ABORIGINAL PARTICIPATION IN COMMERCIAL FISHERIES OF THE CANADIAN NORTH: THE INUIT EXPERIENCE

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Your file Votre référence
ISBN: 0-612-84004-2
Our file Notre référence
ISBN: 0-612-84004-2

ABORIGINAL PARTICIPATION IN COMMERCIAL FISHERIES OF THE CANADIAN NORTH:

THE INUIT EXPERIENCE

by

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A report submitted to
the School of Graduate Studies
in partial fulfillment of the
requirements for the degree of
Master of Marine Studies
(Fisheries Resource Management)

Memorial University of Newfoundland

July 2002

St. John's Newfoundland

Abstract

For over four millennium the Inuit people have occupied the Arctic utilizing marine resources of the Arctic region for subsistence purposes. In recent decades a number of significant events including the recognition of aboriginal fisheries rights, the negotiation of land claims agreements and the devolution of management authority have triggered radical changes in fisheries management in the northern region. This paper examines the many marine species in the Northern region and identifies, Greenland halibut (Reinharditus Hippoglossoides) and Northern shrimp (Pandalus borealis) as having the greatest economic potential for commercial exploitation. A detailed life history and stock status of these two stocks confirms the long term sustainability of the stock for commercial exploitation. Current management strategies are examined and found to be deficient. Commercial exploitation of the resource is challenged by limited quotas assigned by the Department of Fisheries and Oceans, lack of access, nonexistent infrastructure, and lack of trained human resources. A compelling case for increased local access is made based on the United Nations international principles of fisheries allocation namely, historical attachment, socio-economic dependence and adjacency. This work recommends a management development strategy based on attaining direct access through increased licenses, partnership arrangements with southern fishing interests to gain expertise and equity, and a co-management of the marine resources in the Arctic region incorporating traditional ecological knowledge with western science.

Acknowledgements

I would like to thank Dr. George Rose for supervising the development and completion of this project. In am also indebted to many colleagues including Mr. Glenn Blackwood and Dr. Paul Snelgrove who reviewed earlier drafts of this report. Special thanks to Dr. Scott Grant and Karen Daley both of whom reviewed several drafts of the report and provided valuable advice and editorial direction. I would also like to express my appreciation to the library staff of the Marine Institute, Ms. Diane Taylor-Harding and Ms. Ruth Wilson, for their considerable assistance.

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1.0 Introduction

Native cultures inhabiting the coastline of northern Canada, particularly the Inuit, have traditionally harvested fish and marine mammals for subsistence. Marine resources are central to the economic and cultural well being of the Inuit people. In pursuit of socioeconomic development, the Arctic regions' native peoples have expanded their participation into commercial and recreational fisheries while maintaining a subsistence fishery. Until recently the prosecution and management of Canada's Arctic and northern fisheries resources received scant attention from national policy makers. Preoccupied with problems and opportunities of both the east and west coast regions and a national policy review, the Department of Fisheries and Oceans (DFO) paid little attention to its northern fisheries management mandate and placed little significance on the value of fisheries resources in this region. Large commercial fish stocks are managed and prosecuted from the Atlantic region with only minor quota allocations being assigned to Northern populations. In recent decades a number of significant events have triggered radical changes in fisheries management in the northern region. These events include: the recognition of aboriginal fisheries rights; the negotiation of land claims agreements and; the devolution of management authority. Collectively, these events have quickened the pace of political, economic, cultural and administrative change in the region and have assisted the development of a new era in fisheries resource management.

It is within this context that this paper will examine northern aboriginal fisheries as they have developed from the subsistence level to highly sophisticated commercial activities. Supreme court decisions with respect to aboriginal fishing rights, land claims settlements with respect to access and jurisdiction, and the principal of adjacency established under the Canadian Fisheries Act have determined the direction of northern fisheries management strategies. By examining the historical nature of Inuit fishery participation and determining how these relationships have evolved, the current status of aboriginal fishery participation will be evaluated to determine how Nunavut can derive maximum benefits from these fisheries and how Nunavut can contribute to overall territorial development. As well, future trends of management regimes and the potential for viability, resource conservation and sustainability will be explored. To accomplish this, Greenland halibut (*Reinhardtius hippoglossoides)* and Northern shrimp (*Pandalus borealis*) stocks must be evaluated for their current status, as well as, future potential for the Aboriginal people of the North. These stocks represent the primary commercial fisheries that Nunavut participates in and the potential for growth in a fragile Arctic environment must be examined. Therefore, to clearly assess the fisheries development potential of these resources and how such development might best proceed within an Inuit society, a review which includes a brief history of the culture, as well as, a working knowledge of the biology and life history of the organisms undertaken. This paper will focus on the two most important commercial species currently being harvested in the northern North Atlantic, Greenland halibut and Northern shrimp. This paper evaluates

northern co-management strategies and their effectiveness on resource exploitation and sustainability will be attempted.

2.0 Historical perspective

2.1 Cultural Origins

The Arctic coastal area is populated primarily by aboriginal people, particularly the Inuit. The exact origins of Canadian Inuit are unknown, but many archaeologists believe that their ancestors came to North America from Asia crossing a land bridge formed between the two continents during the last ice age. The first wave of Eskimo people is believed to have migrated throughout the Canadian Arctic about 4,000 years ago (McGhee, 1996). These first people are classified as Paleo-Eskimo and are considered inland hunters, but as they moved east across the North they began to adapt to coastal conditions and began to hunt seal and walrus. This new Dorset culture increased its utilization of marine foods and brought new adaptive technological changes such as heavy duty harpoon gear for whaling, dog traction, and new forms of social structure (Fitzhugh, 1977).

Approximately 1000 AD, a Neo Eskimo variant known as the Thule culture expanded rapidly into the Eastern Arctic establishing enclaves in prime whale hunting locations. The existing Dorset culture seems to have amalgamated with or became acculturated by the Thule people (Fitzhugh, 1977). Most archaeologists believe that modern Inuit from the coast of Labrador to the Arctic region are descendants from the Thule culture. The

Inuit culture can properly be described as having sprung from the adaptation to marine hunting and the use of the kayak.

2.2 European Contact

Traditional aspects of Inuit culture remained unchanged until the first European contact with whaling vessels in the late 1600s. Essentially, this was sporadic contact that did not result in major cultural change. Enduring economic contact between Canadian Inuit and Europeans began in earnest during the 17th century. It was at this time that the whaling industry began the practice of over-wintering and the northern fur trade was established (Wenzel, 1991). The growing importance of the fur trade also brought the Inuit into further contact with the outside world. Furs were always a vital part of the Inuit lifestyle and trapping soon equalled the economic importance of hunting.

Christian missionary stations were also expanding into northern areas during this period and were contributing to the European influence on Inuit culture. These contacts, while certainly exposing the Inuit to European culture, did not in any real sense influence the daily lives of Inuit. Until the end of the Second World War, Canadian Inuit continued to set the cultural pace of their own lives maintaining a mode of life not much different from before the early Arctic explorers ventured north. Despite widespread changes in socioeconomic organization and in material culture, many aspects of Inuit life followed

the basic Thule pattern. Whales were replaced by seals and walrus as a source of food and trade and the ever adaptive Inuit culture continued to evolve. Hunting remained central to Inuit life. The culture was organized to support this activity with the family as the basic unit. Hunting was essentially a cooperative venture with several households forming a hunting unit (Wenzel, 1991).

2.3 Post World War II

Modern Inuit history begins in the post WW II period with the recognition of the North as having special strategic, political and potentially economic significance to Canada and all the nations of the northern hemisphere (Wenzel, 1991). Interactions between the Inuit and other Canadians accelerated rapidly with the construction of weather and radar stations. Government services, mining exploration, and development increased, and more recently, discoveries of large oil and gas reserves have brought thousands of southerners into the North. As a result of these developments, more aspects of Euro-Canadian society became visible in the North. Federal Government institutions became predominant and exercised more authority in the daily life of the Inuit. According to Wenzel (1991), the Inuit remained joined to the land and their adaptive culture continued to accommodate a southern colonization. This is evidenced by the move of Inuit to a smaller number of larger, more stable communities with an infrastructure similar to any small town in Canada. Today, about 55,000 Inuit live in 53 communities across the North (The Library of Parliament, 1998). The territory of Nunavut was created on April 1, 1999 and

comprises over 20 percent of the total land mass of Canada. The population is estimated at approximately 27,000, of whom 85 percent are Inuit, and half are under the age of 25 (Statistics Canada, 2001). Over the past few decades, the Inuit population has grown rapidly up 8.1 percent from the 1996 census, due mainly to the high birth rate among the Inuit population and the growth of its capital of Iqaluit (Statistics Canada, 2001). The harvesting of fish and marine mammals continues to be a dominant human activity in the North. Subsistence fisheries occur in all areas where people live or travel and provide a major and essential source of food and a significant contribution to the cultural life of its residents (Clarke, 1993). As well, commercial and recreational fisheries, and the primary processing of marine mammal products contributes one of the few sources of employment and income to the economies of the communities (Parsons, 1993).

Modern technology has changed life for the Inuit, facilitating transportation and communications, and improving health care and protection against the harsh climate. The traditional dog team has largely been replaced by snowmobiles, all-terrain vehicles, cars and trucks. The harpoon has been replaced by the rifle. And the *iglu*, that legendary dome-shaped snow shelter, has been replaced by houses with central heating, electricity, appliances and plumbing. The *iglu* is now only used when hunting.

Modern life has also brought new problems with it. In common with many aboriginal peoples, Canada's Inuit must grapple with the challenge of adapting to life in an

advanced industrialized society, while attempting to maintain and preserve their traditional social and cultural roots.

3.0 Environment and Resources

3.1 Physical Environment

The Eastern Canadian Arctic waters represent a large expanse of territory ranging from the Arctic Archipelagos through the Davis Strait and southwards to the Labrador Sea (see Figure 1). The major physical differences between the Arctic seas and the Atlantic and Pacific seas are the low temperatures and the seasonal presence of ice in the former. The interrelationships amongst water, land and ice result in diverse habitats for marine mammals and fisheries resources (Clarke, 1993). As a result of extreme environmental conditions productivity is low. Arctic waters produce only about one quarter of the organic biomass per unit area that is produced annually over the continental shelves of the Canadian east and west coasts (Welch, 1995). The Arctic marine system is characterized by relatively low food web diversity but long food chains supporting top predators characterized as long-lived species with low reproductive rates and slow rebound abilities from population reductions (Welch, 1995). The fishery and marine mammal resources of the Arctic are primarily the terminal predators of the food web. These unique biophysical attributes characterize a fragile ecosystem that requires special conservation consideration and sound management principles.

Fish stocks in the North are harvested for subsistence, commercial, and recreational use. In the near shore coastal areas, fisheries are particularly important to residents of smaller communities where subsistence catches make a crucial contribution to a healthy diet. Commercial and sport fishing offer an opportunity for cash in communities where income earning opportunities are limited. The Canadian Eastern Arctic fisheries provide significant benefits to local residents. The estimated dollar value of benefits is $15 million for the replacement value of food from the subsistence harvest, $2 million as other consumer surplus benefits, and $7 million as the value-added to the Canadian economy (Clarke, 1993). The most important contribution is the support that the Arctic fisheries provide to aboriginal culture, as food and other materials for their use and employment for 50 to 75 percent of the population (Parsons, 1993).

The main species harvested are Arctic char (*Salvelinus alpinus)*, Atlantic salmon (*Salmo salar*), Northern shrimp (*Pandalus borealis*), Greenland halibut (*Reinhardtius hippoglossoides)*, beluga (*Delphin apterus leucas.*), narwhal (*Monodon monoceros)*, walrus (*Odobenus rosmarus*), and seals (*Phocidae*).

3.2 Subsistence Fisheries

Subsistence fisheries are conducted for marine mammals throughout the north. This includes both whales and seals. These fisheries have been a source of considerable

controversy with animal rights activists and continue to create great debate. Whales and seals represent an extremely important source of food to northern peoples and are the "raison d'etre" of cultural life for the Inuit.

3.2.1 Seals

In the late 1960s, sparked by the controversy over the Newfoundland harp seal hunt, animal rights activists launched a highly emotional campaign against seal hunting in general. This protest, aimed at stopping the highly commercial, industrialized seal hunt in the waters of Atlantic Canada, had disastrous social and economic consequences for the Inuit. The 1982 European communities voluntary boycott of all seal product imports resulted in the near total collapse of the Arctic sealing industry (Notzke, 1994). Prior to 1983 local hunters in northern Canada harvested about 61,000 seals annually. With the collapse of the market for seal skins both the average price per skin and the number of skins sold dropped dramatically. In the past decade the annual harvest of seals has remained around 8,000 animals (Clarke, 1993).

In the history of Euro-North American colonial encroachment into the Arctic, there has never been a southern challenge as directly aimed at the physical and biological base critical to Inuit culture as the collapse of the Arctic sealing industry (Wenzel, 1991). The devastating effects include reduction of access to the technical means hunters require for local food production, alienation of the traditional economy, growing socioeconomic

differentiation in northern communities and a weakening of the food base on which Inuit communities depend. The last nomadic Inuit hunters and their families were forced to leave the land for an uncertain future in communities with little wage employment or means of self sufficiency (Notzke, 1996).

3.2.2 Whales

Whale hunting has both a subsistence and commercial history that can best be described as interwoven into the fabric of northern culture. Beginning with the Thule inhabitation of coastal areas about 1000 years ago for subsistence, it became a commercial activity of European countries in the 1600s and continued sporadically until a commercial ban was enforced in Canada in 1972 (Clarke, 1993). Narwhale and beluga whales have been the primary focus of Inuit whale hunting since commercial whaling ended however, the hunting of bowhead has recently been resumed in both the eastern and western Canadian Arctic (Goodman, 1996). Subsistence harvesting of whales has continued in the north but has also been a source of controversy for the Inuit. While the Canadian government recognizes the importance of whales to native culture, whaling has a complex management history that includes international elements. The International Whaling Commission (IWC), the United Nations Convention on the Law of the Sea (UNCLOS) and the North Atlantic Marine Mammal Commission (NAMMCO) are all organizations with influence on marine mammal management. In 1982, Canada withdrew from the International Convention for the Regulation of Whaling (Article 65 of UNCLOS) and

from the IWC. Canadian Inuit favoured Canada's withdrawal from the IWC and have figured prominently in Canada's current whaling policy.

