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A description of the Lake Winnipeg commercial fishery

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INTRODUCTION

The purpose of this manuscript report is to describe the gear, methods, and conditions of the Lake Winnipeg commercial fishery in order to supplement the reports of the scientific study which appear from time to time. It is hoped that this general description of the fishery will help the reader to understand the conditions under which the regular scientific study is conducted, and to appreciate the general trend it has taken.

There is a natural division of the Lake Winnipeg commercial fishery into two parts, an open water fishery, and a winter fishery conducted through the ice. Of the open water fishery there are four components, three of which start in the early summer and run concurrently for a time. There is a short closed season during the later summer before the start of the fall fishery. As each component fishery is more or less independent of the whole, this account deals with each in a like manner.

In all the component fisheries gill-nets are used exclusively. A similarity exists also in the various species of fish which appear in the catches. A list of these fish, together with common and local names follows:

| | <u>Accepted common name</u> | <u>Local name</u> |
|----------------------------------|-----------------------------|-------------------|
| <u>Amphiodon alosoides</u> | goldeye | goldeye |
| <u>Coregonus clupeaformis</u> | lake whitefish | whitefish |
| <u>Leucichthys</u> spp. | cisco | tullibee |
| <u>Catostomus</u> spp. * | sucker | mullet |
| Other Catostomidae (rarely sold) | - | mullet |
| <u>Cyprinus carpio</u> | carp | carp |
| <u>Ictalurus lacustris</u> | catfish | catfish |
| <u>Ameirus</u> spp. | bullhead | bullhead |
| <u>Esox lucius</u> | northern pike | jackfish |
| <u>Perca flavescens</u> | yellowperch | perch |
| <u>Stizostedion vitreum</u> | yellow walleye | pickerel |
| <u>S. canadense</u> | sauger | sauger |
| <u>Aplodinotus grunniens</u> | fresh water drum | sunfish |

The gill-net and its operation

The gill-net is like an underwater fence set to lie along a straight line at the bottom of the water. It is anchored at each end and is weighted as well at intervals along the lower margin to keep it from drifting. The upper margin is buoyed up with "corks" which are placed opposite the weights along the bottom. The margins of the net are usually light cotton rope called side lines between which hangs a "web" made from fine strong twine. A fish encountering the "web" is liable to snag

itself by its teeth, gill covers, or a fin and in the struggle to free itself it usually becomes further entangled. Webs of various sizes are used depending on what size and kind of fish the fisherman wishes to catch. In this paper all mesh sizes are stretched measure.

THE LAKE WINNIPEG SUMMER WHITEFISH FISHERY

There are 150 available licences, allotted on a seniority basis, which must be claimed regularly or the right will lapse. A licence holder is permitted to take 19,400 lbs. of whitefish and 1000 lbs. of pikeperch. The commercial whitefish fishery opens on either the first or second Monday in June and continues for 8 weeks. The fish companies generally try to obtain an extension of the fishing season, which is usually granted. This practice is not popular with the fishermen generally. Those who take advantage of the extension do so usually because they are in debt to the company and feel obligated.

Stations

The summer whitefish fishery is conducted from "stations" situated at suitable points on the lake with regard to harbour or anchorage facilities and general productivity of the fishing area. The "station" is the groups of buildings used

by the fish company. They are usually built on Crown lands, in which case a lease is obtained from the Provincial authorities.

In 1950 the fishery was conducted from the following points (the number of stations located at each point are shown): George Island, 3 stations; Big Black River (Mukatawa River), 3 stations; Berens River, 2 stations; Birch Island, 1 station; Poplar Point, 2 stations; Sandy Island, 1 station; Montreal Point, 1 station; Shoal Point, 1 station; Spider Island, 1 station; Stony Island, 1 station; and Warren's Landing, 4 stations, a total of 20 stations.

In general, a whitefish station consists of a rambling ill-kept group of frame buildings. The Hallgrimson station at Big Black River is somewhat typical of the stations. A description of this station follows:

There is a rough dock built of peeled poles on long pilings, the major part of which is occupied by a shed in which the fish are dressed. Another part of the dock is reserved for storage of oil and fuel drums. The section of the dock at which the fish are unloaded is equipped with a roller-type conveyor, which leads into the dressing shed.

The dressing shed has bins about four feet square along two end walls. The bottoms of the bins are sloped toward the interior of the building. A section of the wall above the bins is omitted so that they may be reached from the outside as

well as the inside. These bins will hold from 150 to 200 fish. Adjacent to the bins are waist high lumber tables with holes 4 inches square cut at intervals along the top. Fish are dressed on these tables and the offal is passed through the holes to containers below. A few feet behind the dressing shed and connected by another roller conveyor is a cooler.

The cooler is an insulated frame building about 24 feet by 16 feet. The sides of the building can be charged with an ice-salt mixture, which supplies the refrigeration. It is usually charged once a day in order to maintain a temperature of just above 32°F. A short distance from the cooler is an ice house. The two are connected by a gangway.

The ice house is an insulated frame building with a capacity of 200 to 300 tons. It incorporates a filling ramp built of rough poles. As a general rule the ice house is filled by a contractor. The filling begins when the ice is two feet or more in thickness. Blocks of ice about three feet long and two feet wide are cut a few yards from the ice house. Power driven circular saws are used. The blocks are pulled up the ramp by a rope and pulley system using a horse or a small tractor.

