

The Economic Performance
of the Southern Indian Lake
Summer Commercial Fishery, 1988

by
Grant D. Baker

A Practicum Submitted
in Partial Fulfillment of the
Requirements for the Degree,
Master of Natural Resources Management

Natural Resources Institute
The University of Manitoba

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Grant D. Baker

A practicum submitted to the Faculty of Graduate Studies
of the University of Manitoba in partial fulfillment of the
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Management.

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ABSTRACT

In 1976, Southern Indian Lake, a large shallow lake on the Churchill River system, was flooded as part of a hydro electric project. After impoundment, the lake became the focus of much research into the effects of flooding a northern lake.

This study examines the economy of the Southern Indian Lake summer commercial fishery in 1988 and considers the fishery from economic and social perspectives. As well, this study compares the summer commercial fishery in 1988 to what it was in 1980.

This study found that the real income from the fishery was 32% greater in 1988 than another study found in 1980. This increase is attributed to a number of factors, including substantial increases in continental and cutter grade whitefish prices in 1988. The fishery provided not only a net cash income to the fishermen but also access to fish and moose for domestic use in the community.

The future of the commercial fishery appears financially secure. Cash flow from the fishery is able to sustain the replacement of capital items including boats and motors. The number of fishermen participating in the fishery has remained constant at about 100 since impoundment. While financially secure, this study found that, in 1988, about 36% of the revenue to the fishery came from a compensation fund and from a provincial freight subsidy program. Without these supplements the future may be less secure.

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Chapter I

INTRODUCTION

1.1 BACKGROUND

Southern Indian Lake is located in north central Manitoba (57°N,99°W) on the Churchill River. In the 1960's, with growing demand for hydro electric power, the Federal and Provincial governments began to study the economic potential of the Nelson and Churchill river systems. A number of proposals were made involving the diversion of the Churchill River into the Nelson. In 1968, Manitoba Hydro decided to divert the Churchill River at Southern Indian Lake by building a control structure at Missi Falls, the natural outflow channel of the lake. A new outflow was to be created, with water flowing from South Bay, through the diversion channel into the Rat River, through the Burntwood River, and finally into the Nelson River (Bodaly et al. 1983).

The original plan called for the water level of Southern Indian Lake to be raised over 10 m. Because of concerns for the environment and economy of the area, the lake level was increased only 3 m. Work began on the project in 1973 and was completed in 1976.

Southern Indian Lake was impounded in 1976 as part of the Churchill-Nelson River diversion. Prior to impoundment, Southern Indian Lake was the twenty - first largest lake in Canada, with a total area of 1,977 km². Impoundment increased the total surface area of the lake to 2,391 km² (McCullough, 1981).

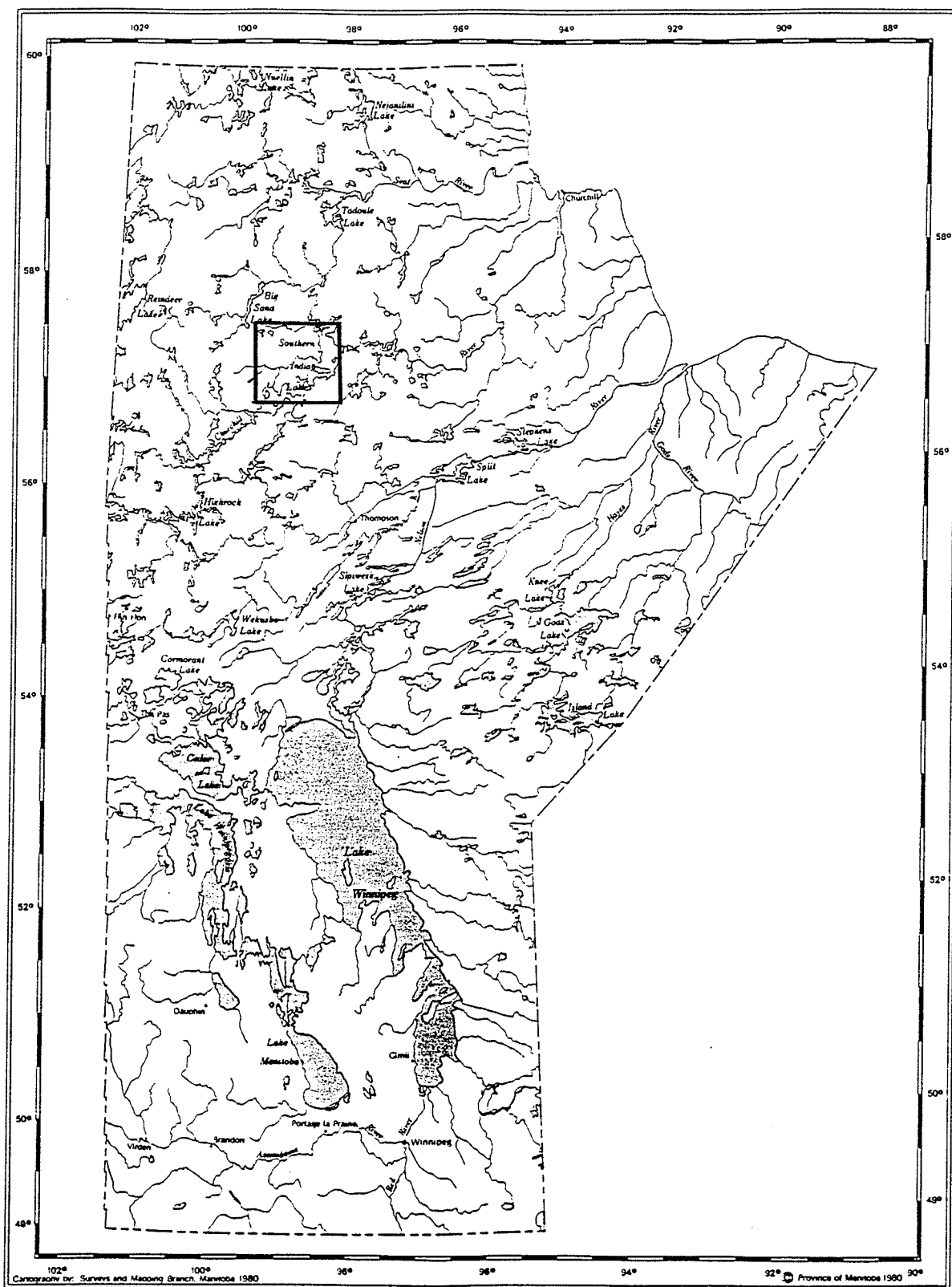


Figure 1: Location of Southern Indian Lake in Manitoba

Southern Indian Lake has had a commercial fishery since 1941. Since its inception, the fishery has been a major component in the economy of the community of South Indian Lake.

The Southern Indian Lake summer commercial fishery is conducted annually from approximately June 1st to October 15th. There is a stoppage of the fishery from mid-July to mid-August when warm weather causes a reduction in the quality of the catch.

The fishery provides employment for residents of the community of South Indian Lake. This community of approximately 1,000 people is located at the south end of Southern Indian Lake. Most of the residents are status or non-status Cree Indians.

The fishery is mainly a whitefish fishery with other species constituting less than 10% of the commercial harvest in 1988. All of the fish sold commercially were sold to the Freshwater Fish Marketing Corporation (FFMC). FFMC, a Crown corporation owned by the federal government, holds a virtual monopoly on the sale of freshwater fish in Canada.

Fishing is done by "firms", in most cases consisting of two partners and occasionally a hired helper. The type of boat most commonly used is a 20' fibreglass yawl equipped with an outboard motor ranging in size from 45 to 65 Hp.

During the 1988 summer commercial fishing season, fish were delivered, usually daily, to one of two depots located on Southern Indian Lake. One of the depots is located at Missi Falls in the north

basin of the lake. Fish were taken from Missi Falls via a freight boat to Leaf Rapids for processing. Connected to the fish depot was a small store selling basic grocery needs and fuel. The other fish depot was located at the main dock in the community of South Indian Lake. Fish were then hauled by truck to Leaf Rapids for processing.

1.1.1 The Churchill River Diversion

The Churchill River Diversion has had a significant effect on Southern Indian Lake and has caused a reduction in the quality of the fishery. The following are some of the problems with the fishery that have resulted from the diversion:

1. Increased frequency of net relocation is now required (Bodaly et al. 1983).
2. A decrease in the proportion of the higher priced "light" whitefish in the catch to that of the lower priced "dark" whitefish (Bodaly et al. 1983).
3. An increase in parasitic cyst infestation levels in the commercial whitefish catch, resulting in lower market values (Bodaly et al. 1983).
4. A decrease in the catch per unit effort. In other words, more effort is now required to catch a kilogram of fish (Peristy, 1989).
5. Mercury levels in all commercial fish species, especially walleye and northern pike, have been elevated since the diversion (Bodaly et al. 1984a).

6. A decrease in the net income of commercial fishing operations (Wagner, 1984).

In separate studies in 1977 and 1980, data were gathered (using similar methods), concerning the performance of the summer fishery at Southern Indian Lake. These studies determined the costs, revenues, and net incomes of the commercial fishing operations in those years. In comparing the data, the net income per firm, without taking into account compensation, dropped from \$1964 in 1977 (1980\$), to a loss of \$304 in 1980 (Wagner, 1984).

1.2 ISSUE STATEMENT

The flooding of Southern Indian Lake in 1976, as part of the Churchill River Diversion, has had a profound effect upon the commercial fishery in the lake.

Declines in the quantity and quality of fish caught have resulted in decreased revenue, while the difficulty in locating the diminishing fish stocks has caused an increase in effort and operating costs for every pound of fish caught (Peristy, 1989).

The Freshwater Institute of the Department of Fisheries and Oceans has a mandate to conduct research into the Southern Indian Lake fishery. This study gathered new data in 1988 in order to provide an up-to-date evaluation of the economic performance of the fishery.

1.3 SPECIFIC OBJECTIVES

The specific objectives of this study were:

1. To determine the average net income of individual fishing operations on Southern Indian Lake.
2. To compare the average net income of fishermen in 1988 to that of fishermen in 1980, and draw conclusions about the changes in the fishery since impoundment.
3. To evaluate the cost effectiveness of fishing outlying lakes and transporting the catch by air to the Freshwater Fish Marketing Corporation's (FFMC) depot on Southern Indian Lake.
4. To consider the question of whether the commonly used economic concept of the "firm" is appropriate for the study of people living traditional land based lifestyles.
5. To recommend changes that might improve the economic returns for the fishermen.

1.4 METHODS

The methods used included field research, participant observation, as well as structured interviews using questionnaires.

Field research began on June 8th, 1988 and was completed on September 5th, 1988. The primary means of gathering data was a survey using a questionnaire. This questionnaire had questions similar to those used by Wagner (1981). Because of the relatively small numbers of licenses (95), an attempt was made to interview as many as of the fishermen as possible.

Changes in the wording of the questionnaire, as suggested by Wagner (1981), were incorporated into the 1988 questionnaire. Additional questions were included in the survey that reflected changes that have occurred in the fishery.

This study also incorporated the technique of participant observation. The author was able to accompany a number of fishermen onto the lake as a crew member and to reside for a period of time with these fishermen and their families at camps on the lake. In addition, the author also visited with many of the fishermen in their homes in the community. These experiences provided valuable information regarding the fishery and its relationship to the community. These insights have been incorporated throughout this report.

Chapter II

REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

Southern Indian Lake has been the object of considerable study since it was first announced that the level of the lake would be raised as part of the Churchill River Diversion. The first large - scale studies of Southern Indian Lake were undertaken prior to impoundment by the Lake Winnipeg, Churchill and Nelson Rivers Study Board. These studies began in 1971 and were completed in 1975. The lead agency for the limnology and fisheries studies was the Freshwater Institute of the Department of Fisheries and Oceans.

In connection with the Northern Flood Agreement, the Freshwater Institute undertook post-impoundment monitoring of Southern Indian Lake. Since 1976, the Freshwater Institute has produced extensive data about the effects of flooding on Southern Indian Lake and other lakes and rivers affected by the diversion. Many of their results appear in the following sets of publications: the Environment Canada "Fisheries and Marine Services Technical Report" series, the Department of Fisheries and Oceans "Technical Report of Fisheries and Aquatic Sciences" series, and in a special issue of the "Canadian Journal of Fisheries and Aquatic Sciences" titled, "Southern Indian Lake Impoundment and Churchill River

Diversion". A number of the references contained in this literature review

2.2 IMPACT OF THE FLOODING

The primary cause of many of the lake's problems has been the tremendous increase in shoreline erosion. It has been determined that prior to impoundment, 76% of the shoreline of Southern Indian Lake was comprised of bedrock, with the remainder being composed of various types of overburden. After flooding, the percentage of shoreline that consisted of bedrock fell to just 14% (Newbury and McCullough, 1984).

