, it was still the most northern society-driven greenhouse above the treeline. It still functions as a community collective garden, where members of the ICGS participate jointly in hardening tasks.

The annual operational costs for the Iqaluit greenhouse is $6,000 which is mostly covered by donations and fundraising.[26]

Naujaat, Nunavut

Naujaat, Nunavut has a 1,300 ft^2 polycarbonate dome greenhouse installed in 2016. The dome structure means it can withstand winds of up to 110 km/hr and more than two meters of snow accumulation.

The greenhouse operates for about six months of the year and has a combination of raised soil beds and 1.5 m tall vertical hydroponic towers. The greenhouse has a large water tank that acts as a thermal mass to help keep the internal temperature between 20 and 25° Celsius. Produce grown includes leafy greens, carrots, turnips, potatoes, beans, beets, radishes and cauliflower. The produce is sold at farmers' markets and to the local food bank.[27] The project was spearheaded by the non-profit group Green Iglu.

The dome greenhouse cost about $160,000 to purchase and ship to Naujaat. The annual operating costs are about $17,000.[28]

Source: https://www.vice.com/en/article/ywg7kj/greenhouses-in-the-arctic-will-reduce-food-insecurity-in-canadas-north

Source: https://www.cbc.ca/television/higharctichaulers/igloo-shaped-greenhouses-are-growing-nutritious-affordable-food-in-canada-s-north-1.5365796

[24] WEBB, K. (1976b) End of two month report on Frobisher Bay Greenhouse. Report to Department of Economic Development and Tourism, Government of N.W.T., Yellowknife. 5pp.
[25] ROMER, M. (1987) Pond Inlet Gardens: A Report on the Design and Operation of a Solar Greenhouse on North Baffin Island, NWT, with Particular Reference to Economic Viability of Vegetable Production for Arctic Regions. Prepared for the Toonoonik-Sahoonik Co-op, Pond Inlet, NWT and Dept. Of Economic Development, GNWT.
[26] CHEN, A (2019) Greening Canada's Arctic food system: Local food procurement strategies for combating food insecurity
[27] WHITEHOUSE, J. (2018) Cold growth in northern climates. Greenhouse Canada
[28] MCGWIN, K. (2017) Can greenhouses take root in Nunavut? The Arctic Journal

Inuvik, Northwest Territories

Source: https://spectacularnwt.com//sites/default/files/styles/hero_desktop/public/attraction/gallery/2021-

The Inuvik Community Greenhouse is located in Inuvik, NWT and still boasts the title of being North America's northernmost greenhouse, which is located above the Arctic Circle (68.36° North). In 1998, the non-profit organization – Community Garden Society of Inuvik began plans for converting the decommissioned Grolier Hall Hockey Arena into a greenhouse. Most of the repurposed structure remained the same, save for the roof, which was replaced with polycarbonate glazing to let the 24-hour summer light to come in[29]. The retrofitted structure extends the growing season from May to October.

The 16,000 square foot structure is divided into two sections. The first is a 12,000 square foot garden on the ground floor, which holds seventy-four full size plots. Members pay a $25 fee per year and must complete 15 volunteer hours. The second part is a and a 4,000 square foot commercial greenhouse, where a variety of bedding plants and hydroponic vegetables (tomatoes, and English cucumbers) are produced. The revenues from the commercial operation go into covering the operation and management costs[30].

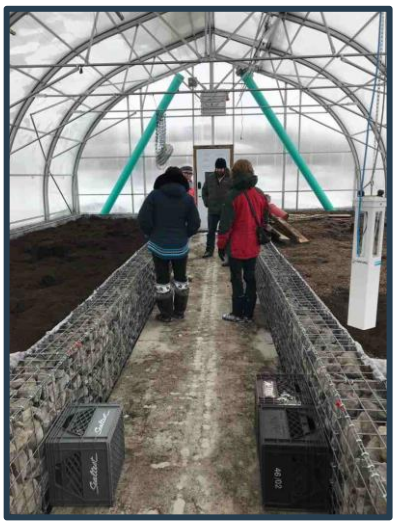
Carmacks, Yukon

The First Nation Reserve of Little Salmon/Carmacks which is two and a half hours north of Whitehorse, Yukon, has a community greenhouse. The facilities now include two greenhouses, a garden, potato farm and cold storage[31].

Source: https://www.yukon-news.com/wp-content/uploads/2017/06/YKN_LifeFR_localfood.jpg

[29] ICG – INUVIK COMMUNITY GREENHOUSE (2014) About the Inuvik Community Greenhouse. http://www.inuvikgreenhouse.com/index.php?p=1_7_FAQ
[30] MAHONEY, J. (2004) Hothouse flourishes as rink turns over new leaf. The Globe and Mail, July 12, 2004
[31] YUKON WELLNESS (2012) Greenhouse and Farm Operations, Carmacks. http://www.yukonwellness.ca/stories_greenhouse.php#.UubJOBAo5D8.

Kuujjuaq, Quebec



In Kuujjuaq, the largest community in the Nunavik Region of Quebec, boasts two community-led greenhouses, one which has been in operation since 1999. Both greenhouses have a combined total of 46 garden beds, which are distributed by a lottery system each year. The greenhouses are not artificially lit or heated, which limits the growing season to just 20 weeks a year[32].

Source: https://www.makivik.org/article/greenhouses-in-nunavik/

Other Indoor Farming Practices in the Arctic

While many northern growing operations can be neatly classified under greenhouse and VFS facilities, some follow a more holistic approach that utilizes a combination of agricultural and horticultural techniques including livestock production.

North Star Agriculture

North Star Agriculture is one such example of an agriculture development company that provides innovative food sovereignty solutions using a combination of technology and agricultural practices for northern communities. The company specializes in sustainable food production facilities across the Canadian North. Their mission is to ensure that northern, remote and Indigenous communities have an ability to plan, design, build and operate sustainable food production to secure their own food sovereignty through four pillars:

- A socially-minded approach
- Sustainability-first planning
- Innovative solutions for unique climates
- Integration of renewable resources throughout all projects

North Star's farming operations utilize a full suite of agricultural/horticultural methods, including outdoor farming/livestock production, greenhouses, VFS and aquaculture. North Star is developing VFS to complement their farming operations, in partnership with other organizations.

[32] For a more comprehensive analysis on greenhouses in the Arctic, please see the study by Ellen Avard: Avard, E. (2015). *Northern greenhouses: An alternative local food provisioning strategy for Nunavik* (Doctoral dissertation, Université Laval).

Case Studies

Na-Cho Nyak Dun First Nation, Yukon

As part of a comprehensive food strategy, North Star Agriculture worked with Na-Cho Nyak Dun First Nation in the Yukon to develop a working and teaching farm to increase access to healthy and nutritious food, grown in their own traditional territory. The ultimate goal was to provide community members with greater control over their food supply while also developing skills capacity.

Source: https://northstaragriculture.ca/nnd-farm/

The Na-Cho Nyak Dun First Nation acquired the 160-acre farm in 2018[33]. North Star Agriculture began renovations to the property in early 2020, which included renovations to the exterior gardens, greenhouse, stable, barn, coop and other structural components. Renovations to the greenhouse resulted in over 10 varieties of vegetables planted the following season, including cucumber, squash, corn, onions, tomatoes, swiss chard, lettuce, spinach, cauliflower, and various herbs.

Flat Creek Farm

Flat creek farm is Yukon's largest pasture-raised hog operation, located next to the Takhini River on 79 acres of land. North Star has been leading the development of the farm since 2015. The farm stared with 10 pigs in 2015 and has since expanded to a 200-pig operation in 2020. All pigs are sold to a Yukon-based meat distributor.

Arctic Indoor Farming Challenges and Opportunities

Incorporating indoor farming systems across Nunavut poses numerous challenges, especially if these systems are to function as part of an overall food sovereignty and food security solution. In reviewing the literature on indoor farming in the Arctic, along with corresponding with operators of systems across the territories, the following were identified as the main issues:

Arctic Climate and Extreme Weather

The arctic tundra brings with it sub-zero temperatures for much of the year, getting as cold as minus 40-60°C with the windchill. As a result, any indoor farming system, be it a greenhouse or VFS, must be constructed and customized to deal with these extreme temperatures. For greenhouses, their design must consider the prevailing wind direction and the position of the sun to maximize heat retention and

[33] https://northstaragriculture.ca/

energy efficiency.[34] [35] For VFS, containers need to be properly insulated to ensure maximum heat retention.

Snow accumulation on and around indoor farming structures must also be taken into account; high winds and blizzard conditions often create hard-packed snow drifts, which cause significant snow accumulation around structures.

Conversely, it is important to consider that in the summer months temperatures can often soar above 30°C inside greenhouses. This, combined with the effects of climate change, may mean shade curtains and proper ventilation systems for cooling greenhouses are needed in the summer months. For VFS, being able to dissipate heat from the LED lighting systems via proper HVAC technologies is a critical factor for success not just in the summer months, but year-round.

Growing Season

The number of days in the Arctic where the temperature remains above zero are considerably less than in southern latitudes. Even within Nunavut, there is considerable variation from east to west, and north to south. In Iqaluit, for example, daily mean temperatures are above zero Celsius for only four months of the year, while Sanikiluaq, the most southern Nunavut community, experiences above zero temperatures for six months (from May to October)[36][37].

Thus, colder mean monthly temperatures have the effect of shortening the growing season in a greenhouse. Growing seasons can be extended with the use of external heat inputs. This is not a limiting factor for VFS systems but applies to greenhouses.

In the long run, warming effects due to climate change will lead to an extended growing season, which will be an important consideration when designing new indoor farming systems.

Photoperiod

The photoperiod, or number of sunlight hours, is a critical consideration when it comes to designing greenhouses in the North. Overall, the days in Nunavut are much longer in the summer versus the dark season of winter. However, there is considerable variation in daylight hours across Nunavut. For instance, northern Qikiqtani Region communities such as Igloolik, Arctic Bay and Grise Fjord experience midnight sun in the summer along with periods of complete darkness in winter, while more southern communities such as Iqaluit, Rankin Inlet, and Kugluktuk in the west do not see the same variations during the year.

The summer daylight hours, therefore, are a major benefit to northern indoor farming operations in the North. The plentiful summer sunshine largely compensates for the shorter annual growing season. There

[34] Lamalice, A., Haillot, D., Lamontagne, M. A., Herrmann, T. M., Gibout, S., Blangy, S., ... & Courchesne, F. (2018). Building food security in the Canadian Arctic through the development of sustainable community greenhouses and gardening. *Écoscience*, *25*(4), 325-341.
[35] Avard, E. (2015). *Northern greenhouses: An alternative local food provisioning strategy for Nunavik* (Doctoral dissertation, Université Laval).
[36] Lamalice, A., Avard, E., Coxam, V., Herrmann, T., Desbiens, C., Wittrant, Y., & Blangy, S. (2016). Supporting food security in the Far North: Community greenhouse projects in Nunavik and Nunavut. *Etudes inuit. Inuit studies*, *40*(1), 147-169.
[37] Sanikiluaq weather data: https://www.wunderground.com/history/daily/ca/sanikiluaq/date/2022-2-5

are some varieties of plants that require periods of darkness for optimum growth, but these factors can be controlled using shading.

Lack of Local Soil

Good quality soil is another challenge for establishing greenhouse operations in Nunavut. This does not apply to the VFS under analysis, as they utilize soilless hydroponic methods. The soil in most Nunavut communities is sandy, with little organic matter. In some low-lying areas, organic matter has accumulated over years and forms a layer of dark black topsoil over the bedrock. If local soil is used, it must be modified to be more fertile.

In a 2016 study by Lamalice et al. looking at community greenhouses in the Arctic, the researchers used the Kuujjuaq greenhouse as a case study. In analyzing the local soil samples, the pH values of the soil were all below 5.2, meaning they were acidic. In contrast, the composts had a neutral to slightly alkaline pH, meaning they were suitable for common garden use. Soils that are acidic need to be limed for gardening purposes.

If soil in Nunavut communities was deemed inadequate, there are other options to consider. For one, shipping bulk quantities of soil for greenhouse operations from southern hubs may be necessary. This option would significantly increase the operating costs and could be a potential barrier to commercial greenhouse operation. Another option is to use compost from organic waste material already available in the form of food waste and other organic wastes in Nunavut communities. A combination of the two options would also be practical. VFS do not require soil, thus the lack of soil is not a limitation.

Crop Limitations

Greenhouse farming has traditionally been limited to the production of vegetables (lettuce, peppers, tomatoes, broccoli, carrots, corn, cucumbers and cabbage), flowers, herbs and small fruits, such as strawberries. However, greenhouses with CEA are able to extend the typical growing season, thereby allowing for a wider variety of crops to be grown.

Currently, VFS systems grow mainly herbs and greens, as they are the most economically feasible. Other crops are too energy intensive, and as a result, cost-prohibitive to grow. With more research and advancements in technology, other crops, such as fruiting vegetables, some fruits and potentially some root vegetables could be grown in VFS. Another challenge is the lack of pollinators, such as bees, required for some crops.