On two sides of the ice house at the Hallgrimson station, two lean-to sheds have been added. One shed is used as a store room for nonperishable grocery items and similar goods. The other shed provides a general working space and houses the machine

shop. Spare motors and spare parts are stored there. The machine shop is poorly equipped with tools.

Somewhat apart from the group of buildings just described, is a cook-house. It is a rough rectangular frame building. The mess section is furnished with two long wooden tables flanked by benches. The kitchen is equipped with a wood-burning stove, a water barrel and sundry cupboards and cook tables.

A commissary building a short distance away from the cook-house houses the company office. The commissary itself provides the variety of merchandise common in the smaller general stores seen in rural districts.

Between the commissary and the cook-house is a little shelter built to protect the lighting plant. It is a 500 watt, 6 volt D. C. outfit powered by a gasoline motor. It supplies light to the commissary and cook-house.

Some distance away from the latter group of buildings, there are three or four bunk houses. They are furnished with double deck army bunks. A small sheet iron heater is provided for use on damp days. There is an outdoor type latrine near the bunk houses. No attempt is made to exclude flies which are present in large numbers.

Boats and motors

The majority of fishermen do not own "whitefish" boats. They prefer to rent one from the company with which they deal. The rental fee of \$250.00 a season is designed to cover the cost of yearly maintenance and to provide a sort of sinking fund to replace the hull when it is worn out.

At the present time, with one exception, all the boats used in the whitefish fishery are wooden. The boats are built along similar lines. These boats average 40 feet in length overall with a beam of 10 to 12 feet. The bow is flared and the stern is square. The motor is mounted well astern of amidships.

Directly above the motor a small deckhouse is erected for shelter for the crew. The house is about 7 feet long, fore and aft, and extends laterally to the beam ends, and is about 6 feet high. The house is completely open to the stern. The forward wall of the wheelhouse is fitted with a small window. In addition there is a large door providing access to the forward deck.

The entire area forward of the deckhouse is decked in at a height of ten inches or so lower than the gunwales. Hatch covers lying flush with the deck provide access to the hold. Subdivisions of the hold are provided by small partitions. These subdivisions are referred to as "fish pockets" and are used for stowing fish.

In most boats the area astern of the deckhouse is decked in as well, but at a level one-foot or more lower than the forward deck. This area is used while setting gill-nets, for a cooking space, and as general stowage. Some boats in use on the lake are decked in at the same level fore and aft. In these, the motor is below deck and is reached by a hatch cover. Both types have similar deckhouses, but in the former cases there is considerably more room in the deckhouse, and often, one or two bunks are fitted along one wall. They are frequently hung with hinges which allow them to be folded away when not in use.

The type and make of the motors used in these boats are varied. Old automobile motors are in the majority with Packard and Studebaker of about 1930 manufacture leading in numbers. These are 8 cylinder valve-in-block motors. They provide adequate power but are not economical with fuel. Speeds of 9 to 11 m.p.h. for a fuel consumption rate of 3.5 to 5 gal./hr. are the rule. These motors must be mounted level, which requires the use of a universal joint in the propeller shaft as well as an end thrust bearing. This arrangement causes frequent trouble.

A few marine type motors are used, most common are the St. Lawrence, Gray, and Vivian. The latter is a 2 cylinder motor of obsolete design, and although dependable, it uses an excessive amount of cylinder oil, and causes the hull to vibrate unduly. The St. Lawrence and the Gray are satisfactory. The fire hazard is considerable, because all motors burn gasoline.

The nets

The regulations governing the fishing gear for the whitefish fishery permit the use of 5,000 yards of gill-net per licence, of a mesh size not less than $5\frac{1}{4}$ inches or greater than $5\frac{1}{2}$ inches.

The materials used in the gilling twine are cotton, linen, and nylon. The use of nets of 45/3 linen twine has been almost traditional. However, during recent years there was a change toward the use of 56/6 cotton, because it was cheaper. During the last two years, nylon outsold both these materials notwithstanding the fact that it was more expensive. At present, cotton has risen so sharply in price that linen now ranks second to nylon in volumes of sales.

Twine made up into gill-netting is sold by the web, according to weight. Webs are made up in four, five and six pound units. The length in yards of a web varies according to its weight, the gauge of the twine, and the width of the web. The width of a web is invariably expressed in the number of meshes "deep". To illustrate, a four pound, 56/6 cotton web 32 meshes deep, varies from 190 to 200 yards; a four and one-half pound nylon web from 180 to 190 yards. The six pound linen web, 45/3 twine, is estimated at 220 yards.

The average net used in the whitefish fishery is probably 200 yards long and 30 to 32 meshes deep.

"Hanging" a gill-net constitutes fixing the mesh between two cotton ropes which run along the lengthwise margins. The cotton ropes are called sidelines and facilitate the handling of the nets without damaging the mesh which is quite flimsy. The usual size of sideline is #132, 3 strands, medium lay. The mesh is "seamed-on" to the sideline with seaming twine. Ties are made at intervals of $10\frac{1}{2}$ inches. Four meshes of the netting are allotted to this distance. The number may vary with different fishermen, but it tends to be standard because most of the hanging is done at the net factory.

The bottom sideline of the gill-net used in the whitefish fishery is weighted with lead weights of five to six ounces each, at intervals of about six feet. These weights, called "leads", are cylindrical in shape with rounded ends. A slot extends along the length of each, large enough to receive the sideline. The slot is hammered together at each end thus enclosing the sideline at these two points.

