

# **A History and Context of Commercial Fishing in the Canadian Beaufort Sea**

Louie Porta and Burton Ayles



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## Abstract

The Canadian Beaufort Sea is one of the last places on Earth that has not experienced recent industrial-scale commercial fishing. Following the signing of the Inuvialuit Final Agreement (IFA), there was a belief that commercial fisheries would be a core economic benefit for the people and communities of the Inuvialuit Settlement Region (ISR). However, despite efforts over the past several decades, governments have been unsuccessful in establishing such a fishery.

This paper presents a complete history and analysis of efforts to establish commercial fisheries in the Canadian Beaufort Sea, including (1) the context and history of commercial fishing for each major marine species or group of species occurring in the Canadian Beaufort Sea; (2) a high-level overview of commercial fishing in the Alaskan Chukchi and Beaufort seas; (3) existing commercial quotas for the Canadian Beaufort Sea; and (4) exploratory fishing applications received by DFO since 2000.

This review finds that, while there are several examples of sustainable small-scale community fisheries, attempts to establish large-scale commercial fisheries commonly struggled to sustain a commercially viable harvest level without depleting stocks. This common finding points to the need to complete a precautionary, science-management tool for Canadian Beaufort Sea fish stocks prior to the advent of commercial fisheries development.

## Preface

This report was written by Louie Porta and Burton Ayles on behalf of the Fisheries Joint Management Committee, Inuvik, NT.

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The Canada/Inuvialuit Fisheries Joint Management Committee (FJMC) Report Series was initiated in 1986 and reports were published sporadically in a variety of formats until 1998. Information on the earlier publications can be obtained directly from the FJMC office. The Series was re-initiated in 2003 and a common format established with concurrent publication on the FJMC website ([www.FJMC.ca](http://www.FJMC.ca)).

## I. Introduction

The history of harvesting marine resources for subsistence purposes pre-dates European arrival in North America. Before European contact, the Inuvialuit were perhaps the richest people in the North American Arctic. The backbone of the Inuvialuit subsistence economy was the harvest of marine resources such as beluga and bowhead whales, ringed and bearded seals, and many species of marine and anadromous fish (McGhee 1974). The Inuvialuit have relied on the marine mammal and fisheries resources of the Inuvialuit Settlement Region (ISR), and their sustainable management, to meet subsistence, cultural, social, and economic needs for generations.

The Canadian Beaufort Sea has a unique commercial fishing history when compared to the rest of the world's oceans. There have been no large-scale commercial fisheries since the beginning of the 20<sup>th</sup> century, when commercial bowhead whaling ended. However, community-run, small-scale, sustainable commercial fishing operations continue to exist for ringed seals and coastal and anadromous fish (Usher 2002). The Inuvialuit and other stakeholders have had an expectation that the fish stocks of the ISR could support larger commercial fisheries. To date, this expectation has not been supported by scientific data or historical fishing experience.

Beginning in the 1960s, commercial fisheries development was seen by the Government of the Northwest Territories (GNWT) as a potential driver of regional economic development in the North. In the early 1970s, the Task Force on Fisheries Development in the Northwest Territories (1972) suggested the Mackenzie Delta area and Liverpool Bay might be considered for ocean fisheries, and provided numerous recommendations for assisting small-scale fisheries development. In the 1980s, the federal government moved to place fisheries development within the overall context of an Arctic marine conservation strategy. To that end, the Department of Fisheries and Oceans Canada (DFO) developed "The Ice Goes Out" (DFO 1988), a comprehensive framework for managing Arctic fisheries. In the 1990s, with the establishment of the NWT Development Corporation, the GNWT Economic Development and Tourism Department developed a new commercial fishing strategy for the NWT (R.T. and Associates 1994). The strategy identified opportunities for enhanced commercial fish production in the Mackenzie Delta but not elsewhere in the ISR. Despite these efforts to spur fisheries development in the Beaufort Sea, there has been limited success as commercial operations in the ISR have historically faced a number of important constraints.<sup>3</sup>

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<sup>3</sup> Davies et al. (1986) and Crawford (1989) provided historical perspectives on commercial operations in the ISR and cited a number of constraints to commercial developments including: high transport costs; high processing costs; lack of handling and storage



Presently, the loss of summer sea ice (Stroeve et al. 2007, 2008, Perovich and Richter-Menge 2009, Wang and Overland 2009) has made millions of square kilometres of the Arctic Ocean accessible to fishing vessels for the first time. The Bering and Barents seas, on the Arctic margin, are among the world's most productive in terms of primary productivity and fish yields (Pauly and Christensen 1995). Whether such biological abundance extends northwards remains to be seen; however, the Canadian Beaufort Sea's primary productivity is characterized as low when compared to other Arctic or sub-Arctic marine systems (Mathias 2012).

