BULLETIN No. 108

Danish-seining Explorations in Newfoundland and Cape Breton Areas

By

T. N. STEWART

Fisheries Research Board of Canada
Biological Station, St. John's, Nfld.

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W. E. RICKER
N. M. CARTER

Editors

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ABSTRACT

The Danish seine can be operated only on a smooth sea bottom, and in 1952 the only known fishing ground suitable for it around Newfoundland was a small area in Fortune Bay, where Danish seining for the witch flounder or grey sole began in 1951. In 1953 and 1954 a survey of the coast of Newfoundland, the southwest edge of the Grand Bank of Newfoundland, and the area to the west of Cape Breton Island was made to locate additional grounds suitable for seining. A 56-foot wooden Danish seiner was used for these explorations.

No new grounds were found close to the Newfoundland coast. The southwest edge of the Grand Bank could be fished by Danish seine, but a larger vessel would be required. The rather small size of the fish and the extra work in culling might make such a fishery uneconomic at 1955 prices. Excellent catches were obtained in the Gulf of St. Lawrence in North Bay near Cape Breton Island, and it is probable that a good Danish-seine fishery could be developed there under present economic conditions.

The Danish-seining method is described in an appendix.

INTRODUCTION

A Danish-seine fishing ground for witch flounder or grey sole, *Glyptocephalus cynoglossus* (Linnaeus), was discovered in 1951 in Fortune Bay by the M. V. *Matthew II*, operated by the Newfoundland Government. Commercial exploitation of this ground began in 1952 and has been continued by a small number of boats since that time. Although as many as seven boats have been equipped for Danish seining, never more than four, and usually less, have operated at one time in this area. This fishery is concentrated in Fortune Bay between Brunette Island and the Burin Peninsula, in depths between 90 and 180 fathoms.

Danish seining requires an area of smooth sea bottom at least one-third of a square mile in extent, so that the ropes which sweep over the sea floor will not be fouled. It was not expected that the rugged Newfoundland coastal area would have much suitable sea bottom, but close examination of the more likely spots was justified.

A program of exploratory Danish seining was carried out by the Fisheries Research Board of Canada in 1953 and 1954. The *Matthew II*, which had been fishing commercially in Fortune Bay, was chartered for the period of June to November in each year, and the crew, under Captain F. B. Hollett, who had worked the *Matthew II* commercially, were retained for the exploratory fishing.

EQUIPMENT

The *Matthew II* is a 56-foot wooden boat, built in Newfoundland, and owned by the Government of Newfoundland. It was equipped with a Danish-seine winch and coiler, driven from the main engine. Its Bendix echo-sounder registered to 200 fathoms.

The fishing gear consisted of 18 coils (120 fathoms each) of $2\frac{1}{4}$ inches circumference manila Danish-seine rope, spliced together to form two warps; Danish-seining nets similar to those in commercial use in Newfoundland; and a 250-pound anchor with 300 fathoms of wire cable. Glass floats were used on the nets.

METHOD

The exploration was carried out by searching systematically with the echo-sounder for suitable areas of the sea bottom and making sets in all areas where there appeared to be a possibility of using the gear. Where possibly suitable ground was found over a comparatively large area, sets were made over a range of depths. A number of sets were made on the known commercial ground in Fortune Bay in order to test the gear.

The method of fishing normally used was anchor-seining (Appendix I). This method of seining was introduced from Europe and was in use in Fortune Bay until 1953. In 1954 the commercial fleet fished by fly-seining, in which the first warp is attached to a free floating buoy, thus removing the necessity for anchoring. During the hauling operation the boat steams slowly ahead, causing the fishing gear to cover a larger area.

Anchor-seining, although it is probably less efficient than fly-seining, was used during this exploration. At the time when the exploration was first undertaken anchor-seining was the method in normal commercial use in Newfoundland; also, the boat arrangement, with the winch driven by the main engine, was more suited to anchor-seining. For successful fly-seining a separate motor for the winch, or a controllable-pitch propeller, is desirable. Two sets were made by fly-seining, the remainder by anchor-seining.

AREAS

The survey was concerned mainly with Newfoundland waters. A preliminary study was made of the otter-trawl catches of witch flounder made in previous years by the research vessel *Investigator II*, and the most likely areas were selected for investigation. From the reports of the *Investigator II* of gear damage, and fathometer tracings of the bottom in areas where she had fished during the years 1948 to 1952, the probable composition of the bottom was marked on a chart.

The survey was planned with regard to the abundance of witch flounder and the smoothness of the sea bottom as indicated by the *Investigator II* records, in order to select the more favourable areas for the most intensive work. Where the bottom was suitable the explorations were extended over a range of depths, so that any local concentrations due to temperature could be discovered. Some areas with bottom temperatures apparently too low for witch flounder were included in the investigation, in order to discover whether American plaice, *Hippoglossoides platessoides* (Fabricius), or the Greenland halibut, *Reinhardtius hippoglossoides* (Walbaum), could be fished commercially by Danish seining.

In the course of the survey a large part of the south coast of Newfoundland was investigated. On the west coast fishing was confined to St. George's Bay, as the *Investigator II* results showed no reason to expect good Danish-seine fishing north of this region. The Labrador Current extends down the east coast, making bottom temperatures beyond the shallow inshore waters very low to depths of over 100 fathoms: because of this, and as these nearer grounds were known to be very rough, the survey was limited to the deeper offshore waters and the deep bays and channels.

The southwest edge of the Grand Bank was selected for fishing in July and August. Good catches of witch flounder are obtained by otter trawlers in this area during springtime, but not during the summer. Since witch flounders are caught more successfully by Danish seine than by otter trawl, it was thought

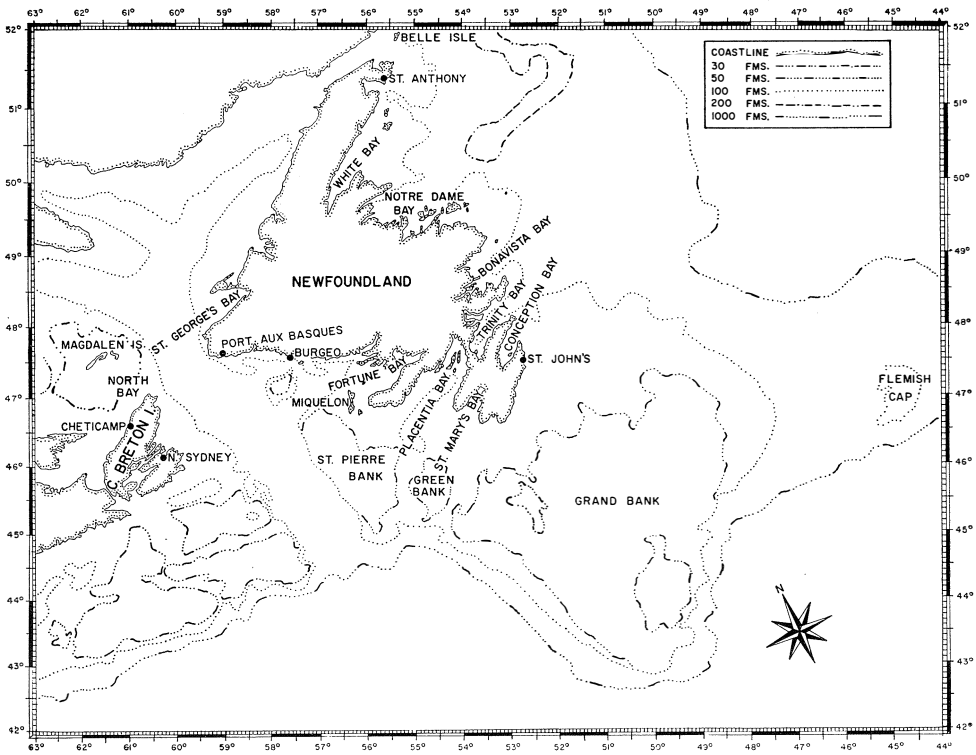

FIGURE 1. Newfoundland and Cape Breton Island.

that good catches of witch might be obtained by the *Matthew II* when the trawlers could not fish them successfully. The southwest edge of the Grand Bank is too far offshore for a small vessel to fish in safety before May.

The portion of the Gulf of St. Lawrence on the west of Cape Breton Island, between this island, the Magdalen Islands and Prince Edward Island, was included in the program at the suggestion of scientists of the Fisheries Research Board's St. Andrews Biological Station, since commercial otter trawlers obtain good catches of flatfish there. This ground is known to the local fishermen as North Bay (Fig. 1).

THE INVESTIGATION

The regions investigated were divided into natural sub-areas according to the type of sea bottom, and the results obtained by fishing in these sub-areas are considered separately. The details of the sets are given in Table I for 1953 and Table II for 1954 (Appendix II).

SOUTH COAST OF NEWFOUNDLAND

ROSE BLANCHE BANK. At the western end of the south coast is the area of Rose Blanche Bank (Fig. 2). The bank itself and the surrounding slopes were surveyed with the echo-sounder. The bank was found to be very rough

and uneven with a hard rocky surface. The western slopes were also hard and, although in the deep water the bottom became smoother, it was not soft enough to allow the use of the Danish seine. East of Rose Blanche Bank towards the Burgeo area, the rough slope dipped down to uneven mud banks. Seven sets were attempted in the Rose Blanche Bank area. The gear was caught on the bottom on all but one occasion, set No. 5, 1953, and only two witch flounder were caught.