Directly opposite each lead weight, a float called a "cork" is fixed on the top sideline. These floats are cylindrical, oil impregnated cedar blocks, about 8 inches long and 3 inches in diameter with the ends rounded. A hole drilled through each float from end to end allows a double thickness of seaming twine to pass through in order to tie it to the sideline.

Arrangement of gear

When ready for fishing the nets are packed in shallow boxes about 3 feet by $3\frac{1}{2}$ feet, with flared sides. This detail permits easier packing and emptying. One box holds three nets. The nets are joined together end to end by tying together the two "cork lines" and the two "lead lines".

Each boat fishes about 10 boxes of nets or 30 nets, more or less. For convenience, the nets are split into two gangs of 15 nets each. Each gang is fitted with a bridle at each end. A brail is usually used to keep the bridle from fouling. A rough stone, called an anchor stone, is attached to each bridle to anchor the ends of the gang. A light manila rope rises from the anchor stone to a wooden marker buoy, which has a flagstaff 15 feet tall kept vertical at the surface of the water by weights under the buoy. The flagstaffs are made usually from peeled spruce trees. They are equipped with a flag bearing the fisherman's licence number.

Setting

Before setting, the type of bottom is sampled with a sounding lead coated with laundry soap. The soap picks up a few particles by which the bottom is classified. A "hard" bottom, i.e. rock or sand is favoured earlier in the season. Later, a "soft" or mud bottom is chosen.

Setting ordinarily involves the use of four men. One man steers the boat along the course on which the nets are to be set. Another transfers the nets from the boxes to the water in such a way that they are fully spread out from top to bottom, and entirely free from snarls or tangles. This man is called the spreader. Since the net is packed with the cork-line and lead-line together in a close aggregation with the mesh, a third man called the spinner, is required to pay out the net to the spreader. The spinner gives the net a little tension between himself and the spreader. In addition he prevents the net from snagging and unwinds the cork and lead lines if need be. A fourth man is needed to bring up additional boxes of nets and to tie the end of the nets to those in the box that is being set. This allows a complete gang to be set without stopping the boat.

When the location has been selected, the skipper sets course. The spreader attaches the anchor stone and buoy line to the bridle, and throws them over the stern. He takes a stand four or five feet forward of this point and well to one side of the vessel. The spinner places his net box three or four feet forward of the spreader. He is usually seated facing the stern. As the boat moves along at $1\frac{1}{2}$ to 2 m.p.h. the spreader grasps the net at intervals along the cork-line allowing the lead to fall to the deck thus separating the bottom sideline from the top sideline. The spinner allows the net to run through the palm of one hand

meanwhile keeping a little tension on the net. His other hand is free to assist in disentangling at any point which may need it. Tangles or snarls that do not respond to this operation require stopping the boat. If this is required, a few feet of net are taken back in to reach the tangle since the boat cannot be immediately stopped.

The fourth man meanwhile is keeping the nets well soaked by pouring buckets of water over them as they lie in the boxes. This makes them easier to set. As the box being set begins to run out, the fourth man brings another box of nets from the forward deck and attaches the ends to those in the box that is being emptied. At the end of the fifth or sixth box, another anchor stone and buoy is attached to the bridle and thrown over. This amount of nets, 15 to 18, constitutes one of the usual 2 gangs of nets. The second gang is set in the same way as the first.

Lifting

The typical lifting day begins at about 4.00 a.m. with breakfast in the cookhouse. The skipper draws the day's rations from the cook while his crew gets the boat ready. Boxes of shaved ice for cooking the fish are packed in the holds.

When the first marker buoy is sighted, the forward deck is cleared for action. One man lifts the buoy into the boat while another pulls up the anchor stone. The skipper manages the boat while the three others do the lifting.

Using the motor throughout the operation, the boat is kept in such a position that the gill-nets are brought into the boat over the bow from the windward quarter. One man places a net box about amidships, just forward of the deckhouse. A second man, starting at the rail at the point of entry of the nets, grasps the cork and lead lines together, walks backward toward the net box near the deckhouse. Since the nets are anchored, this pulls the boat forward, giving the effect of the boat standing still and the nets being pulled aboard. The man at the net box arranges the roped-up nets in the box keeping the leads and corks in pairs. This is called "tailing in". The man tailing in removes the fish from the mesh. The third man takes up the position at the rail recently occupied by the second man and repeats the pulling operation. These two men alternate in a steady continuous fashion in the pulling operation. They are relieved from time to time by substituting positions with the other two men.

Meanwhile, the catch is being deposited in the holds, and the "rough" fish thrown over the side, or put in boxes above decks. We define "rough" fish as non-marketable fish of any kind.

When the lifting is completed, the gangs are either set back in the same general area or removed to another place. The size of the lift generally determines this point.

Treatment of the catch

The catch is brought home to the station as soon as possible after completion of the lift. The boat takes its turn at the unloading point and the crew unload the fish, by hand, into boxes. The boxes are pushed up the conveyors to the bins in the dressing shed.

Dressing is done usually by the four men working in pairs. One man of a pair removes a fish from the bin to the dressing table where he cuts out the gills, and slits open the belly from the anus to the gill isthmus. He passes the fish to his partner who guts and also scrapes out the kidney. Culled fish are deposited with the offal, in the hole cut in the dressing table.

The dressed fish are put into boxes which are dragged by the dock hands to a platform type scale. The weights of the fish belonging to each fisherman are recorded and credited to him. The dock hands line other boxes with paper, put in a layer of ice, and pack 50 pounds of fish to the box. They put a layer of shaved ice over them and lightly nail down the cover. The box is pushed up the conveyor to the cooler where it is stored until ready for shipment.