> *Canada's whaling policy is that, whaling in Canada is only for aboriginal subsistence purposes and that the management of this whaling has as its basis the recognition that whales and whaling are important to Inuit both as a source of food and as a significant part of their culture. Further, the policy is that sustainable management regimes for the utilization of these resources be developed with the incorporation of Inuit traditional knowledge and community based decisions, the application of the precautionary approach, and that their implementation be based on the provisions of land claim agreements, the exercise of Canadian sovereign rights and Article 65 of the United Nations Convention of the Law of the Sea (Goodman 1996).*

3.3 Recreational Fisheries

Recreational fisheries involve mainly Arctic char in the north and Atlantic salmon further south. Studies have shown that in many cases subsistence and sport fishing offer considerably higher economic value than the commercial fishery. As an example, the replacement value of Arctic char harvested in the Baffin region for food would exceed $3.00 per lb. while the commercial value of this fish is approximately $1.00 per lb.. Depending on circumstances, sport fishing may yield an even higher return, up to $20.00 per lb. (Government of the Northwest Territories (GNWT), 1997). Currently, the recreational fishery in Nunavut is worth $1.6 million of which $1 million accrues as wage income (Clarke, 1993). There are now well over fifty Inuit operating recreational lodges from the coast of Labrador to Baffin Island. These lodges are now successfully incorporating ecotourism to complement recreational activities.

4.0 Northern Commercial Fisheries

4.1 The Fisheries

Although the Inuit have a long history of utilizing marine resources, they are relative newcomers to participation in commercial fishery operations. With the notable exceptions of the Great Slave Lake whitefish fishery, the char fisheries of Nunavut, and some activity with commercial salmon and cod stocks off Labrador, most commercial participation began only in the late 1980s. There are three main marine fisheries that represent both modern adaptation and progress for the Inuit, namely the inshore Cumberland Sound Greenland halibut fishery, the offshore Davis Strait Greenland halibut fishery and the offshore northern shrimp fishery. There have been some innovative initiatives to boost the commercial fishery activity and native people's participation in them as demonstrated by the Cumberland Sound Greenland halibut inshore fishery, which is prosecuted through the sea ice using underwater kites and longlines at Pangnirtung, NT (GNWT, 1997).

The Government of Canada considers offshore fisheries Atlantic although they occur in northern waters. In the Arctic region there is significant resource growth in Greenland halibut and northern shrimp. Greenland halibut stocks represent an economic opportunity as a result of their close proximity to Nunavut and their abundance resulting

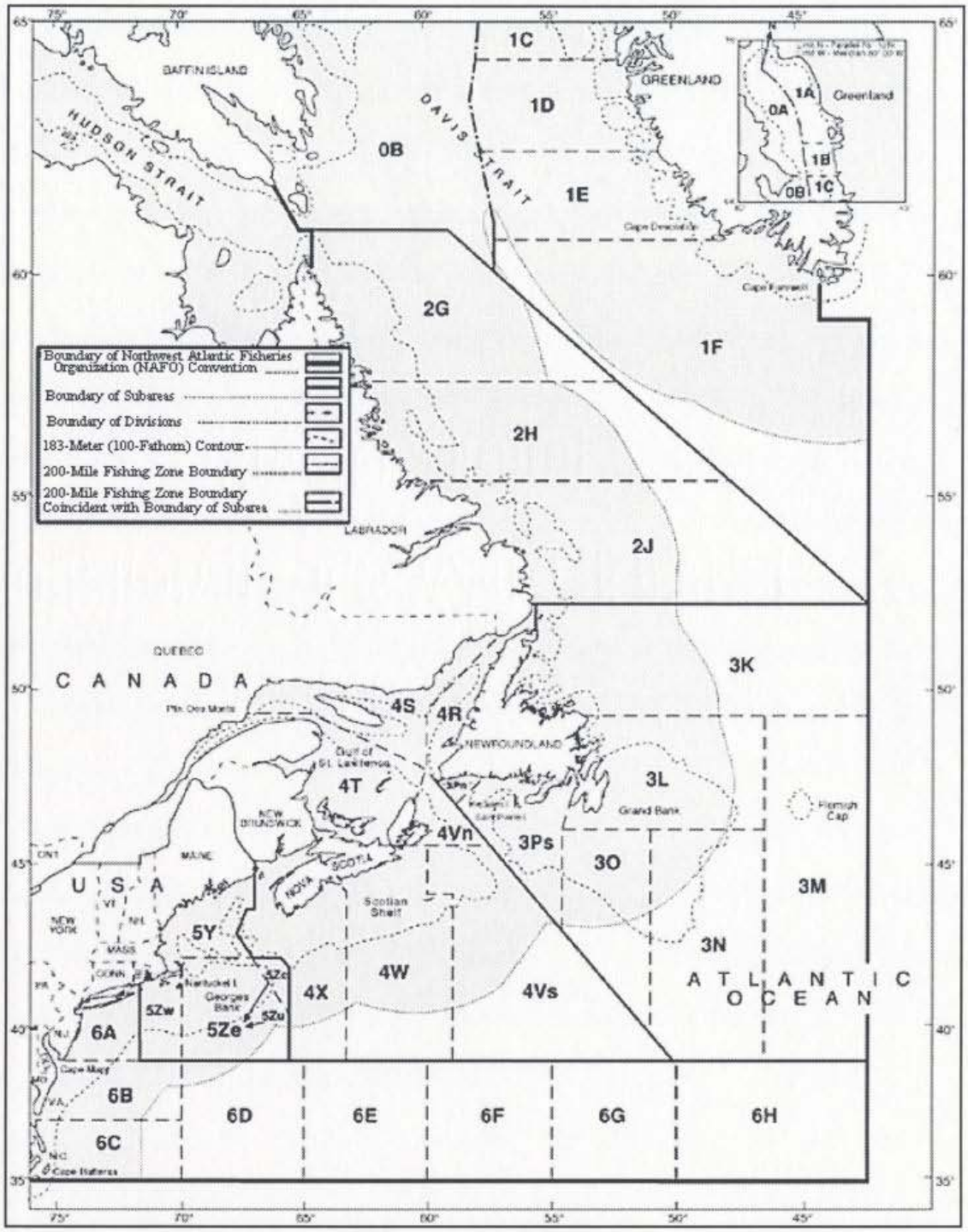

Figure 1: **NAFO Division Areas Map** (Adapted from Morgan and Bowering, 1997).

in increased DFO quota allocations to Nunavut. Therefore, this paper will examine all aspects of this species to fully assess the resource development possibilities for the territory. While Greenland halibut ranks first in future potential, it is the northern shrimp fishery that has consistently provided income and opportunity to Nunavut interests for nearly twenty years. The growing abundance of Northern shrimp over the last five years has also meant increased allocation to Nunavut especially in the northern areas. East coast business interests, however, represent stiff competition for any fishery expansion given that most of the stock biomass inhabits more southerly waters. Furthermore, the shrimp fishery has recently undergone considerable expansion in the waters off Newfoundland and Labrador. A large number of inshore harvesters have been granted access, and there have been offshore allocations to other east coast fishing interests. These renewable resources exhibit considerable spatial and managerial similarities and must be examined closely to fully ensure that resource and economic opportunities are fully achieved. The commercial fisheries for Greenland halibut and Northern shrimp are managed as straddling stocks by the Fisheries Commission of the North Atlantic Fisheries Organization (NAFO). Both resources are shared with Greenland in the north and with the European Union in the south (See Figure 1). A brief synopsis of each resource giving stock status and resource potential will assist in evaluating a comprehensive resource development strategy.

4.2 Greenland Halibut

4.2.1. History and Management

The Greenland halibut (*Reinhardtius hippoglossoides*) is a deep water flatfish that thrives in the cold northern waters of both the Atlantic and Pacific Oceans. The species is widely distributed in the northwest Atlantic ranging from Smith Sound (78° N) southward to Georges Bank (42° N) and has sustained a commercial fishery since the mid 1800s (Morgan & Bowering 1998) . As a result of a wide distribution pattern, the Greenland halibut is known by a variety of names. To Americans it is known as the Greenland halibut, to eastern Canadians it is known as the Greenland turbot or "turbot," while many Europeans refer to it as the "blue" or "black" halibut. Commercial fisheries are prosecuted in both the Atlantic and the Pacific on all stocks with comparable landings being experienced in all fisheries (He, 1996).

While this species has a lengthy and varied history of commercial exploitation, it has recently risen to new economic prominence in the northwest Atlantic as a result of the decline of many other groundfish species. As a consequence, Greenland halibut supported the largest groundfish fishery in the northwest Atlantic throughout the 1990s. In Canada, moratoria on over 20 traditional groundfish species resulted in an increased prosecution of the Greenland halibut fishery. In a relatively short period of time Greenland halibut stocks traversed the spectrum of fisheries management, moving from underutilized status to one of excessive overexploitation. During the process, the

commercial importance of this resource has received national and international attention which culminated in an international fisheries incident between foreign fishing nations and Canada. As a result, the Greenland halibut fishery became the focus of increased scientific activity. Prior to the late 1980s, Greenland halibut fisheries in the NAFO regulatory area were prosecuted by foreign fishing nations.

The spatial distribution of this resource is not easily transferrable to national boundaries, therefore, the geographical boundaries devised by fisheries managers are for administrative purposes. As a result, Greenland halibut are subjected to regional, national, and international agendas that create a wide variety of pressures which complicate the management of this resource. Greenland halibut is especially important to Nunavut, since it is the only commercial fish stock inhabiting waters adjacent to its territory. In the northwestern Atlantic, Greenland halibut are especially abundant in the deep coastal fjords of West Greenland, off the continental shelf of Baffin Island and in the Ungava Bay area of Hudson Strait. They are also found at greater depths along the continental slope of Labrador, and in the deepwater bays of northeastern Newfoundland. Greenland halibut fishing in the Davis Strait is a relatively recent occurrence. Inuit fishermen began fishing in this area in 1986 and were the only Canadian fishermen to record Greenland halibut catches in the strait until 1990 when Canada instituted a "developmental" fishery. As a result of declining fish stocks in Atlantic Canada, new opportunities were being sought to replace declining groundfish catches in the region and

fishing for Greenland halibut filled the gap. Much of this new effort was conducted by foreign vessels especially from the former USSR.

Greenland halibut in the northwest Atlantic were considered to be one stock extending from the Davis Strait, south to the Grand Banks (Bowering, 1983). This stock is transboundary in nature, distributed in Canadian waters inside the 200-mile limit and in the adjacent NAFO regulatory area. As a result, the stock is managed by the Fisheries Commission of NAFO in concurrence with Canada, as the adjacent coastal state for the southern portion of the stock, and both Canada and Greenland for the most northerly stock components. This stock is further sub-divided into three units for management purposes. They are: NAFO Area OA-B + 1A-F, NAFO Area 2G-H + 3K-O and NAFO Area 4RST (Figure 1). It should be noted that a portion of the Greenland halibut stock, namely Division 1A (inshore), supports a substantial inshore fishery along the Greenland coast that is under the exclusive jurisdiction of Greenland (see Figure 1). Much of the known behaviour of Greenland halibut suggests a cyclical pattern of movement that transcends the boundaries of management areas. As such, the stock must be viewed in its entirety to fully understand the implications for a sustainable management system. Given the complexity of the distribution of this species and issues surrounding the allocation and management of the full Northwest Atlantic stock, this paper will concentrate on the northern sub-stock portions which are adjacent to Nunavut.

4.2.2 Biology and Life History

The Greenland halibut belongs to an order of flat, bilaterally symmetrical fish, the *Pleuronectiformes*, comprising some seven families and 117 species (Scott & Scott, 1988). The members of this order undergo an amazing transformation during the larval stage. They begin life swimming with the dorsal fin upwards, like any salmon or trout. Gradually one eye migrates across the top of the larva's skull to position itself close to the eye on the other side of the head. There are corresponding modifications to the skull bones, nerves and muscles. In addition, the eyeless side becomes flat while the eyed side grows slightly rounded. Then, the developing fish turns over and swims on its flat, eyeless side (Scott & Scott, 1988).

The Greenland halibut is somewhat unique among flatfish as the eye does not completely migrate to the other side of the head and the body is only moderately compressed on the blind side. It has a large head and mouth with strong teeth and lower jaw projecting. The fish is not perfectly symmetrical so that some members of the species, those smaller fish that tend to swim in the middle levels of the ocean rather than along the seabed, have been known to swim with the dorsal fin upwards (Scott & Scott, 1988). These special characteristics make the Greenland halibut unusually mobile, and the position of the left eye allows it a greater field of vision than is possessed by most flatfish (Bowering, 1993). This marine fish is similar to the Atlantic halibut, except it is much smaller, reaching a maximum size of 120 cm and a maximum weight of 25 kg.

The Greenland halibut is a voracious, bathypelagic predator, feeding on a great variety of organisms. The position of the left eye on top of the head and the elongated muscular body enable it to feed successfully off the bottom. Summer and autumn appear to be the seasons of heaviest feeding. Large fish in deep water eat larger prey than smaller fish in shallower water. Major species eaten include capelin, Atlantic cod, polar cod, young Greenland halibut, roundnose grenadier, barracudinas, redfishes, sand lance, crustaceans, especially northern shrimp, cephalopods (squid) and small amounts of many species of benthic invertebrates are also eaten (Alton et al., 1988).

Greenland halibut appear to have many predators. The Greenland shark is considered the most important predator, but white whales, narwhales and hooded and harp seals also prey upon them. Among the fishes, cod, salmon, and even Greenland halibut consume the young. Smidt (1969) noted a decline in Greenland halibut abundance in west Greenland waters at the same time cod stocks were increasing. He attributed this to predation on larval and early bottom stages of Greenland halibut (Alton et al., 1988). Similarly, Bowering (1983) has observed exceptionally good year-classes of Greenland halibut in the Labrador area coincident with a dramatic decline in abundance of cod off west Greenland.

The life history of the Greenland halibut, including aspects of reproduction and growth, presents unresolved problems, many of which have been discussed in a study by

Bowering (1983). He studied age and growth from seven regions off the Canadian east coast from the Gulf of St. Lawrence and the Grand Bank in the south, and northward to Baffin Bank. Age composition varied in all regions but older fish were more abundant in northern deep waters. Large numbers of young were found in the Baffin Bank region, suggesting it may be a nursery area.