Burgeo to Miquelon. The Burgeo, Hermitage Bay, Miquelon area, between 56°W. and 58°W. (Fig. 2), was first fished in 1953. A sandy bottom was found in the vicinity of Miquelon, and in September three sets were made between 40 and 140 fathoms; 25 pounds of witch were caught in the shallowest set. There was an indication of good ground in deep water, over 90 fathoms, but the weather conditions and a very strong current made fishing difficult when the sets were made, October 10-26. One set produced 250 pounds and two

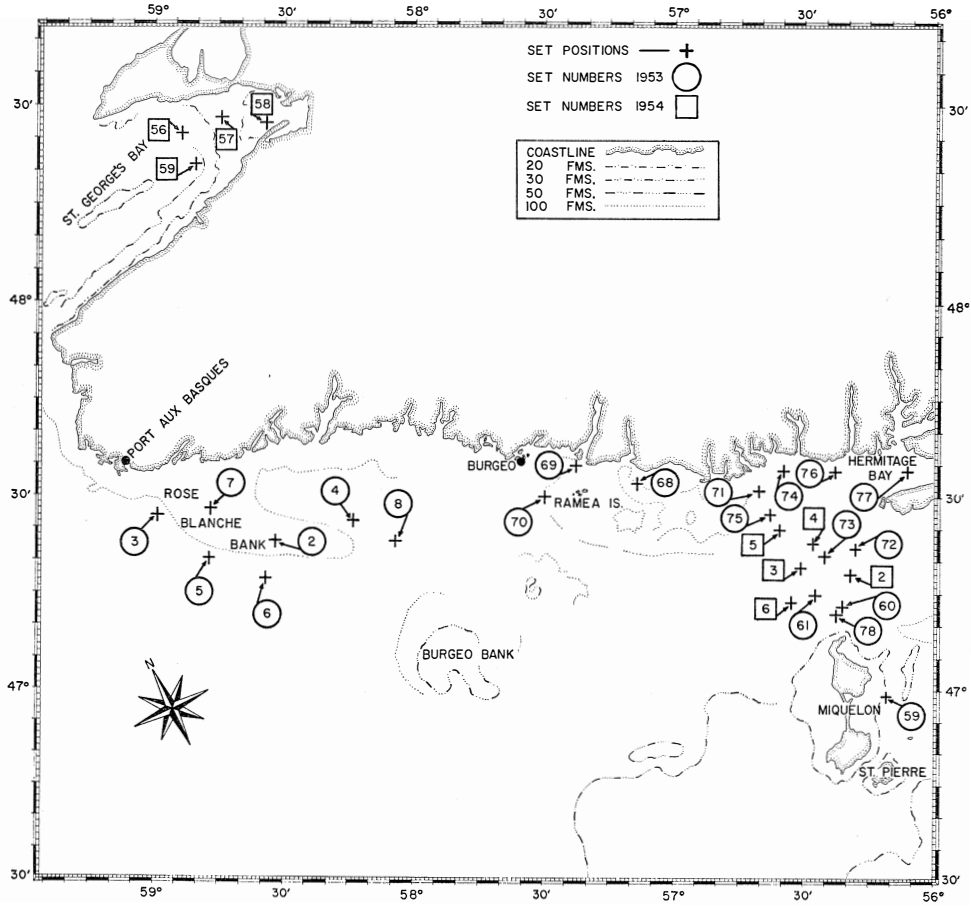

Figure 2. Newfoundland south coast, western portion.

others 100 pounds of witch flounder. In the other sets, tears in the net, or the very strong current which floated the net too soon, caused the possible catch to be lowered.

In July, 1954, 5 more sets were made, the greatest catch being 120 pounds of witch. In two of these sets the gear was caught on rough bottom.

These nineteen sets and the accompanying fathometer survey show that the coast line and bays are rocky, and the narrow channels are not generally suitable for Danish seining. The deeper water, more than 90 fathoms, has some localities in which a Danish seine can be operated. A very strong current prevails here for considerable periods, making deepwater fishing difficult and uncertain, and the best catches in the area were not sufficient for commercial exploitation. As catches of 100 to 250 pounds were obtained, it is possible that small grounds, productive for Danish seining, do exist, although none were found during the survey.

FORTUNE BAY. The present commercial Danish-seine fishery for witch flounder is located in Fortune Bay. Some fishing was done on the known commercial grounds in order to test the working of the gear. Catches were consistent with those obtained by the commercial vessels at the same time; 7 sets, made at intervals during 1953, produced between 400 and 1,600 pounds of witch per set.

A large part of Fortune Bay was surveyed with the echo-sounder and some suitable bottom was found apart from the commercial ground. Fourteen sets (one with ropes only) were made north of the commercial ground (No. 35, 36, 37, 65, 66 and all northward sets in Fig. 3). In sets 65 and 66, at depths from 104 to 140 fathoms, catches of 100 pounds and 300 pounds of witch flounder were obtained. None of the other sets north of the commercial ground produced as much as 100 pounds of witch flounder.

PLACENTIA BAY. Placentia Bay (Fig. 3, 5) is bounded on the west by the Burin Peninsula and on the east by the Avalon Peninsula. The inner part of this bay was found to be very rocky and uneven, but in the deeper water, from 115 to 130 fathoms, smooth muddy bottom was discovered. One set was made in this area in 1953 when the *Matthew II* was returning from the Grand Bank, and smooth bottom was noted on the fathometer. This set, No. 54, was unsuccessful owing to a mechanical failure. The following year the gear was fished over the whole range of available depths in 5 sets. Bottom temperatures were low, $-1{\cdot}0$ to $-1{\cdot}2$°C. ($30{\cdot}2$ to $29{\cdot}8$°F.), and the largest catch of witch flounder was 2 pounds; up to 500 pounds of American plaice were taken per set, but about half of this catch was of fish too small for commercial use. No areas with smooth bottom were found in the shallower water. In localities with depths less than 115 fathoms the ground was extremely rocky and uneven, and, although one deeper sounding was marked on the chart, no water more than 136 fathoms in depth could be found. South of the bay the water became shallower and the bottom rougher.

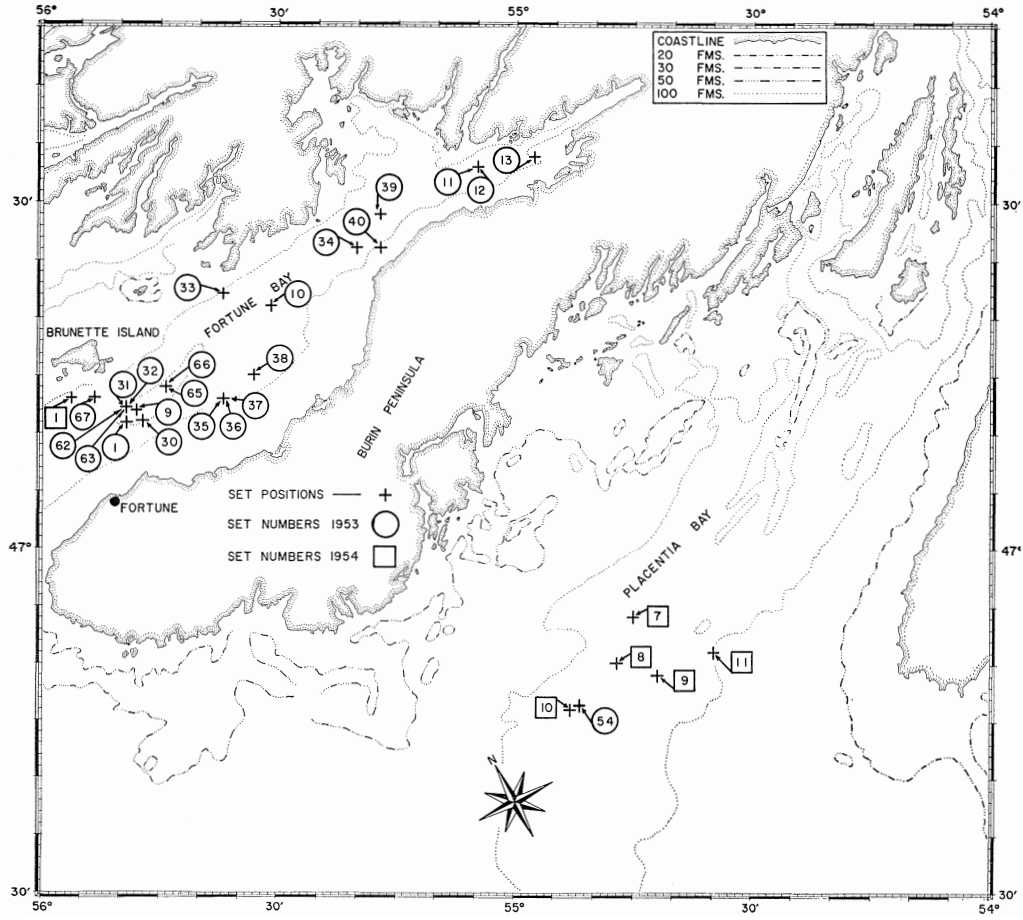

FIGURE 3. South coast, eastern portion.