Shipping

Freighting vessels of 40 to 50 tons capacity, Diesel powered, are used to move the fish to the railhead, which is usually Winnipeg. Most of these vessels are comparatively old, and are quite slow. Their holds are inadequately refrigerated if at all.

In preparation for shipping, the fish are removed from the cooler and fresh ice added to the boxes. The tops are nailed down again and the boxes pushed down the conveyor to the freight vessel. Most vessels have power elevators with which to fill or empty the holds.

The vessels call at the stations on the average of about twice a week. It takes at least 36 hours to deliver the fish at the railhead. This means that about 50% of the catches are from five to six days old by the time they are unloaded from the freight boat.

The six-day fishing week

By a fishery regulation, fishermen are required to have all nets out of the water on Sunday. The original purpose of this regulation is somewhat obscure; however, it gives the fishery officers an opportunity to check the amount of gear that is being fished as well as the mesh size. More important, it gives the fisherman an opportunity to dry, repair or replace nets. It is

common practice to treat the nets with an antibiotic solution, usually copper sulphate. This is done in the following way:

The nets are removed to drying reels, about 10 feet long and 6 feet in diameter. They are either spread or "roped" on the reels for drying. As they are removed, the snarls are untangled and the nets "boxed" ready for setting. The box is then placed on a sloping chute leading to a barrel of copper sulphate solution. Buckets of solution are dipped up and poured over the nets until they are thoroughly soaked. The boxes are allowed to drain before they are stowed aboard the boats.

Financing and sales

The majority of the fishermen begin the whitefish season indebted to the company either new gear, fuel, clothing or money. This places them at a disadvantage in bargaining for a price. In fact, fishermen commonly deliver their catches without knowing what price they are getting. During recent years they have received about 20 cents a pound for their whitefish. The limit set, per licence, is 19,400 pounds of whitefish and 1,000 pounds of yellow walleye. During the past seven or eight seasons the majority did not succeed in approaching the limit. A very small number of the licence holders realized a good profit. A few more realized a fair profit. The majority either just balanced their expenditures, or lost money.

THE LAKE WINNIPEG YELLOW WALLEYE FISHERY

This account of the fishery for yellow walleye is based mainly upon observations at Loon Straits between June 6 and June 22, 1951. There is no essential difference between the Loon Straits fishery and one other observed spring yellow walleye fishery at Big Black River. Presumably there is no great difference between these two fisheries and the yellow walleye fisheries located at various other points on Lake Winnipeg.

Some regulations governing the fishery

The fishery is open only to actual residents (mainly Indians) of the areas designated as yellow walleye fishing areas.

The main area, called Channel Area, lies north of a boundary which runs due west from Observation Point, and south of a boundary which runs due west from Rabbit Point. Within this area, that portion of Fisher Bay lying south of a boundary drawn due west from the most southerly point on Matheson Island, is closed to the fishery.

In addition to the main area there are several small bays which are open to the fishery. These all lie north of the Channel Area and adjoin or overlay the whitefish fishery waters. They are: Sturgeon Bay, Warren's Landing, Big Black River, Berens River, Shoal Point, Montreal Point, Poplar Point, and Grande Rapids.

The dates of the fishery vary a little from year to year but the time allotted is about 40 days. In 1951 the fishery opened June 4 and closed July 10. Within the period, a fisherman is permitted to fish 500 yards of gill-net of a mesh size not smaller than $4\frac{1}{4}$ inches, nor larger than $4\frac{1}{2}$ inches, until he has caught an aggregate weight of yellow walleye and whitefish amounting to 2500 pounds. He is not restricted in the amount of other species which he takes as well. No means other than gill-nets is permitted to take the quota of fish.

The fishing station

Since many of the areas open to the yellow walleye fishery adjoin the whitefish fishery area, it is possible to handle the catches from both fisheries at the whitefish stations. In the Channel Area where the only open water fisheries are in the Fall and Spring, the stations are similar in layout to the whitefish station, but with smaller ice houses and coolers. A full description of the whitefish station has already been presented earlier in this report. A minor difference in the two layouts is the absence of the cook house at the yellow walleye station since the fishermen usually live at home.

The catches from the yellow walleye fishery are brought to the station and handled similarly to the catches from the whitefish fishery. The yellow walleye fishery stations are visited by the same freight boats that service the whitefish fishery.

During the 1951 spring yellow walleye fishery, the 757 fishermen holding licences produced over one million pounds of fish. The weights of the various species caught are given in Table I.

The majority of the whitefish catch is marketed with viscera and gills removed. Yellow walleye are sold round, dressed, or headless and dressed depending on various factors. Northern pike, drum, sauger, and suckers are usually sold headless and dressed, and yellow walleye are usually sold round. Not all of the species mentioned are bought at all stations, and sometimes a species will be bought for only a part of the season.

The fishing gear

As mentioned earlier, only gill-nets are permitted. They are usually arranged in gangs of from two to four hundred yards long. Most of the gill-nets are from 30 to 50 meshes deep. At Loon Straits in 1951, nylon nets were most commonly used, with cotton second and linen last.

In the Channel Area, heavy currents occur from time to time, and present a problem in anchoring the gill-nets. For this reason special iron anchors are constructed for the purpose in the following way:

Two pieces of $\frac{3}{4}$ -inch boiler plate iron, each 2 feet long and 4 inches wide, are bent in a crescent shape about the vertical

axis of the flat side. A hole is drilled in the centre of each piece to receive an eyed iron shaft about $\frac{3}{4}$ inches in diameter and $2\frac{1}{2}$ feet long. The two crescent shaped pieces lie together at the end of the shaft opposite the eye, at 90° to each other, and perpendicular to the shaft, thus forming an efficient anchoring device. Three such anchors are used on a 400 yard gang if heavy currents are known to occur. One anchor is placed at each end of the gang and the third in the middle.