The new shoreline was found to be very susceptible to erosion. The rate of erosion depended upon exposure to wave action in a given area, and the composition of the backshore materials. In sites with fine grained clays and silts, rates of shoreline retreat of up to 12 metres per year were observed. It is estimated that it will take at least 35 years from the time of impoundment in 1976 for 75% of the shoreline to return to bedrock conditions (Newbury and McCullough, 1984)

2.3 OTHER IMPACTS

The increased erosion has led to an increase in the amount of suspended solids in the lake. This increase has had a number of effects. There has been a decrease in the summer lake temperature of between 1 and 2 degrees Celsius, and a decrease in the optical quality, measured in light penetration, of the water. "These changes in the thermal and

optical characteristics after impoundment occurred concurrently with significant changes in the impoundment's biological communities" (Hecky, 1984). The reduction in visibility within the water is believed to be an important factor in the dispersion of whitefish stocks within the lake (Bodaly et al. 1984b).

Perhaps the most significant result of the increase in soil erosion has been an increase in fish mercury levels due to the bacterial methylation of naturally occurring mercury found in flooded soils (Bodaly et al. 1984a). Methyl mercury is a more dangerous toxin than elemental mercury as it tends to accumulate in cell tissue more readily.

Fish caught from the diversion lakes in 1977 and 1978 first led to the discovery of elevated mercury levels. At that time, the mercury levels in fish in many of the affected lakes were above the Canadian marketing limit of 0.5 ppm. It would appear that elevated mercury levels will continue to be a problem for the foreseeable future. Mercury levels in northern pike are still increasing, more than ten years after impoundment (Brandson et al. 1987).

2.4 SOCIAL FACTORS

Prior to impoundment, the fishery was a major source of income to the community of South Indian Lake. In 1972, the fishery was the single most important source of livelihood in the community, providing 43% of the community's income. Furthermore, the strength of the fishery appears

to have been increasing during the early 1970's, the years immediately prior to impoundment. The total income to the community derived from fishing increased from approximately \$102,000 in 1970, to \$129,000 in 1971, and to about \$199,000 in 1972 (unadjusted dollars) (Lake Winnipeg, Churchill & Nelson Rivers Study Board, 1974).

Studies of the fishery have determined that there has been a significant decline in "catch per unit of effort" (CPE). Mean whitefish CPE on traditional fishing grounds decreased from 23 kg per net per night in 1972, to 14 kg/net/night in 1979, to 10.5 kg/net/night in 1980, and to 7.5 kg/net/night in 1983. It has been estimated to have declined even further since then (Bodaly et al. 1980; Bodaly et al. 1983). In separate studies made in 1977 and 1980, data was gathered (using similar methods), concerning the economic performance of the summer fishery at Southern Indian Lake (Federal Department of Fisheries and Oceans, 1977; Wagner, 1981). These studies determined the costs, revenues, and net incomes of the commercial fishing operations in those years. In comparing the data, it was found that the net income of the fishermen dropped significantly between 1977 and 1980 (Wagner, 1984).

Since these studies were completed, there has been a shift in the nature of the fishery. For example, many fishermen are now fishing on other lakes in the region and transporting the catch by air to the depot at Missi Falls in the north basin of Southern Indian Lake. Under a subsidy program administered by the Southern Indian Lake Fishermen's Association, financial assistance is now provided to fishermen utilizing outlying lakes. Fishermen are reimbursed the transportation costs incurred while transporting fish to Leaf Rapids, plus a small residual amount (Thornton, 1986).

2.5 METHODS

In February 1988, a conference was held at the Freshwater Institute in Winnipeg that brought together experts in the fields of native studies, native fisheries and fisheries biology. One of the matters discussed was the question of what methodology is best suited to conduct socio-economic research into Native fisheries. There were two main points of view on this matter. One position held that it was necessary to conduct research in a very structured manner so as to produce results that are scientifically verifiable. This method would include such techniques as randomly administered questionnaires, surveys, etc.

The other point of view held that to conduct useful research among native peoples, it was important for the researcher to spend a significant amount of time in the community and to become a "participant observer". After some debate it was concluded that an element of participant observation was necessary for satisfactory data collection.

The conclusion of the conference is supported by Usher and Wenzel (1987) who stress both the importance of using a standardized questionnaire as well as using the method of participant observation in conducting harvest study interviews among native peoples.

2.6 SUMMARY

There has been a large amount of material written about Southern Indian Lake and the effect that impoundment of the lake and the diversion have had on the area. However, most of the research that has been conducted has focused upon the biological effects of the flooding. Relatively little attention has been focused upon socio-economic concerns.

Chapter III

METHODS

3.1 INTRODUCTION

The methodology for this study was based largely upon the techniques discussed in the literature review. This study combined the participant observer method with that of a structured interview using a questionnaire.

3.2 COMMUNITY APPROVAL

On May 20th, 1988, the researcher travelled to the community of South Indian Lake to attend the South Indian Lake Fishermens' Association annual meeting. The project was explained to the fishermen at this time. No objections to the study were brought forward. Fishermen suggested ways to improve the quality and usefulness of the study.

3.3 FIELD ACTIVITIES

3.3.1 Dates

Field activities began on June 12th, 1988 and were completed by September 5th, 1988. The fishery closes annually from mid-July to mid-August due to warm weather which adversely effects the quality of the catch especially during transportation. In 1988, this break occurred from July 15th to August 29th.

The field work was concluded on September 5th, 1988. On October 13th, the author travelled to the FFMC office at Leaf Rapids, immediately prior to the close of the fishing season, to review each fisherman's account.

3.4 SOURCES OF DATA

Data for this study were obtained from a number of sources. These included: 1) Interviews with fishermen using a questionnaire.

2) Conversations with and observations of fishermen and other residents of the community throughout the period of the field work.

3) By the author being a participant observer of the fishery.

4) FFMC Data.

3.4.1 The Questionnaire

The formal method of gathering data for this study was a structured interview using a questionnaire, with individual fishermen (Appendix A). Participation was voluntary. Each interview required a minimum of 30 minutes. In some cases the interview extended over an entire afternoon or evening. An attempt was made to interview all of the fishermen operating on the lake during the period of the field work.

The wording of the questionnaire was similar to that used in a questionnaire developed by the Economics and Marketing Directorate of the Federal Department of Fisheries and Oceans for a 1977 study, and

which was used again, with one minor deletion, in a 1980 economic study of the Southern Indian Lake commercial fishery (Wagner, 1981). In this study, the text of the questionnaire has remained essentially unchanged from the 1980 study.

3.4.2 Conversations With the Fishermen

During the course of the field work, the author had the opportunity to have frequent conversations with the fishermen as well as with other persons in the community. Also, the author was invited to the homes and camps of the fishermen. These informal discussions yielded valuable information which was later recorded. The information gained from these discussions is incorporated throughout this report.

3.4.3 Participant Observation

The author was fortunate as he was invited by a group of fishermen to accompany them onto the lake as an extra helper. While the author, due to lack of fishing experience did not offer these fishermen much assistance, the insights gained during this period proved invaluable in the preparation of this report. As well as being invited onto the lake as a crew member, the author was also invited to camp with a group of four families who were fishing an area about 30 km from the community. The period spent at this camp provided information about the fishermen's subsistence resource use, including subsistence fishing and hunting, as well as information as to the social importance of the fishery.

The author also participated in a number of non-fishing activities in the community. These activities included a wedding, a social, a community dance, and numerous other social activities.

3.4.4 FFMC Data

Data made available by FFMC were the major source of financial information used for calculating the net incomes from the fishery.

All data concerning individual fishermen were used with the permission of the individuals concerned. During the first few interviews, fishermen were asked to sign a release allowing the author to have access to the account information. There were no objections to this, however, the author soon realized that many of the fishermen could not read the form they were signing. As a result, use of the signed release was discontinued and verbal permission was requested. None of the fishermen who consented to an interview refused to allow access to this information.

During the last week of the commercial fishing season, the author travelled to the FFMC office at Leaf Rapids to examine each fisherman's account file that is maintained there. At that time, each file was reviewed to determine which expenses, that had been charged to an FFMC account, were not legitimate fishing expenses. Items found during this examination included goods such as home furnishings from the Hudsons Bay Co. store and auto parts suppliers in Leaf Rapids. A note was made of all non-fishing expenses.

A note was made also of the nets purchased by each fishermen so that they could be treated as capital expenses. If the nets had not been separated from the other fishing expenses at this time, it would have been impossible to differentiate net purchases from general fishing gear expenses later when examining the fishermen's year-end account analysis statements.

A photocopy of each fisherman's year end account analysis statement was supplied to the author in early January, 1989. These statements included records of all transactions made between the fishermen and FFMC including fish sales to the corporation, Manitoba Hydro Compensation payments, freight subsidies, fishing expenses, loan payments deducted from the fisherman's earnings as well as any non-fishing related purchases charged to the FFMC account. The notes made in October were used to delete any of these non-fishing expenses.

FFMC also made available each fisherman's production record. These records included the quantity, in kilograms, of each species of fish caught by each fisherman. These data were used to estimate the final payment due to each fisherman in December of 1989.

3.5 DEFINITION OF A "FIRM"

A fishing "firm" or partnership at Southern Indian Lake is not a legal entity but rather an informal arrangement between two or more individuals to catch fish.

The "arrangement" between these individuals varied between firms. Some firms were straightforward, having two licensed fishermen

(partners) actively fishing in one boat which they owned jointly. The partners then split the catch and the expenses equally.

Other firms were not as simply organized. In some firms, one person owned the equipment (boat, motor and perhaps the nets) but did not fish, instead arranging for one or two people to run the boat and catch the fish in return for a portion of the catch and some split of expenses. In other cases one active fishermen who owned his own rig would employ helpers on a cash basis.

For purposes of this study, the firm and its partners are defined as all persons associated with a particular fishing operation who have a proportion of the operation's catch sold under their name to FFMC. Persons who were paid in cash were considered hired labour. This broad approach to the "firm" and to partnership in it was necessary to avoid missing, in the calculation of the data, a significant portion of the net revenue and expenses of the firm.

3.6 COMPILATION OF DATA

The financial data for each firm was organized and put into three basic categories: Revenue; Operating Expenses; Depreciation and Interest.

3.6.1 Revenue

Revenue to the firm included a number of items: 1) sales, which included both initial payments the final payments; 2) Hydro Compensation payments; and 3) Freight Subsidy payments. These amounts were determined

from fishermen's year end account analysis statements as well as their production records for the season.

3.6.2 Operating Expenses

Operating expenses were also determined from the year end account analysis statements. Most of the headings are self explanatory, however some clarification is needed.

The headings "Food" and "Fuel" have been combined due to the nature of the reporting of expenses from Missi Falls. Food and Fuel bought at the Missi Falls store appear under one code on the fishermen's statements. Therefore it was decided to group together all of the food and fuel expenses regardless of where they were incurred.

It was assumed that all of the food and fuel purchased at Missi Falls was consumed in the course of fishing. In fact, some of the groceries were returned to homes in the community. However, the manager of the supply store at Missi Falls advised that any groceries that were taken to the community were probably offset by groceries brought out onto the lake from the community.

In the case of fishermen who fished the south end of the lake and who returned home daily, food expenses were estimated, based on observations by the author, to be \$5.00 per day, per fisherman. For those in the south end camping on the lake, food expenses were considered to be \$10.00 per day. It was necessary to use a per diem amount because many of the fishermen purchased a substantial quantity of food from stores in Leaf Rapids and charged them to their accounts. In some cases,

individuals who were partners in firms (by virtue of the fact that they owned the boat and motor) but, who did not fish, charged over \$1,000.00 in groceries to their accounts. Similarly, some active fishermen had grocery charges far beyond the needs of one or two individuals.

"Fishing Gear" includes all expenditures on expendable fishing equipment. This heading includes items such as knives, gloves and raingear but does not include expenditures on nets, floats and leads which are considered capital items and have been depreciated.

3.6.3 Depreciation

The method used to calculate the depreciation of capital goods was similar to that used in the 1980 study (Wagner, 1981). Straightline depreciation was used for all types of goods, however, the period over which the depreciation occurred varied. Boats were depreciated over 10 years, while motors and nets were depreciated over 2.5 and 3 years respectively. For camp gear, including tents, stoves, and radios, the period was set at 5 years. Equipment that was older than the number of years allowed for depreciation was valued at zero.