ST. MARY'S BAY. St. Mary's Bay (Fig. 5) has a rocky coastline; smooth gravel banks are situated near the mouth; and a deep muddy hole is found well inside the bay. In July, 1954, the bay was surveyed and one set, No. 12, was made on muddy ground. The gear was caught on what appeared to be a bank of very soft mud and there was no catch.

At the end of September, 1954, reports were received from longline fishing boats of excellent catches of American plaice from what appeared to be smooth sand banks, and a further investigation of St. Mary's Bay was made from September 22-24. Two attempts were made to fish these grounds, an extensive fathometer survey was made, and a further set was made in the deep hole. Although the American plaice grounds were of sand and gravel, the smooth areas were too limited to allow the gear to be set out clear of obstructing rocks. The two attempts to fish these grounds, sets No. 42 and 43, were without success. Set No. 44 was on the steep muddy slope at the edge of the deep hole, but the bottom was too steep and the ropes were caught.

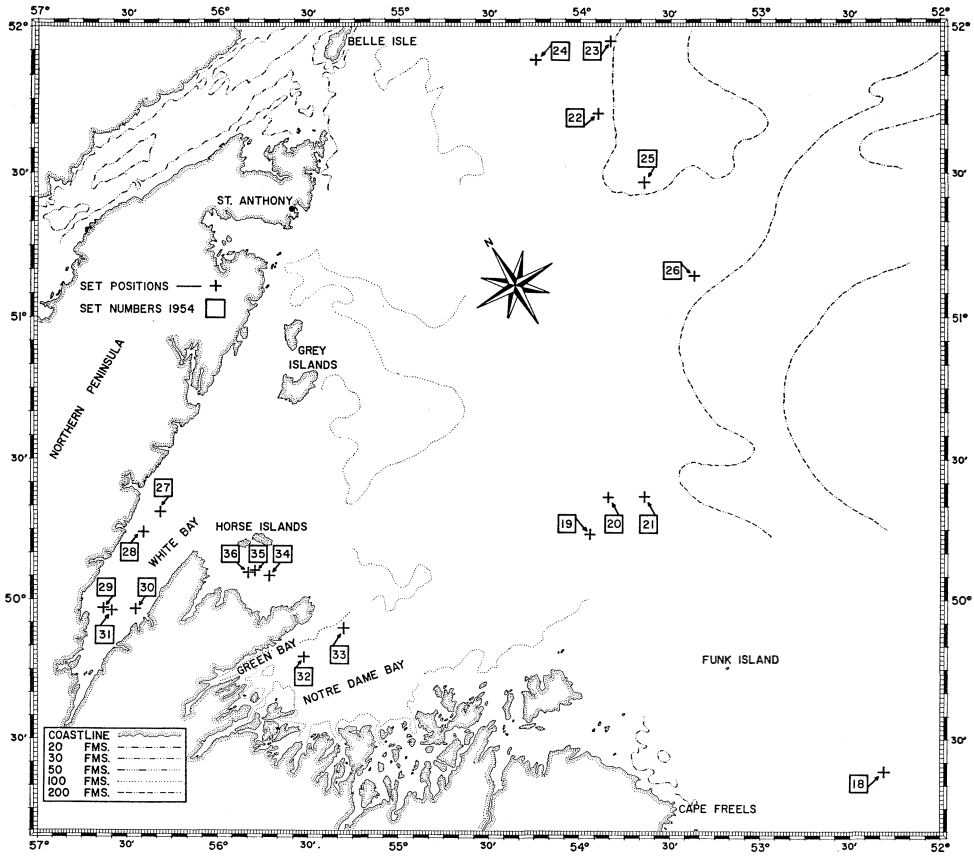

FIGURE 4. East coast, northern portion.

The survey of the south coast of Newfoundland did not locate any new fishing grounds for witch flounder. Further offshore than the regions surveyed there was no reason to expect better results. The deeper water off Rose Blanche Bank appeared unproductive. Burgeo Bank offshore from the Burgeo sub-area is known to be very rough from reports from otter trawlers. St. Pierre Bank, south of the eastern portion of the south coast survey, also had a rough bottom unsuitable for Danish seining.

THE EAST COAST OF NEWFOUNDLAND

The east coast is shown in Figures 4 and 5. East of the Avalon Peninsula on the southern portion of the east coast the depth of the water is usually less than 100 fathoms. This is an extension of the Grand Bank, and the cold Labrador Current apparently makes the bottom temperature too low for witch flounder. The bottom here is also too rough for Danish seining. Deeper channels run into Trinity Bay and Bonavista Bay from the northeast; these channels and bays and also Conception Bay were surveyed. North of Cape Freels the deep water extends northward, in a wide channel over 200 fathoms

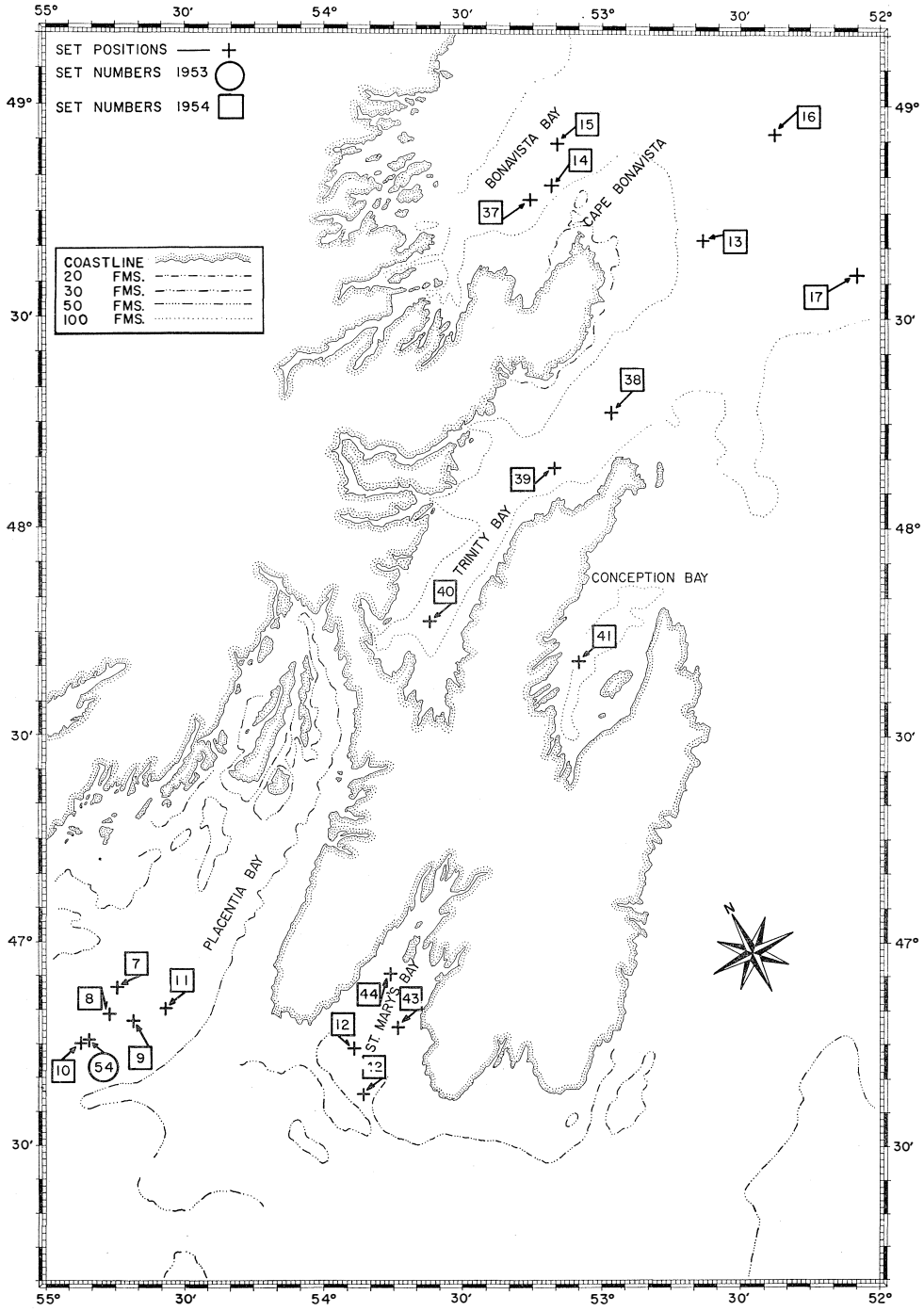

FIGURE 5. East coast, southern portion.

deep, as far as Belle Isle. Between this channel and the Northern Peninsula there is rough bottom right in to the coast. Near the land the sea bottom is very rugged.

White Bay, which is at the base of the Northern Peninsula, and Green Bay at the west of Notre Dame Bay were included in the survey. Notre Dame Bay itself is very rocky with numerous small islands, and no locality was found suitable for Danish-seine fishing.

