

**Integrated Fisheries Management Plan  
Arctic Region**

**Cambridge Bay Arctic Char, *Salvelinus alpinus*,  
Commercial Fishery,  
Nunavut**

**Effective 2021**

**Arctic Char  
(*Salvelinus alpinus*)**



## Foreword

The purpose of this Integrated Fisheries Management Plan (IFMP) is to identify the main objectives and requirements for the Cambridge Bay Arctic Char (*Salvelinus alpinus*) commercial fishery, as well as the management measures that will be used to achieve these objectives. This document also serves to provide a common understanding of basic knowledge of the fishery, the biology of commercially harvested Arctic Char and outlines its sustainable management to Fisheries and Oceans Canada (DFO), legislated co-management organizations, including the Ekaluktutiak Hunters and Trappers Organization, as well as resource users and other stakeholders.

This IFMP is not a legally binding instrument which can form the basis of a legal challenge. The IFMP can be modified at any time and does not fetter the Minister's discretionary powers set out in the *Fisheries Act*. The Minister can, for reasons of conservation, or for any other valid reasons, modify any provision of the IFMP in accordance with the powers granted pursuant to the *Fisheries Act*.

Where DFO is responsible for implementing obligations under land claim agreements, the IFMP will be implemented in a manner consistent with these obligations. In the event that an IFMP is inconsistent with obligations under land claim agreements, the provisions of the land claim agreements will prevail to the extent of the inconsistency.

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Gabriel Nirlungnayuq, Regional Director General, Arctic Region  
Fisheries and Oceans Canada

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Date

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Daniel Shewchuk, Chairperson, Nunavut Wildlife Management Board

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Date

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## Acronym List

<b>C&amp;A</b>	Central and Arctic Region, Fisheries and Oceans Canada
<b>C&amp;P</b>	Conservation and Protection, Fisheries and Oceans Canada
<b>CPUE</b>	Catch-Per-Unit-Effort
<b>DFO</b>	Fisheries and Oceans Canada
<b>EHTO</b>	Ekaluktutiak Hunters and Trappers Organization
<b>HTO</b>	Hunters and Trappers Organization
<b>IFMP</b>	Integrated Fishery Management Plan
<b>IQ</b>	Inuit Qaujimajatuqangit
<b>KRWB</b>	Kitikmeot Regional Wildlife Board
<b>NA</b>	<i>Nunavut Agreement</i>
<b>NSA</b>	Nunavut Settlement Area
<b>NWMB</b>	Nunavut Wildlife Management Board
<b>NWT</b>	Northwest Territories
<b>RWO</b>	Regional Wildlife Organization
<b>TC</b>	Transport Canada
<b>TEK</b>	Traditional Ecological Knowledge
<b>PA</b>	Precautionary Approach

## 1 Overview

An Integrated Fisheries Management Plan (IFMP) is used to guide the conservation and sustainable use of marine resources, supports the management of sustainable fisheries, and combines available science and Indigenous traditional knowledge and shared Inuit Qaujimajatuqangit (IQ) on fish species with industry data to determine best practices for harvest and management. IFMPs are developed and finalized through an extensive and collaborative approach with co-management partners, local resource users and other stake-holders.

Fisheries and Oceans Canada (DFO) engages with fishery rights holders, Indigenous organizations, groups and communities, resource users and stakeholders to determine how to best manage fisheries and develop IFMPs in support of the fishery. The duty to consult on this IFMP has been recognized and incorporated into activities since the first stages of the planning and development process for this IFMP. A number of activities were used to involve fishery rights holders, Indigenous organizations, groups and communities, resource users and stakeholders, which have included: regular IFMP WG meetings; engagements and consultations; sharing information; opportunities to review and comment on the draft updated plan; annual fishery performance reviews.

All IFMPs require regular updating to address current objectives and issues, new information (biological and fishery-related), and varying pressures on the fishery resource.

### 1.1 Cambridge Bay Arctic Char commercial fishery IFMP

The IFMP for commercially harvested Arctic Char (*Salvelinus alpinus*) from the Cambridge Bay region of Nunavut was first implemented in 2014, making it the first IFMP for this species in Canada. The Cambridge Bay commercial Arctic Char IFMP is intended to be reviewed and updated every 5 years, or as required, by the Cambridge Bay IFMP Working Group (WG).

The IFMP WG meets annually to review the post-season performance of the fishery and the effectiveness of the management plan. The IFMP WG has met annually each year since the initial approval of the IFMP in 2014. Additionally, DFO has conducted annual pre-season and post-season engagements with commercial fishers and other stakeholders, as well coordinated public engagements to discuss and provide updates on the commercial fishery and related science research and activities, on an annual basis. DFO and the IFMP WG have used these conversations to identify the key challenges and priorities to be addressed in the fishery. All comments received were given careful consideration when finalizing this updated IFMP.

This IFMP was finalized on:

## 1.2 History

Arctic Char, *Salvelinus alpinus*, are distributed across the Canadian Arctic occurring as both non-anadromous (lake-resident or land-locked) and anadromous (searun) forms. The anadromous form is found in many of the rivers and lakes on Victoria Island, near the Community of Ekaluktutiak, also known as Cambridge Bay, where they are harvested in subsistence, recreational and commercial fisheries.

There are several key commercial waterbodies in the Cambridge Bay area. These waterbodies are known by several names, including local Inuinnaqtun and English names, as well as the legal name used in the Northwest Territories (NWT) Fishery Regulations (**Error! Reference source not found.**). Throughout this IFMP both the local Inuinnaqtun and English names are used concurrently given they are most commonly recognized by resource users.

**Table 1. Commercial Waterbody Names in the Cambridge Bay Area.**

Inuinnaqtun Local Name	English Local Name	English Legal Name
Ekalluktok	Ekalluk (Wellington) River	Ekalluk River
Halokvik	Thirty-Mile River	Halovik River
Paliryuak	Surrey River	Paliryuak River
Jayko	Jayco River	Jayco River, Albert Edward Bay
Paalik	Lauchlan River	Lauchlan River (Byron Bay)

Note: Legal Name refers to the commercial waterbody name used in Column I of Schedule V, *NWT Fishery Regulations*.

The early history of this fishery is described in Abrahamson (1964) and Barlishen & Webber (1973). Prior to the onset of the commercial fishery, it is likely that all river systems in the Cambridge Bay area were fished for food by Inuit (Friesen, 2002 and Appendix A has a map with historical fishing locations). Commercial fishing in the area first began in 1960, with a gillnet operation on nearby Freshwater Creek (Day & Harris, 2013). To avoid over-exploitation of this system from the competing pressure of the local food fishery, the commercial fishery was relocated in 1962 further from the community to the mouth of the Ekalluktok (Ekalluk) River, where the river empties into Wellington Bay (Day & Harris, 2013).

Initially, a river-specific quota was used at Ekalluktok (Ekalluk) River and remained in effect until 1967. Subsequently an “area” quota was established for Wellington Bay with the intent to distribute fishing pressure amongst additional rivers in the area (i.e. Paliryuak (Surrey), Halokvik (Thirty-Mile) and Paalik (Lauchlan) rivers). However, the decline in the fishery (as evidenced by a decrease in mean weight) at Ekalluktok (Ekalluk) River, where most of the fishing still took place given its proximity to Cambridge Bay, necessitated the establishment of “river-specific” quotas to distribute fishing effort amongst these systems. In the 1970s, commercial fishing was extended to Jayko (Jayco) River to the northeast of Cambridge Bay and the Ellice and Perry rivers, on the nearby mainland.

From 2010 to 2017 Paalik (Lauchlan River) was not commercially harvested due to a lack of economic viability related to the historically assigned commercial quota and significant transportation costs associated with the distance of this fishing location from



Cambridge Bay. With renewed interest in this fishery, the Ekaluktutiak Hunters and Trappers Organization (EHTO) and Kitikmeot Foods Ltd, supported by DFO, requested the targeted quota be increased to 5,000kgs (from the historically targeted 2,400kgs). The Nunavut Wildlife Management Board (NWMB) determined that the current commercial quota (in accordance with the *Northwest Territories Fishery Regulations*) of 9,100 kg was legal and valid. In its decision, the NWMB recognized and supported the continued conservation-based management approach of the fishery by the EHTO and DFO with the operational support of Kitikmeot Foods Ltd to maintain a sustainable commercial char fishery (Nunavut Wildlife Management Board, 2017). Beginning in 2018, Paalik (Lauchlan River) was harvested at a targeted quota of 5,000kgs, facilitated by fishery-dependent and –independent monitoring, and will continue to be harvested at this targeted quota until such time as a stock assessment can be completed and sustainable harvest levels can be established.

No fishing has occurred at the Ellice River since 1999 and the Perry River since 1991 for a variety of reasons, including transportation costs, noticeably whiter and less marketable flesh, and regularly inclement weather in the fall. Factors in considering commercial locations may include social and cultural practices (e.g., primary subsistence fisheries), availability of commercial quota, and geography in addition to economic viability (e.g., proximity to community, transportation costs), fish quality and marketability (e.g., flesh colouration) and weather conditions.

Current commercial fishing takes place at the Ekalluktok (Ekalluk), Paliryuak (Surrey), Halokvik (Thirty-Mile), Paalik (Lauchlan) and Jayko (Jayco) rivers (

Figure 2). Recent harvest and stock status of this fishery is provided by (Day & Harris, 2013) and is available on the internet at: [http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2013/2013\\_068-eng.html](http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2013/2013_068-eng.html).

For the purposes of this IFMP, all current Arctic Char commercial waterbodies (**Error! Reference source not found.**) in the Cambridge Bay area are collectively referred to as the “Cambridge Bay Arctic Char commercial fishery”. For management purposes, each commercial waterbody is considered an individual management unit associated with a river-specific quota.

### 1.3 Type of Fishery and Participants

Arctic Char plays an important role in the social culture, nutritional and economic growth of the community – fostering the continuation of traditional culture and lifestyles, provision of irreplaceable traditional foods, and the economic benefits of successful commercial and recreational fisheries. Arctic Char are primarily harvested in subsistence

and commercial fisheries with a few recreational (sport) fisheries in the Cambridge Bay area.

The commercial fishery, which is the focus of this IFMP, is conducted by local Inuit fishers in conjunction with the operational support of Kitikmeot Foods Ltd., the commercial processing plant in Cambridge Bay. Kitikmeot Foods Ltd. was established in 1990 as a subsidiary of the Nunavut Development Corporation, and serves a growing domestic and international fish market under the territorial brand *Truly Wild Arctic Char*<sup>TM</sup>. This fishery has demonstrated sustainability in accordance with various independent measures, and is currently recognized by Ocean Wise as a sustainably managed fishery. Centrally located in Cambridge Bay, Kitikmeot Foods Ltd. currently employs as many as 28 local residents and beneficiaries, including management, seasonal processors and commercial fishers.

The Ekalluktok (Ekalluk River) and Paalik (Lauchlan River) locations have supported local outfitters that direct sport-fishing operations during upstream migrations. These outfitters, however, have not been in operation in recent years. The fishing pressure from these sport-fishing operations are considered low as they practiced catch and release; however, this is still taken into account for a small degree of fish mortality when conducting stock assessments on the rivers. The fishing pressure depends on catch rates and can continually fluctuate in any given year.

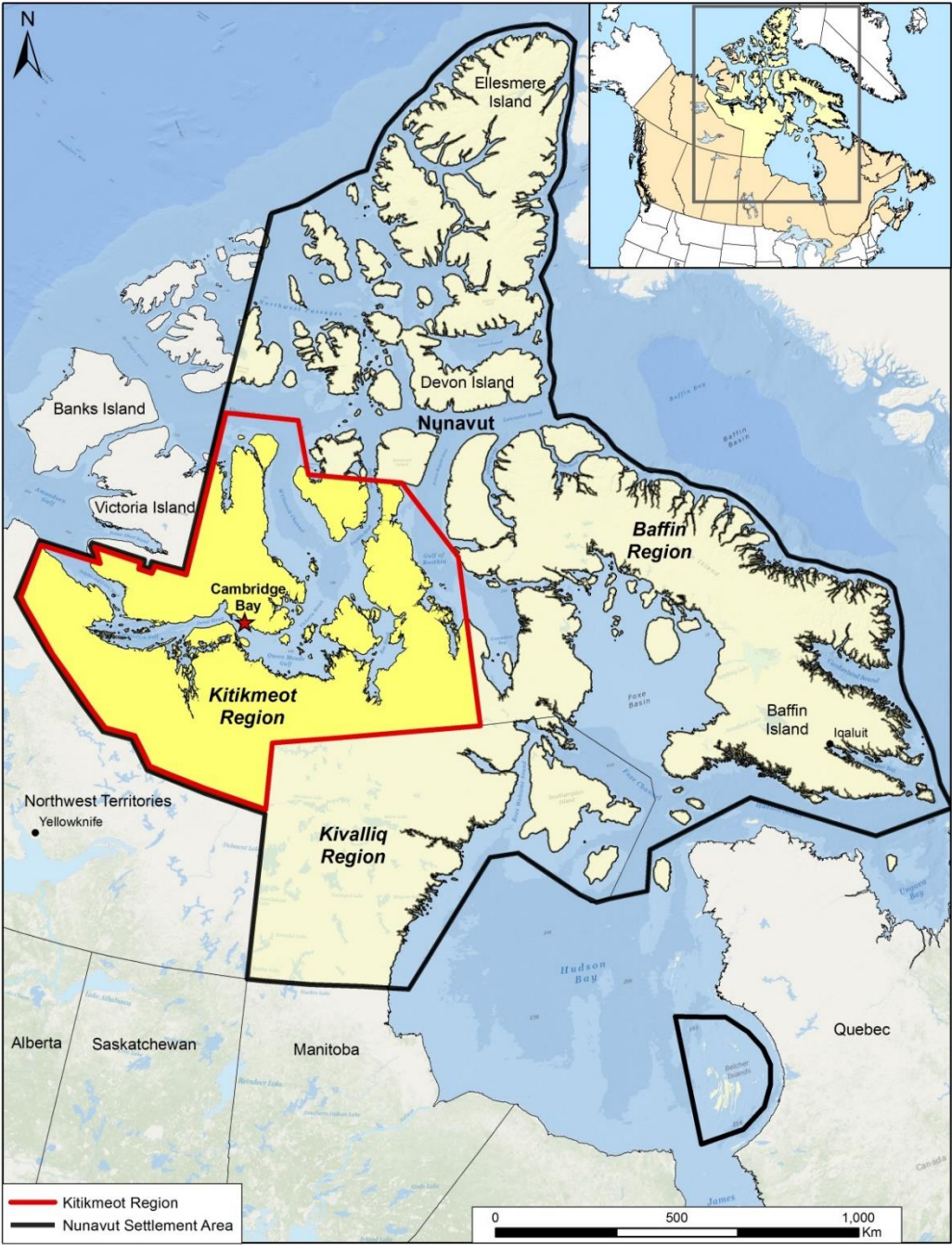
Several other locations nearer to and in the community are used for both recreational (sport) and subsistence fisheries (e.g. Starvation Cove, Long Point, Grenier Lake, Gravel Pit and Freshwater Creek) by local residents. Historically, each of the commercial locations has, at different times, been harvested for subsistence purposes. Currently most subsistence harvesting occurs at the local recreational fisheries locations close to the community of Cambridge Bay.