Greenland halibut is a relatively slow growing species. In general, males and females grow at about the same rate for the first 5-7 years, until reaching a length of about 45 cm, but the age and size varies for each region. From then on females grow faster and live longer than males. The reason is that much of the energy previously used for body growth by the early maturing males is directed to reproduction. On the northern Grand Bank, 5-year-old Greenland halibut average about 40 cm long, 8-year-olds about 50 cm, 10-year-old females 70 cm, and 10-year-old males 60 cm. Males attain a maximum length and age of 70-80 cm and 12-14 years respectively, but all fish over 90 cm in length are females. A study records females off Labrador and northward to lengths of 110 cm and 19 years old, but large older fish are difficult to age with 20 years considered to be the maximum life span (Lear, 1970).

Spawning is believed to occur in Davis Strait in winter or early spring at depths of 650-1000 metres depending on location. North of the Baffin-Greenland Rise in Davis Strait spawning probably occurs in depths approaching 1,000 metres at temperatures of 0° C or

less. Potential spawners are considered to move or migrate northward to the Davis Strait region to reproduce, but do not appear to make a return journey (Bowering et al., 1994). Studies have confirmed the Davis Strait winter spawning location, however, spawning appears to be concentrated further south at about 67°N at depths of 1200 metres or more (Bowering et al., 1995). More recent studies have indicated that spawning Greenland halibut may be captured at various times of the year along the continental slope from the Davis Strait to the Flemish Pass (Morgan & Bowering, 1997).

The eggs, as many as 160,000 from a single fish, drift in the middle depths for some weeks, later rising into the surface waters in the form of larvae. In Davis Strait, they are largely carried northward by currents along the west coast of Greenland and into the northern part of Davis Strait in the region of Disko Bay. There, the current turns southward, and some larvae are taken as far as the continental banks off Baffin Island. Greenland halibut have a low reproductive rate compared to other deep water species. Vast shallow areas northwest, west and southwest of Disko Bay are important nursery grounds where larvae develop at the depths down to 250 metres. From here, the young fish are believed to drift with the current southward to the continental shelf and slopes of Labrador and Newfoundland (Bowering, 1984).

Greenland halibut is a deepwater species occurring on the bottom at temperatures of 0.5° C to about 6.0° C; but is usually more abundant at temperatures of 2 to 5° C. Such

temperatures may occur year round at considerable depths or higher latitudes. In the northwest Atlantic, off northern Newfoundland - southern Labrador, Greenland halibut are usually taken in depths in excess of 400 metres. Total depth range is 200-1600 metres with larger fish usually caught at the greatest depths. Tagging experiments have shown that Greenland halibut may move considerable distances. Some tagged off White Bay, Newfoundland, were recaptured off northern Labrador, Baffin Island, and west Greenland (Bowering, 1983).

The presence of northern shrimp as a food source is found to be related to the distribution of Greenland halibut. Bowering and Chumakov (1989) found both species occurred in highest abundance in northern areas that previously coincided with reported areas of high abundance of northern shrimp. A sampling of Greenland halibut stomach contents in NAFO Division 1 has shown that northern shrimp was the dominant crustacean prey item (Boje, 1991). In more southerly locations along the coast of Newfoundland, capelin is the main prey item, and Greenland halibut distribution coincides with high capelin abundance (Bowering and Chumakov, 1989).

It is suggested that decreasing catch rates of Greenland halibut below depths of 1,000 m was due to decreasing water temperatures. Bowering et al., (1994) suggested that as abundance of Greenland halibut began to decrease in area 2J followed by decreases in area 3K in the late 1980s, abundance began to increase along the Flemish Pass and that a

mass southerly migration may be the explanatory factor. It is, however, unclear whether these observed differences are a result of a more southern distribution of the stock due to colder than normal oceanographic conditions or whether the increase in the volume of data available and the ability to collect data at greater depths in recent years have contributed to a better understanding of normal behaviour patterns (Bowering & Nedreaas, 2000). It is clear that Greenland halibut spawn in much greater depths than previously observed and exhibit a south to north migration pattern to deeper waters with maturity (Morgan & Bowering, 1996). Recent stock assessments suggest that geographic distribution patterns may be returning to those observed before the southward shift in distribution (Bowering & Nedreaas, 2000).

Bowering et al., (1994) observed a seasonal migration of Greenland halibut between spawning areas and feeding areas in both the Davis Strait and the Gulf of St. Lawrence. Bowering (1984) describes the two types of migrations as a spiral like combination of a gradual northward movement with seasonal feeding and (for larger fish) spawning migrations between shallow and deep water. Bowering and Chumakou (1989) found a similar increase in size distribution off eastern Canada when moving progressively northward from Division 3K in the south to Sub-area 0 in the north, and they also found that larger fish dominated the catches in deeper waters. This type of seasonal movement by Greenland halibut is observed elsewhere. In Sub-area 0, near what is assumed to be the spawning area, Bowering and Chumakov (1989) found the main abundance at depths

between 750 and 1000 m in summer and beyond 1,000 m in autumn/winter surveys, indicating a spawning and feeding migration pattern very similar to that found off west Greenland. Based on the distribution maps it can be concluded that Greenland halibut in the eastern and western Davis Strait are part of the same population (Jorgensen, 1993).

4.2.3 Stock Status, Harvest and Management

The most northerly portion of Greenland halibut stocks constituted an important harvest for Greenlanders from the mid-1800s until the 1930s when milder climates resulted in a large influx of cod and associated decline in Greenland halibut. By 1935 the fishery had completely failed, apparently because of the pressures of numerous cod as predators, as well as competitors (Bowering, 1983).

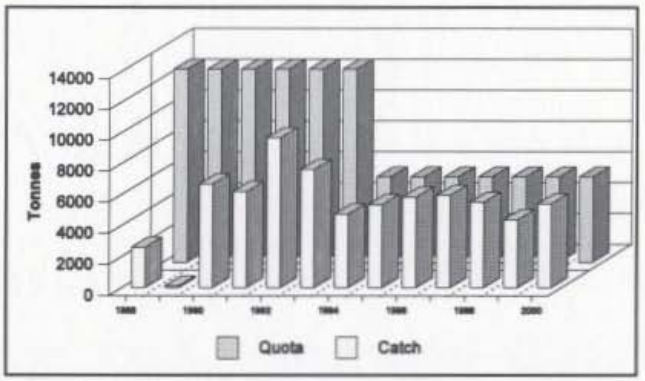

Figure 2: Division OB Canadian Quota and Catch

(Adapted from DFO Statistics, 2001).

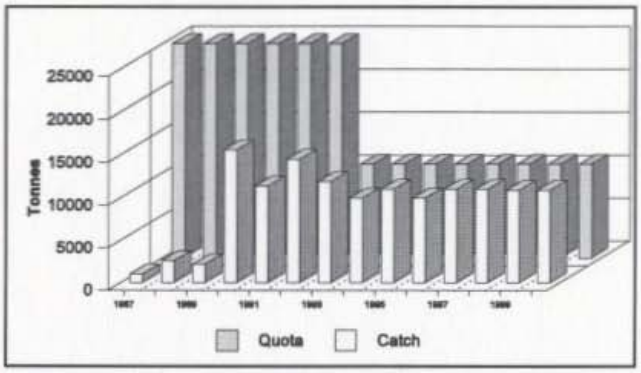

Figure 3: NAFO Catches and Quota Division OB -1B-F

(Adapted from NAFO Science, 2001)

Following an almost 20 year absence, harvest again improved to warrant a fishery during the 1950s with the main exploiters being Denmark and the USSR (Division OB). The traditional Greenland fishery was prosecuted in the fjords and on near shore banks, primarily in the north (Division 1A). During the 1970s landings of Greenland halibut from this area (Div. 1A) fluctuated greatly. In 1975, over 25,000 metric tonnes were landed and only four years later in 1979 total catches amounted to only 12,000 metric tonnes (Bowering, 1983). This area was susceptible to foreign catch following the declaration of the 200 mile limit until 1992 when foreign catches were phased out. Through the 1980s the average catch continued to fluctuate annually, of which approximately 50 percent constituted Canadian fishing harvest (See Figure 2). In the 1990s this area witnessed a considerable increase in catch mainly in Division OB due to a new otter trawl fishery. Catches increased abruptly from 2,000 tonnes in 1989 to 16,000 tonnes in 1990 and have remained above 10,000 tonnes annually since (See Figure 3) (NAFO, 2001). The total allowable catch during this period was consistently set at 25,000 tonnes and remained at this level until 1995 when it was substantially reduced to 11,000 metric tonnes and since then the inshore areas of NAFO Division 1A have been excluded from this management zone (Bowering & Nedreaas, 2000). Combined standardized catch rates from Div. OB + Div. 1CD have been stable during 1990-99 (NAFO, 2001) and the age composition in the catches in Div. OB and 1B-F, where most of the fishery takes place, have been stable in recent years (See Figure 4) (NAFO, 2001). There is, however, a considerable lack of time series data. Furthermore, biomass and

recruitment estimates are unclear and recommendations for a status quo total allowable catch (TAC) by the Fisheries Commission of NAFO seems prudent. While the catch per unit and size compositions have remained unchanged, the offshore fisheries in this region are concentrated in relatively small areas and are targeting fish on spawning areas and are, therefore, targeting mature fish which are aggregated for this purpose.

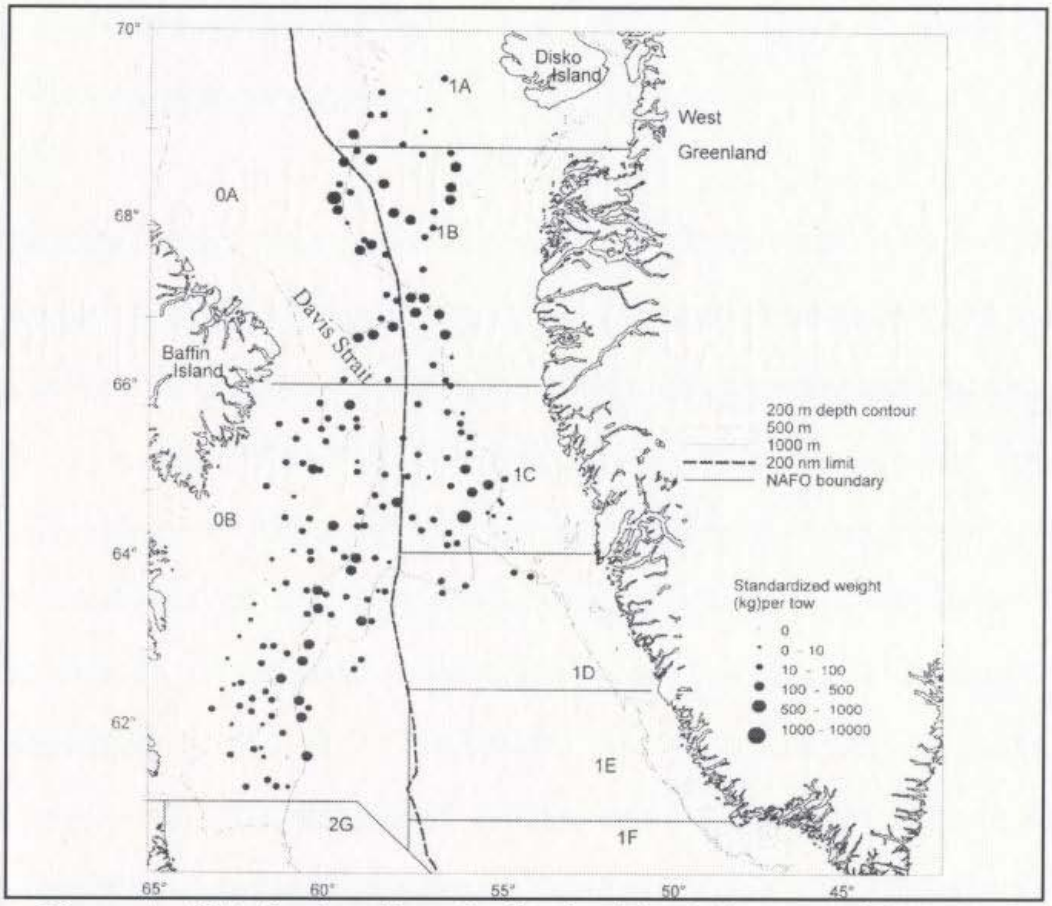

Figure 4: Distribution of standardized weight (kg) per set of Greenland halibut, NAFO Subareas 0 and 1, 1986. (Bowering and Nedreaas, 2000)

Changes in the commercial fishery have changed the relative age distributions of catches. Age 7 is still the most dominant year class in overall catches, but due to increases in longline and gillnet fishing harvest, there has been a tendency to capture larger older fish compared to previous years. However, catch rate series are incomplete and it is difficult to determine overall trends (NAFO, 1997). Older and larger fish are usually more successful at spawning and may have contributed more to the population in previous years. Furthermore, Greenland halibut are known to have a relatively low reproductive rate which may seriously impact stock sustainability in this area.

Overall, stock status for Greenland halibut in northern areas appears to be stable with limited growth potential. Available information suggests that current harvest levels could be maintained given many positive indicators of rebuilding. However, Subarea 1A (inshore Greenland) has been recently removed from the management Division. This Subarea represents significant fishing effort, so it should be carefully monitored. In Division OA & 1A (offshore) there has been no assigned fishing effort and little about the relationship between these areas and others. In subarea 1A (inshore) there is currently unrestricted fishing effort, yet it has comprised most of the catch in NAFO Subareas O and 1 in recent years (Jorgensen 1998). A recent survey was conducted in Division OA which resulted in a new biomass estimate of 83,000 tonnes. As a result, the Fisheries Commission has suggested that an additional TAC be implemented for the offshore areas of Div. OA and 1A that would generate a low fishing mortality (NAFO, 2001). As a

consequence of this advice, a TAC of 4,000 tonnes was established for NAFO Area OA. This quota was reserved exclusively for Nunavut interests under the principles of adjacency and priority access for Aboriginal groups.