All of the time periods indicated above are the same as those used in the 1980 study with the exception of the nets. In 1980 they were considered to have a useful lifetime of only 2 years. In this study the period has been increased to 3 years and, in fact, could possibly have been set at 4 years. During the interviews the fishermen indicated that their nets lasted approximately 3 years each. However, the rate of replacement, based on the purchases of new nets for the 1988 season, suggested a rate of 4 years.

Information regarding capital goods was obtained during the interviews as well as by direct observation. Caution had to be used to avoid including too many capital items in the calculations. Many fishermen, during the interviews, indicated that they owned 2 or 3 late model motors. However, in fact they actually used only one of these motors during the fishing season. Similarly, with nets, many fishermen indicated that they owned far more nets than they set. Only the number of nets that were regularly set was used to calculate depreciation.

The prices used to evaluate the motors were determined from the dealer in Leaf Rapids where most, if not all, of the motors were purchased. The prices of the boats were supplied by the manufacturer.

Nets were all based on one price even though the actual price of nets varied slightly depending upon the type. The price per net was set at \$65.00. This value included the cost of fitting the nets with floats and leads.

The values for camp gear were determined in the interviews. Because of the numerous brand names available for this type of equipment each fisherman was asked to recall the prices paid.

3.6.4 Interest Charges

During the interview, each fisherman was asked what loans they had arranged to finance their fishing operations. Many did indeed have outstanding loans, all but a few of which were through the Manitoba Agricultural Credit Corporation (MACC). The method for repaying these loans was automatic payments arranged through FFMC based upon a

percentage of the catch, usually 25%. Most fishermen caught enough fish to pay off the loans within the fishing season. Thus their total interest payments should have been in the order of 4 or 5% of the borrowed amount. Unfortunately, many of the fishermen also had MACC loans for non-fishing related goods including snowmobiles. Thus, it was difficult to separate fishing loans from the fishermen's final statements. As a result, interest charges were calculated as 10% of the total MACC payments made by the fishermen. This may actually be a slight over-estimate of the interest paid.

3.7 COMPARISON WITH 1980 DATA

In order to make an accurate comparison of the data from the two years, it was necessary to adjust the 1980 data for inflation as well as changes in the fishery. Due to the fact that the fish pricing structure as well as the source of the Hydro Compensation payments has changed since 1980, the 1988 prices and compensation values have been used to evaluate the 1980 catch. As well, 1988 freight subsidy rates have been used. The 1980 operating costs have been increased based upon the change in the consumer price index for Winnipeg from 1980 to 1988. In 1980, the consumer price index for Winnipeg was 90.0. In 1988, the index was at 142.1 (Statistics Canada data). License fees have remained constant at \$10.00 and therefore were not adjusted.

It should be noted that the method for converting the results from the 1980 study to 1988 values was chosen arbitrarily by the author. The results of the comparison can vary greatly using other methods for converting the values.

3.8 THE INLAND LAKES

The inland lakes are lakes outlying from Southern Indian Lake. Fishermen access these lakes by small aircraft, most of which are chartered. Catches are flown back daily to either Leaf Rapids or Missi Falls. This study was only concerned with firms that operated out of Missi Falls. Many of the firms that operated on inland lakes also fished on Southern Indian Lake. Data from a firm's inland lake operations were calculated separately from its Southern Indian Lake data. In fact, a firm that fished on both Southern Indian Lake and on one or more inland lakes was considered to be two separate firms for purposes of this study. It should be noted that each firm's capital costs were added up only once.

Chapter IV

RESULTS

4.1 INTRODUCTION

4.1.1 Sample Size

The author obtained data regarding 23 fishing operations (firms). These 23 firms contained 54 licensed fishermen.

There were 95 licenses issued to fishermen on Southern Indian Lake. Of the 95 licenses issued, 23 were not used and therefore did not produce any fish. Five fishermen operated outside of the study area, delivering fish directly to Leaf Rapids. Thus there were 67 licensed fishermen who were in fact active in the study area during the 1988 summer fishing season (FFMC data). The 54 fishermen who were included in this study represent approximately 81% of the active licensed fishermen in the study area. In most cases, fishermen who were not included were active for only one or two weeks near the end of the season after the field research had been completed.

There is a distinction to be made between "licenses" and "fishermen". Many license holders did not fish but were nevertheless active as partners within the firm. In many cases, they owned the boat and/or motor and received a portion of the catch as rent.

4.2 1988 RESULTS FOR SOUTHERN INDIAN LAKE

4.2.1 Organization of Data

Each of the 23 firms was analyzed to determine its various incomes and costs. Total revenue included sales as well as freight subsidies and Manitoba Hydro compensation payments. Costs were categorized as operating costs, depreciation costs and interest expenses.

Table 1 presents the aggregate revenues, costs and net incomes for the 23 firms studied. Table 2 presents the average revenues, costs, and net income for these firms. The following is a description of each heading in the left column of Tables 1 and 2.

1. Sales

- includes both the initial payments and the final payments. Fishermen were paid an initial payment on a weekly basis throughout the fishing season. In addition, they later received a final payment which is essentially the distributed profit that FFMC earns on the eventual sale of the fish. Each fisherman is then paid an amount per kg varying by species.

2. Hydro Compensation

- Hydro Compensation of 33 cents per kg was paid on all species of fish delivered to FFMC. An annual limit is placed on the total amount of this compensation. The limit was reached in the first week of October thus resulting in a small discrepancy between the kilograms of fish caught and the total amount of compensation paid.

3. Freight Subsidy

TABLE 1

**Aggregate Net Income of the 23 Firms Sampled During the 1988 Summer
Commercial Fishing Season at Southern Indian Lake**

Revenue	
Sales	\$240,284
Hydro Compensation	72,826
Freight Subsidies	62,881
	<hr/>
Total Revenue	\$375,991
Operating Costs	
Food and Fuel	68,850
Repairs	5,199
Fishing Gear	5,532
Hired Labour	8,660
Licenses	540
Boat Charges	26,330
Truck Charges	14,023
Ice Harvest	4,829
Miscellaneous	300
	<hr/>
Total Operating Costs	\$134,263
Gross Operating Profit	\$241,728
Depreciation	
Boats	8,418
Motors	25,220
Nets	8,880
Camp Gear	1,539
	<hr/>
Total Depreciation	\$44,057
Interest	5,420
	<hr/>
Aggregate Net Income	\$192,251

TABLE 2

**Average Net Income of the 23 Firms Sampled During the Summer Commercial
Fishing Season at Southern Indian Lake**

Revenue	
Sales	\$ 10,447
Hydro Compensation	3,166
Freight Subsidies	2,734
	<hr/>
Total Revenue	\$ 16,347
Operating Costs	
Food and Fuel	2,993
Repairs	226
Fishing Gear	241
Hired Labour	376
Licenses	23
Boat Charges	1,145
Truck Charges	610
Ice Harvest	210
Miscellaneous	13
	<hr/>
Total Operating Costs	\$ 5,837
Gross Operating Profit	\$ 10,509
Depreciation	
Boats	366
Motors	1,095
Nets	386
Camp Gear	67
	<hr/>
Total Depreciation	\$ 1,914
Interest	236
	<hr/>
Average Net Income	\$ 8,359

- a subsidy, per kilogram, is paid by the province, to help fishermen pay the cost of transporting fish from dockside to Winnipeg. The subsidy paid varies by lake depending upon the distance from Winnipeg. For Southern Indian Lake it was approximately \$0.29 per kg.

4. Food and Fuel

- Food - includes the amount spent by firms on food and tobacco for the licensed fishermen and their hired help. Food for dependents is not included.

- Fuel - includes gasoline, oil and other lubricants, as well as charges for delivering fuel and for gas drums.

5. Fishing Gear

- includes gloves, rain gear, knives, etc. Does not include nets or their fittings as these are included as capital items.

6. Hired Labour

- the amount paid by the firms for wage labour. This does not include an "opportunity cost" of labour for the partners of the firm.

7. Repairs

- includes expenses for maintenance and unforeseen expenses to boats and motors.

8. Boat Charge

- amount charged firms to transport fish from Missi Falls to Leaf Rapids on the freight boat.

9. Truck Charge

- amount charged firms to transport fish via truck from the community of South Indian Lake to the fish plant at Leaf Rapids.

10. Ice Harvest

- a charge used by the Fishermens' Association to maintain ice for use by fishermen on the lake.

11. Depreciation

- accounts for the deterioration of capital items including boats, motors, nets, and camp gear.

12. Interest

- interest paid on loans made on capital items.

13. Net Income

- the amount of income remaining after operating expenses, depreciation and interest charges.

4.3 CASH FLOW

The net income amounts presented in Tables 1 and 2 represent the total value of the fish caught including compensation and subsidy payments minus operating costs, depreciation and interest. The net income amount is not the same as "cash flow". To determine the cash flow it is necessary to add back the depreciation and interest expenses. Table 3 shows the cash flows from the fishery on an aggregate and on an average basis. It should be noted that this cash flow does not go into the community entirely as "cash" per se. This amount includes a substantial amount of store - bought groceries, as well as miscellaneous household purchases, that were charged to fishermens' FFMC accounts.

TABLE 3
Cash Flows of the 23 Firms Sampled During the 1988 Summer Commercial Fishing Season

	Aggregate Cash Flow	Average Per Firm
Net Income	\$192,251	\$8,359
Depreciation	44,057	1,914
Interest	5,420	236
	\$241,728	\$10,509

(From Tables 1 and 2)

4.4 TOTAL COMMUNITY INCOME FROM THE FISHERY

Perhaps the most significant information that can be generated from the data is an estimate of the total dollar value of the Southern Indian Lake fishery to the community. To determine this amount, the aggregate revenues and costs from the firms surveyed were increased by the ratio of the total number of kilograms of fish caught in Southern Indian Lake overall to the total caught by the firms surveyed. This calculation is based upon the assumption that the firms not surveyed had similar costs per kilogram as the sampled firms. This assumption is not unreasonable given the similar costs per kg of firms operating in the north basin of the lake and those operating near the community (See p. 40).

$$\frac{\text{Total Kg of fish caught in S.I.L.}}{\text{Total Kg of fish caught by firms surveyed}} = \frac{267,908}{220,709} = 1.21:1$$

TABLE 4

**Estimate of the Total Community Income of the S.I.L. Commercial Fishery
in 1988**

Revenue	
Sales	\$290,743
Hydro Compensation	88,119
Freight Subsidies	76,086
	<hr/>
Total Revenue	\$454,948
Operating Costs	
Food and Fuel	83,308
Repairs	6,291
Fishing Gear	6,694
Hired Labour	10,479
Licenses	950
Boat Charges	31,859
Truck Charges	16,968
Ice Harvest	5,843
Miscellaneous	363
	<hr/>
Total Operating Costs	\$162,755
Gross Operating Profit	\$292,193
Depreciation	
Boats	10,186
Motors	30,516
Nets	10,745
Camp Gear	1,862
	<hr/>
Total Depreciation	\$53,309
Interest	6,558
	<hr/>
Estimated Net Dollar Value of the Fishery to the Community	\$232,326
 Total Estimated Cash Flow to the Community	
Net Community Income	\$232,326
Depreciation	53,309
Interest	6,558
Hired Labour	10,479
	<hr/>
Total Estimated Cash Flow	\$302,672

Table 4 shows the estimated total revenues and costs for the entire South Indian Lake commercial fishery. The numbers in Table 4 are derived by multiplying the numbers in Table 1 by 1.21. It should be noted that the figures in Table 4 do not include the value to the community of the inland lakes fishery.

4.4.1 Value of Subsistence Activities

In addition to cash income from the fishery, the community also benefited from a substantial amount of food from the fishery. Not only was a large quantity of fish consumed in the community but the fishermen were able to shoot moose while on the lake fishing.

Estimated values of the fish consumed are based upon the average of per capita consumption rates for similar communities (F. Berkes, Pers. Comm.). Berkes has compiled information from studies done by various researchers in native communities across the north. The average consumption was found to be 60 kg of fish per person, per year.

In this study, for comparison purposes, the figure of 60 kg of fish per person has been used as well 30 kg of fish per person or one-half of the average. The estimate of 30 kg of fish per person may be realistic given the ready availability of store bought goods in the community as well as in Leaf Rapids.

