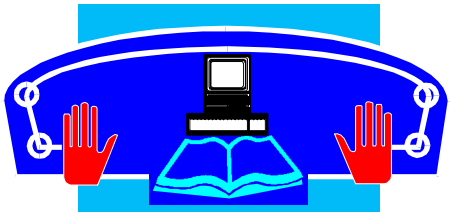

Commercial Fisheries Of The Northwest Territories - An Historical Perspective

Type of Study: Analysis/review

Date of Report: 1987

Author: S. Davies, K. Kroeker And D. Macdonald

Catalogue Number: 3-14-40

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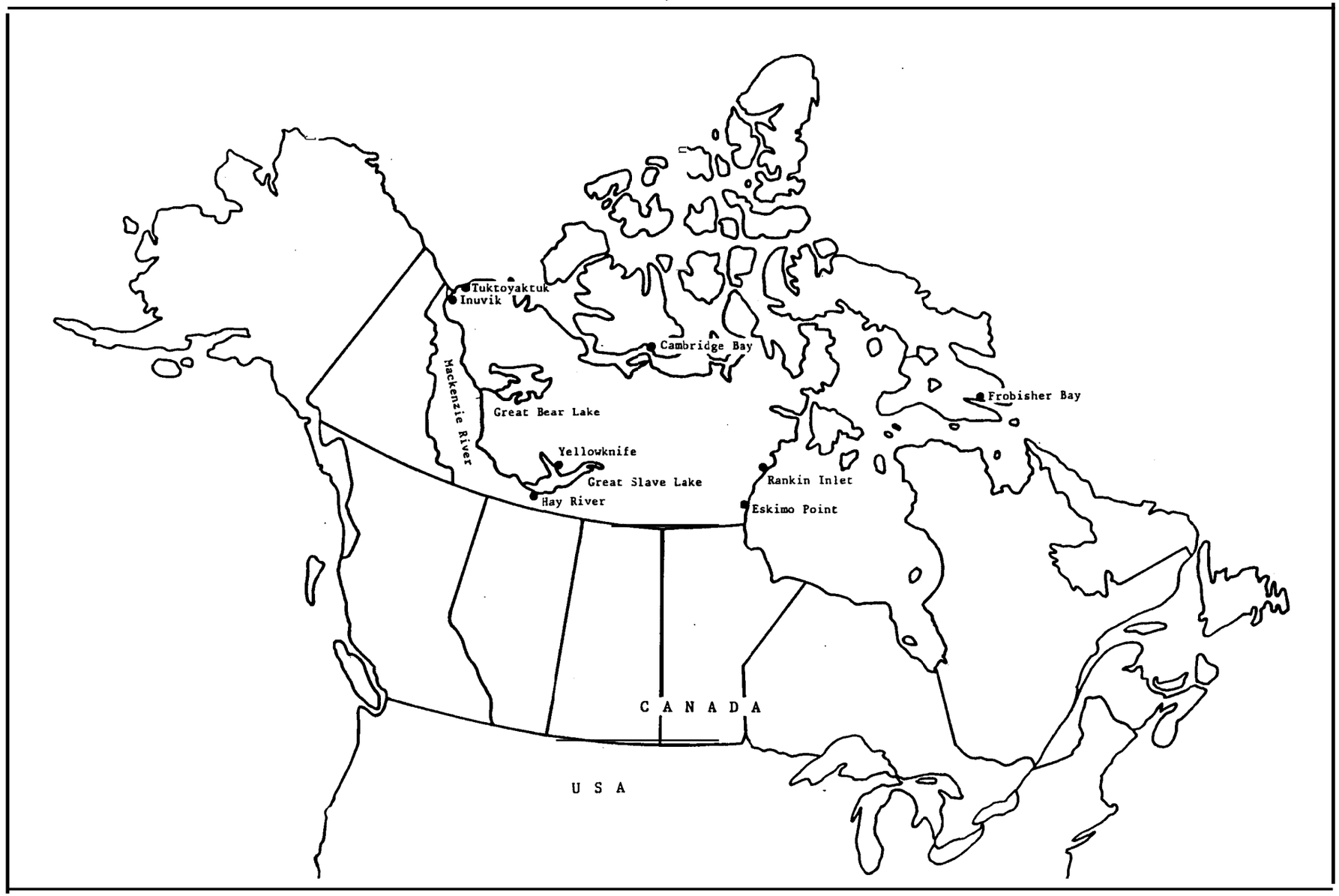
This report has been written for the general public. Scientific terminology has been avoided whenever possible and although a bibliography has been provided, references to these publications have not been made in order to provide a more readable document. The information presented in the report, while not written for the scientific community, is relevant to both fisheries biologists and planners.

The views expressed in this report are those of the authors and do not necessarily reflect those of the Government of the Northwest Territories.



Map of the Northwest Territories indicating major population centres and their position in relation to Canada.

1.0 INTRODUCTION

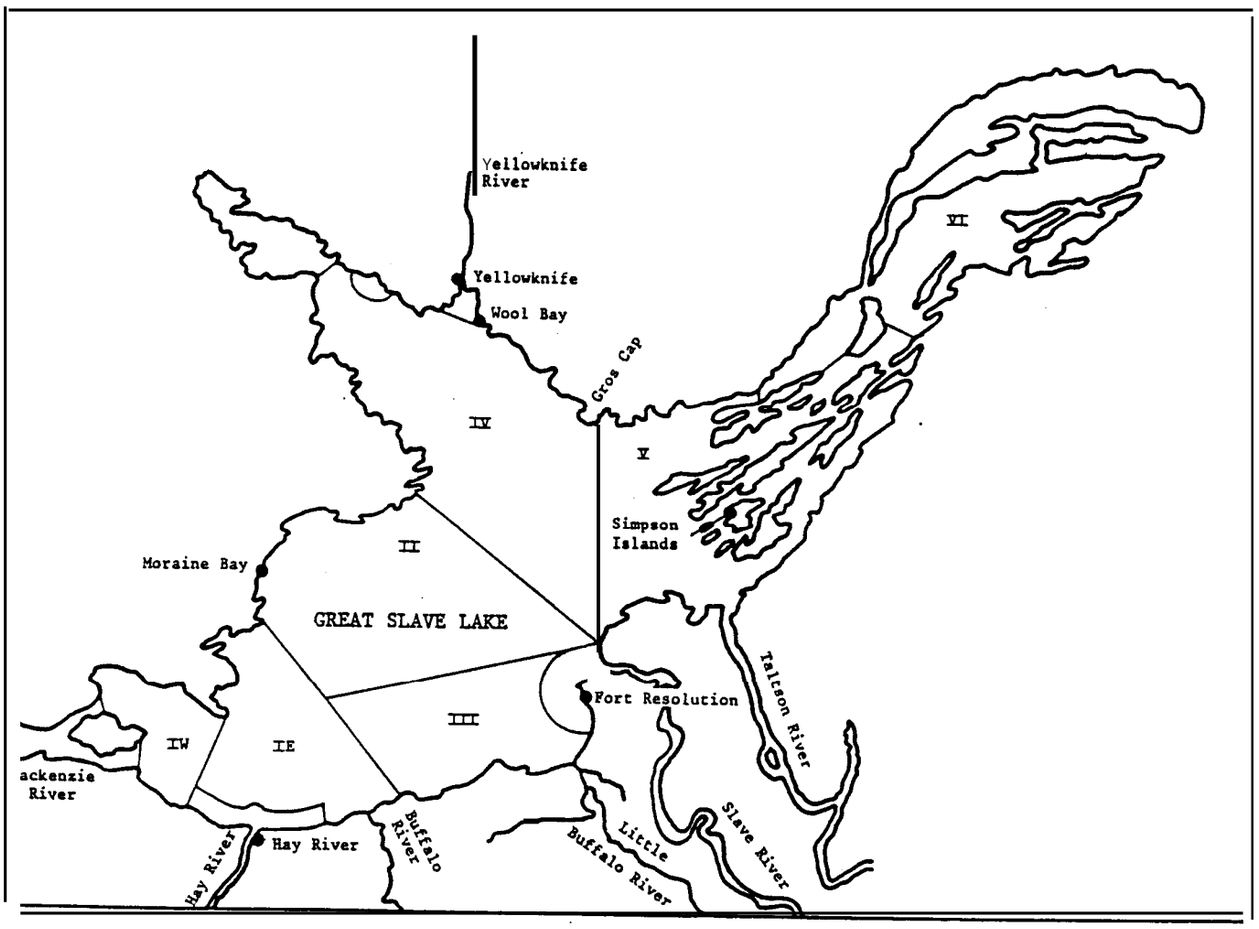
The history of commercial fishing in the Northwest Territories has never been adequately documented. Due to the lack of communications during the early days of the fishery, reports have often been found to contain incorrect or contradictory information. During the writing of this report the authors have attempted to provide an accurate account of the development of the fishery by reviewing the original correspondence between the individuals and organizations who developed the fishery; scientific reports written during its development; current fisheries and economics reports and by interviewing individuals presently involved in the fishery.

An attempt has also been made to provide a complete historical record of harvest data from the initiation of the various fisheries to current times. Although records of sales to the Freshwater Fish Marketing Corporation have been well documented since the 1970/71 fishing season, information prior to this date and recent information on fish caught for sale locally (with the exception of Arctic charr) is often fragmented and incomplete. Historical harvest data have also been reported in a number of ways including: the winter/summer season, the summer/winter season, government fiscal years (April 1 to March 31), calendar years, round weight, dressed weight, filleted weight and in the case of the pulse fisheries, harvesting conducted over a two year period has been reported as a single year. The harvest statistics presented in Appendix I have been assembled from a combination of published and unpublished reports and information provided-by biologists and economists working in the area. Whenever possible data were checked against original catch records to ensure accuracy.

Due to the significant influence that both domestic and sport fisheries have had on the development of the commercial fisheries, brief sections outlining these fisheries have been included in this report. A section has also been provided on the marine fisheries, which is playing an increasingly important role in the commercial fisheries of the Northwest Territories.

It is hoped that the historical information provided on the fisheries, including reasons for failures, will be used by individuals and government departments to formulate strategies that will assist in the development of future fisheries or the expansion of existing ones.

A chronological summary of the important events which shaped the development of commercial fishing in the Northwest Territories is provided in Appendix VIII.



Great Slave Lake showing the Control Areas and locations of important commercial fishing activity.

2.0 COMMERCIAL FISHING REGIONS OF THE NORTHWEST TERRITORIES

In 1944, the Fisheries Research Board of Canada, under the direction of Dr. D.S. Rawson, conducted a survey of Great Slave Lake to determine 'the possibilities of a commercial fishery. On his recommendation, a commercial fishery was opened on Great Slave Lake in the summer of 1945 with a quota of 1590 metric tonnes dressed weight of lake trout and whitefish.

Since that time, numerous other commercial fisheries have been established in the N.W.T. but Great Slave Lake remains the most dominant. At present, four generalized commercial fishing regions can be identified:

1. **Great Slave Lake**
2. **Inland lakes**
3. **Arctic coastal (Arctic charr)**
4. **Mackenzie River Delta**

2.1 GREAT SLAVE LAKE

When commercial fishing began on Great Slave Lake there was considerable optimism about its potential. There were, however, no roads or railways to the area and this isolation severely hampered the growth of the fishery in its initial years. In 1945 only one company, McInnes Products Corp. Ltd., was able to take up the challenge. This company had been operating an essentially barge based fishery on Lake Athabasca and it was relatively simple to move their equipment down the Slave River and onto Great Slave Lake.

McInnes Products established a camp at an excellent natural harbour called Gros Cap on the northeast shore about forty-five miles south of Yellowknife. From here an initial fleet of 20 fishing boats harvested the area around Gros Cap. The fish were returned to the base camp where they were dressed or filleted, frozen, and loaded onto freezer barges. These barges were subsequently taken across Great Slave Lake and up the Slave and Athabasca Rivers to the railhead at Waterways, Alberta. Except for a brief and unprofitable attempt at air transport, the fishery carried on essentially unchanged until 1948.

In August of 1948 the Mackenzie Highway was completed to Hay River, linking Great Slave Lake to the highway system of Alberta. Also in 1949, the commercial quota was raised from 1590 metric tonnes dressed to 4090 metric tonnes round weight of lake trout and whitefish. This increase followed the recommendation of Dr. D. S. Rawson and Dr. W. A. Kennedy of the Fisheries Research Board of Canada and was based on investigation of the results of the first three years of fishing at Gros Cap. The combination of road link and increased quota allowed a rapid expansion of the industry and by 1949-50 there were 7 fish companies and fish buyers operating on the lake during the summer and 13 during the winter.

The fish buying and processing plant at Gros Cap continued to operate until 1955 but after 1948 Hay River became the center of commercial fishing on Great Slave Lake. The companies that established themselves at Hay River were able to take advantage of lower transport costs and were able to exploit the winter fishery, which had begun in the winter of 1946. Prices as much as 50% higher for winter fish compensated for any additional difficulties encountered in a winter fishery. Improved access also allowed the development of a more profitable fresh fish market.

When the quota was raised in 1949, the lake was also divided into four administrative areas in order to prevent localized overfishing. Although some areas were eventually split into east and west, these areas have persisted more or less unchanged to the present. Each area was assigned its own portion of the total lake quota and these in turn were subdivided into summer and winter portions. These quotas remained essentially unchanged until 1971 but since that time they have been regularly revised downward in response to changes in exploitation and production. The 1985/86 total quota for Great Slave Lake is 1682 metric tonnes of whitefish and trout.

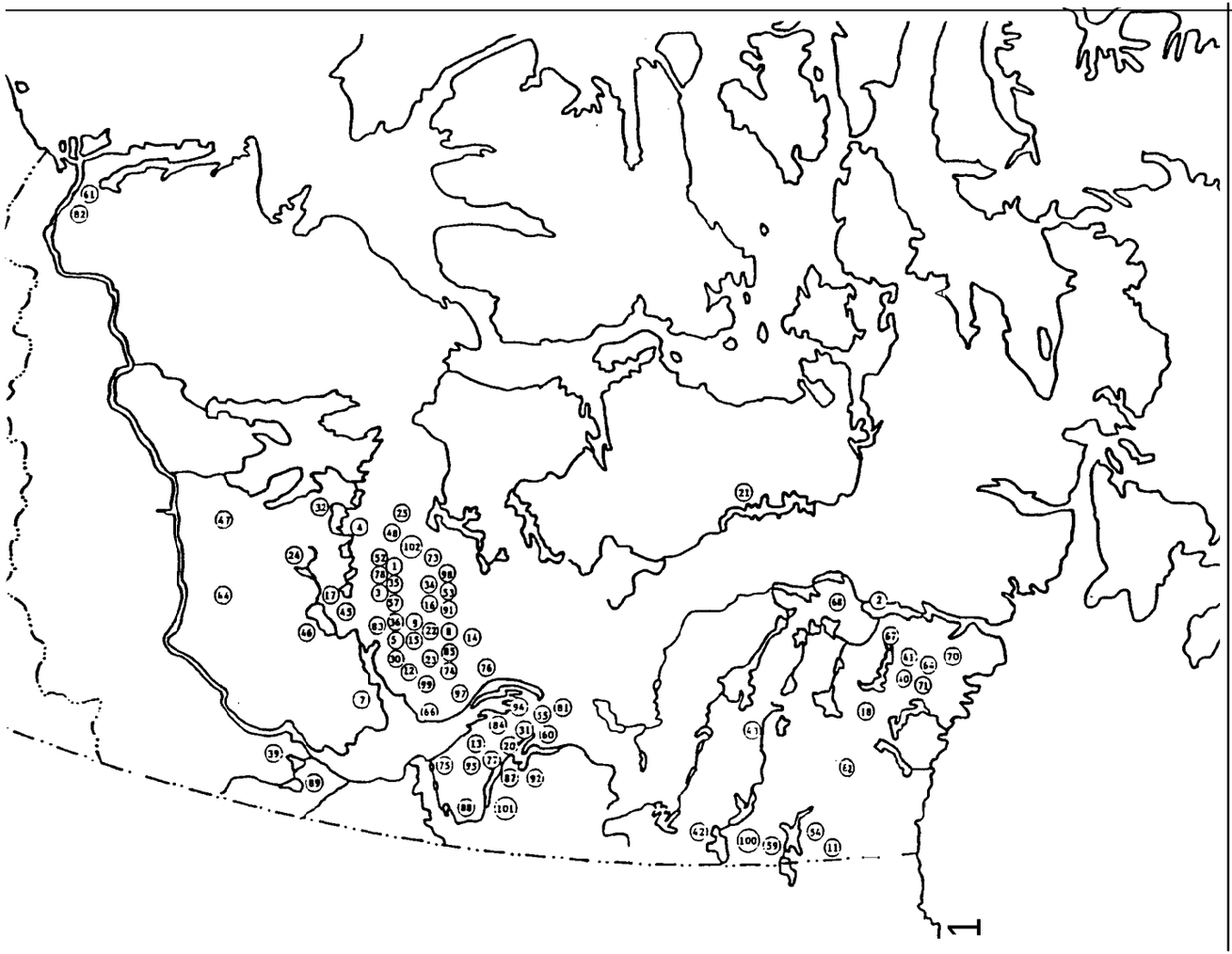
Although the fishing fleet, in terms of number of companies, boats and men, continued to grow until the mid-1950's, the actual production had already peaked in 1949 when a total of 4500 metric tonnes was harvested. In part this can be attributed to a decline in fish abundance, particularly in the case of lake trout in the west end. However, the overall catch per unit of fishing effort had stabilized by the mid-1950's and has changed little since that time. One reason for the overall decline in catch is that it has never become profitable to harvest the more remote areas of the lake. Hence, the quotas of those areas lying closest to Hay River have been filled but the overall lake quota has not been reached since 1949.

In 1979 a licensing policy was introduced which restricted the number of operators on Great Slave Lake. The limit was set at 28 Summer Class A (whitefish boats) and 80 Summer Class B (skiffs) licences. New licence applications are submitted to the Department of Fisheries and Oceans and are reviewed by the Great Slave Lake Advisory Commitee. This commitee meets twice annually and is made up of eleven members representing the Dept. of Fisheries and Oceans, Government of NWT, NWT Fishermen's Federation, Dene Nation, and the NWT Travel Association. New licences are approved on a point system and consideration is given to residency, fishing experience and family history in the fishery.

It is **clear from the historical production figures that the composition of the harvest has changed greatly since 1945 (see Figure 5, Appendix IV). Initially, lake trout made up 64% of the total catch and whitefish contributed another** 30%. By 1984-85 these proportions had reached 4% and 80% respectively for lake trout and whitefish. This shift can be attributed largely to a significant drop in lake trout numbers in the west end of the lake, a direct result of prolonged exploitation. In an effort to head off a total collapse of the lake trout population, the East Arm of Great Slave Lake was closed to commercial fishing in 1974.

There is another factor which should be considered when discussing the declining importance of lake trout. When McInnes Products started fishing in 1945 they restricted themselves entirely to the north and east portions of the lake which were predominantly lake trout waters. The west end of the lake was dominated by whitefish and the rising prominence of the Hay River fishery after 1948 can be seen in the rising proportion of whitefish.

The total production from Great Slave Lake from 1945 to 1985 was 87,270 metric tonnes and the average annual production was 2129 metric tonnes.



Locations of inland lakes where commercial fishing has been conducted.

1.	Arseno	35.	Ingray	* 69.	Plante
2.	Baker	36.	Johnston	70.	Peter
3.	Basler	* 37.	Jones (63° 04)	71.	Quartzite
4.	Beaver Lodge	* 38.	Jones (64° 42)	* 72.	Reade
5.	Blaisdell	39.	Kakisa	73.	Rebesca
* 6.	Charlie	40.	Kaminak	74.	Reid
7.	Chedabucto	41.	Kaminuriak	75.	Rocher River
8.	Chipp	42.	Kasba	76.	Ross
9.	Chitty	43.	Kazan	77.	Rutledge
* 10.	David	44.	Keller	78.	Saddle
11.	Debartok	45.	Labrish	79.	Salkeld
12.	DeFeat	46.	Lac la Martre	80.	Savage
13.	Deskenatlata	47.	Lac Ste. Therese	81.	Shultz
14.	Desparation	48.	Little Crapeau	82.	Siridgi
15.	Drygeese	* 49.	MacDonald	83.	Slemon
16.	Duncan	* 50.	Macewan	84.	Sparks
17.	Faber	* 51.	MacKay	85.	Sparrow
18.	Ferguson	52.	Margaret	* 86.	Stark
* 19.	Frank	53.	Mattberry	87.	Taltson
20.	Gagnon	54.	McAlesse	88.	Taltson River
21.	Garry	55.	McInnes	89.	Tathlina
22.	Gordon	* 56.	Mergle	* 90.	Thekuthili
23.	Graham	57.	Mosher	91.	Thistlewaite
24.	Grandin	58.	Nameless	92.	Thuban
25.	Grant	59.	Nuelton	* 93.	Trefiak
* 26.	Gullion	60.	Nonacho	94.	Tronka chua
* 27.	Hagalik	61.	Noel	95.	Isu
* 28.	Harding	62.	North Henik	* 96.	Turner
* 29.	Helmer	* 63.	O'Connor	97.	Victory
30.	Hidden	64.	O'Neil	98.	Wecho
31.	Hjalmar	* 65.	Palaok	99.	Wedge
32.	Hottah	66.	Pauline	100.	Windy
* 33.	Husky	67.	Parker	101.	Yatsore
34.	Indin	68.	Pitz	102.	Zinto

* Lakes not indicated on the map.

2.2 INLAND LAKES

The first commercial fishery on an inland lake, other than Great Slave Lake, began on Kakisa Lake in 1946. This fishery has carried on uninterrupted to the present time. The next effort to organize an inland fishery did not occur until 1950 when a government sponsored, and unsuccessful, effort was made to establish an income for local Inuit on Nueltin Lake in the District of Keewatin.

By 1960 the Fisheries Research Board of Canada had amassed a considerable body of knowledge regarding fish populations through its continuing scientific surveys. The notion of a controlled expansion of the commercial fishery to other inland lakes in the Northwest Territories was being developed. Reduced whitefish production from Manitoba and the Great Lakes had resulted in an increased market demand. Finally, the closure of the Rankin Inlet Mine had prompted an effort to increase employment in that region.

It was, however, realized that the chances of viability were low for the smaller inland lakes because of the high costs of maintaining an annual fishery with a relatively small potential return. In December of 1961 a program became effective which initiated a controlled expansion of the fishery to lakes which would be fished on a rotational or cyclic basis. Under this program the District of Mackenzie was divided into six control areas, Great Slave Lake excluded, and all lakes within these areas were reserved for either commercial fishing, commercial fishing and experimental research, or sport and domestic fishing.

All commercial lakes were assigned a 6-year fishing cycle of 2 years “open” and 4 years “closed”. Quotas were calculated for these lakes by allowing 1/2 lb. to be taken for every acre of surface area. Therefore if the lake’s size was 10,000 acres, an annual quota of 5000 lbs. was set. The “cyclic “ system allowed the fisherman to go into the lake and harvest up to six times this annual quota within two years. The lake was then closed for the next four years.

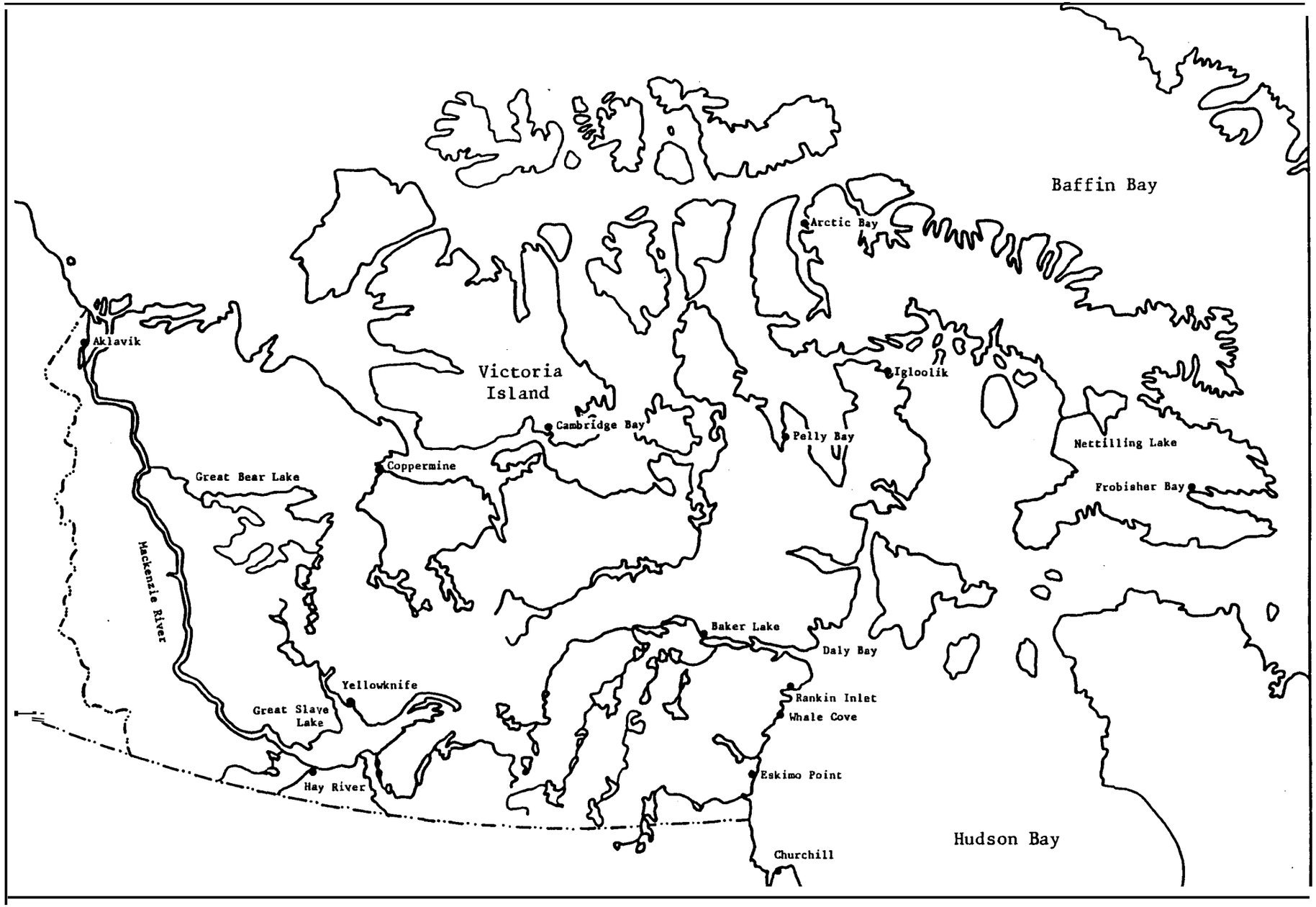
Two additional Control Areas were established for the District of Keewatin. Control Area 7 was opened in 1962-63 and Control Area 8 was opened in 1964-65 but little information is available on the development of the fisheries in these areas. Only Kasba Lake in Control Area 7, and Nueltin Lake and Windy Lake in Control Area 8 appear to have developed to any level of importance. Fish from these lakes, predominantly whitefish and lake trout, were shipped directly south to buying companies in Winnipeg and Montreal via Lynn Lake, Manitoba.

By the mid-1960's it was evident that the Control Area System was not working satisfactorily. Since all the lakes within a Control Area were on the same cycle, a commercial operator was not able to concentrate in one area long enough to justify the expense of establishing proper processing and holding facilities. Therefore, the Control Area System as such was rescinded in 1966 in favour of a uniform system in which the same cyclic principle was applied to individual lakes.

The inland fishery peaked in 1971 when 25 lakes were fished and a total harvest of approximately 375 metric tonnes was taken. In recent years this fishery has gone into serious decline due to rising operating costs and dissatisfaction amongst fishermen. It is generally felt that the cyclic format is still too rigid and there has been a gradual return to the annual quota system.

There are two significant fisheries which have not operated on the cyclic basis. Lac la Marte, located 200 km northwest of Yellowknife, was opened to commercial fishing in the summer of 1969 with a quota of 113,600 kg round weight of lake trout and whitefish. By 1972 it was becoming clear that the economic viability of this fishery was only marginal, due to the high cost of air freight. Furthermore, the extent of the domestic use had not been fully considered and the residents were becoming concerned that the fishery might collapse. Consequently, in 1973 the fishery was restricted to local use only and it has been maintained on this basis to the present.

The other significant inland fishery is Kakisa Lake, which has successfully maintained an annual pickerel fishery since 1946. Kakisa Lake has the advantages of road access and closeness to the fish plant at Hay River which have helped it to remain economically viable. This fishery is open to local residents only.



Locations of areas commercially fished in the Arctic Coastal areas.

2.3 A HISTORY OF THE COMMERCIAL CHARR FISHERIES

The first example of commercial fishing for charr occurred in 1932 when Mr. Ingebrigtsen of Churchill, Manitoba travelled about 250 km up the Keewatin coast in a small sailing vessel. His venture was successful considering the limitations of the time and upon his return he processed and marketed 1000 kg of "lightly salted sea trout". This early entrepreneur did not continue fishing in subsequent years, possibly due to the fact that his boat was not equipped with motors and traveling in the area would have been relatively dangerous.

Between 1932 and 1959, the only attempt at commercial fishing was an unsuccessful one at Frobisher Bay in 1947. In 1965 an experimental fishery was conducted at Cambridge Bay in order to provide an inexpensive source of food for relief issue. In the first year of operation a total of 17,955 kg of charr were taken by gillnet in Cambridge Bay and Wellington Bay. The price per kilogram at this time was a little under 7 cents which compared to todays prices of $1.13/kg frozen and $1.81/kg fresh shows that charr has definitely progressed from being a relief item to being a gourmet food. The total production from the Cambridge Bay area over the past 26 years has been in exess of 1.1 million kg of landlocked and searun charr. The current production of approximately 62,000 kg per year places it as the largest and most successful charr fishery in the N.W.T. The Cambridge Bay operation has, like most fisheries, had its share of problems during its developmental stage but has remained a viable operation due to a strong commitment by the community, the advantage of being able to use weirs as harvesting gear, access to the fresh fish market, and sound biological management.

The expansion of the charr fisheries in the Keewatin District was caused by the serious economic problems occurring in the area in the late fifties. When the Rankin Inlet Nickel Mine was closed in 1962 the Federal Government created an intensive program to develop an economy based *on* the processing and canning of the fish and marine mammal resources of the area. The initial investment was for the construction of a processing plant at Daly Bay. Although initial estimates of the area's fish resources were promising, after two years it was found that there was an inadequate supply of fish and the" plant was then closed and moved to Rankin Inlet. Initially there was a great deal of optimism for the future of the plant as seen in the following article which appeared in the Winnipeg Free Press in 1966.

CANNERY BOOSTS ESKIMO INCOME

By Frits Roos

OTTAWA (CP) - When the government opened a $70,000 cannery high up in the Arctic two years ago, it hoped to stabilize the ups and downs of Eskimo food supplies and start another badly needed flow of dollars northward.

Plans called for canning locally-caught Arctic char in the summer and lake trout in the fall.

The purpose was to keep the canning income in the Arctic and at the same time build up a local reserve for years of lean catches when Eskimos could only hope for good hunting.

Previously, Arctic food products were brought south in freezer ships to be canned and distributed in cities across Canada.

The venture at Daly Bay, a Hudson Bay inlet **some 500 miles north of Churchill, Man., seemed doomed almost as soon as it started. Poor catches forced the northern affairs department to close the plant last year.**

But convinced there was a southern market for Arctic char, the department was willing to give it a second try.

CANNERY MOVED

The 23 by 32 foot building was dismantled and moved south 160 miles to Rankin Inlet where expanded production again supervised by Erich Hoffman, a specialty food officer, went into full swing this summer.

"This time it looks as if we are going to succeed." a department spokesman said. If the project keeps going, the factory, a first in the Arctic, may be handed over to the local Eskimos as a co-operative.

About half of this year's char and trout catch, expected to be more than 100,000 pounds, will be stocked for local consumption. The remainder, prepared in tasty sauces, will be shipped south.

The cans will appear in shop windows wrapped in a blue Ookpik **label, already identified with muktuk and other whale meals for southern consumers.**

The brand, named after the furry Arctic owl which hit it off so well with Canadian and foreign tourists, carries a Crown copyright held by the northern affairs department.

The department hopes the char, trout and whale canning venture will pour some $75,000, into the Rankin community of about 250. Its 25 fishermen receive 15 to 20 cents a pound and the canners between $45. and $70. a week.

CATCH LIMITED

Now, the cannery's only limits appear to be the catch quota set by the fisheries department, a necessary measure based on the slow growth of the northern fish population.

Northern affairs already has expanded the experiment - a $4,000. portable cannery at Whale Cove, 60 miles south of Rankin. And plans for more portable canneries are being studied.

Since the department brought the first planeload south in 1959, Arctic char has been accepted across Canada by a small but growing market of food fanciers.

The fish, a North Atlantic salmon which, gourmets say, tastes even richer than its more southern fellows, now has joined seal and whale meats in the ranks of exotic Canadian dishes. Caught from July to September, it has been an age-old part of the Eskimo diet.

It won't be sold in the supermarket for a long time to come, says Ernie Potachin of the Party Palace delicatessen here. At 90 cents a can or more, it is still at least 20 cents more expensive than salmon.

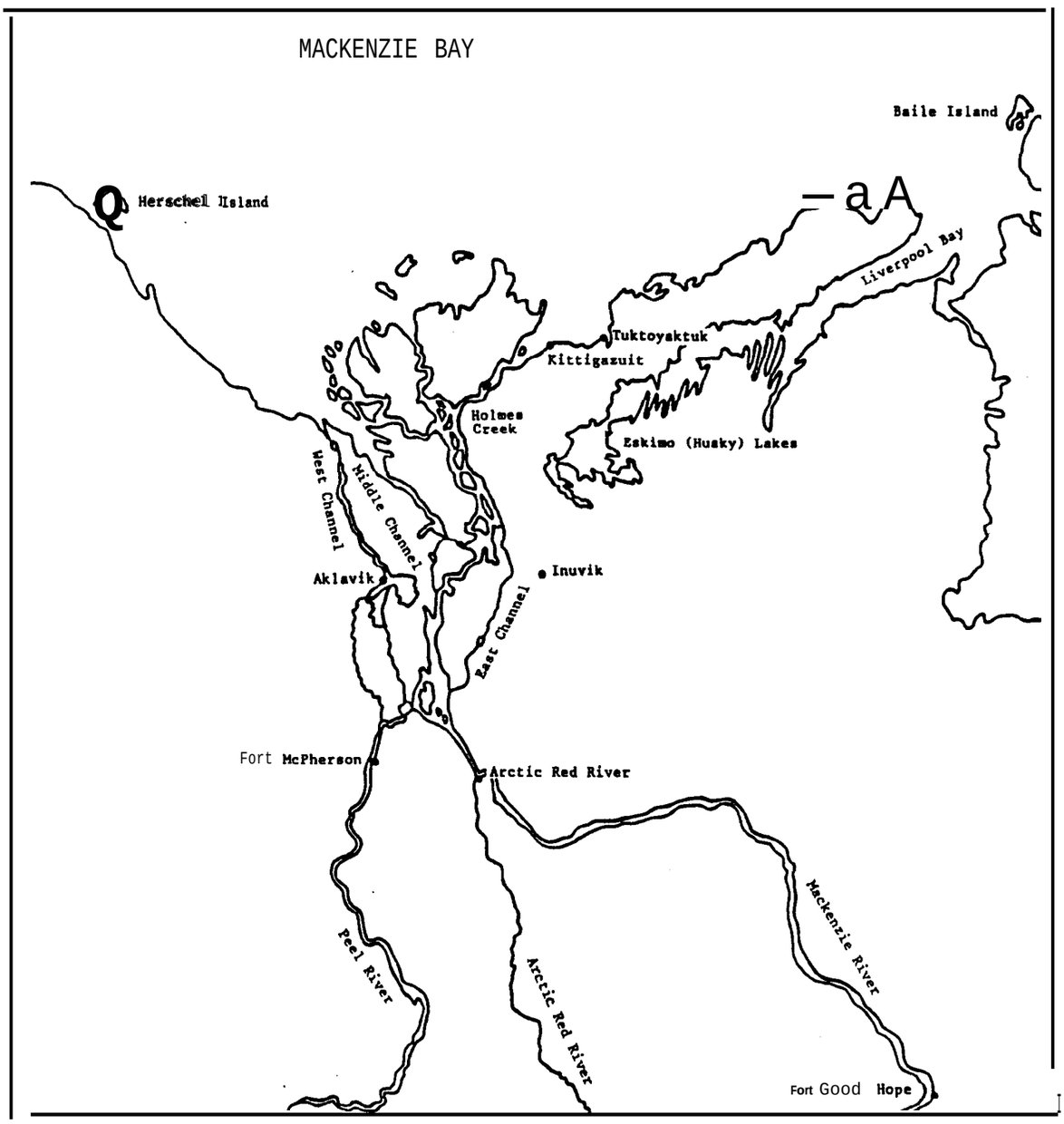
"But Canadians have shown they like it." he says, "and they will eat it, just like we got them to enjoy whale steak and muktuk."

1966

Despite this initial optimism and the numerous attempts at product development it was found that the cannery could not become economically viable and it was subsequently closed in 1978. During its 10 year operational period it did, however, do a great deal to expand commercial charr fishing in settlements along the Keewatin coast. Between 1964 and 1975 over 20 sites in the area were fished with the charr production exceeding half a million kg.

Although the Cambridge Bay and Rankin Inlet fisheries are the ones most commonly referred to, other important fisheries such as Pelly Bay in 1969 and Nettilling Lake in 1974 have also been developed. In recent years there has been increased emphasis placed on promoting local and intersettlement trade and this coupled with the higher prices being paid for exported charr has prompted a number of settlements to become interested in commercial fishing. In the 1984/1985 season a total of 85 sites were fished and over 143,000 kg of landlocked and searun charr were harvested.