The Fisheries Resource Conservation Council of Canada (FRCC) has expressed serious concerns regarding both the lack of information available for assessment of this stock, as well as the consistency of effort expended by both Canada and Greenland. Further caution regarding the closure of spawning and nursery areas, by-catch, and other fishing practises was also expressed. In 1998, the FRCC indicated that while harvest levels appear constant, the council considered the TAC for this stock excessive in view of biomass estimates. It would appear that total allowable catches established by the Fisheries Commission of NAFO closely reflect maximum fishing effort in the area. The TAC is certainly not indicative of any "precautionary approach" given so many crucial unknown variables. To sustain fishing activity at any level it is imperative that both Canada and Greenland reach consensus and employ a more rational fisheries management framework. The FRCC's last recommendation with respect to this stock was to advised that the TAC be set below 11,000 tonnes (FRCC, 1998). It is notable that as a result of the NAFO mandate for Greenland halibut, the FRCC no longer advises DFO on the Canadian position for NAFO or makes recommendations on this stock. The Canadian Fisheries Minister has the sole authority to decide how to distribute the TAC among user groups.

4.2.4 Inshore Greenland Halibut Fishery

Greenland halibut fishing in Cumberland Sound began in 1986 when local Inuit from Pangnirtung adapted a longline ice fishing method practised by Greenland fishermen. This fishery is conducted approximately 60 miles from Pangnirtung using snowmobiles and longlines and has made significant contributions to the community. In 1995, the fishery landed 160 tonnes of Greenland halibut worth $336K which provided 130 local seasonal jobs and total personal incomes of $250K (GNWT, 1996). However, in 1996 there was virtually no inshore fishery as a result of poor ice conditions which prevented access to the resource. The poor catch from 1996 fishing season is a good example of the vulnerability of an inshore fishery in the face of difficult and unpredictable environmental factors. In 1997 this fishery produced approximately 180 tonnes of turbot and has greatly enhanced the economic position of the local people. In many instances, this fishery can transfer any unharvested quota to the offshore following the deterioration of ice conditions in late spring. The fish can then be landed for processing at the Pangnirtung plant to provide seasonal local employment. This arrangement has been explored in recent years. While limited by seasonal output, lack of infrastructure, and excessive transportation costs of bringing product to market, this fishery has been a success. Further evaluation as to whether other communities can duplicate this success depends on the availability of Greenland halibut, good ice conditions and strong community interest in developing a fishery. This fishery will be hampered by environmental variables on an ongoing basis. Nonetheless, it may continue to supplement the incomes of an

employment challenged population and contribute to the development of skills necessary for commercial fishery participation. Inuit fishermen may endeavour to duplicate Atlantic inshore fisheries operations by employing smaller fishing vessels (<20 metres) to harvest their quotas and increase their fishing abilities. At present the Inuit are in the awkward position of holding substantial fishery allocation without the licences that provides access to fish independently. This critical issue will be given closer examination later.

4.2.5 Offshore Greenland Halibut Fishery

In NAFO Division OB the TAC is set at 11,000 metric tonnes which is divided equally between Greenland and Canada at 5,500 tonnes each. Under the principle of adjacency and native allocation priority, a portion of this stock has been assigned to Inuit organizations from Baffin Island to Labrador as well as Newfoundland interests. Nunavut receives 27 percent or 1,500 tonnes which is divided between inshore (500 tonnes) and offshore (1,000 tonnes) interests. This quota has been traditionally fished under joint venture arrangements with companies from Atlantic Canada. These are highly mechanized and capital intensive fishing operations that employ ice strengthened factory freezer trawlers that process and package the catch into a semi-processed product onboard. In the mid-1990s a nominal number of smaller gillnetters's (<20 metres) increased their participation in this fishery in the Davis Strait area and now serve as an alternative to the larger factory freezer trawlers for harvesting of the resource. These

vessels are limited to a very short season given the northern climate and have been plagued by product quality problems. When equipped with freezing capacity these vessels have preformed very well in a shortened fishing season.

Inuit participation in this fishery consists of a fee for quota arrangement with the vessel operators including a small number of Inuit employment positions onboard the vessels. In 1996 the Baffin offshore Greenland halibut fishery (Nunavut) harvested 1.5 million kgs of Greenland halibut worth $2.64 million and employed three fishermen, earning $49,500 (GNWT, 1996). Because this fishery is relatively new, benefits to the Inuit are meagre compared to the total value of the fishery. Fees paid to Inuit quota holders usually are in the neighbourhood of 10 percent of the landed value of the catch. With the small quota allotments that were assigned to Nunavut in Division OB in the 1990s (that were then divided into inshore and offshore parcels) they remained a small player in a lucrative and adjacent resource. Inuit groups are dissatisfied with their portion of the TAC and have voiced considerable displeasure (Government of Nunavut, 2001) .

In the view of the Nunavut Wildlife Management Board (NWMB) even though the Greenland halibut fishery is directly adjacent to the Baffin Island, 73 percent of the total Canadian TAC for this fishery is currently allocated to fishermen from southern Canada which is a glaring anomaly to the application of the adjacency principle (Library of Parliament, 1998). As a result of the recent additional Division OA quota allocation

(4,000 tonnes), the Nunavut allocation has improved considerably in the offshore Greenland halibut fishery. At an industry average of $4,000 per ton of landed product, Nunavut now has an allocation of Greenland halibut valued at more than $22 million. (M. Allaird, Seaku Fisheries. pers. comm. May 8th , 2001). While this quota represents a considerable opportunity, it is important to note that Nunavut interests currently do not hold any fishing licences and as a consequence are severely limited in harvesting possibilities as a result of this lack of access to the resource. To effectively harvest this species requires enormous capital investment, expertise, and intensive training, much of which is currently lacking with Inuit groups.

Access to any fisheries resource will always involve competition between user groups. In the offshore Greenland halibut fishery the acute learning curve being experienced by Inuit at present does not detract from the potential of this resource. If the Inuit are able to secure an ongoing portion of Greenland halibut allocation and permanent licenses, harvesting employment and other benefits will increase dramatically.

4.3 Northern Shrimp

4.3.1 History and Management

Northern shrimp *(Pandalus borealis)*, also commonly known as pink shrimp, are found in the cold boreal waters of both the Atlantic and Pacific Oceans. The species is widely distributed in the northwest Atlantic ranging from the Davis Strait to the Gulf of Maine.

The Northern shrimp, is the most commercially important of over 30 shrimp species found in the northwest Atlantic (Anon., 1985). A closely related species, the striped shrimp, *(Pandalus montagui)*, occurs as a bycatch in the northern shrimp fishery and is occasionally fished commercially in the Hudson Strait and Ungava Bay areas. Both are referred to as northern shrimp commercially but are known also by the common names pink and striped shrimp respectively (MacDonald & Collins, 1990).

In the northwest Atlantic the offshore fishery for northern shrimp has been prosecuted from the Davis Strait to the Flemish Cap since the late 1970s. Although separate stocks of shrimp have not been clearly defined, scientist have observed differences in the growth rates and maturation, which are attributable to different habitat conditions across the geographic range of the species (DFO, 1997). These differences provide the present basis for delineating assessment and management units, referred to as Shrimp Fishing Areas (SFAs). The shrimp fishery in the northwest Atlantic has seven management areas with separate TACs. These area TACs are then divided into Enterprise Allocations (EAs). The individual fishing areas vary considerably in their contribution to the commercial fishery. In recent years, the more southerly areas (SFAs 4, 5& 6) have accounted for over 75 percent of the total Canadian TAC (DFO, 1997).

This fishery began as an experimental venture in 1977 and within two years had demonstrated the potential for commercial feasibility by achieving catch rates exceeding

eight tonnes per day (MacDonald & Collins 1990). Application for entrance to this fishery was sought by many interested parties and the Government of Canada responded by issuing 11 licenses in 1978. Early results were encouraging, but generally weak markets in the early 1980s resulted in a decline in landings (DFO, 1997). By 1986 market conditions had improved, and a noticeable decline in groundfish stock landings had increased the requests for entrance into the shrimp fishery. Landings increased rapidly during the mid-1980s, reaching 28,000 tonnes in 1990 and continued to increase steadily reaching 30,000 tonnes in 1995 (DFO, 1998). Ice strengthened factory freezer vessels required for the shrimp fishery did not exist in Canada, therefore, initial prosecution of northern shrimp was undertaken by mainly foreign flag vessels under joint venture arrangements with licensees (MacDonald and Collins, 1990). Some of these arrangements have persisted and it is only recently that the industry has claimed to have achieved complete Canadianization within the Canadian Exclusive Economic Zone (EEZ). Throughout the 1990s this resource has continued to grow at an incredible pace. As the fishery has grown, the requests to participate in the fishery have also grown. Currently, there are 17 offshore license holders, a number of temporary community allocations and some 400 new

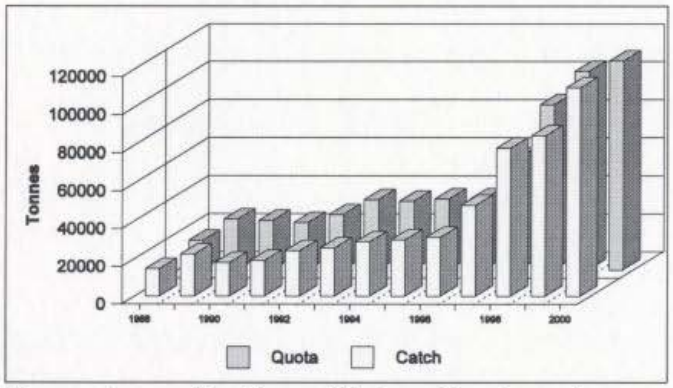

Figure 5: **Northern Shrimp Quota and Catches, 1988-2000**
(Adapted from DFO Statistics 2001)

inshore entrants have been added since 1997 (DFO, 1997). By 2001 quotas and catches had almost doubled over a five year period (See Figure 5).

Nunavut interests were allocated one licence in 1987, which was later increased to one and a half and they have been joint venture participants in this fishery for nearly fifteen years. These licences are of considerable value to the Inuit of the Baffin Island region, in both income and employment. For example, the total annual income for all Inuit participants is estimated to be in the range of $4 million (QC, 1999). In addition, the fees paid for quota allocations have become an important source of funds for northern development (Northern Shrimp Management Plan (NSMP), 1997). Formulas to determine the rate of service fee paid by southern companies for harvesting rights vary, but are normally based on a combination of fee per ton and number of employment positions on board the vessel. The estimated industry standard for fee rates are usually in the range of $300-$500 Canadian dollars per ton and there are between six to ten factory worker positions per trip for northern partners. Currently, the average market value of landed product per ton is estimated between $3,500 and $4,500 for southern enterprises (P. Keenainak, Qikiqtaaluk Corporation Pers. Comm. May 9th ,2001).

4.3.2 Biology and Life History

The northern shrimp belongs to a class of invertebrates known as crustaceans, which includes lobster and crab. They possess a hard outer shell, have jointed legs and respire

through gills (DFO, 1985). They are pale scarlet in colouration, and possess a shell covering the head and thorax also known as the carapace and a shell also covers the abdomen. The carapace can attain lengths of 15 to 16 cm (Scott & Scott, 1988). Northern shrimp are good swimmers and can move with remarkable agility, both horizontally and vertically, over considerable distances. Sudden flexing of the tail allows for rapid movement over short distances as an emergency escape mechanism (DFO, 1985).

Northern shrimp filter feed on the bottom on marine plants and small crustacea during daytime and migrate vertically in the water column at night, feeding mainly on copepods. Shrimp themselves, serve as food for many species of fish, especially Greenland halibut and Atlantic cod (DFO, 1985).

Northern shrimp are protandric hermaphrodites, that is, they mature first as males, and function as males from one to several years and then change sex (usually in the fourth year) to spend the rest of their lives as females (DFO, 1997). They are known to live for more than eight years in some areas and populations in the northern part of the range exhibit slower rates of growth and maturation, but increased longevity typically results in a larger maximum size (DFO, 1997). Growth cycles occur during periodic moulting of the shell, a process that makes them highly vulnerable to predators. In eastern Canadian waters, shrimp eggs are extruded during late summer and early fall and remain attached to the female until the following spring. An average female carries approximately 1,700

eggs and may spawn in one or more successive years. The eggs hatch as larvae and float at the surface where they feed on small plankton before they descend to the bottom as juveniles, a miniature form of the adult (DFO, 1985).

Northern shrimp are distributed along the slopes of the continental shelf ranging from NAFO Divisions OA in the north to 3L in the south in water depths ranging between 150-400 metres. They tend to concentrate in water temperatures between 2 and 6°C and in some areas temperature requirements restrict their distribution to greater depths. There is also a relationship between size and depth with larger individuals preferring deeper water and areas where the bottom is soft and muddy (MacDonald & Collins,1990). Northern shrimp exhibit both horizontal and vertical migration patterns. Vertical migration occurs on a daily basis. Shrimp tend to leave the ocean floor at night and move upward in the water column in search of food (DFO,1997). Horizontal migrations are apparently seasonal and occur when egg-bearing females migrate to shallower water for spawning purposes (DFO, 1985). There has been some observed changes in stock abundance and distribution in a southerly direction in recent years. An increased abundance in SFA 6, has been attributed to a lack of predators and ideal oceanographic conditions for shrimp larvae survival and may be unrelated to normal migratory behaviour.