Financial Considerations

The costs associated with VFS and indoor farming in general are high, especially in the North. This is a result of the relatively high start-up costs, high transportation costs, and high costs of energy inputs. This makes it a challenge to achieve high productivity levels and price points of crops. All above mentioned companies in the space do offer financing/funding models and support to assist in bridging this gap. In addition, the utilization of alternative energy sources, such as solar or district heating, to reduce heating and energy costs are potential options to improve economic viability of northern indoor farming projects

Social Considerations

There are also many social concerns to overcome on the road to successful indoor farming operations in the North. For one, much training and capacity building is needed. Community project champions are a key factor in the long-term success of these facilities. In addition, these projects require community buy-in. There is an overall lack of cultural exposure to agriculture in the north, and initiatives around food sovereignty and food security are largely focused on traditional foods. Moreover, not everyone may want to purchase or eat leafy greens and herbs. On the other hand, Nunavummiut do buy these foods at their local stores. Being able to harvest locally produced crops would still serve Nunavut communities in providing nutritious and local food.

Recommendations

The variety of indoor farming technologies available means that there are options to choose from when planning infrastructure needs to support food sovereignty in Nunavut communities. Regardless of what options are chosen, these decisions must be done on a community level. Before these decisions are made, however, much legwork needs to be done regionally and Nunavut-wide to build capacity. Below are some recommended steps for communities, governments, institutions and organizations to take to advance indoor farming solutions in Nunavut.

1. Building Capacity – Education and Community Support

Indoor farming is not a traditional nor common food harvesting practice in Nunavut. As a result, many Nunavummiut likely do not know the benefits and opportunities that indoor farming technologies can bring in addressing food security in their communities. A natural first step then is to educate and inform the public on what indoor farming is, and how it can be utilized across Nunavut. This will require collaboration among all levels of government (municipal, territorial), along with support from Inuit Associations (including HTOs) and economic development corporations and NGOs. Working groups can be established as a first step to chart a plan of action. This capacity building should also address the barriers to adoption (ie funding, training, limits of growing crops), while also encouraging a holistic approach that takes into consideration a combination of technologies (both greenhouses and VFS). The success of this effort will only be realized when Nunavut's communities know, understand, and see both the benefits and challenges of installing and operating these systems.

2. Funding and Training Opportunities

As with any initial adoption of technologies, financial incentives are needed early on to help communities overcome the cost barriers of installation, operation and maintenance associated with indoor farming technologies. Supporting governments and organizations should work to identify available funding sources, as well as identify gaps in what is available for communities to access. There may be a need to develop new grants, subsidies, rebates and other financial mechanisms that are specific to indoor farming technologies. It will also be helpful to work with indoor farming companies already operating in the North, as they often help customers access various levels of funding.

All indoor farming companies contacted for this report provide training for their respective technologies. Beyond these opportunities, opportunities exist to provide education and training across Nunavut. This could range from creating new course modules at the college level, such as incorporating indoor farming technology training as part of Nunavut Arctic College's Environmental Technology Program, to sparking interest among youth through educational opportunities in schools. These programs should cultivate community champions who are willing to lead efforts in building and operating indoor farming infrastructure in their communities.

3. Ownership and Operations Structure

The ownership and operations structure of indoor farming facilities will vary from community to community. The majority of Northern indoor farming systems in this study are owned by First Nations and Inuit communities or non-profit organizations. For example, Inuvik's Community Greenhouse is run by the Community Garden Society of Inuvik, a not-for-profit organization formed in 1998 when the greenhouse began operating. Similarly, the Iqaluit Greenhouse is operated by the Iqaluit Greenhouse Society, which is also a non-profit organization. In contrast, Kuujuuaq's Growcer VFS is owned and operated by the Makivik Corporation, the organization which represents the Inuit of Nunavik, Northern Quebec. The type of ownership can also set the stage for who will be in charge of day-to-day operations.

Some examples of operational considerations that should be considered in the planning stages include:

- Is the proposed facility going to be run by volunteers or paid staff?
- Is there a way for youth to set up a structure where youth can be empowered to grow as community champions, while providing meaningful employment?
- Will there be membership fees for community members to have their own plots?
- Will the produce be sold direct to the consumer?

4. Community Specific Solutions

There is no one-size-fits-all approach to implementing greenhouse or VFS in Nunavut; there are advantages and limitations to both types of indoor farming. For example, while greenhouses with CEA technology may be able to grow a wider variety of crops, their utility is still limited to a short growing season in the North. VFS can grow produce year-round, but the commercial viability of crops is still limited largely to leafy greens and herbs. In addition, there is much diversity across Nunavut's communities in terms of population, climate and infrastructure needs. The first two recommendations should provide support for both types of indoor farming technologies in an unbiased way, so that all stakeholders are accurately informed of the benefits and drawbacks indoor farming technology can offer. Solutions should be tailored to suit community wishes and needs. An indoor farming solution that uses both greenhouse and VFS technology would be ideal, as they would complement one another and be able to provide a wider crop variety.

Conclusion

Advancements in agriculture and horticulture have led to a rapid rise in indoor farming techniques and technologies across the world. From modern greenhouses to VFS, these systems are making their way into Canada's North. Through CEA, environmental variables can be controlled with precision, allowing crops to be grown even in the cold, remote arctic climate.

Further advancements in Ag Tech will lead to overall cost declines for indoor farming systems including VFS, increasing their economics and attractiveness as potential solutions to addressing food security for northern regions, including Nunavut. These systems have the potential to shift some food production from the south to the community level, empowering Nunavut communities to take control of where their food comes from.

Several challenges remain, however. Costs still need to come down, and community buy-in must be there, along with community champions to ensure long-term success. Much capacity building also needs to be done to highlight both the opportunities and challenges. But many northern communities are already leading the way, like Iqaluit, Yellowknife, Kuujjuaq, and Inuvik (among others). These communities are utilizing both greenhouse and VFS technologies to help address the issues of food security and food sovereignty.

Despite the challenges, indoor farming holds potential in supporting food sovereignty and food security across Nunavut. Greenhouses (with CEA) and VFS are already operating in the north, with several companies looking to expand further into the territory. Nunavut organizations and communities to develop indoor farming solutions that cater to their specific needs. In many cases, it may make sense to combine VFS and greenhouse systems, allowing for the benefits of both to complement each other. These hybrid models are already being tried in northern communities, such as in Kuujjuuaq[38]. In addition, there is potential to explore the raising of livestock in communities, if they are willing; several individual-scale projects to raise livestock are already happening. More research is needed to accurately detail the challenges, opportunities, and feasibility of growing systems in the north. Equally as important is building the capacity amongst Nunavummiut to educate people on how indoor farming could potentially play a role in Northern food systems.

Modern problems require modern solutions. Indoor farming technologies may not be traditional ways of harvesting food, but they have the potential to enhance food sovereignty and empower Nunavummiut to grow their own food.

[38] https://www.makivik.org/kuujjuaq-hydroponic-container-growing-fresh-produce-in-nunavik/

Integrated Community Sustainability Plans

Qikiqtani community food related infrastructure plans

Community	Infrastructure Plan
Arctic Bay	• Upgrade or replace community freezer • Community soup kitchen – warm place to go for a meal • Food bank – better storage for food
Clyde River	• Community fishing vessel
Grise Fiord	• New community freezer • Greenhouse • Resources for community hunting and fishing
Resolute Bay	• Renovate community freezer
Sanirajak	• New community freezer • Fish plant – generate employment and allow for harvesting of fish • Marine Infrastructure Feasibility Study Project – help ensure that adequate facilities to support a commercial fishery
Kimmirut	• Meat and fish processing plant – updating equipment and infrastructure to enhance traditional economy • Search and rescue office and storage – for equipment, supplies, and to run searches from
Kinngait	• New community freezer • Greenhouse
Pangnirtung	• Repair community freezer • Install saltwater supply, processing and draining system for the fish processing plant • New rescue boat and storage area for search and rescue team
Sanikiluaq	• Food bank

Hunters and Trappers Engagement Summary

Correspondence with Qikiqtani Region Hunters and Trappers Associations/Organizations

Hunters and Trappers Associations/Organizations	
Kinngait	• Would like funding for a community walrus hunt. Expensive to do community hunts. • Interested in greenhouse – local students could help run it if located near the school
Sanikiluaq	• Fisheries opportunities - working with World Wildlife Fund and Memorial University
Sanirajak	• Community freezer is expected in 2022 and will help with wastage of country food • Interested in a vacuum sealer • Need butchering equipment • HTA relies on government contributions for harvesting country food • Need funding for operating equipment • Need a dedicated employee to food preparation and operating the equipment. • Salary for the HTA manager is not sufficient for their level of responsibility and the amount of work that is expected. Some projects suffer as a result. • Potential for fisheries in the area

Economic Development Officer Engagement Summary

Correspondence with Qikiqtani Region Economic Development Officers

Economic Development Officer Correspondence	
Clyde River	• HTO has a new community freezer, with butchering area – has not been operational • Community has only one food store currently for a population of 1,200+
Grise Fiord	• If community freezer space was available, musk oxen and muktuk could be stored and profitable
Kimmirut	• local HTA pays Hunters and Trappers for locally hunted or trapped animals, which they then distribute to the community • Hope to be involved in commercial fisheries
Pangnirtung	• In need of reliable community freezer • Funding for harvesting, training for harvesting and processing needed • Community members in need cannot afford fish at Pang fish plant
Pond Inlet	• Tower Gardens in community's wellness centre – scheduled to arrive 2022 sealift • Would like to support harvesters to provide for their community
Qikiqtarjuaq	• Have a new community freezer (2020) but not operational – electrical problems and work was delayed • Community members are eager to start hunting – need funding to make possible
Sanikiluaq	• Community freezer built in 2015, but operating costs too much for HTA to cover. Need more funding for HTA.

Proceedings from Niriqatigiit: a Food Sovereignty Roundtable

QBDC held a three-day roundtable event in Iqaluit with delegates from across the Qikiqtani Region. Representatives included Elders, youth, hunter and trappers' members, Hamlet Council members, and economic development officers.

The *Niriqatigiit Roundtable* was a forum to stimulate discussion around food sovereignty in the Qikiqtani Region and to kick-off a larger project being undertaken by QBDC and QIA to bolster the food sovereignty movement.

Niriqatigiit – a Food Sovereignty Roundtable

Conference Proceedings

August 29 – September 1, 2022
Aqsarniit Hotel & Conference Centre
Iqaluit, Nunavut

Conference Goal:
The conference is aiming to have an overall discussion on food sovereignty and kick off a larger project being undertaken by QBDC and QIA to advance food security actions in the Qikiqtani region. Key to this conference will be hearing from communities on what they are doing and what they need around food sovereignty.

Tuesday, August 30 Qikiqtani Food Sovereignty Initiatives		
Session	**Discussion**	**Outcome/Take home**
QBDC - Qikiqtani Food Sovereignty Implementation Solution Presenter: Sheldon Nimchuk, QBDC • Welcome, overview of three days • Introduce QC/QBDC	Community Delegate: • Community has been 6 years without an operational freezer • Have lost a lot of opportunities, especially with Elders/youth, because of lack of infrastructure • Where to get help with freezer? • Have a hard time working with southern consultants • Encouraged by the High Arctic Inuit Stewards program and looks forward to seeing the impacts to local economies	• All communities lack adequate freezer space • With adequate freezer space, country food won't go to waste and there will be more

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Qikiqtaaluk Business Development Corporation

• Speak to Northern Food Innovation Challenge QBDC project	Community Delegate: • Just received a new community freezer, funded by the GN, but there are space issues and they do not have processing equipment (current equipment is more than 40 years old) • Finds there is a disconnect between consultant recommendation and reality/what's feasible (in relation to a new youth centre) • All community members contribute to food security. Often men are compensated to hunt, but women are not compensated to make food for community members. This should be considered in future programming. QBDC Response: • QBDC can support facilitating the conversations with consultants. Community Delegate: • Community freezer is too small. Often country food rots because they do not have enough space • With more space, harvesters and youth can hunt and feed our community • There are resources and potential to teach the younger generation, but they don't have the infrastructure to support this • Have inspection challenges with their freezer Sonny Gray – NorthStar Agriculture • Infrastructure has an expiry date and the more high-tech the infrastructure is, the more issues and costs to operate • Should look at low tech options for freezers – seacans with blocks of ice, or bury insulated boxes in ground Community Delegate: • Community freezer is not operational, in good condition structurally	opportunities for intergenerational teaching/learning • Communities need northern expertise to plan/deliver infrastructure • Should look at low tech community freezer options • Programming to not only support harvesters but also to support and compensate feeding our communities is needed
Qikiqtani Food Sovereignty Infrastructure QFSIS – infrastructure concepts	Community Delegate:	• Communities need processing