Removal of the physical barrier of ice makes possible the development of commercial fisheries in the newly accessible waters of the Arctic Ocean. Nearly everywhere else in the world, fisheries have developed as a result of fishers taking the initiative to try a new location, new gear, or new species, with science and management coming later (Roberts 2007). One result has been overfishing in most of the world (Pauly et al. 1998, Jackson et al. 2001), as fishers race to exploit areas and species while abundance lasts and before competition or regulations lead to reduced catches. In light of these new opportunities and risks, Arctic nations have begun to grapple with how to manage expectations of new commercial fisheries in newly accessible Arctic waters.

Governance of the Canadian Beaufort Seas fisheries is primarily controlled through the Inuvialuit Final Agreement (IFA), a comprehensive land claim signed by the Inuvialuit and the Government of Canada in 1984. The IFA established a co-management regime for resource management and governance between the Inuvialuit, Government of Canada, and the GNWT. Within the ISR<sup>4</sup>, the IFA delineates how fisheries resources are to be managed and allocated. The IFA also contains specific provisions regarding the development, management, and potential economic benefits associated with commercial fisheries (IFA 2005).

Following the signing of the IFA, local fishers recognized that they had enhanced control over resource development and asked the Fisheries Joint Management Committee (FJMC) to assess opportunities for fishery development in the Canadian Beaufort Sea-Amundsen Gulf area. The assessment (Stewart et al. 1993) reviewed existing knowledge of invertebrate and fish stocks in the area and did not find any stocks capable of sustaining a viable commercial export fishery. Stewart et al. (1993) found that any coastal and offshore commercial fisheries would be severely constrained by environmental, social, and economic factors. The study recommended that if the

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facilities; limited local markets; lack of skilled shore-side facility maintenance personnel; and conflicts between domestic and commercial fisheries.

<sup>4</sup> The marine portion of the ISR includes the Canadian Beaufort Sea.

FJMC planned to proceed with fishery development, it should conduct biological stock assessment research in the hope of locating a suitable stock. It also recommended that before any commercial development proceeded, it should have local support, be sustainable, and optimize benefits to the Inuvialuit. The report concluded that Arctic marine fisheries development should not precede stock assessment research, and it outlined options for the type of research that should be considered.

Precautionary ecosystem-based management mechanisms have been developed or are being considered for Arctic jurisdictions. Some steps have already been taken down this new path. The United States of America (USA) adopted a fishery management plan for its Arctic waters (north of the Bering Strait, in the Chukchi and Beaufort seas) that sets a catch limit of zero for the three species (Arctic cod (*Arctogadus glacialis*), saffron cod (*Eleginus gracilis*), snow crab (*Chionoecetes*)) that are most likely to be of commercial interest (NOAA 2009). The idea is to allow time for gathering data about these species and the ecosystem of which they are part, prior to allowing fishing vessels to fish in these waters.

Canada is considering a similar approach in its part of the Beaufort Sea (Standing Senate Committee on Fisheries and Oceans 2010). A Memorandum of Understanding (MOU) regarding the development of a Beaufort Sea Integrated Fisheries Management Framework was signed in April 2011 by DFO, the FJMC, the Inuvialuit Regional Corporation, and the Inuvialuit Game Council<sup>5</sup>. The USA is promoting an international agreement based on principles of precautionary ecosystem-based management for the central Arctic Ocean, the area beyond the Exclusive Economic Zones of the five Arctic coastal states (Canada, Russia, USA, Norway and Denmark (via Greenland))<sup>6</sup>. Taken together, these actions suggest a growing interest among Arctic nations in developing Arctic fisheries management regimes guided initially by sound science.

The goal of this paper is to provide a complete history and analysis of commercial fishing in the Canadian Beaufort Sea. To accomplish this goal, the following themes will be discussed: (1) the context and history of commercial fishing in the Canadian Beaufort Sea; (2) a high-level overview of commercial fishing in the Alaskan Chukchi and Beaufort seas; (3) existing

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<sup>5</sup> See <http://www.cbc.ca/news/canada/north/beaufort-sea-commercial-fishing-banned-1.1028286>. A copy of the MOU is available by contacting the FJMC resource person at [fjmc-rb@jointsec.nt.ca](mailto:fjmc-rb@jointsec.nt.ca).

<sup>6</sup> Public Law 110-243 was signed by President Bush on 3 June 2008. The Council of the European Union recently adopted a policy calling for a regulatory framework to be established in the central Arctic Ocean before any fishing is allowed. In 2011, Denmark, Greenland, and the Faeroe Islands (the kingdom of Denmark) called for an international Arctic fisheries agreement and stated that commercial fishing in the area should not start until management measures are in place.

commercial quotas in the Northwest Territories Fishing Regulations (*Fisheries Act* 2009); and (4) exploratory fishing applications received by DFO since 2000.<sup>7</sup>

## II. A History of Commercial Fishing in the Canadian Beaufort Sea

With this backdrop in mind, each major marine species or group of species occurring in the Canadian Beaufort Sea will be discussed in the context of its importance to subsistence harvesting and commercial fishing efforts to date. By amalgamating the experience of each individual fishery or attempted fishery, common themes emerge, which connect the history of fishing endeavours in the Canadian Beaufort Sea. A particularly common theme among these attempted fisheries is the challenge of sustaining a commercially viable harvest level without depleting stocks. Managers should consider these themes and lessons learned within the context of future commercial fisheries development and management in the Canadian Beaufort Sea.

