Manitoba

FIVE YEAR REPORT TO THE LEGISLATURE ON FISHERIES

YEAR ENDING 1983-84

Manitoba
Natural
Resources

Her Honour,
The Honourable Pearl McGonigal,
Lieutenant-Governor of the
Province of Manitoba.

Your Honour:

It is with a great deal of pleasure that I present to you the first Five-Year Report to the Legislature on Fisheries.

This report reviews the status of the fisheries resources in the Province for the period ending with fiscal year 1983-1984 and forecasts trends that are to be expected over the next five or so years.

Yours truly,

Original signed by

Samuel Uskiw,
Minister.

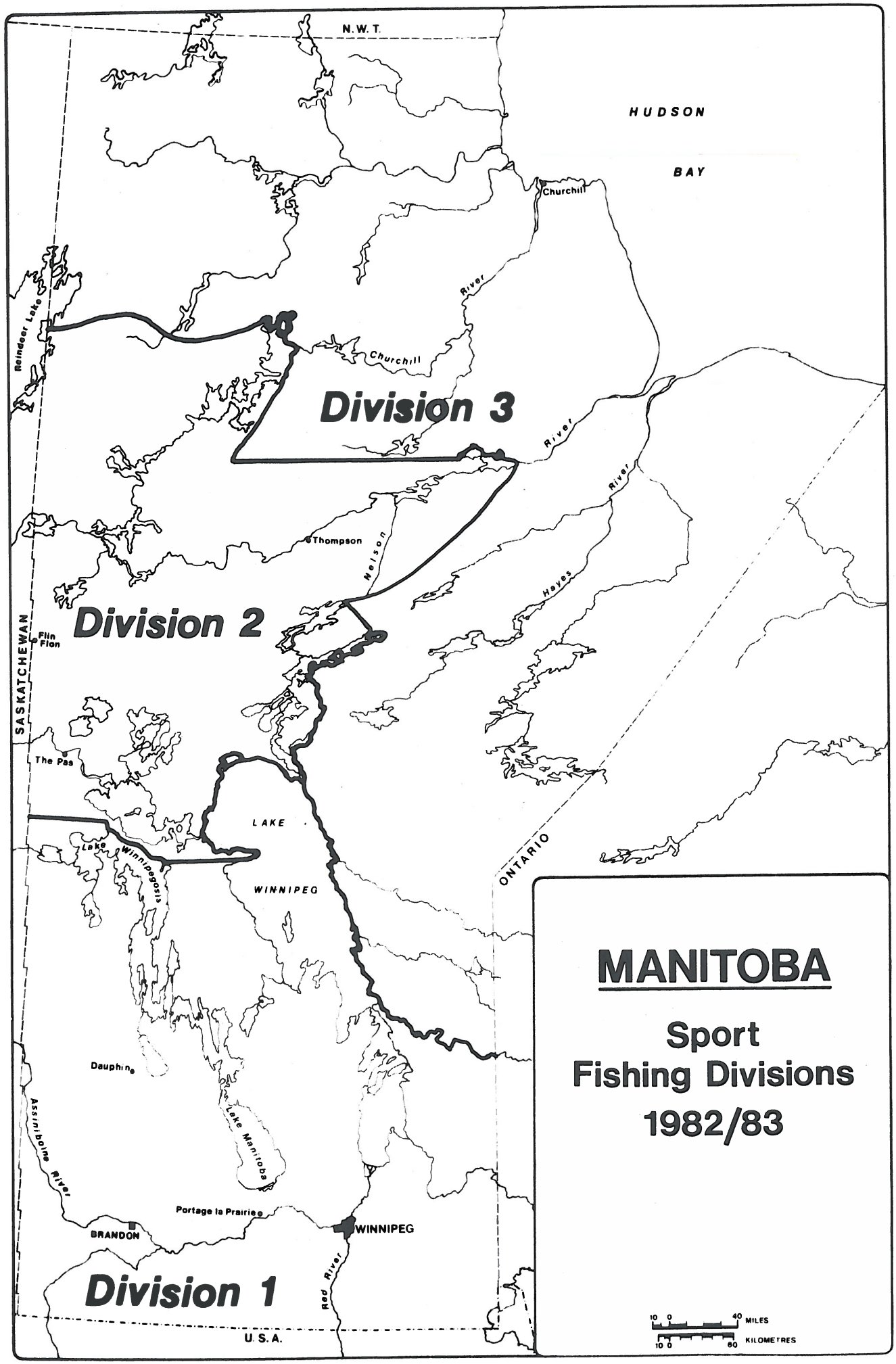

N.W.T.
HUDSON
BAY
Churchill
Churchill River
Reindeer Lake
Division 3
Churchill River
Nelson River
Hayes River
Thompson
Division 2
SASKATCHEWAN
Flin Flon
The Pas
LAKE
WINNIPEG
Lake Winnipegosis
ONTARIO
Dauphin
Lake Manitoba
Assiniboine River
Portage la Prairie
BRANDON
WINNIPEG
Red River
Division 1
U.S.A.
MANITOBA
Sport
Fishing Divisions
1982/83
10 0 40 MILES
10 0 60 KILOMETRES

TABLE OF CONTENTS

Dear Sir:

I have the honour to provide the first Five-Year Report to the Legislature on Fisheries.

Manitoba's fisheries generate more than $150 million to the provincial economy each year. They provide an invaluable recreational opportunity for one in every four Manitobans through sport fishing, support a developing tourist industry and represent an important source of income and a way of life for nearly 3,000 commercial fishermen. Less well documented, but in some locations more important, is the subsistence fishery which is traditionally important and provides income in kind.

Fisheries Branch has prepared this report. It summarizes the status of Manitoba's fisheries and forecasts trends to be expected over the next five or so years. Identified are a number of issues that must be addressed if the contribution of Manitoba's fisheries are to be maintained or improved in the future. I believe five of these issues are particularly significant and will require specific policy and management strategies.

These issues are:

1. Degradation and loss of fish habitat and resource base in southern Manitoba.

   North America is replete with other examples of this problem; the outcome of non-integrated land use management. Although the newly established Habitat Heritage Fund will help in this situation, both refined land use and development policies and co-ordination of all relevent agencies and developers are also needed. More effective approaches to soil conservation and watershed management are essential.

2. Declining economic viability of some northern and remote commercial fisheries.

   There is a general trend of decreasing profits in commercial fisheries. Costs of harvesting and delivering are increasing at a greater rate than is the price

of fish. Some of the threatened commercial fisheries are extremely important to local users as they provide one of their few sources of income. Many or most of these fisheries are already subsidized to a considerable extent by such programs as Special ARDA and the Northern Fishermen's Freight Assistance Program. For these individual fishing operations to remain even marginally viable such support must be continued and increased. The crucial issue is the ultimate limit for such support. Early policy consideration will allow both Fisheries Branch and the fishermen to prepare for a timely and orderly transition to more viable uses of the fisheries.

3. Supply/demand imbalance in southern sport fisheries.

Manitoba's population is concentrated in the southern part of the Province while our water resources are primarily north. Most habitat degradation is occurring and continues in southern Manitoba. Fish stocking programs have been one of the few techniques available to deal with this matter, although the habitat improvement and enhancement funds available through the Habitat Heritage program will also help in this regard. However, if angling quality is to be maintained, it is likely that further harvest restrictions will be required. Public education programs can play a major role.

4. Introduction of non-native fish to Manitoba.

Little more needs be said of the threat, through projects like the Garrison Diversion, to a viable fishery on such lakes as Lake Winnipeg. The potential long term negative impacts to the Lake Winnipeg fishery and other fisheries are severe. It is important to continue to protect what we have.

5. Development of tourism through sport fishing lodges.

This is clearly a growth industry with considerable potential and value. Particularly in northern Manitoba, it is a major source of resource based employment and income for local people. Further development appears to be a practical alternative to the weakening traditional commercial fisheries of the north. The maintenance of a high quality, remote angling experience is esential to future viability. Continued integration of northern residents into the existing industry must remain a priority.

Conclusion

This report represents a first attempt to establish status and trends and identify issues and potential management actions in a public document. It may be viewed as a milestone which sets the stage for future fisheries management programs. The existing Manitoba Fisheries Strategy provides the overall direction of fisheries management in the Province. The Strategy is now being expanded in the broad program areas of commercial fisheries, sport fisheries and resource enhancement to provide more definitive approaches and guidance as we address the major management issues outlined above.

Original signed by

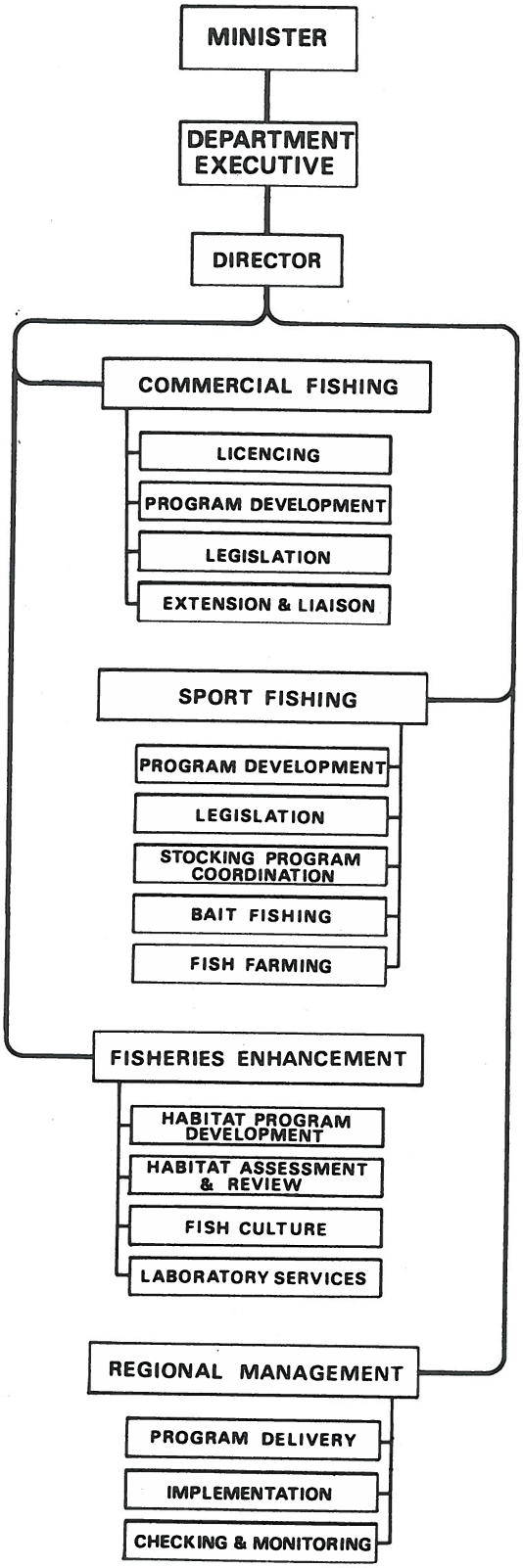
R. L. (Nick) Carter.

INTRODUCTION

As required by the Legislature, the Minister of Natural Resources is to submit a report to the Legislature regarding the administration of the fisheries resources of the Province.

The purpose of the report is to evaluate past and present use of sport and commercial fisheries, to identify the factors and issues that affect the resource, and to propose management strategies that address the major issues and concerns.

This report is organized into three major sections. The first deals with the responsibilities and management functions of the Fisheries Branch, followed by a brief description of regulations, Acts and other legislative controls. The second section deals with resource supply, harvest potential, and limitations to this potential. The final section addresses actual resource use through sport, commercial and domestic fishing.



BRANCH MANDATE AND ORGANIZATION

MANDATE

The mandate of the Fisheries Branch is to manage fishery resources to provide the greatest possible long-term benefits for Manitobans. Its programs are designed to ensure that fish stocks not only survive but remain productive enough to support sustained annual harvest by sport and commercial fishermen. Therefore, a major part of the Branch's effort is devoted to the day-to-day management of the resource. Setting harvest quotas, collecting and analyzing harvest data, and monitoring key populations are typical, ongoing management functions.

Other programs deal with biological assessment, habitat improvement, public information, fish farming, and restocking of heavily fished waters, to name a few prominent examples.