The author observed that fish species consumed by the fishermen and their dependents as well as that given to other members of the community was often not of commercial value. These fish were commonly of a non-commercial species, red sucker being an example. Often, however,

they were fish of commercially marketable species that had been slightly damaged in the nets. In either case, use of these fish for domestic consumption did not reduce the value of the commercial catch as they were unmarketable. Only rarely did fishermen retain fish of market value.

Based upon discussions the author had with fishermen, as well as from observations and discussions in the community, it was determined that approximately 20 moose were killed during the fishing season by fishermen on Southern Indian Lake. These were generally opportunistic kills that would not have occurred had the people not been in the area fishing at the time. Each moose was valued at a minimum of \$2,300.00 which reflects an estimate of the value of 250 kgs of meat at \$8.00 per kg and a value for the hide of \$300.00. The importance of the subsistence harvest is considered in Chapter 5.

Table 5 presents an estimate of the total value of the Southern Indian Lake fishery including the subsistence production. It should be emphasized that the estimated values of the subsistence production are indeed very rough estimates. These estimates have been included in this study only to illustrate to the reader the importance of subsistence activities to the community and to give an estimate of the magnitude of their value.

TABLE 5

Estimated Value of the Commercial and Subsistence Fisheries of Southern Indian Lake

Annual Consumption of Fish per Capita in S.I.L	60 kg	30 kg
Community Net Dollar Income From Fishery (from Table 4)	\$232,326	\$232,326
Estimated Value of Fish Consumed*	240,000	120,000
Estimated Value of Moose Harvested (20 moose at \$2,300 per moose)	46,000	46,000
Total Value of Fishery	\$518,326	\$398,326

* Based upon a population of 1,000
Fish valued at \$4.00 per kg

4.5 COMPARISON OF NET INCOME BY REGION OF SOUTHERN INDIAN LAKE

The firms in this study operated in two distinct regions of Southern Indian Lake. Fourteen of the 23 firms studied operated mainly in the southwest region of the lake and delivered their fish directly to the community of South Indian Lake. These fish were then taken by truck to Leaf Rapids for processing. The remaining nine firms operated mainly in the north section of the lake and delivered their fish at Missi Falls. These fish were then taken by freight boat to Leaf Rapids.

While fishermen have been operating in the southwest region of the lake for some time, it would appear that the introduction of ferry service to South Bay in 1985 has influenced the fishery. This ferry service connects the community of South Indian Lake by road to Leaf Rapids and Thompson. Fishermen can now pick up a supply of ice from the

TABLE 6

Average Net Incomes of Sampled Firms by Region of Southern Indian Lake

	Firms Delivering to Community of S.I.L.	Firms Delivering to Missi Falls
Revenue		
Sales	\$ 91,947	\$148,337
Hydro Compensation	25,356	47,470
Freight Subsidies	23,089	39,792
Total Revenue	\$140,392	\$235,599
Operating Costs		
Food and Fuel	27,944	40,906
Repairs	2,231	2,968
Fishing Gear	3,023	2,509
Hired Labour	1,050	7,610
Licenses	330	210
Boat Charges	2,255	24,075
Truck Charges	10,897	3,126
Ice Harvest	1,768	3,061
Miscellaneous	300	0
Total Operating Costs	\$ 49,798	\$ 84,465
Gross Operating Profit	\$ 90,594	\$151,134
Depreciation		
Boats	4,268	4,150
Motors	11,460	13,760
Nets	5,082	3,798
Camp Gear	514	1025
Total Depreciation	\$21,324	\$22,733
Interest	\$1,431	\$3,989
Aggregate Net Income	\$ 67,839	\$124,412
Average Net Income per Firm	\$4,846	\$13,823
(14 Firms)		(9 Firms)

depot in the community each morning and drop off fish upon their return in the evening. As a result it would appear that a significant number of fishermen are choosing to fish in the southwest area, despite having smaller catches, for the convenience of having ready access to the community. This trend is likely to continue or increase as a new fish processing facility and an ice maker were built in the community shortly after the completion of the 1988 fishing season.

Table 6 presents the aggregate revenues and costs for the 23 firms in this study, broken down by region. The firms delivering fish to Missi Falls had an average net income of \$13,823 which was significantly higher than the average of \$4,846 earned by firms delivering their catch to the depot at the community of Southern Indian Lake.

4.6 UNIT COSTS AND REVENUES OF FISHING

This section examines the unit costs and revenues of fishing. The unit cost is the average cost of catching a unit of fish, in this case 1 kg. Similarly, the unit revenue is the revenue received for 1 unit kg of fish. The unit costs and revenues are examined firstly on the basis of the entire group of firms, and then be broken down by the region that the firm operated in.

4.6.1 All Firms

The unit cost of fishing was determined by dividing the total kilograms of fish caught by the total cost of catching those fish. The total cost includes operating costs, depreciation and interest expenses.

$$\frac{\text{Total Cost of Fishing}}{\text{Total kgs of Fish Caught by the 23 Firms Sampled}} = \frac{\$183,740}{220,709 \text{ kg}} = \$0.83 \text{ per kg} = \text{Avg Cost}$$

Total revenue is determined in a similar manner. Total revenue includes revenue from sales of fish as well as revenue from compensation and subsidy payments.

$$\frac{\text{Total Revenue}}{\text{Total kgs of Fish Caught by the 23 Firms Sampled}} = \frac{\$375,991}{220,709 \text{ kg}} = \$1.70 \text{ per kg} = \text{Avg Rev.}$$

4.6.2 Firms Delivering To Community of S.I.L.

The unit revenue and cost in a region varied from that of the lake as a whole. Specifically, the costs and revenue varied between firms delivering to the community of South Indian Lake and firms delivering to Missi Falls. The unit costs varied by region due to such things as economies of scale, distances of travel, etc. The unit revenue varied as a result of a slightly different species composition in the catch from each area. The following is a calculation of the unit costs and revenues for firms operating in the south end of the lake and delivering fish directly to the community of South Indian Lake.

$$\frac{\text{Total Cost of Fishing}}{\text{Total kg of Fish Caught}} = \frac{\$ 72,553}{81,596 \text{ kg}} = \$0.89 \text{ per kg} = \text{Avg Cost}$$

$$\frac{\text{Total Revenue}}{\text{Total kg of Fish Caught}} = \frac{\$140,392}{81,596 \text{ kg}} = \$1.72 \text{ per kg} = \text{Avg Rev.}$$

4.6.3 Firms delivering to Missi Falls

The following are calculations of the average unit cost and revenue of the firms operating in the north basin of Southern Indian Lake and who deliver their fish mainly to Missi Falls.

$$\frac{\text{Total Cost of Fishing}}{\text{Total kg of Fish Caught}} = \frac{\$111,187}{139,113 \text{ kg}} = \$0.80 \text{ per kg} = \text{Avg Cost}$$

$$\frac{\text{Total Revenue}}{\text{Total kg of Fish Caught}} = \frac{\$235,599}{139,113 \text{ kg}} = \$1.69 \text{ per kg} = \text{Avg Rev.}$$

4.7 AN ALTERNATIVE ANALYSIS OF NET INCOME

Table 7 presents an alternative analysis of the aggregate net income of the 23 firms sampled during the 1988 summer commercial fishing season. This calculation is an attempt to illustrate the fishermen's view of the economics of the fishery.

This analysis differs from the analysis presented in Table 1 in that it does not include a calculation of depreciation or interest charges on capital items. MACC (Manitoba Agricultural Credit Corporation) payments made by the fishermen are used in place of the depreciation and interest amounts on boats and motors to represent the cost of capital items. The cost of nets and camp gear purchased during the fishing season has been used in place of the calculation of depreciation of nets and camp gear. MACC does not provide loans to finance nets or camp gear thus they are not covered under the calculation of MACC payments.

TABLE 7

An Alternative Analysis of the Net Income of the 23 Firms Sampled During
the 1988 Summer Commercial Fishing Season at Southern Indian Lake

Revenue	
Sales	\$240,284
Hydro Compensation	72,826
Freight Subsidies	62,881
UIC Benefits (Estimated)	45,269

Total Revenue	\$421,260
Costs	
Food and Fuel	68,850
Repairs	5,199
Fishing Gear	5,532
Net Purchases	6,456
Hired Labour	8,660
Licenses	540
Boat Charges	26,330
Truck Charges	14,023
Ice Harvest	4,829
Camp Gear Purchases	465
UIC Premiums	1,590
Miscellaneous	300

Total Operating Costs	\$142,774
MACC Payments (Incl. Interest)	
	54,216
Aggregate Net Income	

	\$224,270
Average Net Income	
	\$9,751
	(23 Firms)

This alternative also considers the importance of Unemployment Insurance Corporation (UIC) benefits to the fishermen. The premiums paid are considered costs.

This calculation is significant because it more closely reflects the net cash income that is received by the fishermen. Most fishermen are not concerned with the somewhat abstract concepts of depreciation and interest costs.

4.8 COMPARISON WITH 1980 DATA

Table 8 presents a comparison of the data gathered in 1988 with data gathered during the 1980 fishing season. The calculations used to determine net income differ somewhat from those used in this study. As a result, the headings used in the left hand column have been reorganized to make them compatible with the earlier data. The following changes have been made to the headings:

1. Revenue

- 1988 prices have been used to evaluate the 1980 catch. Similarly, the 1988 subsidy and compensation rates have been used.

2. Opportunity Cost of Labour

- the previous studies assigned an opportunity cost to the value of the labour put into the fishing operation by the firms' partners. This cost was based upon an 8 hour day at minimum wage. The opportunity cost for the 1988 season has been calculated. The opportunity costs found in the previous studies

TABLE 8
Comparison With 1980 - Aggregate Results

	(1988\$)	
	1988	1980
Revenue		
Sales	\$240,284	\$233,150
Hydro Compensation	72,826	68,088
Freight Subsidies	62,881	58,803
Total Revenue	<u>\$375,955</u>	<u>\$360,041</u>
Operating Costs		
Food and Fuel	68,850	57,369
Repairs	5,199	8,807
Fishing Gear	5,532	18,474
Hired Labour	8,660	nil
Boat Charges	26,330	41,593
Truck Charges	14,023	n/a
Ice Harvest	4,829	n/a
Miscellaneous	300	2,178
Total Operating Costs	<u>\$133,723</u>	<u>\$128,421</u>
Indirect Costs		
License	540	580
Insurance	nil	473
UIC	1,590	2,400
Total Indirect Costs	<u>\$ 2,130</u>	<u>\$ 3,453</u>
Depreciation		
Boats	8,418	7,412
Motors	25,220	35,970
Nets	8,880	24,333
Camp Gear	1,539	1,436
Total Depreciation	<u>\$ 44,057</u>	<u>\$ 69,151</u>
Interest	\$ 5,420	\$ 7,816
Aggregate Net Income	<u>\$190,115</u> (23 firms)	<u>\$151,210</u> (24 firms)

(n/a = not applicable in 1980)

TABLE 9
Comparison With 1980 Results - Average Income per Firm

	(1988\$)	
	1988	1980
Revenue		
Sales	\$ 10,447	\$ 9,715
Hydro Compensation	3,166	2,837
Freight Subsidies	2,733	2,450
Total Revenue	<u>\$ 16,346</u>	<u>\$15,002</u>
Operating Costs		
Food and Fuel	2,993	2,390
Repairs	226	367
Fishing Gear	241	770
Hired Labour	377	nil
Boat Charges	1,145	1,733
Truck Charges	610	n/a
Ice Harvest	210	n/a
Miscellaneous	13	91
Total Operating Costs	<u>\$ 5,815</u>	<u>\$ 5,351</u>
Indirect Costs		
License	23	24
Insurance	nil	21
UIC	69	100
Total Indirect Costs	<u>\$ 92</u>	<u>\$ 145</u>
Depreciation		
Boats	366	309
Motors	1,095	1,499
Nets	386	1,013
Camp Gear	67	60
Total Depreciation	<u>\$ 1,914</u>	<u>\$ 2,881</u>
Interest	\$ 236	\$ 326
Average Net Income	<u>\$8,289</u> (23 firms)	<u>\$ 6,299</u> (24 firms)

(n/a = not applicable in 1980)

have been increased by the ratio of the 1980 to 1988 minimum wage rates.

3. Insurance

- refers to insurance on boats and motors. Insurance was not purchased by the firms surveyed during the 1988 fishing season.

4. Unemployment Insurance (UIC)

- unemployment insurance premiums were considered a cost to the firm in the 1980 study. For comparison purposes, the 1988 UIC premiums have been included as a cost. The 1980 premiums have been increased by the change in the consumer price index. It should be noted that this study, in making all other calculations, has treated UIC premiums as an expense to individuals rather than to the firm due to the unique treatment of fishermen within the UIC program.