4.3.3 Stock Status

This stock is transboundary in nature and is similar to Greenland halibut in both management and scientific advice structures. Canada and Greenland jointly manage the most northern portions of the stock in SFA1 (See Figure 6) under a long-term sharing arrangement of 17 percent and 83 percent respectively of the total NAFO quota. The Scientific Council of NAFO conducts annual assessments (DFO, 1997). As well, SFA 7 which is located entirely

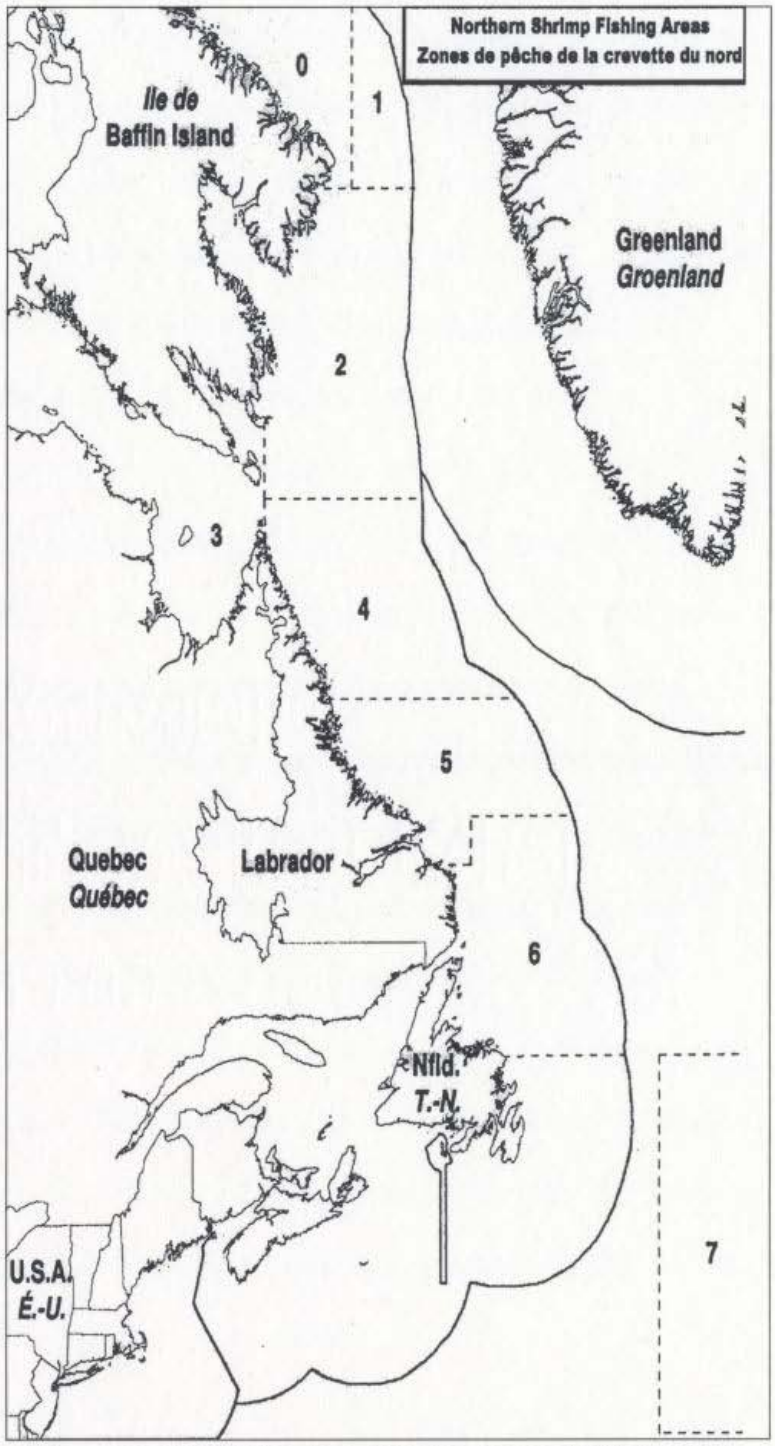

Figure 6: NAFO Shrimp Fishing Areas (DFO, 1997)

outside Canada's EEZ, is managed by NAFO and has been a subject of much consternation given the propensity for overfishing in this area. This fishery differs from the Greenland halibut fishery in that much of the fishing activity occurs in more southerly waters that are adjacent to Newfoundland and Labrador. A review of overall stock status, with emphasis on the development interests of Nunavut will be sufficient for this document. Similar to the Greenland halibut stock, the status of northern shrimp in adjacent waters and overall health of the stock are the most relevant factors.

In the north, fishing activity in Canadian territory is relatively small. However, the eastern portion of the Davis Strait represents a significant fishery along the coast of Greenland. In 2000, NAFO Scientific Council advised that recruitment and survey biomass were the highest observed in recent years and that the stock could sustain a catch of 85,000 tonnes in 2001 (Northwest Atlantic Fisheries Organization (NAFO) 2002). In the Canadian north, SFA 0 is hampered by extreme environmental conditions and has attracted little fishing effort from the Canadian fleet. Fishing effort is conducted competitively in this area. Similarly, SFA 1 has not performed well in recent years with the average catch over the period 1994 to 1999 being less than 30 percent of the TAC (DFO, 2002). There is a small precautionary quota of 500 tonnes annually. Given the harsh environmental conditions and limited Canadian access, resource potential is positive but limited in scope.

Farther south, SFA 2 has experienced continuous growth throughout the 1990s. Effort increased from less than 500 tonnes in 1994 to more than 5000 tonnes in 1997 and remained at this level during 2000 (Orr et al, 2001). This area supports a mixed fishery for both pink and striped shrimp which confounds stock assessment. There have been no research trawl surveys conducted in this area, hence it is not possible to estimate stock size or structure. It is believed that the resource could continue to develop with opportunities for further expansion (DFO:, 2001). The fishery in SFA 3 is directed almost exclusively toward striped shrimp and is sporadic because of the lower value of the species. No assessment was preformed here (DFO, 1997). A quota of 1,200 tonnes, 500 tonnes of which is reserved for Nunavut, is in effect in SFA 3. In SFA 4, catches have also risen dramatically in the past decade from 2,600 tonnes in 1994 to 8,000 tonnes in 1999 and remain constant to date. No surveys have been conducted and although the spawning stock appears healthy the current status remains uncertain (NAFO:, 2001). In SFA 5, similar results are being experienced. Catches have increased dramatically from 6,000 tonnes in 1993 to 15,000 tonnes in 2000 (DFO:, 2001). In SFAs 2, 4, and 5 catches have closely matched quotas on an annual basis.

Stock assessment surveys have been conducted in SFA 6 and reliable indices of distribution, abundance, and biomass have been obtained each year from 1995 to 2000 (Orr et al., 2001). These surveys indicate that shrimp biomass and abundance have been at high levels since the mid-1990s with strong year classes in 1997 and 1998 (DFO:,

2001). Catches have increased from approximately 21,200 tonnes in 1997 to 46,300 in 1998. Despite the large increase in catch, relative exploitation remained low (Orr et al., 2001). In 1999, the TAC was increased 27 percent and in 2000 the TAC was further increased by four percent to 60,908 tonnes. Preliminary data indicates that about 63,000 tonnes were taken(Orr et al.2001). Results from the 2000 Fall multispecies research survey showed that shrimp continue to be widely distributed, with biomass and abundance estimates the highest in the series. It would appear that the survey results from SFA 6 have been used as a conservative baseline for resource status estimates in more northern areas. Shrimp stocks are at an all time high and represent considerable opportunity for all stakeholders.

This fishery has progressed at an extraordinary rate with the addition of new entrants under temporary access permits and an increased effort from the traditional offshore fleet. In 1997, total Canadian quotas were increased to 59,000 tonnes and have continued to rise, reaching 110,000 tonnes in 2000 and are projected to remain at this level for some time (DFO, 2001) (See Figure 7). Despite the large increase in catch, relative exploitation has remained low and catch per unit of effort has increased with an overall decline in fishing effort being experienced (Orr et al,2001).

With the exception of the operational start up pains experienced in 1997 by the inshore sector (temporary access permits), quota allotments have been attained each year in

southern areas (SFAs 4,5 and 6) by all enterprises. In 2000, the inshore sector caught approximately one third or 20,000 tonnes of the quota in SFA 6 and does not have any allocation in other SFAs. It is important to acknowledge the temporary nature of additional participants should any fishery contraction occur. Nunavut does not, at present hold any access to participate in the inshore sector, therefore, though the status of this fleet represents

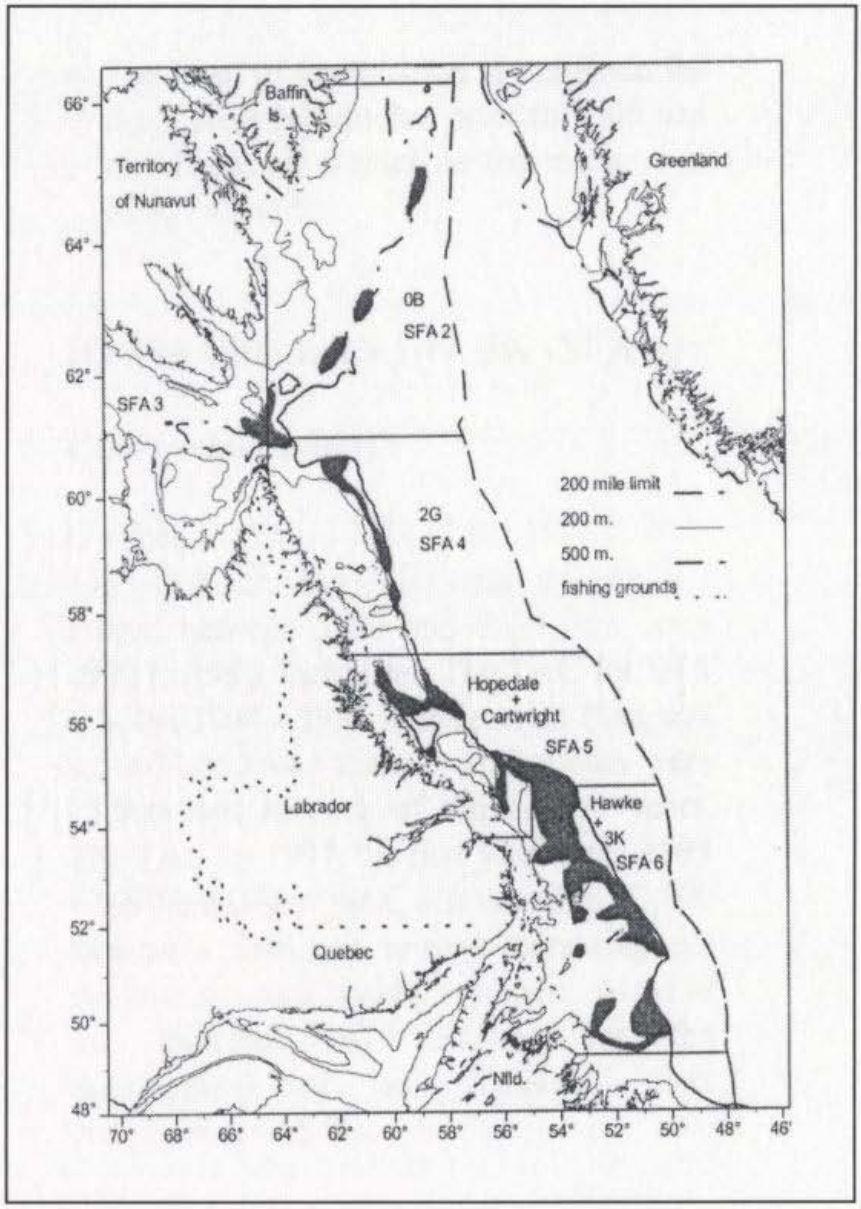

Figure 7: Distribution of Shrimp Catches SFA 1-6
(DFO, 2001)

significant opportunity no further analysis will be attempted in this report. Perhaps, more relevant to the position of Nunavut is the allocation of northern shrimp that has been acquired by special interest groups from Atlantic Canada. The entrance into the offshore sector of a consortium from Prince Edward Island signifies a lack of adherence to the adjacency principle, which could have a negative competitive impact for Nunavut.

4.3.4 Offshore Northern Shrimp Fishery

The Canadian shrimp industry is well established and considered one of the best managed fisheries in Canada. Following the successful development of this fishery in the mid-1980s a number of licenses were issued to Inuit groups from the Labrador coast to Baffin Island. Entry into this fishery is both severely limited and extremely lucrative. This fishery is a $160 million industry that is operated under just 17 licenses with a TAC of 40,000 tonnes of northern shrimp (DFO, 1998). Five of the 17 licenses are held by Inuit groups from Labrador, Quebec, and the Baffin region (The Northern Coalition) representing approximately 14 percent of the Canadian resource. These licenses are utilized under joint venture arrangements with large fishing companies operating FFTs. There are approximately 12 vessels operating in this fishery and due to vessel efficiency it is common practice to operate 1.5 to two licenses per vessel. Many of these vessels are capable of converting to groundfish and can harvest Greenland halibut on a temporary basis. With increased catch rates many of the operators can harvest their quotas in a relatively short period of time and use the remaining portion of the year to direct for

Greenland halibut. Based on the existing harvesting capacity of these 12 vessels, the current quota levels for northern shrimp can be fully harvested without adding capacity.

Inuit license holders have received profit sharing in the range of $400,000 - $500,000 per license each year. As well, an increasing number of Inuit have been trained to work in many levels of the fishery. Currently, approximately one third of all crews from vessels prosecuting native licenses are Inuit. There is no land based focal point to the northern shrimp fishery. These vessels stay at sea for an average trip duration of one month and produce a ready for market product. In addition, license holders have access to both adjacent waters and to more southern Canadian waters. This has allowed year-round fishing operations and the creation of full-time permanent jobs with an average annual salary of $50,000. Further opportunities are anticipated as participants achieve the experience and training needed to attain higher officer ranks. Currently, a number of Inuit fishermen have advanced to junior officer ranking and seem to have adapted well to the industrialized setting. An effort to formalize and document their progression would certainly enhance opportunities for advancement.

Northern shrimp and Greenland halibut stocks are stable and vibrant commercial entities that have positive prospects for the short and medium term. While Nunavut fishing interests have accrued substantial annual returns on their fisheries allocation in both these fisheries, there still exist considerable opportunity which has not been exploited. For a

more comprehensive view of the status of Nunavut fishing interests with respect to these opportunities, an understanding of the resource management framework employed by DFO as well as other influencing factors must be attempted.

5.0 Resource Management

5.1 Canadian Experience

5.1.1 Principles and Background

Resource management in Canada has undergone substantial change in recent decades and it is the act of change itself that has remained the only constant. In the 1970s the priority was to establish control over fisheries in Canadian waters and to extend fisheries management capabilities throughout the 200 mile exclusive economic zone. In the worldwide move from open access fisheries of the 1960s, Canada developed a fisheries management system that was designed to address the chronic problems of "boom and bust" typical of open access fisheries. This management system was top down in nature and based on the United Nations Food and Agriculture Organizations principles of fisheries management. These principles were structured to end open access and prevent overcapacity by limiting and categorizing access to fishery resources. In line with other nations, the traditional criteria used by DFO in determining access were as follows: adjacency, historical dependence, economic viability, and equity (DFO, 1997). The Minister of Fisheries had absolute discretion in issuing rights to harvest, under advice from his department and under the influence of the lobbying efforts by the various

stakeholders. These groups represent vastly different and often competitive objectives of economics, employment, and resource sustainability. Without clear objectives, this method of quota allocation prevented the progression of any meaningful industry rationalization.