Presenter: Sheldon Nimchuk, QBDC • Present infrastructure concepts • Feedback on concept	• Have a model for a community freezer a consultant developed – first 4 years Hamlet is responsible for operations and then another entity will take over. Uncertain who this entity is • Potential for the smaller community facilities to pack product whole, freeze and ship out to distribution hub for further processing QBDC response: • Who will own and operate the facilities will be part of the dialogue moving forward. Currently HTAs typically operate the community freezers Levi Barnabas (Chairman, QC Board of Directors): • Freezers could be owned/operated by Inuit or by individuals/small group in community, not CGS, not HTA Community Delegate: • HTA's used to have a business arm • The processing plant in Iqaluit started small, a small store to sell products is needed in Iqaluit. Sonny Gray, NorthStar Agriculture • Non-profit organization to own/operate facilities with different entities overseeing the different aspects (food bank, market, catering, farm, etc). Non-profits can maximize leveraging funding. Community Delegate: • To better support harvesters, processing facilities are needed so harvests can be processed and distributed within or to other communities before it rots and to make a profit (currently animals harvested that do not have tusks do not make a profit) • Distribution network – need to consider both transportation network and resource capacity • Processing facilities – different requirements for different animals therefore each community needs to have different facilities Community Delegate:	facilities to support harvesters • Start with smaller facilities to promote success • Each community will have a different concept depending on capacity and resources in that community • Airline transportation will be a constraint and needs to be considered • Consideration of community owned and operated facilities through a non-profit organization may give the most flexibility and opportunities for funding

	• Distribution network considerations: Not all transportation hubs are good food processing hubs. Eg: Rankin Inlet is a transportation hub, but it is not a good place for country food hunting • Food processing facilities don't need to be big, just need processing and market space. Need to consider regulatory requirements • Airline challenge – lack cold/freezer storage space in communities Nathan Jewett – Sedna's Lair • The concept is too big, communities don't have enough country food to make this concept sustainable • Airlines don't have the capacity to move that much food, this will be a huge constraint. Example of the Pangnirtung fish processing plant, the GN had to arrange for charters to move product and eventually the plant had to adjust their schedule to match the airline schedule which meant laying people off Michael Doyle – Arctic Fresh • There needs to be a focus on keeping product in the north • Need to empower communities to own and operate the facilities, start small to empower communities to have their own food autonomy • If the food processing facilities are CFIA approved, can get the NNC food subsidy Community Delegate: • Country food is ordered from other communities because each community has different country food available – this cargo needs to be prioritized with the same level as store-bought food. Also need appropriate storage facilities so it doesn't rot • Concerned about the food processing infrastructure not getting built in smaller communities QBDC:	

	• Intent is for each community to have a facility. Each community will have a different facility depending on the need. A community-specific drawing will be made for each community	
Arctic Fresh – Healthy Hubs Presenter: Michael Doyle	Healthy Hub model: • Modular design with butcher shop, cold and freezer storage, dry storage, greenhouse, retail store • Can be built under $1M • Off-grid enabled • Self-sustaining units • Looking at autonomous aircraft to move food (drones in 2025) • If Health Canada certified, product can be shipped within Canada • A component of the model is recipes, nutrition, cooking, teaching • Arctic Fresh looking at equipment hubs in communities to stock equipment Community Delegate: • Butcher shop will allow added value meat processing like char steaks • Challenge in communities is financial audits – limited resources to complete them on time. More financial and business support is needed for these facilities Community Delegate: • Different products in different communities that can be utilized to sell. Eg: Kimmirut has blackberries that can be marketed Community Delegate: • There is not enough country food even when ordering from other communities. This is due to not enough people harvesting, not lack of wildlife. Supply is increasing – eg: caribou are coming back • Unemployed people want to hunt but do not have the resources to buy equipment. Need better support for these people which will realize more country food availability	• Considerations need to be given as to what financial and business support communities need to run these facilities • More programming is needed for harvesters to purchase equipment • Food security isn't only about country food – young people prefer store bought food which needs to be considered • Need to capitalize on the value of country food • Inuit need to be consulted about wildlife availability and seasonal

	• Consideration for programming to help pay down payments for equipment • "When people hunt for their own food, they have food security" Community Delegate: • Need funding support for hunters to provide free food for community as hungry people don't always have money to buy products • Young people like to eat store bought food, so this also needs to be considered Nathan Jewett – Sedna's Lair • Need to take advantage of the high value of country food. It can be sold in the south at a high value, and revenue can be used to purchase equipment • Often there are certain migratory animals available but there isn't the equipment to harvest them, or they're waiting on parts. Equipment and parts need to be stockpiled in communities Community Delegate: • Qikiqtani has 13 communities therefore would need a lot of food processing facilities. Could consider fewer hub facilities to process • For any commercial model, Inuit need to be consulted properly about wildlife and different migration/seasonal patterns. Really need to understand supply before these facilities are constructed. Need to consider what animals are available each month and in what community. Each community may have/need a total allowable harvest Sonny Gray – NorthStar Agriculture • The modular design can be expanded on for livestock such as chickens and rabbits. Freezer will be expiring heat that can be used to heat the livestock area. Livestock can build soil for growing produce	availability needs to be considered – create food maps to model a sustainable food system

	• Need to consider that different processing areas are needed for red meat, white meat, and marine products • Consider utilizing the network of universities to leverage funding/do research	

QBDC - Food Sovereignty Campaign
Presenter: Sheldon Nimchuk
 	
• This session is about collecting feedback from communities on food sovereignty. Specifically:
  ○ How can communities host events?
  ○ How can communities support HTAs?
  ○ What equipment for small-scale food processing is needed and where can it be housed?
	Feedback:
	• Train youth on traditional butchering
	• Need more radios, VHF antennas, more training to use this equipment
	• Gas cards, cases of pop for prizes	

Wednesday, August 31 Inshore Fisheries & Local Harvesting Opportunities		
Session	Discussion	Outcome/take-home

QIA Nauttiqsuqtiit Program
Speaker: Neil Kigutaq
• Overview of Nauttiqsuqtiit Program
• Overview of planned infrastructure
• Role of Nauttiqsuqtiit in food sovereignty
	Presentation notes:
	• QIA's IQ Department also doing a food sovereignty survey – will be creating food maps to model a sustainable food system
	• Nauttiqsuqtiit have created harvesting calendars
	• Community priorities to coordinate **cooperative harvests** with other communities
	• Community Needs:
	  ○ Sustainability Needs
	  ▪ Food first for the community
	  ▪ Revenue streams to support ongoing expenses
	  ▪ Indoor farming, solar, innovative technology
	  ▪ Creation of local jobs
	  ○ Operational Needs
	  ▪ Capacity building and administrative training
	  ▪ Harvester wages
	  ○ Infrastructure Needs
	  ▪ Community freezers with renewable energy
	  ▪ office space
	  ▪ Gear and accessories store
	  ▪ Food processing and retail
	Communtity Delegate:
	• Biggest issue is funding – these programs need to be sustainable as funds are not endless, definitely should consider commercial opportunities to support sustainability
	• Leverage opportunities of the Nunavut Agreement (IOL land, Inuit funding from Feds, Article 5)
	• Identify a board or group to help advance sustainable programming
	Community Delegate:
		• Nauttiqsuqtiit program is supported by communities and beneficial in supporting food security
		• More QIA support is needed to ensure communities are compensated for the offshore fisheries
		• Harvester support needed:
		  ○ Equipment subsidies
		  ○ Compensation for harvests
		  ○ Training for technicians to fix newer machines
		  ○ Chest freezers
		  ○ More parts to be available in communities
		  ○ Secure storage and garage to store and work on machines

	• The Nauttiqsuqtiit program really supports communities with their harvest, especially in a time when the cost of living is increasing. Would like to see this program in all communities • Hunters need to be compensated for their harvests and to distribute food to communities Community Delegate: • Concern that the offshore fisheries aren't supporting communities and suggest an IIBA is created for the offshore to ensure communities are compensated for the offshore resources. Would like QIA support on this Community Delegate: • One obstacle with some funding programs is the requirement to have insurance and to use registered outfitters. Limited them from getting funding for youth on-the-land programs Community Delegate: • Reiterated community freezer issues, breaking down and food gets wasted. Need technicians that can fix freezers General Discussion: • Technician Sharing Agreements with Co-op and Airlines for maintenance on all freezers. Need commonality between all freezers in communities so they all have similar parts • Research and development for low tech freezers, pilot projects to prove a concept Community Delegate: • Suggested support for hunters to buy chest freezers so they can preserve their harvests • Community has 75 full time harvesters, 20 youth learning from them • Currently have gas rations (20 L/day for next 4 weeks), this will limit harvesting • Orcas are further north now – are they a threat to the marine habitat? can they be harvested?	

	Discussion on orcas: • Elder: traditionally orcas are valued, cleanse the sick/weak • Elder: Orcas support harvesters because its easier to hunt other whales that the orcas are preying on – we shouldn't worry about their presence Discussion on harvester support: • Each hunter needs a skidoo, qamutik, boat, PPE, gun, fuel, etc (>$100K) just to get on-the-land. Each time on-the-land they're not guaranteed to harvest. Need to be compensated • Newer equipment is harder to maintain due to electronics/digital, need the diagnostic tools, need more training for local people to fix skidoos, ATVs, or start a new business for this • Need more availability of parts in communities so don't need to order from Iqaluit or south • Needs change as season changes, equipment gets lost when on-the-land – there is a constant need for equipment and there are limited choices/availability in communities for equipment • Hunters with no jobs are very able to hunt but can't afford to • Typically supplies that are needed but hard to get: red buoys, life jackets, life suits • Need a garage to work on small machines, hunters have an average length of boat that is 18-20' long • Vandalism of boats/skidoos is common – need secure storage • Support for purchasing sewing machines	

Inshore Fisheries Development Speaker: Jesslene Jawanda • Inshore fisheries development plan • Inshore fisheries research • Seal blubber initiative	**Inshore Fishery Research – presentation notes** • Currently doing research in Sanikiluaq, Kinngait, Igloolik and Sanirajak • RV Ludy Pudluk – multi-million-dollar research vessel owned by QC • Starting a student mentorship program, 8 students in Igloolik and Sanirajak will participate in research activities on board the Ludy Pudluk for the day • QC is applying for more funding to do research in the other communities and to build a second research vessel • With 3-5 years of research, QC can request inshore fishery licenses from DFO who consults NWMB to approve licenses • Consult HTA prior to conducting research in communities to find out which species they are interested in • Also researching the type of tools and equipment needed to harvest the inshore fishery areas Discussion: • QBDC: Want to look at national and international markets as well as a regional trade system • QBDC: Will assess how much product is needed to sustain a processing facility as part of the QFSIS project • Communities lack infrastructure and have a poor transportation system, this problem needs to be fixed before inshore fisheries can be developed - Pangnirtung fish plant has had issues due to the transportation system. • Potential for ships to transport product to and from communities during the summer months, could own a ship • Concern of food regulations • QBDC: will add potential for ship to move product to the QFSIS challenge statement	• Explore potential uses for other marine animal blubber • Generally, communities are interested in commercial inshore fisheries • Need infrastructure and transportation system in place for a sustainable commercial inshore fishery

	• One challenge is there is no storage facility in Nunavut to store the research vessel over winter – currently chartering the vessel for research work elsewhere during the off season in Nunavut **Seal Blubber Initiative – presentation notes** • Hired Iqaluit HTA to harvest ringed seal and remove and vacuum pack the seal blubber • Seal blubber was sent to a southern facility to render the blubber into pure oil • Product would be made into a vitamin type pill • Has health benefits for diabetics, helps with nerve damage • Elder from Pangnirtung identified when he eats ringed seal his symptoms lesson • Currently doing market research on the oil Discussion: • In the past narwhal and beluga blubber was used for qulliq and to feed dog teams, now there isn't a use for it. It doesn't rot easily and is a good oil, but we throw it away. • In the past, oil and blubber were used to heal, the ligament that keeps blubber together was used as bandages and is edible • The meat and bones of the seal that were used in this project were distributed around the community • Bearded seal oil is very good for cuts and skin problems, could explore this potential	

Thursday, September 1 Business/Community Initiatives Opportunities		
Session	Discussion	Outcome/Take-home
Funding Opportunities Speakers: • Connie Kwon: Arctic Inspiration Prize • Sheldon Nimchuk: QIA, Government funding opportunities	• Funding is required for trades/carpentry programs • Winners of the Arctic Inspiration Prize are a national news story so that often attracts more funding	
Sedna's Lair Speaker: Nathan Jewett • Speak about small food business start-up • Logistics of moving food around the territory, etc • Canning/pickling demonstration	Presentation notes: • Need to capitalize on the value of wild food; pristine environment = high premium, unique food that isn't sold anywhere else • Under Article 5 of the Nunavut Agreement anyone can process and sell food within Nunavut without a CFIA approved facility • Main market in Nunavut is people in Nunavut travelling south • The higher end the packaging, the more you can charge • Good idea to have multiple product streams. Merchandise is another popular item, plants could be sold for teas or as fuel for a smoker, Nunavut has unique berries you can't get anywhere else, potentially mushrooms • Important to remember about liability - Need group liability insurance Discussion: • Concern there isn't a market. Eg: Pond Inlet had halibut but didn't have any buyers	• Communities have interest in learning more about other ways to preserve country food • Supports are needed on the administrative side of starting and operating a commercial business • Can capitalize on the value of wild food from Nunavut – there are markets