### Commercial Whaling

In many cases, attempts to develop large-scale commercial fisheries targeted species that were already harvested in traditional Inuvialuit subsistence fisheries. The Beaufort Sea's first commercial fishery follows this pattern. Bowhead whales, *Balaena mysticetus*, were harvested by Inuvialuit living along the west side of the Tuktoyaktuk Peninsula as well as near Cape Bathurst. The Inuvialuit relied on umiaqs, large roomy skin boats, to harvest 1-3 bowhead whales annually (McGhee 1974). The bowhead whale would eventually become the largest commercial marine fishery in the Canadian Beaufort Sea.

In 1848, American whalers passed through the Bering Strait and hunted bowhead whales along the north coast of Alaska and eastern Siberia. Bowhead whales were valued for their oil and baleen (Alunik et al. 2003). In 1889, American whalers first arrived in the Canadian Beaufort where they discovered bowhead summering grounds along the Yukon North Slope and near Cape Bathurst. From 1892-1909 whalers over-wintered at Pauline Cove or Herschel Island so they could maximize their hunting season. As many as 15 whaling vessels over-wintered in Canada. One shipload of baleen could be worth up to \$500,000 at that time, or many times as much today.

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<sup>7</sup> Please note the geographic scope of this paper excludes Eastern Canadian Arctic waters. This area falls within the boundaries of a different settled land claim, Nunavut. In addition, the Eastern Canadian Arctic marine ecosystem is dissimilar from the Western Arctic in terms of biological productivity, species composition, and species abundance (Mathias 2012).

By 1910, the stock was nearly extirpated. Some 18,650 bowhead were taken from the Western Arctic between 1848 and 1915 (Bockstoe and Botkin 1983) in the commercial fishery.

Subsiding hunting pressure because of the collapse of the baleen market enabled the bowhead whale to survive (Alunik et al. 2003). In fact, today the population has significantly recovered. Although Canada no longer allows commercial whaling, bowhead whales are still hunted for subsistence purposes by the Siberian Yupik in the northern Bering Sea, Inupiat along the Alaskan northwestern and northern coast, and occasionally by the Inuvialuit in the Canadian Beaufort Sea. The Alaskan subsistence quota was 67 bowhead whales for 2010, whereas the Inuvialuit have harvested only two bowhead whales since 1991.

## Beluga Whales

Beluga whales, *Delphinapterus leucas*, have been, and remain, one of the most important subsistence species for the Inuvialuit. Historically, families would spend the summer in coastal cabins along the mouth of the Mackenzie Delta, Kugmalit Bay, and Mackenzie Bay to hunt beluga whales and net fish. This practice is still an active component of Inuvialuit culture. Approximately 60-120 beluga whales are harvested annually from a stock of at least 30,000 (Harwood and Smith 2002). Beluga whales remain significant for food and cultural purposes. Beluga whales have never been targeted by commercial whaling efforts in the Canadian Beaufort Sea<sup>8</sup>, but there may have been some incidental catches during commercial bowhead whaling.

## Ringed Seals

The Inuvialuit have long hunted ringed seals, *Pusa hispida*, for food, clothing, handicrafts, and dog food. Ringed seals are abundant and widespread throughout the Canadian Beaufort Sea, where population estimates for the stock are greater than 650,000. Over the course of the 20<sup>th</sup> century, a commercial ringed seal harvest developed. The commercial ringed seal harvest peaked from 1960-1980, with an annual range of 350-9,078 and an average of 2,600 ringed seals taken annually. The community of Ulukhaktok (formerly Holman), on Victoria Island, harvested the majority of these ringed seals.

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<sup>8</sup> Although no record exists of a commercial harvest of beluga whales in the western Arctic, they were historically commercially harvested in other areas of the Canadian Arctic such as the high Arctic: southeastern Baffin Island, western and eastern Hudson's Bay, Hudson Strait, and Ungava Bay (<http://www.dfo-mpo.gc.ca/science/publications/uww-msm/articles/beluga-eng.htm>).

Anti-sealing campaigns of the 1980s, combined with natural variability in seal production caused by environmental conditions, have resulted in declining harvest levels since 1980 (Stewart et al. 1986). All Western Arctic harvests currently total less than 1,000 ringed seals per year. Unlike many marine fisheries, sealing in the Canadian Beaufort appears to be limited by political pressures and market forces, rather than biological productivity (Condon 1996).

## Arctic Char and Dolly Varden Char

Historically, the Inuvialuit used subsistence char fisheries to feed themselves and their dog teams, and for ceremonial purposes. Char fisheries in the Canadian Beaufort Sea have targeted both Arctic char, *Salvelinus alpinus*, and Dolly Varden char, *Salvelinus malma*. Arctic char inhabit rivers east of the Mackenzie River, including river systems on Victoria and Banks islands. Dolly Varden char occur in rivers west of the Mackenzie River along the Yukon North Slope. These fisheries are very important to the Inuvialuit (Byers 2010).