OFFSHORE. Most of this survey was carried out from St. Anthony. The water deepens quickly. Near the shore the bottom drops to 80 fathoms precipitously and levels off to a gentle but very rocky slope to a depth of 150 fathoms at 50 to 60 miles from shore. The slope then increases, and from 170 fathoms to over 200 fathoms there is a smooth muddy incline. In 1954 eight sets were made in this deep water (Fig. 4). The bottom temperatures 2·1 to 2·3°C. (35·8 to 36·1°F.) appeared favourable, but the greatest catch of witch flounder was 12 pounds. In several sets 15 to 20 pounds of American plaice were obtained. A fathometer survey was made of the area between the Northern Peninsula and the deep channel. Two sets (No. 18 and 19) near the edge of the southern part of the channel and a set (No. 24) in 119 to 120 fathoms at the northern end were all unsuccessful as the ground was too rough.

The shelf west of the deep channel was surveyed by fathometer on courses radiating from St. Anthony, the shallow water west of Grey Islands and the level area between these islands and the Horse Islands being included in this work. The bottom was all unsuitable as it was very rough and rocky.

WHITE BAY. White Bay is very deep with a soft mud bottom and steep sides. A commercial linetrawl fishery for Greenland halibut is located here. The water is known to be very cold, but the bay was included in the survey as it was possible that catches of Greenland halibut would be obtained. Three sets in depths from 132 to 196 fathoms produced no catches. In two deeper sets in over 200 fathoms it is probable that the net was not fishing on the bottom; one of these was a fly-set. There was no suitable shallower water to be found. The sea bottom rises in cliffs to the shore line.

GREEN BAY. Green Bay is similar to White Bay. Two sets were made in the mouth of the bay and 35 pounds of witch were taken in one of them. The bottom temperature was very low, — 0·5°C. (31·1°F.). South of Horse Islands, between Green Bay and White Bay, a level area varying from 118 to 126 fathoms was found. The bottom was rough and in two of three sets the gear caught on the bottom. In the third set the net was twisted by the current and there was no catch. This area was unsuitable because of rough bottom and very strong currents.

BONAVISTA BAY. Three sets were made in the deep channel of Bonavista Bay (Fig. 5). In two of these sets the gear became hooked up, and in the successful set only 4 pounds of witch flounder and 80 pounds of small American plaice

were taken. In two sets made off Cape Bonavista (No. 13 and 16), one with the ropes only, the gear became hooked up in obstructions on the bottom, indicating that the bottom was too rough for Danish seining.

Trinity Bay. The southeast side of Trinity Bay has steep cliffs which drop into very deep water of more than 200 fathoms. The southern end and the northwest side of the bay have rough gravel banks. Two sets were made on a patch of soft mud at the mouth of the bay in 150 to 166 fathoms. The gear was hauled in each of these sets but dragged hard through the mud; one set produced 25 pounds of witch flounder and 10 pounds of American plaice.

Farther in the bay the sides were too steep for fishing, and the centre of the bay was too deep. Set No. 40 was made on the slope at the southern end of the bay, but the gear caught on the bottom and there was no catch.

Conception Bay. The only suitable place with a soft bottom in Conception Bay was a deep muddy hole well inside the bay. One set made here caught fifty pounds of American plaice.

The east coast of Newfoundland did not show any promise for Danish seining. The offshore deep water was the only ground of any extent on which the gear could be used satisfactorily, and the catches there were consistently very poor, although the bottom temperatures were suitable for witch flounder.

St. George's Bay, Newfoundland West Coast

Four sets were made in St. George's Bay in November, 1954 (Fig. 2). The work was hampered by bad weather and the survey was not extensive. The greatest catch of witch flounder was 300 pounds, and on one other set 200 pounds of American plaice were obtained. There was no indication of good witch flounder grounds from the survey.

The Grand Bank of Newfoundland

A series of lines, with depths ranging from 40 to 120 fathoms was surveyed along the southwest edge of the bank, between 52°W. and 54°W. (Fig. 6). The bottom was smooth and was found to be suitable for Danish-seining operations throughout the area, although the catches of witch proved to be very variable. A few witch appeared in every haul, but the catch exceeded 100 pounds in only four out of 28 sets made in the area. Witch flounders in good commercial quantities, namely 1,350 and 2,200 pounds, were obtained in only two sets. These sets were in positions 44°35′N., 53°00′W., and 44°26′N., 52°30′W., and at depths of 51 and 46 fathoms respectively.

The catches obtained in the Grand Bank area generally consisted of a variety of species, variable numbers of American plaice, common hake and haddock appearing in most sets.

In addition to the southwest edge, two sets were made in Whale Deep; two in Green Bank Gully, west of Green Bank; and three in the Channel Gully, east of Green Bank. These sets were unsuccessful.

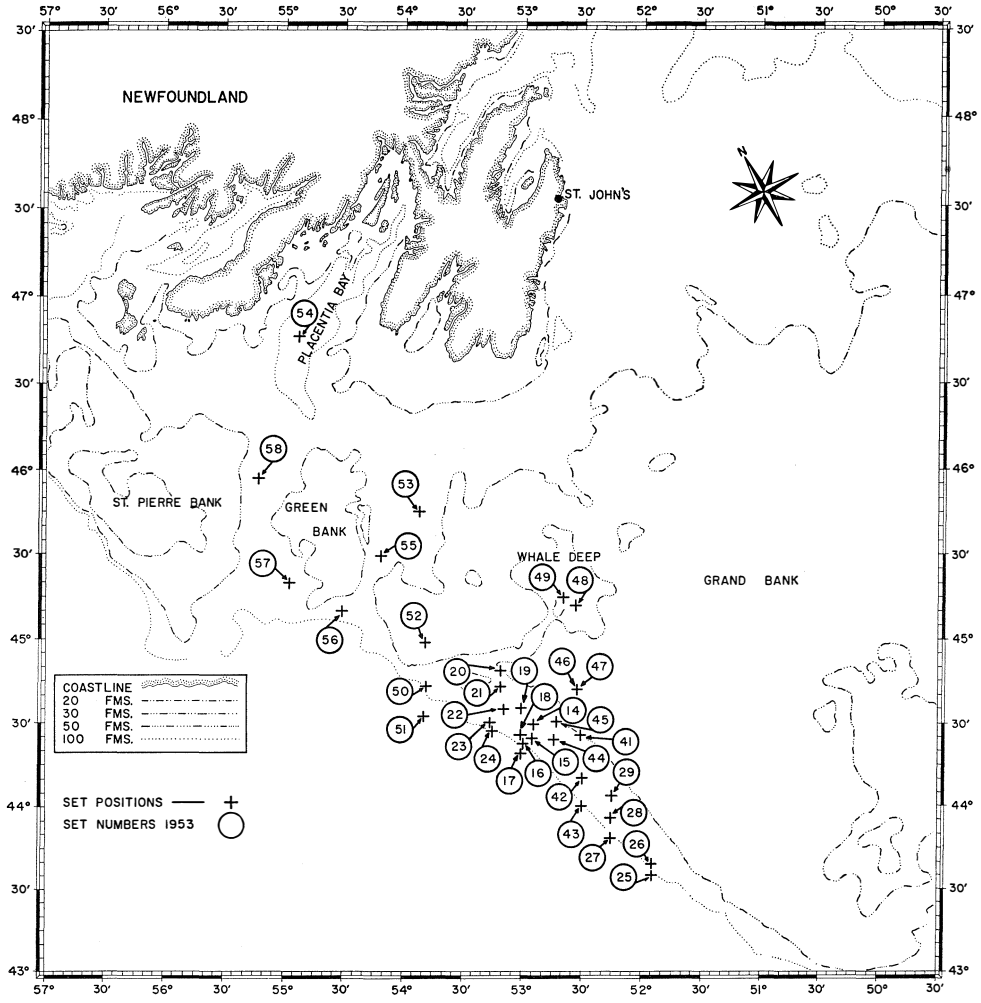

FIGURE 6. Newfoundland banks.

The sets on the southwest edge of the Grand Bank were made in July and August. Otter trawlers working the same area generally obtain witch in large quantities only during the spring months. The catch of a Danish seiner working this area in spring would probably be excellent, but a larger, more seaworthy boat than the *Matthew II* would be required to exploit the ground at that time of year. More work would be entailed in fishing on the southwest edge of the bank than in Fortune Bay, as the bank catches always had large amounts of trash fish, mostly common hake, which would have to be culled.

Danish seining would be possible in this area, but because of the extra distance from port, and the larger size of vessel required to fish the ground in safety, it would not be economical while catches in Fortune Bay are high.