	• Funding for a certified plant requires a guaranteed market • Response – there is a huge market potential in high end restaurants, tourism, Asia. Can share business plan. There is funding available to do a market scan and secure clients • A big obstacle is the administrative side of things to get a business up and running – operating computers, making applications, financing • Communities don't have processing/packaging equipment (pickling, vacuum sealer, etc) – how do we get this? • Communities typically only eat meat fresh or frozen, questions about the pickling/canning process • Questions/discussion about fish roe market potential and how to preserve • Questions/discussion about permits required to export products outside the Territory	

Indoor farming/agriculture opportunities
 	
North Star Agriculture – Sonny Gray
	• Discussion on low tech freezers:
	  ○ Elders used to make freezers when on-the-land, can do this in communities too
	  ○ Kimmirut Hudson Bay Company used to have an underground freezer
	• Discussion on Indoor Vertical Farming:
	  ○ Electricity use is minimal because now they use LED lights, just need electricity for the pump to move water around
	  ○ Can put them in existing infrastructure rather than building new infrastructure
	  ○ Doesn't require soil, use liquid nutrients
	  ○ Click together the vertical panels so it can become various sizes
	  ○ Using chlorinated water is fine, system uses little water
	• Discussion on composting:
		• Interest in vertical farming

	○ Can make soil within 18 days through composting with worms ○ Compost won't freeze • Reproducible Livestock: ○ Rabbits and chickens ○ Rabbits = pelt, meat, fertilizer (manure can be used directly on plants, doesn't need to be composted), dehydrate ears, feet, and tail for dog treats ○ Chicken = meat and eggs • Greenhouses: ○ Straight forward, low tech ○ Opportunities for bees to pollinate (lots of bees in Sanirajak this summer!) ○ Can burn waste oil to heat	
Pinnguaq – Robynn Pavia • Technology support/food sovereignty survey – led by youth • Financial Literacy – including how to prepare an invoice	• Need support to start businesses • Documents on QBDC website to help start business	• More supports are needed to start businesses

Annotated Summary of Reports Pertaining to Food Sovereignty in Nunavut

Annotated Summary of Reports Pertaining to Food Sovereignty in Nunavut

Draft

December 2021

Executive Summary

This annotated summary of reports pertaining to food sovereignty in Nunavut has been developed to support the ongoing discussion and efforts to advance food sovereignty in Nunavut communities.

In Nunavut food sovereignty means the right to nutritious locally sourced food. For Inuit this translates to country food, such as Arctic char, seal, narwhal, caribou, berries, birds, and shellfish. In Nunavut, harvesters play an integral role in Inuit food sovereignty. They provide country food that feeds communities, reinvigorates Inuit cultural practices, and stimulates local economies.

Specifically, Inuit food sovereignty means the right to healthy and nutritious food, the right to culturally appropriate food, the right to food harvested through ecologically sound and sustainable methods and the right to access wildlife in ways that empower communities and stimulate local economies.

Country food is central to Inuit culture. In Nunavut, the harvesting industry empowers Inuit, transmits Inuit Qaujimajatuqangit, promotes knowledge, skills and Inuktitut language transfer and safeguards Inuit cultural traditions and values related to harvesting, preparation and sharing of food.

It is widely recognized that resources and supports are lacking to promote to a future for Nunavut Inuit where country food is a readily available choice for families and harvesting is a viable livelihood. Through Qikiqtaaluk Business Development Corporation's (QBDC) Qikiqtani Food Sovereignty Implementation Solution (QFSIS) Project these resources and supports will be identified in collaboration with the Qikiqtani communities.

QBDC was created to stimulate local, regional and territorial economic development opportunities. Creating partnerships and collaborating with communities, QBDC works to build prosperous, more self-sufficient communities by creating work and capacity building opportunities.

Improving access to country food and supporting harvesting infrastructure is one avenue QBDC is working with Qikiqtani communities to build prosperous and more self-sufficient communities. The QFSIS Project is an essential first step to establish the necessary community-based infrastructure to support harvesters and communities in achieving food sovereignty.

The goal of the QFSIS Project is to support access to country food and develop enabling technologies so that Inuit can improve food sovereignty on a community and regional level. The Qikiqtani Food Sovereignty Implementation Solution is an essential first step to establish the necessary community-based infrastructure to support harvesters and communities in achieving food sovereignty.

To this end, this *Annotated Summary of Reports Pertaining to Food Sovereignty in Nunavut* compiles the available and relevant information respecting country food consumption and food sovereignty in Nunavut. This compilation does not represent an exhaustive list.

Each report within is summarized in content and with perspectives for application in Nunavut. The perspective for application to the QFSIS project represents the opinions of the authors.

Contents

1.0 Inuit Food (In)Security in Canada: Assessing the Implications and Effectiveness of Policy

Title: Inuit Food (In)Security in Canada: Assessing the Implications and Effectiveness of Policy
Type of Publication: Policy Review, published in Queen's Policy Review Vol 2, No.2
Author: Hilary Ferguson, Ryerson University
Date: Fall 2011

This paper analyzes available data at the time of writing (2011). Based on the data the paper looks at the causal factors behind Inuit food insecurity, mainly looking at socioeconomic and environmental factors, as well as the positive and negative impacts of territorial national and international policy and legislation. The paper also discusses government and community responses to these policies.

Interpretation

Written in 2011, the general state of food insecurity for Nunavut Inuit has not improved significantly over the last decade. The same challenges are faced, and the same needs are evident. This multi-faceted problem remains complex and of critical importance and while written a decade ago the papers content is still relevant.

Application to Qikiqtani Food Sovereignty Implementation Solution

The paper points to several challenges that will be evaluated through this project

- The study points to socio-economic change as a factor, specifically stating:
  > "As a result of the shift from a traditional to a more modernized economy, there is competition between traditional food consumption and a more westernized diet based on the convenience of prepared foods. Youth are less interested in hunting as a result of increasing opportunities in the wage economy and there has been a decline in the number of Inuit hunters"
- The cost of harvesting is identified as an obstacle:
  - "Furthermore, the cost of hunting is estimated to be more than $200 for a weekend hunt requiring inputs such as gas and ammunition, especially demanding for individuals with insecure incomes."
- The study also points to changes in the traditional sharing culture:
  - "With increased hunting cost, and the scarcity of caribous and walrus, hunters are increasingly reluctant to share country food.
- The study also identifies the necessity of working community freezers:
  - "Community freezers are also a strong focus of various local organizations that aim to provide storage facilities for what is harvested during community hunts. These are usually managed by hunter and trapper organizations and are run during the warmer summer months to keep harvests frozen. Many freezers are currently in a poot state and require repairs or replacement, a condition that is described as a threat to food security since problems with freezers can result in food spoilage.

2.0 Recommendations for an Improved Nutrition North Canada Subsidy Program

Title: Recommendations for an Improved Nutrition North Canada Subsidy Program
Type of Publication: Recommendation document submitted to Nutrition North Canada
Author: Nunavut Tunngavik Inc.
Date: November 30, 2016

This document highlights the inadequacies of Nutrition North Canada's subsidy program in Nunavut. Less than one percent of the Nutrition North Canada budget has contributed to increasing access to country food. As well, the removal of subsidies for hunting, fishing, and harvesting equipment has prevented Inuit from participating in and strengthening local food systems.

The food system in Nunavut includes harvested country food and store-bought food, both which are essential to food security. The current subsidy model preferentially supports availability of imported, store-bought food rather than locally harvested food. The authors propose a realignment of the subsidy that recognizes food as the right of northern Canadians, stating the subsidy should create a relationship between the federal government and northern communities, rather than retailers.

This document stresses the importance of country food to Inuit culture, including the transfer of traditional knowledge related to harvesting, sharing, preparing, and consuming food.

The authors suggest several other ways to improve the Nutrition North Canada subsidy, such as increasing the budget to accommodate inflation and population growth, verifying the benefits of the subsidy are being passed to the consumer, allowing small businesses to become eligible Nutrition North suppliers, and to create a separate program specifically designed to provide a subsidy for harvesting equipment and increased access to country food.

Application to Qikiqtani Food Sovereignty Implementation Solution

This document shines a light on the importance of Inuit and northern government input in the federal government's Nutrition North Canada subsidy. It also highlights the importance of locally sourced country food as essential food sources and to promote and preserve Inuit culture and traditions.

Throughout the Qikiqtani Food Sovereignty Innovative Solution, care should be taken to discuss food security concerns and needs of local Inuit and to promote harvesting, sharing, and preparing country food.

3.0 Recommendations on Northern Sustainable Food Systems

Title: Recommendations on Northern Sustainable Food Systems
Type of Publication: Recommendation document
Author: National Indigenous Economic Development Board
Date: February 2019

This report highlights the complex meaning of food for Northern Indigenous people and suggests food is linked to identity culture and a way of life. Food is central to the physical, emotional, spiritual, and mental health of Indigenous peoples. Within Inuit culture there is a strong commitment to sharing country food with family and community members.

The authors provide five recommendations to address the gap in food sovereignty in the north. The first recommendation is to implement policy tools to support harvesters and facilitate the procurement of traditional foods for use in schools and government and facilitate food inspections. These policies would be co-developed with Indigenous governing bodies.

The second recommendation is to develop and enhance local small-scale Indigenous commercial fisheries. This would include the support for local processing facilities.

The third recommendation is to enhance and alter federal subsidy programs. This includes support for local food production and harvesting through Nutrition North Canada as well as introduction of Northern income allowance and indexed federal income tax rates. They also recommend economic development supports to enable locally owned supply and distribution chains for market foods.

The fourth recommendation is an infrastructure investment strategy to take advantage of future economic development opportunities. These investments include deep water port construction, airport improvements, and road enhancements.

The final recommendation is a simplification of funding opportunities for Northern individuals, communities, and businesses.

Application to Qikiqtani Food Sovereignty Implementation Solution

Food security in Nunavut requires a combination of support for harvesters, facilities for processing country food, development of local Inuit commercial fisheries, enhancements to Nutrition North Canada to include country food, creating income equality, and addressing the lack of infrastructure.

4.0 A Northern Food Security Monitoring and Contingency Planning Solution

Title: A Northern Food Security Monitoring and Contingency Planning Solution
Type of Publication: Recommendation document
Author: Canadian Northern Economic Development Agency
Date: 2021

COVID-19 emphasized the vulnerabilities of the food, fuel, and medical supply chains in the far north and that there is no “Plan B” solution. IndigenousTech.ai Corporation proposed a monitoring and contingency planning solution to safeguard the northern supply chain during the COVID-19 pandemic.

The project team proposed an Indigenous-led Information Technology solution that monitors and tracks the health of pilots and truckers with rapid notification to Northern Affairs Canada and the Canadian Military if concerns arise.

The proposed solution involved collecting data on Northern Indigenous Communities' supply chains on a weekly basis, storing data on a protected service, data analysis by artificial intelligence, and notification to Department of National Defence if potential issues arise.

Application to Qikiqtani Food Sovereignty Implementation Solution

The pandemic brought to light the vulnerabilities of supply chains in the north and impacts this can have on food security. Supply chains should be evaluated for improvements that can be made including resiliency to future emergencies.

5.0 The Commercialization of Country Food and Food Security: The Case of Greenland and What Nunavut Can Learn

Title: The Commercialization of Country Food and Food Security: The Case of Greenland and What Nunavut Can Learn
Type of Publication: Recommendation document in response to *Nunavut Food Security Strategy and Actiona Plan 2014-16*
Author: Joanna Petrasek Macdonald, Catherine Huet, and Dr. James Ford, McGill University
Date: April 2015

This report examines the feasibility of developing and promoting country food markets in Nunavut based on the model of common open air traditional food markets in Greenland.

The authors conducted a literature review and key informant interviews focused on the importance of country foods for Inuit, the nutrition transition, and the alternative methods of traditional food access in both Nunavut and Greenland.

Specifically, the report addresses the questions: 1) How do commercial country food markets in Greenland operate? 2) Do country food markets affect food security? 3) What can Nunavut learn from Greenland's experience with country food markets?

The report provides a thorough overview of Greenland's system and the factors which make traditional food markets operational including licensing and reporting requirements, policy, quotas, government economic support, and collaboration and cooperation of various stakeholders. However, the report recognizes that what works in Greenland took 150 years to develop, is still not prefect and may not work in Nunavut because of the differing socioeconomic and historical contexts.

While some benefits of country food markets in Nunavut were discussed, the general perception was that there are many challenges and reasons why a market would not be feasible or desirable in Nunavut. Challenges and problems discussed were deterioration of sharing networks, pressure on wildlife sustainability and the lack of scientific data on wildlife stocks and harvesting rates, barriers to harvesting such as the amount of resources required to hunt.