There have been a number of attempts to initiate commercial char fisheries over the past 55 years. In 1960-1961, the Department of Northern Affairs and National Resources started a Dolly Varden char (then identified as Arctic char) fishery at Shingle Point. The fishery closed after two years as a result of over-fishing. In total, 13,626 kg of Dolly Varden char were harvested (Corkum and McCart 1981).

In 1965-1966, the Menzies Fish Company initiated a commercial fishery for Dolly Varden char in the Mackenzie Delta, Pauline Cove, Ptarmigan Bay, and the along the Yukon North Slope. Again, the fishery only lasted for two seasons because of a host of complications, including: mechanical and technical problems, spoiled fish, transportation costs, and discontented fishermen. The fishery yielded 7,675 kg of char over the two years (Corkum and McCart 1981).

In 1968, the Paulatuk Hunters and Trappers Committee (PHTC) started an Arctic char commercial fishery with an annual quota of 2,300 kg on the Hornaday River. Harvests were initially low, but rose rapidly during the late 1970s. The quota was raised to 4,500 kg in 1974 and then to 6,800 kg in 1976 (Kristofferson et al. 1989). By the early 1980s, harvests and catch per unit effort were in decline and there were concerns that the stock was suffering from over-exploitation. In light of these issues, the commercial fishery was permanently shut down in 1987 (Harwood 2009). Currently, no commercial fishing takes place on the Hornaday River. Further,

the PHTC, FJMC, and DFO have established a community fishing plan (Paulatuk HTC, 1998) to ensure the long-term health of the Arctic char stock and a sustainable subsistence harvest.

The community of Ulukhaktok (formerly Holman), on Victoria Island has traditionally harvested Arctic char for subsistence purposes in many of the rivers that empty into Prince Albert Sound as well as along the Diamond Jenness Peninsula. There currently are two small-scale community-run Arctic char subsistence fisheries. In 1992, a 4,500 kg quota was established for the Kagloryuak River. In 1996, a 600 kg quota was established for the Kuujjua River. Both subsistence fisheries are managed sustainably in accordance with the Holman Char Fishing Plan (Olokhaktomiut HTC 2004). Furthermore, in 2000 the Olokhaktomiut Hunters and Trappers Committee (OHTC) applied for and received an exploratory commercial fishing licence for the Ulukhaktok coastal area, the Kuuk River, and the Kagluk River. Currently, the OHTC has a DFO stage I licence for the commercial harvest of 500 Arctic char from the coastal area of Ulukhaktok. The Ulukhaktok Char Fishing Plan (updated Holman Char Fishing Plan – currently under revision) will manage these new quotas.

## Shellfish

The Canadian Beaufort Sea has never had a commercial shellfish fishery but at least one survey has investigated presence, abundance, and species composition of shellfish (clams, crabs and shrimp). From 1999-2000, DFO conducted a survey for shellfish in areas around Banks Island, the Sachs River estuary, Sachs Harbour, and Thesiger Bay. The DFO survey found nine species of shellfish present in these areas. Local residents of Banks Island identified five of the species (soft shell clam (*Mya arenaria*), Greenland cockle (*Serripes groenlandicus*), hairy cockle (*Ciliatocardium ciliatum*), toad crab (*Hyas araneus*), and shrimp (*Pandalus borealis*)). The DFO study concluded abundances may be enough to support a limited local harvest, but they were not high enough to support a commercial harvest (Siferd 2006).

Many significant scientific data gaps exist for benthic invertebrate communities of the Beaufort Sea. Biological information related to life cycles, larval stages, and development, are unknown for polychaetes, bivalves, amphipods, ophiuroids, and sea stars (Hopcroft et al. 2008). Lastly, the studies that have been conducted on benthic invertebrates suggest low growth rates and high longevity (Mathias 2012).

## Marine Fish

Unlike anadromous char stocks, few marine fish are captured in the subsistence fishery. There are three general reasons for this. First, marine fish in the Beaufort Sea tend to be small with a low meat yield per effort. Second, many common marine species are not desired table fare by the Inuvialuit. Third, the chief species of interest, capelin and herring, are too small to be consistently caught in whitefish or char gillnets.

There has never been a commercial marine fishery in the Canadian Beaufort Sea, where there are 14 families and 53 different species of marine fish known at present. Very limited survey data exist on species abundance and distribution in the Beaufort Sea. The data that exist are skewed heavily towards the southern Canadian Beaufort Sea and to the open-water months of July and August.

Of all the marine fish species that inhabit the Canadian Beaufort Sea, Pacific herring, *Clupea pallasii*, have been the most interesting to potential commercial harvesters. DFO studies in 1962 and 1981 showed sizable stocks between Liverpool Bay and Darnley Bay. Although a commercial marine fishery has never existed in the Canadian Beaufort Sea, there have been two experimental fisheries for Pacific herring (Gillman and Kistofferson 1984).