The reasons why fisheries and specifically charr fisheries have failed in the past are outlined in Section 6.0. These failures have primarily been due to overfishing caused by domestic, commercial and sports fishing being conducted simultaneously and through too rapid an expansion of the fishery which did not leave sufficient time to work out the problems inherent in the development of any commercial venture.



Locations of areas commercially fished in the Mackenzie River area.

2.4 MACKENZIE RIVER DELTA

The Mackenzie Delta region is a vast area of interconnected lakes and channels covering almost 13000 square km, and consisting of about three quarters water. Some 17 species of fish important to either commercial; domestic, or sport fishing are found in the waters of the delta. The most abundant of these are broad whitefish, lake whitefish, Arctic cisco, least cisco, Arctic charr, and inconnu. Of these, broad whitefish is by far the most important commercially. Lake whitefish, though very numerous are heavily infested with tapeworms and are generally reserved for dog food. It is well documented that large numbers of fish, particularly whitefish and ciscoes, pass through the channels of the delta on annual feeding migrations from the Mackenzie River and its tributaries to the near coastal waters of the Beaufort Sea.

The result of these mass migrations is a high concentration of easily exploited fish populations in the channels of the delta. However, in spite of extensive and ongoing scientific investigation there is still a scarcity of information regarding the sizes of these populations, as well as destinations, feeding patterns, life cycles, and over-wintering grounds.

Although the resource is apparently large and accessible, all of the many attempts to establish a commercial fishery have so far ended in failure. Table 7 summarizes all of the commercial catches which have been recorded for the Mackenzie Delta region since 1955. Unfortunately, the reporting of commercial, domestic, and sport fishing data from this region has been somewhat sporadic over the years.

The earliest efforts at organized fishing often involved the Anglican and Roman Catholic Missions and the Royal Canadian Mounted Police but they were principally carried out by local Inuit and Indians. The first attempt to commercially fish in the delta region was made in the mid-50's when a local Fort McPherson trader tried to start a winter fishery, but the venture never actually materialized.

By 1960 the Department of Northern Affairs and National Resources (DNANR) was taking an interest in the fisheries potential of the region and for the. next two years several small fisheries were set up at Aklavik, "Kittigazuit, and the mouth of the Peel River. Poor equipment and lack of adequate storage and freezing space severely hampered and eventually ended the attempt.

In 1963 an experimental Pacific herring fishery was carried out near Bailie Island, northeast of Tuktoyaktuk, and about 8000 kg were harvested. Although the production was encouraging, the costs of production and transport were found to be too high to enable the fishery to be competitive with the Scandinavian herring fisheries.

Also in 1963, the Department of Indian Affairs and Northern Development (DIAND) established a small whitefish and inconnu fishery at Holmes Creek, about 105 km north of Inuvik on the East Channel. A barge mounted freezer was used on site and about 9000 kg of dressed fish, mostly whitefish, were harvested and processed in the first year. However, the costs were again too high and the local market was unable to absorb even this relatively small amount.

The Holmes Creek fishery was run again the next year but the problems encountered the previous year were repeated in 1964. In addition, most of the harvest failed to pass inspection and was eventually destroyed.

In 1965 and 1966 the Menzies Fish Company Ltd. of Edmonton ran a commercial whitefish fishery out of Inuvik as well as an Arctic charr fishery at Herschel Island and Ptarmigan Bay on the Yukon coast. In the first year 9000 kg of whitefish and 16000 kg of Arctic charr were harvested but the marginal returns were more than offset by the loss of a $10,000 collection boat in drift ice off Herschel Island. A second attempt the following year produced only 3200 kg of fish in total. A variety of technical and mechanical problems combined with high transport costs, spoiled fish, and discontented fishermen effectively discouraged Menzies Fish Co. from returning to the region.

From 1967 to 1971 there were no attempts made to fish commercially in the area and by 1972 the Territorial Government had decided to place a strong emphasis on domestic fishing and commercial fishing for the local market only. Accordingly, the Holmes Creek fishery was re-opened in 1972 with the intent of supplying the Inuvik market. In the next three years a total of 26000 kg was taken, the majority of which was sold in Inuvik. In 1974 about 10500 kg was sold to the Freshwater Fish Marketing Corp. in Winnipeg. The following year the Holmes Creek fish plant was moved to Inuvik but, although the quota was taken, it was still uneconomical and the fishery was closed.

In recent years there has been renewed interest in a Pacific herring fishery, this time for a salt-cured roe product for the Japanese market. In 1981/82 the Department of Fisheries and Oceans conducted an exploratory test of roe from Pacific herring, Arctic cisco, broad whitefish and lake whitefish. Initial evaluations of product quality have been quite positive but it is not yet clear whether favorable economics or adequate resource supply will allow the fishery to develop.

3.0 **DOMESTIC FISHING**

Domestic fishing has historically been an important part of the traditional life styles of native northerners and subsequently have been given first priority when resource-use conflicts arise. In recent years there has been a decline in domestic harvests due to the change from dog sleds to snowmobiles and the loss of fishermen who are finding employment in the oil and mining industries.

As domestic harvests still equal or exceed commercial production in some areas, it is necessary to know the exact level of harvest in order not to over-exploit the fish populations. Unfortunately, domestic production is generally not well documented which in several cases (Sylvia Grinnell, Diana River, and Sandy Point River) has contributed to the collapse of the fish population. In order to prevent the loss of domestic fishing sites, it is therefore imperative that local residents assist resource planners in determining the actual harvest. As domestic fishing will take precedence over commercial, this would be advantageous for the residents.

The areas where domestic fishing is conducted and the species taken are detailed in the section on the Life Histories of Commercially Important Species in Appendix 5.

4.0 SPORT FISHERIES

The development and expansion of the sport fishery has closely followed that of the commercial fishery. Both were initially restricted because of limited access, but in the late forties and early fifties the increase in northern resource development improved access and transportation into the Territories. As a result both industries expanded rapidly in the vicinity of Great Slave Lake, Great Bear Lake and the Mackenzie River Valley.

Originally sport fishing activity developed in conjunction with lodges that offered trophy lake trout fishing. The first lodge was built in 1951 at Talthelei Narrows on Great Slave Lake. By 1965, 10 lodges and 5 sport fishing outfitters were operating. Today, there are 48 sport fishing lodges and camps scattered throughout the Territories. The majority are still lake trout lodges that are concentrated in the vicinity of Great Slave and Great Bear Lakes and on inland lakes north of the Manitoba border. However, there is an increasing demand to fish Arctic coastal areas for Arctic charr.

The importance and rapid expansion of this industry is reflected in angler licence sales. The first angling licenses were sold in 1951 at Hay River. In this first year a total of 133 were sold, 27 to residents of the Northwest Territories and 106 to non-residents. The 1975 national angling survey showed that license sales had increased to 11,375. Of these 4,851 were sold to N.W.T. residents and 2,865 and 3,659 were sold to other Canadians and non-residents respectively. The increase in license sales reflects not only the increase in lodge development but also non-lodge oriented sport fishing. That is, the improvement of highways in the Territories has attracted increasing numbers of tourists to road accessible waterbodies.

Of the 15 sport species available in the Nortwest Territories, lake trout, Arctic charr, northern pike, grayling, and pickerel are the most important to the sport fishery in terms of economic development. Most of these species are also important to the commercial fishery and as a result allocation conflicts have occurred. The first effort to separate sport and commercial fishing occurred in 1948 when Talthelei Narrows (East Arm of Great Slave Lake) was closed to commercial fishing. The closure was extended and today the entire East Arm of Great Slave Lake is managed strictly for sport fishing of lake trout with no commercial fishing allowed. Similarly, the lake trout stocks of Great Bear Lake are managed primarily for sport fishing. These measures were taken because lake trout do

not have the capability to respond to heavy fishing pressure and the lodges on Great Slave and Great Bear Lakes have traditionally been dependent on trophy size lake trout to attract anglers.

The emphasis on trophy fishing by the lodge industry has resulted in a net decline in the availability and size of trophy fish captured. As a result, strict sport fishing regulations have been adopted in recent years to protect the numbers of trophy sized individuals in the fish stocks of the N.W.T. Presently, anglers are allowed to keep only one lake trout longer than 71 cm and one northern pike over 88 cm in fork length from designated waters.

Although sport fishing has provided economic benefits to the Territories in the past, it is essential that future developments encourage local ownership and participation in order to maximize these benefits. In 1975, Great Bear Lake lodge owners provided a fly-in. fishing service to the Hornaday River for Arctic charr. Although the service was valuable to the lodge owners it provided little or no benefits to the local residents who were dependent on the resource for both domestic and commercial fishing. Therefore, the economic contributions to the local community should be considered in the allocations of resources.

5.0 MARINE RESOURCES

While marine mammals have been important to the northern economy for centuries the fish and sea food resources have received only minimal attention until recent years. In 1957 when the scientific expeditions of the M.V. Calanus were being conducted it was reported that shrimp were present in the Hudsons Bay area near Churchill and that commercial harvesting may be feasible. The survey also found that shrimp were present in limited amounts at Pangnirtung and Ungava Bay.

In 1950 an experimental fishery was conducted at Port Burwell and a total of 6,347 cod and two halibut were taken at the rate of 20 fish per hour. The cod fishery in the area continued for some time but was restricted by the lack of freezing facilities and the limited acceptance of the fish as the community had a distinct preference for fresh seal meat over the frozen or salted cod. In 1965 Mr. Ray Buffitt, the project officer for Port Burwell, conducted an experimental fishery for halibut. The experiment was conducted overnight using a longline and resulted in a catch of 2200 kg of which 185 kg were halibut weighing between 3.5 and 27 kg each. The remainder of the catch was primarily catfish which again weighed between 3.5 and 27 kg and Rough head Grenadine, the latter of which had no commercial value. Records of whether further experiments or fishing were conducted after this initial success have not been found. The following statement by Mr. Buffitt could explain why the fishery may not have been continued: "After the lines were set I anchored for the rest of the night. This was when the Eskimos thought I had gone off the deep end - to anchor 30 miles off in 100 fathoms of water and then to go to sleep! They didn't think much of it. I didn't have any trouble getting someone to watch because because all three were watching all night."

In 1973 funds were provided by the Commissioner of the G.N.W.T. to conduct a survey of the shrimp, mussels, clams, crabs, and lobsters in the Keewatin area. Indications were that shrimp were present in the Marble Island area, lobster and crabs at Coral Harbour and Chesterfield Inlet, and mussels and clams of a non-commercial size in the Rankin Inlet area. Unfortunately, the results of the study do not appear to have been published and it is unknown whether or not they were present in commercial quantities.

There has recently been renewed interest in the marine resources. Two companies, one based in Labrador and one in Quebec, are expected to start harvesting the 750 metric tonne quota for shrimp in the Resolution Island area this year. Current plans are for the harvested shrimp to be processed in Greenland and subsequently sold in the European market. Although initial catch rates are estimated to be higher than those off the east coast of Canada it is unknown whether or not the present quota represents a maximum sustainable yield. The species of shrimp from the area is also different and its acceptance in the market place remains unknown. Further investigations are also being conducted by the Department of Economic Development and Tourism (Frobisher Bay) on cod, Greenland halibut, and scallop fisheries in the Pangnirtung Fjord area.

6.0 PAST ATTEMPTS AT COMMERCIAL FISHERIES AND REASONS FOR FAILURES

Throughout the history of commercial fishing in the Northwest Territories there have been numerous attempts at starting fisheries and yet, with the exception of the charr fisheries, only Great Slave and the two walleye producing lakes (Kakisa and Tathlina) are currently being harvested.

There are four items which are essential to a successful fishery:

a) a community which is interested in and capable of developing the fishery

b) a large enough fish population to withstand the amount of harvesting necessary to make the fishery viable

c) favorable economics, i.e. low transport and processing costs in relation to fish prices

and

d) sound biological and financial planning conducted under a phased development scheme which allows for unforeseen problems to be worked out prior to large capital outlays.

Previous failures have generally been caused by the lack of one or more of these categories.

6.1 MACKENZIE RIVER DELTA FISHERIES

Reports indicate that attempts to develop fisheries in the area have failed due to unfavorable economics. We feel that perhaps this has been oversimplified for if appropriate freezing facilities had been in place, the economics may have been considerably different.

During the period of 1960 to 1972 eight attempts were made to develop a fishery, seven of which were unsuccessful due to the lack of proper freezing facilities. The freezers were generally purchased in the year that fishing was to take place and their subsequent late arrival and/or breakdown caused both a loss of fishing time and production (in some years up to 50% of fish harvested were lost).

6.2 SYLVIA GRINNELL RIVER

The failure of the charr fishery on the Sylvia Grinnell River was due to over-exploitation of the resource. Commercial, domestic, and sports fishing were conducted simultaneously. The charr population could not withstand the level of harvest and subsequently collapsed.

6.3 DIANA RIVER

The reason for the decline of the fishery is similar to that of the Sylvia Grinnell River. All "three fisheries were again conducted simultaneously which resulted in over exploitation and the subsequent collapse of the population. However, unlike the Sylvia Grinnell River the population appears to be increasing due to a high level of co-operation between the communities and the fisheries biologists.

6.4 SANDY POINT LAKE AND RIVER

Again, like the Sylvia Grinnell River the charr population was lost due to over harvesting a limited resource.

6.5 LAC LAMARTE

The loss of the Lac La Marte fishery was primarily due to unfavorable economics. The cost of flying the fish to the Hay River plant plus the cost of managing a relatively isolated fishery increased the overhead to the point where it was no longer viable.

6.6 FERGUSON, HENIK, KAMINAK, QUARTZITE, AND YATHKYED LAKES

In 1971 mercury levels of up to 0.8 ppm were found in lake trout from these lakes. At that time acceptable Canadian and U.S. levels were set at 0.5 ppm (acceptable Us. levels were later raised to 1.0 ppm) and fishing in the lakes was subsequently restricted. The loss of these lakes also added to the decline of the Rankin Inlet plant as it was forced to stop processing and canning lake trout.

6.7 MAGUSE AND KASBA LAKES

The development of the fishery was restricted due to high cyst counts in the whitefish.

6.8 INLAND LAKES

In addition to the previously mentioned areas over 100 other lakes and rivers have been fished which are no longer in production. While specific information on the individual sites is not readily available failures generally occurred as cost of flying the fish from fishing sites to the processing plant were found to be prohibitive.

7.0 FISHING METHODS

7.1 THE DEVELOPMENT OF VESSELS, GEAR AND FISHING METHODS

7.1.1 Great Slave Lake Summer Fishery

When looking at types of vessels that have been used on Great Slave Lake, two broad categories can be identified: carriers and fishing boats. Carriers would include tugs that were sometimes used to haul barges, and together these boats acted as the support vessels for the fishery. They were used to haul supplies for the fishermen and to collect fish for transport to processing or shipping centers. McInnes Products Corp. used tugs and barges to haul their catch, initially to the railhead at Waterways, Alberta, and later to Hay River. The use of fish carriers peaked in 1957 when 25 were in use on the lake and their importance declined steadily after that. The last fish carrier, the Freshwater Fish Marketing Corp.'s collector boat Broadhead, was removed from active duty in 1985 in favour of a collector airplane.

As with the fishermen, the first fishing boats of the Great Slave Lake fishery were a varied assortment brought in from other fisheries in southern Canada, particularly from the Prairie Provinces. When McInnes Products Corp. moved in from Lake Athabasca they brought with them a fleet of more or less similar, wooden-hulled boats with gasoline motors. These were all typical "Lake Athabasca" fishing boats, averaging 28 feet in length, driven by 10 to 15-h.p. gasoline motors, and capable of carrying 3 or 4 tons of fish under ideal conditions. Most had a small cabin built over the engine but none had sleeping accommodation.

Since 1945 there have been several trends in the development of the Great Slave Lake fishing fleet. Table 15, Appendix III summarizes the historical development of the fleet according to the numbers of boats and the companies that operated them. The most obvious change has been an increase in overall dimensions. The 28-foot boats first brought in by McInnes Products were soon found to be too small to be effectively used on Great Slave Lake and by 1958, when the first comprehensive investigation of the fleet was conducted, the average length of boat was over 37 ft. This was due in large part to the introduction of the "Lake Winnipeg" type boat which made its appearance as early as 1948, and made up about 60% of the fleet ten years later. These boats were typically 35 to 45 feet in length,

usually steel-hulled, had a cabin with some accommodation, and were operated by three or four men.

There is a third type of vessel which has been used extensively on Great Slave Lake. This vessel" is the "skiff" which can be generally described as an open or partially decked boat, less than 24 feet in length, powered by an outboard motor and usually operated by one man. Small boats, mostly canoes used by the Treaty Indians of Hay River, were in use as early as 1946 but the true skiff came into regular use in the commercial fishery in 1954. Generally, skiffs were privately owned and their use on Great Slave Lake peaked in 1962 when 77 were reported to be in use.

Two additional boat types were introduced to the fishery in 1977. Inboard-outboard yawls, 20 to 26 feet in length and without cabins, are usually included in skiff data and issued Class B licences. Aluminum bowpickers, 30 to 35 feet in length and with stern-mounted cabins, are pooled with the larger whitefish boats and require Class A licences. There has been a recent trend towards an increasing proportion of skiffs in the fleet.

Fishing gear has changed very little since 1945. Sinking gill nets have been used exclusively since the beginning, and although floating gill nets, trap nets, seine nets, and otter trawls, have all been tried experimentally, none have gained any acceptance. An initial preference for cotton nets gradually shifted toward nylon nets, due mainly to better durability and efficiency. Legal mesh size was maintained at 5 1/2 inches stretched measure until 1977 when it was reduced to 5 1/4 inches and both sizes are presently in use. Regulations regarding gill net use have also varied. Until 1961, gill nets could be no longer than 90 meters (100 yds.). At the same time the restriction on the number of nets allowed per fisherman, set at ten in 1945, was lifted. Net hanging ratio and the maximum allowable time a net could be left in the water were also regulated at one time.

There have been some significant gear introductions since 1945. Net lifters, depth guages and two-way radios, introduced in the mid-50's, gained rapid acceptance by greatly improving efficiency. There has also been a long standing trend towards carrying life boats on board the larger fishing boats.

In the early years of commercial fishing on Great Slave Lake there were some clear distinctions between the Gros Cap and the Hay River fisheries. The regional and ethnic makeup of the fishermen involved in both fisheries was basically similar. Most summer fishermen were seasonal residents only who came in from northern Alberta and Saskatchewan or from the large lakes of Manitoba.

The majority of the Gros Cap fishermen came from Lake Athabasca where they had been fishing primarily for lake trout. As thier employer, McInnes Products Corp., had a clear preference for marketing lake trout; this became the main species fished for in the area. The Hay River fishery on the other hand, employed mostly fishermen who had come from the large "whitefish" lakes of the prairies. Since their location on the west end of Great Slave Lake also put them on predominantly whitefish waters, it was logical that their fishery would come to be dominated by whitefish.

The Gros Cap fishermen landed all of their catch at the Gros Cap plant. For the first few years the catches were goodin areas close to the base camp but eventually the fishermen had to travel further afield. This reduced both their efficiency and their overall production since so much of their time was spent traveling. Often the fish quality also declined due to extended travel time. In an effort to salvage the lower quality fish, McInnes developed the frozen fillet product which eventually dominated their production.

The Hay River fishermen were not tied to a base plant. Unless they were fishing in the vicinity of Hay River, they delivered their catch to temporary barge mounted processing plants. These plants were moved periodically to follow the fishermen. The fish were stored fresh in coolers until enough had accumulated, usually not more than two days, at which time they were transferred to carrier boats for shipment to Hay River.

The overall efficiency of the Hay River fishery in combination with the ability to take advantage" of the lucrative fresh fish market permitted the Hay River based companies to offer their fishermen higher prices. By 1955 the Gros Cap fishery was becoming non-competitive and they decided to pull out.

7.1.2 Great Slave Lake Winter Fishery

Winter fishing on Great Slave Lake began in 1946 when the winter road was completed to Hay River. Hay River has continued to be the base of operations for all winter fishing. In the beginning a wide variety of transport vehicles were tried, including trucks, aircraft, and dog sleds. However, the Bombardier snowmobile quickly established itself as the workhorse of the fishery. A snowmobile was generally used in combination with a "caboose", a well insulated shack on skids that was towed from site to site and offered mobile accommodation to a team of fisherman.

Gill nets have always been the only capture gear in use and they are fundamentally the same as those used in the summer. Needle bars and ice chisels were originally used to make the holes through which the nets were set but these were eventually replaced by the mechanical ice auger. A clever device called a "jigger", originally developed for Lake Winnipeg, has been used since 1946 to run the nets under the ice.

Since the 1960's the "skidoo" type snowmobile has found a place in the fishery and *in* 1985 there were 21 registered. The restricted entry policy, introduced in 1979, allows a maximum of 32 Winter Class A (bombardier) and 30 Winter Class B (skidoo) certificates.

7.1.3 Inland Lakes

The mainstay of the inland lakes fishery has always been the airplane as this is the only vehicle that makes most of the lakes accessible. Ironically, the high cost of air transport has always been the biggest deterrent to the growth of the fishery.

On the water, small outboard-powered boats have been used exclusively and the capture gear has always been the standard sinking gill net. A minimum legal mesh size of 5 1/2 inches has been specified for all commercial lakes except those that have been designated as pickerel lakes on which a mesh size of 4 1/2 inches has been allowed.

Some inland lakes have been fished in winter using Bombardiers on winter roads but these attempts have not been found to be cost effective.

7.1.4 Mackenzie Delta

All of the government-sponsored fisheries that were carried out in the early 1960's utilized mobile barge mounted freezers as the main processing and storage facility. Ultimately, problems with these freezers proved to be one of the major sources of setbacks. The Menzies Fish Co. used a collector boat to periodically collect fish from the various sites that it fished during 1965. The loss of this boat towards the end of that season led Menzies to use an aircraft for fish collection during the next season and the high cost of this enterprise may have contributed to the companies decision to pull out.

Small fishing boats and gill nets have been the basis of the fishery throughout and these have not differed fundamentally from those used elsewhere in the Northwest Territories.

7.1.5 Arctic Coast

For the past 20 years the majority of charr harvested (with the exception of the Cambridge Bay fishery) have been taken with standard sinking gill nets. Currently, the trend is to replace the gear and use weirs.

The use of weirs for domestic fishing in the Arctic predates recorded history. In the coastal areas weirs were generally constructed by blocking off the streams with rocks and coralling the fish into a central area where they were speared. In the Mackenzie River Valley traps were constructed from branches and sticks on small streams and the fish were "funnelled" into holding pens where they were removed by hand.

Although weirs or fish fences have been used by biologists to determine fish populations since 1938, they have not to date been recognized as a legal fishing gear. The advantages of weirs over traditional commercial gear have however been recognized by resource managers and the Fisheries Act is currently being reviewed. It is expected that weir fishing may be allowed within the next few years. As weirs have the potential of capturing and subsequently destroying 100% of the migrating population, certain conditions on the portion of the river allowed to be trapped and strict management guidelines will have to be developed prior to its acceptance.

The advantages of this gear, which have been highlighted by the success of the Cambridge Bay operation, are:

a **better quality fish is produced without gillnet marks which increases its acceptance by southern consumers**

fish can be held live at the trap site until transport can be arranged which decreases the spoilage rate and increases the access into the higher priced fresh fish market

weirs are more economical and do not have to be replaced on a yearly basis

it allows for the specific selection of marketable size fish

and

the weir allows the resource manager to properly assess and monitor the fish population

8.0 STATISTICS

Statistics on the commercial fisheries of the Northwest Territories are presented in Tables 1 to 15, Appendices I to III and Figures 1 to 9, Appendix IV.

8.1 HARVEST DATA AND REGIONAL INPUT

The total N.W.T. harvest, as a percentage of the total national average, is presented in Figure 1, Appendix IV. After production peaked in 1949 the N.W.T. fisheries have experienced an almost constant decline in production. By 1983 the Territories contributed only 2.4% to the national total as compared to 12.2% in 1949. As Great Slave Lake is the major contribute to the N.W.T. fishery, this is also reflected in the decline in the total commercial landings for Great Slave Lake (Figure 2, Appendix IV). The major producers of freshwater fish and their contribution to the Canadian total for the period covering 1974 to 1983 (Figure 4, Appendix IV) were Ontario (64.8%), Manitoba (29.4%), Saskatchewan (9.8%), Northwest Territories (3.2%) and Alberta (3.0%).

Despite this lower production the N.W.T. has maintained a substantial share of the whitefish production. During the period of 1974 to 1983, the N.W.T. harvested 12% of total whitefish production (Figure 3, Appendix IV). The major whitefish producers during this period were Manitoba (39.6%), Saskatchewan (19.7%), Ontario (18.3%), N.W.T. (12.0%), and Alberta (10.4%).

During the period of 1974 to 1983 Great Slave Lake accounted for 89.7% of the Territorial production. This was followed by the coastal fishery at 7.3%, the inland lakes at 2.5%, and the Mackenzie Delta at 0.5%. The recent interest in developing the coastal charr fisheries and the declining interest in fishing inland lakes will change their contribution to the overall fishery in future years. The Mackenzie Delta is not currently being fished commercially and with the exception of a possible herring fishery there does not appear to be any plans to revive it.

8.2 SPECIES COMPOSITION

The composition of the N.W.T. harvest has changed significantly since 1945. Originally lake trout contributed approximately 64% to the total catch but in recent years this has fallen below 6%. In the same period the proportion of whitefish has risen from 30% to 72%. The amount of pike harvested has also risen while pickerel and inconnu catches have been extremely variable over the years (Table 1, Appendix I). Despite the previously mentioned interest in developing the charr fisheries, which in 1984 represented approximately 12% of the total harvest, the whitefish has established itself as the dominant commercial species and it is doubtful that it will lose its position in the fishery. The species composition of the commercial catch from Great Slave Lake is provided in Figure 6, Appendix IV.

While the quantity of fish harvested has declined the average size of the fish captured has remained relatively constant. The changes in the average round weights of whitefish and lake trout from Great Slave Lake are illustrated in Figure 7, Appendix IV. Life histories of the important commercial and sport fish of the N.W.T. have been provided in Appendix V.

8.3 PRICES AND INCOMES

A comparison of the landed values for whitefish in the N.W.T., Ontario and Manitoba to the national average is provided in Figure 8, Appendix IV.

The Ontario prices have consistently been significantly higher than the national average. The Ontario prices peaked around 1978 and again in 1982 and showed a decrease in 1983. The Manitoba prices have been extremely variable since 1967 but, with the exception of two years, have consistently been below the national average. The price paid to Manitoba fishermen was at its all time low in 1982 and showed a slight increase in 1983. The N.W.T. prices were far below the national average in 1945 but showed a steady increase until 1969. At this time the landed value for whitefish peaked and although it remained above the national average for the next five years, the general trend was downwards. With the exception of one year, the" prices have remained below the national average and by 1983 this difference was approximating the 1945 disparity. The lower prices, as compared to both Ontario and Manitoba, can partially be accounted for by their distance from southern markets and the increased costs of transportation.

However, as these factors did stop relative prices paid to the fishermen from increasing until 1969, other factors such as the loss of the smoker category of whitefish and the current pooling system could be contributing to the disparity between the regions.

The overall prices paid to N.W.T. fishermen have been rising in recent years but this is primarily, if not solely, due to the heavy subsidies form the Territorial Government. The actual, unsubsidized prices have been dropping steadily and are now well below the threshold of economic viability.

While the average fisherman's income has risen consistently (Table 12, Appendix III), the number of self-employed operators has declined proportionally. Considering inflation, the actual increase in total earnings has not been significant (1.1 million in 1970/71 compared to 1.7 million in 1983/84) but these earnings are being concentrated in a smaller group of fishermen.

8.4 EMPLOYMENT

When commercial fishing first started in the N.W.T. the majority of fishermen were directly associated with the fishing companies and did not own their own boats. Gradually there was a shift towards self employment and owner operated boats and by 1969 all boats were privately owned. Records on the number of self-employed operators have been kept since the 1970/71 season at which time 236 were fishing, Table 12, Appendix II. In the 1983/84 season this had decreased to 69 operators and a total of 118 individuals were employed in the primary industry.

9.0 PRIVATE SECTOR INVOLVEMENT

Private companies were responsible for the bulk of the commercial fishing from 1945 to 1969 when the FFMC was established. Most of these companies operated exclusively on Great Slave Lake and were based in Hay River. Table 15, Appendix III summarizes the historical record of private sector involvement in the Great Slave Lake fishery.

All of these companies were essentially similar in the way in which they operated and in their relationships with the fishermen. Typically the fishermen worked in crews of 2 to 4 men, including a skipper who had overall responsibility. Through an informal agreement a skipper would affiliate himself with a specific company and would deliver all of his catch to that company. In return, the companies would rent fishing boats, usually for $500 per month, supply leads and corks for their nets, and offer substantial credit or cash advances. Most companies operated “floating stores” which followed the fleet and kept the fishermen supplied with essentials.

The majority of boats were company owned but the few privately owned boats also affiliated themselves with their favourite companies. The fishermen were paid a flat rate as the fish were delivered.

Most of the companies operated their own stores, outside of Hay River, and conducted all of their finances through southern banks. Consequently, they did not contribute significantly to the local economy. Though the companies did consistently depend on many reliable and experienced local fishermen, they tended to show a hiring preference for non-resident fishermen. Most of these men were seasonal residents who came up from the prairie provinces for either the summer or the winter fishing seasons.

The number of private companies involved in the Great Slave Lake fishery peaked in the early 1950’s and declined steadily thereafter. Four companies were still located in Hay River in 1969 when the NWT fishery came under the jurisdiction of the FFMC. In that same year one of the surviving companies, Carter Fisheries, was bought out by a group of local fishermen who formed a company called the Syndicate of Fishermen. With 15 men and 9 fishing boats, they formed the first and only locally owned and owner operated fishing company to operate on Great Slave Lake. The effort failed and the syndicate was disbanded leaving the FFMC as the sole fish buying agency in the N.W.T.

10.0 PUBLIC SECTOR INVOLVEMENT

10.1 FRESHWATER FISH MARKETING CORPORATION

The Freshwater Fish Marketing Corporation (FFMC) is a federal crown agency which was established in 1969 under the Freshwater Fish Marketing Act. The corporation is active in the Northwest Territories, Manitoba, Alberta, and Northwestern Ontario and has a mandate to increase the returns to the fishermen through the orderly marketing of the fish and the promotion of national and international sales. The majority of the fish marketed by the corporation (approximately 70%) are sold to the U.S. with the remaining product being sold to France, Sweden, Finland, Germany and the domestic Canadian market. The sale of whitefish to the U.S. is primarily to the Jewish market where the demand increases during the winter religious holidays.

In the Northwest Territories the FFMC operates a processing plant in Hay River, three fish receiving stations on Great Slave Lake (Wool Bay, Simpsons Islands, and Whitefish Station), and the M.V. Broadhead (the operation of which is paid for by the G.N.W.T.). Current Plans include the replacement of the Broadhead by a vessel capable of carrying “piggy back” containers which can be transferred directly to trucks for shipment south and the construction of a newer, smaller and more cost effective processing plant in Hay River.

From the time of its inception the FFMC has come under a great deal of controversy and the rapport between the corporation and the fishermen in the N.W.T. has at times been lively to say the least. Although the object of this report is not to review the operations of the FFMC, a number of questions were raised by the fishermen interviewed and although concrete answers have not been found to all of these, we feel it would be negligent not to provide our opinions and findings.

Marketing

In records dated as early as 1972 the FFMC has been criticized for being too conservative in its approach to marketing. During this survey individuals were asked what they felt could be done to improve the Territorial fisheries and the increased emphasis on marketing of Arctic charr was often given as a first priority. Despite some recent reports which have indicated that the marketing of Arctic charr has been adequate, the fact remains that last year’s catch is still unsold. The Department of Economic

Development and Tourism in concert with other government agencies has recently been investigating the promotion of Arctic charr as a smoked product and results to date have been promising. As the amount of charr which is processed by the FFMC is small in comparison to other species such as whitefish, the amount of effort put into its marketing may not properly reflect its importance to the coastal charr fishery. An arrangement where the G.N.W.T. would provide both the required funding and an individual to work with the FFMC's marketing section specifically on the promotion of Arctic charr could be a possible solution.

The historical market for rough fish as dog food has been almost eliminated with the advent of snowmobiles. As there is currently no other market for these fish, up to 50% of the fishermen's catches are being discarded. A number of fishermen in the Hay River area felt that as the FFMC did not provide a market for their burbot and tullibee that they should be allowed to develop whatever markets were available to them. The authors are of the opinion that unless the FFMC plans to develop a market for these fish in the foreseeable future that this should be allowed. It should however be noted that the marketing of these species may have a somewhat detrimental effect on the overall market as in some cases they would be purchased as an alternative to other species. In additon, although a small market for burbot does currently exist the transport costs and the fact that the Great Lakes fishermen are selling their burbot for approximately 2.5 cents/kg will make it difficult to develop an economically viable operation. We feel that the promotion of sales inside the N.W.T. through the development of new products may have a better chance at success.

Infrastructure

Some of the Hay River fishermen voiced concern that the construction of the newer and smaller plant would be detrimental to the winter fishery and that it in fact heralded the end of that fishery. The authors are of the opinion that the new plant will, if anything, enhance the winter fishery and that all groups involved including the FFMC and government managers would like to see the expansion of the winter fisheries. During the winter months the prices for whitefish have been considerably higher than in summer months due to the demand for the product for use during the Jewish religious holidays and the decreased competition from the Great Lakes. If the winter fisheries were discouraged the FFMC would have difficulty supplying this demand.

The fishermen have also voiced concern that the replacement of the Broadhead by a catamaran type boat capable of carrying piggyback containers is unfeasible for the water experienced on Great Slave Lake. A number of people subsequently interviewed were asked if this would be the case and the views expressed were varied. The authors have not been able to determine whether or not this type of boat would in fact be suitable but considering the economic restrictions on the fishery due to high transport costs alternatives such as this should be investigated.

Economics

Concerns were raised that when fish bi-passed the FFMC i.e. when fish from Great Slave Lake were sent directly to the U.S. from Edmonton or when charr were shipped via Montreal for the Montreal market that the transport costs related to the F.O.B., FFMC Transcona policy are not adjusted accordingly. The FFMC states that when fish are inspected, passed and shipped to the market without passing through their plant that the transport costs are adjusted accordingly.

Another area of contention expressed was the pooling of whitefish for the determination of the final payment to fishermen. Fishermen generally feel that this method is unfair because the final payment made for export grade whitefish is the same as for cutters. The FFMC holds that the difference between the grades including the final payment is reflected in the initial payment and that in the past few years the best return has been from the processed cutters. Although the authors do not have access to that type of information it would appear that the smokers and export grade whitefish are more versatile as they can be sold as a continental or cutter or whatever the market demands while a cutter can not be upgraded and sold as anything but a cutter. For this reason we feel that a closer look at the current pooling practices of the FFMC should be made.

Although the authors feel that certain practices of the FFMC should be reveiwed we also feel that the original mandate of increasing the returns to the fishermen is being met. The general consensus of individuals involved in the management and economics of the Territorial commercial fisheries is that if the N.W.T. were to withdraw from it's current arrangement with the FFMC it would have a detrimental effect on the fishery.

10.2 DEPARTMENT OF FISHERIES AND OCEANS

The Department of Fisheries and Oceans, Western Region, has complete responsibility for fisheries research and management in the Northwest Territories. Through its various Directorates and the N.W.T. District Management, the Department of Fisheries and Oceans oversees the following:

1. **Fisheries Management**

   refers to the management of sport and commercial fisheries through programs of inventory, monitoring exploitation, and assessment of potential fisheries and the setting of seasons, quotas, restrictions and licensing.

2. **Environmental Impact**

   refers to the inventory and surveillance of aquatic resources that may be affected by industrial development in the N.W.T.

3. **Enforcement**

   ensuring the conservation and protection of the fish resources through the enforcement of regulations.

4. **Inspection**

   refers to the inspection and certification of fish processing and handling facilities and fish products.

5. **Small Craft Harbours**

   responsible for the administration and maintenance of federally funded harbours and ancillary facilities utilized by commercial and sport fishermen.

10.3 DEPARTMENT OF ECONOMIC DEVELOPMENT AND TOURISM, G.N.W.T.

The N.W.T. Department of Economic Development and Tourism is involved in both the commercial and sport fisheries. Its involvement in commercial fisheries is restricted principally to local industry promotion. The department, through the Small Business Loans or Guarantees Fund, the Eskimo Loan Fund, Special ARDA, an EDA, will assist fishermen with insufficient capital to enter commercial fishing. In addition, both commercial and intersettlement commercial fisheries are supported and subsidized.

In regards to its sport fishery activities, the department is actively involved in the tourist promotion of sport fishing in the N.W.T. It is also responsible for providing direction on how to attract and service tourists. Although the N.W.T. Government ultimately depends on the Department of Fisheries and Oceans to manage the sport fishery, the Department of Economic Development and Tourism effectively controls the development of the sport fishing industry. That is, the department controls the number of lodges and guests at a lodge on any lake.

10.4 DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT

The principal responsibility of the Department of Indian Affairs and Northern Development is to ensure that the development of commercial or sport fisheries will benefit native people economically and socially. In addition, through the northern development programs, fish handling facilities, boats, fishing gear, and transportation networks are assisted or subsidized for the native people and communities.

11.0 CONSTRAINTS

11.1 ECONOMICS

The major constraint which has restricted the development of commercial fisheries in the N.W.T. has been the economics. The high costs for transport, fuel, labour, materials and fishing gear have caused the closure of the majority of the inland lakes and Mackenzie Delta fisheries and has severely restricted the Great Salve Lake and Arctic charr fisheries.