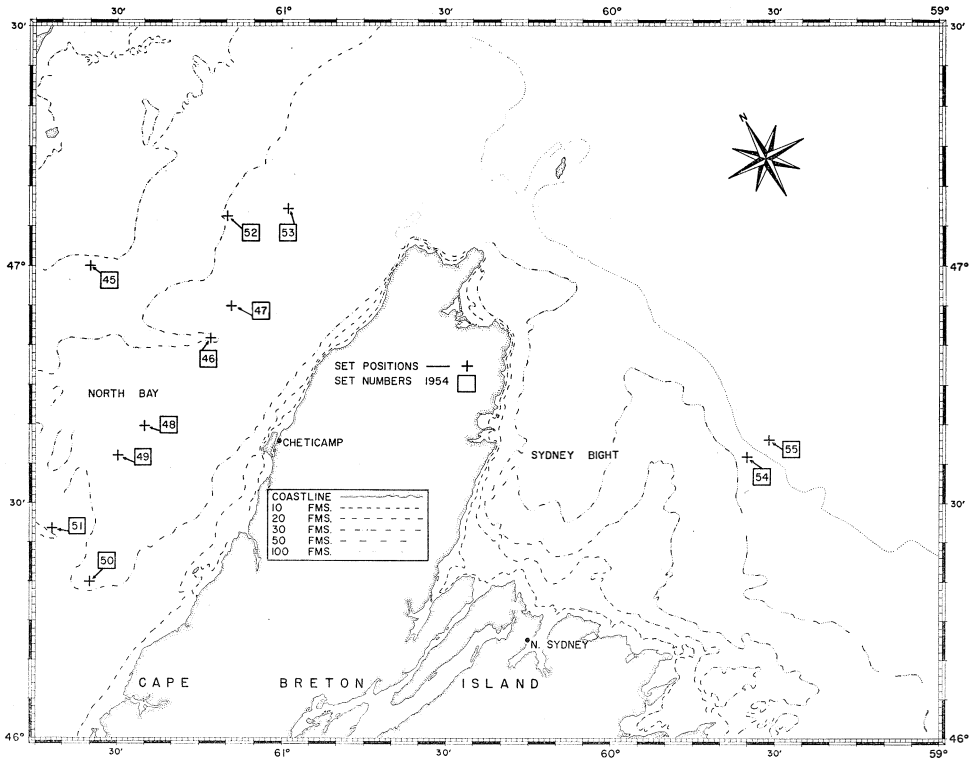

FIGURE 7. Cape Breton Island.

NORTH BAY, GULF OF ST. LAWRENCE

North Bay lies to the west of Cape Breton Island (Fig. 7). Near the shore there is a deep channel, the western side of which slopes gradually upwards to the Magdalen Islands. The sea bottom on this slope is smooth and consists of fine red sand. In the region between 46°20′N. and 46°55′N., and 61°09′W. and 61°42′W. a large area of sea bottom suitable for Danish seining was found. Five sets (No. 47 to 51) made in this area, in depths between 32 and 37 fathoms, produced excellent catches, varying from 4,000 to 9,000 pounds of witch flounder and American plaice.

The witch flounder catches were from 1,000 to 3,000 pounds for each set, and these fish were large and of good quality. American plaice made up the bulk of the catches, as much as 7,000 pounds to one set, and were mainly fish of good commercial size. Small amounts of scrod and small market cod were also caught.

One set (No. 46) in this area was unsuccessful, the gear being caught on an isolated rock. Set No. 45, in shallower water (20 fathoms), caught 300 pounds of yellowtail flounder and 100 pounds of American plaice. Set No. 53, in deeper water, caught 700 pounds of witch and 200 pounds of American plaice, a good

commercial catch but less than the other sets. North of the area the sea bottom became harder. Set No. 52 was made on this ground and the net was caught on the bottom.

Two sets were made in Sydney Bight, northeast of Cape Breton Island. The ground was too rough and the tidal currents too strong for the gear to function properly.

North Bay contains an extensive area in which the sea bottom is excellent for Danish seining, and where very large catches of witch flounder and American plaice were made during October, 1954. Although otter trawlers were working the same area their catches per set were much smaller.

FISH SIZES

BURGEO, HERMITAGE AND MIQUELON. The average lengths of the samples of witch flounder taken from this area varied between 14·7 and 17·3 inches.

FORTUNE BAY. The lengths of the witch flounder of the Fortune Bay fishery averaged 18·6 inches. There are very few small or immature witch caught on this ground, 78% of the fish sampled being in the length range 17·3 to 20·8 inches, and all the commercial catches are retained without cull.

SOUTHWEST EDGE OF THE GRAND BANK. There was a great variation in the average lengths of samples of witch from this area, ranging from 13·5 to 17·9 inches. The average length for the whole area for the 1,224 fish measured, was 15·5 inches; 76% were in the length range 12·2 to 17·7 inches. The smaller size of these fish makes them less valuable commercially.

ST. GEORGE'S BAY. The sample taken from set No. 59, in which 300 pounds of witch were caught, had an average length of 18·8 inches. These fish were all of good size.

NORTH BAY. The average length of the witch flounder taken in 32 to 37 fathoms was 20·1 inches; those from set No. 53 in 55 fathoms averaged 18·7 inches. All these fish were of excellent quality, and there were no small or immature fish; 76% of the fish were between 18·0 and 20·0 inches in length.

SUMMARY

A survey was carried out in 1953 and 1954 to discover new fishing grounds for Danish seining, the main interest being in witch flounder. The investigation covered the south and east coasts of Newfoundland; St. George's Bay on the west coast; North Bay, Cape Breton Island; and the southwest edge of the Grand Bank of Newfoundland.

No new grounds were found on the Newfoundland coast.

The southwest edge of the Grand Bank could probably support a commercial Danish-seine fishery in spring time, but a moderately large vessel would be required to withstand the weather conditions. During the summer isolated concentrations of witch could be found, but the smaller size of the fish, the extra work in culling unwanted species, and the distance to the fishing ground would probably make the fishery uneconomic at 1955 prices.

North Bay, Cape Breton Island, would probably support a good commercial Danish-seine fishery for American plaice and witch flounder. Better catches of larger fish should be obtainable over a more extensive area than in the present Fortune Bay fishery.

ACKNOWLEDGMENTS

This exploration was carried out with the assistance of E. J. Sandeman, R. W. Ellis and C. Barbour.

Thanks are due to Captain F. B. Hollett and the crew of the *Matthew II*, who carried out their duties admirably and were most helpful throughout the work. The Department of Fisheries of the Province of Newfoundland has been most co-operative and lent the *Matthew II* for the survey.

The expenses of the operations were borne by the Industrial Development Service of the Canadian Department of Fisheries.

APPENDIX I

METHOD OF DANISH SEINING ON THE *Matthews II*

EQUIPMENT

Anchor with 300 fathoms of cable.

Buoy consisting of two oil drums lashed about 1 fathom apart and a spot buoy attached.

Three canvas buoys, one of which has a longer rope than the others, the rope ending at a C-link.

Rope. Eighteen 120-fathom coils $2\frac{1}{4}$ inches circumference rope, nine coils being spliced together with short splices to form each warp.

Net. Commercial net in use is 30 fathoms across the wings, has glass floats on the head rope and leads on the foot rope. Lengths of chain were attached to the extremities of the wings.

Fairleads.

Winch and coiler.

SETTING

The anchor is run out; the oil drums and spot buoy are attached to the anchor cable to take the weight. Two of the three canvas buoys are attached to the cable, the one with the C-link being near the end of the cable (Fig. 8A). The warp is attached by a C-link to the link of this canvas buoy. The third buoy is attached to the warp (Fig. 8B, 11B).

The warp is held at first so that the anchor cable is stretched in the direction in which the tide is running (Fig. 8C), then released and the first leg of the set made (Fig. 8D). Six and a half coils of rope are run out more or less with the tide; but the direction is modified so that, when hauling, the boat will be head-on to the wind. The course is then changed 120° to bring the second leg across the tide, and the remaining two and a half coils are shot.

The net is placed on the stern with the mouth facing forward and the left wing on the port side. The end of the first warp is connected to the right wing and the net is shot right wing first (Fig. 9A), then the bag and lastly the left wing. The boat is slowed while the net is being shot, and the second warp, attached by a C-link, is held so that the wings are stretched to their full extent.

Two and a half coils of the second warp are laid out in the same direction, and then a second turn of about 120° is made to return to the buoy.

A grapnel is used to pick up the warp between the second and third buoys (Fig. 9B). The end of the anchor cable is secured by a hook on the bow, while the ends of the two warps are led through fairleads to the winch and coiler.