Application to Qikiqtani Food Sovereignty Implementation Solution

Key take home messages from the report's literature review and interviews which are applicable to the Qikiqtani Food Sovereignty Implementation Solution project are:

- Improved harvester support programs are needed
- There is an agreement that food harvested in Nunavut should stay in Nunavut and that any initiative should come from Nunavummiut
- There are mixed opinions and perceptions on the idea of country food markets in Nunavut
- Professional hunting is a full-time job and livelihood in Greenland however in Nunavut hunting may not be a viable livelihood given the current situational limitations such as the caribou ban, and inadequate harvester support programs.
- The physical infrastructure to support country food markets does not exist in Nunavut communities
- There is an agreement that the audience who should be served is the population presently excluded and most in need which includes low-income households, Elders, single parents, and teenagers living on their own.

6.0 Inuit Community Roundtable – Iqaluit

Title: Inuit Community Roundtable - Iqaluit
Type of Publication: Briefing Note
Author: Community Solutions Network, Future Cities Canada
Date: Fall 2019

In September 2019, an Inuit Community Roundtable was held in Iqaluit, Nunavut which provided an opportunity for harvesters, community members, Elders, and youth to share knowledge, experiences, and approaches to adapting to changing climate, environment, and society. It also provided an opportunity for researchers, service providers, and government to learn and share.

The key themes identified for the Roundtable were technology and ice safety for harvesters, wildlife stewardship, and intergenerational uses of technology. The most beneficial and accessible innovations for communities are often those that reinvigorate traditional design techniques with modern digital technology.

The Roundtable highlighted food security in Nunavut. The issue of food security is often discussed, but there is often not a link between safety and food security. Safety concerns around sea ice stability, harvesting equipment and being on-the-land should be considered in policies, programs, and funding.

Participants in the Roundtable provided insight into food insecurity and its link to changes in climate and lack of technology. Participants suggested that community-based solutions to build food security while considering on-the-land safety and hunting technologies are required.

The Roundtable also provided information on services available to harvesters such as SmartICE sea-ice monitoring which provides information on safe and unsafe area in terms of ice stability. Other Government of Nunavut programming was highlighted such as providing free SPOT devices as well as food security and poverty reduction programs which address gaps in harvesting requirements and food needs of families.

Application to Qikiqtani Food Sovereignty Implementation Solution

This Roundtable provide insight into concerns that could be addressed in the Qikiqtani Food Sovereignty Implementation Solution. These include addressing safety concerns while hunting on-the-land by providing access to reliable equipment and safety gear.

Inuit should also be aware of the services available to them to increase safety while hunting on-the-land and the status of sea ice.

7.0 Nunavut Wildlife Harvesting Survey 2004

Title: The Nunavut Wildlife Harvest Study
Type of Publication: Harvesting study for the Nunavut Wildlife Management Board
Author: Heather Priest, Nunavut Wildlife Management Board; Peter Usher, P.J. Usher Consulting Services
Date: February 2004

This study summarizes the harvesting data that was collected monthly from Inuit hunters over five years, from June 1996 to May 2001. The results of the study were to be used by the Nunavut Wildlife Management Board to aid in the management of wildlife resources in Nunavut. It considers the basics needs level of Inuit. Information collected included the species of animal harvested, the number of animals harvested and the location, age, and sex of the animal.

The authors of this study suggest that the sample of harvests from each community do not fully and accurately represent the hunter population and that harvesting rate are higher than catalogued in this study. This paper outlines the challenges in obtaining accurate hunter response due to fieldworker staffing difficulties, hunters not wanting to be interviewed, non- or variable response rates and under reporting of certain species such as eggs and shellfish.

While the authors do not provide specific information on how much harvesting impacts Inuit in this study, it does show that harvesting is an important aspect of Inuit culture and provides food for families and communities. For example, the mean harvested ringed seal over the five-year time period was over 25,000 animals each year. For Arctic char, almost 200,000 were harvested each year. From this study one can calculate basic needs levels for Inuit.

Application to Qikiqtani Food Sovereignty Implementation Solution

This paper provides insight to the challenges in obtaining accurate harvesting data in Nunavut. These challenges will be taken into consideration throughout the Qikiqtani Food Sovereignty Implementation Solution project when attempting to reviewing hunters' activities and food distribution costs.

8.0 Collaborating toward improving food security in Nunavut

Title: Collaborating toward improving food security in Nunavut
Type of Publication: International Journal of Circumpolar Health 2013, 72: 21201
Author: Jennifer Wakegijig, Geraldine Osborne, Sara Statham and Michelle Doucette Issaluk, Government of Nunavut Department of Health
Date: April 2015

This paper identifies food security factors in Nunavut and summarizes the work by the Government of Nunavut since 2003. The summary ends with the development of the Nunavut Food Security Coalition in 2014 and their collaborative efforts to develop a territorial food security strategy to address pervasive food insecurity in the context of poverty reduction. The Nunavut Food Security Coalition is a partnership between Inuit organizations and the Government of Nunavut.

This paper outlines several factors that affect food security in Nunavut, including changing environmental conditions and therefore changing availability of country food, a reduction in the number of active harvesters due to changing socio-cultural conditions, high cost of obtaining food, and low incomes and money management skills.

Four main components of food security are recognized by international agencies and academics as the primary factors relevant to food systems:

1. Availability – sufficient food consistently
2. Accessibility – enough resources to obtain food
3. Quality – adequate nutritional and cultural value
4. Use – how to utilize food

Application to Qikiqtani Food Sovereignty Implementation Solution

This paper shows the complex factors that relating to food security in Nunavut as well as suggests the challenge of lacking policy implementation resources and political will as potential issues.
Food security in Nunavut requires a combination of strategic thinking and planning and collaborative efforts to address socio-economic issues.

9.0 Nunavut Food Security Strategy and Action Plan 2014-16

Title: Nunavut Food Security Strategy and Action Plan 2014-16
Type of Publication: Action plan document
Author: Nunavut Food Security Coalition
Date: 2014

This action plan document, created by Nunavut Food Security Coalition, was published in 2014, and while data and references are from over a decade ago, many of the same issues are relevant.

The Nunavut Food Security Coalition outlines four components of food security: availability (wildlife or groceries in stores), accessibility (ability to go hunting or to buy groceries), quality, and use (how to store, prepare, consume food). These four factors are complex in Nunavut.

This document outlines several objectives of the Nunavut Food Security Strategy.

1. Country food – to promote country food as a foundational food for Nunavummiut, to support harvesters and promote country food sharing, to explore sustainable commercialization of country food, and improve infrastructure.
2. Store-bought food – to develop relationships with commercial partners to promote and encourage healthy eating, to increase healthy food options in stores and to reduce the cost and increase access of store-bought food.
3. Local food production – to support research efforts and project initiatives that explore ways of producing food locally.
4. Life skills – improve life skills by providing resources, training, and sharing.
5. Programs and community initiative – to enhance and extend school nutrition programming for children, to support and promote community-based programs that support food security.
6. Policy and Legislation – provide food security through relevant policy and legislative measures.

Application to Qikiqtani Food Sovereignty Implementation Solution

This document demonstrates the complexity of food security in Nunavut that will be evaluated and can be addressed in the Qikiqtani Food Sovereignty Solution project. These include:

- Accessibility of country food – this document suggests the high costs of harvesting equipment and low incomes have affected the ability of Nunavummiut to access country food. As well, weakening community sharing networks have affected accessibility.
- Availability – increased population and changing environmental implications have impacted the availability of country food.
- Use – loss of traditional knowledge and limited food preparation space and skills have impacted the use of country food.

10.0 Serving Country Food in Government-Funding Facilities and Community Programs

Title: Serving Country Food in Government-Funded Facilities and Community Programs
Type of Publication: Guideline publication for serving country food
Author: Nunavut Food Security Coalition
Date: unknown

This document provides recommendations for food being served to high-risk populations, such as people who are already sick or who have weakened immune systems.

This document highlights the importance of choosing country foods from experienced hunters who are knowledgeable in the processing of foods. It outlines safety of the storage of country food such as storing it at a temperature of four degrees Celsius or colder, or completely frozen.

The authors discourage fermented or aged foods for people who are sick or immunocompromised.

This document also provides information on how to safely prepare country foods, such as keeping raw foods separate from cooked, ensuring proper cleaning tools and surfaces, thawing meat properly, keeping track of the temperature of meat while cooking, washing hands, and not handling food while sick.

The authors provide information on the different ways to serve country food such as frozen Arctic char and seal meat, and cooked caribou and polar bear. They provide information on common parasites and bacteria that can be harmful if consumed. The document outlines how to properly prepare and serve the food to ensure it is safe for consumption.

Application to Qikiqtani Food Sovereignty Implementation Solution

Key takeaways from this document are based on the processing and safe preparation of country food. Items that could be related to and included in the Qikiqtani Food Sovereignty Implementation Solution are:

- Food processing facilities having thermometers to check the temperature of meat
- Providing food-safe packaging such as butcher paper, aluminum foil and food-safe plastics
- Labelling and tracking harvested country foods
- Storing foods in freezers or fridges (under 4°C)
- Providing food labels and tracking sheets to harvesters

11.0 Food Policy in the Canadian North: Is there a role for country food markets?

Title: Food policy in the Canadian North: Is there a role for country food markets?
Type of Publication: Opinion piece, published in Social Science & Medicine, Vol. 152
Author: James Ford, Joanna Petrasek Macdonald, Catherine Huet, Sara Statham, Allison MacRury
Date: 2016

This publication examines Greenland's country food market model and draws on semi-structured interviews to determine if country food markets offer a feasible, sustainable, and effective model for improving the access, availability, and quality of country good in Nunavut.

The paper discussed that the Greenlandic country food market experience has largely been positive. In Nunavut, however, while potential benefits of such markets were recognized, an underlying theme challenged whether they would provide the basis for strengthening the food security of the most vulnerable community members most in need of support. Findings suggested that alternative programs to address food insecurity would likely have greater success, including increasing emphasis and funding for harvester support programs, providing education and training in food preparation, investing in community freezers, and enhancing food support mechanisms.

The study found that negative attitudes towards selling country foods are softening, and in light of the food security challenge facing Nunavut, there is interest in exploring new ways of improving country food access, availability, and quality. While the idea of country food markets was received with caution, there was openness for further examining how markets might be developed.

The paper concluded that Nunavut is not currently in the position to develop country food markets given knowledge gaps and regulatory and institutional conditions including:

- Gain perspectives of community members. Efforts to promote country food markets must be community-led and driven, and flexible to local circumstances
- Some degree of regulatory oversight on harvesting wildlife is needed if country food markets are to be promoted in Nunavut. Several wildlife populations are already under stress, and climate change, resource development and increasing demand due to population growth could further affect the sustainability of wildlife.
- Regular monitoring and evaluation of wildlife populations for species being commercially sold is important for reinforcing sustainable management and ensuring food safety. However existing research in Nunavut is likely insufficient for informing the regulatory structure needed to support country food markets.
- The pricing of country foods in markets needs to be examined. If country food markets are to enhance food security, they need to provide enough food at an affordable price consistently, yet it is unclear if harvest levels supplying markets would be enough to achieve this, or if an affordable price would meet the costs of harvesting.

Application to Qikiqtani Food Sovereignty Implementation Solution

There are many knowledge gaps that must be addressed prior to implementing country food markets in Nunavut including:

1. Consulting communities to gain perspectives of community members on country food markets.
2. Identifying and resolving regulatory issues around wildlife management and harvesting.
3. Examining how the system would be funded and administered.
4. Studying how future risks such as climate change and resource development would affect sustainability and effectiveness of country food markets.

12.0 Food insecurity in Nunavut following the introduction of Nutrition North Canada

Title: Food insecurity in Nunavut following the introduction of Nutrition North Canada
Type of Publication: Research, published in Canadian Medical Association Journal, 2019: 191
Author: James Ford, Dylan Clark, Angus Naylor
Date: 2019

Nutrition North Canada, a food retail subsidy intended to improve food access and affordability in isolated communities, was assessed for its impact on household food insecurity in Nunavut. This study defines household food insecurity as insecure or inadequate access to food because of financial constraints. In 2012, the Canadian average of households experiencing food insecurity was almost 13 percent. Nunavut has consistently had the highest rates of food insecurity in Canada, reaching 47 percent in 2014.

Nutrition North Canada was launched in 2011 and was fully implemented in 2013. This retail subsidy was intended to make perishable, nutritious food more affordable and accessible in remote northern

communities. Nutrition North Canada works by providing a retail subsidy to southern suppliers and northern retailers who are expected to pass the full subsidy to consumers.

In this study, data from 2007 to 2016 from the Canadian Community Health Survey was used to determine whether the introduction of Nutrition North Canada provided changes in rates of self-reported food insecurity in Nunavut. This study used data from households in ten Nunavut communities.

The data analysis in this study showed the annual rates of food insecurity in the included communities was approximately 33 percent before the launch of Nutrition North Canada. During implementation of Nutrition North Canada in 2011, approximately 39 percent of households reported being food insecure. After full implementation in 2014, 47 percent reported being food insecure.