#### **1.4 Location of the Fishery**

The Community of Cambridge Bay is located on the south shore of Victoria Island in the Canadian Arctic Archipelago. Cambridge Bay is the largest community in the Kitikmeot Region (Figure 1). Fishing typically takes place at or near the mouth of the Ekalluktok (Ekalluk), Paliryuak (Surrey), Halokvik (Thirty-Mile), Paalik (Lauchlan) and Jayko (Jayco) rivers (

Figure 2) targeting either downstream (spring) or upstream (fall) migrants.

**Figure 1. Map of the Nunavut Settlement Area with the Kitikmeot Region and the community of Cambridge Bay.**



**Figure 2. Map of Cambridge Bay area showing current commercial fishing locations.**



### 1.5 Fishery Characteristics

Upon ratification of the NA in 1993, all existing restrictions or quotas on the amount of wildlife that could be harvested within the NSA were retained and deemed to have been established by the NWMB. These regulatory provisions continue to form the basis for the regulation and management of the Cambridge Bay Arctic Char commercial fishery, requiring among other things:

- A licence to commercially fish Arctic Char in water bodies identified in Schedule V of the *NWT Fishery Regulations* (<https://laws-lois.justice.gc.ca/eng/regulations/C.R.C., c. 847/index.html>)
- Management measures, including gear restrictions, to ensure sustainable harvests
- Requirements to keep records and to report harvest information

In accordance with Section 17(1) of the *NWT Fishery Regulations*, all waterbodies commercially fished in the Cambridge Bay area are listed in Schedule V under Region IV Central Arctic (see Table 3 (Section 6) in IFMP for current quotas). Variation Orders are issued annually by DFO to open each commercial waterbody specifying the fishing periods, quotas, and gear requirements. At the beginning of each year, DFO releases a



summary of all issued Variation Orders (<https://www.dfo-mpo.gc.ca/fisheries-peches/commercial-commercial/atl-arc/variation-orders-ordonnances/nunavut-2018-19-v001-eng.html>) to each community HTO office in Nunavut. Additionally, if there is community interest in opening a commercial waterbody that has not been harvested in recent years, an HTO can request the waterbody be opened for commercial fishing.

Fishers are responsible for obtaining a commercial fishing licence for each commercial waterbody. Licences specify the waterbody, quota and other conditions (including Supplemental License Conditions) and are currently issued by local Conservation Officers (Department of Environment - Government of Nunavut) on behalf of DFO. Each commercial waterbody is fished by a lead fisher with a crew of two to five other fishers. Due to the distance from Cambridge Bay, camps are established at each of the waterbodies, and fishers typically remain in camp for the duration of the harvest, which may last for 3 weeks or more.

Arctic Char are typically harvested by gillnet at or near the mouths of the rivers when fish are migrating downstream to marine waters in July, locally known as a spring fishery (Lauchlan and Surrey rivers), or via either gillnets or weir while returning to freshwater in mid-August through mid-September, locally known as the fall fishery (Halokvik, Ekalluktok and Jayko rivers). At Ekalluktok (Ekalluk) River fish are harvested at the outlet of this river system nearest to Ferguson Lake, to accommodate sport-fishing interests in the area.

Commercial harvests are conducted by either gillnet or weir, depending on the river characteristics. Where conditions are favourable (there is a shallow narrowing in the river), a weir is the preferred method of harvesting. Weirs more effectively allow smaller fish to avoid capture and spawning Char to be released unharmed, and those Arctic Char that are large enough to be retained are allowed to swim freely in the area, causing little stress and thus a better quality of fish. Whereas gillnets may leave markings on the flesh of the fish, weir harvests generate a greater market value for whole product form, and accordingly fishers are paid a premium. Weirs are also favourable as they essentially render by-catch negligible, significantly reduce the risk of lost gear, and eliminate any potential for marine mammal interactions.

Arctic Char are dressed in the field (i.e., viscera and gills are removed) and washed before being packed on ice in tubs. Each tub holds, on average, 45 kg (100 lbs.) of dressed fish and as many as 13 tubs can typically be loaded on a de Havilland Beaver float plane. Float planes are contracted by Kitikmeot Foods Ltd. to transport fish from each location to Cambridge Bay, where they are offloaded at the dock and transported directly to the plant for immediate processing. As fish arrive at the plant, each tub is weighed separately and details related to fish quality and quantity are recorded.

The plant reports harvest details related to each trip daily to DFO, allowing real time harvest reporting and quota monitoring during the commercial fishing season. Conversion factors are applied to the reported harvest to reconcile round weight (from dressed weight) in kilograms, as per the assigned commercial quota. When a quota is

reached, a Notice of Closure is issued by DFO and posted in the community, formally closing the waterbody to further commercial fishing.

Throughout the year DFO works with commercial fishers, Kitikmeot Foods Ltd., and the EHTO to identify priority management issues, and during the fishing season DFO Fishery Officers monitor commercial harvesting activities for compliance with the *Fisheries Act* and applicable regulations. Management issues and compliance concerns are addressed during the fishing season and at pre- and post-fishing season meetings, or whenever possible. In addition, Kitikmeot Foods Ltd. holds a pre-season fishers' meeting in advance of each fishing season to discuss related issues and priorities.

## **1.6 Governance**

The Cambridge Bay Arctic Char commercial fishery is co-managed by the Nunavut Wildlife Management Board (NWMB), Ekaluktutiak Hunters and Trappers Organization (EHTO), and Fisheries and Oceans Canada (DFO), in accordance with the Nunavut Agreement (NA), the *Fisheries Act* and its regulations. The NWMB is the main instrument of wildlife management in the Nunavut Settlement Area (NSA), although the Minister retains ultimate authority and responsibility for wildlife management and conservation of fish.

### ***1.6.1 Fisheries Act, regulations and policies***

The Cambridge Bay Arctic Char commercial fishery is regulated by the *Fisheries Act* (R.S., 1985, c. F-14) and regulations made pursuant to it, including the *Fishery (General) Regulations* and the *Northwest Territories Fishery Regulations*. Where an inconsistency exists between these statutes and the Nunavut Land Claims Agreement, the Agreement shall prevail to the extent of the inconsistency.

These documents are available on the Internet at: <http://www.dfo-mpo.gc.ca/acts-lois/index-eng.htm>

### ***1.6.2 Sustainable Fisheries Framework***

DFO has adopted a Sustainable Fisheries Framework (SFF) for all Canadian fisheries to ensure that objectives for long-term sustainability, economic prosperity, and improved governance for Canadian fisheries are met. The SFF contains policies for adopting an ecosystem based approach to fisheries management, including *A Fishery Decision-Making Framework Incorporating the Precautionary Approach*, *Managing Impacts of Fishing on Benthic Habitat, Communities and Species* and *Policy on Managing Bycatch*.

These documents are available on the Internet at: <http://www.dfo-mpo.gc.ca/reports-rapports/regs/sff-cpd/overview-cadre-eng.htm>

### ***1.6.3 Policy on Managing Bycatch***

Bycatch within the Cambridge Bay fishery is recorded via Logbooks as per commercial license conditions (see section 4.2 and 7.1). The fishery also utilizes weir harvesting techniques at two locations, which eliminates virtually all mortality of bycatch. After review of Logbook information, fisheries management data and communicating with resource users and co-management partners, it has been determined that this fishery little impact or concern to other fish, seabird or marine mammal populations. There has been no reported marine mammal Incidental Mortality and Serious Injury (IMSI) for the past 5 fishing seasons in the Cambridge Bay area. Commercial gillnets are checked 3-4 times daily, and if marine mammals are encountered and found alive are released, otherwise are opportunistically harvested for subsistence purposes in accordance with land claim rights.

The Cambridge Bay commercial fishery has been added to the United States National Oceanic and Atmospheric Administration's (NOAA) List Of Foreign Fisheries (LOFF) to adhere to international regulations implementing the Marine Mammal Protection Act and import provisions. The LOFF classifies each fishery as either an "exempt" or "export" fishery based on its risk of marine mammal bycatch. Prohibition of the intentional mortality or serious injury of marine mammals (including seals) during the course of commercial fishing operations is required for both exempt and export fisheries. The submission of the Cambridge Bay commercial fishery to the LOFF remains under review by NOAA, however it is expected to be exempt given the low impact and minimal interaction with marine mammals encountered in this fishery.

#### 1.6.4 Ghost Gear Initiative

Beginning in 2019, DFO has started developing a Ghost Gear Initiative. The purpose of this Initiative is to reduce the impacts of plastic pollution and ghost fishing associated with lost fishing gear from Canadian fisheries, and promote the prosperity and sustainability of fisheries, marine species at risk, and the health of Canada's oceans and other aquatic ecosystems in support of DFO's core responsibilities. For the Cambridge Bay Arctic Char commercial fishery, license conditions have been implemented and management measures are being developed to better reflect current practices and further promote reporting of lost and/or found fishing gear. Presently, lost gear is not a concern for this fishery.

#### 1.6.5 Nunavut Agreement

In 1993, Canada settled a comprehensive land claim agreement with the Inuit of the NSA. The Nunavut Agreement (NA) created priority access and wildlife harvesting rights for Inuit and other Aboriginal groups who traditionally harvested within the NSA.

The Agreement also created an Institution of Public Government, the NWMB, to share decision making authority with the Federal Government. The NWMB and DFO Minister consider matters relating to the proper management and control of fisheries and the conservation of fish within the NSA. Under this co-management regime, the NWMB is the main instrument of wildlife management, but the Minister retains ultimate

responsibility for wildlife management and may accept, reject or vary decisions made by the NWMB with respect to harvesting and other decisions related to management and protection of wildlife and wildlife habitat.

The NA establishes wildlife management authority for Regional Wildlife Organizations (RWO) and Hunters and Trappers Organizations (HTO). The RWO in the Cambridge Bay area is the Kitikmeot Regional Wildlife Board (KRWB). The powers and functions of RWOs (NA 5.7.6) include:

- Regulation of harvesting practices and techniques among the members of HTOs in the region, including the use of non-quota limitations.
- Allocation and enforcement of regional basic needs levels and adjusted basic needs levels among HTOs in the region.
- Assignment to any person or body other than an HTO, with or without valuable consideration and conditions, of any portion of regional basic needs levels and adjusted basic needs levels.
- Generally, the management of harvesting among the members of HTOs in the region.

The HTO in the Cambridge Bay area is the Ekaluktutiak Hunters and Trappers Organization (EHTO). The powers and functions of HTOs (NA 5.7.3) include:

- Regulation of harvesting practices and techniques among the members, including the use of management measures.
- Allocation and enforcement of community basic needs levels and adjusted basic needs levels among members.
- Assignment to non-members, with or without valuable consideration and conditions, of any portion of community basic needs levels and adjusted basic needs levels.
- Generally, the management of harvesting among the members.

The Nunavut Agreement establishes authority to Nunavut Tunngavik Incorporated as the primary Designated Inuit Organization under the Agreement (Article 39). It is responsible for ensuring that Inuit rights and obligations under the land claim are implemented, including the wildlife management provisions (Article 5) of the Nunavut Agreement.

Under the Agreement, wildlife management and Inuit harvesting are guided by the principles of conservation (NA s.5.1.5).

The Nunavut Agreement is available on the internet at:  
<http://laws-lois.justice.gc.ca/eng/acts/N-28.7/>

## **1.7 Approval Process**

This IFMP will be provided to the Minister of DFO and the NWMB for approval. This IFMP has been developed as an evergreen document, meaning that it is written in such a way as to be relevant over a long period of time, with no fixed end date. Through regular



reviews (see Section 9 of IFMP) by the IFMP Working Group and stakeholders, updates and amendments will be provided to the NWMB and Minister of Fisheries and Oceans for approval, as required.

The approved IFMP will be translated to Inuinnaqtun, hardcopies published and distributed to co-management partners, and made publically available on the internet by DFO.