ORGANIZATION

The many programs and management functions are administered under three different sections: commercial fishing, sport fishing, and fisheries enhancement.

The **Commercial Fishing Section** is responsible for developing and maintaining a thriving commercial net fishery. It must see to it that the licencing system is kept up-to-date and is efficiently run. The Commercial Section must also represent the

Branch on various advisory boards, maintain liaison with other agencies, identify future demands and management issues and recommend programs to address them, and coordinate the development of policy and legislation that will guide commercial harvest.

The **Sport Fishing Section** oversees and develops programs to meet the demands of resident and non-resident anglers. Like the Commercial Fishing Section, Sport Fishing must establish harvest levels, set licencing policy, and deal with the myriad of issues and management strategies that affect the resource and its use. The Sport Fishing Section must also work cooperatively with user groups and other agencies and coordinate the sport fish stocking program. The Chief of Sport Fishing is responsible for bait fish and fish farming.

The main function of the **Fisheries Enhancement Section** is to plan, coordinate and implement programs to protect and improve fish habitat. Specifically, this section identifies and evaluates habitat issues, decides which are most important, then develops ways to resolve them. Effective habitat enhancement programs are based on sound research, impact assessment, and analysis of management data that in many cases are provided through a liaison with other sections of the Branch and outside agencies. The Fisheries Enhancement Section is also responsible for the provincial fish hatchery system, consisting of three seasonal and two

year-round hatcheries that supply stock for both commercial and sport fisheries.

Regional Fisheries Managers carry out most of the programs of the Branch. Each of the six fisheries managers works with all aspects of fisheries management; they are directly involved in monitoring, liaison, licencing, habitat inspection, program development, project management, resource allocation and planning for the overall management of regional fisheries.

The Regional Services Branch of the department enforces all acts and regulations pertaining to fisheries and is a valuable communication link between user groups and the department at the regional level.

LEGISLATIVE FRAMEWORK

The Department of Natural Resources administers both federal and provincial legislation with respect to fisheries.

The Federal Fisheries Act and the Manitoba Fishery Regulations made under that Act provide the legislative basis for the management and use of Manitoba's fishery resource.

Before 1930, Manitoba's fisheries were solely under the jurisdiction and control of the federal government. The Resource Transfer Agreements of 1930, an amendment to the BNA Act 1867, transferred proprietary rights to Manitoba. However, the federal government retained its exclusive

legislative control over Manitoba's fisheries. This has resulted in an overlap between the Manitoba and federal government jurisdictions, a situation that can be resolved by delegating full legislative responsibility to the Province. This, however, would require an amendment to the Constitution Act. Consequently, other approaches are now being taken to provide greater provincial authority in regulating fisheries use.

INTER-AGENCY COOPERATION

The fishery resource and its use are greatly influenced by various land uses and developments. Some of these activities have positive, beneficial effects, while others may be harmful. Since Fisheries Branch is responsible for maintaining healthy fish stocks, and for controlling and allocating their use, it is essential that the Branch work in cooperation with agencies and groups that may affect fish habitat, production or harvest. Liaison may be ongoing and formal, such as exists between Fisheries Branch and the federal fisheries department when regulations are amended, or it may be informal, as it is when the Branch deals with agricultural groups.

Liaison is necessary if conflicts between fisheries and other agencies are to be resolved or avoided, and if fishery enhancement programs are to be fully effective. Coordination with user groups is provided through meetings with local sport and commercial associations and more

regularly with commercial fishermen advisory boards. The design of various approval processes provides for required contact and liaison between the Branch and such agencies as Tourism, various Branches in the Department of Natural Resources and with the Freshwater Fish Marketing Corporation. In other cases, contact is made through third party regulatory agencies, such as the Clean Environment Commission.

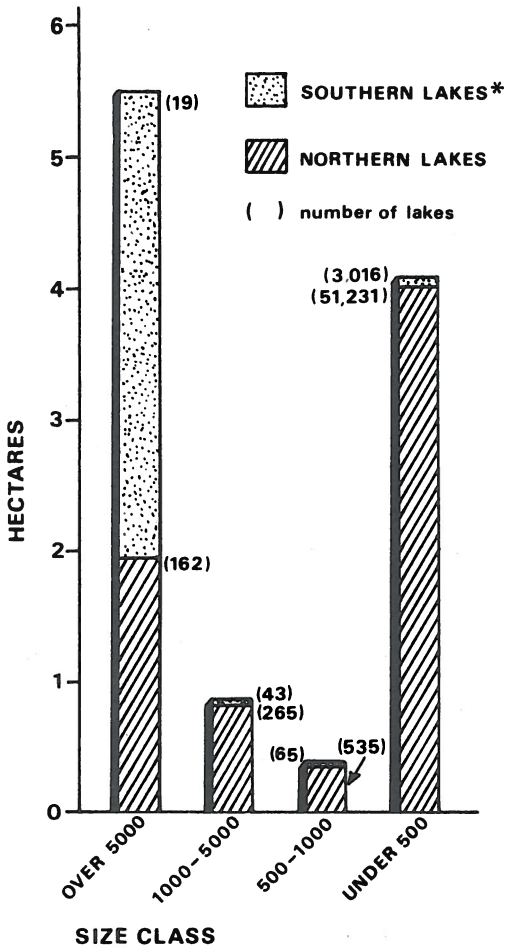
In all cases, productive co-operation depends on communication with other groups so that the needs and objectives of each participant are clearly understood. Such efforts ensure that decisions made and actions taken provide the greatest benefit for Manitoba, without jeopardizing the interests of any one group.

RESOURCE SUPPLY

This section examines the potential for fish harvest in both northern and southern areas of Manitoba and describes how land use and natural events affect habitat quality, fish production and catch. Because the report is intended to address resource problems and issues on a broad, province wide level, the discussion here will focus primarily on the general aspects of resource status and impact, rather than on the details of population structure and trends.

AVAILABLE HABITAT

Manitoba has 55,000 lakes that together cover approximately 112,000 km^2 or 17% of the province. One-third of this area (33,550 km^2) is contained within Lakes Winnipeg, Winnipegosis and Manitoba. Lake Winnipeg is the thirteenth largest freshwater lake in the world, being slightly smaller than Lake Erie. As the chart opposite shows, most of Manitoba's lakes are in the northern half of the province and are smaller than 500 hectares.

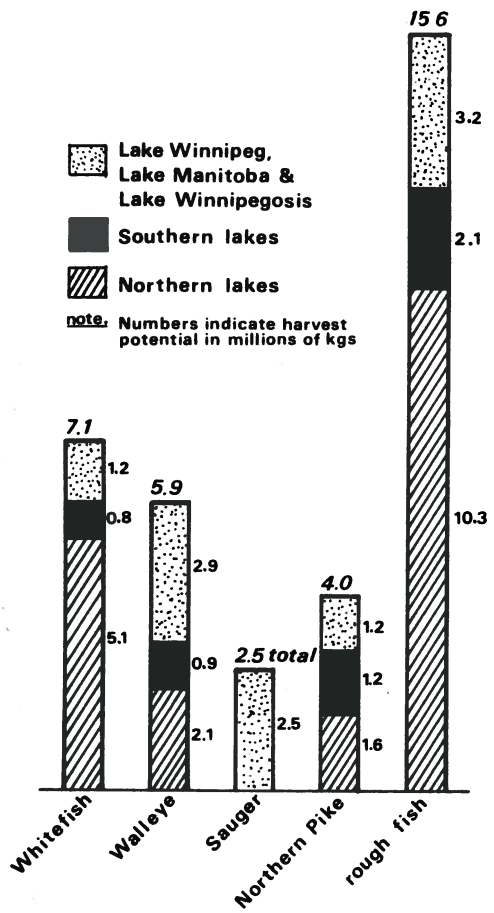


SURFACE AREA OF MANITOBA LAKES (In millions of hectares) BY SIZE CLASS.

*includes L. Winnipeg, L. Manitoba and L. Winnipegosis - total 3.34 million ha

HARVEST POTENTIAL

The capacity of a lake to produce fish depends on the shape of its basin, its average depth, and its geographical and geological setting. Long-term catch records are another measure of productivity and can be



ESTIMATED BIOLOGICAL POTENTIAL (In millions of kg's) FOR MANITOBA LAKES.

used to estimate the proportions of fish species that a lake can produce. Taken together, the physical properties and catch history for a given lake are the principle tools for estimating its fishery potential for both prime species (those managed by catch limits or quotas, such as whitefish and walleye) and less valuable species, such as suckers and carp.

Harvest potential, then, refers to the maximum number of fish that can be taken from a particular lake or region without decreasing fish productivity or depleting fish stocks. Harvest potential can be changed by creating or destroying habitat, or by improving habitat quality through management efforts. For example, most lakes enlarged through drainage controls (dams, dikes) will eventually support a larger fishery with a correspondlingly greater harvest potential. Naturally, drainage works that decrease or degrade habitat will have the opposite effect.

Manitoba's harvest potential for prime species based on habitat and catch data is approximately 20 million kilograms or 44 million pounds. The potential for coarse fish is slightly lower - about 16 million kilograms (35 million pounds). These figures are general rather than precise indicators of harvest potential, since the data used to derive them comes from relatively few "representative" lakes from each region.

One must keep in mind that estimates of harvest potential **do not** represent actual harvest, which depends as much on

social and economic factors as on biological limitations. Actual harvest can and does vary dramatically with changes in fish prices, operating costs, market demands, social pressures, and numbers of fishermen, to name some of the more prominent factors. In years when demand and prices are high and costs low, harvest can reach or even exceed a fishery's potential; in years of low prices and high costs, the catch is likely to fall far short of harvest capacity.

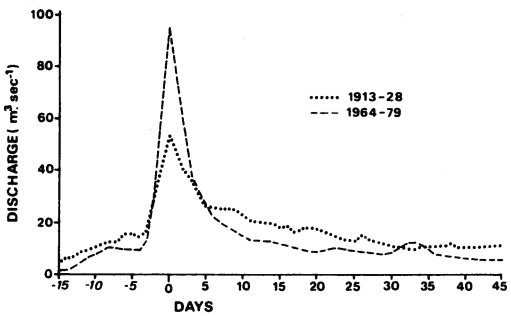
The following sections of this report discuss the various factors that limit harvest potential; later on, the report looks at past and present harvest levels, identifies harvest trends with respect to harvest potential, and outlines probable future developments for Manitoba's major fisheries.

LIMITATIONS TO POTENTIAL HARVEST

Land use and resource development have contributed to the degradation of fish habitat, which in turn has caused a decline in fish populations and harvest levels. Such problems have been most severe in southern parts of the Province, where land clearing, drainage, increased sedimentation and intensive farming practices have altered the hydrologic regime and reduced the volume of water that was in short supply at the outset.

Physical Impacts

Land Clearing and Drainage: Activities that promote soil erosion will affect fish habitat by increasing sedimentation of lakes and streams. Land clearing and drainage programs designed to improve agricultural production encourage erosion by increasing the rate of run-off along creeks and ditches. Every year, tons of topsoil exposed through cultivation and summerfallow are washed or blown from fields and eventually end up as sediment in lakes and watercourses. Livestock feeding along shores contribute to the problem by causing banks to slump and wash into downstream habitats.

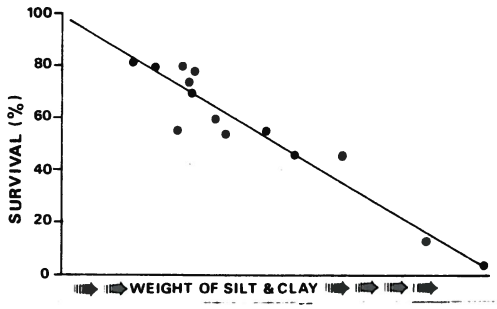


CHANGES IN THE AVERAGE DISCHARGE PATTERNS IN THE VALLEY RIVER BEFORE AND AFTER SPRING PEAK (DAY 0), 1913-1928 AND 1964-1979.