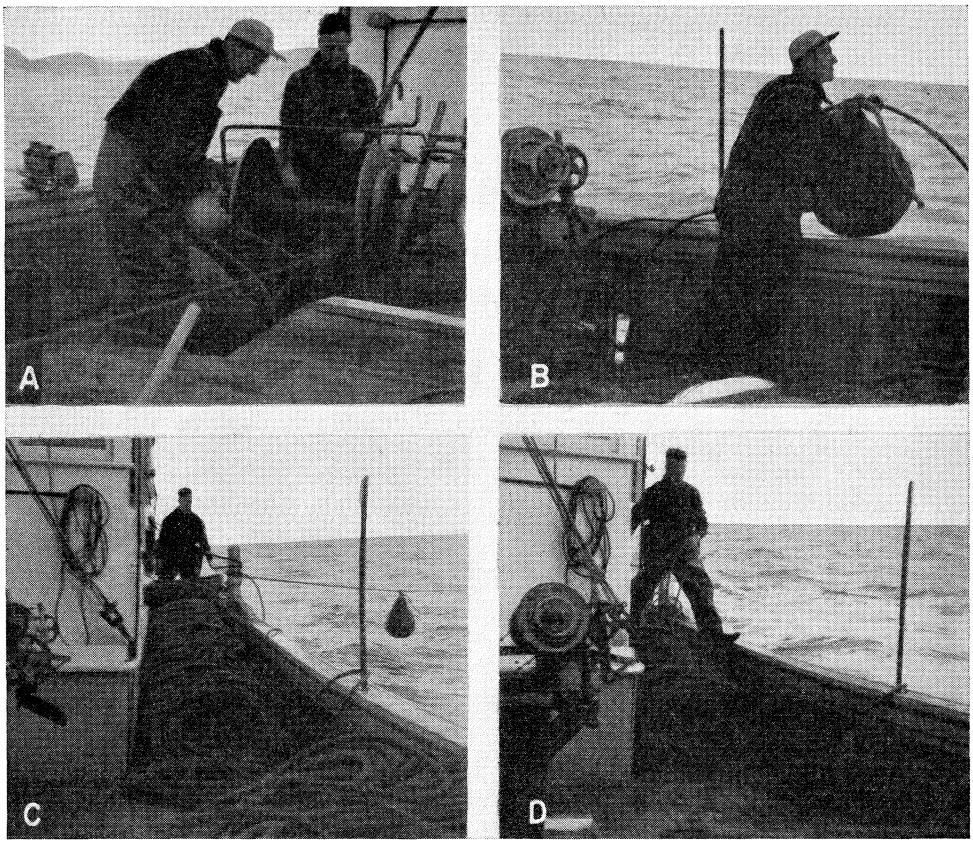

FIGURE 8A. Second canvas buoy being attached to the end of the anchor cable.
FIGURE 8B. Third buoy is attached to the warp.
FIGURE 8C. The first warp is held to stretch the anchor cable.
FIGURE 8D. The first warp being run out.

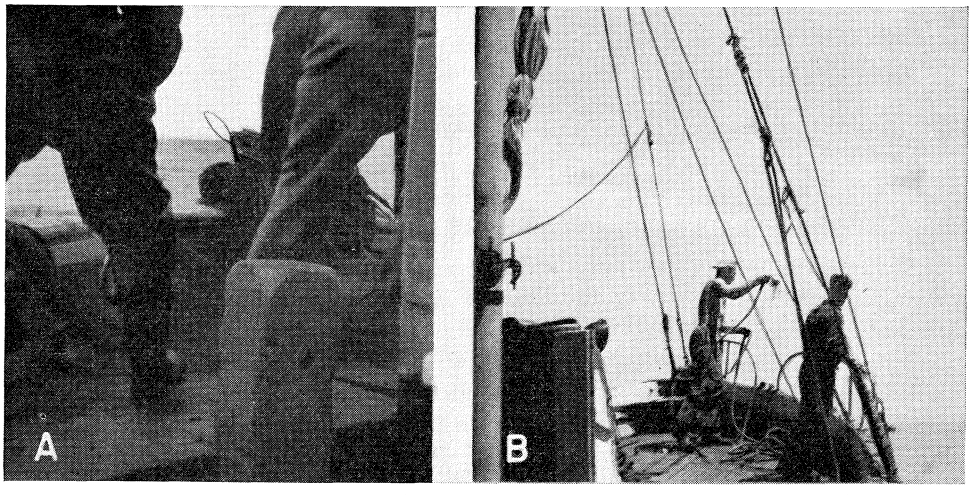

FIGURE 9A. The right wing is shot; the belly and cod end are arranged on the rail to be shot clear of the wings.
FIGURE 9B. The warp between buoys No. 2 and No. 3 is picked up with a three-pronged grapnel.

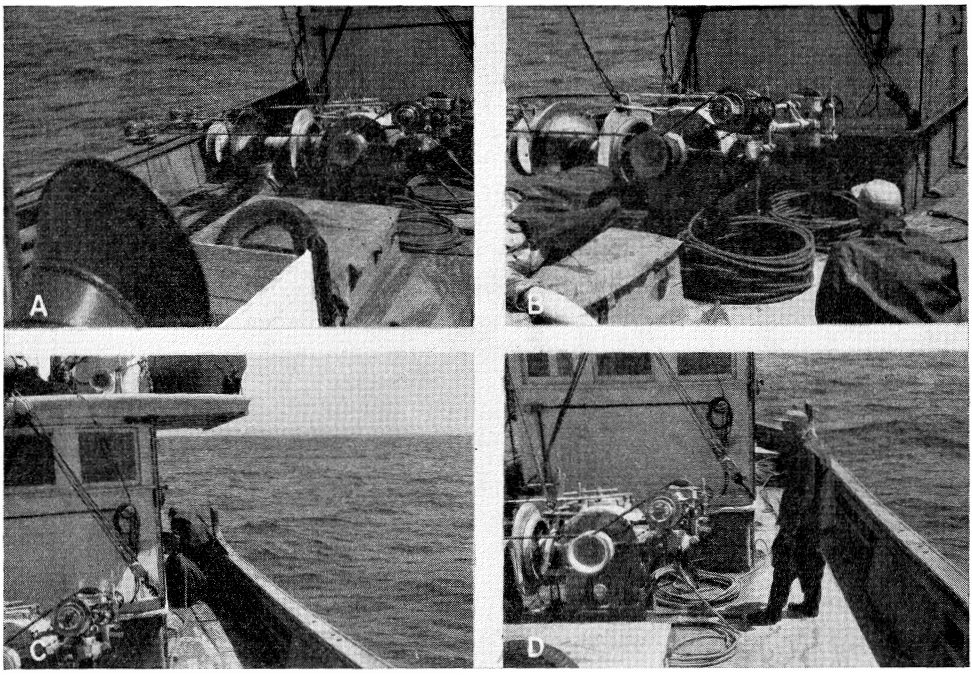

FIGURE 10A. Fairleads, winch and coiler.
FIGURE 10B. Warps being coiled by the coiler.
FIGURE 10C. Stacking the coils in preparation for the next set.
FIGURE 10D. Stacking the coils in preparation for the next set.

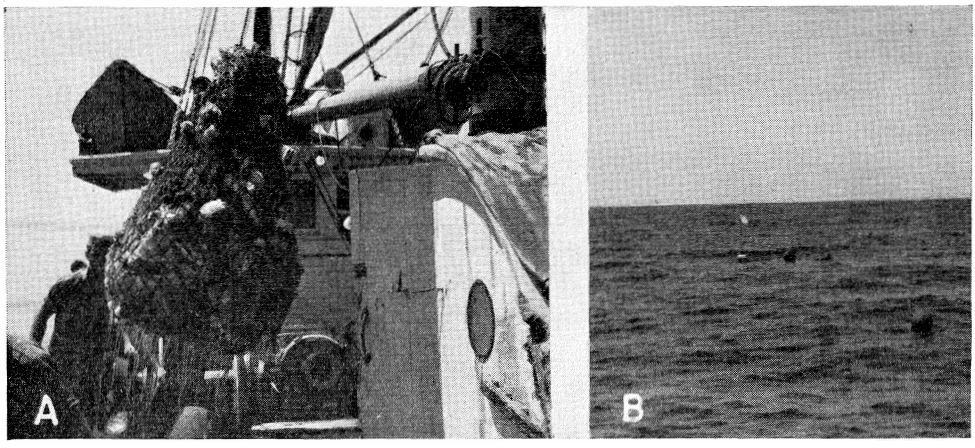

FIGURE 11A. A bag of fish hoisted by the gilson.
FIGURE 11B. The spot buoy, anchor cable buoys, and canvas buoy No. 1, as seen during hauling.

HAULING

The ropes may be hauled over either side of the boat, or in good weather over the stern, but are usually hauled from the windward side. The coils formed on the deck under the coiler are removed periodically and arranged on deck in preparation for the next set (Fig. 10).

The hauling is in three phases.

At first, for a period lasting about an hour, the rope is hauled slowly; during this time the net remains stationary on the bottom and the warps are straightened out.

At the end of this time the ropes come in more easily and the speed of hauling is increased. The net is moved over the bottom; the length of time depends on the speed and force of the tide, which, when it is strong, tends to lift the net. The usual duration is 20 to 25 minutes.

When the net rises clear of the bottom the wings come together; this can be seen on the boat as the ropes are now coming in side by side. The forward rope is now passed through the after fairlead in addition to the forward one, and the haul is completed as quickly as possible, the tension on the two ropes being kept equal. If one becomes more taut than the other, it is slackened off for a few moments.

When the net is brought up, the wings and mouth of the bag are hauled by hand over the stern. The bag is hoisted in by means of a gilson (Fig. 11A).

APPENDIX II

Tables showing the position and depth of all sets made, 1953 and 1954, together with the poundage of witch and American plaice taken, the average size of the witch, and the bottom temperature of the water.