The 1980s witnessed a considerable expansion of the capacity of industry to harvest the seemingly vast resources now under Canadian control and on developing systems to regulate the different fleet sectors and their interactions (Atlantic Fisheries Policy Review (AFPR), 2002). These were heady times for DFO personnel who were equipped with substantial science and management budgets and other resources.

The 1990s marked a dramatic departure from the expansionism of the 1980s. A new era and policy direction was shaped by the collapse of many of the traditional groundfish species which created a crisis of extraordinary proportions on the entire east coast. The inherent problems of overcapacity and overcapitalization of a common property resource were again recognized as being the root cause. To achieve resource sustainability, considerable effort was directed at industry rationalization in the form of more responsible harvesting practices and capacity reduction through the use of licence buy back schemes, retirement packages, and other programs.

The need to balance the effort directed against a resource with the amount of resource

available for harvest has become widely recognized as an important conservation requirement. In the 1990s available capacity in the Atlantic groundfish fisheries was far in excess of what was required to harvest the resource (up to 50 percent) and capacity reduction was one of the primary objectives of government programs (Fisheries Resource Conservation Council (FRCC), 1996). This is evidenced by the mandate of programs such as The Atlantic Groundfish Strategy (TAGS), The Harvesting Adjustment Board, and reports such as the Report on Incomes and Adjustments, sought some form of industry contraction. A reduction of capital investment was encouraged and subsidies discontinued.

The catastrophic failure of fisheries management and science highlighted inadequacies in the micro-management policy approach and created major policy shifts to a more decentralized and public process of management involving input into the decision making process from various stakeholders in a transparent environment. This led to the formation of the Fisheries Resource Conservation Council, a Minister's advisory board on fisheries status made up of industry stakeholders and members of the scientific community. It was established to advise on conservation issues, including science, research priorities, and the setting of TACs. The FRCC has a very open public input process and advocates a precautionary approach to resource management that puts conservation first and does so through the use of public forums and integrated management principals. This macro-management or ecosystem approach recognized that fishery problems consist of a

complex mixture of social, economic, and ecological issues. Solving problems will require an understanding of fish, humans, and their environment (FRCC, 1997). Therefore, all stakeholders must be involved in the decision making process and both the fishing activities and resource must be better understood. The integration of scientific expertise with the knowledge and experience of the industry led to a broader range of information being considered to set management objectives, particularly the traditional knowledge and experience of local user groups.

5.1.2 Changing Commercial Species

While the FRCC concerned itself solely with groundfish stocks, a changing ocean environment had produced ideal conditions for an unprecedented bloom in shellfish stocks on the Canada's east coast (FRCC, 1997). In 1980, shrimp and crab were relatively minor commercial species, together accounting for less than 10 percent of the total value of landings whereas in the year 2000, these two species accounted for 45 percent of total landings and combined with lobster and scallops accounted for 84 percent of total landed values (DFA, 2001). The lucrative nature of these fisheries again created pressure for access in Newfoundland especially, where major portions of the groundfish industry were left idle as a result of moratoria on traditional groundfish stocks. As a consequence, the number of licenced inshore shrimp harvesting enterprises expanded from 43 in 1996 to about 380 in 2001 (DFA, 2002). It is estimated that over $100

million dollars in new capital was invested in the Newfoundland fishery through the modernizing of vessels and the construction of shell fish processing facilities (DFO, 2002).

Given the opportunities that were available there was certainly no incentive for enterprises to leave the industry and many increased investment in vessels and equipment. These developments did not go unnoticed throughout the Atlantic region. The increase in shrimp abundance created intense lobbying on the federal government from interest groups from the entire Maritime region. In DFO's 1997 Integrated Management Plan for Northern Shrimp (NSMP), quotas were set at 59,000 tonnes, nearly double the TAC set just five years earlier. As well, temporary access was granted to a number of new user groups in both the inshore and offshore sectors (DFO, 1997).

Industry expansion has continued for the last several years and has sparked intense public debate and heated conflict over how the principles of fisheries management were applied. Particularly upsetting to Newfoundland stakeholders was an allocation of 1,500 tonnes of quota to a consortium from Prince Edward Island, which defied all traditional resource access criteria. This group has not demonstrated historical attachment, economic dependence, or adjacent coastline, and furthermore, lacked any harvesting capabilities.

5.1.2 Policy Directions

In 1997, a standing committee on Fisheries and Oceans was formed to investigate fisheries resource conflicts. This non-partisan committee of parliamentarians, travelled to the regional areas and held public forums to gather public opinion on fisheries issues and the decision making process. These sessions were particularly well attended and volatile in both Nunavut and Newfoundland. Attendees highlighted concerns that were documented and carried to the government in regional reports. The continued conflicts and instabilities have served to further the development of a more formalized co-management fisheries system. The co-management approach is emphasised in the promulgation of the Oceans Act with its emphasis on integrated management, public participation, and resource sustainability (AFPR, 2002). The evolution of fisheries policy towards co-management is an ongoing process that continues to gain momentum.

Currently, DFO is engaged in a complete policy review called the Atlantic Fisheries Policy Review (AFPR) with a broad mandate to develop a clear and consistent policy framework for the longterm. Concurrent with this initiative, and under ministerial mandate, a panel was established that deals specifically with the issue of fisheries access called the Independent Panel On Access Criteria (IPAC). The quest for an orderly management of fisheries resources is clearly taking the route of a more public decision making process and a shared stewardship between government and industry. Such an approach has already adopted by other major fishing nations of the world such as

Norway, Iceland, and New Zealand (International Council for Exploration of the Sea (ICES), 2000).

It is within this environment of changing policy directions, with an emphasis on contraction, that Nunavut stakeholders must work to increase both their allocation and access to fisheries resources within the existing east coast management regime. It would seem that the expanded participation of Nunavut in the prosecution of the northern shrimp fishery is both contrary to federal fisheries policy and competitive with the fishing interests of the entire Atlantic region. However, recent changes in the direction of fisheries policy towards a more public process has provided Nunavut with a forum and opportunity to put forth their case of under representation in resource sharing.

In the mid-1990s, the Department of Fisheries and Oceans was confronted with several new and important developments regarding increased involvement of aboriginal groups in commercial fisheries. Foremost among these developments was the 1990 Supreme Court ruling in the Sparrow decision. This decision outlined aboriginal peoples right to fish for food, social, and ceremonial purposes. This right takes priority over all other uses of the fishery, but is subject to certain overriding considerations, such as conservation of the resource. In response to the Sparrow decision, DFO launched the Aboriginal Fisheries Strategy (AFS) in 1992. The AFS was designed to integrate native people into the management of fisheries, provide economic benefits, and establish and provide

allocations of fish (DFO, 1993). This strategy represented a significant change, acknowledging aboriginals as legitimate stakeholders in Canadian fisheries and ensuring that individuals and communities can participate in these fisheries as commercial activities. Since 1994, more than 300 commercial licenses have been issued to Aboriginal groups under the Allocation Transfer Program of the Aboriginal Fisheries Strategy (DFO, 2001). While this program focused government policy on fisheries participation by aboriginal groups, the Government of Canada determined that Nunavut did not qualify for this program as a result of a land claim agreement being in place. Another significant development that highlighted the traditional under representation of aboriginal groups in commercial fisheries was the Marshall decision by the Supreme Court of Canada. This decision recognizes and affirms a constitutionally protected right to fish in pursuit of a moderate livelihood. This protection changes the nature of Aboriginal participation in the Atlantic fishery from that of individuals who enjoy a privilege like that of non-Aboriginals, to communities that have a right to participate commercially and to earn a certain level of income from the fishery. These events have served to legitimize the case for granting access to Aboriginal fishers and providing allocations that are sufficient to support an enterprise and that decision making processes regarding access involve significant, substantial, and effective Aboriginal participation (IPAC, 2002). This is a contentious development for fishery managers since it is contrary to the rationalized policy that has been pursued. The current approach is to purchase existing licences from non-Aboriginals and reassign them. However, this does not

diminish capacity and has the added impact of increasing the purchase value of licences to all user groups. A difficult situation may arise in the future if a shortage of fishers willing to sell their licenses to government at reasonable prices constrains the government's ability to meet its constitutional obligations (IPAC, 2002).

5.2 Nunavut's Experience

Fisheries management in the North has also undergone substantial change in recent decades. Up until the 1980s, little emphasis was placed on commercial harvesting of fishery resources. Much of the activity surrounding fish stocks had centred around the acknowledgement of fish as vitally important to the subsistence diet of northern peoples. As well, a number of commercial projects had been attempted on a relatively small scale with limited success and interest had waned. With the exception of the Arctic char fisheries, most of these fishery projects were of the inland or lake variety and had failed or were abandoned because they did not meet satisfactory harvest levels, lacked financial criteria, or were thought to endanger stocks (Keith et al., nd). As harvests and prices oscillated, the instability of northern fisheries continued and it became easy for policy makers and department officials to retain their focus on the larger fisheries of Canada.

The northern area also posed certain managerial challenges to government due to its special characteristics. Many of these fisheries are small and widely scattered. Their development and management is made difficult by a lack of knowledge of the biology of

the fishery resources and the extensive cost of micro-management. For most fisheries, there is heavy reliance on self-compliance by resource users (Parsons, 1993). Research and development programs were limited and few involved northerners in any meaningful way or took into consideration local needs or aspirations. Frustration and discontent with the role of the federal government, as well as, a feeling of drift and disregard were prevalent which resulted in widespread calls for the devolution of fisheries authority (Keith et al., nd.).

In 1985, the Department of Fisheries and Oceans held a workshop in Iqaluit to address some of the concerns of the North and not surprisingly, all participants indicated a determination for change. In many ways this conference marked the rebirth of interest in fisheries development and an enthusiasm for participation in fisheries management. The now familiar themes of increased economic opportunity, co-operative management, lack of relevant science, and exclusion of local knowledge were all significant points of discussion (DFO, 1987). Furthermore, the integration of native peoples knowledge and scientific information into policy and management systems was strongly recommended (Keith et al., nd.). While DFO initially resisted much of the workshops recommendations it was recognized that native people could assume a greater role in local fisheries management and environmental protection in the future (Keith et al., nd.). It is significant that at this time co-management had little historical record and only some of the co-management regimes created by land claims settlements or initiated by

governments in crisis situations had a historical depth of several years (Notzke, 1994).

Concurrently, political developments and circumstances from fisheries management experiences on both the east and west coasts were making alternative management systems much more attractive to the federal Department of Fisheries in the late 1980s. Resource management in the Canadian North has continued to undergo substantial change in the 1990s. While the primary importance of near shore fisheries remained for subsistence usage, increased commercial fishery participation and the development of new fisheries has been ongoing against a background of changing political, economic, administrative, and cultural dynamics. Participation in the coastal fisheries for Greenland halibut and northern shrimp had expanded and a new era of commercial, oceans focused fisheries had begun. This was a natural progression since the Inuit are a coastal people with 25 of the 26 communities with historical attachment to the sea and marine resources that predate European contact (Government of Nunavut, 2001). As in the Atlantic region, Nunavut now affirms inshore and offshore components to their fisheries and accordingly must adapt different strategies for development and prosecution.

5.2.1 Inshore Fisheries

There has been what some have termed a "political awakening" in Canada's North, fuelled mainly by the Nunavut Land Claims Agreement of 1993 and the optimism leading up to the creation of the new territory of Nunavut in 1999. The new territory is a

geopolitical entity akin to the existing Atlantic provinces in legislative powers and economic development interests and represents northern stakeholders accordingly (IPAC, 2002). The Nunavut Final Agreement (1993) for the central and eastern Arctic is the most comprehensive and specific to date and is guaranteed under section 35 of the Constitution Act, 1982 (Nunavut Land Claims Agreement, 1993). Under this agreement, the management of wildlife (including fish, sea birds, and marine mammals) is the responsibility of the Nunavut Wildlife Management Board (NWMB). The NLCA gives the NWMB jurisdiction over fisheries management of resources within the Canadian 12 mile territorial sea of the east coast of Baffin Island and Ellesmere Island (Nunavut Report, 1998). This board is an institution of government and is composed of one member appointed by the Government of Nunavut, three members appointed by the federal government, four members from designated Inuit organizations, and a tie breaking chairman selected by the NWMB itself.

The Government of Nunavut implements and enforces NWMB decisions once they are made. The NWMB is a broadly representative and powerful body with a mandate to control all aspects of marine harvesting and conservation in the Nunavut Settlement Area (NSA) including access and allocation of quotas. This gives control of all local inshore fisheries to end-user groups and should, under a co-management system, protect and enhance the sustainability of these resources given their intimate connection and dependence. The Minister of Fisheries can interfere with this right only if it is

demonstrated that NWMB actions threaten the conservation of stocks (Welch, 1995).

The settlement of comprehensive land claims agreements created a different managerial environment for the management of northern fisheries. The land claims agreements are comprehensive, providing for substantial territory jurisdiction, financial compensation, social development funding, hunting rights, a greater role in wildlife management, the right to share in resource royalties, conservation, and environmental protection. Given the fundamental importance of fishery resources to the Inuit, and the prominence of aboriginal fisheries across Canada, the possibility of an expanded co-management format is certainly compelling.

The NLCA contains all the required agreements for an inclusive co-management regime and it is within this structure that traditional knowledge comes into play in the decision making process. Inuit users of resources have built up a great knowledge about their prey and the ecosystems that produce those prey. They also have a conservation minded belief system, the theme of which is the preservation of the holistic nature of ecosystems. Much debate among scholars has focused on the image of native people as "indigenous conservationist" and there exists considerable documentation of sustainable resource use by aboriginal peoples (Berkes, 1988).

Furthermore, it is likely that Inuit users of the resource will incorporate a strong

conservation and ecosystem ethic into resource decision making. The western scientific base is incomplete for fisheries stocks and extremely inadequate for ecosystems. The traditional knowledge base could be used to narrow the gap, but it has not been extensively tapped. The tools of western science combined with the incorporation of traditional ecological knowledge can assist local groups to make decisions consistent with their underlying philosophy of "wise use" (Welch, 1995).