These problems are best illustrated by examining the following operations:

Kaminuriak Lake, 1973

Total catch of whitefish		9,852 kg
Total catch of lake trout		13,172 kg
Total		23,024 kg
Aircraft Cost	$	19,900.00
Wages to fishermen		17,255.00
Groceries		2,200.00
Gasoline		1,912.00
Diesel		279.00
Total	$	41,546.00

Breakdown of Costs

Air transport	86.0 cents/kg of fish
Wages	74.0 cents/kg of fish
Groceries	9.0 cents/kg of fish
Fuel	9.0 cents/kg of fish

The production cost per kilogram of fish was $1.78 which compared to the F.O.B. Hay River price of 70 cents/kg and 75 cents/kg for whitefish and lake trout respectively demonstrates the problems inherent in fishing inland lakes.

Lac La Marte - 1971

The following relates to production costs for jumbo whitefish:

Air freight to Wool Bay	28 cents/kg of fish
Packer vessel to Hay River	4 cents/kg of fish
Charge for gutters	3 cents/kg of-fish
Charge for plant workers	2 cents/kg of fish
Plant rental	11 cents/kg of fish
Total	48 cents/kg of fish

The F.O.B. Hay River price for export whitefish in 1971 was 55 cents/kg which left 7 cents/kg for the fishermen who to the best of our knowledge had to supply the boats, motors, gas and labour. Within a few years the Lac La Marte fishery was subsequently closed as it was non-viable.

Mackenzie Delta - 1963

Although a breakdown of the operational costs is not available, in 1963 these costs, including depreciation of capital assets, were $1.65/kg for whitefish which sold at 66 cents/kg and 88 cents/kg for fresh frozen and smoked respectively.

Mackenzie Delta - 1964

Production costs for dressed whitefish, not including depreciation, were 53 cents/kg. These fish were retailed in the Inuvik market for 77 cents/kg.

These examples have been randomly chosen from the literature and represent the financial constraints that the fishermen have had to operate under. These high costs and low earnings have been the primary reason for the decline in self employed operators as shown in Table 12, Appendix II. In the 1970/71 season there were 236 operators as compared to 69 in the 1983/84 season. This decline in operators however has also been shadowed by a parallel increase in the average gross income to these operators which has increased from $4,631. in the 1970/71 season to $25,060. in the 1983/84 season.

11.2 COMPETITION FROM OTHER FISHERIES

The N.W.T. provides approximately 12% of the whitefish produced in Canada (Figure 3, Appendix IV). During the period of 1974 to 1983 the largest producer was Manitoba with 39.6% followed by Saskatchewan (19.7%), Ontario (18.3%), and Alberta (10.4%). Although production from both Saskatchewan and Alberta has been decreasing in recent years, the difference has been taken up by Manitoba and Ontario while N.W.T. production has remained relatively constant. Production figures for whitefish from each province are provided for the period of 1945 to 1983 in Table 10, Appendix 1.

As the largest producers of a product are generally the ones who dictate or control the price structure and since these producers are located in close proximity to the markets, the N.W.T. fishery has met with stiff competition throughout its development. The degree of influence that the Great Lakes has on the price of whitefish is demonstrated during the winter fishery. As these lakes cannot generally be fished to any extent in the winter, the prices paid to the Great Slave Lake fishermen have been as much as 50% higher.

In formulating any plans for the marketing of rough fish from the Territories, competition from these areas should definitely be taken into account. Although small quantities of N.W.T. burbot are currently being marketed, it is doubtful that a significant market could be developed. The burbot from the Great Lakes are being sold at 2.5 cents/kg which is considerably less than even the cost of shipping them from the Territories.

Competition for charr sales has historically come from the producers in Labrador. In recent years, Scandinavian countries have become interested in producing charr through aquiculture and have met with considerable success. These charr are currently being marketed in Europe and in some areas are taking over markets previously held by the territories. An effort should therefore be made to promote Arctic charr as a quality product produced in the clear unpolluted northern waters in order to make sure that the consumer can differentiate between the two types.

11.3 COMPETITIVE USES

Throughout the development of the fishery there has been and continues to be considerable discussion as to whether domestic, sports or commercial fishing should take precedence where there is a limited resource. Historically, it has been shown that northern fish populations can rarely support all three types of fishing pressure. At the Sylvia Grinnel River, Diana River, and Sandy Point River where all three types of fishing were conducted simultaneously the fisheries eventually collapsed.

As the domestic fishery is important in order to maintain the traditional life style of the residents and economically important due to the cost of alternate food supplies, it should be given preference.

The authors feel that sport fishing should continue to be placed as the next priority. For species such as lake trout which are extremely slow growing and have low reproductive rates and northern pike which is considerably more in demand as a sport fish than as a food fish, this should be the preferred harvesting method.

However, while the sports fishing industry should be supported, an increased participation by the local residents should also be encouraged in order to ensure that the individuals who depend on the resource for their livelihood are the ones who ultimately benefit from its development.

11.4 POLLUTION

Historically, pollution has not caused major problems to commercial fisheries to date. However, as northern fish are much slower growing and live longer than southern fish they are more susceptible to accumulating higher levels of pollutants. As one of the prime selling features of territorial fish is their reputation for being of good quality and pollutant free, it is extremely important that activities such as oil exploration and mining be closely monitored.

The effects of the Norman Wells oilfield development is currently being investigated after the residents of Fort Good Hope reported poor quality flesh and abnormalities in the livers of fish being taken from the Mackenzie River.

In 1972 studies were conducted on the Giant and Con gold mines which are located in the Yellowknife area. It was found that the Giant Mine was discharging high levels of arsenic, copper, and zinc into Yellowknife Bay and that the Con Mine was discharging low levels of arsenic and copper into Great Slave Lake. During the same survey it was found that the Echo Bay mine was discharging high levels of arsenic into Great Bear Lake and that the Terra Mine was discharging arsenic into Ho-Hum Lake. In recent years these mines have changed their production methods which has resulted in a decrease of pollutants leaving the mines. Despite the reduction, new mines such as the proposed Thor Lake beryllium mine which could start operations on Great Slave Lake as early as 1987 will have to be closely monitored.

In 1970 fish from several lakes in the Keewatin District were found to have higher than acceptable levels of mercury. This mercury, which was naturally occurring and not due to industrial pollution, was found to be highest in lake trout where a maximum level of 0.82 ppm was recorded. As the acceptable level was only 0.5 ppm., 2727 kg of lake trout had to be discarded and the Rankin Inlet cannery was restricted to canning only whitefish and charr. It should be noted that while Canada has maintained the maximum acceptable level of 0.5 ppm the United States has raised it to 1.0 ppm and these fish would now be acceptable for export.

Export to U.S. Market

12.0 RECOMMENDATIONS

A. The economics of commercial fishing in the N.W.T. leaves little or no room for error. It is therefore recommended that the Federal and Territorial Governments jointly formulate a standard set of procedures which would be conducted prior to initiating any new ventures. This working plan should include but not be limited to the following:

a determination of the level of interest for commercial fishing in the community, i.e. are they willing to commit themselves to the development of the fishery

an economic study to determine whether a market exists for the fish and whether it's economically feasible to transport the fish to that market. The minimum harvest required to maintain a viable fishery should also be included in the report

a complete stock assessment should then be conducted to determine whether or not an adequate resource exists to sustain the minimum required harvest

information on fish health including levels of pollutants and degree of parasitism should be taken during the stock assessment

in the case of whitefish the percentage of jumbos versus large, medium and small should be determined

in the case of Arctic charr flesh colour should be noted and attempts should be made to see if the fish have access to the fresh fish market

the economic study should then be reviewed in light of the information acquired from the stock asessment

If it is then determined that the fishery is to proceed, the following should be conducted:

all equipment required including freezing facilities and fishing gear should be ordered, in place, and functioning in the first year of the project with no fishing to take place until the second year

a controlled expansion of the fishery should take place with the maximum allowable quota being taken in the fourth or fifth year of the project to ensure that all problems have been solved prior to processing a large harvest

Although many of the above are currently being conducted or applied by the responsible departments, we feel that if a detailed work plan was developed and conducted in a sequential manner, the success rate of commercial ventures would increase significantly.

B. Reports on the marketing of Arctic charr have indicated that a significant effort has been made to increase sales. However, as last year's catch remains unsold, it is obvious that further promotion is still required especially in light of the potential increase in production. As the quantity of charr handled by the FFMC is small in relation to other species, the corporation may not be willing to increase its marketing effort. In order to utilize the FFMC's substantial resources and expertise, an individual employed through the Territorial Government could be seconded to the FFMC specifically for increasing the marketability of charr. This should be conducted as soon as possible for if charr continue to be sold after being held for long periods of time, any chance of promoting them as a gourmet item will be lost.

C. Due to the high cost of transporting fish to southern markets, the high cost of food supplies to northerners, and the decrease in domestic fishing as northerners find employment in the oil and mining industries, there has been a steadily increasing market for fish in the N.W.T. We therefore feel that an increase in intersettlement trade would benefit both the fisherman and consumer and consequently should be promoted.

D. Since the initial days of the FFMC'S involvement in the Territorial fisheries, there has been considerable controversy between the Corporation and the fishermen. Having compared the comments of the fishermen acquired during the writing of this report to the concerns expressed by the fishermen over the past 16 years, a considerable overlap has been found. We feel that this has and is continuing to affect the morale and subsequently the productivity of the fishermen. We therefore feel that a concerted effort should be made to openly air, discuss and clarify these problem areas. As attempts have been made at this in the past and have not met with a great deal of success, we would recommed that an independent expert on commercial fisheries and fish marketing be jointly selected by the Fishermen's Association and the FFMC to assist them in this matter.

E. Winter fishing on Great Slave Lake has not reached its fullest Potential. Considering the higher winter prices for fish coupled with the steadily rising costs of maintaining the existing fishing fleet, the promotion of the winter fishery would be advantageous at this time.

F. During the past forty years Great Slave Lake has developed primarily as a gill net fishery. With the exception of work conducted by the Department of Fisheries and Oceans very little research on gear development has taken place. In order to compete with other fisheries further research should be conducted with emphasis being placed on gear which will provide the fishermen with live, unmarked fish which would be more suitable for the fresh fish market.

G. A comprehensive training program on the management and marketing of fish resources should be developed and offered to communities involved in commercial fishing. The program should include basic information on what happens to the fish once they leave the community, what type of product the southern consumer wants to buy, and how fish stocks are managed. While the program would not be designed to create instant biologists or marketing experts, it would enable the community to more actively participate in the fishery. It would also facilitate discussion between the communities and participating groups such as the FFMC and government biologists and subsequently create a more effective fishery.

H. On various occasions commercial fisheries have been developed as a method of relieving regional economic distress although it was realized at the time that it would not be economically viable. In time the reasoning behind the development of these fisheries was forgotten and they were subsequently labelled a failure and closed. Future activities should not include this type of development as it discourages communities where commercial fishing could be feasible.

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APPENDIXI

HARVEST DATA

Table 1. Northwest Territories commercial landings, 1945-1984. Harvest volumes in thousands of kgs round weight. Summarized from Tables 2, 6, 7 and 9.

Year	Wh.fish*	Lake Trout	Pickerel	N. Pike	Inconnu	Arctic Charr	Mixed	Total
1945	228	484			40			752
1946	570	735			51			1357
1947	907	757			39			1698
1948	2196	994	2		102			3294
1949	2468	1825		18	163			4474
1950	2608	1157	1	51	124			3941
1951	1913	1259	1	33	146			3351
1952	1665	1346	3	33	90			3138
1953	1788	1092	17	31	91			3020
1954	1789	1121	34	29	78			3051
1955	1991	1295	56	30	75		1	2403
1956	1864	1189	32	27	76		8	3193
1957	1994	900	27	42	97		4	3060
1958	1533	915	57	71	99			2672
1959	1560	783	51	120	141			2645
1960	1733	508	114	114	78	24	17	2588
1961	1722	511	29	183	135	23	31	2636
1962	2106	608	6	125	125	53	493	3519
1963	2078	343	54	140	156	51	316	3138
1364	2072	429	11	80	133	42	258	3033
1965	1812	441	16	108	139	74	406	3000
1966	1266	282	14	149	98	76	311	2198
1967	1057	345	16	212	111	48	153	1944
1968	1454	126	11	162	84	48	146	2030
1969	1375	160	7	133	80	91	356	2202
1970	1728	329	42	135	58	51	30	2372
1971	1533	197	68	103	62	114	12	2089
1972	1442	173	66	91	79	97	10	1963
1973	1065	134	47	155	104	135	1	1632
1974	993	113	45	111	100	166	1	1693
1975	938	111	46	96	95	154	4	1443
1976	993	83	32	103	77	80		1369
1977	1176	108	30	119	87	138	5	1661
1978	1113	107	15	158	153	108	1	1655
1979	1076	121	31	131	154	103		1620
1980	1203	130	52	205	65	105		1770
1981	1097	85	55	151	43	102		1535
1982	1127	89	17	139	18	86		1556
1983			40			85	6	1277
1984			26			143	4	1226

X includes lake whitefish, broad whitefish and round whitefish

Table 2. Great Slave Lake commercial fisheries harvest, 1945-1985. Harvest volumes in thousands of kg round weight. From DFO, MS Reports and Ken Roberts, Hay River.

Year	Whitefish	Lake Trout	N.Pike	Inconnu	Pickerel	Total
1945	228	484		40		752
1946	570	735		51		1357
1947	907	757		39		1698
1948	2196	994		102	2	3294
1949	2468	1825	18	163		4474
1950	2608	1157	51	124	1	3941
1951	1913	1259	33	146	1	3351
1952	1665	1346	33	90	3	3138
1953	1788	1092	31	91	1	3004
1954	1789	1121	29	78	1	3018
1955	1991	1295	30	75	5	3397
1956	186.4	1189	27	76	2	3155
1957	1993	900	42	97	1	3033
1958	1533	915	71	99	3	2618
1959	1557	775	114	141	10	2587
1960	1722	498	110	78	5	2413
1961	1678	486	175	135	10	2484
1962	2042	533	123	125	5	2829
1963	2042	317	139	156	6	2660
1964	1764	303	80	133	10	2290
1965	1709	369	108	139	14	2339
1966	1230	268	149	98	14	1760
1967	1050	303	212	111	16	1693
1968	1441	123	162	84	11	1819
1969	1368	136	133	80	7	1724
1970	1469	223	134	58	8	1892
1971	1375	146	99	62	15	1697
1972	1067	86	90	79	7	1328
1973	1006	92	155	104	17	1374
1974	975	111	111	100	45	1478
1975	923	100	96	95	10	1223
1976	977	83	103	77	9	1249
1977	1175	108	119	87	11	1499
1978	1109	106	158	153	13	1539
1979	1067	121	130	154	6	1478
1980	1180	122	200	65	19	1585
1981	1097	85	151	43	4	1381
1982	1124	81	138	18		1411
1983						1096
1984						1056
1985						1157

Table 3. Great Slave Lake commercial landings of whitefish and lake trout (thousands of kg round weight) according to years and seasons. Data from DFO: MS Reports, Data Reports, and Ken Roberts, Hay River.

	Whitefish			Lake Trout			Both		
	Summer	Winter	Annual	Summer	Winter	Annual	Summer	Winter	Annual
1945	227	0	227	499	0	499	726	0	726
1946	454	91	590	726	0	726	1179	91	1315
1947	408	499	907	680	91	771	1089	590	1633
1948	454	1724	2177	635	363	997	1089	2087	3175
1949	1043	1406	2449	1361	454	1814	2404	1860	4264
1950	1043	1542	2585	907	272	1134	1950	1814	3765
1951	953	953	1905	997	272	1270	1950	1225	3175
1952	726	907	1633	1134	227	1361	1860	1134	2994
1953	680	1089	1769	862	227	1089	1542	1315	2858
1954	1043	771	1814	862	227	1089	1905	997	2903
1955	1089	862	1950	1089	181	1270	2177	1043	3220
1956	1043	816	1860	953	227	1179	1996	1043	3039
1957	1225	771	1996	771	136	907	1996	907	2903
1958	816	680	1497	816	136	953	1633	816	2449
1959	907	680	1588	635	136	771	1542	816	2359
1960	1134	590	1724	408	91	499	1542	680	2223
1961	907	771	1678	408	91	499	1315	862	2177
1962	1225	816	2041	408	91	499	1633	907	2540
1963	1179	862	2041	272	45	318	1451	907	2359
1964	1043	680	1724	272	0	272	1315	680	1996
1965	907	771	1678	318	45	363	1225	816	2041
1966	635	590	1225	227	0	227	862	590	1451
1967	590	499	1089	227	45	272	816	544	1361
1968	816	590	1406	91	0	91	907	590	1497
1969	816	544	1361	136	0	136	953	544	1497
1970	862	590	1451	136	91	227	997	680	1678
1971	862	499	1361	92	45	136	953	544	1497
1972	726	363	1043	46	45	91	771	408	1134
1973	771	45	862	272	45	272	997	91	1089
1974	726	45	771	272	45	318	953	91	1089
1975	590	91	726	318	0	318	907	91	997
1976	771	91	862	181	0	181	953	91	1043
1977	953	91	1089	181	0	181	1179	91	1270
1978	771	91	862	318	0	318	1089	91	1225
1979	726	91	862	318	0	363	1043	136	1179
1980	816	91	953	363	0	363	1179	136	1315
1981	318	0	363	181	0	181	499	45	544
1982							885	328	1213
1983							661	299	960
1984							694	219	913
1985							645	341	986

Table 4. A summary of catch quotas for Great Slave Lake, summer and winter, (1945 - 1986) . Values given represent total lake quotas in thousands of kg round weight, of whitefish and lake trout.

Years	Total Quota
1945-1947	1900.0
1948-1970	4090.9
1971-1974	2265.9
1975-1976	2175.0
1977-1978	1545.5
1979	1613.6
1980-1986	1681.9

Table 5. Historical record of lakes fished and annual production from the inland lakes of the Northwest Territories. Harvest volumes in kg round weight.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	others	Total	Source
Arseno	1966	2177	999				6987	A
Baker	1960	x	x			x	10614	B
	1961	300	127				427	B
	1966	x	x			x	9091	B
	1967	7364	905				8269	B
	1975						1298	B
Basler	1963						2863	C
	1964						5555	C
	1965						3221	C
	1966	1452	10442				11894	A
	1982/83	2524	8452		253		11229	D
Beaverlodge								
	1965						76	C
	1970/71	11290	339				11629	D
Blaisdell								
	1964						659	C
Charlie	1965	---	3182	---			3182	B
Chedabucto								
	1961		2134		7		2141	C,E
	1966						3468	C
	1967						4719	C
Chipp	1970						8245	C
Chitty	1973/74	1612	846		130		2588	D
	1974/75	1152	539		102		1793	D
	1982/83				503		503	D
David	1967						1367	C
Debartok								
	1965						27273	B
Defeat	1964						10048	C
Deskenatlata								
	1971						2374	C
	1971/72	7845	3690	3579	9		15123	D
	1977/78	87	68				155	D
	1980/81	2880	1206	801			4887	D

x harvest of unknown amount

cont. . .

Table 5. cont.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Desperation	1963						1937	C
	1964						2610	C
Drygeese	1973/74	736	285				1721	D
Duncan	1967						1345	c
	1970						209	c
	1970/71	102	211		3		316	C,D
Faber	1962	451	2850				3301	E
Ferguson	1968						1252	c
Frank	1968						1987	c
Gagnon	1962	8647	11191				19838	C,E
	1963	2438	5105				7543	E
	1970						6230	c
	1970/71	6802	3384				10186	D,C
	1971/72	7409	5924				13333	D
Garry	1975	10165	1410				11575	B
Gordon	1963						40297	c
	1964						20791	c
	1969						48467	c
	1970						17195	c
	1970/71	9772	5455		34		15261	C,D
Graham	1970						2775	c
	1971	3542	576	257	3896		8271	D
Grandin	1963						111479	c
	1968						8702	c
	1969						73342	c
	1970						6957	c
	1970/71	1224	5634				6858	D
Grant	1966						20555	c
Gullion	1967						291	c
Hagalik	1967						784	c

cont. . .

Table 5. cent.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Harding	1966						1961	C
	1967						8059	C
Helmer	1964						4003	C
Hidden	1963						1887	C
	1968						580	C
Hjalmar	1969						3870	C
	1970						45015	C
	1970/71	14516	8556				23072	D,C
	1971/72	314	391				705	D
Hottah	1963	5087	4051				9138	F
	1964	243756	103340				347096	F
	1965	94272	71647				165919	F
	1966	3829	2691				6520	F
	1970						1189	c
	1970/71	21180	3184				24364	F
	1973/74	6221	2265				8486	D
Husky	1966						6075	c
Indin	1964		47				47	C,A
Ingray	1964						5758	c
	1965						22884	c
	1966						18117	c
	1970						2998	c
	1970-71	1340	1732				3072	D,C
	1980/81	458	1189				1647	D
Johnston	1960		17	1330			1347	E
	1964			668			668	E
	1970						139	c
	1971						139	c
	1976/77			327			327	D
Jones (63° 04')								
	1968						2571	C
	1970						323	C
	1970/71	138	147				334	D,C
Jones (69° 42')								
	1970/71	172	162				285	D,C

cont. . .

Table 5. cont.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Kakisa	1953			16286			16286	
	1954			32563			32563	
	1955			5095			5095	
	1956			29616			29616	
	1957			25884			25884	
	1958			54300			54300	E
	1959			34426	5110		39536	E
	1960			25525	2358		27883	E
	1961			18372	7395		25767	E
	1965						1257	c
	1966						72735	c
	1967						32674	c
	1968						15774	c
	1969						15200	c
	1970						14726	c
	1970/71	95	240	16907	54		17296	D,C
	1971/72			22846			22846	D,C
	1972/73			20553			20553	D
	1973/74			22017			22017	D
	1974/75			21541	105		21646	D
	1975/76			20922			20922	D
	1976/77			14238			14238	D
	1977/78	11		18036			18047	D
	1978/79			1885			1885	D
	1979/80			22084	45		22129	D
	1980/81			17097	4914		22011	D
	1981/82	81	226	19687			19994	D
	1982/83			15972	125		16097	D
	1983/84			19714	73		19787	D
	1984/85			22173			22173	D
Kaminak	1967						1027	B
	1968	302	421	60			783	B
	1969	6818	2273				9091	B
	1970	47169	5224				52393	B
	1971	15031	3259				18290	B
	1973	840	858				1698	B
	1974						455	B
	1975	4985	9595				14580	B
Kaminuriak								
	1967	2138					2138	B
	1972	15257	14471				29728	G
	1973	18105	22900				41005	B
	1974	265	1061			498	1824	B

cent. . .

Table 5. cent.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Kasba	1962						454000	
	1967						4545	
	1968						38536	C
	1969						1508	C
Kazan	1959	x	x			x	6818	B
	1966						507	B
	1969						15909	B
	1970						8483	B
	1971						9091	B
	.1972						255	B
	1978						888	B
Keller	1961	11608	8847				20455	E
	1962	25822	15508	82			41412	E
	1963	19685	8992	293			28970	E
	1970						2917	C
Labrish	1966						4381	C
Lac la Marte								
	1969		22202			89256	111458	H,C
	1970		23875			103041	126918	H,C
	1970/71	75028	18217				93245	D
	1971/72	96153	13224	13	10		109400	D
	1972/73	280440	15378	3988	6156		299806	D
Lac Ste. Therese								
	1962		298	500			798	E,C
	1963	2354	2549	16774			21677	E,C
	1973/74			189			189	D
	1979/80	549					549	D
Little Crapeau								
	1966						2708	C
	1967						2239	C
MacDonald								
	1960	1123	1650				2773	E
	1961	11291	10491				21782	E,C
	1966						7824	C
	1972/73	10040	7842		31		17913	D
	1973/74	332	255		3		335	D
	1978/79	1048	683		78		1809	D
	1980/81	40			10		50	D

cont...

Table 5. cent .

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Macewan	**1960**	2213		47	23		2283	**E**
	1961	771		85			865	**E,C**
	1969						3230	**C**
	1974/75	575		2			577	**D**
MacKay	1966						11126	**C**
	1967						26035	**C**
Margaret	1966						9932	**C**
	1967						18540	**C**
Mattberry								
	1966	4994	11350				16344	A,C
	1980/81	3530	1643		**34**		5207	**D**
McAlesse								
	1966	---1oooo---					10000	B
McInnes	**1971**						1890	**C**
	1971/72	2719	1053				3772	D
Mergle								
	1980/81	1620	1359				2979	D
Mosher	**1963**						323	**C**
	1964						1237	**C**
Nameless								
	1970/71	16	18				34	D
Neultin	**1963**						128318	**C**
	1964						184117*	I,C
	1965						83543	**C**
	1966						67982	**C**
	1967						6932	**C**
	1968						87256	**C**
	1969						30104	**C**
Nonacho	**1958**	468	1835				2303	E
	1959	11527	13073				24600	E
	1962	278	758				1037	**E,C**
	1962						54005	**C**
	1970						140419	**C**
	1970/71	34546	31609				66155	D,C
Noel	1979	119					119	**J**

*** dressed weight**

cont. . .

Table 5. cent.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
North Henik	1970						2555	C
O'Conner	1972/73	1173	918				2091	D
O'Neil	1973	116	85				201	B
Palayok	1968						6477	C
Pauline	1964						1070	C
	1966						1685	C
Parker	1974	196	1945			131	2272	B
Pitz	1975		(260-900)					B
Plante	1964						2177	C
	1970						3067	C
	1970/71	1895	381				2276	D,C
Peter	1973			no data				
Quartzite				no data				I
Reade	1961	765		116	809		1690	E
	1969						1646	c
Rebesca	1970						4895	c
	1970/71	3006	1465				4471	D,C
Reid	1964		114	65			179	E
Rocher River	1967						567	c
	1969						920	c
	1970						2116	c
Ross	1963						10030	c
	1972/73	1433	805				2238	D
	1973/74	5336	2459		34		7829	D
Rutledge	1970						2439	c
Saddle	1966						13399	c
Salkeld	1971	9904	4311		5		14220	D,C

cent . . .

Table 5. cent .

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Savage	1973	4	166				170	B
Shultz	1975		(818-1360)					B
Sitidgi	1977						909	J
	1979		73				73	J
Slemon	1966						6840	**C**
	1973/74	968	453	68			1489	D
	1983/84	299	1053		32		1384	D
Sparks	1966						10793	**C**
	1972						15359	**C**
	1972/73	23187	7522		92		30801	**D**
	1980/81	2880	967		63		3910	**D**
Sparrow	1964						5585	**c**
	1983/84	3013	918		93		4024	**D**
Stark	1959	3016	7965		91		11072	**E**
Talston	1970						31441	**c**
	1970/71	21805	10126	49			32001	**D,C**
	1980/81	14		876			890	**D**
Talston River								
	1982/83	326	5	35	50	6	422	**D**
	1983/84			784	706		1490	**D**
Tathlina								
	1959			6588	900		7488	**E**
	1960			71788	1273		73061	**E**
	1961						25340	**E**
	1962						7326	**E**
	1963			30552	820		31372	**E,C**
	1964						11186	**c**
	1965						1947	**c**
	1966						326	**c**
	1967						16991	**c**
	1968						9072	**c**
	1969						11530	**c**
	1970						19601	**c**
	1970/71			14997			14997	**D,C**
	1971/72		689	25146	82		28464	**D**
	1972/73		108	33889			33997	**D**
	1973/74			7599		367	7966	**D**
	1974/75			6452	9		6461	**D**

cent. . .

Table 5. cont.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Tathlina (cont.)								
	1975/76			15069			15069	D
	1976/77			8578			8578	D
	1977/78			541	3		544	D
	1979/80	2327		3390	222		5939	D
	1980/81			14611			14611	D
	1981/82			31210			31210	D
	1982/83			30682	377		31059	D
	1983/84			19777			19777	D
	1984/85	53		4356	92		4501	D
Thekuthili								
	1962	20481	31820		107		52408	**E,C**
	1965						20374	**C**
	1966						7878	c
	1971/72	8886	4518	1271			14675	D
	1972/73	35784	25977		67		61828	D
	1980/81	2708	1275		81		4064	D
Thistlewaite								
	1970						2294	c
	1970/71	1366	851				2217	**D,C**
Thuban	**1960**	2238	7654				9892	E
	1961	1423	3660				5083	**E,C**
	1962						27524	c
	1963						13520	c
	1970						9993	c
	1970/71	2977	2514	**36**	513		6040	**D,C**
	1971/72	5749	8658		85		14492	D
Trefiak	**1960**			**10597**			10597	E
	1961						536	E
	1966						2713	c
	1967						5902	c
	1968						5149	c
	1969						2300	c
	1970						2300	c
	1970/71			2285			2285	**D,C**
	1972						16935	**C**
	1972/73			1025	256		1281	D
	1973/74			14	114		128	D
Tronka Chua								
	1970						10522	**C**
	1970/71	8233	2377				10610	**D,C**

cont. . .

Table 5. cent.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Tsu	1960	172	596	151	141		1060	E
Turner	1967						2775	c
Victory	1963	323	160				483	E,C
	1964						3536	c
Wecho	1965						339	c
Wedge	1969						4549	c
Windy	1964	29000	15000				44000	I
Yatsore	1967						15798	c
	1972/73	6335	2443				8778	D
	1973/74	2779	1349				4128	c
Zinto	1966						5304	c

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Table 6. A summary of the commercial harvest for the Inland Lakes fishery of the Northwest Territories (1953-1984). Round weight (kg.). From Table 5.

Year	Lakes Fished	Whitefish	Lake Trout	Pickerel	Northern Pike	Mixed	Total
1953	1			16286			16286
1954	1			32563			32563
1955	1			5095			5095
1956	1			29616			29616
1957	1			25884			25884
1958	1			54300			54300
1959	3	3016	7965	41014	6101		58096
1960	9	5746	9917	109436	3795	10616	139510
1961	10	26158	25259	18573	8211	26185	104386
1962	9	55679	62425	582	107	488850	607643
1963	14	29887	20857	47619	820	310563	409746
1964	19	272756	118501	733		258332	650322
1965	10	94272	71647	1947		402481	570347
1966	26	7458	14132			311174	332764
1967	19	7364	905			152728	160997
1968	13	302	421	60		146490	147273
1969	16	6818	24475			355836	387129
1970	30	254439	99449	34274	604	29690	418456
1971	14	157552	46293	53117	4082	11777	272821
1972	12	373649	75464	59455	6732	9623	524923
1973	15	36937	31806	29887	281	838	99749
1974	6	1992	1600	27995	216	953	32756
1975	8	15150	11005	35991		3558	65704
1976	4			23123			23123
1977	4	98	68	18577	3	909	19655
1978	4	1048	683	1885	78	888	4582
1979	5	2995	73	25474	267		28809
1980	10	14130	7639	33385	5102		60256
1981	2	81	226	50897			51204
1982	5	2850	8457	46689	1308	6	59310
1983	5	3312	1971	40275	904		46462
1984	2	53		26329	92	200	26674

Table 7. A summary of the commercial landings from the Mackenzie Delta Area, 1955-1980. Harvest volumes in kg round weight. (reported by Corkum,L.D. and McCart,P.J. in Can. MS Rep. Fish. Aquat. Sci. 1613: v + 55p. from data by B. Wong, Fisheries Biologist, Yellowknife) .

Year	Whitefish*	Arctic Charr	Inconnu	Northern Pike	Others	Mixed	Total
1955							752
1956							8500
1957	611		8	62			681
1958						13	13
1959							
1960	5445					5976	11431
1961	18204		968			5000	24172
1962	8784		1614	2376	4262		17036
1963	6516				1851		8401
1964	35161		4036			34	42566
1965	9059	7311				3369	16370
1966	28235	364			101		28700
1967							
1968							
1969							
1970							
1971							
1972	1715						1715
1973	22273		409				22682
1974	15909						15909
1975							
1976	16145						16145
1977	523						523
1978	2727	1136					3863
1979	6198	639	2375	364		182	9758
1980	9045	4723	2388			3459	19615

* Includes broad whitefish and lake whitefish

Table 8. Historical record of locations fished and annual production from the coastal Arctic charr fisheries of the Northwest Territories. Harvest volumes in kg round weight.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Cambridge Bay							
Includes:	1960	17955				17955	A
	1961	7561				7561	A
Ekalluk R.	1962	5777				5777	A
Greiner R.	1963	16176				16176	A
Ellice R.	1964	15537				15537	A
Perry R.	1965	20909				20909	A
Lauchlan R.	1966	16818				16818	A
Halovic R.	1967	24586				24586	A
Paliryuak R.	1968	43465				43465	A
Jayco R.	1969	48658				48658	B
Elu Inlet	1970	34588				34588	A
Dease Point	1971	42386	10315			52701	A
Starvation	1972	48985	15195			64180	A
Cove	1973	28492	9921			38413	A
Padliak Inlet	1974	30707	1850			32557	A
Collinson	1975	30914	1255			32169	A
Peninsula	1976	39774				39774	A
	1977	77338				77338	A
	1978	68343				68343	A
	1979	68169				68169	C
	1980	59250				59250	C
	1981	60554				60554	D
	1982	53620				53620	D
	1983	61614				61614	E
	1984	62964				62964	E
Ferguson L.	1962	1930			12563	14606(1)	B
	1963	259			4794	8382(2)	B
	1964	579		489	7829	8915	B
	1965	422		118	7790	8330	B
	1974	1305				1305	A
	1975	435				435	A
Kitiga L.	1967	548			40736	41284	B
	1979	(440 kgs. A.charr & L.trout)				440	H
Merkley	1968			3680	1095	4775	B
	1970			575	5181	5756	B
	1972				2945*	2945	B

cont...

(1) includes: 113 kgs. of tullibee
(2) includes: 3182 kgs. of mixed A.charr & L.trout
147 kgs. of tullibee
* dressed weight

Table 8. cont.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Cambridge Bay(cont.)							
Surey L.	1970			3293	1350	4643	B
	1972				8576*	8576*	B
	1977			--- 3260	---	3260	A
Toassie L.	1968			8 7 1 4	1350	10064	B
	1970			220	225	445	B
Unnamed	1971			455*	5000*	5455*	B
Lakes	1977			--- 16373	---	16373	A
Kuujjua R. Minto Inlet Holman Island		600/yr.				600/yr.	M
Whale Cove:							
Settlement	1962	5007				5007	L
Region	1963	2727				2727	L
	1965	1636*				1636*	L
	1970	4091*				4091*	L
	1971	2953*				2953*	L
	1976	15495				15495	L
	1982	510				510	D
	1983	546				546	E
	1984	602				602	E
Mistake Bay	1973	2291				2291	L
	1974	2088				2081	L
	1982	370				370	D
	1983	455				455	E
	1984	360				360	E

cont...

* dressed weight

Table 8. cont.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Whale Cove(cont.)							
Ferguson R.	1962	12563				12563	L
	1963	7976				7976	L
	1964	8318				8318	L
	1965	17409				17409	L
	1966	13730				13730	L
	1972	3929				3929	L
	1973	7178				7178	L
	1974	14037				14037	L
	1975	14319				14319	L
	1981	18380				18380	D
	1982	7149				7149	D
	1983	5000				5000	E
	1984	360				360	E
Copperneedle R.	1973	2309				2309	L
	1974	2227				2227	L
	1975	1818				1818	L
	1983	545				545	E
Wilson R.	1960	727				727	L
	1961	591			114	705	L
	1981	4571				4571	D
	1982	6903				6903	D
	1983	427				427	E
	1984	360				360	E
Pistol Bay	1974	5500				5500	L
	1981	9				9	D
	1983	364				364	E
	1984	360				360	E
Unnamed River	?	1094				1094	L

cont. . .

* dressed weight

Table 8. cent.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Chesterfield Inlet:							
Settlement Area	1962	1364				1364	L
	1965	6190				6190	L
	1969	1831				1831	L
	1970	1000				1000	L
	1974	1454				1454	L
	1975	1569				1569	L
	1976	8372				8372	L
	1983	545				545	E
	1984	2591				2591	E
Headwind Point	1974	813				813	L
Stoney Point	1974	1527				1527	L
	1975	4273				4273	L
Robin Hood Bay	1974	1172				1172	L
Barbour Bay	1971	782*				782*	L
	1974	1904				1904	L
Big River	1974	2535				2535	L
Han Way River	1974	619				619	L
	1983	409				409	E
Ranger Seal R.	1974	113				113	L
Daly Bay	1964	911				911	L
Steep Rock Bay	1977	no data available					
Repulse Bay	1969	2097				2097	N
Josephine R.	1983	591				591	E
	1984	141				141	E
Baker Foreland	1981	3475				3475	D
	1982	3000				3000	D
	1983	2200				2200	E
	1984	332				332	E

cont. . .

* dressed weight

Table 8. cent .

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Eskimo Point:							
Eskimo Point	1962	2273				2273	L
	1965	3150				3150	L
	1975	1922				1922	L
	1983	1343				1343	E
	1984	1363				1363	E
Maguse R.	1977		no data available				
	1983	2000				2000	E
Sandy Point	1972	4545				4545	F
	1973	2385				2385	L
	1974	2590				2590	L
	1983	68				68	E
	1984	150				150	E
Wallace R.	1972	4317				4317	L
	1974	939				939	L
	1983	136				136	E
Rankin Inlet:	1961	2267				2267	J
	1962	17655				17655	J
	1963	19340				19340	J
	1964	13625				13625	J
	1965	19045				19045	J
	1966	27367				27367	J
	1967	20275				20275	J
	1968	2388				2388	J
	1969	26146				26146	J
	1970	7848				7848	J
	1971	27017				27017	J
	1972	16524				16524	J
	1973	28329				28329	J
	1974	42589				42589	J
	1975	29973				29973	J
	1976		no data available				J
	1977	23759				23759	K
	1978	11634				11634	K
	1979	11781				11781	K
	1980	24725				24725	K
	1981	15574				15574	D
	1982	14464				14464	D
	1983	6053				6053	E
	1984	5412				5412	E

cont. . .