TABLE I.—Experimental Danish seining, 1953

Date	Set	Position		Witch catch	Witch average size	American plaice catch	Bottom	Depth	Bottom temp.	Bottom temp.	Remarks
				lb.	*inches*	*lb.*		*fathoms*	°C.	°F.	
Fortune Bay											
June 5	1	47°11′N.	55°49′W.	500	18·6	10	Mud	132	1·3	34·3	Hooked up
Rose Blanche Bank											
June 6	2	47°23′N.	58°33′W.	.....	.....	.....	Hard	95	.....	.....	Hooked up
June 8	3	47°27′N.	59°00′W.	.....	.....	.....	Hard red clay	114-128	.....	.....	Hooked up
June 9	4	47°26′N.	58°15′W.	4	.....	0	Mud bank	112	5·3	41·5	Hooked up
June 12	5	47°20′N.	58°48′W.	3	15·4	0	Hard mud	162	5·2	41·4	
June 12	6	47°17′N.	58°35′W.	.....	.....	.....	Mud bank	150	.....	.....	Hooked up
June 13	7	47°28′N.	58°48′W.	.....	.....	.....	Sandy mud	75	.....	.....	Hooked up
June 19	8	47°23′N.	58°05′W.	.....	.....	.....	Rough	112	.....	.....	Hooked up
Fortune Bay											
June 26	9	47°12′N.	55°48′W.	400	18·3	150	Mud	95	0·7	33·3	
June 26	10	47°21′N.	55°31′W.	.....	.....	.....	Banks uneven, mud	120	.....	.....	Hooked up
June 27	11	47°33′N.	55°05′W.	.....	.....	.....	.....	.....	.....	.....	Not completed
June 29	12	47°33′N.	55°05′W.	15	17·1	0	Smooth mud	142	.....	.....	
June 29	13	47°34′N.	54°58′W.	.....	.....	.....	Hard, uneven	89–130	.....	.....	Hooked up

TABLE I.—(contd.)

Date	Set	Position	Witch catch	Witch average size	American plaice catch	Bottom	Depth	Bottom temp.	Bottom temp.	Remarks
			lb.	*inches*	*lb.*		*fathoms*	°C.	°F.	
Grand Bank										
July 12	14	44°30′N. 52°54′W.	5	.....	8	Sand	53	3·6	38·5	
July 12	15	44°25′N. 52°55′W.	20	.....	9	Soft mud	66	4·5	40·1	
July 12	16	44°22′N. 53°00′W.	5	.....	9	Soft mud	94	4·4	39·9	
July 13	17	44°20′N. 53°00′W.	10	.....	1	Smooth, firm	120	4·8	40·6	
July 13	18	44°25′N. 53°00′W.	25	.....	5	Smooth, firm	63	4·4	39·9	
July 13	19	44°35′N. 53°00′W.	1,350	17·0	150	Mud	51	3·0	37·4	
July 13	20	44°49′N. 53°10′W.	450	15·9	150	Mud	50	5·0	41·0	
July 14	21	44°43′N. 50°10′W.	35	.....	60	Sand	50	5·0	41·0	
July 14	22	44°35′N. 53°09′W.	5	.....	5	Sand	56	4·5	40·1	
July 14	23	44°30′N. 53°15′W.	50	13·5	50	Sand	72	3·2	37·8	
July 14	24	44°27′N. 53°15′W.	4	.....	1	Sand	102–120	4·6	40·3	
July 15	25	43°35′N. 51°54′W.	50	17·9	150	Sand and slime	54	1·4	34·5	
July 15	26	43°38′N. 51°54′W.	10	.....	5	Sand and mud	66	0·6	33·1	
July 15	27	43°49′N. 52°15′W.	100	16·5	40	Mud and sand	70	1·0	33·8	
July 15	28	43°56′N. 52°15′W.	30	.....	20	Sand	50	1·2	34·2	
July 16	29	44°04′N. 52°14′W.	.....	.....	.....	Sand	49	1·4	34·5	Hooked up
Fortune Bay										
July 24	30	47°11′N. 55°47′W.	600	19·4	25	Mud and stones	130–160	0·0	32·0	
July 24	31	47°12′N. 55°49′W.	1,300	18·6	100	Mud and stones	96	0·2	32·4	
July 24	32	47°12′N. 55°49′W.	400	18·6	25	Mud and stones	96	.....	.....	
July 25	33	47°22′N. 55°37′W.	.....	.....	.....	Hard	98–138	.....	.....	Hooked up
July 25	34	47°26′N. 55°20′W.	0	.....	0	Rough	50–92	.....	.....	
July 27	35	47°13′N. 55°37′W.	.....	.....	.....	Sand and mud	104	0·2	32·4	Trial set. Ropes only
July 27	36	47°13′N. 55°37′W.	250	18·4	20	Sand and mud	104	0·2	32·4	Net not fishing properly
July 27	37	47°13′N. 55°37′W.	90	17·6	15	Sand and mud	104	0·2	32·4	
July 27	38	47°15′N. 55°33′W.	0	.....	0	Sand and mud	106	0·1	32·2	
July 28	39	47°29′N. 55°17′W.	2	.....	0	Soft mud	146	0·1	32·2	Net not fishing properly
July 28	40	47°26′N. 55°17′W.	.....	.....	.....	Soft mud	96–128	.....	.....	Hooked up

Grand Bank											
Aug. 1	41	41°26′N.	52°30′W.	2,200	16·8	30	Sand and mud	46	2·6	36·7	
Aug. 3	42	44°10′N.	52°30′W.	20	.....	25	Sand	56	1·2	34·2	
Aug. 3	43	44°00′N.	52°30′W.	12	.....	2	Sand	68	0·7	33·3	
Aug. 3	44	44°24′N.	52°43′W.	60	15·0	15	Sand	69	1·8	35·2	
Aug. 3	45	44°30′N.	52°42′W.	25	.....	30	Sand	54	2·5	36·5	
Aug. 4	46	44°42′N.	52°32′W.	.....	.....	.....	Hard	44	2·6	36·7	Net torn
Aug. 4	47	44°42′N.	52°32′W.	.....	.....	.....	Rough	44	2·6	36·7	Hooked up
Aug. 4	48	45°12′N.	52°33′W.	1	.....	0	Sand and rock	60	−0·1	31·8	Hooked up
Aug. 4	49	45°15′N.	52°39′W.	0	.....	2	Muddy sand	51	0·0	32·0	Hooked up
Aug. 5	50	44°43′N.	53°48′W.	600	13·9	120	Soft mud	71	3·2	37·8	
Aug. 5	51	44°32′N.	53°49′W.	60	13·9	100	Fine sand	91	2·5	36·5	
Aug. 5	52	44°59′N.	53°48′W.	5	.....	5	Sand and mud	44	0·6	33·1	
Channel											
Aug. 12	53	45°45′N.	53°51′W.	0	.....	180	Sand	61	−1·1	30·0	
Placentia Bay											
Aug. 18	54	46°46′N.	54°51′W.	0	.....	150	Sand and rocks	122	.....	.....	Winch trouble
Channel											
Sept. 6	55	45°30′N.	54°10′W.	.....	.....	.....	Hard	56	.....	.....	Winch trouble
Sept. 6	56	45°10′N.	54°30′W.	.....	.....	.....	Hard mud	86	.....	.....	Hooked up
Gully											
Sept. 6	57	45°20′N.	54°56′W.	.....	.....	.....	.....	.....	.....	.....	Hooked up
Sept. 7	58	45°57′N.	55°12′W.	2	20·9	30	Hard sand	84	−1·1	30·0	
Miquelon											
Sept. 12	59	46°59′N.	56°12′W.	25	17·3	20	Fine sand	40–62	0·8	33·4	
Sept. 14	60	47°13′N.	56°22′W.	.....	.....	.....	Fine sand	82	3·3	37·9	Hooked up
Sept. 14	61	47°15′N.	56°28′W.	0	.....	1	Fine sand	128–140	5·6	42·1	

TABLE I.—(cont.)

Date	Set	Position		Witch catch	Witch average size	American plaice catch	Bottom	Depth	Bottom temp.	Bottom temp.	Remarks
				lb.	*inches*	*lb.*		*fathoms*	°C.	°F.	
Fortune Bay											
Sept. 15	62	47°12′N.	55°49′W.	9	.....	0	Fine sand.....	101	−0·1	31·8	
Sept. 15	63	47°12′N.	55°49′W.	1,600	18·3	100	Fine sand.....	104	.....	.....	Fly seining
Sept. 16	65	47°14′N.	55°44′W.	300	.....	0	.....	104–140	.....	.....	
Sept. 16	66	47°14′N.	55°44′W.	100	.....	0	.....	104	.....	.....	
Oct. 6	67	47°13′N.	55°53′W.	600	18·3	60	Mud.....	106	.....	.....	
Burgeo–Miquelon											
Oct. 10	68	47°32′N.	57°10′W.	100	16·2	10	Mud.....	120	4·7	40·5	
Oct. 10	69	76°35′N.	57°24′W.	.....	.....	.....	Hard.....	91–114	.....	.....	Hooked up
Oct. 12	70	47°30′N.	57°31′W.	50	.....	5	Mud.....	138	5·7	42·3	Too much current
Oct. 16	71	47°31′N.	56°42′W.	.....	.....	.....	Mud.....	98	4·8	40·6	Strong current
Oct. 22	72	47°22′N.	56°19′W	250	14·7	30	Mud.....	122	5·6	42·1	
Oct. 22	73	47°21′N.	56°26′W.	40	.....	0	Mud.....	162	5·3	41·5	Strong current
Oct. 23	74	47°34′N.	56°36′W.	.....	.....	.....	.....	102	.....	.....	Hooked up
Oct. 23	75	47°27′N.	56°39′W.	100	17·0	0	Mud.....	142	5·3	41·5	Net torn
Oct. 24	76	47°34′N.	56°24′W.	15	.....	2	Mud.....	140	.....	.....	Net torn
Oct. 24	77	47°34′N.	56°07′W.	.....	.....	.....	Mud, san dand rocks	144	.....	.....	Hooked up
Oct. 26	78	47°12′N.	56°23′N.	0	.....	1	.....	116	.....	.....	Current too strong