Interpretation

With the implementation of Nutrition North Canada, most non-perishable foods and all non-food items were excluded from the subsidy. With challenges of shipping perishable foods to remote communities and therefore limited access to fresh produce and meats, Nutrition North Canada may have worsened access to foods as prices of non-perishable foods rose.

This study suggested that subsidised food was possibly being consumed in the most affluent households in Nunavut, while the economically vulnerable households were challenged with higher prices of non-perishable foods.

Application to Qikiqtani Food Sovereignty Implementation Solution

This study suggests that the reliance of Nutrition North Canada for nutritious food and food security is not working. Another approach must be considered to create food security in Nunavut households.

13.0 Food insecurity in Nunavut: Are we going from bad to worse?

Title: Food insecurity in Nunavut: Are we going from bad to worse?
Type of Publication: Research, published in Canadian Medical Association Journal, Vol. 191
Author: James Ford, Dylan Clark, Angus Naylor
Date: 2019

This commentary paper provides an overview of the complex interactions between availability and access to store and traditional foods. These interactions should be what determines food policy in Nunavut.

Standard food surveys such as the one used in *Food insecurity in Nunavut following the introduction of Nutrition North Canada* often lack cultural aspects and provide a simple snapshot of the state of the food system at a particular point in time. This paper asks the question: would rates of food insecurity have increased without the implementation of Nutrition North Canada?

This paper looks at four other aspects that may impact food insecurity in Nunavut. The first is social changes due to the impacts of colonialism and its legacy. It is suggested that there is less harvesting of traditional foods in younger generations and less intergenerational transfer of traditional knowledge.

The second aspect is a demographic change across Nunavut. The population in Nunavut has increased significantly and household size and crowding have become a problem. Research has shown that population growth can dilute traditional food-sharing networks.

Thirdly, harvesting restrictions of various species have been implemented in Nunavut over the last ten decades. For example, caribou populations have declined significantly, resulting in limited harvesting.

The fourth aspect is climate change. The changing climate has been linked to declining caribou populations and increasing stress on other species regularly consumed by Inuit.

Application to Qikiqtani Food Sovereignty Implementation Solution

Addressing food subsidization, such as Nutrition North Canada, is just one aspect of many actions needed to address food insecurity in Nunavut. Strengthening harvester support programs, investing in infrastructure and skill development and supporting community wellness programs, reconciliation and healing should all be addressed in creating food security in Nunavut.

14.0 Food Sovereignty and Harvesting

Title: Food Sovereignty and Harvesting
Type of Publication: Informative document
Author: Qikiqtani Inuit Association
Date: March 2019

The Qikiqtani Inuit Association (QIA) developed the Food Sovereignty and Harvesting document to highlight the need for a renewed policy frameworks and funding models that recognize Inuit leadership in decision-making and long-term strategic planning around food sovereignty in Nunavut.

This document provides information on the shortcomings of the Nutrition North Canada program highlighting that the program does not subsidize hunting, fishing or harvesting equipment, does not access country food, preferentially supports imported animal proteins and protects the interests of retailers rather than the public.

QIA envisions a Nunavut where country food is a readily available choice for families and harvesting is a viable livelihood.

This document provides suggestions on how to achieve food sovereignty in Nunavut. These include:

- Renewed policy frameworks and funding models
- Investing in harvesting enabling infrastructure that facilitate access to land and waters
    - Marine infrastructure, multi-use facilities, food processing plants, training facilities
- Funding harvesters and Inuit steward programs
    - Provide harvesters wages
    - Provide equipment, tools, and supplies
- Provide skills development and mentorship programs
    - Elders and youth programs

Application to Qikiqtani Food Sovereignty Implementation Solution

This document outlines the complex factors that relating to food security in Nunavut and suggests actions to achieve food sovereignty. Actions on achieving food sovereignty should be Inuit-led and should be applied at the community level.

Food security in Nunavut requires a combination of strategic thinking and planning and collaborative efforts to address socio-economic issues.

15.0 Food Insecurity and Food Consumption by Season in Households with Children in an Arctic City: a cross-sectional study

Title: Food insecurity and food consumption by season in households with children in an Arctic city: a cross-sectional study
Type of Publication: Research article, published in BMC Public Health, Vol. 17
Author: Catherine Huet, et al.
Date: 2017

This research article compared food security and food consumption patterns between households with and without children, compared food security and food consumption patterns between seasons, as well as identified factors associated with food insecurity for households with children in Iqaluit, Nunavut

The study found that food insecurity is high (32.9 percent) among households with children in Iqaluit but did not significantly differ by season. Demographic and socioeconomic characteristics of the person responsible for food preparation, including low formal education attainment, unemployment, and female and Inuit identity were associated with increased odds of food insecurity in households with children. In households with children, food insecurity was significantly higher when people in the household consumed more retail foods. Conversely, food insecurity was lower for households where people consumed more fruits and vegetables, and cooked fish.

The prevalence of food insecurity among households with children in Iqaluit (33 percent) was lower compared to other studies conducted in Kugaaruk (83 percent) and in 16 Nunavut communities (70 percent). A variety of factors could explain the lack of seasonal differences. The study found that retail foods were consumed more frequently than local foods in Iqaluit which might reflect the nutrition transition taking place in many Inuit communities – households are increasingly relying on retail rather than local foods. Alternate local food access points (food shipments, soup kitchens and food banks) might help negate seasonal scarcities. Iqaluit's economy is wage-based and less dependent on subsistence activities compare to other communities, thus decreasing the influence of climatic and seasonal conditions on subsistence activities compared to other communities. Local food consumption was not associated with food security status in Iqaluit.

Application to Qikiqtani Food Sovereignty Implementation Solution

Food security interventions in Iqaluit should be designed differently than those in other smaller Nunavut communities. Retail foods were consumed more frequently than local foods, suggesting that food security

interventions should consider the affordability of healthy retail food choices, in addition to programing increasing the availability of local foods. Future policies and interventions should consider the underlying social determinants of health, such as low formal education attainment and gender, which continue to aggravate food insecurity in Iqaluit.

16.0 Summary of the Nunavut Hunting Regulations

Title: Summary of the Nunavut Hunting Regulations: 2021-2022
Type of Publication: Public regulations
Author: Government of Nunavut Department of Environment
Date: 2021

The Government of Nunavut Department of Environment publishes a summary of the Nunavut Hunting Regulations to provide a general outline of hunting areas in Nunavut. The regulations provided apply to hunters who require a harvesting license to hunt. The hunting rights of Indigenous people in Nunavut are based on traditional use and land claim rights and are different from other hunters.

There are three classes of licensed hunters in Nunavut: Nunavut Resident who has been living in Nunavut for at least three months, a Non-Resident Canadian citizen who lives outside Nunavut or a Non-Resident Foreigner.

This document outlines the requirements of a hunting license and species authorization tags and approval for harvesting of certain species by the local Hunter and Trappers Organizations. It also provides details on prohibitions such as wastage of meat, raw pelt or hide, and where and when one cannot discharge a firearm.

There is also information about how to tag harvested animals as well as information on what to do if one shoots a diseased animal or comes across a problem bear and needs to kill it in self-defence.

The Hunting Regulations provide a summary of the annual harvesting limit for each animal species as well as specific regulations based on each species.

Application to Qikiqtani Food Sovereignty Implementation Solution

The annual harvesting regulations and limits for each animal species must be respected. Throughout the Qikiqtani Food Implementation Sovereignty Solution these regulations should be considered. This project shall require any hired hunters to follow the Nunavut Hunting Regulations.

17.0 Inshore Fishery Training and Capacity Program

Title: Inshore Training and Capacity Program: Municipality of Qikiqtarjuaq
Type of Publication: Funding application developed on behalf of the Municipality of Qikiqtarjuaq
Author: Mike Cook
Date: 2019

This proposal provides information on the Nattivak Hunters and Trappers Association's (HTA), in Qikiqtarjuaq, Nunavut, aspirations to develop a sustainable operations and maintenance plan for its freezer and food processing area. The project proposal includes developing a business case for a community country food market.

The Nattivak HTA is currently developing its inshore fisheries development strategy which aligns with the development and implementation of a community country food market. The inshore fisheries strategy objectives include:

- Training and capacity development for hunters and fishers as well as the HTA Board, administration, and the community at large
- Addressing food insecurity within Qikiqtarjuaq through the adaption of a food sovereignty approach which prioritizes a "Fish as Food First" influenced methodology
- Provide vital leadership and management in the development of economic opportunities for fishers and hunters, while protecting our resources for future generations
- An ecological approach to fisheries activities and development work

The project objectives are to develop a business plan for a country food market in Qikiqtarjuaq. One of the methods of analysis is to conduct a community survey to address knowledge gaps, such as amount and type of species harvested, community consumption levels, harvester participation rates, and community access to country food. Throughout this project the Nattivak HTA is intimately involved in all aspects, including the writing of the business plan.

Application to Qikiqtani Food Sovereignty Implementation Solution

This proposal provides some key suggestions on how to create a community driven food sovereignty solution. By involving the local HTA and community members in each step of the project process, the community can increase its capacity and skills.

The Qikiqtani Food Sovereignty Implementation Solution can draw on this project for key information to implement such as working closely with the local Qikiqtani HTAs and community members and gathering survey information on animal harvesting and consumption in each community. Information on the sustainability of Qikiqtarjuaq's freezer and food processing facility can be used to drive the Qikiqtani Food Sovereignty Implementation Solution needs assessment and business plan.

18.0 Inuit Nunangat Food Security Strategy

Title: Inuit Nunangat Food Security Strategy
Type of Publication: Action summary document
Author: Inuit Tapiriit Kanatami
Date: July 2021

The Inuit Nunangat Food Security Strategy advances Inuit-driven solutions for improving food security and creating a sustainable food system in the north. The goal of this document was to create a national understanding of the prevalence of food insecurity among Inuit, to facilitate a national understanding of

the drivers of food insecurity, and to coordinate measurable actions by governments and stakeholders to improve food security. The author notes that the drivers of food insecurity are interconnected and there is not one single cause of food insecurity in the north.

This document outlines the Inuit Nunangat food system, highlighting the fact that most foods Inuit consume are shipped by air and sea. The authors also suggest that broader social and economical impacts are impacting food security in the north, such as poverty, high living costs, climate change, and diminishing Inuit self-determination.

As action strategies this document provides five priority areas:

1. Food systems and well-being – integrating Inuit-led food security and poverty reduction initiatives
2. Legislation and policy – create sustained Inuit engagement on food security solutions, promote regional food security strategies and community programs to provide food and food skills for Inuit
3. Programs and services – build evidence-based programs and services, support local food programs
4. Knowledge, skills, and capacity – support Inuit country food harvesting and sharing systems, and promote programs that teach Inuit harvesting knowledge and skills and advocate for marine and harvesting infrastructure
5. Research and evaluation – provide in depth research on food security in the north and evaluate existing food programs, policies, and initiatives

Application to Qikiqtani Food Sovereignty Implementation Solution

This document outlines the complex factors that relate to food security in the Inuit Nunangat and suggests actions to achieve food sovereignty.

The Qikiqtani Food Sovereignty Implementation Solution can draw on some of these actions such as engaging with Inuit to understand their food sovereignty needs and wants, as well as building a food security program that is sustainable and Inuit-led.

19.0 Hunter Harvester Guardian Program Evaluation Toolkit

Title: Hunter Harvester Guardian Program Evaluation Toolkit
Type of Publication: Program evaluation guidelines
Author: MakeWay, Shari Fox
Date: 2021

In 2021, MakeWay released the Hunter/Harvester/Gradian Evaluation Toolkit to create a set of processes and tools that provide the impacts of full-time hunter programs in communities. MakeWay worked directly with northern and Indigenous organizations to create the toolkit. The toolkit supports organizations and communities to plan, design and implement evaluations to assess the impacts of their Harvester or Guardian program. The toolkit allows hunters and communities identify what support hunters need, what activities they take part in, and the outcomes of their activities.

Application to Qikiqtani Food Sovereignty Implementation Solution

This toolkit could be useful in assessing the outcomes of the QFSIS project. Using a hunter/harvester centred approach, the Project Team could evaluate the following items:

1. What is required to support hunters/harvesters/guardians?
2. What are the types of activities hunters/harvesters/guardians engage in?
3. What activities benefit the community?
4. What cultural significance do hunter/harvester/guardian programs provide to the hunter, their family, and community?

Qikiqtani Food Sovereignty: Baseline Literature and Projects Review

Qikiqtani Food Sovereignty: Baseline Literature and Projects Review Report

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Qikiqtaaluk Business Development Corporation

March 2022

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1 INTRODUCTION

As defined by Nunavut Tunngavik Inc. and Qikiqtani Inuit Association, food sovereignty means the right to nutritious locally sourced food. For Inuit this translates to country food, such as Arctic char, seal, narwhal, caribou, berries, birds, and shellfish. In Nunavut harvesters play an integral role in Inuit food sovereignty. They provide country food that feeds communities, reinvigorates Inuit cultural practices, and stimulates local economies.