## **2 Stock Assessment, Science and Traditional Knowledge (Science lead)**

### **2.1 Biological Synopsis**

Harris, et al., (2020a) provides a comprehensive summary of the biology of Cambridge Bay Arctic char, and some of their main points are touched upon below. Arctic Char, *Salvelinus alpinus* (L.) are distributed throughout the Canadian Arctic including the islands of the Arctic Archipelago (McPhail & Lindsey, 1970; Scott & Crossman, 1973), and occur as both non-anadromous (lake-resident or land-locked) and anadromous (i.e., searun) forms (Johnson, 1980; Jonsson & Jonsson, 2001; Loewen et al., 2009). Arctic Char can tolerate the salinity of the sea when they reach a length of 150 to 200 mm (Johnson, 1980; Gilbert et al., 2016), at which size they are able to descend rivers accessing marine habitats for feeding (Moore, 1975; Harris, et al., 2020). Feeding takes place in near-shore, shallow areas primarily in estuaries for around 30-45 days, although as little as six days has been documented (Dutil, 1986; Gyselman 1994; Moore, et al., 2016). Feeding is primarily surface oriented although foraging dives of more than 30 m have been recorded (Harris, et al., 2020). Although estuaries are clearly important for summer foraging while at sea (Harris, et al., 2020), some long distance marine migrations have been recorded (e.g.,  $\geq 100$ -400 km, Gyselman 1994; Dempson & Kristofferson, 1987; Moore, et al., 2016). The Cambridge Bay commercial fishery targets downstream, or spring, migrations (July) associated with feeding and upstream, or fall, migrations (mid to late August and early September) associated with the return to spawning or overwintering habitats.

Spawning takes place in fresh water in the fall, usually late-September or early-October, over gravel beds in lacustrine habitats. In the Cambridge Bay area in particular, and the central Canadian Arctic in general, spawning takes place in lakes, because most rivers freeze completely in winter (Johnson, 1980). After hatching, the young Char spend their early years entirely in fresh water (Johnson, 1980). Young Arctic Char feed on freshwater shrimp (amphipods) and insect larvae, and the adults feed on small fish and benthic organisms including snails, clams and insect larvae. In most systems, the young Char reach a size of about 150-200 mm in four or five years, and they are ready to take their first migration to sea (Gilbert et al., 2016) so they can forage on lipid rich marine prey sources. In the fall, all Char return to fresh water to overwinter and escape the lethal temperatures of winter marine waters (Johnson, 1980).

Non-anadromous Arctic Char are also found in systems inhabited by the anadromous form. Although these Char also have access to the sea, they do not migrate. The reasons for this have yet to be explored in the Cambridge Bay area, however, in other systems

differential migratory strategies appear to be a life history tactic conditional on some threshold of size or growth (Hendry, et al., 2004; Moore et al., 2014).

Sexual maturity of anadromous Arctic Char is generally reached at a size of about 450 mm in length (Johnson, 1980; Harris et al. 2020a). Recently, Harris et al. (in press) estimated length ( $L_{50}$ ) and age ( $A_{50}$ ) at 50% maturity as an index for reproductive potential for two systems in the region. They estimated the overall  $L_{50}$  at the Jayko River to be 553.7 mm and at the Halokvik River to be 539.7 mm. Across all samples combined, Harris et al. (in press) found the overall  $A_{50}$  at Jayko was 12.5 years whereas the overall  $A_{50}$  at Halokvik was 10.4 years. These estimates of reproductive potential, however, were variable among years. Females generally carry 3000 to 5000 eggs (Scott & Crossman, 1973). Arctic Char are capable of spawning more than once in a lifetime. In the Cambridge Bay area, however, they do not appear to spawn in consecutive years, once sexual maturity is reached. The almost complete absence of spawners in the fall upstream migrations suggests that they do not, for the most part, go to sea the summer prior to spawning (Johnson, 1980, Moore et al., 2017). After spawning, the Char remain in fresh water for another winter before resuming their feeding migration to the sea the following spring. This behaviour results in a loss of 30-40% of their body weight, so they are often in very poor condition at this time (Dutil, 1986).

The life history and migratory patterns of Cambridge Bay Arctic Char and the subsequent implications for genetic stock structure are summarized succinctly by Harris et al. (2020a). Their main points are re-iterated below. Units of management composed of discrete stocks (i.e., “Wellington Bay”, “Albert Edward Bay” and mainland stock complexes) were initially proposed by Kristofferson et al. (1984, see also Dempson & Kristofferson, 1987) based on differences in biological characteristics between these stocks and evidence from a long-term tagging study. Assaying enzyme variation Kristofferson (2002) suggested spawning char in the region show high natal fidelity and that suggested that discrete stocks may exist between and within river systems. A more recent microsatellite DNA assessment (Harris et al. 2016) found that there was regional genetic structure across the entire study area similar to the proposed by Kristofferson et al. (1984), however, fishery sampling locations in the Cambridge Bay region were weakly differentiated. Harris et al. (2016) also suggested that discrete stocks are known to mix extensively while at sea which is consistent with emerging acoustic telemetry evidence (Moore, et al., 2016, 2017). This latter fact, severely complicates the management of this fishery. Most recently Moore et al. (2017) combined genomic and acoustic telemetry data to reveal weak, genetic population differentiation and asymmetric dispersal. Their combined data suggested that Arctic Char in the Cambridge Bay region return home to their natal river to spawn, but may overwinter in rivers with the shortest migratory route to minimize the costs of migration in nonbreeding years. This means that discrete stocks not only mix while at sea, they also mix extensively in freshwater overwintering habitats. Future mixed stock fishery analyses focusing on which stocks are being harvested and to what extent in both marine and freshwater locations should be a top priority.

As described by Harris et al. (2020a), the following are major points for understanding genetic stock structure as it relates the management of char stocks in the region:

1. discrete stocks are known to mix extensively while at sea,
2. the mixing of discrete stocks is likely also very prevalent in overwintering habitats,
3. individual Arctic char must return to fresh water annually to over winter regardless of reproductive status resulting in the potential for two types of dispersal (i.e., breeding and overwintering dispersal),
4. in the Cambridge Bay region virtually all upstream-migrating individuals are current-year non-spawners and have no potential for gene flow in the present year and,
5. the majority of dispersal events would therefore be overwintering dispersal and
6. overall fidelity appears to be quite low in this species.

For management purposes, all Arctic Char present within a given waterbody are treated as a single management unit, separate from Arctic Char stocks in the other waterbodies. This has been the historical management approach for the Cambridge Bay Arctic Char commercial fishery, and to date has proved to be sustainable. Updating information on the nature and prevalence of mixed-stock harvest may allow for modifications of the current river-specific management regime in the region.

## 2.2 Ecosystems Interactions

DFOs Sustainable Fisheries Framework (SFF) aims to support stock conservation and sustainable use of aquatic resources in Canada (DFO 2016). This framework guides integrated fisheries management planning but also considers aquatic habitat and how species interact within their ecosystem, supporting the adoption of ecosystem-based approaches to management that aim to protect biodiversity and fisheries habitats.

Habitat alteration and/or degradation of spawning and overwintering sites do not appear to be an issue. Kristofferson (2002), with the assistance of community elders and fishers, identified 12 spawning grounds in the Cambridge Bay area. Given the size and complexity of each commercial freshwater system, however, it is quite clear that there are other potential spawning areas within each watershed. Those that have been identified through traditional knowledge are not in the immediate vicinity of commercial fishing locations. Additional, spawning lakes have also been identified (L.N. Harris, unpublished data) as part of the long-term acoustic monitoring program that has been ongoing in the region since (see Moore et al. 2016, 2017, Harris et al. in press).

Anadromous Arctic Char feed on marine invertebrates (amphipods such as *Parathemisto libellula* and mysids (Mysidacea)) and marine fishes (mostly Arctic cod (*Boreogadus saida*), capelin (*Mallotus villosus*) and northern sand lance (*Ammodytes dubius*) while at sea in summer (Dempson & Kristofferson, 1987, Gyselman 1994, Dempson et al. 2002, Spares et al. 2012). Young Char are preyed upon by Lake Trout (*Salvelinus namaycush*) in fresh water; and by gulls, other fish-eating birds and occasionally seals while in the sea. None of these impacts likely pose a serious threat to Arctic Char population health. Large Arctic Char appear to be virtually immune to predation and can be considered the

terminal predator (Johnson, 1980), although seals have been observed actively chasing char in the area (L.N. Harris, personal observation).

There is minimal bycatch in the Cambridge Bay Arctic Char commercial fishery because of the targeted fishing period and gear selection. Recent commercial monitoring has identified that in the freshwater gillnet fishery (i.e., in Ferguson lake where the Ekalluktok stock is harvested) very little bycatch occurs, however when it does occur, Lake Whitefish (*Coregonus clupeaformis*) and Lake Trout are the most common bycatch species captured. In the marine environment, bycatch species include marine sculpins (*Myoxocephalus spp.*) and Arctic Cod. Some of the bycatch retained in the commercial fishery is used for personal consumption by fishers in the camps. In the weir fishery, all bycatch are released unharmed. Recently, with improved monitoring efforts, loons have been documented as bycatch. Overall, bycatch is considered to have a negligible impact to the ecosystem.

### **2.3 Traditional Knowledge and Inuit Qaujimaqatuqangit**

The Cambridge Bay area has been a place of significant fishing activity for centuries. The Inuit of Cambridge Bay have accumulated a great deal of historical ecological and environmental expertise that provided a basis for their survival as it related to food sources and signs of decline in a given area (Riedlinger & Berkes, 2001). In particular, the Ekalluktok (Ekalluk River) has a well-documented history of the traditional ecological knowledge (TEK) of the Iqaluktuurmiut, the group of Inuit families who occupied the area. As discussed in an exhibit booklet developed by the Kitikmeot Heritage Society (2007), because of the strong runs of Arctic Char that occur both in the spring and the fall the Ekalluktok (Ekalluk River) area has been an important settlement area with archaeological evidence of the area being continuously occupied for four thousand years (see also Friesen, 2002).

Since 2000, the Kitikmeot Heritage Society has collaborated with the University of Toronto on an oral history/archaeological research project documenting traditional life with specific attention given to fishing activities, including knowledge, practices and beliefs (Friesen, 2002, 2004). The exhibit booklet is available on the internet at: <https://www.kitikmeotheritage.ca/>.

Inuit knowledge and Inuit Qaujimaqatuqangit (IQ) continues to be an important means of managing the fishery, and is used with scientific knowledge for effective fisheries decision-making and in the development of scientific research and fishery management plans (Thorpe and Moore 2019). Inuit knowledge and IQ associated with local Arctic Char spawning locations has been collected through the assistance of community elders and fishers (Kristofferson, 2002) and traditional knowledge has contributed to the information needed to support an updated stock status of commercially harvested Arctic Char in the Cambridge Bay area (Day & Harris, 2013, Harris et al. 2020a). Inuit knowledge, including TEK and IQ continue to be collected regularly through community consultations. DFO Science research plans are reviewed annually with resource users, and project designs are adjusted to incorporate local knowledge and advice. This IFMP,

including management measures and best practices related to the use of fishing gear and the release of spawning char, has been developed by the Cambridge Bay Arctic Char Working Group in consultation with the community. Finally, in 2016 a collaboration was established with the Ekaluktutiak Hunters and Trappers Organization (EHTO) to document the IQ of Arctic in the Cambridge Bay region (Thorpe and Moore 2019). This work, funded by Polar Knowledge Canada, involved the training of local youth to conduct semi directed ethnocartographic interviews to document the IQ of nine individuals of the community (Thorpe and Moore 2019). Interview findings contributed to an IQ database managed by the EHTO and the initiative culminated in an elder-youth knowledge exchange camp for a week in August 2016. The plan is to organize and host similar events in the coming years where community members can come together to share knowledge on char research and management in the region.

## **2.4 Stock Assessment**

A complete stock status assessment of Cambridge Bay Arctic Char was completed by Day & Harris (2013) and is available on the internet at: [http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2013/2013\\_068-eng.html](http://www.dfo-mpo.gc.ca/csas-sccs/Publications/ResDocs-DocRech/2013/2013_068-eng.html). The assessment analyzed fishery-dependent data focussed on trends in biological characteristics for all commercially harvested water bodies. This assessment concluded that all of the primary stock complexes, with the exception of the Ellice River, were considered to have a low level of risk of overexploitation given the harvest strategies at the time. Quantitative stock assessment modelling approaches have also been explored (Zhu et al. 2014 a,b) but the results of these analyses have not yet resulted in the modification of existing management strategies.

The Precautionary Approach (PA) to fisheries management within the sustainable fisheries framework involves applying a harvest strategy that (1) identifies three stock status zones (healthy, cautious, and critical) according to upper stock and limit reference points (2) set harvest rates for each zone and (3) adjusts the removal rate according to fish stock status (DFO 2006). Most recently, an assessment of the Halokvik (Thirty-Mile River) and Jayko (Jayco River) combined trend analyses (Harris et al. 2020a) with quantitative modelling (Zhu et al. in press) to assess stock and to biological reference points consistent with the PA to fisheries management. This assessment concluded that both fisheries would be considered near the boundary of the healthy and cautious zone and that there is likely a moderate risk to these populations if harvest remains the same.

In support of stock assessment, past attempts have also been made to determine the abundance of various systems (McGowan, 1990; McGowan and Low 1992, Harris et al. unpublished data), primarily through the use of weirs during upstream migrations. These counts were variable among river systems and, in some cases, among years within the same system. Accurate enumerations over multiple years would prove useful for understanding exploitation rates that are sustainable in this species. At this time, these data are not available.