Table 8. cent.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Rankin Inlet (cont.)							
Corbett Inlet	1973	4308					
	1974	4280					
	1975	4241					
	1983	545					
	1984	353					
Diana R.	1966	13636				13636	L
	1967	2933			463	3396	L
	1968	2388			218	2606	L
	1969	11475				11475	N,L
	1970	3323			786	4109	N
	1973	118				118	L
Meliadine R.	1961	136/day (July&Aug.)					
	1962	'2045					
Baffin Island:							
Approach L	1984	544				544	G
Cockburn R.	1984	40				40	G
	1985	646				646	0
Eqalulik R.	1978	3700				3700	M
Freshwater L.	1984	2172				2172	G
Frobisher Bay	1977	13716				13716	K
Gifford R.	1984	3500				3500	G
Hall L.	1984	3600				3600	G
Harder R.	1985	449				449	o
Igloolik	1977	81				81	K
	1978	3539				3539	K
	1980	6205				6205	K
	1984	5868				5868	K

cont...

Table 8. cent.

Area + Location	Year	Sea run Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Baffin Island (cont.)							
Ikaluit R.	1984	2000				2000	G
Ikpikitturjuak River	1985	1093				1093	o
Irvine Inlet	1984	2411				2411	G
Kingnait Fjord	1984	1346				1346	G
Kipisa L.	1984	2716				2716	G
Kukaluk R.	1984	4500				4500	G
Neergaard R.	1985	1104				1104	o
Nettílling L.	1974	22727				22727	J
	1975	27000				27000	J
	1976	11245				11245	J
Okalik Bay	1984	617				617	G
Padle R.	1984	1800				1800	G
Padle Fjord	1984	1800				1800	G
Padloping Is.	1984	900				900	G
Paquet Bay	1984	2268				2268	G
Pond Inlet	1978	2570				2570	K
Qualluatik L.	1984	1332				1332	G
Qulurnilik R.	1985	1257				1257	o
Ravn R.	1984	9100				9100	G
	1985	1748				1748	o
Rowley R.	1984	112				112	G
	1985	1064				1064	o

cont. . .

Table 8. cent.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Baffin Island (cont.)							
Sam Ford Fjord	1984	816				816	G
Saputing R.	1984	4535				4535	G
Sylvia Grinell River	1960	5543				5543	J
	1961	4684				4684	J
	1962	4698				4698	J
	1963	4840				4840	J
	1964	3832				3832	J
	1965	5600				5600	J
	1966	4668				4668	J
Tarsuaq Arm	1984	168				168	G
	1985	590				590	O
Tugat R.	1984	1363				1363	G
Unnamed River (Cumberland Sd)	1984	977				977	G
Unnamed River (Cape Raper)	1984	187				187	G
Boothia Peninsula:							
Agnew R.	1977		no data available				
Arrowsmith R.	1971	495				495	L
	1973	11664				11664	L
	1974	3109				3109	L
	1984	150				150	G
Becher R.	1972	805				805	L
	1973	1685				1685	L
	1974	849				849	L
	1984	1375				1375	G
Committee Bay	1973	243				243	L
Gjoa Haven	1977	653				653	K
	1978	2273				2273	H

cont. . .

Table 8. cont.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Boothia Peninsula (cont.)							
Kellet R.	1971	13674				13674	L
	1972	2542				2542	L
	1973	12148				12148	L
	1974	2621				2621	L
	1975	18182				18182	L
	1977	3676				3676	H
	1978	3675				3675	H
	1979	935				935	H
Lord Lindsay L.	1977	3400				3400	M
	1978	2161				2161	H
	1984	694				694	G
Murchison R.	1973	346				346	L
	1979	1395				1395	H
Pelly Bay	1969	682				682	J
	1970	386				386	J
	1971	15909				15909	J
	1972	3347				3347	J
	1973	22377				22377	J
	1974	21195				21195	J
	1975	18541				18541	J
	1976	5552				5552	K
	1977	7420				7420	K
	1978	3551				3551	K
	1979	12287				12287	K
	1980	8858				8858	K
Port Parry	1984	756				756	G
Spence Bay	1977	1709				1709	K
Stanwell Fletcher L.	1978	340				340	M
	1984	2700				2700	G
Unnamed Lake (Spence Bay)	1977	505	(all species combined)			505	H

cont...

Table 8. cent ,

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Wager Bay:							
Bennett Bay	1984	798				798	E
Cleveland R.	1984	1000				1000	G
Gore Bay	1983	272				272	E
	1984	380				380	E
Haviland Bay	1983	364				364	E
	1984	109				109	E
North Pole R.	1969	849				849	L
	1983	818				818	E
	1984	49				49	E
Pisimak R.	1983	454				454	E
Thomsen R.	1983	454				454	E
Coppermine:							
Coppermine R.	1979	682				682	H
	1984	600				600	G
Paulatuk:							
Hornaday R.	1973	3636				3636	
	1977	6341				6341	H
	1978	6023				6023	H
	1979	6795				6795	H
	1980	6427				6427	H
	1984	5300				5300	G
Port Burwell:							
Ungava Bay	1969		17273 kg	of cod		172'73	L

A inaccurate
65 - 10-20 kg Range
66 -
67 -
68 -
69 -

cont...

Table 8. cent.

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N. Stephanson, S.E. 1973. The fisheries potential of the Northwest Territories: A method of inventory and assessment and the organization and transportation trends affecting future fisheries development. Practicum. Natural Resource Institute, Univ. Man. 162p. + App.

O. Data on the Steensby Inlet charr fishery. North/South Consultants Inc.

Table 9. A summary of commercial landings for the Arctic coastal fishery, 1960-1984, From Table 8. Weights in kg round weight.

Year	Searun A. charr	Landlocked A. charr	Whitefish	Lake Trout	Mixed	Total
1960	24225					24225
1961	23303					23303
1962	53312			12563	113	65988
1963	51318			4794	3329	59441
1964	41891		489	7829	18	50227
1965	74361					74361
1966	76219					76219
1967	48342			41199		89541
1968	48241		12394	2663		63298
1969	91056					91056
1970	51236		4088	6756		62080
1971	103216	10315	455	5000		118986
1972	81647	15195		11521		108678
1973	125218	9921				135139
1974	163999	1850				165849
1975	153187	1255				154442
1976	80438					80438
1977	138094				4163	142257
1978	107809					107809
1979	103349					103789
1980	105465					105465
1981	102563					102563
1982	85646					85646
1983	84748					84748
1984	143329					143329

Table 10. Total whitefish landings, by province, for the major Canadian freshwater fisheries, 1945-1983. Volumes in thousands of kg round weight. Data from: Canadian Fisheries - Annual Statistical Review.

Year	Ontario	Manitoba	NWT	Saskatchewan	Alberta
1945	1939	2043	984	2057	1476
1946	2023	2260	1663	1503	1205
1947	2246	1718	864	1610	808
1948	2941	1526	2251	1462	800
1949	3210	1918	2617	1610	831
1950	2995	2826	2836	1995	1096
1951	3264	2784	2082	2660	1229
1952	4285	2617	1741	2563	1436
1953	4643	2063	1757	1768	1373
1954	3111	2408	1827	2362	1445
1955	2023	2356	2091	2276	1221
1956	1840	2511	1805	2379	1847
1957	1466	2946	1955	2920	1801
1958	1490	2854	1536	5727	1920
1959	1447	3135	1573	5705	1965
1960	1752	2805	1729	3537	2465
1961	1776	3180	1829	3453	2081
1962	1655	3675	2051	3359	1254
1963	1616	3578	2077	3245	926
1964	1468	3310	1842	2868	698
1965	1470	3388	1823	3520	762
1966	1279	2743	1276	3026	949
1967	1271	2565	1059	2491	943
1968	1321	2404	1458	2195	917
1969	1344	2459	1570	2852	1090
1970	1304	2203	1598	2769	1055
1971	1068	2521	1304	2913	992
1972	1000	2541	1141	2553	1003
1973	902	2427	1094	1862	990
1974	1072	2335	1019	2222	1075
1975	1113	2757	783	2175	1039
1976	1374	3037	950	2052	1161
1977	*	*	1020	*	*
1978	1747	3665	1091	*	*
1979	1345	4544	1066	1819	703
1980	1771	4527	1208	1913	837
1981	1800	3391	1102	1203	770
1982	1814	2976	1166	693	919
1983	2271	3361	886	919	834

* **data** not **available**

Table 11. Total commercial landings, by province, for the major Canadian freshwater fisheries, 1945-1983. Volumes in thousands of kgs. round weight. Data from: Canadian Fisheries - Annual Statistical Review.

Year	Ontario	Manitoba	Saskatchewan	Alberta	NWT
1945	12717	13794	3919	3622	1496
1946	14999	13044	3544	5032	3018
1947	11327	13608	3645	4499	1581
1948	13228	14331	3671	3283	3548
1949	11014	13411	3396	2865	4137
1950	10164	14304	3969	3212	3576
1951	14077	16125	5233	3818	3399
1952	17293	14245	4824	4390	3201
1953	20381	10617	3855	4927	3054
1954	21673	12930	4784	3984	3192
1955	20699	15847	4605	3961	3558
1956	27084	13788	4282	4373	3153
1957	23183	14321	5019	4724	2993
1958	21398	14483	5715	5208	2680
1959	22219	14085	5693	5744	2613
1960	21591	14490	6591	7190	2548
1961	24926	13906	6584	5133	2595
1962	28930	16377	6804	4094	2811
1963	24649	16211	6391	3860	2739
1964	19735	12989	6489	5784	2690
1965	23807	13421	6774	3862	2599
1966	25557	13578	6253	4947	1993
1967	24792	9453	5318	4497	1763
1968	25269	11673	4976	5390	1975
1969	28670	9702	6312	4985	2110
1970	20902	7379	5540	3128	2138
1971	19411	6763	5309	1231	1768
1972	19593	10225	5053	1210	1630
1973	23895	10601	5021	1267	1539
1974	24143	11409	5630	698	1435
1975	20576	12215	4884	874	1143
1976	18645	10832	5104	1020	1283
1977	23529	12540	5214	1131	1376
1978	25413	12830	3748	997	1496
1979	25087	14556	4484	1019	1446
1980	26701	18086	5336	1213	1651
1981	28071	13734	3460	1101	1444
1982	34110	15454	3801	1106	1585
1983	27538	15005	2542	1135	1137

APPENDIX II

EMPLOYMENT, INCOME, AND LANDED VALUES

Table 12. A summary of employment and incomes for the Northwest Territories, 1970/71 - 1984/85. Data from Dept. of Fisheries and Oceans, Economics Branch.

Year	Self-employed Operators	Average Income per Operator(gross)	Total Employment
70/71	236	4,631	
71/72	199	4,882	
72/73	112	6,686	
73/74	119	6,788	
74/75	112	6,596	
75/76	136	5,237	
76/77	118	7,789	
77/78	144	10,116	239
78/79	121	12,875	205
79/80	100	15,363	168
80/81	102	18,284	198
81/82	97	16,000	161
82/83	89	15,199	134
83/84	69	25,060	118

Table 13. Average prices paid to fishermen for fresh fish landed at Hay River, summer and winter combined. Data from Dept. of Fish. and Oceans, Economics Branch, Winnipeg, Man. (values given include fishermen's assistance subsidies) .

Year	Export Whitefish $/Kg.	All fish combined $/Kg,
1970/71	0.55	0.63
1971/72	0.58	0.66
1972/73	0.59	0.58
1973/74	0.70	0.67
1974/75	0.74	0.68
1975/76	0.72	0.75
1976/77	0.73	0.86
1977/78	0.81	1.00
1978/79	1,18	1.17
1979/80	1.07	1.16
1980/81	1.01	1.28
1981/82	1.03	1.32
1982/83	0.93	1.12
1983/84	0.84	1.32
1984/85	1.14	1.55

Table 14. Total landed values of commercial harvests, by province, for the major Canadian freshwater fisheries, 1946 - 1983. Values in thousands of dollars. Data from: Canadian Fisheries - Annual Statistical Review.

Year	Ont.	Man.	Sask.	Alta.	NWT .	Total
1945	6483	3418	882	742	112	12,138
1946	5597	3304	729	600	288	10,914
1947	4803	3477	484	449	143	9,689
1948	5683	3181	513	375	387	10,641
1949	5497	2821	521	342	549	10,212
1950	6252	3880	718	437	612	12,376
1951	7035	4263	910	544	535	13,855
1952	7407	3439	679	654	735	13,457
1953	7027	2717	553	667	471	12,114
1954	7013	3088	741	667	636	12,725
1955	6783	3477	763	687	742	13,124
1956	7927	2947	784	790	788	13,892
1957	7046	3279	939	854	721	13,471
1958	7217	3540	1091	879	682	14,024
1959	4866	3757	1190	1016	703	12,103
1960	4983	3867	1367	1159	700	12,765
1961	5745	3174	1385	883	675	12,450
1962	5341	4229	1478	714	860	13,346
1963	5498	4356	1300	676	796	13,297
1964	5222	3720	1490	799	833	12,715
1965	6402	4370	1734	677	977	14,972
1966	5995	4788	1706	844	765	14,853
1967	5988	2527	1163	758	775	11,831
1968	5968	3276	1382	915	759	12,957
1969	7389	3354	2294	935	1013	15,660
1970	6535	2151	2083	826	1087	13,237
1971	6948	2258	1839	413	960	13,132
1972	8119	4113	1641	469	839	15,840
1973	10,370	4928	1778	468	809	19,095
1974	9655	4871	1806	313	738	18,241
1975	11,052	5940	1791	423	677	20,944
1976	12,513	7062	2277	579	872	24,146
1977	14,555	10,231	3145	729	1100	31,091
1978	17,161	12,830	2629	646	1541	32,959
1979	25,873	10,801	2663	797	1576	43,234
1980	23,644	16,591	3794	1014	1793	48,352
1981	31,767	17,846	3262	899	1538	57,125
1982	36,788	15,508	2686	834	1674	58,847
1983	27,838	14,515	2762	788	1151	48,464

APPENDIX III

GREAT SLAVE LAKE FISHING FLEET

Table 15. An historical record of the Great Slave Lake summer fishing fleet including the numbers of fishing companies, fishing boats, and skiffs (in parentheses) which have operated since 1945. Data from Dep. of Fish. and Oceans MS and Data reports,

	McInnes	Menzies	Alaska	Gateway	Inland	Clark	Kutcher and Trefiak	Carter	Total Fleet
1945	20								20
1946	22								30
1947	18								22
1948	19	2							24
1949	21	17	6	4	7	8			66
1950	22	16	8	5		6			57
1951	21	12	9	10			9		62
1952	16	8	9	10			10		53
1953	12	9	?	?			7		40
1954	14	lo(3)	11(3)	6			9		51(6)
1955	15	lo(3)	14(3)	7			10	8	65(6)
1956	15	9(1)	13(2)	9			9	lo(l)	70(4)
1957	18(1)	lo(3)	15(3)	9			9	lo(2)	68(11)
1958	14	12(1)	lo(4)	5			9	7(2)	57(11)
1959	14	12(3)	16(2)				lo(2)	7(15)	59(22)
1960	14	lo(3)	13(7)				9(4)	7(15)	53(29)
1961		9(4)	14(6)				8(5)	5(10)	40(25)
1962		11(35)	13(19)				10(8)	5(15)	39(77)
1963		9(17)	15(16)				9(15)	7(11)	40(59)
1964									38(38)
1965			Data for private sector						39(31)
1966			involvement unavailable						39(55)
1967									31(40)
1968									31(23)
1969			After 1969 the FFMC was						29(25)
1970			the only fish buying						37(58)
1971			company operating in						34(50)
1972			the NWT						24(40)
1973									18(56)
1974									14(56)
1975									14(37)
1976									16(54)
1977									22(68)
1978									23(54)
1979									24(50)
1980									22(37)
1981									18(39)
1982									19(24)
1983									19(29)
1984									17(31)
1985									22(52)

APPENDIX IV

FIGURES

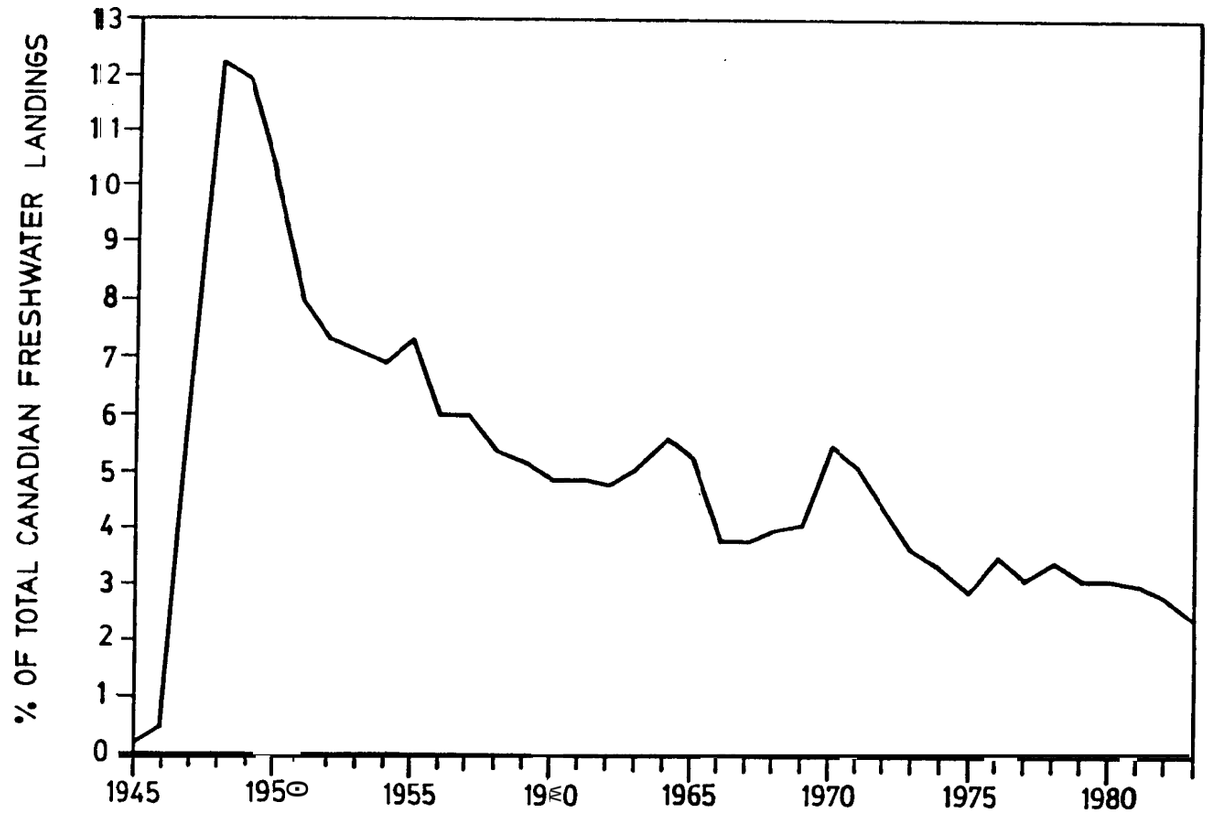

Figure 1. Total commercial landings of the N.W.T., expressed as a percentage of the total Canadian freshwater landings, 1945-1983. Data from D.F.O., Data Reports and Canadian Fisheries - Annual Statistical Review.

Figure 2. Total commercial landings for all species from Great Slave Lake, 1945-1985. Data from F.A.O., Data Reports.

TOTAL WHITEFISH HARVESTS BY REGION

(1974-1983) (by weight)

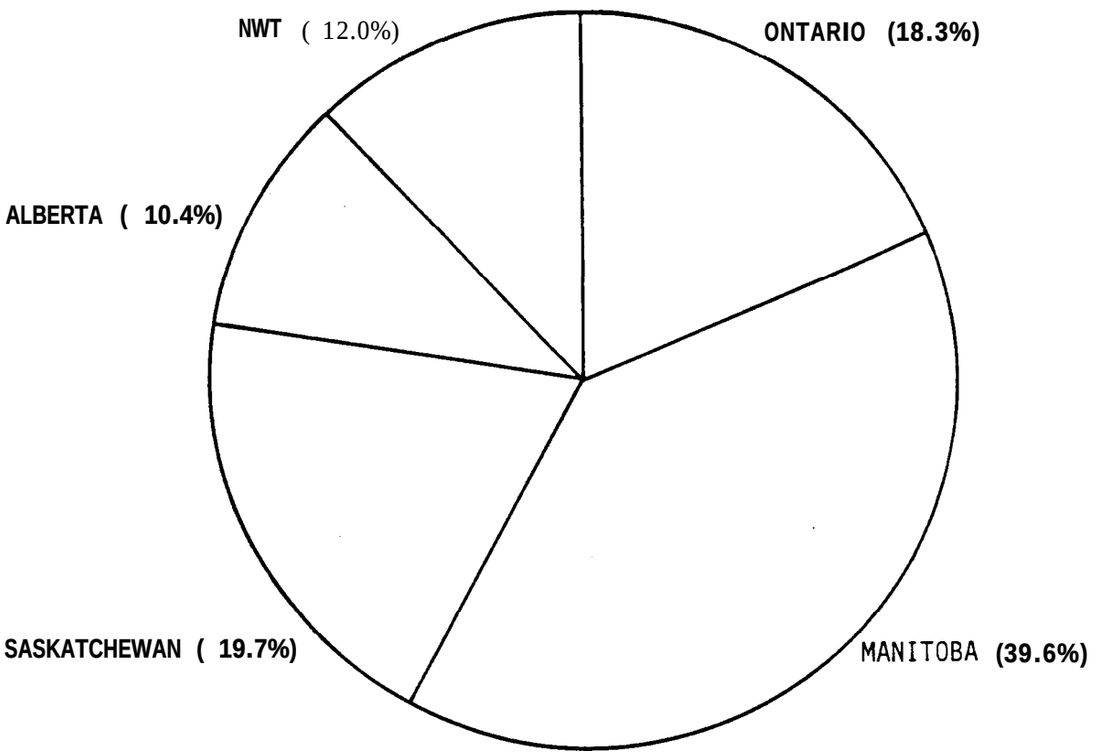

Figure 3. Relative contributions of each major producing province to the total production of whitefish, 1973-1983. Data from the Canadian Fisheries-Annual Statistical Review.

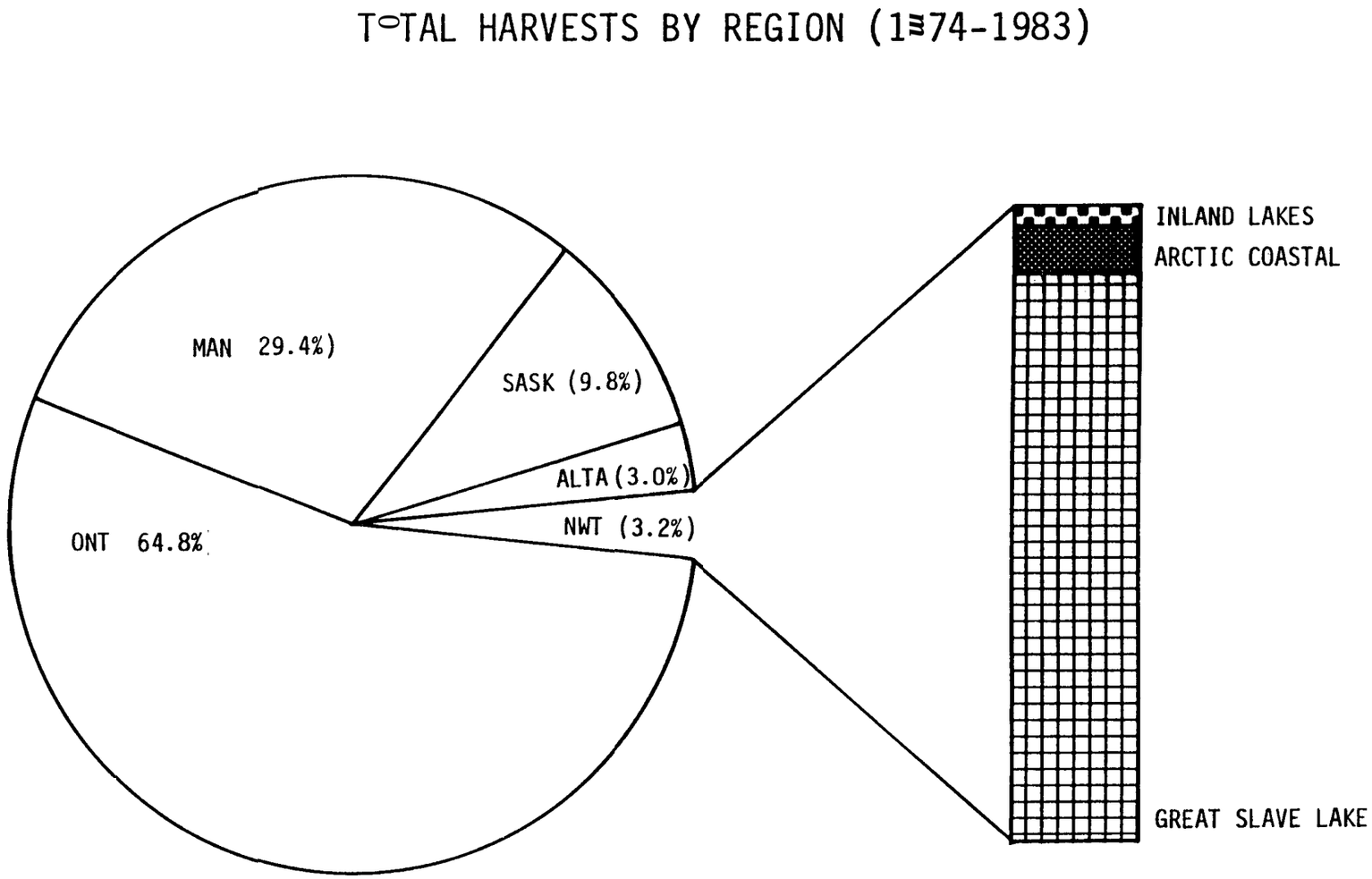

Figure 4. Canadian freshwater landings showing relative contributions of the major producing regions, 1974-1983 combined. Data from Canadian Fisheries - Annual Statistical Review and D.F.O., Data Reports.

HARVEST DISTRIBUTION WITHIN F. F.M. C.

By Region and by Five-Year Intervals

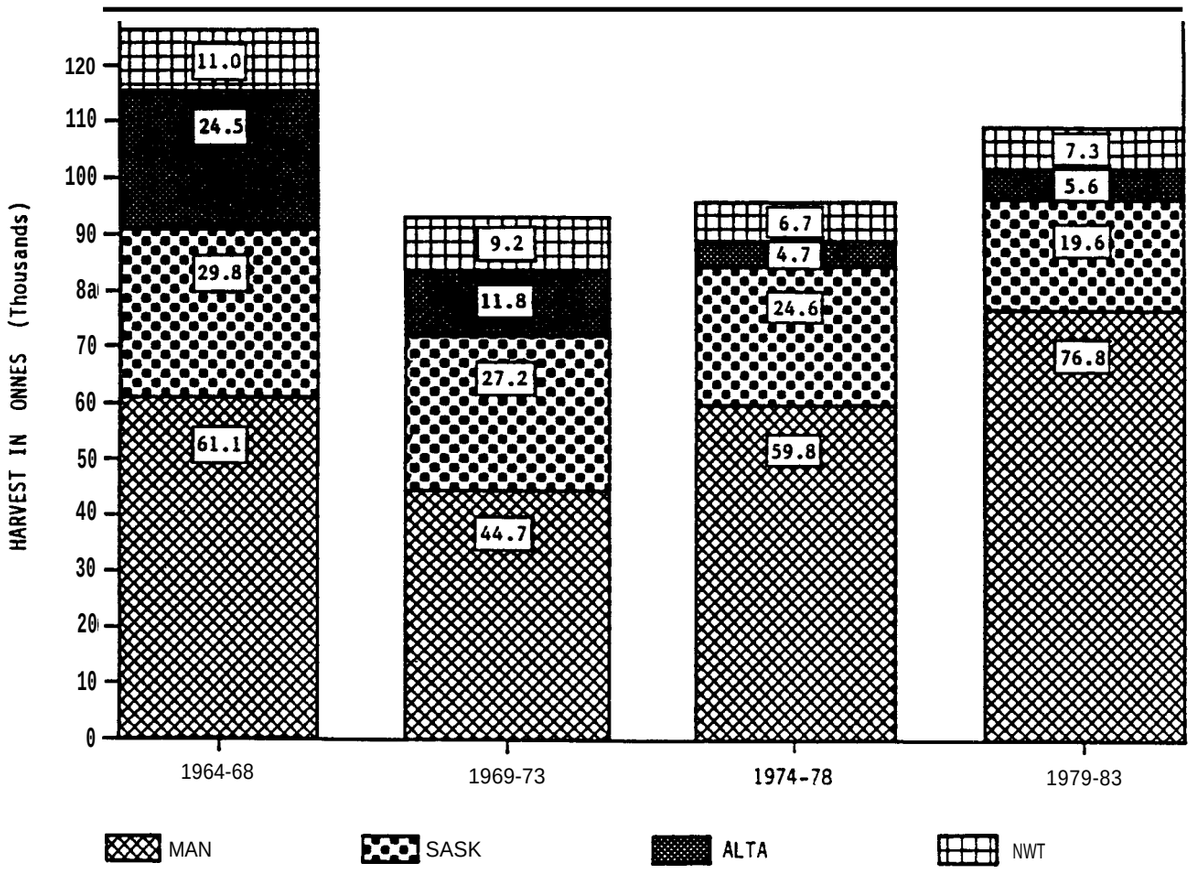

Figure 5. Comparison of total commercial production from **F.F.M.C.** regions **at five** year intervals.

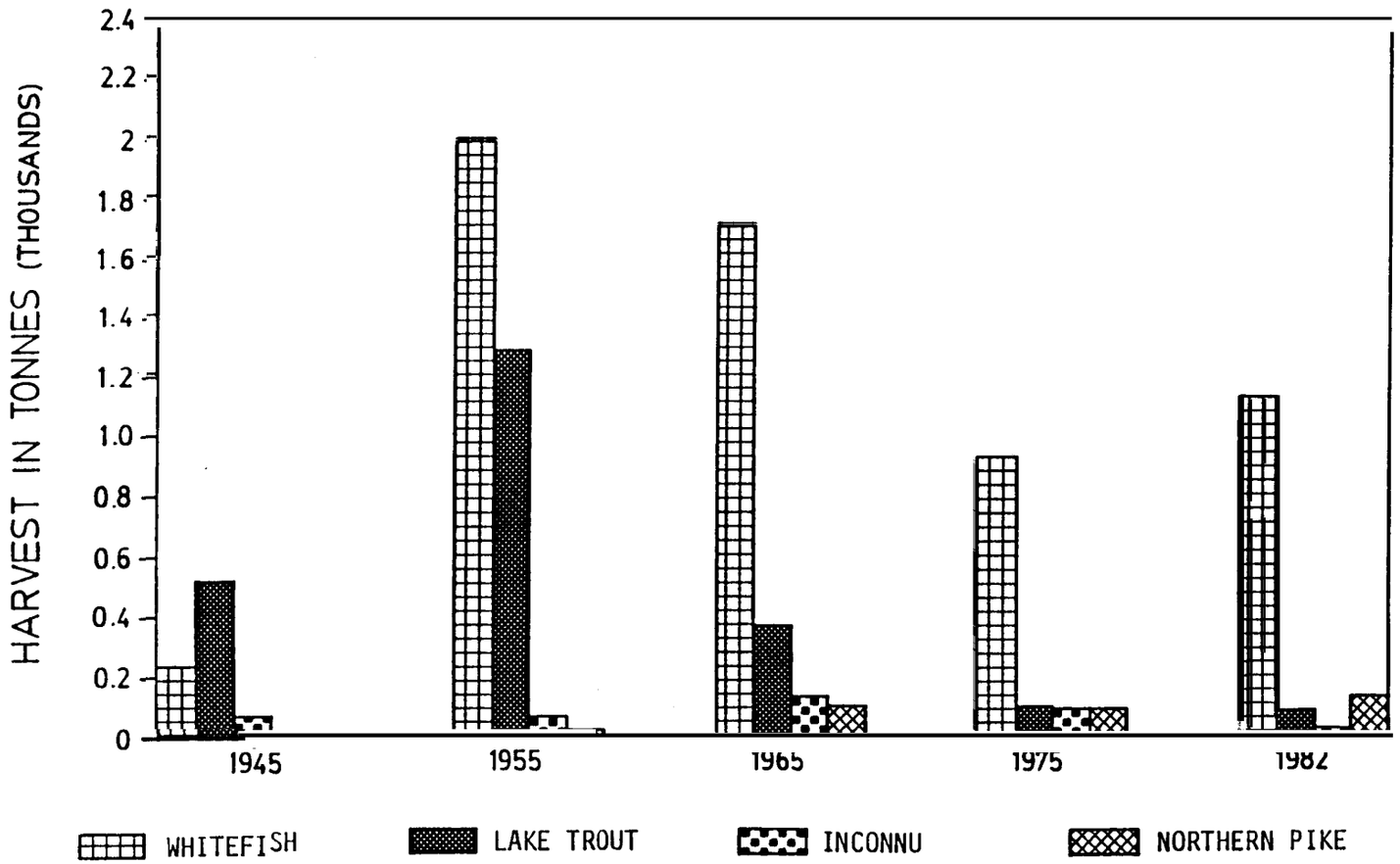

Figure 6. Species composition of the commercial catch from Great Slave Lake, 1945-1982. Data from D.F.O., Data Reports.

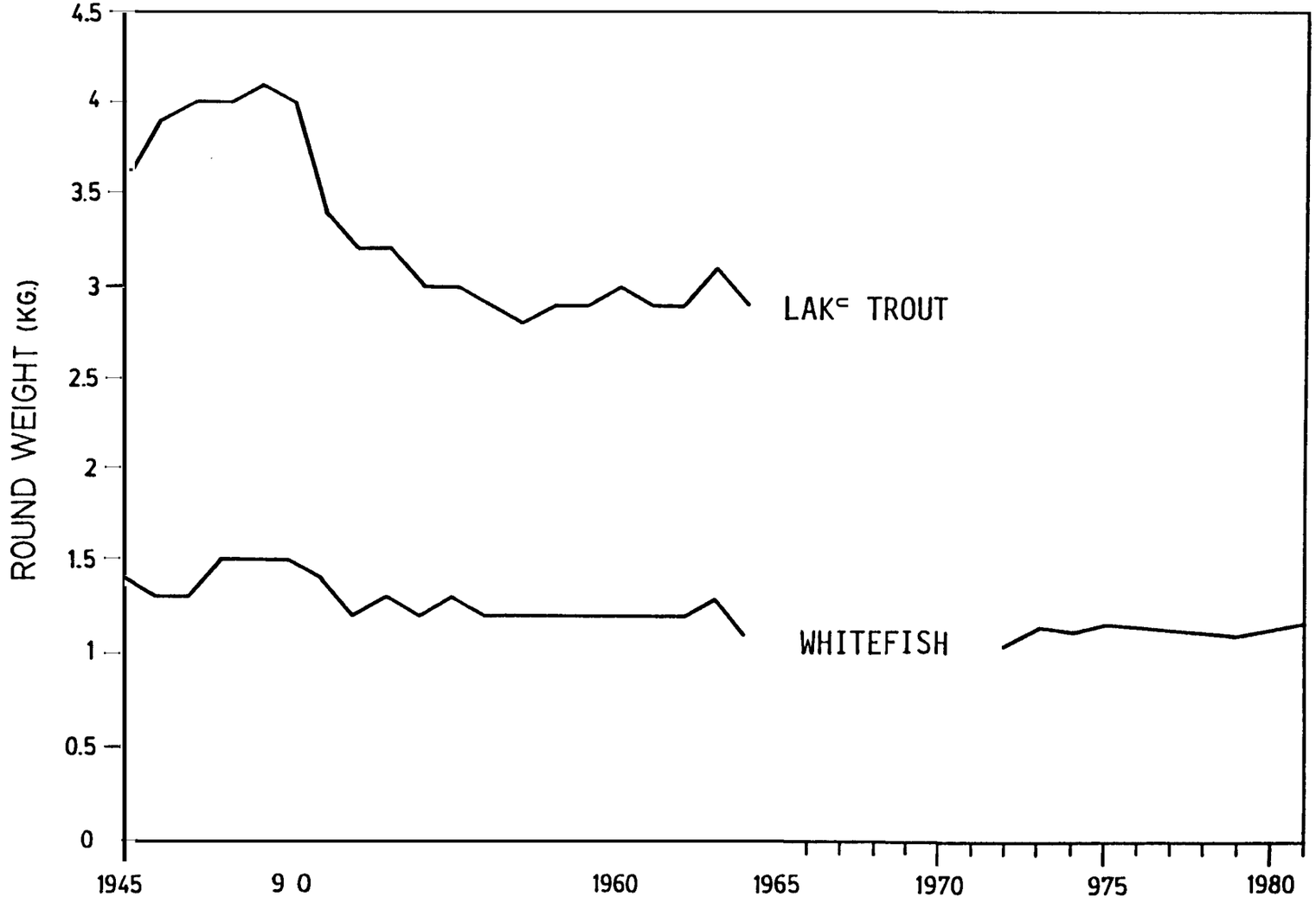

Figure 7. Changes in the average round weights of whitefish and lake trout taken from Great Slave Lake, 1945-1981. Data from D.F.O., Data Reports and M.S. Reports.