The nets are usually set on the bottom in which case conventional lead weights are used on the lead line. However, sometimes the fisherman prefers to set the nets at the surface, in which case he removes one-third of the leads. If he wants to set the nets a short distance from the bottom, flat stones attached to the lead-line by long strings are substituted for the leads, after the fashion described in the account of the winter fishery given below.

Boats and motors

Since the spring yellow walleye fishery is predominately an inshore fishery small boats provide greater accessibility to the best grounds. The most popular boat is the round bottomed, keeled type, known locally as a yawl. Flat bottomed skiffs are used as well but in decreasing numbers each year. Both types are of wooden construction and usually built locally. In size the boats range from 16 to 20 feet in length, with a beam of just

over 4 feet. Practically all are powered by some kind of motor.

The most common type of motor is the outboard in the 5 to 8 horsepower group, but larger outboards--up to 22 h.p.--are becoming more popular each year. A few inboard engines are used. These range from old single cylinder water cooled models, through a variety of auto engines, to light air-cooled types of recent manufacture.

Setting the gill-nets

Although the yellow walleye fishery is primarily an inshore fishery, many fishermen in the channel area make offshore sets for whitefish. In either case the sets are similar.

Each man nearly always fishes alone which makes setting difficult for those using an outboard motor. In this case, the fisherman drops the net anchor and the marker buoy, and pays out the gill-net over the bows while drifting with the wind. Fishermen using inboard powered boats set the nets over the stern since there is nothing to obstruct the action, and they can control the direction in which the nets are set to some extent.

Lifting the nets

In order to clear the nets, the bridle is pulled up by the buoy line. The fisherman leans over the bow and pulls his boat along the net by the side lines taking out each fish as he

comes to it. Sometimes he passes the net over the bow but this is possible only if the wind and current are just right. This way of clearing the nets is called "running" the nets.

The catch is put into fish boxes and covered with a little ice. In only a few cases are the boats fitted with regular fish holds. Rough fish are either brought in to the station for mink or dog food, or thrown overboard.

At intervals the whole gang is pulled into the boat and brought to the beach for drying. The gang is roped in on a piece of burlap which makes handling easier. The nets are dried, "boxed" into an old fish box, and treated with bluestone solution before resetting. The interval at which nets are treated in this way depends upon their material. Nylon nets are dried and treated about twice a month, others every 4 or 5 days.

Some general aspects of the fishery

The spring fishery is a comparatively recent one on Lake Winnipeg, and is designed as a sort of relief measure for the Indian between the winter and fall fisheries. The Indian on Lake Winnipeg is a poor fisherman because of his rather indolent nature, and many prefer to sell their licences (illegally) to others for about \$25.00. To those who do actually fish, the profit is considerable for the small outlay required.

The existence of the fishery is resented by many whitefish fishermen for various reasons. They feel that the yellow walleye fishermen are taking the whitefish which they might otherwise harvest themselves, and, they feel penalized in being required to use a gill-net of a larger mesh size.

THE LAKE WINNIPEG SUMMER FRESHWATER DRUM FISHERY

No formal investigation of the drum fishery has yet been made. The account given here is based on data from other sources.

The drum season runs concurrently with the whitefish fishery. In 1951 the dates of the two fisheries coincided. It differs from the whitefish fishery on three major points: There is no limit on the number of available licences; there is no limit on the amount of fish which may be taken; and small boats must be used. The reason for prohibiting the use of large boats is not clear.

Like the other fisheries on the lake gill-nets are the only legal gear. A drum licence permits the use of 1500 yards of gill-nets of a mesh size of $5\frac{1}{4}$ inches. The licence is valid in all of that part of Lake Winnipeg which lies south of a line running due west from Observation Point.

The bulk of the catch is delivered to the 8 or 10 drum fishery stations but a considerable amount is landed at points available to trucks and are shipped daily to the fish companies in larger centres where they are packed.

The fishery stations are similar in construction and operation to those servicing the other open water fisheries.

No exact data are available on the way the nets are fished, but it is probably very similar to the other small-boat fisheries. The boats and motors used are similar to those in use in the fall and spring fisheries.

An examination of Table II shows that the same species of fish appear in the catches as in the spring and fall fisheries, but with a notable difference in the proportionate amounts.

THE LAKE WINNIPEG FALL FISHERY

The fall fishery on Lake Winnipeg produces about one-third of the annual catch in spite of the many problems caused by the usual bad weather at that time of year. The capital outlay is relatively small compared to the winter and summer fisheries, and therefore it attracts a large number of fishermen.

Some regulations governing the fishery

Gill-nets are the only legal fishing gear. A fisherman is allowed to fish 500 yards of net of a mesh size of either $3\frac{3}{4}$ inches or $4\frac{1}{4}$ inches depending on the area in which he chooses to fish. In the entire area south of a boundary running west from Rabbit Point, either $3\frac{3}{4}$ - or $4\frac{1}{4}$ -inch mesh may be used, but north of the boundary as far as the extreme limit of the fishing ground, mesh smaller than $4\frac{1}{4}$ inches may not be used. This northern boundary, as of 1951, runs west from Pigeon Point to the south tip of Berens Island and from there to Lynx Point.