The effects of land use practices on fish habitat can be clearly illustrated by briefly reviewing agricultural development in the Dauphin Lake Watershed. Land clearing and wetland drainage over the past 55 years have profoundly affected seasonal flows in the Valley River, which drains into Dauphin Lake. Recent spring peak discharges in the Valley River were nearly double those recorded between 1913 and 1928, before land clearing had become widespread. As peak discharge volumes rose, the duration of runoff after the peak became shorter.

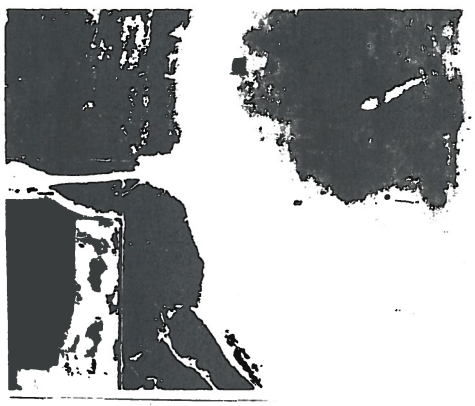
Increased sedimentation caused by accelerated runoff over cleared land together with a shorter spring flow period can have significant detrimental effects on spawning success of

fish. Sediments that accumulate on spawning areas will suffocate fish eggs. The figure opposite shows that the survival of walleye eggs on a Valley River spawning site in 1983 decreased dramatically as the weight of sediment increased. A rapid reduction in flows after spring peak discharge can also have disastrous effects on fish production by exposing eggs to air or subjecting them to wide temperature fluctuations. Fry that hatch under conditions of reduced flow may find themselves stranded near spawning areas.



EFFECT OF SILT AND CLAY DEPOSITION ON WALLEYE EGG SURVIVAL (VALLEY RIVER, 1983).

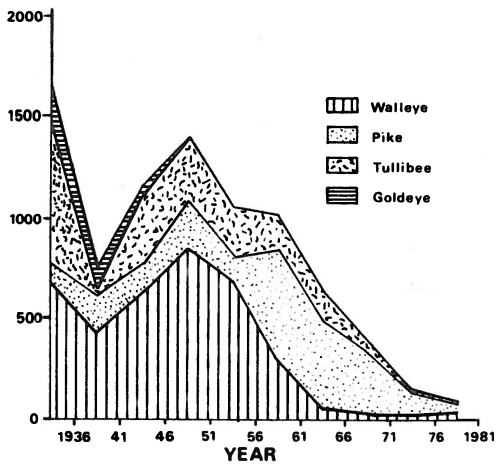
Physical alteration of streams through ditching and drainage of associated marshes destroys fish spawning sites and nursery areas and reduces food production. For example, channelization of Mink River and drainage of wetlands in headwaters of Crooked and Garrioch Creeks and Ochre River has significantly reduced spawning habitat for walleye. That ditching also promotes sedimentation can be seen in two views of the mouth of Edwards Creek, one taken in 1950, shortly after the creek was straightened, and one in 1962, by which time a sizeable delta had formed.



1950 PHOTO OF EDWARDS CREEK DRAIN JUST AFTER CONSTRUCTION.

Dauphin Lake was one of the most productive lakes in Manitoba from 1930 to 1960, but fish harvest there has declined nearly tenfold in recent years, largely as a result of sedimentation and altered stream flows. Fish such as walleye, goldeye, sauger, tullibee and whitefish have either disappeared or declined in

1962 PHOTO OF EDWARDS CREEK DRAIN SHOWING DEPOSITION OF SEDIMENT DELTA.



DAUPHIN LAKE COMMERCIAL FISH HARVEST SHOWN AS FIVE-YEAR AVERAGES, 1931-1981 (In 100's of kg's).

importance in the overall catch, while the less valuable carp and suckers are on the increase. It is important to note that the more valuable species are relatively intolerant to deteriorating habitat conditions compared with carp and suckers, which tend to thrive in muddy, weedy waters.

Although the examples presented here concern agricultural land use, similar, if somewhat less severe, problems can arise following forestry operations where cutting is permitted along streams and lakeshores.

Dams and Control Structures: Dams constructed for hydroelectric generation, water supply and flood control can significantly alter aquatic systems and fish populations upstream and downstream of the control site. Dams obstruct fish migration and spawning runs, induce changes in the structure of fish communities by turning rivers into lakes, and alter aquatic life downstream by changing water quality and flow regime.

Fish passage structures to permit upstream migration to spawning and feeding areas are needed on many of the 522 dams registered in Manitoba. To date, only nine of these dams contain passage structures.

Hydroelectric development in the Churchill and Nelson rivers has had a major impact on northern Manitoba's fisheries resource. The quality, availability, and annual harvest of whitefish in Southern Indian

Lake have declined significantly since flooding began in 1976. Controls have severely reduced discharge levels in the lower Churchill River and associated lakes, while causing extensive flooding in the Rat River system. Flooding has been accompanied by an increase in suspended sediments and submerged and floating timber, and has produced dramatic changes in flushing rates and temperatures of the lakes.

Summer storage of water in Lake Winnipeg for winter release during peak periods of hydroelectric demand has reversed the natural flow regime in downstream lakes such as Cross Lake. Summer volumes in Cross Lake are now 49% less than before regulation. This adds up to a significant loss in fish habitat, which has had serious impacts on associated commercial and domestic fisheries. Dams on the lower Nelson River will block migrations of sea-run brook trout, which spend part of each summer in the Nelson River estuary in Hudson Bay.

On the positive side, it should be mentioned that development of reservoirs has created many new sport fisheries, particularly in southern and southwestern Manitoba where water shortages have severely limited fish habitat.

Stream Crossings: Improperly installed crossings for highways, forest access roads and winter roads can block or interfere with fish migration to upstream feeding and spawning sites. Undersized culverts, which are not

uncommon in Manitoba, increase stream flow velocities and make passage impossible for fish. Improperly designed crossings can also accelerate sedimentation of the stream bed. Although a complete list of faulty stream crossings has not been compiled, a survey of 42 crossings in northern Manitoba revealed that 19 (45%) were inadequate for fish passage. Only four road crossings in Manitoba have fishways (baffled culverts), even though many others in the Province warrant such facilities.

Many of the above problems can be avoided by using bridges or applying the guidelines noted in the report "Recommended Fish Protection Procedures for Stream Crossings in Manitoba" (Manitoba Department of Natural Resources, Fisheries Branch, Winnipeg, 1981).

Chemical Impacts

Nutrient Loading: Man has long used water to dilute concentrations of chemicals flushed into waterways. Fish-kills are common where toxic chemicals have been released into aquatic systems. Such losses, while regrettable, tend to be local and short-lived; of more widespread concern, particularly in heavily populated and farmed areas of Manitoba, is the cumulative addition of nutrients to water.

Current farming practices rely on large amounts of chemical fertilizers containing nutrients (nitrogen and phosphorous) that enrich and

pollute surface waters. Phosphorous, the most critical nutrient in this process, is absorbed in soil particles and transported to receiving waters by wind and surface run-off. Animal wastes from feedlot operations create pollution problems similar to those caused by chemical fertilizers, particularly when the feedlot is located along a streambank or lakeshore. In a survey of the Dauphin Lake drainage basin, for example, approximately 5000 cattle were counted recently in 84 feedlots bordering streams. The pollution problem caused by 5000 cattle is equivalent to a town of 60,000 people dumping raw sewage directly into the lake.

How does nutrient loading from fertilizers and livestock affect fish and fish habitat? Nutrient loading stimulates algae and vegetative growth during summer. In winter, when ice and snow reduces light penetration and thus photosynthesis, the algae and vegetation decay, a process that depletes oxygen and kills fish. Waterbodies in southern Manitoba that are rich in nutrients and are subject to extensive winterkills include the Pembina River Lakes (Rock, Pelican, and Swan), and Oak Lake, Pilot Mound, Kenton, Mary Jane, and Deloraine Reservoirs. The amount of phosphorous in Rock Lake at times is more than 2.5 times that of a typical eutrophic (i.e. nutrient rich) lake. At Boissevain Reservoir, local residents have reduced nutrient loading through bank stabilization and fencing programs and so have prevented fish winterkills to date.

Other sources of nutrients are urban and industrial sewage and organic materials that leach from flooded vegetation and soils in new reservoirs. This is the main reason why substantial algae blooms often develop in new reservoirs.

Pollution: A more serious problem in new reservoirs, since it affects human health as well as fish, is the mobilization and methylation of naturally occurring mercury in flooded soils. Mercury levels in fish have increased in all lakes flooded by the Churchill River diversion to the point where restrictions on commercial marketing of fish have had to be set on 10 of these lakes.

Synthetic chemicals found in herbicides and pesticides can be toxic to fish. Extensive fish kills from imprudent use of pesticides are uncommon; nevertheless, it is important that these chemicals be applied under rigorous controls.

Heavy metals discharged in mining wastewater and from smelters have a variety of impacts on aquatic systems. Mine tailings have high concentrations of zinc and cadmium which are toxic to fish. Airborne pollutants from smelters produce acid rain and deposit metals in lakes and streams. In low concentrations, such pollution can inhibit fish reproduction; in high concentrations, it is lethal. An example of the effects of mining effluent on a fish population can be seen at Schist Lake near Flin Flon, where fish have been

contaminated with zinc from mine tailings.

Other Factors

The preceding review has focused primarily on how land use activities, especially in the south, have reduced or degraded fish habitat and limited resource supply. An agent that affects northern fisheries is the parasite, **Triaenophorus**, which infests whitefish. Whitefish in almost 75% of northern lakes are moderately or heavily infested with this parasite which encysts in the flesh. Although **Triaenophorus** is not harmful to people, the unattractive appearance of the cysts in the fish flesh greatly reduces the commercial value of the catch. Therefore commercial fisheries in the north which have infestation problems frequently become uneconomic.

CONCLUSION

Land use practices, particularly those associated with agricultural development in the southern half of the Province, have had a significant, unfavourable impact on fish habitat and harvest potential. The growth of agriculture and the spread of urban development have gradually degraded natural waters by increasing sediment levels, removing valuable marshes and backwaters, and adding undesirable nutrients and pollutants. While this has been compensated to some extent by the construction of fish bearing reservoirs, the net effect is a general reduction

of fish production and harvest potential.

In northern lakes, large scale hydroelectric projects, pollution from mining and smelting operations, and economic restraints imposed by inaccessibility of fishing areas, are the factors limiting harvest potential. In addition parasite infestation by **Triaenophorus** restricts marketing of whitefish caught in many northern lakes.

If fish harvests and harvest potentials are to be improved, many of the limitations described above will have to be addressed through cooperative management efforts. Agencies participating in major land use development must recognize the effects such activity can have on aquatic habitats and take steps to minimize damage to fishery resources. Established soil and water conservation measures, properly conceived and instituted, do much to enhance fish production and harvest in predominantly agricultural regions. The additional costs that may be required initially to control nutrient-loading, sedimentation and pollution are more than repaid in long-range benefits gained from a productive, self-sustaining fishery.

Preserving and perhaps improving fishery resources need not create economic hardships for land use developers. Much can be accomplished if agencies and private groups cooperate to ensure that resource conflicts are avoided in the initial stages of land development programs.

SPORT FISHING

Sport fishing is an important economic activity in Manitoba. In 1980, an estimated 280,000 anglers fished 4.1 million days and caught 14 million fish. In the process, they spent over $105 million, of which about $45 million represents value added to or income generated in the Province. Annual sales of sport fishing licences generate revenues of about $1.4 million based on the present fee structure. This is roughly equivalent to Fisheries Branch expenditures on sport fisheries management and stocking programs.

For management and allocation purposes, sport anglers are considered in two categories: recreational anglers and commercial anglers. Recreational anglers represent about 80% of the total. These are Manitoba and other Canadian residents entitled to purchase resident licences. Commercial anglers include all non-residents of Canada and anglers staying at commercial facilities such as tourist lodges. Recreational anglers are entitled to fish all waters in the Province during open season. Allocation of fish resources to commercial angling is based on economic criteria, such as the contribution made to the provincial economy.