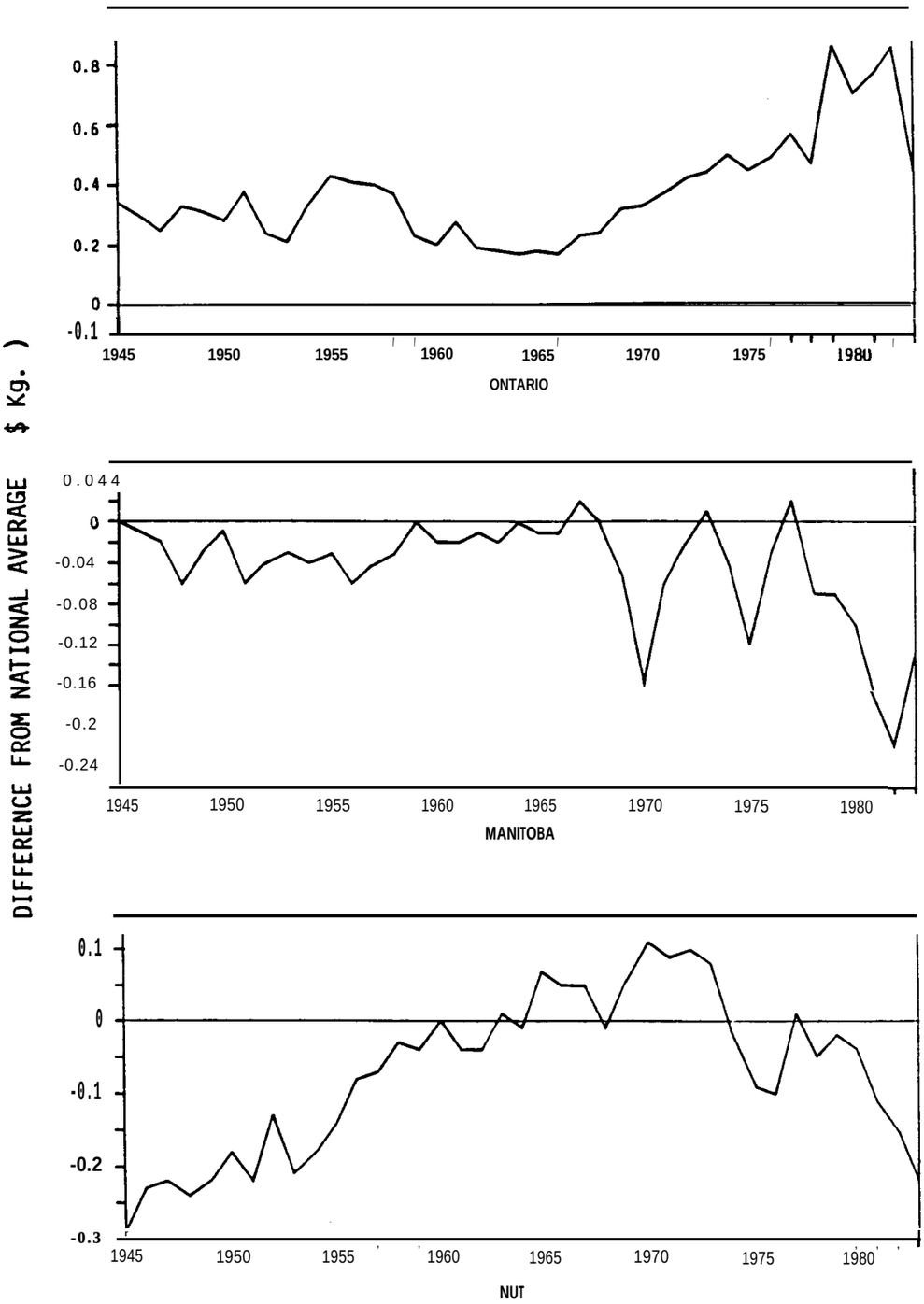

Figure 8. A comparison of landed values of whitefish for Ontario, Manitoba and the N.W.T., 1945-1982. Values represent the amount, in dollars/kg, above or below the national average landed value for freshwater fish in a given year. Data from the Canadian Fisheries - Annual Statistical Review.

APPENDIX V

LIFE HISTORIES OF IMPORTANT COMMERCIAL FISH SPECIES

Arctic Charr *Salvelinus alpinus*

Salvelinus - an old name for charr

alpinus - alpine

Description

The body is typically troutlike, and is easily distinguished by large round violet-pink spots on the back and sides. Colour is variable and depends on size, habitat, and sexual maturity. In fresh sea-run charr the back is dark blue and the sides and under parts are silvery white, while in landlocked charr, the back is dark blue or olive green and the sides and underparts are white or dusty. The most striking coloration is exhibited by spawning Arctic charr which possess brilliant red sides.

Distribution

The Arctic charr has the most northerly distribution of any freshwater fish. They are native to northern coastal rivers and lakes in North America, Asia and Scandinavia. In the Northwest Territories, Arctic charr are found along the Arctic coast from the Mackenzie River to Frobisher Bay. Their distribution includes most coastal streams, some coastal lakes and the High Arctic Islands.

Biology

Arctic charr occur both as anadromous and landlocked populations. Anadromous charr overwinter in freshwater lakes, but migrate downstream in the spring to the sea and feed there throughout the summer. In the autumn they return to their home streams.

Arctic charr spawn in the autumn, usually in September or October. Landlocked populations spawn in lakes or the mouths of rivers entering lakes. Eastern anadromous charr are generally lake spawners, while western anadromous charr often spawn in stream riffles. Most anadromous spawners do not migrate to the sea in the year of spawning, but remain in freshwater for the entire year. Spawning occurs during the day over rock or gravel bottoms where the water temperature is around 4°C. Even though the males establish and guard territories, it is the female that prepares the redd or nest by clearing debris away from the site with her tail. The average anadromous female lays between 3000-5000 eggs (4-5 mm in diameter) while landlocked females due to their smaller size, lay fewer eggs. After spawning the female undulates over the nest, forcing the eggs down between the rock crevices.

The eggs develop over winter in water temperatures between 0 - 2.2°C. Hatching occurs in March or April, but the young remain in the gravel until June or July. The young of anadromous charr remain in freshwater for 3-8 years before making their first migration to the sea. During this freshwater period they feed initially on zooplankton and gradually shift to insect larvae and crustaceans. Once in the sea, they feed primarily on fish and large crustaceans, but will utilize whatever prey is easily available.

The growth rate of Arctic charr is slow, and varies greatly among different populations. Anadromous Arctic charr grow faster and larger than freshwater charr due to greater food abundance in the marine environment. Freshwater charr seldom exceed 350 mm even though they may live 20 years or more. In addition, eastern anadromous Arctic charr are slower growing than western charr, but tend to live longer, reaching a greater maximum size. Eastern anadromous charr have attained ages of 29 years, while the maximum age for western anadromous charr is between 10 to 14 years. The differences in growth between western and eastern stocks may be the result of different environments or genetic makeup.

Although some freshwater populations mature as early as age 3, most Arctic charr populations mature between the ages of 4 to 9 years. In general, western charr reach sexual maturity 1 to 3 years before eastern charr and freshwater charr mature 1 to 3 years before anadromous charr. In both freshwater and anadromous populations, males mature 1 to 4 years before females. Females spawn every second or third year, but seldom every year except in the southern parts of their range.

Freshwater charr feed almost exclusively on aquatic insects and crustaceans. Anadromous charr feed predominately on crustaceans and fish, including whitefish and several marine species.

Arctic charr have few natural predators, although young charr are eaten by larger charr, loons, and terns. Larger charr are also preyed upon by seals.

Utilization

Domestic fishing for Arctic charr occurs along the north and east coast of the Territories. Inuit fishermen generally prefer the anadromous charr because of its larger size and ease of capture. Most are taken in estuaries and rivers during their spring and fall migrations and are used for both human and dog food.

The high price this species commands and its reputation as a gourmet food have made Arctic charr one of the most valuable commercial speciesinthe Territories. Commercial fishing, however, is restricted primarily to the eastern Arctic anadromous stocks. In fact, the Rankin Inlet, Cambridge Bay, Pelly Bay, and Nettilling Lake fisheries account for most of the charr harvested commercially. Attempts to commercially fish freshwater populations have generally proven uneconomical and the limited abundance of the western anadromous stocks have prohibited extensive utilization. Because the eastern charr grow slowly and are in tremendous demand, strict management regulations have been necessary to ensure enough young charr escape the commercial harvest to maintain their populations. These regulations have included a 5.5 inch (13.9 cm) and 2.5 inch (6.35 cm) stretched mesh restriction for the anadromous and freshwater populations respectively.

A combination of excellent eating and fighting qualities have made the anadromous Arctic charr a prized sport fish. Most sport fishing for Arctic charr occurs near Rankin Inlet or Baffin Island, or in streams entering Coronation and Queen Maud Gulf.

Arctic Grayling - Thymallus arcticus

Thymallus - thyme-like, referring to the supposed odour of wild thyme

articus - means of the Arctic

Description

The Arctic grayling is closely related to the whitefishes, but is easily distinguished by its greatly enlarged dorsal fin, and small mouth with teeth on both jaws. A strikingly coloured fish; the back is dark purple or blue and the sides are *grey* with scattered black spots. The dorsal fin is dark with rows of orange and emerald green spots, and is edged with red or orange. The colours are more intense in males than in females, especially during spawning.

Distribution

Grayling are found throughout the mainland of the Northwest Territories, but are absent from the Boothia Peninsula and the Arctic Islands.

Biology

Arctic grayling prefer clear waters of large, cold rivers, rocky creeks and lakes. Although they avoid turbid water, they can be found in the Mackenzie River usually where clear tributaries enter. In large lakes they are generally close to shore, along rocky shores or near stream mouths.

Spawning occurs in the spring from May to mid-June usually when the lake ice cover is breaking. Grayling prefer to spawn when the water temperature is between 7-10OC. Adults migrate from lakes and large rivers into small tributaries with gravel or rock substrates. Although no actual nest or redd is prepared, males are territorial on the spawning ground and will chase or threaten other males. Spawning occurs during daylight, reaching its peak at midday. During the spawning act the male folds his dorsal fin over the female and milt and eggs are simultaneously released by vigorous vibration. An average female lays between 4,000-7,000 eggs, 3-4 mm in diameter. The female may spawn only once, or several times in different locations with different males. No parental care is given the eggs and the adults return to the lakes and rivers after spawning.

Hatching occurs within 2-3 weeks and the young are approximately 8 mm long. They spend another 8 days absorbing their yolk sac, although feeding may begin within 3 days after hatching. Food of the young is primarily zooplankton with a gradual shift to immature insects such as mayflies, caddisflies, and midges.

Growth is rapid at first and young-of-the-year will have attained a length of 7.6 or 10.2 cm by the end of the first summer. In later years, growth is variable depending on latitude and temperature. For example, grayling in their sixth summer had fork lengths of 40.5 cm in Great Slave Lake, while in Great Bear Lake the average was 35.6 cm. Most grayling mature at 6 - 9 years of age and live to 11 or 12 years, although individuals 20 years old have been caught. The largest recorded grayling was angled in the Katseyedie River, N.W.T., measuring 75.7 cm long and weighing 7.2 kg.

Adults feed mainly on aquatic and terrestrial insects, but small fish, fish eggs and lemmings have been found in their stomachs.

Utilization

Due to their relatively small size, grayling are of little importance as a commercial species. They are utilized principally by sport fishermen and to a lesser extent by domestic fishermen for human consumption and as dog food. Grayling are particularly vulnerable to domestic fishing during the spring spawning runs and in the fall when they aggregate in preparation for over-wintering. Most sport and domestic fishing occurs in the Mackenzie River, its tributaries and Great Slave Lake. Sport Fishing for this species is increasing in other regions of the Northwest Territories that offer lodges or fly-in camps.

Arctic grayling offer excellent potential as a sport species. It is a uniquely attractive species which exhibits highly desirable angling qualities. Its preference for cold clear streams, surface insects, and its tendency to leap when hooked are features that will attract increasing numbers of fly fishermen to the Northwest Territories.

Inconnu - Stenodus leucichthys nelma

Stenodus - narrow tooth

leucichthys - whitefish

nelma - Russian name for this fish .

Description

Inconnu is the largest member of the whitefish family and is distinguished by its wide mouth and projecting jaw. The body is pike-like with silvery sides and large scales.

Distribution

In North America they inhabit the fresh and brackish waters of northwestern Canada and Alaska. Their distribution in the Northwest Territories is restricted to the Mackenzie River drainage and the Anderson River.

Biology

Inconnu inhabiting the lower Mackenzie River are anadromous spending their summer months in the coastal waters near the delta. Prior to freeze-up they return to fresh water. The inconnu of Great Slave Lake are apparently not anadromous but they do migrate up large tributary rivers in late summer.

Inconnu probably spawn in late summer or early autumn in rivers. The spawning habits of the inconnu in terms of movements, areas utilized, and rearing areas for young are not well documented. It is suspected that anadromous stocks of the lower Mackenzie River spawn in the tributaries of the Peel, Rengleny and Arctic Red Rivers. Lake dwelling inconnu of Great Slave Lake spawn in the larger tributaries of Slave, Taltson and Little Buffalo Rivers. The upstream, presumably pre-spawning migration of inconnu is not obvious and may take place over the entire summer. In contrast, the post-spawning downstream migration is rapid and spectacular. Spawning occurs in swift water at depths from 1.5 - 1.8 m over coarse gravel substrates. Females lay between 100,000-400,000 eggs.

Hatching occurs in the spring and the young remain in the tributary streams for at least 2 years. Young inconnu eat primarily aquatic insect larvae and zooplankton.

Inconnu are the fastest growing of the whitefish species and reach the largest maximum size. Individuals ranging from 5 - 15 kg are common in the Mackenzie Delta fishery and inconnu exceeding 20 kg have been taken in Great Slave Lake. Most inconnu mature between the ages of

7-11 years and they are believed to spawn only every 2-4 years. Few inconnu live longer than 11 years in Great Slave Lake, but one individual 22 years old was caught in the Mackenzie Delta.

Adult inconnu feed primarily on fish. Inconnu of Great Slave Lake feed mainly on whitefish, but also northern pike, cisco, minnows and small inconnu. Anadromous stocks feed on pacific herring, cod, sticklebacks and to a lesser extent marine crustaceans. Because of its large size inconnu have few natural predators, although northern pike and burbot will prey upon young inconnu.

Utilization

Presently the commercial harvest of inconnu is confined to the Great Slave Lake area. Approximately 69,000 kg are taken annually and sold primarily in the United States on the smoked fish market. Domestically, inconnu are caught in the Mackenzie Delta and Great Slave Lake regions and are used for both human consumption and dog food. Utilization by sport fishermen is extremely low.

Historically, inconnu have not been commercially fished to any great extent because of its "oily flesh". Ironically this has become its best selling feature. The inconnu is ideally suited for smoking and the demand for this species is increasing in the south.

Lake Trout - Salvelinus namaycush

Salvelinus - an old name for charr

namaycush - Indian name

Description

Lake trout is actually a misnomer, because this fish belongs to the charr (Salvelinus) genus and not the trout (Salmo) genus. Lake trout achieve the largest size and are among the longest-lived freshwater fish in the Northwest Territories. It can be easily distinguished by irregular white spots on the back and sides and the deeply forked tail. Coloration varies depending partially on size and habitat but usually the back is dark green to grey, or brown, and gradually shades into pale white or yellow underparts.

Distribution

Lake trout are native only in North America and are most abundant in northern Canada. They are found throughout the mainland portions of the Northwest Territories as well as several Arctic islands including Baffin, Southampton, King William, Victoria, and Banks Islands.

Biology

In southern Canada lake trout are found only in relatively deep lakes, but in the Territories they also occur in shallow tundra lakes and rivers. Their depth distribution varies with the seasons, especially in southern Canada, but they usually prefer water temperatures of about 10°C. Although it has been reported in coastal waters, the lake trout is the least tolerant of salt water of all the charrs and is seldom found in salinity greater than 10%.

Spawning has been reported as early as mid August in Great Bear Lake, but generally most spawning in the Northwest Territories occurs in late September or October when water temperatures are between 7-14°C. In the autumn mature lake trout move into shallower water (12m or less) of lakes to spawn over large boulder or rubble bottoms. Occasionally, spawning has been observed in rivers. While there is some evidence of horning, thatis, returning to the same spawning beds year after year, it is not as strong or complete as the homing behaviour exhibited by salmon. Spawning takes place after dark with one or two males spawning with one female or groups of males and females may spawn together. No nest is built and fertilized eggs become lodged in rock crevices. The

average female lays about 6000 eggs (4-6mm in diameter), but larger individuals may deposit up to 18,000 eggs. After spawning, lake trout disperse throughout the lake to overwinter.

Lake trout eggs incubate for about 4-6 months and hatching usually occurs in April or May. In southern locales, the young usually seek deeper water within a month or so after hatching, while in the north they may remain inshore for months or even years as in Great Bear Lake. Initially, the young feed *on* zooplankton, but as they move into deeper water aquatic insects, snails, freshwater shrimp and deep water sculpin become more important in their diet.

In the Northwest Territories lake trout are relatively slow growing and long-lived, often exceeding 30 years of age with some individuals age 60 or more. The fastest northern growth rates occur along the Mackenzie River drainage but decline with increasing latitude. For example, lake trout in Great Bear Lake take almost twice as long to grow to a comparable size as those in Great Slave Lake. Northern lake trout generally mature between 6 and 13 years of age and spawn every second or third year. There is also a tendency for northern lakes to be" dominated by old mature fish (10 years and older) and the recruitment of juveniles is relatively low.

Adult lake trout feed upon a wide range of animals, including crustaceans, aquatic insects, fish and small mammals. However when available, ciscoes (tullibee) are the preferred food of most lake trout populations.

Lake trout have few natural enemies, although they are known to feed on their own young. Also, several species of fish have been reported to consume lake trout eggs.

Utilization

Sustaining an economically viable lake trout fishery is a difficult management problem. Because of the large size they attain and the excellent quality of its flesh, lake trout are highly prized both as a sport and commercial species. Unfortunately, unlike whitefish, the lake trout does not have the same capacity to respond to heavy fishing pressure. The combination of its long lifespan, slow growth rate, low adult mortality, low fecundity and low spawning success results in low recruitment of young lake trout into the fishery. Often the recruitment is too low to sustain the population resulting in a gradual deterioration of the fishery.

Presently all three fisheries, domestic, commercial and sport utilize lake trout in the Northwest Territories. Domestic fishing for lake trout is concentrated in the Mackenzie Valley, including the area surrounding Great Slave and Great Bear Lakes, in the inland lakes near Hudson Bay and in the vicinity of Bathurst Inlet and Cambridge Bay. Natives generally prefer whitefish and Arctic charr for food and lake trout rarely comprise more than 20% of the domestic fishery in the Northwest Territories.

Historically, lake trout were the most abundant species harvested. But whitefish and pike have now replaced the lake trout as the first and second most abundant species. In most cases, commercial fishing for lake trout is limited by transportation costs and is only economically viable when it occurs in conjunction with commercially harvestable whitefish or Arctic charr fisheries. Unfortunately, in these fisheries, the management of whitefish stocks to maintain a high substained yield ultimately results in the decline of the lake trout stocks.

Although the commercial harvest has declined in recent years, lake trout continue to be the most important sport species in the Territories. Southern anglers are attracted to the Northwest Territories in search of “trophy” lake trout and the lodges and out–camps that offer this type of fishing are concentrated in the area surrounding Great Slave and Great Bear Lakes and on the lakes north of the Manitoba border.

Greater benefits are derived when lake trout are managed as a sport rather than commercial species. The economic return to the Northwest Territories is greater and the impact of exploitation is less. That is, sport fishing generally causes a decline in the abundance of large fish, but the population structure is altered much less than with commercial harvesting. However, to continue attracting southern anglers to fish for trophy lake trout requires intensive management of this species. One trophy only and catch and release fishing are ways to conserve the trophy lake trout stocks in the Northwest Territories. The development of more fly–in camps in remote locations would also reduce the pressure on any individual lake trout population and increase the benefits derived from these under-utilized areas.

Northern Pike - Esox lucius

Esox - an old European name for pike

lucius - latin for pike

Description

The pike or jackfish is distinguished by its long, slender body, long, flattened snout, large mouth with strong canine teeth, and backward location of the dorsal fin. The back and sides are dark green, and the underparts are white. The sides are also covered with numerous irregular white spots.

Distribution

The northern pike is one of the most widely distributed freshwater fishes in Canada. In the Territories pike are common in lakes and streams throughout the mainland except in the northern and eastern coastal regions and on the Arctic islands. They are primarily a freshwater fish, but they have been known to enter estuaries of the Beaufort Sea.

Biology

Although pike occur in a wide range of habitats, they prefer shallow, warm, weedy bays of lakes or slow, heavily vegetated rivers. In the spring and fall, pike are found mainly in shallow water but move to deeper cooler waters in the summer.

Spawning occurs in the spring closely following ice break up (May to June) when water temperatures reach 7.2°C. Pike prefer to spawn over aquatic vegetation in shallow weedy bays or marshes or in vegetated river floodplains. Spawning occurs mainly during the day with one or two males mating with one larger female. Small numbers of very adhesive eggs are scattered randomly and they attach to the vegetation of the spawning area. An average female lays approximately 32,000 eggs (2.5-3.0 mm in diameter) over a 2 to 5 day period.

Depending on water temperature, the eggs hatch in about 2 weeks. The young 6-8 mm in length, often remain attached to vegetation by means of adhesive glands on the head for 6-10 days existing on their yolk reserves. After this, pike feed on zooplankton and immature aquatic insects for about 2 weeks. They quickly shift to a diet of small fish such as sucker and other pike fry. Mortality of young pike fry, due to predation, or by stranding due to lowering water levels has been estimated as high as 99%.

Growth is rapid at first and by the end of the first year pike in the Mackenzie System will have attained a length of 10 cm. Rapid growth in length continues during the first 1-3 years but slows after sexual maturity is attained. At this point, the fish increases more in weight than in length. Generally, northern populations grow slower but live longer than southern populations. Life expectancy in the south can be as low as 10-12 years while Arctic populations live as long as 24-26 years. Northern populations of pike usually mature at age 5 for males and age 6 for females.

Adult pike prey mainly on fish but will eat any animal they can swallow, including frogs, crayfish, mice, muskrats and ducklings. Preferred fish species are whitefish, tullibee, suckers, perch and shiners. The ability of pike to utilize almost any prey item is probably one of the main reasons for the success of this species in exploiting such a wide range of northern habitats.

Utilization

Northern pike are important to all fisheries in the Northwest Territories. The commercial harvest comes principally from Great Slave Lake where pike are second only to whitefish in terms of weight caught. Because of its relative abundance across Canada and low demand in the Canadian fish market, the price received for pike is much lower than for whitefish or Arctic charr. There is however potential to increase northern pike sales to Europe where it is considered a gourmet food.

Domestic and sport fishing for pike occurs mainly in the Mackenzie River Valley, and around Rankin Inlet and Baker Lake. Although domestic fishermen use pike mainly for dog food, it is a highly sought after sport species by American anglers because of its large size and fighting quality. Only Arctic charr and lake trout demand a greater share of the non-resident sport fishing industry in the Northwest Territories.

Pickerel - Stizostedion vitreum

Stizostedion - means pungent throat

vitreum - means glassy, alluding to the nature of this species large, silvery eyes

Description

The yellow pickerel or walleye is part of the perch (Percidae) family. The only other member of this family found in the Northwest Territories is the yellow perch. The pickerel is easily recognized by its two separate dorsal fins, large mouth with canine teeth and large glassy eyes. Colour varies depending on habitat, but the back is usually dark green to brown, often with brassy yellow specks, while the sides are mottled yellowish and the wider parts are white. Other distinguishing colour characteristics are a black dot on the posterior base of the first dorsal (spiny) fin and a white patch on the lower lobe of its tail.

Distribution

The pickerel is limited to the freshwaters of North America with rare occurrences in brackish waters. It is widely distributed throughout most of Canada (except west of the Rockies) and the east and central states of the United States. In the Northwest Territories pickerel occur throughout the Mackenzie drainage, but are only found in abundance in the area south of Great Bear Lake.

Biology

Pickerel are tolerant of a great range of environmental situations, but prefer large, shallow, semi-turbid lakes. Clear water lakes are also inhabited by pickerel but because their eyes are sensitive to light, feeding and movements are restricted to twilight or dark periods.

Spawning begins shortly after ice break-up when water temperatures are between 6-11°C. Depending on the latitude this usually occurs in late May or June in the Territories. In years when conditions are not favorable, in particular water temperature, northern populations may not spawn. Homing behaviour has been reported in walleye. Males migrate first to the spawning ground, which are either sandy or rocky shoals in lakes or gravel shallows in streams. Most spawning occurs after dark in less than 1-2 m of water. Spawning takes place in groups of one large female with one or two smaller males or two females with

several males. Females have been reported to deposit between 35,000 to 600,000 eggs although the average is closer to 100,000 eggs. The egg is small, 1.5-2 mm in diameter, and most females lay and abandon the majority of their eggs in one evening.

Depending on water temperature, the eggs will hatch in 2-3 weeks. After hatching, the pickerel fry disperse from the spawning ground and spend the early summer near the surface in open water. By mid-summer the young pickerel move inshore. to feed and eventually seek deeper water in the autumn. Pickerel fry initially feed on zooplankton, but quickly switch to fish, especially young perch. From the time of spawning to the end of their first summer, pickerel eggs and fry are subject to a variety of environmental factors and predation that can result in mortality rates as high as 99%.

Pickerel growth rates are dependent on the length of the growing season and the productivity of the water. As a result, pickerel grow much slower and mature later in the Northwest Territories than in the south. Most mature male and female pickerel captured in Mosquito Creek (a tributary of Great Slave Lake) were 9 and 10 years old respectively. Populations found farther north probably mature even later. In contrast southern male and female pickerel mature at 2-4 and 3-6 years respectively.

Adult pickerel feed principally on fish, although mayflies, frogs, leeches and crayfish are often found in their stomachs. When present young-of-the-year perch are very important items in their diet.

The northern pike is probably the most important predator of pickerel over most of its range. However, lake trout, burbot and pickerel themselves, will also feed on young pickerel.

Utilization

Pickerel are probably the most economically valuable commercial and sport species in Canada's inland waters. However, because of their limited abundance and slow growth rates, pickerel are utilized only in very minor quantities in the Northwest Territories. The commercial harvest is restricted principally to Kakisa, Tathlina and Great Slave Lakes. In recent years production has declined from a maximum of 72,036 kg in 1972/73 to 37,321 kg in 1984/85.

Throughout the Mackenzie River drainage, small quantities of pickerel are taken by the domestic fisheries, but these are generally incidental to catches of other species.

Sport fishing is restricted to road accessible areas, Great Slave Lake and at lodges wherever the species is present. Since commercial fishing is economically feasible in a very limited number of water bodies in the Northwest Territories, this species' greatest potential lies with sport fishing, The species is highly prized by anglers for its excellent eating qualities.

Tullibee - ciscoes

Three species of cisco occur in the Northwest Territories: lake cisco Coregonus artedii, least cisco Coregonus sardinella, and Arctic cisco Coregonus autumnalis.

Coregonus - angle-eye

artedii - is named for Petrus Artedi, considered the "father of ichthyology"

sardinella - small sardine

autumnalis - of the autumn

Description

Ciscoes or tullibees are members of the whitefish family. The terminal mouths distinguish them from whitefish, who have inferior mouths that are overhung by their snouts. Distingushing the three cisco species from each other is much more difficult and positive identification is often dependent on the position of the lower jaw, distance between fins, or number of gill rakers. Ciscoes are usually dark green or brown above and silver below,

Distribution

Lake cisco are found throughout the eastern mainland of the Northwest Territories and in the Mackenzie System from Great Bear Lake south. Arctic and least cisco are very abundant in coastal waters from Alaska to Bathurst Inlet. Both species can also be found in the lower reaches of many Arctic rivers, including the Mackenzie.

Biology

Lake cisco are most commonly found in lakes where they form large schools that usually inhabit the mid-water region. Its mid-water depth varies with season and temperature but in general they can be found in the shallows in the spring and fall and in deep water during the summer. Both Arctic and least cisco are anadromous species, leaving the estuaries of rivers and brackish coastal waters in the spring and summer, ascending freshwater rivers to spawn and then moving downstream to the coast in the autumn. However, some least cisco populations are non-migratory and spend their entire life in freshwater.

All cisco spawn in the autumn. Least and lake cisco are known to spawn in both lakes and rivers over sand or gravel bottoms,

Arctic cisco are believed to spawn in tributaries of the Mackenzie River over gravel substrates. The number of eggs deposited depends on the species and size of the female. Usually though, least cisco lay 9,000-14,000 eggs; Arctic cisco up to 90,000 eggs; and lake cisco 6,000-22,000 eggs. The eggs are simply scattered over the bottom and abandoned.

The eggs develop slowly over the winter and hatch in May or June. The young begin feeding on zooplankton even before their yolk sac is absorbed. It is believed the young of the anadromous least cisco and Arctic cisco move downstream into estuaries. Whereas the young of lake cisco and non-migratory least cisco spend approximately one month in the shallows and then move into deeper regions of lakes and rivers.

Ciscoes grow relatively slowly. The maximum size attained by Arctic ciscoes rarely exceeds 500 mm, and least and lake ciscoes seldom grow longer than 350 mm. Arctic ciscoes are generally faster growing and live longer than the other cisco species, possibly because they spend more time in the sea. Similarly, anadromous least cisco grow faster and live longer than non-migratory least cisco. Ciscoes mature by age 5 or 6.

Adult lake and non-migratory least cisco feed predominately on zooplankton, crustaceans, and occasionally small fish and fish eggs. Arctic cisco and migratory least cisco prey mainly on small fish and crustaceans. Ciscoes, in turn, are important food items for a variety of predatory fish, including lake trout, northern pike, inconnu, burbot and pickerel.

Utilization

Ciscoes are harvested for domestic use primarily in the Mackenzie Delta, and Great Slave and Great Bear Lakes. Most are used for dog food, although Arctic cisco are utilized for human consumption because of their larger size. No effort is being made to commercially fish ciscoes in the Northwest Territories and their sport potential is also low. They are however an important link in the food chain, serving as forage for larger and more economically valuable species such as lake trout, northern pike and pickerel.

Whitefish

Three species of whitefish are common in the Northwest Territories: the lake or humpback whitefish Coregonus clupeaformis, the broad whitefish Coregonus nasus, and the round whitefish Prosopium cylindraceum.

Coregonus - angle-eye

clupeaformis - herring-shaped

nasus - referring to the shape of the nose

Prosopium - a mask, referring to the large bones in front of the eyes

cylindraceum - like a cylinder

Historically all three species have been placed together and considered as species for commercial and domestic catch records and commercial quotas. However, of the three, the lake whitefish is the most widely distributed and contributes the most to the commercial and domestic harvest. Therefore, it will be discussed in greater detail.

Description

Whitefish are closely related to ciscoes, but can be easily distinguished by their inferior mouths and overhanging snouts. Ciscoes in contrast have terminal mouths. The features that distinguish the three whitefish species from each other are as follows: the brow of a lake whitefish is concave in profile; the brow of a broad whitefish is not concave, but rounded; the body of the round whitefish is much more cylindrical in shape than that of the other two species; whitefish are usually dark brown or green above and silver below.

Distribution

Lake whitefish are widely distributed in Canada and are especially abundant in the Northwest Territories. It can be found in most lakes and rivers in the mainland portion of the Territories and is known to occur in brackish coastal estuaries in the vicinity of the Mackenzie Delta and near Cambridge Bay.

Similarity, the round whitefish is widely distributed throughout the lakes and rivers of the Northwest Territories and is often found in brackish waters near the mouths of the Mackenzie, Coppermine and Churchill Rivers. In contrast, the broad whitefish distribution is much more restricted. They are found principally in the Mackenzie River and along the Beaufort Sea coast to Bathurst Inlet.

Biology

Lake whitefish exhibit a variety of life history types ranging from the freshwater lake-dwellers of Great Slave Lake to the semi-anadromous stocks of the Mackenzie Delta. Until recently, very little was known concerning the movements of the semi-anadromous stocks. It has been found that some Mackenzie River lake whitefish migrate along the Beaufort Sea coast in the spring and ascend streams into freshwater lakes where they feed throughout the summer. In the fall, some return to the Mackenzie River to spawn while others overwinter in the freshwater lakes.

Broad and round whitefish also exhibit lake-dwelling and semi-anadromous life histories.

Lake and round whitefish spawn in the early fall in lakes or rivers. Very little is known regarding the spawning habits of the broad whitefish, but it is suspected it may spawn earlier than the other two species. In northern populations, whitefish may only spawn once every 2 or 3 years. Spawning usually occurs in shallow water (7.6 m or less) when the water temperature is between 6–10°C. The eggs are scattered randomly in small batches over gravel or rock substrates. The spawning period lasts 7-10 days. The number of eggs deposited by a female varies from population to population, but up to 22,000 eggs (2.5 mm in diameter) per kg of female may be laid.

The eggs develop over winter and hatch in May *or* June. The young are carried inshore by currents where they tend to concentrate in shallow water. Feeding commences as soon as the yolk sac is absorbed. Initially, zooplankton are preyed upon, but by early summer the young have moved into deeper water and the diet shifts to aquatic insect larvae.

The growth rate of lake whitefish varies from lake to lake, but in general it is relatively rapid. Because it is a cold adapted species, growth rates are best in the central and northern parts of its range and poorest in the southern, warmer regions of its range. In Great Slave Lake, whitefish take approximately 9 years to reach the commercial size of 0.9 kg. Broad whitefish also exhibit extremely variable growth rates, but the fastest growing population are within the Mackenzie Delta and the slowest in the Coppermine River. Broad whitefish in the Mackenzie Valley generally grow larger than lake whitefish.

Round whitefish tend to be smaller than the other two species, although a specimen 561 mm was taken in Great Slave Lake.

Lake whitefish generally mature between 5 and 9 years of age in northern waters. Broad whitefish may mature as early as 3-4 years of age and as late as 7-10 years of age. Most round whitefish mature in their sixth or seventh year.

Adult whitefish are generally bottom feeders consuming a wide variety of bottom-living invertebrates such as mayflies, midge larvae, and small clams. Occasionally, small fish and fish eggs are consumed. In turn, a variety of other fish species prey upon whitefish including lake trout, northern pike, and pickerel.

Utilization

Commercial and domestic harvesting of lake whitefish is concentrated in the immediate vicinity of communities in the Mackenzie River Valley, Great Slave Lake area, the Coronation-Queen Maud Gulf area and along the west coast of Hudson Bay. Presently, lake whitefish is the most important commercial species in the Northwest Territories accounting for almost 74% of the total commercial harvest in 1984/85. Most of the commercial harvest is taken from Great Slave Lake. The lake whitefish is also the most important species in the domestic fisheries in terms of kilograms harvested and preference. Sport fishing for this species is limited.

Broad and round whitefish do not contribute significantly to the commercial harvest in the Territories. However, broad whitefish are important to the domestic fisheries of the Mackenzie Delta.

APPENDIX VI

INTERVIEWS CONDUCTED

INTERVIEWS CONDUCTED

Mr. B. Buckley	Commercial Fisherman Hay River, N.W.T.
Mr. G. Carder	Fish & Marine Mammal Management Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. F. Diamond	Commercial Fisherman Hay River, N.W.T.
Mr. D. Dowler	Field Services Dept. Fisheries and Oceans
?lr. A. Drobot	Field Operations Freshwater Fish Marketing Corp. Winnipeg, Manitoba
Mr. G. Gudmundson	Commercial Fisherman Hay River, N.W.T.
Mr. K. Hall	Dept. Fisheries and Oceans Yellowknife, N.W.T.
Mr. D. Iredale	Process Development & Production Promotions Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. S. Kirwan	Renewable Resources Economic Development & Tourism Yellowknife, N.W.T.
Mr. A. Kristofferson	Fish & Marine Mammal Management Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. G. Low	Fish & Marine Mammal Management Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. D. Moshenko	Dept. Fisheries and Oceans Yellowknife, N.W.T.

Mr. R. Moshenko	Fish & Marine Mammal Management Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. R. Peet	Arctic Resource Assessment Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Ms. M. Roberge	Fish & Marine Mammal Management Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. K. Roberts	Field Services Dept. Fisheries and Oceans Hay River, N.W.T.
Mr. M. Ross	Commercial Fisherman Hay River, N.W.T.
Mr. L. Simpson	Renewable Resources Economic Development & Tourism Frobisher Bay, N.W.T.
Mr. D. Stewart	N.W.T. Federation of Fishermen Hay River, N.W.T.
Mr. E. Studney	Commercial Fisherman formerly with Alaska Fisheries Hay River, N.W.T.
Mr. P. Thompson	Regional Economics & Marketing Services Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. B. Wong	Field Services Dept. Fisheries and Oceans Yellowknife, N.W.T.

APPENDIX VII

A CHRONOLOGICAL HISTORY OF COMMERCIAL FISHING IN THE N.W.T.

A CHRONOLOGICAL HISTORY OF COMMERCIAL FISHING IN THE N.W.T.

1913. Scientists of the Canadian Arctic Expedition initiate research on fisheries resources in the N.W.T.

1932. Mr. Ingebrigsten conducts the first commercial fishery for charr along the Keewatin coast.

1938. Fisheries Research Board of Canada formulates plans to investigate the potential for commercial fishing in the N.W.T. Plans are cancelled due to the Second World War.

1944. Dr. D.S. Rawson, on behalf of the Fisheries Research Board of Canada, begins a three year study to assess the fish resources of Great Slave Lake.

1945. Great Slave Lake is opened to commercial fishing and is given a quota of 3.5 million pounds dressed weight (1590 metric tonnes) of lake trout and whitefish,

McInnes Prod. Corp. moves from Lake Athabasca and establishes a fish plant at Gros Cap on Great Slave Lake.

Fisheries Research Board of Canada begins a 20 year study of the Great Slave Lake commercial fishery.

1946. Winter road completed to Hay River and winter fishing begins.

Commercial fishing begins on Kakisa Lake.

1947. Commercial charr fishery started at Frobisher Bay.

A nine year study of the marine resources of the Eastern Arctic is initiated by Dr. M.J. Dunbar.