The Cambridge Bay commercial fishery for Arctic char is considered a data-poor fishery which presents a number of challenges and uncertainties for formal stock assessments

(Tallman et al. 2013). A multi-year stock assessment plan has been developed by DFO, in consultation with resource users and co-management organizations, for the Cambridge Bay Arctic Char commercial fishery in order to address this data-poor concern. The objectives of the plan are to assess stock health and to establish sustainable harvest levels for all commercially harvested waterbodies. Both fishery dependent (those data collected directly from the commercial fishery) and independent data (those collected independent of the commercial fishery) are required as part of the plan and should be collected annually.

Fishery-dependent data continues to be collected through the DFO-funded plant sampling program, which has generated a long-term series of biological data (length, weight and age) and is a key assessment tool in Cambridge Bay. Samples are examined annually for changes in the average length, weight and age and their frequency distributions that may signal a response of the stock to the current level of harvest.

Starting in 2012, the EHTO, supported by Kitikmeot Foods Ltd and DFO, initiated a long-term, river-based monitoring program to collect catch per unit effort (CPUE) and harvest information. This program contributes to fishery dependent data collection for actively harvested commercial fisheries. The program was maintained for five consecutive years through a funding contribution from the Nunavut General Monitoring Plan before transitioning into a commercial fisher-led program. The monitoring program is designed to estimate annual CPUE of commercial harvest through the use of logbooks. Additionally, the reporting of bycatch and discards in the fishery will contribute to an improved understanding of species interactions. Filling out log books completely and accurately is now part of the license conditions for the Cambridge Bay Arctic Char commercial fishery.

Fishery-independent data was collected at Jayko (Jayco River) from 2010-2015, and at the Halokvik (Thirty-Mile River) from 2011-2015. These data formed the foundation of a 2017 assessment for each fishery (see Harris et al. in press, Zhu et al. in press). Fishery-independent sampling is now taking place at the Paalik (Lauchlan River) and is expected to continue until 2022, after which an assessment of this stock will take place. Additionally, a long-term acoustic tagging project (in collaboration with the University of Windsor and Université Laval), which commenced in 2013, has been assessing straying and dispersal among systems, spatiotemporal ocean migration patterns and marine and fresh water habitat use (Harris et al. 2014, Moore et al. 2016, 2017, Harris et al. 2020). Finally, parasite assessments for Arctic Char from all river systems are currently being completed (in collaboration with Lakehead University), marine trophic structure is being assessed (in collaboration with McGill University), life history variation is being assessed through otolith microchemistry (in collaboration with the University of Waterloo), thermal limits and cardiac performance are being examined (in collaboration with the University of British Columbia) and the impacts of marine microplastics on Arctic char are being studied (in collaboration with the University of Toronto).

Current quotas are based on “Tallman’s rule” which is a conservative exploitation level of about 5% of the number of Char in the run vulnerable to the fishing (Tallman et al.



2015). As mentioned above, further research to update exploitation rates for commercially harvested Arctic Char in the Cambridge Bay area is needed. Improved understanding of abundance, biomass, and stock health are important for assessing these exploitation rates and for establishing sustainable harvest levels for each waterbody.

## **2.5 Precautionary Approach**

As described above, the SFF also includes the adoption of the PA framework to fisheries management. This framework (1) identifies three stock status zones (healthy, cautious, and critical) according to upper stock and limit reference points (2) sets harvest rates for each zone and (3) adjusts the removal rate according to fish stock status. Only recently have reference points been identified for two of the river systems (Halokvik and Jayko Rivers) within the Cambridge Bay region (Zhu et al. in press). For this assessment a depletion-based stock reduction analysis (DB-SRA) and data-limited model (DLM) were employed to assess stock status and sustainable fisheries management of these fisheries. Under the precautionary approach in fisheries management, both fisheries would be considered near the boundary of the healthy and cautious zone with the most likely position being just below the Upper Stock Reference of  $0.8 B_{MSY}$ . However, much uncertainty is present, and the lower bounds of the credible intervals also overlap the lower-limit reference points for these fisheries. Reference points have not been developed for any other fisheries in the Cambridge Bay region.

## **2.6 Research**

Research is critical for informing the sustainable management of Arctic char in the Cambridge Bay region. As outlined in the short-term objectives of this document there is a need to update stock assessment information and advice on sustainable harvest levels for each commercial waterbody and to improve our understanding of the biology of Arctic Char in the region. Fishery-dependent data collection is an important part of char research in the region facilitating the collection of biological data (length, weight and age) from each harvested stock on an annual basis. This is done through an annual commercial plant sampling program (in collaboration with Kitikmeot Foods Ltd) that has been collecting biological data since the 1970s. Fishery independent surveys are also completed annually to collect biological data that compliments that collected through the plant sampling programs and to further our understanding of char biology. In 2013, a collaboration between DFO, the Ocean Tracking Network (OTN), Universite Laval and the University of Windsor was initiated to use acoustic telemetry to track the migrations of

Arctic char in both the marine and fresh waters of the region. The intent is that this research program will continue until 2022. The results from this work has provided novel insights into marine habitat use and the timing of migrations between freshwater and marine habitats for both Arctic char (Moore et al. 2016, 2017, Harris et al. 2020b) and Lake Trout (Harris et al. 2014, 2020c). The extent of freshwater migrations and freshwater habitat use (spawning and overwintering) are currently being studied for both Arctic char and Lake Trout as part of this program, the results of which have yet to be published. Additional research in recent year has focussed on stock discrimination and understanding straying and dispersal among stocks of char in the region (Harris et al.

2016, Moore et al. 2017). The results of these studies suggest that there is significant but weak genetic differentiation among char stocks in the region and that migratory harshness is an important driver of overwintering dispersal. Other recent work has focussed on assessing the effects of temperature on aerobic metabolism and maximum heart rate of upriver migrating Arctic char in the Kitikmeot region that has found char are already experiencing temperature above which performance would be limited (Gilbert et al. 2020). There are also several other unpublished ecosystem-based studies currently underway that are evaluating the marine food web in the region including the trophic position of Arctic char in the marine environment, assessing and quantifying bycatch that results from the commercial harvest of char in the region and resolving parasites that are common in commercially harvested char.

### **3 Social, Cultural and Economic Importance of the Fishery**

#### **3.1 Social and Cultural**

Arctic Char is very important to the social connection, cultural definition and food requirements of Inuit across Canada (Myers et al 2005; Balikci 1980). Cambridge Bay is also known as Ekaluktutiak, which in Inuinnaqtun translates to “Good Fishing Place” and reflects the strong historical and cultural connection the people share with Arctic Char (Thorpe et al. 2019). Today the area remains a significant food fishery as well as a social and economic contributor through recreational and commercial fisheries.

Arctic Char play an important role in the nutrition (Evans et al. 2016) and social culture of the community – fostering the continuation of traditional culture and lifestyles, provision of traditional foods, and local self-sufficiency (Thorpe et al. 2019). The nutritional value of country foods like Arctic Char cannot be adequately replaced by southern foods, which are costly to transport and lack the same quality as a food source (Myers et al 2005). For example, the current Nunavut Fisheries Strategy, 2016-20 has estimated food replacement value of char is over \$7 million (The Territory of Nunavut, Government of Nunavut, Department of Environment, 2016). Additionally, Arctic Char are considered a good food choice for those seeking to maintain a traditional diet while minimizing Hg (mercury) intake that can be associated with other traditional foods (e.g., Lake Trout and marine mammals, Evans et al. 2016). The commercial harvest of Arctic Char supports important social and cultural values of family, sharing and community that have been passed down through generations of fishers. Some of the fishers in the commercial fishery harvest at the same locations where they were born, and where their families spent their lives fishing and hunting. The skills and traditions they learned are passed down through their families and are shared with other fishers.

According to the Nunavut Wildlife Harvest Study (NWMB 2004), Arctic char is the most harvested resource in Nunavut. Between 1996 and 2001 the annual number of food harvesters in the Cambridge Bay area varied between 23 and 55, harvesting an average of 6,461 Arctic Char per year from the many nearby waterbodies. Fish sold to the fish plant were excluded from the study. Assuming that the average size of Arctic Char from the



food harvest is similar to the average commercially harvested size, the Study suggests the food harvest may be as much as half of the average commercial harvest.

### 3.2 Economic Importance

The economic contribution of the Cambridge Bay Arctic Char commercial fishery is significant for both the local economy and the Territory. In 2015, the total Arctic Char commercial harvest in Nunavut was estimated at 72,574 kgs with an estimated landed value of \$1,800,000 (2016 GN Fisheries Strategy). Cambridge Bay contributed 37,765 kgs (52%) of that total harvest, with an estimated market value contribution of \$855,363.<sup>1</sup> More recently, in 2019 the Cambridge Bay commercial fishery harvested 99% of the targeted quotas (48,493 Kg), totalling 48,097 Kgs.

For the most recent 5-year period available for Cambridge Bay Arctic Char commercial harvests (2015-2019), the annual average landings as a percentage of targeted quota was found highest for Ekalluktok (Ekalluk River) (96%), followed by Halovik (Thirty-Mile River) (93%), Jayko (Jayco River) (89%), Paliryuak (Surrey River) (86%), and Paalik (Lauchlan River) (90% over 2 years). The landed value generated by the landings over this 5-year period were approximately \$942,883, with an annual average of \$188,577.

During the 2015-2019, period, the market value generated by the landings in Cambridge Bay were approximately \$4,073,397, with an annual average of \$814,679. The five-year average market value for all forms of Cambridge Bay Arctic Char produced by Kitikmeot Foods Ltd. was \$22.65/kg<sup>2</sup>.

Until recently, the economic contribution of Arctic Char could vary from one year to the next due to several factors. While the quotas continue to remain stable, annual operational costs, market demand and value, and opportunities to harvest as is not consistent and may vary annually. For example, rising transportation costs, productive food fisheries, and poor weather can negatively impact the market value, demand and supply of Arctic Char. A detailed analysis of landings, values, economic viability and potential economic influences is provided in Appendix D: Economic Analysis.

The Nunavut Development Corporation is a public agency of the Government of Nunavut, and is responsible for promoting economic opportunities, diversity, and long-term growth and stability in Nunavut. It is committed to maximizing opportunities across Nunavut, as well as expanding Arctic Char markets both domestically and internationally. Advancing collaboration with NDC, the Government of Nunavut, DFO, and community stakeholders to improve the understanding and potential for Arctic Char to contribute economic benefit locally and territorially is important to properly managing the fishery.

**Ocean Wise** seafood is an independent conservation program that makes it easy for consumers to choose sustainable seafood distributors and restaurants for the long term

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<sup>1</sup> See Appendix D: Economic Analysis for details.

health and sustainability of Canada's fisheries. The four criteria to become Ocean Wise certified are: (1) Fisheries abundant and resilient to fishing pressures, (2) well managed with a comprehensive management plan based on current research, (3) harvested in a method that ensures limited bycatch on non-target and endangered species, and (4) harvested in ways that limit damage to marine or aquatic habitats and negative interactions with other species.

Presently, Kitikmeot Foods Ltd. employs approximately 28 local residents and beneficiaries in support of the Arctic Char commercial fishery on an annual basis. The commercial fishery maximizes local employment opportunities, thus allowing fishers to live and work in Cambridge Bay and contribute to the local economy while continuing to carry forward skills from a more traditional way of life.

As Arctic Char total sales and market opportunities grow, operational costs too continue to increase. Kitikmeot Foods Ltd. has had to rely heavily on freight subsidies from the Nunavut Development Corporation on an on-going basis to offset high transportation costs incurred to bring Arctic Char from fishing sites to the plant and onto various domestic and international markets. Over the 5-year period of 2014-2018, Kitikmeot Foods Ltd. experienced an increase in transportation related costs annually, from 20% of overall operating expenditures in 2014 to 27% in 2018.

## **4 Management Issues**

There are a number of issues that co-management organizations continue to address in the management of the Cambridge Bay Arctic Char commercial fishery. The priority management issues include the need for updated stock abundance estimates to support management decisions, timely harvest reporting and consistent reporting of bycatch and catch and effort information in support of sustainable harvest levels, and ensuring the long-term viability and prosperity of the commercial fishery.

### **4.1 Stock Abundance Estimates and Exploitation rates**

Comprehensive up-to-date abundance (or biomass) estimates and stock assessments are still required for several of the stocks of commercially harvested Arctic Char (See Section 3.2.5). Traditional scientific approaches for stock assessments and abundance estimates for setting sustainable harvest levels may be impractical in terms of cost, feasibility and applicability at all river systems. To compliment these approaches, quantitative modelling methods with predictive strengths are now being recommended in many cases where the data are available. With updated abundance estimates and stock assessments, updated exploitation rates for commercially harvested Arctic Char in the Cambridge Bay area can be provided. It should be noted, however, that exploitation rates that are sustainable for Arctic Char are still not fully understood and research aimed at resolving levels acceptable in this species should be initiated. It has been suggested that in some regions of the Canadian Arctic, an exploitation rates of 11% is not sustainable

(Johnson 1980), while in the other areas they are removal rates of 15% - 41% have been noted (Dempson 1995).

Currently, the maximum exploitation rate that are still sustainable for Arctic Char in Nunavut is unknown and this makes it difficult for managers to optimally manage stocks. As mentioned above, where abundance (or biomass) is known a precautionary rate of 5% ("Tallman's Rule") has been proposed to ensure sustainability for data poor assessments. Thus, it is clear the work aimed at understanding the harvest pressure(s) this species can sustainably withstand paramount. All told, science research needs to continue to support management decisions and resource conservation.