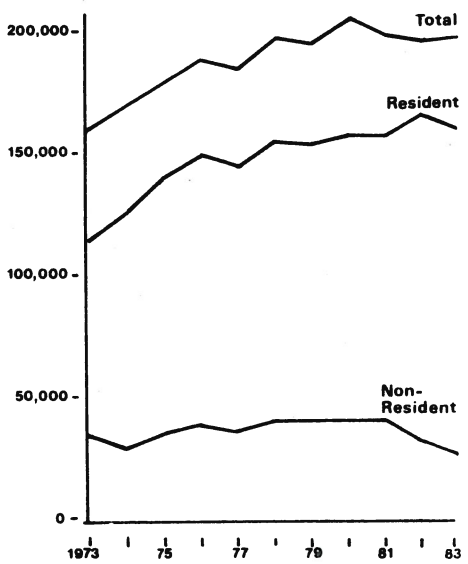
Further discussion of the sport fishing industry is presented in two parts. The first considers the present status, future trends, and management concerns of recreational sport

fishing in terms of licence sales, effort, catch and harvest, and expenditures. The second deals with Manitoba's fishing lodge industry. Throughout this discussion, reference will be made to the Province's three sport fisheries management divisions (see front cover map). Division 1 represents the southern part of the Province; Division 2 includes those parts of the north that can be reached by road, including such population centres as The Pas, Thompson, Flin Flon and Lynn Lake; and Division 3 takes in the remote north.

RECREATIONAL SPORT FISHING

Status and Trends

The following discussion is based primarily on annual licence sales and surveys conducted in 1975 and 1980.



SPORT FISH LICENCE SALES, 1973-1983.

Anglers: The trend in licence sales from 1973 to 1982 is shown opposite. Total licence sales have increased about 2% per year, from 160,000 in 1973 to around 200,000 in the early 1980's. Resident licence sales rose steadily from 130,000 in 1973 to 164,000 in 1982. Non-resident sales were less consistent; during the first three years sales increased from 30,000 to 40,000, then levelled off at about 40,000 before dropping to 32,000 in 1982. The 1982 decline was due, in part, to a substantial increase in non-resident licence fees, although the general decline in tourism that accompanied the

economic recession probably was more significant. (Both Ontario and Saskatchewan experienced declines in non-resident licence sales in 1982.) It is interesting to note that despite the poor economy and a licence fee increase, resident licences in 1982 increased by about 5000. It would appear that with the downturn in the economy, more Manitobans took up sport fishing in their own province, but fewer non-Canadians came to Manitoba to fish.

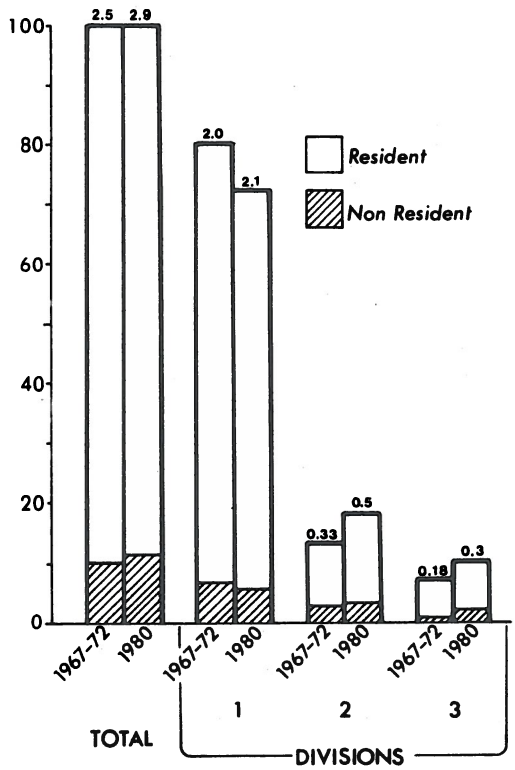
Angling effort: The effort expended by sport fishermen is measured in angler days. Total effort in 1975 was about 3.5 million angler days. In 1980, the angling effort increased 16% to approximately 4.1 million angler days.

A breakdown of relative angling effort for the three management divisions is presented opposite. Over 2 million angler days, or 72% of the total effort, was expended in Division 1 (Agro-Manitoba). This represents 74% of the resident effort and 52% of the non-resident effort in the Province.

The relative distribution of angling effort by management division is not available for 1975. However, one can get some perspective on regional trends by comparing licence questionnaire returns for 1967-72 with results of the 1980 survey. The data show a decline in effort in Division 1 and a corresponding increase in Divisions 2 and 3. This trend in part reflects road and

	Effort Angler days
1975	
Resident	2,132,000
Non-Resident	368,000
Total	2,500,000
1980	
Resident	2,575,000
Non-Resident	315,000
Total	2,890,000

EFFORT BY LICENCED ANGLERS, 1975 AND 1980.



DISTRIBUTION OF ANGLING EFFORT BY MANAGEMENT DIVISION DURING 1967-1972 AND 1980 (number in parenthesis represents effort in millions of angler days).

	Fish harvest	
	No. caught	No. kept
1975		
Resident	6,230,000	4,022,000
Non-Resident	2,137,000	931,000
Total	8,367,000	4,953,000
1980		
Resident	8,221,000	4,615,000
Non-Resident	2,472,000	967,000
Total	10,693,000	5,582,000

FISH HARVEST BY LICENCED ANGLERS, 1975 AND 1980.

	1975	
Species	Percent of catch	Percent released
Walleye	34	37
Pike	32	55
Lake Trout	2	39
Smallmouth Bass	2	32
Rainbow Trout	1	27
Brook Trout	1	23
Other	28	47
Total	100	41

	1980	
Species	Percent of catch	Percent released
Walleye	33	41
Pike	39	62
Lake Trout	3	61
Smallmouth Bass	2	76
Rainbow Trout	1	47
Brook Trout	1	46
Other	21	49
Total	100	48

SPECIES COMPOSITION OF CATCH AND PERCENT RELEASED.

community development in northern Manitoba, which has improved access to fishing areas. The proportion of resident/non-resident effort in Division 1 did not change appreciably from 1967-72 to 1980; in Division 3, however, the non-resident effort had increased significantly with respect to resident angling effort. Unlike the increase in Division 2, which is influenced by road development and the tendency among non-resident anglers to fish the new hotspot at road's end, the trend in the remote north (Division 3) is largely due to the development and expansion of the lodge industry since the late 1960's.

Harvest: Harvest data from 1975 and 1980 surveys show that the number of fish caught rose from 8.4 million in 1975 to 10.7 million in 1980, a 28% increase (upper table). Walleye and pike, the most popular species, represented 60-70% of the catch. While the actual numbers of fish kept went up 12% in 1980 (from 4.9 to 5.6 million) the proportion of the catch kept dropped by 7%. This is more clearly demonstrated in the catch and release data. In 1975, 41% of fish caught were released versus 48% in 1980. The lower table indicates a high rate of release of all species in the sample. The Master Angler program administered by the Department of Business Development and Tourism initiated an award program in 1980 for trophy fish that were caught and released. The number of trophy fish released has gradually increased over the past three years.

Manitoba anglers appear to release a larger portion of their catch (48%) than their counterparts in Ontario (35%) and Saskatchewan (32%).

The proportions of fish caught and released in Manitoba vary from only 38% in Division 1 to 56% and 72% in Divisions 2 and 3, respectively. This is not only a reflection of better fishing in the north, but of high quality management schemes (reduced limits and one trophy-only policies) adopted by many lodge operators in Divisions 2 and 3.

In general, the trend towards catch-and-release fishing reflects the growing awareness among anglers that the resource base is limited and should be conserved. To encourage such trends, Fisheries Branch has actively promoted the use of barbless hooks and other programs that encourage anglers to limit their fish kill.

Angling Quality: The vast majority of angler effort and sport fish harvest takes place in Division 1. A first order comparison of angling quality, measured in fish caught per angling day, is substantially lower in Division 1 (2.6 fish per day) than in Divisions 2 and 3 (6.2 and 5.0 respectively). To put these catch rates into perspective, past angler questionnaires indicate that the perception of angling quality is influenced by the success anglers experience; however the minimum expectation is about two to three fish per angler day. For a common pike-walleye fishery, anglers lose interest when catch rates drop

below 0.2-0.3 fish per angler hour. Some lakes, including many intensively fished lakes in Whiteshell Provincial Park, fall in this category.

	Expenditures $ million
1975	
Resident	56.7
Non-Resident	11.5
Total	68.2
1980	
Resident	86.1
Non-Resident	19.3
Total	105.4

EXPENDITURES BY LICENCED ANGLERS, 1975 AND 1980.

Expenditures: The sport fisheries of Manitoba generate a significant amount of money for the provincial economy. Total expenditures by anglers increased from $68.2 million in 1975 to $105.4 million in 1980. Non-resident spending increased by 68% versus 52% for residents. Resident anglers spent significantly more (61%) on major purchases such as boats and gear, than on day-to-day expenses (37%). These trends reflect a general increase in the amount of leisure time and disposable income, the emergence of the more knowledgeable, better equipped angler who is willing to spend more on sport fishing, and the rapid development of the lodge industry in the Province.

Future Trends and Concerns

Trend analysis for the period 1975-80 indicates more anglers (up 12%), are spending more time (up 16%) and money (up 55%) on sport fishing in Manitoba. Although anglers are catching more fish (up 28%), the total harvest has increased only 12%, because fishermen are releasing a greater portion of their catch.

	1980	1985	1990
Licenced anglers	200	221	243
Effort (man days)	2,900	3,400	3,900
Fish harvest			
Number caught	10,700	13,700	17,500
Number kept	5,600	6,300	7,000
Total Expenditures($)	105,000	163,000	253,000

PROJECTED LICENCE SALES, EFFORT, CATCH, AND EXPENDITURES FOR LICENCED ANGLERS BASED ON 1975-80 TRENDS (In 1,000's).

Projections of licence sales, effort, catch and expenditures based on the above trends are provided opposite. In view of the restrained economy over the

past several years, the projections for 1985 may be too high. However, resident angling activity does not seem overly sensitive to economic factors, and the tourist market should recover quickly once the economy improves. There is little if any resource surplus in Division 1. Even under the most optimistic scenario, assuming enhancement efforts such as habitat rehabilitation and stocking programs are successful, there is little chance that habitat loss and deterioration can be reversed or totally offset. Therefore, angler demand can be expected to exceed resource supply in the near future.

Although the quality of angling is high in Divisions 2 and 3, steps must be taken to ensure that angling quality will not decline significantly in the future. High quality angling along with some trophy fishing is essential if the road-accessible north (Division 2) is to maintain, and perhaps improve, its status as a tourist destination. Road building activities associated with forestry and mining operations are likely to create additional drive-in angling opportunities. But, even though anglers in Division 2 release 56% of their catch, they are the Province's greatest consumers of fish, keeping 2.7 fish per day, versus 1.6 and 1.4 fish per day in Divisions 1 and 2, respectively. The availability of high quality angling and trophy fishing in Division 3 is essential to the survival and future success of the lodge industry in Manitoba.

	Total Industry
Number of establishments	106
Number of beds[1]	4,112
Number of lodges accessible by road/rail/boat	79
air	27
Number of lodges owned by Manitobans	97
Other Canadians	1
Non-Canadians	8
Number of employees[2] (including owner and family)	856
Paid employees	684
Salaries ($)	2,067,500
Revenue ($)	11,836,500

SUMMARY OF MANITOBA'S LODGE INDUSTRY FOR 1981.

[1]Includes outcamp beds.
[2]Low estimate - no data for lodges on the east side of Lake Winnipeg

	Division 1	Division 2	Division 3
Number of establishments	50	31	25
Number of beds[1]	2,076	1,121	915
Number of lodges accessible by road rail/boat	50	29	0
air	0	2	24
Number of lodges owned by Manitobans	50	27	20
Other Canadians	0	1	0
Non-Canadians	0	6	3
Number of employees (including owner and family)	243	257	356
Paid employees	144	199	341
Salaries	349,100	484,900	1,233,500
Revenue	4,272,400	2,711,100	4,853,000
Average revenue/lodge	85,500	87,500	194,100

SUMMARY OF MANITOBA's LODGE INDUSTRY BY DIVISION FOR 1981.

[1]Includes outcamp beds.