In 1963, a DFO-led experimental Pacific herring fishery was initiated near Baillie Island. The experimental fishery yielded approximately 8,000 kg of Pacific herring (Corkum and McCart 1981). The experimental fishery was shut down after a single season because of a series of challenges, which included: clogged gillnets, lack of access to regular supplies, inclement weather, and high processing and transportation costs. It was concluded that Canadian Beaufort Sea Pacific herring was not competitive with the Scandinavian market (Stewart et al. 1993).

In 1983, another experimental fishery for Pacific herring was attempted at the mouth of Liverpool Bay. The experimental fishery harvested 4,581 kg of Pacific herring, with 398 kg of roe. Male herring were smoked for sale in a test market. In 1985, a feasibility study concluded that the roe could have been a marketable product if the fishery could produce at least 12,000-13,000 kg annually. In 1986, aerial surveys were flown but failed to locate Pacific herring stocks that met the parameters outlined in the feasibility study. The test fishery did not continue because the biomass of the harvest was too low for investment (Stewart et al. 1993).

## Summary

There have been a number of attempts to develop commercial fisheries in the coastal and marine areas of the ISR. With the exception of small, inshore community-run fisheries, most commercial fishing efforts have not lasted more than a couple of years because of unsustainable harvest levels. Since the signing of the IFA, the belief existed that commercial fisheries could provide economic benefit to the people and communities of the ISR. To date, this belief has not come to fruition because of the fact that the Canadian Beaufort Sea ecosystem does not appear to produce enough surplus biomass to support large-scale commercial fisheries (Mathias 2012)<sup>9</sup>.

## III. Alaskan Beaufort and Chukchi Fisheries

To assess the complete history of commercial fishing in the Canadian Beaufort Sea, it is prudent to present a high level overview of commercial fishing attempts and efforts in the USA Chukchi and Beaufort seas. Due to the USA moratorium on commercial fishing in federal Arctic waters (signed into law August 2009), the commercial fishing industry is not operating in that area. However, the USA moratorium does not include the coastal sea (from the land to three miles out), which is managed by the State of Alaska.

Similar to the Canadian Beaufort, most coastal fisheries have targeted species that comprise traditional subsistence species of the Inupiat (Aboriginal peoples who inhabit the Alaskan North Slope). Commercial fishing efforts to date have been small-scale, state-managed fisheries in Kotzebue Sound and the Colville River Delta. At present, there is one operational commercial fishery in the Colville River Delta and there are two in Kotzebue Sound (National Marine Fisheries Service 2009).

A small family-run commercial fishery has been operating in the Colville River (US Beaufort Sea) for 35 years. The fishery targets Arctic cisco (*Coregonus autumnalis*), least cisco (*Coregonus sardinella*), broad whitefish (*Coregonus nasus*) and humpback whitefish (*Coregonus pidschian*). The fishery yields a range of 20,000-25,000 fish annually (National Marine Fisheries Service 2009).

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<sup>9</sup> This finding is consistent with evidence from the Chukchi Sea. A pool of cold water in the northern Bering Sea is a persistent barrier to the northward movement of fishes, and is likely to remain that way for the foreseeable future. Although there are reports of pollock in the Chukchi and Beaufort seas, they are small and uncommon, showing no signs of becoming commercially viable stocks. Snow crab, on the other hand, is already relatively abundant on the Beaufort and Chukchi shelves, but not sufficiently so to justify the costs of management (Mueter and Litzow, 2008; Mueter *et al.*, 2011).



Furthermore, two small state-managed commercial fisheries currently exist in Kotzebue Sound (Soong et al. 2008). First, a small red king crab (*Paralithodes camtschaticus*) fishery operates in the outer waters of Kotzebue Sound. There is limited information pertaining to this fishery. Results from exploratory fishing in 1984 and 1989 suggested that there was not enough biomass to support large-scale commercial crabbing (Lean et al. 1992). In 2001, a crab test fishery was allowed under an educational permit. The harvest was small, an average of one legal crab per pot. Approximately 3,574 pounds of red king crab were harvested and distributed to the fishermen for subsistence purposes (Lean et al. 1992).

Second, there is an inconnu (*Stenodus leucichthys*) fishery with a quota of 25,000 pounds. Reported commercial harvests have been significantly less than the quota, a few thousand pounds annually. In 2006 and 2007, no commercial harvests were reported; fuelling speculation that unreported harvests may be an issue (Soong et al. 2008).

Historically, there have also been opportunistic chum salmon (*Oncorhynchus keta*) and Dolly Varden set net fisheries when markets existed. Pacific herring sac roe fisheries have also taken place, but have been dormant since 1996. Last, commercial whitefish fisheries have occurred in Hotham Inlet and the Selawik River.

## **IV. Recent Canadian Beaufort Sea Exploratory Fishing Applications**

Since 2002, there has been consistent interest in developing new large-scale commercial fisheries in the Canadian Beaufort Sea. Exploratory commercial fishing took place on two occasions, but with limited results. These commercial exploratory fishing ventures were attempting to locate stocks large enough to establish new commercial quotas for the Canadian Beaufort Sea. The DFO process to establish a commercial quota is guided by the Department's Sustainable Fisheries Framework (DFO 2009) and the New Emerging Fisheries Policy.