There is no limit to the amount of fish which each fisherman may take, nor is there any limit on the number of licences issued. In 1950, there were a total of 1245 licences. Of these 567 were for fishermen in the "channel" area and about one-half of the remainder were for fishermen in the north area ($4\frac{1}{4}$ -inch mesh area) and about one-half for fishermen south of the Channel area.

The fishery stations

The fall fishery stations are located at nearly every available harbour and anchorage throughout the fishing area. In 1950 there were 48 stations operating. In construction and operation they are similar to the whitefish fishery stations described above.

The fishing gear

The gill-nets are set in gangs of two to four nets, each net about 100 yards long, and are usually floated at the surface. The lake is generally very rough during the fall due to high seasonal winds, and currents are heavy. For this reason, an anchor is used at the end of each net in the gang. The anchors used are the same as those described in the account of the summer yellow walleye fishery. Except for differences in mesh size the gill-nets used are also the same.

Boats and motors

The boats and motors in use are similar to those described in the account of the yellow walleye fishery, except that occasionally a large boat ("whitefish" boat) is used as a "tug" to take small boats to offshore grounds. As many as 10 skiffs are taken in tow on the run out to the nets. The large boat is anchored while the lifting is done with the skiffs. The catches are loaded aboard the large boat for the homeward run. The use of such a boat lowers the fuel cost of the group and provides a measure of safety and comfort while fishing the exposed offshore grounds.

The offshore catches are similar to those inshore, and in composition closely resemble the yellow walleye fishery catches during the early summer. The fish are handled and marketed as described above for other fisheries.

Some aspects of the fishery

Although the fishery regulations permit only 500 yards of gill-net per licence, the yardage fished is often considerably more.

Another common violation of the regulations is the widespread disregard of the legal mesh size particularly in the area where 3 $\frac{3}{4}$ -inch mesh is specified. In this area, 3-inch mesh is legal during the winter fishery. As most fishermen fish during both seasons, and own 3-inch nets, the temptation to use them during the fall is too great to overcome. These nets are of course liable to seizure when fished in the fall, and so are set at the bottom without markings in order to increase the chances that the fishery patrols will not find these.

During seasons when severe storms occur, losses of gear are considerable. The rough weather often prevents a fisherman from visiting his nets for 2 or even 3 days which results in a large number of culled fish. The loss of gear and the number of culled fish are higher in the most northerly fishing area.

THE LAKE WINNIPEG WINTER FISHERY

There are two components of the winter fishery, one of which has not yet been investigated. This fishery is for whitefish and is confined to two areas in the northwest section of the lake. The winter fishery is mainly for sauger and yellow walleye, and is described in the following account.

Location and regulations

The northern boundary of the winter sauger fishery is the same as for the fall fishery. Two bays which are closed to the fall fishery are open in the winter. One of these, Sturgeon Bay is open for a yellow walleye fishery using $4\frac{1}{4}$ -inch mesh gill-nets, and the other, Fisher Bay is open for a goldeye fishery using $3\frac{3}{4}$ -inch gill-nets. The remainder may be fished with 3-inch gill-nets, and in addition there are some areas where special permission is granted to also use gill-nets of a larger size. In all areas a fisherman is permitted to use 2000 yards of gill-net of the prescribed mesh size.

The fishery opens December 15 and closes on the second Saturday in March. There is no limit on the amount of fish which may be taken, nor on the number of available licences.

Character of the fishery

The outstanding feature of the fishery is that it is conducted through the ice. The winter on Lake Winnipeg is notably frosty and fresh winds are quite regular. There is an average annual snowfall of 50.8 inches which presents a further obstacle to fishing operations. In spite of these apparent difficulties the winter fishery is quite extensive.

The distance to the railhead usually determines whether the fish can be sold "fresh" (non-frozen) or in a frozen condition. Fishing "fresh" is a little more profitable than "frozen" but is more inconvenient because of the storage problem. At the beginning of the season the price spread between the "fresh" and "frozen" fish is not usually great, so the majority of fish is frozen even at points close to the railhead.

The "frozen" fishery camp

The winter sauger fishery is conducted mostly from the camps which are used during the fall season. These are numerous, built at intervals of a few miles, and are located as closely as possible to the established ports of call of the freight vessels. The camps tend to run in groups, one of the number being larger than the others, complete with large dock, ice house, and a packing shed in order to accommodate its neighbours during the fall fishery. The typical winter layout may be described as follows:

The living quarters consist of a one-story log shack approximately 12 by 14 feet. The flooring is of rough lumber, and uncovered. There are 2 small windows. The heating arrangement consists of one sheet iron heater called an "air-tight" and an old range for cooking. Both burn wood, and require frequent stoking. There is no chimney, instead the stovepipe merely projects through a hole in the roof.

The furnishings consist of a table, and benches, and bunks along the wall for 2 or 3 persons. The sleeping section is partly partitioned off with old cardboard cartons.

A log shed is provided to stable a horse. In case a tractor is used, the building serves as a garage. Another small shed is provided for use as a store house for gear, and tools. A roughly built privy with an open pit completes the layout.

The "fresh" fishery camp

In general, the fisherman fishing fresh does so because he is near a railhead, or is a resident of a fishing village. In this case his base is generally his home. The house and out-buildings are on par with those in any rural area in this part of Canada.