Specifically, Inuit food sovereignty means the right to healthy and nutritious food, the right to culturally appropriate food, the right to food harvested through ecologically sound and sustainable methods, and the right to access wildlife in ways that empower communities and stimulate local economies. In Nunavut, the harvesting industry empowers Inuit, transfers Inuit Qaujimajatuqangit, promotes knowledge, skills and Inuktitut language transfer, and safeguards Inuit cultural traditions and values related to harvesting, preparation and sharing of food.

It is widely recognized that resources and supports are lacking and are needed to promote to a future for Nunavut Inuit where country food is a readily available choice for families and harvesting is a viable livelihood. Through Qikiqtaaluk Business Development Corporation's (QBDC) Qikiqtani Food Sovereignty Implementation Solution (QFSIS) Project these resources and supports will be identified in collaboration with the Qikiqtani communities.

QBDC was created to stimulate local, regional, and territorial economic development opportunities. Creating partnerships and collaborating with communities, QBDC works to build prosperous, more self-sufficient communities by creating work and capacity building opportunities.

Improving access to country food and supporting infrastructure is one avenue QBDC is working with Qikiqtani communities to build prosperous and more self-sufficient communities. The QFSIS Project is an essential first step to establish the necessary community-based infrastructure to support harvesters and communities in achieving food sovereignty.

This *Qikiqtani Food Sovereignty: Baseline Literature and Project Review Report* provides an overview of past and current publications, projects, activities, and initiatives across the Qikiqtani Region related to food sovereignty activities. A review of both literature and initiatives was undertaken to define the baseline conditions and to help establish parameters of the QFSIS Project.

2 LITERATURE REVIEW

There has been considerable research conducted and reported on pertaining to food sovereignty and country food in Nunavut. This work has increased over the last decade as the awareness of food insecurity in Nunavut has become more prevalent. An annotated summary of reports pertaining to these topics has been developed to support the ongoing discussion and efforts to advance food sovereignty in Nunavut communities.

The *Annotated Summary of Reports Pertaining to Food Sovereignty in Nunavut* provided in Appendix A, compiles the available and relevant information respecting country food consumption and food sovereignty in Nunavut. This compilation does not represent an exhaustive list.

The QFSIS Project Team reviewed eighteen reports, research papers and strategies produced by various groups including governments, Inuit Organizations, Universities and other groups and organizations. Each publication reviewed is summarized in content and with perspectives for application in Nunavut within the Annotated Summary Report. The perspective for application to the QFSIS project represents the opinions of the authors.

Common themes of these reports include:

- Food sovereignty in Nunavut is not a simple solution and has many complex factors to consider. There is not one reason for food insecurity in Canada's far north. Food security requires a combination of strategic thinking and planning to address socio-economic issues
- There exist challenges and shortcomings in the current food subsidization programs in Nunavut, such as Nutrition North Canada
- Food sovereignty in Nunavut should include improving harvester support programs and providing wages for harvesters who provide food to their communities
- Country food should be viewed as nutritious and should be readily available in communities as a food source
- Investing in infrastructure to support harvesting, processing, and storing of country food should be a priority in each Nunavut community

3 Country Food Harvested in Communities

In 2004, the Nunavut Wildlife Management Board released the Nunavut Wildlife Harvest Study which documents a detailed list of country food harvested in Nunavut communities. The Nunavut Agreement mandated the Study be completed to determine how many animals were harvested by Inuit in each community in Nunavut. The Study collected data from Inuit hunters for a total of five years. QBDC could not find a more recent extensive documentation of country food harvested in Qikiqtani communities.

Table 1 provides a summary of country food harvested in each Qikiqtani community from data collected recently by QBDC. It is not an exhaustive list and only an indication of common country food harvested in the communities. Much of the information was gathered from community Facebook groups, project team knowledge, and outreach to community stakeholders.

The Nunavut Wildlife Harvest Study and QBDC's information gathering indicates the harvesting culture is prominent in all communities with country food harvesting and distribution activities existing in all communities.

Table 1: Summary of Country food harvested in Qikiqtani communities

Community	Country Food Harvested Locally	Country Food Outsourced	Commercially Harvested Country Food
Arctic Bay	Seal, Arctic char, narwhal, bowhead whale, snow geese		Arctic Char*
Clyde River	Caribou, Arctic char, cod, seal, arctic hare, bowhead whale, narwhal	Caribou	Arctic Char, seal
Grise Fiord	Ring seal, muskox	Shrimp Caribou Arctic Char Dried meat	Occasionally muktuk sold to Iqaluit country food store
Kimmirut	Arctic hare, Arctic char, seal, walrus, caribou, ptarmigan, beluga, cod, berries	Caribou from Kivalliq Igunaq (aged, fermented meat)	Ptarmigan (occasionally sold to Iqaluit HTA)
Kinngait	Arctic char, bowhead whale, narwhal, seaweed		Arctic Char*
Igloolik	Arctic char, seal, caribou from Melville Peninsula, walrus		Arctic Char*
Iqaluit	Polar Bear (need a tag), caribou (need a tag), walrus, narwhal, beluga, ringed seal, bearded seal, clams, mussels, crow berries, blue berries, Arctic hare, Arctic char, ptarmigan, snow geese, Canada geese Between Kimmirut and Iqaluit there are cloud berries		Arctic Char*
Pangnirtung	Turbot, Arctic char, polar bears, seal, walrus, rabbit, ptarmigan, eider duck, narwhal, beluga, caribou (when tags are available)	Caribou from Kivalliq Region	Arctic Char & Greenlandic Turbot
Pond Inlet	Seal, Arctic char, narwhal, ptarmigan, Arctic hare, polar bear, geese, crow berries, blueberries, beluga. Caribou – must travel halfway to Sanirajak or Arctic Bay	various	Arctic Char
Qikiqtarjuaq	Arctic char, polar bear, seal, narwhal (need a tag) caribou, Arctic hare		Arctic Char, clams*
Resolute Bay	Polar bears, caribou, walrus, musk ox, Arctic hare and siksik (ground squirrels), ring seals, bearded seals, harp seals, beluga, narwhal, ptarmigans, geese, eider ducks	Caribou Fish	

Community	Country Food Harvested Locally	Country Food Outsourced	Commercially Harvested Country Food
Sanikiluaq	Walrus, beluga, ringed seal, bearded seal, shellfish, Eider duck, Arctic char, summer sea birds, Canada geese, mussels, scallops, sea stars, sea urchins, sea cucumbers		Eider Duck down*
Sanirajak	Caribou, walrus, Arctic char, landlock, trout, bearded seal, ringed seal, ptarmigan, clams, geese, and occasionally beluga and harp seal		Arctic Char – commercial quota of 25,000 lbs from Hall Lake*

*Reported in the 2004 Nunavut Wildlife Harvest Study (data from 1996-2001)

4 Local Harvesting, Distribution and Trade

The harvesting economy for local consumption, distribution and trade is perhaps the largest economy in Nunavut providing many social, economic, cultural, and environmental benefits to communities and Inuit. Posts on Facebook, used in communities as a marketplace tool, indicate that all Qikiqtani communities are actively harvesting and locally distributing country food within their communities.

In the past, full-time harvester support programs have been funded by governments. However, there have been challenges in the set up and operations of these programs, including restrictive benefits and lack of administrative support.

The QFSIS Project Team researched country food distribution and harvesters support programs. Below are programs available in the Qikiqtani Region and Nunavut-wide however it may not be an exhaustive list.

4.1 Nunavut Tunngavik Inc. Harvesters Support Program

The Nunavut Harvesters Support Program (NHSP) was established in 1993 by the Government of the Northwest Territories and the Tungavik Federation of Nunavut to provide financial assistance to Inuit to acquire equipment for traditional harvesting activities. NTI administered the program up until September 1, 2020. The Regional Inuit Associations now administer the programs in their respective regions.

4.2 QIA Harvesting Support Programs

Qikiqtani Inuit Association (QIA) administers the Nunavut Harvester Support Program (NHSP) on behalf of NTI. The NHSP funds two programs, the Harvesting Equipment Program, and the Community Hunt Program.

The Harvesting Equipment Program provides Inuit funding assistances for the purchase of small and larger harvesting equipment, safety equipment, and insurance, and aids in disaster relief. The Community Hunt Program provides funding assistance to organizations or groups interested in participating in community hunts.

Throughout the COVID-19 pandemic, QIA offered a variety of funding programs, made available through the Government of Canada's Indigenous Community Support Fund, as part of their ongoing COVID-19 relief efforts. The COVID-19 Community Hunt Program provided $2,000 for eligible applicants to purchase supplies that might be needed while harvesting on-the-land. The COVID-19 Hunters Support Program provided five $2,000 grants to each of the Qikiqtani Region's 13 communities. Harvesters were required to share their catch with community members at no cost.

QIA also provided funding through the Emergency Land Access Initiative. This initiative was also made available through the Government of Canada's Indigenous Community Support Fund. Over 800 Qikiqtani Inuit accessed a one-time $1,500 grant to help self-isolate on-the-land during COVID-19 outbreaks in Kinngait and Iqaluit.

QIA also funds various cultural programming through its Qikiqtani Cultural Activities Program (QCAP) and Ilagiiktunut fund.

QCAP is an application-based program that provides funding for community-led projects that foster the preservation and transmission of traditional skills and cultural activities. In 2020-2021, 30 projects funded were for hunting or on-the-land projects. An example of a QCAP project was a cultural skills trip in Kinngait where 20 youth participated in boating, fishing, and seal hunting, as well as processing and preserving their catch.

The Ilagiiktunut fund supports social and cultural projects for Inuit living in the five communities impacted by the Mary River Mine. In 2020-2021, some of the projects funded included seal hunting, narwhal hunting, and qamutik making projects.

4.3 QIA Nauttiqsuqtiit Inuit Steward Program

As part of the establishment of Tallurutiup Imanga National Marine Conservation Area, QIA launched Tallurutiup Imanga Nauttiqsuqtiit program in Arctic Bay. The program has since grown to include the other high Arctic communities of Clyde River, Grise Fiord, Pond Inlet, and Resolute Bay. In 2021, QIA announced the expansion of the Nauttiqsuqtiit program to Sanikiluaq.

An important part of the Nauttiqsuqtiit work is harvesting animals and sharing their catch with the community. Harvesting is part of their wildlife monitoring work. The animals provide valuable data, but also help to feed the community.

4.4 EDT Program Country Food Distribution Program

The Government of Nunavut Department of Economic Development and Transportation has a Country Food Distribution Program that aims to help improve the economic viability of harvesting. The program supports two streams of the harvesting economy:

1. Annual contribution to communities. Projects funded are developed by the municipalities and/or local HTAs and must support local harvesters such as paying harvesters to stock community freezers with country food, purchase small equipment for community use or finance other projects that will improve the viability of the harvesting economy. Funding can also be used to pay for operation and maintenance costs of community freezers.

2. Investments in harvesting infrastructure. This stream is application based and primarily supports the construction or renovation of community freezers or other identified harvesting infrastructure.

4.5 Government of Nunavut Hunters and Trappers Support

The Government of Nunavut's Department of Environment supplies core operational funding to Hunters and Trappers Organizations. Funds are intended to facilitate operations related to wildlife co-management. Each organization receives a lump sum contribution based on the community's population. The base funding allocation is $11,000 per community and increases with higher population to a maximum of $20,000.

The Government of Nunavut Department of Environment provided $25,000 to each of Nunavut's Hunters and Trappers Organizations to support harvesters in providing healthy country food for their communities during the COVID-19 pandemic.

4.6 Canadian North Country Food Subsidized Rate

The sole commercial airline in the Qikiqtani Region, Canadian North, supports the sharing of country foods through offering subsidized cargo rates. They provide a flat rate of $1.31/kg on all shipments of country food up to 100 kg. This is considerably lower than the general cargo rate which varies depending on which communities the shipment is between. Generally, this can range from $4.55/kg to $28.22/kg.

4.7 Nutrition North Canada Harvesters Support Grant

Nutrition North Canada (NNC) has a Harvesters Support Grant which provides funding to support traditional hunting, harvesting and food sharing in isolated communities. The program is currently providing $40 million over five years, and $8 million per year ongoing funding to Indigenous governments and organizations which represent eligible communities.

Nunavut Tunngavik Inc. is the recipient organization who receives this funding in Nunavut. NTI decides how best to support Nunavut communities with this funding. The grant can be used for harvesting activities such as:

- Transportation and equipment like ATVs, boats, snowmobiles
- Harvesting equipment
- Safety and rescue equipment
- Equipment maintenance and repair
- Training, maintenance, and education,
- Transfer of traditional knowledge, practices, and techniques
- Processing, food preparation and storage infrastructure

In 2020, NTI received $14.9 million for a five-year period.