Given this fishery is still considered data-poor, to support standard stock assessment, both fishery-dependent (those data collected directly from the commercial fishery) and fishery-independent data (those collected independent of the commercial fishery) are required. Long-term monitoring, designed to estimate annual CPUE of harvests and report bycatch and discards in the fishery, will contribute to an improved understanding of abundance and species interactions, necessary for the sustainable and ecosystem-based management of Arctic Char in Cambridge Bay.

#### **4.2 Harvest Reporting**

Timely, accurate reporting of all catches and the effort exerted to harvest these catches from each of the commercial waterbodies is essential. Without complete and accurate monitoring of all harvesting activities, total harvest removals from all fisheries remain unknown, and co-managers must exercise caution when establishing harvest limits so that healthy Arctic Char populations capable of sustaining commercial harvests and the subsistence needs of Inuit can be maintained.

Overharvests of commercial quotas have occurred on occasion. Commercial harvesting needs to remain within regulated harvest levels. The timeliness of the reporting allows managers to assess the harvest as limits are approached. Recent initiatives have resulted in daily reporting of commercial landings through the processing plant (see Management Measures, Section 7.4). In addition, a shared stewardship monitoring program involving the EHTO, Kitikmeot Foods Ltd. and DFO has been funded through the Nunavut General Monitoring Plan ran from 2011-2017. All commercial fisheries are currently monitored for total removals, including commercial landings, bycatch and discards, and personal consumption as required by recently updated commercial license conditions.

#### **4.3 Economic Viability of the Fishery**

Rising transportation costs are impacting the economic feasibility of commercially fishing at some of the more distant river systems, and limit consideration of establishing new commercial fisheries at other distant fishery locations. The purchase of Arctic Char from other nearby communities, the use of a collector vessel, and other strategies are being assessed by stakeholders to supplement commercial landings in Cambridge Bay, optimizing the full processing and employment capacity of Kitikmeot Foods Ltd.

Regional and territorial co-management organizations continue to promote economic viability while ensuring stocks remain healthy and abundant.

## 5 Objectives

Objectives for the Cambridge Bay Arctic Char commercial fishery are a key component of the IFMP. Long term objectives guide the management of the fishery and may be categorized as stock conservation, ecosystem, shared stewardship, and social, cultural and economic objectives. Each long term objective is supported by one or more short term objectives to address existing management issues in the fishery. The objectives listed in Table 2 were developed by the IFMP Working Group and other stakeholders.

**Table 2. Long-term and short-term objectives for the Cambridge Bay Arctic Char commercial fishery.**

Long-term Objectives	Short-term Objectives
<b><i>Stock Conservation</i></b>	
Conserve Arctic Char stocks through sustainable use and effective fishery management	<ul style="list-style-type: none"> <li>• Update stock assessment information and advice on sustainable harvest levels for each commercial waterbody</li> <li>• Improve knowledge of Arctic Char biology, ecology and stock discrimination</li> <li>• Improve the timeliness and accuracy of harvest and CPUE reporting in commercial, recreational and food fisheries to monitor total removals of arctic Char and bycatch.</li> <li>• Encourage conservation and responsible fishing practices for Arctic Char.</li> <li>• Given uncertainties related to the abundance of Arctic Char stocks in the Cambridge Bay area, continue to harvest at conservative levels using PA framework.</li> </ul>
<b><i>Ecosystem</i></b>	
Conserve bycatch species through effective fishery management.	<ul style="list-style-type: none"> <li>• Improve the accuracy and completeness of reporting bycatch to improve understanding of species interactions and management.</li> </ul>
<b><i>Shared Stewardship</i></b>	
Promote collaboration, participatory decision making, and shared responsibility	<ul style="list-style-type: none"> <li>• Conduct post-season fishery meetings and IFMP Working Group meetings on an annual basis.</li> </ul>

Long-term Objectives	Short-term Objectives
with resource users, co-management organizations and other stakeholders.	<ul style="list-style-type: none"> <li>• Continue to engage local participation in co-management activities at every opportunity.</li> <li>• Promote the responsibility of commercial fishers to monitor and report, as per licence conditions.</li> <li>• Secure funding for monitoring programs for commercial, recreational and food fisheries.</li> </ul>
<b><i>Social, Cultural and Economic</i></b>	
Promote an economically viable and self-sufficient fishery based on high quality that maximizes social and economic benefits, while ensuring stocks remain healthy and abundant for future generations.	<ul style="list-style-type: none"> <li>• Support initiatives to optimize community-based processing and employment capacity.</li> <li>• Support strategies to increase feasibility of commercial operations at more distant river systems and other fishery locations.</li> <li>• Maintain and conserve local and traditional fishing activities and areas.</li> <li>• Promote collaboration among co-management organizations associated with economic development throughout Nunavut.</li> </ul>
<b><i>Compliance</i></b>	
Promote compliance with legislation, regulations and management measures to achieve conservation and sustainable use.	<ul style="list-style-type: none"> <li>• Ensure commercial licence conditions are updated regularly, to reflect requirements related to the sustainable management of the fishery. Promote compliance through education and shared stewardship. Work collaboratively with local and territorial wildlife officers.</li> <li>• Promote compliance through regular monitoring and surveillance activities, and increased presence in the community.</li> </ul>

## 6 Access and Allocation

Commercial quotas are established for each water body, as set out in Schedule V of the *NWT Fishery Regulations*. All waterbodies have a competitive quota; in other words, all

fishers licensed to commercially fish a given waterbody collectively fish against the total quota for that waterbody. There are no individual quota allocations associated with the commercial fishery. The commercial fishery is opened annually through a Variation Order, and closed by a Notice of Closure when the quota is met. Commercial fishing licences are issued to fishers under Section 7 of the *Fisheries Act*.

After the addition of Paalik (Lauchlan River) in 2018, targeted reduced quotas were set for Ekalluktok and Jayko Rivers to offset the increased landings expected from Paalik (Lauchlan River). These targeted reduced quotas may vary each year depending on demand as the fish plant operates at full capacity with the current total quota and does not have the required storage space to accept more Arctic Char. The reduced targeted quotas are typically applied to the fall fisheries, improving the balance of the spring-fall harvest distribution, and additionally affords fishers and float planes to leave Jayko sooner, before ice and weather conditions become a safety concern later in September.

Table 3 displays current legal quotas for the commercial fishery in both round weight kilograms (the appropriate product form and unit of measure of quota allocation, as set out in Schedule V) and dressed weight pounds (form and unit of measure used to record landings). Conversion factor calculations are outlined in Section 7.3. Quotas and landings for the commercial fishery in recent years are presented in Appendix B. In recent years Kitikmeot Foods Ltd. has included target quotas to reflect the plant capacity.

**Table 3. Legal quotas for the Cambridge Bay Arctic Char commercial fishery.**

<b>Location</b>	<b>Legal Quota</b> (Kg, Round Weight)	<b>Converted Legal Quota</b> (Lbs, Dressed Weight)
Ekalluktok (Ekalluk) River	20,000	36,744
Halokvik (Thirty-Mile) River	5,000	9,186
Jayko (Jayco) River	17,000	31,232
Paliryuak (Surrey) River	9,100	16,718
Paalik (Lauchlan) River	9,100	16,718
<b>Grand Total</b>	<b>60,200 Kgs.</b>	<b>110,598 Lbs.</b>

## **7 Management Measures for the Duration of the Plan**

Management measures outline the controls or rules adopted for the fishery, including stock conservation and sustainable management measures. Management measures for the Cambridge Bay Arctic Char commercial fishery include controls related to quota, openings and notices of closure for fisheries; licensing and conditions of licence, including reporting requirements of bycatch, discards, marine mammal interactions and found/lost gear through the use of commercial logbooks. These measures are based on the

*Fisheries Act* and its regulations, the NA, DFO policies, and measures agreed upon by the IFMP Working Group, in support of sustainable fisheries management. In addition, these measures are aided by the shared stewardship arrangements and best practices in place for the Cambridge Bay Arctic Char commercial fishery (see Section 8). Appendix C provides an overview of the management measures currently in place.

### **7.1 Licensing of Commercial Fishing Activities**

Commercial fishing licenses are issued annually in accordance with Section 7 of the *Fisheries Act*. Section 5(1) of the *NWT Fishery Regulations* further specifies that all fishing activities must occur under the authority of a license. In addition to the provisions set out in the *Fishery (General) Regulations* and *NWT Fishery Regulations*, specific management measures may be outlined in commercial licenses.

### **7.2 Quota**

All waterbodies have a competitive quota. Once the competitive quota is reached for a waterbody, no further harvesting of Arctic Char is allowed for commercial purposes for the remainder of the fishing period (March 31). The waterbody is closed to further commercial fishing through public issuance of a Notice of Closure by a Fishery Officer consistent with Section 19(2) of the *NWT Fishery Regulations*. This includes issuing the notice to both the EHTO and Kitikmeot Foods Ltd. for posting on their respective premises.

### **7.3 Monitoring and Reporting**

Commercial fishers are responsible for reporting landings, in accordance with the *Fishery (General) Regulations* and *NWT Fishery Regulations* and as outlined in the management measures of this plan. In support of this measure, logbooks are available from the EHTO, GN Conservation Office, or Kitikmeot Foods Ltd. Completing logbooks is an updated condition of licence, and is the responsibility of commercial fishers. Commercial fishers are required to use logbooks to record all commercial landings, fishing effort, any Arctic Char discarded or kept for personal consumption, ghost gear reporting, seabird and marine mammal interactions, and all other fish bycatch encountered in the commercial fishery. Logbooks are submitted to the local wildlife office or fish plant and returned to DFO at the end of the season.

To support real time harvest reporting and quota monitoring, daily records of landings for each commercial waterbody are kept by Kitikmeot Foods Ltd. and are reported daily to DFO. Reports are verified regularly during the fishing season, and accumulated landings for each waterbody are tracked against the commercial quota. Plant reporting is validated using logbook information at the end of the season. Any discrepancies are addressed during the post-season review.

Effective quota monitoring requires the application of conversion factors. Landings are recorded in pounds (lbs.) dressed weight, whereas the quota is issued in kilograms (Kg)



round weight. A conversion factor of 1.2 is used to convert product dressed weight to round weight. A standard conversion factor of 0.45359237 is applied to convert pounds to kilograms. Round weight kilogram estimation is therefore calculated using the following equation:

$$\text{Round Weight Kg} = (\text{Dressed Weight lbs.} \times 1.2) \times (0.45359237)$$

An example of the monitoring and reporting process is presented in Appendix B. A quota monitoring and conversion report (Figure 4) is maintained based on daily reporting summaries (Figure 5) and daily trip reports (Figure 6).

#### **7.4 Supplemental License Conditions**

In addition to current licence conditions, measures, and monitoring and reporting requirements, additional supplemental conditions have been incorporated into the fishery to improve understanding for fishers, data collection efforts, and improved sustainable management of the fishery overall.

7.4.1 The quota identified on a licence is a total allocation of the competitive commercial quota for the specified waterbody. Fishing activity must stop after the quota is reached. DFO will notify resource users of closure of the fishery by an official notice.

1.1 Fishing activity must cease immediately upon reaching the quota.

7.4.2. Commercial logbooks must be filled out accurately, completely, and legibly each time a gill-net is checked or a weir is emptied. All species caught, retained and discarded shall be recorded, including bycatch species, and any seabird and marine mammal interactions.

7.4.3. In support of the Ghost Gear Initiative (see section 1.6.4), license holders are required to report the loss or theft of any nets to DFO via the following email:

[DFO.CALostandRetrievedGear-EnginsPerdusRecupCA.MPO@dfo-mpo.gc.ca](mailto:DFO.CALostandRetrievedGear-EnginsPerdusRecupCA.MPO@dfo-mpo.gc.ca).

Further to the Ghost Gear Initiative, gear tags are being implemented in the commercial fishery, supported by a pilot project led by DFO with the support of the HTO and local Conservation Officers. Valid gear tags are to be attached to commercial gill nets by a Fishery Officer or designated local Conservation Officer before fishing commences using a tamperproof fastener. Gear tags are to remain attached to gill nets at all times while the net is in use for commercial fishing purposes. Lost gear tags must be reported to [Lostgear-enginsperdus@dfo-mpo.gc.ca](mailto:Lostgear-enginsperdus@dfo-mpo.gc.ca) or by calling toll-free 1-800-465-4336 and recorded (in the logbook).

## **8 Shared Stewardship Arrangements**

The IFMP for the Cambridge Bay Arctic Char commercial fishery was initiated and developed by the Cambridge Bay Arctic Char Working Group in 2010. Participation on



the Working Group includes representatives from the EHTO (co-Chair), Kitikmeot Foods Ltd., commercial fishers, community elders, Department of Environment – Fisheries and Sealing Division, and DFO. Youth from the local high school are encouraged to actively participate as a sitting member of the Working Group.

A letter of support from the NWMB was received by the Working Group in 2011 expressing support for the initiative of the Working Group and development of a management plan. Meetings have been held in Cambridge Bay at least once annually since 2010. Each meeting is accompanied by a community consultation to obtain community views regarding Arctic Char management issues, objectives, management measures and scientific research.

A five (5) year review of the IFMP was conducted in 2019/2020 and forms the basis of this updated version of the IFMP.

There are a number of different ways that the objectives for the fishery may be achieved. Current management measures are identified in Appendix C. Other measures may be initiated by co-management organizations, through the IFMP Working Group, and are included in this section of the IFMP.

### **8.1 Best Management Practice – Spawners**

In support of the long-term health of Arctic Char stocks and sustainability of the fishery, it is important to reduce any potential impact to the spawning population. The almost complete absence of spawners in the fall upstream migrations suggests that the spawning component of the population is not adversely impacted by the commercial fishery. When spawners are captured in the gillnet fishery, and where they are alive, all spawning Arctic Char should be released where they were taken, in a manner that causes them the least harm. When encountered in a weir fishery, all spawning Arctic Char should be released unharmed. These best management practices are currently in place in the commercial fishery.