The winter fishing vehicle

The winter counterpart of the fishing boat is a caboose mounted on some sort of a sleigh. It serves as a shelter for the fishermen when they take their frequent lunches throughout the fishing day. In it they may warm themselves on particularly frosty days, and it serves as a storage room for spare clothing. For the "fresh" fisherman it is quite large, and serves as a store house. A minority of "fresh" fishermen in some areas sleep in the caboose at night when the nets are a considerable distance from the home base. The typical "frozen" fishery caboose is a lightly constructed affair, often canvas over a wooden frame. It is about six feet by five, and six feet high. It has a door, a window, and the usual air-tight heater.

If the caboose is to be drawn by a single horse, it is mounted on a homemade "ski sleigh", similar in design to a hand-sleigh, the difference being the addition of skis to the runners, which makes it easier to pull. The back of the sleigh extends 3 feet or so beyond the caboose in order to carry 2 large fish boxes, and the fisherman's tools.

A vehicle drawn by a team or by a tractor is more ruggedly built. The shelter is larger, and instead of the ski sleigh a bob sleigh is substituted. The bob sleigh type is rapidly replacing the older ones since tractors are being used

in increasing numbers each season. The horse will likely disappear altogether except in areas adjacent to farm lands where horses are used for other purposes.

A very recent departure in fishing vehicles is the Bombardier snowmobile. Its increased range compared to horses and tractors is making it very popular. In some cases the caboose is dispensed with altogether and the vehicle alone is used for tool storage and as a shelter for the men.

Two types of tractors are in common usage, the crawler type represented by the Cletrac, and the wheel type represented by the Ford-Ferguson and the Allis Chalmers. Both types use small, gasoline burning motors. The wheel tractors are not as efficient under heavy snow conditions as the track laying type. This difficulty is being overcome by the addition of a rubber track laying attachment, currently in production, which makes the wheel tractor almost as efficient as the regular crawler type.

Equipment and methods

The gear used corresponds closely to that described in the summer fishery so does not deserve special description at this point.

Of the tools, the "jigger", a device by which a line may be drawn under the ice, has been adequately described by Sprules (1949). The ice chisel, or "spud", is a standard tool

made from a 5-foot length of steel bar about $1\frac{1}{2}$ inches in diameter. It has a chisel point about 4 inches wide. The needle bar is a similar tool but has a long, sharp 3 cornered point instead of the chisel. It is used for opening a hole in the ice which is then trimmed smooth with the chisel. Many fishermen use one tool for both these operations. A standard scoop shovel is used for removing ice and snow from the holes. A large hook with a 3 or 4 foot long handle is used to reach into the hole to snag the gill-net anchor line. These hooks are made from iron rods or are simply a branch from a tree with the appropriate bend at the end.

Setting the gill-nets

Fishermen who have camps well beyond the railway or highway reach them in late fall by water and wait until the lake freezes. The ice is precariously thin for 2 weeks or more after the winter operations begin, so no vehicle larger than a small handsleigh is used for fear of breaking through. The time of thin ice is usually devoted largely to setting the gill-nets.

At "first ice" the jigger is dispensed with in favour of a long thin pole. The fisherman cuts a hole in the ice, attaches a "running line" to the pole and gives it a strong push under the ice. It coasts along carrying the light cotton running line with it. When it comes to rest, the pole is retrieved and the operation continued until a net length has been measured, usually 100 yards. The running line is now in position to pull a gill-net under.

The gill-net is fitted with a bridle at each end, properly spread and laid out on the ice adjacent to the running line, which is attached to the bridle. While one man pulls the line, another guides the net into the hole. When the net has been pulled under each bridle is fastened to a rough stone serving as an anchor. For use later in lifting the net an anchor line rises to the surface from the stones and is permanently fastened to a small stake frozen into the ice at the side of the hole. Gill-nets are set end to end in a long string so that one anchor stone serves the ends of two adjacent nets.

When the ice becomes too thick to use a setting pole, the jigger is used to pull the running line under the ice. Setting is not too big a problem since the gill-nets are rarely moved from their original positions all season except at mid season when they are pulled up to dry. When this is done, many fishermen leave a running line in position so that the nets may be easily replaced.

In the winter fishery, there is considerable variation in the distance of bottom at which gill-nets are fished. In order to vary the distance at any one place, small flat stones are substituted for the leads used at other times to weight the lower line. These stones, usually limestone, are roughly chipped at their margins at the centre to form a sort of spool which holds

up to 4 fathoms of strong twine. The depth of the net can be readily changed according to the length of the twine wound upon the "spool". Another device is the use of toy balloons which float the top line of the gill-net at the undersurface of the ice. Balloons are used because they do not tend to freeze to the undersurface of the ice. If they do, a slight pull breaks them free.

Number of nets fished

This number depends upon the run of fish to some extent, but largely upon the means of power. If a tractor is used, 30 to 40 nets per man are often used, and sometimes more, depending on the number of hours the fishermen care to work. If horses are used, 20 to 30 nets per man are all that can be conveniently handled. Although nets differ in length, they probably average about 100 yards each. Except for differences in mesh size they are essentially the same as the nets described in connection with the other fisheries.

Size of the crew

Most crews consist of 2 or 3 men. One man sometimes fishes alone but there is a good deal of lost time. Three men constitute the ideal number for lifting, as will be seen from the following description.