Management objectives for the three divisions are as follows:
- Maintain the existing (1980) level of angling opportunities in Division 1.
- Maintain high quality drive-in and fly-in fishing as well as some trophy fishing, in Division 2;
- Maintain a high quality wilderness and trophy fishery in Division 3.

The management strategies are similar in each Division in that they seek to promote lower resource consumption through public education and regulation. The Branch recognizes that catch-and-release fishing is imperfect, since it causes some mortality, and that changes in angling gear and methods may be required in the future to reduce such losses.

COMMERCIAL SPORT FISHING

Status

There are 106 licenced lodges, 85 outcamps, and over 160 boat caches involved in commercial sport fishing activity in Manitoba. In 1981, the lodge industry generated gross revenues of $11.8 million and employed 856 people (table opposite) based on the results of a comprehensive lodge survey conducted in 1982/83. The lodge industry in 1981 realized approxiamtely 247,000 guest days.

As the table opposite shows, 79, or 74%, of Manitoba's 106 lodges are accessible by road. Most of these, representing about a third of the entire industry, are located in the

Whiteshell and Nopiming Parks. The majority of Manitoba's remote lodges (64%), lie east and northeast of Lake Winnipeg (all lodges in Division 3 are considered remote).

About 90% of lodges in Manitoba are owned by Manitoba residents, with 8% owned by Americans and 2% by other Canadians.

Remote lodges operating in Division 3 hire more employees per lodge (13.6) than road-accessible lodges (2.8) in Divisions 1 and 2, and account for 61% of the industry payroll. Lodge owners in Divisions 1 and 2 employ more family members than those in Division 3.

Lodges in Division 3 generated about 42% of the gross industry revenue. Remote establishments took in more revenue ($201,300 per lodge) than road-accessible lodges ($84,700 per lodge) in the Province.

An estimated 29% (9,700) of the 32,000 non-resident anglers who purchased seasonal angling licences during 1980 stayed at a lodge or fishing camp, while 31% (10,000) stayed in a tent or trailer. Each lodge angler spent an average of $872 in Manitoba, whereas campers spent $373. Similar trends in spending were noted for three-day non-Canadian licence holders: campers each spent $324; lodge guests spent $493.

To evaluate how the lodge industry has changed in northern Manitoba (Division 2 and 3), data from 1973 and 1981 (table opposite) were

	1973	1981
Number of establishments	48	56
Number of beds[1]	1,574	2,036
Occupancy	43%	32%
Accessibility		
road/rail/boat	28	29
air	20	27
Ownership		
Manitoba	45	47
Other Canadians	0	1
Non-Canadians	3	8
Employees		
(includes owner and family)	519	613
Paid employees	464	540
Full time	180	339
Part time	284	201
Salaries	181,521	1,718,400
Revenue	1,301,975	7,564,100

SUMMARY OF MANITOBA'S NORTHERN LODGE INDUSTRY FOR 1973 AND 1981, DIVISIONS 2 AND 3.

[1]Includes outcamp beds.

compared. Over the past 8 years, eight new remote lodges and associated outcamps providing 348 additional beds were developed, all in Division 3. The number of paid employees has increased moderately from 464 to 540; however, the ratio of full time to part time employees has increased significantly. Salaries and revenues have gone up by nine and six times, respectively, over the 10-year period.

The future of the high-priced remote lodge industry depends on two critical factors: 1) The availability of trophy fish and 2) The ability to provide a wilderness experience. Both government and industry have recognized this, a fact that has been reflected in fisheries management practices and policies over the past five to 10 years.

Government has been applying lake capacity guidelines in an attempt to match the level of development and investment to the size and value of the resource. Lodge operators are given long term commercial access rights to the resource, but are expected to meet performance standards in terms of occupancy, employment, and local benefits. Department cottaging guidelines allow remote cottage development on lakes where the resource base is too small for commercial development (200 ha. lakes in eastern and 500 ha. lakes in northern regions) and on lakes that otherwise have limited potential for such development. The process works both ways, in that cottage development is not allowed on large remote lakes with commercial potential.

Manitoba lodge operators have been leaders in resource conservation programs. They recognize the fragile nature of the trophy fisheries in the north, and, realizing that their investment is not very portable, have voluntarily applied a one-trophy-only policy and have reduced harvest. Over the past several years a one-trophy-only regulation for major species has been implemented throughout the Province. In addition, reduced limits have been applied to many lodge and outcamp lakes. One operator is experimenting with a no-fish-kill policy on a trophy pike outcamp lake.

Future Trends

Commercial sport fishing is a growth industry in Manitoba and has potential for future expansion. In Division 1, the resource supply is limited and the potential for significant new lodge development geared primarily towards sport fishing is not high. Management programs for Division 1 will attempt to maintain and enhance existing commercial operations oriented primarily towards the family vacation market.

Division 2 has a long established commercial sport fishing industry. Major lakes presently have high levels of development and investment and the future viability of some in terms of solely commercial sport fishing operations is in doubt. For lodges serviced by roads, the trend will likely be towards market diversification where recreational activities

other than fishing will become increasingly important. The resource base for existing fly in lodges in Division 2 is not large. Their future viability as high quality angling establishments will depend on resource conservation practices and the extent to which their resource base can be expanded by developing outcamps and boat caches on outlying lakes.

The large resource base required for major new lodge development does not exist in Division 2; however, there is some potential for developing and upgrading boat caches and outcamps for fly-out sport fishing, and for wilderness river canoeing/outfitting operations.

In Division 3, the major allocation of sport fish resources is to large, American Plan lodges. Fisheries in the area east of Lake Winnipeg generally receive heavier use than those in the mid-north and far north. While lodge accommodations east of Lake Winnipeg are less expensive and attract more anglers, the quality of angling tends to be lower than in the north. This situation will likely continue, although a few operators are starting to show an interest in high quality management and resource conservation programs.

There is some potential for additional lodge development in the mid and far north, but fisheries in most cases will first have to be reallocated from commercial net fishing. Fisheries Branch estimates that 6 to 12 lakes, each with a

fishery capable of supporting a 25-30 bed lodge, could be developed in the future. The rate at which development takes place will depend, in part, on market demand, which is expected to grow moderately over the next few years.

The high cost of moving large numbers of people over large distances in the far north will require construction of airstrips and use of larger wheel-equipped airplanes. Five lodges in Division 3 now have private airstrips, while an additional four use public airstrips. The idea of a central lodge with an airstrip servicing outlying camps and caches is growing more popular in the north and likely will become widespread in the future.

CONCLUSION

Recreational sport fishing is on the rise in Manitoba, both in terms of numbers of anglers and fish harvested. The total annual catch by the 250,000 or so anglers that fish in Manitoba rose from 8.4 million fish in 1975 to 10.7 million in 1980, with walleye and pike representing about 65% of the total. While the catch has increased, the proportion of fish kept has decreased, indicating anglers are realizing that conserving fishery resources is crucial if the quality of sport fishing is to remain high.

Although most recreational angling takes place in the southern third of the province (Division 1), the quality of angling in that region, expressed in fish caught per angling day, is substantially lower than in Divisions 2 and 3 to the north.

The current trend, in which recreational anglers, on average, are spending more time and money and catching more fish in Manitoba each year is likely to continue over the next 5-6 years. Because Division 1 is being fished at or near its current harvest capacity, most of the projected increase will take place in Divisions 2 and 3.

The 106 licenced lodges involved in Manitoba's commercial sport fishery currently provide 247,000 guest days, generate $11.8 million in gross revenue, and directly employ 856 people. About 74% of the lodges are in Division 1, which is accessible by road.

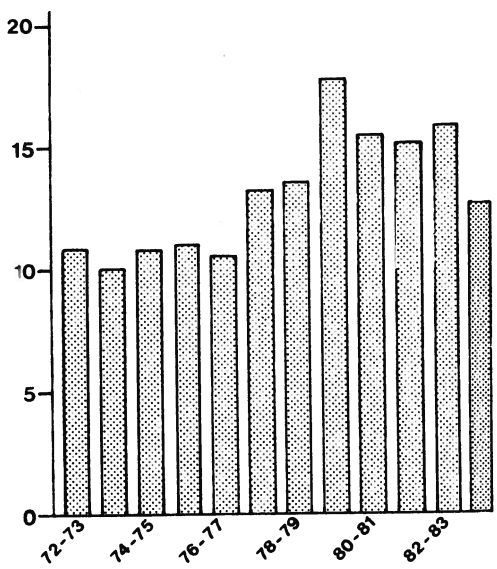
As with the recreational sport fishery, Manitoba's lodge industry has grown over the past 10 years, reflected by increased revenues from $1.4 to $5.1 million in northern lodges alone.

Fisheries Branch anticipates that commercial sport fishing will continue to thrive as long as it provides high-quality trophy fishing in a wilderness setting. Future growth is anticipated in Divisions 2 and 3, particularly if operators

are willing to provide greater variety in recreational experience. The opportunities for growth in the north, of course, will also depend on the future allocation of resources in Manitoba's commercial net fishery.

COMMERCIAL FISHING

Commercial fishing has been an important economic activity in Manitoba since the late 1800's and has played a significant role in the Province's development ever since. The industry at first was confined to the major lakes -- Winnipeg, Manitoba, Winnipegosis -- but soon spread north as rail and road networks expanded. Today, commercial fishing provides both income and a way of life for nearly 3,000 Manitobans. Fishing takes place in all seasons with each fisherman's yearly catch governed by lake quotas set by Fisheries Branch. Catches are first delivered to packing sheds then transferred to the Freshwater Fish Marketing Corporation (FFMC), which processes them for sale to provincial, national and international markets. Established in 1969 as a Federal Crown Corporation to replace the many private fish companies then buying and exporting fish, FFMC has the exclusive right to market fish caught commercially in Manitoba, Saskatchewan, Alberta, Northwest Territories, and Northwestern Ontario. Between 80% and 90% of the fish caught in Manitoba are exported to markets outside Canada.



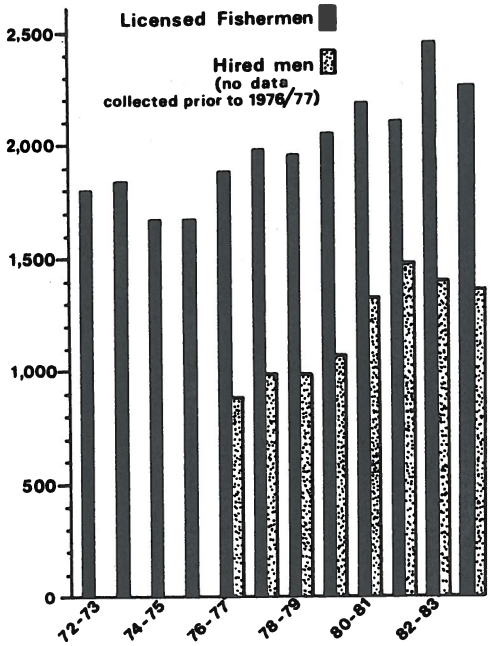
TOTAL COMMERCIAL HARVEST IN MANITOBA (In millions of kg's), 1972/73 - 1983/84.

The size of the annual commercial harvest in Manitoba has fluctuated widely over the past 40 years, from a low of 7.5 million kg in 1970/71 to nearly 18 million kg during the war years (1940 to 1945) and in 1979/80. Since 1980, the catch

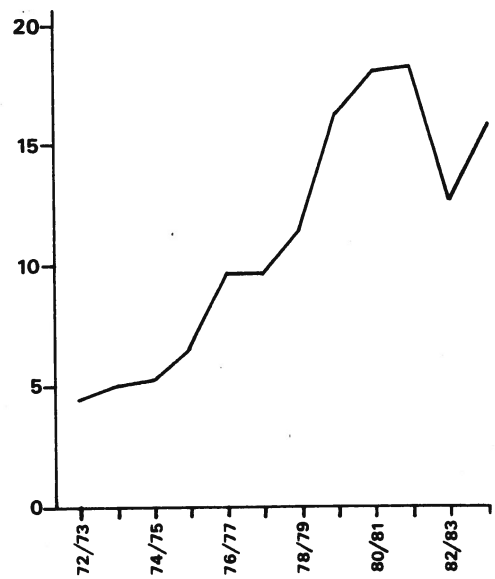
has levelled off at about 15 million kg per year.