4.9 THE INLAND LAKES FISHERY

4.9.1 Introduction

The inland lakes are outlying lakes in the region of Southern Indian Lake that are fished by the fishermen of the South Indian Lake Fishermens' Association. Fishermen require a separate license for each lake fished. Unlike Southern Indian Lake where a quota is set for the entire lake, a quota is set for each license issued on an inland lake. The inland lakes were accessed by small aircraft. Each firm's catch was flown daily to Missi Falls.

Some fishermen or firms fished more than one lake during the summer of 1988. Firms that fished multiple lakes were still considered one firm. The incomes and expenses for each firm was totalled regardless of whether the income and expenses were incurred in one inland lake or more than one inland lake. Income and expenses from Southern Indian Lake have been separated from the data concerning the inland lakes.

4.9.2 Sample Size

The author obtained information regarding six Inland Lakes firms that operated out of Missi Falls during the 1988 summer fishing season. One firm was deleted by the author as it was not considered to be representative of the type of firm operating on inland lakes. Thus the information presented herein relates to five firms that operated out of Missi Falls during the 1988 season. The five firms fished a total of six different lakes. The lakes fished were: Thornsteinson, North Indian, Buckland, Ullman, Trout and Gauer Lakes.

4.9.3 Aggregate Net Income

The average net income was considerably higher for the inland lakes than for the Southern Indian Lake fishery (See Table 10).

The headings used in the left column of Table 10 are the same as those used in Table 1. There is one addition in Table 10. The heading, "Air Freight", has been included. This represents the amount paid by the firms to transport personnel, gear, and their catch from the inland lake to Missi Falls.

TABLE 10

Aggregate and Average Incomes of Firms Operating on the Inland Lakes

	Aggregate Sample Income	Average Income (5 Firms)
Revenue		
Sales	\$ 70,529	\$14,105
Hydro Compensation	28,351	5,670
Freight Subsidies	14,396	2,879
Total Revenue	<u>\$113,276</u>	<u>\$22,655</u>
Operating Costs		
Food and Fuel	9,755	1,951
Repairs	195	39
Fishing Gear	560	112
Hired Labour	10,380	2,076
Licenses	70	14
Boat Charges	9,402	1,880
Air Freight	23,331	4,666
Ice Harvest	1,067	213
Total Operating Costs	<u>\$ 54,760</u>	<u>\$ 10,951</u>
Gross Operating Profit	\$ 58,516	\$ 11,704
Depreciation		
Boats	1,300	260
Motors	1,548	310
Nets	2,771	554
Camp Gear	1,185	237
Total Depreciation	<u>\$ 6,804</u>	<u>\$ 1,361</u>
Interest (estimated)	\$ 1,000	\$ 200
Net Income	<u>\$ 50,712</u>	<u>\$ 10,143</u>

(Includes inland lakes activities only)

Chapter V

DISCUSSION

5.1 INTRODUCTION

5.1.1 Point of View

This practicum has been written primarily from the economic point of view of the community. This fact is significant in that it results in Hydro Compensation payments and provincial freight subsidy payments being treated as benefits. Had the study been written from a provincial or federal point of view, these payments might be seen as merely transfers within the economy and therefore not included as a benefit from fishing.

The difficulty in looking at the fishery from this larger point of view is that it greatly underestimates the continuing importance of the commercial fishery to the economy of the community of South Indian Lake. Furthermore, it tends to underestimate the prospects for the long term viability of the fishery by undervaluing the average net income of each firm. By considering only the actual dollars received for the fish without including compensation and subsidy payments the conclusion could be drawn that many of the firms were in a deficit position or that few firms would be able to replace capital items in the long term. However, the fishermen are indeed replacing boats, motors and nets and are receiving an income from the fishery. By considering total revenue,

including compensation and freight subsidy payments, a clearer picture is obtained of the fishery at the community level and the future viability of the fishery can be more accurately predicted.

5.1.2 The Opportunity Cost of Labour

Previous studies of the economic performance of the Southern Indian Lake Commercial Fishery have included as an expense the "opportunity cost" of the labour put into each firm by the firms' partners (Wagner, 1984). Minimum wage and an eight hour day formed the basis of the calculation.

To use minimum wage as an opportunity cost makes the assumption that employment is available for the fishermen at minimum wage. Very few employment opportunities exist for the people of South Indian Lake at any wage rate. The author could find no instances of persons from South Indian Lake working at the Leaf Rapids mine. Leaf Rapids is located about 1.5 hours away by automobile. The community has invested in a lodge at Big Sand Lake. A number of persons in the community are employed there. However, unemployment remains high in the community. A fisherman, taking employment at the lodge, would likely displace someone else from the community.

The value of leisure is sometimes used to evaluate the opportunity cost of labour (Randall, 1987). However, during the summer of 1988, South Indian Lake offered little in the way of community recreation.

For these reasons, the opportunity cost of labour has been treated as zero and not included in the calculations.

It should be noted that valuing the opportunity cost of labour at zero in no way suggests that persons' lives are worth zero. It should be emphasized that this is an economic concept that uses the value of alternative uses of time to measure the value of time put into labour.

5.1.3 Unemployment Insurance Premiums

Unemployment insurance premiums have not been included as expenses except in comparison with the 1980 results (Tables 8 & 9). These payments are not truly expenses to the firm but are really expenses to individual fishermen. Commercial fishermen are treated differently than most self-employed workers in Canadian society in that they can participate in the unemployment insurance program. Furthermore, the benefits received from the Unemployment Insurance Commission far outweigh their cost. Fishermen are eligible to collect benefits after only 10 weeks of employment in the fishery per year. From a community point of view, these unemployment insurance claims represent income and an important benefit from the fishery.

Claims were made by 25 fishermen for unemployment insurance benefits following the 1988 summer commercial fishing season. Benefits were paid to 13 of those who applied. The total benefits paid to the successful claimants was \$54,775. The total UIC premiums paid by fishermen on Southern Indian Lake was approximately \$1900. Therefore, UIC payments to the community as a result of the commercial fishery represented a net benefit to the community of about \$52,875 following the 1988 summer commercial fishing season.

5.2 INCOME EARNED IN 1988 BY THE SAMPLED FIRMS

The 23 firms examined earned revenue of \$375,991. This amount includes \$72,826 in Hydro Compensation and \$62,881 in freight subsidy payments.

The average firm earned a net income of \$8,359. However, the profitability of the 23 firms varied significantly by region of the lake fished. Those firms fishing at the north end of the lake had a significantly higher income than those fishing the south end near the community. The incomes were \$13,823 and \$4,846 respectively (See Table 6). This difference in income, between the two areas, can be attributed to a number of factors including the following:

1. A greater catch per unit effort in the north end of the lake. The author observed daily catches being delivered in early September, at the north end of the lake, in the order of 25 tubs of whitefish (about 600 kg) for approximately every 20 nets set. In contrast, a similar number of nets set at about the same time in the region near the community yielded 8 to 10 tubs of whitefish.
2. The north end of the lake required a greater commitment to the fishery. The lake is much rougher in this area. Few children, spouses, or elderly people were observed fishing there. The south end, in contrast, is more hospitable. Catches are smaller but the lake tends to be calmer with less open water. The temperature also tends to be warmer as it is in a different climatic zone than the north end. More families, people learning

to fish, and elderly people fish in this area. Thus, it would appear that there is a trade-off between lower catches but more hospitable conditions in the south end and higher catches and more difficult conditions in the north end.

In the future it is likely that a change will occur in the number of fishermen or firms delivering to each area. A new fish processing facility has been constructed at the community of South Indian Lake. This may have the effect of encouraging more fishermen to deliver fish at the community rather than at the north end. At Missi Falls, the fish depot may have to be moved at the insistence of Manitoba Hydro. This move may have some effect on the fishery in that area but it is impossible to predict whether this effect will be positive or negative.

5.2.1 Income per Day Fished

Based upon information obtained from the questionnaires it was determined that fishermen on Southern Indian Lake fished a total of 1491 eight hour days. This represents an average net income per fisherman of approximately \$128.

Average net income per day can be broken down by area. The fishermen delivering fish to the community of South Indian Lake worked a total of 854 days for a daily net income of approximately \$79. By comparison fishermen delivering to Missi Falls worked 637 days and had a daily net income of about \$195.

5.2.2 Unit Cost and Revenue

From a financial point of view, the difference in the average net income between the two areas was due primarily to the difference in the size of the average catch in each region. The 9 firms operating near Missi Falls caught an average of 15,475 kg of fish per firm for a total of 139,113 kg. The 14 firms operating primarily at the south end of the lake caught a total of 81,596 kg, an average of only 5,828 kg. The average revenue per kilogram of fish caught and the average cost per kilogram of fish caught did not vary enough to account for the difference in incomes.

The cost of catching 1 kg of fish in the north end was slightly lower than the cost at the south end. This is most likely due to an economy of scale as a result of the larger catches at the north end. The unit cost or the average cost per kilogram at the north end was \$0.80 versus \$0.89 at the south end. This saving per kilogram at the north end was largely offset by a lower unit revenue. The average revenue per kilogram at the north end was \$1.69 versus \$1.72 at the south end of the lake. The difference in average revenue can be attributed to a slight difference in species composition of the catch at the respective ends of the lake. Fishermen are paid different prices for each species of fish caught.

5.3 TOTAL COMMUNITY INCOME FROM THE FISHERY

The estimation of the total dollar value of the fishery to the community is perhaps the most significant value that can be derived from the data gathered. This estimation is made based upon the assumption that the firms that were not examined and who caught the remaining fish, about 20% of the fish overall, had similar unit revenues and costs to the 23 firms studied. This assumption is not unreasonable given the fact that unit revenues and costs did not differ greatly between the productive firms at the north end and the less productive firms at the south end. Furthermore, the percentage of the active Southern Indian Lake fishermen who were included in this study (81%) caught an approximately equal percentage (82%) of the total from the lake. Therefore, the average catch and revenue of the fishermen not included in this study should be about the same as those fishermen who were included.

As shown in Table 4, the total estimated revenue for the entire Southern Indian Lake fishery is \$454,948. The net community income after operating expenses, depreciation, and interest is \$232,326. If the wage labour paid out by the firms is added back in, the total net income rises to \$242,631.

Assessing the fishery in terms of the total net benefit to the community is superior, in some ways, to looking at the fishery on an average net income per firm basis or as an aggregate income for a sampling of firms.

Analyzing the income of the fishery on a per firm basis requires a strict definition of "a firm". In practice, maintaining a strict definition of a firm was difficult. This was due to the varied nature of each firm, the fact that the partners frequently changed and the fact that some firms split their efforts between Southern Indian Lake and one or more inland lakes. As a result, there is a virtually unavoidable degree of subjectivity involved in a study of the Southern Indian Lake fishery that looks only at individual firms.

In an analysis that looks at the overall value of the fishery, the "firm" is only significant as a means of recording the ownership of capital items and preventing the double counting of them. Most other items can be looked at on the basis of individual fishermen.

Estimating the total value of the fishery rather than examining it on a per firm basis has the added feature of being potentially sensitive to changes in technology. For example; perhaps, at some point in the future, technology is adopted by the fishermen that allows 10 firms to catch the same amount of fish as the 23 firms studied. Assuming that unit revenues and costs remained the same, the income per firm would increase by a factor of 2.3. This might lead to the false assumption that the economic performance of the fishery has improved when from a community point of view it would be producing exactly the same total net income.

5.3.1 Cash Flow to the Community

The net cash flow to the community is presented at the bottom of Table 4 and is estimated to be \$302,672. To determine the net cash flow, the depreciation was added back as it is not a cash expense in the short term. As well, money paid out for hired labour was included in the cash flow.

This income did not enter the community entirely as cash per se. A significant portion of the income went into the community as store - bought groceries and other goods. Fishermen often bought large quantities of groceries from FFMC in Leaf Rapids. These grocery purchases were often far in excess of what was required for fishing. Some licensed fishermen, who were partners in a firm by virtue of owning the boat or motor and who did not fish, had sizable grocery bills charged to their FFMC account. In addition to groceries from FFMC, groceries were also purchased from the Federated Co-op store in Leaf Rapids and from the community owned grocery store in South Indian Lake. These purchases were also frequently charged to FFMC accounts. Certain other non-fishing purchases were also charged to fishermen's accounts. These included purchases from the Hudsons Bay Co. store in Leaf Rapids, automobile supply store in Thompson, and various other sources. All of the above types of non-fishing related purchases that were charged to the fishermen's accounts are treated in this study as income to the fishermen and to the community.