### **8.2 Best Management Practice – Precautionary Approach**

Paalik (Lauchlan River) was not commercially harvested from 2010 through 2017 due to a lack of economic viability related to the available commercial quota and significant transportation costs. Starting in 2018, the targeted commercial quota for Paalik (Lauchlan River) was set at 5,000 kg, to assist with improving stock assessment and economic viability. The legal quota for this fishery is 9,100kg, but there is uncertainty in the stock biomass at this time.

### **8.3 Best Management Practice – Weir Utilization**

The weir is a traditional method of the Inuit to subsistence fish at the mouths of rivers. Weirs traditionally span the entire width of a river allowing all migrating fish to be funnelled and sorted. The weir is the preferred method for the subsistence and commercial collection of Arctic Char at Jayko River. The usage of a weir causes fish less

stress and allows for quotas to be filled more quickly, reduces bycatch, animal interactions and lost gear potential. Weirs also allow fishermen to be more selective with their collection of fish, and they can safely return spawning females to the river system unharmed; this would not be possible with the use of a gill net.

## **9 Compliance Plan**

The DFO Conservation & Protection program promotes compliance with legislation, regulations and management measures implemented to achieve the conservation and sustainable use of Canada's aquatic resources.

The program is delivered by DFO Fishery Officers in the Central and Arctic Region through a balanced regulatory management and enforcement approach including the following:

- Promotion of compliance through education and shared stewardship;
- Monitoring, control and surveillance activities; and
- Management of investigations in relation to complex compliance issues.

### **9.1 Compliance Program Delivery**

DFO Fishery Officers are responsible for compliance activities related to the Cambridge Bay Arctic Char commercial fishery. Fishery Officers conduct surveillance activities, and are supported by Regional DFO staff that provide assistance with monitoring, reporting, education and shared stewardship.

Fishery Officers are designated under Section 5 of the *Fisheries Act* with enforcement powers and responsibilities consistent with the *Fisheries Act* and any other Act of Parliament, including the Criminal Code and the *Constitution Act*. Fishery Officers can inspect and investigate processing operations, fishing locations and vessels for compliance with the *Fisheries Act* and related regulations, including Variation Orders and conditions of licences.

### **9.2 Consultation**

DFO Fishery Officers participate in fishery review meetings where compliance issues are presented and recommendations requested for resolution. As well, informal meetings continue on an ad hoc basis to resolve in-season matters. Fishery Officers discuss fisheries conservation and shared stewardship during visits to Cambridge Bay and interact with community resource users, fishers and processors.

### **9.3 Compliance Performance**

Post season analysis sessions are conducted to review issues encountered during the previous season and make recommendations on improving management measures.

## **10 IFMP Performance Review**

This IFMP was developed through a consultative process including resource users, co-management organizations, and stakeholders.

Commercially fished Arctic Char stocks in the Cambridge Bay area will continue to be assessed through shared stewardship with resource users, and multi-year stock assessments that aim to provide scientific advice. Monitoring of the fishery will be accomplished using several tools including daily reporting of landings, quota monitoring, fishery-dependent (plant) sampling, logbooks, and surveillance.

Post season reviews will be conducted on a regular basis with stakeholders and the IFMP Working Group. Progress on achieving the short term objectives and effective implementation of management measures identified in this Management Plan will be reviewed. Recommendations to improve management of the Cambridge Bay Arctic Char commercial fishery will be developed to meet the long term objectives of maintaining a sustainable fishery.

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## Glossary

**Abundance:** Number of individuals in a stock or a population.

**Age Composition:** Proportion of individuals of different ages in a stock or in the catches.

**Anadromous:** An anadromous species, such as salmon, spends most of its life at sea but returns to fresh water grounds to spawn in the river it comes from.

**Bycatch:** The unintentional catch of non-targeted species while directing fishing for another species. For example, in this IFMP the directed fishing is Arctic Char, bycatch is all other species.

**Biomass:** total weight of all individuals in a stock or a population.

**Fishery:** As defined by the *Fisheries Act*, a fishery includes the area, locality, place or station in or on which a pound, seine, net, weir, or other fishing appliance is used, set, placed, or located, and the area, tract or stretch of water in or from which fish may be taken. For the purposes of this IFMP, all current Arctic Char commercial waterbodies in the Cambridge Bay area are collectively referred to as the “Cambridge Bay Arctic Char commercial fishery”.

**Gillnet:** Fishing gear: netting with weights on the bottom and floats at the top used to catch fish. Gillnets can be set at different depths and are anchored to the seabed. For the purposes of this IFMP, all commercially used gillnets must have a minimum mesh size is 139mm (5-½ inch), in accordance with the *NWT Fishery Regulations*.

**Harvesting:** Catching or attempting to catch fish by any method.

**Landings:** Quantity of a species caught and kept. For the purposes of this document, landings refer to the quantity of Arctic Char kept for commercial sale.

**Notice of Closure:** As defined in Section 19 of the *NWT Fishery Regulations*, a notice issued by a Fishery Officer or Regional Director-General stating that the quota set out in a Variation Order has been, or is about to be, reached. Notice must be brought to the attention of persons affected by (e.g. notice provided to Ekaluktutiak HTO and Kitikmeot Foods Ltd. for public posting).

**Nunavut Agreement (NA):** The 1993 agreement between the Inuit of the Nunavut Settlement Area, as represented by the Tunngavik Federation of Nunavut and Her Majesty the Queen in Right of Canada.

**Nunavut Wildlife Management Board (NWMB):** Established by the NA, an institution of public government that shares decision-making authority with the Federal Government.

**Population:** Group of individuals of the same species, forming a breeding unit, and sharing a habitat.

**Quota:** For the purposes of this IFMP, the total amount (in Kilograms Round Weight) of Arctic Char that can be commercially harvested, as set out in Column V, Schedule V of the *NWT Fishery Regulations* or in accordance with a Variation Order.

**Spawner:** Sexually mature individual.

**Stock:** Describes a population of individuals of one species found in a particular area. Ex: a group of Arctic Char that share a common gene pool. Waterbody specific stock is used as a unit for fisheries management purposes in the Cambridge Bay commercial fishery. For management purposes, each commercial waterbody is considered an individual management unit.

**Traditional Ecological Knowledge (TEK):** A cumulative body of knowledge handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.

**Variation Order:** As defined in Section 6(1) of the *Fishery (General) Regulations*, where a close time, fishing quota or limit on the size or weight of fish is fixed in respect of an area (such as a waterbody) under any Regulations, the Regional Director-General may, by order, vary such restrictions.

**Weir:** Fishing gear: an underwater fence that is set up in a V-shape, which is designed to hinder the passage of fish. It comes in from two sides in a channel, directing the fish into a catch basin. In the Cambridge Bay area fish weirs were traditionally built from stones. Current weirs are constructed of conduit pipe.

## Appendix A Historical Commercial Fishing Locations

Figure 3. Map of Cambridge Bay area showing historical commercial fishing locations.



## Appendix B Commercial quota and landing reporting

**Table 4. Commercial Arctic Char quota and landings in the Cambridge Bay area, 2009-2019**

Year	Ekalluktok/ Ekalluk River		Paliryuak/ Surrey River		Halokvik/ Thirty-Mile River		Paalik/ Lauchlan River		Jayko/ Jayco River		Total Quota	Total Landing
	Quota	Landing	Quota	Landing	Quota	Landing	Quota	Landing	Quota	Landing		
2009	20,000	12,666	9,100	8,657	5,000	5,219	2,400	NF	17,000	6,514	53,500	33,056
2010	20,000	20,434	9,100	9,074	5,000	3,317	2,400	2,534	17,000	NF	53,500	35,359
2011	20,000	13,636	9,100	11,475	5,000	1,124	2,400	NF	17,000	NF	53,500	26,235
2012	20,000	19,038	9,100	8,945	5,000	4,920	2,400	NF	17,000	15,231	53,500	48,134
2013	20,000	18,548.48	9,100	9,078.01	5,000	4,768.16	2,400	NF	17,000	15,195.25	53,500	47,589.9
2014	20,000	18,279.37	9,100	9,082.10	5,000	5,010.08	2,400	NF	17,000	14,892.62	53,500	47,264.17
2015	20,000	16,929.78	9,100	6,823.75	5,000	4,159.62	2,400	NF	17,000	9,851.21	53,500	37,764.37
2016	20,000	20,011.32	9,100	5,739.49	5,000	4,212.42	2,400	NF	17,000	17,010.8	53,500	46,974.03
2017	20,000	20,000.97	9,100	8,990.11	5,000	4,888.46	2,400	NF	17,000	16,199.51	53,500	50,079.05
2018	20,000	16,569.64	9,100	8,791.71	5,000	4,997.05	9,100	3,917.13	17,000	11,573.14	60,200	45,848.66
2019	20,000	16,698.91	9,100	8,883.97	5,000	4,971.74	9,100	5,061.27	17,000	12,481.32	60,200	48,097.21

Quota and landing values reported in Kilograms, Round Weight.

NF = Not Fished.

A complete history (1960 – 2009) of quota and harvest of the Cambridge Bay Arctic Char commercial fishery is provided by Day and Harris (2013).

**Figure 4. Example of the quota monitoring and conversion report (2019)**

Site	2019 Commercial Quota - Round Weight		2019 Targeted Harvest		2019 Commercial Quota - Dressed Weight (conversion =1.2)		2019 Targeted Harvest - Dressed Weight		Kitikmeot Foods Reported Harvest (original reporting in Dressed Weight)		Kitikmeot Foods Harvest (converted to Round Weight)		Quota (Round Weight) Remaining		Percentage Harvested
	KG	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	LB	
Lauchlan (Byron Bay)	9,100	20,062	5,000	11,023	7,583	16,718	4,167	9,186	4,217.73	9,298.50	5,061.27	11,158.20	-61.27	8,903.84	101.2%
Ekalluk	20,000	44,092	10,000	22,046	16,567	36,744	14,061	31,000	13,915.76	30,679.00	16,638.91	36,814.80	174.59	7,277.60	99.0%
Halovik (30 Mile)	5,000	11,023	5,000	11,023	4,167	9,186	4,167	9,186	4,143.11	9,154.00	4,371.74	10,960.80	28.26	62.30	99.4%
Jayco	17,000	37,479	12,519	27,630	14,167	31,232	10,433	23,000	10,401.10	22,930.50	12,481.32	27,516.60	37.68	9,961.94	99.7%
Paliryuak (Surrey)	9,100	20,062	9,100	20,062	7,583	16,718	7,583	16,718	7,403.31	16,321.50	8,883.97	19,585.80	216.03	476.24	97.6%
<b>TOTAL</b>	<b>60,200</b>	<b>132,718</b>	<b>48,493</b>	<b>106,908</b>	<b>50,167</b>	<b>110,598</b>	<b>40,410</b>	<b>89,090</b>	<b>40,081.01</b>	<b>88,363.50</b>	<b>48,097.21</b>	<b>94,878.00</b>	<b>456.56</b>	<b>17,778.08</b>	<b>99.2%</b>
					Reflects a round weight to dressed weight (gutted, head on) conversion in kilograms - Standard conversion for Cambridge Bay		Reflects a round weight to dressed weight (gutted, head on) conversion in pounds - Standard conversion for Cambridge Bay		Harvest converted to kilograms. Dressed Weight (gutted, head on) - this column can be compared to Column D	Original harvests from Kitikmeot Foods are reported in Lbs. Dressed Weight (gutted, head on) - this column can be compared to Column E (quota)	Harvest converted to kilograms. Round Weight (gutted, head on) - this column is compared to Column B to determine over/under	Original harvests from Kitikmeot Foods in Lbs. converted to Round Weight - this column is compared to Column C to determine	A negative [-] value (displayed in red) indicates an over-harvest of the quota	A negative [-] value (displayed in red) indicates an over-harvest of the quota	
										THIS IS THE ONLY COLUMN YOU NEED TO ENTER DATA IN - all other data is automatically					
		This column reflects what is actually issued on a Variation Order		Kitikmeot Foods has advised that Ekalluk and Jayco targeted harvest is reduced by 5000 and 8000 lbs respectively to offset the increased landings expected from harvesting at Lauchlan. The fish plant operates at full capacity with the current total quota.			This column can be used by Kitikmeot Foods for tracking of the annual quota (since it reports harvests in dressed weight)			This column reflects what is actually reported by Kitikmeot Foods		This column reflects the dressed to round weight conversion of what is actually reported by Kitikmeot Foods (Column H)			

Original form is maintained in an Excel spreadsheet, and is updated regularly based on Daily Reporting Summary Sheet (see Figure 9 below)