The real test of co-management will be how this regime is integrated with the demand for fishery development in the region. The demand for fishery development is high, with at least 19 communities expressing a desire to establish commercial marine fisheries (Clarke, 1993). However, development of fisheries can create allocation conflicts between user groups and the process of choosing communities as development sites or setting project priorities may be significant obstacles in a development hungry North. Development of emerging fisheries is expensive and requires substantial resources and logistical arrangements, especially in the North. This is evidenced by the Pangnirtung experience, which is hampered by unpredictable fishing seasons, high operational costs, and a lack of infrastructure. Perhaps an important source of support would be the further development of links to the more lucrative offshore fisheries, especially to the smaller gillnetter / longliner vessels (<20m) that operate in Davis Strait. These vessels do not have the range capability of factory trawlers and would therefore need port facilities and other support systems that would enhance development in the North. These vessels

require less mechanization and could serve as excellent platforms to transfer the technology necessary for independent fishery prosecution.

5.2.2 Offshore Fisheries

The offshore sector of northern fisheries is essentially a portion of the Atlantic fisheries and does not have any history beyond the last several decades for any of the participants. Fishing effort in the Davis Strait area (NAFO Subarea OB), particularly for Greenland halibut, was expanded rapidly with the implementation of the Underutilized Groundfish Program in the 1990 Atlantic Groundfish Management plan in January 1990 (Mahoney, 1990). The intention of this program was to encourage the development and exploitation of underutilized groundfish stocks in Atlantic Canada by increasing landings and plants throughout, thereby generating additional employment and economic benefits in the region (Mahoney, 1990).

The traditional Greenland halibut fishery off the coast of Newfoundland had been allocated to offshore Canadian and foreign vessels as "developmental". Nunavut was excluded from this developmental pool even though Inuit fishermen began fishing for Greenland halibut in this area in 1986 and were the only Canadian fishermen to record catches (Library of Parliament, 1998). This program occurred in the early 1990s at a time when Greenland halibut populations were experiencing excessive exploitation in all NAFO areas. A panel headed by Dr. Leslie Harris recommended the cessation of the

program, finding not enough scientific information existed and that no further fishing pressure should be brought to bear on this stock. This panel further concluded that Canadians were fully capable of exploiting this resource and that developmental aspects were minimal (Harris, 1993). The establishment of this "developmental pool" was a questionable and dubious management decision from the outset, especially in the case of Greenland halibut. Similar to the offshore fishery for northern shrimp, the fishery for Greenland halibut in the northern NAFO subareas was slowly Canadianized from foreign joint venture arrangements in the past decade. The fishing industry from the east coast of Canada claims ownership as a result of this development and has become firmly entrenched as stakeholders. This is more a result of moratoria on dwindling southern resources and the quest for more lucrative fishing grounds than on investment in developmental fisheries.

While fishing interests from the Atlantic region have increased their reliance on northern resources, the lack of access by northern stakeholders to southern fishing grounds has meant no reciprocal benefits for northern interests (with the exception of northern shrimp allocations, which are distributed over all shrimp fishing areas). The lack of any groundfish allocation to Nunavut, south of Davis Strait, has impeded the ability of Inuit stakeholders to improve their position in the Atlantic fishery. This is an increasing frustration to Nunavut and a number of other native fishing groups from both Quebec and Labrador. In 1996, Nunavut and five other northern based groups formed the "Northern

Coalition". Originally, the purpose of this alliance was to seek increased participation in the northern shrimp fishery at a time of rapid expansion. The coalition partners emphasised that since this fishery was prosecuted in waters adjacent to Labrador, northern Quebec, and Baffin Island a share of the increased allocation should be assigned to its members (Library of Parliament, 1998). In the 1997 Shrimp Management Plan the coalition members were excluded from any quota increase for SFA 6.

The coalition did not seem to perform well and members with differing agendas found the alliance cumbersome. Southern interests were threatened by its existence as a potential bargaining unit. Further to this, it was early in the process and there was a lack of the resource knowledge available. The Northern interests were also disadvantaged compared to their southern counterparts by their lack of experience in bargaining with DFO. Finally, individual members did individual bargaining with government and southern joint venture groups. This undermined the inherent power base of the Northern Coalition for bargaining purposes.

Although the initial mandate of the Northern Coalition was unsuccessful, the concept of an alliance has attractive possibilities with restructuring. Finlayson (1994) suggested that corporate and bureaucratic structures displayed many common characteristics which made communication and understanding between these groups much easier than other stakeholders in the management of fisheries. This would suggest that the Northern

Coalition must choose their representatives carefully and these consultants must be particularly sensitive to the traditional social structure of Aboriginal society. In hindsight, the Northern Coalition required a dedicated resource manager for the scientific assessment of stock status to make informed decisions. Members of the coalition need to agree to bargain as a unit with southern interests to achieve maximum economic benefit from the resource.

As stated earlier, the Davis strait fishery for Greenland halibut (NAFO Subarea 0+1) is managed bilaterally by Canada and Greenland. Canada's 50 percent share of the TAC is 5,500 tonnes annually. This quota is divided among three sub-groups which include Nunavut interests at 1,500 tonnes, company quotas at 2,500 tonnes and a competitive fishery at 1500 tonnes (DFO, 2002). While this quota allotment gives Nunavut a significant stakehold in the fishery, its 27 percent share of the TAC in adjacent waters certainly does not follow the traditionally applied adjacency principals of allocation on the east coast of Canada. It is ironic that in response to Nunavut's claims of unfairness, DFO maintains that the history and needs of other fishers must be considered (DFO 2002). In addition, DFO indicates that the Nunavut allocation for Greenland halibut in Subarea O has increased in the past decade from 100 tonnes to 1,500 tonnes while the overall Canadian quota has been reduced from 12,500 tonnes to 5,500 tonnes during the same period (DFO, 1999).

Nunavut stakeholders cannot participate in the competitive portion of the overall quota because they do not hold any of the groundfish licenses that would permit them access. This portion of the quota is prosecuted by both the inshore (gillnetters) and offshore (trawlers) sectors of the Atlantic fishery. The nonparticipation of Inuit fishermen means the loss of a considerable economic opportunity and a missed occasion to acquire the skills necessary for independent fishery prosecution.

The portion of TAC assigned as company quotas is also a sore point for Nunavut interests, since one seafood company currently operating out of Atlantic Canada has been allocated 1,900 tonnes of quota which exceeds all of Nunavut's share by 400 metric tonnes (DFO, 98). It is noteworthy that these quotas were previously provided as foreign charter allocations and that this company has little investment in harvesting operations preferring to use joint ventures, yet benefits as a fishery resource developer. Nunavut stakeholders prosecute the fishery using similar joint venture arrangements, however, since they have no processing capability (excluding the small operation at Pangnirtung) the benefits accrued are limited to a modest royalty arrangement and a number of employment positions on the vessels. The generally accepted fee arrangement is set at approximately 6 percent to 10 percent of the landed value of the resource with the percentages varying depending on other contract arrangements (R. Coombs, Katsheshuk Fisheries pers. comm. April 10th , 2002).

In the 1997 season, 85 Inuit were employed on offshore trawlers, earning $2.4 million in wages (Nunavut Report, 1998). Since the offshore fisheries for both northern shrimp and Greenland halibut have no focal point, vessel operators can take advantage of well equipped southern ports at competitive rates and require little infrastructure. This indicates that the development of infrastructure in the north to prosecute this fishery is neither economically feasible nor required.

The Nunavut Land Claims Agreement divides NAFO subarea 0 into 2 parts (see Figure 4). The 12 mile territorial sea boundary is under the jurisdiction of the NWMB. Outside this area and extending to Canada's 200 mile EEZ is an area known as Zone 1 that remains the responsibility of the federal government. It is here that the NLCA has provided the NWMB with the opportunity to further devolve the fisheries management decision making structure in the Arctic region. The Minister must seek and consider the advice of the NWMB with respect to decisions in Zone 1 that would affect the substance and value of Inuit harvesting rights and opportunities within the marine areas of the NLCA and to exercise discretion in allocating quotas to benefit Nunavut Inuit (Library of Parliament Report, 1999).

DFO interprets the function of the NWMB in Zone 1 as advisory. The ability of the NWMB to effectively participate in a co-management capacity was tested in 1997. The NAFO subarea OB is prime fishing grounds for the prosecution of the offshore fishery for

Greenland halibut in the Davis Strait. In 1997, just six weeks before a federal election, the Minister of Fisheries decided to increase the TAC for Greenland halibut by 1,100 tonnes of which 90 percent was assigned to fishermen outside of Nunavut. This decision was made contrary to the advice of the NWMB and the FRCC, as well as, departmental officials (Library of Parliament, 1998). A judicial review was filed on behalf of the NWMB to set aside the Minister's decision. In July 1997, Mr. Justice Campbell of the Federal Court handed down a decision that strongly supported the review with respect to NWMB advice and recommendations, the granting of groundfish licences for Nunavut and priority consideration for Nunavut Inuit (Library of Parliament, 1998). The quota increase was reversed, however, no groundfish licences were issued to Nunavut fishermen.

Further north in NAFO Subarea OA, considerable interest was expressed by Nunavut stakeholders in expanding the fishery given the successful fishing effort being experienced by Greenland fishermen in adjacent waters and encouraged DFO to increase allocation (see Figure 4). The NWMB however, indicated that in keeping with the precautionary principle, this was not possible without the NAFO Scientific Council recommended trawl survey to allow for a more complete evaluation of stock status and cited a time lapse of more than fifteen years since the last scientific survey. In 1999, the NWMB and DFO jointly funded a scientific survey using a Greenland vessel in cooperation with NAFO. The results were very encouraging with a biomass estimate of

83,000 metric tonnes in Division A. NAFO Scientific Council recommended a TAC of 4,000 metric tonnes for Division OA + 1A in 2001 (NAFO, 2001). Nunavut was granted 100 percent of Canada's share of the 4,000 ton quota. While this quota has exciting possibilities, historically this area has not preformed well. It is considered an extremely hostile environment and has proven to be economically difficult to harvest. The implications of this decision are far more important. The willingness of the NWMB to incorporate science into their decision making process and to accept some of the financial burden was certainly a compelling reason to rely on the co-management system. As well, this marks a commitment to the traditional principles of fisheries management by DFO. This decision may also open the door for access to adjacent resources by Nunavut stakeholders. There are certainly a number of optimistic indicators for successful Inuit fishery participation.

6.0 Development Strategies

From an examination of recent management history and current stock status, it has been determined that the commercial fishery resources of Nunavut are relatively stable and have considerable economic potential for the new territory. To fully exploit the development potential of these renewable resources, Nunavut must map out a long-term strategy that derives the greatest social and economic benefit for the Inuit of the north. This must be accomplished within the context of the uniqueness of these northern ecosystems and the inherent slower pace of growth in both individuals and populations of

exploited species.

Whatever strategy that is chosen must include the two distinct components of resource development, namely resource management and resource exploitation. Resource management includes policy issues such as access and allocation, as well as, the ongoing chores of regulation and data collection. Exploitation is concerned mainly with the method and procedures of resource extraction or harvesting ability. While the management and exploitation components will be assessed separately their interdependence, especially in the Nunavut case, is central to a successful resource development strategy. There are several options available within each component that can be chosen as part of an implementation strategy. Some options involve more risk and hence greater possibility of reward than others. The intention here is to outline several options for effective resource management and exploitation with varying degrees of risk and reward to assist stakeholders in defining the optimum course and to recognize the challenges involved in each strategy.

6.1 Fisheries Management Options

6.1.1 Option One

In Nunavut, a number of factors bring uniqueness to the case of fisheries management. Being a new territory, with a new management regime and an expanding fisheries participation, Nunavut is contrary to the present Canadian experience. However, as

elsewhere, the issues of access, allocation, and resource conservation are fundamental policy issues. Under current fisheries policy it would be difficult to imagine a better case for greater fisheries access and allocation than the Nunavut case. Nunavut's case is unique among Aboriginal groups. As stated earlier, at a government level, the new territory of Nunavut is a geopolitical entity akin to the existing Atlantic Provinces in legislative powers and economic development interests (IPAC, 2002). Furthermore, the land claims agreement as outlined under Section 35 of the Constitution Act (1982) gives the NWMB both jurisdiction and advisory status with regards to decision making on natural resources (GN, 1999). Given the traditional principles of resource allocation based on historical attachment, adjacency, and dependence, it is only a matter of time before Nunavut's resource allocation will increase. Therefore, the first option is a status quo position with a gradual improvement of resource allocation. The Federal Government has acknowledged the current inequity and is actively searching for a solution (DFO, 2001). This may be difficult given DFO's focused efforts on fisheries contraction, the dilemma of overcapacity, and the vibrant lobby efforts of other Atlantic interest groups to gain increased quota. Given these efforts, it is less certain that Nunavut's access would be solved as quickly.

6.1.2 Option Two

To counter this competitive environment, a second option would be to request a modified federal fisheries structure that transferred fish management in the northern NAFO areas to

the Arctic region. Since NAFO is the international scientific and management authority no changes are necessary. It would only be a national matter of distributing Canadian quota to Canadian stakeholders on a regional basis. This change would remove southern pressures and make bilateral management with Greenland an issue that could be negotiated between northern Aboriginal peoples. As well, an effective co-management structure that incorporates traditional ecological knowledge for the northern stock portions, would be easier to employ with fewer stakeholders. In keeping with DFO's devolution strategy that advocates making decisions at the level closest to where they are implemented, Nunavut's fisheries co-management structure has certainly outlined an alternative approach to traditional fisheries management. The willingness of this body to employ a precautionary approach to TAC setting and to integrate traditional ecological knowledge with western science has already proven successful in limited testing in the north. This format would be extremely useful if applied to emerging fisheries and expanded into the offshore sector. Success here would improve Nunavut's stature as a regional player in Atlantic fisheries. As well, reciprocal allocation agreements could be negotiated within NAFO areas with Atlantic stakeholders that would provide Nunavut with allocations of quota in other fisheries in exchange for access to northern resources. A new Arctic regional management structure would also eliminate the current access freeze that is hindering Nunavut stakeholders from further fisheries development. Under a new Arctic regional management structure, the Federal Government would not be constrained by southern management policy issues such as the fleet reduction initiatives.