The number of licenced commercial fishermen reflects the pattern of harvest. From 1972/73 to 1982/83, the number of fishermen licenced each year ranged from 1684 (1975/76) to 2459 (1982/83) and averaged 1800. Many licenced fishermen hire assistants to help set and lift nets. In 1982/83, for example, there were 1389 hired men working in the fishery. The industry also employs people to handle, process, and market the product as it comes off the lake - about 425 people were so employed in 1982/83.

Gross revenues of fishermen have increased dramatically in the last decade, going from $4.5 million in 1972/73 to a high of $18.5 million in 1981/82. The added income provided by processing and marketing comes to $16.5 million annually, bringing the total direct revenue generated by commercial fishing in Manitoba to more than $35 million.



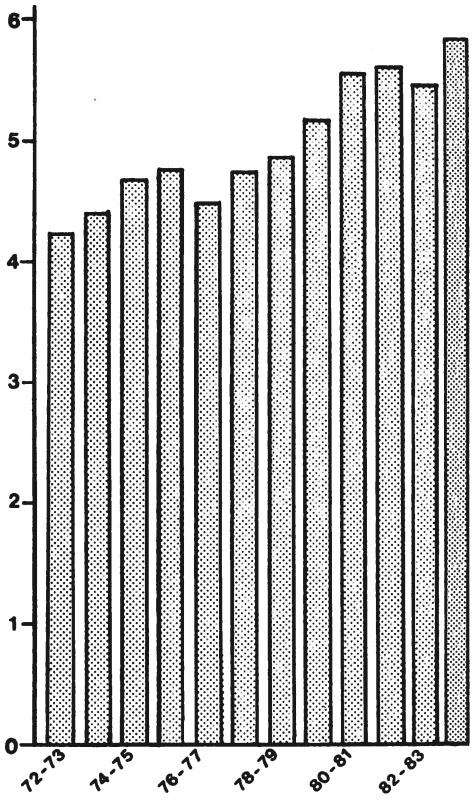
LICENCED COMMERCIAL FISHERMEN AND HIRED MEN IN MANITOBA, 1972/73 - 1983/84.



TOTAL LANDED VALUE OF MANITOBA COMMERCIAL HARVEST (In million's of $), 1972/73 - 1983/84.

STATUS AND TRENDS

Manitoba's commercial fishery has been divided into three categories to help clarify resource situations and concerns. The first is Lake Winnipeg, which supports a fishery large and complex enough to warrant separate treatment; the second includes other major lakes (Manitoba, Winnipegosis, Cedar); the third deals with northern lakes.



COMMERCIAL HARVEST FROM LAKE WINNIPEG (in millions of kg's), FOR ALL SPECIES, 1972/73 - 1983/84.

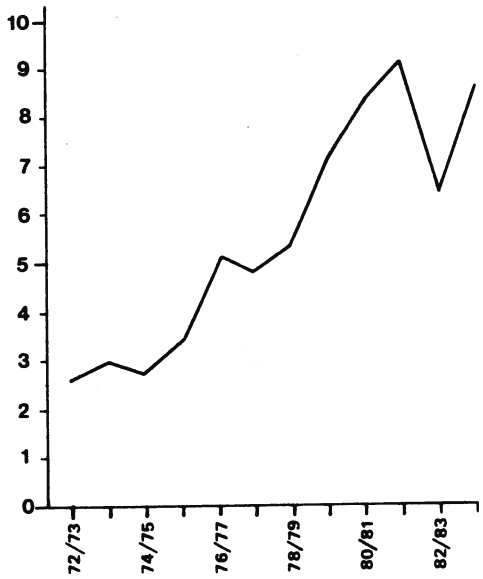
Lake Winnipeg

Harvest: Lake Winnipeg has been fished commercially for the past 100 years and is, by far, the most complex and significant fishery in Manitoba. The lake was closed to commercial fishing for the 1970/71 and 1971/72 seasons due to mercury contamination. Since the fishery re-opened in 1972/73, Lake Winnipeg, on average, has contributed 38% of the total annual commercial fish harvest in Manitoba. Although catches declined from 9 million kg in 1940 to 2.5 million kg in 1969, they have increased steadily since 1972/73. Current annual production has averaged 5.2 million kg, which equals the long term annual production figures from before 1970.

The species composition of the harvest has not changed significantly in recent times, with whitefish accounting for 27%, walleye for 34%, sauger for 27%, and pike for 7% of the catch. Changes, when they have occurred, have been attributed to variations in the availability and price of different species.

Participants: Through most of the 1970's, the number of licences held steady at 1230, then was raised to 1300 after the 1980/81 season. The number of fishermen and hired men increased proportionally as more licences became available. By 1983/84, Lake Winnipeg supported 861 licenced fishermen (many are licenced for more than one season) who employed 293 helpers.

Value: Since 1972/73, Lake Winnipeg has contributed 43 to 58% of the annual harvest value of all provincial commercial fisheries. The value of the Lake Winnipeg commercial harvest has risen from $3.4 million in 1975/76 to a high of $9.0 million in 1981/82, because of increasing prices and catches.



LANDED VALUE OF LAKE WINNIPEG HARVESTS (In millions of $), 1972/73 - 1983/84.

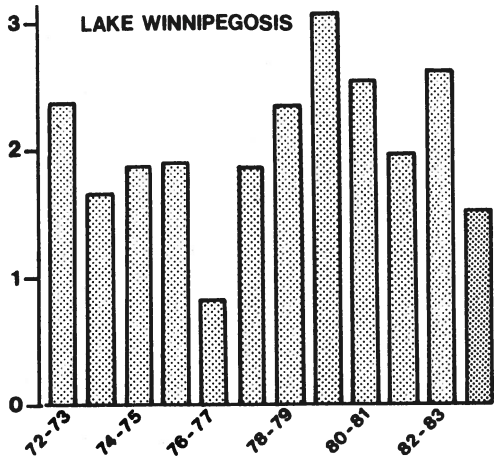
Other Major Lakes (Winnipegosis, Manitoba, Cedar)

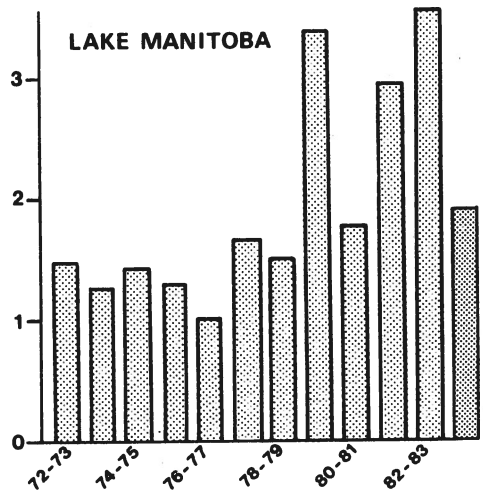
Harvest: Lake Winnipegosis harvests have been subject to large fluctuations. Since 1975/76, the total catch has ranged from 0.8 million kg to 3.1 million kg, with walleye harvests varying between 0.16 million kg and 0.33 million kg. This represents a substantial decline from earlier years (1946/47 to 1966/67), when walleye catches consistently exceeded 0.45 million kg and in 1955/56 reached the 1.0 million kg mark.

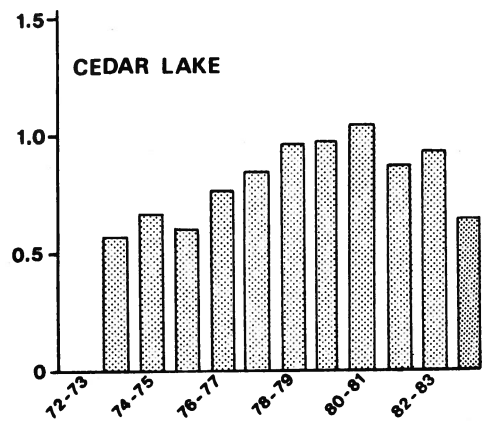
The fish most commonly harvested in Lake Winnipegosis today is mullet, accounting for approximately 50% of the annual catch, followed by pike and walleye.

Lake Manitoba harvests are also subject to fluctuation. In recent years (1975/76-1983/84), harvests have varied between 0.81 and 3.06 million kg, with mullet contributing 50% of the catch in most years. Walleye production has been as high as 0.70 million kg, and as low as 0.17 million kg. The same fluctuating trend applied to sauger (0.06 to 0.27 million kg) and pike (0.1 to 0.6 million kg).

Unlike Lakes Manitoba and Winnipegosis, harvest levels at







COMMERCIAL HARVEST (in millions of kg's), FOR ALL SPECIES, 1972/73 - 1983/84.

Cedar Lake have been increasing steadily, from 0.6 million kg in 1975/76 to 1.05 million kg in 1980/81.

The composition of Cedar Lake harvests also differs from that of Lakes Manitoba and Winnipegosis. Before 1981, pike was the prominent species harvested. Since then walleye have become more important and now account for about 50% of the annual harvest. Whitefish and tullibee make up the remainder of the commercial catch and are harvested in approximately equal volumes.

The large, unpredictable annual variations in harvest that characterize the Lake Manitoba and Winnipegosis fisheries are believed to be due primarily to periodic over-harvest and changes in demand (i.e. prices). Both lakes have been fished commercially for over 80 years, often with few restraints or controls, and this may have depleted walleye and pike populations. It appears that fish populations are recovering from past over-harvest; however, the size and structure of these populations remains uncertain. Harvest has also been influenced by fish prices, alternate employment opportunities, number of fishermen, and the strength of mullet markets.

Cedar Lake, on the other hand, is a relatively new fishery, having been fished commercially for only 40 years. In addition, Cedar Lake has been part of a hydroelectric reservoir since 1964, which has increased the lake area by nearly 100%.

Except for a period (1970/71-1972/73) when the lake was closed because of mercury contamination, the allowable harvest has been increasing, based on periodic stock assessments.

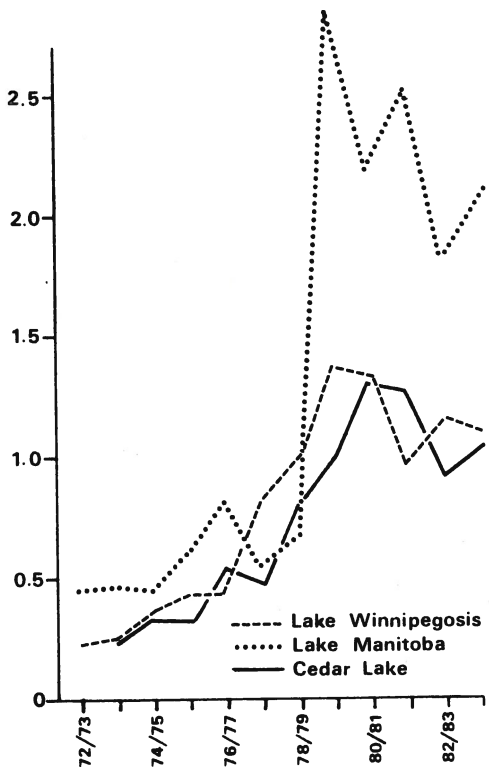
Other reasons for Cedar Lake's viability include the limitation on the number of fishermen participating and the abundance of high-value, marketable species. These factors have made Cedar Lake a more productive fishery than Lakes Manitoba and Winnipegosis.

Participants: Since 1977, the number of licenced fishermen on Lake Winnipegosis has been restricted to 48 in summer and 140 in winter. During 1983/84, the fishery supported 147 licenced fishermen (48 summer, 99 winter) and 227 hired men (132 summer, 95 winter), This represents an increase of 34 licence holders since 1980/81 which probably reflects a scarcity of other income opportunities.