Figure 5. Example of the daily recording worksheet 2019

Date	Time	Lot#	Tub#	Dressed Weight (lbs)	Round Weight (Kg)	Trip Total	per Tub per Trip (Lbs)	Culls (#)	Comments		
10-Jul-19	18:35	1	1	102.5	55.79					Site:	Surrey River
10-Jul-19	18:35	1	2	110.5	60.15					Fishing Period:	7/10/2019 - 7/21/2019
10-Jul-19	18:35	1	3	99.0	53.89					Average Weight per Tub:	102.60
10-Jul-19	18:35	1	4	102.0	55.52					Average Weight per Trip:	1,088.10
10-Jul-19	18:35	1	5	97.5	53.07					Total Trips:	15
10-Jul-19	18:35	1	6	98.5	53.61					Total Culls:	159
10-Jul-19	18:35	1	7	97.0	52.80					Quota (Dressed Wt LB):	16,718
10-Jul-19	18:35	1	8	81.0	44.09					Targeted Quota (Dressed Wt LB):	16,718
10-Jul-19	18:35	1	9	98.5	53.61					Total Harvest (Dr Wt LB):	16,321.50
10-Jul-19	18:35	1	10	96	52.25	982.50	98.25	10	Fish Condition: firm and uniform, no smell, good texture, no lesions, fish temp @ 3C.	Remaining Quota (Dr Wt LB):	396.89
11-Jul-19	10:15	2	1	100.0	54.43					Remaining Trips (estimate):	0.364753438
11-Jul-19	10:15	2	2	95.5	51.98						
11-Jul-19	10:15	2	3	89.0	48.44						
11-Jul-19	10:15	2	4	120.0	65.32					Quota (Rd Wt KG):	9,100
11-Jul-19	10:15	2	5	107.0	58.24					Targeted Harvest (Rd Wt KG)	9,100
11-Jul-19	10:15	2	6	120.0	65.32					Harvest to date (Rd Wt KG):	8,883.97
11-Jul-19	10:15	2	7	96.5	52.53					Remaining Quota (Rd Wt KG)	216.03
11-Jul-19	10:15	2	8	106.5	57.97	834.50	104.31	8	Fish Condition: firm and uniform, no smell, good texture, no lesions, fish temp @ 3C.	Percent Landed to date:	97.6%
12-Jul-19	13:45	5	1	108.5	59.06						
12-Jul-19	13:45	5	2	103.5	56.34						
12-Jul-19	13:45	5	3	100	54.43						
12-Jul-19	13:45	5	4	100.5	54.70						
12-Jul-19	13:45	5	5	98.5	53.61						
12-Jul-19	13:45	5	6	94.5	51.44						
12-Jul-19	13:45	5	7	98.5	53.61						
12-Jul-19	13:45	5	8	102.0	55.52						
12-Jul-19	13:45	5	9	110.5	60.15						

Original form is maintained in an Excel spreadsheet, and is updated daily based on Daily Trip Reports (see Figure 6 below)

**Figure 6. Example of a daily trip report completed by Kitikmeot Foods Ltd (2019).**

Kitikmeot Foods Ltd.  
Fish Plant

Raw Product Inspection Report

ARCTIC CHAR

Date: JULY 13-2019  
Time: 12:00  
Area: SURRY RIVER Lot# 06  
Tubs: 13

Tub #	Weight lbs.	Culls
1	116	
2	96	
3	104.5	
4	105.5	
5	99	
6	112	
7	101.5	
8	99	
9	103	
10	97	
11	99.5	
12	104.5	
13	108	
<u>= 1254.5 lbs.</u>		

Lot: Pass ☒  
Fail ☐

#Culls: 13

Comments: Fish Condition  
Firm and Uniform  
No Smell  
Good Texture  
No Lesions  
Fish Temp 10.4°C

QMP Manager: [Signature]  
Date: 07/13/19

\* ALL FISH ARE INSPECTED PRIOR TO PROCESSING \*

C:\Documents and Settings\SANDRA\My Documents\Fishing - inspection report.doc

Note: landings are reported in Pounds, Dressed Weight. Weight conversions are applied as illustrated in Figures 4 and 5.

## Appendix C Current management measures

Management Measure	Description
Locations	<ul style="list-style-type: none"> <li>Commercial waterbodies are set out in NWT Regulations.</li> <li>Waterbodies opened annually by Variation Order</li> </ul>
Quota	<ul style="list-style-type: none"> <li>Set out in NWT Regulations for each commercial waterbody.</li> <li>All waterbodies have a competitive quota. There are no individual allocations associated with the commercial fishery.</li> </ul>
Licences	<ul style="list-style-type: none"> <li>Required when commercially fishing.</li> </ul>

Management Measure	Description
Species, area and catch limitations	<ul style="list-style-type: none"> <li>Species and waterbody permitted to fish are specified.</li> <li>Quota is specified in Kilograms, Round Weight.</li> <li>Conversion factors are specified, where applicable.</li> <li>Quantity specified is the total competitive commercial quota available.</li> </ul>
Fishing Season	<ul style="list-style-type: none"> <li>April 1 – March 31, annually.</li> </ul>
Notification of closure	<ul style="list-style-type: none"> <li>Once the competitive quota is reached, the waterbody is closed to commercial fishing.</li> <li>Via public notice, issued by Fishery Officer.</li> </ul>
Fishing gear	<ul style="list-style-type: none"> <li>Minimum gillnet mesh size is 139mm (5-½ inch).</li> <li>When using a weir, 1/3 of the width of any river or stream shall always remain open.</li> </ul>
Ghost Gear	<ul style="list-style-type: none"> <li>The licensee must report the loss or theft of nets and any found fishing gear, within 24 hours to a specified DFO email listed on the Supplemental License Conditions of the commercial fishing license.</li> </ul>
Disposal	<ul style="list-style-type: none"> <li>Fish are to be disposed in gurry grounds. These sites are designated by DFO Fisheries Officers under section 56 of the Fisheries Act.</li> </ul>
Discards and Bycatch	<ul style="list-style-type: none"> <li>All discards of Arctic Char, including those for personal consumption, are to be reported in logbooks.</li> <li>Any bycatch is to be reported in logbooks, identifying those kept for personal consumption and those that are not retained.</li> </ul>
Reporting requirements	<ul style="list-style-type: none"> <li>Reporting of landings is required by commercial fishers.</li> <li>Reporting of all bycatch and discards in logbook.</li> <li>Reporting of all marine mammal interactions and result of interaction e.g. subsistence harvest or released alive; reporting is recorded in the logbook.</li> <li>Commercial fishers to accurately and completely record fishing activities, including catch and effort of each gillnet set or weir landing, as per directions in logbooks. Logbook is to be provided to DFO immediately at the end of each fishery. Logbooks are available from the EHTO or Kitikmeot Foods Ltd.</li> <li>Kitikmeot Foods Ltd. to provide report from each trip, which includes date, time, location, lot and tub numbers, and landing amounts. Raw Product Inspection Report is an acceptable format. Each trip report is faxed or emailed to DFO on the day of trip receipt.</li> </ul>



## Appendix D Economic analysis of Cambridge Bay Arctic Char for the Cambridge Bay Commercial Arctic Char Integrated Fisheries Management Plan

Fishers from Cambridge Bay have long recognized the importance of the Arctic char resource for their community. The commercial fishery is conducted by local Inuit fishers in conjunction with the operational support of Kitikmeot Foods Ltd. (KFL), the commercial processing plant for both Arctic Char and muskox. Kitikmeot Foods Ltd., the only processing plant in Cambridge Bay, was established in 1990 as a subsidiary of the Nunavut Development Corporation. KFL serves a growing domestic and international fish market under the territorial brand *Truly Wild Arctic Char*<sup>TM</sup>.

The major commercial fishing sites in the Cambridge Bay area currently include Ekalluktok (Ekalluk), Paliryuak (Surrey), Halovik (Thirty-Mile), Paalik (Lauchlan) and Jayko rivers.

### Landings and Landed Values

During 2014/15-2018/19, a combined total of 227,915 kg of Arctic Char was landed in the Cambridge Bay commercial fishery (Table 5 and Table 7).<sup>2</sup> To avoid calculation bias, annual average numbers used in this economic analysis exclude Paalik (Lauchlan River) as there was no commercial fishing activity between 2010 and 2018. Beginning in 2018, Paalik (Lauchlan River) was harvested using a targeted reduced quota, given the lack of recent scientific information, determined by the IFMP working group in support of a conservative approach to the sustainable management of the fishery. The landed value generated by the fishery was approximately \$1.2 million during the same time period, with an annual average of \$298,000.<sup>3</sup>

**Table 5. Total landings over 5 year 2014/15-2018/19**

	Landed catch (kg) <sup>1</sup> over 5 year period	Annual average landings (%) <sup>2</sup>
Ekalluktok (Ekalluk River)	91,791	95
Jayko (Jayco River)	69,528	86
Paliryuak (Surrey River)	39,427	87
Halovik (Thirty-Mile River)	23,268	93
Paalik (Lauchlan River)	3,902	7890 (over 2 years fished)
<b>Total</b>	<b>227,915</b>	<b>90</b>

<sup>2</sup> For details on landings and values, see Table 7.

<sup>3</sup> To avoid calculation bias, the annual average numbers exclude Paalik River, as it fished only in 2018/19.

## Industry Viability

During 2014/15 - 2018/19, the 5-year combined market value generated by the landings were approximately \$5.9 million, with an annual average of \$1.5 million. The average market price of Cambridge Bay Arctic Char was \$25.9/kg (see Table 7 details)<sup>4</sup> which reflected a market value increase of 22% during the 5 year period.<sup>5</sup> The highest increase was recorded in head/tail off product form (35%) followed by whole dressed (28%), fillets (19%) smoked sides (10%) and jerky (4%). The increase in market value may be in part explained by increase consumer demand; the increase in estimated market price is likely due to the increase in cost of operation (particularly freight related expenses) of the fishery.

**Table 6. KFL Operational Cost 2014/15 – 2017/18**

Costs Items	2014/15	2015/16	2016/17	2017/18	Average
Freight Related Expenses	20%	21%	22%	27%	22%
Utilities	25%	25%	25%	24%	25%
Office Administration	38%	40%	36%	33%	37%
Fish Purchase and Processing	17%	15%	17%	16%	16%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Costs per Kg Processed	\$16.6	\$22.4	\$18.3	\$16.1	<b>\$18.3</b>

*Source: Policy and Economics, DFO Arctic Region calculations based on data provided by Kitikmeot Foods Ltd.*

*Note: KFL operational costs data for 2018/19 was not available at time of calculation.*

During the 4 year period of 2014/15 – 2017/18 period, the average annual operational expenses incurred by KFL was approximately \$800,000. Of that, office administration accounted for most expenses (37%) followed by, utilities (25%), freight (20%) and payment to fishers and processors (16%).

The analysis found that the cost of harvesting Arctic Char ranges from \$2.9 - \$3.6 per lb. for the commercial sites during the 2014/15 – 2017/18 period. It was evident that for some rivers, though the total cost of harvesting was high, the unit cost was low due to a greater amount of harvesting due to higher quotas (e.g. Ekalluktok river). In other words, the higher the level of harvest is at a given site, the lower the unit costs since the transportation costs and KFL Plant costs per unit are reduced. The analysis showed that after harvesting Arctic Char from the commercial sites and subsequently processing at the plant in order to distribute to primary markets, the annual average operational cost amounts to \$18.0 per kg of Arctic Char processed.

<sup>4</sup>The weighted market prices were calculated based on the percentages of sales volume as follows: (i) Whole dressed: 55% of production; (ii) Head, tail off: 23%; (iii) Fillets: 10%; (iv) Smoked sides: 8%; and (v) Jerky: 4%. For details about the percentages of sales volume, see RT & Associates (2001).

<sup>5</sup>Due to unavailability, market prices for 2016/17 and 2018/19 were estimated based on market prices for other years.

## **Employment**

The commercial fishery and the processing plant are economically important for the community of Cambridge Bay. The Arctic Char fishery stimulates local job creation and business growth, provides long-term employment and training opportunities for local residents, and promotes economic diversification.

Kitikmeot Foods processes year-round and employs local fishers to harvest during the spring and fall fishing season. The fish plant employs 6 permanent staff, 14 seasonal staff, and up to 20 seasonal fishers.

In the Cambridge Bay Arctic Char fishery, each commercial fishing site is coordinated by a lead fisher, who manages a crew of other skilled fishers. The size of the crew may vary depending on different factors, including site location and gear used, expectations of the run (e.g. quota, climate, timing), and the availability and experience of fishers. Some fishers are employed at multiple sites. For the period 2014-18, the average annual number of harvesters was 10.<sup>6</sup> Most of the fish harvesters were active at Ekalluktok (Ekalluk) River, Paliriyuak (Surrey) and Jayko (Jayco) Rivers, reflecting the larger quotas and landings and the required scale of operations at these sites.<sup>7</sup>

## **Distribution and Value**

KFL promotes sustainable harvest of Arctic Char products from the Kitikmeot region of Nunavut. KFL has also developed important client partnerships with commercial customers throughout Nunavut and the Northwest Territories, southern Canada and into the United States. Recent recognition by Ocean Wise<sup>TM</sup>, which has independently assessed this fishery has further promoted the sustainability of the Cambridge Bay Arctic Char fishery.

The primary markets for Cambridge Bay commercial Arctic Char includes Nunavut and the NWT, and select markets throughout Canada and the US. During the summer and fall harvesting seasons, fresh Arctic Char is shipped through Edmonton to be exported to other cities across Canada, and to San Francisco, where it gets distributed to high-end restaurants across the US (e.g. San Francisco, Boston). Toronto, Ottawa, and Montreal are currently the primary Canadian destinations for Cambridge Bay Arctic Char outside the territories.

Due to the remote nature of the fishery, fishers spend upward of a month at a given site catching fish, which are then shipped by float plane to KFL for processing. KFL staff process Arctic Char in various forms depending on demand throughout the year. Product forms include whole dressed (fresh/frozen), head/tail off, fillet (premium/regular), smoked fillet/sliced, candied char, and jerky (KFL Price List, 2017/18), and are marketed to hotels, discerning restaurants, institutional markets, grocery market, gift markets, and

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<sup>6</sup> The number is adjusted to avoid accounting for multiple employment of same fisher at different sites.