Mr. R. B. Miller of the Fisheries Research Board of Canada conducts a study of Great Bear Lake and concludes that fish abundance and annual growth rates are insufficient to support a fishery.

Management and policy enforcement in the N.W.T. is conducted from a new office in Hay River under the auspices of the Department of Fisheries in Winnipeg, Manitoba.

1948. Mackenzie Highway reaches Hay River .

Menzies Fish Co. establishes the first fish plant at Hay River.

Talthelei Narrows closed to commercial fishing due to the decline in lake trout populations and the interest in developing sport fishing.

Mr. W.M. Sprules of the Fisheries Research Board of Canada conducts a preliminary survey of the Arctic charr resources of the west coast of Hudson's Bay and concludes that quantities are insufficient to support a commercial fishery.

1949. Great Slave Lake quota is raised to 4090 metric tonnes of lake trout and whitefish.

Great Slave Lake production peaks at 4,500 metric tonnes. It becomes the largest single producer of whitefish in North America.

Great Slave Lake is divided into six Administrative Areas to prevent localized overfishing.

1950. A commercial fishery was started on Nueltin Lake. The attempt was unsuccessful.

1951. First angling licences issued in Hay River,

First sports fishing lodge established at Talthelei Narrows.

Treaty Indians are issued with free fishing permits to promote their involvement in the fishery.

195? Fort McPherson trader attempts to establish a winter fishery in the Mackenzie River Delta area.

Barren Ground Fisheries Survey conducted by the Fisheries Research Board of Canada to determine which lakes were suitable for development of commercial fishing.

Portion of McLeod Bay closed to commercial fishing.

1960. Department of Northern Affairs and National Resources attempts to establish a commercial fishery in the Mackenzie Delta area.

Commercial charr fishery started at Cambridge Bay.

1961. **The Ekaloktotiak Eskimo Co-operative is established at Cambridge Bay and commercial fishing of the Greiner River begins.**

The Control Area System and cyclic fishing are introduced in an effort to expand the inland fishery.

1962. Overfishing of the Greiner River causes the Cambridge Bay fishery to shift to the Ekalluk River in Wellington Bay.

Rankin Inlet Nickel Mine closure adds to an already severe economic depression in the Keewatin area prompting the Federal Government to develop the fish and marine mammal resources of the area.

Commercial processing plant begins operation in Cambridge Bay.

1963. First **assessment on the potential of developing a Pacific herring fishery in the Mackenzie Delta.**

A cannery is established at Daly Bay as a pilot project to determine the feasibility of processing fish, walrus, seal, and whale products for local consumption.

1965. **Daly Bay processing plant is moved to Rankin Inlet.**

Menzies Fish Co. begins a two year fishery for whitefish and Arctic charr in the Mackenzie Delta and along the Yukon Coast to Herschel Island

1966. **The original Control Area System is rescinded in favour of the less rigid cyclic system.**

1967. **The Freshwater Institute in Winnipeg, Manitoba assumes responsibility from the Arctic Biological Station for freshwater fish research.**

1968. **The Syndicate of Fishermen is formed by a group of 15 Hay River fishermen in an attempt to head off the establishment of the FFMC. The syndicate is dissolved in 1970.**

1969. **The Freshwater Fish Marketing Corporation is established with a mandate to increase the returns to the fishermen and develop the orderly marketing of fish in the N.W.T. .**

Pelly Bay charr fishery established.

Commercial fishing is started at Lac La Marte.

1970. Canning of marine mammal products and lake trout is discontinued after the discovery of high levels of naturally occurring mercury in the products.

1971. A major fish processing plant is constructed at Cambridge Bay.

The inland fishery reaches its peak with a total of 650,322 kg. being harvested.

1972. .Great Slave Lake Advisory Commitee is established,

1973. Lac La Marte fishery is restricted to domestic fishing and commercial production for local sales only.

1974. Commercial fishing for charr starts at Nettilling Lake.

1975. All canning operations at Rankin Inlet are discontinued as they are found not to be economically viable.

1977. Complete East Arm of Great Slave Lake is closed to commercial fishing.

1979. A new licencing policy and restricted entry are introduced to the Great Slave Lake fishery.

1980. Department of Fisheries and Oceans initiates a study to assess the potential of 'processing Pacific herring, tullibee and whitefish roe in the Mackenzie Delta.

1981. The G.N.W.T. provides support for whitefish prices. By 1985 the total cost including packer service had increased to $370,000. .

Expansion of charr fisheries is prompted by increased prices and promotion of intersettlement trade.

1985. Proposals are made for the development of a new processing plant at Hay River and the discontinuation the M.V. Broadhead.

Arctic charr test fisheries conducted at Steensby Inlet and Holman Island.

Commercial charr fishery started at Chesterfield Inlet.

Fish processing plant constructed at Chesterfield Inlet.

Exploratory work initiated on the development of shrimp, scallops, and Greenland halibut in the Pangnirtung Fjord area.

1986. Arctic charr test fisheries conducted at Duke of York Bay and Holman Island.

Test fishery at Steensby Inlet expanded to include weir operation.

Shrimp fishery starts in the Hudson Bay/Ungava Bay area.

Table 3. Great Slave Lake commercial landings of whitefish and lake trout (thousands of kg round weight) according to years and seasons. Data from DFO: MS Reports, Data Reports, and Ken Roberts, Hay River.

	Whitefish			Lake Trout			Both		
	Summer	Winter	Annual	Summer	Winter	Annual	Summer	Winter	Annual
1945	227	0	227	499	0	499	726	0	726
1946	454	91	590	726	0	726	1179	91	1315
1947	408	499	907	680	91	771	1089	590	1633
1948	454	1724	2177	635	363	997	1089	2087	3175
1949	1043	1406	2449	1361	454	1814	2404	1860	4264
1950	1043	1542	2585	907	272	1134	1950	1814	3765
1951	953	953	1905	997	272	1270	1950	1225	3175
1952	726	907	1633	1134	227	1361	1860	1134	2994
1953	680	1089	1769	862	227	1089	1542	1315	2858
1954	1043	771	1814	862	227	1089	1905	997	2903
1955	1089	862	1950	1089	181	1270	2177	1043	3220
1956	1043	816	1860	953	227	1179	1996	1043	3039
1957	1225	771	1996	771	136	907	1996	907	2903
1958	816	680	1497	816	136	953	1633	816	2449
1959	907	680	1588	635	136	771	1542	816	2359
1960	1134	590	1724	408	91	499	1542	680	2223
1961	907	771	1678	408	91	499	1315	862	2177
1962	1225	816	2041	408	91	499	1633	907	2540
1963	1179	862	2041	272	45	318	1451	907	2359
1964	1043	680	1724	272	0	272	1315	680	1996
1965	907	771	1678	318	45	363	1225	816	2041
1966	635	590	1225	227	0	227	862	590	1451
1967	590	499	1089	227	45	272	816	544	1361
1968	816	590	1406	91	0	91	907	590	1497
1969	816	544	1361	136	0	136	953	544	1497
1970	862	590	1451	136	91	227	997	680	1678
1971	862	499	1361	92	45	136	953	544	1497
1972	726	363	1043	46	45	91	771	408	1134
1973	771	45	862	272	45	272	997	91	1089
1974	726	45	771	272	45	318	953	91	1089
1975	590	91	726	318	0	318	907	91	997
1976	771	91	862	181	0	181	953	91	1043
1977	953	91	1089	181	0	181	1179	91	1270
1978	771	91	862	318	0	318	1089	91	1225
1979	726	91	862	318	0	363	1043	136	1179
1980	816	91	953	363	0	363	1179	136	1315
1981	318	0	363	181	0	181	499	45	544
1982							885	328	1213
1983							661	299	960
1984							694	219	913
1985							645	341	986

Table 4. A summary of catch quotas for Great Slave Lake, summer and winter, (1945 - 1986) . Values given represent total lake quotas in thousands of kg round weight, of whitefish and lake trout.

Years	Total Quota
1945-1947	1900.0
1948-1970	4090.9
1971-1974	2265.9
1975-1976	2175.0
1977-1978	1545.5
1979	1613.6
1980-1986	1681.9

Table 5. Historical record of lakes fished and annual production from the inland lakes of the Northwest Territories. Harvest volumes in kg round weight.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Arseno	1966	2177	999				6987	A
Baker	1960	x	x			x	10614	B
	1961	300	127				427	B
	1966	x	x			x	9091	B
	1967	7364	905				8269	B
	1975						1298	B
Basler	1963						2863	c
	1964						5555	c
	1965						3221	c
	1966	1452	10442				11894	A
	1982/83	2524	8452		253		11229	D
Beaverlodge								
	1965						76	c
	1970/71	11290	339				11629	D
Blaisdell								
	1964						659	c
Charlie	1965	---	3182	---			3182	B
Chedabucto								
	1961		2134		7		2141	C,E
	1966						3468	c
	1967						4719	c
Chipp	1970						8245	c
Chitty	1973/74	1612	846		130		2588	D
	1974/75	1152	539		102		1793	D
	1982/83				503		503	D
David	1967						1367	c
Debartok								
	1965						27273	B
Defeat	1964						10048	c
Deskenatlata								
	1971						2374	c
	1971/72	7845	3690	3579	9		15123	D
	1977/78	87	68				155	D
	1980/81	2880	1206	801			4887	D

x harvest of unknown amount

cont. . .

Table 5. cent.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Harding	1966						1961	C
	1967						8059	C
Helmer	1964						4003	C
Hidden	1963						1887	C
	1968						580	C
Hjalmar	1969						3870	C
	1970						45015	C
	1970/71	**14516**	8556				23072	**D,C**
	1971/72	314	391				705	D
Hottah	1963	5087	4051				9138	F
	1964	243756	103340				347096	F
	1965	94272	71647				165919	F
	1966	3829	2691				6520	F
	1970						1189	c
	1970/71	21180	3184				24364	F
	1973/74	6221	2265				8486	D
Husky	1966						6075	c
Indin	1964		47				47	**C,A**
Ingray	1964						5758	c
	1965						22884	c
	1966						18117	c
	1970						2998	c
	1970-71	1340	1732				3072	**D,C**
	1980/81	458	1189				1647	D
Johnston	1960		17	1330			1347	E
	1964			668			668	E
	1970						139	c
	1971						139	c
	1976/77			327			327	D
Jones (63° 04′)								
	1968						2571	c
	1970						323	c
	1970/71	138	147				334	**D,C**
Jones (69° 42′)								
	1970/71	172	162				285	**D,C**

cont. . .

Table 5. cent.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Macewan	1960	2213		47	23		2283	E
	1961	771		85			865	**E,C**
	1969						3230	c
	1974/75	575		2			577	D
MacKay	1966						11126	c
	1967						26035	c
Margaret	1966						9932	c
	1967						18540	c
Mattberry								
	1966	4994	11350				16344	**A,C**
	1980/81	3530	1643		34		5207	D
McAlesse								
	1966	---10000---					10000	B
McInnes	1971						1890	c
	1971/72	2719	1053				3772	D
Mergle								
	1980/81	1620	1359				2979	D
Mosher	1963						323	c
	1964						1237	c
Nameless								
	1970/71	16	18				34	D
Neultin	1963						128318	c
	1964						**184117***	**I,C**
	1965						83543	c
	1966						67982	c
	1967						6932	c
	1968						87256	c
	1969						30104	c
Nonacho	1958	468	1835				2303	E
	1959	11527	13073				24600	E
	1962	278	758				1037	**E,C**
	1962						54005	c
	1970						140419	c
	1970/71	34546	31609				66155	**D,C**
Noel	1979	119					119	J

* dressed weight

cont. . .

Table 5. cont.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Kakisa	1953			16286			16286	
	1954			32563			32563	
	1955			5095			5095	
	1956			29616			29616	
	1957			25884			25884	
	1958			54300			54300	E
	1959			34426	5110		39536	E
	1960			25525	2358		27883	E
	1961			18372	7395		25767	E
	1965						1257	c
	1966						72735	c
	1967						32674	c
	1968						15774	c
	1969						15200	c
	1970						14726	c
	1970/71	95	240	16907	54		17296	**D,C**
	1971/72			22846			22846	**D,C**
	1972/73			20553			20553	D
	1973/74			22017			22017	D
	1974/75			21541	105		21646	D
	1975/76			20922			20922	D
	1976/77			14238			14238	D
	1977/78	11		18036			18047	D
	1978/79			1885			1885	D
	1979/80			22084	45		22129	D
	1980/81			17097	4914		22011	D
	1981/82	81	226	19687			19994	D
	1982/83			15972	125		16097	D
	1983/84			19714	73		19787	D
	1984/85			22173			22173	D
Kaminak	1967						1027	B
	1968	302	421	60			783	B
	1969	6818	2273				9091	B
	1970	47169	5224				52393	B
	1971	15031	3259				18290	B
	1973	840	858				1698	B
	1974						455	B
	1975	4985	9595				14580	B
Kaminuriak								
	1967	2138					2138	B
	1972	15257	14471				29728	G
	1973	18105	22900				41005	B
	1974	265	1061			498	1824	B

cont...

Table 5. cent.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Kasba	1962						454000	
	1967						4545	
	1968						38536	C
	1969						1508	C
Kazan	1959	x	x			x	6818	B
	1966						507	B
	1969						15909	B
	1970						8483	B
	1971						9091	B
	.1972						255	B
	1978						888	B
Keller	1961	11608	8847				20455	E
	1962	25822	15508	82			41412	E
	1963	19685	8992	293			28970	E
	1970						2917	C
Labrish	1966						4381	C
Lac la **Marte**								
	1969		22202			89256	111458	**H,C**
	1970		23875			103041	126918	**H,C**
	1970/71	75028	18217				93245	D
	1971/72	96153	13224	13	10		109400	D
	1972/73	280440	15378	3988	6156		299806	D
Lac Ste. Therese								
	1962		298	500			798	E,C
	1963	2354	2549	16774			21677	E,C
	1973/74			189			189	D
	1979/80	549					549	D
Little Crapeau								
	1966						2708	C
	1967						2239	C
MacDonald								
	1960	1123	1650				2773	E
	1961	11291	10491				21782	**E,C**
	1966						7824	C
	1972/73	10040	7842		31		17913	D
	1973/74	332	255		3		335	D
	1978/79	1048	683		78		1809	D
	1980/81	40			10		50	D

cont...

Table 5. cont.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Desperation								
	1963						1937	C
	1964						2610	C
Drygeese								
	1973/74	736	285				1721	D
Duncan	1967						1345	c
	1970						209	c
	1970/71	102	211		3		316	C,D
Faber	1962	451	2850				3301	E
Ferguson								
	1968						1252	c
Frank	1968						1987	c
Gagnon	1962	8647	11191				19838	C,E
	1963	2438	5105				7543	E
	1970						6230	c
	1970/71	6802	3384				10186	D,C
	1971/72	7409	5924				13333	D
Garry	1975	10165	1410				11575	B
Gordon	1963						40297	c
	1964						20791	c
	1969						48467	c
	1970						17195	c
	1970/71	9772	5455		34		15261	C,D
Graham	1970						2775	c
	1971	3542	576	257	3896		8271	D
Grandin	1963						111479	c
	1968						8702	c
	1969						73342	c
	1970						6957	c
	1970/71	1224	5634				6858	D
Grant	1966						20555	c
Gullion	1967						291	c
Hagalik	1967						784	c

cont.. .

Table 5. cent.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
North Henik	1970						2555	C
O'Conner	1972/73	1173	918				2091	D
O'Neil	1973	116	85				201	B
Palayok	1968						6477	c
Pauline	1964						1070	c
	1966						1685	c
Parker	1974	196	1945			131	2272	B
Pitz	1975		(260-900)					B
Plante	1964						2177	c
	1970						3067	c
	1970/71	1895	381				2276	D,C
Peter	1973			no data				
Quartzite				no data				I
Reade	1961	765		116	809		1690	E
	1969						1646	c
Rebesca	1970						4895	c
	1970/71	3006	1465				4471	D,C
Reid	1964		114	65			179	E
Rocher River	1967						567	c
	1969						920	c
	1970						2116	c
Ross	1963						10030	c
	1972/73	1433	805				2238	D
	1973/74	5336	2459		34		7829	D
Rutledge	1970						2439	c
Saddle	1966						13399	c
Salkeld	1971	9904	4311		5		14220	D,C

cent. . .

Table 5. cent .

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Savage	1973	4	166				170	B
Shultz	1975		(818-1360)					B
Sitidgi	1977						909	J
	1979		73				73	J
Slemon	1966						6840	C
	1973/74	968	453	68			1489	D
	1983/84	299	1053		32		1384	D
Sparks	1966						10793	C
	1972						15359	C
	1972/73	23187	7522		92		30801	D
	1980/81	2880	967		63		3910	D
Sparrow	1964						5585	C
	1983/84	3013	918		93		4024	D
Stark	1959	3016	7965		91		11072	E
Talston	1970						31441	C
	1970/71	21805	10126	49			32001	**D,C**
	1980/81	14		876			890	D
Talston River								
	1982/83	326	5	35	50	6	422	D
	1983/84			784	706		1490	D
Tathlina								
	1959			6588	900		7488	E
	1960			71788	1273		73061	E
	1961						25340	E
	1962						7326	E
	1963			30552	820		31372	**E,C**
	1964						11186	C
	1965						1947	C
	1966						326	C
	1967						16991	C
	1968						9072	C
	1969						11530	C
	1970						19601	C
	1970/71			14997			14997	**D,C**
	1971/72		689	25146	82		28464	D
	1972/73		108	33889			33997	D
	1973/74			7599		367	7966	D
	1974/75			6452	9		6461	D

cent. . .

Table 5. cont.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Tathlina (cont.)								
	1975/76			15069			15069	D
	1976/77			8578			8578	D
	1977/78			541	3		544	D
	1979/80	2327		3390	222		5939	D
	1980/81			14611			14611	D
	1981/82			31210			31210	D
	1982/83			30682	377		31059	D
	1983/84			19777			19777	D
	1984/85	53		4356	92		4501	D
Thekuthili								
	1962	20481	31820		107		52408	**E,C**
	1965						20374	**C**
	1966						7878	c
	1971/72	8886	4518	1271			14675	D
	1972/73	35784	25977		67		61828	D
	1980/81	2708	1275		81		4064	D
Thistlewaite								
	1970						2294	c
	1970/71	1366	851				2217	**D,C**
Thuban	1960	2238	7654				9892	E
	1961	1423	3660				5083	**E,C**
	1962						27524	c
	1963						13520	c
	1970						9993	c
	1970/71	2977	2514	36	513		6040	**D,C**
	1971/72	5749	8658		85		14492	D
Trefiak	1960			10597			10597	E
	1961						536	E
	1966						2713	c
	1967						5902	c
	1968						5149	c
	1969						2300	c
	1970						2300	c
	1970/71			2285			2285	**D,C**
	1972						16935	c
	1972/73			1025	256		1281	D
	1973/74			14	114		128	D
Tronka Chua								
	1970						10522	c
	1970/71	8233	2377				10610	**D,C**

cont. . .

Table 5. cent.

Lake	Year	Whitefish	Lake Trout	Walleye	Pike	Others	Total	Source
Tsu	1960	172	596	151	141		1060	E
Turner	1967						2775	C
Victory	1963	323	160				483	E,C
	1964						3536	C
Wecho	1965						339	C
Wedge	1969						4549	C
Windy	1964	29000	15000				44000	I
Yatsore	1967						15798	C
	1972/73	6335	2443				8778	D
	1973/74	2779	1349				4128	C
Zinto	1966						5304	c

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D. DFO Economics Data

E. Sinclair, S., S. **Trachtenberg,** and **M.L. Beckford.** 1967. Physical and economic organization of the District of Mackenzie, Northwest Territories. Fish. Res. Bd. of Canada, Bull. No.: 158.

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Table 6. A summary of the commercial harvest for the Inland Lakes fishery of the Northwest Territories (1953-1984). Round weight (kg.). From Table 5.

Year	Lakes Fished	Whitefish	Lake Trout	Pickerel	Northern Pike	Mixed	Total
1953	1			16286			16286
1954	1			32563			32563
1955	1			5095			5095
1956	1			29616			29616
1957	1			25884			25884
1958	1			54300			54300
1959	3	3016	7965	41014	6101		58096
1960	9	5746	9917	109436	3795	10616	139510
1961	10	26158	25259	18573	8211	26185	104386
1962	9	55679	62425	582	107	488850	607643
1963	14	29887	20857	47619	820	310563	409746
1964	19	272756	118501	733		258332	650322
1965	10	94272	71647	1947		402481	570347
1966	26	7458	14132			311174	332764
1967	19	7364	905			152728	160997
1968	13	302	421	60		146490	147273
1969	16	6818	24475			355836	387129
1970	30	254439	99449	34274	604	29690	418456
1971	14	157552	46293	53117	4082	11777	272821
1972	12	373649	75464	59455	6732	9623	524923
1973	15	36937	31806	29887	281	838	99749
1974	6	1992	1600	27995	216	953	32756
1975	8	15150	11005	35991		3558	65704
1976	4			23123			23123
1977	4	98	68	18577	3	909	19655
1978	4	1048	683	1885	78	888	4582
1979	5	2995	73	25474	267		28809
1980	10	14130	7639	33385	5102		60256
1981	2	81	226	50897			51204
1982	5	2850	8457	46689	1308	6	59310
1983	5	3312	1971	40275	904		46462
1984	2	53		26329	92	200	26674

Table 7. A summary of the commercial landings from the Mackenzie Delta Area, 1955-1980. Harvest volumes in kg round weight. (reported by **Corkum,L.D.** and **McCart,P.J.** in Can. MS Rep. Fish. **Aquat. Sci.** 1613: V + 55p. from data by B. Wong, Fisheries Biologist, Yellowknife) .

Year	Whitefish*	Arctic Charr	Inconnu	Northern Pike	Others	Mixed	Total
1955							752
1956							8500
1957	611		8	62			681
1958						13	13
1959							
1960	5445					5976	11431
1961	18204		968			5000	24172
1962	8784		1614	2376	4262		17036
1963	6516				1851		8401
1964	35161		4036			34	42566
1965	9059	7311				3369	16370
1966	28235	364			101		28700
1967							
1968							
1969							
1970							
1971							
1972	1715						1715
1973	22273		409				22682
1974	15909						15909
1975							
1976	16145						16145
1977	523						523
1978	2727	1136					3863
1979	6198	639	2375	364		182	9758
1980	9045	4723	2388			3459	19615

* Includes broad whitefish and lake whitefish

Table 8. Historical record of locations fished and annual production from the coastal Arctic **charr** fisheries of the Northwest Territories. Harvest volumes in kg round weight.

Area + Location	Year	Searun **Charr**	**Land-**locked **Charr**	Whitefish	Lake Trout	Total	Source
Cambridge Bay							
Includes:	1960	17955				17955	A
	1961	7561				7561	A
Ekalluk R.	1962	5777				5777	A
Greiner R.	1963	16176				16176	A
Ellice R.	1964	15537				15537	A
Perry R.	1965	20909				20909	A
Lauchlan R.	1966	16818				16818	A
Halovic R.	1967	24586				24586	A
Paliryuak R.	1968	43465				43465	A
Jayco R.	1969	48658				48658	B
Elu Inlet	1970	34588				34588	A
Dease Point	1971	42386	10315			52701	A
Starvation	1972	48985	15195			64180	A
Cove	1973	28492	9921			38413	A
Padliak Inlet	1974	30707	1850			32557	A
Collinson	1975	30914	1255			32169	A
Peninsula	1976	39774				39774	A
	1977	77338				77338	A
	1978	68343				68343	A
	1979	68169				68169	c
	1980	59250				59250	c
	1981	60554				60554	D
	1982	53620				53620	D
	1983	61614				61614	E
	1984	62964				62964	E
Ferguson L.	1962	1930			12563	14606(1)	B
	1963	259			4794	8382(2)	B
	1964	579		489	7829	8915	B
	1965	422		118	7790	8330	B
	1974	1305				1305	A
	1975	435				435	A
Kitiga L.	1967	548			40736	41284	B
	1979	(440 **kgs** . **A.charr** & **L.trout)**				440	H
Merkley	1968			3680	1095	4775	B
	1970			575	5181	5756	B
	1972				2945*	2945	B

cont...

(1) includes: 113 **kgs.** of **tullibee**
(2) includes: 3182 **kgs.** of mixed **A.charr** & **L.trout**
147 **kgs.** of **tullibee**
* dressed weight

Table 8. cont.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Cambridge Bay(cont.)							
Surey L.	1970			3293	1350	4643	B
	1972				8576*	8576*	B
	1977			--- 3260	---	3260	A
Toassie L.	1968			8 7 1 4	1350	10064	B
	1970			220	225	445	B
Unnamed	1971			455%	5000*	5455*	B
Lakes	1977			--- 16373	---	16373	A
Kuujjua R. Minto Inlet Holman Island		600/yr.				600/yr.	M
Whale Cove:							
Settlement	1962	5007				5007	L
Region	1963	2727				2727	L
	1965	1636*				1636*	L
	1970	4091*				4091*	L
	1971	2953*				2953*	L
	1976	15495				15495	L
	1982	510				510	D
	1983	546				546	E
	1984	602				602	E
Mistake Bay	1973	2291				2291	L
	1974	2088				2081	L
	1982	370				370	D
	1983	455				455	E
	1984	360				360	E

cont...

* dressed weight

Table 8. cont.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Whale Cove(cont.)							
Ferguson R.	1962	12563				12563	L
	1963	7976				7976	L
	1964	8318				8318	L
	1965	17409				17409	L
	1966	13730				13730	L
	1972	3929				3929	L
	1973	7178				7178	L
	1974	14037				14037	L
	1975	14319				14319	L
	1981	18380				18380	D
	1982	7149				7149	D
	1983	5000				5000	E
	1984	360				360	E
Copperneedle R.	1973	2309				2309	L
	1974	2227				2227	L
	1975	1818				1818	L
	1983	545				545	E
Wilson R.	1960	727				727	L
	1961	591			114	705	L
	1981	4571				4571	D
	1982	6903				6903	D
	1983	427				427	E
	1984	360				360	E
Pistol Bay	1974	5500				5500	L
	1981	9				9	D
	1983	364				364	E
	1984	360				360	E
Unnamed River	?	1094				1094	L

cont. . .

* dressed weight

Table 8. cent.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Chesterfield Inlet:							
Settlement Area	1962	1364				1364	L
	1965	6190				6190	L
	1969	1831				1831	L
	1970	1000				1000	L
	1974	1454				1454	L
	1975	1569				1569	L
	1976	8372				8372	L
	1983	545				545	E
	1984	2591				2591	E
Headwind Point	1974	813				813	L
Stoney Point	1974	1527				1527	L
	1975	4273				4273	L
Robin Hood Bay	1974	1172				1172	L
Barbour Bay	1971	782*				782*	L
	1974	1904				1904	L
Big River	1974	2535				2535	L
Han Way River	1974	619				619	L
	1983	409				409	E
Ranger Seal R.	1974	113				113	L
Daly Bay	1964	911				911	L
Steep Rock Bay	1977	no data available					
Repulse Bay	1969	2097				2097	N
Josephine R.	1983	591				591	E
	1984	141				141	E
Baker Foreland	1981	3475				3475	D
	1982	3000				3000	D
	1983	2200				2200	E
	1984	332				332	E

* dressed weight

cont. . ,

Table 8. cent .

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Eskimo Point:							
Eskimo Point	1962	2273				2273	L
	1965	3150				3150	L
	1975	1922				1922	L
	1983	1343				1343	E
	1984	1363				1363	E
Maguse R.	1977		no data available				
	1983	2000				2000	E
Sandy Point	1972	4545				4545	F
	1973	2385				2385	L
	1974	2590				2590	L
	1983	68				68	E
	1984	150				150	E
Wallace R.	1972	4317				4317	L
	1974	939				939	L
	1983	136				136	E
Rankin Inlet:	1961	2267				2267	J
	1962	17655				17655	J
	1963	19340				19340	J
	1964	13625				13625	J
	1965	19045				19045	J
	1966	27367				27367	J
	1967	20275				20275	J
	1968	2388				2388	J
	1969	26146				26146	J
	1970	7848				7848	J
	1971	27017				27017	J
	1972	16524				16524	J
	1973	28329				28329	J
	1974	42589				42589	J
	1975	29973				29973	J
	1976		no data available				J
	1977	23759				23759	K
	1978	11634				11634	K
	1979	11781				11781	K
	1980	24725				24725	K
	1981	15574				15574	D
	1982	14464				14464	D
	1983	6053				6053	E
	1984	5412				5412	E

cont. . .

Table 8. cent.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Rankin Inlet (cont.)							
Corbett Inlet	1973	4308					
	1974	4280					
	1975	4241					
	1983	545					
	1984	353					
Diana R.	1966	13636				13636	L
	1967	2933			463	3396	L
	1968	2388			218	2606	L
	1969	11475				11475	N,L
	1970	3323			786	4109	N
	1973	118				118	L
Meliadine R.	1961	136/day (July&Aug.)					
	1962	"2045					
Baffin Island:							
Approach L	1984	544				544	G
Cockburn R.	1984	40				40	G
	1985	646				646	o
Eqalulik R.	1978	3700				3700	M
Freshwater L.	1984	2172				2172	G
Frobisher Bay	1977	13716				13716	K
Gifford R.	1984	3500				3500	G
Hall L.	1984	3600				3600	G
Harder R.	1985	449				449	o
Igloolik	1977	81				81	K
	1978	3539				3539	K
	1980	6205				6205	K
	1984	5868				5868	K

cont...

Table 8. cent.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Baffin Island (cont.)							
Ikaluit R.	1984	2000				2000	G
Ikpikitturjuak River	1985	1093				1093	o
Irvine Inlet	1984	2411				2411	G
Kingnait Fjord	1984	1346				1346	G
Kipisa L.	1984	2716				2716	G
Kukaluk R.	1984	4500				4500	G
Neergaard R.	1985	1104				1104	o
Nettilling L.	1974	22727				22727	J
	1975	27000				27000	J
	1976	11245				11245	J
Okalik Bay	1984	617				617	G
Padle R.	1984	1800				1800	G
Padle Fjord	1984	1800				1800	G
Padloping Is.	1984	900				900	G
Paquet Bay	1984	2268				2268	G
Pond Inlet	1978	2570				2570	K
Qualluatik L.	1984	1332				1332	G
Qulurnilik R.	1985	1257				1257	o
Ravn R.	1984	9100				9100	G
	1985	1748				1748	o
Rowley R.	1984	112				112	G
	1985	1064				1064	o

cont. . .

Table 8. cent.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Baffin Island (cont.)							
Sam Ford Fjord	1984	816				816	G
Saputing R.	1984	4535				4535	G
Sylvia Grinell River	1960	5543				5543	J
	1961	4684				4684	J
	1962	4698				4698	J
	1963	4840				4840	J
	1964	3832				3832	J
	1965	5600				5600	J
	1966	4668				4668	J
Tarsuaq Arm	1984	168				168	G
	1985	590				590	O
Tugat R.	1984	1363				1363	G
Unnamed River (Cumberland Sd)	1984	977				977	G
Unnamed River (Cape Raper)	1984	187				187	G
Boothia Peninsula:							
Agnew R.	1977		no data available				
Arrowsmith R.	1971	495				495	L
	1973	11664				11664	L
	1974	3109				3109	L
	1984	150				150	G
Becher R.	1972	805				805	L
	1973	1685				1685	L
	1974	849				849	L
	1984	1375				1375	G
Committee Bay	1973	243				243	L
Gjoa Haven	1977	653				653	K
	1978	2273				2273	H

cont. . .

Table 8. cont.

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Boothia Peninsula (cont.)							
Kellet R.	1971	13674				13674	L
	1972	2542				2542	L
	1973	12148				12148	L
	1974	2621				2621	L
	1975	18182				18182	L
	1977	3676				3676	H
	1978	3675				3675	H
	1979	935				935	H
Lord Lindsay L.	1977	3400				3400	M
	1978	2161				2161	H
	1984	694				694	G
Murchison R.	1973	346				346	L
	1979	1395				1395	H
Pelly Bay	1969	682				682	J
	1970	386				386	J
	1971	15909				15909	J
	1972	3347				3347	J
	1973	22377				22377	J
	1974	21195				21195	J
	1975	18541				18541	J
	1976	5552				5552	K
	1977	7420				7420	K
	1978	3551				3551	K
	1979	12287				12287	K
	1980	8858				8858	K
Port Parry	1984	756				756	G
Spence Bay	1977	1709				1709	K
Stanwell Fletcher L.	1978	340				340	M
	1984	2700				2700	G
Unnamed Lake (Spence Bay)	1977	505	(all species combined)			505	H

cont...

Table 8. cent .

Area + Location	Year	Searun Charr	Land-locked Charr	Whitefish	Lake Trout	Total	Source
Wager Bay:							
Bennett Bay	1984	798				798	E
Cleveland R.	1984	1000				1000	G
Gore Bay	1983	272				272	E
	1984	380				380	E
Haviland Bay	1983	364				364	E
	1984	109				109	E
North Pole R.	1969	849				849	L
	1983	818				818	E
	1984	49				49	E
Pisimak R.	1983	454				454	E
Thomsen R.	1983	454				454	E
coupermine:							
Coppermine R.	1979	682				682	H
	1984	600				600	G
Paulatuk:							
Hornaday R.	1973	3636				3636	
	1977	6341				6341	H
	1978	6023				6023	H
	1979	6795				6795	H
	1980	6427				6427	H
	1984	5300				5300	G
Port Burwell:							
Ungava Bay	1969		17273 kg	of cod		172'73	L

↑ incorrect
10-20 kg Page

65 -
66 -
67 -
68 -
69 -

cont...

Table 8. cent.

Sources:

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K. Department Fisheries and Oceans. Economics data.

L. Rankin Inlet Fisheries Catch Records.

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N. Stephanson, S.E. 1973. The fisheries potential of the Northwest Territories: A method of inventory and assessment and the organization and transportation trends affecting future fisheries development. Practicum. Natural Resource Institute, Univ. Man. 162p. + App.

O. Data on the Steensby Inlet charr fishery. North/South Consultants Inc.

Table 9. A summary of commercial landings for the Arctic coastal fishery, 1960-1984. From Table 8. Weights in kg round weight.

Year	Searun A. charr	Landlocked A. charr	Whitefish	Lake Trout	Mixed	Total
1960	24225					24225
1961	23303					23303
1962	53312			12563	113	65988
1963	51318			4794	3329	59441
1964	41891		489	7829	18	50227
1965	74361					74361
1966	76219					76219
1967	48342			41199		89541
1968	48241		12394	2663		63298
1969	91056					91056
1970	51236		4088	6756		62080
1971	103216	10315	455	5000		118986
1972	81647	15195		11521		108678
1973	125218	9921				135139
1974	163999	1850				165849
1975	153187	1255				154442
1976	80438					80438
1977	138094				4163	142257
1978	107809					107809
1979	103349					103789
1980	105465					105465
1981	102563					102563
1982	85646					85646
1983	84748					84748
1984	143329					143329

Table 10. Total whitefish landings, by province, for the major Canadian freshwater fisheries, 1945-1983. Volumes in thousands of kg round weight. Data from: Canadian Fisheries - Annual Statistical Review.

Year	Ontario	Manitoba	NWT	Saskatchewan	Alberta
1945	1939	2043	984	2057	1476
1946	2023	2260	1663	1503	1205
1947	2246	1718	864	1610	808
1948	2941	1526	2251	1462	800
1949	3210	1918	2617	1610	831
1950	2995	2826	2836	1995	1096
1951	3264	2784	2082	2660	1229
1952	4285	2617	1741	2563	1436
1953	4643	2063	1757	1768	1373
1954	3111	2408	1827	2362	1445
1955	2023	2356	2091	2276	1221
1956	1840	2511	1805	2379	1847
1957	1466	2946	1955	2920	1801
1958	1490	2854	1536	5727	1920
1959	1447	3135	1573	5705	1965
1960	1752	2805	1729	3537	2465
1961	1776	3180	1829	3453	2081
1962	1655	3675	2051	3359	1254
1963	1616	3578	2077	3245	926
1964	1468	3310	1842	2868	698
1965	1470	3388	1823	3520	762
1966	1279	2743	1276	3026	949
1967	1271	2565	1059	2491	943
1968	1321	2404	1458	2195	917
1969	1344	2459	1570	2852	1090
1970	1304	2203	1598	2769	1055
1971	1068	2521	1304	2913	992
1972	1000	2541	1141	2553	1003
1973	902	2427	1094	1862	990
1974	1072	2335	1019	2222	1075
1975	1113	2757	783	2175	1039
1976	1374	3037	950	2052	1161
1977	*	*	1020	*	*
1978	1747	3665	1091	*	*
1979	1345	4544	1066	1819	703
1980	1771	4527	1208	1913	837
1981	1800	3391	1102	1203	770
1982	1814	2976	1166	693	919
1983	2271	3361	886	919	834

* data not available

Table 11. Total commercial landings, by province, for the major Canadian freshwater fisheries, 1945-1983. Volumes in thousands of kgs. round weight. Data from: Canadian Fisheries - Annual Statistical Review.