4.8 Qajuqturvik Community Food Centre Country Food Box

The Qajuqturvik Community Food Centre in Iqaluit started a country food box program in January 2022. The food boxes each have five portions of three to five different types of country food. The country food is sourced from hunters in Clyde River and Pond Inlet.

The program was started to bring country food to community members that face barriers to accessing country food. The program has a pay-what-you-can option for those on lower income.

4.9 Qajuqturvik Community Food Centre Social Impact Bond Feasibility Study

In 2021, Qajuqturvik Community Food Centre completed a feasibility study to determine if a program that provides salaries for hunters could address food insecurity, cultural loss, and physical and mental health challenges. Project salaries would be provided by funding through a social impact bond Ultimately, the authors determined that there were challenges limiting the feasibility of a social impact bond in Nunavut and suggested funding for a grant-funded pilot should be the first step for this program.

4.10 The Hunter Pilot Project

In 2017, a pilot project was developed in Clyde River to find out how supporting and strengthening the roles of hunters and harvesters can improve community food sovereignty. The pilot provided a full-time salary to a local hunter to harvest animals, track harvesting activities and yield, and to share harvests with community members. The project also documented the cultural importance of a hunter role, including monitoring the environment, and sharing knowledge and skills with youth.

The project showed that one hunter can provide access to more sustainable, nutritious, and affordable food for hundreds of individuals. In addition, the project also highlighted the many social, cultural, environmental, health and economic benefits for everyone involved.

4.11 Other Nunavut Community Initiatives

Outside of the Qikiqtani Region, there are other community initiatives that are ongoing to support sustainable harvesting in Nunavut. One of these is the Young Hunters Program. This project is run through Aqqiumavvik, Arviat's Wellness Society. Program participants, aged 8-18, gain local hunting skills and knowledge through time spent with local Elders.

The Kivalliq Inuit Association offers funding to support community-based initiatives that foster Inuit traditional skills and activities. They also offer the Pijunnaqsiniq Culture Camp for Inuit youth to participate in activities such as hunting, fishing, and tool making on-the-land.

5 Commercial Harvesting

The majority of Nunavut's commercial harvesting is in the fisheries industry. In the Qikiqtani Region the only commercial fish processing plant is located in Pangnirtung, which processes turbot and Arctic char. There are no other land-based country food processing plants in the Qikiqtani Region. There is a country food store in Iqaluit.

According to the 2004 Nunavut Harvest Wildlife Study (NHWS), the Qikiqtani communities do not typically harvest animals for commercial sale other than Arctic char. The NHWS also identified that some Qikiqtani communities sell harvests locally through the HTO/A or the local store.

Nunavut's fisheries are growing contributors to the Territory's economy. The three main commercial species harvested are turbot, shrimp, and Arctic char. In 2015, the total landed value of the fish was $86.3 million. There is an increasing number of Nunavummiut participating in the commercial fisheries who often use their income to put towards other fishing and hunting activities in their communities.

The Government of Nunavut published its first Fisheries Strategy in 2005 which laid the groundwork for the challenges, opportunities, and plan to advance the fisheries in Nunavut. Since then, the Nunavut Fisheries has grown and evolved significantly. The latest strategy was published in 2016.

The Nunavut Wildlife Management Board (NWMB) is responsible for suballocating Nunavut's allocations of turbot and shrimp in Nunavut's adjacent commercial marine fisheries resources. The NWMB created a Fisheries Advisory Committee (FAC), composed of six members appointed by the Government of Nunavut, Nunavut Tunngavik Inc. and NWMB, that represent the interests of Inuit and Nunavummiut. The FAC review Nunavut's allocation holders' Applications for Allocation and provide independent recommendations and advice to the NWMB on suballocations.

5.1 Offshore Fishery

The Qikiqtani Region leads Nunavut's offshore commercial fishery. There are four Nunavut turbot and shrimp allocation holders that are all represented and/or owned by Qikiqtani communities:

- **Arctic Fishery Alliance (AFA) -** Shareholders are HTAs and community trusts of Arctic Bay, Grise Fiord, Qikiqtarjuaq, Resolute Bay
- **Qikiqtaaluk Corporation (QC) -** Shareholder is QIA who represents the 13 Qikiqtani communities
- **Cumberland Sound Fisheries Limited (CSFL) in partnership with Pangnirtung Fisheries Limited (PFL) -** Shareholders of CSFL are Pangnirtung Co-op, Pangnirtung HTO, and individual Inuit
- **Baffin Fisheries (BF) -** Shareholders are HTAs of Pangnirtung, Iqaluit, Pond Inlet, Kimmirut, and Clyde River

The Hunters and Trappers Associations (HTAs) in Sanikiluaq, Kinngait, Sanirajak and Igloolik came together in 2017 to form Qikiqtani Fisheries Alliance (QFA). These four communities were not otherwise directly affiliated with the above allocation holders and wanted to participate in the Nunavut fishery. QFA has not yet been provided allocations for turbot or shrimp off Nunavut's shores.

The four Nunavut allocation holders have about 50 percent of total fishing quotas off Nunavut's shores. The GN, NTI and QIA are currently lobbying to have more quotas in Nunavut's adjacent waters allocated to Nunavut fishers.

2022 Allocations held by Nunavut's fishers are found in Table 2.

Table 2: Nunavut fishery 2022 allocations

Company	Turbot		Shrimp	
	Tonne	Percent of total Nunavut allocations	Tonne	Percent of total Nunavut allocations
Arctic Fishery Alliance (AFA)	2,186	16%	351	2%
Qikiqtaaluk Corporation (QC)	2,363	17%	6,528	38%
Cumberland Sound Fisheries Limited (CSFL) in partnership with Pangnirtung Fisheries Limited (PFL)	2,171	16%	544	3%
Baffin Fisheries (BF)	7,056	51%	9,663	57%
Total	**13,776**	**100%**	**17,087**	**100%**

5.2 Inshore Fishery

The inshore fisheries across the Qikiqtani Region is primarily Arctic char and turbot and consists of individual harvesters harvesting fish and selling to processing plants, to country food stores or on Facebook marketplaces.

In 2016, there were approximately 300 Schedule V waterbodies across Nunavut that are regulated for commercial fishery of char, trout, whitefish, Arctic cisco and cod. The Department of Fisheries and Oceans Canada selects which of these waterbodies will be open for commercial fishing each year. HTO can also request that any of the remaining waterbodies be opened as well.

Some communities are in the exploratory phases of harvesting shrimp, whelks, and clams. Qikiqtani communities in exploratory phases include eleven waterbodies in Pangnirtung, three in Pond Inlet and one in Qikiqtarjuaq. In 2015, there were also exploratory char fisheries in Igloolik

Pangnirtung is the only community in the Qikiqtani Region with an established processing plant, Pangnirtung Fisheries Ltd. It has the capacity to process both char and whitefish. Iqaluit has a country food store, Nunavut Country Food Store, which sells a variety of seafood and other country food.

Inshore fisheries are largely supported by the territorial and federal governments, not-for-profits and the offshore allocation holders.

5.2.1 Pangnirtung Fish Plant

The Pangnirtung Fisheries Ltd. fish plant processes Arctic Char and Greenlandic Turbot. Since 2014, Pangnirtung has seen a significant increase in local fishery participation during the winter turbot fishery with over 70 licensed participants. Pangnirtung has an opportunity to develop a summer fishery as well. Fish caught in Cumberland Sound are processed at the Pangnirtung fish plant before being shipped to Asian markets.

The development of the Pangnirtung fish plant has provided insight to other Qikiqtani communities. While it is heavily subsidized by government funding, the Pangnirtung fish plant has provided relevant information including fishery research findings and business development practices.

5.3 Commercial Fisheries Programs and Support

Significant investments have been made researching and implementing programs to build Nunavut's inshore and offshore fisheries. These programs are all aimed to grow the industry to create employment and socio-economic benefits for Nunavummiut.

Table 3 provides examples of some recent or currently underway projects across the Qikiqtani Region. This summary is not exhaustive but provides in indication of the extensive work that has been and continues to be done to grow the industry.

Investments in these programs have been made by various organizations including the Government of Nunavut, Government of Canada, Nunavut Allocation Holders, and Qikiqtaaluk Corporation.

Table 3: Commercial fishery projects in the Qikiqtani Region

Project/Initiative/Program	Type	Details
Government of Nunavut RV Nuliajuk Research Vessel	Inshore fishery research	The vessel has been conducting research in the Qikiqtani Region including ocean bottom mapping, assessing potential commercial fish stocks, turbot tagging to follow the movements of turbot along the coast and mapping of safe harbours and inner passages between communities.
Qikiqtaaluk Corporation RV Ludy Puduk Research Vessel	Inshore fishery research	The vessel conducts baseline surveys on benthic marine invertebrates such as sea cucumbers, whelk, scallops etc. in two communities each open water season. In 2021 the RV Ludy Pudluk worked in Sanikiluaq and Kinngait and in 2022 the vessel will be conducting research in Sanirajak and Igloolik.
Seal Blubber Omega-3 Research Project	Industry development	Qikiqtaaluk Corporation is undertaking a project to assess the viability of an Omega-3 extraction industry from ringed seal blubber. In 2021, QC piloted a project with the HTA in Iqaluit. HTA members were provided a wage to harvest and butcher ringed seal. The under-utilized seal blubber was then vacuumed packed and shipped to a lab to assess its value for Omega-3s. The objective of this project is to assess the viability of a Nunavut processing facility for rendering oil from seal blubber.
Redfish Exploratory Fishery Project	Offshore fishery research	QC Fisheries is conducting a three-year exploratory offshore research project to assess the commercial viability of redfish in Baffin Bay and Davis Strait.

Project/Initiative/Program	Type	Details
Small Scale Fisheries Development	Inshore fishery research	WWF-Canada is currently working with the local HTAs in Kinngait and Sanikiluaq to build small-scale commercial fisheries. WWF-Canada is doing baseline research on local populations of scallops, sea urchins, and sea cucumbers in Sanikiluaq and Arctic Lyre crab in Kinngait.
Exploratory Fishing Char	Inshore fishery research	Kabva Marine Services & Contracting Ltd and DFO are managing this three-year project to establish test fisheries at two locations in Frobisher Bay, York Sound and Kendall Straits. The project goal is to establish commercial char quota.
Nunavut Fisheries Association Research Projects	Various	Nunavut Fisheries Association represent the four Nunavut Allocation holders and promote the continued growth of Nunavut's fishing industry. They have been conducting various projects to advance the industry including: • Commercial viability of porcupine crab • Offshore and inshore turbot fisheries research • Shrimp research and marketing • Explored trawling technologies
Arctic Fishery Alliance Research	Inshore fishery research	AFA conducted research onboard their fishing vessel Kiviuq in its member communities of Arctic Bay, Resolute Bay, Qikiqtarjuaq on the commercial viability of species such as turbot, shrimp and whelk.
Pond Inlet Arctic Char Fishery Development Research	Inshore fishery research	Pond Inlet has recently been trying to redevelop their Arctic char fisheries. DFO is working with the Mittimatalik HTO to collect baseline data from two Arctic char stocks in the Pond Inlet Area.
Community based Fisheries Monitoring in Qikiqtarjuaq	Various	DFO trained community members to collect data on Arctic char around Qikiqtarjuaq. This research provides insight into changes in Arctic char abundance and ecology. It also provides research into total allowable harvests for char stocks and developing a comprehensive sustainable fisheries management plan.

6 Community Food Cultivation

In Canada's territories there is a growing number of local food production initiatives such as community greenhouses, hydroponic containers, and local food processing.

In Iqaluit, the Iqaluit Community Greenhouse Society, a not-for-profit organization, is run by volunteers. Produce is provided to the Qajukturvik Community Food Centre to provide nutritious meals for those in need. During the school year, growth pods are brought to Iqaluit's middle school and high school and are taken care of by the home economic students. The fresh produce harvested by the students is used for school lunch programs.

In 2020, the Canadian Space Agency joined Gjoa Haven to research the feasibility of growing produce in a sea can. The sea can is powered by wind and solar energy. The project technology will help scientists learn how to grow fresh food more efficiently for astronauts in space as well as providing fresh produce to the North throughout the year and creating jobs.

7 CLOSING

The baseline research on current food sovereignty activities, programming and initiatives across the Qikiqtani Region indicates that harvesting, both for local distribution and for commercial purposes, is prominent across the Region. There are many programs in place to support and enhance these activities however there are still many barriers limiting communities from achieving their food sovereignty and economic development goals.

Harvesters will often post messages on community Facebook pages and/or on the local radio when they have country food available. Even with sharing country food, some still goes to waste. Communities indicated harvesting some country food is limited in the summer months to smaller wildlife as they have no place to store larger animals. This is an indication that communities lack infrastructure to store country food.

Resources, infrastructure, and supports are needed to promote food sovereignty for Nunavut Inuit and to seek a future that allows for the production, distribution, and consumption of food that is consistent with Inuit culture. Through the next phase of QBDC's Qikiqtani Food Sovereignty Implementation Solution Project these resources and supports will be identified in collaboration with the Qikiqtani communities.