From 2002-2009, DFO received one application for an exploratory fishing licence every year; three different companies were involved (Table 1). Leader Fishing Ltd. applied in 2002 and 2003; Griffin Fish Ltd., in partnership with PacifiTech Environmental Consulting, applied in 2004 and 2005; and Saavittuag Enterprises Ltd. applied from 2006-2009. Exploratory fishing licences were granted for all years except for 2008 and 2009. However, exploratory fishing was

only done in 2004 by Griffin Fish Ltd and PacifiTech Environmental Consulting off the Yukon North Slope, and in 2006 by Saavittuag Enterprises Ltd. off the coast of Banks Island in Thesiger Bay.

**Table 1. Summary of DFO commercial fishing licence applications and efforts since 2000.**

| <b>Year</b> | <b>Company</b>  | <b>Licence Granted</b> | <b>Fishing Conducted</b> |
|-------------|---|------------------------|--------------------------|
| 2002        | Leader Fishing Ltd.                                       | Granted                | No                       |
| 2003        | Leader Fishing Ltd.                                       | Granted                | No                       |
| 2004        | Griffin Fish Ltd. and PacifiTech Environmental Consulting | Granted                | Exploratory              |
| 2005        | Griffin Fish Ltd. and PacifiTech Environmental Consulting | Granted                | No                       |
| 2006        | Saavittuag Enterprises Ltd.                               | Granted                | Exploratory              |
| 2007        | Saavittuag Enterprises Ltd.                               | Granted                | No                       |
| 2008        | Saavittuag Enterprises Ltd.                               | Not granted            | No                       |
| 2009        | Saavittuag Enterprises Ltd.                               | Not granted            | No                       |

Each company received an exploratory fishing licence for the same target species: crab, cod, prawn, shrimp, halibut/turbot (*Reinhardtius hippoglossoides*), and gastropods/shellfish. The authorized target species, gear, and limits of harvest were identical for each of the approved exploratory fishing licences (Table 2).

**Table 2. Summary of exploratory fishing species, gear and quotas.**

| <b>Species</b>      | <b>Gear</b>            | <b>Quota (kg round weight)</b> |
|---------------------|------------------------|--------------------------------|
| Cod                 | Longline and cod traps | 4,000                          |
| Crab                | Crab traps             | 4,000                          |
| Shrimp              | Prawn traps            | 4,000                          |
| Prawn               | Prawn traps            | 4,000                          |
| Halibut/turbot      | Longline               | 4,000 (combined)               |
| Gastropod/shellfish | Hoop trap              | 1,500                          |

In 2004, Griffin Fish Ltd. and PacifiTech Environmental Consulting submitted catch data records and samples to DFO from their exploratory fishing efforts along the Yukon North Slope.

Unfortunately, the samples were spoiled by weather damage. However, the catch data records indicated that although many of the species targeted in their experimental licence were caught, catch per unit effort was poor and abundance was minimal. The following species were caught

during 2004 experimental fishery: opilio crab, shrimp, snail, starfish, clam, brittle star, isopod, and *Gammarus*. Figure 1 is a picture submitted to the DFO of the largest opilio crab caught during the fishing season.



Figure 1. The largest opilio crab caught in the 2004 exploratory fishing season by Griffin Fish Ltd.

In 2006, Saavittuag Enterprises Ltd. submitted catch data and samples to DFO from their exploratory fishing efforts off the coast of Banks Island in Thesiger Bay. The catch data records indicated that only a few target species were successfully harvested with minimal abundance. The following species were caught during the 2006 experimental fishery: toad crab, sea urchin (*Echinodea*), and Arctic clam (*Mactromeris polynyma*).

## V. Existing Commercial Quotas for the Canadian Beaufort Sea

When considering the issue of commercial fishing in the Canadian Beaufort Sea, attention is generally focused on the idea of new exploratory commercial fishing efforts (described above). However, there are already a number of existing commercial quotas for coastal and marine waters of the Canadian Beaufort Sea. Schedule V of the Northwest Territories Fishery Regulations (*Fisheries Act* 2009) establishes species, mesh sizes, fishing seasons, and quotas for commercial fishing in the waters of the NWT. Table 3 summarizes the information in Schedule V pertaining to significant water bodies/areas in the ISR. Many of the commercial quotas are for anadromous species. The areas identified as Mackenzie River Delta I, II, III, and IV are shown in Appendix 1; only areas III and IV contain marine waters.