Year	Ontario	Manitoba	Saskatchewan	Alberta	NWT
1945	12717	13794	3919	3622	1496
1946	14999	13044	3544	5032	3018
1947	11327	13608	3645	4499	1581
1948	13228	14331	3671	3283	3548
1949	11014	13411	3396	2865	4137
1950	10164	14304	3969	3212	3576
1951	14077	16125	5233	3818	3399
1952	17293	14245	4824	4390	3201
1953	20381	10617	3855	4927	3054
1954	21673	12930	4784	3984	3192
1955	20699	15847	4605	3961	3558
1956	27084	13788	4282	4373	3153
1957	23183	14321	5019	4724	2993
1958	21398	14483	5715	5208	2680
1959	22219	14085	5693	5744	2613
1960	21591	14490	6591	7190	2548
1961	24926	13906	6584	5133	2595
1962	28930	16377	6804	4094	2811
1963	24649	16211	6391	3860	2739
1964	19735	12989	6489	5784	2690
1965	23807	13421	6774	3862	2599
1966	25557	13578	6253	4947	1993
1967	24792	9453	5318	4497	1763
1968	25269	11673	4976	5390	1975
1969	28670	9702	6312	4985	2110
1970	20902	7379	5540	3128	2138
1971	19411	6763	5309	1231	1768
1972	19593	10225	5053	1210	1630
1973	23895	10601	5021	1267	1539
1974	24143	11409	5630	698	1435
1975	20576	12215	4884	874	1143
1976	18645	10832	5104	1020	1283
1977	23529	12540	5214	1131	1376
1978	25413	12830	3748	997	1496
1979	25087	14556	4484	1019	1446
1980	26701	18086	5336	1213	1651
1981	28071	13734	3460	1101	1444
1982	34110	15454	3801	1106	1585
1983	27538	15005	2542	1135	1137

APPENDIX II

EMPLOYMENT, INCOME, AND LANDED VALUES

Table 12. A summary of employment and incomes for the Northwest Territories, 1970/71 - 1984/85. Data from Dept. of Fisheries and Oceans, Economics Branch.

Year	Self-employed Operators	Average Income per Operator(gross)	Total Employment
70/71	236	4,631	
71/72	199	4,882	
72/73	112	6,686	
73/74	119	6,788	
74/75	112	6,596	
75/76	136	5,237	
76/77	118	7,789	
77/78	144	10,116	239
78/79	121	12,875	205
79/80	100	15,363	168
80/81	102	18,284	198
81/82	97	16,000	161
82/83	89	15,199	134
83/84	69	25,060	118

Table 13. Average prices paid to fishermen for fresh fish landed at Hay River, summer and winter combined. Data from Dept. of Fish. and Oceans, Economics Branch, Winnipeg, Man. (values given include fishermen's assistance subsidies) .

Year	Export Whitefish $/Kg.	All fish combined $/Kg.
1970/71	0.55	0.63
1971/72	0.58	0.66
1972/73	0.59	0.58
1973/74	0.70	0.67
1974/75	0.74	0.68
1975/76	0.72	0.75
1976/77	0.73	0.86
1977/78	0.81	1.00
1978/79	1.18	1.17
1979/80	1.07	1.16
1980/81	1001	1.28
1981/82	1*03	1.32
1982/83	0.93	1.12
1983/84	0.84	1.32
1984/85	1.14	1.55

Table 14. Total landed values of commercial harvests, by province, for the major Canadian freshwater fisheries, 1946 - 1983. Values in thousands of dollars. Data from: Canadian Fisheries - Annual Statistical Review.

Year	Ont.	Man.	Sask.	Alta.	NWT .	Total
1945	6483	3418	882	742	112	12,138
1946	5597	3304	729	600	288	10,914
1947	4803	3477	484	449	143	9,689
1948	5683	3181	513	375	387	10,641
1949	5497	2821	521	342	549	10,212
1950	6252	3880	718	437	612	12,376
1951	7035	4263	910	544	535	13,855
1952	7407	3439	679	654	735	13,457
1953	7027	2717	553	667	471	12,114
1954	7013	3088	741	667	636	12,725
1955	6783	3477	763	687	742	13,124
1956	7927	2947	784	790	788	13,892
1957	7046	3279	939	854	721	13,471
1958	7217	3540	1091	879	682	14,024
1959	4866	3757	1190	1016	703	12,103
1960	4983	3867	1367	1159	700	12,765
1961	5745	3174	1385	883	675	12,450
1962	5341	4229	1478	714	860	13,346
1963	5498	4356	1300	676	796	13,297
1964	5222	3720	1490	799	833	12,715
1965	6402	4370	1734	677	977	14,972
1966	5995	4788	1706	844	765	14,853
1967	5988	2527	1163	758	775	11,831
1968	5968	3276	1382	915	759	12,957
1969	7389	3354	2294	935	1013	15,660
1970	6535	2151	2083	826	1087	13,237
1971	6948	2258	1839	413	960	13,132
1972	8119	4113	1641	469	839	15,840
1973	10,370	4928	1778	468	809	19,095
1974	9655	4871	1806	313	738	18,241
1975	11,052	5940	1791	423	677	20,944
1976	12,513	7062	2277	579	872	24,146
1977	14,555	10,231	3145	729	1100	31,091
1978	17,161	12,830	2629	646	1541	32,959
1979	25,873	10,801	2663	797	1576	43,234
1980	23,644	16,591	3794	1014	1793	48,352
1981	31,767	17,846	3262	899	1538	57,125
1982	36,788	15,508	2686	834	1674	58,847
1983	27,838	14,515	2762	788	1151	48,464

APPENDIX III

GREAT SLAVE LAKE FISHING FLEET

Table 15. An historical record of the Great Slave Lake summer fishing fleet including the numbers of fishing companies, fishing boats, and skiffs (in parentheses) which have operated since 1945. Data from Dep. of Fish. and Oceans MS and Data reports.

	McInnes	Menzies	Alaska	Gateway	Inland	Clark	Kutcher and Trefiak	Carter	Total Fleet
1945	20								20
1946	22								30
1947	18								22
1948	19	2							24
1949	21	17	6	4	7	8			66
1950	22	16	8	5		6			57
1951	21	12	9	10			9		62
1952	16	8	9	10			10		53
1953	12	9	?	?			7		40
1954	14	lo(3)	11(3)	6			9		51(6)
1955	15	lo(3)	14(3)	7			10	8	65(6)
1956	15	9(1)	13(2)	9			9	lo(l)	70(4)
1957	18(1)	lo(3)	15(3)	9			9	lo(2)	68(11)
1958	14	12(1)	lo(4)	5			9	7(2)	57(11)
1959	14	12(3)	16(2)				lo(2)	7(15)	59(22)
1960	14	lo(3)	13(7)				9(4)	7(15)	53(29)
1961		9(4)	14(6)				8(5)	5(10)	40(25)
1962		11(35)	13(19)				10(8)	5(15)	39(77)
1963		9(17)	15(16)				9(15)	7(11)	40(59)
1964									38(38)
1965			Data for private sector						39(31)
1966			involvement unavailable						39(55)
1967									31(40)
1968									31(23)
1969			After 1969 the FFMC was						29(25)
1970			the only fish buying						37(58)
1971			company operating in						34(50)
1972			the NWT						24(40)
1973									18(56)
1974									14(56)
1975									14(37)
1976									16(54)
1977									22(68)
1978									23(54)
1979									24(50)
1980									22(37)
1981									18(39)
1982									19(24)
1983									19(29)
1984									17(31)
1985									22(52)

APPENDIX IV

FIGURES

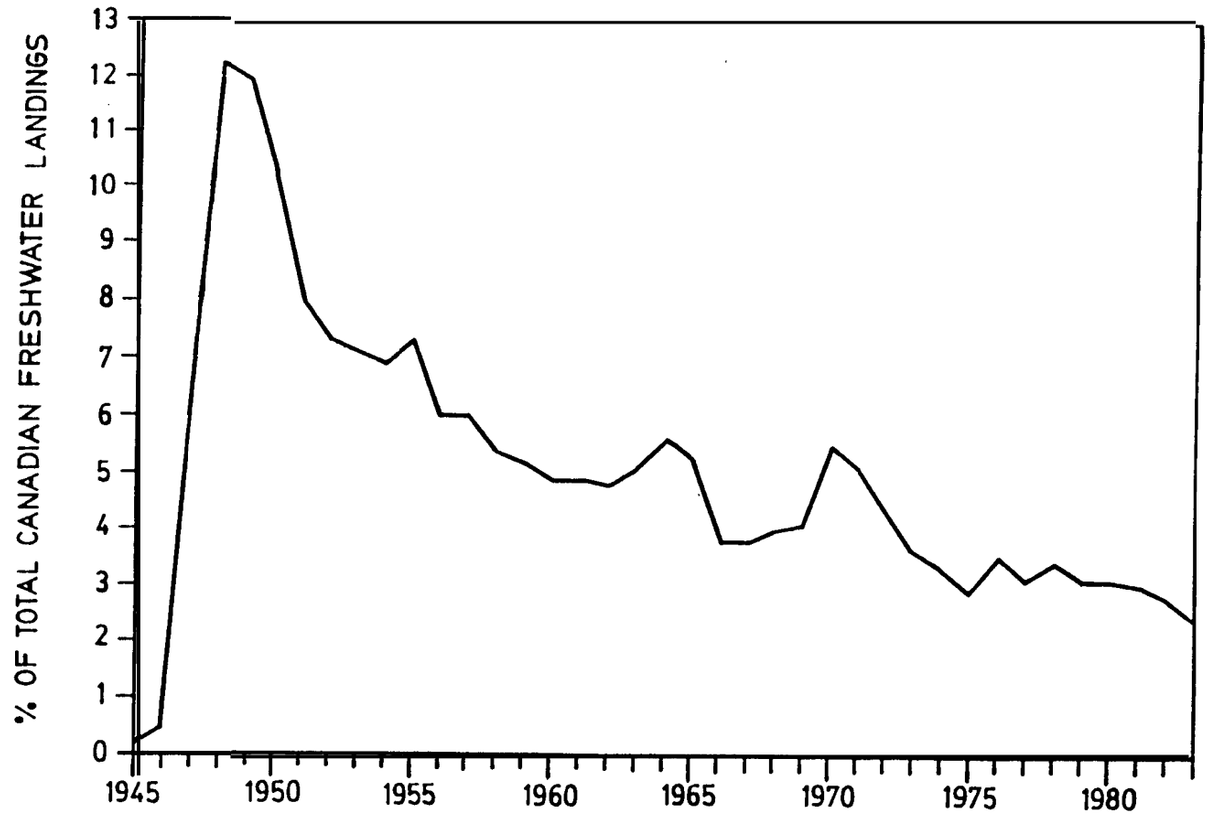

Figure 1. Total commercial landings of the N.W.T., expressed as a percentage of the total Canadian freshwater landings, 1945-1983. Data from D.F.O., Data Reports and Canadian Fisheries - Annual Statistical Review.

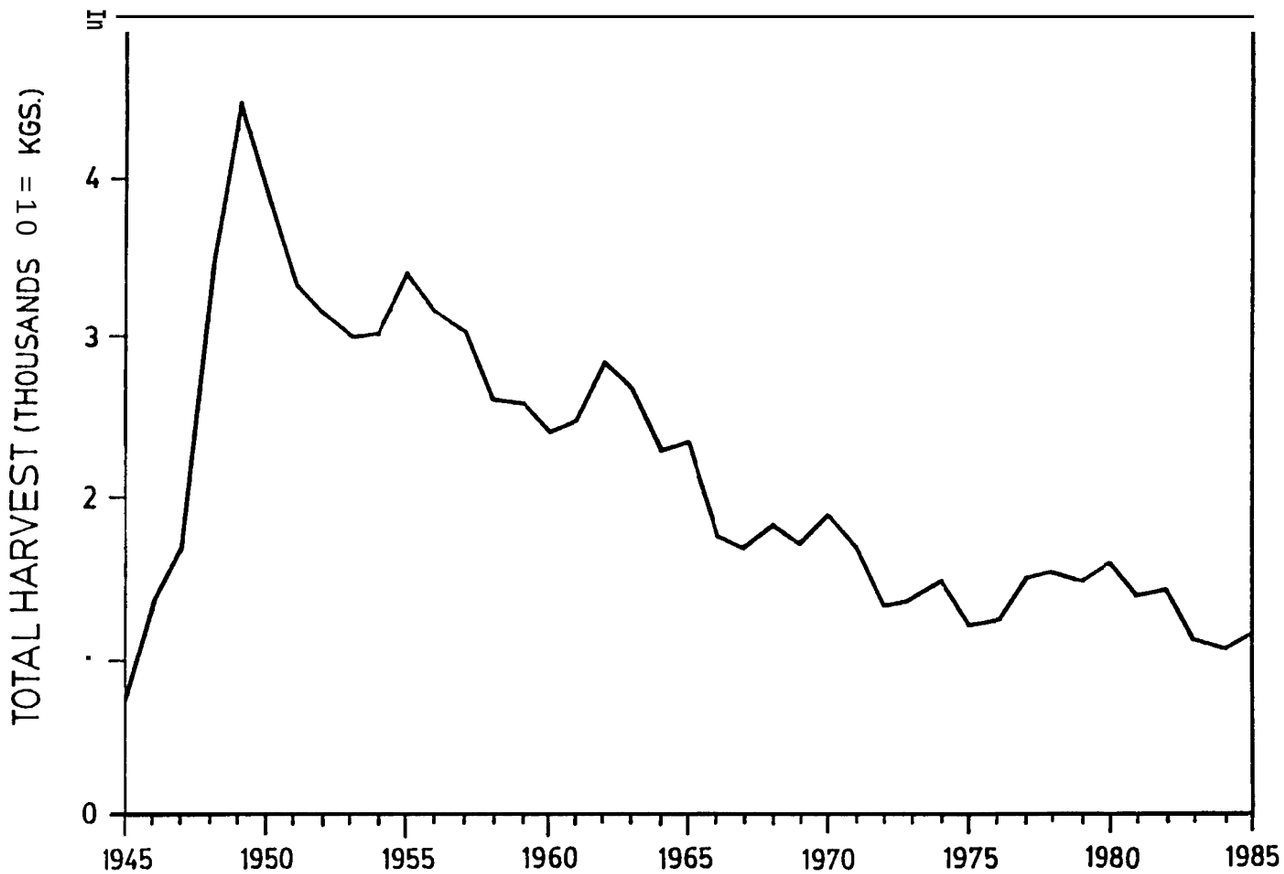

Figure 2. Total commercial landings for all species from Great Slave Lake, 1945-1985. Data from D.F.O., Data Reports.

TOTAL WHITEFISH HARVESTS BY REGION

(1974-1983) (by weight)

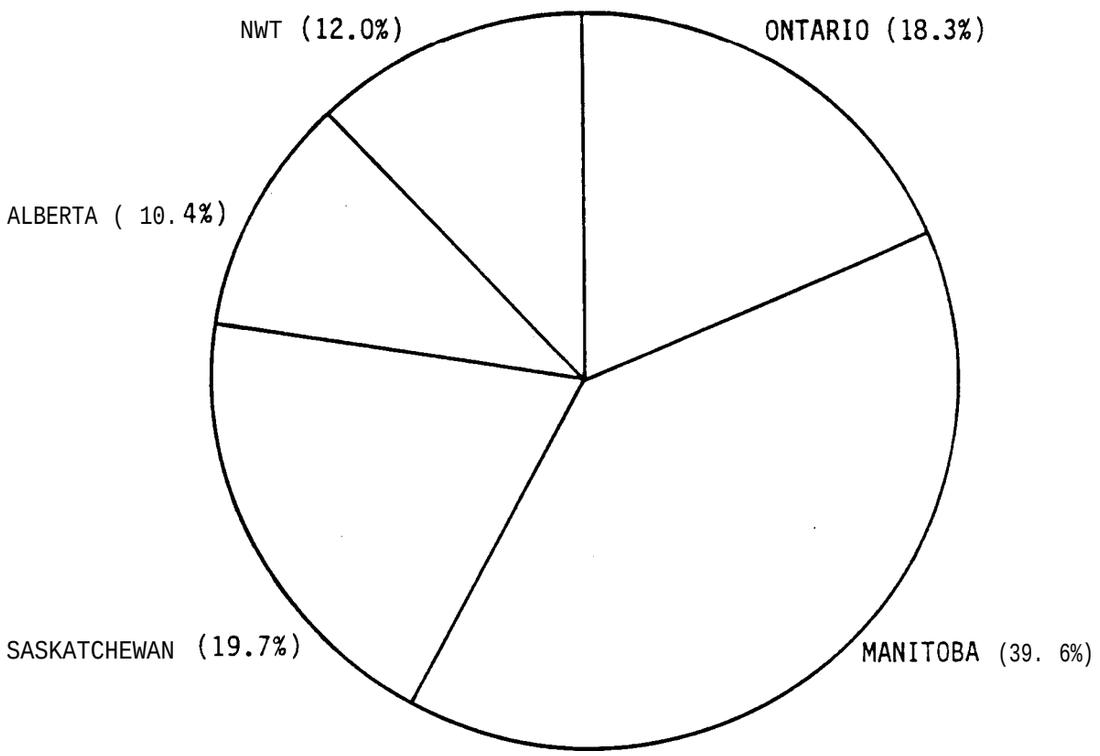

Figure 3. Relative contributions of each major producing province to the total production of whitefish, 1973-1983. Data from the Canadian Fisheries - Annual Statistical Review.

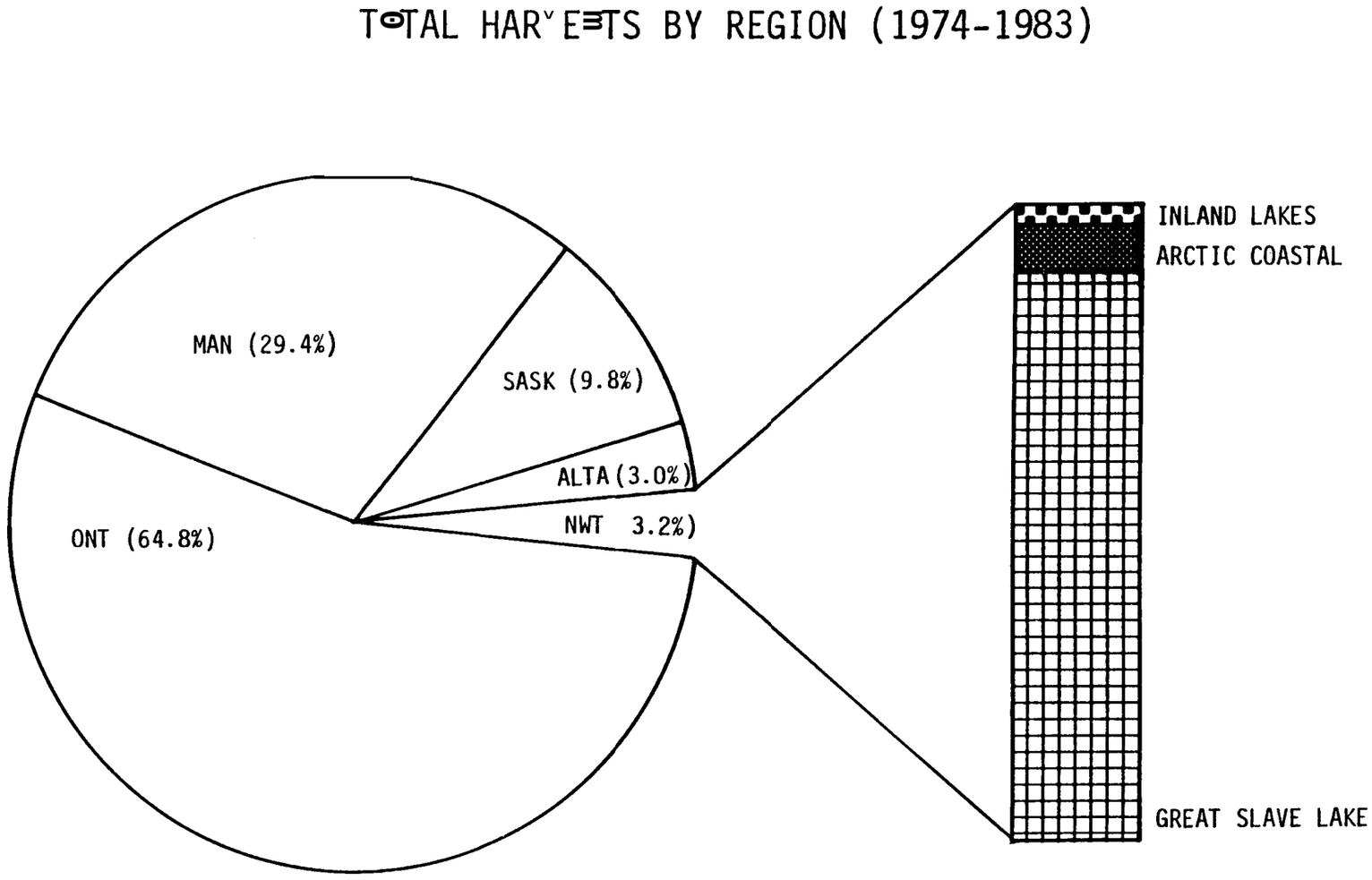

Figure 4. Canadian freshwater landings showing relative contributions of the major producing regions, 1974-1983 combined. Data from Canadian Fisheries - Annual Statistical Review and D.F.O., Data Reports.

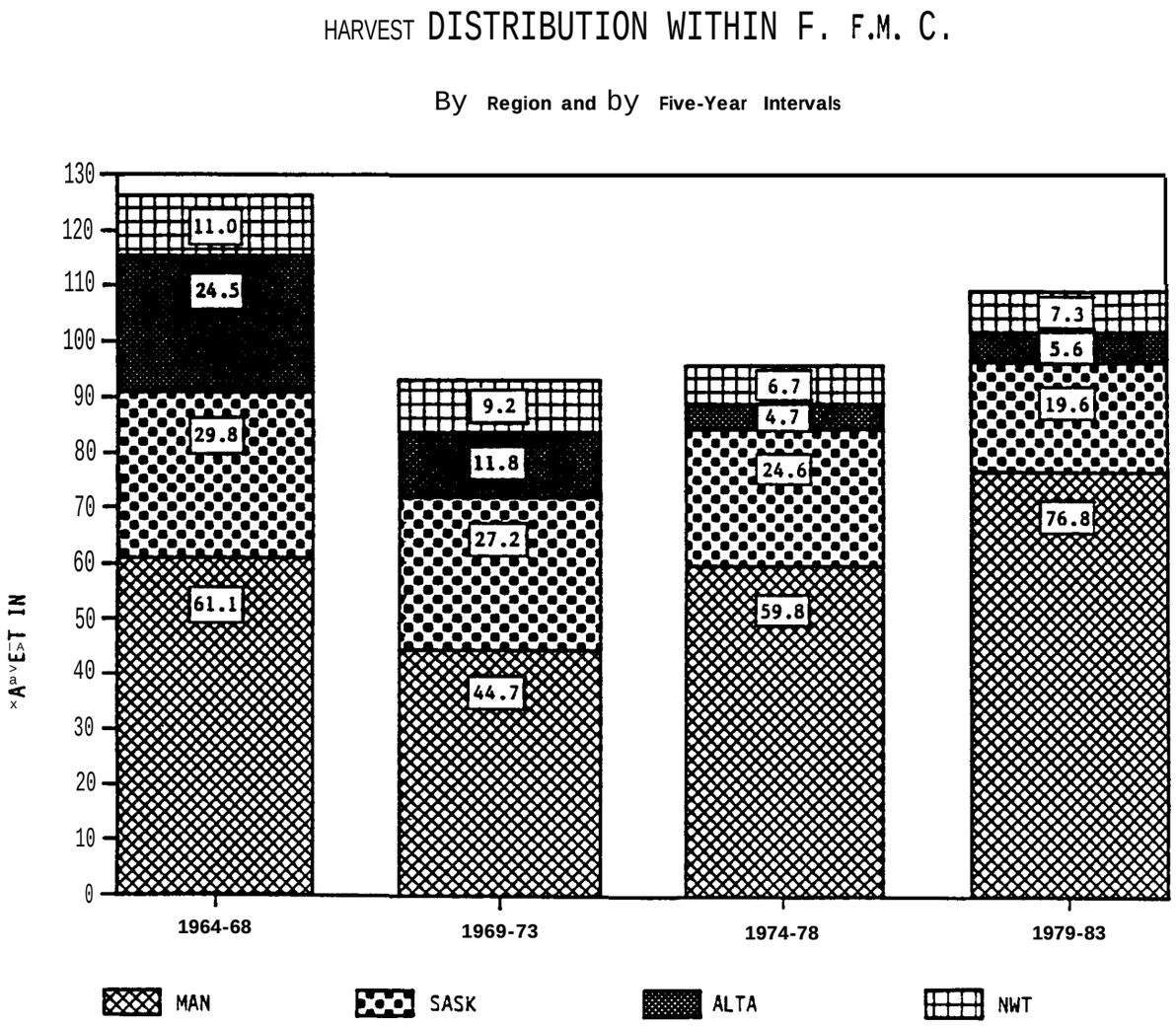

Figure 5. Comparison of total commercial production from F.F.M.C. regions at five year intervals.

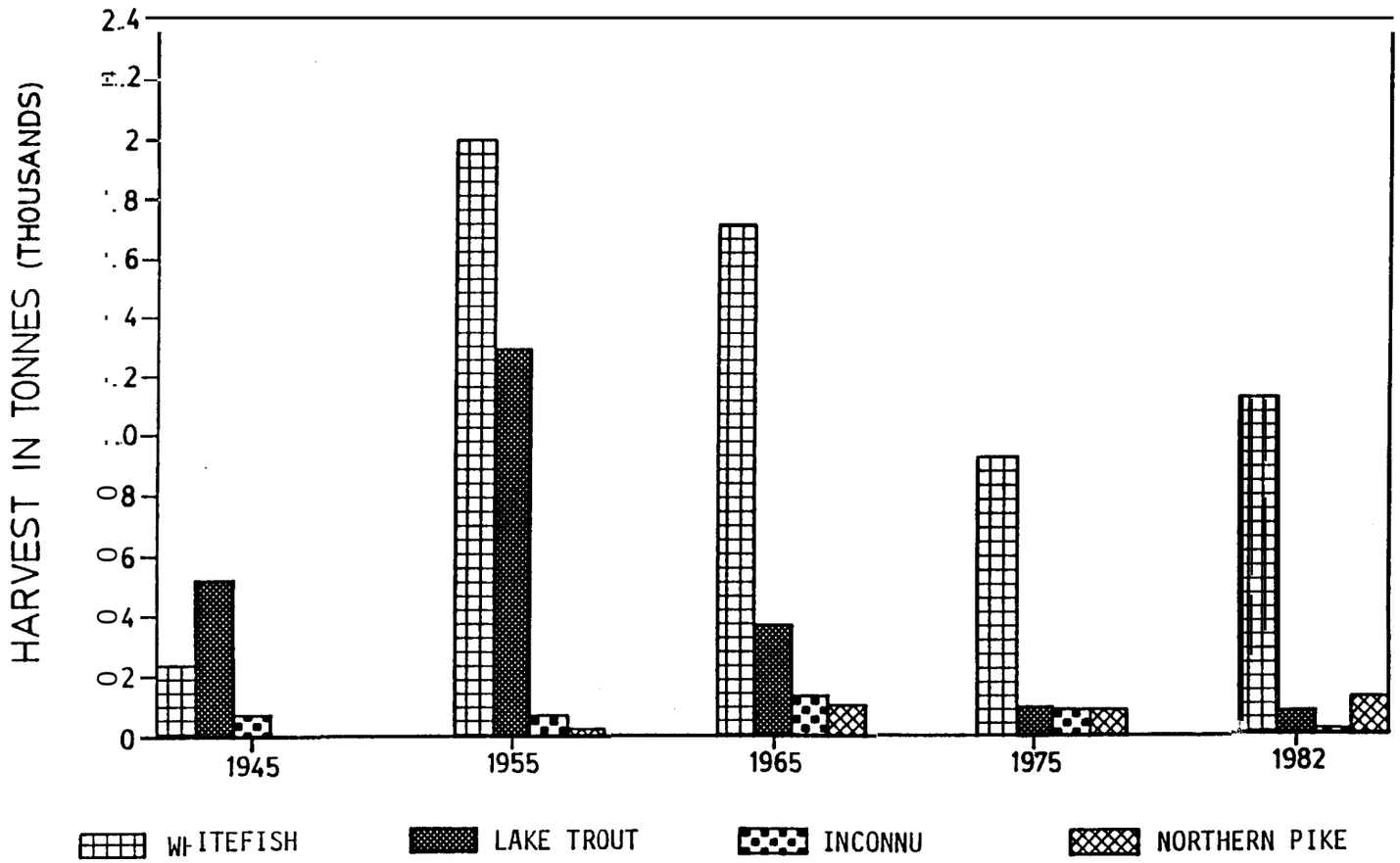

Figure 6. Species composition of the commercial catch from Great Slave Lake, 1945-1982. Data from D.F.O., Data Reports.

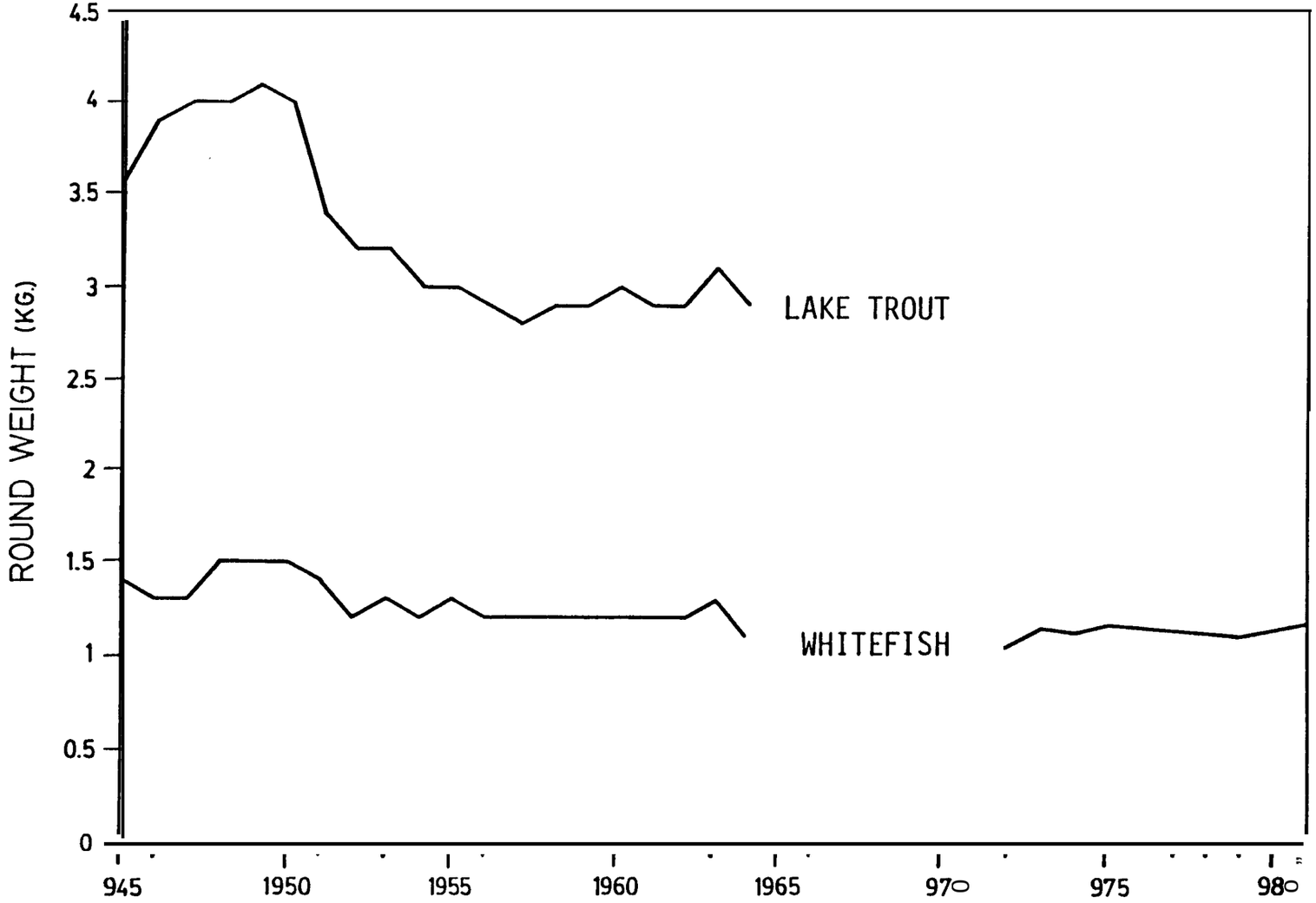

Figure 7. Changes in the average round weights of whitefish and lake trout taken from Great Slave Lake, 1945-1981. Data from D.F.O., Data Reports and M.S. Reports.

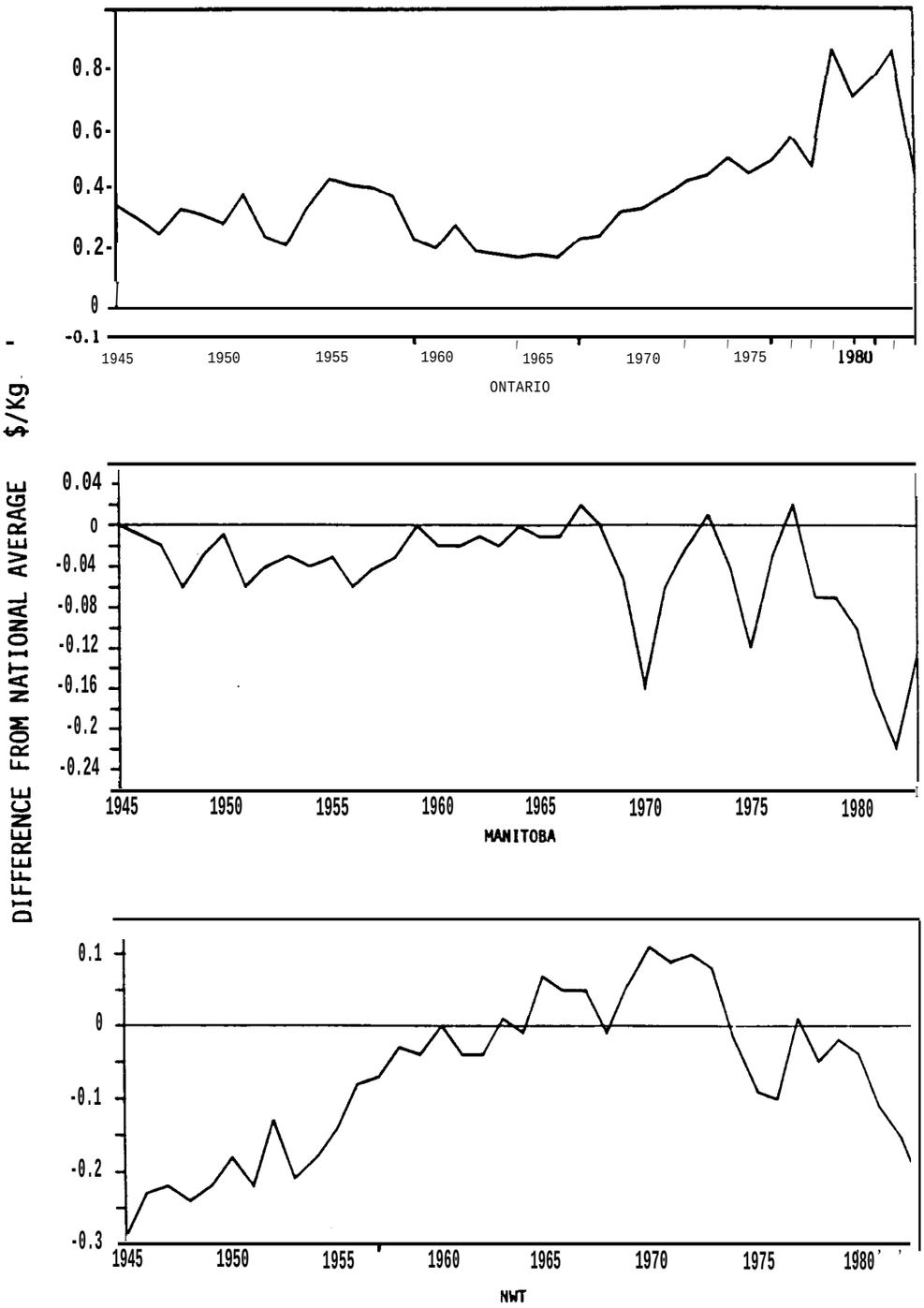

Figure **8.** A comparison of landed values of whitefish for Ontario, Manitoba and the N.W.T., 1945-1982. Values represent the amount, in dollars/kg, above or below the national average landed value for freshwater fish in a given year. Data from the Canadian Fisheries - Annual Statistical Review.

APPENDIX V

LIFE HISTORIES OF IMPORTANT COMMERCIAL FISH SPECIES

Arctic Charr *Salvelinus alpinus*

Salvelinus - an old name for charr

alpinus - alpine

Description

The body is typically troutlike, and is easily distinguished by large round violet-pink spots on the back and sides. Colour is variable and depends on size, habitat, and sexual maturity. In fresh sea-run charr the back is dark blue and the sides and under parts are silvery white, while in landlocked charr, the back is dark blue or olive green and the sides and underparts are white or dusty. The most striking coloration is exhibited by spawning Arctic charr which possess brilliant red sides.

Distribution

The Arctic charr has the most northerly distribution of any freshwater fish. They are native to northern coastal rivers and lakes in North America, Asia and Scandinavia. In the Northwest Territories, Arctic charr are found along the Arctic coast from the Mackenzie River to Frobisher Bay. Their distribution includes most coastal streams, some coastal lakes and the High Arctic Islands.

Biology

Arctic charr occur both as anadromous and landlocked populations. Anadromous charr overwinter in freshwater lakes, but migrate downstream in the spring to the sea and feed there throughout the summer. In the autumn they return to their home streams.

Arctic charr spawn in the autumn, usually in September or October. Landlocked populations spawn in lakes or the mouths of rivers entering lakes. Eastern anadromous charr are generally lake spawners, while western anadromous charr often spawn in stream riffles. Most anadromous spawners do not migrate to the sea in the year of spawning, but remain in freshwater for the entire year. Spawning occurs during the day over rock or gravel bottoms where the water temperature is around 4°C. Even though the males establish and guard territories, it is the female that prepares the redd or nest by clearing debris away from the site with her tail. The average anadromous female lays between 3000-5000 eggs (4-5 mm in diameter) while landlocked females due to their smaller size, lay fewer eggs. After spawning the female undulates over the nest, forcing the eggs down between the rock crevices.