Currently in the Atlantic region, there are a considerable number of "temporary" licence holders in both the inshore and offshore fisheries sectors. These permits (mostly for shellfish) were issued on a "last in, first out" philosophy. It is however, generally agreed by all stakeholder groups that there is nothing as permanent as a temporary licence in east coast fisheries. This has significantly expanded the number of players in Atlantic fisheries and should any instability occur in the shellfish fisheries that temporary licence holders prosecute, it is inevitable that this fishing effort would seek redirection. A separate Arctic management area therefore, would assist DFO by reducing lobby pressure on more northern resources, particularly Greenland halibut, and provide Nunavut with bargaining power for reciprocity allocation of other species. Furthermore, DFO has expressed considerable desire to withdraw from the daily micro-management of fisheries resources as practised under current departmental mandate. Nunavut could be an excellent test case for new fisheries management policy direction.

6.2 Fisheries Exploitation Options

6.2.1 Current Status

While the management of fishery resources is fundamental to resource conservation and stability, it is the exploitation strategy employed by stakeholders that determines whether economic and social benefits are maximized. This is clearly indicated by the evolution of fisheries in Newfoundland since the mid-1990s from a volume driven industry to one of

reliance on maximizing product return by engaging in value-added secondary processing and broadening the product output from raw material. The dependence on emerging species and the redirection of fishing effort to nontraditional resources was critical to both enterprise and community preservation. Therefore, it is within the harvesting sector that Nunavut must be especially creative to reach full resource development potential. Currently, Nunavut stakeholders opt to collect resource rents and employ a number of harvesters within the operations of their joint-venture partners. This is a conservative exploitation strategy that is a result of a number of factors that have combined to slow Inuit participation and retard further development. On a macro level, the newness of commercial fisheries to the Inuit, especially in the offshore sector, coupled with political change, lack of defined resources and the absence of northern infrastructure have all been contributing factors to the present status quo. With barely two decades of commercial fisheries experience and having suffered a number of development setbacks, it is difficult to determine whether more resource rents could have been attained.

It is encouraging that Nunavut has emerged as a significant stakeholder in the fisheries resources of Atlantic Canada. This is a considerable feat given the turmoil and conflict that often characterizes the Atlantic fisheries. The Inuit stakeholders have chosen a silent partner approach that is not capital intensive yet provides reasonable rewards with minimal risk. However, under this risk adverse strategy, socioeconomic benefits are not maximized and long-term growth is limited. Having traversed a steep learning curve, the

benefits that Inuit stakeholders derive from current harvesting strategies must be improved upon to further the contribution of fisheries resources to the overall development of the Nunavut Territory.

Nunavut must choose one of several more financially lucrative and socially beneficial options. Keeping in mind the necessity of long term stability of the Arctic resources and concentrating on the offshore fisheries potential, a bolder strategy of resource exploitation must be initiated. This strategy must incorporate the objectives of the Inuit people, as well as, the business aspirations of Nunavut stakeholders. To accomplish these dual objectives, considerable balancing of risk and reward is required. Given the assumption that the status quo requires improvement, perhaps the most efficient method of analysis is to examine the merits of the best case scenarios as options. This is especially relevant given the broad range of activity possible with large scale commercial fisheries.

Currently, there are two methods of fish harvesting employed in the predominantly offshore based commercial fisheries of Nunavut. They are the offshore factory freezer trawler fisheries for northern shrimp and Greenland halibut and the inshore gillnet fisheries (<20 metre vessels) for Greenland halibut in Davis Strait. Many of the fishing companies in both the offshore and inshore sectors operate multi-species vessels, however, the vessels and equipment are considerably different in size, capability and in some cases method of operation. Each fishery requires an individual examination to determine their potential for inclusion in the formulation of an integrated strategy of

resource development.

6.2.2 Factory Freezer Trawlers

The Factory Freezer Trawlers (FFTs) are the vessel of choice for the harvesting of northern shrimp and Greenland halibut in northern waters. This is because of their ability to operate year round in extreme environmental conditions and produce a market ready product at sea. FFTs can stay at sea for up to two months, and can operate efficiently from distant ports. These ships have little need for onshore processing facilities or other fishing port amenities. Most have streamlined arrangements in more southerly ports with suppliers of fuel, packaging, and other goods so that they are shipped according to the vessel's landing schedule and where transportation and supply rates are competitive and cost efficient. Their more sophisticated needs such as repair and refit are performed in specialized facilities such as shipyards that are often located in the Scandinavian countries of Europe. These vessels require highly trained individuals with specialty skills in areas of navigation, engineering, production, net making and marine safety. Most ships officers complement training with a minimum of ten years industrial experience (Clarke, 1993). Vessels are primarily equipped for northern shrimp harvesting, however, apart from differences in onboard production facilities, these vessels show little variance in their mode of operation whether they are directing for shellfish or groundfish.

FFTs are state of the art fishing operations with individual vessels costing between $25 and $30 million dollars (D. Foster, Fishery Products International, personal comm. May 15th , 2001). These vessels require considerable amounts of quota to sustain a year round operation and usually direct for Greenland halibut during the latter part of the year when shrimp quotas are exhausted. Originally, catch rates were much lower when directing for northern shrimp, therefore most FFTs required a complete fishing year to catch all of the assigned northern shrimp quota.

In recent years the abundance of shrimp has meant substantially better catch rates, thus reducing overall fishing effort and making available several months of fishing effort for Greenland halibut. When provided with sufficient quantities of quota, these vessels are safe, economically stable, extremely reliable, and reduce the vagaries of product supply to the market, making them an optimum harvesting platform. The sophistication of these operations leaves little room for improvement and it appears that only technological advances in equipment will enhance the operations. As silent partners with the owners of these vessels, aboriginal groups appear to have entered a stable and profitable long-term marriage of convenience.

The intention of Inuit stakeholder groups is to improve their position over time by acquiring the skills necessary to increase their participation. This is a challenge since Inuit have no large scale fisheries background and will require considerable time to acquire this knowledge. Also, it is certainly not in the interest of current vessel owners to

support increased participation in any meaningful manner, therefore human resource development opportunities are limited. As a consequence, training and advancement of Inuit fishers has been rudimentary at best and advancement has been limited. Presently, few have succeeded in advancing to even the junior ranks of ships officers and no complete needs analysis of skill requirements nor training schedules have been introduced.

Secondly, to improve their overall resource returns, it would seem essential that the Inuit stakeholders need to develop an equity position within the offshore harvesting sector. A co-ownership position with a profit sharing formula would create an environment of increased opportunity. While there is an inevitable element of risk involved in this type of arrangement, this uncertainty can be eased with a controlled phase in and the rewards in the longterm make this risk acceptable. Some of the benefits include the further development of an entrepreneurial culture, an accelerated pace of technological transfer and the creation of a larger capital base for purchase of an FFT or further development of other business interests. As well, an ownership position creates an access opportunity and makes the Inuit a permanent fisheries player. Should Arctic resources decline or experience cyclical shift, the assets created by ownership provide leverage, equity, and a skilled work force.

In terms of fisheries management, an equity position also provides substantial benefits. These vessels are similar in design to the research ships utilized by DFO and could be

employed by a co-management authority to provide scientific information on stock status or to participate in the development of emerging fisheries. This could also provide protection against the dangers of over exploitation, since ownership and co-management by local people would enhance the potential for long-term sustainability.

6.2.3 Inshore Vessels

Investment in a FFT is essential to a long-term development strategy since it will enhance the Inuit position in northern commercial fisheries by raising resource rents and creating year round activity. There remains a number of issues that would not be addressed should this be the sole method of fishery participation. An attractive supplementary fish harvesting method and an excellent primer for entry into large scale fisheries is the incorporation of inshore vessels into a fish harvesting strategy .

The deployment of fishing vessels that are approximately less than 20 metres in length has been an extremely successful fleet sector in Atlantic fisheries. These vessels are versatile multispecies platforms, equipped with standard technological advancements in navigation and harvesting equipment and can be an economical and efficient alternative to the larger scale FFTs. Many of the current operators indicate gross landed values exceeding one million dollars annually (R. Simmonds, AMP Fisheries, pers. comm. March 10th , 2001). While the operation of this class of vessel is seasonal and product handling has traditionally been poor, these vessels offer a number of features that address fisheries gaps created by a strictly large scale strategy and by current federal licencing

policy.

This class of inshore fleet sector vessel is extremely mobile and can engage in exploratory or multi-species fisheries in a near shore or deep sea capacity with effectiveness, especially in fixed gear fisheries such as pot fishing, longlining or gillnetting. These vessels employ smaller crews of approximately eight to ten persons and in most cases return to port with an iced product that requires further processing. The smaller scale of this type of harvesting operation requires less specialized technical knowledge, which would make entrance somewhat easier for new participants. These vessels have considerable range, but to operate efficiently they require substantial support networks in close proximity to the fishing grounds. Support services such as refuelling depots, food supplies, crew changes, and product handling facilities must be available to make these operations economical. Participation in this type of enterprise would therefore, dictate the necessity of improving infrastructure in northern areas. This would suggest a number of onshore employment positions in service industries and provide other benefits to the local economy. Through the use of a cooperative group such as the Northern Coalition, a number of possible supply centres could be identified for fleet support. As well, onshore processing facilities such as currently being utilized in Labrador and Pangnirtung could provide seasonal employment on a regular basis.

These vessels can operate in both the offshore and inshore areas of the Davis Strait. This provides Nunavut stakeholders with the opportunity to operate within the 12 mile

territorial zone and be completely under the jurisdiction of the NWMB. Essentially, this may create an opportunity to access licences without Atlantic fisheries interference. The offshore fisheries could be accessed on a part time basis by these vessels. Furthermore, it would enhance the necessity of infrastructure development and provide the opportunity to implement a co-management structure that represents an integration of science and traditional ecological knowledge. These vessels can operate on relatively small quotas and with local control of licensing, harvest rates can be kept low while maximizing the social and economic benefits derived from fishery resources.

From an offshore access perspective, a small number of licences could be provided at a reasonable cost allowing the Federal Government to fulfill their fisheries policy and constitutional obligations and assure Inuit stakeholders the right of participation. As a small, developmental fishery, the Inuit fishers could increase their probability of success by employing southern experts in an advisory capacity and instituting a skills oriented training program. These relatively small scale operations would ease the learning curve for northern people and provide a broader range of fisheries skills and fisheries participation over a shorter period of time. These skills could then be transferred to the FFTs offshore to assist in a more complex technology transfer. Both the inshore and offshore fisheries sectors can be utilized in harmony to fully exploit the potential of northern fisheries resources for the benefit of the Nunavut people while enhancing the likelihood of long-term sustainability.

7.0 Conclusion

Although Arctic fisheries are small compared to those on the east and west coasts of Canada, they play a vital role in the lives of Inuit people and their economic importance is increasing as a result of fishery development. The pace of change that has confronted the Inuit in the last decade has been tremendous and it is unclear, how these dynamics will affect the Inuit culture or the marine resources of the North. Nevertheless, the Inuit have a documented history of adaptation and it is suggested that this will continue.

The development of a new Greenland halibut fishery at Pangnirtung and increasing participation in marine offshore fisheries are indications of the willingness of the Inuit to adapt, combining old and new lifestyles in ways that maintain and enhance their identity while allowing their economy to evolve. This is supported by new initiatives being under taken by the Government of Nunavut such as the newly created fisheries development office within the Department of Sustainable Development and the increased participation of Nunavut in the fisheries issues of Atlantic Canada (GN, 2001). The emphasis on fisheries access, allocation and ability has increased and this focus is being felt in the Atlantic Region. As well, positive movement on critical issues such as science, infrastructure, and training are encouraging.

Cooperative management has had some success in the North and is now becoming more formalized through changes in government policy and land claim agreements. Even

successful co-management will not assure the conservation and sustainability of Arctic fisheries resources. With the constant search for new fishing grounds, it is certain that northern resources will be subjected to continuous pressure for expansion from all stakeholders. A management system that uses a precautionary approach with emphasis on the inclusion of traditional knowledge with western science is likely to be the optimal method to incorporate the knowledge of the Inuit peoples and to conserve the marine resources. Such inclusion should not be restricted by arguments that traditional knowledge does not fit into some fisheries models or methods, rather the methods and models might be adapted. Research is needed in this area, but lack of strict quantitative elements to Inuit knowledge should not restrict its use in determining management options.

With the large number of stakeholders involved it may be integrated resource planning and cautious fishery development that are the keys to success. Increased participation by Inuit in marine offshore fisheries that require intensive capital investment and extensive training is no easy task. The offshore stocks of northern shrimp and Greenland halibut are at present stable and represent excellent development strategy opportunities. The Canadianization of these fisheries has occurred slowly and now provide reasonable returns to stakeholders. With the devolution of Federal fisheries policy, it may now be time to implement a resource "northernization" strategy with a co-management structure that is consistent with the principles of adjacency and local benefit. Some of the options examined here may assist with development and expose the challenges to be assessed.

There are no guarantees that these resources will maintain an equilibrium on a long-term basis, therefore a prudent developmental strategy that takes potential instability into account is desirable.

Currently, there are no comprehensive long-term training plans, which will result in the full participation of the Inuit into large scale fisheries. Nor is it in the economic interest of any joint venture partners to assist in this process. A potential labour pool that could be tapped is in the mining industries of the North. Many of these operations have well trained personnel similar to those needed on large fishing vessels. For example, many are skilled in diesel machinery operation and conveyer technology and have adapted well to working in confined spaces. This is not unlike the environment experienced in deep sea fishing operations, and there is a need for such skilled people on most fishing vessels.

Canada's Inuit have demonstrated a remarkable resilience in withstanding, absorbing, and adapting to modern cultures without losing either their traditional values or their desire to remain a distinct and self-reliant society. The establishment of the new political structure of Nunavut in the North has been embraced with much enthusiasm by the Inuit people. To be successful, the new organizational structure must withstand future tests of adversity and maintain a balance between development and traditional Inuit values. The Inuit people are now entering a new millennium as legitimate players in a complex and competitive East Coast environment. They must now define an approach to resource management and exploitation that includes substantial investment and provides the potential to maximize

socioeconomic returns. The resource wealth can help the Inuit create their own economic distribution systems. The Inuit are a democratic and adaptive culture with a long standing and demonstrated conservation ethic with respect to wildlife and fisheries that has the potential to become a fisheries management model for the world. It remains to be seen how well this model performs alongside the more classical approaches taken further south. Given their accomplishments over the last several decades, it would seem that sustainable management of marine resources may be achieved.

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