**Table 3. Existing commercial quotas in the ISR from the NWT Fishery Regulations relevant to the Beaufort Sea. Species in bold indicate established quotas of  $\geq 10,000$  kg round weight.**

| <b>Waters</b>                  | <b>Species</b>           | <b>Quota (kg round weight)</b> |
|--------------------------------|--------------------------|--------------------------------|
| Cape Parry Area                | <b>Cod</b>               | <b>11,400</b>                  |
|                                | <b>Herring</b>           | <b>20,000</b>                  |
|                                | Whitefish and trout      | 300                            |
| Eskimo (Husky) Lake            | <b>Whitefish</b>         | <b>11,400</b>                  |
|                                | <b>Cisco</b>             | <b>11,400</b>                  |
|                                | <b>Lake trout</b>        | <b>11,400</b>                  |
|                                | Inconnu                  | 1,200                          |
| Hornaday River                 | Arctic char (sea run)    | 6,800                          |
| Liverpool Bay                  | <b>Herring</b>           | <b>20,000</b>                  |
|                                | <b>Cisco</b>             | <b>11,400</b>                  |
|                                | Inconnu                  | 1,200                          |
| Mackenzie River Delta Area I   | Whitefish                | 2,300                          |
|                                | Arctic char              | 900                            |
|                                | Lake trout               | 2,300                          |
|                                | Cisco                    | 2,300                          |
|                                | Burbot and northern pike | 4,600                          |
| Mackenzie River Delta Area II  | Burbot and northern pike | 4,600                          |
|                                | Cisco                    | 2,300                          |
|                                | Whitefish                | 9,100                          |
|                                | Lake trout               | 2,300                          |
| Mackenzie River Delta Area III | <b>Whitefish</b>         | <b>45,500</b>                  |
|                                | Cisco                    | 2,300                          |
|                                | Lake trout               | 2,300                          |
|                                | Burbot and northern pike | 4,600                          |
| Mackenzie River Delta Area IV  | <b>Herring</b>           | <b>20,000</b>                  |
|                                | Lake trout               | 2,300                          |
|                                | Inconnu                  | 4,600                          |
|                                | Whitefish                | 4,600                          |

Many of these quotas are 20-40 years old, and were established by a discrete set of DFO protocols. The process would begin by a GNWT Economic Officer identifying a potential commercial fisheries opportunity. A meeting would then be held between the GNWT Economic Officer, community representatives, and DFO. The GNWT would provide infrastructure support, equipment, boats, processing facilities, etc. DFO, as the federal regulator, would establish the commercial quota for the fishery.

At that time, commercial quotas in the Western Arctic were created based on expected production levels of a target species over an anticipated fishing season. Therefore, many of these older commercial quotas are not science-based and have not been assessed against DFO's current Sustainable Fisheries Framework (DFO 2009).

## VI. Conclusion

Commercial fisheries development had been seen as a potential driver of economic development in the western Canadian Arctic, but by the turn of the millennium, co-managers and governments were starting to shift focus. In particular, the *Oceans Act* (1996) and Canada's Oceans Strategy (DFO 2002) emphasized the need for sustainable development, a precautionary approach, conservation, shared responsibility, and ecosystem-based management.

Research and experience suggest that there is insufficient biological productivity for a sustainable commercial fishery, although subsistence fisheries are viable. This suggestion is reflected in the numerous examples of attempted and failed commercial fishing endeavors over the past 40 years. Appendix 2 provides a chronological summary of the twelve commercial fishing ventures documented in the Beaufort Sea.

The FJMC is advocating that parts of the Beaufort Sea be designated as an Arctic Marine Reserve, to ensure the long-term protection of existing species for subsistence purposes (Mathias et al. 2008). Further, the interest in fisheries development has faded within the GNWT, replaced by an emphasis on mineral development and tourism; there has been no interest in fisheries development (GNWT-ITI, 2012).

In summary, the profile of fisheries development in the Beaufort Sea peaked in the 1960s to 1980s, faded during the 1990s, and was revisited in the 2000s. The realities of resource, infrastructure and market limitations have set in. The Canadian Beaufort Sea is one of the last places on earth that has not experienced recent industrial-scale commercial fishing. The IFA established a unique co-management regime to manage marine resources of the ISR.

Except for small sustainably managed community fisheries, each attempt at commercial fishing resulted in either a decline of the target species population or an inability of government or industry to locate commercial stocks viable for exploitation. This common theme points to the

need to complete a precautionary, science-management tool for Canadian Beaufort Sea fish stocks prior to the advent of commercial fisheries development.