The eggs develop over winter in water temperatures between 0 - 2.2°C. Hatching occurs in March or April, but the young remain in the gravel until June or July. The young of anadromous charr remain in freshwater for 3-8 years before making their first migration to the sea. During this freshwater period they feed initially on zooplankton and gradually shift to insect larvae and crustaceans. Once in the sea, they feed primarily on fish and large crustaceans, but will utilize whatever prey is easily available.

The growth rate of Arctic charr is slow, and varies greatly among different populations. Anadromous Arctic charr grow faster and larger than freshwater charr due to greater food abundance in the marine environment. Freshwater charr seldom exceed 350 mm even though they may live 20 years or more. In addition, eastern anadromous Arctic charr are slower growing than western charr, but tend to live longer, reaching a greater maximum size. Eastern anadromous charr have attained ages of 29 years, while the maximum age for western anadromous charr is between 10 to 14 years. The differences in growth between western and eastern stocks may be the result of different environments or genetic makeup.

Although some freshwater populations mature as early as age 3, most Arctic charr populations mature between the ages of 4 to 9 years. In general, western charr reach sexual maturity 1 to 3 years before eastern charr and freshwater charr mature 1 to 3 years before anadromous charr. In both freshwater and anadromous populations, males mature 1 to 4 years before females. Females spawn every second or third year, but seldom every year except in the southern parts of their range.

Freshwater charr feed almost exclusively on aquatic insects and crustaceans. Anadromous charr feed predominately on crustaceans and fish, including whitefish and several marine species.

Arctic charr have few natural predators, although young charr are eaten by larger charr, loons, and terns. Larger charr are also preyed upon by seals.

Utilization

Domestic fishing for Arctic charr occurs along the north and east coast of the Territories. Inuit fishermen generally prefer the anadromous charr because of its larger size and ease of capture. Most are taken in estuaries and rivers during their spring and fall migrations and are used for both human and dog food.

The high price this species commands and its reputation as a gourmet food have made Arctic charr one of the most valuable commercial species in the Territories. Commercial fishing, however, is restricted primarily to the eastern Arctic anadromous stocks. In fact, the Rankin Inlet, Cambridge Bay, Pelly Bay, and Nettilling Lake fisheries account for most of the charr harvested commercially. Attempts to commercially fish freshwater populations have generally proven uneconomical and the limited abundance of the western anadromous stocks have prohibited extensive utilization. Because the eastern charr grow slowly and are in tremendous demand, strict management regulations have been necessary to ensure enough young charr escape the commercial harvest to maintain their populations. These regulations have included a 5.5 inch (13.9 cm) and 2.5 inch (6.35 cm) stretched mesh restriction for the anadromous and freshwater populations respectively.

A combination of excellent eating and fighting qualities have made the anadromous Arctic charr a prized sport fish. Most sport fishing for Arctic charr occurs near Rankin Inlet or Baffin Island, or in streams entering Coronation and Queen Maud Gulf.

Arctic Grayling - Thymallus arcticus

Thymallus - thyme-like, referring to the supposed odour of wild thyme

articus - means of the Arctic

Description

The Arctic **grayling** is closely related to the whitefishes, but is easily distinguished by its greatly enlarged dorsal fin, and small mouth with teeth on both jaws. A strikingly **coloured** fish; the back is dark purple or blue and the sides are grey with scattered black spots, The dorsal fin is dark with rows of orange and emerald green spots, and is edged with red or orange. The **colours** are more intense in males than in females, especially during spawning.

Distribution

Grayling are found throughout the mainland of the Northwest Territories, but are absent from the Boothia Peninsula and the Arctic Islands.

Biology

Arctic **grayling** prefer clear waters of large, cold rivers, rocky creeks and lakes. Although they avoid turbid water, they can be found in the Mackenzie River usually where clear tributaries enter. In large lakes they are generally close to shore, along rocky shores or near stream mouths.

Spawning occurs in the spring from May to mid-June usually when the lake ice cover is breaking. **Grayling** prefer to spawn when the water temperature is between 7-10OC. Adults migrate from lakes and large rivers into small tributaries with gravel **or** rock substrates. Although no actual nest or redd is prepared, males are territorial on the spawning ground and will chase or threaten other males. Spawning occurs during daylight, reaching its peak at midday. During the spawning act the male folds his dorsal fin over the female and milt and eggs are simutaneously released by vigorous vibration. An average female lays between 4,000-7,000 eggs, 3-4 mm in diameter. The female may spawn only once, or several times in different locations with different males. No parental care is given the eggs and the adults return to the lakes and rivers after spawning.

Hatching occurs within 2-3 weeks and the young are approximately 8 mm long. They spend another 8 days absorbing their yolk sac, although feeding may begin within 3 days after hatching. Food of the young is primarily zooplankton with a gradual shift to immature insects such as **mayflies, caddisflies,** and midges.

Growth is rapid at first and young-of-the-year will have attained a length of 7.6 or 10.2 cm by the end of the first summer. In later years, growth is variable depending on latitude and temperature. For example, **grayling** in their sixth summer had fork lengths of 40.5 cm in Great Slave Lake, while in Great Bear Lake the average was 35.6 cm. Most **grayling** mature at 6 - 9 years of age and live to 11 or 12 years, although individuals 20 years old have been caught. The largest recorded **grayling** was angled in the Katseyedie River, N.W.T., measuring 75.7 cm long and weighing 7.2 kg.

Adults feed mainly on aquatic and terrestrial insects, but small fish, fish eggs and lemmings have been found in their stomachs.

Utilization

Due to their relatively small size, **grayling** are of little importance as a commercial species. They are utilized principally by sport fishermen and to a lesser extent by domestic fishermen for human consumption and as dog food. **Grayling** are particularly vulnerable to domestic fishing during the spring spawning runs and in the fall when they aggregate in **preparation for over-wintering. Most sport and domestic fishing occurs in the Mackenzie River, its tributaries and Great Slave Lake. Sport Fishing for this species is increasing in other regions of the Northwest Territories that offer lodges or fly-in camps.**

Arctic **grayling** offer excellent potential as a sport species. It is a uniquely attractive species which exhibits highly desirable angling qualities. Its preference for cold clear streams, surface insects, and its tendency to leap when hooked are features that will attract increasing numbers of fly fishermen to the Northwest Territories.

Inconnu - Stenodus leucichthys nelma

Stenodus - narrow tooth

leucichthys - whitefish

nelma - Russian name for this fish .

Description

Inconnu is the largest member of the whitefish family and is distinguished by its wide mouth and projecting jaw. The body is pike-like with silvery sides and large scales.

Distribution

In North America they inhabit the fresh and brackish waters of northwestern Canada and Alaska. Their distribution in the Northwest Territories is restricted to the Mackenzie River drainage and the Anderson River.

Biology

Inconnu inhabiting the lower Mackenzie River are **anadromous** spending their summer months in the coastal waters near the delta. Prior to freeze-up they return to fresh water. The **inconnu** of Great Slave Lake are apparently not **anadromous** but they do migrate up large tributary rivers in late summer.

Inconnu probably spawn in late summer or early autumn in rivers. The spawning habits of the **inconnu** in terms of movements, areas utilized, and rearing areas for young are not well documented. It is suspected that **anadromous** stocks of the lower Mackenzie River spawn in the tributaries of the Peel, **Rengleny** and Arctic Red Rivers. Lake dwelling **inconnu** of Great Slave Lake spawn in the larger tributaries of Slave, **Taltson** and Little Buffalo Rivers. The upstream, presumably pre-spawning migration of **inconnu** is not obvious and may take place over the entire summer. In contrast, the post-spawning downstream migration is rapid and spectacular. Spawning occurs in swift water at depths from 1.5 - 1.8 m over coarse gravel substrates. Females lay between 100,000-400,000 eggs.

Hatching occurs in the spring and the young remain in the tributary streams for at least 2 years. Young **inconnu** eat primarily aquatic insect larvae and zooplankton.

Inconnu are the fastest growing of the whitefish species and reach the largest maximum size. Individuals ranging from 5 - 15 kg are common in the Mackenzie Delta fishery and **inconnu** exceeding 20 kg have been taken in Great Slave Lake. Most **inconnu** mature between the ages of

7-11 years and they are believed to spawn only every 2-4 years. Few inconnu live longer than 11 years in Great Slave Lake, but one individual 22 years old was caught in the Mackenzie Delta.

Adult inconnu feed primarily on fish. Inconnu of Great Slave Lake feed mainly on whitefish, but also northern pike, cisco, minnows and small inconnu. Anadromous stocks feed on pacific herring, cod, sticklebacks and to a lesser extent marine crustaceans. Because of its large size inconnu have few natural predators, although northern pike and burbot will prey upon young inconnu.

Utilization

Presently the commercial harvest of inconnu is confined to the Great Slave Lake area. Approximately 69,000 kg are taken annually and sold primarily in the United States on the smoked fish market. Domestically, inconnu are caught in the Mackenzie Delta and Great Slave Lake regions and are used for both human consumption and dog food. Utilization by sport fishermen is extremely low.

Historically, inconnu have not been commercially fished to any great extent because of its "oily flesh". Ironically this has become its best selling feature. The inconnu is ideally suited for smoking and the demand for this species is increasing in the south.

Lake Trout - Salvelinus namaycush

Salvelinus - an old name for charr

namaycush - Indian name

Description

Lake trout is actually a misnomer, because this fish belongs to the charr (Salvelinus) genus and not the trout (Salmo) genus. Lake trout achieve the largest size and are among the longest-lived freshwater fish in the Northwest Territories. It can be easily distinguished by irregular white spots on the back and sides and the deeply forked tail. Coloration varies depending partially on size and habitat but usually the back is dark green to grey, or brown, and gradually shades into pale white or yellow underparts.

Distribution

Lake trout are native only in North America and are most abundant in northern Canada. They are found throughout the mainland portions of the Northwest Territories as well as several Arctic islands including Baffin, Southampton, King William, Victoria, and Banks Islands.

Biology

In southern Canada lake trout are found only in relatively deep lakes, but in the Territories they also occur in shallow tundra lakes and rivers. Their depth distribution varies with the seasons, especially in southern Canada, but they usually prefer water temperatures of about 10°C. Although it has been reported in coastal waters, the lake trout is the least tolerant of salt water of all the charrs and is seldom found in salinity greater than 10%.

Spawning has been reported as early as mid August in Great Bear Lake, but generally most spawning in the Northwest Territories occurs in late September or October when water temperatures are between 7-14°C. In the autumn mature lake trout move into shallower water (12m or less) of lakes to spawn over large boulder or rubble bottoms. Occasionally, spawning has been observed in rivers. While there is some evidence of homing, that is, returning to the same spawning beds year after year, it is not as strong or complete as the homing behaviour exhibited by salmon. Spawning takes place after dark with one or two males spawning with one female or groups of males and females may spawn together. No nest is built and fertilized eggs become lodged in rock crevices. The

average female lays about 6000 eggs (4-6mm in diameter), but larger individuals may deposit up to 18,000 eggs. After spawning, lake trout disperse throughout the lake to overwinter.

Lake trout eggs incubate for about 4-6 months and hatching usually occurs in April or May. In southern locales, the young usually seek deeper water within a month or so after hatching, while in the north they may remain inshore for months or even years as in Great Bear Lake. Initially, the young feed on zooplankton, but as they move into deeper water aquatic insects, snails, freshwater shrimp and deep water sculpin become more important in their diet.

In the Northwest Territories lake trout are relatively slow growing and long-lived, often exceeding 30 years of age with some individuals age 60 or more. The fastest northern growth rates occur along the Mackenzie River drainage but decline with increasing latitude. For example, lake trout in Great Bear Lake take almost twice as long to grow to a comparable size as those in Great Slave Lake. Northern lake trout generally mature between 6 and 13 years of age and spawn every second or third year. There is also a tendency for northern lakes to be" dominated by old mature fish (10 years and older) and the recruitment of juveniles is relatively low.

Adult lake trout feed upon a wide range of animals, including crustaceans, aquatic insects, fish and small mammals. However when available, ciscoes (tullibee) are the preferred food of most lake trout populations.

Lake trout have few natural enemies, although they are known to feed on their own young. Also, several species of fish have been reported to consume lake trout eggs.

Utilization

Sustaining an economically viable lake trout fishery is a difficult management problem. Because of the large size they attain and the excellent quality of its flesh, lake trout are highly prized both as a sport and commercial species. Unfortunately, unlike whitefish, the lake trout does not have the same capacity to respond to heavy fishing pressure. The combination of its long lifespan, slow growth rate, low adult mortality, low fecundity and low spawning success results in low recruitment of young lake trout into the fishery. Often the recruitment is too low to sustain the population resulting in a gradual deterioration of the fishery.

Presently all three fisheries, domestic, commercial and sport utilize lake trout in the Northwest Territories. Domestic fishing for lake trout is concentrated in the Mackenzie Valley, including the area surrounding Great Slave and Great Bear Lakes, in the inland lakes near Hudson Bay and in the vicinity of Bathurst Inlet and Cambridge Bay. Natives generally prefer whitefish and Arctic charr for food and lake trout rarely comprise more than 20% of the domestic fishery in the Northwest Territories.

Historically, lake trout were the most abundant species harvested. But whitefish and pike have now replaced the lake trout as the first and second most abundant species. In most cases, commercial fishing for lake trout is limited by transportation costs and is only economically viable when it occurs in conjunction with commercially harvestable whitefish or Arctic charr fisheries. Unfortunately, in these fisheries, the management of whitefish stocks to maintain a high substained yield ultimately results in the decline of the lake trout stocks.

Although the commercial harvest has declined in recent years, lake trout continue to be the most important sport species in the Territories. Southern anglers are attracted to the Northwest Territories in search of "trophy" lake trout and the lodges and out-camps that offer this type of fishing are concentrated in the area surrounding Great Slave and Great Bear Lakes and on the lakes north of the Manitoba border.

Greater benefits are derived when lake trout are managed as a sport rather than commercial species. The economic return to the Northwest Territories is greater and the impact of exploitation is less. That is, sport fishing generally causes a decline in the abundance of large fish, but the population structure is altered much less than with commercial harvesting. However, to continue attracting southern anglers to fish for trophy lake trout requires intensive management of this species. One trophy only and catch and release fishing are ways to conserve the trophy lake trout stocks in the Northwest Territories. The development of more fly-in campsin remote locations would also reduce the pressure on any individual lake trout population and increase the benefits derived from these under-utilized areas.

Northern Pike - *Esox lucius*

Esox - an old European name for pike

lucius - latin for pike

Description

The pike or jackfish is distinguished by its long, slender body, long, flattened snout, large mouth with strong canine teeth, and backward location of the dorsal fin. The back and sides are dark green, and the underparts are white. The sides are also covered with numerous irregular white spots.

Distribution

The northern pike is one of the most widely distributed freshwater fishes in Canada. In the Territories pike are common in lakes and streams throughout the mainland except in the northern and eastern coastal regions and on the Arctic islands. They are primarily a freshwater fish, but they have been known to enter estuaries of the Beaufort Sea.

Biology

Although pike occur in a wide range of habitats, they prefer shallow, warm, weedy bays of lakes or slow, heavily vegetated rivers. In the spring and fall, pike are found mainly in shallow water but move to deeper cooler waters in the summer,

Spawning occurs in the spring closely following ice break up (May to June) when water temperatures reach 7.2°C. Pike prefer to spawn over aquatic vegetation in shallow weedy bays or marshes or in vegetated river floodplains. Spawning occurs mainly during the day with one or two males mating with one larger female. Small numbers of very adhesive eggs are scattered randomly and they attach to the vegetation of the spawning area. An average female lays approximately 32,000 eggs (2.5-3.0 mm in diameter) over a 2 to 5 day period.

Depending on water temperature, the eggs hatch in about 2 weeks. The young 6-8 mm in length, often remain attached to vegetation by means of adhesive glands on the head for 6-10 days existing on their yolk reserves. After this, pike feed on zooplankton and immature aquatic insects for about 2 weeks. They quickly shift to a diet of small fish such as sucker and other pike fry. Mortality of young pike fry, due to predation, or by stranding due to lowering water levels has been estimated as high as 99%.

Growth is rapid at first and by the end of the first year pike in the Mackenzie System will have attained a length of 10 cm. Rapid growth in length continues during the first 1-3 years but slows after sexual maturity is attained. At this point, the fish increases more in weight than in length. Generally, northern populations grow slower but live longer than southern populations. Life expectancy in the south can be as low as 10-12 years while Arctic populations live as long as 24-26 years. Northern populations of pike usually mature at age 5 for males and age 6 for females.

Adult pike prey mainly on fish but will eat any animal they can swallow, including frogs, crayfish, mice, muskrats and ducklings. Preferred fish species are whitefish, tullibee, suckers, perch and shiners. The ability of pike to utilize almost any prey item is probably one of the main reasons for the success of this species in exploiting such a wide range of northern habitats.

Utilization

Northern pike are important to all fisheries in the Northwest Territories. The commercial harvest comes principally from Great Slave Lake where pike are second only to whitefish in terms of weight caught. Because of its relative abundance across Canada and low demand in the Canadian fish market, the price received for pike is much lower than for whitefish or Arctic charr. There is however potential to increase northern pike sales to Europe where it is considered a gourmet food.

Domestic and sport fishing for pike occurs mainly in the Mackenzie River Valley, and around Rankin Inlet and Baker Lake. Although domestic fishermen use pike mainly for dog food, it is a highly sought after sport species by American anglers because of its large size and fighting quality. Only Arctic charr and lake trout demand a greater share of the non-resident sport fishing industry in the Northwest Territories.

Pickerel - Stizostedion vitreum

Stizostedion - means pungent throat

vitreum - means glassy, alluding to the nature of this species large, silvery eyes

Description

The yellow pickerel or walleye is part of the perch (Percidae) family. The only other member of this family found in the Northwest Territories is the yellow perch. The pickerel is easily recognized by its two separate dorsal fins, large mouth with canine teeth and large glassy eyes. Colour varies depending on habitat, but the back is usually dark green to brown, often with brassy yellow specks, while the sides are mottled yellowish and the wider parts are white. Other distinguishing colour characteristics are a black dot on the posterior base of the first dorsal (spiny) fin and a white patch on the lower lobe of its tail.

Distribution

The pickerel is limited to the freshwaters of North America with rare occurrences in brackish waters. It is widely distributed throughout most of Canada (except west of the Rockies) and the east and central states of the United States. In the Northwest Territories pickerel occur throughout the Mackenzie drainage, but are only found in abundance in the area south of Great Bear Lake.

Biology

Pickerel are tolerant of a great range of environmental situations, but prefer large, shallow, semi-turbid lakes. Clear water lakes are also inhabited by pickerel but because their eyes are sensitive to light, feeding and movements are restricted to twilight or dark periods.

Spawning begins shortly after ice break-up when water temperatures are between 6-11^{o}C. Depending on the latitude this usually occurs in late May or June in the Territories. In years when conditions are not favorable, in particular water temperature, northern populations may not spawn. Homing behaviour has been reported in walleye. Males migrate first to the spawning ground, which are either sandy or rocky shoals in lakes or gravel shallows in streams. Most spawning occurs after dark in less than 1-2 m of water. Spawning takes place in groups of one large female with one or two smaller males or two females with

several males. Females have been reported to deposit between 35,000 to 600,000 eggs although the average is closer to 100,000 eggs. The egg is small, 1.5-2 mm in diameter, and most females lay and abandon the majority of their eggs in one evening.

Depending on water temperature, the eggs will hatch in 2–3 weeks. After hatching, the pickerel fry disperse from the spawning ground and spend the early summer near the surface in open water. By mid-summer the young pickerel move inshore. to feed and eventually seek deeper water in the autumn. Pickerel fry initially feed on zooplankton, but quickly switch to fish, especially young perch. From the time of spawning to the end of their first summer, pickerel eggs and fry are subject to a variety of environmental factors and predation that can result in mortality rates as high as 99%.

Pickerel growth rates are dependent on the length of the growing season and the productivity of the water. As a result, pickerel grow much slower and mature later in the Northwest Territories than in the south. Most mature male and female pickerel captured in Mosquito Creek (a tributary of Great Slave Lake) were 9 and 10 years old respectively. Populations found farther north probably mature even later. In contrast southern male and female pickerel mature at 2–4 and 3-6 years respectively.

Adult pickerel feed principally on fish, although mayflies, frogs, leeches and crayfish are often found in their stomachs. When present young-of-the-year perch are very important items in their diet.

The northern pike is probably the most important predator of pickerel over most of its range. However, lake trout, burbot and pickerel themselves, will also feed on young pickerel.

Utilization

Pickerel are probably the most economically valuable commercial and sport species in Canada's inland waters. However, because of their limited abundance and slow growth rates, pickerel are utilized only in very minor quantities in the Northwest Territories. The commercial harvest is restricted principally to Kakisa, Tathlina and Great Slave Lakes. In recent years production has declined from a maximum of 72,036 kg in 1972/73 to 37,321 kg in 1984/85.

Throughout the Mackenzie River drainage, small quantities of pickerel are taken by the domestic fisheries, but these are generally incidental to catches of other species.

Sport fishing is restricted to road accessible areas, Great Slave Lake and at lodges wherever the species is present. Since commercial fishing is economically feasible in a very limited number of water bodies in the Northwest Territories, this species' greatest potential lies with sport fishing. The species is highly prized by anglers for its excellent eating qualities.

Tullibee - ciscoes

Three species of cisco occur in the Northwest Territories: lake cisco Coregonus artedii, least cisco Coregonus sardinella, and Arctic cisco Coregonus autumnalis.

Coregonus - angle-eye

artedii - is named for Petrus Artedi, considered the "father of ichthyology"

sardinella - small sardine

autumnalis - of the autumn

Description

Ciscoes or tullibees are members of the whitefish family. The terminal mouths distinguish them from whitefish, who have inferior mouths that are overhung by their snouts. Distingushing the three cisco species from each other is much more difficult and positive identification is often dependent on the position of the lower jaw, distance between fins, or number of gill rakers. Ciscoes are usually dark green or brown above and silver below.

Distribution

Lake cisco are found throughout the eastern mainland of the Northwest Territories and in the Mackenzie System from Great Bear Lake south. Arctic and least cisco are very abundant in coastal waters from Alaska to Bathurst Inlet. Both species can also be found in the lower reaches of many Arctic rivers, including the Mackenzie.

Biology

Lake cisco are most commonly found in lakes where they form large schools that usually inhabit the mid-water region. Its mid-water depth varies with season and temperature but in general they can be found in the shallows in the springand fall and in deep water during the summer. Both Arctic and least cisco are anadromous species, leaving the estuaries of rivers and brackish coastal waters in the spring and summer, ascending freshwater rivers to spawnandthen moving downstream to the coast in the autumn. However, some least cisco populations are non-migratory and spendtheir entire life in freshwater.

All cisco spawn in the autumn. Least and lake cisco are known to spawn in both lakes and rivers over sand or gravel bottoms,

Arctic cisco are believed to spawn in tributaries of the Mackenzie River over gravel substrates. The number of eggs deposited depends on the species and size of the female. Usually though, least cisco lay 9,000-14,000 eggs; Arctic cisco up to 90,000 eggs; and lake cisco 6,000-22,000 eggs. The eggs are simply scattered over the bottom and abandoned.

The eggs develop slowly over the winter and hatch in May or June. The young begin feeding on zooplankton even before their yolk sac is absorbed. It is believed the young of the anadromous least cisco and Arctic cisco move downstream into estuaries. Whereas the young of lake cisco and non-migratory least cisco spend approximately one month in the shallows and then move into deeper regions of lakes and rivers.

Ciscoes grow relatively slowly. The maximum size attained by Arctic ciscoes rarely exceeds 500 mm, and least and lake ciscoes seldom grow longer than 350 mm. Arctic ciscoes are generally faster growing and live longer than the other cisco species, possibly because they spend more time in the sea. Similarly, anadromous least cisco grow faster and live longer than non-migratory least cisco. Ciscoes mature by age 5 or 6.

Adult lake and non-migratory least cisco feed predominately on zooplankton, crustaceans, and occasionally small fish and fish eggs. Arctic cisco and migratory least cisco prey mainly on small fish and crustaceans. Ciscoes, in turn, are important food items for a variety of predatory fish, including lake trout, northern pike, inconnu, burbot and pickerel.

Utilization

Ciscoes are harvested for domestic use primarily in the Mackenzie Delta, and Great Slave and Great Bear Lakes. Most are used for dog food, although Arctic cisco are utilized for human consumption because of their larger size. No effort is being made to commercially fish ciscoes in the Northwest Territories and their sport potential is also 1ow$_{o}$ They are however an important link in the food chain, serving as forage for larger and more economically valuable species such as lake trout, northern pike and pickerel.

Whitefish

Three species of whitefish are common in the Northwest Territories: the lake or humpback whitefish Coregonus clupeaformis, the broad whitefish Coregonus nasus, and the round whitefish Prosopium cylindraceum.

Coregonus - angle-eye

clupeaformis - herring-shaped

nasus - referring to the **shape** of the nose

Prosopium - a mask, referring to the large bones in front of the eyes

cylindraceum - like a cylinder

Historically all three species have been placed together and considered as species for commercial and domestic catch records and commercial quotas. However, of the three, the lake whitefish is the most widely distributed and contributes the most to the commercial and domestic harvest. Therefore, it will be discussed in greater detail.

Description

Whitefish are closely related to ciscoes, but can be easily distinguished by their inferior mouths and overhanging snouts. Ciscoes in contrast have terminal mouths. The features that distinguish the three whitefish species from each other are as follows: the brow of a lake whitefish is concave in profile; the brow of a broad whitefish is not concave, but rounded; the body of the round whitefish is much more cylindrical in shape than that of the other two species; whitefish are usually dark brown or green above and silver below.

Distribution

Lake whitefish are widely distributed in Canada and are especially abundant in the Northwest Territories. It can be found in most lakes and rivers in the mainland portion of the Territories and is known to occur in brackish coastal estuaries in the vicinity of the Mackenzie Delta and near Cambridge Bay.

Similarity, the round whitefish is widely distributed throughout the lakes and rivers of the Northwest Territories and is often found in brackish waters near the mouths of the Mackenzie, Coppermine and Churchill Rivers. In contrast, the broad whitefish distribution is much more restricted. They are found **principally** in the Mackenzie River and along the Beaufort Sea coast to Bathurst Inlet.

Biology

Lake whitefish exhibit a variety of life history types ranging from the freshwater lake-dwellers of Great Slave Lake to the **semi-anadromous** stocks of the Mackenzie Delta. Until recently, very little was known concerning the movements of the **semi-anadromous** stocks. It has been found that some Mackenzie River lake whitefish migrate along the Beaufort Sea coast in the spring and ascend streams into freshwater lakes where they feed throughout the summer. In the fall, some return to the Mackenzie River to spawn while others overwinter in the freshwater lakes.

Broad and round whitefish also exhibit lake-dwelling and **semi-anadromous** life histories.

Lake and round whitefish spawn in the early fall in lakes or rivers. Very little is known regarding the spawning habits of the broad whitefish, but it is suspected it may spawn earlier than the other two species. In northern populations, whitefish may only spawn once every 2 or 3 years. Spawning usually occurs in shallow water (7.6 **m or less) when the water** temperature **is between 6-10°C. The eggs are scattered randomly in small batches over gravel or rock substrates. The spawning period lasts 7-10 days. The number of eggs deposited by a female varies from population to population, but up to 22,000 eggs (2.5 mm in diameter)** per kg of female may be laid.

The eggs develop over winter and hatch in May or June. The young are carried inshore by currents where they tend to concentrate in shallow water. Feeding commences as soon as the yolk sac is absorbed. Initially, zooplankton are preyed upon, but by early summer the young have moved into deeper water **and the diet shifts to aquatic insect larvae.**

The growth rate of lake whitefish varies from lake to lake, but in general it is relatively rapid. Because it is a cold adapted species, growth rates are best in the central and northern parts of its range and poorest in the southern, warmer regions of its range. In Great Slave Lake, whitefish take approximately 9 years to reach the commercial size of 0.9 kg. Broad whitefish also exhibit extremely variable growth rates, but the fastest growing population are within the Mackenzie Delta and the slowest in the Coppermine River. Broad whitefish in the Mackenzie Valley generally grow larger than lake whitefish.

Round whitefish tend to be smaller than the other two species, although a specimen 561 mm was taken in Great Slave Lake.

Lake whitefish generally mature between 5 and 9 years of age in northern waters. Broad whitefish may mature as early as 3-4 years of age and as late as 7-10 years of age. Most round whitefish mature in their sixth or seventh year.

Adult whitefish are generally bottom feeders consuming a wide variety of bottom-living invertebrates such as **mayflies,** midge larvae, and small clams. Occasionally, small fish and fish eggs are consumed. In turn, a variety of other fish species prey upon whitefish including lake trout, northern pike, and pickerel.

Utilization

Commercial and domestic harvesting of lake whitefish is concentrated in the immediate vicinity of communities in the Mackenzie River Valley, Great Slave Lake area, the Coronation-Queen Maud Gulf area and along the west coast of Hudson Bay. Presently, lake whitefish is the most important commercial species in the Northwest Territories accounting for almost 74% of the total commercial harvest in 1984/85. Most of the commercial harvest is taken from Great Slave Lake. The lake whitefish is also the most important species in the domestic fisheries in terms of kilograms harvested and preference. Sport fishing for this species is limited.

Broad and round whitefish do not contribute significantly to the commercial harvest in the Territories. However, broad whitefish are important to the domestic fisheries of the Mackenzie Delta.

APPENDIX VI

INTERVIEWS CONDUCTED

INTERVIEWS CONDUCTED

Mr. B. Buckley	Commercial Fisherman Hay River, N.W.T.
Mr. G. Carder	Fish & Marine Mammal Management Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. F. Diamond	Commercial Fisherman Hay River, N.W.T.
Mr. D. Dowler	Field Services Dept. Fisheries and Oceans
Mr. A. Drobot	Field Operations Freshwater Fish Marketing Corp. Winnipeg, Manitoba
Mr. G. Gudmundson	Commercial Fisherman Hay River, N.W.T.
Mr. K. Hall	Dept. Fisheries and Oceans Yellowknife, N.W.T.
Mr. D. Iredale	Process Development & Production Promotions Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. S. Kirwan	Renewable Resources Economic Development & Tourism Yellowknife, N.W.T.
Mr. A. Kristofferson	Fish & Marine Mammal Management Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. G. Low	Fish & Marine Mammal Management Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. D. Moshenko	Dept. Fisheries and Oceans Yellowknife, N.W.T.

Mr. R. Moshenko	Fish & Marine Mammal Management Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. R. Feet	Arctic Resource Assessment Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Ms. M. Roberge	Fish & Marine Mammal Management Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. K. Roberts	Field Services Dept. Fisheries and Oceans Hay River, N.W.T.
Mr. M. Ross	Commercial Fisherman Hay River, N.W.T.
Mr. L. Simpson	Renewable Resources Economic Development & Tourism Frobisher Bay, N.W.T.
Mr. D. Stewart	N.W.T. Federation of Fishermen Hay River, N.W.T.
Mr. E. Studney	Commercial Fisherman formerly with Alaska Fisheries Hay River, N.W.T.
Mr. P. Thompson	Regional Economics & Marketing Services Freshwater Institute Dept. Fisheries and Oceans Winnipeg, Manitoba
Mr. B. Wong	Field Services Dept. Fisheries and Oceans Yellowknife, N.W.T.

APPENDIX VII

A CHRONOLOGICAL HISTORY OF COMMERCIAL FISHING IN THE N.W.T.

A CHRONOLOGICAL HISTORY OF COMMERCIAL FISHING IN THE N.W.T.

1913. Scientists of the Canadian Arctic Expedition initiate research on fisheries resources in the N.W.T.

1932. Mr. Ingebrigsten conducts the first commercial fishery for charr along the Keewatin coast.

1938. Fisheries Research Board of Canada formulates plans to investigate the potential for commercial fishing in the N.W.T. Plans are cancelled due to the Second World War.

1944. Dr. D.S. Rawson, on behalf of the Fisheries Research Board of Canada, begins a three year study to assess the fish resources of Great Slave Lake.

1945. Great Slave Lake is opened to commercial fishing and is given a quota of 3.5 million pounds dressed weight (1590 metric tonnes) of lake trout and whitefish.

McInnes Prod. Corp. moves from Lake Athabasca and establishes a fish plant at Gros Cap on Great Slave Lake.

Fisheries Research Board of Canada begins a 20 year study of the Great Slave Lake commercial fishery.

1946. Winter road completed to Hay River and winter fishing begins.

Commercial fishing begins on Kakisa Lake.

1947. Commercial charr fishery started at Frobisher Bay.

A nine year study of the marine resources of the Eastern Arctic is initiated by Dr. M.J. Dunbar.

Mr. R. B. Miller of the Fisheries Research Board of Canada conducts a study of Great Bear Lake and concludes that fish abundance and annual growth rates are insufficient to support a fishery.

Management and policy enforcement in the N.W.T. is conducted from a new office in Hay River under the auspices of the Department of Fisheries in Winnipeg, Manitoba.

1948. Mackenzie Highway reaches Hay River .

Menzies Fish Co. establishes the first fish plant at Hay River.

Talthelei Narrows closed to commercial fishing due to the decline in lake trout populations and the interest in developing sport fishing.

Mr. **W.M. Sprules** of the Fisheries Research Board of Canada conducts a preliminary survey of the Arctic **charr** resources of the west coast of Hudson's Bay and concludes that quantities are insufficient to support a commercial fishery.

1949. Great Slave Lake quota is raised to 4090 metric tonnes of lake trout and whitefish.

Great Slave Lake production peaks at 4,500 metric tonnes. It becomes the largest single producer of whitefish in North America.

Great Slave Lake is divided into six Administrative Areas to prevent localized overfishing.

1950. A commercial fishery was started on **Nueltin** Lake. The attempt was unsuccessful.

1951. First angling **licences** issued in Hay River.

First sports fishing lodge established at **Talthelei** Narrows.

Treaty Indians are issued with free fishing **permits to** promote their involvement in the fishery.

195? Fort McPherson trader **attempts to** establish a winter fishery in the Mackenzie River Delta area.

Barren Ground Fisheries Survey conducted by the Fisheries Research Board of Canada to determine which lakes were suitable for development of commercial fishing.

Portion of McLeod Bay closed to commercial fishing.

1960. Department of Northern Affairs and National Resources attempts to establish a commercial fishery in the Mackenzie Delta area.

Commercial **charr** fishery started at Cambridge Bay.

1961. The Ekaloktotiak Eskimo Co-operative is established at Cambridge Bay and commercial fishing of the **Greiner** River begins.

The Control Area System and cyclic fishing are introduced in an effort to expand the inland fishery.

1962. **Overfishing of the Greiner River causes the Cambridge Bay fishery to shift to the Ekalluk River in Wellington Bay.**

Rankin Inlet Nickel Mine closure adds to an already severe economic depression in the Keewatin area prompting the Federal Government to develop the fish and marine mammal resources of the area.

Commercial processing plant begins operation in Cambridge Bay.

1963. First assessment on the potential of developing a Pacific herring fishery in the Mackenzie Delta.

A cannery is established at Daly Bay as a pilot project to determine the feasibility of processing fish, **walrus, seal,** and whale products for local consumption.

1965. Daly Bay **processing plant is moved to Rankin Inlet.**

Menzies Fish Co. begins a two year fishery for whitefish and Arctic **charr** in the Mackenzie Delta and along **the** Yukon Coast to Herschel Island

1966. The original Control Area System is rescinded in favour of the less rigid cyclic system.

1967. **The Freshwater Institute in Winnipeg, Manitoba assumes responsibility from the Arctic Biological Station for freshwater fish research.**

1968. The Syndicate of Fishermen is formed by a group of 15 Hay River fishermen in an attempt to head off the establishment of the **FFMC.** The syndicate is dissolved in 1970.

1969. **The Freshwater Fish Marketing Corporation is established with a mandate to increase the returns to the fishermen and develop the orderly marketing of fish in the N.W.T..**

Pelly Bay **charr fishery established.**

Commercial fishing is started at Lac La **Marte.**

1970. **Canning of marine mammal products and lake trout is discontinued after the discovery of high levels of naturally occurring mercury in the products.**

1971. A major fish processing plant is constructed at Cambridge Bay.

The inland fishery reaches its peak with a total of 650,322 kg. being harvested.

1972. **.Great** Slave Lake Advisory Commitee is established.

1973. Lac La Marte fishery is restricted to domestic fishing and commercial production for local sales only.

1974. Commercial **fishing for charr starts at Nettilling Lake.**

1975. All canning operations at Rankin Inlet are discontinued as they are found not to be economically viable.

1977. **Complete East Arm of Great Slave Lake is closed to commercial fishing.**

1979. A **new licencing policy and restricted entry are introduced to the Great Slave Lake fishery.**

1980. Department of Fisheries and Oceans initiates a study to assess the potential of "processing Pacific herring, **tullibee** and whitefish roe in the Mackenzie Delta.

1981. The **G.N.W.T.** provides support for whitefish prices. By **1985** the total cost including packer service had increased to $370,000. .

Expansion of **charr** fisheries is prompted by increased prices and promotion of intersettlement trade.

1985. **Proposals are made for the development of a new processing plant at Hay River and the discontinuation the M.V. Broadhead.**

Arctic **charr** test fisheries conducted at Steensby Inlet and **Holman** Island.

Commercial charr fishery started at Chesterfield Inlet.

Fish processing plant constructed at Chesterfield Inlet.

Exploratory work initiated on the development of shrimp, scallops, and Greenland halibut in the Pangnirtung Fjord area.

1986. **Arctic** charr **test fisheries conducted at Duke of York Bay and** Holman **Island.**

Test fishery at Steensby Inlet expanded to include weir operation.

Shrimp fishery starts in the Hudson Bay/Ungava Bay area.