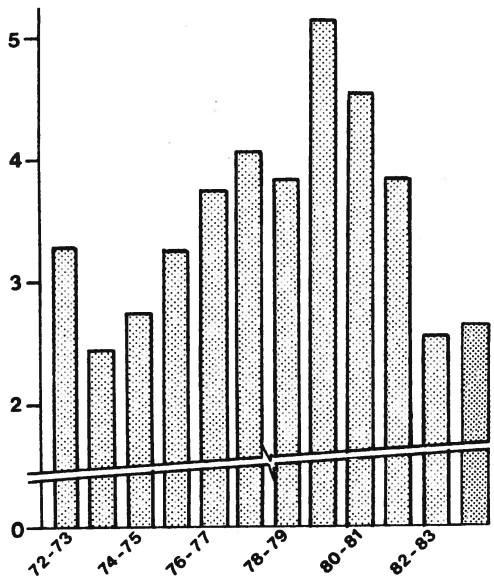
The Lake Manitoba fishery has followed a similar pattern, with the number of licenced fishermen increasing from 420 to 568 between 1980/81 and 1982/83. On Lake Manitoba, commercial fishing is permitted only in the winter.

The Cedar Lake fishery has been limited to 80 licencees since 1976/77, but the number of hired men has varied between 29 and 59.

Value: The gross values of fish taken from Lakes Manitoba, Winnipegosis and Cedar have generally increased since 1975/76.



LANDED VALUES OF COMMERCIAL HARVESTS (In millions of $), 1972/73 - 1983/84.



COMMERCIAL HARVEST FROM NORTHERN LAKES (In millions of kg's), FOR ALL SPECIES, 1972/73 - 1983/84.

The increase in harvest value from Lake Winnipegosis is due largely to steadily rising walleye prices which have compensated for the decline in walleye catches since the 1960's.

The harvest value from Lake Manitoba has risen 400% since 1975/76. This is attributable to rising prices and harvest volumes for walleye and sauger. Similar increases on Cedar Lake are the result of higher catches and increasing prices for walleye and pike.

All three fisheries rely primarily upon walleye for revenues. This is best illustrated on Lake Winnipegosis where between 1975/76 and 1983/84 walleye accounted for only 9% to 20% of the fish harvested but approximately 50% of total revenues. Thus, the gross values of these fisheries are very sensitive to changes in either walleye prices or quantities.

Northern Manitoba Lakes

Harvest: The annual commercial fish harvest from northern lakes has fluctuatd from 2.4 million kg in 1973/74 to 5.2 million kg in 1979/80.

Whitefish has comprised 48% of the harvest, with walleye and pike providing 23% and 20% respectively. Between 1980/81 and 1981/82, whitefish production dropped 40% while walleye production rose 20%.

Such changes are attributed to:

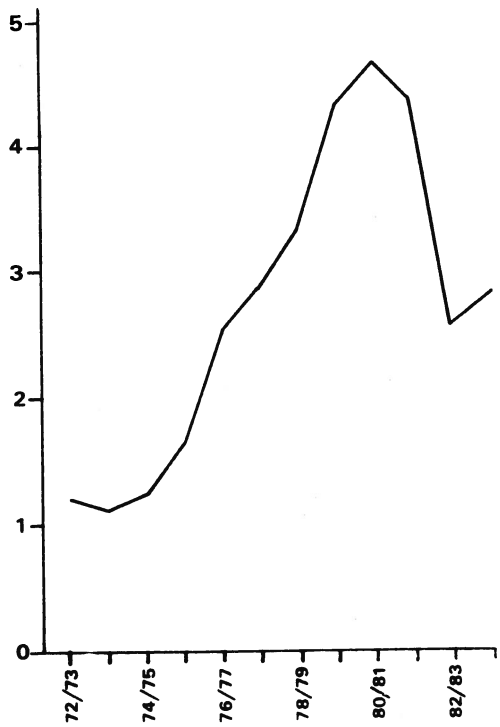
(1) Changes in fish prices;
(2) Changes in production costs and;
(3) Support programs.

Although it is difficult to say how each of these factors has influenced annual production, fish prices and production costs appear to be the most significant.

Participants: The number of individuals licenced to fish northern lakes has varied over the past several years from 841 to 990, but has remained relatively constant since 1981/82. The number of hired men has fluctuated from 163 to 376.

Many of the northern commercial fisheries are centred around smaller communities. The commercial fishery has provided employment in areas which traditionally have been economically depressed and where alternative employment opportunities are limited. In many instances, the commercial fishery is a major source of earned income for communities.

Value: From 1971/72 to 1979/80, the value of the commercial catch increased steadily from $1.2 million to $4.6 million primarily because of rising walleye prices. Since 1979/80, the value has declined to $2.8 million. Although walleye make up only 23% of the catch, versus 48% for whitefish they contribute 53% of the total revenue, versus 31% for whitefish.



LANDED VALUE OF COMMERCIAL HARVESTS FROM NORTHERN LAKES (In millions of $), 1972/73 - 1983/84.

ECONOMIC PERFORMANCE

Since commercial fishing is an economic endeavour, it is essential, in the long term that it be profitable on an individual basis. This section evaluates the economic viability of commercial fisheries by using the net revenue equation, where net revenue equals fish harvest times price per pound less harvest and transportation costs.

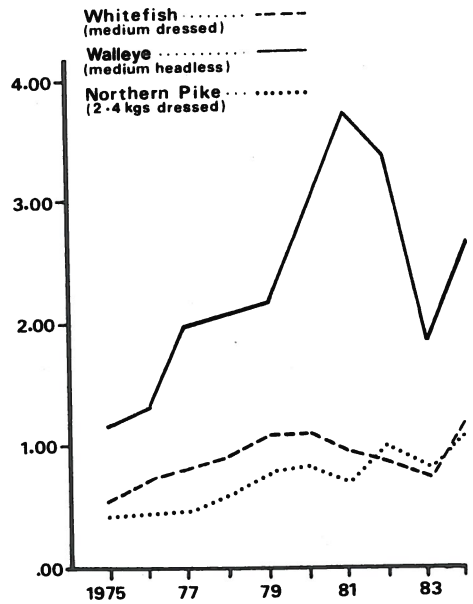
The **amount harvested** ultimately is limited by a lake's biological capacity to produce fish. This capacity is reflected in the harvest quotas established for each fishery by Fisheries Branch. Quotas may be adjusted to accommodate competing users (sport and domestic fishermen) or to compensate for increases or decreases of fish stocks. In any given year a number of other factors - weather, other employment opportunities, fish prices - also affect the size of the catch.

The price paid to fishermen is set by FFMC according to schedules established at the start of the fishing season. Walleye and sauger have been the premium-priced species although whitefish and northern pike also provide relatively high returns. Lower prices are paid for other commercial species; sometimes low prices make it unprofitable for fishermen to deliver lower valued species to market. FFMC price schedules, of course are primarily influenced by the consumer market. The price to

fishermen is usually set at 80% of the anticipated total price to fishermen, which, if sales are as predicted, allows a final payment to fishermen at the end of the year.

Prices for walleye have increased and fluctuated considerably in recent years - whitefish and pike prices less so.

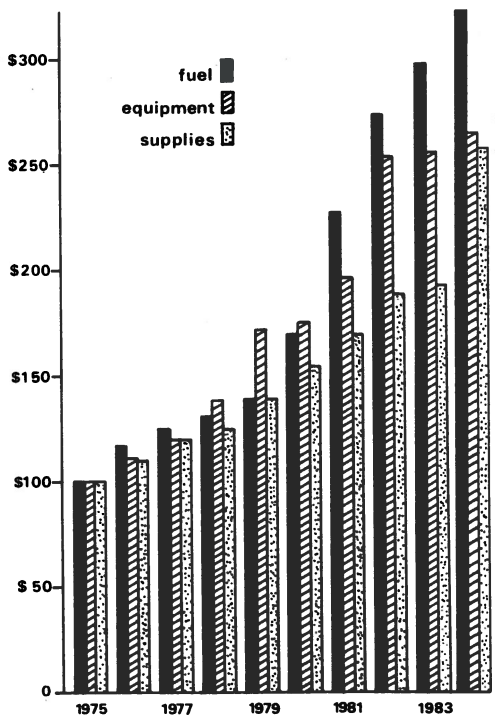
The price changes outlined opposite reflect such factors as market competition from other fisheries, changing consumer preferences, processing and handling costs, and national and international economic conditions. To get the greatest return from their efforts, fishermen try to catch as many higher valued fish as possible and seek larger quotas to increase revenues.



PRICES PAID FOR MAJOR SPECIES, F.O.B. WINNIPEG ($ per kg), 1975-1984.

The main cost items facing commercial fishermen are equipment (purchase and maintenance), operating supplies, fuel, and transportation/delivery expenses.

Since 1975, fuel and equipment costs have increased 173% and 124% respectively, while supplies have increased by 86%. All commercial fishermen have experienced these changes, which are largely driven by inflation but not all have been affected to the same degree. Fishermen who can use skiffs rather than large boats and who do not have to travel far to reach their nets or deliver their catch, are less affected by the increase in operating costs.



INDEX OF LEADING COST FACTORS AFFECTING COMMERCIAL FISHERIES, 1975-1984.

The following analysis examines the economic performance of the three main categories of

fisheries, identifies social and cultural factors that influence economic return, and offers an economic forecast for the next 3-5 years.

Lake Winnipeg Fishery

For many years the Lake Winnipeg fishery has operated under a system of restricted entry and individual quotas - a system that encourages co-operation rather than competition between fishermen. Recent quota increases have allowed many fishermen to improve their income when walleye and sauger prices were high (1980-82) and to accomodate seasons when prices were lower or in decline (1982-83).

Since 1979, all areas of Lake Winnipeg have received increases in quotas, with Grand Rapids, Poplar/Big Black River, and Sturgeon Bay getting the largest increases. In Grand Rapids and Popular/Big Black River, quota increases significantly improved the viability of these fisheries. The economic benefits to Sturgeon Bay were somewhat different because the quota increase was distributed among 46 new entrants to the fishery.

Quota increases combined with individual quota regulation has permitted Lake Winnipeg fishermen to expand or maintain revenues and exert some control over production costs, thus slowing the rate at which profits are being reduced by costs.

The North End whitefish fishery on Lake Winnipeg is unique. This fishery includes 44 licenced fishermen, each with a 15,900 kg quota. Large (40'-60') boats, which are expensive to own and operate, are used to harvest quotas. Restrained whitefish prices have had a negative impact on this fishery, which has remained profitable only because it is currently productive and can be harvested quickly at relatively low unit costs. Based on present equipment costs, it is doubtful whether this fishery will remain profitable in the future.

The economic future of the Lake Winnipeg fishery as a whole depends upon three key factors.

The first is the ability of the resource to sustain annual harvest at current levels. Current harvest levels are near maximum sustainable limits and the prospect for increasing quotas appears limited.

Fish prices are the second factor that will determine the future economic well-being of Lake Winnipeg fisheries. Price increases for walleye and sauger will help fishermen maintain their current economic status. Whitefish prices, on the other hand, are not likely to increase significantly over the next five years, which means the economy of the North End whitefish fleet will continue to decline. Profits will become smaller as operating costs increase, and fishermen who have to replace vessels and equipment may find it difficult to recover their investment.

The third factor influencing the future economy of the Lake Winnipeg fishery has to do with the possible re-allocation of individual quotas. The economic health of the walleye-sauger and whitefish fisheries can be improved if quotas are re-assigned to better match each fisherman's need for income. Implementation of such a provision would provide fishermen with a greater ability to adjust to changing economic conditions and help them keep their operations on a sound economic footing.

Other Major Fisheries

The economic success of fishing operations on **Lake Winnipegosis** is limited by the fishery's how harvest yield. Although walleye is the target species for the open water fishery, it comprised only 9% of the total catch. The importance of mullet and pike catches in sustaining this fishery cannot be under-estimated, and, in fact, have become more economically significant in recent years.

Since 1981, fluctuating walleye prices and a decline in walleye catches have reduced the value of the Lake Winnipegosis fishery to the point where it may not be profitable. This problem cannot be overcome by increasing quota since walleye stocks are at a point where biological production is less than allowable quotas.

The future of the Lake Winnipegosis commercial fishery depends upon rehabilitation of the resource base. Given the

current levels of harvest, prices and costs, this fishery is of doubtful or, at best, marginal viability in the short run. In the long run, under an effective rehabilitation program, Lake Winnipegosis has the potential to support a profitable and significant commercial fishery.