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## Appendices

### Appendix 1: Mackenzie River Delta Commercial Fishing Areas

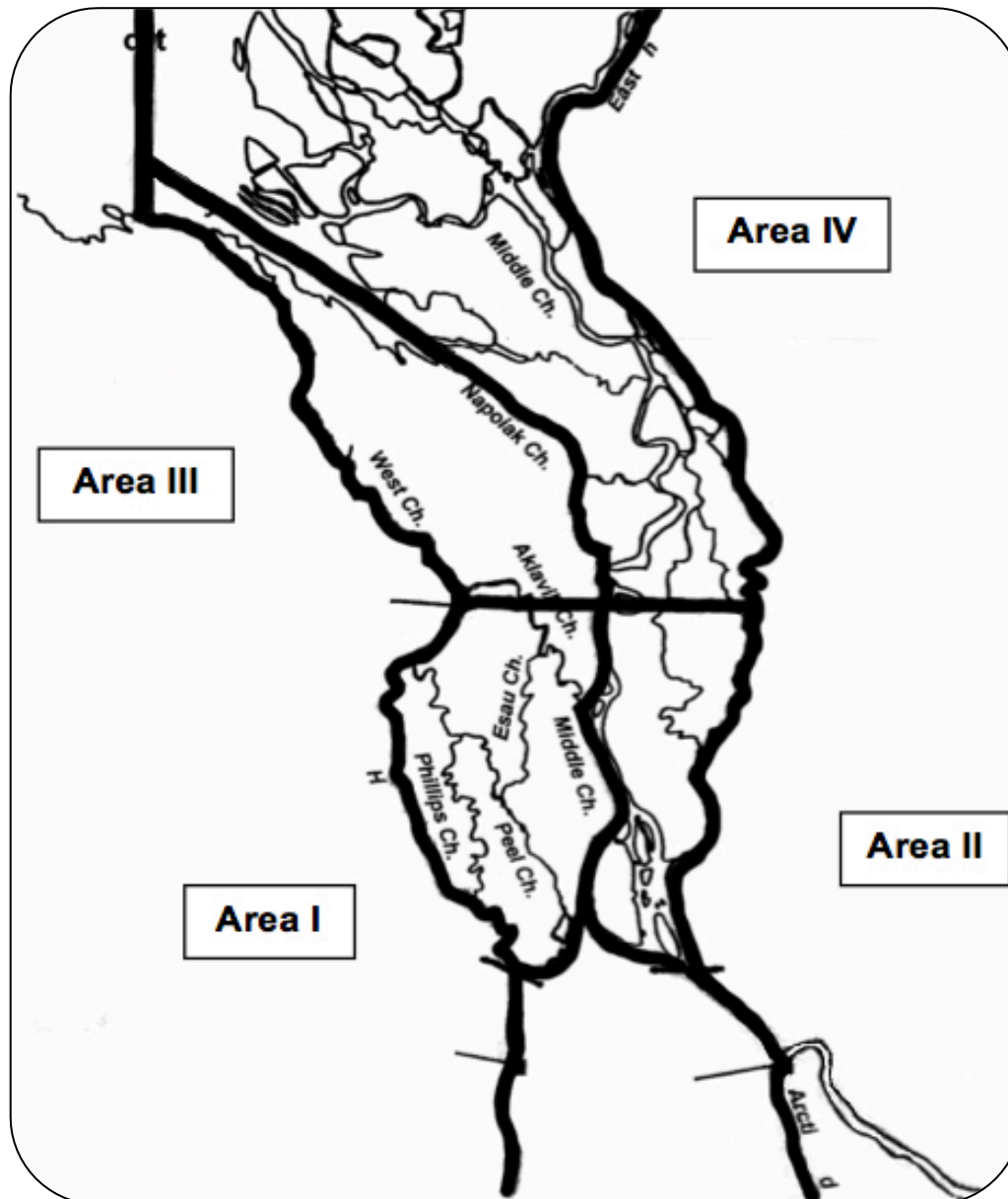


Figure A1. Map of Mackenzie River Delta commercial fishing areas I-IV.

## Appendix 2: Chronology of Coastal and Marine Commercial Fishing Ventures for the Beaufort Sea

Table A2. Chronology of coastal and marine commercial fishing ventures for the Beaufort Sea.

| Date         | Species           | Area   | Catch (kg or number of fish)                     |
|--------------|-------------------|--|--|
| 1848-1915    | Bowhead whale     | Beaufort Sea                                     | 18,650 (total no.)                               |
| 1960-1961    | Dolly Varden char | Shingle Point                                    | 13,626 kg (total)                                |
| 1960-1980    | Ringed seal       | Beaufort Sea*                                    | 350-9,078 (annual no.)                           |
| 1963         | Pacific herring   | Ballie Island                                    | 8,000 kg (one-time experimental fishery)         |
| 1965-1966    | Dolly Varden      | Mackenzie Delta, Pauline Cove, Yukon North Slope | 7,675 kg (total)                                 |
| 1968-1987    | Arctic char       | Hornaday River                                   | Unknown  |
| 1980-present | Ringed seal       | Beaufort Sea                                     | < 1,000 (annual no.)                             |
| 1983         | Pacific herring   | Liverpool Bay                                    | 4,581 kg (one-time experimental fishery)         |
| 1992-present | Arctic char       | Kagloryuak River**                               | Unknown (4,500 kg quota)                         |
| 1996-present | Arctic char       | Kuujua River**                                   | Unknown (600 kg quota)                           |
| 2000-present | Arctic char       | Kuuk and Kagluk Rivers**                         | Unknown (500 kg quota)                           |
| 2004         | Species list      | Mackenzie Bay and Yukon North Slope              | Unknown (4,000 kg quota for each target species) |
| 2006         | Species list      | Beaufort Sea                                     | Unknown (4,000 kg quota for each target species) |

\* Ringed seals were harvested throughout the Beaufort Sea, but most were taken in the vicinity of Ulukhaktok, Victoria Island.

\*\* These rivers have commercial quotas, but are not actively fished commercially.