5.3.2 Value of the Subsistence Production

During the course of the field work, the author observed that the fishery produced a quantity of country food for the community. These foods included moose meat, various types of berries, and, of course, fish. The fish species most commonly consumed in the community were whitefish and red sucker (long nosed sucker).

Approximately 20 moose were killed by fishermen while living out on the lake during the fishing season. The question, "Did you hunt in the past year", was used to initiate a conversation with the fishermen concerning their subsistence hunting. Virtually all of the fishermen interviewed indicated that they had hunted for moose during the fishing season.

Commercial fishing gives the residents of South Indian Lake access to moose. The moose were killed usually on an opportunistic basis. That is, the fishermen killed moose that they encountered while fishing. As well, fishing increased hunting opportunities by taking fishermen too areas of the lake, away from the community, where moose were relatively abundant.

Moose are hunted with the use of fishing boats. The technique used by the fishermen was to go from island to island looking for tracks. If tracks were found, beaters were dispatched to walk the island. The boat circled the island to ensure that the moose did not swim to the mainland. The author observed that this technique was very efficient.

Because the moose were found 30 km or more away from the community, a boat was a necessity for accessing them. The fishermen, already a good distance out on the lake, often were camped in good hunting areas. Thus, very little additional travelling time or fuel was required to hunt moose.

As stated above, approximately 20 moose were killed during the summer fishing season. A value of \$2,300.00 per moose has been used to estimate the value of this resource. This is based upon an average of 250 kg of meat per moose at \$8.00 per kg. The meat was shared widely within the community. The hide yielded approximately \$300.00 in crafts. These items, including leather slippers, jackets, and mukluks, were often made by the older women in the community, providing them with a small income.

5.3.2.1 Subsistence Fishing

This study did not have as a specific objective the examination of the value or nature of the subsistence fishery. However, it became apparent during the course of the field work that the subsistence activities relating to the commercial fishery contributed to the economy of the community.

Information regarding the nature of the subsistence harvest was gathered through direct observations of fish being taken home or to camp, observations of fish consumption during visits to homes and camps, and through the interview question: "what types of fish do you keep for your own or your family's consumption". From observations and interviews, whitefish and red sucker (long nosed sucker) were found to be the species most commonly consumed.

The fish consumed in the community did not significantly reduce the size or value of the commercially sold catch. Red sucker is a non-commercial species caught in nets set to catch other species. If they were not consumed, these fish would likely be tossed up on the shoreline. Of the commercial species consumed in the community, the particular fish chosen were usually ones that had been superficially damaged in the nets. If sold, these fish would have had a low or nil value when sold to FFMC. Thus there was little cost to the fishery of the fishermen using these fish for food or giving them away to other people in the community.

It was beyond the scope of this study to attempt to determine the per capita consumption of fish in the community. However, a number of studies have been conducted in similar communities. One author has compiled data from a number of studies to estimate a range of consumption levels of fish in native communities (F. Berkes, Pers. Comm.). The level of consumption used to estimate value in this study represents a consumption level from the lower end of the continuum constructed in Berkes study. It should be noted therefore that the actual per capita consumption of fish in the community of South Indian Lake may, in fact, have been different than the amount chosen to represent value herein. The reader should, therefore, consider the values given to represent the subsistence fishery as merely estimates intended to illustrate the significance of the subsistence harvest to the community.

5.4 THE ALTERNATIVE ANALYSIS

The alternative analysis of the net income of the 23 firms sampled (Table 7) attempts to consider the fishery from the point of view of the fishermen. The category of "depreciation" is deleted from this analysis and is replaced by the MACC payments actually made by the fishermen. Thus, the non-cash expense of depreciation is replaced by a cash expense, clearly represented as a deduction on the pay cheques from FFMC.

The alternative analysis takes into account UIC premiums and benefits. As discussed earlier, the UIC benefits contribute significantly to the income of the fishermen. Fishermen must fish to receive UIC benefits. Receiving UIC benefits forms part of an individual's economic strategy.

This type of analysis may be useful in future studies of the South Indian Lake, or other, fisheries. Should significant changes be made in either the UIC or MACC programs it is possible that the participation in the fishery may be affected.

5.5 SOCIAL IMPORTANCE OF THE FISHERY

An understanding of the social factors affecting the community is necessary in order to put the overall significance of the fishery into perspective.

5.5.1 The Fishermen

The men and women who fish the lake vary widely in age, level of experience and in their dedication to the fishery. In general, a distinction can be drawn between the fishermen fishing the south end of the lake, near the community, and those fishing the north end, delivering to Missi Falls.

As presented in the Results, the average net income of the firms located in the south end was considerably lower than that of the firms fishing the north end. This is not to say that the fishery in the south end is not as socially important to the community as the fishery located in the north end.

The south end of the lake was observed by the author to be a somewhat safer and more comfortable area to travel in. There was less open water and waves were lower than in the north end. The fishery in the south end of the lake was relatively family oriented. Family members, including wives and children fished in this area. Older persons remained active in this area, often helping to teach younger people the skills necessary to fish successfully. This was the area in which beginners generally, learned to fish. For some fishermen the south end is a transition zone. Beginners may gain confidence and later fish the north end. For others, it may be a place to fish and remain active before retiring.

Many of the people fishing in the south end return to their homes in the community each evening. Some fishermen camp on the lake while others split their time between home and camp.

Cash income, per se, may not be the motivating factor for many of the fishermen in the south end. As will be discussed in more detail later, the community of South Indian Lake does not offer many recreational opportunities. Drinking of alcohol during periods of inactivity was observed to be a serious problem. The fishery appeared to be a recreation in itself for many fishermen. The south end fishery, as well as providing something to do, also gave the fishermen a small net income, most of which was taken home in the form of store bought groceries. The cash income derived from fishing allowed the fishermen to own and maintain boats which often were used as personal transportation within the community.

Fishing in the north end appeared to be conducted in a more intense manner. Few children or wives were observed in the boats. The typical person fishing in this area was male, between 25 and 50 years of age and physically fit in appearance. Ten to 12 hour days were not uncommon for firms in this area.

Because Missi Falls is approximately 100 km or about two and one-half hours by boat from the community, all of the fishermen in this area lived in camps located near where they were fishing. Trips to the community by these fishermen were relatively infrequent.

5.6 COMPARISON TO 1980 STUDY

5.6.1 Changes in the Fishery

Since the 1980 study was conducted (Wagner, 1981), there have been a number of changes in the fishery. In 1980, most of the fish was delivered to Loon Narrows, from there it was taken by boat to Leaf Rapids. The fish handling facility at Loon Narrows has since been abandoned. A new facility was built at Missi Falls, farther to the north-east from the community.

Since 1980, there has been an apparent split in the fishery with some firms delivering to Missi Falls and others directly to a depot at the community of South Indian Lake. The community based fishery has developed as a result of the introduction of ferry service to the community. This enables a truck to transport the catch, via ferry and road, daily to Leaf Rapids. As discussed earlier, a significant difference in income exists between firms operating out of Missi Falls and those operating in the vicinity of the community.

Other changes have occurred as well. The entire pricing structure for fish has changed on the lake. Export grade prices are no longer paid for any whitefish from Southern Indian Lake. There has also been a change in the compensation program. In 1980, compensation to fishermen on Southern Indian Lake was paid from the "Commercial Fishermens' Assistance Program" set up in 1978 by Manitoba Hydro to compensate fishermen affected by the Churchill River Diversion. Since 1980, Hydro has reached an agreement with the South Indian Lake Fishermens' Association. The agreement, made in 1983, paid the Association

\$2,500,000. This money has been used to establish a fund, administered by the South Indian Lake Fishermens' Association to provide compensation for fishermen. This compensation is paid on a per-kilogram basis for fish caught on South Indian Lake and certain outlying lakes. In 1988, fishermen were paid \$0.33 per kilogram for all species of fish caught and sold to FPMC. In 1980, the amount of compensation paid varied between species, grades, and the area of the lake in which the fish were caught. Now, one amount is paid for all commercial species from all areas of the lake.

5.6.2 Rationalizing the Data

In order to make a meaningful comparison between the net income of the fishery in 1980 and the net income of 1988, adjustments had to be made to the 1980 data. The 1988 prices for fish, as well as the current levels of compensation and freight subsidy payments were assigned to the 1980 catch. Operating expenses for 1980 were increased using the change in the Consumer Price Index for Winnipeg for the period (Statistics Canada data).

5.6.3 Change in Net Income

Table 8 presents the aggregate totals for 24 firms studied in 1980 and the 23 firms studied in 1988. Table 8 shows the average revenue, costs and net income per firm in each year. As Table 9 shows, there has been a substantial increase in the net income of firms since 1980. The average income per firm has increased 32% from \$6,299 in 1988 dollars to \$8,289 in 1988. This increase can be attributed to a number of changes

in the fishery. The most important factor has been an increase, by over 1,000 kilograms, in the average catch per firm. In 1988, the average catch per firm was 9,609 kg compared with only 8,597 kg in 1980. The rate of net replacement appears to have been substantially reduced. In the 1980 study (Wagner, 1981), the author reported frequent net replacement due to debris in the lake as a result of the flooding. In 1988, the number of nets destroyed by debris was apparently reduced. As a result, this study has used a longer period, 3 years versus 2 years over which the nets have been depreciated. Reduced amount of debris in the lake may be responsible for a lower amount being spent on repairs in 1988.

Charges for transporting fish remain much the same. In 1980, firms spent \$1,733 (\$1988) on boat charges for shipping their catch from Loon Narrows to Leaf Rapids. In 1988, firms paid an average of \$1755 to transport their catch to Leaf Rapids. In 1988, this cost was split between road and boat transportation however the total cost has remained relatively constant. In fact, the cost has gone down marginally as a cost per kilogram.

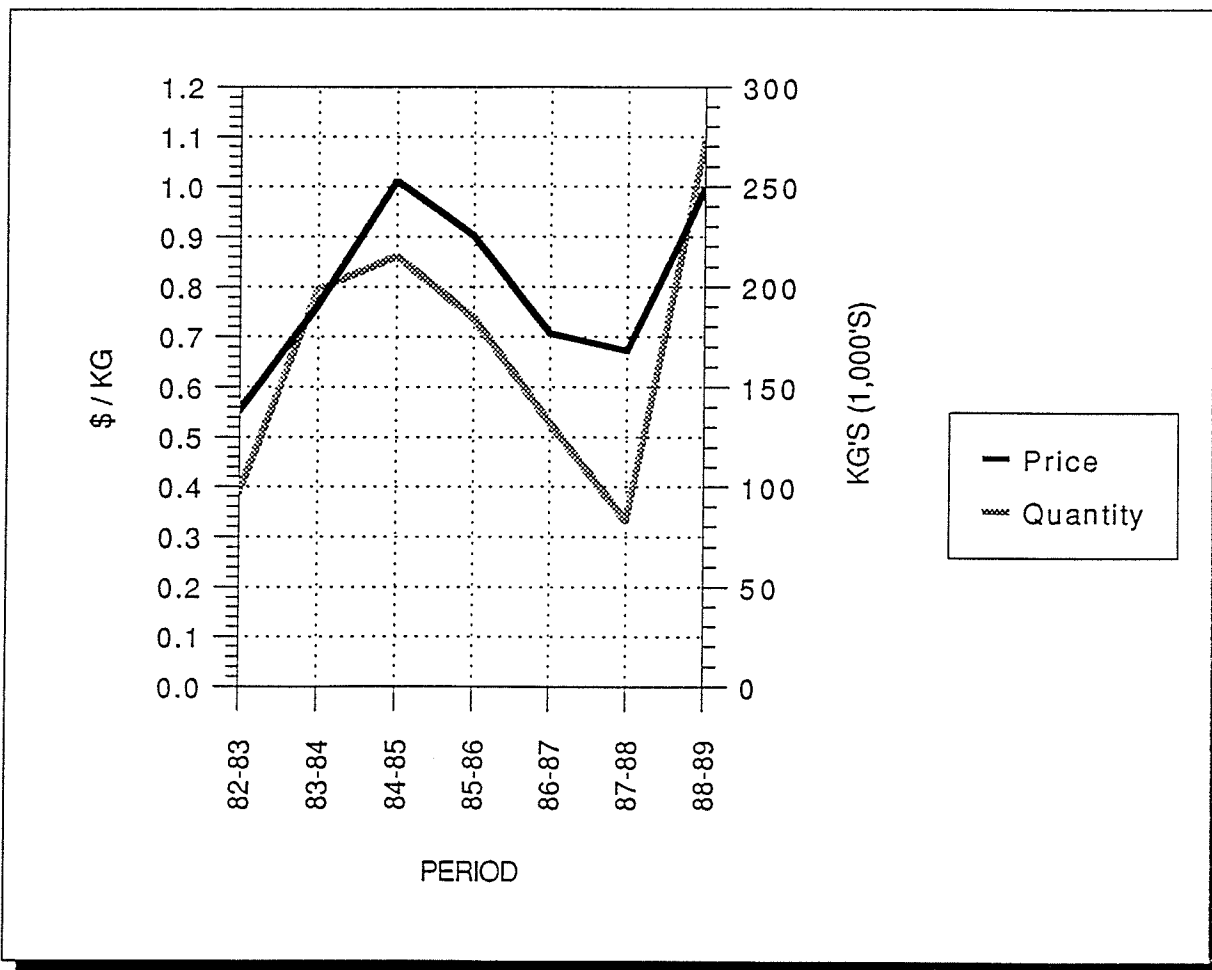


Figure 2: The Relationship Between the Average Price per kg and the Quantity of Whitefish Produced from Southern Indian Lake

5.6.4 Was 1988 a Typical Year?

In 1988 the production of fish from Southern Indian Lake more than doubled from the previous year. In fact, the production of fish from the lake in 1988 was at one of the highest levels since impoundment. Thus, the question can be asked: "from an economic point of view, was 1988 a typical year for the Southern Indian Lake summer commercial fishery"? Based upon the relationship since 1982 between the price paid for whitefish and the quantity produced from the lake it would appear that the 1988 season continued a trend established during the previous six years. This relationship is illustrated in Figure 3. The output of whitefish follows closely the average price per kg.