The **Lake Manitoba** walleye/ sauger harvest has been double that of Lake Winnipegosis in recent years, however, it is subject to uncertainties that might jeopardize its economic well being. As a winter-only fishery, Lake Manitoba incurs higher operating costs than open water fisheries, however, these costs are partially offset by winter prices, which are traditionally higher than those in summer.

Catches of mullet and pike help sustain this fishery especially when walleye and sauger harvests are low. The importance of mullet, however, is almost entirely dependant on markets, which, unfortunately, are not annually dependable.

The major constraint to future improvement of the Lake Manitoba fishery is the increasing competition for a share of fluctuating walleye/ sauger harvests. As new fishermen enter the fishery, established fishermen must increase their effort and spending in order to stay even. Increasing entry, then, places an economic burden on existing fishermen, increases the pressure on fish populations, and therefore detracts from the value of the fishery as a whole. The economic value of this fishery could be improved

substantially by placing realistic limits on the number of fishermen participating.

Cedar Lake is a unique commercial fishery in Manitoba in that both its resource base and harvest have increased in recent years. Fishermen also benefit from relatively valuable catches of whitefish, pike and tullibee.

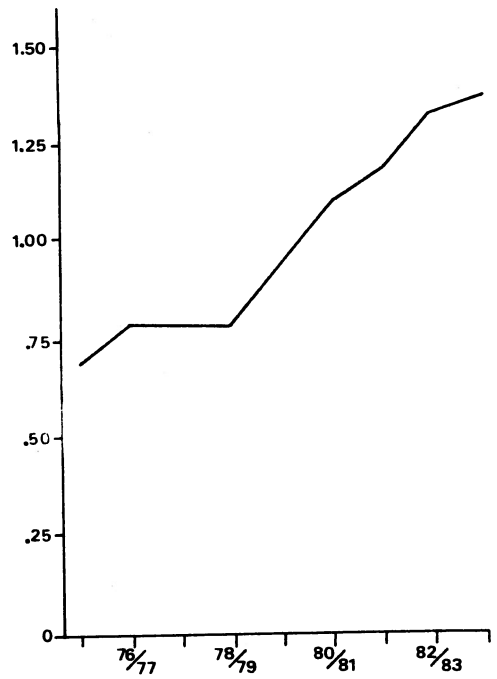
The number of fishermen on Cedar Lake is restricted to 80, protecting the fishery from uncontrolled entry of fishermen. In 1982 Cedar Lake fishermen also adopted a system of individual quotas where each fisherman receives rights to a share of the annual harvest, thereby enabling him to reduce harvest costs. In other words, the individual quota system eliminates the often wasteful and expensive need to compete for a share of the harvest.

Three factors - increased productivity and harvest, restricted entry, and individual quotas - are largely responsible for Cedar Lake's economically healthy fishery. Compared to Lakes Winnipegosis and Manitoba, the economic outlook for Cedar Lake is good. The resource base appears capable of sustaining current annual harvest levels in the future. This, combined with the way the fishery has been organized, will help mitigate increasing operating costs. It should be noted, however, that the option of further increasing quotas to offset declining profits has likely been exhausted. Fishermen will have to control fishing costs closely to maintain income.

Northern Fisheries

The northern fisheries are not homogeneous. At one end of the spectrum are community-based fisheries where social objectives(i.e. providing a maximum number of employment opportunities) have a higher priority than purely economic objectives. At the other end are the business-oriented fisheries operated by small numbers of individuals who often command large quotas and look after packing and transporting the catch themselves.

Because northern fisheries are remote from markets and centres of supply, transportation costs have a major impact on them. In many areas, equipment, fuel and supplies have to be flown in and the fish flown out to rail or roadheads. Air transportation is the most expensive method of moving fish, and flying costs are increasing significantly.



AIR TRANSPORTATION COSTS ($ per km) BASED ON A 545 KG PAYLOAD FOR A BEAVER AIRCRAFT, 1975/76 - 1983/84.

Freight costs in northern fisheries are three times greater than in southern fisheries. Costs will have a more severe effect on community-based fisheries, because they are less flexible to adjustments in capital and operating costs.

The value of northern fisheries is also limited by lack of diversity. The major species harvested is whitefish, which are often poor in quality (and thus price) because of **Triaenophoras**. When whitefish prices are low, fishermen are often unable to compensate by concentrating greater effort

on higher-value species because they are less abundant.

The effect of increasing costs and declining prices has been most severe in remote, community-based fisheries where whitefish are the principal species harvested. The economic viability of some of these fisheries has been reduced to the point where they are unable to repay loans to MACC and FFMC. Larger, single operator fisheries have also experienced economic decline, but not to the same degree as the community-based operations.

Faced with low fish prices, relative to southern fisheries, and high operating costs, remote and semi-remote community fisheries that rely on whitefish will be hard-pressed to continue operating. Due to the traditional nature of commercial fishing and a lack of alternative employment, many fishermen are forced to accept losses or very low returns. In the long run these fisheries will be unable to continue operations without continuing or increasing subsidy support.

Larger, single-operator remote fisheries must also face the possibility of reducing profits. It is doubtful these fisheries would continue to accept operating losses for as long a period as community-based fisheries.

Northern fisheries served by roads will experience some economic decline, but should be able to continue operations over the next number of years.

The primary threat to these commercial fisheries will be competition from sport fishermen.

Should northern fisheries be diminished, the businesses that service commercial fishing in the north will certainly be affected. The support industry (packing facilities, fish stations, etc.) is designed to minimize per unit costs; if harvest production in the north decreases significantly, the unit costs for production in general must rise. This applies to virtually every aspect of support, including the FFMC plant at Transcona. Ultimately, the rising costs will be passed on to other Manitoba fisheries in the form of reduced profits. Such a possibility is greater with northern fisheries than elsewhere.

CONCLUSION

Commercial fishing is a regionally important industry, with catches marketed through the Freshwater Fish Marketing Corporation. Annual harvests have fluctuated widely over the past 40 years, ranging from 7.5 to 15 million kg; numbers of licenced fishermen have varied from 1684 to 2459. Gross revenues reached $18.5 million in 1981/82, with an additional $16.5 million generated by the processing and marketing sectors.

Lake Winnipeg is the largest and most important fishery, generating 38% of the

province's total commercial harvest and 58% of its cash value.

In general, harvest levels and total revenues have increased in the Province over the past 10-15 years; nevertheless, the future growth of most commercial fisheries is constrained by economic and productivity factors.

For most commercial fisheries, current harvest levels equal or exceed biological productivity, making future quota increases unlikely. At the same time, costs have reduced profits for some operators to the point where fishing may be marginally or submarginally viable. Cedar Lake and parts of the Lake Winnipeg fishery afford exceptions to this situation.

Northern fishing operations tend to be either community-based enterprises, where social objectives are at least as important as economic returns, or single operator, intensively managed business ventures. The current and future well-being of northern fisheries is limited by high operating and transportation costs and by a lack of high valued species.

To ensure the continuation or promote future growth of fisheries in all parts of Manitoba, measures designed to improve their efficiency will have to be instituted. Some specific areas where changes are needed are:

- -Quotas on major fisheries may have to be reallocated to better reflect the individual operator's needs.

-Increased fish prices, particularly for "subprime" fish such as mullet and tullibee would improve the viability of fisheries.

-Major rehabilitation programs are needed to rebuild depressed fisheries (particularly Lake Winnipegosis) and so increase or create operators' profits.

-The number of commercial fishermen may have to be limited where excessive competition threatens to reduce economic viability of fisheries.

DOMESTIC FISHING

Some Manitobans, particularly Treaty Indians, have historically depended on fish as an important part of their diet. This use of the resource has been recognized in various Treaties and in the Resources Transfer Act (1930).

Domestic use of fish is still important to trappers and certain native communities. Domestic fishing surveys completed during the 1970's for the Churchill-Nelson River Diversion project, and more recently at Cross Lake, indicate that the domestic use of fish varies from one community to another. Unfortunately there is no practical way to accurately measure this demand throughout Manitoba; therefore it is difficult to determine the amount of fish required for domestic use.

Domestic use is given higher priority than commercial use when allocating the fisheries resource. This is especially important for remote and semi-remote communities where residents have traditionally relied on the fishery resource as a source of food.

At present, neither commercial nor sport fishing poses a serious threat to domestic harvest, but of concern is the potential impact of major energy and resource development projects on domestic fishing areas. Continued development of water diversion and hydroelectric projects in the north, for

example, could impact domestic fisheries by disrupting fish life cycles or by impeding access to favoured fishing sites.

Because of the importance of domestic fishing and because the demand for fish from commercial and sport users is increasing, it is essential that some portion of the fisheries concerned be set aside and safeguarded for domestic use.

BAIT FISHING

Year	Number of fishermen	Number of Blocks
1974	18	89
1975	28	139
1976	31	88
1977	33	177
1978	33	204
1979	27	229
1980	n.d.	n.d.
1981	35	287
1982	40	305
1983	38	265

SUMMARY OF MANITOBA'S BAIT FISHING INDUSTRY, 1974-1983.

Year	Live bait (dozen of fish	Frozen bait (tubs)
1974	23,100	151,785
1975	26,000	169,577
1976	29,440	164,000
1977	31,250	203,735
1978	38,550	233,116
1980	n.d.	n.d.
1979	27,889	228,213
1981[1]	n.d.	n.d.
1982	n.d.	n.d.
1983	30,000[2]	240,000[2]

SUMMARY OF MANITOBA'S BAIT FISHING INDUSTRY 1974-1983.

[1] No new bait fishermen were allowed into the fishery.

[2] Production figures for 1983 rough estimates.

The capture and sale of minnows - live or frozen - is a small but relatively stable industry in terms of participation and production.

In recent years, 30-40 bait fishermen have used 250-300 bait fish blocks, generating annual licence fees of around $4,000. Annual gross revenues from the industry are estimated at $400,000.

The bulk of the production, an estimated 240,000 tubs in 1983, is in the form of frozen bait. Roughly 70% of this comes from the Red and Fairford Rivers. The harvest, sale and use of live minnows for bait is restricted to parts of Division 1 (Southern Manitoba) and involve only four commercial operations. In 1983, a moratorium which limited live bait fish operations to existing licenced operators, was placed on the live bait fish industry.

There is a fairly large turnover in the bait fishing industry from year to year; only about 10 operators have stayed in the business over the term. This turnover and entry of new operators has caused some problems of competition, since the market for frozen bait in Manitoba is relatively small and fixed. New, inexperienced operators often put up large quantities of bait (often of poor quality) which is then dumped on the market, resulting in considerable price and market instability.

TROUT FARMING

Trout farming started in Manitoba in 1968, when fisheries personnel from the federal Freshwater Institute and the Department of Natural Resources examined the feasibility of using small prairie lakes and ponds for rearing and harvesting trout. Originally it was hoped trout farming would be an additional source of income for farmers; however, because small prairie waterbodies vary widely in their ability to produce a predictable annual yield, trout farming has never fulfilled its commercial expectations.

Over the past 10 years, 260 to 400 individuals have participated in trout farming each year. Of these, 20 to 40 were licenced trout farmers, while the remainder held permits (upper table). Licenced trout farmers are those who sell their catch or use waterbodies on Crown Land; permit holders stock trout in private ponds for their own consumption or recreation. Since 1974, trout farmers have annually stocked 300,000 to over 600,000 rainbow trout fingerlings in 300 to 450 ponds.

Presently, emphasis in trout farming has shifted from its commercial to its recreational values. Although a few individuals are still involved commercially, most trout farmers raise rainbow trout as a hobby and for their own consumption or angling enjoyment.

Year	Permits	Licences	Total Participants
1974	229	32	261
1975	283	25	308
1976	239	28	267
1977	300	33	333
1978	248	26	274
1979	285	26	311
1980	370	17	387
1981	327	25*	352*
1982	313*	30	343*
1983	243	29	272

TROUT FARMING IN MANITOBA.
*Estimate.

Year	Fingerlings Stocked	Waterbodies Stocked
1974	530,000	338
1975	635,000	374
1976	465,000	325
1977	469,000	432
1978	370,000	389
1979	397,000	347
1980	359,000	447
1981	488,000	403
1982	305,000	383*
1983	320,000	299

TROUT FARMING IN MANITOBA.
*Estimate.