<sup>7</sup> The employment scenario discussed in this section focused on direct employment generated by fishing activities. It should, however, be noted that commercial fishing activities also generate some indirect and induced employment in other Indigenous businesses and investments.

local sales for consumption (Consilium Nunavut Inc., 2002). According to the 2011/12 comparative income statement of KFL, the total revenue generated from Arctic Char products was \$466,916, of which whole dressed (fresh and frozen) accounted for 31%; premium and regular fillet (30%), jerky (12%), head/tail off (11%), smoked (7%), and other products (10%).

Arctic Char are considered a high-quality, but expensive, alternative to farm-raised Salmon (FishChoice, 2018). Iceland is the main supplier of farmed Arctic Char to the U.S., producing 3,260t in 2012, whereas Canada and the US combined producing around 500t. Production also occurs in Norway and Sweden, however, exports to the US are minimal (Eithier, 2014). This shows that demand for Arctic Char in the US far exceeds the current production of Arctic Char. Therefore, being able to realize this potential depends on KFL Arctic Char marketing and distinguishing itself within these markets so as to be able to compete with farmed Arctic Char and Salmon being supplied to these areas. There is demand for Arctic Char in Europe, but there is also local production, mostly farmed, that is likely meeting this demand.

It has been suggested that in addition to focusing on the US and Canadian markets, a stronger market may be developed for Char in Nunavut and the Northwest Territories (Consilium Nunavut Inc., 2002). Increasing costs related to operations, transportation, and alternate foods throughout Nunavut communities may limit the economic viability of expanding markets, and as a result may make local and traditional food sources a stronger market within Nunavut.

### **Conclusions**

There are some issues that may impact the economic operation and viability of the fishery. Firstly, fluctuation of the Canadian dollar against the US dollar. In the last five years, the average value of the Canadian dollar depreciated by over 33% against the US dollar. Such an unprecedented level of depreciation of the Canadian dollar against the US dollar has substantial implications on revenues from Arctic Char fishing activities for the portion of the fishes exported and prices received in the US dollars. Secondly, increasing costs of production (e.g. freight and product distribution costs); and thirdly, interest in adjusting quotas and opportunities to fish alternate sites may increase the scale and viability of the fishery. Commercial harvesting at Paalik (Lauchlan River) is a case in point. Commercial harvesting at Paalik (Lauchlan River) was recorded in 2010 which was then discontinued due to a lack of economic viability related to the available commercial quota and significant transportation costs. In 2018, commercial harvesting at Paalik (Lauchlan River) has resumed with an adjusted quota of 5,000 kg (round weight) which is in compliance to the sustainable management of this fishery.

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Table 7. Landings, landed and market values and prices by waterbody, 2015 - 2019

Waterbody Name	2015	2016	2017	2018	2019	5-Year Total	5-Year Average
<b>Ekalluktuk River (Ekalluk)</b>							
<i>Landings (kg)</i>	16,930	20,011	20,001	16,570	16,699	90,211	15,344
<i>Landed Value<sup>8</sup></i>	\$88,712	\$104,859	\$104,805	\$86,825	\$87,502	\$282,684	\$56,537
<i>Market Value<sup>9</sup></i>	\$383,460	\$453,256	\$453,022	\$375,302	\$379,230	\$1,774,002	\$354,800
<b>Jayko River (Jayco)</b>							
<i>Landings (kg)</i>	9,851	17,011	16,200	11,573	12,481	36,072	7,214
<i>Landed Value<sup>10</sup></i>	\$51,620	\$89,137	\$84,885	\$60,643	\$65,402	\$161,292	\$32,258
<i>Market Value<sup>211</sup></i>	\$223,130	\$385,295	\$366,919	\$262,132	\$282,702	\$771,068	\$154,214
<b>Halokvik River (Thirty-Mile)</b>							
<i>Landings (kg)</i>	4,160	4,212	4,888	4,997	4,972	19,135	3,827
<i>Landed Value<sup>10</sup></i>	\$21,796	\$22,073	\$25,616	\$26,185	\$26,052	\$89,700	\$17,940
<i>Market Value<sup>11</sup></i>	\$94,215	\$95,411	\$110,724	\$113,183	\$112,610	\$419,245	\$83,849
<b>Paliryuak River (Surrey)</b>							
<i>Landings (kg)</i>	6,824	5,739	8,990	8,792	8,884	43,007	8,601
<i>Landed Value<sup>10</sup></i>	\$35,756	\$30,075	\$47,108	\$46,069	\$46,552	\$185,057	\$37,011

<sup>8</sup> Landed value for individual waterbodies excludes the freight guarantee. Data is not available by waterbody.

<sup>9</sup> Market price based on Kitikmeot Foods Ltd. Price List (various years) and were calculated based on the percentages of sales volume as follows: (i) Whole dressed: 55% of production; (ii) Head, tail off: 23%; (iii) Fillets: 10%; (iv) Smoked sides: 8%; and (v) Jerky: 4%.

<i>Market Value</i> <sup>11</sup>	\$154,558	\$129,999	\$203,626	\$199,132	\$201,222	<b>\$1,002,092</b>	<b>\$200,418</b>
<b>Paalik River (Lauchlan)</b>							
<i>Landings (kg)</i>	NF	NF	NF	3,902	5,061	<b>8,963</b>	<b>1,792</b>
<i>Landed Value</i> <sup>10</sup>	-	-	-	\$20,449	\$26,521	<b>\$46,970</b>	<b>\$9,394</b>
<i>Market Value</i> <sup>11</sup>	-	-	-	\$88,390	\$114,638	<b>\$203,028</b>	<b>\$40,605</b>
<b>Total<sup>10</sup></b>							
<i>Landings (kg)</i>	37,765	46,973	50,079	45,834	48,097	<b>228,748</b>	<b>345,749.6</b>
<i>Landed Value</i> <sup>11</sup>	<b>\$197,885</b>	<b>\$246,144</b>	<b>\$262,414</b>	<b>\$240,170</b>	<b>\$252,029</b>	<b>\$942,883</b>	<b>\$188,577</b>
<i>Landed Price/kg</i>	<b>\$4.57</b>	<b>\$4.29</b>	<b>\$5.85</b>	<b>\$7.04</b>	<b>\$5.00</b>		<b>\$5.24</b>
<i>Market Value</i> <sup>11</sup>	<b>\$855,363</b>	<b>\$1,063,962</b>	<b>\$1,134,290</b>	<b>\$1,031,139</b>	<b>\$1,089,402</b>	<b>\$4,073,397</b>	<b>\$814,679</b>
<i>Market Price/kg</i>	<b>\$19.23</b>	<b>\$19.75</b>	<b>\$24.26</b>	<b>\$26.33</b>	<b>\$24.09</b>		<b>\$22.65</b>

<b>Market Prices/Lb. of Arctic Char by Product Form</b>							
Whole Dressed	\$6.02	\$6.27	\$7.67	\$9.17	\$8.15	NA	\$7.45
Head, tail off	\$7.04	\$7.29	\$10.21	\$10.84	\$9.05	NA	\$8.89
Fillets	\$10.22	\$10.47	\$11.87	\$12.59	\$12.61	NA	\$11.55
Smoked sides	\$15.39	\$15.64	\$17.04	\$18.08	\$18.15	NA	\$16.86
Jerky	\$39.02	\$38.89	\$47.85	\$43.13	\$41.84	NA	\$42.14
<b>Weighted Ave. Price</b>	<b>\$8.74</b>	<b>\$8.98</b>	<b>\$11.03</b>	<b>\$11.97</b>	<b>\$10.95</b>	<b>NA</b>	<b>\$10.33</b>

Source: KFL Plant; Policy and Economics, C&A, DFO, staff calculations

Note: - Not Fished; NA – Not applicable.

**Table 8. Operational costs incurred by by Kitikmeot Foods Ltd., 2008-2012**

<b>Cost Items</b>	<b>2008</b>	<b>2009</b>	<b>2010*</b>	<b>2011*</b>	<b>2012*</b>	<b>Total</b>	<b>Average</b>
<b>Ekalluktok River (Ekalluk)</b>							
<i>Operational Cost</i> <sup>12</sup>	\$34,136	\$44,145	\$74,441	\$64,617	\$63,347	\$461,053	\$56,537
<i>Weight (lb.)</i>	24,078	27,865	44,956	29,999	41,883	168,781	33,756
<i>Costs per lb.</i> <sup>13</sup>	\$1.50	\$1.58	\$1.66	\$2.15	\$1.51		\$1.67
<b>Jayko River (Jayco)</b>							
<i>Operational Cost</i> <sup>12</sup>	\$65,912	\$37,696	-	-	\$57,684	\$161,292	\$53,764
<i>Weight (lb.)</i>	31,519	14,330	NF	NF	33,509	79,359	26,453
<i>Costs per lb.</i> <sup>13</sup>	\$2.09	\$2.63	-	-	\$1.72		\$2.07
<b>Halokvik River</b>							

<sup>10</sup> Slight discrepancies in total values due to rounding up of values/prices.

<sup>11</sup> Total landed value is the summation of payment to fishers and transportation costs. Does not include other operational costs. Total landed values for period 2010-12 include transportation cost guarantee. A freight subsidy of \$32,555 given in 2012 is excluded.

<sup>12</sup> Operational costs include payment to fishers and transportation costs. Does not include KFL plant costs. Total operational cost values for period 2010-12 include transportation cost guarantee. A freight subsidy of \$32,555 given in 2012 is excluded.

<sup>13</sup> Excludes KFL plant costs.

<b>(Thirty-Mile)</b>							
<i>Operational Cost</i> <sup>12</sup>	\$21,533	\$23,044	\$15,253	\$13,099	\$16,770	\$89,700	\$17,940
<i>Weight (lb.)</i>	10,021	11,481	7,297	2,473	10,824	42,097	8,419
<i>Costs per lb.</i> <sup>13</sup>	\$2.15	\$2.01	\$2.09	\$5.30	\$1.55		\$2.27
<b>Paliryuak River (Surrey)</b>							
<i>Operational Cost</i> <sup>12</sup>	\$25,533	\$36,847	\$38,451	\$44,451	\$39,804	\$185,057	\$37,011
<i>Weight (lb.)</i>	10,681	19,046	19,963	25,247	19,678	94,615	18,923
<i>Costs per lb.</i> <sup>13</sup>	\$2.42	\$1.93	\$1.93	\$1.75	\$2.02		\$1.89
<b>Paalik River (Lauchlan)</b>							
<i>Operational Cost</i> <sup>12</sup>	\$19,795	-	\$15,646	-	-	\$35,441	\$17,720
<i>Weight (lb.)</i>	5,208	NF	5,574	NF	NF	10,782	5,391
<i>Costs per lb.</i> <sup>13</sup>	\$3.80	-	\$2.81	-	-		\$3.29
<b>Total</b>							
<i>Operational Cost</i> <sup>12</sup>	<b>\$169,235</b>	<b>\$141,732</b>	<b>\$206,693</b>	<b>\$184,715</b>	<b>\$240,508</b>	<b>\$942,883</b>	<b>\$188,577</b>
<i>Weight (lb.)</i>	<b>81,507</b>	<b>72,722</b>	<b>77,791</b>	<b>57,719</b>	<b>105,895</b>	<b>395,634</b>	<b>79,127</b>
<i>Costs per lb.</i> <sup>13</sup>	<b>\$2.08</b>	<b>\$1.95</b>	<b>\$2.66</b>	<b>\$3.20</b>	<b>\$2.27</b>		<b>\$2.38</b>
<b>KFL Plant Costs</b>							
Wage	\$40,228	\$101,236	\$38,491	\$50,248	46,148	\$276,350	\$55,270
Electricity	\$30,071	\$58,109	\$26,979	\$40,330	36,892	\$192,381	\$38,476
Fuel	\$3,933	\$7,087	\$7,065	\$3,460	9,183	\$30,728	\$6,146
Water	\$2,115	\$2,067	\$2,982	\$1,744	3,028	\$11,936	\$2,387
<b>Total</b>	<b>\$76,347</b>	<b>\$168,499</b>	<b>\$75,517</b>	<b>\$95,781</b>	<b>\$95,251</b>	<b>\$511,395</b>	<b>\$102,279</b>
<b>Distribution of KFL Costs</b>							
<i>Operational Costs</i>	32.0%	21.7%	25.8%	26.0%	32.4%		27.6%
<i>KFL Plant Costs</i>	31.1%	54.3%	26.8%	34.1%	28.4%		35.2%
<i>Weight</i>	81,507	72,722	77,791	57,719	105,895		79,127
<b>Average Total Costs per lb.</b>	<b>\$3.01</b>	<b>\$4.27</b>	<b>\$3.63</b>	<b>\$4.86</b>	<b>\$3.17</b>		<b>\$3.68</b>

Source: Kitikmeot Foods Limited (KFL).

Note: NF – Not Fished

## Appendix E Safety at sea

Vessel owners and masters have a duty to ensure the safety of their crew and vessel. Adherence to safety regulations and good practices by owners, masters and crew of fishing vessels will help save lives, protect the vessel from damage and protect the environment. All fishing vessels must be in a seaworthy condition and maintained as required by Transport Canada (TC), and other applicable agencies. Vessels subject to inspection should ensure that the certificate of inspection is valid for the area of intended operation.

In the federal government, responsibility for shipping, navigation, and vessel safety regulations and inspections lies with TC; emergency response with the Canadian Coast Guard and DFO has responsibility for management of the fisheries resources. In Nunavut, the Workers Safety and Compensation Commission has jurisdiction over health

and safety issues in the workplace. DFO and TC have a Memorandum of Understanding to formalize cooperation and to establish, maintain and promote a safety culture within the fishing industry.

For information on boating safety, please call the TC Office of Boating Safety toll-free at 1-800-267-6687 or visit the website at <https://tc.canada.ca/en/marine-transportation/marine-safety/office-boating-safety>.

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