It should be noted that the Southern Indian Lake fishery is a "price taker" in the marketplace. It does not control enough of the overall market for whitefish for its production to have a measureable effect upon price. The price of fish from Southern Indian Lake is set by FFMC and is the same for all lakes.

In 1987, there was a sudden decline in the output of whitefish beyond what might have been expected given the fact that the average price remained relatively stable between 1986 and 1987. This decline was likely due to a whitefish reduction program put in place by FFMC in 1987 which encouraged fishermen to cut production by 25% from the previous year. In 1988, prices increased substantially and the whitefish reduction program was discontinued. In fact, fishermen were encouraged to supply all types of whitefish to FFMC with the the lower quality cutter whitefish fetching a price close to that of continental quality

fish. These factors contributed to an output of whitefish almost triple that of the year before. The reaction of the fishery to market conditions would suggest that the marketplace is a significant factor in determining the quantity of whitefish produced in Southern Indian Lake. Furthermore, the reaction of the fishery to the marketplace was what could be expected given the trend established. Thus, 1988 was a typical year given this relationship between price and output.

5.6.5 Cost of Wage Labour

In 1980, the firms studied indicated that they did not hire any labourers on a cash basis and thus paid zero in wages (Wagner, 1981). In 1988, the 23 firms examined paid out a total of \$8,660, or an average of \$377 per firm, in wages. In the 1988 study, the wage labour may account for the significant difference in the number of days fished by the firms' partners. In 1980, each partner contributed approximately 96 days of labour to the fishing operation. In 1988, each partner worked an average of about 65 days.

Wages ranged from a few dollars to about \$40 per day. The exact amount paid was difficult to determine. The employees often claimed that they were paid an amount far less than what the partners claimed during the interview. Based on the information obtained from all sources it is estimated that on average, workers were paid approximately \$20 per day.

It is estimated by the author that the wage labour offsets approximately 20 days per firm of labour that would otherwise be put in by partners. Thus the amount of labour that this study found to be

required by each firm may in fact not be very different from that found in the 1980 study . However in 1988, in comparison to 1980, the amount of labour that is being contributed by partners appears to have declined somewhat and was replaced by low priced wage labourers.

5.6.6 The Opportunity Cost of Labour

The 1980 study assigned an opportunity cost of labour to represent the value of the labour put into the firm by each partner. This amount was based upon minimum wage. As discussed earlier, this study has assumed a zero opportunity cost of labour. However, for comparison purposes a similar opportunity cost has been calculated for the 1988 fishing season.

The opportunity cost in 1980 was found to be \$3,607 per firm (using 1988 minimum wage and an 8 hour day). This represents an average of about 96 days of labour being put into each firm by the partners. In 1988, this opportunity cost was found to be only \$2,438 per firm, or about 65 days worth of labour by the partners. This difference can be explained by the presence of wage labourers in the fishery. In 1980 there were no wage labourers in the firms studied. As discussed above, the wage labourers offset about 20 days per firm of labour that would otherwise have been put into the fishery by partners.

5.7 THE INLAND LAKES FISHERY

5.7.1 Introduction

The inland lakes fishery is significantly different from that found on South Indian Lake. However, many of the fishermen who operated on inland lakes also operated, for a portion of the summer, on the main lake. For purposes of this study, income and expenses for firms while operating on the inland lakes was separated from income earned on Southern Indian Lake. In cases where, for example, a firm consisting of two individual fishermen operated on both Southern Indian Lake and on the inland lakes, the Southern Indian Lake operation and the inland operation were considered entirely different firms. It should be noted that some of the inland firms fished more than one inland lake during the summer. They were nevertheless considered as one inland lake firm.

5.7.2 Net Income

As discussed in the results section, data regarding 5 inland lake firms has been included in this report. The average income for these firms was found to be \$10,143 per firm (Table 10). This is significantly higher than the \$8,359 overall average for firms operating on Southern Indian Lake (Table 2). On the other hand, it is less than the \$13,823 average income for firms operating at the North End of Southern Indian Lake (Table 6).

To make an accurate comparison of the incomes earned on the inland lakes versus Southern Indian Lake it is necessary to consider profit per partner day fished, in other words, the average profit earned per day by

a partner in a firm. The partners in an inland lake firm fished on average 30 days compared to 28 days on Southern Indian Lake. The average income per day for fishermen on the inland lakes was \$244 compared to \$129 for partners on Southern Indian Lake. When the inland lakes fishery is viewed in this manner it appears to be far more lucrative than the Southern Indian Lake fishery, with the inland lakes fishermen earning about twice as much per day. In addition, 4 of the 5 firms interviewed also fished on Southern Indian Lake during the 1988 summer season. Three of the 4 firms were among the top 5 firms operating on Southern Indian Lake in terms of fish caught. Thus, the inland lakes fishery provides a significant additional income for certain of the fishermen.

5.7.3 Access to the Inland Lakes Fishery

Why don't all of the fishermen fish the inland lakes? Access to the inland lakes fishery appears to be limited by two main factors: 1) The relative scarcity of suitable lakes in the region, that is, lakes that produce fish in suitable commercial quantities and are within about 80 air km of Missi Falls or Leaf Rapids. Furthermore, fishermen who hold licenses to an inland lake do so in virtual perpetuity; 2) The high start - up cost of operating on an inland lake. Included in these costs is the expense of additional boats and motors as well as maintaining a second set of nets (4 1/4 inch nets are permitted on most inland lakes. Only 5 inch and larger nets are permitted on Southern Indian Lake). Missi Falls or Leaf Rapids.

Chapter VI

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The Southern Indian Lake commercial fishery is an important economic, cultural and social institution for the people who live there. The fishery is an important source of cash income for the fishermen and their families. As well, the commercial fishery improves community access to a subsistence food harvest of moose and fish.

It was observed during the course of the field work that the fishery is an important social institution in the community. During periods of inactivity in the fishery, social problems appeared to increase.

Since 1980, there has been an improvement of nearly 32% in the average net incomes of firms involved in the Southern Indian Lake fishery. This increase can be attributed to two main factors: 1) A significant increase in the catch per firm. This increase was due, at least in part, to the relatively high price paid for whitefish in 1988. 2) A reduced replacement rate for capital items. This may be due to a reduction, since 1980, of the debris in the water resulting from the flooding.

Overall, the future of the Southern Indian Lake fishery seems secure from a financial point of view. The fishery is producing a cash income

for the fishermen and it is generating enough revenue to allow for replacement of capital items in the long run.

This study also considered the inland lakes fishery. These outlying lakes produced a substantial net income per firm. In fact, inland lakes firms outperformed those on Southern Indian Lake. When the net income was considered on a per diem basis, the gap between the inland lakes fishery and the Southern Indian Lake fishery became greater. Therefore, it can be concluded that fishing the inland lakes is a profitable exercise for the community.

6.2 RECOMMENDATIONS

One of the objectives of this study was to "make recommendations for changes that might improve the economic returns for the fishermen". Overall, it is recommended that no major changes be made in the fishery. However, the following are recommendations that the author feels will maintain or improve the benefits that the community receives from the fishery:

1. Currently, the Southern Indian Lake fishery is essentially an open access fishery. From an economic point of view, it may be possible to increase the performance if the number of fishermen is reduced or if individual quotas were established. However, as has been discussed in this study, the Southern Indian Lake fishery is both a source of income and an important social institution. Any restriction upon access to the fishery is likely to have a social impact. Therefore, the community may be best served by leaving the structure of the fishery unchanged.

2. It is recommended that future studies of the Southern Indian Lake commercial fishery focus upon estimating the total net income to the community rather than attempting to calculate the average net income on a per firm basis. As well, future studies of the Southern Indian Lake commercial fishery should attempt to consider the fishery from the point of view of the fishermen and the community. The alternative analysis of aggregate income (Table 7) presented in this study has attempted to present this point of view. In considering the fishery from a community point of view, it is important to consider all revenues and costs including compensation and freight subsidies as well as UIC benefits and premiums.
3. An important and inseparable part of the Southern Indian Lake commercial fishing economy is the subsistence harvest of fish and moose. In the event of a collapse or decline in the commercial fishery, it is likely that the subsistence harvest would be adversely affected. As a result, future studies at Southern Indian Lake, as well as the study of other northern areas affected by hydro electric developments, should consider, in detail, the subsistence harvest. The most appropriate method would be to conduct a parallel subsistence study at the same time as an economic study.
4. There appears to be a relationship between the price of whitefish and the quantity of fish produced from Southern Indian Lake; the

greater the price, the more fish produced. As a result, the community income from the fishery may fluctuate greatly from one year to the next. The Southern Indian Lake Fishermen's Association may wish to consider using the funds that were received from Manitoba Hydro, as compensation, to stabilize prices. In 1988, a year of relatively high prices, the Association might have reduced the amount of compensation that it paid to its members, setting aside some funds to increase the payment in a year of lower prices. This could have four benefits for the community: 1) It would help to stabilize the cash income to the community from the fishery; 2) Accepting the assumption that there is a relationship between the commercial fishery and the subsistence benefits to the community, a stabilized commercial fishery will promote a more stable supply of fish and moose for domestic consumption; 3) Stabilized fish prices may also maintain a consistent participation rate in the fishery on a year to year basis. This may stabilize the annual flow of UIC benefits into the community; 4) It will help to maintain social stability in the community.

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Appendix A QUESTIONNAIRE TEXT

Fishing Expenses

Please indicate the stations you delivered fish to and the time you spent fishing.

Station	Date Started	Approximate No. of Lifts	Approx days spent before & after preparing Equipment

Labour Expenses

Please list the names of the people you had work for you. Please include members of your family even if you did not pay them.

Name	Date Started	Date Finished	Payment (Share % or Wages per wk.	Total Wages Paid.
1) _____				
2) _____				
3) _____				
4) _____				

Do You Have A Partner? Yes _____ No _____

(If Yes:) Name: _____

Address: _____

Please describe your sharing arrangement:

	Your %	Partner's %
1) Catch	_____	_____
2) Expenses	_____	_____
(or describe if not applicable:)	_____	_____

Do you sell all the fish you catch under your name or do you sell your partners share under his name?

Do you frequently share a boat with another fisherman to bring
in your catch? Yes _____ No _____ Comments _____

How many hours a day to you usually spend fishing? _____

How many days do you fish? Early Season _____
Late Season _____

General Expenses (Purchased during the 1988 fishing season)

"Which of the following items were not purchased from FFMC?"