Lifting

The job requiring the most vigour is that of opening of the holes which have frozen over since they were last visited. In a crew of 3 each man takes his turn at this task. The man who is opening holes ranges ahead of the other two carrying the shovel, the needle bar and the chisel. The snow is shovelled off and a square hole about $1\frac{1}{2}$ to 2 feet in size is quickly punched with the needle bar. The ice may become as much as 4 feet thick by the end of the season. Except for the first hole of the day the sides of the hole are trimmed with the chisel to eliminate possible snags. Then, still using the chisel, the edge of the hole over which the net will slide is bevelled off. This sloping margin makes the opening a "basin" hole. All the chipped ice is removed with the shovel and put in a pile at one side.

The other two men arrive and stop the caboose on the windward side of the first open hole. The caboose often has a skirt which can be lowered to the ice providing additional shelter. One man reaches into the hole with the hook and snags the anchor line. The other takes it from the hook and pulls up the anchor stone hand over hand, unties the bridle from the anchor stone, and attaches a running line to the bridle. The anchor line is hitched around the stake.

The vehicle is moved now to the next hole, which is a basin hole. The men pull up the anchor stone as before and untie the bridle. Then, standing side by side a few feet back of the basin hole, the men pull out the net, one pulling the "cork line" and the other the "lead line". They keep a little tension between them so the web may be properly spread before the net freezes and falls to the ice in lateral folds. The fish are cleared as they appear in the web unless the run is quite heavy. In this case, the net is pulled out a few yards at a time and laid on the ice while the fish are being cleared from the mesh. Saleable fish are kept in one pile and "rough" fish thrown in another.

When the net has been cleared, one man runs back to the starting point and picks up the running line which has just been pulled under the ice during the lifting. While the other man guides the gill-net, his partner pulls the line back out. This is done by walking steadily away from the hole so that the pull will be an even one. When he has pulled it all in he returns to the hole, unties the running line, affixes the anchor stone to the bridle, and drops in the stone. He then walks back to the basin hole dragging the running line with him.

At the basin hole, the running line is attached to the bridle of the net which adjoins the one just lifted. This second net and succeeding ones are lifted in the same sequence.

After each net is lifted, each fisherman wrings out his woollen mitts and rinses them in a bucket of warm water in the caboose. Some fishermen change mitts after each net, and rinse and dry them all in the evening at camp.

Treatment of the catch

The treatment of the catch at this stage varies with fresh and frozen fishing. The "fresh" fisherman puts them in a box as soon as they are lifted and stores them in his caboose. The "frozen" fisherman throws them in a loose pile on the ice and allows them to glaze with the frost before putting them in a box which he carries on the platform of the caboose.

The nets are rarely lifted more often than once in 7 days. Toward the end of the season, the interval increases to about 14 days. After 7 days, there are few culls but many fish are definitely of a poor quality. Frozen fish of poor quality are not easy to detect, so culls are quite rare in the frozen fishery.

The "fresh" fisherman keeps his catch in a shed so that it will not freeze before being picked up periodically throughout the week by a truck or a Bombardier snowmobile, for market. The "frozen" fisherman keeps his catch in a pile outside where it is eventually sorted as to size and species, packed in large wooden boxes, with the weight recorded on the box. At intervals

throughout the season, a freighter calls for it and hauls it away to the railhead.

Practically all frozen fish is freighted with a large track-laying diesel tractor pulling a string of 4 or 5 freight sleighs. This outfit, known as a "swing" delivers gasoline and supplies to the camp on outbound trips. The service provided is similar to that given by the freight vessels during the time of open water.

LITERATURE CITED

- Sprules, W. M. 1949. Prairie ice jigger. Amer. Soc. Limn. and Ocean. Spec. Publ. No. 20.

Table I. The total weight* in pounds of fish landed by commercial fishermen for the yellow walleye fishery on Lake Winnipeg during June 4 to July 10, 1951.

| | |
|---------------------|---------|
| yellow walleye..... | 316,457 |
| whitefish..... | 300,112 |
| northern pike..... | 233,525 |
| cisco..... | 300,472 |
| sauger..... | 131,940 |
| yellow perch..... | 5,976 |
| goldeye..... | 680 |
| sucker..... | 21,865 |
| freshwater drum.... | 74,608 |
| catfish..... | 513 |
| bullhead..... | 208 |

* The figures given include dressed, round, and headless weights and are not distinguishable for any species.

Table II. The total weight^{*} in pounds of fish landed by 255 commercial fishermen from Lake Winnipeg during the 1951 summer freshwater drum fishery.

| | |
|---------------------|-----------|
| freshwater drum.... | 1,560,200 |
| yellow walleye..... | 142,800 |
| sauger..... | 95,900 |
| perch..... | 6,800 |
| northern pike..... | 3,600 |
| carp..... | 10,700 |
| goldeye..... | 3,000 |
| whitefish..... | 9,500 |
| suckers..... | 40,300 |
| catfish..... | 5,200 |
| bullhead..... | 4,000 |

^{*} The figures given include dressed, round and headless weights and are not distinguishable for any species.

Table II. The total weight of fish landed by 275 commercial fishermen from Lake Winnebago during the 1961 season. (Reprinted from Liberty)

| | |
|----------------------|-----------|
| Walleye..... | 1,100,000 |
| Yellow perch..... | 1,000,000 |
| Rock bass..... | 250,000 |
| Whitefish..... | 1,800,000 |
| Common carp..... | 1,600,000 |
| Golden shiner..... | 10,700 |
| Brook trout..... | 2,400 |
| Smallmouth bass..... | 9,200 |
| White sucker..... | 40,300 |
| Catfish..... | 2,200 |
| Bluegill..... | 4,000 |

The figures given include broods, young and adults. Weights are not standardized for age classes.