TABLE II.—Experimental Danish seining, 1954

Date	Set	Position		Witch catch	Witch average size	American plaice catch	Bottom	Depth	Bottom temp.	Bottom temp.	Remarks
				lb.	*inches*	*lb.*		*fathoms*	°C.	°F.	
Fortune Bay											
July 1	1	47°13′03″N.	55°56′01″W.	5	.....	0	Mud	104–118	0·3	32·5	Dry net twisted
Burgeo–Miquelon											
July 2	2	47°18′N.	56°20′W.	5	.....	0	Hard rocky	100–106	4·3	39·7	Hooked up
July 2	3	47°19′N.	56°32′W.	50	15·8	0	Sand	172–180	5·1	41·2	
July 2	4	47°23′N.	56°29′W.	120	15·4	15	Smooth sand	176	5·0	41·0	
July 3	5	47°25′N.	56°37′W.	.....	.....	.....	.....	.....	.....	.....	Net floated by tide
July 3	6	47°14′N.	56°34′W.	.....	.....	.....	Rough and rocky	.....	.....	.....	Hooked up
Placentia Bay											
July 6	7	46°54′N.	54°45′01″W.	.....	.....	.....	.....	134–136	.....	.....	Hooked up
July 6	8	46°50′00″N.	54°47′01″W.	2	.....	200	Soft mud	130	.....	.....	Net filled with mud
July 7	9	46°49″02″N.	54°42′02″W.	0	.....	70	Flat. Soft mud	127–128	−1·0	30·2	
July 7	10	46°46′00″N.	54°53′02″W.	2	.....	200	Soft mud	130–129	−1·2	29·8	
July 8	11	46°51′N.	54°35′W.	2	.....	500	Mud banks	116–115	−1·2	29·8	
St. Mary's Bay											
July 12	12	46°45′00″N.	53°54′00″W.	.....	.....	.....	Soft mud	57–62	0·0	32·0	Hooked up in mud banks
Off Cape Bonavista											
July 22	13	48°41′N.	52°38′W.	.....	.....	.....	Mud banks	148	.....	.....	Ropes only. Hooked up

TABLE II.—(cont.)

Date	Set	Position		Witch catch	Witch average size	American plaice catch	Bottom	Depth	Bottom temp.	Bottom temp.	Remarks
				lb.	*inches*	*lb.*		*fathoms*	°C.	°F.	
Bonavista Bay											
July 24	14	48°49′N.	53°11′W.	4	.....	80	Level mud	169–170	0.8	33·4	
July 24	15	48°55′N.	53°09′W.	.....	.....	.....	Mud banks	156–154	0·3	32·5	Hooked up
Off Cape Bonavista											
July 27	16	48°56′00″N.	52°22′00″W.	.....	.....	.....	Rough	170–166	2·3	36·1	Hooked up
July 27	17	48°36′N.	52°04′W.	.....	.....	.....	Uneven but soft	168	1·5	34·7	Lost buoy in fog
Offshore E. Coast											
July 28	18	49°23′N.	52°19′W.	.....	.....	.....	Boulders	178–176	2·3	36·1	Hooked up
July 29	19	50°14′N.	53°56′W.	.....	.....	.....	Hard patches	176	.....	.....	Dragged hard
July 29	20	50°22′N.	53°50′W.	12	.....	15	Soft and even	180	2·1	35·8	
July 29	21	50°22′N.	53°38′W.	0	.....	0	Soft and level	196–197	.....	.....	
Aug. 4	22	51°42′N.	53°53′W.	0	.....	20	Muddy slope	170–182	2·2	36·0	
Aug. 5	23	51°57′N.	53°49′W.	0	.....	0	Muddy slope	165–174	2·2	36·0	
Aug. 5	24	51°53′N.	54°14′W.	.....	.....	.....	Rough	119–120	.....	.....	Hooked up
Aug. 9	25	51°28′N.	53°38′W.	0	.....	0	Steep muddy slopes	210–198	2·3	36·1	
Aug. 10	26	51°09′N.	53°22′W.	4	.....	20	Mud. Even	174–178	.....	.....	
White Bay											
Aug. 18	27	50°19′00″N.	56°17′02″W.	2	.....	0	Steep muddy slope	132–165	−1·0	30·2	
Aug. 18	28	50°14′N.	56°24′W.	10	.....	15	Soft and flat	196–195	−0·3	31·5	
Aug. 19	29	49°58′N.	56°37′W.	.....	.....	.....	Mud	250	−0·5	31·1	Net afloat. Depth too great
Aug. 19	30	49°58′03″N.	56°27′02″W.	6	.....	0	Mud	168–176	−1·0	30·2	
Aug. 19	31	49°58′N.	56°35′W.	.....	.....	.....	Soft mud	over 200	.....	.....	Net floated. Too deep. Fly set

Green Bay											
Sept. 3	32	49°48′N.	55°31′W.	.....	.....	.....	Hard and uneven....	140–142	−0·3	31·5	Dragged hard
Sept. 3	33	49°54′N.	55°17′W.	35	20·7	10	Level mud.....	151–154	−0·5	31·1	
S. of Horse Islands											
Sept. 6	34	50°05′N.	55°42′W.	.....	.....	.....	Soft. Hard patches.	122–126	−1·3	29·7	Hooked up
Sept. 6	35	50°06′N.	55°47′W.	.....	.....	.....	Level.....	120–122	.....	.....	Net twisted by tide
Sept. 8	36	50°06′N.	55°49′W.	.....	.....	.....	Slightly rough.....	118–120	.....	.....	Rope parted
Bonavista Bay											
Sept. 11	37	48°47′N.	53°15′W.	.....	.....	.....	Uneven slope.....	101–128	.....	.....	Hooked up
Trinity Bay											
Sept. 15	38	48°17′N.	52°58′W.	0	.....	0	Gravel.....	152–150	.....	.....	
Sept. 16	39	48°09′N.	53°10′W.	25	12·8	10	Soft.....	166	.....	.....	
Sept. 16	40	47°47′N.	53°37′W.	.....	.....	.....	Steep slope.....	136–172	.....	.....	Hooked up
Conception Bay											
Sept. 17	41	47°41′N.	55°05′W.	0	.....	50	Mud.....	.....	−1·2	29·8	
St. Mary's Bay											
Sept. 22	42	46°38′N.	53°52′W.	.....	.....	.....	Smooth.....	35–40	.....	.....	Hooked up
Sept. 23	43	46°48′N.	53°44′W.	10	18·9	10	.....	46–48	−0·3	31·5	Hooked up
Sept. 24	44	46°56′05″N.	53°46′W.	.....	.....	.....	Steep slope.....	79–110	.....	.....	Hooked up
North Bay											
Oct. 11	45	47°00′N.	61°35′W.	0	.....	100	Level.....	20	8·4	47·1	(300 lb. yellowtail)
Oct. 13	46	46°51′N.	61°13′W.	0	.....	50	Level.....	34–34	1·9	35·4	Hooked up. Net
Oct. 13	47	46°55′N.	61°09′W.	3,000	19·2	1,000	Smooth sand.....	37–33	1·8	35·2	torn
Oct. 15	48	46°40′N.	61°25′W.	1·000	.....	7,000	Smooth sand.....	34	1·7	35·1	

TABLE II.—(cont.)

Date	Set	Position		Witch catch	Witch average size	American plaice catch	Bottom	Depth	Bottom temp.	Bottom temp.	Remarks
				lb.	*inches*	*lb.*		*fathoms*	°C.	°F.	
North Bay											
Oct. 15	49	46°36′N.	61°30′W.	2,000	.....	7,000	Smooth sand.....	32	1·8	35·2	
Oct. 18	50	46°20′N.	61°35′03″W.	1,000	21·1	6,000	Smooth sand.....	34	1·9	35·4	
Oct. 18	51	46°27′N.	61°42′W.	2,500	20·4	1,500	Smooth sand.....	32	1·8	35·2	
Oct. 19	52	47°06′N.	61°10′W.	.....	.....	.....	Slightly rough.....	35–36	1·8	35·2	Had to release anchor
Oct. 19	53	47°07′N.	60°59′W.	700	18·7	200	Smooth.....	54–55	2·5	36·5	
Sydney Bight											
Oct. 27	54	46°36′N.	59°35′N.	.....	.....	.....	Steep slope.....	76–96	.....	.....	Hooked up. No catch
Oct. 27	55	46°38′N.	59°31′W.	5	.....	0	Sand and gravel.....	144–154	.....	.....	Net closed early due to tide
St. George's Bay											
Nov. 8	56	48°26′N.	58°55′W.	3	.....	25	Mud.....	45–46	1·6	34·9	
Nov. 9	57	48°28′N.	58°46′W.	.....	.....	.....	Mud.....	13	.....	.....	Hooked up. No catch
Nov. 9	58	48°28′N.	58°36′W.	0	.....	200	Mud.....	32–34	2·2	36·0	
Nov. 10	59	48°21′N.	58°52′W.	300	18·8	106	Mud.....	58–60	1·5	34·7	