<u>Description</u>	<u>Amount</u>	<u>Approximate Cost</u>
Oil	_____ litres	\$ _____
Gasoline	_____ litres	\$ _____
Diesel Fuel	_____ litres	\$ _____
Aviation Fuel	_____ litres	\$ _____
Kerosene	_____ litres	\$ _____
Propane	_____ kg	\$ _____
Transmission Oil	_____ litres	\$ _____
Antifreeze	_____ litres	\$ _____
Gillnet Mesh	_____ yards/metres	\$ _____
Floats	_____	\$ _____
Leads	_____	\$ _____
Lead Core Line	_____ yds or lbs	\$ _____
Seaming Twine	_____ lbs or kg	\$ _____
Rope	_____ metres	\$ _____
Sideline	_____ metres	\$ _____
Tarp	_____	\$ _____
Paint	_____ gallons	\$ _____
Shovels	_____	\$ _____
Chisels	_____	\$ _____
Jiggers	_____	\$ _____
Axes	_____	\$ _____
Saws	_____	\$ _____
Plastic Tubs	_____	\$ _____
Fish Boxes	_____	\$ _____
Net Trays	_____	\$ _____
Buoys	_____	\$ _____
Flags	_____	\$ _____
Mitts	_____ (pairs)	\$ _____
Gloves	_____ (pairs)	\$ _____
Boots	_____ (pairs)	\$ _____
Oilers	_____	\$ _____
Parkas	_____	\$ _____
Socks	_____ (pairs)	\$ _____
Knives	_____	\$ _____
Fire Extinguishers	_____	\$ _____
Life Jackets	_____	\$ _____
Food	_____	\$ _____

Boat Insurance		\$ _____
Fishing Insurance		\$ _____
Radio Licence		\$ _____
Spark Plugs	_____	\$ _____
Points and Condensers	_____	\$ _____
Oil Filters	_____	\$ _____
Fiberglass (For repairs)	_____	\$ _____
Gas Filters	_____	\$ _____
Batteries (Marine)	_____	\$ _____
Ice	_____	\$ _____
Others:		\$ _____
_____	_____	\$ _____
_____	_____	\$ _____

Maintenance and Repair Expenses

"Please List Repairs and Parts Purchased"

Repair	Parts Cost	Labour cost	Total Cost
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Financing Expenses

Have you borrowed money to finance your fishing operation?

Yes _____, No _____.

If "Yes":

Original Amount Borrowed _____

Interest Rate _____

Date Loan Started Month _____ Year _____

Number of Years to Repay _____

Number of Payments Required Per Year _____

Who Provided the Loan?

Bank	_____
Family/Relatives	_____
Fishermens' Assoc	_____
Other	_____

Equipment Inventory**Type of Boat**

"Whitefish Boat" _____ Yawl (Inboard/outboard) _____
 "Bow Picker" _____ Yawl (Outboard) _____
 Skiff _____ Canoe _____
 Other _____

Boat Details

Name of Boat _____
 Name of Manufacturer _____
 Address of Manuf. _____
 M.O.T. Registration # _____
 Date of Manufacture _____ 19____
 Date Purchased _____ 19____
 Length _____
 Width _____

Hull Construction

Steel _____ Wood Planks _____ Fiberglass _____ Plywood _____
 Other _____

Outboard Engines

Make _____	HP _____	Model Year _____
Make _____	HP _____	Model Year _____
Make _____	HP _____	Model Year _____

How many years do you expect your outboard motor to last you for fishing? _____ years.

Do you own, rent, or borrow this boat?

Own _____ Rent _____ Borrow _____

If rented: Do you rent:

Boat only _____ Motor(s) _____ Boat and Motor _____

Boat, Motor, and Equipment _____

Please indicate:

Name of Owner _____
 Address of Owner _____

Amount of Rent, or, if you share your catch and/or expenses with the owner, please indicate.

\$ _____ Your Percentage Owner's Percentage

1) Catch _____

2) Expenses _____

If the catch is shared with the boat owner: Do you sell all of the fish yourself, or do you sell the owner's percentage of the catch under his name? _____

Fishing Equipment

Gillnets	Mesh Size	Twine Size	Depth in Meshes	Length (yards)	Number
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Is lead core line used on the nets? _____

On how many nets is it used? _____

Item Description	Quantity	Approximate Cost (each)
_____	_____	_____
Depth Sounder	_____	_____
Fish Finder	_____	_____
Plastic Fish Tubs	_____	_____
Steel Net Anchors	_____	_____
Buoys	_____	_____
Chains	_____	_____
Boat Anchors	_____	_____
Life Jackets	_____	_____
Fire Extinguishers	_____	_____
Tents	_____	_____
Sleeping Bags	_____	_____
Stoves	_____	_____
Coolers	_____	_____
Lanterns	_____	_____
Others:	_____	_____
_____	_____	_____
_____	_____	_____

How many nets do you normally lift and set in a normal day?
_____ liftsHow many open water fishing seasons do you expect your nets to last?
_____ seasonsDo you, or have you ever fished the inland lakes? _____
_____Were you a registered trapper during the past year? _____
How much did you get for your furs? _____

Did you hunt in the past year? _____

What months of the year did your family eat wild meat other than
fish? _____Did you fish commercially during the past winter? _____
If yes: On what lakes did you fish? _____

Appendix B
1988 FISH PRICES FOR SOUTHERN INDIAN LAKE

Species	Grade	\$/Kg
Whitefish		
Export Dressed	Small (.45 - 0.7 kg)	.412
	Med (.70 - 1.4 kg)	.792
	Large (1.4 - 1.8 kg)	.812
	Jumbo (over 1.8 kg)	.832
Whitefish		
Continental Dressed	Small (.45 - 0.7 kg)	.302
	Med (0.7 - 1.4 kg)	.412
	Large (1.4 - 1.8 kg)	.412
	Jumbo (over 1.8 kg)	.412
Continental Headless		.552
Whitefish		
Cutter Headless	All Sizes	.372
Pickereel		
Round	Small (.35 - 0.6 kg)	1.732
	Med (.60 - 1.6 kg)	1.952
	Large (over 1.6 kg)	1.622
Pickereel		
Belly Split	Small (.30 - .55 kg)	1.912
Pickereel		
Dressed	Med (.55 - 1.4 kg)	2.512
	Large (over 1.4 kg)	2.132
Northern Pike		
Dressed	Med (not accepted)	
	Large (1.8 - 4.1 kg)	.962
Northern Pike		
Headless	Small (.35 - 0.9 kg)	.632
	Other (over 0.9 kg)	.632

Prices FOB Leaf Rapids

Appendix C

REVENUES, COSTS AND NET INCOME OF EACH OF THE 23 FIRMS SAMPLED DURING THE 1988 SUMMER COMMERCIAL FISHING SEASON AT SOUTHERN INDIAN LAKE

Firm #:	#1	#2	#3	#4	#5	#6	#7	#8	#9
Revenue									
Sales	\$15,422	7,536	4,431	36,345	10,009	20,808	7,796	4,797	2,681
Hydro Compensation	4,722	1,876	1,010	11,010	2,638	6,770	2,026	1,925	557
Freight Subsidy	3,764	1,609	951	9,310	2,418	6,077	2,236	1,434	567
Total Revenue	\$23,908	11,021	6,392	56,665	15,065	33,655	12,058	8,156	3,805
Operating Costs									
Food and Fuel	3,399	1,815	970	8,264	3,606	5,184	3,173	1,298	1,140
Repairs	63	0	30	1,193	80	239	0	201	0
Fishing Gear	208	255	265	505	358	402	340	188	18
Hired Labour	0	400	0	2,500	0	0	900	0	0
Licenses	10	30	20	30	30	40	20	10	30
Boat Charges	2,690	0	0	5,922	0	1,907	337	0	0
Truck Charges	0	1,063	602	547	1,467	1,939	834	950	366
Ice Harvest	299	133	54	728	186	454	166	122	46
Miscellaneous	0	0	0	0	0	0	0	0	100
Total Operating Costs	6,669	3,696	1,941	19,689	5,727	10,165	5,770	2,769	1,700
Gross Operating Profit	17,239	7,325	4,451	36,976	9,338	23,490	6,288	5,387	2,105
Depreciation									
Boats	0	200	400	900	400	800	400	400	200
Motors	1,120	840	0	3,600	720	2,420	1,000	840	390
Nets	325	476	390	541	260	1,083	346	238	163
Camp Gear	125	113	0	115	130	0	120	0	0
Total Depreciation	1,570	1,629	790	5,156	1,510	4,303	1,866	1,478	753
Interest	424	94	26	635	129	273	86	0	23
Net Income	15,245	5,602	3,635	31,185	7,699	18,914	4,336	3,909	1,329

Firm #:	#10	#11	#12	#13	#14	#15	#16	#17	#18
Revenue									
Sales	1,639	3,712	15,875	12,537	30,098	9,405	3,971	8,110	8,630
Hydro Compensation	228	1,049	5,344	4,358	9,620	3,003	1,273	3,235	1,980
Freight Subsidy	373	1,073	4,467	3,683	8,209	2,797	1,146	1,906	1,874
Total Revenue	<u>2,240</u>	<u>5,834</u>	<u>25,686</u>	<u>20,578</u>	<u>47,927</u>	<u>15,205</u>	<u>6,390</u>	<u>13,351</u>	<u>12,484</u>
Operating Costs									
Food and Fuel	448	1,389	4,939	4,089	7,413	2,750	1,060	2,719	2,441
Repairs	625	0	1,008	0	42	0	0	531	966
Fishing Gear	123	253	342	210	440	94	134	263	278
Hired Labour	0	200	0	0	2,410	1,000	0	0	200
Licenses	30	20	20	20	20	30	20	40	10
Boat Charges	0	0	3,003	2,396	4,949	1,579	20	1,091	188
Truck Charges	139	631	0	41	552	519	594	289	84
Ice Harvest	17	79	334	272	622	206	83	157	153
Miscellaneous	0	0	0	0	0	0	0	0	0
Total Operating Costs	<u>1,382</u>	<u>2,572</u>	<u>9,646</u>	<u>7,028</u>	<u>16,448</u>	<u>6,178</u>	<u>1,911</u>	<u>5,090</u>	<u>4,320</u>
Gross Operating Profit	858	3,262	16,040	13,550	31,479	9,027	4,479	8,161	8,164
Depreciation									
Boats	80	0	400	400	650	500	400	400	400
Motors	0	840	1,140	1,360	2,720	1,000	1,000	100	1,860
Nets	52	368	455	433	312	650	433	390	325
Camp Gear	0	0	150	100	100	115	140	100	71
Total Depreciation	<u>132</u>	<u>1208</u>	<u>2,145</u>	<u>2,293</u>	<u>3,782</u>	<u>2,265</u>	<u>1,973</u>	<u>990</u>	<u>2,656</u>
Interest	0	44	449	248	714	719	140	99	222
Net Income	<u>726</u>	<u>2,010</u>	<u>13,446</u>	<u>11,009</u>	<u>26,983</u>	<u>6,043</u>	<u>2,366</u>	<u>7,072</u>	<u>5,286</u>

Firm #:	#19	#20	#21	#22	#23	Totals
Revenue						
Sales	4,887	5,593	12,749	8,776	4,441	\$240,248
Hydro Compensation	1,029	1,569	4,155	2,514	935	72,826
Freight Subsidy	793	1,467	3,420	2,461	846	62,881
Total Revenue	<u>6,709</u>	<u>8,629</u>	<u>20,324</u>	<u>13,751</u>	<u>6,222</u>	<u>375,955</u>
Operating Costs						
Food and Fuel	1,495	1,771	4,160	3,422	1,905	68,850
Repairs	0	40	131	50	0	5,199
Fishing Gear	102	174	107	352	121	5,532
Hired Labour	0	250	800	0	0	8,660
Licenses	20	20	20	30	20	540
Boat Charges	0	140	2,108	0	0	26,330
Truck Charges	243	746	344	1,486	587	14,023
Ice Harvest	73	110	277	185	73	4,829
Miscellaneous	200	0	0	0	0	300
Total Operating Costs	<u>2,133</u>	<u>3,251</u>	<u>7,947</u>	<u>5,525</u>	<u>2,706</u>	<u>134,263</u>
Gross Operating Profit	4,576	5,378	12,377	8,226	3,516	241,692
Depreciation						
Boats	63	125	500	400	400	8,418
Motors	250	420	1,720	880	1,000	25,220
Nets	146	217	346	606	325	8,880
Camp Gear	0	60	100	0	0	1,539
Total Depreciation	<u>459</u>	<u>822</u>	<u>2,666</u>	<u>1,886</u>	<u>1,725</u>	<u>44,057</u>
Interest	0	133	615	93	254	5,420
Net Income	<u>4,117</u>	<u>4,423</u>	<u>9,096</u>	<u>6,247</u>	<u>1,537</u>	<u>\$ 192,215</u>

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Fishing Gear	208	255	265	505	358	402	340	188	18
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Boat Charges	2,690	0	0	5,922	0	1,907	337	0	0
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